STATE OF CONNECTICUT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

Daniel C. Esty
Commissioner

Bureau of Natural Resources
Marine Fisheries Division
www.ct.gov/deep/fishing

A STUDY OF MARINE RECREATIONAL FISHERIES IN CONNECTICUT

Federal Aid in Sport Fish Restoration
F-54-R-31 Annual Performance Report
March 1, 2011 – February 29, 2012

State of Connecticut
Department of Energy and Environmental Protection
79 Elm Street
Hartford, CT 06106-5127
www.ct.gov/deep

Federal Aid in Sport Fish Restoration
F-54-R-31
Annual Performance Report

Project Title: ***A Study of Marine Recreational Fisheries in Connecticut***

Period Covered: March 1, 2011 - February 29, 2012

Job Title	***Prepared by*:**
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Part 2: Estuarine Seine Survey	David R. Molnar
Job 3: Inshore Survey	Jacqueline M. Benway
Job 4: Studies in Conservation Engineering	Inactive
Job 5: Cooperative Interagency Resource Monitoring	Matthew J. Lyman Katie O'Brien-Clayton
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***Approved by*:**
David G. Simpson, Director
Marine Fisheries Division

Date: August 30, 2012

Cover: A wonderful moment with family… enjoying a great catch of summer flounder (fluke).

EXECUTIVE SUMMARY

Project: A Study of Marine Recreational Fisheries in Connecticut
Federal Aid Project: F54R-31 (Federal Aid in Sport Fish Restoration)
Annual Progress Report: March 1, 2011 – February 29, 2012

Purpose of the Project

The purpose of this project is to collect information needed for management of the marine recreational fishery. This information includes angler participation, effort, catch, and harvest; the relative abundance of finfish and specific population parameters for important selected species, water quality and habitat parameters, and assessment of fishery related issues such as hook and release mortality. The project also includes an outreach component to inform the public, and increase understanding and support for management programs and regulations.

The project is comprised of six jobs: 1) Marine Angler Survey, Part 1: Marine Recreational Fishery Statistics Survey, and Part 2: Volunteer Angler Survey, 2) Marine Finfish Survey, Part 1: Long Island Sound Trawl Survey, and Part 2: Estuarine Seine Survey, 3) Inshore Survey, 4) Fishing Gear Studies (Inactive), 5) Cooperative Interagency Resource Monitoring, 6) Public Outreach. Job 4 has been inactive since 2000.

Information on marine angler activity is collected from intercept interviews conducted by DEEP Marine Fisheries staff and through a telephone survey conducted by a National Marine Fisheries Service contractor as part of the coastwide Marine Recreational Fisheries Statistics Survey (MRFSS). The relative abundance of 40 species and more detailed population information on selected finfish and invertebrates are obtained from an annual Long Island Sound Trawl Survey. The relative abundance of young-of-year winter flounder and nearshore finfish species is obtained from fall seine sampling conducted at eight sites. Fishing gear and fishing practices are evaluated by conducting studies of hook and release mortality rates and through sampling catches of commercial fishing vessels taking species of recreational interest. Marine habitat is monitored and evaluated monthly through cooperative interagency sampling of water quality parameters (temperature, salinity, dissolved oxygen) at 20 to 25 fixed sites throughout the Sound. Public outreach is performed through speaking engagements at schools, with civic organizations and fishing clubs as well as through displays in the Marine Headquarters lobby. Marine Program displays and staffing at various fishing shows also is conducted under public outreach. Project staff also keep the Fisheries Advisory Council informed on project activities and frequent media contacts provide broad newspaper coverage of project activities and findings.

JOB 1: MARINE ANGLER SURVEY
PART 1: MARINE RECREATIONAL FISHERY STATISTICS SURVEY

OBJECTIVES (Summary)

- To estimate the number of marine anglers, fishing trips, fish caught, and the number and weight of fish creeled.

KEY FINDINGS:

- Marine recreational fishery statistics estimates are continuously updated over time. Estimates of participants, trip effort, and catch can be queried by region, sub-region, and state by visiting the National Oceanic and Atmospheric Administration (NOAA Fisheries/National Marine Fisheries Service/Marine Recreational Fishery Statistics Survey (MRFSS)) web site at http://www.st.nmfs.gov/st1/recreational/queries/index.html. For this reason, this report will not include MRFSS statistics. However, intercept survey work completed by Connecticut is available in the Results and Discussion section of this report.

CONCLUSIONS:

- Coastwide fishery management plans are resulting in increases in several fish populations and good catches of many primary recreational species.

RECOMMENDATIONS:

- Continue obtain catch and harvest information and angler participation rates through the Marine Recreational Fishery Statistics Survey in order the status of the recreational fishery.

JOB 1: MARINE ANGLER SURVEY
PART 2: VOLUNTEER ANGLER SURVEY

OBJECTIVES (Summary)

- To characterize the size composition of both kept and released fish observed by volunteer anglers.

KEY FINDINGS:

- A total of 40 anglers participated in the survey and made 830 trips in 2011. Volunteers including anglers involved in a fishing party made a total of 1,666 trips. With multiple species taken per trip anglers reported 752 trips targeting bluefish, 1,114 trips for striped bass, 360 trips for summer flounder, 29 trips for winter flounder, 140 trips for scup, and 153 trips for tautog.

- Volunteer anglers measured 923 bluefish measuring > 12 inches in length, 941 striped bass, 1,456 summer flounder, 35 winter flounder, 1,007 scup and 613 tautog. Collecting length measurements on released fish provides valuable data not available through the Marine Recreational Information Program except for the headboat at sea sampling survey.

CONCLUSIONS:

- Volunteer anglers provide a tremendous amount of data on the size and catch composition of popular recreational species in Connecticut, supplying several stock assessments with scarce length information on released fish.

RECOMMENDATIONS:

- Maintain the Volunteer Angler Survey as an effective means of characterizing angler behavior and particularly in collecting length data on released fish that are not available from the Marine Recreational Fishery Statistics Survey.

JOB 2 PART 1: LONG ISLAND SOUND TRAWL SURVEY (LISTS)
OBJECTIVES (Summary)

- Provide an annual index of numbers and biomass per standard tow for 40 common species and age specific indices of abundance for scup, tautog, winter flounder, and summer flounder, and recruitment indices for bluefish (age 0) and weakfish (age 0).
- Provide annual totals counts for all finfish species taken, total biomass for all finfish and invertebrate species taken, as well as, a species list for all species caught in LIS Trawl Survey sampling.

KEY FINDINGS:

- A total of 127,956 finfish, lobster and squid weighing 16,633 kg were collected in 2011.

- Sixty-five (65) finfish species and forty one (41) invertebrate species (or taxa) were collected from 172 tows conducted in 2011. The total fish species count (65) is 13% higher than the previous 27-year average of 57.4 species per year (1984-2010). Sixty-five species is also the third highest since the survey began. The Long Island Sound Trawl Survey has collected one hundred and two (102) finfish species since 1984 with two new species; silver perch (*Bairdiella chrysoura*) and white mullet (*Mugil curema*) being observed in 2011.

- Springtime adult scup abundance remains high relative to 1984-1999 levels; the 2011 spring index of age 2+ fish was the sixth highest in the time-series at 34.2 fish/tow. Although the fall scup index is usually the preferred index of abundance from the trawl survey, even the springtime scup indices have been above the time-series average for six of the past twelve years. The fall index of age 2+ was also high (third highest), in fact, there were age 10+ scup in the fall survey for the first time in 2011. The record 1999 year class (498 fish/tow) has spanned out to record age class strength each year since, and is now included in the age 10+ group.

- During the spring survey two finfish species were at record high levels of abundance, smooth dogfish and summer flounder, while red hake were at record low levels of abundance. Of the species where the spring index is the preferred index of abundance for the trawl survey, an additional three species had indices above the time-series mean; black sea bass, ocean pout and spiny dogfish.

- During the fall survey, two species had record high indices of abundance, spotted hake and northern kingfish. Conversely, two species had record low indices of abundance, bluefish and butterfish. The tropical storms that impacted the Long Island Sound area during the latter part of August and the beginning of September may have been a contributing factor in displacing many species outside the survey area. Even so, of the species where the fall index is the preferred index, an additional eleven (11) species had indices above the time-series mean; smooth dogfish, summer flounder, spotted hake, hogchoker, northern kingfish, Atlantic menhaden, moonfish, rough scad, scup, striped searobin, and clearnose skate.

- Although the striped bass abundance in spring 2011 fell below the mean for the second time in the past 16 years, the current index of 0.48 fish per tow remains well above the average for the first eight years of the time series.

- The fluke index for spring 2011 (3.85 fish per tow) is more than triple the time-series average. The spring survey index for tautog has remained low and below the time-series average for 18 of the past 19 years. Winter flounder springtime abundance has been low and declining for the past thirteen years, with 2006 being the lowest index for the time-series and 2007-2011 indices being approximately one-third the time series average. The weakfish age 1+ index for the fall survey (0.68 fish/tow) show the highest abundance of older weakfish since the peak years in the mid 1990's.

- Relative indices of abundance (geometric mean number per tow) of American lobster were at record low levels for both spring and fall surveys in 2011. This continues the decreasing trend begun in the late 1990's. Current springtime abundance has seen more than a 95% drop since the peak abundance of 18.52 lobsters per tow in 1998. Fall lobster abundance has fallen more than 98% since the high of 19.6 lobsters/tow observed in 1997.

CONCLUSIONS:

- The abundance of some recreationally important species in Long Island Sound remains moderate to high including scup, striped bass, summer flounder and black sea bass. However, some recreational species like winter flounder and tautog have gone through a protracted period of declining abundance and this is cause for concern. Additionally, several species not typically targeted by recreational fishermen have undergone changes in abundance in trawl survey catches that may indicate shifts in species assemblages within Long Island Sound associated with broad scale increasing temperature trends in the northwest Atlantic.

RECOMMENDATIONS:

- C
ontinue monitoring through LIS Trawl Survey to provide information for stock assessment purposes, to evaluate management measures and to maintain the continuity of this long-standing time-series.

JOB 2 PART 2: ESTUARINE SEINE SURVEY

OBJECTIVES (summary)

- To provide an annual index of recruitment for young-of-year winter flounder and all finfish and crab species taken.

KEY FINDINGS:

- The 2011 annual index of recruitment for young-of-year winter flounder (1.1) fish/haul) ranked third lowest (22nd) out of 24 annual indices, following the 2009 record low.

- Mean catch of all finfish (186 fish/haul) ranked sixth out of 24 annual indices and was just above the series average of 145 fish/haul (Figure 2.2).

- The forage fish index for 2011 (127 forage fish/haul) was the seventh highest of the time series.

CONCLUSIONS:

- Another decrease in abundance of the winter flounder young of year index for 2011, followed by fairly low indices since 2000 and the absence of a strong year class since 1996 (relatively high in 2004) is not expected to change the disappointing short term outlook for the stock.

- The inshore forage fish abundance index primarily reflects the abundance of Atlantic silversides, followed by striped killifish, mummichog and sheepshead minnow, the dominant forage species taken in the survey.

RECOMMENDATIONS:

- Continue to monitor young-of-year winter flounder and inshore forage species abundance through the September seine survey.

JOB 3: INSHORE SURVEY

OBJECTIVES (Summary)

- Provide information on the adult American shad spawning population: length, age structure and sex ratio.

- Provide annual indices of relative abundance for juvenile shad, blueback herring and common nearshore marine species.

KEY FINDINGS:

- The 2011 adult American shad run experienced an increase of 33% at the Holyoke Lift; This is the first time the lift count has surpassed 200,000 shad since 2003. The sex ratio indicates that the majority of the fish lifted are males (70%).

- The age structure in 2011 for adult American shad is consistent with recent years. Age structure for males ranged from ages 3-6 and ages 4-6 for females. The majority of female fish were 4 years old (47%) as well as the majority of male fish (42%). The percentage of repeat spawners continues to be low with 6.4% for females and 10.3% for males.

- The 2011 CT River seine survey completed 83 seine hauls. Over 20,000 fish comprised of 32 different species or taxonomic groups were collected. Sampling in 2011 was impacted by Tropical Storm Irene, which elevated river height levels to nearly 64 times above average.

- The 2011 CT River juvenile shad index (3.08) ranks as the 5th lowest value in the 34 year time series and is approximately half of the average (6.09) CPUE.

- The 2011 juvenile blueback herring index value (21.87) ranks as the 12^{th} lowest value in the 34 year time series and is a little more than half (41.16) of the average CPUE.

- The Thames River seine survey completed 56 seine hauls. Catches were comprised of 28 different species or taxonomic groups. The 2011 Atlantic menhaden juvenile index in the Thames River (0.58) ranked as 3^{rd} lowest in the 14 year time series.

CONCLUSIONS:

- Abundance of Adult shad appears to have increased, but did not result in an increase in recruitment. Age structure for adults is comparable to recent years, as is the repeat spawning rate.
- Year classes of both American shad and blueback herring are below average in the Connecticut River for 2011.

RECOMMENDATIONS:

- Continue to monitor the Connecticut and Thames Rivers to maintain the long term time series on juvenile American shad and blueback herring. Adult age structure and juvenile

indices contribute to alosine stock assessments as well as a management plan under ASMFC that monitors sustainability of the American shad fishery.

JOB 4 FISHING GEAR SELECTIVITY – <u>INACTIVE THIS SEGMENT</u>

JOB 5: COOPERATIVE INTERAGENCY RESOURCE MONITORING

OBJECTIVES

- Provide monthly monitoring of water quality parameters important in the development of summer hypoxia in Long Island Sound including temperature, salinity, and dissolved oxygen.
- Provide indicators of hypoxia impacts on living resources.

KEY FINDINGS:

- Hypoxia first developed on or about July 6, 2011, and persisted for 54 days ending on or about August 28, 2011.
- Thirty-five mi^2 (90.6 km^2) were affected by severe hypoxia (<2.0 mg/l dissolved oxygen) in 2011.
- Hypoxia (<=3.0 mg/l dissolved oxygen) extended over a maximum area of 130.3 mi^2 (337.4 km^2) during 2011.
- The Biomass Area-Day Depletion Index (BADD) index for 2011 was the sixth lowest at approximately 4,727 area-days (average=6,850). The BADD index is a gross measure of seasonal habitat loss associated with hypoxia.

CONCLUSIONS:

- Hypoxia was about average in 2011, persisting for 54 days (mean= 55 d).

RECOMMENDATIONS:

- Continue conducting the water quality monitoring program to provide information needed to evaluate the effectiveness of measures to reduce nutrient loading to LIS and the impact of water quality improvements on marine life.

JOB 6: PUBLIC OUTREACH

OBJECTIVES

- Increase public awareness among anglers and the general public that information provided through this project contributes to state and federal efforts to enhance recreational fisheries conservation and that the majority of marine fisheries research and monitoring activities in Connecticut are funded through the Federal Aid in Sportfish Restoration Program.

KEY FINDINGS:

- A total of 25,733 outdoor and environmental writers, marine anglers and boaters, marina operators, fishing tackle retailers, Fisheries Advisory Council (FAC) members, and members of the general public attended outreach events. The two largest event were the "CMTA Boat Show" attended by 9,872 fishermen and hunters, followed by "Northeast Hunting and Fishing Expo" at the Hartford Convention Center which had an attendance of 14,667.

CONCLUSIONS:

- Large numbers of anglers and members of the general public are provided information about Marine Fisheries programs through participation in outdoor fishing & hunting shows, Science and Career Days, public speaking engagements and displays at the Marine Fisheries Office.

RECOMMENDATIONS:

- Continue outreach efforts.

JOB 1: MARINE ANGLER SURVEY

Part 1: Marine Recreational Fishery Statistics Survey

Part 2: Volunteer Angler Survey

PART 1: MARINE RECREATIONAL FISHERY STATISTICS SURVEY

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PART 1: MARINE RECREATIONAL FISHERY STATISTICS SURVEY

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JOB 1: MARINE ANGLER SURVEY
PART 1: MARINE RECREATIONAL FISHERY STATISTICS SURVEY

GOAL

To provide long term monitoring of marine recreational fishing activity including angler participation and catch statistics in a manner that is comparable to other Atlantic coastal states.

OBJECTIVES

Provide estimates of:

1) *Number of marine anglers in Connecticut each year.*

2) *Total effort (trips) expended by anglers in Connecticut each year.*

3) *Total catch (numbers of fish kept and released fish) and harvest (numbers and the weight of kept fish) of the most commonly sought species: bluefish, scup, winter flounder, summer flounder, tautog, and striped bass.*

4) *Length-frequency of harvested bluefish, scup, winter flounder, summer flounder, tautog, and striped bass.*

INTRODUCTION

The Connecticut Department of Energy and Environmental Protection (DEEP), Bureau of Natural Resources, Marine Fisheries Division, has been collecting marine recreational fisheries information along the Connecticut coastline since 1979. However, in order to improve state-wide marine fisheries statistics and become more consistent with other states, Connecticut joined with the MRFSS program in July, 1987. Before Connecticut's involvement in the MRFSS, data collection was conducted by NMFS's contractor just as in other states where state agencies do not participate in the program.

METHODS

Currently the MRFSS is undergoing a series of procedural changes in order to improve accuracy and precision on both angler effort and catch estimates. The new changes entail new estimation methods including telephone and intercept collection procedures and will be housed under the new Marine Recreational Information Program (MRIP). However, the MRIP still utilizes traditional MRFSS methodology as discussed in the background section of this report.

Background

The MRFSS is based on two complementary surveys: A random telephone survey of households, and an intercept survey of anglers at fishing sites (NMFS 1992). MRFSS utilized a contractor to conduct the telephone survey to calculate total angler participation and trip estimates. Connecticut performed the angler intercept survey (angler interviews) in order to collect angler catch and effort data, biological data, and socioeconomic and demographic information.

The MRFSS's primary objectives are (1) to provide a collection of accurate and representative data on the marine recreational fishery and (2) to produce accurate and precise regional (e.g. ME-CT) catch estimates which can be used by fishery managers to assess the impacts of recreational fishing on finfish stocks. In order to produce estimates with adequate precision at the state level (where proportional Standard Error (PSE) $\leq$20%, a modified version of Coefficient of Variation = S.E./Mean *100), the MRFSS initial intercept quota was tripled for Connecticut. Telephone and Intercept Surveys are collected in bimonthly time periods (termed Waves) and further broken down by mode in the Intercept Survey. The three principal modes of marine recreational fishing include shore mode (anglers fishing from beach and bank or manmade structure), private/rental boat mode (anglers fishing from a privately owned or rental boats), and charter boat and headboat modes where anglers pay a captain/vessel for hire to fish.

In 2001, NMFS base allocations for the Northeast and Mid-Atlantic sub-regions were increased 1.5 times in order to increase effort and catch precision estimates for those areas. The increase was accomplished through a grant proposal submitted by the Atlantic Coastal Cooperative Statistics Program (ACCSP) Recreational Statistics Technical Committee and later approved by the ACCSP Coordinating Council. ACCSP is comprised of fifteen Atlantic coastal states and two federal agencies, which oversee and administer the collection of commercial and recreational fishery statistics. ACCSP provided funding for the additional intercept sampling as described in Table 1.1. However since state participation in 1987, Connecticut had already tripled NMFS Intercept Survey allocation and provided funding for those increases. ACCSP's involvement basically reduces Connecticut's expenditure toward processing additional intercepts by NMFS' contractor. Wave 1 is not sampled in Connecticut or any states in the Mid Atlantic (NY-VA) and Northeast (ME-CT) sub-regions due to low fishing activity (NMFS 1992).

In addition, the sampling methodology of the headboat and charter boat modes was modified beginning in Wave 4 (July-August) 2003 in order to improve catch and trip estimates. This change was the beginning transition point from the MRFSS to the MRIP. The new changes in the survey (termed "the For-Hire Survey" component) called upon each state to provide and update a comprehensive list of current headboat and charter boat vessels and operators. This list provided a sampling frame where ten percent of for-hire vessel operators would be randomly selected to be contacted by telephone to report their fishing trip effort (angler trips) for a given two week period. Coupled with the telephone survey, pre-validation of vessels was performed where vessels were randomly selected and checked to determine if the vessel was out fishing or not. The same list would generate intercept assignments by wave. For-hire intercept assignments were split by vessel type (charter - 6 or less passengers) and headboats (more than 6) since sampling methods differ. Anglers fishing in the charter boat fishery were interviewed at

dockside where headboat anglers were interviewed on board while at sea. Dockside sampling of charter boat anglers was selected because of the six passenger limitation. At sea sampling was selected to increase the number of length and weight measurements on harvested fish in addition to length measurements on discarded fish. Intercept collection quotas for the headboat mode were set by the number of trips (based on 2 samplers/trip). All other modes were allocated by the number of intercepts.

In addition, a socio-economic survey was added to the intercept survey in order to collect angler expenditures as it related to their fishing trip. Anglers could also volunteer to participate in a more detailed survey either by mail or computer web based application.

Table 1.1: MRFSS/MRIP + ACCSP and State Angler Intercept and Headboat Trip Allocation by Mode and Wave, 2011

NMFS+ACCSP	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	
Mode	**Mar-Apr**	**May-Jun**	**Jul-Aug**	**Sep-Oct**	**Nov-Dec**	**Total (%)**
Shore (SH)	**45**	**64**	**83**	**63**	**42**	**297 (26%)**
Charter Boat (CH)	**0**	**50**	**52**	**48**	**45**	**195 (17%)**
Private/Rental Boat (PR)	**48**	**113**	**270**	**139**	**63**	**633 (56%)**
Headboat Trips (HB) (based on 2 samplers/trip)	**0**	**12**	**16**	**12**	**0**	**40 Trips**
Total Number of Intercepts (SH, CH, PR)	**93**	**227**	**405**	**250**	**150**	**1,125**

MRFSS/MRIP Estimation Methods

MRFSS/MRIP estimation methods used to compute catch and effort statistics were based on the following criteria: (1) improved guidelines for recording proxy data in lieu of missing data, (2) imputation for missing data, (3) telephone survey sample weighting, and (4) cleanup of historical intercept data (NMFS 1994). In cases where gaps or insufficient data occurs, proxy data (information obtained in the Telephone Survey from someone in a fishing household other than the angler) were used to fill voids in the database. In addition, catch and effort statistics for 1979-80 were omitted because of inadequate information (missing files that contained non-fishing household sample size information).

Angler participation and fishing trip estimates were derived primarily from the Telephone Survey and, in special situations, the Intercept Survey (NMFS 1992). In the Telephone Survey, households with telephones located in coastal counties or within 50 miles of the coastline were randomly selected and called to determine if a household fell into either of two categories: (1) households that comprised one or more marine recreational anglers and (2) non-fishing households. Households with anglers were further surveyed in order to collect fishing trip information used in estimating total fishing trips and angler participation. In situations where

anglers did not possess a telephone (or live in a household), Intercept Survey data were used in order to account for that segment of the angling population that would otherwise be missed.

MRFSS/MRIP Catch Type Categories

Catch estimates were broken down into three categories: Catch Type A, B1 and B2. Catch Type A consisted of catches that were kept by anglers and available for inspection by field interviewers. Catch Type B1 included angler catches that were used for bait, discarded dead, etc., and were not available for inspection, and Catch Type B2 was comprised of fish that were caught and released alive. Total catch estimates consist of Catch Types A+B1+B2. Harvested catch (fish removed from the population) include Catch Type A+B1 only. Catch Types A and B1 were the only catch groups estimated in both numbers and weights. Since Catch Type B1 are unobserved catches, Catch Type A mean weight estimates were used to expand Catch Type B1 estimates.

RESULTS AND DISCUSSION

Connecticut Intercept Survey 2011

During March-December 2011, a total of 151 assignments were completed and 1,258 interviews (intercepts) with marine anglers were conducted by Marine Fisheries Division staff for the MRFSS/MRIP (Table 1.2). Intercept shortfalls occurred particularly in Waves 2, 5 and 6 for NMFS + ACCSP quotas because of low fishing activity and poor weather conditions. Tropical Storm Irene wreaked havoc along the coastline in August followed by a freak late October nor'easter snow storm. Both storms devastated the state to the point where emergency declarations were signed by President Obama. Furthermore, the charter and headboat fishery did not start fishing operations until late May (weekends only) and full time in mid June which affected sampling in Wave 3. In addition, the majority of Connecticut-based headboat/charter businesses and marinas terminate their operations by November 1. This year the number of assignments where zero intercepts were collected was unusually higher than past years (60 assignments/39.7%).

Table 1.2: Total Number of Angler Intercepts Collected by Mode and Headboat Trips Taken by Wave, 2011

	Wave 2	**Wave 3**	**Wave 4**	**Wave 5**	**Wave 6**	
Mode	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	**Total (%)**
Shore (SH)	13	64	108	26	2	213 (17%)
Charter Boat (CH)	0	53	54	39	0	146 (12%)
Private/Rental Boat (PR)	44	115	277	94	11	541 (43%)
Headboat Trips (HB) (2 interviewers/trip)*	0 Trip (0 Ints.)	5 Trips (104 Ints.)	6 Trips (161 Ints.)	5 Trips (93 Ints.)	0 Trips (0 Ints.)	16 Trips (358 Ints. 28%)
Total Number of Intercepts	57	336	600	252	13	1,258

MRFSS/MRIP 2011 Statistics

MRFSS/MRIP intercept sampling procedures and statistics are continuously updated by NMFS and are available on line to the public. Estimates of participants, trip effort, and catch can be queried by region, sub-region, and state by visiting their web site at http://www.st.nmfs.noaa.gov/st1/recreational/queries/index.html. For that reason, this report will not include MRFSS/MRIP statistics. However, intercept collection information will continue to be reported along with historical accounts of Connecticut's marine recreational fishery regulations (Table 1.3).

As discussed, the MRFSS is in a transition phase to improve angler trip and catch estimates through the development of MRIP. The MRIP will succeed the MRFSS by continuing to implement new statistical methodologies and collection procedures. More detailed information concerning MRIP can be located at the following web site: https://www.countmyfish.noaa.gov.

MODIFICATIONS

None.

LITERATURE CITED

NMFS. 1992. Marine recreational fishery statistics survey, Atlantic and Gulf Coasts, 1990-91. Current fishery statistics number 9204:275pp. Silver Spring, MD.

NMFS. 1994. Marine recreational fishery statistics survey. Changes in estimation procedures. mimeo 2pp. Silver Spring, MD.

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Table 1.3: History of Connecticut Marine Recreational Fisheries Regulations for Selected Species

Striped Bass

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
1935	16 in. (fork length)	None.	Year round.	None.	Spearing prohibited.
1953	16 in. (fork length)	None.	Year round.	None.	No sale; spearing prohibited.
Jan 1982	16 in. (fork length)	4 fish between 16 and 24in. No limit >24in.	Year round.	None.	No sale; spearing prohibited.
Aug 1984	24 in. (fork length)	None.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing prohibited.
Aug 1985	26 in. (fork length)	None.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing prohibited.
Jul 1, 1986- Striped bass fishery closed in all state waters (Moratorium)					
1987	33 in. (total length)	1 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Apr 1, 1989	34 in. (total length)	1 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Jul 1, 1989	36 in. (total length)	1 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Jan 1, 1990	38 in. (total length)	1 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Sep 1990	36 in. (total length)	1 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Apr 22, 1994	34 in. (total length)	1 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
1995	28 in. (total length)	2 fish/angler.	Apr 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Jul 29, 1996	28 in. (total length)	2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
May 10, 2000	24-30 in. and $\geq$ 40 in (total length) Party/Charter Only-29½ in. (total length)	1 fish/angler per length group. 2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Feb 27, 2001	24-32 in. and $\geq$ 41 in (total length) Party/Charter Only-28 in. (total length)	1 fish/angler per length group. 2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
May 15, 2003-Current	28 in. (total length)	2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.

Bluefish

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Jan 1, 1991	None	10 fish/angler for fish > 12 in (total length).	Year round.	None.	None.
Apr 22, 1994-Current	None	10 fish/angler	Year round.	None.	None.

Summer Flounder (Fluke)

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Jan 1, 1982	14 in. (total length)	None.	Year round.	None.	None.
Apr 22, 1994	14 in. (total length)	6 fish/angler	May 15-Sep 30.	Oct 1-May 14 in all state waters	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Jul 29, 1996	14 in. (total length)	6 fish/angler	Year round.	None.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Apr 24, 1997	14½ in. (total length)	6 fish/angler	Year round.	None.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
May 5, 1998	15 in. (total length)	6 fish/angler	Year round.	None.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Mar 17, 1999	15 in. (total length)	8 fish/angler	May 29-Sep 11.	Sep 12-May 28 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
May 10, 2000	15½ in. (total length)	8 fish/angler	May 10-Oct 2.	Oct 3-May 9 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
May 17, 2001	17 in. (total length)	6 fish/angler	Year round.	None.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
May 27, 2005	17 ½ in. (total length)	6 fish/angler	Apr 30-Dec 31.	Jan 1-Apr 29 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Apr 30, 2006	18 in. (total length)	6 fish/angler	Apr 30-Dec 31.	Jan 1-Apr 29 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Apr 2, 2007	18 in. (total length)	5 fish/angler	Apr 30-Sep 5.	Sep 6-Apr 29 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Apr 5, 2008	19 ½ in. (total length)	5 fish/angler	May 24-Sep 1.	Sep 2-May 25 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
May 1, 2009	19 ½ in. (total length)	3 fish/angler	Jun 15-Aug 19.	Aug 20-Jun 14 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Apr 1, 2010	19 ½ in. (total length)	3 fish/angler	May 15-Aug 25.	Aug 26-May 14 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
Apr 5, 2011-Current	18 ½ in. (total length)	3 fish/angler	May 15-Sep 5.	Sep 6-May 14 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
	17 in. (total length)	1 fish/angler			Special shore-based fishing season/daily creel limit at specific designated shore sites only.

Winter Flounder

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Jan 1, 1982	8 in. (total length)	None.	Year round.	None.	None.
Jan 1, 1985	10 in. (total length)	None.	Year round.	None.	None.
Aug 19, 1986	10 in. (total length)	None.	Year round except for Niantic River.	Niantic River closed Dec 1-Mar 31	None.
Apr 22, 1994	11 in. (total length)	8 fish/angler	Apr 15-Feb 28.	Mar 1-Apr 14 in all state waters.	None.
Oct 1, 1995	12 in. (total length)	8 fish/angler	Apr 15-Feb 28.	Mar 1-Apr 14 in all state waters.	None.
Jan 1, 1996	12 in. (total length)	8 fish/angler	Year round.	None.	None.
Aug 1, 2005	12 in. (total length)	10 fish/angler	Apr 1-May 30.	Jun 1-Mar 31 in all state waters.	None.
Nov 1, 2010-Current	12 in. (total length)	2 fish/angler	Apr 1-May 30.	Jun 1-Mar 31 in all state waters.	None.

Black Sea Bass

Effective Date	Minimum Size (Excluding tendril or long filament on tail)	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Apr 24, 1997	9 in. (total length)	None.	Year round.	None.	None.
May 5, 1998	10 in. (total length)	20 fish/angler	Year round.	None.	None.
May 17, 2001	11 in. (total length)	25 fish/angler	May 10-Feb 28.	Mar 1-May 9 in all state waters.	None.
Jun 19, 2002	11½ in. (total length)	25 fish/angler	Year round.	None.	None.
May 15, 2003	12 in. (total length)	25 fish/angler	Jan 1-Sep 1 and Sep 16-Nov 30.	Sep 2-Sep 15 and Dec 1-Dec 31 in all state waters.	None.
Aug 05, 2004	12 in. (total length)	25 fish/angler	Jan 1-Sep 7 and Sep 22-Nov 30.	Sep 8-Sep 21 and Dec 1-Dec 31 in all state waters.	None.
May 27, 2005	12 in. (total length)	25 fish/angler	Jan 1-Nov 30.	Dec 1-Dec 31.	None.
Apr 30, 2006	12 in. (total length)	25 fish/angler	Year Round.	None.	None.
May 1, 2009	12 ½ in. (total length)	25 fish/angler	Year Round.	None.	None.
Apr 1, 2010	12 ½ in. (total length)	25 fish/angler	May 22-Sep 12.	Sep 13-May 21 in all state waters.	None.
Jun 8, 2010	12 ½ in. (total length)	25 fish/angler	May 22-Oct 11 and Nov 1-Dec 31.	Jan 1-May 21 and Oct 12-Oct 31 in all state waters.	None.
Apr 5, 2011-Current	13 in. (total length)	25 fish/angler	Jul 1-Oct 1 and Nov 1-Dec 31.	Jan 1-Jun 30 and Oct 2-Oct 31 in all state waters.	None.

Scup (Porgy)

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Jan 1, 1982	7 in. (total length)	None.	Year round.	None.	None.
Jan 1, 1985	8 in. (total length)	None.	Year round.	None.	None.
May 10, 2000	8 in. (total length)	50 fish/angler	Year round.	None.	None.
May 10, 2001	9 in. (total length)	25 fish/angler	Jun 3- Oct 23.	Oct 24-Jun 2 in all state waters.	None.
Jun 19, 2002	10 in. (total length)	50 fish/angler	Jul 13- Sep 25.	Sep 26-Jul 12 in all state waters.	None.
May 15, 2003	10 in. (total length)	50 fish/angler	May 24- Oct 30.	Oct 31-May 23 in all state waters.	None.
May 24, 2004	10 ½ in. (total length)	20 fish/angler	Jul 23- Oct 12 and Nov 1-Dec 31.	Jan 1-Jul 22 and Oct 13-Oct 31 in all state waters.	None.
May 27, 2005	10 ½ in. (total length)	25 fish/angler Party/charter boats *only* – 60 fish/angler	Jul 1- Oct 31. Sep 1- Oct 31.	Nov 1- Jun 30 in all state waters.	None.
Apr 30, 2006	10 ½ in. (total length)	25 fish/angler Party/charter boats *only* – 60 fish/angler	Jun 1- Oct 31. Sep 1- Oct 31.	Nov 1- May 31 in all state waters.	None.
Apr 4, 2008 Party/ charter boats	10 ½ in. (total length) 11 in. (total length)	10 fish/angler 10 fish/angler Party/charter boats – 45 fish/angler	Jun 1- Sep 26. Jun 12- Aug 31. Sep 1- Oct 15.	Sep 27- May 31 in all state waters. Oct 16- Jun 13 in all state waters.	None.
May 1, 2009 Party/ charter boats	10 ½ in. (total length) 11 in. (total length)	10 fish/angler 10 fish/angler Party/charter boats – 45 fish/angler	May 24- Sep 26. Jun 12- Aug 31. Sep 1- Oct 15.	Sep 27- May 23 in all state waters. Oct 16- Jun 11 in all state waters.	None.
Apr 1, 2010 Party/ charter boats	10 ½ in. (total length) 11 in. (total length)	10 fish/angler 10 fish/angler Party/charter boats – 40 fish/angler	May 24- Sep 26. Jun 8- Sep 6. Sep 7- Oct 11.	Sep 27- May 23 in all state waters. Oct 12- Jun 7 in all state waters.	None.

Scup (Porgy) Continued

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Sep 23, 2011-Current	10 ½ in. (total length)	10 fish/angler	May 24-Dec 31.	Jan 1-May 23 in all state waters.	None.
Party/charter boats	11 in. (total length)	10 fish/angler	Jun 8-Sep 6 and Oct 12 – Dec 31.	Jan 1 - Jun 7 in all state waters.	
		Party/charter boats – 40 fish/angler	Sep 7-Oct 11.		

Tautog (Blackfish)

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Sep 19, 1987	12 in. (total length)	None.	Year round.	None.	None.
May 19, 1995	14 in. (total length)	None.	Year round.	None.	None.
Jul 29, 1996	14 in. (total length)	4 fish/angler	Jun 15-Apr 30.	May 1-Jun 14 in all state waters.	None.
May 15, 2003	14 in. (total length)	4 fish/angler	Jan 1-Apr 30 and Jun 15-Nov 23.	May 1-Jun 14 and Nov 24-Dec 31 in all state waters.	None.
Feb 27, 2004	14 in. (total length)	4 fish/angler	Jan 1-Apr 30, June 15-Sep 7 and Sep 22 – Dec 13.	May 1-Jun 14, Sep 8 – Sep 21 and Dec 14-Dec 31 in all state waters.	None.
Jan 4, 2008-Current	14 in. (total length)	4 fish/angler	Jan 1-Apr 30 and Oct 1-Dec 6.	May 1-Jun 30, Sep 1-Sep 30 and Dec 7-Dec 31 in all state waters.	None.
		2 fish/angler	Jul 1-Aug 31.		
		4 fish/angler			

Weakfish

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Jan 1, 1995	16 in. (total length)	None.	Year round.	None.	None.
Apr 1, 2003	16 in. (total length)	10 fish/angler	Year round.	None.	None.
Oct 29, 2007	16 in. (total length)	6 fish/angler	Year round.	None.	None.
Apr 1, 2010 Current	16 in. (total length)	1 fish/angler	Year round.	None.	None.

Hickory Shad

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Mar 17, 1999-Current	None.	6 fish/angler, or in aggregate with American shad.	Year round.	None.	None.

White Perch

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Apr 1, 2003-Current	7 in. (total length)	30fish/angler.	Year round.	See Other Restrictions.	Only for Long Island Sound and Tidal Rivers and Streams.

American Eel

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
May 10, 2000-Current	6 in. (total length)	50 fish/angler	Year round.	None.	None.

Coastal Sharks (Smooth Dogfish and Sandbar Shark (Brown Shark))

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Feb 2, 2010-Current	Not applicable.	Prohibited to possess or land.	None.	Year round in all state waters.	None.

Gear Restrictions

1935-Current	Striped bass may be taken by hook and line method only.
Apr 22, 1994-Current	Spearing is allowed as a recreational activity only and must abide all recreational fishing regulations.

PART 2: VOLUNTEER ANGLER SURVEY

PART 2: VOLUNTEER ANGLER SURVEY

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OBJECTIVES

Provide estimates of:

1) Size composition data on both kept and released bluefish, striped bass other common species.

Anglers participating in the Volunteer Angler Survey measured bluefish, striped bass and other species. Length frequencies of popular species: bluefish, striped bass, summer flounder, winter flounder, scup, tautog and black sea bass are listed in Tables 1.1A - 1.7A.

2) Catch frequency (trips catching 0,1,2,...fish) data on both kept and discarded fish.

Catch frequency data and percent distribution on both kept (harvested) and released for selected species are listed in Tables 1.8A-1.9A.

INTRODUCTION

The purpose of the Volunteer Angler Survey (VAS) is to supplement the National Marine Fisheries Service, Marine Recreational Fishery Statistics Survey/Marine Recreational Information Program by providing additional length measurement data particularly concerning fish that are released. In 1994, the VAS program was incorporated into the Marine Angler Survey (Job 1) in order to improve and expand the survey.

The survey's initial objective was to collect marine recreational fishing information concerning finfish species with special emphasis on striped bass. In 1994, the collection of bluefish length measurements was added to the survey to fully understand that fishery. In 1997, length measurement information on other marine finfish was added to the survey. This report primarily consists of data collected in 2011.

METHODS

The VAS is designed to collect trip and catch information from marine recreational (hook and line) anglers who volunteer to record their fishing activities by logbook. The logbook format consists of recording fishing effort, target species, fishing mode (boat and shore), area fished (subdivisions of Long Island Sound and adjacent waters), catch information concerning finfish kept (harvested) and released, and striped bass and bluefish length measurements (Appendix 1.1A). In 1997, the logbook was modified in order to collect length measurement data on other species. Instructions for volunteers were provided on the inside cover of the postage paid logbook. Each participating angler was assigned a personal numeric code for confidentiality purposes. After the logbook data were computer entered, logbooks were returned to each volunteer for their own personal record. For their participation, volunteers were sent a newsletter with updates of survey results and a nylon wallet with embossed VAS logo. Furthermore, to

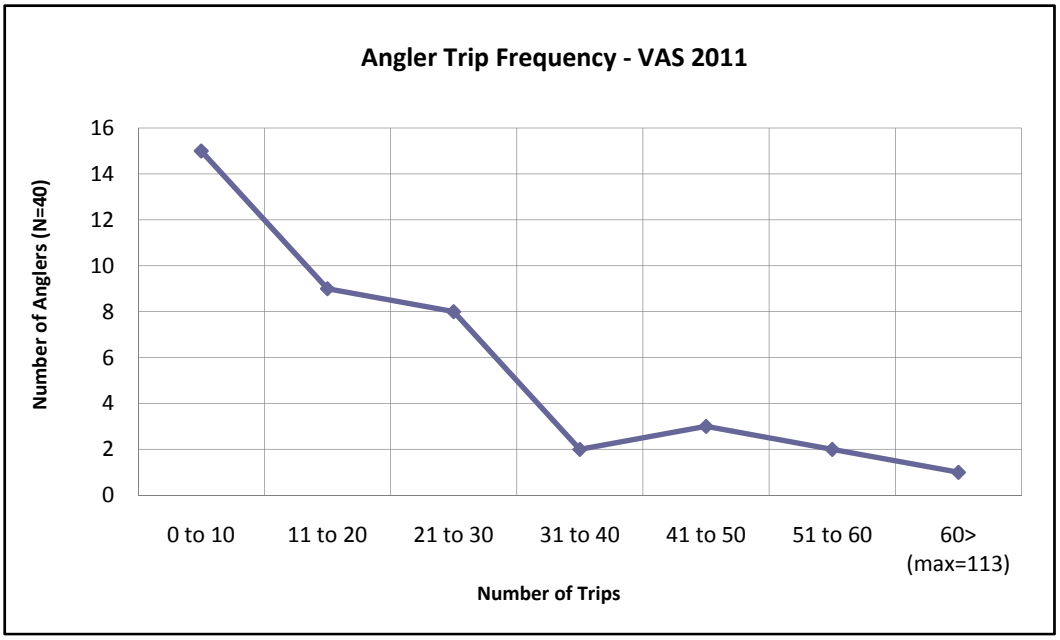
improve communications with recreational anglers and to encourage more public input, volunteers were notified of upcoming public hearings including proposed and final changes in recreational fishing regulations.

RESULTS AND DISCUSSION

Over the years the number of participants in the survey ranged from as low as 18 anglers participating in 1979 to a high of 115 anglers in 1997. Advertising the VAS program through the DEEP's annually published Connecticut Angler's Guide including the state web site www.ct.gov/dep has helped increase volunteer participation. The guide is distributed to anglers purchasing Connecticut fishing licenses in addition to being circulated by bait and tackle shops and other entities.

VAS 2011

In 2011, a total of 40 anglers participated in the survey. Those 40 anglers made 830 fishing trips and measured 5,518 fish. The average number of trips volunteers took was about 21 trips per year and the range in trips was 1 to 113 (Figure 1.1A). Volunteers including additional anglers involved in a fishing party made a total of 1,666 fishing trips (note: targeted trips in the following paragraphs are not additive to the trip total since more than one species may be sought during an angler trip). Boat trips comprised 73% of the total trips taken. The percent of successful trips, where at least one fish of any species was caught, was 88% for boat anglers and 69% for shore anglers. Besides striped bass and bluefish, VAS anglers pursued and caught a wide range of inshore and offshore pelagic species and recorded length measurements on many species. This report contains statistics on species anglers targeted the most and that are under a current fishery management plan (bluefish, striped bass, summer flounder, scup, winter flounder, tautog, and black sea bass). Please refer to tables 1.1A-1.7A for length frequency distribution tables and catch trip frequency distributions for kept (harvested) and released fish are listed in tables 1.8A-1.9A.



Bluefish

VAS participants made 752 targeted bluefish trips (boat and shore modes combined) and recorded a total of 1,404 adult bluefish caught (bluefish >12 inches). Of the total number of targeted trips, 24% were unsuccessful. The overall catch including trips not targeting bluefish was 1,608 fish. Of the overall catch, anglers measured 923 adult bluefish (57%) and released about 74%. The 50th percentile length measurement for bluefish was approximately 23.5 inches (total length). The targeted catch-per-unit-of-effort (CPUE) was 1.9 and 0.5 fish per angler trip for total and harvested catches.

Striped bass

Volunteers made 1,114 trips targeting striped bass and caught a total of 993 fish (overall catch including trips not targeting striped bass was 1,017 fish). About 22% or 243 trips targeting striped bass were unsuccessful. Of the overall catch, about 87% of the catch was released. VAS anglers measured 941 striped bass (93% of the overall catch). Legal size striped bass ($\geq$ 28 inches) comprised about 38% of the measured catch. The percent of legal size striped bass released was estimated at 61%. The 50th percentile length measurement for striped bass was about 25.5 inches. Striped bass ranged in length from as small as 7 inches to 48 inches. Targeted CPUE was 0.9 and 0.1 fish per angler trip for total and harvested catches.

Summer flounder

A total of 360 fishing trips were directed toward catching 1,737 summer flounder. Only 8% of the trips targeting summer flounder were unsuccessful. The overall catch was 1,788 fish. Volunteers measured 1,456 fish or about 81% of the overall catch. Approximately 90% of the overall catch was released. About 14% of the measured catch was comprised of legal size summer flounder (18.5 inches or greater). VAS anglers released 25% of legal size summer flounder. The 50th percentile length measurement for summer flounder was about 15 inches. Length measurements ranged from 8 to 28 inches. Summer flounder targeted CPUE was 4.8 and 0.5 fish per angler trip for total and harvested catches.

Winter flounder

Volunteers made 29 trips that targeted winter flounder. Both targeted and non-targeted trips produced just 35 fish. Of the total trips targeting winter flounder, 34% of the trips were unsuccessful. All of the winter flounder caught were measured. Anglers released about 46% of the overall catch and 97% of the measured catch were of legal size (12 inches and greater). Anglers released 42% of legal sized fish, however, the daily creel limit for winter flounder was only 2 fish per person. The 50th percentile length measurement for winter flounder was about 14 inches. Length measurements ranged from 11 to 17 inches. Winter flounder targeted CPUE was 1.17 and 0.7 fish per angler trip for total and harvested catches.

Scup

Volunteers made 140 targeted trips for scup producing a total of 657 fish. Of the total trips targeting scup, 14% of the trips were unsuccessful. The overall total catch was 1,311 fish. Volunteers measured about 77% (1,007) of the overall total catch. Of the overall total catch, 61% were released. Legal sized fish (10.5 inches and greater) comprised 67% of the measured catch. The proportion of legal sized fish released by anglers was approximately 46%. The 50th percentile length measurement for scup was about 11 inches. Length measurements ranged from as little as 6 inches to 17 inches. Scup targeted CPUE was 4.7 and 1.9 fish per angler trip for total and harvested catches.

Tautog

VAS anglers made 153 trips that targeted tautog and caught a total of 686 fish. Of the total trips targeting tautog, 12% of the trips were unsuccessful. The overall total catch was 691 fish and 63% was released. Volunteers measured 613 tautog or about 89% of the overall total catch. About 63% of the measured catch was comprised of legal size fish (14 inches or greater). Of the legal size measured catch, approximately 30% were released. The 50th percentile length measurement for tautog was about 14.5 inches. Length measurements ranged from 5 to 24 inches. Tautog targeted CPUE was 4.5 and 1.7 fish per angler trip for total and harvested catches.

Weakfish

Only 4 trips targeted weakfish and one weakfish was caught incidentally.

Black sea bass

VAS anglers took only 16 trips targeting black sea bass catching 62 fish. However, the overall catch was 149 black sea bass. Of the overall total catch, 80% were released. Volunteers measured 148 fish or 99% of the overall total catch. Of the measured catch, 30% caught were of legal size (13 inches and greater). The 50th percentile length measurement for black sea bass was about 10 inches and the percent of legal size fish released was 29%. Black sea bass targeted CPUE was 3.9 and 1.3 fish per angler trip for total and harvested catches.

CONCLUSIONS

VAS anglers provide valuable recreational fisheries data at a relatively low cost. In addition, collecting length data on released fish is often difficult or unattainable through conventional access point angler intercept surveys. The VAS program provides this information which is essential in assessing the recreational fishery in Connecticut as required by the Atlantic States Marine Fisheries Commission. Any anglers interested in participating in the program can contact Rod MacLeod at 860-434-6043, or e-mail address: rod.macleod@ct.gov or writing to State of Connecticut, DEEP, Marine Fisheries Office, P.O. Box 719, Old Lyme CT 06371.

MODIFICATIONS

None.

ACKNOWLEDGMENTS

I am very grateful to all anglers who have participated in the survey. Without their cooperation and assistance, the VAS program would not be possible.

Table 1.1A: Bluefish (12> inches) Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Bluefish (12>inches) Freq	%Freq	%Cum	Total Length (inches)	Freq	%Freq	%Cum
13	11	1.2	1.2	**27**	40	4.3	73.2
14	18	2.0	3.2	**28**	53	5.7	79.0
15	20	2.2	5.3	**29**	20	2.2	81.2
16	33	3.6	8.9	**30**	56	6.1	87.2
17	22	2.4	11.3	**31**	17	1.8	89.1
18	44	4.8	16.0	**32**	36	3.9	93.0
19	36	3.9	19.9	**33**	24	2.6	95.6
20	68	7.4	27.3	**34**	20	2.2	97.7
21	37	4.0	31.3	**35**	8	0.9	98.6
22	111	12.0	43.3	**36**	5	0.5	99.1
23	40	4.3	47.7	**37**	0	0.0	99.1
24	83	9.0	56.7	**38**	8	0.9	100.0
25	66	7.2	63.8	**Total**	**923**		
26	47	5.1	68.9				

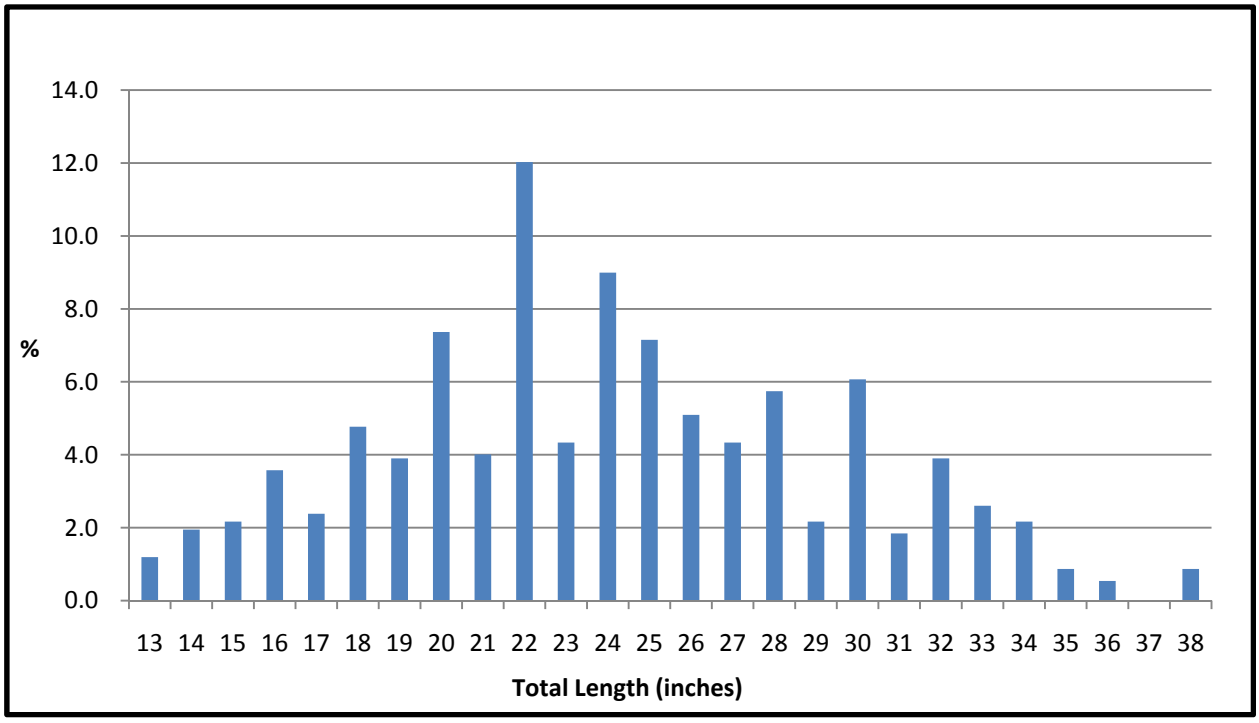


Table 1.2A: Striped Bass Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Striped Bass Freq	%Freq	%Cum	Total Length (inches)	Freq	%Freq	%Cum
< or = 8	5	0.5	0.5	29	50	5.3	73.9
9	4	0.4	1.0	30	53	5.6	79.5
10	5	0.5	1.5	31	29	3.1	82.6
11	11	1.2	2.7	32	45	4.8	87.4
12	15	1.6	4.3	33	27	2.9	90.2
13	8	0.9	5.1	34	31	3.3	93.5
14	12	1.3	6.4	35	15	1.6	95.1
15	31	3.3	9.7	36	17	1.8	96.9
16	35	3.7	13.4	37	7	0.7	97.7
17	19	2.0	15.4	38	8	0.9	98.5
18	39	4.1	19.6	39	6	0.6	99.1
19	26	2.8	22.3	40	0	0.0	99.1
20	46	4.9	27.2	41	3	0.3	99.5
21	26	2.8	30.0	42	3	0.3	99.8
22	49	5.2	35.2	43	0	0.0	99.8
23	29	3.1	38.3	44	1	0.1	99.9
24	56	6.0	44.2	45	0	0.0	99.9
25	39	4.1	48.4	46	0	0.0	99.9
26	69	7.3	55.7	47	0	0.0	99.9
27	61	6.5	62.2	48	1	0.1	100.0
28	60	6.4	68.5	Total	941		

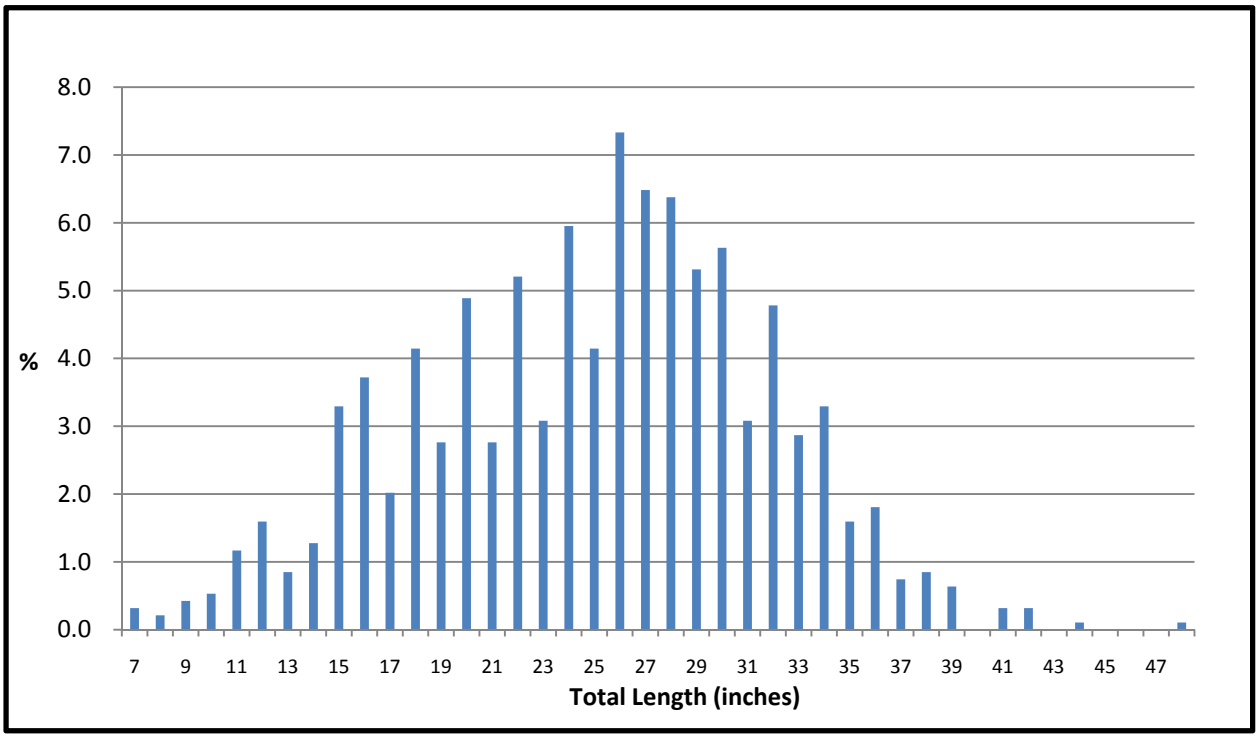


Table 1.3A: Summer Flounder Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Summer Flounder		
	Freq	%Freq	%Cum
< or = 8	10	0.7	0.7
9	1	0.1	0.8
10	29	2.0	2.8
11	5	0.3	3.1
12	99	6.8	9.9
13	144	9.9	19.8
14	221	15.2	35.0
15	230	15.8	50.8
16	206	14.1	64.9
17	185	12.7	77.6
18	127	8.7	86.3
19	57	3.9	90.3
20	50	3.4	93.7
21	33	2.3	96.0
22	28	1.9	97.9
23	8	0.5	98.4
24	10	0.7	99.1
25	5	0.3	99.5
26	7	0.5	99.9
27	0	0.0	99.9
28	1	0.1	100.0
Total	1,456		

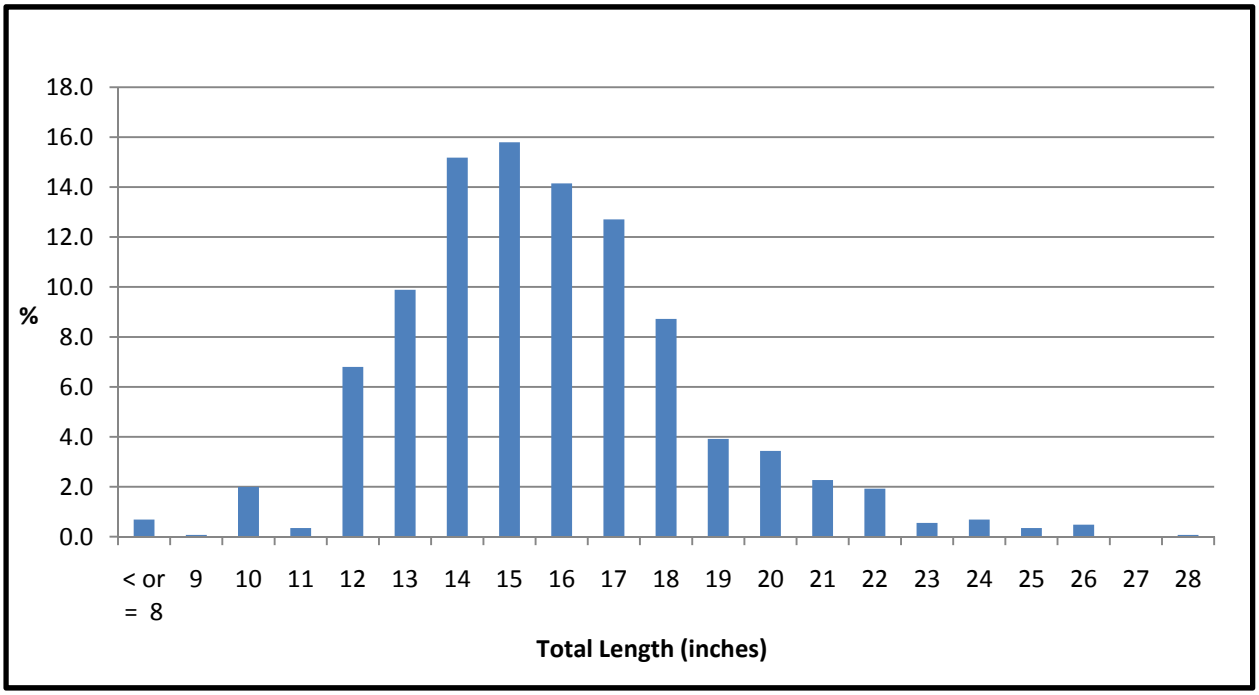


Table 1.4A: Winter Flounder Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Winter Flounder		
	Freq	%Freq	%Cum
10	0	0.0	0.0
11	1	2.9	2.9
12	4	11.4	14.3
13	5	14.3	28.6
14	7	20.0	48.6
15	6	17.1	65.7
16	5	14.3	80.0
17	7	20.0	100.0
Total	**35**		

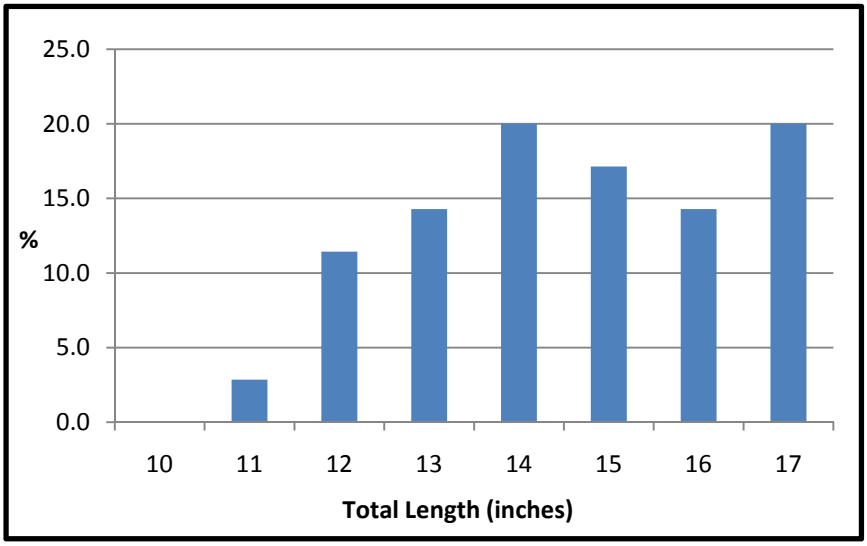


Table 1.5A: Scup Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Scup		
	Freq	%Freq	%Cum
6	2	0.2	0.2
7	14	1.4	1.6
8	60	6.0	7.5
9	98	9.7	17.3
10	159	15.8	33.1
11	211	21.0	54.0
12	212	21.1	75.1
13	107	10.6	85.7
14	78	7.7	93.4
15	40	4.0	97.4
16	17	1.7	99.1
17	9	0.9	100.0
Total	**1,007**		

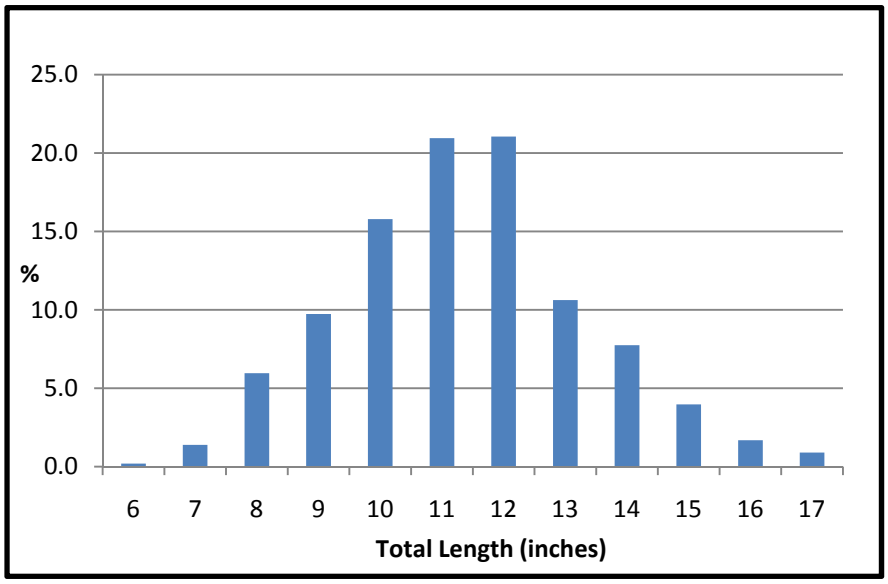


Table 1.6A: Tautog Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Tautog		
	Freq	%Freq	%Cum
< or = 7	4	0.7	0.7
8	18	2.9	3.6
9	7	1.1	4.8
10	32	5.2	10.0
11	23	3.8	13.8
12	67	10.9	24.7
13	78	12.7	37.4
14	54	8.8	46.2
15	87	14.2	60.4
16	64	10.4	70.8
17	52	8.5	79.3
18	53	8.6	88.0
19	33	5.4	93.4
20	23	3.8	97.1
21	10	1.6	98.7
22	2	0.3	99.1
23	5	0.8	99.9
24	1	0.2	100.0
Total	**613**		

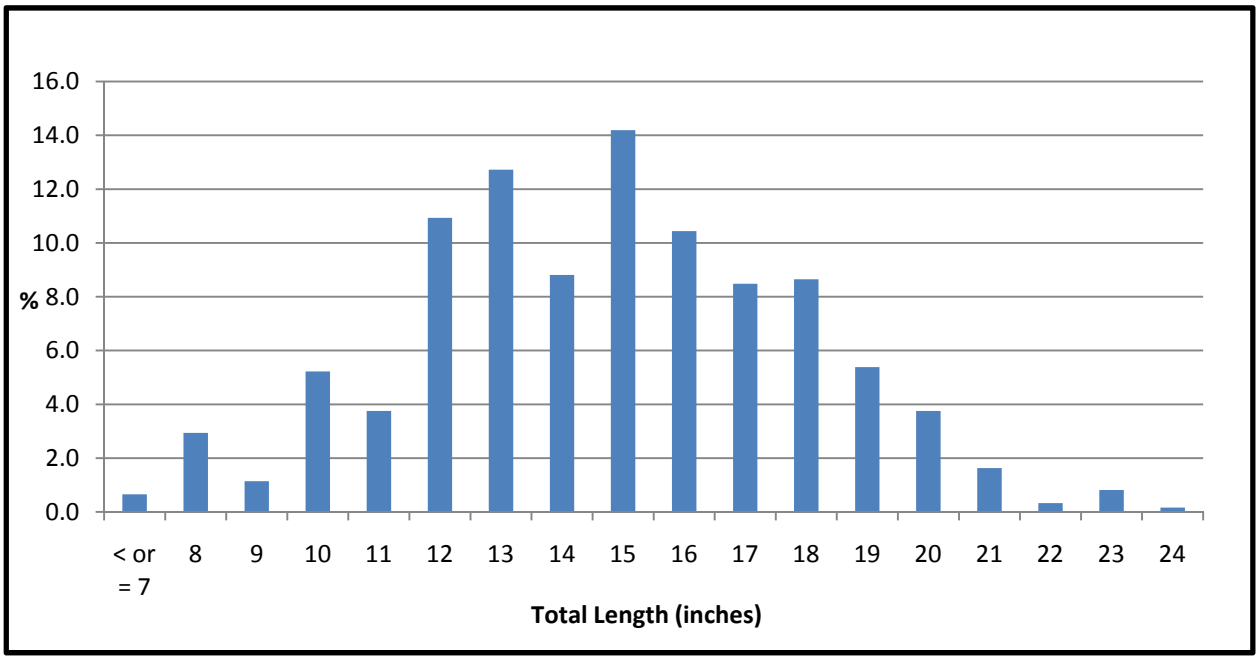


Table 1.7A: Black Sea Bass Length Frequency Distribution, 2011

Total Length (inches)	2011 Measurement Data Black Sea Bass		
	Freq	%Freq	%Cum
6	0	0.0	0.0
7	13	8.8	8.8
8	21	14.2	23.0
9	15	10.1	33.1
10	30	20.3	53.4
11	7	4.7	58.1
12	17	11.5	69.6
13	5	3.4	73.0
14	10	6.8	79.7
15	16	10.8	90.5
16	2	1.4	91.9
17	4	2.7	94.6
18	4	2.7	97.3
19	0	0.0	97.3
20	1	0.7	98.0
21	1	0.7	98.6
22	0	0.0	98.6
23	2	1.4	100.0
Total	**148**		

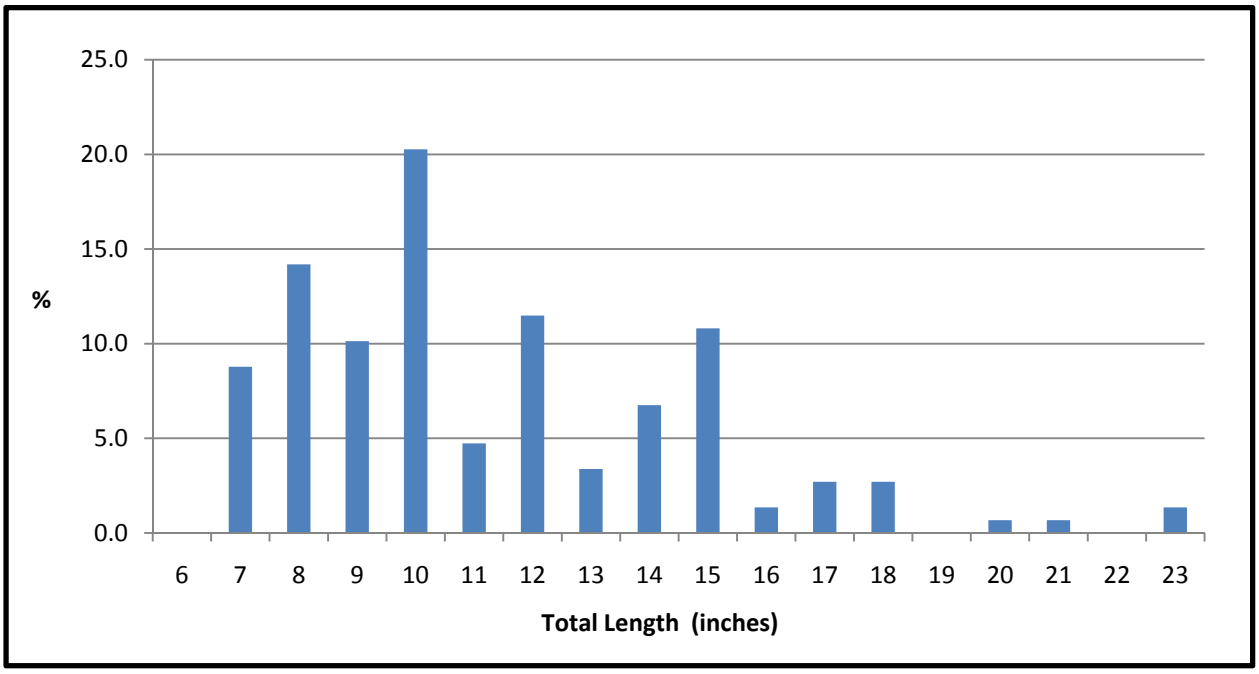


Table 1.8A: Catch Trip Frequency Distribution of Kept (Harvested) Fish for Selected Species, 2011

Kept (Harvested)

Bluefish (12 in. >)

# of Fish	# of Trips	% Distr.
0	155	64.3%
1	49	20.3%
2	14	5.8%
3	10	4.1%
4	4	1.7%
5	3	1.2%
6	1	0.4%
7	2	0.8%
8	2	0.8%
10	1	0.4%
Total	241	100%

Striped Bass

# of Fish	# of Trips	% Distr.
0	206	77.4%
1	46	17.3%
2	14	5.3%
Total	266	100%

Summer Flounder

# of Fish	# of Trips	% Distr.
0	107	61.8%
1	48	27.7%
2	12	6.9%
3	5	2.9%
30	1	0.6%
Total	173	100%

Winter Flounder

# of Fish	# of Trips	% Distr.
0	4	33.3%
1	2	16.7%
2	6	50.0%
Total	12	100%

Scup

# of Fish	# of Trips	% Distr.
0	38	39.6%
1	15	15.6%
2	15	15.6%
3	8	8.3%
4	7	7.3%
5	6	6.3%
6	1	1.0%
7	1	1.0%
8	1	1.0%
10	4	4.2%
Total	96	100%

Tautog

# of Fish	# of Trips	% Distr.
0	18	28.6%
1	9	14.3%
2	11	17.5%
3	17	27.0%
4	6	9.5%
5	1	1.6%
7	1	1.6%
Total	63	98%

Black Sea Bass

# of Fish	# of Trips	% Distr.
0	38	39.6%
1	15	15.6%
2	15	15.6%
3	8	8.3%
4	7	7.3%
5	6	6.3%
6	1	1.0%
7	1	1.0%
8	1	1.0%
10	4	4.2%
Total	96	100%

Table 1.9A: Catch Trip Frequency Distribution of Released Fish for Selected Species, 2011

Released

Bluefish (12 in. >)		
# of Fish	# of Trips	% Distr.
0	52	22.1%
1	85	36.2%
2	35	14.9%
3	14	6.0%
4	10	4.3%
5	6	2.6%
6	6	2.6%
7	5	2.1%
8	4	1.7%
9	2	0.9%
10	7	3.0%
12	1	0.4%
13	2	0.9%
17	3	1.3%
21	1	0.4%
22	1	0.4%
23	1	0.4%
Total	235	100%

Striped Bass		
# of Fish	# of Trips	% Distr.
0	58	21.2%
1	100	36.6%
2	52	19.0%
3	20	7.3%
4	11	4.0%
5	10	3.7%
6	7	2.6%
7	7	2.6%
8	3	1.1%
9	1	0.4%
10	1	0.4%
12	1	0.4%
13	1	0.4%
14	1	0.4%
Total	273	100%

Summer Flounder		
# of Fish	# of Trips	% Distr.
0	14	7.4%
1	54	28.6%
2	26	13.8%
3	15	7.9%
4	9	4.8%
5	15	7.9%
6	10	5.3%
7	8	4.2%
8	4	2.1%
9	4	2.1%
10	5	2.6%
11	5	2.6%
12	2	1.1%
13	1	0.5%
14	2	1.1%
15	1	0.5%
16	4	2.1%
19	1	0.5%
21	1	0.5%
22	1	0.5%
23	3	1.6%
26	1	0.5%
27	1	0.5%
30	1	0.5%
34	1	0.5%
Total	189	100%

Winter Flounder		
# of Fish	# of Trips	% Distr.
0	1	12.5%
1	5	62.5%
2	1	12.5%
7	1	12.5%
Total	8	100%

Table 1.9A: Catch Trip Frequency Distribution of Released Fish for Selected Species, 2011 (Con't.)

Released

Scup		
# of Fish	# of Trips	% Distr.
0	15	15.2%
1	29	29.3%
2	14	14.1%
3	13	13.1%
4	6	6.1%
5	5	5.1%
6	5	5.1%
7	3	3.0%
8	1	1.0%
10	1	1.0%
13	1	1.0%
16	1	1.0%
26	1	1.0%
29	2	2.0%
34	1	1.0%
51	1	1.0%
Total	99	100%

Tautog		
# of Fish	# of Trips	% Distr.
0	14	21.9%
1	8	12.5%
2	9	14.1%
3	9	14.1%
4	9	14.1%
5	4	6.3%
6	2	3.1%
7	1	1.6%
8	2	3.1%
10	2	3.1%
15	1	1.6%
16	2	3.1%
22	1	1.6%
Total	64	100%

Black Sea Bass		
# of Fish	# of Trips	% Distr.
0	11	24.4%
1	21	46.7%
2	4	8.9%
3	6	13.3%
5	1	2.2%
9	1	2.2%
11	1	2.2%
Total	45	100%

APPENDIX 1.1A: Connecticut Volunteer Angler Logbook

FASTEN

CONNECTICUT VOLUNTEER ANGLER SURVEY

Rev. 6/96

YEAR

ANGLER CODE

Send Me ☐ *More Logbooks*

FASTEN

STATE OF CONNECTICUT
DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Fisheries Division
Marine Fisheries Office

FASTEN

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

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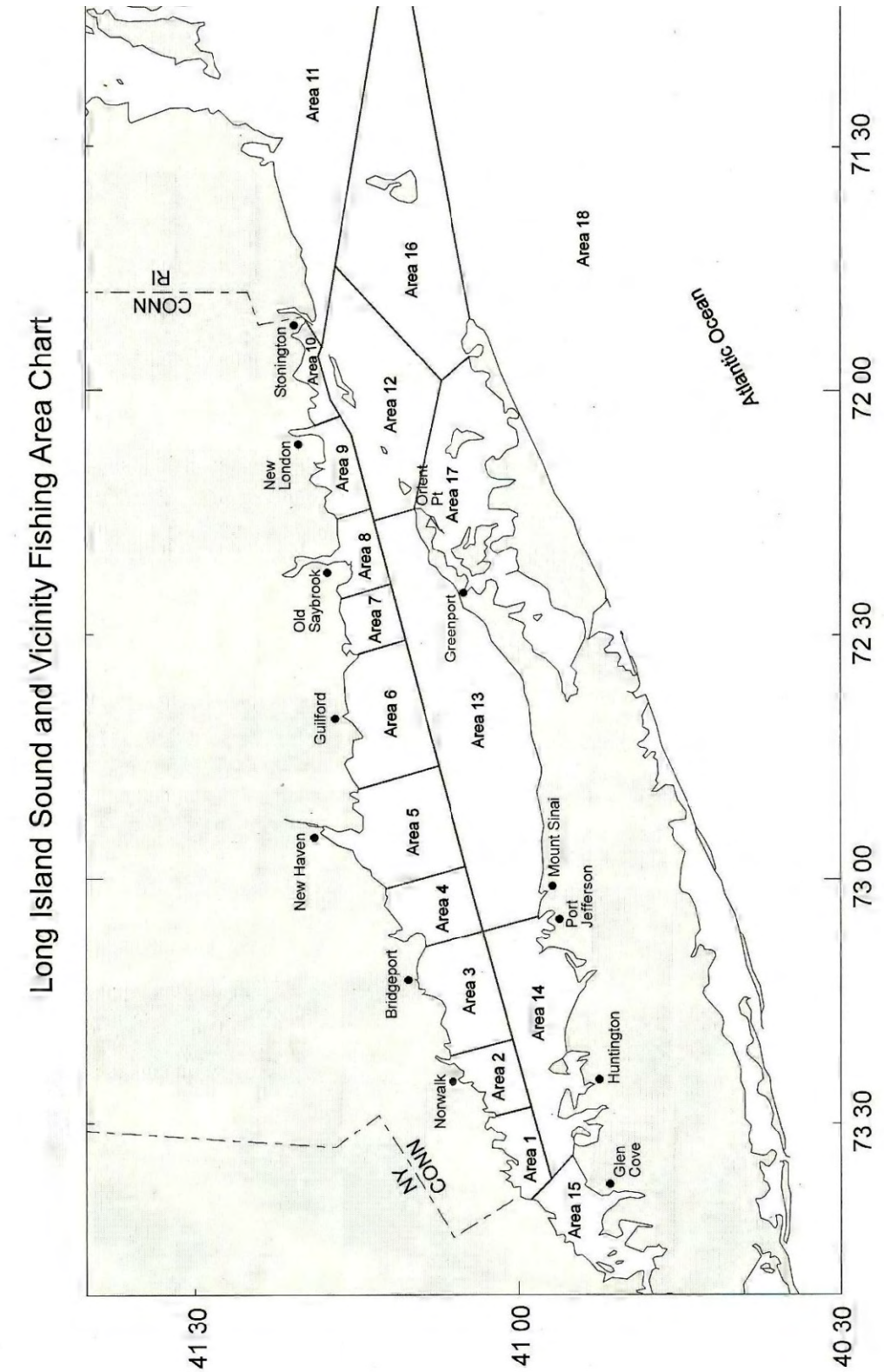
POSTAGE WILL BE PAID BY ADDRESSEE

CT DEPT OF ENVIRONMENTAL PROTECTION
MARINE FISHERIES OFFICE
PO BOX 719
OLD LYME CT 06371-9973


Long Island Sound and Vicinity Fishing Area Chart
CONN
RI
NY
CONN
Area 11
Area 16
Area 18
Area 12
Area 17
Area 10
Area 9
Area 8
Area 7
Area 6
Area 5
Area 4
Area 13
Area 3
Area 14
Area 2
Area 1
Area 15
Stonington
New London
Old Saybrook
Guilford
New Haven
Bridgeport
Norwalk
Glen Cove
Huntington
Port Jefferson
Mount Sinai
Greenport
Orient Pt
Atlantic Ocean
41 30
41 00
40 30
73 30
73 00
72 30
72 00
71 30

Connecticut Volunteer Angler Survey Instructions and Codes

Volunteer Angler Survey Logbook Instructions: Listed below are instructions for filling out the logbook. Upon logbook completion, tape the prepaid postage logbook shut and drop it off in the mail. All information is kept confidential. Once the information is entered in our computer system and error checked, the logbooks will be returned for your own records. If you any questions or comments regarding the survey, please contact **Rod MacLeod** at **(860) 434-6043**.

(1) Please enter the month and day fishing trip took place.
(2) Fishing start time in military time (Example: 11am = 1100, 1pm = 1300 hrs, 2pm = 1400, etc.).
(3) Actual fishing time or lines wet to the nearest ½ hour. Do not include travel time.
(4) Number of anglers in fishing party.
(5) Areas fished most in descending order as described on the chart located on the inside cover of logbook. Also, if most of the fishing took place in a river please place a check mark in the box provided.
(6) Check mark fishing mode.
(7) Enter species code for 1st (primary) targeted species and 2nd (secondary) targeted species provided in the species code list below.
(8) Number of anglers that caught fish.
(9) Place a check mark if no fish were caught for the entire fishing party.

Catch Information: Catch information should include the total number of fish caught by the entire party. Enter the number of fish kept and released in the designated boxes. If you caught fish other than those in the pre-coded boxes, please refer to the species code list below and enter the code in the designated blank boxes. If you caught a fish not listed in the species code list, please write down the common name(s) in the blank box(es) provided.

Length Measurement Information: Please try to provide length measurement data on popular species caught including kept and released fish (exclude skates, cunners, etc). Fish must be measured from the tip of the snout to the end of the tail (total length). In case of large catches, try to measure your catch on a random basis. Measuring just large fish will not accurately reflect the actual size or age distribution of the population. When handling and measuring sub-legal sized fish, anglers should use their best judgement and experience to insure that those fish are returned to the water unharmed.

Species Code List:

01 Albacore	12 Cusk-eel	23 White Marlin	34 Smelt	45 Snapper Bluefish (≤12in.)
02 Alewife	13 Dogfish (all species)	24 Atlantic Menhaden	35 Spot	46 Yellowfin Tuna
03 Atlantic Salmon	14 Dolphin (Mahi-Mahi)	25 Pollock	36 Striped Bass	47 Bigeye Tuna
04 Blackfish (Tautog)	15 American Eel	26 Scup (Porgy)	37 Swordfish	48 Blue Marlin
05 Blowfish (Puffer)	16 Summer Flounder (Fluke)	27 Atlantic Sailfish	38 Oyster Toadfish	49 Blueback Herring
06 Bluefish (Adults > 12in.)	17 Goosefish (Monkfish)	28 Windowpane Flounder	39 Atlantic Tomcod	50 Hickory Shad
07 Atlantic Bonito	18 Haddock	29 Black Sea Bass	40 Bluefin Tuna	51 Little Tunny (False Albacore)
08 Brown Trout (Sea-Run)	19 Atlantic Herring	30 Searobins (all species)	41 Weakfish	52 Skipjack Tuna
09 Butterfish	20 Spanish Mackerel	31 American Shad	42 Whiting (Silver Hake)	53 Atlantic Wolffish
10 Atlantic Cod	21 Hakes (Red, Spotted)	32 Sharks	43 White Perch	54 Northern Kingfish
11 Cunner	22 Atlantic Mackerel	33 Skates	44 Winter Flounder	55 Atlantic Croaker

Daily Fishing Trip Log

(1) Month Day | **(2)** Military Time | **(3)** Hours Fished | **(4)** Number of Anglers in Party | **(5)** Areas Fished (See Map) *1st* *2nd* *3rd* | 4Here if Fished in River

(6) _ Mode of Fishing: Boat ☐ Shore ☐

(7) Target Species (See Code List): 1st ☐☐ 2nd ☐☐

(8) Number of Anglers that Caught Fish

(9) 4Here if *No* Fish were Caught

Catch Information

Length Measurement Information

Species Name	Code		Number Kept	Number Released	Code	Length Data	4 if Released	Code	Length Data	4 if Released
Striped Bass	3	6				•			•	
Bluefish (Adults)	0	6				•			•	
Winter Flounder	4	4				•			•	
Blackfish	0	4				•			•	
Summer Flounder	1	6				•			•	
Scup (Porgy)	2	6				•			•	
						•			•	
						•			•	
						•			•	
						•			•	

JOB 2: MARINE FINFISH SURVEY

Part 1: **Long Island Sound Trawl Survey**

Part 2: **Estuarine Seine Survey**

PART 1: LONG ISLAND SOUND TRAWL SURVEY

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JOB 2 PART 1: LONG ISLAND SOUND TRAWL SURVEY (LISTS)

CRUISE RESULTS FROM THE 2011 SPRING AND FALL SURVEYS

STUDY PERIOD AND AREA

The Connecticut DEP Marine Fisheries Division conducted a Trawl Survey in Long Island Sound Trawl Survey for the twenty-eighth year in 2011. The Long Island Sound Trawl Survey encompasses an area from New London to Greenwich, Connecticut and includes waters from 5 to 46 meters in depth in both Connecticut and New York state waters. Typically, Long Island Sound is surveyed in the spring, from April through June, and during the fall, from September through October. This report includes results from the 2011 spring and fall sampling periods and provides time series information since the commencement of the survey in 1984.

GOAL

To collect, manage, synthesize and interpret fishery independent data on the living resources of Long Island Sound for fishery management and information needs of Connecticut biologists, fishery managers, lawmakers and the public.

OBJECTIVES

1) *Provide an annual index of counts and biomass per standard tow for 40 common species.*
2) *Provide age specific indices of abundance for scup, summer flounder, tautog and winter flounder.*
3) *Provide a recruitment index for bluefish (age 0) and weakfish (age 0).*
4) *Provide length frequency distributions of bluefish, scup, striped bass, summer flounder, tautog, weakfish, winter flounder, and other ecologically important species suitable for conversion to age using modal analysis, age-length keys or other techniques.*
5) *Provide annual total counts and biomass for all finfish species taken.*
6) *Provide annual total biomass for all invertebrate species taken.*
7) *Provide a species list for Long Island Sound based on LIS Trawl Survey sampling, noting the presence of additional species from other sampling conducted by the Marine Fisheries Division.*

INTRODUCTION

The Long Island Sound Trawl Survey (LISTS) was initiated in 1984 to provide fishery independent monitoring of important recreational species in Long Island Sound. A stratified-random design based on bottom type and depth interval was chosen and forty sites were sampled monthly from April through November to establish seasonal patterns of abundance and distribution. Seven finfish species were initially of primary interest: bluefish, scup, striped bass, summer flounder, tautog, weakfish, and winter flounder. Length data for these species were collected from every tow; scup, tautog, and winter flounder were sampled for aging. Lobster were also enumerated and measured from every tow. All fish species were identified and counted.

Since 1984, several changes have been incorporated into the Survey. In 1991, the sampling schedule was changed to a spring/fall format, although sampling is still conducted on a monthly basis (April - June, September, and October). Beginning in 1992, species were weighed in aggregate with an onboard scale to provide indices of biomass. Furthermore, more species have been sampled for lengths, such as windowpane and fourspot flounders, and important forage species such as butterfish, long-finned squid, and several herring species. By 2003, the list of species measured expanded to 20 finfish species and two invertebrate species (lobster and long-finned squid). In addition, rarely occurring species (totaling less than 30 fish/year each) are now measured and age structures are collected from weakfish and large summer flounder (>59 cm). All of these changes serve to improve the quality and quantity of information made available to fishery managers for local and regional assessment of stock condition, and to provide a more complete annual inventory of LIS (Long Island Sound) fishery resources.

METHODS

Sampling Design

LISTS is conducted from longitude 72^{o} 03' (New London, Connecticut) to longitude 73^{o} 39' (Greenwich, Connecticut). The sampling area includes Connecticut and New York waters from 5 to 46 m in depth and is conducted over mud, sand and transitional (mud/sand) sediment types. Sampling is divided into spring (April-June) and fall (Sept-Oct) periods, with 40 sites sampled monthly for a total of 200 sites annually. The sampling gear employed is a 14 m otter trawl with a 51 mm codend (Table 2.1). To reduce the bias associated with day-night changes in catchability of some species, sampling is conducted during daylight hours only (Sissenwine and Bowman 1978).

LISTS employs a stratified-random sampling design. The sampling area is divided into 1.85 x 3.7 km (1 x 2 nautical miles) sites (Figure 2.1), with each site assigned to one of 12 strata defined by depth interval (0 - 9.0 m, 9.1 - 18.2 m, 18.3 - 27.3 m or, 27.4+ m) and bottom type (mud, sand, or transitional as defined by Reid et al. 1979). For each monthly sampling cruise, sites are selected randomly from within each stratum. The number of sites sampled in each stratum was determined by dividing the total stratum area by 68 km^2 (20 square nautical miles), with a minimum of two sites sampled per stratum (Table 2.2). Discrete stratum areas smaller than a sample site are not sampled.

Sampling Procedures

Prior to each tow, temperature (^{o}C) and salinity (ppt) are measured at 1 m below the surface and 0.5 m above the bottom using a YSI model 30 S-C-T meter. Water is collected at depth with a five-liter Niskin bottle, and temperature and salinity are measured within the bottle immediately upon retrieval.

The survey's otter trawl is towed from the 15.2 m aluminum R/V John Dempsey for 30 minutes at approximately 3.5 knots, depending on the tide. At completion of the tow, the catch is placed onto a sorting table and sorted by species. Finfish, lobsters and squid are counted and weighed in aggregate (to the nearest 0.1 kg) by species with a precision marine-grade scale (30 kg, +/- 10 gm capacity). Catches weighing less than 0.1 kg are recorded as 0.1 kg. During the initial two years of the survey (1984 & 1985), lobsters were the only invertebrates recorded. Squid abundance has been recorded since 1986. Since 1992, additional invertebrate species have been weighed in aggregate, and some have been counted. The complete time series of species counted and weighed in the survey is documented in Appendix 2.4.

For selected finfish species, lengths are recorded to the centimeter as either total length or fork length (e.g. measurements from 100 mm to 109 mm are recorded as 10 cm) and entered in the database as 105 mm (Table 2.3). Lobsters are measured to 0.1 mm carapace length. Squid are measured using the mantle length (cm) and horseshoe crab measurements are taken using prosomal width (cm).

The number of individuals measured from each tow varies by species, and also depends on the size of the catch and range of lengths (Table 2.3). If a species is subsampled, the length frequency of the catch is determined by multiplying the proportion of measured individuals in each centimeter interval by the total number of individuals caught. Some species are sorted and subsampled by length group so that all large individuals are measured and a subsample of small (often young-of-year) specimens is measured. All individuals not measured in a length group are counted. The length frequency of each group is estimated as described above, i.e. the proportion of individuals in each centimeter interval of the subsample is expanded to determine the total number of individuals caught in the length group. The estimated length frequencies of each size group are then appended to complete the length frequency for that species. This procedure is often used with catches of bluefish, scup, and weakfish, which are usually dominated by young-of-year or discrete age/length classes.

Scup, summer flounder, tautog, weakfish and winter flounder are sampled for age determination (Table 2.3). Subsamples of scup, stratified by length group, are measured to the nearest mm (fork length) and scales from each individual are taken for ageing. Scup scales are removed posterior to the pectoral fin and ventral to the lateral line. The scales are pressed onto plastic laminate with an Ann Arbor roller press to obtain an impression of the scale, which is then viewed with a microfiche reader at 21x. Scales are also taken from all summer flounder greater than 59 cm. At least 15 scales are removed from the caudal peduncal area. These scales are pressed and aged to supplement the National Marine Fisheries Service age key and are also included in the formulation of LISTS summer flounder catch-at-age matrix (see below). Most tautog taken in LISTS

are aged due to the low numbers caught in recent years (under 250 fish). Tautog are iced and taken to the lab, where their total length (mm), sex, and total weight (gm) are recorded and their age is determined from opercular bones (Cooper 1967). Subsamples of winter flounder, stratified by length group and area (as listed in bottom of Table 2.3), are iced and taken to the lab where they are measured to the millimeter (total length), weighed (gm) and sexed. Their maturity stage is determined (NMFS 1989), and they are aged with whole and sectioned otoliths (Simpson et al. 1988). Weakfish scales are obtained and processed as described above for scup, and otoliths are sectioned and read using procedures described in Simpson et al. 1988.

In reports prior to 2001, three species were not included in annual and seasonal totals: American sand lance, bay anchovy, and striped anchovy. These species, with the possible exception of striped anchovy, can be very abundant in Long Island Sound, but are not retained well in the otter trawl. Additionally, many of these fish are young-of-year and often drop out of the net as it is retrieved and wound on the net reel. For this reason they were not included in the list of species to be counted when LISTS was started in 1984. However, to document the occurrence of these species in LISTS catches, American sand lance was added in 1994, striped anchovy was added in 1996, and bay anchovy was added in 1998. Since 2001, adults of these three species are added to the annual and seasonal totals and the young-of-year are listed if present in the year's catch but are not quantified (Table 2.15, Appendix 2.4). Young-of-year for these three species are included in the database but are cataloged with a separate species identifier and quantities are considered estimates (Appendix 2.2).

Data Analysis

Indices of Abundance: Annual Mean Count and Weight per Tow

To evaluate the relative abundance of common species, an annual spring (April - June) and fall (September-October) geometric mean number per tow and weight per tow (biomass, kg) is calculated for the common finfish and invertebrate species. To calculate the geometric mean, the numbers and weight per tow are logged ($\log_e$) to normalize the highly skewed catch frequencies typical of trawl surveys:

$$\text{Transformed variable} = \ln(\text{variable}+1).$$

Means are computed on the log scale and then retransformed to the geometric mean:

$$\text{geometric mean} = \exp(\text{mean})-1.$$

The geometric mean count per tow was calculated from 1984 - 2011 for 38 finfish species, lobster, and long-finned squid (1986 - 2011). The geometric mean weight per tow was calculated using weight data collected since 1992 for the same species, plus an additional 13 invertebrates.

For the seven finfish species that were measured on every tow (bluefish, scup, striped bass, summer flounder, tautog, weakfish, and winter flounder) biomass indices were calculated for the years 1984 - 1991 by using length/weight equations to convert length frequencies to weight per tow. Bluefish, scup, weakfish and winter flounder lengths were converted using equations from Wilk et al. 1978; striped bass conversions

were accomplished using an equation from Young et al. 1994; summer flounder and tautog conversions were accomplished using equations developed from LISTS data from 1984 -1987 and 1984 -1996 respectively.

Indices of Abundance: Indices-at-Age and Age Group

Annual age specific indices (indices-at-age matrices) were calculated for scup, striped bass, summer flounder, winter flounder and tautog. The age data used to calculate the indices came from three sources: striped bass ages were derived using the von Bertalanffy (1938) equation; summer flounder age-length keys were obtained from the National Marine Fisheries Service (NMFS) Northeast Fisheries Science Center spring and fall trawl surveys combined with LISTS ages (>59 cm); scup, winter flounder and tautog age-length keys (in 1 cm intervals) were obtained directly from LISTS. Since fish growth can fluctuate annually as a function of population size or other environmental factors, a year and season specific age-length key was used wherever possible. Once lengths have been converted to age, the proportion at age is multiplied by the abundance index of the appropriate season to produce an index of abundance at age.

Recruitment (young-of-year) and age 1+ (all fish age one and older) indices were calculated for bluefish and weakfish. Observed modes in the length frequencies were used to separate the two groups.

The specific methods used to calculate indices-at-age for each species were as follows:

- **Bluefish**. Since bluefish are not aged, modes observed in the fall length frequencies were used to separate bluefish into age 0 and age 1+ groups, and a geometric mean catch per tow was calculated for each group (Table 2.22). Comparison of the mean length-at-ages reported for young-of-year and age 1 bluefish in the New York Bight (Chiarella and Conover 1990) and Long Island Sound (Richards 1976) with LISTS length frequencies suggests that bluefish can easily be identified as either age 0 (snapper bluefish) or adults (age 1+). Richards (1976) and Chiarella and Conover (1990) determined that most bluefish less than 30 cm are age 0. A discontinuity in the LISTS fall length frequencies occurs most years between 26 cm and 39 cm (Table 2.42). Therefore 30 cm was determined to be a suitable length for partitioning age 0 and age one fish.

  Although North Carolina state biologists have aged bluefish, their age keys were not used to age Long Island Sound bluefish because North Carolina mean lengths-at-age are not consistent with modes observed in Long Island Sound bluefish length frequencies. This difference suggests that growth may vary by region, or that early and late spawned bluefish may be differentially distributed along the coast (Kendall and Walford 1979).

- **Scup**. An index-at-age matrix was developed for 1984-2011 using spring (May-June only) and fall (September-October) LISTS data (Table 2.23). April data was omitted since very few scup are taken at this time. A total of 10,873 scup aged between 1984 and 2011 were used to make year and season specific age-length keys (1 cm intervals). In the relatively few instances when the season/year specific key failed at

a given 1 cm length interval, a three-year pooled key was used to determine the age. Three-year pooled keys were calculated using the years proceeding and following the "run" year. For the terminal year, only two years were used for the pooled key. The final index-at-age was computed for both spring and fall indices-at-age. Since very few scup older than age 9 are taken (less than 4% in any given year), an age 10+ group is calculated by summing indices for ages 10 and up. To represent the full adult portion of the population an age 2+ index is calculated by summing the indices for ages 2 through 10+.

- **Striped bass**. To approximate the ages of striped bass taken in the spring survey (Table 2.24), the average of the Chesapeake Bay and Hudson River striped bass von Bertalanffy parameters (L_{max} = 49.9 in, K = 0.13, t_o = 0.16, Vic Crecco, pers. comm.) were used in the rearranged von Bertalanffy equation:

$$t = (1/K) * (-\log_e ((L_{max} - L_t) / L_{max})) + t_o$$

Since this equation estimates age t as a fraction of a year, the estimates were rounded to the nearest year (e.g. age 3 = ages 2.5 to 3.4). A spring catch-at-age matrix was developed for 1984 through 2011 by apportioning the spring index by the percentage of fish at each age (Table 2.25).

- **Summer flounder**. The year and season specific age-length keys (1 cm intervals) used to age LISTS catches were provided by NMFS from their spring and fall trawl surveys. These keys were supplemented with fish caught and aged by LISTS (60 cm and over). In 2011, 31 summer flounder, 60 cm TL or greater, were aged; 26 from the spring and five (5) from the fall. Since 2001, whenever the season/year specific key failed at a given 1 cm length interval a pooled year key using only adjacent years was used (Gottschall and Pacileo 2002). Since it is thought that growth rates for summer flounder have changed over time, a pooled key using only adjacent years would more accurately represent fish that could not be aged by the season/year specific key. Using this methodology, the catch-at-age matrix (Table 2.26) will remain unchanged for all but the terminal year, which will be updated as the following years' data becomes available.

- **Tautog**. An index-at-age matrix was developed for 1984-2011 using all survey months (Gottschall and Pacileo 2007) (Table 2.27). During 2011, 103 tautog were captured and opercles were collected from all; 92 collected in the spring and 11 were collected in the fall. Ageing for 2006-2010 has been completed by a first reader, however, final checks on samples that were cataloged with low confidence of age have not been performed. A second independent read is necessary on these samples. Preliminary age data for 2006-2010 are presented in this report. Opercula collected in 2011 have not been aged yet, so those fish were aged using a pooled key.

- **Weakfish**. Age 0 and age 1+ indices were calculated for both spring (1984 – 2011) and fall surveys (1984 – 2009, 2011) (Table 2.28). Since few weakfish are taken in April, the spring geometric mean was calculated using only May and June. All weakfish taken in spring are assumed to be age 1+. Similar to bluefish, the fall age 0

and 1+ index was calculated by using length frequencies to separate the catch. Since a break in the fall length frequencies generally occurs between 24 and 32 cm each year (Table 2.57), weakfish less than 30 cm are considered to be age 0 while those greater than or equal to 30 cm are ages 1+.

- **Winter flounder**. An index-at-age matrix was developed for 1984-2011 using April and May LISTS data (Table 2.29). June data was not used since length frequency data suggest that many adult winter flounder have left the Sound by this time (an exception was made for 1984, the first year of LISTS, because very few samples were taken in the spring months). A total of 21,180 winter flounder aged between 1984 and 2011 were used to make year and region (east of Stratford Shoal, west of Stratford Shoal) specific age-length keys in 1 cm intervals. Similar to scup and summer flounder, three year pooled keys using only the adjacent years (two years for the terminal year runs) were used to assign ages if year specific keys were not available.

RESULTS AND DISCUSSION

Overview of LISTS 2011 Spring and Fall Surveys

The spring survey commenced on April 26, 2011, in eastern Long Island Sound aboard the R/V John Dempsey and continued on April 27 & 29 for a total of two (3) days underway and 12 tows completed. The late April start was due to delays in getting the research vessel back from the shipyard. May sampling started in the eastern Sound on May 9th and continued for an additional eight (8) days for a total of nine (9) days underway and 40 sites completed. June sampling began on June 8th and ended on June 21st, taking nine (9) days underway to complete 40 sites. The Fall Survey needed 10 days underway in September and 11 days in October to complete the 40 sites in each of the months. A total of 172 LISTS tows were completed in 42 days underway during the spring and fall 2011 surveys (Table 2.4); not including transit days.

Maps showing the sites selected versus the sites sampled during each month of sampling are provided in Figure 2.2 (April), Figure 2.3 (May), Figure 2.4 (June), Figure 2.5 (September) and Figure 2.6 (October). Within each figure the red bordered sites are the sites selected for the month and the solid blue dots are the actual sites sampled. If a site had to be relocated during sampling, an explanation of why it had to be moved is listed under the figure. Since only a couple days were available for April sampling once repairs to the research vessel were completed, the priority was to do as many sites as possible while still getting a decent sample of winter flounder for ageing purposes. Therefore, none of the sites west of New Haven were attempted, nor any of the sand tows in the east. Two of the sites were relocated during the May cruise; no sites were moved during the June, September or October cruises. Additional site/station information is provided in Table 2.5 (April), Table 2.6 (May), Table 2.7 (June), Table 2.8 (September) and Table 2.9 (October) including date of sample, time, tow duration, latitude/longitude, and surface and bottom temperature and salinity.

Sometimes, a full 30-minute tow cannot be completed. Typical reasons for short tows include lack of room because of observed pot gear set in the immediate area, a drop

in speed due to entanglement with some object on the bottom (frequently derelict pot gear), or a complete stop in forward motion (submerged wreck or rock pile). Survey crew will often attempt to finish an interrupted tow by clearing the net (if needed) and resetting beyond the obstruction or observed gear. If this is not possible, a site may have to be moved to another site nearby with the same stratum (bottom type and depth). If the site was moved, the data from the initial site will not be used. Typically, a minimum of 15-20 minutes is required for a LISTS tow to be recorded. However, there are rare occasions when a tow with less than 15 minutes will be accepted, usually because there is no alternate site in the designated strata in the vicinity. Short tow information for each month in the 2011 survey is summarized in Table 2.10.

Cooperative Sample and Data Collection

Throughout the time series, LISTS staff have been participating in cooperative efforts for sample collections, data requests, and special projects using survey personnel, equipment, and other resources. Most of these cooperative efforts are with state researchers or agencies, the National Marine Fisheries Service, Atlantic States Marine Fisheries Commission, New England and Mid-Atlantic Councils, and researchers or graduate students associated with state or local universities. Table 2.11 illustrates many of the organizations that requested data in 2011, while Table 2.12 shows sample request received and fulfilled (each by month). In recent years many requests for samples have come from high schools, aquariums, or other educational organizations needing finfish and invertebrates for teaching purposes. Additionally, our own staff often have sample or data requests for media or other public outreach events (see job six of this report).

Number of Species Identified

Sixty-five finfish species were observed in the 2011 Long Island Sound Trawl Survey (Table 2.13). This includes two new species for the survey, silver perch and white mullet (shown at right), both from the fall survey. From 1984 to 2011, one hundred two (102) finfish species have been identified on the Long Island Sound Trawl Survey (Appendix 2.1), averaging 58 species per year with a range of 43 to 70 species (Fig 2.7). In addition, a total of 41 types of invertebrates were collected in 2011 (Table 2.14). Most invertebrates are identified to species. However, in some cases, invertebrates were identified to genus or higher taxon.

Total Catch

Appendix 2.4 presents a time series (1984-2011) of the finfish species collected each year and their respective rank by numbers. Annual total biomass of invertebrates is also included in this appendix (1992-2011), and are ranked by weight (kg).

A total of 114,706 finfish weighing 16,210 kg were sampled in 2011 (Table 2.15). In nineteen out of the last twenty-eight years butterfish has been the highest-ranking finfish (numbers) in LISTS. In 2011, over forty-two thousand (42,141) butterfish accounted for 36.7% of the catch by number and 9.9% of the biomass. Scup was the second most abundant by number (34,458) and the most abundant by weight, accounting for 41.7% of the biomass in 2011. Scup ranked first by (by number and weight) in 2007 and 2008 (Appendix 2.4). Typically, scup and butterfish account for 60% of the Trawl Survey annual catch (27.1%-86%, 1984-2011, Appendix 2.4). American sand lance were abundant in springtime catches and ranked third (9,535 fish) overall in 2011 followed by bay anchovy (4,693 fish), winter flounder (3,092 fish) and windowpane flounder (2,831 fish). Catches of bluefish (2,765 fish) and weakfish (2,604 fish) were relatively low this year, due to lack of young-of-year fish in the fall catches. The fall index of young-of-year for both species (Table 2.22 for bluefish and Table 2.28 for weakfish) has been below average for three of the last four years (and there was no fall survey in 2010). The top five species by number accounted for 81.8% of the total annual catch and 55.5% of the total biomass in 2011. Three species (scup, butterfish, and winter flounder) have been among the five most abundant species caught (by number) each year in the 27-year LISTS time series.

A total of 45,105 finfish weighing 9,232 kg were sampled in spring of 2011 (Table 2.16). Butterfish topped the spring catch, with 10,647 fish (856.3 kg) accounting for 23.6% of the catch numerically. Scup was again the key component of the spring catches by weight, with 10,439 fish (3,748.1 kg) accounting for 23.1% of the total by number and 40.6% of the biomass. The scup index of abundance for spring 2011 (22.34 scup per tow) was the fourth highest in the time-series for April-June combined (the ten highest springtime indices have occurred in the past twelve years, Table 2.18). Porgy (scup) from 15 to 30 cm fork length were most prominent in the length frequency distribution. The smaller size group often seen in the spring (10-12 cm) was not that abundant in 2011, however, the number of fish greater than 30 cm in springtime catches has been increasing for the past decade (Table 2.44). American sand lance was the third most abundant fish by number (9,535, or 21.1% of the total) due to two tows in June in which an estimated 9,450 sand lance were retained in the net (4,500 fish in one tow and 4,950 in the other). Winter flounder was the fourth most abundant species this season by number and weight with 2,880 fish accounting for 580.2 kg. Windowpane flounder round out the top five species by number for this spring, with 1,971 fish (319.0 kg).

Summer flounder (fluke) springtime catches have been increasing since the mid 1990's, except for a dip in 2005-2006 (Table 2.18). Another noteworthy item about the springtime catches is the increasing frequency of juvenile cod in recent years (Appendix 2.2). This cold temperate species rarely occurred in trawl survey catches prior to 2003; only five individuals were observed between 1984 and 2002. From 2003-2005, cod were observed in 5-11% of the tows. Since 2009, cod have been observed in 5-17% of the tows. In 2011, one hundred nine (109) cod were captured on 29 of 92 spring tows. The majority (97%) of the cod were juveniles between 3 and 6 cm TL, however, three fish were adults between 53 and 63 cm TL (based on length cutoffs used by Fahay et.al. 1999).

A total of 69,599 finfish weighing 6,978 kg were sampled in fall of 2011 (Table 2.16). Catches in the fall survey have consistently been dominated by four species: butterfish, scup, weakfish, and bluefish (Table 2.16). In 2011 these four species comprised 87% of the total catch of finfish and 64% of the total fall biomass. Scup abundance was about average this past fall with 24,019 fish (3,010.9 kg) taken or 34.5% of the fall total count and 43.1% of the fall biomass. The corresponding fall indices for all sizes of scup (198.23, Table 2.19) and for young-of-year scup (119.03, Table 2.23) were near their time-series means of 176.07 and 131.09, respectively (Figure 2.11). Despite comprising 45% of the fall catch by number, butterfish abundance in the fall fell to its lowest level since the survey began in 1984 (geometric mean catch per tow = 39.62, Table 2.19, Figure 2.8). Butterfish abundance indices elsewhere along the Atlantic coast were average or above average in 2011 (J. Didden, pers. comm.) The unusually low butterfish abundance in Long Island Sound may have been caused by a two tropical storms with high winds and rainfall that impacted the Northeast during latter part of August and beginning of September (see Job 5 of this report for more information on the storms). Bluefish and weakfish and comprised 3.9% and 3.7% of the fall catch with 2,737 fish and 2,567 fish respectively. Bluefish abundance may also have been impacted by the tropical storm event; the fall 2011 index of 11.10 fish/tow was the lowest in the 28-year survey (Table 2.19, Figure 2.8). Despite the storms, the overall fall finfish catch, in numbers of fish, was not atypical; 1,740 fish per tow were collected (the average for the time-series is 1,427 fish per tow). The weakfish index of abundance (12.27 fish/tow) was below the time-series mean of 19.33 fish/tow (Table 2.19), driven by the low young-of year index (11.64 fish/tow, Table 2.28). Young-of-year weakfish comprised 95% of the weakfish catch in 2011. The fall age 1+ index for weakfish (0.68 fish/tow), however, was the third highest in the time-series and almost three times the mean (0.25 fish/tow, Table 2.28). Smooth dogfish again ranked high in biomass (2nd) with 1,235.8 kg from 240 individuals.

A total of 1,505 kg of invertebrates were taken in 2011 (Table 2.15). Over 75% of the invertebrate biomass was comprised of four species, namely, horseshoe crab (505.2 kg, 33.5% of total), long-finned squid (370.7 kg, 24.6%), spider crab (151.8 kg, 10.1%) and lady crab (132.4 kg, 8.8%). American lobster was the fifth most abundant invertebrate by weight (52.0 kg) and accounted for 3.4% of the biomass.

The total biomass of invertebrate catch taken in the spring of 2011 was 657 kg (Table 2.17). Horseshoe crab had the highest biomass of 209.3 kg comprising 31.8% of the total spring weight followed by spider crab with 123.7 kg (18.8%) and long-finned squid with 86.6 kg (13.1%). After a slight increase in 2007 and 2008, the spring lobster abundance index has continued to decrease. The 2011 spring index reached a new record low of 0.79 lobsters/tow (Table 2.18). The spring 2011 index of long-finned squid (4.10 per tow) was slightly below for the time series, roughly one-third of the peak abundance recorded in 2006 (11.55 per tow) (Table 2.18, Figure 2.14).

A total of 848 kg of invertebrates were taken in fall of 2011 (Table 2.17). Horseshoe crab was the most abundant invertebrate in the fall, as well as the spring, with 152 crabs weighing 295.9 kg or 34.8% of the total invertebrate biomass for fall. Long-finned squid was the second most abundant invertebrate with 284.1 kg, followed by 113.3

kg of lady crab. There were only 62 American lobster (13.2 kg), yielding an index of 0.38 lobsters per tow, approximately 6% of the time-series mean and another record low for fall abundance (Table 2.19, Figure 2.14).

Length Frequencies

Length frequency tables are provided primarily to give the reader an understanding of the size range of various species taken in LISTS. Lengths are converted to age frequencies for analysis of principal species such as scup, bluefish, striped bass, summer flounder, tautog, winter flounder, and weakfish. Changes such as an expansion in the size (age) range for some important recreational species are apparent in recent years including more large scup (Table 2.49-2.50), striped bass (Table 2.51-2.52), and summer flounder (Table 2.53-2.54).

Length frequencies were prepared for 21 species:

alewife	spring and fall	1989 - 2011	Table 2.30;
American shad	spring and fall	1989 - 2011	Table 2.31;
American lobster	spring and fall (M&F)	1984 - 2011	Table 2.32-Table 2.35;
Atlantic herring	spring and fall	1989 - 2011	Table 2.36;
Atlantic menhaden	fall	1996 – 2011	Table 2.37;
black sea bass	spring and fall	1987 – 2011	Table 2.38, Table2.39
blueback herring	spring and fall	1989 - 2011	Table 2.40;
bluefish	spring and fall	1984 - 2011	Table 2.41, Table 2.42;
butterfish	spring and fall	1986 - 1990, 1992 - 2011	Table 2.43;
fourspot flounder	spring and fall	1989 - 1990, 1996 - 2011	Table 2.44;
hickory shad	spring and fall	1991 - 2011	Table 2.45;
horseshoe crab	spring and fall (M&F)	1998 - 2011	Table 2.46, Table 2.47
long-finned squid	spring and fall	1986 - 1990, 1992 - 2011	Table 2.48;
scup	spring and fall	1984 - 2011	Table 2.49, Table 2.50;
striped bass	spring and fall	1984 - 2011	Table 2.51, Table 2.52;
summer flounder	spring and fall	1984 - 2011	Table 2.53, Table 2.54;
tautog	spring	1984 - 2011	Table 2.55;
weakfish	spring and fall	1984 - 2011	Table 2.56, Table 2.57;
windowpane flounder	spring and fall	1989, 1990, 1994 - 2011	Table 2.58, Table 2.59;
winter flounder	April-May and fall	1984 - 2011	Table 2.60, Table 2.61;
winter skate	spring and fall	1995 - 2011	Table 2.62.

For the years where length data are available, length frequencies were prepared for the seasons or months for which the preferred indices of abundance and catch-at-age matrices are calculated; for some species length frequencies are provided for both seasons.

Seasonal Indices of Abundance

The geometric mean count per tow was calculated from 1984-2011 for 38 finfish species plus lobster and long-finned squid (squid since 1986). All spring (April-June) and fall (September-October) data are used to compute the abundance indices presented in Tables 2.18 (spring) and 2.19 (fall), with the preferred seasonal index (for counts)

denoted by an asterisk. Geometric mean biomass-per-tow indices have been calculated for 38 finfish and 15 invertebrate species (or species groups) since 1992, for both spring and fall (Table 2.20 and 2.21, respectively). Age specific indices of abundance were calculated for selected important recreational species, including scup, striped bass, summer flounder, and winter flounder (see below). For two other species, bluefish and weakfish recruitment indices were calculated using modal analysis of the length frequencies. For each of the thirty-eight finfish species, plots including catch per tow in numbers and biomass in kilograms are illustrated in Figures 2.8 through 2.13. These figures also include plots of each of the age specific indices and recruitment indices mentioned above. Figure 2.14 provides plots of abundance (biomass) indices for crabs (lady, rock, spider; 1992-2011), American lobster (1984-2011), horseshoe crab (1992-2011), and long-finned squid (1986-2011).

Since the 2011 April survey only consisted of data from 12 tows, this should be kept in mind when comparing the latest spring indices to the time series. Similarly, when comparing the fall indices for 2011 to the time series, one should keep in mind the two tropical storms that occurred in August and September and the effects they may have had on fall catches.

During the spring survey two finfish species were at record high levels of abundance, smooth dogfish and summer flounder, while red hake were at record low levels of abundance. Of the species where the spring index is the preferred index of abundance for the trawl survey (Table 2.18), an additional three species had indices of abundance (geometric mean count per tow) above the time-series mean; black sea bass, ocean pout and spiny dogfish (Figures 2.8 – 2.13). Although the fall trawl index is usually the preferred index of scup abundance, even the springtime scup indices have been above the time-series mean for six of the past twelve years (Table 2.18) due to high abundances of age 2+ scup in recent years (Figure 2.11).

During the fall survey, two species had record high indices of abundance, spotted hake and northern kingfish. Conversely, two species had record low indices of abundance, bluefish and butterfish. As mentioned previously, the tropical storms that impacted the Long Island Sound area during the latter part of August and the beginning of September may have been a contributing factor in displacing these species outside the survey area. However, of the species where the fall index is the preferred index of abundance for the trawl survey (Table 2.19), an additional eleven (11) species had indices of abundance (geometric mean count per tow) above the time-series mean; smooth dogfish, summer flounder, spotted hake, hogchoker, northern kingfish, Atlantic menhaden, moonfish, rough scad, scup, striped searobin, and clearnose skate (Figures 2.8 – 2.13).

Relative indices of abundance (geometric mean number per tow) of American lobster were at record low levels for both spring and fall surveys in 2011. This continues the decreasing trend begun in the late 1990's. American lobster abundance in spring 2011 remains low at 0.79 lobsters per tow, and is at a time-series low for the third year in a row (Table 2.18). Current springtime abundance is less than one-twentieth the peak abundance of 18.52 lobsters per tow seen in 1998 (Figure 2.14). Catch of long-finned

squid was average in 2011; the spring index of 4.10 squid per tow was very close to the seasonal time-series mean (4.93 squid per tow) and the fall index (85.68 squid per tow) was marginally below the time-series mean (122.84 squid per tow) (Tables 2.18 – 2.19, Figure 2.14).

Indices of Abundance: Important Recreational Species

Spring and fall abundance indices are presented in Tables 2.18-2.19. Indices of abundance at age were also calculated for seven important recreational species: bluefish (Table 2.22), scup (Table 2.23), striped bass (Table 2.24 age frequency, Table 2.25 indices at age), summer flounder (Table 2.26), tautog (Table 2.27), weakfish (Table 2.28) and winter flounder (Table 2.29). Bluefish and striped bass indices-at-age are based on the fall and spring surveys, respectively, whereas winter flounder indices-at-age are based on only the April and May cruises of the spring survey. In 2011, LISTS collected otoliths from 894 winter flounder, 890 of which were used in the development of age keys and the final catch-at-age matrix. Both scup and weakfish indices-at-age are calculated and presented separately for each season. Scales from 734 scup were collected and aged in 2011, 732 of which were used in the keys and calculations of the age matrix. Weakfish and bluefish use modal distributions for calculating their respective recruitment index although a small number of weakfish are taken each year for ageing purposes (see methods).

Although the striped bass abundance in spring 2011 fell below the mean for the second time in the past 16 years, the current index of 0.48 fish per tow remains well above the average for the first eight years of the time series (0.08 fish per tow, 1984-1992). Springtime adult scup abundance remains high relative to 1984-1999 levels; the 2011 spring index of age 2+ fish was the sixth highest in the time-series (Table 2.23, Figure 2.11). The index of age 2+ was also high in the fall, in fact, there were age 10+ scup in the fall survey for the first time in the time-series (Table 2.23). Summer flounder (fluke) abundance, in both spring and fall, has generally been increasing for the past 13-14 years (Tables 2.13-2.14). The fall index of abundance has historically been viewed as the preferred index of abundance from the trawl survey, however, fluke are now more abundant in the spring survey than the fall survey. The fluke index for spring 2011 (3.85 fish per tow) is more than triple the time-series average (1.25 fish per tow). The spring survey index for tautog has remained low and below the time-series average for 18 of the past 19 years, there was a small, short-lived increase in abundance in 2002 (Figure 2.13). Winter flounder springtime abundance has been low and declining for the past thirteen years, with 2006 being the lowest index for the time-series and 2007-2011 indices being approximately one-third the time series average (Figure 2.9). Weakfish age 1+ indices for the fall survey (Table 2.28, Figure 2.13) show the highest abundance of older weakfish since the peak years in the mid 1990's (1995-1997).

MODIFICATIONS

Addendum I to Amendment 1 of the Atlantic State Marine Fisheries Commission (ASMFC http://www.asmfc.org/) Bluefish Fishery Management Plan added a compliance criterion requiring collection of otoliths for ageing purposes. LISTS will begin collecting Bluefish otoliths in 2012.

At the recommendation of the ASMFC Tautog Technical Committee, LISTS will also begin collecting tautog otoliths in 2012, in addition to the opercula which have been collected since the inception of the survey.

In recent years, there has been an increased need for staff to use geospatial technology to map and analyze marine environmental or fisheries related information. Project staff have also experienced an increase in requests to provide geospatial data to others (intra-agency, inter-agency, NGOs, academic institutions, etc). Therefore, a new job is being created within the project (Job 7: Marine Fisheries GIS) to support this need for geospatial datasets, data layers, analyses and products.

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TABLES 2.1 - 2.29
LISTS

Table 2.1. Specifications for the Wilcox 14 m high-rise trawl net and associated gear.

Component	Description
Headrope	9.1 m long, 13 mm combination wire rope
Footrope	14.0 m long, 13 mm combination wire rope
Sweep	Combination type, 9.5 mm chain in belly, 7.9 mm chain in wing
Floats	7 floats, plastic, 203 mm diameter
Wings	102 mm mesh, #21 twisted nylon
Belly	102 mm mesh, #21 twisted nylon
Tail Piece	76 mm mesh, #21 twisted nylon
Codend	51 mm mesh, #54 braided nylon
Ground Wires	18.2 m long, 6x7 wire, 9.5 mm diameter
Bridle Wires:	top legs 27.4 m long, 6x7 wire, 6.4 mm diameter
Bottom Legs	27.4 m long, 6x7 wire, 11.1 mm, rubber disc type, 40 mm diameter
Doors	Steel "V" type, 1.2 m long x 0.8 m high, 91 kg
Tow Warp	6x7 wire, 9.5 mm diameter

Table 2.2. The number of sites scheduled for sampling each month within the 12 depth-bottom type strata.

	Depth Interval (m)				
Bottom type	**0 - 9.0**	**9.1 - 18.2**	**18.3 - 27.3**	**27.4+**	**Totals**
Mud	2	3	5	5	15
Sand	2	2	2	2	8
Transitional	3	5	5	4	17
Totals	**7**	**10**	**12**	**11**	**40**

Table 2.3. Length and age data collected in 2011.

In addition to the species listed below, other rarely occurring species (totaling less than 30 fish/year each) were measured. During 2011, thirty-nine other species were measured during LISTS sampling as either rarely occurring species or for other research related projects

Species measured	Measurement	# tows/day	# fish measured
Alewife	FL (cm)	All	min of 15 / tow
American lobster	CL (0.1 mm)	All	min of 50 / tow
American shad	FL (cm)	All	min of 15 / tow
Atlantic herring	FL (cm)	All	min of 15 YOY and min of 30 adults / tow
Atlantic menhaden	FL (cm)	All	min of 15 / tow
Atlantic sturgeon	FL (cm)	All	All
Blueback herring	FL (cm)	All	min of 15 / tow
Bluefish	FL (cm)	All	min of 30 YOY / tow, all adults
black sea bass	TL (cm)	All	All
butterfish	FL cm)	1st -3rd	min of 15 YOY and 15 adults / tow
cunner	TL (cm)	All	All
dogfish, smooth	FL (cm)	1st -3rd	All
dogfish, spiny	FL (cm)	All	All
fourspot flounder	TL (cm)	3rd on	min of 30/tow
hickory shad	FL (cm)	All	All
horseshoe crab	PW (cm)	All	All
northern searobin	FL (cm)	3rd on	min of 30/tow
moonfish	FL (cm)	Occasional	min of 10/tow
smallmouth flounder	TL (cm)	Occasional	min of 10/tow
striped bass	FL (cm)	All	All
striped searobin	FL (cm)	3rd on	min of 30/tow
scup	FL (cm)	All	min of 15 YOY and 30 / mode for age 1+
long-finned squid	ML (cm)	1st -3rd	min of 30 / tow
summer flounder	FL (cm)	All	All
tautog	TL (cm)	All	All
weakfish	FL (cm)	All	min of 15 YOY / tow, all adults
windowpane flounder	TL (cm)	1st -3rd	min of 50 / tow
winter flounder	TL (cm)	All	min of 100 / tow
winter skate	TL (cm)	All	All

Species aged	Structure	Subsample
scup	scales	Collected every month. For each month scales are taken from the following: 3 fish/cm <20 cm; 5/cm from 20-29 cm; and all fish > 30 cm.
summer flounder	scales	all fish > = 60 cm
tautog	opercular bones	Collected from a minimum of 200 fish/year.
weakfish	scales / otoliths	Collected each season. For each season, 1 scale and one otolith sample / cm up to 19 cm and all scales and otoliths >= 20 cm.
winter flounder	otoliths	Collected during April and May from two areas in the Sound: eastern-central and western. For each month and area, subsamples are taken as follows: in the eastern-central area 7 fish / cm < 30 cm, 14 / cm from 30-36 cm, all fish > 36 cm. In the western area 5 fish / cm < 30 cm, 10/cm from 30-36 cm, all fish > than 36 cm.

Notes: min = minimum; YOY = young-of-year; FL = fork length; TL = total length; CL = carapace length; ML = mantle length; PW = prosomal width.

Table 2.4. Number of Long Island Sound Trawl Survey (LISTS) samples taken by year and cruise.

In 1984, thirty-five sites per monthly cruise from April through November were scheduled for sampling. Starting in 1985, forty sites per cruise were scheduled. In 1991, the Trawl Survey was modified to a spring (April - June) and fall (September - October) format--July, August and November sampling was suspended. In 1993 and 1994, an additional cruise of 40 sites was added to the fall period. The additional fall cruise was suspended in 1995. One hundred twenty tows were conducted in 2006 due to delays in rebuilding the main engine on the R/V John Dempsey (spring) and mechanical failure/overhaul of the hydraulic power take-off (fall). Delays in overhauling the transmission in the fall of 2008 resulted in missing September sampling. The June cruise and all of fall sampling in 2010 were canceled for an engine replacement in the R/V John Dempsey. Due to delays in engine replacement, begun in 2010 but not completed until late April 2011, April sampling in 2011 was abbreviated.

	Year																													
Cruise	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	
April	-	-	35	40	40	40	40	40	-	40	40	40	40	40	40	40	40	40	40	40	40	40	-	40	40	40	40	12	
May	13	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	38	40	
June	19	5	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	39	40	40	40	40	40	-	40	
July	35	40	40	40	40	40	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
August	34	40	40	40	40	40	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
September	35	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	-	40	-	40	
Sept/Oct	-	-	-	-	-	-	-	-	-	40	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
October	35	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	-	40	40	-	40	40	40	-	40	
November	29	40	40	40	40	40	40	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-	
Total	**200**	**246**	**316**	**320**	**320**	**320**	**297**	**200**	**160**	**240**	**240**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**200**	**199**	**200**	**120**	**200**	**160**	**200**	**78**	**172**	**5,988**

Table 2.5. Station information for LISTS April 2011.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
SP2011001	4/26/2011	1437	T	4	15:34	30	2.0	41.2345	-72.2663	9.3	19.9	6.4	29.5
SP2011002	4/27/2011	1028	T	4	8:13	30	2.7	41.1757	-72.5804	7.4	25.7	6.7	26.9
SP2011003	4/27/2011	0625	T	4	9:53	30	2.6	41.1088	-72.7108	8.1	26.5	6.5	26.6
SP2011004	4/27/2011	0426	T	3	11:11	30	3.6	41.0665	-72.7031	8.1	26.3	6.5	26.5
SP2011005	4/27/2011	0326	T	3	12:25	30	2.4	41.0648	-72.6655	8.5	26.3	6.8	26.4
SP2011006	4/27/2011	0125	T	4	13:46	30	3.2	41.0088	-72.7468	8.6	26.0	6.4	26.6
SP2011007	4/27/2011	0126	T	3	14:40	30	3.2	41.0222	-72.6890	8.7	26.0	6.6	26.5
SP2011008	4/27/2011	0226	T	3	15:49	30	2.9	41.0408	-72.6853	8.7	26.2	6.6	26.5
SP2011009	4/29/2011	1427	T	1	7:54	30	3.8	41.2475	-72.6083	7.8	25.1	7.3	26.7
SP2011010	4/29/2011	1322	T	1	9:24	23	3.3	41.2348	-72.8165	8.9	24.7	7.9	25.4
SP2011011	4/29/2011	1221	T	2	10:56	30	3.7	41.2122	-72.9116	9.8	24.4	8.3	25.7
SP2011012	4/29/2011	1021	M	2	12:19	30	3.6	41.1673	-72.9223	9.3	25.7	7.8	26.1

Table 2.6. Station information for LISTS May 2011.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
SP2011013	5/9/2011	1533	S	1	6:55	30	2.0	41.2550	-72.3368	9.3	25.7	9.2	26.7
SP2011014	5/9/2011	1737	T	1	8:50	30	3.1	41.2880	-72.1983	9.4	28.6	9.0	29.2
SP2011015	5/9/2011	1437	T	4	10:12	30	3.2	41.2432	-72.2126	9.8	25.3	8.5	29.6
SP2011016	5/9/2011	1336	T	4	11:21	30	3.8	41.2212	-72.2524	10.5	22.9	8.5	29.3
SP2011017	5/9/2011	0530	S	3	13:29	30	3.4	41.0930	-72.5090	11.3	26.2	9.2	27.0
SP2011018	5/9/2011	0728	S	3	14:39	19	2.0	41.1158	-72.6103	10.9	26.5	9.1	27.0
SP2011019	5/12/2011	1433	S	2	10:12	30	1.9	41.2470	-72.3516	9.9	26.3	9.6	27.2
SP2011020	5/12/2011	0931	S	4	11:54	30	2.2	41.1605	-72.4424	10.1	26.9	9.3	27.6
SP2011021	5/12/2011	0430	T	3	13:21	30	3.3	41.0862	-72.4913	11.7	26.3	9.8	26.7
SP2011022	5/12/2011	0126	T	3	14:48	30	3.7	41.0283	-72.6428	12.4	26.1	8.9	26.4
SP2011023	5/12/2011	0327	T	3	16:08	30	2.4	41.0526	-72.6793	12.9	25.7	8.7	26.4
SP2011024	5/12/2011	0629	S	4	17:38	30	1.9	41.0818	-72.6656	10.1	26.9	9.5	27.1
SP2011025	5/13/2011	0525	T	4	10:04	30	3.6	41.1013	-72.7053	13.4	25.6	9.1	26.4
SP2011026	5/13/2011	0424	M	4	11:34	30	2.8	41.0940	-72.7328	12.7	25.7	8.3	26.5
SP2011027	5/13/2011	0023	M	4	12:58	30	2.9	41.0306	-72.7902	13.2	25.6	7.9	26.9
SP2011028	5/13/2011	5823	S	1	14:16	30	3.2	40.9813	-72.8187	12.9	25.6	12.3	25.5
SP2011029	5/13/2011	0326	T	3	15:50	30	2.7	41.0560	-72.7206	12.9	25.6	8.2	26.6
SP2011030	5/16/2011	1328	T	2	7:49	30	4.2	41.2393	-72.5758	10.3	26.8	10.4	26.9
SP2011031	5/16/2011	0621	M	3	9:56	30	2.8	41.1428	-72.9240	12.5	25.6	9.3	26.2
SP2011032	5/16/2011	0120	M	4	11:25	30	2.9	41.0245	-72.9253	11.6	25.6	8.0	26.6
SP2011033	5/16/2011	5920	M	2	12:41	30	2.7	40.9948	-72.8938	11.2	25.7	8.4	26.3
SP2011034	5/16/2011	5918	M	3	13:55	30	2.7	40.9957	-72.9802	10.2	25.9	8.4	26.3
SP2011035	5/17/2011	1118	M	1	7:37	30	3.8	41.1908	-73.0229	12.8	25.6	12.8	25.6
SP2011036	5/17/2011	1120	T	2	9:51	30	3.5	41.1937	-72.9288	12.0	25.8	11.8	25.8
SP2011037	5/19/2011	0715	T	1	8:02	30	3.8	41.1281	-73.1235	13.7	15.1	12.5	25.1
SP2011038	5/19/2011	0210	T	2	15:36	30	2.8	41.0522	-73.3093	11.8	25.5	11.5	25.5
SP2011039	5/20/2011	0311	T	2	9:16	30	3.6	41.0575	-73.3030	13.4	23.2	11.5	25.5
SP2011040	5/20/2011	0211	T	2	10:28	30	2.5	41.0371	-73.3666	13.3	23.4	11.8	25.2
SP2011041	5/20/2011	5709	S	2	11:54	25	.	40.9508	-73.4068	12.5	25.2	12.2	25.2
SP2011042	5/20/2011	5811	M	3	13:22	30	2.7	40.9740	-73.3468	12.8	25.2	11.7	25.3
SP2011043	5/23/2011	0018	M	3	8:42	30	2.8	41.0115	-73.0073	11.9	25.5	9.3	26.1
SP2011044	5/23/2011	0017	M	4	9:44	24	2.8	41.0157	-73.0291	12.1	25.4	9.3	26.2
SP2011045	5/23/2011	0015	T	4	10:53	30	3.0	41.0075	-73.1231	12.5	25.3	9.5	26.0
SP2011046	5/23/2011	0012	M	4	12:14	30	2.7	41.0085	-73.2750	12.9	25.0	10.3	25.8
SP2011047	5/23/2011	0515	M	2	13:33	30	2.1	41.0822	-73.1860	12.8	25.0	11.8	25.6
SP2011048	5/24/2011	0518	M	3	8:14	30	3.5	41.0908	-73.0511	14.0	23.4	11.0	26.0
SP2011049	5/24/2011	0923	T	3	9:46	30	3.6	41.1443	-72.8425	12.5	26.0	11.4	26.1
SP2011050	5/24/2011	1123	M	2	11:05	30	3.2	41.1808	-72.8436	12.4	25.6	12.0	25.8
SP2011051	5/24/2011	1425	M	1	12:19	30	3.3	41.2382	-72.7278	13.0	24.3	12.5	25.1
SP2011052	5/24/2011	1428	T	1	13:53	30	2.7	41.2346	-72.6422	12.9	23.7	11.7	25.8

Table 2.7. Station information for LISTS June 2011.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
SP2011053	6/8/2011	0931	S	4	8:00	30	1.7	41.1525	-72.4403	17.0	26.2	14.3	28.4
SP2011054	6/8/2011	0429	T	3	9:34	30	2.6	41.0810	-72.5410	18.4	25.3	15.2	27.0
SP2011055	6/8/2011	5925	T	1	11:07	30	3.4	41.0010	-72.7115	18.5	25.2	16.1	25.3
SP2011056	6/8/2011	0222	M	4	12:46	30	2.7	41.0330	-72.8846	18.3	25.3	11.8	26.6
SP2011057	6/8/2011	0526	T	3	14:24	30	2.4	41.1108	-72.8082	19.0	25.0	14.0	26.6
SP2011058	6/9/2011	0730	S	4	8:24	30	1.8	41.1325	-72.4625	17.7	26.1	14.6	28.2
SP2011059	6/9/2011	0228	T	2	10:12	30	3.0	41.0428	-72.5612	19.8	25.1	15.5	26.9
SP2011060	6/9/2011	5924	M	3	11:48	30	3.2	41.0027	-72.7355	19.2	25.1	11.8	26.0
SP2011061	6/9/2011	5823	S	1	12:54	30	3.0	41.0228	-72.8561	19.1	25.0	18.5	25.1
SP2011062	6/9/2011	0628	S	3	14:49	30	2.3	41.1038	-72.6213	20.5	25.0	15.2	27.1
SP2011063	6/10/2011	1433	S	2	7:10	30	1.5	41.2462	-72.3541	15.7	27.7	15.1	28.9
SP2011064	6/10/2011	1840	T	1	9:25	30	3.2	41.3240	-72.0836	16.0	27.6	15.2	29.6
SP2011065	6/10/2011	1437	T	4	11:20	30	2.4	41.2445	-72.2098	15.4	28.3	14.5	29.6
SP2011066	6/10/2011	1434	S	1	12:38	30	3.3	41.2415	-72.3365	22.1	.	15.6	27.7
SP2011067	6/13/2011	0223	M	4	10:08	30	3.3	41.0403	-72.8438	15.2	25.7	12.4	26.7
SP2011068	6/13/2011	1026	T	4	11:44	30	3.8	41.1648	-72.7126	17.6	25.6	15.4	27.1
SP2011069	6/13/2011	1428	T	1	13:45	30	4.1	41.2350	-72.6415	17.8	26.2	16.2	27.1
SP2011070	6/14/2011	1029	S	3	7:50	30	3.7	41.1721	-72.5315	15.9	27.5	15.8	27.6
SP2011071	6/14/2011	1126	T	3	9:17	30	3.8	41.1968	-72.6616	16.8	26.7	16.0	27.2
SP2011072	6/14/2011	1225	T	2	10:31	30	3.2	41.2163	-72.8223	17.6	25.7	15.3	26.6
SP2011073	6/14/2011	0927	T	4	11:53	30	3.5	41.1553	-72.6720	17.2	26.5	15.3	27.0
SP2011074	6/16/2011	0511	M	2	8:56	30	3.6	41.1010	-73.2571	18.4	24.4	15.7	25.5
SP2011075	6/16/2011	0110	T	3	10:23	30	2.7	41.0228	-73.3726	17.9	25.2	13.1	25.7
SP2011076	6/16/2011	0111	M	3	11:32	20	2.7	41.0298	-73.3185	18.8	25.1	12.9	25.8
SP2011077	6/16/2011	0311	T	2	12:44	23	3.2	41.0475	-73.3539	18.8	24.9	16.5	25.3
SP2011078	6/16/2011	0615	M	2	14:07	30	3.4	41.0935	-73.1998	18.2	24.8	15.1	25.6
SP2011079	6/16/2011	1119	M	2	15:39	30	3.5	41.1690	-73.0368	20.7	25.2	16.8	25.6
SP2011080	6/17/2011	5714	T	3	9:05	17	2.8	40.9656	-73.1746	17.7	25.1	15.2	25.4
SP2011081	6/17/2011	5513	S	2	10:21	30	3.3	40.9276	-73.2360	17.1	25.0	15.6	25.3
SP2011082	6/17/2011	5614	T	2	11:34	30	3.3	40.9337	-73.2271	17.2	25.1	15.3	25.3
SP2011083	6/20/2011	1118	M	1	7:44	30	3.5	41.1797	-73.0553	19.3	25.3	17.2	25.6
SP2011084	6/20/2011	1320	M	1	9:11	30	3.4	41.2353	-72.9568	18.2	25.2	16.8	25.9
SP2011085	6/20/2011	0920	T	2	10:50	30	3.0	41.1537	-72.9796	19.8	25.3	14.6	26.3
SP2011086	6/20/2011	0719	M	3	12:12	20	2.8	41.1163	-73.0170	20.5	25.3	14.2	26.4
SP2011087	6/20/2011	0518	M	3	13:20	30	2.6	41.0885	-73.0526	19.9	25.3	14.0	26.6
SP2011088	6/21/2011	0320	M	4	8:30	30	2.9	41.0568	-72.9290	19.3	25.5	14.4	26.5
SP2011089	6/21/2011	0017	M	4	10:04	19	3.1	41.0170	-73.0273	18.7	25.0	13.5	26.5
SP2011090	6/21/2011	0015	T	4	11:14	30	2.6	41.0013	-73.1620	20.7	25.1	13.6	26.5
SP2011091	6/21/2011	5918	M	3	12:43	30	3.0	40.9857	-73.0353	20.0	24.9	14.8	26.0
SP2011092	6/21/2011	0319	M	4	13:56	30	2.5	41.0470	-73.0195	18.4	25.3	13.8	26.5

Table 2.8. Station information for LISTS September 2011.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
FA2011001	9/8/2011	0831	S	4	7:58	30	3.4	41.2313	-72.5015	20.8	26.7	21.1	27.7
FA2011002	9/8/2011	1428	T	1	10:14	30	2.9	41.2488	-72.5775	20.8	26.2	21.1	26.8
FA2011003	9/8/2011	1529	T	1	11:26	30	2.7	41.2480	-72.5692	21.0	25.7	21.1	26.6
FA2011004	9/8/2011	1127	T	3	12:40	30	2.4	41.1920	-72.6053	21.5	26.4	21.8	27.3
FA2011005	9/8/2011	1029	S	3	13:54	20	2.7	41.2173	-72.6673	22.1	27.4	22.0	27.5
FA2011006	9/9/2011	1433	S	2	7:11	30	2.1	41.3297	-72.3743	19.1	.	20.2	27.7
FA2011007	9/9/2011	1437	T	4	9:23	16	2.4	41.2332	-72.2636	20.3	26.5	20.0	29.2
FA2011008	9/9/2011	1738	T	2	10:49	30	2.1	41.2860	-72.1563	20.3	28.2	20.1	29.0
FA2011009	9/13/2011	0630	S	4	8:20	30	2.9	41.1703	-72.5731	22.0	27.3	22.1	27.4
FA2011010	9/13/2011	0129	S	2	9:59	30	3.7	41.0298	-72.5610	22.6	27.4	22.5	27.4
FA2011011	9/13/2011	5925	T	1	11:20	30	3.0	40.9997	-72.7120	22.5	27.1	22.6	27.1
FA2011012	9/13/2011	5823	S	1	12:37	30	3.7	40.9813	-72.8223	22.7	26.9	22.6	27.0
FA2011013	9/13/2011	0227	T	3	14:01	30	3.7	41.0353	-72.6613	23.6	27.1	22.4	27.4
FA2011014	9/14/2011	0828	S	3	8:33	30	3.2	41.1495	-72.5591	22.3	27.0	22.2	27.4
FA2011015	9/14/2011	5924	M	3	10:33	30	3.2	41.0035	-72.7325	22.8	26.5	22.3	27.2
FA2011016	9/14/2011	5824	S	1	11:58	30	3.4	40.9825	-72.7960	23.2	26.3	22.7	26.6
FA2011017	9/14/2011	0125	T	4	14:45	30	3.6	41.0093	-72.7483	24.5	26.2	22.3	27.2
FA2011018	9/14/2011	0426	T	3	16:05	30	3.7	41.0693	-72.6978	23.6	25.7	22.3	27.5
FA2011019	9/15/2011	0625	T	4	10:38	30	3.7	41.1077	-72.7133	22.7	25.9	22.2	27.5
FA2011020	9/15/2011	1025	T	3	12:09	30	3.4	41.1770	-72.7073	22.7	26.2	22.3	27.4
FA2011021	9/15/2011	0823	M	3	13:16	30	3.1	41.1501	-72.7973	22.8	26.1	22.1	27.4
FA2011022	9/15/2011	0722	M	3	14:47	30	2.6	41.1333	-72.8406	22.8	26.3	22.0	27.4
FA2011023	9/16/2011	0212	M	3	9:01	30	3.3	41.0450	-73.2373	22.0	26.3	22.0	27.0
FA2011024	9/16/2011	0110	T	3	10:33	27	3.3	41.0305	-73.3246	21.9	25.9	22.0	27.0
FA2011025	9/16/2011	5911	M	3	11:59	21	2.5	40.9905	-73.3310	22.2	25.5	22.2	26.0
FA2011026	9/16/2011	0012	M	4	13:35	30	2.9	41.0062	-73.2778	22.4	25.9	22.1	27.0
FA2011027	9/20/2011	0418	M	4	8:40	30	2.5	41.0785	-72.9771	20.9	26.4	21.5	27.0
FA2011028	9/20/2011	5613	T	2	11:06	30	3.1	40.9381	-73.2413	21.1	25.8	21.7	26.3
FA2011029	9/20/2011	0015	T	4	12:39	30	2.7	40.9987	-73.1765	21.0	25.8	21.9	26.9
FA2011030	9/21/2011	0920	T	2	8:15	30	2.8	41.1537	-72.9811	20.6	25.9	21.3	26.8
FA2011031	9/21/2011	0120	M	4	10:04	30	2.7	41.0281	-72.9072	21.1	26.5	21.8	27.5
FA2011032	9/21/2011	5920	M	2	11:24	30	3.1	40.9842	-72.9490	21.1	26.3	21.0	26.2
FA2011033	9/21/2011	0123	M	4	12:59	30	3.3	41.0362	-72.8013	21.7	26.6	21.9	27.4
FA2011034	9/21/2011	0121	M	4	14:23	30	3.4	41.0340	-72.8701	21.7	26.5	21.8	27.4
FA2011035	9/22/2011	1319	M	1	7:57	30	3.5	41.2098	-72.9971	20.7	25.1	20.7	25.8
FA2011036	9/22/2011	1121	M	2	10:26	30	2.7	41.1977	-72.8820	21.0	26.3	20.8	26.6
FA2011037	9/22/2011	0819	T	2	12:01	30	3.3	41.1380	-73.0176	21.3	26.0	21.3	26.6
FA2011038	9/22/2011	1020	T	2	13:58	30	3.1	41.1900	-72.9102	21.9	25.8	21.0	26.5
FA2011039	9/23/2011	1021	M	2	8:34	30	3.2	41.1610	-72.9353	21.6	25.8	21.0	26.7
FA2011040	9/23/2011	1425	M	1	10:35	30	3.2	41.2390	-72.7273	20.9	26.6	20.9	26.6

Table 2.9. Station information for LISTS October 2011.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
FA2011041	10/12/2011	1436	T	4	7:19	30	1.6	41.2350	-72.2896	18.5	27.5	18.6	29.4
FA2011042	10/12/2011	1740	T	2	9:26	30	2.8	41.2860	-72.0724	18.2	29.5	18.3	29.9
FA2011043	10/12/2011	1840	T	1	10:50	30	3.4	41.3238	-72.0853	18.2	25.5	18.3	29.5
FA2011044	10/13/2011	1427	T	1	7:55	30	4.2	41.2500	-72.5916	18.4	26.9	18.4	26.9
FA2011045	10/13/2011	1425	M	1	9:07	30	3.5	41.2395	-72.7266	18.9	26.6	18.8	26.5
FA2011046	10/13/2011	1423	T	1	10:25	30	3.7	41.2388	-72.8115	18.9	26.4	18.9	26.4
FA2011047	10/13/2011	1121	M	2	11:44	30	3.3	41.1937	-72.8903	19.5	26.6	19.5	26.5
FA2011048	10/13/2011	1029	S	3	14:07	30	3.3	41.1605	-72.5970	19.0	27.4	19.0	27.6
FA2011049	10/14/2011	0731	S	4	8:06	19	3.1	41.1353	-72.4688	19.0	27.2	18.9	27.8
FA2011050	10/14/2011	0227	T	3	9:29	30	3.6	41.0460	-72.6000	19.6	26.7	19.3	27.2
FA2011051	10/14/2011	5825	S	1	10:43	30	3.1	40.9998	-72.7136	19.5	26.6	19.5	26.6
FA2011052	10/14/2011	5823	S	1	12:02	30	3.2	40.9808	-72.8243	19.6	26.5	19.6	26.6
FA2011053	10/14/2011	0526	T	3	13:38	30	3.3	41.0876	-72.6971	19.5	26.9	19.4	27.0
FA2011054	10/18/2011	0628	S	3	8:47	30	2.5	41.1150	-72.5668	18.2	26.6	18.2	27.9
FA2011055	10/18/2011	5924	M	3	10:33	30	3.3	41.0015	-72.7335	18.3	26.5	18.5	26.8
FA2011056	10/18/2011	0024	M	3	11:41	30	3.4	41.0056	-72.7469	18.3	26.5	18.5	26.8
FA2011057	10/18/2011	0125	T	4	13:06	30	2.8	41.0070	-72.7558	18.4	26.5	18.6	26.8
FA2011058	10/18/2011	0830	S	4	15:24	30	2.9	41.1363	-72.5435	18.1	27.1	18.1	28.8
FA2011059	10/24/2011	0826	T	3	8:16	30	3.4	41.1470	-72.6228	16.8	26.5	17.3	27.6
FA2011060	10/24/2011	0424	M	4	9:39	30	3.1	41.0768	-72.7605	17.0	26.4	17.4	27.0
FA2011061	10/24/2011	0123	M	4	10:59	30	2.5	41.0375	-72.7932	17.0	26.6	17.5	27.0
FA2011062	10/24/2011	5921	M	3	12:08	30	2.5	41.0005	-72.8571	17.8	26.6	17.6	26.6
FA2011063	10/24/2011	5920	M	2	13:24	30	2.5	40.9940	-72.8951	17.6	26.4	17.7	26.5
FA2011064	10/26/2011	0015	T	4	8:48	30	3.5	41.0083	-73.1258	17.3	26.3	17.6	26.6
FA2011065	10/26/2011	5714	T	3	10:20	28	3.1	40.9653	-73.1753	16.8	25.9	16.8	25.9
FA2011066	10/26/2011	5614	T	2	11:33	30	3.1	40.9435	-73.1716	17.0	26.0	16.9	26.0
FA2011067	10/26/2011	5612	T	2	12:56	30	3.6	40.9448	-73.2628	17.1	26.0	17.1	26.0
FA2011068	10/26/2011	5513	S	2	14:18	30	3.0	40.9263	-73.2513	16.8	25.9	16.8	25.9
FA2011069	10/27/2011	0311	T	2	9:09	30	2.5	41.0560	-73.3060	17.2	26.3	17.1	26.3
FA2011070	10/27/2011	5709	S	2	11:16	30	2.7	40.9502	-73.4059	16.8	25.6	16.8	25.6
FA2011071	10/28/2011	5911	M	3	9:29	30	2.3	40.9743	-73.3423	16.5	25.9	16.4	25.9
FA2011072	10/28/2011	5813	M	3	10:42	30	2.5	40.9680	-73.2646	16.6	26.0	16.6	26.1
FA2011073	10/28/2011	0418	M	4	12:40	30	3.0	41.0656	-73.0421	17.0	26.6	17.0	26.7
FA2011074	10/28/2011	0220	M	4	13:49	30	3.2	41.0371	-72.9633	17.0	26.8	16.9	26.7
FA2011075	10/31/2011	0517	T	3	8:18	30	3.6	41.0958	-73.0795	14.7	25.8	15.1	26.1
FA2011076	10/31/2011	0521	M	4	9:41	30	3.0	41.0855	-72.9185	15.9	26.8	15.9	26.7
FA2011077	10/31/2011	1124	T	2	11:26	30	2.7	41.1896	-72.8041	14.6	26.4	15.3	26.6
FA2011078	10/31/2011	0921	M	2	13:18	30	3.7	41.1747	-72.8815	15.4	26.6	15.2	26.6
FA2011079	10/31/2011	1319	M	1	14:43	30	3.4	41.2317	-72.9633	12.7	25.1	12.7	25.4
FA2011080	11/1/2011	1026	T	4	9:05	30	3.0	41.1645	-72.7115	15.1	26.9	15.1	26.9

Table 2.10. Samples with non-standard tow durations and reasons for incomplete tows, spring and fall 2011.
Standard LISTS tows begin with SP(spring) or FA (fall).

Sample	Date	Site	Bottom Type	Depth Interval	Time	Duration	Reason	Comments
APRIL								
SP2011010	4/29/2011	1322	T	1	9:24	23	hangs	Part I & II: hangs on bottom, no damage to net
MAY								
SP2011018	5/09/2011	0728	T	3	14:39	19	pots	speed dropped; pots on both doors
SP2011041	5/20/2011	5709	S	2	11:54	25	debris	speed dropped; frequently snag ghost gear or other debris here
SP2011044	5/23/2011	0017	M	4	9:44	24	pots	speed dropped; had string of pots on port wing, look old; one single old pot in net (one end of pot eroded away)
JUNE								
SP2011076	6/16/2011	0111	M	3	11:32	20	pots	speed dropped; strings on both sides; three old pots in net
SP2011077	6/16/2011	0311	T	2	12:44	23		speed dropped
SP2011080	6/17/2011	5714	T	3	9:05	17	pots	speed dropped: picked up very old string of pots; only one pot in mouth of net; had to mend ripped port wing of net
SP2011086	6/20/2011	0719	M	3	12:12	20	pots	speed dropped; string of pots on port side; flipped it off the door; no buoy
SP2011089	6/21/2011	0017	T	4	12:44	19	pots	speed dropped; pot warp dropped off port door & chain during haul-back; lots of tension on line
SEPT								
FA2011005	09/08/2011	1029	S	3	13:54	20	speed drop	speed dropped but no problem with net on haul-back
FA2011007	09/09/2011	1437	T	4	09:23	16	pots	speed dropped; pot warp visible on cable during haul-back but then fell off; no pots in net but large rip in starboard wing; had to change nets
FA2011024	09/16/2011	0110	T	3	10:33	27		
FA2011025	09/16/2011	5911	M	3	11:59	21	pots	speed dropped old pot gear in port wing
OCT								
FA2011049	10/14/2011	0731	S	4	08:06	19	pots	pot gear in front of us, ran out of room to tow; started to pick up a buoy line in mouth of net during haul-back but it flipped out
FA2011065	10/26/2011	5714	T	3	10:20	28	debris	woody debris in net

Table 2.11. Data requests by month, 2011.

MONTH	REQUEST		ORGANIZATION OR PURPOSE
January			
	GIS data layers of 1x2 nm grid in LIS, FIS, major harbors & rivers		NOAA
	Past 10 years of LIS Trawl Survey data - incl in report		Harvard grad student
	electronicn copy of F54r report for Job 2.1 & 2.2		TNC
	tautog age data and indices at age, 2004-2010		ASMFC
	LISTS summer flounder catch-at-length & age matrices		NY DEC
	LISTS tow, count, length data for greater Niantic Bay area		private consultant
	LISTS horseshoe crab indices		CT DEEP staff
February			
	stats on number of fish species in LIS		CT DEEP staff
	LISTS striper & lobster indices		CT DEEP staff
	LISTS black sea bass indices & lengths		CT DEEP staff
	LISTS shad & herring length frequencies		CT DEEP staff
	LISTS herring counts, lengths & indices		NMFS staff
	LISTS indices 1984-2010		EPA staff
March			
	maps of LISTS lobster distributions for three time periods		CT DEEP staff
	LISTS count indices (1984-2010)		Dominion staff
	LISTS winter flounder catch-at-age matrices		NMFS staff & CT DEEP staff
	LISTS winter flounder catch-at-age matrices		Dominion staff
	LISTS tow, count & length time-series		UNH grad student
April			
	LISTS towpaths (1995-2007)		TNC LISEA
	list of species in LIS		CT DEEP staff
	LISTS winter flounder catch-at-age matrices		NMFS staff
May			
	LISTS sturgeon counts (1984-2010)		CT DEEP staff
June			
	LISTS summer flounder, scup, black sea bass indices		CT DEEP staff
	LISTS starfish indices & distribution map		Brooklyn College professor
July			
	squid data and articlefor Wracklines newsletter		CT Sea Grant
	LISTS tow information and horseshoe crab catch		Uconn grad student
August			
	Smithtown catch		NYDEC
	black sea bass indices		CT DEEP staff
	menhaden indices		ASMFC staff
Ocotber			
	rock gunnel indices		Boudin College grad student
November			
	LISTS indices of abundance		environmental consultant
	tautog catch, catch at age matrix and site info		UConn student
December			
	LISTS catch data (1984-2010)		UNH grad student

Table 2.12. Sample requests by month, 2011.

MONTH	REQUEST		ORGANIZATION OR PURPOSE
April			
	stripers for fillet length vs whole length		CT DEP staff
	silver hake		NY SUNY Purchase
May			
	Loligo paeleii (longfin squid) for dissection class		Illing Middle School
	squid & various finfish specimens for dissection class		Putnam High School
	silver hake		NY SUNY Purchase
	stripers for fillet length vs whole length		CT DEP staff
June			
	misc critters for touch tank		CT DEEP staff
	misc critters for education/outreach		Maritime Education Network
	silver hake		NY SUNY Purchase
	stripers for fillet length vs whole length		CT DEP staff
	Environthon teachers		Envirothon
September			
	summer flounder (otoliths)		Old Dominion graduate student
	stripers for fillet length vs whole length		CT DEP staff
Ocotber			
	summer flounder (otoliths)		Old Dominion graduate student
	stripers for fillet length vs whole length		CT DEP staff

Table 2.13. List of finfish species observed in 2011.

Sixty - five finfish species were observed in 2011. (Bold type indicates new species). Since 1984, one hundred two species of finfish have been identified in LISTS (see Appendix 2.1 for the full list of species).

Common Name	Scientific Name	Common Name	Scientific Name
anchovy, bay	Anchoa mitchilli	menhaden, Atlantic	Brevoortia tyrannus
anchovy, striped	Anchoa hepsetus	moonfish	Selene setapinnis
black sea bass	Centropristes striata	**mullet, white**	**Mugil curema**
blue runner	Caranx crysos	ocean pout	Macrozoarces americanus
bluefish	Pomatomus saltatrix	**perch, silver**	**Bairdiella chrysoura**
burrfish, striped	Chilomycterus schoepfi	perch, white	Morone americana
butterfish	Peprilus triacanthus	pipefish, northern	Syngnathus fuscus
cod, Atlantic	Gadus morhua	pollock	Pollachius virens
croaker, Atlantic	Micropogonias undulatus	puffer, northern	Sphoeroides maculatus
cunner	Tautogolabrus adspersus	rockling, fourbeard	Enchelyopus cimbrius
cusk-eel, striped	Ophidion marginatum	sand lance, American	Ammodytes americanus
dogfish, smooth	Mustelus canis	scad, rough	Trachurus lathami
dogfish, spiny	Squalus acanthius	scad, round	Decapterus punctatus
eel, conger	Conger oceanicus	sculpin, longhorn	Myoxocephalus octodecemspin
flounder, American plaice	Hippoglossoides platessoide	scup	Stenotomus chrysops
flounder, fourspot	Paralichthys oblongus	sea raven	Hemitripterus americanus
flounder, smallmouth	Etropus microstomus	searobin, northern	Prionotus carolinus
flounder, summer	Paralichthys dentatus	searobin, striped	Prionotus evolans
flounder, windowpane	Scophthalmus aquosus	sennet, northern	Sphyraena borealis
flounder, winter	Pseudopleuronectes american	shad, American	Alosa sapidissima
flounder, yellowtail	Pleuronectes ferrugineus	shad, hickory	Alosa mediocris
grubby	Myoxocephalus aeneus	skate, clearnose	Raja eglanteria
gunnel, rock	Pholis gunnellus	skate, little	Leucoraja erinacea
hake, red	Urophycis chuss	skate, winter	Leucoraja ocellata
hake, silver	Merluccius bilinearis	spot	Leiostomus xanthurus
hake, spotted	Urophycis regia	stingray, roughtail	Dasyatis centroura
herring, Atlantic	Clupea harengus	striped bass	Morone saxatilis
herring, alewife	Alosa pseudoharengus	sturgeon, Atlantic	Acipenser oxyrinchus
herring, blueback	Alosa aestivalis	tautog	Tautoga onitis
hogchoker	Trinectes maculatus	toadfish, oyster	Opsanus tau
jack, crevalle	Caranx hippos	tomcod, Atlantic	Microgadus tomcod
kingfish, northern	Menticirrhus saxatilis	weakfish	Cynoscion regalis
lizardfish, inshore	Synodus foetens		

Names taken from: Common and Scientific Names of Fishes from the United States, Canada and Mexico, American Fisheries Society, Sixth ed., 2004.

Table 2.14. List of invertebrates observed in 2011.

In 2011, forty - one invertebrate" species" were identified. In most cases, invertebrates are identified to species; however, species that are very similar are identified to genus, and in difficult cases, to a higher taxon.

Common Name	Scientific Name	Common Name	Scientific Name
Tubularia hydroids	Tubularia, spp.	mussel, blue	Mytilus edulis
anemones	anemomes spp.	northern moon snail	Lunatia heros
arks	Noetia-Anadara spp.	oyster, common	Crassostrea virginica
bryozoan, bushy	Phylum Bryozoa	polychaetes	Class polychfeta
bryozoan, rubbery	Alcyonidium verrilli	sea grape	Molgula spp.
clam, common razer	Ensis directus	sea urchin, purple	Arbacia punctulata
clam, hard clams	Artica-Mercinaria-Pitar sp.	shrimp, coastal mud	Upogebia affinis
clam, surf	Spisula solidissima	shrimp, ghost	Gilvossius setimanus
coral, star	Astrangia poculata	shrimp, mantis	Squilla empusa
crab, mud	Family Xanthidae	shrimp, northern red	Pandalus montagui
crab, blue	Callinectes sapidus	shrimp, sand	Crangon septemspinosa
crab, flat claw hermit	Pagurus pollicaris	slipper shell, common	Crepidula fornicata
crab, horseshoe	Limulus polyphemus	sponge spp.	sponge spp.
crab, lady	Ovalipes ocellatus	sponge, boring	Cliona celate
crab, rock	Cancer irroratus	sponge, red bearded	Microciona prolifera
crab, spider	Libinia emarginata	squid, long-finned	Loligo pealeii
hydroid spp.	hydroid spp.	starfish spp.	Asteriid spp.
jelly, northern comb	Bolinopsis infundibulum	tunicates, misc	misc. class ascidiacea
jelly, water	Rhacostoma atlanticum	whelk, channeled	Busycotypus canaliculatus
jellyfish, lion's mane	Cyanea capillata	whelk, knobbed	Busycon carica
lobster, American	Homarus americanus		

Names taken from: A Field Guide to the Atlantic Seashore, Peterson Field Guide Series, 1978 (Gosner, 1978).

Table 2.15. Total number and weight (kg) of finfish and invertebrates caught in 2011.

Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=172.

species	count	%	weight	%
butterfish	42,141	36.7	1,600.8	9.9
scup	34,458	30.0	6,759.0	41.7
American sand lance	9,535	8.3	7.5	0.0
bay anchovy	4,693	4.1	10.5	0.1
winter flounder	3,092	2.7	613.8	3.8
windowpane flounder	2,831	2.5	395.9	2.4
bluefish	2,765	2.4	584.7	3.6
weakfish	2,583	2.3	192.6	1.2
striped searobin	1,630	1.4	558.7	3.4
Atlantic herring	1,482	1.3	199.4	1.2
fourspot flounder	1,400	1.2	224.2	1.4
summer flounder	1,051	0.9	713.0	4.4
silver hake	948	0.8	40.3	0.2
northern searobin	803	0.7	85.5	0.5
spotted hake	725	0.6	76.8	0.5
little skate	674	0.6	359.4	2.2
moonfish	640	0.6	6.3	0
smooth dogfish	613	0.5	2,031.7	12.5
alewife	512	0.4	29.8	0.2
red hake	278	0.2	25.1	0.2
American shad	271	0.2	17.5	0.1
striped bass	243	0.2	721.9	4.5
Atlantic menhaden	181	0.2	69.8	0.4
rough scad	150	0.1	6.8	0
hogchoker	147	0.1	16.8	0.1
Atlantic cod	109	0.1	9.2	0.1
tautog	106	0.1	151.7	0.9
black sea bass	91	0.1	54.2	0.3
blueback herring	72	0.1	3.2	0
smallmouth flounder	67	0.1	3.5	0
spiny dogfish	58	0.1	203.5	1.3
clearnose skate	56	0	109.8	0.7
inshore lizardfish	43	0	4.6	0
fourbeard rockling	43	0	4.0	0
winter skate	37	0	101.2	0.6
northern kingfish	34	0	3.7	0
ocean pout	27	0	4.5	0
blue runner	24	0	1.7	0
cunner	14	0	1.9	0
northern puffer	9	0	0.9	0
longhorn sculpin	9	0	2.0	0
hickory shad	8	0	1.5	0
Atlantic sturgeon	5	0	181.9	1.1
pollock	5	0	0.5	0
spot	5	0	0.7	0
crevalle jack	4	0	0.4	0
grubby	4	0	0.1	0
northern pipefish	4	0	0.3	0
rock gunnel	4	0	0.2	0
conger eel	3	0	1.1	0
sea raven	3	0	0.9	0
striped cusk-eel	2	0	0.2	0
Atlantic tomcod	2	0	0.2	0
American plaice	1	0	0.1	0
Atlantic croaker	1	0	0.2	0
northern sennet	1	0	0.1	0
round scad	1	0	0.1	0
roughtail stingray	1	0	13.0	0.1

species	count	%	weight	%
striped burrfish	1	0	0.5	0
striped anchovy	1	0	0.1	0
silver perch	1	0	0.1	0
oyster toadfish	1	0	0.2	0
white perch	1	0	0.1	0
white mullet	1	0	0.1	0
yellowtail flounder	1	0	0.3	0
Total	**114,706**		**16,210.3**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
horseshoe crab	257	1.7	505.2	33.5
long-finned squid	13,020	86.4	370.7	24.6
spider crab	.	.	151.8	10.1
lady crab	.	.	132.4	8.8
American lobster	230	1.5	52.0	3.4
rock crab	.	.	45.5	3.0
hydroid spp.	.	.	30.5	2.0
mantis shrimp	971	6.4	29.6	2.0
bushy bryozoan	.	.	24.9	1.7
knobbed whelk	62	0.4	23.8	1.6
flat claw hermit crab	.	.	22.1	1.5
channeled whelk	99	0.7	19.0	1.3
starfish spp.	.	.	14.4	1.0
blue crab	69	0.5	12.4	0.8
lion's mane jellyfish	345	2.3	11.3	0.7
mixed sponge species	.	.	11.0	0.7
blue mussel	1	0	6.7	0.4
northern moon snail	.	.	5.6	0.4
boring sponge	.	.	5.5	0.4
hard clams	.	.	5.3	0.4
common slipper shell	.	.	5.2	0.3
sand shrimp	.	.	4.5	0.3
Tubularia, spp.	.	.	3.5	0.2
mud crabs	.	.	2.6	0.2
rubbery bryzoan	.	.	1.7	0.1
common oyster	1	0	1.6	0.1
sea grape	.	.	1.5	0.1
arks	.	.	1.4	0.1
surf clam	7	0	1.0	0.1
purple sea urchin	3	0	0.6	0
red bearded sponge	.	.	0.3	0
northern comb jelly	.	.	0.3	0
anemones	6	0	0.2	0
star coral	.	.	0.2	0
coastal mud shrimp	1	0	0.1	0
common razor clam	1	0	0.1	0
ghost shrimp	1	0	0.1	0
northern red shrimp	1	0	0.1	0
polychaetes	.	.	0.1	0
tunicates, misc	.	.	0.1	0
water jelly	1	0	0.1	0
Total	**15,076**		**1,505.0**	

Note: nc= not counted

Table 2.16. Total counts and weight (kg) of finfish taken in the spring and fall sampling periods, 2011.
Species are listed in order of descending count.. Young-of-year bay anchovy, striped anchovy, Atlantic herring and American sand lance are not included. Number of tows (sample sizes): Spring = 92 and Fall=80.

Spring					Fall				
species	**count**	**%**	**weight**	**%**	**species**	**count**	**%**	**weight**	**%**
butterfish	10,647	23.6	856.3	9.3	butterfish	31,494	45.3	744.5	10.7
scup	10,439	23.1	3,748.1	40.6	scup	24,019	34.5	3,010.9	43.1
American sand lance	9,535	21.1	7.5	0.1	bay anchovy	3,524	5.1	4.7	0.1
winter flounder	2,880	6.4	580.2	6.3	bluefish	2,737	3.9	537.8	7.7
windowpane flounder	1,971	4.4	319.0	3.5	weakfish	2,567	3.7	187.0	2.7
Atlantic herring	1,478	3.3	199.0	2.2	windowpane flounder	859	1.2	76.9	1.1
fourspot flounder	1,184	2.6	214.3	2.3	striped searobin	710	1.0	159.9	2.3
bay anchovy	1,169	2.6	5.8	0.1	moonfish	640	0.9	6.3	0.1
striped searobin	919	2.0	398.8	4.3	spotted hake	334	0.5	52.5	0.8
silver hake	852	1.9	36.7	0.4	little skate	333	0.5	181.1	2.6
summer flounder	759	1.7	511.3	5.5	summer flounder	293	0.4	201.7	2.9
northern searobin	628	1.4	75.3	0.8	smooth dogfish	240	0.3	1,235.8	17.7
spotted hake	391	0.9	24.3	0.3	fourspot flounder	215	0.3	9.9	0.1
smooth dogfish	373	0.8	795.9	8.6	winter flounder	212	0.3	33.6	0.5
alewife	364	0.8	22.1	0.2	northern searobin	175	0.3	10.2	0.1
little skate	341	0.8	178.3	1.9	rough scad	149	0.2	6.7	0.1
striped bass	166	0.4	562.2	6.1	alewife	148	0.2	7.7	0.1
red hake	164	0.4	10.8	0.1	Atlantic menhaden	138	0.2	51.1	0.7
American shad	162	0.4	7.8	0.1	red hake	114	0.2	14.3	0.2
Atlantic cod	109	0.2	9.2	0.1	American shad	109	0.2	9.7	0.1
tautog	95	0.2	144.4	1.6	hogchoker	97	0.1	10.4	0.1
spiny dogfish	57	0.1	201.7	2.2	silver hake	96	0.1	3.6	0.1
hogchoker	50	0.1	6.4	0.1	striped bass	77	0.1	159.7	2.3
black sea bass	48	0.1	32.0	0.3	black sea bass	43	0.1	22.2	0.3
blueback herring	47	0.1	2.1	0	clearnose skate	43	0.1	86.5	1.2
Atlantic menhaden	43	0.1	18.7	0.2	inshore lizardfish	43	0.1	4.6	0.1
fourbeard rockling	40	0.1	3.7	0	smallmouth flounder	39	0.1	2.3	0
winter skate	30	0.1	90.7	1.0	northern kingfish	34	0	3.7	0.1
bluefish	28	0.1	46.9	0.5	blueback herring	25	0	1.1	0
smallmouth flounder	28	0.1	1.2	0	blue runner	24	0	1.7	0
ocean pout	27	0.1	4.5	0	tautog	11	0	7.3	0.1
weakfish	16	0	5.6	0.1	northern puffer	9	0	0.9	0
clearnose skate	13	0	23.3	0.3	hickory shad	7	0	1.4	0
cunner	12	0	1.7	0	winter skate	7	0	10.5	0.2
longhorn sculpin	9	0	2.0	0	spot	5	0	0.7	0
pollock	5	0	0.5	0	Atlantic herring	4	0	0.4	0
grubby	4	0	0.1	0	crevalle jack	4	0	0.4	0
rock gunnel	4	0	0.2	0	northern pipefish	3	0	0.2	0
Atlantic sturgeon	3	0	80.9	0.9	fourbeard rockling	3	0	0.3	0
sea raven	3	0	0.9	0	Atlantic sturgeon	2	0	101.0	1.4
Atlantic tomcod	2	0	0.2	0	conger eel	2	0	0.6	0
American plaice	1	0	0.1	0	cunner	2	0	0.2	0
conger eel	1	0	0.5	0	northern sennet	1	0	0.1	0
Atlantic croaker	1	0	0.2	0	round scad	1	0	0.1	0
hickory shad	1	0	0.1	0	roughtail stingray	1	0	13.0	0.2
northern pipefish	1	0	0.1	0	striped burrfish	1	0	0.5	0
rough scad	1	0	0.1	0	striped cusk-eel	1	0	0.1	0
striped cusk-eel	1	0	0.1	0	spiny dogfish	1	0	1.8	0
oyster toadfish	1	0	0.2	0	striped anchovy	1	0	0.1	0
white perch	1	0	0.1	0	silver perch	1	0	0.1	0
yellowtail flounder	1	0	0.3	0	white mullet	1	0	0.1	0
Total	**45,105**		**9,232.4**		**Total**	**69,599**		**6,977.9**	

Table 2.17. Total catch of invertebrates taken in the spring and fall sampling periods, 2011.
Species are ranked by total weight (kg). Number of tows (sample sizes): Spring = 92 and Fall=80.

	Spring			
species	**count**	**%**	**weight**	**%**
horseshoe crab	105	5.4	209.3	31.8
spider crab	.	.	123.7	18.8
long-finned squid	1,047	54.1	86.6	13.1
American lobster	168	8.7	38.8	5.9
rock crab	.	.	35.7	5.4
hydroid spp.	.	.	24.2	3.7
bushy bryozoan	.	.	19.2	2.9
lady crab	.	.	19.1	2.9
starfish spp.	.	.	11.8	1.8
channeled whelk	68	3.5	11.2	1.7
mixed sponge species	.	.	11.0	1.7
flat claw hermit crab	.	.	10.5	1.6
lion's mane jellyfish	343	17.7	10.3	1.6
mantis shrimp	155	8.0	7.3	1.1
northern moon snail	.	.	5.5	0.8
hard clams	.	.	5.3	0.8
knobbed whelk	16	0.8	5.1	0.8
sand shrimp	.	.	4.4	0.7
blue crab	21	1.1	3.2	0.5
common slipper shell	.	.	2.3	0.3
blue mussel	1	0.1	2.1	0.3
mud crabs	.	.	1.8	0.3
rubbery bryzoan	.	.	1.7	0.3
common oyster	.	.	1.5	0.2
Tubularia, spp.	.	.	1.3	0.2
arks	.	.	0.8	0.1
sea grape	.	.	0.7	0.1
surf clam	4	0.2	0.5	0.1
boring sponge	.	.	0.4	0.1
northern comb jelly	.	.	0.3	0
purple sea urchin	3	0.2	0.3	0
red bearded sponge	.	.	0.2	0
star coral	.	.	0.2	0
anemones	1	0.1	0.1	0
common razor clam	1	0.1	0.1	0
ghost shrimp	1	0.1	0.1	0
northern red shrimp	1	0.1	0.1	0
tunicates, misc	.	.	0.1	0
water jelly	1	0.1	0.1	0
Total	**1,936**		**656.9**	

Note: nc= not counted

	Fall			
species	**count**	**%**	**weight**	**%**
horseshoe crab	152	1.2	295.9	34.8
long-finned squid	11,973	91.1	284.1	33.5
lady crab	.	.	113.3	13.3
spider crab	.	.	28.1	3.3
mantis shrimp	816	6.2	22.3	2.6
knobbed whelk	46	0.4	18.7	2.2
American lobster	62	0.5	13.2	1.6
flat claw hermit crab	.	.	11.6	1.4
rock crab	.	.	9.8	1.2
blue crab	48	0.4	9.2	1.1
channeled whelk	31	0.2	7.8	0.9
hydroid spp.	.	.	6.3	0.7
bushy bryozoan	.	.	5.7	0.7
boring sponge	.	.	5.1	0.6
blue mussel	.	.	4.6	0.5
common slipper shell	.	.	2.9	0.3
starfish spp.	.	.	2.6	0.3
Tubularia, spp.	.	.	2.2	0.3
lion's mane jellyfish	3	0	1.0	0.1
sea grape	.	.	0.8	0.1
mud crabs	.	.	0.8	0.1
arks	.	.	0.6	0.1
surf clam	3	0	0.5	0.1
purple sea urchin	.	.	0.3	0
anemones	5	0	0.1	0
red bearded sponge	.	.	0.1	0
coastal mud shrimp	1	0	0.1	0
sand shrimp	.	.	0.1	0
northern moon snail	.	.	0.1	0
common oyster	1	0	0.1	0
polychaetes	.	.	0.1	0
Total	**13,141**		**848.1**	

Table 2.18. Spring indices of abundance for selected species, 1984-2011.

The geometric mean count per tow was calculated for 38 finfish and 2 invertebrates using April-June data. An asterisk next to the species name and time series mean, indicates that the spring index is a better estimate than the fall index (Simpson et al. 1991). Two asterisks indicate that both the spring and the fall indices provide good estimates.

	Spring																												84-10
Species	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Mean**
alewife *	0.43	0.10	0.66	1.00	0.47	0.72	0.54	0.39	0.39	0.84	1.83	0.96	2.18	1.44	1.11	1.89	1.53	0.75	0.95	1.14	1.86	1.30	0.78	1.62	1.32	1.04	1.29	0.94	1.06
black sea bass *	0.16	0.27	0.12	0.05	0.04	0.08	0.10	0.07	0.03	0.07	0.12	0.07	0.11	0.10	0.04	0.08	0.22	0.25	0.67	0.21	0.22	0.07	0.05	0.26	0.22	0.32	0.28	0.27	0.16
bluefish	0.00	0.02	0.19	0.07	0.11	0.07	0.09	0.52	0.31	0.05	0.07	0.03	0.07	0.18	0.12	0.24	0.08	0.07	0.30	0.16	0.11	0.11	0.22	0.16	0.08	0.24	0.01	0.17	
butterfish	8.92	0.62	2.38	0.25	0.46	0.80	1.60	2.17	2.60	0.48	1.71	1.06	3.22	6.16	6.51	1.90	3.35	2.94	7.09	3.17	2.10	2.27	18.67	3.48	4.64	9.44	1.99	15.64	
cunner *	1.28	0.29	0.28	0.22	0.16	0.29	0.55	0.25	0.11	0.20	0.07	0.16	0.07	0.15	0.18	0.18	0.17	0.20	0.25	0.11	0.07	0.08	0.06	0.05	0.10	0.05	0.08	0.08	0.21
dogfish, smooth	0.39	0.46	0.45	0.21	0.49	0.48	0.34	0.46	0.56	0.26	0.60	0.33	0.44	0.24	0.47	0.54	0.53	0.55	1.19	0.63	0.53	0.44	1.33	0.64	0.87	1.05	0.09	1.51	
dogfish, spiny *	0.00	0.15	0.14	0.07	0.12	0.18	0.19	0.06	0.04	0.01	0.06	0.00	0.00	0.01	0.01	0.01	0.00	0.04	0.02	0.03	0.03	0.03	0.09	0.12	0.07	0.43	0.03	0.19	0.07
flounder, fourspot *	18.18	10.55	3.15	2.38	4.62	4.14	6.53	8.46	9.33	2.37	2.59	5.00	4.82	7.54	4.34	3.53	4.57	3.83	4.82	2.78	2.56	1.14	1.86	3.37	2.94	1.71	1.52	4.09	4.76
flounder, summer	0.63	0.44	0.95	1.06	0.50	0.10	0.35	0.64	0.55	0.51	0.86	0.28	0.96	1.00	1.30	1.44	1.79	1.75	3.19	3.42	1.84	0.80	0.61	2.51	1.61	1.93	2.69	3.85	
flounder, windowpane *	172.27	119.82	67.82	40.33	66.02	101.71	39.74	30.87	13.17	24.71	23.54	10.69	37.47	30.43	24.27	14.19	8.11	9.04	5.44	4.90	5.96	2.29	2.98	15.65	10.11	7.08	11.40	9.39	33.33
flounder, winter *	111.96	66.81	61.50	67.92	100.96	135.23	170.12	118.95	54.31	53.34	74.35	48.11	93.05	57.41	59.36	32.80	33.67	46.40	25.49	21.22	16.45	17.47	7.50	20.58	22.34	18.98	20.88	16.68	57.67
hake, red *	15.04	3.02	4.67	3.84	3.64	13.12	4.75	4.35	4.83	6.00	0.89	4.12	1.49	1.41	6.28	7.21	4.01	2.64	5.11	1.18	1.37	1.06	1.30	3.85	3.37	1.48	3.27	0.60	4.20
hake, silver *	7.53	1.83	1.19	2.48	2.25	4.86	5.53	3.87	2.67	1.56	1.73	4.88	1.15	4.32	4.64	12.57	2.28	7.64	5.92	0.76	2.63	0.57	4.75	0.98	19.08	2.30	5.24	2.10	4.27
hake, spotted	0.00	0.00	0.02	0.01	0.22	0.01	0.02	0.22	0.08	0.07	0.02	0.21	0.31	0.25	0.26	1.11	2.68	1.52	2.05	1.18	0.65	0.37	1.47	1.04	3.15	0.65	1.89	1.84	
herring, Atlantic *	0.00	0.58	1.12	2.77	2.16	2.27	5.73	4.91	2.73	7.24	2.95	4.23	1.70	2.53	1.06	0.99	1.21	0.85	0.41	0.49	0.53	1.33	0.31	1.66	0.77	1.82	2.56	1.57	2.03
herring, blueback	5.42	0.30	0.34	0.14	0.03	0.05	0.08	0.11	0.20	0.08	0.55	0.29	0.28	0.25	0.15	0.02	0.37	0.19	0.15	0.27	0.46	0.33	0.13	0.29	0.21	0.43	0.37	0.14	
hogchoker	0.63	0.45	0.14	0.15	0.18	0.21	0.17	0.14	0.24	0.08	0.11	0.03	0.10	0.05	0.03	0.06	0.11	0.10	0.15	0.15	0.19	0.11	0.08	0.17	0.13	0.11	0.15	0.24	
kingfish, northern	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
lobster, American**	7.09	3.10	2.76	3.30	2.24	3.76	5.33	7.74	7.88	6.72	4.10	8.36	6.77	7.67	18.52	12.49	11.01	7.56	6.31	3.89	2.50	2.43	1.94	3.22	2.72	1.40	1.30	0.79	5.63
menhaden, Atlantic	0.09	0.11	0.18	0.39	0.17	0.14	0.10	0.03	0.14	0.07	0.05	0.11	0.02	0.02	0.00	0.01	0.03	0.00	0.13	0.01	0.02	0.01	0.04	0.13	0.05	0.07	0.05	0.11	
moonfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
ocean pout *	0.21	0.04	0.06	0.06	0.07	0.12	0.14	0.14	0.14	0.23	0.10	0.09	0.11	0.08	0.06	0.06	0.08	0.03	0.06	0.06	0.06	0.02	0.04	0.05	0.04	0.08	0.04	0.10	0.08
rockling, fourbeard*	2.87	0.37	0.43	0.56	0.61	0.88	0.82	0.58	0.80	0.59	0.27	0.58	0.33	0.60	0.47	0.66	0.55	0.57	0.37	0.36	0.48	0.35	0.09	0.35	0.26	0.18	0.17	0.19	0.56
scad, rough	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	
sculpin, longhorn *	0.20	0.33	0.18	0.15	0.15	0.24	0.65	0.39	0.12	0.06	0.04	0.03	0.04	0.02	0.01	0.01	0.06	0.02	0.02	0.01	0.03	0.00	0.00	0.02	0.01	0.01	0.01	0.04	0.10
scup	2.80	5.65	3.40	1.17	1.11	2.77	2.25	3.09	1.75	1.32	1.88	5.24	3.25	3.23	4.25	2.22	28.46	7.20	50.42	4.84	8.12	3.48	59.05	10.00	19.87	21.92	6.88	22.34	
sea raven*	0.36	0.37	0.29	0.37	0.17	0.11	0.19	0.09	0.03	0.01	0.01	0.01	0.01	0.01	0.10	0.04	0.08	0.04	0.06	0.01	0.04	0.02	0.00	0.03	0.00	0.02	0.05	0.02	0.09
searobin, northern *	6.48	14.38	0.82	0.71	1.13	0.85	0.62	1.36	1.18	1.26	1.21	1.07	1.26	1.73	0.72	1.03	2.66	1.55	2.67	1.16	0.80	0.32	1.19	0.82	1.32	1.73	1.52	1.16	1.91
searobin, striped	1.30	1.78	1.33	0.60	0.57	0.66	0.71	1.55	1.52	0.46	0.93	1.28	0.82	0.71	1.48	1.82	3.69	2.36	3.83	1.85	1.40	0.31	0.89	0.95	1.07	2.14	0.77	2.96	
shad, American	0.10	1.36	0.57	0.92	0.44	0.90	0.34	0.54	0.75	0.29	0.68	0.49	0.48	1.08	0.86	0.80	0.38	0.08	0.61	0.20	0.34	0.28	0.25	0.44	0.57	0.57	0.53	0.49	
shad, hickory	0.52	0.00	0.01	0.00	0.01	0.00	0.00	0.01	0.02	0.01	0.02	0.01	0.07	0.05	0.09	0.12	0.09	0.04	0.15	0.09	0.10	0.25	0.27	0.12	0.02	0.03	0.02	0.01	
skate, clearnose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.02	0.03	0.10	0.04	0.03	0.01	0.07	0.09	0.06	0.08	0.01	0.08	
skate, little *	5.71	7.22	7.19	5.34	15.51	21.24	11.50	25.19	12.41	12.03	16.96	6.58	18.78	11.23	11.65	7.56	6.21	8.03	7.63	7.03	6.54	1.65	1.40	2.82	1.56	1.03	1.02	1.15	8.93
skate, winter*	0.00	0.12	0.15	0.07	0.37	0.34	0.22	0.23	0.18	0.23	0.14	0.12	0.24	0.16	0.24	0.17	0.16	0.10	0.13	0.16	0.21	0.09	0.13	0.15	0.12	0.15	0.10	0.14	0.17
spot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
squid, long-finned**	nc	nc	3.24	2.56	9.37	4.98	7.87	7.18	6.44	4.23	3.82	6.21	3.24	5.14	3.33	3.49	2.70	2.73	3.22	2.50	9.43	4.76	11.55	2.14	3.45	6.57	3.20	4.10	4.93
striped bass *	0.02	0.00	0.00	0.05	0.04	0.06	0.16	0.15	0.22	0.27	0.30	0.59	0.63	0.85	0.97	1.10	0.84	0.61	1.30	0.87	0.56	1.17	0.61	1.02	0.57	0.60	0.40	0.48	0.52
sturgeon, Atlantic	0.06	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.02	0.03	0.01	0.01	0.01	0.05	0.04	0.02	0.01	0.05	0.00	0.00	0.02	0.05	0.02	0.01	0.01	0.01	0.02	
tautog *	2.75	1.47	1.50	0.71	0.65	1.09	1.00	0.92	0.82	0.42	0.44	0.15	0.49	0.40	0.42	0.40	0.57	0.70	0.91	0.52	0.54	0.57	0.64	0.48	0.50	0.40	0.25	0.38	0.73
weakfish	0.02	0.00	0.07	0.01	0.04	0.03	0.05	0.18	0.12	0.06	0.03	0.11	0.12	0.27	0.24	0.28	0.11	0.17	0.12	0.02	0.10	0.17	0.14	0.07	0.03	0.05	0.01	0.08	

Table 2.19. Fall indices of abundance for selected species, 1984-2011.

The geometric mean count per tow was calculated for 38 finfish and 2 invertebrates using September-October data. An asterisk next to the species name and a time series mean, indicates that the fall index provides a better estimate than the spring index (Simpson et al. 1991). Two asterisks indicate that both the spring and the fall indices provide good estimates. There was no fall sampling in 2010.

	Fall																											84-10
Species	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Mean**
alewife	0.42	0.01	0.05	0.04	0.19	0.16	0.11	0.07	0.19	0.40	0.66	0.16	0.24	1.23	0.11	0.42	0.25	0.55	0.22	0.58	0.26	0.43	0.05	0.95	0.42	0.18	-	0.43	
black sea bass	0.03	0.11	0.01	0.03	0.05	0.01	0.06	0.14	0.01	0.04	0.06	0.01	0.05	0.03	0.07	0.23	0.18	0.43	1.01	0.15	0.35	0.17	0.24	0.36	0.93	0.26	-	0.29	
bluefish *	23.41	19.01	13.66	14.32	15.49	26.25	23.88	33.43	25.22	18.92	32.06	24.46	20.80	37.90	31.41	45.31	20.57	24.24	18.75	28.53	29.13	18.89	15.66	30.66	14.28	18.11	-	11.10	24.01
butterfish *	51.93	89.72	63.41	60.09	146.67	174.87	154.65	170.59	301.72	87.73	93.05	320.06	173.74	186.62	355.49	477.91	125.97	142.89	165.07	112.86	175.37	197.24	140.23	154.53	181.71	409.75	-	39.62	181.30
cunner	0.09	0.05	0.05	0.06	0.05	0.06	0.05	0.08	0.09	0.05	0.05	0.03	0.01	0.05	0.08	0.06	0.07	0.04	0.03	0.06	0.04	0.05	0.02	0.01	0.05	0.05	-	0.01	
dogfish, smooth *	2.47	1.92	1.43	0.81	0.91	0.41	0.55	0.46	0.78	0.95	0.49	0.46	0.80	0.59	0.72	0.93	1.88	1.69	3.58	3.10	1.44	1.41	0.94	2.27	0.63	1.13	-	1.43	1.26
dogfish, spiny	0.04	0.00	0.00	0.03	0.01	0.00	0.12	0.00	0.02	0.05	0.10	0.00	0.01	0.04	0.07	0.03	0.04	0.16	0.05	0.00	0.18	0.22	0.00	0.00	0.11	0.08	-	0.01	
flounder, fourspot	1.18	1.03	0.50	0.37	1.73	0.80	1.47	0.74	1.44	1.55	1.33	0.44	2.05	3.29	1.63	1.19	1.15	1.17	1.09	0.96	1.14	1.11	0.65	0.73	1.30	1.82	-	1.35	
flounder, summer *	0.99	1.19	1.73	1.40	1.42	0.14	0.87	1.26	1.02	1.11	0.55	0.54	2.19	2.50	1.72	2.68	1.91	4.42	6.12	3.39	1.95	2.41	1.35	1.89	3.09	3.12	-	2.56	1.96
flounder, windowpane	22.11	11.56	7.32	6.85	12.10	8.68	7.19	4.71	6.79	9.48	3.89	2.43	28.13	13.36	4.64	2.53	2.81	1.81	1.86	3.39	2.27	6.14	1.54	3.65	7.95	5.59	-	5.32	
flounder, winter	7.31	2.75	3.86	5.42	10.07	11.03	15.42	6.10	6.41	9.32	6.13	3.77	12.29	7.75	6.69	8.66	7.08	3.07	1.74	1.25	2.19	2.15	0.94	0.82	2.26	1.55	-	1.27	
hake, red	0.74	0.33	1.00	0.37	0.75	1.14	0.44	0.33	0.39	1.81	0.59	0.20	1.62	0.89	0.53	0.29	1.20	0.41	0.15	0.73	0.76	0.45	0.33	0.54	0.41	0.90	-	0.60	
hake, silver	0.55	0.23	1.65	0.01	0.30	0.60	0.96	0.32	0.48	0.20	3.34	0.22	0.06	0.80	0.07	0.16	0.09	0.07	0.07	0.18	0.18	0.09	0.64	0.04	0.28	0.18	-	0.41	
hake, spotted *	0.28	0.17	0.21	0.14	0.10	0.05	0.11	0.03	0.39	1.48	0.50	0.16	1.68	0.12	0.41	0.61	1.18	0.35	0.86	1.95	0.14	0.32	0.56	0.39	0.69	1.11	-	2.62	0.54
herring, Atlantic	0.00	0.00	0.01	0.02	0.40	0.08	0.04	0.03	1.47	0.14	0.14	0.00	0.19	0.06	0.25	0.00	0.02	0.00	0.00	0.38	0.02	0.02	0.03	0.02	0.02	0.06	-	0.04	
herring, blueback *	0.38	0.16	0.07	0.13	0.53	0.34	0.10	0.04	0.08	0.11	0.93	0.27	0.05	0.75	0.16	0.06	0.06	0.20	0.06	0.10	0.09	0.06	0.15	0.24	0.05	0.09	-	0.08	0.20
hogchoker *	0.90	0.56	0.21	0.17	0.30	0.17	0.22	0.38	0.15	0.18	0.05	0.07	0.18	0.05	0.05	0.19	0.10	0.15	0.21	0.26	0.15	0.13	0.11	0.20	0.12	0.09	-	0.59	0.21
kingfish, northern *	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.06	0.03	0.19	0.04	0.04	0.12	0.05	0.01	0.02	0.01	0.00	0.04	0.03	0.00	0.04	0.05	0.05	-	0.21	0.03
lobster, American **	7.41	3.33	4.75	5.95	3.54	3.75	7.29	9.90	9.52	11.50	10.13	8.05	10.07	19.60	10.47	11.18	6.83	4.28	2.68	3.03	3.68	2.10	1.48	1.21	2.07	1.82	-	0.38	6.37
menhaden, Atlantic *	0.23	0.15	0.79	0.14	0.13	0.45	0.66	0.59	2.00	0.40	1.02	0.56	0.43	0.57	0.73	1.08	0.97	0.32	0.76	0.95	1.63	0.94	0.23	0.80	0.47	0.28	-	0.74	0.66
moonfish *	0.05	0.33	0.11	0.04	0.41	0.10	0.04	0.17	0.22	0.04	0.34	0.25	1.99	0.91	2.08	1.15	2.11	0.82	1.36	0.69	0.74	1.55	1.51	1.66	5.08	10.03	-	1.50	1.30
ocean pout	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	
rockling, fourbeard	0.08	0.01	0.04	0.05	0.21	0.15	0.07	0.04	0.06	0.03	0.06	0.01	0.11	0.07	0.03	0.04	0.12	0.03	0.01	0.04	0.04	0.01	0.00	0.02	0.06	0.04	-	0.03	
scad, rough *	0.13	0.08	0.03	0.27	0.42	0.08	0.08	0.01	0.00	0.21	0.03	0.00	0.18	0.05	0.00	0.00	0.00	0.07	0.07	0.14	0.09	0.19	0.15	0.08	0.00	0.38	-	0.32	0.11
sculpin, longhorn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	
scup *	10.72	30.97	25.76	18.54	39.70	65.09	69.48	311.57	83.73	77.06	92.52	59.14	61.46	41.28	103.27	537.68	521.10	177.64	348.70	152.23	291.46	424.06	116.75	475.29	303.26	139.38	-	198.23	176.07
sea raven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	
searobin, northern	0.20	0.22	0.31	0.03	0.38	0.18	0.43	0.43	0.15	0.25	0.80	0.12	0.27	0.14	0.93	0.62	0.47	1.15	1.25	0.51	1.03	0.68	0.21	1.05	1.11	0.88	-	1.19	
searobin, striped *	2.75	3.44	1.64	0.90	3.44	3.83	2.39	1.97	2.75	4.44	2.00	0.74	4.03	2.62	3.68	4.48	5.68	3.34	4.85	6.44	4.67	3.26	0.81	2.25	3.66	3.54	-	4.10	3.22
shad, American *	3.13	0.19	0.27	0.29	2.66	3.10	0.65	0.72	0.54	1.11	1.84	1.90	0.27	0.91	1.22	1.73	0.55	0.41	0.76	0.75	0.95	0.54	0.12	0.38	0.41	0.46	-	0.42	0.99
shad, hickory *	0.02	0.01	0.03	0.01	0.00	0.00	0.01	0.00	0.05	0.04	0.10	0.04	0.09	0.10	0.05	0.12	0.09	0.03	0.04	0.09	0.13	0.25	0.24	0.08	0.03	0.06	-	0.05	0.07
skate, clearnose *	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.05	0.04	0.01	0.02	0.01	0.03	0.12	0.10	0.10	0.34	0.18	0.33	0.10	0.48	0.23	0.44	0.38	0.24	-	0.27	0.13
skate, little	4.41	3.62	4.01	2.72	8.13	4.31	7.50	5.24	5.52	10.00	6.41	3.37	11.55	6.90	7.73	5.23	5.25	5.07	5.39	2.99	3.12	3.90	1.03	1.09	1.28	0.99	-	0.84	
skate, winter	0.00	0.01	0.00	0.00	0.03	0.03	0.05	0.02	0.07	0.09	0.12	0.07	0.17	0.08	0.05	0.06	0.01	0.13	0.13	0.00	0.07	0.10	0.00	0.06	0.21	0.10	-	0.05	
spot *	0.00	0.18	0.20	0.02	0.09	0.00	0.04	0.02	0.00	0.38	0.18	0.03	0.99	0.08	0.00	0.28	0.63	0.08	0.35	0.00	0.07	0.00	0.19	0.00	2.67	0.01	-	0.04	0.25
squid, long-finned **	nc	nc	27.40	28.60	159.16	85.60	69.12	62.97	172.95	272.11	127.96	155.28	180.99	68.57	202.29	132.50	109.87	60.18	35.48	269.32	94.47	81.12	70.58	179.39	114.99	187.15	-	85.68	122.84
striped bass	0.01	0.00	0.01	0.01	0.03	0.00	0.00	0.05	0.05	0.09	0.06	0.08	0.13	0.40	0.18	0.23	0.27	0.23	0.37	0.12	0.77	0.25	0.47	0.38	0.44	0.30	-	0.24	
sturgeon, Atlantic *	0.03	0.01	0.03	0.03	0.00	0.02	0.02	0.01	0.08	0.08	0.06	0.02	0.01	0.02	0.02	0.07	0.03	0.08	0.05	0.10	0.04	0.03	0.10	0.05	0.06	0.10	-	0.02	0.04
tautog	0.72	0.32	0.22	0.50	0.25	0.17	0.16	0.23	0.20	0.15	0.14	0.11	0.07	0.11	0.23	0.36	0.23	0.20	0.26	0.37	0.16	0.19	0.20	0.13	0.23	0.08	-	0.07	
weakfish *	1.55	6.35	13.57	0.73	3.54	8.69	5.71	12.11	3.22	4.18	11.21	5.64	15.49	12.93	5.28	31.36	63.42	40.51	41.45	49.46	59.07	26.00	1.50	63.96	9.11	6.65	-	12.27	19.33

Table 2.20. Finfish and invertebrate biomass indices for the spring sampling period, 1992-2011.

The geometric mean weight (kg) per tow was calculated for 38 finfish and 15 invertebrate species for the spring (April-June) sampling period.

	Spring																			
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
alewife	0.06	0.17	0.32	0.15	0.50	0.25	0.20	0.37	0.34	0.15	0.25	0.19	0.25	0.22	0.21	0.31	0.22	0.24	0.16	0.17
black sea bass	0.01	0.03	0.06	0.03	0.06	0.06	0.02	0.05	0.07	0.17	0.40	0.17	0.15	0.07	0.04	0.14	0.10	0.21	0.18	0.18
bluefish	0.45	0.08	0.13	0.04	0.10	0.23	0.17	0.35	0.09	0.08	0.36	0.20	0.12	0.14	0.23	0.21	0.11	0.30	0.03	0.24
butterfish	0.43	0.10	0.31	0.19	0.73	1.27	1.06	0.52	0.69	0.79	1.48	0.64	0.41	0.55	2.30	0.66	1.06	1.37	0.49	2.69
cunner	0.02	0.04	0.01	0.03	0.02	0.03	0.04	0.04	0.03	0.04	0.05	0.03	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02
dogfish, smooth	1.04	0.44	1.14	0.63	0.83	0.42	0.90	1.05	0.85	0.82	2.31	1.10	0.87	0.77	2.83	1.14	1.88	2.07	0.18	2.90
dogfish, spiny	0.10	0.02	0.12	0.00	0.00	0.01	0.03	0.02	0.00	0.08	0.06	0.07	0.07	0.05	0.21	0.25	0.15	0.84	0.07	0.37
flounder, fourspot	2.19	0.75	0.75	1.48	1.37	2.08	1.28	0.96	1.31	1.28	1.35	1.01	1.03	0.44	0.60	1.05	0.93	0.64	0.62	1.23
flounder, summer	0.35	0.27	0.48	0.16	0.53	0.60	1.15	1.09	1.35	1.21	2.38	2.45	1.69	0.67	0.61	1.72	1.44	1.40	1.28	2.73
flounder, windowpane	1.96	2.53	2.96	1.60	4.76	4.16	3.21	2.38	1.69	1.97	1.31	1.21	1.32	0.54	0.63	2.51	2.04	1.29	2.20	1.86
flounder, winter	8.72	7.54	9.44	6.51	14.61	10.63	9.65	6.67	7.46	9.77	6.31	6.64	3.87	2.94	1.65	4.99	3.84	2.94	4.26	3.60
hake, red	0.78	0.85	0.14	0.66	0.21	0.33	0.94	1.05	0.59	0.45	0.96	0.13	0.20	0.22	0.25	0.67	0.61	0.23	0.47	0.09
hake, silver	0.20	0.14	0.40	0.36	0.12	0.39	0.48	0.56	0.19	0.54	0.52	0.06	0.16	0.05	0.33	0.10	1.02	0.27	0.33	0.26
hake, spotted	0.01	0.01	0.00	0.02	0.03	0.09	0.03	0.13	0.27	0.17	0.20	0.13	0.18	0.05	0.14	0.11	0.31	0.07	0.14	0.21
herring, Atlantic	1.06	2.03	1.09	1.77	0.55	0.88	0.25	0.22	0.42	0.26	0.14	0.19	0.12	0.32	0.09	0.55	0.19	0.37	0.65	0.30
herring, blueback	0.05	0.02	0.06	0.03	0.04	0.04	0.02	0.00	0.04	0.02	0.01	0.02	0.04	0.04	0.02	0.04	0.02	0.06	0.04	0.02
hogchoker	0.04	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.03	0.04	0.04	0.04	0.04	0.03	0.02	0.05	0.03	0.02	0.04	0.06
kingfish, northern	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
menhaden, Atlantic	0.07	0.03	0.03	0.04	0.01	0.01	0.00	0.00	0.02	0.00	0.03	0.01	0.01	0.00	0.02	0.07	0.03	0.04	0.03	0.07
moonfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ocean pout	0.07	0.09	0.04	0.04	0.04	0.03	0.02	0.02	0.03	0.01	0.03	0.02	0.03	0.00	0.01	0.02	0.01	0.03	0.01	0.03
rockling, fourbeard	0.13	0.10	0.05	0.10	0.05	0.11	0.08	0.13	0.09	0.12	0.06	0.06	0.08	0.05	0.02	0.05	0.05	0.03	0.03	0.03
scad, rough	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
sculpin, longhorn	0.06	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.01	0.01	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.01
scup	0.48	0.49	0.58	0.65	0.73	0.75	0.75	0.56	4.56	2.85	13.16	2.28	3.93	1.65	10.41	3.35	5.88	6.40	3.14	9.55
sea raven	0.03	0.00	0.00	0.00	0.01	0.00	0.05	0.03	0.05	0.02	0.03	0.01	0.01	0.00	0.00	0.02	0.00	0.01	0.02	0.01
searobin, northern	0.26	0.35	0.28	0.27	0.28	0.33	0.17	0.22	0.70	0.51	0.51	0.40	0.29	0.08	0.35	0.26	0.23	0.44	0.52	0.30
searobin, striped	0.86	0.30	0.51	0.77	0.46	0.40	0.87	1.14	1.99	1.40	2.21	1.21	0.97	0.22	0.49	0.56	0.65	1.34	0.47	1.81
shad, American	0.29	0.09	0.21	0.10	0.11	0.23	0.13	0.20	0.05	0.01	0.11	0.03	0.04	0.05	0.05	0.07	0.08	0.07	0.07	0.07
shad, hickory	0.01	0.01	0.01	0.01	0.03	0.02	0.05	0.06	0.05	0.03	0.09	0.05	0.04	0.10	0.11	0.05	0.00	0.01	0.00	0.00
skate, clearnose	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.04	0.06	0.13	0.07	0.04	0.02	0.08	0.12	0.08	0.11	0.02	0.11
skate, little	5.89	5.99	8.87	3.38	9.35	6.00	6.27	4.25	3.43	4.47	4.56	4.35	4.01	1.05	0.91	1.82	0.97	0.71	0.66	0.79
skate, winter	0.37	0.52	0.28	0.21	0.46	0.29	0.46	0.27	0.25	0.21	0.25	0.24	0.28	0.12	0.22	0.23	0.19	0.23	0.15	0.25
spot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
striped bass	0.31	0.43	0.45	0.49	0.77	1.13	1.15	1.86	1.13	0.93	2.10	1.38	0.87	1.52	1.27	1.37	0.86	0.93	0.66	0.96
sturgeon, Atlantic	0.05	0.05	0.08	0.03	0.02	0.04	0.13	0.08	0.05	0.03	0.16	0.00	0.00	0.05	0.15	0.06	0.02	0.02	0.02	0.08
tautog	1.00	0.51	0.51	0.19	0.63	0.42	0.49	0.51	0.59	0.78	1.09	0.61	0.62	0.65	0.84	0.61	0.60	0.51	0.30	0.44
weakfish	0.11	0.03	0.01	0.05	0.06	0.15	0.20	0.31	0.12	0.11	0.12	0.03	0.04	0.09	0.12	0.08	0.02	0.04	0.01	0.04
Invertebrates																				
crab, blue	0.03	0.02	0.00	0.02	0.00	0.02	0.02	0.03	0.04	0.01	0.04	0.01	0.01	0.00	0.01	0.04	0.02	0.00	0.02	0.03
crab, flat claw hermit	0.15	0.08	0.18	0.02	0.09	0.04	0.10	0.10	0.07	0.12	0.14	0.32	0.17	0.05	0.04	0.11	0.09	0.12	0.08	0.09
crab, horseshoe	0.35	0.45	0.60	0.13	0.61	0.33	0.55	0.80	0.74	0.94	0.76	1.33	0.96	0.39	0.25	0.86	0.62	0.65	0.52	0.81
crab, lady	0.25	0.23	0.16	0.18	0.50	0.50	0.39	0.16	0.13	0.04	0.07	0.01	0.01	0.01	0.04	0.02	0.02	0.01	0.06	0.11
crab, rock	1.17	0.61	0.64	0.14	0.45	0.32	1.04	0.55	0.25	0.35	0.31	0.36	0.14	0.05	0.16	0.16	0.20	0.18	0.13	0.25
crab, spider	0.98	1.08	1.22	0.32	0.96	0.52	0.69	0.39	0.35	1.02	1.30	1.85	1.42	0.36	0.27	0.55	0.57	0.46	0.70	0.78
jellyfish, lion's mane	0.01	0.11	0.01	0.15	0.10	0.08	0.19	0.06	0.06	0.03	0.02	0.23	0.14	0.38	0.11	0.00	0.10	0.03	0.08	0.08
lobster, American	2.80	2.32	1.53	3.24	2.72	3.02	6.56	4.95	3.90	3.04	2.55	1.48	1.03	1.00	0.84	1.24	1.18	0.62	0.55	0.30
mussel, blue	0.31	0.01	0.07	0.03	0.03	0.01	0.05	0.03	0.04	0.01	0.17	0.08	0.11	0.09	0.04	0.04	0.02	0.00	0.02	0.02
northern moon shell	0.05	0.04	0.12	0.03	0.02	0.02	0.04	0.05	0.05	0.08	0.10	0.10	0.06	0.02	0.00	0.03	0.03	0.04	0.04	0.04
oyster, common	0.04	0.00	0.06	0.00	0.00	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.01
shrimp, mantis	0.06	0.13	0.05	0.05	0.04	0.03	0.03	0.07	0.18	0.08	0.04	0.03	0.03	0.01	0.02	0.05	0.04	0.04	0.01	0.07
squid, long-finned	1.01	0.91	0.67	0.89	0.55	0.99	0.41	0.62	0.51	0.41	0.42	0.42	1.69	1.08	1.41	0.33	0.40	0.92	0.77	0.61
starfish sp.	0.22	0.13	0.06	0.02	0.03	0.03	0.05	0.04	0.06	0.28	0.24	0.29	0.12	0.06	0.03	0.09	0.13	0.11	0.12	0.09
whelks	0.16	0.04	0.07	0.01	0.07	0.03	0.06	0.08	0.09	0.13	0.12	0.31	0.15	0.05	0.05	0.12	0.11	0.08	0.05	0.13

Table 2.21. Finfish and invertebrate biomass indices for the fall sampling period, 1992-2011.

The geometric mean weight (kg) per tow was calculated for 38 finfish and 15 invertebrate species for the fall (Sept-Oct) sampling period. There was no fall sampling in 2010.

	Fall																			
	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
alewife	0.03	0.08	0.10	0.02	0.04	0.22	0.02	0.07	0.02	0.09	0.03	0.09	0.04	0.05	0.01	0.14	0.04	0.02	-	0.06
black sea bass	0.01	0.01	0.01	0.00	0.01	0.01	0.05	0.07	0.07	0.23	0.31	0.08	0.08	0.08	0.07	0.14	0.23	0.07	-	0.15
bluefish	16.39	9.91	9.45	8.09	7.62	6.53	5.06	8.51	8.34	6.11	7.87	8.99	16.39	8.75	3.92	9.74	9.19	6.40	-	3.84
butterfish	6.31	4.12	3.40	10.26	9.30	6.97	13.27	15.43	4.45	7.80	6.56	3.47	6.24	7.85	7.73	5.82	8.97	14.39	-	2.81
cunner	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.01	-	0.00
dogfish, smooth	1.20	1.75	0.76	0.85	1.16	1.09	1.32	1.27	2.85	3.02	6.09	6.18	2.95	2.70	2.46	6.23	1.25	2.80	-	3.66
dogfish, spiny	0.03	0.08	0.18	0.00	0.01	0.05	0.10	0.05	0.06	0.24	0.07	0.00	0.27	0.34	0.00	0.00	0.18	0.18	-	0.01
flounder, fourspot	0.14	0.16	0.14	0.08	0.48	0.24	0.19	0.14	0.35	0.17	0.25	0.30	0.29	0.19	0.06	0.19	0.16	0.21	-	0.11
flounder, summer	0.87	0.85	0.47	0.43	1.61	1.84	1.77	2.27	1.77	3.19	4.41	3.27	1.74	1.93	1.36	1.65	1.97	2.41	-	1.82
flounder, windowpane	0.51	0.73	0.42	0.32	2.11	1.30	0.61	0.38	0.45	0.30	0.38	0.43	0.26	0.57	0.29	0.42	0.98	0.64	-	0.68
flounder, winter	0.84	0.99	0.78	0.45	1.56	1.04	0.87	1.37	1.28	0.62	0.55	0.34	0.32	0.41	0.16	0.22	0.49	0.26	-	0.28
hake, red	0.11	0.34	0.19	0.04	0.48	0.18	0.10	0.06	0.32	0.07	0.02	0.19	0.14	0.10	0.06	0.12	0.09	0.13	-	0.14
hake, silver	0.04	0.02	0.28	0.02	0.01	0.06	0.01	0.03	0.01	0.01	0.01	0.02	0.02	0.01	0.08	0.01	0.03	0.02	-	0.04
hake, spotted	0.09	0.30	0.15	0.04	0.37	0.03	0.08	0.17	0.34	0.09	0.19	0.41	0.03	0.08	0.17	0.10	0.16	0.23	-	0.53
herring, Atlantic	0.07	0.01	0.01	0.00	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.01	-	0.00
herring, blueback	0.01	0.01	0.12	0.03	0.01	0.09	0.02	0.01	0.01	0.05	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.01	-	0.01
hogchoker	0.02	0.03	0.01	0.01	0.04	0.01	0.01	0.04	0.02	0.03	0.05	0.04	0.03	0.03	0.02	0.04	0.02	0.02	-	0.11
kingfish, northern	0.00	0.01	0.00	0.03	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	-	0.04
menhaden, Atlantic	0.36	0.22	0.36	0.25	0.25	0.24	0.09	0.39	0.22	0.05	0.35	0.25	0.49	0.43	0.06	0.29	0.12	0.10	-	0.39
moonfish	0.02	0.00	0.03	0.03	0.12	0.05	0.13	0.09	0.13	0.04	0.08	0.03	0.04	0.07	0.07	0.11	0.27	0.21	-	0.07
ocean pout	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
rockling, fourbeard	0.01	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	-	0.00
scad, rough	0.00	0.03	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.03	-	0.05
sculpin, longhorn	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
scup	4.96	3.72	3.33	4.63	3.68	2.49	4.50	22.72	30.76	11.28	23.69	28.95	16.31	13.79	10.49	24.42	16.53	13.73	-	20.27
sea raven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00
searobin, northern	0.02	0.05	0.06	0.02	0.04	0.02	0.08	0.06	0.08	0.13	0.18	0.11	0.11	0.09	0.05	0.08	0.09	0.08	-	0.11
searobin, striped	0.82	0.54	0.32	0.34	0.81	0.60	1.04	1.37	1.59	1.27	2.12	2.43	0.96	0.82	0.38	0.37	0.94	0.61	-	1.12
shad, American	0.14	0.35	0.39	0.43	0.06	0.16	0.26	0.42	0.14	0.07	0.16	0.17	0.15	0.10	0.02	0.05	0.08	0.11	-	0.09
shad, hickory	0.03	0.02	0.04	0.02	0.05	0.05	0.02	0.07	0.05	0.02	0.02	0.05	0.07	0.14	0.11	0.03	0.01	0.02	-	0.01
skate, clearnose	0.06	0.05	0.01	0.04	0.01	0.05	0.17	0.15	0.15	0.53	0.30	0.46	0.17	0.71	0.30	0.69	0.64	0.40	-	0.41
skate, little	2.47	4.61	3.47	1.78	5.66	3.81	4.06	2.85	2.92	2.88	3.00	1.96	2.02	2.32	0.67	0.65	0.82	0.64	-	0.58
skate, winter	0.11	0.15	0.21	0.09	0.25	0.10	0.09	0.08	0.01	0.21	0.21	0.00	0.11	0.16	0.00	0.12	0.31	0.18	-	0.07
spot	0.00	0.07	0.03	0.00	0.14	0.01	0.00	0.06	0.13	0.01	0.08	0.00	0.01	0.00	0.03	0.00	0.34	0.00	-	0.01
striped bass	0.09	0.16	0.11	0.15	0.21	0.68	0.38	0.39	0.51	0.48	0.70	0.26	1.25	0.48	0.88	0.64	0.79	0.61	-	0.43
sturgeon, Atlantic	0.21	0.19	0.13	0.10	0.02	0.06	0.04	0.21	0.08	0.23	0.18	0.27	0.09	0.12	0.23	0.13	0.21	0.29	-	0.10
tautog	0.22	0.22	0.15	0.09	0.07	0.14	0.27	0.31	0.30	0.20	0.27	0.43	0.21	0.23	0.23	0.16	0.20	0.07	-	0.05
weakfish	0.47	0.56	1.26	1.27	1.88	1.70	0.94	3.39	3.17	2.41	2.86	1.72	2.85	2.52	0.42	3.51	1.17	0.66	-	1.37
Invertebrates																				
crab, blue	0.15	0.17	0.05	0.04	0.04	0.11	0.10	0.17	0.11	0.05	0.10	0.06	0.02	0.00	0.01	0.07	0.02	0.04	-	0.09
crab, flat claw hermit	0.17	0.40	0.15	0.11	0.26	0.16	0.35	0.16	0.17	0.33	0.30	0.13	0.18	0.16	0.05	0.12	0.24	0.16	-	0.12
crab, horseshoe	1.01	1.16	0.55	0.32	1.27	1.32	0.93	1.09	1.31	1.39	1.76	1.67	1.93	0.93	1.00	1.40	1.92	1.21	-	1.25
crab, lady	1.52	1.58	1.52	1.56	3.54	1.84	0.82	0.48	0.60	0.17	0.14	0.10	0.08	0.14	0.07	0.07	0.25	0.18	-	0.30
crab, rock	0.58	0.55	0.18	0.09	0.45	0.32	0.37	0.22	0.19	0.13	0.12	0.04	0.08	0.02	0.10	0.04	0.28	0.09	-	0.09
crab, spider	0.53	1.89	0.46	0.25	0.71	0.42	0.25	0.24	0.21	0.30	0.27	0.47	0.32	0.13	0.10	0.15	0.25	0.29	-	0.21
jellyfish, lion's mane	0.02	0.01	0.03	0.17	0.18	0.50	0.17	0.03	0.22	0.17	0.10	0.01	0.13	0.12	0.46	0.45	0.02	0.58	-	0.01
lobster, American	3.17	4.11	3.58	3.03	3.48	7.22	4.24	4.16	2.65	1.91	1.10	1.28	1.46	0.84	0.61	0.51	0.80	0.77	-	0.12
mussel, blue	0.07	0.06	0.12	0.02	0.00	0.01	0.09	0.00	0.04	0.12	0.11	0.02	0.10	0.10	0.02	0.07	0.04	0.03	-	0.03
northern moon shell	0.03	0.02	0.03	0.01	0.01	0.00	0.02	0.01	0.00	0.04	0.10	0.00	0.00	0.01	0.00	0.00	0.03	0.01	-	0.00
oyster, common	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	-	0.00
shrimp, mantis	0.05	0.08	0.02	0.02	0.13	0.06	0.02	0.09	0.18	0.05	0.06	0.02	0.04	0.03	0.04	0.06	0.08	0.06	-	0.22
squid, long-finned	5.00	7.92	4.71	4.68	5.53	2.20	6.40	6.06	4.05	2.39	1.81	5.88	3.38	3.47	2.15	6.51	4.29	4.25	-	2.52
starfish sp.	0.11	0.08	0.07	0.00	0.01	0.02	0.05	0.02	0.12	0.22	0.09	0.01	0.10	0.11	0.02	0.05	0.09	0.06	-	0.03
whelks	0.28	0.28	0.06	0.08	0.22	0.10	0.27	0.23	0.38	0.52	0.38	0.24	0.24	0.20	0.08	0.20	0.30	0.20	-	0.21

Table 2.22. Bluefish indices of abundance, 1984-2011.
Using September and October length data, the geometric mean catch per tow was calculated for two age groups of bluefish: age-0 and all fish age 1 and older. Age-0 was defined as bluefish less than 30 cm fork length.

	Fall			
Year	age 0 count / tow	age 0 kg / tow	ages 1+ count / tow	ages 1+ kg / tow
1984	20.34	2.51	1.61	2.03
1985	11.27	1.64	4.16	6.25
1986	8.05	1.13	3.77	5.96
1987	9.01	0.88	3.11	4.85
1988	10.73	1.59	2.20	4.43
1989	21.07	3.17	1.92	3.80
1990	12.82	2.09	6.14	8.92
1991	22.57	2.75	5.59	8.49
1992	9.23	1.27	8.44	14.88
1993	11.61	1.96	3.34	7.11
1994	24.85	2.54	3.07	6.09
1995	16.85	2.48	4.07	5.32
1996	13.85	2.27	2.34	4.09
1997	31.26	2.56	2.35	3.68
1998	25.89	2.08	1.65	2.70
1999	39.19	5.43	0.86	1.61
2000	14.67	2.97	2.18	3.75
2001	19.04	2.11	2.62	3.87
2002	12.35	2.25	3.63	4.81
2003	16.85	3.16	2.16	3.31
2004	13.30	2.39	10.38	13.96
2005	12.10	2.39	2.65	5.04
2006	12.43	1.49	2.14	2.74
2007	23.98	4.14	2.44	4.22
2008	6.14	0.82	4.52	8.18
2009	11.65	1.16	3.18	5.09
2010	-	-	-	-
2011	8.21	1.34	1.4	2.36
84-09 mean	**16.58**	**2.28**	**3.48**	**5.58**

Table 2.23. Scup indices-at-age, 1984-2011.

Spring (May and June) and fall (September and October) catch and age data were used to determine the geometric mean indices-at-age[1]. The spring and fall age keys were used to expand length frequencies to age frequencies and then the spring and fall overall indices were proportioned by the percentage of fish in each age. The 0-10+ index represents the overall index (sum of ages 0-10+), and the adult 2+ index is provided as the sum of ages 2-10+ index. All fish older than age 9 were included in the age 10+ index[2].

Spring (May-June)

Year	0-10+	2+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10+
1984	2.797	2.308	0	0.489	1.311	0.577	0.307	0.074	0.004	0.002	0	0	0.034
1985	5.648	2.707	0	2.941	2.002	0.327	0.244	0.047	0.025	0.050	0	0.004	0.008
1986	7.230	2.785	0	4.444	1.651	0.988	0.137	0.003	0.003	0.003	0	0	0.003
1987	2.186	1.758	0	0.428	1.646	0.071	0.034	0.007	0	0	0	0	0
1988	2.061	0.893	0	1.168	0.309	0.502	0.054	0.026	0	0	0	0	0.003
1989	6.249	0.615	0	5.634	0.563	0.034	0.016	0.000	0.001	0.001	0	0	0
1990	4.867	2.345	0	2.521	2.098	0.206	0.037	0.005	0	0	0	0	0
1991	7.046	2.795	0	4.251	1.436	1.258	0.086	0.012	0.002	0	0	0	0
1992	1.749	1.360	0	0.389	1.212	0.093	0.052	0.002	0	0.002	0	0	0
1993	2.530	2.492	0	0.038	2.286	0.189	0.006	0.006	0.002	0.002	0	0	0
1994	3.892	3.093	0	0.799	2.038	0.931	0.100	0.015	0.003	0.007	0	0	0
1995	13.587	0.645	0	12.943	0.387	0.199	0.052	0.003	0.003	0	0	0	0
1996	7.766	2.562	0	5.204	2.477	0.074	0.004	0.006	0.002	0	0	0	0
1997	7.558	4.394	0	3.164	2.610	1.679	0.063	0.009	0.023	0.005	0.005	0	0
1998	10.826	0.761	0	10.065	0.578	0.115	0.063	0.005	0	0	0	0	0
1999	4.732	2.021	0	2.711	1.755	0.162	0.074	0.030	0	0	0	0	0
2000	146.224	21.711	0	124.513	17.184	4.237	0.195	0.064	0.030	0	0	0	0
2001	22.486	20.837	0	1.649	18.988	1.575	0.252	0.018	0.003	0.001	0	0	0
2002	257.914	208.764	0	49.150	66.611	123.248	17.437	1.294	0.099	0.035	0.040	0	0
2003	13.116	12.980	0	0.136	4.047	3.284	4.964	0.608	0.069	0.005	0.005	0	0
2004	26.915	26.902	0	0.014	3.965	8.956	4.904	8.207	0.764	0.079	0.018	0.009	0
2005	8.483	7.325	0	1.157	1.278	1.055	1.511	1.269	1.944	0.223	0.045	0	0
2006	59.052	40.570	0	18.482	23.719	5.629	2.072	2.557	3.160	2.897	0.529	0.007	0
2007	32.809	25.295	0	7.514	15.865	5.845	1.489	0.548	0.536	0.541	0.385	0.073	0.007
2008	92.117	75.160	0	16.957	40.620	27.815	4.936	0.911	0.158	0.303	0.236	0.148	0.016
2009	104.454	72.840	0	31.614	28.228	28.413	12.491	2.498	0.613	0.215	0.134	0.250	0.000
2010	68.167	67.746	0	0.421	24.265	21.998	14.002	6.019	1.187	0.118	0.058	0.041	0.029
2011	36.293	34.166	0	2.1269	3.2883	11.3939	9.8278	4.1217	3.3816	1.408	0.2417	0.0684	0.256
84-10 Mean	**34.165**	**22.728**	**0.000**	**11.437**	**9.968**	**8.869**	**2.429**	**0.898**	**0.320**	**0.166**	**0.054**	**0.020**	**0.004**

Fall (Sept-Oct)

Year	0-10+	2+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10+
1984	10.721	1.692	7.986	1.043	0.783	0.519	0.280	0.092	0.018	0	0	0	0
1985	30.972	1.277	24.914	4.781	0.425	0.587	0.190	0.044	0.030	0.002	0	0	0
1986	25.761	2.519	12.863	10.379	2.277	0.219	0.013	0.005	0.005	0	0	0	0
1987	18.544	2.063	12.468	4.013	1.405	0.579	0.058	0.009	0.009	0.004	0	0	0
1988	39.699	2.092	31.687	5.920	1.818	0.242	0.032	0	0	0	0	0	0
1989	65.087	1.596	40.920	22.571	1.501	0.083	0.012	0	0	0	0	0	0
1990	69.477	7.396	54.350	7.731	6.946	0.398	0.034	0.005	0.008	0	0	0.005	0
1991	311.570	2.953	291.568	17.050	1.759	1.040	0.147	0.008	0	0	0	0	0
1992	83.731	6.244	50.971	26.516	5.540	0.398	0.287	0.013	0.007	0	0	0	0
1993	77.057	1.165	74.061	1.831	1.019	0.121	0.012	0.010	0	0	0.003	0	0
1994	92.523	0.657	90.778	1.088	0.457	0.185	0.012	0.003	0	0	0	0	0
1995	59.136	0.150	32.465	26.521	0.144	0.006	0	0	0	0	0	0	0
1996	61.459	1.400	51.497	8.562	1.365	0.029	0	0.005	0	0	0	0	0
1997	41.276	0.809	31.791	8.677	0.630	0.172	0.008	0	0	0	0	0	0
1998	103.272	0.628	90.404	12.240	0.537	0.069	0.022	0	0	0	0	0	0
1999	537.683	8.574	498.180	30.930	8.349	0.195	0.019	0.011	0	0	0	0	0
2000	521.103	9.265	250.391	261.446	8.323	0.794	0.140	0.008	0	0	0	0	0
2001	177.641	20.239	140.506	16.897	18.421	1.607	0.186	0.025	0	0	0	0	0
2002	348.703	41.179	259.902	47.623	23.321	16.812	0.665	0.325	0.048	0	0.007	0	0
2003	152.227	83.963	52.910	15.354	32.065	22.394	26.440	2.493	0.539	0.016	0.016	0	0
2004	291.458	36.277	251.052	4.129	8.338	15.082	5.978	6.245	0.534	0.072	0.008	0.021	0
2005	424.063	18.183	373.318	32.562	8.144	2.437	4.015	1.505	1.689	0.332	0.060	0	0
2006	116.755	13.575	52.164	51.016	9.525	2.341	0.257	0.351	0.377	0.681	0.044	0	0
2007	475.295	37.346	319.893	118.056	29.335	5.929	0.896	0.226	0.302	0.313	0.313	0.033	0
2008	303.256	24.478	243.679	35.099	11.921	7.044	3.556	1.055	0.502	0.137	0.124	0.140	0
2009	139.380	31.506	67.486	40.388	20.786	6.934	2.615	0.735	0.214	0.131	0.068	0.022	0
2010	-	-	-	-	-	-	-	-	-	-	-	-	-
2011	198.342	40.901	119.032	38.409	8.157	14.894	9.669	3.922	3.225	0.586	0.167	0.025	0.256
84-10 Mean	**176.071**	**13.739**	**131.085**	**31.247**	**7.890**	**3.316**	**1.764**	**0.507**	**0.165**	**0.065**	**0.025**	**0.009**	**0.000**

(1) In 1984, 1985, 2003, 2004, 2006, 2008,2010 and 2011 less than the number of scheduled tows were conducted in some months(Table 2.4).

(2) Fish in the age 10+ group include: 6 fish taken 1984-1988, 8fish taken 2002-2010 and 81 taken in 2011. The oldest fish aged was a 14-year-old taken in 1985.

Table 2.24. Age frequency of striped bass taken in spring, 1984-2011.

Ages were derived from trawl survey length data using the average of Hudson River and Chesapeake Bay von Bertalanffy parameters (Vic Crecco, pers. comm.).

	Year																										
Age	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
1	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	1	0	2	1	1	0	0	2	11	5	0	1
2	0	0	0	2	1	5	28	11	4	3	6	98	12	36	119	41	113	47	150	30	15	220	3	46	20	84	3	2
3	0	0	0	0	1	3	8	7	8	7	10	26	97	116	122	87	20	41	76	38	38	54	25	109	15	54	7	2
4	0	0	0	2	4	1	2	3	13	16	20	8	37	40	68	42	22	15	48	23	18	59	15	44	48	130	17	29
5	0	0	0	2	0	1	1	5	5	14	18	7	14	17	28	95	22	28	45	39	21	33	22	44	41	64	24	50
6	0	0	0	2	1	1	3	0	1	8	8	6	7	14	20	46	32	36	52	41	22	28	11	28	11	34	11	44
7	0	0	0	0	0	0	0	2	0	7	1	1	8	9	3	17	12	13	25	23	14	16	10	9	7	10	6	29
8	0	0	0	0	0	0	0	1	2	1	1	3	2	4	1	4	4	2	12	5	3	9	4	3	3	1	2	7
9	0	0	0	0	0	0	0	2	1	1	1	0	3	2	1	0	1	2	3	7	2	1	3	1	1	0	0	1
10	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	2	0	1	0	0	0	3	3	2	0	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**0**	**0**	**0**	**8**	**7**	**11**	**43**	**32**	**34**	**59**	**65**	**150**	**184**	**238**	**362**	**334**	**229**	**184**	**414**	**207**	**135**	**421**	**97**	**289**	**159**	**382**	**70**	**166**

Note: *number of fish taken but not measured = one in 1984, one in 1988, two in 1990.*

Table 2.25. Striped bass indices-at-age, 1984-2011.

Spring length data was converted to ages using the average of Hudson River and Chesapeake Bay von Bertalanffy parameters (Vic Crecco, pers comm). Indices-at-age were then determined by apportioning the spring indices (from Table 2.10) by the percentage of fish in each age.

		Spring											
Year	**Index**	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11**	**Age 12**
1984	0.02	0	0	0	0	0	0	0	0	0	0	0	0
1985	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1986	0.00	0	0	0	0	0	0	0	0	0	0	0	0
1987	0.05	0	0.0125	0	0.0125	0.0125	0.0125	0	0	0	0	0	0
1988	0.04	0	0.0057	0.0057	0.0229	0	0.0057	0	0	0	0	0	0
1989	0.06	0	0.0273	0.0164	0.0055	0.0055	0.0055	0	0	0	0	0	0
1990	0.16	0	0.1042	0.0298	0.0074	0.0037	0.0112	0	0	0	0.0037	0	0
1991	0.15	0	0.0516	0.0328	0.0141	0.0234	0	0.0094	0.0047	0.0094	0.0047	0	0
1992	0.22	0	0.0259	0.0518	0.0841	0.0324	0.0065	0	0.0129	0.0065	0	0	0
1993	0.27	0.0093	0.014	0.0326	0.0745	0.0652	0.0372	0.0326	0.0047	0.0047	0	0	0
1994	0.30	0	0.0277	0.0462	0.0923	0.0831	0.0369	0.0046	0.0046	0.0046	0	0	0
1995	0.59	0	0.3855	0.1023	0.0315	0.0275	0.0236	0.0039	0.0118	0	0.0039	0	0
1996	0.63	0.0103	0.0411	0.3321	0.1267	0.0479	0.024	0.0274	0.0068	0.0103	0	0.0034	0
1997	0.85	0	0.1286	0.4143	0.1429	0.0607	0.05	0.0321	0.0143	0.0071	0	0	0
1998	0.97	0	0.3189	0.3269	0.1822	0.075	0.0536	0.008	0.0027	0.0027	0	0	0
1999	1.10	0	0.1346	0.2857	0.1379	0.3119	0.151	0.0558	0.0131	0	0.0033	0.0033	0
2000	0.84	0.0037	0.4163	0.0737	0.0811	0.0811	0.1179	0.0442	0.0147	0.0037	0.0074	0	0
2001	0.61	0	0.1558	0.1359	0.0497	0.0928	0.1193	0.0431	0.0066	0.0066	0	0	0
2002	1.30	0.0063	0.4722	0.2392	0.1511	0.1416	0.1637	0.0787	0.0378	0.0094	0.0031	0	0
2003	0.87	0.0042	0.1267	0.1605	0.0971	0.1647	0.1732	0.0971	0.0211	0.0296	0	0	0
2004	0.56	0.0042	0.0627	0.1588	0.0752	0.0878	0.0919	0.0585	0.0125	0.0084	0	0.0042	0
2005	1.17	0	0.61	0.1497	0.1636	0.0915	0.0776	0.0444	0.025	0.0028	0	0.0028	0
2006	0.61	0	0.0189	0.1572	0.0943	0.1384	0.0692	0.0629	0.0252	0.0189	0.0189	0.0063	0
2007	1.02	0.0071	0.1629	0.386	0.1558	0.1558	0.0992	0.0319	0.0106	0.0035	0.0106	0	0
2008	0.57	0.0394	0.0717	0.0538	0.1721	0.147	0.0394	0.0251	0.0108	0.0036	0.0072	0	0
2009	0.60	0.0078	0.1316	0.0846	0.2037	0.1003	0.0533	0.0157	0.0016	0	0	0	0
2010	0.40	0	0.0169	0.0394	0.0958	0.1352	0.062	0.0338	0.0113	0	0	0	0
2011	0.48	0.0029	0.0058	0.0058	0.0839	0.1446	0.1272	0.0839	0.0202	0.0029	0	0	0.0029
84-10 mean	**0.52**	**0.0034**	**0.1305**	**0.1228**	**0.0842**	**0.0772**	**0.0550**	**0.0263**	**0.0094**	**0.0049**	**0.0023**	**0.0007**	**0.0000**

Table 2.26. Summer flounder indices-at-age, 1984-2011.

Year and season specific age keys obtained from the NMFS spring and fall surveys were used to convert LISTS length frequencies to ages. Starting in 2000 LISTS ageing data (60 cm and over) were added to the age key to supplement the older age groups. Indices-at-age were determined for each season by apportioning the spring and fall overall indices (from Table 2.19 and Table 2.20) by the percentage of fish in each age. The age 0-7+ index is the sum of indices ages 0-9.

Spring

Year	0-7+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11
1984	0.6291	0	0.3236	0.2610	0.0445	0	0	0	0	0	0	0	0
1985	0.4410	0	0.0166	0.3168	0.0489	0.0587	0	0	0	0	0	0	0
1986	0.9510	0	0.7700	0.0892	0.0742	0.0126	0.0050	0	0	0	0	0	0
1987	1.0572	0	0.9515	0.0793	0.0202	0.0036	0.0026	0	0	0	0	0	0
1988	0.4986	0	0.2317	0.2232	0.0352	0.0085	0	0	0	0	0	0	0
1989	0.1016	0	0.0111	0.0550	0.0191	0.0164	0	0	0	0	0	0	0
1990	0.3475	0	0.3053	0.0201	0.0156	0.0065	0	0	0	0	0	0	0
1991	0.6391	0	0.3892	0.2059	0.0205	0.0235	0	0	0	0	0	0	0
1992	0.5546	0	0.3182	0.1906	0.0229	0	0.0229	0	0	0	0	0	0
1993	0.5074	0	0.3216	0.1504	0.0101	0.0152	0.0101	0	0	0	0	0	0
1994	0.8601	0	0.4959	0.3136	0.0324	0	0	0	0.0182	0	0	0	0
1995	0.2796	0	0.2023	0.0608	0.0110	0	0	0	0.0055	0	0	0	0
1996	0.9609	0	0.6216	0.2370	0.0868	0	0.0052	0	0.0103	0	0	0	0
1997	0.9991	0	0.4481	0.4461	0.0740	0.0121	0.0134	0.0054	0	0	0	0	0
1998	1.3067	0	0.0734	0.5952	0.4693	0.1167	0.0324	0.0197	0	0	0	0	0
1999	1.4401	0	0.3263	0.5563	0.3521	0.1110	0.0696	0.0248	0	0	0	0	0
2000	1.7898	0	0.3805	0.7853	0.4240	0.0538	0.1316	0.0092	0	0.0054	0	0	0
2001	1.7468	0	0.8408	0.3395	0.3653	0.1073	0.0488	0.0333	0.0067	0.0051	0	0	0
2002	3.1851	0	1.0571	1.2637	0.4646	0.2233	0.0930	0.0362	0.0236	0.0145	0.0091	0	0
2003	3.4211	0	1.6080	1.0159	0.3949	0.2316	0.0851	0.0462	0.0327	0.0025	0.0042	0	0
2004	1.8381	0	0.2592	0.8180	0.4100	0.1878	0.0338	0.0817	0.0302	0.0145	0.0029	0	0
2005	0.8038	0	0.2523	0.2641	0.1495	0.0334	0.0364	0.0393	0.0196	0.0046	0.0046	0	0
2006	0.6129	0	0.0383	0.3597	0.0676	0.0654	0.0337	0.0263	0.0168	0.0051	0	0	0
2007	2.5073	0	1.1569	0.2053	0.5595	0.3163	0.1150	0.0888	0.0428	0.0152	0.0065	0.0010	0
2008	1.6145	0	0.6008	0.2912	0.2374	0.2633	0.1165	0.0622	0.0236	0.0033	0.0054	0.0054	0.0054
2009	1.9295	0	0.7772	0.3770	0.2905	0.1804	0.1949	0.0700	0.0258	0.0101	0.0036	0	0
2010	2.6878	0	1.8671	0.2805	0.2113	0.1439	0.0944	0.0416	0.0244	0.0142	0.0052	0.0052	0
2011	3.8479	0	1.0024	1.0839	0.8014	0.382	0.3159	0.1098	0.0628	0.058	0.0171	0.0146	0
84-10 Mean	**1.2485**	**0.0000**	**0.5424**	**0.3630**	**0.1819**	**0.0812**	**0.0424**	**0.0217**	**0.0104**	**0.0035**	**0.0015**	**0.0004**	**0.0002**

Fall

Year	0-7+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11
1984	0.9888	0	0.5648	0.3269	0.0713	0.0140	0.0042	0.0042	0.0034	0	0	0	0
1985	1.1931	0.2453	0.3605	0.4984	0.0804	0	0.0085	0	0	0	0	0	0
1986	1.7157	0.1738	1.1902	0.2681	0.0817	0.0019	0	0	0	0	0	0	0
1987	1.3963	0.0749	1.0573	0.2309	0.0305	0.0027	0	0	0	0	0	0	0
1988	1.4159	0.0150	0.8739	0.4782	0.0366	0.0122	0	0	0	0	0	0	0
1989	0.1363	0	0.0227	0.1051	0.0085	0	0	0	0	0	0	0	0
1990	0.8678	0.0321	0.6720	0.1214	0.0339	0.0042	0.0042	0	0	0	0	0	0
1991	1.2557	0.0363	0.8141	0.3457	0.0432	0.0082	0.0041	0.0041	0	0	0	0	0
1992	1.0178	0.0131	0.5685	0.3578	0.0561	0.0134	0.0089	0	0	0	0	0	0
1993	1.1113	0.0842	0.8371	0.1490	0.0362	0.0029	0	0.0019	0	0	0	0	0
1994	0.5517	0.1325	0.3008	0.0957	0.0138	0.0089	0	0	0	0	0	0	0
1995	0.5408	0.0424	0.3812	0.1043	0.0090	0.0039	0	0	0	0	0	0	0
1996	2.1914	0.0840	1.0394	1.0276	0.0375	0.0029	0	0	0	0	0	0	0
1997	2.4980	0.0693	0.8494	1.2261	0.3016	0.0321	0.0099	0.0084	0.0012	0	0	0	0
1998	1.7153	0	0.3251	1.0456	0.2867	0.0392	0.0187	0	0	0	0	0	0
1999	2.6787	0.0482	0.8000	1.4412	0.2963	0.0823	0.0084	0.0023	0	0	0	0	0
2000	1.9134	0.1151	0.5117	0.8244	0.2971	0.1122	0.0433	0.0067	0	0.0029	0	0	0
2001	4.4181	0.0208	2.6891	1.1372	0.4342	0.1095	0.0153	0.0078	0	0.0042	0	0	0
2002	6.1211	0.4415	3.0870	1.9304	0.4769	0.1216	0.0429	0.0168	0.0040	0	0	0	0
2003	3.3879	0	1.4584	1.3192	0.4069	0.0873	0.0908	0.0164	0.0089	0	0	0	0
2004	1.9537	0.2545	0.3848	0.7551	0.4398	0.0804	0.0241	0.0150	0	0	0	0	0
2005	2.4099	0.0671	1.0930	0.7441	0.3554	0.0866	0.0316	0.0123	0.0166	0.0032	0	0	0
2006	1.3148	0.0976	0.2170	0.5915	0.2299	0.0957	0.0435	0.0214	0.0182	0	0	0	0
2007	1.8880	0.1295	0.5669	0.3869	0.4676	0.2012	0.0778	0.0408	0.0087	0.0043	0	0	0.0043
2008	3.0853	0.7816	0.4848	0.9581	0.4458	0.3256	0.0804	0.0090	0	0	0	0	0
2009	3.1169	0.4054	0.6606	0.8883	0.6241	0.3182	0.1330	0.0437	0.0244	0.0070	0.0122	0.0000	0.0000
2010	-	-	-	-	-	-	-	-	-	-	-	-	-
2011	2.5578	0.1173	0.6933	0.9333	0.5641	0.1232	0.0543	0.0275	0.0130	0.0130	0.0061	0.0052	0.0075
84-09 Mean	**1.9571**	**0.1294**	**0.8389**	**0.6676**	**0.2154**	**0.0680**	**0.0250**	**0.0081**	**0.0033**	**0.0008**	**0.0005**	**0.0000**	**0.0002**

Table 2.27. Tautog indices-at-age, 1984-2011.

Year and season specific age keys obtained from the LISTS spring and fall surveys were used to convert LISTS length frequencies to ages. Indices-at-age were then determined for each season by apportioning the spring and fall overall indices (from Table 2.10 and Table 2.11) by the percentage of fish in each age, and then summing the spring and fall indices-at-age. The age 1-20+ index is the sum of indices ages 1 – 20+. The age 20+ category includes 36 fish ranging from 20 to 30 years of age.

		Age									
Year	**1 - 20+**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1984	3.4693	0.0109	0.0816	0.1898	0.3030	0.4591	0.4949	0.2890	0.2857	0.3104	0.3533
1985	1.7966	0	0.0170	0.0943	0.1931	0.1677	0.1273	0.1837	0.3003	0.2021	0.0902
1986	1.7199	0.0015	0.0273	0.0924	0.0500	0.1049	0.2011	0.2409	0.2452	0.2864	0.1017
1987	1.2129	0.0237	0.0810	0.0585	0.0602	0.1003	0.1342	0.1908	0.1349	0.0957	0.0523
1988	0.9008	0.0038	0.0318	0.0463	0.0726	0.0449	0.0401	0.0756	0.1007	0.1641	0.0790
1989	1.2588	0	0.0421	0.0686	0.1369	0.0894	0.1154	0.1495	0.1600	0.1046	0.0817
1990	1.1611	0.0060	0.0895	0.1548	0.1117	0.1139	0.0493	0.0501	0.1247	0.0874	0.0622
1991	1.1468	0.0054	0.0225	0.0593	0.1190	0.1241	0.1487	0.0931	0.1254	0.1071	0.1067
1992	1.0253	0.0186	0.0505	0.0697	0.0417	0.0492	0.1229	0.1324	0.0849	0.0632	0.0636
1993	0.5693	0.0041	0.0206	0.0493	0.0321	0.0167	0.0605	0.0595	0.0423	0.0489	0.0522
1994	0.5838	0.0075	0.0379	0.0321	0.0685	0.0558	0.0551	0.0555	0.0799	0.0516	0.0312
1995	0.2529	0.0031	0.0091	0.0095	0.0297	0.0602	0.0269	0.0212	0.0346	0.0150	0.0219
1996	0.5627	0.0073	0.0518	0.0305	0.0086	0.0762	0.0452	0.0654	0.0712	0.0667	0.0608
1997	0.5079	0	0.0390	0.0675	0.0568	0.0574	0.0639	0.0491	0.0556	0.0486	0.0101
1998	0.6442	0	0.0425	0.0281	0.0701	0.0821	0.0876	0.0875	0.0848	0.0465	0.0575
1999	0.7614	0.0498	0.0792	0.0583	0.0666	0.1015	0.1379	0.0748	0.0843	0.0431	0.0203
2000	0.8004	0.0012	0.0466	0.0578	0.0830	0.0739	0.1402	0.1376	0.0897	0.0392	0.0467
2001	0.8946	0.0062	0.0299	0.0868	0.0830	0.1294	0.1197	0.1193	0.1058	0.0715	0.0454
2002	1.1665	0.0087	0.0261	0.0586	0.1011	0.1747	0.1972	0.1895	0.2091	0.0739	0.0419
2003	0.8978	0.0021	0.0142	0.0078	0.0597	0.1485	0.2385	0.1596	0.0893	0.0778	0.0185
2004	0.6933	0.0075	0.0206	0.0148	0.0361	0.0710	0.1930	0.1096	0.0494	0.0812	0.0440
2005	0.7596	0.0100	0.0367	0.0618	0.0261	0.0922	0.1437	0.1576	0.1064	0.0303	0.0268
2006	0.8405	0	0.0334	0.0345	0.1039	0.1274	0.1140	0.1196	0.1521	0.0620	0.0479
2007	0.6136	0.0024	0.0140	0.0167	0.0460	0.0478	0.0608	0.0919	0.0936	0.0966	0.0532
2008	0.7269	0.0035	0.0310	0.0428	0.0620	0.0848	0.1164	0.0708	0.0649	0.0831	0.0640
2009	0.4822	0.0150	0.0355	0.0074	0.0026	0.0394	0.0681	0.1013	0.0658	0.0319	0.0324
2010	0.2471	0	0.0105	0.0402	0.0093	0.0053	0.0315	0.0503	0.0294	0.0096	0.0093
2011	0.4457	0.0050	0.0395	0.0442	0.0516	0.0404	0.0459	0.0486	0.0472	0.0320	0.0273
84-10 Mean	**0.8549**	**0.0072**	**0.0362**	**0.0519**	**0.0666**	**0.0861**	**0.1092**	**0.1091**	**0.1071**	**0.0803**	**0.0508**

	Age									
Year	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20+**
1984	0.1262	0.2281	0.0933	0.0513	0.0449	0.0322	0.0463	0.0156	0.0006	0.0531
1985	0.1595	0.0982	0.0226	0.0994	0	0.0249	0.0039	0.0124	0	0
1986	0.1423	0.0863	0.0374	0.0523	0.0232	0.0071	0.0112	0.0003	0.0023	0.0061
1987	0.0607	0.0543	0.0479	0.0313	0.0246	0.0265	0.0105	0.0004	0.0048	0.0203
1988	0.0469	0.0395	0.0295	0.0225	0.0493	0.0086	0.0063	0.0055	0.0052	0.0286
1989	0.0569	0.0932	0.0430	0.0404	0.0348	0.0172	0.0067	0.0048	0	0.0136
1990	0.0978	0.0375	0.0567	0.0397	0.0221	0.0250	0.0088	0.0170	0.0035	0.0034
1991	0.0610	0.0258	0.0399	0.0361	0.0217	0.0005	0.0160	0.0117	0.0080	0.0148
1992	0.0599	0.0512	0.0440	0.0581	0.0236	0.0208	0.0167	0.0298	0.0167	0.0078
1993	0.0368	0.0351	0.0351	0.0129	0.0157	0.0152	0.0129	0.0097	0.0097	0
1994	0.0234	0.0238	0.0071	0.0118	0.0118	0.0096	0.0024	0.0047	0.0070	0.0071
1995	0.0036	0.0036	0.0073	0	0	0	0.0036	0	0	0.0036
1996	0.0230	0.0127	0.0103	0.0048	0.0100	0.0090	0.0086	0.0003	0.0001	0.0002
1997	0.0072	0.0119	0.0144	0.0048	0.0121	0.0071	0	0.0024	0	0
1998	0.0192	0.0164	0.0055	0.0055	0	0.0027	0.0055	0	0	0.0027
1999	0.0191	0.0090	0.0087	0.0029	0	0	0.0030	0.0029	0	0
2000	0.0213	0.0130	0.0123	0.0101	0.0084	0.0104	0.0023	0	0.0027	0.0040
2001	0.0407	0.0161	0.0152	0.0004	0.0053	0.0105	0.0036	0.0001	0.0026	0.0031
2002	0.0257	0.0185	0.0107	0.0070	0.0147	0.0039	0	0	0	0.0052
2003	0.0274	0.0088	0.0059	0.0184	0.0029	0.0124	0	0.0029	0	0.0031
2004	0.0204	0.0221	0.0119	0.0003	0.0028	0.0031	0.0026	0.0002	0	0.0027
2005	0.0347	0.0257	0.0039	0.0037	0	0	0	0	0	0
2006	0.0183	0.0200	0.0037	0	0.0037	0	0	0	0	0
2007	0.0294	0.0156	0.0194	0.0108	0.0019	0.0116	0	0.0019	0	0
2008	0.0322	0.0225	0.0228	0.0163	0.0098	0	0	0	0	0
2009	0.0343	0.0064	0.0091	0.0217	0.0070	0.0032	0.0011	0	0	0
2010	0.0192	0.0139	0.0048	0.0046	0.0046	0	0	0	0.0046	0
2011	0.0185	0.0136	0.0101	0.0075	0.0050	0.0026	0.0015	0.0023	0.0009	0.0020
84-10 Mean	**0.0462**	**0.0374**	**0.0231**	**0.0210**	**0.0131**	**0.0097**	**0.0064**	**0.0045**	**0.0025**	**0.0066**

Table 2.28. Weakfish age 0 and age 1+ indices of abundance, 1984-2011.
Using spring (May, June) and fall (September, October) length data, the geometric mean catch per tow was calculated for three groups of weakfish: fall age-0, spring - all fish age 1 and older (1+), and fall - all fish age 1 and older (1+). Weakfish less than 30 cm fork length in the fall were defined as age-0.

	Fall		Fall		Spring	
Year	age 0 count / tow	age 0 kg / tow	ages 1+ count / tow	age 1+ kg / tow	ages 1+ count / tow	ages 1+ kg / tow
1984	1.00	0.14	0.53	0.84	0.02	0.15
1985	6.19	0.74	0.24	0.46	0.00	0.10
1986	13.16	0.91	0.24	0.51	0.10	0.33
1987	0.63	0.13	0.11	0.16	0.02	0.11
1988	3.49	0.30	0.06	0.13	0.05	0.17
1989	8.69	0.94	0.02	0.10	0.04	0.16
1990	5.56	0.56	0.08	0.13	0.07	0.13
1991	11.95	1.44	0.31	0.41	0.28	0.26
1992	3.05	0.31	0.18	0.24	0.12	0.22
1993	4.08	0.46	0.12	0.18	0.10	0.15
1994	11.19	1.23	0.06	0.13	0.04	0.12
1995	5.22	0.84	0.70	0.64	0.18	0.16
1996	15.23	1.49	0.56	0.52	0.19	0.19
1997	12.38	1.03	0.89	0.81	0.42	0.34
1998	5.02	0.76	0.28	0.36	0.37	0.41
1999	30.93	3.21	0.39	0.51	0.45	0.59
2000	63.31	3.34	0.30	0.32	0.18	0.28
2001	40.09	2.20	0.52	0.54	0.27	0.26
2002	41.35	2.85	0.16	0.26	0.16	0.26
2003	49.41	1.77	0.07	0.17	0.04	0.14
2004	58.98	2.99	0.21	0.25	0.15	0.16
2005	25.86	2.50	0.12	0.18	0.27	0.23
2006	1.05	0.20	0.29	0.30	0.14	0.22
2007	63.93	3.86	0.06	0.14	0.11	0.22
2008	9.03	1.17	0.08	0.14	0.05	0.12
2009	6.48	0.57	0.30	0.22	0.08	0.16
2010	-	-	-	-	0.02	0.12
2011	11.64	0.87	0.68	0.55	0.10	0.15
84-09 mean	**19.85**	**1.43**	**0.25**	**0.31**	**0.16**	**0.22**

Table 2.29. Winter flounder indices-at-age, 1984-2011.

The Long Island Sound Trawl Survey April and May catch and age data was used to calculate the geometric mean indices-at-age. An April-May age key was used to convert lengths to ages, and an overall April-May index (the ages 1-13 index in the table) was apportioned by the percentage of fish at age. The 4+ index is the sum of indices ages 4-13 and represents the abundance of winter flounder that are recruited to the fishery. The age-0 indices were obtained from the Estuarine Seine Survey (Job 2 Part 2).

Catch-at-age: numbers											April-May					
Year	1 - 13	4+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12	Age 13
1984	111.96	27.91	-	8.21	44.01	31.83	20.96	4.23	1.23	0.67	0.74	0.04	0.01	0.03	0	0
1985	83.58	18.13	-	4.11	28.46	32.88	14.17	2.33	0.82	0.45	0.19	0.11	0.04	0.02	0	0
1986	63.65	15.43	-	6.69	26.00	15.53	12.26	2.05	0.50	0.24	0.24	0.10	0.01	0.03	0	0
1987	79.92	13.35	-	7.32	44.69	14.56	5.05	6.55	1.28	0.11	0.24	0.13	0	0	0	0
1988	137.59	12.13	15.40	14.49	71.87	39.10	8.59	1.83	1.46	0.16	0.04	0.02	0.02	0	0	0
1989	148.19	14.97	1.66	13.56	78.43	41.23	10.85	2.84	0.98	0.14	0.09	0.06	0.01	0	0	0
1990	223.09	15.29	2.85	11.31	131.52	64.97	8.97	4.09	1.96	0.19	0.05	0	0.02	0	0	0
1991	150.20	14.31	5.23	8.52	66.99	60.39	9.31	4.05	0.80	0.14	0	0	0	0.01	0	0
1992	61.39	10.49	11.90	6.80	31.32	12.78	8.97	1.10	0.36	0.05	0	0	0	0	0	0
1993	63.60	9.16	5.68	19.11	19.87	15.46	4.81	3.24	0.80	0.15	0.11	0.04	0.01	0	0	0
1994	84.44	4.87	14.23	9.57	64.14	5.86	3.01	1.14	0.49	0.17	0.05	0.01	0.01	0	0	0
1995	50.12	2.31	10.10	14.35	23.69	9.77	1.36	0.63	0.20	0.08	0.02	0.02	0.00	0	0	0
1996	110.62	15.92	19.22	11.46	59.07	24.17	14.41	0.97	0.28	0.14	0.06	0.04	0.01	0	0	0
1997	71.31	13.84	7.47	12.53	25.53	19.41	9.45	3.76	0.51	0.07	0.03	0.01	0.01	0.01	0	0
1998	72.91	17.06	9.16	11.22	32.40	12.23	12.67	3.15	0.99	0.14	0.02	0.07	0	0	0	0
1999	41.35	11.10	8.70	6.56	12.42	11.27	6.09	3.20	1.14	0.61	0.04	0.01	0.02	0	0	0
2000	45.41	13.26	4.33	7.11	16.66	8.40	7.70	3.42	1.53	0.31	0.26	0.01	0.01	0	0.01	0
2001	54.50	15.61	1.34	8.45	19.60	10.85	8.06	5.46	1.28	0.68	0.05	0.08	0	0	0	0
2002	43.71	7.99	3.06	6.27	19.90	9.56	4.43	1.95	1.02	0.35	0.11	0.03	0.10	0	0	0
2003	27.84	8.83	8.07	2.47	7.83	8.71	4.79	1.95	0.77	0.82	0.29	0.07	0.14	0	0	0
2004	20.46	6.81	10.96	6.32	3.88	3.45	3.88	1.92	0.64	0.21	0.11	0.03	0.01	0	0	0.01
2005	16.10	2.03	5.63	7.06	6.18	0.84	0.81	0.67	0.21	0.16	0.10	0.05	0.01	0.01	0	0
2006	5.59	0.74	0.93	1.14	2.60	1.10	0.19	0.14	0.17	0.09	0.01	0.09	0.03	0.02	0	0
2007	28.68	4.16	4.73	2.98	10.83	10.70	3.10	0.61	0.15	0.11	0.12	0.04	0.01	0.01	0.01	0
2008	24.11	4.97	1.97	11.46	3.49	4.18	4.12	0.65	0.12	0.04	0.03	0.01	0	0	0.01	0
2009	22.65	2.86	0.77	7.56	11.21	1.02	1.31	1.21	0.22	0.06	0.04	0	0.01	0	0.01	0
2010	20.88	1.84	0.96	6.64	8.45	3.94	0.71	0.57	0.44	0.11	0.01	0	0	0	0	0
2011	27.95	5.55	1.12	6.54	9.34	6.53	3.66	1.15	0.30	0.39	0.04	0	0	0	0	0
84-10 Mean	69.03	10.57	6.71	8.64	32.26	17.56	7.04	2.36	0.75	0.24	0.11	0.04	0.02	0.00	0.00	0.00

Catch-at-age: biomass (kg)											April-May					
Year	1-13	4+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11	Age 12	Age 13
1984	15.68	7.81	NA	0.31	3.06	4.50	5.18	1.51	0.49	0.30	0.28	0.03	0.01	0.01	0	0
1985	13.91	5.96	NA	0.15	2.54	5.26	3.97	0.97	0.46	0.33	0.11	0.08	0.03	0.02	0	0
1986	10.33	5.39	NA	0.24	2.16	2.55	3.68	0.88	0.32	0.21	0.16	0.09	0.01	0.03	0	0
1987	11.76	4.94	NA	0.30	4.03	2.50	1.39	2.59	0.64	0.08	0.14	0.09	0	0	0	0
1988	18.28	4.51	NA	0.54	6.06	7.17	2.64	0.93	0.74	0.12	0.03	0.02	0.03	0	0	0
1989	22.62	5.64	NA	0.43	7.99	8.56	3.62	1.32	0.47	0.10	0.07	0.05	0.01	0	0	0
1990	29.01	7.09	NA	0.33	10.37	11.21	3.79	2.19	0.89	0.14	0.04	0	0.04	0	0	0
1991	24.59	5.54	NA	0.32	6.82	11.92	3.53	1.47	0.43	0.10	0	0	0	0.01	0	0
1992	12.29	4.79	NA	0.27	3.82	3.41	3.81	0.71	0.25	0.02	0	0	0	0	0	0
1993	10.26	4.43	NA	0.54	1.93	3.36	1.96	1.73	0.51	0.11	0.08	0.04	0.01	0	0	0
1994	12.20	2.95	NA	0.34	7.13	1.79	1.51	0.77	0.43	0.16	0.06	0.01	0.01	0	0	0
1995	7.72	1.39	NA	0.51	2.70	3.12	0.71	0.39	0.18	0.08	0.02	0.01	0.01	0	0	0
1996	20.41	7.36	NA	0.41	6.11	6.53	6.32	0.61	0.22	0.12	0.06	0.03	0.01	0	0	0
1997	15.53	6.96	NA	0.48	2.61	5.48	4.26	2.23	0.36	0.07	0.03	0.01	0.01	0.01	0	0
1998	14.66	7.28	NA	0.36	3.59	3.43	4.88	1.64	0.60	0.09	0.02	0.05	0	0	0	0
1999	10.29	5.32	NA	0.23	1.41	3.33	2.60	1.59	0.69	0.39	0.02	0.00	0.03	0	0	0
2000	12.63	7.22	NA	0.32	2.31	2.78	3.68	2.05	0.96	0.29	0.21	0.01	0.01	0	0.01	0
2001	14.02	7.94	NA	0.27	2.33	3.48	3.39	3.05	0.87	0.51	0.05	0.07	0	0	0	0
2002	10.83	4.41	NA	0.31	3.05	3.06	2.13	1.12	0.70	0.28	0.09	0.02	0.07	0	0	0
2003	8.87	5.03	NA	0.09	0.96	2.79	2.35	1.21	0.50	0.59	0.23	0.06	0.08	0	0	0
2004	6.11	4.19	NA	0.19	0.53	1.20	2.13	1.24	0.50	0.18	0.10	0.02	0.01	0	0	0.01
2005	3.37	1.75	NA	0.28	0.96	0.38	0.57	0.61	0.22	0.17	0.09	0.06	0.02	0.01	0	0
2006	1.82	0.71	NA	0.06	0.48	0.58	0.16	0.13	0.17	0.08	0.02	0.09	0.05	0.02	0	0
2007	7.02	2.34	NA	0.12	1.18	3.38	1.55	0.37	0.14	0.10	0.11	0.03	0.01	0.01	0.01	0
2008	5.08	3.00	NA	0.39	0.39	1.30	2.31	0.47	0.11	0.05	0.04	0.01	0	0	0.01	0
2009	3.96	1.89	NA	0.28	1.48	0.32	0.68	0.88	0.20	0.05	0.04	0	0.01	0	0.02	0
2010	4.26	1.38	NA	0.24	1.16	1.49	0.40	0.45	0.42	0.10	0.01	0	0	0	0	0
2011	6.72	3.19	NA	0.23	1.34	1.96	1.81	0.78	0.22	0.35	0.04	0	0	0	0	0
84-10 Mean	12.13	4.71	NA	0.31	3.23	3.88	2.71	1.23	0.46	0.18	0.08	0.03	0.02	0.00	0.00	0.00

Note: 1984: April = 0 tows, May = 13 tows, and 19 tows in June used to increase sample size; 1985: April = 0 tows, May = 41 tows; 1986-1991, 1993-1995, 1997-2004, and 2009: April = 40 tows, May = 40 tows; 1992 and 2006: April = 0 tows, May = 40; 1996: April = 17 tows, May = 63 tows; 2005: April = 35 tows, May = 45 tows; 2007: April = 35 tows, May = 45 tows; 2008: April = 36, and May = 44 tows; 2010: May = 38 tows, 2011: April = 12 tows.

TABLES 2.30 - 2.62
LENGTH FREQUENCIES
LISTS

Table 2.30. Alewife length frequencies, spring and fall, 1 cm intervals, 1989–2011.
From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

Spring

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	2	0	0	0	0	0	0	4	0	0	1	0	1	0	0	4	0	2	1
8	0	0	0	0	18	3	3	0	0	0	2	9	16	0	3	1	2	0	0	4	1	10	0
9	0	0	2	0	15	9	6	1	6	0	6	21	32	1	18	6	16	0	0	4	6	10	0
10	0	0	0	1	11	19	18	2	22	7	6	28	23	5	32	55	32	0	8	5	11	23	5
11	0	0	5	4	10	44	11	2	64	11	20	52	14	6	27	87	26	29	13	32	10	9	22
12	6	0	4	7	6	83	17	8	127	12	32	43	5	29	25	100	55	44	34	131	17	6	54
13	1	0	4	4	47	122	48	16	63	44	42	99	4	70	11	83	61	15	38	193	24	12	48
14	0	0	9	7	77	172	35	26	69	61	56	234	7	139	28	63	37	9	37	178	51	6	50
15	3	0	8	5	68	140	54	32	56	51	120	334	6	157	25	33	50	49	85	86	101	8	59
16	2	0	8	5	84	159	38	86	44	50	144	320	4	86	26	31	74	25	128	46	106	7	37
17	5	4	4	16	63	108	32	203	28	34	330	85	5	82	21	33	73	78	161	47	142	5	7
18	4	4	9	8	59	81	7	254	32	22	136	15	4	15	19	18	71	93	182	25	196	2	11
19	6	7	7	2	37	33	7	180	9	11	99	20	3	6	26	42	59	86	122	49	215	7	11
20	3	1	7	2	27	24	10	161	17	17	82	22	9	17	13	30	26	76	105	38	137	7	9
21	1	0	3	1	13	17	14	107	34	22	72	27	12	28	22	50	21	40	71	21	53	18	9
22	4	2	8	2	10	26	12	103	48	18	47	41	18	46	25	48	18	18	41	14	29	22	10
23	5	1	8	6	3	12	12	76	44	16	47	90	36	63	40	36	7	5	28	16	13	12	16
24	7	0	3	2	1	12	7	34	28	14	21	58	45	49	42	13	6	1	10	7	14	4	7
25	3	2	1	0	3	5	2	9	9	2	11	11	23	12	29	11	3	1	3	0	11	2	4
26	1	0	1	2	1	5	1	3	1	2	2	1	5	7	17	5	2	0	2	0	1	0	2
27	2	0	1	0	0	1	0	0	0	0	0	1	2	1	2	2	1	0	0	0	0	0	0
28	1	0	0	0	1	1	0	0	0	1	0	0	0	1	0	2	1	0	0	1	0	0	2
29	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**56**	**21**	**93**	**74**	**556**	**1,076**	**334**	**1,304**	**701**	**395**	**1,275**	**1,515**	**274**	**820**	**452**	**749**	**642**	**569**	**1,068**	**901**	**1,138**	**172**	**364**

Fall

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
8	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	1	0	-	0
9	0	0	0	0	3	1	0	0	1	0	0	1	6	1	1	0	1	0	3	2	0	-	1
10	0	0	0	0	5	1	4	1	1	0	1	4	23	0	7	1	7	0	8	2	1	-	1
11	0	0	0	0	27	30	5	5	6	1	3	5	59	0	33	6	14	0	22	1	2	-	9
12	0	0	0	1	120	82	9	25	12	9	6	9	86	4	64	7	8	0	44	0	2	-	22
13	0	0	3	0	88	84	14	21	21	7	9	17	72	0	4	12	17	0	87	5	10	-	14
14	0	0	2	4	16	36	11	30	31	0	11	10	23	3	3	16	15	0	134	14	10	-	22
15	0	0	1	8	21	31	0	9	53	0	5	8	24	3	5	28	15	2	118	4	8	-	28
16	3	0	3	10	53	14	4	1	110	1	25	2	36	17	20	30	12	4	31	0	1	-	14
17	2	0	0	12	25	33	1	2	194	4	34	0	27	8	19	12	3	0	8	3	1	-	19
18	3	0	0	9	13	24	1	1	62	3	11	1	5	0	0	1	5	0	6	0	1	-	17
19	0	0	0	2	1	11	0	0	0	1	4	1	0	1	0	0	0	0	7	1	0	-	1
20	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	-	0
21	0	0	0	0	3	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	-	0
22	0	1	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0
23	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	-	0
24	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
25	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
27	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	**8**	**1**	**9**	**46**	**377**	**354**	**50**	**95**	**492**	**27**	**117**	**58**	**364**	**38**	**156**	**113**	**98**	**6**	**468**	**33**	**37**	**0**	**148**

Table 2.31. American shad length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989-2011.
From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

												Spring											
length	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
9	0	0	0	0	8	2	17	0	6	9	5	5	2	13	6	1	6	0	0	0	1	0	0
11	0	0	1	3	7	2	16	5	24	27	20	46	1	101	12	8	11	0	5	26	12	12	5
13	4	0	10	8	4	4	11	9	59	85	31	29	2	87	11	14	10	0	20	78	36	21	28
15	49	1	82	17	6	22	22	191	177	108	65	21	2	41	0	45	25	38	54	180	66	77	100
17	29	8	49	23	10	72	68	154	319	97	52	32	4	49	3	6	4	14	44	51	40	47	25
19	5	5	4	33	6	374	40	47	62	32	20	13	0	17	0	2	0	5	8	11	15	5	3
21	1	3	10	25	6	158	6	9	2	1	35	1	0	4	4	2	6	0	3	3	3	2	1
23	0	3	31	20	5	18	2	16	5	8	50	4	0	7	7	4	7	0	4	3	4	0	0
25	0	2	10	7	1	6	0	15	1	7	14	2	3	4	0	0	3	0	7	0	0	1	0
27	0	1	1	0	0	2	0	5	0	1	1	1	0	0	0	0	2	0	4	0	0	0	0
29	0	0	0	0	0	1	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	1	0	0	0	0	0	0
33	0	0	0	0	0	0	0	1	3	0	3	3	0	1	0	0	1	0	2	0	0	0	0
35	0	1	1	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	1	1	0	0
37	0	0	0	2	0	1	0	0	4	0	1	0	0	1	0	0	1	1	0	0	0	0	0
39	1	0	0	3	2	2	1	0	2	0	4	0	0	2	0	0	0	1	1	0	0	0	0
41	1	0	1	5	2	3	2	0	3	0	3	0	0	0	0	0	0	1	0	0	0	0	0
43	0	0	1	4	2	1	0	0	1	1	6	0	0	2	0	0	0	0	0	0	0	0	0
45	1	0	1	7	2	3	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	2	0	1	2	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0
49	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
51	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**91**	**24**	**202**	**163**	**61**	**675**	**189**	**452**	**669**	**378**	**313**	**157**	**14**	**337**	**43**	**83**	**79**	**60**	**152**	**353**	**178**	**165**	**162**

												Fall											
length	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
7	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	-	0
9	0	0	7	1	2	6	7	0	6	1	5	0	1	1	4	5	4	0	2	4	0	-	4
11	0	1	4	5	23	26	16	1	20	14	27	0	4	1	14	6	3	0	19	4	27	-	4
13	0	0	7	21	54	208	24	7	28	13	44	0	1	0	22	4	5	0	26	3	22	-	2
15	0	0	4	2	33	245	14	2	5	4	6	0	0	0	0	2	0	0	13	0	36	-	2
17	0	0	22	7	10	20	2	0	12	64	13	2	5	11	15	77	3	1	2	0	3	-	6
19	32	34	93	41	53	57	84	0	67	290	130	16	47	199	121	155	23	6	5	6	42	-	35
21	129	143	22	102	466	229	335	15	99	123	251	104	34	44	80	21	46	0	8	28	88	-	42
23	30	27	0	30	394	197	83	19	12	0	179	39	3	0	6	0	14	1	8	7	25	-	14
25	0	0	0	1	24	50	3	4	0	0	17	0	1	0	0	1	0	0	0	0	0	-	0
27	0	0	0	3	2	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
37	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
41	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
49	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
51	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	**192**	**205**	**159**	**214**	**1,061**	**1,047**	**568**	**48**	**251**	**509**	**674**	**161**	**96**	**256**	**262**	**273**	**98**	**8**	**83**	**52**	**243**	**-**	**109**

Table 2.32. American lobster length frequencies-spring, female, 1 mm intervals, 1984–2011.

Lobsters were measured from each tow.

Female	Spring																											
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Length	(32)	(46)	(116)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(189)	(120)	(80)	(120)	(120)	(120)	(78)	(92)
16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	2	0	2	0	4	0	0	1	0	0	0	0	0	1	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	1	0	0	3	1	0	2	4	0	0	0	1	0	0	0	0	0	1	0
23	0	0	0	0	0	0	0	0	0	4	0	1	3	1	1	2	6	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	2	1	8	0	2	0	1	0	0	0	0	2	0	0	1	0
25	1	0	0	0	0	0	1	0	0	1	0	1	1	0	3	2	0	0	0	0	0	0	0	0	0	1	0	0
26	0	0	0	0	0	0	0	3	5	0	0	0	6	9	3	9	2	0	0	1	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	1	0	0	1	0	5	7	12	4	6	9	0	0	1	0	0	0	0	0	0	0	0
28	0	2	0	0	1	0	0	3	0	1	1	0	5	8	6	10	11	1	0	0	0	0	0	1	0	0	0	0
29	0	0	1	2	0	0	0	4	0	2	0	0	13	14	7	8	13	3	2	1	1	0	0	0	0	0	0	2
30	0	0	0	1	1	0	11	6	0	5	3	0	13	12	95	2	19	2	0	1	0	0	0	1	0	0	0	1
31	0	0	0	0	1	1	6	3	6	1	1	4	8	22	19	16	20	1	4	1	0	0	0	0	0	0	0	0
32	0	0	0	1	0	0	13	7	2	20	0	2	15	13	18	21	23	2	2	1	1	0	0	0	0	0	1	0
33	0	1	0	2	2	6	8	0	5	1	6	21	14	13	35	18	8	3	0	2	1	1	0	5	1	0	0	2
34	0	3	0	1	0	0	5	8	15	4	0	18	7	22	64	8	37	4	8	2	3	0	0	4	0	0	1	0
35	4	4	3	2	0	0	9	1	4	6	4	22	15	22	59	22	48	3	5	2	1	2	0	4	0	1	0	0
36	5	3	2	11	0	0	9	8	6	14	0	8	14	21	41	26	48	3	5	2	0	0	0	0	0	0	0	0
37	0	4	1	2	0	0	10	9	6	7	11	27	21	42	58	29	36	2	3	4	0	2	0	3	3	0	0	1
38	2	0	0	7	2	4	6	11	13	17	1	49	10	31	72	42	35	7	10	2	3	0	1	5	0	0	1	1
39	1	3	0	3	5	1	0	8	12	9	4	22	16	39	73	34	53	7	3	2	3	2	0	10	3	1	2	4
40	1	4	2	10	4	4	7	6	17	28	8	41	18	30	98	23	68	8	10	6	5	2	3	11	1	0	3	1
41	2	3	1	18	2	3	22	9	10	23	8	18	18	17	71	36	58	11	8	4	2	2	2	13	1	3	2	0
42	1	6	3	8	1	3	17	22	9	41	11	46	18	33	143	54	65	11	18	5	6	0	0	5	2	0	1	1
43	1	1	1	22	0	11	19	16	11	13	11	53	27	44	59	50	84	9	6	8	6	4	1	7	1	2	1	0
44	1	1	2	16	6	2	13	12	14	25	9	61	22	32	43	38	117	19	15	15	4	5	4	9	3	3	0	1
45	0	2	1	9	1	12	11	12	5	24	8	38	22	36	135	35	138	9	14	3	3	2	2	9	0	0	1	0
46	4	3	1	12	3	8	4	18	26	30	2	34	22	42	88	64	102	15	22	4	0	1	4	3	3	1	1	2
47	2	1	4	31	2	14	4	21	8	40	8	59	35	53	70	77	91	18	20	25	7	2	5	11	3	1	0	1
48	2	2	2	15	6	20	22	17	28	35	12	54	31	56	104	59	72	11	17	9	7	6	2	7	3	5	3	2
49	4	4	4	10	4	7	13	28	19	67	15	37	32	55	198	90	89	8	15	15	5	1	3	7	2	2	0	5
50	6	1	6	7	4	7	16	18	5	40	21	51	43	67	139	63	104	13	21	13	6	2	0	10	6	1	0	3
51	4	5	6	8	3	15	33	24	22	59	16	58	48	88	133	95	109	31	17	13	5	2	4	16	6	3	1	0
52	9	8	3	15	3	14	29	45	32	35	33	58	57	73	165	89	125	40	25	11	6	4	3	13	3	3	1	0
53	10	4	4	20	5	19	14	38	31	54	24	53	47	82	167	89	83	32	26	9	6	6	5	14	3	3	0	0
54	2	4	6	15	2	22	38	35	18	38	29	44	45	87	140	84	152	30	41	15	6	7	2	9	3	3	1	1
55	9	2	8	14	3	9	26	19	26	47	17	59	64	82	191	91	132	34	38	21	8	9	11	20	6	7	2	2
56	6	9	11	12	14	15	31	47	16	60	17	64	56	98	152	99	85	44	24	14	10	14	2	20	7	0	3	0
57	10	3	6	10	11	23	24	57	61	79	24	46	60	95	159	156	102	44	28	11	7	10	7	17	12	6	1	2
58	1	8	7	15	6	25	38	35	27	53	17	56	62	111	144	118	118	38	35	11	12	12	7	15	9	5	5	1
59	10	18	7	14	7	29	13	51	28	52	37	70	66	97	144	147	105	45	32	12	12	11	9	15	4	3	5	0
60	6	12	11	19	9	25	34	45	43	57	30	91	76	97	114	102	97	60	48	15	16	10	3	24	6	4	1	3
61	5	14	11	8	12	15	33	49	31	56	44	62	62	92	181	160	79	46	40	21	6	20	13	28	7	3	2	2
62	12	9	5	11	4	12	57	33	34	75	46	61	67	94	118	116	75	59	46	13	11	14	9	22	10	7	2	2
63	4	9	10	27	9	27	56	41	25	60	44	60	70	96	133	136	66	43	41	28	14	13	6	23	11	5	4	1
64	10	16	9	16	8	13	38	33	41	75	24	64	91	86	176	148	110	75	46	23	11	16	8	25	10	6	1	1
65	9	7	9	29	15	25	46	45	26	68	28	72	78	110	169	160	84	63	48	10	16	19	12	16	13	10	0	0
66	11	15	18	25	10	21	43	59	48	86	26	84	87	116	147	121	99	55	39	15	19	9	3	21	23	8	1	0
67	6	20	22	21	14	31	33	51	41	52	28	67	62	98	148	171	90	72	42	16	23	23	9	17	8	4	4	1
68	21	10	12	43	11	14	41	65	37	45	29	76	73	94	142	158	107	49	48	19	20	13	14	21	15	7	4	2
69	10	8	18	33	16	16	36	78	56	58	30	71	57	107	148	188	76	79	52	28	16	13	1	13	19	10	2	2
70	15	5	14	30	13	29	51	59	37	67	27	79	74	119	157	177	86	67	57	25	21	12	6	23	20	6	6	0
71	10	11	12	21	12	13	29	48	49	67	44	92	88	125	117	166	91	74	45	24	15	18	10	23	14	6	3	4
72	11	6	20	18	8	24	40	50	48	61	30	77	91	107	157	177	98	75	80	20	13	22	10	30	15	8	0	1
73	13	9	18	13	14	20	47	39	54	54	37	97	69	107	171	164	99	59	61	30	17	17	8	23	18	8	6	1
74	10	6	17	20	8	24	24	43	52	45	39	60	74	130	153	215	104	66	70	25	11	12	9	17	13	6	5	0
75	15	12	17	28	7	20	67	87	56	54	25	83	68	103	181	196	124	80	47	27	16	19	9	17	14	7	5	0
76	14	9	20	14	8	25	67	71	41	38	24	78	69	114	229	185	102	59	45	15	9	16	11	13	25	5	9	0
77	9	5	15	19	15	32	41	77	69	44	20	102	65	95	160	195	109	52	39	23	16	13	17	16	11	6	3	2
78	24	9	15	14	13	49	60	57	63	64	22	90	61	110	177	176	93	48	55	18	7	9	15	16	16	10	4	4
79	23	6	24	21	10	55	42	64	35	52	30	77	92	117	179	203	98	51	52	11	10	9	13	14	12	14	3	2
80	22	1	18	10	11	35	34	45	31	71	41	71	79	92	180	200	91	63	41	16	15	9	11	15	8	7	9	3
81	10	2	7	15	13	19	69	56	49	48	34	72	86	148	170	140	85	62	33	11	15	9	9	12	16	2	8	2
82	9	0	3	9	5	15	28	41	36	35	21	71	57	110	108	106	47	40	21	14	8	6	5	14	10	4	5	0
83	9	5	5	8	3	7	25	22	16	7	7	15	31	28	65	59	41	25	17	4	4	7	3	9	14	9	2	1
84	3	1	7	9	4	11	15	12	7	8	4	11	19	20	7	33	14	18	18	4	4	5	3	5	7	7	2	0
85	5	2	5	7	6	3	11	5	7	8	8	17	20	28	22	9	15	9	7	1	5	1	0	5	6	2	1	2
86	9	3	6	3	6	8	14	14	3	3	2	11	23	24	23	10	12	8	11	2	0	3	0	2	7	1	4	0
87	10	0	3	4	8	13	17	9	7	13	15	16	11	13	12	9	8	7	4	4	1	3	3	0	1	2	1	0
88	2	3	8	3	9	9	6	11	3	11	2	7	13	18	17	5	1	9	1	0	1	0	0	2	5	3	2	0
89	3	6	5	8	5	8	12	10	12	5	2	16	12	16	13	11	8	9	5	1	1	1	0	3	0	1	0	0
90	15	2	4	3	8	4	5	8	11	3	3	9	15	10	11	10	7	10	4	1	4	2	0	1	4	0	0	0
91	5	1	1	6	2	5	11	8	1	3	0	5	7	11	6	3	2	4	0	0	0	2	1	0	0	0	2	0
92	4	2	0	2	3	2	7	1	0	3	3	3	5	7	7	2	1	2	7	0	1	0	0	0	1	3	0	0
93	0	1	2	1	2	1	2	1	0	0	1	0	6	3	0	2	5	0	1	0	0	0	1	0	1	0	3	0
94	0	2	1	1	3	1	1	2	0	1	5	1	1	1	4	1	0	1	0	1	0	0	0	1	2	0	0	0
95	0	0	1	2	2	3	8	4	0	0	0	0	0	0	6	0	0	1	1	0	0	0	0	1	0	1	0	0
96	0	1	0	0	0	2	0	1	0	1	2	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0
97	1	1	1	0	3	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
98	2	2	0	1	0	1	1	0	1	0	0	0	1	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0
99	3	0	2	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
101	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
102	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
106	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
109	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
110	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
111	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	451	335	469	838	405	914	1,621	1,946	1,560	2,336	1,131	3,052	2,837	4,220	6,921	5,731	4,595	2,011	1,646	709	483	458	296	737	449	238	144	69
legal size	81.0					81.8		82.6															83.3	84.1			85.7	

Table 2.33. American lobster length frequencies–fall, female, 1 mm intervals, 1984–2011.

Lobsters were measured from each tow.

Female	Fall																										
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Length	(70)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(120)	(120)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(40)	(80)	(80)	(40)	(80)	(40)	(80)	(0)	(80)
16	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
17	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
21	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
22	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0
23	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0
24	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
25	0	0	0	0	0	1	0	0	0	0	0	1	2	0	0	0	0	1	0	0	1	0	0	0	0	0	-	0
26	0	0	0	0	0	0	0	0	0	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0
27	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	-	0
28	0	0	0	0	0	0	1	0	4	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
29	0	0	0	0	0	1	1	0	0	3	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-	0
30	0	0	0	0	1	0	4	0	2	5	3	0	5	7	2	0	0	0	0	0	0	0	0	0	0	1	-	0
31	0	0	1	0	0	0	3	0	7	11	8	1	5	4	0	0	1	1	0	0	1	0	0	0	0	0	-	0
32	1	0	0	0	0	0	3	1	15	4	13	1	4	5	0	0	0	0	0	0	0	0	0	0	0	0	-	0
33	0	0	0	2	1	1	3	12	9	2	2	0	0	1	1	5	0	0	0	0	0	0	0	0	1	0	-	1
34	1	0	0	0	2	1	0	6	16	3	17	2	6	8	1	8	0	0	0	0	1	0	0	0	0	0	-	1
35	0	0	6	1	0	2	3	0	23	5	16	3	8	6	0	2	1	0	0	0	1	0	0	0	0	0	-	1
36	4	0	1	1	1	3	1	1	31	7	26	0	8	14	0	5	0	0	0	0	0	0	0	0	1	0	-	0
37	4	0	2	0	3	2	10	22	19	2	19	5	5	7	1	8	1	0	1	0	1	1	0	0	0	0	-	0
38	3	2	2	3	3	2	8	1	24	9	23	1	18	17	2	13	1	2	0	0	0	1	0	0	0	0	-	0
39	6	0	10	1	1	0	9	15	32	6	22	0	7	22	2	4	1	2	1	0	0	0	2	0	0	1	-	0
40	0	0	3	1	12	14	14	20	35	16	24	12	23	15	3	8	1	1	0	0	0	0	0	0	0	0	-	0
41	3	0	0	5	2	6	19	21	32	22	52	8	39	15	7	13	2	0	0	1	2	1	0	0	0	0	-	1
42	7	0	5	0	4	2	3	36	52	21	43	7	24	49	9	17	2	3	0	0	2	0	1	0	0	0	-	0
43	5	0	2	4	4	2	16	23	30	39	52	16	20	25	5	15	3	0	1	1	1	4	0	0	0	0	-	0
44	29	7	1	8	1	6	11	32	32	29	63	14	46	47	9	17	5	0	2	1	2	1	0	0	0	2	-	1
45	18	0	7	3	2	0	12	25	50	17	57	22	38	32	7	27	4	2	2	1	0	1	1	0	0	1	-	0
46	10	0	1	11	6	6	26	34	42	43	63	20	33	50	12	18	9	3	2	1	5	2	2	1	0	0	-	1
47	21	7	3	12	2	12	18	52	47	44	41	27	32	42	5	16	2	1	0	1	2	0	0	0	0	1	-	1
48	10	5	4	14	8	18	19	35	58	52	69	28	33	58	14	15	7	2	6	0	2	2	1	0	1	0	-	0
49	29	6	7	14	15	11	15	27	77	58	47	47	19	71	11	27	10	2	4	2	4	1	1	0	0	1	-	0
50	27	9	6	21	12	4	31	41	52	38	69	54	28	61	13	31	10	6	2	2	2	4	3	2	3	0	-	0
51	35	8	2	12	3	11	10	44	73	72	94	45	41	49	15	30	13	6	3	1	2	2	0	0	1	0	-	0
52	26	11	3	15	3	11	21	40	66	54	59	51	42	120	18	34	13	3	6	3	5	2	1	0	0	0	-	1
53	33	8	3	22	10	7	22	55	82	94	55	43	43	106	29	18	16	9	3	1	6	10	2	3	1	3	-	0
54	16	8	18	11	12	14	20	41	61	83	76	38	58	82	17	45	28	8	1	3	2	2	3	1	2	3	-	1
55	23	10	27	21	2	6	22	59	58	59	54	39	45	102	48	32	18	9	1	3	7	8	1	1	3	1	-	3
56	45	10	11	36	10	24	22	29	82	87	74	45	41	90	23	32	33	12	1	3	6	0	3	2	1	6	-	3
57	16	15	16	18	7	7	15	52	71	71	78	50	44	121	24	39	22	13	5	2	13	5	2	1	10	6	-	2
58	23	16	11	19	13	17	36	55	63	119	79	69	47	114	29	31	23	14	6	5	5	8	1	2	2	5	-	1
59	21	11	13	26	13	23	30	79	66	110	84	48	46	110	35	36	28	18	5	6	10	4	4	0	2	5	-	0
60	30	18	20	18	7	17	16	74	53	115	70	53	51	140	29	35	34	8	6	9	7	6	1	4	5	2	-	1
61	10	4	17	24	12	14	37	46	52	91	79	51	56	119	34	37	27	9	5	2	12	7	2	1	2	6	-	1
62	27	16	23	21	14	32	41	64	53	107	117	44	53	133	39	44	32	19	3	5	10	3	5	1	2	8	-	1
63	31	14	13	22	8	20	22	53	66	130	93	58	41	126	51	45	29	19	6	6	16	12	4	4	4	5	-	0
64	25	10	15	29	23	31	26	71	38	100	86	79	38	139	34	44	29	21	9	12	19	5	4	4	4	7	-	0
65	17	9	39	24	15	28	26	77	44	93	89	49	43	146	49	42	37	18	9	6	15	9	1	2	3	9	-	0
66	24	26	25	23	15	16	42	70	56	90	87	82	53	126	51	43	26	19	5	5	10	7	1	4	1	6	-	0
67	17	24	33	11	19	16	29	38	43	78	106	51	38	117	26	53	31	17	8	11	14	6	2	3	3	8	-	0
68	15	8	27	18	22	30	36	41	42	94	77	48	55	124	54	44	37	19	7	6	4	8	1	6	4	4	-	0
69	13	18	15	27	26	32	21	34	61	104	85	38	50	136	54	47	30	22	4	8	16	12	5	1	4	3	-	1
70	63	18	42	27	34	23	20	36	51	122	63	60	55	128	47	35	34	23	17	4	13	5	0	4	3	3	-	0
71	26	21	28	34	33	40	30	50	50	94	87	62	87	127	50	40	20	20	3	6	14	2	0	2	3	6	-	2
72	27	16	27	32	13	12	39	58	31	81	85	38	49	150	41	53	32	25	11	12	10	3	2	3	6	4	-	0
73	21	29	42	24	18	15	58	46	33	74	69	60	40	106	41	47	36	24	9	6	10	5	2	6	4	5	-	1
74	31	17	23	29	14	21	36	30	39	85	73	44	38	111	37	49	39	19	12	7	16	9	3	2	3	1	-	1
75	39	14	25	24	14	12	21	31	25	66	84	31	58	122	67	50	29	28	7	7	16	5	3	7	3	1	-	1
76	31	14	22	36	14	13	35	27	35	112	50	38	57	113	47	43	26	21	10	8	15	5	3	4	2	3	-	0
77	17	16	10	26	13	14	17	37	40	74	72	36	23	64	41	31	22	18	2	1	18	5	3	4	0	1	-	0
78	27	17	24	27	27	21	22	24	19	57	53	19	34	96	43	38	20	33	6	15	5	8	2	2	0	2	-	0
79	26	19	16	37	31	13	29	33	26	72	42	28	28	91	34	28	32	21	2	9	12	6	3	5	3	5	-	0
80	33	11	15	20	23	12	6	14	23	65	26	25	44	91	25	32	26	19	14	2	16	4	2	5	1	4	-	0
81	13	7	13	14	5	10	12	18	24	36	38	36	41	61	25	28	20	20	2	4	3	4	0	0	2	5	-	3
82	9	2	19	6	6	2	10	14	10	39	26	25	21	52	23	23	14	7	2	5	3	8	3	2	0	5	-	0
83	10	5	8	12	6	12	8	3	11	17	11	12	31	20	10	6	13	7	4	1	2	9	1	5	0	4	-	0
84	5	6	2	7	1	1	4	10	8	17	22	10	7	17	5	4	7	6	0	0	2	1	0	0	1	3	-	0
85	9	1	8	6	9	3	6	17	7	8	20	5	5	13	5	2	5	3	1	0	2	1	0	1	2	1	-	0
86	11	2	9	10	0	1	10	12	4	10	14	1	6	12	5	2	6	1	0	0	2	1	0	0	0	1	-	0
87	11	6	9	8	23	4	18	12	5	16	20	1	8	11	3	5	5	3	0	1	1	2	1	0	1	1	-	1
88	9	3	9	9	3	1	3	9	9	13	8	1	20	10	7	5	2	1	0	0	0	1	0	0	0	0	-	0
89	3	4	6	2	7	3	5	1	8	8	12	5	13	14	1	3	3	3	0	0	0	4	0	0	1	0	-	0
90	8	1	3	6	0	1	6	1	5	1	15	9	5	10	1	2	1	2	1	0	0	1	0	0	0	1	-	0
91	3	1	2	5	0	1	1	0	3	0	5	0	9	3	2	1	1	0	0	0	0	0	0	0	0	1	-	0
92	8	0	0	2	1	1	4	1	7	1	6	1	3	1	3	0	0	0	0	0	0	0	0	0	0	2	-	0
93	2	2	0	3	2	0	0	1	2	1	8	0	1	4	2	1	0	0	0	0	0	0	0	0	0	0	-	0
94	0	2	0	1	0	0	0	2	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	-	0
95	1	0	0	1	6	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	0
96	3	0	0	1	1	0	1	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-	0
97	15	1	0	1	1	0	1	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	0
98	2	1	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
99	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
100	0	1	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
101	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
102	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
103	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
104	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
105	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
107	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
111	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
113	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
117	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	1,089	523	759	907	622	688	1,133	1,917	2,301	3,264	3,198	1,795	1,979	4,196	1,329	1,511	957	596	223	195	365	225	84	94	96	150	-	31
legal size:	81.0					81.8		82.6														83.3	84.1				85.7	

Table 2.34. American lobster length frequencies–spring, male, 1 mm intervals, 1984–2011.

Lobsters were measured from each tow.

Male	Spring																											
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Length	(32)	(46)	(116)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(119)	(120)	(80)	(120)	(120)	(120)	(78)	(92)
16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	3	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	1	0	0	0	1	0	0	0	0	0
23	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	2	0	0	0	0	2	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	2	0	2	0	1	0	6	0	1	3	0	0	3	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	1	1	0	4	6	4	0	0	0	0	0	0	1	0	0	0	0
26	0	0	0	0	0	0	0	0	0	4	0	0	4	3	2	2	2	1	0	0	2	0	0	0	0	0	0	2
27	0	0	0	0	0	9	0	0	1	9	2	0	2	1	2	1	1	2	0	1	0	0	0	0	1	0	0	0
28	0	0	0	0	0	0	0	0	1	3	1	0	2	1	5	2	12	2	2	0	0	0	0	1	1	0	0	0
29	0	0	0	0	0	0	0	0	0	9	0	0	2	3	5	0	9	3	1	0	0	0	0	0	0	0	0	3
30	0	0	0	1	0	1	5	0	5	1	0	3	10	5	2	4	15	3	1	2	1	0	0	0	0	0	0	0
31	0	1	0	1	1	0	0	8	4	3	2	0	8	13	14	7	18	3	4	0	0	1	1	1	0	0	0	0
32	0	0	0	0	3	6	0	6	6	8	1	8	9	12	11	16	17	2	2	5	0	0	0	2	0	0	1	1
33	0	2	1	2	0	0	1	9	0	6	4	15	6	9	4	15	16	3	9	3	0	1	0	1	1	0	0	1
34	0	0	3	2	0	1	1	5	1	6	0	27	19	16	52	12	25	2	4	1	0	0	0	5	0	0	1	0
35	2	0	2	0	0	0	4	5	9	5	1	20	12	22	26	23	33	2	5	2	4	0	1	2	1	0	0	1
36	2	4	0	1	1	7	14	4	5	7	3	17	13	24	34	19	26	6	1	3	1	2	0	6	0	0	1	3
37	1	1	2	5	0	3	2	23	9	12	4	15	20	32	58	35	32	5	3	2	4	2	0	7	1	0	0	1
38	0	1	1	5	2	7	14	9	1	26	3	18	18	21	93	12	28	3	8	4	2	1	2	7	0	0	2	1
39	0	0	0	10	0	6	12	5	7	15	4	31	15	20	33	20	35	11	9	4	3	2	3	8	0	1	0	0
40	0	2	0	7	2	8	3	5	12	17	7	25	21	41	32	20	52	8	10	2	0	1	2	4	2	0	1	3
41	0	2	2	9	1	0	11	8	7	4	10	28	19	41	75	46	55	3	13	7	3	0	1	6	3	0	2	2
42	4	2	0	3	1	9	13	10	13	42	7	39	18	46	125	36	63	14	9	10	3	5	0	16	3	2	0	3
43	1	2	1	16	0	9	14	9	12	23	5	52	26	24	70	51	32	5	9	10	5	2	2	8	1	1	1	0
44	3	0	1	15	1	3	10	11	6	42	9	17	21	50	170	44	110	10	15	9	1	0	4	12	2	1	3	3
45	1	5	4	22	3	7	7	20	13	45	6	39	28	46	76	50	65	17	16	20	5	3	2	9	3	1	2	2
46	0	2	2	24	2	24	7	12	25	37	9	32	22	66	155	71	74	19	18	18	4	3	2	11	0	4	1	3
47	0	1	2	31	7	3	2	17	47	32	9	54	32	66	146	87	65	17	9	4	4	4	1	16	0	2	2	1
48	6	6	5	9	1	8	20	17	7	23	6	45	32	78	93	60	57	22	29	6	3	6	5	8	4	2	2	0
49	9	3	4	24	4	22	20	45	21	40	19	46	18	82	120	87	69	16	18	8	15	3	4	16	3	3	1	0
50	7	3	1	19	4	23	10	21	25	30	21	29	35	61	66	83	110	34	22	16	7	6	4	9	4	2	0	2
51	3	4	4	12	2	20	26	42	16	75	16	62	45	57	158	90	65	24	31	19	8	8	9	10	3	5	0	0
52	9	5	2	12	2	15	23	21	25	37	31	49	52	75	81	80	100	27	27	14	10	6	2	12	3	2	2	0
53	5	9	7	17	4	10	12	33	16	41	26	60	50	56	138	69	66	25	20	11	5	7	5	19	6	4	1	0
54	10	3	16	14	7	14	30	45	36	43	29	74	49	74	210	79	110	33	38	26	15	6	5	21	5	4	1	4
55	5	3	6	18	7	23	16	42	27	50	27	46	51	82	101	101	114	38	23	18	2	9	6	12	5	3	2	1
56	3	12	11	17	10	6	34	38	37	44	14	70	54	83	130	82	95	37	29	19	13	11	9	7	7	6	6	2
57	1	7	10	26	11	17	36	30	12	51	27	54	60	68	145	93	95	43	35	22	7	6	5	21	4	3	3	3
58	12	7	5	10	4	19	44	71	31	47	35	41	83	96	111	111	99	43	46	11	12	8	5	13	8	1	2	1
59	3	13	7	12	14	25	29	57	27	88	34	71	56	67	63	144	89	43	43	13	6	11	10	24	9	7	4	2
60	1	9	14	29	8	23	49	50	37	42	34	94	84	156	121	105	105	56	35	24	8	9	6	16	9	6	1	0
61	9	14	16	12	10	22	39	56	46	62	34	77	59	102	176	123	83	51	36	28	14	10	14	11	11	6	3	3
62	11	10	13	15	6	30	44	78	36	65	54	57	58	127	152	117	84	69	44	20	11	12	7	12	16	12	2	0
63	18	15	16	28	8	24	52	65	54	44	36	59	60	101	167	132	73	54	44	24	16	13	13	19	19	5	6	2
64	8	16	12	26	8	21	45	72	43	63	27	73	90	95	153	133	98	69	46	26	10	14	8	22	16	4	8	3
65	13	8	11	20	15	20	47	55	36	73	33	77	73	97	165	111	96	75	50	30	21	17	8	16	16	8	2	1
66	5	10	11	26	16	32	49	71	31	71	23	39	73	107	223	129	64	56	39	23	31	15	6	22	23	2	6	2
67	1	5	11	26	11	32	29	57	44	39	21	69	60	118	182	149	66	77	53	24	16	14	6	33	19	1	3	1
68	5	10	13	12	7	21	33	80	48	26	34	67	64	100	147	116	81	82	32	36	22	23	11	20	19	10	5	0
69	8	9	10	19	24	25	39	71	46	43	32	57	79	101	156	140	77	73	51	25	11	20	8	16	11	4	3	4
70	8	11	14	23	7	34	38	50	51	27	24	60	77	99	158	152	85	73	44	27	21	16	9	15	21	11	5	2
71	9	5	13	22	13	29	55	66	23	48	42	85	58	91	112	152	62	71	56	20	29	20	7	4	18	5	11	3
72	6	17	13	14	17	33	40	93	42	37	41	59	85	111	145	105	72	62	42	23	13	11	8	25	15	7	4	3
73	14	5	10	21	11	28	37	94	42	34	27	93	64	82	122	109	61	63	46	15	22	16	6	13	14	3	6	1
74	6	9	27	21	11	45	40	74	36	32	33	67	71	92	146	123	74	85	40	35	15	10	2	15	8	9	5	3
75	6	3	13	15	10	35	29	63	40	48	21	84	62	73	81	120	52	72	39	21	16	14	6	19	11	5	2	3
76	12	3	20	16	18	18	33	79	23	32	23	47	48	67	143	122	49	69	50	25	9	11	4	13	8	3	4	2
77	9	7	10	14	7	22	30	69	31	24	12	50	54	66	115	97	57	63	35	24	18	17	2	8	14	10	6	2
78	18	3	18	9	11	33	46	37	29	38	20	55	35	46	113	90	37	56	55	14	9	8	4	9	13	8	0	2
79	7	9	15	21	15	22	31	77	19	41	30	36	43	64	129	83	43	57	31	14	13	9	7	13	7	12	6	4
80	5	6	9	22	5	23	34	49	22	19	32	52	37	57	77	63	47	67	39	19	8	10	6	15	9	4	7	0
81	8	0	9	11	1	34	21	53	34	31	19	43	27	70	118	67	44	45	41	11	6	8	5	11	9	10	3	1
82	2	3	2	10	4	9	18	39	25	13	13	51	27	62	97	83	23	36	31	10	7	2	1	16	8	2	2	0
83	9	0	5	9	7	18	12	33	24	6	7	15	15	47	33	41	37	25	21	4	8	4	7	2	8	6	0	3
84	5	1	8	12	2	5	10	33	9	7	3	26	8	34	28	29	24	23	21	8	7	3	3	8	10	2	2	2
85	3	2	6	8	4	6	9	28	6	3	0	14	4	49	18	20	26	23	18	2	8	3	5	5	1	2	1	1
86	1	3	5	1	6	26	8	28	7	4	2	15	13	12	19	17	30	23	15	1	8	1	1	7	6	1	2	1
87	3	0	1	13	8	9	4	31	0	0	6	3	6	30	37	23	11	15	8	3	3	1	2	1	7	4	0	2
88	0	0	5	4	1	14	2	21	2	0	4	14	4	32	15	27	12	10	13	2	2	1	1	1	4	1	1	0
89	5	0	2	2	3	2	6	21	5	0	2	11	3	33	28	23	13	10	8	2	1	3	2	0	4	4	2	0
90	0	0	0	1	5	6	5	24	2	1	0	7	7	30	25	24	16	11	9	3	0	0	1	3	3	4	0	1
91	4	0	1	7	4	7	5	26	6	1	0	7	2	25	11	20	11	14	8	3	1	4	0	0	3	2	1	1
92	2	0	2	4	2	3	1	24	1	3	0	8	11	23	15	9	8	10	10	1	0	1	1	0	1	0	0	1
93	0	0	3	6	1	10	0	5	0	1	0	8	2	6	27	4	13	9	4	0	1	1	0	5	0	0	0	0
94	0	2	1	3	0	1	0	9	1	0	0	9	2	7	16	17	11	9	4	3	2	0	1	0	3	0	0	1
95	1	0	0	5	0	0	0	1	0	1	2	7	1	4	5	8	7	0	1	2	1	0	0	0	1	1	0	0
96	0	0	1	1	0	0	2	8	1	1	0	6	0	1	8	4	5	2	3	0	1	0	0	0	0	0	0	0
97	3	3	1	2	1	9	2	2	4	0	0	3	0	6	3	4	1	2	0	1	0	0	0	0	2	1	0	0
98	0	0	0	3	0	0	1	1	0	0	1	0	0	2	0	0	1	0	2	1	0	1	1	0	0	0	0	0
99	2	0	0	1	0	1	0	2	0	0	0	1	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0
100	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0
101	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
104	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
107	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**317**	**295**	**436**	**854**	**375**	**1,031**	**1,362**	**2,429**	**1,371**	**1,906**	**1,064**	**2,690**	**2,389**	**3,875**	**6,112**	**4,554**	**3,624**	**2,198**	**1,633**	**843**	**541**	**439**	**266**	**690**	**451**	**231**	**149**	**99**
legal size			81.0			81.8									82.6								83.3		84.1		85.7	

Table 2.35. American lobster length frequencies–fall, male, 1 mm intervals, 1984–2011.

Lobsters were measured from each tow.

Male	Fall																											
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Length	(70)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(120)	(120)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(40)	(80)	(80)	(40)	(80)	(40)	(80)	(0)	(80)
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0
25	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
26	0	0	2	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	0
27	0	0	0	0	0	2	0	0	1	9	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	-	0
28	1	2	0	0	0	0	3	0	0	3	4	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	-	1
29	0	0	0	0	0	1	3	0	0	6	0	0	3	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
30	0	0	0	0	0	0	3	0	3	0	4	0	3	2	0	0	0	0	0	0	0	1	0	0	0	0	-	0
31	0	0	2	0	1	0	2	0	4	2	3	0	6	2	2	0	0	0	0	0	0	1	0	1	0	0	-	0
32	4	0	0	4	0	0	0	5	13	2	3	0	4	5	2	2	0	0	0	0	1	0	0	0	0	0	-	0
33	1	0	0	2	0	1	0	3	4	0	9	1	11	3	1	5	3	0	0	0	0	0	0	0	0	0	-	0
34	1	0	0	2	1	0	2	1	13	4	11	0	4	1	1	1	1	0	0	0	0	0	0	0	1	1	-	0
35	3	0	0	1	0	0	3	7	13	15	12	1	8	3	0	4	0	0	0	0	0	0	0	0	0	0	-	0
36	3	0	0	1	0	1	5	8	25	8	21	1	7	14	2	1	0	0	0	1	1	0	0	0	0	0	-	0
37	3	0	6	0	1	1	7	4	38	4	21	1	11	7	0	2	0	0	0	0	0	1	0	0	0	0	-	0
38	2	2	2	3	2	0	0	6	40	6	34	1	17	14	3	5	0	0	0	0	1	4	3	0	0	0	-	0
39	0	0	2	1	2	1	5	8	34	5	25	4	16	28	7	17	3	0	1	0	0	1	0	0	1	0	-	0
40	3	0	6	2	1	5	10	8	35	21	35	6	15	14	5	7	1	0	2	0	0	0	0	0	0	1	-	0
41	6	1	1	3	4	1	12	13	43	14	54	5	11	24	1	6	1	0	1	0	0	1	2	0	1	0	-	0
42	4	6	2	0	11	3	12	13	43	34	55	5	29	25	9	8	5	0	1	1	2	1	0	0	1	0	-	1
43	1	0	3	3	2	1	7	7	49	17	56	12	23	41	5	21	2	2	0	0	0	1	1	1	1	0	-	0
44	4	1	1	5	11	1	6	13	35	13	63	26	16	40	5	19	3	2	1	1	3	0	0	0	0	2	-	2
45	7	3	3	3	8	10	11	42	44	34	43	20	44	53	9	18	5	3	2	1	2	2	2	0	0	1	-	1
46	2	2	1	7	4	14	10	31	44	19	58	33	18	35	7	16	5	2	3	0	0	2	0	0	2	1	-	2
47	13	4	3	10	10	5	16	14	66	60	26	26	33	41	13	20	7	2	2	1	2	3	0	1	1	0	-	0
48	15	3	5	7	14	4	16	10	67	49	72	19	49	72	8	20	9	9	1	0	3	2	0	0	0	0	-	0
49	4	2	10	8	2	12	18	45	48	100	56	33	30	48	10	37	9	1	0	1	6	3	2	0	1	2	-	0
50	13	5	8	21	9	11	16	37	63	56	55	53	28	56	15	44	9	3	2	0	5	4	3	1	0	0	-	1
51	51	6	5	17	10	11	24	46	74	30	88	27	22	88	21	37	18	6	3	3	3	0	1	0	0	1	-	0
52	15	5	11	17	3	16	31	43	65	78	82	56	30	80	36	42	9	4	2	0	3	4	1	1	1	3	-	0
53	13	9	3	30	5	15	22	57	55	83	83	61	37	103	29	29	15	8	3	1	7	1	0	1	0	1	-	1
54	24	12	19	26	21	17	25	76	47	59	97	59	30	116	23	43	21	7	2	3	8	5	2	1	3	3	-	1
55	23	4	17	23	13	26	25	47	83	84	70	80	32	96	26	46	38	9	2	2	12	3	3	1	0	7	-	1
56	18	12	25	18	13	13	13	37	65	104	90	52	43	89	39	39	21	10	3	4	10	3	3	0	2	6	-	0
57	9	0	10	30	26	18	36	43	64	101	79	92	27	111	44	42	27	10	5	4	8	8	1	7	2	4	-	0
58	29	15	24	23	13	30	34	51	68	68	107	58	48	80	42	57	21	10	8	5	6	7	3	1	1	5	-	1
59	47	8	26	31	16	14	23	43	86	109	78	76	40	143	33	54	29	24	10	8	10	13	6	5	1	6	-	0
60	16	6	11	26	7	26	39	56	77	103	109	69	30	134	56	61	37	9	9	7	13	7	2	2	0	1	-	0
61	23	5	10	25	30	12	24	57	68	138	120	78	59	128	53	64	44	15	8	5	17	8	5	4	1	3	-	0
62	50	17	26	23	10	13	36	37	57	125	92	80	42	145	57	49	28	19	10	7	10	6	3	1	4	7	-	0
63	14	18	37	20	15	19	28	63	68	144	107	74	41	149	60	63	39	29	15	7	4	9	5	4	1	10	-	2
64	28	17	22	24	35	19	25	86	74	87	106	73	77	138	57	68	42	35	9	8	19	12	2	2	2	8	-	0
65	36	10	39	31	20	16	39	87	49	107	83	75	73	161	75	48	37	34	17	10	14	14	3	4	6	11	-	1
66	22	13	21	41	31	27	22	60	59	81	87	93	40	130	63	61	41	24	12	7	21	6	4	2	6	11	-	3
67	14	16	39	28	21	24	30	78	82	108	119	63	46	136	51	38	43	38	13	7	17	12	2	7	7	14	-	1
68	16	18	30	31	17	19	42	71	69	107	79	55	34	113	67	61	57	33	21	7	15	12	5	5	4	16	-	0
69	46	13	22	32	31	30	24	51	81	131	101	75	28	121	52	54	41	21	20	11	23	10	2	5	5	8	-	0
70	32	11	28	31	14	24	26	63	56	117	112	79	36	122	60	78	42	22	12	8	30	7	1	4	3	6	-	3
71	8	14	25	23	21	25	24	58	63	115	83	52	63	126	69	75	48	47	21	13	20	6	6	0	4	12	-	1
72	23	20	31	36	29	19	33	89	61	86	76	65	66	86	77	64	47	52	13	9	19	10	6	9	2	8	-	0
73	40	18	42	29	13	42	40	53	44	85	83	51	44	98	54	70	47	32	6	5	20	9	0	3	4	9	-	1
74	36	18	22	25	22	19	39	28	69	130	108	56	42	99	64	65	37	39	21	14	10	4	1	8	6	12	-	1
75	9	8	23	18	16	28	33	38	53	101	97	58	35	99	62	63	39	33	14	6	23	12	0	3	1	11	-	1
76	21	15	24	25	12	36	20	37	33	75	66	37	32	88	55	66	33	28	14	5	16	4	5	7	0	6	-	1
77	13	6	23	19	33	18	32	28	53	79	52	55	37	94	55	60	31	33	17	3	7	9	5	6	2	7	-	0
78	28	12	9	32	13	29	24	36	46	70	55	59	33	76	46	54	28	38	11	5	8	3	1	5	4	2	-	2
79	5	13	11	33	8	19	19	56	48	61	66	43	47	81	52	59	35	35	17	6	9	4	2	5	4	6	-	2
80	15	18	13	20	22	15	38	40	49	102	53	39	29	78	44	51	34	26	7	5	5	7	3	4	0	3	-	0
81	23	11	18	10	8	17	16	45	39	47	66	46	32	83	37	52	25	18	14	2	12	5	0	4	0	2	-	0
82	7	7	20	10	6	6	21	19	21	46	26	41	15	57	34	29	23	21	10	3	8	5	3	5	4	5	-	0
83	6	6	12	5	6	11	14	23	29	26	25	23	10	23	20	20	12	4	3	1	3	2	1	0	4	2	-	0
84	4	2	13	5	8	10	6	10	23	12	15	31	8	19	6	15	7	6	1	2	3	2	0	4	1	1	-	0
85	7	2	15	8	10	3	14	15	39	11	13	17	5	12	4	10	8	3	1	1	3	2	0	0	0	3	-	0
86	7	5	11	5	5	3	8	2	10	10	30	26	14	20	7	10	3	3	0	0	2	0	0	0	2	0	-	0
87	5	0	15	5	7	6	17	2	16	8	13	15	4	16	6	17	3	1	0	0	0	3	0	1	0	1	-	0
88	3	1	12	7	2	0	26	2	16	9	25	13	8	14	6	7	7	3	0	0	3	0	0	0	0		-	0
89	7	5	9	5	9	7	7	4	19	9	20	17	10	15	8	12	5	0	0	0	0	0	0	0	0	2	-	0
90	18	3	13	3	5	7	8	8	10	3	22	10	5	14	3	4	6	0	1	0	4	0	0	0	0	0	-	0
91	4	2	14	5	2	11	5	7	12	17	15	6	3	15	4	7	3	0	0	0	1	0	0	1	0	2	-	0
92	7	0	8	4	14	1	3	2	10	3	19	6	3	10	4	5	1	0	0	0	0	0	0	0	0	2	-	0
93	1	0	0	1	6	0	6	5	7	3	12	12	0	8	3	3	1	0	0	0	1	0	0	0	2	0	-	0
94	1	1	2	1	0	1	4	2	3	2	12	2	1	6	0	2	1	0	0	0	1	0	0	0	0	0	-	0
95	0	1	5	1	0	0	0	1	3	2	9	1	0	4	5	1	0	0	0	0	0	0	0	0	0	0	-	0
96	0	0	3	1	0	14	0	0	1	4	1	2	0	4	4	1	0	0	0	0	0	0	0	0	0	0	-	0
97	13	0	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0
98	1	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	-	0
99	0	1	4	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0
100	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
101	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
102	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	0
103	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
106	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
107	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	**930**	**436**	**888**	**945**	**712**	**814**	**1,198**	**2,043**	**2,853**	**3,563**	**3,673**	**2,406**	**1,750**	**4,165**	**1,783**	**2,107**	**1,202**	**814**	**375**	**200**	**454**	**266**	**101**	**126**	**100**	**235**	-	**31**
legal size:	81.0					81.8		82.6														83.3	84.1				85.7	

Table 2.36. Atlantic herring length frequencies, spring and fall, 1 cm intervals, 1989-2011.
Atlantic herring lengths were recorded from the first three tows of each day.

												Spring											
length	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
3	0	0	0	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	4	0	0	0	0	18	504	61	0	0	1	2	0	0	0	1	213	2	12
5	0	2	0	11	3	1	0	0	1	149	1,547	104	0	0	8	30	76	3	20	36	3,416	28	35
6	1	3	3	16	1	0	1	3	0	92	237	1	3	0	9	10	140	2	2	13	449	12	59
7	0	1	4	15	2	0	2	15	69	84	18	7	11	1	0	8	118	1	0	12	44	1	103
8	0	0	7	0	1	0	0	5	165	28	5	1	6	1	0	9	73	11	0	23	48	1	132
9	0	0	3	0	1	0	1	1	27	11	4	0	8	0	0	3	8	10	0	16	59	0	43
10	0	0	0	0	3	1	0	0	0	2	0	0	1	0	0	0	0	0	0	2	6	0	3
11	0	0	0	0	3	1	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0
12	0	0	0	0	38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
13	0	8	0	0	215	8	0	0	5	0	0	0	0	0	0	1	3	0	0	0	0	5	1
14	0	1	0	0	203	11	0	1	29	0	0	0	1	0	0	9	7	0	0	0	1	29	26
15	2	0	8	0	122	9	6	0	59	5	0	0	2	0	0	49	14	0	9	1	9	39	55
16	3	1	38	0	174	17	7	3	12	8	0	3	0	0	0	65	20	0	14	0	91	49	19
17	2	31	33	0	100	42	8	2	4	5	0	6	2	0	0	140	63	0	27	2	149	25	3
18	2	4	29	2	28	32	12	0	10	2	0	0	1	0	3	275	98	0	166	6	28	31	7
19	0	16	19	29	21	39	12	6	21	0	1	0	11	2	1	117	57	0	467	1	203	86	14
20	0	161	67	15	41	43	78	10	40	5	1	6	65	3	2	67	67	0	228	7	521	222	14
21	0	333	72	24	35	29	283	26	14	4	2	11	85	17	0	12	19	0	99	11	279	106	8
22	0	424	70	111	96	14	399	15	19	11	10	38	77	32	0	16	11	3	105	9	162	71	24
23	0	201	160	61	387	111	245	20	7	4	15	36	14	87	4	0	15	4	106	13	144	97	59
24	0	195	297	311	436	224	290	22	18	1	19	47	33	71	17	0	25	3	150	27	71	105	173
25	0	315	337	751	645	485	416	46	117	2	9	99	31	18	36	3	21	5	122	38	87	108	214
26	1	447	360	503	921	560	1,028	85	202	31	10	70	46	30	63	3	78	3	125	39	108	110	210
27	0	347	514	382	807	947	723	93	236	33	35	80	24	27	65	14	106	9	122	38	69	95	147
28	0	338	513	391	825	604	706	64	234	44	37	104	34	19	72	9	87	6	116	36	85	62	65
29	2	247	319	492	550	387	337	37	82	21	25	69	29	52	52	1	40	3	47	15	44	26	48
30	0	156	383	142	287	204	231	29	31	1	11	24	8	3	27	3	19	1	6	6	27	7	2
31	2	127	139	77	129	29	14	4	15	2	0	0	4	0	8	1	0	0	0	2	6	0	2
32	0	50	22	1	33	6	14	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0
33	0	11	13	2	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
34	0	8	1	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**15**	**3,427**	**3,411**	**3,341**	**6,119**	**3,808**	**4,814**	**489**	**1,421**	**566**	**2,491**	**767**	**497**	**363**	**368**	**847**	**1,165**	**64**	**1,931**	**355**	**6,319**	**1,317**	**1,479**

												Fall											
length	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
8	0	0	0	99	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
9	0	0	0	328	16	4	0	0	2	3	0	0	0	0	1	0	0	0	0	0	4	-	1
10	0	0	0	176	3	6	0	14	6	59	0	0	0	0	12	1	0	0	0	0	2	-	0
11	0	3	0	34	5	9	0	11	3	49	0	1	0	0	47	0	0	2	0	0	1	-	0
12	0	0	0	3	9	11	0	1	0	0	0	0	0	0	20	1	0	0	1	0	0	-	0
13	0	0	0	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0
14	0	0	0	0	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
15	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
16	0	0	0	1	7	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0
17	0	0	1	0	7	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	1
18	0	0	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	1
19	0	0	5	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
20	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
21	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
22	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1
23	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	-	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0
Total	**0**	**3**	**12**	**642**	**110**	**40**	**0**	**27**	**12**	**112**	**0**	**2**	**0**	**0**	**80**	**3**	**3**	**2**	**2**	**1**	**9**	-	**4**

Table 2.37. Atlantic menhaden length frequency, fall, 1 cm intervals, 1996-2011.
Menhaden are scheduled to be measured from every tow. However, the following numbers of menhaden were not measured: 5 juveniles and 4 adults in 1996, and 7 adults in 1997.

length	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	0
5	0	0	0	0	0	0	0	2	0	0	0	1	0	0	-	0
6	0	0	0	0	0	0	0	17	1	0	0	24	0	0	-	0
7	1	0	0	20	12	0	2	32	26	0	1	39	2	0	-	0
8	0	1	18	51	73	0	6	22	178	11	0	32	2	2	-	0
9	0	11	53	152	128	0	8	9	135	22	0	12	6	0	-	0
10	1	5	120	471	125	1	9	1	143	19	0	34	3	3	-	0
11	0	6	49	337	51	25	14	1	47	13	2	51	2	4	-	0
12	0	11	44	25	35	30	10	1	18	9	8	24	1	5	-	6
13	0	0	20	2	15	16	14	4	1	1	1	49	0	4	-	7
14	0	2	0	0	6	7	20	2	0	3	2	7	0	3	-	9
15	0	0	0	0	2	4	24	0	0	1	0	1	1	5	-	6
16	0	0	0	0	2	0	8	0	0	2	1	1	4	4	-	3
17	0	0	0	0	3	0	12	0	0	0	0	0	3	0	-	0
18	0	0	0	0	0	0	17	0	0	0	0	0	0	1	-	0
19	0	0	0	0	0	0	16	0	0	0	0	0	0	1	-	0
20	0	0	0	1	0	0	2	0	0	0	0	0	0	0	-	0
21	0	0	0	1	0	0	1	0	0	1	0	0	0	0	-	0
22	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
24	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
26	0	0	0	0	0	0	1	0	0	0	0	3	0	0	-	0
27	2	0	0	0	0	0	1	0	0	1	0	21	9	4	-	4
28	3	1	0	3	0	0	2	0	3	4	0	35	2	7	-	18
29	23	17	0	6	1	0	18	5	10	21	2	31	1	1	-	48
30	30	25	0	28	3	0	29	8	44	54	2	18	0	5	-	30
31	11	17	1	42	7	1	39	8	65	43	2	7	0	2	-	4
32	2	6	1	27	12	0	27	3	51	21	1	2	0	0	-	2
33	0	1	0	19	4	2	25	2	10	5	0	0	0	0	-	0
34	0	0	0	1	4	0	9	1	7	2	1	0	0	0	-	0
35	0	0	0	0	1	0	5	0	1	1	0	0	0	0	-	0
Total	**73**	**103**	**306**	**1,187**	**484**	**86**	**320**	**119**	**740**	**234**	**23**	**392**	**36**	**51**	**-**	**137**

Table 2.38. Black sea bass length frequencies, spring, 1 cm intervals, 1987-2011.
Since 1987, black sea bass have been measured from every tow.

	Spring																								
length	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	8	0	0	0	0	1	1	2	0	0
9	0	0	0	0	2	0	0	0	0	0	0	0	1	2	0	9	0	0	0	0	1	1	1	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	5	0	0	0	0	7	7	2	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	1	2	1	0	0
12	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	5	0	0	0	0	1	2	2	0	1
13	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	9	0	0	0	0	2	1	1	0	1
14	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	1	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	1	0
19	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
20	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0
21	0	0	1	0	0	0	0	1	0	1	0	0	1	1	0	1	1	1	0	0	1	1	0	0	0
22	2	0	1	0	0	0	1	1	0	1	0	0	0	1	2	0	1	0	0	1	4	2	2	1	2
23	1	0	0	2	0	0	1	1	0	3	0	1	0	1	0	1	2	1	0	0	4	3	3	1	2
24	3	0	0	0	0	1	1	3	3	2	1	2	1	8	1	5	4	0	0	0	0	0	3	1	2
25	0	0	2	0	0	1	2	2	1	0	2	1	0	0	0	2	0	1	0	0	4	1	2	0	2
26	0	1	0	1	0	1	0	1	3	0	1	1	0	1	5	2	0	1	0	0	1	2	1	1	0
27	0	0	0	0	0	0	0	1	1	0	1	1	2	2	4	1	0	1	0	0	1	0	0	2	0
28	0	0	0	4	0	0	1	0	0	0	0	0	0	3	0	2	0	1	0	1	1	0	2	0	0
29	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	6	0	0	1	1	2	4	0
30	0	0	1	2	0	0	1	2	0	0	1	0	1	1	3	1	0	4	0	0	0	0	2	4	1
31	0	0	0	1	0	0	0	0	0	0	1	1	1	0	3	10	0	7	0	0	0	3	2	2	2
32	0	2	0	1	0	0	2	1	0	1	4	0	1	1	3	15	1	5	0	0	4	5	2	3	3
33	0	1	0	1	0	0	0	2	0	2	1	0	0	1	11	12	1	3	0	0	1	2	2	0	1
34	0	0	1	1	0	0	0	1	0	1	1	1	1	3	6	11	1	2	0	0	3	3	4	6	1
35	0	0	0	0	0	0	1	0	0	1	3	0	0	1	7	11	2	1	1	0	5	0	4	1	3
36	0	1	0	1	0	0	1	1	2	1	0	0	1	0	3	13	0	3	4	0	5	0	7	0	2
37	0	0	0	1	0	0	0	0	0	1	1	0	2	0	5	6	2	0	1	0	1	1	3	2	5
38	0	1	0	0	1	0	0	0	0	0	0	0	1	3	2	11	3	0	1	0	1	0	4	2	4
39	0	0	0	0	2	0	0	2	0	1	0	0	0	0	3	13	1	0	1	0	0	1	7	0	5
40	0	0	1	0	1	0	0	0	0	3	0	0	0	1	2	15	2	1	0	0	2	0	4	0	3
41	0	0	0	0	3	0	0	0	0	0	0	0	1	0	3	11	4	4	4	0	1	1	5	2	2
42	1	0	1	0	0	0	0	1	1	0	0	0	1	1	1	11	3	0	4	1	0	0	7	1	2
43	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	5	3	2	2	0	1	1	3	0	2
44	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	5	2	1	1	1	0	0	0	0	1
45	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7	0	1	0	0	1	1	0	1	0
46	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	6	2	1	0	0	0	1	0	0	1
47	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	5	0	2	0	0	1	0	2	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	1	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
51	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
52	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**8**	**8**	**12**	**19**	**16**	**3**	**12**	**22**	**11**	**20**	**18**	**8**	**16**	**47**	**67**	**239**	**46**	**49**	**19**	**7**	**58**	**43**	**84**	**36**	**48**

Table 2.39. Black sea bass length frequencies, fall, 1 cm intervals, 1987-2011.
Since 1987, black sea bass have been measured from every tow.

	Fall																								
length	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	2	0	0	1	-	0
5	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	2	0	3	1	0	0	0	1	-	4
6	0	0	0	1	0	0	3	0	0	0	0	0	0	0	3	1	0	7	0	0	1	1	0	-	4
7	0	0	0	0	4	0	3	1	0	1	0	0	3	0	6	4	0	23	2	0	3	2	0	-	2
8	2	0	1	0	4	0	1	2	0	1	0	0	0	1	5	8	0	15	2	0	4	0	2	-	1
9	0	0	0	1	3	0	0	4	0	0	0	1	0	0	3	6	0	10	2	0	1	2	0	-	1
10	0	0	0	0	2	0	0	1	0	0	0	0	0	0	1	3	0	5	2	0	2	0	0	-	0
11	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	2	2	0	1	0	0	-	0
12	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	-	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	-	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	-	0
16	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	1	5	0	-	0
17	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	7	0	0	0	1	4	8	2	-	0
18	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	16	1	0	0	1	1	14	6	-	0
19	0	0	0	0	0	0	0	0	0	0	2	0	3	1	0	23	0	0	0	2	2	10	4	-	0
20	0	0	0	0	3	0	0	0	0	2	0	1	6	3	0	19	0	0	0	1	4	10	6	-	0
21	0	0	0	0	1	0	0	0	1	0	1	0	4	1	0	17	0	0	1	3	4	9	4	-	0
22	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	5	0	0	0	0	1	4	3	-	0
23	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	1	0	0	2	0	0	-	0
24	0	2	0	0	0	0	0	0	0	1	0	0	3	0	0	2	0	0	0	0	0	0	0	-	0
25	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	-	0
26	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	-	1
27	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	2	-	1
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	2	0	-	1
29	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3	0	1	1	2	0	1	0	0	-	2
30	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	-	5
31	0	0	0	1	0	2	0	0	0	0	0	0	0	1	0	1	1	0	0	0	2	1	0	-	4
32	0	2	0	0	0	0	0	0	0	0	1	0	2	3	2	0	0	0	0	0	2	0	0	-	1
33	0	0	0	2	0	0	0	0	0	0	0	0	0	3	2	0	0	0	2	0	0	0	0	-	1
34	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0	1	0	1	1	0	-	1
35	0	1	0	0	0	0	0	0	0	0	0	1	0	0	3	2	1	1	0	0	0	1	1	-	2
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	0	-	0
37	0	1	0	0	0	0	0	0	0	0	0	0	0	1	9	2	0	0	0	0	1	1	0	-	3
38	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7	3	0	0	1	0	1	0	1	-	1
39	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	2	0	1	-	2
40	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	2	0	1	0	0	0	1	0	-	1
41	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	0	1	0	2	0	0	-	3
42	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	2	0	0	0	0	-	3
43	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	1	0	0	-	0
44	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3	1	0	0	0	0	0	0	0	-	1
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	-	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0
47	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	-	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	-	0
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	-	0
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	-	0
Total	**3**	**9**	**1**	**8**	**22**	**2**	**8**	**12**	**1**	**6**	**4**	**10**	**33**	**22**	**66**	**155**	**11**	**75**	**23**	**12**	**53**	**77**	**38**	**-**	**45**

Table 2.40. Blueback herring length frequencies, spring and fall, 1 cm intervals, 1989-2011.
From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

Spring

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
6	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	2	0	2	7	2	0	0	2	0	4	1	0	3	2	1	0	0	1	0	4	0
8	0	0	3	0	2	76	20	4	0	5	0	10	7	12	7	9	8	1	0	8	0	1	0
9	0	0	2	0	3	114	11	5	21	15	0	14	5	9	23	23	14	8	1	11	7	4	3
10	0	0	5	10	7	74	9	19	45	45	0	18	2	9	26	47	6	23	9	14	19	19	5
11	0	0	3	4	9	41	9	10	258	48	0	28	1	6	11	39	10	2	3	12	25	38	9
12	3	0	5	0	2	9	5	3	4	16	0	18	2	3	4	20	12	0	5	2	27	8	3
13	0	0	0	4	0	13	5	2	0	2	0	12	1	1	1	12	3	1	3	4	17	10	6
14	0	0	0	15	0	5	3	1	1	1	0	3	0	0	0	0	7	0	1	1	5	4	2
15	0	0	1	27	1	3	4	7	0	0	1	2	0	4	0	0	8	1	2	2	9	1	0
16	0	0	0	65	0	8	3	7	0	3	5	1	1	1	4	4	13	2	23	1	30	4	2
17	0	0	1	11	3	9	1	10	4	0	5	3	10	7	4	4	11	2	37	7	64	2	12
18	0	1	0	2	0	3	0	4	2	0	0	5	15	2	3	3	1	2	7	3	49	1	3
19	0	0	0	0	1	2	4	3	2	0	0	0	3	0	0	3	2	1	3	2	17	2	1
20	0	0	0	4	0	1	1	0	0	0	0	2	1	1	0	0	5	2	0	1	2	0	1
21	2	1	2	0	0	1	1	3	0	0	0	1	3	0	0	3	2	3	2	0	1	1	0
22	1	0	0	1	0	3	0	4	0	1	0	3	0	0	1	0	1	0	1	1	0	1	0
23	0	0	3	2	0	3	2	3	1	0	0	5	0	1	0	1	0	0	1	1	0	1	0
24	0	1	2	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	2	0	0	1	0
25	0	0	0	1	0	1	1	1	0	0	0	1	0	0	2	0	0	1	1	0	0	0	0
26	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
Total	**6**	**3**	**29**	**147**	**30**	**373**	**83**	**90**	**338**	**140**	**11**	**136**	**52**	**56**	**89**	**173**	**104**	**49**	**101**	**71**	**272**	**102**	**47**

Fall

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
5	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
7	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	1	0	0	0	0	0	-	0
8	0	0	0	0	0	0	33	0	2	0	0	0	0	0	0	0	0	0	1	0	0	-	0
9	0	0	0	0	0	0	21	3	2	2	1	0	0	0	0	0	0	0	1	0	2	-	0
10	0	0	0	0	0	1	3	0	8	1	0	1	0	0	0	0	0	0	0	0	0	-	0
11	0	0	0	0	3	13	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	-	0
12	0	0	3	9	8	227	14	0	12	1	1	0	7	0	0	2	0	0	0	0	0	-	0
13	38	1	4	11	24	225	48	0	117	18	0	0	36	2	0	15	2	2	0	0	0	-	0
14	77	0	1	6	18	247	40	1	111	28	1	0	117	7	0	17	3	8	1	1	3	-	4
15	24	0	0	1	20	94	3	3	34	16	0	3	52	3	4	6	2	4	14	2	5	-	9
16	0	0	0	0	2	14	0	0	0	5	2	1	10	0	4	0	0	0	31	0	2	-	9
17	0	0	0	0	0	2	0	0	0	1	1	2	2	0	1	0	0	0	7	0	1	-	3
18	1	0	0	0	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0	0	5	-	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
20	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0
21	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	-	0
22	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
24	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0
25	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	**140**	**2**	**9**	**27**	**76**	**827**	**172**	**7**	**292**	**72**	**8**	**8**	**227**	**12**	**9**	**42**	**8**	**14**	**55**	**3**	**18**	**0**	**25**

Table 2.41. Bluefish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2011.
Bluefish lengths were recorded from every tow.

	Spring																											
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	3	0	0	0	0	0	0	1	0	2	1	0	0	0	1	0	1	3	0	2	0	0
27	0	0	0	0	0	0	1	2	1	0	0	0	0	2	2	0	6	0	1	0	2	0	2	10	1	5	0	1
29	0	0	2	1	0	0	1	2	0	0	0	1	1	1	0	1	6	0	1	0	1	0	5	0	0	10	0	0
31	0	0	0	0	0	0	0	11	0	0	0	0	0	1	0	0	1	0	0	1	0	2	2	1	0	2	0	0
33	0	0	1	0	0	0	0	16	0	0	0	0	0	2	1	1	0	0	1	0	0	0	3	1	0	3	0	0
35	0	0	0	1	0	0	0	16	0	0	0	0	1	0	0	1	0	1	0	0	0	0	1	1	0	1	0	1
37	0	0	0	0	0	0	0	10	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	0	1	0	0
39	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	0	0	1	0	0	0	1	1	1	1	1	0	1
41	0	0	2	0	0	0	2	10	0	0	0	1	0	0	0	4	0	4	6	5	0	7	0	0	0	0	0	0
43	0	0	2	1	1	0	0	26	1	0	0	0	1	3	2	3	1	9	13	7	1	2	0	1	7	0	0	4
45	0	0	1	0	0	0	1	17	4	0	0	1	2	0	3	2	0	5	6	3	0	1	2	3	10	0	0	4
47	0	0	0	0	0	0	0	3	3	0	0	0	0	0	0	1	2	2	3	0	1	0	6	1	2	0	0	4
49	0	0	3	2	3	0	0	4	5	3	0	0	0	0	1	6	1	2	3	1	1	1	3	0	1	1	0	0
51	0	0	2	1	5	2	1	7	12	2	0	0	4	10	3	6	1	1	9	4	6	1	3	1	1	1	0	2
53	0	0	4	3	6	1	0	6	7	1	2	0	2	6	2	6	2	2	6	3	3	2	6	2	0	7	0	3
55	0	0	4	1	11	0	1	4	0	1	1	0	3	2	1	3	1	1	6	1	1	2	0	3	1	4	0	3
57	0	0	3	2	8	0	0	2	1	2	0	1	0	1	3	2	0	1	0	1	0	1	2	2	1	1	0	0
59	0	1	0	0	6	1	1	0	0	1	1	0	0	1	0	3	1	0	0	4	1	2	1	2	0	0	0	1
61	0	0	3	0	2	2	0	0	2	1	4	0	0	3	0	2	0	0	0	1	0	0	0	2	1	4	1	1
63	0	0	1	0	1	0	0	1	1	1	4	0	0	0	3	2	1	0	0	2	0	1	0	1	1	1	0	0
65	0	0	1	1	0	3	0	1	2	0	0	1	0	0	0	2	0	0	1	0	0	0	0	0	1	2	0	3
67	0	0	0	0	0	3	1	1	0	0	0	0	1	0	1	1	0	0	0	2	0	1	0	1	1	4	1	0
69	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0
71	0	0	1	0	0	0	1	2	1	1	0	0	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	0
73	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0
75	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
77	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
79	0	0	3	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
83	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**1**	**35**	**13**	**43**	**13**	**17**	**146**	**42**	**13**	**12**	**6**	**16**	**38**	**23**	**51**	**26**	**29**	**56**	**36**	**18**	**25**	**39**	**39**	**29**	**52**	**2**	**28**

Table 2.42. Bluefish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2011.
Bluefish lengths were recorded from every tow.

	Fall																											
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0
7	1	2	0	0	0	0	0	2	33	0	1	0	0	3	13	4	0	1	1	0	0	0	2	0	0	0	-	0
9	2	11	0	5	3	0	3	51	325	5	82	1	0	148	429	293	2	40	9	8	18	77	11	31	0	29	-	0
11	38	18	20	95	116	78	75	315	474	82	1,450	162	7	2,946	1,774	1,205	64	302	153	103	1,072	729	315	126	21	410	-	6
13	1,308	148	65	430	603	743	107	540	392	603	5,722	825	65	4,163	3,566	654	210	259	399	110	1,168	950	413	535	421	766	-	55
15	2,559	1,789	514	982	334	1,500	508	443	497	432	3,786	216	602	870	1,267	637	410	458	342	44	428	390	241	365	708	256	-	329
17	1,797	2,067	932	546	779	2,342	1,183	1,086	1,060	698	1,862	641	3,323	1,005	287	863	370	1,247	106	661	274	619	401	1,148	67	1,104	-	1,079
19	426	554	386	118	780	2,436	1,222	1,164	838	2,445	1,041	1,897	1,845	769	211	435	1,200	670	149	1,487	556	1,527	286	3,397	89	466	-	769
21	246	96	169	19	532	903	507	627	263	1,174	803	934	487	332	199	913	2,246	391	617	1,011	677	1,188	108	2,152	69	83	-	240
23	68	21	86	9	193	198	150	398	28	214	469	202	32	154	216	1,096	840	161	723	104	550	429	64	853	8	11	-	52
25	19	24	15	5	18	18	62	212	1	66	265	14	7	25	370	1,032	337	76	355	2	339	178	28	221	2	2	-	21
27	2	5	0	0	1	5	9	32	0	10	62	3	0	3	167	476	9	18	50	0	53	32	14	18	1	0	-	1
29	0	2	0	0	0	0	0	1	0	0	1	0	0	0	7	53	0	5	1	0	10	0	2	4	2	0	-	2
31	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	2	0	0	1	0	1	-	0
33	0	0	0	2	0	0	6	0	0	0	0	2	0	0	1	0	0	0	3	0	14	0	4	1	0	1	-	0
35	0	0	0	4	1	0	17	0	3	0	0	22	0	1	1	0	0	0	13	1	79	0	4	3	0	1	-	1
37	4	8	1	16	2	1	41	1	21	0	10	92	0	2	2	1	2	15	27	6	188	0	27	5	5	35	-	5
39	25	66	35	56	6	10	145	19	118	4	30	192	2	52	28	7	31	52	67	20	428	0	50	45	42	111	-	18
41	64	133	118	84	23	72	245	130	169	19	116	125	18	110	46	15	129	90	152	15	212	15	25	79	35	83	-	23
43	32	63	101	41	31	101	156	229	77	42	125	37	22	52	28	11	73	31	86	13	33	43	11	69	13	35	-	35
45	6	14	20	21	32	34	25	137	35	79	32	10	23	20	30	1	16	15	10	6	15	57	2	40	10	10	-	14
47	13	11	63	9	25	19	25	69	72	74	7	19	61	6	29	7	9	15	8	14	27	38	1	25	11	3	-	8
49	21	55	52	11	19	21	17	88	179	81	9	20	74	27	33	9	14	25	14	19	47	35	6	32	20	10	-	14
51	25	58	43	14	16	19	36	73	210	50	13	21	38	16	23	7	32	26	13	18	59	57	4	26	29	21	-	12
53	31	44	21	14	18	32	16	21	162	26	42	25	17	10	9	10	40	12	18	7	22	22	12	23	28	9	-	6
55	20	25	9	25	8	21	5	5	90	11	56	6	10	5	9	4	16	5	12	6	31	8	7	11	12	4	-	5
57	13	9	4	30	1	12	1	3	54	33	32	3	10	8	2	10	3	4	12	8	48	14	7	5	3	8	-	1
59	4	5	15	11	12	7	3	6	29	69	11	1	8	10	6	12	6	8	9	4	40	15	5	13	5	8	-	3
61	6	20	5	9	8	4	5	6	10	108	20	4	8	10	5	3	11	10	3	5	17	12	6	31	11	14	-	3
63	2	13	11	5	15	4	9	6	11	54	20	5	2	5	10	3	6	3	6	3	21	27	2	25	10	8	-	3
65	0	12	11	6	12	2	13	1	12	30	39	7	1	2	7	3	11	2	5	1	22	14	3	23	5	8	-	0
67	0	11	11	3	14	4	12	1	3	16	49	5	3	4	5	3	7	5	6	1	9	11	1	14	14	18	-	2
69	1	7	8	10	17	10	12	9	4	2	35	4	2	1	2	6	3	5	7	1	12	10	0	11	10	22	-	3
71	1	1	13	4	7	19	15	5	11	1	17	5	3	1	1	7	8	1	7	2	6	1	0	1	11	26	-	6
73	1	2	3	8	7	7	16	5	15	11	7	4	1	5	1	0	2	2	4	1	6	3	0	5	3	20	-	8
75	2	1	5	3	9	5	13	8	17	8	5	4	7	3	4	5	1	1	1	1	1	4	0	1	1	12	-	5
77	0	3	1	1	3	4	10	6	6	4	8	3	8	6	1	1	0	0	3	0	3	1	0	0	1	4	-	3
79	0	2	2	1	1	3	1	2	4	6	2	1	0	1	0	1	1	2	1	0	0	0	0	1	0	2	-	3
81	0	1	0	0	0	1	2	0	1	0	4	1	2	0	0	1	1	0	0	0	1	0	0	0	0	1	-	1
83	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	6,737	5,301	2,739	2,598	3,646	8,635	4,673	5,701	5,224	6,457	16,234	5,514	6,688	10,776	8,789	7,789	6,110	3,957	3,393	3,682	6,488	6,506	2,063	9,340	1,667	3,602	-	2,736

Table 2.43. Butterfish length frequencies, 1 cm intervals, spring and fall, 1986-1990, 1992–2011.
Length frequencies of butterfish taken from the first three tows of each day.

Spring

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	1	2	4	0	0	0	0
4	0	0	0	0	0	0	0	2	0	0	0	0	3	0	9	0	15	0	1	1	8	1	5	0	3
5	0	0	0	0	0	2	0	6	0	2	0	0	4	0	51	1	29	1	0	1	5	3	53	0	9
6	0	0	0	0	0	0	0	35	0	21	3	0	0	0	207	0	7	20	0	2	0	1	276	1	35
7	0	0	0	2	0	0	0	57	1	7	0	3	0	0	202	0	3	95	1	0	0	3	233	0	50
8	0	0	0	2	0	0	0	18	0	0	0	0	0	1	107	0	0	101	2	4	0	0	228	0	34
9	0	0	0	0	0	0	0	0	4	0	57	5	4	0	15	0	4	47	0	61	12	1	197	198	7
10	4	0	0	40	0	2	0	4	7	0	165	183	10	0	5	4	10	146	10	201	73	53	225	530	2
11	29	0	0	269	5	16	3	28	20	19	618	622	16	84	51	44	130	427	27	540	292	74	461	291	28
12	39	0	3	208	7	32	17	45	80	190	1,005	656	55	961	272	202	616	433	216	1,632	794	409	1,426	47	217
13	26	0	6	34	16	88	25	75	62	485	1,598	466	152	1,265	317	656	546	201	442	3,108	531	976	1,196	110	1,347
14	61	0	7	2	28	111	10	76	30	327	1,296	190	145	317	145	990	129	71	425	1,690	130	739	439	237	1,819
15	66	0	27	3	26	50	9	117	24	255	1,033	173	122	122	236	851	137	64	234	493	234	646	237	376	1,443
16	57	0	20	10	26	49	25	156	44	275	951	267	148	31	381	669	155	126	124	173	190	654	201	301	1,228
17	25	0	14	7	38	41	23	92	25	178	654	175	137	47	332	490	64	107	81	104	146	396	154	61	982
18	20	0	0	0	18	38	10	44	14	83	307	88	106	28	284	335	36	50	71	72	85	405	113	41	599
19	7	0	0	4	16	27	4	9	3	48	110	70	24	23	128	249	26	21	59	84	22	179	49	5	286
20	0	0	1	2	7	10	0	4	1	13	72	29	27	21	53	142	16	9	12	27	18	56	9	13	67
21	4	0	0	1	5	1	0	0	0	2	22	3	8	7	7	26	4	1	4	1	0	1	7	0	33
22	4	0	0	0	7	0	1	0	0	0	0	5	3	0	1	4	4	1	0	0	0	0	0	0	0
23	0	0	0	0	1	2	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**342**	**0**	**78**	**584**	**200**	**469**	**127**	**768**	**315**	**1,905**	**7,906**	**2,935**	**965**	**2,907**	**2,804**	**4,666**	**1,933**	**1,921**	**1,710**	**8,196**	**2,544**	**4,598**	**5,509**	**2,211**	**8,191**

Fall

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
3	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0	2	0	0	0	0	0	-	24
4	0	2	87	0	0	0	20	1	8	2	2	1	3	0	16	15	0	7	0	1	15	0	6	-	0
5	0	3	1,141	23	3	475	436	16	268	180	33	20	13	72	69	53	52	29	260	2	152	29	324	-	78
6	0	10	5,778	144	62	2,429	3,144	197	426	601	461	317	250	334	409	616	685	710	658	34	1,270	230	1,997	-	345
7	12	146	5,728	678	173	13,780	4,344	1,701	5,055	1,540	1,614	920	3,755	2,709	1,405	1,842	4,972	9,342	2,991	162	1,951	771	9,132	-	1,075
8	117	1,093	4,844	1,425	471	22,246	5,983	7,653	11,919	3,292	5,449	4,070	24,915	8,904	3,196	7,453	5,630	18,524	14,062	1,060	4,508	4,744	18,840	-	3,621
9	277	2,236	5,489	3,196	2,515	22,133	7,781	17,663	12,110	5,856	11,122	14,691	53,739	16,392	4,444	14,401	3,067	13,237	18,276	4,647	5,086	8,864	16,054	-	5,715
10	1,143	2,017	1,068	4,927	5,886	6,614	4,001	8,178	3,765	6,674	10,645	29,516	31,244	13,110	6,002	14,408	832	13,284	16,897	9,830	7,584	6,576	5,377	-	3,197
11	919	1,204	477	1,661	2,781	634	871	2,414	832	5,493	6,050	23,892	8,496	3,528	2,997	5,682	294	4,193	8,203	5,929	6,404	4,103	1,678	-	648
12	623	1,041	51	216	827	65	360	1,951	346	2,344	2,849	7,162	2,009	915	2,004	430	639	982	2,391	3,266	2,614	1,812	5,041	-	2,451
13	409	2,477	204	45	212	94	2,400	2,610	131	976	818	675	1,156	306	1,714	264	570	218	1,265	1,173	1,122	457	9,925	-	2,295
14	259	1,946	172	144	52	50	1,721	1,238	273	2,072	289	498	481	93	2,307	247	231	350	212	281	278	4	6,842	-	729
15	95	1,334	196	139	234	101	797	679	597	2,104	197	272	212	30	2,026	190	95	420	188	184	405	131	2,211	-	240
16	106	387	197	210	415	177	390	41	951	1,196	238	388	92	151	1,521	85	156	320	203	688	420	368	1,167	-	103
17	184	124	228	117	133	130	124	144	853	392	335	574	158	392	391	152	66	208	137	398	228	539	836	-	120
18	48	59	115	102	83	347	54	110	429	59	407	168	80	198	310	266	8	89	177	77	145	243	117	-	84
19	30	10	19	27	91	16	19	2	68	34	211	263	62	106	199	206	0	29	44	39	110	11	63	-	24
20	4	8	2	26	8	8	3	0	0	11	20	14	7	4	155	94	13	16	11	3	1	68	15	-	1
21	18	2	0	0	0	1	8	1	0	0	10	62	6	1	31	15	1	1	4	0	0	1	0	-	1
22	0	0	0	2	0	0	8	0	0	0	0	0	0	0	0	14	1	1	1	0	0	0	0	-	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
25	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	-	0
Total	**4,244**	**14,108**	**25,796**	**13,082**	**13,946**	**69,300**	**32,464**	**44,599**	**38,034**	**32,826**	**40,750**	**83,503**	**126,680**	**47,245**	**29,196**	**46,433**	**17,312**	**61,962**	**65,980**	**27,775**	**32,293**	**28,951**	**79,627**	**-**	**20,751**

Table 2.44. Fourspot flounder length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989, 1990, 1996-2011.

Fourspot lengths were recorded from the first three tows of each day.

										Spring								
length	**1989**	**1990**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
13	2	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0
15	5	2	0	0	5	5	0	0	3	0	3	0	0	0	0	0	0	0
17	21	8	1	3	8	12	1	2	17	2	13	0	0	6	0	0	6	2
19	19	19	8	16	14	61	22	5	89	8	8	0	6	7	7	4	2	1
21	17	42	31	60	13	28	26	4	99	6	4	1	18	11	9	10	3	10
23	11	341	198	161	16	32	239	42	33	8	4	14	24	9	17	6	5	45
25	56	528	279	353	105	72	422	181	84	124	26	71	29	44	39	37	33	157
27	103	225	208	456	209	97	256	300	199	228	82	75	33	105	81	91	55	150
29	120	139	193	392	233	81	201	245	191	187	129	64	44	170	108	127	55	107
31	89	60	117	192	137	66	139	153	175	163	178	68	61	121	94	90	69	93
33	51	27	54	76	60	60	81	45	89	88	113	52	36	52	70	51	36	49
35	8	33	15	22	16	25	39	11	26	47	35	31	13	43	34	31	24	27
37	2	12	6	3	4	7	12	8	7	12	5	11	4	9	11	7	9	9
39	0	4	3	0	2	1	1	2	3	6	2	3	1	7	2	0	4	5
41	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0
43	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Total	**504**	**1,440**	**1,113**	**1,734**	**822**	**548**	**1,439**	**999**	**1,015**	**879**	**602**	**394**	**271**	**585**	**472**	**455**	**302**	**655**

										Fall								
length	**1989**	**1990**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
5	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	1	-	0
7	0	1	0	1	4	0	0	1	0	0	1	0	2	0	0	1	-	1
9	5	0	0	23	19	0	2	2	0	4	1	0	2	1	1	7	-	4
11	9	4	2	46	27	5	4	17	5	2	12	4	5	0	7	16	-	17
13	10	15	5	68	22	24	6	25	3	3	9	9	13	2	8	59	-	28
15	6	17	35	55	21	42	5	15	9	0	13	17	4	5	11	45	-	22
17	0	0	42	16	3	16	1	0	3	0	1	26	3	2	16	20	-	4
19	0	0	22	0	0	4	1	0	1	0	0	2	0	0	7	6	-	0
21	0	0	0	2	2	3	2	0	2	0	1	0	0	1	0	0	-	0
23	1	2	9	2	5	0	17	1	5	0	0	0	1	1	0	1	-	0
25	0	3	42	7	16	5	58	3	7	3	4	1	0	6	1	2	-	2
27	0	7	41	10	22	4	77	5	13	7	6	5	0	7	1	6	-	1
29	0	3	24	5	22	5	54	10	18	11	13	5	0	20	6	8	-	1
31	0	1	20	3	6	3	25	1	18	4	30	6	0	12	5	6	-	1
33	0	0	6	1	1	1	7	1	13	7	19	2	1	3	1	11	-	3
35	0	0	4	0	1	0	5	0	6	5	6	7	0	4	4	1	-	2
37	0	0	0	0	0	0	2	1	3	0	2	0	0	0	0	1	-	1
39	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	-	0
Total	**31**	**53**	**252**	**239**	**171**	**112**	**266**	**83**	**106**	**46**	**118**	**85**	**33**	**64**	**68**	**192**	**-**	**87**

Table 2.45. Hickory shad length frequencies, spring and fall, 1 cm intervals, 1991-2011.
Hickory shad were measured from every tow, with the exception of one fish in each of fall 1996, fall 1997, and fall 1998.

	Spring																				
length	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
17	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0	0
18	0	0	0	1	0	1	0	0	2	0	0	0	0	0	1	7	1	2	1	0	0
19	0	0	0	1	0	0	1	0	0	0	0	0	0	3	5	6	0	1	1	0	0
20	0	0	0	0	0	2	0	2	0	0	0	0	0	2	4	2	0	0	0	0	1
21	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	1	1	0	0	1	0
22	0	0	0	0	0	0	0	0	1	0	2	0	0	1	1	0	0	0	0	0	0
23	0	0	1	0	0	0	0	0	1	0	0	0	1	2	0	2	1	0	0	0	0
24	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	0	0	0	0
25	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	6	5	0	0	0	0
26	0	0	0	0	0	0	0	1	0	0	0	2	0	0	6	5	2	0	0	0	0
27	0	0	0	0	0	0	1	0	1	0	0	1	0	0	18	3	5	0	1	0	0
28	0	0	0	1	0	1	1	1	2	2	0	4	1	0	14	3	3	0	1	1	0
29	0	0	0	0	0	0	2	4	1	7	0	5	0	2	5	2	1	0	1	0	0
30	0	0	1	1	1	0	1	5	1	5	0	5	3	1	6	5	2	0	0	0	0
31	0	0	0	0	1	1	1	2	1	4	0	2	0	0	1	0	2	0	1	0	0
32	0	2	0	0	0	3	0	6	6	2	1	2	1	1	0	5	1	0	0	0	0
33	0	0	0	0	0	2	1	2	3	1	0	3	2	0	0	0	1	0	0	0	0
34	0	0	0	0	0	0	1	3	1	2	2	1	3	1	2	1	1	0	0	0	0
35	0	0	1	0	0	1	0	2	2	2	0	4	2	2	2	0	0	0	0	0	0
36	0	0	0	0	0	0	0	2	1	1	0	4	1	0	1	0	0	0	0	0	0
37	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	1	0	0	1	2	2	1	1	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Total	**1**	**2**	**3**	**4**	**2**	**12**	**9**	**34**	**24**	**26**	**10**	**40**	**16**	**20**	**75**	**53**	**27**	**3**	**6**	**2**	**1**

	Fall																				
length	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
19	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
22	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	-	0
23	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	-	2
24	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	-	2
25	0	0	0	6	0	1	1	0	2	0	0	0	0	0	2	1	2	0	0	-	0
26	0	1	2	8	0	3	1	0	5	0	0	0	0	4	3	0	0	0	0	-	3
27	0	0	0	3	0	2	0	0	5	2	0	1	0	3	0	1	0	0	0	-	0
28	0	1	0	1	0	3	0	0	2	0	0	1	0	1	1	1	0	0	2	-	0
29	0	0	0	2	0	0	0	0	0	2	0	0	0	1	2	3	0	0	0	-	0
30	0	1	0	1	1	0	1	0	0	0	0	0	0	0	8	7	2	0	3	-	0
31	0	0	1	0	1	0	2	1	2	0	0	0	1	0	15	1	2	0	2	-	0
32	0	1	0	0	1	2	2	1	7	3	1	0	2	0	12	1	1	0	0	-	0
33	0	2	1	2	0	1	3	2	2	2	3	1	2	1	5	0	1	2	0	-	0
34	0	2	0	0	1	4	2	0	3	4	0	1	1	0	5	1	0	0	0	-	0
35	0	0	2	0	0	0	0	0	0	2	0	0	0	2	1	1	0	0	0	-	0
36	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0	-	0
37	0	1	1	0	0	0	1	0	2	1	0	0	0	1	2	0	0	0	0	-	0
38	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	1	0	0	0	-	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	-	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0
Total	**0**	**10**	**7**	**27**	**4**	**16**	**15**	**5**	**32**	**16**	**4**	**5**	**6**	**18**	**60**	**22**	**10**	**2**	**7**	**0**	**7**

Table 2.46. Horseshoe crab length frequencies by sex, spring, 1 cm intervals, 1998-2011.
Horseshoe crabs were measured (prosomal width) from every tow.

			Spring												
Sex	**length**	**1998***	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
F	**13**		1	0	0	0	0	0	0	0	0	0	0	0	0
F	**14**		1	3	0	1	2	0	1	0	0	0	0	0	0
F	**15**		0	0	0	1	1	0	0	0	0	1	0	0	0
F	**16**		1	0	0	3	2	1	1	0	0	1	0	0	0
F	**17**		1	0	2	2	1	4	1	0	1	1	0	0	0
F	**18**		2	1	0	3	2	4	0	0	2	1	1	0	0
F	**19**		4	1	2	2	5	5	0	0	3	4	1	0	0
F	**20**		5	2	0	7	1	2	3	0	3	2	0	0	1
F	**21**		8	2	1	8	6	2	1	0	3	8	1	0	3
F	**22**		8	6	4	13	10	7	2	0	10	4	6	0	3
F	**23**		14	15	18	19	22	17	3	2	9	14	4	3	4
F	**24**		15	7	15	32	29	25	5	4	15	11	12	6	3
F	**25**		15	10	23	25	22	20	8	5	11	16	10	9	9
F	**26**		23	13	28	26	22	23	3	2	16	12	10	4	16
F	**27**		15	9	18	18	18	18	8	4	10	9	9	5	18
F	**28**		8	6	9	6	7	4	2	2	5	4	10	3	8
F	**29**		3	0	3	4	4	4	0	3	5	1	3	4	1
F	**30**		1	0	3	2	0	0	3	2	0	2	1	1	4
F	**31**		0	0	0	0	4	0	0	0	0	1	1	0	0
F	**32**		0	0	0	0	1	0	1	0	0	0	0	0	0
M	**14**		0	0	0	0	0	0	0	0	1	0	0	0	0
M	**15**		0	0	0	0	3	0	0	0	0	0	0	0	0
M	**16**		0	0	0	2	5	2	0	1	2	0	0	2	0
M	**17**		5	2	4	7	9	9	0	0	3	2	3	0	1
M	**18**		11	8	12	19	24	21	2	0	17	10	3	2	5
M	**19**		22	13	32	42	25	33	3	0	19	12	10	7	7
M	**20**		15	16	30	20	33	31	7	0	21	10	11	7	15
M	**21**		18	5	13	14	16	10	1	0	6	12	5	3	3
M	**22**		4	5	7	6	7	6	2	0	4	2	1	1	4
M	**23**		1	0	3	1	4	2	1	0	0	1	1	0	0
M	**24**		2	1	1	0	0	0	0	0	0	0	0	0	0
M	**25**		0	0	0	0	0	1	2	0	0	0	0	0	0
M	**26**		0	0	0	1	0	0	0	0	0	0	1	0	0
M	**27**		0	0	0	0	0	0	0	0	0	0	0	0	0
M	**28**		0	0	0	0	0	0	0	0	0	0	0	0	0
M	**29**		0	0	0	0	0	0	0	0	0	0	0	0	0
M	**30**		0	0	0	1	0	0	0	0	0	0	0	0	0
U	**22**		1	0	0	0	0	0	0	0	0	0	0	0	0
Total		**51**	**204**	**125**	**228**	**285**	**285**	**251**	**60**	**25**	**166**	**141**	**104**	**57**	**105**

Table 2.47. Horseshoe crab length frequencies by sex, fall, 1 cm intervals, 1998-2011.
Horseshoe crabs were measured (prosomal width) from every tow.

		Fall													
Sex	**length**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
F	**13**	0	0	2	0	0	0	3	0	1	0	0	0	-	0
F	**14**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
F	**15**	0	0	0	0	2	0	0	0	0	0	0	0	-	0
F	**16**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
F	**17**	1	1	0	0	2	1	0	1	1	0	1	0	-	0
F	**18**	0	2	0	1	0	1	1	1	0	0	0	0	-	0
F	**19**	3	2	2	2	0	1	0	0	1	0	1	1	-	0
F	**20**	5	1	1	4	4	2	3	0	2	0	0	2	-	0
F	**21**	3	2	2	3	1	4	6	3	1	1	1	0	-	0
F	**22**	3	8	13	13	10	3	9	4	1	2	6	6	-	6
F	**23**	8	15	15	12	8	8	13	10	7	7	6	14	-	6
F	**24**	7	19	30	27	21	9	24	10	6	17	14	22	-	18
F	**25**	17	12	20	31	33	13	19	6	12	26	17	17	-	19
F	**26**	19	23	33	31	18	9	29	12	10	22	15	24	-	25
F	**27**	14	7	21	22	18	7	22	8	3	17	11	28	-	16
F	**28**	2	4	10	8	13	6	15	5	4	8	11	22	-	11
F	**29**	2	3	2	5	2	3	8	2	0	4	1	5	-	2
F	**30**	0	1	1	2	0	2	1	2	0	2	0	2	-	0
F	**31**	0	1	0	0	1	0	0	2	0	0	0	1	-	0
F	**32**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
F	**33**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
F	**34**	0	0	0	0	0	1	0	0	0	0	0	0	-	0
M	**11**	0	0	0	1	0	0	0	0	0	0	0	0	-	0
M	**12**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
M	**13**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
M	**14**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
M	**15**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
M	**16**	0	0	2	1	5	3	0	0	0	1	1	0	-	1
M	**17**	6	5	7	6	3	5	11	0	1	3	1	2	-	3
M	**18**	12	14	28	18	14	15	21	3	9	3	9	18	-	13
M	**19**	10	20	39	27	31	11	39	13	4	12	21	14	-	9
M	**20**	20	23	35	32	22	8	30	12	9	19	23	31	-	10
M	**21**	6	11	18	15	9	4	15	4	2	10	6	13	-	7
M	**22**	5	3	8	4	6	0	10	2	5	6	2	5	-	6
M	**23**	0	0	3	2	6	1	1	0	2	3	1	3	-	0
M	**24**	0	0	1	3	0	0	1	0	1	2	0	2	-	0
M	**25**	0	0	2	0	0	0	0	0	0	0	0	1	-	0
M	**26**	2	0	0	3	0	0	0	0	1	0	0	1	-	0
M	**27**	0	0	0	0	0	0	0	0	0	0	0	0	-	0
M	**28**	0	0	0	0	0	0	0	1	0	0	0	0	-	0
M	**29**	0	0	0	1	0	0	0	0	0	0	0	0	-	0
Total		**145**	**177**	**295**	**274**	**229**	**117**	**281**	**101**	**83**	**165**	**148**	**234**	**-**	**152**

Table 2.48. Long-finned squid length frequencies, spring and fall, 2 cm intervals (midpoint given), 1986-1990, 1992-2011.
Length frequencies of squid taken from the first three tows of each day.

Spring

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
3	0	0	0	0	0	0	0	0	1	5	1	18	4	11	0	7	0	6	0	1	2	125	17	1	0
5	0	1	38	0	1	10	73	168	135	62	46	426	42	68	17	92	27	121	12	30	44	440	194	6	23
7	2	8	113	0	0	25	196	225	354	57	90	769	38	50	39	64	15	153	24	21	57	214	215	11	87
9	5	13	71	2	3	40	90	146	311	74	86	449	61	36	68	55	37	75	13	20	49	109	94	12	38
11	3	32	129	5	13	45	107	211	615	130	121	201	129	57	126	89	57	143	39	91	103	278	231	112	76
13	43	335	354	18	35	129	296	257	624	172	223	84	194	203	177	147	141	519	197	285	124	332	684	302	152
15	45	611	594	84	126	178	372	188	278	158	393	31	193	196	91	148	137	862	442	256	95	181	385	300	130
17	21	822	522	191	289	120	507	147	178	85	340	19	110	135	65	93	83	827	407	239	49	136	240	151	91
19	59	569	445	187	272	89	345	52	119	68	188	15	61	90	42	34	38	343	198	117	40	68	153	109	69
21	52	542	245	91	157	97	170	31	95	34	117	10	38	59	38	33	29	260	135	90	16	59	63	56	65
23	26	398	145	82	107	68	72	23	26	16	106	11	21	37	20	15	26	164	89	58	12	21	31	42	38
25	19	369	98	63	111	20	44	16	17	9	94	3	26	24	19	8	21	104	64	43	10	14	25	23	29
27	13	439	78	85	85	35	48	9	40	4	43	5	7	19	9	7	7	45	37	17	5	7	17	7	9
29	4	219	29	40	81	27	34	5	7	4	11	3	7	1	7	5	2	20	12	10	2	2	6	1	0
31	8	199	38	23	36	7	9	3	12	1	14	1	1	1	2	8	2	14	2	8	2	0	4	0	3
33	0	86	14	13	15	10	7	1	5	1	5	0	1	1	1	4	0	1	1	1	0	0	3	0	2
35	1	38	0	0	11	2	2	2	8	0	4	0	0	1	2	1	0	0	0	0	0	0	0	0	0
37	2	38	4	5	6	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
39	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**303**	**4,720**	**2,917**	**894**	**1,348**	**903**	**2,372**	**1,484**	**2,825**	**880**	**1,882**	**2,045**	**933**	**990**	**723**	**811**	**622**	**3,657**	**1,672**	**1,287**	**610**	**1,986**	**2,362**	**1,133**	**812**

Fall

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
3	0	157	59	113	74	316	914	89	181	82	130	135	133	55	36	90	90	171	101	181	29	119	433	-	92
5	0	1,212	1,039	1,211	1,108	4,413	5,838	1,809	1,682	1,968	1,582	2,530	1,577	1,598	893	956	3,111	2,450	2,302	836	1,787	711	3,271	-	2,036
7	16	1,835	1,886	1,124	1,305	10,225	8,690	3,954	4,150	4,620	2,446	6,150	4,172	4,046	1,919	2,260	5,752	5,464	4,889	1,830	6,602	1,385	5,640	-	2,720
9	151	1,346	479	391	349	4,704	6,725	4,711	4,205	4,078	1,504	4,932	3,637	2,878	1,455	1,417	3,670	2,694	3,289	996	5,668	1,685	2,922	-	1,511
11	13	813	126	128	82	1,630	2,950	3,662	2,445	1,962	736	1,891	2,112	1,251	792	569	1,076	1,018	1,511	387	3,353	812	1,134	-	980
13	0	247	45	72	41	526	1,145	1,259	546	876	279	696	700	627	285	232	60	240	501	116	1,175	296	330	-	350
15	0	108	20	34	9	58	463	510	187	243	75	302	369	332	134	65	3	151	108	35	403	65	68	-	127
17	0	19	11	22	6	0	127	174	48	62	28	113	231	174	40	16	0	44	55	25	262	12	16	-	25
19	0	2	23	6	1	0	22	43	2	7	10	17	117	42	5	4	0	9	3	23	76	0	1	-	25
21	0	28	0	8	1	0	2	10	0	0	1	1	45	12	3	1	0	4	2	1	4	0	0	-	0
23	0	2	0	6	1	0	2	12	0	6	0	1	21	0	0	0	0	0	2	0	0	0	0	-	1
25	0	1	0	3	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	5	0	0	-	0
Total	**180**	**5,770**	**3,688**	**3,118**	**2,977**	**21,872**	**26,879**	**16,233**	**13,446**	**13,904**	**6,791**	**16,768**	**13,115**	**11,016**	**5,562**	**5,610**	**13,762**	**12,245**	**12,763**	**4,430**	**19,364**	**5,085**	**13,815**	**-**	**7,867**

Table 2.49. Scup spring length frequencies, 1 cm intervals, 1984-2011.
Lengths were recorded from every tow.

	Spring																											
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	13	0	0	0
8	0	0	0	6	3	84	0	12	0	0	0	11	0	0	10	24	61	0	16	0	0	4	56	4	145	3	0	0
9	4	30	50	33	46	1,049	11	80	9	0	11	408	152	10	163	128	976	98	400	0	0	77	322	145	606	148	0	19
10	8	138	377	46	160	2,523	270	514	49	3	48	1,202	537	145	1,381	355	5,293	405	2,303	4	1	169	1,151	926	1,700	1,966	14	115
11	10	362	724	38	144	2,075	493	1,365	67	4	92	1,437	1,055	311	1,617	313	10,571	645	3,389	19	1	136	1,259	1,033	2,055	3,476	22	203
12	5	194	427	9	31	312	280	576	57	3	67	809	826	151	712	131	8,815	586	1,706	33	1	62	1,263	486	950	3,418	7	178
13	2	51	122	4	9	87	56	122	18	4	23	108	397	36	359	51	4,041	265	722	25	2	19	888	78	586	1,141	1	77
14	0	7	64	2	0	72	22	0	11	5	2	20	29	25	154	16	1,043	104	498	7	1	8	626	76	357	561	3	16
15	2	4	4	11	4	137	40	3	3	77	7	3	3	11	66	1	201	220	247	7	42	56	251	298	426	593	40	19
16	9	47	26	65	19	121	202	8	4	217	48	6	61	49	24	13	48	1,349	1,035	121	327	129	722	1,177	1,971	1,430	222	100
17	37	91	91	119	40	105	310	63	49	339	142	11	264	123	57	75	229	4,517	2,943	415	485	129	1,670	1,607	3,916	2,151	614	215
18	22	204	208	174	34	95	231	182	135	286	194	28	545	216	89	161	1,034	8,611	4,097	733	403	140	2,254	1,444	3,722	1,953	780	313
19	28	130	182	100	16	50	121	347	258	159	203	30	390	136	66	172	1,451	6,452	3,619	720	261	114	1,607	918	1,978	1,078	527	270
20	11	71	131	33	25	33	30	256	136	35	99	22	153	81	21	130	1,106	1,840	3,679	390	381	29	934	390	1,315	798	424	257
21	3	15	36	15	44	13	26	223	65	27	95	19	34	62	11	78	513	518	6,253	427	584	42	559	266	2,149	1,320	599	656
22	7	7	6	4	49	7	18	292	11	17	56	17	10	96	8	29	173	292	8,129	660	1,077	111	416	458	2,835	1,941	723	1,261
23	6	22	103	3	33	12	12	225	10	25	44	19	1	86	17	25	240	755	5,618	931	982	174	427	603	2,340	1,522	641	1,389
24	4	38	124	5	14	9	6	103	21	14	23	24	8	46	18	26	282	833	2,385	977	745	161	361	558	1,351	1,149	580	1,125
25	3	28	77	2	4	5	7	33	15	8	10	15	2	20	12	13	199	278	1,292	1,025	844	216	234	272	854	909	573	931
26	0	11	73	2	3	3	3	15	10	1	8	5	1	5	10	10	154	132	1,266	741	1,215	332	262	128	642	793	523	659
27	2	3	35	3	1	4	1	5	4	4	6	8	2	3	7	7	50	93	491	363	1,200	353	283	91	382	504	350	652
28	0	12	4	5	4	3	3	1	6	2	2	0	1	3	3	2	13	88	282	201	730	379	427	109	230	267	243	638
29	1	14	6	3	2	0	0	2	2	0	0	0	1	0	1	6	19	36	147	81	331	332	622	115	198	234	153	469
30	0	11	3	1	0	1	0	2	1	1	1	1	1	3	0	0	8	8	71	33	116	171	618	156	64	90	41	321
31	0	1	0	1	2	0	0	1	0	0	1	0	1	4	0	1	6	3	35	23	37	101	441	167	54	42	34	235
32	0	2	1	0	1	1	1	0	1	0	0	1	0	0	0	3	3	2	10	11	28	41	317	126	68	32	15	121
33	0	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	4	2	11	4	11	16	266	65	57	57	14	73
34	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	3	1	4	2	8	1	30	37	47	16	4	39
35	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0	3	0	1	2	17	18	26	10	4	32
36	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	4	9	11	11	2	28
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	3	4	8	1	15
38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	5
39	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Total	**166**	**1,497**	**2,877**	**684**	**689**	**6,801**	**2,143**	**4,430**	**942**	**1,232**	**1,183**	**4,204**	**4,474**	**1,624**	**4,806**	**1,771**	**36,537**	**28,134**	**50,654**	**7,955**	**9,817**	**3,506**	**18,292**	**11,764**	**31,052**	**27,623**	**7,155**	**10,435**

Table 2.50. Scup fall length frequencies, 1 cm intervals, 1984-2011.
Lengths were recorded from every tow.

	Fall																											
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0
3	0	8	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	13	4	9	0	0	-	4
4	1	61	0	0	17	1	3	14	196	0	6	0	0	18	4	1	1	28	117	19	143	363	11	74	0	34	-	21
5	16	90	313	213	103	128	57	120	483	28	312	1	13	70	224	21	168	317	603	214	1,302	850	129	381	0	234	-	131
6	295	249	626	1,193	625	612	340	1,805	1,516	554	931	41	185	338	1,246	1,041	991	1,891	2,132	573	4,723	4,122	389	1,303	4	1,106	-	705
7	627	588	753	491	1,782	1,367	640	4,923	1,554	4,383	5,217	219	788	1,020	2,354	4,570	4,228	5,003	5,571	1,589	8,721	9,683	942	4,516	871	2,923	-	1,769
8	345	1,827	507	499	2,264	1,765	2,152	11,168	2,595	9,063	11,585	602	2,048	1,318	4,330	9,886	7,464	7,327	9,315	701	10,637	11,328	1,442	10,576	3,092	3,078	-	3,977
9	719	2,637	210	434	2,050	1,500	3,806	13,883	936	9,169	13,327	1,867	3,502	1,479	4,515	18,224	9,302	5,369	10,102	205	10,751	8,808	1,517	13,782	6,383	1,316	-	4,882
10	262	2,025	84	77	656	798	2,728	5,539	250	5,754	4,712	1,916	2,667	1,184	3,126	29,863	6,831	2,837	6,754	33	5,987	5,295	459	10,376	7,196	610	-	2,365
11	8	1,064	19	12	81	95	601	1,191	78	814	432	606	525	499	728	20,073	1,806	888	2,020	3	1,896	1,973	126	2,547	1,733	75	-	632
12	0	9	4	22	17	124	28	88	40	12	46	103	31	191	94	6,931	467	312	488	6	344	734	256	1,316	84	10	-	112
13	14	59	41	144	53	670	51	2	304	13	4	46	39	44	56	1,190	428	229	197	87	77	680	606	1,645	27	81	-	42
14	30	265	322	288	274	1,449	13	46	860	70	22	403	161	130	180	198	2,744	309	276	249	159	1,158	1,101	3,269	193	598	-	248
15	86	339	603	277	649	1,102	171	305	1,393	176	68	1,283	459	517	504	459	6,889	690	854	325	268	784	1,210	4,216	367	1,890	-	883
16	91	473	452	149	313	487	373	910	942	251	117	1,478	491	588	738	742	10,695	762	1,403	201	130	555	801	3,003	493	2,445	-	1425
17	46	299	361	61	111	213	362	683	465	168	103	869	299	289	446	1,583	7,208	593	1,642	92	75	359	338	1,468	330	1,777	-	1138
18	27	170	188	29	81	87	415	242	110	70	87	262	111	101	193	1,548	3,508	225	1,370	43	37	261	179	555	110	830	-	613
19	8	44	55	20	85	42	309	39	28	56	57	47	51	21	72	1,196	771	294	733	175	78	234	113	676	88	320	-	293
20	21	15	36	52	93	43	266	13	145	95	34	18	75	32	33	436	396	769	621	586	189	308	147	1,121	185	343	-	110
21	47	8	44	87	87	34	424	56	254	111	41	9	70	34	33	289	337	967	797	693	339	194	158	1,179	228	336	-	186
22	59	38	116	88	96	34	333	64	265	88	56	4	58	39	27	460	216	655	1,214	500	447	147	128	655	238	226	-	288
23	75	77	133	61	18	14	101	86	181	44	38	4	23	17	16	329	189	328	1,185	315	544	88	134	365	150	190	-	408
24	93	64	84	33	17	9	34	98	27	16	33	3	7	10	7	173	124	195	1,071	506	744	104	90	189	94	170	-	649
25	46	49	38	27	4	6	21	47	23	12	17	1	1	12	5	66	49	96	769	726	1,072	146	59	181	123	170	-	822
26	38	53	13	28	10	3	10	19	17	10	11	0	0	4	2	13	35	55	271	720	878	173	42	170	147	167	-	643
27	38	64	9	36	7	1	2	13	22	10	7	0	2	1	2	19	42	27	184	558	790	212	23	91	99	128	-	502
28	31	18	12	11	3	1	3	6	13	7	6	0	2	1	1	4	20	11	67	261	731	214	15	78	85	107	-	383
29	9	21	4	7	0	0	1	1	6	4	2	0	0	0	3	2	13	14	32	101	433	174	23	32	59	86	-	341
30	8	16	2	1	0	0	0	0	0	3	0	0	0	0	0	0	3	4	22	75	122	101	36	27	51	35	-	196
31	7	7	1	1	0	0	1	2	1	0	0	0	1	0	0	1	2	3	14	23	45	46	26	43	22	28	-	111
32	2	1	0	0	0	0	3	0	0	0	1	0	0	0	0	1	0	0	1	14	25	18	20	37	20	21	-	76
33	1	2	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	5	10	3	6	27	14	13	-	31
34	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	2	10	11	13	-	16
35	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	6	7	-	10
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	1	4	2	-	7
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	-	2
Total	**3,050**	**10,641**	**5,030**	**4,344**	**9,496**	**10,592**	**13,249**	**41,363**	**12,705**	**30,983**	**37,272**	**9,782**	**11,609**	**7,957**	**18,939**	**99,319**	**64,927**	**30,198**	**49,829**	**9,602**	**51,706**	**49,133**	**10,533**	**63,921**	**22,507**	**19,371**	-	**24,021**

Table 2.51. Striped bass spring length frequencies, 2 cm intervals (midpoint given), 1984–2011.
All striped bass taken in the Survey were measured, with the exception of one fish taken in 1984, one in 1988, and two in 1990.

	Spring																											
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	1
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	8	0	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0
19	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	0	0
21	0	0	0	0	0	2	3	0	0	0	0	4	1	0	2	1	3	0	8	0	0	1	0	0	0	21	0	0
23	0	0	0	0	0	1	1	0	1	0	0	9	0	0	11	1	8	1	22	0	0	23	0	7	1	24	1	0
25	0	0	0	1	0	1	4	2	0	0	0	18	0	2	28	1	18	7	32	4	2	57	0	9	4	24	1	2
27	0	0	0	0	0	0	5	1	2	0	2	28	2	5	30	2	24	15	38	4	1	67	1	12	4	7	1	0
29	0	0	0	0	1	0	9	2	0	1	1	24	4	12	21	14	28	16	27	11	4	50	1	10	6	5	0	0
31	0	0	0	0	0	1	6	2	1	2	2	12	4	14	20	10	29	5	17	7	5	19	1	4	4	1	0	0
33	0	0	0	1	0	0	0	6	1	0	3	7	8	5	20	24	7	6	12	10	10	6	2	5	4	6	0	0
35	0	0	0	0	1	0	3	2	1	1	0	8	20	2	19	16	3	4	7	7	13	7	6	6	1	2	1	1
37	0	0	0	0	0	0	3	1	0	0	1	8	26	25	25	15	2	11	12	11	11	4	5	16	2	5	2	1
39	0	0	0	0	0	1	0	0	0	0	3	3	19	42	23	13	2	14	14	7	4	7	6	35	2	10	3	0
41	0	0	0	0	0	2	2	1	3	1	3	4	17	30	25	19	6	7	20	3	2	20	2	26	2	19	1	0
43	0	0	0	0	0	0	0	1	3	5	1	0	7	16	17	11	3	2	17	5	1	13	4	25	6	14	0	0
45	0	0	0	1	0	0	0	0	5	2	2	3	12	6	19	9	4	1	17	2	3	12	2	11	7	21	0	0
47	0	0	0	0	2	0	0	0	0	3	6	0	7	10	15	10	5	6	9	3	2	17	0	7	10	30	2	6
49	0	0	0	0	2	0	2	1	2	3	4	1	5	13	14	6	4	3	8	5	6	17	1	12	9	28	7	4
51	0	0	0	0	0	1	0	1	4	3	4	2	7	7	12	6	4	3	9	7	1	4	6	5	10	32	2	8
53	0	0	0	1	0	0	0	1	2	5	4	2	7	4	8	11	5	2	5	6	6	9	6	8	12	19	5	11
55	0	0	0	0	0	0	1	1	1	4	2	2	5	3	13	13	7	3	8	9	3	7	6	4	12	9	7	11
57	0	0	0	0	0	0	0	2	2	2	8	1	2	3	6	21	4	5	9	9	6	13	3	15	12	13	8	13
59	0	0	0	2	0	1	0	0	0	4	2	2	2	7	7	22	4	5	10	11	4	5	5	5	8	17	6	5
61	0	0	0	0	0	0	0	2	1	2	5	2	3	3	2	26	4	10	17	7	6	6	4	12	5	17	3	13
63	0	0	0	1	1	0	0	0	1	5	1	0	2	3	2	21	8	13	6	9	7	7	4	15	5	15	2	12
65	0	0	0	0	0	0	0	0	0	1	4	0	3	5	10	15	10	4	13	9	4	8	6	4	1	12	4	8
67	0	0	0	0	0	1	0	0	1	1	0	1	3	4	6	10	9	6	19	14	6	4	3	8	4	8	1	15
69	0	0	0	0	0	0	2	0	0	3	3	3	1	3	1	10	3	13	15	10	5	7	2	5	3	3	2	9
71	0	0	0	1	0	0	1	0	0	0	1	2	1	3	1	10	5	6	6	5	3	9	1	4	5	7	2	12
73	0	0	0	0	0	0	0	2	0	3	0	0	7	6	2	5	8	5	12	10	2	6	3	3	3	3	2	7
75	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	6	1	2	4	10	5	5	1	3	0	3	4	8
77	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	3	5	2	0	6	1	5	2	1	1	0	9
79	0	0	0	0	0	0	0	1	1	0	0	3	2	3	0	1	2	1	7	1	1	4	2	0	1	1	1	5
81	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	2	2	0	4	0	2	4	1	2	2	0	1	1
83	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	4	0	1	1	1	0	0	0	1
85	0	0	0	0	0	0	0	2	0	0	0	0	2	1	0	0	0	1	3	2	0	1	0	0	0	0	0	1
87	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	1	0	4	2	0	2	1	1	0	0	0
89	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	3	0	0	0	0	0
91	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	1	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0
97	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**0**	**0**	**0**	**8**	**7**	**11**	**43**	**32**	**34**	**59**	**65**	**151**	**184**	**239**	**361**	**335**	**229**	**184**	**413**	**208**	**135**	**422**	**97**	**287**	**160**	**382**	**69**	**165**

Table 2.52. Striped bass fall length frequencies, 2 cm intervals (midpoint given), 1984–2011.
All striped bass taken in the Survey were measured on each tow.

	Fall																											
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	7
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	13
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	9
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	4
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	-	3
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1
39	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	4	0	0	0	0	0	-	1
41	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	7	0	2	0	0	0	-	0
43	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	1	0	1	0	19	0	0	0	1	0	-	0
45	0	0	1	0	0	0	0	0	0	0	0	0	4	3	2	2	0	0	1	0	18	1	1	2	0	0	-	0
47	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	11	0	0	1	1	18	1	1	10	0	2	-	0
49	0	0	0	0	0	0	0	0	0	1	0	0	9	9	2	9	1	0	0	0	14	2	4	22	1	1	-	0
51	0	0	0	0	0	0	0	0	0	4	2	0	8	4	1	9	0	0	3	0	29	2	5	18	2	4	-	2
53	1	0	0	0	0	0	0	0	0	2	2	1	5	14	7	5	5	0	3	0	27	7	7	16	7	7	-	2
55	0	0	0	0	0	0	0	0	1	0	1	0	2	10	5	5	2	0	4	1	26	1	2	10	4	10	-	3
57	0	0	0	1	1	0	0	1	1	5	0	2	3	11	5	5	5	2	7	1	11	6	3	6	3	8	-	0
59	0	0	0	0	0	0	0	0	1	0	0	0	0	7	3	0	8	0	2	0	13	6	3	5	3	8	-	0
61	0	0	0	0	3	0	0	1	0	1	0	2	2	3	1	2	4	2	2	0	12	1	6	4	3	4	-	2
63	0	0	0	0	2	0	0	1	1	1	1	0	0	3	2	3	6	7	3	1	9	5	2	5	1	6	-	3
65	0	0	0	0	1	0	0	0	2	1	1	0	0	2	0	4	6	5	3	0	7	2	2	7	1	6	-	6
67	0	0	0	0	1	0	0	1	0	1	2	2	1	1	0	1	6	1	6	0	8	4	3	4	0	5	-	3
69	0	0	0	0	1	0	0	0	0	1	1	0	2	2	0	0	4	3	4	0	6	0	3	6	2	6	-	2
71	0	0	0	0	1	0	0	0	1	0	0	1	1	1	2	0	3	3	5	0	3	3	0	0	0	1	-	1
73	0	0	0	0	0	0	0	0	0	2	1	4	0	2	3	1	2	2	0	1	3	0	0	0	4	1	-	5
75	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	1	3	2	1	1	1	2	0	1	0	0	-	1
77	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	4	0	4	0	1	0	0	2	3	0	-	5
79	0	0	0	0	0	0	0	0	0	2	1	0	0	1	1	0	1	1	2	1	1	0	1	0	3	1	-	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	-	0
83	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0
85	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	2	1	0	1	0	3	-	1
87	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	-	0
89	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	-	1
91	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	-	0
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	0
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	2	-	0
97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	5	-	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	-	0
101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	-	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	-	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	0
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0
Total	**1**	**0**	**1**	**1**	**10**	**0**	**0**	**6**	**8**	**22**	**16**	**15**	**48**	**80**	**37**	**62**	**64**	**28**	**56**	**8**	**243**	**47**	**47**	**131**	**39**	**83**	-	**77**

Table 2.53. Summer flounder length frequencies, spring, 2 cm intervals (midpoint given), 1984–2011.
All summer flounder taken in the Survey were measured, with the exception of one fish in 1990.

	Spring																												
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
13	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	15	0	0	1	0
17	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	28	1	1	7	0
19	0	0	0	36	0	0	1	0	0	0	0	1	1	0	0	0	2	0	0	2	1	0	0	37	1	3	10	0
21	0	0	11	39	0	0	0	0	0	0	3	2	2	1	0	0	2	1	1	3	0	0	0	46	5	16	21	1
23	0	0	10	31	1	0	1	3	2	0	9	1	2	2	0	0	0	6	1	13	1	2	1	37	3	21	38	4
25	1	0	22	33	2	0	2	6	1	9	20	1	2	10	1	2	6	5	2	27	3	3	0	21	7	43	86	21
27	8	0	43	25	20	0	7	12	6	22	32	3	11	10	2	14	7	26	13	79	8	14	0	11	13	55	94	50
29	7	0	39	6	18	0	15	17	14	15	10	9	45	22	5	32	21	60	50	135	25	10	2	19	34	53	78	90
31	9	1	17	3	18	0	19	23	12	12	19	12	44	27	4	42	23	53	89	104	14	19	5	19	28	24	37	92
33	0	7	13	5	12	1	12	9	8	7	22	2	14	25	7	22	28	16	57	54	18	15	21	6	25	26	10	70
35	2	8	4	2	13	3	1	5	6	7	16	2	12	11	11	22	22	10	41	49	13	12	17	9	14	20	7	81
37	1	3	4	5	8	2	1	6	2	6	20	1	10	20	28	26	34	20	57	75	34	8	14	12	10	28	16	69
39	3	3	3	4	5	1	2	5	2	7	7	0	12	16	38	18	36	12	61	71	51	9	10	22	14	36	20	55
41	1	3	7	1	8	2	1	6	5	4	6	3	5	10	35	14	33	19	51	77	49	13	5	26	17	35	12	38
43	0	1	3	0	2	2	0	0	2	4	6	7	6	6	22	16	22	24	28	58	48	10	5	30	13	28	13	25
45	0	0	1	1	3	0	0	8	4	0	4	0	5	4	15	11	29	16	21	33	18	5	4	26	6	30	7	19
47	0	0	3	3	3	1	1	4	2	1	3	0	1	6	9	10	18	14	20	43	28	12	3	25	14	14	16	26
49	1	0	1	1	1	2	0	2	1	0	2	1	3	2	12	17	7	10	14	32	26	6	3	35	9	13	10	20
51	0	0	5	0	1	0	0	1	1	0	1	0	1	3	15	9	8	12	19	19	13	8	7	26	15	16	9	15
53	0	0	1	0	1	0	2	1	0	1	1	2	3	5	5	9	5	8	10	21	16	6	4	10	15	8	2	18
55	0	2	1	0	1	1	0	0	1	2	1	0	3	2	6	8	8	8	14	10	13	5	2	11	18	14	2	15
57	0	0	0	0	0	1	1	0	0	0	2	0	0	1	5	4	5	8	12	9	3	2	1	13	14	16	2	14
59	0	0	0	0	1	1	0	0	0	2	0	0	2	3	3	8	8	2	6	12	8	4	1	5	5	17	3	7
61	0	2	0	0	0	0	0	0	0	1	2	1	1	0	1	3	4	4	6	5	5	3	0	2	4	7	3	7
63	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	2	1	7	10	9	0	4	6	5	8	2	8
65	0	1	0	0	0	0	0	1	1	0	1	0	0	0	1	1	2	4	2	8	2	1	0	7	3	4	6	4
67	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	1	2	3	5	4	0	1	1	1	1	1	6
69	0	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	0	0	0	4	2	0	0	3	0	1	1	0
71	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	1	2	0	3	4	0	0	0	0	0	0
73	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	0	1	2
75	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	1	2	0	1	1
77	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
79	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total	**33**	**32**	**189**	**203**	**118**	**18**	**67**	**109**	**72**	**101**	**188**	**51**	**186**	**188**	**230**	**289**	**334**	**342**	**588**	**962**	**416**	**172**	**110**	**512**	**297**	**538**	**516**	**758**

Table 2.54. Summer flounder length frequencies, fall, 2 cm intervals (midpoint given), 1984–2011.
All summer flounder taken in the Survey were measured, with the exception of two fish in 1985.

	Fall																											
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	-	0
15	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	-	0
17	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	2	0	0	0	0	2	-	0
19	0	3	3	0	0	0	0	0	0	2	0	0	1	0	0	0	1	0	0	0	0	0	2	1	1	5	-	0
21	0	7	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	2	0	0	1	4	8	-	0
23	0	4	3	0	0	0	0	0	1	2	0	1	3	0	0	0	0	1	7	0	3	2	0	0	11	6	-	0
25	0	6	0	0	0	0	0	2	0	4	0	0	2	0	0	1	1	0	5	0	5	0	0	3	5	7	-	3
27	0	6	3	1	0	0	1	1	0	1	0	0	0	0	0	3	11	1	17	0	5	2	0	4	17	14	-	4
29	0	2	2	7	0	0	0	1	0	1	1	0	1	0	0	1	2	1	19	0	10	1	0	6	8	6	-	5
31	0	3	6	9	3	0	0	1	1	0	1	0	4	3	0	4	2	14	13	0	5	5	0	18	5	5	-	11
33	10	0	10	30	10	0	3	3	3	8	8	8	12	17	1	16	3	28	14	3	6	33	5	14	3	8	-	29
35	22	4	33	35	20	0	10	11	14	29	7	13	33	37	11	18	8	104	70	15	3	55	2	19	1	34	-	35
37	21	17	44	28	41	0	14	21	19	31	10	6	33	44	10	39	23	109	106	29	6	37	6	15	8	34	-	38
39	20	10	35	21	37	0	11	28	15	29	25	6	38	72	17	50	33	81	158	28	18	32	9	9	29	40	-	54
41	16	11	26	16	36	1	18	30	12	37	10	16	49	54	21	52	31	61	119	16	21	57	10	20	36	34	-	41
43	11	24	26	5	21	1	18	13	13	16	4	9	23	27	34	43	31	28	61	22	25	30	16	17	27	29	-	27
45	3	16	9	3	18	1	15	13	9	6	5	2	15	10	32	22	13	16	77	21	32	25	13	14	9	20	-	17
47	2	11	6	6	8	3	3	5	6	11	7	2	13	11	36	8	8	15	35	18	29	15	4	8	5	27	-	6
49	3	12	1	2	3	3	3	3	8	3	7	1	8	7	15	4	18	23	24	10	26	15	8	13	5	20	-	9
51	3	1	4	1	1	2	0	8	4	6	0	3	8	4	9	7	11	20	14	8	9	7	1	15	2	7	-	2
53	1	1	2	2	1	4	1	7	4	3	1	0	3	5	7	12	7	8	5	5	7	8	4	16	1	10	-	1
55	1	2	1	2	1	0	2	4	2	1	0	2	0	3	4	3	5	9	1	2	4	3	2	7	0	8	-	4
57	2	0	1	2	1	0	1	0	1	2	1	1	1	2	2	2	2	5	10	2	4	1	2	3	1	2	-	1
59	0	0	1	0	1	0	1	0	0	1	3	0	0	2	1	6	3	4	7	4	3	1	0	8	0	4	-	1
61	0	0	0	1	0	0	1	0	0	1	0	0	0	1	2	1	2	0	1	2	0	1	0	2	0	4	-	4
63	1	1	0	0	1	0	0	1	1	0	0	0	0	0	2	0	2	1	2	2	1	0	1	1	0	3	-	1
65	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	1	1	1	1	0	1	1	1	0	0	-	0
67	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	1	0	1	-	1
69	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	-	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	-	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	-	0
Total	**117**	**141**	**225**	**171**	**203**	**16**	**102**	**153**	**114**	**194**	**93**	**70**	**248**	**299**	**206**	**293**	**220**	**531**	**770**	**189**	**228**	**331**	**95**	**219**	**178**	**343**	**-**	**294**

Table 2.55. Tautog length frequencies, spring, 2 cm intervals (midpoint given), 1984-2011.
All tautog taken in the Survey were measured.

	Spring																											
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0
13	0	0	1	1	1	0	4	2	1	1	0	0	2	1	0	1	1	3	0	0	2	4	0	1	0	1	0	1
15	0	0	2	3	1	8	10	1	3	3	4	0	1	3	0	0	6	4	1	0	1	1	0	1	1	3	2	2
17	2	1	2	6	3	6	14	4	3	1	4	0	3	5	0	0	5	3	3	1	1	3	3	1	2	1	0	0
19	4	2	2	6	8	14	25	13	6	5	2	1	2	5	1	3	4	8	4	2	0	0	0	2	2	1	1	1
21	8	3	7	2	8	14	27	11	3	6	4	1	0	7	1	3	4	5	5	1	2	3	0	0	2	0	2	4
23	9	5	6	5	12	23	28	20	4	4	6	2	0	7	4	1	6	13	5	1	1	5	5	3	3	0	1	5
25	11	9	5	5	8	15	15	8	4	4	7	2	2	7	3	3	5	11	12	3	3	4	4	6	3	1	4	3
27	11	7	15	3	4	13	20	12	1	4	4	1	1	5	8	3	8	8	11	3	4	1	2	4	3	0	0	6
29	10	16	8	5	7	18	16	8	6	6	16	2	2	5	2	2	7	4	9	4	5	8	2	6	8	0	1	1
31	15	7	15	5	10	20	22	7	2	6	5	1	2	9	3	1	3	9	21	6	10	3	9	3	2	2	1	3
33	14	7	13	14	8	12	13	13	5	1	6	1	5	11	9	9	8	9	31	18	12	8	7	8	4	6	2	1
35	14	11	18	7	15	16	15	16	9	0	5	0	6	13	6	6	9	10	28	9	7	2	9	9	8	4	1	5
37	15	10	39	26	25	19	13	18	4	3	9	2	5	8	5	9	20	20	40	19	21	14	12	7	9	9	5	3
39	17	15	35	18	20	19	21	25	13	5	12	3	11	6	8	10	19	17	47	14	26	13	14	5	21	12	8	5
41	19	14	65	20	25	38	19	27	14	4	12	4	13	5	16	7	28	27	55	15	21	18	16	16	8	21	2	10
43	23	23	50	19	38	45	18	25	16	10	12	2	11	15	13	19	27	29	48	24	21	11	11	27	9	21	3	8
45	36	27	53	23	34	52	49	31	21	11	15	2	7	12	17	17	28	23	71	16	29	10	15	25	15	16	4	7
47	31	18	59	21	40	53	34	40	25	8	18	4	8	11	10	12	17	20	47	18	9	14	17	32	14	11	4	5
49	31	24	37	17	41	60	38	38	15	11	13	1	5	10	10	11	10	15	29	7	9	15	18	27	3	11	2	6
51	22	17	31	10	35	39	38	29	20	9	13	3	8	3	14	9	7	17	18	8	11	8	9	27	10	13	3	7
53	18	12	16	10	25	27	37	16	16	8	9	1	6	7	9	3	6	9	16	4	2	2	10	10	8	7	2	5
55	12	3	11	11	23	21	24	16	13	8	6	3	8	7	7	4	8	5	10	2	5	2	7	14	8	6	3	2
57	4	0	18	10	8	14	16	13	10	4	2	3	4	3	4	4	7	2	4	4	1	1	0	4	5	3	0	1
59	7	3	3	5	6	11	8	7	7	4	4	0	1	1	0	2	2	3	5	1	1	0	0	4	3	0	0	1
61	3	2	1	2	5	4	2	3	3	2	1	0	0	2	1	0	0	1	1	0	2	0	0	3	2	0	1	1
63	0	0	1	3	2	2	2	1	1	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0
65	0	0	0	0	0	3	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
67	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total	**336**	**236**	**513**	**257**	**412**	**566**	**528**	**407**	**227**	**129**	**189**	**40**	**113**	**168**	**151**	**139**	**245**	**277**	**523**	**181**	**208**	**150**	**170**	**247**	**153**	**151**	**52**	**93**

Table 2.56. Weakfish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2011.
Weakfish were measured from every tow.

	Spring																											
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	1	3	0	3
23	0	0	0	0	0	0	0	0	1	0	0	3	0	0	1	0	0	1	2	1	9	3	6	1	0	1	0	2
25	0	0	0	0	1	0	1	0	0	0	2	3	1	0	1	2	3	4	1	2	9	10	3	0	2	0	0	0
27	0	0	0	0	0	0	2	4	0	0	3	5	3	5	4	1	2	13	3	0	3	27	4	4	0	0	0	2
29	0	0	0	0	0	0	2	4	1	3	3	7	12	12	16	5	1	20	0	0	2	22	2	4	1	1	0	0
31	0	0	0	0	1	0	1	6	3	3	3	7	15	21	21	8	5	9	1	0	2	20	1	0	0	0	0	0
33	0	0	0	0	0	0	0	12	0	3	2	1	5	19	10	10	1	5	0	0	0	11	0	3	0	0	0	0
35	0	0	0	0	0	1	1	13	0	0	0	0	4	11	4	3	1	2	1	0	0	0	0	1	0	0	0	1
37	0	0	0	1	0	0	2	5	0	0	0	1	2	2	3	1	0	0	1	0	0	1	0	2	1	0	0	2
39	0	0	0	0	1	0	0	4	0	0	0	0	1	1	0	2	0	0	2	0	0	0	0	1	0	0	0	3
41	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7	3	0	2	1	0	0	0	1	6	0	0	0	1
43	0	0	0	1	0	0	0	1	1	0	0	0	0	2	3	6	0	0	1	0	0	0	0	1	0	0	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0	1	1	0	0	0	0	1	2	2	1	0	1	0	0	0	0	2	0	0	1	0
49	0	0	1	0	0	0	0	0	0	0	0	1	0	1	5	3	1	0	1	0	0	0	4	1	0	0	0	0
51	0	0	0	0	0	1	0	1	2	0	0	0	0	0	6	3	2	0	1	0	0	0	2	0	0	0	0	0
53	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	1	0	0	0
55	0	0	0	0	0	0	0	0	4	0	0	0	0	1	1	3	1	0	2	0	0	0	0	0	0	0	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	0	0	0	0	0	0	0	1	0	0	0	0
61	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	2	0	0	1	0	0	0	0	0	0	0	0
65	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	1	0	0	0	0	0	0
71	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0
73	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	4	0	0	0	0	0	0	0	0	0
75	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0
77	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0
79	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
83	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**1**	**0**	**9**	**2**	**6**	**5**	**9**	**51**	**18**	**11**	**13**	**28**	**43**	**81**	**92**	**85**	**29**	**59**	**28**	**5**	**28**	**96**	**26**	**31**	**6**	**10**	**1**	**16**

Table 2.57. Weakfish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2011.

Weakfish were measured from every tow, with the exceptions of 968 juveniles in 1988 and 863 juveniles in 1989 that were not measured.

															Fall													
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
5	0	0	0	0	2	1	0	0	0	1	0	2	0	3	0	0	24	13	0	6	0	0	1	0	0	0	-	0
7	0	3	51	0	13	46	2	0	48	22	16	34	34	92	0	0	1,065	89	2	357	30	8	3	101	9	9	-	9
9	15	70	448	15	37	247	39	11	218	76	127	74	110	431	27	53	5,951	1,054	253	1,026	1,263	11	6	904	18	117	-	83
11	24	168	1,625	84	63	566	130	423	233	222	413	33	366	749	110	976	7,488	3,672	1,009	1,186	4,329	197	26	2,578	70	528	-	302
13	69	187	2,191	98	60	1,152	207	522	289	340	1,586	137	713	598	589	1,748	3,650	4,135	2,455	1,108	5,940	1,246	41	4,876	492	938	-	455
15	54	474	894	22	31	1,699	519	831	292	550	2,561	566	1,529	214	788	2,802	1,641	2,124	3,740	1,153	3,909	2,538	37	4,570	931	692	-	620
17	17	1,196	107	3	17	750	629	949	120	503	2,538	957	2,084	356	1,160	2,889	1,821	764	1,875	590	1,168	2,739	36	2,084	594	212	-	665
19	5	379	50	2	3	162	312	741	35	235	665	748	1,165	651	497	2,007	1,169	366	851	132	471	1,798	27	991	253	43	-	225
21	2	92	4	4	0	1	57	347	22	63	146	141	187	417	104	1,147	565	250	345	29	235	413	9	645	129	2	-	82
23	1	14	10	1	0	1	6	267	9	6	71	11	8	106	50	357	100	84	94	0	74	89	1	352	15	1	-	8
25	1	13	1	0	0	1	0	65	2	0	0	3	0	5	0	234	22	5	13	0	31	26	0	173	6	0	-	1
27	0	14	0	0	0	0	0	0	2	0	0	0	0	0	0	38	0	2	13	0	0	1	0	70	0	1	-	0
29	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	11	0	0	0	0	1	0	0	-	9
31	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	1	0	0	3	0	0	7	-	10
33	0	0	0	0	0	0	0	0	2	0	0	3	3	0	1	0	3	0	0	1	2	0	2	0	0	12	-	16
35	2	1	0	0	0	0	0	1	1	1	0	6	12	8	3	1	12	0	1	0	4	0	4	0	0	14	-	21
37	5	0	2	1	0	0	1	0	2	0	0	13	19	18	10	0	9	3	1	0	1	2	6	0	0	9	-	9
39	3	0	2	0	0	0	1	2	8	2	2	16	21	31	10	3	13	7	3	1	4	4	1	2	2	6	-	8
41	4	2	4	1	0	0	2	1	1	3	5	23	41	37	13	5	9	18	3	0	6	6	2	3	1	1	-	2
43	5	1	4	4	0	0	0	9	0	8	4	38	18	43	11	14	6	24	3	0	1	6	4	3	1	0	-	1
45	7	4	0	3	1	0	1	9	0	8	1	27	11	28	10	15	1	22	1	0	6	2	1	1	1	0	-	4
47	3	6	0	5	1	0	0	20	0	3	2	9	6	15	8	8	0	34	1	1	3	3	1	0	1	0	-	6
49	0	1	1	0	0	0	1	22	0	1	4	5	1	10	2	9	1	8	0	0	0	3	0	1	0	1	-	10
51	4	1	1	1	0	0	0	26	1	0	0	4	3	2	1	5	0	5	4	0	0	0	1	0	0	0	-	11
53	1	0	0	0	1	0	0	19	2	2	0	0	0	2	1	0	0	2	0	0	0	0	0	0	0	1	-	6
55	0	1	1	0	0	0	1	4	1	0	0	0	0	4	2	3	0	2	1	0	0	0	2	0	0	0	-	2
57	1	2	0	0	2	0	0	0	3	0	0	0	0	2	2	4	2	0	1	0	0	0	1	0	0	0	-	2
59	1	1	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	-	0
61	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0	0	2	0	3	0	0	0	1	0	0	0	-	0
63	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	-	0
65	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0	0	0	0	0	0	1	0	-	0
67	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	-	0
69	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0
71	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0
73	7	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
75	10	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	0
77	5	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
79	2	2	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
81	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
83	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0
85	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
87	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
91	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	**259**	**2,650**	**5,415**	**246**	**234**	**4,628**	**1,911**	**4,270**	**1,299**	**2,047**	**8,141**	**2,850**	**6,332**	**3,823**	**3,404**	**12,331**	**23,561**	**12,683**	**10,686**	**5,592**	**17,478**	**9,092**	**216**	**17,355**	**2,524**	**2,594**	**-**	**2,567**

Table 2.58. Windowpane flounder length frequencies, spring, 1 cm intervals, 1989, 1990, 1994-2011.
Lengths were recorded from the first three tows of each day.

	Spring																			
length	**1989**	**1990**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
4	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1
5	4	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2
6	0	0	0	0	0	2	0	2	5	1	1	10	2	0	0	1	0	4	4	9
7	0	0	0	0	1	4	2	4	17	2	7	22	3	0	0	7	3	8	9	9
8	0	2	4	1	3	5	4	3	27	7	6	23	6	0	0	31	5	17	10	20
9	0	40	16	3	2	9	5	2	11	10	21	20	11	0	0	18	6	10	13	24
10	25	66	67	12	34	15	7	8	17	13	12	11	19	7	2	4	11	23	8	10
11	69	96	169	86	79	37	19	20	5	29	8	3	24	12	1	4	11	8	7	11
12	89	74	305	148	162	76	60	40	3	23	10	7	25	16	7	8	17	4	20	2
13	337	53	362	259	288	136	131	37	10	29	5	9	58	25	12	22	13	6	72	9
14	430	66	232	189	381	309	200	45	11	26	8	13	100	22	34	28	44	17	93	7
15	414	124	152	180	487	362	211	96	24	43	15	13	101	23	42	60	51	37	107	15
16	305	180	126	89	310	606	177	123	27	55	12	15	72	37	36	107	119	62	117	19
17	174	212	209	70	331	754	130	165	23	73	9	15	65	22	48	129	137	97	166	23
18	78	178	372	99	339	588	165	160	32	94	24	23	56	4	45	132	116	90	104	58
19	65	132	357	139	548	440	260	194	26	78	19	26	45	16	20	110	101	75	124	58
20	174	144	289	143	604	366	362	386	75	89	15	31	60	13	24	130	76	51	76	47
21	216	116	217	85	567	429	461	357	136	95	22	45	32	22	24	186	122	50	88	66
22	299	143	139	82	401	438	311	301	166	232	45	50	42	29	27	246	155	63	172	75
23	319	108	163	57	409	368	229	217	138	290	110	92	39	42	28	181	216	92	198	107
24	270	103	147	54	280	323	227	217	125	245	141	123	66	36	41	158	132	84	199	122
25	177	87	183	54	236	231	188	206	121	208	133	111	109	47	31	162	118	82	155	134
26	189	103	184	70	235	191	178	136	106	126	114	76	100	52	52	186	103	67	161	120
27	138	79	138	56	187	222	162	161	91	88	69	88	86	49	37	104	100	60	148	103
28	148	38	70	44	117	145	138	97	56	83	62	68	71	29	38	100	111	45	103	69
29	78	26	68	24	97	98	67	53	47	59	41	37	48	24	24	65	52	30	146	42
30	99	35	42	27	66	75	58	42	37	39	42	35	51	20	14	33	46	24	51	24
31	50	20	25	12	31	23	34	39	12	25	19	22	32	13	8	14	22	11	67	25
32	8	15	13	4	25	12	13	26	16	21	17	9	16	5	2	23	19	6	21	7
33	16	3	2	9	5	8	6	3	8	15	7	2	10	1	3	2	5	1	33	14
34	0	5	5	0	4	1	1	1	2	5	4	4	9	3	0	4	5	2	20	11
35	0	4	5	1	3	0	3	4	5	10	2	4	5	0	0	3	3	3	11	1
36	0	4	2	2	1	1	0	0	1	2	0	5	0	2	0	0	1	0	0	0
37	0	0	0	1	0	0	3	1	1	2	2	1	1	0	0	0	0	0	8	0
38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
39	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**4,171**	**2,256**	**4,064**	**2,001**	**6,234**	**6,274**	**3,812**	**3,147**	**1,381**	**2,118**	**1,002**	**1,015**	**1,365**	**571**	**600**	**2,258**	**1,920**	**1,129**	**2,511**	**1,244**

Table 2.59. Windowpane flounder length frequencies, fall, 1 cm intervals, 1989, 1990, 1994-2011.
Lengths were recorded from the first three tows of each day.

	Fall																			
length	**1989**	**1990**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
6	1	0	1	0	0	0	0	0	3	1	0	0	3	0	0	0	0	1	-	0
7	5	0	5	0	6	0	1	0	0	0	0	2	0	0	0	0	0	4	-	1
8	8	3	18	5	24	15	1	0	6	9	0	5	11	14	5	4	0	15	-	4
9	25	2	28	6	70	17	2	2	2	2	0	21	15	49	2	6	2	15	-	2
10	18	11	78	10	165	50	2	4	3	9	1	20	22	67	1	14	5	17	-	9
11	15	9	60	22	227	75	31	11	7	14	0	13	27	111	5	18	3	24	-	19
12	16	12	50	15	270	107	33	6	9	9	1	6	16	155	2	26	15	29	-	31
13	23	6	30	10	285	173	47	3	11	9	6	0	14	145	8	44	43	19	-	19
14	33	14	11	13	306	154	48	5	23	6	0	4	8	109	3	36	58	27	-	36
15	58	23	23	9	250	110	39	6	18	3	5	8	3	62	2	37	38	25	-	43
16	140	38	15	16	181	60	34	3	11	3	5	9	3	33	0	30	28	31	-	41
17	188	44	35	26	112	78	33	11	30	7	14	4	9	12	7	21	20	35	-	72
18	91	53	47	48	101	119	54	11	15	12	8	11	2	8	19	19	16	47	-	70
19	46	46	49	47	145	179	95	44	29	6	10	7	11	20	32	26	10	45	-	52
20	49	28	39	48	131	213	96	67	30	13	9	6	18	30	39	39	31	24	-	41
21	21	11	23	24	125	165	69	38	52	18	9	11	35	50	25	36	40	28	-	35
22	14	14	16	19	65	123	37	18	28	22	21	2	25	48	25	42	25	26	-	51
23	3	10	20	6	67	63	32	12	37	30	39	6	10	14	12	32	27	20	-	47
24	9	4	7	9	25	49	13	11	33	19	39	11	15	13	9	19	32	23	-	40
25	4	3	6	3	22	28	9	6	18	19	25	14	8	10	10	6	9	9	-	16
26	2	0	8	3	19	29	9	4	16	9	10	18	4	3	4	8	16	6	-	18
27	6	2	3	1	11	17	8	3	5	11	12	17	4	5	3	4	5	4	-	7
28	2	1	4	1	3	12	1	1	4	5	6	9	2	3	3	3	2	7	-	9
29	2	2	0	1	2	17	0	1	6	3	1	4	2	3	1	3	2	1	-	2
30	2	1	2	1	0	5	0	0	1	2	2	2	0	1	1	0	0	0	-	3
31	0	0	0	0	0	0	0	0	0	1	0	3	1	2	0	0	2	1	-	0
32	1	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	-	0
33	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
Total	**782**	**337**	**578**	**344**	**2,613**	**1,858**	**694**	**267**	**397**	**242**	**223**	**215**	**268**	**968**	**218**	**473**	**429**	**484**	-	**668**

Table 2.60. Winter flounder length frequencies, April-May, 1 cm intervals, 1984-2011.
Winter flounder were measured from every tow.

	April-May																												
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	36	4	2	3	0	0	1	0	2	0	0	1	3	0	0	0	0	0	0
8	0	0	5	8	3	1	10	3	1	72	26	28	4	2	5	7	2	5	0	1	5	5	0	1	6	2	1	1
9	1	7	6	52	16	17	38	29	7	208	41	97	21	15	41	18	3	20	4	2	22	32	0	2	19	13	7	6
10	3	9	35	49	29	70	139	54	18	433	137	307	61	75	128	50	23	55	5	11	36	73	5	10	85	42	35	21
11	26	28	188	114	135	312	375	121	75	698	442	618	246	260	283	135	84	161	34	28	129	164	6	37	238	147	117	67
12	35	127	455	239	359	628	1,117	228	136	921	835	877	461	528	492	252	145	256	88	57	174	278	55	73	367	229	179	113
13	149	284	617	483	869	954	2,563	342	170	713	1,006	772	582	497	554	252	169	239	148	50	188	337	48	91	322	220	174	110
14	196	219	733	820	1,378	1,260	3,243	729	180	528	1,149	854	788	517	488	225	185	223	132	54	132	209	39	80	233	169	152	107
15	255	308	808	1,060	1,882	1,424	3,847	1,127	254	526	1,487	792	956	484	481	204	177	162	148	50	81	163	19	80	142	119	146	68
16	177	467	771	1,033	1,819	1,579	3,627	1,169	323	485	1,680	766	992	553	574	214	210	159	174	66	53	128	16	163	136	155	109	53
17	182	473	763	1,028	1,953	1,651	3,544	1,568	373	501	1,540	698	1,099	599	713	290	254	245	160	76	41	122	40	180	74	147	112	53
18	153	574	730	1,006	1,507	1,724	3,145	1,648	398	580	1,467	692	1,149	666	658	313	248	251	206	86	65	108	52	203	85	237	138	73
19	117	794	780	855	1,596	1,532	3,054	1,690	397	542	1,217	632	1,032	574	622	283	327	313	317	142	72	117	41	242	94	214	130	73
20	169	607	665	666	1,136	1,462	2,434	1,676	344	624	896	515	1,012	529	685	296	311	362	364	174	59	148	65	246	51	232	160	101
21	108	591	600	592	1,045	1,358	1,904	1,493	277	626	742	469	821	429	592	320	314	308	353	127	79	125	54	194	59	166	109	122
22	104	486	534	552	963	1,407	1,481	1,332	302	549	556	367	795	444	524	218	289	306	353	87	53	69	45	156	56	129	108	118
23	63	479	521	442	897	1,160	1,416	1,099	212	426	359	346	676	402	486	290	266	233	337	84	48	71	28	135	67	100	72	84
24	81	346	427	377	748	971	1,092	1,113	278	418	310	311	701	401	544	260	218	205	395	79	47	51	22	128	55	48	89	109
25	74	318	341	374	520	1,015	1,018	939	202	349	296	318	692	377	529	344	228	244	311	97	46	49	28	137	60	44	92	105
26	90	187	375	333	541	982	846	858	242	383	219	231	719	461	527	304	223	249	285	129	61	36	13	144	62	42	58	95
27	62	232	240	281	420	736	639	788	181	320	216	318	568	496	505	360	251	259	259	150	84	36	23	168	81	39	67	102
28	43	129	244	230	366	648	586	598	181	197	173	260	549	416	518	418	252	311	187	170	92	25	29	168	84	35	75	72
29	29	86	189	220	253	502	525	511	160	221	122	244	460	401	466	389	285	326	248	200	103	32	17	200	73	28	77	81
30	42	70	178	154	266	339	305	397	133	178	103	180	540	365	448	362	279	299	215	206	96	35	20	186	86	28	52	72
31	24	71	124	151	120	247	307	241	96	200	117	130	367	313	323	321	300	286	201	166	112	33	27	136	93	32	55	58
32	20	85	77	113	169	163	171	157	98	142	91	76	375	260	277	249	227	228	171	167	95	38	28	133	87	42	45	65
33	7	69	86	61	111	73	218	108	60	139	72	63	267	193	195	228	262	172	155	138	122	45	20	87	90	36	34	79
34	7	45	56	85	69	47	113	107	38	159	65	42	190	166	140	191	220	189	109	116	94	48	20	74	99	43	37	51
35	12	19	42	47	54	68	70	65	35	112	52	30	119	136	136	159	195	189	107	115	88	31	20	50	80	45	28	50
36	4	11	39	53	33	65	44	30	26	79	49	33	84	89	79	103	150	143	94	73	91	34	18	53	61	44	28	26
37	4	8	15	20	25	20	24	25	26	36	25	12	50	68	32	90	120	133	60	53	93	27	15	24	36	20	25	27
38	0	15	17	19	15	18	48	7	4	10	21	16	28	37	37	35	80	77	59	79	46	25	4	17	18	17	16	23
39	0	4	18	11	22	3	18	13	0	17	15	14	12	18	13	18	54	70	24	44	56	25	6	9	6	9	14	16
40	0	0	18	8	9	8	12	9	3	3	16	7	13	10	5	20	16	35	32	38	34	11	3	2	7	5	19	16
41	0	0	1	2	6	7	3	1	0	5	6	3	1	6	3	14	20	26	11	17	18	7	5	9	5	4	9	7
42	0	1	3	0	8	3	8	5	0	2	6	3	6	2	2	4	7	10	9	7	9	9	1	9	2	2	4	6
43	0	0	2	3	3	0	1	1	0	2	1	0	2	1	0	3	11	3	4	13	1	3	0	3	3	2	1	2
44	0	1	4	0	2	1	1	1	1	0	0	1	3	0	1	3	4	1	1	3	7	2	0	1	1	0	0	1
45	0	1	0	1	1	0	8	1	0	0	0	0	0	0	0	1	2	0	3	4	2	2	1	2	2	0	2	2
46	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	3	2	0	2	1	0	0	0
47	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	1	1	0	0	0
49	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
51	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Total	**2,237**	**7,152**	**10,707**	**11,543**	**19,350**	**22,455**	**37,996**	**20,283**	**5,231**	**11,449**	**15,565**	**11,124**	**16,445**	**10,790**	**12,106**	**7,246**	**6,413**	**6,755**	**5,763**	**3,160**	**2,640**	**2,758**	**833**	**3,636**	**3,127**	**2,887**	**2,576**	**2,235**

Table 2.61. Winter flounder length frequencies, fall, 1 cm intervals, 1984-2011.

Winter flounder were measured from every tow.

															Fall														
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
6	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0
7	0	0	0	0	1	0	1	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
8	0	0	0	1	7	0	0	1	5	43	0	1	2	0	0	0	0	0	0	0	2	2	0	0	0	0	-	0
9	0	0	0	0	3	4	0	1	8	83	3	0	3	4	2	0	0	0	0	0	0	1	0	0	0	3	-	0
10	0	2	0	0	10	3	2	1	9	39	6	3	11	5	3	0	0	2	0	0	2	1	2	0	0	0	-	1
11	1	3	2	2	8	6	4	9	6	42	10	16	16	6	3	0	0	6	0	0	9	0	0	0	1	1	-	0
12	9	16	16	8	34	38	6	34	18	159	63	28	54	23	20	3	5	13	0	1	21	4	1	3	2	11	-	2
13	18	37	43	47	97	127	34	72	72	331	149	67	157	77	68	44	20	62	6	1	41	28	6	9	10	21	-	5
14	25	57	82	54	243	343	130	139	85	409	230	87	218	113	137	128	53	123	24	5	65	77	8	10	23	36	-	7
15	31	63	116	67	295	367	260	144	149	435	219	96	255	165	190	194	111	122	37	10	61	98	17	9	45	51	-	19
16	60	55	104	72	302	293	345	91	182	377	187	77	225	176	192	243	156	116	40	9	48	99	23	9	60	48	-	28
17	65	49	118	53	207	315	327	110	140	247	146	61	173	175	160	268	170	80	43	11	37	66	11	6	43	50	-	22
18	89	53	86	72	167	213	319	99	111	151	142	64	132	116	87	225	169	66	33	10	19	52	5	10	49	35	-	25
19	111	41	50	79	212	199	326	108	99	85	141	41	119	126	60	158	148	32	31	8	21	33	5	7	25	31	-	18
20	97	36	45	83	184	146	310	95	97	68	124	32	136	78	46	108	107	28	35	9	7	24	7	16	17	14	-	11
21	100	37	27	53	184	121	245	96	84	51	111	23	96	65	25	86	89	25	23	10	8	14	4	19	6	10	-	11
22	67	33	22	54	138	105	176	79	68	39	56	19	97	38	28	52	62	20	38	10	4	9	7	15	6	4	-	5
23	63	22	17	44	104	107	146	73	42	39	38	13	65	55	24	29	41	16	28	17	2	6	3	17	4	5	-	7
24	38	17	13	25	77	68	91	40	37	38	24	10	58	32	15	27	47	33	31	15	1	1	3	18	4	2	-	4
25	34	14	9	21	40	85	53	48	28	29	26	5	47	23	14	29	35	24	28	10	0	7	2	9	9	6	-	4
26	36	10	7	14	32	39	49	20	17	30	28	2	25	26	11	19	30	31	27	18	5	6	2	12	10	0	-	2
27	16	10	1	5	32	43	38	13	8	22	13	3	27	20	13	17	21	15	20	21	3	5	0	8	9	3	-	7
28	34	6	2	11	12	33	16	17	13	10	8	3	14	14	8	13	25	20	9	11	4	5	0	4	6	0	-	6
29	13	3	1	5	9	30	12	7	7	12	10	1	17	7	7	17	15	22	10	10	6	1	0	4	7	3	-	5
30	14	6	2	3	13	10	14	5	7	7	7	0	10	7	3	8	13	17	8	10	2	1	1	9	13	1	-	3
31	8	1	2	2	4	12	1	8	3	8	8	2	13	5	11	7	8	4	4	16	2	1	0	7	8	1	-	2
32	6	0	1	2	6	4	3	2	1	4	3	1	4	2	4	5	6	4	6	11	3	1	0	6	3	4	-	2
33	5	1	2	0	1	1	4	6	0	3	2	1	3	4	5	9	9	6	10	12	2	1	1	0	4	1	-	2
34	1	2	0	0	0	1	0	1	1	2	2	0	3	3	5	1	10	2	7	10	3	0	0	0	5	2	-	3
35	4	0	0	4	0	3	1	0	0	0	1	1	1	1	3	4	6	3	4	4	3	1	0	2	3	0	-	1
36	1	0	1	0	0	0	1	0	0	0	1	0	2	0	0	2	4	3	4	4	2	1	0	2	3	2	-	4
37	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	1	1	3	1	2	2	0	1	3	2	-	2
38	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	2	1	5	4	2	2	0	0	4	2	-	1
39	2	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	1	3	5	0	2	2	0	0	2	0	-	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	2	2	0	1	3	2	-	0
41	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	3	3	0	0	2	0	0	0	0	-	1
42	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	-	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	-	0
44	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	-	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	-	1
Total	**949**	**575**	**769**	**781**	**2,422**	**2,717**	**2,914**	**1,321**	**1,300**	**2,771**	**1,765**	**657**	**1,984**	**1,370**	**1,146**	**1,699**	**1,364**	**907**	**527**	**262**	**392**	**557**	**108**	**213**	**387**	**351**	**-**	**211**

Table 2.62. Winter skate length frequencies, spring and fall, 2 cm intervals (midpoint given), 1995-2011. *Winter skate were scheduled to be measured from every tow. However, the following numbers of skate were not measured: 4 in 1995, 10 in 1996, and 2 in 1997.*

Spring																	
length	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
27	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	1	0	0	3	0	0	1	1	1	1	1
39	0	0	0	0	0	0	0	1	2	2	0	0	1	0	1	0	1
41	0	0	0	0	0	0	0	1	1	2	0	0	1	1	1	2	0
43	0	0	0	0	0	3	0	1	2	4	1	0	0	1	2	1	0
45	0	0	0	0	1	3	0	0	0	6	0	0	2	1	1	2	0
47	0	0	0	0	0	2	0	0	0	4	3	0	3	0	0	0	1
49	0	0	0	0	0	2	0	0	1	2	1	1	1	2	2	0	0
51	0	1	0	1	0	0	0	1	1	0	1	0	0	0	1	0	0
53	0	0	0	0	1	3	1	0	1	0	0	1	1	0	1	0	0
55	0	0	2	3	1	1	0	0	1	1	1	4	3	0	1	0	0
57	1	2	4	3	2	0	0	0	6	0	0	1	2	1	3	0	2
59	5	4	1	5	3	2	0	1	1	2	0	1	0	0	2	1	0
61	1	5	2	1	0	0	3	1	1	1	3	1	1	3	2	0	1
63	2	2	2	4	1	0	0	1	2	3	2	2	0	1	1	0	2
65	4	2	4	7	0	0	0	0	0	0	1	1	1	2	0	0	2
67	1	1	2	2	1	1	0	1	1	1	3	3	0	1	1	1	2
69	2	0	1	4	2	0	0	1	4	1	0	1	2	3	2	0	3
71	1	3	2	3	1	2	2	1	2	2	0	1	2	3	0	0	0
73	0	3	0	0	0	1	2	4	0	2	1	4	3	1	1	1	3
75	4	4	1	5	3	1	2	1	3	1	0	1	4	3	3	4	3
77	0	2	3	6	7	2	1	1	1	1	0	0	2	4	0	1	2
79	1	2	1	4	1	1	2	3	1	1	1	0	4	3	2	1	4
81	0	4	0	3	2	1	1	2	3	3	0	1	1	1	1	0	2
83	0	3	0	2	0	0	1	0	1	1	0	0	1	0	3	1	1
85	0	2	1	1	0	3	1	2	1	0	0	0	0	0	0	0	0
87	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0
89	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0
91	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
93	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Total	**22**	**40**	**27**	**55**	**26**	**29**	**18**	**26**	**37**	**45**	**18**	**23**	**37**	**35**	**32**	**16**	**30**

Fall																	
length	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
39	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0
41	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0
43	0	0	2	0	0	0	0	2	0	0	0	0	0	1	0	-	2
45	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	-	0
47	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	-	0
49	1	5	1	0	0	0	0	0	0	0	1	0	0	0	0	-	0
51	0	0	1	0	2	0	2	0	0	0	0	0	0	1	0	-	0
53	2	0	2	1	0	0	1	1	0	0	1	0	0	0	0	-	0
55	1	2	1	0	1	0	4	0	0	0	0	0	0	1	0	-	0
57	2	6	2	0	0	0	0	3	0	0	2	0	0	1	1	-	3
59	2	2	2	1	0	0	1	1	0	0	0	0	0	0	1	-	0
61	0	5	0	0	0	0	3	0	0	0	0	0	1	0	0	-	0
63	1	4	1	0	0	0	1	0	0	0	2	0	0	0	0	-	0
65	2	3	0	1	1	0	0	1	0	3	0	0	0	1	1	-	1
67	1	2	2	1	0	0	2	0	0	0	3	0	1	1	1	-	0
69	0	2	1	1	0	0	0	1	0	0	0	0	1	1	1	-	0
71	0	0	0	0	0	0	0	1	0	2	0	0	2	1	1	-	0
73	0	2	1	1	1	0	0	2	0	1	1	0	0	0	0	-	1
75	1	3	1	0	1	0	1	1	0	1	1	0	1	1	1	-	0
77	0	1	0	0	0	0	1	2	0	1	0	0	0	2	0	-	0
79	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	-	0
81	0	0	0	1	0	0	1	1	0	0	1	0	1	1	1	-	0
83	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	0
85	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0
87	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	-	0
Total	**15**	**37**	**19**	**7**	**7**	**1**	**20**	**19**	**0**	**9**	**13**	**0**	**7**	**16**	**11**	-	**7**

FIGURES 2.1 - 2.14
LISTS

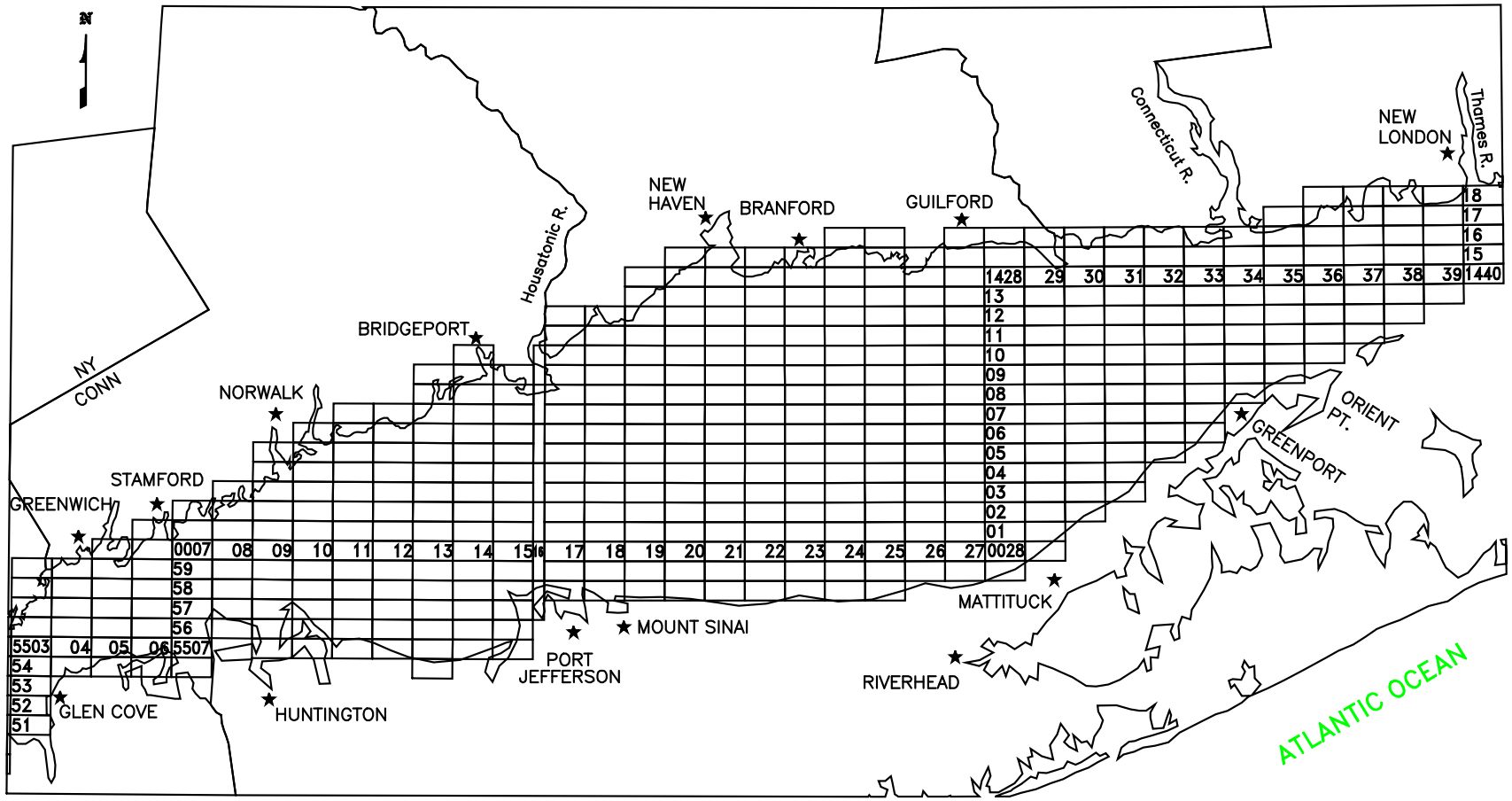
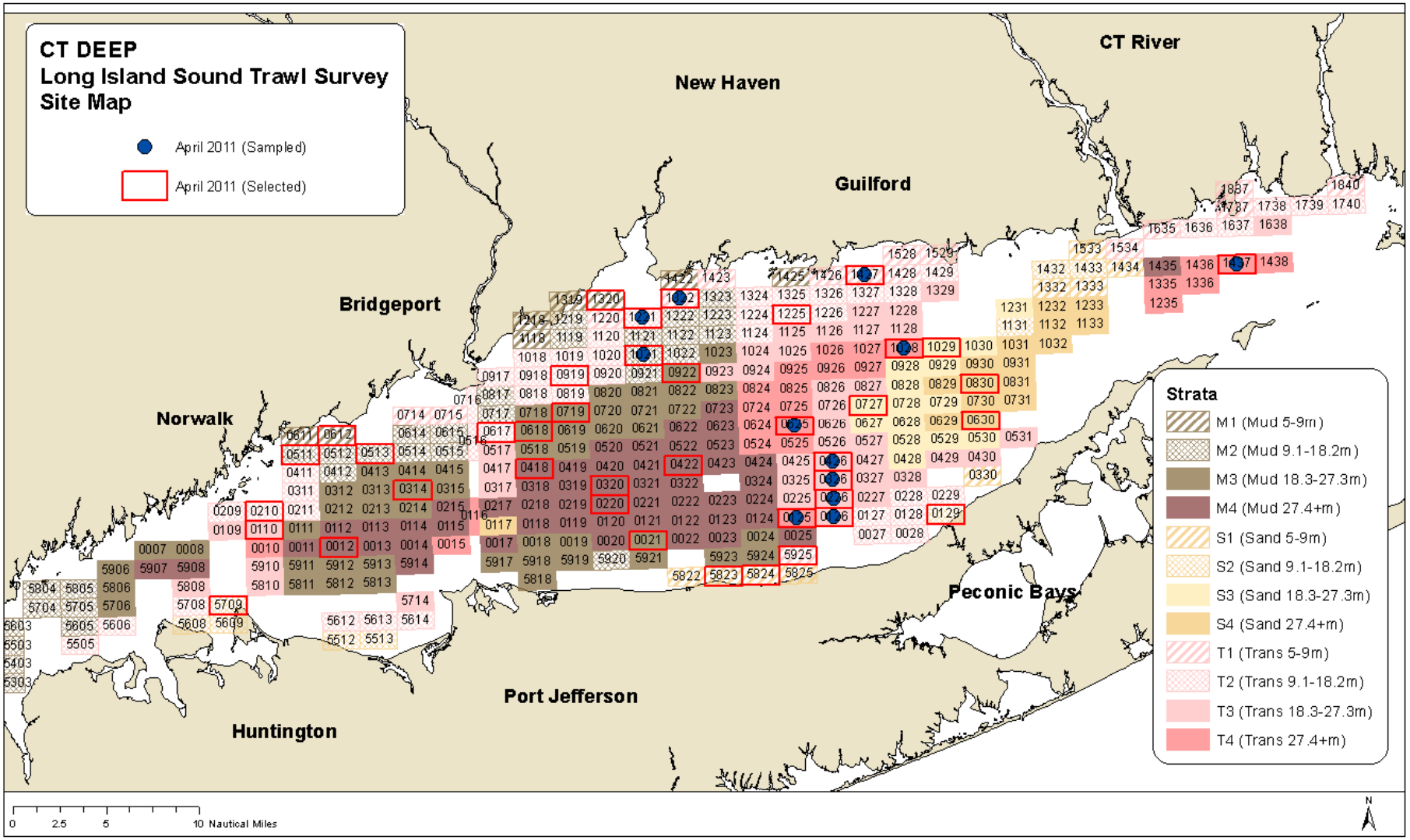


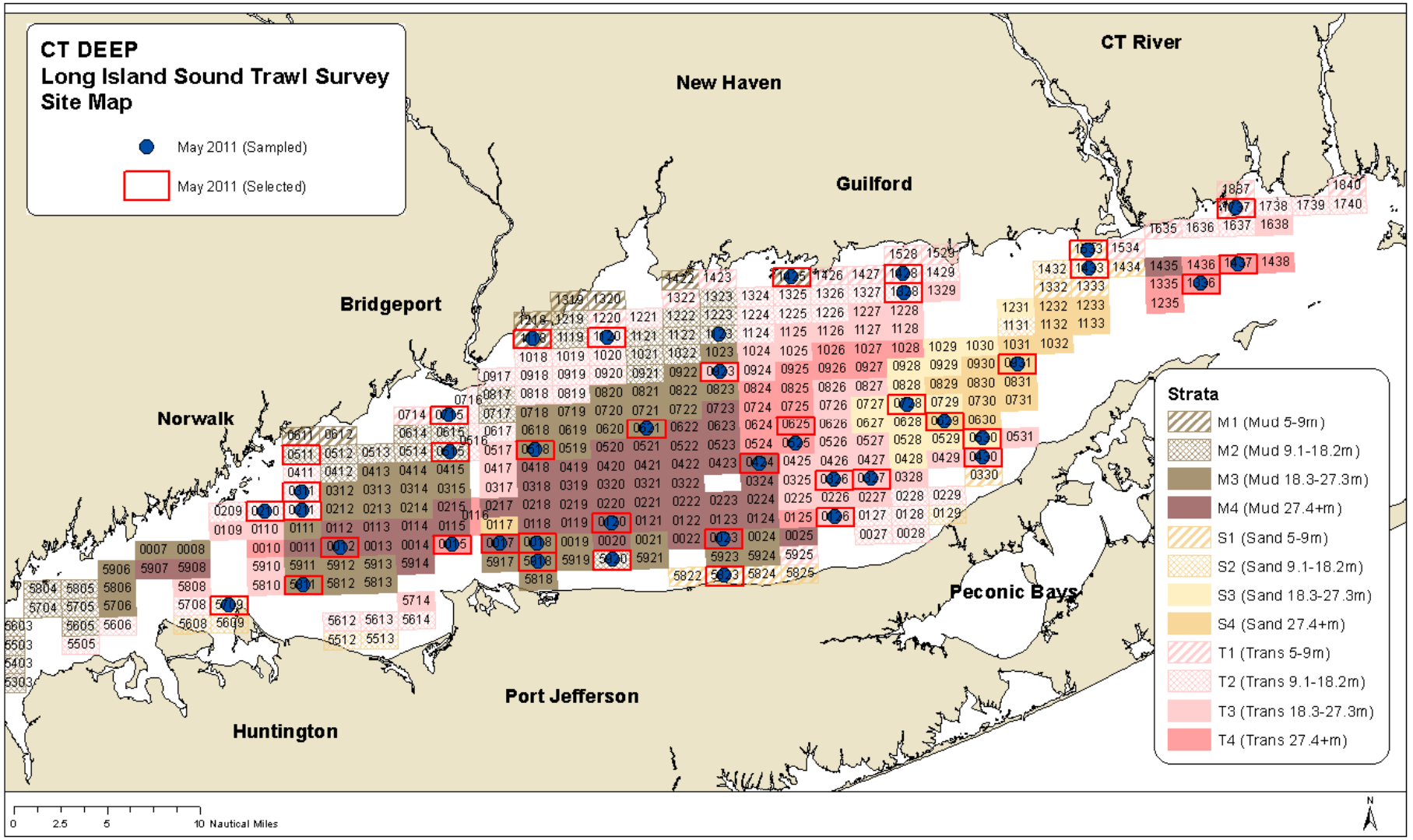
Figure 2.1. Trawl Survey site grid. *Each sampling site is 1x2 nmi (nautical miles). A four-digit number identifies the site: the first two digits are the row numbers (corresponding to minutes of latitude) and the last two digits are the column numbers (corresponding to two nautical miles in length on the longitudinal axis). Examples: site 1428 near Guilford and 0028 near Mattituck. (Note: The sites in column 16 are approximately 2x1 nmi. The grid was drawn on the Eastern and Western Long Island Sound 80,000:1 nautical charts, which overlap by the area in column 16.)*

Figure 2.2. April 2011 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map. Sampling in April 2011 consisted of 12 tows completed in only two days underway (see page 7 for more explanation).*



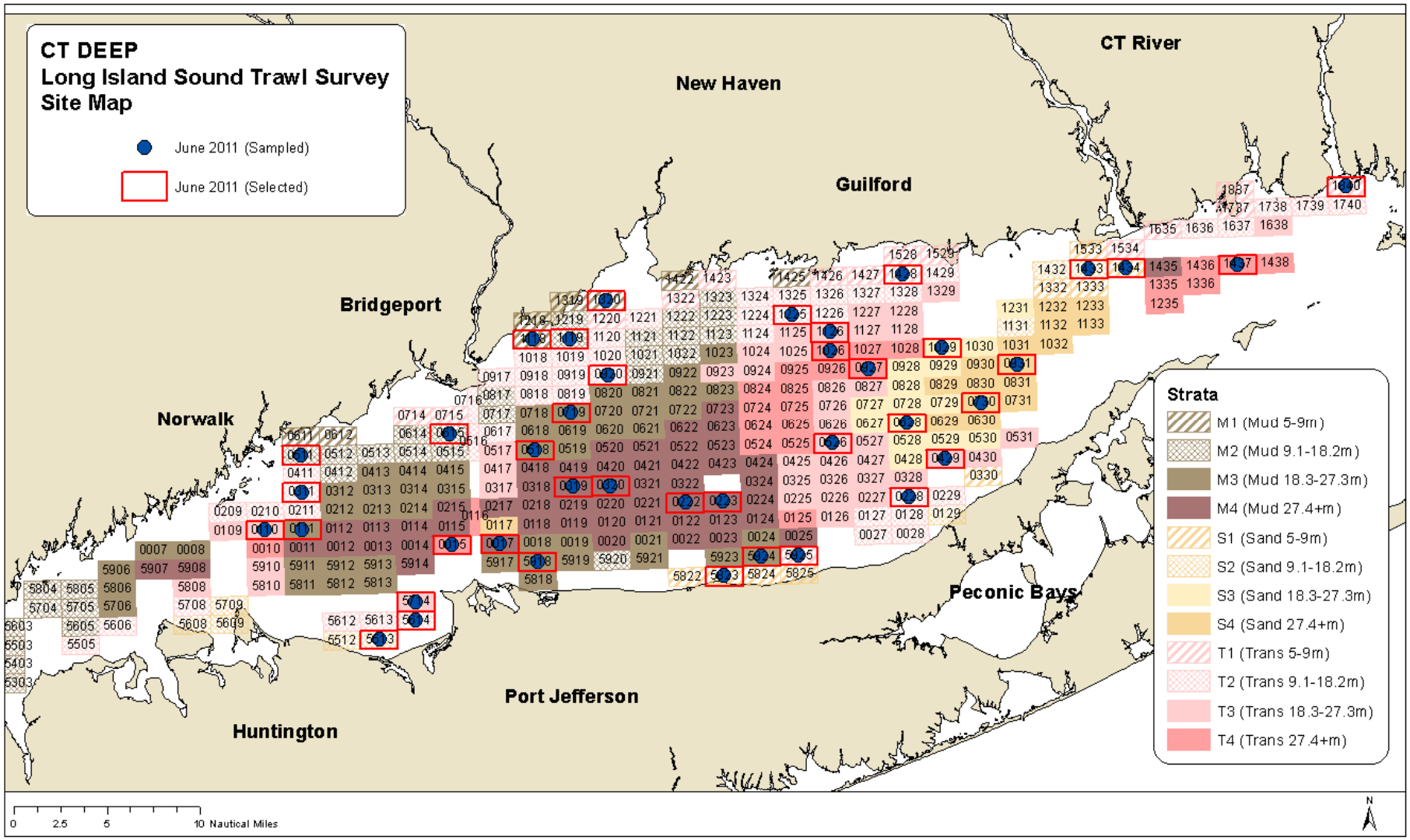
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
No sites were moved during this cruise.					

Figure 2.3. May 2011 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



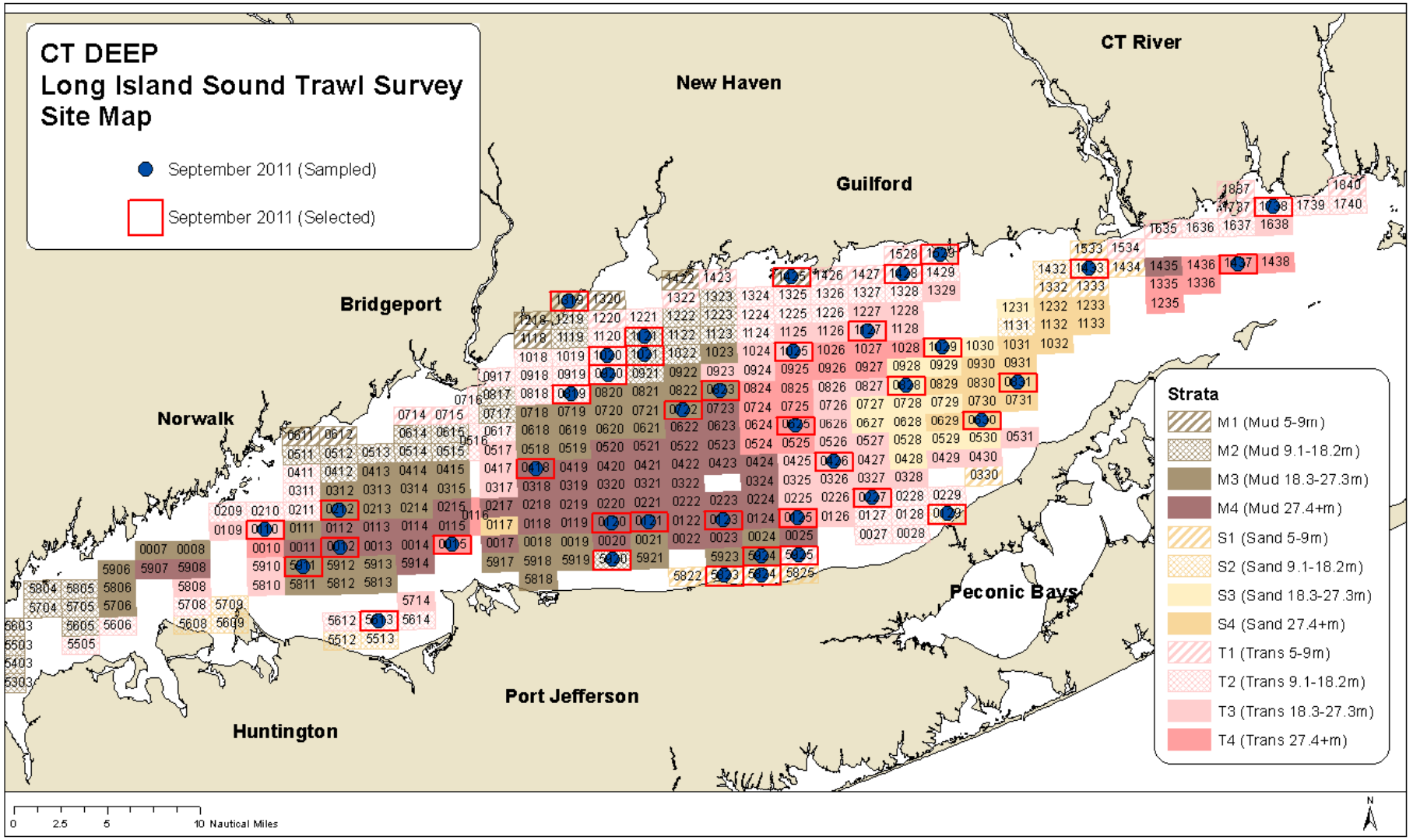
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
SP2011025	0525	T4	0625	T4	hang
SP2011050	1123	M2	0511	T4	ghost pots

Figure 2.4. June 2011 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



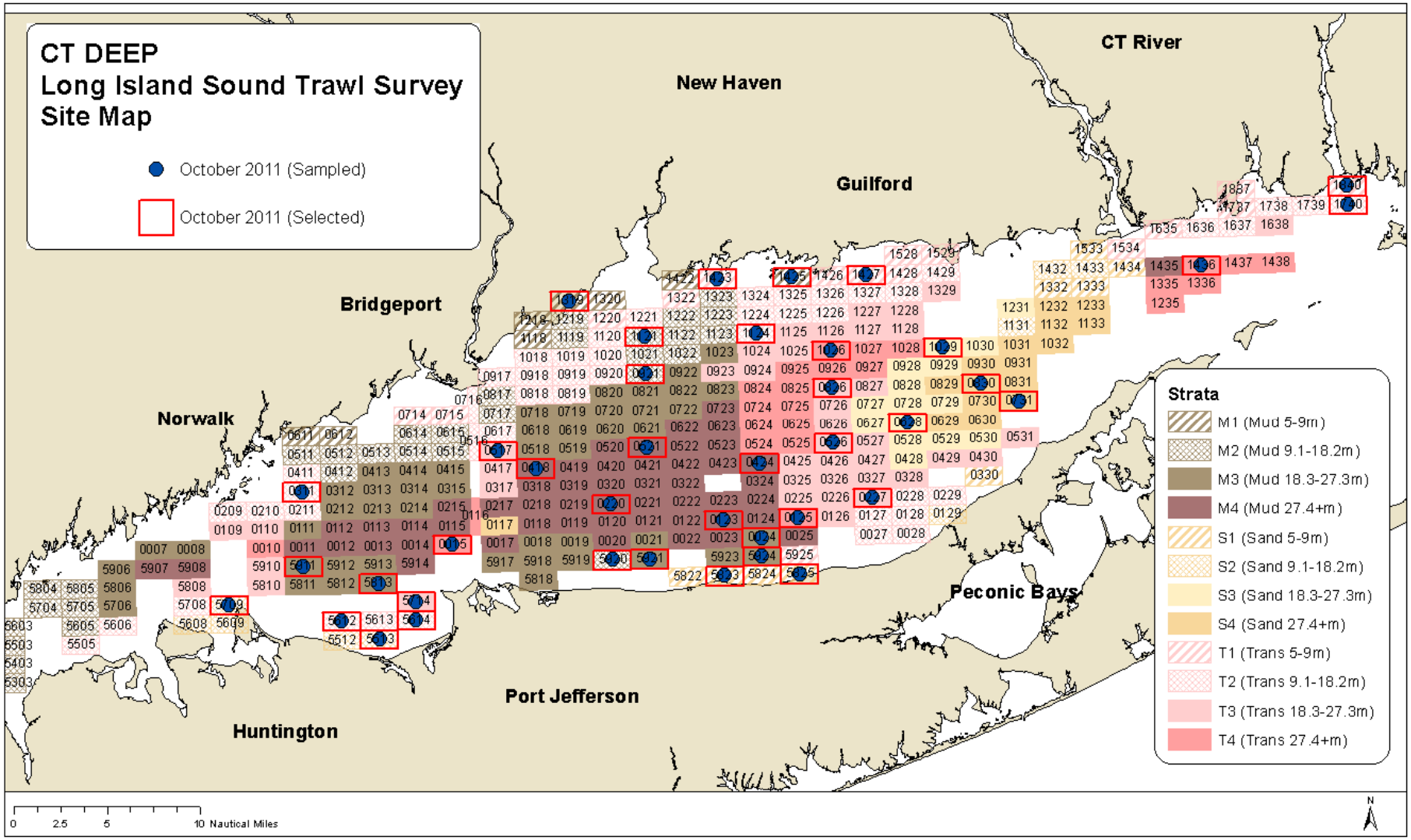
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
No sites were moved during this cruise.					

Figure 2.5. September 2011 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
No sites were moved during this cruise.					

Figure 2.6. October 2011 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
No sites were moved during this cruise.					

Figure 2.7. Number of finfish species observed annually, 1984-2011.

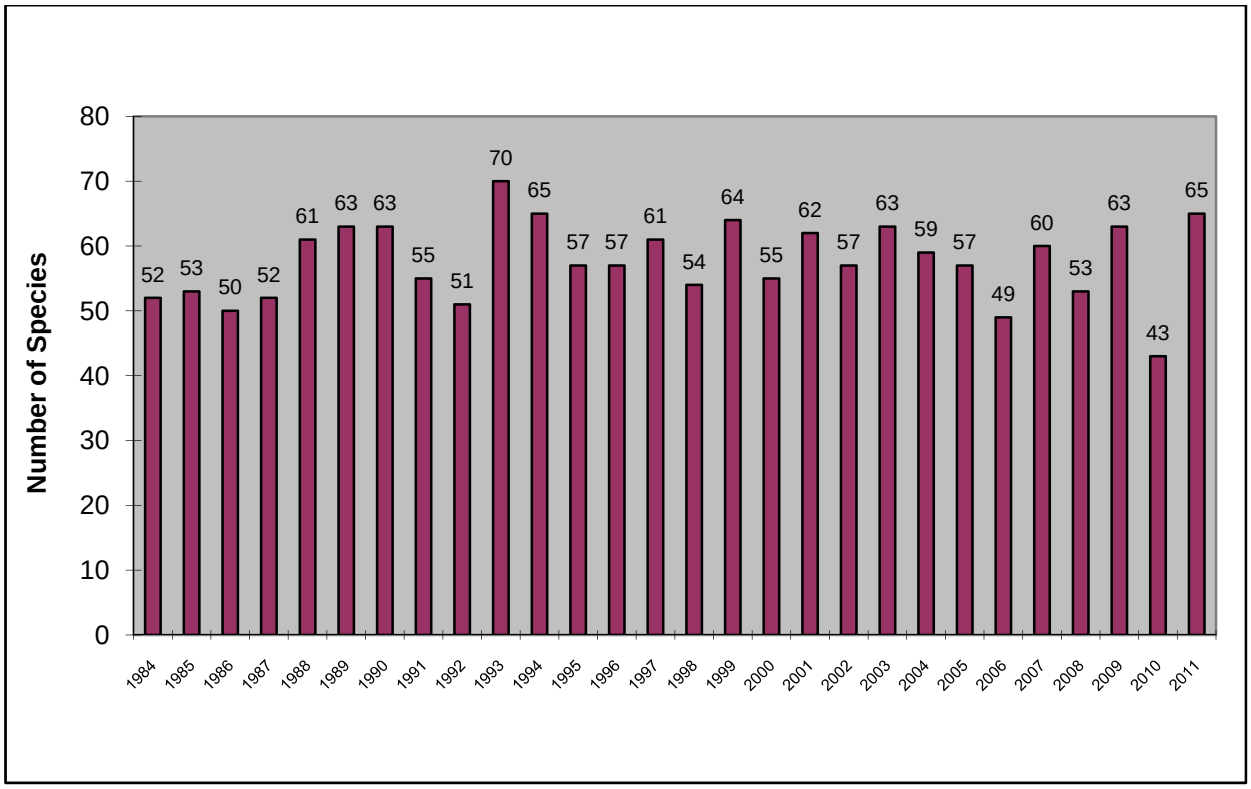
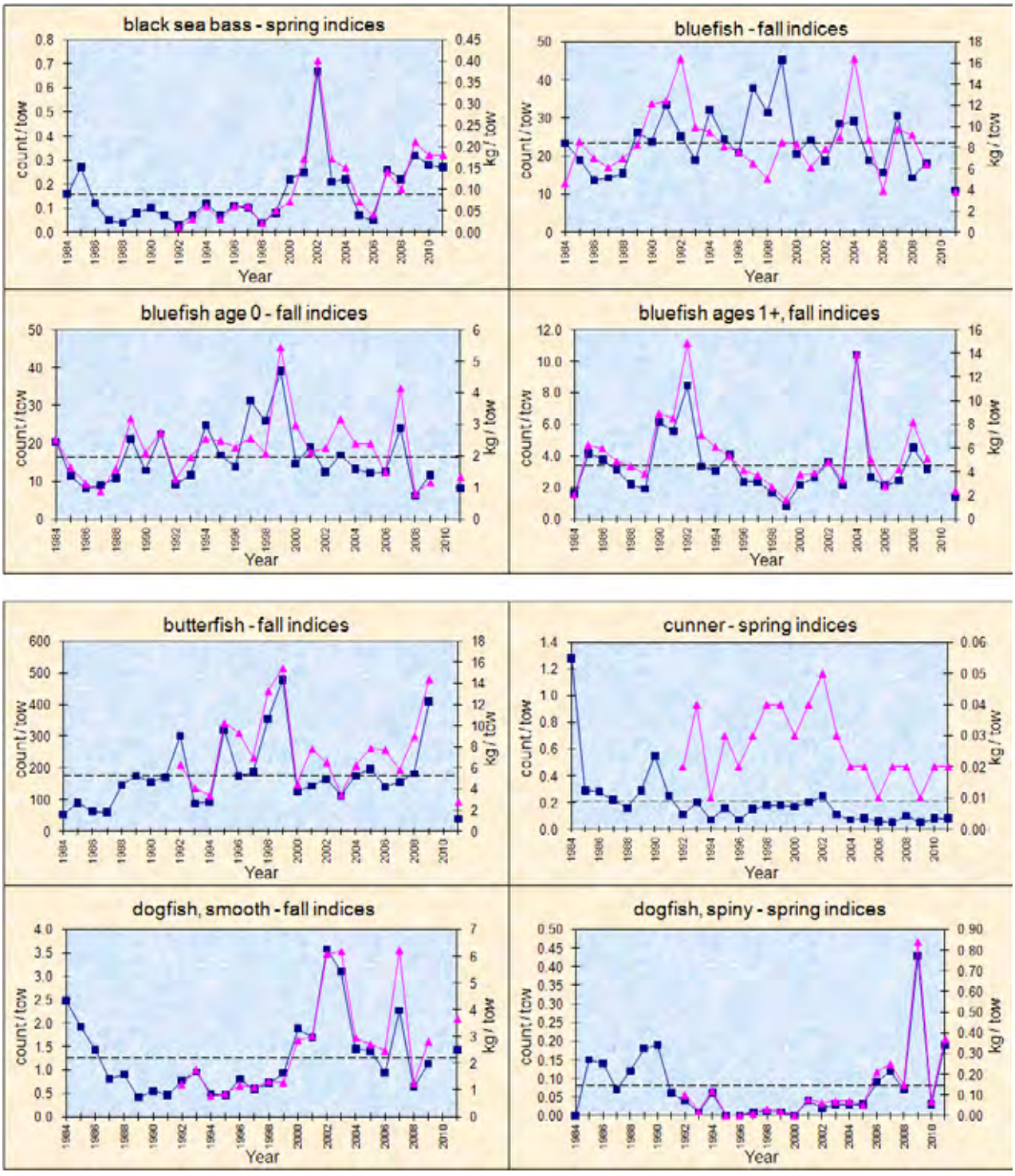


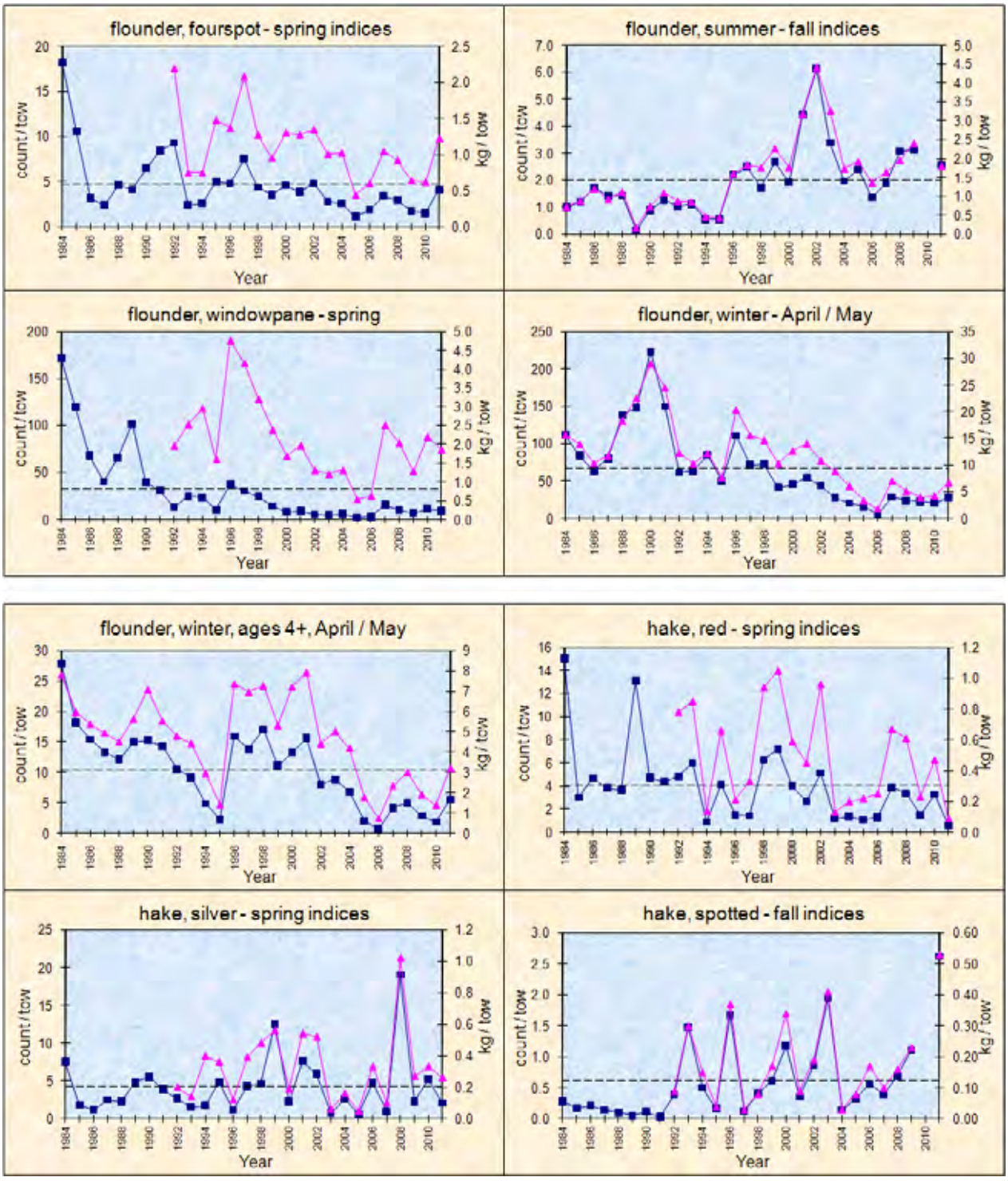
Figure 2.8. Plots of abundance indices for: black sea bass, bluefish (total, age 0, and ages 1+), butterfish, cunner, and dogfish (smooth and spiny).



Legend:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

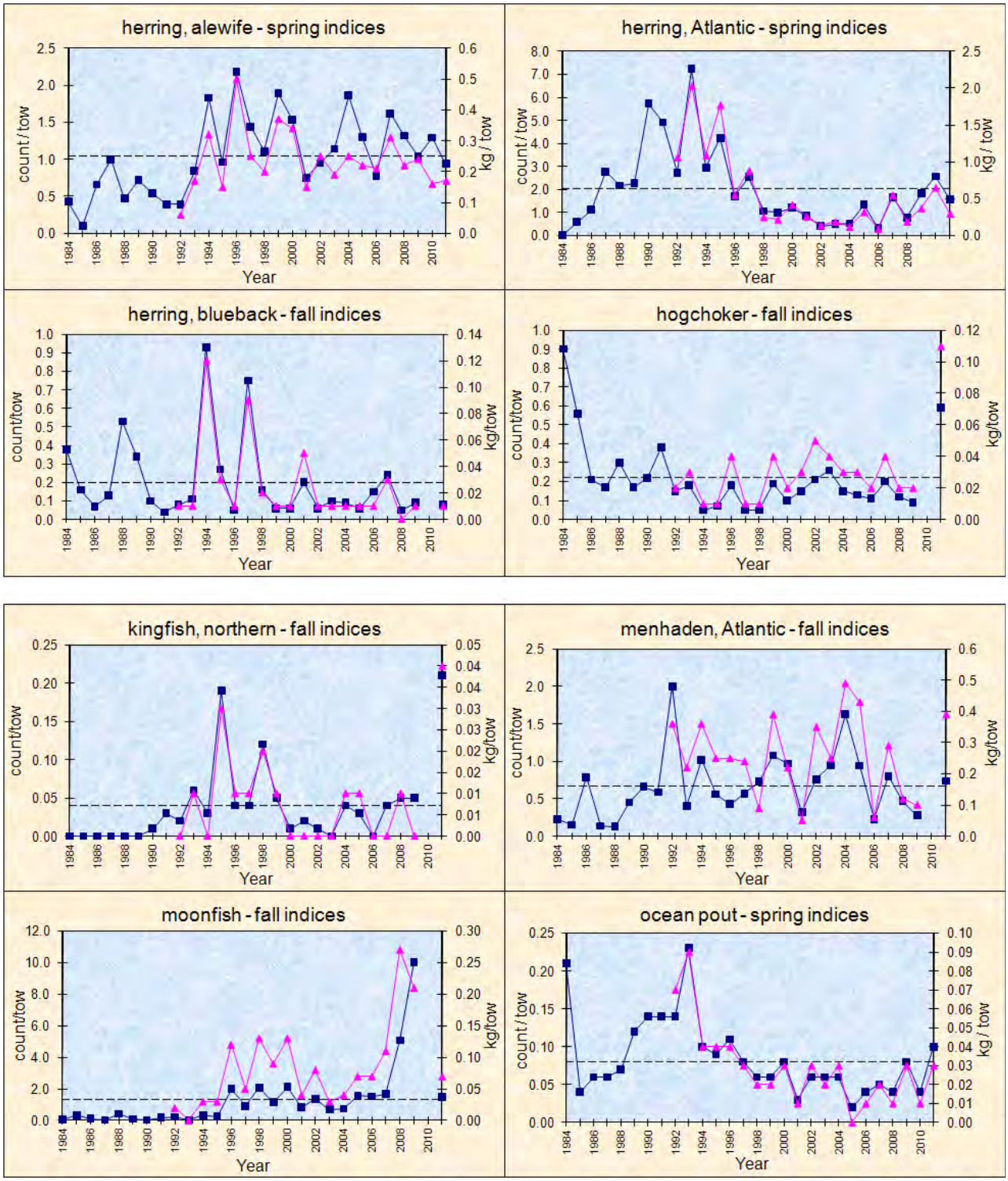
Figure 2.9. Plots of abundance indices for: flounders (fourspot, summer, windowpane, winter, and winter ages 4+) and hakes (red, silver, and spotted).



Legend:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

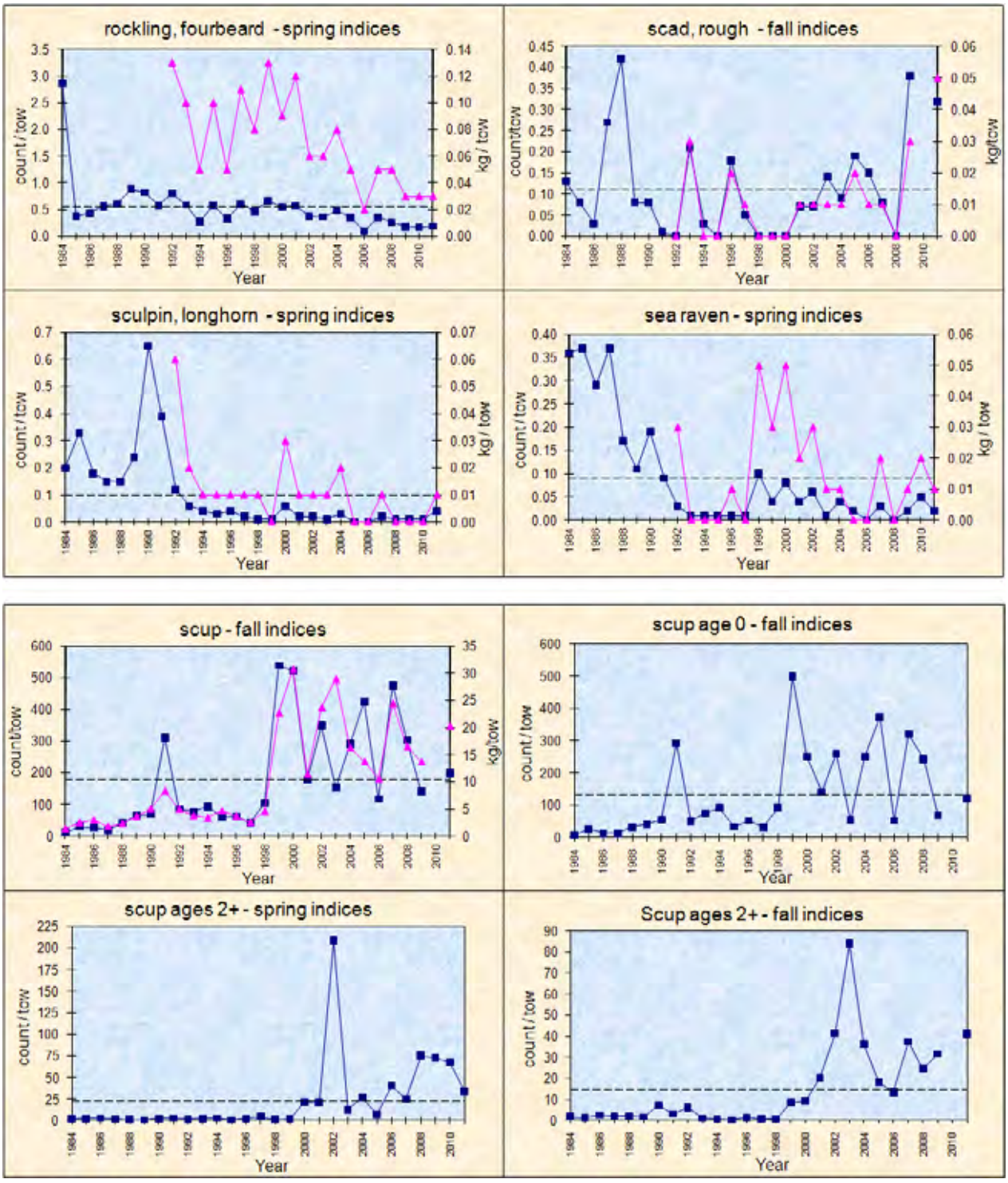
Figure 2.10. Plots of abundance indices for: herrings (alewife, Atlantic, and blueback), hogchoker, Northern kingfish, Atlantic menhaden, moonfish, and ocean pout.



Legend:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

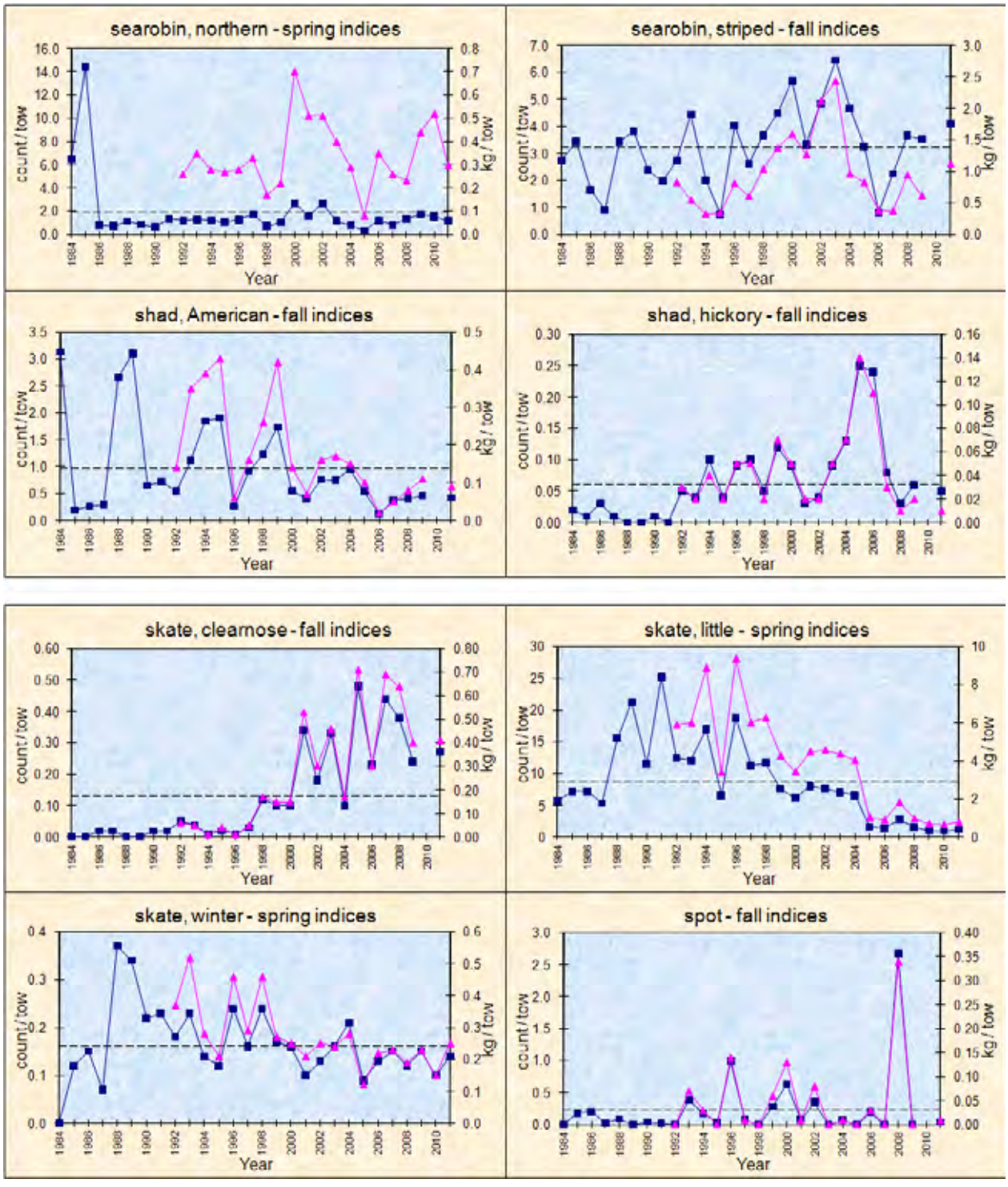
Figure 2.11. Plots of abundance indices for: fourbeard rockling, rough scad, longhorn sculpin, sea raven, and scup (all ages, age 0, and ages 2+).



Legend:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

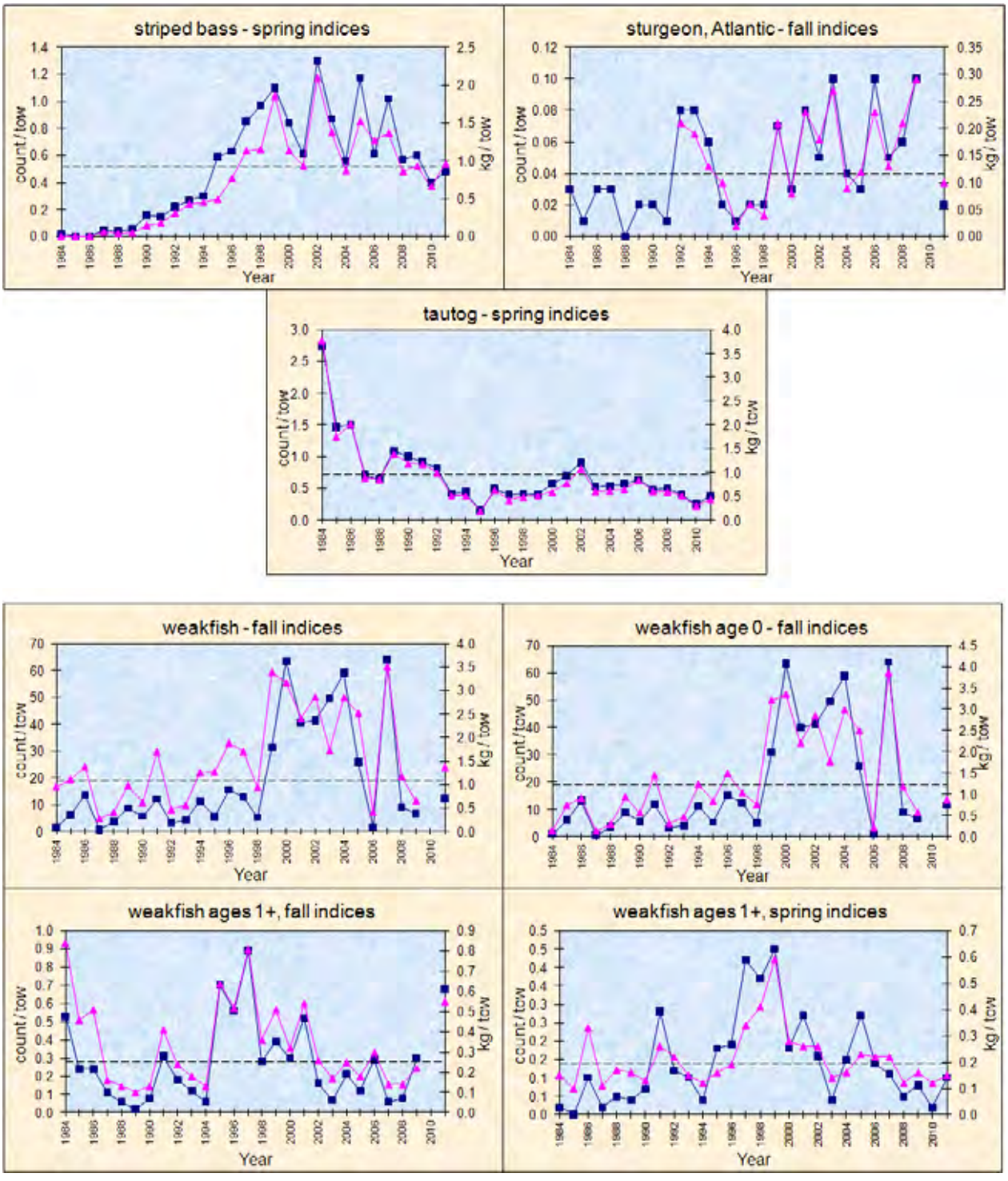
Figure 2.12. Plots of abundance indices for: searobins (striped and northern), shad (American and hickory), skates (clearnose, little, and winter), and spot.



Legend:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

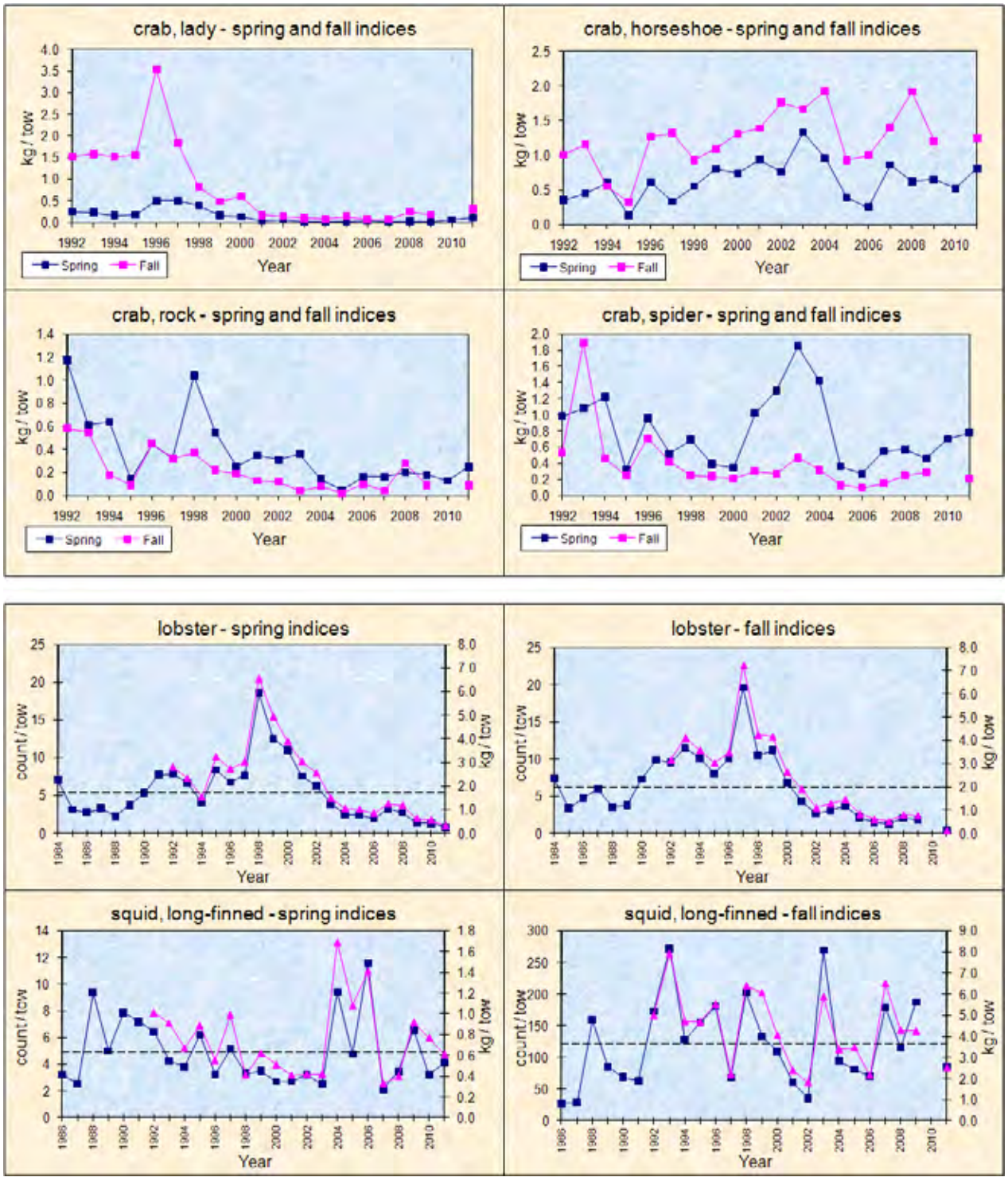
Figure 2.13 Plots of abundance indices for: striped bass, Atlantic sturgeon, tautog, and weakfish (all ages, age 0, and ages 1+).



Legend:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

Figure 2.14. Plots of abundance and biomass indices for: crabs (lady, rock, and spider), horseshoe crab, American lobster, and long-finned squid.



Legend for bottom four graphs:

■ = count / tow
▲ = kg / tow
---- = mean count / tow

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APPENDICES
LISTS

Appendix 2.1. List of finfish species identified by A *Study of Marine Recreational Fisheries in Connecticut* (F54R) and other CT DEP Marine Fisheries Division programs. LISTS has collected one hndred-two finfish species from 1984-2011.

This appendix contains a list of 143 species identified (Bold type indicates new species) from all sampling programs conducted since 1984. Species are listed alphabetically by common name (AFS 2004). Sampling program abbreviations, survey time periods and gear type are as follows:

Survey Abbreviation	Survey Description	Time Period	Gear Type
CTR	CT River Creel Survey	1997-1998	bus stop creel survey mainstem of CT River
EPA	cooperative sampling in western LIS with EPA	1986-1990	used LISTS net
ESS (F54R)	Estuarine Seine Survey	1988 to present	7.6m (25 ft) beach seine
IS (F54R)	Inshore Survey of Juvenile Winter Flounder	1990-1994	beam trawls (also a little data from 1995-1996)
ISS (F54R-starting 2008)	Inshore Seine Surveys in CT & TH rivers	1979 to present	15.2m (50 ft) bag seine set by boat
LISTS (F54R)	Long Island Sound Trawl Survey	1984 to present	14m (50 ft) trawls with 2" codend mesh
MISC	misc sampling conducted on R/V Dempsey	various	various
NCA	"inshore" EPA NCA C2K sampling	2000	skiff trawls
NRRWS	sampling in western end of LIS, the "Narrows"	2000-2007	14m (50 ft) trawls with 2" codend mesh
SNFH (F54R)	Study of Nearshore Finfish Habitat	1995-1996	plankton net
SS (F54R)	Summer Survey	1991-1993, 1996	14m (50 ft) trawls with codend liner in LIS
TN	Trap Net Survey	1997-1998	trap nets in rivers

Common Name	Scientific Name	Survey
anchovy, bay	*Anchoa mitchilli*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC
anchovy, striped	*Anchoa hepsetus*	LISTS; ESS; IS; SS
banded rudderfish	*Seriola zonata*	LISTS; ESS
bass, largemouth	*Micropterus salmoides*	ISS; TN;CTR
bass, rock	*Ambloplites rupestris*	ISS; TN;CTR
bass, smallmouth	*Micropterus dolomieui*	ISS; TN;CTR
bass, striped	*Morone saxatilis*	LISTS;NRRWS;ESS;ISS; SS;NCA;MISC;EPA;TN;CTR
bigeye	*Priacanthus arenatus*	LISTS; IS
bigeye, short	*Pristigenys alta*	LISTS
black sea bass	*Centropristes striata*	LISTS;NRRWS;ESS; IS; SS;NCA;MISC;EPA
blenny, feather	*Hypsoblennius hentz*	LISTS
bluefish	*Pomatomus saltatrix*	LISTS;NRRWS;ESS;ISS; SS; MISC;EPA; CTR
bluegill	*Lepomis macrochirus*	TN;CTR
bonefish	*Albula vulpes*	ISS
bonito, Atlantic	*Sarda sarda*	LISTS; EPA
bullhead, brown	*Ameiurus nebulosus*	ISS; NCA; TN;CTR
burrfish, striped	*Chilomycterus schoepfi*	LISTS; ESS
burrfish, web	*Chilomycterus antillarum*	ESS
butterfish	*Peprilus triacanthus*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA
carp	*Cyprinus carpio*	ISS; NCA; TN;CTR
catfish, channel	*Ictalurus puctatus*	ISS; NCA; TN;CTR
catfish, white	*Ameiurus catus*	NCA; TN;CTR
cod, Atlantic	*Gadus morhua*	LISTS; SS
cornetfish, bluespotted	*Fistularia tabacaria*	ESS; IS
cornetfish, red	*Fistularia petimba*	LISTS; IS
crappie, black	*Pomoxis nigromaculatus*	ISS; NCA; TN;CTR
crappie, white	*Pomoxis annularis*	TN;CTR
croaker, Atlantic	*Micropogonias undulatus*	LISTS; IS
cunner	*Tautogolabrus adspersus*	LISTS;NRRWS;ESS;ISS;IS; SS; MISC;EPA
cusk-eel, fawn	*Lepophidium profundorum*	LISTS
cusk-eel, striped	*Ophidion marginatum*	LISTS; SS
darter, tessellated	*Etheostoma olmstedi*	ISS
dogfish, smooth	*Mustelus canis*	LISTS;NRRWS;ESS; IS; SS; MISC;EPA
dogfish, spiny	*Squalus acanthius*	LISTS;NRRWS; MISC
eel, American	*Anguilla rostrata*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA; EPA;TN;CTR
eel, conger	*Conger oceanicus*	LISTS; IS; SS
fallfish	*Semotilus corporalis*	ISS
filefish, orange	*Aluterus schoepfi*	LISTS; IS; SS
filefish, planehead	*Monacanthus hispidus*	LISTS; EPA
filefish, scrawled	*Aluterus scriptus*	IS
flounder, American plaice	*Hippoglossoides platessoide*	LISTS
flounder, fourspot	*Paralichthys oblongus*	LISTS;NRRWS; IS; SS; MISC;EPA
flounder, smallmouth	*Etropus microstomus*	LISTS;NRRWS;ESS; IS; SS;NCA;MISC

Appendix 2.1 cont.

Common Name	Scientific Name	Survey
flounder, summer	*Paralichthys dentatus*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA;TN;CTR
flounder, windowpane	*Scophthalmus aquosus*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA;TN;CTR
flounder, winter	*Pseudopleuronectes americanus*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA;MISC;EPA;TN;CT
flounder, yellowtail	*Pleuronectes ferrugineus*	LISTS; IS
glasseye snapper	*Priacanthus cruentatus*	LISTS
goatfish, dwarf	*Upeneus parvus*	LISTS
goatfish, red	*Mullus auratus*	LISTS
goby, code	*Gobiosoma robustum*	IS
goby, naked	*Gobiosoma bosci*	LISTS; ESS;ISS;IS
goldfish	*Carassius auratus*	CTR
goosefish	*Lophius americanus*	LISTS; IS; SS; MISC
grubby	*Myoxocephalus aeneus*	LISTS; ESS;ISS;IS;SNFH;SS; EPA
gunnel, banded	*Pholis fasciata*	ESS; IS
gunnel, rock	*Pholis gunnellus*	LISTS; ESS;ISS;IS;SNFH;SS
gurnard, flying	*Dactylopterus volitans*	ESS
haddock	*Melanogrammus aeglefinus*	LISTS; SS
hake, red	*Urophycis chuss*	LISTS;NRRWS; IS; SS; MISC;EPA
hake, silver	*Merluccius bilinearis*	LISTS;NRRWS; SS; MISC;EPA
hake, spotted	*Urophycis regia*	LISTS;NRRWS; ESS; IS; SS; MISC;EPA
herring, Atlantic	*Clupea harengus*	LISTS;NRRWS; IS;SNFH;SS; MISC;EPA
herring, alewife	*Alosa pseudoharengus*	LISTS;NRRWS;ESS;ISS; SNFH;SS; MISC;EPA;TN;CTR
herring, blueback	*Alosa aestivalis*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS; EPA;TN;CTR
herring, round	*Etrumeus teres*	LISTS; EPA
hogchoker	*Trinectes maculatus*	LISTS;NRRWS;ESS;ISS;IS; SS; MISC;EPA;TN
jack, blue runner	*Caranx crysos*	LISTS; EPA
jack, crevalle	*Caranx hippos*	LISTS;NRRWS; ESS; ISS; EPA
jack, yellow	*Caranx bartholomaei*	LISTS;NRRWS; ESS; IS; MISC;EPA
killifish, rainwater	*Lucania parva*	ESS
killifish, striped	*Fundulus majalis*	ESS; IS
kingfish, northern	*Menticirrhus saxatilis*	LISTS;NRRWS;ESS;ISS;IS; SS; EPA
lamprey, sea	*Petromyzon marinus*	LISTS; IS; TN
lizardfish, inshore	*Synodus foetens*	LISTS;NRRWS;ESS;ISS;IS; SS; MISC
lookdown	*Selene vomer*	LISTS; ISS
lumpfish	*Cyclopterus lumpus*	LISTS; IS;SNFH
mackerel, Atlantic	*Scomber scombrus*	LISTS; ISS; SS; EPA
mackerel, Spanish	*Scomberomorus maculatus*	LISTS; SS; EPA
menhaden, Atlantic	*Brevoortia tyrannus*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA;MISC;EPA
minnow, sheepshead	*Cyrinodon variegatus*	ESS;ISS
moonfish	*Selene setapinnis*	LISTS;NRRWS; SS; MISC;EPA
mullet, white	*Mugil curema*	LISTS;ESS;ISS
mummichog	*Fundulus heteroclitus*	ESS; IS
needlefish, Atlantic	*Strongylura marina*	ESS;ISS
ocean pout	*Macrozoarces americanus*	LISTS;NRRWS; MISC;EPA
oyster toadfish	*Opsanus tau*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS; EPA
perch, white	*Morone americana*	LISTS;NRRWS;ESS;ISS;IS;SNFH; NCA; TN;CTR
perch, yellow	*Perca flavescens*	ISS; SNFH; TN;CTR
perch, silver	*Bairdiella chrysoura*	LISTS
pickerel, chain	*Esox niger*	ISS; TN
pike, northern	*Esox lucius*	ISS; TN;CTR
pipefish, northern	*Syngnathus fuscus*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA; EPA
pollock	*Pollachius virens*	LISTS;NRRWS; SNFH;SS; EPA
pompano, African	*Alectis ciliaris*	LISTS; ISS
puffer, northern	*Sphoeroides maculatus*	LISTS;NRRWS;ESS;ISS;IS; SS
pumpkinseed	*Lepomis gibbosus*	ESS;ISS; NCA; TN;CTR
radiated shanny	*Ulvaria subbifurcata*	SNFH
rockling, fourbeard	*Enchelyopus cimbrius*	LISTS;NRRWS; IS;SNFH;SS; MISC;EPA
salmon, Atlantic	*Salmo salar*	LISTS; TN
sand lance, American	*Ammodytes americanus*	LISTS; ESS; IS;SNFH;SS
sandbar (brown) shark	*Carcharhinus plumbeus*	LISTS

Appendix 2.1 cont.

Common Name	Scientific Name	Survey
scad, bigeye	*Selar crumenophthalmus*	LISTS; SS; MISC
scad, mackerel	*Decapterus macarellus*	LISTS; SS
scad, rough	*Trachurus lathami*	LISTS;NRRWS; SS; MISC;EPA
scad, round	*Decapterus punctatus*	LISTS;NRRWS
sculpin, longhorn	*Myoxocephalus octodecemspinosus*	LISTS;NRRWS; ISS; SNFH; MISC
scup	*Stenotomus chrysops*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA
sea raven	*Hemitripterus americanus*	LISTS; SNFH; MISC;EPA
seahorse, lined	*Hippocampus erectus*	LISTS; ESS; IS
searobin, northern	*Prionotus carolinus*	LISTS;NRRWS;ESS; IS;SNFH;SS; MISC;EPA
searobin, striped	*Prionotus evolans*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA
seasnail	*Liparis atlanticus*	LISTS; SNFH
sennet, northern	*Sphyraena borealis*	LISTS; ESS
shad, American	*Alosa sapidissima*	LISTS;NRRWS;ESS;ISS; SS; MISC;EPA;TN;CTR
shad, gizzard	*Dorosoma cepedianum*	LISTS;NRRWS; ISS; TN
shad, hickory	*Alosa mediocris*	LISTS;NRRWS; ISS; SS; MISC;EPA; CTR
sharksucker	*Echeneis naucrates*	LISTS
shiner, golden	*Notemigonus crysoleucas*	ISS; TN
shiner, spottail	*Notropis hudsonius*	ISS; NCA; TN;CTR
silverside, Atlantic	*Menidia menidia*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS; MISC;EPA
silverside, inland	*Menidia beryllina*	SNFH
skate, barndoor	*Dipturus laevis*	LISTS
skate, clearnose	*Raja eglanteria*	LISTS;NRRWS; IS
skate, little	*Leucoraja erinacea*	LISTS;NRRWS;ESS; IS; SS;NCA;MISC;EPA; CTR
skate, winter	*Leucoraja ocellata*	LISTS;NRRWS; SS; MISC
smelt, rainbow	*Osmerus mordax*	LISTS; ESS; IS;SNFH;SS; TN;CTR
snapper, grey	*Lutjanus griseus*	ESS; IS
spot	*Leiostomus xanthurus*	LISTS;NRRWS; ISS;IS; SS; MISC;EPA
stargazer, northern	Astroscopus guttatus	LISTS; ESS
stickleback, four-spine	*Apeltes quadracus*	ESS; IS
stickleback, nine-spine	*Pungitius pungitius*	ESS; IS
stickleback, three-spine	*Gasterosteus aculeatus*	ESS; IS; TN
stingray, roughtail	*Dasyatis centroura*	LISTS
sturgeon, Atlantic	*Acipenser oxyrinchus*	LISTS
sucker, white	*Catostomus commersoni*	ISS; NCA; TN;CTR
tautog	*Tautoga onitis*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA
tomcod, Atlantic	*Microgadus tomcod*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS; EPA; CTR
triggerfish, gray	*Balistes capriscus*	LISTS
trout, brook	*Salvelinus fontinalis*	TN;CTR
trout, brown	*Salmo trutta*	CTR
walleye	*Sander vitreus*	TN
weakfish	*Cynoscion regalis*	LISTS;NRRWS;ESS;ISS;IS; SS;NCA;MISC;EPA

Appendix 2.2. Annual total count of finfish, lobster and squid taken in the LISTS, 1984-2011.

Counts include all tows- number of tows conducted shown in second row. Refer to Appendix 2.4 for details on number of tows conducted per month. Note: nc = not counted. Anchovy spp., (yoy) and sand lance, (yoy) are estimated.

Common name	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
(number of tows)	200	246	316	320	320	320	297	200	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	120	200	78	172	5,948
anchovy, bay	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	548	2,303	443	992	2,434	1,523	814	1,492	2,440	1,128	11,128	475	4,693	30,413
anchovy, striped	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	11	0	0	216	0	47	0	2	0	0	0	6	1	5	0	1	289
anchovy, spp (yoy-est)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	2,667	15,700	935	1,515	3,410	13,110	3,254	2,179	1,267	8,537	1,135	0	2,382	56,090
bigeye	0	0	0	1	2	2	1	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	10
bigeye, short	1	2	0	0	1	2	0	0	0	1	1	0	3	2	0	0	0	1	5	0	0	0	0	0	0	0	0	0	19
black sea bass	34	53	44	24	22	21	39	39	5	20	34	12	27	22	18	50	69	134	394	64	124	42	19	116	122	121	37	91	1,797
blenny, feather	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4
blue runner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	34	0	24	63
bluefish	9,927	8,946	5,712	3,517	3,857	12,568	8,195	5,845	5,269	6,469	16,245	5,524	6,705	10,815	8,814	7,843	6,135	3,986	3,450	3,766	6,504	6,532	2,100	9,378	1,699	3,657	2	2,765	176,224
bonito, Atlantic	0	2	0	1	1	1	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	9
burrfish, striped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2
butterfish	37,137	67,944	44,624	42,519	60,746	94,928	80,778	40,537	95,961	67,087	54,378	64,930	49,360	70,985	136,926	191,100	60,490	45,264	66,550	36,133	94,735	92,996	50,022	49,137	48,766	108,087	2,894	42,141	1,897,155
cod, Atlantic	0	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	1	0	0	58	33	10	0	0	0	15	21	109	251
Gadus spp. (yoy/larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	34	8	17	95
cornetfish, red	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
croaker, Atlantic	0	0	0	0	0	0	0	0	0	41	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	46
cunner	359	98	97	129	72	268	196	75	30	65	25	41	17	43	65	51	50	51	55	42	21	24	8	16	26	18	11	14	1,965
cusk-eel, fawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	4
cusk-eel, striped	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	5
dogfish, smooth	846	919	850	526	564	374	284	193	304	420	361	168	275	167	310	305	467	598	1,019	570	503	467	332	580	328	588	10	613	12,941
dogfish, spiny	89	252	173	76	434	99	417	14	6	14	58	0	1	7	18	10	4	48	17	85	38	41	11	32	35	148	3	58	2,190
eel, American	2	0	1	0	0	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	9
eel, american (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	0	0	0	0	0	0	0	1	0	0	0	0	1
eel, conger	0	0	0	0	0	0	0	0	1	3	0	2	1	0	0	2	0	2	0	3	0	0	0	0	0	0	0	3	17
eel, conger (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	0	0	0	0	1	0	0	0	0	0	0	0	1
filefish, orange	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
filefish, planehead	4	20	1	0	25	13	23	1	0	10	1	0	3	0	0	3	0	1	0	1	0	0	1	0	1	1	0	0	109
flounder, American plaice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	3
flounder, fourspot	2,691	2,759	2,126	2,112	4,653	2,924	4,698	3,553	2,774	1,447	1,674	2,584	2,815	4,122	1,908	1,393	2,590	2,167	1,859	1,877	1,406	688	466	1,094	902	1,036	402	1,400	60,120
flounder, smallmouth	2	0	2	15	39	13	4	20	12	30	17	19	41	58	97	96	61	98	139	49	50	44	7	48	89	96	31	67	1,243
flounder, summer	208	249	716	531	414	47	242	263	186	293	282	121	434	486	436	582	555	875	1,356	1,181	644	506	203	733	477	881	517	1,051	14,467
flounder, windowpane	26,200	18,936	22,514	15,588	26,919	31,082	14,738	8,482	2,980	8,526	6,678	3,815	14,116	10,324	6,483	4,643	2,488	3,065	1,991	2,177	2,275	1,982	1,077	4,051	3,511	2,496	2,850	2,831	252,816
flounder, winter	13,921	13,851	19,033	22,696	36,706	45,563	59,981	26,623	9,548	16,843	21,481	15,558	22,722	14,701	15,697	10,288	8,867	9,826	6,884	4,676	4,021	4,692	1,699	4,550	4,973	4,068	2,579	3,092	425,137
flounder, yellowtail	0	0	0	0	7	0	1	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	1	1	2	1	0	1	18
glasseye snapper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	4	8	1	6	0	0	23
goatfish, dwarf	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
goatfish, red	1	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	7
goby, naked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
goosefish	1	8	1	1	1	15	3	8	10	4	8	4	1	2	3	2	1	1	3	0	1	2	1	0	0	0	0	0	81
grubby	0	1	1	1	5	9	6	0	0	0	5	1	2	11	5	2	0	0	1	2	0	2	0	1	0	0	0	4	59
gunnel, rock	0	6	0	6	5	10	9	0	0	0	1	0	3	0	0	0	3	1	1	6	2	9	2	1	2	2	29	4	103
haddock	0	0	0	0	0	0	0	0	0	0	0	2	0	1	7	1	0	0	0	26	7	2	0	0	0	0	0	0	46
hake, red	3,696	1,161	3,061	2,258	3,808	7,365	3,300	2,085	1,606	4,183	546	1,977	872	748	3,015	2,973	2,393	1,382	2,103	873	829	585	625	2,788	1,723	897	990	278	58,118
hake, silver	1,525	724	1,464	1,848	3,427	3,551	4,243	1,537	544	508	2,136	1,941	489	1,973	1,870	5,126	679	3,945	2,013	496	1,417	165	1,267	290	6,587	947	1,747	948	53,406
hake, spotted	78	69	96	55	255	12	42	73	68	497	184	72	384	77	142	381	1,425	606	798	656	230	234	321	340	1,267	327	665	725	10,077
herring, alewife	284	37	242	819	415	473	287	103	122	934	1,431	386	1,402	1,194	456	1,393	1,572	638	855	746	859	742	573	1,537	931	1,175	172	512	20,290
herring, Atlantic	112	510	2,536	2,549	2,721	2,560	25,029	4,003	4,565	6,271	3,850	9,135	972	3,455	893	2,511	770	497	365	459	851	1,168	66	1,932	356	6,330	1,318	1,482	87,264
herring, blueback	1,722	117	267	104	247	367	124	38	175	106	1,199	255	97	630	211	19	143	279	68	110	218	111	63	156	74	291	101	72	7,363
herring, round	22	15	0	1	0	0	0	0	2	6	2	0	0	0	31	0	0	5	0	0	0	0	0	0	0	0	0	0	84
hogchoker	293	282	140	87	113	118	259	104	61	73	37	17	45	15	12	39	40	85	100	92	83	61	22	78	38	39	34	147	2,513
jack, crevalle	0	1	0	1	4	0	0	0	0	6	8	1	0	3	0	8	0	0	1	2	2	2	0	2	0	1	0	4	46
jack, yellow	0	0	0	0	0	41	8	11	2	2	6	32	6	2	6	20	3	3	13	1	1	28	0	0	0	1	0	0	186
kingfish, northern	0	0	0	0	0	1	1	4	2	10	7	25	6	7	15	6	2	2	1	1	5	4	0	4	3	7	0	34	148
lamprey, sea	0	0	0	1	1	0	1	1	0	2	0	0	1	1	0	0	0	0	0	1	0	0	0	1	1	0	0	0	11
lizardfish, inshore	0	0	0	0	0	2	0	0	0	0	1	0	0	2	1	7	1	21	1	0	0	1	4	2	10	2	0	43	98

Appendix 2.2 cont.

Common name	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
(number of tows)	200	246	316	320	320	320	297	200	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	120	200	78	172	5,948
lobster, American	5,995	3,549	4,924	6,923	6,032	7,645	9,696	8,524	8,160	12,583	9,123	9,944	9,490	16,467	16,211	13,922	10,481	5,626	3,880	2,923	1,843	1,389	748	1,648	1,096	853	293	230	180,197
lookdown	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	6
lumpfish	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
mackerel, Atlantic	68	17	20	29	45	376	46	2	4	17	11	1	5	8	13	21	2	0	5	8	0	37	0	9	0	5	0	0	749
mackerel, Spanish	0	0	0	0	0	11	0	2	1	233	106	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	355
menhaden, Atlantic	161	304	718	600	335	623	407	348	1,115	298	411	318	88	116	306	1,187	492	86	366	799	746	235	28	426	47	69	7	181	10,816
moonfish	7	226	23	7	142	60	10	24	62	6	149	33	921	287	1,188	645	1,817	225	424	133	182	356	361	979	689	2,575	0	640	12,172
mullet, white	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
ocean pout	26	3	14	14	30	58	39	42	18	66	42	30	26	15	13	17	18	6	13	14	18	3	5	12	9	22	6	27	606
perch, silver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
perch, white	0	0	0	0	0	2	0	0	0	4	1	0	1	4	0	1	1	0	0	8	2	0	0	0	4	1	0	1	30
pipefish, northern	1	0	1	0	3	0	0	0	5	21	2	2	0	1	0	2	4	4	2	6	2	4	3	2	0	2	4	4	75
pollock	5	0	3	8	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	18	2	5	55
pompano, African	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
puffer, northern	1	2	6	0	3	2	2	5	1	28	4	1	3	1	28	14	4	8	6	3	5	5	0	8	0	5	0	9	155
rockling, fourbeard	376	89	184	312	563	686	393	163	150	242	93	169	109	199	133	233	185	251	106	113	173	106	14	87	81	47	35	43	5,334
rudderfish, banded	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
salmon, Atlantic	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
sand lance, American	nc	nc	nc	nc	nc	nc	nc	nc	nc	3	25	95	0	2	4	178	4	4	3	19	70	6	0	30	7,495	1,227	13,061	9,535	31,761
sand lance, (yoy-est)	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	1,000	5	0	0	100	1,075	0	430	0	0	0	0	5,444	2	3,750	7,932	0	15,600	35,338
scad, bigeye	0	0	0	0	15	63	1	1	0	0	3	0	2	1	1	21	0	0	0	0	0	0	0	0	0	0	0	0	108
scad, mackerel	0	0	0	0	0	0	1	2	6	0	4	1	3	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	20
scad, rough	34	32	19	89	180	81	41	1	0	100	13	0	35	65	0	0	0	10	10	12	14	62	14	13	0	59	0	150	1,035
scad, round	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	2	0	0	4	11	12	0	3	0	1	0	1	41
sculpin, longhorn	14	82	51	32	107	107	263	139	31	11	7	5	7	4	2	2	14	5	3	5	5	0	0	3	2	2	1	9	913
scup	8,806	18,054	16,449	9,761	12,566	37,642	21,193	45,790	13,646	32,218	38,456	13,985	16,087	9,582	23,742	101,095	101,464	58,325	100,481	26,926	61,521	52,642	28,829	75,681	53,560	46,991	7,157	34,458	1,067,107
sea raven	57	59	70	88	52	34	44	19	4	1	1	2	2	3	30	9	19	7	11	3	7	3	0	5	0	5	6	3	544
seahorse, lined	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
searobin, northern	585	2,267	546	280	605	381	357	609	313	951	878	1,317	672	579	360	547	2,014	1,594	2,123	1,632	784	265	630	691	809	2,012	1,128	803	25,733
searobin, striped	1,434	2,295	2,035	1,482	2,086	2,211	2,353	865	857	1,491	1,298	682	1,008	819	1,321	1,690	3,129	2,061	2,394	2,235	1,308	757	366	755	612	1,507	141	1,630	40,822
seasnail	0	0	0	0	1	0	8	0	0	0	0	0	0	0	0	0	0	4	0	0	4	2	0	0	0	0	0	0	19
sennet, northern	1	0	0	0	0	1	0	0	0	2	0	0	0	0	0	6	0	1	2	0	0	8	0	2	0	5	0	1	29
shad, American	1,852	425	642	1,036	3,208	4,007	550	361	380	1,142	1,723	755	501	922	901	987	316	109	593	689	356	177	68	236	405	422	165	271	23,198
shad, gizzard	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	2	0	1	0	0	0	0	8
shad, hickory	71	4	7	6	4	40	2	1	12	10	31	6	29	25	40	56	42	14	45	41	39	136	75	37	5	13	2	8	801
shark, sandbar	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
sharksucker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
silverside, Atlantic	0	0	0	0	0	0	0	0	1	54	3	39	0	2	0	1	2	1	0	1	0	0	0	1	2	3	1	0	111
skate, barndoor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
skate, clearnose	0	0	3	2	1	1	3	2	8	8	1	4	1	4	20	22	18	65	59	68	22	102	36	97	37	69	1	56	710
skate, little	2,751	4,614	4,303	3,847	9,471	9,349	11,902	6,479	3,495	6,051	6,714	2,372	6,203	4,068	4,305	3,686	3,340	4,311	4,242	4,071	3,044	1,317	593	1,277	682	709	281	674	114,149
skate, winter	1	20	34	17	114	120	85	50	31	62	51	41	88	48	62	41	31	38	45	82	53	31	23	44	51	44	16	37	1,360
smelt, rainbow	0	0	0	0	5	4	2	2	0	9	9	4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	37
spot	0	34	38	10	29	0	8	2	0	124	53	3	195	10	0	45	204	13	52	1	8	0	14	0	308	1	0	5	1,155
squid, long-finned	0	0	11,018	15,135	33,400	21,304	23,789	12,322	32,780	58,312	25,396	23,974	22,720	13,048	27,443	21,580	16,585	9,080	8,034	21,350	23,022	17,542	7,802	24,212	10,490	24,130	1,906	13,020	519,394
stargazer, northern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1
stingray, roughtail	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	1	0	0	0	1	0	0	1	7
striped bass	10	13	12	30	31	59	117	38	42	81	81	165	232	319	400	397	293	214	469	383	378	469	144	422	199	466	71	243	5,776
sturgeon, Atlantic	11	3	6	6	7	13	9	3	30	60	60	6	3	5	17	39	7	18	18	29	8	9	21	18	7	18	1	5	437
tautog	734	773	796	624	629	791	693	501	265	164	224	61	136	190	194	217	287	319	565	225	232	179	186	280	179	163	53	106	9,765
toadfish, oyster	3	4	9	0	0	3	4	1	0	2	0	1	0	0	3	2	6	2	8	9	1	0	1	5	3	3	0	1	71
tomcod, Atlantic	2	1	0	8	2	3	3	4	8	5	2	4	2	1	0	1	0	0	0	0	2	0	0	0	0	1	0	2	51
triggerfish, gray	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	4
weakfish	366	2,740	7,751	327	1,341	5,914	2,246	4,320	1,317	2,060	8,156	2,881	6,375	3,904	3,495	12,416	23,595	12,739	10,713	8,183	17,505	9,191	241	17,386	2,531	2,604	1	2,583	172,881
Total	122,727	152,820	153,699	136,459	216,799	294,346	277,480	174,435	187,135	230,541	205,035	163,732	165,956	170,757	257,979	392,647	271,389	170,780	227,425	130,182	241,059	200,490	108,334	205,171	164,767	235,760	39,313	146,122	5,443,337

Appendix 2.3. Annual total weight (kg) of finfish, lobster and squid taken in LISTS, 1992-2010.

Weights include all tows – number of tows shown in second row. Refer to Appendix 2.4 for details on number of tows conducted per month. Note: nw = not weighed.

Common name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	3,769
anchovy, bay	nw	nw	nw	nw	nw	nw	nw	5.6	12.2	3.6	6.6	13.3	10.3	5.8	8.3	14.5	7.7	35.3	2.8	10.5	**136.5**
anchovy, striped	nw	nw	nw	nw	0.2	0.0	0.0	6.1	0.0	1.2	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.4	0.0	0.1	**8.3**
Anchovy, spp (yoy-est)	nw	nw	nw	nw	nw	nw	nw	0.5	4.5	0.8	1.5	2.0	3.0	1.5	0.6	0.8	5.1	0.7	0.0	1	**22.0**
bigeye	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.4**
bigeye, short	0.0	0.1	0.1	0.0	0.3	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**1.0**
black sea bass	1.8	6.4	11.0	4.7	12.1	10.5	10.6	17.2	22.6	74.8	188.3	49.6	40.5	26.4	9.3	46.8	29.8	59.5	20.1	54.2	**696.2**
blenny, feather	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0	**0.2**
blue runner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	2.3	0.0	1.7	**4.4**
bluefish	2,462.9	2,226.1	2,341.7	1,156.1	1,118.2	977.6	899.0	1,218.0	1,408.0	751.2	1,099.7	791.6	2,140.6	1,333.8	358.6	1,801.3	641.4	1,157.4	6.1	584.7	**24,474.0**
bonito, Atlantic	0.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0	**12.0**
burrfish, striped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	**1.0**
butterfish	1,357.3	1,450.1	1,202.2	1,664.5	1,844.7	2,017.2	3,661.1	4,171.6	1,458.3	1,834.0	1,924.2	682.8	1,842.7	2,097.3	1,631.4	1,446.2	1,442.0	3,186.9	166.9	1600.8	**36,682.2**
cod, Atlantic	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.1	0.0	0.0	2.8	4.7	0.9	0.0	0.0	0.0	1.0	2.1	9.2	**21.2**
cornetfish, red	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.1**
croaker, Atlantic	0.0	2.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	**3.1**
cunner	3.7	6.2	2.1	4.4	2.6	4.1	8.1	5.9	5.3	5.9	7.2	6.7	3.7	4.1	1.3	3.0	3.6	1.8	1.3	1.9	**82.9**
cusk-eel, fawn	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.2**
cusk-eel, striped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	**0.4**
dogfish, smooth	863.2	1,339.1	934.6	566.8	862.8	527.3	989.8	923.0	1,038.5	1,407.6	2,814.3	1,527.4	1,435.3	1,421.7	1,176.6	2,110.2	1,134.2	2,213.3	34.4	2031.7	**25,351.8**
dogfish, spiny	30.7	58.4	199.6	0.0	2.1	13.7	44.5	51.1	9.9	128.6	48.0	239.5	104.7	102.0	47.0	122.3	127.7	545.7	16.2	203.5	**2,095.2**
eel, American	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0	**3.1**
eel, conger	0.1	0.2	0.0	1.2	0.1	0.0	0.0	0.5	0.0	0.3	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	**4.6**
filefish, orange	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.2**
filefish, planehead	0.0	0.8	0.1	0.0	0.3	0.0	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0	**2.0**
flounder, American plaice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	**0.3**
flounder, fourspot	382.4	193.6	202.4	402.9	407.2	615.3	306.0	203.9	398.6	362.7	326.9	350.1	309.3	125.9	88.1	224.9	186.3	169.8	92.0	224.2	**5,572.5**
flounder, smallmouth	0.6	2.6	1.5	1.2	2.3	2.4	6.4	5.2	2.7	3.8	4.9	3.0	2.8	2.4	0.6	2.6	3.2	4.7	1.4	3.5	**57.8**
flounder, summer	142.1	193.1	173.0	79.6	266.4	326.0	431.3	459.8	471.3	628.1	989.3	845.7	627.2	406.1	180.5	590.9	398.0	694.4	229.6	713	**8,845.4**
flounder, windowpane	286.1	578.9	597.2	356.2	1,223.6	986.1	741.1	594.2	368.8	475.5	343.3	378.8	333.7	177.5	128.9	510.8	524.0	342.8	449.3	395.9	**9,792.7**
flounder, winter	1,344.8	1,898.0	2,060.9	1,614.7	3,335.0	2,439.4	2,450.3	2,011.7	1,921.4	1,993.6	1,584.1	1,421.9	839.9	566.1	271.2	951.3	751.9	524.0	450.5	613.8	**29,044.5**
flounder, yellowtail	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.4	1.0	0.4	0.2	0.0	0.3	**3.0**
glasseye snapper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.7	0.1	0.6	0.0	0	**1.7**
goatfish, red	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.3**
goby, naked	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.1**
goosefish	2.5	0.5	2.0	3.3	0.1	1.6	3.2	0.3	0.2	0.4	0.6	0.0	0.1	0.7	1.2	0.0	0.0	0.0	0.0	0	**16.7**
grubby	0.0	0.0	0.3	0.1	0.2	0.7	0.3	0.2	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	**2.4**
gunnel, rock	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.2	0.1	0.1	0.4	0.2	0.6	0.1	0.1	0.2	0.2	0.5	0.2	**3.2**
haddock	0.0	0.0	0.0	0.2	0.0	0.1	0.5	0.1	0.0	0.0	0.0	1.3	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0	**3.0**
hake, red	127.7	254.4	63.9	145.6	95.5	80.5	217.5	226.5	162.6	109.7	206.6	73.4	51.6	56.0	37.4	200.4	141.3	59.5	64.3	25.1	**2,399.5**
hake, silver	22.0	21.9	127.6	61.6	20.0	70.8	88.3	99.6	28.8	152.2	89.6	13.9	27.3	7.1	37.7	14.6	208.5	50.0	35.4	40.3	**1,217.2**
hake, spotted	10.3	55.9	32.4	6.5	42.6	19.0	12.2	38.8	92.3	34.9	48.2	70.4	37.8	17.4	24.3	23.9	65.8	32.1	15.8	76.8	**757.4**
herring, alewife	9.2	54.5	83.2	24.6	134.6	81.3	35.1	107.6	96.0	41.7	70.2	55.3	56.1	47.6	49.5	101.3	51.1	96.0	14.3	29.8	**1,239.0**
herring, Atlantic	797.5	1,120.0	769.3	1,631.7	189.8	515.1	74.6	45.4	124.1	72.6	63.9	89.1	58.3	131.1	10.3	234.2	52.1	239.2	179.0	199.4	**6,596.7**
herring, blueback	8.5	4.7	31.2	7.5	6.2	16.5	5.1	1.1	6.8	11.1	2.4	4.0	6.5	5.4	2.5	9.1	3.2	14.6	3.4	3.2	**153.0**
herring, round	0.2	0.3	0.2	0.0	0.0	0.0	0.6	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**1.4**
hogchoker	5.6	7.3	3.9	1.7	5.4	1.8	1.9	5.0	5.9	10.5	13.3	8.6	9.5	8.7	3.2	11.4	5.6	4.5	4.4	16.8	**135.0**
jack, crevalle	0.0	0.5	0.5	0.1	0.0	0.6	0.0	0.7	0.0	0.0	0.1	0.2	0.2	0.2	0.0	0.1	0.0	0.1	0.0	0.4	**3.7**
jack, yellow	0.2	0.2	0.4	2.1	0.5	0.2	0.7	1.9	0.2	0.3	1.4	0.1	0.1	3.0	0.0	0.0	0.0	0.1	0.0	0	**11.4**
kingfish, northern	0.2	1.0	0.5	2.5	0.6	0.9	1.3	0.6	0.3	0.2	0.2	0.6	0.5	0.6	0.0	0.4	0.4	0.4	0.0	3.7	**14.9**
lamprey, sea	0.0	1.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0	**4.0**
lizardfish, inshore	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.5	0.1	2.2	0.1	0.0	0.0	0.1	0.4	0.2	0.5	0.2	0.0	4.6	**9.3**

Appendix 2.3 cont.

Common name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	3,769
lobster, American	1,537.9	2,700.3	1,956.1	2,141.9	2,113.5	3,800.9	3,873.9	3,397.9	2,184.5	1,531.2	1,005.7	690.9	481.5	364.3	197.9	396.5	314.1	244.0	83.6	52	**29,068.6**
lookdown	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0	**0.4**
lumpfish	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.2**
mackerel, Atlantic	1.0	1.3	0.9	0.1	0.5	1.7	1.1	3.1	0.8	0.0	2.5	1.9	0.0	5.7	0.0	0.8	0.0	0.4	0.0	0	**21.8**
mackerel, Spanish	1.5	5.3	6.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**15.5**
menhaden, Atlantic	60.6	103.9	87.8	41.9	40.5	38.5	9.2	90.9	31.8	4.7	96.3	344.9	110.7	77.9	5.5	63.9	10.4	18.0	2.7	69.8	**1,309.9**
moonfish	1.5	0.6	4.1	2.1	11.6	4.6	13.4	9.6	15.0	3.8	7.4	2.3	3.4	6.0	3.5	12.0	13.4	19.5	0.0	6.3	**140.1**
mullet, white	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
ocean pout	7.7	16.4	9.1	6.5	7.2	4.8	2.7	3.9	4.9	2.3	4.3	2.9	5.4	0.7	0.9	3.2	2.1	4.8	1.4	4.5	**95.7**
perch, silver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	
perch, white	0.0	0.3	0.3	0.0	0.1	0.9	0.0	0.4	0.2	0.0	0.0	1.4	0.5	0.0	0.0	0.0	0.1	0.1	0.0	0.1	**4.4**
pipefish, northern	0.4	0.6	0.2	0.1	0.0	0.1	0.0	0.1	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.2	0.0	0.2	0.3	0.3	**4.3**
pollock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.8	0.1	0.5	**1.9**
pompano, African	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.1**
puffer, northern	0.1	0.9	0.4	0.1	0.3	0.1	0.5	1.1	0.4	0.7	0.3	0.3	0.4	0.3	0.0	0.5	0.0	0.4	0.0	0.9	**7.7**
rockling, fourbeard	12.8	15.7	8.5	14.7	8.6	17.3	11.6	28.8	14.7	21.5	9.7	9.2	13.0	6.8	1.5	7.6	7.1	3.9	2.9	4	**219.9**
salmon, Atlantic	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.1**
sand lance, American	nw	0.3	0.6	0.4	0.0	0.1	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.0	0.3	7.2	2.0	5.2	7.5	**25.5**
sand lance, (yoy - est)	nw	0.0	0.8	0.1	0.0	0.0	0.1	0.4	0.0	0.6	0.0	0.0	0.0	0.0	2.9	0.1	0.2	2.3	0.0	3.8	**11.3**
scad, bigeye	0.0	0.0	0.3	0.0	0.1	0.1	0.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**2.0**
scad, mackerel	0.2	0.0	0.4	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0	**1.0**
scad, rough	0.0	4.4	0.2	0.0	1.5	2.0	0.0	0.0	0.0	0.7	0.7	0.5	0.7	1.9	0.5	0.7	0.0	2.8	0.0	6.8	**23.4**
scad, round	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2	0.0	0.0	0.3	0.3	0.3	0.0	0.3	0.0	0.1	0.0	0.1	**2.2**
sculpin, longhorn	9.0	3.2	1.6	1.3	2.1	0.8	1.0	0.3	5.0	1.5	0.9	2.0	3.4	0.0	0.0	0.8	0.3	0.3	0.4	2	**35.9**
scup	837.7	867.9	878.1	770.5	739.4	530.5	740.5	3,641.3	6,679.0	5,828.4	13,814.0	5,221.9	6,801.1	3,080.7	4,636.1	5,333.5	6,509.9	6,332.1	1,971.6	6759.4	**81,973.6**
sea raven	3.9	0.6	0.2	0.7	1.5	0.4	11.3	4.9	9.2	4.1	4.1	1.6	2.4	0.5	0.0	3.6	0.0	1.7	1.6	0.9	**53.2**
seahorse, lined	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.1**
searobin, northern	35.6	97.9	66.7	166.9	57.4	60.4	39.4	52.0	251.2	222.7	267.3	252.2	112.0	21.3	74.5	74.2	58.8	194.3	149.5	85.5	**2,339.8**
searobin, striped	305.1	260.0	208.6	277.5	278.7	230.5	509.7	497.0	1,036.1	861.0	1,065.0	805.1	465.4	183.7	113.5	217.0	263.0	471.8	66.4	558.7	**8,673.8**
seasnail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0	**0.7**
sennet, northern	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.2	0.0	0.0	0.7	0.0	0.2	0.0	0.4	0.0	0.1	**2.4**
shad, American	63.3	138.9	165.8	81.4	36.2	66.8	60.2	117.3	25.8	9.6	40.3	40.8	24.2	18.2	6.1	15.8	20.2	28.9	8.6	17.5	**985.9**
shad, gizzard	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0	**0.8**
shad, hickory	4.9	4.4	7.6	2.5	10.2	9.1	15.9	19.4	17.1	6.7	19.6	20.1	14.2	43.1	19.1	10.4	1.1	3.6	0.4	1.5	**230.9**
sharksucker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.3**
silverside, Atlantic	0.1	1.0	0.3	0.9	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.1	0	**3.5**
skate, barndoor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.4**
skate, clearnose	10.3	11.3	1.8	11.0	1.7	7.4	36.8	39.4	37.9	132.4	107.3	130.8	48.2	187.1	52.4	193.3	78.1	148.5	4.5	109.8	**1,350.0**
skate, little	1,389.0	2,534.8	3,091.5	1,055.3	2,801.8	1,945.8	2,085.5	1,829.6	1,604.7	2,022.6	2,121.9	2,187.3	1,689.8	682.5	310.6	697.0	327.4	390.0	148.3	359.4	**29,274.8**
skate, winter	105.3	220.9	139.2	89.2	212.7	109.7	180.7	89.8	66.5	112.2	133.5	162.1	100.3	59.9	60.0	117.8	140.8	108.5	37.7	101.2	**2,348.0**
smelt, rainbow	0.0	0.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**1.7**
spot	0.0	10.6	4.3	0.3	14.1	1.1	0.0	5.7	17.8	1.3	7.2	0.1	0.9	0.0	1.2	0.0	21.3	0.2	0.0	0.7	**86.8**
squid, long-finned	844.9	1,629.1	965.4	796.4	720.4	515.2	767.0	826.4	582.3	346.2	279.9	573.2	953.4	683.5	326.0	773.6	330.1	648.4	161.4	370.7	**13,093.5**
stargazer, northern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0	**0.1**
stingray, roughtail	0.0	0.0	0.0	0.0	0.0	50.6	3.4	0.0	0.0	2.5	24.4	0.0	4.1	0.0	0.0	0.0	3.0	0.0	0.0	13	**101.0**
striped bass	89.4	210.3	198.6	185.3	373.5	509.9	484.2	815.4	602.6	472.5	855.2	770.3	811.8	675.1	418.7	888.0	456.3	897.4	173.2	721.9	**10,609.6**
sturgeon, Atlantic	244.8	633.6	848.6	145.5	19.9	37.8	189.7	498.6	79.0	270.6	275.3	550.2	117.6	152.7	368.7	336.4	111.3	286.6	5.6	181.9	**5,354.4**
tautog	508.3	320.0	373.9	95.1	225.9	271.8	347.1	326.6	463.5	491.2	921.1	346.0	353.7	269.2	301.4	551.4	309.4	285.4	83.1	151.7	**6,995.8**
toadfish, oyster	0.0	1.2	0.0	0.5	0.0	0.0	0.9	1.8	2.5	0.4	4.7	5.0	0.8	0.0	1.2	2.0	1.9	0.8	0.0	0.2	**23.9**
tomcod, Atlantic	1.3	0.8	0.3	0.8	0.3	0.1	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.2	**4.8**
triggerfish, gray	0.0	0.9	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**3.2**
weakfish	94.8	121.2	344.5	275.7	414.9	362.0	268.2	771.3	554.5	415.0	442.0	194.8	426.9	449.9	52.2	584.8	116.1	108.7	1.0	192.6	**6,191.1**
Total	**14,191.0**	**19,646.4**	**18,456.5**	**14,105.2**	**17,869.1**	**17,491.1**	**19,846.7**	**23,479.9**	**22,127.8**	**21,076.6**	**31,549.0**	**19,156.8**	**20,693.4**	**13,723.6**	**11,147.6**	**18,911.3**	**15,049.3**	**19,845.3**	**4,777.5**	**16,810.2**	**359,954.1**

Appendix 2.4. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1984.
Finfish species are in order of descending count. Number of tows (sample size)=102.

species	count	%	weight	%	species	count	%	weight	%
butterfish	18,700	31.0	.	.	Atlantic mackerel	48	0.1	.	.
windowpane flounder	13,746	22.8	.	.	spotted hake	46	0.1	.	.
winter flounder	6,847	11.4	.	.	sea raven	32	0.1	.	.
bluefish	6,738	11.2	.	.	ocean pout	25	0	.	.
scup	3,225	5.4	.	.	rough scad	22	0	.	.
fourspot flounder	1,868	3.1	.	.	longhorn sculpin	12	0	.	.
little skate	1,491	2.5	.	.	black sea bass	11	0	.	.
red hake	1,323	2.2	.	.	moonfish	7	0	.	.
American shad	982	1.6	.	.	Atlantic sturgeon	6	0	.	.
blueback herring	925	1.5	.	.	round herring	5	0	.	.
striped searobin	697	1.2	.	.	spiny dogfish	4	0	.	.
silver hake	575	1.0	.	.	American eel	2	0	.	.
smooth dogfish	534	0.9	.	.	striped bass	2	0	.	.
tautog	472	0.8	.	.	oyster toadfish	2	0	.	.
northern searobin	448	0.7	.	.	goosefish	1	0	.	.
fourbeard rockling	303	0.5	.	.	northern sennet	1	0	.	.
weakfish	260	0.4	.	.	northern puffer	1	0	.	.
hogchoker	252	0.4	.	.	red goatfish	1	0	.	.
cunner	220	0.4	.	.	**Total**	**60,230**			
summer flounder	150	0.2	.	.					
alewife	108	0.2	.	.	**Invertebrates**				
hickory shad	71	0.1	.	.	American lobster	2865	100	.	.
Atlantic menhaden	67	0.1	.	.	**Total**	**2,865**		-	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1985.
Finfish species are in order of descending count. Number of tows (sample size)=126.

species	count	%	weight	%	species	count	%	weight	%
butterfish	34,512	41.4	.	.	spot	26	0	.	.
scup	12,155	14.6	.	.	round herring	15	0	.	.
windowpane flounder	11,194	13.4	.	.	rough scad	14	0	.	.
winter flounder	7,980	9.6	.	.	Atlantic mackerel	13	0	.	.
bluefish	5,302	6.4	.	.	spiny dogfish	13	0	.	.
weakfish	2,650	3.2	.	.	winter skate	13	0	.	.
northern searobin	2,098	2.5	.	.	alewife	9	0	.	.
little skate	1,705	2.0	.	.	planehead filefish	7	0	.	.
fourspot flounder	1,289	1.5	.	.	rock gunnel	4	0	.	.
striped searobin	1,078	1.3	.	.	oyster toadfish	4	0	.	.
red hake	573	0.7	.	.	goosefish	3	0	.	.
Atlantic herring	504	0.6	.	.	ocean pout	3	0	.	.
smooth dogfish	405	0.5	.	.	Atlantic bonito	2	0	.	.
tautog	323	0.4	.	.	crevalle jack	1	0	.	.
American shad	280	0.3	.	.	grubby	1	0	.	.
silver hake	250	0.3	.	.	gray triggerfish	1	0	.	.
summer flounder	175	0.2	.	.	hickory shad	1	0	.	.
hogchoker	163	0.2	.	.	orange filefish	1	0	.	.
moonfish	142	0.2	.	.	northern puffer	1	0	.	.
blueback herring	100	0.1	.	.	Atlantic sturgeon	1	0	.	.
longhorn sculpin	80	0.1	.	.	Atlantic tomcod	1	0	.	.
cunner	51	0.1	.	.	**Total**	**83,395**		**-**	
sea raven	50	0.1	.	.					
fourbeard rockling	44	0.1	.	.					
Atlantic menhaden	38	0	.	.	**Invertebrates**				
black sea bass	35	0	.	.	American lobster	1589	100	.	.
spotted hake	27	0	.	.	**Total**	**1,589**		**-**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1986.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight. Number of tows (sample size)=196.

species	count	%	weight	%	species	count	%	weight	%
butterfish	25,192	28.0	.	.	winter skate	32	0	.	.
windowpane flounder	18,848	20.9	.	.	spotted hake	30	0	.	.
winter flounder	15,341	17.0	.	.	black sea bass	28	0	.	.
scup	7,910	8.8	.	.	spot	25	0	.	.
weakfish	5,427	6.0	.	.	Atlantic mackerel	19	0	.	.
little skate	3,210	3.6	.	.	moonfish	14	0	.	.
bluefish	2,789	3.1	.	.	ocean pout	14	0	.	.
red hake	2,657	3.0	.	.	oyster toadfish	9	0	.	.
Atlantic herring	1,999	2.2	.	.	hickory shad	6	0	.	.
fourspot flounder	1,487	1.7	.	.	rough scad	5	0	.	.
striped searobin	886	1.0	.	.	Atlantic sturgeon	4	0	.	.
silver hake	723	0.8	.	.	clearnose skate	2	0	.	.
tautog	566	0.6	.	.	American eel	1	0	.	.
smooth dogfish	430	0.5	.	.	goosefish	1	0	.	.
summer flounder	414	0.5	.	.	grubby	1	0	.	.
northern searobin	396	0.4	.	.	northern pipefish	1	0	.	.
American shad	344	0.4	.	.	northern puffer	1	0	.	.
Atlantic menhaden	318	0.4	.	.	smallmouth flounder	1	0	.	.
blueback herring	256	0.3	.	.	striped bass	1	0	.	.
alewife	216	0.2	.	.	**Total**	**90,031**		-	
fourbeard rockling	123	0.1	.	.					
cunner	76	0.1	.	.					
sea raven	70	0.1	.	.	**Invertebrates**				
hogchoker	60	0.1	.	.	American lobster	2,553	28.1	.	.
longhorn sculpin	51	0.1	.	.	long-finned squid	6,537	71.9	.	.
spiny dogfish	47	0.1	.	.	**Total**	**9,090**		-	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1987.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight. Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
winter flounder	15,600	25.6	.	.	longhorn sculpin	32	0.1	.	.
butterfish	14,674	24.1	.	.	spotted hake	22	0	.	.
windowpane flounder	11,031	18.1	.	.	spiny dogfish	19	0	.	.
scup	5,029	8.3	.	.	ocean pout	14	0	.	.
bluefish	2,611	4.3	.	.	black sea bass	13	0	.	.
little skate	2,140	3.5	.	.	winter skate	13	0	.	.
red hake	1,729	2.8	.	.	striped bass	10	0	.	.
Atlantic herring	1,628	2.7	.	.	Atlantic tomcod	8	0	.	.
fourspot flounder	1,298	2.1	.	.	smallmouth flounder	7	0	.	.
silver hake	906	1.5	.	.	moonfish	6	0	.	.
alewife	754	1.2	.	.	rock gunnel	4	0	.	.
striped searobin	543	0.9	.	.	Atlantic sturgeon	4	0	.	.
summer flounder	374	0.6	.	.	spot	3	0	.	.
American shad	371	0.6	.	.	clearnose skate	2	0	.	.
tautog	363	0.6	.	.	hickory shad	2	0	.	.
Atlantic menhaden	329	0.5	.	.	Atlantic bonito	1	0	.	.
smooth dogfish	257	0.4	.	.	Atlantic mackerel	1	0	.	.
weakfish	248	0.4	.	.	round herring	1	0	.	.
fourbeard rockling	241	0.4	.	.	sea lamprey	1	0	.	.
northern searobin	220	0.4	.	.	**Total**	**60,862**		-	
sea raven	86	0.1	.	.					
blueback herring	79	0.1	.	.	**Invertebrates**				
cunner	79	0.1	.	.	American lobster	3,544	25.1	.	.
hogchoker	61	0.1	.	.	long-finned squid	10,552	74.9	.	.
rough scad	48	0.1	.	.	**Total**	**14,096**		-	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1988.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight. Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
butterfish	45,983	36.7	.	.	ocean pout	30	0	.	.
winter flounder	25,695	20.5	.	.	Atlantic mackerel	24	0	.	.
windowpane flounder	19,497	15.6	.	.	spot	18	0	.	.
scup	10,184	8.1	.	.	black sea bass	17	0	.	.
little skate	6,539	5.2	.	.	striped bass	17	0	.	.
bluefish	3,688	2.9	.	.	yellowtail flounder	6	0	.	.
fourspot flounder	2,478	2.0	.	.	grubby	5	0	.	.
red hake	1,933	1.5	.	.	rock gunnel	5	0	.	.
weakfish	1,287	1.0	.	.	rainbow smelt	5	0	.	.
silver hake	1,210	1.0	.	.	crevalle jack	4	0	.	.
striped searobin	1,194	1.0	.	.	bigeye scad	2	0	.	.
Atlantic herring	1,193	1.0	.	.	bigeye	2	0	.	.
American shad	1,187	0.9	.	.	planehead filefish	2	0	.	.
northern searobin	474	0.4	.	.	hickory shad	2	0	.	.
tautog	455	0.4	.	.	northern puffer	2	0	.	.
smooth dogfish	385	0.3	.	.	Atlantic sturgeon	2	0	.	.
summer flounder	320	0.3	.	.	Atlantic tomcod	2	0	.	.
fourbeard rockling	302	0.2	.	.	Atlantic bonito	1	0	.	.
blueback herring	164	0.1	.	.	dwarf goatfish	1	0	.	.
alewife	153	0.1	.	.	goosefish	1	0	.	.
moonfish	137	0.1	.	.	northern pipefish	1	0	.	.
rough scad	128	0.1	.	.	short bigeye	1	0	.	.
longhorn sculpin	103	0.1	.	.	striped cusk-eel	1	0	.	.
winter skate	101	0.1	.	.	sea lamprey	1	0	.	.
spotted hake	87	0.1	.	.	**Total**	**125,344**		-	
hogchoker	75	0.1	.	.					
Atlantic menhaden	69	0.1	.	.					
sea raven	50	0	.	.	**Invertebrates**				
cunner	48	0	.	.	American lobster	2,114	8.5	.	.
spiny dogfish	39	0	.	.	long-finned squid	22,769	91.5	.	.
smallmouth flounder	34	0	.	.	**Total**	**24,883**		-	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1989.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight. Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
butterfish	47,089	29.3	.	.	sea raven	34	0	.	.
winter flounder	32,361	20.2	.	.	black sea bass	15	0	.	.
windowpane flounder	25,109	15.6	.	.	rough scad	11	0	.	.
scup	17,391	10.8	.	.	striped bass	11	0	.	.
bluefish	8,649	5.4	.	.	yellow jack	11	0	.	.
little skate	7,079	4.4	.	.	goosefish	9	0	.	.
red hake	5,689	3.5	.	.	smallmouth flounder	9	0	.	.
weakfish	5,496	3.4	.	.	rock gunnel	8	0	.	.
American shad	1,977	1.2	.	.	grubby	7	0	.	.
fourspot flounder	1,877	1.2	.	.	spotted hake	7	0	.	.
striped searobin	1,763	1.1	.	.	rainbow smelt	4	0	.	.
silver hake	1,697	1.1	.	.	planehead filefish	3	0	.	.
Atlantic herring	1,154	0.7	.	.	Atlantic sturgeon	3	0	.	.
tautog	600	0.4	.	.	Atlantic tomcod	3	0	.	.
fourbeard rockling	397	0.2	.	.	bigeye	2	0	.	.
blueback herring	307	0.2	.	.	American eel	2	0	.	.
northern searobin	297	0.2	.	.	short bigeye	2	0	.	.
Atlantic mackerel	237	0.1	.	.	oyster toadfish	2	0	.	.
Atlantic menhaden	230	0.1	.	.	white perch	2	0	.	.
smooth dogfish	202	0.1	.	.	northern sennet	1	0	.	.
alewife	190	0.1	.	.	northern puffer	1	0	.	.
longhorn sculpin	107	0.1	.	.	banded rudderfish	1	0	.	.
cunner	106	0.1	.	.	Spanish mackerel	1	0	.	.
hogchoker	91	0.1	.	.	**Total**	**160,581**		**-**	
winter skate	91	0.1	.	.					
spiny dogfish	66	0	.	.					
ocean pout	58	0	.	.	**Invertebrates**				
bigeye scad	45	0	.	.	American lobster	3,447	19.9	.	.
moonfish	42	0	.	.	long-finned squid	13,883	80.1	.	.
summer flounder	35	0	.	.	**Total**	**17,330**		**-**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1990.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight. Number of tows (sample size)=200.

species	count	%	weight	%
winter flounder	47,184	31.1	.	.
butterfish	45,373	29.9	.	.
scup	15,393	10.2	.	.
windowpane flounder	9,825	6.5	.	.
Atlantic herring	8,779	5.8	.	.
little skate	6,456	4.3	.	.
bluefish	4,688	3.1	.	.
fourspot flounder	3,270	2.2	.	.
silver hake	2,334	1.5	.	.
red hake	2,237	1.5	.	.
weakfish	1,921	1.3	.	.
striped searobin	866	0.6	.	.
tautog	554	0.4	.	.
American shad	406	0.3	.	.
fourbeard rockling	299	0.2	.	.
longhorn sculpin	243	0.2	.	.
northern searobin	232	0.2	.	.
Atlantic menhaden	219	0.1	.	.
smooth dogfish	209	0.1	.	.
summer flounder	170	0.1	.	.
cunner	168	0.1	.	.
alewife	160	0.1	.	.
spiny dogfish	150	0.1	.	.
hogchoker	84	0.1	.	.
winter skate	61	0	.	.
blueback herring	46	0	.	.
striped bass	45	0	.	.
sea raven	42	0	.	.
ocean pout	39	0	.	.
black sea bass	27	0	.	.
spotted hake	21	0	.	.
Atlantic mackerel	10	0	.	.
rough scad	10	0	.	.
seasnail	8	0	.	.
planehead filefish	7	0	.	.
moonfish	7	0	.	.
rock gunnel	7	0	.	.
yellow jack	7	0	.	.
grubby	4	0	.	.
spot	4	0	.	.
Atlantic sturgeon	4	0	.	.
oyster toadfish	4	0	.	.
goosefish	3	0	.	.
smallmouth flounder	3	0	.	.
Atlantic tomcod	3	0	.	.
clearnose skate	2	0	.	.
lookdown	2	0	.	.
red goatfish	2	0	.	.
rainbow smelt	2	0	.	.
bigeye scad	1	0	.	.
bigeye	1	0	.	.
hickory shad	1	0	.	.
mackerel scad	1	0	.	.
northern kingfish	1	0	.	.
northern puffer	1	0	.	.
red cornetfish	1	0	.	.
sandbar shark	1	0	.	.
sea lamprey	1	0	.	.
yellowtail flounder	1	0	.	.
Total	**151,600**		-	
Invertebrates				
American lobster	5,369	27.0.	.	
long-finned squid	14,538	73.0.	.	
Total	**19,907**		-	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1991.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight. Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
scup	45,790	29.9	.	.	moonfish	24	0	.	.
butterfish	40,537	26.4	.	.	smallmouth flounder	20	0	.	.
winter flounder	26,623	17.4	.	.	sea raven	19	0	.	.
windowpane flounder	8,482	5.5	.	.	spiny dogfish	14	0	.	.
little skate	6,479	4.2	.	.	yellow jack	11	0	.	.
bluefish	5,845	3.8	.	.	goosefish	8	0	.	.
weakfish	4,320	2.8	.	.	northern puffer	5	0	.	.
Atlantic herring	4,003	2.6	.	.	northern kingfish	4	0	.	.
fourspot flounder	3,553	2.3	.	.	Atlantic tomcod	4	0	.	.
red hake	2,085	1.4	.	.	Atlantic sturgeon	3	0	.	.
silver hake	1,537	1.0	.	.	clearnose skate	2	0	.	.
striped searobin	865	0.6	.	.	Atlantic mackerel	2	0	.	.
northern searobin	609	0.4	.	.	mackerel scad	2	0	.	.
tautog	501	0.3	.	.	rainbow smelt	2	0	.	.
American shad	361	0.2	.	.	Spanish mackerel	2	0	.	.
Atlantic menhaden	348	0.2	.	.	spot	2	0	.	.
summer flounder	263	0.2	.	.	bigeye scad	1	0	.	.
smooth dogfish	193	0.1	.	.	planehead filefish	1	0	.	.
fourbeard rockling	163	0.1	.	.	hickory shad	1	0	.	.
longhorn sculpin	139	0.1	.	.	red goatfish	1	0	.	.
hogchoker	104	0.1	.	.	rough scad	1	0	.	.
alewife	103	0.1	.	.	sea lamprey	1	0	.	.
cunner	75	0	.	.	oyster toadfish	1	0	.	.
spotted hake	73	0	.	.	**Total**	**153,389**		-	
winter skate	50	0	.	.					
ocean pout	42	0	.	.	**Invertebrates**				
black sea bass	39	0	.	.	American lobster	8,524	40.9	.	.
blueback herring	38	0	.	.	long-finned squid	12,322	59.1	.	.
striped bass	38	0	.	.	**Total**	**20,846**		-	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1992.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=160.

species	count	%	weight	%
butterfish	95,961	65.7	1,357.3	11.7
scup	13,646	9.3	837.7	7.2
winter flounder	9,548	6.5	1,344.8	11.5
bluefish	5,269	3.6	2,462.9	21.1
Atlantic herring	4,565	3.1	797.5	6.8
little skate	3,495	2.4	1,389.0	11.9
windowpane flounder	2,980	2.0	286.1	2.5
fourspot flounder	2,774	1.9	382.4	3.3
red hake	1,606	1.1	127.7	1.1
weakfish	1,317	0.9	94.8	0.8
Atlantic menhaden	1,115	0.8	60.6	0.5
striped searobin	857	0.6	305.1	2.6
silver hake	544	0.4	22.0	0.2
American shad	380	0.3	63.3	0.5
northern searobin	313	0.2	35.6	0.3
smooth dogfish	304	0.2	863.2	7.4
tautog	265	0.2	508.3	4.4
summer flounder	186	0.1	142.1	1.2
blueback herring	175	0.1	8.5	0.1
fourbeard rockling	150	0.1	12.8	0.1
alewife	122	0.1	9.2	0.1
spotted hake	68	0	10.3	0.1
moonfish	62	0	1.5	0
hogchoker	61	0	5.6	0
striped bass	42	0	89.4	0.8
longhorn sculpin	31	0	9.0	0.1
winter skate	31	0	105.3	0.9
cunner	30	0	3.7	0
Atlantic sturgeon	30	0	244.8	2.1
ocean pout	18	0	7.7	0.1
hickory shad	12	0	4.9	0
smallmouth flounder	12	0	0.6	0
goosefish	10	0	2.5	0
clearnose skate	8	0	10.3	0.1
Atlantic tomcod	8	0	1.3	0
mackerel scad	6	0	0.2	0
spiny dogfish	6	0	30.7	0.3

species	count	%	weight	%
black sea bass	5	0	1.8	0
northern pipefish	5	0	0.4	0
Atlantic mackerel	4	0	1.0	0
sea raven	4	0	3.9	0
northern kingfish	2	0	0.2	0
round herring	2	0	0.2	0
yellow jack	2	0	0.2	0
Atlantic silverside	1	0	0.1	0
conger eel	1	0	0.1	0
northern puffer	1	0	0.1	0
Spanish mackerel	1	0	1.5	0
Total	**146,035**		**11,648.2**	
Invertebrates				
American lobster	8,160	19.9	1,537.9	28.6
blue mussel	nc	nc	1,157.1	21.5
long-finned squid	32,780	80.1	844.9	15.7
horseshoe crab	nc	nc	514.1	9.6
lady crab	nc	nc	375.4	7.0
rock crab	nc	nc	239.1	4.5
boring sponge	nc	nc	225.5	4.2
spider crab	nc	nc	186.0	3.5
starfish spp.	nc	nc	148.6	2.8
whelks	nc	nc	57.5	1.1
flat claw hermit crab	nc	nc	34.7	0.6
bluecrab	nc	nc	18.1	0.3
mantis shrimp	nc	nc	10.3	0.2
northern moon snail	nc	nc	8.6	0.2
common oyster	nc	nc	7.3	0.1
lion's mane jellyfish	nc	nc	2.4	0
surf clam	nc	nc	1.7	0
hard clams	nc	nc	1.2	0
bushy bryozoan	nc	nc	1.0	0
purple sea urchin	nc	nc	0.4	0
mud crabs	nc	nc	0.3	0
star coral	nc	nc	0.1	0
Total	**40,940**		**5,372**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1993.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	35,361	33.0	847.8	7.1
scup	18,785	17.6	581.4	4.8
winter flounder	16,090	15.0	1,855.7	15.4
windowpane flounder	7,953	7.4	547.6	4.6
Atlantic herring	6,269	5.9	1,119.8	9.3
little skate	5,186	4.8	2,172.3	18.1
bluefish	4,402	4.1	1,343.2	11.2
red hake	3,963	3.7	232.0	1.9
fourspot flounder	1,262	1.2	182.3	1.5
weakfish	1,142	1.1	60.3	0.5
striped searobin	1,079	1.0	165.4	1.4
northern searobin	935	0.9	96.8	0.8
American shad	791	0.7	101.1	0.8
alewife	788	0.7	48.2	0.4
silver hake	500	0.5	21.1	0.2
spotted hake	331	0.3	36.7	0.3
smooth dogfish	283	0.3	857.6	7.1
Atlantic menhaden	271	0.3	94.1	0.8
fourbeard rockling	241	0.2	15.6	0.1
summer flounder	224	0.2	137.9	1.1
tautog	157	0.1	308.2	2.6
Spanish mackerel	136	0.1	2.2	0
blueback herring	96	0.1	4.3	0
rough scad	92	0.1	3.8	0
striped bass	78	0.1	198.7	1.7
ocean pout	66	0.1	16.4	0.1
cunner	64	0.1	6.1	0.1
Atlantic sturgeon	60	0.1	633.6	5.3
winter skate	59	0.1	213.2	1.8
spot	57	0.1	4.5	0
hogchoker	56	0.1	5.2	0
Atlantic silverside	54	0.1	1.0	0
northern puffer	23	0	0.4	0
smallmouth flounder	23	0	2.1	0
Atlantic croaker	20	0	1.1	0
black sea bass	16	0	5.0	0
spiny dogfish	14	0	58.4	0.5
Atlantic mackerel	11	0	0.9	0
longhorn sculpin	11	0	3.2	0
planehead filefish	9	0	0.7	0
hickory shad	9	0	4.1	0
northern pipefish	9	0	0.4	0
rainbow smelt	9	0	0.6	0
crevalle jack	5	0	0.4	0
northern kingfish	5	0	0.6	0
Atlantic tomcod	5	0	0.8	0
clearnose skate	4	0	7.7	0.1
white perch	4	0	0.3	0
conger eel	3	0	0.2	0

species	count	%	weight	%
goosefish	3	0	0.3	0
American sand lance	3	0	0.3	0
Atlantic bonito	2	0	6.4	0.1
lumpfish	2	0	0.2	0
moonfish	2	0	0.2	0
sea lamprey	2	0	1.0	0
Atlantic salmon	1	0	0.1	0
American eel	1	0	1.6	0
northern sennet	1	0	0.1	0
orange filefish	1	0	0.1	0
round herring	1	0	0.1	0
red cornetfish	1	0	0.1	0
red goatfish	1	0	0.1	0
short bigeye	1	0	0.1	0
sea raven	1	0	0.6	0
yellow jack	1	0	0.1	0
Total	**107,035**		**12,012.4**	

Invertebrates				
American lobster	10,306	20.6	2,173.5	34.4
long-finned squid	39,723	79.4	1,176.5	18.6
blue mussel	nc	nc	945.1	15.0
horseshoe crab	nc	nc	673.8	10.7
spider crab	nc	nc	511.2	8.1
lady crab	nc	nc	428.0	6.8
rock crab	nc	nc	155.9	2.5
flat claw hermit crab	nc	nc	45.7	0.7
starfish spp.	nc	nc	37.4	0.6
boring sponge	nc	nc	36.6	0.6
whelks	nc	nc	34.0	0.5
mantis shrimp	nc	nc	31.6	0.5
lion's mane jellyfish	nc	nc	27.6	0.4
bluecrab	nc	nc	20.0	0.3
northern moon snail	nc	nc	8.9	0.1
common oyster	nc	nc	2.0	0
surf clam	nc	nc	1.0	0
hard clams	nc	nc	0.9	0
purple sea urchin	nc	nc	0.7	0
arks	nc	nc	0.7	0
mud crabs	nc	nc	0.4	0
star coral	nc	nc	0.3	0
blood star	nc	nc	0.2	0
common slipper shell	nc	nc	0.2	0
sand shrimp	nc	nc	0.1	0
sand dollar	nc	nc	0.1	0
northern red shrimp	nc	nc	0.1	0
polychaetes	nc	nc	0.1	0
Total	**50,029**		**6,313**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1994.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
butterfish	33,538	28.7	776.8	6.3	longhorn sculpin	7	0	1.6	0
scup	25,451	21.8	660.8	5.4	grubby	5	0	0.3	0
winter flounder	20,615	17.6	1,992.2	16.2	mackerel scad	4	0	0.4	0
bluefish	7,703	6.6	1,159.8	9.4	Atlantic silverside	3	0	0.3	0
windowpane flounder	6,062	5.2	574.5	4.7	bigeye scad	2	0	0.2	0
little skate	5,604	4.8	2,565.3	20.9	lookdown	2	0	0.2	0
Atlantic herring	3,836	3.3	768.6	6.3	northern puffer	2	0	0.2	0
weakfish	3,320	2.8	160.0	1.3	Atlantic tomcod	2	0	0.3	0
silver hake	1,703	1.5	112.9	0.9	bigeye	1	0	0.1	0
fourspot flounder	1,494	1.3	195.6	1.6	clearnose skate	1	0	1.8	0
American shad	1,289	1.1	133.2	1.1	inshore lizardfish	1	0	0.1	0
alewife	1,211	1.0	75.0	0.6	northern pipefish	1	0	0.1	0
blueback herring	1,052	0.9	26.6	0.2	rock gunnel	1	0	0.1	0
striped searobin	927	0.8	183.6	1.5	sea raven	1	0	0.2	0
northern searobin	800	0.7	63.7	0.5	white perch	1	0	0.3	0
red hake	490	0.4	54.0	0.4	yellow jack	1	0	0.1	0
smooth dogfish	310	0.3	816.3	6.6	**Total**	**117,002**		**12,284.5**	
Atlantic menhaden	276	0.2	61.4	0.5					
summer flounder	242	0.2	141.6	1.2	**Invertebrates**				
tautog	207	0.2	346.5	2.8	American lobster	7,057	31.6	1,533.9	38.6
spotted hake	148	0.1	25.7	0.2	long-finned squid	15,299	68.4	594.8	15.0
moonfish	93	0.1	2.6	0	horseshoe crab	nc	nc	386.7	9.7
fourbeard rockling	92	0.1	8.4	0.1	blue mussel	nc	nc	377.5	9.5
striped bass	81	0.1	198.6	1.6	lady crab	nc	nc	338.5	8.5
Atlantic sturgeon	60	0.1	848.6	6.9	spider crab	nc	nc	335.0	8.4
spiny dogfish	55	0	186.2	1.5	rock crab	nc	nc	136.8	3.4
ocean pout	42	0	9.1	0.1	starfish spp.	nc	nc	124.6	3.1
hogchoker	36	0	3.8	0	flat claw hermit crab	nc	nc	51.4	1.3
black sea bass	33	0	10.9	0.1	northern moon snail	nc	nc	34.6	0.9
winter skate	33	0	101.5	0.8	common oyster	nc	nc	18.4	0.5
American sand lance	25	0	0.6	0	whelks	nc	nc	14.1	0.4
Spanish mackerel	25	0	1.7	0	mantis shrimp	nc	nc	9.8	0.2
cunner	18	0	1.3	0	lion's mane jellyfish	nc	nc	4.2	0.1
smallmouth flounder	15	0	1.3	0	bluecrab	nc	nc	3.7	0.1
hickory shad	14	0	3.7	0	arks	nc	nc	3.0	0.1
rough scad	13	0	0.2	0	boring sponge	nc	nc	1.9	0
Atlantic mackerel	11	0	0.9	0	hard clams	nc	nc	1.3	0
spot	11	0	1.1	0	bushy bryozoan	nc	nc	0.6	0
rainbow smelt	9	0	0.6	0	mud crabs	nc	nc	0.3	0
crevalle jack	8	0	0.5	0	surf clam	nc	nc	0.3	0
goosefish	8	0	2.0	0	purple sea urchin	nc	nc	0.1	0
northern kingfish	7	0	0.5	0	**Total**	**22,356**		**3,972**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1995.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
butterfish	64,930	50.1	1,664.5	15.2	spot	3	0	0.3	0
winter flounder	15,558	12.0	1,614.7	14.7	Atlantic cod	2	0	0.1	0
scup	13,985	10.8	770.5	7.0	conger eel	2	0	1.2	0
Atlantic herring	9,135	7.0	1,631.7	14.9	haddock	2	0	0.2	0
bluefish	5,524	4.3	1,156.1	10.5	northern pipefish	2	0	0.1	0
windowpane flounder	3,815	2.9	356.2	3.2	sea raven	2	0	0.7	0
weakfish	2,881	2.2	275.7	2.5	African pompano	1	0	0.1	0
fourspot flounder	2,584	2.0	402.9	3.7	crevalle jack	1	0	0.1	0
little skate	2,372	1.8	1,055.3	9.6	grubby	1	0	0.1	0
red hake	1,977	1.5	145.6	1.3	Atlantic mackerel	1	0	0.1	0
silver hake	1,941	1.5	61.6	0.6	mackerel scad	1	0	0.1	0
northern searobin	1,317	1.0	166.9	1.5	northern puffer	1	0	0.1	0
American shad	755	0.6	81.4	0.7	oyster toadfish	1	0	0.5	0
striped searobin	682	0.5	277.5	2.5	yellowtail flounder	1	0	0.1	0
alewife	386	0.3	24.6	0.2	**Total**	**129,609**		**10,966.8**	
Atlantic menhaden	318	0.2	41.9	0.4					
blueback herring	255	0.2	7.5	0.1	**Invertebrates**				
fourbeard rockling	169	0.1	14.7	0.1	American lobster	9,944	29.3	2,141.9	55.1
smooth dogfish	168	0.1	566.8	5.2	long-finned squid	23,974	70.7	796.4	20.5
striped bass	165	0.1	185.3	1.7	lady crab	nc	nc	535.0	13.8
summer flounder	121	0.1	79.6	0.7	horseshoe crab	nc	nc	116.8	3
American sand lance	95	0.1	0.4	0	spider crab	nc	nc	95.4	2.5
spotted hake	72	0.1	6.5	0.1	lion's mane jellyfish	nc	nc	78.3	2
tautog	61	0	95.1	0.9	rock crab	nc	nc	47.0	1.2
cunner	41	0	4.4	0	blue mussel	nc	nc	14.0	0.4
winter skate	41	0	89.2	0.8	flat claw hermit crab	nc	nc	12.8	0.3
Atlantic silverside	39	0	0.9	0	boring sponge	nc	nc	11.2	0.3
moonfish	33	0	2.1	0	whelks	nc	nc	10.8	0.3
yellow jack	32	0	2.1	0	mantis shrimp	nc	nc	8.1	0.2
ocean pout	30	0	6.5	0.1	bluecrab	nc	nc	6.0	0.2
northern kingfish	25	0	2.5	0	northern moon snail	nc	nc	5.8	0.1
smallmouth flounder	19	0	1.2	0	starfish spp.	nc	nc	4.7	0.1
hogchoker	17	0	1.7	0	arks	nc	nc	1.4	0
black sea bass	12	0	4.7	0	hard clams	nc	nc	0.7	0
hickory shad	6	0	2.5	0	purple sea urchin	nc	nc	0.7	0
Atlantic sturgeon	6	0	145.5	1.3	sand shrimp	nc	nc	0.4	0
longhorn sculpin	5	0	1.3	0	ghost shrimp	nc	nc	0.3	0
clearnose skate	4	0	11.0	0.1	mud crabs	nc	nc	0.2	0
goosefish	4	0	3.3	0	common razor clam	nc	nc	0.1	0
rainbow smelt	4	0	0.3	0	shore shrimp	nc	nc	0.1	0
Atlantic tomcod	4	0	0.8	0	**Total**	**33,918**		**3,888**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1996.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	49,360	37.0	1,844.7	12.4
winter flounder	22,722	17.0	3,335.0	22.5
scup	16,087	12.0	739.4	5.0
windowpane flounder	14,116	10.6	1,223.6	8.2
bluefish	6,705	5.0	1,118.2	7.5
weakfish	6,375	4.8	414.9	2.8
little skate	6,203	4.6	2,801.8	18.9
fourspot flounder	2,815	2.1	407.2	2.7
alewife	1,402	1.0	134.6	0.9
striped searobin	1,008	0.8	278.7	1.9
Atlantic herring	972	0.7	189.8	1.3
moonfish	921	0.7	11.6	0.1
red hake	872	0.7	95.5	0.6
northern searobin	672	0.5	57.4	0.4
American shad	501	0.4	36.2	0.2
silver hake	489	0.4	20.0	0.1
summer flounder	434	0.3	266.4	1.8
spotted hake	384	0.3	42.6	0.3
smooth dogfish	275	0.2	862.8	5.8
striped bass	232	0.2	373.5	2.5
spot	195	0.1	14.1	0.1
tautog	136	0.1	225.9	1.5
fourbeard rockling	109	0.1	8.6	0.1
blueback herring	97	0.1	6.2	0
Atlantic menhaden	88	0.1	40.5	0.3
winter skate	88	0.1	212.7	1.4
hogchoker	45	0	5.4	0
smallmouth flounder	41	0	2.3	0
rough scad	35	0	1.5	0
hickory shad	29	0	10.2	0.1
black sea bass	27	0	12.1	0.1
ocean pout	26	0	7.2	0
cunner	17	0	2.6	0
striped anchovy	11	0	0.2	0
longhorn sculpin	7	0	2.1	0
northern kingfish	6	0	0.6	0
yellow jack	6	0	0.5	0
Atlantic mackerel	5	0	0.5	0
planehead filefish	3	0	0.3	0
mackerel scad	3	0	0.1	0
northern puffer	3	0	0.3	0
rock gunnel	3	0	0.2	0
short bigeye	3	0	0.3	0
Atlantic sturgeon	3	0	19.9	0.1
bigeye scad	2	0	0.1	0
grubby	2	0	0.2	0
sea raven	2	0	1.5	0
Atlantic tomcod	2	0	0.3	0
clearnose skate	1	0	1.7	0
conger eel	1	0	0.1	0
gizzard shad	1	0	0.1	0
goosefish	1	0	0.1	0
sea lamprey	1	0	0.7	0
spiny dogfish	1	0	2.1	0
white perch	1	0	0.1	0
Total	**133,546**		**14,835.2**	

Invertebrates				
American lobster	9,490	29.5	2,113.5	39.1
lady crab	nc	nc	1,160.4	21.5
long-finned squid	22,720	70.5	720.4	13.3
horseshoe crab	nc	nc	717.0	13.3
spider crab	nc	nc	293.9	5.4
rock crab	nc	nc	162.7	3.0
lion's mane jellyfish	nc	nc	42.7	0.8
blue mussel	nc	nc	42.5	0.8
flat claw hermit crab	nc	nc	39.4	0.7
whelks	nc	nc	33.0	0.6
mantis shrimp	nc	nc	20.9	0.4
boring sponge	nc	nc	19.2	0.4
bushy bryozoan	nc	nc	15.2	0.3
starfish spp.	nc	nc	6.2	0.1
arks	nc	nc	4.3	0.1
northern moon snail	nc	nc	4.3	0.1
bluecrab	nc	nc	4.0	0.1
hard clams	nc	nc	3.2	0.1
surf clam	nc	nc	1.4	0
mud crabs	nc	nc	0.3	0
purple sea urchin	nc	nc	0.1	0
Total	**32,210**		**5,405**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1997.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	70,985	50.3	2,017.2	15.5
winter flounder	14,701	10.4	2,439.4	18.8
bluefish	10,815	7.7	977.6	7.5
windowpane flounder	10,324	7.3	986.1	7.6
scup	9,582	6.8	530.5	4.1
fourspot flounder	4,122	2.9	615.3	4.7
little skate	4,068	2.9	1,945.8	15.0
weakfish	3,904	2.8	362.0	2.8
Atlantic herring	3,455	2.4	515.1	4.0
silver hake	1,973	1.4	70.8	0.5
alewife	1,194	0.8	81.3	0.6
American shad	922	0.7	66.8	0.5
striped searobin	819	0.6	230.5	1.8
red hake	748	0.5	80.5	0.6
blueback herring	630	0.4	16.5	0.1
northern searobin	579	0.4	60.4	0.5
summer flounder	486	0.3	326.0	2.5
striped bass	319	0.2	509.9	3.9
moonfish	287	0.2	4.6	0
fourbeard rockling	199	0.1	17.3	0.1
tautog	190	0.1	271.8	2.1
smooth dogfish	167	0.1	527.3	4.1
Atlantic menhaden	116	0.1	38.5	0.3
spotted hake	77	0.1	19.0	0.1
rough scad	65	0	2.0	0
smallmouth flounder	58	0	2.4	0
winter skate	48	0	109.7	0.8
cunner	43	0	4.1	0
hickory shad	25	0	9.1	0.1
black sea bass	22	0	10.5	0.1
hogchoker	15	0	1.8	0
ocean pout	15	0	4.8	0
grubby	11	0	0.7	0
spot	10	0	1.1	0
Atlantic mackerel	8	0	1.7	0
northern kingfish	7	0	0.9	0
spiny dogfish	7	0	13.7	0.1
Atlantic sturgeon	5	0	37.8	0.3
clearnose skate	4	0	7.4	0.1
longhorn sculpin	4	0	0.8	0
white perch	4	0	0.9	0
crevalle jack	3	0	0.6	0
sea raven	3	0	0.4	0
Atlantic silverside	2	0	0.1	0
goosefish	2	0	1.6	0
inshore lizardfish	2	0	0.2	0
round scad	2	0	0.2	0
American sand lance	2	0	0.1	0
short bigeye	2	0	0.2	0
yellow jack	2	0	0.2	0
bigeye scad	1	0	0.1	0
Atlantic cod	1	0	0.3	0
haddock	1	0	0.1	0
northern pipefish	1	0	0.1	0
northern puffer	1	0	0.1	0
roughtail stingray	1	0	50.6	0.4
sea lamprey	1	0	0.1	0
Atlantic tomcod	1	0	0.1	0
yellowtail flounder	1	0	0.3	0
Total	**141,040**		**12,974.6**	

Invertebrates				
American lobster	16,467	55.3	3,800.9	64.6
lady crab	nc	nc	592.5	10.1
long-finned squid	13,048	43.8	515.2	8.8
horseshoe crab	204	0.7	472.4	8.0
spider crab	nc	nc	188.3	3.2
rock crab	nc	nc	94.1	1.6
lion's mane jellyfish	nc	nc	88.0	1.5
bushy bryozoan	nc	nc	28.0	0.5
flat claw hermit crab	nc	nc	21.7	0.4
boring sponge	nc	nc	16.5	0.3
whelks	22	0.1	14.8	0.3
bluecrab	33	0.1	13.6	0.2
mantis shrimp	nc	nc	9.3	0.2
starfish spp.	nc	nc	7.3	0.1
hard clams	nc	nc	3.8	0.1
blue mussel	nc	nc	3.5	0.1
northern moon snail	nc	nc	3.3	0.1
northern comb jelly	nc	nc	2.0	0
arks	nc	nc	1.8	0
common oyster	nc	nc	1.8	0
surf clam	nc	nc	0.9	0
common slipper shell	nc	nc	0.7	0
mud crabs	nc	nc	0.6	0
sand shrimp	nc	nc	0.2	0
common razor clam	nc	nc	0.2	0
blood star	nc	nc	0.1	0
star coral	nc	nc	0.1	0
northern red shrimp	nc	nc	0.1	0
shore shrimp	nc	nc	0.1	0
purple sea urchin	nc	nc	0.1	0
Total	**29,774**		**5,882**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1998.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	136,926	64.0	3,661.1	24.4
scup	23,742	11.1	740.5	4.9
winter flounder	15,697	7.3	2,450.3	16.3
bluefish	8,814	4.1	899.0	6.0
windowpane flounder	6,483	3.0	741.1	4.9
little skate	4,305	2.0	2,085.5	13.9
weakfish	3,495	1.6	268.2	1.8
red hake	3,015	1.4	217.5	1.4
fourspot flounder	1,908	0.9	306.0	2.0
silver hake	1,870	0.9	88.3	0.6
striped searobin	1,321	0.6	509.7	3.4
moonfish	1,188	0.6	13.4	0.1
American shad	901	0.4	60.2	0.4
Atlantic herring	893	0.4	74.6	0.5
alewife	456	0.2	35.1	0.2
summer flounder	436	0.2	431.3	2.9
striped bass	400	0.2	484.2	3.2
northern searobin	360	0.2	39.4	0.3
smooth dogfish	310	0.1	989.8	6.6
Atlantic menhaden	306	0.1	9.2	0.1
blueback herring	211	0.1	5.1	0
tautog	194	0.1	347.1	2.3
spotted hake	142	0.1	12.2	0.1
fourbeard rockling	133	0.1	11.6	0.1
smallmouth flounder	97	0	6.4	0
cunner	65	0	8.1	0.1
winter skate	62	0	180.7	1.2
hickory shad	40	0	15.9	0.1
round herring	31	0	0.6	0
sea raven	30	0	11.3	0.1
northern puffer	28	0	0.5	0
clearnose skate	20	0	36.8	0.2
black sea bass	18	0	10.6	0.1
spiny dogfish	18	0	44.5	0.3
Atlantic sturgeon	17	0	189.7	1.3
northern kingfish	15	0	1.3	0
Atlantic mackerel	13	0	1.1	0
ocean pout	13	0	2.7	0
hogchoker	12	0	1.9	0
haddock	7	0	0.5	0
yellow jack	6	0	0.7	0
grubby	5	0	0.3	0
round scad	4	0	0.3	0
American sand lance	4	0	0.3	0
goosefish	3	0	3.2	0
oyster toadfish	3	0	0.9	0
gray triggerfish	2	0	2.3	0
longhorn sculpin	2	0	1.0	0
bigeye scad	1	0	0.1	0
inshore lizardfish	1	0	0.1	0
mackerel scad	1	0	0.1	0
roughtail stingray	1	0	3.4	0
Total	**214,025**		**15,005.7**	
Invertebrates				
American lobster	16,211	36.7	3,873.9	60.2
long-finned squid	27,443	62.1	767.0	11.9
horseshoe crab	303	0.7	489.4	7.6
blue mussel	nc	nc	309.0	4.8
lady crab	nc	nc	291.2	4.5
rock crab	nc	nc	241.4	3.8
spider crab	nc	nc	157.2	2.4
lion's mane jellyfish	nc	nc	63.1	1.0
flat claw hermit crab	nc	nc	56.0	0.9
bushy bryozoan	nc	nc	55.6	0.9
boring sponge	nc	nc	24.9	0.4
knobbed whelk	51	0.1	22.5	0.3
starfish spp.	nc	nc	18.2	0.3
bluecrab	49	0.1	12.8	0.2
channeled whelk	40	0.1	10.1	0.2
whelks	52	0.1	9.8	0.2
northern moon snail	nc	nc	8.6	0.1
mantis shrimp	nc	nc	5.6	0.1
common oyster	nc	nc	5.4	0.1
hard clams	nc	nc	3.7	0.1
arks	nc	nc	2.0	0
red bearded sponge	nc	nc	1.4	0
surf clam	nc	nc	1.1	0
sea grape	nc	nc	0.8	0
mud crabs	nc	nc	0.7	0
boreal squid	18	0	0.7	0
purple sea urchin	nc	nc	0.6	0
common slipper shell	nc	nc	0.5	0
star coral	nc	nc	0.4	0
moon jelly	nc	nc	0.2	0
ghost shrimp	nc	nc	0.1	0
Total	**44,167**		**6,434**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1999.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	191,100	54.1	4,171.6	21.9
scup	101,095	28.6	3,641.3	19.1
weakfish	12,416	3.5	771.3	4.0
winter flounder	10,288	2.9	2,011.7	10.6
bluefish	7,843	2.2	1,218.0	6.4
silver hake	5,126	1.5	99.6	0.5
windowpane flounder	4,643	1.3	594.2	3.1
little skate	3,686	1.0	1,829.6	9.6
red hake	2,973	0.8	226.5	1.2
Atlantic herring	2,511	0.7	45.4	0.2
striped searobin	1,690	0.5	497.0	2.6
alewife	1,393	0.4	107.6	0.6
fourspot flounder	1,393	0.4	203.9	1.1
Atlantic menhaden	1,187	0.3	90.9	0.5
American shad	987	0.3	117.3	0.6
moonfish	645	0.2	9.6	0.1
summer flounder	582	0.2	459.8	2.4
bay anchovy	548	0.2	5.6	0
northern searobin	547	0.2	52.0	0.3
striped bass	397	0.1	815.4	4.3
spotted hake	381	0.1	38.8	0.2
smooth dogfish	305	0.1	923.0	4.8
fourbeard rockling	233	0.1	28.8	0.2
tautog	217	0.1	326.6	1.7
striped anchovy	216	0.1	6.1	0
American sand lance	178	0.1	0.3	0
smallmouth flounder	96	0	5.2	0
hickory shad	56	0	19.4	0.1
cunner	51	0	5.9	0
black sea bass	50	0	17.2	0.1
spot	45	0	5.7	0
winter skate	41	0	89.8	0.5
hogchoker	39	0	5.0	0
Atlantic sturgeon	39	0	498.6	2.6
clearnose skate	22	0	39.4	0.2
bigeye scad	21	0	1.4	0
Atlantic mackerel	21	0	3.1	0
yellow jack	20	0	1.9	0
blueback herring	19	0	1.1	0
ocean pout	17	0	3.9	0
northern puffer	14	0	1.1	0
spiny dogfish	10	0	51.1	0.3
sea raven	9	0	4.9	0
crevalle jack	8	0	0.7	0
inshore lizardfish	7	0	0.5	0
northern kingfish	6	0	0.6	0
northern sennet	6	0	0.5	0
planehead filefish	3	0	0.3	0
bigeye	2	0	0.2	0
conger eel	2	0	0.5	0

species	count	%	weight	%
goosefish	2	0	0.3	0
grubby	2	0	0.2	0
northern pipefish	2	0	0.1	0
longhorn sculpin	2	0	0.3	0
oyster toadfish	2	0	1.8	0
Atlantic silverside	1	0	0.1	0
gizzard shad	1	0	0.1	0
haddock	1	0	0.1	0
round scad	1	0	0.1	0
striped cusk-eel	1	0	0.1	0
sharksucker	1	0	0.3	0
Spanish mackerel	1	0	0.2	0
Atlantic tomcod	1	0	0.7	0
white perch	1	0	0.4	0
Total	**353,203**		**19,054.7**	
Invertebrates				
American lobster	13,922	38.1	3,397.9	61.6
long-finned squid	21,580	59.0	826.4	15.0
horseshoe crab	384	1.1	634.1	11.5
lady crab	nc	nc	159.7	2.9
rock crab	nc	nc	118.6	2.2
spider crab	nc	nc	95.4	1.7
bushy bryozoan	nc	nc	78.0	1.4
flat claw hermit crab	nc	nc	32.5	0.6
knobbed whelk	61	0.2	24.8	0.4
bluecrab	89	0.2	21.3	0.4
channeled whelk	81	0.2	21.1	0.4
mantis shrimp	376	1.0	19.3	0.4
boring sponge	nc	nc	19.3	0.4
lion's mane jellyfish	61	0.2	16.7	0.3
blue mussel	nc	nc	14.1	0.3
northern moon snail	nc	nc	9.1	0.2
starfish spp.	nc	nc	8.8	0.2
common oyster	nc	nc	4.7	0.1
arks	nc	nc	2.8	0.1
common slipper shell	nc	nc	1.8	0
mud crabs	nc	nc	1.7	0
hard clams	nc	nc	1.5	0
sand shrimp	nc	nc	1.0	0
purple sea urchin	nc	nc	1.0	0
northern red shrimp	nc	nc	0.9	0
surf clam	nc	nc	0.4	0
sea grape	nc	nc	0.2	0
star coral	nc	nc	0.1	0
common razor clam	nc	nc	0.1	0
moon jelly	nc	nc	0.1	0
nemerteans	nc	nc	0.1	0
Total	**36,554**		**5,514**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2000.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
scup	101,464	44.4	6,679.0	34.9	northern kingfish	2	0	0.3	0
butterfish	60,490	26.5	1,458.3	7.6	round scad	2	0	0.2	0
weakfish	23,595	10.3	554.5	2.9	bigeye	1	0	0.1	0
winter flounder	8,867	3.9	1,921.4	10.0	Atlantic cod	1	0	0.1	0
bluefish	6,135	2.7	1,408.0	7.3	goosefish	1	0	0.2	0
little skate	3,340	1.5	1,604.7	8.4	inshore lizardfish	1	0	0.1	0
striped searobin	3,129	1.4	1,036.1	5.4	lined seahorse	1	0	0.1	0
fourspot flounder	2,590	1.1	398.6	2.1	white perch	1	0	0.2	0
windowpane flounder	2,488	1.1	368.8	1.9	yellowtail flounder	1	0	0.1	0
red hake	2,393	1.0	162.6	0.8	**Total**	**228,425**		**19,156.5**	
bay anchovy	2,303	1.0	12.2	0.1					
northern searobin	2,014	0.9	251.2	1.3	**Invertebrates**				
moonfish	1,817	0.8	15.0	0.1	American lobster	10,481	36.0	2,184.5	49.9
alewife	1,572	0.7	96.0	0.5	horseshoe crab	420	1.4	689.4	15.8
spotted hake	1,425	0.6	92.3	0.5	long-finned squid	16,585	57.0	582.3	13.3
Atlantic herring	770	0.3	124.1	0.6	lady crab	nc	nc	308.4	7.1
silver hake	679	0.3	28.8	0.2	spider crab	nc	nc	99.4	2.3
summer flounder	555	0.2	471.3	2.5	bushy bryozoan	nc	nc	95.2	2.2
Atlantic menhaden	492	0.2	31.8	0.2	rock crab	nc	nc	60.4	1.4
smooth dogfish	467	0.2	1,038.5	5.4	boring sponge	nc	nc	58.6	1.3
American shad	316	0.1	25.8	0.1	mantis shrimp	1,086	3.7	49.0	1.1
striped bass	293	0.1	602.6	3.1	blue mussel	nc	nc	36.8	0.8
tautog	287	0.1	463.5	2.4	lion's mane jellyfish	223	0.8	36.4	0.8
spot	204	0.1	17.8	0.1	channeled whelk	138	0.5	32.0	0.7
fourbeard rockling	185	0.1	14.7	0.1	knobbed whelk	76	0.3	29.9	0.7
blueback herring	143	0.1	6.8	0	starfish spp.	nc	nc	29.0	0.7
black sea bass	69	0	22.6	0.1	flat claw hermit crab	nc	nc	26.0	0.6
smallmouth flounder	61	0	2.7	0	bluecrab	104	0.4	19.3	0.4
cunner	50	0	5.3	0	northern moon snail	nc	nc	9.7	0.2
hickory shad	42	0	17.1	0.1	hydroid spp.	nc	nc	4.8	0.1
hogchoker	40	0	5.9	0	fan worm tubes	nc	nc	3.4	0.1
winter skate	31	0	66.5	0.3	hard clams	nc	nc	3.3	0.1
sea raven	19	0	9.2	0	arks	nc	nc	3.1	0.1
clearnose skate	18	0	37.9	0.2	mud crabs	nc	nc	2.8	0.1
ocean pout	18	0	4.9	0	sand shrimp	nc	nc	2.7	0.1
longhorn sculpin	14	0	5.0	0	common slipper shell	nc	nc	2.4	0.1
Atlantic sturgeon	7	0	79.0	0.4	purple sea urchin	nc	nc	2.3	0.1
oyster toadfish	6	0	2.5	0	common oyster	nc	nc	1.4	0
northern pipefish	4	0	0.2	0	sea grape	nc	nc	1.1	0
northern puffer	4	0	0.4	0	blood star	nc	nc	0.2	0
American sand lance	4	0	0.3	0	northern comb jelly	nc	nc	0.1	0
spiny dogfish	4	0	9.9	0.1	common razor clam	nc	nc	0.1	0
rock gunnel	3	0	0.2	0	northern cyclocardia	nc	nc	0.1	0
yellow jack	3	0	0.2	0	northern red shrimp	nc	nc	0.1	0
Atlantic silverside	2	0	0.1	0	surf clam	nc	nc	0.1	0
Atlantic mackerel	2	0	0.8	0	**Total**	**29,113**		**4,374**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2001.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay anchovy, striped anchovy, and American sand lance and Atlantic herring are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
scup	58,325	37.7	5,828.4	30.7
butterfish	45,264	29.3	1,834.0	9.7
weakfish	12,739	8.2	415.0	2.2
winter flounder	9,826	6.4	1,993.6	10.5
little skate	4,311	2.8	2,022.6	10.6
bluefish	3,986	2.6	751.2	4.0
silver hake	3,945	2.6	152.2	0.8
windowpane flounder	3,065	2.0	475.5	2.5
fourspot flounder	2,167	1.4	362.7	1.9
striped searobin	2,061	1.3	861.0	4.5
northern searobin	1,594	1.0	222.7	1.2
red hake	1,382	0.9	109.7	0.6
summer flounder	875	0.6	628.1	3.3
alewife	638	0.4	41.7	0.2
spotted hake	606	0.4	34.9	0.2
smooth dogfish	598	0.4	1,407.6	7.4
Atlantic herring	497	0.3	72.6	0.4
bay anchovy	443	0.3	3.6	0
tautog	319	0.2	491.2	2.6
blueback herring	279	0.2	11.1	0.1
fourbeard rockling	251	0.2	21.5	0.1
moonfish	225	0.1	3.8	0
striped bass	214	0.1	472.5	2.5
black sea bass	134	0.1	74.8	0.4
American shad	109	0.1	9.6	0.1
smallmouth flounder	98	0.1	3.8	0
Atlantic menhaden	86	0.1	4.7	0
hogchoker	85	0.1	10.5	0.1
clearnose skate	65	0	132.4	0.7
cunner	51	0	5.9	0
spiny dogfish	48	0	128.6	0.7
striped anchovy	47	0	1.2	0
winter skate	38	0	112.2	0.6
inshore lizardfish	21	0	2.2	0
Atlantic sturgeon	18	0	270.6	1.4
hickory shad	14	0	6.7	0
spot	13	0	1.3	0
rough scad	10	0	0.7	0
northern puffer	8	0	0.7	0
sea raven	7	0	4.1	0
ocean pout	6	0	2.3	0
round herring	5	0	0.1	0
longhorn sculpin	5	0	1.5	0
fawn cusk-eel	4	0	0.2	0
northern pipefish	4	0	0.3	0
American sand lance	4	0	0.3	0
seasnail	4	0	0.3	0
yellow jack	3	0	0.3	0
conger eel	2	0	0.3	0
northern kingfish	2	0	0.2	0
oyster toadfish	2	0	0.4	0
Atlantic silverside	1	0	0.1	0
American eel	1	0	0.6	0
planehead filefish	1	0	0.1	0
goosefish	1	0	0.4	0
naked goby	1	0	0.1	0
northern sennet	1	0	0.1	0
rock gunnel	1	0	0.1	0
red goatfish	1	0	0.1	0
roughtail stingray	1	0	2.5	0
short bigeye	1	0	0.1	0
yellowtail flounder	1	0	0.2	0
Total	**154,514**		**18,997.8**	
Finfish not ranked				
American sand lance, yoy				
anchovy spp, yoy				
Atlantic herring, yoy				
Invertebrates				
American lobster	5,626	35.1	1,531.2	39.2
horseshoe crab	503	3.1	870.7	22.3
long-finned squid	9,080	56.6	346.2	8.9
spider crab	nc	nc	302.5	7.7
bushy bryozoan	nc	nc	162.9	4.2
starfish spp.	nc	nc	154.7	4.0
rock crab	nc	nc	86.3	2.2
blue mussel	nc	nc	84.7	2.2
lady crab	nc	nc	79.0	2.0
flat claw hermit crab	nc	nc	57.6	1.5
knobbed whelk	118	0.7	53.3	1.4
channeled whelk	190	1.2	48.0	1.2
boring sponge	nc	nc	30.0	0.8
lion's mane jellyfish	182	1.1	25.9	0.7
northern moon snail	nc	nc	17.5	0.4
mantis shrimp	304	1.9	16.5	0.4
bluecrab	38	0.2	6.2	0.2
sea grape	nc	nc	6.1	0.2
common slipper shell	nc	nc	5.3	0.1
hydroid spp.	nc	nc	5.0	0.1
arks	nc	nc	4.0	0.1
mud crabs	nc	nc	3.6	0.1
hard clams	nc	nc	3.0	0.1
sand shrimp	nc	nc	2.8	0.1
common oyster	1	0	1.2	0
fan worm tubes	nc	nc	1.0	0
purple sea urchin	nc	nc	0.8	0
moon jelly	nc	nc	0.4	0
ghost shrimp	nc	nc	0.3	0
bobtail squid	1	0	0.1	0
common razor clam	nc	nc	0.1	0
northern red shrimp	nc	nc	0.1	0
surf clam	nc	nc	0.1	0
Total	**16,043**		**3,907**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2002.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
scup	100,481	47.0	13,814.1	46.0
butterfish	66,550	31.1	1,924.2	6.4
weakfish	10,713	5.0	442.0	1.5
winter flounder	6,884	3.2	1,584.1	5.3
little skate	4,242	2.0	2,121.9	7.1
bluefish	3,450	1.6	1,099.7	3.7
striped searobin	2,394	1.1	1,065.0	3.5
northern searobin	2,123	1.0	267.3	0.9
red hake	2,103	1.0	206.6	0.7
silver hake	2,013	0.9	89.6	0.3
windowpane flounder	1,991	0.9	343.3	1.1
fourspot flounder	1,859	0.9	326.9	1.1
summer flounder	1,356	0.6	989.3	3.3
smooth dogfish	1,019	0.5	2,814.3	9.4
bay anchovy	992	0.5	6.6	0
alewife	855	0.4	70.2	0.2
spotted hake	798	0.4	48.2	0.2
American shad	593	0.3	40.3	0.1
tautog	565	0.3	921.1	3.1
striped bass	469	0.2	855.2	2.8
moonfish	424	0.2	7.4	0
black sea bass	394	0.2	188.3	0.6
Atlantic menhaden	366	0.2	96.3	0.3
Atlantic herring	365	0.2	63.9	0.2
smallmouth flounder	139	0.1	4.9	0
fourbeard rockling	106	0	9.7	0
hogchoker	100	0	13.3	0
blueback herring	68	0	2.4	0
clearnose skate	59	0	107.3	0.4
cunner	55	0	7.2	0
spot	52	0	7.2	0
hickory shad	45	0	19.6	0.1
winter skate	45	0	133.5	0.4
Atlantic sturgeon	18	0	275.3	0.9
spiny dogfish	17	0	48.0	0.2
ocean pout	13	0	4.3	0
yellow jack	13	0	1.4	0
sea raven	11	0	4.1	0
rough scad	10	0	0.7	0
oyster toadfish	8	0	4.7	0
northern puffer	6	0	0.3	0
Atlantic mackerel	5	0	2.5	0
short bigeye	5	0	0.2	0
goosefish	3	0	0.6	0
American sand lance	3	0	0.1	0
longhorn sculpin	3	0	0.9	0
northern sennet	2	0	0.2	0
northern pipefish	2	0	0.2	0
Atlantic bonito	1	0	2.4	0
crevalle jack	1	0	0.1	0
gizzard shad	1	0	0.1	0
grubby	1	0	0.1	0
inshore lizardfish	1	0	0.1	0
northern kingfish	1	0	0.2	0
rock gunnel	1	0	0.1	0
rainbow smelt	1	0	0.1	0
roughtail stingray	1	0	24.4	0.1
Total	**213,796**		**30,062.0**	

Finfish not ranked

anchovy spp, yoy

Atlantic herring, yoy

Invertebrates

blue mussel	nc	nc	2,497.8	43.9
American lobster	3,880	29.7	1,005.7	17.7
horseshoe crab	517	4.0	862.9	15.2
spider crab	nc	nc	348.4	6.1
long-finned squid	8,034	61.5	279.9	4.9
lady crab	nc	nc	117.0	2.1
starfish spp.	nc	nc	91.8	1.6
bushy bryozoan	nc	nc	85.0	1.5
boring sponge	nc	nc	83.9	1.5
rock crab	nc	nc	74.6	1.3
flat claw hermit crab	36	0.3	55.8	1.0
channeled whelk	174	1.3	43.6	0.8
northern moon snail	nc	nc	40.3	0.7
knobbed whelk	40	0.3	19.1	0.3
bluecrab	84	0.6	16.1	0.3
lion's mane jellyfish	71	0.5	12.3	0.2
mantis shrimp	226	1.7	11.2	0.2
arks	nc	nc	7.8	0.1
common slipper shell	nc	nc	7.3	0.1
hydroid spp.	nc	nc	7.3	0.1
sea grape	nc	nc	5.3	0.1
hard clams	3	0	5.2	0.1
mud crabs	nc	nc	4.7	0.1
purple sea urchin	nc	nc	2.3	0
sand shrimp	nc	nc	1.6	0
rubbery bryzoan	nc	nc	1.0	0
surf clam	nc	nc	1.0	0
deadman's fingers sponge	nc	nc	0.5	0
blood star	nc	nc	0.4	0
common oyster	nc	nc	0.4	0
mixed sponge species	nc	nc	0.4	0
northern red shrimp	nc	nc	0.3	0
anemones	nc	nc	0.1	0
bobtail squid	1	0	0.1	0
ghost shrimp	nc	nc	0.1	0
ribbed mussel	nc	nc	0.1	0
sea cucumber	1	0	0.1	0
Total	**13,067**		**5,691**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2003.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring are not quantified. Number of tows (sample size)=160.

species	count	%	weight	%
butterfish	25,483	34.4	524.6	3.7
scup	17,552	23.7	4,389.3	30.6
weakfish	5,596	7.6	131.9	0.9
winter flounder	4,245	5.7	1,276.5	8.9
bluefish	3,717	5.0	655.0	4.6
little skate	2,867	3.9	1,554.1	10.8
bay anchovy	2,254	3.0	12.5	0.1
windowpane flounder	1,858	2.5	333.9	2.3
fourspot flounder	1,658	2.2	327.7	2.3
striped searobin	1,529	2.1	687.0	4.8
northern searobin	1,468	2.0	240.7	1.7
summer flounder	1,151	1.6	825.0	5.8
red hake	681	0.9	31.1	0.2
alewife	608	0.8	49.4	0.3
smooth dogfish	552	0.7	1,508.8	10.5
spotted hake	527	0.7	41.6	0.3
Atlantic herring	448	0.6	87.8	0.6
American shad	305	0.4	23.5	0.2
silver hake	217	0.3	8.3	0.1
striped bass	215	0.3	542.1	3.8
tautog	210	0.3	325.4	2.3
Atlantic menhaden	121	0.2	16.1	0.1
fourbeard rockling	111	0.1	9.0	0.1
blueback herring	98	0.1	3.4	0
moonfish	97	0.1	1.3	0
hogchoker	89	0.1	8.3	0.1
black sea bass	57	0.1	45.7	0.3
Atlantic cod	57	0.1	2.7	0
clearnose skate	55	0.1	105.9	0.7
smallmouth flounder	38	0.1	2.4	0
winter skate	38	0.1	90.6	0.6
cunner	36	0	5.9	0
haddock	26	0	1.3	0
Atlantic sturgeon	23	0	391.9	2.7
hickory shad	22	0	10.3	0.1
American sand lance	19	0	0.2	0
ocean pout	14	0	2.9	0
rough scad	12	0	0.5	0
oyster toadfish	9	0	5.0	0
spiny dogfish	7	0	34.8	0.2
rock gunnel	6	0	0.4	0
round scad	4	0	0.3	0
glasseye snapper	3	0	0.1	0
conger eel	3	0	1.1	0
Atlantic mackerel	3	0	0.3	0
crevalle jack	2	0	0.2	0
northern pipefish	2	0	0.2	0
northern puffer	2	0	0.2	0
longhorn sculpin	2	0	0.9	0
sea raven	2	0	1.3	0
striped anchovy	2	0	0.1	0
Atlantic silverside	1	0	0.1	0

Species	count	%	weight	%
barndoor skate	1	0	0.4	0
Planehead filefish	1	0	0.1	0
rainbow smelt	1	0	0.1	0
sea lamprey	1	0	1.3	0
Spanish mackerel	1	0	2.1	0
Total	**74,107**		**14,323.6**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
Invertebrates				
Horseshoe crab	399	1.7	670.5	23.2
spider crab	nc	nc	640.6	22.2
American lobster	1,958	8.3	479.7	16.6
long-finned squid	19,231	81.9	421.3	14.6
boring sponge	nc	nc	107.5	3.7
rock crab	nc	nc	80.9	2.8
starfish spp.	nc	nc	73.7	2.6
flat claw hermit crab	nc	nc	61.3	2.1
channeled whelk	334	1.4	58.8	2.0
bushy bryozoan	nc	nc	54.3	1.9
lion's mane jellyfish	1,307	5.6	40.6	1.4
knobbed whelk	96	0.4	35.1	1.2
sea grape	nc	nc	31.1	1.1
northern moon snail	nc	nc	20.9	0.7
blue mussel	nc	nc	19.7	0.7
common slipper shell	nc	nc	16.8	0.6
lady crab	nc	nc	12.0	0.4
hydroid spp.	nc	nc	9.6	0.3
ribbed mussel	nc	nc	8.8	0.3
sand shrimp	nc	nc	6.8	0.2
arks	nc	nc	6.5	0.2
mud crabs	nc	nc	6.5	0.2
rubbery bryzoan	nc	nc	6.0	0.2
mantis shrimp	110	0.5	4.9	0.2
bluecrab	24	0.1	4.3	0.1
hard clams	nc	nc	3.9	0.1
star coral	nc	nc	1.9	0.1
coastal mud shrimp	4	0	0.7	0
purple sea urchin	nc	nc	0.6	0
blood star	nc	nc	0.4	0
northern red shrimp	2	0	0.4	0
Japanese shore crab	4	0	0.3	0
anemones	nc	nc	0.1	0
sand dollar	1	0	0.1	0
common razor clam	1	0	0.1	0
moon jelly	nc	nc	0.1	0
northern cyclocardia	nc	nc	0.1	0
mixed sponge species	nc	nc	0.1	0
Total	**23,471**		**2,887**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2004.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring are not quantified. Number of tows (sample size)=199.

species	count	%	weight	%
butterfish	94,735	46.7	1,842.7	9.7
scup	61,521	30.3	6,801.1	35.7
weakfish	17,505	8.6	426.9	2.2
bluefish	6,504	3.2	2,140.6	11.2
winter flounder	4,021	2.0	839.9	4.4
little skate	3,044	1.5	1,689.8	8.9
windowpane flounder	2,275	1.1	333.7	1.8
bay anchovy	1,523	0.8	10.3	0.1
silver hake	1,417	0.7	27.3	0.1
fourspot flounder	1,406	0.7	309.3	1.6
striped searobin	1,308	0.6	465.4	2.4
alewife	859	0.4	56.1	0.3
Atlantic herring	851	0.4	58.3	0.3
red hake	829	0.4	51.6	0.3
northern searobin	784	0.4	112.0	0.6
Atlantic menhaden	746	0.4	110.7	0.6
summer flounder	644	0.3	627.2	3.3
smooth dogfish	503	0.2	1,435.3	7.5
striped bass	378	0.2	811.8	4.3
American shad	356	0.2	24.2	0.1
tautog	232	0.1	353.7	1.9
spotted hake	230	0.1	37.8	0.2
blueback herring	218	0.1	6.5	0
moonfish	182	0.1	3.4	0
fourbeard rockling	173	0.1	13.0	0.1
black sea bass	124	0.1	40.5	0.2
hogchoker	83	0	9.5	0
American sand lance	70	0	0.2	0
winter skate	53	0	100.3	0.5
smallmouth flounder	50	0	2.8	0
hickory shad	39	0	14.2	0.1
spiny dogfish	38	0	104.7	0.5
Atlantic cod	33	0	4.7	0
clearnose skate	22	0	48.2	0.3
cunner	21	0	3.7	0
ocean pout	18	0	5.4	0
rough scad	14	0	0.7	0
round scad	11	0	0.3	0
spot	8	0	0.9	0
Atlantic sturgeon	8	0	117.6	0.6
haddock	7	0	0.6	0
sea raven	7	0	2.4	0
northern kingfish	5	0	0.5	0
northern puffer	5	0	0.4	0
longhorn sculpin	5	0	3.4	0
seasnail	4	0	0.2	0
crevalle jack	2	0	0.2	0
northern pipefish	2	0	0.2	0
rock gunnel	2	0	0.2	0
Atlantic tomcod	2	0	0.2	0
white perch	2	0	0.5	0

species	count	%	weight	%
American plaice	1	0	0.1	0
conger eel	1	0	0.1	0
gizzard shad	1	0	0.1	0
goosefish	1	0	0.1	0
pollock	1	0	0.1	0
roughtail stingray	1	0	4.1	0
oyster toadfish	1	0	0.8	0
yellow jack	1	0	0.1	0
Total	**202,887**		**19,056.6**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
Invertebrates				
long-finned squid	23,022	86.5	953.4	28.8
horseshoe crab	534	2.0	873.4	26.4
American lobster	1,843	6.9	481.5	14.5
spider crab	nc	nc	355.5	10.7
blue mussel	nc	nc	250.2	7.6
bushy bryozoan	nc	nc	50.9	1.5
flat claw hermit crab	nc	nc	42.4	1.3
channeled whelk	199	0.7	42.3	1.3
starfish spp.	nc	nc	41.7	1.3
boring sponge	nc	nc	41.7	1.3
rock crab	1	0.0	35.2	1.1
lion's mane jellyfish	803	3.0	34.0	1.0
common slipper shell	nc	nc	22.9	0.7
sea grape	nc	nc	16.4	0.5
lady crab	nc	nc	14.5	0.4
northern moon snail	nc	nc	11.5	0.3
knobbed whelk	21	0.1	7.7	0.2
mantis shrimp	159	0.6	7.0	0.2
arks	nc	nc	7.0	0.2
mud crabs	nc	nc	5.4	0.2
sand shrimp	nc	nc	4.7	0.1
bluecrab	13	0	2.8	0.1
hard clams	nc	nc	2.3	0.1
surf clam	5	0	1.0	0
purple sea urchin	nc	nc	0.8	0
mixed sponge species	nc	nc	0.6	0
hydroid spp.	nc	nc	0.6	0
deadman's fingers sponge	nc	nc	0.5	0
rubbery bryzoan	nc	nc	0.4	0
star coral	nc	nc	0.3	0
northern red shrimp	nc	nc	0.3	0
northern cyclocardia	nc	nc	0.2	0
blood star	nc	nc	0.1	0
coastal mud shrimp	1	0	0.1	0
sea cucumber	2	0	0.1	0
Total	**26,603**		**3,309.4**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2005.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
butterfish	92,996	52.2	2,097.3	16.8	haddock	2	0	0.2	0
scup	52,642	29.6	3,080.7	24.7	seasnail	2	0	0.2	0
weakfish	9,191	5.2	449.9	3.6	glasseye snapper	1	0	0.1	0
bluefish	6,532	3.7	1,333.8	10.7	inshore lizardfish	1	0	0.1	0
winter flounder	4,692	2.6	566.1	4.5	lookdown	1	0	0.1	0
windowpane flounder	1,982	1.1	177.5	1.4	pollock	1	0	0.1	0
little skate	1,317	0.7	682.5	5.5	**Total**	**178,073**		**12,474.3**	
Atlantic herring	1,168	0.7	131.1	1.1					
bay anchovy	814	0.5	5.8	0	**Finfish not ranked**				
striped searobin	757	0.4	183.7	1.5	anchovy spp, yoy				
alewife	742	0.4	47.6	0.4	Atlantic herring, yoy				
fourspot flounder	688	0.4	125.9	1					
red hake	585	0.3	56.0	0.4	**Invertebrates**				
summer flounder	506	0.3	406.1	3.3	blue mussel	nc	nc	971.0	32.6
striped bass	469	0.3	675.1	5.4	long-finned squid	17,542	83.2	683.5	22.9
smooth dogfish	467	0.3	1,421.7	11.4	American lobster	1,389	6.6	364.3	12.2
moonfish	356	0.2	6.0	0	horseshoe crab	161	0.8	304.2	10.2
northern searobin	265	0.1	21.3	0.2	starfish spp.	nc	nc	198.4	6.7
Atlantic menhaden	235	0.1	77.9	0.6	lion's mane jellyfish	1,806	8.6	97.3	3.3
spotted hake	234	0.1	17.4	0.1	spider crab	nc	nc	92.0	3.1
tautog	179	0.1	269.2	2.2	bushy bryozoan	nc	nc	64.6	2.2
American shad	177	0.1	18.2	0.1	lady crab	nc	nc	48.8	1.6
silver hake	165	0.1	7.1	0.1	boring sponge	nc	nc	26.1	0.9
hickory shad	136	0.1	43.1	0.3	flat claw hermit crab	nc	nc	23.1	0.8
blueback herring	111	0.1	5.4	0	channeled whelk	101	0.5	23.0	0.8
fourbeard rockling	106	0.1	6.8	0.1	common slipper shell	nc	nc	12.2	0.4
clearnose skate	102	0.1	187.1	1.5	rubbery bryzoan	nc	nc	11.0	0.4
rough scad	62	0	1.9	0	knobbed whelk	23	0.1	9.7	0.3
hogchoker	61	0	8.7	0.1	rock crab	nc	nc	9.3	0.3
smallmouth flounder	44	0	2.4	0	ribbed mussel	nc	nc	7.6	0.3
black sea bass	42	0	26.4	0.2	hard clams	nc	nc	7.2	0.2
spiny dogfish	41	0	102.0	0.8	northern moon snail	nc	nc	4.7	0.2
Atlantic mackerel	37	0	5.7	0	sea grape	nc	nc	4.5	0.2
winter skate	31	0	59.9	0.5	mantis shrimp	64	0.3	3.8	0.1
yellow jack	28	0	3.0	0	arks	nc	nc	3.5	0.1
cunner	24	0	4.1	0	hydroid spp.	nc	nc	3.4	0.1
round scad	12	0	0.3	0	mud crabs	nc	nc	2.5	0.1
Atlantic cod	10	0	0.9	0	sand shrimp	nc	nc	2.1	0.1
rock gunnel	9	0	0.6	0	deadman's fingers sponge	nc	nc	1.1	0
Atlantic sturgeon	9	0	152.7	1.2	purple sea urchin	nc	nc	0.7	0
northern sennet	8	0	0.7	0	bluecrab	3	0	0.6	0
American sand lance	6	0	0.2	0	mixed sponge species	nc	nc	0.4	0
northern puffer	5	0	0.3	0	surf clam	nc	nc	0.4	0
northern kingfish	4	0	0.6	0	star coral	nc	nc	0.3	0
northern pipefish	4	0	0.3	0	sand dollar	1	0	0.2	0
ocean pout	3	0	0.7	0	northern red shrimp	nc	nc	0.2	0
sea raven	3	0	0.5	0	boreal squid	1	0	0.1	0
crevalle jack	2	0	0.2	0	Japanese shore crab	5	0	0.1	0
gizzard shad	2	0	0.2	0	northern cyclocardia	nc	nc	0.1	0
goosefish	2	0	0.7	0	common oyster	nc	nc	0.1	0
grubby	2	0	0.2	0	**Total**	**21,096**		**2,982.1**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2006.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=120.

species	count	%	weight	%	species	count	%	weight	%
butterfish	50,022	54.3	1,631.4	15.5					
scup	28,829	31.3	4,636.1	44.2					
bluefish	2,100	2.3	358.6	3.4	**Finfish not ranked**				
winter flounder	1,699	1.8	271.2	2.6	anchovy spp, yoy				
bay anchovy	1,492	1.6	8.3	0.1	Atlantic herring, yoy				
silver hake	1,267	1.4	37.7	0.4	American sand lance (yoy)				
windowpane flounder	1,077	1.2	128.9	1.2					
northern searobin	630	0.7	74.5	0.7					
red hake	625	0.7	37.4	0.4					
little skate	593	0.6	310.6	3	**Invertebrates**				
alewife	573	0.6	49.5	0.5	long-finned squid	7,802	83.4	326	32.5
fourspot flounder	466	0.5	88.1	0.8	horseshoe crab	109	1.2	205.8	20.5
striped searobin	366	0.4	113.5	1.1	American lobster	748	8	197.9	19.7
moonfish	361	0.4	3.5	0	boring sponge	nc	nc	51.3	5.1
smooth dogfish	332	0.4	1,176.6	11.2	spider crab	nc	nc	50.6	5
spotted hake	321	0.3	24.3	0.2	lion's mane jellyfish	558	6	45.4	4.5
weakfish	241	0.3	52.2	0.5	rock crab	nc	nc	40.4	4
summer flounder	203	0.2	180.5	1.7	bushy bryozoan	nc	nc	17.8	1.8
tautog	186	0.2	301.4	2.9	blue mussel	nc	nc	7.6	0.8
striped bass	144	0.2	418.7	4	channeled whelk	41	0.4	7.6	0.8
hickory shad	75	0.1	19.1	0.2	lady crab	nc	nc	7.5	0.7
American shad	68	0.1	6.1	0.1	deadman's fingers sponge	nc	nc	6.8	0.7
Atlantic herring	66	0.1	10.3	0.1	hydroid spp.	nc	nc	5.9	0.6
blueback herring	63	0.1	2.5	0	flat claw hermit crab	nc	nc	5.7	0.6
clearnose skate	36	0	52.4	0.5	starfish spp.	nc	nc	4.8	0.5
Atlantic menhaden	28	0	5.5	0.1	rubbery bryzoan	nc	nc	4	0.4
winter skate	23	0	60	0.6	common slipper shell	nc	nc	3.9	0.4
hogchoker	22	0	3.2	0	mantis shrimp	70	0.7	3.4	0.3
Atlantic sturgeon	21	0	368.7	3.5	mud crabs	nc	nc	2.1	0.2
black sea bass	19	0	9.3	0.1	blue crab	11	0.1	1.8	0.2
fourbeard rockling	14	0	1.5	0	knobbed whelk	5	0.1	1.2	0.1
rough scad	14	0	0.5	0	sand shrimp	nc	nc	0.6	0.1
spot	14	0	1.2	0	mixed sponge species	nc	nc	0.6	0.1
spiny dogfish	11	0	47	0.4	moon jelly	2	0	0.5	0
cunner	8	0	1.3	0	sea grape	nc	nc	0.5	0
smallmouth flounder	7	0	0.6	0	arks	nc	nc	0.4	0
ocean pout	5	0	0.9	0	purple sea urchin	2	0	0.4	0
glasseye snapper	4	0	0.1	0	star coral	nc	nc	0.3	0
inshore lizardfish	4	0	0.4	0	hard clams	1	0	0.3	0
northern pipefish	3	0	0.2	0	northern red shrimp	1	0	0.3	0
rock gunnel	2	0	0.1	0	red bearded sponge	nc	nc	0.2	0
yellow jack	2	0	0.1	0	fan worm tubes	nc	nc	0.2	0
Atlantic bonito	1	0	3.2	0	northern moon snail	nc	nc	0.2	0
planehead filefish	1	0	0.1	0	surf clam	1	0	0.2	0
goosefish	1	0	1.2	0	brown shrimp	1	0	0.1	0
pollock	1	0	0.1	0	ghost shrimp	nc	nc	0.1	0
oyster toadfish	1	0	1.2	0	Japanese shore crab	nc	nc	0.1	0
yellowtail flounder	1	0	0.4	0	northern cyclocardia	nc	nc	0.1	0
Total	**92,042**		**10,500.2**		**Total**	**9,352**		**1,002.6**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2007.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%	species	count	%	weight	%
scup	75,681	42.6	5,333.5	30.4	grubby	1	0	0.1	0
butterfish	49,137	27.6	1,446.2	8.2	pollock	1	0	0.1	0
weakfish	17,386	9.8	584.8	3.3	rock gunnel	1	0	0.1	0
bluefish	9,378	5.3	1,801.3	10.3	striped burrfish	1	0	0.5	0
winter flounder	4,550	2.6	951.3	5.4	sea lamprey	1	0	0.1	0
windowpane flounder	4,051	2.3	510.8	2.9	yellowtail flounder	1	0	1.0	0
red hake	2,788	1.6	200.4	1.1					
bay anchovy	2,440	1.4	14.5	0.1	**Finfish not ranked**				
Atlantic herring	1,932	1.1	234.2	1.3	anchovy spp, yoy				
alewife	1,537	0.9	101.3	0.6	Atlantic herring, yoy				
little skate	1,277	0.7	697.0	4.0	American sand lance (yoy)				
fourspot flounder	1,094	0.6	224.9	1.3					
moonfish	979	0.6	12.0	0.1	**Invertebrates**				
striped searobin	755	0.4	217.0	1.2	long-finned squid	24,212	88.2	773.6	30.8
summer flounder	733	0.4	590.9	3.4	horseshoe crab	333	1.2	596.4	23.7
northern searobin	691	0.4	74.2	0.4	American lobster	1,648	6.0	396.5	15.8
smooth dogfish	580	0.3	2,110.2	12.0	spider crab	nc	nc	165.5	6.6
Atlantic menhaden	426	0.2	63.9	0.4	lion's mane jellyfish	660	2.4	129.8	5.2
striped bass	422	0.2	888.0	5.1	bushy bryozoan	nc	nc	107.4	4.3
spotted hake	340	0.2	23.9	0.1	mixed sponge species	nc	nc	84.5	3.4
silver hake	290	0.2	14.6	0.1	rock crab	nc	nc	41.4	1.6
tautog	280	0.2	551.4	3.1	channeled whelk	196	0.7	33.4	1.3
American shad	236	0.1	15.8	0.1	flat claw hermit crab	nc	nc	27.5	1.1
blueback herring	156	0.1	9.1	0.1	blue mussel	nc	nc	20.4	0.8
black sea bass	116	0.1	46.8	0.3	starfish spp.	nc	nc	20.3	0.8
clearnose skate	97	0.1	193.3	1.1	boring sponge	nc	nc	17.7	0.7
fourbeard rockling	87	0	7.6	0	blue crab	68	0.2	13.0	0.5
hogchoker	78	0	11.4	0.1	mantis shrimp	264	1.0	12.1	0.5
smallmouth flounder	48	0	2.6	0	deadman's fingers sponge	nc	nc	11.5	0.5
winter skate	44	0	117.8	0.7	lady crab	nc	nc	11.5	0.5
hickory shad	37	0	10.4	0.1	knobbed whelk	23	0.1	11.1	0.4
spiny dogfish	32	0	122.3	0.7	common slipper shell	nc	nc	9.3	0.4
American sand lance	30	0	0.3	0	mud crabs	nc	nc	4.3	0.2
Atlantic sturgeon	18	0	336.4	1.9	northern moon snail	nc	nc	4.3	0.2
cunner	16	0	3.0	0	sand shrimp	nc	nc	3.5	0.1
rough scad	13	0	0.7	0	sea grape	nc	nc	3.5	0.1
ocean pout	12	0	3.2	0	arks	2	0	2.7	0.1
Atlantic mackerel	9	0	0.8	0	hydroid spp.	nc	nc	2.5	0.1
glasseye snapper	8	0	0.7	0	hard clams	1	0	2.2	0.1
northern puffer	8	0	0.5	0	rubbery bryzoan	nc	nc	1.4	0.1
striped anchovy	6	0	0.1	0	common oyster	nc	nc	1.1	0
sea raven	5	0	3.6	0	surf clam	10	0	1.0	0
oyster toadfish	5	0	2.0	0	anemones	16	0.1	0.6	0
yellow jack	5	0	0.4	0	purple sea urchin	2	0	0.6	0
northern kingfish	4	0	0.4	0	red bearded sponge	nc	nc	0.5	0
round scad	3	0	0.3	0	star coral	nc	nc	0.4	0
longhorn sculpin	3	0	0.8	0	water jelly	1	0	0.3	0
American eel	2	0	0.9	0	jonah crab	1	0	0.2	0
inshore lizardfish	2	0	0.2	0	northern red shrimp	1	0	0.2	0
mackerel scad	2	0	0.1	0	blood star	nc	nc	0.1	0
northern sennet	2	0	0.2	0	coastal mud shrimp	1	0	0.1	0
northern pipefish	2	0	0.2	0	green sea urchin	1	0	0.1	0
Atlantic silverside	1	0	0.1	0	Japanese shore crab	nc	nc	0.1	0
gizzard shad	1	0	0.1	0	tunicates, misc	1	0	0.1	0
Total	**177,841**		**17,540.3**		**Total**	**27,441**		**2,512.7**	

Note: nc= not counted

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2008.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=120.

species	count	%	weight	%
scup	53,560	38	6,509.9	45.7
butterfish	48,766	34.6	1,442.0	10.1
American sand lance	7,495	5.3	7.2	0.1
silver hake	6,587	4.7	208.5	1.5
winter flounder	4,973	3.5	751.9	5.3
windowpane flounder	3,511	2.5	524.0	3.7
weakfish	2,531	1.8	116.1	0.8
red hake	1,723	1.2	141.3	1.0
bluefish	1,699	1.2	641.4	4.5
spotted hake	1,267	0.9	65.8	0.5
bay anchovy	1,128	0.8	7.7	0.1
alewife	931	0.7	51.1	0.4
fourspot flounder	902	0.6	186.3	1.3
northern searobin	809	0.6	58.8	0.4
moonfish	689	0.5	13.4	0.1
little skate	682	0.5	327.4	2.3
striped searobin	612	0.4	263.0	1.8
summer flounder	477	0.3	398.0	2.8
American shad	405	0.3	20.2	0.1
Atlantic herring	356	0.3	52.1	0.4
smooth dogfish	328	0.2	1,134.2	8.0
spot	308	0.2	21.3	0.1
striped bass	199	0.1	456.3	3.2
tautog	179	0.1	309.4	2.2
black sea bass	122	0.1	29.8	0.2
smallmouth flounder	89	0.1	3.2	0
fourbeard rockling	81	0.1	7.1	0
blueback herring	74	0.1	3.2	0
winter skate	51	0	140.8	1.0
Atlantic menhaden	47	0	10.4	0.1
hogchoker	38	0	5.6	0
clearnose skate	37	0	78.1	0.5
spiny dogfish	35	0	127.7	0.9
cunner	26	0	3.6	0
inshore lizardfish	10	0	0.5	0
ocean pout	9	0	2.1	0
Atlantic sturgeon	7	0	111.3	0.8
hickory shad	5	0	1.1	0
feather blenny	4	0	0.2	0
white perch	4	0	0.1	0
northern kingfish	3	0	0.4	0
oyster toadfish	3	0	1.9	0
Atlantic silverside	2	0	0.2	0
rock gunnel	2	0	0.2	0
longhorn sculpin	2	0	0.3	0
yellowtail flounder	2	0	0.4	0
Atlantic croaker	1	0	0.1	0
planehead filefish	1	0	0.1	0
glasseye snapper	1	0	0.1	0
pollock	1	0	0.1	0
roughtail stingray	1	0	3.0	0

species	count	%	weight	%
sea lamprey	1	0	0.8	0
striped anchovy	1	0	0.1	0
Total	**140,777**		**14,239.8**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
horseshoe crab	289	2.2	496.8	29.2
long-finned squid	10,490	80.5	330.1	19.4
American lobster	1,096	8.4	314.1	18.5
spider crab	nc	nc	145.8	8.6
rock crab	nc	nc	64.0	3.8
bushy bryozoan	nc	nc	54.2	3.2
lady crab	nc	nc	36.3	2.1
starfish spp.	nc	nc	32.1	1.9
boring sponge	nc	nc	30.1	1.8
channeled whelk	177	1.4	29.3	1.7
mixed sponge species	nc	nc	27.8	1.6
hydroid spp.	nc	nc	24.6	1.4
flat claw hermit crab	nc	nc	22.8	1.3
common slipper shell	nc	nc	15.7	0.9
lion's mane jellyfish	520	4	14.3	0.8
mantis shrimp	244	1.9	9.1	0.5
sea grape	nc	nc	6.6	0.4
arks	124	1	6.1	0.4
knobbed whelk	17	0.1	5.9	0.3
blue mussel	nc	nc	5.8	0.3
northern moon snail	1	0	5.6	0.3
sand shrimp	nc	nc	4.0	0.2
blue crab	16	0.1	3.8	0.2
mud crabs	nc	nc	3.5	0.2
rubbery bryzoan	nc	nc	3.1	0.2
common oyster	1	0	2.1	0.1
hard clams	8	0.1	1.4	0.1
purple sea urchin	15	0.1	0.9	0.1
northern red shrimp	21	0.2	0.7	0
deadman's fingers sponge	nc	nc	0.6	0
surf clam	9	0.1	0.6	0
red bearded sponge	nc	nc	0.4	0
Jonah crab	2	0	0.4	0
star coral	nc	nc	0.3	0
sea cucumber	2	0	0.3	0
tunicates, misc	nc	nc	0.3	0
anemones	nc	nc	0.2	0
coastal mud shrimp	1	0	0.1	0
green crab	1	0	0.1	0
moon jelly	1	0	0.1	0
northern cyclocardia	1	0	0.1	0
Total	**13,036**		**1,700.1**	

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2009.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	108,087	53.6	3,186.9	17
scup	46,991	23.3	6,332.1	33.8
bay anchovy	11,128	5.5	35.3	0.2
Atlantic herring	6,330	3.1	239.2	1.3
winter flounder	4,068	2	524.0	2.8
bluefish	3,657	1.8	1,157.4	6.2
weakfish	2,604	1.3	108.7	0.6
moonfish	2,575	1.3	19.5	0.1
windowpane flounder	2,496	1.2	342.8	1.8
northern searobin	2,012	1	194.3	1
striped searobin	1,507	0.7	471.8	2.5
American sand lance	1,227	0.6	2.0	0
alewife	1,175	0.6	96.0	0.5
fourspot flounder	1,036	0.5	169.8	0.9
silver hake	947	0.5	50.0	0.3
red hake	897	0.4	59.5	0.3
summer flounder	881	0.4	694.4	3.7
little skate	709	0.4	390.0	2.1
smooth dogfish	588	0.3	2,213.3	11.8
striped bass	466	0.2	897.4	4.8
American shad	422	0.2	28.9	0.2
spotted hake	327	0.2	32.1	0.2
blueback herring	291	0.1	14.6	0.1
tautog	163	0.1	285.4	1.5
spiny dogfish	148	0.1	545.7	2.9
black sea bass	121	0.1	59.5	0.3
smallmouth flounder	96	0	4.7	0
clearnose skate	69	0	148.5	0.8
Atlantic menhaden	69	0	18.0	0.1
rough scad	59	0	2.8	0
fourbeard rockling	47	0	3.9	0
winter skate	44	0	108.5	0.6
hogchoker	39	0	4.5	0
blue runner	34	0	2.3	0
ocean pout	22	0	4.8	0
Atlantic sturgeon	18	0	286.6	1.5
cunner	18	0	1.8	0
pollock	18	0	0.8	0
Atlantic cod	15	0	1.0	0
hickory shad	13	0	3.6	0
northern kingfish	7	0	0.4	0
glasseye snapper	6	0	0.6	0
Atlantic mackerel	5	0	0.4	0
northern sennet	5	0	0.4	0
northern puffer	5	0	0.4	0
sea raven	5	0	1.7	0
striped anchovy	5	0	0.4	0
Atlantic silverside	3	0	0.3	0
oyster toadfish	3	0	0.8	0
inshore lizardfish	2	0	0.2	0
northern pipefish	2	0	0.2	0
rock gunnel	2	0	0.2	0
longhorn sculpin	2	0	0.3	0
crevalle jack	1	0	0.1	0
planehead filefish	1	0	0.1	0
round scad	1	0	0.1	0

species	count	%	weight	%
striped cusk-eel	1	0	0.1	0
spot	1	0	0.2	0
northern stargazer	1	0	0.1	0
Atlantic tomcod	1	0	0.1	0
white perch	1	0	0.1	0
yellow jack	1	0	0.1	0
yellowtail flounder	1	0	0.2	0
Total	**201,476**		**18,750**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
long-finned squid	24,130	91.4	648.4	30.2
horseshoe crab	340	1.3	645.8	30
American lobster	853	3.2	244	11.3
spider crab	.	.	144.1	6.7
lion's mane jellyfish	641	2.4	89.3	4.2
lady crab	.	.	63.6	3
rock crab	.	.	42.4	2
common slipper shell	.	.	37	1.7
flat claw hermit crab	.	.	33.8	1.6
bushy bryozoan	.	.	33.3	1.5
starfish spp.	.	.	26.6	1.2
channeled whelk	127	0.5	26	1.2
hydroid spp.	.	.	25.7	1.2
knobbed whelk	39	0.1	11.6	0.5
mantis shrimp	215	0.8	10.7	0.5
Tubularia, spp.	.	.	9	0.4
northern moon snail	.	.	7.2	0.3
anemones	.	.	5.6	0.3
mixed sponge species	.	.	5.4	0.3
sea grape	.	.	5.0	0.2
boring sponge	.	.	4.2	0.2
blue crab	19	0.1	4.1	0.2
sand shrimp	.	.	3.8	0.2
deadman's fingers sponge	.	.	3.5	0.2
blue mussel	8	0	3.5	0.2
mud crabs	.	.	3.1	0.1
common oyster	1	0	3.1	0.1
arks	2	0	2.5	0.1
surf clam	18	0.1	1.7	0.1
hard clams	4	0	1.1	0.1
red bearded sponge	.	.	0.8	0
purple sea urchin	4	0	0.8	0
rubbery bryzoan	.	.	0.6	0
star coral	.	.	0.2	0
ghost shrimp	2	0	0.2	0
coastal mud shrimp	2	0	0.1	0
northern cyclocardia	1	0	0.1	0
northern red shrimp	1	0	0.1	0
sea cucumber	1	0	0.1	0
tunicates, misc	1	0	0.1	0
Total	**26,409**		**2,148.2**	

Note: nc= not counted

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2010.

Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=78.

species	count	%	weight	%
American sand lance	13,061	35.3	5.2	0.1
scup	7,157	19.3	1,971.6	44.3
butterfish	2,894	7.8	166.9	3.7
windowpane flounder	2,850	7.7	449.3	10.1
winter flounder	2,579	7.0	450.5	10.1
silver hake	1,747	4.7	35.4	0.8
Atlantic herring	1,318	3.6	179.0	4
northern searobin	1,128	3	149.5	3.4
red hake	990	2.7	64.3	1.4
spotted hake	665	1.8	15.8	0.4
summer flounder	517	1.4	229.6	5.2
bay anchovy	475	1.3	2.8	0.1
fourspot flounder	402	1.1	92.0	2.1
little skate	281	0.8	148.3	3.3
alewife	172	0.5	14.3	0.3
American shad	165	0.4	8.6	0.2
striped searobin	141	0.4	66.4	1.5
blueback herring	101	0.3	3.4	0.1
striped bass	71	0.2	173.2	3.9
tautog	53	0.1	83.1	1.9
black sea bass	37	0.1	20.1	0.5
fourbeard rockling	35	0.1	2.9	0.1
hogchoker	34	0.1	4.4	0.1
smallmouth flounder	31	0.1	1.4	0
rock gunnel	29	0.1	0.5	0
Atlantic cod	21	0.1	2.1	0
winter skate	16	0	37.7	0.8
cunner	11	0	1.3	0
smooth dogfish	10	0	34.4	0.8
Atlantic menhaden	7	0	2.7	0.1
ocean pout	6	0	1.4	0
sea raven	6	0	1.6	0
northern pipefish	4	0	0.3	0
spiny dogfish	3	0	16.2	0.4
bluefish	2	0	6.1	0.1
hickory shad	2	0	0.4	0
pollock	2	0	0.1	0
American plaice	1	0	0.1	0
Atlantic silverside	1	0	0.1	0
Atlantic sturgeon	1	0	5.6	0.1
clearnose skate	1	0	4.5	0.1
longhorn sculpin	1	0	0.4	0
weakfish	1	0	1.0	0
Total	**37,029**		**4,455**	

species	count	%	weight	%
Invertebrates				
long-finned squid	1,906	62.9	161.4	28.4
horseshoe crab	58	1.9	112.2	19.8
American lobster	293	9.7	83.6	14.7
spider crab	.	.	81.6	14.4
bushy bryozoan	.	.	23.1	4.1
rock crab	.	.	16.7	2.9
starfish spp.	.	.	15.1	2.7
common slipper shell	.	.	11.2	2
lion's mane jellyfish	401	13.2	7.8	1.4
lady crab	.	.	7.7	1.4
flat claw hermit crab	.	.	6.8	1.2
hydroid spp.	.	.	6.7	1.2
channeled whelk	33	1.1	4.5	0.8
northern moon snail	.	.	4.1	0.7
blue mussel	.	.	3.1	0.5
common oyster	.	.	2.9	0.5
sea grape	.	.	2.7	0.5
sand shrimp	.	.	2.3	0.4
deadman's fingers sponge	.	.	2.3	0.4
blue crab	10	0.3	2.0	0.4
arks	.	.	1.6	0.3
mud crabs	.	.	1.6	0.3
rubbery bryzoan	.	.	1.2	0.2
mantis shrimp	19	0.6	1.1	0.2
Unknown Jellyfish	300	9.9	0.8	0.1
Tubularia, spp.	.	.	0.5	0.1
anemones	5	0.1	0.4	0.1
surf clam	2	0.1	0.4	0.1
knobbed whelk	1	0	0.3	0.1
mixed sponge species	.	.	0.3	0.1
northern comb jelly	1	0	0.2	0
purple sea urchin	4	0.1	0.2	0
boring sponge	.	.	0.1	0
red bearded sponge	.	.	0.1	0
coastal mud shrimp	.	.	0.1	0
star coral	.	.	0.1	0
hard clams	.	.	0.1	0
sea cucumber	.	.	0.1	0
Total	**3,033**		**567.0**	

Note: nc= not counted

Finfish not ranked

anchovy spp, yoy
Atlantic herring, yoy
American sand lance (yoy)

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2011.

Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=172.

species	count	%	weight	%
butterfish	42,141	36.7	1,600.8	9.9
scup	34,458	30.0	6,759.0	41.7
American sand lance	9,535	8.3	7.5	0.0
bay anchovy	4,693	4.1	10.5	0.1
winter flounder	3,092	2.7	613.8	3.8
windowpane flounder	2,831	2.5	395.9	2.4
bluefish	2,765	2.4	584.7	3.6
weakfish	2,583	2.3	192.6	1.2
striped searobin	1,630	1.4	558.7	3.4
Atlantic herring	1,482	1.3	199.4	1.2
fourspot flounder	1,400	1.2	224.2	1.4
summer flounder	1,051	0.9	713.0	4.4
silver hake	948	0.8	40.3	0.2
northern searobin	803	0.7	85.5	0.5
spotted hake	725	0.6	76.8	0.5
little skate	674	0.6	359.4	2.2
moonfish	640	0.6	6.3	0
smooth dogfish	613	0.5	2,031.7	12.5
alewife	512	0.4	29.8	0.2
red hake	278	0.2	25.1	0.2
American shad	271	0.2	17.5	0.1
striped bass	243	0.2	721.9	4.5
Atlantic menhaden	181	0.2	69.8	0.4
rough scad	150	0.1	6.8	0
hogchoker	147	0.1	16.8	0.1
Atlantic cod	109	0.1	9.2	0.1
tautog	106	0.1	151.7	0.9
black sea bass	91	0.1	54.2	0.3
blueback herring	72	0.1	3.2	0
smallmouth flounder	67	0.1	3.5	0
spiny dogfish	58	0.1	203.5	1.3
clearnose skate	56	0	109.8	0.7
inshore lizardfish	43	0	4.6	0
fourbeard rockling	43	0	4.0	0
winter skate	37	0	101.2	0.6
northern kingfish	34	0	3.7	0
ocean pout	27	0	4.5	0
blue runner	24	0	1.7	0
cunner	14	0	1.9	0
northern puffer	9	0	0.9	0
longhorn sculpin	9	0	2.0	0
hickory shad	8	0	1.5	0
Atlantic sturgeon	5	0	181.9	1.1
pollock	5	0	0.5	0
spot	5	0	0.7	0
crevalle jack	4	0	0.4	0
grubby	4	0	0.1	0
northern pipefish	4	0	0.3	0
rock gunnel	4	0	0.2	0
conger eel	3	0	1.1	0
sea raven	3	0	0.9	0
striped cusk-eel	2	0	0.2	0
Atlantic tomcod	2	0	0.2	0
American plaice	1	0	0.1	0
Atlantic croaker	1	0	0.2	0
northern sennet	1	0	0.1	0
round scad	1	0	0.1	0
roughtail stingray	1	0	13.0	0.1
striped burrfish	1	0	0.5	0
striped anchovy	1	0	0.1	0
silver perch	1	0	0.1	0
oyster toadfish	1	0	0.2	0
white perch	1	0	0.1	0
white mullet	1	0	0.1	0
yellowtail flounder	1	0	0.3	0
Total	**114,706**		**16,210.3**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
horseshoe crab	257	1.7	505.2	33.5
long-finned squid	13,020	86.4	370.7	24.6
spider crab	.	.	151.8	10.1
lady crab	.	.	132.4	8.8
American lobster	230	1.5	52.0	3.4
rock crab	.	.	45.5	3.0
hydroid spp.	.	.	30.5	2.0
mantis shrimp	971	6.4	29.6	2.0
bushy bryozoan	.	.	24.9	1.7
knobbed whelk	62	0.4	23.8	1.6
flat claw hermit crab	.	.	22.1	1.5
channeled whelk	99	0.7	19.0	1.3
starfish spp.	.	.	14.4	1.0
blue crab	69	0.5	12.4	0.8
lion's mane jellyfish	345	2.3	11.3	0.7
mixed sponge species	.	.	11.0	0.7
blue mussel	1	0	6.7	0.4
northern moon snail	.	.	5.6	0.4
boring sponge	.	.	5.5	0.4
hard clams	.	.	5.3	0.4
common slipper shell	.	.	5.2	0.3
sand shrimp	.	.	4.5	0.3
Tubularia, spp.	.	.	3.5	0.2
mud crabs	.	.	2.6	0.2
rubbery bryzoan	.	.	1.7	0.1
common oyster	1	0	1.6	0.1
sea grape	.	.	1.5	0.1
arks	.	.	1.4	0.1
surf clam	7	0	1.0	0.1
purple sea urchin	3	0	0.6	0
red bearded sponge	.	.	0.3	0
northern comb jelly	.	.	0.3	0
anemones	6	0	0.2	0
star coral	.	.	0.2	0
coastal mud shrimp	1	0	0.1	0
common razor clam	1	0	0.1	0
ghost shrimp	1	0	0.1	0
northern red shrimp	1	0	0.1	0
polychaetes	.	.	0.1	0
tunicates, misc	.	.	0.1	0
water jelly	1	0	0.1	0
Total	**15,076**		**1,505.0**	

Note: nc= not counted

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PART 2: ESTUARINE SEINE SURVEY

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JOB 2 PART 2: ESTUARINE SEINE SURVEY

OBJECTIVES

1) *Provide an annual index of recruitment for winter flounder (Age0, 1+), all finfsh species taken, and all crab species.*

The 2011 annual index of recruitment for young-of-year winter flounder (1.1 fish/haul) ranked the third lowest (22nd) out of 24 annual indices.

2) *Provide an annual total count for all finfish taken.*

Mean catch of all finfish (186 fish/haul) ranked sixth highest out of 24 annual indices and was above the series average of 145 fish/haul (Figure 2.2). Geometric means were calculated for 22 species commonly captured since the survey began in 1988 (Table 2.1).

3) *Provide an index for shallow subtidal forage species abundance.*

An index of forage abundance was generated using the catch of four of the most common forage species caught: Atlantic silversides, striped killifish, mummichog, and sheepshead minnow. The index for 2011 (127 forage fish/haul) was the seventh highest of the 24-year series, and slightly above the time series average of 97 forage fish/haul.

METHODS

Eight sites (Figure 2.1) are sampled during September using an eight-meter (25 ft.) bag seine with 6.4mm (0.25 in.) bar mesh. Area swept is standardized to 4.6 m (15 ft.), width by means of a taut spreader rope and a 30m (98 ft.), measured distance, parallel to, or at a 45^{o} angle to the shoreline, against the current or tide if present. At each site, six seine hauls are taken within two hours before and after low slack tide during daylight hours. Sites in Groton, Waterford, Old Lyme, Clinton, New Haven, Bridgeport and Greenwich have been sampled since 1988. The Milford site was added in 1990.

Finfish, crabs, and other invertebrates taken in each sample are identified to species or lowest practical taxon (full listing given in Appendix 2.1, 2.2) and counted. One exception is inland silversides, which are not separated from Atlantic silversides because they are rare and difficult to identify. Qualitative counts were used for menhaden when abundant (n>1000) to minimize discard mortality. Winter flounder are measured to total length (mm), and classified as young-of-year (YOY) if less than 12 cm and age 1+ if 12cm or larger. The age of flounder near this size was verified in 1990-1992 by examination of the sagittal otolith. Physical data recorded at each seine location included water temperature and salinity at one-meter depth. The geometric or retransformed natural log mean catch per standard haul is calculated for catches at each site and collectively for the 22 most abundant species, with separate indices for young-of-year and winter flounder age 1 and older. Confidence intervals (95%) for each geometric mean are retransformations of the corresponding log intervals. Frequency of occurrence is given as a percentage of all samples taken each year.

RESULTS

A total of 48 seine hauls were taken in 2011 at eight sites, yielding a total catch of 8,931 fish of 29 species and 5,787 invertebrates of ten species. Mean catch of all finfish (186 fish/tow) was the sixth highest in the time series (Figure 2.2). This catch is above the long-term mean of 145 fish/tow which can be attributed to above average catches of black sea bass, as well as mummichog, striped killifish, sheepshead minnow, smallmouth flounder, northern pipefish and grubby. Atlantic silversides were caught in average abundance. Geometric means were calculated for 22 species commonly captured since the survey began in 1988 (Table 2.1). The most frequently caught species was Atlantic silversides, which occurred in all samples, followed by striped killifish (98%), yoy winter flounder (63%), black sea bass (58%), northern pipefish (44%), grubby and mummichog (42%), smallmouth flounder (40%) and tautog (23%). This rank order has changed from the previous years, with a notable decrease in winter flounder (age 0 and age 1+), mummichog, sheepshead minnow and windowpane flounder occurrence rates along with an increase in black sea bass, northern pipefish, smallmouth flounder and grubby (sculpin) occurrence. Only eight of the 22 species monitored decreased in abundance in 2011, while fourteen other fish species increased and seven were unchanged. Tautog abundance and occurrence rate increased significantly in 1998-99, returned to the series average in 2005, 2010 and 2011 after a record year in 2007. Previous to 2005, tautog relative abundance had significantly increased to all-time abundance levels in 2002-04 (Figure 2.4). In 2011, three forage species increased slightly in abundance from the previous year (mummichog, sheepshead minnow and striped killifish). Forage fish species Atlantic silverside was slightly below the 24-year time-series average in 2011. Scup occurrence and abundance fell to the 24 year time series average in 2011. The abundance of cunner the other labridae species commonly seen in the survey fell again in 2011. None were captured for the fourth time in the 24 year time-series and have declined since 2007. Snapper bluefish occurred at the time series average in 2011 after a 2007 absence. Striped bass and weakfish were not observed in the survey in 2011. Weakfish young-of-year were absent and have only occurred in 2003. All other species occurred in less than 10% of all samples, with occurrence rates similar to previous years. One new species of finfish, a juvenile gizzard shad (*Dorosoma cepedianum*) was captured in 2011, at the New Haven site. No juvenile summer flounder were captured in 2011. Summer flounder (juvenile) have occurred in 2006-08 and 2010 of the 24 year time series. Windowpane flounder re-occurred at low abundance in 2011 after being absent in 2009-10. Other notable catches: at the Waterford site; lined seahorses, striper burrfish, white perch, inshore lizardfish and Atlantic tomcod. The New Haven site saw striped burrfish, white mullet and gizzard shad. The Old Lyme (CT River) site saw abundant blue crabs, the re-occurrence of windowpane flounder, Atlantic tomcod and northern kingfish. The Groton site saw Atlantic tomcod, sheepshead minnow and 285 black sea bass. The Bridgeport and Greenwich sites (western Long Island Sound) saw snapper bluefish, white mullet and smallmouth flounder in 2011.

Relative Abundance of Juvenile Winter Flounder and Tautog

The 2011 index of YOY winter flounder (1.1 fish/haul) ranked third lowest out of the 24 annual indices (Table 2.2, Figure 2.3 and 2.7). Overall, the time series indicates that relatively strong year classes were only produced many years ago in 1988, 1992, 1994, and 1996 (Figure 2.3).

The 2011 index of YOY tautog (0.3 fish/haul) was the second lowest ranking (tie) out of 24 annual indices (Table 2.1, Figure 2.4), well below the series average of 0.7 tautog / haul. Overall, the time series indicates an increasing trend in abundance of young-of-year tautog from 1988 to 2008, with good year classes produced in 1998-99, 2002-04 and 2007-08, even though the 2006 and 2009-11 mean was below the long-term average. ($P \leq 0.03$, $t=2.3$, $df=23$), (Table 2.1, Figure 2.4).

Presence of Other Important Recreational Finfish

YOY scup is another recent addition to the seine survey, first occurring in 1999, with the highest relative abundance in the last nine years of the time series, a reflection of strong recruitment and survival in recent years (Table 2.3, Figure 2.7). Juvenile striped bass first occurred in the survey in 1999 with one individual captured. In 2003 six more YOY stripers were taken (Table 2.3, Figure 2.8). One large individual (369mm) was captured in 2008. YOY summer flounder have occurred in nine years (more recently) of the 23-year time series (1993, 1994, 1996, and 1998, 2006 - 2010). The 2010 summer flounder abundance was the third highest of the time series. No summer flounder were captured in 2011. YOY black sea bass first appeared in 1991 and every year since 1997, reaching their highest abundance in 2011, (Figure 2.7). Snapper bluefish have occurred in 18 out of 24 years of the time series, reaching peak abundance in 1999. Juvenile tautog have occurred every year in the seine survey except 1989. White perch appeared in record numbers in 2008 and only once prior (2005) were present in 2011. Atlantic tomcod, a threatened species re-appeared in 2008 and 2011, none were present in 2009 and 2010.

Relative Abundance of Forage Species

Seine survey catches are numerically dominated by forage species, defined here as short-lived, highly fecund species that spend the majority of their life cycle inshore where they are common food for piscivorous fish. An index of forage fish abundance was generated using the catch of four of the most common forage species caught: Atlantic silversides, striped killifish, mummichog, and sheepshead minnow (Figure 2.5, Figure 2.6). The index for 2011 was the seventh highest in the 24 year time series. Only one of the four forage fish species (Atlantic silverside) decreased in occurrence in 2011. Atlantic silverside abundance declined in 2011 from the fourth highest in 2010. Atlantic silversides were the most abundant, and the only species present at all sites in all samples (Table 2.1). There was a substantial increase in striped killifish, mummichog and sheepshead minnow abundance in 2011. An increase in these species' abundance in 2011 reversed a two-year decrease from 2009-2010. Striped killifish, increased in abundance

in 2011, to the highest in the long time-series. Mummichog abundance (3.1) was above the long-term average of 2.4 in 2011. Sheepshead minnow had a record abundance (3.35) in 2007 and decreased in 2008 through 2010. In 2011, the index of abundance of this forage fish (0.5) was substantially higher, ranking sixth in the time series. Striped killifish abundance and occurrence increased significantly and was above the series mean levels in 2011 (28.7 fish/tow, 98% occurrence). Collectively, killifish abundance has not been high in 2001-2004, 2006 and 2009. However, it was the only forage fish species to remain at high levels in 2008.

Forage fish abundance has generally been increasing since 1997 (Figure 2.5) after a period of lower abundance (decreasing trend) since 1991. In 2011, forage fish abundance rose above the series mean of 97 fish/haul, with a mean catch of 127 fish per haul (slight decline from 2010). Forage fish abundance is driven numerically by the occurrence of adult Atlantic silverside (Figure 2.6) and more recently striped killifish, mummichog and sheepshead minnow, the second and third most abundant forage species. Striped killifish are more suited to marine habitats, than other 'Fundulus' species captured in the estuarine seine survey. Striped killifish were captured at historically high numbers in 2011, suggesting excellent year class production and survival 2 –3 years ago, since the survey captures adults more effectively. Mummichog, the third most abundant forage fish (Table 2.3) in the survey, peaked in abundance in 2007. The lowest time series abundance occurred in 1997, mummichog appear to be stable with an above average catches since 1999. Sheepshead minnow the least abundant of the four forage fish species monitored has recently shown elevated abundances in 2002-04 and 2007-09, with a record year in 2007 (3.35 fish/tow) and above average catches in 2008 (1.2 fish/tow) followed by slight decreases in 2009 and 2010. In 2011, the sheepshead minnow catch rebounded and was slightly above average (0.5 fish/tow).

Relative Abundance of Invertebrate Species

A total of 5,787 invertebrates of ten species were captured in 2011 (Table 2.3), (Appendix 2.2). Seven crab species were present in the seine hauls, along with two shrimp species and one gastropod. Mud snail, sand shrimp, shore shrimp, green crab, and hermit crab were the most abundant, and only mud snails, shore shrimp, sand shrimp, and hermit crab had greater than 50% occurrence in 2011 (Table 2.3). Blue crab abundance continued to remain low in 2011 from an all-time high in 2009 (333 crabs). The Asian shore crab (Japanese crab) re-appeared in 2011 from being absent from 2008-10. Both sand and shore shrimp increased in abundance in 2011 from the previous year (Table 2.3). Mud snail abundance was at the time series average. Mud crabs dropped significantly in 2011 from an all-time high in 2010. Spider crab abundance was at a time-series high in 2011.

MODIFICATIONS

None.

LITERATURE CITED

Northeast Utilities Service Company (NUSCo), 2002. Monitoring the marine environment of Long Island Sound at Millstone Nuclear Power Station, Waterford, CT. Winter flounder studies, Table 6, page 34.

Table 2.1: Geometric mean catch of species commonly taken in seine samples, 1988-2011. *See Appendix 3.1 for complete species names.*

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
alewife	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
American sand lance	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
American shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Atlantic menhaden	0.1	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.1	0.4	0.4	0.4
Atlantic silverside	68.2	31.6	45.0	88.5	51.2	42.7	37.7	27.0	17.7	23.1	74.3	102.5	99.7
Atlantic tomcod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
black sea bass	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.1	0.0
blueback herring	0.0	0.1	0.0	0.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
bluefish	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.0
cunner	0.2	0.3	0.0	0.1	0.2	0.0	0.3	0.2	0.3	0.0	0.3	0.5	0.3
fourspine stickleback	0.3	0.4	0.0	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0
grubby	0.8	0.1	0.0	0.1	0.5	0.1	0.4	0.3	0.2	0.3	0.2	0.5	0.1
inshore lizardfish	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.4	0.1	0.2	0.2
mummichog	2.8	1.6	1.1	1.9	1.6	3.7	3.3	0.7	1.2	0.5	2.0	0.8	3.2
naked goby	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
northern kingfish	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.0	0.1	0.1	0.1	0.0
northern pipefish	0.7	0.3	0.4	1.0	0.9	0.9	1.1	0.5	1.0	0.4	2.1	1.0	1.0
northern puffer	0.1	0.3	0.1	0.4	0.1	0.4	0.2	0.5	0.2	0.1	0.1	0.2	0.6
rainbow smelt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
scup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
sheepshead minnow	0.8	1.0	0.1	0.6	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.4
smallmouth flounder	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.0
striped bass	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
striped killifish	11.9	7.9	5.9	4.2	3.1	4.9	5.1	3.9	2.0	1.5	7.2	4.5	8.6
striped searobin	0.2	0.2	0.1	0.2	0.1	0.9	0.1	0.0	0.1	0.4	1.9	0.6	0.1
summer flounder	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
tautog	0.3	0.1	0.3	0.7	0.4	0.2	0.8	0.7	0.3	0.2	0.9	1.3	0.5
weakfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
windowpane flounder	0.6	0.1	0.2	0.2	0.3	0.3	0.1	0.2	0.7	0.4	0.1	0.1	0.1
winter flounder	0.2	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
winter flounder YOY	15.4	1.7	2.9	5.2	11.9	5.7	14.2	10.1	19.2	7.5	9.2	8.7	4.3

Table 2.1: Geometric mean catch of species commonly taken in seine samples, 1988-2011. *See Appendix 3.1 for complete species names.*

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
alewife	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
American sand lance	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.0**
American shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
Atlantic menhaden	0.0	1.0	8.2	0.4	0.2	0.4	0.6	0.1	0.3	0.0	**0.1**
Atlantic silverside	36.1	80.1	113.6	85.1	81.3	37.7	74.9	57.5	66.8	96.9	**66.5**
Atlantic tomcod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.1**
black sea bass	1.0	0.4	0.2	0.4	0.1	0.5	0.6	0.3	1.1	0.4	**3.2**
blueback herring	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
bluefish	0.1	0.0	0.2	0.2	0.1	0.2	0.0	0.0	0.3	0.0	**0.2**
cunner	0.2	0.3	0.2	0.5	0.3	0.1	0.5	0.1	0.2	0.1	**0.0**
fourspine stickleback	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
grubby	0.2	0.3	0.5	1.3	0.8	0.3	0.3	0.2	0.5	0.3	**0.7**
inshore lizardfish	1.2	0.0	0.0	0.0	0.0	1.9	0.2	0.3	0.2	0.1	**0.2**
mummichog	1.4	3.4	2.9	2.3	1.5	2.5	7.3	2.9	3.8	1.7	**3.1**
naked goby	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	**0.0**
northern kingfish	0.2	0.1	0.2	0.3	0.1	0.0	0.0	0.2	0.3	0.5	**0.2**
northern pipefish	1.4	0.5	0.3	0.7	0.5	0.6	0.8	0.7	1.9	0.6	**1.1**
northern puffer	0.2	0.7	0.7	0.7	0.5	0.4	1.2	0.2	0.3	0.4	**0.4**
rainbow smelt	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
scup	0.5	1.0	0.6	0.2	0.9	0.1	1.0	0.1	1.9	0.1	**0.2**
sheepshead minnow	0.2	0.6	0.7	0.5	0.2	0.2	3.3	1.2	0.5	0.3	**0.5**
smallmouth flounder	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	**0.9**
striped bass	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
striped killifish	7.5	14.5	14.9	12.9	19.4	7.1	21.2	21.7	12.3	15.9	**28.7**
striped searobin	0.4	0.3	0.7	0.5	0.2	0.1	0.3	0.3	0.8	0.2	**0.1**
summer flounder	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.1	**0.0**
tautog	0.6	1.5	1.1	1.4	0.7	0.4	2.4	1.0	0.4	0.4	**0.3**
weakfish	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
windowpane flounder	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.2	0.0	0.0	**0.1**
winter flounder	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.0	**0.0**
winter flounder YOY	1.3	3.1	8.1	11.0	5.6	0.9	4.7	2.0	0.8	1.0	**1.1**

Table 2.1 cont.: Percent occurrence of species commonly taken in seine samples, 1988-2011. See Appendix 3.1 for species names.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
alewife	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
American sand lance	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic menhaden	0.06	0.05	0.04	0.04	0.19	0.06	0.10	0.04	0.00	0.06	0.06	0.15	0.10
Atlantic silverside	0.97	0.93	0.96	1.00	1.00	0.96	1.00	0.96	0.94	0.92	0.98	0.94	1.00
Atlantic tomcod	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00
black sea bass	0.00	0.00	0.00	0.04	0.00	0.00	0.15	0.04	0.00	0.00	0.06	0.08	0.02
blueback herring	0.00	0.05	0.04	0.13	0.04	0.00	0.06	0.02	0.00	0.00	0.02	0.08	0.02
bluefish	0.00	0.00	0.00	0.10	0.02	0.00	0.02	0.00	0.00	0.02	0.13	0.46	0.04
cunner	0.17	0.19	0.04	0.10	0.15	0.00	0.23	0.15	0.13	0.02	0.21	0.23	0.19
fourspine stickleback	0.17	0.19	0.00	0.23	0.15	0.04	0.02	0.00	0.04	0.00	0.13	0.04	0.02
grubby	0.33	0.07	0.04	0.10	0.31	0.06	0.33	0.25	0.19	0.29	0.17	0.27	0.10
inshore lizardfish	0.06	0.00	0.04	0.00	0.00	0.06	0.10	0.00	0.00	0.29	0.06	0.17	0.19
mummichog	0.47	0.48	0.35	0.40	0.38	0.50	0.42	0.35	0.42	0.15	0.42	0.29	0.44
naked goby	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.02	0.00
northern kingfish	0.00	0.00	0.00	0.06	0.08	0.10	0.04	0.15	0.04	0.13	0.10	0.08	0.04
northern pipefish	0.42	0.31	0.37	0.63	0.35	0.50	0.58	0.33	0.44	0.33	0.73	0.48	0.54
northern puffer	0.08	0.24	0.09	0.27	0.08	0.31	0.17	0.40	0.15	0.06	0.10	0.19	0.35
rainbow smelt	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
scup	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
sheepshead minnow	0.31	0.31	0.09	0.21	0.04	0.02	0.02	0.04	0.00	0.04	0.04	0.06	0.17
smallmouth flounder	0.03	0.00	0.00	0.02	0.00	0.13	0.10	0.06	0.04	0.04	0.00	0.21	0.06
striped bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00
striped killifish	0.78	0.67	0.65	0.73	0.58	0.65	0.58	0.69	0.54	0.40	0.75	0.67	0.63
striped searobin	0.11	0.12	0.11	0.10	0.08	0.48	0.10	0.02	0.10	0.35	0.60	0.38	0.10
summer flounder	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.00	0.02	0.00	0.02	0.00	0.00
tautog	0.22	0.05	0.22	0.42	0.31	0.19	0.33	0.33	0.13	0.17	0.38	0.46	0.23
weakfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
windowpane flounder	0.31	0.10	0.13	0.23	0.23	0.19	0.17	0.19	0.35	0.23	0.13	0.13	0.06
winter flounder	0.25	0.12	0.00	0.15	0.08	0.23	0.17	0.19	0.10	0.15	0.10	0.06	0.15
winter flounder YOY	0.97	0.71	0.74	0.92	0.98	0.88	0.98	0.94	1.00	0.94	0.92	0.88	0.77

Table 2.1 cont.: Percent occurrence of species commonly taken in seine samples, 1988-2011. See Appendix 3.1 for species names.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
alewife	0.00	0.04	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
American sand lance	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	**0.00**
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
Atlantic menhaden	0.02	0.27	0.58	0.08	0.06	0.13	0.17	0.02	0.15	0.02	**0.02**
Atlantic silverside	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**1.00**
Atlantic tomcod	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.00	0.00	**0.06**
black sea bass	0.25	0.17	0.13	0.25	0.08	0.23	0.23	0.15	0.27	0.13	**0.58**
blueback herring	0.00	0.04	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.02	**0.00**
bluefish	0.13	0.02	0.10	0.15	0.04	0.08	0.00	0.02	0.15	0.02	**0.10**
cunner	0.15	0.13	0.17	0.29	0.21	0.13	0.25	0.10	0.17	0.08	**0.04**
fourspine stickleback	0.06	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.00	**0.04**
grubby	0.17	0.21	0.29	0.50	0.46	0.27	0.15	0.19	0.27	0.21	**0.42**
inshore lizardfish	0.56	0.04	0.00	0.06	0.00	0.60	0.13	0.19	0.15	0.13	**0.10**
mummichog	0.42	0.54	0.44	0.35	0.27	0.48	0.65	0.48	0.50	0.40	**0.42**
naked goby	0.08	0.02	0.02	0.04	0.00	0.08	0.00	0.02	0.00	0.00	**0.02**
northern kingfish	0.13	0.04	0.15	0.17	0.10	0.02	0.02	0.19	0.17	0.23	**0.13**
northern pipefish	0.48	0.19	0.25	0.48	0.25	0.29	0.42	0.23	0.52	0.40	**0.44**
northern puffer	0.17	0.35	0.31	0.40	0.31	0.29	0.44	0.23	0.23	0.21	**0.31**
rainbow smelt	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
scup	0.23	0.35	0.25	0.13	0.29	0.04	0.29	0.02	0.38	0.04	**0.06**
sheepshead minnow	0.10	0.15	0.19	0.15	0.15	0.06	0.40	0.27	0.13	0.10	**0.13**
smallmouth flounder	0.13	0.00	0.00	0.00	0.00	0.02	0.00	0.13	0.15	0.06	**0.40**
striped bass	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00	**0.00**
striped killifish	0.71	0.85	0.81	0.73	0.96	0.65	0.88	0.94	0.75	0.90	**0.98**
striped searobin	0.29	0.25	0.40	0.38	0.13	0.13	0.27	0.19	0.40	0.17	**0.06**
summer flounder	0.00	0.00	0.00	0.00	0.00	0.19	0.06	0.15	0.02	0.04	**0.00**
tautog	0.40	0.54	0.50	0.54	0.42	0.17	0.54	0.42	0.35	0.31	**0.23**
weakfish	0.00	0.00	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
windowpane flounder	0.00	0.02	0.10	0.21	0.15	0.06	0.04	0.10	0.00	0.04	**0.02**
winter flounder	0.04	0.02	0.00	0.17	0.21	0.15	0.08	0.15	0.04	0.04	**0.04**
winter flounder YOY	0.58	0.79	0.85	0.98	0.94	0.46	0.92	0.71	0.52	0.60	**0.63**

Table 2.2: Mean catch of young-of-year winter flounder at eight sites sampled by seine, 1988-2011.

Year	BPT	CLT	GRT	GRW	MIL	NHH	OLM	WTF	All Sites
1988	*18.72	2.73	11.39	9.63		38.66	58.19	29.57	**15.4**
1989	1.7	1.14	1.53	0.7		2.14	2.04	2.99	**1.7**
1990	3.97	0.19	2.21	0.51	1.62	5.69	16.83	2.64	**2.9**
1991	1.77	4.1	5.62	1.99	2.46	6.45	15.32	18.25	**5.2**
1992	3.34	5.53	6.25	9.42	4.29	40.15	47.99	32.52	**11.9**
1993	1.22	1.4	8.59	4.33	3.62	11.47	13.34	16.66	**5.7**
1994	4.46	8.11	38.36	4.26	4.62	35.34	61.65	21.03	**14.2**
1995	1.94	3.19	30.28	7.22	1.77	18.93	34.23	36.58	**10.1**
1996	7.67	11.81	15.67	*12.61	*6.58	*49.29	91.34	30.53	***19.2**
1997	2.87	6.61	23.69	3.43	1.64	3.79	52.01	11.25	**7.5**
1998	1.24	4.03	17.63	8.12	0.91	22.37	57.19	21.89	**9.2**
1999	1.04	2.6	25.7	7.95	3.49	0.94	*137.07	36.12	**8.7**
2000	2.14	0.51	0.76	6.65	0.78	1.74	48.34	*41.56	**4.3**
2001	0.2	1.12	4.12	1.24	0.59	0	0.91	9.1	**1.3**
2002	0.91	2.66	3.06	5.08	0.26	1.08	15.55	8.98	**3.1**
2003	1.88	4.61	*45.78	5.88	0.89	1.7	51.13	32.3	**8.1**
2004	1	*18.36	33.84	11.27	3.36	33.06	11.13	13.04	**11.0**
2005	1.94	11.14	16.7	7.71	5.14	1.64	4.06	7.3	**5.6**
2006	0.12	1.38	5.53	0.12	0	0	3.3	1.29	**0.9**
2007	0.78	5.65	17.9	4.44	0.78	6.42	7.89	7.11	**4.7**
2008	0.51	2.45	10.84	0.51	0	1.57	2.62	5.94	**2.0**
2009	0.91	1.62	2.29	0.12	0.51	0.12	0.12	1.75	****0.8**
2010	0.41	1.11	1.71	1.33	0.12	0.41	1.88	1.57	**1.0**
2011	**0.12**	**0.98**	**1.18**	**2.26**	**0.78**	**0.12**	**4.27**	**1.45**	**1.1**

*record high for a site/year.
** record low for time-series

Table 2.3: Total catch 1988-2011.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
alewife							1							
American eel	1	3					1				5			
American sand lance					1		10							
American shad			1											
American shad (1+)		18									151			
Anchovy, spp (YOY)														
Atlantic menhaden	3	2	2	4	1,074	3	9	2		11	2,003	377	1,236	1
Atlantic needlefish														
Atlantic silverside	4,750	3,316	5,356	6,383	5,468	5,263	6,311	2,352	1,942	3,249	6,345	10,120	8,738	4,417
Atlantic tomcod						3					1			
banded gunnel											2	3		
banded rudderfish														
bay anchovy								4	69		27			1
black sea bass				10			41	43			27	14	2	687
blue spotted coronet fish												1		
blueback herring		26	3	194	10		5	2			3	24	1	
bluecrab														
bluefish				15	2		1			1	9	142	3	8
boreal squid														
brown shrimp														
burrfish, striped												1		
butterfish								1						
channeled whelk														
common slipper shell														
crevalle jack	6													
cunner	15	27	2	5	19		42	24	63	1	23	142	26	15
flat claw hermit crab														
flying gurnard														
fourspine stickleback	33	76		183	11	21	1		3		24	3	1	7
gizzard shad														
green crab														
grey snapper			1											
grubby	111	3	2	7	61	6	38	19	21	28	17	55	15	73
hogchoker									2					

Table 2.3: Total catch 1988-2011.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Grand Total
alewife	28	1									**30**
American eel											**10**
American sand lance									13		**24**
American shad											**1**
American shad (1+)											**169**
Anchovy, spp (YOY)							15				**15**
Atlantic menhaden	1,284	5,098	1,117	75	117	144	21	54	3	43	**12,683**
Atlantic needlefish							2				**2**
Atlantic silverside	5,730	13,278	5,122	5,089	3,267	5,087	3,245	4,156	7,063	4,657	**130,704**
Atlantic tomcod			1	3			1			8	**17**
banded gunnel			4	2	3	1	3			1	**19**
banded rudderfish									1		**1**
bay anchovy	11		1	12					1		**126**
black sea bass	63	27	110	15	82	109	33	304	86	489	**2,142**
blue spotted coronet fish											**1**
blueback herring	13	5				9			3		**298**
bluecrab			*1*	*2*	*84*	*31*	*4*	*333*	*35*	*23*	***513***
bluefish	2	17	23	8	30		7	53	1	26	**348**
boreal squid						1					**1**
brown shrimp					*11*						**11**
burrfish, striped										10	**11**
butterfish											**1**
channeled whelk									*1*		***1***
common slipper shell					*13*						***13***
crevalle jack									1		**7**
cunner	110	15	54	35	18	58	8	28	15	2	**747**
flat claw hermit crab			*761*	*532*	*703*	*153*	*244*	*539*	*558*	*441*	***3,931***
flying gurnard						1					**1**
fourspine stickleback			9		2			8		2	**384**
gizzard shad										4	**4**
green crab			*234*	*266*	*341*	*147*	*644*	*176*	*308*	*228*	***2,344***
grey snapper											**1**
grubby	33	95	143	76	31	32	16	51	25	55	**1,013**
hogchoker								1			**3**

Table 2.3: Total catch 1988-2011.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
inshore lizardfish	5		2			4	6			46	6	16	15	103
Japanese shore crab														
Jonah crab														
lady crab														
lined seahorse							4			1			2	
little skate										1				
mole crab														
moon jelly														
mud crabs														
mud snail														
mummichog	1,031	197	171	765	573	1,256	1,943	78	149	190	396	115	1,008	246
naked goby			1	4				1			1	1		4
northern comb jelly														
northern kingfish				3	4	23	2	9	3	10	7	6	5	17
northern pipefish	65	23	33	106	120	82	117	52	241	38	295	141	96	189
northern puffer	4	22	13	34	4	37	15	40	25	5	5	13	63	14
northern searobin		2	1				1	1					3	40
northern sennet														
northern star gazer		5												
oyster drill														
oyster toadfish	5			1						1	1			1
pumpkinseed				2										
rainbow smelt						5	2							
rainwater killifish									3	4			2	
rock crab														
rock gunnel			1		1	1	1			3				
sand shrimp														
scup												1		58
sheepshead minnow	174	815	5	345	4	1	2	30		14	19	12	267	59
shore shrimp														
smallmouth flounder	1			1		8	14	7	2	5		40	3	12
smooth dogfish			1											
spider crab														
***starfish spp*.**														
striped anchovy														
striped bass												1		

Table 2.3: Total catch 1988-2011.

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Grand Total
inshore lizardfish	2		3		169	18	26	22	10	16	**469**
Japanese shore crab			*1*		*1*	*1*				*6*	***9***
Jonah crab								*2*			***2***
lady crab			*298*	*119*	*66*	*195*	*92*	*42*	*19*	*24*	***855***
lined seahorse						2	7	2	1	2	**21**
little skate	1										**2**
mole crab			*1*	*5*							***6***
moon jelly									*319*		***319***
mud crabs			*60*	*55*	*74*	*30*	*85*	*67*	*308*	*80*	***759***
mud snail			*948*	*2,071*	*4,478*	*3,569*	*3,810*	*3,128*	*2,699*	*2,683*	***23,386***
mummichog	811	702	637	543	398	1,203	498	857	299	775	**14,841**
naked goby	2	2	2		13		2			2	**35**
northern comb jelly								*346*	*36*		***382***
northern kingfish	5	21	38	11	1	1	23	42	76	30	**337**
northern pipefish	87	25	72	92	82	75	156	307	49	248	**2,791**
northern puffer	79	101	75	93	34	241	19	41	51	28	**1,056**
northern searobin	24	5	4	13	2	10			1	9	**116**
northern sennet					1						**1**
northern star gazer											**5**
oyster drill					*38*						***38***
oyster toadfish		1	2	1	1	1	2	1			**18**
pumpkinseed			3								**5**
rainbow smelt			34								**41**
rainwater killifish	6	35	53	19	3						**125**
rock crab			*2*						*1*		***3***
rock gunnel			1				1				**9**
sand shrimp			*278*	*373*	*1,027*	*525*	*2,625*	*762*	*902*	*1,507*	***7,999***
scup	172	131	50	154	6	170	14	413	21	30	**1,220**
sheepshead minnow	402	276	205	28	104	1,439	304	203	82	219	**5,009**
shore shrimp			*990*	*404*	*1,149*	*707*	*1,390*	*535*	*619*	*762*	***6,556***
smallmouth flounder					1		14	21	5	114	**248**
smooth dogfish											**1**
spider crab			*4*	*5*	*6*	*1*	*3*	*1*	*7*	*33*	***60***
starfish spp.									1		**1**
striped anchovy								3			**3**
striped bass		6					1				**8**

Table 2.3: Total catch 1988-2011.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
striped killifish	1,511	1,383	748	659	465	773	1,923	520	269	289	1,066	539	1,797	1,494
striped searobin	22	12	5	94	5	71	5	1	9	40	178	51	7	33
summer flounder						2	6		1		1			
tautog	23	5	23	72	32	16	104	88	42	19	135	174	67	59
threespine stickleback														11
weakfish														
web burrfish														
white mullet	1	1	8		3									
white perch														
windowpane flounder	49	4	22	19	35	30	9	13	71	50	12	10	4	
winter flounder	12	6		7	6	14	13	12	21	282	9	4	7	2
winter flounder YOY	900	117	276	410	1,055	483	1,401	916	1,486	874	999	1,497	708	138
yellow jack														
Grand Total	**8,722**	**6,063**	**6,677**	**9,323**	**8,953**	**8,102**	**12,028**	**4,215**	**4,422**	**5,162**	**11,767**	**13,503**	**14,076**	**7,689**

Species	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	Grand Total
striped killifish	1,698	3,410	1,548	1,470	1,063	1,994	1,874	1,508	1,300	1,964	31,265
striped searobin	33	62	38	19	6	32	36	82	14	4	859
summer flounder					16	8	8	1	6		49
tautog	153	140	145	64	93	321	131	25	33	27	1,991
threespine stickleback											11
weakfish		15									15
web burrfish					1				1		2
white mullet	1				7	7	11		75	68	182
white perch				3			11			6	20
windowpane flounder	1	5	15	15	3	2	17		2	4	392
winter flounder	3		9	11	7	6	13	2	2	2	450
winter flounder YOY	302	1,310	914	470	110	365	190	72	71	86	15,150
yellow jack									1		1
Grand Total	**11,056**	**24,783**	**14,010**	**12,153**	**13,662**	**16,696**	**15,606**	**14,188**	**15,125**	**14,718**	**272,699**

Figure 2.1: *Sampling locations of the seine survey along the coast of Connecticut.*

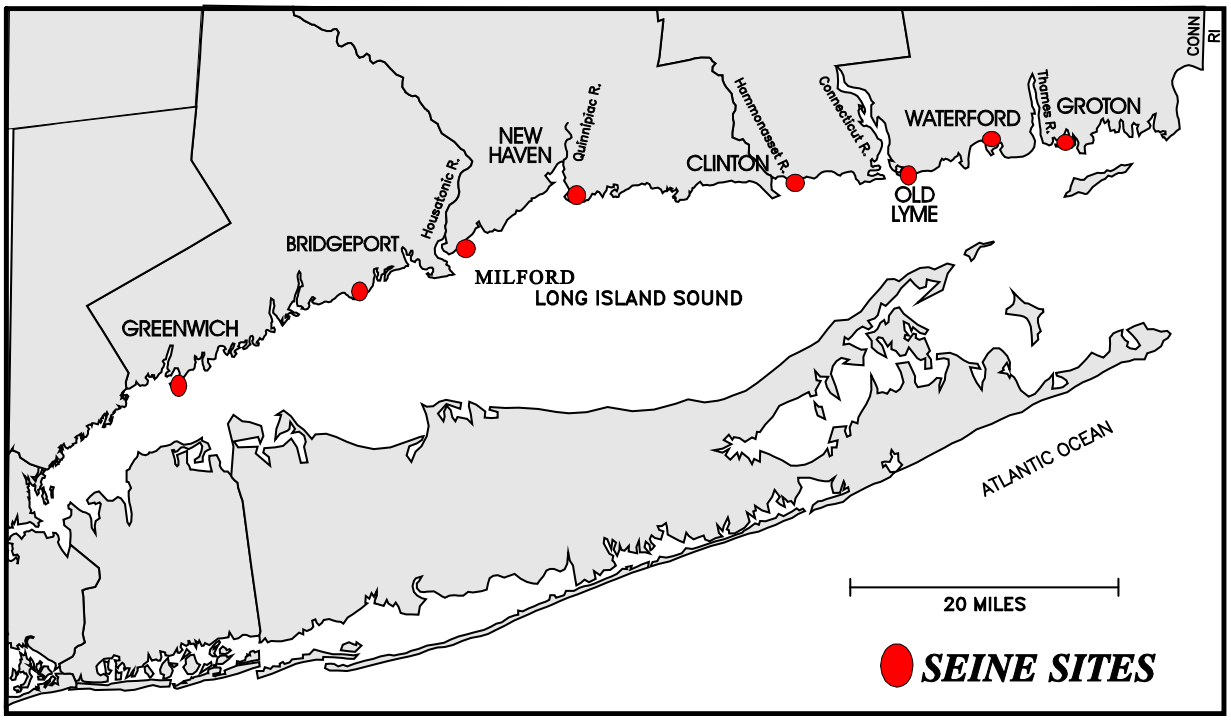

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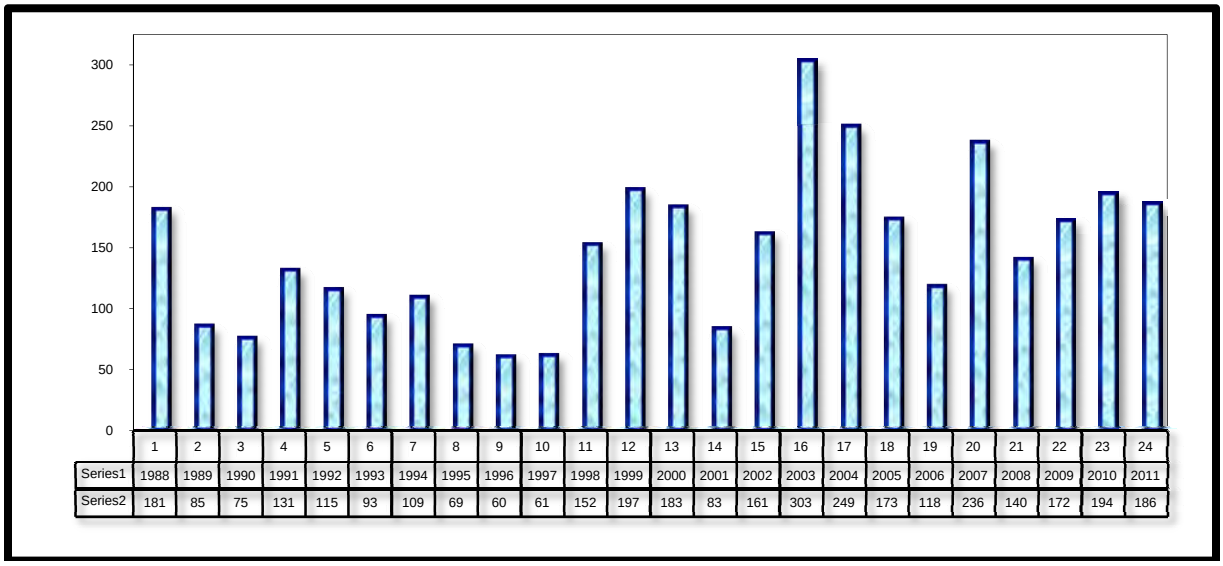
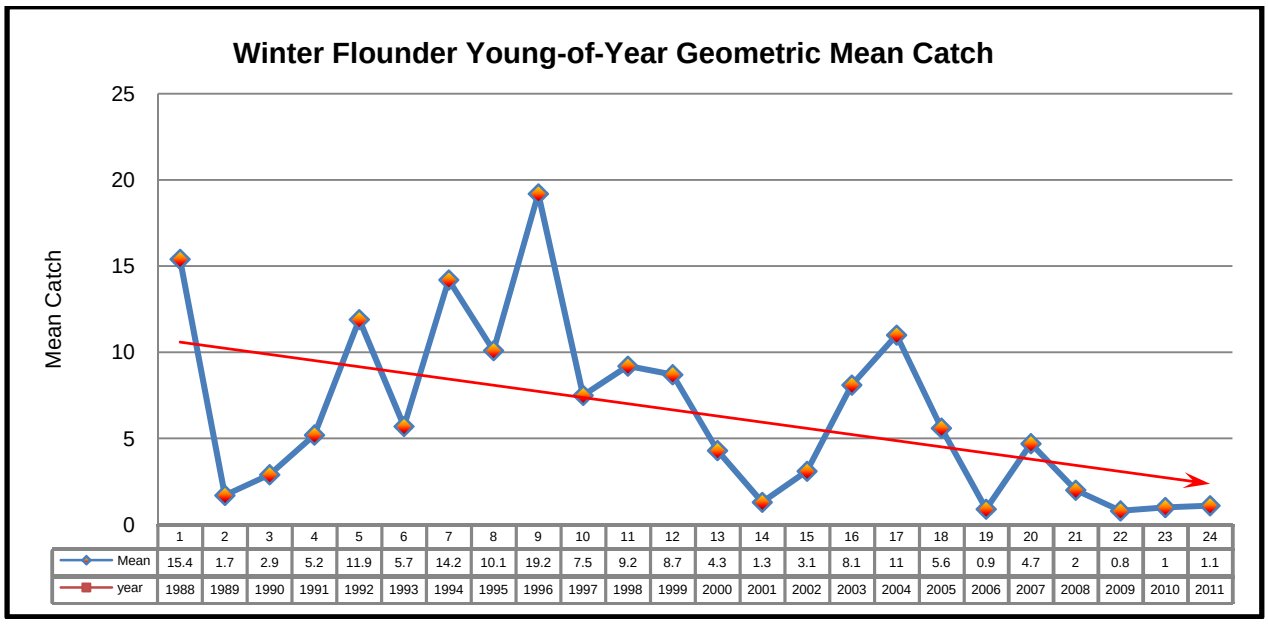
Figure 2.2: Mean catch (numbers) of all finfish taken in seine samples, 1988-2011.
Mean catch per haul includes samples at all sites. Note that sampling at the Milford site began in 1990.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Series1	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Series2	181	85	75	131	115	93	109	69	60	61	152	197	183	83	161	303	249	173	118	236	140	172	194	186

Figure 2.3: Mean catch of young-of-year winter flounder, 1988-2011. *The trend line is shown as a horizontal line with an arrow. Note that all sites are included with sampling at the Milford site beginning in 1990.*



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Mean	15.4	1.7	2.9	5.2	11.9	5.7	14.2	10.1	19.2	7.5	9.2	8.7	4.3	1.3	3.1	8.1	11	5.6	0.9	4.7	2	0.8	1	1.1
year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011

Figure 2.4: Mean catch of young-of-year tautog taken in seine samples, 1988-2011. *Geometric mean catch per haul (numbers) and occurrence (percent) includes samples at all sites. The time series trend line is shown by the yellow line. Note that sampling at the Milford site began in 1990.*

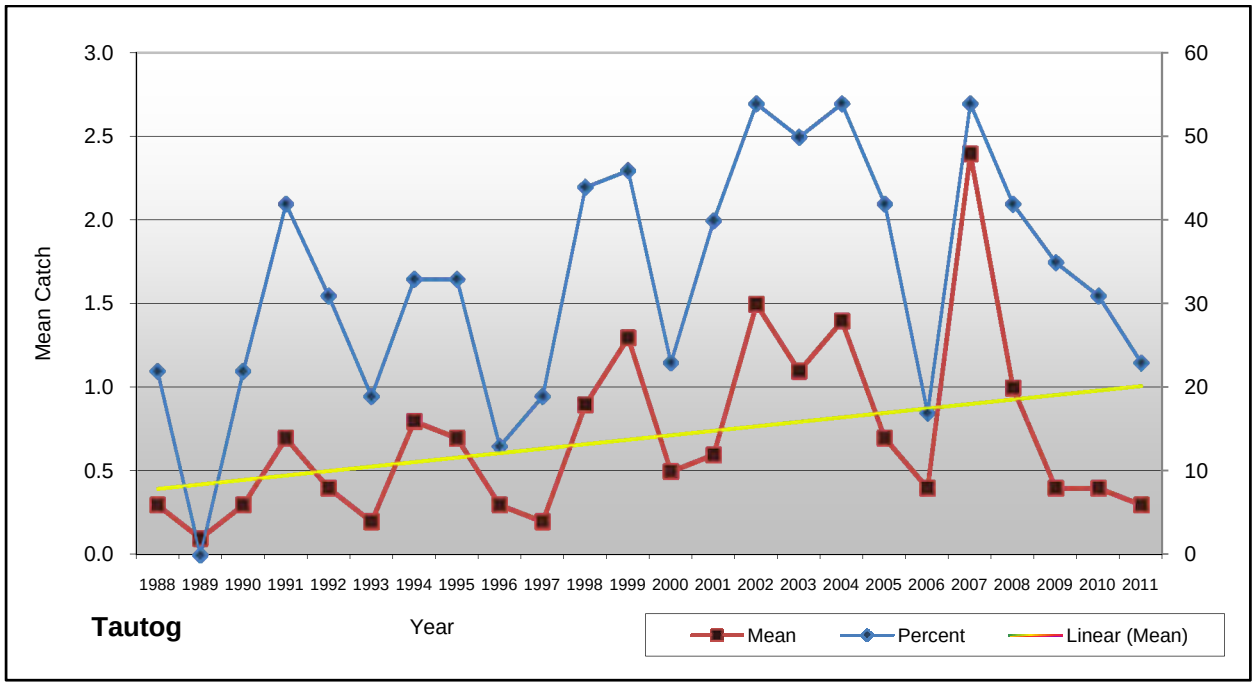


Figure 2.5: Mean catch of forage fish at eight sites sampled by seine, 1988-2011.
Forage species include Atlantic silversides, mummichog, sheepshead minnow, and striped killifish.
The 95% confidence interval (CI) for each mean is also listed. See Appendix 2.1 for complete species names.

MEAN CATCH PER STANDARD HAUL

YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
MEAN	139	62	65	110	71	65	57	43	26	32	100	127
95% CI	97-189	52-107	45-94	81-149	52-104	41-103	34-99	32-57	18-36	20-50	83-145	85-190

YEAR	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
MEAN	146	52	125	206	130	122	59	150	100	106	137	127
95% CI	108-197	32-86	97-162	152-281	108-155	101-147	43-82	119-187	82-121	86-131	112-167	105-153

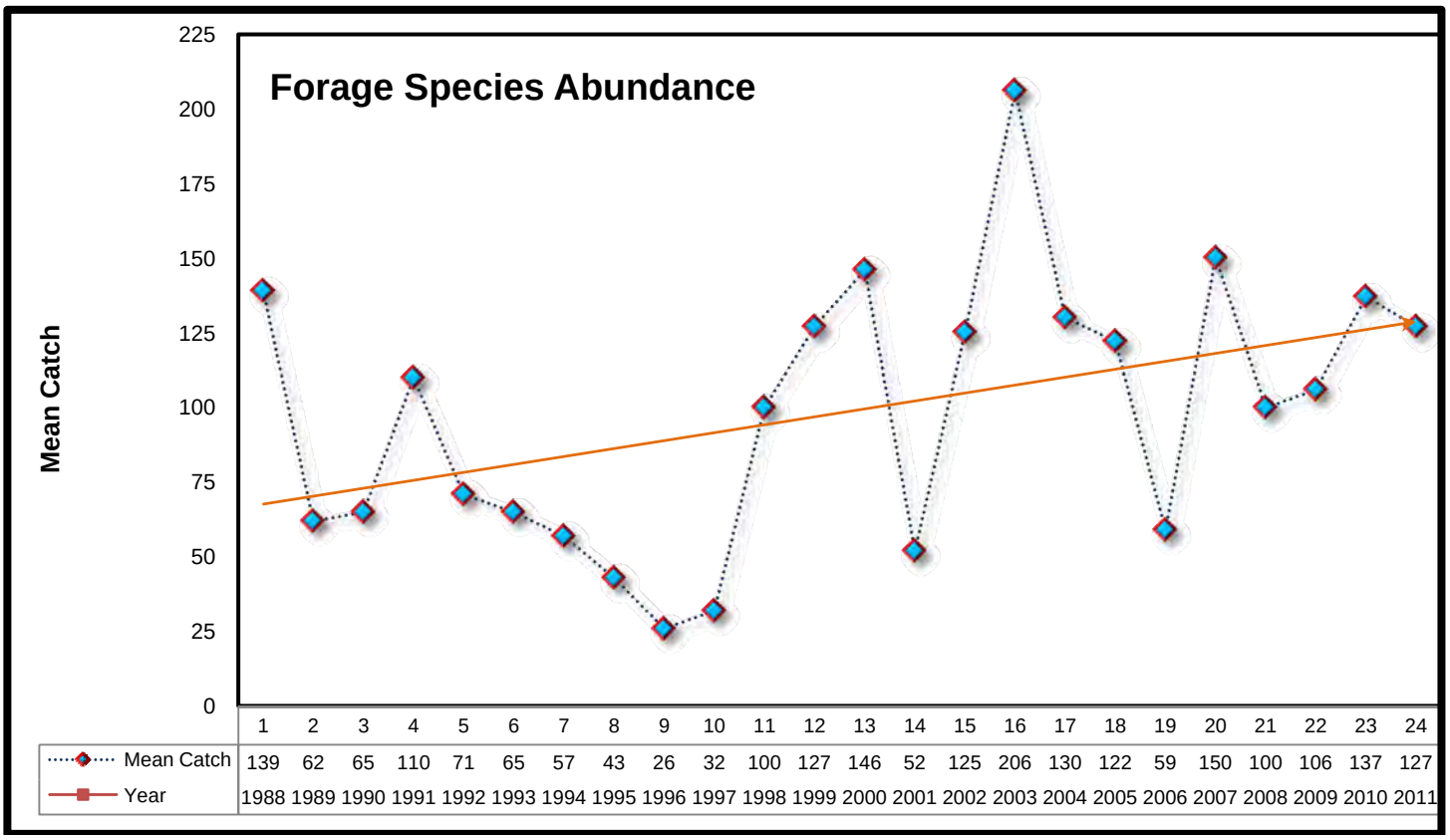


Figure 2.6: Total Catch of Four Species of Forage Fish, 1998-2011

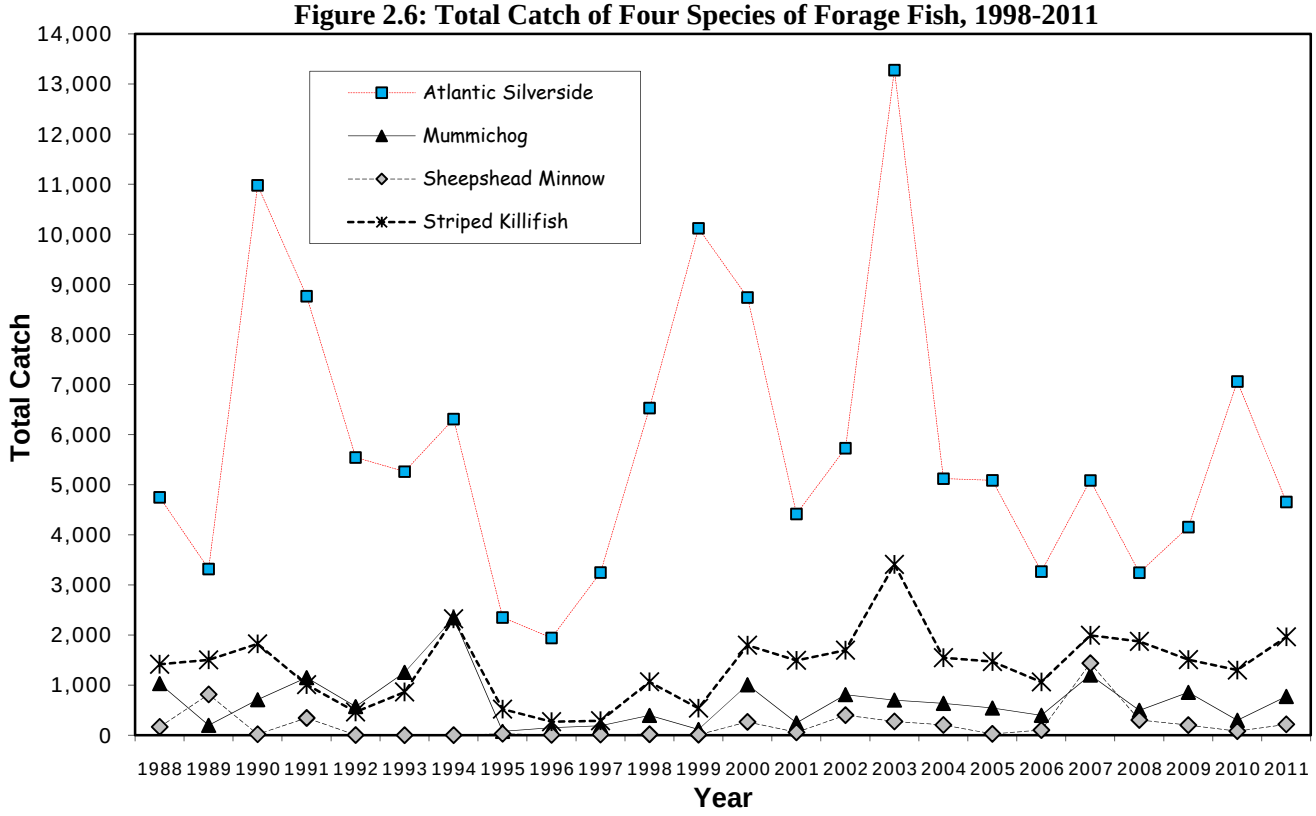


Figure 2.7: Total Catch of Juvenile Black Sea Bass and Scup, Recreational Important Finfish, 1988-2011

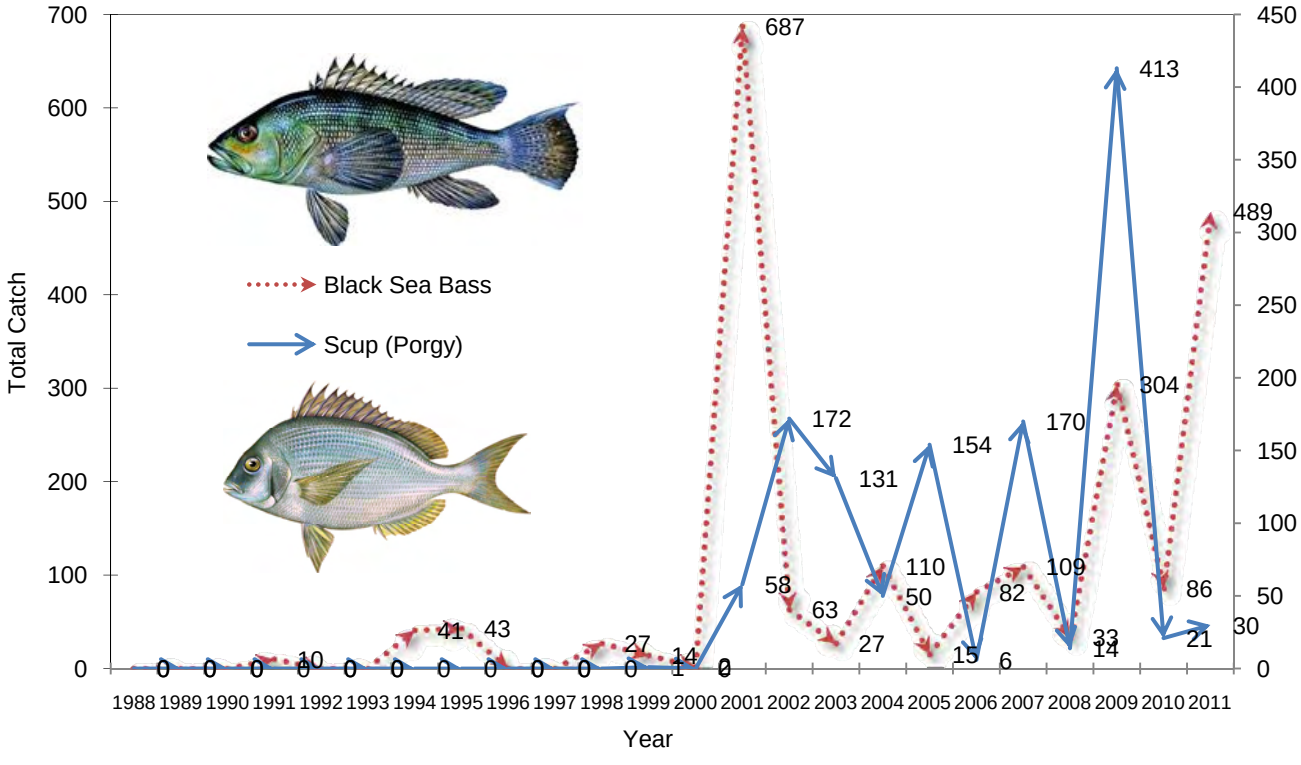


Figure 2.8: Total Catch of Juvenile Striped Bass, Summer Flounder and Weakfish, Recreational Important Finfish, 1988-2011

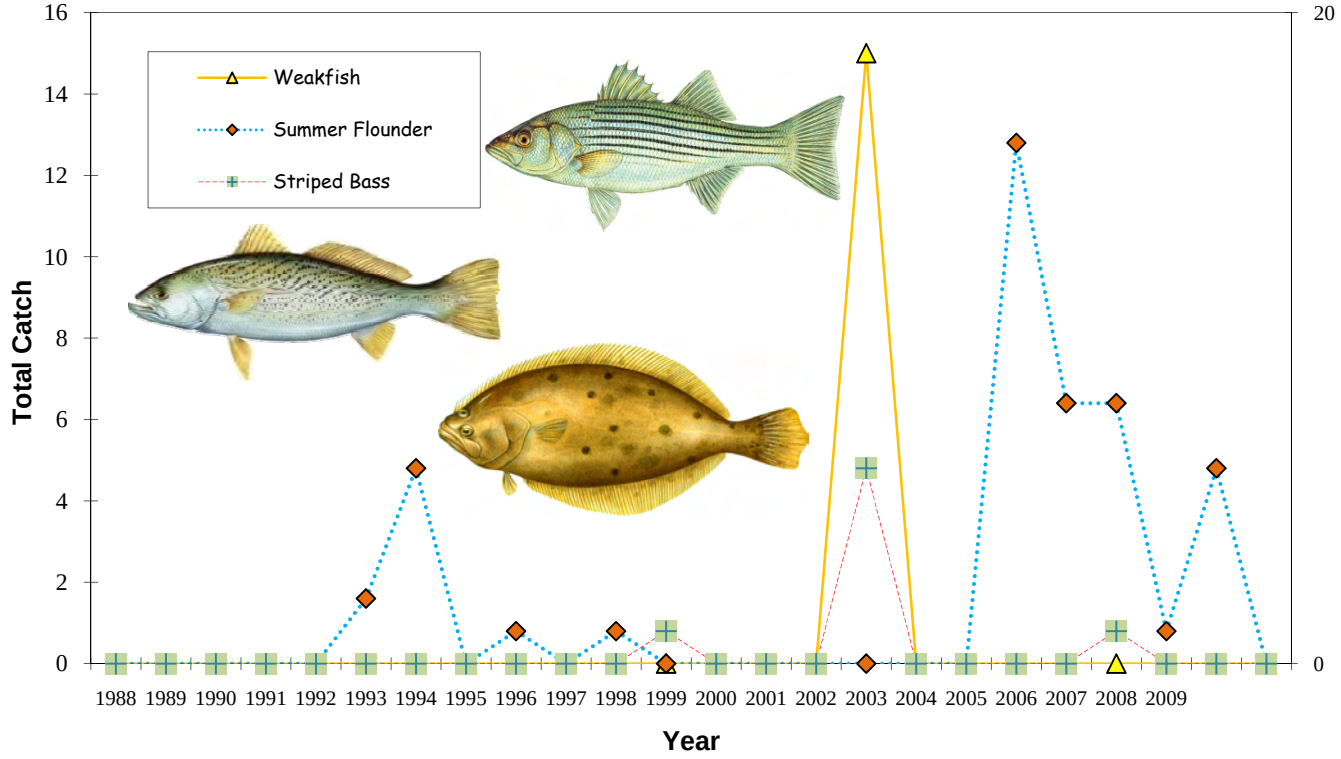
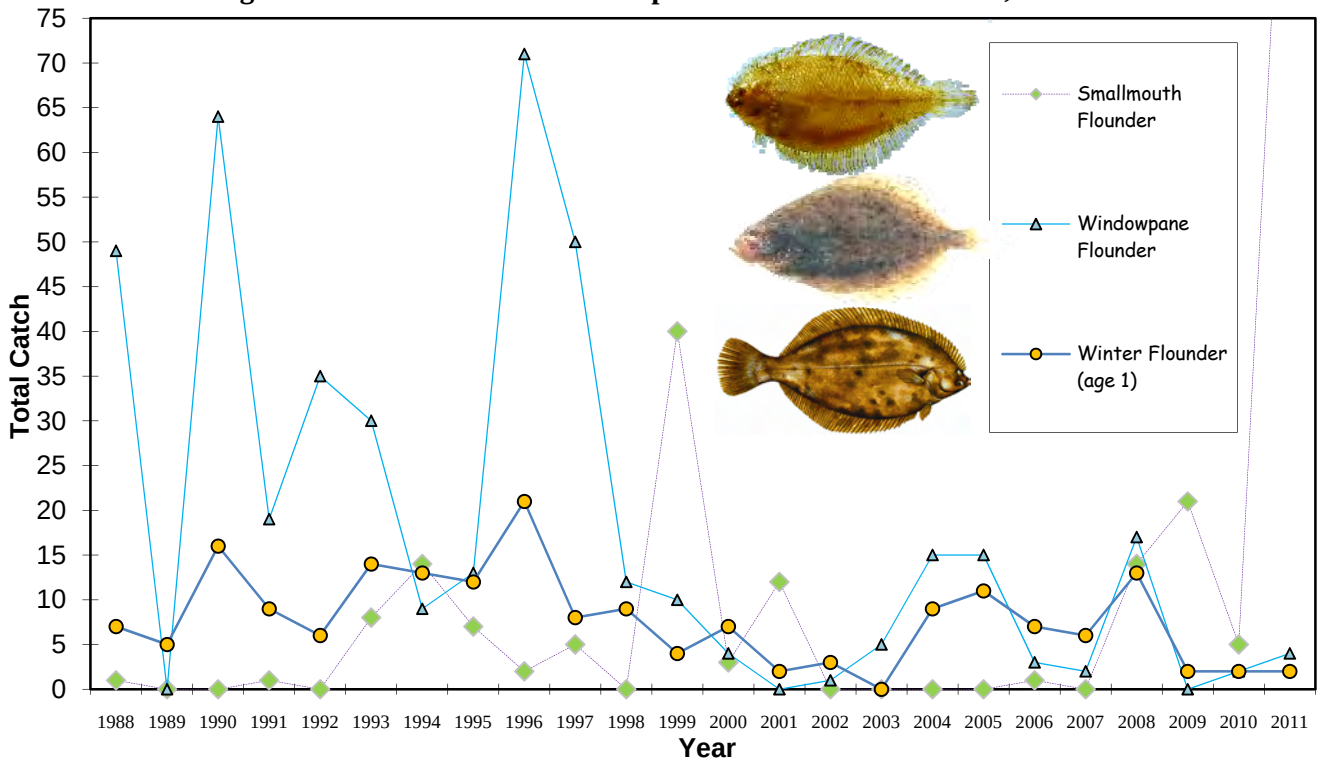


Figure 2.9: Total Catch of Three Species of Juvenile Flounders, 1998-2011



Appendix 2.1: Finfish species taken in the Estuarine Seine Survey, 1988-2011.

COMMON NAME	SPECIES CODE	*SCIENTIFIC NAME*
Alewife	**ALW**	*Alosa pseudoharengus*
American eel	**EEL**	*Anguilla rostrata*
American shad	**ASD**	*Alosa sapidissima*
American sand lance	**ASL**	*Ammodytes americanus*
Atlantic needlefish	**ANF**	*Strongylura marina*
Atlantic silversides	**ASS**	*Menidia menidia*
Atlantic tomcod	**TOM**	*Microgadus tomcod*
Banded gunnel	**BGN**	*Pholis fasciata*
Banded rudderfish	**RUD**	*Seriola zonata*
Bay anchovy	**ACH**	*Anchoa mitchilli*
Black-spot stickleback	**BSS**	*Gasterosteus wheatlandi*
Black sea bass	**BSB**	*Centropristis striata*
Blueback herring	**BBH**	*Alosa aestivalis*
Bluefish	**BLF**	*Pomatomus saltatrix*
Blue spotted coronetfish	**BSC**	*Fistularia tabacaria*
Crevalle jack	**CRJ**	*Caranx hippos*
Cunner	**CUN**	*Tautogolabrus adspersus*
Flying Gurnard	**FGD**	*Dactylopterus volitans*
Four-spine stickleback	**FSS**	*Apeltes quadracus*
Gizzard Shad	**GIZ**	*Dorosoma cepedianum*
Gray snapper	**GRA**	*Lutjanus griseus*
Grubby	**GRB**	*Myoxocephalus aeneus*
Hogchoker	**HOG**	*Trinectes maculatus*
Inshore lizardfish	**LIZ**	*Synodens foetens*
Little skate	**LSK**	*Raja erinacea*
Menhaden	**MEN**	*Brevoortia tyrannus*
Mummichog	**MUM**	*Fundulus heteroclitus*
Naked goby	**NKG**	*Gobiosoma bosci*
Nine-spine stickleback	**NSS**	*Pungitius pungitius*
Northern kingfish	**NKF**	*Menticirrhus saxatilis*
Northern pipefish	**PIP**	*Syngnathus fuscus*
Northern puffer	**PUF**	*Sphaeroides maculatus*
Northern searobin	**NSR**	*Prionotus carolinus*
Northern stargazer	**STR**	*Astroscopus guttatus*
Pumpkinseed	**PUM**	*Lepomis gibbosus*
Rainbow smelt	**RSM**	*Osmerus mordax*
Rainwater killifish	**RWK**	*Lucania parva*
Rock gunnel	**RGN**	*Pholis gunnellus*
Northern seahorse	**SEH**	*Hippocampus erectus*
Northern sennet	**NOS**	*Sphyraena borealis*
Scup	**PGY**	*Stenotomus chrysops*
Sheepshead minnow	**SHM**	*Cyprinodon variegatus*
Smallmouth flounder	**SMF**	*Etropus microstomus*
Smooth dogfish	**SMD**	*Mustelus canis*
Spotted hake	**SPH**	*Urophycis regius*
Striped anchovy	**STA**	*Anchoa hepsetus*
Striped bass	**STB**	*Morone saxatilis*
Striped burrfish	**SBF**	*Chilomycterus schoepfi*
Striped killifish	**SKF**	*Fundulus majalis*
Striped searobin	**SSR**	*Prionotus evolans*
Summer flounder	**SFL**	*Paralichthys dentatus*
Tautog	**BKF**	*Tautoga onitis*
Three-spine stickleback	**TSS**	*Gasterosteus aculeatus*
Toadfish	**TDF**	*Ospsanus tau*
Weakfish	**WKF**	*Cynoscion regalis*
Web Burrfish	**WBF**	*Chilomycterus antillarum*
White mullet	**WML**	*Mugil curema*
Windowpane flounder	**WPF**	*Scopthalmus aquosus*
Winter flounder (YOY)	**WFO**	*Pseudopleuronectes americanus*
Winter flounder (AGE 1+)	**WFL**	*Pseudopleuronectes americanus*
Yellow jack	**YJK**	*Caranx bartholomaei*

Appendix 2.2: Invertebrate species taken in the Estuarine Seine Survey, 1988-2011.

COMMON NAME	SPECIES CODE	*SCIENTIFIC NAME*
Blue crab	**BCR**	*Callinectes sapidus*
Brown Shrimp	**BNS**	*Panaeus aztecus*
Chaneled Whelk	**CHW**	*Busycotypus canaliculatus*
Northern Comb Jelly	**COM**	*Bolinopsis infundibulum*
Green crab	**GCR**	*Carcinus maenas*
Hermit crab	**HER**	*Pagurus spp.*
Horseshoe crab	**HSC**	*Limulus polyphemus*
Japanese crab	**JCR**	*Hemigrapsus sanguineus*
Lady crab	**LCR**	*Ovalipes ocellatus*
Moon Jelly	**MOJ**	*Aurelia aurita*
Mud crab	**BMC**	*Panopeus spp.*
Mole crab	**MLR**	*Emerita talpoida*
Mud snail	**MSN**	*Nassarius obsoletus*
Rock crab	**RCR**	*Cancer irroratus*
Sand shrimp	**CRG**	*Crangon septemspinosa*
Sea Star	**STF**	*Asterias forbesi*
Shore shrimp	**PAL**	*Palaemonetes spp.*
Shortfin Squid	**ILL**	*Illex illecebrosus*

Figure 2.10: Haul Seining in 2011.

JOB 3: INSHORE SURVEY

JOB 3: INSHORE SURVEY

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JOB 3: AMERICAN SHAD MONITORING AND INSHORE SEINE SURVEYS

STUDY PERIOD AND AREA

This report contains information on adult American shad monitoring and two seine studies conducted in the Connecticut and Thames Rivers on American shad, blueback herring, menhaden and common nearshore marine species in 2011. Areas of the Connecticut River sampled range from Holyoke, MA to Essex, CT. The Thames River seine survey begins just south of Norwich Harbor and ends in Uncasville, CT. Time series data collected under a separate funding source are also included.

GOAL

To monitor relative abundance and distribution of American shad and other fish in Connecticut's nearshore waters.

OBJECTIVES

Provide:
1) Information on the adult American shad spawning population: commercial catch, age structure, sex ratio and size.
2) Annual indices of relative abundance for juvenile shad, blueback herring and common nearshore marine species.

INTRODUCTION

Annual spawning migrations of American shad (*Alosa sapidissima*) in the Connecticut River have supported both recreational and commercial fisheries in the State of Connecticut, as well as recreational fisheries in upriver states, for generations. There is currently a commercial driftnet fishery that occurs in the lower CT River. Connecticut requires an annual commercial shad license for the Connecticut River. The fishery is managed through area, gear, and season restriction as well as rest days. The Connecticut River is the state's only occurrence of a commercial shad fishery. American shad were once one of Connecticut's top five most economically important commercial finfish species in terms of landings. The commercial fishery occurs in the main stem of the Connecticut River south of the Putnam Bridge in Glastonbury, CT. The recreational fishery occurs north of Hartford, Connecticut (RKM 83) and south of the Holyoke Dam in Massachusetts (RKM 139).

The Connecticut Department of Energy and Environmental Protection (CT DEEP) has conducted annual research studies on adult American shad in the Connecticut River since 1974, to monitor annual changes in stock composition. Data is collected from mandatory annual reporting of commercial landings. Landings information is compiled and used to estimate the maximum losses to the spawning stock from fishing. The Massachusetts Division of Fish and Wildlife monitors fish passage which includes adult American shad passage at the first main stem dam on the Connecticut River in Holyoke, Massachusetts. Data on the recreational fisheries are monitored periodically by a roving creel survey. Juvenile shad are monitored by CT DEEP through an annual seine survey conducted since 1978.

Sampling for American shad was expanded to the Thames River system after 1996 to monitor the effect of the operation of the Greenville Dam fishway. The fishway was constructed to aid in the enhancement of American shad in the system. CT DEEP initiated the seine survey in the Thames River to estimate juvenile production of shad. Sites were chosen based on previous work conducted by the department. The survey has documented few shad and river herring, but is continued to monitor catches of forage fish and juvenile fish of recreationally important species such as menhaden, tautog, winter flounder and bluefish.

METHODS

American shad adults:

Commercial fishermen are required by regulation to report daily landings and fishing effort for American shad. Landings information is compiled and used to estimate the maximum losses to the spawning stock from fishing. Once reports were received, the harvest was tallied by pounds and number of shad landed by sex. This information is collected from the commercial fishermen who submit their logbook catch data annually to CT DEEP.

The adult American shad age structure and sex ratio were calculated from samples collected at the Holyoke Dam fishlift at Holyoke, MA. Information on the number of fish lifted daily, the number of lift days (days the lift is in operation) and the daily sex ratio at Holyoke were obtained from the Massachusetts Division of Fisheries. The annual sex ratio was calculated by weighting the daily sex ratios by the number of fish lifted that day. A subset of daily fish lifted are sampled for scales

To determine the age structure of the fishery, CT DEEP staff collected biological samples with drift gill nets with a mesh size similar to the commercial fishery and in a similar fashion to that used by commercial operators to assist in characterizing the fishery. Gill nets were fished during daylight hours to avoid interfering with commercial efforts; research nets were shorter in length and drift times were shorter than those employed by commercial netters. One hundred and fifty five scale samples were collected.

Age structure was derived from scale samples collected at the Holyoke Fishlift in Holyoke, MA and were used to characterize the population. Adult shad were sexed, measured to fork length (mm) and 15-25 scales removed. All scale samples collected were separated by sex and stratified into 1 cm length groups. Scale samples were processed by cleaning with an ultrasonic cleaner and pressed onto acetate for aging. Age determinations were made as the consensus of two or more readers of projected images (43x) counting annuli and spawning scars according to the criteria of Cating (1953). Repeat spawners were noted by the presence of spawning scar(s) at the periphery of the scale. The age and repeat spawning frequency were extrapolated to the entire population by direct proportion.

Juvenile Surveys:

Connecticut River Seine Survey

A single seine haul was conducted at seven fixed locations one day a week from July 6th through October 12, 2011. Seine haul locations and techniques were identical to those used in past

Connecticut River seine surveys. The sampling sites were previously chosen based on location, physical conditions and accessibility (Marcy 2004, Crecco et. al. 1981, Savoy and Shake 1993). The seven stations were sampled during daylight hours with an 18.3 m nylon bag seine (0.5 cm delta mesh) and 30.5 m lead ropes. The seine was fished with the aid of a boat to deploy it upstream and offshore to sweep down through the site. Using the lead ropes, the seine was towed in a downstream arc to the shore and beached. All fish species other than family clupeidae, (American shad, blueback herring, alewife and menhaden) were identified, quantified or estimated and released. Invertebrate species are either counted or noted as presence/absence.

Thames River Seine Survey

Eight fixed stations were sampled twice a month from July 10 through October 15. The method of seine deployment and gear used in the Thames River was identical to what is used for the Connecticut River seine survey.

For both surveys, clupeids (*Alosa sapidissima*, *A. aestivalis*, *A. pseudoharengus*, and *Brevoortia tyrannus*) were returned to the laboratory for measurement and identification. All other fish were identified and counted (subsampling large catches as necessary) and returned to the water. In the laboratory, juvenile clupeids were identified to species by the criteria of Lippson and Moran (1974) and counted. For each sample, up to 40 randomly selected clupeids of each species were measured to total length (mm).

A relative abundance index was calculated for both the arithmetic and geometric mean catch per haul among all stations and dates combined. Arithmetic mean catch per haul is presented for American shad and blueback herring because it has been the preferred index when looking at year to year changes. Geometric mean is the preferred method when reporting to the Atlantic States Marine Fisheries Commission for annual compliance reports. See job 2, part 1 methods section for calculating geometric mean (Gottschall 2009 Job 2.1).

RESULTS

Connecticut River Adult American shad:

The Holyoke fishlift was open for fish passage from April 11 through July 15, 2011 except for closings due to high water or operational factors. Total lift numbers of American shad at the Holyoke Dam were obtained from the Massachusetts Division of Fisheries and Wildlife.

The number of shad passed at Holyoke in 2011 (244,189), was the highest since 2003 (287,000) and was an increase of 33% from 2010 (164,000) (Figure 3.3). The number of American shad lifted upstream annually at the Holyoke Dam has been variable through the time series and remains below the long term average of 299,730 (range 114,137 to 721,764). The sex ratio of the 2011 shad run was derived from information collected at the Holyoke fishlift which is located at River kilometer 140, upstream of both the commercial and sport fisheries. The combined impact of these small fisheries is not thought to be significant enough to affect the composition of the run. The weighted sex ratio of shad sampled at Holyoke provided by Mass Wildlife was 70% for males and 30% females (Figure 3.5).

American shad were sampled for scales on 28 days during lift operation. The shad age structure

from scale samples was expanded based on the number of fish lifted at Holyoke Dam. Four hundred eighty five scale samples collected from shad at the Holyoke Dam fishlift were examined for age determination.

Length frequency of American shad collected at the Holyoke lift ranged from 31.0 to 47.0 cm FL for male shad and 36.0 to 54.0 cm FL among female shad. Length frequencies of both sexes were fairly normally distributed (Figure 3.5). Average size among males was 40.36 cm FL and among females was 45.69 cm FL.

The 2011 male population of spawning adult shad was from the 2005-2008 year classes. Forty one percent of male shad scales examined were from 4 year old fish. Twenty three percent of male shad scales examined were from five year old fish. Three year old males comprised 30 percent of the age structure and lastly 5 percent of males were 6 year old fish (Table 3.3).

The majority of female shad sampled in 2011 were made up of the 2007 year class. Forty seven percent of female scale samples examined were 4 year old fish. Five year old fish contributed 38 percent to the annual run and fifteen percent were 6 year old fish. The incidence of overall repeat spawning remains low. The percentage of repeat spawners for males is 10.3% and 6.4% among females (Table 3.3). Combining both sexes gives a total repeat rate of 9.2%. The shad spawning population continues to rely on a few age classes and low rates of repeat spawners.

Landings/Commercial Fishery

Fifteen commercial shad licenses were sold in 2011 and eight boats reported landings. The number of licenses sold is comparable to recent years (Table 3.1, Figure 3.2). The number of shad boats fishing annually continues to remain low as few new participants enter the fishery.

The Connecticut River American shad commercial fishery continues to have a small impact on the stock as the size of the fishery remains at low levels. The annual 2011 shad commercial harvest was the third lowest recorded since 1990. The 2011 commercial landings were 32,183 pounds in 218 trips by 8 boats (Figure 3.1). The catch is reported as number of fish by sex (Table 3.1).

Shad age ranged from 3 to 7 year olds among males and from age 4 to 7 year olds among females in the commercial fishery. Age frequencies were dominated by five year old fish in the catches in both sexes with 45% of the males and 46% of the females being from the 2006 year class. Among males, 38% of the catch was 4 year olds and 11% were age six. Among females, 28% were four year olds and 24% were age six. The sex ratio of the samples collected was 64% females to 36% males comparable to the sex ratio at the lift indicating that the commercial fishery in the lower river is having a minimal effect on the stock composition (Figure 3.6).
While reported landings in mandatory Catch Reports were skewed towards females (90%), with males accounting for 10% of the landings (Table 3.1). The difference in sex ratios could be due to underreporting of males. The repeat spawning rates were similar between males and females in 2011 (9% and 7%, respectively).

Seine Survey:
The seine survey experienced an unusual weather event during 2011 survey. The Connecticut River Basin was severely affected by Tropical Storm Irene. The storm produced strong winds and heavy amounts of rainfall causing river height and flow speed during that period well above typical averages of late summer and early fall (Figure 3.8). Large volumes of sediment were also transported down river having a large effect on turbidity (Figure 3.7). For two weeks sampling was cancelled due to dangerous conditions. After river levels dropped, sampling was resumed and catches of alosines, as well as all other species declined (Table 3.4, Table 3.5, Figure 3.9).

Estimates of river flow at the USGS water gaging station in Thompsonville, CT reached 128,000 cubic feet per second on August 30, which is nearly 64 times the usual flow for early fall and the highest flow rate since May 1984 (Figure 3.8) . Rainfall levels within the CT River watershed received 6-10 inches. Turbidity measured in Essex, CT at the USGS gaging station, was 50 times higher than before the storm (Figure 3.7).

Juvenile collections in the Connecticut River were conducted from July 6 through October 12, 2012. In the 83 hauls completed in 2011, over 20,000 fish representing 32 species or taxonomic groups (Table 3.7). To minimize mortality and to facilitate returning large catches of fish quickly to the water, some fish were identified only to the family or genus level (e.g. sunfish, catfish, killifish). Large catches of common species were sometimes quantified with a visual estimate to minimize handling and processing time. Estimated catches are noted as such in the database. In 2011, the most abundant species collected were spottail shiners, blueback herring, *Fundulus spp.* and American shad. Spottail shiners, American shad, *Fundulus spp.* and sunfish also had a high frequency of occurrence in the catches (Table 3.7).

A total of 1,815 juvenile American shad were collected for the season (Table 3.4). The geometric mean catch of juvenile American shad from all stations and all dates was 3.08 (Figure 3.12). The geometric mean in 2011 was the 5th lowest in the time series and was the lowest value since 2006 (Table 3.6). The annual index of juvenile abundance (geometric mean catch/haul) varies without trend. The highest catch for 2011 was 636 shad collected during the 3rd week of sampling upriver at the Wilson site and represents 35% of the catch for the season (Table 3.4). Two stations (Holyoke and Wilson) accounted for 78% of the total 2011 catch.

Annual catches of American shad by station over time has been variable with Holyoke and Wilson typically being the sites with the largest annual catches of juvenile shad (Figure 3.11). In 2011 91% of the shad were collected before the storm. The incidence of positive catches was lower than the previous year (64% vs. 73%) with the Enfield and Glastonbury sites providing the lowest catches of the season. The Enfield station produced the highest number of zero catches and lowest catch of the season

A total of 4,522 blueback herring were collected in 2011 (Table 3.5). Blueback herring catches for 2011 were 2.5 times larger than American shad and accounted for 60% percent of the two *Alosa* species collected (Figure 3.9). Historically the ratio of shad to bluebacks has varied with up of 90% bluebacks in early years. The 2011 *Alosa spp.* catches were both well below average and the blueback CPUE is the 4th lowest geometric mean in the time series with the last

comparable low value occurring in 2004. The three southernmost stations (Salmon River, Deep River, Essex) accounted for 98% of the total juvenile blueback catches in 2011 (Figure 3.12)

Thames River Seine Survey

The 2011 Thames River survey was conducted from June 30th until October 6th and completed 56 seine hauls. Over 5,000 fish were collected representing 28 groups or species (Table 3.8). Atlantic silversides had the highest presence in the catch (98%), followed by *Fundulus spp*, bluefish and sticklebacks. In past years, menhaden were typically caught in higher abundance, however only 418 were collected in 2011 with a geometric mean cpue of 0.58. Juvenile menhaden catches have been variable with the lowest CPUE in 2010 (0.18) and a peak geometric mean cpue of 117.46 in 2002 (Table3.9). Two juvenile winter flounder, 19 juvenile blackfish and 191 bluefish were also among the total catches for the 2011 season.

Data Requests and Sample Collections:

Data requests and sample requests are fulfilled for a number of different government and non-government organizations. Requests fulfilled in 2011 are listed in table 3.10.

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Table 3.1. Annual American shad commercial fishery harvest. Landings are reported by weight (lbs.) and counts, by sex, 1990-2011.

Year	Total lbs.	# Male	Male Wt (lbs.)	Mn Wt Male	# Female	Female Wt (lbs.)	Mn Wt Female	# of Boats	Total Trips
1990	259,425	8,568			21,142			20	402
1991	149,300	9,174			23,112			21	416
1992	144,300	7,171			26,768			16	410
1993	96,660	5,173			17,790			15	332
1994	104,000	1,812			19,400			16	312
1995	61,576	1,862	5,893	3.16	12,299	55,682	4.53	19	352
1996	66,757	2,298	6,941	3.02	13,660	59,816	4.38	13	264
1997	91,003	2,812	10,275	3.65	18,743	80,728	4.31	11	271
1998	89,342	2,983	9,440	3.16	18,529	79,902	4.31	12	280
1999	44,574	872	3,373	3.87	9,506	41,201	4.33	11	195
2000	107,416	2,342	7,491	3.2	21,228	99,925	4.71	11	210
2001	59,234	1,469	3,980	2.71	13,074	55,254	4.23	13	193
2002	108,099	7,153	22,555	3.15	20,653	85,544	4.14	11	248
2003	111,127	5,176	17,518	3.38	21,244	93,609	4.41	14	249
2004	66,328	2,456	8,000	3.26	13,436	58,328	4.34	14	226
2005	69,333	1,873	6,136	3.28	15,336	67,070	4.37	12	218
2006	38,547	1,864	5,445	2.92	7,372	33,102	4.49	12	185
2007	51,572	1,688	5,701	3.38	9,888	43,497	4.4	13	199
2008	28,419	858	2,637	3.07	6,486	25,782	3.97	10	203
2009	40,680	1156	4,045	3.5	6,437	32,187	5	13	182
2010	24,641	855	2,994	3.5	4,238	21,192	5	7	202
2011	32,183	953	3,334	3.5	5,772	28,849	5	8	218

Table 3.2. Fishery dependent spawning history and age distribution of American shad in the Connecticut River, 2011

	Age					
Females	**3**	**4**	**5**	**6**	**7**	**Total**
Pop		8,159	13,405	6,994	291	28,849
% shad at age		28.28%	46.46%	24.24%	1.01%	
Repeat			291	1,748		2,040
% Repeats			2.17%	25.00%		7.07%
Males	**3**	**4**	**5**	**6**	**7**	**Total**
Pop	179	1,250	1,488	357	60	3,334
% shad at age	5.36%	37.50%	44.64%	10.71%	1.79%	
Repeat			179	60	60	298
% Repeats			12.00%	16.67%	100%	8.93%

Table 3.3. Fishery independent spawning history and age distribution of American shad in the Connecticut River, 2011

	Age				
Females	**3**	**4**	**5**	**6**	**Total**
Pop		34,777	27,907	10,734	73,418
% shad at age		47.37%	38.01%	14.62%	
Repeat		1,288	2,147	1,288	4,723
% Repeats			7.69%	12.00%	6.43%
Males	**3**	**4**	**5**	**6**	**Totals**
Pop	51,231	71,063	40,214	8,263	170,771
% shad at age	30.00%	41.61%	23.55%	4.84%	
Repeat		3,856	10,467	3,305	17,628
% Repeats		5.43%	26.03%	40.00%	10.32%

Table 3.4. Catch (C), effort (E) and catch per effort (C/E) of juvenile American shad from the 2011 CT River seine survey.

Date	Holyoke	Enfield	Wilson	Glastonbury	Salmon River	Deep River	Essex	Catch	Effort
7/6/2011	481	0	7	0	12	6	9	515	7
7/13/2011	0	0	5	0	16	2	0	23	7
7/20/2011	1	0	636	15	38	5	6	701	7
7/27/2011	0	0	233	0	2	6	0	241	7
8/4/2011	0	0	20	0	25	41	0	86	7
8/10/2011	0	0	5	0	8	21	0	34	7
8/17/2011	0	0	2	0	33	0	3	38	7
8/24/2011	1	1	5	0	13	7	0	27	7
8/31/2011	No sampling due to high water								
9/7/2011	No sampling due to high water								
9/15/2011		8	7	9	22	15	3	64	6
9/21/2011	10	0	1	3	6	1	3	24	7
9/30/2011				1	2	2	5	10	4
10/5/2011					10	27	3	40	3
10/12/2011	0	0	3	4	0	0	5	12	7
Total	493	9	924	32	187	133	37	1815	83

Table 3.5. Catch (C), effort (E) and catch per effort (C/E) of juvenile blueback herring from the 2011 CT River seine survey.

Date	Holyoke	Enfield	Wilson	Glastonbury	Salmon River	Deep River	Essex	Catch	Effort
7/6/2011	0	0	0	5	7	13	1260	1285	7
7/13/2011	0	0	0	45	25	640	520	1230	7
7/20/2011	0	0	0	20	30	25	14	89	7
7/27/2011	0	0	0	3	46	47	88	184	7
8/4/2011	0	0	0	0	155	82	0	237	7
8/10/2011	0	0	0	0	70	111	0	181	7
8/17/2011	0	0	0	0	246	0	0	246	7
8/24/2011	0	0	0	0	943	9	3	955	7
8/31/2011	No sampling due to high water								
9/7/2011	No sampling due to high water								
9/15/2011		0	0	1	25	2	3	31	6
9/21/2011	0	0	0	1	12	1	62	76	7
9/30/2011				1	2	0	1	4	4
10/5/2011					1	0	2	3	3
10/12/2011	0	0	0	0	0	1	0	1	7
Total	0	0	0	76	1562	931	1953	4522	83

Table 3.6. Geometric mean relative abundance index (CPUE) of juvenile American Shad and blueback herring,1978-2011.

Year	Juv Shad	Juv BBH
1978	5.89	
1979	7.84	24.8
1980	9.21	26.75
1981	6.05	11.49
1982	1.81	6.09
1983	4.99	16.47
1984	3.37	11.57
1985	7.14	18.23
1986	6.29	13.61
1987	9.89	21.58
1988	5.68	17.04
1989	4.85	7.52
1990	10.39	14.41
1991	3.92	11.36
1992	7.21	9.87
1993	9.49	14.43
1994	12.22	13.92
1995	1.34	5.03
1996	6.5	5.91
1997	6.75	9.66
1998	3.65	4.39
1999	5.47	5.57
2000	4.42	4.17
2001	2.73	3.83
2002	5.55	3.95
2003	6.88	5.88
2004	5.62	2.36
2005	10.08	4.1
2006	1.82	3.5
2007	8.15	6.61
2008	5.06	2.2
2009	3.4	1.77
2010	10.23	12.82
2011	3.08	2.93

Table 3.7. List of fish species or group and percent frequency of occurrence of fish collected in Connecticut River seine survey, 2008-2011. **includes more than one species*

Species	2008	2009	2010	2011
alewife	6.98	9.28	7.77	12.05
American eel	13.95	19.59	17.48	8.43
American shad	61.63	60.82	72.82	63.86
Atlantic silverside	3.49	5.15	14.56	2.41
bay anchovy	2.33	2.06	0.97	4.82
black crappie	13.95	6.19	20.39	20.48
blue crab		7.22	17.48	6.02
blueback herring	46.51	36.08	60.19	45.78
bluefish	1.16	6.19	11.65	6.02
carp	4.65	5.15	19.42	12.05
catfish*	16.28	11.34	27.18	10.84
crevalle jack			3.88	
fallfish	4.65	3.09	3.88	2.41
gizzard shad			4.85	
goby		1.03		
golden shiner	15.12	12.37	28.16	15.66
hickory shad	4.65	3.09		
hogchoker	2.33	8.25	15.53	18.07
killifish & mummichog*	43.02	27.84	37.86	55.42
largemouth bass	26.74	18.56	25.24	19.28
menhaden	3.49	11.34	13.59	4.82
northern kingfish			0.97	
northern pike	13.95	5.15	1.94	9.64
chain pickerel	1.16		0.97	4.82
pipefish			4.85	1.20
rock bass	19.77	5.15	25.24	13.25
smallmouth bass	39.53	14.43	20.39	30.12
spottail shiner	73.26	59.79	64.08	65.06
stickleback	4.65	5.15	13.59	1.20
striped bass			2.91	2.41
summer flounder	1.16			
sunfish*	52.33	38.14	59.22	53.01
tessellated darter	33.72	26.8	31.07	30.12
white perch	22.09	7.22	18.45	16.87
white sucker	11.63	12.37	27.18	12.05
winter flounder			0.97	
yellow perch	47.67	29.9	44.66	50.60

Table 3.8. List of fish species or group and percent frequency of occurrence of fish collected in Thames River seine survey, 2005-2011. **includes more than one species.*

Species	2005	2006	2007	2008	2009	2010	2011
alewife	6.67	1.56	17.86	1.59	8.06	1.77	5.36
American eel		6.25		1.59	4.84	0.71	1.79
American shad			5.36		6.45		1.79
Atlantic herring					3.23		
Atlantic needlefish	6.67	1.56					
Atlantic silverside	80		82.14	74.6	80.65	21.63	98.21
bay anchovy		10.94	7.14	14.29	9.68	3.55	10.71
blueback herring			1.79	1.59	1.61	0.35	
bluefish	60	45.31	44.64	31.75	46.77	15.25	41.07
brown trout							1.79
butterfish	3.33			1.59	4.84	1.06	1.79
carp		1.56	1.79			0.35	
catfish*				1.59			
crevalle jack	23.33	12.5	5.36	1.59	11.29	3.55	
cunner					1.61		
darter				1.59			1.79
golden shiner							1.79
hogchoker							17.86
horseshoe crab	3.33						
killifish & mummichog*	43.33	25	32.14	42.86	20.97	6.03	69.64
largemouth bass		1.56					
lizardfish		6.25	5.36				
menhaden	20	35.94	42.86	12.7	22.58	2.13	17.86
naked goby		3.13	8.93	9.52		1.77	16.07
northern kingfish	3.33						7.14
northern pike	3.33						3.57
oyster toadfish						0.35	
pipefish	13.33	15.63	26.79	11.11	9.68	1.42	
scup	6.67		14.29				
sheepshead minnow	3.33		3.57	3.17			1.79
spot			1.79	1.59			
spottail shiner	6.67	9.38	3.57	6.35	3.23	1.06	7.14
stickleback*	16.67	12.5	5.36	36.51	32.26	2.13	42.86
striped bass	3.33	6.25	21.43	11.11	8.06	1.77	7.14
striped sea robin			3.57				
summer flounder		4.69	5.36	15.87	4.84	0.35	3.57
sunfish*		1.56					7.14
tautog	20	6.25	21.43	12.7	1.61	1.77	3.57
tomcod			3.57	4.76	3.23	0.35	1.79
white mullet		4.69		3.17	1.61	3.9	1.79
white perch	13.33	3.13	8.93	1.59	1.61	0.35	1.79
windowpane flounder			7.14				1.79
winter flounder	23.33	10.94	37.5	26.98	9.68	1.77	3.57

Table 3.9. Number collected, number of seine hauls and geometric mean catch per haul of Thames River juvenile menhaden, 1998-2011.

Year	Menhaden	Seine Hauls	G Mn
1998	429,209	151	12.63
1999	594,724	144	20.61
2000	1,020,000	112	50.25
2001	5,458	119	2.13
2002	840,458	55	117.46
2003	248,984	80	12.78
2004	30,274	56	3.91
2005	3,118	30	1.19
2006	129,719	64	6.08
2007	100,082	56	6.39
2008	195	63	0.37
2009	39,909	62	2.11
2010	212	64	0.18
2011	418	56	0.58

Table 3.10. Data and sample requests for 2011.

Organization	**Type of Request**
Massachussetts Division of Fisheries and Wildlife	Data
U.S. Fish and Wildlife Service	Data
U.S. Geological Survey	Sample
Montery Bay Aquarium	Data
University of Connecticut (Graduate Student)	Data
Dominion Millstone Power Station	Data
LISTS	Sample
Diadromous Species Restoration Research Network (DSRRN)	Data
Old Dominion University	Sample
KleinSchmidt	Data

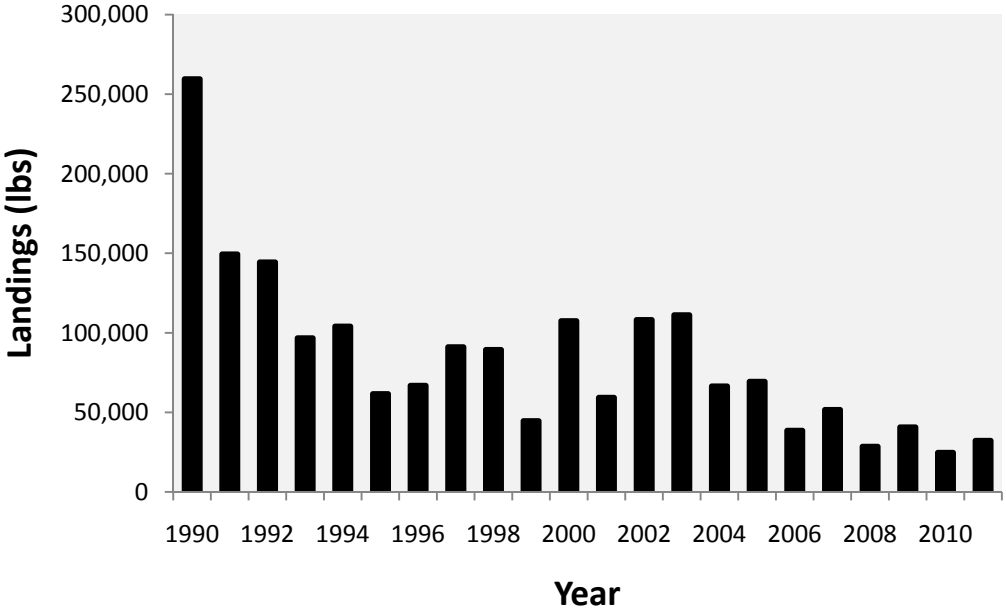

Figure 3.1 Commercial Landings for Adult American shad, 1990-2011

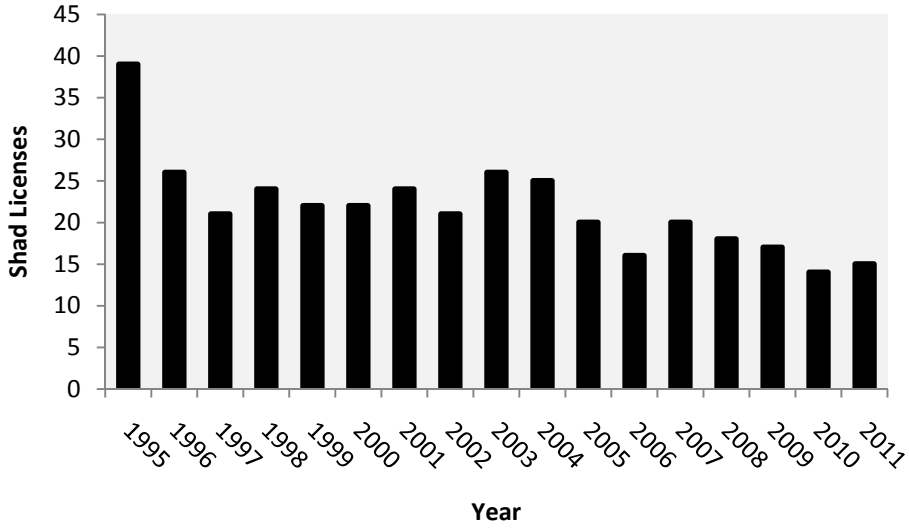

Figure 3.2. Number of Commercial shad license sales, 1995-2011.

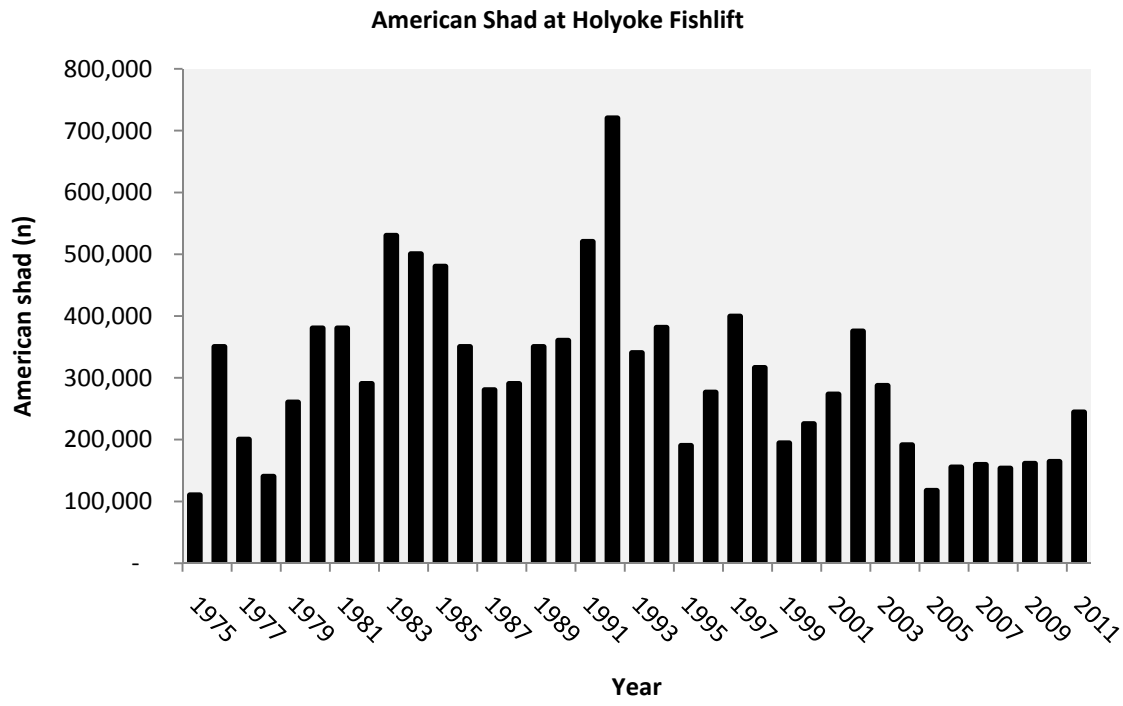

Figure 3.3. Number of adult shad lifted at the Connecticut River Holyoke Dam (Rkm 140), 1975-2011.

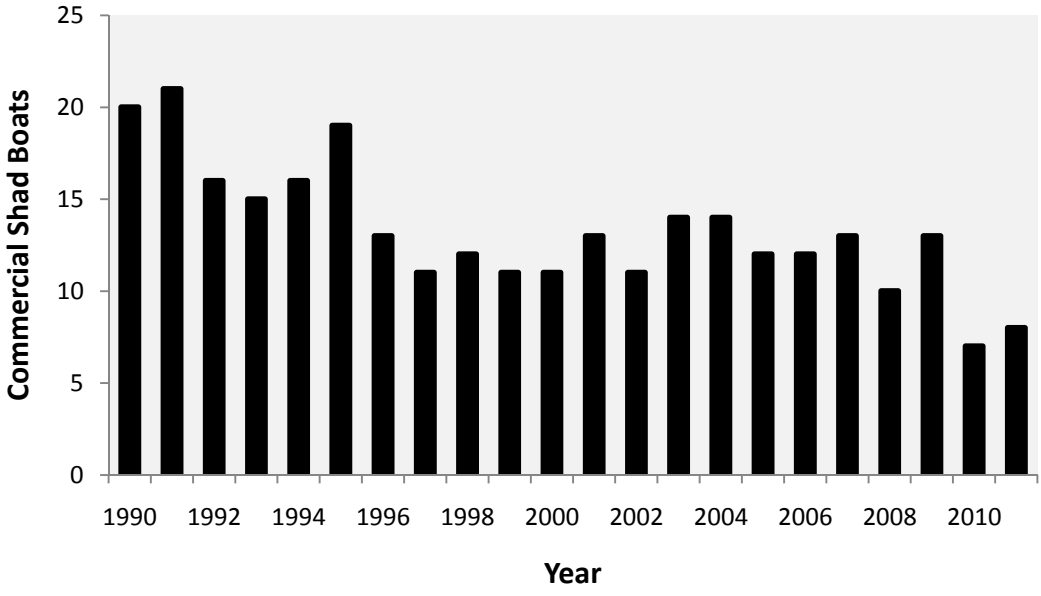

Figure 3.4. Annual number of boats participating in the commercial shad fishery, 1990-2011..

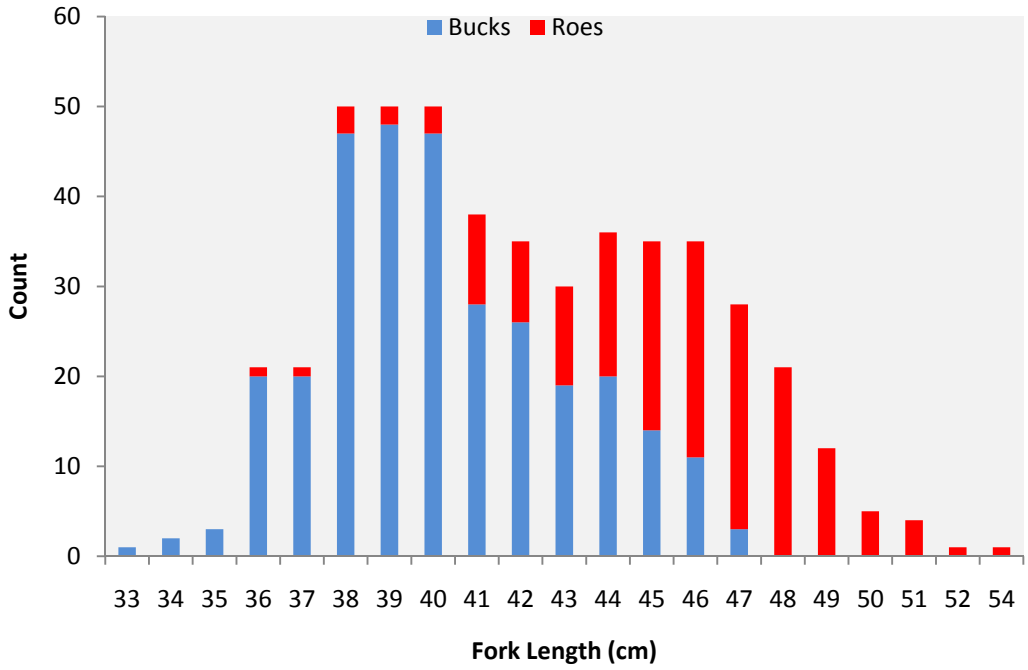

Figure 3.5 American shad length frequencies (FL, cm), by sex, at the Holyoke Lift, 2011.

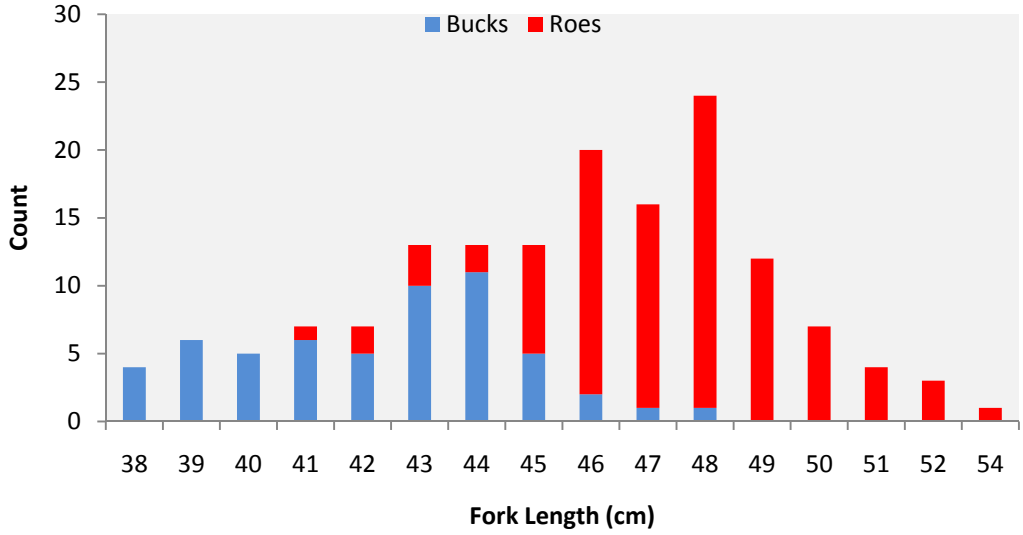

Figure 3.6. American shad length frequencies (FL, cm), by sex, collected in the lower river by gillnet, 2011.

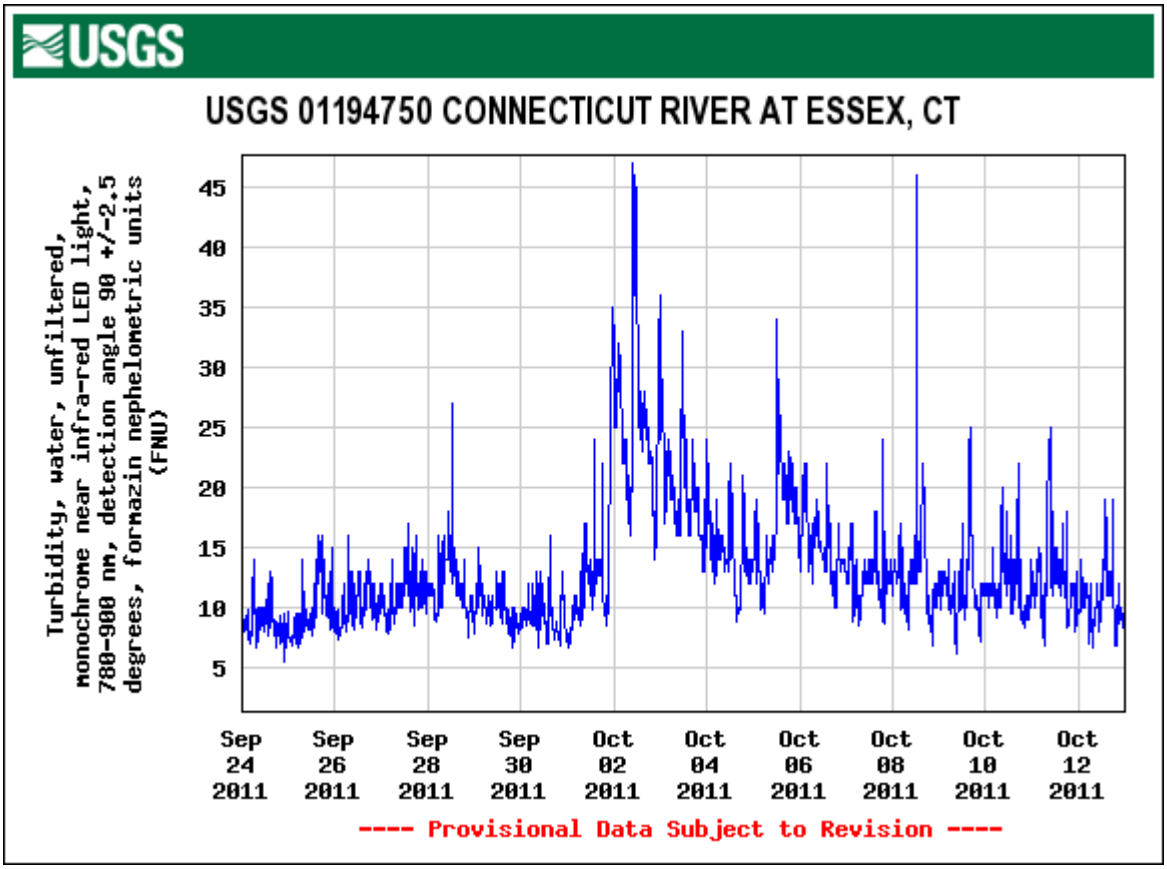

Figure 3.7. Turbidity levels measured at the USGS Essex, CT gaging station during Tropical Storm Irene, Sept. 24-Oct 12, 2011.

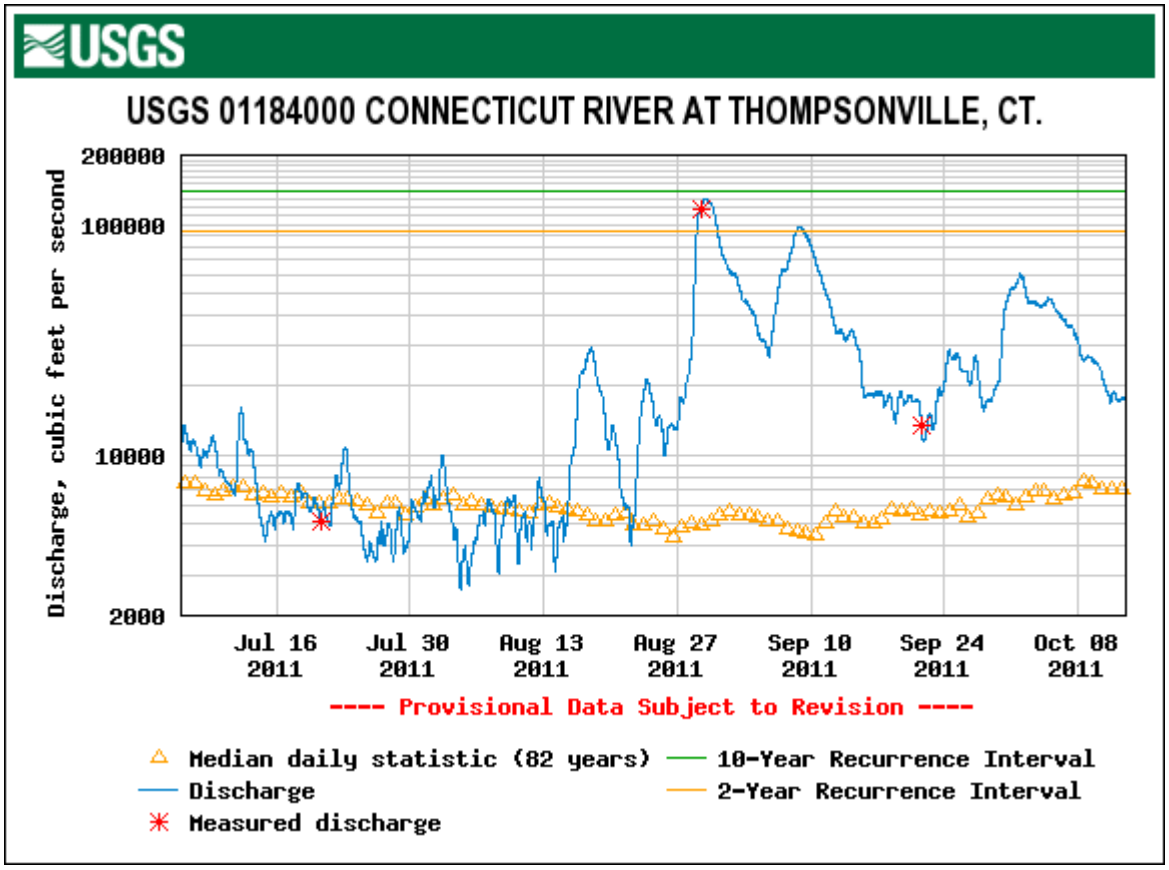

Figure 3.8. Provisional average daily Connecticut River Flows provided by USGS at Thompsonville, CT station. Time frame shows seine sampling period flows (cfs) 2011.

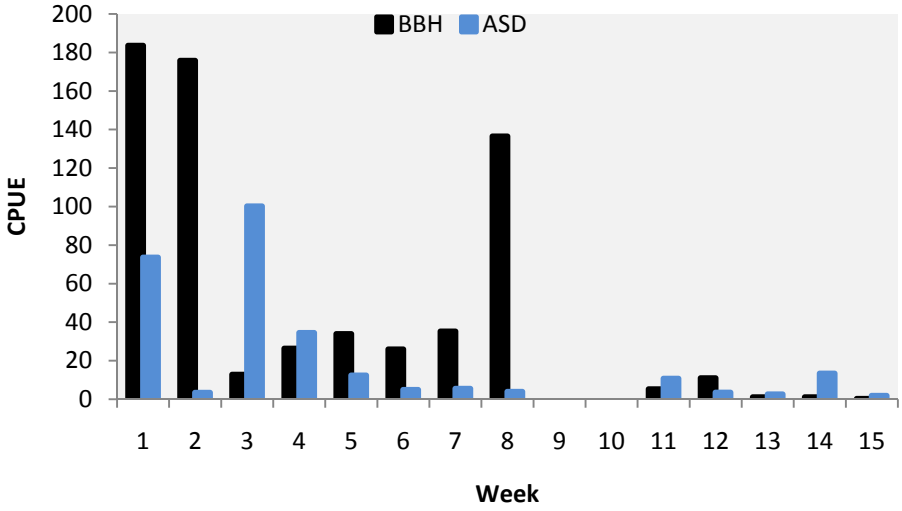

Figure 3.9. Weekly catch per unit effort of juvenile alosines, 2011.

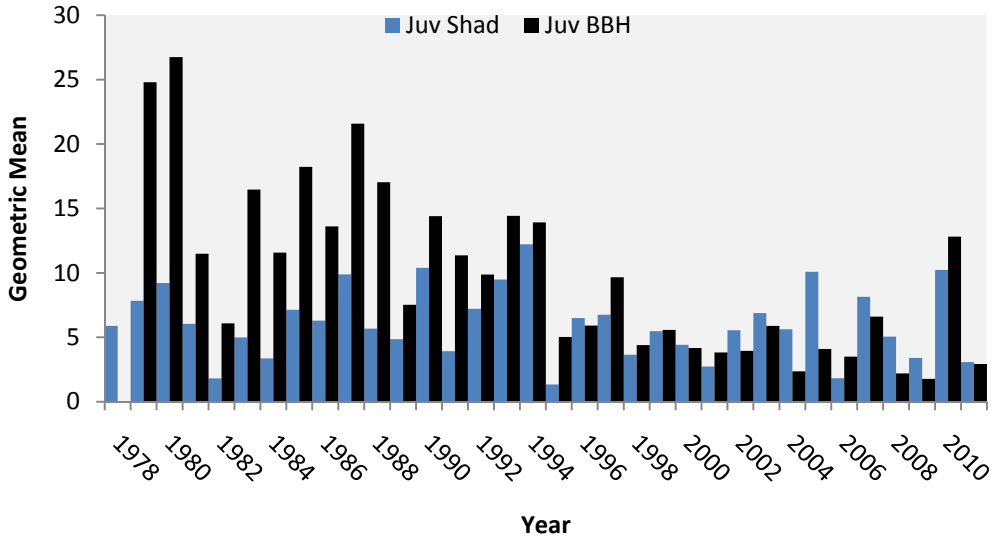

Figure 3.10 Annual cpue of juvenile shad and blueback herring, 1979-2011.

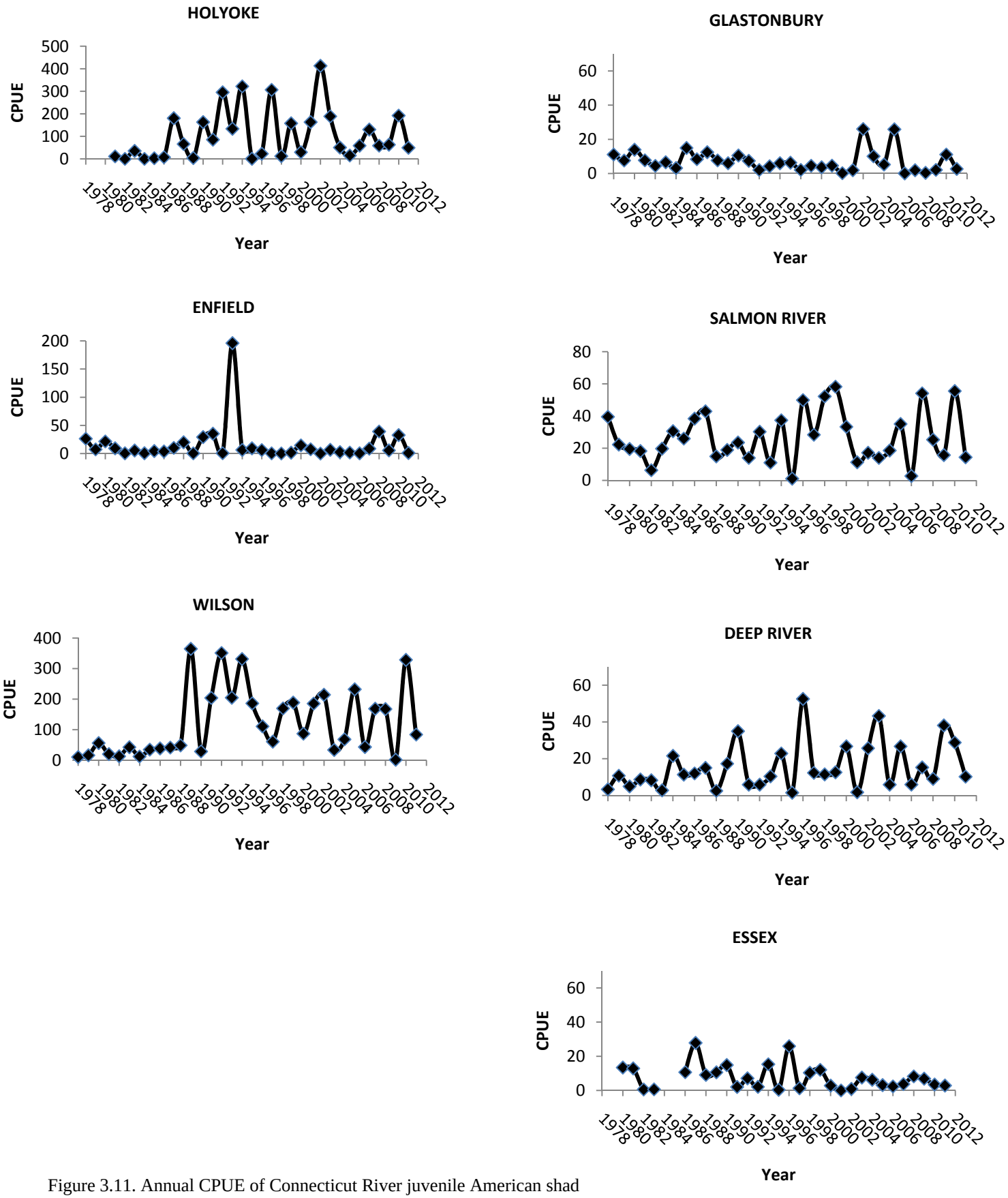

Figure 3.11. Annual CPUE of Connecticut River juvenile American shad by station, 1978-2011.

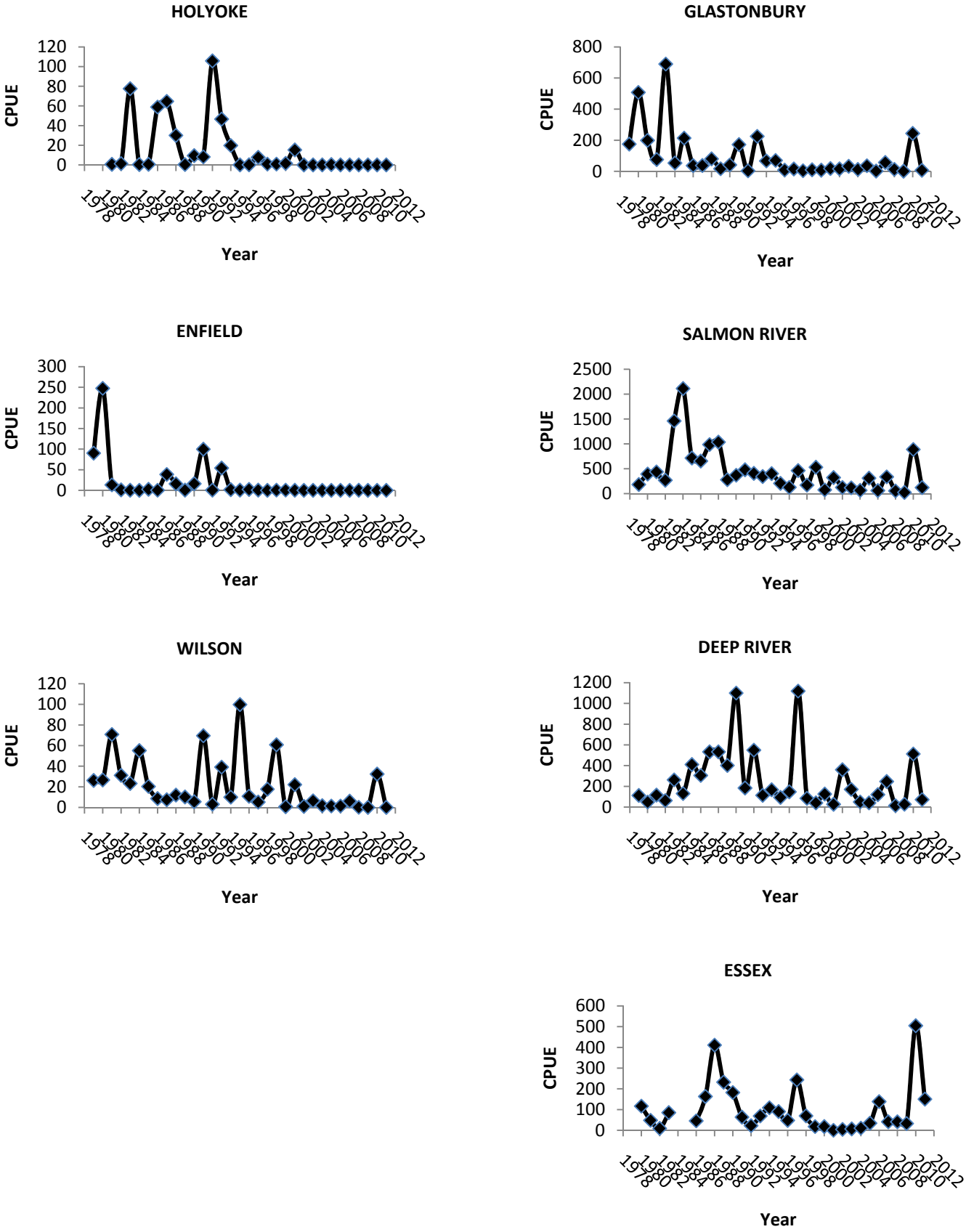

Figure 3.12. Annual CPUE of Connecticut River juvenile blueback herring by station, 1978-2011.

JOB 5: COOPERATIVE INTERAGENCY RESOURCE MONITORING

LONG ISLAND SOUND AMBIENT WATER QUALITY MONITORING PROGRAM

Inquiries regarding the DEEP's ongoing water quality monitoring efforts in Long Island Sound should be directed to:

Long Island Sound Water Quality Monitoring Program staff (see below)
at
CTDEEP Bureau of Water Management
Planning and Standards Division
79 Elm Street
Hartford, CT 06106-5127

Christine B. Olsen
Phone: (860) 424-3727
E-mail: christine.olsen@ct.gov
program oversight, reporting, data analysis, database management, scheduling and cooperative requests, QA/QC

Matthew J. Lyman
Phone: (860) 424-3158
E-mail: matthew.lyman@ct.gov
database management, data requests, field operations, webpage development, regional monitoring work group contact

Katie O'Brien-Clayton
Phone: (860) 424-3176
E-mail: katie.obrien-clayton@ct.gov
hypoxia area mapping, field operations, survey summaries

Visit the Long Island Sound Water Quality Monitoring Program web page,
with Program information and data at:
http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325534&depNav_GID=1654

JOB 5: COOPERATIVE INTERAGENCY RESOURCE MONITORING

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JOB 5: COOPERATIVE INTERAGENCY RESOURCE MONITORING

GOAL

To provide long-term monitoring of physical, chemical and biological indicators of environmental conditions in order to evaluate the effects of non-fishing activities on the health and abundance of valued recreational species.

OBJECTIVES

1) Provide monthly monitoring of water quality parameters important in the development of summer hypoxia in Long Island Sound including temperature, salinity, and dissolved oxygen, at eighteen fixed axial and lateral stations throughout Long Island Sound.

2) Provide estimates of the area and duration of summer hypoxia (low oxygen) in Long Island Sound based on sampling at an additional 30 fixed sites semi-monthly between June and September.

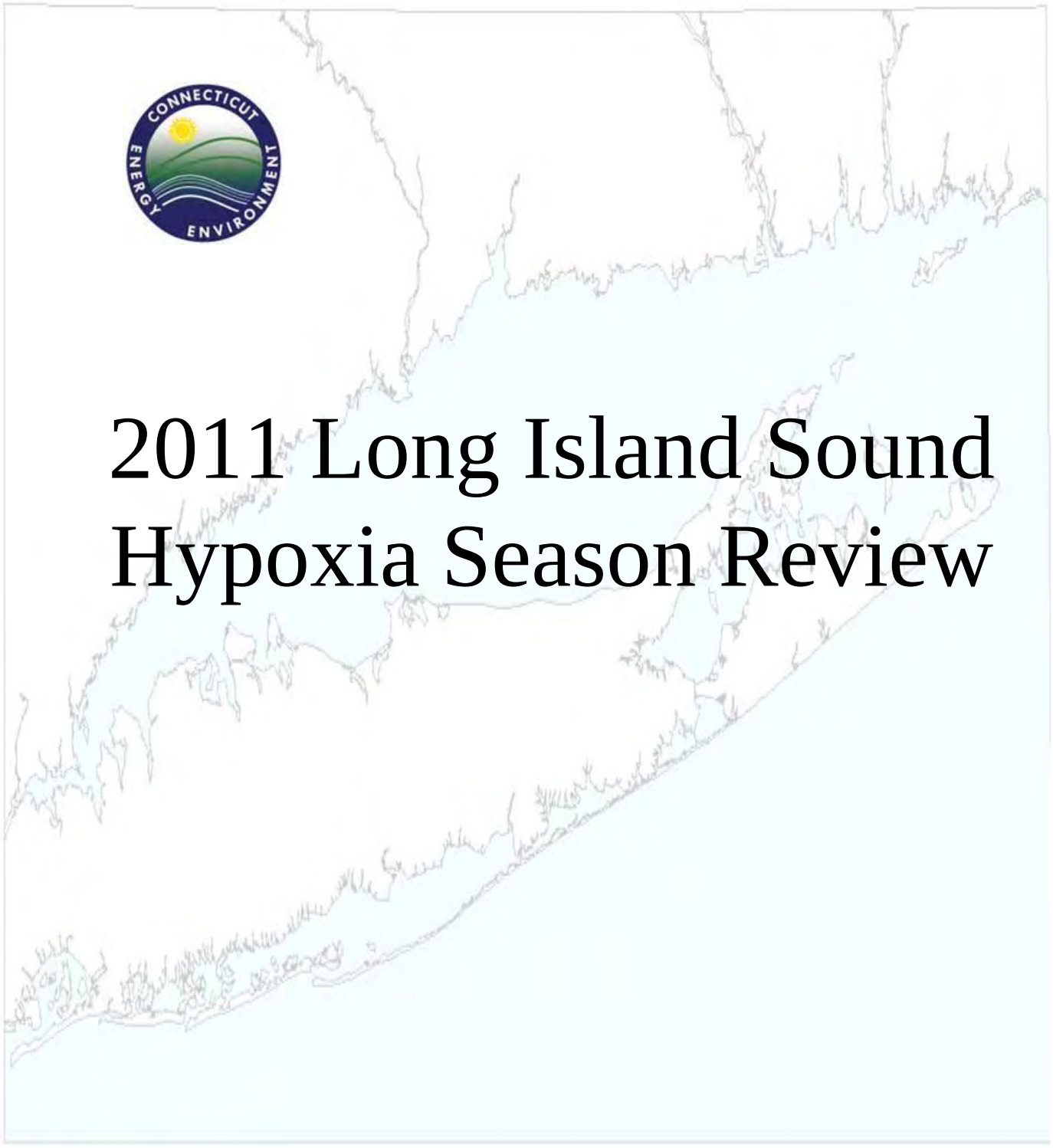
RESULTS AND DISCUSSION

Overview of 2011 Water Quality Monitoring Program

Since 1991, the CT DEP has conducted a water quality monitoring program involving both the Natural Resources Bureau and the Water Management Bureau with support from EPA and Federal Aid to Sportfish Restoration. The 2011 survey was conducted using the same sampling design and methodology as described in previous annual reports. Hypoxic conditions in the Sound usually occur during the summer and are mainly confined to the section of the Sound west of a line from Stratford CT to Port Jefferson NY. The maximum extent of hypoxic conditions in the Sound typically occurs in early August.

During the 2011 survey, seven cruises were conducted between 31 May and 1 September. Onset of hypoxia (< 3 mg/L) in 2011 occurred on or about 6 July and lasted until approximately 28 August. Although this was a typical start date for hypoxia in Long Island Sound, the duration (54 days) was shorter than average (55 days, 1991-2011). The peak hypoxic event occurred during the August 15-17 cruise, when the maximum areal extent of hypoxia was estimated to be 337.5 sq km (130.3 sq mi). The lowest dissolved concentration (1.65 mg/L) recorded at Station A4 in the western Sound. The event did not persist beyond the mid-August cruise, after which the coast was buffeted by two major storms. Hurricane/Tropical Storm Irene impacted the area from 20-28 August, followed by Tropical Storm Lee from 2-5 September. The result was a comparatively mild hypoxia event in Long Island Sound, with average duration but a smaller than average area affected. The index of demersal finfish habitat temporarily affected by hypoxia in 2011 (approximately 4,727 area-days) was also lower than average (approximately 6,900 area-days).

Please see the following ***2011 Long Island Sound Hypoxia Season Review,*** provided by the CT DEEP Water Bureau, for more details and further results of the 2011 hypoxia season.



2011 Long Island Sound Hypoxia Season Review

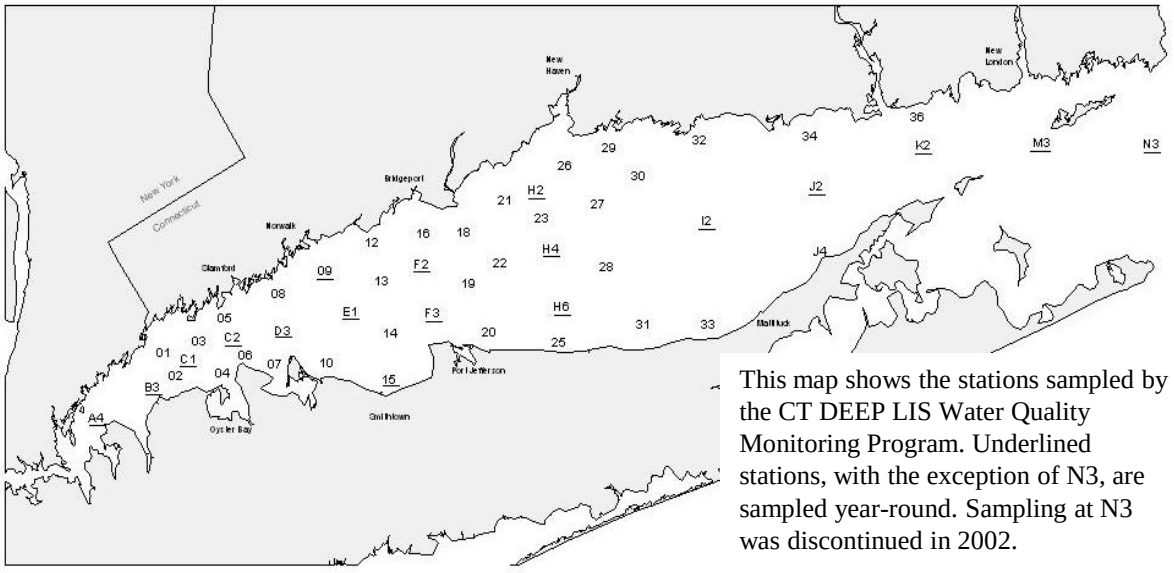
CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
79 ELM STREET, HARTFORD, CT 06106
DANIEL C. ESTY, COMMISSIONER

MONITORING LONG ISLAND SOUND 2011

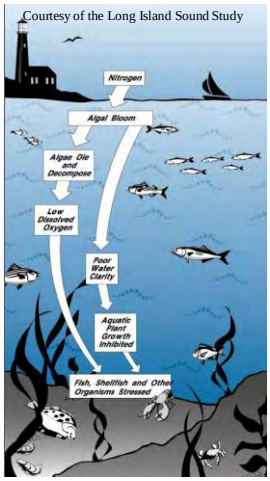
Program Overview

Since 1991, the Connecticut Department of Energy & Environmental Protection (CT DEEP, formerly the Department of Environmental Protection, (CTDEP)) has conducted an intensive year-round water quality monitoring program on Long Island Sound. Water quality is monitored at up to forty-eight (48) sites by staff aboard the Department's Research Vessel *John Dempsey*. These data are used to quantify and identify annual trends and differences in water quality parameters relevant to hypoxia, especially nutrients, temperature, and chlorophyll. These data are also used to evaluate the effectiveness of the management program to reduce nitrogen concentrations. During the summer (June - September) CT DEEP conducts additional summer hypoxia surveys at bi-weekly intervals to better define the areal extent and duration of hypoxia.

R/V John Dempsey

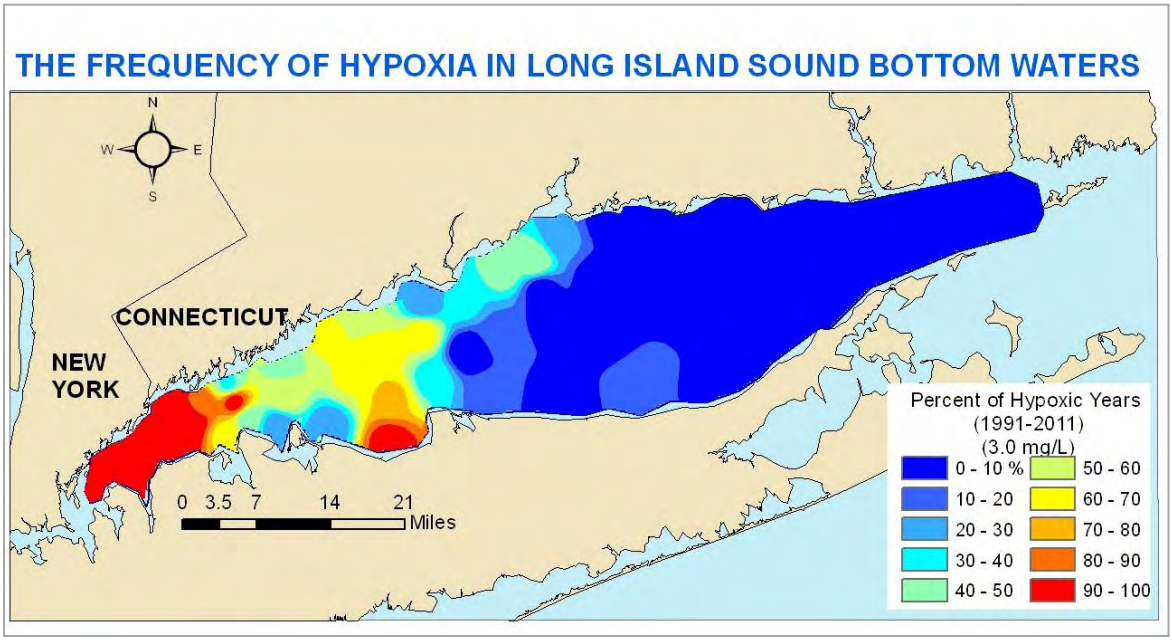


This map shows the stations sampled by the CT DEEP LIS Water Quality Monitoring Program. Underlined stations, with the exception of N3, are sampled year-round. Sampling at N3 was discontinued in 2002.



What is Hypoxia?

The term "hypoxia" means low dissolved oxygen ("DO") concentrations in the water. Marine organisms need oxygen to live, and low concentrations, depending on the duration and the size of the area affected, can have serious consequences for a marine ecosystem. As defined by the Long Island Sound Study, hypoxia exists when DO drops below a concentration of 3 milligrams per liter (mg/L), although ongoing national research suggests that there may be adverse affects to organisms even above this level, depending upon the length of exposure. In 2011, Connecticut adopted revised water quality criteria for dissolved oxygen. These criteria, designed to protect the state's waters from degradation, define hypoxia as DO concentrations below 3.0 mg/L. Low oxygen levels can occur naturally in estuaries during the summer, when calm weather conditions prevent the mixing of the water column that replenishes bottom water oxygen during the rest of the year. However, studies of the limited historical data base for the Sound suggest that summer oxygen depletion in Western Long Island Sound has grown worse since the 1950s.



How Seriously Does Low Oxygen Impact the Sound?

Each summer low oxygen levels render hundreds of square miles of bottom water unhealthy for aquatic life. DO levels follow seasonal patterns with a decrease in bottom water DO over the course of the summer. Hypoxic conditions during the summer are mainly confined to the Narrows and Western Basin of Long Island Sound. Those areas comprise the section of the Sound west of a line from Stratford, CT to Port Jefferson, NY. The maximum extent of the hypoxic condition typically occurs in early August.

Photo By Lloyd Langevin, June 2007

2011 Important Facts

CT DEEP conducted seven cruises during the summer of 2011 between 31 May and 1 September. Over the course of the season, 11 different stations were documented as hypoxic and of the 228 site visits completed in 2011, hypoxic conditions were found 20 times. Compared to the 21-year averages, 2011 was below average in area and slightly below average in duration (see page 4).

Cruise	Start Date	End Date	Number of stations sampled	Number of hypoxic stations
WQJUN11	5/31/2011	6/6/2011	17	0
HYJUN11	6/16/2011	6/16/2011	21	0
WQJUL11	7/5/2011	7/7/2011	39	3
HYJUL11	7/18/2011	7/20/2011	39	1
WQAUG11	8/1/2011	8/3/2011	40	6
HYAUG11	8/15/2011	8/17/2011	35	10
WQSEP11	8/30/2011	9/1/2011	37	0

The peak event occurred during the HYAUG11 cruise between 15 and 17 August. The lowest dissolved oxygen concentration (1.65 mg/L) was documented during the WQAUG11 cruise at Station A4. The hypoxia area maps for 2011 appear on pages 7-11.

Estimated Start Date	7/6/2011
Estimated End Date	8/28/2011
Duration (days)	54
Maximum Area (mi^2)	130.3

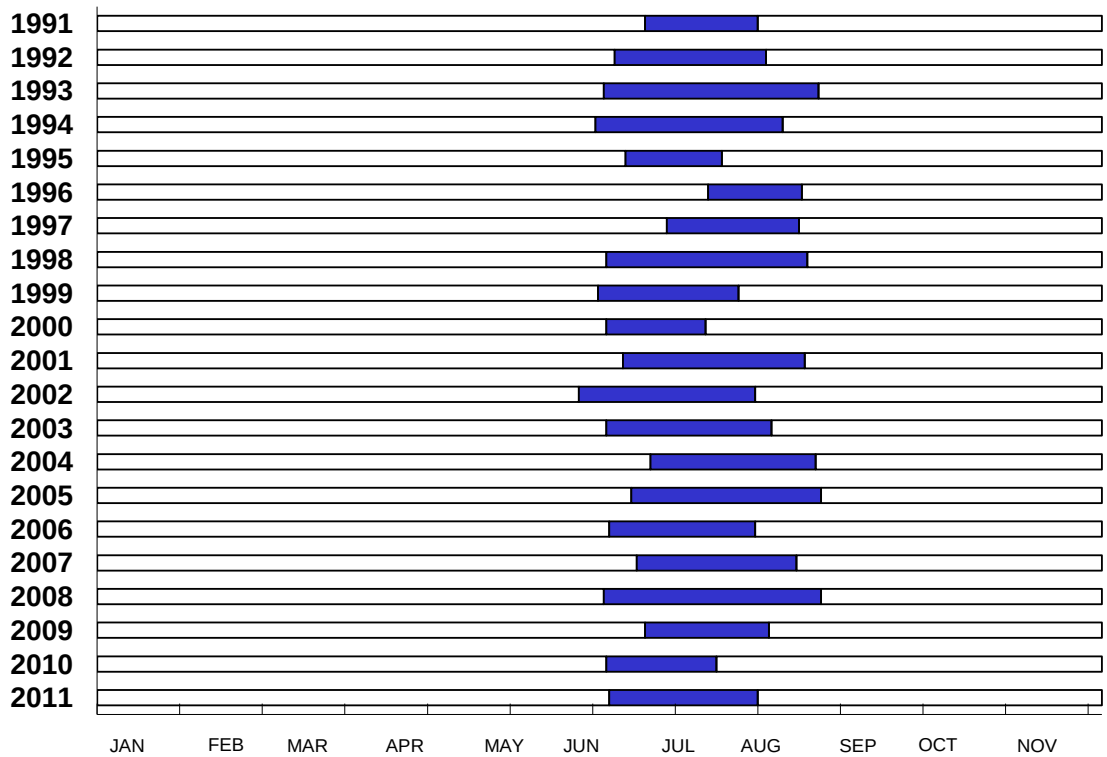
The Long Island Sound Study has defined hypoxia as dissolved oxygen concentrations below 3.0 mg/L. In December 2009, CT DEEP public noticed revisions to the water quality standards that specified dissolved oxygen in Class SA and SB waters shall not be less than 3.0 mg/L at anytime. These revisions were approved and adopted on 25 February 2011.

Timing and Duration of Hypoxia, 1991 - 2011

The figures and tables below displays the onset, duration, and end of the hypoxia events from 1991 through 2011 based on the 3.0 mg/L standard.

LISS 3.0 mg/L				
Year	Estimated Start Date	Estimated End Date	Maximum Area (mi^2)	Duration (days)
1991	July 19	Aug 28	122	41
1992	July 7	Aug 30	80	55
1993	July 9	Sept 10	202	64
1994	July 1	Sept 6	393	68
1995	July 12	Aug 15	305	35
1996	Aug 10	Sept 12	220	34
1997	July 27	Sept 12	30	48
1998	July 5	Sept 15	168	73
1999	July 2	Aug 21	121	51
2000	July 2	Aug 6	173	35
2001	July 10	Sept 14	133	66
2002	June 25	Aug 28	130	65
2003	July 5	Sept 3	345	61
2004	July 20	Sept 12	202	55
2005	July 14	Sept 20	177	69
2006	July 6	Aug 27	199	53
2007	July 16	Sept 11	162	58
2008	July 3	Sept 19	180.1	79
2009	July 19	Sept 1	169.1	45
2010	July 5	August 13	101.1	40
2011	July 6	August 28	130.3	54
Average	July 10	Sept 3	178	55
Deviation	±10 days	±13 days	± 85 mi^2	± 13 days

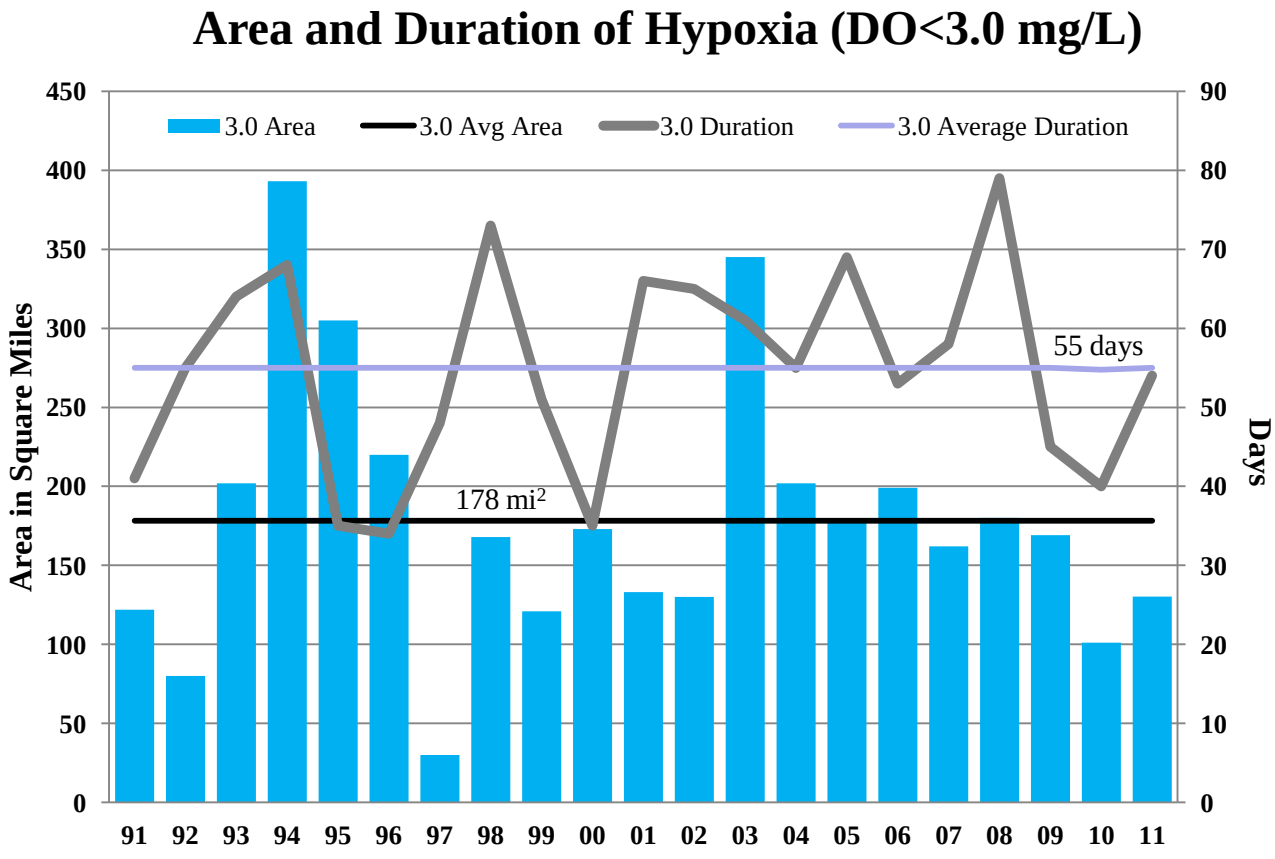
Based on the LISS standard of 3.0 mg/L, the average date of onset was July 10 (± 10 days), the average end date was September 3 (± 13 days), and the average duration was 55 days (± 13 days). The earliest onset of hypoxia (red text) occurred on 25 June 2002 and the latest end date (green text) occurred on 20 September 2005. The maximum area of hypoxia was 393 square miles (blue text) and occurred in 1994. The longest hypoxic event occurred in 2008 (magenta text) and lasted 79 days.



Timing and Duration of Hypoxia based on 3.0 mg/L

Yearly Comparison of Maximum Areal Extent and Duration of Hypoxia

This graph utilizes the data presented on the previous page to illustrate the year-to-year differences in the maximum areal extent of hypoxic conditions. Based on the 3.0 mg/L DO standard the average areal extent was 178 mi^2 and the average duration was 55 days.

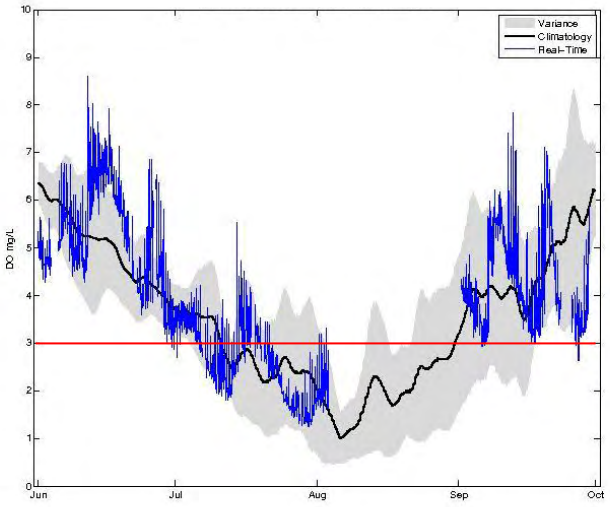


Duration Based on Buoy Data Obtained From the LISICOS Network on 28 September 2011

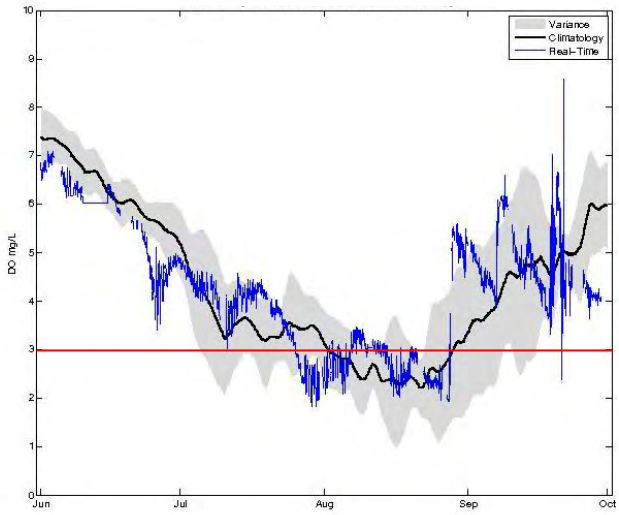
"LISICOS, or the Long Island Sound Integrated Coastal Observing System, was established in 2003 as a component of a regional/national ocean observing system, with the initial goal of developing a capability to observe and understand the LIS ecosystem and predict its response to natural and anthropogenic changes." LISICOS monitors water quality parameters (salinity, temperature, dissolved oxygen, photosynthetically available radiation and chlorophyll) as well as meteorological parameters (wind direction, speed, surface wave height) throughout the sound using a series of buoys and sensors. Data are sent in real-time via satellite (telemetered) where they are stored in a database and uploaded to the internet. The system is maintained by the University of Connecticut.

Duration and maximum /minimum concentration statistics are available on the LISICOS website for the Execution Rocks and Western Long Island Sound stations. Please note however that these statistics are based upon telemetered data and due to various events (Tropical Storm Irene, Tropical Storm Lee) data were not available real-time during August and early September. After data processing from the sondes, these statistics will likely be revised. UConn is expecting to fill in the data gaps by the end of November/early December.

Execution Rocks Bottom Dissolved Oxygen



Western LIS Bottom Dissolved Oxygen



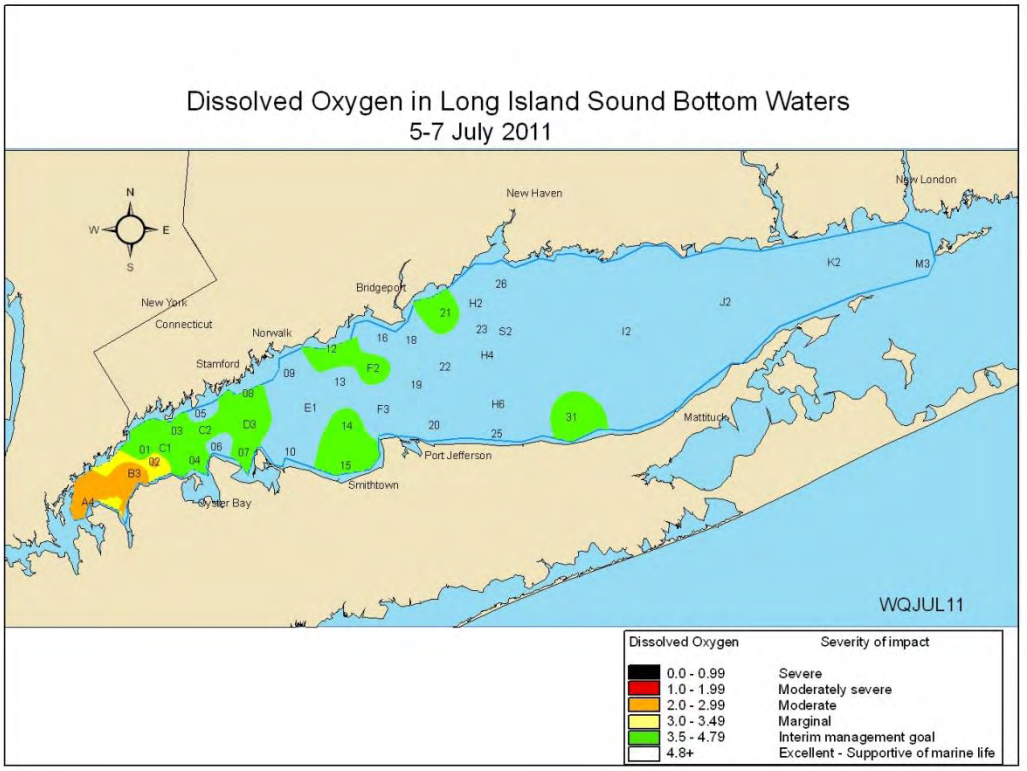
Blue line is the 2011 real-time data, black line is the average of the entire dataset (7 or 10 years, depending on the station) and the gray shading is the variability.

Based upon data obtained from the LISICOS Execution Rocks Bottom Dissolved Oxygen Prediction Tool webpage (http://lisicos.uconn.edu/do_fcst.php?site=exrx), between 1 June and 29 September, there were **21.18** days when the DO concentration was below or equal to 3.0 mg/L. The minimum DO concentration recorded was 1.25 mg/L on 30 July.

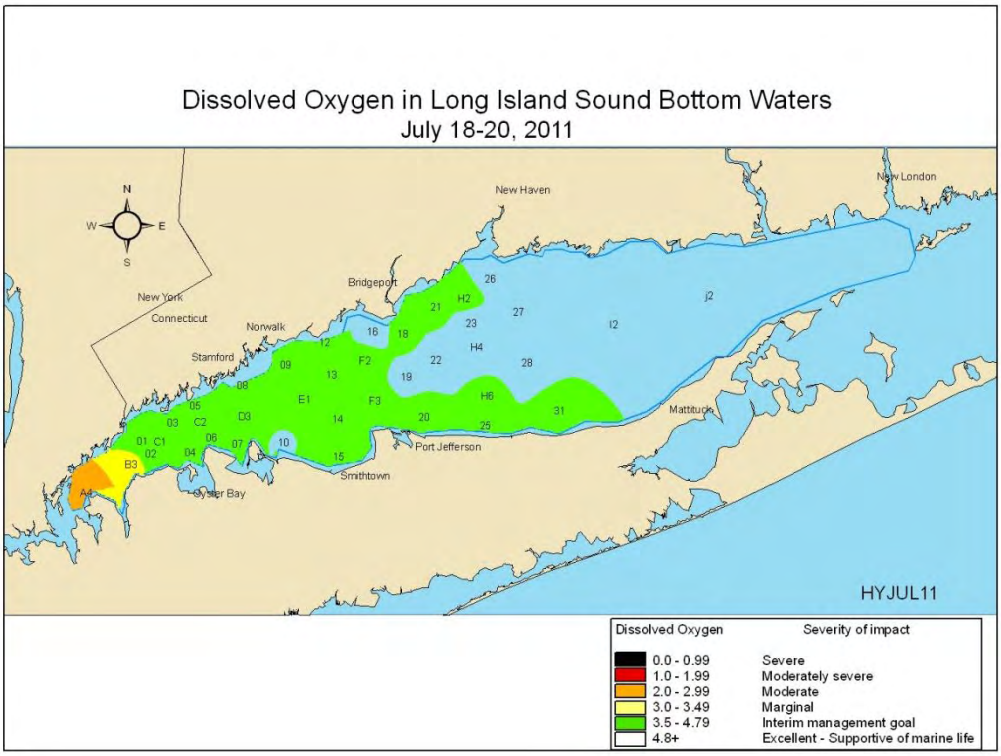
Based upon data obtained from the LISICOS Western LIS Bottom Dissolved Oxygen Prediction Tool website (http://lisicos.uconn.edu/do_fcst.php?site=wlis), there were **22.51** days of DO concentration below or equal to 3.0 mg/L between 1 June and 29 September. The minimum DO concentration recorded was 1.84 mg/L on 29 July.

Hypoxia Maps

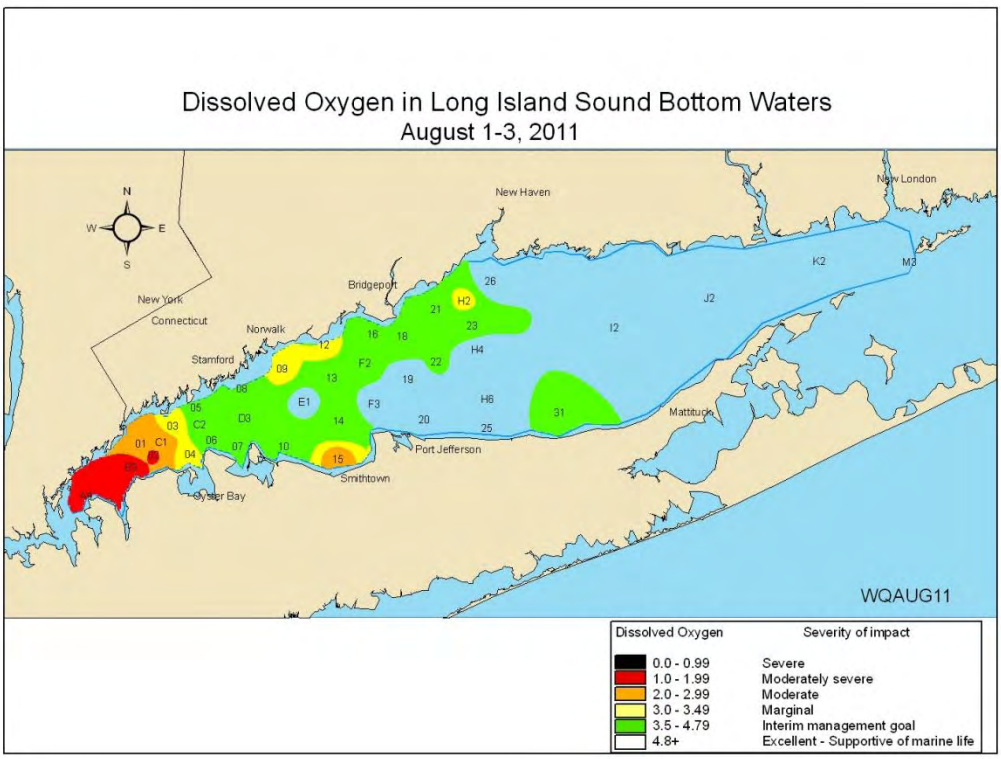
The following maps depict the development of hypoxia based on CT DEEP cruise data through the 2011 season. During the HYJUN11 survey all stations had DO concentrations above 4.8 mg/L. During the WQJUL11 survey DO concentrations were less than 4.8 mg/L at 14 stations and concentrations at B3 and A4 had already dropped below 3 mg/L. Data for all surveys are available upon request.



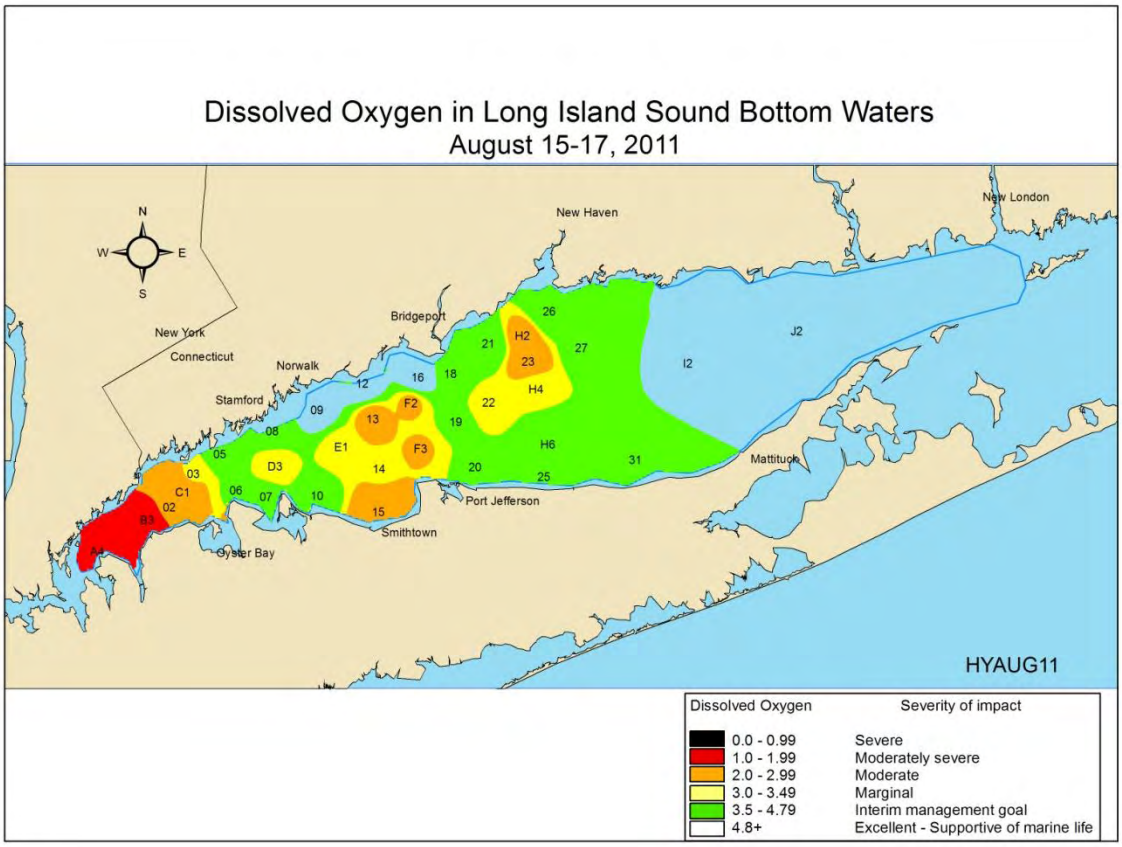
During the HYJUL11 survey, DO concentrations dropped below 4.8 mg/L at 26 stations; Station A4 remained below 3 mg/L, but concentrations at B3 improved slightly.



During the WQAUG11 survey, DO concentrations dropped below 3.5 mg/L at 5 stations, 3 stations fell below 3 mg/L, and three stations were below 2 mg/L.



Concentrations continued to decline during the HYAUG11 survey with two stations exhibiting DO concentrations below 2 mg/L. Eight stations had concentrations below the 3.0 mg/L standard and six stations were below 3.5 mg/L.



Maximum Areal Extent (130.3 mi^2) of Hypoxia

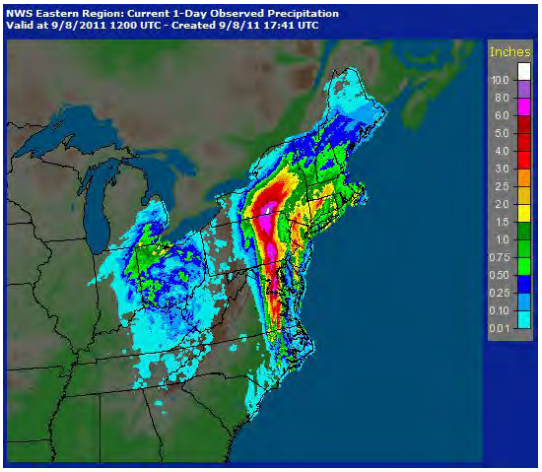
The map illustrates the dissolved oxygen concentrations in the bottom waters of Long Island Sound during the height of the hypoxic event.

Hurricane/Tropical Storm Irene and Tropical Storm Lee

Hurricane/Tropical Storm Irene buffeted the east coast of the US from 20-28 August and impacted the northeast two days before the scheduled September survey. USGS provisional storm surge data associated with the storm are available at the following link http://water.usgs.gov/osw/floods/2011_HIrene/. Select meteorological data (http://www.erh.noaa.gov/box/dailystns.shtml) for 8/28 around the region are tabulated below. Data from the LISICOS buoys are also included.

Location	Rainfall (inches)	Avg wind speed (mph)	Max gust (mph)
Bridgeport	3.35	24.9	63
Central Park	6.87	14	60
LaGuardia	5.69	27.7	67
JFK	5.03	28.8	59
Bennington, VT	4.23	10.1	30
North Adams, MA	5.11	9.7	47
ESTRN	N/A	25.8	51
CLIS	N/A	27.9	64
WLIS	N/A	26.9	48
EXRX	N/A	25.4	49

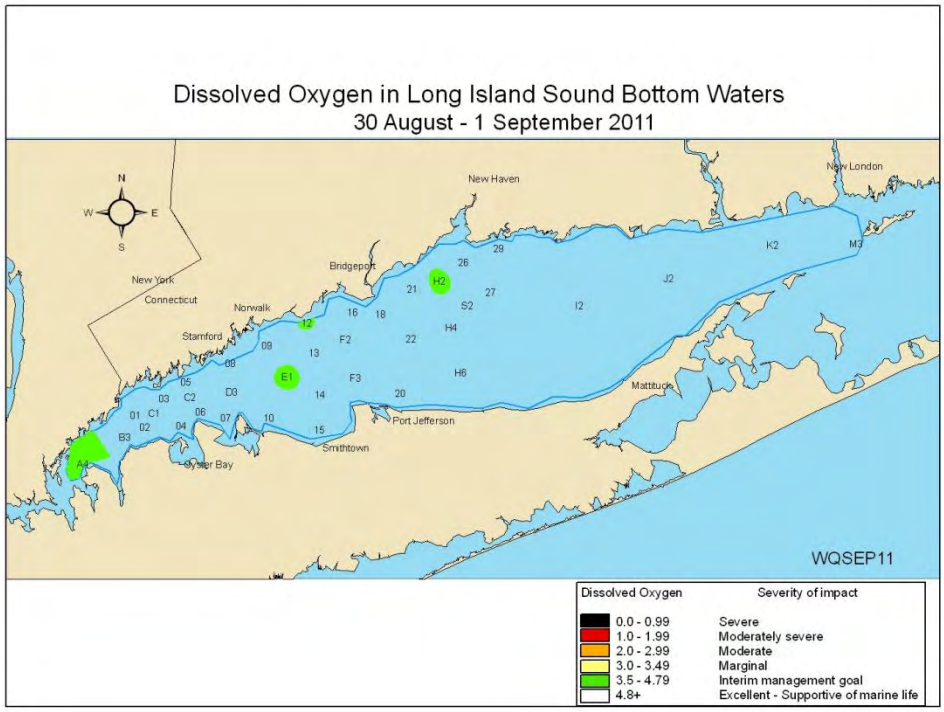
Following Irene, Tropical Storm Lee pummeled the area from 2-5 September. Maximum sustained winds reported by the National Hurricane Center were 60 mph.

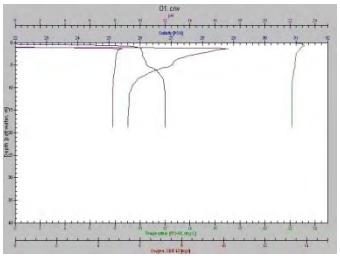


Northeast 24-hour Observed Precipitation. Image from NWS found on USGS Tropical Storm Lee Activities website http://water.usgs.gov/osw/floods/2011_TSLee/index.html

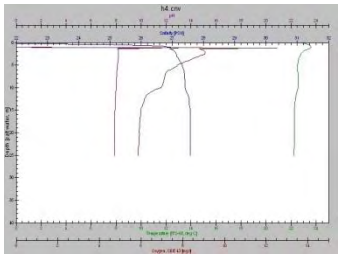
Sediment plumes in Hudson River acquired 9/12/11 http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=52125

The WQSEP11 survey was postponed one day due to Tropical Storm Irene. The wind and rain helped to mix the water column, easing thermal stratification, and all but eliminating hypoxic conditions. Only three stations had concentrations below 4.8 mg/L. Conditions continued to improve and the HYSEP11survey was cancelled.

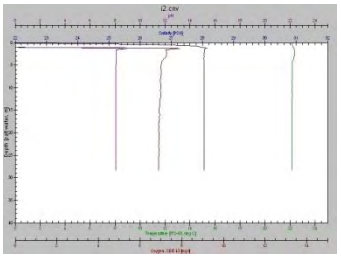




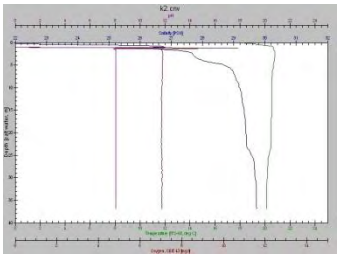
Station 01



Station H4



Station I2



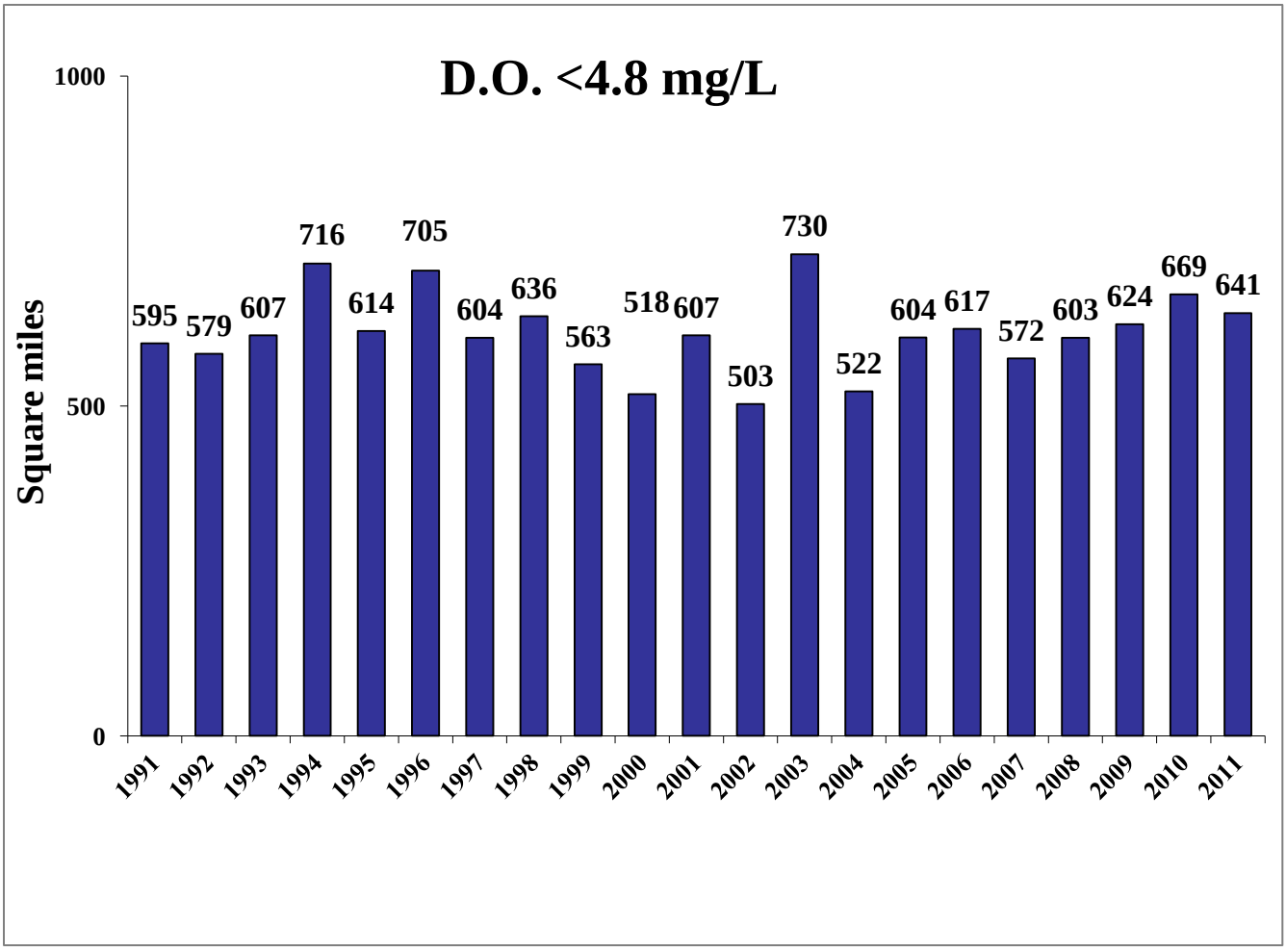
Station K2

CTD profiles obtained during the WQSEP11 survey. The blue line is salinity, green is temperature, darker red is oxygen, and magenta is pH.

Area of Dissolved Oxygen Below the Chronic Criterion for Growth and Protection of Aquatic Life for LIS

Aquatic organisms are harmed based on a combination of minimum oxygen concentration and duration of the low DO excursion. A DO concentration of 4.8 mg/L meets the chronic criterion for growth and protection of aquatic life regardless of the duration.

This chart illustrates the maximum area of bottom waters within Long Island Sound with DO concentrations less than 4.8 mg/L. In 2011, the maximum area occurred during the HYAUG11 survey. This area was lower than 2010 but higher than 2009. The area affected by concentrations less than 4.8 mg/L averages 610.9 square miles and varies slightly from 503 to 730 square miles.

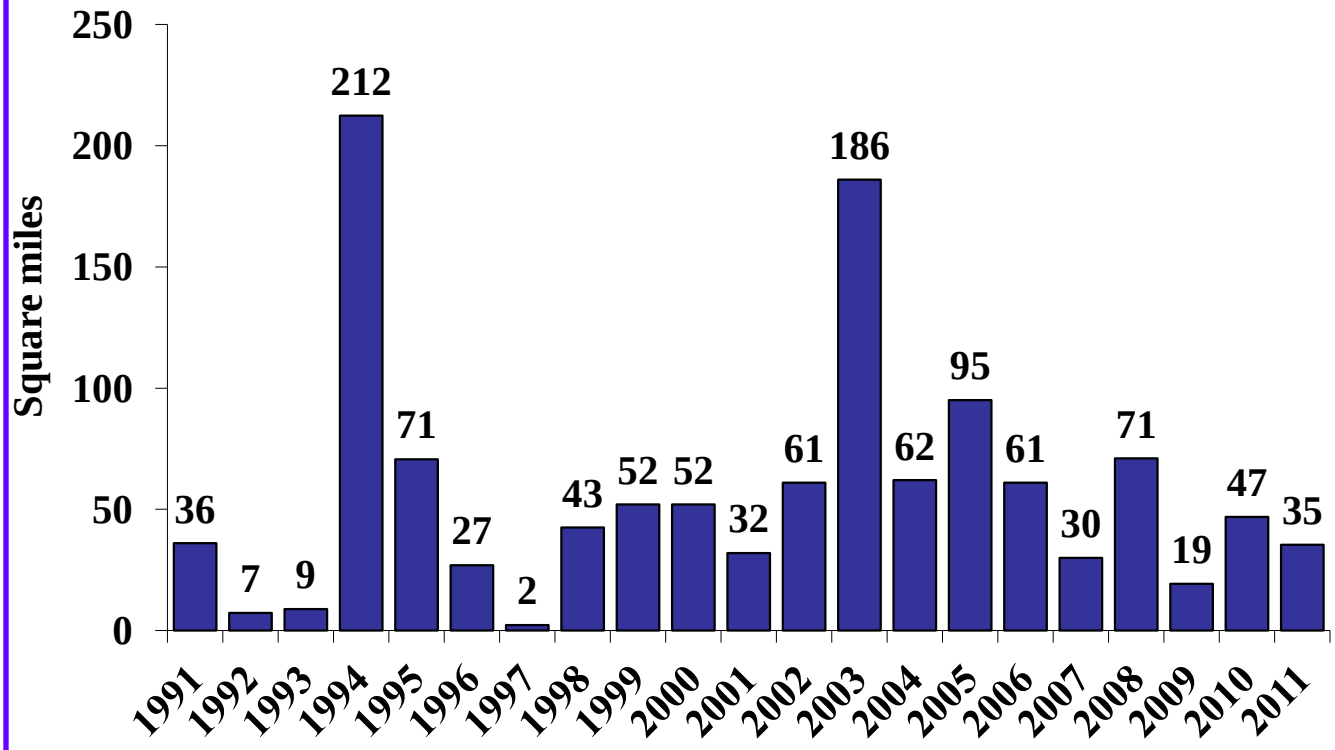


Severe Hypoxia

D.O. <2 mg/L

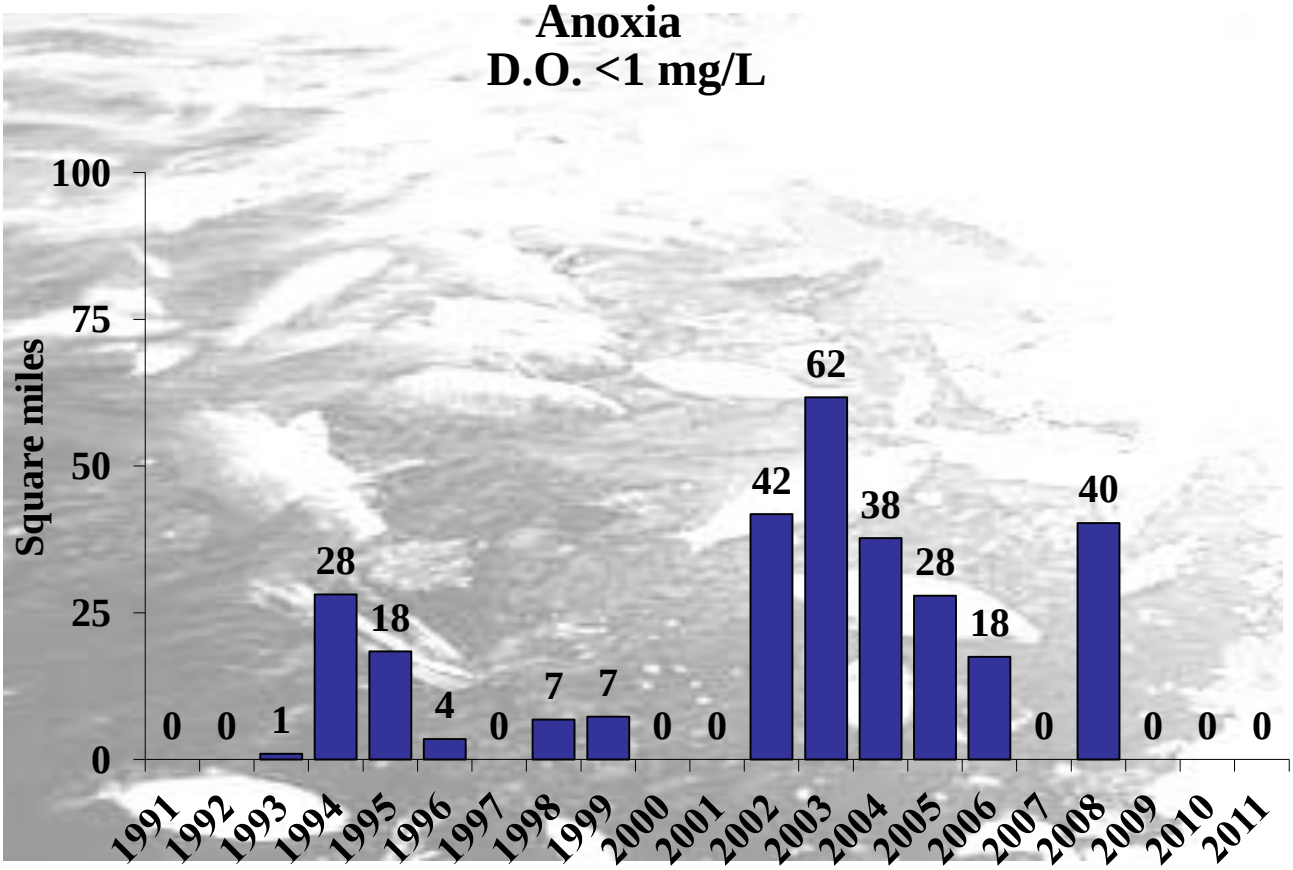
The Gulf of Mexico is another water body that exhibits severe hypoxia, although the standard is determined at the 2.0 mg/L level. The average size of the hypoxic zone in the northern Gulf of Mexico from 1985-2010 is roughly 5330 mi^2. The maximum area of the Gulf of Mexico hypoxic zone occurred in 2002 and was estimated at 8,841 mi^2. (http://www.gulfhypoxia.net/Research/Shelfwide%20Cruises/ /).

This chart illustrates the maximum area of bottom waters of Long Island Sound with concentrations less than 2 mg/L.



In 2011, the maximum area of LIS affected by severe hypoxia was 35 mi^2, a decrease from 2010. The average area, calculated from 1991-2011, is 57.7 mi^2.

1994 and 2003 appear to be especially bad years for concentrations less than 2 mg/L. 1994 had cold winter bottom water temperatures and an unusually warm June which led to the establishment of strong stratification. The highest average Delta T in July 1994 was 8.54 ºC. 2003 was the second hottest summer since 1895 and the 28th wettest which also led to the Sound being very strongly stratified. Strong stratification (Delta T greater than 4) lasted for four months in 1994 (May-August) and only one month (July) in 2003.

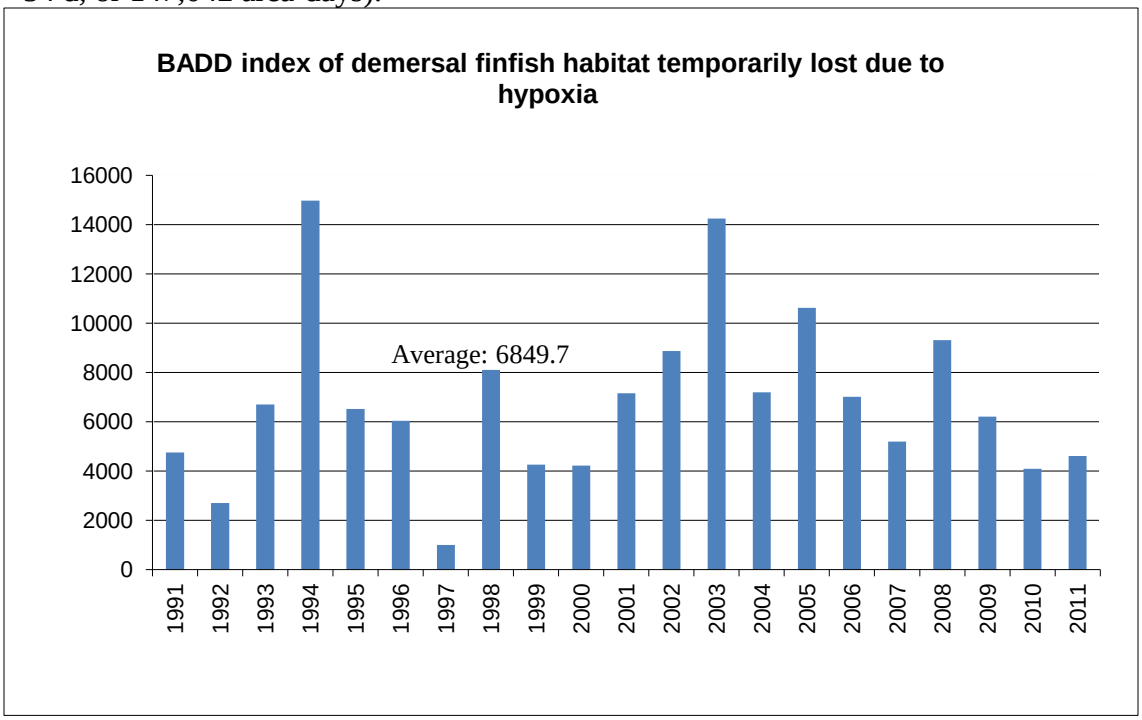


For management purposes the Long Island Sound Study defines anoxia as DO concentrations less than 1 mg/L. In eight of the twenty-one years there was no anoxia reported by CT DEEP. The greatest area with D.O. below 1 mg/L observed in LIS, based on ~biweekly sampling by CT DEEP, was during the summer of 2003. Prior to 2002, the average area of bottom waters affected by anoxia was 5.92 mi^2. From 2002-2011 the average area affected was 22.69 mi^2. The overall average area affected from 1991-2011 is 13.9 mi^2. A consistent decline was observed from 2003-2007. During the summer of 2008 three stations (A4, B3, and 02) were observed to have gone anoxic. In 2009, 2010, and 2011 CT DEEP did not document any stations with DO < 1 mg/L. However, on 31 August2009 the Interstate Environmental Commission documented two stations that were anoxic, Stations B3 (same as CT DEEP) and B2 (northwest of B3). In 2010 IEC also documented two stations that were anoxic- Station B3 on 2 August and Station H-D (Hempstead Harbor) on 9 September. In 2011, no stations were documented to have gone anoxic by either the IEC or CT DEEP; the lowest concentration documented by IEC was 1.53 mg/L at Station B3 and the lowest concentration documented by CT DEEP was 1.65 mg/L at Station A4. Additionally the lowest concentration reported at the LISICOS Execution Rocks buoy (Station A4) for 2011 was 1.25 mg/L . The buoy is operated by the University of Connecticut, Department of Marine Sciences.

HABITAT IMPAIRMENT ASSOCIATED WITH HYPOXIA

Simpson *et al*, (1995) identified low oxygen tolerance thresholds for 16 individual species of finfish and lobster, and six aggregate species indices. For the most sensitive species (scup, striped sea robin) dissolved oxygen becomes limiting at over 4.0 mg/l, whereas more highly tolerant species (Atlantic herring and butterfish) did not decline in abundance until oxygen levels were below 2.0 mg/l. Both demersal species biomass and demersal species richness begin to decline when dissolved oxygen levels fall below about 3.5 mg/l. No finfish or macroinvertebrates were observed when dissolved oxygen fell below 1.0 mg/l.

An index of habitat impairment (Biomass Area-Day Depletion, BADD) was developed based on the percent reduction in demersal finfish biomass associated with each 1 mg/L interval below 3.0 mg/L. Based on Simpson *et al* (1996), demersal finfish biomass is reduced 100% (total avoidance) in waters with DO<1.0 mg/L. From 1.0-1.9 mg/L biomass is reduced 82%, while a 41% reduction occurs at 2.0-2.9 mg/L, and a 4% reduction occurs at 3.0-3.9 mg/L dissolved oxygen. These rates are applied to the area-days within each DO interval calculated during each survey and summed over the hypoxia season defined here as July 5- August 28 (54 d). The index is then expressed as a percentage of the available area-days (sample area 2,723 km^2 x 54 d, or 147,042 area-days).

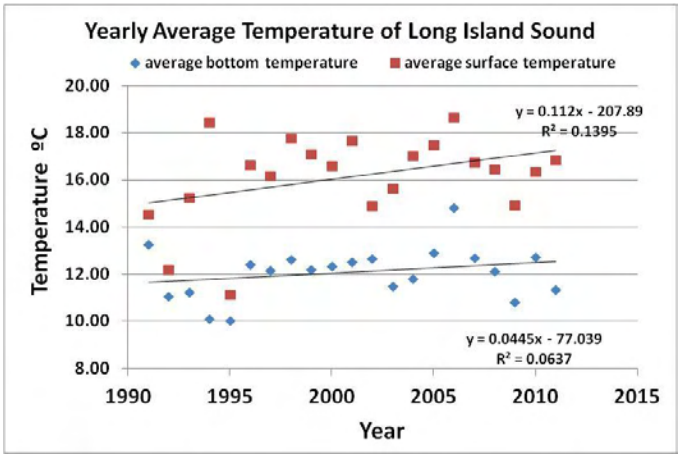


Simpson, David G., Kurt Gottschall, and Mark Johnson. 1995. Cooperative interagency resource assessment (Job 5). In : A study of marine recreational fisheries in Connecticut, CT DEP Marine Fisheries Office, PO Box 719, Old Lyme, CT 06371, p 87-135.

Simpson, David G., Kurt Gottschall, and Mark Johnson. 1996. Cooperative interagency resource assessment (Job 5). In : A study of marine recreational fisheries in Connecticut, CT DEP Marine Fisheries Office, PO Box 719, Old Lyme, CT 06371, p 99-122.

WATER TEMPERATURE

In LIS, water temperature plays a major role in the ecology of the Sound especially in the timing and severity of the summer hypoxia event. CT DEEP's monitoring program records water temperatures and salinity year round, but data collected during the hypoxia monitoring cruises are used to help estimate the extent of favorable conditions for the onset, extent, and end of the hypoxic event. In LIS, there are two key contributors to hypoxia: nutrient enrichment and stratification. Nutrients, especially nitrogen, flow into the Sound from numerous sources including point sources like wastewater treatment plants and nonpoint sources such as stormwater runoff. This enrichment leads to excessive growth of phytoplankton, particularly in the spring. As the plankton die, they begin to decay and settle to the bottom. Bacterial decomposition breaks down the organic material from the algae, using up oxygen in the process.



The Sound is coldest during February and March and warmest during August and September. The yearly average surface and bottom temperature of the Sound appear to be increasing.

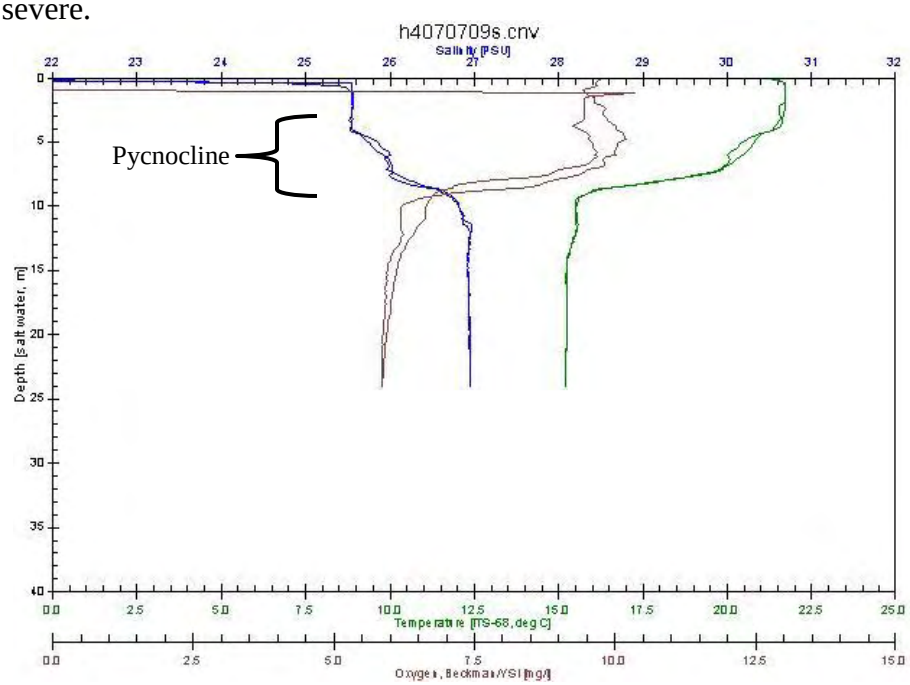
2011 maximum, minimum, and average temperatures (ºC) across Long Island Sound by cruise based upon CT DEEP Conductivity, Temperature, Depth (CTD) profile data

Cruise	Max	Min	Average
WQJAN11	4.601	0.595	2.923
WQFEB11	2.334	0.232	0.871
CHFEB11	1.302	0.678	0.791
WQMAR11	4.121	1.809	2.564
WQAPR11	7.060	3.732	5.147
WQMAY11	11.736	6.584	8.238
WQJUN11	21.436	9.778	12.927
HYJUN11	18.571	12.532	15.837
WQJUL11	23.774	15.197	17.734
HYJUL11	23.789	16.924	19.432
WQAUG11	24.791	18.366	20.818
HYAUG11	23.737	20.420	21.644
WQSEP11	23.876	19.711	21.952

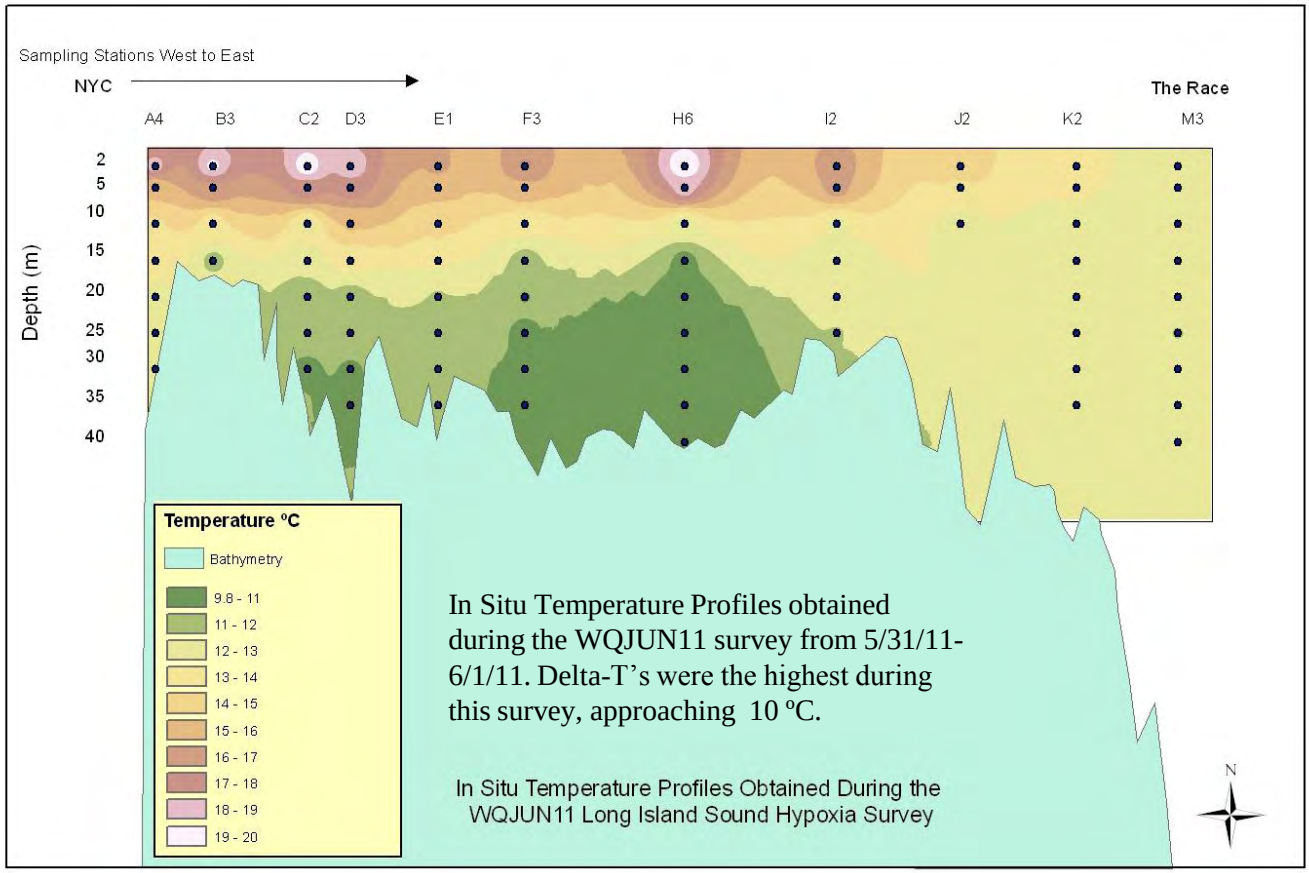
Delta T

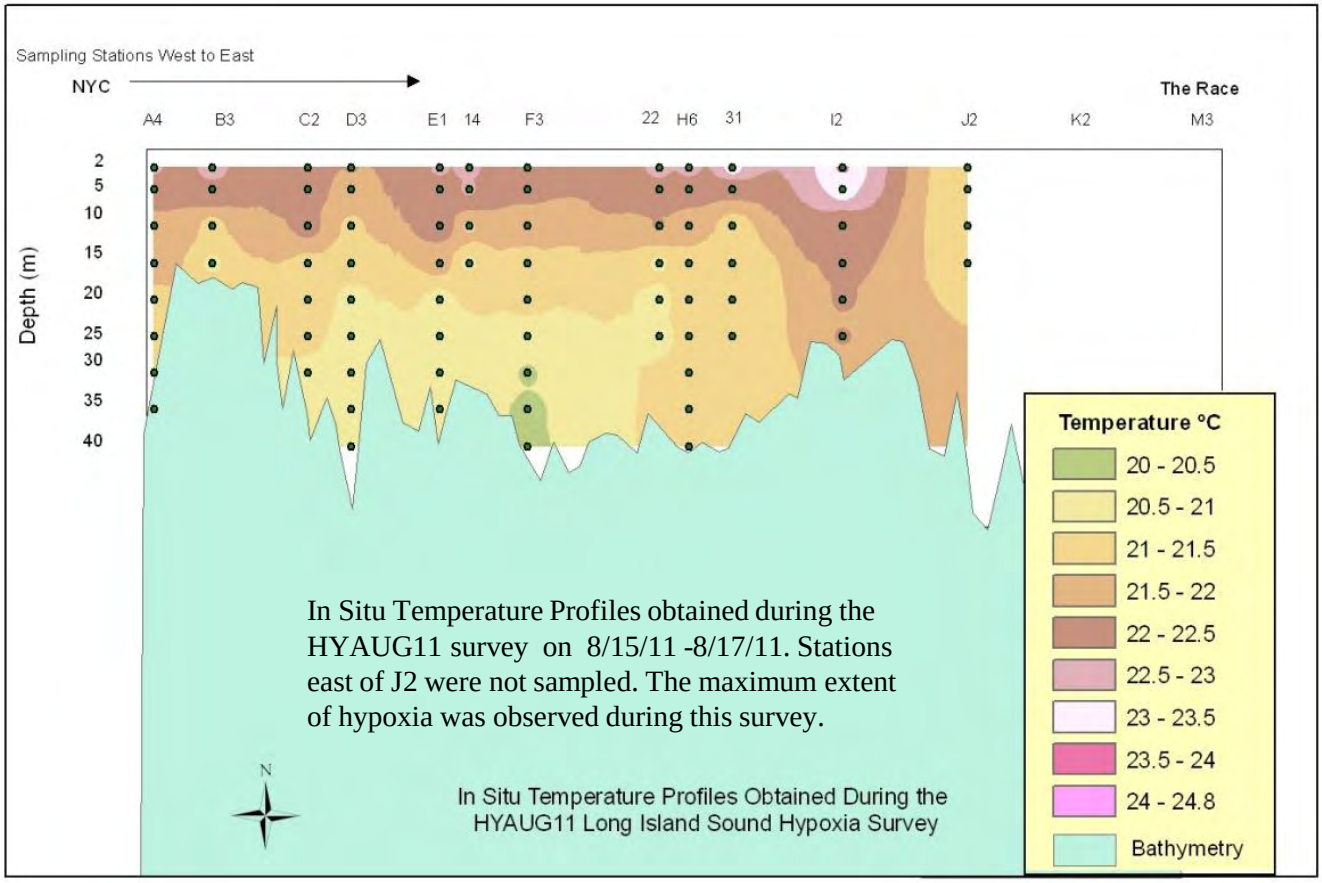
The temperature difference between the bottom waters and the surface waters is known as "delta T". This delta T, along with salinity differences, creates a density difference, or "density gradient" resulting in a separation or "stratification" of water layers that hinders the oxygenated surface waters from circulating downward and mixing with the oxygen starved bottom waters. The pycnocline, or zone where water density increases rapidly with depth due to the changes in temperatures and salinity (see image on next page), inhibits oxygenated surface waters from mixing with oxygen deplete bottom waters exacerbating the hypoxia. The pycnocline typically develops in LIS in late spring/early summer when rapid surface water warming exceeds the rate of warming in the bottom waters and persists

into early fall when it is disrupted by strong winds associated with storms which lead to mixing or cooling air temperatures. With the dissolution of the pycnocline, hypoxic conditions are alleviated/eliminated. The smallest Delta-Ts occur during the winter when the water column is well mixed. The largest Delta T's occur during the early summer. The greater the delta T the greater is the potential for hypoxia to be more severe.

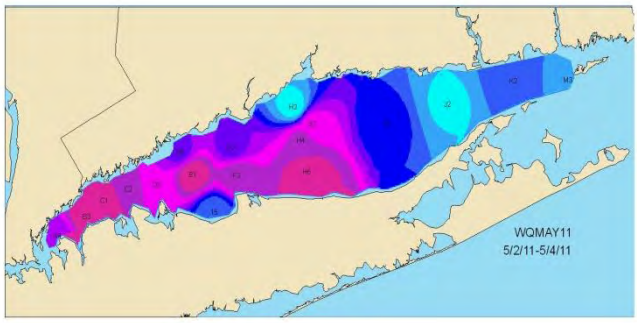


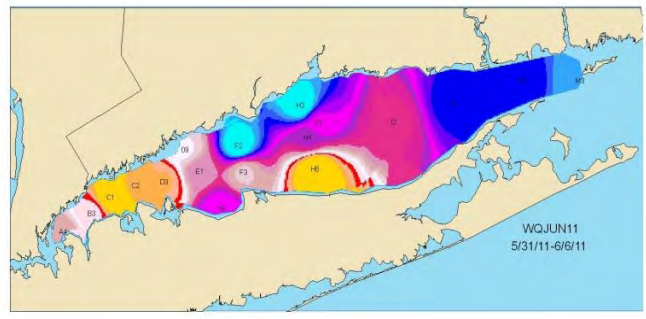
The temperature graphs on page 16 show computer interpolations along the west-east axis of LIS generated from profile data collected during two CT DEEP surveys. During the WQJUN11 survey, surface water temperatures had warmed to 21ºC while the bottom water remained cooler around 12ºC. This set up the largest differences in temperatures between the surface and bottom waters. The second graph shows how the water column was thermally stratified during the HYAUG11 survey when hypoxic conditions were at their worst. The graphs on page 17 show how the Delta T's varied over the course of the summer sampling season. Delta T's increased from the WQAPR11 survey, decreased during the HYJUN11 survey, then increased again through the WQAUG11 survey, setting up the stratification and leading to the maximum extent of hypoxia in late August. By the September survey with the help of remnants of two tropical storms, Delta T's decreased to around 1 ºC over much of the Sound allowing the oxygenated surface waters to mix through to the bottom, leading to the end of the hypoxic event. The graphs also show how the Delta T varies spatially. The western Sound has higher Delta T's due to the limited flushing capacity, topology, and geology. In the east where cooler, oxygen rich, off- shore ocean water mixes with the Sound water, Delta T's are much lower and hypoxia rarely occurs.

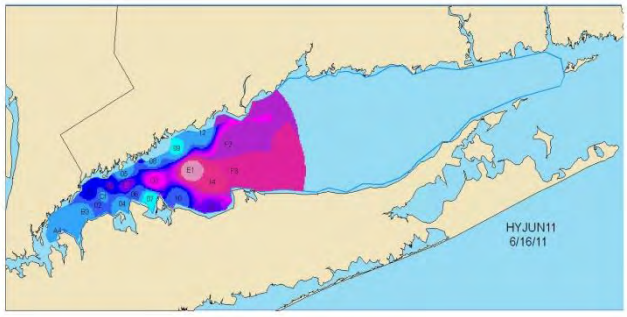

Sampling Stations West to East
NYC
The Race
A4
B3
C2
D3
E1
F3
H6
I2
J2
K2
M3
Depth (m)
2
5
10
15
20
25
30
35
40
Temperature °C
Bathymetry
9.8 - 11
11 - 12
12 - 13
13 - 14
14 - 15
15 - 16
16 - 17
17 - 18
18 - 19
19 - 20
In Situ Temperature Profiles obtained during the WQJUN11 survey from 5/31/11-6/1/11. Delta-T's were the highest during this survey, approaching 10 °C.
In Situ Temperature Profiles Obtained During the WQJUN11 Long Island Sound Hypoxia Survey
N

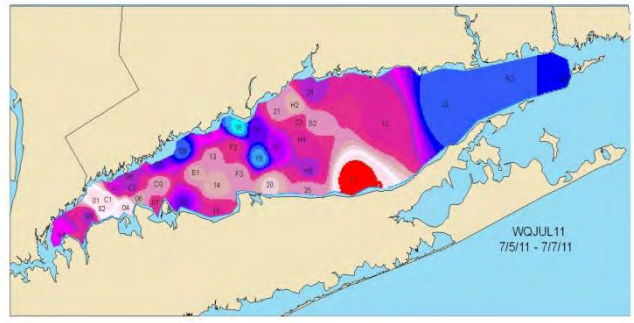

Sampling Stations West to East
NYC
The Race
A4
B3
C2
D3
E1
14
F3
22
H6
31
I2
J2
K2
M3
Depth (m)
2
5
10
15
20
25
30
35
40
Temperature °C
20 - 20.5
20.5 - 21
21 - 21.5
21.5 - 22
22 - 22.5
22.5 - 23
23 - 23.5
23.5 - 24
24 - 24.8
Bathymetry
In Situ Temperature Profiles obtained during the HYAUG11 survey on 8/15/11 -8/17/11. Stations east of J2 were not sampled. The maximum extent of hypoxia was observed during this survey.
In Situ Temperature Profiles Obtained During the HYAUG11 Long Island Sound Hypoxia Survey
N

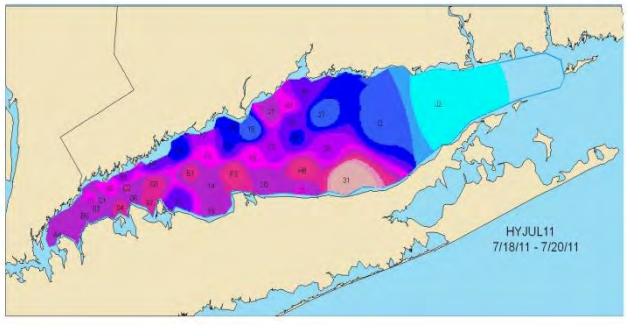
2011 Delta-T Maps

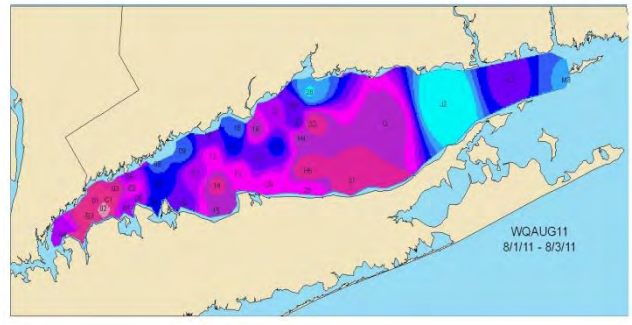


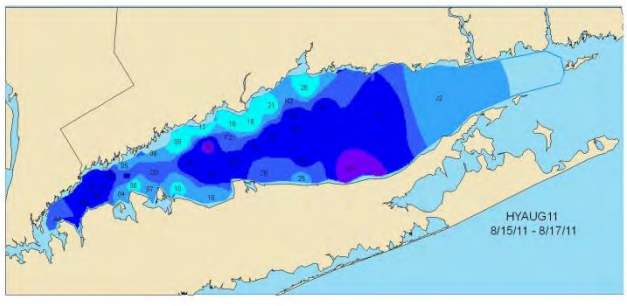


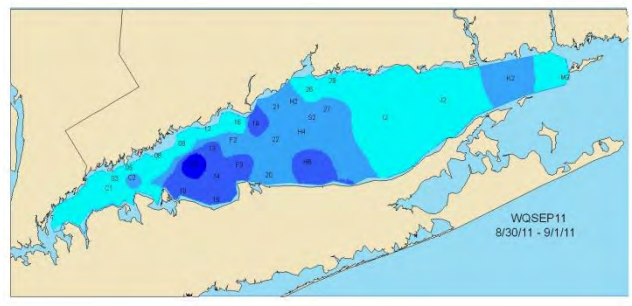












0 - 0.5
>0.5 - 1
>1 - 1.5
>1.5 - 2
.2 - 2.5
>2.5 - 3
>3 - 3.5
.3.5 - 4
>4- 4.5
>4.5 - 5
>5 - 5.5
>5.5 - 6
>6 - 6.5
>6.5 - 7
>7 - 7.5
>7.5 - 8
>8- 8.5
>8.5 - 9
>9

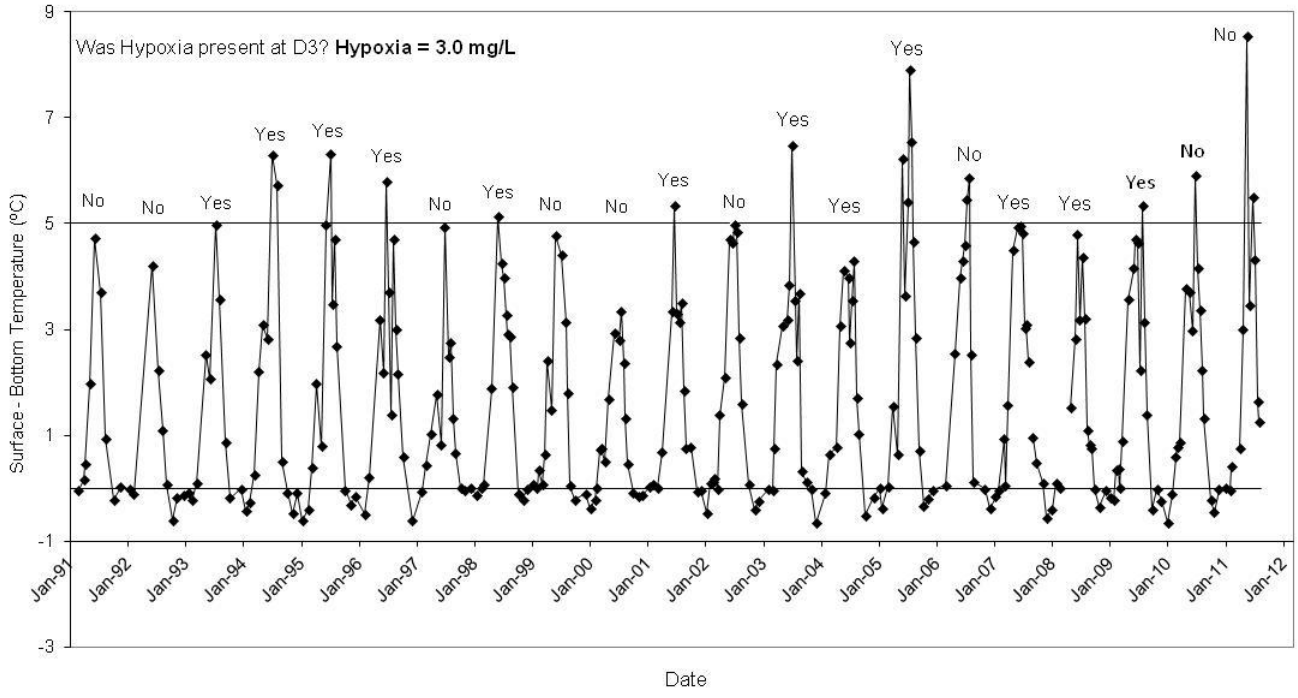
Delta-T ºC

N
W
E
S

This table summarizes the minimum winter temperatures (January, February, and March), the maximum summer temperatures (June, July, August, and September), the maximum delta T, and maximum hypoxic area at Station D3. Station D3 is located in the eastern-most and deepest portion of the Narrows (see map on page 1). The CT DEP 1991-1998 Data Review report (Kaputa and Olsen, 2000) found a positive correlation between the maximum delta T observed at D3 and the maximum area of hypoxia in the same year. Delta T was not correlated to the duration of hypoxia. 2004 had the lowest water temperature recorded, 2006 had the highest, 2011 had the highest ΔTmax, and 1994 had the largest area of hypoxia.

Year	Minimum Winter Temp (ºC)	Maximum Summer Temp (ºC)	Maximum ΔT (ºC)	Maximum Area of Hypoxia (mi^2) DO<3.0 mg/L
1991	2.69	22.23	4.75	122
1992	1.86	20.89	4.83	80
1993	1.06	22.68	5.33	202
1994	-0.68	24.08	6.33	**393**
1995	0.95	23.78	6.33	305
1996	-0.19	23.78	5.91	220
1997	1.87	21.81	4.96	30
1998	3.40	23.20	5.22	168
1999	2.67	23.41	5.51	121
2000	0.57	21.99	6.02	173
2001	1.67	23.20	5.38	133
2002	4.03	23.47	5.52	130
2003	-0.52	22.88	6.74	345
2004	**-0.93**	23.09	4.33	202
2005	0.53	25.10	8.19	177
2006	2.17	**25.11**	6.72	199
2007	0.83	23.03	5.12	162
2008	2.45	22.47	4.91	180.1
2009	0.72	24.31	5.90	169.1
2010	1.35	24.91	6.36	101.1
2011	0.66	22.32	**8.34**	130.3

Kaputa, Nicholas P., and Christine B. Olsen. 2000. Long Island Sound summer hypoxia monitoring survey 1991-1998 data review. CTDEP Bureau of Water Management, Planning and Standards Division, 79 Elm Street, Hartford, CT 06106-5127, 45 p.



Time series of ΔT (surface water temperature - bottom water temperature) at station D3, 1991 through 2011.

Prior to 2004, when Station D3 became hypoxic the observed maximum delta-T was greater than 5ºC. Since 2004, this trend/pattern does not seem to hold. In fact, over the period of record this year (2011) had the highest observed Delta-T at Station D3 (>8ºC) but the lowest dissolved oxygen concentration recorded in 2011 at D3 was 3.22 mg/L.

Salinity

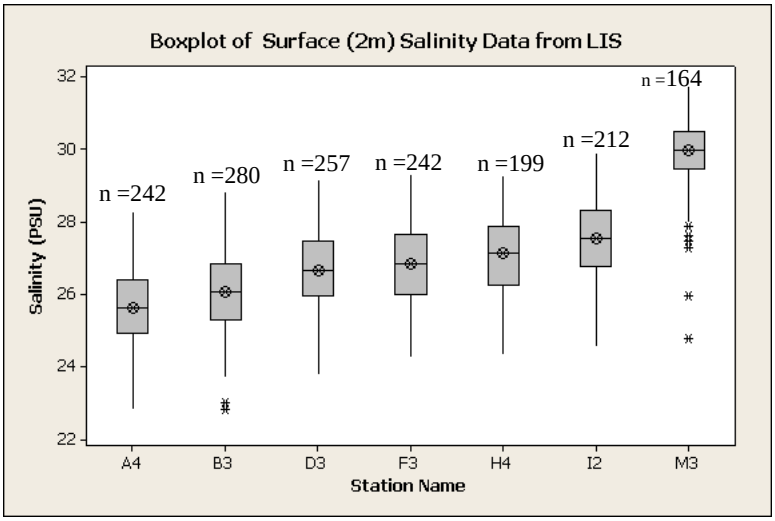
Salinity is a measure of the dissolved salts content of seawater. It is usually expressed in practical salinity units (PSU). Salinity levels across Long Island Sound vary from 23 PSU in the Western Sound at Station A4 to 33 PSU in the eastern Sound at Station M3. The Thames, Connecticut, and Housatonic rivers are the major sources of freshwater entering the Sound. Summary statistics for salinity data collected from seven stations across the Sound from1991-20101are presented in the tables below. Data collected this year are also presented separately.

	1991-2011 Bottom Water Statistics							
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	249	23.823	28.727	26.324	26.31	0.0591	0.933	0.87
B3	297	24.259	28.926	26.6	26.557	0.0538	0.928	0.861
D3	274	24.912	29.215	27.243	27.359	0.0535	0.886	0.784
F3	258	25.153	29.432	27.592	27.636	0.0538	0.864	0.746
H4	217	25.508	29.7	27.743	27.765	0.0574	0.845	0.714
I2	242	25.762	29.985	28.063	28.153	0.0542	0.844	0.712
M3	203	28.608	32.622	30.559	30.556	0.0503	0.717	0.514

	2011 Bottom Water Statistics							
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	11	24.413	27.579	25.832	25.736	0.313	1.037	1.075
B3	11	24.681	27.773	26.101	26.008	0.302	1.001	1.003
D3	11	25.376	27.908	26.811	27.36	0.29	0.963	0.928
F3	10	25.852	28.204	27.145	27.428	0.281	0.89	0.792
H4	9	26.235	28.215	27.437	27.681	0.238	0.715	0.511
I2	9	26.511	28.323	27.553	27.865	0.232	0.696	0.484
M3	4	29.379	30.182	29.89	30	0.183	0.366	0.134

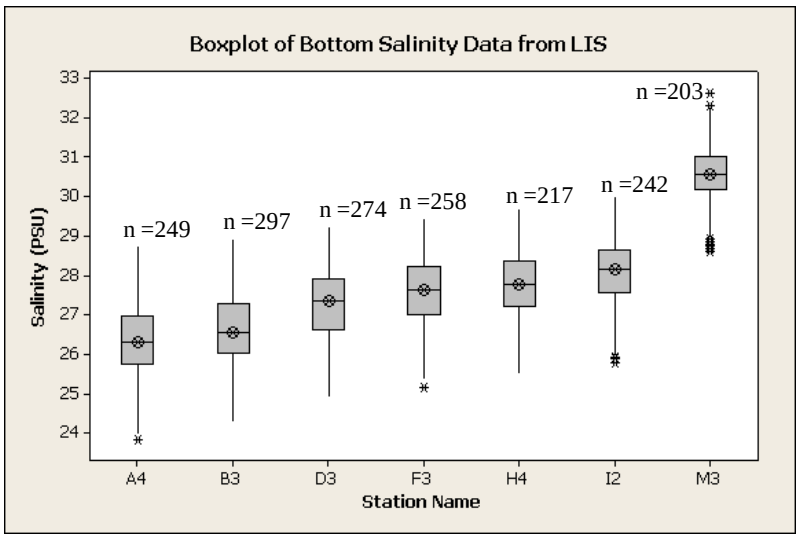
	1991-2011 Surface Statistics							
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	242	22.833	28.278	25.636	25.623	0.0664	1.033	1.068
B3	280	22.8	28.84	26.041	26.073	0.0639	1.07	1.145
D3	257	23.772	29.146	26.663	26.645	0.0662	1.061	1.126
F3	242	24.246	29.307	26.819	26.826	0.0699	1.087	1.182
H4	199	24.315	29.262	27.056	27.145	0.0771	1.088	1.183
I2	212	24.56	29.909	27.489	27.552	0.0725	1.056	1.115
M3	164	24.789	31.758	29.899	29.979	0.0804	1.029	1.06

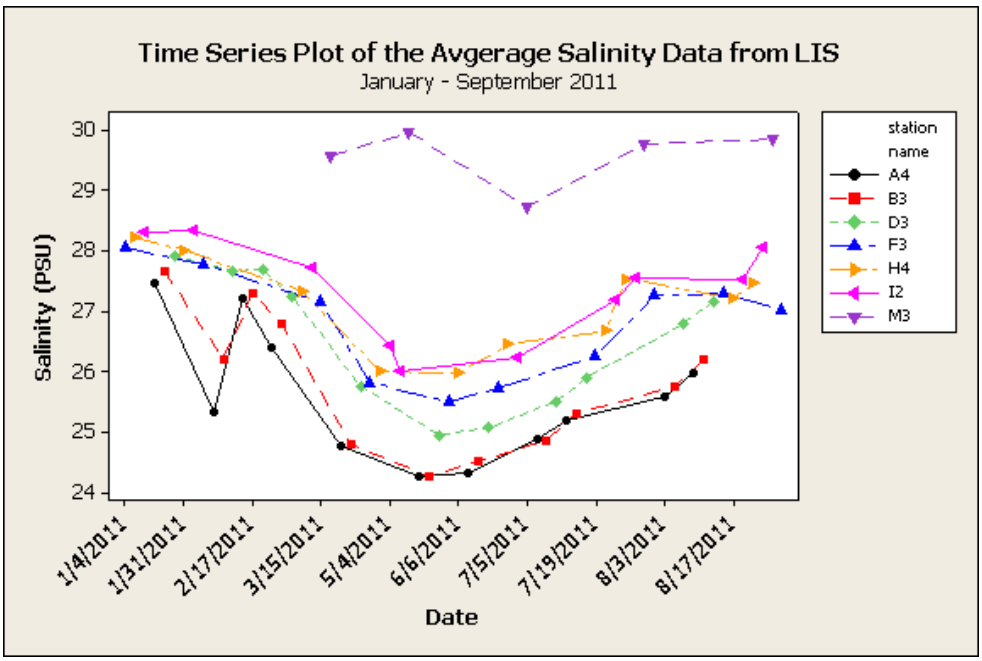
	2011 Surface Statistics							
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	11	22.865	27.099	24.912	24.824	0.453	1.433	2.054
B3	11	22.8	27.073	24.731	24.708	0.448	1.416	2.004
D3	11	23.772	27.907	25.92	25.668	0.445	1.407	1.979
F3	10	24.416	27.94	25.889	25.591	0.363	1.148	1.318
H4	10	24.922	28.216	26.303	26.238	0.362	1.143	1.307
I2	10	24.56	28.317	26.576	26.431	0.43	1.361	1.851
M3	5	27.623	29.281	28.64	28.829	0.366	0.732	0.535



This box plot, based upon data collected during CT DEEP surveys from January 1991-September 2011 (n=317, includes BOLD09 survey), shows the median surface salinity, range, interquartile range, and outliers by station. Surface in this case refers to data collected two (2) meters below the air/water interface. Salinity increases from west to east across the Sound.

This box plot, based upon data collected during CT DEEP surveys from January 1991-September 2011 (n=317, includes BOLD09 survey), shows the median bottom salinity, range, interquartile range, and outliers by station. Bottom in this case refers to data collected five (5) meters above the sediment/water interface. The bottom waters are generally saltier than the surface waters.

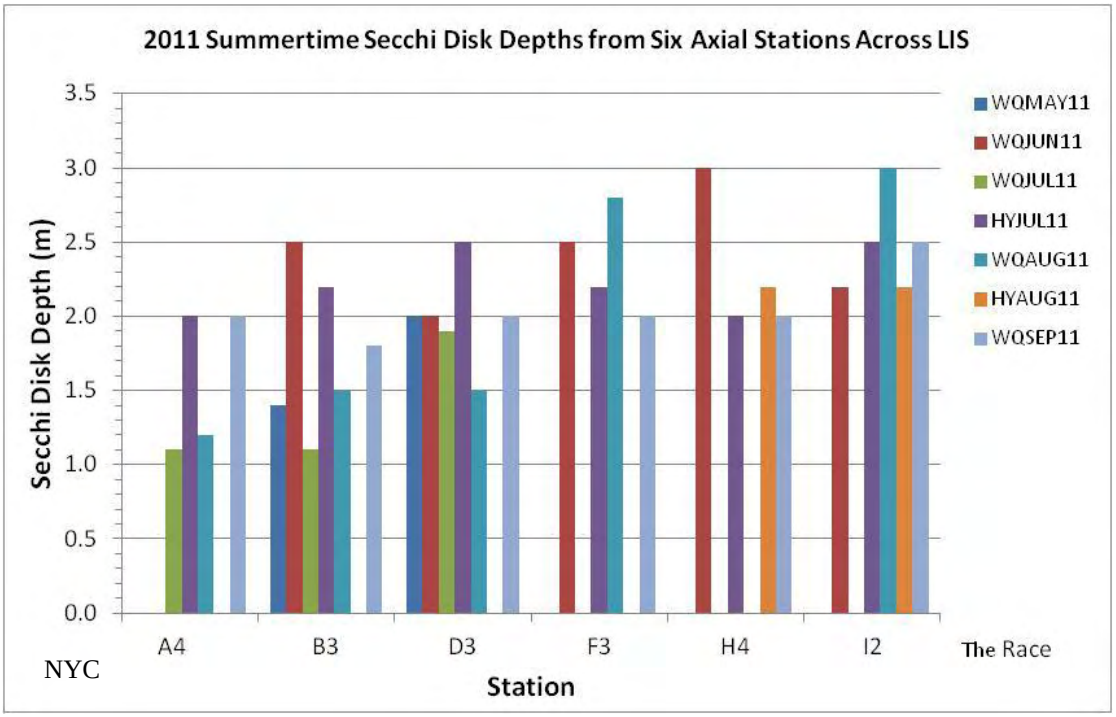




This time series plot illustrates the temporal variability of the mean salinity values by station from January-September 2011.

Water Clarity

Water clarity is measured by lowering a Secchi disk into LIS by a measured line until it disappears. It is then raised until it reappears. The depth where the disk vanishes and reappears is the Secchi disk depth. The depth to disappearance is related to the transparency of the water. Transparency may be reduced by both absorption and scattering of light. Water absorbs light, but absorption is greatly increased by the presence of organic acids that stain the water a brown "tea" color and by particles. Scattering is largely due to turbidity, which can be attributable to both inorganic silt or clay particles, or due to organic particles such as detritus or planktonic algae suspended in the water. CT DEEP began taking Secchi Disk measurements in June 2000. Since then, 2,163 measurements have been entered into our database; of those 1256 are from the 17 stations sampled annually. The 2000-2011 average Secchi depth is 2.44 m with a minimum depth of 0.4 m (WQSEP05, station A4) and a maximum depth of 6.2 m (WQNOV00 Station K2). Below is a graph depicting Secchi disk depths from six of the axial stations sampled by CT DEEP LISS Water Quality Monitoring Program between May and September 2011.



2010 data

- **Average Secchi Disk Depth: 2.68 m (n=174)**
- **Minimum Secchi Disk Depth: 0.9 m at Station B3 during the WQSEP10 cruise**
- **Maximum Secchi Disk Depth: 6.1 m at Station F3 during the HYAUG10 cruise**

2011 data

- **Average Secchi Disk Depth: 2.16 m (n=157)**
- **Minimum Secchi Disk Depth: 1.0 m at Station 02 & 07 during the WQJUL11 cruise and Station 29 during the WQSEP11 cruise**
- **Maximum Secchi Disk Depth: 3.6 m at Stations K2 and J2 during the WQAUG11 cruise**

pH and Ocean Acidification

Human activities have resulted in increases in atmospheric carbon dioxide (CO_2). The ocean absorbs CO_2, greatly reducing greenhouse gas levels in the atmosphere and minimizing the impact on climate. When CO_2 dissolves in seawater carbonic acid is formed. This acid formation reduces the pH of seawater and reduces the availability of carbonate ions. Carbonate ions are utilized by marine organisms in shell and skeletal formation. According to the NOAA Pacific Marine Environmental Laboratory Ocean Acidification Home Page, the pH of the ocean surface waters has already decreased from an average of 8.21 SU to 8.10 SU since the beginning of the industrial revolution and the Intergovernmental Panel on Climate Change predicts a decrease of an additional 0.3 SU by 2100. (See http://www.pmel.noaa.gov/co2/OA/background.html.)

With this issue in mind, CT DEP upgraded its SeaCat Profilers and began collecting and reporting pH data in August 2010. Data are summarized below.

	Surface			
Cruise	Max	Min	Avg	Count
HYAUG10	8.22	7.50	8.00	34
WQSEP10	8.34	7.67	8.15	28
WQOCT10	8.13	7.84	8.03	16
WQNOV10	8.24	8.02	8.16	15
WQDEC10	8.23	8.06	8.16	14
WQJAN11	8.32	8.06	8.23	14
WQFEB11	8.61	7.96	8.27	15
WQMAY11	8.81	7.58	8.52	18
WQJUN11	8.04	7.06	7.66	16
HYJUN11	7.89	7.34	7.72	21
WQJUL11	8.36	7.61	7.95	32
HYJUL11	7.98	7.38	7.83	39
WQAUG11	8.28	7.72	8.01	40
HYAUG11	7.96	7.40	7.71	37
WQSEP11	8.19	7.37	7.95	31

	Bottom			
Cruise	Max	Min	Avg	Count
HYAUG10	7.98	7.51	7.74	34
WQSEP10	8.18	7.52	7.79	28
WQOCT10	8.07	7.89	8.01	16
WQNOV10	8.25	8.04	8.15	16
WQDEC10	8.21	8.07	8.15	16
WQJAN11	8.34	8.18	8.25	16
WQFEB11	8.76	8.12	8.43	16
WQMAY11	8.64	8.22	8.52	18
WQJUN11	7.80	7.26	7.59	16
HYJUN11	7.62	7.44	7.56	21
WQJUL11	7.76	7.31	7.57	28
HYJUL11	7.82	7.32	7.61	39
WQAUG11	8.05	7.38	7.74	39
HYAUG11	7.79	7.45	7.60	38
WQSEP11	8.07	7.39	7.78	32

Photos By Lloyd Langevin, June 2007

Acknowledgements

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JOB 6: PUBLIC OUTREACH

JOB 6: PUBLIC OUTREACH

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JOB 6: PUBLIC OUTREACH

GOAL

To increase awareness among anglers and the general public of the information products provided by this project and how this information contributes to state and federal efforts to enhance, restore and protect marine habitat and recreational fish populations.

OBJECTIVES

1) Increase public awareness that research & monitoring are essential to good fisheries management and the majority of marine fisheries research & monitoring activities in Connecticut are funded through excise tax on fishing tackle and motorboat fuels

SUMMARY

1. A total of 25,733 outdoor and environmental writers, marine anglers and boaters, marina operators, fishing tackle retailers, Fisheries Advisory Council (FAC) members, students, and members of the general public attended outreach events. The importance of research and monitoring to good fisheries management was incorporated into the programs (Table 6.2).

2. These same audiences also learned that good water quality and proper pollution prevention (non-fishing impacts) are essential to good fisheries habitat management.

3. Total attendance at three engagements with sportsmen clubs and other recreational environmental clubs was 137 (Table 6.2). The audience was encouraged to become actively involved in the fishery management process by attending public hearings and FAC meetings. Notices of public hearings were sent to hundreds of tackle shops and various media outlets including the DEEP website (www.ct.gov/deep/fishing).

4. Total attendance at four career day events at the Marine Fisheries office with Connecticut high schools was 28 (Table 6.2). The students were encouraged to become actively involved in fisheries biology and management.

5. The message that the majority of marine finfish research and monitoring are funded through Federal excise taxes on fishing and motorboat fuels was emphasized at major department outreach events (Table 6.2).

INTRODUCTION

Public outreach was formally incorporated into this project in 1997 (segment 17). An outreach plan was developed by project staff working closely with US Fish and Wildlife Service personnel. Six target audiences were identified in priority order (Table 6.1) in the outreach plan. This report summarizes F54R outreach activities conducted from March 2011 to February 2012 (segment 29).

Table 6.1:
Priority Audiences for Outreach Activities

1. Outdoor/environmental writers
2. Marine anglers
3. Marine boaters and marina operators
4. Fishing tackle retailers
5. Fisheries Advisory Council (to CT DEP)
6. General public

RESULTS AND DISCUSSION

Outdoor and Environmental Writers

DEEP press releases, project summaries, FAC quarterly reports and full annual reports were mailed and e-mailed out to several outdoor writers, members of the CT Outdoor Recreation Coalition (CORC) and Fisheries Advisory Council (FAC). Project staff were also interviewed concerning F54R activities in person, at public and regulatory hearings, and over the telephone by writers and reporters for the news media.

Marine Anglers and Marine Boaters

Project personnel organized and assisted in DEEP, Marine and Inland Fisheries Division displays at two statewide fishing/hunting and boating shows. The shows were sponsored by CMTA, Dodge Trucks, Channel 3, Channel 30 and Connecticut Outdoor Recreation Coalition and were held in January and February of 2012 at the Connecticut Convention Center. These shows attracted 24,539 anglers, non-anglers, boaters, tackle retailers, legislators and general outdoor recreation enthusiasts. The theme for this show was "Enhanced Fishing Opportunities", Trophy Fish Close to Home" and "Marine Fisheries Division Angler Surveys". F54R activities were highlighted at these shows in displays entitled "Trophy Fish Award Program" and "Marine Angler Surveys, (a marine fisheries cooperative management program)". Audiences learned the importance of research and monitoring which are funded through excise taxes on fishing tackle and motorboat fuels. Colorful posters and pictures, brief project specific text and taxidermy reproductions helped draw attention to marine species monitored under F54R programs and solicit questions and discussion of those programs. The new state record Tautog (taxidermy reproduction) was also displayed at the DEEP booth.

Several outreach displays were developed by project staff and mounted in the lobby and hallways at the Marine Fisheries Headquarters in Ferry Point State Park. These displays highlighted unique characteristics of Long Island Sound, public access, species identification, the trophy fish award program, marine angler surveys and gave a brief description of current F54R programs designed to protect the Sound's resources. These fisheries displays can easily be viewed by anglers, boaters and their families at this popular fishing and picnic area.

The Connecticut Department of Environmental Protection (DEEP) hosted the 'Third Annual Trophy Fish Award Ceremony' at the Northeast Fishing and Hunting Expo in the Connecticut Convention Center in Hartford on Saturday February 18, 2012. Twenty-two marine anglers were presented with a framed "Angler of the Year" certificate recognizing their achievement of having harvested or caught and released the largest fish in one of several species categories during 2011. Twelve marine anglers were presented with a customized wooden plaque for catching new state record fish in 2011 (8 adult and 4 youth). For a summary please see: 2011 Marine Fisheries Trophy Fish Award Program Summary.

Fishing Tackle Retailers

Fishing tackle retailers provide an important avenue for communication between the department and anglers. A complete list of fishing tackle retailers is maintained and updated yearly. Timely DEEP press releases, species fact sheets, Connecticut angler guides and Marine Fisheries Brochure are mailed to tackle retailers to keep them informed. Correspondence between the marine fisheries office staff and retailers are ongoing.

Fisheries Advisory Council

The Fisheries Advisory Council, which represents a cross section of Connecticut residents with interests in fisheries issues, met quarterly to discuss statewide fisheries issues. After each meeting most Council members report Council discussions back to the fishing and environmental groups they represent. Council members also discussed monitoring and funding issues at meetings with state legislators. Many Council members visited Marine Fisheries displays at the Northeast Fishing and Hunting Expo, CMTA Boating and Fishing Show and other activities the Fisheries Division held during 2012. 'A Study of Marine Recreational Fisheries in Connecticut' was mailed to Fishery Advisory Council members to keep them informed.

General Public

Marine Headquarters is open daily Mon-Fri. attracting thousands to the public outreach displays at the office. Display topics included all F54R projects. Activities funded under other Federal Aid in Sport Fish Restoration projects were also highlighted; including Connecticut Pumpout Stations and Waste Reception Facilities (V-4), Motorboat Access Renovation and Development (F60D), Motorboat Access Area Operation and Maintenance (F70D), and Habitat Conservation and Enhancement (F61T).

Sport Fish Restoration projects were also highlighted at public schools and universities throughout the year. Presentations titled "Marine Fisheries Management / Sportfish Restoration and Marine Resource Management" were provided to students. These outreach events highlighted the importance of coastal resources and all facets of marine resource protection. Approximately 481 students attended Marine Fisheries Division presentations.

Finally, project staff lead numerous workshops and speaking engagements throughout the state, as well as informational tours and talks at the Marine Fisheries Office (Table 6.2). These talks and

tours reached all target audiences, especially the business community, teachers and students. Audiences learned how to become active participants in the fisheries management process, through public informational hearings and FAC Meetings.

MODIFICATIONS

None.

Figure 6.1: 2011 state record Tautog (23lbs 9ozs) on display at the Northeast Fishing and Hunting Expo, Hartford CT, February 2011 (CT DEEP Marine Fisheries Display).

Table 6.2: Summary of talks, tours, career days and workshops given by project staff highlighting F54R activities, March 2011 – February 2012 (segment 29).

DATE:	PRESENTATION TYPE:	ORGANIZATION	TITLE / TOPIC:	Target Audience	TOTAL
3/21/2011	Marine Presentation	CCSU Marine Biology	Marine Fisheries Biology	students	54
4/5/2011	Fishing Club Talk	Westport Outfitters	Marine Fisheries Mgmt./ Angler Surveys	anglers	41
4/17/2011	Career Day / Mentoring	Fermi High School	Marine Fisheries Biologist	students	6
4/18/2011	Career Day / Mentoring	Girl Scouts	Marine Fisheries What we do	students	20
4/20/2011	Career Day / Mentoring	South Windsor High School	Marine Fisheries Biologist	students	6
4/21/2011	Career Day / Mentoring	Enfield High School	Marine Fisheries Biologist	students	8
4/22/2011	Career Day / Mentoring	Southington High School	Marine Fisheries Biologist	students	8
5/1/2011	Fishing Club Talk	CFFA	Marine Fisheries Mgmt./ Angler Surveys	anglers	43
5/19/2011	Career Day / Mentoring	Glastonbury High School	Marine Fisheries Careers	students	140
6/16/2011	Marine Field Presentation	CCSU Marine Biology	Marine Fisheries Biology	students	65
7/18/2010	Fishing Club Talk	HTFD Club Sports	Marine Fisheries Mgmt./ Angler Surveys	anglers	50
7/25/2011	Marine Presentation	Groton Maritime Academy	Marine Fisheries Biology	Students	17
9/24/2011	Marine Presentation	CT DEP Hunting and Fishing Appreciation Day	Marine Fisheries Management	anglers	500
1/27-29/2012	Outreach Display	CMTA Boating Show	Enhanced Fishing Opportunities	General Public	9,872
2/17-19/2012	Outreach Display	Northeast Fish and Hunting Expo	Enhanced Fishing Opportunities	General Public	14,667
2/18/2012	Award Presentation	Northeast Fish and Hunting Expo	Trophy Fish Award Program Ceremony	Marine Anglers	236
					25,733