Annual Report on the Maine-New Hampshire Inshore Trawl Survey

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Lastly, we appreciate the support and cooperation of those fixed gear fishermen throughout the survey area that moved gear and suggested alternate sites when necessary. The Lobster Zone Councils, Maine Lobster Advisory Council, Maine Lobstermen's Association, and Downeast Lobstermen's Association also provided many comments and suggestions to help minimize gear conflicts and improve cooperation.

EXECUTIVE SUMMARY

This report summarizes results from the 2008 sampling season of a comprehensive bottom trawl survey of groundfish and invertebrate species along the coast of Maine and New Hampshire. Prior to 2000, fishery-independent data were not available for nearly 80% of the inshore Gulf of Maine's inshore waters. The Maine-New Hampshire Inshore Trawl Survey was established to fill the information gap and collect valuable information on the fish and biological communities in this area and create a time series for long-term monitoring of inshore stocks. The survey uses a stratified random sampling design, with an additional single fixed station per stratum. Using the Flagg designed ME-NH survey trawl net and a commercial fishing vessel, the survey has proven to be a successful example of fishermen and scientists working together to benefit fisheries management. Two annual surveys are conducted, fall and spring, to create a rich database on fish and invertebrate species that is accessible to fishery managers, academic researchers, fishing industry members, graduate students, non-governmental organizations, and the general public. With eight complete years and a ninth underway, seasonal time series of abundance have been established for over 25 species of fish and invertebrates. Information from the survey is used in the assessment and management of several fisheries, and additional requests for and uses of these data have provided new insight into communities and populations in the Gulf of Maine.

INTRODUCTION

Initiated in the fall of 2000, the Maine-New Hampshire Inshore Trawl Survey is a collaborative partnership between commercial fishermen and state researchers to assess inshore fish stocks along the Maine and New Hampshire coasts. The survey has completed eight years of biannual survey work, and the ninth year is now underway. From its inception, the project has been supported by federal funds appropriated to the National Marine Fisheries Service to foster cooperative research using commercial vessels. Collaborative research enables fishermen to contribute their knowledge and experience toward the progress of scientific data collection and ultimately to resource management decisions. It is a valuable method to strengthen the trust between fishermen and scientists and increase the confidence fishermen have in the data.

Fishery-independent trawl surveys help to provide an index of the distribution and abundance of a variety of fish and invertebrate species that is not influenced or biased by fishing effort or outside factors. As they continue on an annual basis, these surveys should reflect changes in abundances of populations more accurately than commercial fisheries catch statistics. Abundance indices derived from research trawl surveys that maintain consistent and standardized efforts can be utilized to enhance catch statistic based assessments and with additional research efforts could eventually provide population abundance estimates.

Surveying the inshore waters of the Maine and New Hampshire coasts has been difficult due to a complex bottom consisting of ledges, canyons, seamounts and boulders, amplified by an abundance of lobster gear. The survey has seen an average success rate of 95% in the spring and 72% in the fall. Dealing with the large quantity of fixed gear, especially in the fall, still limits the number of tows that can be made, but continual and extensive public outreach has maintained a satisfactory level of tow completion. Despite the difficulties, the coverage this survey provides promises to be very valuable to better understanding marine ecosystems in the Gulf of Maine. We are confident that the northern Gulf of Maine can be successfully and consistently sampled via trawl survey indefinitely, with sustained funding.

Project Objectives:

The overall goal of this project is to establish a solid foundation for a long-term fishery-independent monitoring program in Maine and New Hampshire's inshore waters (5-80^{+} fathoms).

Specific objectives are:

- To document the distribution and relative abundance of marine resources in the nearshore Gulf of Maine.
- To improve survey logistics to gain cooperation of the fixed gear fishermen.
- To develop recruitment indices for assessments of target species.
- To involve fishermen in scientific data collection.
- To collect environmental data, including temperature and salinity that can affect fish distribution.
- To gather information on biological parameters (growth rates and reproduction).

MATERIALS AND METHODS

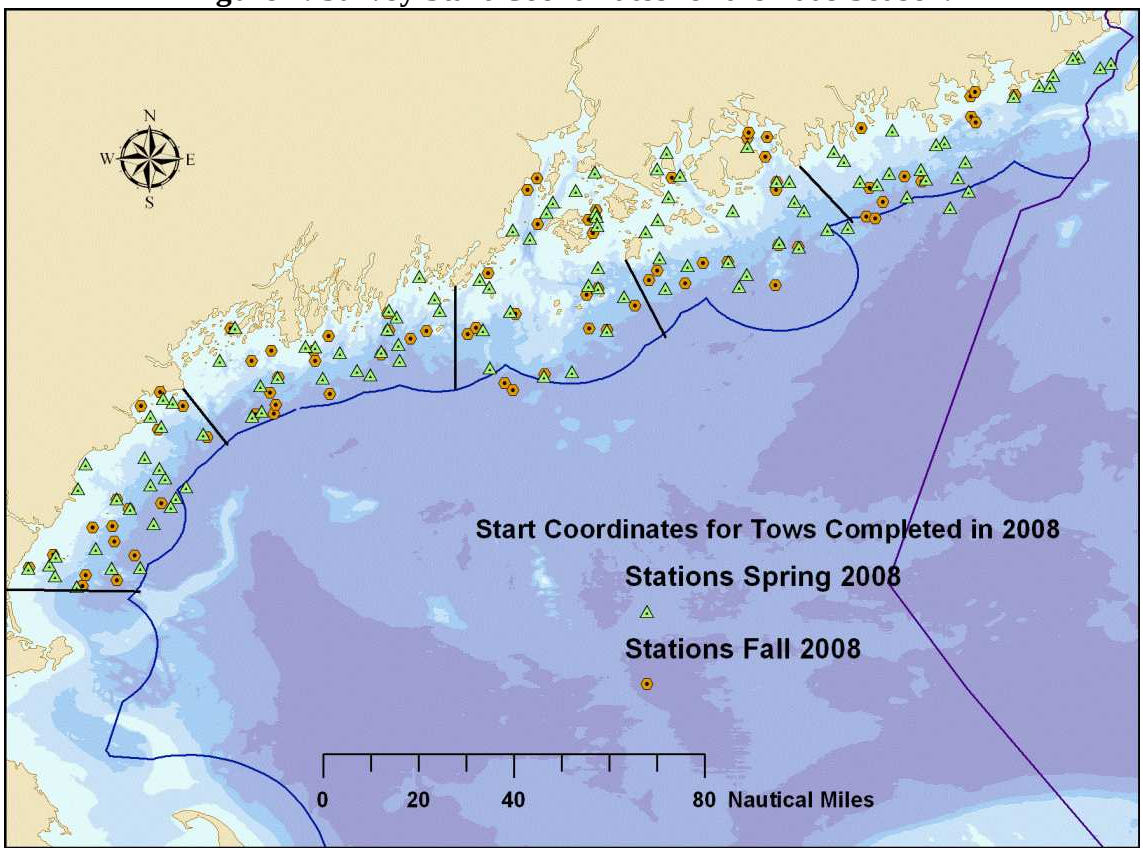
Methods are described under separate cover in "Maine-New Hampshire Inshore Groundfish Trawl Survey Procedures and Protocols (2005)," available on-line at http://www.maine.gov/dmr/rm/trawl/trawl.htm. The manual includes detailed descriptions of survey design, station selection, survey vessels, net design, public notification, sample collection and catch handling, and other information on survey methods and operations.

RESULTS

SPRING 2008 SUMMARY

The spring survey began May 5, 2008 in Portsmouth, New Hampshire and finished on June 6 off Cutler, ME. Of the 115 targeted tows, 112 total tows were completed for a success rate of 97%, the most tows completed in a single survey so far. Start coordinates for the spring survey are shown in Figure 1. The 12-mile limit approximates the survey's seaward extent, the black lines divide the regions and the depth strata are illustrated by the color gradient. On average, 4.5 tows were completed per day. The weather conditions were quite good for the spring survey and no days were lost to weather. The spring study was the first full survey with the new captain and crew. All tows were conducted using our protocols and MEDMR personnel were confident that the execution of the survey remains consistent. We employed 3D plotting software for the first time this survey, which assists the captain in locating towable areas and can help in avoiding hangs.

Figure 1. Survey Start Coordinates for the 2008 Season.



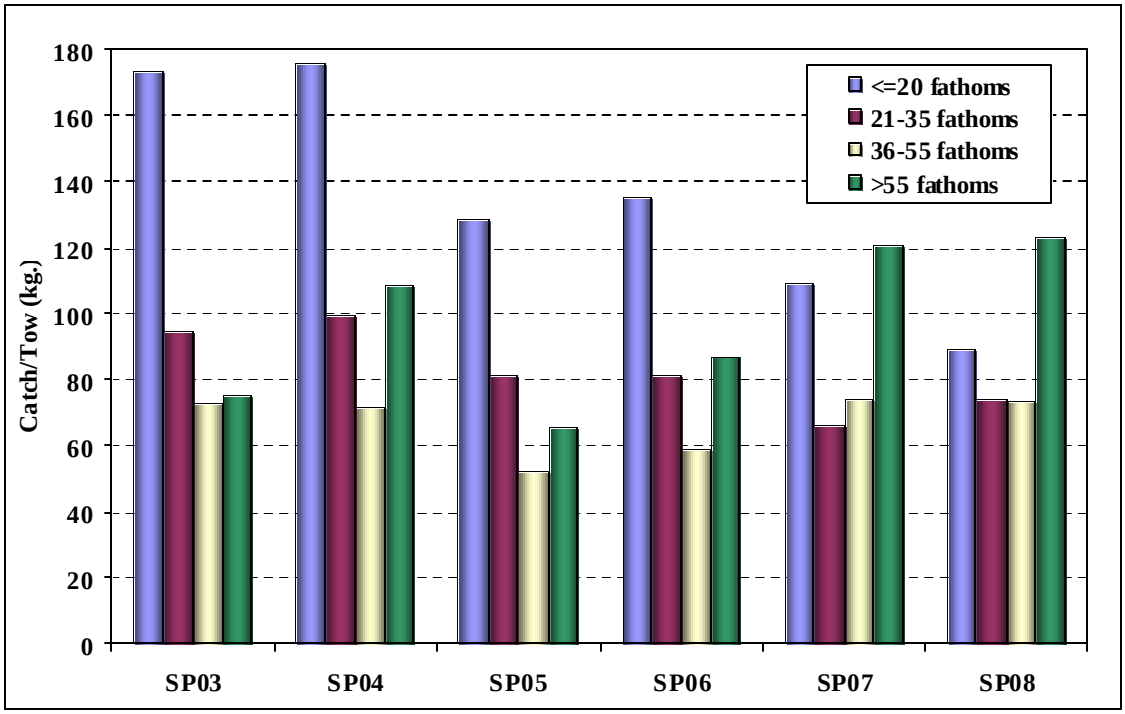
Average bottom temperatures by stratum ranged from 4.0 to 7.6 °C (Table 1), with an overall average of 5.6 °C. The highest spring survey average temperature was 6.2 °C in 2006 and the lowest average was 4.0 °C in 2004.

Table 1. Average Bottom Temperature (°C) for the Spring 2008 Survey

REGION					
STRATUM	**1**	**2**	**3**	**4**	**5**
1	5.6	6.6	6.0	7.6	6.4
2	4.6	4.9	5.9	6.9	6.1
3	4.0	4.9	5.4	5.3	5.9
4	4.3	4.7	5.0	5.4	6.2

The volume of total mixed catch varied from 10 kg to 693 kg per tow, with an average of 88 kg and a median of 70 kg per tow. The average catch per tow for this survey was similar to that of the past few years, but overall one of the lower springs catches, the lowest (80 kg) occurring in 2005 (Sherman et al, 2007). Note the decrease in the average weight per tow in the shallow stratum (3-20 fathom) and an increase in the last 2 years of catch in the deepest stratum, greater than 55 fathom (Figure 2).

Figure 2. Average catch size by depth stratum for spring surveys since 2003.



The total number of species caught was 98, with a low of 13 and high of 36 in any particular tow, and an average of 23 species. A complete listing of tow locations, coordinates, dates, times, and

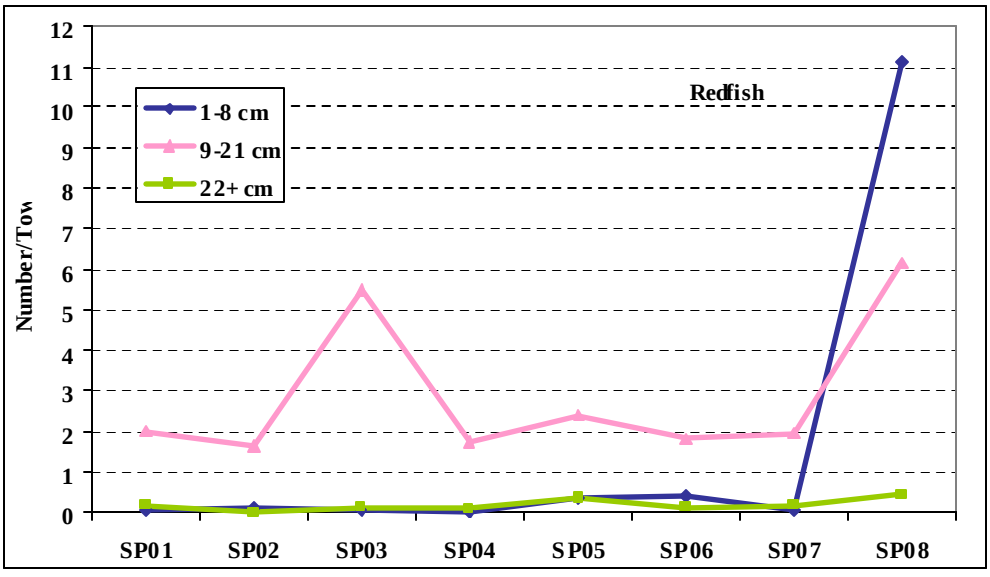
depths can be found in Appendix A. Biological samples are collected on selected finfish species, based on seasonal abundance and available time between tows. Table 2 shows the numbers of biological samples taken for the spring 2008 survey.

Table 2. Spring 2008 species sampled for individual weights, sex, maturity, food habits, and hard parts for aging.

Number of Biological Samples Spring 2008				
Species	**Lengths**	**Sex and Maturity Stage**	**Otoliths**	**Food Habits**
American plaice	4401	568	363	NA
Atlantic cod	396	171	140	37
Haddock	52	37	35	4
Winter Flounder	2707	595	452	NA
Witch Flounder	464	46	31	NA
Yellowtail Flounder	301	95	NA	NA

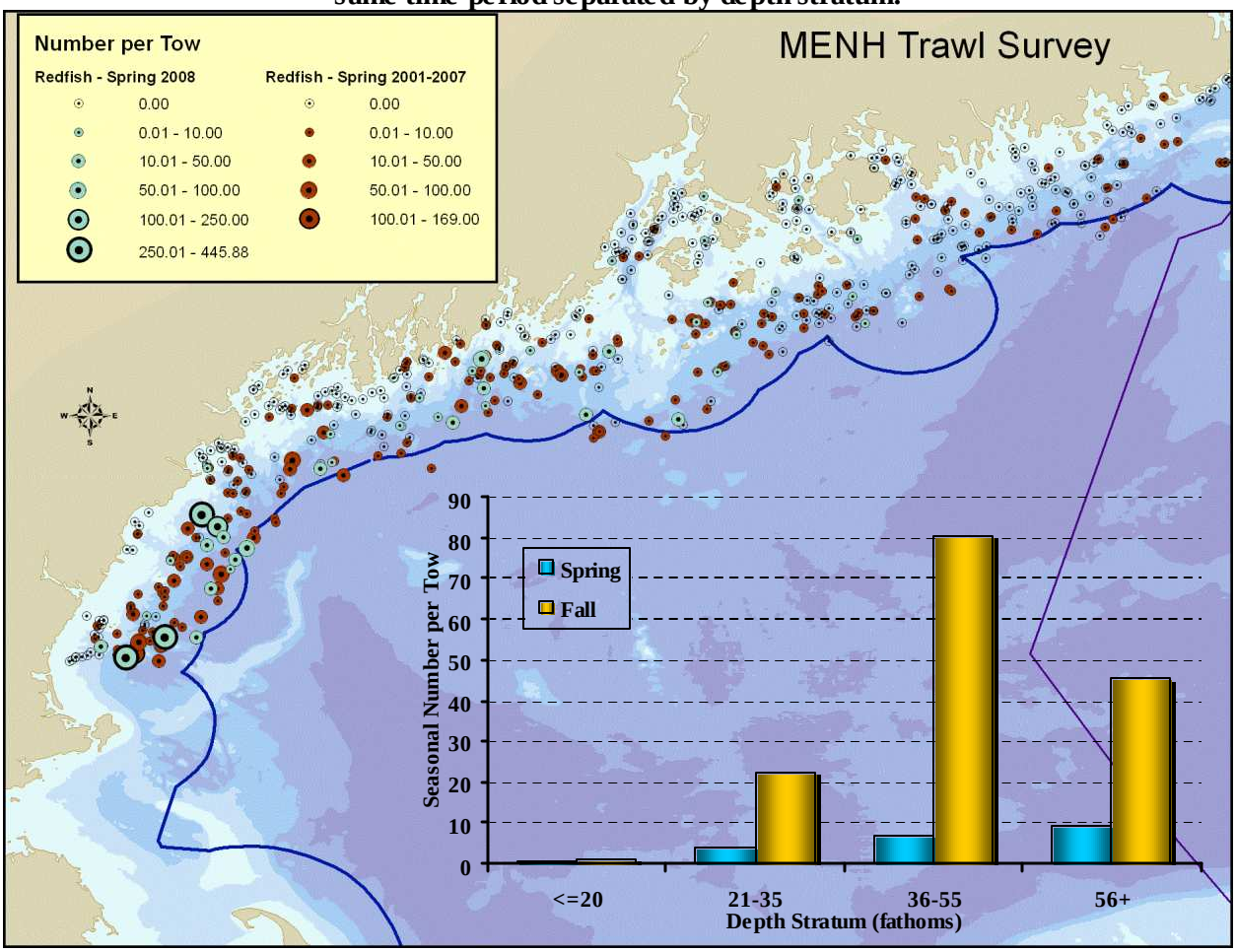
One highlight of the spring 2008 survey was the catches of juvenile Acadian redfish, *Sebastes fasciatus*, which were higher than any previous year across the whole survey area. Median length at maturity for redfish is reported as 22 cm for females and 21 cm for males (O'Brien et al, 1993). Figure 3 illustrates the sharp rise in abundance of redfish less than 22 cm seen in the spring 2008 survey.

Figure 3. Stratified catch at length for Acadian redfish in spring surveys.



Redfish are more commonly seen in the western portion of the survey area from New Hampshire to the Portland area (Fig. 4). The larger catches of spring 2008 are emphasized by the light green circles on the chart. The overlain plot represents the incidence of redfish from 2000 through 2008 as a seasonal average catch in numbers. Overall, more redfish are seen in the fall surveys, but in each survey they are more abundant in the deeper strata (Fig. 4, overlay)

Figure 4. Numbers of redfish caught in a individual tows for spring surveys from 2001 through 2007 in green and 2008 in red. The overlay is average number per tow combined by season for the same time period separated by depth stratum.



Atlantic wolffish, *Anarhicas lupus,* are rarely seen in our survey catches and for the first four years none were seen in either spring or fall. First caught in fall 2004, they are more frequently seen in the spring (Table 2). Spring 2008 saw the most in one survey with 4 wolffish being caught in the waters off southern Maine and New Hampshire (Fig. 5, Table 3) Wolffish prefer habitats that are complex with lots of structure and may venture out into sand and mud substrates to forage (Collette and Klein-MacPhee 2002). They most likely are only susceptible to the trawl during these times, therefore trawl catches and indices are not good predictors of wolffish abundance.

Figure 5. Catch locations for Atlantic wolffish sampled in the MENH trawl survey 2000-2008

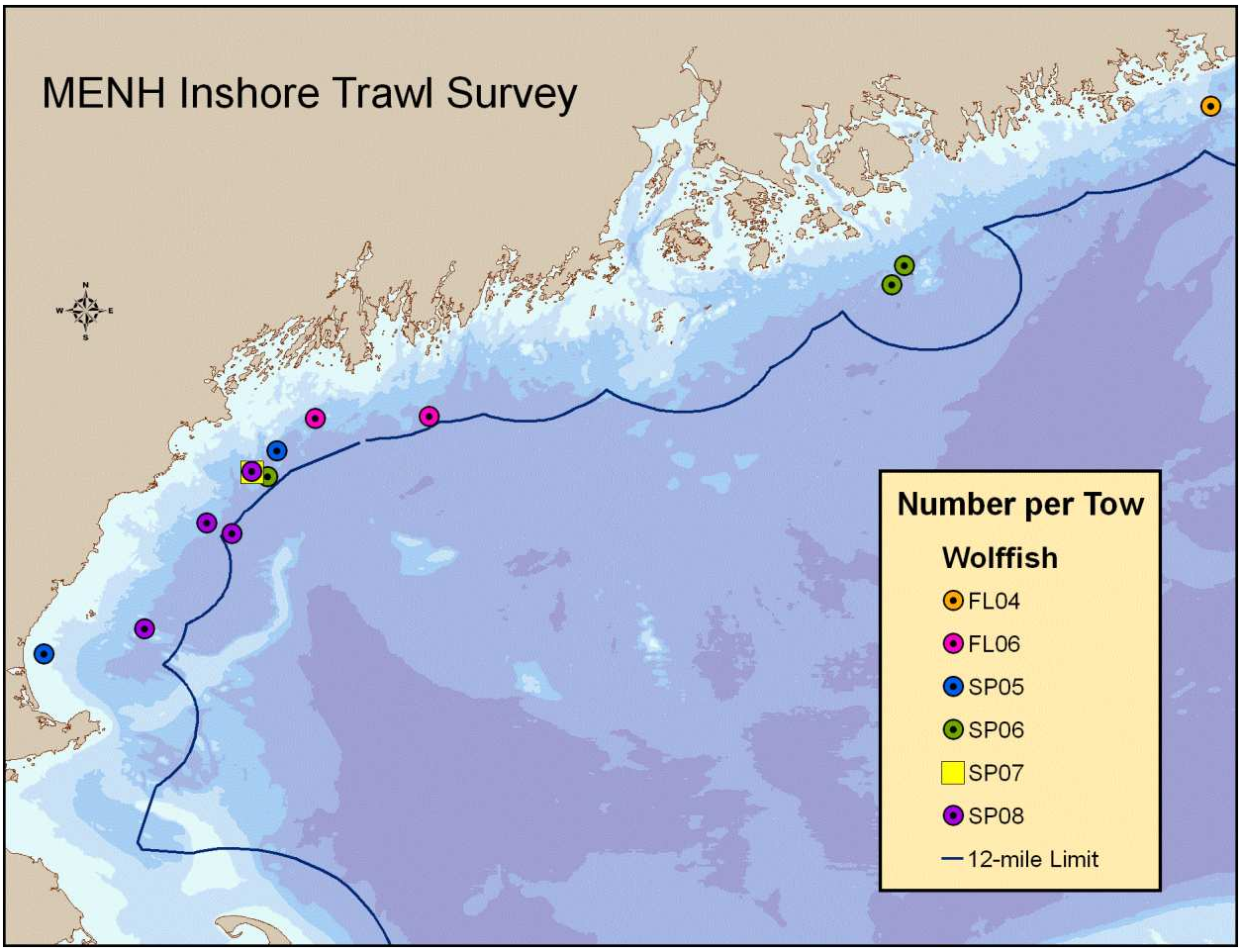
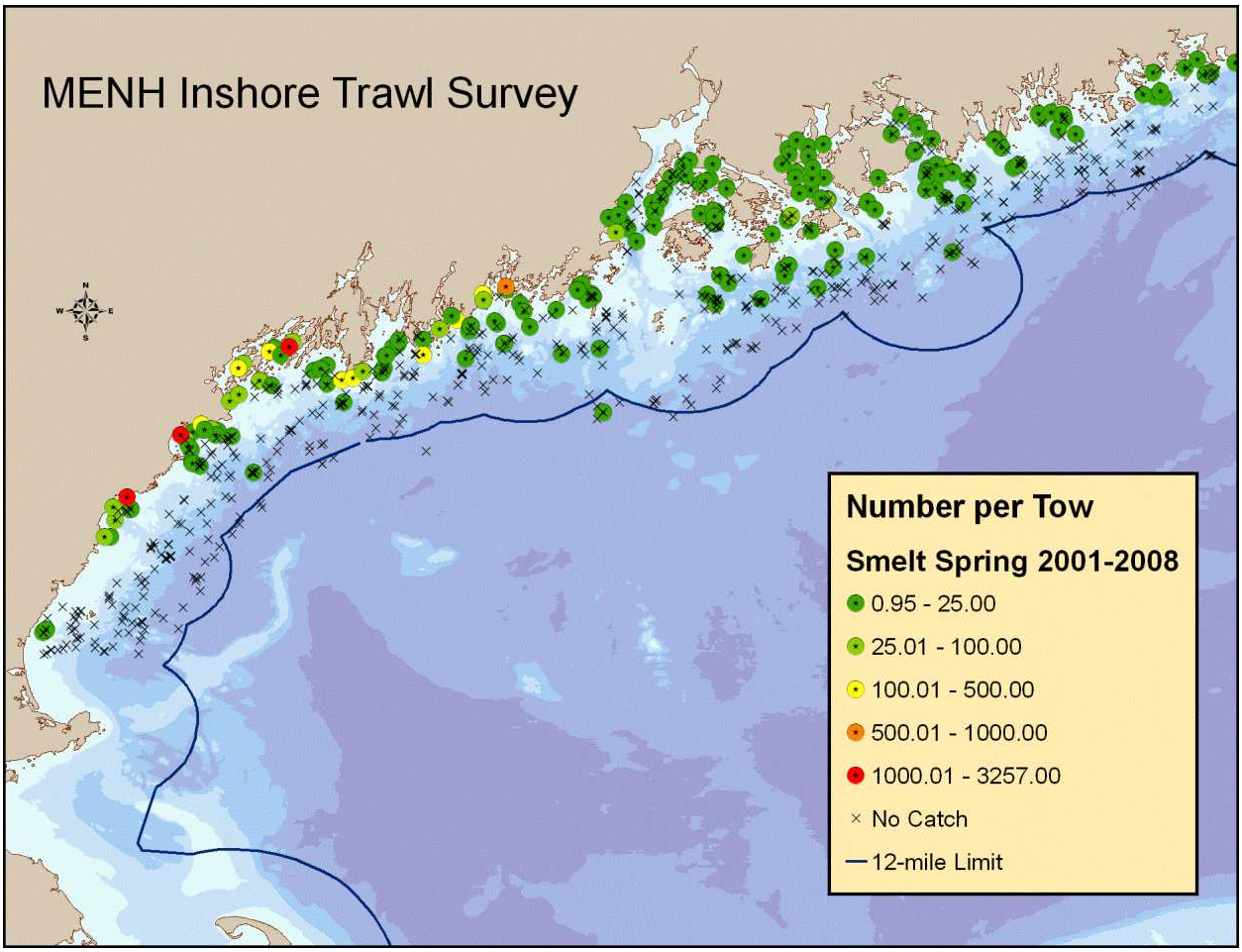


Table 3. Number caught and total lengths of wolffish sampled in the surveys from 2000-2008.

Atlantic Wolffish – MENH Survey				
	Year	**Number Caught**	**Length (cm)**	**Location**
Fall	2004	1	96	Off Machias Bay
	2006	2	78,83	Mid-coast
Spring	2005	2	78,95	So. Maine, Casco Bay
	2006	3	7,8,98	Casco Bay, Off Mt. Desert Is.
	2007	2	71,73	Off Portland
	2008	4	77,83,92,97	So. Maine

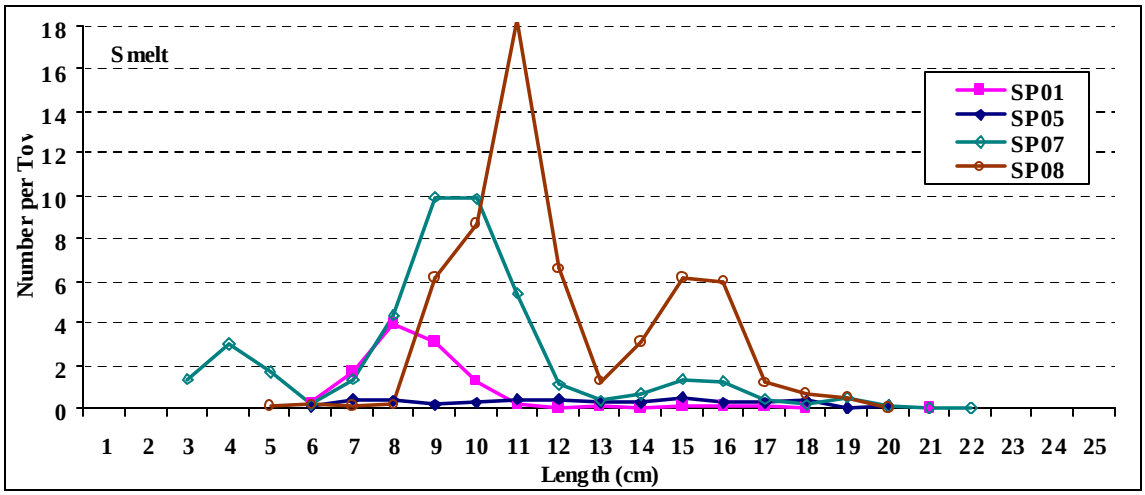
Numbers of rainbow smelt, *Osmerus mordax*, caught in the spring survey have increased in the last 2 years (App. B, Fig. 7). Smelt usually remain close to shore in shallow water and move into the streams in April and May to spawn (Collette and Klein-MacPhee, 2002). They are more likely to be caught in the southwestern portion of the survey area closest to shore (Fig. 6).

Figure 6. Numbers of smelt caught in individual tows for spring surveys from 2001 – 2008



From 2001 through 2006 stratified mean number of smelt ranged from <1 per tow to 12 per tow with an average of 6.7. Spring 2007 and spring 2008 means were 33 and 45 respectively (App. B). Smelt lengths showed three peaks in 2007 (3-5 cm, 7-11 cm, and a smaller peak between 14 and 16 cm). Average length at first year has been reported at 8.6 cm and at age 2 at 14.5 cm in Great Bay, NH (Warfel et al, 1943). In 2008, there is a large peak 9-12 cm and a smaller peak between 14 and 18 cm (Fig. 7).

Figure 7. Catch at length as stratified mean number per tow for rainbow smelt in selected springs.



FALL 2008 SUMMARY

The start of the fall survey was delayed by a day due to hurricane Kyle passing through the Gulf of Maine on September 28, 2008. The survey began September 30 in Portsmouth, New Hampshire and finished on November 2 off of Cutler, Maine. Weather conditions were not as favorable for the fall survey and 4 days were postponed. We completed 79 tows out of the scheduled 115. This translates to a 69% completion rate, with an average of 3 tows per day. Tow completion rates remain lower due to the shorter daylight period and the increasing amount of fixed gear present. Start coordinates for the fall survey are shown in Figure 1. We completed the entire survey utilizing only one net (with only minor repairs needed on a few occasions). Average bottom temperatures by stratum ranged from 6.6 to 12.4 ^{o} C, with an average of 9.6 ^{o} C for the whole survey (Table 4).

Table 4. Average bottom temperature (^{o}C) for the fall 2008 survey.

REGION					
STRATUM	**1**	**2**	**3**	**4**	**5**
1	12.4	11.0	11.8	10.9	9.7
2	9.0	9.4	11.2	10.6	10.0
3	8.0	8.6	9.6	10.4	9.8
4	6.6	7.4	7.4	9.4	9.4

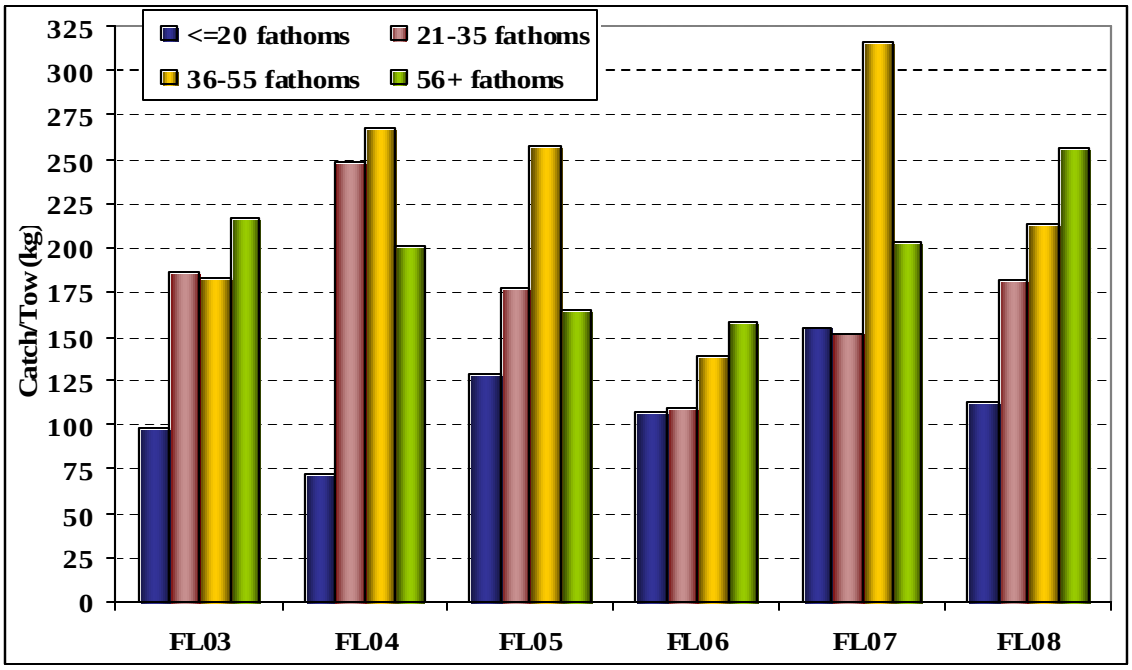
The volume of total mixed catch varied from 31 kg to 1545 kg per tow, with an average of 194 kg and a median of 116 kg per tow. The total number of species caught was 99, with a low of 15 and high of 36 in any particular tow, and an average of 25 species. Selected species for biological sampling are somewhat modified for the fall surveys. Table 5 shows the samples collected for fall 2008.

Table 5. Fall 2008 species sampled for individual weights, sex, maturity, food habits, and hard parts for aging.

Number of Biological Samples Fall 2008				
Species	**Lengths**	**Sex and Maturity Stage**	**Otoliths**	**Food Habits**
Atlantic cod	59	34	28	8
Haddock	148	6	5	0
Monkfish	359	109	NA	93
White Hake	6126	202	151	29
Witch Flounder	1014	172	114	0

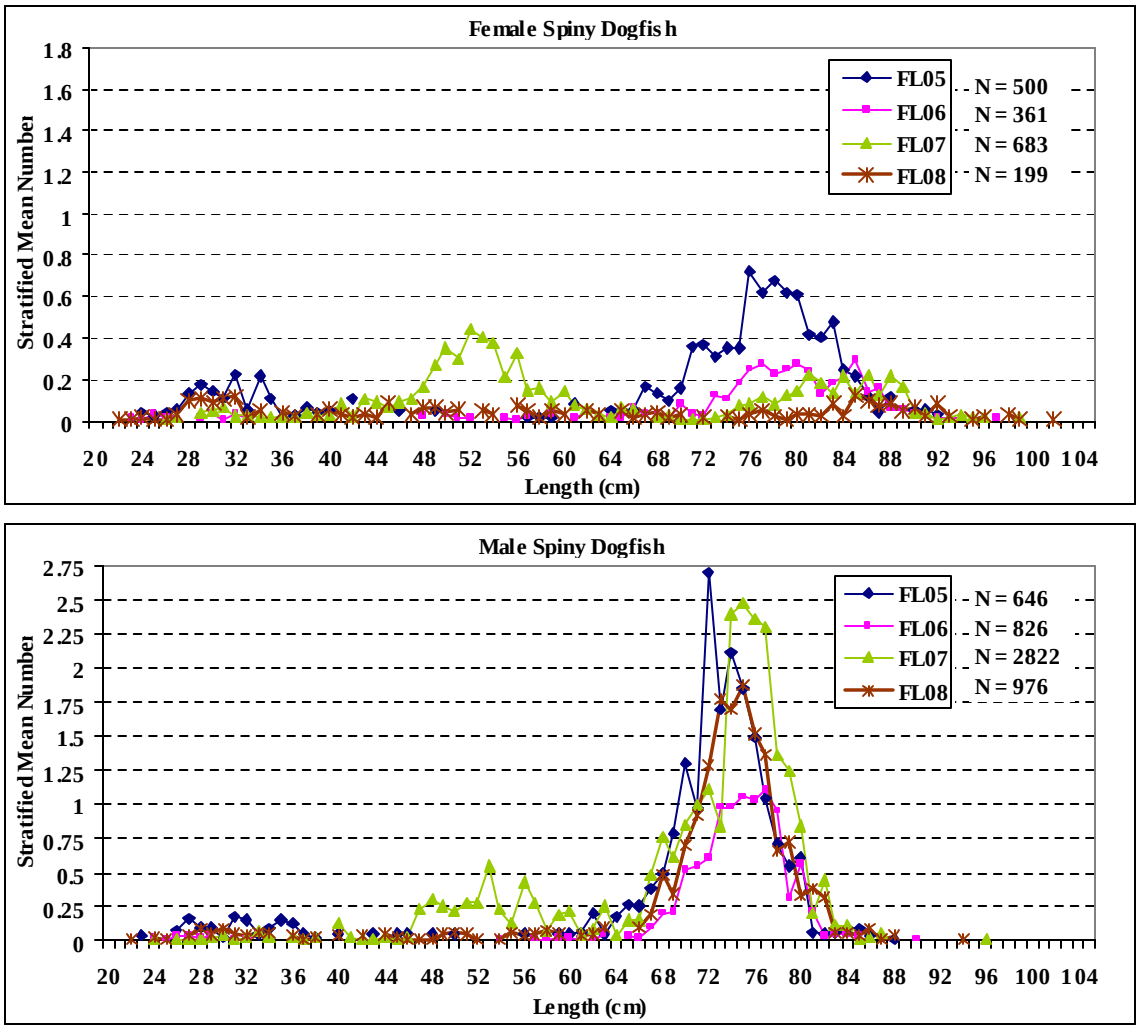
In general, this survey's catches were comparable with previous surveys. In stratum 3 (36-55 fathoms), the average catch per tow was noticeably less than the previous year (Fig. 8), but higher than fall 2006.

Figure 8. Average catch per tow by depth stratum for fall surveys since 2003.



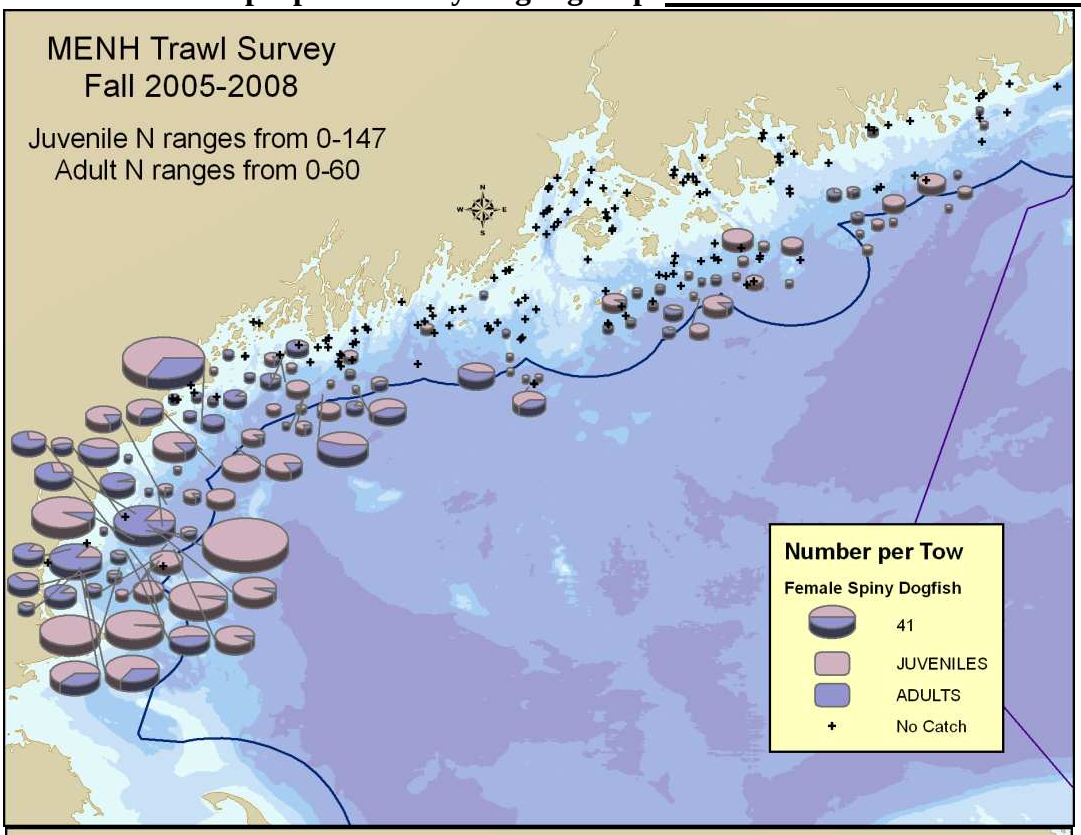
Spiny dogfish, *Squalus acanthias*, catches declined from earlier years; they account for average of 20% of the total catch by weight in all fall surveys. The proportion of female dogfish in the fall catches has declined since 2005, from nearly 45% in that year to only 17% in fall 2008 (Fig. 9). Median size at maturity is reported as 60 cm for male dogfish and between 75 and 85 cm for female dogfish (MacMillan and Morse, 1999).

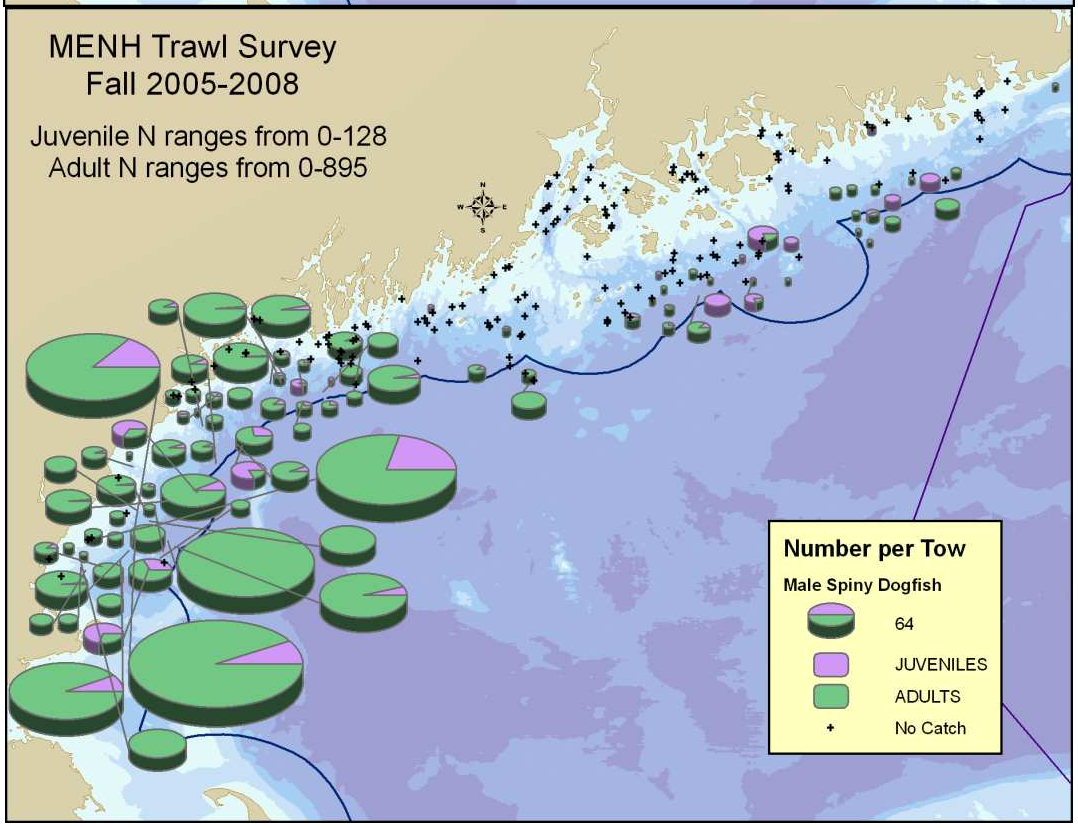
Figure 9. Spiny Dogfish catch at length for fall surveys 2005-2006 separated by sex. Note the difference in the range of the Y-axes.



Dogfish are more abundant in the southwestern portion of the survey area and numbers caught are greater in the deeper strata. Figure 10 illustrates the numbers of juvenile and adult females based on length groups (juveniles are <80 cm) in the top chart and males in the lower chart (juvenile males <60 cm).

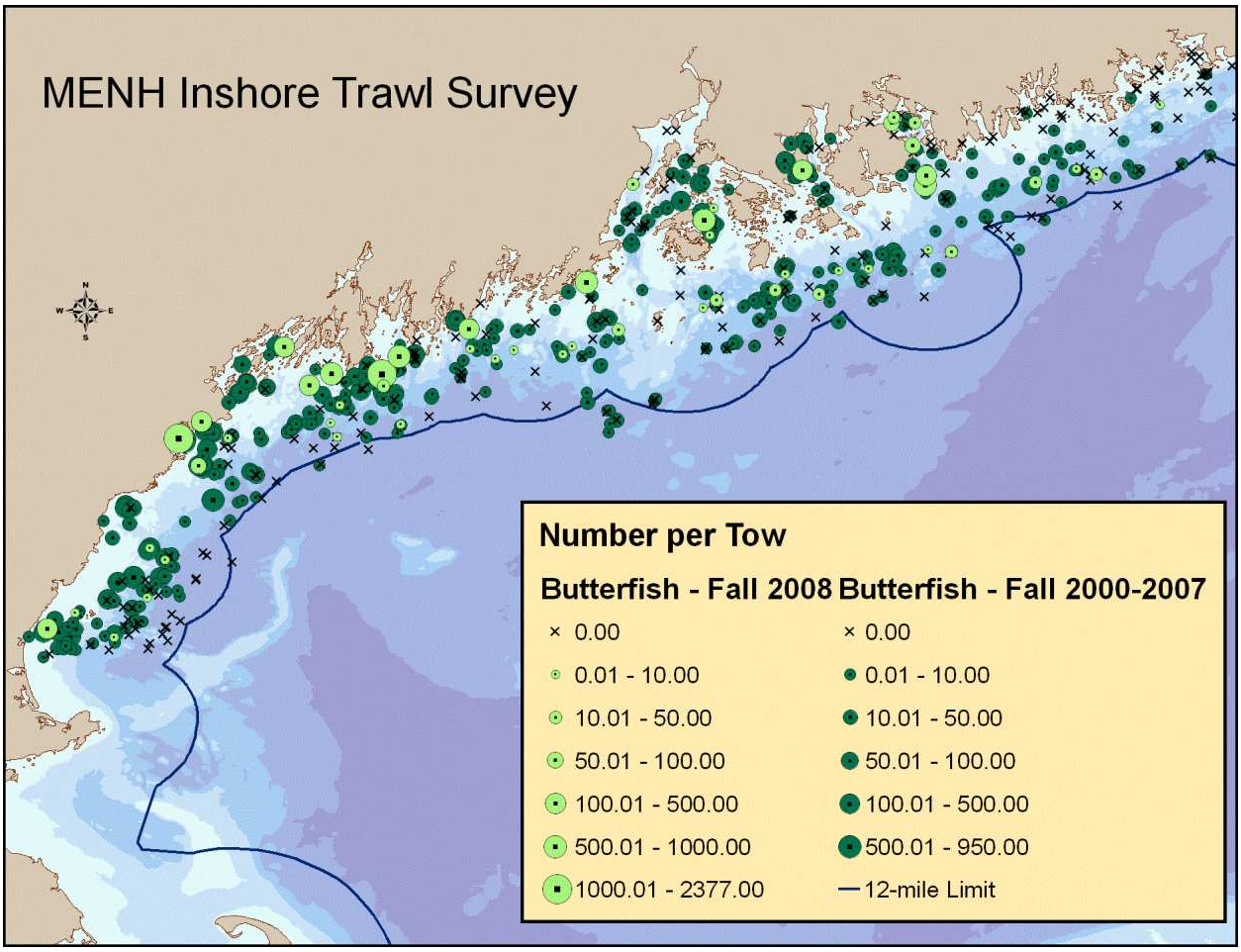
Figure 10. Spiny Dogfish catches for recent fall surveys. The size of the pie is representative of the total catch and proportioned by length group. Note the different scale for males.





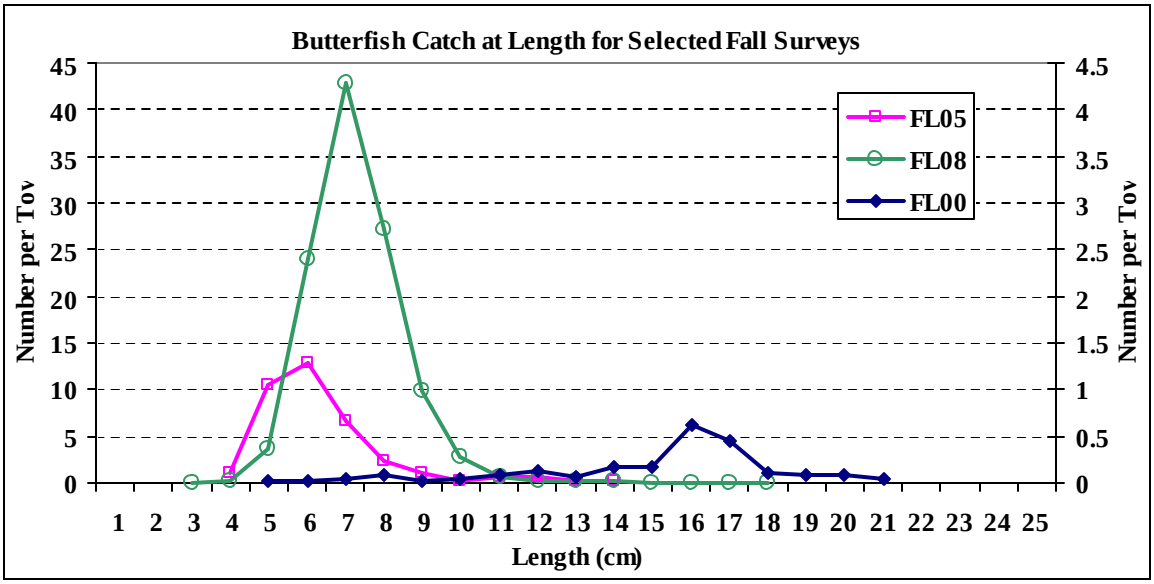
Butterfish, *Peprilus triacanthus*, are commonly caught in the fall survey with only minimal numbers seen in the spring (Sherman et al, 2005). Butterfish are more abundant in the shallower waters closer to shore in the fall season (Fig. 11) and the numbers seen in the 2008 survey were considerably larger than previous years.

Figure 11. Atlantic butterfish catch in numbers for individual tows for fall stations sampled from 2000 through 2007 in dark green and 2008 highlighted in light green).



Adult butterfish are reported in general to be larger than 12.0 cm (O'Brien et al, 1993, Collette and Klein-MacPhee, 2002). The large numbers of butterfish seen in 2008 were predominantly juveniles between 3 and 11 cm (Fig. 12). Mean length for butterfish sampled in the fall of 2008 was 7.3 +/- 0.6 cm with an N of 6998. Our largest mean length was 15.1 +/-0.6 cm in 2000 with an N of 189 and the smallest mean was in 2005 at 6.6 +/-0.8 cm with an N of 1689 (Fig. 12).

Figure 12. Stratified catch at length for butterfish in the fall 2000, 2005 and 2008 surveys. Note that fall 2000 is on the secondary axis.



White hake caught in the fall surveys are shown in Figure 13. In the last year the fall survey has encountered an increase in numbers of YOY white hake not seen previously (Fig. 14), High catches were seen in all depth strata (Fig. 15)

Figure 13. White hake individual catches in number for fall surveys.

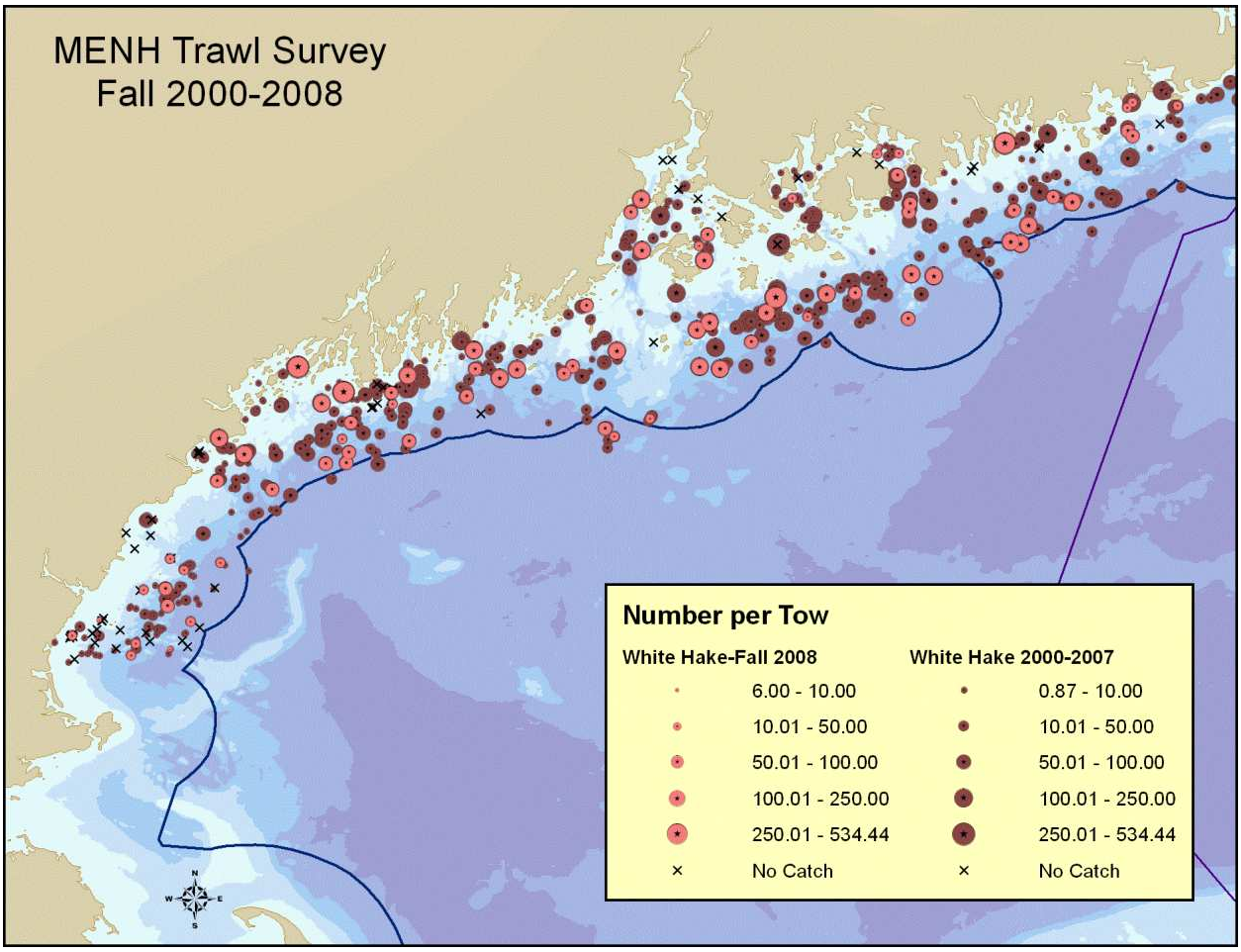


Figure 14. Catch at length as stratified mean number for fall white hake. Size classes determined from Chang et al, 1999

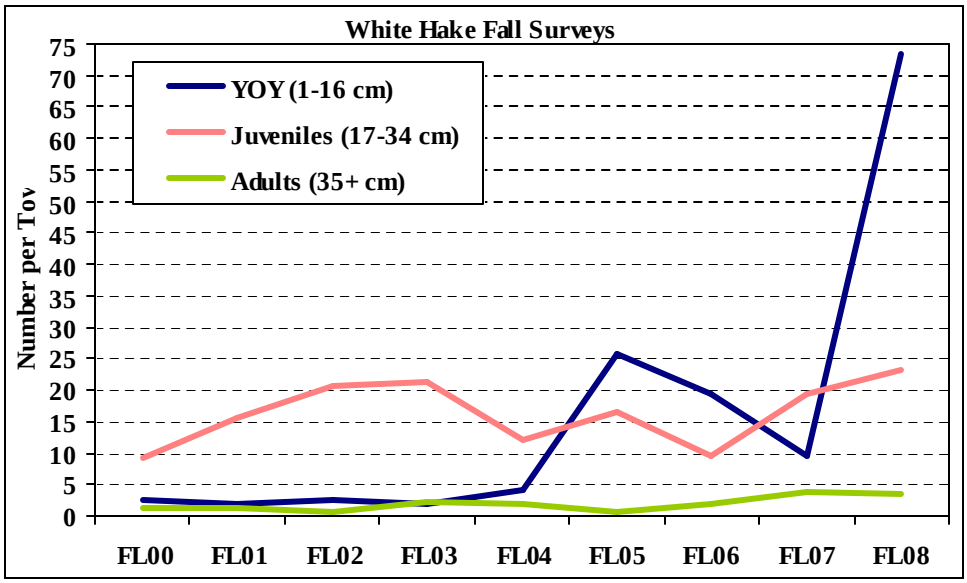
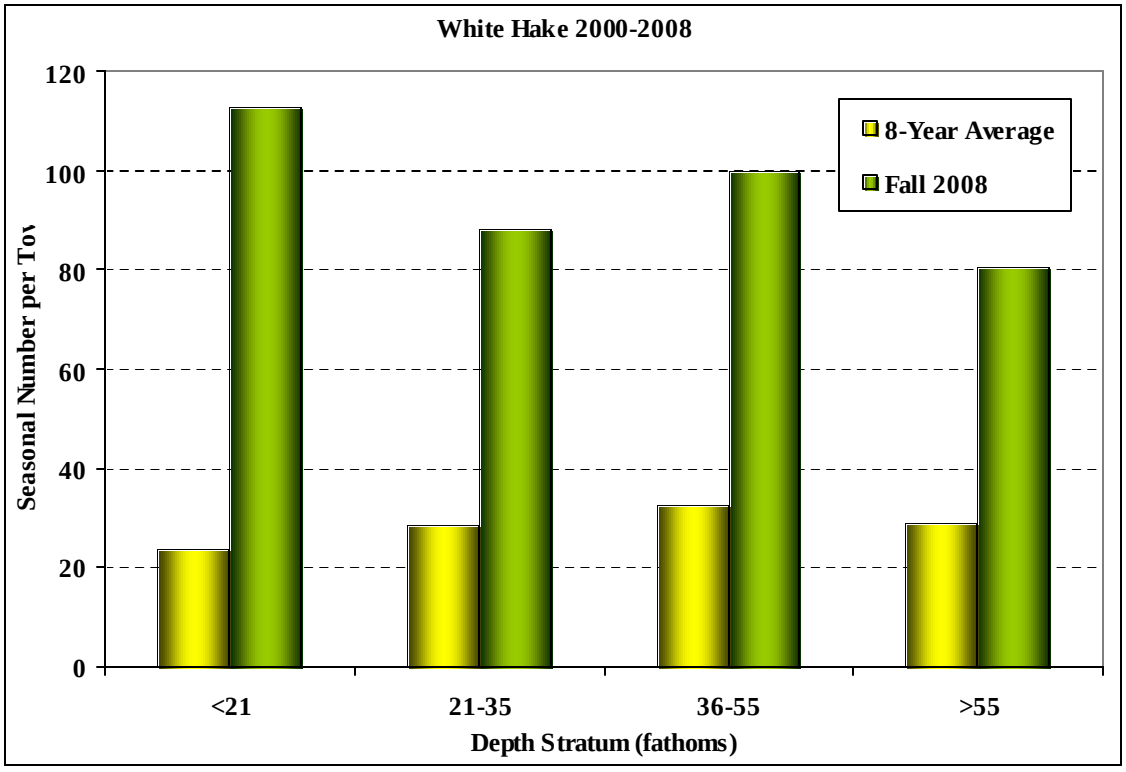
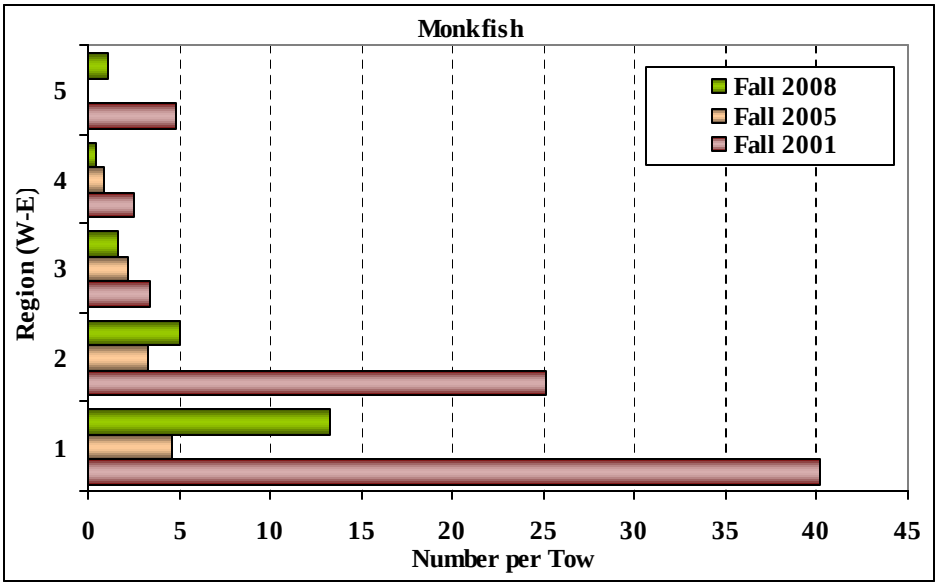


Figure 15. Average catch per tow by depth stratum for white hake in fall surveys.



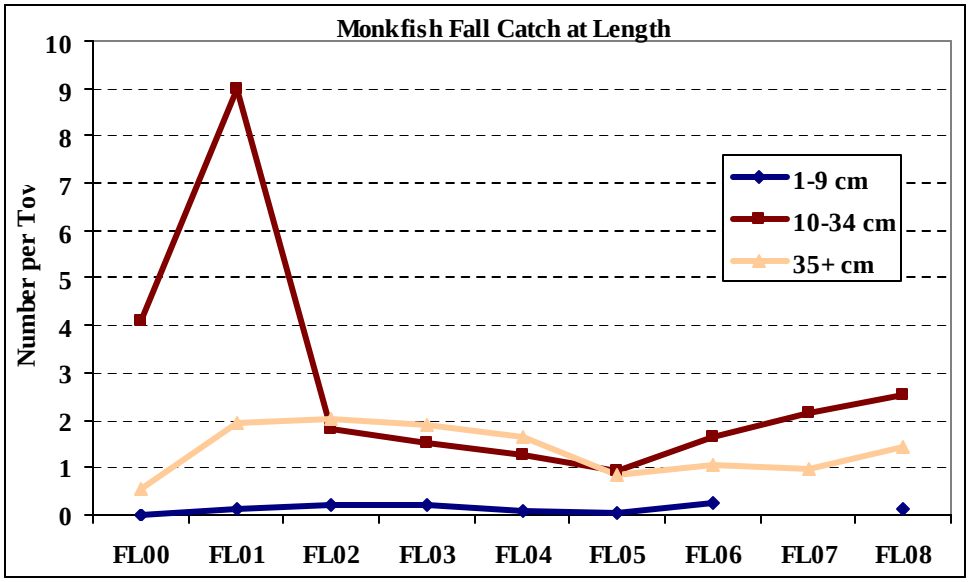
Goosefish (monkfish), *Lophius americanus*, which are much more abundant in the fall, have shown a decline in numbers in recent years (App. B, Figs. 16 and 17). Fall 2008 was an average season; the overall average catch in numbers of 4.1 goosefish per tow is close to the seasonal average for the previous 8 years of 4.3. Catches are consistently higher in the western part of the survey area (Fig. 16).

Figure 16. Regional average catch in numbers for goosefish for three fall surveys



Median length at maturity for goosefish is between 32 and 48 cm (Almeida et al, 1995, Steimle et al, 1999). Goosefish sampled by the MENH survey are largely juveniles (Figs. 17). Y-O-Y goosefish are caught in the fall survey. Steimle et al (1999) report growth of 10 cm in the first year for goosefish. A small portion of 1-9 cm fish is sampled by this survey (Fig. 17).

Figure 17. Stratified Mean Catch at Length for goosefish in the fall.



The highest total catch of lobster, *Homarus americanus*, occurred in 2008. Over 9700 lobsters were sampled in 2008, compared to a low of 3475 in 2004 and the previous high of 8500 in 2006. The high abundance of lobster occurs in the shallower waters close to shore at depths between 5 and 50 fathoms (Figs. 18 and 19)

Figure 18. Individual catches in number for lobster in the fall surveys

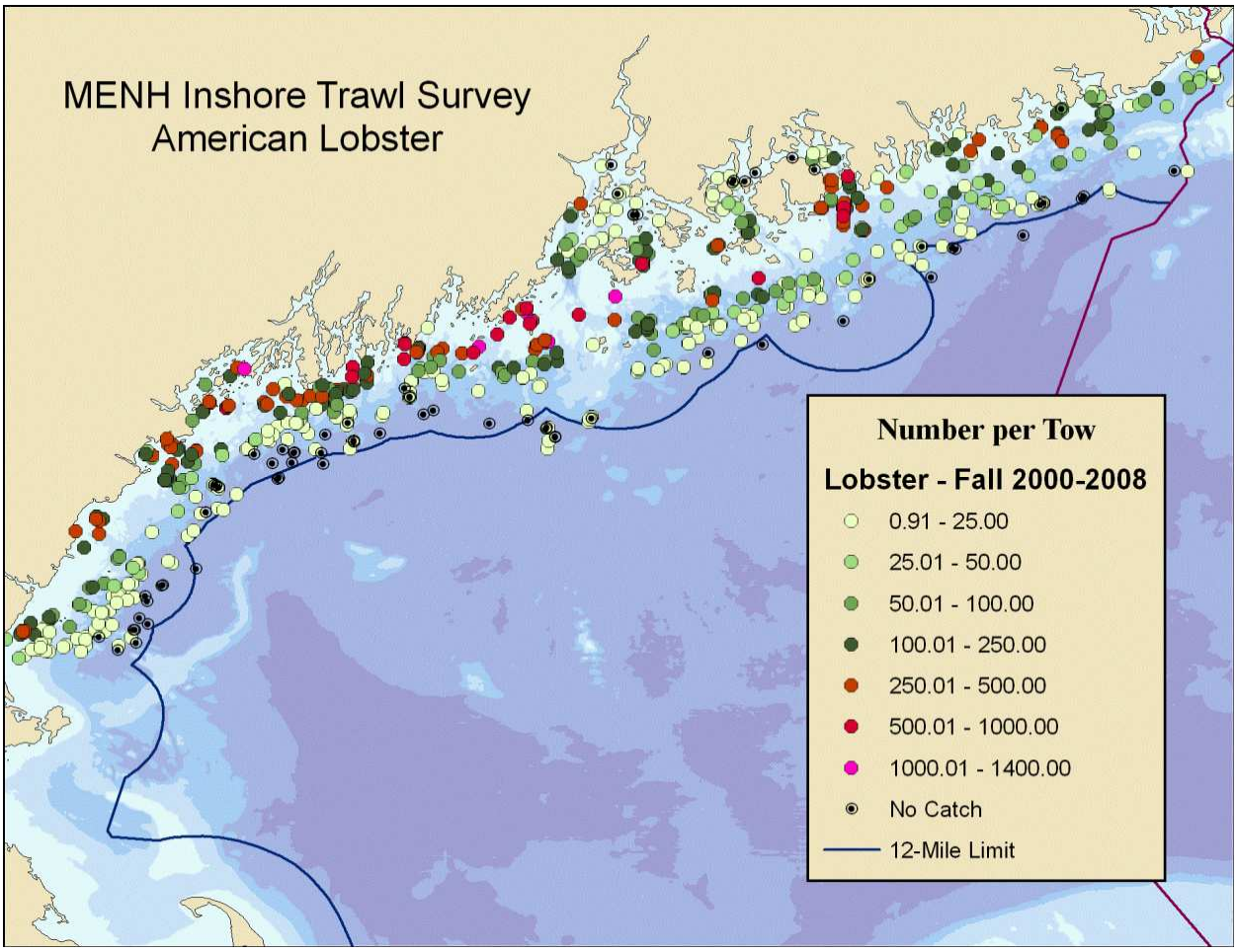
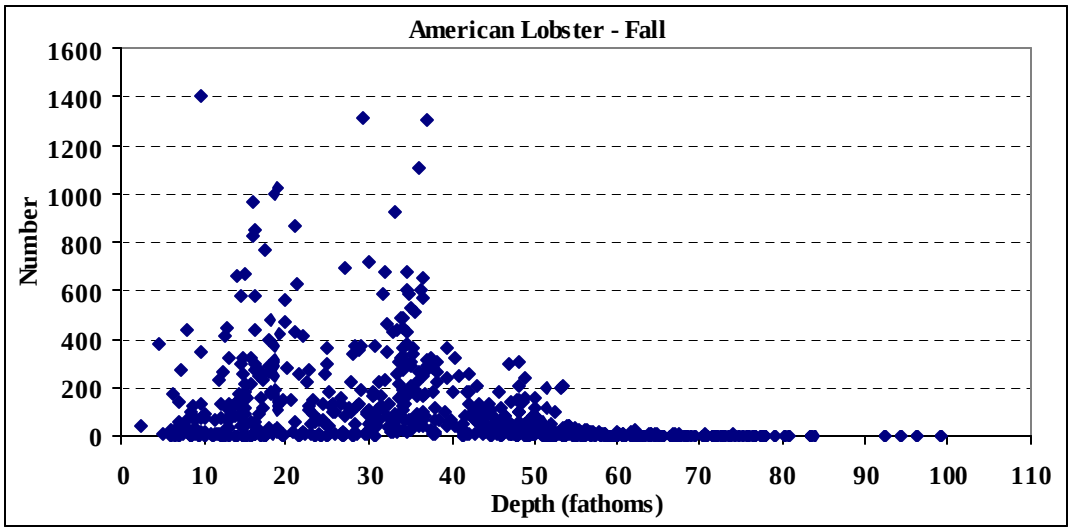
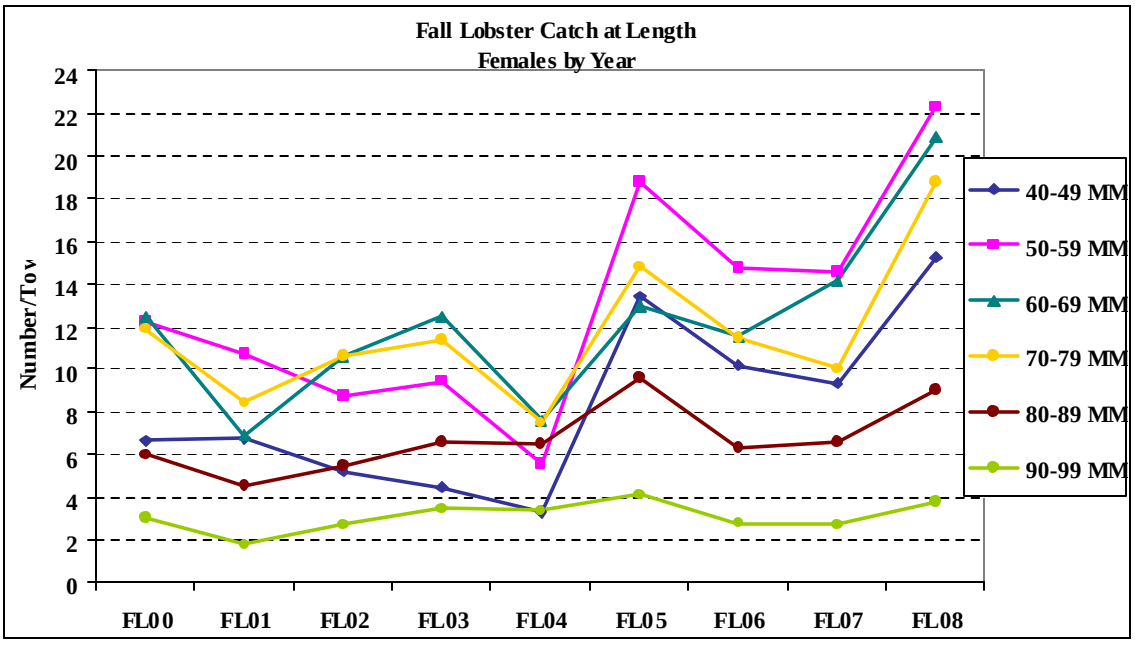


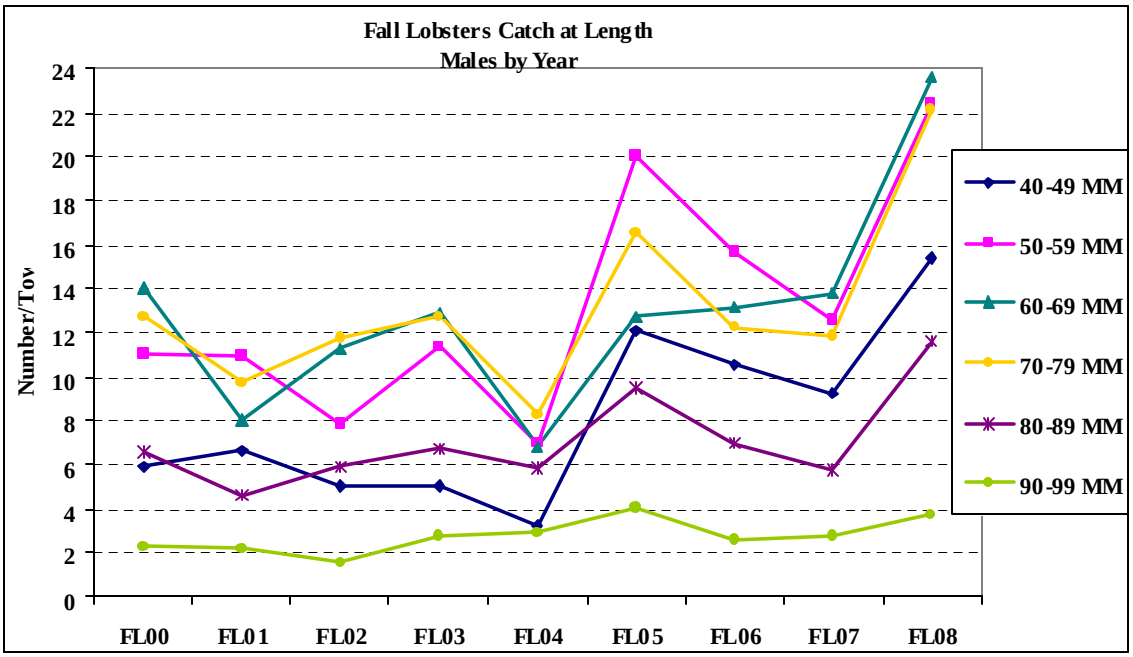
Figure 19. Scatter plot of catch against depth for lobster in fall surveys.



The increased abundance in 2008 is principally in the 50-80 mm carapace length range (Figure 20). The lengths of lobsters sampled range from 15 mm to 200 mm but the numbers of lobsters <40 mm and >99 mm is low.

Figure 20. Stratified catch at length (carapace length) for fall lobsters sampled by sex.



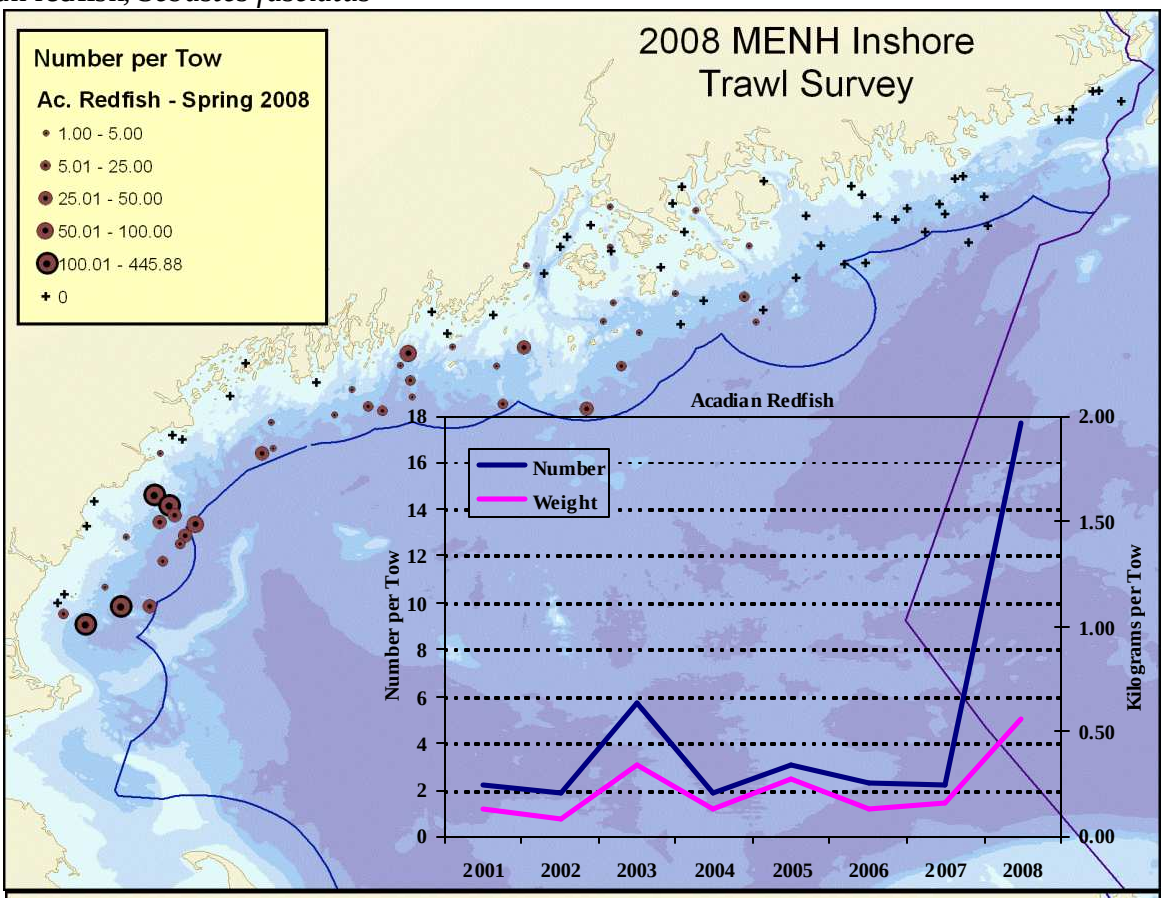


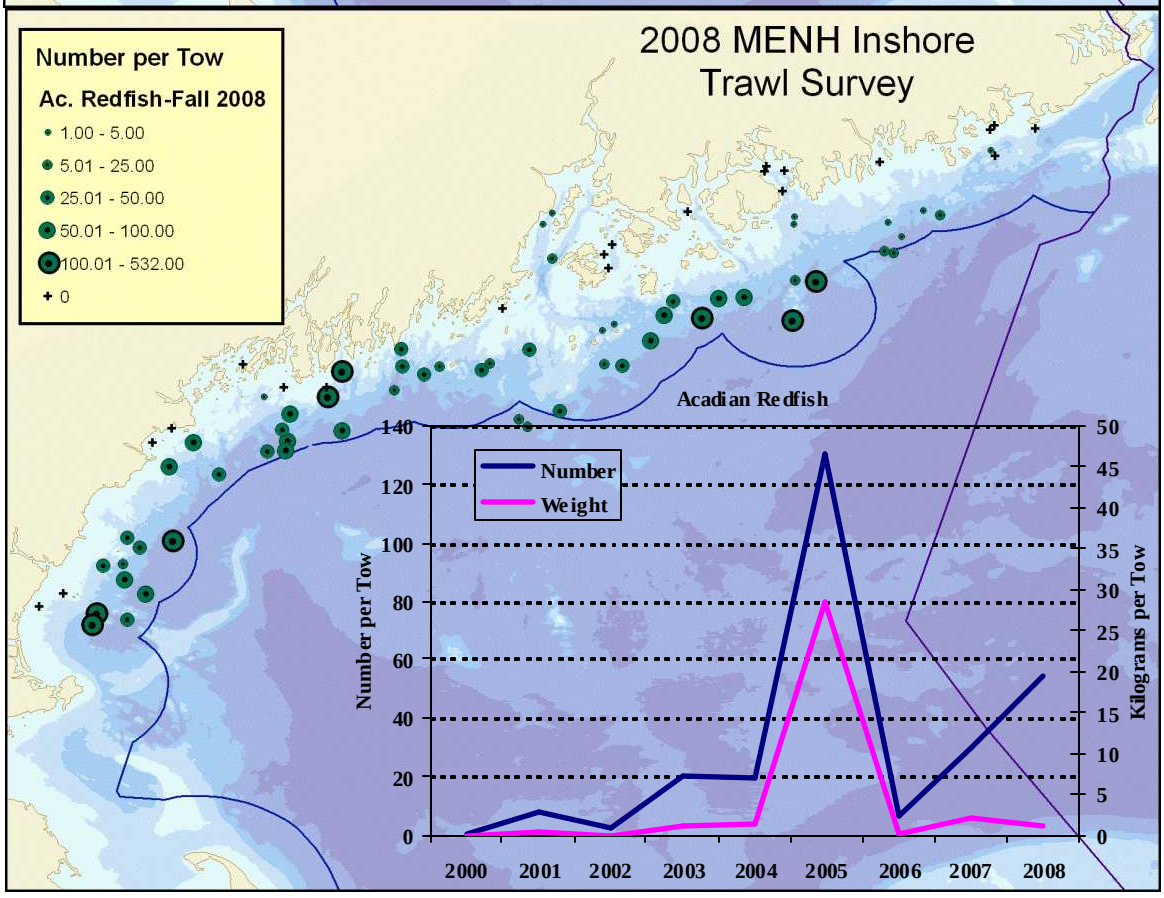
SELECTED SPECIES

The following pages contain bubble distribution maps, catch at length plots, abundance indices, and data tables for a selection of fish and invertebrates that are important to Maine and New Hampshire commercially or recreationally as well as others that are consistently abundant in our trawl catch. All indices and catch at length data was calculated for the entire survey area (20 strata) unless otherwise noted.

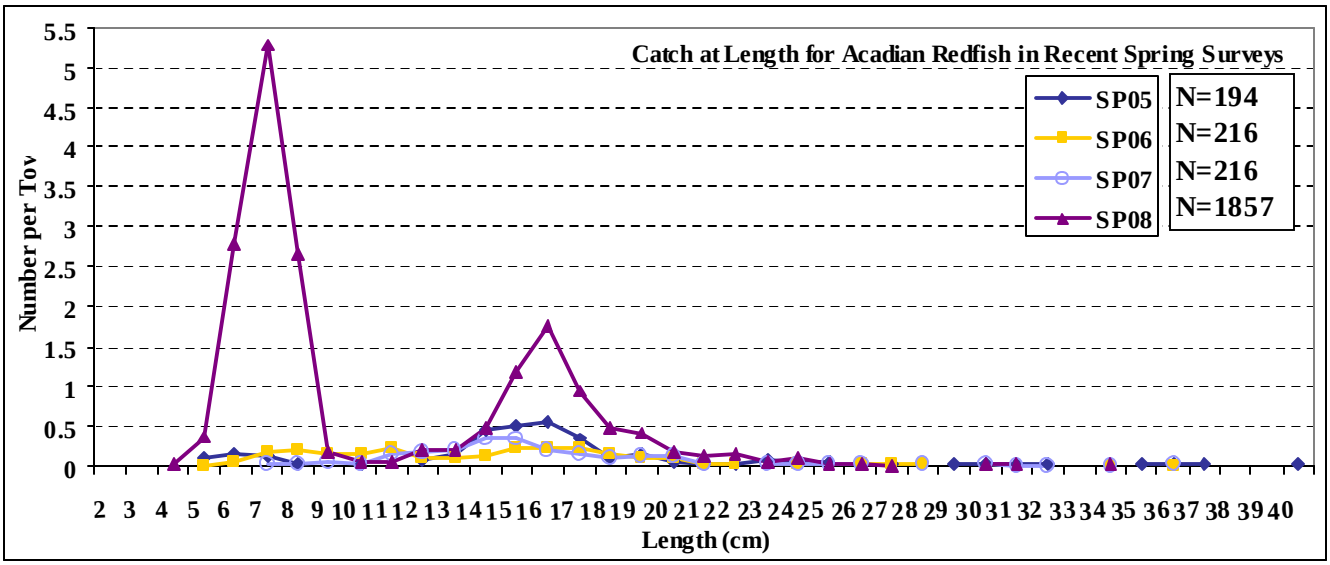
FINFISH

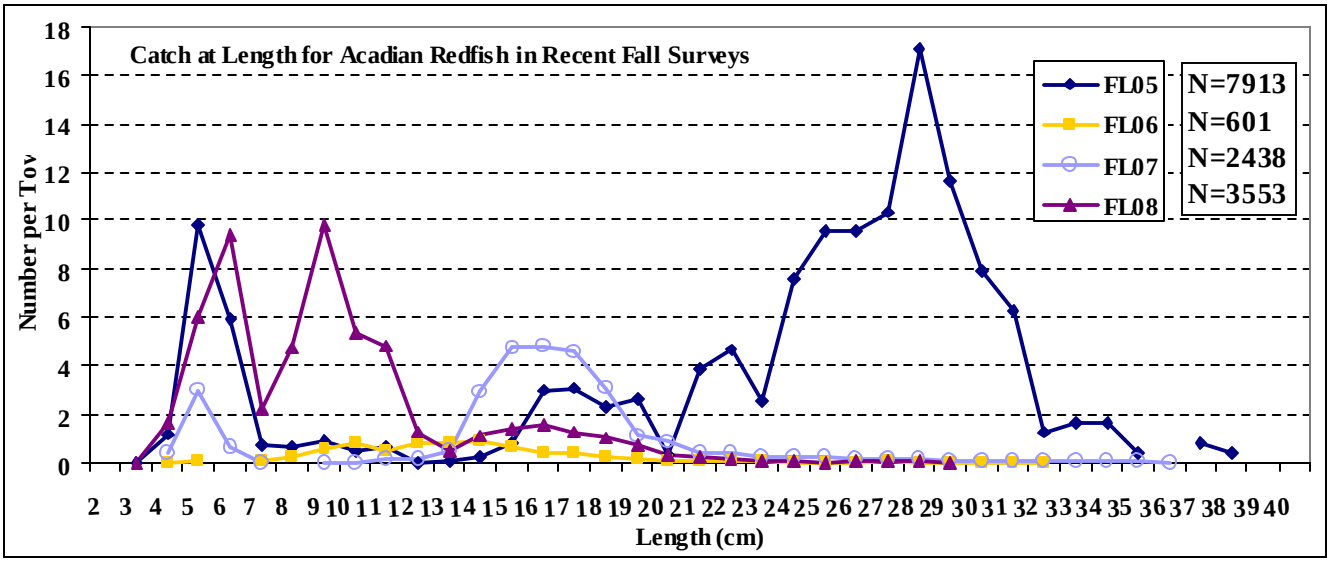
Acadian redfish, *Sebastes fasciatus*



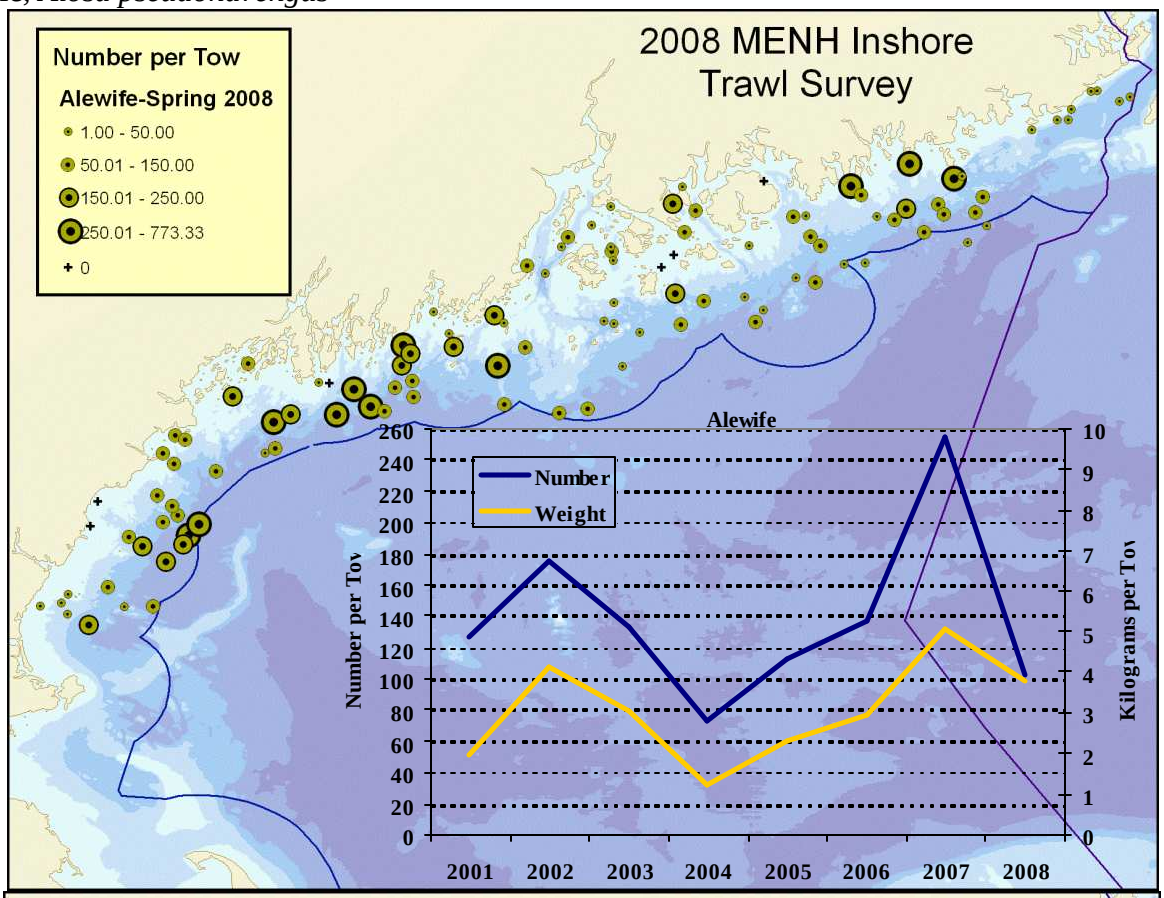


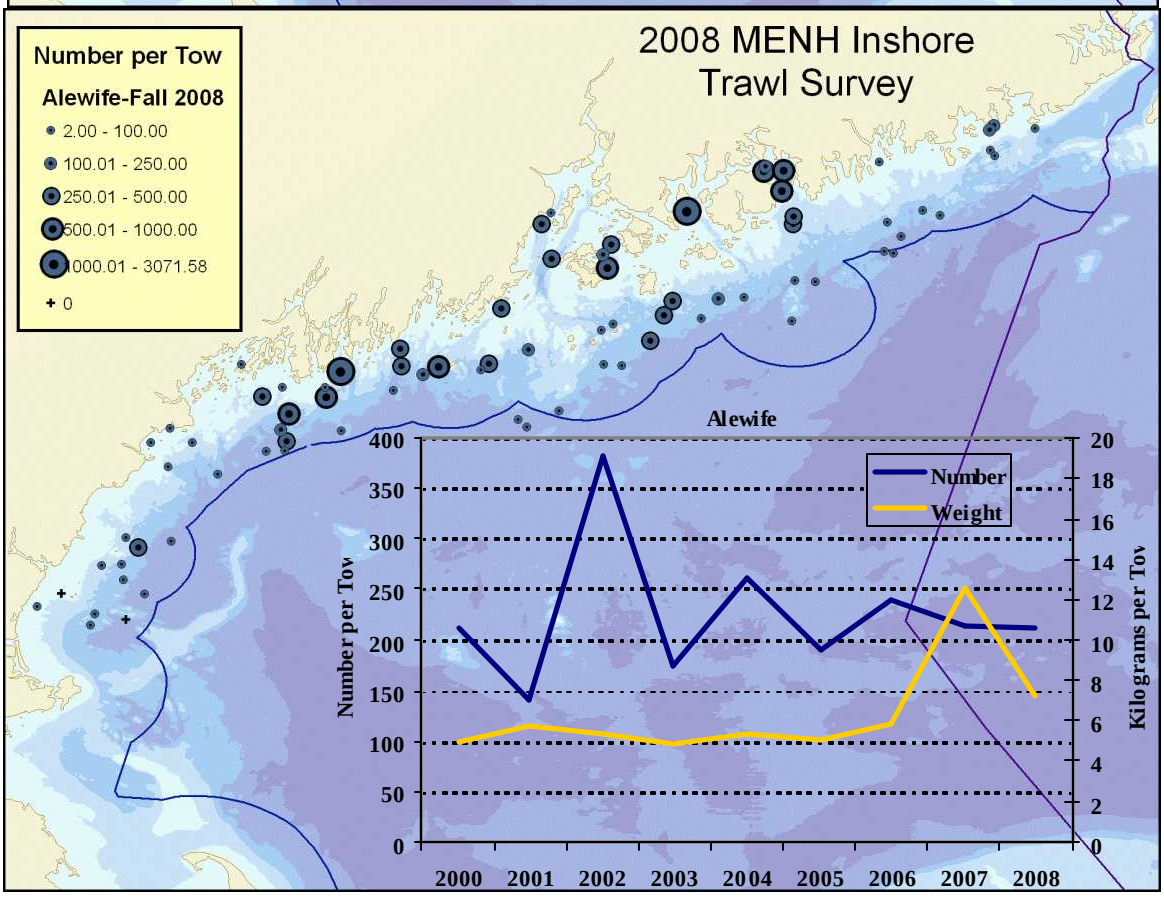
Mean and error for the graphs overlain on the distribution maps									
fixed stations not included									
SPRING					FALL				
for redfish, indices calculated for regions 1 through 5; strata 1 through 4									
Stratified Mean					Stratified Mean				
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	0.65	0.21	0.03	0.01
2001	2.18	0.62	0.13	0.06	2001	7.95	2.74	0.54	0.33
2002	1.79	0.41	0.08	0.02	2002	2.70	1.24	0.07	0.05
2003	5.66	2.14	0.34	0.14	2003	20.07	17.79	1.19	0.88
2004	1.82	0.53	0.13	0.03	2004	19.42	5.58	1.22	0.46
2005	3.09	0.76	0.28	0.12	2005	129.96	105.82	28.50	28.05
2006	2.33	0.91	0.13	0.05	2006	6.95	2.10	0.32	0.09
2007	2.15	0.51	0.16	0.04	2007	29.64	12.15	2.07	0.64
2008	17.69	5.14	0.56	0.22	2008	53.93	14.85	1.06	0.33



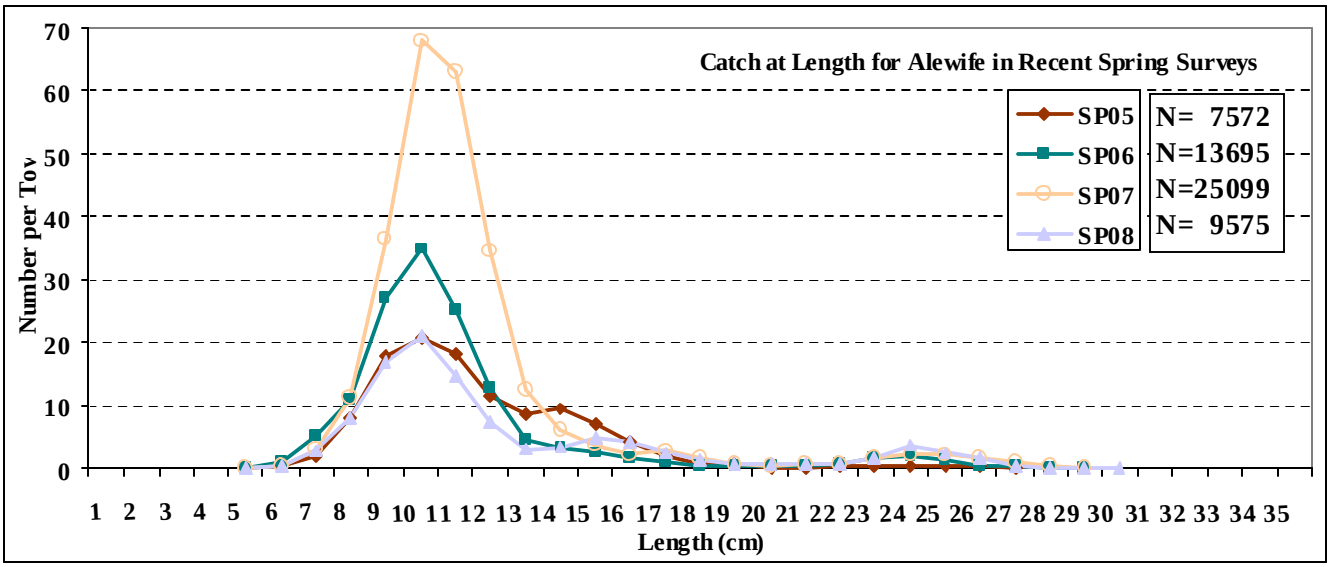


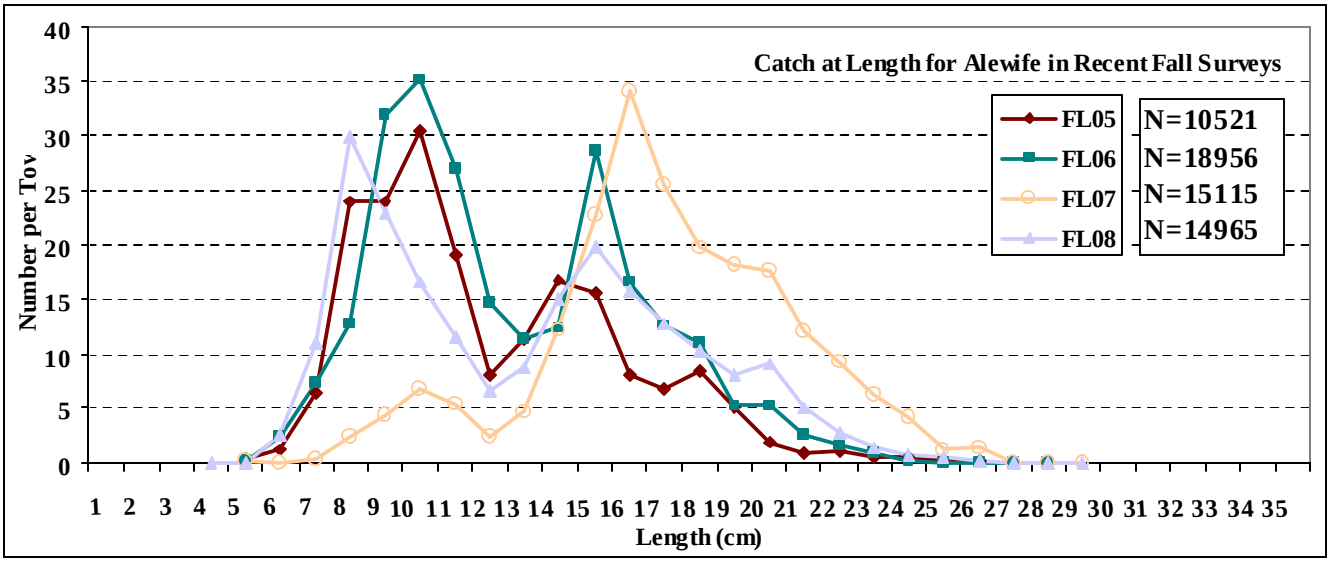
Alewife, *Alosa pseudoharengus*



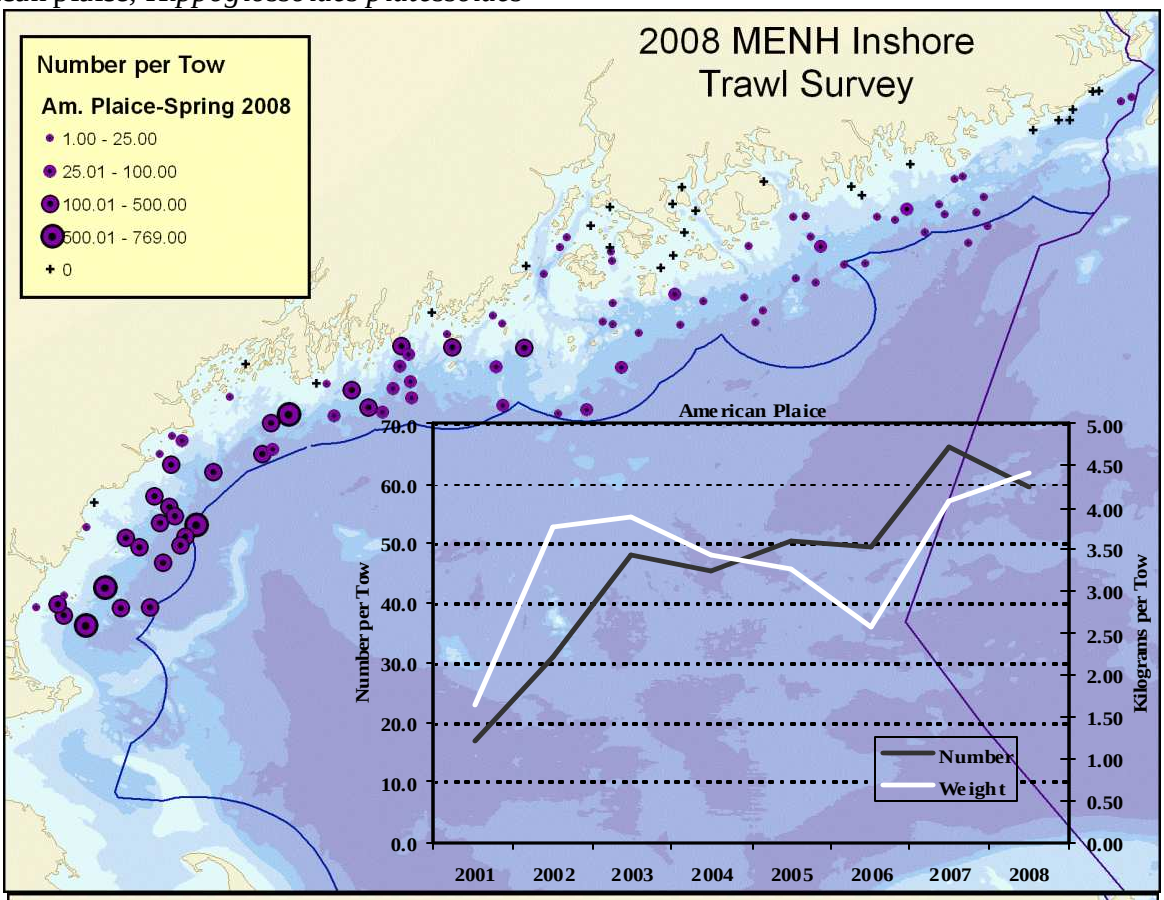


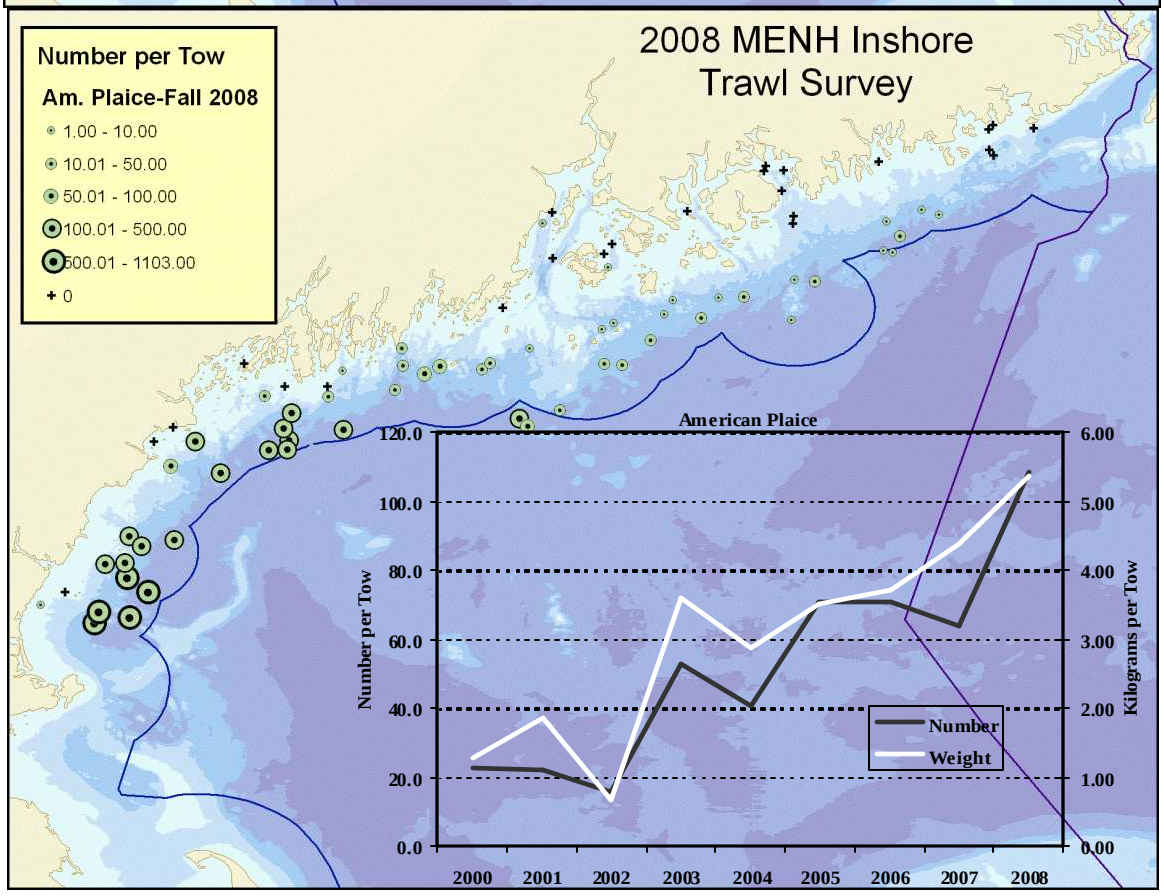
Mean and error for the graphs overlain on the distribution maps									
no fixed stations									
For alewife, regions 1 through 5; Strata 1 through 4 (2003 on)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	mean	error	mean	error		mean	error	mean	error
					2000	210.41	72.14	4.94	1.48
2001	127.44	31.43	1.97	0.41	2001	140.64	57.86	5.72	2.16
2002	175.59	53.23	4.15	0.88	2002	381.27	163.92	5.36	1.71
2003	132.72	32.46	3.05	0.72	2003	174.43	51.42	4.85	2.07
2004	72.77	10.47	1.20	0.15	2004	261.32	61.81	5.36	0.66
2005	112.12	14.21	2.29	0.29	2005	190.51	28.49	5.10	0.70
2006	137.11	17.69	2.97	0.39	2006	239.42	59.48	5.85	1.45
2007	255.01	67.35	5.06	1.06	2007	215.23	49.97	12.52	3.33
2008	101.79	11.82	3.78	1.13	2008	211.32	43.56	7.18	0.79



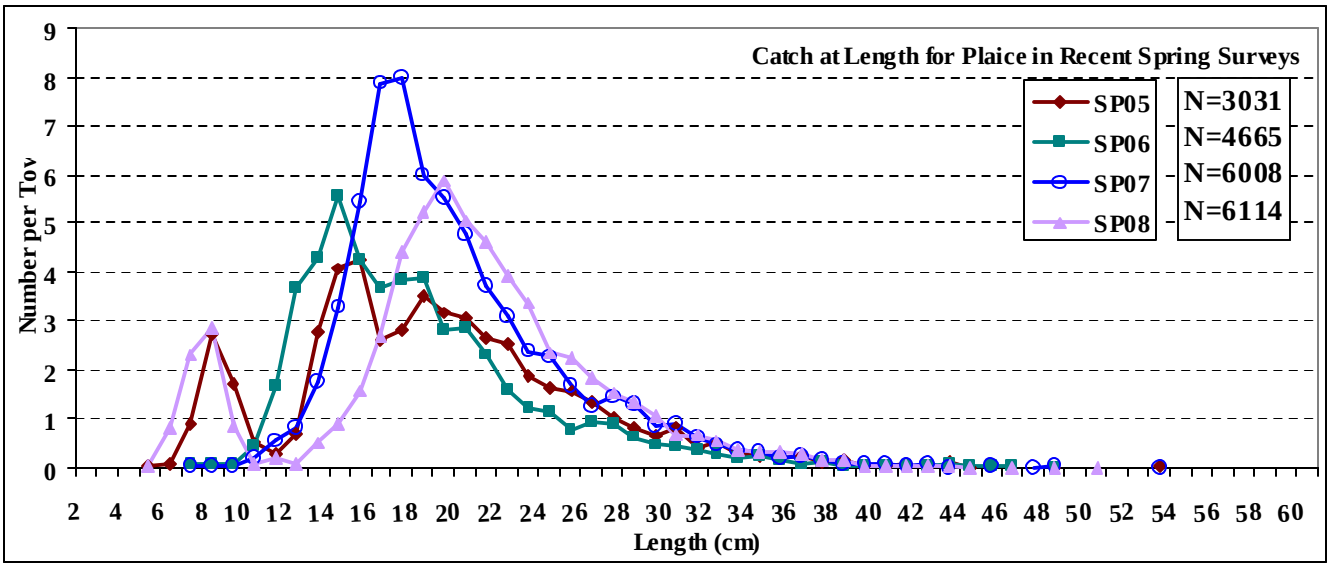


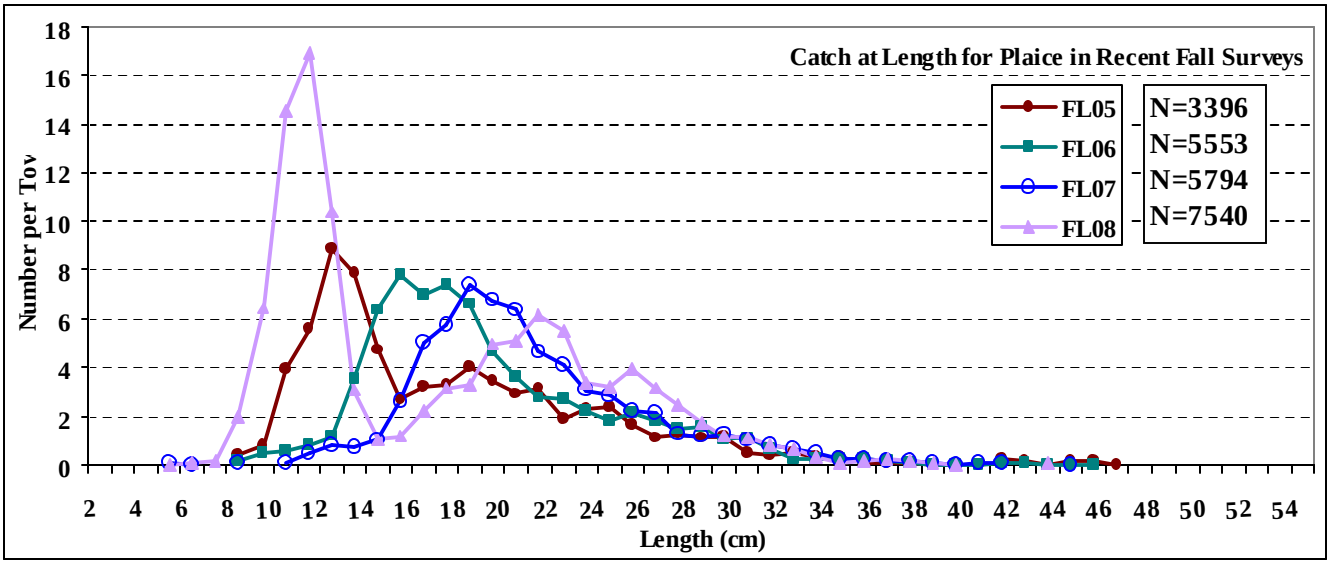
American plaice, *Hippoglossoides platessoides*



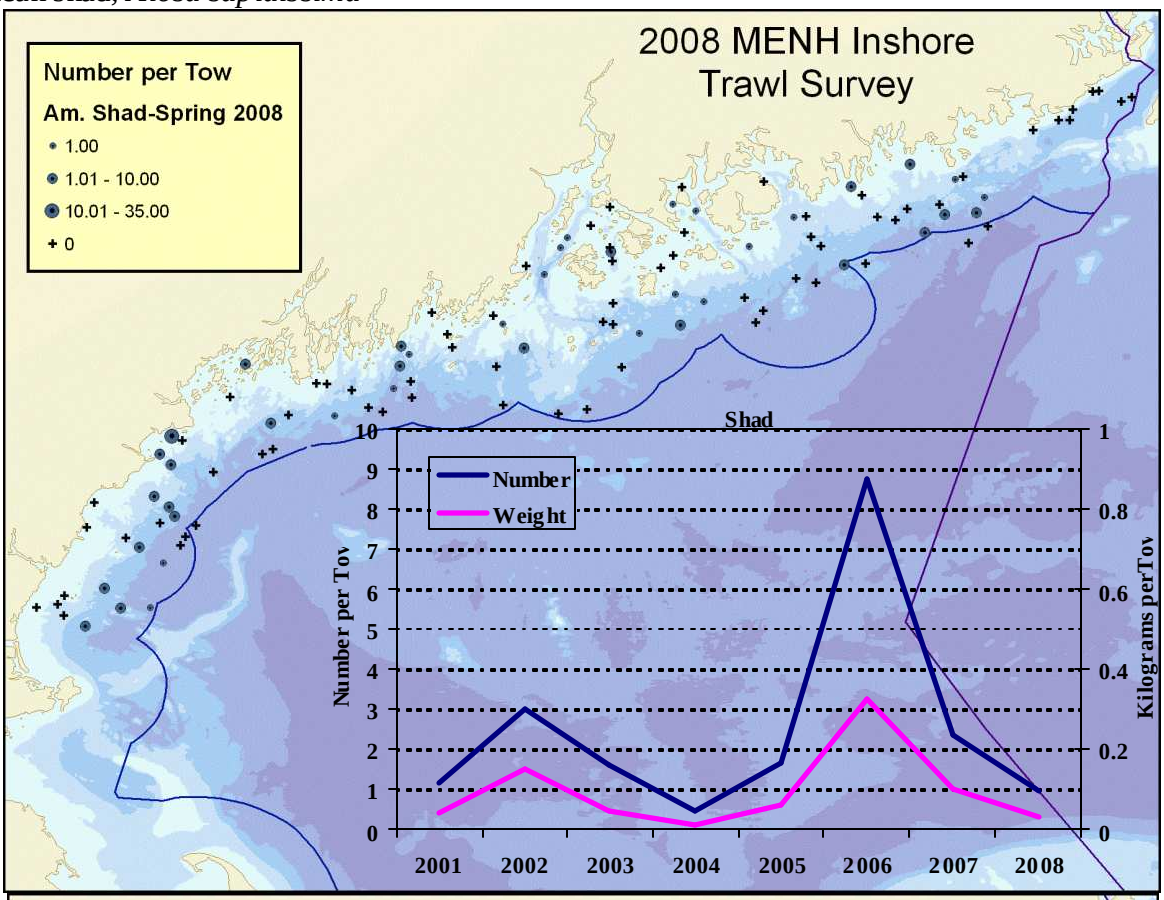


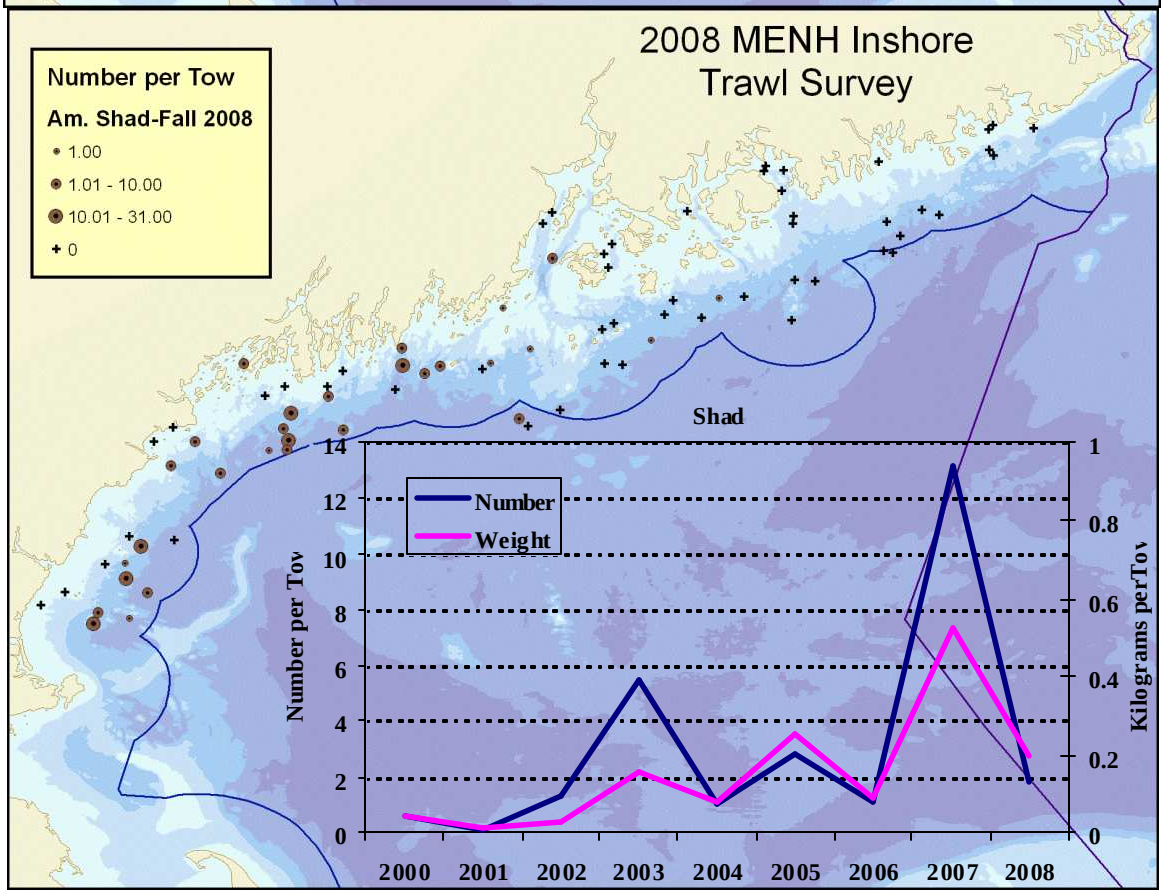
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
SPRING					FALL				
for plaice, indices calculated for regions 1 through 5; strata 1 through 4 (2003 on)									
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	22.7	6.30	1.28	0.28
2001	16.9	3.73	1.64	0.44	2001	21.9	2.26	1.85	0.20
2002	31.1	3.80	3.76	0.46	2002	15.7	3.68	0.67	0.13
2003	48.0	6.10	3.89	0.46	2003	52.8	7.31	3.60	0.38
2004	45.6	7.91	3.42	0.52	2004	41.1	4.29	2.89	0.27
2005	50.7	5.85	3.27	0.34	2005	70.7	8.89	3.53	0.32
2006	49.5	5.03	2.58	0.20	2006	70.7	7.66	3.74	0.30
2007	65.9	6.40	4.09	0.35	2007	63.6	7.38	4.38	0.43
2008	59.29	7.51	4.41	0.45	2008	108.7	12.7	5.35	0.63



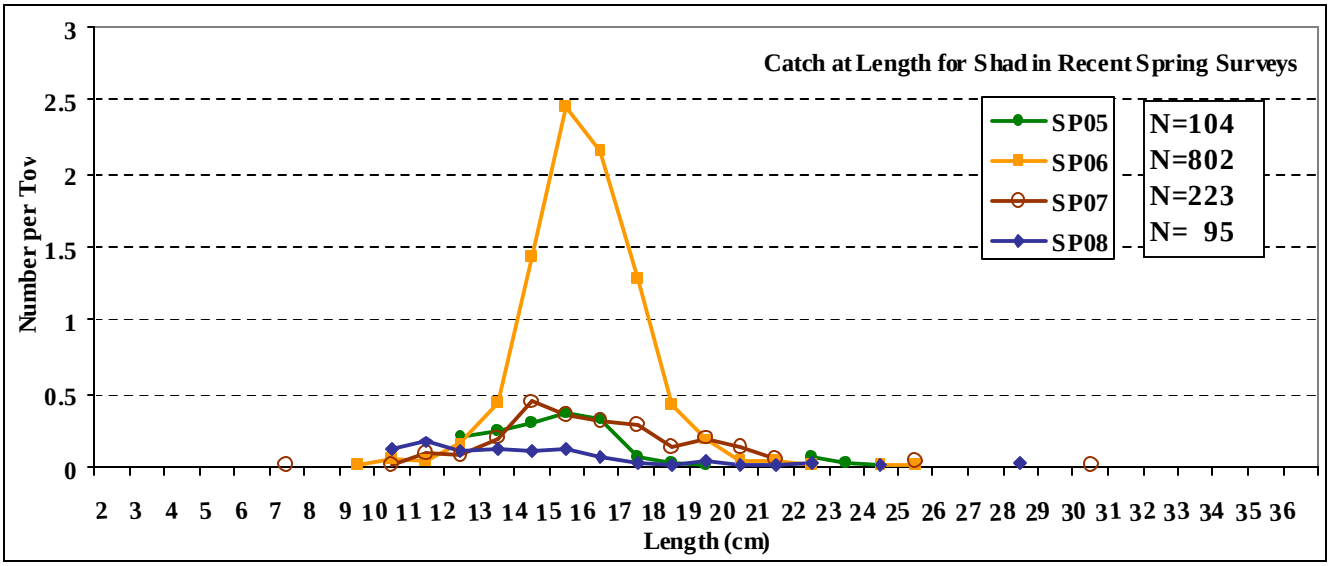


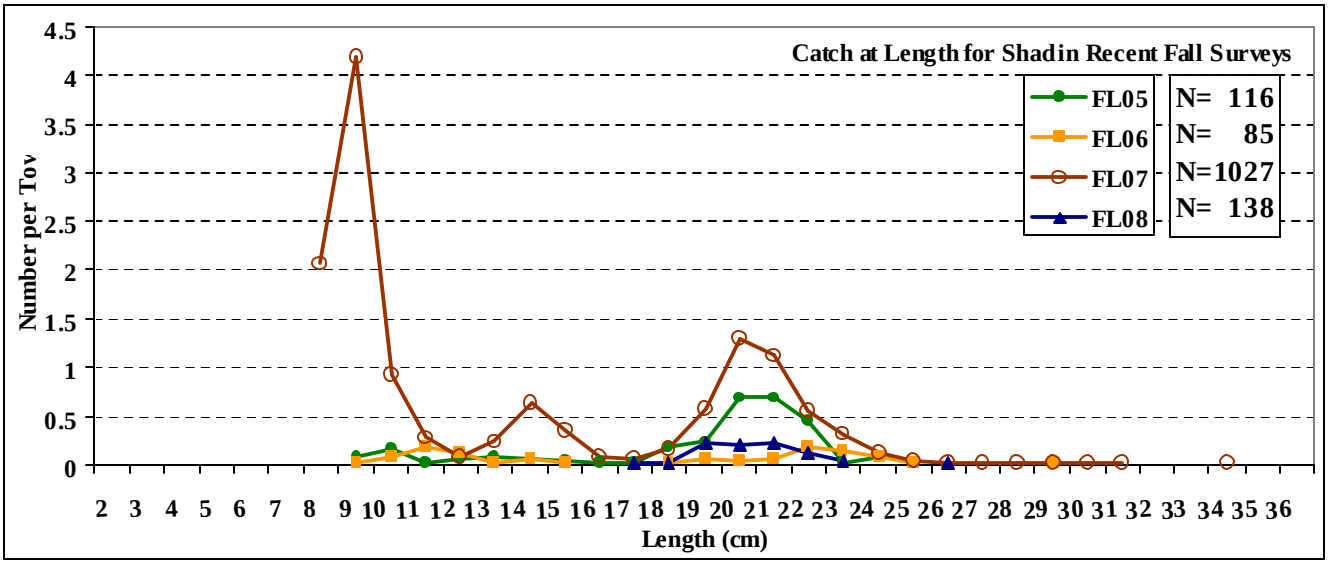
American shad, *Alosa sapidissima*



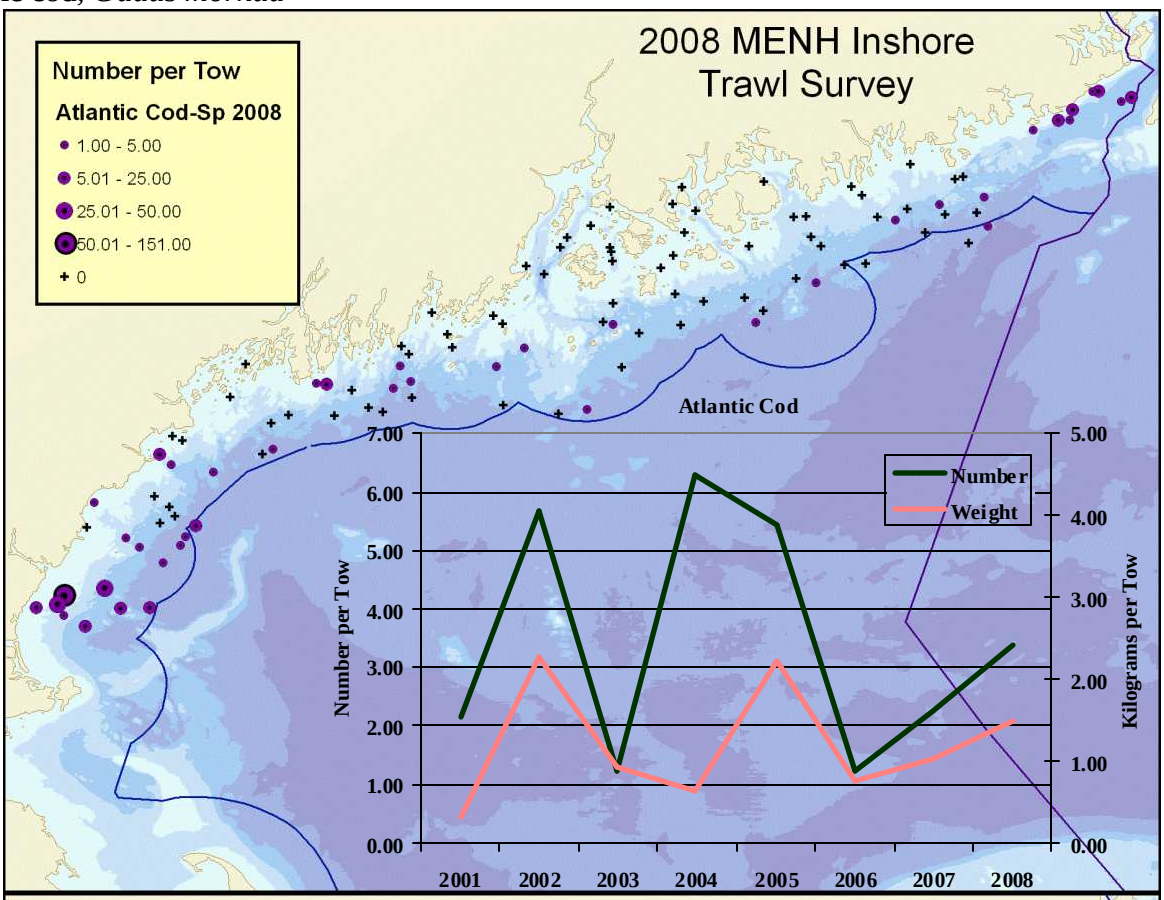


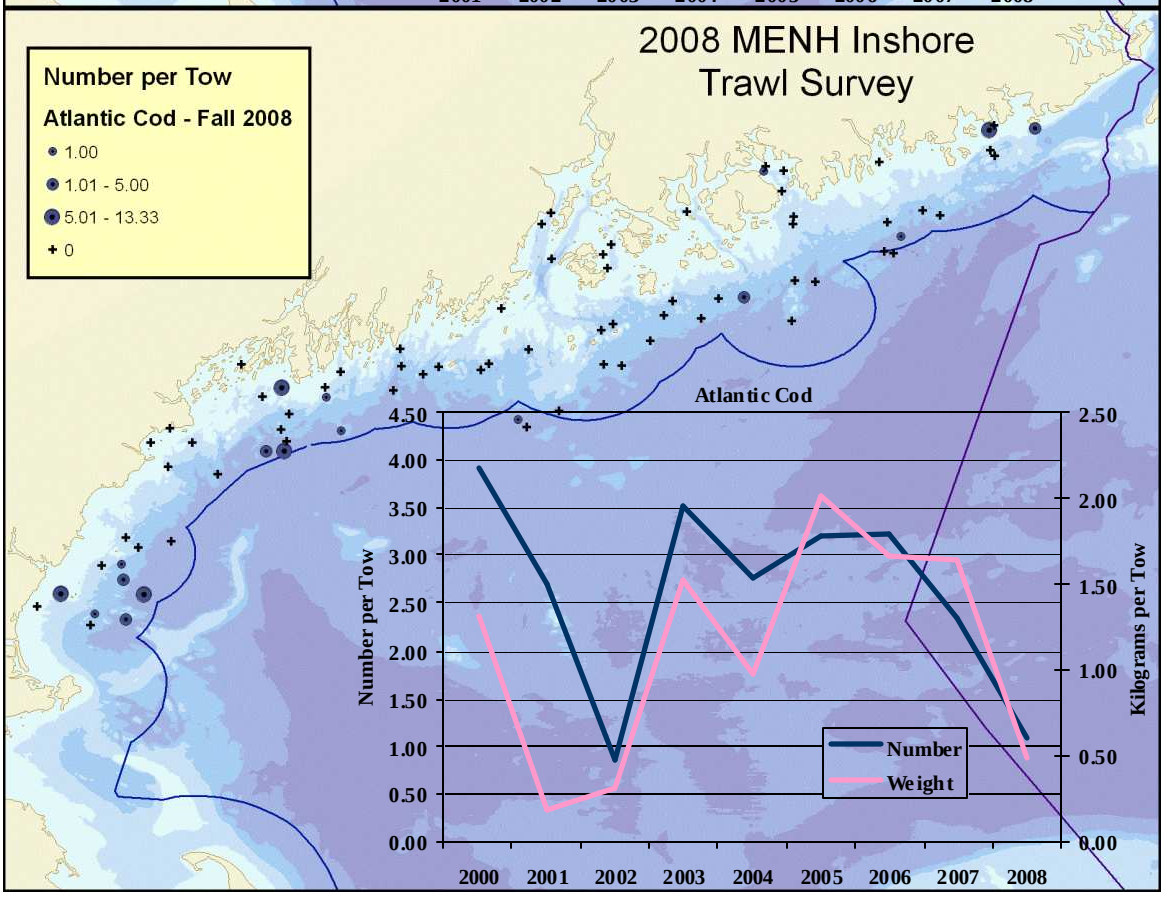
Mean and error for graphs overlain on distribution maps no fixed stations included for shad, indices calculated for regions 1 through 5; Strata 1 through 4 (2003 on)									
SPRING					**FALL**				
	Stratified Mean					**Stratified Mean**			
	Number		**Weight**			**Number**		**Weight**	
	Mean	**Error**	**Mean**	**Error**		**Mean**	**Error**	**Mean**	**Error**
					2000	0.56	0.18	0.041	0.014
2001	1.16	0.37	0.041	0.012	**2001**	0.06	0.04	0.008	0.004
2002	3.03	0.50	0.147	0.031	**2002**	1.33	0.54	0.031	0.011
2003	1.62	0.34	0.047	0.011	**2003**	5.45	4.52	0.156	0.090
2004	0.45	0.11	0.015	0.004	**2004**	1.06	0.46	0.081	0.030
2005	1.65	0.28	0.061	0.013	**2005**	2.81	0.37	0.255	0.028
2006	8.72	1.59	0.321	0.060	**2006**	1.13	0.54	0.091	0.023
2007	2.35	0.29	0.102	0.014	**2007**	13.15	7.26	0.525	0.157
2008	0.97	0.35	0.031	0.007	**2008**	1.78	0.43	0.198	0.046



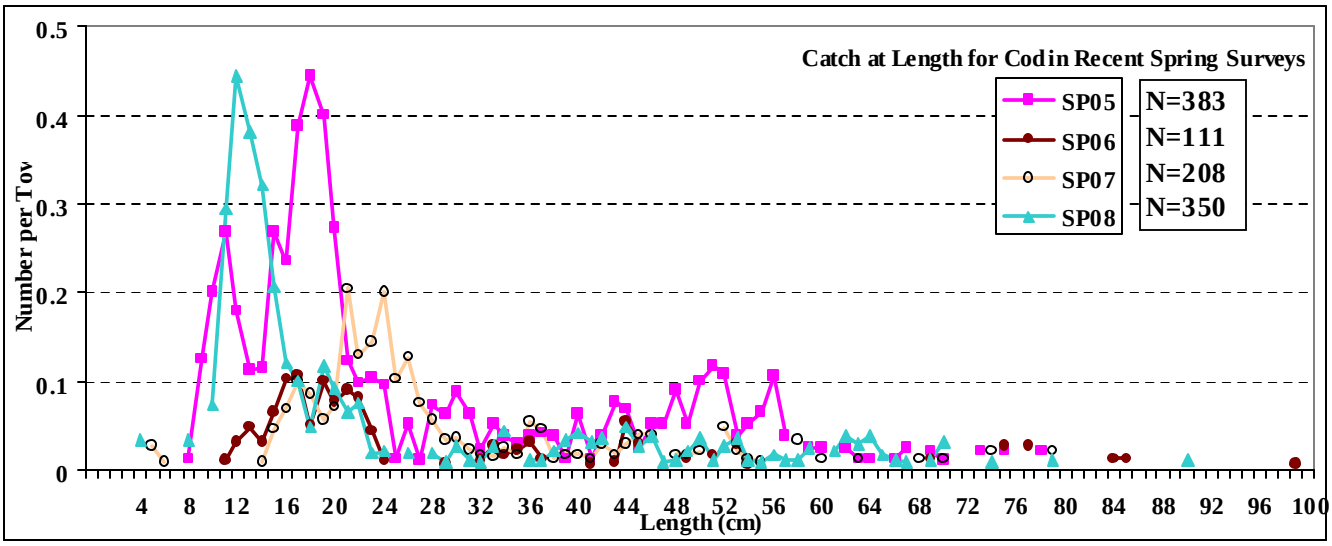


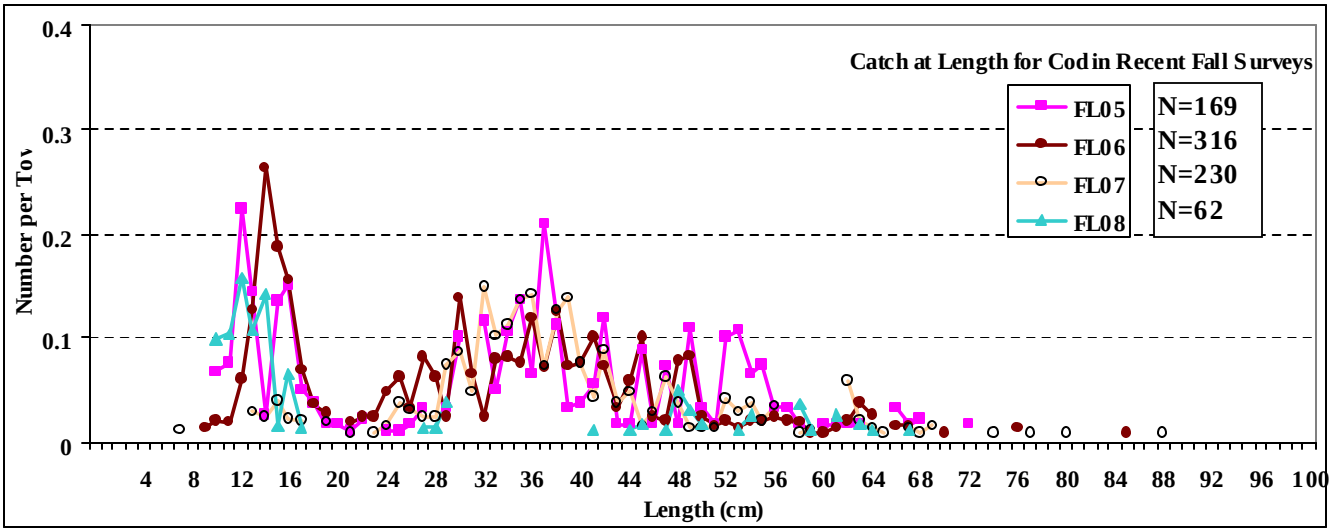
Atlantic cod, *Gadus morhua*



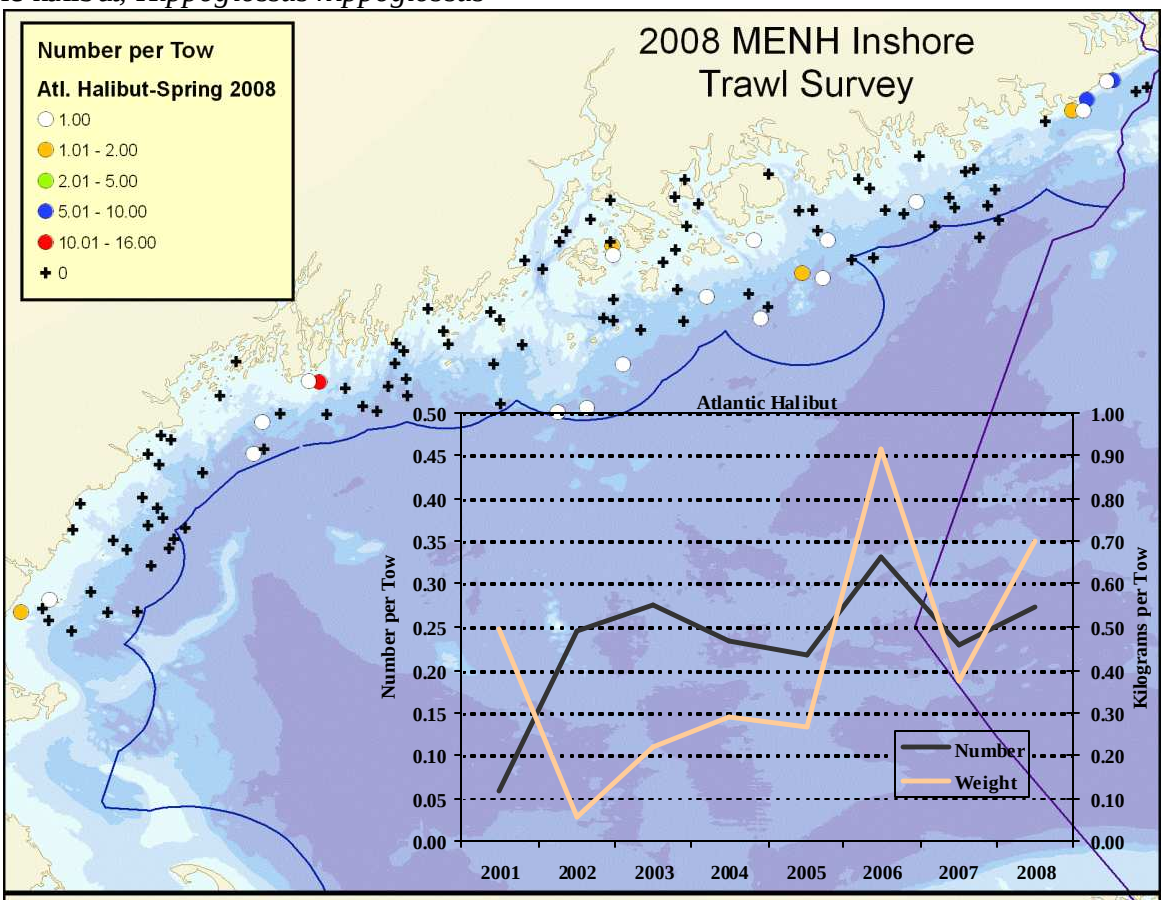


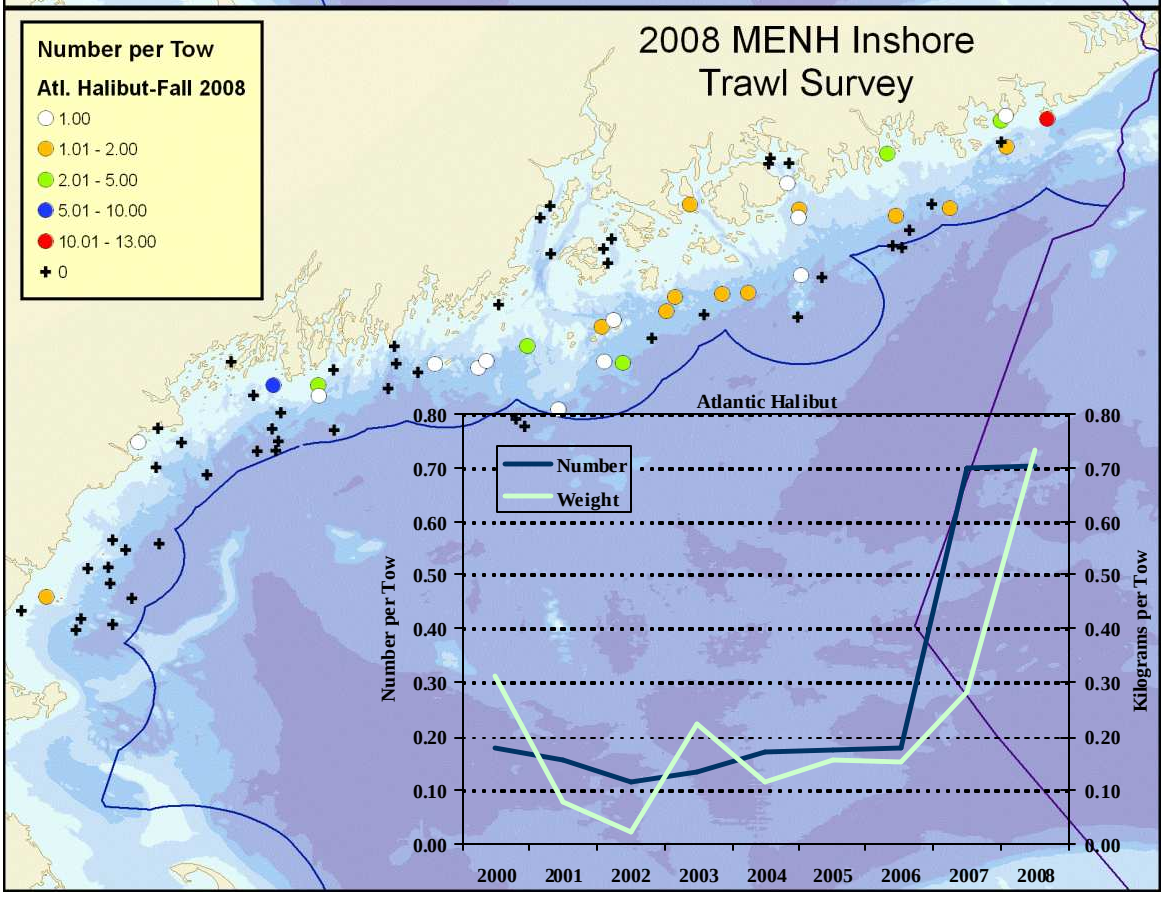
Mean with error for the graphs overlain on the distribution maps									
fixed stations not included									
FALL					SPRING				
for Atlantic cod, indices calculated for regions 1 through 5; strata 1 through 4									
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
2000	3.91	1.85	1.32	0.74					
2001	2.72	0.72	0.18	0.04	2001	2.17	0.52	0.32	0.09
2002	0.85	0.20	0.30	0.09	2002	5.66	2.95	2.29	0.92
2003	3.53	0.80	1.52	0.30	2003	1.23	0.27	0.94	0.28
2004	2.76	1.11	0.98	0.27	2004	6.30	1.60	0.63	0.18
2005	3.20	1.87	2.01	1.37	2005	5.46	2.68	2.22	1.45
2006	3.22	1.56	1.66	0.86	2006	1.24	0.35	0.76	0.45
2007	2.34	1.21	1.64	0.83	2007	2.26	0.61	1.04	0.19
2008	1.08	0.45	0.48	0.19	2008	3.38	1.46	1.49	0.57



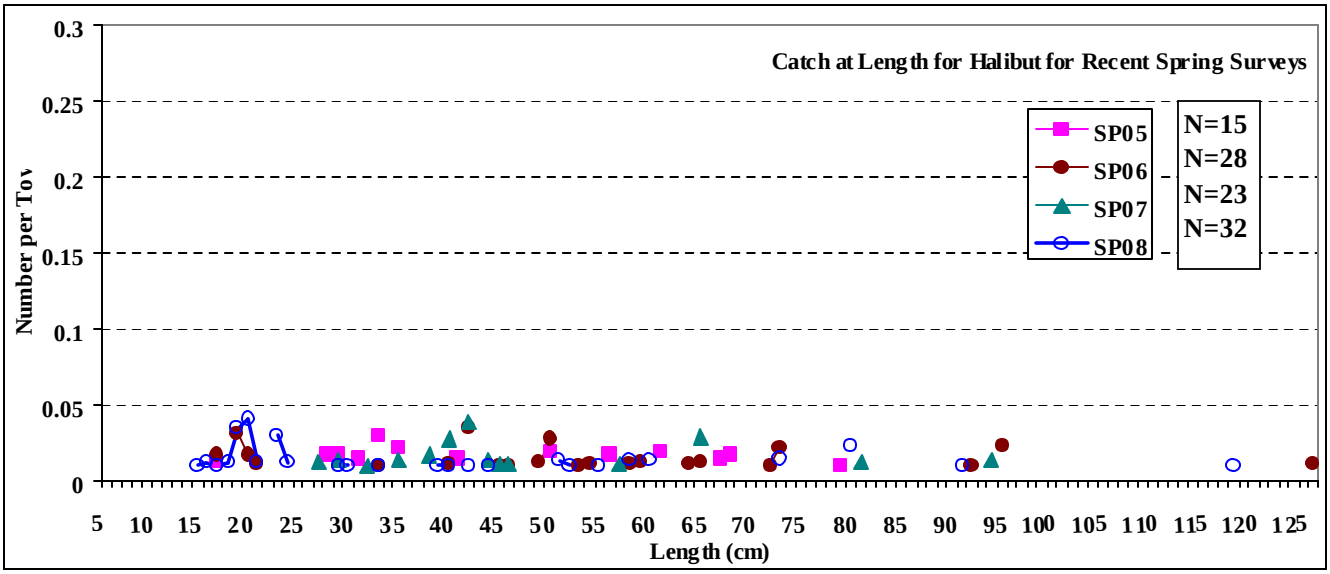


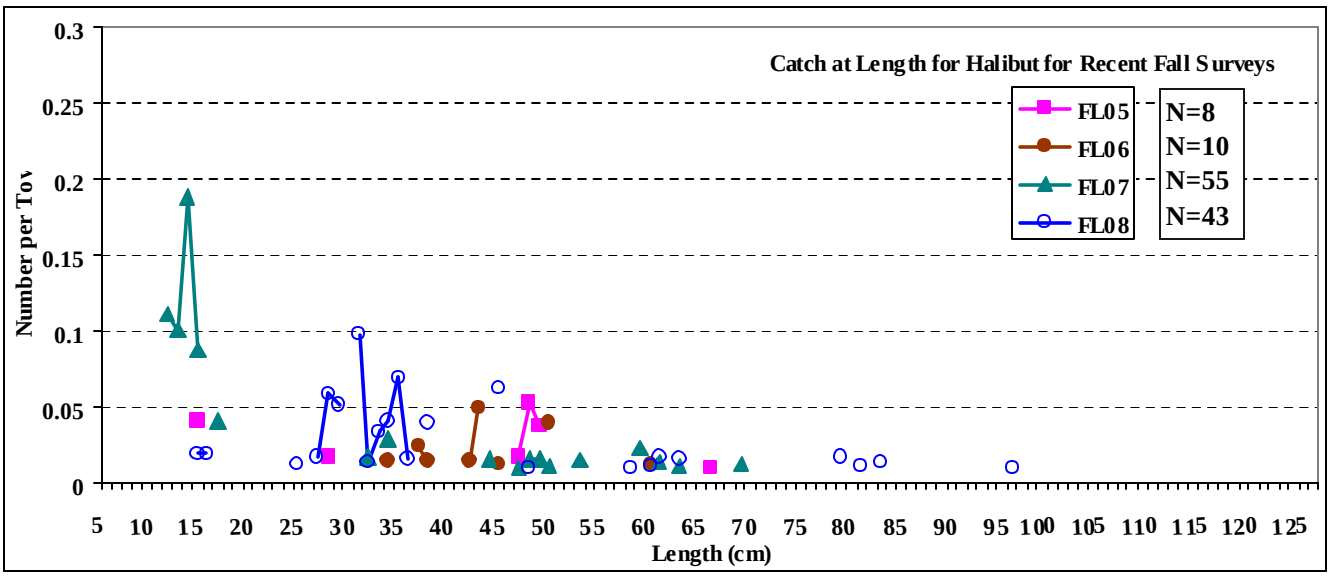
Atlantic halibut, *Hippoglossus hippoglossus*



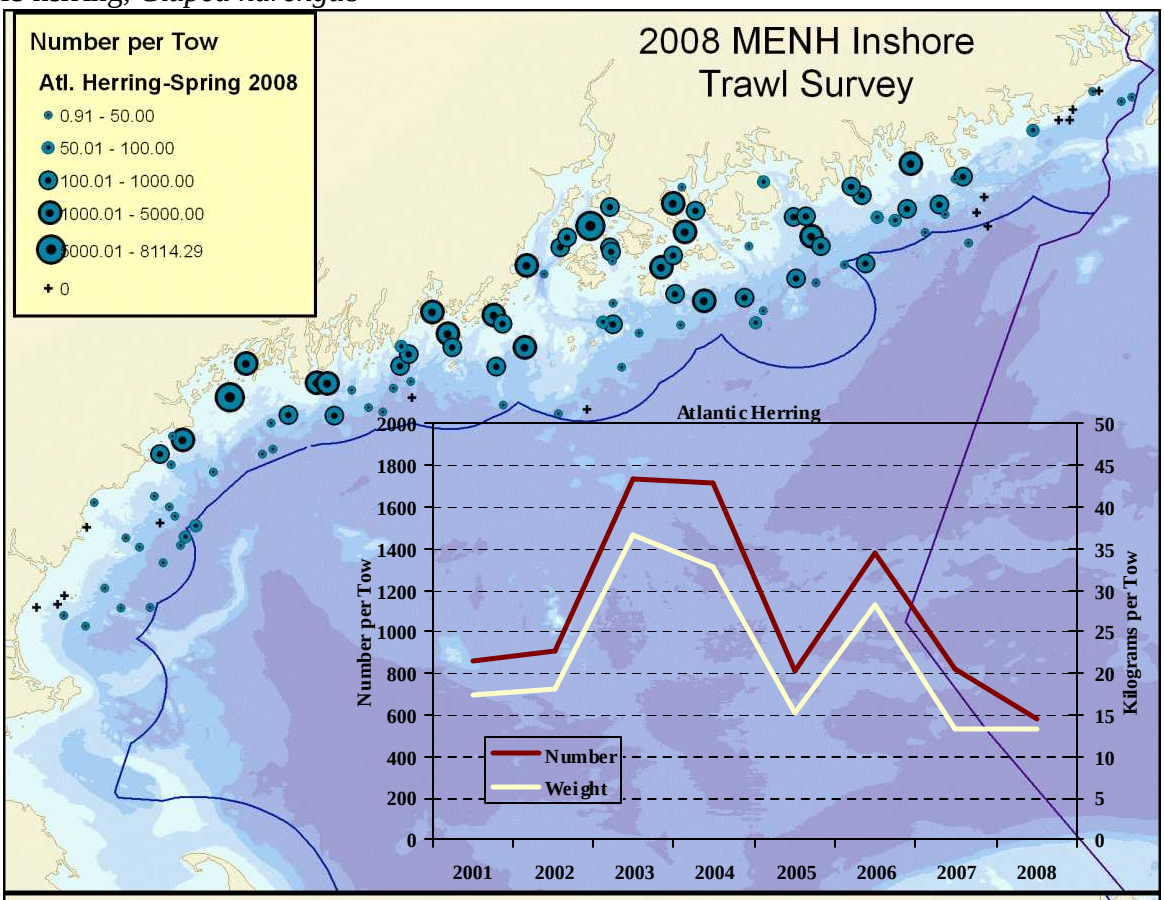


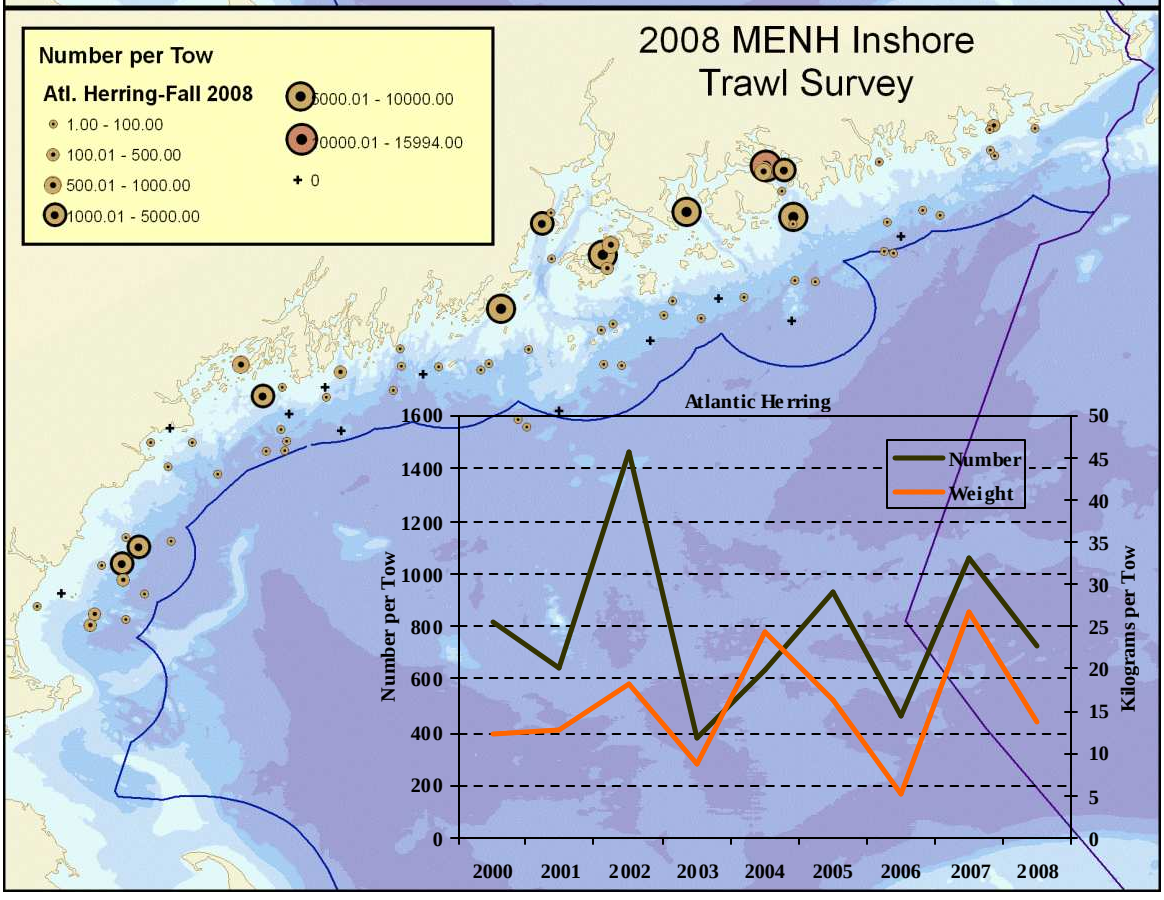
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for halibut, indices calculated for regions 1 through 5; strata 1 through 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	0.177	0.082	0.312	0.165
2001	0.057	0.025	0.494	0.412	2001	0.156	0.088	0.076	0.072
2002	0.244	0.085	0.052	0.028	2002	0.112	0.051	0.023	0.011
2003	0.276	0.065	0.220	0.127	2003	0.135	0.052	0.222	0.118
2004	0.234	0.062	0.286	0.184	2004	0.170	0.089	0.116	0.040
2005	0.217	0.078	0.267	0.116	2005	0.173	0.056	0.157	0.048
2006	0.331	0.077	0.916	0.338	2006	0.178	0.102	0.153	0.086
2007	0.230	0.068	0.376	0.161	2007	0.700	0.392	0.280	0.079
2008	0.274	0.076	0.703	0.282	2008	0.702	0.182	0.734	0.229



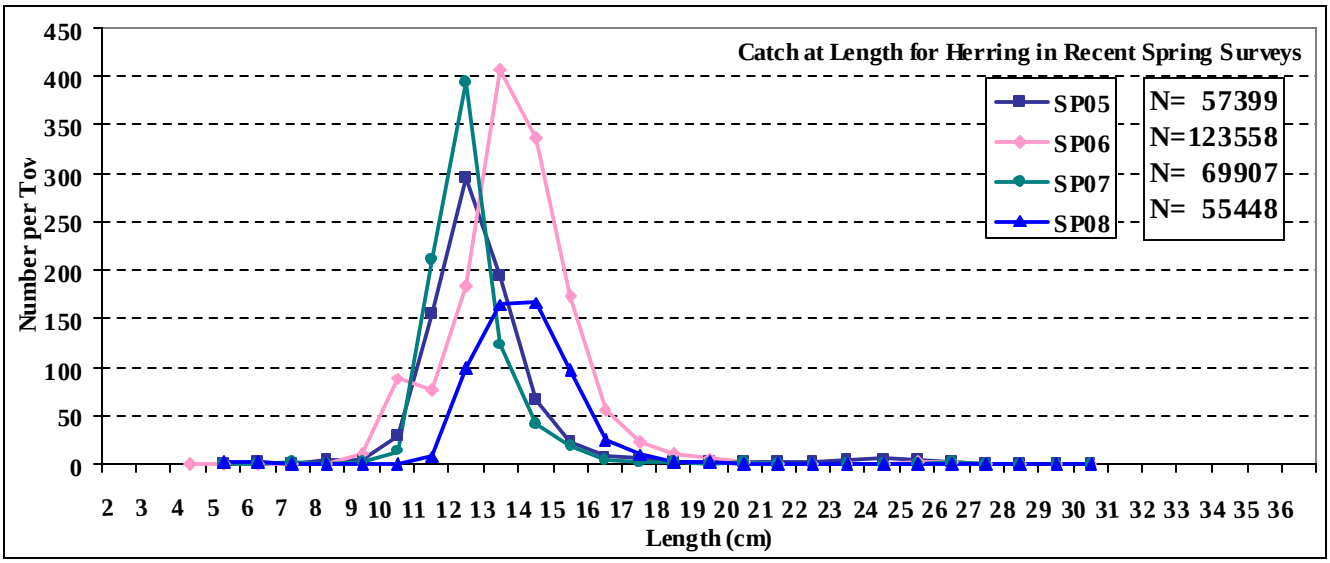


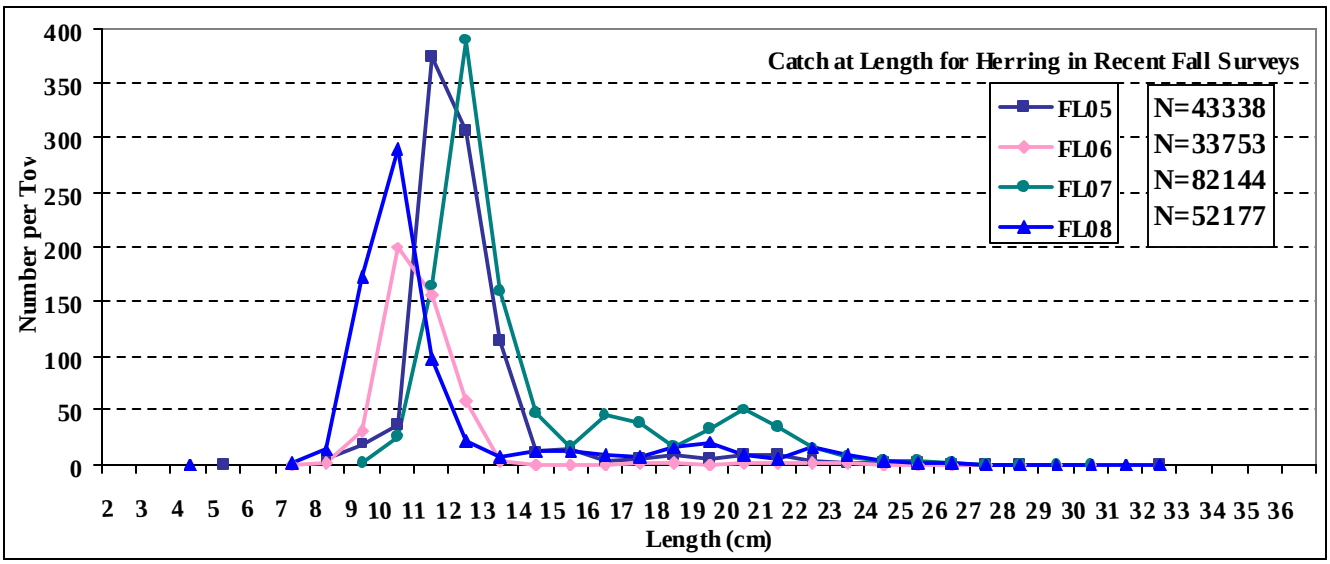
Atlantic herring, *Clupea harengus*





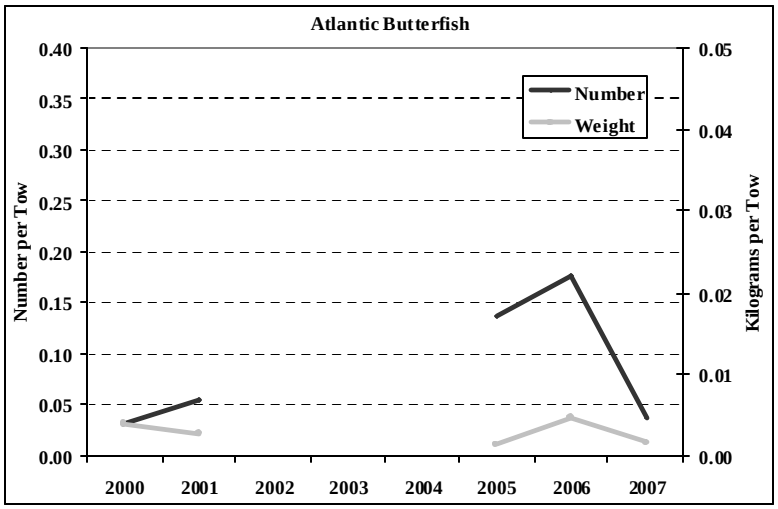
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
For herring: Regions 1 through 5, strata 1 through 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	819.95	280.03	12.42	2.99
2001	863.57	320.16	17.43	6.35	2001	647.59	257.07	12.83	5.45
2002	907.83	277.64	18.16	5.12	2002	1457.16	583.46	18.15	6.45
2003	1734.67	451.80	36.64	9.17	2003	376.73	184.61	8.71	5.23
2004	1709.26	394.93	32.81	7.04	2004	633.36	206.06	24.47	11.50
2005	810.78	285.45	15.25	4.24	2005	928.00	248.14	16.44	6.37
2006	1375.43	320.15	28.22	6.03	2006	461.44	86.01	5.26	1.22
2007	821.49	293.07	13.48	4.70	2007	1059.36	284.90	26.78	13.05
2008	582.13	97.32	13.40	2.16	2008	730.87	195.77	13.58	5.61

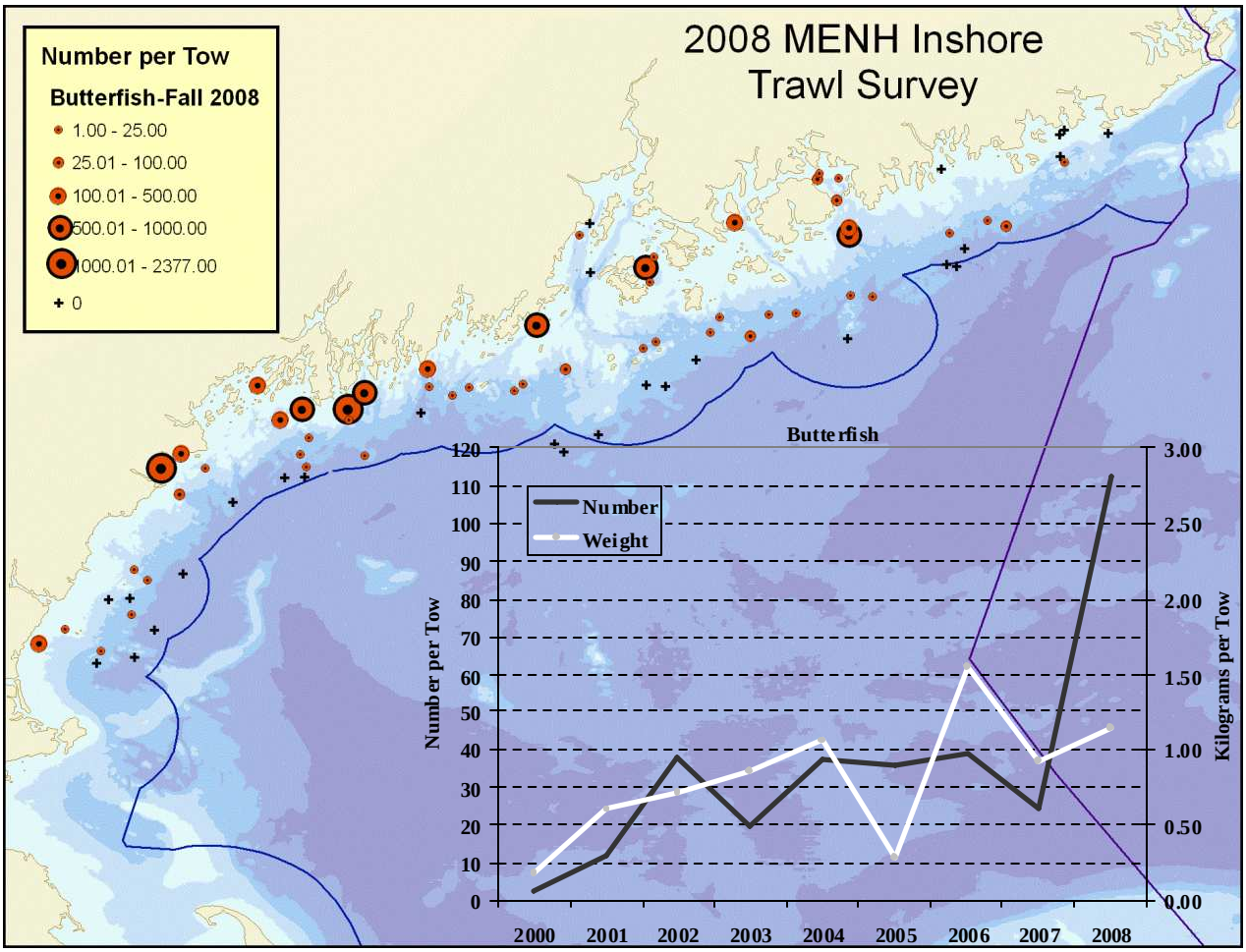


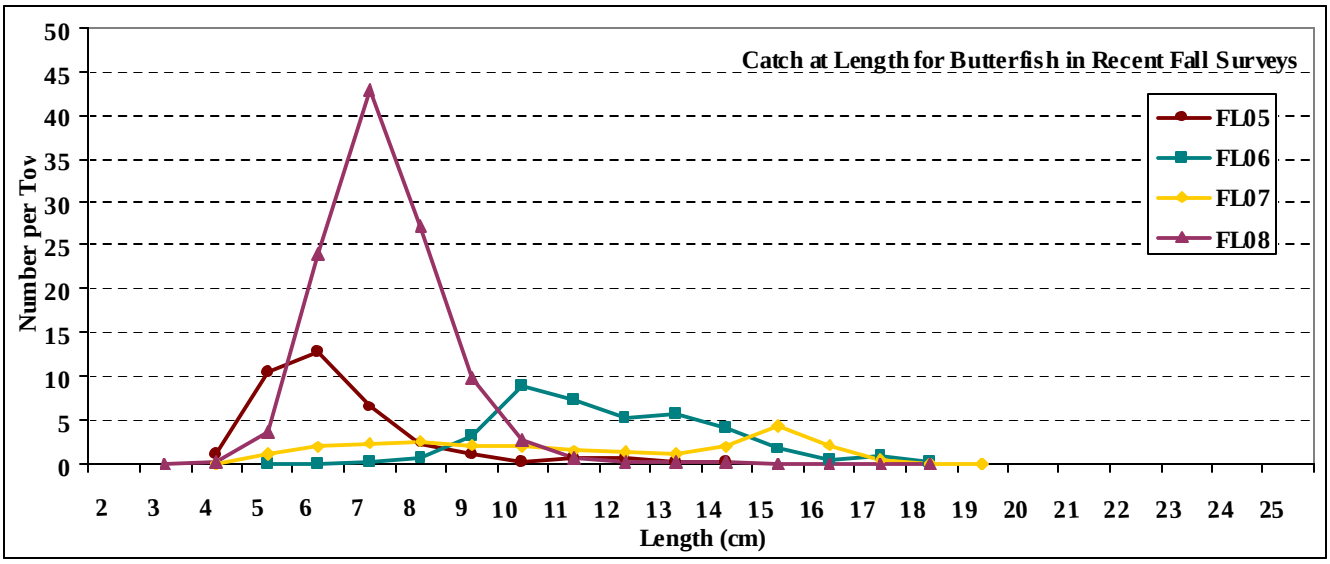


Butterfish, *Peprilus tricanthus*

Fairly rare in the spring surveys, a total of 2 fish were caught in 2001, 3 in 2002, then nothing until 2006 where 13 fish were caught, 15 in 2007, and 3 in spring 2008.

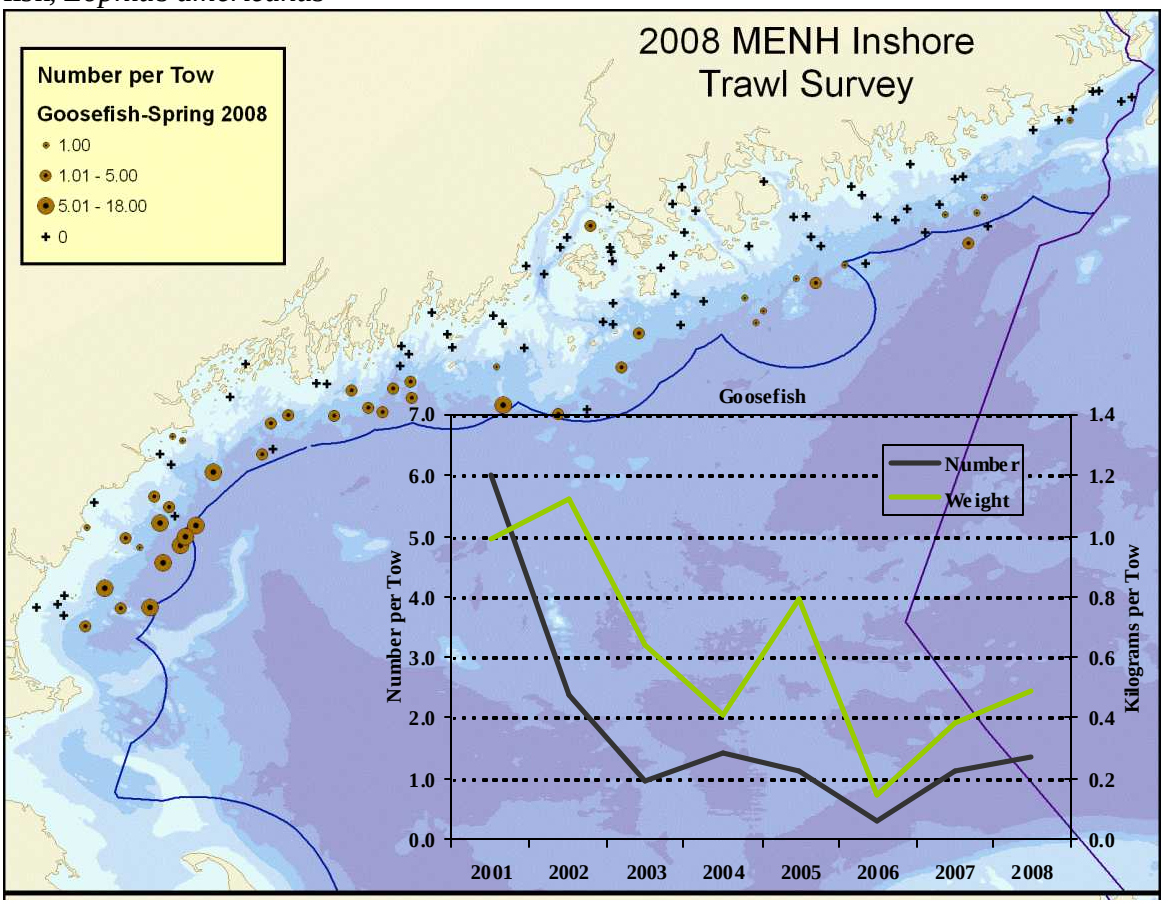


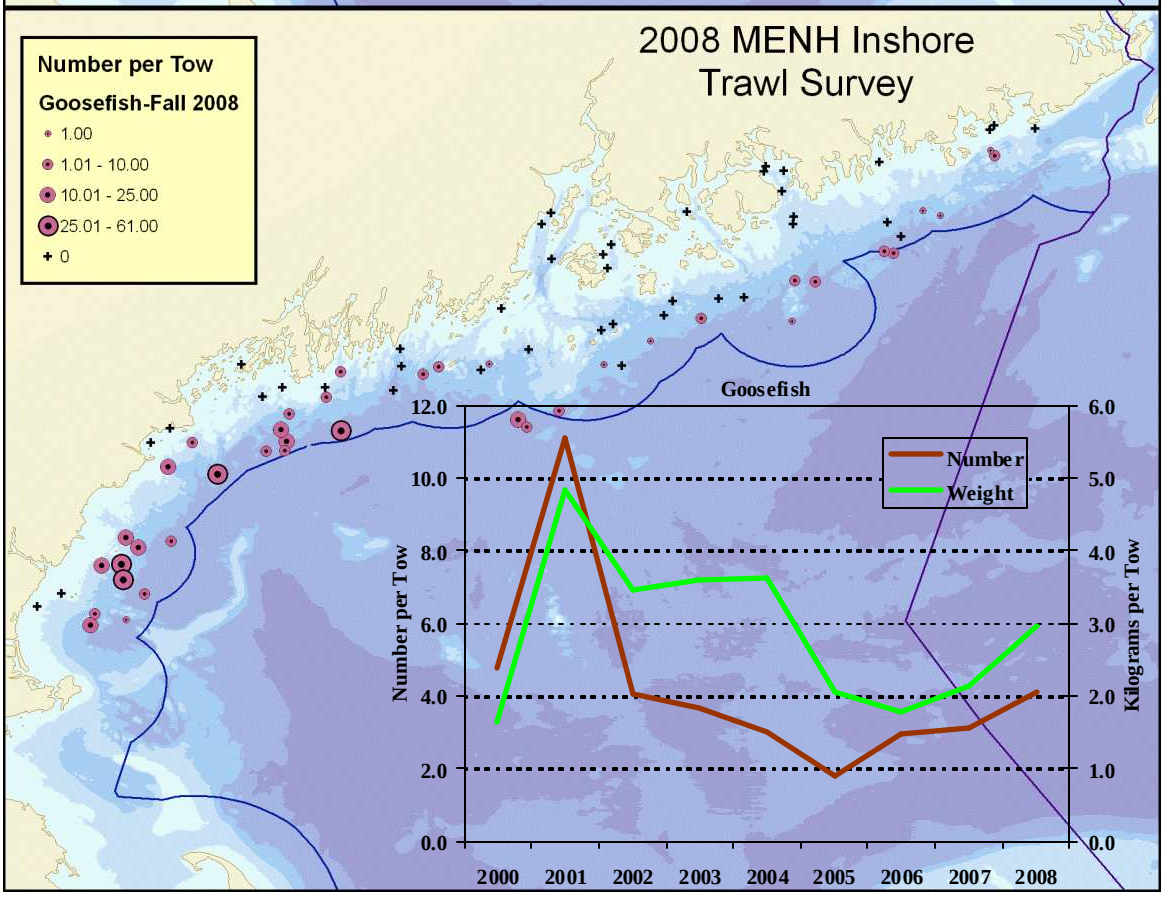




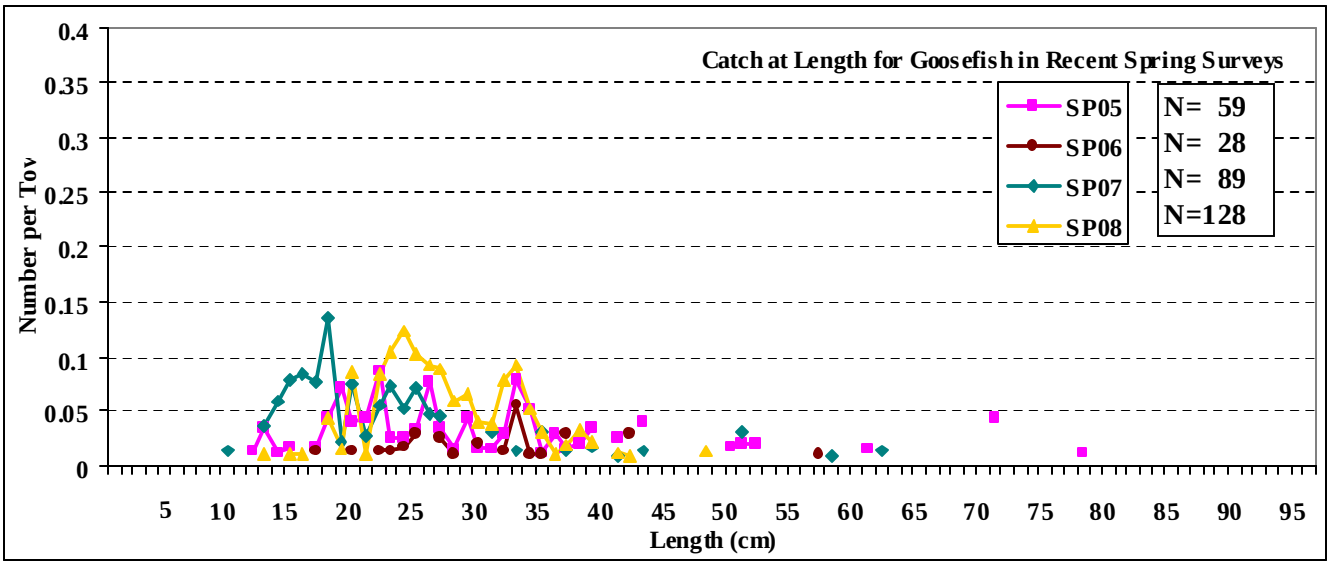
fixed stations not included				
FALL				
for butterfish, indices calculated for regions 1 through 5				
strata 1 through 4 (2003 and up)				
	Stratified Mean			
	Number		Weight	
	Mean	Error	Mean	Error
2000	2.26	0.78	0.18	0.07
2001	11.67	4.38	0.60	0.23
2002	37.92	13.73	0.71	0.21
2003	19.65	4.50	0.86	0.12
2004	37.60	5.91	1.06	0.34
2005	36.16	21.37	0.29	0.13
2006	38.91	10.93	1.55	0.56
2007	24.85	3.71	0.92	0.11
2008	112.10	42.00	1.14	0.37

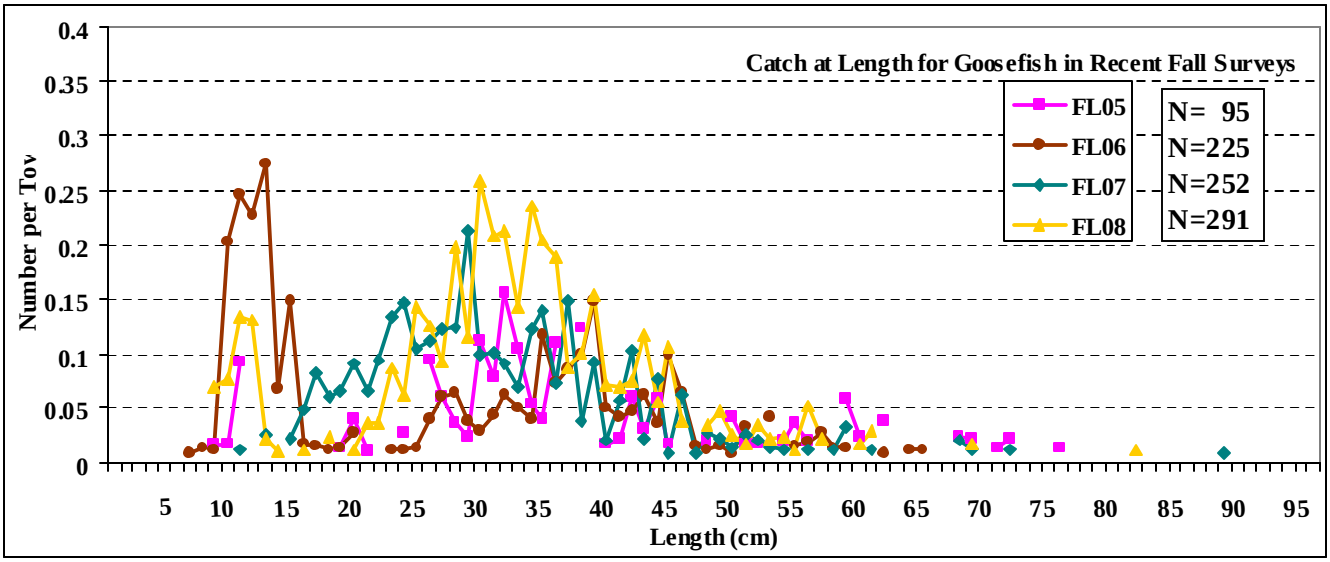
Goosefish, *Lophius americanus*



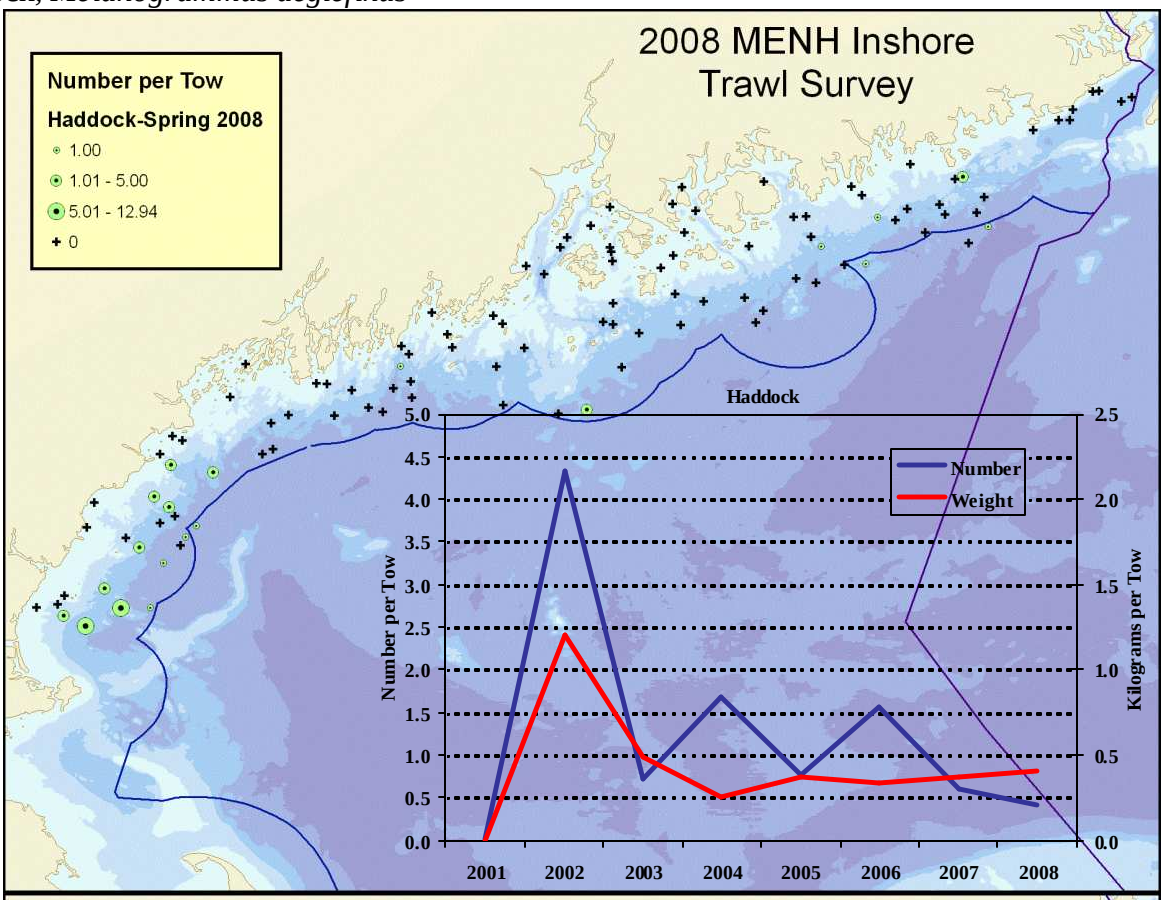


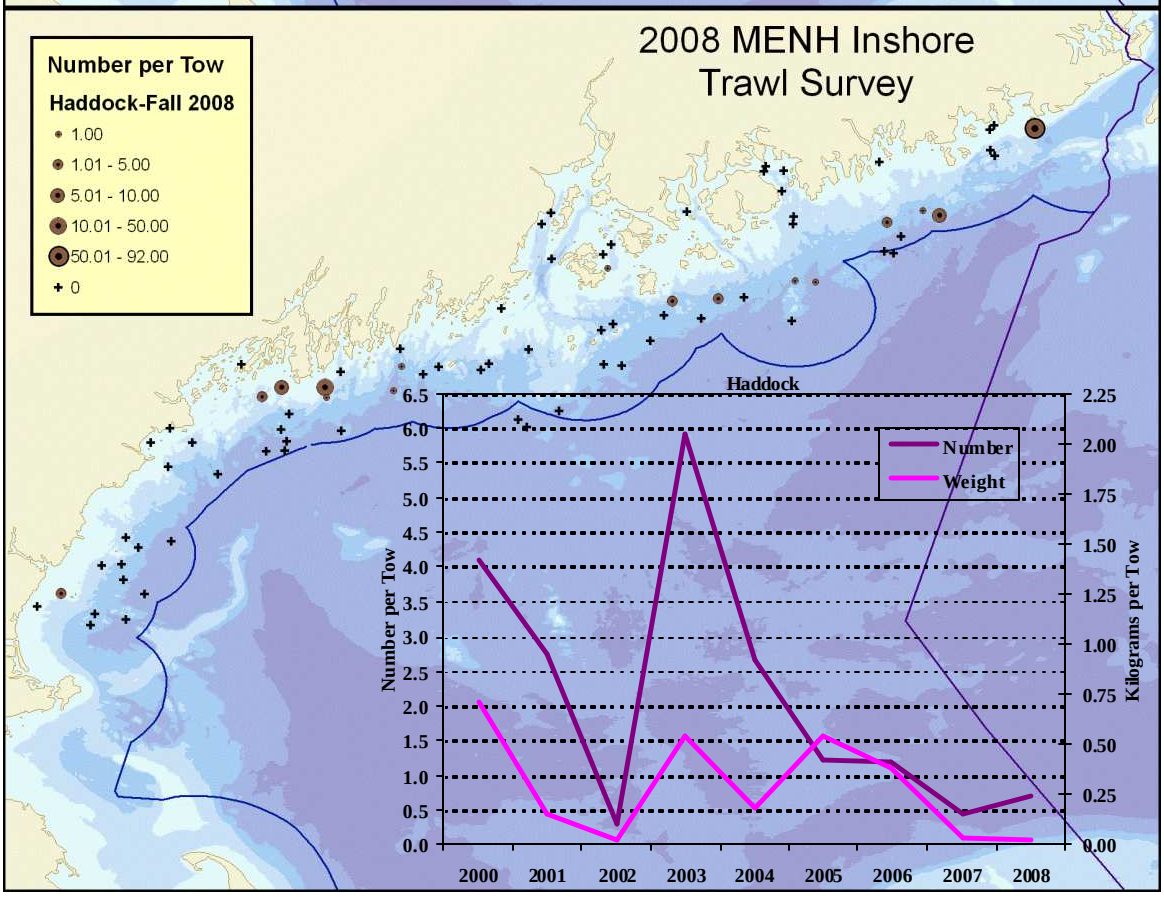
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for goosefish, indices calculated for regions 1 through 5									
strata 1 through 4 (from 2003 on)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	4.8	0.61	1.65	0.28
2001	6.0	0.91	0.99	0.15	2001	11.1	1.56	4.83	0.50
2002	2.4	0.33	1.12	0.17	2002	4.1	1.13	3.45	1.14
2003	1.0	0.14	0.64	0.18	2003	3.7	0.64	3.60	0.80
2004	1.4	0.17	0.41	0.12	2004	3.0	0.52	3.63	0.84
2005	1.1	0.16	0.79	0.15	2005	1.8	0.25	2.04	0.47
2006	0.3	0.06	0.15	0.03	2006	2.9	0.31	1.79	0.20
2007	1.1	0.18	0.38	0.10	2007	3.1	0.43	2.13	0.35
2008	1.37	0.19	0.49	0.08	2008	4.10	0.70	2.96	0.41



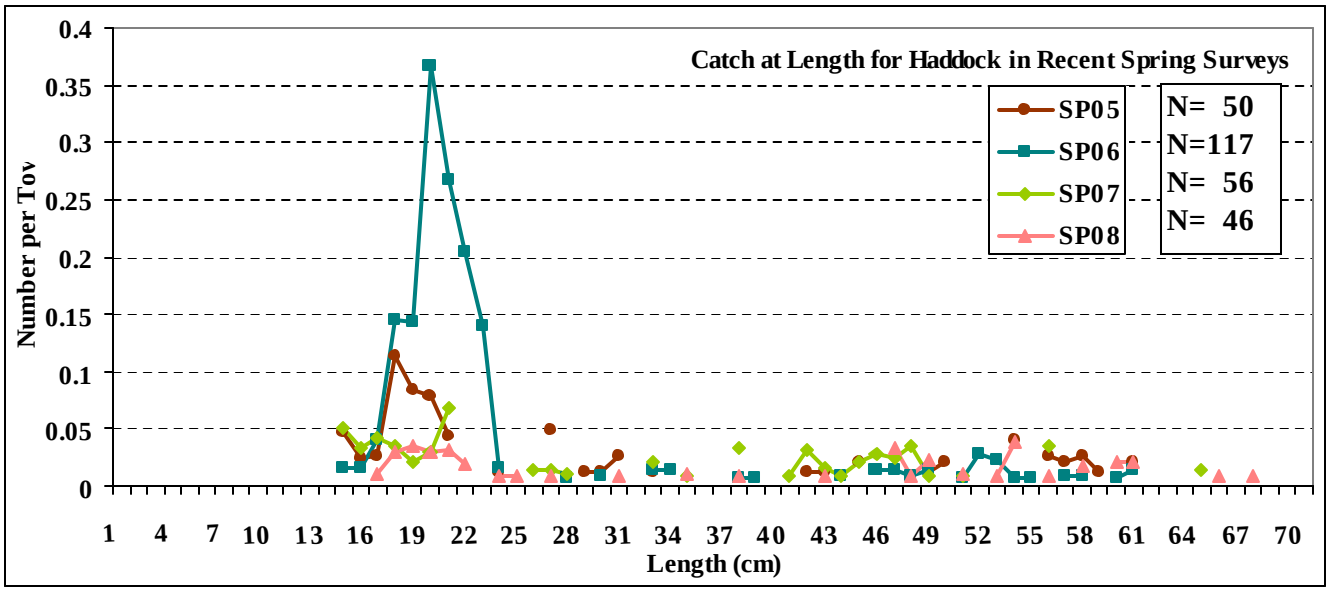


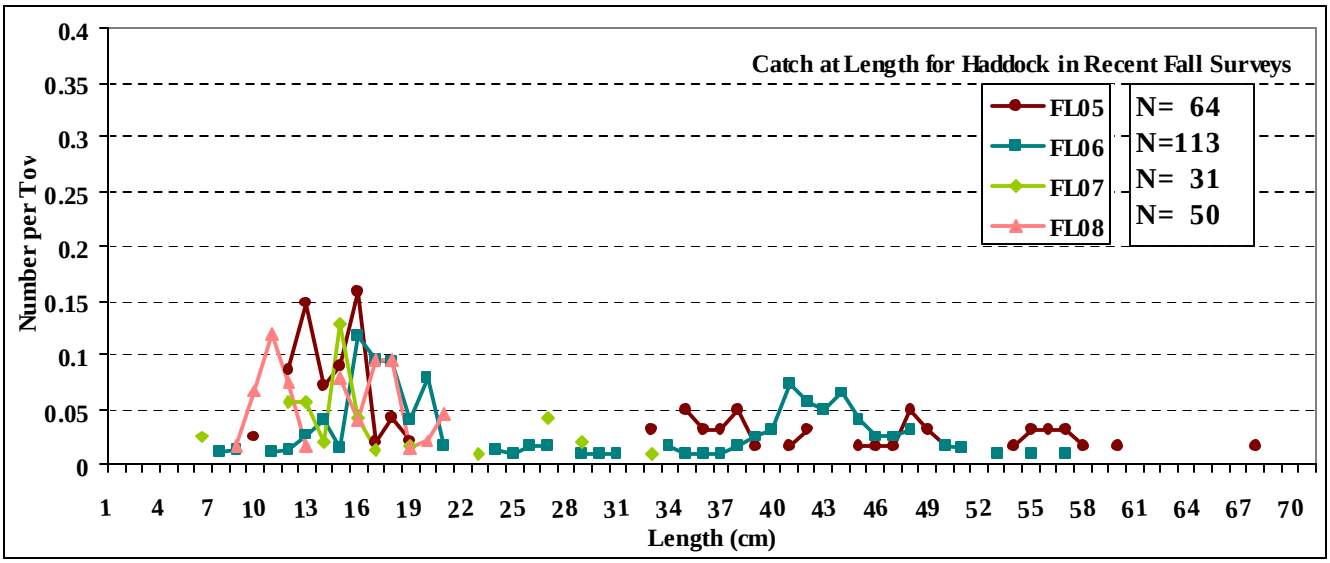
Haddock, *Melanogrammus aeglefinus*



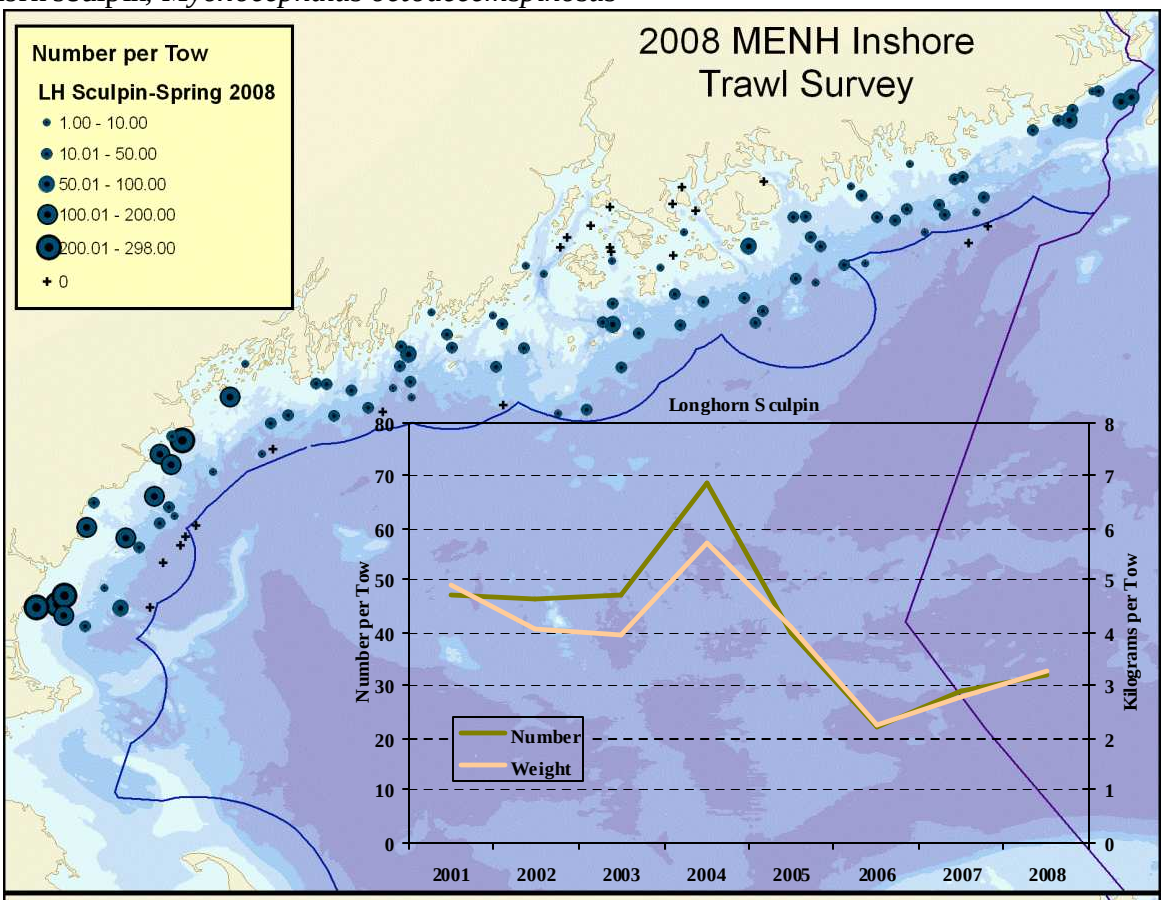


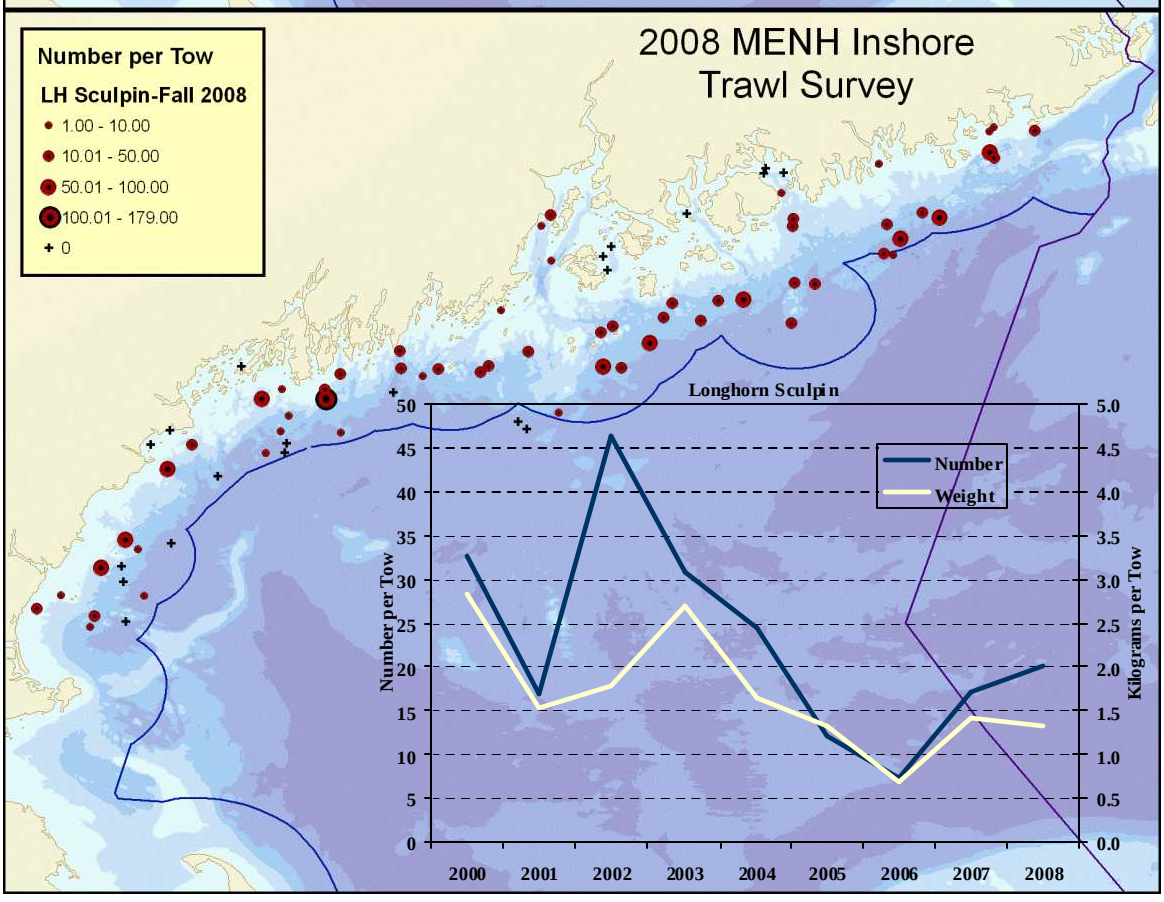
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for haddock, indices calculated for regions 1 through 5									
Strata 1 though 4 (2003 and up)									
SPRING					FALL				
	Number		Weight			Number		Weight	
	mean	error	mean	error		mean	error	mean	error
					2000	4.10	1.27	0.71	0.47
2001	0.016	0.016	0.000	0.000	2001	2.75	1.35	0.15	0.07
2002	4.331	1.247	1.203	0.315	2002	0.29	0.15	0.02	0.02
2003	0.712	0.404	0.462	0.307	2003	5.94	3.90	0.54	0.24
2004	1.630	0.621	0.101	0.044	2004	2.65	1.04	0.18	0.07
2005	0.634	0.303	0.122	0.065	2005	1.23	0.60	0.54	0.52
2006	1.773	1.348	0.284	0.139	2006	1.18	0.62	0.38	0.35
2007	0.400	0.109	0.227	0.084	2007	0.44	0.23	0.03	0.01
2008	0.427	0.162	0.367	0.154	2008	0.68	0.26	0.02	0.01



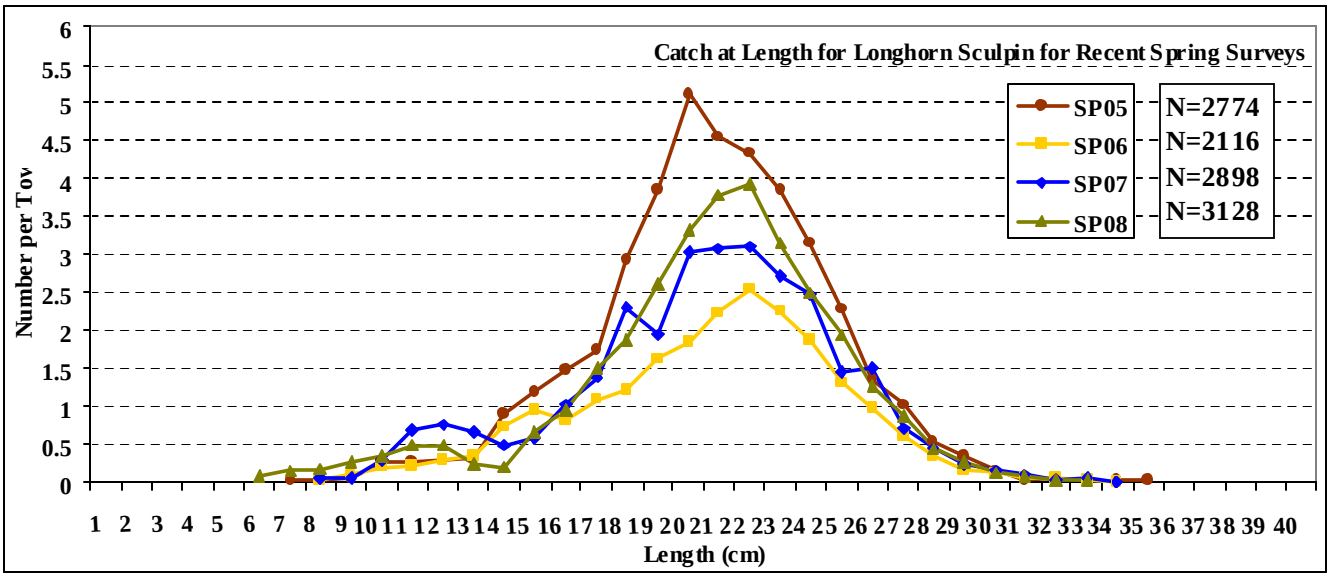


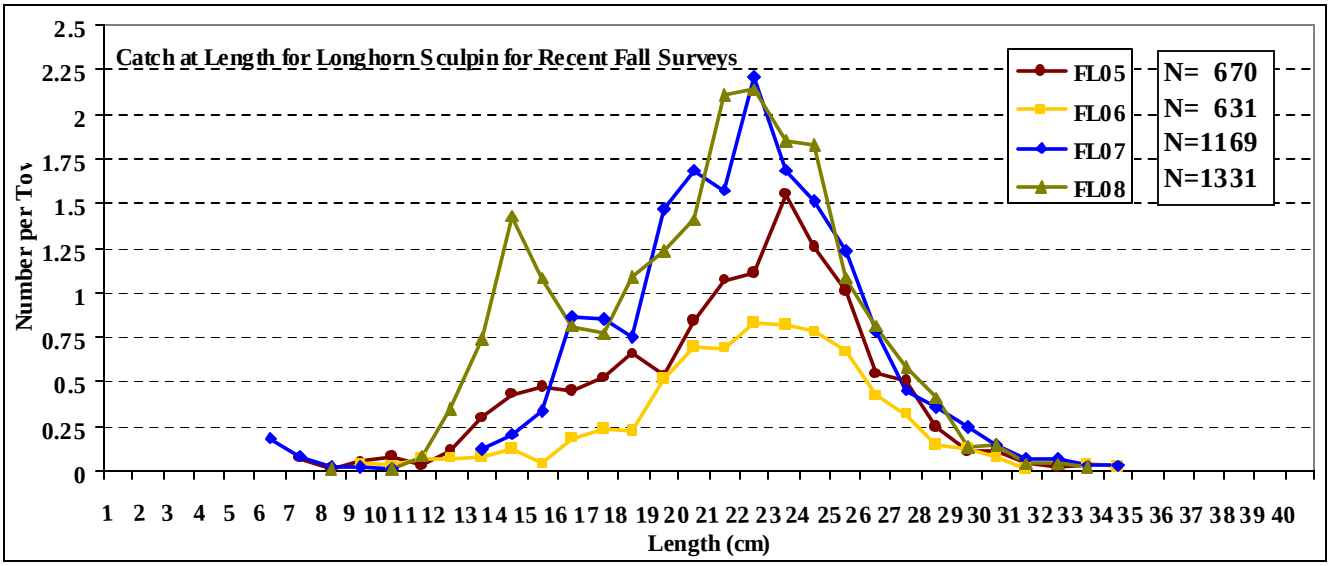
Longhorn sculpin, *Myoxocephalus octodecemspinosus*



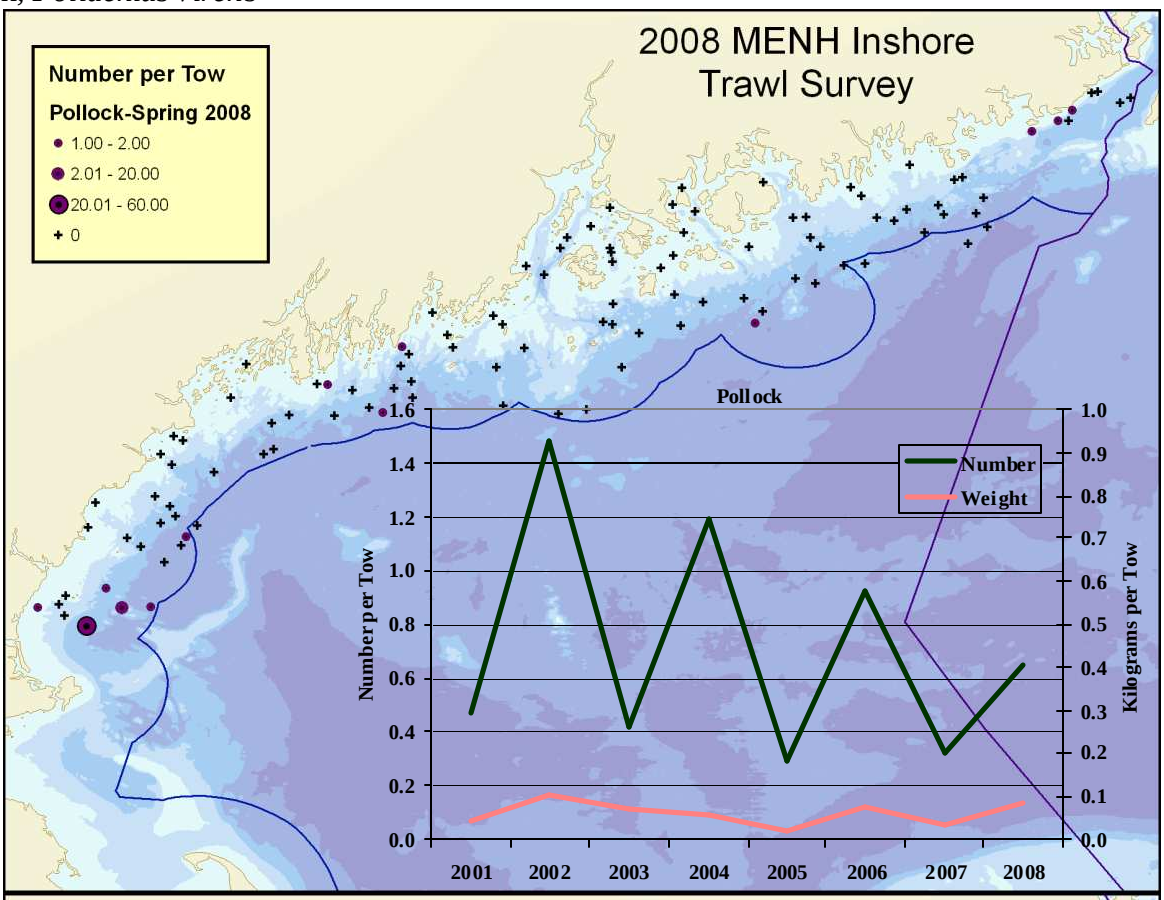


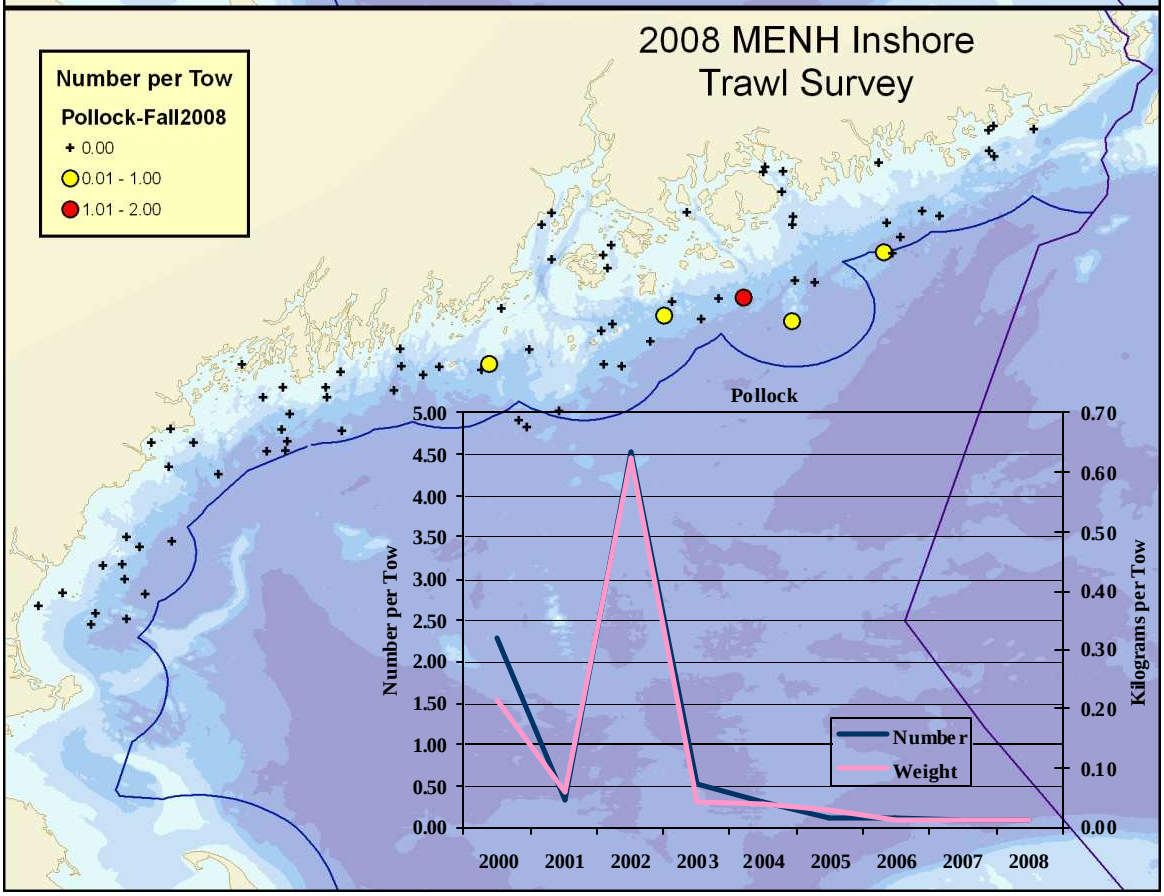
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for LH Sculpin, indices calculated for regions 1 through 5									
strata 1 through 4 (2003 and up)									
SPRING					FALL				
Stratified Mean					Stratified Mean				
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	32.64	8.18	2.84	0.38
2001	47.28	5.67	4.91	0.53	2001	17.05	4.05	1.53	0.32
2002	46.28	7.28	4.07	0.53	2002	46.49	8.24	1.79	0.51
2003	47.37	5.25	3.93	0.50	2003	30.72	1.73	2.69	0.17
2004	68.73	5.83	5.70	0.50	2004	24.45	4.55	1.64	0.29
2005	40.09	3.89	4.10	0.37	2005	12.20	2.89	1.32	0.28
2006	21.86	3.79	2.22	0.34	2006	7.27	0.97	0.70	0.10
2007	29.06	5.02	2.77	0.46	2007	17.16	3.32	1.40	0.28
2008	31.61	3.51	3.28	0.39	2008	20.25	3.00	1.32	0.26



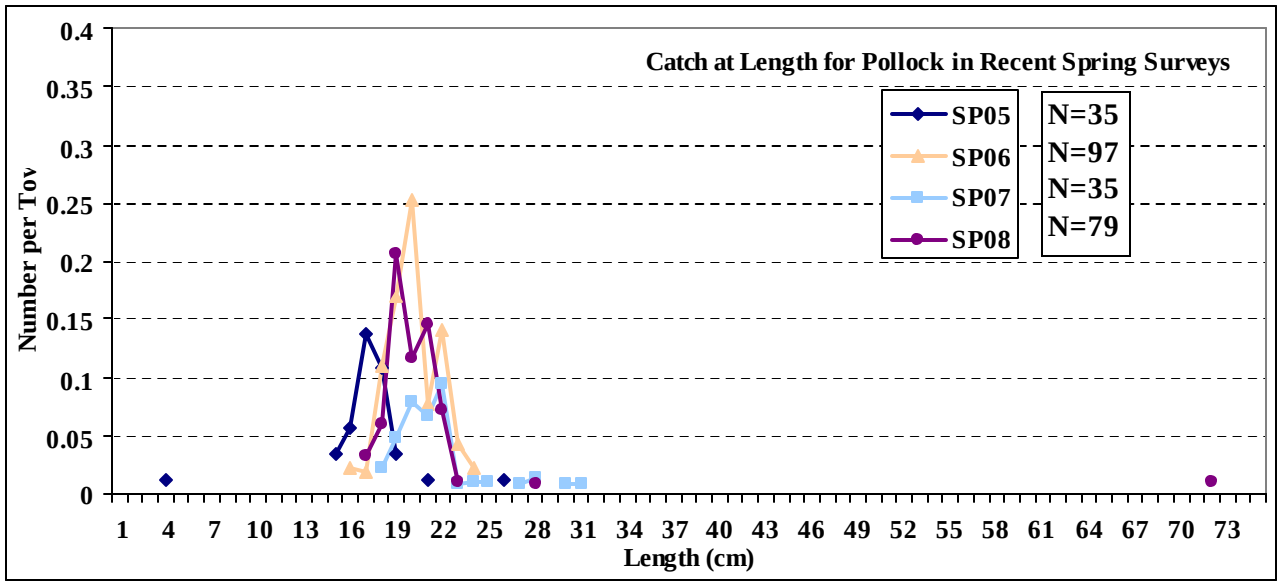


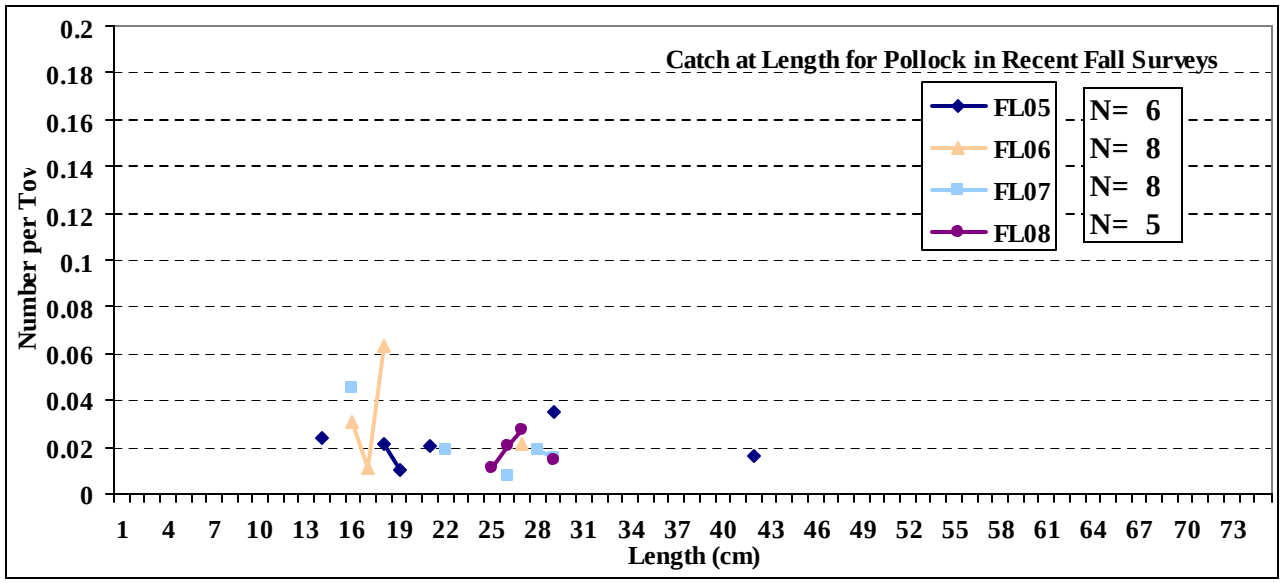
Pollock, *Pollachius virens*



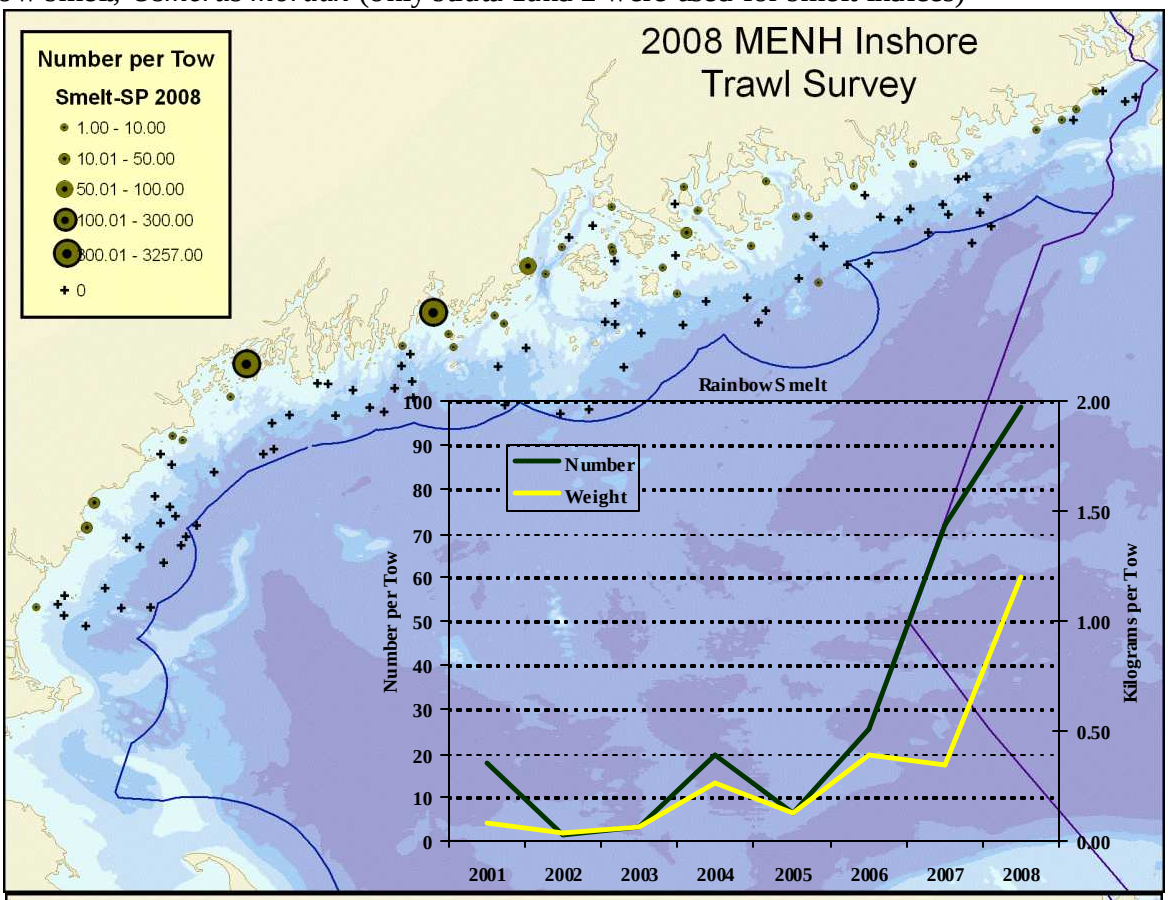


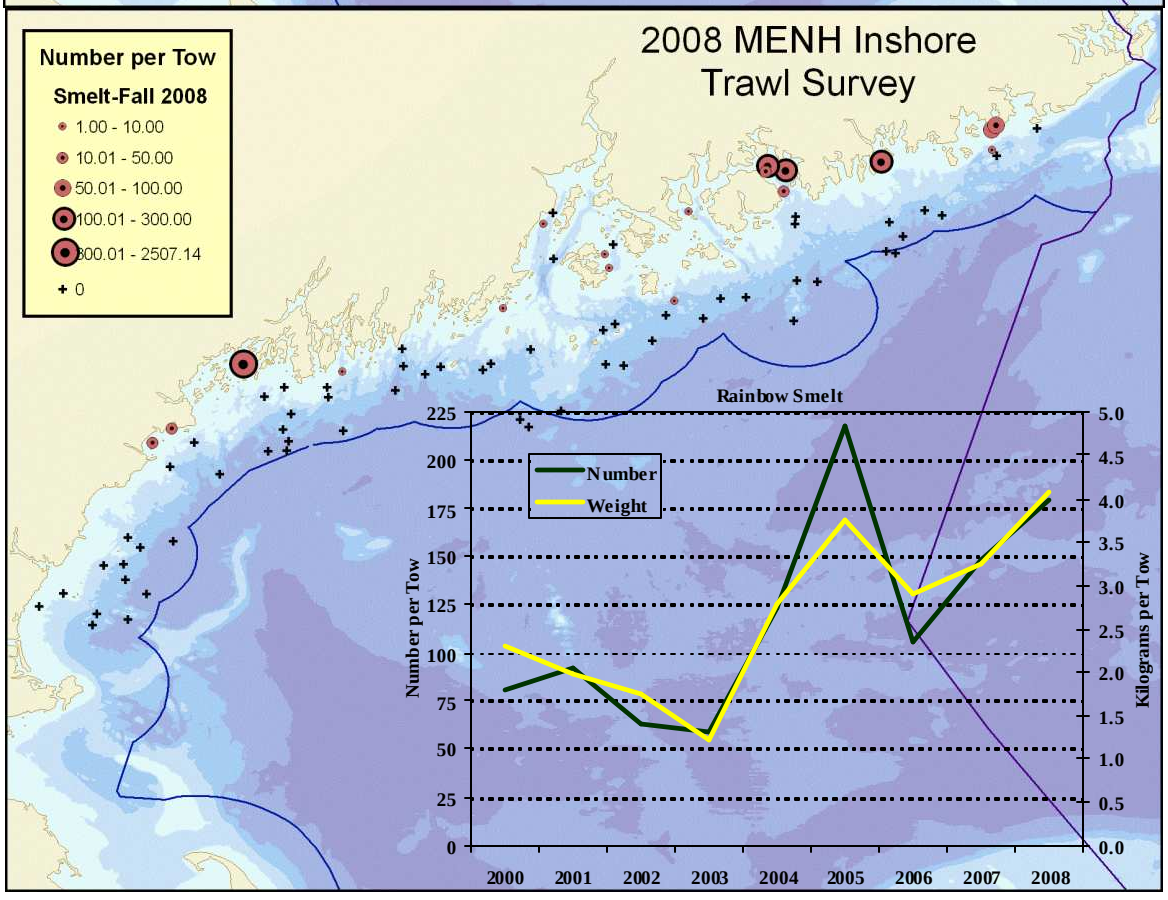
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for pollock, indices calculated for regions 1 through 5; strata 1 through 4 (2003 on)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	2.272	1.236	0.217	0.067
2001	0.470	0.193	0.044	0.016	2001	0.333	0.113	0.061	0.016
2002	1.484	0.477	0.106	0.034	2002	4.538	3.153	0.626	0.458
2003	0.418	0.138	0.069	0.043	2003	0.530	0.202	0.042	0.016
2004	1.192	0.357	0.056	0.015	2004	0.298	0.115	0.041	0.012
2005	0.293	0.266	0.019	0.016	2005	0.128	0.055	0.030	0.016
2006	0.920	0.502	0.075	0.043	2006	0.113	0.056	0.010	0.005
2007	0.322	0.172	0.033	0.015	2007	0.081	0.037	0.015	0.009
2008	0.650	0.470	0.086	0.054	2008	0.072	0.039	0.013	0.006



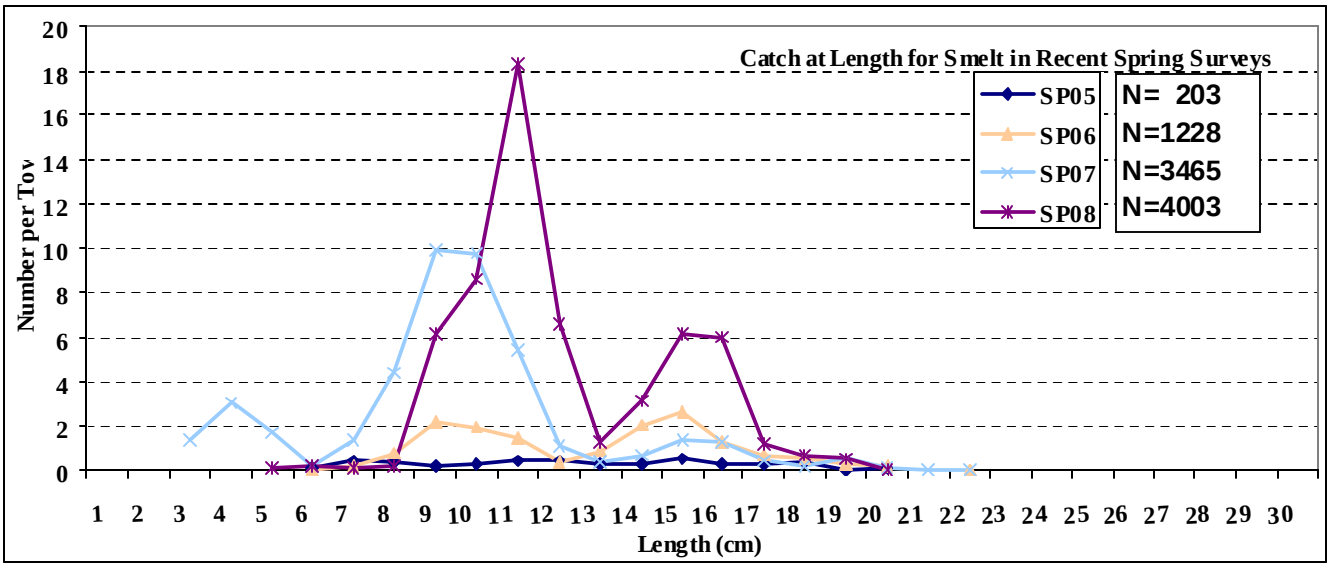


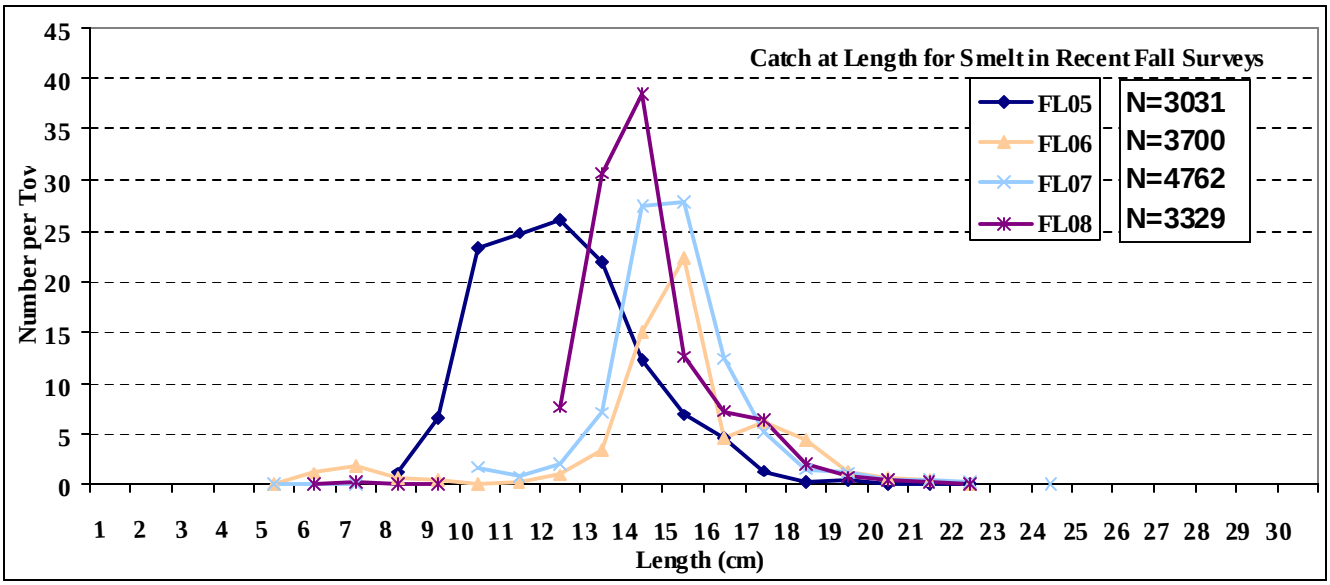
Rainbow smelt, *Osmerus mordax* (only strata 1and 2 were used for smelt indices)



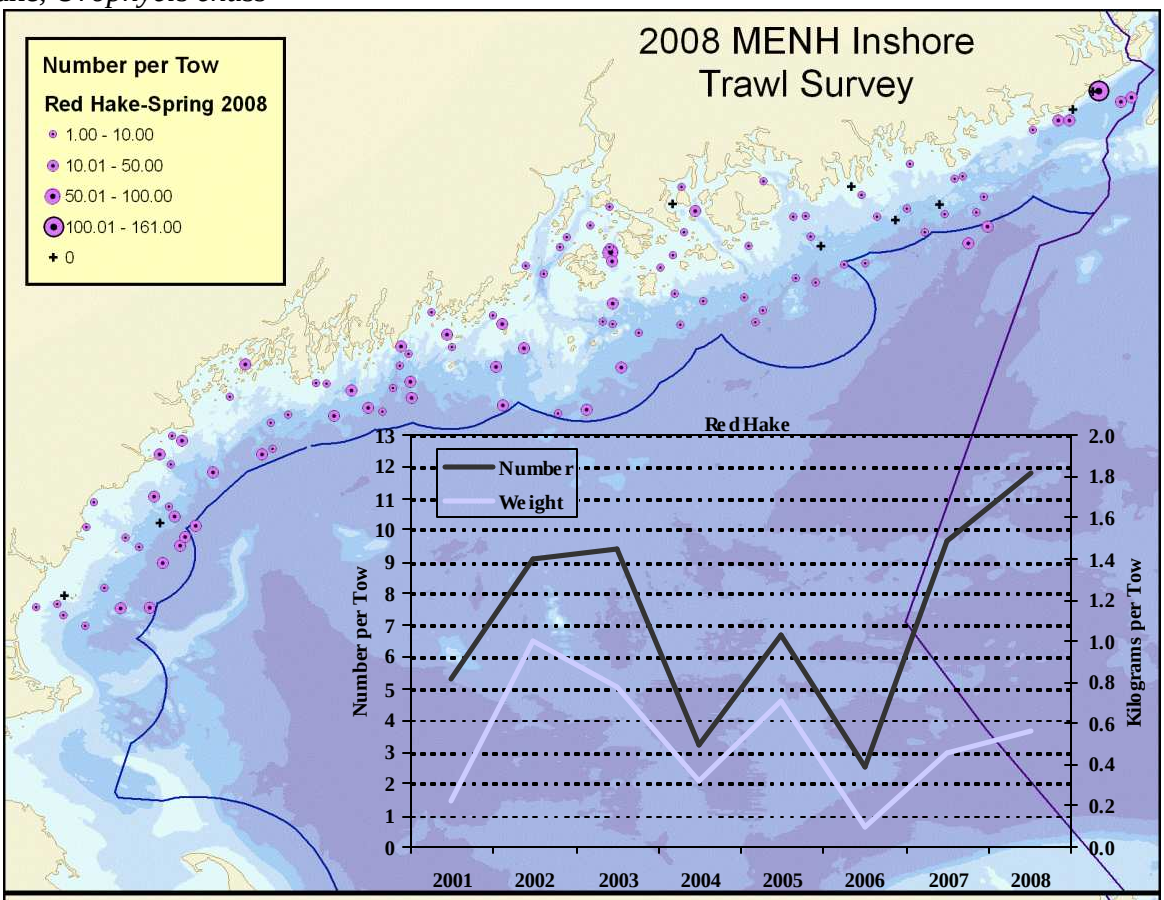


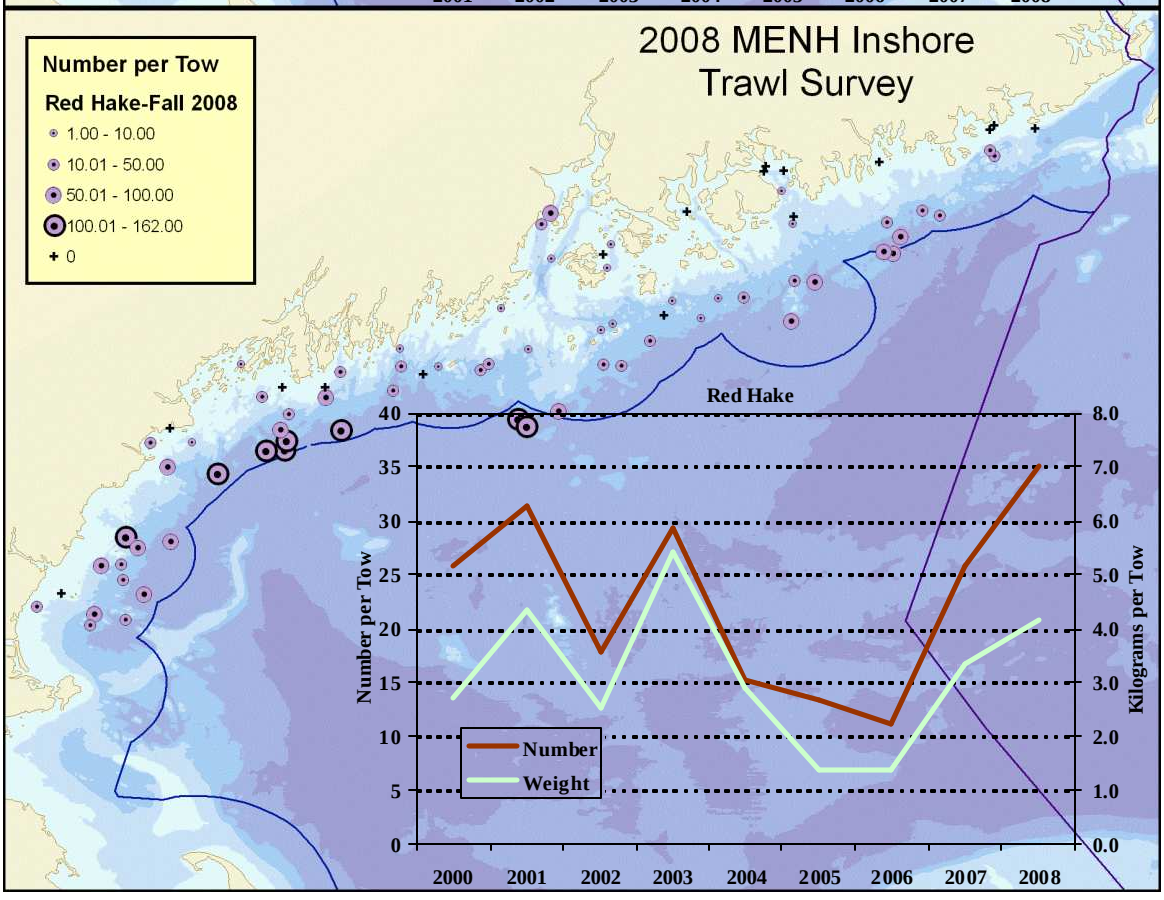
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for smelt, indices calculated for regions 1 through 5									
strata 1 through 3									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	81.00	38.77	2.32	1.28
2001	18.07	11.76	0.09	0.05	2001	91.94	17.99	1.99	0.41
2002	1.34	0.53	0.04	0.02	2002	63.24	49.51	1.74	1.32
2003	3.20	1.16	0.06	0.02	2003	58.18	16.65	1.20	0.35
2004	19.50	10.88	0.26	0.12	2004	123.81	42.44	2.77	0.92
2005	6.68	2.14	0.13	0.06	2005	217.23	48.69	3.76	0.97
2006	25.62	9.20	0.40	0.14	2006	105.85	58.25	2.89	1.39
2007	72.07	37.68	0.34	0.14	2007	148.49	85.05	3.25	1.70
2008	98.79	78.88	1.20	0.91	2008	179.87	156.18	4.07	3.34



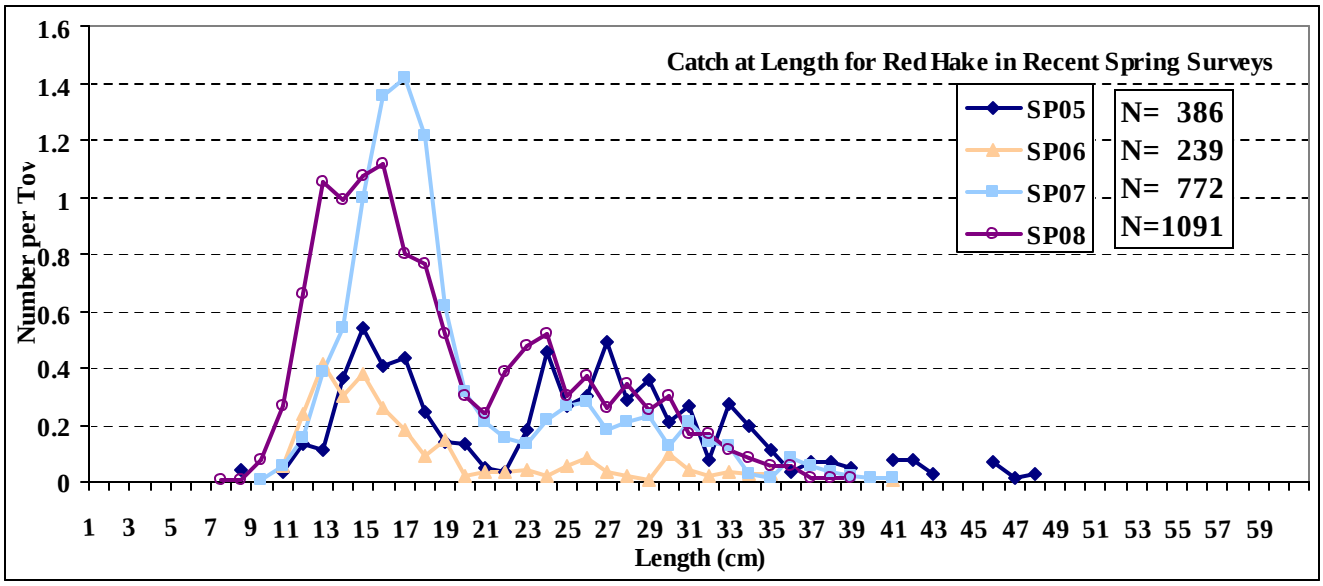


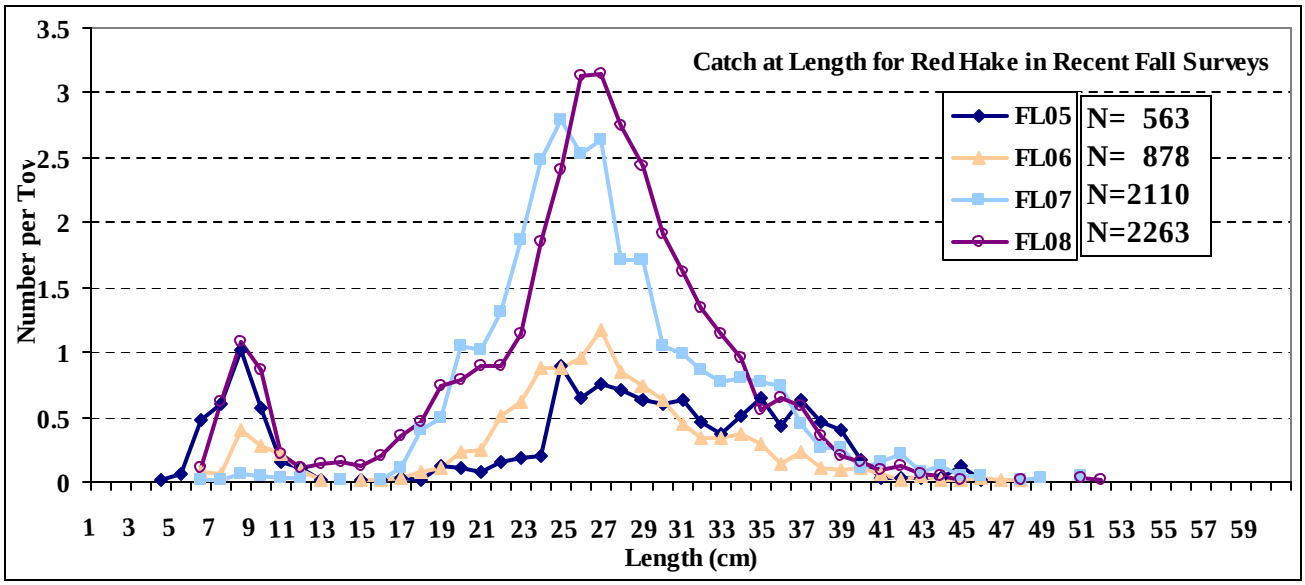
Red hake, *Urophycis chuss*



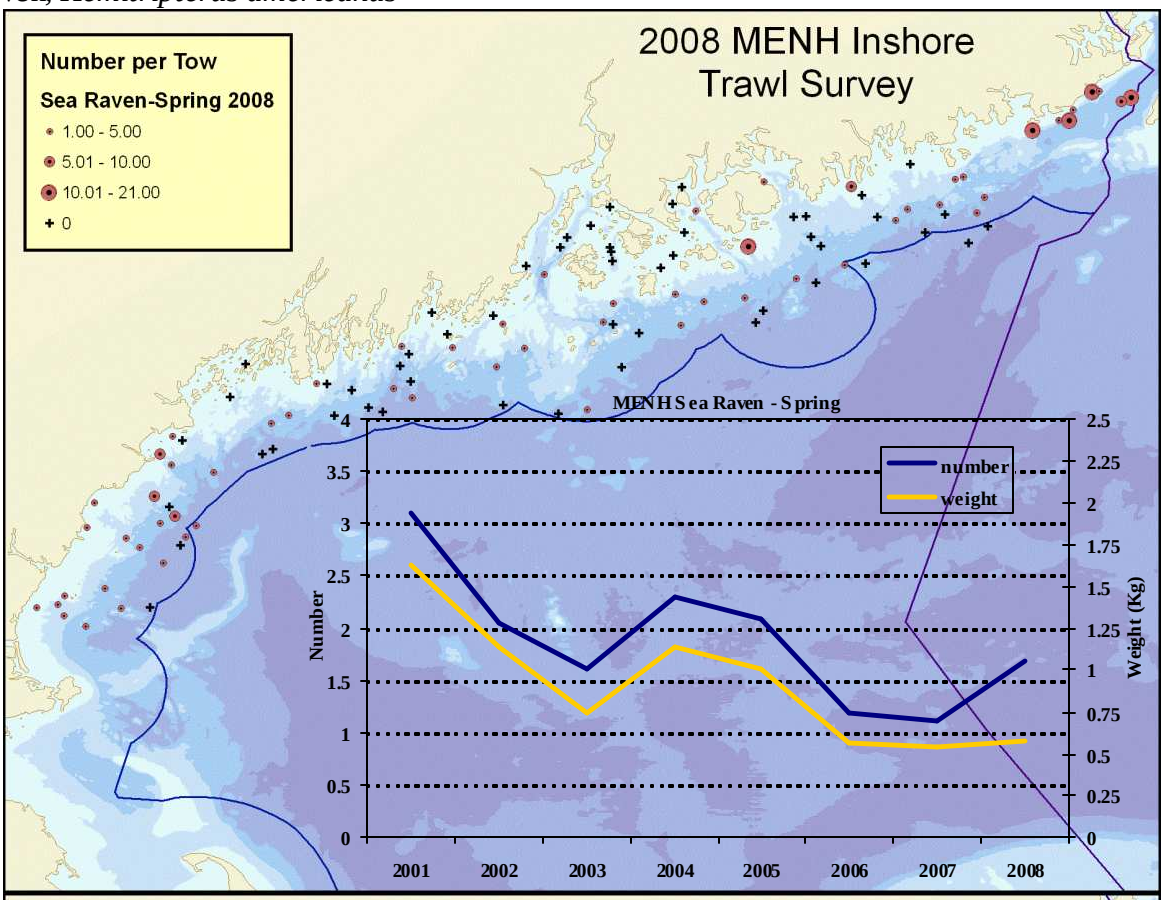


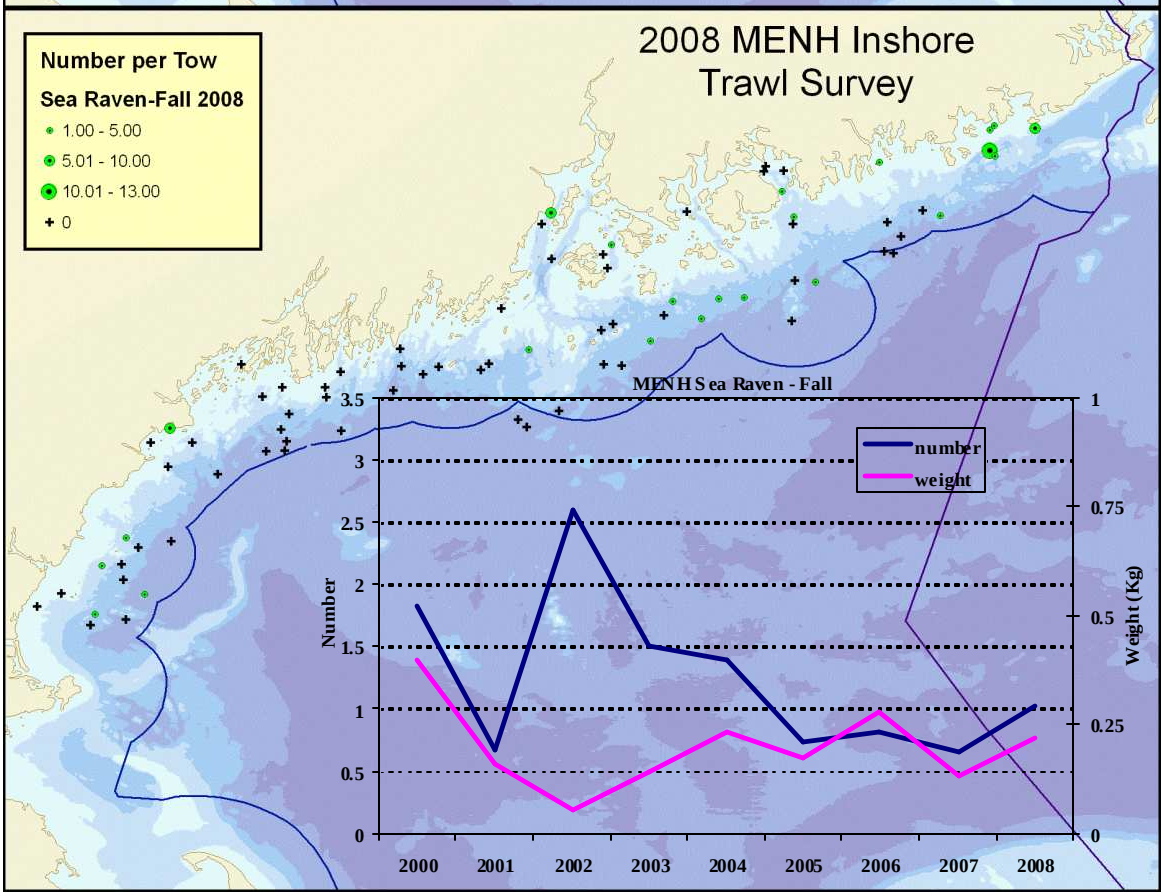
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for red hake, indices calculated for regions 1 through 5; strata 1 through 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	25.78	3.06	2.70	0.31
2001	5.30	1.14	0.22	0.08	2001	31.33	4.52	4.34	0.61
2002	9.08	1.07	1.00	0.11	2002	17.92	3.24	2.51	0.50
2003	9.45	1.46	0.78	0.17	2003	29.38	2.89	5.43	0.53
2004	3.21	0.35	0.31	0.05	2004	15.30	2.12	2.91	0.49
2005	6.74	0.55	0.71	0.05	2005	13.41	1.60	1.37	0.26
2006	2.56	0.42	0.10	0.02	2006	11.18	1.94	1.37	0.21
2007	9.70	1.48	0.46	0.10	2007	25.86	4.21	3.35	0.59
2008	11.82	1.80	0.57	0.07	2008	35.07	4.42	4.16	0.46



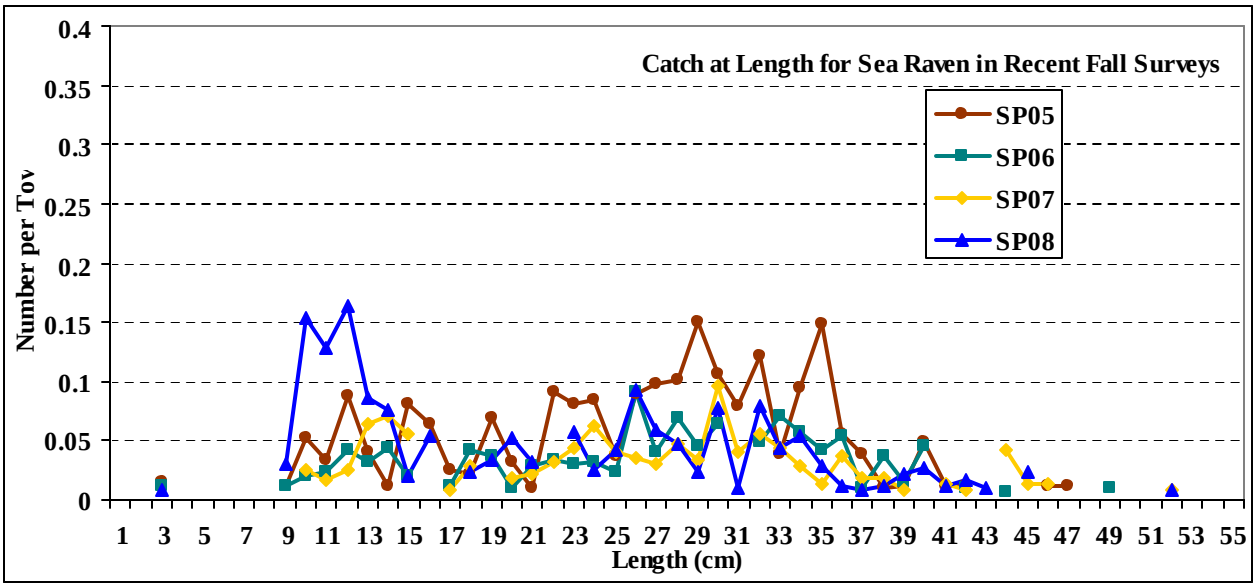


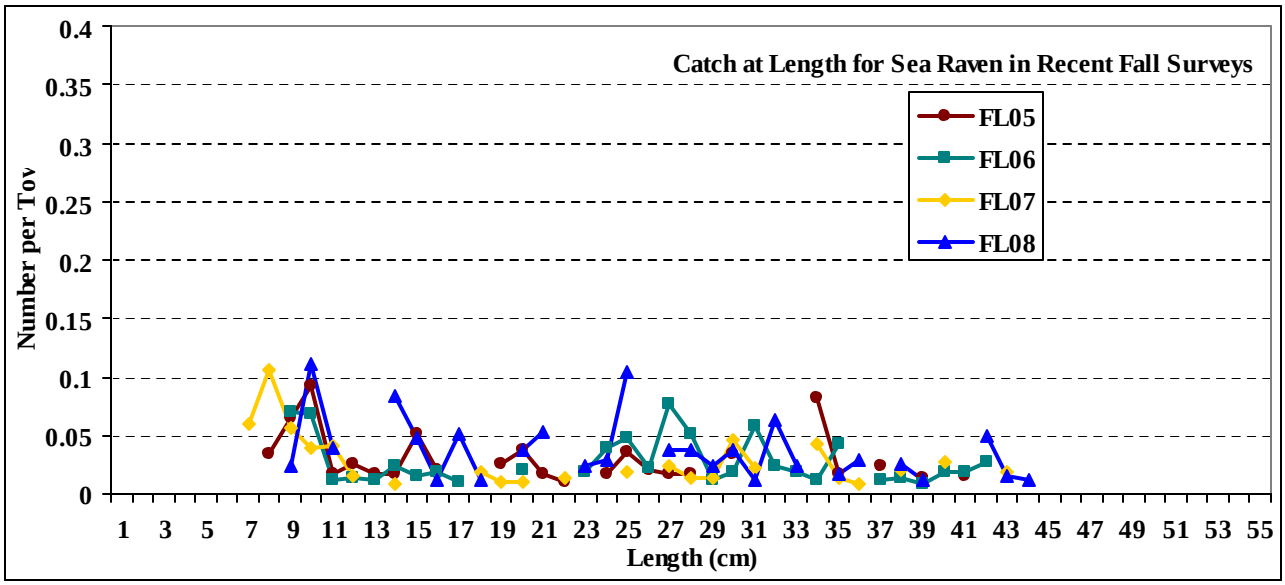
Sea raven, *Hemitripterus americanus*



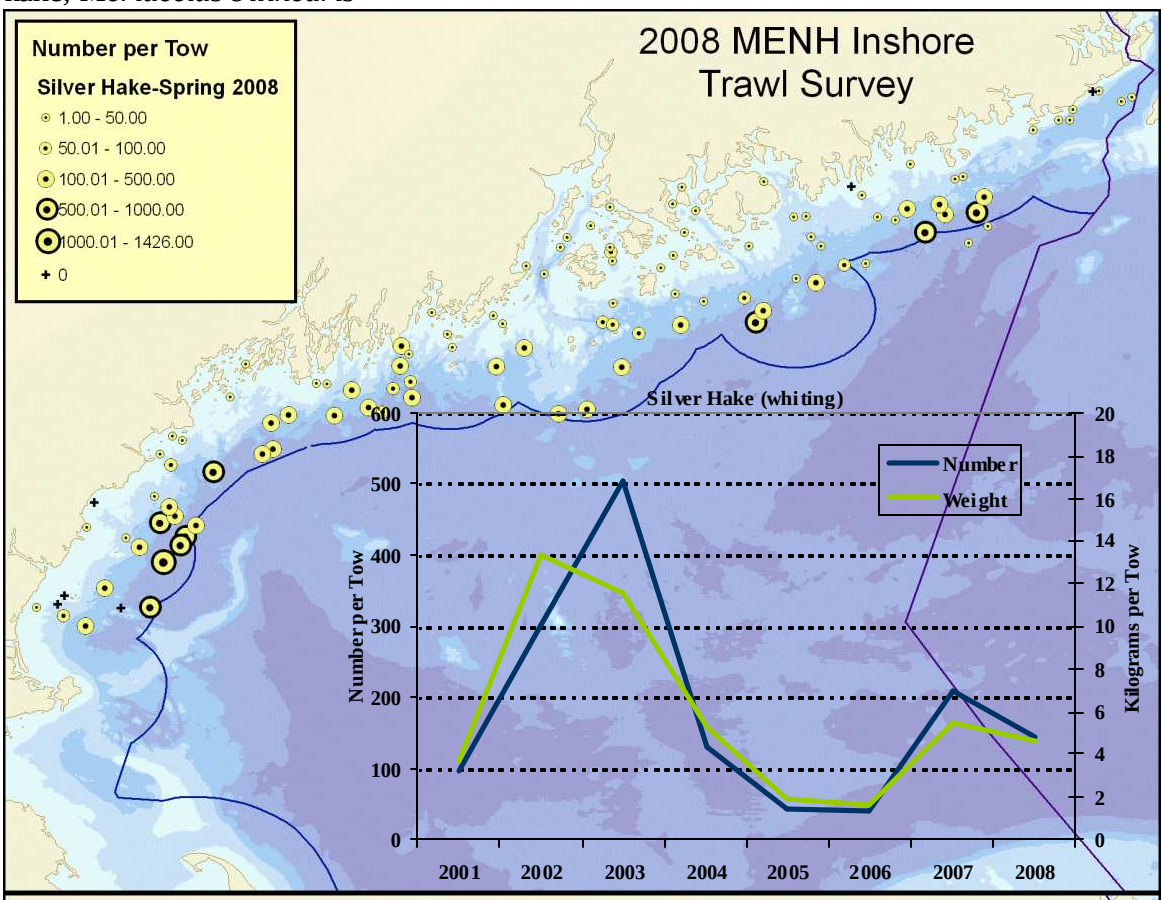


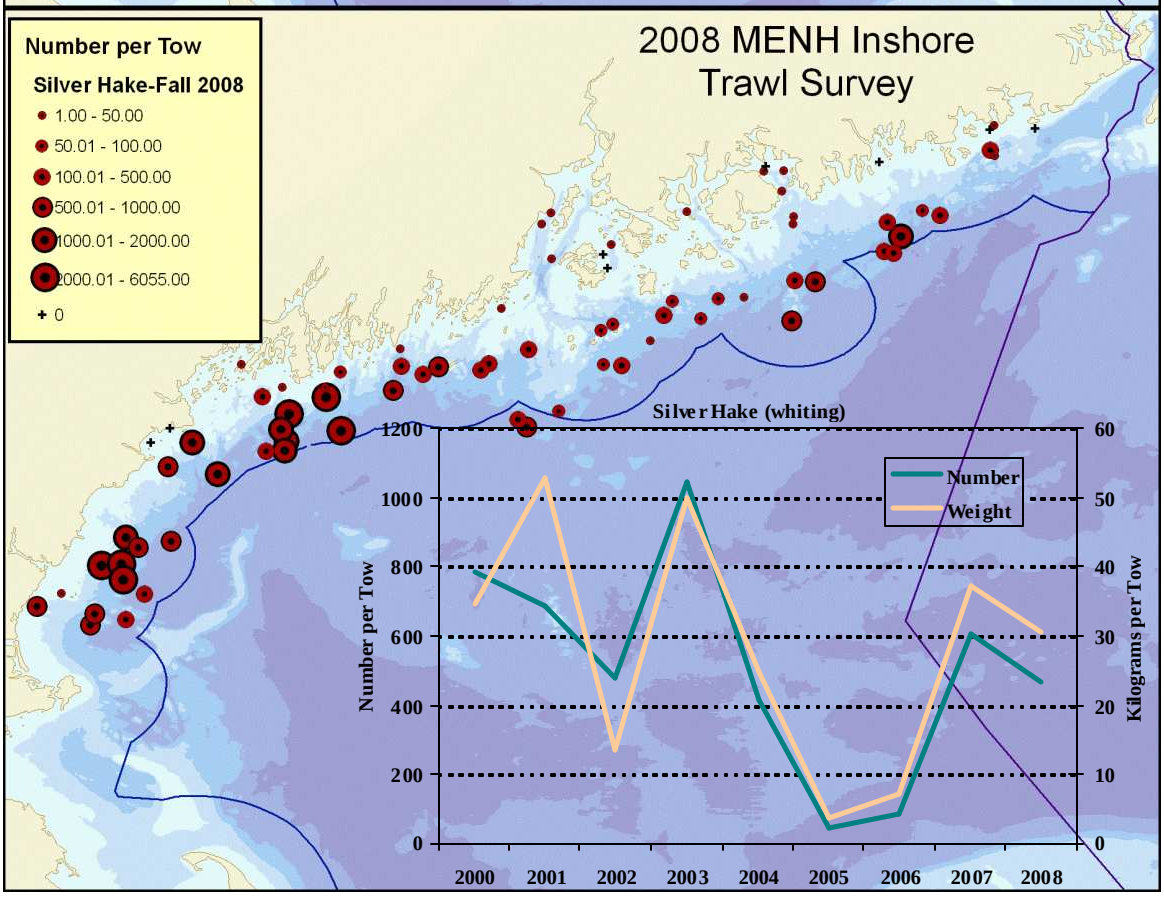
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for sea raven, indices calculated for regions 1 through 5 and strata 1 through 4									
SPRING					FALL				
Stratified Mean			Stratified Mean		Stratified Mean			Stratified Mean	
	number		weight			number		weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	1.83	0.30	0.40	0.09
2001	3.09	1.01	1.63	0.55	2001	0.67	0.13	0.16	0.06
2002	2.06	0.34	1.14	0.22	2002	2.59	0.84	0.05	0.02
2003	1.62	0.35	0.75	0.17	2003	1.50	0.36	0.14	0.06
2004	2.30	0.56	1.14	0.33	2004	1.39	0.42	0.24	0.06
2005	2.08	0.29	1.00	0.14	2005	0.73	0.17	0.17	0.04
2006	1.18	0.26	0.56	0.15	2006	0.80	0.17	0.28	0.07
2007	1.11	0.22	0.54	0.10	2007	0.65	0.25	0.13	0.04
2008	1.68	0.32	0.58	0.09	2008	1.03	0.34	0.22	0.11



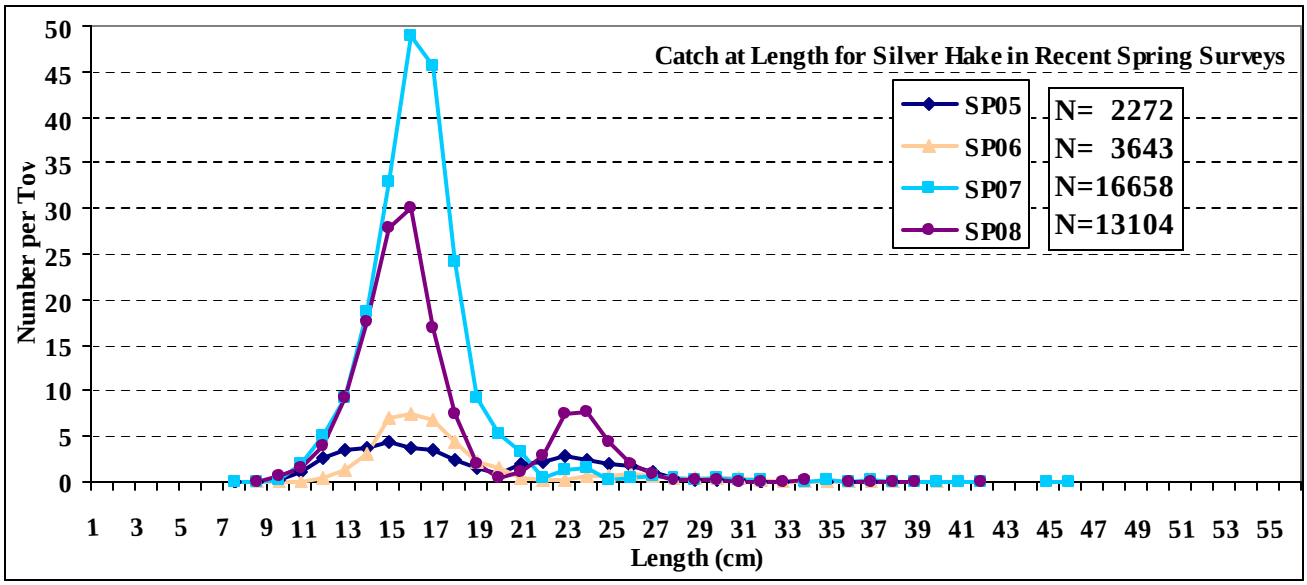


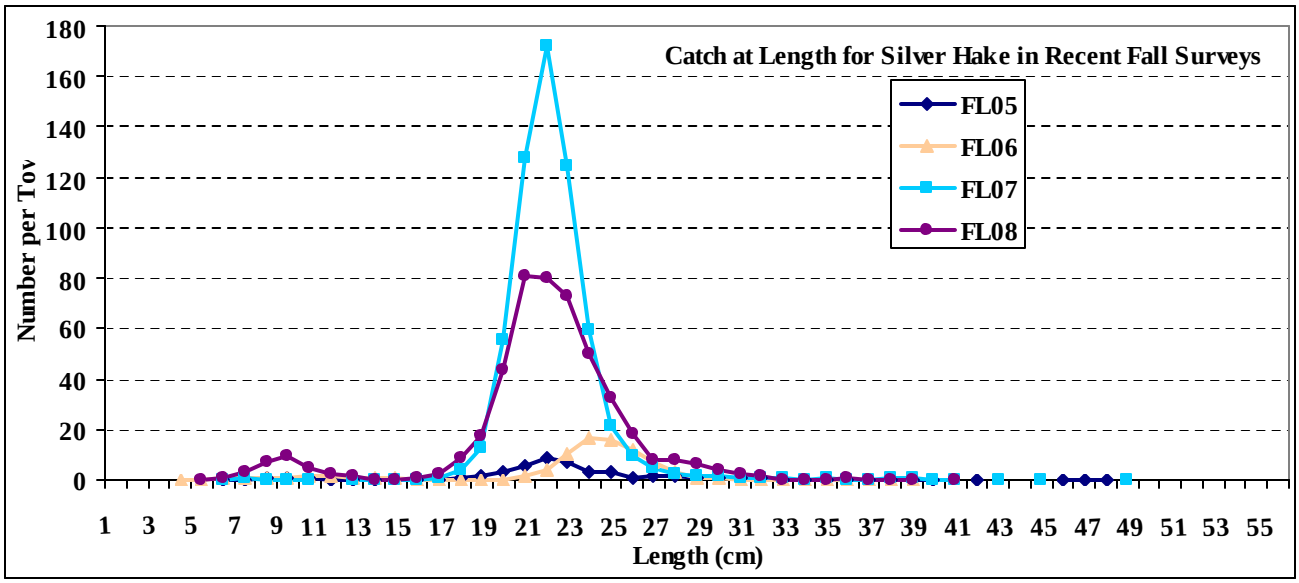
Silver hake, *Merluccius bilinearis*



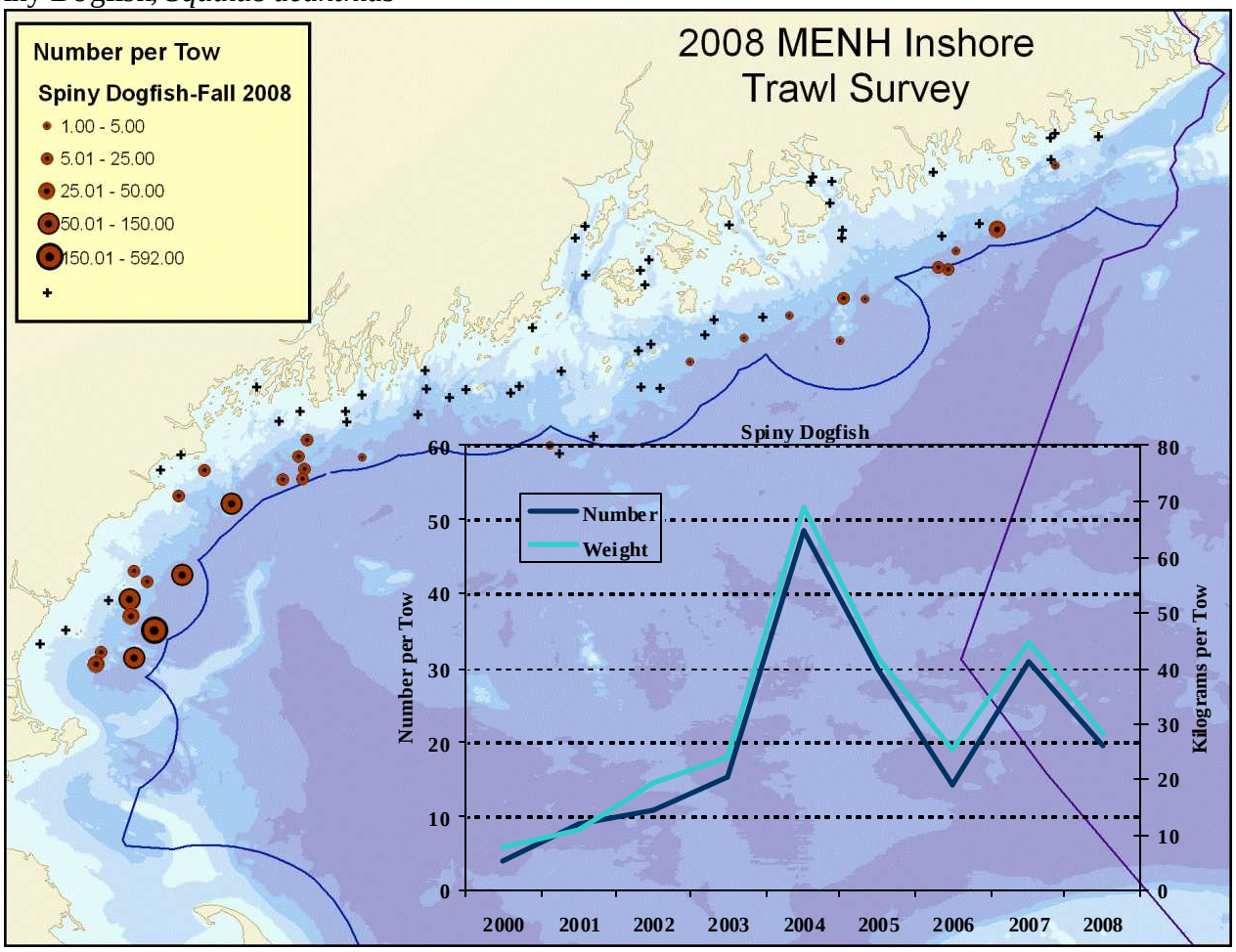


Mean and error for grpahs overlain on distribution maps									
fixed stations not included									
for silver hake, indices calculated for regions 1 through 5; strata 1 through 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	786.49	70.49	34.77	3.55
2001	97.74	13.58	3.68	0.50	2001	687.67	109.48	52.88	7.74
2002	302.44	103.63	13.34	4.69	2002	476.28	111.28	13.47	2.15
2003	503.71	79.69	11.63	1.86	2003	1046.25	116.65	49.97	5.72
2004	131.82	11.73	5.25	0.64	2004	413.66	95.64	24.85	6.03
2005	43.34	4.88	1.91	0.21	2005	44.93	9.31	3.77	0.92
2006	40.47	7.24	1.58	0.29	2006	82.59	20.11	7.13	2.03
2007	211.00	96.55	5.45	2.56	2007	605.57	111.88	37.14	6.75
2008	145.21	18.62	4.67	0.70	2008	467.93	120.68	30.66	9.67

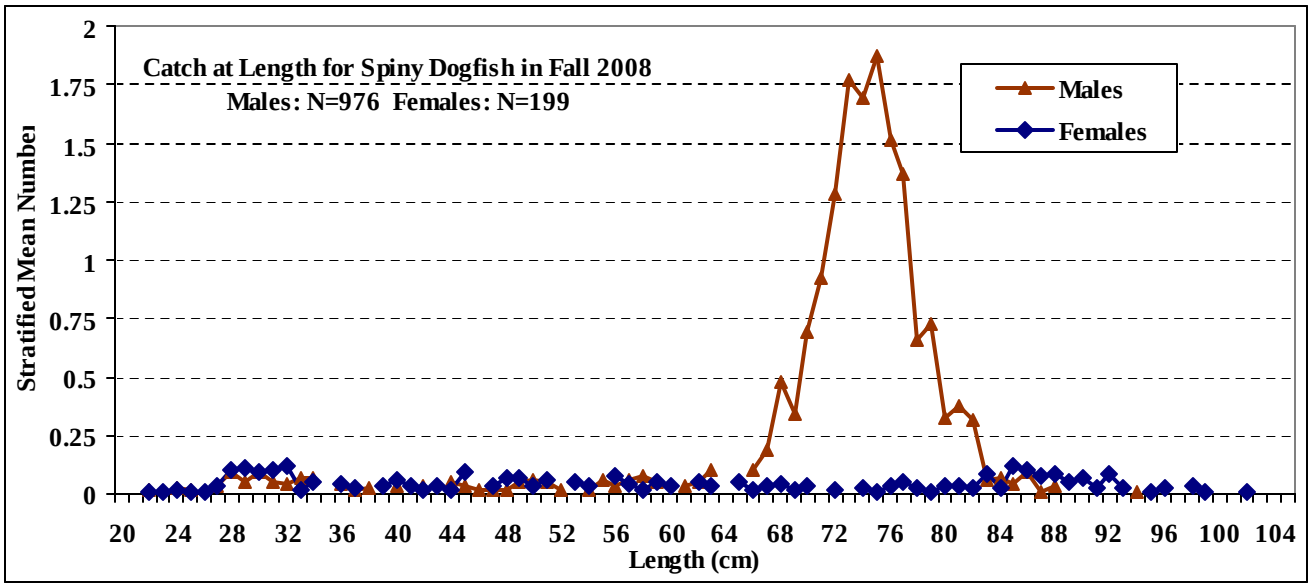




Spiny Dogfish, *Squalus acanthias*

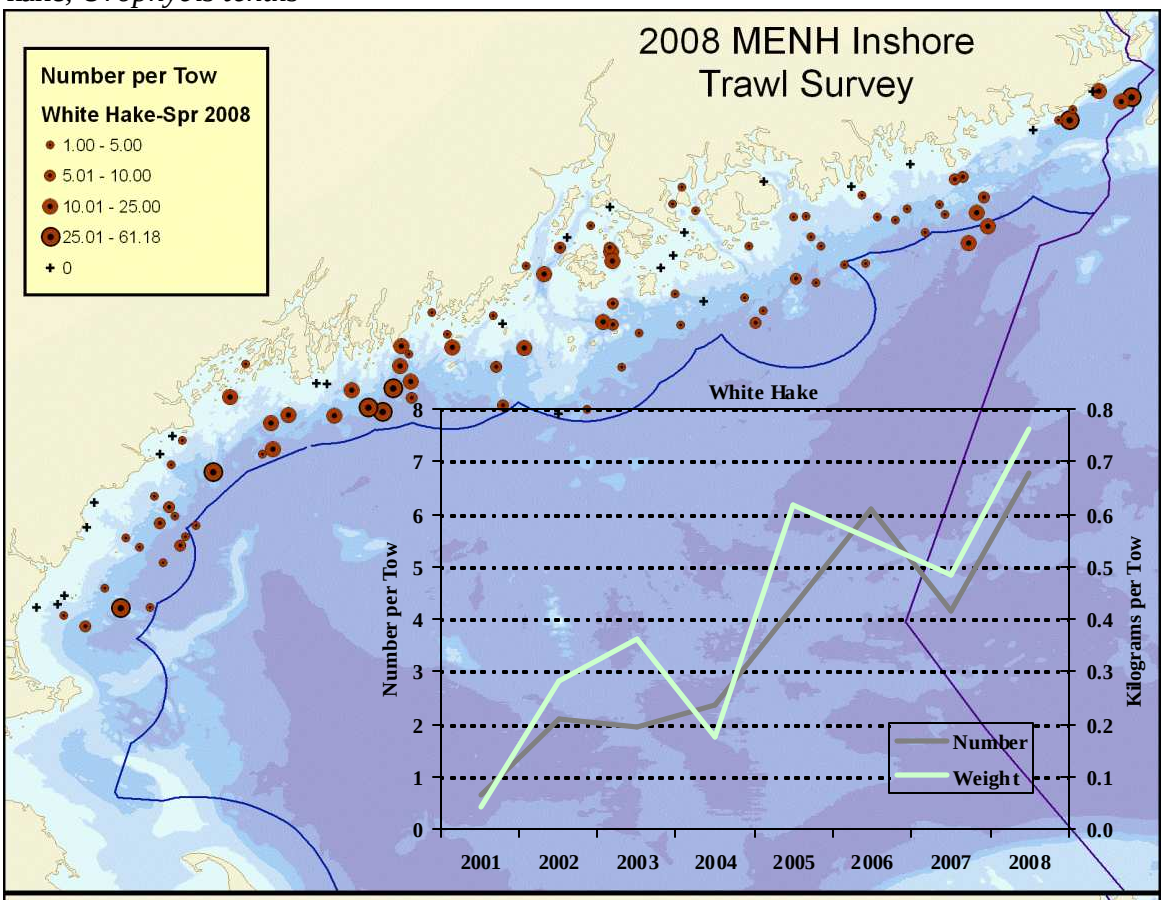


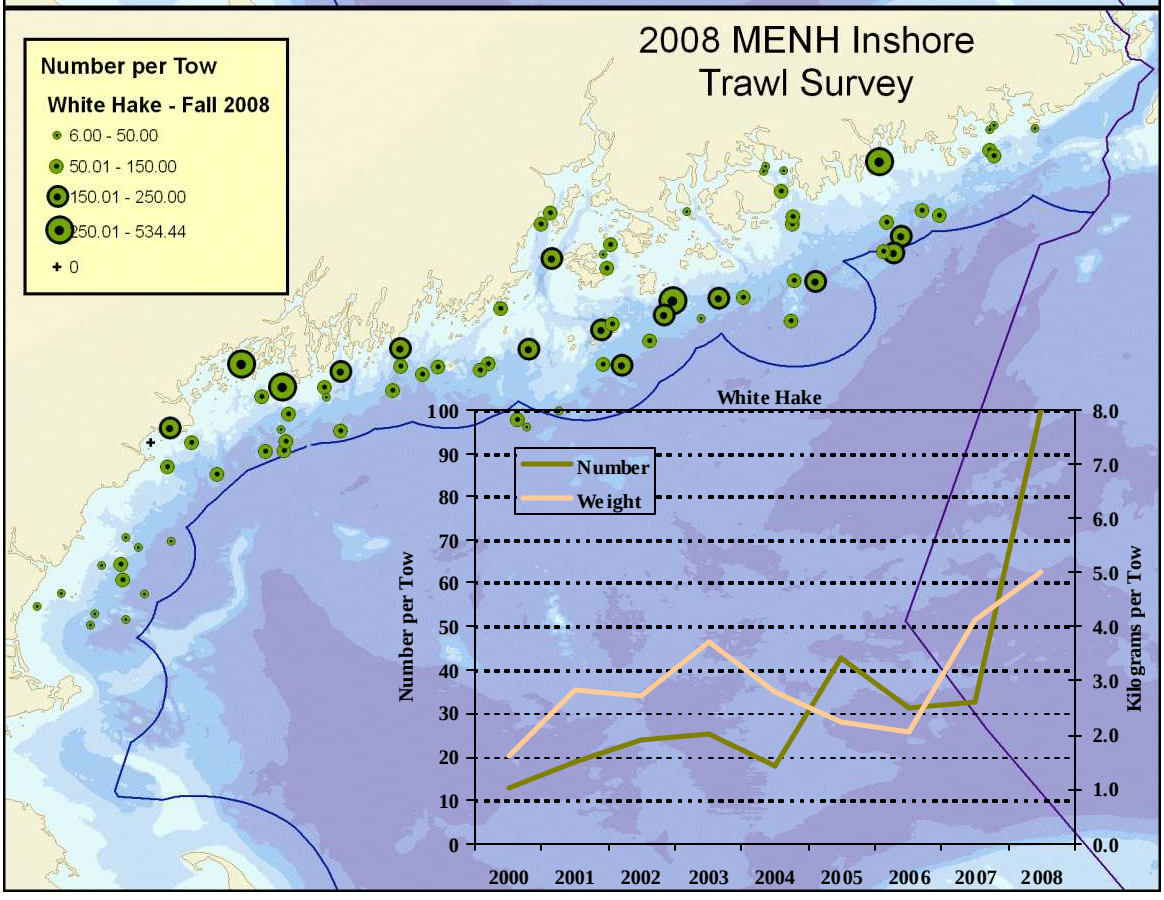
Mean and error for both seasons, only fall is displayed on the distribution map									
fixed stations not included									
for dogs, indices calculated for regions 1 through 5									
Strata 1 though 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	4.0	0.52	7.7	1.05
2001					2001	8.9	2.70	10.7	3.06
2002	0.08	0.04	0.17	0.08	2002	10.6	1.94	19.5	3.81
2003	0.21	0.15	0.23	0.22	2003	15.4	3.36	23.8	4.96
2004					2004	48.5	12.02	69.0	17.73
2005					2005	29.7	3.43	41.8	5.54
2006	0.33	0.13	0.10	0.05	2006	14.1	2.32	25.2	4.16
2007	0.04	0.03	0.04	0.04	2007	30.9	7.64	44.5	11.06
2008	0.25	0.16	0.30	0.04	2008	19.5	8.9	28.3	13.8



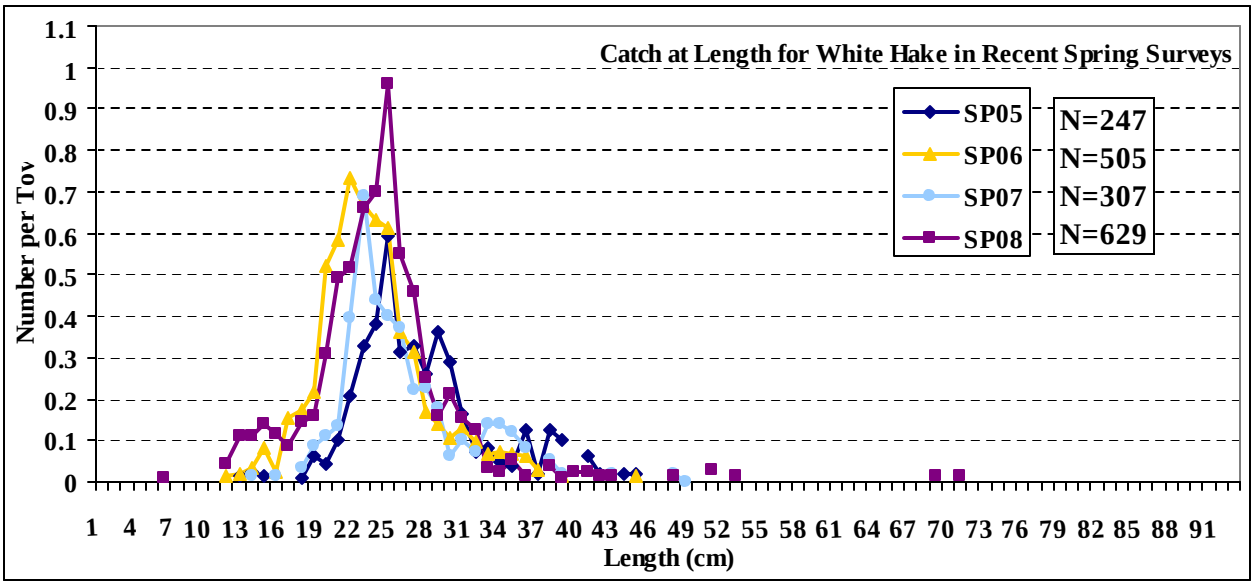
Dogfish are rarely caught in spring surveys, so only the data are presented.

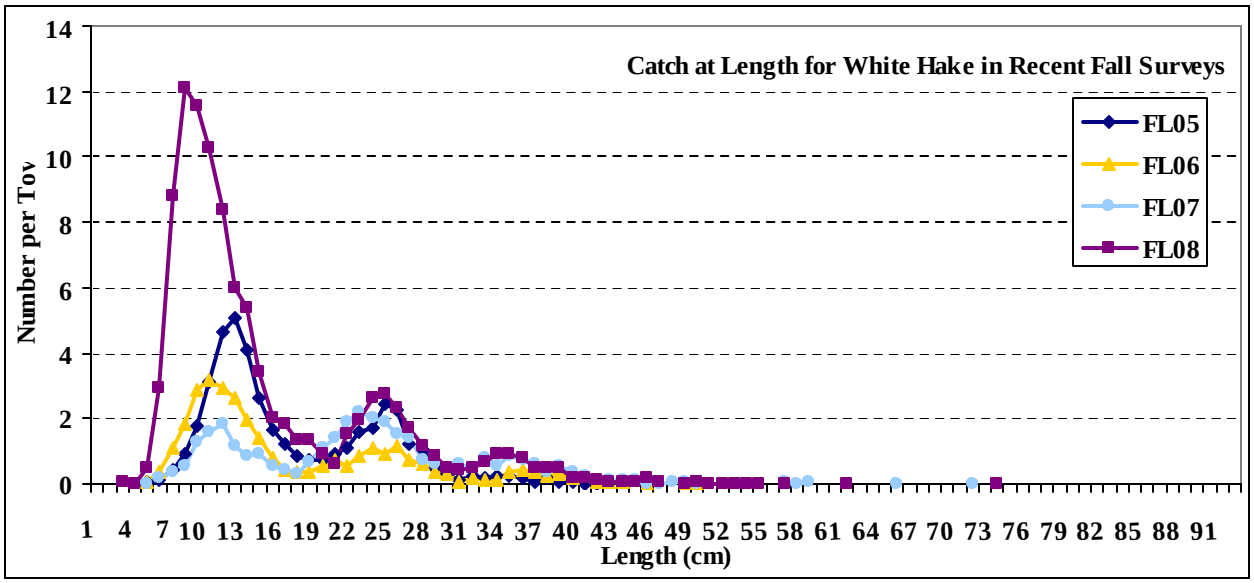
White hake, *Urophycis tenuis*



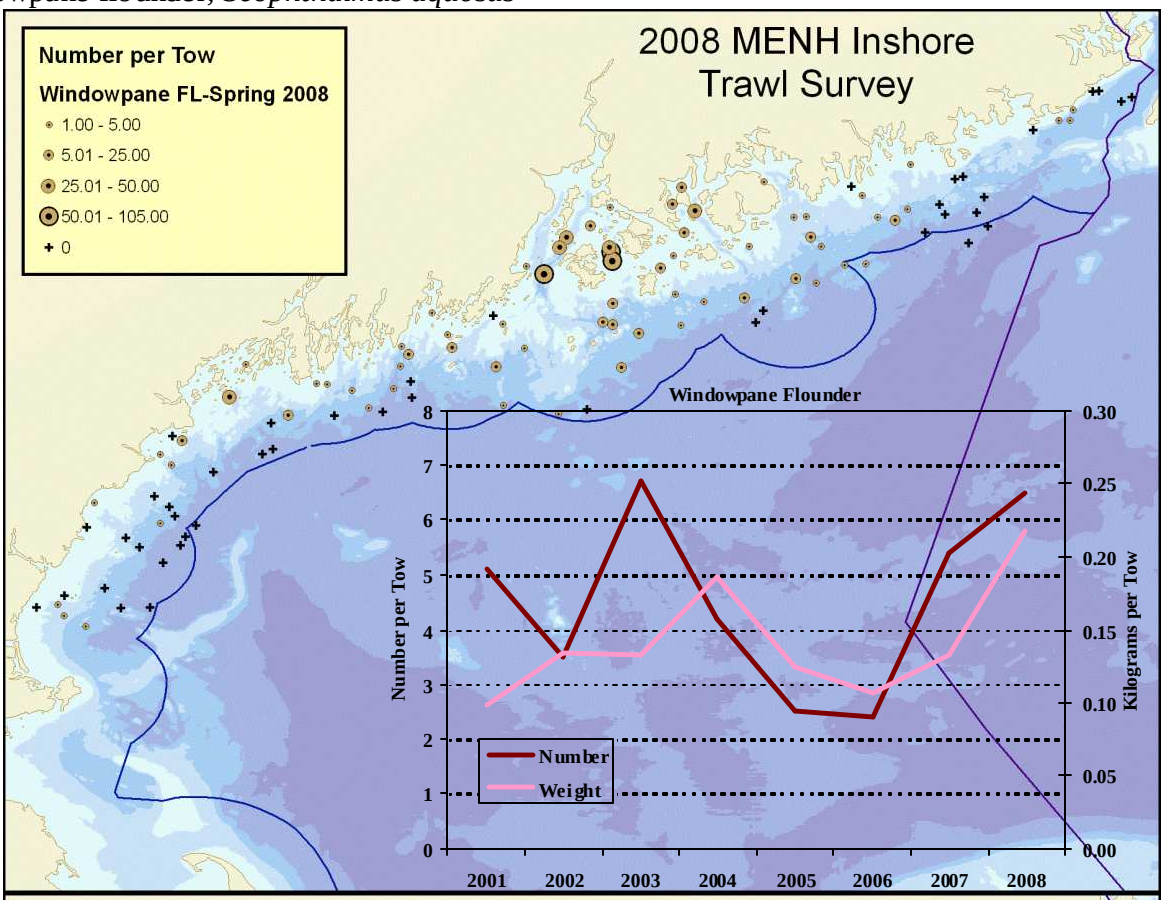


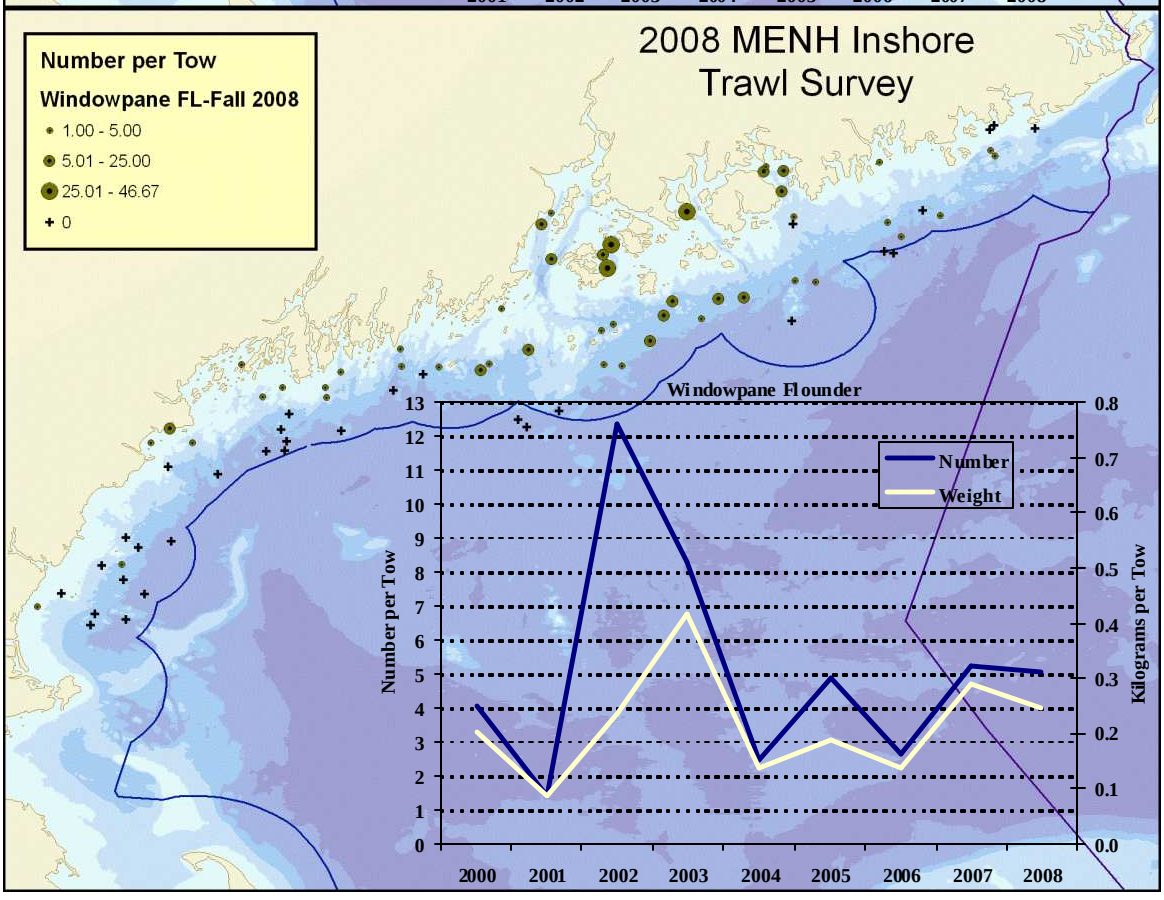
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for white hake, indices calculated for regions 1 through 5; strata 1 through 4 (2003 on)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	13.1	1.2	1.63	0.16
2001	0.7	0.1	0.04	0.01	2001	18.9	2.7	2.84	0.33
2002	2.1	0.4	0.28	0.06	2002	23.6	1.9	2.71	0.27
2003	1.9	0.5	0.36	0.11	2003	25.4	3.0	3.70	0.45
2004	2.4	0.4	0.17	0.03	2004	17.8	2.6	2.77	0.35
2005	4.2	0.8	0.62	0.13	2005	42.8	3.1	2.26	0.22
2006	6.1	0.7	0.55	0.08	2006	31.1	3.7	2.05	0.21
2007	4.2	0.9	0.48	0.17	2007	32.9	2.8	4.12	0.51
2008	6.8	0.8	0.76	0.12	2008	99.9	8.4	5.00	0.33



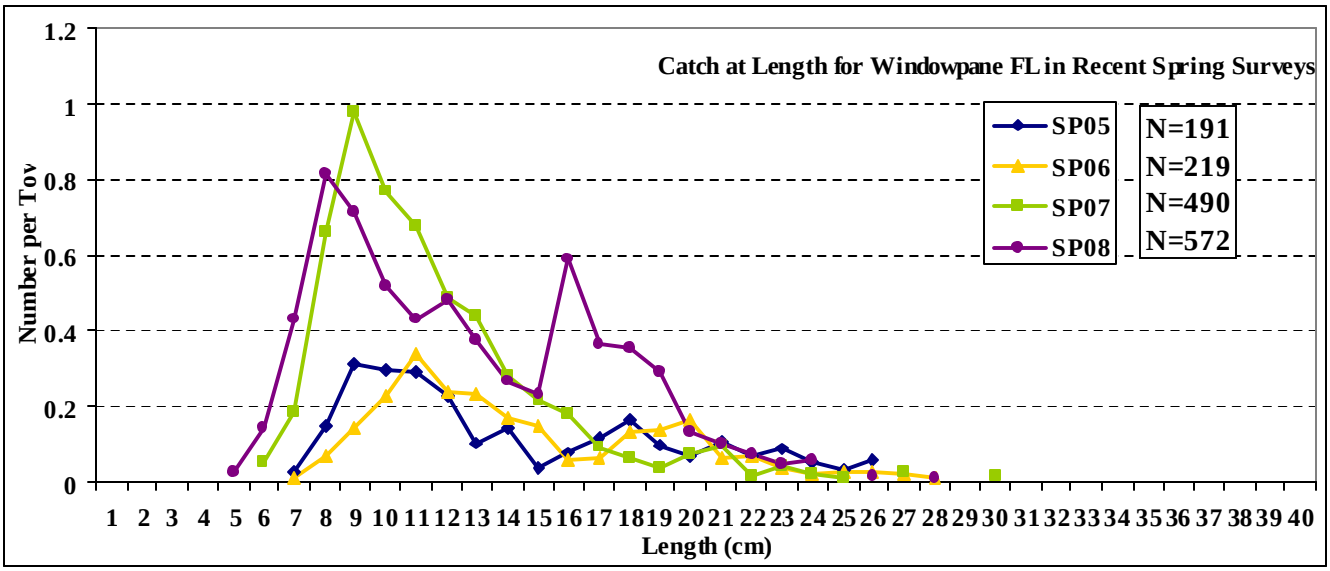


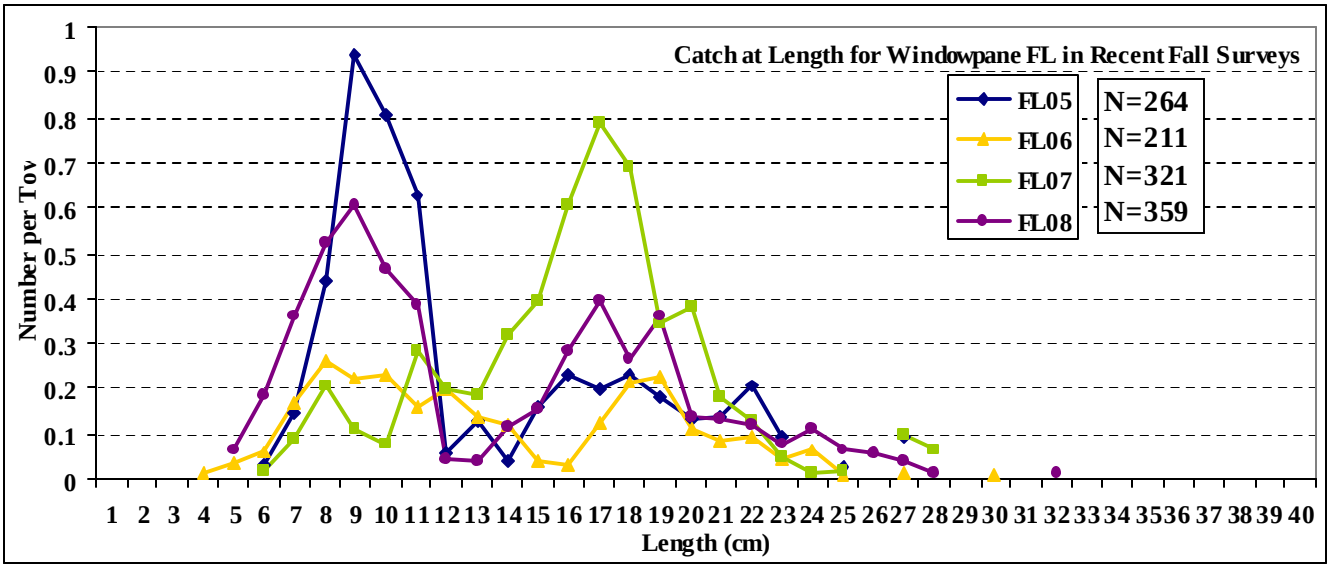
Windowpane flounder, *Scophthalmus aquosus*



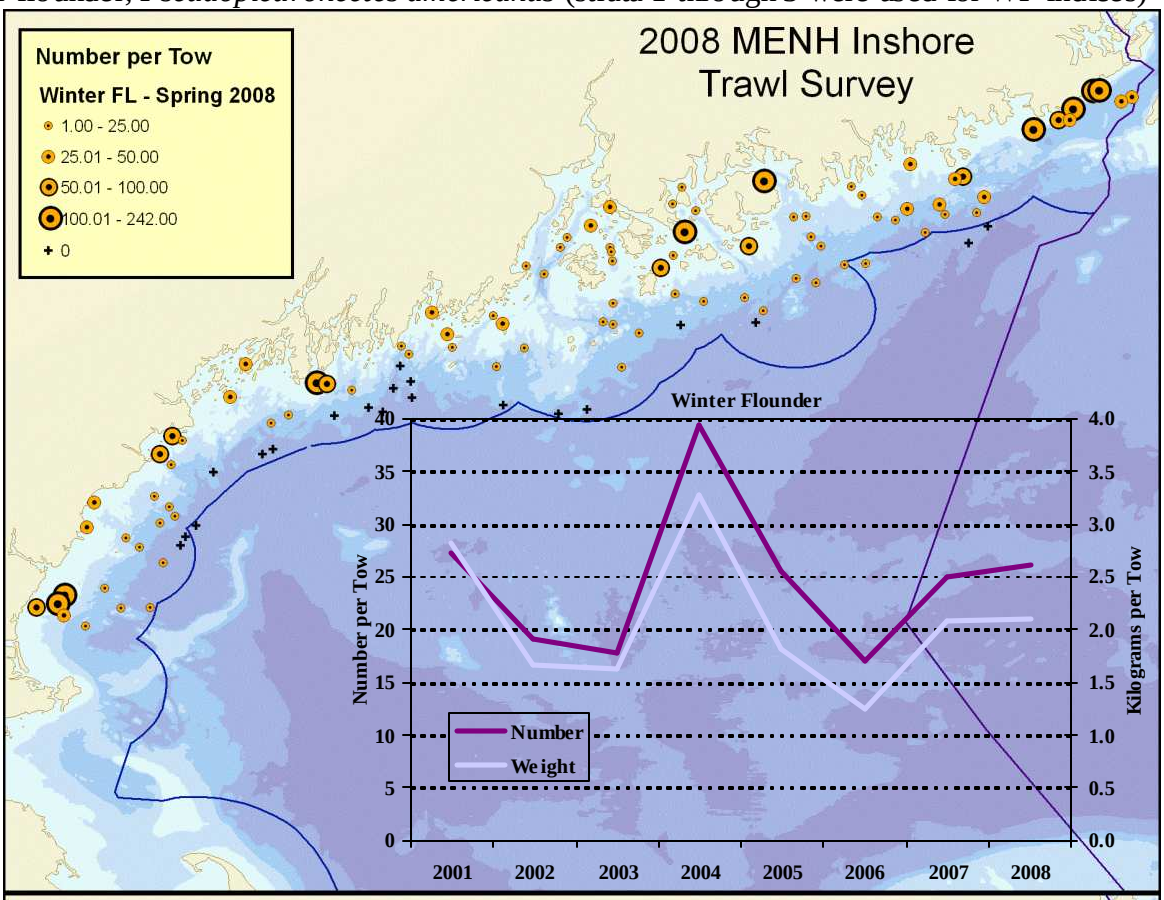


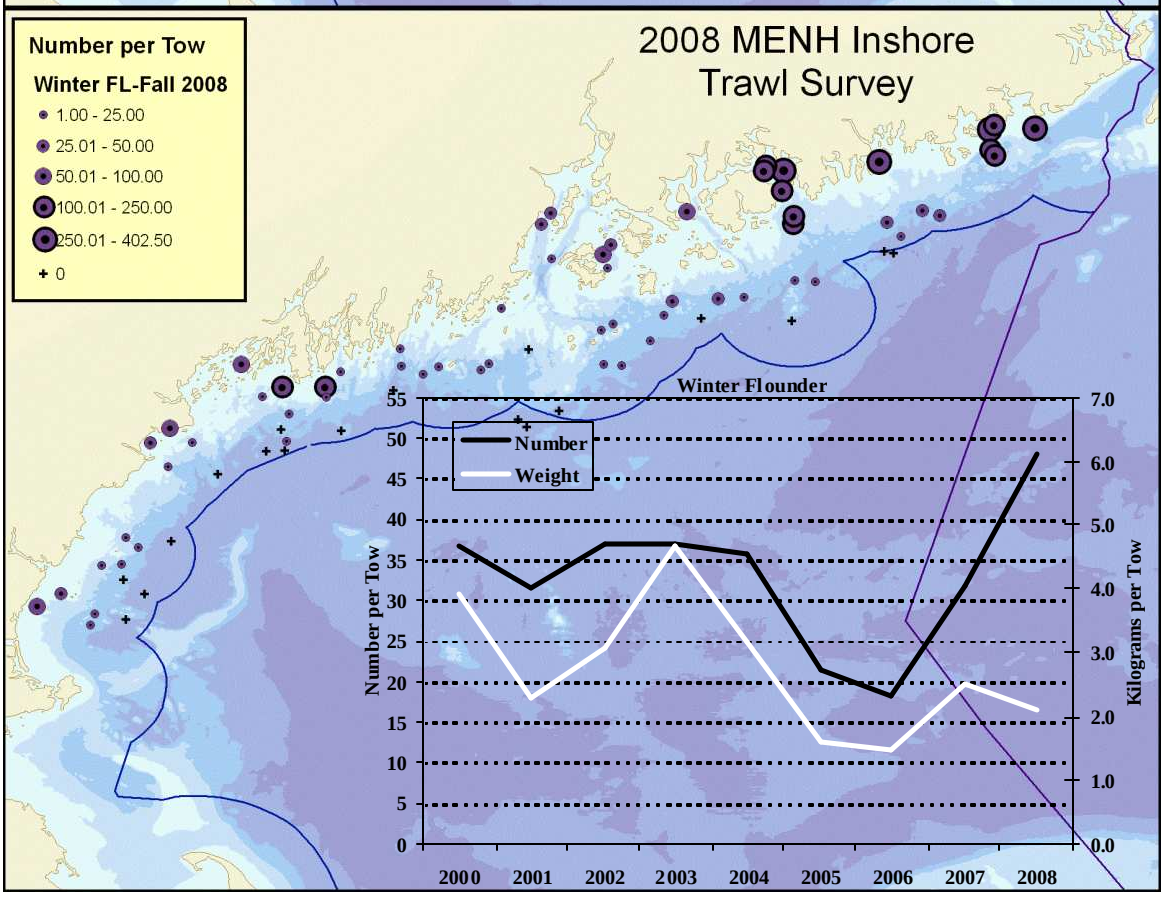
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for windowpane, indices calculated for regions 1 through 5; strata 1 through 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	4.05	0.62	0.20	0.03
2001	5.12	1.48	0.10	0.02	2001	1.46	0.48	0.09	0.02
2002	3.51	0.61	0.13	0.02	2002	12.35	3.64	0.24	0.06
2003	6.71	1.15	0.13	0.02	2003	8.29	1.20	0.42	0.05
2004	4.20	0.69	0.19	0.03	2004	2.52	0.78	0.14	0.03
2005	2.51	0.45	0.12	0.02	2005	4.90	1.60	0.19	0.05
2006	2.39	0.52	0.11	0.02	2006	2.66	0.39	0.14	0.03
2007	5.41	1.06	0.13	0.02	2007	5.24	1.16	0.29	0.07
2008	6.47	1.31	0.22	0.03	2008	5.03	0.82	0.24	0.03



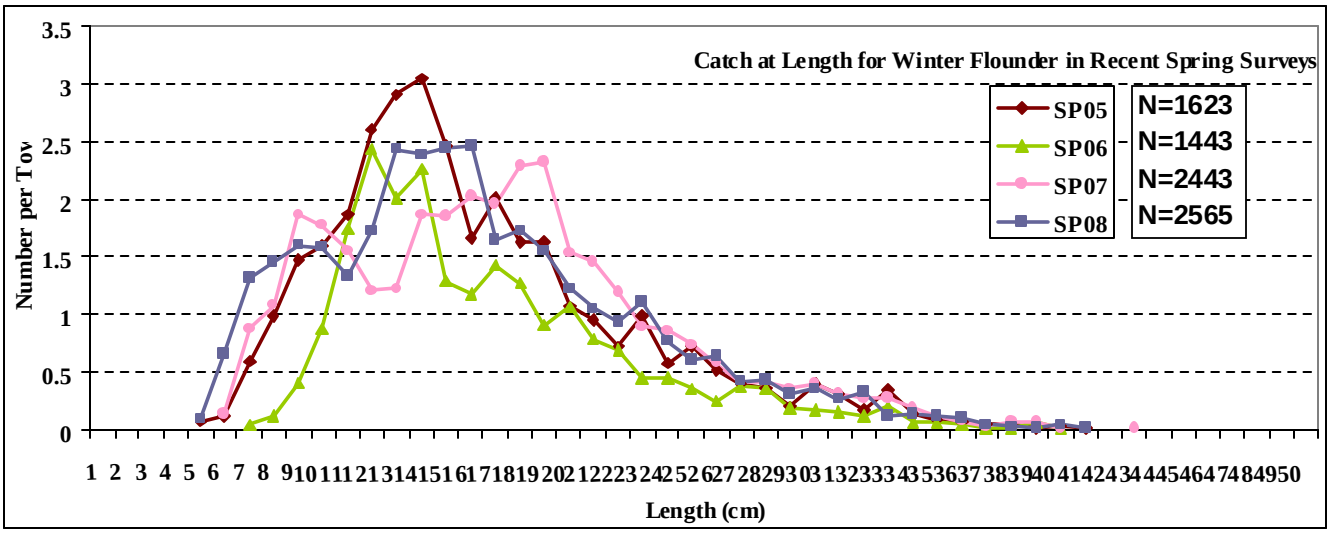


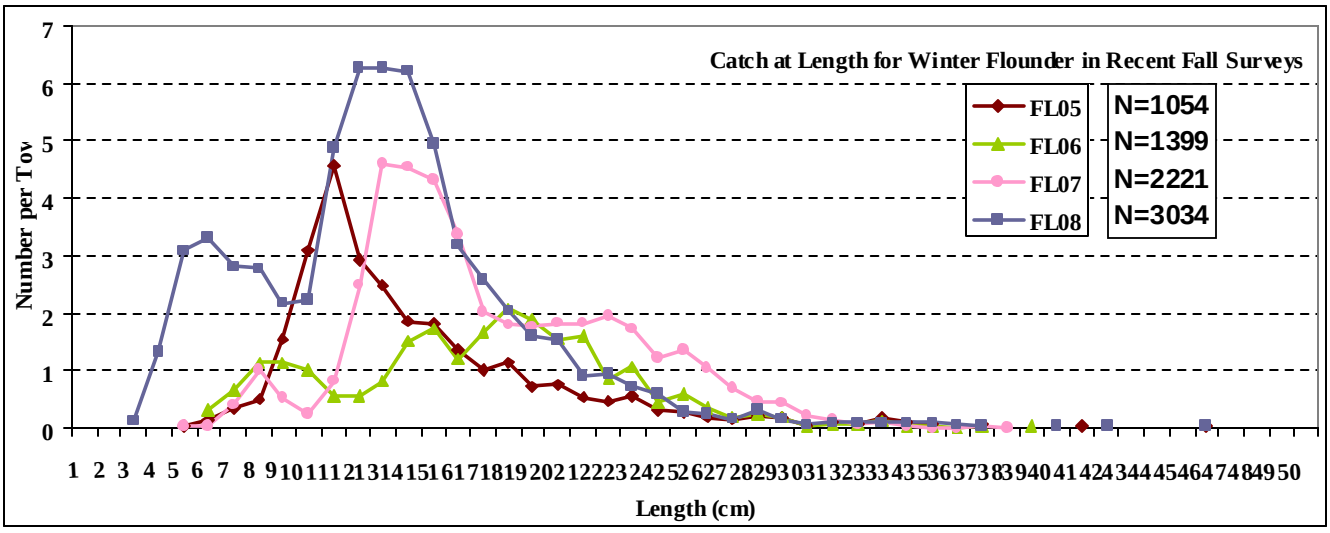
Winter flounder, *Pseudopleuronectes americanus* (strata 1 through 3 were used for WF indices)



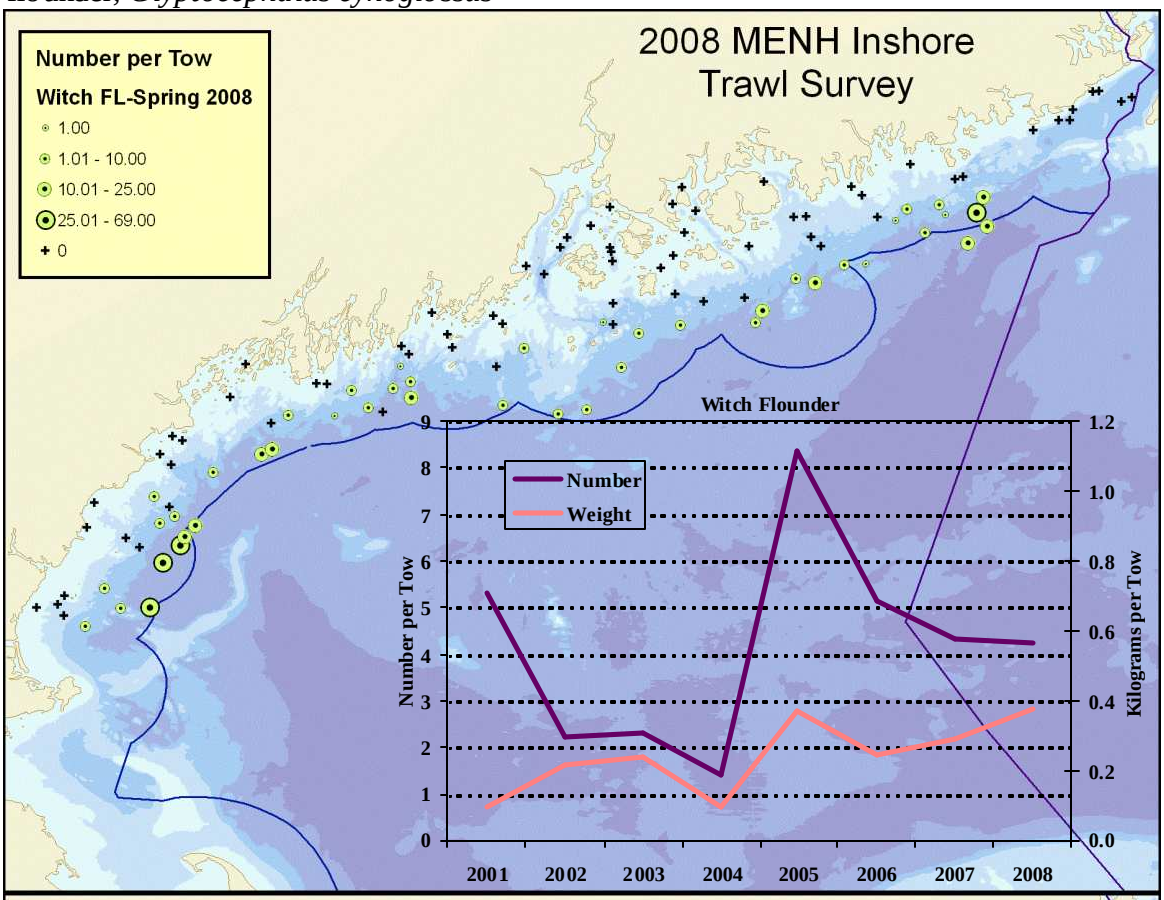


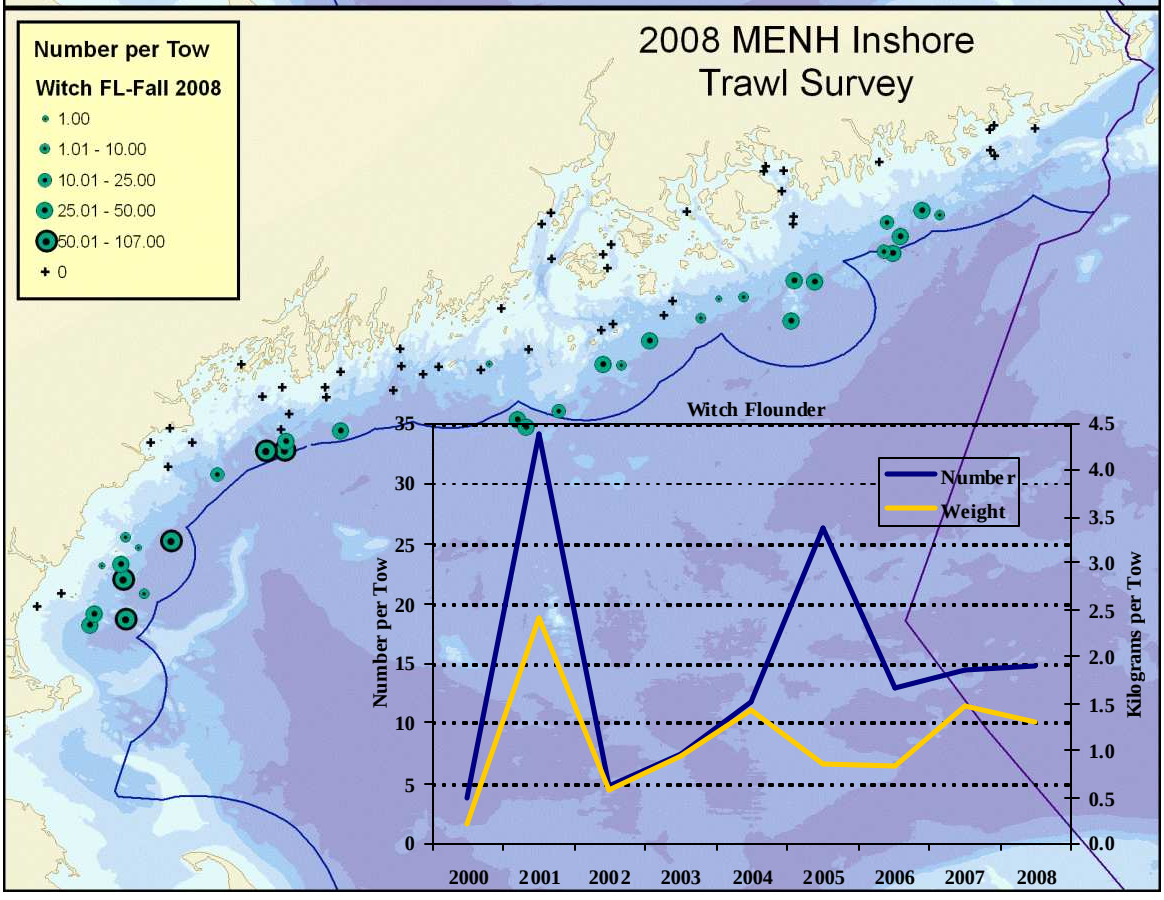
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for winter flounder, indices calculated for regions 1 through 5									
strata 1 through 3									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	36.77	3.17	3.92	0.41
2001	27.30	4.03	2.82	0.40	2001	31.43	6.21	2.28	0.25
2002	19.00	2.81	1.67	0.16	2002	36.95	6.77	3.08	0.71
2003	22.57	3.81	1.63	0.27	2003	48.15	5.82	6.06	0.22
2004	50.79	6.31	3.95	0.58	2004	46.42	9.01	4.14	0.82
2005	32.89	3.82	1.53	0.20	2005	27.90	2.57	2.08	0.28
2006	21.94	5.25	1.28	0.38	2006	23.78	3.44	1.92	0.25
2007	32.46	3.68	2.64	0.27	2007	41.18	7.78	3.22	0.91
2008	33.55	4.55	2.65	0.36	2008	62.46	5.96	2.70	0.24



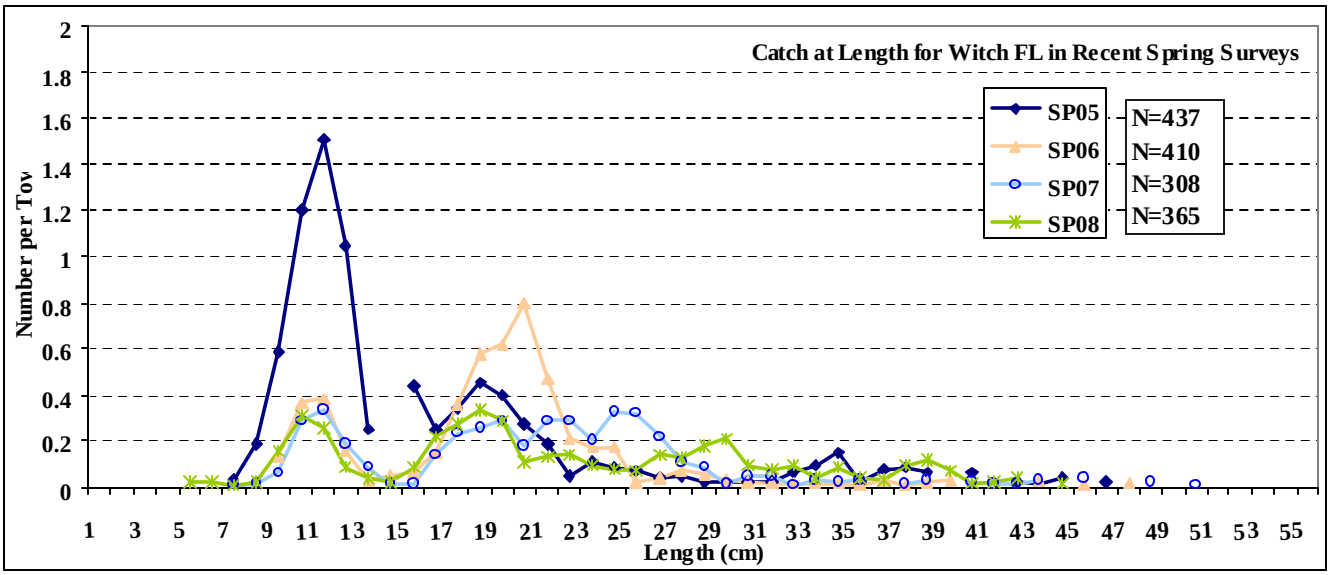


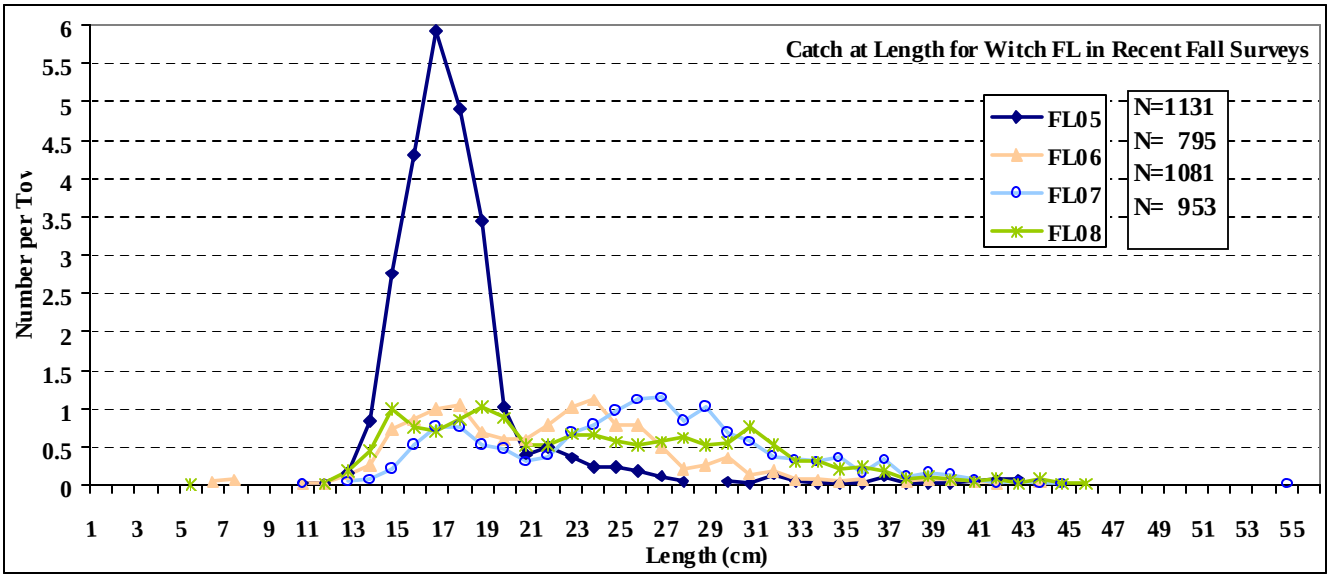
Witch flounder, *Glyptocephalus cynoglossus*



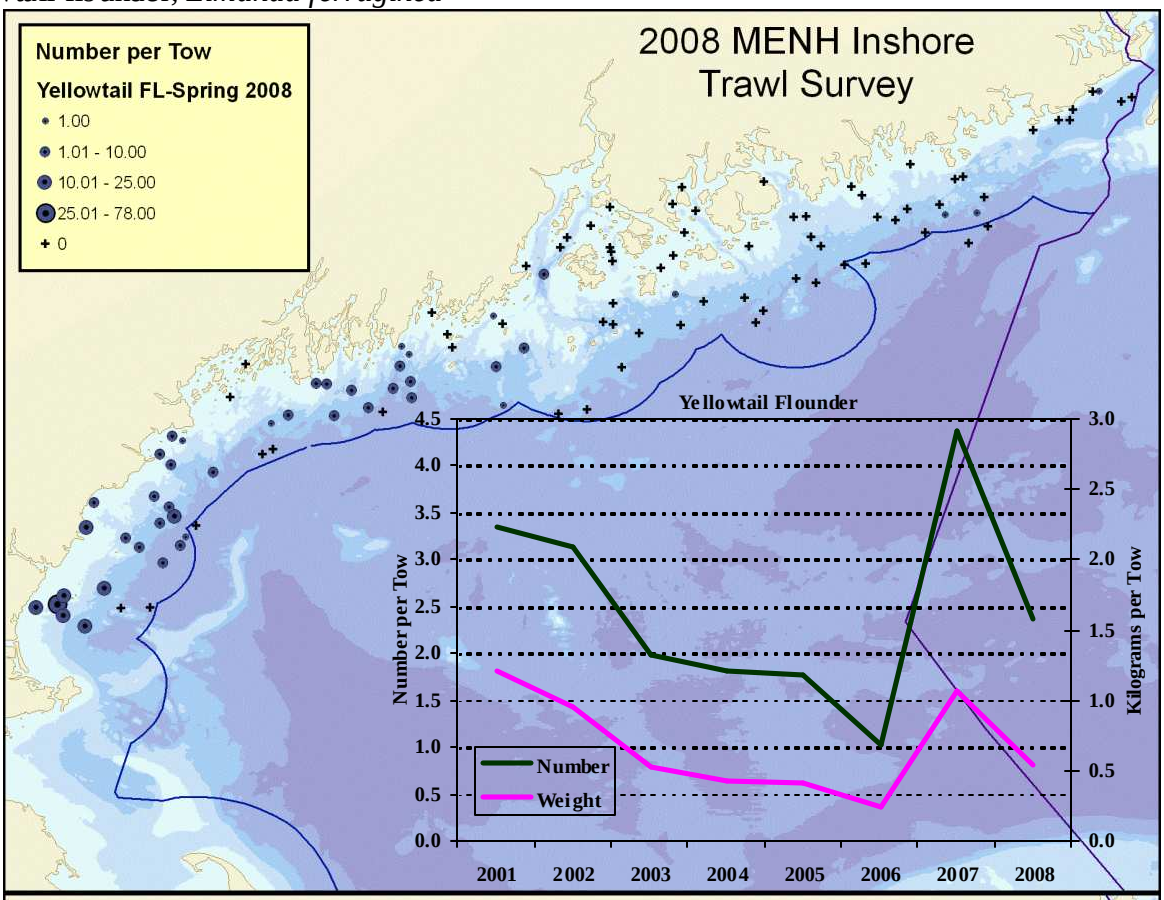


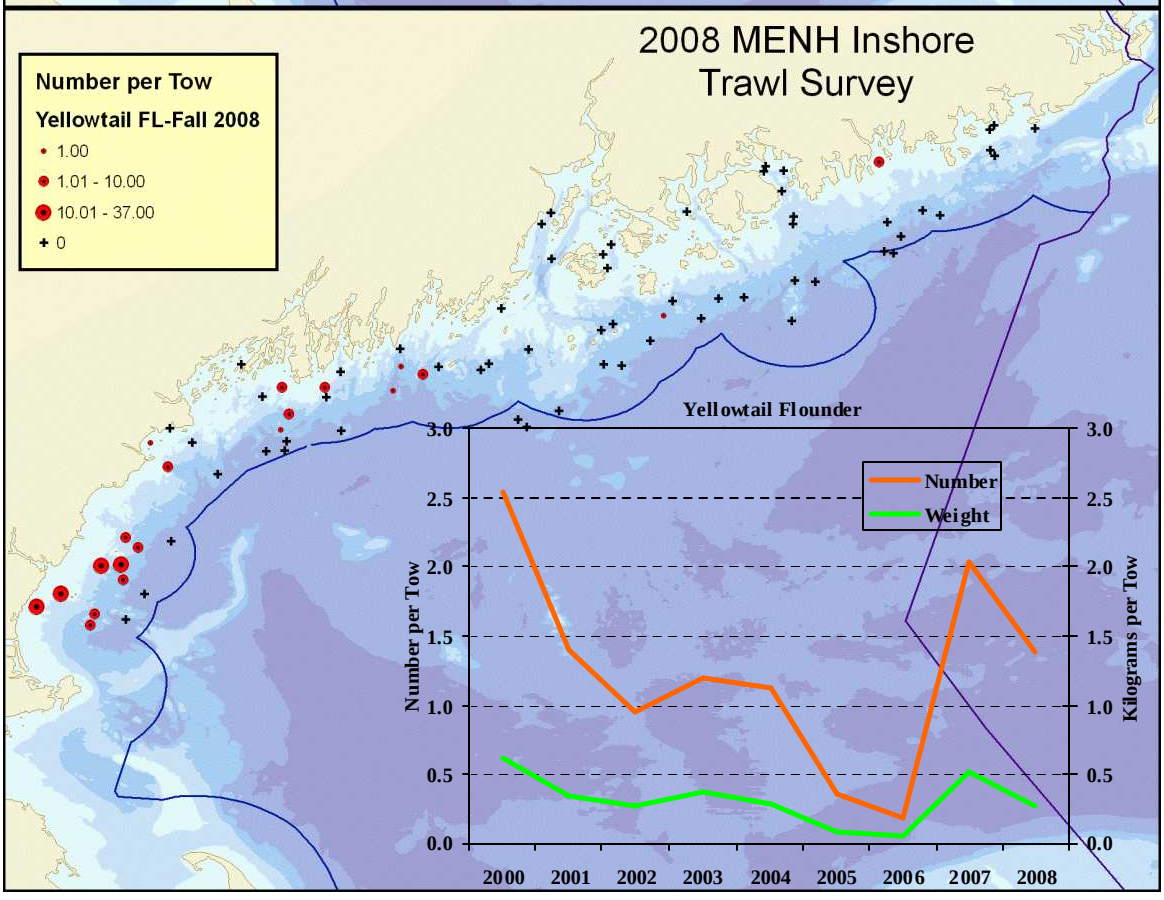
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for witch flounder, indices calculated for regions 1 through 5; strata 1 through 4 (2003 on)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	3.9	0.71	0.21	0.04
2001	5.3	1.38	0.10	0.02	2001	34.2	4.31	2.42	0.46
2002	2.2	0.91	0.22	0.12	2002	4.8	1.23	0.56	0.17
2003	2.3	0.72	0.24	0.07	2003	7.4	1.16	0.92	0.19
2004	1.4	0.21	0.10	0.02	2004	11.7	1.94	1.41	0.20
2005	8.4	1.33	0.37	0.09	2005	26.2	3.55	0.86	0.10
2006	5.2	1.11	0.24	0.06	2006	12.8	1.37	0.83	0.07
2007	4.4	0.68	0.29	0.04	2007	14.4	2.04	1.47	0.30
2008	4.2	0.6	0.38	0.08	2008	14.8	1.8	1.31	0.23



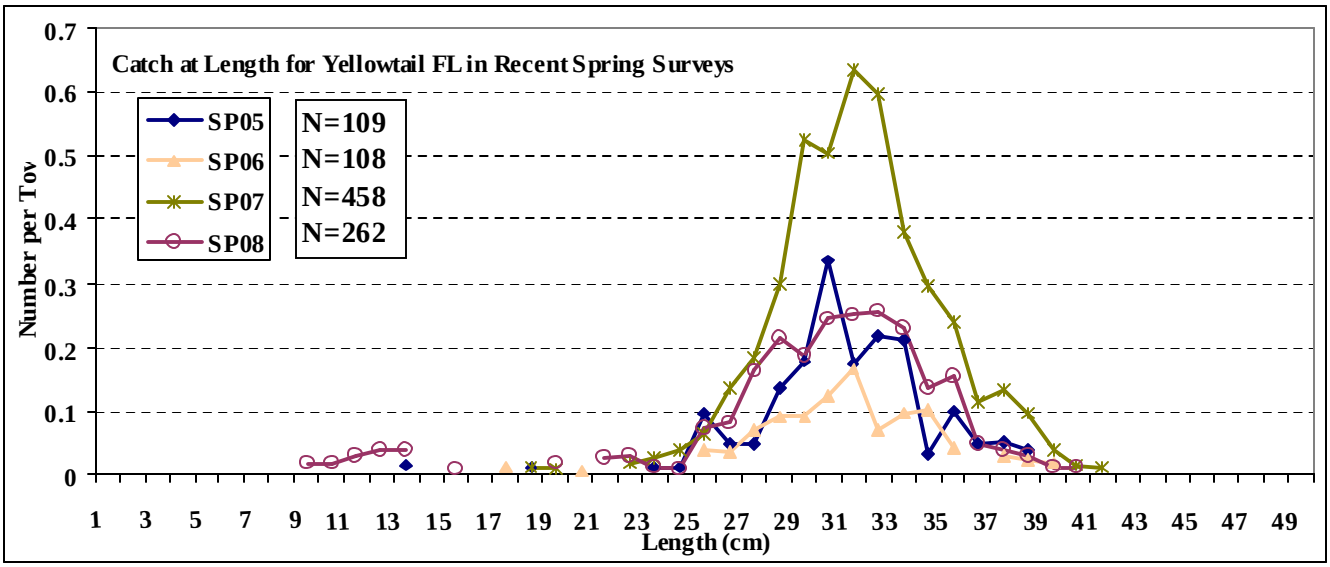


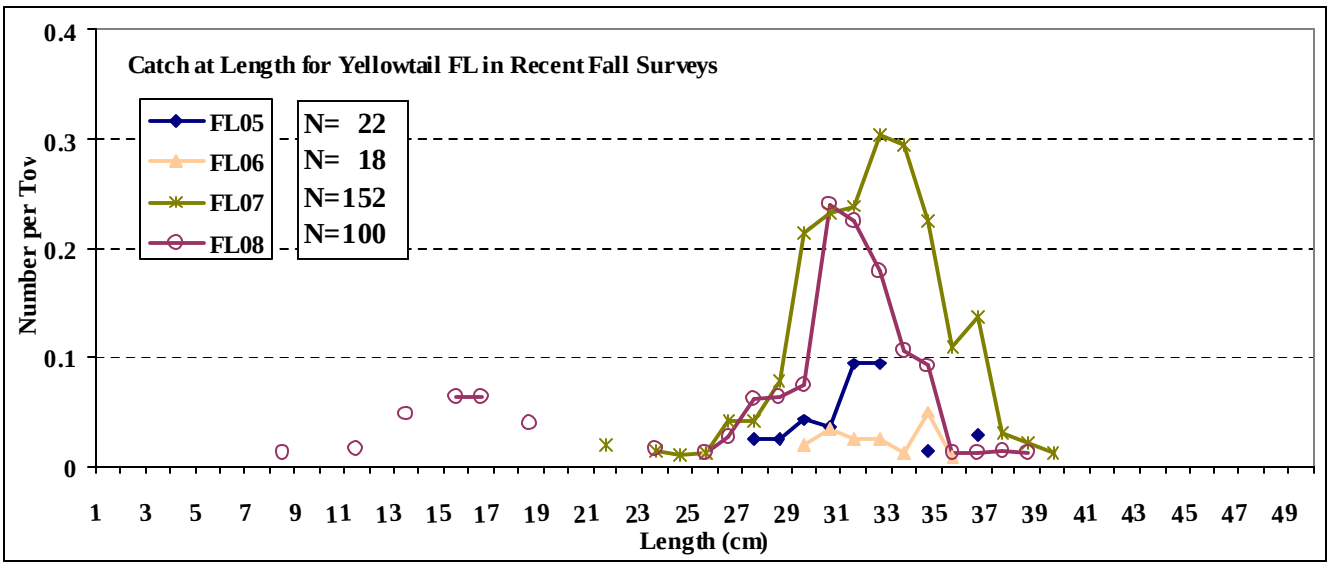
Yellowtail flounder, *Limanda ferruginea*





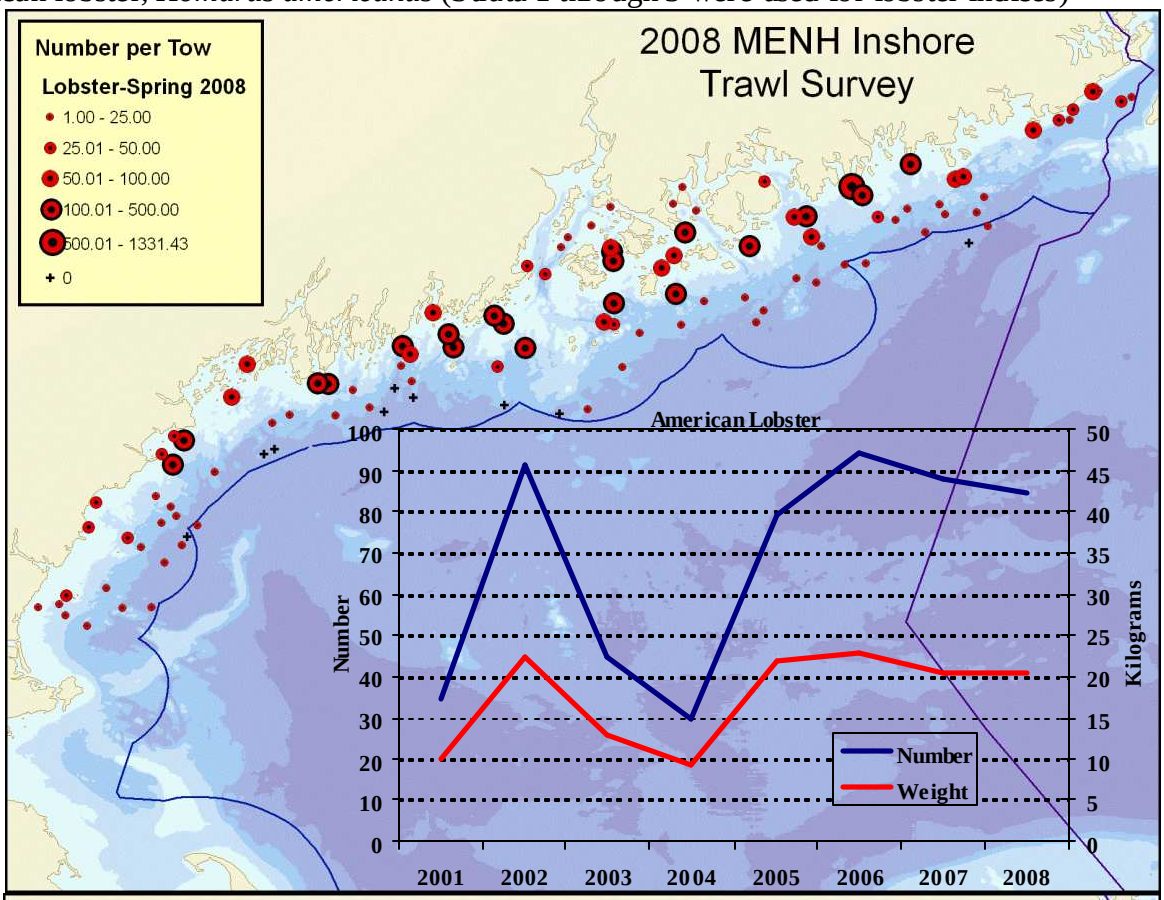
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for yellowtail flounder, indices calculated for regions 1 through 5; strata 1 through 4 (2003 on)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	2.5	1.34	0.61	0.31
2001	3.35	2.09	1.20	0.82	2001	1.4	0.74	0.35	0.17
2002	3.14	0.76	0.95	0.22	2002	0.9	0.28	0.27	0.07
2003	1.99	0.43	0.52	0.11	2003	1.2	0.04	0.37	0.01
2004	1.80	0.45	0.43	0.11	2004	1.1	0.29	0.28	0.06
2005	1.77	0.51	0.40	0.11	2005	0.4	0.24	0.09	0.06
2006	1.02	0.20	0.23	0.05	2006	0.2	0.14	0.05	0.03
2007	4.38	1.17	1.05	0.27	2007	2.0	0.94	0.52	0.27
2008	2.37	0.68	0.53	0.15	2008	1.39	0.53	0.28	0.11

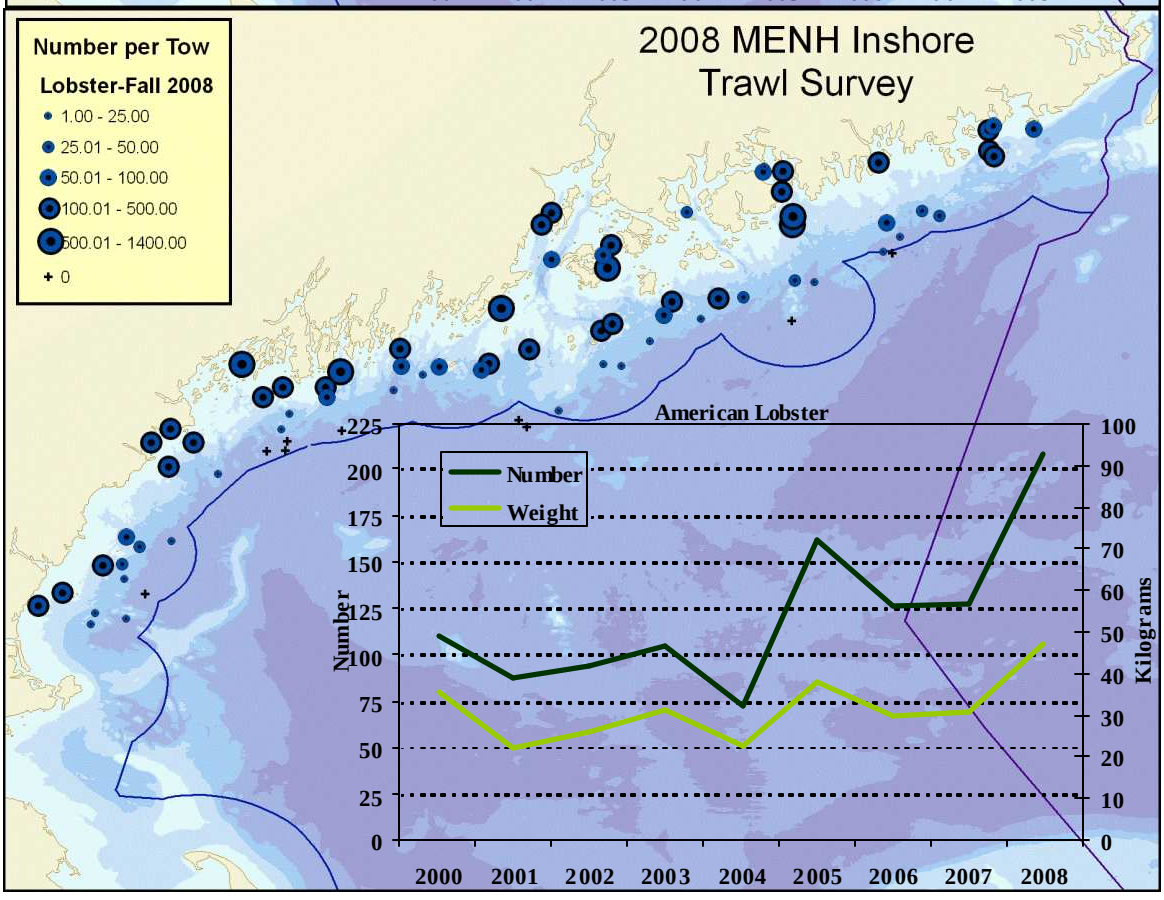




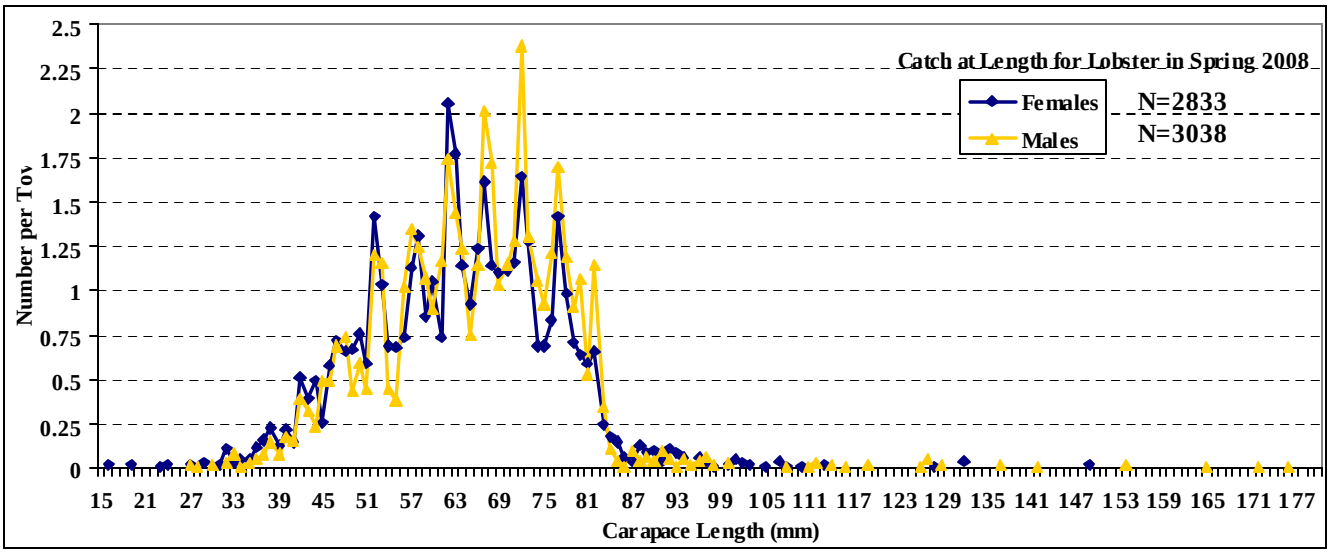
INVERTEBRATES

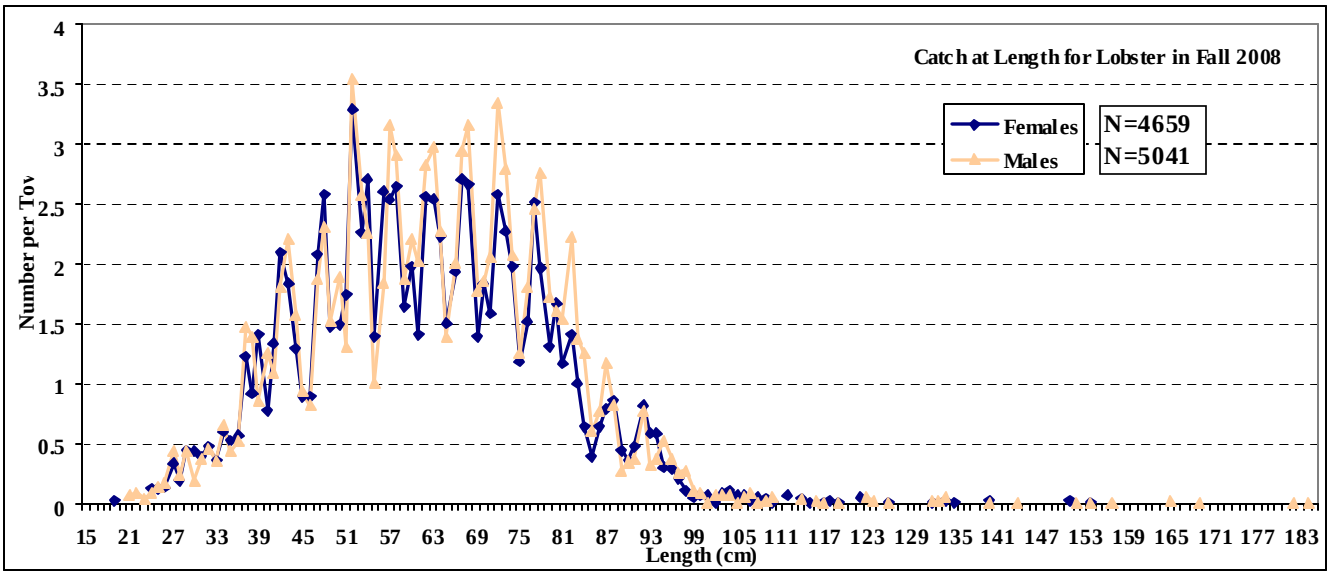
American lobster, *Homarus americanus* (Strata 1 through 3 were used for lobster indices)



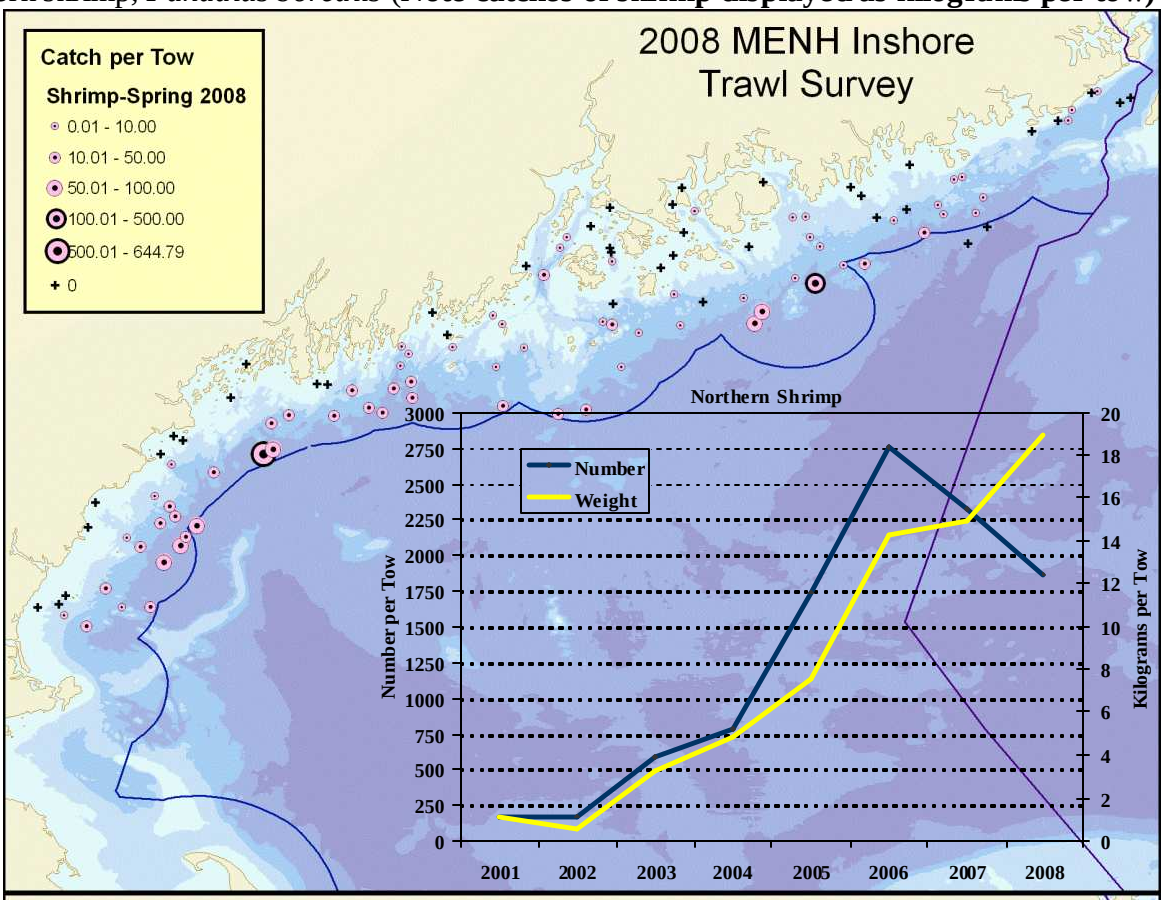


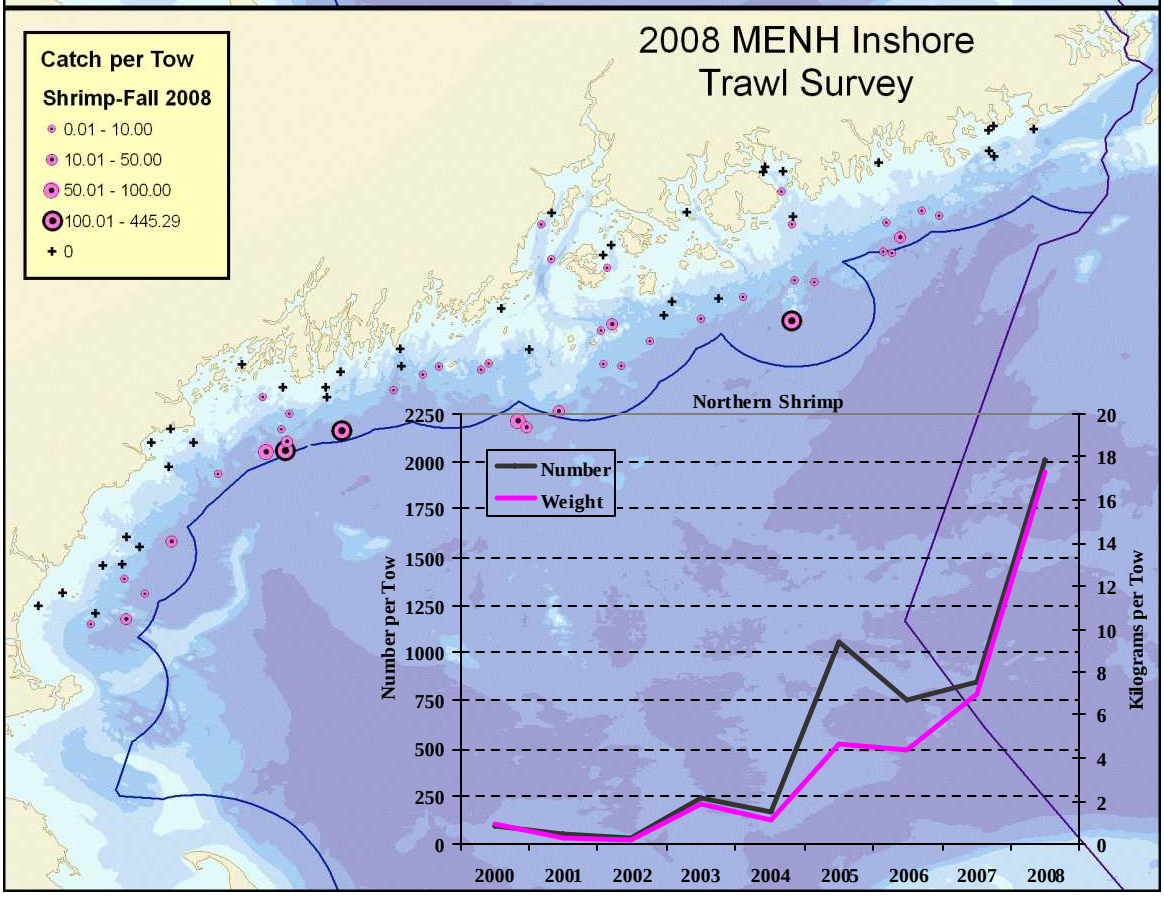
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for lobster, indices calculated for regions 1 through 5									
strata 1 through 3									
SPRING					FALL				
Stratified Mean			Stratified Mean		Stratified Mean			Stratified Mean	
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	109.43	19.58	35.60	4.98
2001	34.67	5.53	10.04	1.37	2001	87.13	18.67	21.68	3.71
2002	91.47	13.85	22.42	3.09	2002	93.61	11.91	25.97	2.77
2003	44.64	7.43	12.82	1.84	2003	105.40	10.09	30.99	2.97
2004	30.17	3.81	9.31	1.07	2004	73.21	14.55	22.84	3.69
2005	79.24	14.21	22.02	3.75	2005	161.77	28.23	37.66	6.82
2006	94.52	22.57	22.75	4.65	2006	126.31	20.14	30.02	4.37
2007	88.37	11.68	20.48	2.48	2007	127.68	20.53	30.87	4.24
2008	84.84	21.66	20.56	5.30	2008	207.77	50.58	47.15	7.64





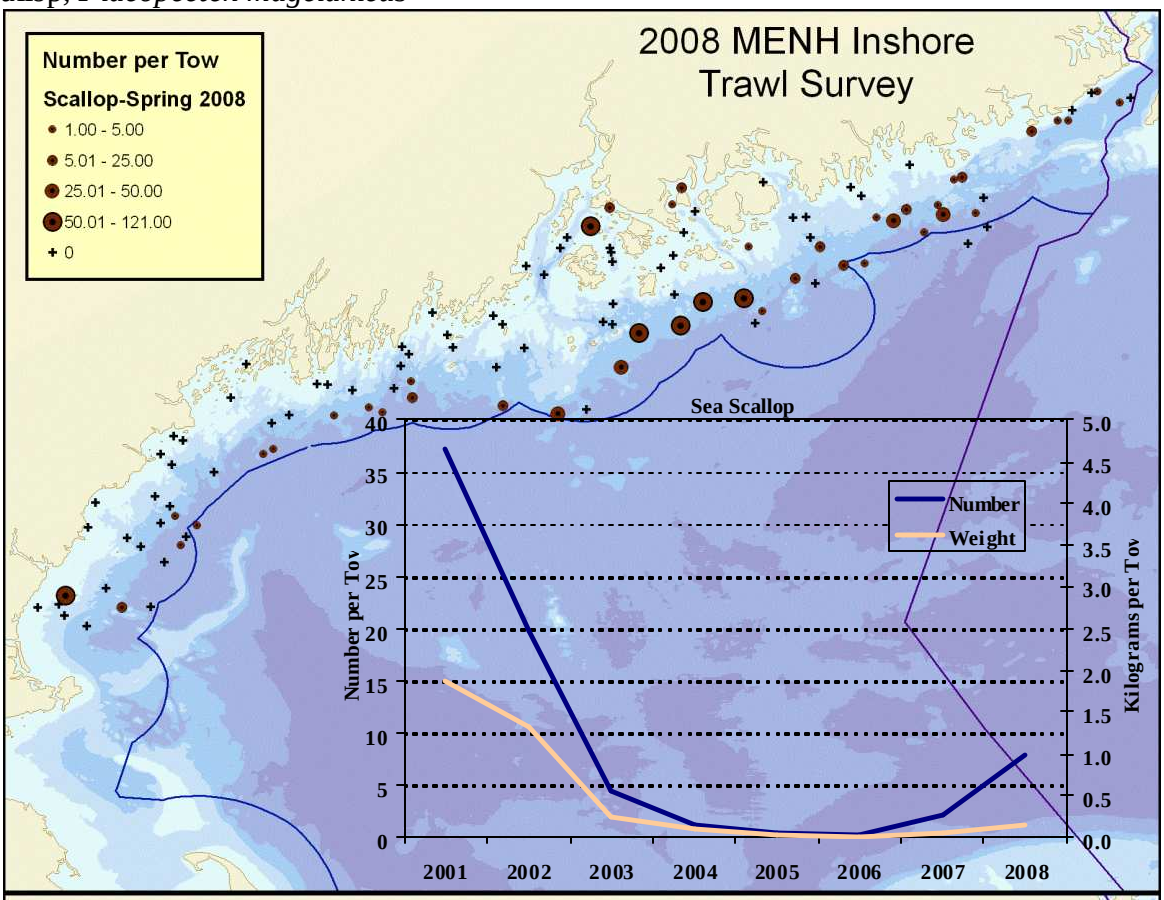
Northern shrimp, *Pandalus borealis* (**Note catches of shrimp displayed as kilograms per tow)**

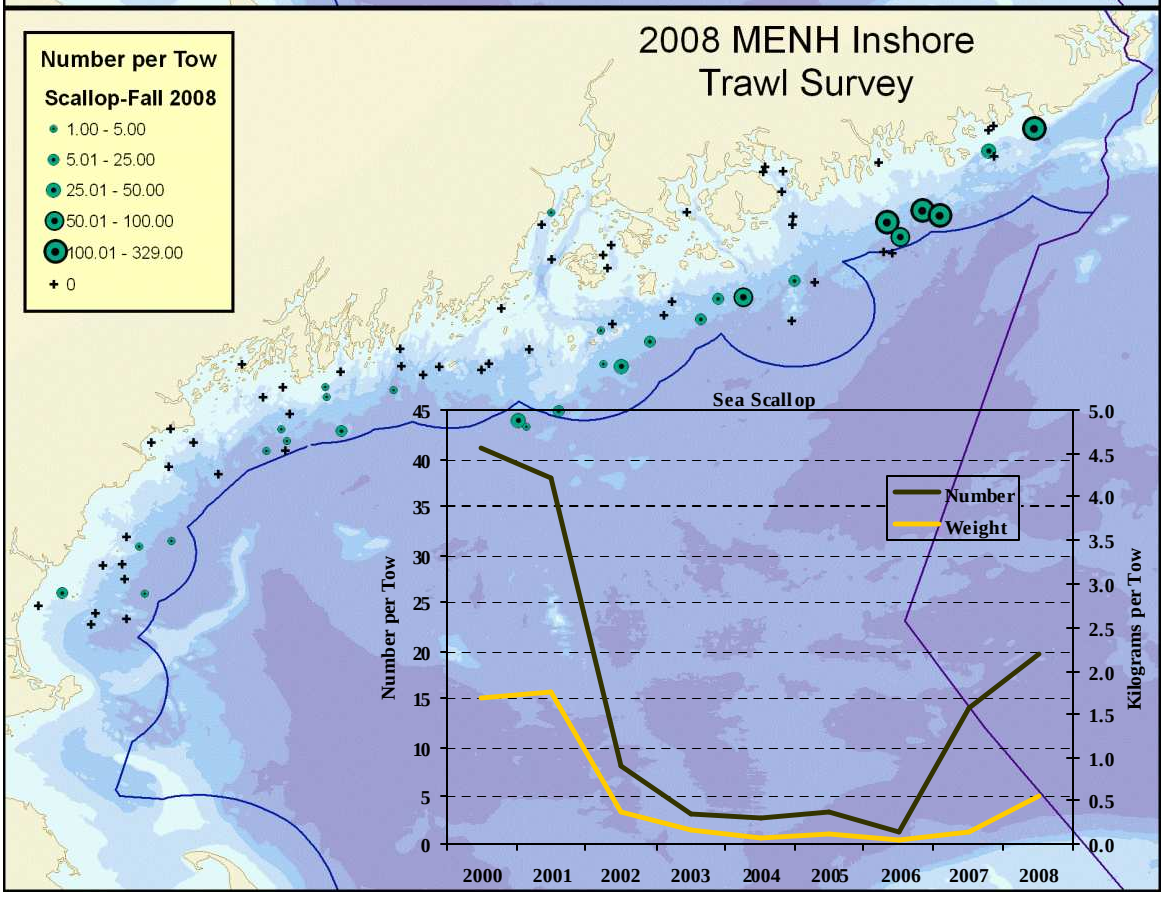




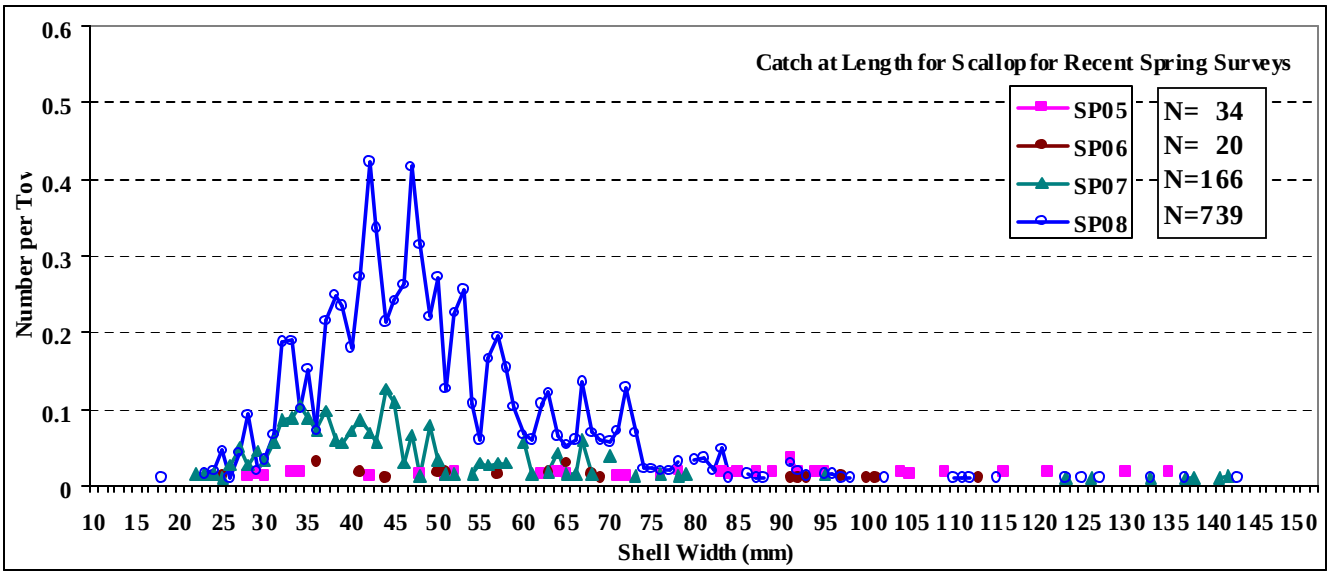
Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for shrimp, indices calculated for regions 1 through 5; strata 1 through 4 (2003 and up)									
SPRING					FALL				
	Stratified Mean					Stratified Mean			
	Number		Weight (kg.)			Number		Weight (kg)	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	92.57	54.20	0.88	0.41
2001	159.77	52.13	1.05	0.35	2001	49.89	24.04	0.27	0.13
2002	167.40	68.82	0.50	0.22	2002	22.95	10.15	0.16	0.07
2003	582.09	77.06	3.25	0.39	2003	242.48	92.03	1.80	0.67
2004	774.30	139.20	4.86	1.18	2004	175.04	99.88	1.03	0.57
2005	1746.05	176.71	7.54	0.89	2005	1052.09	50.44	4.63	0.17
2006	2754.63	407.04	14.25	2.17	2006	749.43	204.83	4.44	1.34
2007	2327.07	611.97	14.86	4.38	2007	843.76	163.47	7.00	1.37
2008	1865.34	169.86	18.90	7.98	2008	2010.33	965.43	17.29	9.23

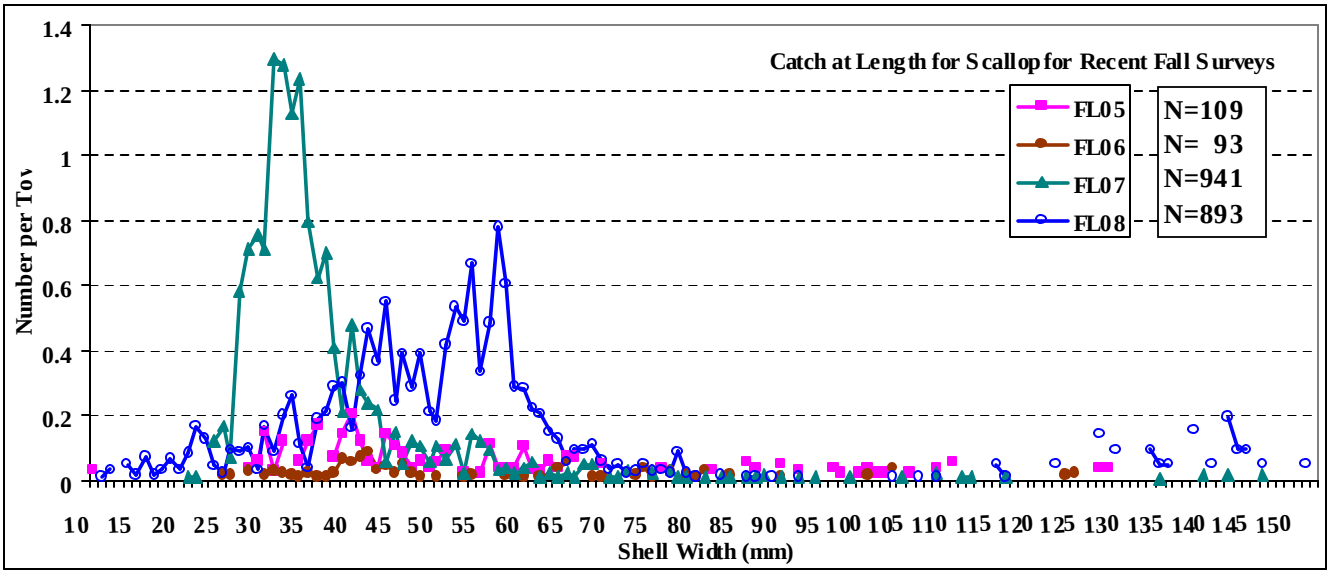
Sea scallop, *Placopecten magelanicus*





Mean and error for graphs overlain on distribution maps									
fixed stations not included									
for scallop, indices calculated for regions 1 through 5									
strata 1 through 4 (2003 on)									
SPRING					FALL				
Stratified Mean					Stratified Mean				
	Number		Weight			Number		Weight	
	Mean	Error	Mean	Error		Mean	Error	Mean	Error
					2000	41.08	11.66	1.70	0.67
2001	37.25	8.35	1.87	0.70	2001	38.01	10.51	1.75	0.37
2002	19.66	5.41	1.32	0.39	2002	8.13	1.95	0.39	0.10
2003	4.51	1.18	0.23	0.07	2003	3.17	1.96	0.16	0.09
2004	1.23	0.33	0.09	0.02	2004	2.72	1.20	0.08	0.03
2005	0.51	0.16	0.04	0.02	2005	3.38	1.24	0.11	0.04
2006	0.27	0.11	0.01	0.00	2006	1.16	0.39	0.04	0.01
2007	2.23	0.66	0.06	0.02	2007	13.98	4.71	0.14	0.03
2008	7.89	1.87	0.17	0.04	2008	19.80	6.12	0.55	0.27





PARTNERSHIPS

The fisherman-scientist partnership during this project has been consistently strong. Foremost is the partnership between the scientific staff and commercial boat crews. The commercial crew of the F/V Robert Michael has proven to be completely dedicated to this project. Not only did the crew operate the boat and handle the gear, they have become equal partners in solving problems related to gear conflicts, communications, scheduling and logistics. Their participation involves far more than boat operations and gear handling, including sorting the catch, weighing and measuring samples, and collecting biological specimens including otoliths. Their involvement has resulted in significant improvements to survey efficiency while still adhering to standard protocols.

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Sherman, S., Stepanek, K., Gowen, A. Sowles, J., Grout, D., and Tetrault, R.M 2007 Annual Report on the Maine-New Hampshire Inshore Trawl Survey (January 1, 2007-December 31, 2007) Maine Department of Marine Resources, Research Reference Document 09/0?

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Appendix A
Individual Station Descriptors for Start of Tow

DATE	REGION	TOWID	LAT deg/min	LON deg/min	Stratum	Time	Tow Duration	Depth (FA)	Temp C °	Salinity ppt
Spring 2008										
5/5/2008	1	SP08__1	42 52.334	70 34.558	3	0934	20	47.7	3.95	32.44
5/5/2008	1	SP08__2	42 54.509	70 39.133	2	1141	20	32.5	4.07	32.38
5/5/2008	1	SP08__3	42 56.812	70 40.399	2	1322	20	24.5	4.09	32.33
5/5/2008	1	SP08__4	42 56.173	70 44.725	1	1448	20	15.0	4.09	32.33
5/6/2008	1	SP08__5	42 58.651	70 38.995	1	0638	20	17.5	5.54	31.57
5/6/2008	1	SP08__6	42 56.131	70 27.261	3	0901	17	49.5	3.84	32.31
5/6/2008	1	SP08__7	42 56.270	70 21.242	4	1119	20	77.5	4.46	32.90
5/6/2008	1	SP08__8	43 00.210	70 30.601	3	1312	19	46.6	3.88	32.37
5/6/2008	1	SP08__9	43 12.761	70 34.284	1	1616	20	15.0	5.78	31.56
5/7/2008	1	SP08_10	43 05.512	70 18.458	4	0815	20	73.5	4.36	32.86
5/7/2008	1	SP08_11	43 10.881	70 13.866	4	1002	20	65.0	3.95	32.57
5/7/2008	1	SP08_12	43 13.187	70 11.626	4	1121	20	63.5	4.09	32.63
5/7/2008	1	SP08_13	43 09.061	70 14.888	4	1252	20	74.0	4.22	32.75
5/7/2008	1	SP08_14	43 08.734	70 23.366	3	1428	20	48.6	3.96	32.45
5/7/2008	1	SP08_15	43 10.607	70 26.169	2	1555	17	37.0	4.39	32.73
5/8/2008	1	SP08_16	43 18.006	70 32.785	1	0757	17	10.0	5.54	31.61
5/8/2008	1	SP08_17	43 13.668	70 19.154	3	1049	16	52.5	4.00	32.44
5/8/2008	1	SP08_18	43 15.089	70 16.086	3	1222	11	51.7	4.11	32.63
5/8/2008	1	SP08_19	43 17.126	70 17.215	3	1408	16	50.0	4.00	32.39
5/8/2008	1	SP08_20	43 19.271	70 20.300	2	1542	19	38.0	4.47	32.32
5/9/2008	1	SP08_21	43 24.290	70 08.080	4	0740	18	56.0	4.25	32.46
5/9/2008	1	SP08_22	43 25.862	70 16.852	2	0947	20	34.5	4.94	32.49
5/9/2008	1	SP08_23	43 28.037	70 19.152	1	1113	20	17.5	4.79	32.17
5/9/2008	1	SP08_24	43 30.874	70 14.521	2	1228	20	23.1	5.68	31.69
5/9/2008	1	SP08_25	43 31.781	70 16.507	1	1333	20	14.0	7.56	29.59
5/12/2008	2	SP08_26	43 46.646	70 01.413	1	0826	20	9.0	8.14	29.02
5/12/2008	2	SP08_27	43 39.787	70 04.609	1	1436	20	20.5	5.14	32.14
5/13/2008	2	SP08_28	43 27.984	69 57.851	4	0846	20	67.0	4.65	32.57
5/13/2008	2	SP08_29	43 29.059	69 55.765	4	1017	20	68.0	4.65	33.78
5/13/2008	2	SP08_30	43 34.400	69 56.072	3	1204	20	50.5	5.16	33.37
5/13/2008	2	SP08_31	43 36.097	69 52.514	3	1339	20	46.0	5.20	32.45
5/13/2008	2	SP08_32	43 36.041	69 43.038	3	1622	20	54.7	5.10	32.82
5/14/2008	2	SP08_33	43 37.661	69 35.861	3	0757	17	59.5	4.98	32.27
5/14/2008	2	SP08_34	43 41.276	69 39.34	3	1016	18	46.2	4.81	30.42
5/14/2008	2	SP08_35	43 42.502	69 44.543	1	1302	20	17.0	5.42	31.63
5/14/2008	2	SP08_36	43 42.629	69 46.669	1	1401	20	10.5	6.80	30.16
5/15/2008	2	SP08_37	43 57.357	69 22.732	1	0736	20	7.8	8.49	28.93
5/15/2008	2	SP08_38	43 52.808	69 19.580	1	0926	20	15.2	5.53	31.46
5/15/2008	2	SP08_39	43 50.122	69 18.522	2	1046	15	40.5	5.31	31.94
5/15/2008	2	SP08_40	43 48.740	69 27.571	2	1307	20	34.5	4.67	31.97
5/15/2008	2	SP08_41	43 50.330	69 29.084	2	1426	20	33.5	4.61	31.62
5/16/2008	2	SP08_42	43 46.329	69 29.364	3	0710	20	49.2	4.74	32.12
5/16/2008	2	SP08_43	43 43.111	69 27.121	3	0843	17	58.5	4.63	32.62
5/16/2008	2	SP08_44	43 39.776	69 26.869	4	1017	18	67.2	4.59	32.68

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DATE	REGION	TOWID	LAT deg/min	LON deg/min	Stratum	Time	Tow Duration	Depth (FA)	Temp C °	Salinity ppt
5/16/2008	2	SP08_45	43 41.652	69 30.720	4	1129	20	65.2	4.62	32.62
5/16/2008	2	SP08_46	43 36.699	69 32.993	4	1311	18	70.2	4.66	32.60
5/19/2008	3	SP08_47	43 50.025	69 03.630	2	0919	17	40.0	5.58	31.91
5/19/2008	3	SP08_48	43 55.014	69 08.140	1	1120	20	21.2	6.42	31.37
5/19/2008	3	SP08_49	43 56.719	69 10.034	1	1305	20	20.5	5.82	31.45
5/19/2008	3	SP08_50	44 07.012	69 03.207	1	1611	20	21.9	5.06	31.23
5/20/2008	3	SP08_51	44 15.348	68 49.884	1	0725	14	10.8	5.81	31.15
5/20/2008	3	SP08_52	44 12.953	68 54.751	2	0845	20	33.5	5.46	30.76
5/20/2008	3	SP08_53	44 10.805	68 56.106	2	1002	20	31.0	5.48	31.36
5/20/2008	3	SP08_54	44 05.325	68 59.562	3	1145	20	52.8	5.62	29.85
5/21/2008	3	SP08_55	43 46.116	69 09.386	3	0857	20	50.0	5.49	32.19
5/21/2008	3	SP08_56	43 38.113	69 07.991	4	1137	20	71.8	4.75	32.81
5/21/2008	3	SP08_57	43 36.402	68 56.558	4	1351	22	67.0	4.85	32.76
5/21/2008	3	SP08_58	43 37.281	68 50.686	4	1527	20	73.2	5.29	32.70
5/22/2008	3	SP08_59	43 46.047	68 43.372	3	0748	20	57.5	5.42	32.41
5/22/2008	3	SP08_60	43 53.107	68 39.780	3	1342	20	53.0	5.23	32.00
5/22/2008	3	SP08_61	43 54.933	68 45.280	3	1503	20	53.2	5.42	31.92
5/22/2008	3	SP08_62	43 55.472	68 47.276	3	1609	20	49.5	5.36	31.94
5/22/2008	3	SP08_63	43 59.242	68 45.223	2	1737	18	37.0	5.39	31.93
5/23/2008	3	SP08_64	44 19.225	68 45.879	1	0917	16	15.0	5.68	31.07
5/23/2008	3	SP08_65	44 10.858	68 45.858	1	1051	18	18.2	6.87	30.96
5/23/2008	3	SP08_66	44 09.899	68 45.573	2	1203	20	33.5	6.57	31.10
5/23/2008	3	SP08_67	44 08.030	68 45.374	2	1340	20	35.5	6.48	31.29
5/26/2008	4	SP08_68	44 01.164	68 32.392	3	0808	20	38.8	5.42	31.91
5/26/2008	4	SP08_69	44 06.634	68 35.282	1	1059	15	13.5	7.58	31.37
5/26/2008	4	SP08_70	44 09.235	68 32.720	1	1335	14	12.5	7.79	31.36
5/26/2008	4	SP08_71	44 13.977	68 30.448	1	1521	20	12.0	8.63	30.98
5/27/2008	4	SP08_72	44 23.374	68 30.891	1	0831	20	15.0	8.89	30.68
5/27/2008	4	SP08_73	44 19.825	68 32.863	1	0953	20	18.0	6.64	31.38
5/27/2008	4	SP08_74	44 18.468	68 28.124	2	1106	20	33.5	10.61	25.78
5/28/2008	4	SP08_75	43 54.758	68 31.169	3	0832	20	54.0	5.34	32.51
5/28/2008	4	SP08_76	43 59.644	68 26.447	3	1024	20	45.8	5.28	32.35
5/28/2008	4	SP08_77	43 55.247	68 15.628	4	1301	20	62.5	5.33	32.19
5/28/2008	4	SP08_78	43 57.671	68 14.088	4	1408	20	59.5	5.34	32.39
5/28/2008	4	SP08_79	44 00.371	68 17.989	3	1535	20	51.5	5.30	32.34
5/28/2008	4	SP08_80	44 11.067	68 17.001	2	1754	20	21.5	6.02	31.67
5/29/2008	4	SP08_81	44 04.454	68 07.272	3	0718	20	56.0	5.43	32.58
5/29/2008	4	SP08_82	44 03.485	68 03.129	4	0838	20	60.5	5.55	32.98
5/29/2008	4	SP08_83	44 07.194	67 57.187	4	1025	20	62.2	5.44	32.61
5/29/2008	4	SP08_84	44 07.555	67 52.881	3	1149	20	55.0	5.42	32.51
5/29/2008	4	SP08_85	44 11.062	68 02.092	3	1346	20	46.0	5.26	31.98
5/30/2008	4	SP08_86	44 24.478	68 14.001	1	0757	13	7.5	6.16	31.61
5/30/2008	4	SP08_87	44 13.058	68 04.141	3	1324	20	40.0	5.33	31.95
5/30/2008	4	SP08_88	44 17.258	68 05.158	2	1517	20	34.5	5.50	31.62
5/30/2008	4	SP08_89	44 17.138	68 07.792	2	1628	20	35.2	5.42	31.76
6/2/2008	5	SP08_90	44 23.480	67 55.801	1	1037	14	19.5	6.90	31.55

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DATE	REGION	TOWID	LAT deg/min	LON deg/min	Stratum	Time	Tow Duration	Depth (FA)	Temp C °	Salinity ppt
6/2/2008	5	SP08_91	44 21.624	67 53.627	2	1244	19	22.5	6.42	31.72
6/2/2008	5	SP08_92	44 17.170	67 50.408	2	1415	20	37.3	5.68	32.03
6/2/2008	5	SP08_93	44 16.467	67 46.731	3	1536	20	41.5	5.54	32.28
6/2/2008	5	SP08_94	44 18.871	67 44.200	3	1705	20	42.0	5.57	31.93
6/3/2008	5	SP08_95	44 13.986	67 40.486	4	0719	20	57.5	5.61	32.62
6/3/2008	5	SP08_96	44 11.745	67 31.441	4	0934	22	105.0	6.68	33.95
6/3/2008	5	SP08_97	44 15.233	67 27.504	4	1103	20	106.0	6.63	33.94
6/3/2008	5	SP08_98	44 18.044	67 29.787	4	1241	20	63.5	5.77	32.69
6/3/2008	5	SP08_99	44 21.293	67 28.270	3	1415	20	54.2	5.77	32.41
6/3/2008	5	SP08100	44 17.730	67 36.434	3	1600	20	47.5	5.68	32.26
6/4/2008	5	SP08101	44 19.730	67 37.595	3	0905	18	48.3	5.77	32.01
6/4/2008	5	SP08102	44 25.499	67 32.607	3	1102	20	42.1	6.04	31.90
6/4/2008	5	SP08103	44 24.947	67 34.290	2	1219	20	37.0	6.03	31.87
6/4/2008	5	SP08104	44 28.027	67 43.575	1	1408	20	20.0	6.51	31.65
6/5/2008	5	SP08105	44 35.108	67 18.133	2	0912	20	28.9	6.19	31.82
6/5/2008	5	SP08106	44 37.274	67 12.786	2	1056	20	35.5	6.18	31.81
6/5/2008	5	SP08107	44 39.476	67 09.846	1	1255	20	25.5	6.20	31.78
6/5/2008	5	SP08108	44 37.229	67 10.498	3	1427	20	49.8	6.11	31.94
6/6/2008	5	SP08109	44 43.305	67 04.534	2	0824	20	34.5	6.07	31.77
6/6/2008	5	SP08110	44 43.088	67 05.745	1	0959	20	20.5	6.09	31.77
6/6/2008	5	SP08111	44 41.972	66 57.628	3	1139	15	55.5	6.07	31.78
6/6/2008	5	SP08112	44 41.046	66 59.888	3	1328	20	47.5	6.11	31.78
Fall 2008										
9/30/2008	1	FL08__1	42 54.673	70 32.683	3	0942	20	44.5	8.31	32.50
9/30/2008	1	FL08__2	42 52.411	70 33.359	3	1146	20	47.5	7.43	32.65
9/30/2008	1	FL08__3	42 56.227	70 44.612	1	1508	20	16.0	13.75	31.47
9/30/2008	1	FL08__4	42 58.973	70 39.584	1	1641	15	13.4	12.93	31.65
10/1/2008	1	FL08__5	42 53.543	70 26.253	4	0800	20	71.7	6.66	32.44
10/1/2008	1	FL08__6	42 58.747	70 22.406	4	1017	20	64.7	6.23	32.72
10/1/2008	1	FL08__7	43 01.766	70 26.706	3	1224	20	52.4	7.77	32.74
10/1/2008	1	FL08__8	43 04.964	70 27.170	3	1427	20	43.6	8.34	32.54
10/1/2008	1	FL08__9	43 04.701	70 31.251	2	1653	20	34.1	9.16	32.45
10/2/2008	1	FL08_10	43 10.541	70 26.231	2	0939	18	35.7	9.17	32.44
10/2/2008	1	FL08_11	43 08.476	70 23.632	3	1331	20	47.6	8.37	32.68
10/2/2008	1	FL08_12	43 09.734	70 16.877	4	1543	20	67.1	5.93	32.99
10/3/2008	1	FL08_13	43 23.586	70 07.228	4	0840	20	59.0	7.47	32.82
10/4/2008	1	FL08_14	43 25.187	70 17.501	2	0815	20	30.8	8.52	32.47
10/4/2008	1	FL08_15	43 30.173	70 21.097	1	1020	20	6.9	11.34	32.17
10/4/2008	1	FL08_16	43 33.088	70 17.098	1	1237	13	4.5	11.53	32.75
10/4/2008	1	FL08_17	43 30.138	70 12.404	2	1356	20	34.8	9.09	32.61
10/6/2008	2	FL08_18	43 46.439	70 02.348	1	0840	14	9.5	12.33	31.64
10/6/2008	2	FL08_19	43 39.656	69 57.884	2	1217	17	28.2	9.87	32.53
10/6/2008	2	FL08_20	43 41.707	69 53.814	1	1436	15	14.0	10.36	32.41
10/7/2008	2	FL08_21	43 28.379	69 57.117	4	0830	20	67.6	6.44	33.25

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10/7/2008	2	FL08_22	43 28.526	69 53.300	4	1035	20	71.5	7.22	33.10
10/7/2008	2	FL08_23	43 30.427	69 52.876	4	1221	20	64.1	7.67	33.06
10/7/2008	2	FL08_24	43 32.933	69 54.044	3	1411	20	49.1	8.65	32.50
10/7/2008	2	FL08_25	43 36.102	69 52.403	3	1558	20	45.9	8.69	32.79
10/8/2008	2	FL08_26	43 41.688	69 44.870	1	0857	20	18.9	10.42	32.37
10/8/2008	2	FL08_27	43 39.551	69 44.668	2	1045	20	33.1	9.30	32.64
10/8/2008	2	FL08_28	43 32.648	69 41.539	4	1259	20	56.6	7.68	32.95
10/8/2008	2	FL08_29	43 44.835	69 41.755	2	1654	15	31.7	9.69	32.50
10/9/2008	2	FL08_30	43 40.989	69 30.735	4	0740	20	70.5	8.00	32.92
10/9/2008	2	FL08_31	43 46.060	69 29.118	3	1135	20	45.9	8.65	32.60
10/10/2008	2	FL08_32	43 49.608	69 29.391	3	0752	20	38.2	8.56	31.21
10/10/2008	2	FL08_33	43 44.310	69 24.638	3	1121	20	50.4	8.27	33.12
10/10/2008	2	FL08_34	43 45.920	69 21.325	3	1235	20	44.8	8.83	32.81
10/13/2008	3	FL08_35	43 45.228	69 12.560	3	0924	20	50.2	8.89	33.06
10/13/2008	3	FL08_36	43 46.589	69 10.940	3	1044	20	47.7	8.58	32.97
10/13/2008	3	FL08_37	43 57.992	69 08.392	1	1335	20	15.8	10.99	32.15
10/14/2008	3	FL08_38	44 17.847	68 58.024	2	0919	19	32.3	11.88	32.04
10/14/2008	3	FL08_39	44 15.487	69 00.043	2	1220	19	26.7	11.71	32.13
10/14/2008	3	FL08_40	44 08.239	68 57.916	2	1541	20	34.9	11.53	32.17
10/15/2008	3	FL08_41	43 49.494	69 02.663	2	0935	20	39.4	9.82	32.75
10/15/2008	3	FL08_42	43 34.897	69 04.856	4	1423	20	75.7	6.98	33.15
10/15/2008	3	FL08_43	43 33.466	69 03.104	4	1602	20	74.7	7.12	33.23
10/15/2008	3	FL08_44	43 36.788	68 56.411	4	1727	20	67.5	8.14	33.20
10/16/2008	3	FL08_45	43 51.232	68 37.487	3	0927	20	54.9	9.36	33.18
10/16/2008	3	FL08_46	43 46.108	68 43.372	3	1158	16	58.6	9.34	33.18
10/16/2008	3	FL08_47	43 46.457	68 47.120	3	1324	20	56.6	9.40	33.10
10/16/2008	3	FL08_48	43 53.448	68 47.613	3	1544	13	48.1	10.75	32.66
10/16/2008	3	FL08_49	43 54.803	68 45.269	3	1652	20	49.9	10.58	32.70
10/17/2008	3	FL08_50	44 06.371	68 46.345	1	1013	20	14.9	12.02	31.45
10/17/2008	3	FL08_51	44 09.167	68 47.324	1	1158	15	8.9	12.05	31.43
10/17/2008	3	FL08_52	44 11.257	68 45.652	1	1316	15	18.0	12.02	31.65
10/20/2008	4	FL08_53	44 18.033	68 29.857	1	1547	19	18.9	11.62	31.98
10/21/2008	4	FL08_54	43 58.477	68 32.908	3	0955	15	46.8	10.37	32.85
10/21/2008	4	FL08_55	43 56.577	68 34.658	3	1130	20	44.1	10.48	32.79
10/21/2008	4	FL08_56	43 55.899	68 26.954	3	1303	20	56.4	10.15	32.94
10/21/2008	4	FL08_57	44 00.085	68 23.335	3	1510	20	48.0	10.52	32.77
10/23/2008	4	FL08_58	44 03.833	68 07.475	3	1042	20	54.2	10.21	32.82
10/23/2008	4	FL08_59	44 03.479	68 03.213	4	1241	20	60.3	10.13	32.92
10/23/2008	4	FL08_60	43 55.465	68 08.110	4	1435	20	77.6	7.82	34.03
10/23/2008	4	FL08_61	44 00.364	68 18.086	3	1703	19	49.7	10.21	32.83
10/24/2008	4	FL08_62	44 26.385	68 13.968	2	0829	20	23.6	10.71	32.34
10/24/2008	4	FL08_63	44 27.444	68 13.628	1	0952	20	12.6	10.55	32.17
10/24/2008	4	FL08_64	44 26.487	68 09.832	1	1128	20	19.0	10.58	32.35
10/24/2008	4	FL08_65	44 22.352	68 10.176	2	1309	20	24.8	10.70	32.41
10/24/2008	4	FL08_66	44 17.088	68 07.819	2	1440	12	34.8	10.55	32.53
10/25/2008	4	FL08_67	44 15.442	68 07.969	2	0752	20	36.6	10.39	32.59

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10/28/2008	5	FL08_68	44 09.819	67 48.997	4	1005	20	73.9	9.45	33.29
10/28/2008	5	FL08_69	44 09.465	67 47.118	4	1140	20	79.1	9.31	33.33
10/28/2008	5	FL08_70	44 12.931	67 45.558	4	1327	20	67.6	9.42	33.34
10/30/2008	5	FL08_71	44 28.333	67 50.028	1	1019	18	9.5	9.78	31.69
10/31/2008	5	FL08_72	44 15.858	67 48.361	3	0928	19	45.1	9.73	33.05
10/31/2008	5	FL08_73	44 18.260	67 41.026	3	1112	20	48.4	9.84	32.95
10/31/2008	5	FL08_74	44 17.265	67 37.433	3	1243	20	53.5	9.78	32.98
11/1/2008	5	FL08_75	44 35.022	67 27.176	1	0841	8	8.6	9.57	31.92
11/1/2008	5	FL08_76	44 35.963	67 26.187	1	1046	20	9.6	9.65	32.31
11/1/2008	5	FL08_77	44 35.355	67 17.766	2	1451	20	29.8	10.00	32.50
11/2/2008	5	FL08_78	44 30.749	67 27.005	2	0824	20	28.8	10.06	32.60
11/2/2008	5	FL08_79	44 29.659	67 26.088	2	1239	20	38.2	9.94	32.75