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
F12AF00972 (F-54-R-32) Annual Performance Report
March 1, 2012 – February 28, 2013

State of Connecticut
Department of Energy and Environmental Protection
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Federal Aid in Sport Fish Restoration
F12AF00972 (F-54-R-32)
Annual Performance Report

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

Period Covered: March 1, 2012 - February 28, 2013

Job Title	***Prepared by*:**
Job 1: Marine Angler Survey	Roderick E. MacLeod
Part 1: Marine Recreational Fishery Statistics Survey	
Part 2: Volunteer Angler Survey	
Job 2: Marine Finfish Survey	
Part 1: Long Island Sound Trawl Survey	Kurt F. Gottschall Deborah J. Pacileo
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
Job 6: Public Outreach	David R. Molnar
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***Approved by*:**
David G. Simpson, Director
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Date: August 27, 2013

Cover: Angler holding his summer flounder caught at Fort Trumbull Enhanced Opportunity Fishing Site.

EXECUTIVE SUMMARY

Project: A Study of Marine Recreational Fisheries in Connecticut
Federal Aid Project: F12AF00972 (F54R-32) Federal Aid in Sport Fish Restoration
Annual Performance Report: March 1, 2012 – February 28, 2013
Total Project Cost: $1,249,364; Federal Share: $930,273; State Share: $310,091

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 seven 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, and 7) Marine Fisheries GIS. 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 harvested.

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 Information Program (MRIP) web site at http://www.st.nmfs.noaa.gov/st1/recreational/queries/.

  For this reason, this report will not include MRIP 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 to obtain catch and harvest information and angler participation rates in order to monitor 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 51 anglers participated in the survey and made 1,194 trips in 2012. Volunteers including anglers involved in a fishing party made a total of 2,297 trips. With multiple species taken per trip anglers reported 887 trips targeting bluefish, 1,580 trips for striped bass, 561 trips for summer flounder, 29 trips for winter flounder, 161 trips for scup, 189 trips for tautog, and 60 trips for black sea bass.

- Volunteer anglers measured 1,507 bluefish measuring > 12 inches in length, 1,437 striped bass 1,292 summer flounder, 61 winter flounder, 1,192 scup, 893 tautog and 603 black sea bass. 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 Information Program.

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:

- Fifty-seven finfish species, totaling 159,770 fish, and forty types of invertebrates (or taxa) including 9,767 long-fined squid and 349 lobsters were collected in 200 tows in 2012.

- The total fish species count (57) is average for the previous 29-year average of 57.6 species per year (1984-2011). The Long Island Sound Trawl Survey has collected one hundred and three (103) finfish species since 1984 with one new species; pinfish (*Lagodon rhomboids) ob*served in 2012.

- Springtime adult scup abundance remains high relative to 1984-1999 levels; the 2012 spring index of age 2+ fish was the fifth highest in the time-series at 65.37 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 ten years. Scup also topped the spring catch both by number and biomass this year. The fall index of age 2+ was also higher than average.

- The 2012 spring survey saw several species (seven finfish) that were at record high levels of abundance; black sea bass, clearnose skate, Atlantic menhaden, northern kingfish, striped searobin, weakfish, and whiting were all at record high levels. 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; fourspot flounder, northern sea robin, and winter skate.

- During the fall survey, six species had record high indices of abundance, black sea bass, clearnose skate, hogchoker, northern kingfish, northern searobin and striped searobin. Conversely, two species had record low indices of abundance, Atlantic herring and blueback herring Of the species where the fall index is the preferred index, an additional nine (9) species had indices above the time-series mean; butterfish, hickory shad, scup, smooth dogfish, spot, summer flounder, spotted hake, rough scad, and weakfish.

- Although the striped bass abundance in spring 2012 fell below the mean for the third time in the past 18 years, the current index of 0.43 fish per tow remains well above the average for the first eight years of the time series.

- Summer flounder (fluke) abundance, in both spring and fall, has generally been increasing for the past fifteen (15) years. index for spring 2011 (3.85 fish per tow) is more than triple the time-series average. The fall index of abundance has historically been viewed as the preferred index of abundance from the trawl survey, however, fluke are now just as abundant in the spring survey.

- A fwe species of recreational importance were at relatively high abundances in 2012. In fact, black sea bass indices of abundance were at record high levels for both spring and fall 2012. Spot, a popular recreational species further south along the east Coast, was at very high abundance in the fall 2012 survey; the second highest in the time-series behind the peak in 2008. Hickory shad abundance in the fall 2012 survey was the third highest in the time-series. Adult weakfish (age 1+) were also relatively abundant for anglers in 2012; the spring LIS Trawl Survey index was the highest for the spring time-series and second highest for the fall time-series.

- Tautog and winter flounder springtime abundance has remained low for the past fifteen or more years despite restrictive management measures.

- Relative indices of abundance (geometric mean number per tow) of American lobster were at record low levels for both spring and fall surveys in 2012. This continues the decreasing trend begun in the late 1990's. Current springtime abundance (0.97 lobsters/tow) has seen more than a 95% drop since the peak abundance of 18.52 lobsters per tow in 1998. Fall lobster abundance (0.29 lobsters/tow) 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.

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 2012 annual index of recruitment for young-of-year winter flounder (0.3 fish/haul) ranked the lowest out of 25 annual indices.

- Mean catch of all finfish (153 fish/haul) ranked ninth highest out of 25 annual indices and was slightly above the series average of 147 fish/haul (Figure 2.2). Geometric means were calculated for 22 species commonly captured since the survey began in 1988 (Table 2.1).

- 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 2012 (60 forage fish/haul) was the eighth lowest of the 25-year series, and well below the time series average of 98 forage fish/haul.

CONCLUSIONS:

- Another decrease in abundance of the winter flounder young of year index for 2012, 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. In 2013 the seven original seine sites (all sites except Milford) will be sampled in June, July, and August as well as September. These catch data will be compared to catches made in the same summer months in 1988-1990.

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, juvenile blueback herring and common nearshore marine species.

KEY FINDINGS:

- The 2012 adult American shad run experienced an increase of 50% at the Holyoke Lift; This is the second time the lift count has surpassed 200,000 shad since 2003 and is the highest number of fish passed since 1992. The sex ratio indicates that the majority of the fish lifted are males (62%).

- The age structure in 2012 for adult American shad is consistent with recent years. Age structure for males ranged from ages 3-7 and ages 4-7 for females. The majority of female fish were 5 years old (56%) as well as the majority of male fish (43%). The percentage of repeat spawners continues to be low with 5% for females and 3% for males.

- The 2012 CT River seine survey completed 88 seine hauls. Nearly 29,000 fish comprised of 33 different species or taxonomic groups were collected.

- The 2012 CT River juvenile shad index (3.0) ranks as the 5th lowest value in the 35 year time series and is half of the long term average (6.0) CPUE.

- The 2012 juvenile blueback herring index value (2.2) ranks as the 3rd lowest value in the 35 year time series and well below (9.6) the long term average CPUE.

- The Thames River seine survey completed 40 seine hauls. Catches were comprised of 32 different species or taxonomic groups. The 2012 Atlantic menhaden juvenile index in the Thames River (3.5) ranked as 7th lowest in the 15 year time series.

CONCLUSIONS:

- Abundance of Adult shad appears to have increased substantially, but juvenile production remains below average. Age structure for adults is comparable to recent years, as is the repeat spawning rate.
- Relative abundance indices for both *Alosa* below average in the Connecticut River for 2012.

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 10, 2012, and persisted for 63 days ending on or about September 10, 2012.
- Severe hypoxia (<2.0 mg/l dissolved oxygen) affected 66.7 mi^2 (172.75 km^2) of the Sound in 2012.
- Hypoxia (<=3.5 mg/l dissolved oxygen) extended over a maximum area of 288.5 mi^2 (747.2 km^2) during 2012.
- The Biomass Area-Day Depletion Index (BADD) index for 2012 was the fourth lowest at about 4,608 area-days (average=6,753). The BADD index is a gross measure of seasonal habitat loss associated with hypoxia.

CONCLUSIONS:

- Hypoxia was more widespread in 2012, than has been observed in the Sound since 2003.

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:

- Excluding the BIG E event, a total of 22,691 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.

- Total attendance at two engagements with sportsmen clubs and other recreational environmental clubs was 101 (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).

- Total attendance at two career day events with Connecticut high schools was 223 (Table 6.2). The students were encouraged to become actively involved in fisheries biology and management.

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 7 MARINE FISHERIES GIS

OBJECTIVES:

- Provide GIS-compatible, or GIS-ready, data sets and geo-referenced layers of data collected through other Jobs of this Project that are sanctioned by the Marine Fisheries Division.
- Provide maps and geospatial analyses of Marine Fisheries Division data or other information relevant to managing living marine resources in Long Island Sound.

KEY FINDINGS:

- An interactive web map was created and published on the Agency website to promote shore-based angling sites with special regulations aimed at improving the shore angling experience (http://www.depdata.ct.gov/maps/marinefish/fishmap.htm).
- Over 1,000 GIS data layers were catalogued in the first year of this job.
- A spatial analysis of CT DEEP data was conducted to assist the Agency with Endangered Species Management.
- A tutorial was created to allow staff without GIS on their computers to get the maximum benefit from PDF maps with active data layers using the free Adobe Reader.
- A map of recreational catch and harvest data for ASMFC partners was used in the coastwide management of recreationally important summer flounder stock.
- A PDF map with active layers was created for the spring 2012 LIS Trawl Survey catch of a new invasive alga, *Heterosiphonia japonica*, which was shared with CT OLISP and Sea Grant.
- Using a spatial statistics tool called “Hot Spot Analysis,” a time-series of maps was created to assist with a ASMFC Technical Committee stock analysis relating to the location of egg-bearing lobsters caught in the LIS Trawl survey.

CONCLUSIONS:

- The implementation of a job focused on developing GIS at Marine Fisheries Division allowed staff to benefit from spatial depiction and analyses for a variety of Agency and Project related goals.
- Providing maps for the Agency website is an effective way of providing angling related information to the public.

RECOMMENDATIONS:

- Continue to assist Marine Fisheries Division projects that support sport fish restoration goals through the use of GIS data and software.

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 National Marine Fisheries Service (NMFS) Marine Recreational Fishery Statistics Survey (MRFSS) 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

Presently, MRIP is based on two complementary surveys: A random telephone survey of households, and an intercept survey of anglers at fishing sites (NMFS 1992). NMFS 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.

MRIP'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) ≤20%, a modified version of Coefficient of Variation = S.E./Mean *100), the initial intercept quota's were increased. 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 funded increased NMFS Intercept Survey allocation. 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, dockside validations 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.

Table 1.1: MRIP + ACCSP State Add-on Angler Intercept, Headboat Trip, and Dockside Validation Allocations by Mode and Wave, 2012

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**	**6**	**8**	**6**	**0**	**20 Trips**
Total Number of Intercepts (SH, CH, PR)	**93**	**227**	**405**	**250**	**150**	**1,125**
Dockside Validations	**0**	**81**	**101**	**101**	**81**	**364**

MRIP Estimation Methods

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.

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 2012

During March-December 2012, a total of 244 assignments were completed and 1,825 interviews (intercepts) with marine anglers were conducted by Marine Fisheries Division staff for MRIP (Table 1.2). Intercept shortfalls occurred in Waves 2 and 6 for NMFS + ACCSP add-on quotas because of low fishing activity and poor weather conditions. Furthermore, the charter and headboat fishery did not start for-hire operations until late May (weekends only) and full time until mid June and terminated by the first of November. In addition, no weekday headboat assignments were scheduled by NMFS' contractor for the first month of each wave. NMFS' contractor was notified of the problem but the issue was never resolved. This year the number of assignments where zero intercepts were collected was 29.1% (71 assignments).

Table 1.2: Total Number of Angler Intercepts Collected by Mode, Headboat Trips Conducted, and Dockside Validations Completed by Wave, 2012

	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	
Mode	**Mar-Apr**	**May-Jun**	**Jul-Aug**	**Sep-Oct**	**Nov-Dec**	**Total (%)**
Shore (SH)	**15**	**132**	**145**	**93**	**12**	**397 (22%)**
Charter Boat (CH)	**0**	**72**	**103**	**86**	**0**	**261 (14%)**
Private/Rental Boat (PR)	**56**	**217**	**312**	**217**	**65**	**867 (48%)**
Headboat Trips (HB) (2 interviewers/trip)*	**0 Trip (0 Ints.)**	**5 Trips (101 Ints.)**	**7 Trips (134 Ints.)**	**3 Trips (65 Ints.)**	**0 Trips (0 Ints.)**	**15 Trips (300 Ints. 16%)**
Total Number of Intercepts Collected	**71**	**522**	**694**	**461**	**77**	**1,825**
Dockside Validation	**0**	**87**	**136**	**112**	**39**	**374**

MRIP 2012 Statistics

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/.

For that reason, this report will not include 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).

In addition, MRIP is in the process of implementing new access point angler intercept survey collection procedures in 2013. MRIP continues its efforts to improve angler trip and catch estimates for fisheries management purposes. More detailed information concerning MRIP can be located at the following web site: https://www.countmyfish.noaa.gov.

MODIFICATIONS

CT DEEP Marine Fisheries Division participates in the MRIP survey as a subcontractor to NOAA's private contractor, currently Research Triangle Institute (RTI). Survey design changes NOAA proposed for 2013 include a 24 hour sampling frame and fixed site assignments regardless of observed activity level. These changes are intended to improve the reliability of survey results. However, these changes are also expected to add considerably to the cost of conducting the survey including in the number of staff and vehicles required to conduct the survey. The proposal to add 24 hour sampling also raised safety concerns for our creel agents and presented an unacceptable supervisory burden on staff. As a consequence the agency has decided to withdraw from its role as a subcontractor and allow RTI to conduct the Connecticut survey directly. Following discussions with NOAA and RTI, Marine Fisheries staff assisted in the transition by performing 50% of wave 2 (March-April) site assignments. RTI took over the survey in wave 3 (May-June).

With RTI carrying out the MRIP survey, Job 1 staff will focus 2013 efforts on collecting additional length composition data needed for stock assessment and management alternatives analysis. Length data will be collected through both a random creel agent survey of boat and shore anglers and a self-selecting single trip volunteer angler survey. Individual trip angler survey cards were developed for each survey type which allows anglers to record lengths of both kept and released fish, the total number of both kept and released fish by species and related trip information. We believe randomly collected size composition information on both kept and released fish will serve as an important complement to the MRIP survey which historically collects few lengths from kept fish and provides no insight into the size composition of released fish from the private boat and shore modes. This data is critical in stock assessment work (ultimately as numbers of fish at age and mean weight at age in the recreational fishery and the stock).

This information will also enhance our understanding of minimum size regulation effects across angler groups, especially shore versus boat based anglers. The agency is committed to providing a quality fishing experience for all anglers including a reasonable opportunity to harvest fish. Improving our understanding of the size composition available to anglers by mode will aid our efforts to level the playing field for shore bound anglers by appropriately adjusting minimum size regulations at public shore fishing sites.

LITERATURE CITED

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

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A History of Connecticut Marine Recreational Fisheries Regulations for Selected Species from 1935-2012

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	28 in. (total length)	2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.

Striped bass (Con't.)

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Mar 14, 2012-Current	28 in. (total length)	2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
	22 in. up to but not including 28 in. (total length)	2 bonus (extra) fish/angler.	May 1-Jun 30 in all state waters.	Jul 1-Apr 30 in all state waters.	Bonus Striped Bass Voucher Program. Angler must fill out voucher upon harvest. 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-April 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).

Summer flounder (Fluke) Con't.

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Apr 5, 2011	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			Designated Shore Based Fishing Sites only.
Mar 14, 2012-Current	18 in. (total length)	5 fish/angler	May 15-Oct 31.	Nov 1-May 14 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
	16 in. (total length)	5 fish/angler			Enhanced Opportunity Shore Angler Program Designated Fishing 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.

Black Sea Bass (Con't.)

Effective Date	Minimum Size (Excluding tendril or long filament on tail)	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Aug 5, 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	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.
Mar 14, 2012-Current	13 in. (total length)	15 fish/angler	Jun 15-Dec 31.	Jan 1-Jun 14 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.

Scup (Porgy) Con't.

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Apr 4, 2008	10 ½ in. (total length)	10 fish/angler	Jun 1- Sep 26.	Sep 27- May 31 in all state waters.	None.
Party/ charter boats	11 in. (total length)	10 fish/angler Party/charter boats – 45 fish/angler	Jun 12- Aug 31. Sep 1- Oct 15.	Oct 16- Jun 13 in all state waters.	
May 1, 2009	10 ½ in. (total length)	10 fish/angler	May 24- Sep 26.	Sep 27- May 23 in all state waters.	None.
Party/ charter boats	11 in. (total length)	10 fish/angler Party/charter boats – 45 fish/angler	Jun 12- Aug 31. Sep 1- Oct 15.	Oct 16- Jun 11 in all state waters.	
Apr 1, 2010	10 ½ in. (total length)	10 fish/angler	May 24- Sep 26.	Sep 27- May 23 in all state waters.	None.
Party/ charter boats	11 in. (total length)	10 fish/angler Party/charter boats – 40 fish/angler	Jun 8- Sep 6. Sep 7- Oct 11.	Oct 12- Jun 7 in all state waters.	
Sep 23, 2011	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 Party/charter boats – 40 fish/angler	Jun 8- Sep 6 and Oct 12 – Dec 31. Sep 7- Oct 11.	Jan 1 - Jun 7 in all state waters.	
Mar 14, 2012-Current	10 ½ in. (total length)	20 fish/angler	May 1- Dec 31.		None.
Party/ charter boats	11 in. (total length)	20 fish/angler Party/charter boats – 40 fish/angler	May 1- Aug 31 and Nov 1 – Dec 31. Sep 1- Oct 31.	Jan 1- Apr 30 in all state waters.	None.
Enhanced Opportunity Shore Angler Program	9 in. (total length)	20 fish/angler	May 1-Dec 31.		Enhanced Opportunity Shore Angler Program Designated Fishing Sites only.

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, Jun 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	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.		
Jan 31, 2012	Not applicable.	Possession prohibited	Season Closed	Feb 1-Apr 30 in all state waters.	None.
Mar 14, 2012-Current	16 in. (total length)	2 fish/angler	Apr 1-Apr 30 and Jul 1-Aug 31.	May 1-Jun 30, Sep 1-Oct 9, and Dec 7-Mar 31 in all state waters.	None.
		4 fish/angler	Oct 10-Dec 6.		

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.

Sandbar Shark (Brown Shark)

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

Smooth Dogfish

Effective Date	Minimum Size	Daily Possession Limit	Fishing Season	Closed Season/Area	Other Restrictions
Feb 2, 2010	Not applicable.	Prohibited to possess or land.	None.	Year round in all state waters.	None.
Apr 27, 2012-Current	None.	None.	Year round.	None.	None.

Gear Restrictions

1935-Current	Striped bass may be taken by hook and line method only (spearing is prohibited).
Apr 22, 1994-Current	Spearing is allowed as a recreational activity only and must abide all recreational fishing regulations (with the exception of striped bass where spearing is prohibited-see above).

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 2012.

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.

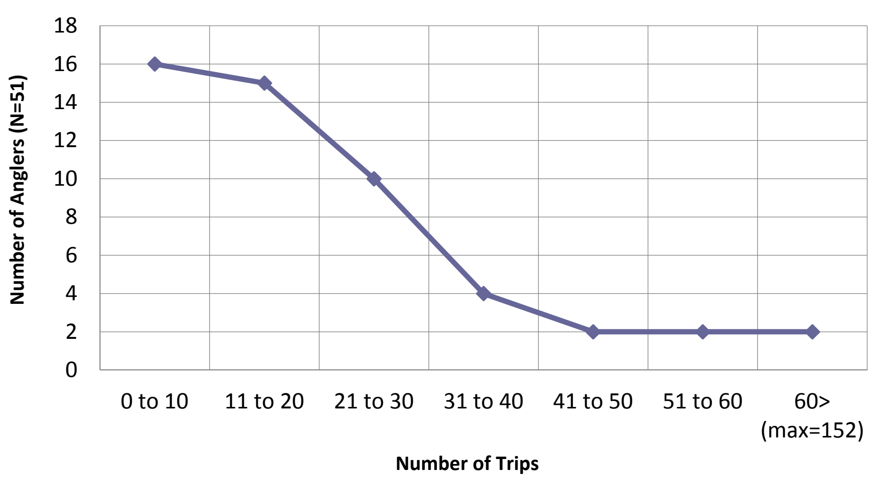
RESULTS AND DISCUSSION

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 2012

In 2012, a total of 51 anglers participated in the survey. Those 51 anglers made 1,194 fishing trips and measured 8,161 fish. The average number of trips volunteers took was about 23 trips per year and the range in trips was 4 to 152 (Figure 1.1A). Volunteers including additional anglers involved in a fishing party made a total of 2,297 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 65% of the total trips taken. The percent of successful trips, where at least one fish of any species was caught, was 91% for boat anglers and 71% 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.

Figure 1.1A: Angler Trip Frequency - VAS 2012



Bluefish

VAS participants made 887 targeted bluefish trips (boat and shore modes combined) and recorded a total of 1,590 adult bluefish caught (bluefish >12 inches). Of the total number of targeted trips, 22% were unsuccessful. The overall catch including trips not targeting bluefish was 1,973 fish. Of the overall catch, anglers measured 1,507 adult bluefish (76%) and released about 76%. The 50th percentile length measurement for bluefish was approximately 21 inches (total length). The targeted catch-per-unit-of-effort (CPUE) was 1.8 and 0.4 fish per angler trip for total and harvested catches.

Striped bass

Volunteers made 1,580 trips targeting striped bass and caught a total of 1,528 fish (overall catch including trips not targeting striped bass was 1,575 fish). About 20% or 314 trips targeting striped bass were unsuccessful. Of the overall catch, about 88% of the catch was released. VAS anglers measured 1,437 striped bass (91% of the overall catch). Legal size striped bass ($\geq$ 28 inches) comprised about 25% of the measured catch. The percent of legal size striped bass released was estimated at 48%. The 50th percentile length measurement for striped bass was about 20 inches. Striped bass ranged in length from as small as 8 inches to 52 inches. Targeted CPUE was 1.0 and 0.1 fish per angler trip for total and harvested catches.

Summer flounder

A total of 561 fishing trips were directed toward catching 1,330 summer flounder. Only 4% of the trips targeting summer flounder were unsuccessful. The overall catch was 1,400 fish. Volunteers measured 1,292 fish or about 92% of the overall catch. Approximately 82% of the overall catch was released. About 22% of the measured catch was comprised of legal size summer flounder (18 inches or greater). VAS anglers released 23% of legal size summer flounder. The 50th percentile length measurement for summer flounder was about 15.5 inches. Length measurements ranged from 8 to 29 inches. Summer flounder targeted CPUE was 2.4 and 0.4 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 73 fish. Of the total trips targeting winter flounder, 14% of the trips were unsuccessful. A total of 61 winter flounder caught were measured. Anglers released about 52% of the overall catch and 84% of the measured catch were of legal size (12 inches and greater). Anglers released 47% 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 13.5 inches. Length measurements ranged from 6 to 18 inches. Winter flounder targeted CPUE was 1.8 and 1.0 fish per angler trip for total and harvested catches.

Scup

Volunteers made 161 targeted trips for scup producing a total of 938 fish. Of the total trips targeting scup, only 2% of the trips were unsuccessful. The overall total catch was 1,618 fish. Volunteers measured about 74% (1,192) of the overall total catch. Of the overall total catch, 66% were released. Legal sized fish (10.5 inches and greater) comprised 63% of the measured catch. The proportion of legal sized fish released by anglers was approximately 45%. The 50th percentile length measurement for scup was about 11 inches. Length measurements ranged from as little as 4 inches to 19 inches. Scup targeted CPUE was 5.8 and 2.1 fish per angler trip for total and harvested catches.

Tautog

VAS anglers made 189 trips that targeted tautog and caught a total of 1,083 fish. Of the total trips targeting tautog, only 4% of the trips were unsuccessful. The overall total catch was 1,122 fish and 72% was released. Volunteers measured 893 tautog or about 80% of the overall total catch. About 41% of the measured catch was comprised of legal size fish (16 inches or greater). Of the legal size measured catch, approximately 16% were released. The 50th percentile length measurement for tautog was about 14.5 inches. Length measurements ranged from 5 to 25 inches. Tautog targeted CPUE was 5.7 and 1.6 fish per angler trip for total and harvested catches.

Weakfish

Only 7 trips targeted weakfish. A total of three weakfish were caught, however, two were caught incidentally.

Black sea bass

VAS anglers took 60 trips targeting black sea bass catching 411 fish. The overall catch was 964 black sea bass and 83% were released. Volunteers measured 603 fish or 63% of the overall total catch. Of the measured catch, 15% caught were of legal size (13 inches and greater). The 50th percentile length measurement for black sea bass was about 6.5 inches and the percent of legal size fish released was 30%. Black sea bass targeted CPUE was 6.8 and 2.3 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

For 2013, the VAS logbook format will be slightly modified so that the information collected will be compatible with Atlantic Coast Cooperative Statistics Program (ACCSP) minimum data element standards. These changes should not affect the time series for comparison purposes. In addition, the logbook will be made available in both electronic and paper logbook form to all participants. All reported data by VAS anglers will be stored in the central ACCSP data warehouse.

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, 2012

Total Length (inches)	2012 Measurement Data Bluefish (12>inches)			Total Length (inches)			
	Freq	%Freq	%Cum		Freq	%Freq	%Cum
13	24	1.6	1.6	**27**	55	3.6	86.5
14	45	3.0	4.6	**28**	41	2.7	89.2
15	59	3.9	8.5	**29**	33	2.2	91.4
16	103	6.8	15.3	**30**	40	2.7	94.0
17	89	5.9	21.2	**31**	22	1.5	95.5
18	148	9.8	31.1	**32**	21	1.4	96.9
19	86	5.7	36.8	**33**	16	1.1	98.0
20	122	8.1	44.9	**34**	17	1.1	99.1
21	95	6.3	51.2	**35**	8	0.5	99.6
22	113	7.5	58.7	**36**	4	0.3	99.9
23	82	5.4	64.1	**37**	0	0.0	99.9
24	126	8.4	72.5	**38**	2	0.1	100.0
25	77	5.1	77.6	**Total**	**1,507**		
26	79	5.2	82.8				

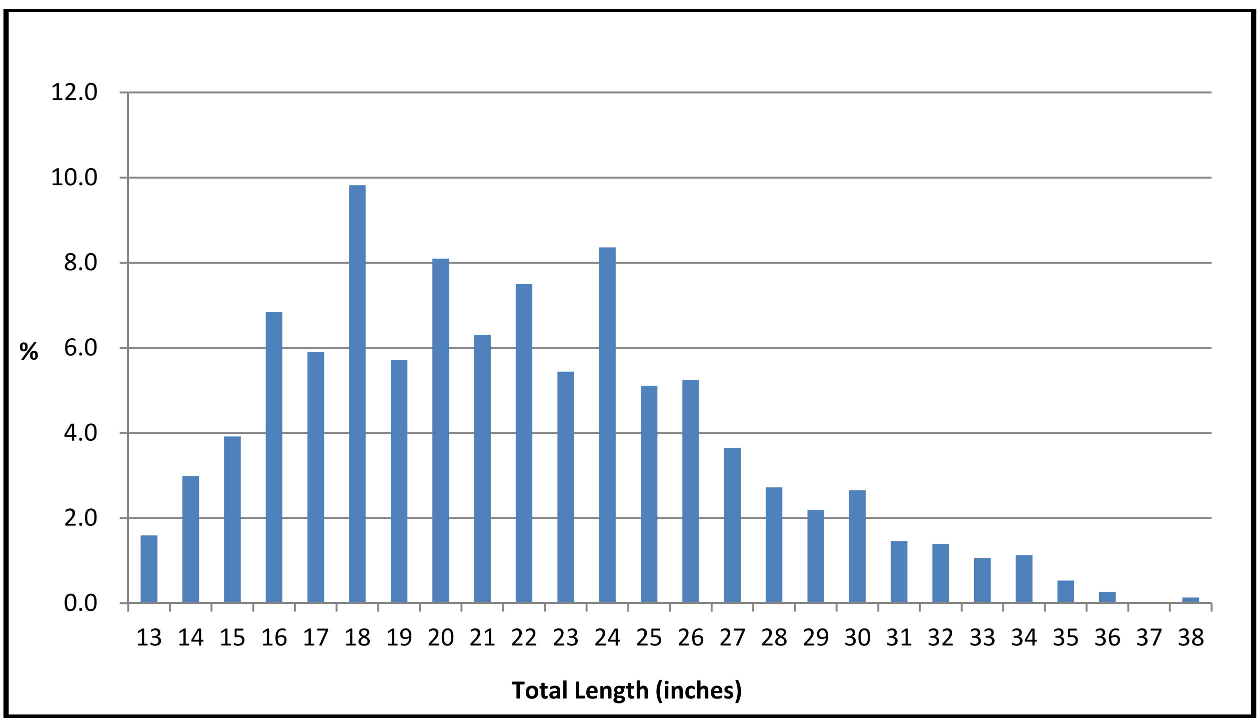


Table 1.2A: Striped Bass Length Frequency Distribution, 2012

Total Length (inches)	2012 Measurement Data Striped Bass Freq	%Freq	%Cum	Total Length (inches)	Freq	%Freq	%Cum
< or = 8	2	0.1	0.1	**30**	40	2.8	82.8
9	2	0.1	0.3	**31**	42	2.9	85.7
10	10	0.7	1.0	**32**	41	2.9	88.6
11	13	0.9	1.9	**33**	30	2.1	90.7
12	32	2.2	4.1	**34**	38	2.6	93.3
13	43	3.0	7.1	**35**	22	1.5	94.9
14	66	4.6	11.7	**36**	25	1.7	96.6
15	98	6.8	18.5	**37**	10	0.7	97.3
16	128	8.9	27.4	**38**	13	0.9	98.2
17	88	6.1	33.5	**39**	7	0.5	98.7
18	121	8.4	42.0	**40**	4	0.3	99.0
19	72	5.0	47.0	**41**	3	0.2	99.2
20	62	4.3	51.3	**42**	4	0.3	99.4
21	39	2.7	54.0	**43**	1	0.1	99.5
22	61	4.2	58.2	**44**	1	0.1	99.6
23	27	1.9	60.1	**45**	3	0.2	99.8
24	57	4.0	64.1	**46**	0	0.0	99.8
25	61	4.2	68.3	**47**	1	0.1	99.9
26	63	4.4	72.7	**48**	0	0.0	99.9
27	30	2.1	74.8	**49**	0	0.0	99.9
28	37	2.6	77.4	**50**	1	0.1	99.9
29	38	2.6	80.0	**51**	0	0.0	99.9
				52	1	0.1	100.0
				Total	**1,437**		

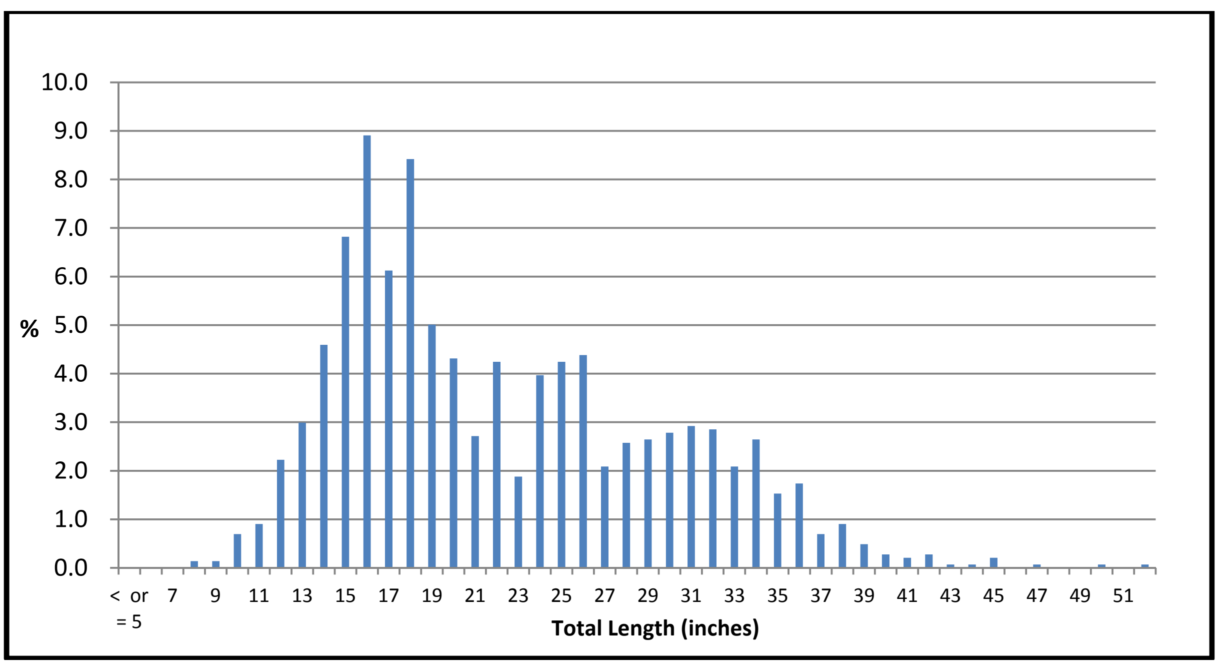


Table 1.3A: Summer Flounder Length Frequency Distribution, 2012

Total Length (inches)	2012 Measurement Data Summer Flounder		
	Freq	%Freq	%Cum
< or = 8	4	0.3	0.3
9	0	0.0	0.3
10	21	1.6	1.9
11	14	1.1	3.0
12	58	4.5	7.5
13	70	5.4	12.9
14	181	14.0	26.9
15	163	12.6	39.5
16	231	17.9	57.4
17	191	14.8	72.2
18	139	10.8	83.0
19	89	6.9	89.9
20	60	4.6	94.5
21	20	1.5	96.0
22	27	2.1	98.1
23	9	0.7	98.8
24	8	0.6	99.4
25	1	0.1	99.5
26	4	0.3	99.8
27	0	0.0	99.8
28	1	0.1	99.9
29	1	0.1	100.0
Total	1,291		

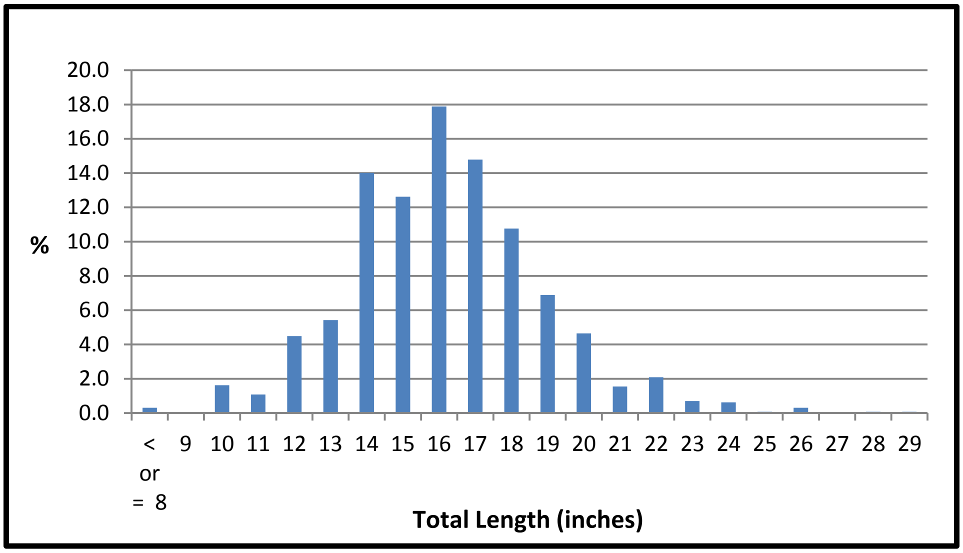


Table 1.4A: Winter Flounder Length Frequency Distribution, 2012

Total Length (inches)	2012 Measurement Data Winter Flounder Freq	%Freq	%Cum
< or = 10	6	9.8	9.8
11	2	3.3	13.1
12	4	6.6	19.6
13	12	19.7	39.3
14	14	23.0	62.3
15	14	23.0	85.2
16	5	8.2	93.4
17	3	4.9	98.3
18	1	1.6	100.0
Total	**61**		

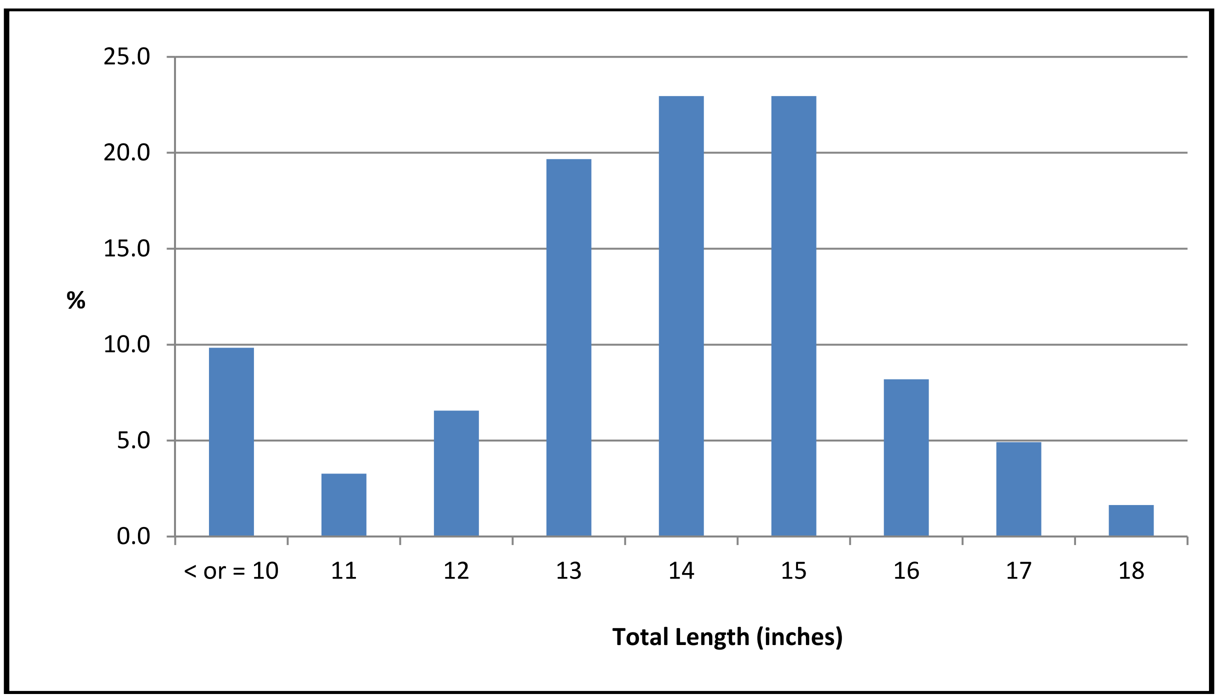


Table 1.5A: Scup Length Frequency Distribution, 2012

Total Length (inches)	2012 Measurement Data Scup		
	Freq	%Freq	%Cum
< or = 6	85	7.1	7.1
7	39	3.3	10.4
8	61	5.1	15.5
9	103	8.6	24.1
10	153	12.8	37.0
11	138	11.6	48.5
12	173	14.5	63.1
13	141	11.8	74.9
14	130	10.9	85.8
15	80	6.7	92.5
16	46	3.9	96.4
17	27	2.3	98.6
18	7	0.6	99.2
19 or >	9	0.8	100.0
Total	1,192		

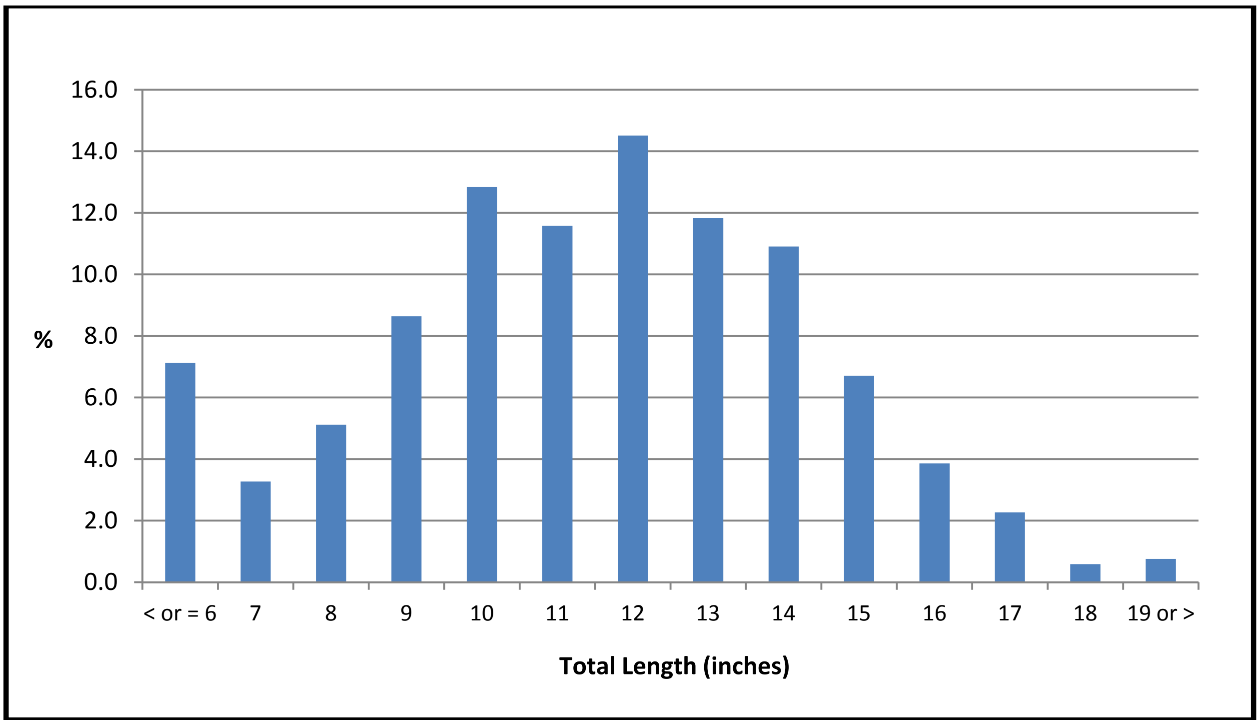


Table 1.6A: Tautog Length Frequency Distribution, 2012

Total Length (inches)	2012 Measurement Data Tautog		
	Freq	%Freq	%Cum
< or = 7	18	2.0	2.0
8	14	1.6	3.6
9	15	1.7	5.2
10	48	5.4	10.6
11	58	6.5	17.1
12	74	8.3	25.4
13	97	10.9	36.3
14	84	9.4	45.7
15	84	9.4	55.1
16	86	9.6	64.7
17	100	11.2	75.9
18	74	8.3	84.2
19	51	5.7	89.9
20	54	6.0	96.0
21	19	2.1	98.1
22	7	0.8	98.9
23	4	0.4	99.3
24	4	0.4	99.8
25	2	0.2	100.0
Total	**893**		

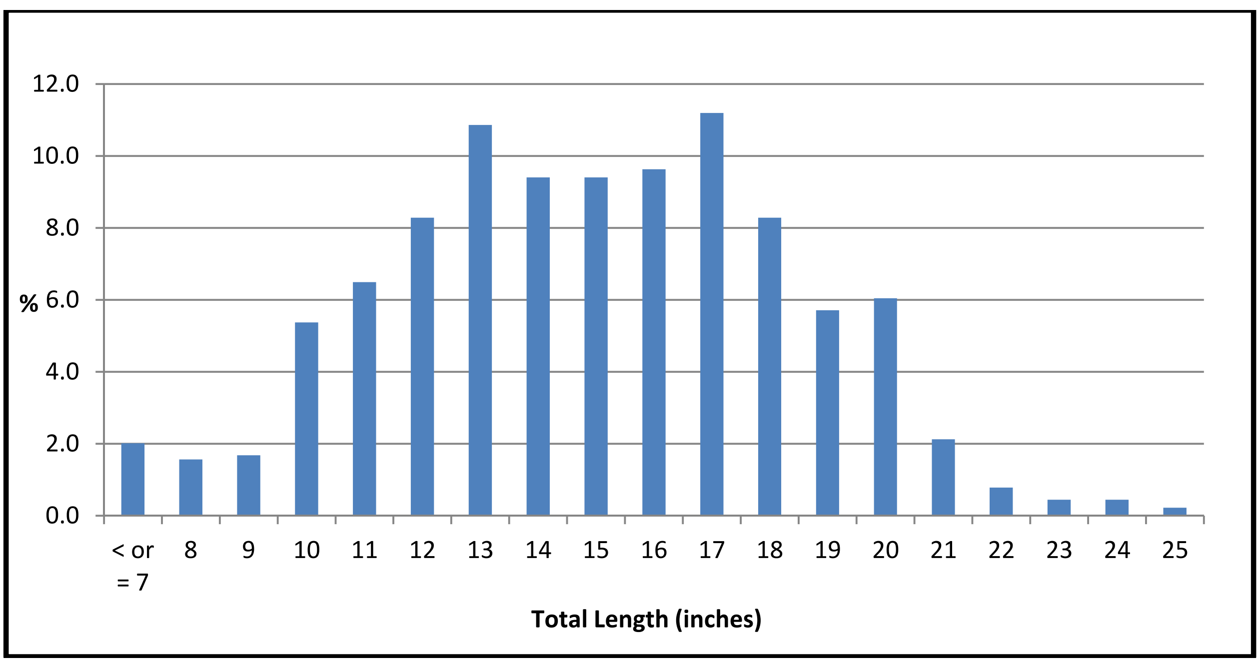


Table 1.7A: Black Sea Bass Length Frequency Distribution, 2012

Total Length (inches)	2012 Measurement Data Black Sea Bass Freq	%Freq	%Cum
3	2	0.3	0.3
4	53	8.8	9.1
5	105	17.4	26.5
6	105	17.4	43.9
7	87	14.4	58.4
8	75	12.4	70.8
9	34	5.6	76.5
10	25	4.1	80.6
11	11	1.8	82.4
12	10	1.7	84.1
13	11	1.8	85.9
14	16	2.7	88.6
15	15	2.5	91.0
16	18	3.0	94.0
17	13	2.2	96.2
18	8	1.3	97.5
19	6	1.0	98.5
20	3	0.5	99.0
21	1	0.2	99.2
22	3	0.5	99.7
23	0	0.0	99.7
24	0	0.0	99.7
25	0	0.0	99.7
26	2	0.3	100.0
Total	**603**		

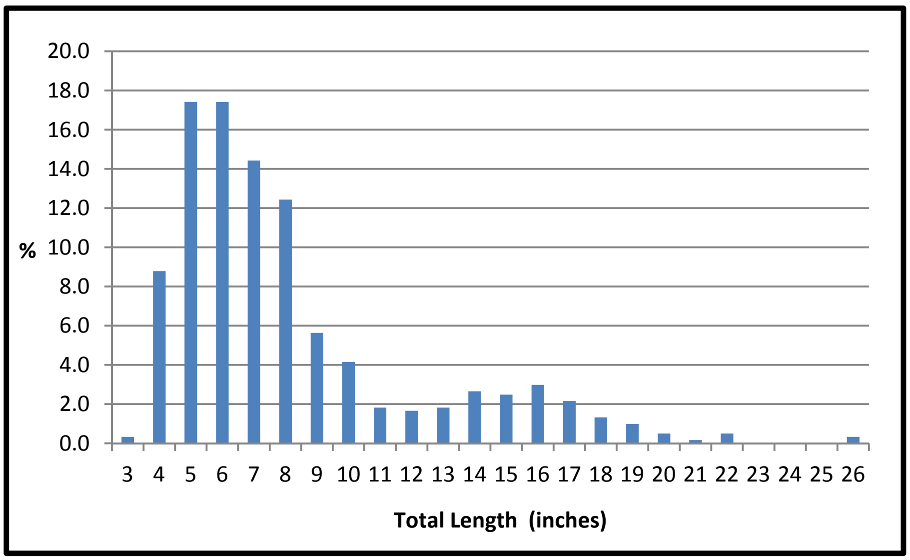


Table 1.8A: Catch Trip Frequency Distribution of Kept (Harvested) Fish for Selected Species, 2012

Creeled (Harvested)

Bluefish (12 in. >)		
# of Fish	# of Trips	% Distr.
0	216	64.3%
1	76	22.6%
2	21	6.3%
3	11	3.3%
4	5	1.5%
5	1	0.3%
6	3	0.9%
7	2	0.6%
8	0	0.0%
10	1	0.3%
Total	336	100%

Striped Bass		
# of Fish	# of Trips	% Distr.
0	363	81.4%
1	69	15.5%
2	14	3.1%
Total	446	100%

Summer Flounder		
# of Fish	# of Trips	% Distr.
0	173	61.6%
1	75	26.7%
2	17	6.0%
3	12	4.3%
4	1	0.4%
5	3	1.1%
Total	281	100%

Winter Flounder		
# of Fish	# of Trips	% Distr.
0	9	45.0%
1	4	20.0%
2	7	35.0%
Total	20	100%

Scup		
# of Fish	# of Trips	% Distr.
0	93	50.0%
1	27	14.5%
2	20	10.8%
3	21	11.3%
4	7	3.8%
5	5	2.7%
6	3	1.6%
7	2	1.1%
8	4	2.2%
10	3	1.6%
17	1	0.5%
Total	186	100%

Tautog		
# of Fish	# of Trips	% Distr.
0	26	28.9%
1	14	15.6%
2	25	27.8%
3	17	18.9%
4	8	8.9%
Total	90	100%

Black Sea Bass		
# of Fish	# of Trips	% Distr.
0	90	75.0%
1	19	15.8%
2	1	0.8%
3	3	2.5%
4	1	0.8%
5	3	2.5%
6	0	0.0%
7	1	0.8%
8	1	0.8%
15	1	0.8%
Total	120	100%

Table 1.9A: Catch Trip Frequency Distribution of Released Fish for Selected Species, 2012

Released

Bluefish (12 in. >)		
# of Fish	# of Trips	% Distr.
0	90	26.8%
1	98	29.2%
2	50	14.9%
3	31	9.2%
4	11	3.3%
5	15	4.5%
6	11	3.3%
7	3	0.9%
8	5	1.5%
9	0	0.0%
10	5	1.5%
11	2	0.6%
12	2	0.6%
13	1	0.3%
14	1	0.3%
15	1	0.3%
16	2	0.6%
17	3	0.9%
18	1	0.3%
19	1	0.3%
20	2	0.6%
22	1	0.3%
Total	336	100%

Striped Bass		
# of Fish	# of Trips	% Distr.
0	90	20.0%
1	192	42.6%
2	68	15.1%
3	41	9.1%
4	14	3.1%
5	11	2.4%
6	9	2.0%
7	7	1.6%
8	6	1.3%
9	1	0.2%
10	0	0.0%
11	5	1.1%
12	2	0.4%
13	0	0.0%
14	1	0.2%
15	1	0.2%
16	1	0.2%
18	1	0.2%
22	1	0.2%
Total	451	100%

Summer Flounder		
# of Fish	# of Trips	% Distr.
0	29	10.3%
1	88	31.3%
2	57	20.3%
3	40	14.2%
4	22	7.8%
5	18	6.4%
6	7	2.5%
7	4	1.4%
8	3	1.1%
9	3	1.1%
10	4	1.4%
11	0	0.0%
12	1	0.4%
13	2	0.7%
14	2	0.7%
15	0	0.0%
16	1	0.4%
Total	281	100%

Winter Flounder		
# of Fish	# of Trips	% Distr.
0	7	35.0%
1	9	45.0%
2	2	10.0%
3	1	5.0%
4	1	5.0%
Total	20	100%

Table 1.9A: Catch Trip Frequency Distribution of Released Fish for Selected Species, 2012 (Con't.)

Released

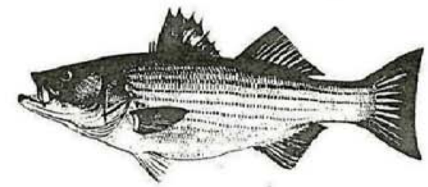
Scup			Tautog			Black Sea Bass		
# of Fish	# of Trips	% Distr.	# of Fish	# of Trips	% Distr.	# of Fish	# of Trips	% Distr.
0	33	17.7%	0	27	30.0%	0	14	11.9%
1	44	23.7%	1	17	18.9%	1	35	29.7%
2	30	16.1%	2	11	12.2%	2	10	8.5%
3	26	14.0%	3	7	7.8%	3	13	11.0%
4	11	5.9%	4	6	6.7%	4	11	9.3%
5	12	6.5%	5	2	2.2%	5	10	8.5%
6	12	6.5%	6	2	2.2%	6	6	5.1%
7	5	2.7%	7	0	0.0%	7	6	5.1%
8	3	1.6%	8	2	2.2%	8	1	0.8%
10	3	1.6%	9	1	1.1%	9	1	0.8%
12	1	0.5%	10	2	2.2%	10	7	5.9%
16	1	0.5%	12	4	4.4%	11	1	0.8%
20	1	0.5%	13	1	1.1%	13	1	0.8%
22	1	0.5%	14	1	1.1%	14	2	1.7%
30	1	0.5%	15	1	1.1%	Total	118	100%
45	1	0.5%	16	1	1.1%			
50	1	0.5%	17	2	2.2%			
Total	186	100%	20	1	1.1%			
			25	1	1.1%			
			70	1	1.1%			
			Total	90	100%			

APPENDIX 1.1A: Connecticut Volunteer Angler Logbook

FASTEN

CONNECTICUT
VOLUNTEER ANGLER SURVEY

Rev. 6/96



YEAR

ANGLER CODE

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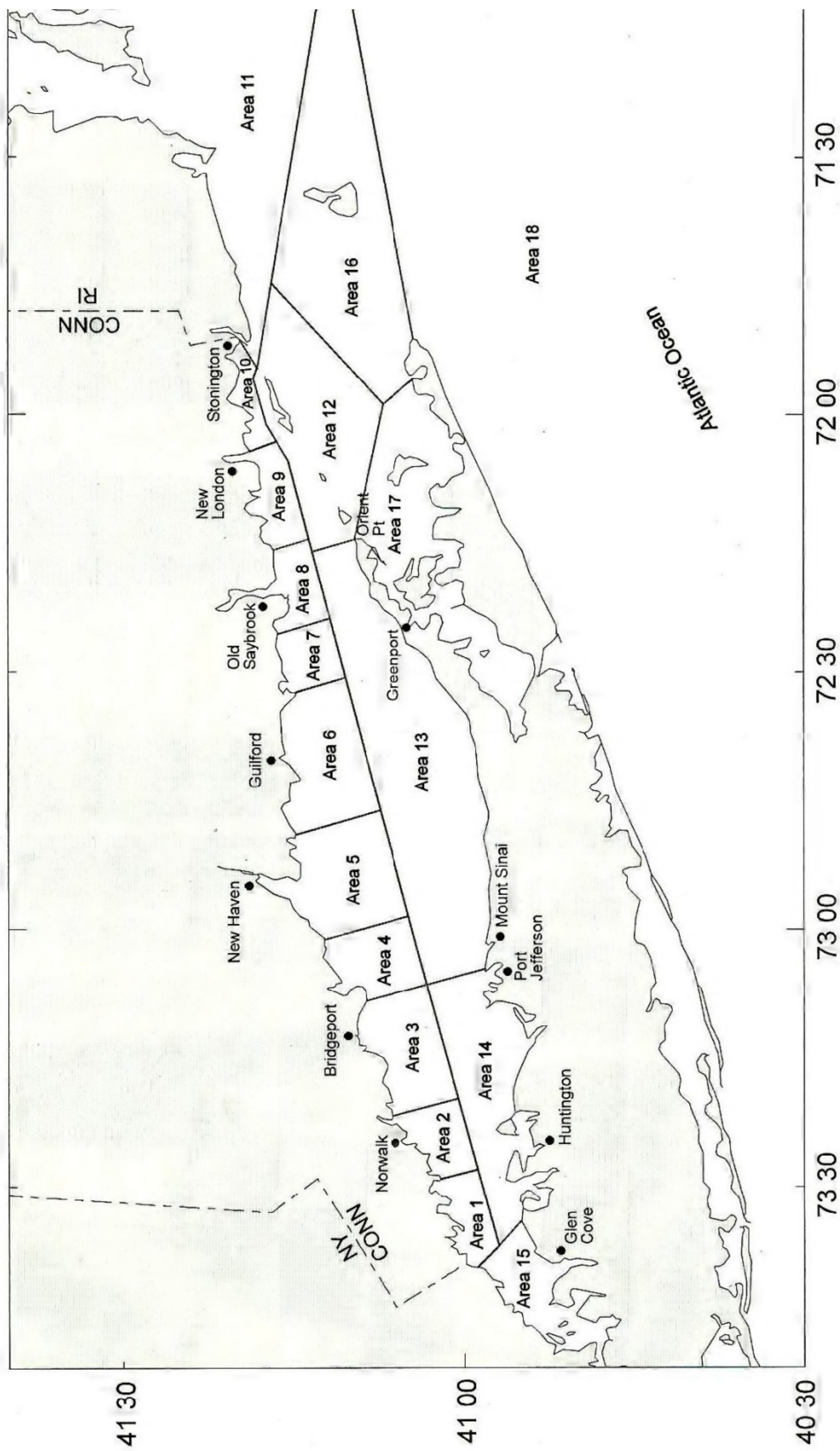
Long Island Sound and Vicinity Fishing Area Chart



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

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

Length Measurement Information

Code	Length Data	4 if Released	Code	Length Data	4 if Released
	•			•	
	•			•	
	•			•	
	•			•	
	•			•	
	•			•	
	•			•	
	•			•	
	•			•	
	•			•	

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 2012 SPRING AND FALL SURVEYS

STUDY PERIOD AND AREA

The Connecticut DEEP Marine Fisheries Division conducted a Trawl Survey in Long Island Sound Trawl Survey for the twenty-ninth year in 2012. 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 2012 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.

Bluefish, scup, summer flounder, tautog, weakfish and winter flounder are sampled for age determination (Table 2.3). The target number of age samples for bluefish were 50 from the spring period (defined by ASMFC Bluefish Technical Committee as Jan-July) and 50 from the fall period (August-December). 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). At the request of the ASMFC Tautog Technical Committee, LISTS began collecting tautog otoliths in addition to opercles in 2012. Results from a recent ASMFC Tautog Ageing Workshop (May 2012) indicated there was no clear benefit to switching from opercles to otoliths for CT, so tautog otoliths will be collected and archived for future use. 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 have been included in 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).

For the purposes of tracking species richness, the species discussed in the preceding paragraph were omitted. All other finish species captured in LISTS were divided into groups based on their temperature preferences and seasonal spawning habits as documented in the literature (Collette and Klein-MacPhee 2002, Murdy et al. 1997). Species in the cold temperate group prefer water temperatures below 15^0C (60^0F), tend to spawn at the lower end of their temperature tolerance range, and are more abundance north of Long Island Sound than south of New York. Species in the warm temperate group prefer warmer temperatures (11-22^0C or 50-77^0F), tend to spawn in the upper range of their temperature tolerance, and are more abundant south of the Sound than north of Cape Cod (Appendix 2.4). Species that are not tolerant of cold temperatures, are abundant only south of Chesapeake Bay but stray into northern waters mostly as juveniles, and spawn only in the mid-Atlantic Bight and south were placed into a separate group (subtropical) and were not included in the analysis because they are typically only present in the fall LISTS.

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 - 2012 for 38 finfish species, lobster, and long-finned squid (1986 - 2012). 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**. Otoliths were taken from 124 bluefish, 61 from the spring period and 63 from the fall period. Of the 61 samples taken in the spring, only seven (7) were obtained from LISTS; the bulk of the samples came from recreational anglers. All of the fall samples were obtained from LISTS. Since 2012 was the initial year for collecting and ageing bluefish otoliths, there were very limited results available at reporting time. Therefore, the method of using modes observed in the fall length frequencies to separate bluefish into age 0 and age 1+ groups, and calculate a geometric mean catch per tow for each group (Table 2.22) was continued for 2012. 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 1984-2012 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 11,448 scup aged between 1984 and 2012 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 2012, 19 summer flounder, 60 cm TL or greater, were aged; 18 from the spring and one (1) 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 1984-2012 using all survey months (Gottschall and Pacileo 2007) (Table 2.27). During 2012, 131 tautog were captured and opercles were collected from all; 111 collected in the spring and 20 were collected in the fall. Ageing for 2006-2010 has been completed. Ageing for 2011 and 2012 samples 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. Age data for 1984-2010 and preliminary data for 2011 are presented in this report.

- **Weakfish**. Age 0 and age 1+ indices were calculated for both spring (1984 – 2012) and fall surveys (1984 – 2009, 2012) (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 1984-2012 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 21,986 winter flounder aged between 1984 and 2012 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 2012 Spring and Fall Surveys

Each month of the survey, sampling aboard the R/V John Dempsey generally began in the east end of Long Island Sound and progressed westward. The April survey commenced on April 11, 2012, and continued until April 27 for a total of nine (9) days underway and 40 tows completed. May sampling started on May 8 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 11 and ended on June 22, taking eight (8) days underway to complete 40 sites. The Fall Survey needed 9 days underway in September and 11 days underway in October to complete the 40 sites in each of the months. October sampling continued into the beginning of November due to the arrival of Hurricane Sandy in the latter part of October which made sampling impossible for a few days. A total of 200 LISTS tows were completed in 46 days underway during the spring and fall 2012 surveys (Table 2.4); not including transit days or weather 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 indicate the actual sites sampled. If a site had to be relocated during sampling, an explanation of why it was moved is provided under the figure. 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). These tables provide date of sample, time, tow duration, latitude/longitude, surface and bottom temperature and salinity, average tow speed, distance towed and approximate area swept for each tow.

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 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 2012 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 2012, while Table 2.12 shows sample request received and fulfilled. 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

Fifty-seven finfish species were observed in the 2012 Long Island Sound Trawl Survey (Table 2.13). This includes one new species for the survey, pinfish (*Lagodon rhomboids*, shown at right), caught on two tows during the fall survey. From 1984 to 2012, LIS Trawl Survey has identified one hundred three (103) finfish species (Appendix 2.1), averaging 58 species per year with a range of 43 to 70 species (Fig 2.7). In addition, a total of 40 types of invertebrates were collected in 2012 (Table 2.14). Most invertebrates are identified to species. However, in some cases, invertebrates were identified to genus or a higher level taxon.

Total Catch

Appendix 2.4 presents a time series (1984-2012) of the finfish species collected each year and their respective rank by numbers. Annual total biomass of invertebrates is also included in this appendix (1992-2012), and are ranked by weight (kg).

A total of 159,770 finfish weighing 17,570 kg were sampled in 2012 (Table 2.15). In twenty out of the last twenty-nine years butterfish has been the highest-ranking finfish (numbers) in LISTS. In 2012, over sixty thousand (60,539) butterfish accounted for 37.9% of the catch by number and 10.8% of the biomass. Scup was the second most abundant by number (53,119) and the most abundant by weight, accounting for 35.1% of the biomass in 2012. Typically, scup and butterfish account for 60% of the Trawl Survey annual catch (27.1%-86%, 1984-2012, Appendix 2.4) and have been among the five most abundant species caught (by number) each year of the 29-year LISTS time-series. Scup was more abundant than butterfish in the spring survey, however, butterfish was the more abundant species in the fall (Table 2.16). The top five species (by number) in 2012, in order of decreasing abundance, were butterfish, scup (porgy), silver hake (whiting), weakfish and bluefish. These five species accounted for 82.5% of the total annual catch and 52.2% of the total biomass.

A total of 64,749 finfish weighing 10,405 kg were sampled in spring of 2012 (Table 2.16). Scup topped the spring catch both by number and biomass, with 21,280 fish (4,114.5 kg) accounting for 32.9% of the catch numerically and 39.5% by weight. The scup index of abundance for spring 2012 (50.24 scup per tow) was the third highest in the time-series, making 2012 the seventh time in the past 13 years that the springtime index has been above the time-series mean of 11.66 scup per tow (Table 2.18). Scup from 10 to 30 centimeters fork length were most prominent in the length frequency distribution. Three modes were present at 11, 19, and 26 centimeters. The smaller size group often seen in the spring (10-12 cm) was not abundant in 2011; however, during the spring 2012 cruise it once again dominated the catch. The number of scup greater than 30 cm in springtime catches has been increasing for the past decade (Table 2.44). Silver hake was the third most abundant fish by number (7,461, or 11.5% of the total). Northern searobin and windowpane flounder were the third and fourth most abundant, respectively, for the spring. Winter flounder, historically one the top five most abundant species, was only the six most abundant species this season by number with 2,819 fish accounting for 531.9 kg. Summer flounder (fluke) springtime catches have been increasing since the mid 1990's, except for a dip in 2005-2006 (Table 2.18). The springtime fluke index was 3.06 fish/tow, roughly three times more than the time-series average of 1.4 fish per tow.

A total of 95,024 finfish weighing 7,165 kg were sampled in fall of 2012 (Table 2.16). Catches in the fall survey have consistently been dominated by four species: butterfish, scup, weakfish and bluefish (Table 2.16). In fact, three of the four (butterfish, scup and bluefish) have been the five most abundant fish in each fall survey in the LIST time-series. In 2012, the four named species comprised 92.3% of the total catch of finfish and 56.8% of the total fall biomass. Butterfish comprised 47.9% of the fall catch by number and 17.1% by weight. The fall catch of 45,550 butterfish was only about 24% below average in 2012, a significant increase from fall 2011 when it fell to its lowest level since the survey began in 1984 (geometric mean catch per tow = 39.62, Table 2.19, Figure 2.8). Scup abundance was about 20% above average this past fall with 31,839 fish (2,056 kg) taken or 33.5% of the fall total count and 28.7% of the fall biomass. The corresponding fall indices for all sizes of scup (223.52, Table 2.19) and for young-of-year scup (153.23, Table 2.23) were near their time-series means of 178.56 and 131.45, respectively (Figure 2.11). Weakfish and bluefish comprised 3.9% and 4.0% of the fall catch with 6,597 fish and 3,832 fish respectively. Bluefish abundance was low again this past fall, with an index of 15.06 fish/tow that was below the time-series average (23.23 fish/tow). The weakfish index of abundance (22.27 fish/tow) was about average for the time-series (Table 2.19), driven by the average young-of year index (21.96 fish/tow, Table 2.28). Over the time-series, 97% of the fall weakfish catch is young-of-year weakfish (less than 30 cm TL). The fall age 1+ index for weakfish (0.73 fish/tow), however, was the second highest in the time-series. The past two fall surveys (2011 and 2012) have had the most age 1+ weakfish since the peak catch in 1997 (Figure 2.13). Smooth dogfish again ranked high in biomass (3rd) with 1,071.2 kg from 384 individuals. Overall, the number of finfish caught in fall 2012 was fairly typical, with an average of 1,188 fish/tow (the time-series average is 1,418 fish/tow).

A total of 1,258 kg of invertebrates were taken in 2012 (Table 2.15). Over 75% of the invertebrate biomass was comprised of four species, namely, horseshoe crab (385.8

kg, 30.6% of total), long-finned squid (333.9 kg, 26.5%), spider crab (162.4 kg, 12.9%) and American lobster (70.0 kg, 5.6%). The total biomass of invertebrate catch taken in the spring of 2012 was 703 kg (Table 2.17). Horseshoe crab had the highest biomass 249.2 kg comprising 35.4% of the total spring weight followed by spider crab with 144.1 kg (20.5%) and long-finned squid with 85.8 kg (12.2%). For American lobsters, the 2012 spring index of 0.97 lobsters/tow was only slightly better than the record low of 0.79 lobsters/tow in spring 2011 (Table 2.18). The spring 2012 index of long-finned squid (3.34 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 555 kg of invertebrates were taken in fall of 2012 (Table 2.17). Long-finned squid was the most abundant invertebrate in the fall, with 8,326 squid weighing 248.1 kg or 44.7% of the total invertebrate biomass for fall. Horseshoe crab was the second most abundant invertebrate with 136.6 kg, followed by 34.5 kg of lady crab. There were only 54 American lobster (11.5 kg), yielding an index of 0.29 lobsters per tow, another record low for fall abundance (Table 2.19, Figure 2.14).

A new invasive alga species, *Heterosiphonia japonica* (HJ), was documented in more than 35% of the Spring 2012 tows. May survey had the highest monthly catch of HJ (514.9 kg) and highest single haul (172.8 kg). However, June survey had the most frequent occurrence, with HJ present in 23 of 40 tows (57.5%). HJ was a significant nuisance for the trawl survey. This particular alga does not shake out of the net very easily, in fact, it sometimes took more than an hour to beat the alga out of the net meshes using boat brushes (see photo at right).

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 - 2012	Table 2.30;
American shad	spring and fall	1989 - 2012	Table 2.31;
American lobster	spring and fall (M&F)	1984 - 2012	Table 2.32-Table 2.35;
Atlantic herring	spring and fall	1989 - 2012	Table 2.36;
Atlantic menhaden	spring and fall	1996 – 2012	Table 2.37;
black sea bass	spring and fall	1987 – 2012	Table 2.38, Table2.39
blueback herring	spring and fall	1989 - 2012	Table 2.40;
bluefish	spring and fall	1984 - 2012	Table 2.41, Table 2.42;
butterfish	spring and fall	1986 - 1990, 1992 - 2012	Table 2.43;
fourspot flounder	spring and fall	1989 - 1990, 1996 - 2012	Table 2.44;
hickory shad	spring and fall	1991 - 2012	Table 2.45;
horseshoe crab	spring and fall (M&F)	1998 - 2012	Table 2.46, Table 2.47
long-finned squid	spring and fall	1986 - 1990, 1992 - 2012	Table 2.48;
scup	spring and fall	1984 - 2012	Table 2.49, Table 2.50;
striped bass	spring and fall	1984 - 2012	Table 2.51, Table 2.52;
summer flounder	spring and fall	1984 - 2012	Table 2.53, Table 2.54;
tautog	spring	1984 - 2012	Table 2.55;
weakfish	spring and fall	1984 - 2012	Table 2.56, Table 2.57;
windowpane flounder	spring and fall	1989, 1990, 1994 - 2012	Table 2.58, Table 2.59;
winter flounder	April-May and fall	1984 - 2012	Table 2.60, Table 2.61;
winter skate	spring and fall	1995 - 2012	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 1984-2012 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; 1992-2012), American lobster (1984-2012), horseshoe crab (1992-2012), and long-finned squid (1986-2012).

During the spring survey seven finfish species were at record high levels of abundance (black sea bass, clearnose skate, menhaden, northern kingfish, striped searobin, weakfish and whiting). 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; fourspot flounder, northern searobin and winter skate (Figures 2.8 – 2.13). Although the fall trawl index is usually the preferred index of scup abundance, even the springtime scup indices have mostly been above average since 2000 (Table 2.18) due to high abundances of age 2+ scup in recent years (Figure 2.11).

During the fall survey, six finfish species had record high indices of abundance (black sea bass, clearnose skate, hogchoker, northern kingfish, northern searobin and striped searobin). Of the species where the fall index is the preferred index of abundance for the trawl survey (Table 2.19), an additional nine (9) species had indices of abundance (geometric mean count per tow) above the time-series mean; butterfish, hickory shad, scup, smooth dogfish, spot, summer flounder, spotted hake, rough scad and weakfish (Figures 2.8 – 2.13). Conversely, two species had record low indices of abundance (Atlantic herring and blueback herring). Abundance of both of these species in fall LISTS has been below average for the past decade (Table 2.19).

Relative indices of abundance (geometric mean number per tow) of American lobster were at record or near-record low levels for both spring and fall surveys in 2012. This continues the decreasing trend begun in the late 1990's. American lobster abundance in spring 2012 remains low at 0.97 lobsters per tow, the second lowest in the time-series (Table 2.18). Current springtime abundance is only about one-twentieth the peak abundance of 18.52 lobsters per tow seen in 1998 (Figure 2.14). American lobster fall index of abundance was another record low for the time-series (0.29 lobster per tow) and is currently only 1.5% of peak abundance in the 1997 fall trawl survey index (19.60 lobsters per tow, Table 2.19). Catch of long-finned squid has been a bit below average for the past two years. The 2012 spring index of 3.34 squid per tow was close to the seasonal time-series mean (4.84 squid per tow) and the fall index (62.53 squid per tow) was about half the time-series mean (119.09 squid per tow) (Tables 2.18 – 2.19, Figure 2.14). Lady crab and rock crab indices have been low for the past decade, (Tables 2.20-2.21, 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 2012, LISTS collected otoliths from 808 winter flounder, 806 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 612 scup were collected and aged in

2012, 610 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 2012 fell below the mean for the third time in the past 18 years, the current index of 0.43 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 2012 spring index of age 2+ fish (65.37 fish/tow) was the fifth highest in the time-series (Table 2.23, Figure 2.11). The index of age 2+ was also relatively high in the fall (15.98 fish/tow) compared to the first half of the time-series average of 2.58 fish/tow. Summer flounder (fluke) abundance, in both spring and fall, has generally been increasing for the past 15 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 just as abundant in the spring survey. The fluke index for spring 2012 (3.06 fish per tow) is more than double the time-series average (1.4 fish per tow) and the fall index (3.74 fish per tow) is the third highest in the time-series. The spring survey index for tautog has remained low and below the time-series average for 19 of the past 20 years, although there was a small, short-lived increase in abundance in 2002 (Table 2.18, Figure 2.13). Abundance indices from 1993-2012 averaged 0.48 fish/tow, only about half the 1984-1992 average of 1.2 fish/tow. Winter flounder springtime abundance has been low and declining for the past fourteen years, with 2006 being the lowest index for the time-series and the average for 2007-2012 being approximately one-third the time series average (Figure 2.9).

Other species of recreational importance were at relatively high abundances in 2012. In fact, black sea bass indices for both spring and fall were record highs for the LISTS time-series (0.83 fish per tow in the spring and 1.49 fish per tow in the fall, Tables 2.18-2.19). Spot, a popular recreational species further south along the East Coast, was at very high abundance in the fall 2012 survey; the fall index of 1.60 fish/tow was second only to the peak index of 2.67 fish/tow in 2008 (Table 2.19, Figure 2.12). Hickory shad abundance was also relatively high in the fall 2012 survey, with the third highest index of the time-series (0.19 fish/tow) being much higher than the rest of the time-series except for 2005 & 2006 (Table 2.19, Figure 2.12). Finally, adult weakfish was also relatively abundant in the 2012 surveys; the 1+ spring index was the highest of the time-series while the 1+ fall index was the second highest of the time-series (Table 2.8, Figure 2.13).

Species Richness by Group

The number of cold temperate and warm temperate species captured in each tow was averaged by seasonal cruise (April-June and September-October) for each year from 1984-2012 as an indicator of annual biological diversity or species richness. Trends in these indicators were tested for statistical significance by regression analysis. Results (Figure 2.15) show that the average number of warm temperate species captured/tow in spring and fall cruises has increased ($F=18.3$ and 52.8 respectively, $p<0.001$); while the average number of cold temperate species has decreased, especially in spring ($F=23.9$, $p<0.0001$) but also in fall cruises ($F=5.5$, $p=0.028$).

Interestingly, of the nine (9) species that were at record high abundances in either the spring or fall LISTS cruises, only one (whiting) is classified as cold temperate. The other species are all warm temperate; black sea bass, clearnose skate, hogchoker, menhaden northern kingfish, northern searobin, striped searobin and weakfish. This is an indication that, in addition to an increase in the number of warm temperate species in the Sound, there was also an increase in abundance for some of the warm temperate species.

MODIFICATIONS

Ecosystem health relates to the diversity of species and the abundance of numerous species (not just recreationally important species or forage species), yet the LIS Trawl Survey collects only minimal data for some of these other species (e.g. only count and weight are recorded). Therefore, in 2013, lengths will be collected from some additional species that are commonly collected during the trawl survey; red hake, spotted hake and whiting (silver hake) will be measured from third tow on each day.

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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 2012.

In addition to the species listed below, other rarely occurring species (totaling less than 30 fish/year each) were measured. During 2012, twenty-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
bluefish	scales / otoliths	minimum 50 from each season
tautog	opercular bones otoliths	Collected paired structures (opercles and otos) from a minimum of 200 fish/year; opercles to be aged and otoliths to be archived for future work
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**	**2012**	
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	40	
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	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	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	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	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**	**200**	**6,188**

Table 2.5. Station information for LISTS April 2012.

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 labeled as S_ and B_, respectively. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc, ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Ave Speed (knots)	Distance (nm)	Area Swept (sq.nm)
SP2012001	4/11/2012	1737	T	1	7:45	30	41.2892	-72.1985	9.1	30.5	9.2	30.6	3.0	1.50220	0.00759
SP2012002	4/11/2012	1437	T	4	9:36	30	41.2430	-72.2131	8.8	29.5	8.6	30.2	2.9	1.47111	0.00743
SP2012003	4/13/2012	1336	T	4	8:06	30	41.2132	-72.2840	8.7	29.6	8.7	30.5	1.7	0.83462	0.00421
SP2012004	4/13/2012	0629	S	4	10:49	30	41.1125	-72.5043	8.8	27.6	8.7	28.8	2.3	1.17111	0.00591
SP2012005	4/13/2012	0427	T	3	12:11	30	41.0866	-72.6045	9.2	27.4	8.8	27.7	3.1	1.53791	0.00777
SP2012006	4/13/2012	0828	S	3	13:40	30	41.1368	-72.6130	9.2	27.7	8.8	28.2	2.0	1.00111	0.00506
SP2012007	4/16/2012	0128	T	2	8:53	30	41.0315	-72.5798	10.1	27.4	9.3	28.4	2.7	1.34293	0.00678
SP2012008	4/16/2012	5823	S	1	10:53	30	40.9813	-72.8224	10.8	27.1	10.7	27.1	3.7	1.85985	0.00939
SP2012009	4/16/2012	0522	M	4	12:44	30	41.0913	-72.8890	10.6	27.4	8.7	28.0	3.2	1.62389	0.00820
SP2012010	4/16/2012	1025	T	3	14:20	30	41.1631	-72.7633	12.2	27.4	9.0	28.2	3.1	1.56739	0.00791
SP2012011	4/16/2012	1328	T	2	16:00	30	41.2271	-72.6330	10.0	28.2	9.8	28.5	2.2	1.12033	0.00566
SP2012012	4/17/2012	1534	T	1	7:00	30	41.2593	-72.3613	10.5	28.4	10.2	29.9	2.6	1.31389	0.00663
SP2012013	4/17/2012	0931	S	4	8:54	30	41.1600	-72.4465	10.0	28.7	9.3	29.7	3.1	1.54176	0.00779
SP2012014	4/17/2012	0426	T	3	10:35	30	41.0771	-72.6415	11.2	27.3	9.2	28.4	2.6	1.29111	0.00652
SP2012015	4/17/2012	0027	T	2	11:56	30	41.0185	-72.5898	11.1	27.3	10.4	27.3	2.3	1.17308	0.00592
SP2012016	4/17/2012	0327	T	3	13:21	30	41.0520	-72.6786	12.6	27.5	9.2	28.1	3.5	1.77033	0.00894
SP2012017	4/18/2012	1533	S	1	7:17	30	41.2570	-72.3381	10.3	30.4	10.3	30.4	2.3	1.13901	0.00575
SP2012018	4/18/2012	0729	S	3	9:09	30	41.1256	-72.5258	10.1	28.7	9.6	29.3	3.6	1.80526	0.00912
SP2012019	4/18/2012	0927	T	4	10:33	30	41.1683	-72.6216	9.7	29.0	9.7	29.0	2.8	1.40824	0.00711
SP2012020	4/18/2012	1227	T	3	11:53	30	41.2135	-72.5880	10.5	29.2	9.9	29.2	2.4	1.17692	0.00594
SP2012021	4/18/2012	1225	T	2	13:16	30	41.2070	-72.7186	10.2	28.1	9.6	28.6	2.3	1.16044	0.00586
SP2012022	4/18/2012	0921	M	2	14:43	30	41.1755	-72.8721	9.9	27.6	9.0	27.6	2.7	1.33846	0.00676
SP2012023	4/18/2012	0821	M	3	15:42	30	41.1556	-72.9230	10.6	27.4	8.9	27.5	3.0	1.47802	0.00746
SP2012024	4/19/2012	0817	M	2	7:56	30	41.1377	-73.0503	10.1	27.0	8.7	27.4	3.7	1.84231	0.00930
SP2012025	4/19/2012	0007	M	3	10:25	30	41.0148	-73.4625	10.5	27.1	9.2	27.1	3.2	1.62033	0.00818
SP2012026	4/19/2012	5709	S	2	11:51	30	40.9478	-73.4096	12.6	26.5	10.5	26.8	3.1	1.57364	0.00795
SP2012027	4/19/2012	0211	T	2	13:26	30	41.0408	-73.3611	10.2	27.1	8.9	27.3	3.3	1.65393	0.00835
SP2012028	4/19/2012	0612	M	1	14:32	30	41.1008	-73.3151	12.2	27.1	10.3	27.1	3.3	1.66703	0.00842
SP2012029	4/19/2012	0615	M	2	15:11	20	41.0941	-73.2035	10.5	27.0	9.1	27.2	3.3	1.09781	0.00554
SP2012030	4/20/2012	0012	M	4	10:14	30	41.0197	-73.2248	11.1	27.1	8.9	27.6	3.2	1.59560	0.00806
SP2012031	4/20/2012	5513	S	2	11:38	30	40.9242	-73.2485	11.8	26.6	10.7	26.8	3.3	1.63022	0.00823
SP2012032	4/26/2012	0415	M	3	9:14	30	41.0717	-73.1417	10.3	26.7	9.3	27.5	2.8	1.42198	0.00718
SP2012033	4/26/2012	0213	M	3	10:26	21	41.0495	-73.2126	10.4	27.0	9.4	27.6	3.2	1.13039	0.00571
SP2012034	4/26/2012	0015	T	4	11:47	13	40.9998	-73.1757	10.4	27.0	9.4	28.1	2.3	0.49358	0.00249
SP2012035	4/26/2012	0017	M	4	13:44	30	41.0073	-73.0806	10.6	27.0	9.6	28.4	2.4	1.17692	0.00594
SP2012036	4/26/2012	0119	M	4	14:53	14	41.0215	-73.0195	10.6	27.2	9.6	28.4	2.5	0.59364	0.00300
SP2012037	4/26/2012	0419	M	4	16:18	12	41.0757	-72.9700	10.6	27.3	10.2	28.5	2.4	0.48865	0.00247
SP2012038	4/26/2012	0518	M	3	17:09	30	41.0901	-73.0540	10.5	27.3	9.5	28.0	3.2	1.59505	0.00805
SP2012039	4/27/2012	1319	M	1	7:51	30	41.2061	-72.9950	10.5	26.4	10.0	27.3	3.1	1.56758	0.00792
SP2012040	4/27/2012	1427	T	1	10:13	30	41.2360	-72.6590	11.2	28.1	11.2	28.1	3.2	1.62473	0.00820

Table 2.6. Station information for LISTS May 2012.

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 labeled as S_ and B_, respectively. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc, ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Ave Speed (knots)	Distance (nm)	Area Swept (sq.nm)
SP2012041	5/8/2012	0730	S	4	8:05	30	41.1283	-72.4706	11.3	28.2	11.3	28.4	3.0	1.49615	0.00756
SP2012042	5/8/2012	0531	T	3	9:38	30	41.0923	-72.4734	11.6	28.1	11.6	28.1	3.5	1.73681	0.00877
SP2012043	5/8/2012	0229	T	2	11:23	30	41.0442	-72.5593	11.6	27.9	11.6	27.9	3.4	1.69121	0.00854
SP2012044	5/8/2012	5824	S	1	13:19	30	40.9808	-72.7998	11.5	27.7	11.5	27.7	3.0	1.49835	0.00757
SP2012045	5/8/2012	0526	T	3	15:01	30	41.0870	-72.6924	12.2	27.5	11.3	28.0	3.2	1.60385	0.00810
SP2012046	5/9/2012	1533	S	1	6:52	30	41.2546	-72.3408	11.8	23.5	11.4	27.7	2.5	1.26044	0.00636
SP2012047	5/9/2012	1336	T	4	8:29	30	41.2245	-72.2388	11.3	28.2	10.9	30.1	2.7	1.34286	0.00678
SP2012048	5/9/2012	0731	S	4	10:26	30	41.1321	-72.4665	11.5	28.2	11.5	28.3	3.4	1.68736	0.00852
SP2012049	5/9/2012	0525	T	4	12:19	30	41.0998	-72.6985	12.3	27.5	11.3	27.9	3.3	1.62857	0.00822
SP2012050	5/9/2012	0824	T	4	13:38	30	41.1277	-72.8038	12.3	27.3	11.1	28.0	2.6	1.28034	0.00647
SP2012051	5/9/2012	1228	T	3	15:24	30	41.2021	-72.6013	11.5	28.2	11.3	28.5	3.2	1.61868	0.00817
SP2012052	5/10/2012	0828	S	3	8:15	30	41.1500	-72.5565	11.6	28.0	11.6	28.0	1.7	0.84056	0.00424
SP2012053	5/10/2012	0727	S	3	9:42	30	41.1240	-72.6169	12.2	27.4	11.5	27.9	2.7	1.36264	0.00688
SP2012054	5/10/2012	0825	T	4	11:14	30	41.1472	-72.7125	12.6	27.5	11.6	28.0	3.3	1.62527	0.00821
SP2012055	5/10/2012	0623	M	4	12:42	30	41.1010	-72.8502	12.7	27.3	10.9	28.1	2.4	1.18111	0.00596
SP2012056	5/10/2012	1126	T	3	14:23	30	41.1900	-72.7017	12.3	27.9	11.8	28.0	2.3	1.16556	0.00589
SP2012057	5/11/2012	1428	T	1	8:16	30	41.2453	-72.5715	11.9	27.8	11.8	27.8	2.2	1.12363	0.00567
SP2012058	5/11/2012	1427	T	1	9:49	30	41.2151	-72.5968	12.3	27.7	12.3	27.7	3.4	1.72222	0.00870
SP2012059	5/14/2012	0427	T	3	8:42	30	41.0868	-72.6048	13.3	27.6	12.2	28.0	2.3	1.13571	0.00574
SP2012060	5/14/2012	0424	M	4	10:39	30	41.0775	-72.7595	13.3	27.5	12.0	27.8	2.3	1.15275	0.00582
SP2012061	5/14/2012	0121	M	4	13:01	30	41.0253	-72.8765	13.7	27.1	10.9	28.0	2.4	1.21429	0.00613
SP2012062	5/15/2012	1118	M	1	7:44	30	41.1805	-73.0548	13.1	27.3	12.7	27.3	3.1	1.54890	0.00782
SP2012063	5/15/2012	0722	M	3	9:20	30	41.1220	-72.8883	14.4	27.1	11.8	27.9	3.2	1.61889	0.00817
SP2012064	5/15/2012	0422	M	4	10:44	30	41.0792	-72.8447	14.1	27.2	11.9	27.9	2.5	1.24835	0.00630
SP2012065	5/15/2012	0518	M	3	14:01	30	41.1002	-72.9996	13.1	27.1	11.3	27.8	3.2	1.59560	0.00806
SP2012066	5/15/2012	0921	M	2	15:24	30	41.1627	-72.9321	14.3	26.8	11.3	27.7	2.8	1.38791	0.00701
SP2012067	5/16/2012	1119	M	2	7:51	30	41.1881	-73.0083	14.3	27.1	11.9	27.5	3.0	1.50989	0.00762
SP2012068	5/16/2012	0617	T	2	9:22	30	41.1135	-73.0410	13.3	27.0	11.4	27.8	3.2	1.58409	0.00800
SP2012069	5/16/2012	0213	M	3	10:55	16	41.0501	-73.2108	13.8	26.9	11.2	27.5	2.7	0.72587	0.00367
SP2012070	5/16/2012	5812	M	3	12:23	30	40.9835	-73.2540	14.5	26.7	11.3	27.6	2.8	1.42473	0.00719
SP2012071	5/16/2012	5709	S	2	13:58	30	40.9492	-73.4095	15.1	26.2	12.6	27.0	3.2	1.60110	0.00809
SP2012072	5/16/2012	0011	M	4	15:33	30	41.0083	-73.3409	14.0	26.6	11.3	27.8	3.1	1.53278	0.00774
SP2012073	5/17/2012	5513	S	2	9:14	30	40.9276	-73.2495	13.5	26.9	13.4	26.9	3.1	1.53626	0.00776
SP2012074	5/17/2012	0211	T	2	10:58	30	41.0392	-73.3611	14.1	26.7	11.5	27.6	3.0	1.51374	0.00764
SP2012075	5/17/2012	5912	M	3	12:17	30	40.9857	-73.2993	14.2	27.0	11.6	27.4	3.3	1.66209	0.00839
SP2012076	5/17/2012	0611	M	1	13:47	30	41.0996	-73.3210	14.7	26.0	12.4	27.2	3.4	1.71154	0.00864
SP2012077	5/17/2012	0917	T	2	15:32	30	41.1515	-73.0860	14.8	25.2	13.3	27.1	3.1	1.52556	0.00770
SP2012078	5/18/2012	1020	T	2	9:10	30	41.1693	-72.9706	14.4	27.3	11.9	27.8	2.7	1.36833	0.00691
SP2012079	5/18/2012	1021	M	2	10:16	30	41.1617	-72.9341	14.8	27.6	11.9	27.8	3.2	1.58077	0.00798
SP2012080	5/18/2012	1423	T	1	11:34	30	41.2292	-72.8564	14.6	27.7	13.9	27.7	3.6	1.81099	0.00914

Table 2.7. Station information for LISTS June 2012.

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 labeled as S_ and B_, respectively. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc, ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Ave Speed (knots)	Distance (nm)	Area Swept (sq.nm)
SP2012081	6/11/2012	1436	T	4	9:19	30	41.2343	-72.2856	16.0	28.2	15.6	29.8	3.7	1.84333	0.00931
SP2012082	6/11/2012	1837	T	1	10:17	30	41.2942	-72.1998	17.1	29.8	16.6	29.9	3.0	1.52253	0.00769
SP2012083	6/11/2012	1740	T	2	12:36	30	41.2918	-72.0745	16.2	30.2	15.6	30.7	2.2	1.10659	0.00559
SP2012084	6/11/2012	1534	T	1	14:50	30	41.2588	-72.3585	17.1	26.3	16.8	28.7	2.2	1.09000	0.00550
SP2012085	6/12/2012	1332	S	1	7:17	30	41.2310	-72.3958	16.3	26.7	16.1	28.7	2.3	1.12637	0.00569
SP2012086	6/12/2012	0831	S	4	8:56	30	41.1423	-72.4474	17.1	28.0	15.8	28.9	1.8	0.87692	0.00443
SP2012087	6/12/2012	0430	T	3	10:24	30	41.0897	-72.4900	17.6	27.6	16.3	28.3	2.1	1.06099	0.00536
SP2012088	6/12/2012	0128	T	2	12:07	30	41.0302	-72.5801	17.4	27.4	16.6	27.9	3.0	1.51000	0.00763
SP2012089	6/12/2012	0330	S	1	13:30	30	41.0475	-72.5226	17.8	27.5	17.4	27.6	2.8	1.42033	0.00717
SP2012090	6/13/2012	1432	S	2	7:20	30	41.2338	-72.4022	16.3	28.2	16.1	28.9	2.8	1.37753	0.00696
SP2012091	6/13/2012	0730	S	4	8:52	30	41.1320	-72.4653	17.3	27.8	15.9	29.0	2.4	1.20889	0.00610
SP2012092	6/13/2012	0429	T	3	10:14	30	41.0823	-72.5378	18.2	27.3	16.3	28.3	2.3	1.14667	0.00579
SP2012093	6/13/2012	0527	T	3	11:31	30	41.1030	-72.6093	18.5	26.8	16.4	28.1	2.5	1.27333	0.00643
SP2012094	6/13/2012	0624	T	4	13:14	30	41.1105	-72.7973	18.5	27.1	15.1	27.7	2.9	1.44111	0.00728
SP2012095	6/13/2012	1028	T	4	14:49	30	41.1630	-72.6343	18.3	27.0	16.1	27.9	2.1	1.07308	0.00542
SP2012096	6/14/2012	0929	S	3	7:53	30	41.1638	-72.5313	16.8	26.7	16.4	28.5	2.9	1.47198	0.00743
SP2012097	6/14/2012	0627	S	3	9:15	30	41.1082	-72.6173	17.7	27.3	16.4	28.2	2.9	1.45934	0.00737
SP2012098	6/14/2012	1027	T	4	10:45	30	41.1820	-72.6423	17.5	27.6	16.3	27.9	2.5	1.25333	0.00633
SP2012099	6/14/2012	1025	T	3	12:22	20	41.1655	-72.7620	18.1	27.1	15.6	27.7	3.0	1.00383	0.00507
SP2012100	6/14/2012	1327	T	2	13:58	30	41.2258	-72.6638	18.3	27.2	17.0	27.7	3.0	1.48132	0.00748
SP2012101	6/14/2012	1529	T	1	15:19	30	41.2395	-72.6136	17.8	27.0	17.3	27.2	2.7	1.35165	0.00683
SP2012102	6/19/2012	1328	T	2	7:53	30	41.2398	-72.5778	18.1	27.2	17.5	27.8	3.8	1.88407	0.00951
SP2012103	6/19/2012	0022	M	4	10:17	30	41.0121	-72.8343	18.1	27.0	14.4	27.6	3.3	1.66264	0.00840
SP2012104	6/19/2012	0121	M	4	11:30	30	41.0248	-72.8768	18.7	27.1	13.9	27.6	3.0	1.48833	0.00752
SP2012105	6/19/2012	0118	M	4	12:53	22	41.0333	-72.9918	19.2	27.2	14.2	27.7	2.3	0.85067	0.00430
SP2012106	6/19/2012	0618	M	3	14:47	30	41.0988	-73.0498	19.7	27.1	15.6	27.7	3.6	1.79780	0.00908
SP2012107	6/20/2012	0511	M	2	8:43	30	41.1002	-73.2645	20.4	26.3	17.9	27.1	3.3	1.64222	0.00829
SP2012108	6/20/2012	5709	S	2	10:53	30	40.9488	-73.4075	20.6	26.3	19.0	26.4	3.2	1.61222	0.00814
SP2012109	6/20/2012	5812	M	3	12:42	30	40.9863	-73.2991	20.2	26.7	16.7	26.9	2.9	1.45461	0.00735
SP2012110	6/20/2012	0210	T	2	14:17	30	41.0400	-73.3655	21.3	26.5	17.1	27.1	3.4	1.70556	0.00861
SP2012111	6/20/2012	0412	M	2	15:24	28	41.0650	-73.3005	22.1	26.4	16.6	27.0	3.2	1.51475	0.00765
SP2012112	6/21/2012	0415	M	3	8:32	27	41.0723	-73.1401	21.0	26.6	16.1	27.4	3.3	1.47667	0.00746
SP2012113	6/21/2012	0218	M	4	10:07	12	41.0396	-73.0633	20.8	26.9	14.8	27.7	2.5	0.50514	0.00255
SP2012114	6/21/2012	0321	M	4	11:49	30	41.0538	-72.9300	21.5	27.2	15.0	27.7	2.9	1.43846	0.00726
SP2012115	6/21/2012	0519	M	3	13:25	22	41.0873	-73.0178	22.6	27.0	15.7	27.7	3.1	1.13556	0.00573
SP2012116	6/21/2012	0621	M	3	14:49	30	41.0998	-72.9077	22.2	27.1	15.2	27.6	3.0	1.48681	0.00751
SP2012117	6/22/2012	1118	M	1	8:07	30	41.1813	-73.0532	21.7	27.1	19.5	27.2	3.1	1.53056	0.00773
SP2012118	6/22/2012	1219	M	2	9:31	28	41.1978	-73.0106	20.8	27.2	19.4	27.3	2.9	1.33252	0.00673
SP2012119	6/22/2012	1320	M	1	10:54	30	41.2353	-72.9591	22.2	26.6	20.0	27.2	3.5	1.72895	0.00873
SP2012120	6/22/2012	1125	T	3	13:15	30	41.1938	-72.7343	20.8	27.5	16.8	27.7	3.2	1.57722	0.00796

Table 2.8. Station information for LISTS September 2012.

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 labeled as S_ and B_, respectively. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc, ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Ave Speed (knots)	Distance (nm)	Area Swept (sq.nm)
FA2012001	9/6/2012	1534	T	1	7:39	30	41.2630	-72.3288	22.2	29.6	22.1	29.7	2.3	1.16447	0.00588
FA2012002	9/6/2012	1432	S	2	8:58	30	41.2317	-72.4031	22.6	29.5	22.3	30.0	2.9	1.46000	0.00737
FA2012003	9/6/2012	0927	T	4	10:46	30	41.1671	-72.6185	23.7	28.9	23.1	29.5	3.2	1.61703	0.00817
FA2012004	9/6/2012	5824	S	1	12:46	30	40.9793	-72.7368	23.8	28.4	23.7	28.4	3.3	1.67088	0.00844
FA2012005	9/6/2012	0128	T	2	14:35	30	41.0200	-72.6358	24.0	28.5	23.7	28.6	2.7	1.33846	0.00676
FA2012006	9/6/2012	0729	S	3	16:10	30	41.1161	-72.5698	23.5	29.3	22.9	29.8	2.8	1.41319	0.00714
FA2012007	9/7/2012	1433	S	2	7:04	30	41.2466	-72.3510	22.2	29.3	22.1	29.8	1.9	0.94121	0.00475
FA2012008	9/7/2012	0827	T	3	9:24	30	41.1407	-72.6219	23.8	28.9	23.3	29.5	2.8	1.39333	0.00704
FA2012009	9/7/2012	0124	M	4	11:45	30	41.0176	-72.8066	24.0	28.6	23.1	29.2	2.7	1.33077	0.00672
FA2012010	9/7/2012	0628	S	3	13:31	30	41.1040	-72.6188	24.7	28.8	23.3	29.6	2.3	1.16813	0.00590
FA2012011	9/7/2012	0629	S	4	14:33	30	41.1027	-72.5540	24.2	29.0	22.6	30.1	2.0	0.98791	0.00499
FA2012012	9/10/2012	1333	S	1	7:07	30	41.2343	-72.3593	21.3	29.8	21.2	30.6	2.4	1.19560	0.00604
FA2012013	9/10/2012	1427	T	1	9:07	30	41.2483	-72.6010	22.4	29.7	22.4	29.8	2.7	1.33901	0.00676
FA2012014	9/10/2012	1224	T	2	10:33	30	41.2123	-72.7468	23.4	29.1	23.2	29.4	2.6	1.31461	0.00664
FA2012015	9/10/2012	0923	T	3	12:31	30	41.1466	-72.8340	23.5	28.8	23.2	29.4	2.9	1.46209	0.00738
FA2012016	9/11/2012	1335	T	4	7:20	30	41.2256	-72.3050	21.5	29.8	20.5	31.3	2.4	1.22143	0.00617
FA2012017	9/11/2012	0931	S	4	9:30	30	41.1596	-72.4476	22.2	29.6	21.5	30.4	2.0	1.00275	0.00506
FA2012018	9/11/2012	0527	T	3	11:14	30	41.1021	-72.6107	23.2	29.0	22.6	30.0	2.3	1.14670	0.00579
FA2012019	9/11/2012	0325	T	3	12:51	30	41.0628	-72.7156	23.3	29.0	23.0	29.4	2.7	1.37473	0.00694
FA2012020	9/12/2012	0715	T	1	8:08	30	41.1278	-73.1268	23.0	28.4	22.9	28.4	3.1	1.54945	0.00782
FA2012021	9/12/2012	0210	T	2	9:49	30	41.0495	-73.3153	23.0	28.5	23.0	28.6	2.4	1.22143	0.00617
FA2012022	9/12/2012	5804	M	2	12:00	17	40.9813	-73.5742	23.4	28.1	23.3	28.5	2.6	0.73340	0.00370
FA2012023	9/12/2012	0413	M	3	14:17	30	41.0623	-73.2645	23.7	28.5	23.2	28.6	3.2	1.59670	0.00806
FA2012024	9/13/2012	0920	T	2	8:12	30	41.1613	-72.9355	22.8	28.7	22.8	28.7	3.3	1.64505	0.00831
FA2012025	9/13/2012	0721	M	3	9:40	30	41.1255	-72.9269	23.1	28.9	23.0	28.9	3.1	1.53516	0.00775
FA2012026	9/13/2012	0223	M	4	11:12	16	41.0418	-72.8431	23.1	28.9	22.7	29.5	2.5	0.65362	0.00330
FA2012027	9/13/2012	0224	M	4	12:25	30	41.0493	-72.7558	23.3	29.0	22.8	29.5	2.5	1.25824	0.00635
FA2012028	9/13/2012	0823	M	3	14:04	30	41.1537	-72.7975	23.9	28.9	22.9	29.7	2.3	1.15220	0.00582
FA2012029	9/17/2012	0517	T	3	8:24	30	41.0981	-73.0588	22.6	28.6	22.1	28.9	2.5	1.26813	0.00640
FA2012030	9/17/2012	0415	M	3	9:47	30	41.0727	-73.1400	22.5	28.5	22.8	28.7	3.7	1.82833	0.00923
FA2012031	9/17/2012	0217	M	4	11:25	21	41.0356	-73.0723	22.9	28.8	22.7	29.3	2.3	0.80336	0.00406
FA2012032	9/17/2012	0120	M	4	12:52	30	41.0211	-72.9606	23.0	28.9	22.5	29.5	3.0	1.48462	0.00750
FA2012033	9/17/2012	0621	M	3	14:38	30	41.0981	-72.9041	23.4	28.9	22.6	29.6	2.8	1.38043	0.00697
FA2012034	9/17/2012	1022	M	2	15:55	30	41.1826	-72.8340	23.4	28.8	22.6	29.3	2.4	1.21758	0.00615
FA2012035	9/17/2012	0524	T	4	17:25	30	41.0993	-72.7586	22.9	28.9	22.4	29.5	2.6	1.30549	0.00659
FA2012036	9/20/2012	1319	M	1	7:51	30	41.2105	-72.9963	21.6	28.4	21.6	28.3	3.2	1.57527	0.00795
FA2012037	9/20/2012	1320	M	1	9:14	30	41.2363	-72.9563	21.5	28.4	21.4	28.4	3.2	1.62033	0.00818
FA2012038	9/21/2012	1223	M	2	8:40	30	41.2015	-72.8413	21.7	28.7	21.7	28.7	3.1	1.57120	0.00793
FA2012039	9/21/2012	1124	T	2	10:12	30	41.1888	-72.8068	21.9	28.9	21.8	28.9	2.7	1.35549	0.00684
FA2012040	9/21/2012	0824	T	4	11:49	30	41.1287	-72.8040	21.9	29.3	21.8	29.3	2.2	1.10110	0.00556

Table 2.9. Station information for LISTS October 2012.
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 labeled as S_ and B_, respectively. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc, ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Ave Speed (knots)	Distance (nm)	Area Swept (sq.nm)
FA2012041	10/17/2012	1433	S	2	6:59	27	41.2458	-72.3583	16.5	25.8	17.1	29.7	3.5	1.57880	0.00797
FA2012042	10/17/2012	1837	T	1	10:16	30	41.2895	-72.1988	17.2	31.1	17.2	31.1	3.2	1.57833	0.00797
FA2012043	10/17/2012	1235	T	4	11:54	16	41.2122	-72.2761	17.3	31.1	17.2	31.2	3.7	0.97633	0.00493
FA2012044	10/17/2012	1335	T	4	13:04	30	41.2262	-72.3021	17.1	29.8	17.5	30.5	3.0	1.52418	0.00770
FA2012045	10/17/2012	0830	S	4	15:39	30	41.1487	-72.4830	17.9	30.1	17.7	30.1	1.3	0.65549	0.00331
FA2012046	10/18/2012	1333	S	1	7:10	30	41.2357	-72.3628	17.2	29.8	17.1	29.8	3.0	1.52418	0.00770
FA2012047	10/18/2012	0430	T	3	9:01	30	41.0870	-72.4911	17.6	29.3	17.6	29.5	3.6	1.81484	0.00916
FA2012048	10/18/2012	0426	T	3	10:35	30	41.0763	-72.6429	18.0	29.3	17.9	29.4	3.7	1.85761	0.00938
FA2012049	10/18/2012	0725	T	4	12:24	30	41.1158	-72.7513	18.0	29.3	17.9	29.4	2.3	1.17308	0.00592
FA2012050	10/18/2012	1028	T	4	13:47	30	41.1630	-72.6368	17.9	29.7	17.7	29.6	2.8	1.41868	0.00716
FA2012051	10/22/2012	1427	T	1	8:59	30	41.2483	-72.6043	16.4	28.9	16.4	29.0	2.4	1.21648	0.00614
FA2012052	10/22/2012	1221	T	2	11:44	30	41.2095	-72.9188	16.6	28.2	16.6	28.2	3.0	1.50824	0.00762
FA2012053	10/22/2012	0827	T	3	13:51	30	41.1313	-72.6685	17.6	29.3	17.7	29.3	2.4	1.19185	0.00602
FA2012054	10/22/2012	0931	S	4	16:03	30	41.1508	-72.4883	17.4	30.0	17.4	29.9	1.8	0.89890	0.00454
FA2012055	10/23/2012	0729	S	3	8:27	30	41.1247	-72.5250	17.4	29.8	17.4	29.8	1.6	0.80659	0.00407
FA2012056	10/23/2012	0527	T	3	9:44	30	41.1010	-72.6157	17.6	29.2	17.6	29.3	2.3	1.13500	0.00573
FA2012057	10/23/2012	0027	T	2	11:24	30	41.0080	-72.6435	17.7	29.0	17.6	28.9	3.3	1.63132	0.00824
FA2012058	10/23/2012	0227	T	3	12:47	30	41.0373	-72.6506	17.9	29.0	17.7	29.0	3.2	1.58132	0.00799
FA2012059	10/24/2012	0727	S	3	8:46	30	41.1256	-72.6212	17.5	29.4	17.4	29.5	2.4	1.21167	0.00612
FA2012060	10/24/2012	5825	S	1	10:38	30	40.9851	-72.7268	17.5	28.9	17.5	28.9	3.0	1.49286	0.00754
FA2012061	10/24/2012	0023	M	4	12:04	30	41.0310	-72.7878	17.5	28.8	17.2	29.2	2.5	1.22889	0.00621
FA2012062	10/24/2012	0223	M	4	13:27	30	41.0421	-72.8403	17.3	29.1	17.2	29.2	2.7	1.36209	0.00688
FA2012063	10/24/2012	0423	M	4	14:53	30	41.0746	-72.8276	17.2	29.0	17.2	29.2	2.5	1.22527	0.00619
FA2012064	10/24/2012	0522	M	4	16:05	30	41.1000	-72.8390	17.2	29.1	17.2	29.1	3.4	1.72088	0.00869
FA2012065	10/25/2012	0612	M	1	9:38	30	41.1065	-73.2481	16.8	28.1	16.8	28.2	3.2	1.57747	0.00797
FA2012066	10/25/2012	5709	S	2	11:45	30	40.9502	-73.4077	16.8	28.1	17.3	28.4	3.0	1.47527	0.00745
FA2012067	10/25/2012	5912	M	3	14:39	25	40.9868	-73.2973	17.5	28.6	17.5	28.7	3.0	1.24890	0.00631
FA2012068	10/26/2012	0515	M	2	8:41	30	41.0883	-73.1608	17.1	27.9	17.4	28.7	3.5	1.76456	0.00891
FA2012069	10/26/2012	0420	M	4	10:55	30	41.0693	-72.9205	17.4	29.0	17.4	29.1	3.3	1.66957	0.00843
FA2012070	11/1/2012	0823	M	3	8:25	30	41.1497	-72.7961	16.4	29.1	16.3	29.1	3.1	1.55275	0.00784
FA2012071	11/1/2012	0820	M	3	9:53	30	41.1435	-72.9233	16.0	28.9	16.0	29.0	2.8	1.42253	0.00718
FA2012072	11/1/2012	0819	T	2	11:03	30	41.1475	-72.9695	16.0	28.7	16.0	28.8	2.7	1.37418	0.00694
FA2012073	11/1/2012	0715	T	1	12:43	30	41.1275	-73.1287	15.3	27.6	15.3	28.2	2.1	1.05000	0.00530
FA2012074	11/1/2012	0413	M	3	14:19	30	41.0637	-73.2620	16.1	28.6	16.1	28.5	3.5	1.75549	0.00886
FA2012075	11/2/2012	5612	T	2	9:40	30	40.9458	-73.2576	15.7	28.5	15.7	28.6	2.9	1.44945	0.00732
FA2012076	11/2/2012	0511	M	2	11:51	28	41.0925	-73.3090	15.4	28.3	15.5	28.2	2.7	1.24201	0.00627
FA2012077	11/2/2012	0611	M	1	13:07	30	41.1021	-73.3185	15.1	28.2	15.0	28.1	3.2	1.58000	0.00798
FA2012078	11/5/2012	0514	M	2	8:34	19	41.0958	-73.1556	14.3	28.0	15.1	28.7	2.7	0.86235	0.00435
FA2012079	11/5/2012	0719	M	3	10:47	30	41.1165	-73.0168	15.2	28.7	15.3	28.8	2.3	1.17088	0.00591
FA2012080	11/5/2012	0920	T	2	12:09	30	41.1518	-72.9845	15.0	28.6	14.9	28.6	2.5	1.23956	0.00626

Table 2.10. Samples with non-standard tow durations and reasons for incomplete tows, spring and fall 2012.
Standard LISTS tows begin with SP(spring) or FA (fall).

Sample	Date	Site	Bottom Type	Depth Interval	Time	Duration	Reason	Comments
APRIL								
SP2012029	4/19/2012	0615	M	2	15:11	20	pots	pot gear with expired tags; string on door & 8 pots in net; damage to net (two large holes in belly & one in wing)
SP2012033	4/26/2012	0213	M	3	10:26	21	pots	pot gear with expired tags; string on door & 1 pot in net
SP2012034	4/26/2012	0015	T	4	11:47	13	pots	2 attempts; pot gear both times; multiple strings of gear
SP2012036	4/26/2012	0119	M	4	14:53	14		2 attempts; pot gear both times; pot gear with expired tags
SP2012037	4/26/2012	0419	M	4	16:18	12	hang	tree branches in net
MAY								
SP2012069	5/16/2012	0213	M	3	10:55	16	pots	2 attempts; pot gear both times; pot gear with expired tags
JUNE								
SP2012099	6/14/2012	1025	T	3	12:22	20	pots	2 attempts; pot gear both times; string on each door; lot of weight/tension;
SP2012105	6/19/2012	0118	M	4	12:53	22	pots	2 attempts; lots of weight/tension; some active gear; some pots with expired tags
SP2012111	6/20/2012	0412	M	2	15:24	28	pots	couple pots with expired tags
SP2012112	6/21/2012	0415	M	3	8:32	27	pots	string of pots with expired tags; buoy had been submerged; lots of weight/tension
SP2012113	6/21/2012	0218	M	4	10:07	12	pots	2 attempts; pot gear both times; pots with expired tags; lots of tension
SP2012115	6/21/2012	0519	M	3	13:25	22	pots	pot gear with expired tags
SP2012118	6/22/2012	1219	M	2	9:31	28	speed drop	speed dropped just before boost but no gear or debris in net
SEPT								
FA2012022	9/12/2012	5804	M	2	12:00	17	speed drop	spreed dropped but no gear or debris; approached by commercial fisher who thought we were getting too close to his pot gear so did not reset trawl net
FA2012026	9/13/2012	0223	M	4	11:12	16	pots	multiple strings of pot gear with expired tags
FA2012031	9/17/2012	0217	M	4	11:25	21	speed drop	2 attempts; speed dropped but no gear or debris on net either time
OCT								
FA2012041	10/17/2012	1433	S	2	6:59	27	hang	hung up abruptly but net came free during haul back
FA2012043	10/17/2012	1235	T	4	11:54	16	hang	hung up abruptly; net needed mending in port wing and along ground line
FA2012067	10/25/2012	5912	M	3	14:39	25	pots	dilapidated pot gear; pot buoy with mussels on it (buoy was submerged)
FA2012076	11/2/2012	0511	M	2	11:51	28	pots	old pot gear with no trap tags
FA2012078	11/5/2012	0514	M	2	8:34	19	pots	multiple strings of pot gear; significant damage to net; had to put on different net for next tow

Table 2.11. Data requests by month, 2012.

MONTH	REQUEST	ORGANIZATION OR PURPOSE
January		
	LISTS eel count and weight, 1984-2011	Acadia University
	LISTS scup indices & length frequency, 1984-2011	CT DEEP & ASMFC
	LISTS spring & fall count & biomass indices, 1984-2011	Dominion
	LISTS summer flounder indices & length frequency, 1984-2011	CT DEEP
	LISTS river herring indices & length frequency, 1984-2011	CT DEEP
February		
	LISTS & LISS BADD indices, 1991-2010	EPA
	LISTS catch & species ranks, 2011	EPA
	LISTS & ESS time-series indices	CT CEQ
	LISTS tautog indices & recreational catch & harvest, 1984-2011	CT DEEP
March		
	LISTS butterfish indices (1984-2011)	MAFMC
April		
	LISTS winter flounder age matrix, 1984-2011	Dominion
	ESS winter flounder indices, 1988-2011	Dominion
	LISTS catch data for spot, 1984-2011	USC Branch Marine Lab
	LISTS indices for spot, 1984-2011	CT DEEP & Rutgers Marine Institute
	LISTS count & biomass indices, 1984-2011	Normandeau Assoc.
	LISTS scup & fluke indices, lengths & age keys, 1984-2011	NMFS
June		
	LISTS whelk count, weight and indices, 2012	CT DEEP staff
	LISTS butterfish indices (1984-2011)	NMFS
July		
	LISTS bottom temps, 1984-2011	Uconn
August		
	data for indicator species (HOR, LOB, ESS, forage, diversity)	EPA
	LISTS counts, weights, lengths for Atlantic sturgeon, 1984-2011	NYDEC
	tow information for LISTS samples with spot	Maritime Aquarium at Norwalk
September		
	LISTS weakfish indices, 1984-2011	ASMFC
October		
	LISTS whelk count, weight and widths, 2012	CT DEEP staff
November		
	LISTS butterfish & squid indices & length frequency, 1984-2011	NMFS
December		
	LISTS black sea bass indices & length frequency, 1984-2011	CT DEEP staff
	LISTS winter flounder age key, 1984-2011	NMFS

Table 2.12. Sample requests by month, 2012.

MONTH	REQUEST	ORGANIZATION OR PURPOSE
April		
	summer flounder (otoliths)	Old Dominion graduate student
September		
	specimens for biology of fishes class	UConn
	river herring (otoliths)	University of California-Santa Cruz
	summer flounder (otoliths)	Old Dominion graduate student
October		
	hermit crabs	UConn
	river herring (otoliths)	University of California-Santa Cruz
November		
	horseshoe crabs	Aquaculture School
	river herring (otoliths)	University of California-Santa Cruz

Table 2.13. List of finfish species observed in 2012.

Fifty - seven finfish species were observed in 2012. (Bold type indicates new species). Since 1984, one hundred three 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	mullet, white	Mugil curema
anchovy, striped	Anchoa hepsetus	ocean pout	Macrozoarces americanus
black sea bass	Centropristes striata	perch, white	Morone americana
blue runner	Caranx crysos	**Pinfish**	**Lagodon rhomboides**
bluefish	Pomatomus saltatrix	pipefish, northern	Syngnathus fuscus
butterfish	Peprilus triacanthus	pompano, African	Alectis ciliaris
cunner	Tautogolabrus adspersus	puffer, northern	Sphoeroides maculatus
dogfish, smooth	Mustelus canis	rockling, fourbeard	Enchelyopus cimbrius
dogfish, spiny	Squalus acanthius	sand lance, American	Ammodytes americanus
eel, conger	Conger oceanicus	scad, rough	Trachurus lathami
flounder, fourspot	Paralichthys oblongus	sculpin, longhorn	Myoxocephalus octodecemspin
flounder, smallmouth	Etropus microstomus	scup	Stenotomus chrysops
flounder, summer	Paralichthys dentatus	sea raven	Hemitripterus americanus
flounder, windowpane	Scophthalmus aquosus	searobin, northern	Prionotus carolinus
flounder, winter	Pseudopleuronectes american	searobin, striped	Prionotus evolans
goosefish	Lophius americanus	sennet, northern	Sphyraena borealis
gunnel, rock	Pholis gunnellus	shad, American	Alosa sapidissima
hake, red	Urophycis chuss	shad, gizzard	Dorosoma cepedianum
hake, silver	Merluccius bilinearis	shad, hickory	Alosa mediocris
hake, spotted	Urophycis regia	skate, clearnose	Raja eglanteria
herring, Atlantic	Clupea harengus	skate, little	Leucoraja erinacea
herring, alewife	Alosa pseudoharengus	skate, winter	Leucoraja ocellata
herring, blueback	Alosa aestivalis	spot	Leiostomus xanthurus
herring, round	Etrumeus teres	stingray, roughtail	Dasyatis centroura
hogchoker	Trinectes maculatus	striped bass	Morone saxatilis
jack, crevalle	Caranx hippos	sturgeon, Atlantic	Acipenser oxyrinchus
kingfish, northern	Menticirrhus saxatilis	tautog	Tautoga onitis
menhaden, Atlantic	Brevoortia tyrannus	weakfish	Cynoscion regalis
moonfish	Selene setapinnis		

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 2012.

In 2012, forty 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
arks	Noetia-Anadara spp.	northern moon snail	Lunatia heros
bryozoan, bushy	Phylum Bryozoa	oyster, common	Crassostrea virginica
bryozoan, rubbery	Alcyonidium verrilli	sea cucumber	Class Holothuroidea
clam, hard clams	Artica-Mercinaria-Pitar sp.	sea grape	Molgula spp.
clam, surf	Spisula solidissima	sea urchin, purple	Arbacia punctulata
coral, star	Astrangia poculata	shrimp, coastal mud	Upogebia affinis
crab, mud	Family Xanthidae	shrimp, mantis	Squilla empusa
crab, blue	Callinectes sapidus	shrimp, northern red	Pandalus montagui
crab, flat claw hermit	Pagurus pollicaris	shrimp, sand	Crangon septemspinosa
crab, horseshoe	Limulus polyphemus	slipper shell, common	Crepidula fornicata
crab, lady	Ovalipes ocellatus	sponge spp.	sponge spp.
crab, rock	Cancer irroratus	sponge, boring	Cliona celate
crab, spider	Libinia emarginata	sponge, deadman's fingers	Haliclona spp.
hydroid spp.	hydroid spp.	sponge, red bearded	Microciona prolifera
jelly, moon	Aurelia aurita	squid, long-finned	Loligo pealeii
jelly, northern comb	Bolinopsis infundibulum	starfish spp.	Asteriid spp.
jelly, water	Rhacostoma atlanticum	tunicates, misc	misc. class ascidiacea
jellyfish, lion's mane	Cyanea capillata	whelk, channeled	Busycotypus canaliculatus
lobster, American	Homarus americanus	whelk, knobbed	Busycon carica

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 2012.
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	60,539	37.9	1,891.3	10.8
scup	53,119	33.2	6,170.2	35.1
silver hake	7,519	4.7	171.0	1.0
weakfish	6,785	4.2	409.2	2.3
bluefish	3,851	2.4	532.7	3.0
northern searobin	3,642	2.3	405.2	2.3
windowpane flounder	3,536	2.2	501.1	2.9
winter flounder	3,365	2.1	604.9	3.4
striped searobin	2,973	1.9	1,086.4	6.2
fourspot flounder	2,597	1.6	454.5	2.6
red hake	1,720	1.1	148.6	0.8
little skate	1,406	0.9	657.9	3.7
bay anchovy	1,296	0.8	8.6	0.0
summer flounder	980	0.6	718.5	4.1
spot	858	0.5	107.5	0.6
alewife	708	0.4	47.0	0.3
spotted hake	626	0.4	64.2	0
smooth dogfish	610	0.4	1,833.3	10.4
Atlantic herring	571	0.4	61.5	0.4
Atlantic menhaden	426	0.3	144.6	0.8
black sea bass	410	0.3	141.0	0.8
hogchoker	340	0.2	30.7	0.2
American shad	321	0.2	25.3	0.1
clearnose skate	280	0.2	491.7	3
moonfish	262	0.2	3.6	0.0
smallmouth flounder	258	0.2	7.5	0.0
striped bass	170	0.1	278.0	1.6
tautog	135	0.1	128.9	0.7
winter skate	97	0.1	179.8	1
northern kingfish	59	0.0	8.4	0
northern puffer	47	0.0	3.1	0.0
blueback herring	46	0	1.6	0.0
fourbeard rockling	43	0	3.5	0
hickory shad	42	0	14.1	0
blue runner	27	0	2.7	0.0
cunner	20	0	2.8	0
rough scad	19	0	1.1	0
spiny dogfish	16	0	62.8	0
ocean pout	14	0	2.0	0
Atlantic sturgeon	7	0	154.2	1
sea raven	5	0	1.1	0
northern sennet	3	0	0.3	0
striped anchovy	3	0	0.2	0.0
crevalle jack	2	0	0.2	0
goosefish	2	0	0.8	0
pinfish	2	0	0.2	0
round herring	2	0	0.1	0
American sand lance	2	0	0.2	0
African pompano	1	0	0.1	0
conger eel	1	0	0.3	0
gizzard shad	1	0	0.1	0
northern pipefish	1	0	0.1	0
rock gunnel	1	0	0.1	0
roughtail stingray	1	0	5.0	0
longhorn sculpin	1	0	0.2	0
white perch	1	0	0.2	0
white mullet	1	0	0.1	0
Total	**159,770**		**17,570.3**	

Finfish not ranked

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

Invertebrates

species	count	%	weight	%
horseshoe crab	199	1.7	385.8	30.6
long-finned squid	9,767	84.5	333.9	26.5
spider crab	.	.	162.4	12.9
American lobster	349	3.0	70.0	5.6
boring sponge	.	.	47.9	3.8
lady crab	.	.	45.3	3.6
rock crab	.	.	40.7	3.2
mantis shrimp	846	7.3	26.6	2.1
bushy bryozoan	.	.	20.4	1.6
flat claw hermit crab	.	.	18.3	1.5
blue crab	72	0.6	14.5	1.2
knobbed whelk	36	0.3	13.8	1.1
channeled whelk	76	0.7	13.7	1.1
blue mussel	1	0.0	9.4	0.7
common slipper shell	.	.	9.4	0.7
mixed sponge species	.	.	7.4	0.6
Tubularia, spp.	.	.	5.0	0.4
hydroid spp.	.	.	4.8	0.4
lion's mane jellyfish	50	0.4	4.4	0.3
mud crabs	.	.	3.9	0.3
starfish spp.	.	.	3.3	0.3
northern red shrimp	118	1.0	3.0	0.2
northern moon snail	.	.	1.8	0.1
sand shrimp	.	.	1.7	0.1
arks	.	.	1.4	0.1
hard clams	3	0	1.3	0.1
red bearded sponge	.	.	1.2	0.1
sea grape	.	.	1.1	0.1
deadman's fingers sponge	.	.	0.8	0.1
purple sea urchin	7	0	0.8	0
common oyster	.	.	0.8	0
surf clam	10	0.1	0.8	0
star coral	.	.	0.4	0
rubbery bryzoan	.	.	0.4	0
sea cucumber	3	0	0.4	0
tunicates, misc	16	0	0.4	0
water jelly	4	0	0.3	0
coastal mud shrimp	1	0	0.2	0
northern comb jelly	.	.	0.1	0
moon jelly	.	.	0.1	0
Total	**11,558**		**1,257.9**	

Note: nc= not counted

Table 2.16. Total counts and weight (kg) of finfish taken in the spring and fall sampling periods, 2012. *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 = 120 and Fall=80.*

Spring				
species	**count**	**%**	**weight**	**%**
scup	21,280	32.9	4,114.5	39.5
butterfish	14,989	23.2	669.0	6.4
silver hake	7,461	11.5	166.4	1.6
northern searobin	3,306	5.1	383.5	3.7
windowpane flounder	2,834	4.4	416.1	4.0
winter flounder	2,819	4.4	531.9	5.1
fourspot flounder	2,474	3.8	441.0	4.2
striped searobin	1,765	2.7	595.5	5.7
red hake	1,668	2.6	143.2	1.4
little skate	1,112	1.7	513.7	4.9
bay anchovy	949	1.5	4.9	0.0
alewife	698	1.1	46.3	0.4
Atlantic herring	571	0.9	61.5	0.6
summer flounder	571	0.9	409.3	3.9
spotted hake	442	0.7	34.0	0.3
American shad	232	0.4	17.1	0.2
smooth dogfish	226	0.3	762.1	7.3
Atlantic menhaden	196	0.3	64.3	0.6
weakfish	188	0.3	119.2	1.1
black sea bass	186	0.3	89.2	0.9
striped bass	124	0.2	198.5	1.9
tautog	114	0.2	119.8	1.2
clearnose skate	95	0.1	157.6	1.5
hogchoker	91	0.1	10.5	0.1
smallmouth flounder	78	0.1	3.2	0
winter skate	77	0.1	150.3	1.4
blueback herring	45	0.1	1.5	0
fourbeard rockling	42	0.1	3.4	0.0
bluefish	19	0.0	28.3	0.3
northern kingfish	19	0.0	4.1	0
cunner	16	0.0	1.9	0
spiny dogfish	15	0	61.2	0.6
hickory shad	14	0	4.1	0.0
ocean pout	14	0	2.0	0
sea raven	5	0	1.1	0
Atlantic sturgeon	4	0	72.6	1
goosefish	2	0	0.8	0
American sand lance	2	0	0.2	0
conger eel	1	0	0.3	0.0
northern pipefish	1	0	0.1	0
northern puffer	1	0	0.2	0
rock gunnel	1	0	0.1	0
longhorn sculpin	1	0	0.2	0
white perch	1	0	0.2	0
Total	**64,749**		**10,404.9**	

Fall				
species	**count**	**%**	**weight**	**%**
butterfish	45,550	47.9	1,222.3	17.1
scup	31,839	33.5	2,055.7	28.7
weakfish	6,597	6.9	290.0	4.0
bluefish	3,832	4.0	504.4	7.0
striped searobin	1,208	1.3	490.9	6.9
spot	858	0.9	107.5	1.5
windowpane flounder	702	0.7	85.0	1.2
winter flounder	546	0.6	73.0	1.0
summer flounder	409	0.4	309.2	4.3
smooth dogfish	384	0.4	1,071.2	14.9
bay anchovy	347	0.4	3.7	0.1
northern searobin	337	0.4	21.7	0.3
little skate	294	0.3	144.2	2.0
moonfish	262	0.3	3.6	0.1
hogchoker	249	0.3	20.2	0.3
Atlantic menhaden	230	0.2	80.3	1.1
black sea bass	225	0.2	51.8	0.7
clearnose skate	185	0.2	334.1	4.7
spotted hake	184	0.2	30.2	0.4
smallmouth flounder	180	0.2	4.3	0.1
fourspot flounder	122	0.1	13.5	0.2
American shad	90	0.1	8.2	0.1
silver hake	58	0.1	4.6	0.1
red hake	52	0.1	5.4	0.1
northern puffer	46	0.0	2.9	0.0
striped bass	46	0.0	79.5	1.1
northern kingfish	40	0.0	4.3	0
hickory shad	28	0	10.0	0.1
blue runner	27	0	2.7	0
tautog	21	0	9.1	0
winter skate	20	0	29.5	0.4
rough scad	19	0	1.1	0
alewife	10	0	0.7	0
cunner	5	0	0.9	0.0
Atlantic sturgeon	3	0	81.6	1
northern sennet	3	0	0.3	0
striped anchovy	3	0	0.2	0
crevalle jack	2	0	0.2	0
pinfish	2	0	0.2	0
round herring	2	0	0.1	0.0
African pompano	1	0	0.1	0
blueback herring	1	0	0.1	0
gizzard shad	1	0	0.1	0
fourbeard rockling	1	0	0.1	0
roughtail stingray	1	0	5.0	0.1
spiny dogfish	1	0	1.6	0
white mullet	1	0	0.1	0
Total	**95,024**		**7,165.4**	

Table 2.17. Total catch of invertebrates taken in the spring and fall sampling periods, 2012.
Species are ranked by total weight (kg). Number of tows (sample sizes): Spring = 120 and Fall=80.

	Spring			
species	**count**	**%**	**weight**	**%**
horseshoe crab	138	6.1	249.2	35.4
spider crab	.	.	144.1	20.5
long-finned squid	1,441	63.5	85.8	12.2
American lobster	295	13.0	58.5	8.3
rock crab	.	.	34.6	4.9
boring sponge	.	.	32.9	4.7
bushy bryozoan	.	.	13.2	1.9
lady crab	.	.	10.8	1.5
blue mussel	.	.	7.9	1.1
blue crab	40	1.8	7.6	1.1
flat claw hermit crab	.	.	6.7	1.0
mantis shrimp	132	5.8	6.2	0.9
channeled whelk	35	1.5	5.4	0.8
Tubularia, spp.	.	.	4.8	0.7
knobbed whelk	9	0.4	4.1	0.6
common slipper shell	.	.	3.9	0.6
hydroid spp.	.	.	3.8	0.5
mixed sponge species	.	.	3.2	0.5
northern red shrimp	118	5.2	3.0	0.4
mud crabs	.	.	2.9	0.4
starfish spp.	.	.	2.9	0.4
sand shrimp	.	.	1.6	0.2
lion's mane jellyfish	39	1.7	1.4	0.2
northern moon snail	.	.	1.4	0.2
red bearded sponge	.	.	1.2	0.2
arks	.	.	1.1	0.2
sea grape	.	.	1.0	0.1
hard clams	3	0.1	0.9	0.1
deadman's fingers sponge	.	.	0.8	0.1
purple sea urchin	5	0.2	0.6	0
star coral	.	.	0.4	0
rubbery bryzoan	.	.	0.4	0
surf clam	4	0.2	0.3	0
tunicates, misc	10	0.4	0.3	0
coastal mud shrimp	1	0.0	0.2	0
moon jelly	.	.	0.1	0
common oyster	.	.	0.1	0
sea cucumber	1	0.0	0.1	0
Total	**2,271**		**703.4**	

Note: nc= not counted

	Fall			
species	**count**	**%**	**weight**	**%**
long-finned squid	8,326	89.6	248.1	44.7
horseshoe crab	61	0.7	136.6	24.6
lady crab	.	.	34.5	6.2
mantis shrimp	715	7.7	20.4	3.7
spider crab	.	.	18.3	3.3
boring sponge	.	.	15.0	2.7
flat claw hermit crab	.	.	11.6	2.1
American lobster	54	0.6	11.5	2.1
knobbed whelk	27	0.3	9.7	1.7
channeled whelk	41	0.4	8.3	1.5
bushy bryozoan	.	.	7.2	1.3
blue crab	32	0.3	6.9	1.2
rock crab	.	.	6.1	1.1
common slipper shell	.	.	5.5	1.0
mixed sponge species	.	.	4.2	0.8
lion's mane jellyfish	11	0.1	3.0	0.5
blue mussel	1	0.0	1.5	0.3
mud crabs	.	.	1.0	0.2
hydroid spp.	.	.	1.0	0.2
common oyster	.	.	0.7	0.1
surf clam	6	0.1	0.5	0.1
hard clams	.	.	0.4	0.1
northern moon snail	.	.	0.4	0.1
starfish spp.	.	.	0.4	0
arks	.	.	0.3	0
water jelly	4	0.0	0.3	0
sea cucumber	2	0	0.3	0
Tubularia, spp.	.	.	0.2	0
purple sea urchin	2	0.0	0.2	0
northern comb jelly	.	.	0.1	0
sand shrimp	.	.	0.1	0
sea grape	.	.	0.1	0
tunicates, misc	6	0.1	0.1	0
Total	**9,288**		**554.5**	

Table 2.18. Spring indices of abundance for selected species, 1984-2012.

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																84-11
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**	**2012**	**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	0.77	1.05
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	0.83	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	0.07	
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	13.44	
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	0.06	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	0.82	
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	0.06	0.08
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	5.45	4.74
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	3.06	
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	9.85	32.48
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	12.02	56.21
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	3.35	4.07
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	19.45	4.19
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	1.6	
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	0.73	2.02
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	0.13	
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	0.29	
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	0.07	
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	0.97	5.46
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	0.63	
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	0	
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	0.05	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	0.16	0.55
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	0	
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	0.01	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	50.24	
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	0.02	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	5.05	1.88
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	5.01	
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	0.46	
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	0.07	
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	0.39	
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	2.15	8.65
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	0.32	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	0	
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	3.34	4.90
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	0.43	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	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	0.44	0.72
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	0.5	

Table 2.19. Fall indices of abundance for selected species, 1984-2012.

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																84-11
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**	**2012**	**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	0.07	
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	1.49	
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	15.06	23.54
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	132.47	176.06
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	0.03	
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	2.41	1.27
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	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	0.81	
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	3.74	1.98
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	3.38	
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	1.37	
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	0.21	
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	0.40	
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	1.15	0.62
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	0.00	
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	0.01	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	0.94	0.22
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	0.24	0.04
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	0.29	6.15
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	0.94	0.67
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	0.79	1.31
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	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	0.01	
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	0.12	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	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	223.52	176.89
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	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	2.07	
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	7.06	3.25
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	0.44	0.97
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	0.19	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	0.73	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	1.14	
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	0.17	
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	1.60	0.24
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	62.53	121.35
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	0.17	
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	0.02	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	0.14	
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	22.27	19.07

Table 2.20. Finfish and invertebrate biomass indices for the spring sampling period, 1992-2012.
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**	**2012**
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	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	0.34
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	0.11
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	1.87
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	0.01
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	1.68
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	0.11
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	1.60
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	2.22
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	1.74
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	2.72
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	0.65
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	0.87
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	0.22
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	0.17
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	0.01
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	0.07
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	0.02
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	0.29
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
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	0.01
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	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	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	0.00
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	9.99
sea raven	0.03	0.00	0.00	0.01	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	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	0.81
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	2.25
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	0.10
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	0.02
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	0.54
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	1.34
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	0.46
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
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	0.58
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	0.10
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	0.38
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	0.39
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	0.04
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	0.05
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	0.55
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	0.06
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	0.16
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	0.74
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	0.01
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	0.33
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	0.04
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	0.01
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	0.00
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	0.05
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	0.43
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	0.02
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	0.06

Table 2.21. Finfish and invertebrate biomass indices for the fall sampling period, 1992-2012.

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**	**2012**
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	0.01
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	0.33
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	3.72
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	6.14
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	0.01
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	4.69
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	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	0.14
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	2.74
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	0.61
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	0.40
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	0.04
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	0.05
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	0.27
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	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	0.00
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	0.17
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	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	0.47
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	0.04
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
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	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	0.01
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	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	-	20.28	13.54
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
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	0.22
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	2.81
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	0.08
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	0.09
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	1.01
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	0.66
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	0.20
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	0.41
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	0.26
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	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	0.08
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	1.88
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	0.07
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	0.13
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	0.65
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	0.20
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	0.05
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	0.18
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	0.03
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	0.10
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	0.02
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	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	0.01
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	0.20
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	2.28
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	0.00
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	0.15

Table 2.22. Bluefish indices of abundance, 1984-2012.
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	1.40	2.36
2012	13.11	1.86	0.97	1.67
84-11 mean	**16.27**	**2.24**	**3.40**	**5.46**

Table 2.23. Scup indices-at-age, 1984-2012.

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	32.802	25.288	0	7.514	15.865	5.845	1.489	0.548	0.536	0.541	0.385	0.073	0.007
2008	92.100	75.143	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	68.138	67.717	0	0.421	24.265	21.998	14.002	6.019	1.187	0.118	0.058	0.041	0.029
2011	36.112	33.985	0	2.127	3.285	11.378	9.812	4.116	3.391	1.421	0.248	0.071	0.263
2012	114.542	65.371	0	49.039	25.925	11.982	9.231	9.567	4.671	2.755	0.871	0.144	0.226
84-11 Mean	**34.233**	**23.128**	**0.000**	**11.104**	**9.729**	**8.959**	**2.693**	**1.013**	**0.429**	**0.211**	**0.061**	**0.021**	**0.013**

						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	198.226	40.786	119.032	38.409	8.157	14.894	9.669	3.922	3.225	0.586	0.167	0.025	0.140
2012	223.522	15.983	153.235	54.305	9.963	2.846	2.063	0.567	0.137	0.323	0.076	0.007	0
84-11 Mean	**176.892**	**14.741**	**130.638**	**31.512**	**7.900**	**3.745**	**2.057**	**0.633**	**0.278**	**0.084**	**0.030**	**0.009**	**0.005**

(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, 81 taken in 2011, and 28 taken in 2012. The oldest fish aged was a 14-year-old taken in 1985.*

Table 2.24. Age frequency of striped bass taken in spring, 1984-2012.
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**	**2012**
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	11
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	46
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	13
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	13
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	19
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	12
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	5
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	3
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	2
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	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	1
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	0
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**	**125**

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, 1984-2012.
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
2012		0.0381	0.1595	0.0451	0.0451	0.0659	0.0416	0.0173	0.0104	0.0069	0	0.0035	0
84-11 mean		**0.0034**	**0.1260**	**0.1186**	**0.0842**	**0.0796**	**0.0576**	**0.0283**	**0.0098**	**0.0048**	**0.0022**	**0.0007**	**0.0001**

Table 2.26. Summer flounder indices-at-age, 1984-2012.

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.

					Spring								
Year	**0-11**	**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	0.3820	0.3159	0.1098	0.0628	0.0580	0.0171	0.0146	0
2012	3.0620	0	0.4684	0.6283	0.9746	0.6346	0.2044	0.0754	0.0333	0.0224	0.0050	0.0113	0.0043
84-11 Mean	**1.3414**	**0.0000**	**0.5588**	**0.3887**	**0.2040**	**0.0919**	**0.0522**	**0.0248**	**0.0123**	**0.0054**	**0.0021**	**0.0009**	**0.0002**

					Fall								
Year	**0-11**	**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
2012	3.7358	0.1633	0.4592	0.8283	1.4239	0.5848	0.1836	0.0631	0.0296	0	0	0	0
84-11 Mean	**1.9793**	**0.1289**	**0.8335**	**0.6774**	**0.2283**	**0.0700**	**0.0261**	**0.0088**	**0.0036**	**0.0013**	**0.0007**	**0.0002**	**0.0004**

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
2012*	0.0000										
84-11 Mean	**0.8397**	**0.0071**	**0.0363**	**0.0516**	**0.0660**	**0.0844**	**0.1069**	**0.1068**	**0.1049**	**0.0785**	**0.0500**

	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
2012*										
84-11 Mean	**0.0452**	**0.0365**	**0.0226**	**0.0205**	**0.0129**	**0.0094**	**0.0062**	**0.0045**	**0.0025**	**0.0065**

* 2011 Preliminary, 2012 not yet complete

Table 2.28. Weakfish age 0 and age 1+ indices of abundance, 1984-2012.

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
2012	21.96	1.47	0.73	0.69	0.62	0.56
84-11 mean	**18.96**	**1.37**	**0.30**	**0.35**	**0.16**	**0.22**

Table 2.29. Winter flounder indices-at-age, 1984-2012.

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
2012	15.80	2.83	0.29	4.84	5.61	2.51	1.97	0.62	0.09	0.06	0.05	0.03	0	0	0	0
84-11 Mean	67.56	10.39	6.23	8.57	31.44	17.17	6.92	2.32	0.74	0.25	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
2012	3.88	1.85	NA	0.20	0.93	0.90	1.13	0.47	0.09	0.06	0.06	0.04	0	0	0	0
84-11 Mean	11.94	4.66	NA	0.30	3.16	3.81	2.68	1.21	0.45	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, 2009, and 2012: 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, 1989–2012.

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**	**2012**
6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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	0
8	0	0	0	0	18	3	3	0	0	0	2	9	16	0	3	1	2	0	0	4	1	10	0	1
9	0	0	2	0	15	9	6	1	6	0	6	21	32	1	18	6	16	0	0	4	6	10	0	3
10	0	0	0	1	11	19	18	2	22	7	6	28	23	5	32	55	32	0	8	5	11	23	5	6
11	0	0	5	4	10	44	11	2	64	11	20	52	14	6	27	87	26	29	13	32	10	9	22	8
12	6	0	4	7	6	83	17	8	127	12	32	43	5	29	25	100	55	44	34	131	17	6	54	27
13	1	0	4	4	47	122	48	16	63	44	42	99	4	70	11	83	61	15	38	193	24	12	48	98
14	0	0	9	7	77	172	35	26	69	61	56	234	7	139	28	63	37	9	37	178	51	6	50	187
15	3	0	8	5	68	140	54	32	56	51	120	334	6	157	25	33	50	49	85	86	101	8	59	123
16	2	0	8	5	84	159	38	86	44	50	144	320	4	86	26	31	74	25	128	46	106	7	37	56
17	5	4	4	16	63	108	32	203	28	34	330	85	5	82	21	33	73	78	161	47	142	5	7	27
18	4	4	9	8	59	81	7	254	32	22	136	15	4	15	19	18	71	93	182	25	196	2	11	17
19	6	7	7	2	37	33	7	180	9	11	99	20	3	6	26	42	59	86	122	49	215	7	11	24
20	3	1	7	2	27	24	10	161	17	17	82	22	9	17	13	30	26	76	105	38	137	7	9	19
21	1	0	3	1	13	17	14	107	34	22	72	27	12	28	22	50	21	40	71	21	53	18	9	18
22	4	2	8	2	10	26	12	103	48	18	47	41	18	46	25	48	18	18	41	14	29	22	10	24
23	5	1	8	6	3	12	12	76	44	16	47	90	36	63	40	36	7	5	28	16	13	12	16	27
24	7	0	3	2	1	12	7	34	28	14	21	58	45	49	42	13	6	1	10	7	14	4	7	18
25	3	2	1	0	3	5	2	9	9	2	11	11	23	12	29	11	3	1	3	0	11	2	4	11
26	1	0	1	2	1	5	1	3	1	2	2	1	5	7	17	5	2	0	2	0	1	0	2	3
27	2	0	1	0	0	1	0	0	0	0	0	1	2	1	2	2	1	0	0	0	0	0	0	1
28	1	0	0	0	1	1	0	0	0	1	0	0	0	1	0	2	1	0	0	1	0	0	2	0
29	1	0	1	0	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	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	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	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**	**698**

												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**	**2012**
6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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	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	0
9	0	0	0	0	3	1	0	0	1	0	0	1	6	1	1	0	1	0	3	2	0	-	1	0
10	0	0	0	0	5	1	4	1	1	0	1	4	23	0	7	1	7	0	8	2	1	-	1	0
11	0	0	0	0	27	30	5	5	6	1	3	5	59	0	33	6	14	0	22	1	2	-	9	0
12	0	0	0	1	120	82	9	25	12	9	6	9	86	4	64	7	8	0	44	0	2	-	22	2
13	0	0	3	0	88	84	14	21	21	7	9	17	72	0	4	12	17	0	87	5	10	-	14	3
14	0	0	2	4	16	36	11	30	31	0	11	10	23	3	3	16	15	0	134	14	10	-	22	0
15	0	0	1	8	21	31	0	9	53	0	5	8	24	3	5	28	15	2	118	4	8	-	28	2
16	3	0	3	10	53	14	4	1	110	1	25	2	36	17	20	30	12	4	31	0	1	-	14	1
17	2	0	0	12	25	33	1	2	194	4	34	0	27	8	19	12	3	0	8	3	1	-	19	2
18	3	0	0	9	13	24	1	1	62	3	11	1	5	0	0	1	5	0	6	0	1	-	17	0
19	0	0	0	2	1	11	0	0	0	1	4	1	0	1	0	0	0	0	7	1	0	-	1	0
20	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	-	0	0
21	0	0	0	0	3	1	1	0	0	1	2	0	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	0
23	0	0	0	0	0	1	0	0	0	0	3	0	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	0
25	0	0	0	0	0	1	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	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**	**10**

Table 2.31. American shad length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989-2012.

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**	**2012**
7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	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	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	3
13	4	0	10	8	4	4	11	9	59	85	31	29	2	87	11	14	10	0	20	78	36	21	28	34
15	49	1	82	17	6	22	22	191	177	108	65	21	2	41	0	45	25	38	54	180	66	77	100	106
17	29	8	49	23	10	72	68	154	319	97	52	32	4	49	3	6	4	14	44	51	40	47	25	45
19	5	5	4	33	6	374	40	47	62	32	20	13	0	17	0	2	0	5	8	11	15	5	3	5
21	1	3	10	25	6	158	6	9	2	1	35	1	0	4	4	2	6	0	3	3	3	2	1	0
23	0	3	31	20	5	18	2	16	5	8	50	4	0	7	7	4	7	0	4	3	4	0	0	10
25	0	2	10	7	1	6	0	15	1	7	14	2	3	4	0	0	3	0	7	0	0	1	0	22
27	0	1	1	0	0	2	0	5	0	1	1	1	0	0	0	0	2	0	4	0	0	0	0	4
29	0	0	0	0	0	1	0	0	0	0	0	0	0	5	0	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	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	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	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	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	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	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	1
45	1	0	1	7	2	3	2	0	0	0	1	0	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	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	1
51	0	0	0	1	0	1	0	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**	**231**

												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**	**2012**
7	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	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	4
11	0	1	4	5	23	26	16	1	20	14	27	0	4	1	14	6	3	0	19	4	27	-	4	4
13	0	0	7	21	54	208	24	7	28	13	44	0	1	0	22	4	5	0	26	3	22	-	2	2
15	0	0	4	2	33	245	14	2	5	4	6	0	0	0	0	2	0	0	13	0	36	-	2	0
17	0	0	22	7	10	20	2	0	12	64	13	2	5	11	15	77	3	1	2	0	3	-	6	2
19	32	34	93	41	53	57	84	0	67	290	130	16	47	199	121	155	23	6	5	6	42	-	35	5
21	129	143	22	102	466	229	335	15	99	123	251	104	34	44	80	21	46	0	8	28	88	-	42	52
23	30	27	0	30	394	197	83	19	12	0	179	39	3	0	6	0	14	1	8	7	25	-	14	21
25	0	0	0	1	24	50	3	4	0	0	17	0	1	0	0	1	0	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	0
29	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
33	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	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	0
39	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	0	0	1	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
45	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
49	1	0	0	0	0	1	0	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	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**	**90**

Table 2.32. American lobster length frequencies-spring, female, 1 mm intervals, 1984–2012.

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	2012
Length	(32)	(46)	(16)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(19)	(120)	(80)	(120)	(120)	(120)	(78)	(92)	(120)
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	1
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	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	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	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	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	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	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	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	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	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	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	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	1
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	5
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	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	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	0
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	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	1
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	4
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	4
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	2
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	1
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	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	1
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	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	3
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	4
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	1
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	3
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	5
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	1
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	6
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	2
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	3
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	4
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	2
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	3
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	4
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	4
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	0
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	3
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	12
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	2
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	3
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	4
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	5
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	0
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	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	4
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	7
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	1
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	1
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	1
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	2
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	2
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	3
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	2
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	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	4
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	1
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	1
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	3
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	4
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	0
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	1
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	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	3
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	0
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	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	2
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	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	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	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	1
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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**	**139**
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, 1984–2012.

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	2012
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)	(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	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	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	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	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	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	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	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	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	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	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	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	2
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	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	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	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	0
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	0
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	0
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	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	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	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	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	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	0
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	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	1
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	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	1
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	0
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	0
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	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	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	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	1
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	0
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	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	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	2
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	2
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	0
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	0
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	2
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	2
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	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	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	1
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	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	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	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	1
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	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	0
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	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	0
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	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	0
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	0
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	0
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	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	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	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	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	1
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	0
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	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	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	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	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	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	0
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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**	**20**
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, 1984–2012.

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	2012
Length	(32)	(46)	(16)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(19)	(120)	(80)	(120)	(120)	(120)	(78)	(92)	(120)
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	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	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	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	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	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	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	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	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	1
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	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	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	0
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	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	1
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	3
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	0
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	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	2
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	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	4
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	1
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	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	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	4
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	2
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	2
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	4
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	2
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	0
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	2
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	3
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	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	1
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	7
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	2
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	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	3
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	4
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	1
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	2
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	3
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	4
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	5
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	5
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	5
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	5
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	5
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	0
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	10
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	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	3
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	5
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	1
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	5
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	2
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	4
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	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	5
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	6
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	3
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	0
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	1
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	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	1
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	0
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	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	0
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	0
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	0
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	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	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	0
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	0
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	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	1
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	0
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	1
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	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	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	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	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	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	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	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	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	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	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	154
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, 1984–2012.
Lobsters were measured from each tow.

Male Length	Fall 1984 (70)	1985 (80)	1986 (80)	1987 (80)	1988 (80)	1989 (80)	1990 (80)	1991 (80)	1992 (80)	1993 (120)	1994 (120)	1995 (80)	1996 (80)	1997 (80)	1998 (80)	1999 (80)	2000 (80)	2001 (80)	2002 (80)	2003 (40)	2004 (80)	2005 (80)	2006 (40)	2007 (80)	2008 (40)	2009 (80)	2010 (0)	2011 (80)	2012 (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	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	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	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	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	0
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	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	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	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	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	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	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	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	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	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	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	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	1
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	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	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	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	0
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	0
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	0
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	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	2
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	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	2
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	1
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	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	0
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	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	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	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	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	0
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	2
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	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	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	2
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	0
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	3
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	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	1
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	3
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	4
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	2
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	0
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	0
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	1
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	0
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	0
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	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	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	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	1
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	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	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	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	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	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	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	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	1
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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**	**34**
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, 1989-2012.
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**	**2012**
3	0	0	0	5	0	0	0	0	0	2	0	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	0
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	15
6	1	3	3	16	1	0	1	3	0	92	237	1	3	0	9	10	140	2	2	13	449	12	59	2
7	0	1	4	15	2	0	2	15	69	84	18	7	11	1	0	8	118	1	0	12	44	1	103	2
8	0	0	7	0	1	0	0	5	165	28	5	1	6	1	0	9	73	11	0	23	48	1	132	0
9	0	0	3	0	1	0	1	1	27	11	4	0	8	0	0	3	8	10	0	16	59	0	43	1
10	0	0	0	0	3	1	0	0	0	2	0	0	1	0	0	0	0	0	0	2	6	0	3	1
11	0	0	0	0	3	1	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	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	0
13	0	8	0	0	215	8	0	0	5	0	0	0	0	0	0	1	3	0	0	0	0	5	1	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	6
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
16	3	1	38	0	174	17	7	3	12	8	0	3	0	0	0	65	20	0	14	0	91	49	19	12
17	2	31	33	0	100	42	8	2	4	5	0	6	2	0	0	140	63	0	27	2	149	25	3	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	0
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
20	0	161	67	15	41	43	78	10	40	5	1	6	65	3	2	67	67	0	228	7	521	222	14	107
21	0	333	72	24	35	29	283	26	14	4	2	11	85	17	0	12	19	0	99	11	279	106	8	196
22	0	424	70	111	96	14	399	15	19	11	10	38	77	32	0	16	11	3	105	9	162	71	24	91
23	0	201	160	61	387	111	245	20	7	4	15	36	14	87	4	0	15	4	106	13	144	97	59	23
24	0	195	297	311	436	224	290	22	18	1	19	47	33	71	17	0	25	3	150	27	71	105	173	21
25	0	315	337	751	645	485	416	46	117	2	9	99	31	18	36	3	21	5	122	38	87	108	214	16
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	18
27	0	347	514	382	807	947	723	93	236	33	35	80	24	27	65	14	106	9	122	38	69	95	147	11
28	0	338	513	391	825	604	706	64	234	44	37	104	34	19	72	9	87	6	116	36	85	62	65	4
29	2	247	319	492	550	387	337	37	82	21	25	69	29	52	52	1	40	3	47	15	44	26	48	4
30	0	156	383	142	287	204	231	29	31	1	11	24	8	3	27	3	19	1	6	6	27	7	2	0
31	2	127	139	77	129	29	14	4	15	2	0	0	4	0	8	1	0	0	0	2	6	0	2	0
32	0	50	22	1	33	6	14	1	2	1	1	0	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	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	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**	**570**

												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**	**2012**
7	0	0	0	1	0	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	0
9	0	0	0	328	16	4	0	0	2	3	0	0	0	0	1	0	0	0	0	0	4	-	1	0
10	0	0	0	176	3	6	0	14	6	59	0	0	0	0	12	1	0	0	0	0	2	-	0	0
11	0	3	0	34	5	9	0	11	3	49	0	1	0	0	47	0	0	2	0	0	1	-	0	0
12	0	0	0	3	9	11	0	1	0	0	0	0	0	0	20	1	0	0	1	0	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	0
14	0	0	0	0	24	0	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	0
16	0	0	0	1	7	2	0	1	0	0	0	0	0	0	0	1	0	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	0
18	0	0	6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	1	0
19	0	0	5	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
20	0	0	0	0	2	0	0	0	1	0	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	0
22	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	0
23	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	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	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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**	**0**

Table 2.37. Atlantic menhaden length frequency, spring and fall, 1 cm intervals, 1996-2012.
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.

								Spring									
length	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
7	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	0	0	0	0	0
9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	7
11	0	0	0	1	0	0	13	0	0	0	0	0	0	0	0	0	3
12	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	15
13	0	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	8
14	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5
15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	8
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
20	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
22	0	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
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	1
26	0	0	0	0	0	0	1	0	0	0	0	4	0	0	0	0	2
27	0	0	0	0	0	0	1	0	0	0	0	6	2	3	1	4	14
28	0	1	0	0	1	0	1	0	0	0	0	5	4	9	5	10	33
29	0	1	0	0	1	0	0	1	3	0	1	5	2	2	1	18	53
30	0	1	0	0	0	0	1	1	0	0	0	4	1	5	0	10	28
31	0	3	0	0	0	0	0	0	1	0	2	4	1	0	0	1	12
32	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	1
33	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Total	**0**	**6**	**0**	**1**	**9**	**0**	**47**	**2**	**5**	**1**	**5**	**33**	**10**	**19**	**7**	**43**	**195**

								Fall									
length	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0
5	0	0	0	0	0	0	0	2	0	0	0	1	0	0	-	0	0
6	0	0	0	0	0	0	0	17	1	0	0	24	0	0	-	0	1
7	1	0	0	20	12	0	2	32	26	0	1	39	2	0	-	0	0
8	0	1	18	51	73	0	6	22	178	11	0	32	2	2	-	0	0
9	0	11	53	152	128	0	8	9	135	22	0	12	6	0	-	0	0
10	1	5	120	471	125	1	9	1	143	19	0	34	3	3	-	0	1
11	0	6	49	337	51	25	14	1	47	13	2	51	2	4	-	0	0
12	0	11	44	25	35	30	10	1	18	9	8	24	1	5	-	6	0
13	0	0	20	2	15	16	14	4	1	1	1	49	0	4	-	7	1
14	0	2	0	0	6	7	20	2	0	3	2	7	0	3	-	9	0
15	0	0	0	0	2	4	24	0	0	1	0	1	1	5	-	6	1
16	0	0	0	0	2	0	8	0	0	2	1	1	4	4	-	3	0
17	0	0	0	0	3	0	12	0	0	0	0	0	3	0	-	0	1
18	0	0	0	0	0	0	17	0	0	0	0	0	0	1	-	0	2
19	0	0	0	0	0	0	16	0	0	0	0	0	0	1	-	0	2
20	0	0	0	1	0	0	2	0	0	0	0	0	0	0	-	0	2
21	0	0	0	1	0	0	1	0	0	1	0	0	0	0	-	0	1
22	0	0	0	0	0	0	1	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
24	0	0	0	1	0	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	0
26	0	0	0	0	0	0	1	0	0	0	0	3	0	0	-	0	7
27	2	0	0	0	0	0	1	0	0	1	0	21	9	4	-	4	27
28	3	1	0	3	0	0	2	0	3	4	0	35	2	7	-	18	68
29	23	17	0	6	1	0	18	5	10	21	2	31	1	1	-	48	66
30	30	25	0	28	3	0	29	8	44	54	2	18	0	5	-	30	35
31	11	17	1	42	7	1	39	8	65	43	2	7	0	2	-	4	11
32	2	6	1	27	12	0	27	3	51	21	1	2	0	0	-	2	0
33	0	1	0	19	4	2	25	2	10	5	0	0	0	0	-	0	0
34	0	0	0	1	4	0	9	1	7	2	1	0	0	0	-	0	0
35	0	0	0	0	1	0	5	0	1	1	0	0	0	0	-	0	0
Total	**73**	**103**	**306**	**1,187**	**484**	**86**	**320**	**119**	**740**	**234**	**23**	**392**	**36**	**51**	**-**	**137**	**226**

Table 2.38. Black sea bass length frequencies, spring, 1 cm intervals, 1987-2012.
Since 1987, black sea bass have been measured from every tow.

														Spring													
length	**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**	**2012**
5	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
6	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	2
7	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	1
8	0	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	3
9	0	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	9
10	0	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	8
11	0	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	11
12	0	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	14
13	0	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	12
14	0	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	2
15	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	1
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	0	0
17	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
18	0	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	0
19	0	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	0
20	0	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	0
21	0	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	1
22	0	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	2
23	0	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	4
24	0	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	1
25	2	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	1
26	0	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	3
27	0	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	6
28	1	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	3
29	0	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	3
30	0	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	2
31	0	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	3
32	0	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	6
33	0	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	7
34	2	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	10
35	0	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	6
36	1	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	7
37	0	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	3
38	1	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	8
39	1	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	12
40	0	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	4
41	0	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	11
42	0	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	1
43	0	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	6
44	2	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	2
45	1	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	3
46	0	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	2
47	0	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	2
48	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	1
49	0	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	1
50	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
51	0	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	0
52	0	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	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	1	0	0
54	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
55	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
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	0	1
57	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	**12**	**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**	**186**

Table 2.39. Black sea bass length frequencies, fall, 1 cm intervals, 1987-2012.
Since 1987, black sea bass have been measured from every tow.

														Fall													
length	**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**	**2012**
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	2	0	0	1	-	0	1
5	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	2	0	3	1	0	0	0	1	-	4	0
6	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	3	1	0	7	0	0	1	1	0	-	4	1
7	0	0	0	0	0	4	0	3	1	0	1	0	0	3	0	6	4	0	23	2	0	3	2	0	-	2	1
8	0	2	0	1	0	4	0	1	2	0	1	0	0	0	1	5	8	0	15	2	0	4	0	2	-	1	2
9	0	0	0	0	1	3	0	0	4	0	0	0	1	0	0	3	6	0	10	2	0	1	2	0	-	1	2
10	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	1	3	0	5	2	0	2	0	0	-	0	2
11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	2	2	0	1	0	0	-	0	5
12	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	-	0	3
13	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	4
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	-	0	14
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	-	0	21
16	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	1	5	0	-	0	37
17	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	7	0	0	0	1	4	8	2	-	0	20
18	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	16	1	0	0	1	1	14	6	-	0	20
19	0	0	0	0	0	0	0	0	0	0	0	2	0	3	1	0	23	0	0	0	2	2	10	4	-	0	23
20	0	0	0	0	0	3	0	0	0	0	2	0	1	6	3	0	19	0	0	0	1	4	10	6	-	0	14
21	0	0	0	0	0	1	0	0	0	1	0	1	0	4	1	0	17	0	0	1	3	4	9	4	-	0	9
22	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	5	0	0	0	0	1	4	3	-	0	3
23	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	1	0	0	2	0	0	-	0	6
24	0	0	2	0	0	0	0	0	0	0	1	0	0	3	0	0	2	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	1	1	0	0	0	0	0	2	-	0	0
26	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	-	1	0
27	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	2	-	1	1
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	2	0	-	1	2
29	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3	0	1	1	2	0	1	0	0	-	2	1
30	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	-	5	1
31	0	0	0	0	1	0	2	0	0	0	0	0	0	0	1	0	1	1	0	0	0	2	1	0	-	4	1
32	0	0	2	0	0	0	0	0	0	0	0	1	0	2	3	2	0	0	0	0	0	2	0	0	-	1	0
33	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	2	0	0	0	2	0	0	0	0	-	1	1
34	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0	1	0	1	1	0	-	1	1
35	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	3	2	1	1	0	0	0	1	1	-	2	1
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	0	-	0	1
37	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	9	2	0	0	0	0	1	1	0	-	3	1
38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7	3	0	0	1	0	1	0	1	-	1	1
39	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	2	0	1	-	2	2
40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	2	0	1	0	0	0	1	0	-	1	3
41	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	0	1	0	2	0	0	-	3	2
42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	2	0	0	0	0	-	3	4
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	1	0	0	-	0	3
44	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3	1	0	0	0	0	0	0	0	-	1	3
45	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
46	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
47	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	-	0	1
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	-	0	2
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	-	0	0
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	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	-	0	1
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	1
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	0
54	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	1
Total	**0**	**3**	**9**	**1**	**8**	**22**	**2**	**8**	**12**	**1**	**6**	**4**	**10**	**33**	**22**	**66**	**155**	**11**	**75**	**23**	**12**	**53**	**77**	**38**	**-**	**45**	**224**

Table 2.40. Blueback herring length frequencies, spring and fall, 1 cm intervals, 1989-2012.

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**	**2012**
6	0	0	0	0	0	0	1	0	0	2	0	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	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	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	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	18
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
12	3	0	5	0	2	9	5	3	4	16	0	18	2	3	4	20	12	0	5	2	27	8	3	5
13	0	0	0	4	0	13	5	2	0	2	0	12	1	1	1	12	3	1	3	4	17	10	6	1
14	0	0	0	15	0	5	3	1	1	1	0	3	0	0	0	0	7	0	1	1	5	4	2	0
15	0	0	1	27	1	3	4	7	0	0	1	2	0	4	0	0	8	1	2	2	9	1	0	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	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	2
18	0	1	0	2	0	3	0	4	2	0	0	5	15	2	3	3	1	2	7	3	49	1	3	2
19	0	0	0	0	1	2	4	3	2	0	0	0	3	0	0	3	2	1	3	2	17	2	1	0
20	0	0	0	4	0	1	1	0	0	0	0	2	1	1	0	0	5	2	0	1	2	0	1	0
21	2	1	2	0	0	1	1	3	0	0	0	1	3	0	0	3	2	3	2	0	1	1	0	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	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	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	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	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	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	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**	**45**

												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**	**2012**
5	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	1	0	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	0
8	0	0	0	0	0	0	33	0	2	0	0	0	0	0	0	0	0	0	1	0	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	0
10	0	0	0	0	0	1	3	0	8	1	0	1	0	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	0
12	0	0	3	9	8	227	14	0	12	1	1	0	7	0	0	2	0	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	1
14	77	0	1	6	18	247	40	1	111	28	1	0	117	7	0	17	3	8	1	1	3	-	4	0
15	24	0	0	1	20	94	3	3	34	16	0	3	52	3	4	6	2	4	14	2	5	-	9	0
16	0	0	0	0	2	14	0	0	0	5	2	1	10	0	4	0	0	0	31	0	2	-	9	0
17	0	0	0	0	0	2	0	0	0	1	1	2	2	0	1	0	0	0	7	0	1	-	3	0
18	1	0	0	0	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0	0	5	-	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
20	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	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	0
22	0	0	0	0	0	1	0	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	0
24	0	1	0	0	1	0	0	0	0	0	1	0	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	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**	**1**

Table 2.41. Bluefish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2012.
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**	**2012**
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	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	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	0
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	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	1
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	2
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	4
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	2
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	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	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	2
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	0
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	0
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	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	0
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	2
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	0
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	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	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	0
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	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	0
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	2
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	1
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	1
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	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	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	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	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	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	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**	**19**

Table 2.42. Bluefish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2012.
Bluefish lengths were recorded from every tow.

length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	2	0	0	0	0	0	2	33	0	1	0	0	3
9	2	11	0	5	3	0	3	51	325	5	82	1	0	148
11	38	18	20	95	116	78	75	315	474	82	1,450	162	7	2,946
13	1,308	148	65	430	603	743	107	540	392	603	5,722	825	65	4,163
15	2,559	1,789	514	982	334	1,500	508	443	497	432	3,786	216	602	870
17	1,797	2,067	932	546	779	2,342	1,183	1,086	1,060	698	1,862	641	3,323	1,005
19	426	554	386	118	780	2,436	1,222	1,164	838	2,445	1,041	1,897	1,845	769
21	246	96	169	19	532	903	507	627	263	1,174	803	934	487	332
23	68	21	86	9	193	198	150	398	28	214	469	202	32	154
25	19	24	15	5	18	18	62	212	1	66	265	14	7	25
27	2	5	0	0	1	5	9	32	0	10	62	3	0	3
29	0	2	0	0	0	0	0	1	0	0	1	0	0	0
31	0	0	0	1	0	0	1	0	0	0	0	0	0	1
33	0	0	0	2	0	0	6	0	0	0	0	2	0	0
35	0	0	0	4	1	0	17	0	3	0	0	22	0	1
37	4	8	1	16	2	1	41	1	21	0	10	92	0	2
39	25	66	35	56	6	10	145	19	118	4	30	192	2	52
41	64	133	118	84	23	72	245	130	169	19	116	125	18	110
43	32	63	101	41	31	101	156	229	77	42	125	37	22	52
45	6	14	20	21	32	34	25	137	35	79	32	10	23	20
47	13	11	63	9	25	19	25	69	72	74	7	19	61	6
49	21	55	52	11	19	21	17	88	179	81	9	20	74	27
51	25	58	43	14	16	19	36	73	210	50	13	21	38	16
53	31	44	21	14	18	32	16	21	162	26	42	25	17	10
55	20	25	9	25	8	21	5	5	90	11	56	6	10	5
57	13	9	4	30	1	12	1	3	54	33	32	3	10	8
59	4	5	15	11	12	7	3	6	29	69	11	1	8	10
61	6	20	5	9	8	4	5	6	10	108	20	4	8	10
63	2	13	11	5	15	4	9	6	11	54	20	5	2	5
65	0	12	11	6	12	2	13	1	12	30	39	7	1	2
67	0	11	11	3	14	4	12	1	3	16	49	5	3	4
69	1	7	8	10	17	10	12	9	4	2	35	4	2	1
71	1	1	13	4	7	19	15	5	11	1	17	5	3	1
73	1	2	3	8	7	7	16	5	15	11	7	4	1	5
75	2	1	5	3	9	5	13	8	17	8	5	4	7	3
77	0	3	1	1	3	4	10	6	6	4	8	3	8	6
79	0	2	2	1	1	3	1	2	4	6	2	1	0	1
81	0	1	0	0	0	1	2	0	1	0	4	1	2	0
83	0	0	0	0	0	0	0	0	0	0	1	1	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**

	Fall														
length	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
5	0	0	0	0	0	0	0	0	1	0	0	0	-	0	0
7	13	4	0	1	1	0	0	0	2	0	0	0	-	0	0
9	429	293	2	40	9	8	18	77	11	31	0	29	-	0	1
11	1,774	1,205	64	302	153	103	1,072	729	315	126	21	410	-	6	10
13	3,566	654	210	259	399	110	1,168	950	413	535	421	766	-	55	126
15	1,267	637	410	458	342	44	428	390	241	365	708	256	-	329	658
17	287	863	370	1,247	106	661	274	619	401	1,148	67	1,104	-	1,079	1,632
19	211	435	1,200	670	149	1,487	556	1,527	286	3,397	89	466	-	769	795
21	199	913	2,246	391	617	1,011	677	1,188	108	2,152	69	83	-	240	311
23	216	1,096	840	161	723	104	550	429	64	853	8	11	-	52	112
25	370	1,032	337	76	355	2	339	178	28	221	2	2	-	21	49
27	167	476	9	18	50	0	53	32	14	18	1	0	-	1	7
29	7	53	0	5	1	0	10	0	2	4	2	0	-	2	3
31	0	1	0	0	1	0	2	0	0	1	0	1	-	0	0
33	1	0	0	0	3	0	14	0	4	1	0	1	-	0	4
35	1	0	0	0	13	1	79	0	4	3	0	1	-	1	4
37	2	1	2	15	27	6	188	0	27	5	5	35	-	5	5
39	28	7	31	52	67	20	428	0	50	45	42	111	-	18	18
41	46	15	129	90	152	15	212	15	25	79	35	83	-	23	20
43	28	11	73	31	86	13	33	43	11	69	13	35	-	35	10
45	30	1	16	15	10	6	15	57	2	40	10	10	-	14	7
47	29	7	9	15	8	14	27	38	1	25	11	3	-	8	7
49	33	9	14	25	14	19	47	35	6	32	20	10	-	14	3
51	23	7	32	26	13	18	59	57	4	26	29	21	-	12	7
53	9	10	40	12	18	7	22	22	12	23	28	9	-	6	8
55	9	4	16	5	12	6	31	8	7	11	12	4	-	5	5
57	2	10	3	4	12	8	48	14	7	5	3	8	-	1	3
59	6	12	6	8	9	4	40	15	5	13	5	8	-	3	3
61	5	3	11	10	3	5	17	12	6	31	11	14	-	3	1
63	10	3	6	3	6	3	21	27	2	25	10	8	-	3	5
65	7	3	11	2	5	1	22	14	3	23	5	8	-	0	0
67	5	3	7	5	6	1	9	11	1	14	14	18	-	2	2
69	2	6	3	5	7	1	12	10	0	11	10	22	-	3	3
71	1	7	8	1	7	2	6	1	0	1	11	26	-	6	0
73	1	0	2	2	4	1	6	3	0	5	3	20	-	8	5
75	4	5	1	1	1	1	1	4	0	1	1	12	-	5	3
77	1	1	0	0	3	0	3	1	0	0	1	4	-	3	2
79	0	1	1	2	1	0	0	0	0	1	0	2	-	3	0
81	0	1	1	0	0	0	1	0	0	0	0	1	-	1	1
83	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**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**	**3,830**

Table 2.43. Butterfish length frequencies, 1 cm intervals, spring and fall, 1986-1990, 1992–2012.
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**	**2012**
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	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	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	2
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	6
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	0
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	3
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	279
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	768
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	1,523
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	1,489
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	1,214
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	735
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	396
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	330
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	237
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	83
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	35
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	40
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	0
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	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	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	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	0
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	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	0
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**	**7,143**

													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**	**2012**
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	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	0
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	10
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	64
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	280
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	1,559
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	5,148
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	7,742
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	7,792
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	3,451
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	1,426
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	647
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	429
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	670
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	1,296
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	1,318
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	749
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	105
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	66
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	0
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	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	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	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	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	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**	**32,752**

Table 2.44. Fourspot flounder length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989, 1990, 1996-2012.

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**	**2012**
13	2	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	1
15	5	2	0	0	5	5	0	0	3	0	3	0	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	5
19	19	19	8	16	14	61	22	5	89	8	8	0	6	7	7	4	2	1	24
21	17	42	31	60	13	28	26	4	99	6	4	1	18	11	9	10	3	10	42
23	11	341	198	161	16	32	239	42	33	8	4	14	24	9	17	6	5	45	56
25	56	528	279	353	105	72	422	181	84	124	26	71	29	44	39	37	33	157	258
27	103	225	208	456	209	97	256	300	199	228	82	75	33	105	81	91	55	150	441
29	120	139	193	392	233	81	201	245	191	187	129	64	44	170	108	127	55	107	461
31	89	60	117	192	137	66	139	153	175	163	178	68	61	121	94	90	69	93	303
33	51	27	54	76	60	60	81	45	89	88	113	52	36	52	70	51	36	49	92
35	8	33	15	22	16	25	39	11	26	47	35	31	13	43	34	31	24	27	31
37	2	12	6	3	4	7	12	8	7	12	5	11	4	9	11	7	9	9	4
39	0	4	3	0	2	1	1	2	3	6	2	3	1	7	2	0	4	5	0
41	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
45	0	0	0	0	0	0	0	0	0	0	0	1	0	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**	**1,719**

	Fall																		
length	**1989**	**1990**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
5	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	1	-	0	0
7	0	1	0	1	4	0	0	1	0	0	1	0	2	0	0	1	-	1	0
9	5	0	0	23	19	0	2	2	0	4	1	0	2	1	1	7	-	4	0
11	9	4	2	46	27	5	4	17	5	2	12	4	5	0	7	16	-	17	3
13	10	15	5	68	22	24	6	25	3	3	9	9	13	2	8	59	-	28	4
15	6	17	35	55	21	42	5	15	9	0	13	17	4	5	11	45	-	22	13
17	0	0	42	16	3	16	1	0	3	0	1	26	3	2	16	20	-	4	12
19	0	0	22	0	0	4	1	0	1	0	0	2	0	0	7	6	-	0	0
21	0	0	0	2	2	3	2	0	2	0	1	0	0	1	0	0	-	0	0
23	1	2	9	2	5	0	17	1	5	0	0	0	1	1	0	1	-	0	0
25	0	3	42	7	16	5	58	3	7	3	4	1	0	6	1	2	-	2	3
27	0	7	41	10	22	4	77	5	13	7	6	5	0	7	1	6	-	1	9
29	0	3	24	5	22	5	54	10	18	11	13	5	0	20	6	8	-	1	11
31	0	1	20	3	6	3	25	1	18	4	30	6	0	12	5	6	-	1	6
33	0	0	6	1	1	1	7	1	13	7	19	2	1	3	1	11	-	3	6
35	0	0	4	0	1	0	5	0	6	5	6	7	0	4	4	1	-	2	2
37	0	0	0	0	0	0	2	1	3	0	2	0	0	0	0	1	-	1	0
39	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	-	0	0
Total	**31**	**53**	**252**	**239**	**171**	**112**	**266**	**83**	**106**	**46**	**118**	**85**	**33**	**64**	**68**	**192**	**-**	**87**	**69**

Table 2.45. Hickory shad length frequencies, spring and fall, 1 cm intervals, 1991-2012.
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	2012
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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	0
17	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0	0	1
18	0	0	0	1	0	1	0	0	2	0	0	0	0	0	1	7	1	2	1	0	0	0
19	0	0	0	1	0	0	1	0	0	0	0	0	0	3	5	6	0	1	1	0	0	0
20	0	0	0	0	0	2	0	2	0	0	0	0	0	2	4	2	0	0	0	0	1	2
21	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	1	1	0	0	1	0	1
22	0	0	0	0	0	0	0	0	1	0	2	0	0	1	1	0	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	0
24	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	0	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	0
26	0	0	0	0	0	0	0	1	0	0	0	2	0	0	6	5	2	0	0	0	0	2
27	0	0	0	0	0	0	1	0	1	0	0	1	0	0	18	3	5	0	1	0	0	3
28	0	0	0	1	0	1	1	1	2	2	0	4	1	0	14	3	3	0	1	1	0	1
29	0	0	0	0	0	0	2	4	1	7	0	5	0	2	5	2	1	0	1	0	0	1
30	0	0	1	1	1	0	1	5	1	5	0	5	3	1	6	5	2	0	0	0	0	1
31	0	0	0	0	1	1	1	2	1	4	0	2	0	0	1	0	2	0	1	0	0	0
32	0	2	0	0	0	3	0	6	6	2	1	2	1	1	0	5	1	0	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	0
34	0	0	0	0	0	0	1	3	1	2	2	1	3	1	2	1	1	0	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	0
36	0	0	0	0	0	0	0	2	1	1	0	4	1	0	1	0	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	1
38	0	0	0	0	0	0	0	1	0	0	1	2	2	1	1	0	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	0
40	0	0	0	0	0	0	0	0	0	0	1	1	0	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	1
42	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
44	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
46	0	0	0	0	0	0	0	0	0	0	1	0	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**	**14**

											Fall											
length	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
19	0	0	0	0	0	0	1	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	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	0
22	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0
23	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	-	2	1
24	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	-	2	1
25	0	0	0	6	0	1	1	0	2	0	0	0	0	0	2	1	2	0	0	-	0	2
26	0	1	2	8	0	3	1	0	5	0	0	0	0	4	3	0	0	0	0	-	3	1
27	0	0	0	3	0	2	0	0	5	2	0	1	0	3	0	1	0	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	1
29	0	0	0	2	0	0	0	0	0	2	0	0	0	1	2	3	0	0	0	-	0	4
30	0	1	0	1	1	0	1	0	0	0	0	0	0	0	8	7	2	0	3	-	0	3
31	0	0	1	0	1	0	2	1	2	0	0	0	1	0	15	1	2	0	2	-	0	7
32	0	1	0	0	1	2	2	1	7	3	1	0	2	0	12	1	1	0	0	-	0	3
33	0	2	1	2	0	1	3	2	2	2	3	1	2	1	5	0	1	2	0	-	0	1
34	0	2	0	0	1	4	2	0	3	4	0	1	1	0	5	1	0	0	0	-	0	4
35	0	0	2	0	0	0	0	0	0	2	0	0	0	2	1	1	0	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	1
37	0	1	1	0	0	0	1	0	2	1	0	0	0	1	2	0	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	0
39	0	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	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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**	**29**

Table 2.46. Horseshoe crab length frequencies by sex, spring, 1 cm intervals, 1998-2012.
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**	**2012**
F	**13**		1	0	0	0	0	0	0	0	0	0	0	0	0	1
F	**14**		1	3	0	1	2	0	1	0	0	0	0	0	0	0
F	**15**		0	0	0	1	1	0	0	0	0	1	0	0	0	0
F	**16**		1	0	0	3	2	1	1	0	0	1	0	0	0	1
F	**17**		1	0	2	2	1	4	1	0	1	1	0	0	0	1
F	**18**		2	1	0	3	2	4	0	0	2	1	1	0	0	0
F	**19**		4	1	2	2	5	5	0	0	3	4	1	0	0	2
F	**20**		5	2	0	7	1	2	3	0	3	2	0	0	1	2
F	**21**		8	2	1	8	6	2	1	0	3	8	1	0	3	5
F	**22**		8	6	4	13	10	7	2	0	10	4	6	0	3	3
F	**23**		14	15	18	19	22	17	3	2	9	14	4	3	4	9
F	**24**		15	7	15	32	29	25	5	4	15	11	12	6	3	15
F	**25**		15	10	23	25	22	20	8	5	11	16	10	9	9	14
F	**26**		23	13	28	26	22	23	3	2	16	12	10	4	16	14
F	**27**		15	9	18	18	18	18	8	4	10	9	9	5	18	11
F	**28**		8	6	9	6	7	4	2	2	5	4	10	3	8	10
F	**29**		3	0	3	4	4	4	0	3	5	1	3	4	1	3
F	**30**		1	0	3	2	0	0	3	2	0	2	1	1	4	0
F	**31**		0	0	0	0	4	0	0	0	0	1	1	0	0	0
F	**32**		0	0	0	0	1	0	1	0	0	0	0	0	0	0
M	**14**		0	0	0	0	0	0	0	0	1	0	0	0	0	0
M	**15**		0	0	0	0	3	0	0	0	0	0	0	0	0	0
M	**16**		0	0	0	2	5	2	0	1	2	0	0	2	0	0
M	**17**		5	2	4	7	9	9	0	0	3	2	3	0	1	5
M	**18**		11	8	12	19	24	21	2	0	17	10	3	2	5	7
M	**19**		22	13	32	42	25	33	3	0	19	12	10	7	7	8
M	**20**		15	16	30	20	33	31	7	0	21	10	11	7	15	13
M	**21**		18	5	13	14	16	10	1	0	6	12	5	3	3	9
M	**22**		4	5	7	6	7	6	2	0	4	2	1	1	4	5
M	**23**		1	0	3	1	4	2	1	0	0	1	1	0	0	0
M	**24**		2	1	1	0	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	0
M	**26**		0	0	0	1	0	0	0	0	0	0	1	0	0	0
M	**27**		0	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	0
M	**29**		0	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	0
U	**22**		1	0	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**	**138**

Table 2.47. Horseshoe crab length frequencies by sex, fall, 1 cm intervals, 1998-2012.
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**	**2012**
F	**13**	0	0	2	0	0	0	3	0	1	0	0	0	-	0	0
F	**14**	0	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	0
F	**16**	0	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	0
F	**18**	0	2	0	1	0	1	1	1	0	0	0	0	-	0	0
F	**19**	3	2	2	2	0	1	0	0	1	0	1	1	-	0	0
F	**20**	5	1	1	4	4	2	3	0	2	0	0	2	-	0	0
F	**21**	3	2	2	3	1	4	6	3	1	1	1	0	-	0	0
F	**22**	3	8	13	13	10	3	9	4	1	2	6	6	-	6	0
F	**23**	8	15	15	12	8	8	13	10	7	7	6	14	-	6	2
F	**24**	7	19	30	27	21	9	24	10	6	17	14	22	-	18	10
F	**25**	17	12	20	31	33	13	19	6	12	26	17	17	-	19	9
F	**26**	19	23	33	31	18	9	29	12	10	22	15	24	-	25	16
F	**27**	14	7	21	22	18	7	22	8	3	17	11	28	-	16	5
F	**28**	2	4	10	8	13	6	15	5	4	8	11	22	-	11	3
F	**29**	2	3	2	5	2	3	8	2	0	4	1	5	-	2	4
F	**30**	0	1	1	2	0	2	1	2	0	2	0	2	-	0	1
F	**31**	0	1	0	0	1	0	0	2	0	0	0	1	-	0	0
F	**32**	0	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	0
F	**34**	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0
M	**11**	0	0	0	1	0	0	0	0	0	0	0	0	-	0	0
M	**12**	0	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	0
M	**14**	0	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	0
M	**16**	0	0	2	1	5	3	0	0	0	1	1	0	-	1	0
M	**17**	6	5	7	6	3	5	11	0	1	3	1	2	-	3	0
M	**18**	12	14	28	18	14	15	21	3	9	3	9	18	-	13	4
M	**19**	10	20	39	27	31	11	39	13	4	12	21	14	-	9	4
M	**20**	20	23	35	32	22	8	30	12	9	19	23	31	-	10	1
M	**21**	6	11	18	15	9	4	15	4	2	10	6	13	-	7	1
M	**22**	5	3	8	4	6	0	10	2	5	6	2	5	-	6	0
M	**23**	0	0	3	2	6	1	1	0	2	3	1	3	-	0	1
M	**24**	0	0	1	3	0	0	1	0	1	2	0	2	-	0	0
M	**25**	0	0	2	0	0	0	0	0	0	0	0	1	-	0	0
M	**26**	2	0	0	3	0	0	0	0	1	0	0	1	-	0	0
M	**27**	0	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	0
M	**29**	0	0	0	1	0	0	0	0	0	0	0	0	-	0	0
Total		**145**	**177**	**295**	**274**	**229**	**117**	**281**	**101**	**83**	**165**	**148**	**234**	-	**152**	**61**

Table 2.48. Long-finned squid length frequencies, spring and fall, 2 cm intervals (midpoint given), 1986-1990, 1992-2012.
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**	**2012**
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
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	73
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	105
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	89
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	285
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	168
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	80
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	87
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	37
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	55
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	37
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	9
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	6
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	7
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	2
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	0
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	1
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	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	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	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**	**1,046**

												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**	**2012**
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	111
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	1,174
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	1,429
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	1,222
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	757
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	379
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	161
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	43
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	19
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	6
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	2
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	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	0
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
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	1
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**	**5,304**

Table 2.49. Scup spring length frequencies, 1 cm intervals, 1984-2012.
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**	**2012**
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	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	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	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	35
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	435
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	3,169
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	3,888
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	2,589
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	1,241
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	262
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	62
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	52
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	206
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	312	642
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	1,123
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	909
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	655	377
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	1,260	200
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	1,387	313
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	1,123	568
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	930	816
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	658	1,000
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	651	931
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	637	721
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	468	565
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	467
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	307
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	123	174
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	78	105
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	44	63
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	31
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	17
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	6
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	4
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	2
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	3
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	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	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	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	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	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	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	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**	**21,283**

Table 2.50. Scup fall length frequencies, 1 cm intervals, 1984-2012.
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**	**2012**
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	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	0
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	29
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	119
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	567
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	1,849
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	4,036
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	5,961
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	5,770
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	2,695
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	726
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	154
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	482
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	1,483
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	-	1,425	2,233
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	-	1,138	2,015
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	1,332
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	455
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	199
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	212
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	388
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	319
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	184
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	112
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	106
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	122
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	116
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	59
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	63
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	26
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	17
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	11
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	1
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	0
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	1
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	0
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**	**31,842**

Table 2.51. Striped bass spring length frequencies, 2 cm intervals (midpoint given), 1984–2012.

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**	**2012**
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	2
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	0
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	1
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	3
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	5
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	5
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	10
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	8
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	8
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	8
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	5
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	2
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	2
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	3
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	3
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	1
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	4
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	5
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	1
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	1
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	5
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	1
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	5
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	6
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	6
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	1
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	1
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	2
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	4
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	4
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	3
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	1
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	3
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	0
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	1
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	2
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	0
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	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	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	1
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	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	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	1
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	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	0
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**	**125**

Table 2.52. Striped bass fall length frequencies, 2 cm intervals (midpoint given), 1984–2012.
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**	**2012**
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	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	0	0	-	1	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	2
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	1
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	1
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	2
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	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	0
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	4
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	0
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	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	4
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	1
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	5
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	6
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	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	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	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	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	6
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	1
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	0
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	0
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	0
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	0
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	2
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	1
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	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	1
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	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	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	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	0
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	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	0
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	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	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	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	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	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	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	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	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	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	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	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	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**	**46**

Table 2.53. Summer flounder length frequencies, spring, 2 cm intervals (midpoint given), 1984–2012.
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**	**2012**
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	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	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	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	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	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	0
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	2
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	4
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	22
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	56
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	51
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	44
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	58
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	60
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	66
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	34
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	43
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	23
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	24
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	23
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	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	8
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	8
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	3
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	8
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	1
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	6
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	5
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	0
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	1
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	1
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	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	0
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	1
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	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**	**569**

Table 2.54. Summer flounder length frequencies, fall, 2 cm intervals (midpoint given), 1984–2012.
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**	**2012**
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	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	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	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	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	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	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	2
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	1
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	3
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	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	7
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	34
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	42
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	58
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	73
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	55
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	37
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	23
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	15
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	11
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	15
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	11
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	14
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	0
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	2
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	1
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	0
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	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	0
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	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	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	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	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**	**409**

Table 2.55. Tautog length frequencies, spring, 2 cm intervals (midpoint given), 1984-2012.
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**	**2012**
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	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	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	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	4
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	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	6
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	5
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	6
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	9
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	4
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	8
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	5
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	5
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	9
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	3
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	2
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	11
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	6
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	7
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	3
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	6
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	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	4
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	3
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	1
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	0
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	0
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	0
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	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	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	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	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**	**115**

Table 2.56. Weakfish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2012.
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**	**2012**
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	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	1
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	10
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	5
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	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	4
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	5
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	11
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	17
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	28
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	31
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	26
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	15
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	8
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	3
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	2
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	1
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	1
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	7
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	6
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	3
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	1
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	1
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	1
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	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	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	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	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	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	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	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	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	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	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**	**187**

Table 2.57. Weakfish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2012.

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	2012
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	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	6
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	81
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	519
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	1,475
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	1,246
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	1,606
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	1,017
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	332
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	140
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	50
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	8
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	1
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	0
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	6
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	7
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	18
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	18
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	7
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	7
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	5
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	12
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	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	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	8
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	7
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	4
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	1
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	2
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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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**	**6,599**

Table 2.58. Windowpane flounder length frequencies, spring, 1 cm intervals, 1989, 1990, 1994-2012.
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**	**2012**
4	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0
5	4	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0
6	0	0	0	0	0	2	0	2	5	1	1	10	2	0	0	1	0	4	4	9	0
7	0	0	0	0	1	4	2	4	17	2	7	22	3	0	0	7	3	8	9	9	5
8	0	2	4	1	3	5	4	3	27	7	6	23	6	0	0	31	5	17	10	20	19
9	0	40	16	3	2	9	5	2	11	10	21	20	11	0	0	18	6	10	13	24	16
10	25	66	67	12	34	15	7	8	17	13	12	11	19	7	2	4	11	23	8	10	10
11	69	96	169	86	79	37	19	20	5	29	8	3	24	12	1	4	11	8	7	11	10
12	89	74	305	148	162	76	60	40	3	23	10	7	25	16	7	8	17	4	20	2	0
13	337	53	362	259	288	136	131	37	10	29	5	9	58	25	12	22	13	6	72	9	3
14	430	66	232	189	381	309	200	45	11	26	8	13	100	22	34	28	44	17	93	7	7
15	414	124	152	180	487	362	211	96	24	43	15	13	101	23	42	60	51	37	107	15	32
16	305	180	126	89	310	606	177	123	27	55	12	15	72	37	36	107	119	62	117	19	64
17	174	212	209	70	331	754	130	165	23	73	9	15	65	22	48	129	137	97	166	23	81
18	78	178	372	99	339	588	165	160	32	94	24	23	56	4	45	132	116	90	104	58	133
19	65	132	357	139	548	440	260	194	26	78	19	26	45	16	20	110	101	75	124	58	155
20	174	144	289	143	604	366	362	386	75	89	15	31	60	13	24	130	76	51	76	47	135
21	216	116	217	85	567	429	461	357	136	95	22	45	32	22	24	186	122	50	88	66	97
22	299	143	139	82	401	438	311	301	166	232	45	50	42	29	27	246	155	63	172	75	97
23	319	108	163	57	409	368	229	217	138	290	110	92	39	42	28	181	216	92	198	107	117
24	270	103	147	54	280	323	227	217	125	245	141	123	66	36	41	158	132	84	199	122	128
25	177	87	183	54	236	231	188	206	121	208	133	111	109	47	31	162	118	82	155	134	121
26	189	103	184	70	235	191	178	136	106	126	114	76	100	52	52	186	103	67	161	120	118
27	138	79	138	56	187	222	162	161	91	88	69	88	86	49	37	104	100	60	148	103	102
28	148	38	70	44	117	145	138	97	56	83	62	68	71	29	38	100	111	45	103	69	100
29	78	26	68	24	97	98	67	53	47	59	41	37	48	24	24	65	52	30	146	42	70
30	99	35	42	27	66	75	58	42	37	39	42	35	51	20	14	33	46	24	51	24	45
31	50	20	25	12	31	23	34	39	12	25	19	22	32	13	8	14	22	11	67	25	33
32	8	15	13	4	25	12	13	26	16	21	17	9	16	5	2	23	19	6	21	7	7
33	16	3	2	9	5	8	6	3	8	15	7	2	10	1	3	2	5	1	33	14	13
34	0	5	5	0	4	1	1	1	2	5	4	4	9	3	0	4	5	2	20	11	11
35	0	4	5	1	3	0	3	4	5	10	2	4	5	0	0	3	3	3	11	1	4
36	0	4	2	2	1	1	0	0	1	2	0	5	0	2	0	0	1	0	0	0	1
37	0	0	0	1	0	0	3	1	1	2	2	1	1	0	0	0	0	0	8	0	0
38	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	1	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	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	0
42	0	0	0	0	1	0	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**	**1,734**

Table 2.59. Windowpane flounder length frequencies, fall, 1 cm intervals, 1989, 1990, 1994-2012.
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**	**2012**
6	1	0	1	0	0	0	0	0	3	1	0	0	3	0	0	0	0	1	-	0	0
7	5	0	5	0	6	0	1	0	0	0	0	2	0	0	0	0	0	4	-	1	0
8	8	3	18	5	24	15	1	0	6	9	0	5	11	14	5	4	0	15	-	4	2
9	25	2	28	6	70	17	2	2	2	2	0	21	15	49	2	6	2	15	-	2	3
10	18	11	78	10	165	50	2	4	3	9	1	20	22	67	1	14	5	17	-	9	6
11	15	9	60	22	227	75	31	11	7	14	0	13	27	111	5	18	3	24	-	19	1
12	16	12	50	15	270	107	33	6	9	9	1	6	16	155	2	26	15	29	-	31	5
13	23	6	30	10	285	173	47	3	11	9	6	0	14	145	8	44	43	19	-	19	10
14	33	14	11	13	306	154	48	5	23	6	0	4	8	109	3	36	58	27	-	36	14
15	58	23	23	9	250	110	39	6	18	3	5	8	3	62	2	37	38	25	-	43	18
16	140	38	15	16	181	60	34	3	11	3	5	9	3	33	0	30	28	31	-	41	19
17	188	44	35	26	112	78	33	11	30	7	14	4	9	12	7	21	20	35	-	72	37
18	91	53	47	48	101	119	54	11	15	12	8	11	2	8	19	19	16	47	-	70	19
19	46	46	49	47	145	179	95	44	29	6	10	7	11	20	32	26	10	45	-	52	44
20	49	28	39	48	131	213	96	67	30	13	9	6	18	30	39	39	31	24	-	41	50
21	21	11	23	24	125	165	69	38	52	18	9	11	35	50	25	36	40	28	-	35	87
22	14	14	16	19	65	123	37	18	28	22	21	2	25	48	25	42	25	26	-	51	58
23	3	10	20	6	67	63	32	12	37	30	39	6	10	14	12	32	27	20	-	47	79
24	9	4	7	9	25	49	13	11	33	19	39	11	15	13	9	19	32	23	-	40	45
25	4	3	6	3	22	28	9	6	18	19	25	14	8	10	10	6	9	9	-	16	24
26	2	0	8	3	19	29	9	4	16	9	10	18	4	3	4	8	16	6	-	18	22
27	6	2	3	1	11	17	8	3	5	11	12	17	4	5	3	4	5	4	-	7	14
28	2	1	4	1	3	12	1	1	4	5	6	9	2	3	3	3	2	7	-	9	1
29	2	2	0	1	2	17	0	1	6	3	1	4	2	3	1	3	2	1	-	2	0
30	2	1	2	1	0	5	0	0	1	2	2	2	0	1	1	0	0	0	-	3	1
31	0	0	0	0	0	0	0	0	0	1	0	3	1	2	0	0	2	1	-	0	0
32	1	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	-	0	1
33	0	0	0	0	1	0	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**	**560**

Table 2.60. Winter flounder length frequencies, April-May, 1 cm intervals, 1984-2012.
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**	**2012**
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	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	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	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	0
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	7
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	22
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	72
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	139
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	162
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	128
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	101
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	67
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	60
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	65
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	58
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	110
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	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	133
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	141
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	82
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	69
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	58
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	82
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	52
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	70
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	58
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	56
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	47
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	63
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	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	42
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
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	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	18
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	18
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	7
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	2
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	2
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	3
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	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	1
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	1
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	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	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	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	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	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	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	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**	**2,234**

Table 2.61. Winter flounder length frequencies, fall, 1 cm intervals, 1984-2012.
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**	**2012**
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	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	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	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	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	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	0
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	2
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	4
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
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	38
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	59
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	62
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	61
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	50
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	26
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	25
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	16
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	15
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	22
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	20
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	30
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	20
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	20
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	16
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	7
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	5
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	7
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	7
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	4
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	4
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	5
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	0
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	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	4
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	1
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	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	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	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	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	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	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	0
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**	**547**

Table 2.62. Winter skate length frequencies, spring and fall, 2 cm intervals (midpoint given), 1995-2012.
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	2012
27	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
29	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
33	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
37	0	0	0	0	0	0	1	0	0	3	0	0	1	1	1	1	1	7
39	0	0	0	0	0	0	0	1	2	2	0	0	1	0	1	0	1	5
41	0	0	0	0	0	0	0	1	1	2	0	0	1	1	1	2	0	4
43	0	0	0	0	0	3	0	1	2	4	1	0	0	1	2	1	0	0
45	0	0	0	0	1	3	0	0	0	6	0	0	2	1	1	2	0	7
47	0	0	0	0	0	2	0	0	0	4	3	0	3	0	0	0	1	1
49	0	0	0	0	0	2	0	0	1	2	1	1	1	2	2	0	0	3
51	0	1	0	1	0	0	0	1	1	0	1	0	0	0	1	0	0	3
53	0	0	0	0	1	3	1	0	1	0	0	1	1	0	1	0	0	1
55	0	0	2	3	1	1	0	0	1	1	1	4	3	0	1	0	0	2
57	1	2	4	3	2	0	0	0	6	0	0	1	2	1	3	0	2	2
59	5	4	1	5	3	2	0	1	1	2	0	1	0	0	2	1	0	2
61	1	5	2	1	0	0	3	1	1	1	3	1	1	3	2	0	1	2
63	2	2	2	4	1	0	0	1	2	3	2	2	0	1	1	0	2	1
65	4	2	4	7	0	0	0	0	0	0	1	1	1	2	0	0	2	3
67	1	1	2	2	1	1	0	1	1	1	3	3	0	1	1	1	2	3
69	2	0	1	4	2	0	0	1	4	1	0	1	2	3	2	0	3	1
71	1	3	2	3	1	2	2	1	2	2	0	1	2	3	0	0	0	4
73	0	3	0	0	0	1	2	4	0	2	1	4	3	1	1	1	3	5
75	4	4	1	5	3	1	2	1	3	1	0	1	4	3	3	4	3	5
77	0	2	3	6	7	2	1	1	1	1	0	0	2	4	0	1	2	0
79	1	2	1	4	1	1	2	3	1	1	1	0	4	3	2	1	4	2
81	0	4	0	3	2	1	1	2	3	3	0	1	1	1	1	0	2	3
83	0	3	0	2	0	0	1	0	1	1	0	0	1	0	3	1	1	4
85	0	2	1	1	0	3	1	2	1	0	0	0	0	0	0	0	0	3
87	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	1
89	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
91	0	0	0	0	0	0	0	1	0	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	0
95	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Total	**22**	**40**	**27**	**55**	**26**	**29**	**18**	**26**	**37**	**45**	**18**	**23**	**37**	**35**	**32**	**16**	**30**	**77**

									Fall									
length	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
39	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0	2
41	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1
43	0	0	2	0	0	0	0	2	0	0	0	0	0	1	0	-	2	1
45	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	-	0	4
47	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	-	0	1
49	1	5	1	0	0	0	0	0	0	0	1	0	0	0	0	-	0	1
51	0	0	1	0	2	0	2	0	0	0	0	0	0	1	0	-	0	2
53	2	0	2	1	0	0	1	1	0	0	1	0	0	0	0	-	0	2
55	1	2	1	0	1	0	4	0	0	0	0	0	0	1	0	-	0	0
57	2	6	2	0	0	0	0	3	0	0	2	0	0	1	1	-	3	0
59	2	2	2	1	0	0	1	1	0	0	0	0	0	0	1	-	0	1
61	0	5	0	0	0	0	3	0	0	0	0	0	1	0	0	-	0	0
63	1	4	1	0	0	0	1	0	0	0	2	0	0	0	0	-	0	0
65	2	3	0	1	1	0	0	1	0	3	0	0	0	1	1	-	1	0
67	1	2	2	1	0	0	2	0	0	0	3	0	1	1	1	-	0	0
69	0	2	1	1	0	0	0	1	0	0	0	0	1	1	1	-	0	1
71	0	0	0	0	0	0	0	1	0	2	0	0	2	1	1	-	0	0
73	0	2	1	1	1	0	0	2	0	1	1	0	0	0	0	-	1	1
75	1	3	1	0	1	0	1	1	0	1	1	0	1	1	1	-	0	1
77	0	1	0	0	0	0	1	2	0	1	0	0	0	2	0	-	0	0
79	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	-	0	0
81	0	0	0	1	0	0	1	1	0	0	1	0	1	1	1	-	0	1
83	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	0	1
85	0	0	0	0	0	0	0	1	0	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	0
Total	**15**	**37**	**19**	**7**	**7**	**1**	**20**	**19**	**0**	**9**	**13**	**0**	**7**	**16**	**11**	**-**	**7**	**20**

FIGURES 2.1 - 2.15
LISTS

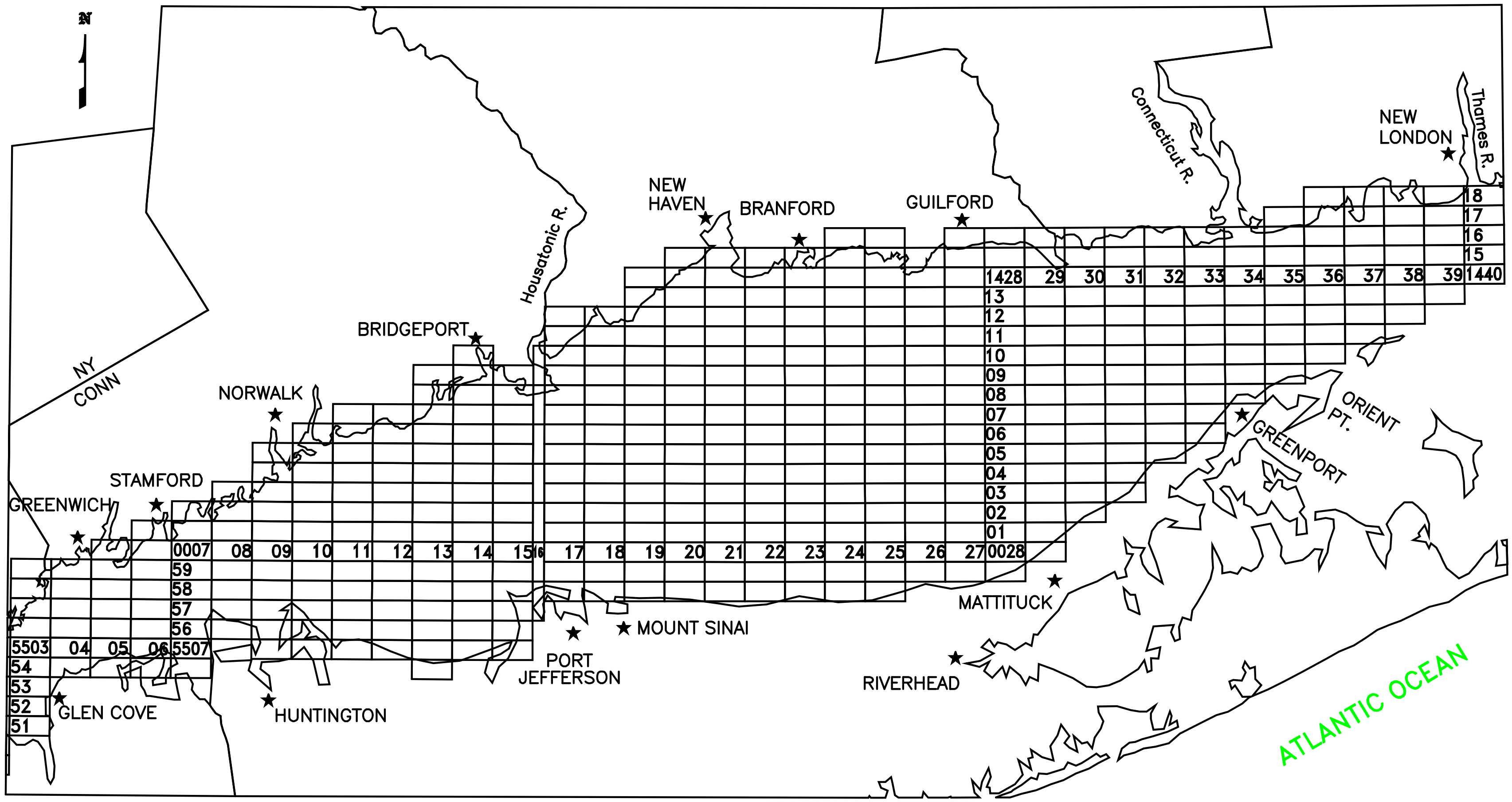
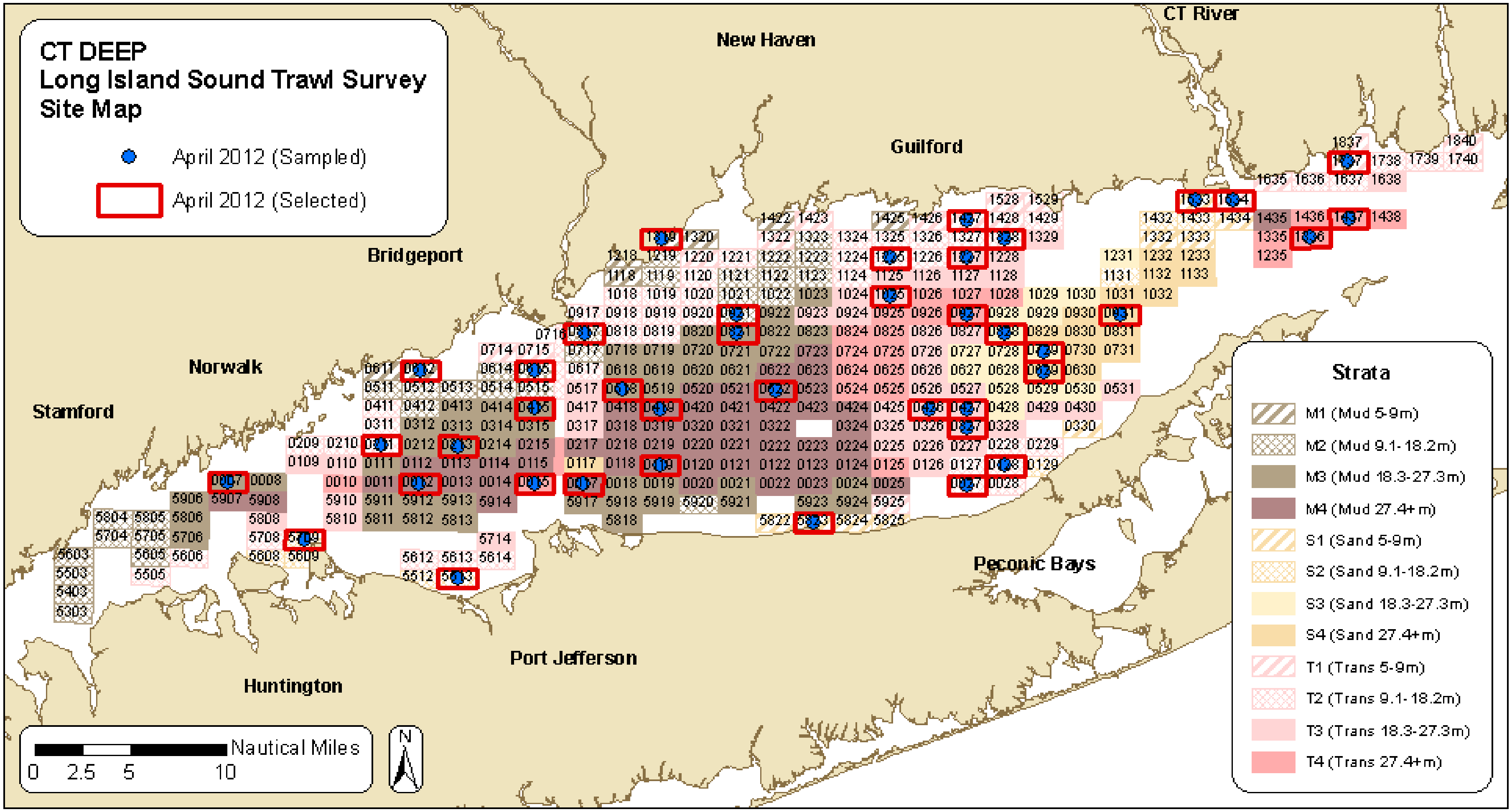


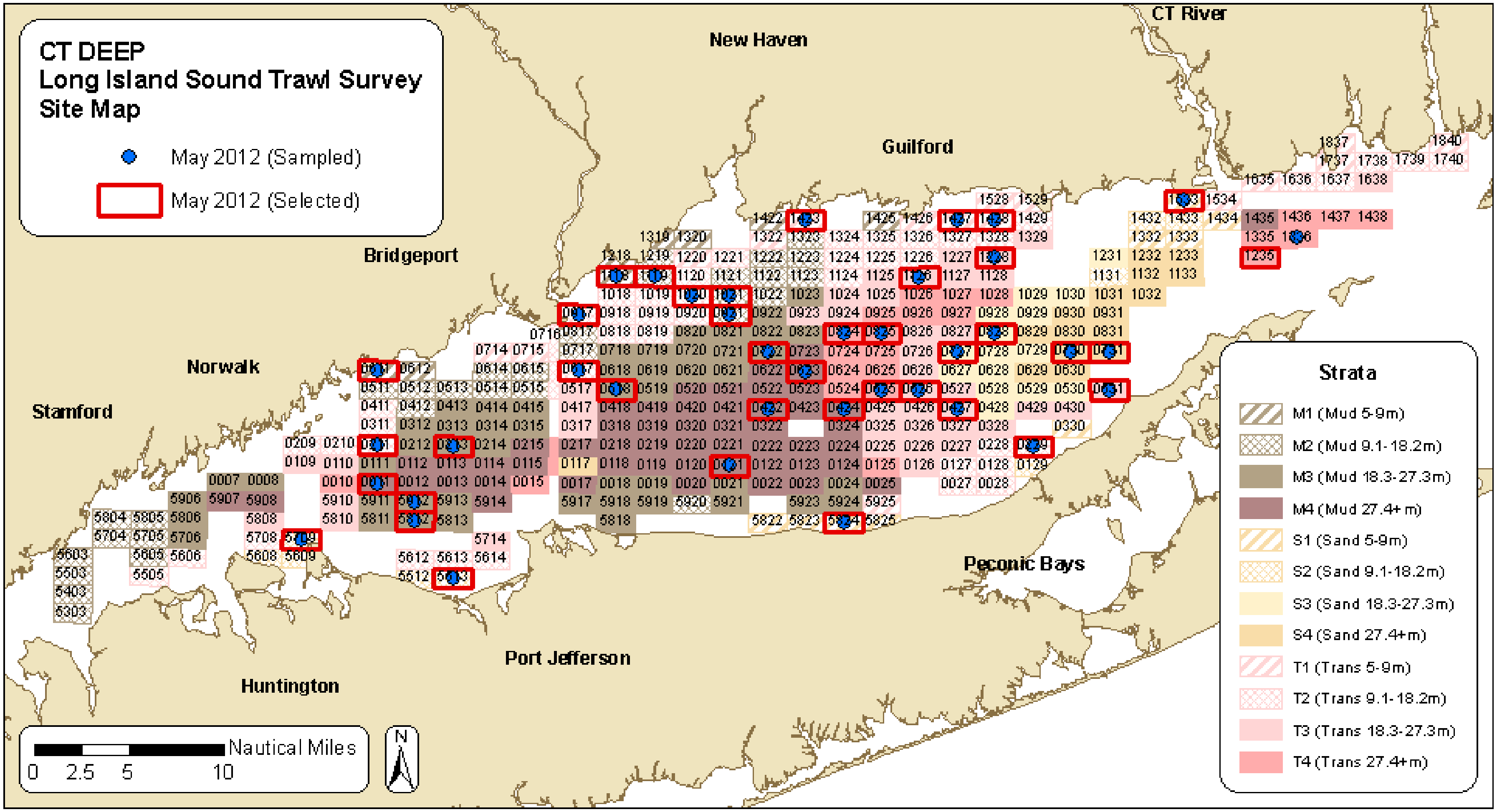
Figure 2.1. Trawl Survey site grid. *Each sampling site is 1x2 nmi (nautical miles). A four-digit number identifies the site: the first two digits are the row numbers (corresponding to minutes of latitude) and the last two digits are the column numbers (corresponding to two nautical miles in length on 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 2012 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.*



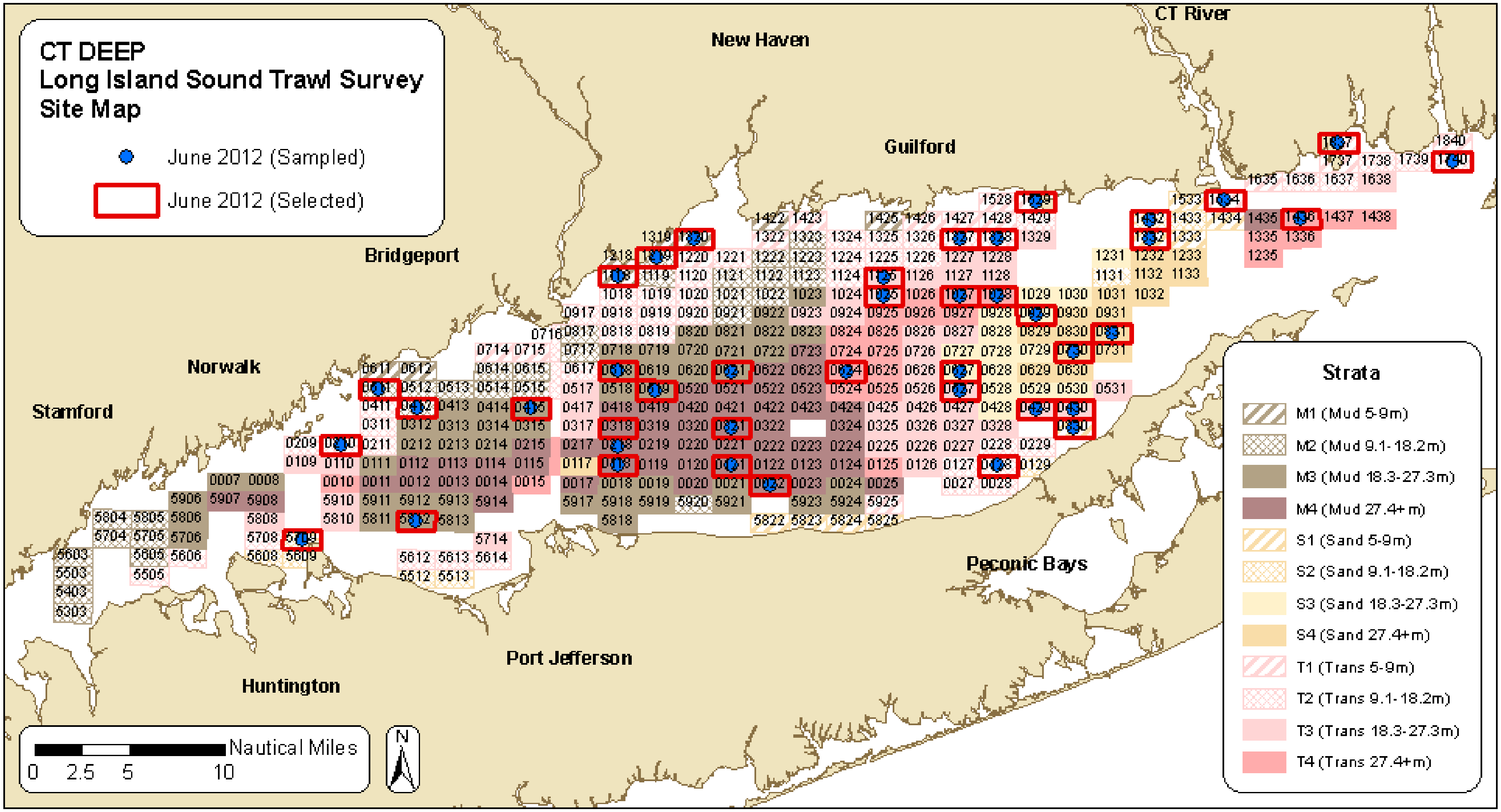
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
No sites were moved during this cruise.					

Figure 2.3. May 2012 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.*



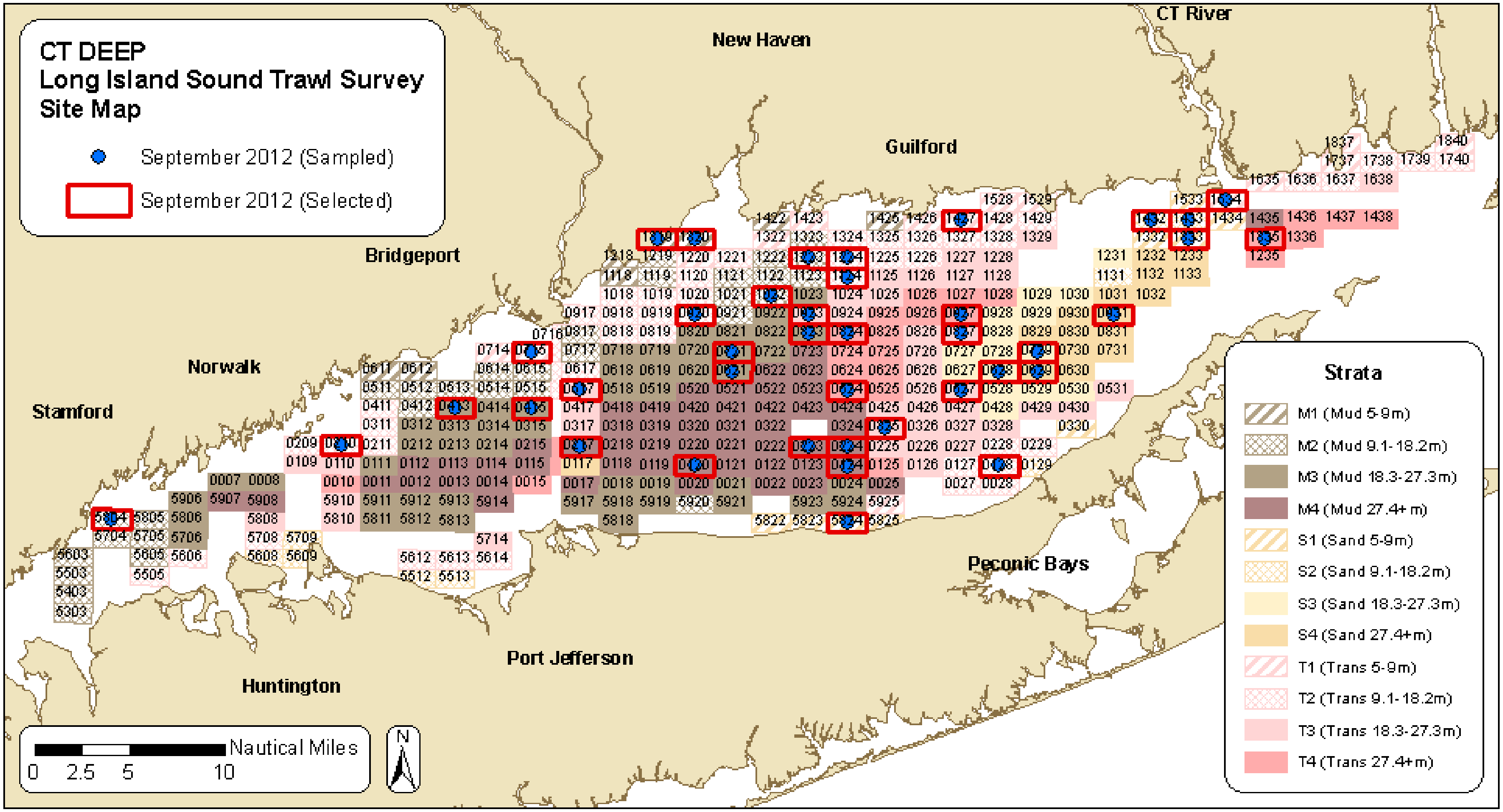
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
SP2012047	1336	T4	1235	T4	problem with tow coordinates

Figure 2.4. June 2012 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.*



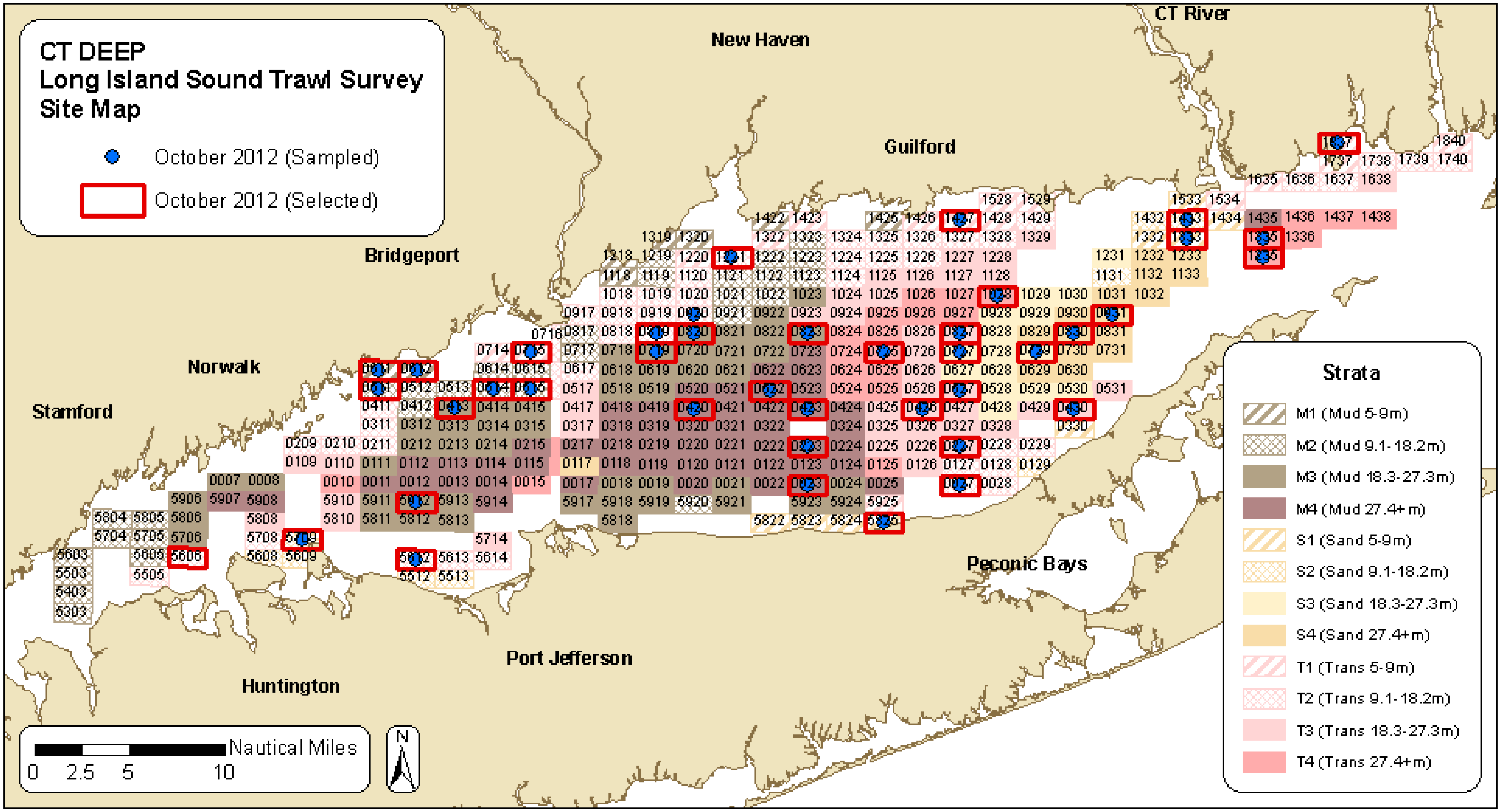
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
SP2012113	0218	M4	0318	M4	problem with tow coordinates

Figure 2.5. September 2012 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 2012 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
FA2012080	0920	T2	5606	T2	ran out of time to complete October cruise so could not continue to go further west

Figure 2.7. Number of finfish species observed annually, 1984-2012. *Note: there was no October sampling in 2006 and there was no June, September or October sampling in 2010. Average number of finfish species caught per year is 57.6 for the time-series. See Table 2.4 for details on number of tows completed each year.*

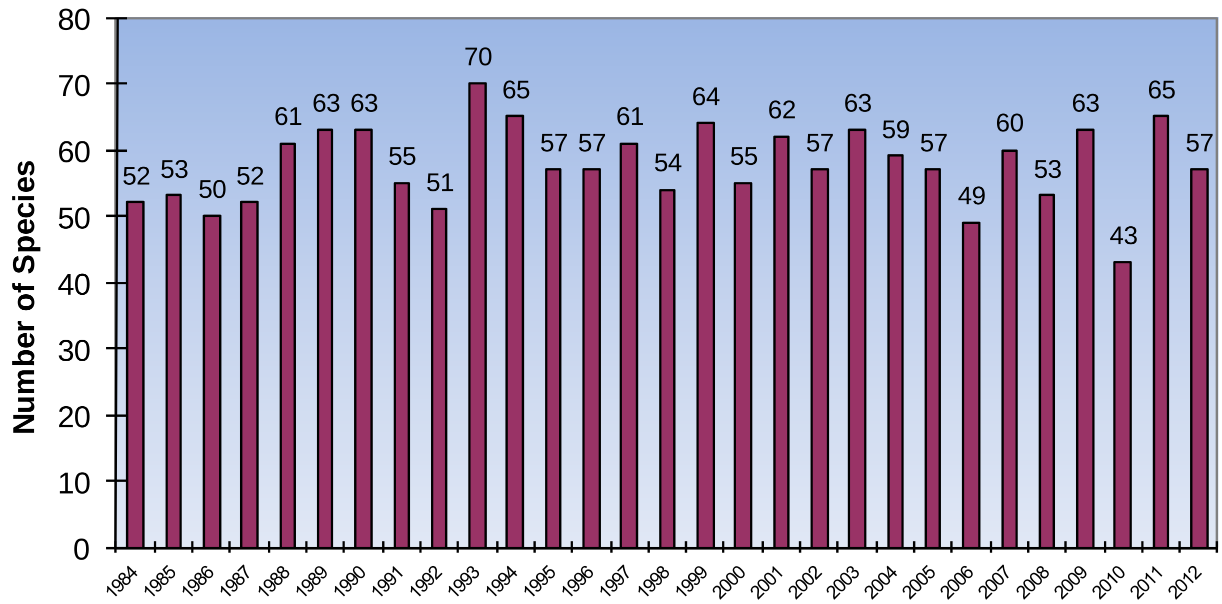
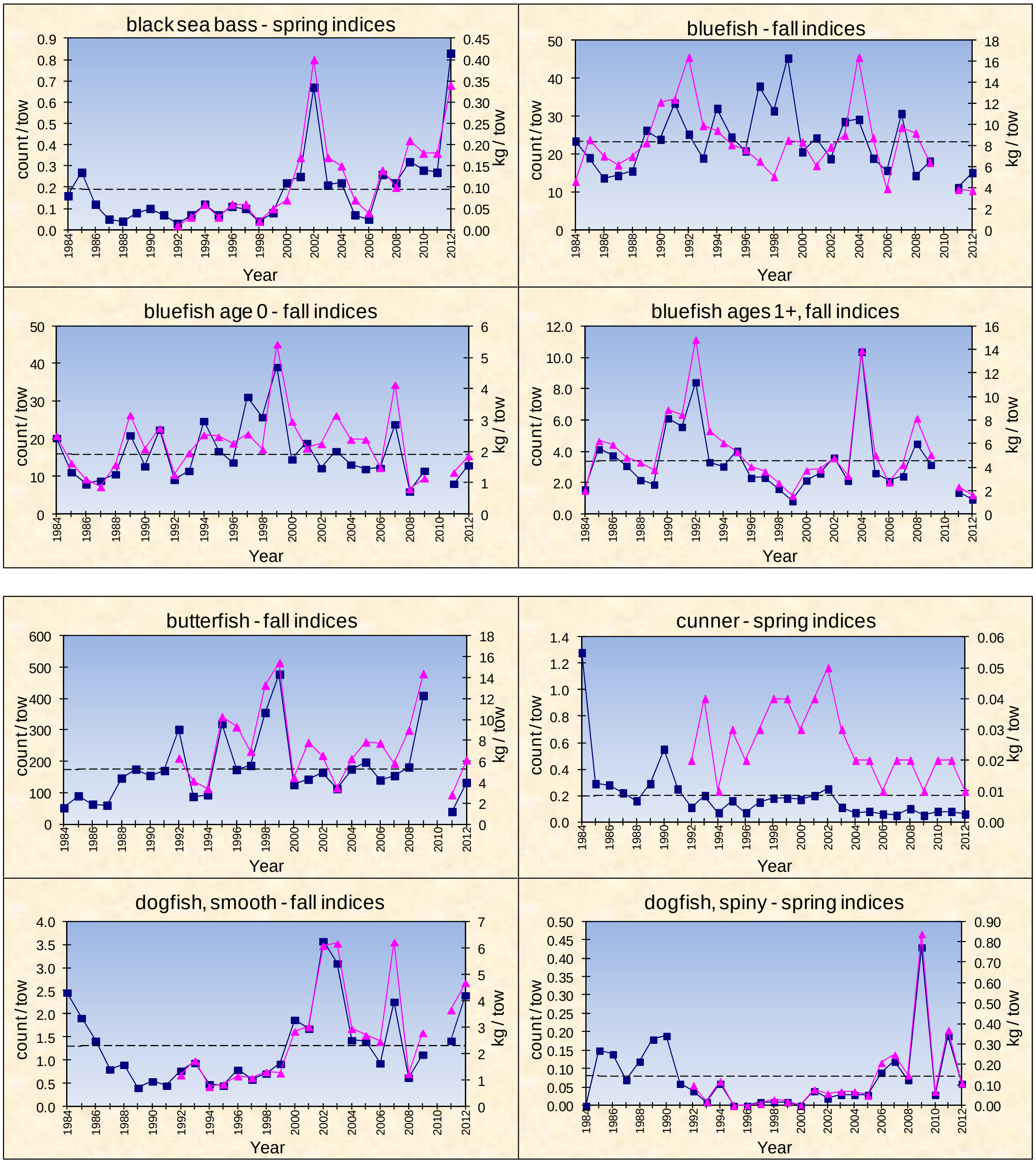


Figure 2.8. Plots of abundance indices for: black sea bass, bluefish (total, age 0, and ages 1+), butterfish, cunner, and dogfish (smooth and spiny).



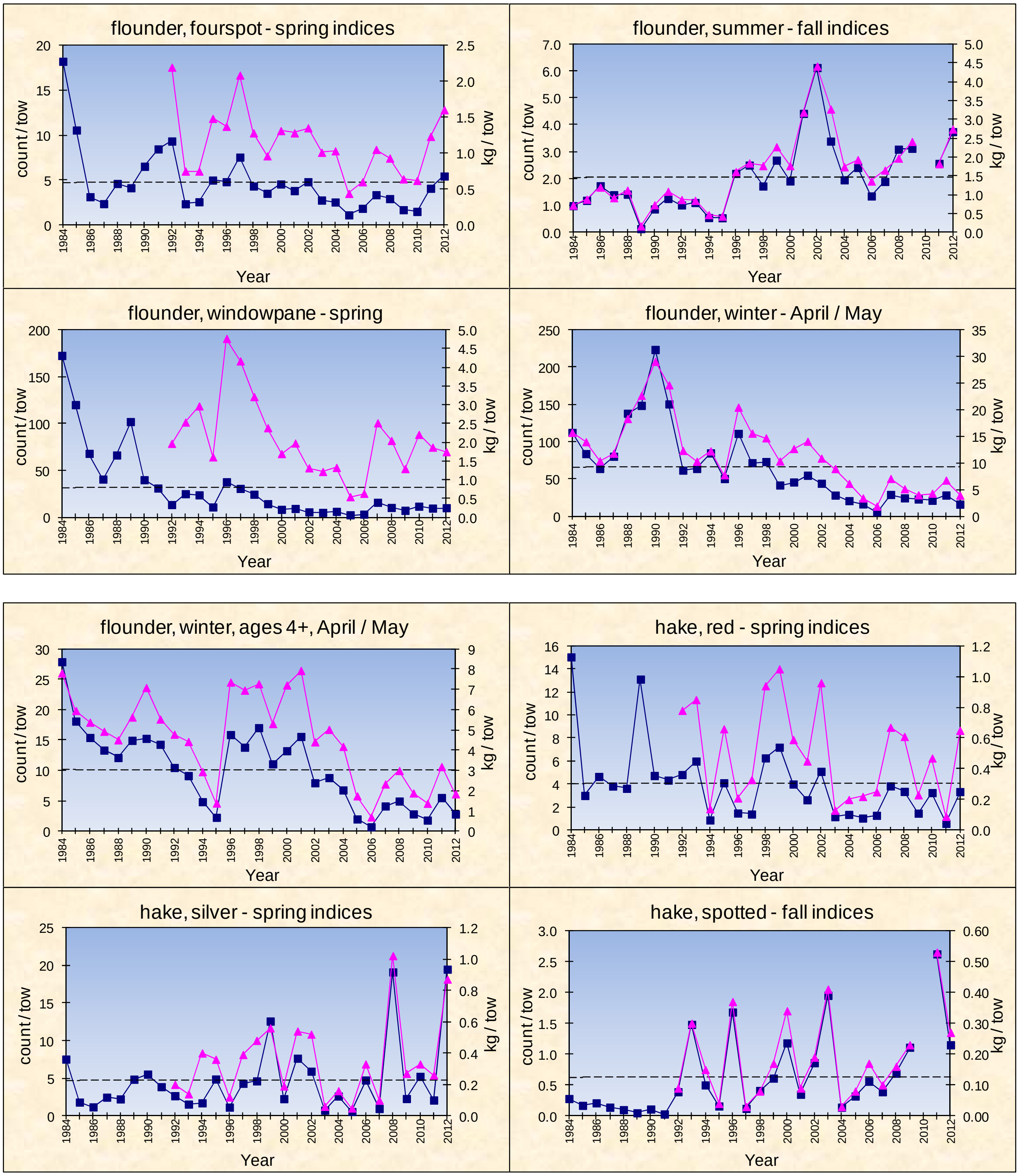
Legend:

■ = count / tow

▲ = kg / tow

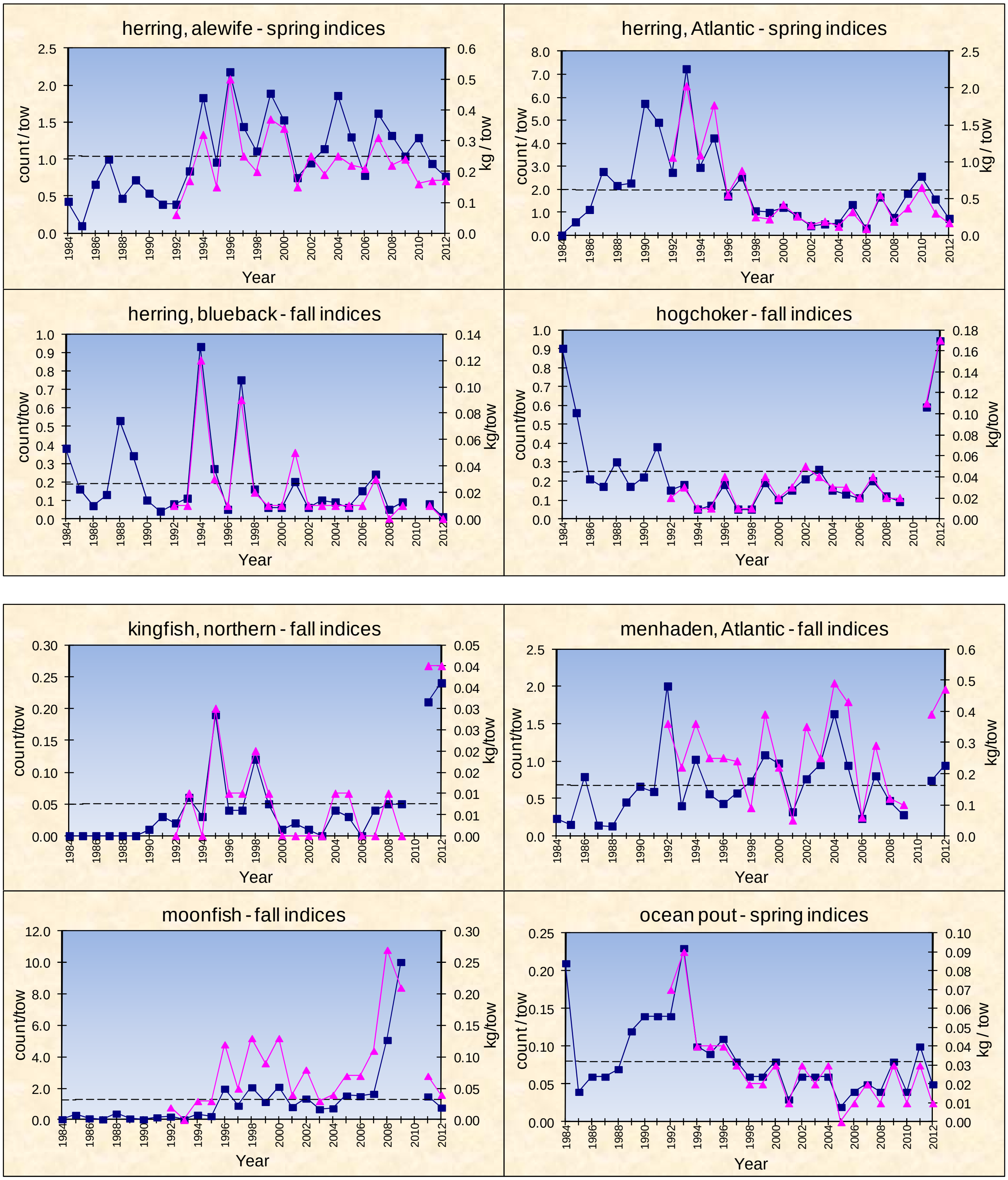
---- = mean count / tow

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



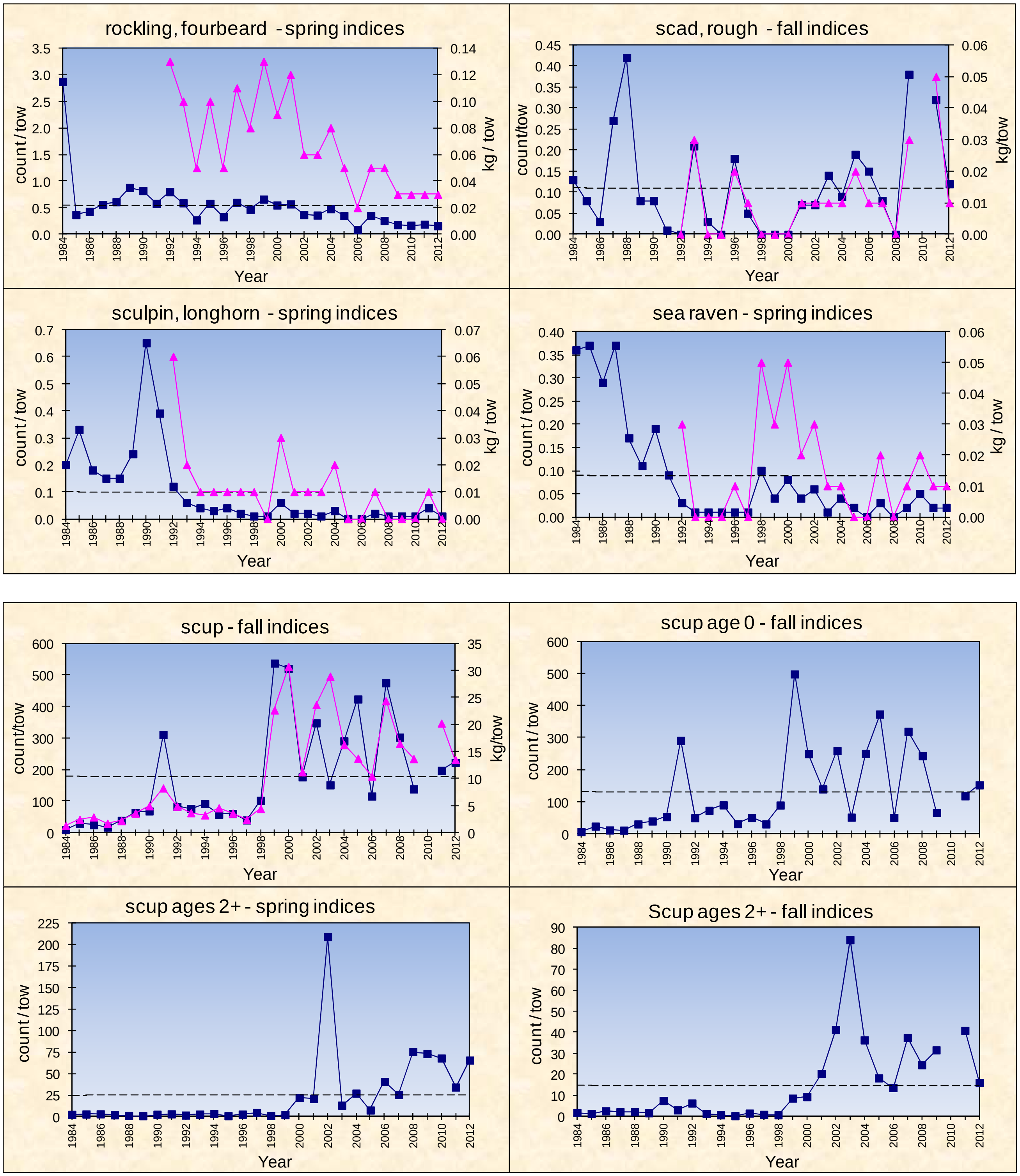
Legend:
■ = count / tow
▲ = kg / tow
---- = mean count / tow

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



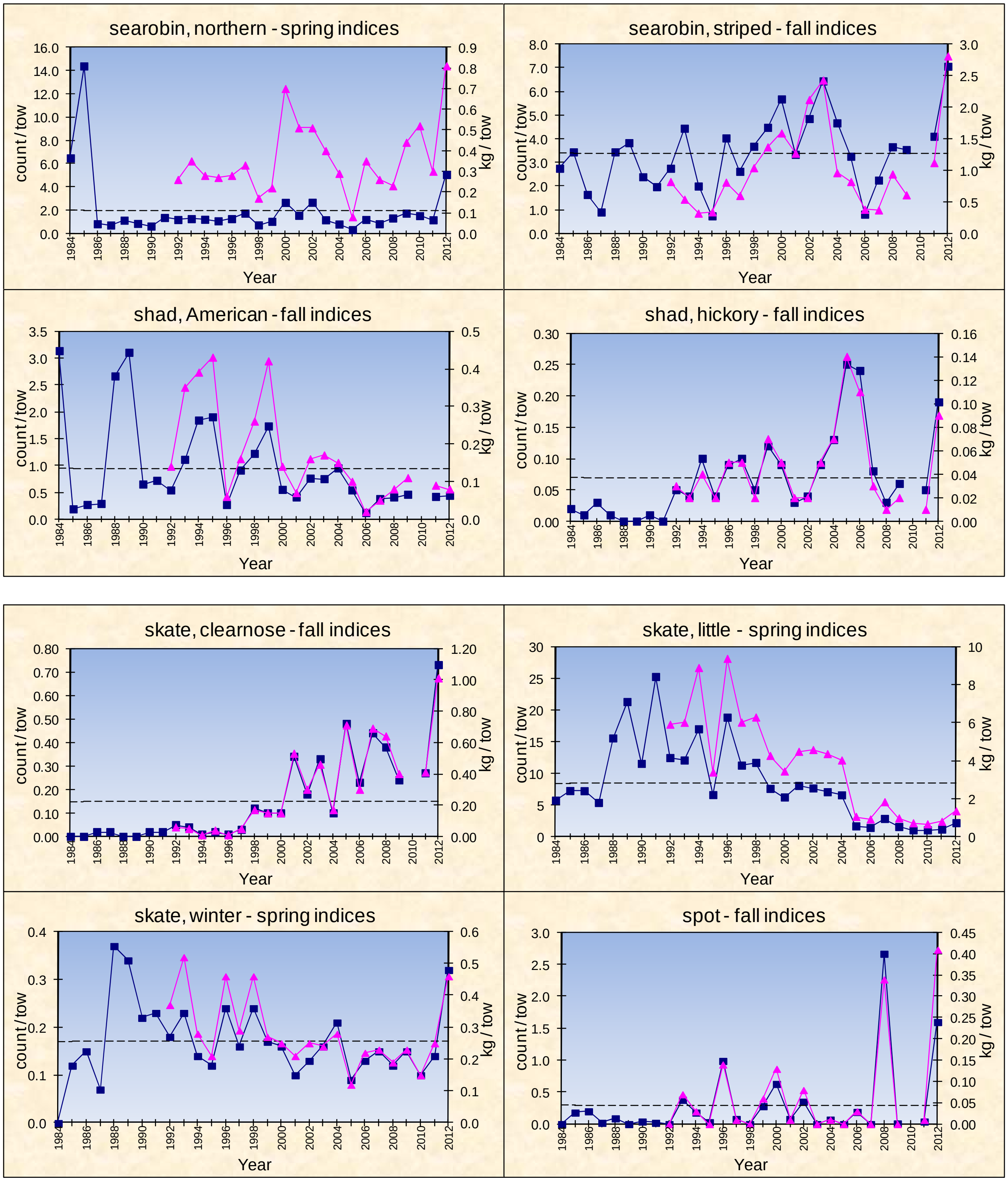
Legend:
■ = count / tow
▲ = kg / tow
---- = mean count / tow

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.



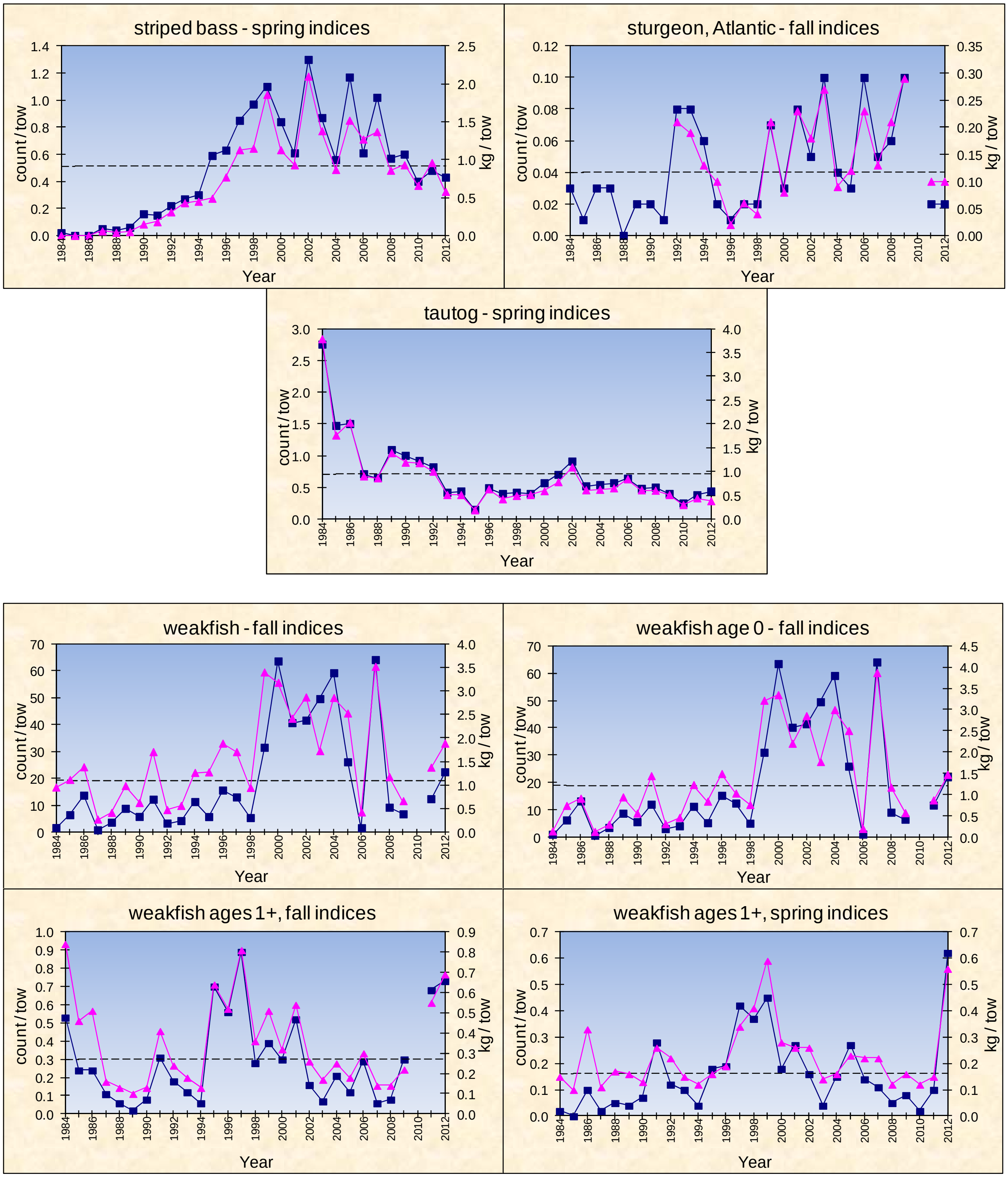
Legend:

■ = count / tow

▲ = kg / tow

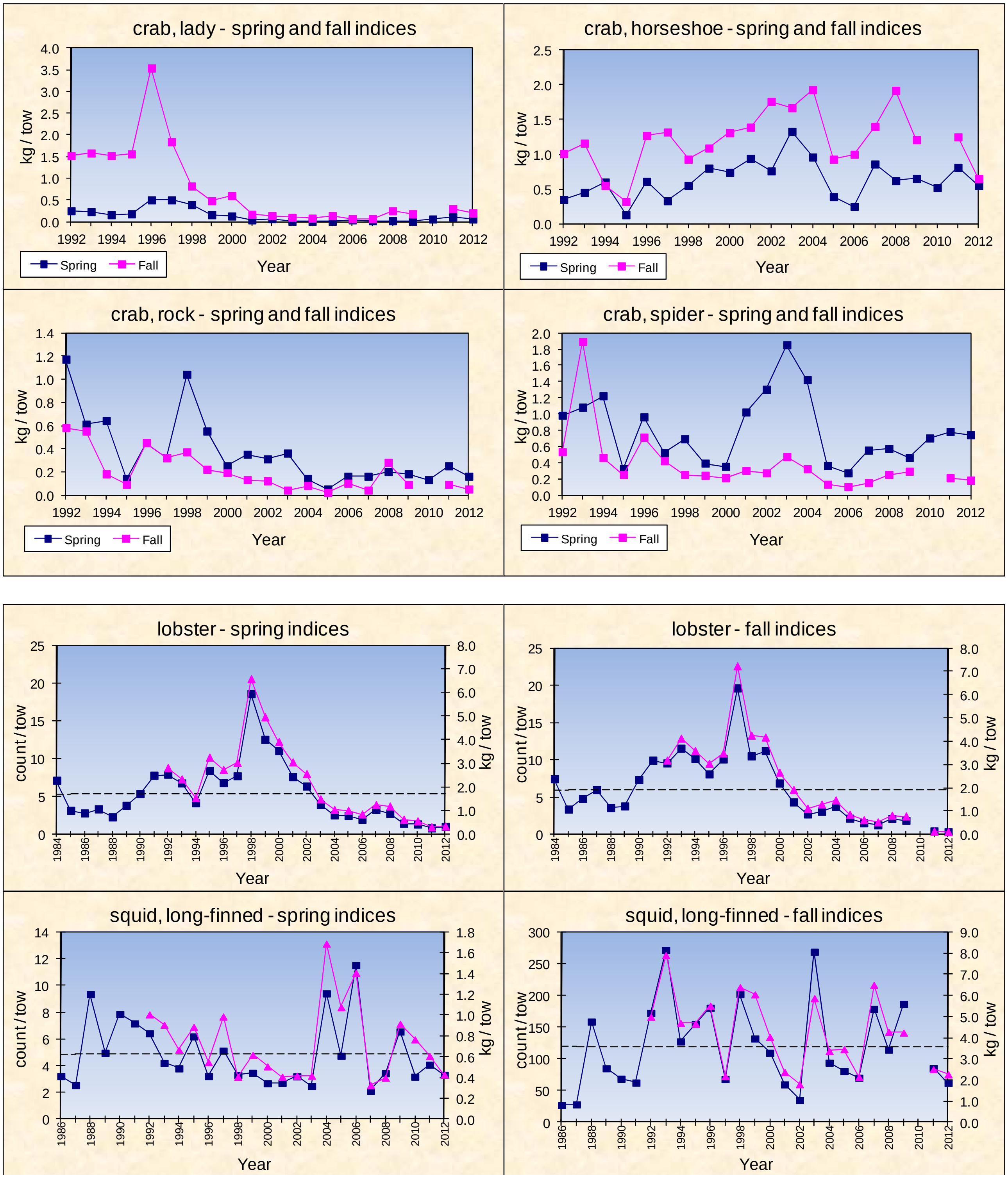
---- = mean count / tow

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.



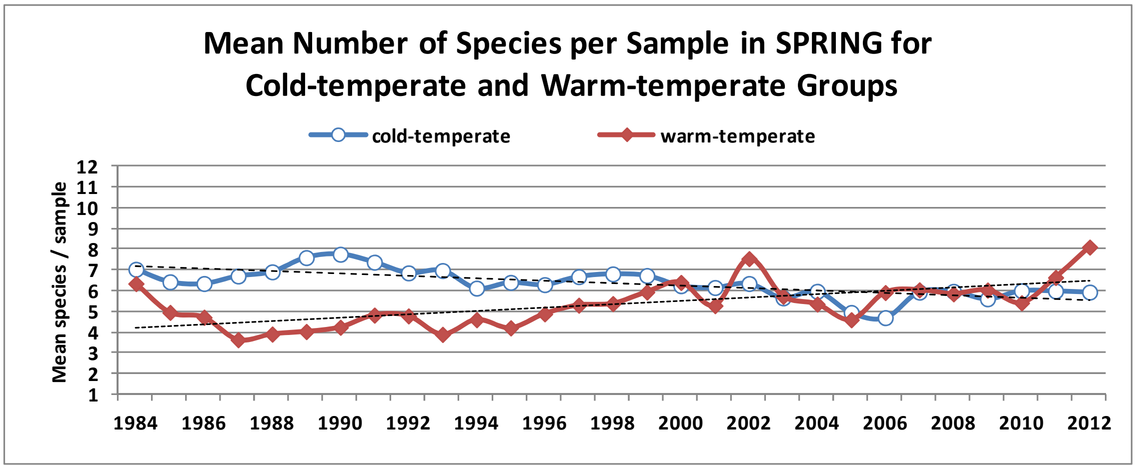
Legend for bottom four graphs:

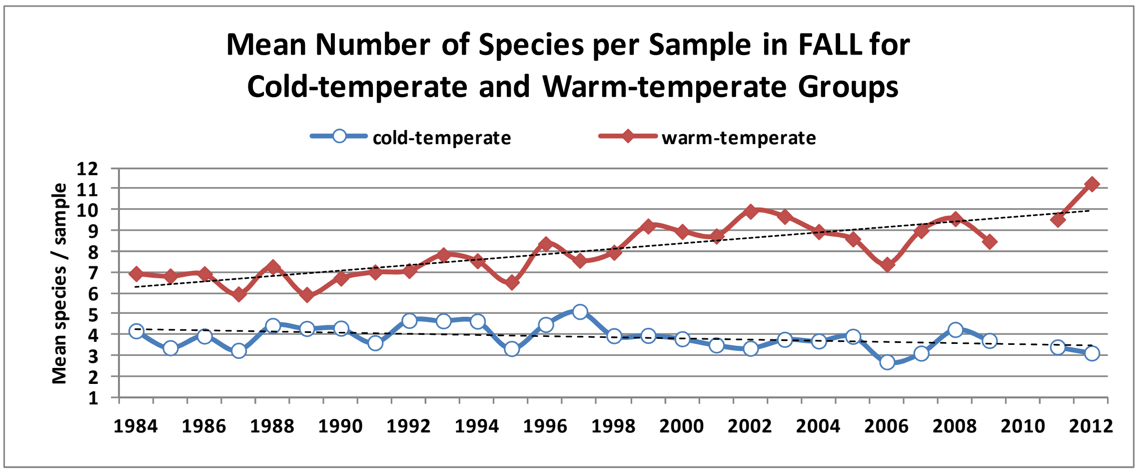
■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.15. Trends in the number of species in cold temperate and warm temperate species groups in the spring and fall LIS Trawl Survey. See Appendix 2.5 for list of species included in analysis.





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-three finfish species from 1984-2012. *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
pinfish	***Lagodon rhomboides***	LISTS
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

Appendix 2.1 cont.

Common Name	Scientific Name	Survey
sandbar (brown) shark	*Carcharhinus plumbeus*	LISTS
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, 1984-2012.

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	2012	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	200	**6,148**
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	1,296	**31,709**
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	3	**292**
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	93	**56,183**
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	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	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	410	**2,208**
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	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	27	**90**
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	3,851	**180,075**
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	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	0	**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	60,539	**1,957,694**
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	0	**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	0	**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	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	0	**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	20	**1,985**
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	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	0	**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	610	**13,551**
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	16	**2,205**
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	0	**9**
eel, american (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	0	0	1	0	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	1	**18**
eel, conger (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	1	0	0	0	0	0	0	0	1	**2**
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	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	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	0	**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	2,597	**62,716**
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	258	**1,500**
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	980	**15,447**
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	3,536	**256,352**
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	3,365	**428,502**
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	0	**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	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	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	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	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	2	**83**
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	0	**59**

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	2012	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	200	**6,148**
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	1	**104**
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	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	1,720	**59,838**
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	7,519	**60,925**
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	626	**10,703**
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	708	**20,998**
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	571	**87,835**
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	46	**7,410**
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	2	**86**
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	340	**2,853**
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	2	**48**
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	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	59	**206**
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	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	0	**98**
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	349	**180,546**
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	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	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	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	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	426	**11,242**
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	262	**12,433**
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	**2**
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	14	**619**
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	0	**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	1	**31**
pinfish	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	**2**
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	1	**76**
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	0	**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	**2**
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	47	**201**
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	43	**5,378**
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	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	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	2	**31,763**
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	0	**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	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	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	19	**1,054**
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	0	**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	1	**914**
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	34,457	53,119	**1,120,225**
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	5	**549**

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	2012	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	200	**6,148**
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	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	3,642	**29,376**
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	2,973	**43,795**
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	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	3	**32**
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	321	**23,519**
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	1	**9**
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	42	**843**
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	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	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	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	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	280	**989**
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	1,406	**115,555**
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	97	**1,456**
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	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	858	**2,013**
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	9,767	**529,161**
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	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	1	**8**
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	170	**5,946**
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	7	**444**
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	135	**9,901**
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	0	**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	0	**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	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	6,785	**179,665**
Total	**122,527**	**152,574**	**153,383**	**136,139**	**216,479**	**294,026**	**277,183**	**174,235**	**186,975**	**230,301**	**204,795**	**163,532**	**165,756**	**170,557**	**257,779**	**392,447**	**271,189**	**170,580**	**227,225**	**129,982**	**240,860**	**200,290**	**108,214**	**204,971**	**164,647**	**235,560**	**39,235**	**145,949**	**169,976**	**5,607,364**

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	2012	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	200	3,969
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	8.6	**145.1**
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	0.2	**8.5**
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	1.0	0.4	**22.4**
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	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	0.0	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	141.0	**837.2**
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	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	2.7	**7.1**
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	532.7	**25,006.7**
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	0.0	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	0.0	**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	1,600.8	1,891.3	**38,573.5**
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	0.0	**21.2**
Gadus spp. (yoy/larvae)	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	1.5	0	0	0	1.8	0.3	0.4	0	**4.0**
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	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	0.0	**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	2.8	**85.7**
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	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	0.0	**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	2,031.7	1,833.3	**27,185.1**
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	62.8	**2,158.0**
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	0.0	0.0	**3.1**
eel, American (yoy)	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	**0.1**
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	0.3	**4.9**
eel, conger (yoy)	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.2**
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	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	0.0	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	0.0	**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	454.5	**6,027.0**
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	7.5	**65.3**
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	713.0	718.5	**9,563.9**
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	501.1	**10,293.8**
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	604.9	**29,649.4**
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	0.0	**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	0.0	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	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	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	0.0	0.8	**17.5**
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	0.0	**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	0.1	**3.3**

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	2012	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	200	3,969
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	0.0	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	148.6	**2,548.1**
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	171.0	**1,388.2**
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	64.2	**821.6**
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	61.5	**6,658.2**
herring, Atlantic (yoy-est)	nw	nw	nw	nw	nw	nw	nw	nw	nw	1.5	1.9	2.8	2.4	1.2	0.2	4.2	0.4	1.9	0.3	0.5	1.2	**18.5**
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	47.0	**1,286.0**
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	1.6	**154.6**
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	0.0	0.1	**1.5**
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	30.7	**165.7**
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	0.2	**3.9**
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	0.0	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	8.4	**23.3**
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	0.0	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	0.0	**9.3**
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	52.0	70.0	**29,138.6**
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	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	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	0.0	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	0.0	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	144.6	**1,454.5**
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	3.6	**143.7**
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	0.1	**0.2**
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	2.0	**97.7**
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	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	0.2	**4.6**
pinfish	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	0.0	0.2	**0.2**
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	0.1	**4.4**
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	0.0	**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	0.1	**0.2**
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	3.1	**10.8**
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	4.0	3.5	**223.4**
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	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	0.2	**25.7**
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	0.0	**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	0.0	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	0.0	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	1.1	**24.5**
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	0.0	**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	2.0	0.2	**36.1**
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	6,759.5	6,170.2	**88,143.9**
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	1.1	**54.3**
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	0.0	**0.1**

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	2012	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	200	3,969
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	405.2	**2,745.0**
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	1,086.4	**9,760.2**
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	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	0.3	**2.7**
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	25.3	**1,011.2**
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	0.1	**0.9**
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	14.1	**245.0**
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	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	0.0	0.0	**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	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	491.7	**1,841.7**
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	657.9	**29,932.7**
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	179.8	**2,527.8**
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	0.0	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	107.5	**194.3**
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	333.9	**13,427.4**
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	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	13.0	5.0	**106.0**
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	278.0	**10,887.6**
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	154.2	**5,508.6**
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	128.9	**7,124.7**
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	0.0	**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	0.0	**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	0.0	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	409.2	**6,600.3**
Total	**14,031.0**	**19,406.4**	**18,216.5**	**13,905.2**	**17,669.1**	**17,291.1**	**19,646.7**	**23,279.9**	**21,927.8**	**20,878.1**	**31,350.9**	**18,959.6**	**20,496.9**	**13,526.3**	**11,027.8**	**18,715.6**	**14,889.7**	**19,649.0**	**4,700.1**	**16,639.2**	**17,975.9**	**374,182.8**

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

species	count	%	weight	%
Invertebrates				
American lobster	2865	100	.	.
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	%
butterfish	25,192	28.0	.	.
windowpane flounder	18,848	20.9	.	.
winter flounder	15,341	17.0	.	.
scup	7,910	8.8	.	.
weakfish	5,427	6.0	.	.
little skate	3,210	3.6	.	.
bluefish	2,789	3.1	.	.
red hake	2,657	3.0	.	.
Atlantic herring	1,999	2.2	.	.
fourspot flounder	1,487	1.7	.	.
striped searobin	886	1.0	.	.
silver hake	723	0.8	.	.
tautog	566	0.6	.	.
smooth dogfish	430	0.5	.	.
summer flounder	414	0.5	.	.
northern searobin	396	0.4	.	.
American shad	344	0.4	.	.
Atlantic menhaden	318	0.4	.	.
blueback herring	256	0.3	.	.
alewife	216	0.2	.	.
fourbeard rockling	123	0.1	.	.
cunner	76	0.1	.	.
sea raven	70	0.1	.	.
hogchoker	60	0.1	.	.
longhorn sculpin	51	0.1	.	.
spiny dogfish	47	0.1	.	.

species	count	%	weight	%
winter skate	32	0	.	.
spotted hake	30	0	.	.
black sea bass	28	0	.	.
spot	25	0	.	.
Atlantic mackerel	19	0	.	.
moonfish	14	0	.	.
ocean pout	14	0	.	.
oyster toadfish	9	0	.	.
hickory shad	6	0	.	.
rough scad	5	0	.	.
Atlantic sturgeon	4	0	.	.
clearnose skate	2	0	.	.
American eel	1	0	.	.
goosefish	1	0	.	.
grubby	1	0	.	.
northern pipefish	1	0	.	.
northern puffer	1	0	.	.
smallmouth flounder	1	0	.	.
striped bass	1	0	.	.
Total	**90,031**		-	

Invertebrates

species	count	%	weight	%
American lobster	2,553	28.1	.	.
long-finned squid	6,537	71.9	.	.
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	%
winter flounder	15,600	25.6	.	.
butterfish	14,674	24.1	.	.
windowpane flounder	11,031	18.1	.	.
scup	5,029	8.3	.	.
bluefish	2,611	4.3	.	.
little skate	2,140	3.5	.	.
red hake	1,729	2.8	.	.
Atlantic herring	1,628	2.7	.	.
fourspot flounder	1,298	2.1	.	.
silver hake	906	1.5	.	.
alewife	754	1.2	.	.
striped searobin	543	0.9	.	.
summer flounder	374	0.6	.	.
American shad	371	0.6	.	.
tautog	363	0.6	.	.
Atlantic menhaden	329	0.5	.	.
smooth dogfish	257	0.4	.	.
weakfish	248	0.4	.	.
fourbeard rockling	241	0.4	.	.
northern searobin	220	0.4	.	.
sea raven	86	0.1	.	.
blueback herring	79	0.1	.	.
cunner	79	0.1	.	.
hogchoker	61	0.1	.	.
rough scad	48	0.1	.	.
longhorn sculpin	32	0.1	.	.
spotted hake	22	0	.	.
spiny dogfish	19	0	.	.
ocean pout	14	0	.	.
black sea bass	13	0	.	.
winter skate	13	0	.	.
striped bass	10	0	.	.
Atlantic tomcod	8	0	.	.
smallmouth flounder	7	0	.	.
moonfish	6	0	.	.
rock gunnel	4	0	.	.
Atlantic sturgeon	4	0	.	.
spot	3	0	.	.
clearnose skate	2	0	.	.
hickory shad	2	0	.	.
Atlantic bonito	1	0	.	.
Atlantic mackerel	1	0	.	.
round herring	1	0	.	.
sea lamprey	1	0	.	.
Total	**60,862**		-	

species	count	%	weight	%
Invertebrates				
American lobster	3,544	25.1	.	.
long-finned squid	10,552	74.9	.	.
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	%
butterfish	47,089	29.3	.	.
winter flounder	32,361	20.2	.	.
windowpane flounder	25,109	15.6	.	.
scup	17,391	10.8	.	.
bluefish	8,649	5.4	.	.
little skate	7,079	4.4	.	.
red hake	5,689	3.5	.	.
weakfish	5,496	3.4	.	.
American shad	1,977	1.2	.	.
fourspot flounder	1,877	1.2	.	.
striped searobin	1,763	1.1	.	.
silver hake	1,697	1.1	.	.
Atlantic herring	1,154	0.7	.	.
tautog	600	0.4	.	.
fourbeard rockling	397	0.2	.	.
blueback herring	307	0.2	.	.
northern searobin	297	0.2	.	.
Atlantic mackerel	237	0.1	.	.
Atlantic menhaden	230	0.1	.	.
smooth dogfish	202	0.1	.	.
alewife	190	0.1	.	.
longhorn sculpin	107	0.1	.	.
cunner	106	0.1	.	.
hogchoker	91	0.1	.	.
winter skate	91	0.1	.	.
spiny dogfish	66	0	.	.
ocean pout	58	0	.	.
bigeye scad	45	0	.	.
moonfish	42	0	.	.
summer flounder	35	0	.	.
sea raven	34	0	.	.
black sea bass	15	0	.	.
rough scad	11	0	.	.
striped bass	11	0	.	.
yellow jack	11	0	.	.
goosefish	9	0	.	.
smallmouth flounder	9	0	.	.
rock gunnel	8	0	.	.
grubby	7	0	.	.
spotted hake	7	0	.	.
rainbow smelt	4	0	.	.
planehead filefish	3	0	.	.
Atlantic sturgeon	3	0	.	.
Atlantic tomcod	3	0	.	.
bigeye	2	0	.	.
American eel	2	0	.	.
short bigeye	2	0	.	.
oyster toadfish	2	0	.	.
white perch	2	0	.	.
northern sennet	1	0	.	.
northern puffer	1	0	.	.
banded rudderfish	1	0	.	.
Spanish mackerel	1	0	.	.
Total	**160,581**		-	
Invertebrates				
American lobster	3,447	19.9	.	.
long-finned squid	13,883	80.1	.	.
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	%
scup	45,790	29.9	.	.
butterfish	40,537	26.4	.	.
winter flounder	26,623	17.4	.	.
windowpane flounder	8,482	5.5	.	.
little skate	6,479	4.2	.	.
bluefish	5,845	3.8	.	.
weakfish	4,320	2.8	.	.
Atlantic herring	4,003	2.6	.	.
fourspot flounder	3,553	2.3	.	.
red hake	2,085	1.4	.	.
silver hake	1,537	1.0	.	.
striped searobin	865	0.6	.	.
northern searobin	609	0.4	.	.
tautog	501	0.3	.	.
American shad	361	0.2	.	.
Atlantic menhaden	348	0.2	.	.
summer flounder	263	0.2	.	.
smooth dogfish	193	0.1	.	.
fourbeard rockling	163	0.1	.	.
longhorn sculpin	139	0.1	.	.
hogchoker	104	0.1	.	.
alewife	103	0.1	.	.
cunner	75	0	.	.
spotted hake	73	0	.	.
winter skate	50	0	.	.
ocean pout	42	0	.	.
black sea bass	39	0	.	.
blueback herring	38	0	.	.
striped bass	38	0	.	.

species	count	%	weight	%
moonfish	24	0	.	.
smallmouth flounder	20	0	.	.
sea raven	19	0	.	.
spiny dogfish	14	0	.	.
yellow jack	11	0	.	.
goosefish	8	0	.	.
northern puffer	5	0	.	.
northern kingfish	4	0	.	.
Atlantic tomcod	4	0	.	.
Atlantic sturgeon	3	0	.	.
clearnose skate	2	0	.	.
Atlantic mackerel	2	0	.	.
mackerel scad	2	0	.	.
rainbow smelt	2	0	.	.
Spanish mackerel	2	0	.	.
spot	2	0	.	.
bigeye scad	1	0	.	.
planehead filefish	1	0	.	.
hickory shad	1	0	.	.
red goatfish	1	0	.	.
rough scad	1	0	.	.
sea lamprey	1	0	.	.
oyster toadfish	1	0	.	.
Total	**153,389**		-	
Invertebrates				
American lobster	8,524	40.9	.	.
long-finned squid	12,322	59.1	.	.
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
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**	

species	count	%	weight	%
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
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	count	%	weight	%
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	%
butterfish	33,538	28.7	776.8	6.3
scup	25,451	21.8	660.8	5.4
winter flounder	20,615	17.6	1,992.2	16.2
bluefish	7,703	6.6	1,159.8	9.4
windowpane flounder	6,062	5.2	574.5	4.7
little skate	5,604	4.8	2,565.3	20.9
Atlantic herring	3,836	3.3	768.6	6.3
weakfish	3,320	2.8	160.0	1.3
silver hake	1,703	1.5	112.9	0.9
fourspot flounder	1,494	1.3	195.6	1.6
American shad	1,289	1.1	133.2	1.1
alewife	1,211	1.0	75.0	0.6
blueback herring	1,052	0.9	26.6	0.2
striped searobin	927	0.8	183.6	1.5
northern searobin	800	0.7	63.7	0.5
red hake	490	0.4	54.0	0.4
smooth dogfish	310	0.3	816.3	6.6
Atlantic menhaden	276	0.2	61.4	0.5
summer flounder	242	0.2	141.6	1.2
tautog	207	0.2	346.5	2.8
spotted hake	148	0.1	25.7	0.2
moonfish	93	0.1	2.6	0
fourbeard rockling	92	0.1	8.4	0.1
striped bass	81	0.1	198.6	1.6
Atlantic sturgeon	60	0.1	848.6	6.9
spiny dogfish	55	0	186.2	1.5
ocean pout	42	0	9.1	0.1
hogchoker	36	0	3.8	0
black sea bass	33	0	10.9	0.1
winter skate	33	0	101.5	0.8
American sand lance	25	0	0.6	0
Spanish mackerel	25	0	1.7	0
cunner	18	0	1.3	0
smallmouth flounder	15	0	1.3	0
hickory shad	14	0	3.7	0
rough scad	13	0	0.2	0
Atlantic mackerel	11	0	0.9	0
spot	11	0	1.1	0
rainbow smelt	9	0	0.6	0
crevalle jack	8	0	0.5	0
goosefish	8	0	2.0	0
northern kingfish	7	0	0.5	0
longhorn sculpin	7	0	1.6	0
grubby	5	0	0.3	0
mackerel scad	4	0	0.4	0
Atlantic silverside	3	0	0.3	0
bigeye scad	2	0	0.2	0
lookdown	2	0	0.2	0
northern puffer	2	0	0.2	0
Atlantic tomcod	2	0	0.3	0
bigeye	1	0	0.1	0
clearnose skate	1	0	1.8	0
inshore lizardfish	1	0	0.1	0
northern pipefish	1	0	0.1	0
rock gunnel	1	0	0.1	0
sea raven	1	0	0.2	0
white perch	1	0	0.3	0
yellow jack	1	0	0.1	0
Total	**117,002**		**12,284.5**	
Invertebrates				
American lobster	7,057	31.6	1,533.9	38.6
long-finned squid	15,299	68.4	594.8	15.0
horseshoe crab	nc	nc	386.7	9.7
blue mussel	nc	nc	377.5	9.5
lady crab	nc	nc	338.5	8.5
spider crab	nc	nc	335.0	8.4
rock crab	nc	nc	136.8	3.4
starfish spp.	nc	nc	124.6	3.1
flat claw hermit crab	nc	nc	51.4	1.3
northern moon snail	nc	nc	34.6	0.9
common oyster	nc	nc	18.4	0.5
whelks	nc	nc	14.1	0.4
mantis shrimp	nc	nc	9.8	0.2
lion's mane jellyfish	nc	nc	4.2	0.1
bluecrab	nc	nc	3.7	0.1
arks	nc	nc	3.0	0.1
boring sponge	nc	nc	1.9	0
hard clams	nc	nc	1.3	0
bushy bryozoan	nc	nc	0.6	0
mud crabs	nc	nc	0.3	0
surf clam	nc	nc	0.3	0
purple sea urchin	nc	nc	0.1	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	%
butterfish	64,930	50.1	1,664.5	15.2
winter flounder	15,558	12.0	1,614.7	14.7
scup	13,985	10.8	770.5	7.0
Atlantic herring	9,135	7.0	1,631.7	14.9
bluefish	5,524	4.3	1,156.1	10.5
windowpane flounder	3,815	2.9	356.2	3.2
weakfish	2,881	2.2	275.7	2.5
fourspot flounder	2,584	2.0	402.9	3.7
little skate	2,372	1.8	1,055.3	9.6
red hake	1,977	1.5	145.6	1.3
silver hake	1,941	1.5	61.6	0.6
northern searobin	1,317	1.0	166.9	1.5
American shad	755	0.6	81.4	0.7
striped searobin	682	0.5	277.5	2.5
alewife	386	0.3	24.6	0.2
Atlantic menhaden	318	0.2	41.9	0.4
blueback herring	255	0.2	7.5	0.1
fourbeard rockling	169	0.1	14.7	0.1
smooth dogfish	168	0.1	566.8	5.2
striped bass	165	0.1	185.3	1.7
summer flounder	121	0.1	79.6	0.7
American sand lance	95	0.1	0.4	0
spotted hake	72	0.1	6.5	0.1
tautog	61	0	95.1	0.9
cunner	41	0	4.4	0
winter skate	41	0	89.2	0.8
Atlantic silverside	39	0	0.9	0
moonfish	33	0	2.1	0
yellow jack	32	0	2.1	0
ocean pout	30	0	6.5	0.1
northern kingfish	25	0	2.5	0
smallmouth flounder	19	0	1.2	0
hogchoker	17	0	1.7	0
black sea bass	12	0	4.7	0
hickory shad	6	0	2.5	0
Atlantic sturgeon	6	0	145.5	1.3
longhorn sculpin	5	0	1.3	0
clearnose skate	4	0	11.0	0.1
goosefish	4	0	3.3	0
rainbow smelt	4	0	0.3	0
Atlantic tomcod	4	0	0.8	0
spot	3	0	0.3	0
Atlantic cod	2	0	0.1	0
conger eel	2	0	1.2	0
haddock	2	0	0.2	0
northern pipefish	2	0	0.1	0
sea raven	2	0	0.7	0
African pompano	1	0	0.1	0
crevalle jack	1	0	0.1	0
grubby	1	0	0.1	0
Atlantic mackerel	1	0	0.1	0
mackerel scad	1	0	0.1	0
northern puffer	1	0	0.1	0
oyster toadfish	1	0	0.5	0
yellowtail flounder	1	0	0.1	0
Total	**129,609**		**10,966.8**	

species	count	%	weight	%
Invertebrates				
American lobster	9,944	29.3	2,141.9	55.1
long-finned squid	23,974	70.7	796.4	20.5
lady crab	nc	nc	535.0	13.8
horseshoe crab	nc	nc	116.8	3
spider crab	nc	nc	95.4	2.5
lion's mane jellyfish	nc	nc	78.3	2
rock crab	nc	nc	47.0	1.2
blue mussel	nc	nc	14.0	0.4
flat claw hermit crab	nc	nc	12.8	0.3
boring sponge	nc	nc	11.2	0.3
whelks	nc	nc	10.8	0.3
mantis shrimp	nc	nc	8.1	0.2
bluecrab	nc	nc	6.0	0.2
northern moon snail	nc	nc	5.8	0.1
starfish spp.	nc	nc	4.7	0.1
arks	nc	nc	1.4	0
hard clams	nc	nc	0.7	0
purple sea urchin	nc	nc	0.7	0
sand shrimp	nc	nc	0.4	0
ghost shrimp	nc	nc	0.3	0
mud crabs	nc	nc	0.2	0
common razor clam	nc	nc	0.1	0
shore shrimp	nc	nc	0.1	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

species	count	%	weight	%
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

species	count	%	weight	%
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
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

species	count	%	weight	%
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	%
scup	101,464	44.4	6,679.0	34.9
butterfish	60,490	26.5	1,458.3	7.6
weakfish	23,595	10.3	554.5	2.9
winter flounder	8,867	3.9	1,921.4	10.0
bluefish	6,135	2.7	1,408.0	7.3
little skate	3,340	1.5	1,604.7	8.4
striped searobin	3,129	1.4	1,036.1	5.4
fourspot flounder	2,590	1.1	398.6	2.1
windowpane flounder	2,488	1.1	368.8	1.9
red hake	2,393	1.0	162.6	0.8
bay anchovy	2,303	1.0	12.2	0.1
northern searobin	2,014	0.9	251.2	1.3
moonfish	1,817	0.8	15.0	0.1
alewife	1,572	0.7	96.0	0.5
spotted hake	1,425	0.6	92.3	0.5
Atlantic herring	770	0.3	124.1	0.6
silver hake	679	0.3	28.8	0.2
summer flounder	555	0.2	471.3	2.5
Atlantic menhaden	492	0.2	31.8	0.2
smooth dogfish	467	0.2	1,038.5	5.4
American shad	316	0.1	25.8	0.1
striped bass	293	0.1	602.6	3.1
tautog	287	0.1	463.5	2.4
spot	204	0.1	17.8	0.1
fourbeard rockling	185	0.1	14.7	0.1
blueback herring	143	0.1	6.8	0
black sea bass	69	0	22.6	0.1
smallmouth flounder	61	0	2.7	0
cunner	50	0	5.3	0
hickory shad	42	0	17.1	0.1
hogchoker	40	0	5.9	0
winter skate	31	0	66.5	0.3
sea raven	19	0	9.2	0
clearnose skate	18	0	37.9	0.2
ocean pout	18	0	4.9	0
longhorn sculpin	14	0	5.0	0
Atlantic sturgeon	7	0	79.0	0.4
oyster toadfish	6	0	2.5	0
northern pipefish	4	0	0.2	0
northern puffer	4	0	0.4	0
American sand lance	4	0	0.3	0
spiny dogfish	4	0	9.9	0.1
rock gunnel	3	0	0.2	0
yellow jack	3	0	0.2	0
Atlantic silverside	2	0	0.1	0
Atlantic mackerel	2	0	0.8	0

species	count	%	weight	%
northern kingfish	2	0	0.3	0
round scad	2	0	0.2	0
bigeye	1	0	0.1	0
Atlantic cod	1	0	0.1	0
goosefish	1	0	0.2	0
inshore lizardfish	1	0	0.1	0
lined seahorse	1	0	0.1	0
white perch	1	0	0.2	0
yellowtail flounder	1	0	0.1	0
Total	**228,425**		**19,156.5**	

Invertebrates

species	count	%	weight	%
American lobster	10,481	36.0	2,184.5	49.9
horseshoe crab	420	1.4	689.4	15.8
long-finned squid	16,585	57.0	582.3	13.3
lady crab	nc	nc	308.4	7.1
spider crab	nc	nc	99.4	2.3
bushy bryozoan	nc	nc	95.2	2.2
rock crab	nc	nc	60.4	1.4
boring sponge	nc	nc	58.6	1.3
mantis shrimp	1,086	3.7	49.0	1.1
blue mussel	nc	nc	36.8	0.8
lion's mane jellyfish	223	0.8	36.4	0.8
channeled whelk	138	0.5	32.0	0.7
knobbed whelk	76	0.3	29.9	0.7
starfish spp.	nc	nc	29.0	0.7
flat claw hermit crab	nc	nc	26.0	0.6
bluecrab	104	0.4	19.3	0.4
northern moon snail	nc	nc	9.7	0.2
hydroid spp.	nc	nc	4.8	0.1
fan worm tubes	nc	nc	3.4	0.1
hard clams	nc	nc	3.3	0.1
arks	nc	nc	3.1	0.1
mud crabs	nc	nc	2.8	0.1
sand shrimp	nc	nc	2.7	0.1
common slipper shell	nc	nc	2.4	0.1
purple sea urchin	nc	nc	2.3	0.1
common oyster	nc	nc	1.4	0
sea grape	nc	nc	1.1	0
blood star	nc	nc	0.2	0
northern comb jelly	nc	nc	0.1	0
common razor clam	nc	nc	0.1	0
northern cyclocardia	nc	nc	0.1	0
northern red shrimp	nc	nc	0.1	0
surf clam	nc	nc	0.1	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

species	count	%	weight	%
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

species	count	%	weight	%
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

species	count	%	weight	%
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

Species	count	%	weight	%
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
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

species	count	%	weight	%
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	%
butterfish	92,996	52.2	2,097.3	16.8
scup	52,642	29.6	3,080.7	24.7
weakfish	9,191	5.2	449.9	3.6
bluefish	6,532	3.7	1,333.8	10.7
winter flounder	4,692	2.6	566.1	4.5
windowpane flounder	1,982	1.1	177.5	1.4
little skate	1,317	0.7	682.5	5.5
Atlantic herring	1,168	0.7	131.1	1.1
bay anchovy	814	0.5	5.8	0
striped searobin	757	0.4	183.7	1.5
alewife	742	0.4	47.6	0.4
fourspot flounder	688	0.4	125.9	1
red hake	585	0.3	56.0	0.4
summer flounder	506	0.3	406.1	3.3
striped bass	469	0.3	675.1	5.4
smooth dogfish	467	0.3	1,421.7	11.4
moonfish	356	0.2	6.0	0
northern searobin	265	0.1	21.3	0.2
Atlantic menhaden	235	0.1	77.9	0.6
spotted hake	234	0.1	17.4	0.1
tautog	179	0.1	269.2	2.2
American shad	177	0.1	18.2	0.1
silver hake	165	0.1	7.1	0.1
hickory shad	136	0.1	43.1	0.3
blueback herring	111	0.1	5.4	0
fourbeard rockling	106	0.1	6.8	0.1
clearnose skate	102	0.1	187.1	1.5
rough scad	62	0	1.9	0
hogchoker	61	0	8.7	0.1
smallmouth flounder	44	0	2.4	0
black sea bass	42	0	26.4	0.2
spiny dogfish	41	0	102.0	0.8
Atlantic mackerel	37	0	5.7	0
winter skate	31	0	59.9	0.5
yellow jack	28	0	3.0	0
cunner	24	0	4.1	0
round scad	12	0	0.3	0
Atlantic cod	10	0	0.9	0
rock gunnel	9	0	0.6	0
Atlantic sturgeon	9	0	152.7	1.2
northern sennet	8	0	0.7	0
American sand lance	6	0	0.2	0
northern puffer	5	0	0.3	0
northern kingfish	4	0	0.6	0
northern pipefish	4	0	0.3	0
ocean pout	3	0	0.7	0
sea raven	3	0	0.5	0
crevalle jack	2	0	0.2	0
gizzard shad	2	0	0.2	0
goosefish	2	0	0.7	0
grubby	2	0	0.2	0

species	count	%	weight	%
haddock	2	0	0.2	0
seasnail	2	0	0.2	0
glasseye snapper	1	0	0.1	0
inshore lizardfish	1	0	0.1	0
lookdown	1	0	0.1	0
pollock	1	0	0.1	0
Total	**178,073**		**12,474.3**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
Invertebrates				
blue mussel	nc	nc	971.0	32.6
long-finned squid	17,542	83.2	683.5	22.9
American lobster	1,389	6.6	364.3	12.2
horseshoe crab	161	0.8	304.2	10.2
starfish spp.	nc	nc	198.4	6.7
lion's mane jellyfish	1,806	8.6	97.3	3.3
spider crab	nc	nc	92.0	3.1
bushy bryozoan	nc	nc	64.6	2.2
lady crab	nc	nc	48.8	1.6
boring sponge	nc	nc	26.1	0.9
flat claw hermit crab	nc	nc	23.1	0.8
channeled whelk	101	0.5	23.0	0.8
common slipper shell	nc	nc	12.2	0.4
rubbery bryzoan	nc	nc	11.0	0.4
knobbed whelk	23	0.1	9.7	0.3
rock crab	nc	nc	9.3	0.3
ribbed mussel	nc	nc	7.6	0.3
hard clams	nc	nc	7.2	0.2
northern moon snail	nc	nc	4.7	0.2
sea grape	nc	nc	4.5	0.2
mantis shrimp	64	0.3	3.8	0.1
arks	nc	nc	3.5	0.1
hydroid spp.	nc	nc	3.4	0.1
mud crabs	nc	nc	2.5	0.1
sand shrimp	nc	nc	2.1	0.1
deadman's fingers sponge	nc	nc	1.1	0
purple sea urchin	nc	nc	0.7	0
bluecrab	3	0	0.6	0
mixed sponge species	nc	nc	0.4	0
surf clam	nc	nc	0.4	0
star coral	nc	nc	0.3	0
sand dollar	1	0	0.2	0
northern red shrimp	nc	nc	0.2	0
boreal squid	1	0	0.1	0
Japanese shore crab	5	0	0.1	0
northern cyclocardia	nc	nc	0.1	0
common oyster	nc	nc	0.1	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	%
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
winter flounder	1,699	1.8	271.2	2.6
bay anchovy	1,492	1.6	8.3	0.1
silver hake	1,267	1.4	37.7	0.4
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
alewife	573	0.6	49.5	0.5
fourspot flounder	466	0.5	88.1	0.8
striped searobin	366	0.4	113.5	1.1
moonfish	361	0.4	3.5	0
smooth dogfish	332	0.4	1,176.6	11.2
spotted hake	321	0.3	24.3	0.2
weakfish	241	0.3	52.2	0.5
summer flounder	203	0.2	180.5	1.7
tautog	186	0.2	301.4	2.9
striped bass	144	0.2	418.7	4
hickory shad	75	0.1	19.1	0.2
American shad	68	0.1	6.1	0.1
Atlantic herring	66	0.1	10.3	0.1
blueback herring	63	0.1	2.5	0
clearnose skate	36	0	52.4	0.5
Atlantic menhaden	28	0	5.5	0.1
winter skate	23	0	60	0.6
hogchoker	22	0	3.2	0
Atlantic sturgeon	21	0	368.7	3.5
black sea bass	19	0	9.3	0.1
fourbeard rockling	14	0	1.5	0
rough scad	14	0	0.5	0
spot	14	0	1.2	0
spiny dogfish	11	0	47	0.4
cunner	8	0	1.3	0
smallmouth flounder	7	0	0.6	0
ocean pout	5	0	0.9	0
glasseye snapper	4	0	0.1	0
inshore lizardfish	4	0	0.4	0
northern pipefish	3	0	0.2	0
rock gunnel	2	0	0.1	0
yellow jack	2	0	0.1	0
Atlantic bonito	1	0	3.2	0
planehead filefish	1	0	0.1	0
goosefish	1	0	1.2	0
pollock	1	0	0.1	0
oyster toadfish	1	0	1.2	0
yellowtail flounder	1	0	0.4	0
Total	**92,042**		**10,500.2**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
long-finned squid	7,802	83.4	326	32.5
horseshoe crab	109	1.2	205.8	20.5
American lobster	748	8	197.9	19.7
boring sponge	nc	nc	51.3	5.1
spider crab	nc	nc	50.6	5
lion's mane jellyfish	558	6	45.4	4.5
rock crab	nc	nc	40.4	4
bushy bryozoan	nc	nc	17.8	1.8
blue mussel	nc	nc	7.6	0.8
channeled whelk	41	0.4	7.6	0.8
lady crab	nc	nc	7.5	0.7
deadman's fingers sponge	nc	nc	6.8	0.7
hydroid spp.	nc	nc	5.9	0.6
flat claw hermit crab	nc	nc	5.7	0.6
starfish spp.	nc	nc	4.8	0.5
rubbery bryzoan	nc	nc	4	0.4
common slipper shell	nc	nc	3.9	0.4
mantis shrimp	70	0.7	3.4	0.3
mud crabs	nc	nc	2.1	0.2
blue crab	11	0.1	1.8	0.2
knobbed whelk	5	0.1	1.2	0.1
sand shrimp	nc	nc	0.6	0.1
mixed sponge species	nc	nc	0.6	0.1
moon jelly	2	0	0.5	0
sea grape	nc	nc	0.5	0
arks	nc	nc	0.4	0
purple sea urchin	2	0	0.4	0
star coral	nc	nc	0.3	0
hard clams	1	0	0.3	0
northern red shrimp	1	0	0.3	0
red bearded sponge	nc	nc	0.2	0
fan worm tubes	nc	nc	0.2	0
northern moon snail	nc	nc	0.2	0
surf clam	1	0	0.2	0
brown shrimp	1	0	0.1	0
ghost shrimp	nc	nc	0.1	0
Japanese shore crab	nc	nc	0.1	0
northern cyclocardia	nc	nc	0.1	0
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	%
scup	75,681	42.6	5,333.5	30.4
butterfish	49,137	27.6	1,446.2	8.2
weakfish	17,386	9.8	584.8	3.3
bluefish	9,378	5.3	1,801.3	10.3
winter flounder	4,550	2.6	951.3	5.4
windowpane flounder	4,051	2.3	510.8	2.9
red hake	2,788	1.6	200.4	1.1
bay anchovy	2,440	1.4	14.5	0.1
Atlantic herring	1,932	1.1	234.2	1.3
alewife	1,537	0.9	101.3	0.6
little skate	1,277	0.7	697.0	4.0
fourspot flounder	1,094	0.6	224.9	1.3
moonfish	979	0.6	12.0	0.1
striped searobin	755	0.4	217.0	1.2
summer flounder	733	0.4	590.9	3.4
northern searobin	691	0.4	74.2	0.4
smooth dogfish	580	0.3	2,110.2	12.0
Atlantic menhaden	426	0.2	63.9	0.4
striped bass	422	0.2	888.0	5.1
spotted hake	340	0.2	23.9	0.1
silver hake	290	0.2	14.6	0.1
tautog	280	0.2	551.4	3.1
American shad	236	0.1	15.8	0.1
blueback herring	156	0.1	9.1	0.1
black sea bass	116	0.1	46.8	0.3
clearnose skate	97	0.1	193.3	1.1
fourbeard rockling	87	0	7.6	0
hogchoker	78	0	11.4	0.1
smallmouth flounder	48	0	2.6	0
winter skate	44	0	117.8	0.7
hickory shad	37	0	10.4	0.1
spiny dogfish	32	0	122.3	0.7
American sand lance	30	0	0.3	0
Atlantic sturgeon	18	0	336.4	1.9
cunner	16	0	3.0	0
rough scad	13	0	0.7	0
ocean pout	12	0	3.2	0
Atlantic mackerel	9	0	0.8	0
glasseye snapper	8	0	0.7	0
northern puffer	8	0	0.5	0
striped anchovy	6	0	0.1	0
sea raven	5	0	3.6	0
oyster toadfish	5	0	2.0	0
yellow jack	5	0	0.4	0
northern kingfish	4	0	0.4	0
round scad	3	0	0.3	0
longhorn sculpin	3	0	0.8	0
American eel	2	0	0.9	0
inshore lizardfish	2	0	0.2	0
mackerel scad	2	0	0.1	0
northern sennet	2	0	0.2	0
northern pipefish	2	0	0.2	0
Atlantic silverside	1	0	0.1	0
gizzard shad	1	0	0.1	0
grubby	1	0	0.1	0
pollock	1	0	0.1	0
rock gunnel	1	0	0.1	0
striped burrfish	1	0	0.5	0
sea lamprey	1	0	0.1	0
yellowtail flounder	1	0	1.0	0
Total	**177,841**		**17,540.3**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
long-finned squid	24,212	88.2	773.6	30.8
horseshoe crab	333	1.2	596.4	23.7
American lobster	1,648	6.0	396.5	15.8
spider crab	nc	nc	165.5	6.6
lion's mane jellyfish	660	2.4	129.8	5.2
bushy bryozoan	nc	nc	107.4	4.3
mixed sponge species	nc	nc	84.5	3.4
rock crab	nc	nc	41.4	1.6
channeled whelk	196	0.7	33.4	1.3
flat claw hermit crab	nc	nc	27.5	1.1
blue mussel	nc	nc	20.4	0.8
starfish spp.	nc	nc	20.3	0.8
boring sponge	nc	nc	17.7	0.7
blue crab	68	0.2	13.0	0.5
mantis shrimp	264	1.0	12.1	0.5
deadman's fingers sponge	nc	nc	11.5	0.5
lady crab	nc	nc	11.5	0.5
knobbed whelk	23	0.1	11.1	0.4
common slipper shell	nc	nc	9.3	0.4
mud crabs	nc	nc	4.3	0.2
northern moon snail	nc	nc	4.3	0.2
sand shrimp	nc	nc	3.5	0.1
sea grape	nc	nc	3.5	0.1
arks	2	0	2.7	0.1
hydroid spp.	nc	nc	2.5	0.1
hard clams	1	0	2.2	0.1
rubbery bryzoan	nc	nc	1.4	0.1
common oyster	nc	nc	1.1	0
surf clam	10	0	1.0	0
anemones	16	0.1	0.6	0
purple sea urchin	2	0	0.6	0
red bearded sponge	nc	nc	0.5	0
star coral	nc	nc	0.4	0
water jelly	1	0	0.3	0
jonah crab	1	0	0.2	0
northern red shrimp	1	0	0.2	0
blood star	nc	nc	0.1	0
coastal mud shrimp	1	0	0.1	0
green sea urchin	1	0	0.1	0
Japanese shore crab	nc	nc	0.1	0
tunicates, misc	1	0	0.1	0
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
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

species	count	%	weight	%
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
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

species	count	%	weight	%
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**	

Finfish not ranked
anchovy spp, yoy
Atlantic herring, yoy
American sand lance (yoy)

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

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

species	count	%	weight	%
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

Appendix 2.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2012.
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	60,539	37.9	1,891.3	10.8
scup	53,119	33.2	6,170.2	35.1
silver hake	7,519	4.7	171.0	1.0
weakfish	6,785	4.2	409.2	2.3
bluefish	3,851	2.4	532.7	3.0
northern searobin	3,642	2.3	405.2	2.3
windowpane flounder	3,536	2.2	501.1	2.9
winter flounder	3,365	2.1	604.9	3.4
striped searobin	2,973	1.9	1,086.4	6.2
fourspot flounder	2,597	1.6	454.5	2.6
red hake	1,720	1.1	148.6	0.8
little skate	1,406	0.9	657.9	3.7
bay anchovy	1,296	0.8	8.6	0.0
summer flounder	980	0.6	718.5	4.1
spot	858	0.5	107.5	0.6
alewife	708	0.4	47.0	0.3
spotted hake	626	0.4	64.2	0
smooth dogfish	610	0.4	1,833.3	10.4
Atlantic herring	571	0.4	61.5	0.4
Atlantic menhaden	426	0.3	144.6	0.8
black sea bass	410	0.3	141.0	0.8
hogchoker	340	0.2	30.7	0.2
American shad	321	0.2	25.3	0.1
clearnose skate	280	0.2	491.7	3
moonfish	262	0.2	3.6	0.0
smallmouth flounder	258	0.2	7.5	0.0
striped bass	170	0.1	278.0	1.6
tautog	135	0.1	128.9	0.7
winter skate	97	0.1	179.8	1
northern kingfish	59	0.0	8.4	0
northern puffer	47	0.0	3.1	0.0
blueback herring	46	0	1.6	0.0
fourbeard rockling	43	0	3.5	0
hickory shad	42	0	14.1	0
blue runner	27	0	2.7	0.0
cunner	20	0	2.8	0
rough scad	19	0	1.1	0
spiny dogfish	16	0	62.8	0
ocean pout	14	0	2.0	0
Atlantic sturgeon	7	0	154.2	1
sea raven	5	0	1.1	0
northern sennet	3	0	0.3	0
striped anchovy	3	0	0.2	0.0
crevalle jack	2	0	0.2	0
goosefish	2	0	0.8	0
pinfish	2	0	0.2	0
round herring	2	0	0.1	0
American sand lance	2	0	0.2	0
African pompano	1	0	0.1	0
conger eel	1	0	0.3	0
gizzard shad	1	0	0.1	0
northern pipefish	1	0	0.1	0
rock gunnel	1	0	0.1	0
roughtail stingray	1	0	5.0	0
longhorn sculpin	1	0	0.2	0
white perch	1	0	0.2	0
white mullet	1	0	0.1	0
Total	**159,770**		**17,570.3**	

Finfish not ranked

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

Invertebrates

species	count	%	weight	%
horseshoe crab	199	1.7	385.8	30.6
long-finned squid	9,767	84.5	333.9	26.5
spider crab	.	.	162.4	12.9
American lobster	349	3.0	70.0	5.6
boring sponge	.	.	47.9	3.8
lady crab	.	.	45.3	3.6
rock crab	.	.	40.7	3.2
mantis shrimp	846	7.3	26.6	2.1
bushy bryozoan	.	.	20.4	1.6
flat claw hermit crab	.	.	18.3	1.5
blue crab	72	0.6	14.5	1.2
knobbed whelk	36	0.3	13.8	1.1
channeled whelk	76	0.7	13.7	1.1
blue mussel	1	0.0	9.4	0.7
common slipper shell	.	.	9.4	0.7
mixed sponge species	.	.	7.4	0.6
Tubularia, spp.	.	.	5.0	0.4
hydroid spp.	.	.	4.8	0.4
lion's mane jellyfish	50	0.4	4.4	0.3
mud crabs	.	.	3.9	0.3
starfish spp.	.	.	3.3	0.3
northern red shrimp	118	1.0	3.0	0.2
northern moon snail	.	.	1.8	0.1
sand shrimp	.	.	1.7	0.1
arks	.	.	1.4	0.1
hard clams	3	0	1.3	0.1
red bearded sponge	.	.	1.2	0.1
sea grape	.	.	1.1	0.1
deadman's fingers sponge	.	.	0.8	0.1
purple sea urchin	7	0	0.8	0
common oyster	.	.	0.8	0
surf clam	10	0.1	0.8	0
star coral	.	.	0.4	0
rubbery bryzoan	.	.	0.4	0
sea cucumber	3	0	0.4	0
tunicates, misc	16	0	0.4	0
water jelly	4	0	0.3	0
coastal mud shrimp	1	0	0.2	0
northern comb jelly	.	.	0.1	0
moon jelly	.	.	0.1	0
Total	**11,558**		**1,257.9**	

Note: nc= not counted

Appendix 2.5: Cold and warm temperate species captured in LISTS. Thirty-three (33) species are included in the cold temperate group, while thirty-four (34) species are included in the warm temperate group. Cold temperate species are defined as being more abundant north of Cape Cod, MA than south of New York, behaviorally adapted to cold temperatures including subfreezing but prefers ~3-15^{0}C, and spawns at lower end of temperature tolerance. Warm temperate species are defined as being more abundant south of New York than north of Cape Cod, MA, behaviorally avoids temperatures < 7-10^{0}C; prefers ~11-22^{0}C, and spawns at higher end of temperature tolerance.

Cold Temperate Group	
Common Name	Scientific Name
alewife	*Alosa pseudoharengus*
American plaice	*Hippoglossoides platessoides*
Atlantic herring	*Clupea harengus*
Atlantic cod	*Gadus morhua*
Atlantic mackerel	*Scomber scombrus*
Atlantic salmon	*Salmo salar*
Atlantic seasnail	*Liparis atlanticus*
Atlantic sturgeon	*Acipenser oxyrinchus*
Atlantic tomcod	*Microgadus tomcod*
barndoor skate	*Dipturus laevis*
cunner	*Tautogolabrus adspersus*
fawn cusk-eel	*Lepophidium profundorum*
fourspot flounder	*Hippoglossina oblonga*
grubby	*Myoxocephalus aeneus*
haddock	*Melanogrammus aeglefinus*
little skate	*Leucoraja erinacea*
longhorn sculpin	*Myoxocephalus octodecemspinosus*
lumpfish	*Cyclopterus lumpus*
monkfish (goosefish)	*Lophius americanus*
northern pipefish	*Syngnathus fuscus*
ocean pout	*Zoarces americanus*
pollock	*Pollachius virens*
rainbow smelt	*Osmerus mordax*
red hake	*Urophycis chuss*
rock gunnel	*Pholis gunnellus*
rockling	*Enchelyopus cimbrius*
searaven	*Hemitripterus americanus*
spiny dogfish	*Squalus acanthias*
whiting (silver hake)	*Merluccius bilinearis*
windowpane	*Scophthalmus aquosus*
winter flounder	*Pseudopleuronectes americanus*
winter skate	*Leucoraja ocellata*
yellowtail flounder	*Limanda ferruginea*

Warm Temperate Group	
Common Name	Scientific Name
American eel	*Anguilla rostrata*
American shad	*Alosa sapidissima*
Atlantic bonito	*Sarda sarda*
Atlantic croaker	*Micropogonias undulates*
Atlantic silversides	*Menidia menidia*
black seabass	*Centropristis striata*
blueback herring	*Alosa aestivalis*
bluefish	*Pomatomus saltatrix*
butterfish	*Peprilus triacanthus*
clearnose skate	*Raja eglanteria*
conger eel	*Conger oceanicus*
gizzard shad	*Dorosoma cepedianum*
hickory shad	*Alosa mediocris*
hogchoker	*Trinectes maculates*
lined seahorse	*Hippocampus erectus*
menhaden	*Brevoortia tyrannus*
naked goby	*Gobiosoma bosci*
northern kingfish	*Menticirrhus saxatilis*
northern puffer	*Sphoeroides maculates*
northern searobin	*Prionotus carolinus*
oyster toadfish	*Opsanus tau*
scup (porgy)	*Stenotomus chrysops*
sea lamprey	*Petromyzon marinus*
smallmouth flounder	*Etropus microstomus*
smooth dogfish	*Mustelus canis*
spot	*Leiostomus xanthurus*
spotted hake	*Urophycis regia*
striped bass	*Morone saxatilis*
striped cusk-eel	*Ophidion marginatum*
striped searobin	*Prionotus evolans*
summer flounder	*Paralichthys dentatus*
tautog (blackfish)	*Tautoga onitis*
white pearch	*Morone Americana*
weakfish	*Cynoscion regalis*

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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 2012 annual index of recruitment for young-of-year winter flounder (0.3 fish/haul) ranked the lowest out of 25 annual indices.

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

Mean catch of all finfish (153 fish/haul) ranked ninth highest out of 25 annual indices and was slightly above the series average of 147 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 2012 (60 forage fish/haul) was the eighth lowest of the 25-year series, and well below the time series average of 98 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 45º 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.

Diversity in the catch, or species richness, was computed for finish species captured in the Survey over the time series. Species were divided into three groups based on their temperature preferences and seasonal spawning habits as documented in the literature (Collette and Klein-MacPhee 2002, Murdy et al. 1997). Criteria used to assign species into a cold temperate group, warm temperate group, or subtropical group are listed in Job 2.1.

RESULTS

A total of 48 seine hauls were taken in 2012 at eight sites, yielding a total catch of 7,323 fish of 29 species and 4,318 invertebrates of eleven species. Mean catch of all finfish (153 fish/tow) was the eighth lowest in the 25 year time series (Figure 2.2). This catch is slightly above the long-term mean of 147 fish/tow which can be attributed to above average catches of black sea bass, as well as scup. Atlantic silversides were caught in average abundance. All other forage fish abundances (except sheepshead minnow) were below average.

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 black sea bass (75%), striped killifish (65%), tautog (60%), northern pipefish (60%), scup (42%), northern puffer (42%) and mummichog (35%). This rank order has changed from the previous years, with a notable decrease in winter flounder (age 0 and age 1+), mummichog, grubby and windowpane flounder occurrence rates and an increase in black sea bass, northern pipefish, scup, tautog and puffer occurrence. Nine of the 22 species monitored decreased in abundance in 2012, fifteen other fish species increased and six 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 significantly increased to all-time abundance levels in 2002-04 and 2012 (Figure 2.4). The abundance of cunner the other labridae species commonly seen in the survey fell in 2011 but rebounded above the time series averages in 2012 after declining in abundance since 2007.

In 2012, three of the four forage species monitored decreased in abundance from the previous year (Atlantic silverside, especially mummichog and striped killifish). Only the forage fish sheepshead minnow increased slightly in abundance in 2012. Forage fish species Atlantic silverside was slightly below the 25-year time-series average in 2012. Scup occurrence and abundance decreased to the 25 year time series average in 2011, but increased to its largest abundance in 3 years in 2012, which is the second largest abundance overall. Snapper bluefish occurred in the time series in 2011 and again in 2012 after a 2007 absence. Striped bass and weakfish were not observed in the survey in 2012. Weakfish young-of-year were absent and only occurred in 2003. All other species occurred in less than 10% of all samples, with occurrence rates similar to previous years.

Spot (*Leiostomus xanthurus*) a mid-Atlantic species, occurred for the first time in the time series. Two other new species of finfish, juvenile and adult feather blenny (southern species) (*Hypsoblennius hentzi*) was captured in 2012, at three sites (WTF, CLT and GRW). Also, skilletfish (*Gobiesox strumosus*) another southern species were captured at the Greenwich site. Six juvenile summer flounder were captured in 2012. Summer flounder (juvenile) have occurred in 2006-08 and 2010 of the 25 year time series. Windowpane flounder re-occurred at low abundance in 2011 after being absent in 2009-10 and once again in 2012. Other notable catches: at the Waterford site; lined seahorses, spot, and feather blenny along with inshore lizardfish. The Cinton site saw large numbers of yoy black sea bass, shorthorn sculpin, spot, feather blenny and American eel. The Greenwich site saw two new species…feather blenny and skilletfish. The New Haven site saw many yoy scup and snapper bluefish. Summer flounder, northern kingfish and large numbers of forage species were captured at the Old Lyme site. Bridgeport was dominated by smallmouth flounder and the Groton (Bluff Point) site saw large numbers of yoy black sea bass.

Relative Abundance of Juvenile Winter Flounder and Tautog

The 2012 index of YOY winter flounder (0.3fish/haul) ranked lowest out of the 25 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 2012 index of YOY tautog (1.3 fish/haul) was the fourth highest (tie, 1999) ranking out of 25 annual indices (Table 2.1, Figure 2.4), well above 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 relatively abundant year classes produced in 1998-99, 2002-04, 2007-08 and 2012. The 2006 and 2009-11 mean was below the long-term average. ($P \leq 0.03$, $t=2.3$, $df=24$), (Table 2.1, Figure 2.4).

Presence of Other Important Recreational Finfish

YOY scup is a recent addition to the seine survey. The species occurred in 1999, with the highest relative abundance in the last ten years of the time series. In 2012, the species was especially abundant, 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 striped bass were taken (Table 2.3, Figure 2.8). One large individual (369mm) was captured in 2008. YOY summer flounder have occurred in ten years (more recently) in the 25-year time series (1993, 1994, 1996, and 1998, 2006 – 2010, 2012). The 2006 summer flounder abundances were the highest of the time series, followed by 2007, 2008, 2010 and 2012. No summer flounder were captured in 2011. YOY black sea bass first appeared in 1991 and every year since 1997, reaching their record highest abundance in 2012, (Figure 2.7). Snapper bluefish occurred in 19 out of 25 years of the time series, reaching peak abundance in

1999. Juvenile tautogs 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, and absent in 2012. Atlantic tomcod, a threatened species re-appeared in 2008 and 2011, none were present in 2009, 2010 and 2012. Inshore lizardfish were captured at average abundances for the time series in 2012. Fourspine stickleback were absent in 2012, and appear to be dropping out of the survey, occurring only 4 times in the past decade.

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 items 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 2012 was the eighth lowest in the 25 year time series. Only one of the four forage fish species (sheepshead minnow) increased slightly in abundance and occurrence in 2012. Atlantic silverside abundance declined in 2012 (45 fish /haul) and was below the series mean of 64 fish/haul for the time series (Table 2.1). Atlantic silversides were the most abundant, and the only species present at all sites in all samples (Table 2.1). There was a substantial decrease in striped killifish, and mummichog abundance in 2012. A decrease in these species' abundance in 2012 reversed a five-year trend of increasing abundance from 2007-2011. Striped killifish decreased substantially in abundance in 2012, to the ninth lowest in the time series. This species of killifish abundance and occurrence (5.3fish/tow, 65% occurrence) was well below the series mean of 10.3. In 2012, mummichog abundance (1.6 fish/haul) was also well below the long-term average of 2.4 in 2012. Sheepshead minnow had a record abundance (3.35) in 2007 and decreased in 2008 through 2010. Sheepshead increased slightly in 2011 and again in 2012, the index of abundance of this forage fish (0.8fish/haul) was substantially higher, ranking third in the time series. Collectively, forage fish abundance has declined since 2003 (Figure 2.5).

Forage fish abundance show a general increase since 1997 (Figure 2.5) after a period of lower abundance (decreasing trend) from 1991-1996. In 2012, forage fish abundance was below the series mean of 98 fish/haul, with a mean catch of 60 fish per haul (large decline from 2007). 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, third and fourth 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 extremely low numbers in 2012, suggesting very poor 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 and 2012, the sheepshead minnow catch rebounded and was slightly above the series average (0.5 – 0.8 fish/tow).

Finfish Species Richness

Over the time series, the mean number of cold temperate species captured per seine haul varied from 1.6 to 2.8 without trend (Figure 2.10, Table 2.4), while the mean number of warm temperate species increased significantly ($F=29.2$, $p<0.001$, $r^2=0.54$). The mean number of warm temperate species rose from 1.6 to 4.4, more than doubling over the 25-year time series. Subtropical species richness showed no trend, averaging one species per haul almost every year.

Relative Abundance of Invertebrate Species

A total of 4,318 invertebrates of eleven species were captured in 2012 (Table 2.3), (Appendix 2.2). Eight crab species were present in the seine hauls, along with three shrimp species (including mantis shrimp) and one gastropod. Mud snail, sand shrimp, shore shrimp, green crab, and hermit crab were the most abundant. Mud snails, shore shrimp, sand shrimp, and hermit crab had greater than 50% occurrence in 2012 (Table 2.3). Blue crab abundance continued to remain low in 2012 from an all-time high in 2009 (333 crabs). The Asian shore crab (Japanese crab) re-appeared in 2011 and 2012 but were absent from 2008-10. Both sand and shore shrimp decreased substantially in abundance in 2012 from the previous year (Table 2.3). Mud snail abundance was at the time series average. Mud crabs dropped significantly in 2011 and 2012 from an all-time high in 2010. Spider crab abundance was at a time-series high in 2011 and decreased too slightly above the time series average in 2012.

MODIFICATIONS

In 2013 the seven original seine sites (all sites except Milford) will be sampled in June, July, and August as well as September. These catch data will be compared to catches made in the same summer months in 1988-1990.

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Table 2.1: Geometric mean catch of species commonly taken in seine samples, 1988-2012. *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, 1988-2012. *See Appendix 3.1 for complete species names.*

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
alewife	0.0	0.1	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	0.0	0.0	0.0	0.1	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**
Atlantic menhaden	0.0	1.0	8.2	0.4	0.2	0.4	0.6	0.1	0.3	0.0	0.1	**0.03**
Atlantic silverside	36.1	80.1	113.6	85.1	81.3	37.7	74.9	57.5	66.8	96.9	66.5	**44.9**
Atlantic tomcod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	**0.0**
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	**5.2**
blueback herring	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.01**
bluefish	0.1	0.0	0.2	0.2	0.1	0.2	0.0	0.0	0.3	0.0	0.2	**0.4**
cunner	0.2	0.3	0.2	0.5	0.3	0.1	0.5	0.1	0.2	0.1	0.0	**0.4**
fourspine stickleback	0.1	0.0	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	**0.2**
inshore lizardfish	1.2	0.0	0.0	0.0	0.0	1.9	0.2	0.3	0.2	0.1	0.2	**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	**1.6**
naked goby	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	**0.06**
northern kingfish	0.2	0.1	0.2	0.3	0.1	0.0	0.0	0.2	0.3	0.5	0.2	**0.5**
northern pipefish	1.4	0.5	0.3	0.7	0.5	0.6	0.8	0.7	1.9	0.6	1.1	**1.4**
northern puffer	0.2	0.7	0.7	0.7	0.5	0.4	1.2	0.2	0.3	0.4	0.4	**0.9**
rainbow smelt	0.0	0.0	0.0	0.2	0.0	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	**2.1**
sheepshead minnow	0.2	0.6	0.7	0.5	0.2	0.2	3.3	1.2	0.5	0.3	0.5	**0.8**
smallmouth flounder	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.9	**0.4**
striped bass	0.0	0.0	0.1	0.0	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	**5.3**
striped searobin	0.4	0.3	0.7	0.5	0.2	0.1	0.3	0.3	0.8	0.2	0.1	**0.08**
summer flounder	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.0	**0.08**
tautog	0.6	1.5	1.1	1.4	0.7	0.4	2.4	1.0	0.4	0.4	0.3	**1.3**
weakfish	0.0	0.0	0.2	0.0	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	**0.0**
winter flounder	0.0	0.0	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0	**0.02**
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	**0.3**

Table 2.1 cont.: Percent occurrence of species commonly taken in seine samples, 1988-2012. 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, 1988-2012. See Appendix 3.1 for species names.

Species	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
alewife	0.00	0.04	0.02	0.00	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	**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	**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	**0.04**
Atlantic silverside	0.92	1.00	0.96	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	**0.98**
Atlantic tomcod	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.06	**0.00**
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	**0.75**
blueback herring	0.00	0.04	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.00	**0.02**
bluefish	0.13	0.02	0.10	0.15	0.04	0.08	0.00	0.02	0.15	0.02	0.10	**0.21**
cunner	0.15	0.13	0.17	0.29	0.21	0.13	0.25	0.10	0.17	0.08	0.04	**0.23**
fourspine stickleback	0.06	0.00	0.00	0.02	0.00	0.02	0.00	0.00	0.02	0.00	0.04	**0.00**
grubby	0.17	0.21	0.29	0.50	0.46	0.27	0.15	0.19	0.27	0.21	0.42	**0.23**
inshore lizardfish	0.56	0.04	0.00	0.06	0.00	0.60	0.13	0.19	0.15	0.13	0.10	**0.15**
mummichog	0.42	0.54	0.44	0.35	0.27	0.48	0.65	0.48	0.50	0.40	0.42	**0.35**
naked goby	0.08	0.02	0.02	0.04	0.00	0.08	0.00	0.02	0.00	0.00	0.02	**0.08**
northern kingfish	0.13	0.04	0.15	0.17	0.10	0.02	0.02	0.19	0.17	0.23	0.13	**0.29**
northern pipefish	0.48	0.19	0.25	0.48	0.25	0.29	0.42	0.23	0.52	0.40	0.44	**0.60**
northern puffer	0.17	0.35	0.31	0.40	0.31	0.29	0.44	0.23	0.23	0.21	0.31	**0.42**
rainbow smelt	0.00	0.00	0.00	0.08	0.00	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	**0.42**
sheepshead minnow	0.10	0.15	0.19	0.15	0.15	0.06	0.40	0.27	0.13	0.10	0.13	**0.25**
smallmouth flounder	0.13	0.00	0.00	0.00	0.00	0.02	0.00	0.13	0.15	0.06	0.40	**0.17**
striped bass	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.00	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	**0.65**
striped searobin	0.29	0.25	0.40	0.38	0.13	0.13	0.27	0.19	0.40	0.17	0.06	**0.08**
summer flounder	0.00	0.00	0.00	0.00	0.00	0.19	0.06	0.15	0.02	0.04	0.00	**0.08**
tautog	0.40	0.54	0.50	0.54	0.42	0.17	0.54	0.42	0.35	0.31	0.23	**0.60**
weakfish	0.00	0.00	0.13	0.00	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	**0.00**
winter flounder	0.04	0.02	0.00	0.17	0.21	0.15	0.08	0.15	0.04	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	**0.27**

Table 2.2: Mean catch of young-of-year winter flounder at eight sites sampled by seine, 1988-2012.

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**
2012	**0.00**	**0.26**	**0.70**	**0.76**	**0.00**	**0.12**	**0.26**	**0.44**	****0.3**

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

Table 2.3: Total catch 1988-2012. Invertebrates not counted 1988-2003.

Species	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
alewife					1								28	1
American eel					1				5					
American sand lance			1		10									
American shad	1													
American shad (1+)									151					
Anchovy, spp (YOY)														
Atlantic menhaden	2	4	1,074	3	9	2		11	2,003	377	1,236	1	1,284	5,098
Atlantic needlefish														
Atlantic silverside	5,356	6,383	5,468	5,263	6,311	2,352	1,942	3,249	6,345	10,120	8,738	4,417	5,730	13,278
Atlantic tomcod				3					1					
banded gunnel									2	3				
banded rudderfish														
bay anchovy						4	69		27			1	11	
black sea bass		10			41	43			27	14	2	687	63	27
blue spotted coronet fish										1				
blueback herring	3	194	10		5	2			3	24	1		13	5
bluecrab														
bluefish		15	2		1			1	9	142	3	8	2	17
boreal squid														
brown shrimp														
burrfish, striped										1				
butterfish						1								
channeled whelk														
common slipper shell														
crevalle jack														
cunner	2	5	19		42	24	63	1	23	142	26	15	110	15
flat claw hermit crab														
flying gurnard														
fourspine stickleback		183	11	21	1		3		24	3	1	7		
gizzard shad														
green crab														
grey snapper	1													
grubby	2	7	61	6	38	19	21	28	17	55	15	73	33	95
hogchoker							2							

Table 2.3 continued

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
alewife										**30**
American eel									**1**	**11**
American sand lance							13			**24**
American shad										**1**
American shad (1+)										**169**
Anchovy, spp (YOY)					15					**15**
Atlantic menhaden	1,117	75	117	144	21	54	3	43	**2**	**12,685**
Atlantic needlefish					2					**2**
Atlantic silverside	5,122	5,089	3,267	5,087	3,245	4,156	7,063	4,657	**4,142**	**134,846**
Atlantic tomcod	1	3			1			8		**17**
banded gunnel	4	2	3	1	3			1		**19**
banded rudderfish							1			**1**
bay anchovy	1	12					1			**126**
black sea bass	110	15	82	109	33	304	86	489	**783**	**2,925**
blue spotted coronet fish										**1**
blueback herring				9			3		**1**	**299**
bluecrab	*1*	*2*	*84*	*31*	*4*	*333*	*35*	*23*	***27***	***540***
bluefish	23	8	30		7	53	1	26	**54**	**402**
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	54	35	18	58	8	28	15	2	**42**	**789**
feather blenny									**36**	**36**
flat claw hermit crab	*761*	*532*	*703*	*153*	*244*	*539*	*558*	*441*	***283***	***4,214***
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*	***175***	***2,519***
grey snapper										**1**
grubby	143	76	31	32	16	51	25	55	**18**	**1,031**
hogchoker						1				**3**

Table 2.3: continued

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
inshore lizardfish	5		2			4	6			46	6	16	15	103	2
Japanese shore crab															
Jonah crab															
lady crab															
lined seahorse							4			1			2		
little skate										1					1
mantis shrimp															
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	811
naked goby			1	4				1			1	1		4	2
northern comb jelly															
northern kingfish				3	4	23	2	9	3	10	7	6	5	17	5
northern pipefish	65	23	33	106	120	82	117	52	241	38	295	141	96	189	87
northern puffer	4	22	13	34	4	37	15	40	25	5	5	13	63	14	79
northern searobin		2	1				1	1					3	40	24
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		6
rock crab															
rock gunnel			1		1	1	1			3					
sand shrimp															
scup												1		58	172
sheepshead minnow	174	815	5	345	4	1	2	30		14	19	12	267	59	402
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: continued

Species	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Grand Total
inshore lizardfish		3		169	18	26	22	10	16	23	**492**
Japanese shore crab		*1*		*1*	*1*				*6*	*1*	***10***
Jonah crab							*2*				***2***
lady crab		298	119	66	195	92	42	19	24	18	***873***
lined seahorse					2	7	2	1	2		**21**
little skate											**2**
mantis shrimp										*1*	***1***
mole crab		*1*	*5*								***6***
moon jelly								319			***319***
mud crabs		*60*	*55*	*74*	*30*	*85*	*67*	*308*	*80*	*80*	***759***
mud snail		*948*	*2,071*	*4,478*	*3,569*	*3,810*	*3,128*	*2,699*	*2,683*	*3072*	***26,458***
mummichog	702	637	543	398	1,203	498	857	299	775	329	**15,170**
naked goby	2	2		13		2			2	4	**39**
northern comb jelly							346	36			***382***
northern kingfish	21	38	11	1	1	23	42	76	30	54	**391**
northern pipefish	25	72	92	82	75	156	307	49	248	152	**2,943**
northern puffer	101	75	93	34	241	19	41	51	28	98	**1,154**
northern searobin	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	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*	*246*	***8,245***
scup	131	50	154	6	170	14	413	21	30	375	**1,595**
sheepshead minnow	276	205	28	104	1,439	304	203	82	219	238	**5,247**
shore shrimp		*990*	*404*	*1,149*	*707*	*1,390*	*535*	*619*	*762*	*402*	***6,958***
smallmouth flounder				1		14	21	5	114	63	**311**
smooth dogfish											**1**
spider crab		*4*	*5*	*6*	*1*	*3*	*1*	*7*	*33*	*13*	***73***
starfish spp.								1			**1**
striped anchovy							3				**3**
striped bass	6					1					**8**

Table 2.3: continued.

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	2012	Grand Total
striped killifish	1,698	3,410	1,548	1,470	1,063	1,994	1,874	1,508	1,300	1,964	720	**31,985**
striped searobin	33	62	38	19	6	32	36	82	14	4	7	**866**
summer flounder					16	8	8	1	6		6	**55**
tautog	153	140	145	64	93	321	131	25	33	27	123	**2,114**
threespine stickleback												**11**
weakfish		15										**15**
web burrfish					1				1			**2**
white mullet	1				7	7	11		75	68	0	**182**
white perch				3			11			6	0	**20**
windowpane flounder	1	5	15	15	3	2	17		2	4	0	**392**
winter flounder	3		9	11	7	6	13	2	2	2	2	**452**
winter flounder YOY	302	1,310	914	470	110	365	190	72	71	86	22	**15,172**
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**	**11,641**	**284,340**

Table 2.4: Cold and warm temperate species captured in the Estuarine Seine Survey.

Cold Temperate Species

Common name	Scientific Name
alewife	*Alosa pseudoharengus*
American sand lance	*Ammodytes americanus*
Atlantic tomcod	*Microgadus tomcod*
cunner	*Tautogolabrus adspersus*
grubby	*Myoxocephalus aeneus*
little skate	*Leucoraja erinacea*
northern pipefish	*Syngnathus fuscus*
rock gunnel	*Pholis gunnellus*
rainbow smelt	*Osmerus mordax*
winter flounder	*Pseudopleuronectes americanus*
windowpane flounder	*Scophthalmus aquosus*

Warm Temperate Species

Common name	Scientific Name
American eel	*Anguilla rostrata*
American shad	*Alosa sapidissima*
Atlantic silversides	*Menidia menidia*
bay anchovy	*Anchoa mitchilli*
blueback herring	*Alosa aestivalis*
black seabass	*Centropristis striata*
bluefish	*Pomatomus saltatrix*
butterfish	*Peprilus triacanthus*
feather blenny	*Hypsoblennius hentz*
gizzard shad	*Dorosoma cepedianum*
hogchoker	*Trinectes maculates*
lined seahorse	*Hippocampus erectus*
menhaden	*Brevoortia tyrannus*
naked goby	*Gobiosoma bosci*
northern kingfish	*Menticirrhus saxatilis*
northern puffer	*Sphoeroides maculates*
northern searobin	*Prionotus carolinus*
northern stargazer	*Astroscopus guttatus*
oyster toadfish	*Opsanus tau*
pumkinseed	*Lepomis gibbosus*
scup	*Stenotomus chrysops*
silver perch	*Bairdiella chrysoura*
smooth dogfish	*Mustelus canis*
smallmouth flounder	*Etropus microstomus*
spotted hake	*Urophycis regia*
spot	*Leiostomus xanthurus*
striped searobin	*Prionotus evolans*
striped anchovy	*Anchoa hepsetus*
striped bass	*Morone saxatilis*
summer flounder	*Paralichthys dentatus*
tautog (blackfish)	*Tautoga onitis*
white perch	*Morone Americana*
weakfish	*Cynoscion regalis*

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

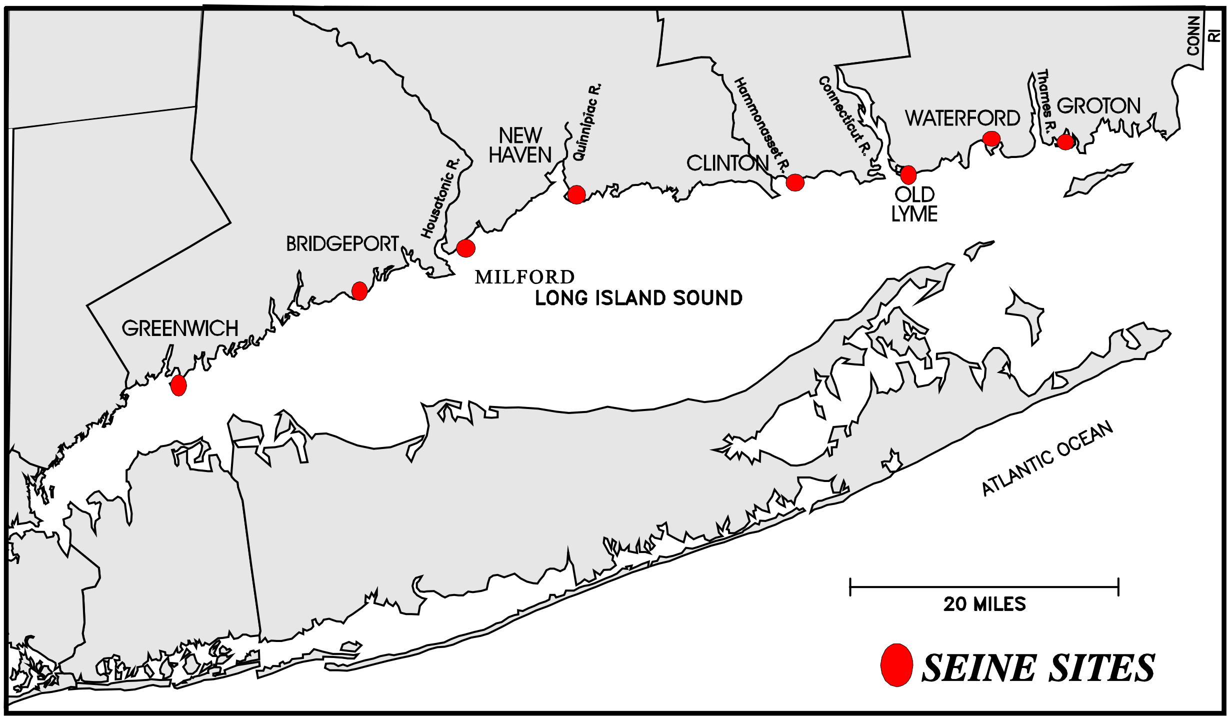

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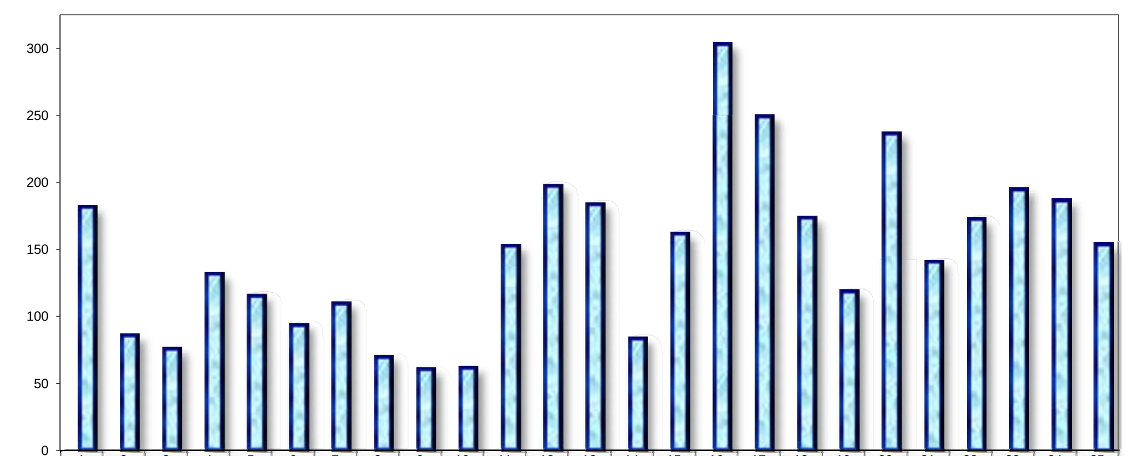
Figure 2.2: Mean catch (numbers) of all finfish taken in seine samples, 1988-2012.
Mean catch per haul includes samples at all sites. Note that sampling at the Milford site began in 1990.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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	2012
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	153

Figure 2.3: Mean catch of young-of-year winter flounder, 1988-2012. *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.*

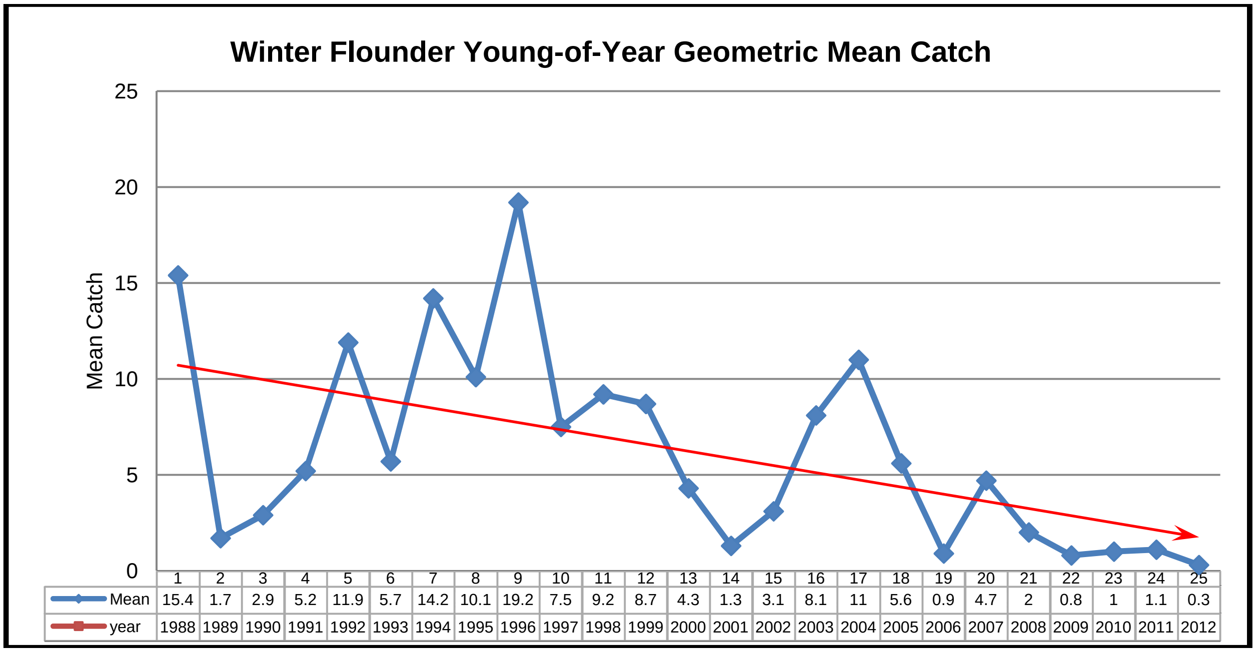


Figure 2.4: Mean catch of young-of-year tautog taken in seine samples, 1988-2012. *Geometric mean catch per haul (numbers) and occurrence (percent) includes samples at all sites. The time series trend line is shown by the yellow line. Note that sampling at the Milford site began in 1990.*

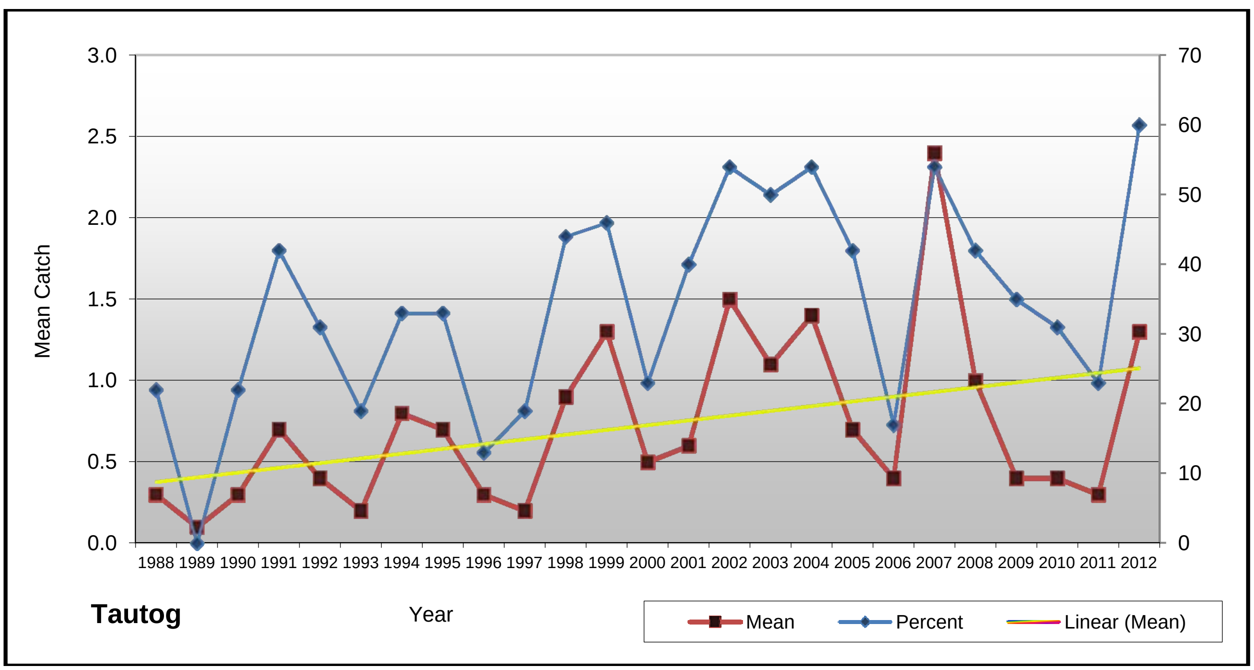
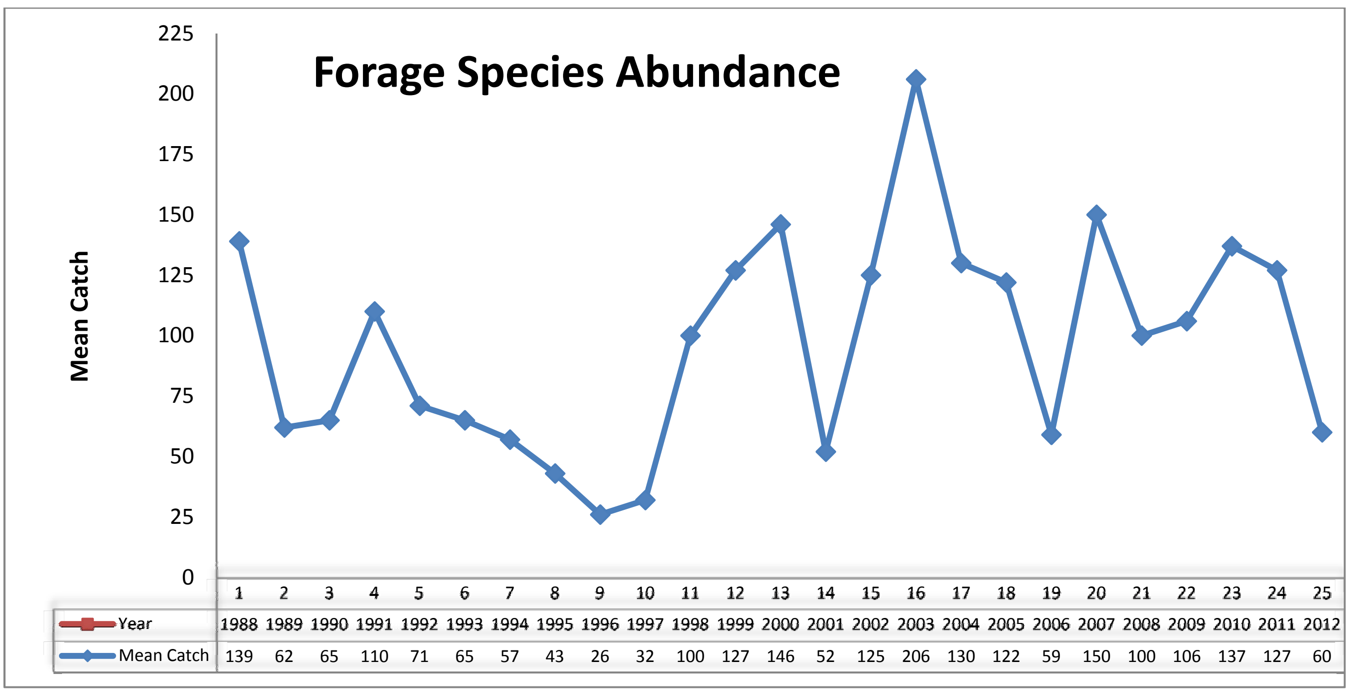


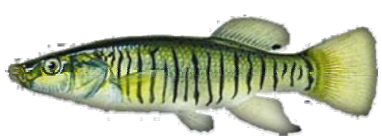
Figure 2.5: Mean catch of forage fish at eight sites sampled by seine, 1988-2012.
Forage species include Atlantic silversides, mummichog, sheepshead minnow, and striped killifish. The 95% confidence interval (CI) for each mean is also listed. See Appendix 2.1 for complete species names.

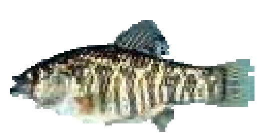
MEAN CATCH PER STANDARD HAUL

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	2012
MEAN	146	52	125	206	130	122	59	150	100	106	137	127	60
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	41-89







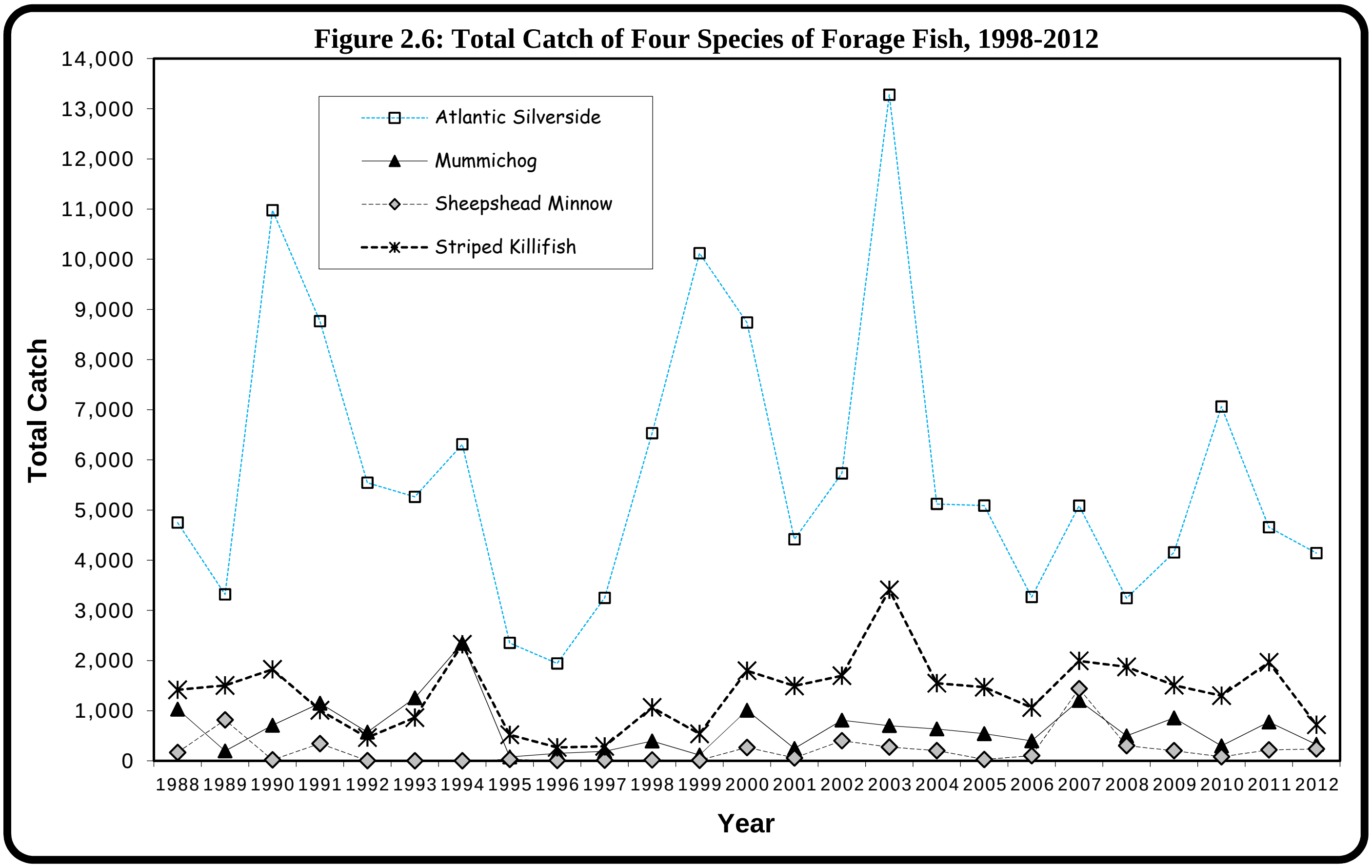


Figure 2.6: Total Catch of Four Species of Forage Fish, 1998-2012
Atlantic Silverside
Mummichog
Sheepshead Minnow
Striped Killifish
Total Catch
Year

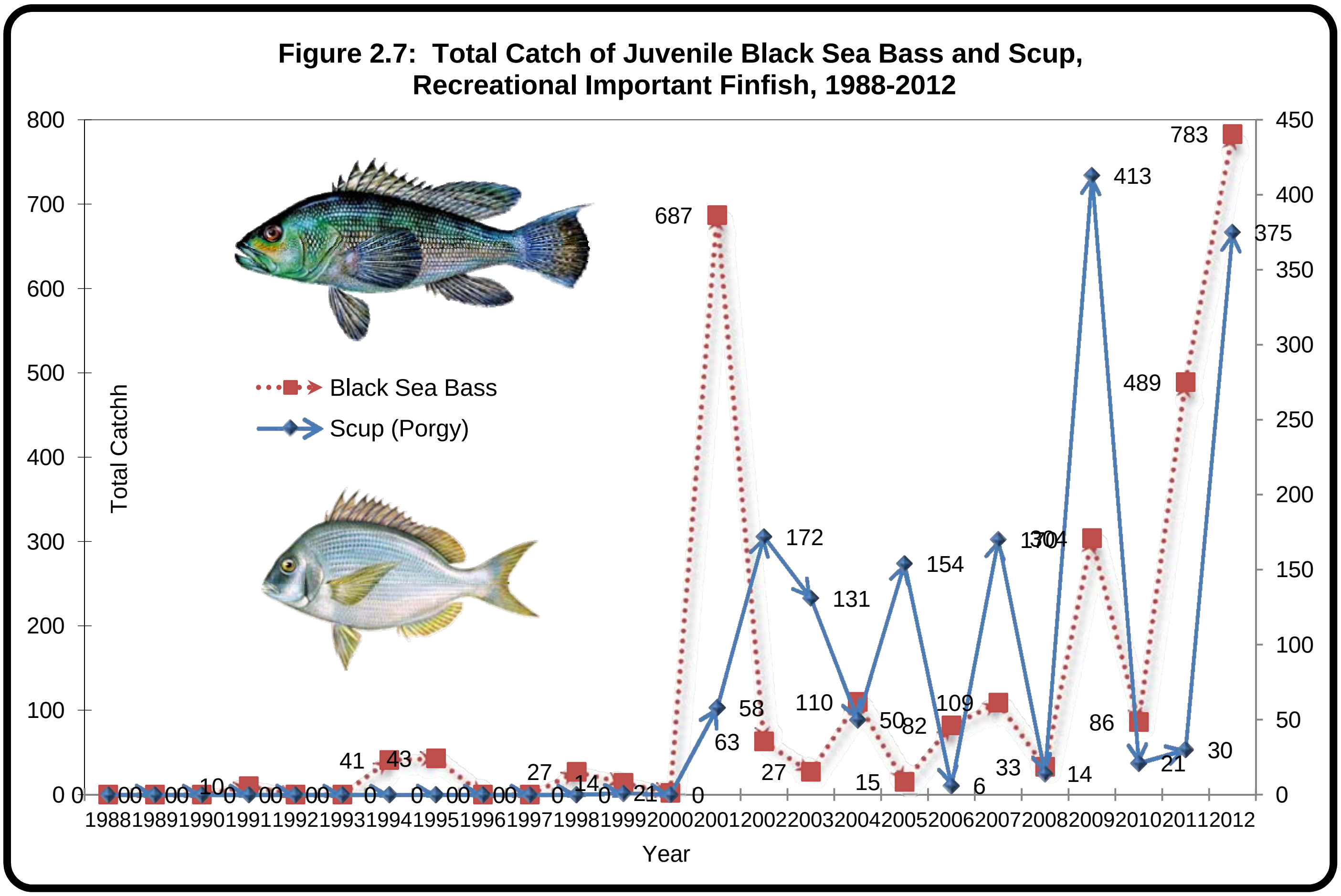


Figure 2.7: Total Catch of Juvenile Black Sea Bass and Scup, Recreational Important Finfish, 1988-2012
Black Sea Bass
Scup (Porgy)
Total Catchh
Year

Figure 2.8: Total Catch of Juvenile Striped Bass, Summer Flounder and Weakfish, Recreational Important Finfish, 1988-2012

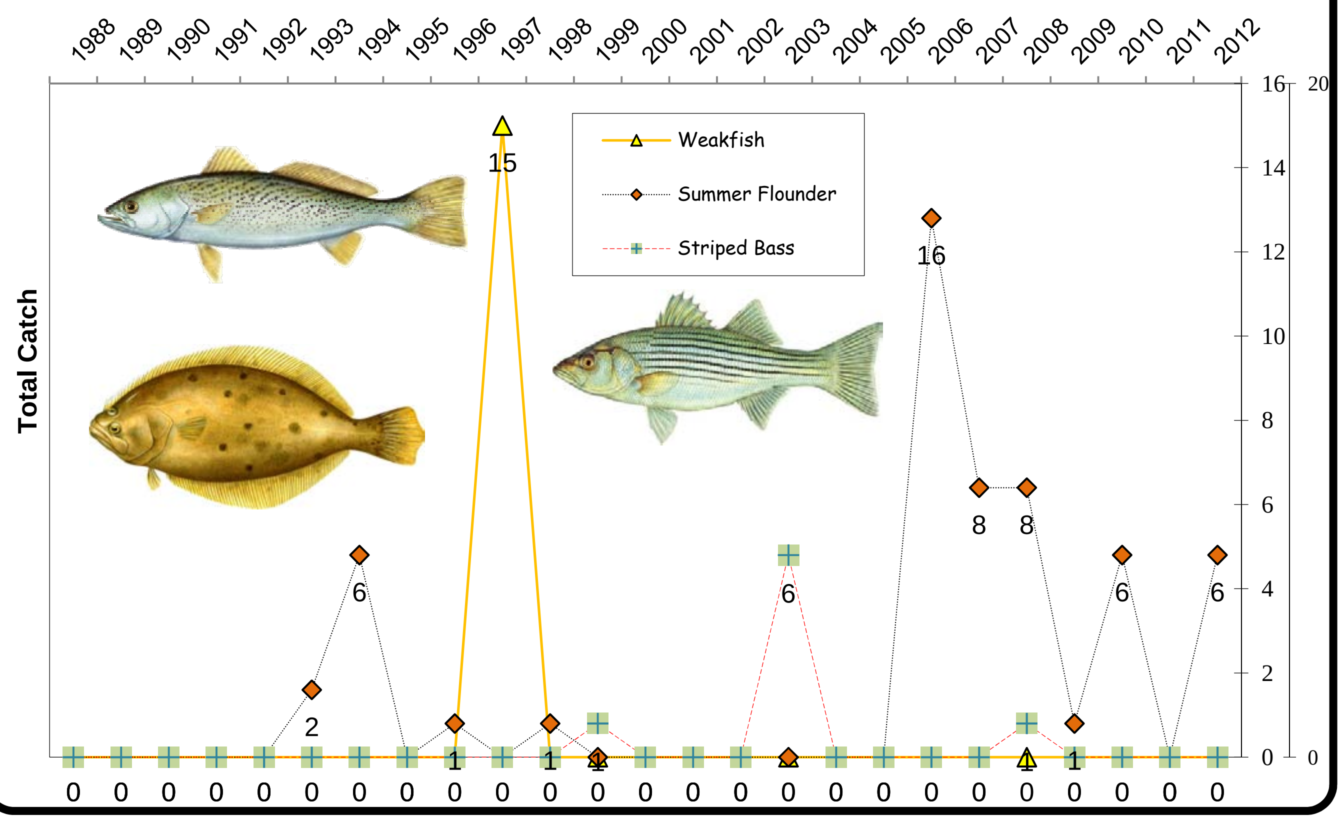
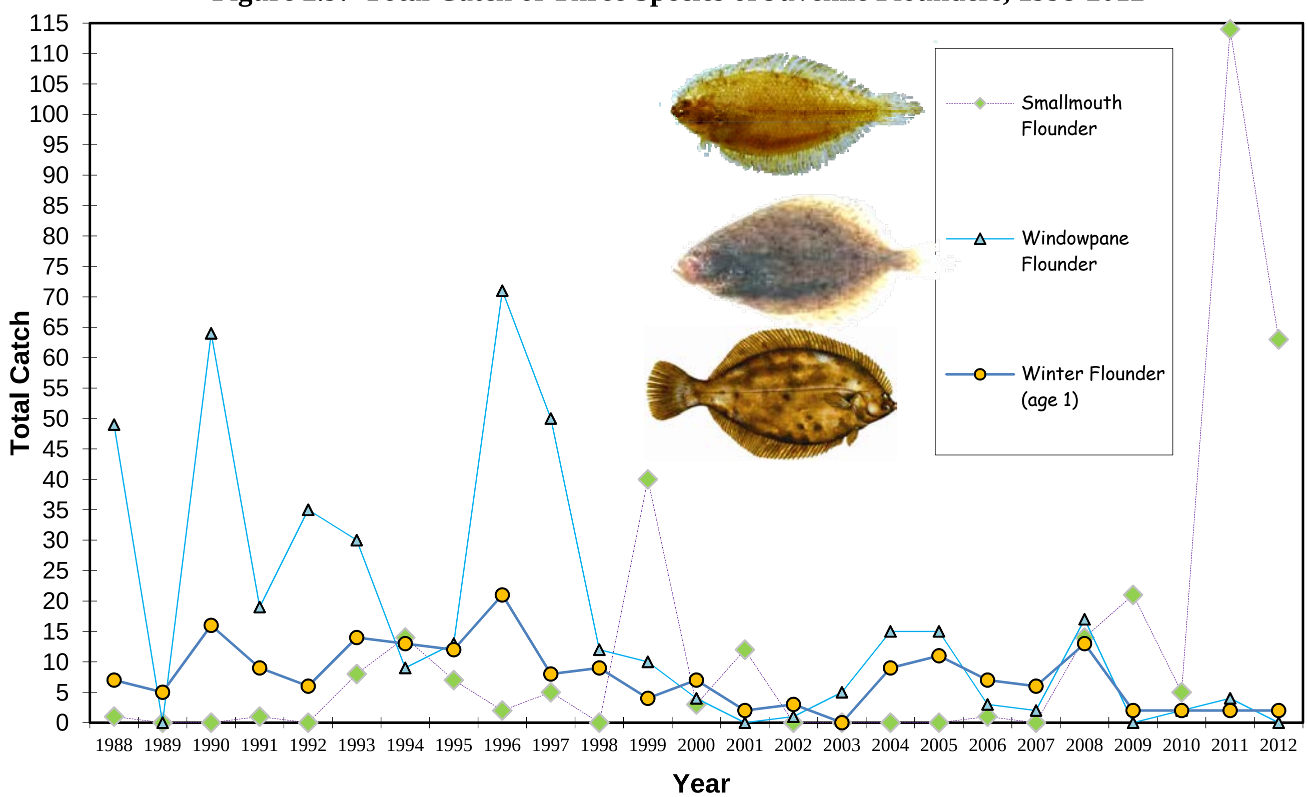


Figure 2.9: Total Catch of Three Species of Juvenile Flounders, 1998-2012



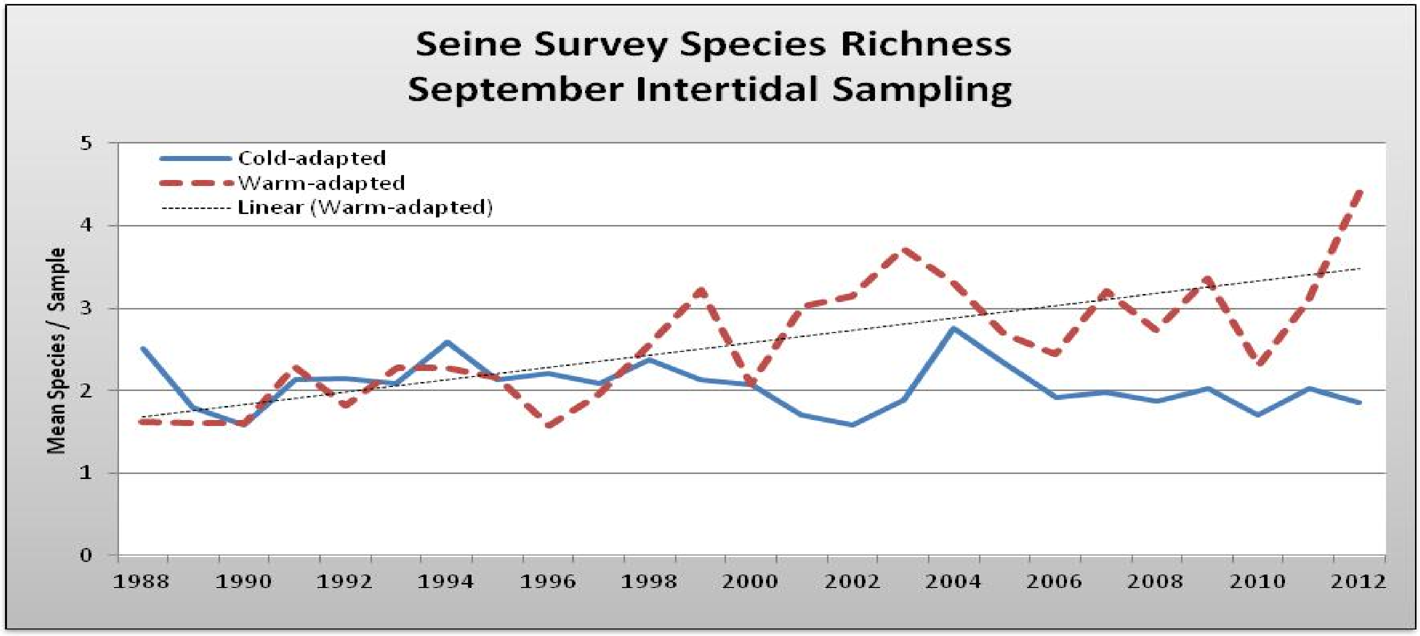


Figure 2.10: Species richness trends for cold and warm adapted finfish species, 1988-2012. *The increasing linear trend in the mean number of warm-adapted species captured per sample is statistically significant.*

Appendix 2.1: Finfish species taken in the Estuarine Seine Survey, 1988-2012.

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*
Feather Blenny	FBL	*Hypsoblennius hentzi*
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 variegates*
Shorthorn Sculpin	SHS	*Myoxocephalus scorpius*
Skilletfish	SKL	*Gobiesox strumosus*
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, 1988-2012.

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*
Mantis shrimp	**MAN**	*Squilla empusa*
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 2.11: Haul Seining in 2012.

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 seine studies on juvenile American shad, blueback herring, menhaden and common nearshore marine species in 2012. 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 was expanded to the Thames River system after 1996 to monitor the effect of the operation of the Greenville Dam fish lift on anadromous fish restoration. The fish lift was constructed to aid in the enhancement of American shad and river herring in the system. CT DEEP initiated the seine survey in the Thames River to estimate juvenile production of shad and blueback herring. Sites were chosen based on previous work conducted by the department. The survey has documented few juvenile shad and river herring, but has been 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 was 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 Fish lift, located at river kilometer 140, in 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 daily. A daily subset of fish lifted are sampled for scales

To estimate 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. Fifty one scale samples were collected. Future drift net collection efforts will continue to be minimal since development of a sustainability plan as mandated by Amendment 3 to the Atlantic States Marine Fisheries Commission (ASMFC) American Shad Fishery Management Plan. Amendment 3 calls for system specific Sustainable Fishery Plans. The Sustainable Fishery Plan for the Connecticut River utilizes juvenile recruitment, Holyoke lift numbers (as a proxy for run size) and total commercial harvest to monitor stock health. Age composition from gillnet collections continues at a smaller scale to serve coast-wide stock assessment needs.

Age structure was derived from scale samples collected at the Holyoke Fish lift in Holyoke, MA to characterize the population independent of the commercial fishery. 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 annual lift count 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 11th through October 10th, 2012. 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 12th through September 6th. 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, counted, subsampled 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 as a geometric mean catch per unit effort for both shad and blueback herring. Geometric mean is the preferred method when reporting to ASMFC 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 Fish lift was open for fish passage from April 4 through July 8, 2012 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 2012 (490,431), was the highest since 1992 (721,764) and was a little more than double the 2011 lift count (244,177) (Figure 3.3). The number of American shad lifted upstream annually at the Holyoke Dam has been highly variable through the time series but was well above the long term average of 297,183 with a range of 114,137 to

721,764 and a median of 281,542. The sex ratio of the 2012 shad run was derived from information collected at the Holyoke fish lift 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 62% for males and 38% females (Figure 3.5).

American shad scales were collected on 43 days over a 60 day span during lift operation. The shad age structure from scale samples was expanded based on the number of fish lifted at Holyoke Dam. Nine hundred eleven samples collected from shad at the Holyoke Dam fish lift were examined for age determination.

Length frequency of American shad collected at the Holyoke lift ranged from 33.0 to 47.5 cm for male shad and 36.0 to 50.0 cm FL among female shad. Length frequencies of both sexes were fairly normally distributed (Figure 3.5). Average size among males was 41.2 cm FL and among females was 45.1 cm FL.

The 2012 male population of spawning adult shad was produced from the 2005-2009 year classes. Forty two percent of male shad scales examined were from 4 year old fish. Forty three percent of male shad scales examined were from five year old fish. Six and seven year old fish were 12 and 0.2 percent of the population, respectively, while three year old males comprised on1y two percent of the age structure (Table 3.3).

The majority of female shad sampled in 2012 were from the 2007 year class. Fifty six percent of female scale samples examined were 5 year old fish. Four year old fish contributed twenty two percent to the annual run and twenty one percent were 6 year old fish. The incidence of overall repeat spawning remains low. The percentage of repeat spawners for males is 3.2% and 5.4% among females, with a combined repeat spawn rate of 4.1% (Table 3.3). The shad spawning population continues to rely on a few age classes and low rates of repeat spawners.

Landings/Commercial Fishery

Fourteen commercial shad licenses were sold in 2012 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 took 61,623 fish in 2012, the highest landings since 2005 and double 2011 landings (32,183), consistent with the doubling in the Holyoke fish lift count this year (Figure 3.1). The fishery continues to have a small impact on the stock. The 2012 commercial harvest ranked fourteenth among 23 years since 1990. The catch is reported as pounds and was converted to numbers of fish by sex (Table 3.1).

CT DEEP scale samples representing the commercial fishery age structure ranged from 4 to 7 year olds among males and from age 4 to 7 year olds among females. Age frequencies were dominated by five year old fish for males with 62% of the males while five year old females comprised 50% of female scales examined. Among males, 15% of the catch was 4 year olds and 23% were age six. Among females, 5% were four year olds and 37% were age five. The sex ratio of the samples collected was 75% females to 25% males indicative gillnets, which are of a size selective gear type more apt to collect larger shad, typically females (Figure 3.6).

Similar to CT DEEP fishing efforts, reported landings in mandatory Catch Reports were skewed towards females (84%), with males accounting for 16% of the landings (Table 3.1). Males are either underreported, less represented in the catch due to mesh size selectivity, or a combination of the two factors. Male shad are less valuable to sell to markets. Repeat spawning rates were not calculated due to low sample size.

Seine Survey

Juvenile collections in the Connecticut River were conducted from July 11th through October 10th, 2012. In the 88 hauls completed in 2012, nearly 29,000 fish representing 33 species or taxonomic groups were collected (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 2012, the most abundant species collected were shiners (mixed species), blueback herring, *Fundulus spp.* and sunfish, followed by American shad ranking 5th highest in total catch. Spottail shiners, American shad, *Fundulus spp.* and sunfish also had a high frequency of occurrence in the catches (Table 3.7).

A total of 1,545 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 3.03 (Figure 3.12). The geometric mean in 2012 was nearly the same as 2011 and ranks as the 5th lowest in the time series (Table 3.6). The annual index of juvenile abundance (geometric mean catch/haul) has varied without trend. The highest catch for 2012 was 220 shad collected at the Holyoke site in early September represented 46% of the total Holyoke catch for the season and 14% of the overall catch (Table 3.4). The station with the largest proportion of the seasons catch was in Deep River. Stations Holyoke and Deep River, combined, accounted for 68% of the total 2012 catch. Deep River having the highest proportion of the annual catch is somewhat of an unusual occurrence. Environmental conditions seemed to have had an effect on catches in the upper river in 2012. Daily discharge values as monitored by USGS, were well below median values for the sampling season (Figure 3.8). The water levels were very low at northern stations, while in the lower section of the river the tidal influence counteracts the effects of low discharge levels upstream.

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). The Enfield and Essex sites provided the lowest catches of the season. The Enfield station produced the highest number of zero catches and lowest catch of the season, 0 and 8, respectively.

A total of 6,249 blueback herring were collected in 2012 (Table 3.5). The geometric mean CPUE for blueback herring was lower than American shad. The ratio of blueback catches to shad has been widely variable through the time series. In more recent times, shad catches exceed blueback catches more often in the recent time series. Early in the time series, blueback catches far exceeded those of American shad. (Figure 3.9). The 2012 *Alosa spp*. CPUE indices were both well below average and the blueback CPUE is the 3rd lowest geometric mean in the time series. As with American shad, the Deep River station had the highest total catch for blueback herring, with 92% of the season's catch. A single catch early in the season at Deep River (2,620) was 42% of the season's total catch of 6,249 blueback herring (Figure 3.12)

Thames River Seine Survey

The 2012 Thames River survey was conducted bi-weekly from July 12th through September 6th with 40 seine hauls. Over 13,000 fish were collected representing 32 groups or species (Table 3.8). Atlantic silversides had the highest presence in the catch (100%), followed by *Fundulus spp*, bluefish and sticklebacks (Figure 3.8). Over the length of the time series, menhaden catches have had a wide variation ranging from less than 200 to over a million. The 2012 menhaden index ranked 7th lowest out of 15. The 2012 menhaden catch was 8,662, with a geometric mean cpue of 3.49. 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). Other notable species caught were: Winter flounder (17), striped bass (14), Scup (53), snapper bluefish (498), and tautog (5).

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 2012 are listed in table 3.10.

Modifications

In 2013 the Thames River seine survey will be expanded both seasonally and spatially with sampling beginning in May, two sites being added further south in the river, and one site eliminated. The addition of more southern sites is to capture a more diverse assemblage of marine species.

Future adult American shad drift net collection efforts will be minimal due to development of a CT River specific Sustainability Fishery Plan, which uses the metrics of juvenile recruitment, Holyoke lift numbers (as a proxy for run size) and total commercial harvest to monitor stock health. This plan was developed as mandated by Amendment 3 to the ASMFC American Shad Fishery Management Plan. Age composition from gillnet collections continues at a smaller scale to serve coast-wide stock assessment needs.

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Table 3.1. Annual American shad commercial fishery harvest. Landings are reported by weight (lbs.) and counts, by sex, 1990-2012.

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	3.2	12,299	55,682	4.5	19	352
1996	66,757	2,298	6,941	3.0	13,660	59,816	4.4	13	264
1997	91,003	2,812	10,275	3.7	18,743	80,728	4.3	11	271
1998	89,342	2,983	9,440	3.2	18,529	79,902	4.3	12	280
1999	44,574	872	3,373	3.9	9,506	41,201	4.3	11	195
2000	107,416	2,342	7,491	3.2	21,228	99,925	4.7	11	210
2001	59,234	1,469	3,980	2.7	13,074	55,254	4.2	13	193
2002	108,099	7,153	22,555	3.2	20,653	85,544	4.1	11	248
2003	111,127	5,176	17,518	3.4	21,244	93,609	4.4	14	249
2004	66,328	2,456	8,000	3.3	13,436	58,328	4.3	14	226
2005	69,333	1,873	6,136	3.3	15,336	67,070	4.4	12	218
2006	38,547	1,864	5,445	2.9	7,372	33,102	4.5	12	185
2007	51,572	1,688	5,701	3.4	9,888	43,497	4.4	13	199
2008	28,419	858	2,637	3.1	6,486	25,782	4.0	10	203
2009	40,680	1156	4,045	3.5	6,437	32,187	5.0	13	182
2010	24,641	855	2,994	3.5	4,238	21,192	5.0	7	202
2011	32,183	953	3,334	3.5	5,772	28,849	5.0	8	218
2012	61,623	2,810	9,835	3.5	10,358	51,788	5.0	9	160

Table 3.2. American shad age distribution in the lower Connecticut River, 2012. Samples were collected by gill net to characterize the commercial fishery.

2012 Fishery Dependent Shad Age Structure					
	4	**5**	**6**	**7**	**Total**
Bucks	2	8	3		13
%	15.38	61.54	23.08		
Shad (n)	1,513	6,052	2,270		9,835
	4	**5**	**6**	**7**	**Total**
Roes	2	14	19	3	38
%	5.26	36.84	50.01	7.89	
Shad (n)	2,724	19,079	25,899	4,086	51,788
	4	**5**	**6**	**7**	
Combined	4	22	22	3	51
%	7.84	43.14	43.14	5.88	
Shad (n)	4,831	26,584	26,584	3,623	

Table 3.3. Fishery independent spawning history and age distribution of American shad in the upper Connecticut River, 2012

2012 American Shad Age Structure							
	3	**4**	**5**	**6**	**7**	**Total**	**% Repeat Spawn**
Bucks	13	234	241	67	1	556	3.24
%	2.34	42.09	43.35	12.05	0.18		
Shad (n)	7,137	128,460	132,303	36,781	549	305,229	
		4	**5**	**6**	**7**	**Total**	**% Repeat Spawn**
Roes		77	195	73	2	347	5.48
%		22.19	56.20	21.04	0.58		
Shad (n)		42,061	106,517	39,876	1,092	189,546	
	3	**4**	**5**	**6**	**7**		**% Repeat Spawn**
Combined	13	311	436	140	3		4.10
%	1.44	34.44	48.28	15.50	0.33		
Shad (n)	7,123	170,405	238,895	76,709	1,644	494,776	

Table 3.4. Catch (C), effort (E) and catch per effort (C/E) of juvenile American shad from the 2012 CT River seine survey.

Date	Holyoke	Enfield	Wilson	Glastonbury	Salmon River	Deep River	Essex	Catch	Effort
7/11/2012	0	0	0	2	9	0	2	13	7
7/18/2012	1	0	0	8	1	0	4	14	7
7/25/2012	19	0	0	3	5	13	0	40	7
8/1/2012	0	0	0	0	0	59	0	59	7
8/8/2012	0	0	0	0	7	108	0	115	7
8/15/2012			73	0	13	0	2	88	5
8/22/2012	72	0	12	0	5	81	0	170	7
8/29/2012	103	0	127	0	48	33	0	311	7
9/5/2012	220	0	10	0	10	22	0	262	7
9/12/2012	0		0	0	6	6	0	12	6
9/19/2012					0	90	0	90	3
9/26/2012	67		42	14	16	140	0	279	6
10/4/2012	0		7	0	21	6	0	34	6
10/10/2012	0		4	0	43	11	0	58	6
Total	482	0	275	27	184	569	8	1545	88

Table 3.5. Catch (C), effort (E) and catch per effort (C/E) of juvenile blueback herring from the 2012 CT River seine survey.

Date	Holyoke	Enfield	Wilson	Glastonbury	Salmon River	Deep River	Essex	Catch	Effort
7/11/2012	0	0	0	3	17	936	53	1009	7
7/18/2012	0	3	0	8	24	2620	8	2663	7
7/25/2012	0	0	0	9	115	404	0	528	7
8/1/2012	0	0	0	0	24	407	0	431	7
8/8/2012	0	0	0	0	4	409	0	413	7
8/15/2012			0	0	0	0	2	2	5
8/22/2012	0	0	0	0	0	108	0	108	7
8/29/2012	0	0	0	0	1	0	0	1	7
9/5/2012	0	0	6	0	0	12	0	18	7
9/12/2012	0		0	0	0	1	2	3	6
9/19/2012					0	418	0	418	3
9/26/2012	0		0	1	0	420	4	425	6
10/4/2012	0		0	0	0	0	5	5	6
10/10/2012	0		0	103	110	12	0	225	6
Total	0	3	6	124	295	5747	74	6249	88

Table 3.6. Geometric mean relative abundance index (CPUE) of juvenile American Shad and blueback herring,1978-2012.

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
2012	3.03	2.22

Table 3.7. List of fish species or group and percent frequency of occurrence of fish collected in Connecticut River seine survey, 2008-2012. **includes more than one species*

Species	2008	2009	2010	2011	2012
alewife	6.98	9.28	7.77	12.05	14.77
American eel	13.95	19.59	17.48	8.43	18.18
American shad	61.63	60.82	72.82	63.86	48.86
Atlantic Needlefish					3.41
Atlantic silverside	3.49	5.15	14.56	2.41	12.50
bay anchovy	2.33	2.06	0.97	4.82	10.23
black crappie	13.95	6.19	20.39	20.48	21.59
blue crab		7.22	17.48	6.02	12.50
blueback herring	46.51	36.08	60.19	45.78	36.36
bluefish	1.16	6.19	11.65	6.02	12.50
carp	4.65	5.15	19.42	12.05	15.91
catfish*	16.28	11.34	27.18	10.84	15.91
crevalle jack			3.88		
fallfish	4.65	3.09	3.88	2.41	3.41
gizzard shad			4.85		1.14
goby		1.03			
golden shiner	15.12	12.37	28.16	15.66	19.32
hickory shad	4.65	3.09			
hogchoker	2.33	8.25	15.53	18.07	18.18
killifish & mummichog*	43.02	27.84	37.86	55.42	42.05
largemouth bass	26.74	18.56	25.24	19.28	26.14
menhaden	3.49	11.34	13.59	4.82	18.18
northern kingfish			0.97		
northern pike	13.95	5.15	1.94	9.64	5.68
chain pickerel	1.16		0.97	4.82	3.41
pipefish			4.85	1.20	2.27
rock bass	19.77	5.15	25.24	13.25	10.23
smallmouth bass	39.53	14.43	20.39	30.12	22.73
spottail shiner*	73.26	59.79	64.08	65.06	55.68
stickleback*	4.65	5.15	13.59	1.20	1.14
striped bass			2.91	2.41	1.14
summer flounder	1.16				1.14
sunfish*	52.33	38.14	59.22	53.01	57.95
tessellated darter	33.72	26.8	31.07	30.12	39.77
white perch	22.09	7.22	18.45	16.87	10.23
white sucker	11.63	12.37	27.18	12.05	9.09
winter flounder			0.97		
yellow perch	47.67	29.9	44.66	50.60	35.23

Table 3.8. List of fish species or group and percent frequency of occurrence of fish collected in Thames River seine survey, 2005-2012. **includes more than one species.*

Species	2005	2006	2007	2008	2009	2010	2011	2012
alewife	6.67	1.56	17.86	1.59	8.06	1.77	5.36	7.5
American eel		6.25		1.59	4.84	0.71	1.79	2.5
American shad			5.36		6.45		1.79	5.0
Atlantic herring					3.23			
Atlantic needlefish	6.67	1.56						
Atlantic silverside	80		82.14	74.6	80.65	21.63	98.21	100
bay anchovy		10.94	7.14	14.29	9.68	3.55	10.71	27.5
blueback herring			1.79	1.59	1.61	0.35		2.5
bluefish	60	45.31	44.64	31.75	46.77	15.25	41.07	85
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			5
darter				1.59			1.79	
gizzard shad								2.5
golden shiner							1.79	
hogchoker							17.86	7.5
horseshoe crab	3.33							
killifish & mummichog*	43.33	25	32.14	42.86	20.97	6.03	69.64	52.5
largemouth bass		1.56						
lizardfish		6.25	5.36					2.5
menhaden	20	35.94	42.86	12.7	22.58	2.13	17.86	50
naked goby		3.13	8.93	9.52		1.77	16.07	15.0
northern kingfish	3.33						7.14	10
northern pike	3.33						3.57	
oyster toadfish						0.35		
pipefish	13.33	15.63	26.79	11.11	9.68	1.42		20
scup	6.67		14.29					20
sheepshead minnow	3.33		3.57	3.17			1.79	
spot			1.79	1.59				10
spottail shiner	6.67	9.38	3.57	6.35	3.23	1.06	7.14	5
stickleback*	16.67	12.5	5.36	36.51	32.26	2.13	42.86	5
striped bass	3.33	6.25	21.43	11.11	8.06	1.77	7.14	17.5
striped sea robin			3.57					2.5
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	12.5
tomcod			3.57	4.76	3.23	0.35	1.79	2.5
white mullet		4.69		3.17	1.61	3.9	1.79	7.5
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	20

Table 3.9. Number collected, number of seine hauls and geometric mean catch per haul of Thames River juvenile menhaden, 1998-2012.

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
2012	8,662	40	3.49

Table 3.10. Data and sample requests for 2011.

Organization	**Type of Request**
Dominion Millstone Power Station	Data
KleinSchmidt	Data
LISTS	Sample
Massachussetts Division of Fisheries and Wildlife	Data
NMFS SEFSC	Data
Normandeau Environmental Consultants	Data
Old Dominion University	Sample
U.S. Fish and Wildlife Service	Data
Wilmerhale Law Firm	Data

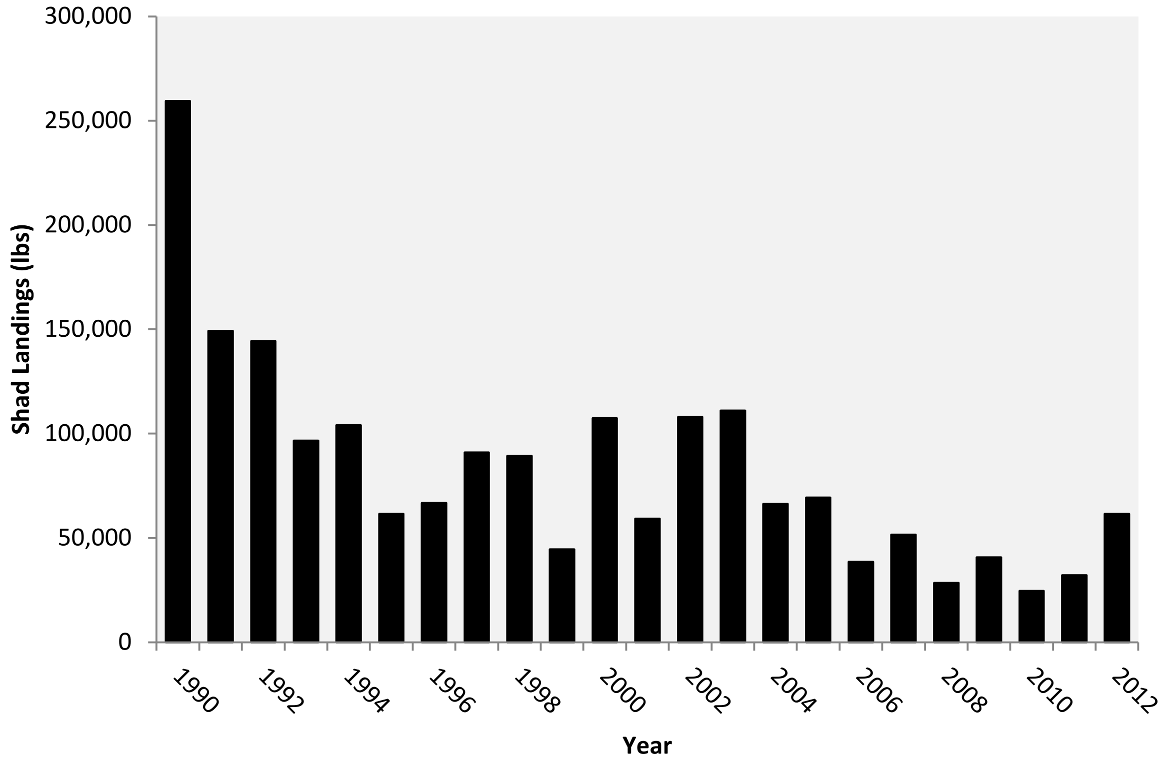

Figure 3.1 Commercial Landings (lbs) for Adult American shad, 1990-2012.

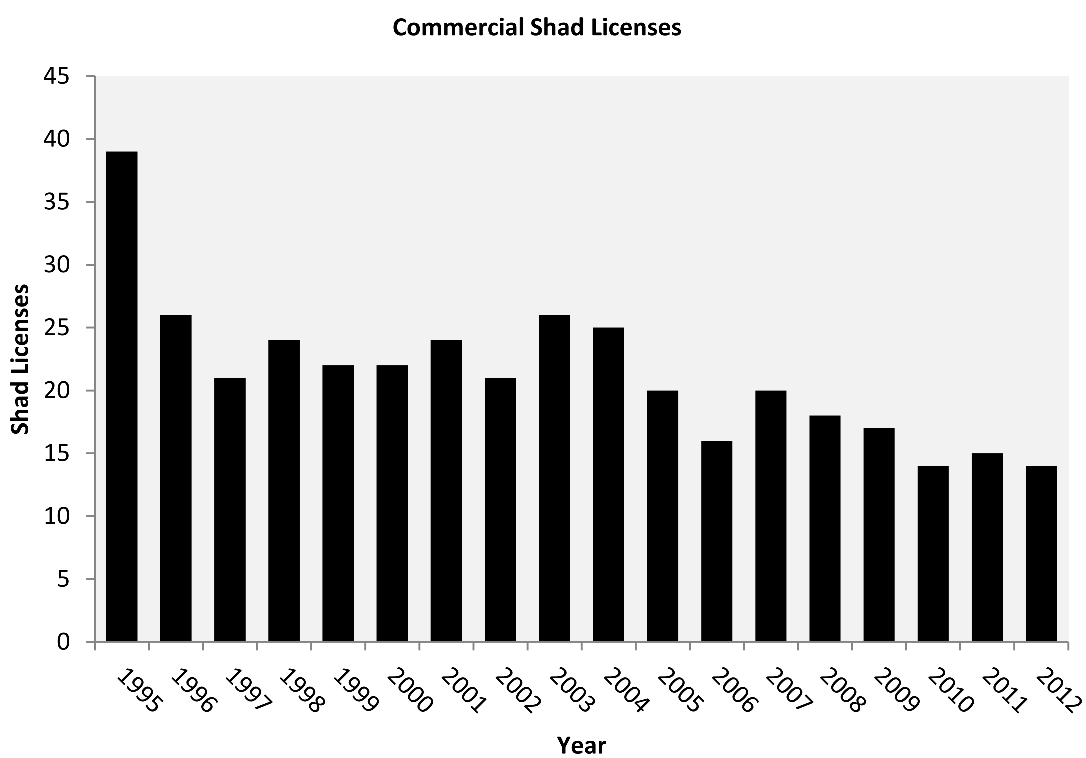

Figure 3.2. Number of Commercial shad license sales, 1995-2012.

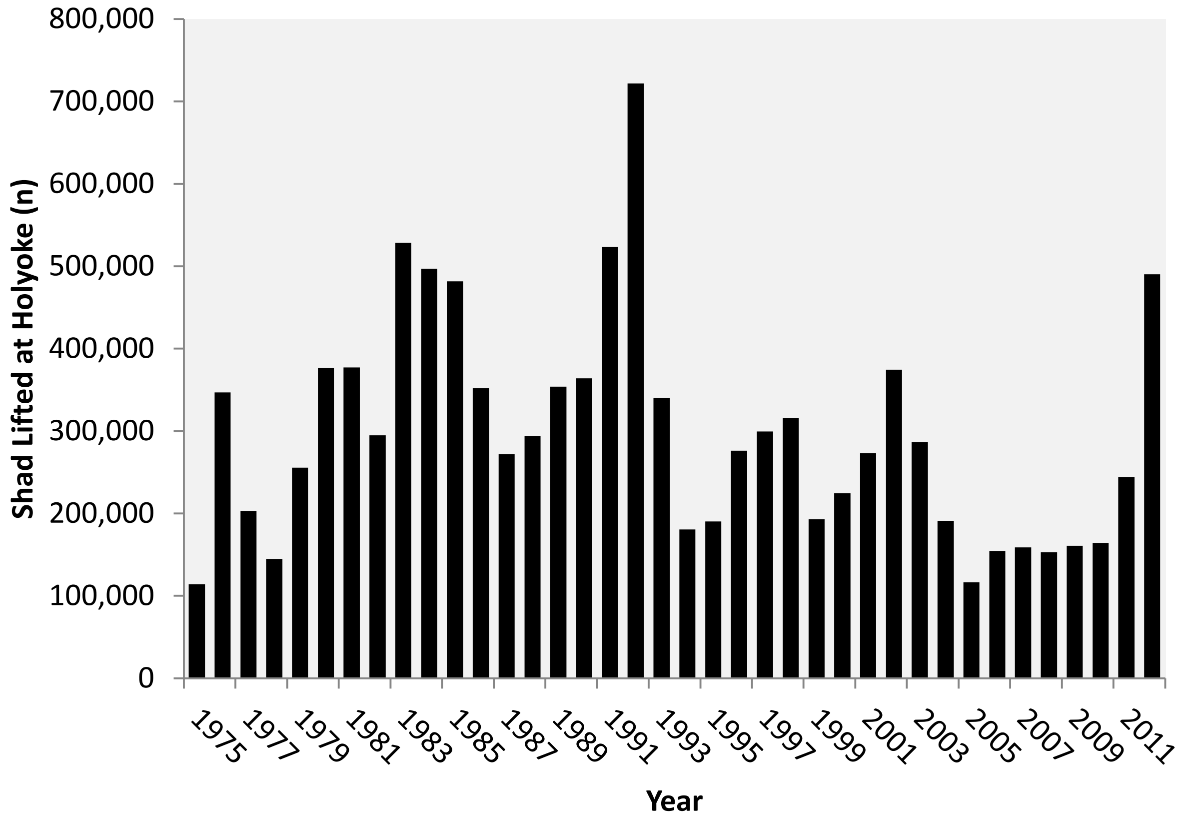

Figure 3.3. Number of adult shad lifted at the Connecticut River Holyoke Dam (Rkm 140), 1975-2012.

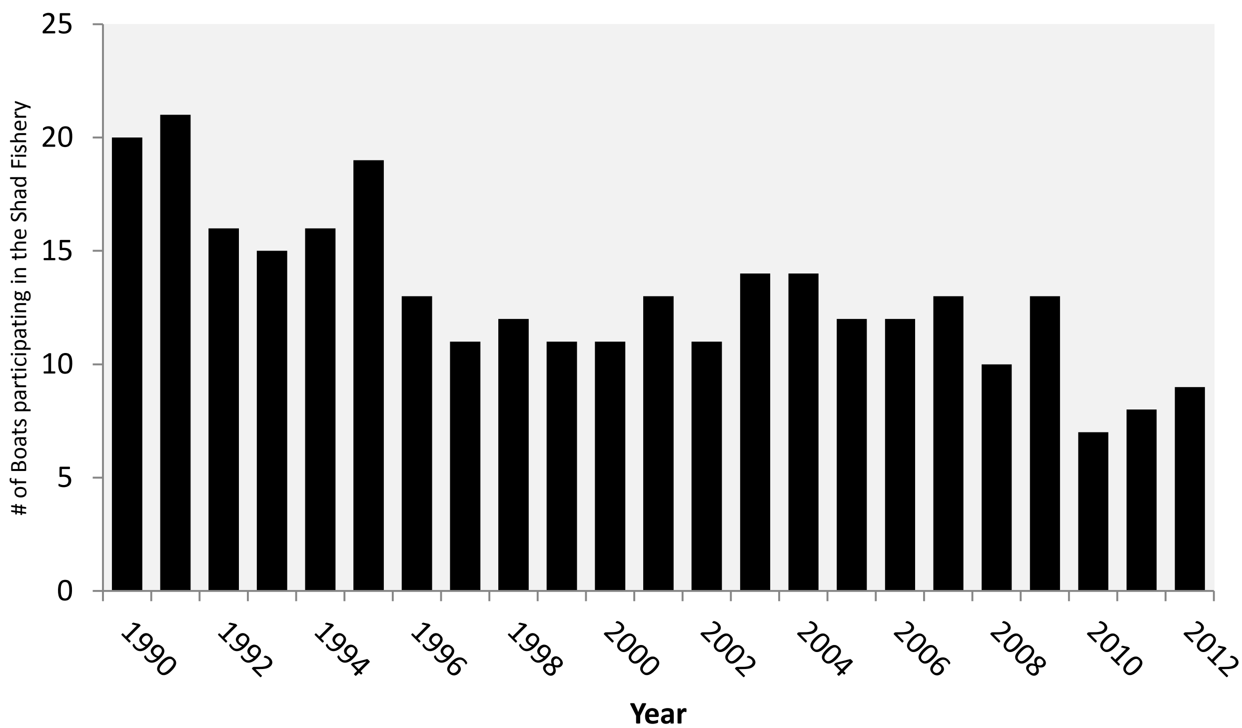

Figure 3.4. Number of boats participating in the commercial shad fishery, 1990-2012.

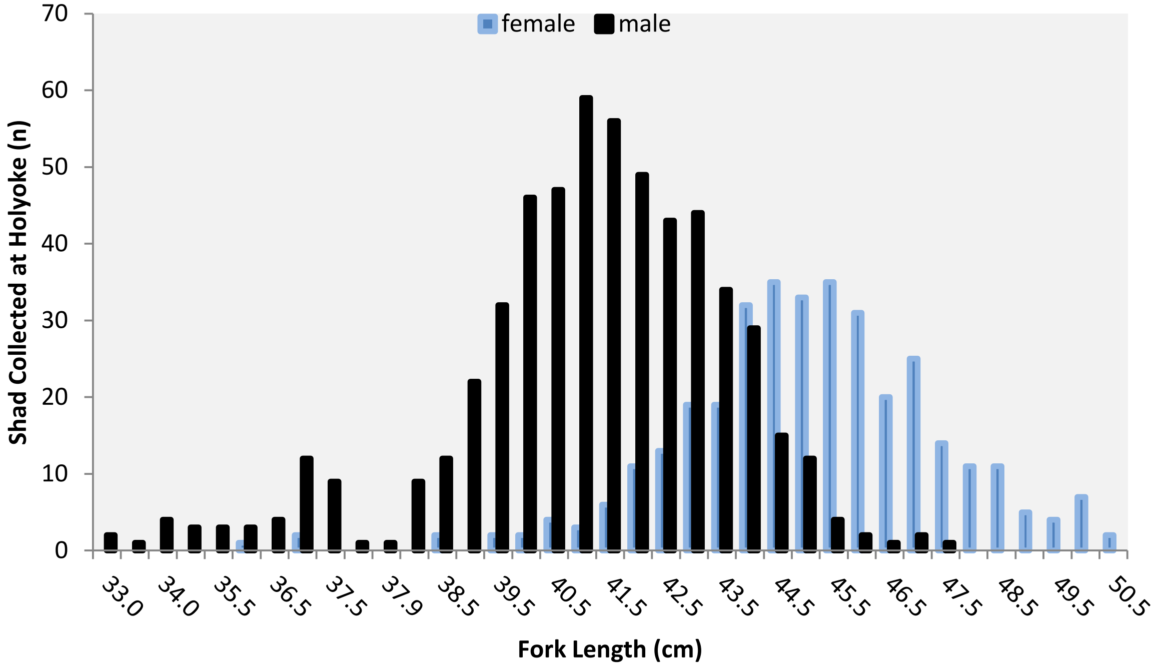

Figure 3.5 American shad length frequencies (FL, cm), by sex, based on collections at the Holyoke Lift, 2012.

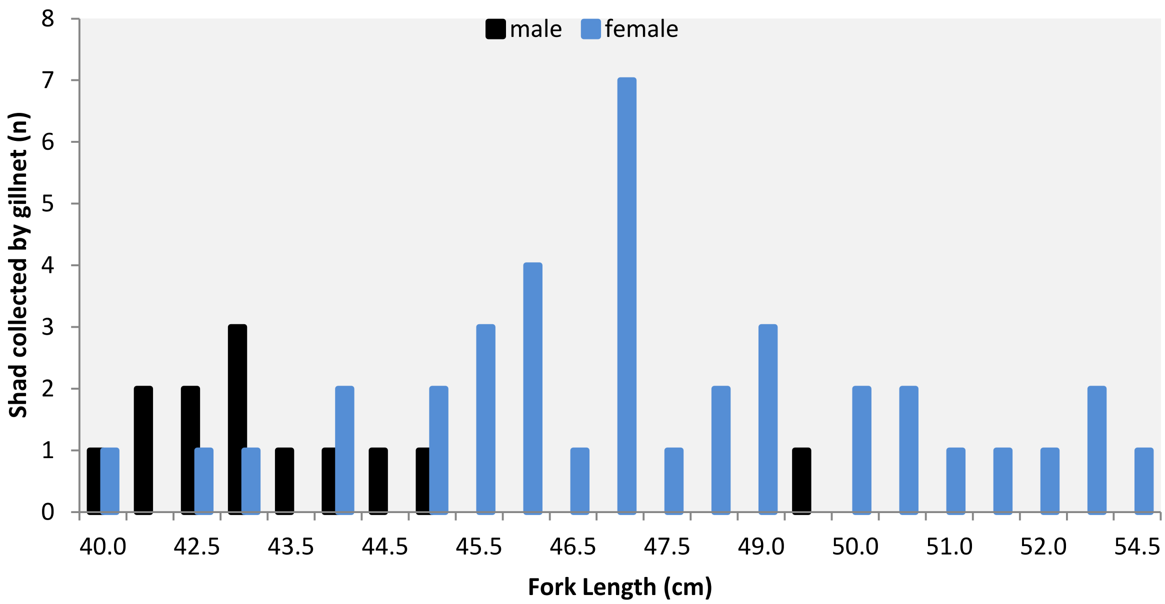

Figure 3.6. American shad length frequencies (FL, cm), by sex, collected by gillnet in the lower river, 2012.

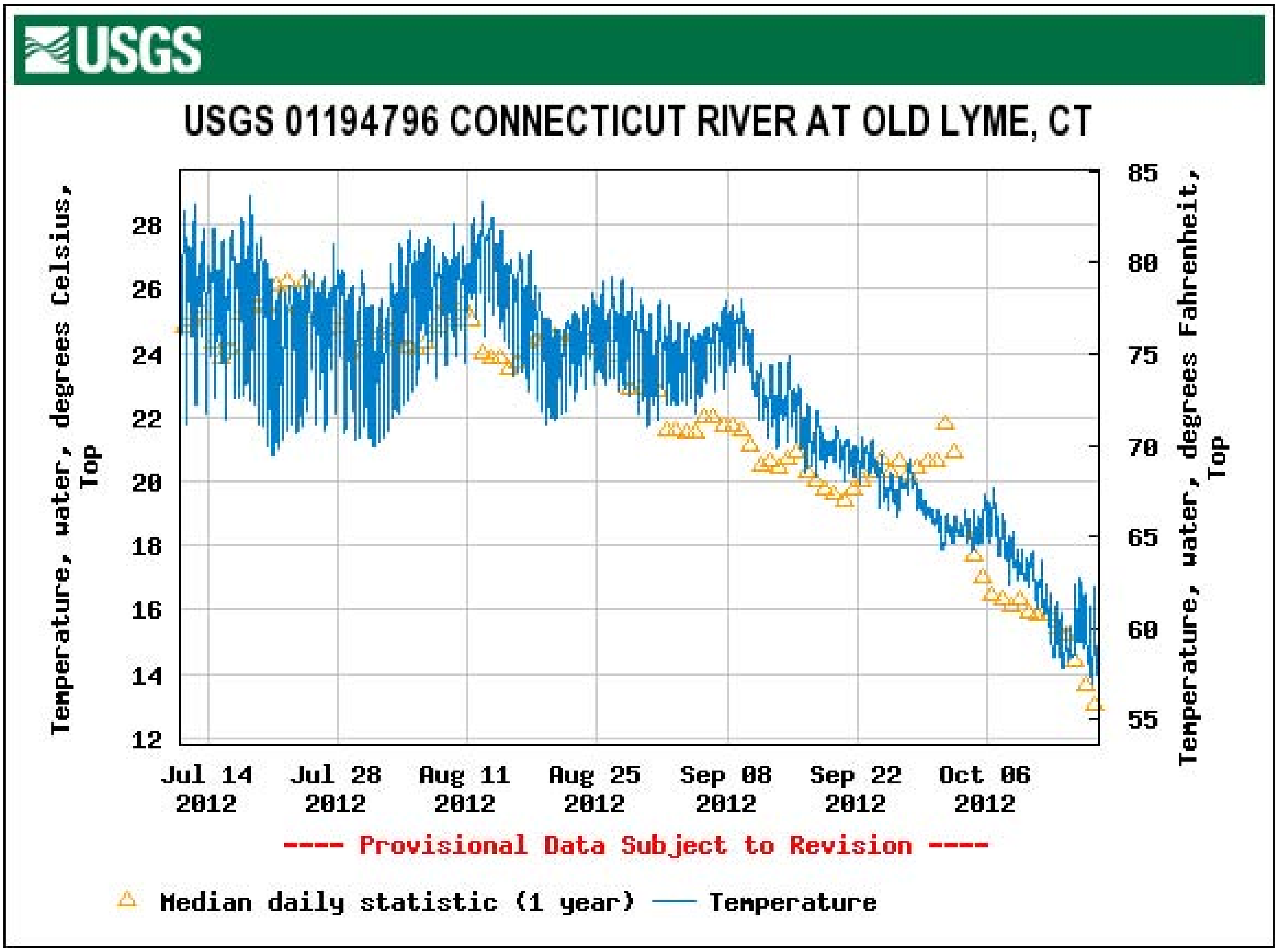

Figure 3.7. Connecticut River bottom temperatures measured at the USGS Old Lyme, CT gaging station July-October, 2012.

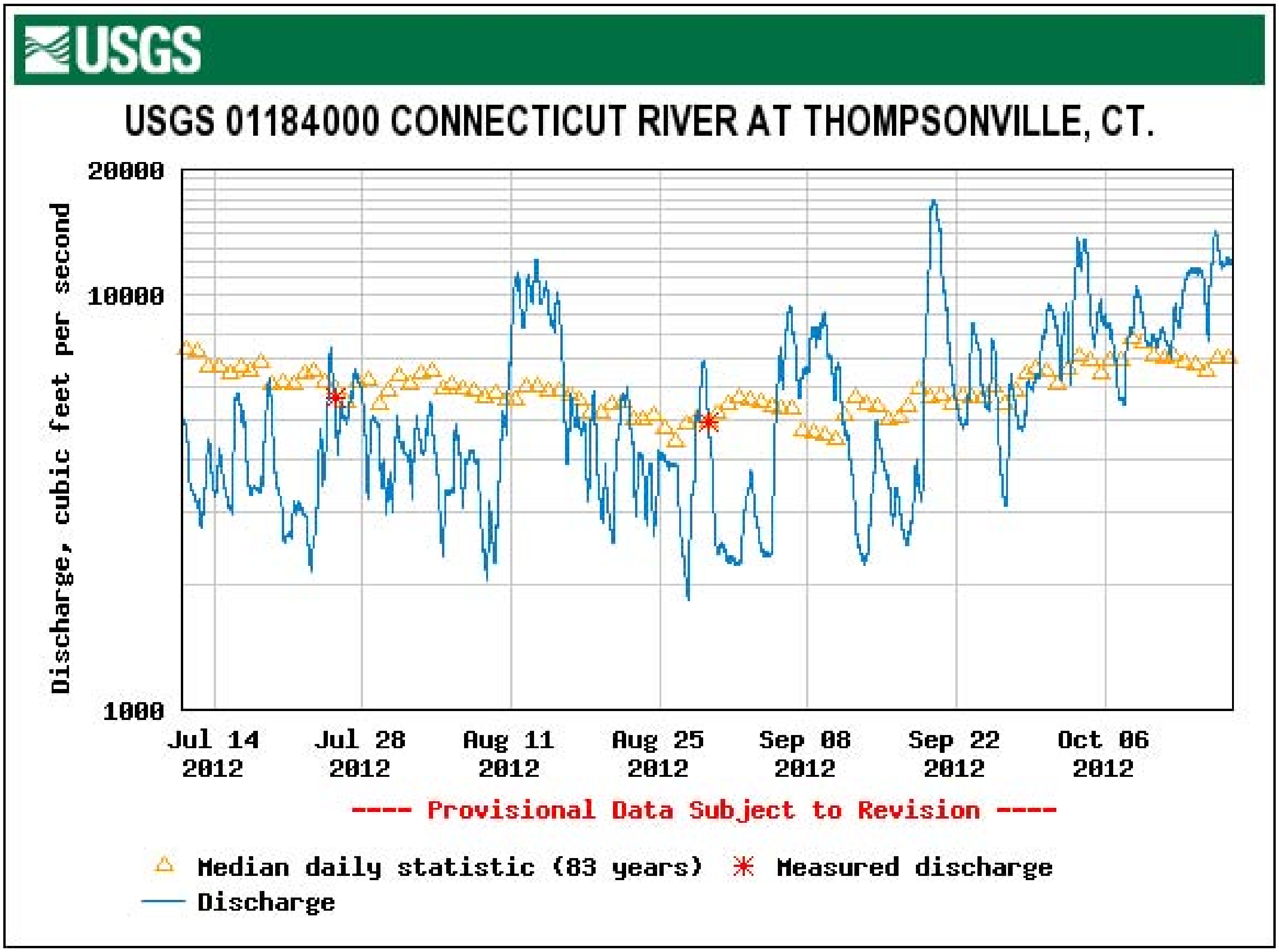

Figure 3.8. Provisional average daily Connecticut River Flow data provided by USGS at Thompsonville, CT station. Time frame shows discharge (cfs) during the 2012 juvenile seine sampling period

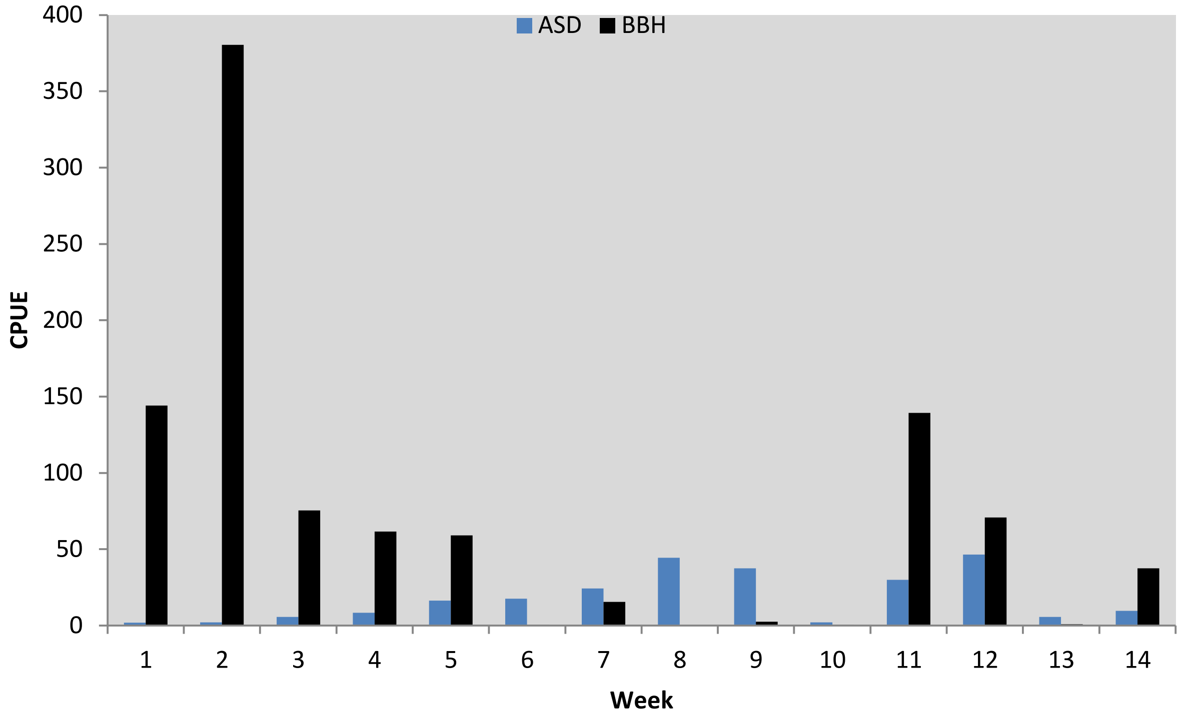

Figure 3.9. Weekly catch per unit effort of juvenile shad and blueback herring, 2012.

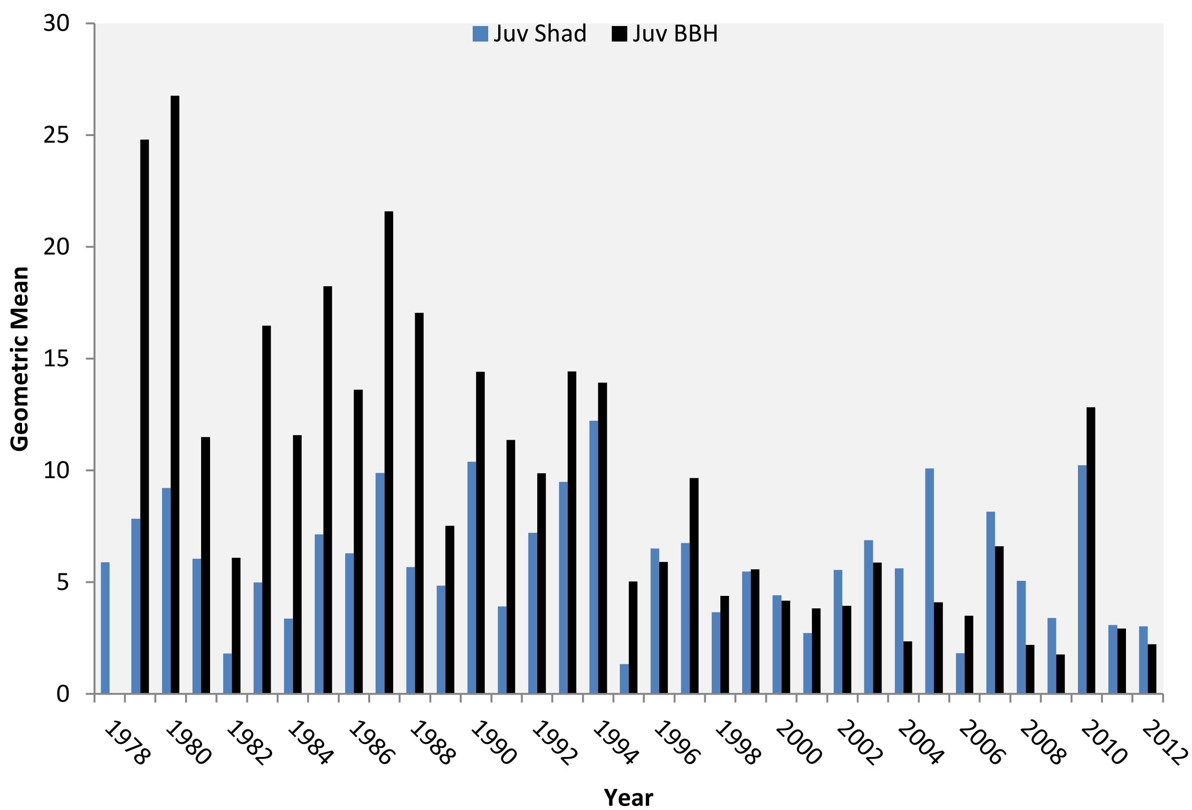

Figure 3.10 Annual cpue of juvenile shad and blueback herring, 1978-2012.

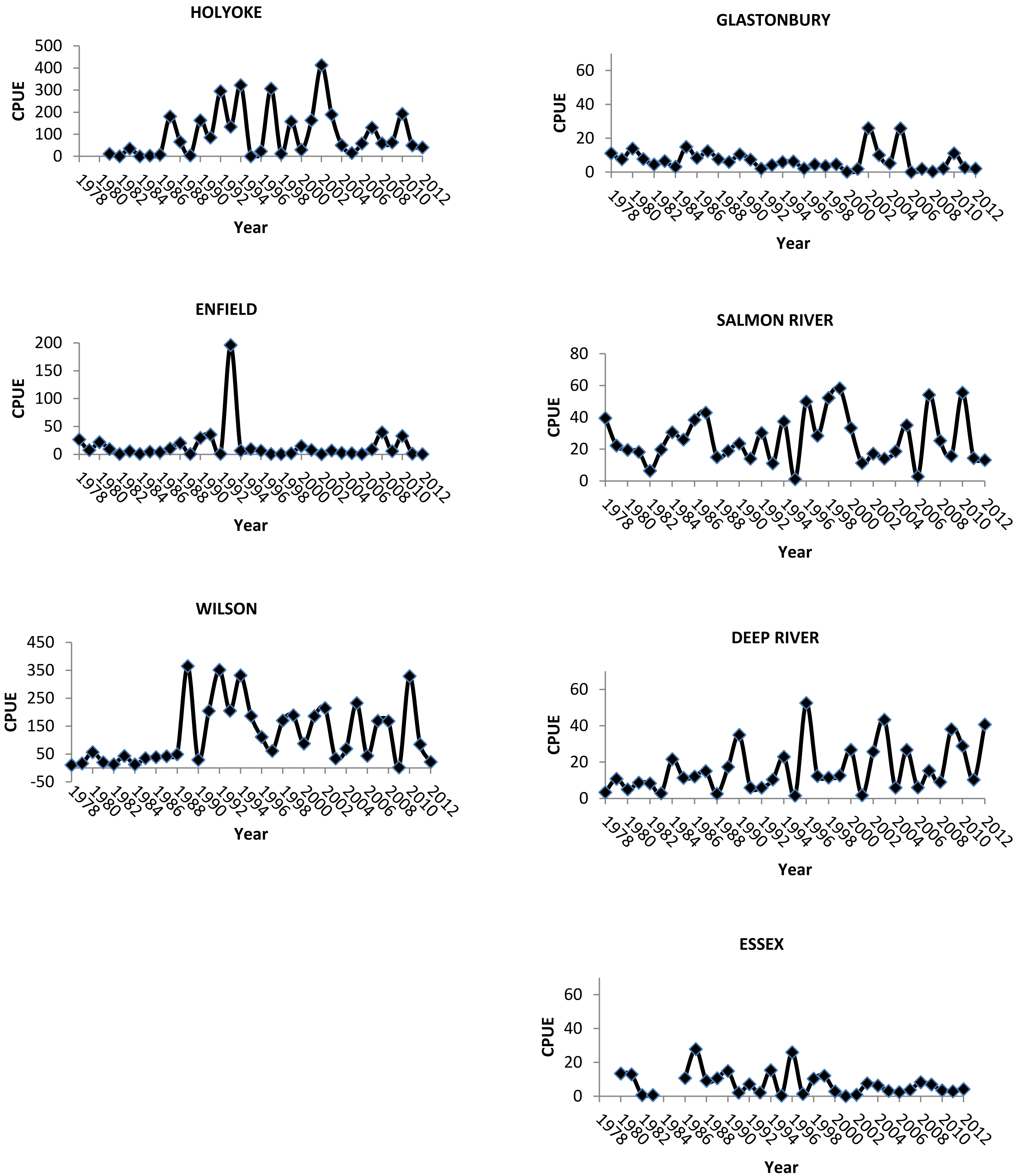

Figure 3.11. Annual CPUE of Connecticut River juvenile American shad by station, 1978-2012.

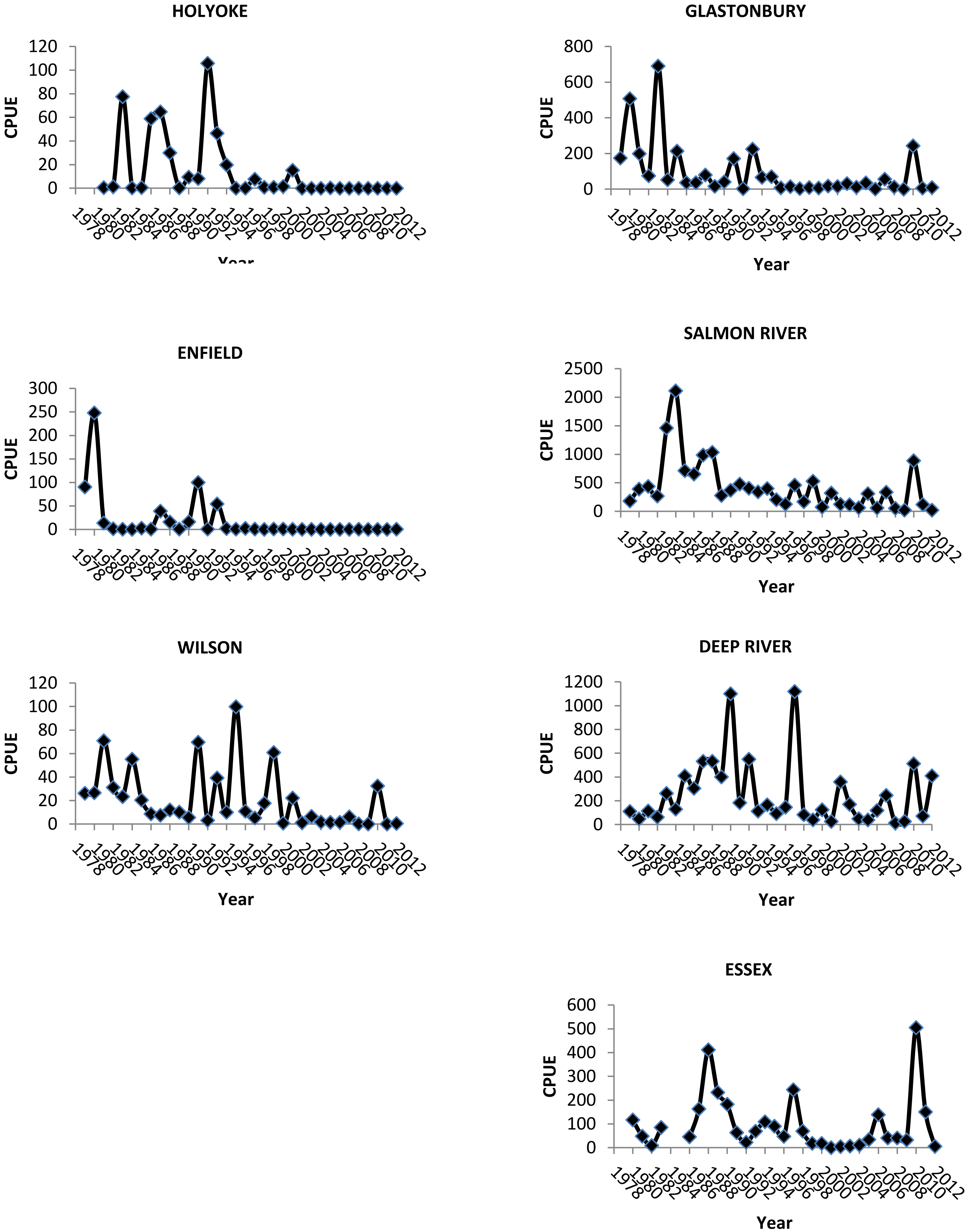

Figure 3.12. Annual CPUE of Connecticut River juvenile blueback herring by station, 1978-2012.

JOB 5: 2012 Long Island Sound Hypoxia Season Review

MONITORING LONG ISLAND SOUND 2012

2012 Long Island Sound Hypoxia Season Review

CONNECTICUT DEPARTMENT OF ENERGY & ENVIRONMENTAL PROTECTION
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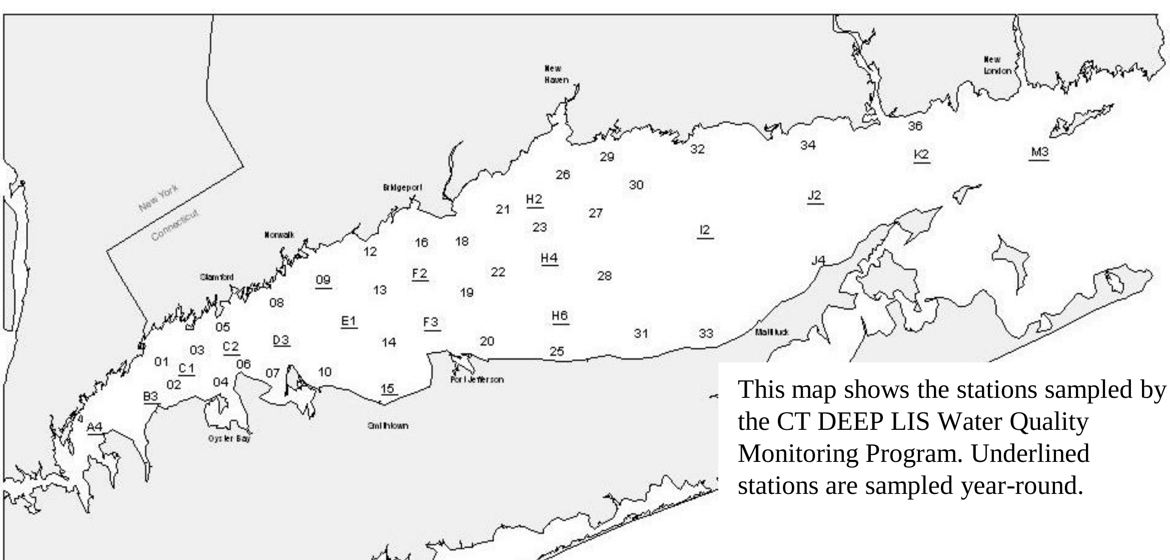
DANIEL C. ESTY, COMMISSIONER

MONITORING LONG ISLAND SOUND 2012

Program Overview

R/V John Dempsey

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 (LIS). 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.



This map shows the stations sampled by the CT DEEP LIS Water Quality Monitoring Program. Underlined stations are sampled year-round.

Methods

Dissolved oxygen, temperature, pH, and salinity data are collected *in situ* using an electronic instrument called a Conductivity Temperature Depth recorder (CTD) that takes measurements from the surface to the bottom of the water column. The CTD, a Sea-Bird model SBE-19 SeaCat Profiler equipped with auxiliary dissolved oxygen, photosynthetically-active radiation (PAR) and pH sensors, is attached to a Rosette Sampler and lowered through the water column at a rate of approximately 0.2 meters per second and measurements are recorded every 0.5 seconds. *In situ* data are reviewed in real-time.

Water samples are collected using Niskin water sampling bottles that are attached to the Rosette Sampler. The Rosette is lowered off the stern of the *Dempsey* and the bottles are triggered remotely to take a water sample at any depth. Parameters for which surface and bottom waters are tested include dissolved silica, particulate silica, particulate carbon, dissolved organic carbon, dissolved nitrogen, particulate nitrogen, ammonia, nitrate + nitrite, particulate phosphorus, total dissolved phosphorus, orthophosphate, chlorophyll *a*, and total suspended solids.

Samples are filtered aboard the mini laboratory and preserved for later analyses at the Center for Environmental Science and Engineering at the University of Connecticut. From October to May, *in situ* and nutrient samples are collected once a month from 17 sites. Bi-weekly hypoxia surveys start in mid-June and end in September with up to 48 stations being sampled during each survey for *in situ* parameters.

Since 2002, CT DEEP has collected zooplankton samples from six stations and phytoplankton from ten stations across Long Island Sound. The samples are sent to researchers at the University of Connecticut who identify species composition, abundance, community structure, and spatial and temporal distribution throughout the Sound.

LISICOS

The Long Island Sound Integrated Coastal Observing System (LISICOS) was established in 2003 as a component of a regional/national ocean observing system. The system was conceptualized as part of a water quality monitoring program that combined the traditional ship-based point sampling surveys with continuous, real-time sampling stations. Funding for the program was first provided through the Environmental Protection Agency EMPACT grant program and is now provided by the National Oceanic and Atmospheric Administration.

The initial goal was to develop “a capability to observe and understand the LIS ecosystem and predict its response to natural and anthropogenic changes”.

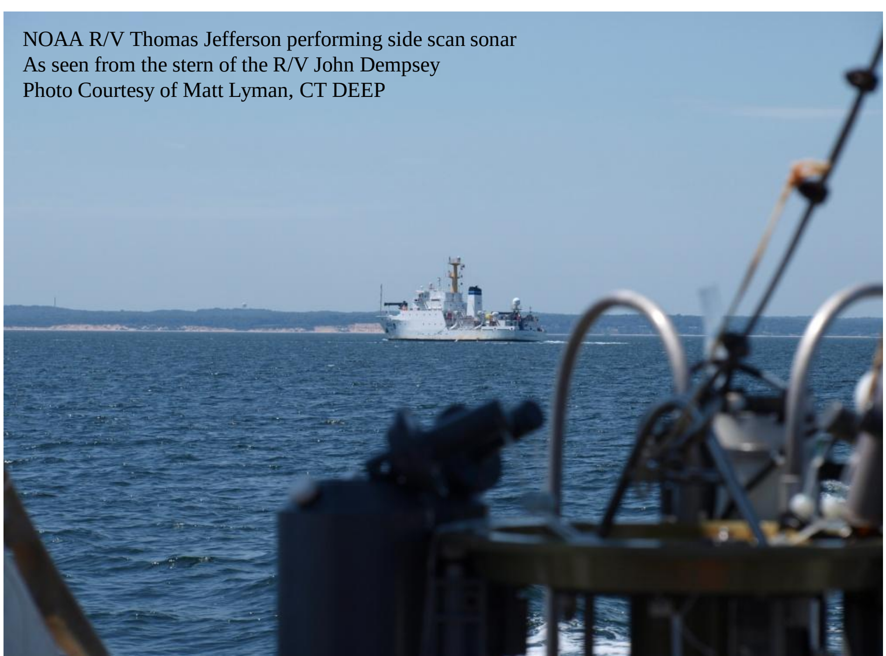
LISICOS monitors water quality parameters (e.g., salinity, temperature, dissolved oxygen, surface waves, photosynthetically available radiation, chlorophyll) and meteorological parameters (e.g., wind speed, direction, barometric pressure, wave height) at up to eight stations across the Sound. Sensors are attached to a moored buoy at various depths (surface, mid, bottom). Data are transmitted every 15 minutes 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.

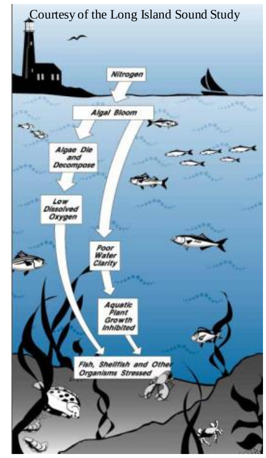
This report presents a summary of the 2012 *in situ* data collected by CT DEEP. Data from LISICOS are presented with permission for informational purposes.

The CT DEEP LIS Water Quality Monitoring Program is synoptic in nature and is intended to characterize water quality conditions at one moment in time over a broad area (the entire Sound). Water column profile data provided by the program are useful for future determinations of volume of hypoxic waters. CT DEEP's program supports a long term monitoring database designed to detect changes in hypoxia due to changing conditions (i.e. management actions, climate change, productivity). The program also provides nutrient and biological data not available from fixed station buoy applications.

The LISICOS water quality sensors are attached to fixed locations and provide a holistic view of the conditions over a long span of time (i.e., continuous data from one station). The LISICOS continuously recording buoys have shown instances where vertical mixing within the water column raises the DO concentrations above the hypoxic thresholds for extended periods of time (e.g., days). These episodic conditions are not captured by CT DEEP surveys which occur bi-monthly during the hypoxic season.

As such CT DEEP's data provides a snapshot of hypoxic condition at one time while the LISICOS data provide a continuous measurement of hypoxia at specific buoy locations. Together these monitoring programs are better able to characterize the extent and duration of hypoxia across LIS. Both types of data contribute to a better understanding of hypoxia in LIS.

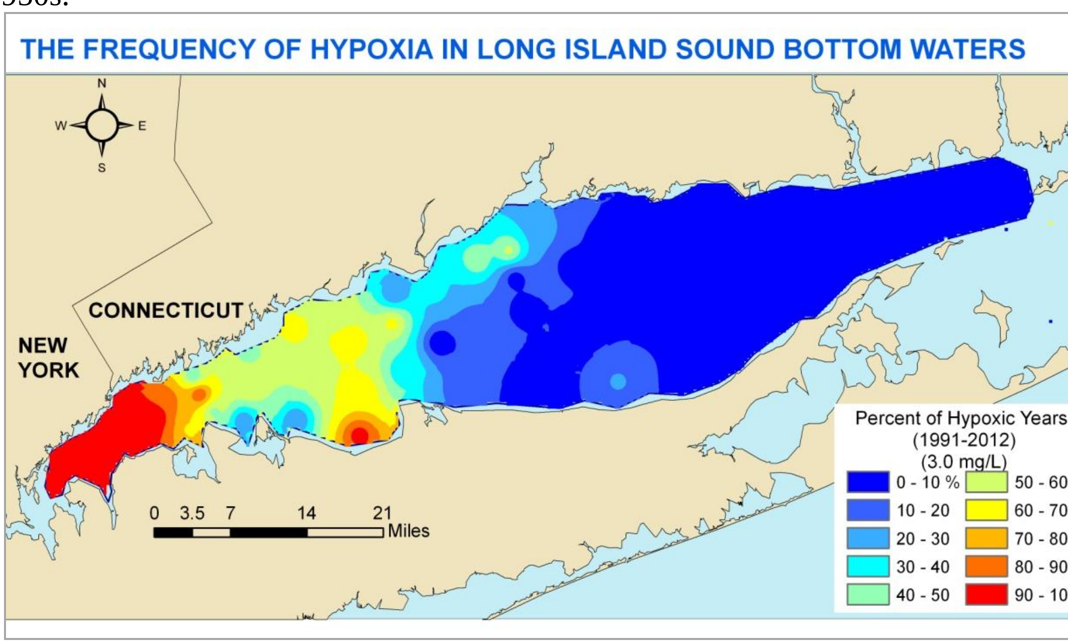

NOAA R/V Thomas Jefferson performing side scan sonar
As seen from the stern of the R/V John Dempsey
Photo Courtesy of Matt Lyman, CT DEEP



Courtesy of the Long Island Sound Study

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

2012 Important Facts

CT DEEP conducted eight cruises during the summer of 2012 between 29 May and 17 September. Over the course of the season, 23 different stations were documented as hypoxic and of the 259 site visits completed in 2012, hypoxic conditions were found 35 times. Compared to the 22-year averages, 2012 was above average in area and duration (see page 7).

Cruise	Start Date	End Date	Number of stations sampled	Number of hypoxic stations
WQJUN12	5/29/2012	5/31/2012	17	0
HYJUN12	6/12/2012	6/12/2012	20	0
WQJUL12	6/26/2012	6/28/2012	35	0
HYJUL12	7/16/2012	7/18/2012	40	4
WQAUG12	7/30/2012	8/1/2012	43	4
HYAUG12	8/14/2012	8/16/2012	41	22
WQSEP12	8/27/2012	8/30/2012	44	5
HYSEP12	9/17/2012	9/17/2012	19	0

The peak event occurred during the HYAUG12 cruise between 14 and 16 August. The lowest dissolved oxygen concentration (0.90 mg/L) was documented during the HYAUG12 cruise at Station A4. The hypoxia area maps for 2012 appear on pages 10-14.

Based on CT DEEP and IEC data

Estimated Start Date	7/10/2012
Estimated End Date	9/10/2012
Duration (days)	63
Maximum Area (mi^2)	288.5

The Long Island Sound Study has defined hypoxia as dissolved oxygen concentrations below 3.0 mg/L. On 25 February 2011, CT DEEP adopted revised water quality standards that specified dissolved oxygen in Class SA and SB waters (applicable to LIS) shall not be less than 3.0 mg/L at anytime.

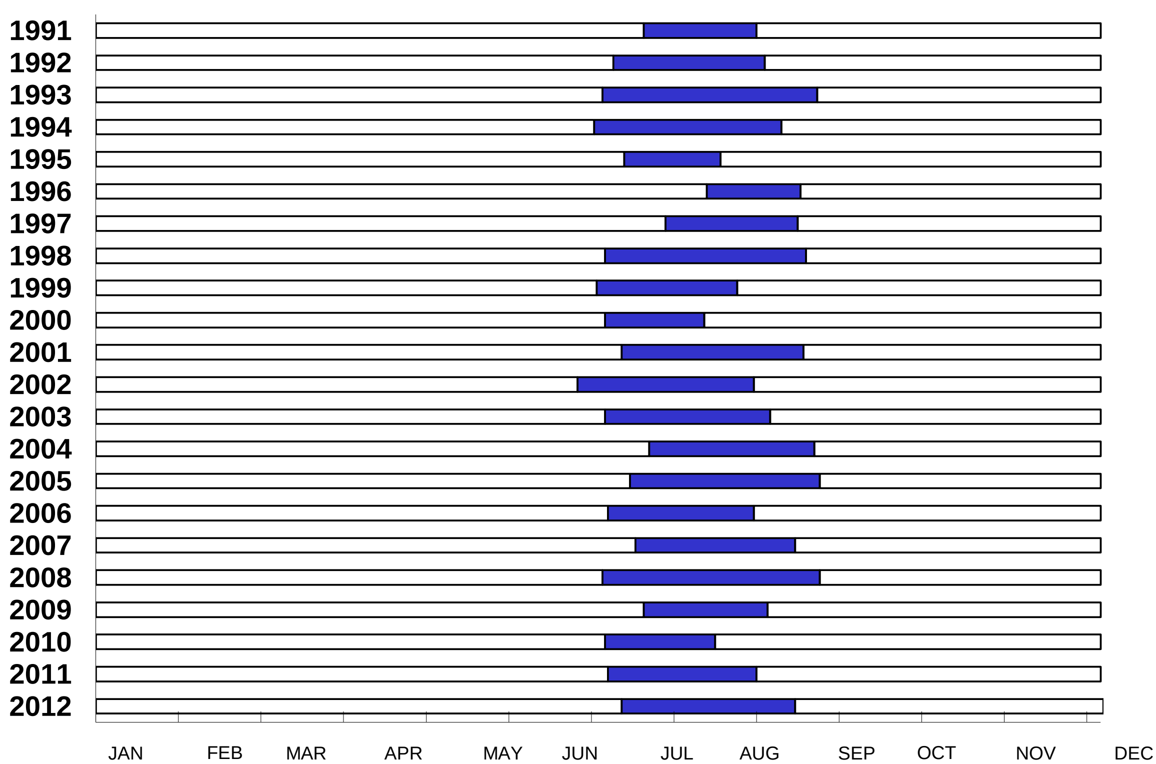
Start date and end date are estimated by plotting DEEP and IEC data from stations A4 and B3 in Excel using a line with markers chart and then interpolating when the DO concentration drops below 3.0 mg/L.

Timing and Duration of Hypoxia, 1991 - 2012

The figure and table below display the onset, duration, and end of the hypoxia events from 1991 through 2012 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
2012	July 10	Sept 10	288.5	63
Average	July 10	Sept 3	183	55
Deviation	$\pm$10 days	$\pm$12 days	$\pm$ 86 mi^2	$\pm$ 13 days

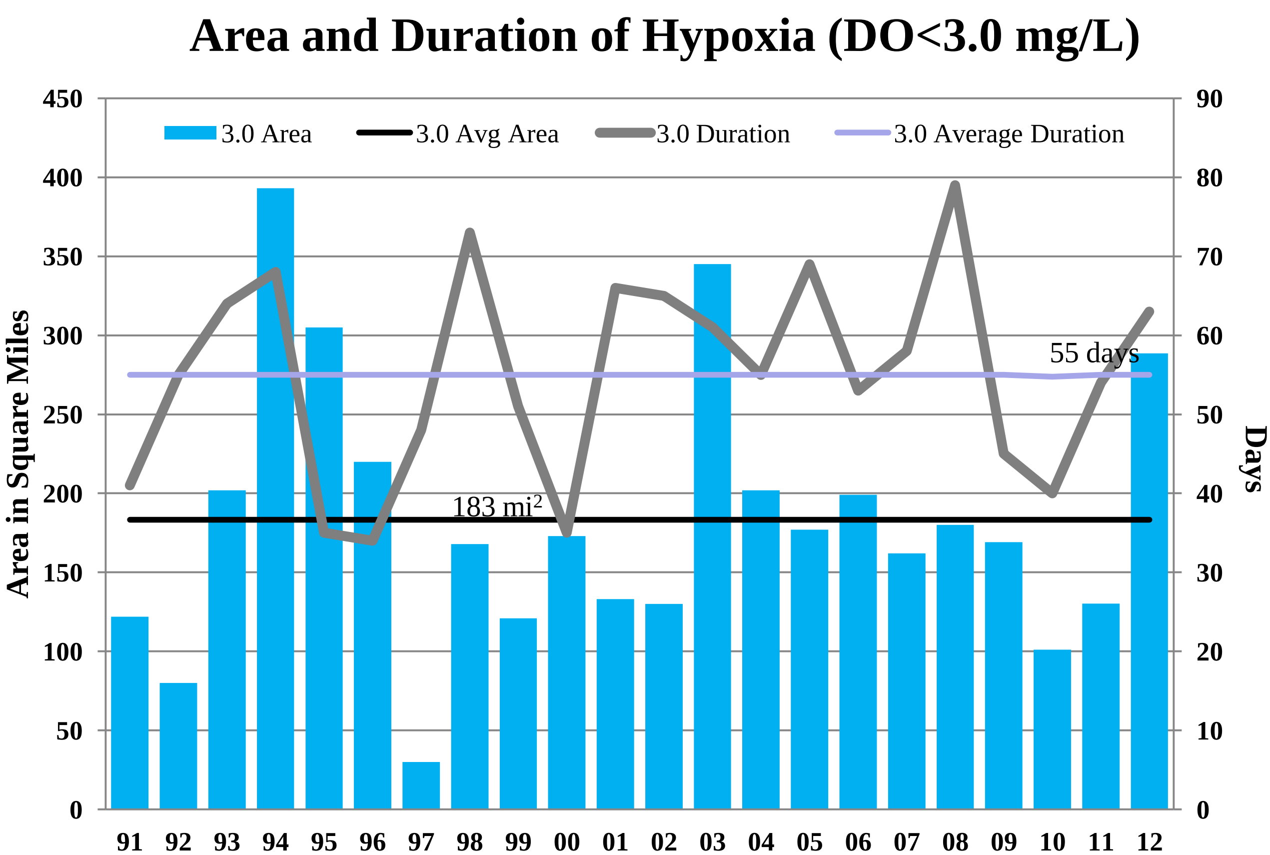
Based on the LISS standard of 3.0 mg/L, the average date of onset was July 10 ($\pm$ 10 days), the average end date was September 3 ($\pm$ 13 days), and the average duration was 55 days ($\pm$ 13 days). The earliest onset of hypoxia (red text) occurred on 25 June 2002 and the latest end date (green text) 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 183 mi^2 and the average duration was 55 days.

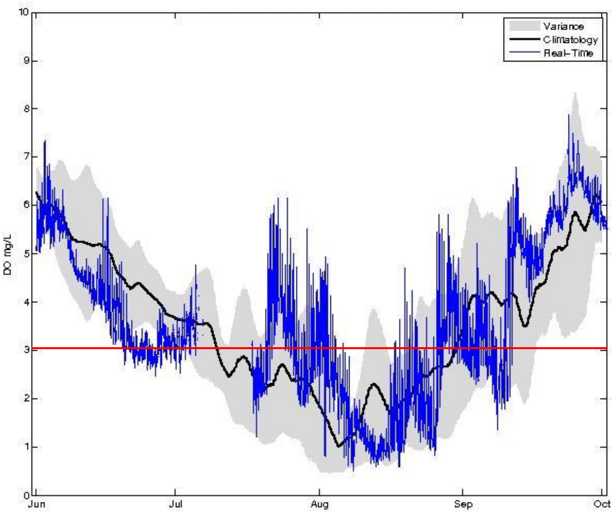


Duration Based on Buoy Data Obtained From the LISICOS Network on 18 October 2012

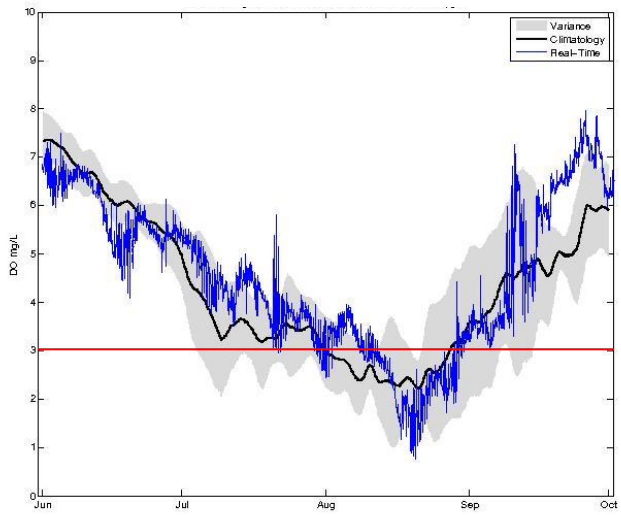
The figures below are from the LISICOS website and depict the 2012 real-time bottom dissolved oxygen data (blue line); the average of the 8 or 11 year dataset, depending on the station (black line); and the variability observed over the historical station record (gray shading).

There were several periods of increased oxygen in the bottom waters that were not captured by CT DEEP surveys and the LISICOS buoys better reflect these reoxygenation events (blue peaks above the red hypoxia threshold line).

Execution Rocks Bottom Dissolved Oxygen



Western LIS Bottom Dissolved Oxygen



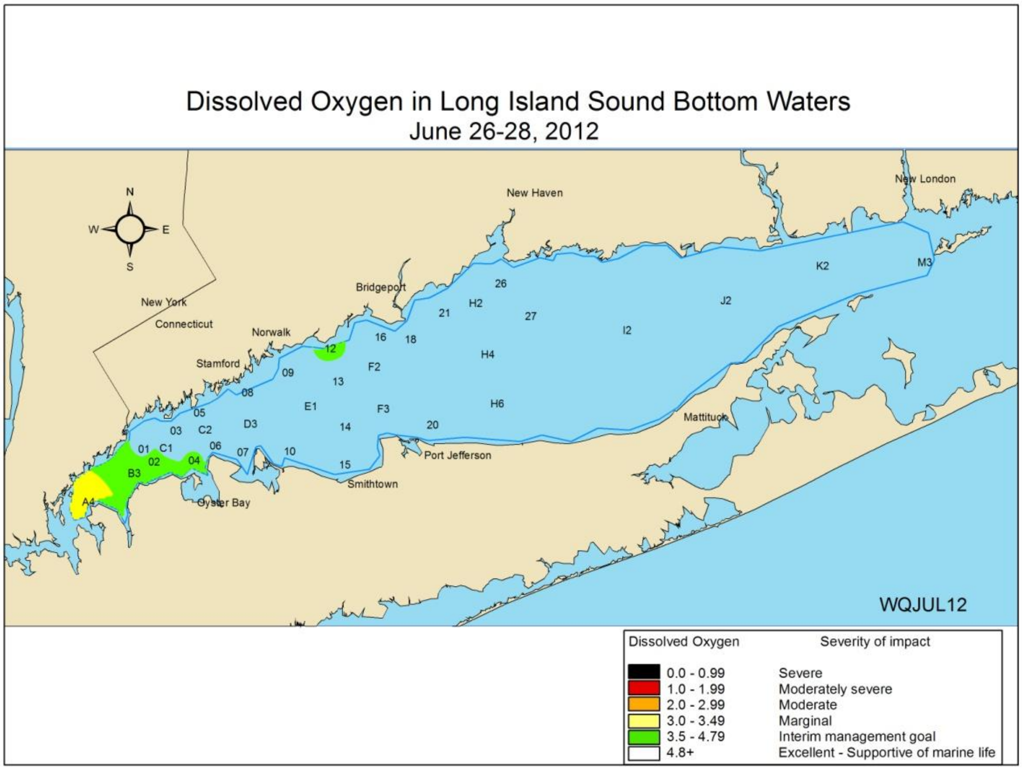
Based on LISICOS Execution Rocks Buoy Data Collected Between 1 June to 18 October

Estimated Start Date	6/20/2012
Estimated End Date	9/11/2012
Duration below 3.0 mg/L (cumulative days)	42.17
Duration below 2.0 mg/L (cumulative days)	18.89
Duration below 1.0 mg/L (cumulative days)	4.04
Minimum DO value (mg/L)	0.52 on 8 August

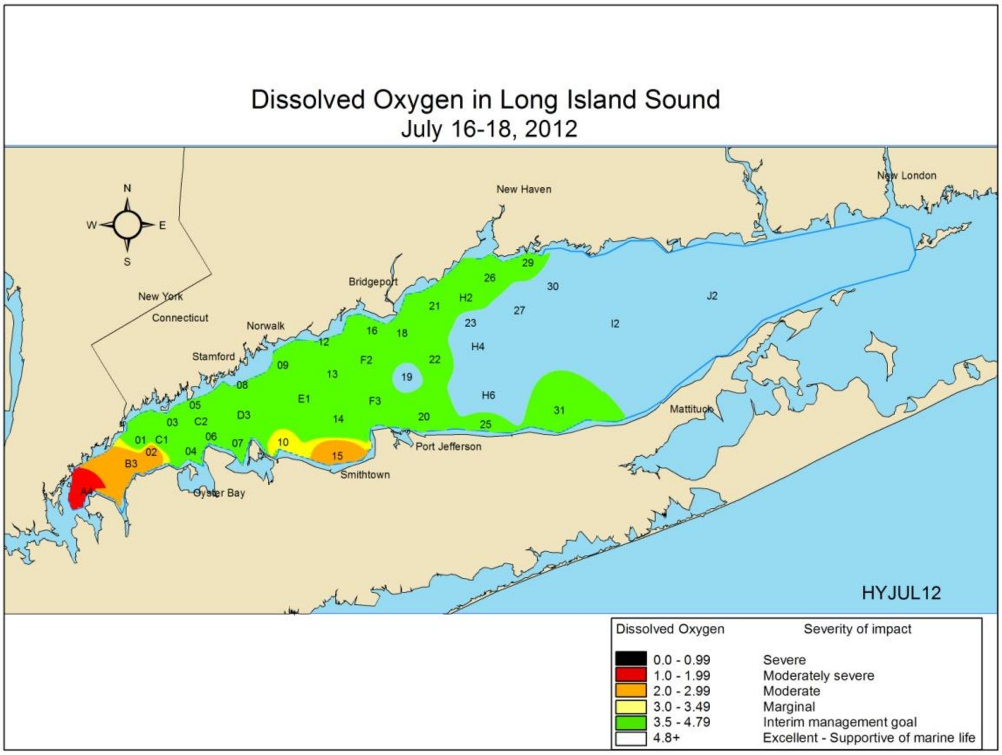
Data obtained from the LISICOS Execution Rocks Bottom Dissolved Oxygen Prediction Tool webpage (http://lisicos.uconn.edu/do_fcst.php?site=exrx). Data are also available for the Western Sound Buoy (http://lisicos.uconn.edu/do_fcst.php?site=wlis) where DO was less than 3.0 mg/L for 20.91 days. Duration is calculated by LISICOS by summing the time (in days) of the number of samples where DO was below the specified value (T. Fake, pers comm. 18 October 2012). ***Data are provisional and subject to change****.*

Hypoxia Maps

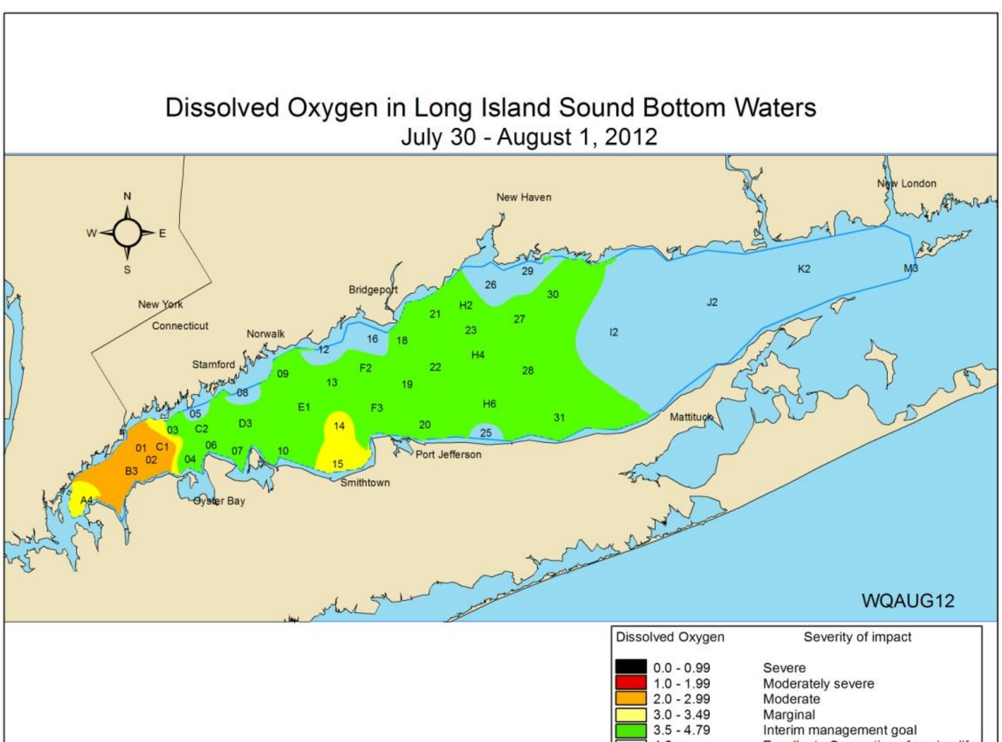
The following maps depict the development of hypoxia based on CT DEEP cruise data through the 2012 season. During the HYJUN12 survey all stations had DO concentrations above 4.8 mg/L. During the WQJUL12 survey DO concentrations were less than 4.8 mg/L at 5 stations and concentrations at A4 had already dropped below 3.5 mg/L. Data for all surveys are available upon request.



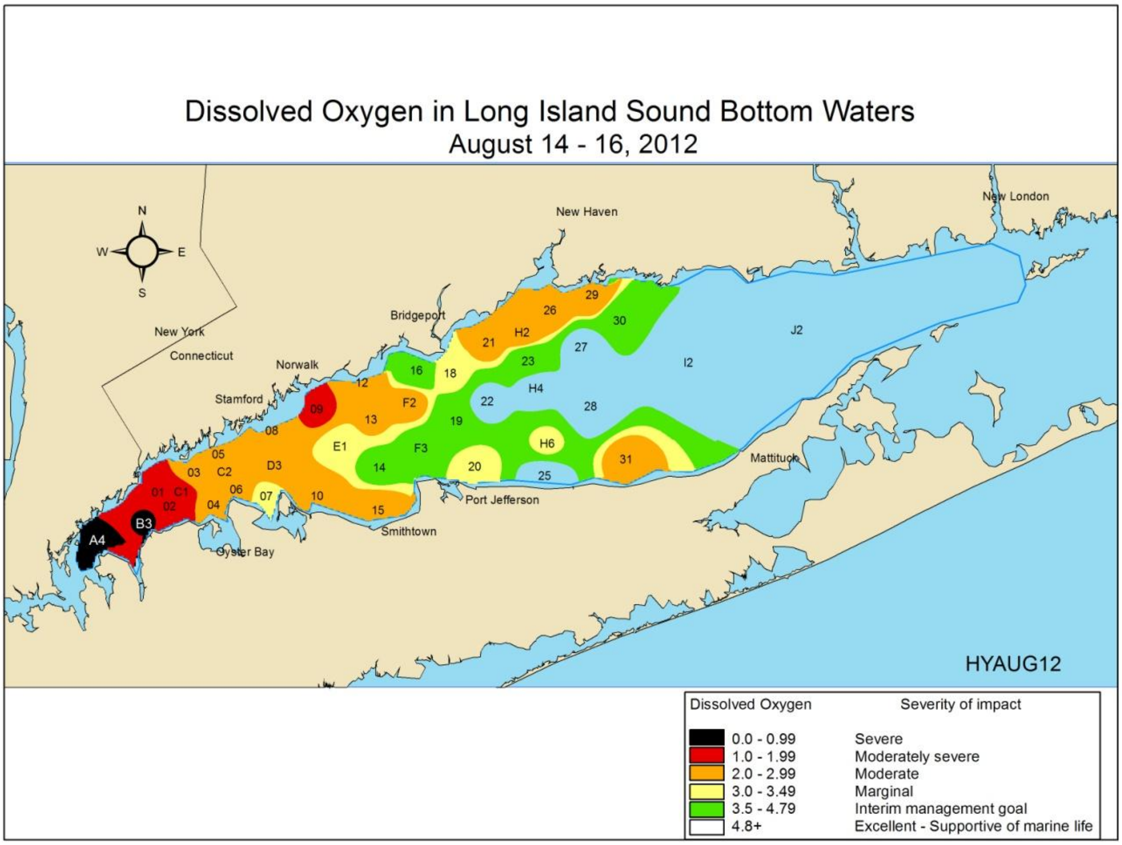
During the HYJUL12 survey, DO concentrations dropped below 4.8 mg/L at 32 stations; four stations were below 3. 0 mg/L, with Station A4 below 2 mg/L. Stations B3 and 02 had mid-water minimum DO concentrations below 3.0 mg/L while the bottom values were 3.79 and 4.12 mg/L, respectively.



During the WQAUG12 survey, DO concentrations were below 3.0 mg/L at 5 stations but all stations were above 2.0 mg/L .



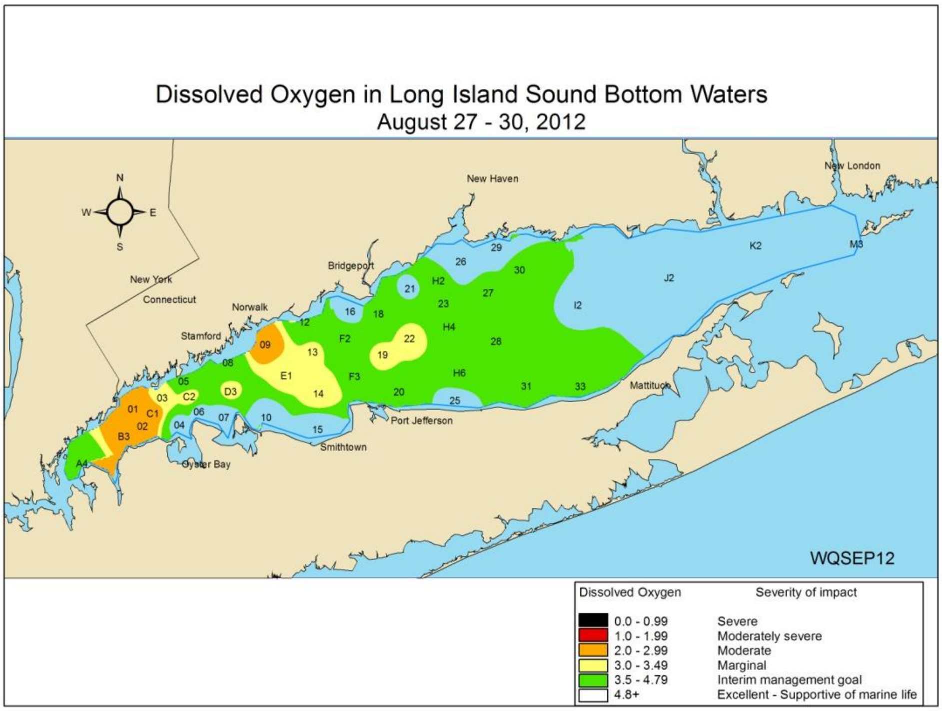
Concentrations continued to decline during the HYAUG12 survey with two stations exhibiting DO concentrations below 1.0 mg/L and four stations below 2.0 mg/L. Additionally, 17 stations had concentrations below the 3.0 mg/L standard and five stations were below 3.5 mg/L. This survey had the fourth highest areal extent since 1991 and it is the first time since 2008 that CT DEEP recorded DO levels less than 1.0 mg/L.



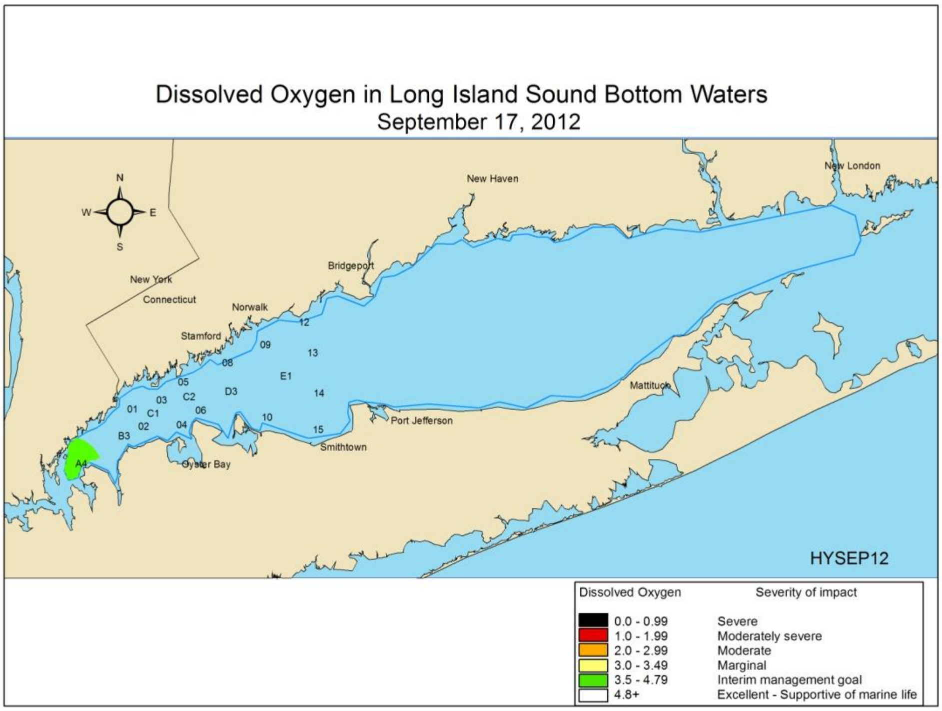
Maximum Areal Extent (288.5 mi^2) of Hypoxia

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

The WQSEP12 survey found conditions improving, with no stations exhibiting DO concentrations below 2.0 mg/L. Five stations still had concentrations less than 3.0 mg/L and eight stations had concentrations less than 3.5 mg/L. This survey was worse than the 2011 survey where no stations were below 3.0. It should be noted that the 2011 survey took place after Tropical Storm Irene which increased mixing and re-oxygenated the bottom waters.



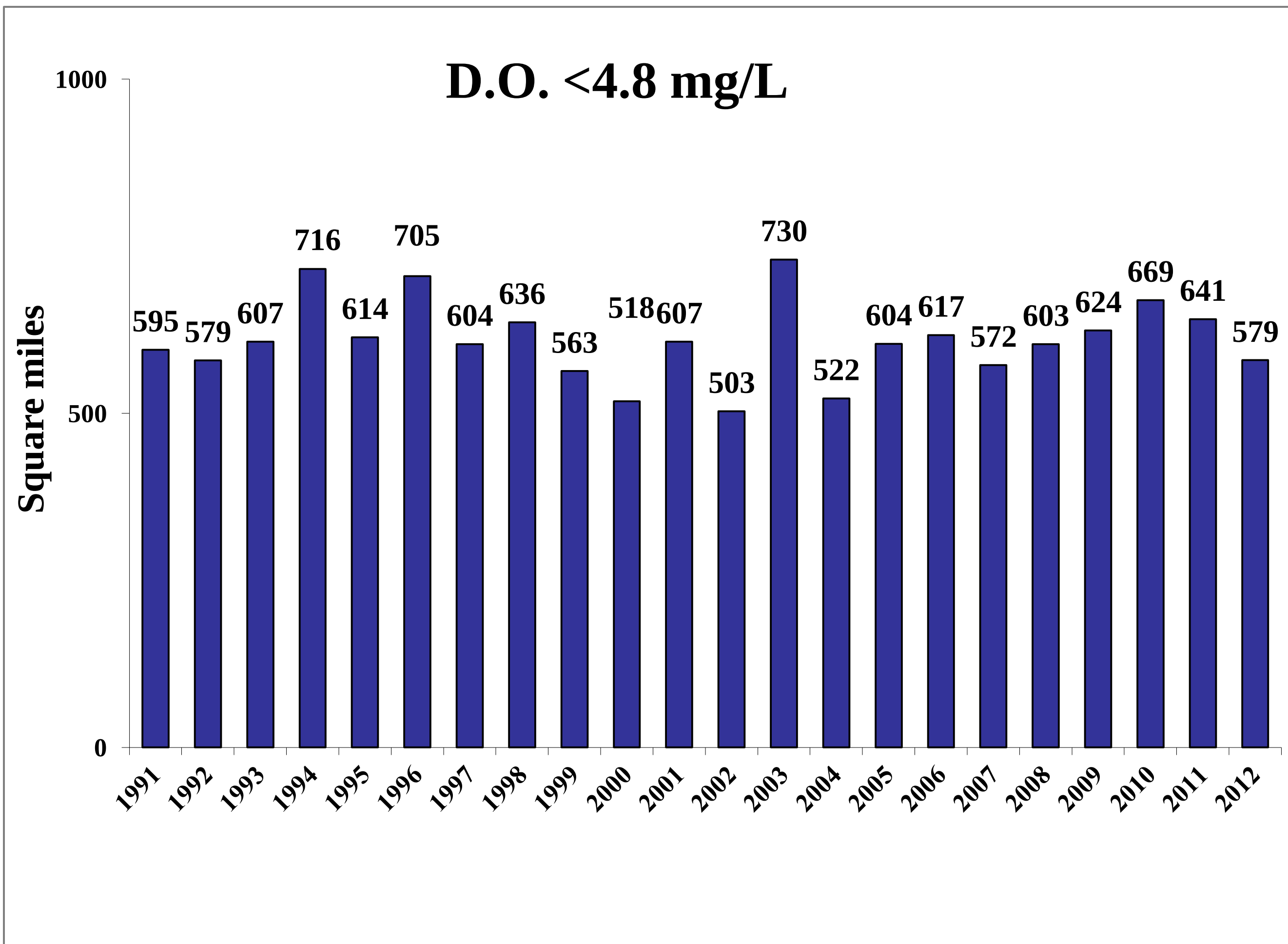
Conditions continued to improve through the HYSEP12 survey with only one station exhibiting DO concentrations below 4.8 mg/L (A4).



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.

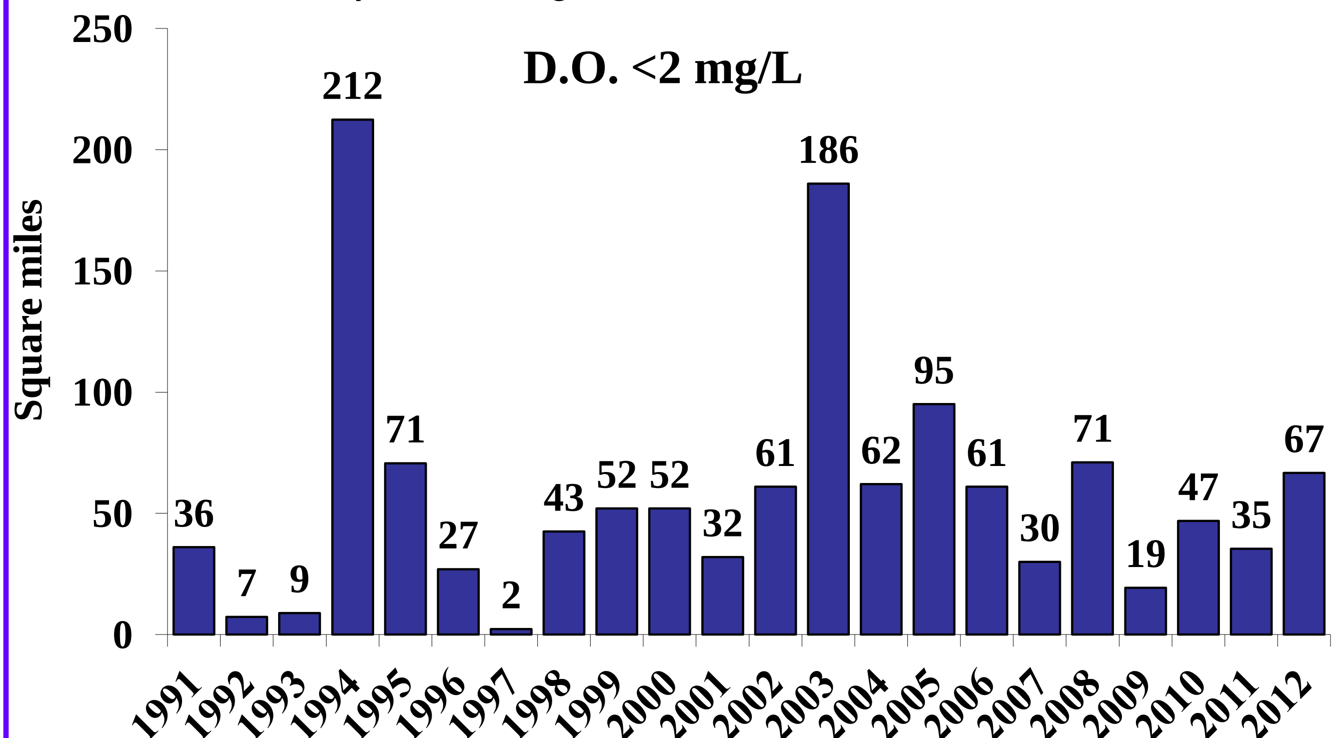
This chart illustrates the maximum area of bottom waters within Long Island Sound with DO concentrations less than 4.8 mg/L. In 2012, the maximum area occurred during the HYAUG12 survey and was estimated at 579 square miles which was lower than in 2011. From 1991-2012, the area affected by concentrations less than 4.8 mg/L averages 609.4 square miles and varies slightly from 503 to 730 square miles.



Severe Hypoxia

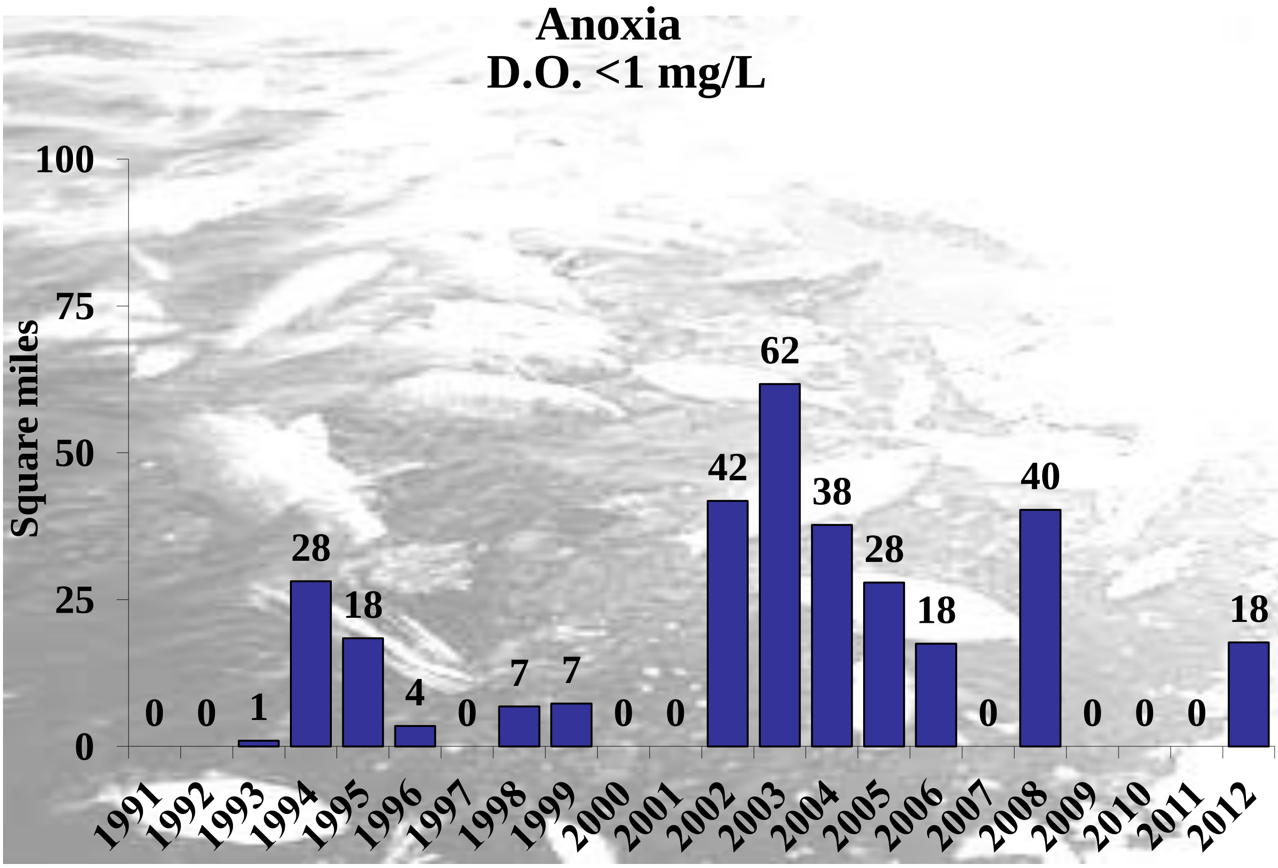
The Gulf of Mexico is another water body that exhibits severe hypoxia, although the standard is determined at the 2.0 mg/L level. The average size of the hypoxic zone in the northern Gulf of Mexico from 1985-2010 is roughly 5330 mi^2. The maximum area of the Gulf of Mexico hypoxic zone occurred in 2002 and was estimated at 8,841 mi^2. The 2012 hypoxic zone was forecasted to cover 6,213 km^2 (slightly larger than Connecticut).
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 2012, the maximum area of LIS affected by severe hypoxia was 66.7 mi^2, an increase from 2011. The average area, calculated from 1991-2012, is 58.1 mi^2. Based on CT DEEP data there were 23 days when DO was less than 2.0 mg/L. Based on the LISICOS Execution Rocks data there were 18.89 days below 2.0 mg/L.



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.

According to the Northeast Regional Climate Center, (www.nrcc.cornell.edu/page_summaries.html) the summer (June-August) of 2012 was the 12th warmest in 118 years. August 2012 was the 20th warmest on record in New York State and warmest since 2005. Connecticut was also above normal; the average August temperature was 2.1° F warmer than usual, 10th warmest since 1895.

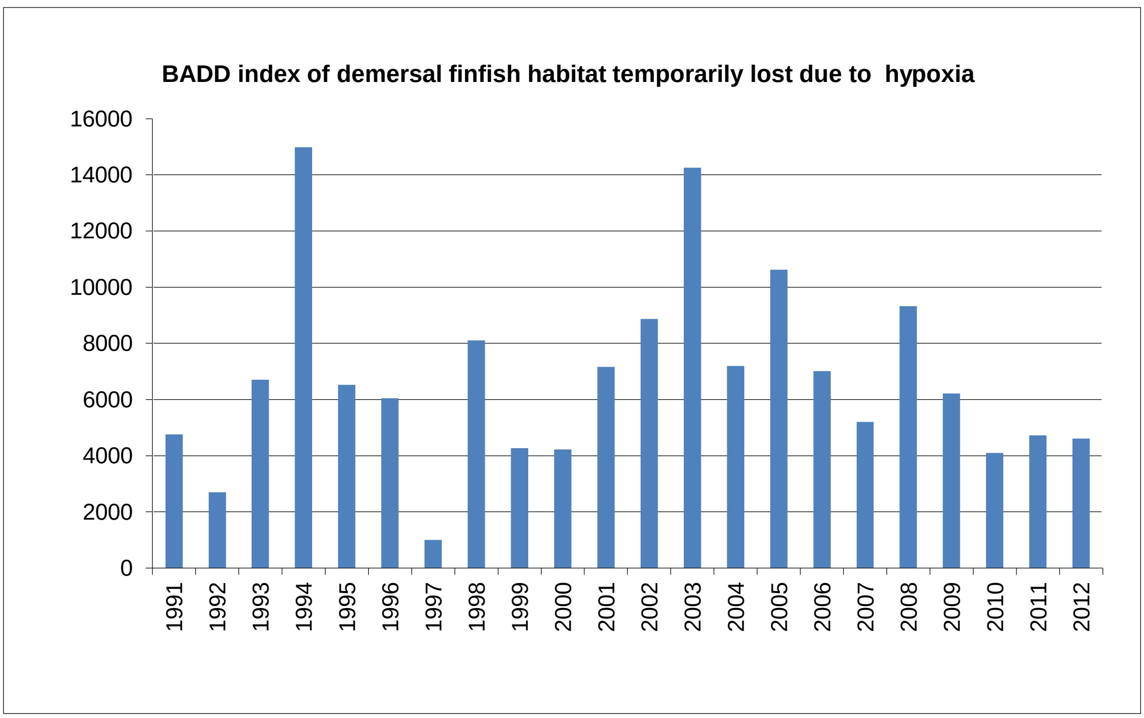


For management purposes the Long Island Sound Study defines anoxia as DO concentrations less than 1 mg/L. In nine of the twenty-two years there was no anoxia reported by CT DEEP. The greatest area with D.O. below 1 mg/L observed in LIS, based on ~biweekly sampling by CT DEEP, was during the summer of 2003. Prior to 2002, the average area of bottom waters affected by anoxia was 5.92 mi^2. From 2002-2012 the average area affected was 22.24 mi^2. The overall average area affected from 1991-2012 is 14.1 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, in 2009 and 2010 the Interstate Environmental Commission documented two stations that were anoxic. In 2011, no stations were documented to have gone anoxic by either the IEC or CT DEEP. However, the lowest concentration reported at the LISICOS Execution Rocks buoy (Station A4) for 2011 was 0.61 mg/L . In 2012, CT DEEP documented two stations that were anoxic (A4 and B3). IEC documented two anoxic stations (A3 (further west than A4, Hewlett Point and H-C in Hempstead Harbor). LISICOS also documented anoxic conditions (4.04 days and minimum DO of 0.52mg/L).

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 10 July – 10 September (63 d). The index is then expressed as a percentage of the available area-days (sample area 2,723 km^2 x 63 d, or 171,549 area-days).

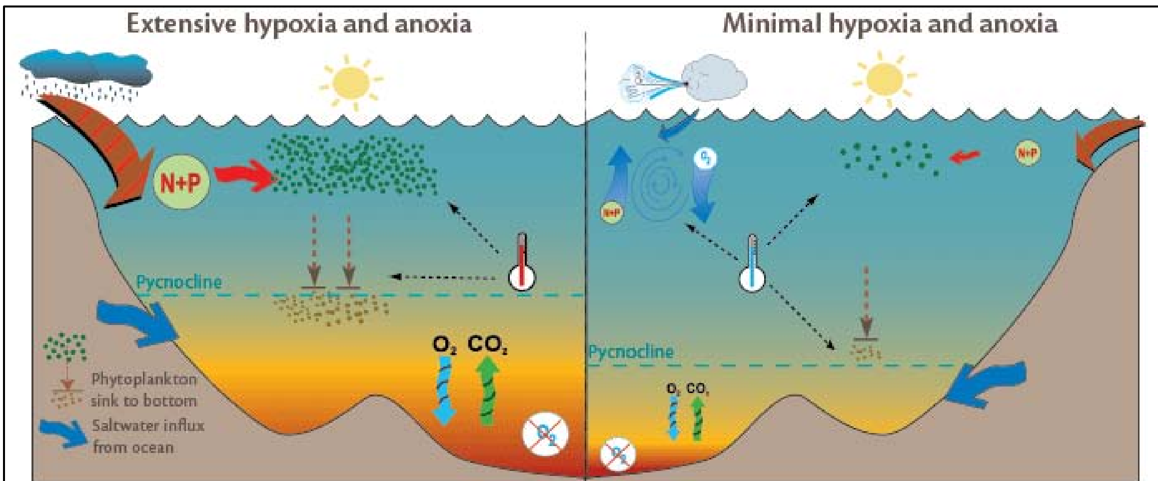


Simpson, David G., Kurt Gottschall, and Mark Johnson. 1995. Cooperative interagency resource assessment (Job 5). In : A study of marine recreational fisheries in Connecticut, CT DEP Marine Fisheries Office, PO Box 719, Old Lyme, CT 06371, p 87-135.

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 AND HYPOXIA

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. The conceptual diagram below, while developed for Chesapeake Bay, applies to Long Island Sound. In LIS, there are two key contributors to hypoxia: nutrient enrichment and stratification. (Stratification is discussed more on page 22.) 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. Temperature can stimulate or impede phytoplankton growth. 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.



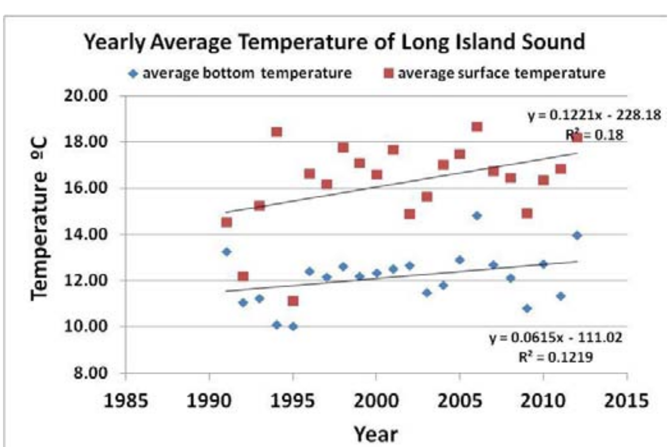
	Loads	Phytoplankton	Decomposition	Temperature	Wind event
Large amount of low dissolved oxygen	Large nitrogen and phosphorus loads	Elevated nutrients cause large phytoplankton blooms	High oxygen consumption by decaying phytoplankton	Warm water a) Stimulates decomposition b) Stratifies water column c) Stimulates phytoplankton	No wind event: water column remains stratified
Little amount of low dissolved oxygen	Small nitrogen and phosphorus loads	Less nutrients lead to small phytoplankton blooms	Low oxygen consumption by decaying phytoplankton	Cool water: a) Slow decomposition b) Mixed water column c) Slow phytoplankton growth	Wind events destratifies water column: a) Bottom water aerated b) Nutrients move to surface

Conceptual diagram detailing the factors that determine the dissolved oxygen content of the tidal waters of Chesapeake Bay
Diagram courtesy of the Integration and Application Network (ian.umces.edu), University of Maryland Center for Environmental Science. Source: Ecocheck

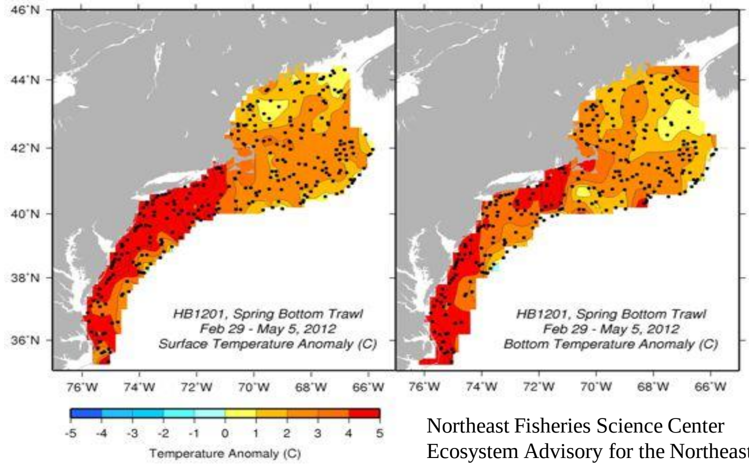
2012 Water Temperature Data

2012 maximum, minimum, and average water temperature (ºC) data are summarized below. Data are integrated across Long Island Sound (i.e., all stations and all depths) and are displayed by cruise. Data were obtained using the CT DEEP Sea Bird Sea Cat Conductivity, Temperature, Depth (CTD) profiler.

Cruise	2012 Max	1991-2011 Max	2012 Min	1991-2011 Min	2012 Average	1991-2011 Average
WQJAN	9.311	8.101	5.606	0.500	7.087	4.286
WQFEB	6.748	5.869	4.122	-1.223	5.058	1.835
CHFEB	4.464	4.328	3.716	0.846	4.179	2.264
WQMAR	6.611	5.385	3.984	-0.431	4.977	2.393
CHMAR	6.575	5.721	5.146	0.917	5.67	3.635
WQAPR	9.069	10.069	6.477	2.456	7.626	5.415
WQMAY	11.751	14.117	9.79	6.777	10.493	10.187
WQJUN	21.066	21.299	12.055	10.215	14.459	15.200
HYJUN	19.877	21.842	13.728	13.553	16.75	18.443
WQJUL	21.124	25.336	14.589	15.899	17.883	20.301
HYJUL	25.829	25.762	18.525	16.093	20.456	21.591
WQAUG	24.584	27.017	19.177	17.341	21.669	22.657
HYAUG	25.517	25.189	21.328	19.986	22.875	22.721
WQSEP	24.925	24.749	20.578	18.719	23.258	22.336
HYSEP	23.484	23.153	22.315	20.490	22.827	22.007
WQOCT	21.181	21.551	17.875	16.190	20.272	19.176
WQNOV		16.072		10.478		13.755
WQDEC		12.526		4.891		8.840



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.



Northeast Fisheries Science Center Ecosystem Advisory for the Northeast Shelf Large Marine Ecosystem. Contact Kevin Friedland @noaa.gov.

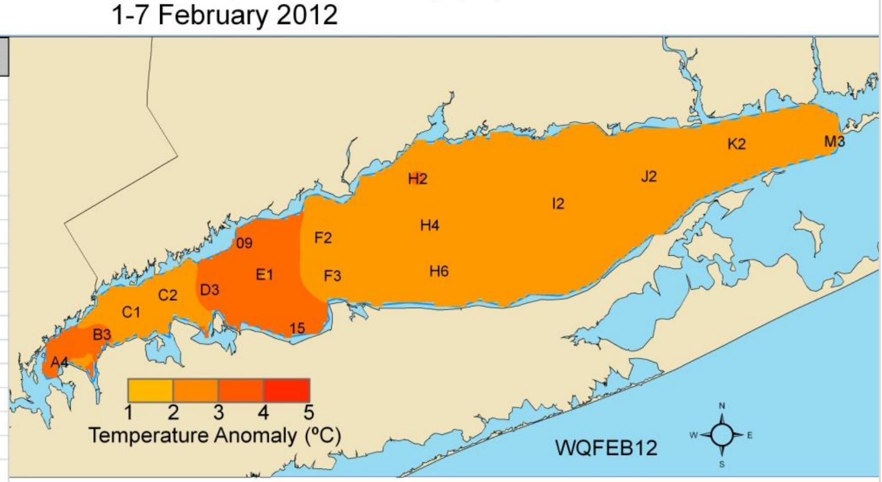
The Northeast Fisheries Science Center stated that sea surface temperatures in the Northeast Shelf Large Marine Ecosystem during the first six months of 2012 were the highest ever recorded. See the Ecosystem Advisory for additional details http://www.nefsc.noaa.gov/ecosys/advisory/current/advisory.html.

CT DEEP data show 2012 average surface water temperatures were generally above the long-term averages (1991-2011) ranging from 0.41ºC above average in August to 3.01ºC above average in February. Only WQJUL water temperatures were below the long-term average. Bottom water temperatures in 2012, while not shown, were also above the long-term averages. The figure below illustrates the surface water temperature anomaly during the WQFEB12 survey.

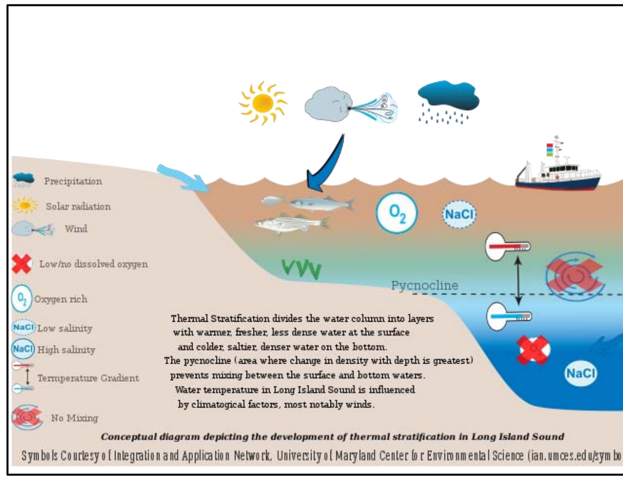
	2012			1991-2011	
Cruise	Max	Min	Avg	Avg	# of surveys
WQJAN	8.30	5.62	6.56	4.22	n=19
WQFEB	6.48	4.12	4.78	1.77	n=19
CHFEB	4.10	3.74	3.90	2.35	n=7
WQMAR	6.46	3.98	4.82	2.43	n=19
CHMAR	6.57	6.09	6.32	3.66	n=8
WQAPR	9.05	7.25	8.08	5.39	n=19
WQMAY	11.75	10.46	10.92	10.08	n=21
WQJUN	21.04	14.05	18.12	15.16	n=21
HYJUN	19.86	17.43	18.78	18.30	n=18
WQJUL	21.11	17.80	19.34	20.29	n=21
HYJUL	25.77	20.04	23.03	21.61	n=18
WQAUG	24.57	19.69	22.92	22.51	n=20
HYAUG	25.48	22.88	24.33	22.76	n=17
WQSEP	24.92	20.90	23.93	22.29	n=20
HYSEP	23.46	22.43	23.01	21.68	n=7
WQOCT	21.18	18.15	20.17	19.07	n=21

LIS Surface Water Temperature Anomaly (ºC)
1-7 February 2012

station name	2012 temperature	Avg 1991-2011 temp	Anomaly
9	4.65	1.15	3.51
15	4.37	1.13	3.24
A4	4.49	1.37	3.12
B3	4.19	1.15	3.03
C1	4.35	1.62	2.73
C2	4.12	1.71	2.42
D3	4.60	1.47	3.13
E1	4.46	1.47	2.99
F2	4.29	1.34	2.95
F3	4.63	1.76	2.87
H2	4.96	1.95	3.01
H4	4.60	1.88	2.71
H6	4.62	1.80	2.82
I2	4.92	2.23	2.69
J2	5.51	2.86	2.65
K2	5.90	3.63	2.27
M3	6.48	3.92	2.56



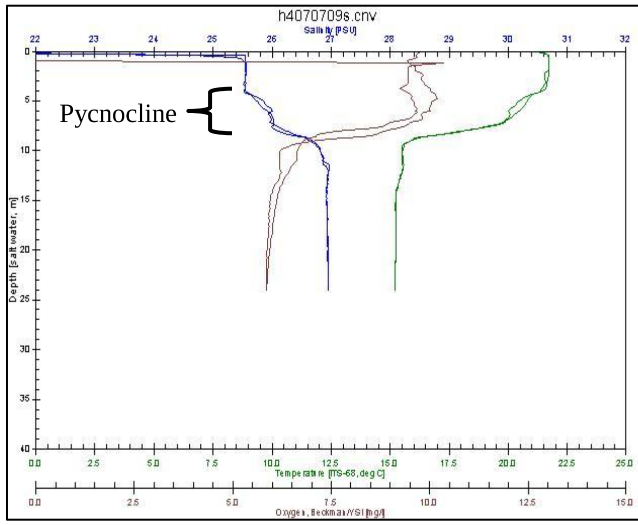
Delta T and Stratification



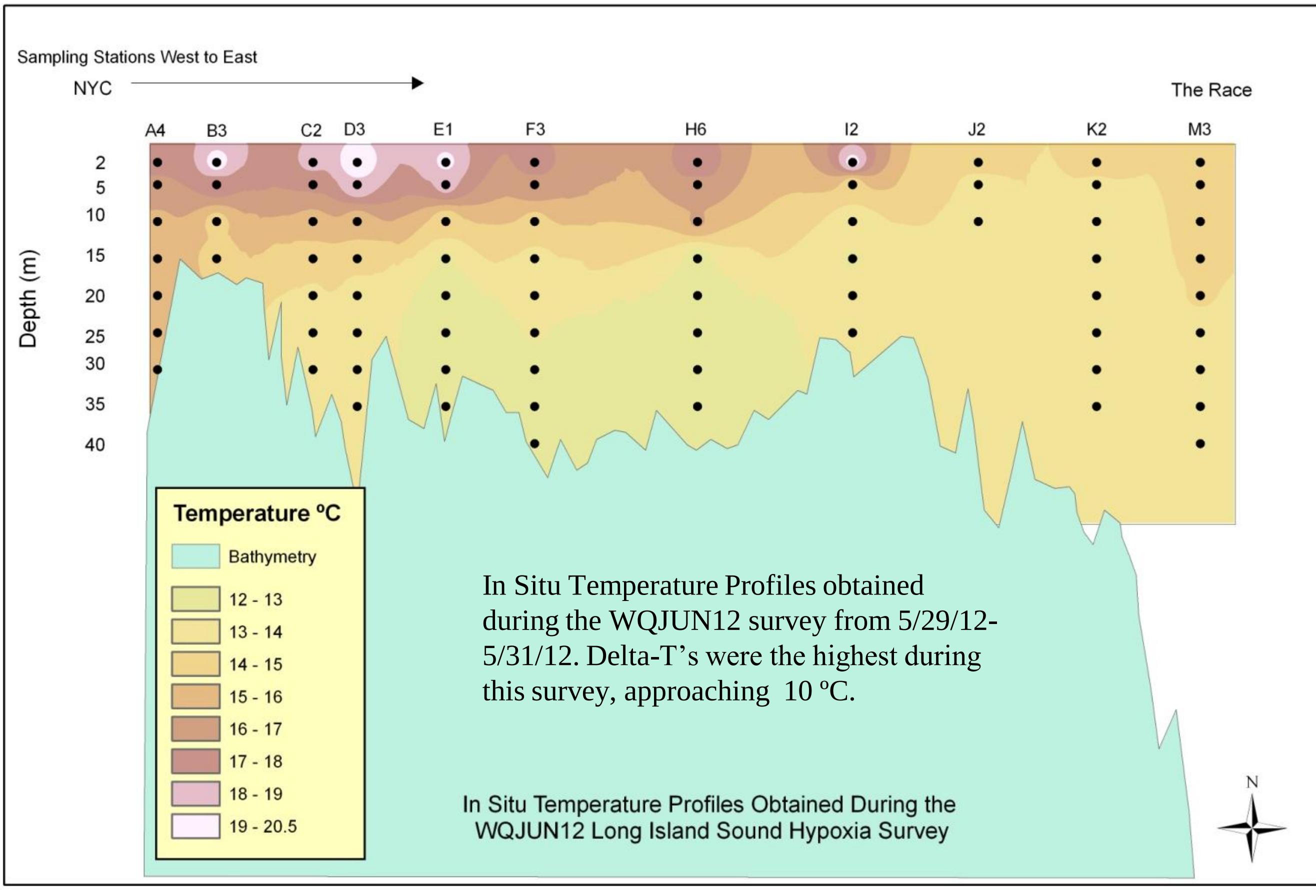
Conceptual diagram depicting the development of thermal stratification in Long Island Sound

Symbols Courtesy of Integration and Application Network, University of Maryland Center for Environmental Science (ian.umces.edu/symbols)

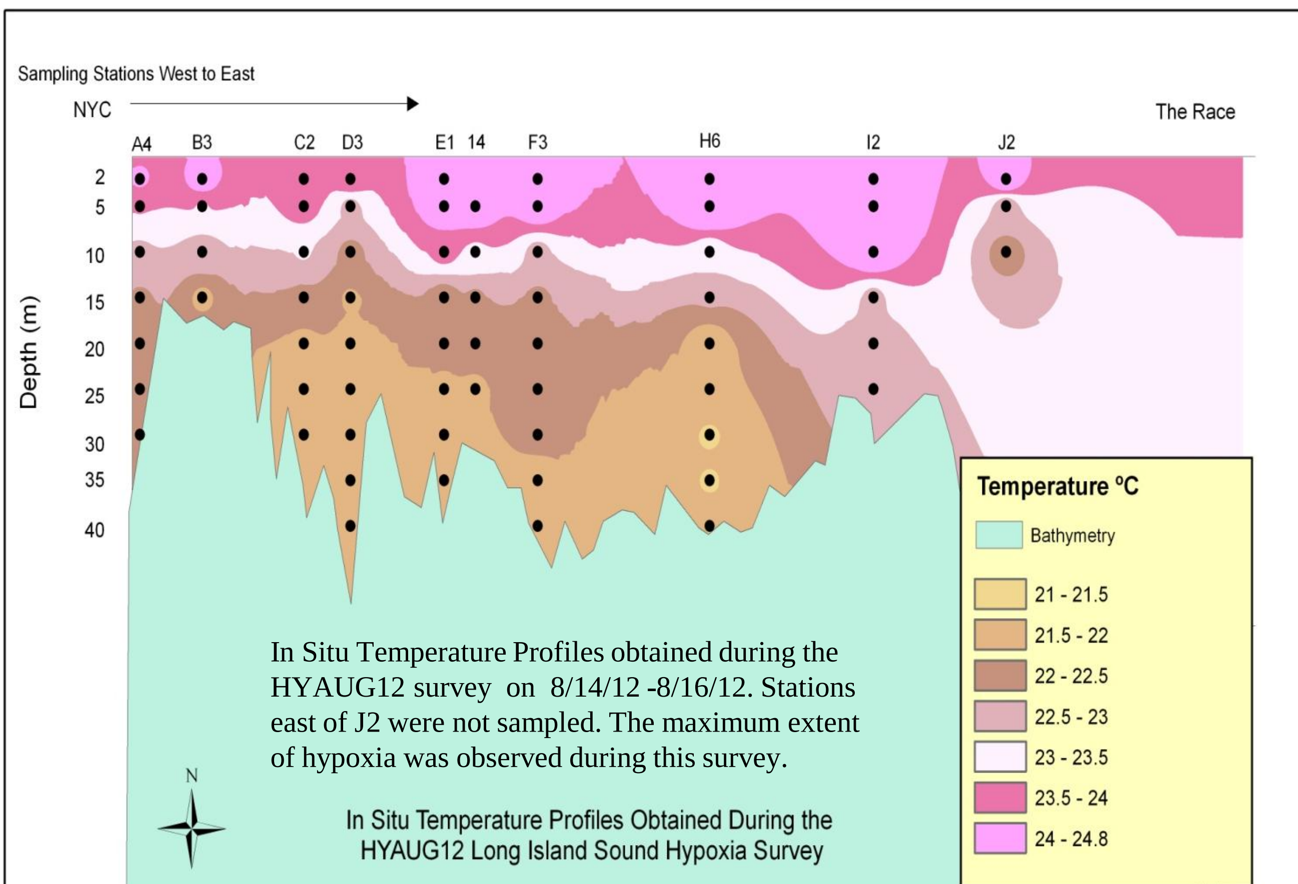
The temperature difference between the bottom waters and the surface waters is known as “Delta T". This Delta T, along with salinity differences, creates a density difference, or "density gradient" resulting in a separation or "stratification" of water layers that hinders the oxygenated surface waters 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, 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 23 show computer interpolations along the west-east axis of LIS generated from profile data collected during two CT DEEP surveys. During the WQJUN12 survey, surface water temperatures had warmed to an average of 17.6 ºC while the bottom water remained cooler around an average of 14ºC. 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 HYAUG12 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 WQAPR12 survey through the WQAUG12 survey, setting up the stratification and leading to the maximum extent of hypoxia in late August. By the September survey Delta T’s decreased to around 1 ºC over much of the Sound. Delta T’s continued to decrease during the HYSEP12 survey to around 0.1ºC, 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.

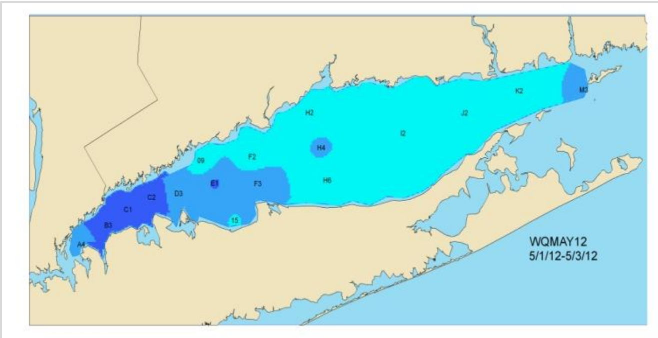


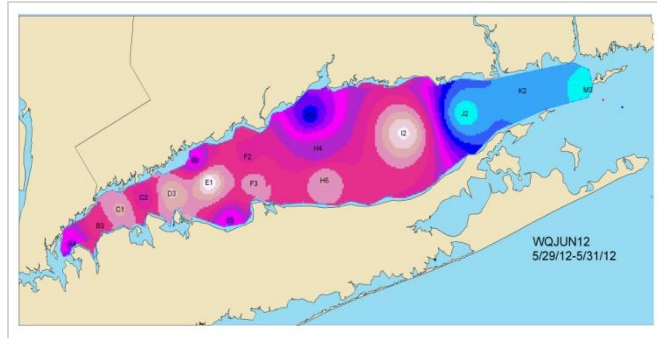
In Situ Temperature Profiles obtained during the WQJUN12 survey from 5/29/12-5/31/12. Delta-T's were the highest during this survey, approaching 10 ºC.

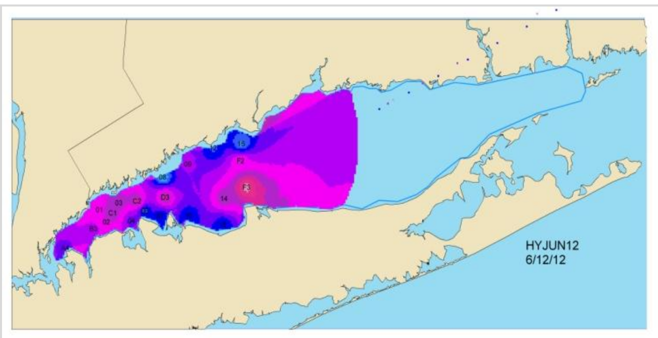


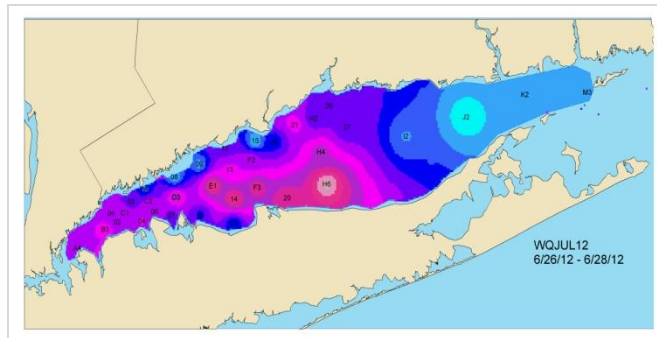
In Situ Temperature Profiles obtained during the HYAUG12 survey on 8/14/12 -8/16/12. Stations east of J2 were not sampled. The maximum extent of hypoxia was observed during this survey.

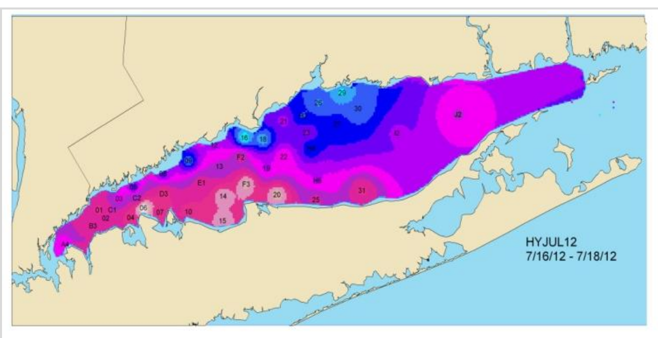
2012 Delta-T Maps

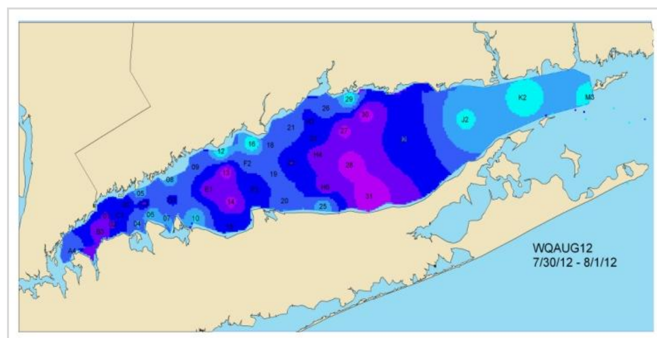


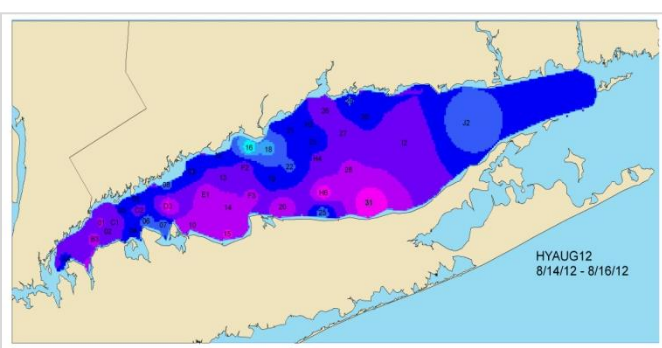


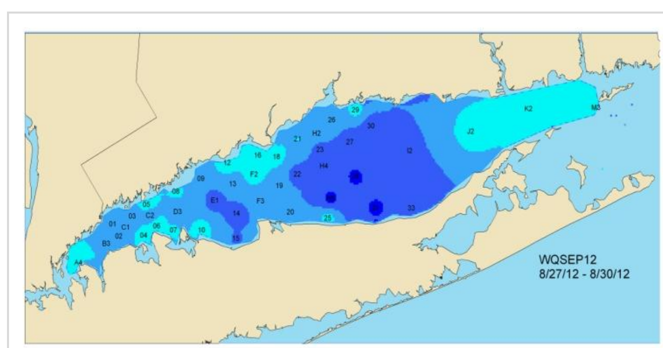






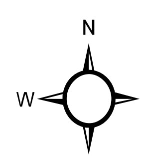






0 - 0.5
>0.5 - 1
>1 - 1.5
>1.5 - 2
.2 - 2.5
>2.5 - 3
>3 - 3.5
.3.5 - 4
>4- 4.5
>4.5 - 5
>5 - 5.5
>5.5 - 6
>6 - 6.5
>6.5 - 7
>7 - 7.5
>7.5 - 8
>8- 8.5
>8.5 - 9
>9

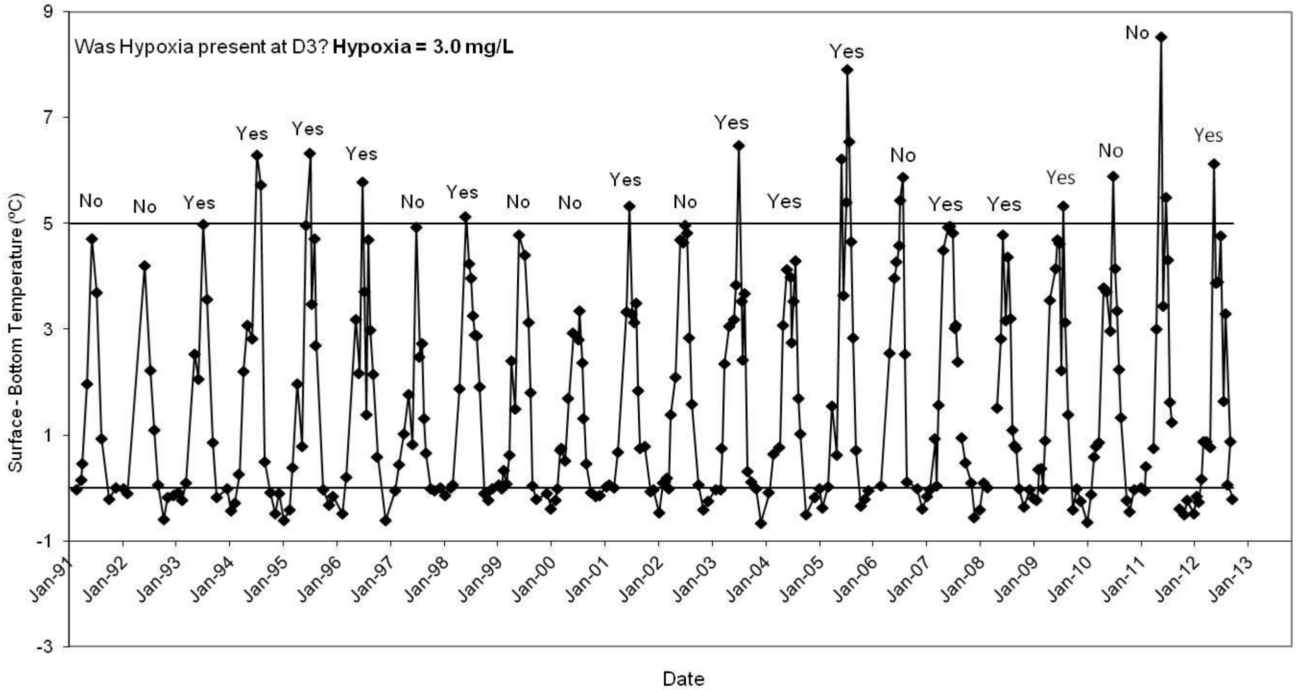
Delta-T ºC



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. 2012 had the warmest minimum winter temperature, 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
2012	**4.09**	24.85	6.13	288.5

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 2012.

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. Over the period of record 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. In 2012, the Delta T was again over 5ºC and D3 was in fact hypoxic (lowest dissolved oxygen was 2.84 mg/L).

Salinity

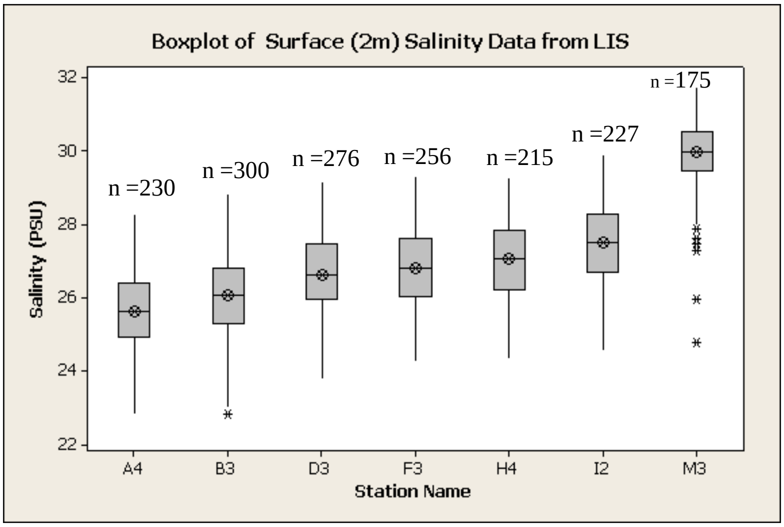
Salinity is a measure of the dissolved salts content of seawater. It is usually expressed in practical salinity units (PSU). Salinity levels across Long Island Sound vary from 23 PSU in the Western Sound at Station A4 to 33 PSU in the eastern Sound at Station M3. The Thames, Connecticut, and Housatonic rivers are the major sources of freshwater entering the Sound. Summary statistics for salinity data collected from seven stations across the Sound from 1991-2012 are presented in the tables below. Data collected this year are also presented separately.

		1991-2012 Bottom Water Statistics						
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	269	23.823	28.727	26.305	26.305	0.057	0.934	0.873
B3	317	24.259	28.926	26.588	26.546	0.0521	0.928	0.861
D3	294	24.912	29.215	27.224	27.266	0.0521	0.893	0.797
F3	274	25.153	29.432	27.587	27.611	0.0523	0.865	0.748
H4	234	25.508	29.7	27.732	27.738	0.0557	0.851	0.725
I2	258	25.762	29.985	28.054	28.12	0.0526	0.845	0.714
M3	215	28.608	32.622	30.571	30.565	0.0486	0.712	0.507

		2012 Bottom Water Statistics						
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	16	25.288	27.651	26.381	26.255	0.19	0.761	0.579
B3	16	25.485	27.96	26.694	26.516	0.202	0.809	0.655
D3	16	25.936	28.55	27.246	27.083	0.218	0.873	0.762
F3	13	26.602	28.824	27.768	27.539	0.212	0.765	0.585
H4	12	26.235	28.931	27.879	27.513	0.268	0.929	0.863
I2	11	27.312	29.469	28.296	28.162	0.227	0.754	0.569
M3	9	30.082	31.61	30.943	31.09	0.196	0.587	0.345

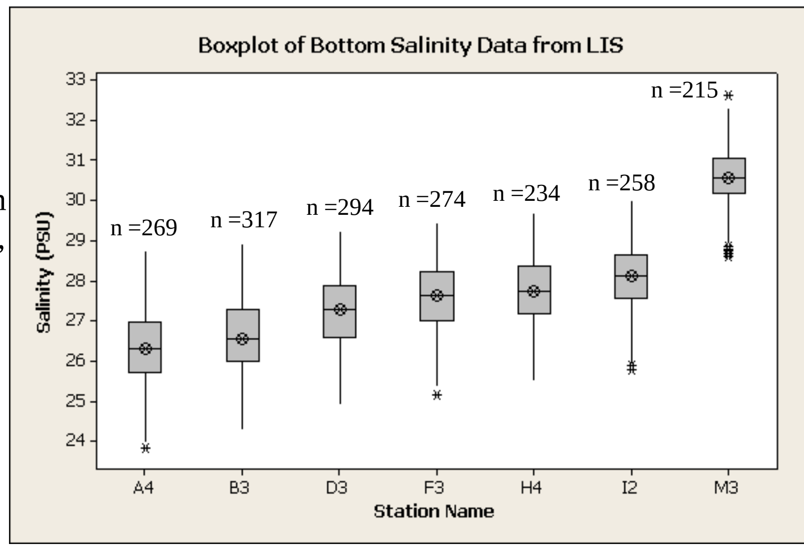
		1991-2012 Surface Statistics						
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	260	22.833	28.278	25.614	25.605	0.0643	1.036	1.074
B3	300	22.8	28.84	26.018	26.05	0.0618	1.07	1.145
D3	276	23.772	29.146	26.645	26.611	0.0635	1.054	1.111
F3	256	24.246	29.307	26.816	26.809	0.0672	1.076	1.157
H4	215	24.315	29.262	27.039	27.059	0.0733	1.075	1.155
I2	227	24.56	29.909	27.467	27.518	0.0691	1.041	1.084
M3	175	24.789	31.758	29.92	29.98	0.0764	1.011	1.022

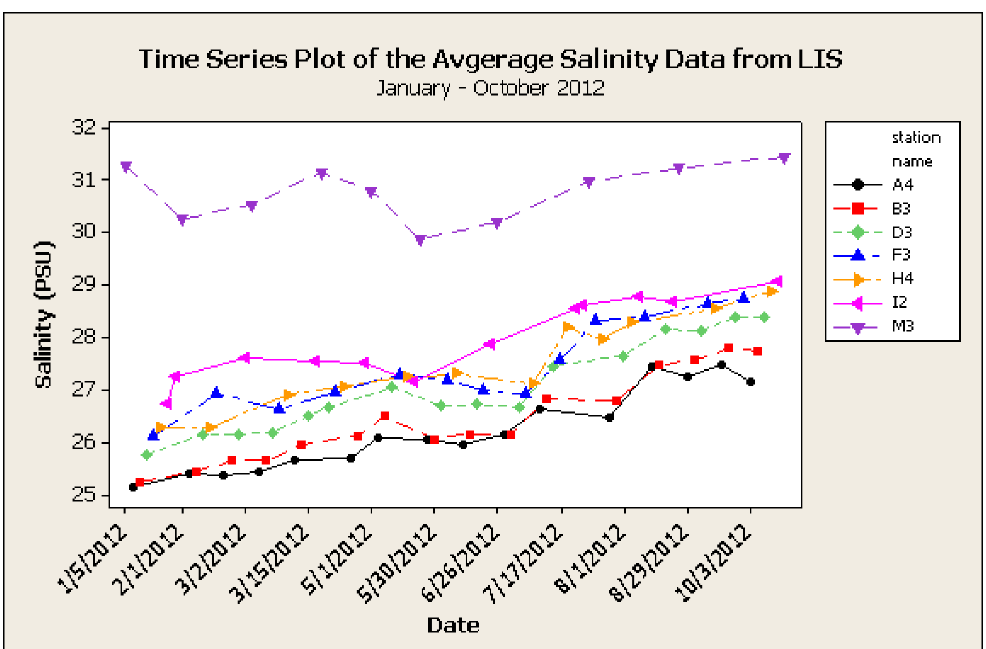
		2012 Surface Statistics						
Station Name	Count	Minimum	Maximum	Mean	Median	SE Mean	Standard Deviation	Variance
A4	14	24	27.208	25.633	25.397	0.244	0.914	0.836
B3	16	24.539	27.596	25.96	25.75	0.247	0.989	0.978
D3	15	25.451	28.328	26.641	26.135	0.236	0.913	0.833
F3	13	25.701	28.683	26.853	26.582	0.233	0.841	0.708
H4	12	25.798	28.839	27.115	27.011	0.245	0.849	0.72
I2	12	26.333	28.764	27.336	27.455	0.213	0.737	0.544
M3	10	29.461	31.195	30.317	30.258	0.186	0.588	0.345



This box plot, based upon data collected during CT DEEP surveys from January - October 2012 (n=431, 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- October 2012 (n=431, 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.

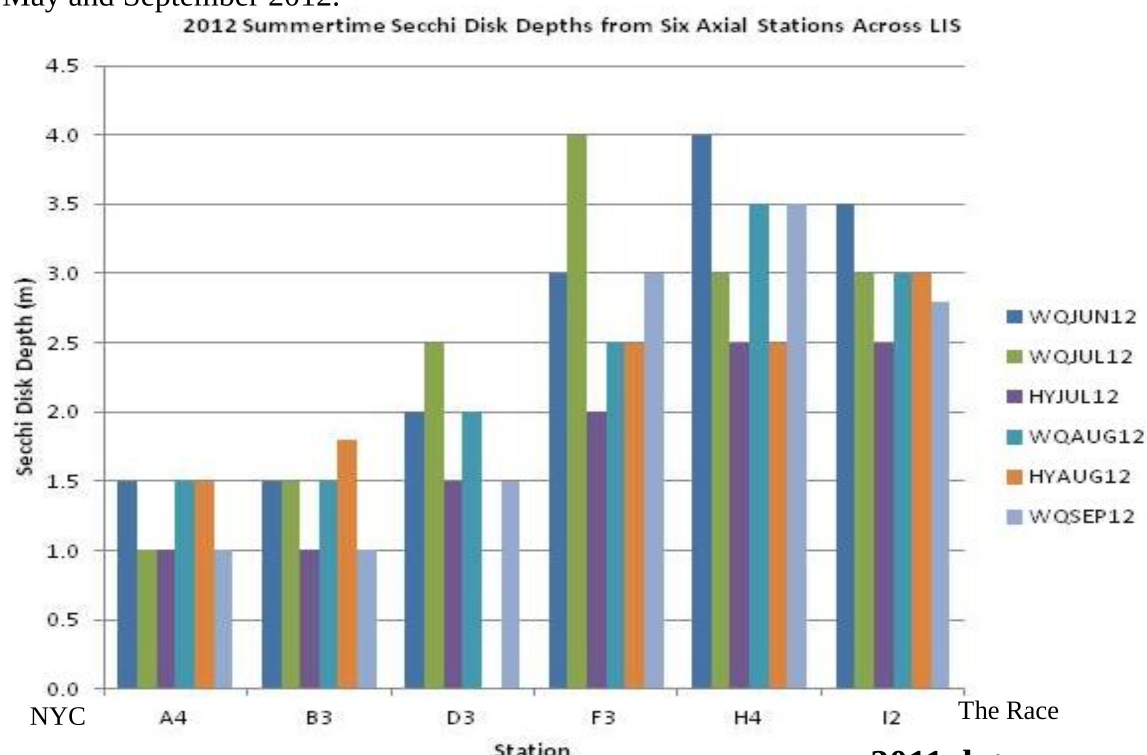




This time series plot illustrates the temporal variability of the mean salinity values by station from January-October 2012.

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, 2466 measurements have been entered into our database; of those 1370 are from the 17 stations sampled annually. The 2000-2012 average Secchi depth is 2.3 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 2012.



2012 data

- **Average Secchi Disk Depth: 2.36 m (n=268)**
- **Minimum Secchi Disk Depth: 1.0 m on multiple dates/stations**
- **Maximum Secchi Disk Depth: 4.0 m at Station F3 during the WQJUL12 cruise**

2011 data

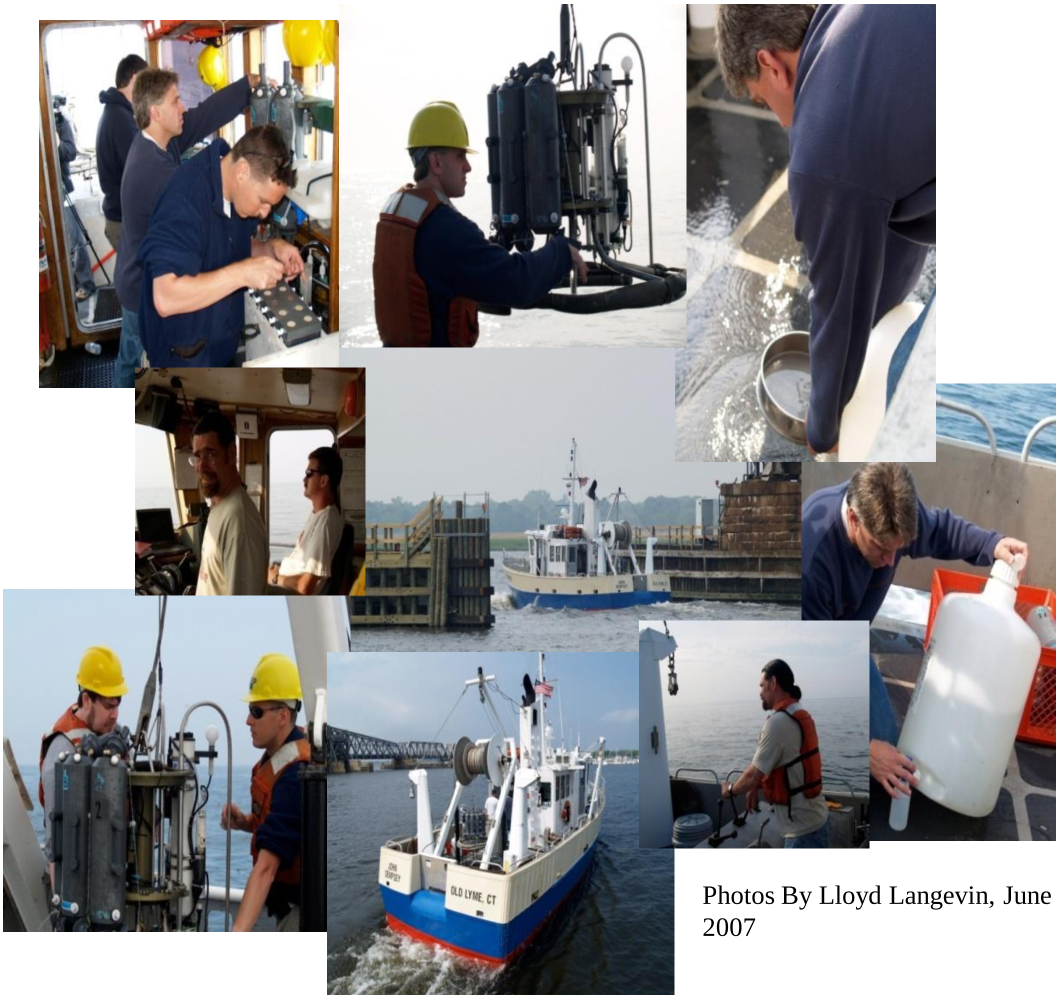
- **Average Secchi Disk Depth: 2.25 m (n=194)**
- **Minimum Secchi Disk Depth: 1.0 m at Station 02 & 07 during the WQJUL11 cruise and Station 29 during the WQSEP11 cruise**
- **Maximum Secchi Disk Depth: 3.6 m at Stations K2 and J2 during the WQAUG11 cruise**

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 DEEP upgraded its SeaCat Profilers and began collecting and reporting pH data in August 2010. Data collected to date are summarized below.

	Surface					Bottom			
Cruise	Max	Min	Avg	Count	Cruise	Max	Min	Avg	Count
HYAUG10	8.22	7.50	8.00	34	HYAUG10	7.98	7.51	7.74	34
WQSEP10	8.34	7.67	8.15	28	WQSEP10	8.18	7.52	7.79	28
WQOCT10	8.13	7.84	8.03	16	WQOCT10	8.07	7.89	8.01	16
WQNOV10	8.24	8.02	8.16	15	WQNOV10	8.25	8.04	8.15	16
WQDEC10	8.23	8.06	8.16	14	WQDEC10	8.21	8.07	8.15	16
WQJAN11	8.32	8.06	8.23	14	WQJAN11	8.34	8.18	8.25	16
WQFEB11	8.61	7.96	8.27	15	WQFEB11	8.76	8.12	8.43	16
WQMAY11	8.81	7.58	8.52	18	WQMAY11	8.64	8.22	8.52	18
WQJUN11	8.04	7.06	7.66	16	WQJUN11	7.80	7.26	7.59	16
HYJUN11	7.89	7.34	7.72	21	HYJUN11	7.62	7.44	7.56	21
WQJUL11	8.36	7.61	7.95	32	WQJUL11	7.76	7.31	7.57	28
HYJUL11	7.98	7.38	7.83	39	HYJUL11	7.82	7.32	7.61	39
WQAUG11	8.28	7.72	8.01	40	WQAUG11	8.05	7.38	7.74	39
HYAUG11	7.96	7.40	7.71	37	HYAUG11	7.79	7.45	7.60	38
WQSEP11	8.19	7.37	7.95	30	WQSEP11	8.07	7.64	7.86	14
WQOCT11	8.08	7.73	7.89	14	WQOCT11	8.00	7.73	7.87	13
WQNOV11	8.14	7.94	8.04	12	WQNOV11	8.07	7.02	7.94	16
WQDEC11	8.01	7.29	7.86	9	WQDEC11	8.01	7.85	7.95	16
WQJAN12	8.15	7.62	7.77	16	WQJAN12	8.17	7.65	7.82	17
WQFEB12	8.21	7.89	8.06	16	WQFEB12	8.19	7.99	8.11	17
CHFEB12	7.52	7.44	7.47	6	CHFEB12	7.41	7.35	7.37	6
WQMAR12	8.29	8.02	8.14	17	WQMAR12	8.22	7.99	8.08	17
CHMAR12	8.21	8.13	8.17	5	CHMAR12	8.15	8.06	8.10	6
WQAPR12	8.35	7.95	8.20	16	WQAPR12	8.30	8.12	8.20	17
WQMAY12	8.19	6.78	7.95	17	WQMAY12	8.17	6.70	8.01	17
WQJUN12	8.41	6.43	8.04	17	WQJUN12	8.21	6.42	7.97	17
HYJUN12	8.31	8.01	8.16	19	HYJUN12	8.19	7.90	8.04	9
WQJUL12	8.23	7.77	8.05	35	WQJUL12	8.18	7.75	8.00	17
HYJUL12	8.27	7.07	8.00	40	HYJUL12	8.23	7.46	7.86	15
WQAUG12	8.33	7.86	8.14	43	WQAUG12	8.16	7.67	7.93	17
HYAUG12	8.28	7.86	8.10	41	HYAUG12	8.12	7.62	7.91	15
WQSEP12	7.87	7.24	7.62	44	WQSEP12	7.78	7.38	7.54	16
HYSEP12	8.06	7.55	7.82	18	HYSEP12	7.90	7.47	7.70	8
WQOCT12	7.87	7.24	7.52	17	WQOCT12	7.88	7.32	7.64	16



Photos By Lloyd Langevin, June 2007

Acknowledgements

Funding for the CT DEEP Long Island Sound Water Quality Monitoring Program is provided through a grant from the EPA through the Long Island Sound Study.

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. Excluding the BIG E event, a total of 22,691 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 two engagements with sportsmen clubs and other recreational environmental clubs was 101 (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 two career day events with Connecticut high schools was 223 (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 2012 to February 2013 (segment 30).

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 DEEP)
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 2013 at the Connecticut Convention Center. These shows attracted 21,458 anglers, non-anglers, boaters, tackle retailers, legislators and general outdoor recreation enthusiasts. The theme for these show were "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.

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 'Fourth Annual Trophy Fish Award Ceremony' at the Northeast Fishing and Hunting Expo in the Connecticut Convention Center in Hartford on Saturday February 18, 2012. Eighty anglers (45 marine anglers) were recognized for their fishing achievements during 2012. Eight new state record holders, including the three new species awards, were honored. The Connecticut Department of Energy & Environmental Protection (DEEP) hosted the ceremony. Seventy-eight anglers were presented framed certificates recognizing their achievement of having caught or landed the largest fish in one of several species categories during 2012. Another five angler's were recognized as angler of the year. For a summary please see: 2012 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 on the CTDEEP website. 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 2012-13. 'A Study of Marine Recreational Fisheries in Connecticut' was emailed 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 led 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: 2012 CT DEEP Trophy Fish Award Program Youth State Records being presented at the Northeast Fishing and Hunting Expo, Hartford CT, February 2013 (CT DEEP Marine Fisheries Division Trophy Fish Award Program).

Table 6.2: Summary of talks, tours, career days and workshops given by project staff highlighting F54R activities, March 2012 – February 2013 (segment 30).

DATE:	PRESENTATION TYPE:	ORGANIZATION	TITLE / TOPIC:	TARGET AUDIENCE	TOTAL NUMBERS
3/28/2012	Marine Presentation	CCSU Marine Biology	Marine Fisheries Biology	Students	54
4/12/2012	Fishing Club Talk	Westport Outfitters	Marine Fisheries Mgmt./ Angler Surveys	Anglers	41
5/29/2012	Career Day / Mentoring	Glastonbury High School	Marine Fisheries Careers	Students	140
6/23/2012	Marine Field Presentation	CCSU Marine Biology	Marine Fisheries Biology	Students	65
7/25/2012	Fishing Club Talk	HTFD Club Sports	Marine Fisheries Mgmt./ Angler Surveys	Anglers	50
7/27/2012	Marine Presentation	Groton Maritime Academy	Marine Fisheries Biology	Students	17
8/23/2012	Marine Presentation	CARE Fort Trumbull No Child Left Inside Event	Marine Fishing Event	Youth Anglers	57
9/22/2012	Marine Presentation	CT DEEP Hunting and Fishing Appreciation Day	Marine Fisheries Management	Anglers	500
9/14-30/12	Marine Presentation	BIG E	Marine Fisheries Mgmt./ Angler Surveys	Youth/Adults	-900,000
10/20/2012	Marine Presentation	Windsor High School	Marine Fisheries Biology	Students	50
1/24-27/2013	Outreach Display	CMTA Boating Show	Enhanced Fishing Opportunities	General Public	11,004
2/15-17/2013	Outreach Display	Northeast Fish and Hunting Expo	Enhanced Fishing Opportunities	General Public	10,454
2/17/2013	Award Presentation	Northeast Fish and Hunting Expo	Trophy Fish Award Program Ceremony	Marine Anglers	176
2/19/2013	Career Day / Mentoring	Soundwaters	CTDEEP Marine Fisheries	Students	83

JOB 7: MARINE FISHERIES GIS

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JOB 7: MARINE FISHERIES GIS

GOAL

To maintain a geographic information system (GIS) of Project data to support map applications and geospatial analyses, assist with planning and executing Connecticut DEEP Marine Fisheries Division (MFD) surveys that support sport fish restoration goals, help people visualize the spatial extent of MFD project sampling efforts, assist in evaluating the effects of fishing and environmental conditions on the distribution and abundance of living resources in Long Island Sound, evaluate effects of marine spatial planning projects on living marine resources and fisheries in Long Island Sound, and improve coordination with other agencies.

OBJECTIVES

1) Provide GIS-compatible, or GIS-ready, datasets and geo-referenced layers of data collected through other Jobs of this Project that are sanctioned by the Marine Fisheries Division.

2) Provide maps and geospatial analyses of Marine Fisheries Division data or other information relevant to managing living marine resources in Long Island Sound.

INTRODUCTION

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 increasing number of requests to provide geospatial data to others (intra-agency, inter-agency, NGOs, academic institutions, etc). Therefore, a new job (Job 7) was created within the project to support this need for geospatial datasets, data layers, analyses and products. This report includes results from the first year of Job 7.

METHODS

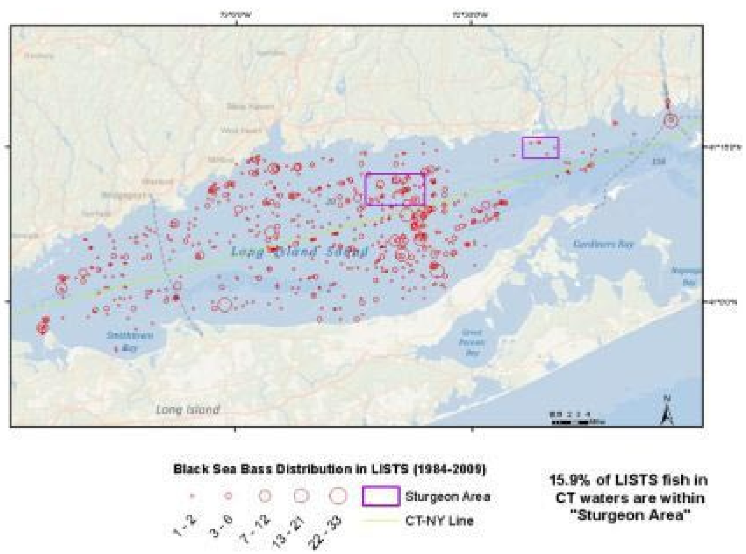
GIS work was accomplished using ESRI ArcMap software and extensions licensed by the Connecticut DEEP. Published layers comply with Department policy pertaining to GIS data. Initial efforts focused on developing file inventories, creating individual layers of Project-specific data and creating and publishing maps depicting project data with other relevant spatial data layers. "Publishing" in this context refers to packaging the GIS data layers so that users did not need access to ArcMap to view a map.

Since most staff did not have access to desktop GIS software, effort was expended in making GIS data sets and data layers readily available for Marine Fisheries Staff through the use of Adobe Reader. This entailed exporting ArcMAP map documents in PDF format with data-driven layers that could be turned on or off in Adobe Reader. In some cases, the data tables 'behind' the ArcMap layers could also be accessed in the PDF versions.

RESULTS

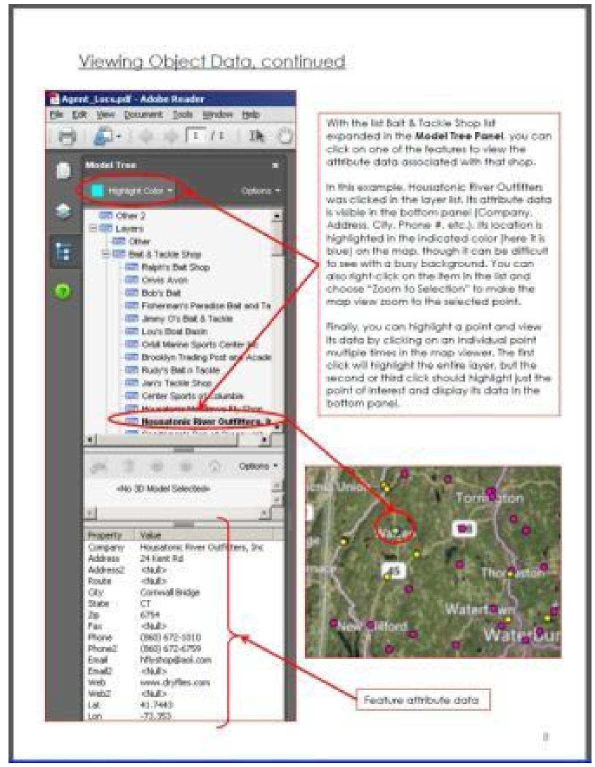
Since CT DEEP Marine Fisheries GIS projects use so much spatial data collected in-house, as well as data layers provided by other sources, there is the potential for the data layers to be in different "projections" - different coordinate systems. GIS data layers should all be in the same "projection" in order to conduct spatial analyses so multiple copies of many of the data layers used in this project were maintained (unprojected GCS, CT State Plane and UTM). The first task for this Job was to catalog the files and re-project if necessary; a list was created with file names, creation dates and hyperlinks to locations and multiple projections of each layer. A tool was created in ModelBuilder to mass project files when appropriate. Over 1,000 GIS data layers were cataloged in the first year of this job.

During the project year, Atlantic sturgeon became a Federally Endangered Species prompting the CT DEEP to conduct a spatial analysis of information related to the distribution of Atlantic sturgeon in CT waters prior to promulgating regulations to establish gear-restriction areas for the protection of Atlantic sturgeon. The spatial analysis used data from the Long Island Sound Trawl Survey (LISTS, Job 2.1) in conjunction with data from other Marine Fisheries projects to calculate areas that would offer the greatest protection to Atlantic sturgeon while having the least impact on other fishery resources. Maps were created to show areas encompassing varying percentages of Atlantic sturgeon locations documented in CT DEEP surveys. Maps were also created to show the percentages of LISTS catch of recreationally important species in these same areas, such as the distribution of black sea bass (shown above).



map showing some of the LISTS data used in spatial analysis prior to establishing areas to help protect Atlantic sturgeon in CT waters

As stated previously, most of the Marine Fisheries staff do not have access to desktop GIS, so maps created in ArcMap were often exported as PDFs which could be viewed on any computer once the free Adobe Reader was installed. Many of the maps had data-driven pages enabled so layers could be turned on/off in Adobe Reader. Viewers could even 'drill into' the data behind the maps in some cases. A tutorial was created to demonstrate and explain features in Adobe Reader that would help Marine Fisheries staff get the most use out of PDF maps and data layers. Shown at right is a page from the PDF Map Tutorial explaining how to ‘drill into’ the data behind the map.



Viewing Object Data, continued

With the list Bait & Tackle Shop list expanded in the **Model Tree Panel**, you can click on one of the features to view the attribute data associated with that shop.

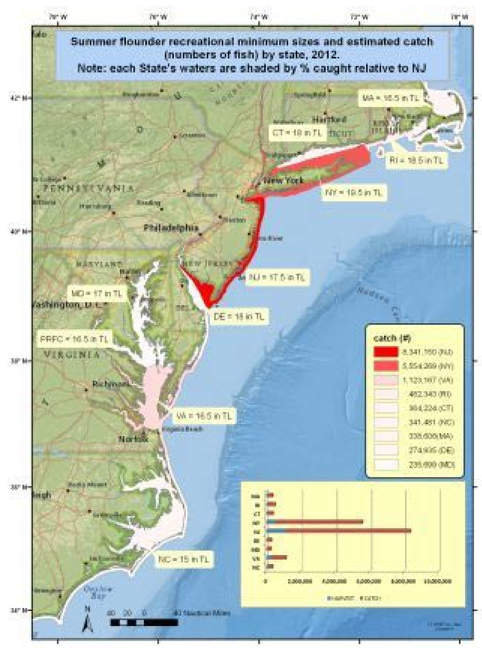
In this example, Housatonic River Outfitters was clicked in the layer list. Its attribute data is visible in the bottom panel (Company, Address, City, Phone #, etc.). Its location is highlighted in the indicated color (here it is blue) on the map, though it can be difficult to see with a busy background. You can also right-click on the item in the list and choose "Zoom to Selection" to make the map view zoom to the selected point.

Finally, you can highlight a point and view its data by clicking on an individual point multiple times in the map viewer. The first click will highlight the entire layer, but the second or third click should highlight just the point of interest and display its data in the bottom panel.

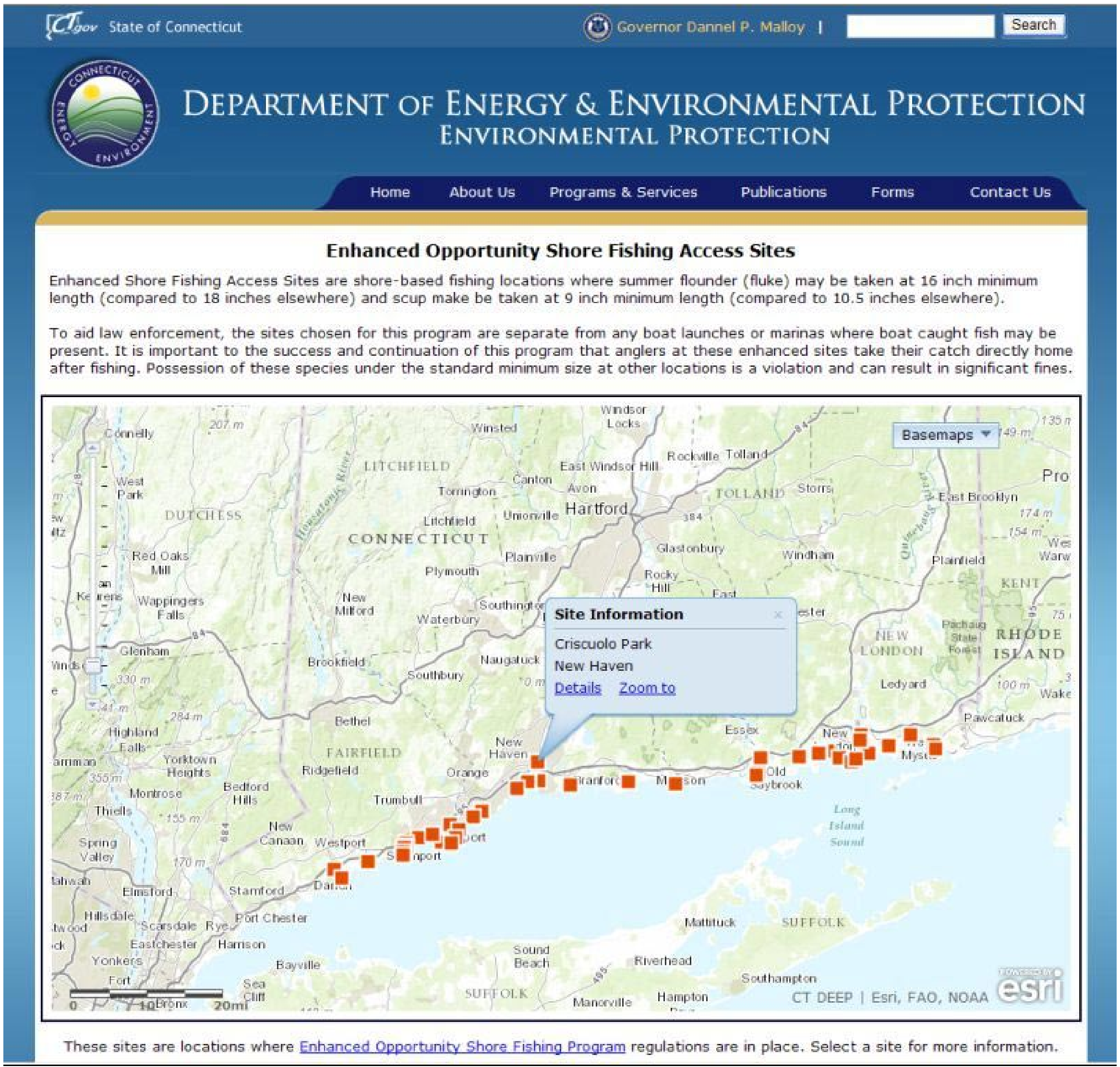
Feature attribute data

To assist in coastwide management of the recreationally important summer flounder (fluke) stock, project staff created a map showing summer flounder recreational fishing measures and amount of catch in 2012 for ASMFC partners. The magnitude of each ASMFC partner's recreational catch of summer flounder in 2012 as a percent of the coastwide total was used to develop a color ramp that directly reflected the percentage (i.e. the color shade was the actual percent of coastwide catch).

fluke recreational fishing measures and catch for ASMFC partners

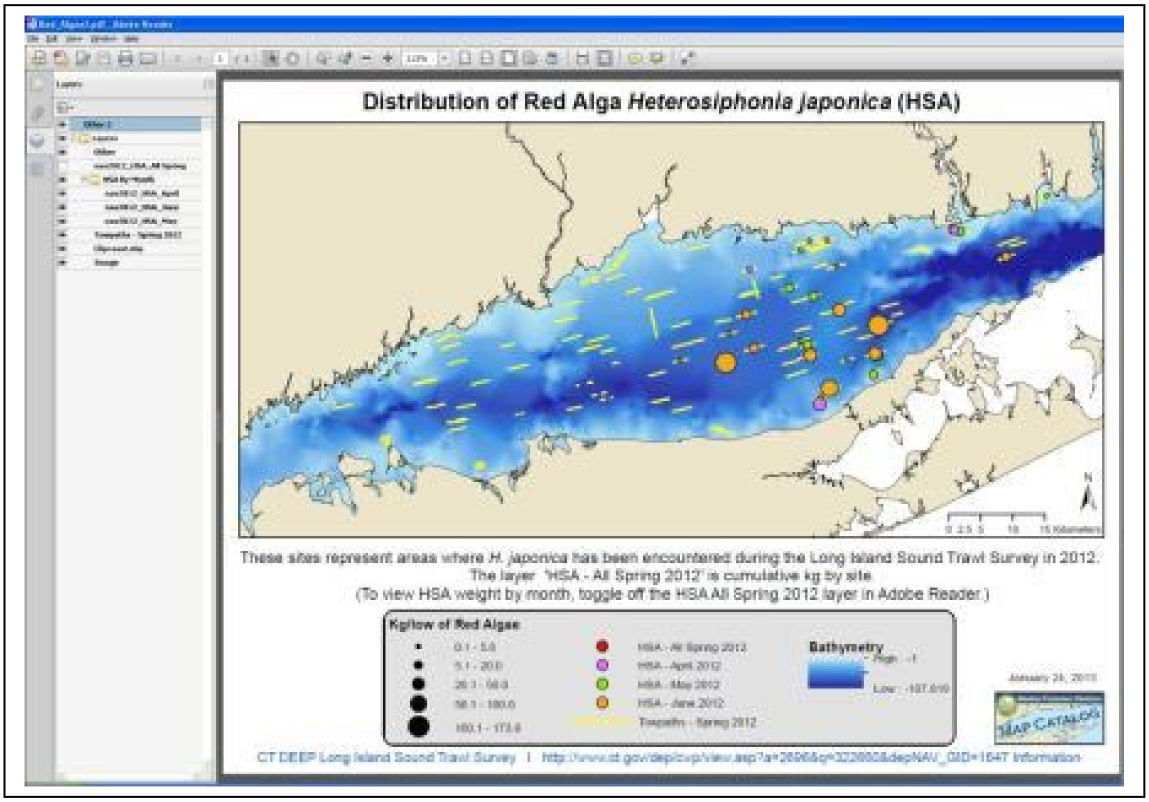


In an effort to improve shore-based angler opportunities and fishing success, CT DEEP has enacted special regulations to allow shore-based anglers in specific locations to keep smaller sized summer flounder and scup than can legally be kept from other locations or other modes (e.g. from boats). Many of these “Enhanced Opportunity Shore Fishing Access Sites” are also State properties featured in the on-line CT Coastal Access Guide. To help promote this important benefit to recreational anglers in CT, an interactive web-based GIS map containing the locations of these sites with links to the on-line Coastal Access Guide was developed and is now available on the Agency website.

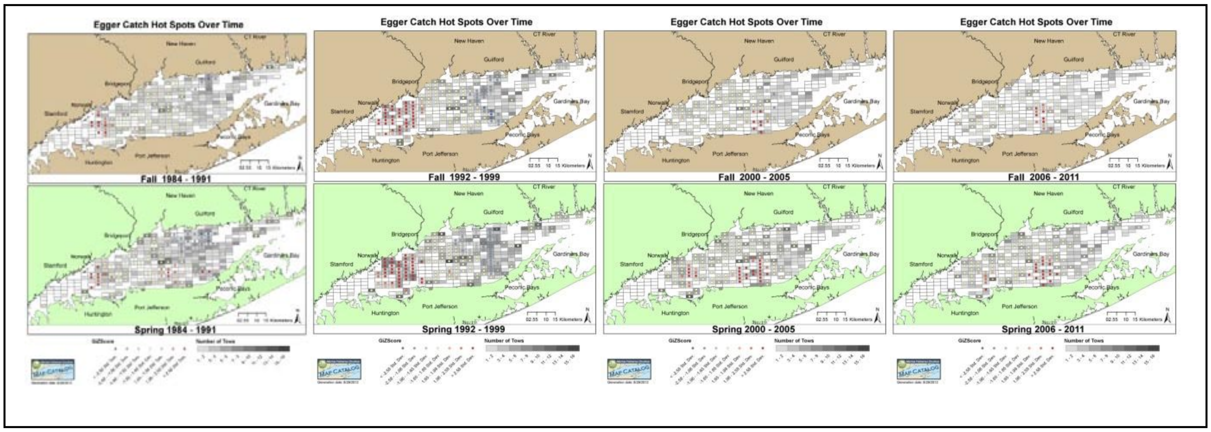


interactive GIS map of “Enhanced Opportunity Shore Fishing Access Sites” for recreational saltwater anglers on CT DEEP web site:
http://www.depdata.ct.gov/maps/marinefish/fishmap.htm

A new invasive alga in Long Island Sound, *Heterosiphonia japonica*, had a significant impact on LISTS spring 2012 sampling (see Job 2.1 section of this report). Project staff created a GIS map of *H.japonica* distribution from the spring trawl survey and exported it as a PDF with active layers for each month of the spring survey. The PDF was then shared with other State of Connecticut Agencies (OLISP, Sea Grant) and interested researchers. An image of the PDF map with active layers is shown below.



LISTS species distribution maps were used to fulfill a variety of data requests in 2012, including requests from Marine Fisheries Division Staff to fulfill needs for fishery stock analyses and assessments as part of ASMFC Technical Committee work. For the ASMFC Lobster Technical Committee, a time series of maps was created to show concentrations of lobsters with eggs from LIS Trawl Survey catches in four time periods (1984 – 1991, 1992 – 1999, 2000 – 2005 and 2006 – 2011, see image below) using “Hot Spot Analysis” in the Spatial Statistics toolbar.



MODIFICATIONS

None.