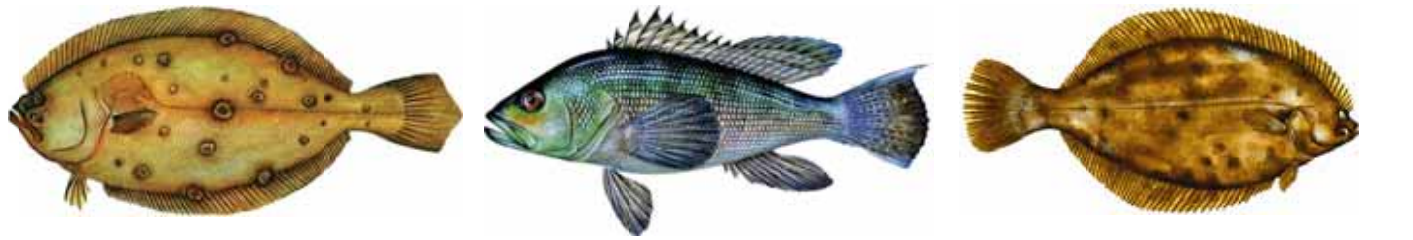
STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Gina McCarthy
Commissioner

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

A STUDY OF MARINE RECREATIONAL FISHERIES IN CONNECTICUT



Federal Aid in Sport Fish Restoration
F-54-R-28 Annual Performance Report
March 1, 2008 – February 28, 2009

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

Federal Aid in Sport Fish Restoration
F-54-R-28
Annual Performance Report

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

Period Covered: March 1, 2008 - February 28, 2009

Job Title	***Prepared by*:**
Job 1: Marine Angler Survey	Roderick E. MacLeod
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
Job 6: Public Outreach	David R. Molnar

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***Approved by*:** David G. Simpson, Director
Marine Fisheries Division

Date: May 28, 2009

EXECUTIVE SUMMARY

Project: A Study of Marine Recreational Fisheries in Connecticut
Federal Aid Project: F54R-28 (Federal Aid in Sport Fish Restoration)
Annual Progress Report: March 1, 2008 – February 29, 2009
Total Project Expenditures (2008/09): $749,036 ($561,777 Federal, $187,259 State)

Purpose of the Project

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

The project is comprised of six jobs: 1) Marine Angler Survey, 2) Marine Finfish Survey, 3) Inshore Survey, 4) Fishing Gear Studies (Inactive), 5) Cooperative Interagency Resource Monitoring, 6) Public Outreach. Job 3 had been inactive from March 1997-2007 (see below). Job 4 has been inactive since 2000.

Information on marine angler activity is collected from intercept interviews conducted by DEP staff and through a telephone survey conducted by a National Marine Fisheries Service contractor as part of the coastwide Marine Recreational Fisheries Statistics Survey. The relative abundance of 40 species and more detailed population information on selected finfish 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 through cooperative interagency monthly 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 and fishing shows. Project staff also keep the Fisheries Advisory Council informed on project activities and frequent media contacts provide broad newspaper coverage of project activities and findings.

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

OBJECTIVES (Summary)

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

KEY FINDINGS:

- An estimated 506,796 marine anglers made 1,906,933 fishing trips in 2008. Twenty percent of anglers were non-residents.

- Total catch was estimated at 8,017,988 fish and creeled catch at 1,652,241 fish for 2008.

- Five species: bluefish, striped bass, scup, summer flounder, and tautog comprised about 90% of the estimated total and creeled catch.

CONCLUSIONS:

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

RECOMMENDATIONS:

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

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

OBJECTIVES (Summary)

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

KEY FINDINGS:

- A total of 65 anglers participated in the survey and made 1,215 trips in 2008. Volunteers including anglers involved in a fishing party made a total of 2,641 trips. With multiple species taken per trip anglers reported 1,253 trips targeting bluefish, 1,794 trips for striped bass, 634 trips for summer flounder, 86 trips for winter flounder, 110 trips for scup, and 132 trips for tautog.

- Volunteer anglers measured 2,017 bluefish measuring > 12 inches in length, 2,090 striped bass, 1,126 summer flounder, 75 winter flounder, 726 scup and 379 tautog. Collecting length measurements on released fish provides valuable data not available through the Marine Recreational Fishery Statistics Survey, except for the headboat sea sampling survey.

CONCLUSIONS:

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

RECOMMENDATIONS:

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

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

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

KEY FINDINGS:

- A total of 152,363 finfish, lobster and squid weighing 14,884 kg were collected in 2008.
- Fifty-three finfish species and forty-one invertebrate species (or taxa) were collected from 160 tows conducted in 2008. The total fish species count (53) is below the 25-year average of 58 species per year (1984-2008). The Long Island Sound Trawl Survey has collected ninety-eight finfish species since the survey began in 1984. One new finfish species, feather blenny (*hypsoblennius hentz)*, was observed in 2008.
- Three species attained record high abundance in Long Island Sound during 2008; silver hake averaged 19.1 fish per tow this spring, while moonfish (5.1 fish/tow) and spot (2.7 fish/tow) reached their respective highest for the time series this past fall. No other species had notably high abundance in 2008 and only three species; summer flounder, northern kingfish, and black sea bass had abundance in their top five rank for the series.
- Adult scup abundance remains high relative to 1984-1998 levels; the 2008 fall index of age 2+ fish was the fifth highest in the time series. Summer flounder abundance increased this past year, approaching the 2003 index. Recently, fluke abundance had declined from the high levels recorded between 2001 and 2003 to average levels as observed from 1996 to 2000.
- Adult bluefish abundance has been at average levels for the past four years after decreasing from near-record high abundance in 2004. Striped bass abundance has been above average for the past 14 years.
- The spring survey index for tautog has remained low and below the time-series average for the past 16 years except for a short-lived increase in abundance recorded in 2002. The past ten years of winter flounder springtime abundance indices have been the lowest on record, with 2006 being the lowest index for the time series and 2007-2008 indices being approximately one-third of the time-series average.
- The spring index for American lobster has been declining for last ten years (since 1999) and has remained below the time-series average for the past six years. Fall lobster abundance has

also declined for nine consecutive years. Six of the past seven years have been the lowest fall indices on record.

- Several species not typically exploited in recreational or commercial fisheries have undergone significant changes in abundance over the survey time series. Declining trends are evident for such species as fourspot flounder, sea raven, longhorn sculpin, ocean pout and cunner all of which are cold temperate species. In contrast, several warm temperates have undergone significant increases in abundance that are similarly difficult to attribute to fishery management actions. These include moonfish, hickory shad, smallmouth flounder and spotted hake.

CONCLUSIONS:

- The abundance of some recreationally important species in Long Island Sound remains moderate to high including scup, striped bass, summer flounder and snapper bluefish. Recent high abundance of young-of-year scup also bodes well for future catches for this species. The increased abundance of hickory shad in recent years (most notably 2005 & 2006) has been providing additional recreational fishing opportunities, especially for nearshore anglers. 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 are at low levels and may indicate shifts in species assemblages within Long Island Sound associated with broad scale increasing temperature trends in the northwest Atlantic.

RECOMMENDATIONS:

- Continue monitoring through LIS Trawl Survey to provide information for stock assessment purposes and to evaluate the effectiveness of management measures.

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 2008 annual index of recruitment for young-of-year winter flounder (2.0 fish/haul) ranked 17th out of 21 annual indices.

- Mean catch of all finfish (140 fish/haul) ranked tenth out of 21 annual indices and was just below the series average of 142 fish/haul (Figure 2.2).

- The forage fish index for 2007 (99.6 forage fish/haul) was the eleventh highest of the time

series, and slightly above the time series average of 95.8 forage fish/haul.

CONCLUSIONS:

- A slight decrease in abundance of the winter flounder young of year index for 2008, 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 and mummichog, the dominant forage species taken in the survey.

RECOMMENDATIONS:

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

JOB 3 INSHORE SURVEY

OBJECTIVES (Summary)

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

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

KEY FINDINGS:

- The CT River seine survey collected at total of 11,994 fish, including 3,541 juvenile shad and 1,629 blueback herring.

- The Thames River seine survey collected 9,882 fish, comprised of 29 taxonomic groups.

- The 2008 CT River juvenile indenx of abundance for American shad was 5.06.

- The 2008 Connecticut River juvenile index of abundance for blueback herring was 2.20.

CONCLUSIONS:

- The juvenile shad indices for 2008 is considered a moderate year class.

- The juvenile blueback indices for 2008 is one of the lowest in the time series

RECOMMENDATIONS:

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

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 June 30, 2008, and persisted for a record (since 1991) 83 days ending on or about September 20, 2008.

- Severe hypoxia (<1.0 mg/l dissolved oxygen) was present during three cruises between July 21 and August 22 and was most widespread (104 $km^{2)}$ during late August.. Areas exposed to severe hypoxia would be expected to be devoid of finfish, lobsters and crabs.

- Hypoxia (<=3.5 mg/l dissolved oxygen) extended over a maximum area of 932 km^2 during late August, the fourth largest areal extent since 1991.

- The Biomass Area-Day Depletion Index (BADD) index for 2008 was the fourth highest at 9,318 or about 4.1% of the total area-days in the LIS sampling area. The BADD index is a gross measure of seasonal habitat loss associated with hypoxia.

CONCLUSIONS:

- Hypoxia developed fairly early in the 2008 (June 30^{th}) season and persisted well into September (20^{th}). Moreover, severe hypoxia was present in three cruises. The BADD index was the fourth highest level recorded or 4.1% of the total area-days in LIS. BADD is a gross measure of seasonal habitat loss.

RECOMMENDATIONS:

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

JOB 6: PUBLIC OUTREACH

OBJECTIVES

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

KEY FINDINGS:

- A total of 23,184 outdoor and environmental writers, marine anglers and boaters, marina operators, fishing tackle retailers, Fisheries Advisory Council (FAC) members, and members of the general public attended outreach events. The largest event was the "CMTA Boat Show" attended by 14,664 fishermen and hunters, followed by "Northeast Hunting and Fishing Expo" at the Hartford Convention Center which had an attendance of 7,751.

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.

EXPENDITURES
Summary of expenditures for the period March 1, 2008 to February 28, 2009.

	Federal	State	Total
Job 1. Marine Angler Survey	$143,873	$47,958	$191,831
Job 2. Marine Finfish Survey	$321,635	$107,212	$428,847
Job 3. A Study of Nearshore Habitat	$69,838	$23,279	$93,117
Job 4. Fishing Gear Selectivity	0	0	0
Job 5. Cooperative Interagency Resource Monitoring	$11,270	$3,757	$15,027
Job 6. Public Outreach	$15,160	$5,053	$20,214
Total	$561,777	$187,259	$749,036

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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.*

A total of 506,796 marine anglers were estimated to have fished in Connecticut during 2008.

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

Marine anglers made 1,906,933 fishing trips in Connecticut during 2008.

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.*

In 2008, marine anglers creeled 416,326 bluefish (2,590,797 lbs.), 672,094 scup (1,045,225 lbs.), zero winter flounder, 115,896 summer flounder (430,181 lbs.), 177,222 tautog (786,588 lbs.), and 98,907 striped bass (1,640,372 lbs.).

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

Length frequency distributions were estimated for bluefish, scup, summer flounder, tautog, and striped bass (Table 1.12).

INTRODUCTION

The Connecticut Department of Environmental Protection (DEP), Bureau of Natural Resources, Marine Fisheries Division, has been collecting marine recreational fisheries information along the Connecticut coastline since 1979. However, in order to improve state-wide marine fisheries statistics and become more consistent with other states, Connecticut joined with the MRFSS program in July, 1987. Before Connecticut's involvement in the MRFSS, data collection was conducted by NMFS's contractor just as in other states where state agencies do not participate in the program. This report includes state angler intercept survey work in 2008

and MRFSS angler effort and catch statistics from 1981-2008. Estimates for 2008 are preliminary.

METHODS

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

The MRFSS's primary objectives are (1) to provide a collection of accurate and representative data on the marine recreational fishery and (2) to produce accurate and precise regional (e.g. ME-CT) catch estimates which can be used by fishery managers to assess the impacts of recreational fishing on finfish stocks. In order to produce estimates with adequate precision at the state level (where proportional Standard Error (PSE) $\leq$20%, a modified version of Coefficient of Variation = S.E./Mean *100), the MRFSS initial intercept quota was tripled for Connecticut. Telephone and Intercept Surveys are collected in bimonthly time periods (termed Waves) and further broken down by mode in the Intercept Survey. In 2001, NMFS base allocations for the Northeast and Mid-Atlantic sub-regions were increased 1.5 times in order to increase effort and catch precision estimates for those areas. The increase was accomplished through a grant proposal submitted by the Atlantic Coastal Cooperative Statistics Program (ACCSP) Recreational Statistics Technical Committee and later approved by the ACCSP Coordinating Council. ACCSP is comprised of fifteen Atlantic coastal states and two federal agencies, which oversee and administer the collection of commercial and recreational fishery statistics. ACCSP provided funding for the additional intercept sampling as described in Table 1.1. However since state participation in 1987, Connecticut had already tripled NMFS Intercept Survey allocation and provided funding for those increases. ACCSP's involvement basically reduces Connecticut's expenditure toward processing additional intercepts by NMFS' contractor. Wave 1 is not sampled in Connecticut or any states in the Mid Atlantic (NY-VA) and Northeast (ME-CT) sub-regions due to low fishing activity (NMFS 1992).

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

selected to increase the number of length and weight measurements on creeled 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: MRFSS + ACCSP and State Angler Intercept and Headboat Trip Allocation by Mode and Wave, 2008

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)	44	64	70	64	38	280 (21%)
Charter Boat (CH)	45	95	103	100	85	428 (33%)
Private/Rental Boat (PR)	42	124	216	162	57	601 (46%)
Headboat Trips (HB) (based on 2 samplers/trip)	0	24	36	30	0	90 Trips
Total Number of Intercepts	131	283	389	326	180	1,309

MRFSS Estimation Methods

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

Angler participation and fishing trip estimates were derived primarily from the Telephone Survey and, in special situations, the Intercept Survey (NMFS 1992). In the Telephone Survey, households with telephones located in coastal counties or within 50 miles of the coastline were randomly selected and called to determine if a household fell into either of two categories: (1) households that comprised one or more marine recreational anglers and (2) non-fishing households. Households with anglers were further surveyed in order to collect fishing trip information used in estimating total fishing trips and angler participation. In situations where anglers did not possess a telephone (or live in a household), Intercept Survey data were used in order to account for that segment of the angling population that would otherwise be missed.

MRFSS 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. In this report, total catch estimates consist of Catch Types A+B1+B2. Creeled 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. Catch statistics in this document will be reported in numbers caught or as otherwise specified.

RESULTS AND DISCUSSION

Connecticut Intercept Survey 2008

During March-December 2008, a total of 1,658 interviews (intercepts) with marine anglers were conducted by Marine Fisheries Division staff for the MRFSS (Table 1.2). Intercept shortfalls occurred particularly in Waves 2 and 6 for NMFS + ACCSP quotas because of low fishing activity and poor weather conditions. Furthermore, most Connecticut-based headboat/charter businesses and marinas terminate their operations by November 1. Furthermore, the headboat mode was not sampled during waves 2 and 6 due to low angler activity.

Table 1.2: Total Number of Angler Intercepts Collected by Mode and Headboat Trips Taken by Wave, 2008

	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	
Mode	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	**Total (%)**
Shore (SH)	33	132	174	34	6	379 (23%)
Charter Boat (CH)	2	80	117	40	0	239 (14%)
Private/Rental Boat (PR)	34	290	280	158	36	798 (48%)
Headboat Trips (HB)	0 Trip (0 Ints.)	5 Trips (53 Ints.)	6 Trips (126 Ints.)	4 Trips (63 Ints.)	0 Trips (0 Ints.)	15 Trips (242 Ints. 15%)
Total Number of Intercepts	69	555	697	295	42	1,658

MRFSS 2008 Angler Participation and Fishing Trip Estimates and the MRFSS Time Series from 1981-2008

During 2008, an estimated 506,796 marine anglers made 1,906,933 trips (Tables 1.3-1.4). The annual estimated number of marine anglers averaged 345,443 participants from 1981-08. The annual total of marine recreational fishing effort averaged 1,468,470 trips for the same period. Connecticut residents comprised about 80% of the total marine fishing population whereas nonresident anglers made up the remaining 20% from 1981-2008.

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. The percentage breakdown of trips in 2008 by mode was 29.6% for shore mode, 2.6% headboat and charter boat modes and 67.8% for the private/rental boat mode. The percent distribution of fishing trips by mode for the time series was 35.7% for shore mode, 5.8% for headboat/charter modes and 58.5% in the private/rental boat mode.

MRFSS Catch Estimates 2008

Total catch was estimated at 8,017,988 fish and creeled catch at 1,652,241 fish for 2008. Five popular species: bluefish, striped bass, scup, summer flounder, and tautog comprised about 90% of the estimated total and creeled catch (Tables 1.5-1.10). For that reason, these species will be the focus of discussion in this section. Precision estimates for bluefish, striped bass, summer flounder, scup and tautog were near or below a PSE of 20% for both total and creeled catch. Total creeled catch in pounds for all species combined was estimated at over 6.6 million lbs.

Catch estimates vary annually for most species primarily due to changes in abundance and fishing regulations. For more insight to historical accounts of Connecticut's marine recreational fishery regulations please refer to Table 1.11.

BLUEFISH

Bluefish was the third most frequently caught species in Connecticut in 2008 with an estimated 1,532,797 million fish for total catch. The creeled catch estimate was 416,326 fish (2,590,797 pounds). Bluefish catch estimates in numbers comprised about 19% of the total catch and 25% of the total creeled catch for all species. Bluefish estimated creeled catch in pounds accounted for 37% of the total creeled catch. The proportion of bluefish released was 73%.

In numbers caught, bluefish have been the most commonly caught and harvested species in the MRFSS time series (26% and 34%, respectively). Bluefish total catch estimates range from a record low of 690,694 fish in 1988 to record high of about 6.3 million fish in 1982. The annual mean was about 1.8 million fish for total catch. Creeled catch estimates have ranged from 372,525 fish in 2000 to 3.3 million fish in 1981. The annual mean for creeled catch was 1.3 million fish. The annual mean rate anglers released fish alive was 29%. The time series for released bluefish ranged from about 4% to a record high of 72% (2005 estimate).

STRIPED BASS

Striped bass were the most frequently caught fish by marine recreational anglers in 2008 with an estimated total catch of about 2.5 million fish (comprising 31% of the total catch for all species). Striped bass creeled catch in numbers comprised 6% (98,907 fish) for all species. Creeled catch in weight was estimated at 1.6 million pounds and comprised 28% of the total creeled catch for all species. Approximately 94% of the total number of striped bass caught were released alive.

Throughout the MRFSS time series, striped bass total catch estimates varied from as low as 27,783 fish in 1981 to a record high of 2.5 million fish in 2008. Low abundance of striped bass in the 1980's due to over-fishing followed by successful stock restoration efforts in the 1990's to present have resulted in a substantial upward trend of total catch. With the exception of 1981, 1983, and 1985 the creeled catch estimate has remained consistently low with an annual mean retention rate of about 6% (range $\underline{\sim}$ 0.7% - 15%). The low retention rate can be attributed to catch restrictions implemented to curtail harvest in addition to recreational anglers increased awareness of conservation fishing practices (e.g. catch and release fishing).

SUMMER FLOUNDER (Fluke)

The summer flounder recreational total catch estimate increased by about two times from 2007 to 2008. The estimated total catch of 911,317 fish comprised 11% of the total catch for all species. The creeled catch estimate in numbers was 115,896 fish and accounted for about 7% of the total creeled catch for all species. The creeled catch in weight was an estimated 430,181 pounds and accounted for 6% of the total creeled catch in weight for all species. Approximately 61% of summer flounder caught were released.

In numbers caught, summer flounder comprised 11% and 7% of the total and creeled catch estimates in the MRFSS time series. The lowest estimated total catches occurred back to back in 1989 and 1990 with only 44,541 and 56,352 summer flounder, respectively. Creeled catch estimates have been highly variable (range = 17,707 in 1990 – 576,160 fish in 1983).

WINTER FLOUNDER

In 2008, there were no winter flounder catch estimates since none were observed or reported caught by anglers in the intercept survey. This once very abundant species has steadily declined from the late 1980's.

SCUP (Porgy)

Scup was the second most frequently caught species in 2008 with 1,808,111 and 672,094 fish estimated for total and creeled catches. In weight, the creeled catch was estimated at 1,045,225 pounds. The proportion of scup released was approximately 63%.

TAUTOG (Blackfish)

Tautog total catch in 2008 was estimated at 378,217 fish. The creeled catch total was estimated at 177,222. The total and creeled estimates comprised 5% and 11% of the total for all species. In weight, the creeled catch was estimated at 786,588 pounds. The proportion of tautog released was 45%.

LENGTH FREQUENCY DISTRIBUTION FOR BLUEFISH, STRIPED BASS, SCUP, SUMMER FLOUNDER, WINTER FLOUNDER, AND TAUTOG

Length measurements were collected as described in the MRFSS Procedures Manual. Attempts were made to measure all marine finfish when available or in random sub-samples when large catches were encountered. Length frequency distributions for Type A (observed fish) as well as catch and trip statistics can be queried on the following NMFS web site: http://www.st.nmfs.gov/st1/recreational/queries/index.html.

Length frequency distributions are shown in Table 1.12. One particular note, in the intercept survey, fish were measured from the tip of the snout to the fork in the tail (fork length). Regulations for minimum length are measured from the tip of the snout to the end of the tail (total length) regardless if a species possess a forked tail or not.

MODIFICATIONS

None.

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

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Table 1.3 MRFSS Estimated Number of Marine Recreational Anglers in Connecticut 1981-2008

Year	Resident	PSE	Non-Resident	PSE	Total	PSE
1981	227,985	10.4	43,898	44.3	271,883	11.3
1982	253,428	20.8	50,371	38.8	303,799	18.5
1983	170,926	13.1	59,500	40.2	230,426	14.2
1984	258,895	11.1	63,546	45.6	322,442	12.6
1985	276,026	11.1	74,525	37.1	350,551	11.8
1986	319,002	9.4	108,338	35.7	427,341	11.4
1987	184,884	9.9	42,559	36.0	227,443	10.5
1988	238,315	10.5	63,118	37.1	301,434	11.4
1989	315,338	10.5	53,239	43.7	368,577	11.0
1990	268,920	9.5	78,851	39.0	347,771	11.5
1991	385,370	10.1	85,224	43.0	470,593	11.3
1992	389,394	10.7	113,995	36.1	503,388	11.6
1993	186,167	9.8	47,067	34.3	233,234	10.4
1994	194,668	11.2	33,439	47.0	228,107	11.8
1995	231,300	12.4	41,245	16.6	272,545	10.8
1996	295,009	10.9	75,864	15.5	370,873	9.2
1997	257,555	12.9	69,686	16.3	327,242	10.8
1998	290,105	13.6	72,993	15.9	363,098	11.4
1999	242,716	14.1	54,663	16.7	297,379	11.9
2000	221,523	10.6	53,054	13.9	274,577	9.0
2001	245,715	9.2	77,970	11.8	323,685	7.5
2002	283,399	8.5	87,313	11.5	370,712	7.1
2003	360,712	8.8	112,039	10.9	472,750	7.2
2004	296,870	12.2	62,539	16.0	359,409	10.5
2005	323,346	11.8	76,920	16.6	400,265	10.1
2006	336,090	9.0	44,064	16.7	380,155	8.2
2007	304,407	8.8	61,534	12.7	365,941	7.6
2008	383,126	8.7	123,669	14.3	506,796	7.4
Annual Mean	276,471		68,972		345,443	
% Distr.	80.0%		20.0%			

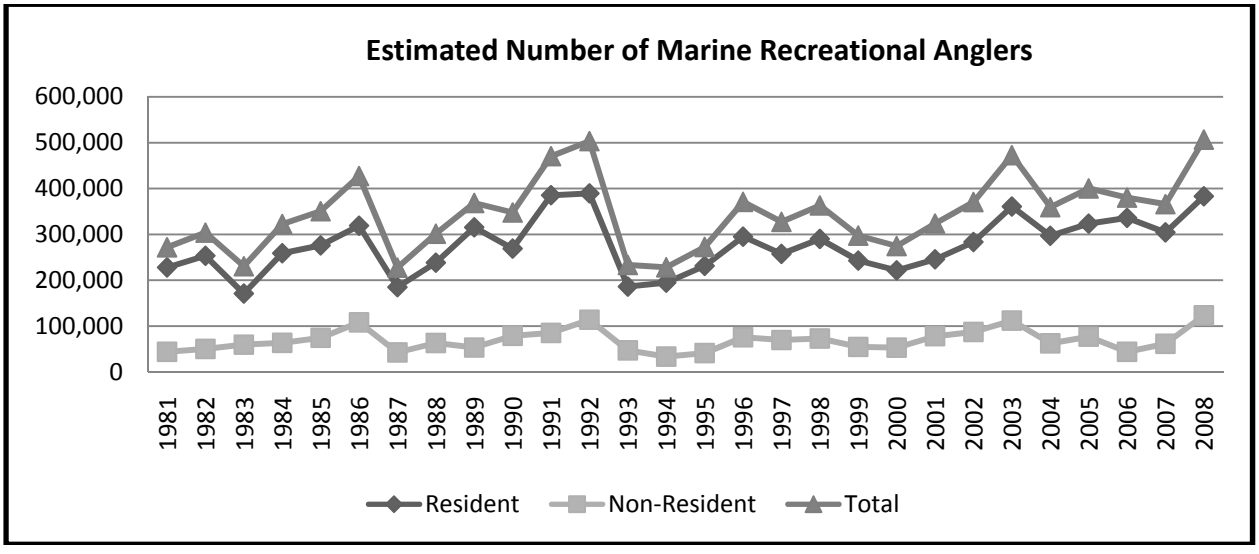


Table 1.4 MRFSS Estimated Number of Marine Recreational Angler Trips in Connecticut 1981-2008

	Shore Mode		Party/Charter Boat Mode		Private/Rental Boat Mode		All Modes Total	
Year	Number of Trips	PSE	Number of Trips	PSE	Number of Trips	PSE	Number of Trips	PSE
1981	486,297	16.8	162,844	22.0	591,019	15.2	1,240,160	10.2
1982	635,851	18.2	601,997	97.0	695,394	19.9	1,933,242	31.6
1983	563,607	19.0	92,655	29.0	601,021	17.2	1,257,283	12.0
1984	485,545	18.4	161,559	32.2	698,261	10.6	1,345,365	9.4
1985	613,944	18.1	117,404	21.1	815,397	13.5	1,546,745	10.2
1986	527,344	14.9	146,664	18.8	952,962	11.0	1,626,970	8.2
1987	373,442	17.8	81,723	20.0	985,915	10.9	1,441,080	8.9
1988	210,495	19.2	73,890	14.7	965,271	12.5	1,249,656	10.3
1989	465,230	16.6	47,323	21.8	847,833	13.1	1,360,386	9.9
1990	398,986	16.4	61,329	22.2	759,820	12.5	1,220,135	9.5
1991	690,244	15.7	31,335	20.7	952,206	13.4	1,673,785	10.0
1992	712,467	18.1	53,723	26.3	1,075,540	13.2	1,841,730	10.4
1993	386,683	14.5	102,996	17.7	727,954	13.6	1,217,633	9.5
1994	356,758	16.2	42,482	26.2	709,549	15.0	1,108,789	11.0
1995	532,159	19.3	72,866	28.2	640,359	15.9	1,245,384	11.8
1996	564,088	16.7	31,550	25.5	873,181	13.3	1,468,819	10.2
1997	346,120	18.3	34,870	34.3	751,248	17.1	1,132,238	12.7
1998	524,236	20.4	30,373	30.7	736,926	18.1	1,291,535	13.3
1999	522,586	20.9	21,859	29.0	774,097	18.7	1,318,542	13.8
2000	608,507	16.0	45,783	24.8	853,510	13.1	1,507,800	9.8
2001	695,406	13.8	46,262	19.9	981,137	11.2	1,722,805	8.5
2002	645,218	13.9	51,148	16.0	953,313	9.6	1,649,679	7.8
2003	624,972	13.3	63,570	19.0	875,228	11.5	1,563,770	8.4
2004	573,814	19.7	38,905	25.8	923,800	15.3	1,536,519	11.8
2005	438,205	20.6	38,226	2.4	1,072,764	13.7	1,549,195	11.1
2006	569,124	13.4	45,694	1.8	862,870	10.4	1,477,688	8.0
2007	543,709	14.4	50,339	3.2	1,089,237	10.7	1,683,285	8.3
2008	564,488	12.9	49,327	17.7	1,293,119	10.9	1,906,933	8.3
Annual Mean	523,554		85,668		859,248		1,468,470	
% Distr.	35.7%		5.8%		58.5%			

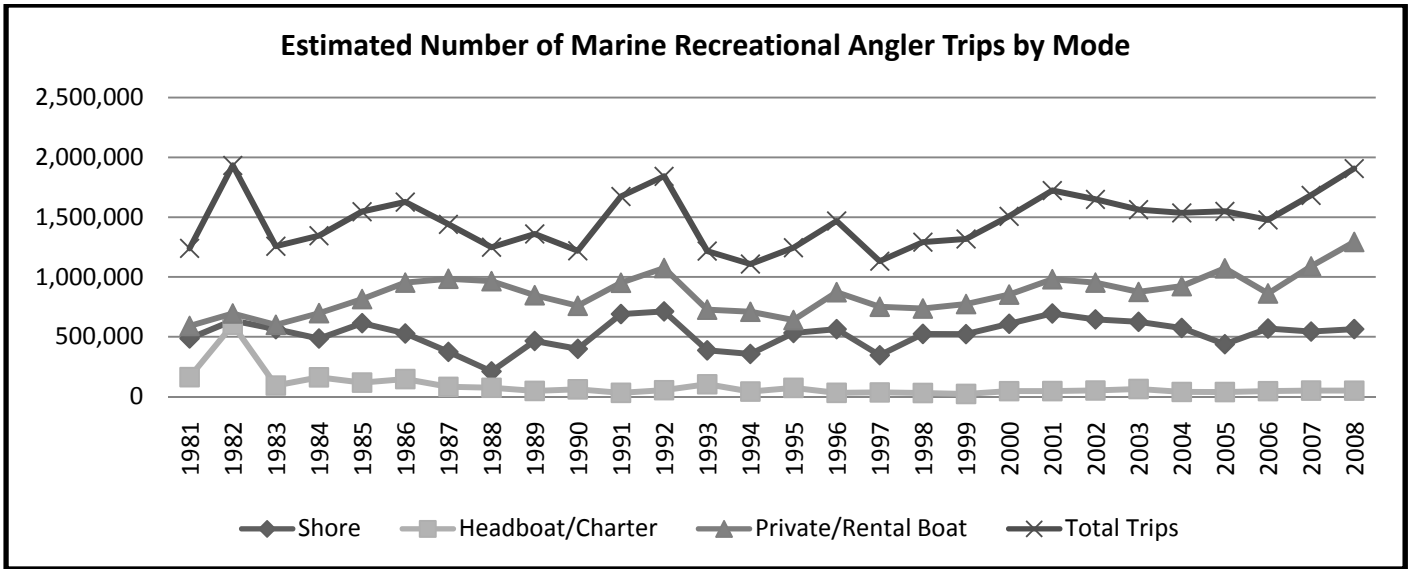


Table 1.5

MRFSS Connecticut Bluefish Estimates 1981-2008 (Numbers of Fish)						Weight Estimates are for Catch Type A + B1 only.	
Year	TOTAL CATCH (TYPE A + B1 + B2)	PSE		HARVEST (TYPE A + B1)	PSE	Weight (lbs.)	PSE
1981	3,691,115	15.9		3,355,092	16.3	4,359,422	28.5
1982	6,336,921	15.5		5,451,071	17.2	17,978,767	26.7
1983	1,271,742	17.0		1,207,856	17.6	2,790,060	21.2
1984	3,528,965	14.0		3,271,917	14.8	11,465,126	18.9
1985	3,461,492	14.5		3,134,579	15.5	8,127,000	22.8
1986	2,669,046	14.2		2,514,539	15.0	12,068,554	16.3
1987	2,825,617	12.4		2,534,984	13.2	8,228,747	11.3
1988	690,694	14.4		663,699	14.9	3,835,493	15.7
1989	1,598,797	15.4		1,467,939	16.6	4,568,277	12.2
1990	1,262,412	12.4		1,034,237	14.5	5,513,678	15.8
1991	2,281,586	12.2		1,729,165	14.8	5,334,949	15.1
1992	1,599,891	11.0		1,184,831	13.8	4,121,570	11.7
1993	1,086,264	8.8		825,333	10.1	4,260,187	10.8
1994	793,618	10.8		512,044	13.5	2,927,535	15.3
1995	778,903	11.3		608,269	13.4	2,817,671	16.0
1996	990,957	11.3		624,072	13.9	2,368,014	19.4
1997	812,047	11.1		518,809	14.6	1,422,862	17.5
1998	791,453	14.7		386,501	18.5	1,125,171	19.6
1999	1,184,863	12.8		440,444	15.2	910,923	20.0
2000	1,252,963	12.4		389,715	17.5	721,178	15.4
2001	2,145,658	10.4		716,477	14.1	1,242,790	11.6
2002	1,231,659	9.8		569,340	12.7	1,257,786	12.4
2003	999,697	8.8		457,759	9.9	2,022,736	11.9
2004	1,480,497	12.0		533,821	12.7	1,622,780	16.3
2005	1,406,412	12.6		417,786	13.0	1,434,983	14.0
2006	1,262,585	12.2		476,182	14.2	2,372,482	17.2
2007	1,222,424	11.2		375,064	13.1	2,273,529	15.3
2008	1,532,797	12.6		416,326	15.3	2,590,797	16.4
Mean	**1,792,538**			**1,279,209**		**4,277,252**	

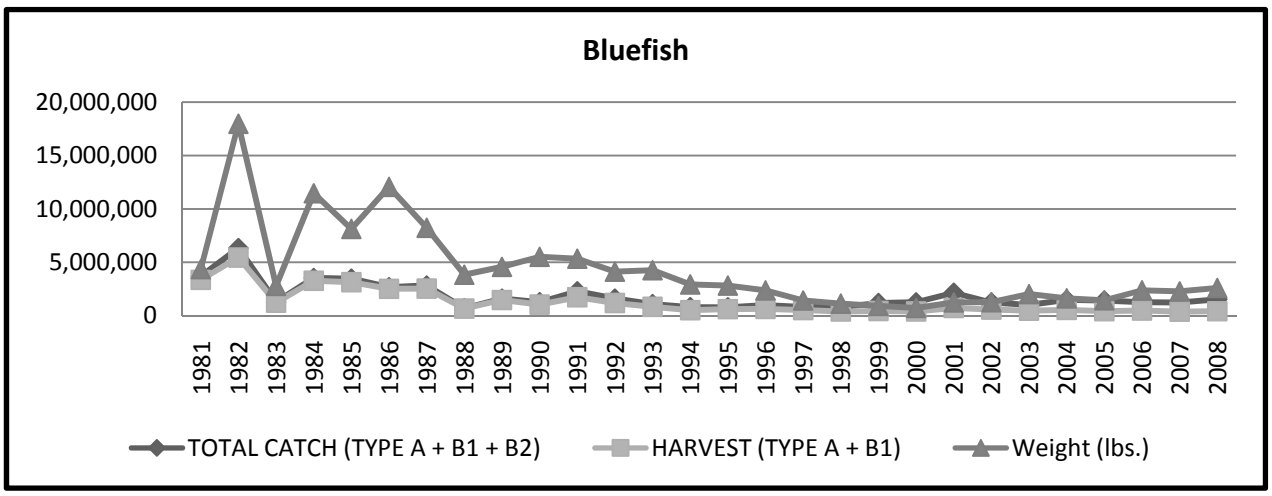


Table 1.6

MRFSS Connecticut Striped Bass Catch Estimates 1981-2008 (Numbers of Fish)						Weight Estimates are for Catch Type A + B1 only.	
Year	TOTAL CATCH (TYPE A + B1 + B2)	PSE		HARVEST (TYPE A + B1)	PSE	Weight (lbs.)	PSE
1981	27,783	40.1		11,146	35.0	34,795	37.9
1982	693,268	57.4		50,081	47.0	110,964	46.0
1983	42,826	45.3		42,826	45.3	310,798	48.5
1984	36,854	55.3		5,678	52.5	91,705	66.7
1985	42,297	32.0		15,350	70.7	41,144	66.4
1986	12,254	49.4		1,760	48.2	21,537	68.1
1987	78,957	27.5		522	60.3	13,307	78.3
1988	28,204	26.8		2,672	49.8	47,536	40.6
1989	131,147	17.7		5,777	41.6	100,688	45.8
1990	95,572	16.5		6,082	33.9	193,011	34.3
1991	306,383	41.5		4,907	39.1	125,309	41.8
1992	301,413	19.4		9,154	31.0	196,278	33.3
1993	290,571	14.1		19,253	19.4	400,067	18.8
1994	506,896	22.7		16,929	28.1	355,829	28.6
1995	545,384	29.1		38,261	22.8	671,647	24.8
1996	1,114,452	23.5		62,840	18.8	915,418	19.6
1997	787,346	17.5		64,639	18.5	920,465	19.1
1998	1,090,407	21.7		64,215	20.8	989,923	21.5
1999	759,829	20.7		55,805	27.1	824,031	27.5
2000	979,557	16.5		53,191	16.0	515,962	17.8
2001	1,161,872	14.6		54,165	14.5	628,044	17.6
2002	748,036	12.7		51,060	17.3	600,482	20.2
2003	939,020	15.1		95,983	12.1	1,251,538	14.0
2004	1,154,548	16.9		75,244	16.6	921,737	22.8
2005	1,828,506	15.0		114,965	22.8	1,643,946	24.1
2006	1,765,762	18.0		83,390	16.4	1,388,296	19.2
2007	1,941,755	16.6		109,856	15.4	1,718,924	18.9
2008	2,456,572	21.8		98,907	16.3	1,640,372	18.8
Mean	**709,553**			**43,381**		**595,491**	

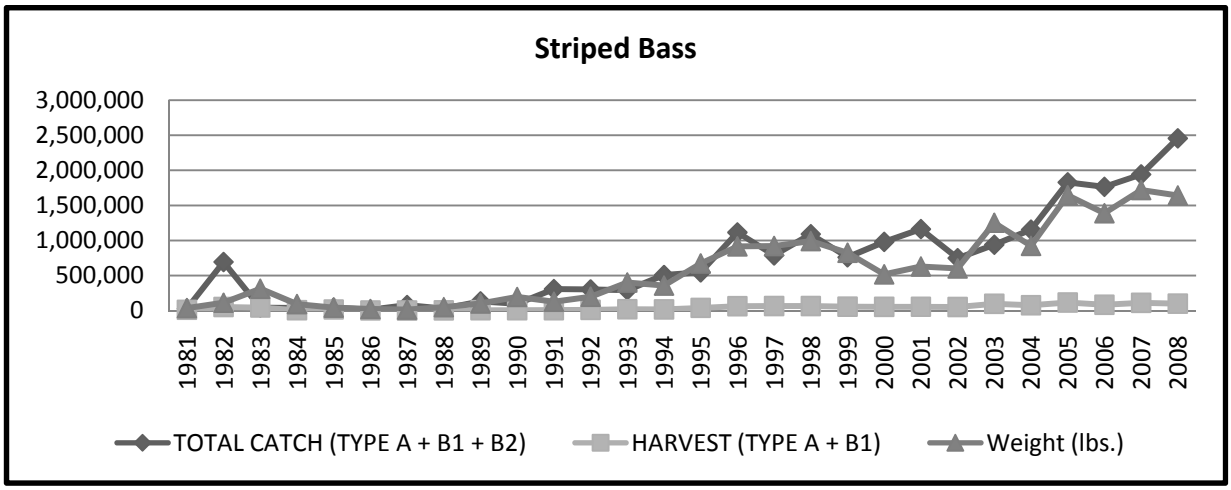


Table 1.7

MRFSS Connecticut Summer Flounder Catch Estimates 1981-2008 (Numbers of Fish)						Weight Estimates are for Catch Type A + B1 only.	
Year	TOTAL CATCH (TYPE A + B1 + B2)	PSE		HARVEST (TYPE A + B1)	PSE	Weight (lbs.)	PSE
1981	95,841	32.0		76,170	38.1	84,482	55.4
1982	253,861	40.1		133,730	56.3	222,477	65.1
1983	669,914	26.6		576,160	29.7	499,022	29.6
1984	596,829	18.4		319,804	18.5	419,046	20.5
1985	214,855	24.7		187,698	26.7	338,622	26.7
1986	916,441	20.0		482,616	29.6	774,630	29.0
1987	377,229	13.4		217,530	16.5	433,673	17.9
1988	120,519	17.2		80,534	22.4	169,692	22.8
1989	44,541	26.5		28,314	37.3	97,430	39.1
1990	56,352	21.0		17,707	31.0	30,917	30.1
1991	115,571	17.0		65,545	22.5	141,321	29.2
1992	237,873	14.3		109,418	18.1	191,611	18.5
1993	142,205	15.4		77,216	19.2	128,594	20.3
1994	493,011	12.8		316,007	16.1	474,994	16.5
1995	364,594	13.3		188,531	16.9	303,000	17.9
1996	612,371	11.5		282,054	14.5	425,481	14.7
1997	674,200	15.9		243,842	18.7	362,392	18.8
1998	529,890	14.4		261,401	20.1	448,367	19.7
1999	717,740	15.7		215,311	19.1	388,651	19.6
2000	815,084	10.9		371,611	17.4	778,206	18.1
2001	558,404	11.6		152,813	15.5	450,157	16.0
2002	545,813	12.8		93,366	18.0	283,042	19.5
2003	640,583	10.9		165,808	13.8	410,708	14.1
2004	579,954	15.4		217,031	19.1	565,833	18.1
2005	1,052,589	16.4		213,131	20.7	587,308	21.6
2006	1,009,024	17.4		107,479	20.3	341,817	20.9
2007	433,038	14.7		108,528	17.7	360,322	18.0
2008	911,317	19.1		115,896	20.2	430,181	21
Mean	**492,130**			**193,759**		**362,213**	

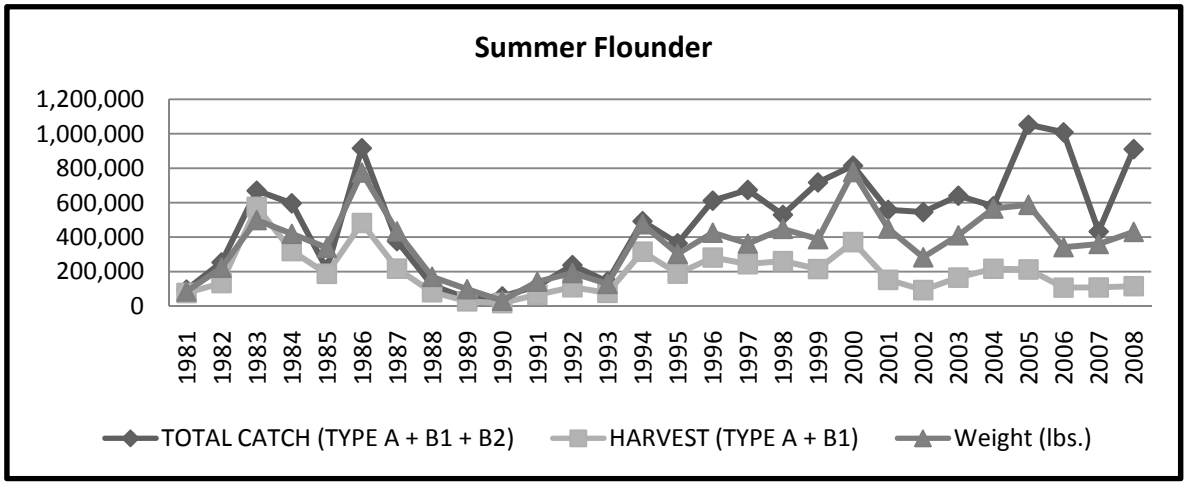


Table 1.8

MRFSS Connecticut Winter Flounder Catch Estimates 1981-2008 (Numbers of Fish)						Weight Estimates are for Catch Type A + B1 only.	
Year	TOTAL CATCH (TYPE A + B1 + B2)	PSE		HARVEST (TYPE A + B1)	PSE	Weight (lbs.)	PSE
1981	763,854	19.9		655,366	21.7	668,097	43.3
1982	1,222,655	51.2		1,044,875	59.6	905,542	63.3
1983	776,492	32.4		627,722	37.8	306,170	37.7
1984	1,325,520	16.9		1,168,713	18.7	1,220,359	18.3
1985	1,281,784	17.4		1,037,205	20.5	946,150	20.6
1986	646,885	15.1		584,858	16.5	609,506	17.0
1987	981,655	17.4		822,565	20.1	1,002,593	20.9
1988	838,014	14.7		659,841	17.8	891,997	18.4
1989	704,319	12.1		537,817	14.0	721,890	14.2
1990	572,247	24.2		417,930	31.3	434,690	33.8
1991	424,153	18.3		339,013	21.7	360,717	22.7
1992	144,845	18.9		123,382	21.3	151,419	22.2
1993	87,467	21.4		73,643	24.7	84,176	24.8
1994	93,724	24.5		68,343	30.2	99,463	30.6
1995	218,481	31.8		191,095	35.8	257,070	37.3
1996	106,086	24.8		90,130	28.6	116,961	28.4
1997	186,006	23.8		163,081	26.8	237,116	27.8
1998	320,381	26.2		235,182	33.8	275,467	33.7
1999	92,121	28.3		67,311	36.6	69,090	39.9
2000	21,653	26.8		10,211	41.1	13,953	41.1
2001	47,401	27.2		15,338	38.5	23,256	39.1
2002	25,663	29.8		16,476	35.4	25,154	35.3
2003	29,227	29.1		23,607	34.0	25,803	36.7
2004	13,442	68.5		4,080	56.8	5,181	71.9
2005	4,496	63.5		3,796	72.9	1,113	55.7
2006	31,756	34.0		7,804	54.9	9,246	55.4
2007	18,258	30.4		4,164	56.4	6,634	62.9
2008	0	0.0		0	0.0	0	0.0
Mean	**392,092**			**321,198**		**338,172**	

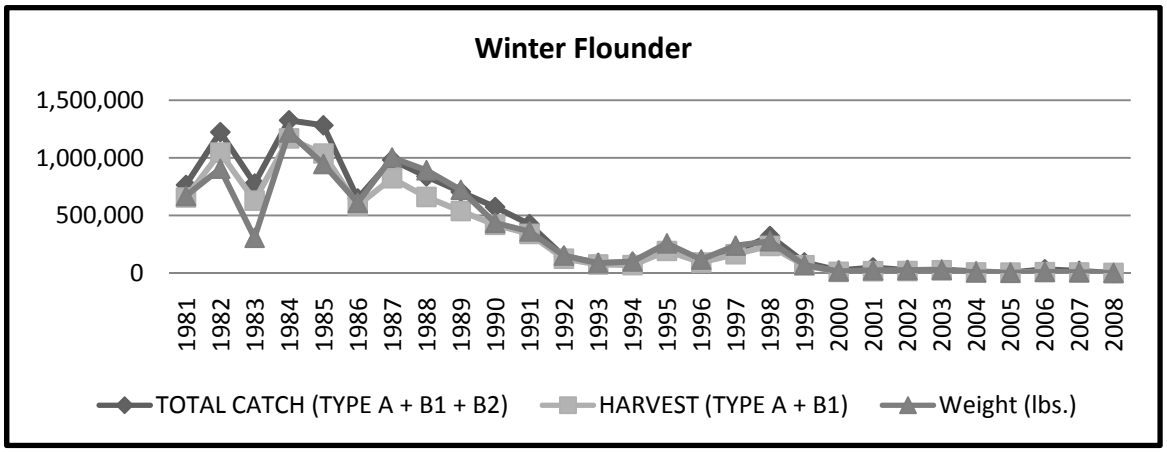


Table 1.9

MRFSS Connecticut Tautog Catch Estimates 1981-2008 (Numbers of Fish)					Weight Estimates are for Catch Type A + B1 only.	
Year	TOTAL CATCH (TYPE A + B1 + B2)	PSE	HARVEST (TYPE A + B1)	PSE	Weight (lbs.)	PSE
1981	104,088	25.0	100,308	25.8	242,336	26.1
1982	243,139	40.2	231,187	42.2	610,608	45.0
1983	281,478	37.6	200,676	44.7	458,581	57.1
1984	357,352	16.3	287,470	18.2	733,711	18.8
1985	228,329	15.8	182,318	17.6	471,185	20.4
1986	367,422	24.1	333,396	26.2	838,345	29.5
1987	359,410	18.6	312,430	20.4	1,106,606	22.0
1988	393,973	13.5	234,198	17.4	610,172	17.4
1989	425,560	12.7	303,782	16.0	1,038,217	17.9
1990	120,676	15.4	75,871	21.3	199,999	20.6
1991	326,838	17.0	191,137	22.4	648,633	23.7
1992	587,603	14.2	319,221	17.4	1,048,638	18.0
1993	263,784	15.5	180,055	18.9	531,024	20.0
1994	285,678	17.7	150,109	23.1	417,439	23.6
1995	194,995	26.1	120,259	32.5	402,617	32.4
1996	146,653	18.2	72,558	24.9	245,817	24.9
1997	99,267	23.0	32,200	42.2	84,297	40.5
1998	274,669	39.8	66,797	50.2	231,622	48.6
1999	84,125	37.8	15,701	60.5	61,142	62.7
2000	39,503	38.4	10,648	56.2	58,475	61.2
2001	75,607	35.4	16,579	53.6	63,157	54.4
2002	318,881	28.7	100,240	27.4	447,139	29.8
2003	450,398	17.3	167,875	19.2	603,862	19.4
2004	427,299	29.0	97,849	32.7	449,293	27.7
2005	218,992	19.3	74,600	25.5	306,536	26.2
2006	317,040	15.6	176,006	20.7	702,189	22.4
2007	656,689	18.5	211,327	24.3	960,086	29.0
2008	378,217	19.6	177,222	23.4	786,588	26.7
Mean	**286,702**		**158,644**		**512,797**	

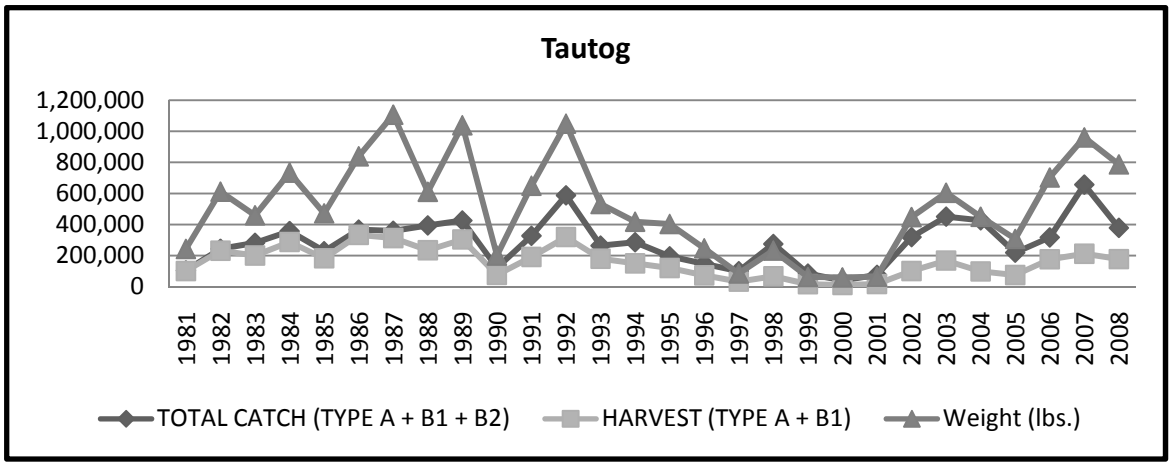


Table 1.10

MRFSS Connecticut Scup Catch Estimates 1981-2008 (Numbers of Fish)						Weight Estimates are for Catch Type A + B1 only.	
Year	TOTAL CATCH (TYPE A + B1 + B2)	PSE		HARVEST (TYPE A + B1)	PSE	Weight (lbs.)	PSE
1981	1,522,052	18.4		1,446,819	19.2	1,022,077	20.3
1982	139,343	47.2		112,094	57.4	166,923	58.8
1983	549,174	34.6		549,174	34.6	326,925	38.9
1984	421,259	26		310,869	30.6	271,177	34
1985	6,977,216	16.3		5,149,220	20.3	3,081,383	20.1
1986	6,301,365	18.8		4,847,537	23	1,840,960	23.1
1987	1,301,640	13.6		1,011,560	15.7	575,817	15.5
1988	2,139,162	12.9		1,482,643	16.6	1,070,298	16.9
1989	2,128,907	15.3		1,402,234	21	947,835	21.5
1990	855,444	25.9		656,489	33.3	405,750	45.9
1991	3,634,381	11.2		2,115,997	14.6	1,415,677	14.7
1992	2,780,816	12.5		1,703,070	16.3	1,184,920	16.4
1993	785,672	13.5		614,635	15.9	338,457	16.2
1994	282,410	23.4		249,047	25.8	210,870	27.4
1995	252,314	22.4		116,856	30.4	100,825	34.7
1996	765,277	22.3		639,222	25.3	398,327	28.6
1997	205,104	28.9		142,669	39.8	46,367	36.6
1998	356,957	23		189,812	37.2	142,715	42.9
1999	647,073	25		373,943	38	199,316	40
2000	2,242,571	13.9		1,317,689	17.7	859,580	18.2
2001	1,946,977	9.7		1,015,860	13.9	960,659	14.5
2002	1,451,339	14.4		881,696	20.5	849,461	20.8
2003	2,332,849	10.1		1,529,146	13.8	1,528,390	14.3
2004	951,611	16.3		564,262	23.2	600,394	23.5
2005	1,443,623	16.6		724,221	22.4	837,395	22.5
2006	1,252,139	17.8		519,010	28.3	732,064	28.9
2007	1,560,603	12.8		689,975	20.3	777,904	21.3
2008	1,808,111	13.2		672,094	18.2	1,045,225	20.6
Mean	**1,679,835**			**1,108,137**		**783,489**	

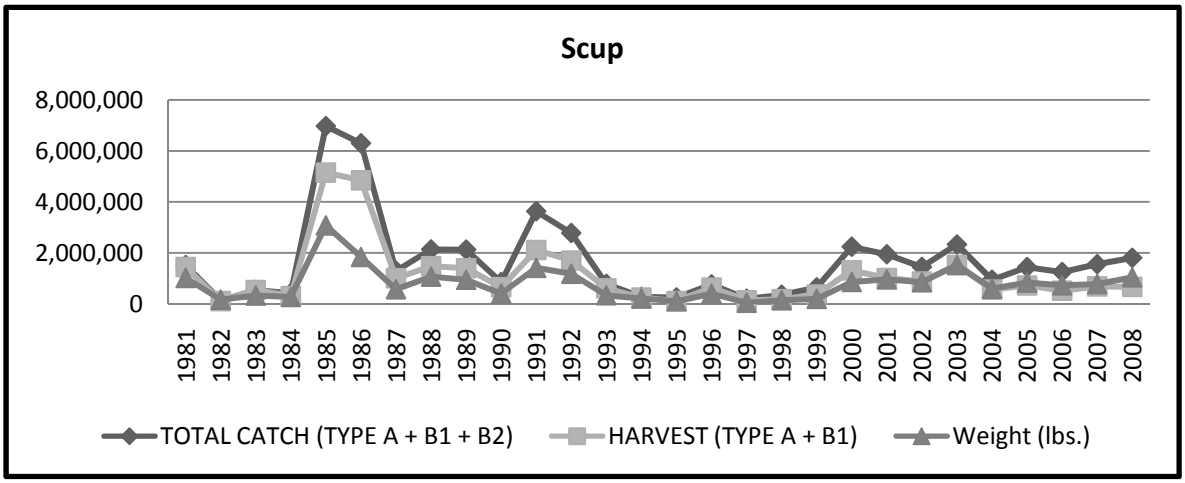


Table 1.11 A History of Connecticut Marine Recreational Fisheries Regulations for Selected Species

Striped Bass

Effective Date	Minimum Size	Daily Creel 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.	April 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing prohibited.
Aug 1985	26 in. (fork length)	None.	April 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.	April 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
April 1, 1989	34 in. (total length)	1 fish/angler.	April 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
July 1, 1989	36 in. (total length)	1 fish/angler.	April 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.	April 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.	April 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
April 22, 1994	34 in. (total length)	1 fish/angler.	April 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.	April 1-Dec 14	Dec 15-Mar 31 in all state waters.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Jul 29, 1996	28 in. (total length)	2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
May 10, 2000	24-30 in. and $\geq$ 40 in (total length) Party/Charter Only-29½ in. (total length)	1 fish/angler per length group. 2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
Feb 27, 2001	24-32 in. and $\geq$ 41 in (total length) Party/Charter Only-28 in. (total length)	1 fish/angler per length group. 2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.
May 15, 2003-Current	28 in. (total length)	2 fish/angler.	Year round.	None.	No sale; spearing and gaffing prohibited; fish must be landed intact.

Bluefish

Effective Date	Minimum Size	Daily Creel 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.
April 22, 1994-Current	None	10 fish/angler	Year round.	None.	None.

Summer Flounder (Fluke)

Effective Date	Minimum Size	Daily Creel Limit	Fishing Season	Closed Season/Area	Other Restrictions
Jan 1, 1982	14 in. (total length)	None.	Year round.	None.	None.
April 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).
July 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).
April 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	April 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).
April 30, 2006	18 in. (total length)	6 fish/angler	April 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).
April 2, 2007	18 in. (total length)	5 fish/angler	April 30-Sep 5.	Sep 6-April 29 in all state waters.	On the water fillets must meet minimum length or be accompanied by legal sized rack (carcass).
April 5, 2008-Current	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).

Winter Flounder

Effective Date	Minimum Size	Daily Creel 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.
April 22, 1994	11 in. (total length)	8 fish/angler	April 15-Feb 28.	Mar 1-Apr 14 in all state waters.	None.
Oct 1, 1995	12 in. (total length)	8 fish/angler	April 15-Feb 28.	Mar 1-April 14 in all state waters.	None.
Jan 1, 1996	12 in. (total length)	8 fish/angler	Year round.	None.	None.
Aug 1, 2005-Current	12 in. (total length)	10 fish/angler	Apr 1-May 30.	June 1-Mar 31.	None.

Black Sea Bass

Effective Date	Minimum Size	Daily Creel 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.
June 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.
August 05, 2004	12 in. (total length)	25 fish/angler	Jan 1-Sep 7 and Sep 22-Nov 30.	Sep 8-Sep 21 and Dec 1-Dec 31 in all state waters.	None.
May 27, 2005	12 in. (total length)	25 fish/angler	Jan 1-Nov 30.	Dec 1-Dec 31.	None.
April 30, 2006 - Current	12 in. (total length)	25 fish/angler	Year Round.	None.	None.

Scup (Porgy)

Effective Date	Minimum Size	Daily Creel 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	June 3-Oct 23.	Oct 24-June 2 in all state waters.	None.

Scup (Porgy, Cont.)

Effective Date	Minimum Size	Daily Creel Limit	Fishing Season	Closed Season/Area	Other Restrictions
June 19, 2002	10 in. (total length)	50 fish/angler	July 13-Sep 25.	Sep 26-July 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	July 23-Oct 12 and Nov 1-Dec 31.	Jan 1-July 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	July 1-Oct 31. Sep 1-Oct 31.	Nov 1-June 30 in all state waters.	None.
April 30, 2006	10 ½ in. (total length)	25 fish/angler Party/charter boats *only* – 60 fish/angler	June 1-Oct 31. Sep 1-Oct 31.	Nov 1-May 31 in all state waters.	None.
April 4, 2008-Current Party/charter boats	10 ½ in. (total length) 11 in. (total length)	10 fish/angler 10 fish/angler Party/charter boats – 45 fish/angler	June 1-Sep 26. June 12-Aug 31. Sep 1-Oct 15.	Sep 27-May 31 in all state waters. Oct 16-June 13 in all state waters.	None.

Tautog (Blackfish)

Effective Date	Minimum Size	Daily Creel 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.
July 29, 1996	14 in. (total length)	4 fish/angler	June 15-Apr 30.	May 1-June 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-June 14 and Nov 24-Dec 31 in all state waters.	None.
Feb 27, 2004	14 in. (total length)	4 fish/angler	Jan 1-April 30, June 15-Sep 7 and Sep 22 –Dec 13.	May 1-June 14, Sep 8 – Sep 21 and Dec 14-Dec 31 in all state waters.	None.

Tautog (Blackfish, Cont.)

Jan 4, 2008-Current	14 in. (total length)	4 fish/angler	Jan 1-April 30.	May 1-Jun 30 31 in all state waters..	None.
		2 fish/angler	July 1-Aug 31.	Sep 1–Sep 30 in all state waters.	
		4 fish/angler	Oct 1- Sep Dec 6.	Dec 7-Dec 31 in all state waters.	

Weakfish

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

Hickory Shad

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

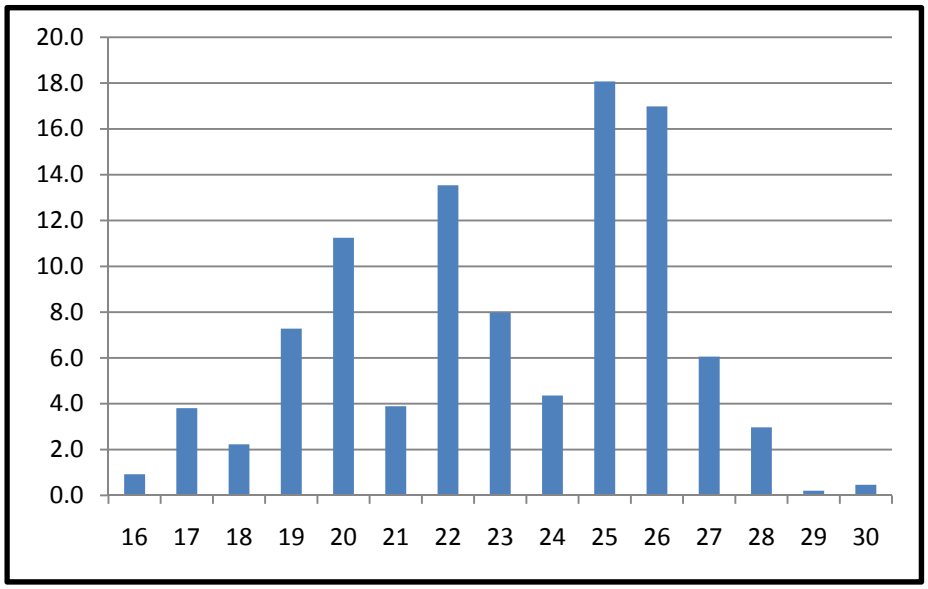
Gear Restrictions

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

Table 1.12 MRFSS Length Frequencies for Selected Marine Recreational Species

Bluefish

Fork Length in Inches	% Dist.
16	0.9
17	3.8
18	2.2
19	7.3
20	11.3
21	3.9
22	13.5
23	8.0
24	4.4
25	18.1
26	17.0
27	6.1
28	3.0
29	0.2
30	0.5



Striped Bass

Fork Length in Inches	% Dist.
26	0.1
27	9.8
28	18.3
29	5.0
30	9.2
31	2.0
33	5.7
34	1.9
36	7.4
37	11.1
38	11.1
39	12.9
40	1.9
41	1.9
42	1.9
46	0.1

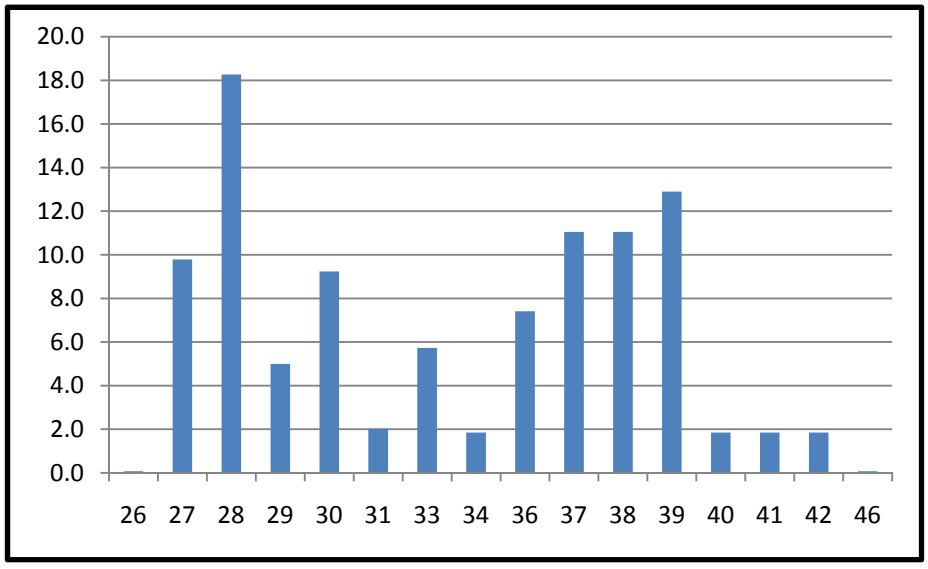
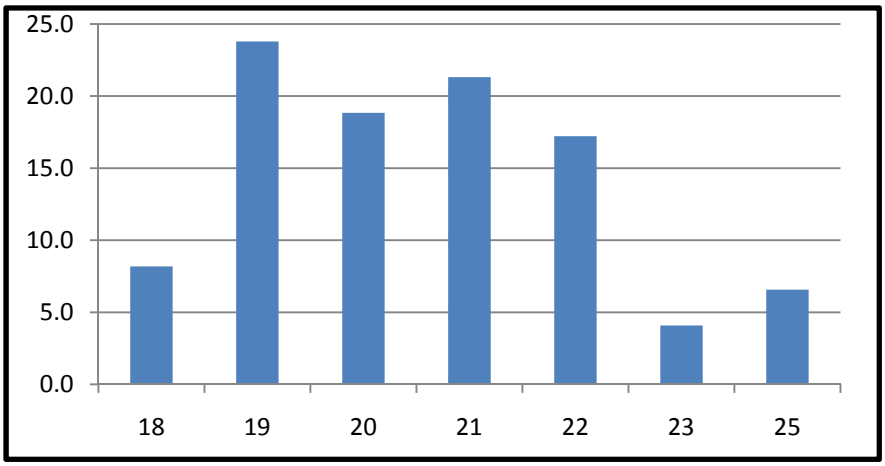


Table 1.12 - Continued

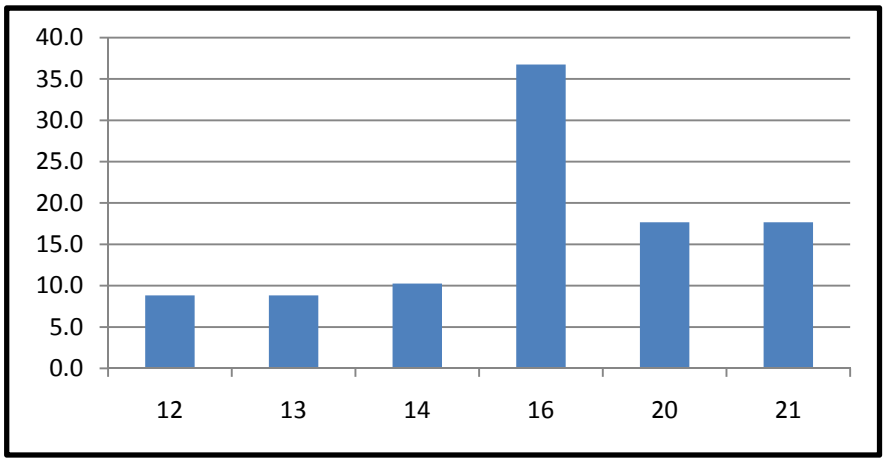
Summer Flounder

Fork Length in Inches	% Dist.
18	8.2
19	23.8
20	18.8
21	21.3
22	17.2
23	4.1
25	6.6



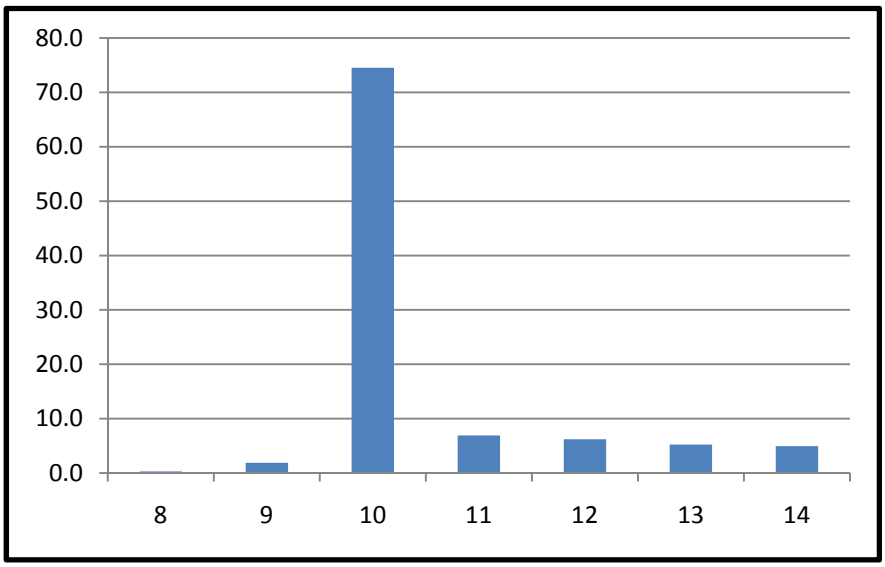
Tautog

Fork Length in Inches	% Dist.
12	8.8
13	8.8
14	10.3
16	36.8
20	17.7
21	17.7



Scup

Fork Length in Inches	% Dist.
8	0.3
9	1.9
10	74.5
11	6.9
12	6.2
13	5.2
14	5.0



PART 2: VOLUNTEER ANGLER SURVEY

PART 2: VOLUNTEER ANGLER SURVEY

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PART 2: VOLUNTEER ANGLER SURVEY

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

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 and released for popular species are listed in Tables 1.1A-1.2A.

INTRODUCTION

The purpose of the Volunteer Angler Survey (VAS) is to supplement the National Marine Fisheries Service, Marine Recreational Fishery Statistics Survey 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 2008.

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 (creeled) 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 soft insulated lunch cooler in addition to updates of survey results. 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 DEP'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 freshwater licenses in addition to being circulated by bait and tackle shops and other entities.

VAS 2008

In 2008, a total of 65 anglers participated in the survey. Those 65 anglers took 1,215 fishing trips. Volunteers including additional anglers involved in a fishing party made a total of 2,641 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 79% of the total trips taken. The percent of successful trips, where at least one fish of any species was caught, was 92% for boat anglers and 74% 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 and discarded (released) fish are listed in figures 1.1A-1.2A.

Bluefish

VAS participants made 1,253 targeted bluefish trips (boat and shore modes combined) and recorded a total of 3,753 adult bluefish caught (bluefish >12 inches). Of the total number of targeted trips, only 12% were unsuccessful. The overall catch including trips not targeting bluefish was 4,219 fish. Of the overall catch, anglers measured 2,017 adult bluefish (48%) and released about 85%. The 50^{th} percentile length measurement for bluefish was approximately 23.5 inches (total length). The targeted catch-per-unit-of-effort (CPUE) was 3.0 and 0.4 fish per angler trip for total and creeled catches.

Striped bass

Volunteers made 1,794 trips targeting striped bass and caught a total of 3,158 fish (overall catch including trips not targeting striped bass was 3,192 fish). About 14% or 250 trips targeting striped bass were unsuccessful. Of the overall catch, about 95% of the catch was released. VAS anglers measured 2,090 striped bass (66% of the overall catch). Legal size striped bass ($\geq$ 28 inches) comprised about 17% of the measured catch. The percent of legal size striped bass released was estimated at 68%. The 50^{th} percentile length measurement for striped

bass was about 23 inches. Striped bass ranged in length from as small as 7 inches to 48 inches. Targeted CPUE was 1.8 and 0.09 fish per angler trip for total and creeled catches.

Summer flounder

A total of 634 fishing trips were directed toward catching 1,488 summer flounder. Only 6% of the trips targeting summer flounder were unsuccessful. The overall catch was 1,573 fish. Volunteers measured 1,126 fish or about 73% of the overall catch. Approximately 80% of the overall catch was released. About 71% of the measured catch was comprised of fish less than the legal length limit of 19.5 inches. VAS anglers released 14% of summer flounder measuring 19.5 inches and greater. The 50th percentile length measurement for summer flounder was about 17 inches. Length measurements ranged from 8.5 to 29 inches. Summer flounder targeted CPUE was 2.4 and 0.46 fish per angler trip for total and creeled catches.

Winter flounder

Volunteers made 86 trips that targeted winter flounder. These targeted trips produced just 136 fish. The overall catch including non-targeted trips was 146 winter flounder. Of the total trips targeting winter flounder, 20% of the trips were unsuccessful. Of the overall catch, 75 or 51% of winter flounder were measured. Anglers released about 35% of the overall catch and about 13% of the measured catch were sub-legal in size (<12 inches). Anglers released 24% of legal sized fish ($\geq$12 inches). The 50th percentile length measurement for winter flounder was about 13 inches. Length measurements ranged from 9 to 22 inches. Winter flounder targeted CPUE was 1.6 and 1.0 fish per angler trip for total and creeled catches.

Scup

Volunteers made 110 targeted trips for scup producing a total of 803 fish. Of the total trips targeting scup, only 3% of the trips were unsuccessful. The overall total catch was 1,284 fish. Volunteers measured about 57% (726 fish) of the overall total catch. Of the overall total catch, 78% were released. Sub-legal fish (<10.5 inches) comprised 53% of the measured catch. The proportion of legal sized fish ($\geq$10.5 inches) released by anglers was approximately 40%. The 50th percentile length measurement for scup was about 10 inches. Length measurements ranged from as little as 3.5 inches to 18 inches. Scup targeted CPUE was 7.3 and 1.6 fish per angler trip for total and creeled catches.

Tautog

VAS anglers made 132 trips that targeted tautog and caught a total of 486 fish. Of the total trips targeting tautog, 6% of the trips were unsuccessful. The overall total catch was 504 fish. Volunteers measured 379 tautog or about 75% of the overall total catch. About 30% of the measured catch was less than the legal size of 14 inches. Of the legal size measured catch, approximately 36% were released. The 50th percentile length measurement for tautog was about 15 inches. Length measurements ranged from 4 to 25 inches. Tautog targeted CPUE was 3.7 and 1.4 fish per angler trip for total and creeled catches.

Weakfish

There were insufficient weakfish catch data for analysis. Although 25 trips targeted weakfish, only two fish were recorded and were caught incidentally.

Black sea bass

VAS angler took 70 trips targeting black sea bass catching 125 fish. However, the overall catch was 317 black sea bass. Of the overall total catch, 32% were released. Volunteers measured 244 fish or 77% of the overall total catch. Of the measured catch, 67% caught were below the 12 inch legal length limit. The 50th percentile length measurement for black sea bass was about 9.5 inches and the percent of legal size fish released was 32%. Black sea bass targeted CPUE was 1.8 and 0.3 fish per angler trip for total and creeled 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 intercept surveys. The VAS program provides this information which is essential in assessing the recreational fishery. VAS data is also used in monitoring and assessing the recreational striped bass fishery in Connecticut as required through the Atlantic States Marine Fisheries Commission. Furthermore, VAS data is now being used in bluefish, summer flounder, winter flounder and weakfish stock assessments and will most likely be involved in other species as well. 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, DEP, Marine Fisheries Office, P.O. Box 719, Old Lyme CT 06371.

MODIFICATIONS

None.

ACKNOWLEDGMENTS

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

Table 1.1A: Bluefish (12> inches) Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Bluefish (12>inches)		
	Freq	%Freq	%Cum
13	11	0.5	0.5
14	37	1.8	2.3
15	46	2.3	4.6
16	68	3.4	8.0
17	80	4.0	12.0
18	128	6.3	18.3
19	81	4.0	22.3
20	114	5.7	28.0
21	129	6.4	34.4
22	136	6.7	41.1
23	104	5.2	46.3
24	189	9.4	55.6
25	143	7.1	62.7
26	162	8.0	70.8
27	117	5.8	76.6
28	115	5.7	82.3
29	81	4.0	86.3
30	49	2.4	88.7
31	47	2.3	91.0
32	43	2.1	93.2
33	24	1.2	94.4
34	28	1.4	95.7
35	18	0.9	96.6
36	15	0.7	97.4
37	10	0.5	97.9
38	14	0.7	98.6
39	1	0.0	98.6
40 & >	27	1.3	100.0
Total	2,017		

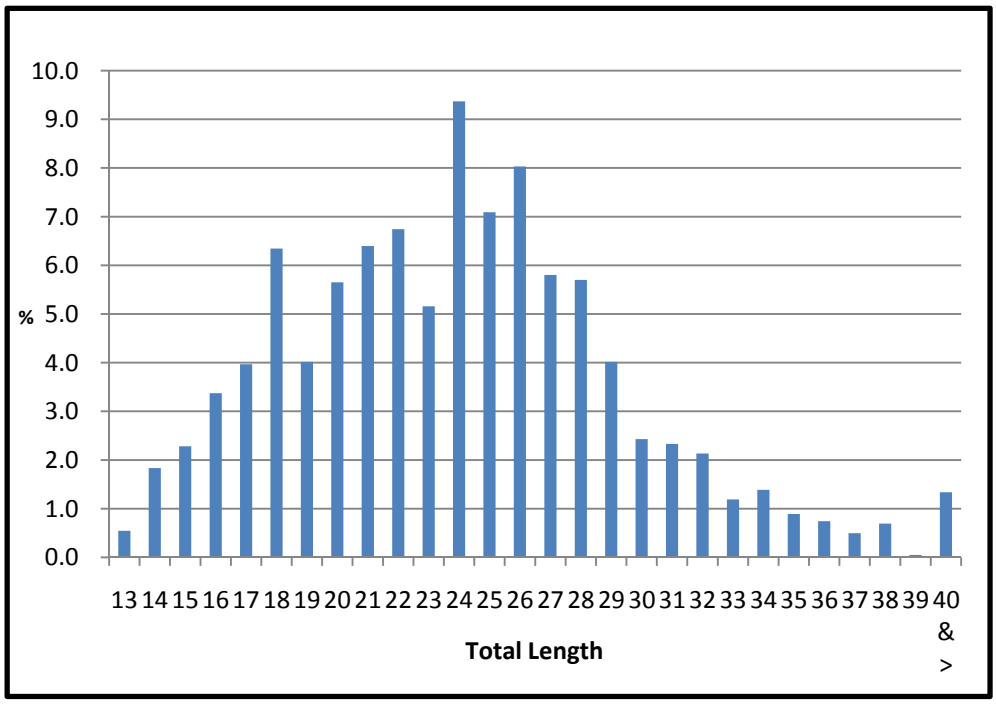

Table 1.2A: Striped Bass Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Striped Bass Freq	%Freq	%Cum	Total Length (inches)	Freq	%Freq	%Cum
< or = 5	0	0.0	0.0	**29**	81	3.9	86.8
6	0	0.0	0.0	**30**	49	2.3	89.1
7	1	0.0	0.0	**31**	47	2.2	91.4
8	12	0.6	0.6	**32**	43	2.1	93.4
9	1	0.0	0.7	**33**	24	1.1	94.6
10	22	1.1	1.7	**34**	28	1.3	95.9
11	3	0.1	1.9	**35**	18	0.9	96.8
12	34	1.6	3.5	**36**	15	0.7	97.5
13	11	0.5	4.0	**37**	10	0.5	98.0
14	37	1.8	5.8	**38**	14	0.7	98.7
15	46	2.2	8.0	**39**	1	0.0	98.7
16	68	3.3	11.2	**40**	4	0.2	98.9
17	80	3.8	15.1	**41**	2	0.1	99.0
18	128	6.1	21.2	**42**	6	0.3	99.3
19	81	3.9	25.1	**43**	6	0.3	99.6
20	114	5.5	30.5	**44**	5	0.2	99.8
21	129	6.2	36.7	**45**	2	0.1	99.9
22	136	6.5	43.2	**46**	0	0.0	99.9
23	104	5.0	48.2	**47**	1	0.0	100.0
24	189	9.0	57.2	**48**	1	0.0	100.0
25	143	6.8	64.1	**49**	0	0.0	100.0
26	162	7.8	71.8	**50**	0	0.0	100.0
27	117	5.6	77.4	Total	2,090		
28	115	5.5	82.9				

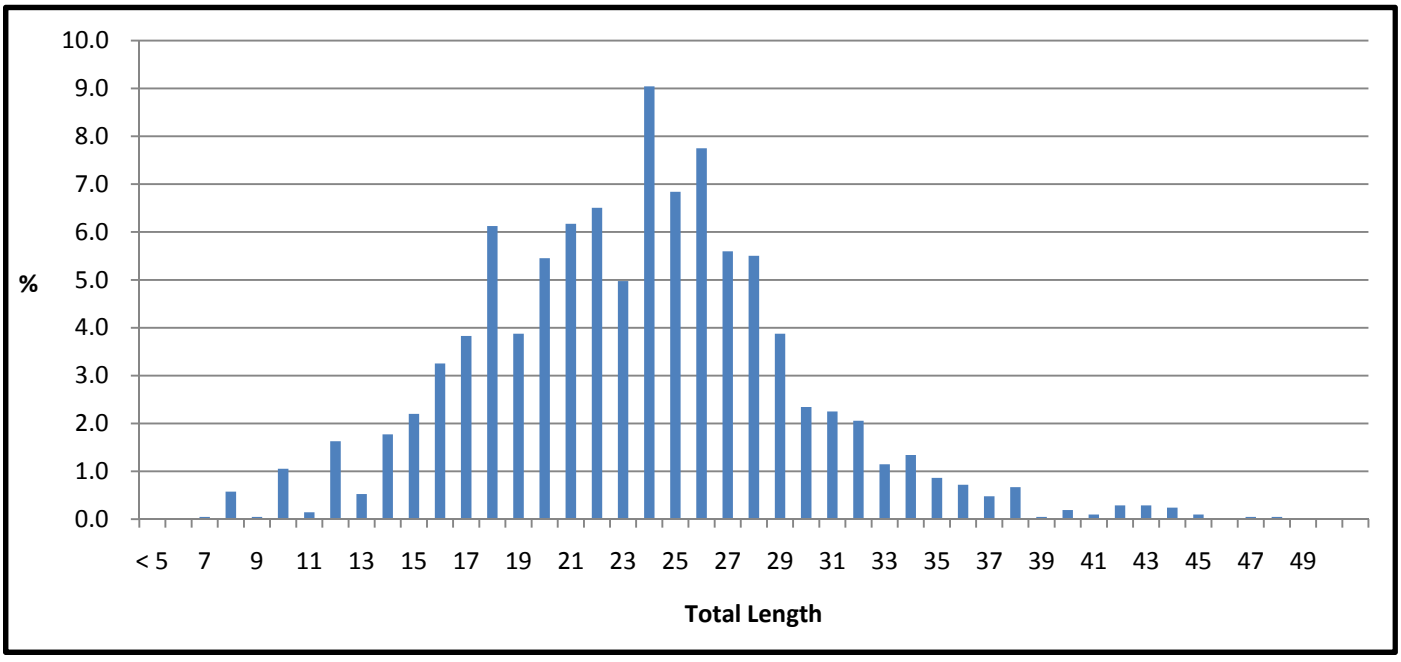

Table 1.3A: Summer Flounder Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Summer Flounder		
	Freq	%Freq	%Cum
< 8	0	0.0	0.0
9	1	0.1	0.1
10	3	0.3	0.4
11	5	0.4	0.8
12	37	3.3	4.1
13	64	5.7	9.8
14	111	9.9	19.6
15	123	10.9	30.6
16	143	12.7	43.3
17	98	8.7	52.0
18	118	10.5	62.4
19	95	8.4	70.9
20	96	8.5	79.4
21	60	5.3	84.7
22	65	5.8	90.5
23	50	4.4	94.9
24	29	2.6	97.5
25	8	0.7	98.2
26	11	1.0	99.2
27	4	0.4	99.6
28	2	0.2	99.7
29	3	0.3	100.0
30	0	0.0	100.0
Total	1,126		

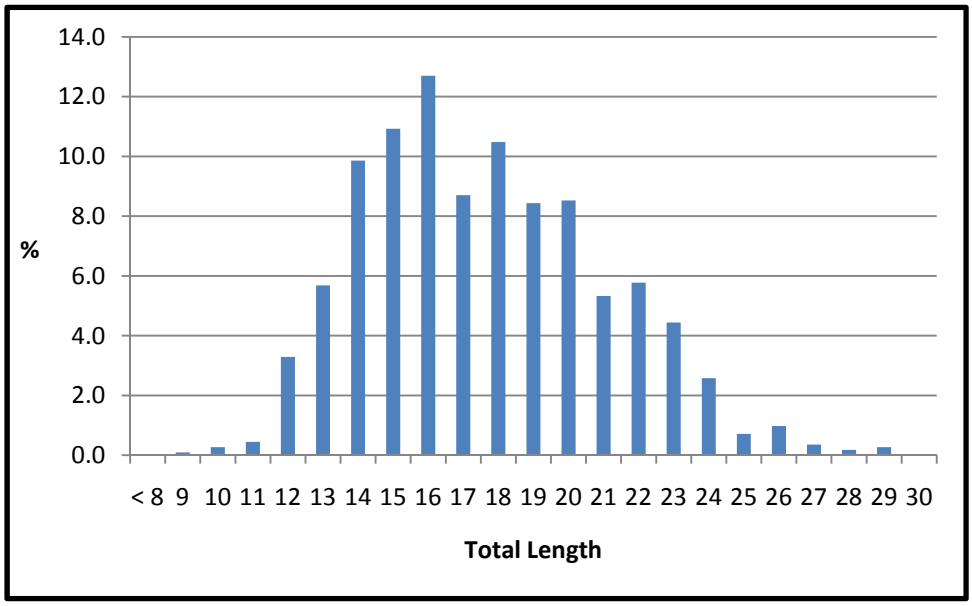

Table 1.4A: Winter Flounder Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Winter Flounder		
	Freq	%Freq	%Cum
< 8	0	0.0	0.0
9	1	1.3	1.3
10	2	2.7	4.0
11	7	9.3	13.3
12	5	6.7	20.0
13	24	32.0	52.0
14	18	24.0	76.0
15	11	14.7	90.7
16	6	8.0	98.7
17	0	0.0	98.7
18	0	0.0	98.7
19	0	0.0	98.7
20	0	0.0	98.7
21	0	0.0	98.7
22	1	1.3	100.0
Total	75	100	

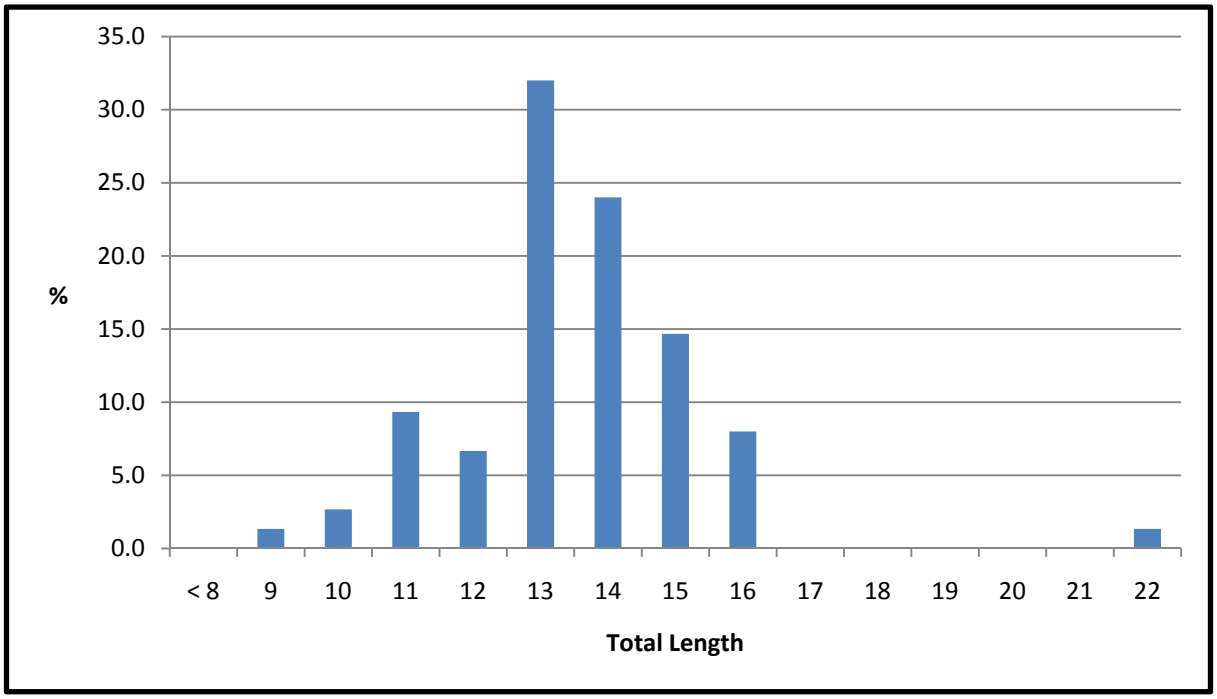

Table 1.5A: Scup Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Scup		
	Freq	%Freq	%Cum
< 4	3	0.4	0.4
5	7	1.0	1.4
6	20	2.8	4.1
7	22	3.0	7.1
8	68	9.4	16.5
9	84	11.6	28.1
10	180	24.8	52.9
11	169	23.3	76.2
12	88	12.1	88.3
13	42	5.8	94.1
14	21	2.9	97.0
15	13	1.8	98.7
16	7	1.0	99.7
17	1	0.1	99.8
18	1	0.1	100.0
Total	726		

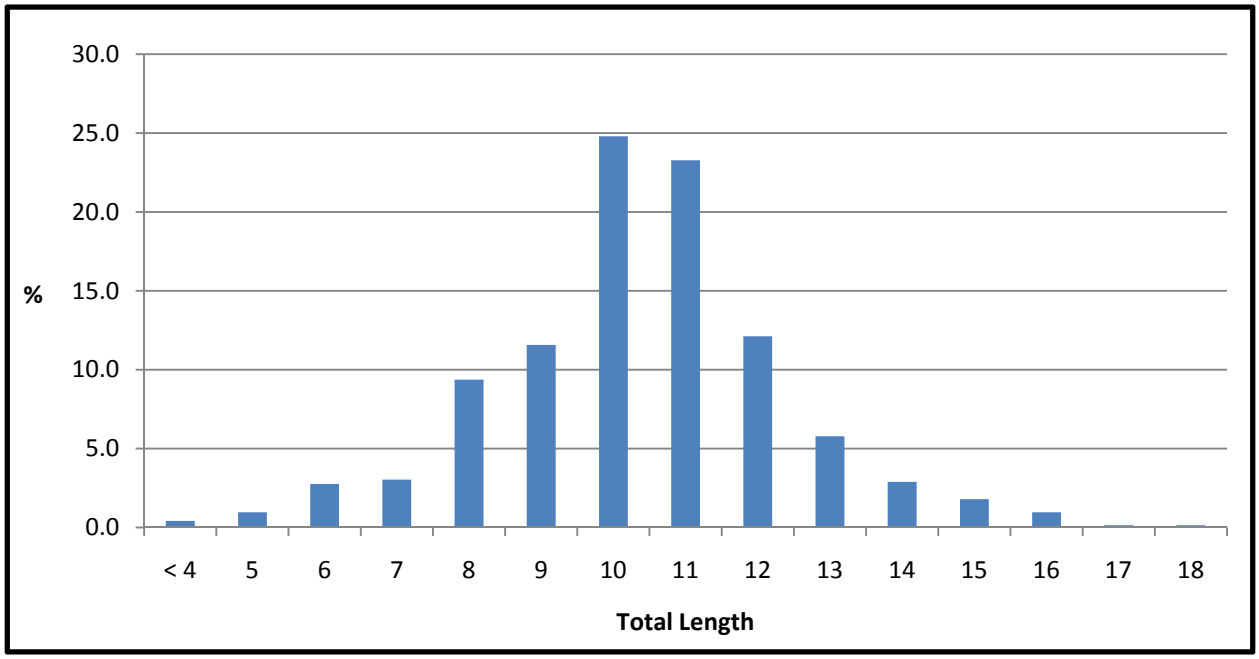

Table 1.6A: Tautog Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Tautog		
	Freq	%Freq	%Cum
< or = 7	3	0.8	0.8
8	4	1.1	1.9
9	6	1.6	3.4
10	12	3.2	6.6
11	20	5.3	11.9
12	27	7.1	19.0
13	42	11.1	30.1
14	41	10.8	40.9
15	46	12.1	53.0
16	37	9.8	62.8
17	33	8.7	71.5
18	33	8.7	80.2
19	21	5.5	85.8
20	16	4.2	90.0
21	20	5.3	95.3
22	7	1.8	97.1
23	6	1.6	98.7
24	2	0.5	99.2
25	3	0.8	100.0
Total	379		

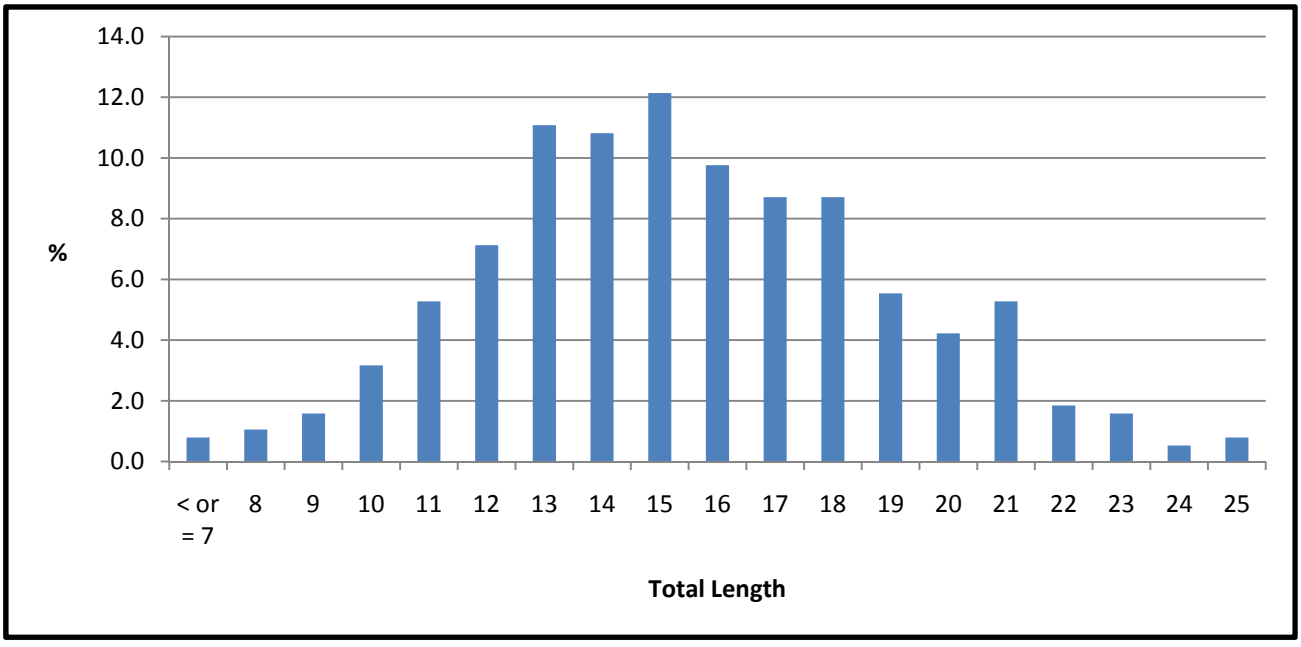

Table 1.7A: Black Sea Bass Length Frequency Distribution, 2008

Total Length (inches)	2008 Measurement Data Black Sea Bass		
	Freq	%Freq	%Cum
4	8	3.3	3.3
5	13	5.3	8.6
6	12	4.9	13.5
7	11	4.5	18.1
8	26	10.7	28.7
9	31	12.7	41.4
10	37	15.2	56.6
11	25	10.2	66.8
12	32	13.1	79.9
13	19	7.8	87.7
14	16	6.6	94.3
15	8	3.3	97.6
16	3	1.2	98.8
17	1	0.4	99.2
18	1	0.4	99.6
19	1	0.4	100.0
20	0	0.0	100.0
Total	244		

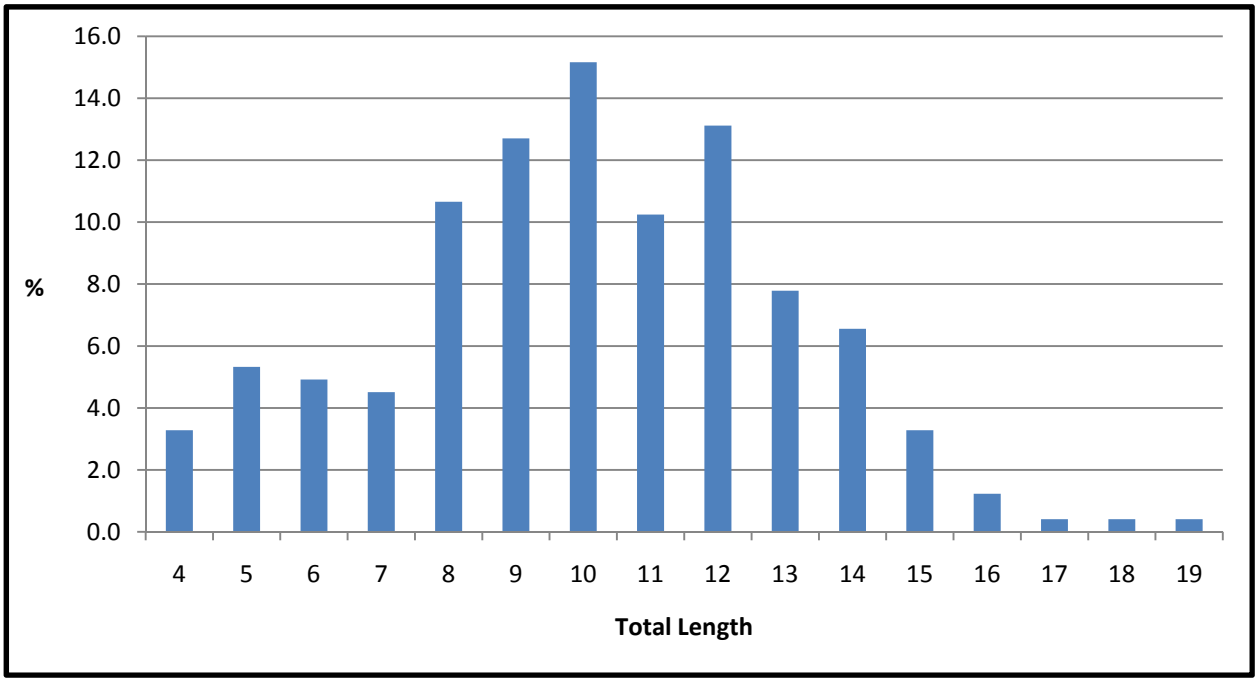

Table 1.8A: Catch Trip Frequency Distribution of Creeled Fish for Selected Species, 2008

Bluefish (12 in. >)		
# of Fish	# of Trips	% Distr.
0	313	66.0%
1	105	22.2%
2	19	4.0%
3	12	2.5%
4	8	1.7%
5	9	1.9%
6	4	0.8%
7	1	0.2%
8	2	0.4%
9	0	0.0%
10	1	0.2%
Total	474	100%

Striped Bass		
# of Fish	# of Trips	% Distr.
0	410	84.5%
1	59	12.2%
2	15	3.1%
3	0	0.0%
4	1	0.2%
Total	485	100%

Summer Flounder		
# of Fish	# of Trips	% Distr.
0	144	59.3%
1	66	27.2%
2	17	7.0%
3	11	4.5%
4	3	1.2%
5	2	0.8%
Total	243	100%

Winter Flounder		
# of Fish	# of Trips	% Distr.
0	7	25.9%
1	8	29.6%
2	4	14.8%
3	3	11.1%
4	3	11.1%
8	1	3.7%
10	1	3.7%
Total	27	100%

Scup		
# of Fish	# of Trips	% Distr.
0	103	64.8%
1	22	13.8%
2	13	8.2%
3	4	2.5%
4	7	4.4%
5	5	3.1%
6	2	1.3%
7	1	0.6%
8	1	0.6%
9	0	0.0%
10	1	0.6%
Total	159	100%

Tautog		
# of Fish	# of Trips	% Distr.
0	20	35.1%
1	12	21.1%
2	9	15.8%
3	8	14.0%
4	8	14.0%
Total	57	100%

Black Sea Bass		
# of Fish	# of Trips	% Distr.
0	72	80.0%
1	15	16.7%
2	2	2.2%
3	1	1.1%
Total	90	100%

Table 1.9A: Catch Trip Frequency Distribution of Released Fish for Selected Species, 2008

Bluefish (12 in. >)		
# of Fish	# of Trips	% Distr.
0	88	18.6%
1	134	28.3%
2	74	15.6%
3	37	7.8%
4	24	5.1%
5	17	3.6%
6	15	3.2%
7	10	2.1%
8	16	3.4%
9	6	1.3%
10	9	1.9%
11	6	1.3%
12	4	0.8%
13	5	1.1%
14	5	1.1%
15	1	0.2%
16	1	0.2%
17	2	0.4%
18	5	1.1%
19	1	0.2%
20	0	0.0%
21	1	0.2%
22	0	0.0%
23	1	0.2%
24	2	0.4%
25	1	0.2%
26	1	0.2%
27	1	0.2%
28	1	0.2%
35	1	0.2%
40	1	0.2%
42	1	0.2%
47	1	0.2%
54	1	0.2%
Total	473	100%

Striped Bass		
# of Fish	# of Trips	% Distr.
0	65	13.5%
1	175	36.4%
2	61	12.7%
3	39	8.1%
4	29	6.0%
5	21	4.4%
6	19	4.0%
7	10	2.1%
8	9	1.9%
9	8	1.7%
10	3	0.6%
11	5	1.0%
12	2	0.4%
13	8	1.7%
14	4	0.8%
15	5	1.0%
16	4	0.8%
17	3	0.6%
18	0	0.0%
19	0	0.0%
20	1	0.2%
21	2	0.4%
23	0	0.0%
24	1	0.2%
25	2	0.4%
26	0	0.0%
27	1	0.2%
28	0	0.0%
29	1	0.2%
30	0	0.0%
31	0	0.0%
32	0	0.0%
33	1	0.2%
34	0	0.0%
35	1	0.2%
39	1	0.2%
Total	481	100%

Summer Flounder		
# of Fish	# of Trips	% Distr.
0	38	15.6%
1	87	35.8%
2	34	14.0%
3	24	9.9%
4	20	8.2%
5	6	2.5%
6	5	2.1%
7	6	2.5%
8	3	1.2%
9	4	1.6%
10	2	0.8%
11	1	0.4%
12	3	1.2%
13	3	1.2%
14	2	0.8%
15	1	0.4%
16	0	0.0%
17	0	0.0%
18	2	0.8%
19	1	0.4%
20	0	0.0%
21	0	0.0%
22	1	0.4%
Total	243	100%

Winter Flounder		
# of Fish	# of Trips	% Distr.
0	13	48.1%
1	8	29.6%
2	3	11.1%
4	1	3.7%
6	2	7.4%
Total	27	100%

Table 1.9A: (Con't.): Catch Trip Frequency Distribution of Released Fish for Selected Species, 2008

Scup		
# of Fish	# of Trips	% Distr.
0	30	18.9%
1	48	30.2%
2	17	10.7%
3	11	6.9%
4	7	4.4%
5	11	6.9%
6	5	3.1%
7	5	3.1%
8	3	1.9%
9	2	1.3%
10	4	2.5%
12	3	1.9%
13	4	2.5%
14	0	0.0%
15	2	1.3%
17	0	0.0%
18	1	0.6%
19	0	0.0%
20	2	1.3%
21	1	0.6%
25	1	0.6%
26	1	0.6%
30	1	0.6%
Total	159	100%

Tautog		
# of Fish	# of Trips	% Distr.
0	8	14.0%
1	20	35.1%
2	13	22.8%
3	1	1.8%
4	7	12.3%
5	0	0.0%
6	1	1.8%
7	1	1.8%
8	1	1.8%
9	1	1.8%
10	1	1.8%
12	1	1.8%
18	1	1.8%
36	1	1.8%
Total	57	100%

Black Sea Bass		
# of Fish	# of Trips	% Distr.
0	21	23.3%
1	37	41.1%
2	15	16.7%
3	8	8.9%
4	2	2.2%
5	2	2.2%
6	3	3.3%
7	1	1.1%
8	0	0.0%
9	0	0.0%
10	1	1.1%
Total	90	100%

APPENDIX 1.1A: Connecticut Volunteer Angler Logbook

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** or at **E-Mail** address **rod.macleod@po.state.ct.us.**

(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 your mode of fishing (boat or shore).
(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 to the ***nearest ½ inch*** 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(oceanic)	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* | **X** Here 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) _ Here 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	**X** if Released	Code	Length Data	**X** 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 2008 SPRING & FALL SURVEYS

STUDY PERIOD AND AREA

The Connecticut DEP Marine Fisheries Division completed the twenty-fifth year of the Long Island Sound Trawl Survey in 2008. 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. 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 2008 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 ageing. 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 collection.

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 are measured. All individuals not measured in a length group are counted. The length frequency of each group is estimated as described above, i.e. the proportion of individuals in each centimeter interval of the subsample is expanded to determine the total number of individuals caught in the length group. The estimated length frequencies of each size group are then appended to complete the length frequency for that species. This procedure is often used with catches of bluefish, scup, and weakfish, which are usually dominated by young-of-year or discrete age/length classes.

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

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

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

Data Analysis

Indices of Abundance: Annual Mean Count and Weight per Tow

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

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

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

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

The geometric mean count per tow was calculated from 1984 - 2008 for 38 finfish species, lobster, and long-finned squid (1986 - 2008). The geometric mean weight per tow was calculated using weight data collected since 1992 for the same species, plus an additional 13 invertebrates.

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

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

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

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

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

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

- **Bluefish**. Since bluefish are not aged, modes observed in the fall length frequencies were used to separate bluefish into age 0 and age 1+ groups, and a geometric mean catch per tow was calculated for each group (Table 2.22). Comparison of the mean length-at-ages reported for young-of-year and age 1 bluefish in the New York Bight (Chiarella and Conover 1990) and Long Island Sound (Richards 1976) with LISTS length frequencies suggests that bluefish can easily be identified as either age 0 (snapper bluefish) or adults (age 1+). Richards (1976) and Chiarella and Conover (1990) determined that most bluefish less than 30 cm are age 0. A discontinuity in the LISTS fall length frequencies occurs most years between 26 cm and 39 cm (Table 2.41). 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 1984-2008 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 9,273 scup aged between 1984 and 2008 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 preceding 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, 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 2008 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). 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. An exception was made in the fall of 2008 because the fall NMFS key was unavailable at the time of analysis. In this instance, the LISTS aged fish (over 60 cm) and the 2007 fall NMFS key were pooled for calculations. Updates will be made when the NMFS 2008 fall key becomes available.

- **Tautog**. An index-at-age matrix was developed for 1984-2006 using all survey months (Gottschall and Pacileo 2007). Ageing for 2006-2008 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 and will be performed in 2009, thus the results and a current index-at-age will not be presented in this report. During the spring 2008 survey 151 tautog were collected and aged. Low catches in the fall resulted in only twenty three fish being processed.

- **Weakfish**. Age 0 and age 1+ indices were calculated for both spring and fall surveys, 1984 – 2008 (Table 2.27). Since few weakfish are taken in April, the spring geometric mean was calculated using only May and June. All weakfish taken in

- **Winter flounder**. An index-at-age matrix was developed for 1984-2008 using April and May LISTS data (Table 2.28). 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 18,771 winter flounder aged between 1984 and 2008 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 2008 Spring and Fall Surveys

The spring survey commenced on April 14th 2008 in eastern Long Island Sound aboard the R/V John Dempsey. The first site of the season proved to be a challenge after having hung on the bottom in shallow waters of Niantic, CT. No full tows were completed that day but sampling resumed on the 15th and continued for another seven days in April and one additional day on May first (total of 9 sampling days) to complete the forty tows for the April cruise. May sampling again started in the eastern Sound on May 14th and continued until the 28th of the month. The June cruise commenced on the 9th and continued until sampling was completed on Monday, June 23rd to finish up the month. Similar to April, both the May and June cruise took a total of nine sampling days each month to complete. A total of 120 LISTS tows were completed during the spring 2008 survey (Table 2.4). Fall sampling was interrupted during September because of delays in rebuilding the transmission on the R/V John Dempsey. This maintenance and rebuild included rebuilding the forward gear clutch pack, replacing the main drive dampener, and replacing the rear main seal as well as rebuilding the PTO. These items took most of the month, so the September cruise was canceled. Sampling resumed on the 10th of October and continued for 10 days of sampling which finished up on the 3rd of November. Only forty tows were completed for the fall of this year.

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 (October). These figures provide a short description if a site had to be relocated and the explanation why. During the spring cruise, only two samples were relocated and both were in April. During the fall October cruise, no sites had to be moved. Additional site/station information is provided in Table 2.5 (April), Table 2.6 (May), Table 2.7 (June), and Table 2.8 (October) including date of sample, time, tow duration, latitude/longitude, and surface and bottom temperature and salinity.

Sometimes, a full 30-minute tow cannot be completed. Typical reasons for short tows include lack of room because of observed pot gear set in the immediate area, a drop in speed due to entanglement with some object on the bottom (frequently 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 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). Typically, a minimum of 15-20 minutes is required for a LISTS tow. However, there are rare occasions when a tow with less than 15 minutes will be accepted, usually because there is no alternate site in the designated strata in the vicinity. Short tow information is summarized in Tables 2.9 (spring) and 2.10 (fall).

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 grad students associated with state or local universities. Table 2.11 illustrates many of the organizations that requested data in 2008 while Table 2.12 shows sample request received and fulfilled (each by month). In recent years many requests for samples have come from high schools, aquariums, or other educational organizations needing finfish and invertebrates for teaching purposes. Additionally, our own staff often have sample or data requests for media or other public outreach events (see job six of this report).

Number of Species Identified

Fifty-three finfish species were observed in 2008 including one new species, the feather blenny (*Hypsoblennius hentz*) (Table 2.13). From 1984 to 2008, ninety-eight (98) finfish species have been identified on the Long Island Sound Trawl Survey (Appendix 2.1), averaging 58 species per year with a range of 49 to 70 species (Fig 2.6). In addition, a total of forty-one types of invertebrates were collected in 2008 (Table 2.14). Most invertebrates are identified to species. However, in some cases, invertebrates were identified to genus or higher taxon.

Total Catch

Appendix 2.4 presents a time series (1984-2008) of the finfish species collected each year and their respective rank by numbers. Annual total biomass of invertebrates are also included in this appendix, and are ranked by weight (kg).

A total of 140,777 finfish weighing 14,239.8 kg were sampled in 2008 (Table 2.15). In seventeen out of the last twenty-five years butterfish has been the highest-ranking finfish (numbers) in LISTS, however, in the last two years scup were more abundant and accounted for 42.6% and 38.0% of the catch by number respectively. Scup also ranked first by weight in 2007 and 2008 with 30.4% and 45.7% of the total annual biomass. Fifty-three thousand five hundred and sixty (53,560) scup were taken from 160 tows this past year. Similar to 2007, butterfish were the second most abundant species caught in LISTS and this year ranked second in biomass (48,766 fish totaling 1,442.0 kg).

American sand lance were abundant in springtime catches and ranked third (7,495 fish) overall in 2008 followed by silver hake (6,587 fish), winter flounder (4,973 fish) and windowpane flounder (3,511 fish). Catches of weakfish (2,531 fish) were low this year due to lack of September samples; pushing its rank from third overall in 2007 to seventh this year. Similarly bluefish (1,699 fish) rank dropped from forth overall to ninth by number. The top five species by number accounted for 86.1% of the total annual catch and 62.7% of the total biomass in 2008. Three species; scup, butterfish, and winter flounder typically are part of the top ranking species in LISTS time series, while sand lance have not been a large component of LISTS catches since 1994 (when they were added to the list of species to be counted/weighed) and silver hake rarely ranks very high with the exception of 1999 and 2006 when it ranked sixth most abundant for both years.

Scup once again topped the spring catches with 31,052 fish accounting for 45.8% of the total and more than a half (52.6%) of the spring biomass (Table 2.16). Scup catches this spring were the third highest in the time series and the largest since the record catch of 50,651 scup in 2002. Three prominent length groups for scup were seen this past spring with modes peaking at 9-12 cm, 16-19 cm, and 21-24 cm (Table 2.48). Both American sand lance (7,429 fish) and silver hake (6,570 fish) were ranked the next most caught species in the spring of 2008. Large catches of sand lance are unusual in LISTS and sand lance were caught on only four tows this past spring with one catch of 5,603 fish accounting for 75% of the spring total for this species. Additionally, silver hake catch has only ranked in the top five species for three of the previous 24 spring surveys. Butterfish, which have most recently (last nine years) ranked either second or third in the spring dropped to fourth this season with 6,088 fish over 120 tows. Winter flounder dropped to fifth position this season with 4,586 fish (693.7 kg). Windowpane flounder were most abundant during spring sampling for the first three years of the survey, however, winter flounder ranked first for the next thirteen years straight until scup became more abundant in the catches in 2000. Flounder then fell to second position each year until 2005 when it surpassed scup once again and then dropped to third rank status in 2006 and 2007 and then dropped again to its current fifth this past season.

Catches in the fall survey have consistently been dominated by four species: butterfish, scup, weakfish, and bluefish (Table 2.16). In 2008 these four species comprised 95.2% of the total catch of finfish and 70.0% of the total fall biomass. Scup abundance and catch fell this past fall with 22,508 fish (1,145.4 kg) taken or 30.9% of the fall total count from 40 tows while butterfish abundance and catch increased to a high 58.5% of the catch from 42,678 fish (974.3 kg). In twenty-two out of the last twenty-five years butterfish have ranked first. Weakfish and bluefish comprised 3.5% and 2.3 % of the fall catch with 2,525 fish and 1,670 fish respectively. Smooth dogfish again ranked high in biomass (4th) with 332.8 kg from 89 individuals. Moonfish, windowpane flounder and winter flounder were the fifth, sixth, and seventh most abundant species by count during the fall period this year.

A total of 1,700.1 kg of invertebrates were taken in 2008 (Table 2.15). Horseshoe crab (496.8 kg), long-finned squid (330.1 kg), and American lobster (314.1 kg) were the top three species in biomass. These three species accounted for 67.1% of the biomass. One thousand ninety-six (1,096) lobsters were recorded in the 160 survey tows in 2008

along with 10,490 long-finned squid and 289 horseshoe crabs. Spider crab (145.8 kg) and rock crab (64.0 kg) were the fourth and fifth most dominant invertebrate species by weight.

The total biomass of invertebrate catch taken in the spring of 2008 was 989.9 kg (Table 2.17). American lobster had the highest biomass of 262.2 kg comprising 26.5% of the total spring weight followed by horseshoe crab with 243.5kg (24.6%) and spider crab with 131.9 kg (13.3%). Spring lobster abundance indices increased from a record low abundance of 1.94 lobsters/tow in 2006, to 3.22 lobsters/tow in 2007 and then dropped slightly this year to 2.72 lobsters/tow (Table 2.18). Springtime catches of long-finned squid made record catches in 2006 with 11.55 squid/tow, however, since then have dropped to 3.45 squid/tow this year or slightly below average (Table 2.18). Good catches of squid during the fall of the last two years however were more reminiscent of the early and mid-1990's with 179.39 squid/tow recorded in 2007 and 114.99 squid/tow in 2008 (Table 2.19). Squid (8,243) totaled 236.1 kg in the forty fall tows (Table 2.17) and accounted for 33.2% of the fall biomass, ranking number two by weight behind horseshoe crab (253.3 kg or 35.7% of the invertebrate biomass from 147 individuals). American lobster abundance, dropping to a time-series low during the fall of 2007, rose slightly to 2.07 lobsters/tow this year (Table 2.19) with 196 individuals (51.9kg) being recorded (Tables 2.17).

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 2.48-2.49), striped bass (Table 2.50-2.51), and summer flounder (Table 2.52-2.53).

Length frequencies were prepared for 21 species:

alewife	spring and fall	1989 - 2008	Table 2.29;
American shad	spring and fall	1989 - 2008	Table 2.30;
American lobster	spring and fall (M&F)	1984 - 2008	Table 2.31-Table 2.34;
Atlantic herring	spring and fall	1989 - 2008	Table 2.35;
Atlantic menhaden	fall	1996 - 2008	Table 2.36;
black sea bass	spring and fall	1987 – 2008	Table 2.37, Table2.38
blueback herring	spring and fall	1989 - 2008	Table 2.39;
bluefish	spring and fall	1984 - 2008	Table 2.40, Table 2.41;
butterfish	spring and fall	1986 - 1990, 1992 - 2008	Table 2.42;
fourspot flounder	spring and fall	1989 - 1990, 1996 - 2008	Table 2.43;
hickory shad	spring and fall	1991 - 2008	Table 2.44;
horseshoe crab	spring and fall (M&F)	1998 - 2008	Table 2.45, Table 2.46
long-finned squid	spring and fall	1986 - 1990, 1992 - 2008	Table 2.47;
scup	spring and fall	1984 - 2008	Table 2.48, Table 2.49;

striped bass	spring and fall	1984 - 2008	Table 2.50, Table 2.51;
summer flounder	spring and fall	1984 - 2008	Table 2.52, Table 2.53;
tautog	spring	1984 - 2008	Table 2.54;
weakfish	spring and fall	1984 - 2008	Table 2.55, Table 2.56;
windowpane flounder	spring and fall	1989, 1990, 1994 - 2008	Table 2.57;
winter flounder	April-May and fall	1984 - 2008	Table 2.58, Table 2.59;
winter skate	spring and fall	1995 - 2008	Table 2.60.

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 1984-2008 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 specific 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 2.7 through 2.12. These figures also include plots of each of the age specific indices and recruitment indices mentioned above. Figure 2.13 provides plots of abundance (biomass) indices for crabs (1992-2008), American lobster (1984-2008), and long-finned squid (1986-2008).

Three species attained record high abundance in Long Island Sound during 2008. Silver hake averaged 19.08 fish/tow this spring, spiking upward by an order of magnitude from near record lows just a year earlier. Silver hake abundance is currently five times higher than the twenty-five year time series mean (3.69 fish/tow). The other two species at record high abundances were moonfish (fall index of 5.08 fish/tow) and spot (fall index of 2.67 fish/tow). For both of these species, the 2008 index was sharply higher than the 2007 index and well above their respective time-series averages. Moonfish abundance was 6.5 times higher than the average (0.78 fish/tow) and spot abundance was almost 17 times the average (0.16 fish/tow). No other species had notably high abundance in 2008 and only three species; summer flounder, northern kingfish, and black sea bass had abundance in their top five rank for the series. Summer flounder increased this year to 3.09 fish/tow, which is slightly above the average since 1996 when increases in abundance for this species were first observed. With the exception of 2005 and 2006, catches of black sea bass since 2000 have been higher than normal during the springtime and the 2008 geometric mean catch of 0.22 fish/tow continues this trend, remaining about average for recent years (0.24 fish/tow since 2000). Overall abundance for bluefish (which is typically driven by young of year abundance) was very low, however, the age 1+ adult index for the fall reached 4.5 fish/tow, or 31% above the mean, and a fifth rank

(Table 2.22). Similarly, the overall fall scup index dropped from 475.3 fish/tow in 2007 to 303.3 fish/tow in 2008, and although age 2+ scup fell from 37.3 fish/tow in 2007 to 24.5 fish/tow in 2008 it remains in the top five for the time-series (Table 2.23). The age 2+ scup abundance is about average since increases were first observed in 1999. The spring index for scup typically isn't preferred for Long Island Sound, nonetheless good catches of age 2+ fish in 2008 (75.2 fish/ tow) resulted in the second highest abundance behind the unusual availability observed in 2002 (208.8 fish/tow. A few additional species have higher abundance during the non-preferred season (see Tables 2.19-2.20 for designation). Four of these species are: striped bass in the fall survey (0.44 fish/tow or 3rd highest); winter skate, also in the fall survey (0.21 fish/tow, 1st); fall northern sea robin (1.11 fish/tow, 3rd); and fall black sea bass abundance (0.93 fish/tow, 2nd); spring spotted hake abundance (3.15 fish/tow, 1st) and smooth dogfish abundance (0.87 fish/tow, 3rd). These six species were all in the top ten percent rank for their respective time series

Several species were at record low abundance or were in the lower tenth percentile for their respective time series in both the spring and fall surveys. This includes five spring species (i.e. where the spring survey provides better estimates of overall abundance): sea raven (0.00 fish/tow) was at record lows in 2008, ocean pout (0.04 fish/tow), fourbeard rockling (0.26 fish/tow), longhorn sculpin (0.01 fish/tow), and little skate (1.56 fish/tow) were in the lower 10^{th} percentile. Winter flounder (22.34 fish/tow), American lobster (2.72 lobster/tow), and winter skate (0.12 fish/tow) were also low in the spring of 2008 but recorded just above the tenth percentile. American lobster spring abundance (spring and fall are both good estimates) increased only slightly from the minimum 1.94 lobsters per tow recorded in 2006. However, LISTS fall sampling produced the third lowest American lobster abundance index (behind 2007) in the twenty-five year time series (2.07 geometric mean count per tow). Two other fall species similarly recorded low abundance in 2008, including bluefish (14.28 fish/tow, 24th) because of the lack young of year in the October samples and blueback herring (0.05 fish/tow, 23^{rd}).

Using the preferred spring index, a total of six "spring species" had increasing abundance in 2008 while fifteen species had decreasing abundance from the prior year (Table 2.19-2.20). During the fall, ten "fall species" had increasing abundance and ten had decreasing abundance from the prior year. One species remained the same for this period.

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 six 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), weakfish (Table 2.27) and winter flounder (Table 2.28). 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 2008, LISTS collected and aged 869 winter flounder for use 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. Four hundred and fifty-four (454) scup were collected and aged in 2008 for use 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).

Bluefish

A generally increasing trend in overall bluefish fall abundance in Long Island Sound was documented in LISTS from 1986 through 1999. Abundance peaked in 1999, however, since 1991 abundance indices have been more variable with changes from 15% to 55% seen from one year to the next (Table 2.19, Figure 2.7). Since the peak in 1999, abundance dropped and varied around the mean of 24.7 fish/tow for the next five years. In 2005 and 2006 abundance was below average at 18.89 fish/tow and 15.66 fish/tow respectively. A substantial increase to 30.66 fish/tow was documented in 2007 with most of that coming from an increase in snapper abundance (93%). Like weakfish, the overall bluefish index is dominated by young-of-year individuals that make up about 70% of the bluefish catch. The 2007 young-of-year index of 23.98 fish/tow is 39% above the mean. Higher abundance of age 0 fish were observed in 1997-1999, however, for the following seven years abundance was at or slightly below average. A sixty-eight percent (68%) drop in age 0 abundance occurred from the time series high in 1999 (39.19 fish/tow) to 2006 (Table 2.23, Figure 2.8). This past season a substantial decrease in snapper abundance (6.14 fish/tow) drove down the overall index to the second lowest in the time series at 14.28 fish/tow. Catches of age 1+ bluefish in 2008 actually went up by 85% from 2007 and are currently the fifth highest in the time series. Age 1+ fish for the previous three seasons (2005-2007) have remained about the same, averaging 2.4 fish/tow; sharply lower than the 21-year record high abundance (in numbers) and the second highest biomass index for age 1+ fish recorded in 2004 (10.38 fish/tow, 13.96 kg/tow). The age 1+ bluefish abundance (>29 cm) increased by a factor of twelve from 1999, when a time series low of 0.86 fish/tow was recorded, to the anomalous high in 2004. At the inception of the survey, adult abundance was low (1.6 fish/tow in 1984) then increased to just above average levels in 1985 (3.56 fish/tow). Abundance of adults then decreased steadily to 1.92 fish/tow in 1989. For the next three years, a large increase nearing record abundance levels was observed (8.44/tow in 1992). The following seven years (1993-1999) marked a declining trend in abundance to well below the series average and the lowest adult abundance recorded for the survey in 1999.

Scup

Scup abundance indices for the fall have increased by nearly an order of magnitude since about 1998 (Table 2.19, Figure 2.10). However, since 1999 abundance has been highly variable, ranging roughly from 117 to 475 fish/tow from one year to the next. Excluding the exceptional but short-lived 1991 year class, which produced an overall index of 311.6 fish/tow, fall abundance indices early in the survey time series (1984 through 1997) ranged between 10.7 (1984) and 92.5 fish/tow (1994), averaging 52 fish/tow. Since 1998, the fall index has ranged from 103.3 (1998) to 537.7 fish/tow (1999), averaging 315 fish/tow, and six times the pre-1998 average. High indices of abundance, as high as 498 fish/tow in 1999, result primarily from strong young-of-year indices (Table 2.23). LISTS has observed several high young-of-year indices since 1999

(with the exception of 2003 and 2006). However, unlike the strong 1991 year class signal (291 fish/tow at age 0) which produced only one subsequent double-digit index (26.5 fish/tow at age 1 in Fall 1992), several recent strong year classes have persisted at double-digit-strength through age 3 (2000, 2001 year classes) or age 4 (1999 year class) and have produced record abundance indices-at-age through at least age 8.

Another very strong young-of-year index was recorded in 2005 and again for the past two fall seasons. These three cohorts are the second, third, and eigth highest respectively in the time series. The 2005 year class followed through in 2006 and 2007 with the second highest age 1 (51.02 fish/tow) and second highest age-2 index (29.3 fish/tow) in the time series. In 2008, the 2005 year class was the fourth highest age 3 index at 7.04 fish/tow. In 2008, all indices-at-age through age nine are well above the 1984-2007 mean. The strongest cohort in the time series (1999) produced a record age 9 index of 0.14 fish/tow this year. Only two year classes, 2003 and 2006, stand out as weak to moderate recruitment in the last several years. The 2006 young-of-year index (52.16 fish/tow) is far below the series mean (129.04 fish/tow). The 2003 year class also produced the lowest age 1 index in the past fourteen years and the lowest age 2 index in the past ten years. High young-of-year indices in the last two seasons (319.89 fish/tow in 2007 and 243.68 fish/tow in 2008) are expected to produce high indices at age as the year classes get older.

The new scale of elevated scup abundance has also been apparent in the spring survey (Table 2.23). Spring indices of adult (age 2+) fish jumped from 2 to 21.7 fish/tow between 1999 and 2000, and have remained elevated since. During the spring 2002 survey, unusually high availability of scup resulted in an age 2+ index of 208.8 fish/tow, almost 13 times the series average. Age 3 fish from the 1999 year-class were particularly abundant in 2002 (123.2 fish/tow), accounting for 48% of the spring catch. Spring age 2+ indices since 2006 are currently the third (2006), fifth (2007) and second (2008) highest abundances observed at 40.57, 25.29, and 75.16 fish/tow respectively (Table 2.23, Figure 2.10).

Striped bass

Similar to scup, striped bass abundance in recent years has been highly variable. Four of the highest abundances were recorded during the spring of 1999, 2002, 2005, and 2007 (Table 2.18, Figure 2.12). Abundance during the first six years of the survey was relatively low, averaging only 0.03 fish/tow. Indications of a stock recovery first appeared in 1990 and during the next five years a moderate upward trend in abundance was observed, however in 1995 a 97% increase started the trend toward high abundance. Each year thereafter abundance increased in the Sound until 2000 and 2001 when LISTS started to observe decreases in abundance and erratic indices from one year to the next. The pattern for the past 14 years has been a record – or near record - high index of abundance one year followed by an index near the lowest since 1995 (approximately 0.6 fish/tow) one to two years later. For example, the high index of 1999 was followed by a low index in 2001, the record-high index of 2002 was followed by a low index in 2004, a near-record high in 2005 was followed by a low index in 2006 and a high index in 2007 was followed by a low index in 2008. Still, for the last 14 years, abundance hasn't dipped below the series mean of 0.52 fish/tow. Overall abundance is still considered high

and on average, over the last ten years, LISTS is capturing nine times the number of stripers as it did in the first ten years of the survey.

Since 1999, larger fish from 53 cm to 73 cm length have been common during the spring, comprising 19% to 49% of the catch annually (Table 2.50). Prior to the mid 1990's only 125 striped bass exceeding 52 cm in length were taken during the spring surveys. During 2008, the age structure was comprised predominately of age four and age five fish (Table 2.25). Age four and five indices in 2008 were also above their respective averages for the time series. Additionally, LISTS fall sampling has also seen higher catches in recent years (Table 2.19). Three of the highest fall annual indices were produced in 2004 (0.77 fish/tow), 2006 (0.47 fish/tow), and 2008 (0.44 fish/tow). Average fall abundance is 0.19 fish/tow for the time series and 0.35 fish/tow over the last ten years.

Summer flounder

Summer flounder rebounded from record low abundances in the early and mid-nineties and have shown above average fall survey abundance (1.86 fish/tow) for eleven out of the last thirteen years. Fewer summer flounder were seen in 2006 (1.35 fish/tow) as the index dropped below the long-term average for the first time in eight years, however, a few more fish were observed in 2007 which bumped up the index to 1.89 fish/tow and again in 2008 to 3.09 fish/tow (Table 2.19, Figure 2.8). LISTS first observed a jump in abundance during the fall of 1996 when the index increased to over 2 fish/tow for the first time in the time series. Abundance then hovered around this level for the next four years, increasing to 4.42 fish/tow in 2001. Summer flounder fall abundance peaked at 6.12 fish/tow in 2002, decreased 45% in 2003 to 3.39 fish/tow and then decreased another 42% in 2004 to 1.95 fish/tow. Although the preferred fall index has declined sharply since 2002, abundance still remains about three times above the average of the first twelve years of the survey (1984-1995).

Summer flounder have also become more common in the spring survey since the mid-nineties when this increasing trend in abundance began (Table 2.18). Excellent springtime catches in 2003 resulted in a record abundance index (3.42 fish/tow), an index slightly higher than the fall value that year (3.39 fish/tow). Recent spring abundance has generally followed the same trend as the fall; peak abundances in 2002 and 2003, followed by decreasing abundance from 2004 through 2006, then increasing abundance in 2007. As with the fall indices, spring indices of abundance since 2002 have been roughly three times higher, on average, than from 1984-1995; the spring 2008 abundance index of 1.61 fish/tow is 39% above the springtime average.

Spring 2008 indices-at-age for age one and ages three through eleven were all higher than the 1984-2007 average, however, with the exception of age two, age five, and age 10, indices dropped from just a year earlier (Table 2.26). Ages four, five and six this year are still considered high and currently rank second in the time series for age 4 (0.26 fish/tow) and 5 (0.12 fish/tow) and third in the series for age 6 (0.6 fish/tow). Additionally, this spring was the first time an eleven year old showed up in the spring matrix. The fall 2008 survey, however, showed a lack of older fish with none older than age 6 recorded. Even so, the fall index is the highest seen in the last five years mainly

because of the availability of zero through age three fish. This year age zero fish showed up in the catches and tallied the highest young-of-year index in the series. These smaller fish accounted for 22% of the total fall catch. Age two fish (1.16 fish/tow) were also abundant this year accounting for more than 37% of the catch and the fifth highest index in the series. Additionally age three fish were abundant (21% and 0.66 fish/tow) and like the young-of-year recorded the highest abundance in the series. Some of the benefits of higher abundance seen since the mid to late-nineties is the presence of older and larger fish in the population (with the exception of this fall). Eight through eleven year old fish are now represented in the age matrix; prior to 1997, the oldest fish were age 7 (Table 2.26). The length frequency distributions in the spring and fall also illustrate this, with an increase in larger (> 50 cm) fish captured in the past ten years during the spring (average 63 fish compared to 5 fish pre-1996) and fall surveys (average 31 fish compared to 9 fish pre-1996), (Table 2.52-2.53).

Weakfish

Weakfish abundance has been highly variable over the last four years. After a time-series low of 1.50 fish/tow in 2006, weakfish rebounded to a time-series high of 63.96 fish/tow in 2007 and then again dropped abruptly in 2008 to 9.11 fish/tow (Table 2.19, Figure 2.12). Age 0 weakfish usually dominate the overall index and have been very abundant in the fall over the last ten years, except in 2006 and 2008 (Table 2.27). A strong year class in 2000 (age-0 index of 63.31 fish/tow) drove the overall index to 63.42 fish/tow, double the previous high of 31.36 fish/tow from the year before. Similarly, the record-high overall index in 2007 (63.96 fish/tow) was driven by a record-high index of age-0 fish (63.93/tow). The age 0 catches between 1999 and 2004 ranged from 30.93 fish/tow (1999) to 63.31 fish /tow (2000) and were unprecedented in the time series. The average catch/tow of age 0 fish prior to 1999 was 7.12 fish/tow. Weakfish age 1+ abundance during the fall has generally fallen since the three years of peak abundance observed between 1995 and 1997. From 2002 through 2005, age 1+ abundance in the fall remained about 50% lower than average, however, in 2006 this index rose to about average levels (0.29 fish/tow) but then dropped to 25% of the time series mean in 2007 and 2008 (0.06-0.08 fish/tow). Similarly, springtime abundance of age 1+ weakfish had remained at roughly three times higher than the average from 1997 to 1999 before declining to 0.04 fish/tow in 2003 (the lowest since 1994). This past spring, LISTS again recorded low abundance at 0.05 fish/tow (Table 2.27, Figure 2.12).

Winter Flounder

Winter flounder generally has seen a decreasing trend in abundance since 1996. LISTS has seen lower than average catches in 15 of the last 17 years. The overall winter flounder spring (April-June) index for 2008 (22.34 fish/tow) is the highest since 2002, however, abundance is still low and is approximately one third (36%) of the long term mean of 62.29 fish/tow (Table 2.18). Average catches for the first ten years of the survey were 94 winter flounder per standard tow. The customized winter flounder index (Table 2.28, Figure 2.8) that uses aged fish from April and May samples (used to develop indices of abundance at age) shows the same pattern as the overall index; the 2007 and 2008 index (28.68 fish/tow, 24.11 fish/tow) increased subtly over the previous three years but is still well below the time series mean (74.84 fish/tow). This season's index is the tenth consecutive year of low abundance despite restrictive management measures

designed to reduce fishing mortality and is cause for concern regarding the status of this species. During the beginning of the time series a slight drop in abundance was observed in 1985 and 1986 to just below average levels in 1986 (63.65 fish/tow). For the next four years (1987-1990), abundance increased to 223.09 fish/tow: the height of winter flounder abundance for the survey. This period of high abundance was short lived as the index dropped 72% during the next two years to 61.39 fish/tow in 1992. From 1992 through 1995, abundance varied at or below average levels, however, 1996 showed a more than two-fold increase to 110.62 fish/tow. Since 2001 abundance generally has decline to the current low level.

The age-0 index, obtained from the Estuarine Seine Survey (Job 2, Part 2), shows a notable increase in abundance between 2002 and 2004 (Table 2.28). From its second lowest value in 2001, the age-0 index rose to average in 2003 (8.07 fish/seine), then increased 35% in 2004 to 10.96 fish/seine: the highest this index attained since 1996. The 2006 index, however, was the lowest in the 20-year time-series (0.93 fish/seine). The age-0 index for 2007 (4.73 fish/seine) increased from the previous year, but it is still approximately 37% below the time-series average of 7.55 fish/seine. In 2008 this index dropped to 1.97 fish/seine, 74% below the average and currently the fourth lowest in the time series. The LISTS age 4+ winter flounder index has remained at less than 10 fish/tow for the last seven years (below the time-series average of 11.49) and is currently at 4.97 fish/tow (Table 2.28). The 4+ index was at its height at the start of the survey in 1984 (27.91 fish/tow) then declined through 1988 to stable and average abundance (around 13.10 fish/tow) for the next three years. Dropping abundance followed, and during 1995 the lowest observed catch/tow for ages 4+ (2.31 fish/tow) at the time was recorded. An unusual increase in abundance occurred in 1996 (15.92 fish/tow) and for the next five years it fluctuated around average levels. The high age 4+ indices from 1996-2001 are probably a result of the strong 1992 and 1994-1996 year classes.

MODIFICATIONS

None.

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TABLES 2.1 - 2.28
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 2008.

In addition to the species listed below, other rarely occurring species (totaling less than 30 fish/year each) were measured. During 2008,twenty-three 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)	All	All
dogfish, spiny	FL (cm)	All	All
fourspot flounder	TL (cm)	3rd on	min of 30/tow
hickory shad	FL (cm)	All	All
horseshoe crab	PW (cm)	All	All
northern searobin	FL (cm)	3rd on	min of 30/tow
moonfish	FL (cm)	Occasional	min of 10/tow
smallmouth flounder	TL (cm)	Occasional	min of 10/tow
striped bass	FL (cm)	All	All
striped searobin	FL (cm)	3rd on	min of 30/tow
scup	FL (cm)	All	min of 15 YOY and 30 / mode for age 1+
long-finned squid	ML (cm)	1st -3rd	min of 30 / tow
summer flounder	FL (cm)	All	All
tautog	TL (cm)	All	All
weakfish	FL (cm)	All	min of 15 YOY / tow, all adults
windowpane flounder	TL (cm)	1st -3rd	min of 50 / tow
winter flounder	TL (cm)	All	min of 100 / tow
winter skate	TL (cm)	All	All

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

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

Table 2.4. Number of Long Island Sound Trawl Survey (LISTS) samples taken by year and cruise.
In 1984, thirty-five sites per monthly cruise from April through November were scheduled for sampling. Starting in 1985, forty sites per cruise were scheduled. In 1991, the Trawl Survey was modified to a spring (April - June) and fall (September - October) format--July, August and November sampling was suspended. In 1993 and 1994, an additional cruise of 40 sites was added to the fall period. The additional fall cruise was suspended in 1995. One hundred twenty tows were conducted in 2006 due to delays in rebuilding the main engine on the R/V John Dempsey (spring) and mechanical failure/overhaul of the hydraulic power take-off (fall). Delays in overhauling the transmission in the fall of 2008 resulted in missing September sampling.

	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**
April	-	-	35	40	40	40	40	40	-	40	40	40	40	40	40	40	40	40	40	40	40	40	-	40	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
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
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	-
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
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**

Table 2.5. Station information for LISTS April 2008.
Standard LISTS tows in the spring begin with SP and fall begins with FA. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
SP2008001	4/15/2008	1837	T	1	8:16:00	30	3.3	41.2913	-72.1970	7.1	28.3	7.3	28.5
SP2008002	4/15/2008	1335	T	4	10:20:00	30	3.7	41.2712	-72.2402	6.4	25	6.5	29.5
SP2008003	4/15/2008	0931	S	4	12:37:00	30	2.1	41.1632	-72.4378	6.7	26.7	6.3	28.1
SP2008004	4/15/2008	0730	S	4	13:49:00	30	2.3	41.1357	-72.4590	6.7	26.9	6.2	27.8
SP2008005	4/15/2008	0929	S	3	15:12:00	30	2.4	41.1528	-72.5833	6.9	27.1	6.3	27
SP2008006	4/16/2008	1433	S	2	7:19:00	30	3.8	41.2463	-72.3575	6.7	15.9	6.7	26.7
SP2008007	4/16/2008	1332	S	1	8:26:00	30	3.0	41.2273	-72.4503	6.6	25.6	6.6	27.8
SP2008008	4/16/2008	0128	T	2	10:51:00	30	3.0	41.0307	-72.5772	7	26.7	7.1	26.8
SP2008009	4/16/2008	5824	S	1	12:28:00	30	3.0	40.9745	-72.7473	8.3	26.5	7.5	26.5
SP2008010	4/16/2008	5924	M	3	13:23:00	30	3.6	40.9912	-72.7913	7.4	26.4	6	27
SP2008011	4/16/2008	0224	M	4	14:40:00	30	3.2	41.0403	-72.7958	8.5	26.9	5.7	27.1
SP2008012	4/17/2008	1128	T	3	8:33:00	30	3.6	41.1925	-72.6013	6.8	21.8	6.5	27.1
SP2008013	4/17/2008	0727	S	3	10:04:00	30	3.4	41.1158	-72.6750	7.2	26.8	6.5	26.9
SP2008014	4/17/2008	0527	T	3	11:36:00	30	2.6	41.1012	-72.6203	7.5	27	6.7	27
SP2008015	4/17/2008	0226	T	3	13:01:00	30	2.5	41.0593	-72.6305	7.4	26.6	7	26.7
SP2008016	4/17/2008	0725	T	4	14:27:00	30	3.6	41.1188	-72.7493	7.7	26.8	6.2	27
SP2008017	4/18/2008	1428	T	1	8:21:00	30	4.1	41.2497	-72.5775	7.2	23.3	7.2	23.4
SP2008018	4/18/2008	1027	T	4	9:35:00	30	3.8	41.1810	-72.6455	7	26.1	6.6	27
SP2008019	4/18/2008	0222	M	4	11:29:00	30	3.0	41.0430	-72.8365	8.7	26.9	5.9	27
SP2008020	4/18/2008	0322	M	4	12:50:00	30	2.8	41.0637	-72.8290	8.3	26.9	6.1	27
SP2008021	4/18/2008	0321	M	4	15:02:00	26	3.3	41.0563	-72.9308	9.9	26.4	5.9	27
SP2008022	4/22/2008	0920	T	2	8:16:00	30	2.9	41.1535	-72.9793	7.7	26.4	7.8	26.3
SP2008023	4/22/2008	0821	M	3	9:32:00	30	3.1	41.1137	-72.9100	7.9	26.6	7.7	26.6
SP2008024	4/22/2008	1123	M	2	10:59:00	30	2.6	41.1810	-72.8465	8.4	25.6	7.7	26.2
SP2008025	4/22/2008	1323	M	2	12:07:00	30	3.5	41.2302	-72.7982	8.6	25.2	8	25.7
SP2008026	4/22/2008	1220	T	1	13:34:00	30	3.4	41.2205	-72.9143	9.1	25.5	8.5	25.6
SP2008027	4/22/2008	1320	M	1	14:44:00	30	3.2	41.2313	-72.9598	10.8	24.7	9.2	25.5
SP2008028	4/23/2008	0015	T	4	9:00:00	23	3.0	41.0085	-73.1275	9.2	26	6.3	26.5
SP2008029	4/23/2008	5714	T	3	10:39:00	30	3.3	40.9628	-73.1823	8.9	26	7.6	26.2
SP2008030	4/23/2008	5919	M	3	12:55:00	20	3.1	40.9878	-73.0320	10	26	7.7	26.3
SP2008031	4/23/2008	0521	M	4	14:31:00	30	3.3	41.0857	-72.9210	9.5	26.4	6.9	26.8
SP2008032	4/23/2008	0818	T	2	16:15:00	30	2.9	41.1500	-72.9932	9.5	25.8	8.2	26.1
SP2008033	4/24/2008	0415	M	3	9:12:00	30	3.5	41.0705	-73.1398	10.3	25.5	8.3	26.4
SP2008034	4/24/2008	5709	S	2	11:10:00	30	3.1	40.9503	-73.4070	10.3	25.7	10.2	25.8
SP2008035	4/24/2008	0211	T	2	12:59:00	30	2.9	41.0383	-73.3655	10.9	25.6	8.3	26.2
SP2008036	4/24/2008	0312	M	3	14:13:00	30	2.8	41.0548	-73.2883	11.5	25.5	8.8	26.3
SP2008037	5/1/2008	0617	T	2	8:14:00	30	3.3	41.1125	-73.0425	9.5	25	8.1	26.5
SP2008038	5/1/2008	0512	M	2	9:57:00	26	3.0	41.1002	-73.2523	10.1	25.6	9.7	26
SP2008039	5/1/2008	0612	M	1	12:58:00	30	3.3	41.0977	-73.3153	11.2	25.4	10.1	25.8
SP2008040	5/1/2008	0417	T	3	15:15:00	30	3.0	41.0753	-73.0788	10.5	25.3	8.3	26.3

Table 2.6. Station information for LISTS May 2008.
Standard LISTS tows in the spring begin with SP and fall begins with FA. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
SP2008041	5/14/2008	0931	S	4	10:23:00	30	2.0	41.1642	-72.4355	10	27.2	9.7	27.9
SP2008042	5/14/2008	0830	S	4	11:57:00	30	2.5	41.1482	-72.4808	10.6	26.9	9.9	27.1
SP2008043	5/14/2008	0530	S	3	13:33:00	30	2.6	41.0965	-72.5055	10.6	26.6	10	26.7
SP2008044	5/14/2008	0827	T	3	15:23:00	30	2.8	41.1322	-72.6677	11.6	26.2	9.5	26.2
SP2008045	5/15/2008	1029	S	3	8:34:00	30	2.8	41.1750	-72.5325	10.2	26.6	9.9	27.2
SP2008046	5/15/2008	0424	M	4	10:30:00	30	3.0	41.0798	-72.7598	10.9	26.2	9.2	26.3
SP2008047	5/15/2008	5824	S	1	12:05:00	30	3.1	40.9737	-72.7560	11.1	26	10.4	26.1
SP2008048	5/15/2008	0224	M	4	13:52:00	30	3.1	41.0397	-72.8013	11.2	26.2	8.8	26.3
SP2008049	5/15/2008	0826	T	3	15:44:00	30	3.0	41.1355	-72.6765	11.6	26	9.6	26.2
SP2008050	5/16/2008	1534	T	1	7:40:00	30	2.6	41.2598	-72.3560	10.8	26.4	10.6	28.2
SP2008051	5/16/2008	1433	S	2	10:08:00	30	1.8	41.2475	-72.3497	10.4	27.5	10.3	28.5
SP2008052	5/16/2008	1432	S	2	11:55:00	30	3.9	41.2352	-72.4423	10.7	25.5	10.1	28
SP2008053	5/16/2008	1332	S	1	13:19:00	30	3.9	41.2412	-72.4330	10.8	25.6	10.3	27
SP2008054	5/20/2008	1128	T	3	8:16:00	30	3.5	41.1945	-72.5810	10.6	26.5	10.5	27.3
SP2008055	5/20/2008	1327	T	2	10:58:00	30	2.7	41.2252	-72.6665	11.2	26.2	10.9	26.4
SP2008056	5/20/2008	1427	T	1	12:18:00	30	2.9	41.2482	-72.6045	11.5	26.5	10.9	27.2
SP2008057	5/20/2008	0925	T	4	13:58:00	30	3.0	41.1648	-72.7168	10.9	26.3	10.5	26.8
SP2008058	5/21/2008	1124	T	2	8:48:00	30	3.6	41.2002	-72.7538	11.1	26	10.7	26
SP2008059	5/21/2008	0624	T	4	10:19:00	30	2.7	41.1112	-72.7952	10.8	26.3	10.6	26.3
SP2008060	5/21/2008	0724	T	4	11:46:00	30	2.7	41.1125	-72.8015	11.1	26.3	10.7	26.3
SP2008061	5/21/2008	0521	M	4	14:31:00	30	3.3	41.0982	-72.8695	11.5	26.1	10.5	26.2
SP2008062	5/21/2008	0922	M	3	15:41:00	30	3.3	41.1232	-72.8353	11.5	26.2	10.6	26.2
SP2008063	5/22/2008	0920	T	2	8:26:00	28	3.1	41.1533	-72.9798	11.2	25.6	10.2	26
SP2008064	5/22/2008	1220	T	1	10:02:00	30	3.3	41.2187	-72.9127	12.1	25.6	11.6	25.9
SP2008065	5/22/2008	1219	M	2	11:23:00	30	3.1	41.2017	-73.0007	11.6	25.9	11.2	25.9
SP2008066	5/22/2008	1320	M	1	12:27:00	30	3.1	41.2303	-72.9635	12.3	25.6	12	25.8
SP2008067	5/22/2008	0717	M	2	14:04:00	30	3.2	41.1202	-73.0997	11.3	25.1	10.3	26
SP2008068	5/23/2008	0313	M	3	8:59:00	30	2.6	41.0602	-73.2075	11.9	25.4	10.5	25.9
SP2008069	5/23/2008	0211	T	2	11:21:00	30	2.8	41.0408	-73.3542	11.9	25.4	11.3	25.6
SP2008070	5/23/2008	0512	M	2	12:48:00	28	3.1	41.0887	-73.3067	12	25.4	11.5	25.6
SP2008071	5/23/2008	0612	M	1	14:20:00	30	3.4	41.1027	-73.3188	12.1	25.5	11.6	25.5
SP2008072	5/27/2008	0015	T	4	9:14:00	30	2.6	41.0088	-73.1250	13.7	25.3	10.6	27.1
SP2008073	5/27/2008	5914	M	4	10:41:00	30	3.1	41.0033	-73.1558	13.8	25.2	10.8	26.7
SP2008074	5/27/2008	5714	T	3	12:23:00	30	3.1	40.9652	-73.1732	14.3	25.2	13.3	25.4
SP2008075	5/27/2008	5613	T	2	13:36:00	30	3.2	40.9470	-73.1887	14.6	25.1	13.8	25.1
SP2008076	5/27/2008	5912	M	3	15:11:00	30	3.1	40.9832	-73.3030	15.4	25.1	11.3	25.7
SP2008077	5/28/2008	0417	T	3	8:38:00	30	3.0	41.0760	-73.0730	12.6	25.6	11	26.7
SP2008078	5/28/2008	0319	M	4	10:02:00	15	2.9	41.0577	-72.9682	12.2	25.6	11	27.9
SP2008079	5/28/2008	5918	M	3	11:41:00	30	3.0	40.9875	-73.0257	14.2	25.2	10.9	27
SP2008080	5/28/2008	5921	M	3	13:08:00	30	3.0	40.9883	-72.9105	14	25.4	13.5	25.5

Table 2.7. Station information for LISTS June 2008.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
SP2008081	6/9/2008	1840	T	1	9:47:00	29	3.3	41.3127	-72.0852	13.8	29	13	30.2
SP2008082	6/9/2008	1738	T	2	11:36:00	30	3.4	41.2875	-72.1583	13.5	30.1	13.3	30.1
SP2008083	6/9/2008	1333	S	1	14:34:00	30	2.6	41.2477	-72.4073	15.5	26.2	13.6	28.5
SP2008084	6/10/2008	0830	S	4	8:30:00	30	2.0	41.1510	-72.4797	16.7	27.2	13.4	29.1
SP2008085	6/10/2008	0629	S	4	9:51:00	30	2.3	41.1157	-72.4987	19	26.4	13.9	28.6
SP2008086	6/10/2008	0328	T	3	11:13:00	30	3.2	41.0618	-72.5787	19.9	25.9	14.4	28.1
SP2008087	6/10/2008	5825	S	1	13:19:00	30	3.6	40.9782	-72.7403	19.3	26.1	16.5	26.4
SP2008088	6/10/2008	0527	T	3	15:04:00	30	2.4	41.0910	-72.6623	20.9	26.1	14.6	27.8
SP2008089	6/11/2008	0929	S	3	8:17:00	30	2.0	41.1645	-72.5270	14.3	28.5	14	28.7
SP2008090	6/11/2008	0327	T	3	9:59:00	30	2.7	41.0613	-72.6287	19.6	26	14.5	28.1
SP2008091	6/11/2008	0124	M	4	11:52:00	30	3.2	41.0282	-72.7542	19.2	25.8	12.2	27.7
SP2008092	6/11/2008	0222	M	4	13:12:00	30	3.0	41.0355	-72.8773	18.4	26.3	12	27.9
SP2008093	6/11/2008	0625	T	4	14:30:00	30	2.9	41.1007	-72.7522	21.2	25.8	13.3	27.7
SP2008094	6/12/2008	0727	S	3	8:38:00	30	2.6	41.1243	-72.6202	18.3	26.8	14.5	28.4
SP2008095	6/12/2008	0524	T	4	10:45:00	30	3.7	41.0910	-72.7882				
SP2008096	6/12/2008	0725	T	4	12:19:00	30	3.4	41.1208	-72.7303	21.4	25.9	13.9	27.6
SP2008097	6/12/2008	1227	T	3	13:54:00	30	3.1	41.1980	-72.6427	17.6	27.5	14.3	28.1
SP2008098	6/16/2008	0721	M	3	9:21:00	30	3.6	41.1348	-72.8777	19.3	26.2	13.3	27.5
SP2008099	6/16/2008	0320	M	4	10:35:00	27	3.3	41.0555	-72.9290	18.8	26.3	12.2	27.8
SP2008100	6/16/2008	0120	M	4	12:12:00	15	2.9	41.0280	-72.9147	18.4	26.3	12	27.8
SP2008101	6/16/2008	0119	M	4	13:08:00	20	2.7	41.0305	-72.9640	18.4	26.3	12.3	27.8
SP2008102	6/16/2008	1019	T	2	14:56:00	28	3.0	41.1725	-72.9900	20.1	26.3	14.3	27
SP2008103	6/17/2008	5917	M	3	8:57:00	30	3.3	40.9972	-73.0223	17.3	26.3	12.8	27.3
SP2008104	6/17/2008	0015	T	4	12:08:00	30	2.7	41.0078	-73.1253	18.6	26.1	12.6	27.6
SP2008105	6/17/2008	5614	T	2	13:55:00	30	3.1	40.9443	-73.1742	19.1	26.1	13.2	26.9
SP2008106	6/17/2008	5513	S	2	15:04:00	30	3.3	40.9242	-73.2482	18.7	26.2	15.5	26.5
SP2008107	6/18/2008	0715	T	1	8:21:00	30	3.8	41.1278	-73.1278	16.1	25.8	15.3	26.6
SP2008108	6/18/2008	0412	M	2	10:56:00	26	3.0	41.0770	-73.2645	19.4	25.9	12.8	27.4
SP2008109	6/18/2008	0313	M	3	12:56:00	26	3.3	41.0513	-73.2558	19.9	25.8	13	27.4
SP2008110	6/18/2008	0515	M	2	14:08:00	15	3.7	41.0828	-73.1825	18.8	25.7	13.3	27.3
SP2008111	6/18/2008	0615	M	2	15:16:00	30	3.8	41.0950	-73.1942	19	26	13.1	27.2
SP2008112	6/19/2008	1319	M	1	8:29:00	30	3.8	41.2293	-72.9715	17.5	26.2	16.1	27
SP2008113	6/19/2008	1320	M	1	10:19:00	30	3.4	41.2377	-72.9550	18.3	25.5	16.8	26.8
SP2008114	6/19/2008	1220	T	1	11:26:00	30	3.1	41.2103	-72.9673	17.7	26.6	14	27.3
SP2008115	6/19/2008	1221	T	2	12:40:00	30	3.2	41.2207	-72.8708	17.7	27.2	14.5	27.4
SP2008116	6/19/2008	1020	T	2	14:28:00	30	2.6	41.1872	-72.9178	19.2	26.6	13.6	27.4
SP2008117	6/23/2008	0111	M	3	9:12:00	19	3.1	41.0413	-73.2620	19.3	26.2	13.2	27.3
SP2008118	6/23/2008	5709	S	2	11:02:00	30	3.2	40.9520	-73.4078	19.6	26	15.7	26.8
SP2008119	6/23/2008	0110	T	3	12:52:00	30	2.9	41.0225	-73.3692	19.7		13.1	
SP2008120	6/23/2008	0413	M	3	14:46:00	16	3.0	41.0627	-73.2687	19.2	26.3	13.4	27.4

Table 2.8. Station information for LISTS October 2008.
Standard LISTS tows in the spring begin with SP and fall begins with FA. Surface and bottom temperature and salinity are listed in the last four columns for each tow.

Sample	Date	Site	Btm Type	Depth Int	Time	Duration	Ave Speed (knots)	Lat	Lon	S_Temp	S_Sal	B_Temp	B_Sal
FA2008001	10/10/2008	1740	T	2	8:29:00	30	3.2	41.2927	-72.0757	17.5	30.1	17.7	30.6
FA2008002	10/10/2008	1437	T	4	10:38:00	30	2.1	41.2398	-72.2273	18.1	29.4	17.5	31
FA2008003	10/10/2008	0531	T	3	13:11:00	30	2.5	41.0920	-72.4708	18.7	28.6	18.3	29
FA2008004	10/14/2008	1534	T	1	7:13:00	30	2.1	41.2582	-72.3583	17	23.7	17.3	29.9
FA2008005	10/14/2008	1434	S	1	8:21:00	30	2.1	41.2343	-72.3768	17.5	29.9	17.4	29.9
FA2008006	10/14/2008	0630	S	4	10:06:00	30	3.3	41.1788	-72.4415	18.1	29.3	18.1	29.3
FA2008007	10/14/2008	0326	T	3	11:48:00	30	2.9	41.0657	-72.6653	18.6	28.6	18.4	28.8
FA2008008	10/14/2008	0623	M	4	13:45:00	30	3.9	41.1037	-72.8402	18.7	28.2	18.6	28.5
FA2008009	10/15/2008	0931	S	4	7:51:00	30	4.2	41.1620	-72.4390	17.9	29.5	17.9	29.6
FA2008010	10/15/2008	0229	T	2	9:30:00	30	4.1	41.0427	-72.5617	18.4	28.5	18.4	28.5
FA2008011	10/15/2008	5925	T	1	11:00:00	30	3.0	41.0063	-72.7042	18.7	28.3	18.6	28.2
FA2008012	10/15/2008	5824	S	1	13:07:00	30	3.5	40.9855	-72.8065	18.9	28.2	18.7	28.2
FA2008013	10/15/2008	0627	S	3	14:45:00	30	4.0	41.0983	-72.6812	19	28.7	18.5	28.7
FA2008014	10/16/2008	0828	S	3	8:14:00	30	3.4	41.1487	-72.5615	18.3	28.8	18.3	28.8
FA2008015	10/16/2008	0724	T	4	10:04:00	30	3.6	41.1240	-72.7362	18.4	28.4	18.2	28.7
FA2008016	10/16/2008	0424	M	4	11:49:00	30	3.0	41.0682	-72.8133	18.7	28.4	18.6	28.5
FA2008017	10/16/2008	0426	T	3	13:18:00	30	3.6	41.0662	-72.7058	18.7	28.4	18.5	28.7
FA2008018	10/20/2008	1423	T	1	9:38:00	30	3.4	41.2387	-72.8118	15.6	27.6	15.8	27.7
FA2008019	10/20/2008	0921	M	2	11:16:00	30	3.4	41.1710	-72.8818	17.1	28.3	17	28.3
FA2008020	10/20/2008	0722	M	3	13:49:00	30	3.5	41.1303	-72.8430	17.4	28.5	17.4	28.5
FA2008021	10/20/2008	0919	T	2	15:29:00	30	3.1	41.1622	-72.9382	17.2	28.3	17.3	28.3
FA2008022	10/21/2008	0220	M	4	8:44:00	30	2.6	41.0482	-72.9090	17.6	28.4	17.6	28.4
FA2008023	10/21/2008	0019	M	3	10:45:00	13	3.3	40.9965	-73.0302	17.3	28.2	17.1	28.2
FA2008024	10/21/2008	0015	T	4	12:13:00	22	3.0	41.0080	-73.1263	17.6	28.2	17.2	28.1
FA2008025	10/21/2008	0614	M	2	14:14:00	24	2.9	41.1032	-73.2188	16.4	27.9	16.4	27.9
FA2008026	10/23/2008	0414	M	3	8:38:00	30	3.0	41.0840	-73.1315	16.3	28	15.7	28
FA2008027	10/23/2008	0612	M	1	10:34:00	30	3.1	41.1067	-73.2665	15.6	28.1	15.3	28
FA2008028	10/23/2008	0212	M	3	11:58:00	30	3.0	41.0457	-73.2417	16.9	28.2	16.7	28.2
FA2008029	10/23/2008	0112	M	4	14:18:00	30	3.2	41.0157	-73.2913	17.1	28.2	16	28
FA2008030	10/27/2008	0412	M	2	8:45:00	15	3.6	41.0753	-73.2588	15.3	27.9	15.4	27.9
FA2008031	10/27/2008	0110	T	3	12:32:00	30	3.0	41.0343	-73.3233	16.6	28.1	16.4	28.2
FA2008032	10/27/2008	5709	S	2	15:03:00	30	3.2	40.9510	-73.4072	15.6	27.7	16	27.9
FA2008033	10/31/2008	0210	T	2	9:09:00	27	3.5	41.0483	-73.3223	14.6	28	14.7	28
FA2008034	10/31/2008	5812	M	3	10:54:00	30	3.1	40.9768	-73.3118	15	28.1	15	28.1
FA2008035	10/31/2008	5513	S	2	12:30:00	30	3.3	40.9243	-73.2513	13.4	27.6	13.9	27.8
FA2008036	10/31/2008	5614	T	2	13:34:00	30	3.3	40.9342	-73.2252	14.1	27.8	13.9	27.8
FA2008037	10/31/2008	0517	T	3	15:30:00	30	3.9	41.0963	-73.0788	14.5	27.3	15.3	28.3
FA2008038	11/3/2008	1320	M	1	8:10:00	30	3.5	41.2333	-72.9540	11.6	26.9	12.5	27.2
FA2008039	11/3/2008	0622	M	4	9:56:00	30	2.7	41.0892	-72.8893	14.6	28.2	14.5	28.3
FA2008040	11/3/2008	0926	T	4	12:06:00	30	2.5	41.1478	-72.6975	13.9	28.6	13.8	28.6

Table 2.9. Samples with non-standard tow durations and reason for incomplete tow, spring 2008.
Standard LISTS tows begin with SP(spring) or FA (fall).

Sample	Date	Site	Bottom Type	Depth Interval	Time	Duration	Reason	Comments
SP2008021	4/18/2008	0321	M	4	15:02:00	26	pots	Couldn't do original site b/c pot gear; snagged pots on alternate site, too; this was 3rd site attempted; lots of active gear in this area.
SP2008028	4/23/2008	0015	T	4	9:00:00	23	pots	Pots were set on our intended course so moved a little off; snagged 6 old beat up pots with 2006 tags.
SP2008030	4/23/2008	5919	M	3	12:55:00	20	hang	no damage
SP2008038	5/1/2008	0512	M	2	9:57:00	26	pots	Made three attempts to complete tow; snagged old pot gear on first two parts of tow.
SP2008063	5/22/2008	0920	T	2	8:26:00	28	pots	Snagged old pots (2006 tags); very muddy with missing doors & vents.
SP2008070	5/23/2008	0512	M	2	12:48:00	28	pots	Snagged string of active gear.
SP2008078	5/28/2008	0319	M	4	10:02:00	15	pots	Two attempts; snagged old pots both times; had 2005 & 2006 tags.
SP2008081	6/9/2008	1840	T	1	9:47:00	29	pots	Ran out of room to tow in between pot gear.
SP2008099	6/16/2008	0320	M	4	10:35:00	27	pots	Two attempts; snagged pot gear both times; had 2007 & 2008 tags.
SP2008100	6/16/2008	0120	M	4	12:12:00	15	pots	Snagged string of active gear.
SP2008101	6/16/2008	0119	M	4	13:08:00	20	pots	Snagged string of old gear.
SP2008102	6/16/2008	1019	T	2	14:56:00	28	pots	Snagged string of old lobster pots & one separate freshly baited winkle trap (no tag).
SP2008108	6/18/2008	0412	M	2	10:56:00	26	pots	Three attempts to complete this tow; snagged old gear each time.
SP2008109	6/18/2008	0313	M	3	12:56:00	26	pots	Snagged active fish pots but no current tags.
SP2008110	6/18/2008	0515	M	2	14:08:00	15	pots	Snagged old lobster pots (2003 tags).
SP2008117	6/23/2008	0111	M	3	9:12:00	19	hang	Two attempts; hung up on wreck; also one ghost pot in net.
SP2008120	6/23/2008	0413	M	3	14:46:00	16	pots	Two attempts; snagged ghost pots and active (stored?) gear.

Table 2.10. Samples with non-standard tow durations and reason for incomplete tow, fall 2008.
Standard LISTS tows begin with SP(spring) or FA (fall).

Sample	Date	Site	Bottom Type	Depth Interval	Time	Duration	Reason	Comments
FA2008023	10/21/2008	0019	M	3	10:45:00	13	hang	no damage
FA2008024	10/21/2008	0015	T	4	12:13:00	22	pots	Speed dropped; gear popped off while retrieving net.
FA2008025	10/21/2008	0614	M	2	14:14:00	24	pots	Snagged active lobster gear; pots set blind across channel (no bouys).
FA2008030	10/27/2008	0412	M	2	8:45:00	15	pots	Three attempts to complete this tow; snagged lobster pot gear each time.
FA2008033	10/31/2008	0210	T	2	9:09:00	27	pots	Snagged two single lobster pots and one single conch pot in net; no bouys or tags.

Table 2.11. Data requests by month, 2008.

MONTH	REQUEST	ORGANIZATION OR PURPOSE
January	weakfish indices-at-age	CT DEP staff
	winter flounder indices-at-age	Dominion Annual Report
February	summer flounder indices	CT DEP staff
	LISTS bottom temperature data for timeseries	University of Connecticut
	summer flounder indices and length-at-age	NMFS
March	LISTS indices of abundance for timeseries	CT DEP Staff
	scup age-length observations	RI DEM
	lobster data	University of Maryland
	turtle data	NY State DEC
	surf clam data	Woods Hole Oceanographic Institute
	count and weight indices	Council on Environmental Quality
April	catch statistics and length frequencies for windowpane flounder	NMFS
	tautog age-length data	NMFS
	maps of towpaths in area of proposed activity in Branford	CT DEP staff
	distribution of large scup catches, spring 2003-2007	NMFA Milford
	LISTS data	The Nature Conservancy
May	catch statistics for lobsters from each tow in LISTS timeseries	University of Maryland
	lobsters lengths from each tow in LISTS and Narrows	University of Maryland
	catch statistics by tow for scup, striped bass and winter flounder	EPA Long Island Sound Study
	winter flounder catch at age matrix	EPA Long Island Sound Study
	abundance indices for scup, striped bass & winter flounder	EPA Long Island Sound Study
	catch for tows in area of Northport	NY State DEC
	lobster data	University of Maryland
June	summary of LISTS v-notch activity	CT DEP staff
	incidence of American sand lance, LISTS spring 2008	American Museum of Natural History
July	LISTS count and weight indices for timeseries	Environmental Consultant
	LISTS weakfish catch statistics	CT DEP staff
August	jellyfish biomass index and catch data	Blue Ocean Institute/Stony Brook University
	catch statistics for striped bass from each tow in LISTS timeseries	Mass DEP/DPH
	LISTS tow and catch data for weakfish	CT DEP staff
	lobster data	University of Maryland
September	alewife indices of abundance and length frequencies	ASMFC Technical Report
	blueback herring indices of abundance and length frequencies	ASMFC Technical Report
	lobster data	University of Maryland
	horseshoe crab length frequency	CT DEP staff
	skate catch, length and indices data	NMFS
October		
November		
December	lobster catch distribution maps	CT DEP staff
	catch and length data for butterfish, mackerel & squids	NMFS

Table 2.12. Sample requests by month, 2008.

MONTH	REQUEST	ORGANIZATION OR PURPOSE
March		
May	*Loligo paeleii* (longfin squid) for dissection class	Illing Middle School
	squid & various finfish specimens for dissection class	Putnam High School
	critters for touch tank / demonstration	NMFS Milford
	critters for school demonstration	Southern Connecticut State University
August	American eels	EPA - residual chemical tissue analysis
September	no sampling in Sept 2008	
October	large specimens of cartilaginous & bony fish spp for dissection class	UConn
	small specimens of various fish spp for type collection	UConn
	horseshoe crabs and butterfish (bait)	sampling for Dept Health study
	weakfish	EPA - residual chemical tissue analysis
	Loligo paeleii (longfin squid) for dissection class	Southern Connecticut State University

Table 2.13. List of finfish species observed in 2008.

Fifty-three species were observed in 2008. (Bold type indicates new species). Since 1984, ninety-eight species of finfish have been identified in LISTS (see Appendix I for the full list of species).

Common Name	Scientific Name	Common Name	Scientific Name
anchovy, bay	Anchoa mitchilli	lamprey, sea	Petromyzon marinus
anchovy, striped	Anchoa hepsetus	lizardfish, inshore	Synodus foetens
black sea bass	Centropristes striata	menhaden, Atlantic	Brevoortia tyrannus
blenny, feather	**Hypsoblennius hentz**	moonfish	Selene setapinnis
bluefish	Pomatomus saltatrix	ocean pout	Macrozoarces americanus
butterfish	Peprilus triacanthus	perch, white	Morone americana
croaker, Atlantic	Micropogonias undulatus	pollock	Pollachius virens
cunner	Tautogolabrus adspersus	rockling, fourbeard	Enchelyopus cimbrius
dogfish, smooth	Mustelus canis	sand lance, American	Ammodytes americanus
dogfish, spiny	Squalus acanthius	sculpin, longhorn	Myoxocephalus octodecemspin
filefish, planehead	Monacanthus hispidus	scup	Stenotomus chrysops
flounder, fourspot	Paralichthys oblongus	searobin, northern	Prionotus carolinus
flounder, smallmouth	Etropus microstomus	searobin, striped	Prionotus evolans
flounder, summer	Paralichthys dentatus	shad, American	Alosa sapidissima
flounder, windowpane	Scophthalmus aquosus	shad, hickory	Alosa mediocris
flounder, winter	Pseudopleuronectes american	silverside, Atlantic	Menidia menidia
flounder, yellowtail	Pleuronectes ferrugineus	skate, clearnose	Raja eglanteria
glasseye snapper	Priacanthus cruentatus	skate, little	Leucoraja erinacea
gunnel, rock	Pholis gunnellus	skate, winter	Leucoraja ocellata
hake, red	Urophycis chuss	spot	Leiostomus xanthurus
hake, silver	Merluccius bilinearis	stingray, roughtail	Dasyatis centroura
hake, spotted	Urophycis regia	striped bass	Morone saxatilis
herring, Atlantic	Clupea harengus	sturgeon, Atlantic	Acipenser oxyrinchus
herring, alewife	Alosa pseudoharengus	tautog	Tautoga onitis
herring, blueback	Alosa aestivalis	toadfish, oyster	Opsanus tau
hogchoker	Trinectes maculatus	weakfish	Cynoscion regalis
kingfish, northern	Menticirrhus saxatilis		

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 invertebrate species observed in 2008.
In 2008, fourty-one invertebrate species were identified. In most cases, invertebrates are identified to species; however, species that are very similar are identified to genus, and in difficult cases, to a higher taxon.

Common Name	*Scientific Name*	*Common Name*	*Scientific Name*
anemones	*anemomes 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, Jonah	*Cancer borealis*	*shrimp, northern red*	*Pandalus montagui*
crab, blue	*Callinectes sapidus*	*shrimp, sand*	*Crangon septemspinosa*
crab, flat claw hermit	*Pagurus pollicaris*	*slipper shell, common*	*Crepidula fornicata*
crab, green	*Carcinus maenas*	*sponge spp.*	*sponge spp.*
crab, horseshoe	*Limulus polyphemus*	*sponge, boring*	*Cliona celate*
crab, lady	*Ovalipes ocellatus*	*sponge, deadman's fingers*	*Haliclona spp.*
crab, rock	*Cancer irroratus*	*sponge, red bearded*	*Microciona prolifera*
crab, spider	*Libinia emarginata*	*squid, long-finned*	*Loligo pealeii*
cyclocardia	*Cyclocardia borealis*	*starfish spp.*	*Asteriid spp.*
hydroid spp.	*Tubularia spp.*	*tunicates, misc*	*misc. class ascidiacea*
jelly, moon	*Aurelia aurita*	*whelk, channeled*	*Busycotypus canaliculatus*
jellyfish, lion's mane	*Cyanea capillata*	*whelk, knobbed*	*Busycon carica*
lobster, American	*Homarus americanus*		

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

Table 2.15. Total number and weight (kg) of finfish and invertebrates caught in 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 are not quantified. Number of tows (sample size)=160.

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)

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**	

Note: nc= not counted

Table 2.16. Total counts and weight (kg) of finfish taken in the spring and fall sampling periods, 2008.
Species are listed in order of total count. Young-of-year bay anchovy, striped anchovy, and American sand lance are not included. Number of tows (sample sizes): Spring = 120, Fall = 40.

	Spring			
species	**count**	**%**	**weight**	**%**
scup	31,052	45.8	5,364.5	52.6
American sand lance	7,429	11.0	7.0	0.1
silver hake	6,570	9.7	207.1	2.0
butterfish	6,088	9.0	467.7	4.6
winter flounder	4,586	6.8	693.7	6.8
windowpane flounder	2,944	4.3	473.3	4.6
red hake	1,688	2.5	137.0	1.3
spotted hake	1,225	1.8	58.5	0.6
bay anchovy	966	1.4	5.8	0.1
alewife	898	1.3	49.5	0.5
fourspot flounder	807	1.2	178.2	1.7
northern searobin	729	1.1	54.9	0.5
little skate	545	0.8	253.9	2.5
Atlantic herring	355	0.5	52.0	0.5
American shad	353	0.5	15.6	0.2
striped searobin	302	0.4	154.0	1.5
summer flounder	298	0.4	288.7	2.8
smooth dogfish	239	0.4	801.4	7.9
striped bass	159	0.2	332.8	3.3
tautog	155	0.2	274.6	2.7
fourbeard rockling	76	0.1	6.8	0.1
blueback herring	71	0.1	3.0	0
smallmouth flounder	69	0.1	2.1	0
black sea bass	43	0.1	16.7	0.2
winter skate	35	0.1	98.5	1.0
hogchoker	30	0	4.5	0
bluefish	29	0	43.6	0.4
spiny dogfish	24	0	97.5	1.0
cunner	22	0	3.4	0
clearnose skate	12	0	22.0	0.2
Atlantic menhaden	10	0	4.4	0
ocean pout	9	0	2.1	0
weakfish	6	0	2.9	0
white perch	4	0	0.1	0
hickory shad	3	0	0.3	0
Atlantic silverside	2	0	0.2	0
Atlantic sturgeon	2	0	13.4	0.1
longhorn sculpin	2	0	0.3	0
oyster toadfish	2	0	0.8	0
yellowtail flounder	2	0	0.4	0
pollock	1	0	0.1	0
rock gunnel	1	0	0.1	0
roughtail stingray	1	0	3.0	0
sea lamprey	1	0	0.8	0
Total	**67,845**		**10,197.2**	

	Fall			
species	**count**	**%**	**weight**	**%**
butterfish	42,678	58.5	974.3	24.1
scup	22,508	30.9	1,145.4	28.3
weakfish	2,525	3.5	113.2	2.8
bluefish	1,670	2.3	597.8	14.8
moonfish	689	0.9	13.4	0.3
windowpane flounder	567	0.8	50.7	1.3
winter flounder	387	0.5	58.2	1.4
striped searobin	310	0.4	109.0	2.7
spot	308	0.4	21.3	0.5
summer flounder	179	0.2	109.3	2.7
bay anchovy	163	0.2	1.9	0
little skate	137	0.2	73.5	1.8
fourspot flounder	95	0.1	8.1	0.2
smooth dogfish	89	0.1	332.8	8.2
northern searobin	81	0.1	3.9	0.1
black sea bass	79	0.1	13.1	0.3
American sand lance	66	0.1	0.2	0
American shad	52	0.1	4.6	0.1
spotted hake	42	0.1	7.3	0.2
striped bass	39	0.1	123.5	3.1
Atlantic menhaden	37	0.1	6.0	0.1
red hake	35	0	4.3	0.1
alewife	33	0	1.6	0
clearnose skate	25	0	56.1	1.4
tautog	24	0	34.8	0.9
smallmouth flounder	20	0	1.1	0
silver hake	17	0	1.4	0
winter skate	16	0	42.3	1.0
spiny dogfish	11	0	30.2	0.7
inshore lizardfish	10	0	0.5	0
hogchoker	7	0	1.1	0
Atlantic sturgeon	5	0	97.9	2.4
fourbeard rockling	5	0	0.3	0
cunner	4	0	0.2	0
feather blenny	4	0	0.2	0
blueback herring	3	0	0.2	0
northern kingfish	3	0	0.4	0
hickory shad	2	0	0.8	0
Atlantic herring	1	0	0.1	0
Atlantic croaker	1	0	0.1	0
planehead filefish	1	0	0.1	0
glasseye snapper	1	0	0.1	0
rock gunnel	1	0	0.1	0
striped anchovy	1	0	0.1	0
oyster toadfish	1	0	1.1	0
Total	**72,932**		**4,042.6**	

Table 2.17. Total catch of invertebrates taken in the spring and fall sampling periods, 2008.
Species are ranked by total weight (kg). Number of tows (sample sizes): Spring = 120, Fall = 40.

	Spring			
species	**count**	**%**	**weight**	**%**
American lobster	900	21.4	262.2	26.5
horseshoe crab	141	3.4	243.5	24.6
spider crab	nc	nc	131.9	13.3
long-finned squid	2,247	53.4	94.0	9.5
bushy bryozoan	nc	nc	50.0	5.0
rock crab	nc	nc	36.7	3.7
boring sponge	nc	nc	30.1	3.0
starfish spp.	nc	nc	27.8	2.8
hydroid spp.	nc	nc	20.2	2.0
channeled whelk	101	2.4	14.6	1.5
lion's mane jellyfish	515	12.2	13.4	1.4
flat claw hermit crab	nc	nc	11.5	1.2
common slipper shell	nc	nc	8.2	0.8
sea grape	nc	nc	6.1	0.6
mantis shrimp	124	3.0	5.6	0.6
arks	123	2.9	4.7	0.5
northern moon snail	1	0	4.5	0.5
sand shrimp	nc	nc	3.9	0.4
blue mussel	nc	nc	3.4	0.3
blue crab	12	0.3	2.8	0.3
rubbery bryzoan	nc	nc	2.8	0.3
mud crabs	nc	nc	2.7	0.3
lady crab	nc	nc	2.4	0.2
knobbed whelk	6	0.1	2.1	0.2
common oyster	nc	nc	1.0	0.1
hard clams	4	0.1	0.9	0.1
northern red shrimp	20	0.5	0.6	0.1
red bearded sponge	nc	nc	0.4	0
purple sea urchin	6	0.1	0.4	0
deadman's fingers sponge	nc	nc	0.3	0
sea cucumber	2	0	0.3	0
anemones	nc	nc	0.2	0
tunicates, misc	nc	nc	0.2	0
coastal mud shrimp	1	0	0.1	0
star coral	nc	nc	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	**4,206**		**989.9**	

Note: nc= not counted

	Fall			
species	**count**	**%**	**weight**	**%**
horseshoe crab	147	1.7	253.3	35.7
long-finned squid	8,243	93.4	236.1	33.2
American lobster	196	2.2	51.9	7.3
lady crab	nc	nc	33.9	4.8
mixed sponge species	nc	nc	27.8	3.9
rock crab	nc	nc	27.3	3.8
channeled whelk	76	0.9	14.7	2.1
spider crab	nc	nc	13.9	2.0
flat claw hermit crab	nc	nc	11.3	1.6
common slipper shell	nc	nc	7.5	1.1
hydroid spp.	nc	nc	4.4	0.6
starfish spp.	nc	nc	4.3	0.6
bushy bryozoan	nc	nc	4.2	0.6
knobbed whelk	11	0.1	3.8	0.5
mantis shrimp	119	1.4	3.5	0.5
blue mussel	nc	nc	2.4	0.3
arks	1	0	1.4	0.2
common oyster	1	0	1.1	0.2
northern moon snail	nc	nc	1.1	0.2
blue crab	4	0	1.0	0.1
lion's mane jellyfish	5	0.1	0.9	0.1
mud crabs	nc	nc	0.8	0.1
surf clam	9	0.1	0.6	0.1
hard clams	4	0	0.5	0.1
sea grape	nc	nc	0.5	0.1
purple sea urchin	9	0.1	0.5	0.1
Jonah crab	2	0	0.4	0.1
deadman's fingers sponge	nc	nc	0.3	0
rubbery bryzoan	nc	nc	0.3	0
star coral	nc	nc	0.2	0
sand shrimp	nc	nc	0.1	0
northern red shrimp	1	0	0.1	0
tunicates, misc	nc	nc	0.1	0
Total	**8,828**		**710.2**	

Table 2.18. Spring indices of abundance for selected species, 1984-2008.

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																									84-07
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**	**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
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	0.14
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	
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	
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	0.23
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	
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	0.06
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	5.10
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	
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	36.31
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	62.29
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	4.38
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	3.69
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	
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	2.07
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	
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	
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	
lobster, American**	7.09	3.1	2.76	3.3	2.24	3.76	5.33	7.74	7.88	6.72	4.1	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	6.11
mackerel, Spanish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
menhaden, Atlantic	0.09	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	
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	
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	0.09
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	0.61
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	
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	0.12
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	
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	0.10
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	1.96
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	
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	
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	
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	9.89
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	0.17
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	
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	5.01
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	0.52
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	
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	0.77
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	

Table 2.19. Fall indices of abundance for selected species, 1984-2008.

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.

	Fall																									84-07
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**	**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	
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	
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	24.67
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	171.77
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	
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	1.29
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	
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	
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	1.86
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	
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	
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	
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	
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	0.51
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	
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	0.21
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	0.21
kingfish, northern *	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.03	0.02	0.06	0.03	0.19	0.04	0.04	0.12	0.05	0.01	0.02	0.01	0.00	0.04	0.03	0.00	0.04	0.05	0.03
lobster, American **	7.41	3.33	4.75	5.95	3.54	3.75	7.29	9.90	9.52	11.50	10.13	8.05	10.07	19.60	10.47	11.18	6.83	4.28	2.68	3.03	3.68	2.10	1.48	1.21	2.07	6.74
mackerel, Spanish *	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.01	0.42	0.23	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.03
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	0.69
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	0.78
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	
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	
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	0.10
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	
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	172.30
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	
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	
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	3.18
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	1.04
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	0.07
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	
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	
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	0.16
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	120.27
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	
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	0.04
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	
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	20.29

Table 2.20. Finfish and invertebrate biomass indices for the spring sampling period, 1992-2008.
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
mackerel, Spanish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
menhaden, Atlantic	0.07	0.03	0.03	0.04	0.01	0.01	0.00	0.00	0.02	0.00	0.03	0.01	0.01	0.00	0.02	0.07	0.03
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
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
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
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
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
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
sea raven	0.03	0.00	0.00	0.00	0.01	0.00	0.05	0.03	0.05	0.02	0.03	0.01	0.01	0.00	0.00	0.02	0.00
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

Table 2.21. Finfish and invertebrate biomass indices for the fall sampling period, 1992-2008.
The geometric mean weight (kg) per tow was calculated for 38 finfish and 15 invertebrate species for the fall (Sept-Oct) sampling period.

	Fall																
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
mackerel, Spanish	0.01	0.04	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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

Table 2.22. Bluefish indices of abundance, 1984-2008.
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
84-07 mean	**17.22**	**2.39**	**3.45**	**5.50**

Table 2.23. Scup indices-at-age, 1984-2008.

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	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	18.4818	23.7191	5.6292	2.072	2.5571	3.1604	2.8971	0.5289	0.0065	0
2007	32.809	25.295	0	7.514	15.8649	5.8445	1.4891	0.5475	0.5357	0.541	0.3852	0.0726	0.0073
2008	92.117	75.160	0	16.9569	40.6204	27.8153	4.9362	0.9107	0.1581	0.303	0.2355	0.1478	0.0163
84-07 Mean	**27.405**	**16.580**	**0.000**	**10.825**	**7.334**	**6.718**	**1.423**	**0.617**	**0.278**	**0.160**	**0.043**	**0.004**	**0.002**

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	32.5615	8.1442	2.4374	4.0146	1.5049	1.6894	0.3322	0.0601	0	0
2006	116.755	13.575	52.1635	51.0162	9.5249	2.3407	0.257	0.3506	0.377	0.6807	0.044	0	0
2007	475.295	37.346	319.893	118.056	29.3351	5.9287	0.8955	0.2259	0.3019	0.313	0.3129	0.0332	0
2008	303.256	24.478	243.679	35.0993	11.9208	7.044	3.556	1.0547	0.5018	0.1369	0.1242	0.1397	0
84-07 Mean	**172.300**	**12.552**	**129.043**	**30.706**	**7.184**	**3.010**	**1.654**	**0.474**	**0.149**	**0.059**	**0.019**	**0.002**	**0.000**

(1) In 1984, 1985, 2003, 2004, and 2006 less than the number of scheduled tows were conducted in some months: in 1984, thirteen tows were conducted in May and nineteen in June; in 1985, five tows were conducted in June; in 2003, the 40 scheduled October tows were conducted in November and thus dropped; in 2004, thirty-nine tows were conducted in June; in 2006, twenty tows were conducted in September and twenty tows were conducted in early October; in 2008, no tows were conducted in September (see Table 2.4).

(2) A total of six fish were taken age 10+, all of which were taken between 1984 and 1988. The oldest fish aged was a 14-year-old taken in 1985.

Table 2.24. Age frequency of striped bass taken in spring, 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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**

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, 1984-2008.
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**
1984	0.02	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
1986	0.00	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
1988	0.04	0	0.0057	0.0057	0.0229	0	0.0057	0	0	0	0	0
1989	0.06	0	0.0273	0.0164	0.0055	0.0055	0.0055	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
1991	0.15	0	0.0516	0.0328	0.0141	0.0234	0	0.0094	0.0047	0.0094	0.0047	0
1992	0.22	0	0.0259	0.0518	0.0841	0.0324	0.0065	0	0.0129	0.0065	0	0
1993	0.27	0.0093	0.0140	0.0326	0.0745	0.0652	0.0372	0.0326	0.0047	0.0047	0	0
1994	0.30	0	0.0277	0.0462	0.0923	0.0831	0.0369	0.0046	0.0046	0.0046	0	0
1995	0.59	0	0.3855	0.1023	0.0315	0.0275	0.0236	0.0039	0.0118	0	0.0039	0
1996	0.63	0.0103	0.0411	0.3321	0.1267	0.0479	0.0240	0.0274	0.0068	0.0103	0	0.0034
1997	0.85	0	0.1286	0.4143	0.1429	0.0607	0.0500	0.0321	0.0143	0.0071	0	0
1998	0.97	0	0.3189	0.3269	0.1822	0.0750	0.0536	0.0080	0.0027	0.0027	0	0
1999	1.10	0	0.1346	0.2857	0.1379	0.3119	0.1510	0.0558	0.0131	0	0.0033	0.0033
2000	0.84	0.0037	0.4163	0.0737	0.0811	0.0811	0.1179	0.0442	0.0147	0.0037	0.0074	0
2001	0.61	0	0.1558	0.1359	0.0497	0.0928	0.1193	0.0431	0.0066	0.0066	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
2003	0.87	0.0042	0.1267	0.1605	0.0971	0.1647	0.1732	0.0971	0.0211	0.0296	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
2005	1.17	0	0.61	0.1497	0.1636	0.0915	0.0776	0.0444	0.025	0.0028	0	0.0028
2006	0.61	0	0.0189	0.1572	0.0943	0.1384	0.0692	0.0629	0.0252	0.0189	0.0189	0.0063
2007	1.02	0.0071	0.1629	0.386	0.1558	0.1558	0.0992	0.0319	0.0106	0.0035	0.0106	0
2008	0.57	0.0394	0.0717	0.0538	0.1721	0.1470	0.0394	0.0251	0.0108	0.0036	0.0072	0
84-07 mean	0.52	0.0019	0.1376	0.1307	0.0751	0.0709	0.0554	0.0264	0.0095	0.0053	0.0023	0.0008

Table 2.26. Summer flounder indices-at-age, 1984-2008.

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 2.18 and Table 2.19) by the percentage of fish in each age. The age 0-7+ index is the sum of indices ages 0-9.

Spring

Year	0-7+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11
1984	0.6291	0	0.3236	0.2610	0.0445	0	0	0	0	0	0	0	0
1985	0.4410	0	0.0166	0.3168	0.0489	0.0587	0	0	0	0	0	0	0
1986	0.9510	0	0.7700	0.0892	0.0742	0.0126	0.0050	0	0	0	0	0	0
1987	1.0572	0	0.9515	0.0793	0.0202	0.0036	0.0026	0	0	0	0	0	0
1988	0.4986	0	0.2317	0.2232	0.0352	0.0085	0	0	0	0	0	0	0
1989	0.1016	0	0.0111	0.0550	0.0191	0.0164	0	0	0	0	0	0	0
1990	0.3475	0	0.3053	0.0201	0.0156	0.0065	0	0	0	0	0	0	0
1991	0.6391	0	0.3892	0.2059	0.0205	0.0235	0	0	0	0	0	0	0
1992	0.5546	0	0.3182	0.1906	0.0229	0	0.0229	0	0	0	0	0	0
1993	0.5074	0	0.3216	0.1504	0.0101	0.0152	0.0101	0	0	0	0	0	0
1994	0.8601	0	0.4959	0.3136	0.0324	0	0	0	0.0182	0	0	0	0
1995	0.2796	0	0.2023	0.0608	0.0110	0	0	0	0.0055	0	0	0	0
1996	0.9609	0	0.6216	0.2370	0.0868	0	0.0052	0	0.0103	0	0	0	0
1997	0.9991	0	0.4481	0.4461	0.0740	0.0121	0.0134	0.0054	0	0	0	0	0
1998	1.3067	0	0.0734	0.5952	0.4693	0.1167	0.0324	0.0197	0	0	0	0	0
1999	1.4401	0	0.3263	0.5563	0.3521	0.1110	0.0696	0.0248	0	0	0	0	0
2000	1.7898	0	0.3805	0.7853	0.4240	0.0538	0.1316	0.0092	0	0.0054	0	0	0
2001	1.7468	0	0.8408	0.3395	0.3653	0.1073	0.0488	0.0333	0.0067	0.0051	0	0	0
2002	3.1851	0	1.0571	1.2637	0.4646	0.2233	0.0930	0.0362	0.0236	0.0145	0.0091	0	0
2003	3.4211	0	1.6080	1.0159	0.3949	0.2316	0.0851	0.0462	0.0327	0.0025	0.0042	0	0
2004	1.8381	0	0.2592	0.8180	0.4100	0.1878	0.0338	0.0817	0.0302	0.0145	0.0029	0	0
2005	0.8038	0	0.2523	0.2641	0.1495	0.0334	0.0364	0.0393	0.0196	0.0046	0.0046	0	0
2006	0.6129	0	0.0383	0.3597	0.0676	0.0654	0.0337	0.0263	0.0168	0.0051	0	0	0
2007	2.5073	0	1.1569	0.2053	0.5595	0.3163	0.1150	0.0888	0.0428	0.0152	0.0065	0.0010	0
2008	1.6145	0	0.6008	0.2912	0.2374	0.2633	0.1165	0.0622	0.0236	0.0033	0.0054	0.0054	0.0054
84-07 Mean	**1.1449**	**0.0000**	**0.4750**	**0.3688**	**0.1738**	**0.0668**	**0.0308**	**0.0171**	**0.0086**	**0.0028**	**0.0011**	**0.0000**	**0.0000**

Fall

Year	0-7+	Age 0	Age 1	Age 2	Age 3	Age 4	Age 5	Age 6	Age 7	Age 8	Age 9	Age 10	Age 11
1984	0.9888	0	0.5648	0.3269	0.0713	0.0140	0.0042	0.0042	0.0034	0	0	0	0
1985	1.1931	0.2453	0.3605	0.4984	0.0804	0	0.0085	0	0	0	0	0	0
1986	1.7157	0.1738	1.1902	0.2681	0.0817	0.0019	0	0	0	0	0	0	0
1987	1.3963	0.0749	1.0573	0.2309	0.0305	0.0027	0	0	0	0	0	0	0
1988	1.4159	0.0150	0.8739	0.4782	0.0366	0.0122	0	0	0	0	0	0	0
1989	0.1363	0	0.0227	0.1051	0.0085	0	0	0	0	0	0	0	0
1990	0.8678	0.0321	0.6720	0.1214	0.0339	0.0042	0.0042	0	0	0	0	0	0
1991	1.2557	0.0363	0.8141	0.3457	0.0432	0.0082	0.0041	0.0041	0	0	0	0	0
1992	1.0178	0.0131	0.5685	0.3578	0.0561	0.0134	0.0089	0	0	0	0	0	0
1993	1.1113	0.0842	0.8371	0.1490	0.0362	0.0029	0	0.0019	0	0	0	0	0
1994	0.5517	0.1325	0.3008	0.0957	0.0138	0.0089	0	0	0	0	0	0	0
1995	0.5408	0.0424	0.3812	0.1043	0.0090	0.0039	0	0	0	0	0	0	0
1996	2.1914	0.0840	1.0394	1.0276	0.0375	0.0029	0	0	0	0	0	0	0
1997	2.4980	0.0693	0.8494	1.2261	0.3016	0.0321	0.0099	0.0084	0.0012	0	0	0	0
1998	1.7153	0	0.3251	1.0456	0.2867	0.0392	0.0187	0	0	0	0	0	0
1999	2.6787	0.0482	0.8000	1.4412	0.2963	0.0823	0.0084	0.0023	0	0	0	0	0
2000	1.9134	0.1151	0.5117	0.8244	0.2971	0.1122	0.0433	0.0067	0	0.0029	0	0	0
2001	4.4181	0.0208	2.6891	1.1372	0.4342	0.1095	0.0153	0.0078	0	0.0042	0	0	0
2002	6.1211	0.4415	3.0870	1.9304	0.4769	0.1216	0.0429	0.0168	0.0040	0	0	0	0
2003	3.3879	0	1.4584	1.3192	0.4069	0.0873	0.0908	0.0164	0.0089	0	0	0	0
2004	1.9537	0.2545	0.3848	0.7551	0.4398	0.0804	0.0241	0.0150	0	0	0	0	0
2005	2.4099	0.0671	1.0930	0.7441	0.3554	0.0866	0.0316	0.0123	0.0166	0.0032	0	0	0
2006	1.3148	0.0976	0.2170	0.5915	0.2299	0.0957	0.0435	0.0214	0.0182	0	0	0	0
2007	1.8880	0.1295	0.5669	0.3869	0.4676	0.2012	0.0778	0.0408	0.0087	0.0043	0	0	0.0043
2008*	3.0854	0.6813	0.5150	1.1553	0.6595	0.0483	0.0126	0.0134	0	0	0	0	0
84-07 Mean	**1.8617**	**0.0907**	**0.8610**	**0.6463**	**0.1888**	**0.0468**	**0.0182**	**0.0066**	**0.0025**	**0.0006**	**0.0000**	**0.0000**	**0.0002**

** note: the 2008 fall index-at-age is calculated using LISTS 60cm+ samples and the pooled 2007 NMFS fall key only. The fall 2008 NMFS age key is not yet available for analysis.*

Table 2.27. Weakfish age 0 and age 1+ indices of abundance, 1984-2008.
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
84-07 mean	**20.07**	**1.43**	**0.27**	**0.35**	**0.16**	**0.22**

Table 2.28. Winter flounder indices-at-age, 1984-2008.

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	15.46	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	1.90	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	5.61	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	9.24	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	11.48	3.48	4.19	4.12	0.65	0.12	0.04	0.03	0.01	0	0	0.01	0
84-07 Mean	74.84	11.49	7.55	8.65	35.33	19.38	7.66	2.55	0.82	0.26	0.12	0.04	0.02	0.01	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
84-07 Mean	13.09	5.04	NA	0.31	3.51	4.24	2.91	1.30	0.49	0.19	0.09	0.04	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, and 1997-2004: 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.

TABLES 2.29 - 2.60
LENGTH FREQUENCIES
LISTS

Table 2.29. Alewife length frequencies, spring and fall, 1 cm intervals, 1989–2008.

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

Fall

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
6	0	0	0	0	0	0	0	0	0	0	0	0	0	1	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
8	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	1
9	0	0	0	0	3	1	0	0	1	0	0	1	6	1	1	0	1	0	3	2
10	0	0	0	0	5	1	4	1	1	0	1	4	23	0	7	1	7	0	8	2
11	0	0	0	0	27	30	5	5	6	1	3	5	59	0	33	6	14	0	22	1
12	0	0	0	1	120	82	9	25	12	9	6	9	86	4	64	7	8	0	44	0
13	0	0	3	0	88	84	14	21	21	7	9	17	72	0	4	12	17	0	87	5
14	0	0	2	4	16	36	11	30	31	0	11	10	23	3	3	16	15	0	134	14
15	0	0	1	8	21	31	0	9	53	0	5	8	24	3	5	28	15	2	118	4
16	3	0	3	10	53	14	4	1	110	1	25	2	36	17	20	30	12	4	31	0
17	2	0	0	12	25	33	1	2	194	4	34	0	27	8	19	12	3	0	8	3
18	3	0	0	9	13	24	1	1	62	3	11	1	5	0	0	1	5	0	6	0
19	0	0	0	2	1	11	0	0	0	1	4	1	0	1	0	0	0	0	7	1
20	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0
21	0	0	0	0	3	1	1	0	0	1	2	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
23	0	0	0	0	0	1	0	0	0	0	3	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
25	0	0	0	0	0	1	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
27	0	0	0	0	0	0	0	0	1	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**

Table 2.30. American shad length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989-2008.
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
7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0
9	0	0	0	0	8	2	17	0	6	9	5	5	2	13	6	1	6	0	0	0
11	0	0	1	3	7	2	16	5	24	27	20	46	1	101	12	8	11	0	5	26
13	4	0	10	8	4	4	11	9	59	85	31	29	2	87	11	14	10	0	20	78
15	49	1	82	17	6	22	22	191	177	108	65	21	2	41	0	45	25	38	54	180
17	29	8	49	23	10	72	68	154	319	97	52	32	4	49	3	6	4	14	44	51
19	5	5	4	33	6	374	40	47	62	32	20	13	0	17	0	2	0	5	8	11
21	1	3	10	25	6	158	6	9	2	1	35	1	0	4	4	2	6	0	3	3
23	0	3	31	20	5	18	2	16	5	8	50	4	0	7	7	4	7	0	4	3
25	0	2	10	7	1	6	0	15	1	7	14	2	3	4	0	0	3	0	7	0
27	0	1	1	0	0	2	0	5	0	1	1	1	0	0	0	0	2	0	4	0
29	0	0	0	0	0	1	0	0	0	0	0	0	0	5	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
33	0	0	0	0	0	0	0	1	3	0	3	3	0	1	0	0	1	0	2	0
35	0	1	1	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	1
37	0	0	0	2	0	1	0	0	4	0	1	0	0	1	0	0	1	1	0	0
39	1	0	0	3	2	2	1	0	2	0	4	0	0	2	0	0	0	1	1	0
41	1	0	1	5	2	3	2	0	3	0	3	0	0	0	0	0	0	1	0	0
43	0	0	1	4	2	1	0	0	1	1	6	0	0	2	0	0	0	0	0	0
45	1	0	1	7	2	3	2	0	0	0	1	0	0	0	0	0	0	0	0	0
47	0	0	0	2	0	1	2	0	1	0	1	0	0	0	0	0	1	0	0	0
49	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
51	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**91**	**24**	**202**	**163**	**61**	**675**	**189**	**452**	**669**	**378**	**313**	**157**	**14**	**337**	**43**	**83**	**79**	**60**	**152**	**353**

Fall

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

Table 2.31. American lobster length frequencies-spring, female, 1 cm intervals, 1984–2008.

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
Length	(32)	(46)	(116)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(119)	(120)	(80)	(120)	(120)
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**
leagal size			81.0			81.8									82.6								83.3	84.1	

Table 2.32. American lobster length frequencies–fall, female, 1 cm intervals, 1984–2008.

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
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)
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**
leagal size:			81.0			81.8																83.3		84.1	

Table 2.33. American lobster length frequencies–spring, male, 1 cm intervals, 1984–2008.

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
Length	(32)	(46)	(116)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(119)	(120)	(80)	(120)	(120)
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**
leagal size			81.0			81.8		82.6															83.3	84.1	

Table 2.34. American lobster length frequencies–fall, male, 1 cm intervals, 1984–2008.

Lobsters were measured from each tow.

Male														Fall													
Length	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)
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
leagal size:			81.0				81.8							82.6								83.3		84.1	

Table 2.35. Atlantic herring length frequencies, spring and fall, 1 cm intervals, 1989-2008.
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**
3	0	0	0	5	0	0	0	0	0	2	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
5	0	2	0	11	3	1	0	0	1	149	1,547	104	0	0	8	30	76	3	20	36
6	1	3	3	16	1	0	1	3	0	92	237	1	3	0	9	10	140	2	2	13
7	0	1	4	15	2	0	2	15	69	84	18	7	11	1	0	8	118	1	0	12
8	0	0	7	0	1	0	0	5	165	28	5	1	6	1	0	9	73	11	0	23
9	0	0	3	0	1	0	1	1	27	11	4	0	8	0	0	3	8	10	0	16
10	0	0	0	0	3	1	0	0	0	2	0	0	1	0	0	0	0	0	0	2
11	0	0	0	0	3	1	0	1	2	0	0	0	0	0	0	0	0	0	0	1
12	0	0	0	0	38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	8	0	0	215	8	0	0	5	0	0	0	0	0	0	1	3	0	0	0
14	0	1	0	0	203	11	0	1	29	0	0	0	1	0	0	9	7	0	0	0
15	2	0	8	0	122	9	6	0	59	5	0	0	2	0	0	49	14	0	9	1
16	3	1	38	0	174	17	7	3	12	8	0	3	0	0	0	65	20	0	14	0
17	2	31	33	0	100	42	8	2	4	5	0	6	2	0	0	140	63	0	27	2
18	2	4	29	2	28	32	12	0	10	2	0	0	1	0	3	275	98	0	166	6
19	0	16	19	29	21	39	12	6	21	0	1	0	11	2	1	117	57	0	467	1
20	0	161	67	15	41	43	78	10	40	5	1	6	65	3	2	67	67	0	228	7
21	0	333	72	24	35	29	283	26	14	4	2	11	85	17	0	12	19	0	99	11
22	0	424	70	111	96	14	399	15	19	11	10	38	77	32	0	16	11	3	105	9
23	0	201	160	61	387	111	245	20	7	4	15	36	14	87	4	0	15	4	106	13
24	0	195	297	311	436	224	290	22	18	1	19	47	33	71	17	0	25	3	150	27
25	0	315	337	751	645	485	416	46	117	2	9	99	31	18	36	3	21	5	122	38
26	1	447	360	503	921	560	1,028	85	202	31	10	70	46	30	63	3	78	3	125	39
27	0	347	514	382	807	947	723	93	236	33	35	80	24	27	65	14	106	9	122	38
28	0	338	513	391	825	604	706	64	234	44	37	104	34	19	72	9	87	6	116	36
29	2	247	319	492	550	387	337	37	82	21	25	69	29	52	52	1	40	3	47	15
30	0	156	383	142	287	204	231	29	31	1	11	24	8	3	27	3	19	1	6	6
31	2	127	139	77	129	29	14	4	15	2	0	0	4	0	8	1	0	0	0	2
32	0	50	22	1	33	6	14	1	2	1	1	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
34	0	8	1	0	8	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**

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

Table 2.36. Atlantic menhaden length frequency, fall, 1996-2008.

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.

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

Table 2.37. Black sea bass length frequencies, spring, 1 cm intervals, 1987-2008.
Since 1987, black sea bass have been measured from every tow.

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

Table 2.38. Black sea bass length frequencies, fall, 1 cm intervals, 1987-2008.
Since 1987, black sea bass have been measured from every tow.

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

Table 2.39. Blueback herring length frequencies, spring and fall, 1 cm intervals, 1989-2008.
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
6	0	0	0	0	0	0	1	0	0	2	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
8	0	0	3	0	2	76	20	4	0	5	0	10	7	12	7	9	8	1	0	8
9	0	0	2	0	3	114	11	5	21	15	0	14	5	9	23	23	14	8	1	11
10	0	0	5	10	7	74	9	19	45	45	0	18	2	9	26	47	6	23	9	14
11	0	0	3	4	9	41	9	10	258	48	0	28	1	6	11	39	10	2	3	12
12	3	0	5	0	2	9	5	3	4	16	0	18	2	3	4	20	12	0	5	2
13	0	0	0	4	0	13	5	2	0	2	0	12	1	1	1	12	3	1	3	4
14	0	0	0	15	0	5	3	1	1	1	0	3	0	0	0	0	7	0	1	1
15	0	0	1	27	1	3	4	7	0	0	1	2	0	4	0	0	8	1	2	2
16	0	0	0	65	0	8	3	7	0	3	5	1	1	1	4	4	13	2	23	1
17	0	0	1	11	3	9	1	10	4	0	5	3	10	7	4	4	11	2	37	7
18	0	1	0	2	0	3	0	4	2	0	0	5	15	2	3	3	1	2	7	3
19	0	0	0	0	1	2	4	3	2	0	0	0	3	0	0	3	2	1	3	2
20	0	0	0	4	0	1	1	0	0	0	0	2	1	1	0	0	5	2	0	1
21	2	1	2	0	0	1	1	3	0	0	0	1	3	0	0	3	2	3	2	0
22	1	0	0	1	0	3	0	4	0	1	0	3	0	0	1	0	1	0	1	1
23	0	0	3	2	0	3	2	3	1	0	0	5	0	1	0	1	0	0	1	1
24	0	1	2	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	2	0
25	0	0	0	1	0	1	1	1	0	0	0	1	0	0	2	0	0	1	1	0
26	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	3	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
Total	**6**	**3**	**29**	**147**	**30**	**373**	**83**	**90**	**338**	**140**	**11**	**136**	**52**	**56**	**89**	**173**	**104**	**49**	**101**	**71**

Fall

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

Table 2.40. Bluefish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.41. Bluefish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2008.
Bluefish lengths were recorded from every tow.

	Fall																								
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
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
7	1	2	0	0	0	0	0	2	33	0	1	0	0	3	13	4	0	1	1	0	0	0	2	0	0
9	2	11	0	5	3	0	3	51	325	5	82	1	0	148	429	293	2	40	9	8	18	77	11	31	0
11	38	18	20	95	116	78	75	315	474	82	1,450	162	7	2,946	1,774	1,205	64	302	153	103	1,072	729	315	126	21
13	1,308	148	65	430	603	743	107	540	392	603	5,722	825	65	4,163	3,566	654	210	259	399	110	1,168	950	413	535	421
15	2,559	1,789	514	982	334	1,500	508	443	497	432	3,786	216	602	870	1,267	637	410	458	342	44	428	390	241	365	708
17	1,797	2,067	932	546	779	2,342	1,183	1,086	1,060	698	1,862	641	3,323	1,005	287	863	370	1,247	106	661	274	619	401	1,148	67
19	426	554	386	118	780	2,436	1,222	1,164	838	2,445	1,041	1,897	1,845	769	211	435	1,200	670	149	1,487	556	1,527	286	3,397	89
21	246	96	169	19	532	903	507	627	263	1,174	803	934	487	332	199	913	2,246	391	617	1,011	677	1,188	108	2,152	69
23	68	21	86	9	193	198	150	398	28	214	469	202	32	154	216	1,096	840	161	723	104	550	429	64	853	8
25	19	24	15	5	18	18	62	212	1	66	265	14	7	25	370	1,032	337	76	355	2	339	178	28	221	2
27	2	5	0	0	1	5	9	32	0	10	62	3	0	3	167	476	9	18	50	0	53	32	14	18	1
29	0	2	0	0	0	0	0	1	0	0	1	0	0	0	7	53	0	5	1	0	10	0	2	4	2
31	0	0	0	1	0	0	1	0	0	0	0	0	0	1	0	1	0	0	1	0	2	0	0	1	0
33	0	0	0	2	0	0	6	0	0	0	0	2	0	0	1	0	0	0	3	0	14	0	4	1	0
35	0	0	0	4	1	0	17	0	3	0	0	22	0	1	1	0	0	0	13	1	79	0	4	3	0
37	4	8	1	16	2	1	41	1	21	0	10	92	0	2	2	1	2	15	27	6	188	0	27	5	5
39	25	66	35	56	6	10	145	19	118	4	30	192	2	52	28	7	31	52	67	20	428	0	50	45	42
41	64	133	118	84	23	72	245	130	169	19	116	125	18	110	46	15	129	90	152	15	212	15	25	79	35
43	32	63	101	41	31	101	156	229	77	42	125	37	22	52	28	11	73	31	86	13	33	43	11	69	13
45	6	14	20	21	32	34	25	137	35	79	32	10	23	20	30	1	16	15	10	6	15	57	2	40	10
47	13	11	63	9	25	19	25	69	72	74	7	19	61	6	29	7	9	15	8	14	27	38	1	25	11
49	21	55	52	11	19	21	17	88	179	81	9	20	74	27	33	9	14	25	14	19	47	35	6	32	20
51	25	58	43	14	16	19	36	73	210	50	13	21	38	16	23	7	32	26	13	18	59	57	4	26	29
53	31	44	21	14	18	32	16	21	162	26	42	25	17	10	9	10	40	12	18	7	22	22	12	23	28
55	20	25	9	25	8	21	5	5	90	11	56	6	10	5	9	4	16	5	12	6	31	8	7	11	12
57	13	9	4	30	1	12	1	3	54	33	32	3	10	8	2	10	3	4	12	8	48	14	7	5	3
59	4	5	15	11	12	7	3	6	29	69	11	1	8	10	6	12	6	8	9	4	40	15	5	13	5
61	6	20	5	9	8	4	5	6	10	108	20	4	8	10	5	3	11	10	3	5	17	12	6	31	11
63	2	13	11	5	15	4	9	6	11	54	20	5	2	5	10	3	6	3	6	3	21	27	2	25	10
65	0	12	11	6	12	2	13	1	12	30	39	7	1	2	7	3	11	2	5	1	22	14	3	23	5
67	0	11	11	3	14	4	12	1	3	16	49	5	3	4	5	3	7	5	6	1	9	11	1	14	14
69	1	7	8	10	17	10	12	9	4	2	35	4	2	1	2	6	3	5	7	1	12	10	0	11	10
71	1	1	13	4	7	19	15	5	11	1	17	5	3	1	1	7	8	1	7	2	6	1	0	1	11
73	1	2	3	8	7	7	16	5	15	11	7	4	1	5	1	0	2	2	4	1	6	3	0	5	3
75	2	1	5	3	9	5	13	8	17	8	5	4	7	3	4	5	1	1	1	1	1	4	0	1	1
77	0	3	1	1	3	4	10	6	6	4	8	3	8	6	1	1	0	0	3	0	3	1	0	0	1
79	0	2	2	1	1	3	1	2	4	6	2	1	0	1	0	1	1	2	1	0	0	0	0	1	0
81	0	1	0	0	0	1	2	0	1	0	4	1	2	0	0	1	1	0	0	0	1	0	0	0	0
83	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	**6,737**	**5,301**	**2,739**	**2,598**	**3,646**	**8,635**	**4,673**	**5,701**	**5,224**	**6,457**	**16,234**	**5,514**	**6,688**	**10,776**	**8,789**	**7,789**	**6,110**	**3,957**	**3,393**	**3,682**	**6,488**	**6,506**	**2,062**	**9,340**	**1,667**

Table 2.42 Butterfish length frequencies, 1 cm intervals, fall, 1986-1990, 1992–2008.
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
3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	1	2	4	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	0	0	0	0	2	0	6	0	2	0	0	4	0	51	1	29	1	0	1	5	3
6	0	0	0	0	0	0	0	35	0	21	3	0	0	0	207	0	7	20	0	2	0	1
7	0	0	0	2	0	0	0	57	1	7	0	3	0	0	202	0	3	95	1	0	0	3
8	0	0	0	2	0	0	0	18	0	0	0	0	0	1	107	0	0	101	2	4	0	0
9	0	0	0	0	0	0	0	0	4	0	57	5	4	0	15	0	4	47	0	61	12	1
10	4	0	0	40	0	2	0	4	7	0	165	183	10	0	5	4	10	146	10	201	73	53
11	29	0	0	269	5	16	3	28	20	19	618	622	16	84	51	44	130	427	27	540	292	74
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
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
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
15	66	0	27	3	26	50	9	117	24	255	1,033	173	122	122	236	851	137	64	234	493	234	646
16	57	0	20	10	26	49	25	156	44	275	951	267	148	31	381	669	155	126	124	173	190	654
17	25	0	14	7	38	41	23	92	25	178	654	175	137	47	332	490	64	107	81	104	146	396
18	20	0	0	0	18	38	10	44	14	83	307	88	106	28	284	335	36	50	71	72	85	405
19	7	0	0	4	16	27	4	9	3	48	110	70	24	23	128	249	26	21	59	84	22	179
20	0	0	1	2	7	10	0	4	1	13	72	29	27	21	53	142	16	9	12	27	18	56
21	4	0	0	1	5	1	0	0	0	2	22	3	8	7	7	26	4	1	4	1	0	1
22	4	0	0	0	7	0	1	0	0	0	0	5	3	0	1	4	4	1	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
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	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**

Fall

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
2	0	1	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
4	0	2	87	0	0	0	20	1	8	2	2	1	3	0	16	15	0	7	0	1	15	0
5	0	3	1,141	23	3	475	436	16	268	180	33	20	13	72	69	53	52	29	260	2	152	29
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
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
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
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
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
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
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
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
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
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
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
17	184	124	228	117	133	130	124	144	853	392	335	574	158	392	391	152	66	208	137	398	228	539
18	48	59	115	102	83	347	54	110	429	59	407	168	80	198	310	266	8	89	177	77	145	243
19	30	10	19	27	91	16	19	2	68	34	211	263	62	106	199	206	0	29	44	39	110	11
20	4	8	2	26	8	8	3	0	0	11	20	14	7	4	155	94	13	16	11	3	1	68
21	18	2	0	0	0	1	8	1	0	0	10	62	6	1	31	15	1	1	4	0	0	1
22	0	0	0	2	0	0	8	0	0	0	0	0	0	0	0	14	1	1	1	0	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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**

Table 2.43. Fourspot flounder length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989, 1990, 1996-2008.

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
13	2	0	0	0	0	1	0	1	0	0	0	0	1	0	0
15	5	2	0	0	5	5	0	0	3	0	3	0	0	0	0
17	21	8	1	3	8	12	1	2	17	2	13	0	0	6	0
19	19	19	8	16	14	61	22	5	89	8	8	0	6	7	7
21	17	42	31	60	13	28	26	4	99	6	4	1	18	11	9
23	11	341	198	161	16	32	239	42	33	8	4	14	24	9	17
25	56	528	279	353	105	72	422	181	84	124	26	71	29	44	39
27	103	225	208	456	209	97	256	300	199	228	82	75	33	105	81
29	120	139	193	392	233	81	201	245	191	187	129	64	44	170	108
31	89	60	117	192	137	66	139	153	175	163	178	68	61	121	94
33	51	27	54	76	60	60	81	45	89	88	113	52	36	52	70
35	8	33	15	22	16	25	39	11	26	47	35	31	13	43	34
37	2	12	6	3	4	7	12	8	7	12	5	11	4	9	11
39	0	4	3	0	2	1	1	2	3	6	2	3	1	7	2
41	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0
43	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
45	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Total	**504**	**1,440**	**1,113**	**1,734**	**822**	**548**	**1,439**	**999**	**1,015**	**879**	**602**	**394**	**271**	**585**	**472**

Fall

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

Table 2.44. Hickory shad length frequencies, spring and fall, 1 cm intervals, 1991-2008.
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**
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
17	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	0	0
18	0	0	0	1	0	1	0	0	2	0	0	0	0	0	1	7	1	2
19	0	0	0	1	0	0	1	0	0	0	0	0	0	3	5	6	0	1
20	0	0	0	0	0	2	0	2	0	0	0	0	0	2	4	2	0	0
21	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	1	1	0
22	0	0	0	0	0	0	0	0	1	0	2	0	0	1	1	0	0	0
23	0	0	1	0	0	0	0	0	1	0	0	0	1	2	0	2	1	0
24	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	0
25	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	6	5	0
26	0	0	0	0	0	0	0	1	0	0	0	2	0	0	6	5	2	0
27	0	0	0	0	0	0	1	0	1	0	0	1	0	0	18	3	5	0
28	0	0	0	1	0	1	1	1	2	2	0	4	1	0	14	3	3	0
29	0	0	0	0	0	0	2	4	1	7	0	5	0	2	5	2	1	0
30	0	0	1	1	1	0	1	5	1	5	0	5	3	1	6	5	2	0
31	0	0	0	0	1	1	1	2	1	4	0	2	0	0	1	0	2	0
32	0	2	0	0	0	3	0	6	6	2	1	2	1	1	0	5	1	0
33	0	0	0	0	0	2	1	2	3	1	0	3	2	0	0	0	1	0
34	0	0	0	0	0	0	1	3	1	2	2	1	3	1	2	1	1	0
35	0	0	1	0	0	1	0	2	2	2	0	4	2	2	2	0	0	0
36	0	0	0	0	0	0	0	2	1	1	0	4	1	0	1	0	0	0
37	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0
38	0	0	0	0	0	0	0	1	0	0	1	2	2	1	1	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0
40	0	0	0	0	0	0	0	0	0	0	1	1	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
42	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
44	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
46	0	0	0	0	0	0	0	0	0	0	1	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**

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

Table 2.45. Horseshoe crab length frequencies by sex, spring, 1 cm intervals, 1998-2008.
Horseshoe crabs were measured (prosomal width) from every tow.

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

*note: horseshoe crabs were not sexed during the spring of 1998.

Table 2.46. Horseshoe crab length frequencies by sex, fall, 1 cm intervals, 1998-2008.
Horseshoe crabs were measured (prosomal width) from every tow.

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

Table 2.47. Long-finned squid length frequencies, spring and fall, 2 cm intervals (midpoint given), 1986-1990, 1992-2008.
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
3	0	0	0	0	0	0	0	0	1	5	1	18	4	11	0	7	0	6	0	1	2	125
5	0	1	38	0	1	10	73	168	135	62	46	426	42	68	17	92	27	121	12	30	44	440
7	2	8	113	0	0	25	196	225	354	57	90	769	38	50	39	64	15	153	24	21	57	214
9	5	13	71	2	3	40	90	146	311	74	86	449	61	36	68	55	37	75	13	20	49	109
11	3	32	129	5	13	45	107	211	615	130	121	201	129	57	126	89	57	143	39	91	103	278
13	43	335	354	18	35	129	296	257	624	172	223	84	194	203	177	147	141	519	197	285	124	332
15	45	611	594	84	126	178	372	188	278	158	393	31	193	196	91	148	137	862	442	256	95	181
17	21	822	522	191	289	120	507	147	178	85	340	19	110	135	65	93	83	827	407	239	49	136
19	59	569	445	187	272	89	345	52	119	68	188	15	61	90	42	34	38	343	198	117	40	68
21	52	542	245	91	157	97	170	31	95	34	117	10	38	59	38	33	29	260	135	90	16	59
23	26	398	145	82	107	68	72	23	26	16	106	11	21	37	20	15	26	164	89	58	12	21
25	19	369	98	63	111	20	44	16	17	9	94	3	26	24	19	8	21	104	64	43	10	14
27	13	439	78	85	85	35	48	9	40	4	43	5	7	19	9	7	7	45	37	17	5	7
29	4	219	29	40	81	27	34	5	7	4	11	3	7	1	7	5	2	20	12	10	2	2
31	8	199	38	23	36	7	9	3	12	1	14	1	1	1	2	8	2	14	2	8	2	0
33	0	86	14	13	15	10	7	1	5	1	5	0	1	1	1	4	0	1	1	1	0	0
35	1	38	0	0	11	2	2	2	8	0	4	0	0	1	2	1	0	0	0	0	0	0
37	2	38	4	5	6	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0
39	0	1	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
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**

Fall

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
3	0	157	59	113	74	316	914	89	181	82	130	135	133	55	36	90	90	171	101	181	29	119
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
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
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
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
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
15	0	108	20	34	9	58	463	510	187	243	75	302	369	332	134	65	3	151	108	35	403	65
17	0	19	11	22	6	0	127	174	48	62	28	113	231	174	40	16	0	44	55	25	262	12
19	0	2	23	6	1	0	22	43	2	7	10	17	117	42	5	4	0	9	3	23	76	0
21	0	28	0	8	1	0	2	10	0	0	1	1	45	12	3	1	0	4	2	1	4	0
23	0	2	0	6	1	0	2	12	0	6	0	1	21	0	0	0	0	0	2	0	0	0
25	0	1	0	3	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	5	0
Total	**180**	**5,770**	**3,688**	**3,118**	**2,977**	**21,872**	**26,879**	**16,233**	**13,446**	**13,904**	**6,791**	**16,768**	**13,115**	**11,016**	**5,562**	**5,610**	**13,762**	**12,245**	**12,763**	**4,430**	**19,364**	**5,085**

Table 2.48. Scup spring length frequencies, 1 cm intervals, 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.49. Scup fall length frequencies, 1 cm intervals, 1984-2008.
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**
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
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
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
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
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
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
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
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	6,382
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
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
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
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
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
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
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
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
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
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	89
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.50. Striped bass spring length frequencies, 2 cm intervals (midpoint given), 1984–2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.51. Striped bass fall length frequencies, 2 cm intervals (midpoint given), 1984–2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.52. Summer flounder length frequencies, spring, 2 cm intervals (midpoint given), 1984–2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.53. Summer flounder length frequencies, fall, 2 cm intervals (midpoint given), 1984–2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.54. Tautog length frequencies, spring, 2 cm intervals (midpoint given), 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
41	19	14	65	20	25	38	19	27	14	4	12	4	13	5	16	7	28	27	55	15	20	18	16	16	8
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
45	36	27	53	23	34	52	49	31	21	11	15	2	7	12	17	17	28	23	71	16	30	10	15	25	15
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.55. Weakfish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.56. Weakfish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2008.

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**
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
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
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	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.57. Windowpane flounder length frequencies, spring and fall, 1 cm intervals, 1989, 1990, 1994-2008.
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
4	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0
5	4	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
6	0	0	0	0	0	2	0	2	5	1	1	10	2	0	0	1	0
7	0	0	0	0	1	4	2	4	17	2	7	22	3	0	0	7	3
8	0	2	4	1	3	5	4	3	27	7	6	23	6	0	0	31	5
9	0	40	16	3	2	9	5	2	11	10	21	20	11	0	0	18	6
10	25	66	67	12	34	15	7	8	17	13	12	11	19	7	2	4	11
11	69	96	169	86	79	37	19	20	5	29	8	3	24	12	1	4	11
12	89	74	305	148	162	76	60	40	3	23	10	7	25	16	7	8	17
13	337	53	362	259	288	136	131	37	10	29	5	9	58	25	12	22	13
14	430	66	232	189	381	309	200	45	11	26	8	13	100	22	34	28	44
15	414	124	152	180	487	362	211	96	24	43	15	13	101	23	42	60	51
16	305	180	126	89	310	606	177	123	27	55	12	15	72	37	36	107	119
17	174	212	209	70	331	754	130	165	23	73	9	15	65	22	48	129	137
18	78	178	372	99	339	588	165	160	32	94	24	23	56	4	45	132	116
19	65	132	357	139	548	440	260	194	26	78	19	26	45	16	20	110	101
20	174	144	289	143	604	366	362	386	75	89	15	31	60	13	24	130	76
21	216	116	217	85	567	429	461	357	136	95	22	45	32	22	24	186	122
22	299	143	139	82	401	438	311	301	166	232	45	50	42	29	27	246	155
23	319	108	163	57	409	368	229	217	138	290	110	92	39	42	28	181	216
24	270	103	147	54	280	323	227	217	125	245	141	123	66	36	41	158	132
25	177	87	183	54	236	231	188	206	121	208	133	111	109	47	31	162	118
26	189	103	184	70	235	191	178	136	106	126	114	76	100	52	52	186	103
27	138	79	138	56	187	222	162	161	91	88	69	88	86	49	37	104	100
28	148	38	70	44	117	145	138	97	56	83	62	68	71	29	38	100	111
29	78	26	68	24	97	98	67	53	47	59	41	37	48	24	24	65	52
30	99	35	42	27	66	75	58	42	37	39	42	35	51	20	14	33	46
31	50	20	25	12	31	23	34	39	12	25	19	22	32	13	8	14	22
32	8	15	13	4	25	12	13	26	16	21	17	9	16	5	2	23	19
33	16	3	2	9	5	8	6	3	8	15	7	2	10	1	3	2	5
34	0	5	5	0	4	1	1	1	2	5	4	4	9	3	0	4	5
35	0	4	5	1	3	0	3	4	5	10	2	4	5	0	0	3	3
36	0	4	2	2	1	1	0	0	1	2	0	5	0	2	0	0	1
37	0	0	0	1	0	0	3	1	1	2	2	1	1	0	0	0	0
38	0	0	0	0	0	0	0	0	0	1	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
40	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
42	0	0	0	0	1	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**

Fall

length	1989	1990	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
6	1	0	1	0	0	0	0	0	3	1	0	0	3	0	0	0	0
7	5	0	5	0	6	0	1	0	0	0	0	2	0	0	0	0	0
8	8	3	18	5	24	15	1	0	6	9	0	5	11	14	5	4	0
9	25	2	28	6	70	17	2	2	2	2	0	21	15	49	2	6	2
10	18	11	78	10	165	50	2	4	3	9	1	20	22	67	1	14	5
11	15	9	60	22	227	75	31	11	7	14	0	13	27	111	5	18	3
12	16	12	50	15	270	107	33	6	9	9	1	6	16	155	2	26	15
13	23	6	30	10	285	173	47	3	11	9	6	0	14	145	8	44	43
14	33	14	11	13	306	154	48	5	23	6	0	4	8	109	3	36	58
15	58	23	23	9	250	110	39	6	18	3	5	8	3	62	2	37	38
16	140	38	15	16	181	60	34	3	11	3	5	9	3	33	0	30	28
17	188	44	35	26	112	78	33	11	30	7	14	4	9	12	7	21	20
18	91	53	47	48	101	119	54	11	15	12	8	11	2	8	19	19	16
19	46	46	49	47	145	179	95	44	29	6	10	7	11	20	32	26	10
20	49	28	39	48	131	213	96	67	30	13	9	6	18	30	39	39	31
21	21	11	23	24	125	165	69	38	52	18	9	11	35	50	25	36	40
22	14	14	16	19	65	123	37	18	28	22	21	2	25	48	25	42	25
23	3	10	20	6	67	63	32	12	37	30	39	6	10	14	12	32	27
24	9	4	7	9	25	49	13	11	33	19	39	11	15	13	9	19	32
25	4	3	6	3	22	28	9	6	18	19	25	14	8	10	10	6	9
26	2	0	8	3	19	29	9	4	16	9	10	18	4	3	4	8	16
27	6	2	3	1	11	17	8	3	5	11	12	17	4	5	3	4	5
28	2	1	4	1	3	12	1	1	4	5	6	9	2	3	3	3	2
29	2	2	0	1	2	17	0	1	6	3	1	4	2	3	1	3	2
30	2	1	2	1	0	5	0	0	1	2	2	2	0	1	1	0	0
31	0	0	0	0	0	0	0	0	0	1	0	3	1	2	0	0	2
32	1	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0
33	0	0	0	0	1	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**

Table 2.58. Winter flounder length frequencies, April-May, 1 cm intervals, 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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	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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.59. Winter flounder length frequencies, fall, 1 cm intervals, 1984-2008.
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**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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**

Table 2.60. Winter skate length frequencies, spring and fall, 2 cm intervals (midpoint given), 1995-2008.
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
27	0	0	0	0	0	1	0	0	0	0	0	0	0	0
29	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
33	0	0	0	0	0	0	0	0	0	1	0	0	0	1
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	1	0	0	3	0	0	1	1
39	0	0	0	0	0	0	0	1	2	2	0	0	1	0
41	0	0	0	0	0	0	0	1	1	2	0	0	1	1
43	0	0	0	0	0	3	0	1	2	4	1	0	0	1
45	0	0	0	0	1	3	0	0	0	6	0	0	2	1
47	0	0	0	0	0	2	0	0	0	4	3	0	3	0
49	0	0	0	0	0	2	0	0	1	2	1	1	1	2
51	0	1	0	1	0	0	0	1	1	0	1	0	0	0
53	0	0	0	0	1	3	1	0	1	0	0	1	1	0
55	0	0	2	3	1	1	0	0	1	1	1	4	3	0
57	1	2	4	3	2	0	0	0	6	0	0	1	2	1
59	5	4	1	5	3	2	0	1	1	2	0	1	0	0
61	1	5	2	1	0	0	3	1	1	1	3	1	1	3
63	2	2	2	4	1	0	0	1	2	3	2	2	0	1
65	4	2	4	7	0	0	0	0	0	0	1	1	1	2
67	1	1	2	2	1	1	0	1	1	1	3	3	0	1
69	2	0	1	4	2	0	0	1	4	1	0	1	2	3
71	1	3	2	3	1	2	2	1	2	2	0	1	2	3
73	0	3	0	0	0	1	2	4	0	2	1	4	3	1
75	4	4	1	5	3	1	2	1	3	1	0	1	4	3
77	0	2	3	6	7	2	1	1	1	1	0	0	2	4
79	1	2	1	4	1	1	2	3	1	1	1	0	4	3
81	0	4	0	3	2	1	1	2	3	3	0	1	1	1
83	0	3	0	2	0	0	1	0	1	1	0	0	1	0
85	0	2	1	1	0	3	1	2	1	0	0	0	0	0
87	0	0	0	0	0	0	1	1	1	0	0	0	0	1
89	0	0	0	1	0	0	0	0	0	0	0	0	0	1
91	0	0	0	0	0	0	0	1	0	0	0	0	0	0
93	0	0	1	0	0	0	0	1	0	1	0	0	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Total	**22**	**40**	**27**	**55**	**26**	**29**	**18**	**26**	**37**	**45**	**18**	**23**	**37**	**35**

Fall

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

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FIGURES 2.1 - 2.13
LISTS

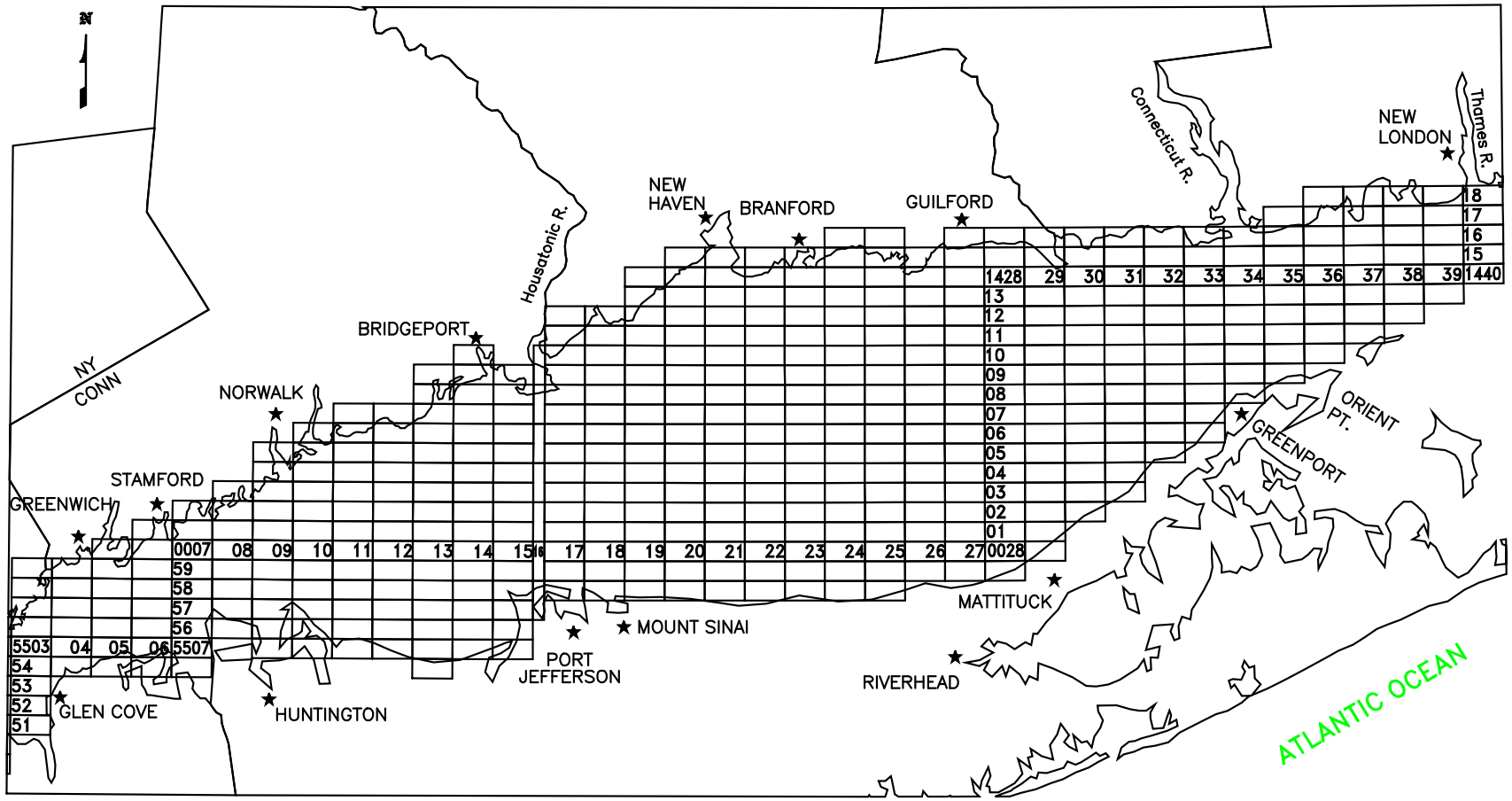
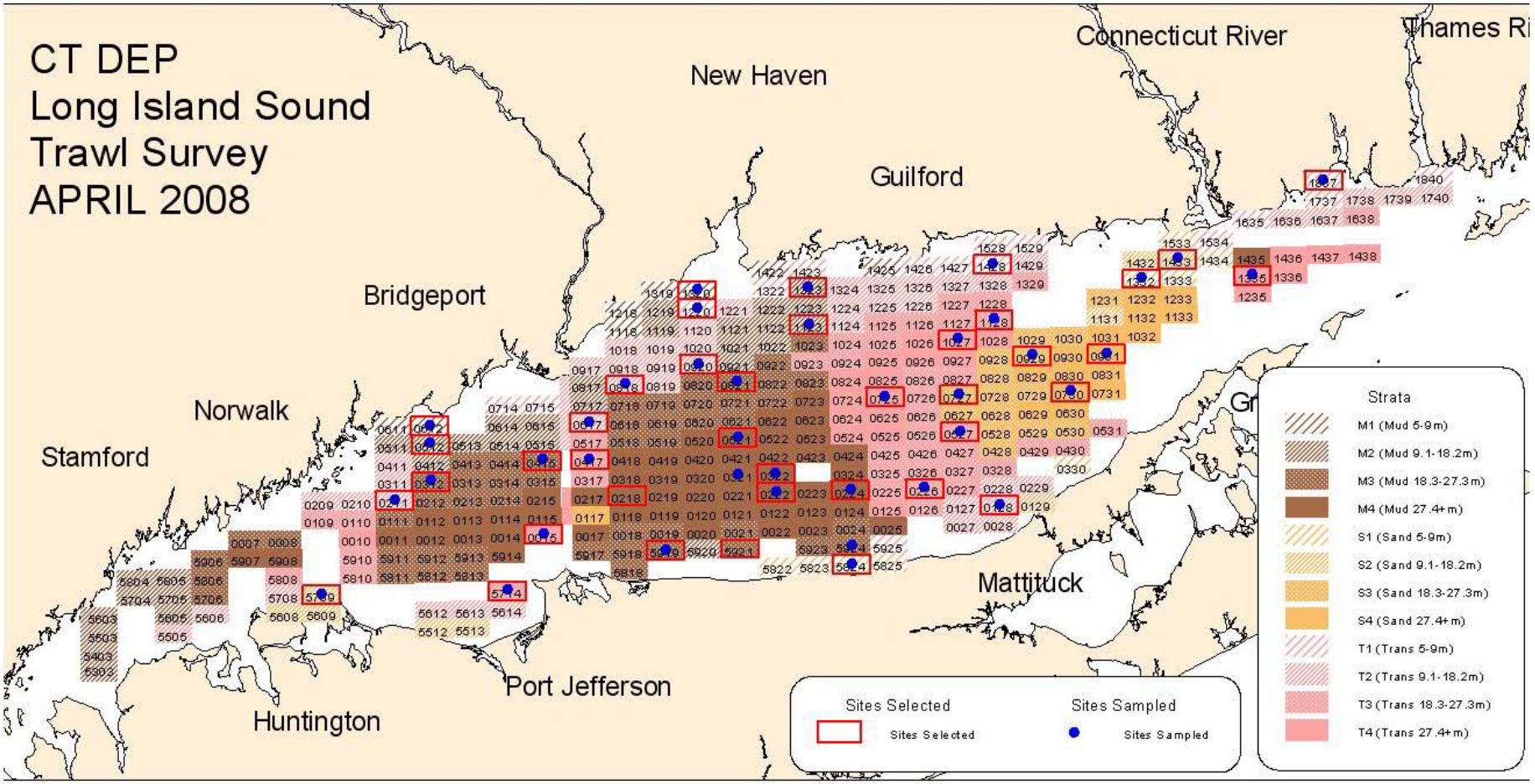


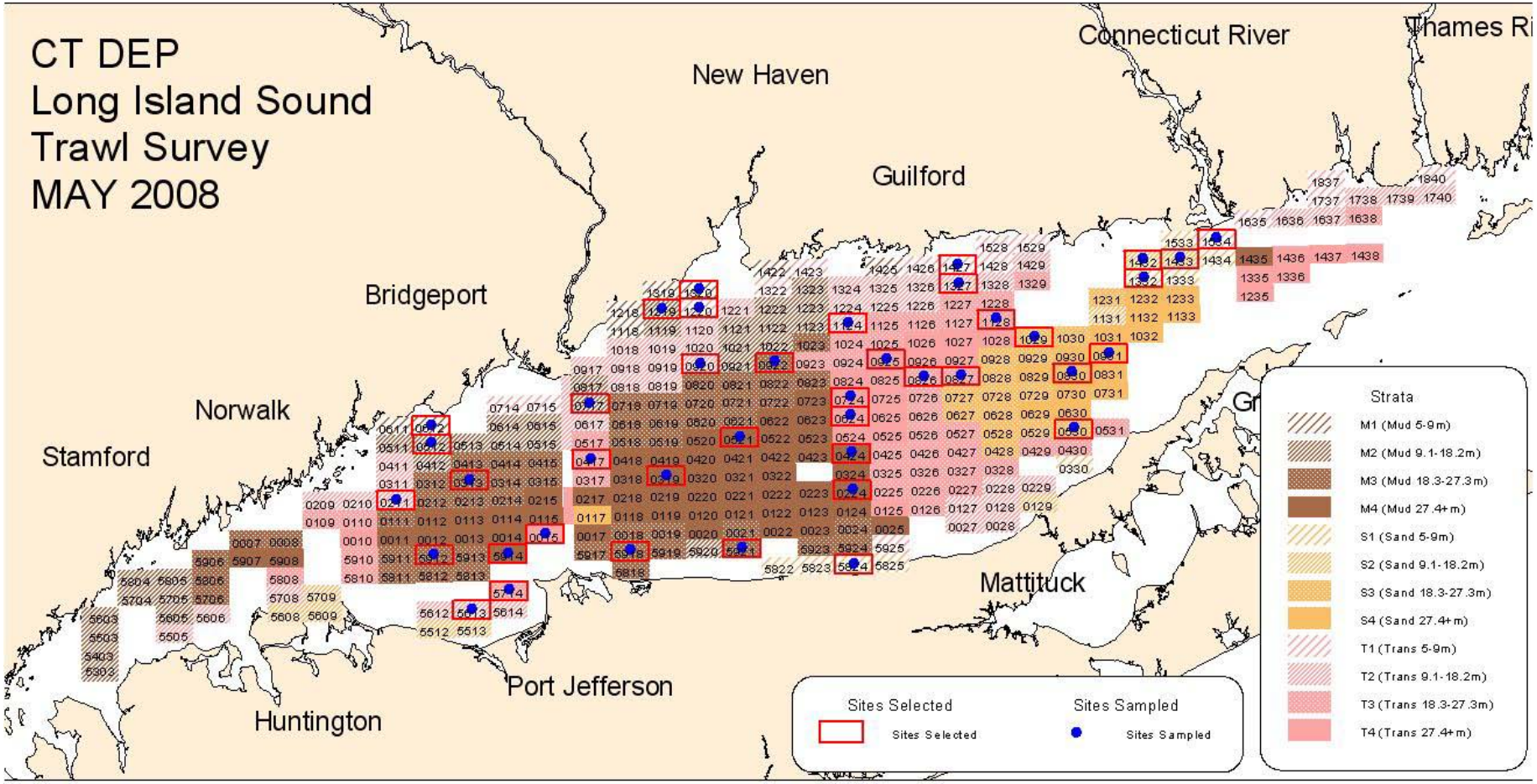
Figure 2.1. Trawl Survey site grid. *Each sampling site is 1x2 nmi (nautical miles). A four-digit number identifies the site: the first two digits are the row numbers (corresponding to minutes of latitude) and the last two digits are the column numbers (corresponding to two nautical miles in length on 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 2008 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples that were collected from a different site than originally selected are noted in table below map.*



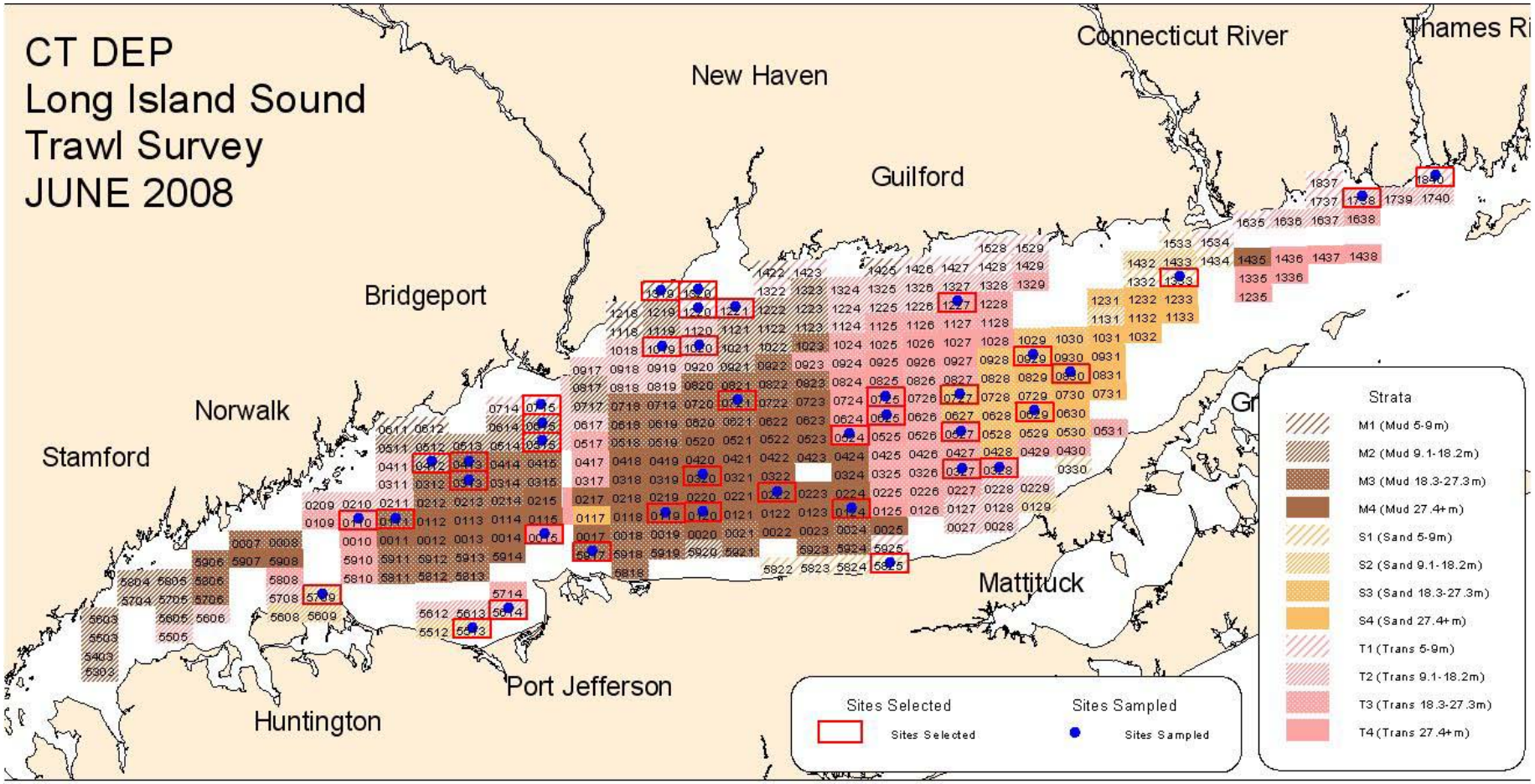
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	# Attempts before Moving	Reason Moved
SP2008010	5924	M3	5921	M3	0	Phone call from commercial fisherman - has pot gear there.
SP2008021	0320	M4	0218	M4	1	Phone call from commercial fisherman - has pot gear in area. Tried to do 0321(M4) but snagged different fisherman's pots.

Figure 2.3. May 2008 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Narrows sites sampled in western LIS are denoted as green dots. Samples that were collected from a different site than originally selected are noted in table below map.*



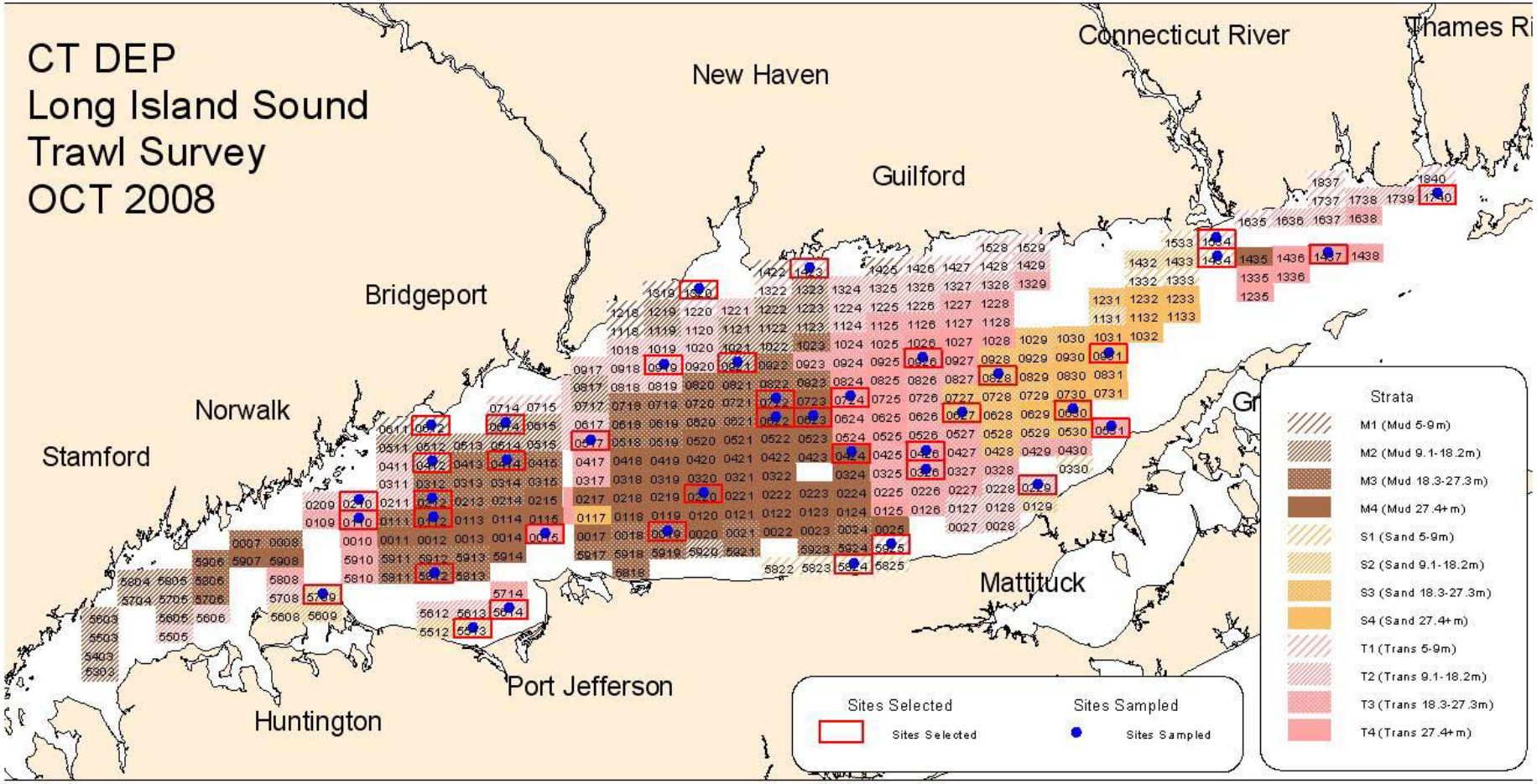
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	# Attempts before Moving	Reason Moved
NO SITES WERE MOVED IN MAY 2008						

Figure 2.4. June 2008 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples that were collected from a different site than originally selected are noted in table below map.*



Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	# Attempts before Moving	Reason Moved
NO SITES WERE MOVED IN JUNE 2008						

Figure 2.5. October 2008 sites selected and sampled. *The red outlined rectangles are the sites selected for the cruise and the blue dots are the sites sampled. Samples that were collected from a different site than originally selected are noted in table below map.*



Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	# Attempts before Moving	Reason Moved
NO SITES WERE MOVED IN OCTOBER 2008						

Figure 2.6. Number of finfish species observed annually, 1984-2008.

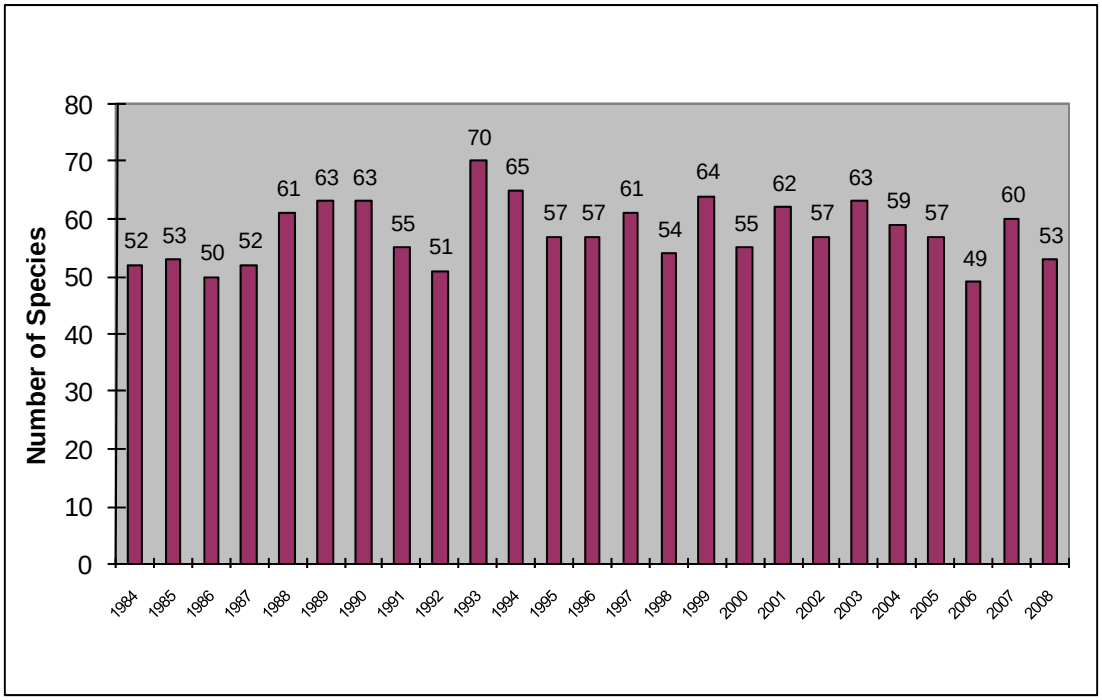
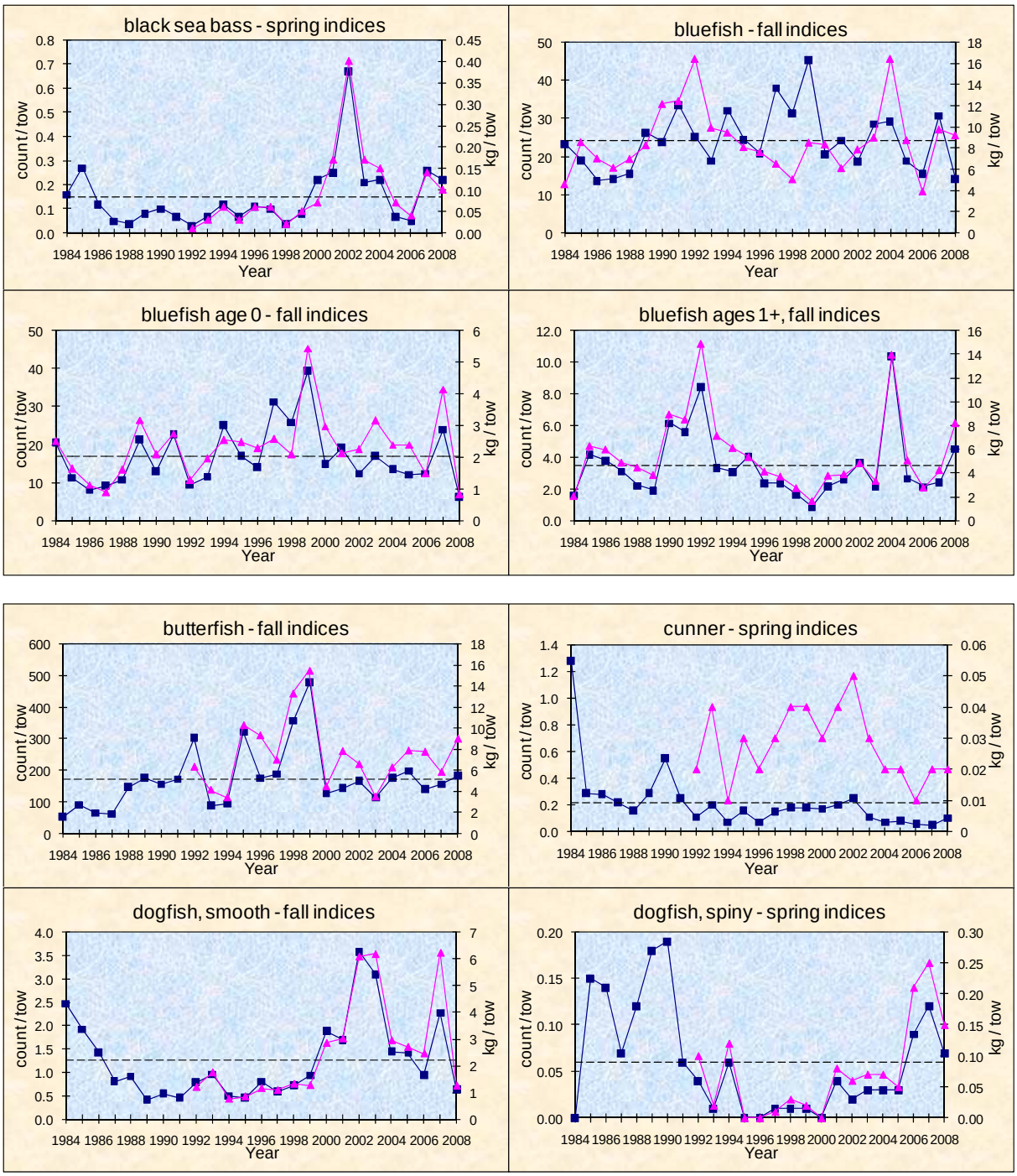


Figure 2.7. Plots of abundance indices for: black sea bass, bluefish (total, age 0, and ages 1+), butterfish, cunner, and dogfish (smooth and spiny).



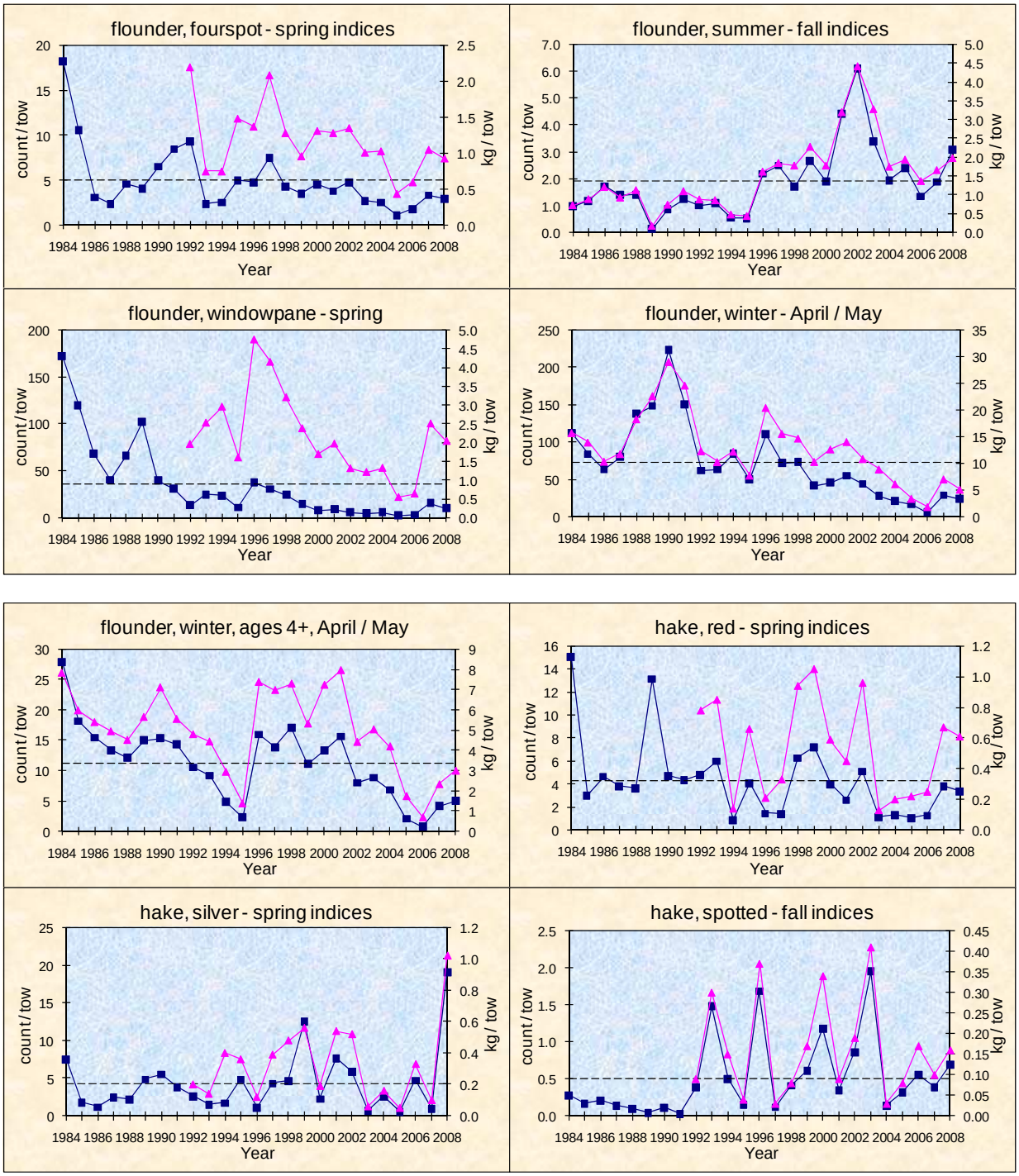
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.8. Plots of abundance indices for: flounders (fourspot, summer, windowpane, winter, and winter ages 4+) and hakes (red, silver, and spotted).



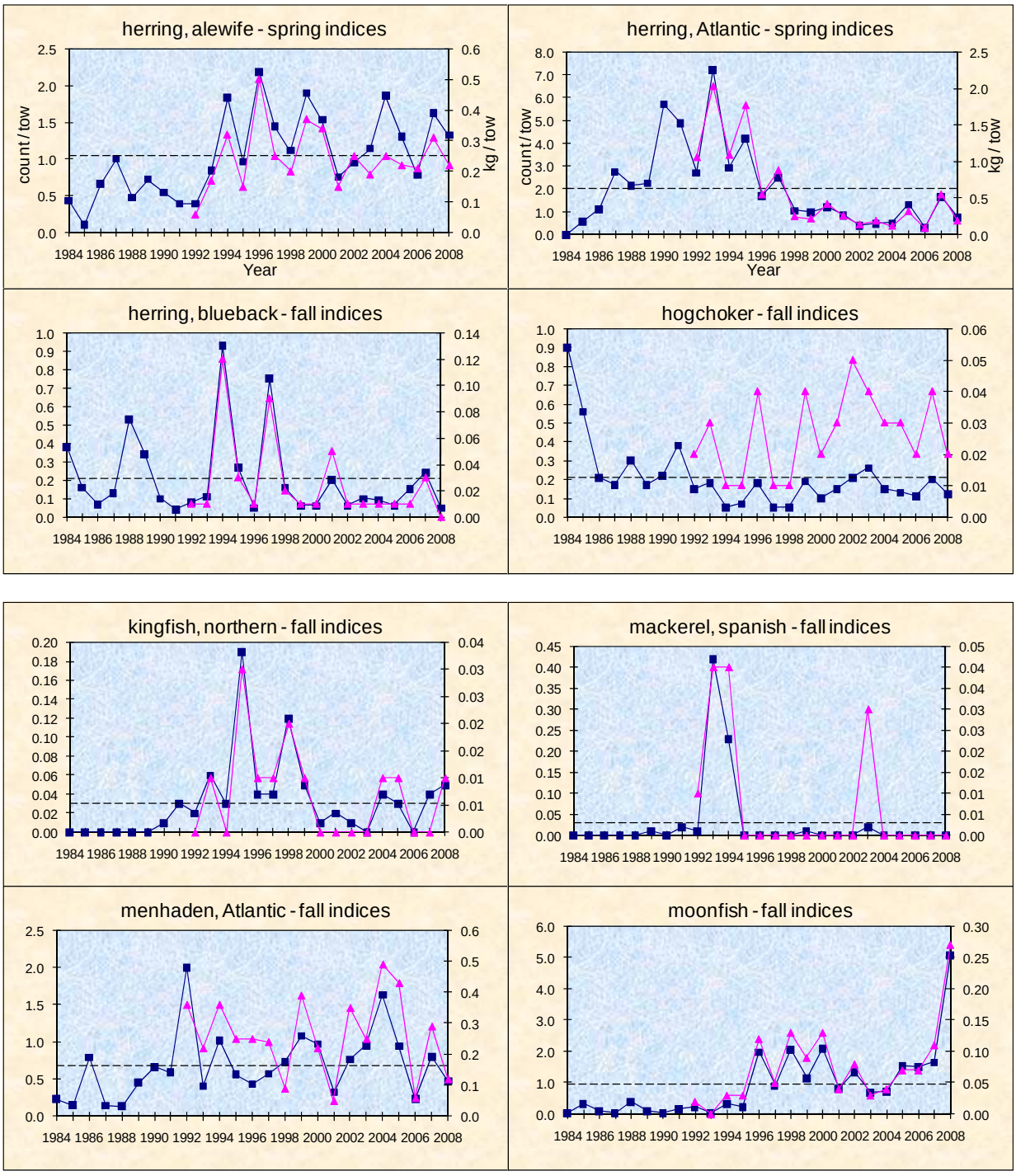
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.9. Plots of abundance indices for: herrings (alewife, Atlantic, and blueback), hogchoker, Northern kingfish, Spanish mackerel, Atlantic menhaden, and moonfish.



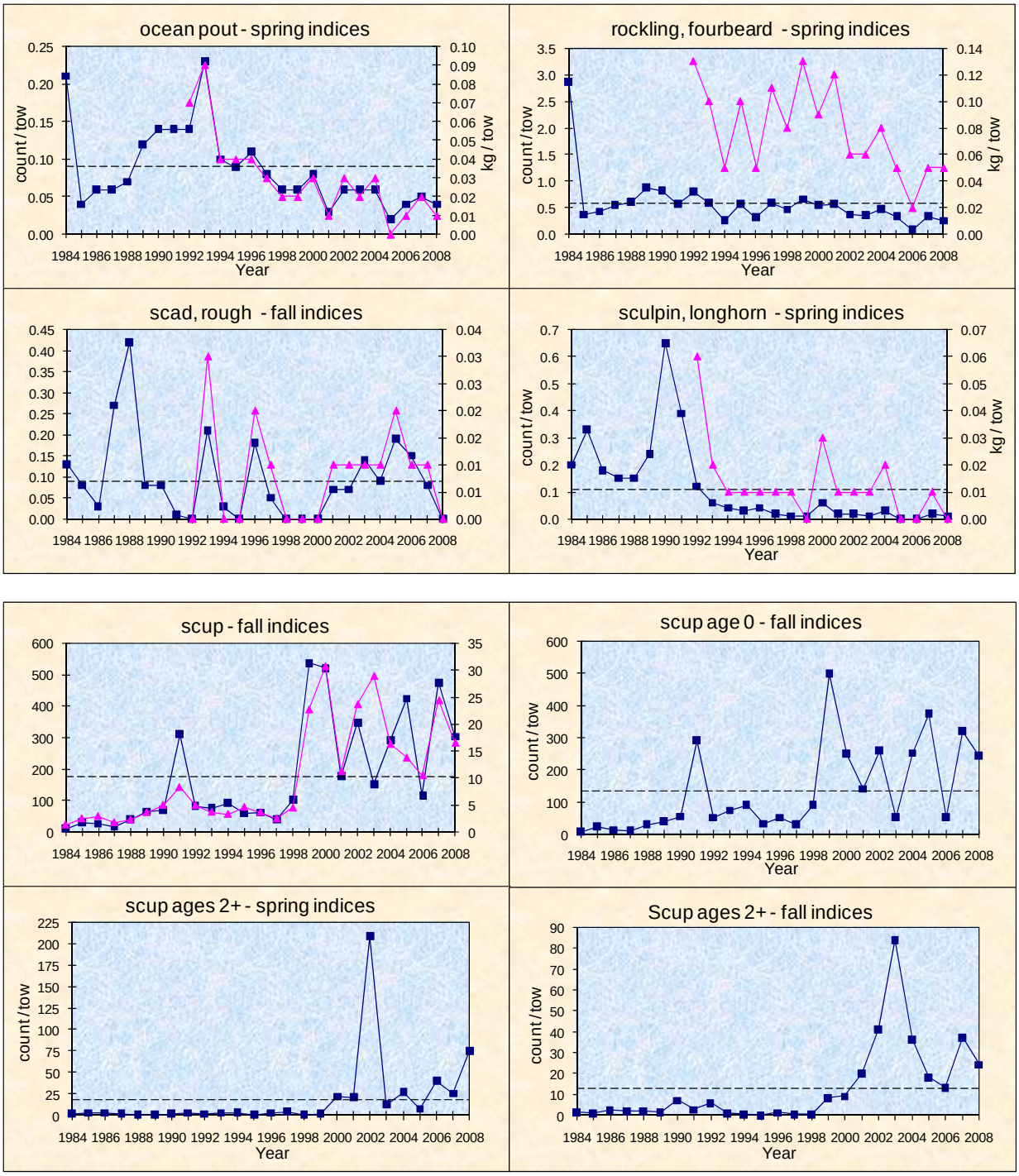
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.10. Plots of abundance indices for: ocean pout, fourbeard rockling, rough scad, longhorn sculpin, and scup (all ages, age 0, and ages 2+).



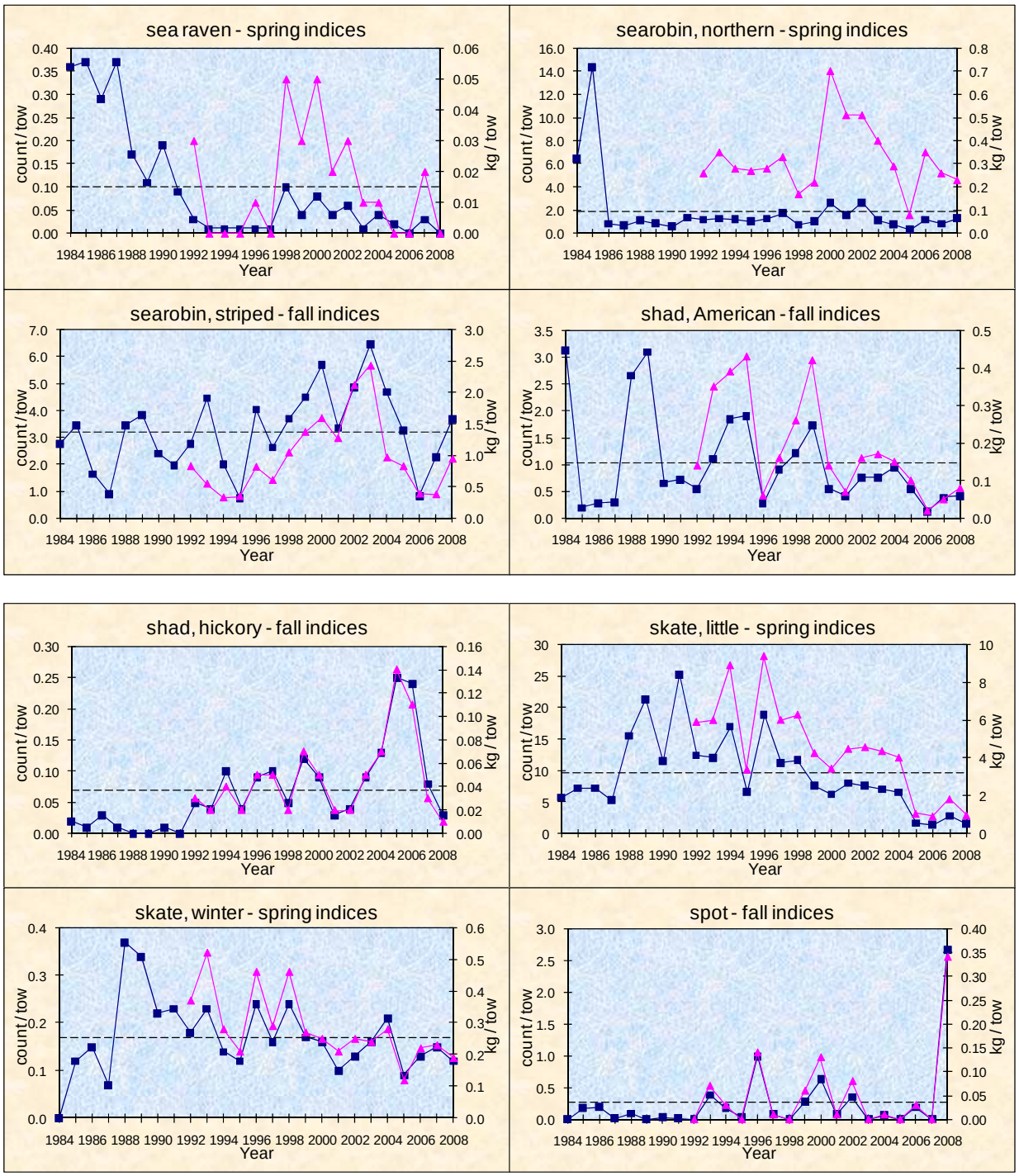
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.11. Plots of abundance indices for: sea raven, searobins (striped and northern), shad (American and hickory), skates (little and winter), and spot.



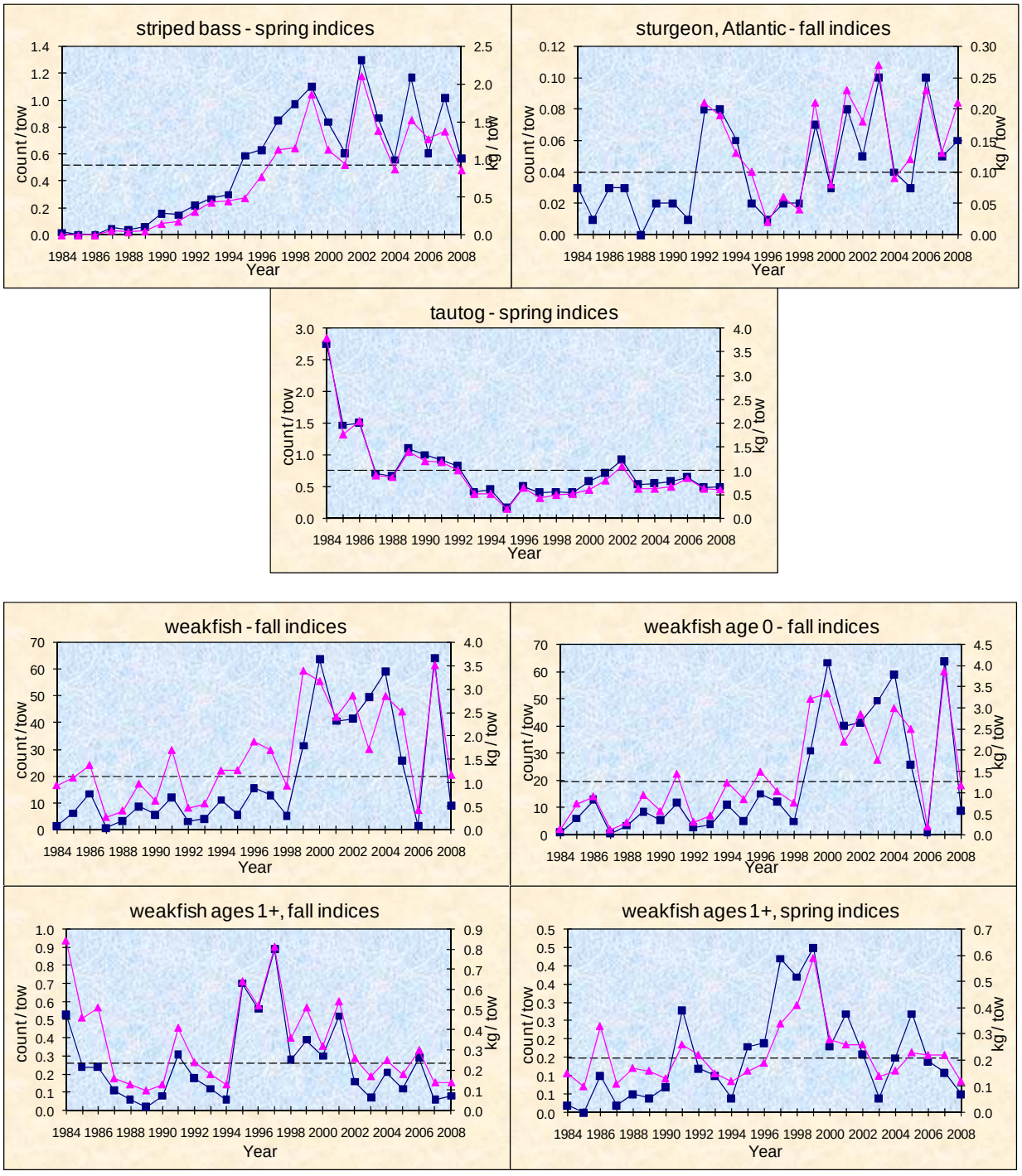
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.12 Plots of abundance indices for: striped bass, Atlantic sturgeon, tautog, and weakfish (all ages, age 0, and ages 1+).



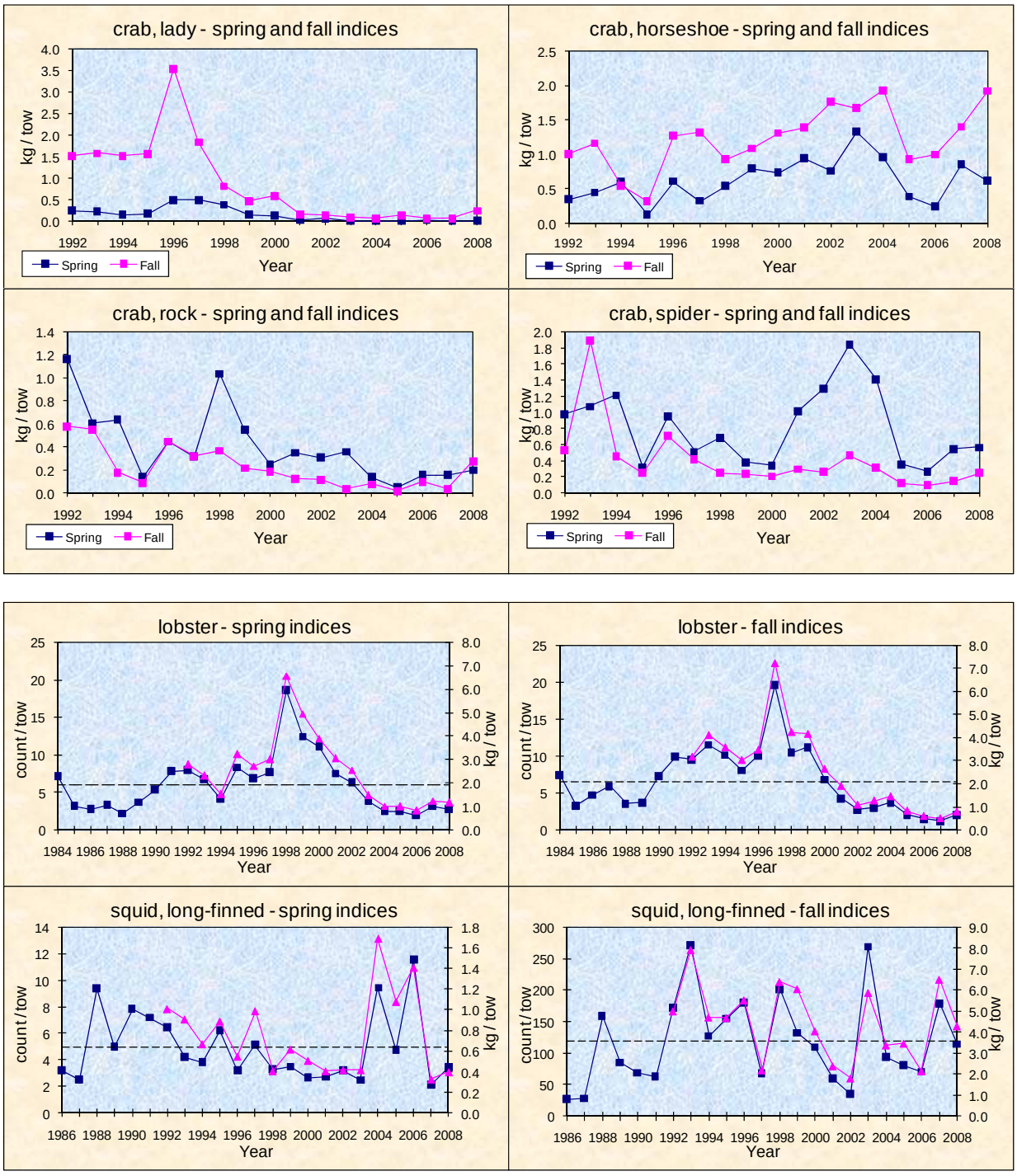
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 2.13. 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

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 ninety-eight species from 1984-2008.

This appendix contains a list of 140 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; IS; SS
banded rudderfish	*Seriola zonata*	LISTS
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; 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, crevalle	*Caranx hippos*	LISTS;NRRWS; ISS; EPA
jack, yellow	*Caranx bartholomaei*	LISTS;NRRWS; 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*	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
pickerel, chain	*Esox niger*	ISS; TN
pike, northern	*Esox lucius*	ISS; TN;CTR
pipefish, northern	*Syngnathus fuscus*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA; EPA
pollock	*Pollachius virens*	LISTS;NRRWS; SNFH;SS; EPA
pompano, African	*Alectis ciliaris*	LISTS; ISS
puffer, northern	*Sphoeroides maculatus*	LISTS;NRRWS;ESS;ISS;IS; SS
pumpkinseed	*Lepomis gibbosus*	ESS;ISS; NCA; TN;CTR
radiated shanny	*Ulvaria subbifurcata*	SNFH
rockling, fourbeard	*Enchelyopus cimbrius*	LISTS;NRRWS; IS;SNFH;SS; MISC;EPA
salmon, Atlantic	*Salmo salar*	LISTS; TN
sand lance, American	*Ammodytes americanus*	LISTS; ESS; IS;SNFH;SS
sandbar (brown) shark	*Carcharhinus plumbeus*	LISTS
scad, bigeye	*Selar crumenophthalmus*	LISTS; SS; MISC
scad, mackerel	*Decapterus macarellus*	LISTS; SS

Appendix 2.1 cont.

Common Name	Scientific Name	Survey
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
stickleback, four-spine	*Apeltes quadracus*	ESS; IS
stickleback, nine-spine	*Pungitius pungitius*	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, 1984-2008.

Counts include all tows- number of tows conducted is shown in second row. Refer to Table 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	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	5,498
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	**14,118**
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	**283**
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	**52,573**
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	**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	**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	**1,549**
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	**4**
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	**169,800**
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	**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	**1**
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	**1,744,033**
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	**106**
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	**36**
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	**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	**45**
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	**1,922**
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	**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	**2**
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	**11,730**
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	**1,981**
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	**9**
eel, american (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	0	0	0	0	0	0	0	1	0	**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	**14**
eel, conger (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	0	0	0	0	1	0	0	0	0	**1**
filefish, orange	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**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	**108**
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	**1**
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	**57,282**
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	**1,049**
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	**12,018**
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	**244,640**
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	**415,399**
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	**16**
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	**17**
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	**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	**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	**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	**81**
grubby	0	1	1	1	5	9	6	0	0	0	5	1	2	11	5	2	0	0	1	2	0	2	0	1	0	**55**

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	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	5,498
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	**67**
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	**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	**55,953**
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	**49,764**
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	**8,360**
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	**18,431**
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	**78,135**
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	**6,900**
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	**84**
hogchoker	293	282	140	87	113	118	259	104	61	73	37	17	45	15	12	39	40	85	100	92	83	61	22	78	38	**2,293**
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	0	0	**39**
jack, yellow	0	0	0	0	0	41	8	11	2	2	6	32	6	2	6	20	3	3	13	1	1	28	2	5	0	**192**
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	**107**
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	**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	**53**
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	**178,822**
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	**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	**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	**744**
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	**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	**10,560**
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	**8,957**
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	**551**
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	**28**
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	**65**
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	**29**
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	**1**
puffer, northern	1	2	6	0	3	2	2	5	1	28	4	1	3	1	28	14	4	8	6	3	5	5	0	8	0	**141**
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	**5,209**
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	**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	**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	**7,938**
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	**11,806**
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	**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	**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	**825**
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	**39**
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	**901**
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	**978,501**
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	**530**
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	**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	**21,790**

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	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	5,498
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	**37,544**
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	**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	**23**
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	**22,341**
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	**8**
shad, hickory	71	4	7	6	4	40	2	1	12	10	31	6	29	25	40	56	42	14	45	41	39	136	75	37	5	**778**
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	**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	**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	**107**
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	**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	**584**
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	**112,486**
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	**1,263**
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	**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	**1,149**
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	**480,338**
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	**6**
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	**4,997**
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	**413**
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	**9,443**
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	**67**
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	**48**
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	**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	**167,693**
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**	**5,016,641**

Appendix 2.3. Annual total weight (kg) of finfish, lobster and squid taken in LISTS, 1992-2008.
Counts include all tows-see Table 2.4 for number of tows conducted. Note: nw = not weighed.

Common name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	120	3,279
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	**87.9**
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	**7.8**
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	**20.3**
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	**0.4**
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	**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	**562.4**
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	**0.2**
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	**22,725.8**
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	**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	**0.5**
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	1442	**31,727.6**
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	**8.9**
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	**0.1**
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	**2.9**
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	**77.9**
cusk-eel, fawn	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.2**
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	**0.1**
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	1134.2	**21,072.4**
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	**1,329.8**
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	**3.1**
eel, conger	0.1	0.2	0.0	1.2	0.1	0.0	0.0	0.5	0.0	0.3	0.0	1.1	0.1	0.0	0.0	0.0	0	**3.6**
filefish, orange	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	**0.2**
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	**1.9**
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	**0.1**
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	**5,086.5**
flounder, smallmouth	0.6	2.6	1.5	1.2	2.3	2.4	6.4	5.2	2.7	3.8	4.9	3.0	2.8	2.4	0.6	2.6	3.2	**48.2**
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	**7,208.4**
flounder, windowpane	286.1	578.9	597.2	356.2	1,223.6	986.1	741.1	594.2	368.8	475.5	343.3	378.8	333.7	177.5	128.9	510.8	524	**8,604.7**
flounder, winter	1,344.8	1,898.0	2,060.9	1,614.7	3,335.0	2,439.4	2,450.3	2,011.7	1,921.4	1,993.6	1,584.1	1,421.9	839.9	566.1	271.2	951.3	751.9	**27,456.2**
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	**2.5**
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	**1.1**
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	**0.3**
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	**0.1**
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	**16.7**
grubby	0.0	0.0	0.3	0.1	0.2	0.7	0.3	0.2	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0	**2.3**
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	**2.3**
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	**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	**2,250.6**
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	**1,091.5**
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	**632.7**
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	**1,098.9**
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	**5,979.1**
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	**131.8**
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	**1.4**
hogchoker	5.6	7.3	3.9	1.7	5.4	1.8	1.9	5.0	5.9	10.5	13.3	8.6	9.5	8.7	3.2	11.4	5.6	**109.3**
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	0.0	0	**3.1**
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	0.1	0.4	0	**11.8**
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	**10.8**
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	**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	**4.5**
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	**28,689.0**
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	**0.4**

Appendix 2.3 cont.

Common name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	120	3,279
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	**0.2**
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	**21.4**
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	**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	**1,219.4**
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	**114.3**
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	**85.0**
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	**4.2**
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	**3.5**
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	**0.5**
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	**0.1**
puffer, northern	0.1	0.9	0.4	0.1	0.3	0.1	0.5	1.1	0.4	0.7	0.3	0.3	0.4	0.3	0.0	0.5	0	**6.4**
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	**209.1**
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	**0.1**
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	**10.8**
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	**5.2**
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	**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	**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	**13.8**
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	**2.0**
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	**33.2**
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	6509.9	**66,910.5**
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	**49.0**
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	**0.1**
searobin, northern	35.6	97.9	66.7	166.9	57.4	60.4	39.4	52.0	251.2	222.7	267.3	252.2	112.0	21.3	74.5	74.2	58.8	**1,910.5**
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	**7,576.9**
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	**0.7**
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	**1.9**
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	**930.9**
shad, gizzard	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0	**0.8**
shad, hickory	4.9	4.4	7.6	2.5	10.2	9.1	15.9	19.4	17.1	6.7	19.6	20.1	14.2	43.1	19.1	10.4	1.1	**225.4**
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	**0.3**
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	**3.1**
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	**0.4**
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	**1,087.2**
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	**28,377.1**
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	**2,100.6**
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	**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	**85.9**
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	**11,913.0**
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	**88.0**
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	**8,817.1**
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	**4,880.3**
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	**6,475.6**
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	**22.9**
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	**4.5**
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	**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	**5,888.8**
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**	**20,876.6**	**31,349.0**	**18,956.8**	**20,494.5**	**13,523.6**	**11,027.6**	**18,711.3**	**14,889.3**	**315,202.4**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

species	count	%	weight	%
butterfish	95,961	65.7	1,357.3	11.7
scup	13,646	9.3	837.7	7.2
winter flounder	9,548	6.5	1,344.8	11.5
bluefish	5,269	3.6	2,462.9	21.1
Atlantic herring	4,565	3.1	797.5	6.8
little skate	3,495	2.4	1,389.0	11.9
windowpane flounder	2,980	2.0	286.1	2.5
fourspot flounder	2,774	1.9	382.4	3.3
red hake	1,606	1.1	127.7	1.1
weakfish	1,317	0.9	94.8	0.8
Atlantic menhaden	1,115	0.8	60.6	0.5
striped searobin	857	0.6	305.1	2.6
silver hake	544	0.4	22.0	0.2
American shad	380	0.3	63.3	0.5
northern searobin	313	0.2	35.6	0.3
smooth dogfish	304	0.2	863.2	7.4
tautog	265	0.2	508.3	4.4
summer flounder	186	0.1	142.1	1.2
blueback herring	175	0.1	8.5	0.1
fourbeard rockling	150	0.1	12.8	0.1
alewife	122	0.1	9.2	0.1
spotted hake	68	0	10.3	0.1
moonfish	62	0	1.5	0
hogchoker	61	0	5.6	0
striped bass	42	0	89.4	0.8
longhorn sculpin	31	0	9.0	0.1
winter skate	31	0	105.3	0.9
cunner	30	0	3.7	0
Atlantic sturgeon	30	0	244.8	2.1
ocean pout	18	0	7.7	0.1
hickory shad	12	0	4.9	0
smallmouth flounder	12	0	0.6	0
goosefish	10	0	2.5	0
clearnose skate	8	0	10.3	0.1
Atlantic tomcod	8	0	1.3	0
mackerel scad	6	0	0.2	0
spiny dogfish	6	0	30.7	0.3
black sea bass	5	0	1.8	0
northern pipefish	5	0	0.4	0
Atlantic mackerel	4	0	1.0	0
sea raven	4	0	3.9	0
northern kingfish	2	0	0.2	0
round herring	2	0	0.2	0
yellow jack	2	0	0.2	0
Atlantic silverside	1	0	0.1	0
conger eel	1	0	0.1	0
northern puffer	1	0	0.1	0
Spanish mackerel	1	0	1.5	0
Total	**146,035**		**11,648.2**	
Invertebrates				
American lobster	8,160	19.9	1,537.9	28.6
blue mussel	nc	nc	1,157.1	21.5
long-finned squid	32,780	80.1	844.9	15.7
horseshoe crab	nc	nc	514.1	9.6
lady crab	nc	nc	375.4	7.0
rock crab	nc	nc	239.1	4.5
boring sponge	nc	nc	225.5	4.2
spider crab	nc	nc	186.0	3.5
starfish spp.	nc	nc	148.6	2.8
whelks	nc	nc	57.5	1.1
flat claw hermit crab	nc	nc	34.7	0.6
bluecrab	nc	nc	18.1	0.3
mantis shrimp	nc	nc	10.3	0.2
northern moon snail	nc	nc	8.6	0.2
common oyster	nc	nc	7.3	0.1
lion's mane jellyfish	nc	nc	2.4	0
surf clam	nc	nc	1.7	0
hard clams	nc	nc	1.2	0
bushy bryozoan	nc	nc	1.0	0
purple sea urchin	nc	nc	0.4	0
mud crabs	nc	nc	0.3	0
star coral	nc	nc	0.1	0
Total	**40,940**		**5,372**	

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

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

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

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

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

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

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

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

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

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

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

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

species	count	%	weight	%	species	count	%	weight	%
butterfish	70,985	50.3	2,017.2	15.5	American sand lance	2	0	0.1	0
winter flounder	14,701	10.4	2,439.4	18.8	short bigeye	2	0	0.2	0
bluefish	10,815	7.7	977.6	7.5	yellow jack	2	0	0.2	0
windowpane flounder	10,324	7.3	986.1	7.6	bigeye scad	1	0	0.1	0
scup	9,582	6.8	530.5	4.1	Atlantic cod	1	0	0.3	0
fourspot flounder	4,122	2.9	615.3	4.7	haddock	1	0	0.1	0
little skate	4,068	2.9	1,945.8	15.0	northern pipefish	1	0	0.1	0
weakfish	3,904	2.8	362.0	2.8	northern puffer	1	0	0.1	0
Atlantic herring	3,455	2.4	515.1	4.0	roughtail stingray	1	0	50.6	0.4
silver hake	1,973	1.4	70.8	0.5	sea lamprey	1	0	0.1	0
alewife	1,194	0.8	81.3	0.6	Atlantic tomcod	1	0	0.1	0
American shad	922	0.7	66.8	0.5	yellowtail flounder	1	0	0.3	0
striped searobin	819	0.6	230.5	1.8	**Total**	**141,040**		**12,974.6**	
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	**Invertebrates**				
summer flounder	486	0.3	326.0	2.5	American lobster	16,467	55.3	3,800.9	64.6
striped bass	319	0.2	509.9	3.9	lady crab	nc	nc	592.5	10.1
moonfish	287	0.2	4.6	0	long-finned squid	13,048	43.8	515.2	8.8
fourbeard rockling	199	0.1	17.3	0.1	horseshoe crab	204	0.7	472.4	8.0
tautog	190	0.1	271.8	2.1	spider crab	nc	nc	188.3	3.2
smooth dogfish	167	0.1	527.3	4.1	rock crab	nc	nc	94.1	1.6
Atlantic menhaden	116	0.1	38.5	0.3	lion's mane jellyfish	nc	nc	88.0	1.5
spotted hake	77	0.1	19.0	0.1	bushy bryozoan	nc	nc	28.0	0.5
rough scad	65	0	2.0	0	flat claw hermit crab	nc	nc	21.7	0.4
smallmouth flounder	58	0	2.4	0	boring sponge	nc	nc	16.5	0.3
winter skate	48	0	109.7	0.8	whelks	22	0.1	14.8	0.3
cunner	43	0	4.1	0	bluecrab	33	0.1	13.6	0.2
hickory shad	25	0	9.1	0.1	mantis shrimp	nc	nc	9.3	0.2
black sea bass	22	0	10.5	0.1	starfish spp.	nc	nc	7.3	0.1
hogchoker	15	0	1.8	0	hard clams	nc	nc	3.8	0.1
ocean pout	15	0	4.8	0	blue mussel	nc	nc	3.5	0.1
grubby	11	0	0.7	0	northern moon snail	nc	nc	3.3	0.1
spot	10	0	1.1	0	northern comb jelly	nc	nc	2.0	0
Atlantic mackerel	8	0	1.7	0	arks	nc	nc	1.8	0
northern kingfish	7	0	0.9	0	common oyster	nc	nc	1.8	0
spiny dogfish	7	0	13.7	0.1	surf clam	nc	nc	0.9	0
Atlantic sturgeon	5	0	37.8	0.3	common slipper shell	nc	nc	0.7	0
clearnose skate	4	0	7.4	0.1	mud crabs	nc	nc	0.6	0
longhorn sculpin	4	0	0.8	0	sand shrimp	nc	nc	0.2	0
white perch	4	0	0.9	0	common razor clam	nc	nc	0.2	0
crevalle jack	3	0	0.6	0	blood star	nc	nc	0.1	0
sea raven	3	0	0.4	0	star coral	nc	nc	0.1	0
Atlantic silverside	2	0	0.1	0	northern red shrimp	nc	nc	0.1	0
goosefish	2	0	1.6	0	shore shrimp	nc	nc	0.1	0
inshore lizardfish	2	0	0.2	0	purple sea urchin	nc	nc	0.1	0
round scad	2	0	0.2	0	**Total**	**29,774**		**5,882**	

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

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

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

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

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

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

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

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

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

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

species	count	%	weight	%
scup	100,481	47.0	13,814.1	46.0
butterfish	66,550	31.1	1,924.2	6.4
weakfish	10,713	5.0	442.0	1.5
winter flounder	6,884	3.2	1,584.1	5.3
little skate	4,242	2.0	2,121.9	7.1
bluefish	3,450	1.6	1,099.7	3.7
striped searobin	2,394	1.1	1,065.0	3.5
northern searobin	2,123	1.0	267.3	0.9
red hake	2,103	1.0	206.6	0.7
silver hake	2,013	0.9	89.6	0.3
windowpane flounder	1,991	0.9	343.3	1.1
fourspot flounder	1,859	0.9	326.9	1.1
summer flounder	1,356	0.6	989.3	3.3
smooth dogfish	1,019	0.5	2,814.3	9.4
bay anchovy	992	0.5	6.6	0
alewife	855	0.4	70.2	0.2
spotted hake	798	0.4	48.2	0.2
American shad	593	0.3	40.3	0.1
tautog	565	0.3	921.1	3.1
striped bass	469	0.2	855.2	2.8
moonfish	424	0.2	7.4	0
black sea bass	394	0.2	188.3	0.6
Atlantic menhaden	366	0.2	96.3	0.3
Atlantic herring	365	0.2	63.9	0.2
smallmouth flounder	139	0.1	4.9	0
fourbeard rockling	106	0	9.7	0
hogchoker	100	0	13.3	0
blueback herring	68	0	2.4	0
clearnose skate	59	0	107.3	0.4
cunner	55	0	7.2	0
spot	52	0	7.2	0
hickory shad	45	0	19.6	0.1
winter skate	45	0	133.5	0.4
Atlantic sturgeon	18	0	275.3	0.9
spiny dogfish	17	0	48.0	0.2
ocean pout	13	0	4.3	0
yellow jack	13	0	1.4	0
sea raven	11	0	4.1	0
rough scad	10	0	0.7	0
oyster toadfish	8	0	4.7	0
northern puffer	6	0	0.3	0
Atlantic mackerel	5	0	2.5	0
short bigeye	5	0	0.2	0
goosefish	3	0	0.6	0
American sand lance	3	0	0.1	0
longhorn sculpin	3	0	0.9	0
northern sennet	2	0	0.2	0
northern pipefish	2	0	0.2	0
Atlantic bonito	1	0	2.4	0
crevalle jack	1	0	0.1	0
gizzard shad	1	0	0.1	0
grubby	1	0	0.1	0
inshore lizardfish	1	0	0.1	0
northern kingfish	1	0	0.2	0
rock gunnel	1	0	0.1	0
rainbow smelt	1	0	0.1	0
roughtail stingray	1	0	24.4	0.1
Total	**213,796**		**30,062.0**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
Invertebrates				
blue mussel	nc	nc	2,497.8	43.9
American lobster	3,880	29.7	1,005.7	17.7
horseshoe crab	517	4.0	862.9	15.2
spider crab	nc	nc	348.4	6.1
long-finned squid	8,034	61.5	279.9	4.9
lady crab	nc	nc	117.0	2.1
starfish spp.	nc	nc	91.8	1.6
bushy bryozoan	nc	nc	85.0	1.5
boring sponge	nc	nc	83.9	1.5
rock crab	nc	nc	74.6	1.3
flat claw hermit crab	36	0.3	55.8	1.0
channeled whelk	174	1.3	43.6	0.8
northern moon snail	nc	nc	40.3	0.7
knobbed whelk	40	0.3	19.1	0.3
bluecrab	84	0.6	16.1	0.3
lion's mane jellyfish	71	0.5	12.3	0.2
mantis shrimp	226	1.7	11.2	0.2
arks	nc	nc	7.8	0.1
common slipper shell	nc	nc	7.3	0.1
hydroid spp.	nc	nc	7.3	0.1
sea grape	nc	nc	5.3	0.1
hard clams	3	0	5.2	0.1
mud crabs	nc	nc	4.7	0.1
purple sea urchin	nc	nc	2.3	0
sand shrimp	nc	nc	1.6	0
rubbery bryzoan	nc	nc	1.0	0
surf clam	nc	nc	1.0	0
deadman's fingers sponge	nc	nc	0.5	0
blood star	nc	nc	0.4	0
common oyster	nc	nc	0.4	0
mixed sponge species	nc	nc	0.4	0
northern red shrimp	nc	nc	0.3	0
anemones	nc	nc	0.1	0
bobtail squid	1	0	0.1	0
ghost shrimp	nc	nc	0.1	0
ribbed mussel	nc	nc	0.1	0
sea cucumber	1	0	0.1	0
Total	**13,067**		**5,691**	

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

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

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

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

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

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

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

species	count	%	weight	%
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
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 are not quantified. Number of tows (sample size)=120.

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

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

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

Note: nc= not counted

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

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

species	count	%	weight	%
sea lamprey	1	0	0.8	0
striped anchovy	1	0	0.1	0
Total	**140,777**		**14,239.8**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
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**	

Note: nc= not counted

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PART 2: ESTUARINE SEINE SURVEY

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JOB 2 PART 2: ESTUARINE SEINE SURVEY

OBJECTIVES

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

The 2008 annual index of recruitment for young-of-year winter flounder (2.0 fish/haul) ranked 17th out of 21 annual indices.

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

Mean catch of all finfish (140 fish/haul) ranked tenth out of 21 annual indices and was just below the series average of 142 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 2008 (99.6 forage fish/haul) was the eleventh highest of the 21-year series, and slightly above the time series average of 95.8 forage fish/haul.

METHODS

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

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

samples taken each year.

RESULTS

A total of 48 seine hauls were taken in 2008 at eight sites, yielding a total catch of 6,709 fish of 31 species and 8,897 invertebrates of nine species. Mean catch of all finfish (140 fish/tow) was the tenth highest in the time series (Figure 2.2). This catch is slightly below the long-term mean of 142 fish/tow and is attributed to below average catches of Atlantic silversides, mummichog, sheepshead minnow, northern puffer, scup and tautog. 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 100 percent of all samples, followed by striped killifish (94%), yoy winter flounder (71%), mummichog (48%), tautog (42%), sheepshead minnow (27%), northern puffer (23%), pipefish (23%), black sea bass (15%), and cunner (10%). This rank order has changed from the previous years, with a notable decrease in winter flounder, mummichog, northern pipefish and puffer occurrence rate along with an increase in striped killifish occurrence. Only eight of the 22 species monitored increased in abundance in 2008, while twelve fish species decreased and two were unchanged. Tautog abundance and occurrence rate increased significantly in 1998-99, returned to the series average in 2005, and was slightly below the series average in 2008 after a record year in 2007. Previous to 2005, tautog relative abundance had significantly increased to all-time abundance levels in 2002-04 (Figure 2.4). In 2008, only one forage fish species (striped killifish) was the highest in the 21-year time-series. Tautog, scup and northern puffer occurrence and abundance were below the 2007 highs. Cunner abundance in 2008 dropped to 1997 levels after being the third highest in the 21 year time-series in 2007. Grubby, age 1 winter flounder, Black Sea Bass decreased in abundance in 2008 from the previous year. Northern kingfish, northern pipefish, windowpane flounder and winter flounder (age 1+ and older) abundance and occurrence was average for the 21-year time-series in 2008. Snapper bluefish occurred in the samples after a 2007 absence. Striped bass, Atlantic tomcod, white mullet (record catch), white perch and smallmouth founder, were observed in the survey in 2008. Weakfish young-of-year were absent and have only occurred in 2003. All other species occurred in less than 10% of all samples, with occurrence rates similar to previous years. One new species of finfish, Atlantic needlefish (*Strongylura marina*) was captured in 2008, at the Waterford site. Other notable catches were 7 northern seahorses captured at the Waterford, New Haven and Clinton sites and eleven white perch at Waterford.

Relative Abundance of Juvenile Winter Flounder and Tautog

The 2008 index of YOY winter flounder (2 fish/haul) ranked seventeenth out of 21 annual indices (Table 2.2, Figure 2.3 and 2.7). Overall, the time series indicates that relatively strong year classes were only produced in 1988, 1992, 1994, and 1996 (Figure 2.3).

The 2008 index of YOY tautog (1 fish/haul) was the seventh highest ranking out of 21 annual indices (Table 2.1, Figure 2.3 and 2.7), well above the series average of 0.75

tautog / haul. Overall, the time series indicates a significant increasing trend in abundance of young-of-year tautog from 1988 to 2008, with good year classes produced in 1998-99, 2002-04 and 2007, even though the 2006 mean was below the long-term average. ($P \leq 0.01$, $t=3.5$, $df=20$), (Table 2.1, Figure 2.4).

Presence of Other Important Recreational Finfish

YOY scup is another recent addition to the seine survey, first occurring in 1999, with the highest relative abundance in the last eight years of the time series, a reflection of strong recruitment and survival in recent years (Table 2.4, Figure 2.8). Juvenile striped bass first occurred in the survey in 1999 with one individual captured. In 2003 six more YOY stripers were taken (Table 2.4, Figure 2.8). Moreover, one large individual (369mm) was captured in 2008. YOY summer flounder have occurred in seven years (more recently) of the 21-year time series (1993, 1994, 1996, 1998, 2006, 2007 and 2008). The 2008 summer flounder abundance was the second highest of the time series. YOY black sea bass first appeared in 1991 and every year since 1997, reaching their highest abundance in 2001, (Figure 2.7). Snapper bluefish have occurred in 15 out of 21 years of the time series, reaching peak abundance in 1999. Juvenile tautog has occurred every year in the seine survey except 1989. White perch appeared in record numbers in 2008 and only once prior (2005). Atlantic tomcod, a threatened species, re-appeared in 2008.

Relative Abundance of Forage Species

Seine survey catches are dominated by forage species, defined here as short-lived, highly fecund species that spend the majority of their life cycle inshore where they are common food for piscivorous fish. An index of forage 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 2008 was the eleventh highest in the 21 year time series. Three of the four forage fish species (Atlantic silverside, sheepshead minnow and mummichog) decreased in occurrence in 2008. Striped killifish abundance remained at historical highs for the time series. 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 silverside abundance in 2008. An increase in this species' abundance in 2002 through 2005 reversed a two-year decrease from 2000-2001 and was similar to 2006. Striped killifish, occurred in record abundance in 2008. Mummichog abundance (2.9) was at the long-term average of 2.5 in 2008. Sheepshead minnow had a record abundance (3.35) in 2007. The 2008 index ranked second in the time series. Striped killifish abundance and occurrence continued to remain high and at record levels in 2008 (21.7 fish/tow, 94% occurrence). Collectively, killifish abundance has not been this high since 2002-2005 and was the only forage fish species to remain at high levels in 2008.

Forage fish abundance has generally been increasing since 1997 (Figure 2.5) after a period of lower abundance (decreasing trend) since 1991. In 2008, forage fish abundance slightly rose above the series mean of 96 fish/haul, with a mean catch of 100 fish per

haul. Forage fish abundance is driven numerically by the occurrence of adult Atlantic silverside (Figure 2.6) and more recently striped killifish, mummichog and sheepshead minnow, the second and third most abundant forage species. Striped killifish are more suited to marine habitats, than other 'Fundulus' species captured in the estuarine seine survey. Both Atlantic silverside and mummichog were captured in slightly below average numbers in 2008, suggesting relatively poor year class production 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 increasing 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 2002-2007, with a record year in 2007 (3.35 fish/tow) and above average catches in 2008 (1.2 fish/tow).

Relative Abundance of Invertebrate Species

A total of 8,897 invertebrates of nine species were captured in 2008 (Table 2.3), (Appendix 2.2). Five crab species were present in the seine hauls, along with two shrimp species, and one gastropod. Mud snail, sand shrimp, shore shrimp, green crab, and hermit crab were the most abundant, and only mud snails, shore shrimp, sand shrimp, and green crab had greater than 50% occurrence in 2008 (Table 2.3).

MODIFICATIONS

None.

LITERATURE CITED

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

Table 2.1: Mean catch of species commonly taken in seine samples, 1988-2008. *Geometric mean catch per haul is given with percent occurrence in parentheses. See Appendix 3.1 for complete species names.*

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
Atlantic Silverside	60.7 (95)	32.6 (95)	45.0 (81)	88.5 (100)	53.2 (100)	42.7 (94)	37.7 (100)	27.0 (96)	17.7 (94)	23.1 (92)	81.6 (100)
Black Sea Bass	0.0 (0)	0.0 (0)	0.0 (0)	0.1 (4)	0.0 (0)	0.0 (0)	0.2 (15)	0.1 (4)	0.0 (0)	0.0 (0)	0.1 (6)
Bluefish (Snapper)	0.0 (0)	0.0 (0)	0.02 (2)	0.1 (10)	0.02 (2)	0.0 (0)	0.01 (2)	0.1 (4)	0.0 (0)	0.01 (2)	0.1 (15)
Cunner	0.2 (17)	0.2 (14)	0.03 (4)	0.1 (11)	0.2 (15)	0.0 (0)	0.4 (23)	0.2 (15)	0.4 (13)	0.01 (2)	0.03 (23)
Fluke	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.03 (4)	0.08 (10)	0.0 (0)	0.02 (2)	0.0 (0)	0.1 (2)
Four-Spine Stickleback	0.3 (17)	0.4 (19)	0.0 (0)	0.7 (22)	0.1 (5)	0.1 (4)	0.01 (2)	0.0 (0)	0.04 (4)	0.0 (0)	0.1 (8)
Grubby	0.8 (33)	0.0 (0)	0.03 (4)	0.1 (11)	0.5 (31)	0.1 (8)	0.4 (33)	0.3 (25)	0.2 (19)	0.3 (29)	0.2 (17)
Menhaden	0.05 (5)	0.0 (0)	0.03 (4)	0.05 (4)	0.54 (19)	0.04 (6)	0.10 (10)	0.03 (4)	0.0 (0)	0.08 (6)	0.4 (6)
Mummichog	2.8 (47)	1.7 (50)	1.1 (35)	1.9 (40)	1.6 (38)	3. 7 (50)	3.5 (42)	0.7 (35)	1.2 (44)	0.5 (15)	2.0 (42)
Northern Kingfish	0.0 (0)	0.0 (0)	0.0 (0)	0.04 (6)	0.1 (8)	0.2 (10)	0.03 (4)	0.1 (15)	0.04 (4)	0.1 (13)	0.02 (10)
Northern Pipefish	0.7 (39)	0.3 (29)	0.5 (41)	1.1 (57)	0.9 (35)	0.9 (50)	1.1 (58)	0.5 (33)	1.0 (44)	0.4 (33)	1.8 (71)
Northern Puffer	0.1 (8)	0.2 (19)	0.1 (10)	0.4 (25)	0.1 (8)	0.4 (23)	0.2 (17)	0.5 (40)	0.2 (15)	0.1 (6)	0.1 (10)
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 (0)	0.0 (0)	0.0 (0)
Sheepshead Minnow	0.7 (27)	1.0 (33)	0.1 (9)	0.6 (21)	0.04 (4)	0.01 (2)	0.02 (2)	0.1 (4)	0.0 (0)	0.1 (4)	0.1 (4)
Striped Killifish	9.6 (72)	11.0 (76)	6.0 (65)	4.2 (73)	3.1 (58)	5.1 (63)	5.3 (63)	4.0 (69)	2.0 (54)	1.5 (40)	7.2 (75)
Smallmouth Flounder	0.02 (3)	0.0 (0)	0.0 (0)	0.02 (2)	0.0 (0)	0.1 (13)	0.1 (10)	0.1 (6)	0.03 (4)	0.1 (4)	0.0 (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 (0)	0.0 (0)	0.0 (0)
Striped Searobin	0.2 (11)	0.0 (0)	0.1 (13)	0.2 (10)	0.1 (8)	0.9 (46)	0.1 (10)	0.01 (2)	0.1 (10)	0.4 (35)	1.9 (60)
Tautog	0.3 (22)	0.0 (0)	0.3 (22)	0.7 (42)	0.4 (31)	0.2 (19)	0.8 (33)	0.7 (33)	0.3 (13)	0.2 (19)	1.0 (44)
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 (0)	0.0 (0)	0.0 (0)
Winter Flounder (young-of-year)	**15.5** (97)	**1.9** (74)	**2.9** (74)	**5.2** (92)	**11.9** (98)	**5.6** (88)	**14.2** (98)	**10.1** (94)	**19.2** (100)	**7.5** (94)	**9.3** (92)
Winter Flounder (age 1 + older)	0.1 (14)	0.1 (10)	0.0 (0)	0.1 (15)	0.1 (8)	0.2 (21)	0.2 (17)	0.2 (19)	0.2 (10)	0.1 (15)	0.1 (10)
Windowpane Flounder	0.6 (31)	0.0 (0)	0.2 (13)	0.2 (13)	0.2 (23)	0.3 (23)	0.3 (17)	0.1 (17)	0.7 (35)	0.4 (23)	0.1 (13)

Table 2.1 cont.: Mean catch of species commonly taken in seine samples, 1988-2008. *Geometric mean catch per haul is given with percent occurrence in parentheses. See Appendix 3.1 for complete species names.*

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Atlantic Silverside	102.5 (94)	99.7 (100)	36.1 (92)	80.1 (100)	113.6 (96)	85.1 (100)	81.3 (100)	37.7 (100)	74.9 (100)	**57.5 (100)**
Black Sea Bass	0.1 (8)	0.02 (2)	0.98 (25)	0.39 (17)	0.18 (13)	0.44 (25)	0.14 (8)	0.5 (23)	0.6 (23)	**0.3 (15)**
Bluefish (Snapper)	0.9 (46)	0.04 (4)	0.1 (13)	0.02 (2)	0.15 (10)	0.20 (15)	0.06 (4)	0.17 (8)	0 (0)	**0.04 (2)**
Cunner	0.5 (23)	0.3 (19)	0.16 (15)	0.33 (13)	0.18 (17)	0.48 (29)	0.30 (21)	0.14 (13)	0.47 (25)	**0.1 (10)**
Fluke	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0 (0)	0.20 (19)	0.08 (6)	**0.12 (15)**
Four-Spine Stickleback	0.04 (4)	0.01 (2)	0.05 (4)	0.0 (0)	0.0 (0)	0.5 (2)	0 (0)	0.02 (2)	0 (0)	**0 (0)**
Grubby	0.5 (27)	0.1 (10)	0.24 (17)	0.31 (21)	0.53 (29)	1.26 (50)	0.84 (46)	0.35 (27)	0.27 (15)	**0.20 (19)**
Menhaden	0.4 (15)	0.4 (10)	0.01 (2)	1.0 (27)	8.1 (58)	0.42 (8)	0.21 (6)	0.40 (13)	0.59 (17)	**0.07 (2)**
Mummichog	0.8 (29)	3.2 (44)	1.4 (42)	3.4 (54)	2.9 (44)	2.8 (35)	1.5 (27)	2.5 (48)	7.3 (65)	**2.9 (48)**
Northern Kingfish	0.1 (8)	0.05 (4)	0.17 (13)	0.05 (4)	0.21 (15)	0.32 (17)	0.11 (10)	0.01 (8)	0.02 (2)	**0.25 (19)**
Northern Pipefish	1.0 (48)	1.0 (54)	1.4 (48)	0.46 (19)	0.30 (25)	0.74 (48)	0.53 (25)	0.62 (29)	0.82 (42)	**0.75 (23)**
Northern Puffer	0.2 (19)	0.6 (35)	0.17 (17)	0.70 (35)	0.70 (31)	0.67 (40)	0.54 (31)	0.37 (29)	1.24 (44)	**0.25 (23)**
Scup	0.0 (0)	0.0 (0)	0.46 (23)	0.99 (35)	0.56 (25)	0.24 (13)	0.88 (29)	0.06 (4)	0.99 (29)	**0.06 (2)**
Sheepshead Minnow	0.1 (6)	0.4 (17)	0.24 (10)	0.58 (15)	0.66 (19)	0.51 (15)	0.23 (15)	0.23 (6)	3.35 (40)	**1.2 (27)**
Striped Killifish	4.5 (67)	8.6 (63)	7.5 (71)	14.5 (85)	14.9 (81)	12.9 (73)	19.4 (96)	7.1 (65)	21.2 (88)	**21.7 (94)**
Smallmouth Flounder	0.3 (21)	0.4 (6)	0.13 (13)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.01 (2)	0 (0)	**0.14 (13)**
Striped Bass	0.02 (2)	0.0 (0)	0.0 (0)	0.0 (0)	0.06 (6)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	**0.01 (2)**
Striped Searobin	0.6 (38)	0.1 (10)	0.38 (29)	0.35 (25)	0.66 (40)	0.49 (38)	0.18 (13)	0.09 (13)	0.32 (27)	**0.27 (19)**
Tautog	1.3 (46)	0.5 (23)	0.61 (40)	1.5 (54)	1.1 (50)	1.4 (54)	0.7 (42)	0.38 (17)	2.42 (54)	**1.04 (42)**
Weakfish	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	0.15 (13)	0.0 (0)	0.0 (0)	0.0 (0)	0.0 (0)	**0.0 (0)**
Winter Flounder (young-of-year)	**8.7** (88)	**4.3** (77)	**1.3** (58)	**3.1** (79)	**8.1 (85)**	**11.0 (98)**	**5.6 (94)**	**0.92 (46)**	**4.73 (92)**	**1.97 (71)**
Winter Flounder (age 1 + older)	0.1 (6)	0.1 (15)	0.03 (4)	0.03 (2)	0.0 (0)	0.13 (17)	0.17 (21)	0.10 (15)	0.08 (8)	**0.15 (15)**
Windowpane Flounder	0.1 (13)	0.05 (6)	0.0 (0)	0.01 (2)	0.7 (10)	0.2 (21)	0.17 (15)	0.04 (6)	0.03 (4)	**0.15 (10)**

Table 2.2: Mean catch of young-of-year winter flounder at eight sites sampled by seine, 1988-2008.

The 95% confidence interval, rounded to the nearest whole number, for each geometric mean per haul is given in parentheses. Sites are listed west to east, left to right.

Year	Greenwich	Bridgeport	Milford	New Haven	Clinton	Old Lyme	Waterford	Groton	**All Sites**
1988	9.7 (3-29)	*19.0 (1-23)	not sampled	38.7 (23-65)	2.7 (1-7)	58.4 (27-126)	29.6 (19-46)	11.4 (8-16)	15.5 (10-23)
1989	0.6 (0-2)	1.7 (1-10)	not sampled	4.7 (2-11)	1.1 (1-2)	1.6 (0-5)	3.5 (2-7)	1.5 (0-4)	1.9 (1-3)
1990	0.5 (0-1)	4.0 (0-5)	1.6 (0-4)	5.7 (2-14)	0.2 (0-1)	16.8 (10-21)	2.6 (0-4)	2.2 (0-8)	2.9 (2-4)
1991	2.0 (1-2)	1.8 (0-5)	2.7 (1-6)	6.4 (3-13)	4.1 (2-7)	15.3 (7-31)	18.2 (8-39)	5.6 (3-9)	5.2 (3-6)
1992	6.2 (4-19)	3.3 (1-8)	4.3 (1-16)	40.2 (17-94)	5.5 (3-10)	48.0 (32-134)	32.5 (18-59)	6.3 (4-10)	11.9 (7-18)
1993	4.3 (1-21)	1.2 (0-3)	3.6 (2-5)	11.5 (6-20)	1.4 (0-4)	13.3 (4-38)	16.7 (13-22)	8.6 (5-15)	5.6 (4-8)
1994	4.3 (1-20)	4.5 (2-7)	4.6 (1-12)	35.3 (21-59)	8.1 (2-31)	61.7 (37-103)	21.0 (8-52)	38.4 (9-144)	14.2 (9-21)
1995	7.2 (4-13)	1.9 (0-5)	1.8 (0-7)	19.0 (14-26)	3.2 (1-9)	34.2 (17-70)	36.6 (23-58)	30.3 (23-40)	10.1 (7-15)
1996	*12.6 (6-24)	7.7 (4-14)	*6.6 (5-9)	*49.3 (31-79)	11.8 (7-18)	91.3 (64-130)	30.5 (14-63)	15.7 (9-26)	*19.2 (14-26)
1997	3.4 (1-12)	2.9 (0-14)	1.6 (0-4)	3.8 (2-9)	6.6 (1-14)	52.0 (33-80)	11.3 (9-15)	23.7 (4-134)	7.5 (5-11)
1998	9.0 (5-17)	1.2 (0-3)	0.9 (0-2)	22.4 (14-35)	4.0 (3-5)	57.2 (38-86)	21.9 (12-40)	17.6 (4-67)	9.3 (6-14)
1999	8.0 (4-15)	1.0 (0-4)	3.5 (1-10)	0.9 (0-2)	2.6 (1-7)	*137.1 (75-249)	36.1 (24-55)	25.7 (12-55)	8.7 (5-14)
2000	6.7 (2-17)	2.1 (0-6)	0.8 (0-3)	1.7 (1-4)	0.5 (0-1)	48.3 (29-81)	*41.6 (31-55)	0.8 (0-3)	4.3 (2-7)
2001	1.2 (.1-3.4)	0.2 (.2-.9)	0.6 (.1-1.3)	0.0 (0)	1.1 (.1-3.1)	0.9 (.8-2.4)	9.1 (4.9-16.2)	4.1 (.7-14.5)	1.3 (.8-2.1)
2002	5.1 (1.6-13.3)	0.9 (0-2.7)	0.3 (0-0.8)	1.1 (.2-2.5)	2.66 (0.7-7)	15.6 (8.7-27.3)	9.0 (5.9-13.5)	3.1 (0-17.3)	3.1 (2-4.6)
2003	5.9 (1.2-20.4)	1.9 (0.4-4.8)	0.9 (0-4.1)	1.7 (0.2-4.9)	4.6 (2.1-9.0)	51.1 (19.7-130.1)	32.3 (15.2-67.6)	*45.8 (8.0-243.3)	8.1 (4.7-13.4)
2004	11.3 (6.4-19.4)	1.0 (0.3-2.1)	3.4 (0.9-8.5)	33.1 (12.3-86)	*18.4 (9.2-35.7)	11.1 (4.2-27.4)	13.0 (5.7-28.5)	33.8 (20.2-56.1)	11.0 (7.6-15.6)
2005	7.7 (2.7-19.6)	1.9 (1.4-2.7)	5.1 (1-18.3)	1.6 (0.4-4.1)	11.1 (5-23.6)	4.1 (0.3-18.8)	7.3 (2-21.9)	16.7 (6.5-40.7)	5.6 (3.9-8.0)
2006	0.1 (0-0.5)	0.1 (0-0.5)	0 (0-0)	0 (0-0)	1.4 (0.4-3.1)	3.3 (2.1-5.0)	1.3 (0.1-3.8)	5.5 (0.8-23)	0.9 (0.5-1.5)
2007	4.4 (1.2-12.3)	0.8 (0-2.5)	0.8 (0.3-1.4)	6.4 (2.4-15)	5.6 (3.2-9.5)	7.9 (3.7-13.1)	7.1 (0.1-3.8)	17.9 (8.8-35.4)	4.7 (3.3-6.6)
2008	**0.5 (0-1.4)**	**0.5 (0-1.4)**	**0.0 (0-0)**	**1.6 (0.3-4.1)**	**2.4 (0.9-5.3)**	**2.6 (0.4-8.1)**	**5.9 (2.9-11.3)**	**10.8 (4.4-25)**	**2.0 (1.3-2.9)**

*****record high for a site.

Table 2.3: Total catch of twelve invertebrate species at eight sites sampled by seine, 2008.
Seine sites are listed west to east.

Species	Greenwich	Bridgeport	Milford	New Haven	Clinton	Old Lyme	Waterford	Groton	All Sites
Blue Crab	0	0	0	0	0	4	0	0	**4**
Green Crab	1	9	4	7	92	349	154	28	**644**
Hermit Crab	1	102	0	18	9	11	9	94	**244**
Japan Crab	0	0	0	0	0	0	0	0	**0**
Lady Crab	10	32	4	24	21	18	1	0	**92**
Mud Crab	0	1	0	36	21	3	16	6	**85**
Mole Crab	0	0	0	0	0	0	0	0	**0**
Mud Snail	76	701	10	134	533	11	121	2,224	**3,810**
Rock Crab	0	0	0	0	0	0	0	0	**0**
Sand Shrimp	33	71	19	3	75	1,642	5	777	**2,625**
Spider Crab	0	0	0	3	0	0	0	0	**3**
Shore Shrimp	18	0	0	88	28	807	449	0	**1,390**
Shortfin Squid	0	0	0	1	0	0	0	0	**0**

Table 2.4: Total Catch by Species, 1988-2008.

SPECIES	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Alewife			1				1								28	1					
American Eel	1	3	1	1			1				5										
American Shad			1																		
American Sand Lance			1				10														
Atlantic Needlefish																					2
Atlantic Silverside	4,750	3,319	10,977	8,765	5,545	5,263	6,311	2,352	1,942	3,249	6,532	10,120	8,738	4,417	5,730	13,278	5,122	5,089	3,267	5,087	3,245
Atlantic Tomcod			13			3											1	3			1
Banded Gunnel											2	3					4	2	3	1	3
Bay Anchovy	18	67	24								27			1			1	12			15
Black-Spot Stickleback			11																		
Black Sea Bass				10			41	43			27	14	2	687	63	27	110	15	82	109	33
Blueback Herring			202	194	10		5	2			3	24	1		13	5				9	
Bluefish (snapper)			26	23	2		1			1	11	152	3	8	2	17	23	8			7
Bluespotted Coronetfish												1									
Crevalle Jack	5		1																		
Cunner	15	13	14	7	19		42	24	63	1	24	142	26	15	110	15	54	35	18	58	8
Flying Gurnard																				1	
4-Spine Stickleback	33	76	83	225	11	21	1		3		6	3	1	7			9		2		
Gray Snapper			1																		
Grubby	111		54	10	61	7	38	19	21	28	17	55	15	73	33	95	143	76	31	32	16
Hogchoker			3	1																	
Inshore Lizardfish	5		2			2	6			46	6	16	15	103	2		3		169	18	26
Little Skate										1					1						
Menhaden	3		4	5	1,074	3	9	2		11	2,003	377	1,236	1	1,284	5,098	1,117	75	117	144	21
Mummichog	1,031	198	710	1,150	573	1,256	2,343	78	151	190	396	115	1,008	246	811	702	637	543	398	1,203	498
Naked Goby			1	5				1			1	1		4	2	2	2		13		2
Nine-Spine Stickleback			132																		
Northern Kingfish			2	5	4	23	2	9	3	10	7	6	5	17	5	21	38	11	1	1	23
Northern Pipefish	64	19	216	142	120	82	117	52	241	38	191	141	96	189	87	25	72	92	82	75	156
Northern Puffer	4	14	59	37	4	37	15	40	25	5	5	13	63	14	79	101	75	93	34	241	19

Table 2.4 Cont.: Total Catch by Species, 1988-2008.

SPECIES	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Northern Searobin			7										3	40	24	5	4	13	2	10	
Northern Sennet																			1		
Northern Stargazer		5																			
Oyster Toadfish	3	_	_	1	_	_	_	_	_	1	1			1		1	2	1	1	1	2
Pumpkinseed				2													3				
Rainbow Smelt						5	2										34				
Rainwater Killifish			4							4			2		6	35	53	19	3		
Rock Gunnel			1		1	1				3							1				1
Seahorse (Northern)			1				4			1			2		1					2	7
Scup (Porgy)												1		58	172	131	50	154	6	170	14
Sheepshead Minnow	168	816	20	345	4	1	2	30	7	14	19	12	267	59	402	276	205	28	104	1,439	
Smallmouth Flounder	1			1		8	14	7	2	5		40	3	12					1		14
Smooth Dogfish			1																		
Spotted Hake			1																		
Striped Bass												1				6					1
Striped Burrfish												1									
Striped Killifish	1,416	1,504	1,824	1,009	465	863	2,323	520	269	289	1,066	539	1,797	1,494	1,698	3,410	1,548	1,470	1,063	1,994	1,874
Striped Searobin	22		20	125	5	71	5	1	9	40							38	19	6	32	36
Summer Flounder						2	6		1		1								16	8	8
Tautog (Blackfish)	23	17	53	135	32	16	104	88	42	20	133	174	67	59	153	140	145	64	93	321	131
Three-Spine Stickleback			64											11							
Weakfish																15					
Web Burrffish																			1		
White Perch																		3			11
White Mullet			8		3										1				7	7	11
Windowpane Flounder	49		64	19	35	30	9	13	71	50	12	10	4		1	5	15	15	3	2	17
Winter Flounder (age 0)	904	139	276	483	1,055	481	1,401	916	1,486	874	1,015	1,497	708	138	302	1,310	914	470	110	365	190
Winter Flounder (age 1)	7	5	16	9	6	14	13	12	21	8	9	4	7	2	3		9	11	7	6	13
Yellow Jack			1																		

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

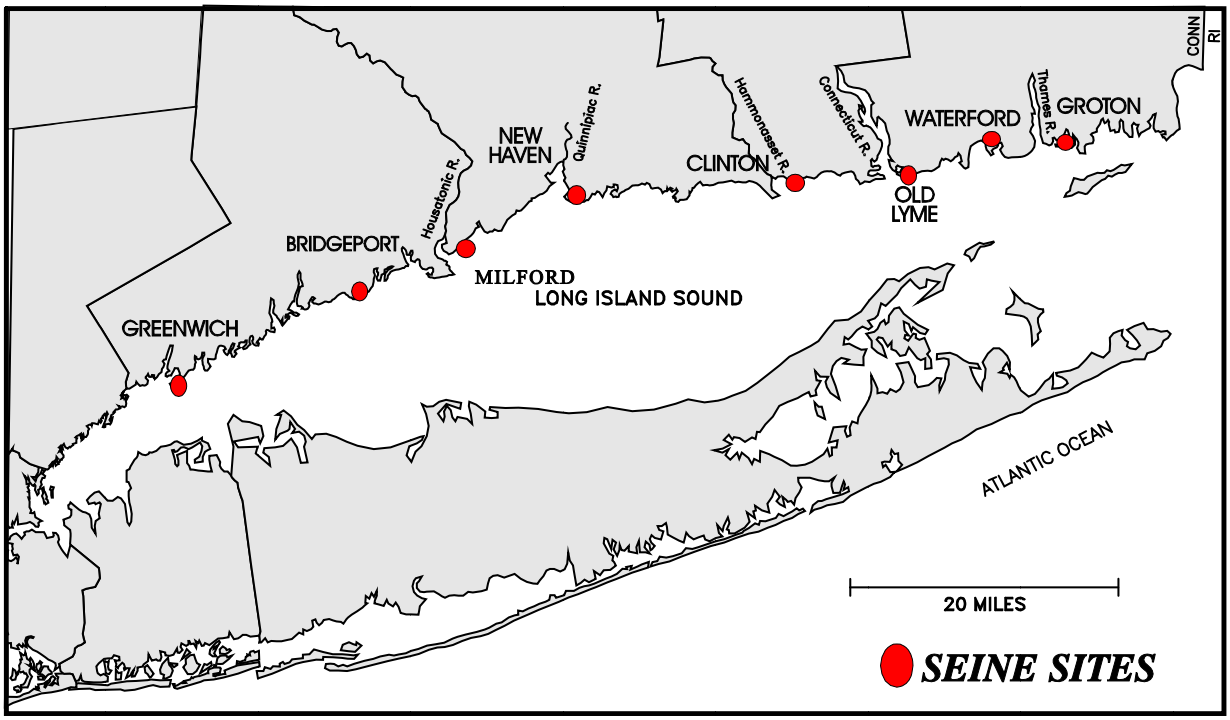

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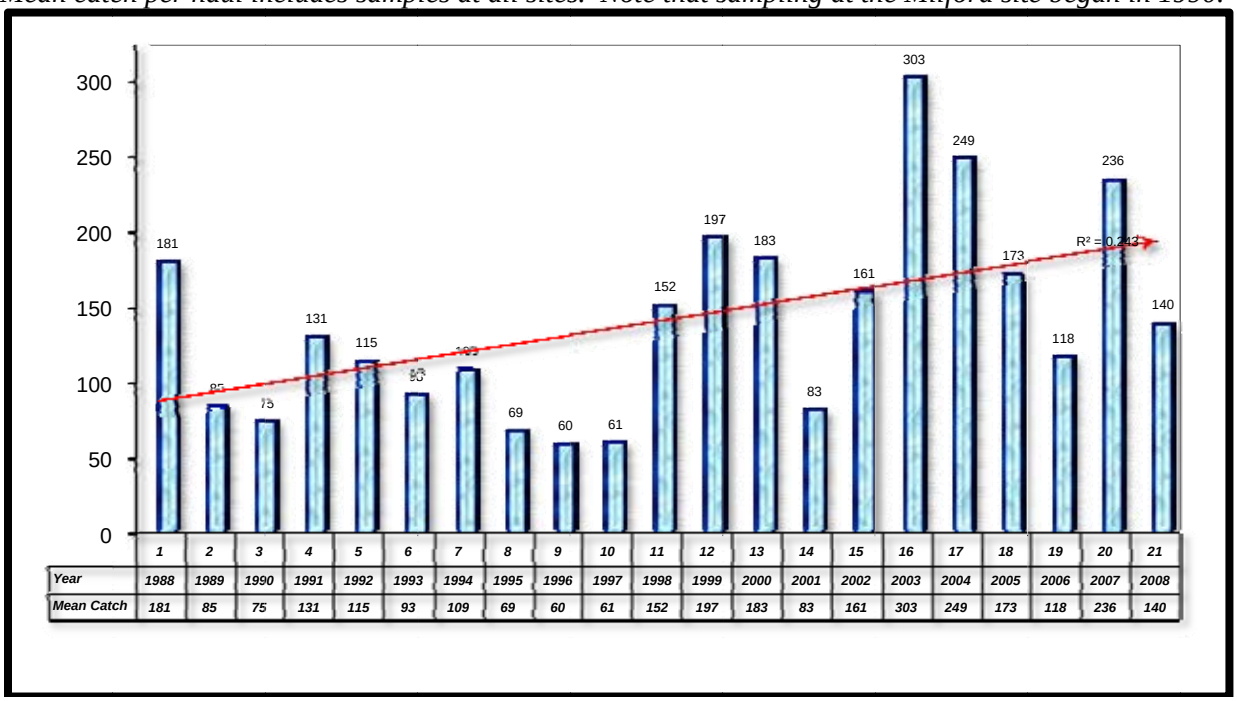
Figure 2.2: Mean catch (numbers) of all finfish taken in seine samples, 1988-2008.
Mean catch per haul includes samples at all sites. Note that sampling at the Milford site began in 1990.



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

Figure 2.3: Mean catch of young-of-year winter flounder, 1988-2008. *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.*

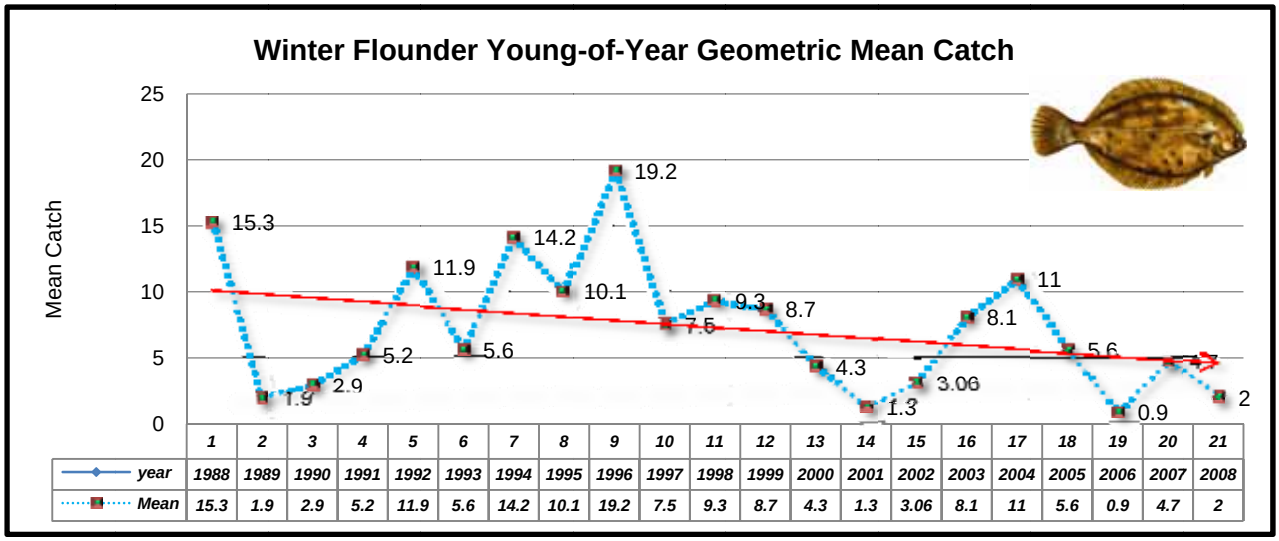


Figure 2.4: Mean catch of tautog young-of-year taken in seine samples, 1988-2008. *Geometric mean catch per haul (numbers) and occurrence (percent) includes samples at all sites. The time series trend line is shown by the black line with an arrow. Note that sampling at the Milford site began in 1990.*

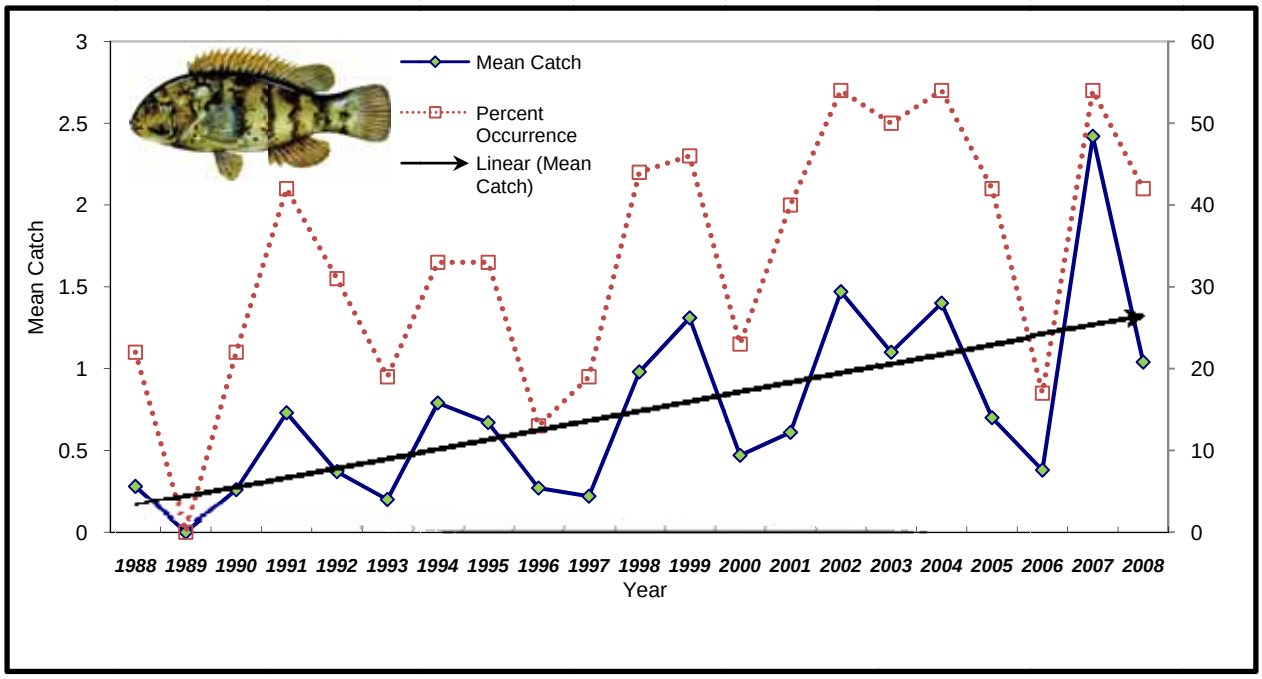


Figure 2.5: Mean catch of forage fish at eight sites sampled by seine, 1988-2008.
Forage species include Atlantic silversides, mummichog, sheepshead minnow, and striped killifish. The 95% confidence interval (CI) for each mean is also listed. See Appendix 2.1 for complete species names.

MEAN CATCH PER STANDARD HAUL

YEAR	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
MEAN	136.3	76.1	65.0	111.7	74.2	65.6	58.0	42.5	25.9	32.2	110.0
95% CI	97-189	52-107	45-94	81-149	52-104	41-103	34-99	32-57	18-36	20-50	83-145

YEAR	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
MEAN	126.9	146.3	52.4	125.3	206.4	129.7	121.7	59.4	149.5	**99.6**
95% CI	85-190	108-197	32-86	97-162	152-281	108-155	101-147	43-82	119-187	**82-121**

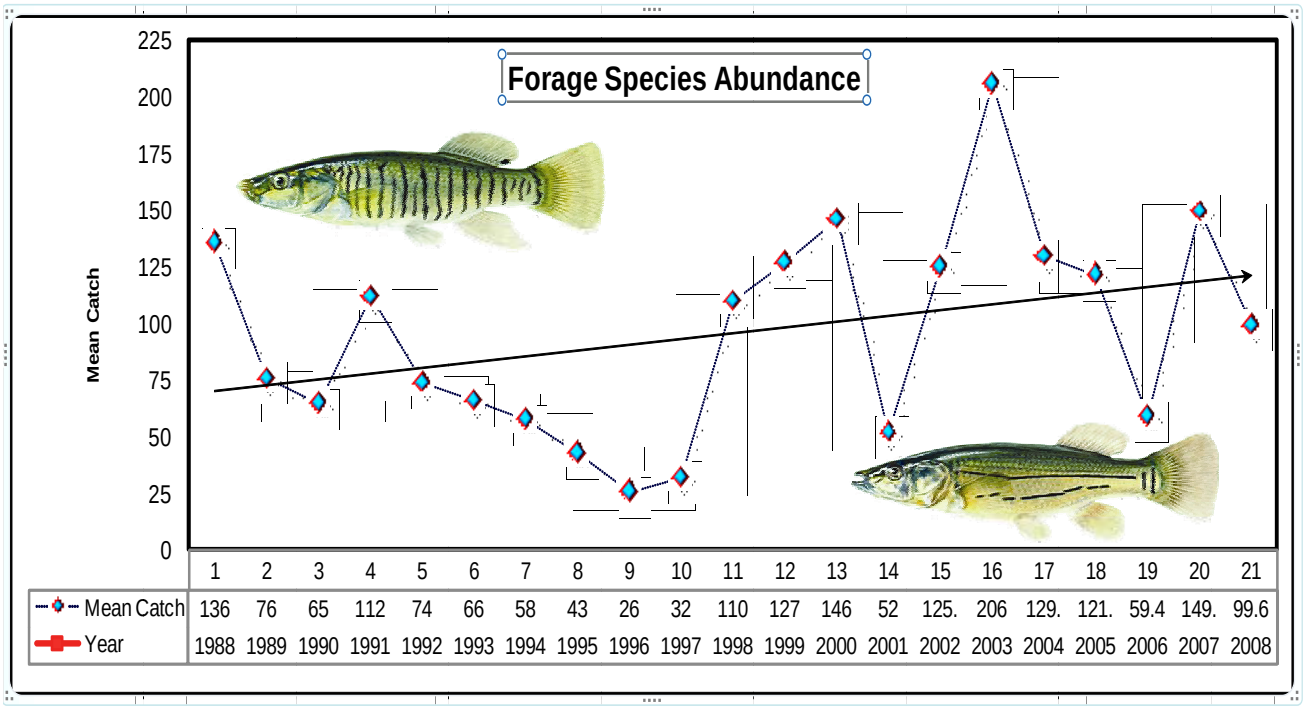


Figure 2.6: Total Catch of Four Species of Forage Fish, 1998-2008

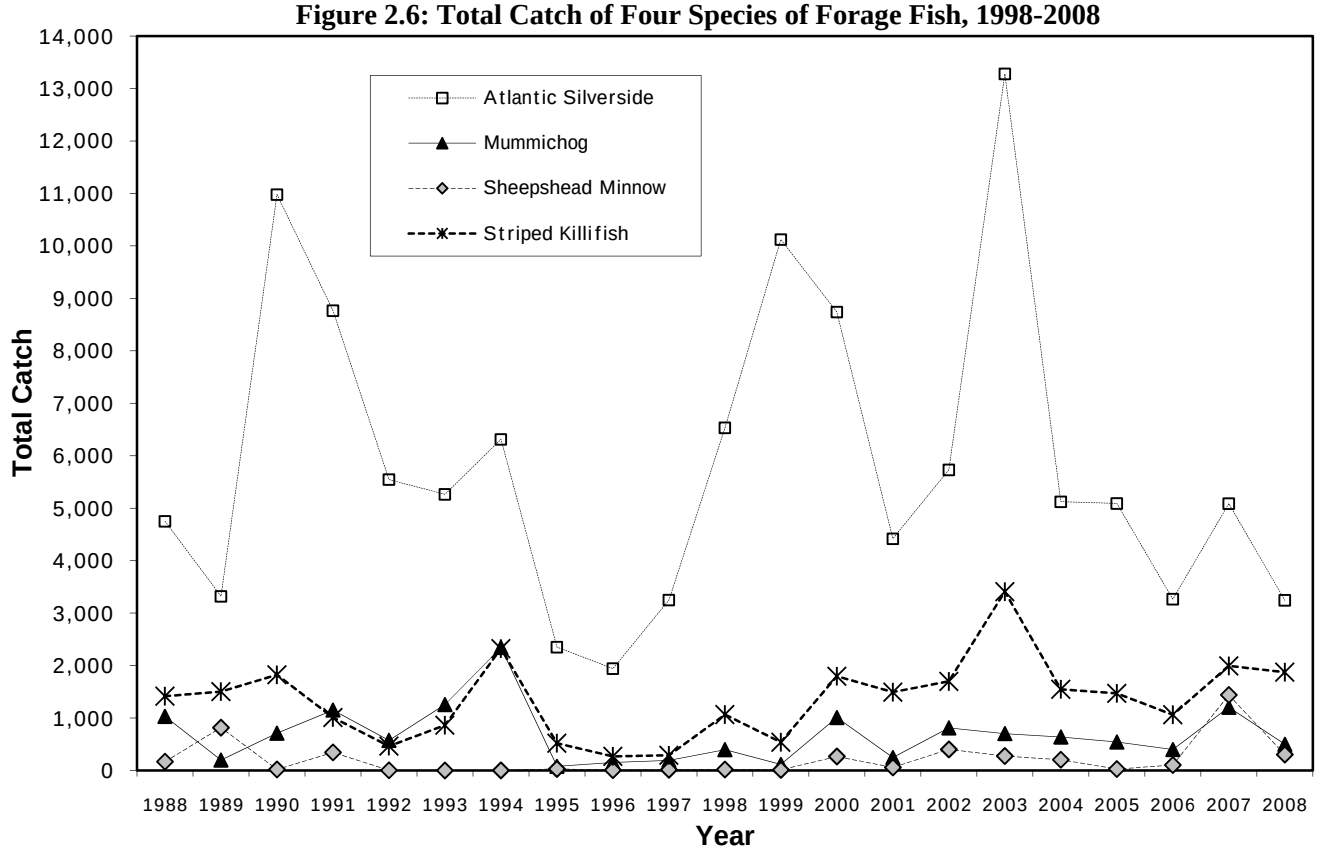


Figure 2.7: Total Catch of Juvenile Black Sea Bass and Scup, Recreational Important Finfish, 1988-2008

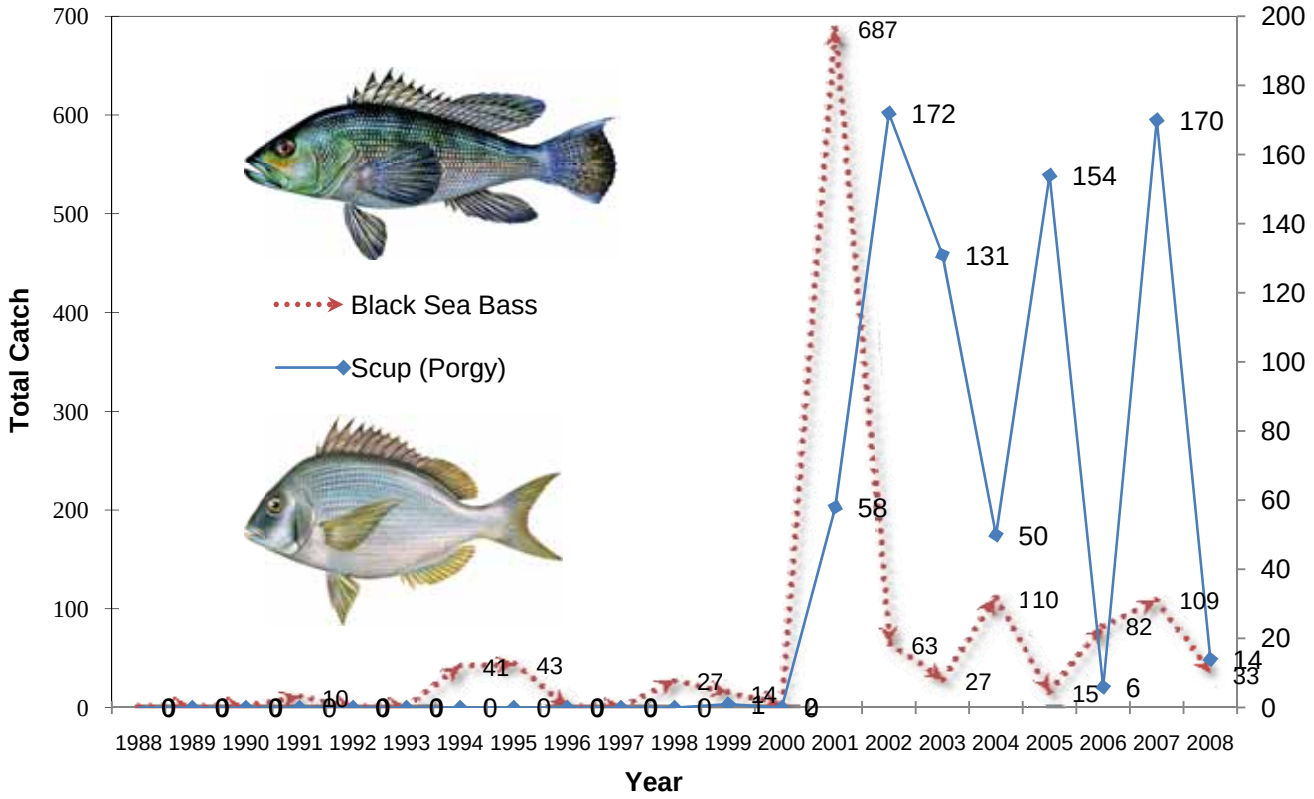


Figure 2.8: Total Catch of Juvenile Striped Bass, Summer Flounder and Weakfish, Recreational Important Finfish, 1988-2008

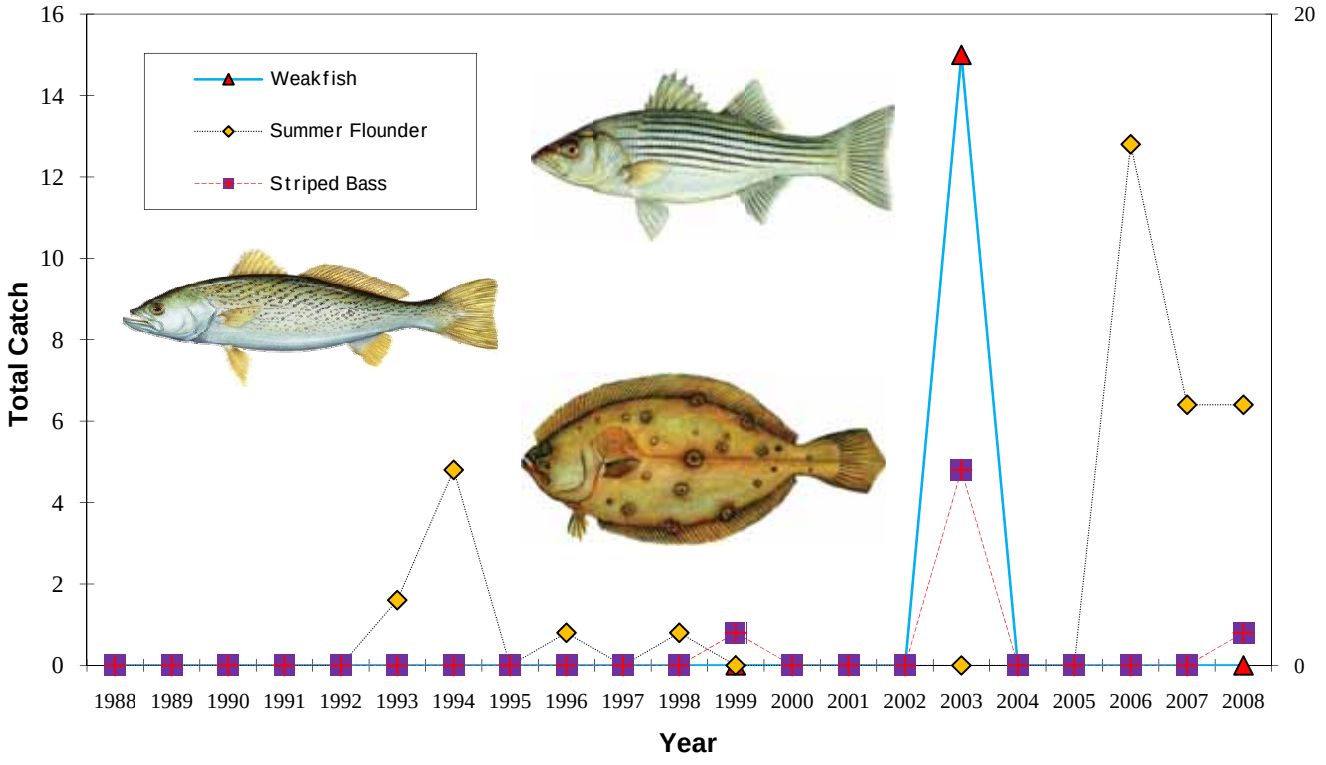
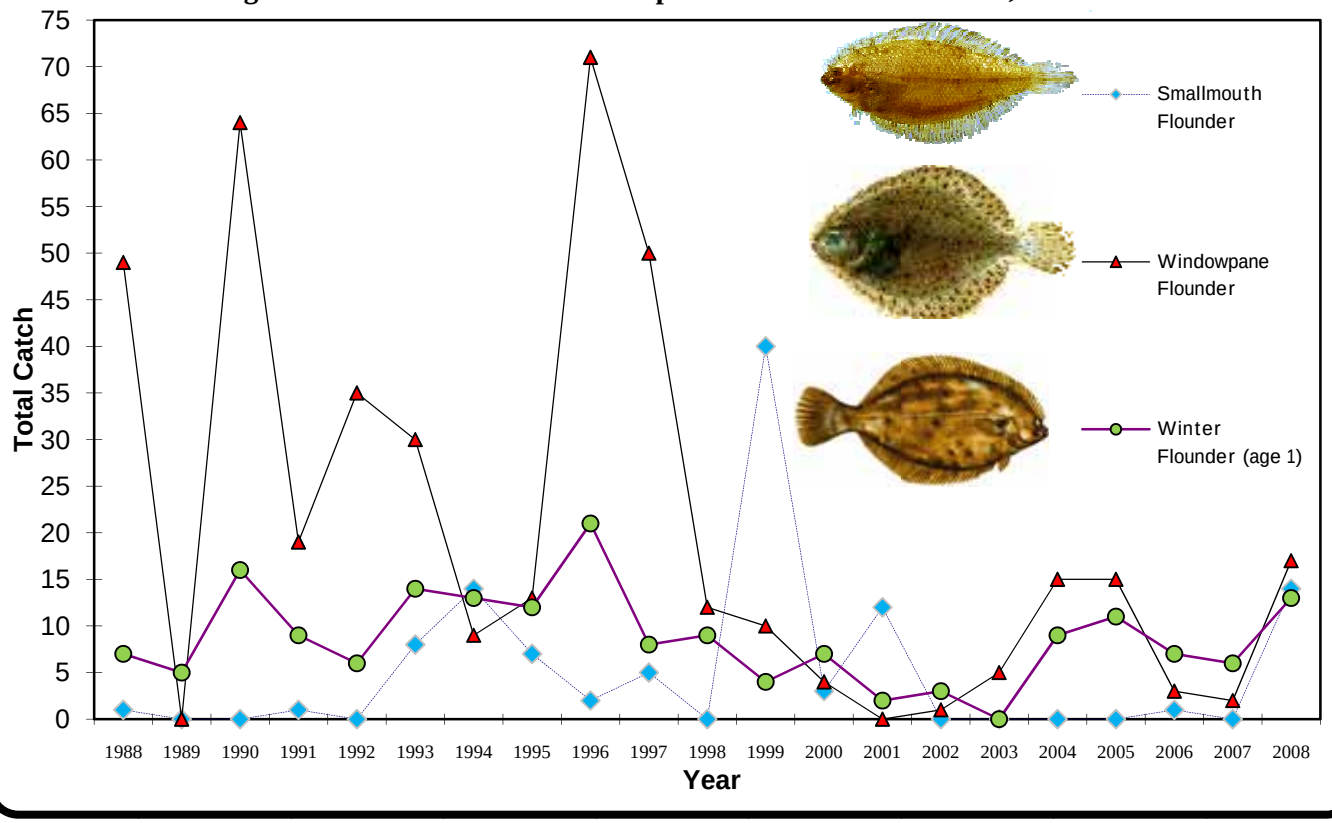


Figure 2.9: Total Catch of Three Species of Juvenile Flounders, 1998-2008



Appendix 2.1: Finfish species taken in the Estuarine Seine Survey, 1988-2008.

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*
Bay anchovy	**ACH**	*Anchoa mitchilli*
Black-spot stickleback	**BSS**	*Gasterosteus wheatlandi*
Black sea bass	**BSB**	*Centropristis striata*
Blueback herring	**BBH**	*Alosa aestivalis*
Bluefish	**BLF**	*Pomatomus saltatrix*
Blue spotted coronetfish	**BSC**	*Fistularia tabacaria*
Crevalle jack	**CRJ**	*Caranx hippos*
Cunner	**CUN**	*Tautogolabrus adspersus*
Flying Gurnard	**FGD**	*Dactylopterus volitans*
Four-spine stickleback	**FSS**	*Apeltes quadracus*
Gray snapper	**GRA**	*Lutjanus griseus*
Grubby	**GRB**	*Myoxocephalus aeneus*
Hogchoker	**HOG**	*Trinectes maculatus*
Inshore lizardfish	**LIZ**	*Synodens foetens*
Little skate	**LSK**	*Raja erinacea*
Menhaden	**MEN**	*Brevoortia tyrannus*
Mummichog	**MUM**	*Fundulus heteroclitus*
Naked goby	**NKG**	*Gobiosoma bosci*
Nine-spine stickleback	**NSS**	*Pungitius pungitius*
Northern kingfish	**NKF**	*Menticirrhus saxatilis*
Northern pipefish	**PIP**	*Syngnathus fuscus*
Northern puffer	**PUF**	*Sphaeroides maculatus*
Northern searobin	**NSR**	*Prionotus carolinus*
Northern stargazer	**STR**	*Astroscopus guttatus*
Pumpkinseed	**PUM**	*Lepomis gibbosus*
Rainbow smelt	**RSM**	*Osmerus mordax*
Rainwater killifish	**RWK**	*Lucania parva*
Rock gunnel	**RGN**	*Pholis gunnellus*
Northern seahorse	**SEH**	*Hippocampus erectus*
Northern sennet	**NOS**	*Sphyraena borealis*
Scup	**PGY**	*Stenotomus chrysops*
Sheepshead minnow	**SHM**	*Cyprinodon variegatus*
Smallmouth flounder	**SMF**	*Etropus microstomus*
Smooth dogfish	**SMD**	*Mustelus canis*
Spotted hake	**SPH**	*Urophycis regius*
Striped 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, 1988-2008.

COMMON NAME	SPECIES CODE	*SCIENTIFIC NAME*
Blue crab	**BCR**	*Callinectes sapidus*
Brown Shrimp	**BNS**	*Panaeus aztecus*
Green crab	**GCR**	*Carcinus maenas*
Hermit crab	**HER**	*Pagurus spp.*
Horseshoe crab	**HSC**	*Limulus polyphemus*
Shortfin Squid	**ILL**	*Illex illecebrosus*
Japanese crab	**JCR**	*Hemigrapsus sanguineus*
Lady crab	**LCR**	*Ovalipes ocellatus*
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*
Shore shrimp	**PAL**	*Palaemonetes spp.*

Figure 2.10: Haul Seining at Old Lyme in 2008.

JOB 3: INSHORE SURVEY

JOB 3: INSHORE SURVEY

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JOB 3: INSHORE SURVEY

STUDY PERIOD AND AREA

This report contains information on studies conducted in the Connecticut and Thames Rivers on American shad, blueback herring, menhaden and common nearshore marine species in 2008. Areas sampled on the Connecticut River range from Holyoke, MA to Essex, CT. The area of the Thames River sampled south of Norwich Harbor to Uncasville, CT. Time series data collected under a separate funding source from 1990-2007 are also included.

GOAL

To monitor abundance and distribution of finfish in Connecticut's nearshore waters.

OBJECTIVES

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

INTRODUCTION

Historically, American shad (*Alosa sapidissima*) has been an important resource to the State of Connecticut. Annual spawning migrations of shad in the Connecticut River have supported recreational and commercial fisheries within Connecticut, as well as recreational fisheries in upriver states. Information on the abundance of shad, age structure, sex ratio, and annual reproductive success are all important in the management of this species.

The Connecticut Department of Environmental Protection collects information on American shad to monitor annual changes in stock composition and manage the commercial and recreational fisheries in the Connecticut River. The department has collected information on adult shad since 1974 and has conducted and annual seine survey for juveniles since 1978.

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

METHODS

American shad adults:

The adult American shad age structure and sex ratio were determined from samples collected at the Holyoke Dam fish lift in Massachusetts. Information on the number of fish lifted daily, number of days the lift was in operation and the daily sex ratio at Holyoke was provided to CTDEP by the Massachusetts Division of Fisheries and Wildlife. The annual sex ratio was calculated by weighting the daily reported sex ratio by the number of fish lifted.

Scales were removed from a subsample of shad for age determination. All shad sampled were measured to fork length (mm). Sex of the fish was determined by visual inspection of the gonads of sacrificed fish. Approximately 25 scales were removed from above the lateral line anterior to the dorsal fin of each fish.

Scale samples were separated by sex and stratified into 0.5 cm length groups. Scale samples will be processed by cleaning with an ultrasonic cleaner and pressed onto acetate for aging. Age determination was made as the consensus of two or more readers of counting annuli and spawning scars on the magnified projected scale image, using criteria from 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 was extrapolated to the entire population by direct proportion.

Connecticut River Seine Survey

Seven fixed stations were seined one day a week from July 15 through October 15 from Holyoke MA to Essex CT. Seine haul locations and techniques were similar 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). Seven stations were sampled with one seine haul per station one day a week during daylight hours with a 15.2 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 species other than clupeids were identified, quantified or estimated through a subsample or visual estimate, and released.

Thames River Seine Survey

Eight fixed stations were sampled twice a month from July 15 through October 15. Method of seine deployment and gear used in the Thames River estuary are identical to those used on the Connecticut River.

Sample processing was the same for both surveys. All or a representative sub-sample of clupeids (*Alosa sapidissima, A. aestivalis, A. pseudoharengus,* and *Brevoortia tyrannus*) were returned to the laboratory for measurement and identification. All other were identified and counted (subsampling large catches as necessary) and returned to the water. In the laboratory, juvenile

clupeids were identified to species by the criteria of Lippson and Moran (1974) and counted. For each sample, up to 40 randomly clupeids of each species were measured to total length (mm).

Relative abundance indices were calculated using the geometric mean catch per haul among all stations and dates combined. See job 2 part 1 for method of calculating geometric mean (Gottschall 2009 Job 2.1).

RESULTS

Connecticut River Adult American shad:
Lift numbers of adult shad decreased 3.6% from 2007 to 2008 (158,812 and 153,149 respectively, Table3.1, Figure 3.1). The number of American shad lifted annually at the Holyoke Dam has been variable through the time series (range 114,137 to 721,764, median 290,476). The number of shad passed has been somewhat consistent in the last five years albeit at lower levels. The lift was opened April 4th, with the first shad passage on April 29, 2008. The lift continued to operate through July 15 for a total of 70 days, closing during periods of high water. Ageing was completed for all (432, 0.28% of the run) of the Holyoke shad scale samples provided by Mass Wildlife. The sex ratio of the 2008 shad run was derived from information collected at the Holyoke fishlift which is located at Rkm 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 the 2008 run based on the number of fish sampled at the Holyoke lift was 60% males and 40% females (MassWildLife 2009 unpub. Report).

Fork lengths of males ranged from 31.0 to 50.0 cm with a mean size of 40.5 cm. Female lengths ranged from 46.5 to 52.0 cm FLwith a mean fork length of 45.6 cm (Table 3.2). Ageing results show that the male population of shad was comprised of 2002-2005 year classes. Fifty one percent of male shad scales examined were from 5 year old fish, 7.4% were 6 year olds, 40.3 percent were four year olds and 1.16 percent were 3 year olds (Table 3.3). The majority of the 2008 female spawners are from the 2002 & 2003 year classes. Thirty three percent of female scale samples examined were 6 year old fish and 52% were 5 year old fish. The percentage of repeat spawners was higher for males as an overall percentage of 3.9 versus 1.7 among females.

Connecticut River Seine Survey
Data entry and error checking is complete for this reporting period but is still being conducted for the entire time series. Part of this process includes re-examining data sheets to determine if species not in the herring family were documented so that they can be classified as presence/absence, subsample, visual approximation or fully counted, if documented. To date 75 data tables have been entered and error checked out of a total of 129 and error checked and 18 additional tables have been entered but not yet error checked.

The Connecticut River was sampled over a 14 week period from July 16 to October 16 in 2008. The northernmost seine site (HOL), located in Holyoke Massachusetts was not sampled until August 20, 2008 because of travel restrictions.

Eighty six seine hauls were completed in 2008, collecting 11,994 fish comprised of 29 species or taxonomic groups (Table 3.7). To facilitate returning fish quickly to the water, some fish were identified only to the family or genus level (e.g. sunfish, catfish, killifish). Another way of expediting processing of live fish was to obtain visual estimates of some large catches instead of counting every fish. The estimated catches are noted as such in the database. In 2008, the most abundant species collected were spottail shiners, American shad and blueback herring. Killifish & mummichogs and sunfish were also abundant and had high occurrence in the catches (Table 3.7).

A total of 3,541 juvenile American shad were collected (Table 3.4). Wilson accounted for 57% of the total 2008 juvenile shad catch. The 2008 shad catches indicate a moderate to low year class (13th highest out of 19 since 1990) with an average catch per unit effort of 41.2. The 2008 geometric mean catch from all stations and dates sampled was 5.06 (Table 3.6, Figure 3.3). The highest individual catch at a site occurred in September at Wilson (1,460) and represents 73% of the catch at that site for the season (Table 3.4). Catches of shad from 1990-2008 were variable over time ranging from 1,517 to 34,595. A total of 1,629 blueback herring were collected in 2008 (Table 3.5). This is the lowest catch in the time series and represents a cpue of 2.20 (Table 3.6, Figure 3.2) The 2008 blueback herring year class ranks lowest in the last 19 years. An index of juvenile abundance is also presented for menhaden. The 4 southernmost stations are used to calculate the index, since juvenile menhaden are not frequently in the freshwater portions of the river. The annual catches of menhaden have ranged from a low of 71 in 2006 to a high of 191,477 in 2002. The 2008 CPUE (0.23) is the lowest in the time series since 1990 (Table 3.6).

Thames River Seine Survey

The Thames River seine survey began in 1996. However, results are presented for the 2005-2008 sampling seasons. Prior to that, species other than clupeids, were not consistently counted. In 2008 a total of 63 hauls were completed and 9,882 fish were collected representing 26 groups or species (Table 3.8). The most numerous species collected were Atlantic silversides (7,243) followed by killifish & mummichogs (616), and sticklebacks. Frequency of occurrences shows that Atlantic silversides, killifish & mummichogs, menhaden, bluefish, and winter flounder were some of more widely distributed species in the seine hauls over the past 4 years (Table 3.9).

Juvenile menhaden were consistently counted throughout the time series. The catches have been variable with a peak geometric mean cpue of 117.46 in 2002. Since then the catches have continued to decline and have reached a low of 0.37 in 2008 (Table 3.10, Figure 3.3).

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Table 3.1. Number of adult shad lifted at the Holyoke Dam, 1975-2008.

Year	# Shad Lifted
1975	114,137
1976	346,702
1977	202,997
1978	144,698
1979	255,753
1980	376,276
1981	377,124
1982	294,834
1983	528,185
1984	496,879
1985	481,668
1986	352,122
1987	271,974
1988	294,157
1989	353,819
1990	363,825
1991	523,153
1992	721,764
1993	340,431
1994	180,807
1995	190,295
1996	276,289
1997	299,448
1998	315,810
1999	193,187
2000	224,483
2001	273,220
2002	374,543
2003	286,795
2004	191,295
2005	116,519
2006	154,745
2007	158,812
2008	153,149

Table 3.2. Length frequencies of adult male (bucks) and female (roes) American shad sampled at the Holyoke FishLift.

Fork Length (cm)	Bucks	Roes	Total
31.00	2		2
31.50	1		1
33.00	2		2
33.50	3		3
34.00	1		1
34.50	1		1
35.00	8		8
35.50	4		4
36.00	5		5
36.50	1		1
37.00	14	1	15
37.50	4		4
38.00	12		12
38.50	7		7
39.00	17	2	19
39.50	9	1	10
40.00	21	2	23
40.50	17		17
41.00	23	4	27
41.50	10	1	11
42.00	24	10	34
42.50	8	5	13
43.00	20	12	32
43.50	12	6	18
44.00	12	15	27
44.50	5	3	8
45.00	4	23	27
45.50	2	10	12
46.00	4	15	19
46.50	1	7	8
47.00	2	5	7
47.50	1	4	5
48.00		15	15
48.50		1	1
49.00	1	10	11
49.50		2	2
50.00	1	5	6
50.50		1	1
51.00		10	10
51.50		1	1
52.00		2	2
Total	**259**	**173**	**432**

Table 3.4. Catch, effort and catch per effort of juvenile American shad from the 2008 CT River seine survey. C=Total catch, E=Number of seine hauls.

Date	HOL	ENF	WIL	GLA	SAL	DEP	ESX	C	E	C/E
7/16		0	0	0	15	8	9	32	6	5.33
7/23		287	9	0	49	8	0	353	6	58.83
7/30		27		0	18	11	1	57	5	11.40
8/7				0	32	1	0	33	4	8.25
8/15		141	7	0	97	30	18	293	6	48.83
8/20	110	15	12	0	11	5	0	153	7	21.86
8/27	57	0	400	0	14	5	22	498	7	71.14
9/3	0	0	1,460	0	8	0	8	1,476	7	210.86
9/10	71	0	3	0	57	3	32	166	7	23.71
9/17			0	0	4	0	10	14	5	2.80
9/24	220	0	83	0	21	11	7	342	7	48.86
10/1	11	0	36	2	14	30	0	93	7	13.29
10/8	0	0	0	3	8	13	0	24	7	3.43
10/16	0	0	0		6	1		7	5	1.40
Total	469	470	2,010	5	354	126	107	3,541	86	41.17

Table 3.5. Catch, effort and catch per effort of juvenile blueback herring from the 2008 CT River seine survey. C=Total catch, E=Number of seine hauls.

Date	HOL	ENF	WIL	GLA	SAL	DEP	ESX	C	E	C/E
7/16		0	0	0	10	10	70	90	6	15.00
7/23		0	0	0	392	89	0	481	6	80.17
7/30		4		6	12	1	7	30	5	6.00
8/7				3	24	1	0	28	4	7.00
8/15		0	0	0	14	1	3	18	6	3.00
8/20	0	0	0	0	21	1	0	22	7	3.14
8/27	0	0	1	0	18	0	3	22	7	3.14
9/3	0	0	0	4	64	0	0	68	7	9.71
9/10	0	0	0	0	122	15	62	199	7	28.43
9/17			0	152	18	0	53	223	5	44.60
9/24	0	0	0	0	43	10	328	381	7	54.43
10/1	0	0	1	0	6	29	0	36	7	5.14
10/8	0	0	0	0	0	28	1	29	7	4.14
10/16	0	0	0		2	0		2	5	0.40
Total	0	4	2	165	746	185	527	1,629	86	18.94

Table 3.6. Total Catch, Geometric and arithmetic mean relative abundance indices (CPUE) of juvenile American shad (ASD), blueback herring (BBH) and menhaden (MEN) CT River 1990-2008.

year	ASD	G mn ASD	BBH	G mn BBH	MEN	G Mn MEN
1990	4,091	10.39	24,097	14.41	2,730	2.73
1991	4,508	4.02	14,903	11.80	22,987	8.91
1992	10,146	7.82	14,906	10.83	59,737	15.32
1993	7,820	9.24	12,767	14.17	9,449	3.42
1994	34,595	13.20	11,236	13.73	6,236	2.58
1995	3,040	1.38	8,312	5.37	923	0.95
1996	3,730	6.50	4,728	5.91	33,426	6.01
1997	6,415	7.40	28,182	10.53	5,813	4.97
1998	4,050	3.69	5,474	5.03	33,488	27.54
1999	5,899	5.47	9,152	5.57	57,178	5.25
2000	2,713	4.42	3,184	4.17	36,600	7.44
2001	4,936	2.60	5,624	3.84	4,068	5.78
2002	9,832	5.29	7,011	4.04	191,477	8.82
2003	3,207	6.88	4,568	5.88	158,944	25.61
2004	2,187	5.62	1,904	2.36	26,726	10.8
2005	4,719	10.08	5,869	4.10	407	0.88
2006	1,517	1.82	4,474	3.50	71	0.34
2007	5,332	8.15	9,355	6.61	17,930	5.54
2008	3,541	5.06	1,629	2.20	138	0.23

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

Species or Group	Code	Count	% occurrence
alewife	ALW	21	6.98
American shad	ASD	3541	61.63
Atlantic silverside	ASS	9	3.49
bay anchovy*	BAY	1	2.33
blueback herring	BBH	1629	44.19
crappie*	BLC	26	13.95
bluefish	BLF	0	1.16
catfish*	CAT	24	16.28
carp	CRP	2	4.65
darter*	DAR	306	33.72
American eel	EEL	18	13.95
fallfish	FAL	55	4.65
killifish & mummichog*	FUN	921	43.02
golden shiner	GSH	44	15.12
hog choker	HOG	0	2.33
hickory shad	HSH	53	4.65
largemouth bass	LMB	53	26.74
menhaden	MEN	138	3.49
chain pickeral	PIC	1	1.16
northern pike	PIK	6	13.95
rock bass	RKB	10	19.77
summer flounder	SFL	2	1.16
smallmouth bass	SMB	93	39.53
spottail shiner	SPS	3741	73.26
stickleback*	STK	6	4.65
sunfish*	SUN	665	52.33
white perch	WHP	266	22.09
white sucker	WHS	108	11.63
yellow perch	YWP	255	47.67
Total		11994	

Table 3.8. List of fish species and frequency of occurrence of fish collected in Thames River seine survey, 2008. * *includes more than one species*

Species or Group	Code	Count	% occurrence
alewife	ALW	3	3.17
American eel	EEL	1	1.59
anchovy*	BAY	484	20.63
Atlantic silverside	ASS	7243	95.24
bluefish	BLF	334	41.27
blueback herring	BBH	3	1.59
butterfish	BUT	1	1.59
catfish*	CAT	1	1.59
crevalle jack	CRJ	1	1.59
darter*	DAR	1	1.59
killifish & mummichogs*	FUN	616	52.38
menhaden	MEN	195	15.87
naked goby	NKG	8	12.70
pipefish	PIP	20	14.29
scup	PGY	9	1.59
sheepshead minnow	SHM	84	3.17
spot	SPT	5	3.17
spottail shiner	SPS	100	6.35
stickleback*	STK	523	46.03
striped bass	STB	16	12.70
summer flounder	SFL	72	19.05
tautog	BKF	38	14.29
tomcod	TOM	5	4.76
white mullet	WML	2	3.17
white perch	WHP	1	1.59
winter flounder	WFL	115	31.75
Total		9882	

Table 3.9. List of fish species and percent frequency of occurrence of fish collected in Thames River seine survey, 2005-2008. **includes more than one species*

Name	Code	2005	2006	2007	2008
African pompano	AFP		1.56		
alewife	ALW	6.67	1.56	17.86	1.59
American eel	EEL		6.25		1.59
American shad	ASD			5.36	
Atlantic needlefish	ANF	6.67	1.56		
Atlantic silverside	ASS	80.00		82.14	74.60
bay anchovy	BAY		10.94	7.14	14.29
blueback herring	BBH			1.79	1.59
bluefish	BLF	60.00	45.31	44.64	31.75
butterfish	BUT	3.33			1.59
carp	CRP		1.56	1.79	
catfish*	CAT				1.59
crevalle jack	CRJ	23.33	12.50	5.36	1.59
darter	DAR				1.59
horseshoe crab	HOR	3.33			
killifish & mummichog*	FUN	43.33	25.00	32.14	42.86
largemouth bass	LMB		1.56		
lizardfish	LIZ		6.25	5.36	
menhaden	MEN	20.00	35.94	42.86	12.70
naked goby	NKG		3.13	8.93	9.52
northern kingfish	NKF	3.33			
northern pike	PIK	3.33			
pipefish	PIP	13.33	15.63	26.79	11.11
scup	PGY	6.67		14.29	
sheepshead minnow	SHM	3.33		3.57	3.17
spot	SPT			1.79	1.59
spottail shiner	SPS	6.67	9.38	3.57	6.35
stickleback*	STK	16.67	12.50	5.36	36.51
striped bass	STB	3.33	6.25	21.43	11.11
striped sea robin	SSR			3.57	
summer flounder	SFL		4.69	5.36	15.87
sunfish*	SUN		1.56		
tautog	BKF	20.00	6.25	21.43	12.70
tomcod	TOM			3.57	4.76
white mullet	WML		4.69		3.17
white perch	WHP	13.33	3.13	8.93	1.59
windowpane flounder	WPF			7.14	
winter flounder	WFL	23.33	10.94	37.50	26.98

Table 3.10. Number collected, number of seine hauls and geometric mean catch per haul of menhaden, 1998-2008.

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

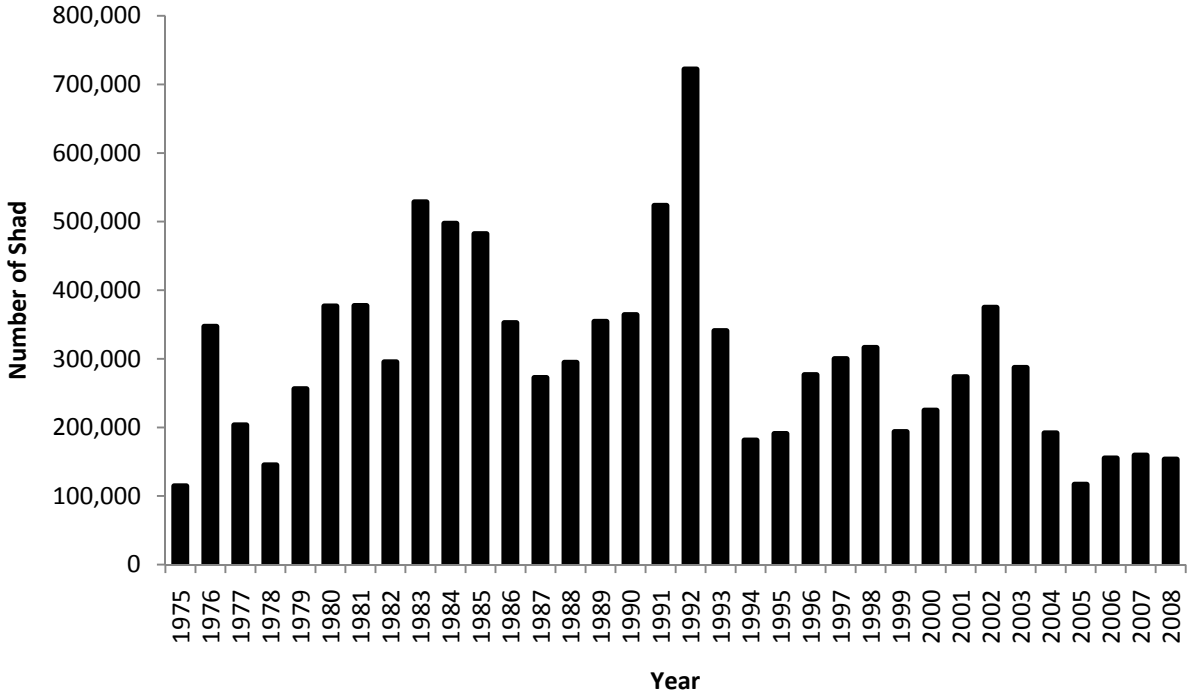

Figure 3.1. Number of shad lifted at the Holyoke Dam, 1975-2008.

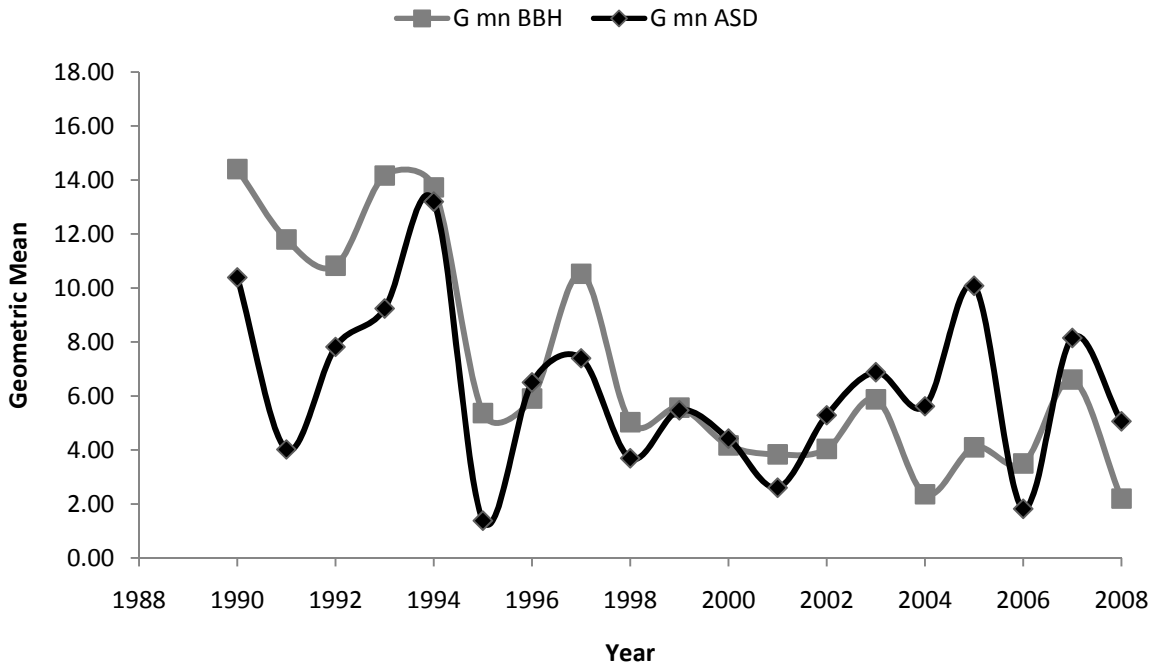

Figure 3.2. Geometric mean catch per haul of American shad (ASD) and blueback herring (BBH) in the Connecticut River 1990-2008.

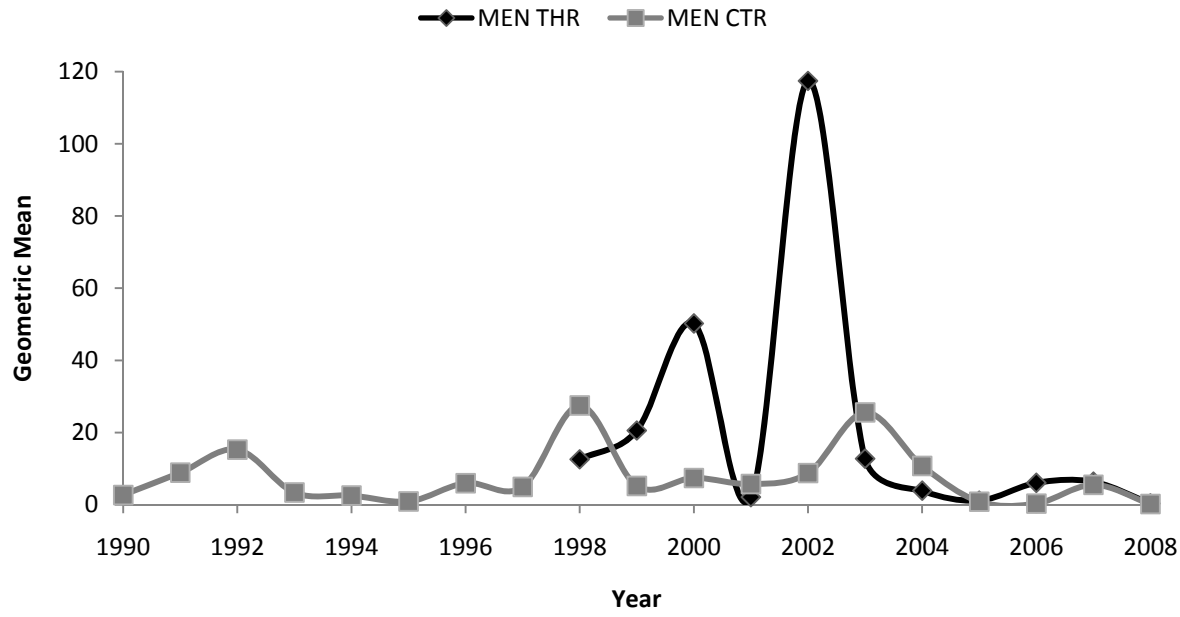

Figure 3.3. Geometric mean catch per haul of menhaden in the Connecticut (MEN CTR) and Thames (MEN THR) Rivers, 1990-2008.

JOB 5: COOPERATIVE INTERAGENCY RESOURCE MONITORING

-LONG ISLAND SOUND AMBIENT WATER QUALITY MONITORING-

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

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hypoxia area mapping, field operations, survey summaries

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

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JOB 5: COOPERATIVE INTERAGENCY RESOURCE MONITORING

GOAL

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

OBJECTIVES

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

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

INTRODUCTION

Long Island Sound, Living Resources and Hypoxia

Long Island Sound (the Sound) is a semi-enclosed estuary that encompasses 3,370 km^2 (337,000 ha) including embayments (Wolfe et al., 1991) and receives runoff from a 41,400 km^2 drainage basin that includes Long Island, New York and much of New England to the Canadian border. More than 7 million people live within the state of Connecticut and New York counties bordering the Sound (LISS 1990). The Sound has typically acted as the receiving body of domestic, agricultural and industrial waste generated within the region.

Excessive nutrient inputs (most notably nitrogen) from atmospheric deposition, runoff and sewage discharges as well as natural sources results in a high rate of primary (phytoplankton) production within the Sound. Summer warming of surface water results in a temperature and density stratification within the water column, known as the pycnocline. As phytoplankton blooms die off and decompose, oxygen in bottom waters is used up, often resulting in hypoxia (low dissolved oxygen, DO <= 3.5 mg/l) and in some cases, anoxia (DO <0.2 mg/l). These periodic hypoxic events generally develop by early July and may persist until late September.

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 3.5

mg/l. In addition to BADD, inter-annual trends in the severity of hypoxia are monitored using duration (weeks where DO<3.5 mg/l) and maximum areal extent of waters with severe hypoxia (DO<1.0 mg/l). Together, these three indices are used to relate dissolved oxygen trends to conditions for living resources in the Sound.

Water Quality Monitoring Program

In January 1991, Connecticut DEP initiated a water quality and hydrographic survey to provide continuity to a time series begun in 1988 under the National Estuaries Program's, Long Island Sound Study. This survey continues in an expanded form with EPA (and Federal Aid to Sportfish Restoration) support as the Department's "Long Island Sound Ambient Water Quality Monitoring Program."

In the first three years of this study (1991-1993), sampling was conducted cooperatively between Marine Fisheries and Water Management staff to evaluate dissolved oxygen (DO) conditions and coincident fish abundance. With the completion of fishery resource sampling in 1993, emphasis shifted to intensive water quality monitoring under the Bureau of Water Management. In 1994, forty-eight permanent stations were established to monitor summer hypoxia; eighteen of these stations are sampled on a monthly basis year-round. Marine Fisheries staff continue to provide research vessel support and rely on this program to evaluate the effects of hypoxia on living resources through the three indices identified above. In addition, monthly patterns in temperature and salinity have proven useful in understanding both seasonal and inter-annual trends and in making inferences concerning fishery resources.

METHODS

Sampling Design

In 1994, 48 fixed stations were established to monitor hypoxia. Beginning in December 1994, eighteen of these stations were also sampled as part of the monthly water quality monitoring program, an expansion from the previous seven axial station coverage. In 1998 a 49th station (J4) was added in the eastern Sound. Monthly stations were distributed to provide axial coverage over the length of the Sound, including a reference station outside the Sound, southeast of Fishers Island. Transverse stations were located off New Haven, Bridgeport and Norwalk. Summer hypoxia monitoring stations are concentrated in the hypoxia prone western half of the Sound, although Connecticut shoreline coverage extends east of the Connecticut River. The eighteen monthly stations are sampled year round, generally during the first week of the month. Beginning in the end of June, hypoxia monitoring commences and twice monthly hypoxia sampling continues through September. During the summer of 2002 Connecticut DEP modified the summer hypoxia sampling by decreasing the number of stations sampled from 49 down to between 20 and 25. These changes were made to make better use of the resources available and to better reflect the understanding from eleven years of monitoring. The mid month Hypoxia surveys will be limited to the narrows, western and central basins with a focus on stations that historically have been affected by hypoxic conditions. The number of stations sampled on these surveys will be adjusted according to the severity of the hypoxic event. During years of unusually severe hypoxia additional stations will be monitored to ensure an accurate assessment of the area affected by low dissolved oxygen.

Sampling Procedures

Water sampling is conducted from the 50 ft Research Vessel John Dempsey. Conductivity-temperature-depth (CTD) water column profiles are taken with a Sea-Bird model SBE-19 SeaCat Profiler, equipped with dissolved oxygen (YSI model 5739), photosynthetically-active radiation (PAR) (Licor spherical underwater model 193SA) and Fluorometer (WET labs WETstar Miniature Fluorometer) sensors. Data are recorded at a rate of twice per second and the instrument is lowered through the water column at a rate of 0.2 m per second. Dissolved oxygen is also measured by Winkler titration as a quality assurance procedure. Nutrients, and chlorophyll a are also measured. See Kaputa and Olsen (2000) for a complete description of the Long Island Sound Water Quality Monitoring Program. Beginning in 2002 CTDEP expanded its monthly monitoring by adding phytopigment analysis (HPLC method) in April of 2002 and Zooplankton analysis in August of 2002. MesoZooplankton samples are collected using a 200-micron mesh, 0.5 meter double ring plankton net and MicroZooplankton samples are collected from a multiple depth composite of whole water samples. These changes will be continued through the fall of 2009.

Area and Duration Estimates

In the initial years of this project (1991-1993) the area affected by hypoxia was estimated using a stratified-random sampling approach where stations were selected at random within five east-west zones, further subdivided by depth at the 18 m contours (Gottschall and Simpson, 1999). In 1994 a fixed station sampling program was adopted. To calculate the area of hypoxia from this fixed station design the monitoring staff developed a GIS based method using ArcView, this approach is more appropriate for the programs design.

To calculate the area affected by hypoxia, the minimum dissolved oxygen and the location of each station sampled during each survey is entered into a Geographic Information System (currently ArcMap 9.1) database and plotted. The Spatial Analyst extension is used to interpolate DO values between stations using the inverse distance weighted (IDW) method, producing a cell grid of minimum DO values for the Sound. The area within each interval (0-0.99, 1.0-1.99, 2.0-2.99, 3.0-3.5, 3.51-4.8) is estimated by multiplying the number of cells within each DO interval by the area within each cell (approximately 0.1 square km). Area estimates include LIS waters shoreward to the 4.0 m contour, except at the eastern (The Race, Fishers Island, Thames River) and western (Throgs Neck Bridge) boundaries, encompassing a total of 2,723 square km.

The duration of each annual hypoxia event in LIS was estimated using the time series of bottom water dissolved oxygen concentrations at each station. Start and end dates were approximated for each station graphically by determining the intersection of the time series line with the 3.5 mg/l grid line. The earliest start date and latest end date – regardless of station – provided the preliminary start and end date estimates for the year. Data available from the Long Island Sound Trawl Survey (Job 2), other programs and agencies, as well as daily wind and precipitation records were then considered. Such supplementary data improved the date estimates by filling in gaps between sampling events and accounting for substantial wind or storm events that would likely have provided the energy necessary to mix the water column.

Indices of Habitat Impairment Associated with Hypoxia

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 3.5 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 04% reduction occurs at 3.0-3.5 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 June 30 – September 20 (83 d). The index is then expressed as a percentage of the available area-days (sample area 2,723 km^2 x 83 d, or 226,009 area-days). In addition to BADD, inter-annual trends in the severity of hypoxia are monitored using duration (weeks where DO<3.5 mg/l) and maximum areal extent of waters with severe hypoxia (DO<1.0 mg/l).

RESULTS AND DISCUSSION

Hypoxic Area and Duration

The hypoxic area (DO<3.5 mg/L) during the summer of 2008 in Long Island Sound was above average and ranked the fourth highest behind 1994, 2003, and 1995. The duration was the longest recorded since 1991. One hundred four square kilometers (104 km^2) were affected by dissolved oxygen levels below 1 mg/L. Our August 20-August 22 (HYAUG08) survey had the maximum area (932 sq. kilometers) affected by hypoxia (Table 5.1). Hypoxia was estimated to begin on or about June 30, 2008 and ended on or about September 20, 2008 for a total of 83 days (Figure 5.1).

Habitat Impairment Associated with Hypoxia

Area-days by DO interval were calculated for each survey (Table 5.2) to produce the biomass-area-day-depletion (BADD) index used to quantify habitat impairment (Table 5.3). The greatest impairment was associated with the 2-2.99 mg/l DO interval due to the wider area of exposure estimated for this interval throughout the summer.

The BADD index was calculated for the 83-day period between June 30 and September 20. The BADD index for 2008 was 9,318 or 4.1% of the total area-days in the LIS sampling area covered by the Ambient Water Quality Monitoring Program.

Monthly Salinity and Temperature Trends

Monthly mean surface and bottom water temperature and salinity were calculated from six axial water quality stations (B3, D3, F3, H6, I2 and M3) for the period between 1991 and 2008. Plots of each year against the time series mean illustrate the inter-annual variability in both salinity (Figure 5.2) and temperature (Figure 5.3). In some cases, deviations from the 1991-2004 mean can be associated with fish population events. For example, strong winter flounder recruitment indices observed in 1994 and 1996 (Job 2) are consistent with colder than average late winter water temperatures that are believed to enhance survival of flounder larvae.

Missing stations can affect monthly means. Therefore the plotted values should be regarded as a qualitative summary of salinity and temperature trends.

MODIFICATIONS
None.

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Table 5.1. Area (km^2) by survey and 1.0 mg/l dissolved oxygen interval during 2008. Actual start and end dates are listed along with number of stations sampled for each survey.

				Area (km^2)					
Survey	Start Date	End Date	Stations sampled	0.0 - 0.99	1.0 - 1.99	2.0 - 2.99	3.0 - 3.5	3.5-4.8	4.8 +
HYJUN08	6/17/2008	6/17/2008	23					154.8	1021.4
WQJUL08	6/30/2008	7/7/2008	38	0	0	10.1	100.1	202.4	2415.4
HYJUL08	7/21/2008	7/23/2008	29	31.5	66.3	53.9	152.8	372	1087.3
WQAUG08	8/5/2008	8/8/2008	44	93	17	125.9	347.4	947.2	1182.3
HYAUG08	8/20/2008	8/22/2008	35	104.3	79.8	282.4	465.8	455	118.7
WQSEP08	9/3/2008	9/5/2008	29	0	0	340.5	258.6	963.4	1149.8
HYSEP08	9/16/2008	9/16/2008	20	0	36	105.9	32.6	462.6	117.1

Table 5.2. Area-days exposure by survey and dissolved oxygen interval during 2008. Dates are interpolated values between surveys, yielding the days used in area-day calculation.

Cruise	Dates	Days		0.0 - 0.99	1.0 - 1.99	2.0 - 2.99	3.0 - 3.5	3.5 - 4.8	4.8+
HYJUN08	6/17-6/27	10		0	0	0	0	1548	10214
WQJUL08	6/27-7/15	18		0	0	101	1001	2024	24154
HYJUL08	7/15-7/31	16		567	663	539	1528	3720	10873
WQAUG08	7/31-8/15	15		1674	170	1259	3474	9472	11823
HYAUG08	8/15-8/29	14		1877	798	2824	4658	4550	1187
WQSEP08	8/29-9/11	13		0	0	3405	2586	9634	11498
HYSEP08	9/11-9/16	5		0	648	1906	587	8327	2108

Table 5.3. Biomass-Area-Day-Depletion (BADD) values by survey and dissolved oxygen interval during 2008. BADD values are calculated as area-days x percent impairment (shown in parentheses) associated with each dissolved oxygen interval. Impairment based on demersal finfish biomass response.

				100%	82%	41%	4%	0%	0%
Cruise	Dates	Days		0.0 - 0.99	1.0 - 1.99	2.0 - 2.99	3.0 -3.5	3.5 - 4.8	4.8+
HYJUN08	6/17-6/27	10		0	0	0	0	0	0
WQJUL08	6/27-7/15	18		0	0	41	40	0	0
HYJUL08	7/15-7/31	16		567	544	221	61	0	0
WQAUG08	7/31-8/15	15		1674	139	516	139	0	0
HYAUG08	8/15-8/29	14		1877	654	1158	186	0	0
WQSEP08	8/29-9/11	13		0	0	1396	103	0	0
HYSEP08	9/11-9/16	5		0	648	1906	587	8327	2108
			Sum	4118	1337	3332	530	0	0

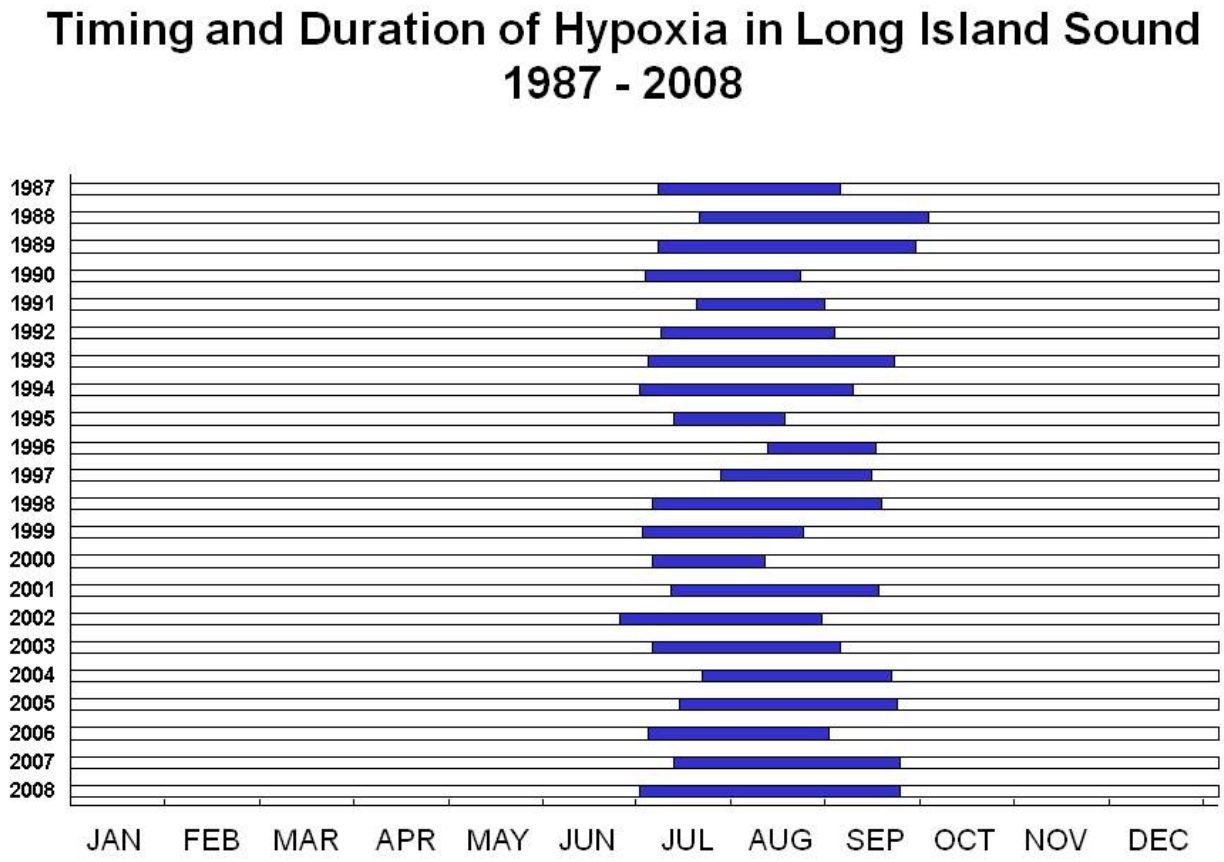

Figure 5.1. Timing and duration of hypoxia in Long Island Sound from 1987 through 2008. In 2008 hypoxia developed on about June 30 and persisted 83 days, ending on or about September 20, 2008.

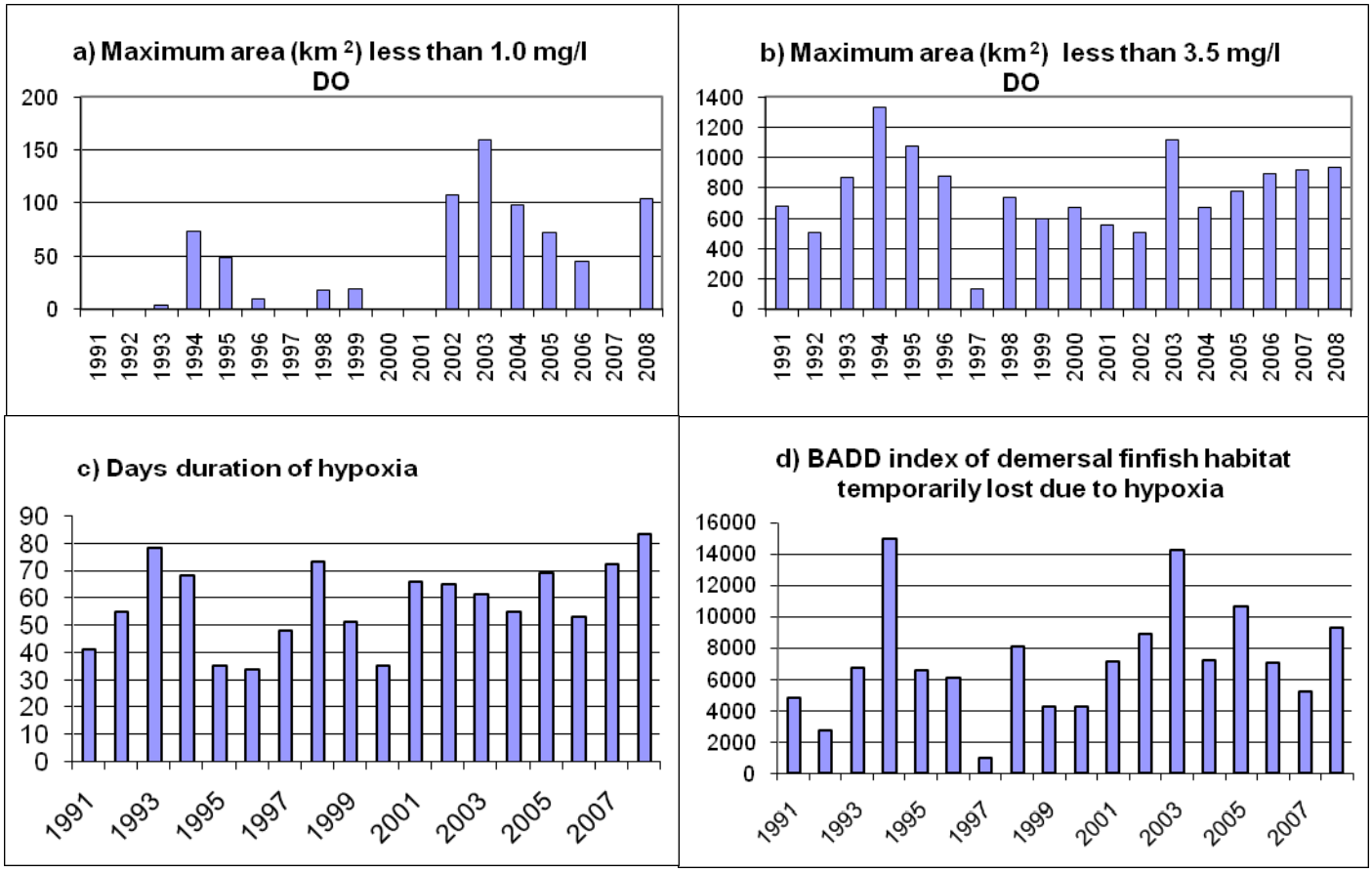

Figure 5.2. a) Maximum area (km^2) less than 1.0 mg/l DO, b) maximum area (km^2) less than 3.5 mg/l DO, c) duration (days) of hypoxia (DO<3.5 mg/l), d) biomass area-day depletion (BADD) index of temporary habitat loss to demersal finfish associated with hypoxia conditions each year.

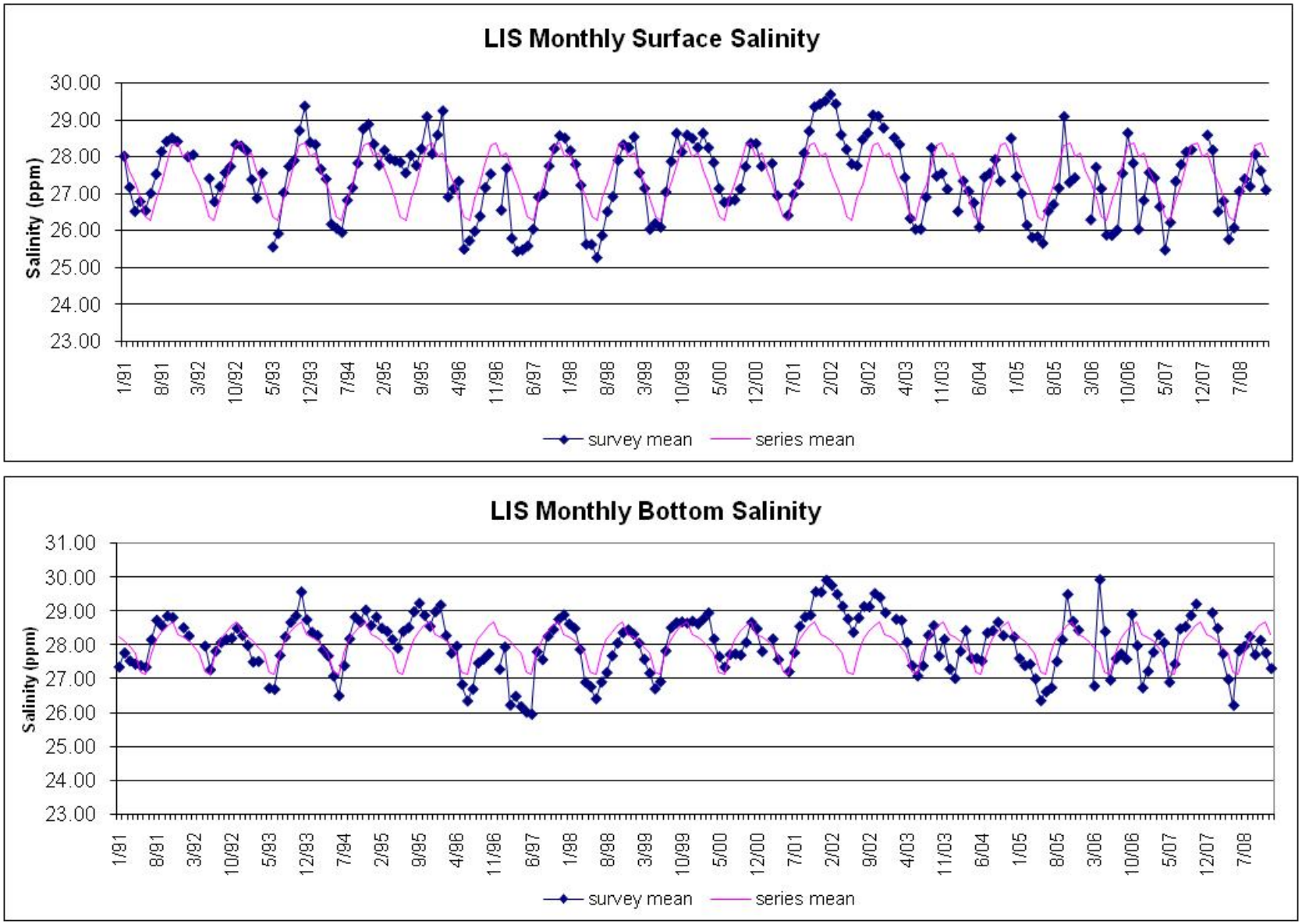

Figure 5.2. Surface and bottom salinity calculated from six axial water quality stations (B3, D3, F3, H6, I2 and M3) for the period between 1991 and 2008. Monthly (survey) means are plotted against the 1991-2008 time series mean.

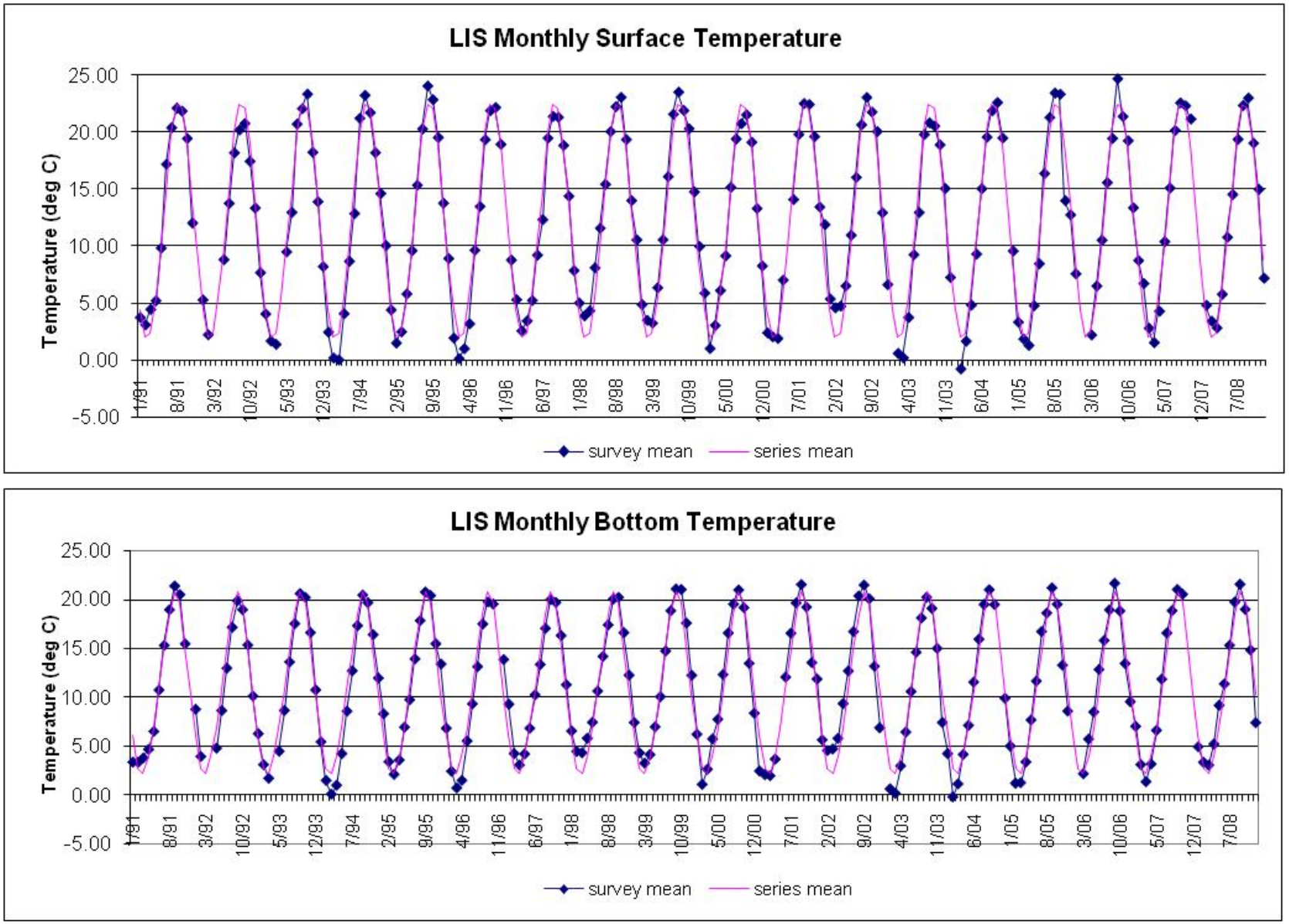

Figure 5.3. Surface and bottom temperature calculated from six axial water quality stations (B3, D3, F3, H6, I2 and M3) for the period between 1991 and 2008. Monthly (survey) means are plotted against the 1991-2008 time series mean.

JOB 6: PUBLIC OUTREACH

JOB 6: PUBLIC OUTREACH

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JOB 6: PUBLIC OUTREACH

GOAL

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

OBJECTIVES

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

SUMMARY

1. A total of 23,184 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 13 speaking engagements with sportsmen clubs and other recreational environmental clubs was 769 (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 DEP website (www.ct.gov/dep/fishing).

4. The message that the majority of marine finfish research and monitoring are funded through 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 2008 to February 2009 (segment 27).

Table 6.1:
Priority Audiences for Outreach Activities

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

RESULTS AND DISCUSSION

Outdoor and Environmental Writers

DEP press releases, project summaries and full annual reports were 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 DEP, 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 2009 at the Connecticut Convention Center. These shows attracted 22,145 anglers, non-anglers, boaters, tackle retailers, legislators and general outdoor recreation enthusiasts. The theme for this show was "No Child Left Inside", 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 (DEP) hosted the 'First Annual Trophy Fish Award Ceremony' at the Northeast Fishing and Hunting Expo in the Connecticut Convention Center in Hartford on Friday February 13, 2009. Eighteen marine anglers were presented with a framed "Angler of the Year" certificate recognizing their achievement of having harvested or caught and released the largest fish in one of several species categories during 2008.

Fishing Tackle Retailers

Fishing tackle retailers provide an important avenue for communication between the department and anglers. A complete list of fishing tackle retailers is maintained and updated yearly. Timely DEP 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 2009. 'A Study of Marine Recreational Fisheries in Connecticut' was mailed to Fishery Advisory Council members to keep them informed.

General Public

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

Sport Fish Restoration projects were also highlighted at public schools and universities through out 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 609 students attended Marine Fisheries Division presentations.

Finally, project staff lead numerous workshops and speaking engagements throughout the state, as well as informational tours and talks at the Marine Fisheries Office (Table 6.2). These talks and tours reached all target audiences, especially the business community, teachers and students.

Audiences learned how to become active participants in the fisheries management process, through public informational hearings and FAC Meetings.

MODIFICATIONS

None.

Figure 6.1: Northeast Fishing and Hunting Expo, Hartford CT, February 2009.

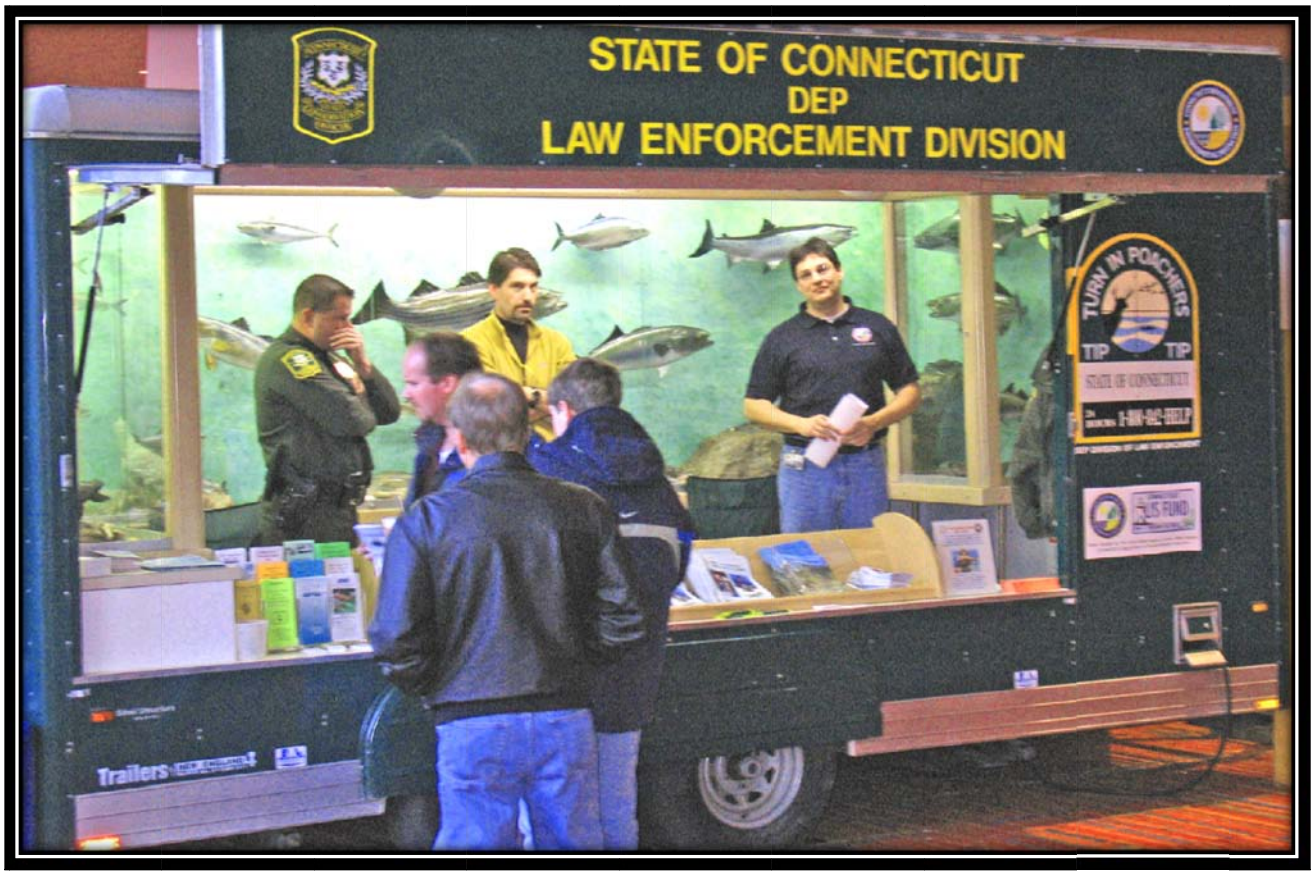

Table 6.2: Summary of talks, tours, career days and workshops given by project staff highlighting F54R activities, March 2008 – February 2009 (segment 27).

DATE:	PRESENTATION TYPE:	ORGANIZATION	TITLE / TOPIC:	Target Audience	Totals
3/5/2008	Fishing Club Talk	Central CT Striped Bass Club	Marine Fisheries Mgmt./ Angler Surveys	anglers	37
3/29/2008	Fishing Club Talk	Westport Outfitters	Marine Fisheries Mgmt./ Angler Surveys	anglers	45
4/15/2008	Talk	Southern CT State University	Marine Fisheries Biology	students	16
4/16/2008	Career Day / Mentoring	Fermi High School	Marine Fisheries Biologist	students	7
4/17/2008	Career Day / Mentoring	Enfield High School	Marine Fisheries Biologist	students	8
5/1/2008	Career Day / Mentoring	Alternative High Schools, Bloomfield, New Haven, and Bridgeport	Marine Fisheries Biologist	students	148
5/17/2008	Talk	Mason's Island Yacht Club	Horseshoe crabs in LIS	club members	18
5/21/2008	Career Day / Mentoring	Stetson College	Marine Fisheries Biologist	students	2
5/28/2008	Talk	Clark Lane Middle School, Waterford	Marine Fisheries Biology	sixth grade	209
6/27/2008	Marine Presentation	CCSU Marine Biology	Marine Fisheries Biology	students	41
11/16/2008	Career Day / Mentoring	East Hartford High School	Marine Fisheries Biologist	students	76
11/17/2008	Career Day / Mentoring	Glastonbury High School	Marine Fisheries Biologist	students	102
1/22-25/2009	Outreach Display	CMTA Boating Show	No Child Left Inside	general public	14,664
1/31/2009	Career Day	West Haven/Milford Middle Schools	Diversity if Long Island Sound	8th grade students	60
2/13-15/2009	Outreach Display	Northeast Fish and Hunting Expo	No Child Left Inside	general public	7,751

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