STATE OF CONNECTICUT
DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

Katherine S. Dykes
Commissioner

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

A STUDY OF MARINE RECREATIONAL FISHERIES IN CONNECTICUT

Federal Aid in Sport Fish Restoration
F21AF00859 (F-54-R-42)
Annual Performance Report
March 1, 2022 – February 28, 2023

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

Federal Aid in Sport Fish Restoration
F21AF00859 (F-54-R-42)
Annual Performance Report

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

Period Covered: March 1, 2022 - February 28, 2023

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Date: Sept 26, 2023

JOB 2: VOLUNTEER ANGLER SURVEY

VOLUNTEER ANGLER SURVEY

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JOB 2: VOLUNTEER ANGLER SURVEY

GOAL

To enhance the fisheries management process by providing supplemental catch, effort and size composition data for several important recreational finfish species through a voluntary logbook program.

OBJECTIVES

Provide estimates of:

1) *Size composition for both kept and released bluefish, striped bass and other common species.*
2) *Length frequency by trip for both kept and discarded fish.*

INTRODUCTION

The Connecticut Volunteer Angler Survey (VAS) began in 1979 with the primary purpose of supplementing the National Marine Fisheries Service, Marine Recreational Fishery Statistics Survey/Marine Recreational Information Program by providing additional length measurement data. The survey emphasizes measurements of fish that are released, which are under-reported in the federal surveys. 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 and in 1997, length data for other marine finfish were added.

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 in a logbook (Appendix 2.1). The logbook contains fields in which to record fishing effort, target species, fishing mode (boat and shore), area fished (subdivisions of Long Island Sound and adjacent waters), catch information concerning finfish kept (harvested) and released, and length measurements. Instructions for volunteers are provided on the inside cover of the postage paid logbook. Each participating angler is assigned a unique numeric code for confidentiality purposes. After the logbook data are entered into the survey database, logbooks are returned to each volunteer for their personal records. Furthermore, to improve communications with recreational anglers and to encourage more public participation, volunteers are notified of upcoming public hearings, including proposed and final changes in recreational fishing regulations.

In 2013, the VAS program was incorporated into the Atlantic Coastal Cooperative Statistics Program (ACCSP) Standard Atlantic Fisheries Information System (SAFIS) eLogbook application. Under the ACCSP eLogbook application, the VAS database was upgraded from the previous outdated software. The VAS logbook format was slightly modified so that the information collected would be compatible with ACCSP minimum data element standards (Appendix 2.1). Initially, one of the primary purposes of incorporating the VAS database into ACCSP SAFIS was to enable anglers to enter their own fishing information and compile their own statistics using eLogbook. However, because of the unique geographic location of Connecticut's shoreline, marine anglers often fish over multiple areas crossing interstate and federal boundaries during a single trip. The eLogbook software did not allow entry of data from fishing areas outside of Connecticut's marine waters. Therefore, as in previous years, paper logbooks were distributed to survey volunteers and Marine Fisheries staff completed VAS data entry.

The problem was resolved in 2014, but only a portion of the volunteers entered their own data in 2014 and 2015, with the remainder submitting paper logbooks.

Since the Survey began in 1997, the number of participants has ranged from 18 anglers participating in 1979 to 115 anglers in 1997. Advertising the VAS program through the annually published *Connecticut Angler's Guide* and on the agency web site (www.ct.gov/deep/fishing) has helped increase volunteer participation. The guide is distributed to all anglers who purchase a Connecticut fishing license and is also circulated by bait and tackle shops and other entities.

RESULTS AND DISCUSSION

In 2022, a total of 24 anglers participated in the program, recording 536 trips for an average of 22 trips each. Fewer VAS anglers, (3) entered their own data through the eLogbook application on the ACCSP website (www.accsp.org) in 2021 than 2020 (4 anglers), which was the eigth year of the eLogbook program. Most of the anglers that entered their own data expressed favorable comments toward the SAFIS eLogbook.

The private boat mode comprised the most trips (83.8%) recorded, followed by shore based trips (12.5%), see Job 3 for description of regular and enhanced shore sites. Of the total, 89.9% of the recorded trips were successful in catching fish. VAS anglers recorded catching 24 species including near shore species to open ocean pelagic species (Table 2.2). This included eight principal recreational species (currently under fisheries management plans) which comprised 89.4% of the total catch (Table 2.3). With the exception of three pelagic species (scup, Atlantic menhaden, and hickory shad) the release rates for nearly all species was 82% or greater. Species that were infrequently captured (less than 19) were not included in the catch & release analysis due to their rare nature.

VAS participants measured 11,021 fish including 9,848 fish within the eight principal species. These data show a wide range in the release rate of the principal species (Table 2.3). For example, 73.2% of hickory shad caught were released while 97.3% of striped bass caught were released. For bluefish, which has no minimum legal size, the release rate was 90.2% (Table 2.3). See Figure 3.1 through Figure 3.8 for length frequency information on the 2022 VAS harvest and catch & release data.

CONCLUSIONS

VAS anglers provide valuable recreational fisheries catch data at a relatively low cost. In addition, the length data on released fish provided by this program is difficult or unattainable through conventional access point angler intercept surveys and is essential for effective assessment of the recreational fishery coastwide and in Connecticut. Any anglers interested in participating in the program can contact David Molnar at 860-434-6043, or e-mail address: david.molnar@ct.gov or writing to State of Connecticut, DEEP, Marine Fisheries Program, P.O. Box 719, Old Lyme CT 06371.

MODIFICATIONS

None.

ACKNOWLEDGEMENTS

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

Table 2.1. Distribution of fishing trips by VAS anglers.

MODE	TRIPS WITH CATCH	PERCENT	TRIPS WITH NO CATCH	PERCENT	TOTAL TRIPS	PERCENT
PRIVATE BOAT	416	77.6%	33	6.2%	449	83.8%
SHORE (BEACH,DOCK,PIER,JETTY)	48	9.0%	19	3.5%	67	12.5%
SHORE (ENHANCED FISHING SITE)	8	1.5%	2	0.4%	10	1.9%
PARTY BOAT	10	1.9%	0	0.0%	10	1.9%
CHARTER BOAT	0	0.0%	0	0.0%	0	0.0%
ALL MODES	482	89.9%	54	10.1%	536	100.0%

Table 2.2. Total measured angler catch by species and disposition. Eight principal recreational species are shown in bold type.

SPECIES	HARVESTED		RELEASED		TOTAL
	NUMBER	%	NUMBER	%	NUMBER
Scup	**1228**	**36.8%**	**2108**	**63.2%**	**3336**
Black Sea Bass	**264**	**9.9%**	**2416**	**90.1%**	**2680**
Tautog	**227**	**12.9%**	**1528**	**87.1%**	**1755**
Striped Bass	**24**	**2.7%**	**876**	**97.3%**	**900**
Summer Flounder	**90**	**11.5%**	**692**	**88.5%**	**782**
Searobins	14	1.9%	707	98.1%	721
Bluefish	**29**	**9.8%**	**267**	**90.2%**	**296**
Sharks, Dogfish	0	0.0%	262	100.0%	262
Hickory Shad	**19**	**26.8%**	**52**	**73.2%**	**71**
Cunner	0	0.0%	65	100.0%	65
Chub Mackerel	28	66.7%	14	33.3%	42
Skates	0	0.0%	32	100.0%	32
Winter Flounder	**5**	**17.9%**	**23**	**82.1%**	**28**
Weakfish Seatrout	3	30.0%	7	70.0%	10
Gray Triggerfish	0	0.0%	9	100.0%	9
Atlantic Cod	2	28.6%	5	71.4%	7
Puffers	0	0.0%	7	100.0%	7
Blue Shark	0	0.0%	5	100.0%	5
Atlantic Menhaden	3	100.0%	0	0.0%	3
Oyster Toadfish	0	0.0%	3	100.0%	3
Little Tunny	0	0.0%	3	100.0%	3
Atlantic Mackerel	0	0.0%	2	100.0%	2
Atlantic Bonito	0	0.0%	1	100.0%	1
Haddock	0	0.0%	1	100.0%	1
Total	**1936**	**17.6%**	**9085**	**82.4%**	**11021**

Table 2.3. Total measured catch and disposition for eight principal recreational species.

SPECIES	HARVESTED		RELEASED		TOTAL
	NUMBER	%	NUMBER	%	NUMBER
Scup	1228	36.8%	2108	63.2%	3336
Black Sea Bass	264	9.9%	2416	90.1%	2680
Tautog	227	12.9%	1528	87.1%	1755
Bass, Striped	24	2.7%	876	97.3%	900
Flounder, Summer	90	11.5%	692	88.5%	782
Bluefish	29	9.8%	267	90.2%	296
Hickory Shad	19	26.8%	52	73.2%	71
Winter Flounder	5	17.9%	23	82.1%	28
TOTAL	**1886**	**19.2%**	**7962**	**80.8%**	**9848**

Figure 3.1. Length frequency of summer flounder caught by disposition.

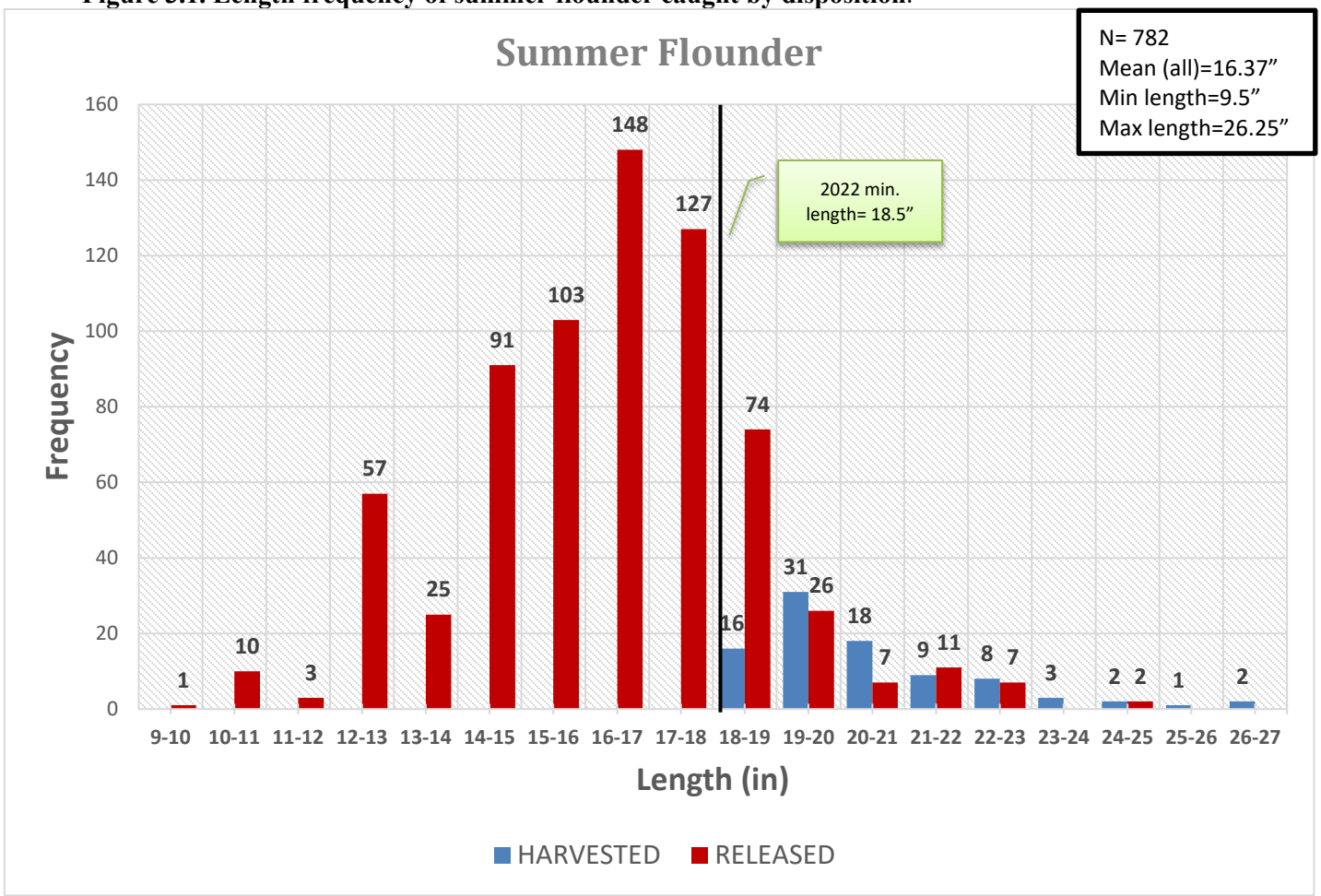


Figure 3.2. Length frequency of striped bass caught by disposition.

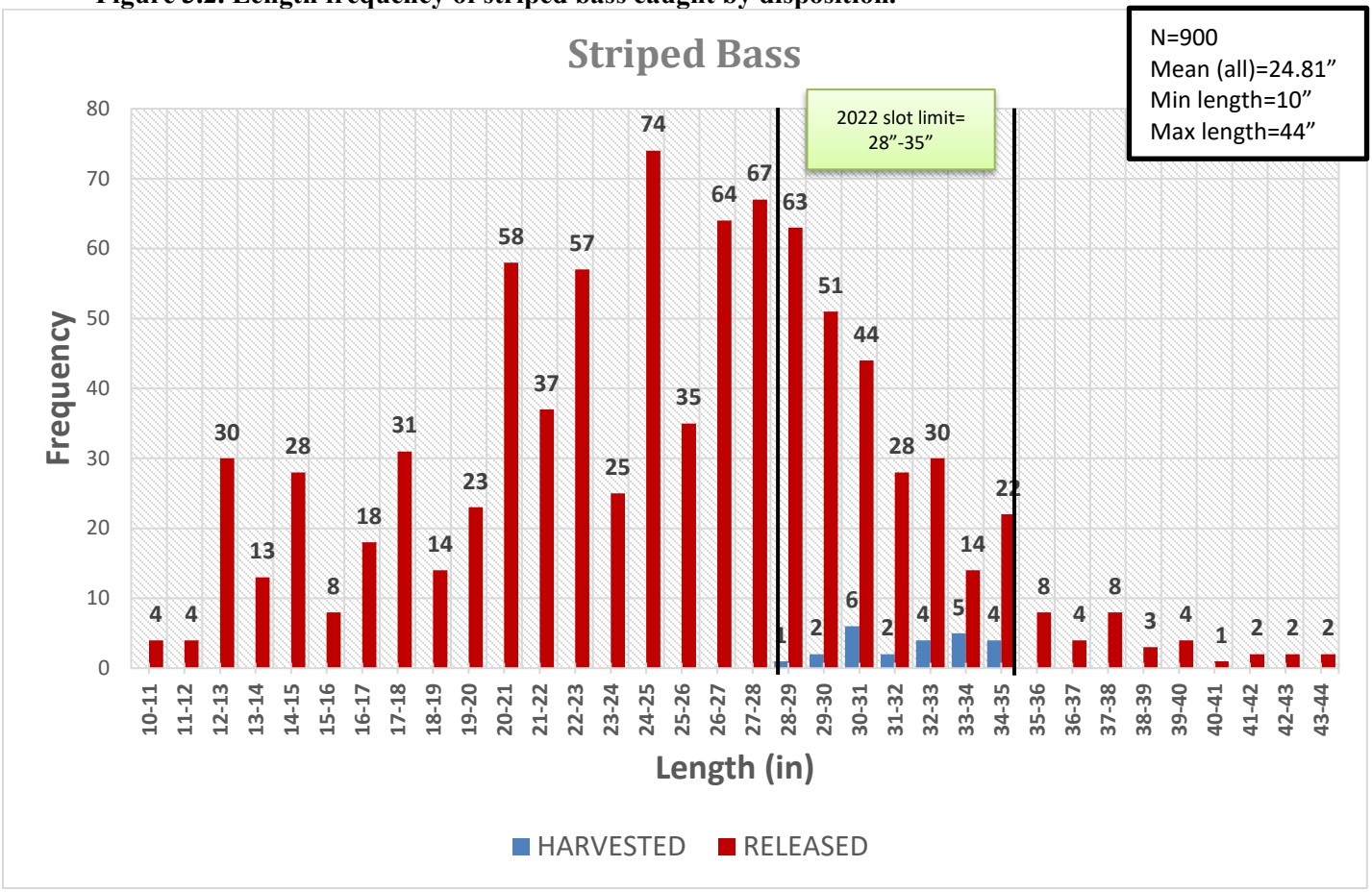


Figure 3.3 Length Frequency of bluefish caught by disposition.

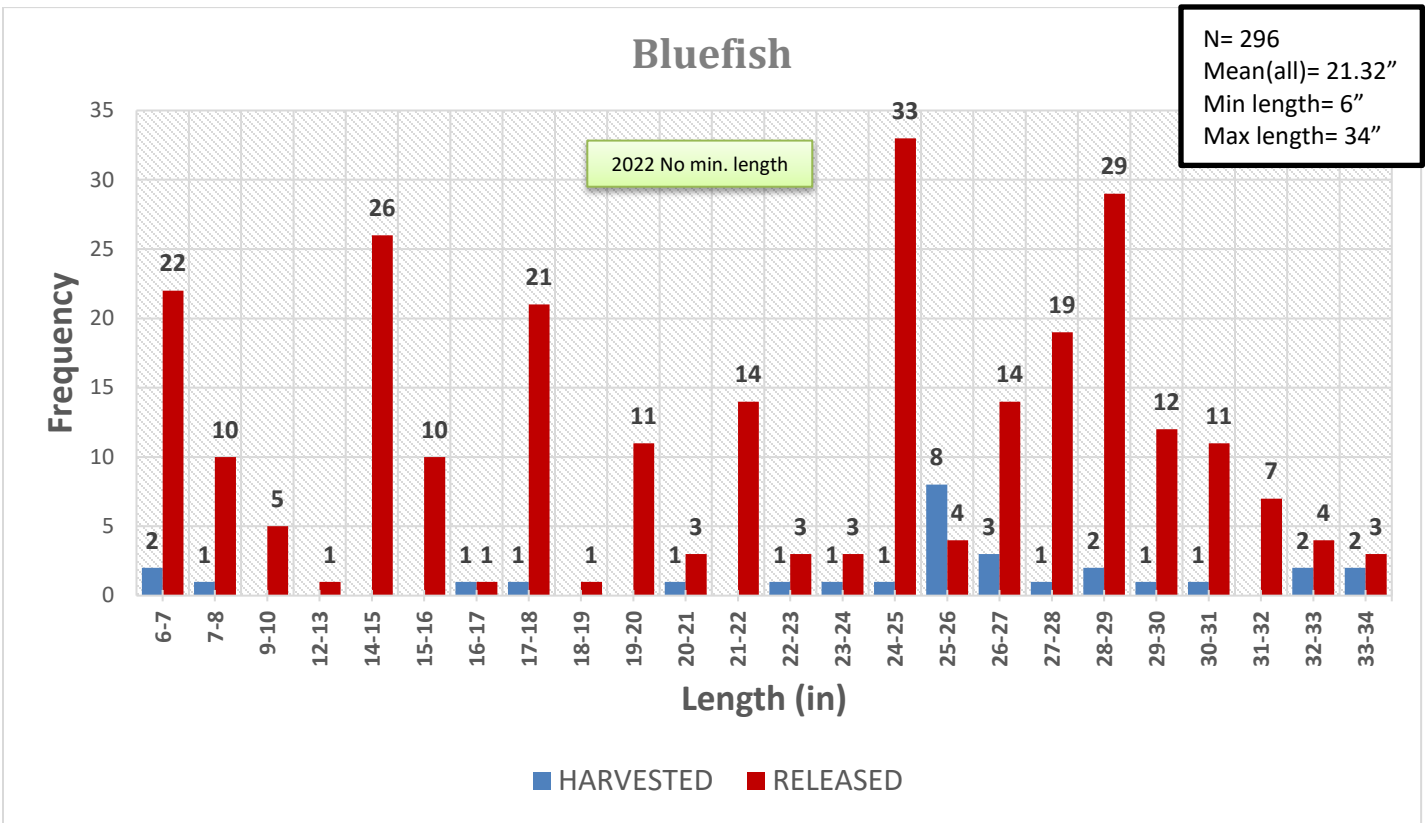


Figure 3.4 Length Frequency of black sea bass caught by disposition.

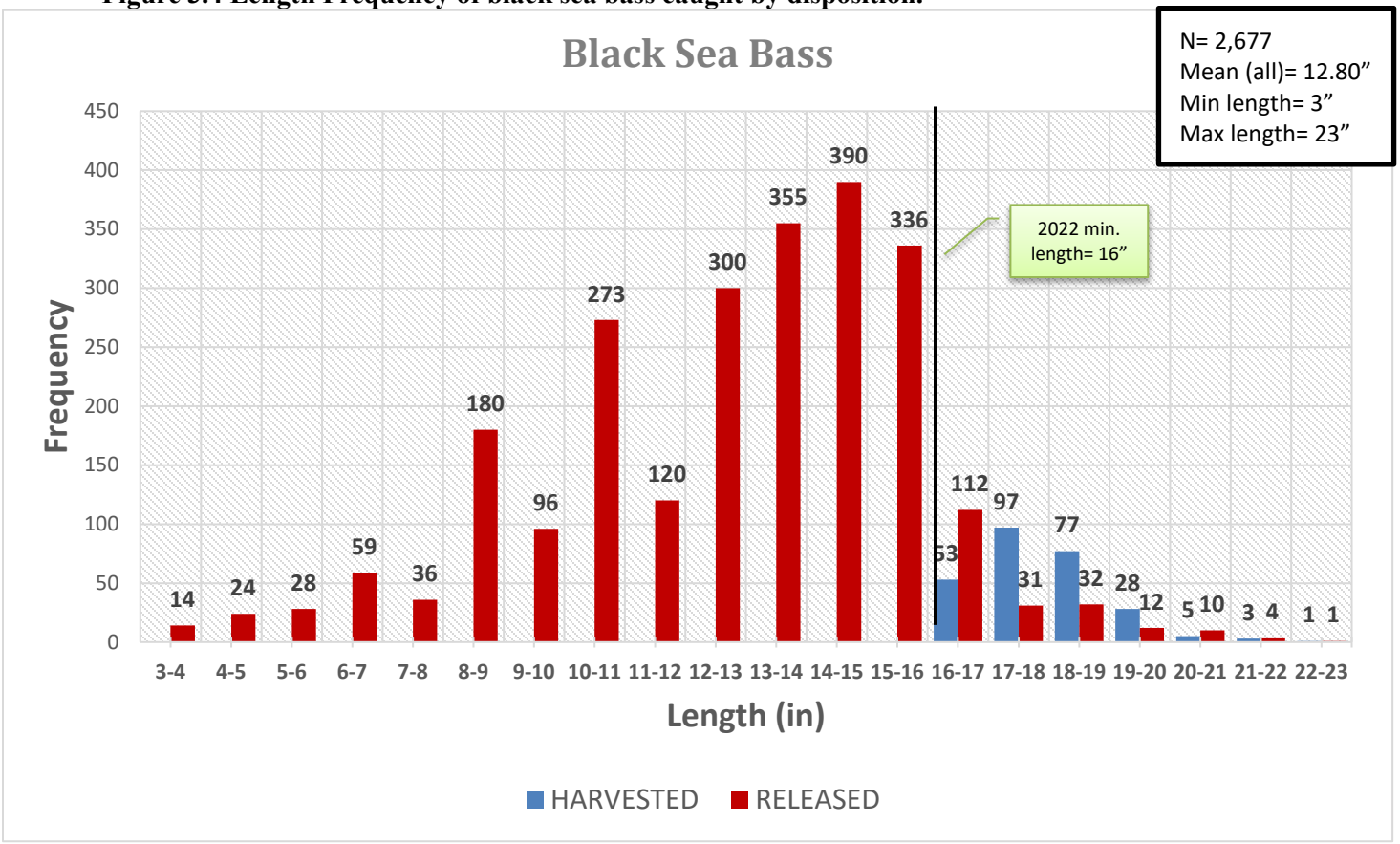


Figure 3.5 Length Frequency of scup caught by disposition.

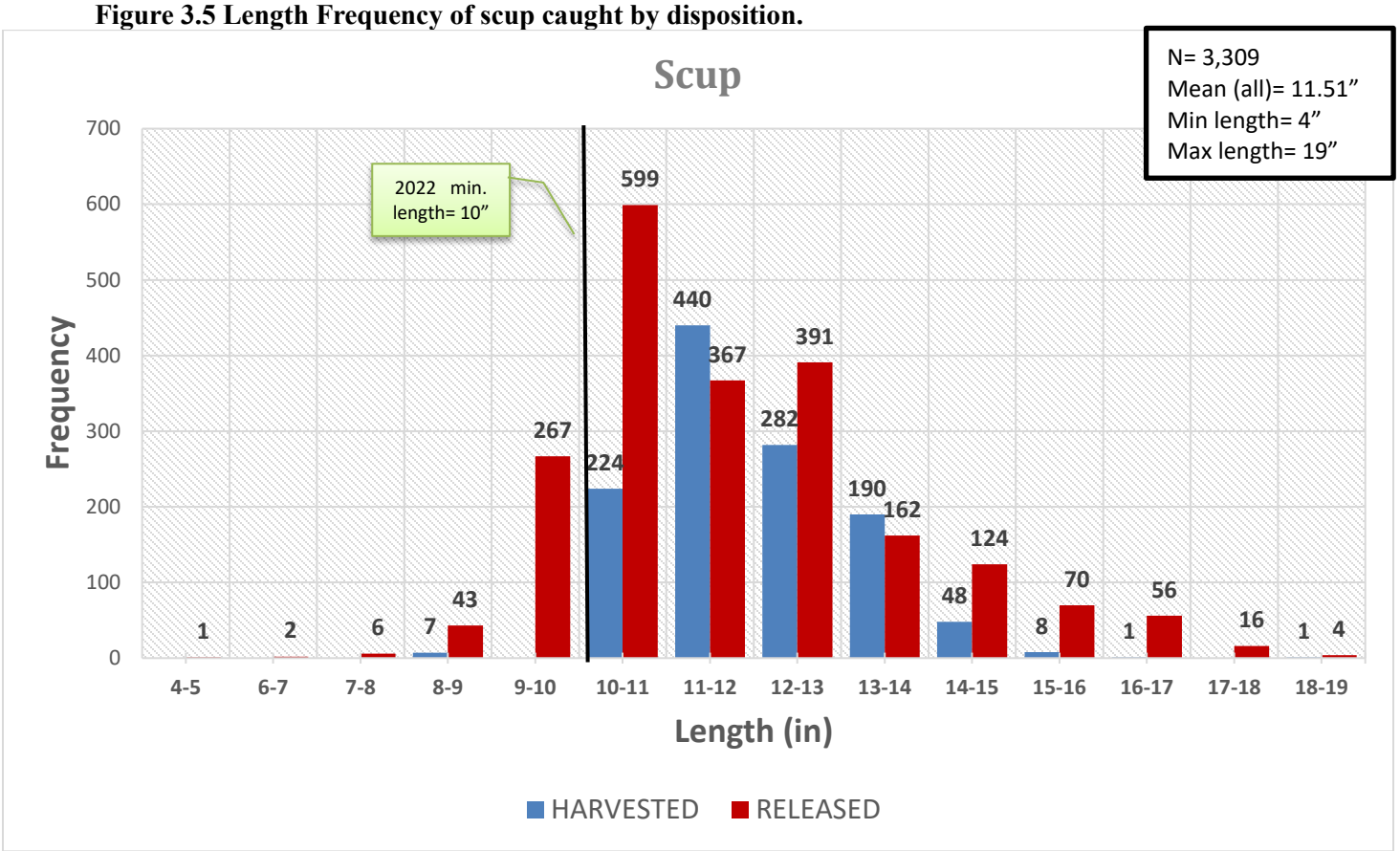


Figure 3.6 Length Frequency of tautog caught by disposition.

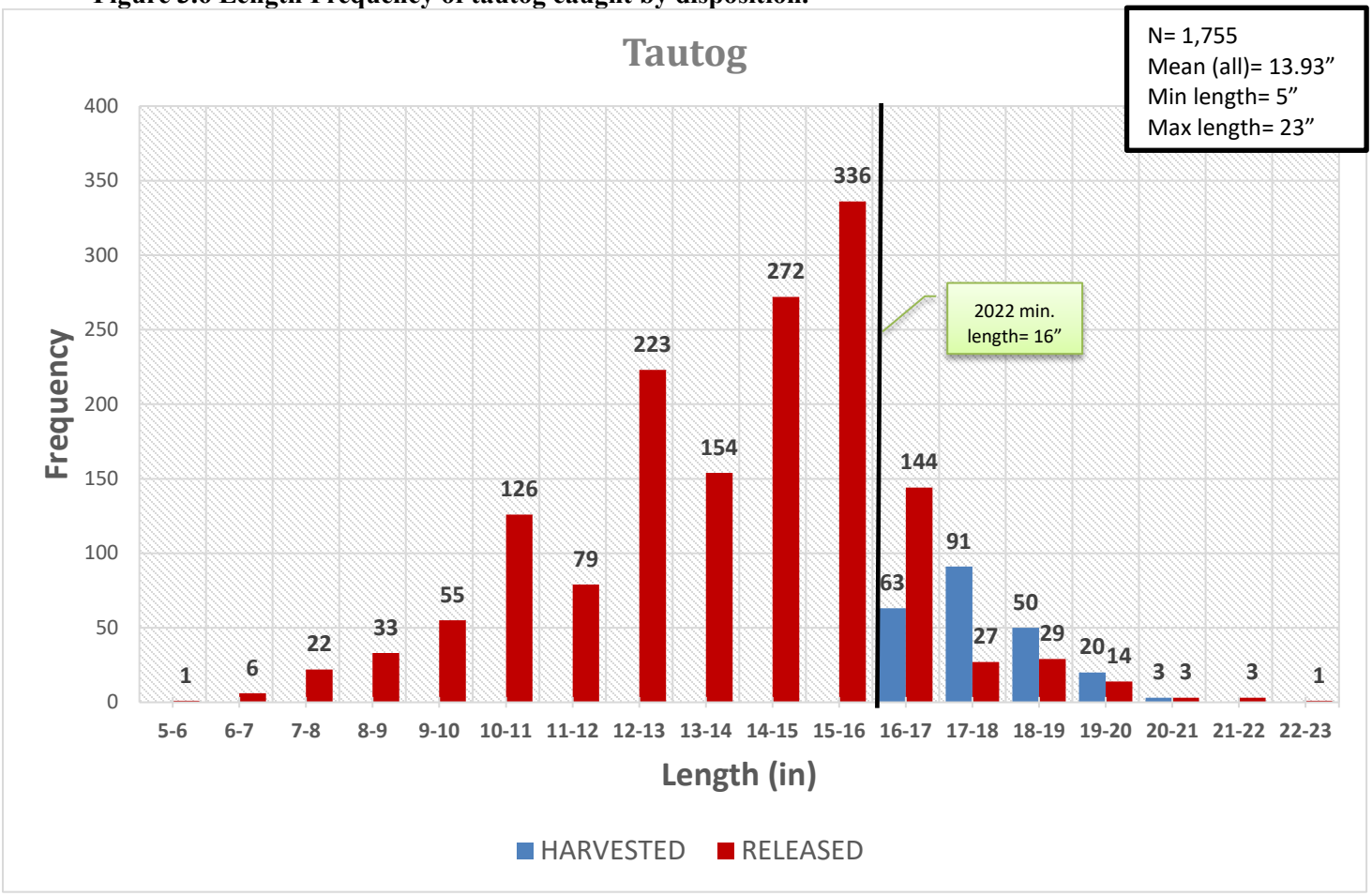


Figure 3.7 Length frequency of hickory shad caught by disposition.

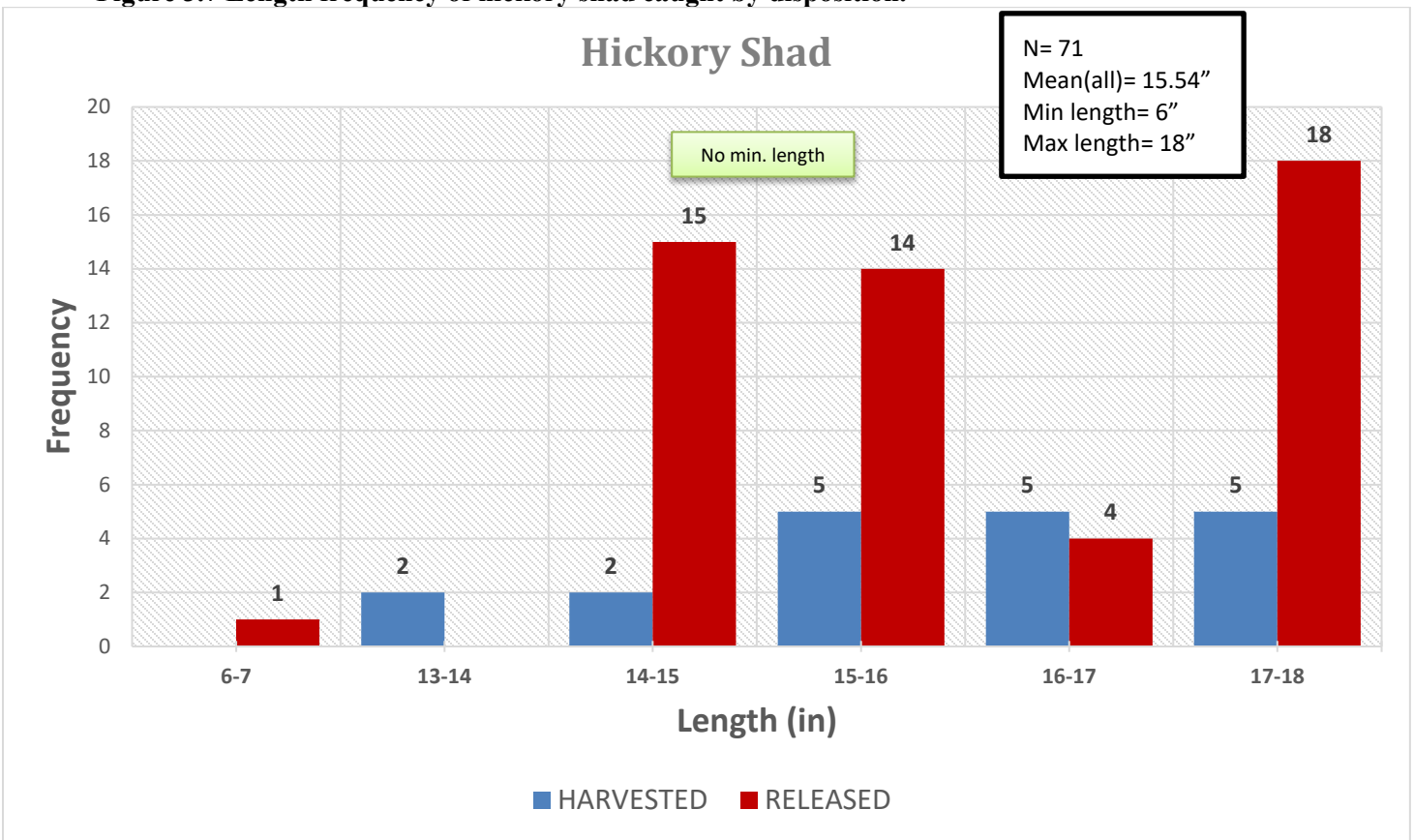
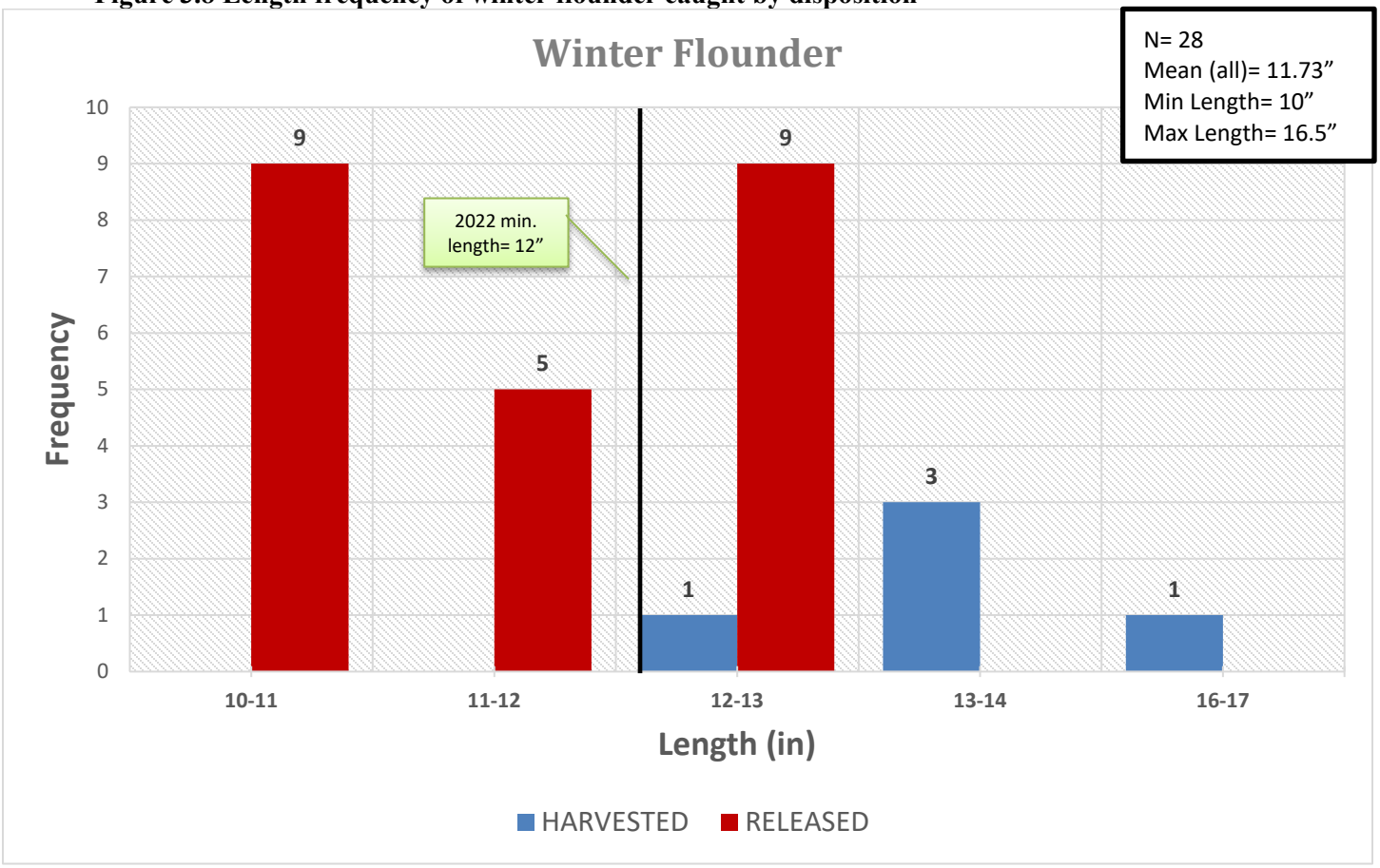


Figure 3.8 Length frequency of winter flounder caught by disposition



APPENDIX 2.1. Connecticut Volunteer Angler Logbook

TAPE

CONNECTICUT MARINE VOLUNTEER ANGLER SURVEY

Rev.4/2017 – 12 Trip

Angler Code

CONNECTICUT DEEP MARINE FISHERIES DIVISION VOLUNTEER ANGLER SURVEY

This space for office use only.

Logged

Entered

Checked

Send Me ☐ *More Logbooks*

Connecticut Department of Energy & Environmental Protection
Bureau of Natural Resources
Marine Fisheries Division

TAPE

Date: / / Start Time: :

Mode: Private Boat ☐ Charter Boat ☐ Party Boat ☐ Shore ☐ Shore (Enhanced Site) ☐

Area	Total Anglers	Lucky Anglers	Hours Fished	Targeted Species 1	Targeted Species 2

Species	K/R	Length (in)	Quantity
		.	
		.	
		.	
		.	
		.	
		.	
		.	
		.	
		.	
		.	
		.	
		.	
		.	

Comments/Observations:_____

VOLUNTEER ANGLER SURVEY 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 into the database, and error checked, the logbooks will be returned for your own records.

If you are interested in online reporting please contact us.
The information provided by this report will help us make critical important management decisions.
Please help us by completing this report as accurately as possible.
If you have any questions or comments regarding the survey, please contact
David R Molnar david.molnar@ct.gov or at 860 447-4334

Trip Header Record

The top of each page is for recording **each trip's header information**. In this section, make a new entry for each trip made. If you fill a logbook page before the trip is over, continue onto the next page. Use as many pages and books as necessary to record your fishing activity. If you have a multi-day trip, make only one entry for that trip.

Date	Enter the date that your fishing trip occurred on.
Start Time	Enter the time on a 24 hour clock (military time) that you started your fishing trip.
Mode	Indicate the fishing mode by putting a check mark in the appropriate box. The Shore (Enhanced Site) option refers to the designated shore fishing sites along the Connecticut coast that allow for the harvest of smaller select species. See the anglers guide for more information.

Trip Effort Record

Enter the approprate fishing effort information for the fishing area.

Fishing Area	Enter the code for the area in which you made your catch. Refer to the Fishing Area Chart on page iii for the appropriate area code. **If you fish in the race along the border between area 6 and 147, please use area code 6**.
Total Anglers	Enter the total number of anglers that are in the fishing party.
Lucky Anglers	Enter the number of anglers that caught fish in the fishing party.
Hours Fished	Enter the actual fishing time or 'lines wet' to the nearest half hour. Do not include travel time.
Targeted Species	Enter the 1st (Primary) targeted species and 2nd (secondary) targeted species.

Trip Catch Record

Under each trip effort record are the associated catch records.

Enter a catch row for each species, disposition (Kept/Released) and length.

If you caught more fish then rows provide, continue onto the next effort or page as necessary.

If you do not catch or harvest any fish, complete the trip header and effort information (Date through Targeted Species 2).

Species	Enter the species code from the Species Code List below. If the species is not listed, write in the species name.
K / R	Indicate if the fish were kept or released by writhing K (Kept) or R (Released). If you kept and released the same species indicate this by adding an additional row. If you kept and released the same species, complete two rows.
Length (in)	Enter the length in inches of the fish**. ROUND DOWN TO THE NEAREST HALF INCH**. In previous years, the Volunteer Angler Survey requested rounding to the nearest half inch but rounding down helps produce more accurate data.
Quantity	Enter the number of fish of that specific species, disposition (K/R), and length. If any of these fields change, create a new row. If additional rows are needed, continue onto the next page.

Species Code List

Groundfish

COD - Cod
HADD - Haddock
POLL - Pollock

Flounders

FLUK - Summer flounder / fluke
FLBB - Winter flounder / blackback

Other Finfish

BLU - Bluefish
BSB - Black sea bass
CUN - Cunner
EEL - Eel, American
MEN - Menhaden / bunker
WPRC - Perch, white
SCUP - Scup / porgy
SROB - Sea robins
HSHD - Hickory shad
STB - Striped bass

Other Finfish continued

TAUG - Tautog / blackfish
TRIG - Triggerfish
WEAK - Weakfish / squeteague / gray sea trout

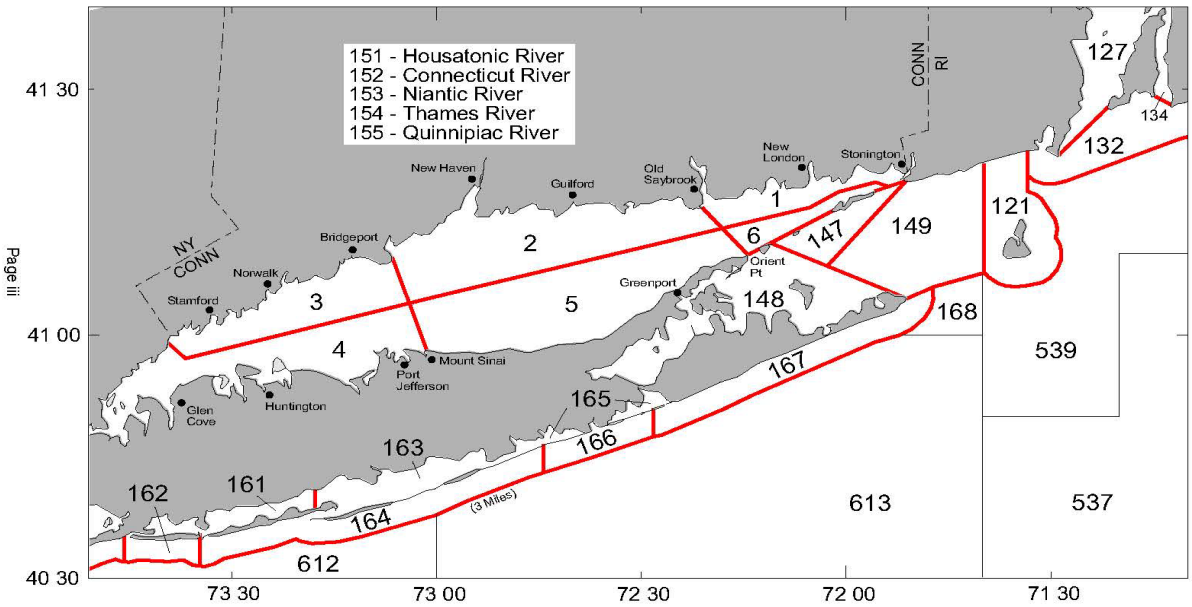
Tuna / Large Pelagics

ALB - Albacore tuna
BET - Big eye tuna
BFT - Bluefin tuna
BON - Bonito
LTNY - Little tunny
SKJ - Skipjack
YFT - Yellowfin tuna
DOL - Dolphin fish / mahi-mahi
WAH - Wahoo

Sharks and Skates

DGSP - Dogfish, spiny
DGSM - Dogfish, smooth
SKAT - Skate
SHBL - Shark, blue

Long Island Sound and Vicinity Fishing Area Chart



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JOB 3: PUBLIC OUTREACH

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Job 3: Public Outreach

GOAL

Increase awareness among anglers and the general public of state and federal efforts to enhance, restore and protect marine sportfish populations and habitats.

OBJECTIVES

1. Increase public awareness of research and monitoring activities that support sportfish management, as well as public awareness of how those activities are funded.
2. Administer the Marine Trophy Fish Award Program, an angler achievement program recognizing and rewarding anglers who catch trophy-sized marine fish.

SUMMARY

1. A total of 262 outdoor and environmental writers, marine anglers, students and boaters, marina operators, fishing tackle retailers, Fisheries Advisory Council (FAC) members, and members of the general public attended outreach events via ZOOM tele-communication or in person. The importance of research and monitoring to good fisheries management was incorporated into the programs (Table 3.2).

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 five ZOOM or in-person engagements with sportsmen clubs and other recreational environmental clubs was 120 (Table 3.2). The audience was encouraged to become actively involved in the fishery management process by attending public hearings, FAC meetings via ZOOM and also joining the Volunteer Angler Survey (VAS). Notices of public hearings were sent to tackle shops and various media outlets including the DEEP website (www.ct.gov/deep/fishing) and through email.

4. The message that most of marine finfish research and monitoring are funded through Federal excise taxes on fishing and motorboat fuels was emphasized at major department sponsored events (Table 3.2).

INTRODUCTION

Public outreach was formally incorporated into this project in 1997 (segment 18). 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 3.1) in the outreach plan. This report summarizes F54R outreach activities conducted from March 2021 to February 2023.

Table 3.1:

Priority Audiences for Outreach Activities

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

RESULTS AND DISCUSSION

Outdoor and Environmental Writers

DEEP press releases, project summaries, FAC reports, and full annual reports were mailed, e-mailed, and posted on CTDEEP Fisheries website to outdoor writers, members of the CT Outdoor Recreation Coalition (CORC), Citizens Advisory Council (CAC) and Fisheries Advisory Council (FAC), media and also to the general public. Project staff were also interviewed concerning F54R activities at public and regulatory hearings (ZOOM Meetings), and over the telephone or television by writers and reporters for the news media.

Marine Anglers and Marine Boaters

Project personnel organized and participated in DEEP Inland Fisheries Division, and Marine Fisheries Program events such as the Annual Fishing and Outdoor Show. The theme for these events were "Marine Fisheries Management - Enhanced Fishing Opportunities", "Trophy Fish Program" and "Marine Fisheries Program Angler Surveys". F54R activities were highlighted at these public outreach events. Other constituent meetings were 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 PowerPoint presentations and compelling images, along with project specific text 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 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 informative fisheries displays can easily be viewed by anglers, boaters and their families at this very popular fishing and picnic coastal access area. However, in 2020-21, the state facility was closed to the public due the SARS COVID 19 pandemic. It was temporarily reopened in the spring of 2022.

The CT DEEP Marine Fisheries Trophy Fish Award Program had a successful year in angler participation. Thirty-four marine anglers participated, by submitting 63 marine fisheries trophy fish award affidavits in this popular outreach program, catching 24 different species. Thirty-two adults and two youth anglers participated in 2022. Bluefish, Tautog, and Striped Bass were the most common trophy species captured. Five harvest and six catch & release new state record holders and four trophy fish records (3 female and 1 youth angler) were recognized via the special ZOOM event. Marine anglers were presented with a framed Trophy Fish Award Certificate of achievement and trophy fish lapel pin (mailed to them) in either bronze, silver, or gold color (depending on award type). Another four marine anglers (3 adults (male & 2 female) and 1 youth male were recognized as Angler of the Year for capturing the most and largest marine fish species. They all received CTDEEP trophy fish award program hats along with their achievements were highlighted on the CTDEEP/Fisheries website. For a summary please see: 2022 Marine Trophy Fish Award Program Summary

Fishing Tackle Retailers

Fishing tackle retailers provide an important avenue for communication between the department and anglers. A complete list of fishing tackle retailers is maintained and updated yearly on the CT DEEP website. Timely DEEP press releases, species fact sheets, Connecticut Marine Angler Fishing Brochure(s) in English and Spanish text are delivered/mailed to tackle retailers and constituents in an effort to provide updated fisheries information. Correspondence between the Marine Fisheries office staff and outdoor recreation 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. For each quarterly meeting, staff produce a report via ZOOM of recent project activities which is then distributed to FAC members and their constituents. 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 these Zoom meetings with state legislators. Many Council members attended Marine Fisheries Zoom meetings and 'A Study of Marine Recreational Fisheries in Connecticut' was emailed to Fishery Advisory Council members to keep them informed.

General Public

The state facility was closed in 2020-21. Temporarily reopened in spring of 2022, attracting the public to outreach displays at the office (note: the office was closed in 2020-21 due to the SARS COVID-19 pandemic). 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).

Two articles describing Sport Fish Restoration projects were published in the Department's Wildlife Magazine. The first summarized the State Public Coastal Access locations and new projects for 2022. A second highlighted the Connecticut Marine Recreational Angler Survey, Critical for Managing CT's Marine Resources. These articles were based on data gathered in Jobs 1 & 2.

Sport Fish Restoration projects were also highlighted at conservation organizations throughout the year via Zoom or in person outreach gatherings. Presentations titled "Marine Fisheries Management / Sportfish Restoration and Marine Resource Management" were presented along with Invasive Species Information. These outreach events highlighted the importance of coastal resources and all facets of marine resource protection. Approximately 67 conservationist attended Marine Fisheries Division presentations.

Finally, project staff led speaking engagements throughout the state via ZOOM or in-person during 2022 (Table 3.2). These talks reached all target audiences, especially the business community, teachers, and concerned citizens. Audiences learned how to become active participants in the fisheries management process, through public informational hearings and FAC Meetings via ZOOM and using the CTDEEP website.

MODIFICATIONS

None.

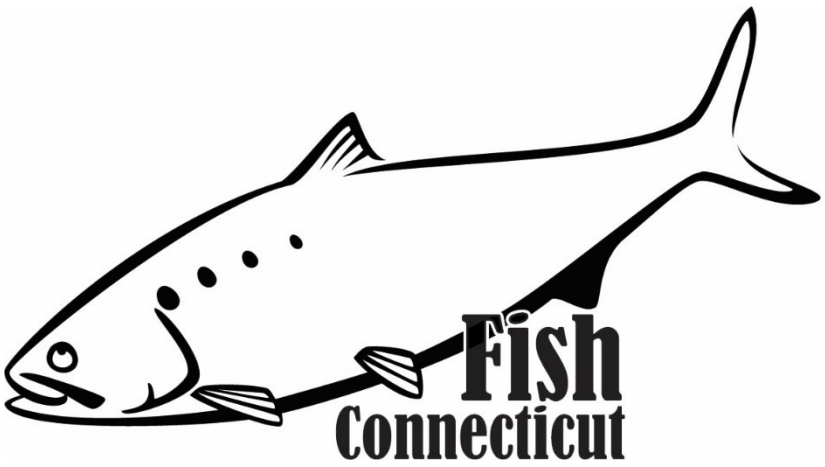

Table 3.2: Summary of talks, tours, career days and workshops given by project staff highlighting F54R activities, March 2022 – February 2023.

Date:	Presentation Type	Organization	Title / Topic	Target Audience	Total
3/5/2022	**ZOOM Presentation**	**Angling Public – State Record Holders & Angler of the Year**	**Trophy Fish Award Program Ceremony**	**Trophy Fish Award Anglers**	**28**
4/12/2022	**Talk**	**Fairfield County League of Sportsmen/Interclub Mtg.**	**Marine Fisheries Angler Survey**	**Marine Anglers**	**31**
5/9/2022	**Talk**	**West Haven Yacht Club**	**Marine Fisheries Management in Long Island Sound**	**Marine Anglers**	**22**
5/21/2022	**Talk**	**Milford Striped Bass Club**	**Marine Fisheries Angler Survey**	**Marine Anglers**	**23**
5/30/2022	**Talk**	**Stratford Boat Owners Association**	**Marine Fisheries Angler Survey**	**Marine Anglers**	**18**
06/17/2022	**Talk**	**CT Surfcasters Association**	**Marine Fisheries Angler Survey**	**Marine Anglers**	**26**
07/28/2022	**Talk**	**CT Audubon Society**	**Mitten Crab & ANS**	**General Public**	**37**
10/19/2022	**Talk**	**New Haven Parks & Rec Department**	**Marine Fisheries Program – Mitten Crab**	**General Public**	**30**
11/07/2023	**Career Day**	**Glastonbury Public Schools**	**Fisheries Biology**	**Students**	**47**
				Total	**262**

JOB 4: MARINE FISHERIES GIS

JOB 4: MARINE FISHERIES GIS

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JOB 4: MARINE FISHERIES GIS

GOAL

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

OBJECTIVES

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

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

INTRODUCTION

In recent years, there has been an increased need for staff to use geospatial technology to map and analyze marine environmental or fisheries related information. Project staff have also experienced an increasing number of requests to provide geospatial data to others (intra-agency, inter-agency, NGOs, academic institutions, etc.) for use in, for example, fisheries stock assessments, habitat assessments, environmental sensitivity maps, and public outreach efforts. Therefore, in 2012, a new job was created within the project to support this need for geospatial datasets, data layers, analyses and products. This report includes results from the most recent year of the Job (2022).

METHODS

GIS work was accomplished using ESRI products licensed by the Connecticut DEEP including ArcMap desktop and ArcGIS Online. Published products comply with Department policy pertaining to GIS data. Script development used well established scripting utilities (*e.g.* Python, HTML, CSS, Javascript). Products designed for the Internet adhere to Agency requirements for Agency websites, pages and products. A number of the custom applications, scripts and tools created during earlier segments of the Job continued to be used as templates in subsequent years.

RESULTS

The main concentration of GIS work in 2022 was on the transfer of data and maps used frequently by the Long Island Sound Trawl Survey (LISTS) from ArcMap to ArcPro. ESRI, the provider of the ArcGIS software that has been used for the program in the past will not be supporting the ArcMap program after March 2026. Although there are years until the full transfer to their new program, the progression over to the new software began in 2022 for LISTS to ensure ample time for a smooth transition. Staff participated in online courses provided by ESRI to gain more experience with the new software. The process of transitioning old data structures used in ArcMap (shapefiles) into the updated ArcPro data files (feature classes in geodatabases) was started in 2022. Data that is used in the execution of the survey such as site selection maps, and tow track data were prioritized over recreating analyses that have already been reported.

ArcPro is a program that is attempting to make GIS more accessible to both the public and scientists that are not as familiar with the older program. Therefore, future goals of using GIS with the LISTS data should include making the data accessible and shareable to the web. The transfer from ArcMap to ArcPro will also continue in the next few years, although some overlap between the two programs will likely occur for the foreseeable future.

MODIFICATIONS

To reduce the administrative tasks related to GIS work in support other jobs in this project, GIS staff plan to incorporate the reporting of GIS work under the respective F54R jobs (instead of maintaining a separate section of the report).

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JOB 5: MARINE FINFISH SURVEY

JOB 5: MARINE FINFISH SURVEY

LONG ISLAND SOUND TRAWL SURVEY

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JOB 5: LONG ISLAND SOUND TRAWL SURVEY (LISTS)

CRUISE RESULTS FROM THE 2022 SPRING AND FALL SURVEYS

STUDY PERIOD AND AREA

The Connecticut DEEP Marine Fisheries Program completed the thirty-ninth year of the Long Island Sound Trawl Survey in 2022. The Long Island Sound Trawl Survey (LISTS) encompasses an area from New London to Greenwich, Connecticut and includes waters from 5 to 46 meters in depth in both Connecticut and New York state waters. Typically, Long Island Sound (LIS) is surveyed in the spring, from April through June, and during the fall, from September through October. This report includes results through the 2022 spring and fall sampling period and provides time series information since the commencement of the survey in 1984.

2022 Sampling Intensity:
In 2021, the policies instituted by the State of Connecticut and CT DEEP to prevent the spread of COVID-19 were relaxed slightly, allowing for five (5) permanent staff to work aboard the *R/V John Dempsey*. The continued limitation in the crew size led to a decision to decrease the sampling intensity in the form of decreased number of samples, see Gottschall et al. 2021. However, in the fall of 2021, in hopes of being able to accomplish the standard survey, the typical forty sites were randomly selected using the standard weighting scheme based on strata. Then thirty-three (33) sites of the forty (40) were randomly selected, maintaining the minimum of 2 sites per stratum (similar to the spring). The remaining seven (7) each month were considered "optional" and would be sampled if there was sufficient time left in the month after completing 33 samples.

The goal for the 2022 sampling season was to complete the standard 40 sites per month using the same site selection methodology and intensity as the fall of 2021 described above. During April of 2022, time and staff constraints prevented a full 40 tow survey from being completed and 33 tows were conducted. A full 40 tow survey was then completed in May of 2022, however during June, only fourteen (14) sites were complete due to mechanical issues with the *R/V John Dempsey*. During the fall of 2022 (September and October), all standard 40 monthly samples were completed.

GOAL

To provide long term monitoring of abundance, biomass and size composition of marine fishery resources along with environmental parameters, in order to evaluate the effects of fishing and environmental conditions on the distribution and abundance of living resources in Long Island Sound.

OBJECTIVES

1) Provide annual indices of counts and biomass per standard tow for 40 common species and age-specific indices of abundance for winter flounder, tautog, scup, summer flounder, bluefish (Age 0, 1+) and weakfish (Age 0, 1+).
2) Provide length-frequency distributions of bluefish, scup, summer flounder, winter flounder, tautog, striped bass, weakfish, black sea bass, and other ecologically important species.
3) Provide annual total counts and biomass for all finfish species taken and annual total biomass for all common macro-invertebrate species taken.
4) Provide species list for LIS based on LISTS sampling, noting the presence of additional species from other sampling conducted by the Marine Fisheries Programs.
5) Provide fishery independent survey data to cooperative state researchers or agencies, such as the National Marine Fisheries Service (NMFS), Atlantic States Marine Fisheries Commission (ASMFC), New England and Mid-Atlantic Fishery Management Councils (NEFMC and MAFMC, respectively), and researchers associated with state or local universities

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 (LIS). A stratified-random design based on bottom type and depth interval was chosen and 40 sites were sampled monthly from April through November to establish seasonal patterns of abundance and distribution. Seven finfish species were initially of primary interest: bluefish, scup, striped bass, summer flounder, tautog, weakfish, and winter flounder. Length data for these species were collected from every tow; scup, tautog, and winter flounder were sampled for aging. Lobster were also enumerated and measured from every tow. All fish species were identified and counted.

Since 1984, several changes have been incorporated into the Survey. In 1991, the sampling schedule was changed to a spring/fall format, although sampling is still conducted on a monthly basis (April - June, September, and October). Beginning in 1992, species were weighed in aggregate with an onboard scale to provide indices of biomass. Furthermore, more species have been sampled for lengths, such as windowpane and fourspot flounders, and important forage species such as butterfish, long-finned squid, and several herring species. By 2003, the list of species measured expanded to 20 finfish species and two invertebrate species (lobster and long-finned squid), plus rarely occurring species. Beginning in 2014, lengths were collected from all finfish species on each tow. In addition, at various times during the time-series, age structures were collected from bluefish, menhaden, tautog, scup, winter flounder, weakfish or summer flounder. 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 fishery resources.

METHODS

Sampling Design

LISTS is conducted from longitude 72º 03' (New London, Connecticut) to longitude 73º 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 mesh codend (Table 5.1). 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 5.1), 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 5.2, Gottschall et al. 2000). Discrete stratum areas smaller than a sample site are not sampled.

Sampling Procedures

Prior to each tow, temperature (ºC) and salinity (ppt), conductivity (µS/m) and dissolved oxygen (mg/l) were measured using an YSI model EXO2 data sonde. 2017 was the first year the EXO2 sonde was used by LISTS, previously a hand-held YSI meter was used. The sonde records numerous water quality parameters while descending from surface to bottom and values are subsequently extracted at the depths most closely matching the 1m below surface and 0.5m above bottom depths used previously in the LISTS timeseries.

The survey's otter trawl was 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 was placed onto a sorting table and sorted by species. Finfish, lobsters and squid were 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 were 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 5.4.

For all species where length was collected, electronic measuring boards were used to capture lengths to the millimeter. For finfish, either fork or total length was collected. Lobsters were measured to 0.1 mm carapace length. Squid were measured using the mantle length (mm), horseshoe crab measurements were taken using prosomal width (mm) and whelk (knobbed and channeled) shell widths were measured in millimeters. For most analysis purposes, lengths were put into centimeter grouped bins (e.g. measurements from 100 mm to 109 mm were processed as 10 cm).

The number of individuals measured from each tow varied by species, the size of the catch and range of lengths (Table 5.3). If a species was subsampled, the length frequency of the catch was determined by multiplying the proportion of measured individuals in each centimeter interval by the total number of individuals caught. Some species were sorted and subsampled by length group so that, for example, all large individuals were measured and a subsample of small (often young-of-year) specimens was measured. All individuals not measured in a length group were counted. The length frequency of each length group was estimated as described above, i.e. the proportion of individuals in each centimeter interval of the subsample was expanded to determine the total number of individuals caught in the length group. The estimated length frequencies of each size group were then appended to complete the length frequency for that species. This procedure was often used with catches of bluefish, scup, and weakfish, which were usually dominated by young-of-year or discrete age/length classes.

Bluefish, menhaden, scup, summer flounder, tautog and winter flounder were sampled for age determination (Table 5.3):

- **Bluefish:** The target number of age samples (otolith) for bluefish were 50 from the spring period (defined by ASMFC Bluefish Technical Committee as Jan-July) and 50 from the fall period (August-December). However, bluefish catches are hard to predict so the number of age samples varied greatly; sometimes more than the target number was collected solely from LISTS samples but other times LISTS samples needed to be augmented with samples from the recreational fishery to meet the target number. Sufficient numbers of bluefish age samples from LIS would also make it possible to develop an LIS-specific age key, so bluefish age samples were sometimes still collected even after the target number was reached.

- **Scup:** Subsamples of scup, stratified by length group, were measured to the nearest mm (fork length) and scales from each individual were taken for ageing. Scup scales were removed posterior to the pectoral fin and ventral to the lateral line. The scales were pressed onto plastic laminate with an Ann Arbor roller press to obtain an impression of the scale, which was then viewed with a microfiche reader at 21x.

- **Summer Flounder:** Scales were taken from a subsample of summer flounder stratified by length group of fish less than 60 cm. Scales were taken from all summer flounder greater than 59 cm. At least 15 scales were removed from the caudal peduncle area. These scales were pressed and aged to supplement the NMFS age key and were also included in the formulation of the LISTS summer flounder catch-at-age matrix (see below).

- **Winter Flounder:** Subsamples of winter flounder, stratified by length group and area (as listed in bottom of Table 5.3), were measured to the millimeter (total length), weighed (kg) and sexed. Weight was then converted to grams. Their maturity stage was determined (NMFS 1989), and otoliths were collected for age determination later.

- **Menhaden:** Amendment 2 of the ASMFC Atlantic menhaden Fishery Management Plan introduced a requirement of 10 fish for age samples per 300 metric tons landed in the commercial bait fishery to support improved stock assessments. Connecticut has such a small menhaden commercial fishery that one 10-fish sample would suffice. The same

size/age component of the menhaden population taken in the commercial fishery was available to LISTS so menhaden scales were collected during LISTS sampling; 190 menhaden age samples were taken in 2022. LISTS age samples of menhaden provide one of the few fishery independent sources of age data for adult menhaden in northern waters and are therefore valuable for stock assessments. Menhaden fork length (mm) were recorded, and scales were taken about mid-body (lateral line) and below the insertion of the dorsal fin.

- **Tautog:** The ASMFC Tautog Fishery Management Plan (FMP) requires CT DEEP to collect a minimum of 200 age structures per year. Due to the low numbers of tautog caught in LISTS in recent years (less than 250 fish), age structures were collected from most tautog taken in LISTS. Tautog were processed onboard in 2022, where their total length (mm), sex, and total weight (kg) were recorded, and age structures were collected. Weight was converted to grams in post-processing. LISTS has used opercula to age tautog since 1984 (Cooper 1967). The ASMFC Tautog Technical Committee requested that states collect paired age structures for comparison studies each year; therefore, LISTS began collecting tautog otoliths in addition to opercula in 2012. Results from an ASMFC Tautog Ageing Workshop in May 2012 indicated there was no clear benefit to switching from opercula to otoliths for Connecticut, so otoliths were collected (minimum of 50 paired structures per ASMFC) and archived for potential use in the future. Subsequent to the 2012 workshop, a study conducted by Massachusetts Division of Marine Fisheries showed pelvic fin spine sections may be a better structure (easier to read and non-lethal to collect) for ageing tautog (Elzey and Trull 2016). In 2017, LISTS started to collect tautog pelvic fin spines, archiving them for future ageing work and ceased the collection of otoliths.

In reports prior to 2001, three species were not included in annual and seasonal totals: American sand lance, bay anchovy, and striped anchovy. These species, with the possible exception of striped anchovy, can be very abundant in Long Island Sound, but are not retained well in the otter trawl. Additionally, many of these fish are young-of-year and often drop out of the net as it is retrieved and wound on the net reel. For this reason, they were not included in the list of species to be counted when LISTS was started in 1984. However, to document the occurrence of these species in LISTS catches, American sand lance was added in 1994, striped anchovy was added in 1996, and bay anchovy was added in 1998. Since 2001, adults of these three species have been included in the annual and seasonal totals and young-of-year listed if present in the year's catch but are not quantified (Table 5.13, Appendix 5.4). 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 5.2).

Although endangered species research and monitoring work is not eligible for Sport Fish Restoration funding, there is the possibility of encountering protected species during the course of conducting the work authorized by this funding for eligible species. Aside from the handling and processing of incidental catches of protected species mandated by the NOAA Greater Atlantic Regional Fisheries Office (GARFO) Protected Species Division, no additional project resources are used on protected species work. Sampling procedures have been modified in recent years to minimize the likelihood of injury to Atlantic Sturgeon (a Federally listed endangered species since 2012). When sampling in a season and area where the chance of catching a sturgeon is high (based on historic LISTS catch) and water depth is greater than 27 m, gear retrieval speed is reduced to

decrease the stress induced by rapid changes in pressure. When an endangered species is detected in the net, it is removed as quickly and carefully as possible. Subsequent handling and processing of endangered species adhere to the Reasonable and Prudent Measures as well as the Terms and Conditions specified in the ESA Section 7 Biological Opinion's Incidental Take Statement issued by NOAA for CT in January 2013 (http://www.greateratlantic.fisheries.noaa.gov/protected/section7/bo/actbiops/usfws_state_fisheries_surveys_2013.pdf). Additionally, handling and processing of sturgeon follow protocols described in A Protocol for Use of Shortnose, Atlantic, Gulf, and Green Sturgeons (Kahn and Mohead. 2010. U.S. Dep. Commerce, NOAA Tech Memo, NMFS-OPR-45, 62p., http://www.nmfs.noaa.gov/pr/pdfs/species/kahn_mohead_2010.pdf). Forty-seven (47) Atlantic Sturgeon were captured on six (6) of the 167 tows completed in 2022. One other protected species, loggerhead turtle, was encountered on one tow in September of 2022. All interactions with endangered species are detailed in Appendix 5.5.

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) was calculated for the common finfish and invertebrate species. To calculate the geometric mean, the numbers and weight per tow were logged ($\log_e$) to normalize the highly skewed catch frequencies typical of trawl surveys:

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

Means were 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 - 2022 for 38 finfish species, lobster, and long-finned squid (1986 - 2022). 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 in the time-series (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, bluefish, 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 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 and bluefish was

derived using both ASMFC provided coastal keys for earlier years and LISTS keys since 2013. 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 had been converted to age, the proportion at age was 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 weakfish by using observed modes in the LISTS length frequencies to separate the two groups. Prior to 2019, a recruitment index was similarly calculated for bluefish using modal length groups, however, the ASMFC bluefish Technical Committee has accepted and has used LISTS full index-at-age for assessment purposes since 2013. The bluefish index-at-age methodology is now presented and described below.

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

- **Bluefish**. In 2012 a coast wide biological sampling program was initiated through ASMFC Addendum 1 of the bluefish management plan. This sampling program was initiated to address the lack of bluefish samples being collected by coastal states for use in the bluefish assessment. This was particularly a problem for the Northern States where few ages were available and contributing to the coastal key. Connecticut collected and aged bluefish samples in 1984, however few samples were collected annually after the initial Survey year. Since robust age-length keys were not available for the Long Island Sound region, until 2013, bluefish age keys for 1985-2012 were provided by the ASMFC Bluefish Technical Committee as combined coastwide annual keys for use to calculate indices-at-age for those earlier years. Currently the 1984 and the 2013-2022 index-at-age uses annual fall (Sept-Oct) age keys generated by CT LISTS ageing program. In 1984, 294 samples (scales) were aged and contributed to the key, along with 1,874 samples (otoliths) from the 2013-2022 period. In 2022, age samples were taken from 129 bluefish: three (3) from the spring period and 126 from the fall period.

- **Scup**. Scales from 822 scup were collected in 2022; 493 from the spring cruise and 329 from the fall cruise. An index-at-age matrix was developed for 1984-2022 using spring (May-June only) and fall (September-October) LISTS data (Table 5.21). April data was omitted since few scup are taken during the month. A total of 17,816 scup aged between 1984 and 2022 were used to make year and season specific age-length keys (1 cm intervals). The 2021 scup aging was not complete in last year's report, and a pooled two-year key was used to get a preliminary index-at-age. The 2021 samples have now been aged, therefore both 2021 and 2022 index-at-age are presented in this report. Prior to 2022, 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. Indices-at-age were computed for both spring and fall each year. Since few scup older than age 9 are taken (less than 4% in any given year), an age 10+ group was calculated by summing indices for ages 10 and

up. To represent the full adult portion of the population an age 2+ index was 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 5.22), 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 2022 by apportioning the spring index by the percentage of fish at each age (Table 5.23).

- **Summer flounder**. Since the 2017 fall cruise, LISTS has collected representative scale samples from all size summer flounder to ensure a robust Connecticut age-key once it became known that there would be no samples from NMFS for the fall 2017 period. Prior to the fall of 2017, 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. Only summer flounder greater than or equal to 60cm were sampled from LISTS for age structures prior to the fall of 2017. The NMFS keys were supplemented with fish caught and aged by LISTS (60 cm and over). LISTS also provides the age data from these fish (> 60cm) to NMFS. Currently, the age-key is constructed using both LISTS (full size structure) and NMFS age data (Table 5.24). In 2022, 450 summer flounder were sampled: 204 from the spring (18 – 67 cm) and 246 from the fall (19 – 70 cm). 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).

- **Tautog**. Operculum from 296 tautog were collected in 2022; 244 from the spring cruise and 52 from the fall cruise. Ageing is not yet complete for 2021 and 2022. An index-at-age matrix was developed for 1984-2019 (Table 5.25). Annual keys were calculated by combining all months in a particular year since so few tautog are captured by LISTS. The 2021 and 2022 index-at-age matrices will be updated upon completion of the ageing, validation, and QA/QC.

- **Weakfish**. Age 0 and age 1+ indices were calculated for both spring (1984 – 2022) and fall surveys (1984 – 2009, 2011 - 2022) (Table 5.26). Since few weakfish are taken in April, the spring geometric mean was calculated using only May and June. All weakfish taken in spring are assumed to be age 1+. Similar to bluefish, the fall age 0 and 1+ indices were calculated by using length frequencies to separate the catch. Since a break in the fall length frequencies generally occurs between 24 and 32 cm each year (Table 5.57), weakfish less than 30 cm are considered to be age 0 while those greater than or equal to 30 cm are ages 1+.

- **Winter flounder**. Otoliths from 243 winter flounder were collected in 2022 from the spring survey. An index-at-age matrix was developed for 1984-2022 using April and May

LISTS data (Table 5.27). June data were not used for the winter flounder matrix 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 25,218 winter flounder aged between 1984 and 2022 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 an age if the year specific key were not available for the particular length bin.

Each flounder aged as described above was also assessed for maturity stage by sex following Burnett (1989). CT DEEP staging of winter flounder was verified in a cooperative study with NMFS in 2009-2010 (Gottschall and Pacileo 2011). The percentage of male and female fish in each centimeter length group that was sexually mature (ripe, resting, or spent) was calculated in order to determine the length group at which 50% was mature each year.

Species Richness by Group

The Long Island Sound Trawl Survey monitors species richness using groups of species classified as either cold temperate or warm temperate. For the purposes of tracking species richness, American sand lance, bay anchovy, and striped anchovy were omitted (see *Sampling Procedures* section). All other finfish species captured in LISTS were divided into groups based on their temperature preferences and seasonal spawning habits as documented in the literature (Collette and Klein-MacPhee 2002, Murdy et al. 1997). Species in the cold temperate group prefer water temperatures below 15^0C (60^0F), tend to spawn at the lower end of their temperature tolerance range, and are more abundant north of Long Island Sound than south of New York. Species in the warm temperate group prefer warmer temperatures (11-22^0C or 50-77^0F), tend to spawn in the upper range of their temperature tolerance, and are more abundant south of the Sound than north of Cape Cod (Appendix 5.6). Species that are not tolerant of cold temperatures, are abundant only south of Chesapeake Bay but stray into northern waters mostly as juveniles, and spawn only in the mid-Atlantic Bight and south were placed into a separate group (subtropical) and were not included in the analysis because they are typically only present in the fall LISTS.

Open Water Forage Abundance

A Long Island Sound open water forage index of abundance was compiled to measure the available food base which supports resident and migratory species within the Sound. This index is formulated as a biomass index that is assembled from 11 of the forage species that are most common in LISTS catches along with three other species that are considered forage at an early life stage (young-of-year or YOY). The species used to generate the index are: Atlantic herring, long-finned squid, butterfish, alewife, blueback herring, American shad, hickory shad, menhaden, whiting, spotted hake, and red hake along with young-of-year scup, bluefish, and weakfish (Figure 5.16). The geometric mean biomass is calculated using the aggregate of these 14 species on a per tow basis and calculated using the same methodology as described above for individual species biomass indices.

RESULTS AND DISCUSSION

Overview of LISTS 2022 Spring and Fall Surveys

In 2022, there were no longer COVID-19 policies in place limiting time and staff on the *R/V John Dempsey*. Given some uncertainty in time limitations and staff, the sampling regime put in place in 2021 was continued in 2022. Forty sites were randomly selected using the standard weighting scheme based on strata. Then thirty-three (33) of the forty (40) were randomly selected, maintaining the minimum of 2 sites per stratum. The remaining seven (7) sites each month were considered "optional" and would be sampled if there was sufficient time left in the month after completing 33 samples. In April 2022, 33 of the 40 sites were completed due to time and staffing constraints. With the addition of seasonal resource assistants in May, 40 sites were completed. The June cruise was cut short (14 sites sampled) due to the *R/V John Dempsey* having mechanical problems along with a generator replacement. Both the September and October cruises were completed, each having the standard 40 sites sampled.

As noted in previous reports, the LISTS database of counts, weights and lengths were all collected electronically. This marks the fourth year in which the system was successfully used to capture all records electronically. Paper records were only used for ancillary notes (also known as metadata) and as a backup. See Job 6 in this report for details on the LISTS transition to electronic data acquisition.

April sampling began on April 14 and ended on May 2, finishing 33 sites in nine (9) days. May sampling started on May 11 and continued until May 26, completing 40 sites in eleven (11) days underway. June sampling began on June 8 and ended on June 14, taking four (4) days underway to complete the 14 sites. The September Survey commenced on September 8 and concluded on September 27, completing 40 tows in twelve (12) days underway. The October Survey commenced on October 14 and concluded on October 28, completing 40 tows in ten (10) days underway, not including two (2) days lost to inclement weather. In total, 167 LISTS sites were completed in 46 days underway during the spring and fall 2022 surveys (Table 5.4), not including transit or changeover days (Water Quality survey to LISTS gear change).

Maps showing the sites selected versus the sites sampled during each month of sampling are provided in Figure 5.2 (April), Figure 5.3 (May), Figure 5.4 (June), Figure 5.5 (September) and Figure 5.6 (October). Within each figure the red bordered sites are the sites selected for the month, the green are the "optional 7 sites" and the solid blue dots indicate the actual sites sampled. If a site had to be relocated during sampling, an explanation of why it was moved is provided under the figure. Additional site/station information is provided in Table 5.5 (April), Table 5.6 (May), Table 5.7 (June), Table 5.8 (September) and Table 5.9 (October). These tables provide date of sample, time, tow duration, latitude/longitude, average tow speed, distance towed and approximate area swept for each tow. Surface, bottom temperature and salinity data were collected and summarized in each months' respective table.

Sometimes, a full 30-minute tow cannot be completed. Typical reasons for short tows include lack of room because of observed pot gear set in the immediate area, a drop in speed due to entanglement with some object on the bottom (frequently derelict pot gear), or a complete stop in forward motion (submerged wreck or rock pile). Survey crew will often attempt to finish an interrupted tow by clearing the net (if needed) and resetting beyond the obstruction or observed

gear. If this is not possible, a site may have to be moved to another site nearby with the same stratum (bottom type and depth). If the site was moved, the data from the initial site will not be used. Typically, a minimum of 15-20 minutes of tow time is required for a LISTS tow to be recorded. However, there are occasions when a tow with less than 15 minutes will be accepted, usually because there is no alternate site in the designated strata in the vicinity. Short tow information for each month in the survey is summarized in Table 5.10.

Post-processing QA/QC:

Since initiating a system to electronically record data while sampling in 2018, the procedures for error checking have evolved from looking for keypunch errors (dual entry), or errors occurring from calculations from subsampling, to new post processing procedures to handle changes that may be needed after the sample is electronically recorded. Any changes needed for a particular sample are subsequently captured in a metadata file and all original databases are maintained in a daily backup stored in a monthly folder. This maintains all original files and timestamps if needed during post-processing or needed in the future. There are two main onboard datasheets for handwritten notes taken during each sample. Appropriate notes are cataloged in one of the two deck sheets in the cases where either data needs to be changed or addressed in the database. Notes taken on these datasheets to address unusual events that have occurred during the tow such as gear interactions (not cataloged in the comments of the software program), unusual catches, or follow-up notes to help with analysis afterwards. Sometimes counts and other notes are recorded to confirm and check electronically recorded records. Final age sample tallies are recorded by species on one of the handwritten summary sheets as well for cataloging samples after being delivered to the lab each day.

Post processing files are created for each cruise by combining several Access databases if needed. Most changes as described above occur on the post processed file prior to making SAS datasets. Intermediate Excel files created from certain Access table level data are also utilized to help with post processing and error checking. A final annual SAS dataset is created and stored in the same format as in prior years so that users can continue to utilize time series analysis on all data. Furthermore, some of the same error checking SAS jobs that look for outliers and calculations of predicted weight per sample (by species) can be run to confirm recorded data is correctly cataloged. These procedures ensure that all data collected while onboard and all necessary changes needed are maintained with a record trail and can be accessed in the future (record and file level timestamps and through the use of metadata files).

2022 sampling intensity/planning:

In 2021, the still present concern over the COVID-19 pandemic limited the crew for LISTS to 5 permanent staff and no seasonal resource assistants for the spring months. Given these constraints, plans were enacted in order to reduce the sampling to a manageable level with the reduction in staff. Two methods were considered to decrease sampling intensity, decreasing tow duration, or decreasing the number of tows done per month. It was decided that a decrease in the number of tows done per month was preferable over decreasing tow duration (Gottschall et al. 2021). By 2022, concerns over the pandemic had sufficiently diminished and the standard crew size of 6-8 staff was allowed aboard the *R/V John Dempsey*. The hope going into the year was that the regular 40 sites a month could be completed. However, since this was the first time in two

years that standard sampling was planned, the reduced sampling plan was still implemented as a backup in case unforeseen issues arise. For each month, forty sites were randomly selected using the standard weighting scheme based on strata. Then thirty-three (33) of the forty (40) were randomly selected, maintaining the minimum of 2 sites per stratum. The remaining seven (7) each month were considered "optional" and would be sampled if there was sufficient time left in the month after completing 33 samples. In April, there were no seasonal resource assistants employed and therefore staffing and timing limitations prevented the full 40 sites from being completed. Only the selected thirty-three (33) sites were completed during April (Figure 5.2). In June, mechanical failure of the *R/V Dempsey* generator forced a premature end to the cruise, and only fourteen (14) sites were completed (Figure 5.4). All other months (May, September, and October) had the full complement of 40 sites completed (Figures 5.3, 5.5 and 5.6).

The reduced sampling procedure was a temporary measure to get through the constraints given by the COVID-19 pandemic safety restrictions. Barring any more complications with staffing or timing restrictions, the standard (pre-pandemic) sampling intensity is expected to be returned in the 2023 season.

Cooperative Sample and Data Collection

As resources permit, LISTS staff participate 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 such as the National Marine Fisheries Service (NMFS), Atlantic States Marine Fisheries Commission (ASMFC), New England and Mid-Atlantic Councils (Councils), and researchers or graduate students associated with state or local universities. In recent years, many requests for samples have also come from high schools, aquariums, or other educational organizations needing finfish and invertebrates for teaching purposes. Additionally, Fisheries Division staff often have sample or data requests for media or other public outreach events (see Job 11 of this report). In 2022, a significant amount of project staff time went toward fulfilling large data requests for NOAA/NMFS, ASMFC, the New England and Mid-Atlantic Councils, several state agencies, Universities, and NGO's. More than forty requests were fulfilled to these agencies and others in 2022. Samples were provided to NY Department of Environmental Conservation, NMFS, CT Health Department, Yale University, and the University of Connecticut.

Number of species identified

LISTS observed 55 finfish species in 2022 (table 5.11). A cownose ray (*Rhinoptera bonasus)* was encountered by LISTS for the first time during the 2022 September cruise. There was a single individual that weighed 2.60 kg and measured 77 cm from the snout to the end of the tail. From 1984 to 2022, LISTS has identified 113 finfish species (appendix 5.1), averaging 57 species per year with a range of 43 to 70 species (figure 5.7). In addition, a total of 39 types of invertebrates were collected in 2022 (table 5.12). Most invertebrates are identified to species, however, in some cases, invertebrates were identified to genus or a higher-level taxon.

Total Catch

Appendix 5.4 presents a time series (1984-2022) of the finfish species collected each year and their respective rank by numbers. Annual total biomass of invertebrates is also included in this appendix (1992-2022), ranked by weight (kg). A total of 163,951 finfish weighing 19,340.5

kg were sampled in 2022 (Table 5.13). In the spring of 2022, a total of 43,695 finfish weighing 10,791.6 kg were sampled and a total of 120,255 finfish weighing 8,548.9 kg were sampled in fall of 2022 (Table 5.14). A total of 1,791.1kg of invertebrates were taken in 2022 (Table 5.13). The total biomass of invertebrate catch taken in the spring of 2022 was 493.2 kg while a total of 1,297.9 kg of invertebrates were taken in fall (Table 5.15).

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 black sea bass (Table 5.37-5.38), scup (Table 5.51-5.52), and summer flounder (Table 5.55-5.56).

Length frequencies were prepared for 22 species:

alewife	spring and fall	1989 - 2022	Table 5.28;
American shad	spring and fall	1989 - 2022	Table 5.29;
American lobster	spring and fall (M&F)	1984 - 2022	Table 5.30-Table 5.34;
Atlantic herring	spring and fall	1989 - 2022	Table 5.35;
Atlantic menhaden	spring and fall	1996 – 2022	Table 5.36;
black sea bass	spring and fall	1987 – 2022	Table 5.37, Table5.38
blueback herring	spring and fall	1989 - 2022	Table 5.39;
bluefish	spring and fall	1984 - 2022	Table 5.40, Table 5.41;
butterfish	spring and fall	1986 - 1990, 1992 - 2022	Table 5.42;
clearnose skate	spring and fall	1993 - 2022	Table 5.43, Table 5.44;
fourspot flounder	spring and fall	1989 - 1990, 1996 - 2022	Table 5.45;
hickory shad	spring and fall	1991 - 2022	Table 5.46;
horseshoe crab	spring and fall (M&F)	1998 - 2022	Table 5.47, Table 5.48;
long-finned squid	spring and fall	1986 - 1990, 1992 - 2022	Table 5.49, Table 5.50;
scup	spring and fall	1984 - 2022	Table 5.51, Table 5.52;
striped bass	spring and fall	1984 - 2022	Table 5.53, Table 5.54;
summer flounder	spring and fall	1984 – 2022	Table 5.55, Table 5.56;
tautog	spring and fall	1984 - 2022	Table 5.57, Table 5.58;
weakfish	spring and fall	1984 - 2022	Table 5.59, Table 5.60;
windowpane flounder	spring and fall	1989, 1990, 1994 - 2022	Table 5.61, Table 5.62;
winter flounder	April-May and fall	1984 - 2022	Table 5.63, Table 5.64;
winter skate	spring and fall	1995 - 2022	Table 5.65.

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

Relative indices of abundance, or the geometric mean counts per tow, were calculated from 1984-2022 for 38 finfish species plus lobster and long-finned squid (squid since 1986). All spring

(April-June) and fall (September-October) data were used to compute the abundance indices presented in Tables 5.16 (spring) and 5.17 (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 5.18 and 5.19, respectively). Age specific indices of abundance were calculated for selected important recreational species, including bluefish, scup, striped bass, summer flounder, and winter flounder (see below). Weakfish recruitment indices were calculated using modal analyses of the length frequencies. For each of the 38 finfish species, plots including catch per tow in numbers and biomass in kilograms are illustrated in Figures 5.8 through 5.13. These figures also include plots of each of the age specific indices and recruitment indices mentioned above. Figure 5.14 provides plots of abundance (biomass) indices for crabs (lady, rock, spider; 1992-2022), American lobster (1984-2022), horseshoe crab (1992-2022), and long-finned squid (1986-2022).

In the spring, a few species to note are windowpane flounder and little skate, which have both had a declining trend in relative abundance in recent years. For each, 2022 had the minimum relative index of abundance through the entire time series (1.12 and 0.14 count/tow respectively). Long-finned squid also saw a large drop in relative abundance in the spring compared to the 2021 spring season (2.04 and 8.81 count/tow respectively). During the fall, black seabass had a large increase in abundance compared to 2021, and the index was the maximum seen in the fall throughout the time series (2.50 count/tow). Northern sea robin also had its maximum fall abundance of the time series in 2022 (2.70 count/tow). Contrary to the spring trend, long-finned squid had a substantial increase in abundance in the fall of 2022 compared to fall 2021 (129.67 and 79.43 count/tow respectively).

Indices of Abundance: Important Recreational Species

Spring and fall abundance indices are presented in Tables 5.16-5.17. Indices of abundance at age were also calculated for seven important recreational species: bluefish (Table 5.20), scup (Table 5.21), striped bass (Table 5.22 age frequency, Table 5.23 indices at age), summer flounder (Table 5.24), tautog (Table 5.25), weakfish (Table 5.26) and winter flounder (Table 5.27). 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. Summer flounder, scup and weakfish indices-at-age are calculated and presented separately for each season. Modal distributions were used to calculate recruitment indices for weakfish.

Species Richness by Group

The number of cold temperate and warm temperate species captured in each tow was averaged by seasonal cruise (April-June and September-October) for each year from 1984-2022 as an indicator of annual biological diversity or species richness. Trends in these indicators were tested for statistical significance by regression analysis. Results (Figure 5.18) show that the average number of warm temperate species captured/tow in spring and fall cruises has increased ($F=66.4$ and 141.2 respectively, $p<0.0001$); while the average number of cold temperate species has decreased, especially in spring ($F=96.1$, $p<0.0001$) but also in fall cruises ($F=48.1$, $p<0.0001$). Essentially, over the past couple decades, the finfish community structure in LIS has shifted away from the historical, two distinct winter-spring and summer-fall species assemblages and more

toward a single spring-summer-fall species assemblage better adapted to the warming bottom water temperatures (Howell and Auster 2012).

MODIFICATIONS

In late 2022, ASMFC notified CTDEEP that based on the commercial and recreational landings of weakfish, it was expected that we would not be *de minimus* in the coming year (2023). We are therefore required to collect 3 otolith samples per mt of total landings of weakfish. Since there likely is little to no opportunity to collect samples from a fishery dependent source, we plan to collect otolith samples from weakfish collected on LISTS. These samples will be representative of the length range encountered on the survey, with an expected annual total of somewhere between 50-100 samples.

As described above in the methods section of this report, tautog is aged in Connecticut using opercula, not otoliths or fin spines. After a ASMFC ageing workshop in 2012, it was recommended that states collected paired structures with opercula for potential future use. From fall 2012 through 2016 LISTS collected otoliths as the paired structure to compliment the opercula collection. From 2017 to 2022 pelvic fin spines were collected as the paired structure with opercula. The collection of opercula and fin spines from Tautog will continue for the foreseeable future, although there are no plans at this time to change the aging structure from opercula.

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TABLES 5.1 - 5.27
LISTS

Table 5.1. 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 5.2. 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 5.3. Length and age data collected in 2022.

In addition to the species listed below, other rarely occurring species (typically totaling less than 30 fish/year each) were measured. During 2022, 23 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 (mm)	All	min of 15 / tow
American lobster	CL (0.1 mm)	All	min of 50 / tow
American shad	FL (mm)	All	min of 15 / tow
anchovy, bay	FL (mm)	All	min of 10 / tow
Atlantic herring	FL (mm)	All	min of 15 YOY and min of 30 adults / tow
Atlantic menhaden	FL (mm)	All	min of 15 / tow
Atlantic sturgeon	FL (mm)	All	All
Blueback herring	FL (mm)	All	min of 15 / tow
Bluefish	FL (mm)	All	min of 30 YOY / tow, all adults
black sea bass	TL (mm)	All	All
butterfish	FL (mm)	All	min of 15 YOY and 15 adults / tow
cunner	TL (mm)	All	All
dogfish, smooth	FL (mm)	All	All
dogfish, spiny	FL (mm)	All	All
fourspot flounder	TL (mm)	All	min of 30 / tow
hake, red	TL (mm)	All	min of 30 / tow
hake, silver (whiting)	TL (mm)	All	min of 30 / tow
hake, spotted	TL (mm)	All	min of 30 / tow
hickory shad	FL (mm)	All	All
hogchoker	TL (mm)	All	min of 30 / tow
horseshoe crab	PW (mm)	All	All
northern searobin	FL (mm)	All	min of 30 / tow
moonfish	FL (mm)	All	min of 10 / tow
smallmouth flounder	TL (mm)	All	min of 10 / tow
skate, clearnose	TL (mm)	All	min of 30 / tow
skate, little	TL (mm)	All	min of 30 / tow
skate, winter	TL (mm)	All	All
striped bass	FL (mm)	All	All
striped searobin	FL (mm)	All	min of 30 / tow
scup	FL (mm)	All	min of 15 YOY and 30 / mode for age 1+
long-finned squid	ML (mm)	All	min of 30 / tow
summer flounder	FL (mm)	All	All
tautog	TL (mm)	All	All
weakfish	FL (mm)	All	min of 15 YOY / tow, all adults
whelk , channeled	PW (mm)	All	All
whelk , knobbed	PW (mm)	All	All
windowpane flounder	TL (mm)	All	min of 50 / tow
winter flounder	TL (mm)	All	min of 100 / tow

Species aged	Structure	Subsample
bluefish	scales / otoliths	Collected each season. For each season, minimum of 50 scale and otolith samples collected from full length distribution. Spring collection may use other means of sampling to obtain the required minimum.
menhaden	scales	Collected each season. For each season, minimum of 50 scale samples collected from full length distribution.
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: for fish < 60 cm, scales collected from 3 fish / cm
tautog	opercular bones	Collected from a minimum of 200 fish/year.
	otoliths or pelvic fin rays	collected from minimum 50 fish/year
weakfish	scales / otoliths	Ageing/collections discontinued in October 2014
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 5.4. Number of Long Island Sound Trawl Survey (LISTS) samples taken by year and cruise.

In 1984, thirty-five sites per monthly cruise from April through November were scheduled for sampling. Starting in 1985, forty sites per cruise were scheduled. In 1991, the Trawl Survey was modified to a spring (April - June) and fall (September - October) format--July, August and November sampling was suspended. In 1993 and 1994, an additional cruise of 40 sites was added to the fall period. The additional fall cruise was suspended in 1995. One hundred twenty tows were conducted in 2006 due to delays in rebuilding the main engine on the R/V John Dempsey (spring) and mechanical failure/overhaul of the hydraulic power take-off (fall). Delays in overhauling the transmission in the fall of 2008 resulted in missing September sampling. The June cruise and all of fall sampling in 2010 were canceled for an engine replacement in the R/V John Dempsey. Due to delays in engine replacement, begun in 2010 but not completed until late April 2011, April sampling in 2011 was abbreviated. In 2017, commencement of the spring survey was delayed until late-May due to repairs to the research vessel. In 2018, April sampling was curtailed due to delays in getting the Halon fire suppression system inspected/repaired on the research vessel. No sampling was conducted in 2020 due to COVID and although sampling resumed in 2021 crew size limitations inhibited the full 40 tows being conducted each month. Thirty-three tows were selected with the same sampling intensity (stratum selection) as a typical forty tow cruise and an additional 7 samples held if time permitted (October 2021). This reduced sampling regime was continued in 2022. There were 33 sites completed in April 2022 due to staff and time limitations. The June 2022 cruise was cut short due to mechanical issues with the R/V John Dempsey.

	Year																																						
Cruise	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Total**
April	-	-	35	40	40	40	40	45*	-	40	40	40	40	40	40	40	40	40	40	40	40	40	-	40	40	40	40	12	40	40	40	40	36	-	12	40	-	-	33	
May	13	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	38	40	40	40	40	40	40	24	40	40	-	33	40	
June	19	5	41	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	39	40	40	40	40	40	-	40	40	40	40	40	40	40	40	40	-	33	14	
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	41**	40	40	40	40	40	40	40	-	40	-	40	40	40	40	40	40	40	40	40	-	40	40	
Sept/Oct	-	-	-	-	-	-	-	-	-	40	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
October	35	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	-	40	40	-	40	40	40	-	40	40	40	39	40	40	40	40	40	-	33	40	
November	29	40	40	40	40	40	40	-	-	-	-	-	-	-	-	-	-	-	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	**200**	**246**	**316**	**320**	**320**	**320**	**297**	**205**	**160**	**240**	**240**	**200**	**200**	**200**	**200**	**200**	**201**	**200**	**200**	**200**	**199**	**200**	**120**	**200**	**160**	**200**	**78**	**172**	**200**	**200**	**199**	**200**	**196**	**144**	**172**	**200**	**0**	**139**	**167**	**7,811**

Table 5.5. Station information for LISTS April 2022.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Number of samples was reduced to 33 due to staffing and time limitations (see 2022 sampling intensity/planning). Latitude (N) and Longitude (W) are displayed in decimal degrees. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc,ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Avg Speed (knots)	Distance (nm)	Area Swept (sq.nm)
SP2022001	4/14/2022	02-29	T	2	12:17	30	41.0478	-72.5591	8.6	28.5	6.7	30.2	2.6	1.30399	0.00658
SP2022002	4/14/2022	04-29	T	3	14:20	30	41.0811	-72.5427	8.4	28.5	6.6	30.3	2.3	1.1433	0.00577
SP2022003	4/18/2022	08-31	S	4	7:54	32	41.1426	-72.4476	7.6	30.1	7.6	30.2	3.4	1.83906	0.00929
SP2022004	4/18/2022	05-27	T	3	10:51	30	41.0893	-72.6713	7.4	29.2	7.4	29.4	2.2	1.0799	0.00545
SP2022005	4/18/2022	05-28	S	3	12:47	30	41.0872	-72.608	7.7	29.9	7.6	29.9	2.4	1.21507	0.00614
SP2022006	4/18/2022	09-31	S	4	14:28	30	41.1498	-72.5045	8	30.1	7.7	30.4	3.2	1.59956	0.00808
SP2022007	4/21/2022	08-28	S	3	8:36	30	41.1476	-72.5703	7.6	29.3	7.7	29.5	2.3	1.13081	0.00571
SP2022008	4/21/2022	07-25	T	4	10:06	30	41.1295	-72.699	7.6	29.2	7.9	29.9	3.2	1.58556	0.00801
SP2022009	4/21/2022	03-24	M	4	11:57	30	41.0582	-72.7543	7.5	29.2	7.4	29.4	3.2	1.60755	0.00812
SP2022010	4/21/2022	05-24	T	4	13:38	30	41.0927	-72.7913	7.7	29.3	7.5	29.5	2.5	1.23976	0.00626
SP2022011	4/21/2022	10-27	T	4	15:17	30	41.1707	-72.6996	8.2	29.4	7.8	29.9	2.6	1.3102	0.00662
SP2022012	4/22/2022	14-33	S	2	7:01	30	41.2473	-72.3452	8.2	25.5	8.1	30	1.2	0.61915	0.00313
SP2022013	4/22/2022	13-28	T	2	9:20	30	41.2388	-72.5826	8.5	29.3	8.4	29.3	2.6	1.29795	0.00655
SP2022014	4/22/2022	14-27	T	1	10:35	30	41.236	-72.6611	8.6	29.6	8.5	29.6	3	1.48298	0.00749
SP2022015	4/22/2022	13-33	S	1	12:53	30	41.2296	-72.4036	9.4	16.2	8.3	28.8	1.8	0.90834	0.00459
SP2022016	4/25/2022	58-23	S	1	9:32	30	40.9775	-72.777	8.9	28.8	7.7	29	3	1.48446	0.0075
SP2022017	4/25/2022	59-20	M	2	10:47	30	40.9932	-72.899	9	28.6	7.3	29.3	2.7	1.33326	0.00673
SP2022018	4/25/2022	00-18	M	3	12:04	30	41.0107	-73.0153	8.9	28.6	7.4	29.4	2.7	1.3361	0.00675
SP2022019	4/25/2022	06-21	M	3	13:47	30	41.0973	-72.9121	9.1	29.2	8	29.5	3	1.49607	0.00755
SP2022020	4/25/2022	08-19	T	2	15:14	30	41.147	-72.9668	9	29.2	8.5	29.2	3.5	1.75542	0.00886
SP2022021	4/26/2022	02-15	M	4	8:39	30	41.0417	-73.121	8.6	28.6	7.4	29.4	3.1	1.52822	0.00772
SP2022022	4/26/2022	58-12	M	3	10:03	30	40.9842	-73.2538	9.2	28.3	7.2	28.8	3	1.50891	0.00762
SP2022023	4/26/2022	57-09	S	2	11:29	30	40.9532	-73.4063	9.9	28	8.5	28.2	2.8	1.40345	0.00709
SP2022024	4/26/2022	56-12	T	2	13:43	12	40.9452	-73.3008	9	28.3	8.6	28.3	2.8	0.5614	0.00283
SP2022025	4/26/2022	57-14	T	3	14:57	30	40.9583	-73.214	9.4	28.3	8.1	28.4	2.7	1.36742	0.00691
SP2022026	4/27/2022	00-14	M	4	9:03	30	41.0167	-73.1841	9	28.4	7.4	29.2	2.5	1.27384	0.00643
SP2022027	4/27/2022	01-12	M	4	11:06	30	41.0165	-73.2811	9	28.4	7.1	29.1	3	1.50309	0.00759
SP2022028	4/27/2022	01-10	T	3	13:50	30	41.0218	-73.371	9.3	27.6	7.3	28.8	3.4	1.68681	0.00852
SP2022029	4/28/2022	11-19	M	2	8:48	30	41.1893	-73.002	9	29	9	29	2.8	1.40615	0.0071
SP2022030	4/28/2022	13-19	M	1	11:04	30	41.2308	-72.9705	9.1	29.2	9.1	29.3	2.7	1.33775	0.00676
SP2022031	4/30/2022	04-13	M	3	8:36	30	41.0721	-73.2068	9.6	28.4	8.4	28.6	3.6	1.78335	0.00901
SP2022032	4/30/2022	07-14	T	1	10:01	30	41.1212	-73.1881	9.4	27.6	8.5	28.5	2.5	1.23313	0.00623
SP2022033	4/30/2022	13-20	M	1	12:19	30	41.2278	-72.9718	10.2	28.9	9.9	29	2.5	1.26925	0.00641

Table 5.6. Station information for LISTS May 2022.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc,ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Avg Speed (knots)	Distance (nm)	Area Swept (sq.nm)
SP2022034	5/11/2022	13-32	S	1	7:29	30	41.2305	-72.4335	9.5	27.4	9.4	28.8	3.1	1.55188	0.00784
SP2022035	5/11/2022	12-28	T	3	8:58	30	41.213	-72.5511	9.6	27.4	9.6	27.5	2.6	1.29867	0.00656
SP2022036	5/11/2022	13-23	M	2	11:19	30	41.2302	-72.8	10.7	27.3	10.3	27.3	2.8	1.39519	0.00705
SP2022037	5/11/2022	12-27	T	3	13:44	30	41.2007	-72.6456	11.2	27.2	10	27.2	3	1.49152	0.00753
SP2022038	5/13/2022	08-31	S	4	7:47	20	41.1426	-72.4478	10.1	27.5	9.6	28.2	3.8	1.28008	0.00646
SP2022039	5/13/2022	03-30	S	1	9:24	30	41.0446	-72.5255	10.7	27.5	10.6	27.5	3.5	1.73298	0.00875
SP2022040	5/13/2022	08-28	S	3	11:13	30	41.1487	-72.56	10	27.5	9.9	27.7	2.1	1.06471	0.00538
SP2022041	5/13/2022	09-31	S	4	12:39	30	41.1473	-72.5105	10.6	27.6	9.7	27.9	3.7	1.83069	0.00924
SP2022042	5/16/2022	07-27	S	3	8:25	30	41.1281	-72.6166	13.1	26.9	10.3	27.2	3.7	1.87373	0.00946
SP2022043	5/16/2022	04-22	M	4	10:50	30	41.0711	-72.8938	14.6	26.8	9.3	27.1	2.5	1.25144	0.00632
SP2022044	5/16/2022	05-25	T	4	12:28	30	41.0875	-72.7601	13.1	27.1	9.9	27.3	3	1.48424	0.00749
SP2022045	5/16/2022	08-25	T	4	14:23	30	41.1457	-72.7168	13	27.1	10.3	27.2	2.2	1.12292	0.00567
SP2022046	5/17/2022	15-34	T	1	7:25	30	41.2506	-72.3201	12.1	25.9	10.6	29	3.2	1.62375	0.0082
SP2022047	5/17/2022	11-27	T	3	9:44	30	41.193	-72.5986	11.7	27.2	10.7	27.5	3.7	1.84046	0.00929
SP2022048	5/17/2022	13-20	M	1	12:55	30	41.2166	-72.9401	13.7	26.9	13.2	27	2.9	1.43918	0.00727
SP2022049	5/18/2022	00-15	T	4	8:56	30	41.0088	-73.126	12.3	26.2	9.6	27	3.2	1.6194	0.00818
SP2022050	5/18/2022	55-13	S	2	11:01	30	40.9258	-73.248	13.2	25.9	12.8	25.9	3.1	1.57386	0.00795
SP2022051	5/18/2022	56-12	T	2	12:43	16	40.943	-73.2784	13.5	25.9	12.4	25.9	3	0.79813	0.00403
SP2022052	5/18/2022	03-14	M	3	15:09	30	.	.	12.1	26.5	10.5	26.8	2.6	1.29718	0.00655
SP2022053	5/19/2022	11-19	M	2	8:06	30	41.1995	-72.9573	13	26.8	11.6	26.9	3.2	1.61571	0.00816
SP2022054	5/19/2022	11-18	M	1	9:39	30	41.1893	-73.0165	12.1	26.4	11.9	26.8	3.5	1.75703	0.00887
SP2022055	5/19/2022	03-21	M	4	12:15	30	41.064	-72.8774	12.3	26.7	9.8	27.1	3.5	1.76261	0.0089
SP2022056	5/19/2022	03-20	M	4	14:02	30	41.0482	-72.9741	12.3	26.4	9.7	27.2	2.8	1.40322	0.00709
SP2022057	5/20/2022	05-17	T	3	8:16	30	41.1043	-73.0302	12.4	26.6	10	26.9	2.8	1.40775	0.00711
SP2022058	5/20/2022	59-18	M	3	9:58	30	40.9978	-72.996	13.1	26.1	10.5	26.8	3.1	1.55347	0.00784
SP2022059	5/20/2022	02-17	M	4	11:54	21	41.036	-73.0711	12.9	26.3	9.8	27.1	2.2	0.77068	0.00389
SP2022060	5/23/2022	07-15	T	1	8:14	30	41.0965	-73.1328	13.1	26.3	12.2	26.6	2.5	1.22859	0.0062
SP2022061	5/23/2022	04-13	M	3	9:59	30	41.0717	-73.2133	14.1	25.6	10.5	26.7	2.9	1.433	0.00724
SP2022062	5/23/2022	02-10	T	2	11:27	30	41.0476	-73.3386	13	26.2	11.5	26.4	2.8	1.37935	0.00697
SP2022063	5/23/2022	57-09	S	2	13:39	30	40.9498	-73.4083	16	25.6	14	25.8	2.9	1.44591	0.0073
SP2022064	5/24/2022	59-12	M	3	9:53	30	40.9957	-73.2488	14.8	26	10.5	26.8	2.9	1.449	0.00732
SP2022065	5/24/2022	57-12	T	2	11:40	30	40.9572	-73.251	14.4	26	11.4	26.3	3.1	1.55951	0.00788
SP2022066	5/24/2022	58-12	M	3	13:31	30	40.9861	-73.2458	14.4	26	10.8	26.6	3.2	1.57711	0.00796
SP2022067	5/25/2022	11-20	T	2	7:44	30	41.1852	-72.9753	13.8	27	12.4	26.9	3.1	1.53468	0.00775
SP2022068	5/25/2022	02-24	M	4	10:23	30	41.0411	-72.795	14.7	26.3	11.4	27.2	3.3	1.6453	0.00831
SP2022069	5/25/2022	01-25	T	4	12:16	30	41.02	-72.7003	15	26.4	10.4	27.1	2.8	1.41084	0.00712
SP2022070	5/25/2022	13-28	T	2	14:33	30	41.2281	-72.632	14.6	27.3	13.3	27.4	3	1.49238	0.00754
SP2022071	5/26/2022	14-28	T	1	8:16	30	41.2485	-72.5779	13	27.6	12.8	27.8	3.6	1.80531	0.00912
SP2022072	5/26/2022	09-24	T	3	10:06	30	41.1368	-72.7654	15.2	26.9	11.9	27.4	3.1	1.54003	0.00778
SP2022073	5/26/2022	11-23	M	2	12:10	30	41.1815	-72.8453	15.1	27	12.1	27.1	3.6	1.78872	0.00903

Table 5.7. Station information for LISTS June 2022.

Standard LISTS tows in the spring begin with SP and fall begins with FA. This cruise was cut short due to mechanical issues with the R/V John Dempsey. Latitude (N) and Longitude (W) are displayed in decimal degrees. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc,ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Avg Speed (knots)	Distance (nm)	Area Swept (sq.nm)
SP2022074	6/8/2022	07-31	S	4	10:56	30	41.1352	-72.4691	17.7	26.7	14.2	29.6	2.3	1.12586	0.00569
SP2022075	6/8/2022	03-27	T	3	12:43	30	41.063	-72.629	18.3	26.9	14.1	28.4	3	1.50732	0.00761
SP2022076	6/10/2022	15-34	T	1	7:03	30	41.2588	-72.3575	16.4	27.9	15.9	29.6	3.2	1.57879	0.00797
SP2022077	6/10/2022	17-38	T	2	8:57	30	41.2855	-72.1555	16	29.8	15.3	30.3	2.2	1.10548	0.00558
SP2022078	6/10/2022	15-33	S	1	11:27	30	41.2567	-72.3413	16.4	28.2	15.9	28.7	1.8	0.87503	0.00442
SP2022079	6/13/2022	14-33	S	2	7:16	25	41.2466	-72.3498	16	29.4	16	29.4	3.9	1.6334	0.00825
SP2022080	6/13/2022	08-30	S	4	9:01	25	41.1485	-72.4756	16.5	28.8	16	29.1	4.1	1.71022	0.00864
SP2022081	6/13/2022	03-26	T	3	10:48	30	41.067	-72.6631	19.1	26.4	15.4	28.1	2.8	1.4102	0.00712
SP2022082	6/13/2022	58-25	S	1	12:46	30	40.985	-72.7291	19	26.4	16	27.1	2.9	1.44004	0.00727
SP2022083	6/13/2022	06-28	S	3	14:46	30	41.1035	-72.6241	19.4	26.4	15.6	28.3	3.8	1.91174	0.00965
SP2022084	6/14/2022	06-27	S	3	8:17	30	41.1125	-72.5965	18.3	26.5	16.5	28.5	3.9	1.96421	0.00992
SP2022085	6/14/2022	00-28	T	2	10:18	30	41.0183	-72.59	18.9	26.7	17	27.7	3.6	1.79701	0.00907
SP2022086	6/14/2022	01-25	T	4	12:02	30	41.01	-72.7501	19.6	26.4	13.3	28.1	3.1	1.55901	0.00787
SP2022087	6/14/2022	05-26	T	3	13:46	30	41.0873	-72.6948	18.9	26.6	15.1	27.6	3.6	1.80371	0.00911

Table 5.8. Station information for LISTS September 2022.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc,ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Avg Speed (knots)	Distance (nm)	Area Swept (sq.nm)
FA2022001	9/8/2022	08-31	S	4	8:38	30	41.141	-72.4506	22.6	30.7	22.7	30.6	3.6	1.825	0.00922
FA2022002	9/8/2022	07-31	S	4	10:34	30	41.1235	-72.5192	22.8	30.4	22.7	30.4	2.6	1.30682	0.0066
FA2022003	9/8/2022	01-28	T	2	12:43	30	41.0303	-72.5801	23.3	29.8	23.1	29.9	2.4	1.19436	0.00603
FA2022004	9/8/2022	13-33	S	1	15:39	30	41.2358	-72.3447	22.4	29.9	22.3	30	2.6	1.311	0.00662
FA2022005	9/12/2022	03-28	T	3	9:02	30	41.0602	-72.5825	23.1	29.8	23.1	30.1	3.7	1.86003	0.00939
FA2022006	9/12/2022	06-28	S	3	11:21	30	41.1158	-72.5713	23	30.1	23	30.1	3.5	1.74677	0.00882
FA2022007	9/12/2022	07-27	S	3	12:58	30	41.1278	-72.6194	23.3	30	23.1	30	2.9	1.43079	0.00723
FA2022008	9/12/2022	09-27	T	4	14:52	30	41.1548	-72.6711	23.5	29.8	23.2	30	3.6	1.78636	0.00902
FA2022009	9/14/2022	14-28	T	1	8:09	30	41.2473	-72.5776	23.2	29.4	23.2	29.5	2.9	1.4438	0.00729
FA2022010	9/14/2022	12-25	T	2	10:09	30	41.2078	-72.7151	.	.	.	.	3.4	1.68006	0.00848
FA2022011	9/14/2022	11-25	T	3	11:58	30	41.1927	-72.7327	23.4	29.5	23.2	29.8	2.7	1.36483	0.00689
FA2022012	9/14/2022	14-27	T	1	13:27	30	41.2361	-72.6583	23.3	29.6	23.2	29.6	2.8	1.41682	0.00715
FA2022013	9/14/2022	14-33	S	2	15:32	30	41.2407	-72.396	22.6	29.4	22.2	30.6	3.3	1.64035	0.00828
FA2022014	9/15/2022	09-24	T	3	9:38	30	41.1815	-72.7828	23.2	29.4	23.4	29.6	2.9	1.45602	0.00735
FA2022015	9/15/2022	06-25	T	4	11:24	30	41.1002	-72.7551	23.2	29.5	23.3	29.7	2.1	1.06024	0.00535
FA2022016	9/15/2022	05-23	M	4	13:12	30	41.0887	-72.8003	23.3	29.5	23.3	29.6	3.2	1.60699	0.00811
FA2022017	9/15/2022	07-25	T	4	14:49	30	41.1166	-72.7468	23.3	29.7	23.2	29.7	2.5	1.23178	0.00622
FA2022018	9/16/2022	01-24	M	4	10:00	30	41.0268	-72.759	22.9	29.2	23	29.5	2.8	1.42125	0.00718
FA2022019	9/16/2022	58-24	S	1	12:34	30	40.9827	-72.7966	.	.	.	.	2.8	1.39195	0.00703
FA2022020	9/16/2022	02-20	M	4	8:43	30	41.0475	-72.9106	22.8	29.3	22.9	29.7	2.5	1.24078	0.00627
FA2022021	9/19/2022	59-18	M	3	10:15	30	40.9978	-72.9957	22.9	29.2	22.8	29.5	2.4	1.20974	0.00611
FA2022022	9/19/2022	04-18	M	4	12:05	30	41.0761	-72.989	23	29.3	22.8	29.5	2.8	1.40652	0.0071
FA2022023	9/19/2022	05-15	M	2	14:06	30	41.0937	-73.1292	23.2	29	22.7	29.1	3	1.49251	0.00754
FA2022024	9/20/2022	02-12	M	3	8:46	30	41.0443	-73.24	22.8	29	22.8	29.5	2.6	1.31203	0.00663
FA2022025	9/20/2022	01-10	T	3	10:51	30	41.0305	-73.3213	22.8	29	22.8	29.3	2.4	1.22105	0.00617
FA2022026	9/20/2022	57-09	S	2	13:06	30	40.9511	-73.4088	23.3	28.6	23	28.6	2.8	1.42	0.00717
FA2022027	9/21/2022	01-14	M	4	8:56	30	41.0185	-73.172	22.7	29.2	22.8	29.5	2.9	1.42791	0.00721
FA2022028	9/21/2022	59-11	M	3	10:48	30	40.9997	-73.2765	23	29	22.8	29.4	2.6	1.29168	0.00652
FA2022029	9/21/2022	06-11	M	1	12:43	30	41.1002	-73.3195	22.9	29	22.7	29.1	3.4	1.69418	0.00856
FA2022030	9/21/2022	05-13	M	2	14:19	30	41.0901	-73.254	23.3	29	22.7	29.2	3.1	1.56718	0.00791
FA2022031	9/22/2022	09-17	T	2	7:42	30	41.1562	-73.0713	22.6	28.7	22.6	29.1	3	1.50502	0.0076
FA2022032	9/22/2022	13-20	M	1	9:23	30	41.2281	-72.9723	22.5	29	22.6	29	2.9	1.45761	0.00736
FA2022033	9/22/2022	11-20	T	2	11:07	30	41.1865	-72.975	22.7	29.3	22.6	29.3	3.4	1.69583	0.00856
FA2022034	9/22/2022	12-21	T	2	13:00	30	41.2197	-72.8694	22.6	29.1	22.7	29.1	2.1	1.04691	0.00529
FA2022035	9/26/2022	09-21	M	2	8:18	30	41.1633	-72.9283	21	29.3	21	29.2	2.6	1.30174	0.00657
FA2022036	9/26/2022	08-25	T	4	10:48	30	41.1365	-72.7625	21.3	29.6	21.4	29.9	2.4	1.19744	0.00605
FA2022037	9/27/2022	08-21	M	3	8:05	30	41.1553	-72.9257	21.2	29.2	21.4	29.3	2.9	1.46243	0.00738
FA2022038	9/27/2022	00-24	M	3	10:08	30	40.9993	-72.795	20.9	29.3	20.9	29.3	2.3	1.13437	0.00573
FA2022039	9/27/2022	03-25	T	3	11:41	30	41.0545	-72.7574	21.3	29.8	21.3	29.8	2.7	1.32954	0.00671
FA2022040	9/27/2022	18-37	T	1	15:21	30	41.287	-72.1998	20.5	31.3	20.5	31.4	3.1	1.53538	0.00775

Table 5.9. Station information for LISTS October 2022.

Standard LISTS tows in the spring begin with SP and fall begins with FA. Latitude (N) and Longitude (W) are displayed in decimal degrees. Area swept is estimated by assuming the effective sweep is 2/3rds of the footrope length.

Sample Number	Date	Site Number	Bottom Type	Depth Interval	Time Start	Duration (min)	Latitude	Longitude	S_Temp (sfc, C)	S_Salinity (sfc,ppt)	B_Temp (btm, C)	B_Salinity (btm, ppt)	Avg Speed (knots)	Distance (nm)	Area Swept (sq.nm)
FA2022041	10/14/2022	18-37	T	1	9:57	30	41.2855	-72.2013	17.9	31.7	17.9	31.7	2.6	1.31723	0.00665
FA2022042	10/14/2022	17-40	T	2	11:48	30	41.2906	-72.0771	17.7	31.9	17.5	31.9	3.2	1.57576	0.00796
FA2022043	10/14/2022	17-37	T	1	13:26	30	41.2865	-72.1928	18.6	31.7	18.2	31.8	2.8	1.4245	0.00719
FA2022044	10/17/2022	12-35	T	4	7:24	30	41.2148	-72.2653	17.4	30.2	17.6	31.9	1.9	0.92728	0.00468
FA2022045	10/17/2022	09-31	S	4	10:51	30	.	.	17.8	30.5	17.8	31	2.6	1.32133	0.00667
FA2022046	10/17/2022	00-27	T	2	13:14	30	41.0175	-72.5952	18.1	29.9	18.1	30	3	1.51843	0.00767
FA2022047	10/17/2022	58-24	S	1	15:10	30	40.9753	-72.7505	17.8	29.7	18	29.8	3.1	1.54622	0.00781
FA2022048	10/18/2022	07-31	S	4	8:12	30	41.1353	-72.4693	17.8	30.6	17.7	31.1	2.1	1.03842	0.00524
FA2022049	10/18/2022	03-28	T	3	10:04	30	41.0613	-72.5835	18	30	18.1	30.3	2.2	1.09022	0.00551
FA2022050	10/18/2022	05-27	T	3	11:29	30	41.0887	-72.6633	18	29.8	18	29.9	3.2	1.58791	0.00802
FA2022051	10/18/2022	05-28	S	3	13:21	30	41.0872	-72.6025	18	30	18.1	30.1	2.5	1.26141	0.00637
FA2022052	10/18/2022	07-29	S	3	14:31	30	41.1122	-72.5818	18.1	30.2	18.1	30.2	2.2	1.1086	0.0056
FA2022053	10/19/2022	14-25	M	1	9:07	30	41.2372	-72.7285	17	29.5	17.1	29.7	2.7	1.35513	0.00684
FA2022054	10/19/2022	11-25	T	3	10:49	30	41.1605	-72.7227	17.8	30	17.9	30.2	2.6	1.31637	0.00665
FA2022055	10/19/2022	09-26	T	4	12:30	30	41.1512	-72.699	17.9	30.1	17.9	30.1	3.1	1.55737	0.00786
FA2022056	10/19/2022	10-27	T	4	14:08	30	41.1707	-72.6948	17.7	30	17.8	30.1	2.8	1.38733	0.00701
FA2022057	10/21/2022	14-34	S	1	8:21	30	41.2451	-72.3381	16.9	31.3	17	31.4	2.7	1.33131	0.00672
FA2022058	10/21/2022	14-29	T	2	10:30	30	41.2367	-72.5715	16.4	30.1	16.4	30.3	2.6	1.27777	0.00645
FA2022059	10/21/2022	03-21	M	4	13:28	30	41.064	-72.8783	17.2	29.7	17.5	30	2.6	1.30763	0.0066
FA2022060	10/24/2022	13-19	M	1	7:40	30	41.2035	-73.0071	15.4	29.4	15.4	29.4	2.4	1.19415	0.00603
FA2022061	10/24/2022	04-20	M	4	9:38	30	41.0851	-72.9223	17	29.8	17.1	29.9	3.1	1.53208	0.00774
FA2022062	10/24/2022	03-15	M	3	11:37	30	41.0628	-73.114	16.8	29.7	16.9	29.8	2.8	1.38355	0.00699
FA2022063	10/24/2022	01-14	M	4	13:22	30	41.0077	-73.2298	17.1	29.8	17.1	29.8	2.8	1.38047	0.00697
FA2022064	10/24/2022	06-17	T	2	15:12	30	41.0987	-73.1016	16.1	29.3	16.3	29.5	3	1.52434	0.0077
FA2022065	10/25/2022	07-17	M	2	7:54	30	41.1292	-73.0505	16.2	29.6	16.2	29.6	4	1.97957	0.01
FA2022066	10/25/2022	59-12	M	3	10:04	30	40.9981	-73.2438	17	29.6	16.9	29.7	3.3	1.63614	0.00826
FA2022067	10/25/2022	55-13	S	2	12:07	30	40.9267	-73.2518	16.6	29.2	16.4	29.4	3	1.52366	0.00769
FA2022068	10/25/2022	57-09	S	2	14:04	30	40.9482	-73.408	16.7	29.4	16.6	29.4	2.9	1.45668	0.00736
FA2022069	10/26/2022	00-14	M	4	8:46	30	41.0165	-73.1786	17.2	29.7	17.1	29.8	3.3	1.66599	0.00841
FA2022070	10/26/2022	58-13	M	3	10:44	30	40.9807	-73.2163	17.1	29.6	17	29.7	3.1	1.56988	0.00793
FA2022071	10/26/2022	01-10	T	3	12:51	30	41.0215	-73.3646	17.3	29.7	17	29.7	2.8	1.41089	0.00712
FA2022072	10/26/2022	01-11	M	3	14:44	30	41.034	-73.3156	17.4	29.7	16.9	29.7	3.4	1.71226	0.00865
FA2022073	10/27/2022	05-13	M	2	9:06	30	41.0963	-73.2118	16.2	29	16.8	29.6	3.3	1.67448	0.00846
FA2022074	10/27/2022	05-11	M	2	10:54	30	41.0941	-73.2966	16.4	29.3	16.7	29.5	2.2	1.0932	0.00552
FA2022075	10/27/2022	01-15	M	4	12:48	30	41.02	-73.1761	17.1	29.8	17.1	29.8	2.3	1.17022	0.00591
FA2022076	10/27/2022	08-21	M	3	15:29	30	41.1052	-72.9158	17.1	29.9	17.1	29.9	2.4	1.21484	0.00613
FA2022077	10/28/2022	09-24	T	3	9:09	30	41.1773	-72.7853	16.4	29.8	16.5	29.8	2.5	1.25307	0.00633
FA2022078	10/28/2022	12-25	T	2	10:49	30	41.192	-72.7753	16.4	29.7	16.4	29.5	2	0.98172	0.00496
FA2022079	10/28/2022	10-26	T	4	12:06	30	41.1643	-72.7131	16.4	30	16.4	30	2	1.00639	0.00508
FA2022080	10/28/2022	14-27	T	1	13:31	30	41.2357	-72.6595	15.9	29.7	16	29.7	3.5	1.75458	0.00886

Table 5.10. Samples with non-standard tow durations and reasons for incomplete tows, spring and fall 2022.
Standard LISTS tows begin with SP (spring) or FA (fall).

Sample	Date	Site	Bottom Type	Depth Interval	Time	Duration	Reason	Comments
April								
SP2022024	4/26/2022	56-12	T	2	13:43	12	Speed drop	Hard hang on the starboard side. Kept the tow given time constraints and weather for the rest of the month
May								
SP2022038	5/13/2022	08-31	S	4	7:47	20	Strata	Ran out of room in strata
SP2022051	5/18/2022	56-12	T	2	12:43	16	Speed drop	Hung hard
SP2022059	5/20/2022	02-17	M	4	11:54	21	Speed drop	Hung on the door, bridle popped off but no damage to the net
June								
SP2022079	6/13/2022	14-33	S	2	7:16	25	Strata	Ran out of room in strata
SP2022080	6/13/2022	08-30	S	4	9:01	25	Strata	Ran out of room in strata
SEPT								All tows this month were standard duration (30 minutes).
OCT								All tows this month were standard duration (30 minutes).

Table 5.11. List of finfish species observed in 2022.

Fifty-five finfish species were observed in 2022. Since 1984, one hundred-thirteen species of finfish have been identified in LISTS (see Appendix 5.1 for the full list of species).

Common Name	Scientific Name	Common Name	Scientific Name
anchovy, bay	*Anchoa mitchilli*	mackerel, Spanish	*Scomberomorus maculatus*
anchovy, striped	*Anchoa hepsetus*	menhaden, Atlantic	*Brevoortia tyrannus*
bigeye	*Priacanthus arenatus*	moonfish	*Selene setapinnis*
black sea bass	*Centropristis striata*	pipefish, northern	*Syngnathus fuscus*
blue runner	*Caranx crysos*	puffer, northern	*Sphoeroides maculatus*
bluefish	*Pomatomus saltatrix*	**ray, cownose**	***Rhinoptera bonasus***
butterfish	*Peprilus triacanthus*	rockling, fourbeard	*Enchelyopus cimbrius*
cod, Atlantic	*Gadus morhua*	sand lance, American	*Ammodytes americanus*
cunner	*Tautogolabrus adspersus*	scad, bigeye	*Selar crumenophthalmus*
dogfish, smooth	*Mustelus canis*	scad, rough	*Trachurus lathami*
eel, American	*Anguilla rostrata*	sculpin, longhorn	*Myoxocephalus octodecemspin*
eel, conger	*Conger oceanicus*	scup	*Stenotomus chrysops*
filefish, planehead	*Monacanthus hispidus*	sea raven	*Hemitripterus americanus*
flounder, fourspot	*Paralichthys oblongus*	searobin, northern	*Prionotus carolinus*
flounder, smallmouth	*Etropus microstomus*	searobin, striped	*Prionotus evolans*
flounder, summer	*Paralichthys dentatus*	seasnail	*Liparis atlanticus*
flounder, windowpane	*Scophthalmus aquosus*	shad, American	*Alosa sapidissima*
flounder, winter	*Pseudopleuronectes american*	shad, hickory	*Alosa mediocris*
goosefish	*Lophius americanus*	skate, clearnose	*Raja eglanteria*
hake, red	*Urophycis chuss*	skate, little	*Leucoraja erinacea*
hake, silver	*Merluccius bilinearis*	skate, winter	*Leucoraja ocellata*
hake, spotted	*Urophycis regia*	spot	*Leiostomus xanthurus*
herring, alewife	*Alosa pseudoharengus*	striped bass	*Morone saxatilis*
herring, Atlantic	*Clupea harengus*	sturgeon, Atlantic	*Acipenser oxyrinchus*
herring, blueback	*Alosa aestivalis*	tautog	*Tautoga onitis*
hogchoker	*Trinectes maculatus*	toadfish, oyster	*Opsanus tau*
kingfish, northern	*Menticirrhus saxatilis*	weakfish	*Cynoscion regalis*
mackerel, Atlantic	*Scomber scombrus*		

Names taken from: Common and scientific names of fishes from the United States, Canada and Mexico, Sixth Edition (Nelson et al. 2004).

Table 5.12. List of invertebrates observed in 2022.

In 2022, Thirty nine 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.*	polychaetes	*Class polychfeta*
arks	*Noetia-Anadara spp.*	sea grape	*Molgula spp.*
bryozoan, bushy	*Phylum Bryozoa*	sea urchin, purple	*Arbacia punctulata*
clam, hard clams	*Artica-Mercinaria-Pitar sp.*	**shrimp, cleaner/peppermint**	***Lysmata spp.***
clam, surf	*Spisula solidissima*	shrimp, coastal mud	*Upogebia affinis*
coral, star	*Astrangia poculata*	shrimp, mantis	*Squilla empusa*
crab, blue	*Callinectes sapidus*	shrimp, northern red	*Pandalus montagui*
crab, flat claw hermit	*Pagurus pollicaris*	shrimp, sand	*Crangon septemspinosa*
crab, green	*Carcinus maenas*	slipper shell, common	*Crepidula fornicata*
crab, horseshoe	*Limulus polyphemus*	sponge spp.	*sponge spp.*
crab, lady	*Ovalipes ocellatus*	sponge, boring	*Cliona celate*
crab, mud	*Family Xanthidae*	sponge, deadman's fingers	*Haliclona spp.*
crab, rock	*Cancer irroratus*	sponge, red bearded	*Microciona prolifera*
crab, spider	*Libinia emarginata*	squid, longfin inshore	*Doryteuthis pealeii*
hydroid spp.	*hydroid spp.*	starfish spp.	*Asteriid spp.*
jellyfish, lion's mane	*Cyanea capillata*	Tubularia hydroids	*Tubularia, spp.*
lobster, American	*Homarus americanus*	whelk, channeled	*Busycotypus canaliculatus*
mussel, blue	*Mytilus edulis*	whelk, knobbed	*Busycon carica*
northern moon snail	*Lunatia heros*	worms, fan	*Myxicola infundibulum*
oyster, common	*Crassostrea virginica*		

Table 5.13. Total number and weight (kg) of finfish and invertebrates caught in 2022.

Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year anchovies and Gadids are neither separated by species nor quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size) = 167.

species	count	%	weight	%
scup	85,562	52.2	10,840.3	56.0
butterfish	48,429	29.5	1,272.9	6.6
weakfish	15,050	9.2	725.4	3.8
northern searobin	2,021	1.2	366.1	1.9
striped searobin	1,653	1.0	616.6	3.2
black sea bass	1,351	0.8	578.8	3.0
smooth dogfish	1,331	0.8	2,054.1	10.6
red hake	1,287	0.8	78.2	0.4
bluefish	881	0.5	178.1	0.9
Atlantic menhaden	881	0.5	223.3	1.2
silver hake	745	0.5	23.3	0.1
windowpane flounder	561	0.3	95.7	0.5
summer flounder	501	0.3	305.2	1.6
bay anchovy	443	0.3	2.1	0.0
hogchoker	410	0.3	52.3	0.3
alewife	388	0.2	22.1	0.1
winter flounder	313	0.2	71.5	0.4
tautog	302	0.2	302.0	1.6
moonfish	235	0.1	3.7	0.0
striped bass	211	0.1	583.1	3.0
American shad	206	0.1	19.3	0.1
northern kingfish	190	0.1	13.4	0.1
smallmouth flounder	150	0.1	2.9	0.0
clearnose skate	122	0.1	191.2	1.0
spotted hake	110	0.1	4.5	0.0
spot	105	0.1	16.6	0.1
northern puffer	85	0.1	2.0	0.0
striped anchovy	62	0.0	1.1	0.0
fourspot flounder	59	0.0	14.2	0.1
little skate	56	0.0	29.4	0.2
Atlantic herring	47	0.0	3.1	0.0
Atlantic sturgeon	47	0.0	608.7	3.1
blueback herring	39	0.0	1.0	0.0
bigeye scad	28	0.0	1.3	0.0
Atlantic mackerel	20	0.0	1.7	0.0
Atlantic cod	15	0.0	18.7	0.1
blue runner	12	0.0	0.9	0.0
hickory shad	7	0.0	2.5	0.0
winter skate	7	0.0	5.8	0.0
rough scad	5	0.0	0.3	0.0
fourbeard rockling	4	0.0	0.3	0.0
goosefish	3	0.0	1.7	0.0
northern pipefish	2	0.0	0.1	0.0
longhorn sculpin	2	0.0	0.6	0.0
Spanish mackerel	2	0.0	0.1	0.0
seasnail	2	0.0	0.1	0.0
bigeye	1	0.0	0.1	0.0
cownose ray	1	0.0	2.6	0.0
conger eel	1	0.0	0.3	0.0
cunner	1	0.0	0.1	0.0
American eel	1	0.0	0.9	0.0
planehead filefish	1	0.0	0.1	0.0
American sand lance	1	0.0	0.1	0.0
sea raven	1	0.0	0.3	0.0
oyster toadfish	1	0.0	0.4	0.0

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
horseshoe crab	402	2.3	714.8	39.9
longfin inshore squid	15,385	86.7	701.1	39.1
bushy bryozoan	nc		139.4	7.8
boring sponge	nc		70.3	3.9
lion's mane jellyfish	1,134	6.4	37.9	2.1
common slipper shell	nc		33.8	1.9
spider crab	nc		31.8	1.8
mantis shrimp	714	4.0	24.3	1.4
channeled whelk	44	0.2	8.2	0.5
knobbed whelk	22	0.1	5.5	0.3
lady crab	nc		3.5	0.2
flat claw hermit crab	nc		3.5	0.2
arks	nc		2.5	0.1
blue crab	14	0.1	2.1	0.1
hard clams	18	0.1	1.4	0.1
American lobster	4	0.0	1.4	0.1
sand shrimp	nc		1.3	0.1
deadman's fingers sponge	nc		1.2	0.1
star coral	nc		1.0	0.1
fan worm tubes	nc		1.0	0.1
rock crab	nc		1.0	0.1
mud crabs	nc		0.9	0.1
Tubularia, spp.	nc		0.8	0.0
common oyster	nc		0.4	0.0
northern moon snail	nc		0.3	0.0
hydroid spp.	nc		0.3	0.0
purple sea urchin	7	0.0	0.3	0.0
surf clam	5	0.0	0.2	0.0
red bearded sponge	nc		0.2	0.0
polychaetes	nc		0.2	0.0
blue mussel	nc		0.1	0.0
cleaner/peppermint shrimp	2	0.0	0.1	0.0
sea grape	nc		0.1	0.0
starfish spp.	nc		0.1	0.0
anemones	nc		0.1	0.0
coastal mud shrimp	1	0.0	0.1	0.0
green crab	1	0.0	0.1	0.0
northern red shrimp	1	0.0	0.1	0.0
mixed sponge species	nc		0.1	0.0
Total	**17,754**		**1,791.0**	

Note: nc= not counted

Table 5.14. Total counts and weight (kg) of finfish taken in the spring and fall sampling periods, 2022.
Species are listed in order of descending count. Young-of-year bay anchovy, striped anchovy, Atlantic herring, American sand lance and Gadids are not included. Number of tows (sample sizes): Spring = 87 and Fall = 80.

	Spring			
species	**count**	**%**	**weight**	**%**
scup	32,458	74.3	7,492.9	69.4
butterfish	3,896	8.9	342.1	3.2
northern searobin	1,462	3.3	283.9	2.6
red hake	1,142	2.6	63.0	0.6
black sea bass	848	1.9	473.3	4.4
striped searobin	785	1.8	315.6	2.9
silver hake	658	1.5	15.0	0.1
alewife	292	0.7	18.7	0.2
winter flounder	287	0.7	65.6	0.6
tautog	250	0.6	274.7	2.5
windowpane flounder	235	0.5	43.2	0.4
smooth dogfish	215	0.5	525.9	4.9
summer flounder	210	0.5	123.6	1.1
striped bass	192	0.4	471.4	4.4
Atlantic menhaden	164	0.4	51.4	0.5
spotted hake	105	0.2	3.6	0.0
American shad	103	0.2	11.7	0.1
hogchoker	95	0.2	13.3	0.1
Atlantic herring	46	0.1	3.1	0.0
little skate	45	0.1	23.2	0.2
smallmouth flounder	40	0.1	1.0	0.0
fourspot flounder	39	0.1	10.6	0.1
weakfish	28	0.1	12.6	0.1
bay anchovy	26	0.1	0.5	0.0
clearnose skate	21	0.0	35.8	0.3
Atlantic cod	15	0.0	18.7	0.2
blueback herring	7	0.0	0.4	0.0
hickory shad	6	0.0	1.9	0.0
winter skate	5	0.0	3.4	0.0
Atlantic sturgeon	3	0.0	81.7	0.8
bluefish	3	0.0	7.0	0.1
goosefish	3	0.0	1.7	0.0
fourbeard rockling	2	0.0	0.2	0.0
longhorn sculpin	2	0.0	0.6	0.0
seasnail	2	0.0	0.1	0.0
cunner	1	0.0	0.1	0.0
northern pipefish	1	0.0	0.1	0.0
American sand lance	1	0.0	0.1	0.0
sea raven	1	0.0	0.3	0.0
striped anchovy	1	0.0	0.1	0.0
Total	**43,695**		**10,791.6**	

	Fall			
species	**count**	**%**	**weight**	**%**
scup	53,104	44.2	3,347.4	39.2
butterfish	44,532	37.0	930.8	10.9
weakfish	15,022	12.5	712.9	8.3
smooth dogfish	1,116	0.9	1,528.2	17.9
bluefish	878	0.7	171.1	2.0
striped searobin	868	0.7	301.0	3.5
Atlantic menhaden	717	0.6	171.9	2.0
northern searobin	559	0.5	82.2	1.0
black sea bass	503	0.4	105.5	1.2
bay anchovy	417	0.3	1.7	0.0
windowpane flounder	326	0.3	52.5	0.6
hogchoker	315	0.3	39.0	0.5
summer flounder	291	0.2	181.6	2.1
moonfish	235	0.2	3.7	0.0
northern kingfish	190	0.2	13.4	0.2
red hake	145	0.1	15.2	0.2
smallmouth flounder	110	0.1	2.0	0.0
spot	105	0.1	16.6	0.2
American shad	103	0.1	7.6	0.1
clearnose skate	101	0.1	155.4	1.8
alewife	96	0.1	3.5	0.0
silver hake	87	0.1	8.3	0.1
northern puffer	85	0.1	2.0	0.0
striped anchovy	61	0.1	1.0	0.0
tautog	52	0.0	27.3	0.3
Atlantic sturgeon	44	0.0	526.9	6.2
blueback herring	32	0.0	0.6	0.0
bigeye scad	28	0.0	1.3	0.0
winter flounder	26	0.0	5.9	0.1
fourspot flounder	20	0.0	3.6	0.0
Atlantic mackerel	20	0.0	1.7	0.0
striped bass	19	0.0	111.7	1.3
blue runner	12	0.0	0.9	0.0
little skate	11	0.0	6.2	0.1
rough scad	5	0.0	0.3	0.0
spotted hake	5	0.0	0.9	0.0
fourbeard rockling	2	0.0	0.1	0.0
Spanish mackerel	2	0.0	0.1	0.0
winter skate	2	0.0	2.4	0.0
Atlantic herring	1	0.0	0.1	0.0
bigeye	1	0.0	0.1	0.0
cownose ray	1	0.0	2.6	0.0
conger eel	1	0.0	0.3	0.0
American eel	1	0.0	0.9	0.0
planehead filefish	1	0.0	0.1	0.0
hickory shad	1	0.0	0.6	0.0
northern pipefish	1	0.0	0.1	0.0
oyster toadfish	1	0.0	0.4	0.0
Total	**120,255**		**8,548.9**	

Table 5.15. Total catch of invertebrates taken in the spring and fall sampling periods, 2022.
Species are ranked by total weight (kg). Number of tows (sample sizes): Spring = 87 and Fall = 80.

	Spring			
species	**count**	**%**	**weight**	**%**
horseshoe crab	127	6.7	207.96	42.2
bushy bryozoan	nc		123.89	25.1
longfin inshore squid	507	27	43.56	8.8
lion's mane jellyfish	1,133	60	37.86	7.7
spider crab	nc		29.91	6.1
boring sponge	nc		22.74	4.6
common slipper shell	nc		6.67	1.4
channeled whelk	23	1.2	4.61	0.9
lady crab	nc		2.89	0.6
mantis shrimp	82	4.3	2.82	0.6
knobbed whelk	9	0.5	1.99	0.4
sand shrimp	nc		1.25	0.3
flat claw hermit crab	nc		1.17	0.2
blue crab	8	0	1.09	0.2
rock crab	nc		0.84	0.2
Tubularia, spp.	nc		0.8	0.2
mud crabs	nc		0.55	0.1
deadman's fingers sponge	nc		0.49	0.1
hard clams	5	0.3	0.41	0.1
hydroid spp.	nc		0.26	0.1
arks	nc		0.25	0.1
star coral	nc		0.2	0
red bearded sponge	nc		0.17	0
northern moon snail	nc		0.15	0
American lobster	1	0.1	0.12	0
purple sea urchin	2	0.1	0.11	0
sea grape	nc		0.1	0
starfish spp.	nc		0.09	0
coastal mud shrimp	1	0.1	0.05	0
blue mussel	nc		0.05	0
northern red shrimp	1	0.1	0.05	0
mixed sponge species	nc		0.05	0
Total	**1,899**		**493.2**	

	Fall			
species	**count**	**%**	**weight**	**%**
longfin inshore squid	14,878	93.8	657.5	50.7
horseshoe crab	275	1.7	506.9	39.1
boring sponge	nc		47.6	3.7
common slipper shell	nc		27.1	2.1
mantis shrimp	632	4.0	21.5	1.7
bushy bryozoan	nc		15.6	1.2
channeled whelk	21	0.1	3.6	0.3
knobbed whelk	13	0.1	3.5	0.3
flat claw hermit crab	nc		2.3	0.2
arks	nc		2.3	0.2
spider crab	nc		1.9	0.1
American lobster	3	0.0	1.2	0.1
fan worm tubes	nc		1.0	0.1
hard clams	13	0.1	1.0	0.1
blue crab	6	0.0	1.0	0.1
star coral	nc		0.8	0.1
deadman's fingers sponge	nc		0.7	0.1
lady crab	nc		0.6	0.0
common oyster	nc		0.4	0.0
mud crabs	nc		0.4	0.0
surf clam	5	0.0	0.2	0.0
northern moon snail	nc		0.2	0.0
polychaetes	nc		0.2	0.0
rock crab	nc		0.2	0.0
purple sea urchin	5	0.0	0.2	0.0
cleaner/peppermint shrimp	2	0.0	0.1	0.0
blue mussel	nc		0.1	0.0
anemones	nc		0.1	0.0
green crab	1	0.0	0.1	0.0
lion's mane jellyfish	1	0.0	0.1	0.0
Total	**15,855**		**1,297.9**	

Note: nc= not counted

Table 5.16. Spring indices of abundance for selected species, 1984-2022.

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. There was no spring sampling in 2020.

	Spring																			
Species	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
lobster, American**	7.09	3.10	2.76	3.30	2.24	3.76	5.33	7.74	7.88	6.72	4.10	8.36	6.77	7.67	18.52	12.49	11.01	7.56	6.31	3.89
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
moonfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
ocean pout *	0.21	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
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
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
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
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
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
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
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
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
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
skate, clearnose	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.02	0.03	0.10	0.04
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
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
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
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
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
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
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
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

Table 5.16 Continued. Spring indices of abundance for selected species, 1984-2022.

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. There was no spring sampling in 2020.

	Spring																			84-21
Species	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Mean**
alewife *	1.86	1.30	0.78	1.62	1.32	1.04	1.29	0.94	0.77	1.06	0.88	0.77	1.71	0.07	1.20	1.57	-	0.17	0.93	1.02
black sea bass *	0.22	0.07	0.05	0.26	0.22	0.32	0.28	0.27	0.83	0.97	2.73	1.94	1.78	4.56	4.17	3.79	-	5.25	3.49	0.83
bluefish	0.11	0.11	0.22	0.16	0.08	0.24	0.01	0.17	0.07	0.11	0.03	0.02	0.05	0.05	0.04	0.01	-	0.05	0.03	
butterfish	2.10	2.27	18.67	3.48	4.64	9.44	1.99	15.64	13.44	3.38	2.87	3.26	14.13	11.14	5.99	1.91	-	10.46	3.41	
cunner *	0.07	0.08	0.06	0.05	0.10	0.05	0.08	0.08	0.06	0.06	0.00	0.06	0.02	0.03	0.03	0.00	-	0.03	0.01	0.16
dogfish, smooth	0.53	0.44	1.33	0.64	0.87	1.05	0.09	1.51	0.82	0.80	0.78	0.87	1.80	2.90	1.58	1.12	-	3.11	0.54	
dogfish, spiny *	0.03	0.03	0.09	0.12	0.07	0.43	0.03	0.19	0.06	0.08	0.06	0.09	0.04	0.03	0.03	0.02	-	0.00	0.00	0.07
flounder, fourspot *	2.56	1.14	1.86	3.37	2.94	1.71	1.52	4.09	5.45	2.26	1.90	0.87	1.82	1.90	2.09	1.89	-	1.19	0.23	4.11
flounder, summer	1.84	0.80	0.61	2.51	1.61	1.93	2.69	3.85	3.06	3.24	3.00	1.64	1.36	1.66	2.64	4.85	-	4.16	1.47	
flounder, windowpane *	5.96	2.29	2.98	15.65	10.11	7.08	11.40	9.39	9.85	5.96	5.02	3.26	3.41	4.33	4.17	4.68	-	3.13	1.12	25.76
flounder, winter *	16.45	17.47	7.50	20.58	22.34	18.98	20.88	16.68	12.02	6.35	4.10	3.93	3.40	0.76	2.41	1.50	-	1.44	1.57	43.51
hake, red *	1.37	1.06	1.30	3.85	3.37	1.48	3.27	0.60	3.35	1.35	0.70	0.26	1.05	0.66	1.05	2.58	-	1.49	2.52	3.42
hake, silver *	2.63	0.57	4.75	0.98	19.08	2.30	5.24	2.10	19.45	1.47	1.08	0.25	1.71	1.51	1.70	12.45	-	2.49	2.30	4.31
hake, spotted	0.65	0.37	1.47	1.04	3.15	0.65	1.89	1.84	1.60	2.15	1.03	0.43	4.92	5.12	2.66	6.10	-	3.89	0.53	
herring, Atlantic *	0.53	1.33	0.31	1.66	0.77	1.82	2.56	1.57	0.73	2.64	1.44	0.69	0.69	0.11	0.77	1.01	-	0.25	0.24	1.75
herring, blueback	0.46	0.33	0.13	0.29	0.21	0.43	0.37	0.14	0.13	0.26	0.15	0.42	0.28	0.00	0.28	0.28	-	0.04	0.04	
hogchoker	0.19	0.11	0.08	0.17	0.13	0.11	0.15	0.24	0.29	0.32	0.40	0.21	0.49	1.22	0.97	0.70	-	1.17	0.50	
kingfish, northern	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.01	0.00	0.01	0.05	0.01	0.00	0.03	-	0.06	0.00	
lobster, American**	2.50	2.43	1.94	3.22	2.72	1.40	1.30	0.79	0.97	0.44	0.45	0.31	0.33	0.08	0.09	0.10	-	0.04	0.01	4.21
menhaden, Atlantic	0.02	0.01	0.04	0.13	0.05	0.07	0.05	0.11	0.63	0.37	0.62	0.66	1.04	0.74	0.25	0.38	-	0.68	0.51	
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	
ocean pout *	0.06	0.02	0.04	0.05	0.04	0.08	0.04	0.10	0.05	0.00	0.00	0.01	0.00	0.00	0.00	0.00	-	0.00	0.00	0.07
rockling, fourbeard*	0.48	0.35	0.09	0.35	0.26	0.18	0.17	0.19	0.16	0.02	0.02	0.08	0.02	0.00	0.01	0.09	-	0.09	0.02	0.43
scad, rough	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	
sculpin, longhorn *	0.03	0.00	0.00	0.02	0.01	0.01	0.01	0.04	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01	-	0.01	0.01	0.08
scup	8.12	3.48	59.05	10.00	19.87	21.92	6.88	22.34	50.24	14.23	14.96	10.13	131.15	362.67	104.70	46.67	-	195.21	68.07	32.92
sea raven*	0.04	0.02	0.00	0.03	0.00	0.02	0.05	0.02	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.00	-	0.00	0.01	0.07
searobin, northern *	0.80	0.32	1.19	0.82	1.32	1.73	1.52	1.16	5.05	1.90	1.68	0.57	1.82	4.13	2.18	6.83	-	7.48	3.50	2.28
searobin, striped	1.40	0.31	0.89	0.95	1.07	2.14	0.77	2.96	5.01	2.80	2.50	1.92	5.91	14.42	5.75	6.33	-	11.05	2.74	
shad, American	0.34	0.28	0.25	0.44	0.57	0.57	0.53	0.49	0.46	0.43	0.41	0.48	0.85	0.03	0.32	0.54	-	0.12	0.49	
shad, hickory	0.10	0.25	0.27	0.12	0.02	0.03	0.02	0.01	0.07	0.03	0.11	0.04	0.08	0.02	0.02	0.04	-	0.02	0.04	
skate, clearnose	0.03	0.01	0.07	0.09	0.06	0.08	0.01	0.08	0.39	0.12	0.15	0.15	0.28	0.19	0.14	0.32	-	0.54	0.11	
skate, little *	6.54	1.65	1.40	2.82	1.56	1.03	1.02	1.15	2.15	1.11	1.08	0.61	0.43	0.55	0.52	0.84	-	0.22	0.14	6.75
skate, winter*	0.21	0.09	0.13	0.15	0.12	0.15	0.10	0.14	0.32	0.28	0.26	0.09	0.07	0.05	0.02	0.18	-	0.16	0.04	0.16
spot	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.01	0.00	-	0.00	0.00	
squid, long-finned**	9.43	4.76	11.55	2.14	3.45	6.57	3.20	4.10	3.34	1.47	4.09	3.93	5.97	6.80	4.57	1.46	-	8.81	2.04	4.80
striped bass *	0.56	1.17	0.61	1.02	0.57	0.60	0.40	0.48	0.43	0.67	0.41	0.20	0.48	0.34	0.57	0.91	-	0.38	0.92	0.51
sturgeon, Atlantic	0.00	0.02	0.05	0.02	0.01	0.01	0.01	0.02	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.01	-	0.07	0.02	
tautog *	0.54	0.57	0.64	0.48	0.50	0.40	0.25	0.38	0.44	0.43	0.51	0.47	0.59	0.43	0.62	0.59	-	0.72	0.78	0.67
weakfish	0.10	0.17	0.14	0.07	0.03	0.05	0.01	0.08	0.50	0.32	0.11	0.02	0.55	0.57	0.04	0.34	-	0.88	0.15	

Table 5.17. Fall indices of abundance for selected species, 1984-2022.

The geometric mean count per tow was calculated for 38 finfish and 2 invertebrates using September-October data. An asterisk next to the species name and a time series mean, indicates that the fall index provides a better estimate than the spring index (Simpson et al. 1991). Two asterisks indicate that both the spring and the fall indices provide good estimates. There was no fall sampling in 2010 and 2020.

	Fall																			
Species	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
ocean pout	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
rockling, fourbeard	0.08	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
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
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
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
sea raven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
searobin, northern	0.20	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
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
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
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
skate, clearnose *	0.00	0.00	0.02	0.02	0.00	0.00	0.02	0.02	0.05	0.04	0.01	0.02	0.01	0.03	0.12	0.10	0.10	0.34	0.18	0.33
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
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
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
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
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
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
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
weakfish *	1.55	6.35	13.56	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

Table 5.17 Continued. Fall indices of abundance for selected species, 1984-2022.

The geometric mean count per tow was calculated for 38 finfish and 2 invertebrates using September-October data. An asterisk next to the species name and a time series mean, indicates that the fall index provides a better estimate than the spring index (Simpson et al. 1991). Two asterisks indicate that both the spring and the fall indices provide good estimates. There was no fall sampling in 2010 and 2020.

	Fall																			84-21
Species	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**Mean**
alewife	0.26	0.43	0.05	0.95	0.42	0.18	-	0.43	0.07	0.40	0.18	0.64	0.11	0.15	0.19	0.34	-	0.41	0.10	
black sea bass	0.35	0.17	0.24	0.36	0.93	0.26	-	0.29	1.49	0.99	1.35	0.65	1.37	0.91	1.29	1.86	-	1.63	2.50	
bluefish *	29.13	18.89	15.66	30.66	14.28	18.11	-	11.10	15.06	9.71	18.61	8.42	11.25	8.05	4.00	11.19	-	7.24	4.61	20.25
butterfish *	175.37	197.24	140.23	154.53	181.71	409.75	-	39.62	132.47	60.24	132.54	96.23	172.44	116.05	101.39	111.46	-	97.42	104.45	160.38
cunner	0.04	0.05	0.02	0.01	0.05	0.05	-	0.01	0.03	0.01	0.02	0.01	0.00	0.00	0.00	0.00	-	0.02	0.00	
dogfish, smooth *	1.44	1.41	0.94	2.27	0.63	1.13	-	1.43	2.41	4.13	5.78	7.30	5.24	8.29	7.17	6.01	-	8.03	8.19	2.46
dogfish, spiny	0.18	0.22	0.00	0.00	0.11	0.08	-	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	-	0.00	0.00	
flounder, fourspot	1.14	1.11	0.65	0.73	1.30	1.82	-	1.35	0.81	0.42	0.86	0.41	0.24	0.04	0.48	0.20	-	0.23	0.16	
flounder, summer *	1.95	2.41	1.35	1.89	3.09	3.12	-	2.56	3.74	3.07	1.71	2.03	1.92	1.35	2.43	1.44	-	3.05	2.59	2.06
flounder, windowpane	2.27	6.14	1.54	3.65	7.95	5.59	-	5.32	3.38	3.13	2.42	1.67	1.10	1.01	2.19	1.17	-	1.57	1.41	
flounder, winter	2.19	2.15	0.94	0.82	2.26	1.55	-	1.27	1.37	0.33	0.44	0.81	0.28	0.09	0.14	0.11	-	0.32	0.16	
hake, red	0.76	0.45	0.33	0.54	0.41	0.90	-	0.60	0.21	0.39	0.66	1.14	0.01	0.16	0.41	0.57	-	0.36	0.68	
hake, silver	0.18	0.09	0.64	0.04	0.28	0.18	-	0.41	0.40	0.12	0.11	0.16	0.02	0.12	0.35	0.41	-	0.13	0.56	
hake, spotted *	0.14	0.32	0.56	0.39	0.69	1.11	-	2.62	1.15	1.93	1.49	0.91	0.74	2.04	3.72	1.80	-	2.14	0.04	0.90
herring, Atlantic	0.02	0.02	0.03	0.02	0.02	0.06	-	0.04	0.00	0.03	0.03	0.10	0.00	0.00	0.07	0.00	-	0.00	0.01	
herring, blueback *	0.09	0.06	0.15	0.24	0.05	0.09	-	0.08	0.01	0.00	0.04	0.17	0.21	0.24	0.04	0.06	-	0.04	0.05	0.17
hogchoker *	0.15	0.13	0.11	0.20	0.12	0.09	-	0.59	0.94	0.65	0.67	1.06	0.89	1.18	2.55	1.15	-	3.10	1.76	0.50
kingfish, northern *	0.04	0.03	0.00	0.04	0.05	0.05	-	0.21	0.24	0.09	0.23	0.38	0.16	0.08	0.34	0.08	-	0.41	0.37	0.09
lobster, American **	3.68	2.10	1.48	1.21	2.07	1.82	-	0.38	0.29	0.16	0.09	0.08	0.02	0.02	0.01	0.00	-	0.02	0.03	4.63
menhaden, Atlantic *	1.63	0.94	0.23	0.80	0.47	0.28	-	0.74	0.94	0.39	0.61	2.49	0.80	0.43	0.75	2.20	-	0.48	2.02	0.75
moonfish *	0.74	1.55	1.51	1.66	5.08	10.03	-	1.50	0.79	2.62	3.92	1.06	0.77	1.16	0.79	4.57	-	4.48	0.82	1.54
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	0.04	0.01	0.00	0.02	0.06	0.04	-	0.03	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.01	-	0.00	0.02	
scad, rough *	0.09	0.19	0.15	0.08	0.00	0.38	-	0.32	0.12	0.14	0.04	0.37	0.01	0.06	0.00	0.00	-	0.08	0.03	0.11
sculpin, longhorn	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	
scup *	291.46	424.06	116.75	475.29	303.26	139.38	-	198.23	223.52	40.68	182.58	422.23	307.01	212.15	228.62	129.46	-	221.80	404.31	187.34
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	1.03	0.68	0.21	1.05	1.11	0.88	-	1.19	2.07	1.56	2.70	0.84	1.24	0.79	2.32	1.38	-	2.57	2.70	
searobin, striped *	4.67	3.26	0.81	2.25	3.66	3.54	-	4.10	7.06	5.29	5.83	6.93	3.51	3.13	6.34	3.50	-	6.56	4.66	3.77
shad, American *	0.95	0.54	0.12	0.38	0.41	0.46	-	0.42	0.44	0.31	0.20	0.71	0.85	0.63	0.80	1.43	-	1.36	0.42	0.92
shad, hickory *	0.13	0.25	0.24	0.08	0.03	0.06	-	0.05	0.19	0.16	0.04	0.02	0.02	0.02	0.03	0.03	-	0.11	0.01	0.07
skate, clearnose *	0.10	0.48	0.23	0.44	0.38	0.24	-	0.27	0.73	0.68	0.34	0.47	0.43	0.36	0.33	0.29	-	0.58	0.66	0.22
skate, little	3.12	3.90	1.03	1.09	1.28	0.99	-	0.84	1.14	0.63	0.82	0.55	0.48	0.20	0.26	0.05	-	0.14	0.05	
skate, winter	0.07	0.10	0.00	0.06	0.21	0.10	-	0.05	0.17	0.12	0.09	0.04	0.02	0.10	0.00	0.01	-	0.02	0.02	
spot *	0.07	0.00	0.19	0.00	2.67	0.01	-	0.04	1.60	1.70	0.16	0.10	0.07	0.62	0.19	0.34	-	0.34	0.52	0.32
squid, long-finned **	94.47	81.12	70.58	179.39	114.99	187.15	-	85.68	62.53	32.59	112.67	195.00	94.57	114.90	100.45	82.66	-	79.43	129.67	114.96
striped bass	0.77	0.25	0.47	0.38	0.44	0.30	-	0.24	0.17	0.26	0.17	0.26	0.14	0.16	0.40	0.27	-	0.07	0.09	
sturgeon, Atlantic *	0.04	0.03	0.10	0.05	0.06	0.10	-	0.02	0.02	0.01	0.05	0.01	0.06	0.01	0.05	0.05	-	0.07	0.07	0.04
tautog	0.16	0.19	0.20	0.13	0.23	0.08	-	0.07	0.14	0.15	0.18	0.15	0.23	0.09	0.28	0.28	-	0.27	0.24	
weakfish *	59.07	26.00	1.50	63.96	9.11	6.65	-	12.27	22.27	7.50	41.56	31.05	6.33	8.37	25.84	15.44	-	28.88	35.07	19.51

Table 5.18. Finfish and invertebrate biomass indices for the spring sampling period, 1992-2022.

The geometric mean weight (kg) per tow was calculated for 38 finfish and 15 invertebrate species for the spring (April-June) sampling period. There was no spring in 2020.

	Spring																														
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
alewife	0.06	0.17	0.32	0.15	0.50	0.25	0.20	0.37	0.34	0.15	0.25	0.19	0.25	0.22	0.21	0.31	0.22	0.24	0.16	0.17	0.17	0.20	0.18	0.12	0.37	0.01	0.30	0.30	-	0.04	0.15
black sea bass	0.01	0.03	0.06	0.03	0.06	0.06	0.02	0.05	0.07	0.17	0.40	0.17	0.15	0.07	0.04	0.14	0.10	0.21	0.18	0.18	0.34	0.43	1.37	1.44	1.48	3.05	2.20	2.21	-	2.69	2.05
bluefish	0.45	0.08	0.13	0.04	0.10	0.23	0.17	0.35	0.09	0.08	0.36	0.20	0.12	0.14	0.23	0.21	0.11	0.30	0.03	0.24	0.11	0.18	0.03	0.01	0.05	0.05	0.02	0.00	-	0.05	0.04
butterfish	0.43	0.10	0.31	0.19	0.73	1.27	1.06	0.52	0.69	0.79	1.48	0.64	0.41	0.55	2.30	0.66	1.06	1.37	0.49	2.69	1.87	0.66	0.61	0.66	2.03	1.54	1.06	0.49	-	1.49	0.83
cunner	0.02	0.04	0.01	0.03	0.02	0.03	0.04	0.04	0.03	0.04	0.05	0.03	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.00	0.01	0.00	0.01	0.01	0.00	-	0.01	0.00
dogfish, smooth	1.04	0.44	1.14	0.63	0.83	0.42	0.90	1.05	0.85	0.82	2.31	1.10	0.87	0.77	2.83	1.14	1.88	2.07	0.18	2.90	1.68	1.32	1.27	1.41	3.21	6.17	2.58	1.99	-	6.05	0.98
dogfish, spiny	0.10	0.02	0.12	0.00	0.00	0.01	0.03	0.02	0.00	0.08	0.06	0.07	0.07	0.05	0.21	0.25	0.15	0.84	0.07	0.37	0.11	0.16	0.12	0.20	0.09	0.09	0.05	0.06	-	0.00	0.00
flounder, fourspot	2.19	0.75	0.75	1.48	1.37	2.08	1.28	0.96	1.31	1.28	1.35	1.01	1.03	0.44	0.60	1.05	0.93	0.64	0.62	1.23	1.60	0.75	0.65	0.34	0.61	0.59	0.74	0.71	-	0.43	0.09
flounder, summer	0.35	0.27	0.48	0.16	0.53	0.60	1.15	1.09	1.35	1.21	2.38	2.45	1.69	0.67	0.61	1.72	1.44	1.40	1.28	2.73	2.22	2.16	2.09	1.07	1.05	1.36	1.48	1.94	-	2.63	0.90
flounder, windowpane	1.96	2.53	2.96	1.60	4.76	4.16	3.21	2.38	1.69	1.97	1.31	1.21	1.32	0.54	0.63	2.51	2.04	1.29	2.20	1.86	1.74	1.32	1.26	0.78	0.56	0.71	0.86	1.06	-	0.80	0.32
flounder, winter	8.72	7.54	9.44	6.51	14.61	10.63	9.65	6.67	7.46	9.77	6.31	6.64	3.87	2.94	1.65	4.99	3.84	2.94	4.26	3.60	2.72	2.26	1.46	1.01	0.82	0.26	0.77	0.45	-	0.40	0.45
hake, red	0.78	0.85	0.14	0.66	0.21	0.33	0.94	1.05	0.59	0.45	0.96	0.13	0.20	0.22	0.25	0.67	0.61	0.23	0.47	0.09	0.65	0.24	0.11	0.03	0.24	0.10	0.13	0.35	-	0.23	0.42
hake, silver	0.20	0.14	0.40	0.36	0.12	0.39	0.48	0.56	0.19	0.54	0.52	0.06	0.16	0.05	0.33	0.10	1.02	0.27	0.33	0.26	0.87	0.15	0.07	0.03	0.20	0.13	0.12	0.71	-	0.23	0.14
hake, spotted	0.01	0.01	0.00	0.02	0.03	0.09	0.03	0.13	0.27	0.17	0.20	0.13	0.18	0.05	0.14	0.11	0.31	0.07	0.14	0.21	0.22	0.20	0.15	0.05	0.53	0.50	0.30	0.54	-	0.28	0.04
herring, Atlantic	1.06	2.03	1.09	1.77	0.55	0.88	0.25	0.22	0.42	0.26	0.14	0.19	0.12	0.32	0.09	0.55	0.19	0.37	0.65	0.30	0.17	0.60	0.32	0.18	0.16	0.02	0.16	0.40	-	0.01	0.03
herring, blueback	0.05	0.02	0.06	0.03	0.04	0.04	0.02	0.00	0.04	0.02	0.01	0.02	0.04	0.04	0.02	0.04	0.02	0.06	0.04	0.02	0.01	0.03	0.02	0.03	0.02	0.00	0.07	0.03	-	0.00	0.00
hogchoker	0.04	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.03	0.04	0.04	0.04	0.04	0.03	0.02	0.05	0.03	0.02	0.04	0.06	0.07	0.09	0.10	0.05	0.14	0.28	0.26	0.18	-	0.26	0.12
kingfish, northern	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	-	0.02	0.00
menhaden, Atlantic	0.07	0.03	0.03	0.04	0.01	0.01	0.00	0.00	0.02	0.00	0.03	0.01	0.01	0.00	0.02	0.07	0.03	0.04	0.03	0.07	0.29	0.22	0.37	0.39	0.23	0.39	0.15	0.23	-	0.34	0.25
moonfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
ocean pout	0.07	0.09	0.04	0.04	0.04	0.03	0.02	0.02	0.03	0.01	0.03	0.02	0.03	0.00	0.01	0.02	0.01	0.03	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
rockling, fourbeard	0.13	0.10	0.05	0.10	0.05	0.11	0.08	0.13	0.09	0.12	0.06	0.06	0.08	0.05	0.02	0.05	0.05	0.03	0.03	0.03	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.01	-	0.02	0.00
scad, rough	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
sculpin, longhorn	0.06	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.03	0.01	0.01	0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.01
scup	0.48	0.49	0.58	0.65	0.73	0.75	0.75	0.56	4.56	2.85	13.16	2.28	3.93	1.65	10.41	3.35	5.88	6.40	3.14	9.55	9.99	6.47	5.61	3.53	20.25	58.66	27.33	15.36	-	39.53	19.73
sea raven	0.03	0.00	0.00	0.00	0.01	0.00	0.05	0.03	0.05	0.02	0.03	0.01	0.01	0.00	0.00	0.02	0.00	0.01	0.02	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	-	0.00	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	0.44	0.52	0.30	0.81	0.34	0.39	0.22	0.50	0.98	0.71	1.17	-	1.81	0.96
searobin, striped	0.86	0.30	0.51	0.77	0.46	0.40	0.87	1.14	1.99	1.40	2.21	1.21	0.97	0.22	0.49	0.56	0.65	1.34	0.47	1.81	2.25	1.54	1.53	1.21	3.13	6.54	3.09	3.10	-	4.92	1.50
shad, American	0.29	0.09	0.21	0.10	0.11	0.23	0.13	0.20	0.05	0.01	0.11	0.03	0.04	0.05	0.05	0.07	0.08	0.07	0.07	0.07	0.10	0.06	0.07	0.06	0.15	0.01	0.03	0.07	-	0.02	0.10
shad, hickory	0.01	0.01	0.01	0.01	0.03	0.02	0.05	0.06	0.05	0.03	0.09	0.05	0.04	0.10	0.11	0.05	0.00	0.01	0.00	0.00	0.02	0.01	0.05	0.02	0.03	0.01	0.01	0.01	-	0.01	0.02
skate, clearnose	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.03	0.04	0.06	0.13	0.07	0.04	0.02	0.08	0.12	0.08	0.11	0.02	0.11	0.54	0.17	0.21	0.23	0.39	0.30	0.21	0.48	-	0.85	0.15
skate, little	5.89	5.99	8.87	3.38	9.35	6.00	6.27	4.25	3.43	4.47	4.56	4.35	4.01	1.05	0.91	1.82	0.97	0.71	0.66	0.79	1.34	0.74	0.71	0.41	0.30	0.37	0.33	0.58	-	0.15	0.09
skate, winter	0.37	0.52	0.28	0.21	0.46	0.29	0.46	0.27	0.25	0.21	0.25	0.24	0.28	0.12	0.22	0.23	0.19	0.23	0.15	0.25	0.46	0.25	0.33	0.12	0.10	0.05	0.02	0.23	-	0.14	0.03
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	0.20	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
striped bass	0.31	0.43	0.45	0.49	0.77	1.13	1.15	1.86	1.13	0.93	2.10	1.38	0.87	1.52	1.27	1.37	0.86	0.93	0.66	0.96	0.58	0.98	0.54	0.29	0.50	0.57	0.81	1.11	-	0.59	1.66
sturgeon, Atlantic	0.05	0.05	0.08	0.03	0.02	0.04	0.13	0.08	0.05	0.03	0.16	0.00	0.00	0.05	0.15	0.06	0.02	0.02	0.02	0.08	0.10	0.06	0.00	0.00	0.07	0.00	0.00	0.03	-	0.29	0.08
tautog	1.00	0.51	0.51	0.19	0.63	0.42	0.49	0.51	0.59	0.78	1.09	0.61	0.62	0.65	0.84	0.61	0.60	0.51	0.30	0.44	0.38	0.40	0.51	0.42	0.53	0.48	0.56	0.54	-	0.59	0.68
weakfish	0.11	0.03	0.01	0.05	0.06	0.15	0.20	0.31	0.12	0.11	0.12	0.03	0.04	0.09	0.12	0.08	0.02	0.04	0.01	0.04	0.39	0.22	0.08	0.01	0.23	0.33	0.02	0.11	-	0.44	0.09
Invertebrates																															
crab, blue	0.03	0.02	0.00	0.02	0.00	0.02	0.02	0.03	0.04	0.01	0.04	0.01	0.01	0.00	0.01	0.04	0.02	0.00	0.02	0.03	0.04	0.03	0.00	0.00	0.02	0.04	0.02	0.01	-	0.05	0.01
crab, flat claw hermit	0.15	0.08	0.18	0.02	0.09	0.04	0.10	0.10	0.07	0.12	0.14	0.32	0.17	0.05	0.04	0.11	0.09	0.12	0.08	0.09	0.05	0.07	0.07	0.03	0.03	0.03	0.06	0.04	-	0.10	0.01
crab, horseshoe	0.35	0.45	0.60	0.13	0.61	0.33	0.55	0.80	0.74	0.94	0.76	1.33	0.96	0.39	0.25	0.86	0.62	0.65	0.52	0.81	0.55	0.70	0.45	0.38	0.29	0.15	0.80	0.67	-	0.87	0.78
crab, lady	0.25	0.23	0.16	0.18	0.50	0.50	0.39	0.16	0.13	0.04	0.07	0.01	0.01	0.01	0.04	0.02	0.02	0.01	0.06	0.11	0.06	0.01	0.01	0.01	0.00	0.03	0.01	0.01	-	0.01	0.03
crab, rock	1.17	0.61	0.64	0.14	0.45	0.32	1.04	0.55	0.25	0.35	0.31	0.36	0.14	0.05	0.16	0.16	0.20	0.18	0.13	0.25	0.16	0.06	0.03	0.02	0.05	0.01	0.02	0.01	-	0.02	0.01
crab, spider	0.98	1.08	1.22	0.32	0.96	0.52	0.69	0.39	0.35	1.02	1.30	1.85	1.42	0.36	0.27	0.55	0.57	0.46	0.70	0.78	0.74	0.62	0.55	0.42	0.72	0.69	0.51	0.56	-	0.57	0.23
jellyfish, lion's mane	0.01	0.11	0.01	0.15	0.10	0.08	0.19	0.06	0.06	0.03	0.02	0.23	0.14	0.38	0.11	0.00	0.10	0.03	0.08	0.08	0.01	0.16	0.14	0.05	0.01	0.03	0.09	0.03	-	0.04	0.29
lobster, American	2.80	2.32	1.53	3.24	2.72	3.02	6.56	4.95	3.90	3.04	2.55	1.48	1.03	1.00	0.84	1.24	1.18	0.62	0.55	0.30	0.33	0.17	0.15	0.12	0.15	0.03	0.03	0.05	-	0.02	0.00
mussel, blue	0.31	0.01	0.07	0.03	0.03	0.01	0.05	0.03	0.04	0.01	0.17	0.08	0.11	0.09	0.04	0.04	0.02	0.00	0.02	0.02	0.04	0.06	0.08	0.02	0.00	0.02	0.00	0.00	-	0.01	0.00
northern moon shell	0.05	0.04	0.12	0.03	0.02	0.02	0.04	0.05	0.05	0.08	0.10	0.10	0.06	0.02	0.00	0.03	0.03	0.04	0.04	0.04	0.01	0.02	0.03	0.02	0.01	0.01	0.01	0.01	-	0.01	0.00
oyster, common	0.04	0.00	0.06	0.00	0.00	0.01	0.02	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.03	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.01	-	0.00	0.00
shrimp, mantis	0.06	0.13	0.05	0.05	0.04	0.03	0.03	0.07	0.18	0.08	0.04	0.03	0.03	0.01	0.02	0.05	0.04	0.04	0.01	0.07	0.05	0.05	0.03	0.02	0.04	0.06	0.02	0.01	-	0.04	0.03
squid, long-finned	1.01	0.91	0.67	0.89	0.55	0.99	0.41	0.62	0.51	0.41	0.42	0.42	1.69	1.08	1.41	0.33	0.40	0.92	0.77	0.61	0.43	0.20	0.76	0.55	0.80	0.61	0.66	0.31	-	0.83	0.35
starfish sp.	0.22	0.13	0.06	0.02	0.03	0.03	0.05	0.04	0.06	0.28	0.24	0.29	0.12	0.06	0.03	0.09	0.13	0.11	0.12	0.09	0.02	0.01	0.01	0.01	0.01	0.00	0.00	0.00	-	0.00	0.00
whelks	0.16	0.04	0.07	0.01	0.07	0.03	0.06	0.08	0.09	0.13	0.12	0.31	0.15	0.05	0.05	0.12	0.11	0.08	0.05	0.13	0.06	0.10	0.05	0.03	0.06	0.04	0.03	0.03	-	0.24	0.05

Table 5.19. Finfish and invertebrate biomass indices for the fall sampling period, 1992-2022.

The geometric mean weight (kg) per tow was calculated for 38 finfish and 15 invertebrate species for the fall (Sept-Oct) sampling period. There was no fall sampling in 2010 and 2020.

	Fall																														
	1992	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
alewife	0.03	0.08	0.10	0.02	0.04	0.22	0.02	0.07	0.02	0.09	0.03	0.09	0.04	0.05	0.01	0.14	0.04	0.02	-	0.06	0.01	0.03	0.03	0.10	0.01	0.01	0.01	0.04	-	0.04	0.02
black sea bass	0.01	0.01	0.01	0.00	0.01	0.01	0.05	0.07	0.07	0.23	0.31	0.08	0.08	0.08	0.07	0.14	0.23	0.07	-	0.15	0.33	0.46	0.82	0.49	0.59	0.47	0.71	0.91	-	0.89	0.69
bluefish	16.39	9.91	9.45	8.09	7.62	6.53	5.06	8.51	8.34	6.11	7.87	8.99	16.39	8.75	3.92	9.74	9.19	6.40	-	3.84	3.72	2.73	3.91	2.06	2.97	1.65	1.20	1.86	-	1.28	1.00
butterfish	6.31	4.12	3.40	10.26	9.30	6.97	13.27	15.43	4.45	7.80	6.56	3.47	6.24	7.85	7.73	5.82	8.97	14.39	-	2.81	6.14	3.62	5.97	4.08	6.58	5.56	5.69	4.98	-	4.50	4.58
cunner	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.00	0.00	0.01	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.01	0.00
dogfish, smooth	1.20	1.75	0.76	0.85	1.16	1.09	1.32	1.27	2.85	3.02	6.09	6.18	2.95	2.70	2.46	6.23	1.25	2.80	-	3.66	4.69	7.93	11.05	11.70	8.30	14.82	9.57	10.66	-	10.76	9.74
dogfish, spiny	0.03	0.08	0.18	0.00	0.01	0.05	0.10	0.05	0.06	0.24	0.07	0.00	0.27	0.34	0.00	0.00	0.18	0.18	-	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	-	0.00	0.00
flounder, fourspot	0.14	0.16	0.14	0.08	0.48	0.24	0.19	0.14	0.35	0.17	0.25	0.30	0.29	0.19	0.06	0.19	0.16	0.21	-	0.11	0.14	0.05	0.10	0.06	0.06	0.02	0.16	0.07	-	0.06	0.04
flounder, summer	0.87	0.85	0.47	0.43	1.61	1.84	1.77	2.27	1.77	3.19	4.41	3.27	1.74	1.93	1.36	1.65	1.97	2.41	-	1.82	2.74	2.18	1.41	1.54	1.69	0.97	1.58	0.95	-	2.16	1.62
flounder, windowpane	0.51	0.73	0.42	0.32	2.11	1.30	0.61	0.38	0.45	0.30	0.38	0.43	0.26	0.57	0.29	0.42	0.98	0.64	-	0.68	0.61	0.57	0.47	0.37	0.26	0.28	0.44	0.29	-	0.43	0.36
flounder, winter	0.84	0.99	0.78	0.45	1.56	1.04	0.87	1.37	1.28	0.62	0.55	0.34	0.32	0.41	0.16	0.22	0.49	0.26	-	0.28	0.40	0.11	0.17	0.22	0.11	0.03	0.06	0.03	-	0.10	0.05
hake, red	0.11	0.34	0.19	0.04	0.48	0.18	0.10	0.06	0.32	0.07	0.02	0.19	0.14	0.10	0.06	0.12	0.09	0.13	-	0.14	0.04	0.08	0.14	0.28	0.00	0.04	0.09	0.09	-	0.08	0.14
hake, silver	0.04	0.02	0.28	0.02	0.01	0.06	0.01	0.03	0.01	0.01	0.01	0.02	0.02	0.01	0.08	0.01	0.03	0.02	-	0.04	0.05	0.02	0.01	0.03	0.00	0.02	0.06	0.05	-	0.02	0.09
hake, spotted	0.09	0.30	0.15	0.04	0.37	0.03	0.08	0.17	0.34	0.09	0.19	0.41	0.03	0.08	0.17	0.10	0.16	0.23	-	0.53	0.27	0.38	0.36	0.28	0.14	0.51	0.96	0.51	-	0.54	0.01
herring, Atlantic	0.07	0.01	0.01	0.00	0.02	0.01	0.02	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.01	-	0.00	0.00	0.00	0.00	0.01	0.00	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	0.01	-	0.01	0.00	0.00	0.01	0.03	0.05	0.03	0.00	0.00	-	0.00	0.01
hogchoker	0.02	0.03	0.01	0.01	0.04	0.01	0.01	0.04	0.02	0.03	0.05	0.04	0.03	0.03	0.02	0.04	0.02	0.02	-	0.11	0.17	0.11	0.10	0.23	0.17	0.24	0.53	0.22	-	0.60	0.36
kingfish, northern	0.00	0.01	0.00	0.03	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.00	-	0.04	0.04	0.02	0.03	0.07	0.03	0.02	0.08	0.01	-	0.05	0.08
menhaden, Atlantic	0.36	0.22	0.36	0.25	0.25	0.24	0.09	0.39	0.22	0.05	0.35	0.25	0.49	0.43	0.06	0.29	0.12	0.10	-	0.39	0.47	0.18	0.31	0.99	0.17	0.18	0.35	1.00	-	0.24	0.83
moonfish	0.02	0.00	0.03	0.03	0.12	0.05	0.13	0.09	0.13	0.04	0.08	0.03	0.04	0.07	0.07	0.11	0.27	0.21	-	0.07	0.04	0.11	0.20	0.12	0.06	0.05	0.03	0.23	-	0.25	0.04
ocean pout	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
rockling, fourbeard	0.01	0.00	0.01	0.00	0.02	0.01	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
scad, rough	0.00	0.03	0.00	0.00	0.02	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.03	-	0.05	0.01	0.01	0.01	0.06	0.00	0.01	0.00	0.00	-	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	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
scup	4.96	3.72	3.33	4.63	3.68	2.49	4.50	22.72	30.76	11.28	23.69	28.95	16.31	13.79	10.49	24.42	16.53	13.73	-	20.28	13.54	6.47	10.71	20.95	22.28	13.68	20.09	15.91	-	17.69	23.29
sea raven	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
searobin, northern	0.02	0.05	0.06	0.02	0.04	0.02	0.08	0.06	0.08	0.13	0.18	0.11	0.11	0.09	0.05	0.08	0.09	0.08	-	0.11	0.22	0.23	0.24	0.10	0.18	0.20	0.51	0.36	-	0.70	0.55
searobin, striped	0.82	0.54	0.32	0.34	0.81	0.60	1.04	1.37	1.59	1.27	2.12	2.43	0.96	0.82	0.38	0.37	0.94	0.61	-	1.12	2.81	2.66	2.26	2.84	1.72	1.74	2.91	1.82	-	3.03	1.98
shad, American	0.14	0.35	0.39	0.43	0.06	0.16	0.26	0.42	0.14	0.07	0.16	0.17	0.15	0.10	0.02	0.05	0.08	0.11	-	0.09	0.08	0.06	0.03	0.12	0.14	0.13	0.14	0.19	-	0.23	0.07
shad, hickory	0.03	0.02	0.04	0.02	0.05	0.05	0.02	0.07	0.05	0.02	0.02	0.05	0.07	0.14	0.11	0.03	0.01	0.02	-	0.01	0.09	0.08	0.02	0.01	0.01	0.01	0.02	0.02	-	0.06	0.01
skate, clearnose	0.06	0.05	0.01	0.04	0.01	0.05	0.17	0.15	0.15	0.53	0.30	0.46	0.17	0.71	0.30	0.69	0.64	0.40	-	0.41	1.01	0.93	0.54	0.66	0.65	0.60	0.50	0.43	-	0.79	0.92
skate, little	2.47	4.61	3.47	1.78	5.66	3.81	4.06	2.85	2.92	2.88	3.00	1.96	2.02	2.32	0.67	0.65	0.82	0.64	-	0.58	0.66	0.44	0.58	0.38	0.32	0.14	0.17	0.03	-	0.07	0.04
skate, winter	0.11	0.15	0.21	0.09	0.25	0.10	0.09	0.08	0.01	0.21	0.21	0.00	0.11	0.16	0.00	0.12	0.31	0.18	-	0.07	0.20	0.15	0.12	0.05	0.02	0.14	0.00	0.01	-	0.01	0.02
spot	0.00	0.07	0.03	0.00	0.14	0.01	0.00	0.06	0.13	0.01	0.08	0.00	0.01	0.00	0.03	0.00	0.34	0.00	-	0.01	0.41	0.47	0.02	0.02	0.02	0.11	0.03	0.08	-	0.09	0.14
striped bass	0.09	0.16	0.11	0.15	0.21	0.68	0.38	0.39	0.51	0.48	0.70	0.26	1.25	0.48	0.88	0.64	0.79	0.61	-	0.43	0.26	0.44	0.26	0.38	0.20	0.30	0.52	0.42	-	0.11	0.19
sturgeon, Atlantic	0.21	0.19	0.13	0.10	0.02	0.06	0.04	0.21	0.08	0.23	0.18	0.27	0.09	0.12	0.23	0.13	0.21	0.29	-	0.10	0.10	0.03	0.11	0.04	0.27	0.05	0.18	0.19	-	0.25	0.16
tautog	0.22	0.22	0.15	0.09	0.07	0.14	0.27	0.31	0.30	0.20	0.27	0.43	0.21	0.23	0.23	0.16	0.20	0.07	-	0.05	0.08	0.11	0.12	0.08	0.19	0.07	0.17	0.20	-	0.20	0.15
weakfish	0.47	0.56	1.26	1.27	1.88	1.70	0.94	3.39	3.17	2.41	2.86	1.72	2.85	2.52	0.42	3.51	1.17	0.66	-	1.37	1.88	0.99	2.13	3.12	1.07	1.10	1.80	1.45	-	2.93	3.50
Invertebrates																															
crab, blue	0.15	0.17	0.05	0.04	0.04	0.11	0.10	0.17	0.11	0.05	0.10	0.06	0.02	0.00	0.01	0.07	0.02	0.04	-	0.09	0.07	0.05	0.02	0.04	0.02	0.01	0.01	0.03	-	0.05	0.01
crab, flat claw hermit	0.17	0.40	0.15	0.11	0.26	0.16	0.35	0.16	0.17	0.33	0.30	0.13	0.18	0.16	0.05	0.12	0.24	0.16	-	0.12	0.13	0.12	0.05	0.04	0.06	0.06	0.04	0.02	-	0.07	0.03
crab, horseshoe	1.01	1.16	0.55	0.32	1.27	1.32	0.93	1.09	1.31	1.39	1.76	1.67	1.93	0.93	1.00	1.40	1.92	1.21	-	1.25	0.65	1.21	0.87	0.58	0.75	0.95	1.72	0.82	-	1.77	1.85
crab, lady	1.52	1.58	1.52	1.56	3.54	1.84	0.82	0.48	0.60	0.17	0.14	0.10	0.08	0.14	0.07	0.07	0.25	0.18	-	0.30	0.20	0.07	0.06	0.02	0.02	0.01	0.01	0.00	-	0.00	0.01
crab, rock	0.58	0.55	0.18	0.09	0.45	0.32	0.37	0.22	0.19	0.13	0.12	0.04	0.08	0.02	0.10	0.04	0.28	0.09	-	0.09	0.05	0.03	0.01	0.00	0.00	0.00	0.00	0.00	-	0.01	0.00
crab, spider	0.53	1.89	0.46	0.25	0.71	0.42	0.25	0.24	0.21	0.30	0.27	0.47	0.32	0.13	0.10	0.15	0.25	0.29	-	0.21	0.18	0.21	0.10	0.07	0.13	0.12	0.11	0.04	-	0.08	0.02
jellyfish, lion's mane	0.02	0.01	0.03	0.17	0.18	0.50	0.17	0.03	0.22	0.17	0.10	0.01	0.13	0.12	0.46	0.45	0.02	0.58	-	0.01	0.03	0.59	0.07	0.00	0.43	0.01	0.04	0.52	-	0.11	0.00
lobster, American	3.17	4.11	3.58	3.03	3.48	7.22	4.24	4.16	2.65	1.91	1.10	1.28	1.46	0.84	0.61	0.51	0.80	0.77	-	0.12	0.10	0.06	0.04	0.04	0.01	0.01	0.00	0.00	-	0.01	0.01
mussel, blue	0.07	0.06	0.12	0.02	0.00	0.01	0.09	0.00	0.04	0.12	0.11	0.02	0.10	0.10	0.02	0.07	0.04	0.03	-	0.03	0.02	0.16	0.06	0.01	0.00	0.01	0.00	0.00	-	0.00	0.00
northern moon shell	0.03	0.02	0.03	0.01	0.01	0.00	0.02	0.01	0.00	0.04	0.10	0.00	0.00	0.01	0.00	0.00	0.03	0.01	-	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
oyster, common	0.01	0.02	0.00	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.01	-	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-	0.01	0.00
shrimp, mantis	0.05	0.08	0.02	0.02	0.13	0.06	0.02	0.09	0.18	0.05	0.06	0.02	0.04	0.03	0.04	0.06	0.08	0.06	-	0.22	0.20	0.14	0.11	0.08	0.05	0.03	0.11	0.07	-	0.26	0.19
squid, long-finned	5.00	7.92	4.71	4.68	5.53	2.20	6.40	6.06	4.05	2.39	1.81	5.88	3.38	3.47	2.15	6.51	4.29	4.25	-	2.52	2.28	1.25	4.01	10.03	3.17	4.73	3.18	2.83	-	3.22	5.88
starfish sp.	0.11	0.08	0.07	0.00	0.01	0.02	0.05	0.02	0.12	0.22	0.09	0.01	0.10	0.11	0.02	0.05	0.09	0.06	-	0.03	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	-	0.00	0.00
whelks	0.28	0.28	0.06	0.08	0.22	0.10	0.27	0.23	0.38	0.52	0.38	0.24	0.24	0.20	0.08	0.20	0.30	0.20	-	0.21	0.15	0.17	0.09	0.15	0.06	0.06	0.06	0.04	-	0.12	0.07

Table 5.20. Bluefish indices-at-age, 1984-2022.

The 1984 and the 2013-2022 index-at-age uses annual fall age keys generated by CT LISTS ageing program. Bluefish age keys for 1985-2012 were provided by the ASMFC Bluefish Technical Committee as a combined coastwide annual age keys to calculate LISTS indices-at-age for those earlier years.

Year	season	month	Count	PosTow	Tows	GmMn	Age_0	Age_1	Age_2	Age_3	Age_4	Age_5	Age_6+
1984	FA	Sept/Oct	6,738	84.3	70	**23.41**	22.4685	0.4116	0.3505	0.1412	0.0243	0.0035	0.0104
1985	FA	Sept/Oct	5,301	87.5	80	**19.01**	16.9779	0.9518	0.6274	0.2463	0.1456	0.0220	0.0390
1986	FA	Sept/Oct	2,738	92.5	80	**13.66**	10.8225	1.1835	1.1699	0.1894	0.1280	0.0877	0.0790
1987	FA	Sept/Oct	2,598	93.8	80	**14.32**	12.1667	1.0064	0.5081	0.3841	0.1321	0.0576	0.0648
1988	FA	Sept/Oct	3,645	93.8	80	**15.49**	14.2650	0.2111	0.4901	0.1368	0.1703	0.1254	0.0912
1989	FA	Sept/Oct	8,636	88.8	80	**26.25**	24.9977	0.5751	0.4599	0.0425	0.0196	0.0685	0.0869
1990	FA	Sept/Oct	4,671	93.8	80	**23.88**	19.3666	2.9695	0.9283	0.1631	0.1284	0.1223	0.2017
1991	FA	Sept/Oct	5,699	98.8	80	**33.43**	28.4939	1.2789	3.2666	0.1210	0.0555	0.0504	0.1637
1992	FA	Sept/Oct	5,226	97.5	80	**25.22**	18.8709	1.7599	2.7891	1.3239	0.1818	0.0627	0.2317
1993	FA	Sept/Oct	6,456	91.7	120	**18.92**	16.7760	0.1098	1.0323	0.3212	0.5663	0.0299	0.0844
1994	FA	Sept/Oct	16,233	93.3	120	**32.06**	30.5234	0.7623	0.2411	0.1622	0.1373	0.1689	0.0649
1995	FA	Sept/Oct	5,518	92.5	80	**24.46**	21.6960	1.9621	0.5967	0.0547	0.0447	0.0405	0.0652
1996	FA	Sept/Oct	6,689	91.3	80	**20.80**	19.8048	0.2200	0.4129	0.2472	0.0132	0.0249	0.0770
1997	FA	Sept/Oct	10,777	92.5	80	**37.90**	36.5917	0.6024	0.4773	0.0739	0.0668	0.0281	0.0598
1998	FA	Sept/Oct	8,791	91.3	80	**31.41**	29.8708	0.9734	0.3787	0.1585	0.0107	0.0042	0.0137
1999	FA	Sept/Oct	7,792	96.3	80	**45.31**	41.8775	2.8916	0.2241	0.2034	0.0501	0.0078	0.0556
2000	FA	Sept/Oct	6,109	92.5	80	**20.57**	17.2805	2.0259	1.0717	0.1481	0.0011	0.0276	0.0150
2001	FA	Sept/Oct	3,957	93.8	80	**24.24**	21.4720	1.1260	1.4031	0.1838	0.0204	0.0107	0.0240
2002	FA	Sept/Oct	3,394	90.0	80	**18.75**	14.0065	3.7885	0.6379	0.0941	0.0192	0.0795	0.1243
2003	FA	Sept/Oct	3,682	92.5	40	**28.53**	27.3383	0.4251	0.6026	0.0731	0.0206	0.0320	0.0382
2004	FA	Sept/Oct	6,485	90.0	80	**29.13**	21.4523	5.5148	1.4559	0.3311	0.0677	0.1634	0.1448
2005	FA	Sept/Oct	6,507	88.8	80	**18.89**	17.7693	0.0868	0.6550	0.2072	0.0884	0.0454	0.0379
2006	FA	Sept/Oct	2,062	92.5	40	**15.66**	14.2436	0.4875	0.5471	0.2876	0.0639	0.0076	0.0228
2007	FA	Sept/Oct	9,339	87.5	80	**30.66**	27.2623	1.9842	0.7193	0.4278	0.1097	0.0680	0.0888
2008	FA	Sept/Oct	1,670	97.5	40	**14.28**	11.8308	0.5624	1.0856	0.3673	0.1193	0.1527	0.1620
2009	FA	Sept/Oct	3,604	97.5	80	**18.12**	15.6865	0.5196	0.4317	0.8120	0.2967	0.0685	0.2950
2010	FA		No Fall Sampling			**-**	-	-	-	-	-	-	-
2011	FA	Sept/Oct	2,737	83.8	80	**11.10**	10.2076	0.2344	0.2097	0.1741	0.1643	0.0465	0.0634
2012	FA	Sept/Oct	3,832	90.0	80	**15.06**	14.3422	0.2676	0.1849	0.1286	0.0809	0.0220	0.0339
2013	FA	Sept/Oct	1,809	86.3	80	**9.71**	8.8888	0.0322	0.4112	0.1846	0.0886	0.0403	0.0644
2014	FA	Sept/Oct	4,451	91.1	79	**18.61**	18.1376	0.2111	0.0689	0.0627	0.0669	0.0418	0.0209
2015	FA	Sept/Oct	2,647	81.3	80	**8.42**	8.2516	0.0222	0.0604	0.0127	0.0222	0.0318	0.0191
2016	FA	Sept/Oct	2,785	82.5	80	**11.25**	8.5035	1.5980	0.4246	0.5751	0.0656	0.0210	0.0622
2017	FA	Sept/Oct	2,397	75.0	80	**8.05**	7.9290	0.0403	0.0303	0.0336	0.0101	0.0000	0.0067
2018	FA	Sept/Oct	697	82.5	80	**4.00**	3.4097	0.5346	0.0313	0.0206	0.0037	0.0000	0.0000
2019	FA	Sept/Oct	2,047	86.3	80	**11.19**	10.7158	0.3030	0.1289	0.0273	0.0000	0.0000	0.0109
2020	FA		No Fall Sampling			**-**	-	-	-	-	-	-	-
2021	FA	Sept/Oct	1,197	82.2	73	**7.24**	6.9376	0.0415	0.1637	0.0615	0.0297	0.0000	0.0000
2022	FA	Sept/Oct	878	77.5	80	**4.61**	4.4105	0.0665	0.0123	0.0420	0.0461	0.0256	0.0070

Table 5.21. Scup spring indices-at-age, 1984-2022.

Spring (May and June) catch and age data were used to determine the geometric mean indices-at-age[1]. The spring age keys were used to expand length frequencies to age frequencies and then the spring 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. Fish older than age 9 were included in the age 10+ index[2].

	Spring (May-June)												
Year	**0-10+**	**2+**	**Age 0**	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10+**
1984	2.797	2.308	0	0.489	1.311	0.577	0.307	0.074	0.004	0.002	0	0	0.034
1985	5.648	2.707	0	2.941	2.002	0.327	0.244	0.047	0.025	0.050	0	0.004	0.008
1986	7.230	2.785	0	4.444	1.651	0.988	0.137	0.003	0.003	0.003	0	0	0.003
1987	2.186	1.758	0	0.428	1.646	0.071	0.034	0.007	0	0	0	0	0
1988	2.061	0.893	0	1.168	0.309	0.502	0.054	0.026	0	0	0	0	0.003
1989	6.249	0.615	0	5.634	0.563	0.034	0.016	0.000	0.001	0.001	0	0	0
1990	4.867	2.345	0	2.521	2.098	0.206	0.037	0.005	0	0	0	0	0
1991	7.046	2.795	0	4.251	1.436	1.258	0.086	0.012	0.002	0	0	0	0
1992	1.749	1.360	0	0.389	1.212	0.093	0.052	0.002	0	0.002	0	0	0
1993	2.530	2.492	0	0.038	2.286	0.189	0.006	0.006	0.002	0.002	0	0	0
1994	3.892	3.093	0	0.799	2.038	0.931	0.100	0.015	0.003	0.007	0	0	0
1995	13.587	0.645	0	12.943	0.387	0.199	0.052	0.003	0.003	0	0	0	0
1996	7.766	2.562	0	5.204	2.477	0.074	0.004	0.006	0.002	0	0	0	0
1997	7.558	4.394	0	3.164	2.610	1.679	0.063	0.009	0.023	0.005	0.005	0	0
1998	10.826	0.761	0	10.065	0.578	0.115	0.063	0.005	0	0	0	0	0
1999	4.732	2.021	0	2.711	1.755	0.162	0.074	0.030	0	0	0	0	0
2000	146.224	21.711	0	124.513	17.184	4.237	0.195	0.064	0.030	0	0	0	0
2001	22.486	20.837	0	1.649	18.988	1.575	0.252	0.018	0.003	0.001	0	0	0
2002	257.914	208.764	0	49.150	66.611	123.248	17.437	1.294	0.099	0.035	0.040	0	0
2003	13.116	12.980	0	0.136	4.047	3.284	4.964	0.608	0.069	0.005	0.005	0	0
2004	26.915	26.902	0	0.014	3.965	8.956	4.904	8.207	0.764	0.079	0.018	0.009	0
2005	8.483	7.325	0	1.157	1.278	1.055	1.511	1.269	1.944	0.223	0.045	0	0
2006	59.052	40.570	0	18.482	23.719	5.629	2.072	2.557	3.160	2.897	0.529	0.007	0
2007	32.802	25.288	0	7.514	15.865	5.845	1.489	0.548	0.536	0.541	0.385	0.073	0.007
2008	92.100	75.143	0	16.957	40.620	27.815	4.936	0.911	0.158	0.303	0.236	0.148	0.016
2009	104.454	72.840	0	31.614	28.228	28.413	12.491	2.498	0.613	0.215	0.134	0.250	0
2010	68.138	67.717	0	0.421	24.265	21.998	14.002	6.019	1.187	0.118	0.058	0.041	0.029
2011	36.112	33.985	0	2.127	3.285	11.378	9.812	4.116	3.391	1.421	0.248	0.071	0.263
2012	114.410	65.371	0	49.039	25.925	11.982	9.231	9.567	4.671	2.755	0.871	0.144	0.226
2013	57.922	53.309	0	4.613	29.415	8.721	3.150	4.982	4.451	1.545	0.758	0.169	0.117
2014	60.483	45.822	0	14.661	10.635	23.833	5.069	1.504	2.323	1.486	0.608	0.319	0.045
2015	36.141	17.961	0	18.180	5.546	3.985	5.037	1.747	0.570	0.595	0.266	0.121	0.093
2016	972.305	318.511	0	653.794	191.206	68.931	15.618	29.868	5.192	3.221	2.646	1.294	0.535
2017	362.667	328.064	0	34.603	208.316	81.228	14.656	7.525	11.522	1.836	1.186	0.939	0.856
2018	200.594	190.608	0	9.986	39.936	110.787	29.408	2.909	4.540	2.077	0.547	0.243	0.161
2019	144.077	135.292	0	8.785	15.153	41.432	57.186	13.972	2.997	2.713	0.888	0.652	0.300
2020	No Spring Survey in 2020												
2021	195.205	152.564	0	42.642	13.155	34.715	19.836	32.287	39.430	9.590	2.817	0.550	0.184
2022	290.529	232.420	0	58.109	52.631	35.413	36.046	36.182	48.413	19.310	3.761	0.431	0.235
84-21 Mean	**83.847**	**52.840**	**0.000**	**31.006**	**21.938**	**17.201**	**6.340**	**3.587**	**2.371**	**0.857**	**0.332**	**0.136**	**0.078**

(1) In some years, less than the number of scheduled tows were conducted in some months (Table 5.4).

(2) Fish in the age 10+ group include: 6 fish taken 1984-1988, 7 fish taken 2002-2010, 63 taken in 2011, 25 taken in 2012, 24 taken in 2013, 10 taken in 2014, 27 fish in 2015, 28 fish in 2016, 44 fish in 2017, 31 fish in 2018, 40 fish in 2019, 20 fish in 2021, and 18 fish in 2022. The oldest scup aged were two 15-year-old fish taken in 2015.

Table 5.21. Scup fall indices-at-age, 1984-2022 cont.

Fall (September and October) catch and age data were used to determine the geometric mean indices-at-age[1]. The fall age keys were used to expand length frequencies to age frequencies and then the 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. Fish older than age 9 were included in the age 10+ index[2].

	Fall (Sept-Oct)												
Year	**0-10+**	**2+**	**Age 0**	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10+**
1984	10.721	1.692	7.986	1.043	0.783	0.519	0.280	0.092	0.018	0	0	0	0
1985	30.972	1.277	24.914	4.781	0.425	0.587	0.190	0.044	0.030	0.002	0	0	0
1986	25.761	2.519	12.863	10.379	2.277	0.219	0.013	0.005	0.005	0	0	0	0
1987	18.544	2.063	12.468	4.013	1.405	0.579	0.058	0.009	0.009	0.004	0	0	0
1988	39.699	2.092	31.687	5.920	1.818	0.242	0.032	0	0	0	0	0	0
1989	65.087	1.596	40.920	22.571	1.501	0.083	0.012	0	0	0	0	0	0
1990	69.477	7.396	54.350	7.731	6.946	0.398	0.034	0.005	0.008	0	0	0.005	0
1991	311.570	2.953	291.568	17.050	1.759	1.040	0.147	0.008	0	0	0	0	0
1992	83.731	6.244	50.971	26.516	5.540	0.398	0.287	0.013	0.007	0	0	0	0
1993	77.057	1.165	74.061	1.831	1.019	0.121	0.012	0.010	0	0	0.003	0	0
1994	92.523	0.657	90.778	1.088	0.457	0.185	0.012	0.003	0	0	0	0	0
1995	59.136	0.150	32.465	26.521	0.144	0.006	0	0	0	0	0	0	0
1996	61.459	1.400	51.497	8.562	1.365	0.029	0	0.005	0	0	0	0	0
1997	41.276	0.809	31.791	8.677	0.630	0.172	0.008	0	0	0	0	0	0
1998	103.272	0.628	90.404	12.240	0.537	0.069	0.022	0	0	0	0	0	0
1999	537.683	8.574	498.180	30.930	8.349	0.195	0.019	0.011	0	0	0	0	0
2000	521.103	9.265	250.391	261.446	8.323	0.794	0.140	0.008	0	0	0	0	0
2001	177.641	20.239	140.506	16.897	18.421	1.607	0.186	0.025	0	0	0	0	0
2002	348.703	41.179	259.902	47.623	23.321	16.812	0.665	0.325	0.048	0	0.007	0	0
2003	152.227	83.963	52.910	15.354	32.065	22.394	26.440	2.493	0.539	0.016	0.016	0	0
2004	291.458	36.277	251.052	4.129	8.338	15.082	5.978	6.245	0.534	0.072	0.008	0.021	0
2005	424.063	18.183	373.318	32.562	8.144	2.437	4.015	1.505	1.689	0.332	0.060	0	0
2006	116.755	13.575	52.164	51.016	9.525	2.341	0.257	0.351	0.377	0.681	0.044	0	0
2007	475.295	37.346	319.893	118.056	29.335	5.929	0.896	0.226	0.302	0.313	0.313	0.033	0
2008	303.256	24.478	243.679	35.099	11.921	7.044	3.556	1.055	0.502	0.137	0.124	0.140	0
2009	139.380	31.506	67.486	40.388	20.786	6.934	2.615	0.735	0.214	0.131	0.068	0.022	0
2010	No Fall Survey in 2010												
2011	198.226	40.786	119.032	38.409	8.157	14.894	9.669	3.922	3.225	0.586	0.167	0.025	0.140
2012	223.522	15.983	153.235	54.305	9.963	2.846	2.063	0.567	0.137	0.323	0.076	0.007	0
2013	40.683	16.235	17.744	6.704	9.187	4.069	0.807	1.058	0.746	0.237	0.090	0.031	0.011
2014	182.583	14.003	144.702	23.878	4.325	6.505	1.188	0.426	0.808	0.476	0.193	0.051	0.032
2015	422.228	31.773	330.498	59.957	14.802	4.859	8.230	1.723	0.551	0.917	0.410	0.209	0.072
2016	307.010	97.769	55.695	153.546	54.808	18.187	9.458	10.490	2.765	1.150	0.700	0.195	0.017
2017	212.145	47.700	127.558	36.887	28.211	11.197	2.266	2.209	2.492	0.448	0.589	0.196	0.093
2018	228.622	87.177	120.894	20.552	24.723	45.670	12.192	3.010	1.246	0.201	0.089	0.029	0.016
2019	129.462	48.567	56.796	24.100	5.216	12.116	19.092	9.836	1.138	0.637	0.422	0.090	0.021
2020	No Fall Survey in 2020												
2021	221.801	47.953	151.255	22.5930	3.0203	11.7284	7.2471	14.1725	8.9239	2.4591	0.2955	0.0718	0.034
2022	404.306	56.011	299.930	48.365	6.852	8.467	15.071	14.902	8.771	1.026	0.778	0.068	0.077
84-21 Mean	**187.337**	**22.366**	**130.156**	**34.815**	**10.210**	**6.063**	**3.280**	**1.683**	**0.731**	**0.253**	**0.102**	**0.031**	**0.012**

(1) In some years, less than the number of scheduled tows were conducted in some months (Table 5.4).

(2) Fish in the age 10+ group include: 2 fish taken 1984-1993, 12 fish taken 2002-2006, 97 fish taken 2007-2012, 18 taken in 2013, 29 taken in 2014, 60 fish in 2015, 43 fish in both 2016 and 2017, 14 fish in 2017, 39 fish in both 2018 and 2019 and 41 fish taken in 2022. The oldest scup aged were two 15-year-old fish taken in 2015.

Table 5.22. Age frequency of striped bass taken in spring, 1984-2022.

Ages were derived from trawl survey length data using the average of Hudson River and Chesapeake Bay von Bertalanffy parameters.

	Year																																							
Age	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
1	0	0	0	0	0	0	0	0	0	2	0	0	3	0	0	0	1	0	2	1	1	0	0	2	11	5	0	1	11	0	0	0	2	0	0	2	-	0	0
2	0	0	0	2	1	5	28	11	4	3	6	98	12	36	119	41	113	47	150	30	15	220	3	46	20	84	3	2	46	49	4	2	71	4	7	26	-	16	17
3	0	0	0	0	1	3	8	7	8	7	10	26	97	116	122	87	20	41	76	38	38	54	25	109	15	54	7	2	13	33	94	13	5	10	62	115	-	41	12
4	0	0	0	2	4	1	2	3	13	16	20	8	37	40	68	42	22	15	48	23	18	59	15	44	48	130	17	29	13	21	73	23	19	13	41	272	-	18	51
5	0	0	0	2	0	1	1	5	5	14	18	7	14	17	28	95	22	28	45	39	21	33	22	44	41	64	24	50	19	12	20	17	23	8	5	35	-	15	59
6	0	0	0	2	1	1	3	0	1	8	8	6	7	14	20	46	32	36	52	41	22	28	11	28	11	34	11	44	12	16	6	1	2	3	5	7	-	8	30
7	0	0	0	0	0	0	0	2	0	7	1	1	8	9	3	17	12	13	25	23	14	16	10	9	7	10	6	29	5	10	1	1	3	3	9	4	-	1	14
8	0	0	0	0	0	0	0	1	2	1	1	3	2	4	1	4	4	2	12	5	3	9	4	3	3	1	2	7	3	15	5	1	0	3	5	2	-	0	5
9	0	0	0	0	0	0	0	2	1	1	1	0	3	2	1	0	1	2	3	7	2	1	3	1	1	0	0	1	2	1	1	0	2	1	0	0	-	0	2
10	0	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	2	0	1	0	0	0	3	3	2	0	0	0	0	2	1	0	1	0	0	0	-	1	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	0	0	0	1	1	0	1	0	1	0	0	-	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	-	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	-	0	0
Total	**0**	**0**	**0**	**8**	**7**	**11**	**43**	**32**	**34**	**59**	**65**	**150**	**184**	**238**	**362**	**334**	**229**	**184**	**414**	**207**	**135**	**421**	**97**	**289**	**159**	**382**	**70**	**166**	**125**	**160**	**205**	**59**	**129**	**46**	**136**	**463**	-	**100**	**192**

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

Table 5.23. Striped bass indices-at-age, 1984-2022.

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 5.18) by the percentage of fish in each age.

		Spring													
Year	**Index**	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11**	**Age 12**	**Age 13**	**Age 14**
1984	0.02	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1985	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1986	0.00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1987	0.05	0	0.0125	0	0.0125	0.0125	0.0125	0	0	0	0	0	0	0	0
1988	0.04	0	0.0057	0.0057	0.0229	0	0.0057	0	0	0	0	0	0	0	0
1989	0.06	0	0.0273	0.0164	0.0055	0.0055	0.0055	0	0	0	0	0	0	0	0
1990	0.16	0	0.1042	0.0298	0.0074	0.0037	0.0112	0	0	0	0.0037	0	0	0	0
1991	0.15	0	0.0516	0.0328	0.0141	0.0234	0	0.0094	0.0047	0.0094	0.0047	0	0	0	0
1992	0.22	0	0.0259	0.0518	0.0841	0.0324	0.0065	0	0.0129	0.0065	0	0	0	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	0	0	0
1994	0.30	0	0.0277	0.0462	0.0923	0.0831	0.0369	0.0046	0.0046	0.0046	0	0	0	0	0
1995	0.59	0	0.3855	0.1023	0.0315	0.0275	0.0236	0.0039	0.0118	0	0.0039	0	0	0	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	0	0	0
1997	0.85	0	0.1286	0.4143	0.1429	0.0607	0.0500	0.0321	0.0143	0.0071	0	0	0	0	0
1998	0.97	0	0.3189	0.3269	0.1822	0.0750	0.0536	0.0080	0.0027	0.0027	0	0	0	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	0	0	0
2000	0.84	0.0037	0.4163	0.0737	0.0811	0.0811	0.1179	0.0442	0.0147	0.0037	0.0074	0	0	0	0
2001	0.61	0	0.1558	0.1359	0.0497	0.0928	0.1193	0.0431	0.0066	0.0066	0	0	0	0	0
2002	1.30	0.0063	0.4722	0.2392	0.1511	0.1416	0.1637	0.0787	0.0378	0.0094	0.0031	0	0	0	0
2003	0.87	0.0042	0.1267	0.1605	0.0971	0.1647	0.1732	0.0971	0.0211	0.0296	0	0	0	0	0
2004	0.56	0.0042	0.0627	0.1588	0.0752	0.0878	0.0919	0.0585	0.0125	0.0084	0	0.0042	0	0	0
2005	1.17	0	0.6100	0.1497	0.1636	0.0915	0.0776	0.0444	0.0250	0.0028	0	0.0028	0	0	0
2006	0.61	0	0.0189	0.1572	0.0943	0.1384	0.0692	0.0629	0.0252	0.0189	0.0189	0.0063	0	0	0
2007	1.02	0.0071	0.1629	0.3860	0.1558	0.1558	0.0992	0.0319	0.0106	0.0035	0.0106	0	0	0	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	0	0	0
2009	0.60	0.0078	0.1316	0.0846	0.2037	0.1003	0.0533	0.0157	0.0016	0	0	0	0	0	0
2010	0.40	0	0.0169	0.0394	0.0958	0.1352	0.0620	0.0338	0.0113	0	0	0	0	0	0
2011	0.48	0.0029	0.0058	0.0058	0.0839	0.1446	0.1272	0.0839	0.0202	0.0029	0	0	0.0029	0	0
2012	0.43	0.0381	0.1595	0.0451	0.0451	0.0659	0.0416	0.0173	0.0104	0.0069	0	0.0035	0	0	0
2013	0.67	0	0.2052	0.1382	0.0879	0.0503	0.0670	0.0419	0.0628	0.0042	0.0084	0.0042	0	0	0
2014	0.41	0	0.0080	0.1880	0.1460	0.0400	0.0120	0.0020	0.0100	0.0020	0.0020	0.0000	0	0	0
2015	0.20	0	0.0068	0.0441	0.0780	0.0576	0.0034	0.0034	0.0034	0.0000	0.0000	0.0034	0	0	0
2016	0.48	0.0074	0.2642	0.0186	0.0707	0.0856	0.0074	0.0112	0.0000	0.0074	0.0037	0	0.0037	0	0
2017	0.34	0	0.0296	0.0739	0.0961	0.0591	0.0222	0.0222	0.0222	0.0074	0.0000	0.0074	0	0	0
2018	0.57	0	0.0291	0.2580	0.1706	0.0208	0.0208	0.0374	0.0208	0	0	0	0	0	0.0083
2019	0.91	0.0039	0.0511	0.2260	0.5346	0.0688	0.0138	0.0079	0.0039	0	0	0	0	0	0
2020							No Spring Survey in 2020								
2021	0.38	0	0.0608	0.1558	0.0684	0.0570	0.0304	0.0038	0.0000	0	0.0038	0	0	0	0
2022	0.92	0	0.0815	0.0575	0.2444	0.2827	0.1438	0.0671	0.0240	0.0096	0.0096	0	0	0	0
84-21 mean		**0.0039**	**0.1174**	**0.1208**	**0.0988**	**0.0739**	**0.0495**	**0.0254**	**0.0110**	**0.0044**	**0.0022**	**0.0010**	**0.0002**	**0.0000**	**0.0002**

Table 5.24. Summer flounder indices-at-age, 1984-2022.

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. In 2015-2022, LISTS age data for all size fish captured were incorporated into the age key. Indices-at-age were determined for each season by apportioning the spring and fall overall indices (from Table 5.18 and Table 5.19) by the percentage of fish in each age.

Spring

Year	0-12	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
1984	0.6291	0	0.3236	0.2610	0.0445	0	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	0
1986	0.9510	0	0.7700	0.0892	0.0742	0.0126	0.0050	0	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	0
1988	0.4986	0	0.2317	0.2232	0.0352	0.0085	0	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	0
1990	0.3475	0	0.3053	0.0201	0.0156	0.0065	0	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	0
1992	0.5546	0	0.3182	0.1906	0.0229	0	0.0229	0	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	0
1994	0.8601	0	0.4959	0.3136	0.0324	0	0	0	0.0182	0	0	0	0	0
1995	0.2796	0	0.2023	0.0608	0.0110	0	0	0	0.0055	0	0	0	0	0
1996	0.9609	0	0.6216	0.2370	0.0868	0	0.0052	0	0.0103	0	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	0
1998	1.3067	0	0.0734	0.5952	0.4693	0.1167	0.0324	0.0197	0	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	0
2000	1.7898	0	0.3805	0.7853	0.4240	0.0538	0.1316	0.0092	0	0.0054	0	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	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	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	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	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	0
2006	0.6129	0	0.0383	0.3597	0.0676	0.0654	0.0337	0.0263	0.0168	0.0051	0	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	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	0
2009	1.9295	0	0.7772	0.3770	0.2905	0.1804	0.1949	0.0700	0.0258	0.0101	0.0036	0	0	0
2010	2.6878	0	1.8671	0.2805	0.2113	0.1439	0.0944	0.0416	0.0244	0.0142	0.0052	0.0052	0	0
2011	3.8479	0	1.0024	1.0839	0.8014	0.3820	0.3159	0.1098	0.0628	0.0580	0.0171	0.0146	0	0
2012	3.0620	0	0.4684	0.6283	0.9746	0.6346	0.2044	0.0754	0.0333	0.0224	0.0050	0.0113	0.0043	0
2013	3.2359	0	0.8843	0.6681	0.6637	0.6734	0.2047	0.0818	0.0201	0.0184	0.0041	0.0044	0.0129	0
2014	3.0018	0	0.9679	0.7073	0.4854	0.4332	0.2981	0.0466	0.0369	0.0126	0.0072	0.0022	0.0022	0.0022
2015	1.6341	0	0.7770	0.3569	0.2050	0.1232	0.0904	0.0487	0.0176	0.0093	0.0017	0.0018	0.0020	0.0005
2016	1.3568	0	0.1449	0.4154	0.3449	0.1985	0.0952	0.0771	0.0503	0.0216	0.0055	0.0006	0.0028	0
2017	1.6498	0	0.5364	0.4108	0.3073	0.1483	0.1105	0.0495	0.0463	0.0235	0.0074	0.0098	0	0
2018	2.6395	0	1.5411	0.4948	0.2277	0.1749	0.0985	0.0390	0.0146	0.0182	0.0170	0.0083	0.0054	0
2019	4.8467	0	3.4315	0.7787	0.289	0.0957	0.1194	0.0673	0.0275	0.0144	0.0121	0.0057	0.0033	0.0021
2020							No Spring Survey in 2020							
2021	4.1610	0	1.0825	1.1891	0.9064	0.4908	0.2332	0.1153	0.0463	0.0464	0.0222	0	0.0055	0.0233
2022	1.4691	0	0.4765	0.2859	0.2683	0.1889	0.1314	0.0605	0.0316	0.0068	0.0089	0.0089	0.0014	0
84-21 Mean	**1.7066**	**0.0000**	**0.6887**	**0.4469**	**0.2734**	**0.1499**	**0.0788**	**0.0350**	**0.0172**	**0.0092**	**0.0038**	**0.0019**	**0.0012**	**0.0008**

Fall

Year	0-12	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
1984	0.9888	0	0.5648	0.3269	0.0713	0.0140	0.0042	0.0042	0.0034	0	0	0	0	0
1985	1.1931	0.2453	0.3605	0.4984	0.0804	0	0.0085	0	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	0
1987	1.3963	0.0749	1.0573	0.2309	0.0305	0.0027	0	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	0
1989	0.1363	0	0.0227	0.1051	0.0085	0	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	0
1991	1.2557	0.0363	0.8141	0.3457	0.0432	0.0082	0.0041	0.0041	0	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	0
1993	1.1113	0.0842	0.8371	0.1490	0.0362	0.0029	0	0.0019	0	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	0
1995	0.5408	0.0424	0.3812	0.1043	0.0090	0.0039	0	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	0
1997	2.4980	0.0693	0.8494	1.2261	0.3016	0.0321	0.0099	0.0084	0.0012	0	0	0	0	0
1998	1.7153	0	0.3251	1.0456	0.2867	0.0392	0.0187	0	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	0
2000	1.9134	0.1151	0.5117	0.8244	0.2971	0.1122	0.0433	0.0067	0	0.0029	0	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	0
2002	6.1211	0.4415	3.0870	1.9304	0.4769	0.1216	0.0429	0.0168	0.0040	0	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	0
2004	1.9537	0.2545	0.3848	0.7551	0.4398	0.0804	0.0241	0.0150	0	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	0
2006	1.3148	0.0976	0.2170	0.5915	0.2299	0.0957	0.0435	0.0214	0.0182	0	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	0
2008	3.0853	0.7816	0.4848	0.9581	0.4458	0.3256	0.0804	0.0090	0	0	0	0	0	0
2009	3.1169	0.4054	0.6606	0.8883	0.6241	0.3182	0.1330	0.0437	0.0244	0.0070	0.0122	0.0000	0.0000	0
2010							No Fall Survey in 2010							
2011	2.5578	0.1173	0.6933	0.9333	0.5641	0.1232	0.0543	0.0275	0.0130	0.0130	0.0061	0.0052	0.0075	0
2012	3.7358	0.1633	0.4592	0.8283	1.4239	0.5848	0.1836	0.0631	0.0296	0	0	0	0	0
2013	3.0664	0.2181	0.5709	0.6080	0.8049	0.6328	0.1789	0.0291	0.0139	0.0016	0	0.0082	0	0
2014	1.7086	0.1231	0.4034	0.3945	0.3620	0.2825	0.0823	0.0294	0.0205	0.0078	0	0.0031	0	0
2015	2.0218	0.0547	0.5740	0.6717	0.3957	0.1830	0.0821	0.0347	0.0135	0.0086	0	0.0038	0	0
2016	1.9198	0.0361	0.2401	0.6223	0.5563	0.2687	0.1223	0.0319	0.0421	0	0	0	0	0
2017	1.3544	0.2231	0.6948	0.1862	0.1197	0.0746	0.0320	0.0160	0.0000	0.0080	0	0	0	0
2018	2.4292	0.3096	0.8139	0.6373	0.2754	0.2147	0.1076	0.0161	0.0274	0.0181	0.0053	0.0015	0.0023	0
2019	1.4351	0.0180	0.6459	0.4507	0.1263	0.0855	0.0486	0.0184	0.0118	0.0157	0.0077	0.0043	0.0000	0
2020							No Fall Survey in 2020							
2021	3.0464	0.2913	0.5946	0.8952	0.6809	0.3288	0.1296	0.0646	0.0177	0.0302	0.0071	0	0.0064	0
2022	2.5945	0.4015	0.7963	0.7179	0.2873	0.2086	0.1233	0.0109	0.0194	0.0087	0.0124	0.0055	0.0027	0

Table 5.25. Tautog indices-at-age, 1984-2019.

Year and season specific age keys obtained from the LISTS spring and fall surveys were used to convert LISTS length frequencies to ages. Indices-at-age were then determined for each season by apportioning the spring and fall overall indices (from Table 5.18 and Table 5.19) by the percentage of fish in each age, and then summing the spring and fall indices-at-age. The age 1-20+ index is the sum of indices ages 1 – 20+. The age 20+ category includes 36 fish ranging from 20 to 30 years of age.

Note: The 2021/ 2022* ageing is not yet complete.

		Age									
Year	**1 - 20+**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1984	3.4690	0.0109	0.0816	0.1898	0.3030	0.4584	0.4941	0.2911	0.2861	0.3101	0.3531
1985	1.7967	0	0.0212	0.0964	0.1888	0.1655	0.1280	0.1833	0.3004	0.2020	0.0902
1986	1.7201	0.0010	0.0277	0.0971	0.0481	0.1025	0.2009	0.2409	0.2453	0.2864	0.1016
1987	1.2128	0.0243	0.0799	0.0589	0.0594	0.1002	0.1353	0.1911	0.1348	0.0955	0.0522
1988	0.9007	0.0034	0.0335	0.0467	0.0714	0.0446	0.0399	0.0755	0.1007	0.1641	0.0790
1989	1.2590	0	0.0443	0.0691	0.1353	0.0885	0.1154	0.1495	0.1600	0.1046	0.0817
1990	1.1613	0.0112	0.0830	0.1559	0.1112	0.1145	0.0498	0.0502	0.1245	0.0872	0.0623
1991	1.1469	0.0055	0.0279	0.0548	0.1181	0.1241	0.1487	0.0931	0.1253	0.1071	0.1067
1992	1.0253	0.0188	0.0495	0.0715	0.0410	0.0489	0.1230	0.1323	0.0849	0.0632	0.0636
1993	0.5695	0.0035	0.0216	0.0519	0.0299	0.0160	0.0606	0.0595	0.0423	0.0489	0.0522
1994	0.5837	0.0094	0.0373	0.0320	0.0675	0.0555	0.0551	0.0555	0.0799	0.0516	0.0312
1995	0.2530	0.0033	0.0094	0.0087	0.0296	0.0609	0.0265	0.0214	0.0346	0.0150	0.0219
1996	0.5628	0.0073	0.0518	0.0305	0.0086	0.0762	0.0452	0.0654	0.0712	0.0667	0.0609
1997	0.5079	0	0.0390	0.0675	0.0568	0.0574	0.0639	0.0491	0.0556	0.0486	0.0101
1998	0.6442	0	0.0425	0.0281	0.0701	0.0821	0.0876	0.0875	0.0848	0.0465	0.0575
1999	0.7614	0.0498	0.0792	0.0583	0.0666	0.1015	0.1379	0.0748	0.0843	0.0431	0.0203
2000	0.8003	0.0008	0.0469	0.0577	0.0831	0.0739	0.1402	0.1376	0.0897	0.0392	0.0467
2001	0.8947	0.0062	0.0308	0.0859	0.0830	0.1294	0.1197	0.1193	0.1058	0.0715	0.0454
2002	1.1665	0.0103	0.0234	0.0596	0.1011	0.1748	0.1972	0.1895	0.2091	0.0739	0.0419
2003	0.8976	0.0032	0.0130	0.0077	0.0597	0.1485	0.2385	0.1596	0.0893	0.0778	0.0185
2004	0.6936	0.0067	0.0213	0.0152	0.0359	0.0709	0.1930	0.1096	0.0494	0.0812	0.0441
2005	0.7596	0.0100	0.0367	0.0618	0.0261	0.0922	0.1437	0.1576	0.1064	0.0303	0.0268
2006	0.8405	0	0.0334	0.0345	0.1039	0.1274	0.1140	0.1196	0.1521	0.0620	0.0479
2007	0.6136	0.0035	0.0125	0.0173	0.0459	0.0478	0.0608	0.0918	0.0935	0.0966	0.0533
2008	0.7268	0.0065	0.0272	0.0435	0.0620	0.0848	0.1164	0.0708	0.0649	0.0831	0.0640
2009	0.4821	0.0143	0.0368	0.0067	0.0026	0.0394	0.0681	0.1013	0.0658	0.0319	0.0324
2010	0.2472	0	0.0053	0.0455	0.0093	0.0053	0.0315	0.0503	0.0294	0.0096	0.0093
2011	0.4456	0.0180	0.0401	0.0532	0.0303	0.0301	0.0612	0.0630	0.0415	0.0267	0.0167
2012	0.5809	0.0270	0.1148	0.0919	0.0808	0.0635	0.0389	0.0384	0.0499	0.0489	0.0115
2013	0.5781	0.0075	0.0653	0.0561	0.1211	0.0857	0.0912	0.0532	0.0386	0.0215	0.0214
2014	0.6958	0	0.0281	0.1540	0.0854	0.1112	0.1286	0.0754	0.0522	0.0243	0.0185
2015	0.6160	0.0422	0.0494	0.0714	0.0717	0.0759	0.0981	0.0900	0.0584	0.0266	0.0149
2016	0.8239	0.0005	0.0914	0.0961	0.1033	0.1003	0.1522	0.1358	0.0749	0.0414	0.0100
2017	0.5218	0.0132	0.0200	0.0942	0.0476	0.0338	0.0610	0.0746	0.0474	0.0272	0.0408
2018	0.8975	0.0191	0.0813	0.1399	0.1183	0.1756	0.1086	0.1071	0.0710	0.0238	0.0042
2019	0.8710	0.0141	0.0751	0.1179	0.1237	0.1328	0.1148	0.1068	0.0667	0.0639	0.0312
2020						No Spring or Fall Sampling					
2021*	0.9865	Ageing Not Complete									
2022*	1.0209	Ageing Not Complete									
84-20											
Mean	**0.8813**	**0.0098**	**0.0440**	**0.0674**	**0.0778**	**0.0972**	**0.1164**	**0.1075**	**0.0992**	**0.0751**	**0.0512**

	Age									
Year	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20+**
1984	0.1257	0.2280	0.0932	0.0506	0.0447	0.0322	0.0467	0.0155	0.0006	0.0536
1985	0.1595	0.0982	0.0226	0.0994	0	0.0249	0.0039	0.0124	0	0
1986	0.1422	0.0863	0.0375	0.0521	0.0232	0.0071	0.0114	0.0003	0.0023	0.0062
1987	0.0606	0.0543	0.0478	0.0313	0.0245	0.0267	0.0104	0.0004	0.0048	0.0204
1988	0.0469	0.0395	0.0295	0.0225	0.0493	0.0086	0.0063	0.0055	0.0052	0.0286
1989	0.0569	0.0932	0.0430	0.0404	0.0348	0.0172	0.0067	0.0048	0	0.0136
1990	0.0979	0.0375	0.0568	0.0397	0.0220	0.0249	0.0089	0.0169	0.0035	0.0034
1991	0.0609	0.0258	0.0399	0.0361	0.0216	0.0007	0.0159	0.0117	0.0080	0.0150
1992	0.0599	0.0512	0.0440	0.0581	0.0236	0.0208	0.0167	0.0298	0.0167	0.0078
1993	0.0368	0.0351	0.0351	0.0129	0.0157	0.0152	0.0129	0.0097	0.0097	0
1994	0.0234	0.0238	0.0071	0.0118	0.0118	0.0096	0.0024	0.0047	0.0070	0.0071
1995	0.0036	0.0036	0.0073	0	0	0	0.0036	0	0	0.0036
1996	0.0230	0.0126	0.0103	0.0048	0.0099	0.0090	0.0087	0.0004	0.0001	0.0002
1997	0.0072	0.0119	0.0144	0.0048	0.0121	0.0071	0	0.0024	0	0
1998	0.0192	0.0164	0.0055	0.0055	0	0.0027	0.0055	0	0	0.0027
1999	0.0191	0.0090	0.0087	0.0029	0	0	0.0030	0.0029	0	0
2000	0.0213	0.0130	0.0123	0.0101	0.0084	0.0104	0.0023	0	0.0027	0.0040
2001	0.0407	0.0161	0.0152	0.0004	0.0053	0.0105	0.0036	0.0001	0.0026	0.0032
2002	0.0257	0.0185	0.0107	0.0070	0.0147	0.0039	0	0	0	0.0052
2003	0.0274	0.0088	0.0059	0.0184	0.0029	0.0124	0	0.0029	0	0.0031
2004	0.0204	0.0221	0.0119	0.0003	0.0028	0.0032	0.0026	0.0003	0	0.0027
2005	0.0347	0.0257	0.0039	0.0037	0	0	0	0	0	0
2006	0.0183	0.0200	0.0037	0	0.0037	0	0	0	0	0
2007	0.0294	0.0156	0.0194	0.0108	0.0019	0.0116	0	0.0019	0	0
2008	0.0322	0.0225	0.0228	0.0163	0.0098	0	0	0	0	0
2009	0.0343	0.0064	0.0091	0.0217	0.0070	0.0032	0.0011	0	0	0
2010	0.0192	0.0139	0.0048	0.0046	0.0046	0	0	0	0.0046	0
2011	0.0167	0.0161	0.0080	0.0080	0.0040	0	0.0040	0.0080	0	0
2012	0	0.0077	0.0038	0	0.0038	0	0	0	0	0
2013	0.0066	0	0	0.0033	0.0033	0.0033	0	0	0	0
2014	0.0148	0	0	0.0033	0	0	0	0	0	0
2015	0.0060	0.0016	0.0033	0.0049	0	0	0.0016	0	0	0
2016	0.0056	0.0023	0.0046	0.0032	0	0.0023	0	0	0	0
2017	0.0204	0.0136	0.0144	0.0068	0	0	0	0	0	0.0068
2018	0.0007	0.0003	0.0115	0.0177	0	0.008	0	0.0035	0	0.0069
2019	0.0132	0.0086	0	0	0	0	0.0022	0	0	0
2020					No Spring or Fall Sampling					
2021*	Ageing Not Complete									
2022*	Ageing Not Complete									
84-20										
Mean	**0.0370**	**0.0294**	**0.0186**	**0.0170**	**0.0102**	**0.0077**	**0.0050**	**0.0037**	**0.0019**	**0.0054**

Table 5.26. Weakfish age 0 and age 1+ indices of abundance, 1984-2022.

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

	Fall		Fall		Spring	
Year	age 0 count / tow	age 0 kg / tow	ages 1+ count / tow	age 1+ kg / tow	ages 1+ count / tow	ages 1+ kg / tow
1984	1.00	0.14	0.53	0.84	0.02	0.15
1985	6.19	0.74	0.24	0.46	0.00	0.10
1986	13.16	0.91	0.24	0.51	0.10	0.33
1987	0.63	0.13	0.11	0.16	0.02	0.11
1988	3.49	0.30	0.06	0.13	0.05	0.17
1989	8.69	0.94	0.02	0.10	0.04	0.16
1990	5.56	0.56	0.08	0.13	0.07	0.13
1991	11.95	1.44	0.31	0.41	0.28	0.26
1992	3.05	0.31	0.18	0.24	0.12	0.22
1993	4.08	0.46	0.12	0.18	0.10	0.15
1994	11.19	1.23	0.06	0.13	0.04	0.12
1995	5.22	0.84	0.70	0.64	0.18	0.16
1996	15.23	1.49	0.56	0.52	0.19	0.19
1997	12.38	1.03	0.89	0.81	0.42	0.34
1998	5.02	0.76	0.28	0.36	0.37	0.41
1999	30.93	3.21	0.39	0.51	0.45	0.59
2000	63.31	3.34	0.30	0.32	0.18	0.28
2001	40.09	2.20	0.52	0.54	0.27	0.26
2002	41.35	2.85	0.16	0.26	0.16	0.26
2003	49.41	1.77	0.07	0.17	0.04	0.14
2004	58.98	2.99	0.21	0.25	0.15	0.16
2005	25.86	2.50	0.12	0.18	0.27	0.23
2006	1.05	0.20	0.29	0.30	0.14	0.22
2007	63.93	3.86	0.06	0.14	0.11	0.22
2008	9.03	1.17	0.08	0.14	0.05	0.12
2009	6.48	0.57	0.30	0.22	0.08	0.16
2010	-	-	-	-	0.02	0.12
2011	11.64	0.87	0.68	0.55	0.10	0.15
2012	21.96	1.47	0.73	0.69	0.62	0.56
2013	7.01	0.59	0.52	0.52	0.52	0.44
2014	41.53	2.27	0.08	0.12	0.17	0.23
2015	30.91	3.11	0.46	0.35	0.03	0.11
2016	5.87	0.73	0.81	0.59	0.85	0.43
2017	8.20	0.94	0.43	0.40	0.57	0.42
2018	25.66	1.68	0.56	0.40	0.04	0.12
2019	14.33	0.74	1.26	0.79	0.53	0.28
2020	-	-	-	-	-	-
2021	27.94	2.21	1.50	1.10	0.88	0.56
2022	34.83	3.49	0.60	0.58	0.25	0.24
84-21 mean	**19.23**	**1.40**	**0.39**	**0.39**	**0.22**	**0.24**

Table 5.27. Winter flounder indices-at-age, 1984-2022.

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 8).

Catch-at-age: numbers									April-May							
Year	**1 - 13**	**4+**	**Age 0**	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11**	**Age 12**	**Age 13**
1984	111.96	27.91	-	8.21	44.01	31.83	20.96	4.23	1.23	0.67	0.74	0.04	0.01	0.03	0	0
1985	83.58	18.13	-	4.11	28.46	32.88	14.17	2.33	0.82	0.45	0.19	0.11	0.04	0.02	0	0
1986	63.65	15.43	-	6.69	26.00	15.53	12.26	2.05	0.50	0.24	0.24	0.10	0.01	0.03	0	0
1987	79.92	13.35	-	7.32	44.69	14.56	5.05	6.55	1.28	0.11	0.24	0.13	0	0	0	0
1988	137.59	12.13	15.40	14.49	71.87	39.10	8.59	1.83	1.46	0.16	0.04	0.02	0.02	0	0	0
1989	148.19	14.97	1.66	13.56	78.43	41.23	10.85	2.84	0.98	0.14	0.09	0.06	0.01	0	0	0
1990	223.09	15.29	2.80	11.31	131.52	64.97	8.97	4.09	1.96	0.19	0.05	0	0.02	0	0	0
1991	150.20	14.31	5.23	8.52	66.99	60.39	9.31	4.05	0.80	0.14	0	0	0	0.01	0	0
1992	61.39	10.49	11.90	6.80	31.32	12.78	8.97	1.10	0.36	0.05	0	0	0	0	0	0
1993	63.60	9.16	5.68	19.11	19.87	15.46	4.81	3.24	0.80	0.15	0.11	0.04	0.01	0	0	0
1994	84.44	4.87	14.23	9.57	64.14	5.86	3.01	1.14	0.49	0.17	0.05	0.01	0.01	0	0	0
1995	50.12	2.31	10.10	14.35	23.69	9.77	1.36	0.63	0.20	0.08	0.02	0.02	0.00	0	0	0
1996	110.62	15.92	19.22	11.46	59.07	24.17	14.41	0.97	0.28	0.14	0.06	0.04	0.01	0	0	0
1997	71.31	13.84	7.47	12.53	25.53	19.41	9.45	3.76	0.51	0.07	0.03	0.01	0.01	0.01	0	0
1998	72.91	17.06	9.16	11.22	32.40	12.23	12.67	3.15	0.99	0.14	0.02	0.07	0	0	0	0
1999	41.35	11.10	8.70	6.56	12.42	11.27	6.09	3.20	1.14	0.61	0.04	0.01	0.02	0	0	0
2000	45.41	13.25	4.33	7.11	16.66	8.40	7.70	3.42	1.53	0.31	0.26	0.01	0.01	0	0.01	0
2001	54.50	15.61	1.34	8.45	19.60	10.85	8.06	5.46	1.28	0.68	0.05	0.08	0	0	0	0
2002	43.71	7.99	3.06	6.27	19.90	9.56	4.43	1.95	1.02	0.35	0.11	0.03	0.10	0	0	0
2003	27.84	8.83	8.07	2.47	7.83	8.71	4.79	1.95	0.77	0.82	0.29	0.07	0.14	0	0	0
2004	20.46	6.81	10.96	6.32	3.88	3.45	3.88	1.92	0.64	0.21	0.11	0.03	0.01	0	0	0.01
2005	16.10	2.03	5.63	7.06	6.18	0.84	0.81	0.67	0.21	0.16	0.10	0.05	0.01	0.01	0	0
2006	5.59	0.74	0.93	1.14	2.60	1.10	0.19	0.14	0.17	0.09	0.01	0.09	0.03	0.02	0	0
2007	28.68	4.16	4.73	2.98	10.83	10.70	3.10	0.61	0.15	0.11	0.12	0.04	0.01	0.01	0.01	0
2008	24.11	4.97	1.97	11.46	3.49	4.18	4.12	0.65	0.12	0.04	0.03	0.01	0	0	0.01	0
2009	22.65	2.86	0.77	7.56	11.21	1.02	1.31	1.21	0.22	0.06	0.04	0	0.01	0	0.01	0
2010	20.88	1.84	0.96	6.64	8.45	3.94	0.71	0.57	0.44	0.11	0.01	0	0	0	0	0
2011	27.95	5.55	1.12	6.54	9.34	6.53	3.66	1.15	0.30	0.39	0.04	0	0	0	0	0
2012	15.80	2.83	0.29	4.84	5.61	2.51	1.97	0.62	0.09	0.06	0.05	0.03	0	0	0	0
2013	10.08	4.03	0.27	0.61	3.50	1.94	1.96	1.33	0.48	0.10	0.08	0.05	0.02	0	0	0
2014	5.90	2.34	0.47	0.84	0.64	2.08	1.36	0.62	0.26	0.06	0.03	0.01	0	0	0	0
2015	3.94	1.92	0.64	0.89	0.85	0.29	0.64	0.65	0.22	0.27	0.11	0.02	0	0.005	0.01	0
2016	3.98	1.32	0.63	1.02	0.98	0.66	0.32	0.46	0.16	0.11	0.17	0.06	0	0	0	0
2017	0.99	0.25	1.03	0.02	0.32	0.40	0.20	0	0.02	0	0.02	0	0	0	0	0
2018	3.59	1.28	0.42	0.96	0.50	0.86	0.81	0.24	0.06	0.09	0.03	0.01	0.03	0	0	0
2019	1.85	0.52	0.69	0.52	0.57	0.25	0.24	0.18	0.03	0.01	0.03	0.01	0.01	0	0	0
2020	-	-	0.42	No Spring Survey in 2020												
2021	2.44	0.44	0.43	0.96	0.80	0.39	0.17	0.03	0.05	0.04	0	0	0	0	0	0
2022	1.64	0.43	0.27	0.42	0.34	0.46	0.25	0.09	0.02	0.03	0.02	0.01	0	0	0	0
84-21 Mean	52.44	8.27	4.73	6.77	24.17	13.25	5.44	1.86	0.60	0.21	0.10	0.03	0.02	0.00	0.00	0.00

Catch-at-age: biomass (kg)									April-May							
Year	**1-13**	**4+**	**Age 0**	**Age 1**	**Age 2**	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**	**Age 8**	**Age 9**	**Age 10**	**Age 11**	**Age 12**	**Age 13**
1984	15.68	7.81	NA	0.31	3.06	4.50	5.18	1.51	0.49	0.30	0.28	0.03	0.01	0.01	0	0
1985	13.91	5.96	NA	0.15	2.54	5.26	3.97	0.97	0.46	0.33	0.11	0.08	0.03	0.02	0	0
1986	10.33	5.39	NA	0.24	2.16	2.55	3.68	0.88	0.32	0.21	0.16	0.09	0.01	0.03	0	0
1987	11.76	4.94	NA	0.30	4.03	2.50	1.39	2.59	0.64	0.08	0.14	0.09	0	0	0	0
1988	18.28	4.51	NA	0.54	6.06	7.17	2.64	0.93	0.74	0.12	0.03	0.02	0.03	0	0	0
1989	22.62	5.64	NA	0.43	7.99	8.56	3.62	1.32	0.47	0.10	0.07	0.05	0.01	0	0	0
1990	29.01	7.09	NA	0.33	10.37	11.21	3.79	2.19	0.89	0.14	0.04	0	0.04	0	0	0
1991	24.59	5.54	NA	0.32	6.82	11.92	3.53	1.47	0.43	0.10	0	0	0	0.01	0	0
1992	12.29	4.79	NA	0.27	3.82	3.41	3.81	0.71	0.25	0.02	0	0	0	0	0	0
1993	10.26	4.43	NA	0.54	1.93	3.36	1.96	1.73	0.51	0.11	0.08	0.04	0.01	0	0	0
1994	12.20	2.95	NA	0.34	7.13	1.79	1.51	0.77	0.43	0.16	0.06	0.01	0.01	0	0	0
1995	7.72	1.39	NA	0.51	2.70	3.12	0.71	0.39	0.18	0.08	0.02	0.01	0.01	0	0	0
1996	20.41	7.36	NA	0.41	6.11	6.53	6.32	0.61	0.22	0.12	0.06	0.03	0.01	0	0	0
1997	15.53	6.96	NA	0.48	2.61	5.48	4.26	2.23	0.36	0.07	0.03	0.01	0.01	0.01	0	0
1998	14.66	7.28	NA	0.36	3.59	3.43	4.88	1.64	0.60	0.09	0.02	0.05	0	0	0	0
1999	10.29	5.32	NA	0.23	1.41	3.33	2.60	1.59	0.69	0.39	0.02	0.00	0.03	0	0	0
2000	12.63	7.22	NA	0.32	2.31	2.78	3.68	2.05	0.96	0.29	0.21	0.01	0.01	0	0.01	0
2001	14.02	7.94	NA	0.27	2.33	3.48	3.39	3.05	0.87	0.51	0.05	0.07	0	0	0	0
2002	10.83	4.41	NA	0.31	3.05	3.06	2.13	1.12	0.70	0.28	0.09	0.02	0.07	0	0	0
2003	8.87	5.03	NA	0.09	0.96	2.79	2.35	1.21	0.50	0.59	0.23	0.06	0.08	0	0	0
2004	6.11	4.19	NA	0.19	0.53	1.20	2.13	1.24	0.50	0.18	0.10	0.02	0.01	0	0	0.01
2005	3.37	1.75	NA	0.28	0.96	0.38	0.57	0.61	0.22	0.17	0.09	0.06	0.02	0.01	0	0
2006	1.82	0.71	NA	0.06	0.48	0.58	0.16	0.13	0.17	0.08	0.02	0.09	0.05	0.02	0	0
2007	7.02	2.34	NA	0.12	1.18	3.38	1.55	0.37	0.14	0.10	0.11	0.03	0.01	0.01	0.01	0
2008	5.08	3.00	NA	0.39	0.39	1.30	2.31	0.47	0.11	0.05	0.04	0.01	0	0	0.01	0
2009	3.96	1.89	NA	0.28	1.48	0.32	0.68	0.88	0.20	0.05	0.04	0	0.01	0	0.02	0
2010	4.26	1.38	NA	0.24	1.16	1.49	0.40	0.45	0.42	0.10	0.01	0	0	0	0	0
2011	6.72	3.19	NA	0.23	1.34	1.96	1.81	0.78	0.22	0.35	0.04	0	0	0	0	0
2012	3.88	1.85	NA	0.20	0.93	0.90	1.13	0.47	0.09	0.06	0.06	0	0	0	0	0
2013	3.42	2.45	NA	0.02	0.37	0.57	0.98	0.86	0.39	0.07	0.08	0.06	0	0	0	0
2014	2.33	1.48	NA	0.03	0.09	0.73	0.74	0.44	0.21	0.06	0.03	0.01	0	0	0	0
2015	1.19	0.99	NA	0.02	0.09	0.08	0.27	0.33	0.13	0.16	0.07	0.01	0	0.01	0.004	0
2016	1.08	0.73	NA	0.03	0.13	0.19	0.14	0.25	0.10	0.07	0.10	0.04	0.03	0	0	0
2017	0.34	0.14	NA	0.00	0.04	0.16	0.10	0	0.02	0	0.02	0	0	0	0	0
2018	1.22	0.83	NA	0.03	0.06	0.30	0.46	0.16	0.06	0.09	0.02	0.01	0.03	0	0	0
2019	0.60	0.38	NA	0.02	0.10	0.10	0.13	0.13	0.04	0.01	0.04	0.01	0.01	0	0	0
2020	-	-	NA	No Spring Survey in 2020												
2021	0.67	0.22	NA	0.06	0.19	0.19	0.10	0.02	0.06	0.04	0	0	0	0	0	0
2022	0.48	0.24	NA	0.02	0.05	0.17	0.12	0.05	0.01	0.03	0.01	0.01	0	0	0	0
84-21 Mean	9.43	3.77	NA	0.24	2.45	2.97	2.14	0.99	0.37	0.15	0.07	0.03	0.01	0.00	0.00	0.00

Note years with non-standard # of tows: 1984: April = 0 tows, May = 13 tows, and 19 tows in June used to increase sample size; 1985: April = 0 tows, May = 41 tows; 1992 and 2006: April = 0 tows, May = 40; 1996: April = 17 tows, May = 63 tows; 2005: April = 35 tows, May = 45 tows; 2007: April = 35 tows, May = 45 tows; 2008: April = 36, and May = 44 tows; 2010: May = 38 tows; 2011: April = 12 tows; 2016: April = 36 tows; 2017: April = 0 tows, May = 24 tows; 2018: Apr=12 tows, May 40 tows; 2020 No sampling; 2021: April = 0 tows, May = 33 tows; 2022: April=33 tows, May=40 tows.

TABLES 5.28 - 5.65
LENGTH FREQUENCIES
LISTS

Table 5.28. Alewife length frequencies, spring and fall, 1 cm intervals, 1989–2022.

From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

Spring

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
5	0	0	0	0	0	0	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
6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0
7	0	0	0	0	2	0	0	0	0	0	0	4	0	0	1	0	1	0	0	4	0	2	1	0	0	0	3	1	0	0	1	-	0	0
8	0	0	0	0	18	3	3	0	0	0	2	9	16	0	3	1	2	0	0	4	1	10	0	1	3	2	12	9	0	1	17	-	0	0
9	0	0	2	0	15	9	6	1	6	0	6	21	32	1	18	6	16	0	0	4	6	10	0	3	7	5	11	27	0	4	40	-	0	0
10	0	0	0	1	11	19	18	2	22	7	6	28	23	5	32	55	32	0	8	5	11	23	5	6	16	7	16	81	0	4	28	-	1	1
11	0	0	5	4	10	44	11	2	64	11	20	52	14	6	27	87	26	29	13	32	10	9	22	8	11	16	13	230	0	33	61	-	0	3
12	6	0	4	7	6	83	17	8	127	12	32	43	5	29	25	100	55	44	34	131	17	6	54	27	19	15	7	303	0	46	119	-	1	17
13	1	0	4	4	47	122	48	16	63	44	42	99	4	70	11	83	61	15	38	193	24	12	48	98	18	24	6	181	0	67	224	-	0	34
14	0	0	9	7	77	172	35	26	69	61	56	234	7	139	28	63	37	9	37	178	51	6	50	187	14	33	6	351	0	111	230	-	0	49
15	3	0	8	5	68	140	54	32	56	51	120	334	6	157	25	33	50	49	85	86	101	8	59	123	12	48	7	407	0	103	181	-	0	49
16	2	0	8	5	84	159	38	86	44	50	144	320	4	86	26	31	74	25	128	46	106	7	37	56	5	53	5	375	0	119	70	-	1	36
17	5	4	4	16	63	108	32	203	28	34	330	85	5	82	21	33	73	78	161	47	142	5	7	27	10	16	5	353	0	50	32	-	0	29
18	4	4	9	8	59	81	7	254	32	22	136	15	4	15	19	18	71	93	182	25	196	2	11	17	21	30	5	263	6	53	9	-	3	6
19	6	7	7	2	37	33	7	180	9	11	99	20	3	6	26	42	59	86	122	49	215	7	11	24	22	24	9	89	1	61	61	-	2	18
20	3	1	7	2	27	24	10	161	17	17	82	22	9	17	13	30	26	76	105	38	137	7	9	19	10	50	3	32	0	90	124	-	4	16
21	1	0	3	1	13	17	14	107	34	22	72	27	12	28	22	50	21	40	71	21	53	18	9	18	28	58	9	51	1	132	55	-	6	14
22	4	2	8	2	10	26	12	103	48	18	47	41	18	46	25	48	18	18	41	14	29	22	10	24	34	25	20	21	0	83	22	-	2	6
23	5	1	8	6	3	12	12	76	44	16	47	90	36	63	40	36	7	5	28	16	13	12	16	27	39	8	17	7	0	31	25	-	4	8
24	7	0	3	2	1	12	7	34	28	14	21	58	45	49	42	13	6	1	10	7	14	4	7	18	15	18	12	4	0	24	22	-	1	6
25	3	2	1	0	3	5	2	9	9	2	11	11	23	12	29	11	3	1	3	0	11	2	4	11	4	12	10	3	0	6	13	-	4	0
26	1	0	1	2	1	5	1	3	1	2	2	1	5	7	17	5	2	0	2	0	1	0	2	3	3	4	7	4	0	3	4	-	0	0
27	2	0	1	0	0	1	0	0	0	0	0	1	2	1	2	2	1	0	0	0	0	0	0	1	0	1	1	3	0	0	1	-	0	0
28	1	0	0	0	1	1	0	0	0	1	0	0	0	1	0	2	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	-	0	0
29	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
32	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**56**	**21**	**93**	**74**	**556**	**1,076**	**334**	**1,304**	**701**	**395**	**1,275**	**1,515**	**274**	**820**	**452**	**749**	**642**	**569**	**1,068**	**901**	**1,138**	**172**	**364**	**698**	**291**	**449**	**185**	**2,796**	**8**	**1,021**	**1,340**	**-**	**29**	**292**

Fall

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	4	0	-	0	0
6	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
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
8	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	1	0	2	-	0	0	0	0	0	0	0	0	0	-	0	0
9	0	0	0	0	3	1	0	0	1	0	0	1	6	1	1	0	1	0	3	2	0	-	1	0	0	1	3	0	0	2	0	-	0	0
10	0	0	0	0	5	1	4	1	1	0	1	4	23	0	7	1	7	0	8	2	1	-	1	0	0	2	9	0	1	2	0	-	2	2
11	0	0	0	0	27	30	5	5	6	1	3	5	59	0	33	6	14	0	22	1	2	-	9	0	8	0	23	0	0	11	5	-	8	5
12	0	0	0	1	120	82	9	25	12	9	6	9	86	4	64	7	8	0	44	0	2	-	22	2	14	7	32	0	9	9	1	-	20	7
13	0	0	3	0	88	84	14	21	21	7	9	17	72	0	4	12	17	0	87	5	10	-	14	3	16	27	88	0	12	4	2	-	30	32
14	0	0	2	4	16	36	11	30	31	0	11	10	23	3	3	16	15	0	134	14	10	-	22	0	34	48	26	3	3	0	3	-	11	37
15	0	0	1	8	21	31	0	9	53	0	5	8	24	3	5	28	15	2	118	4	8	-	28	2	6	12	53	8	1	1	15	-	6	10
16	3	0	3	10	53	14	4	1	110	1	25	2	36	17	20	30	12	4	31	0	1	-	14	1	2	4	37	4	2	0	24	-	3	1
17	2	0	0	12	25	33	1	2	194	4	34	0	27	8	19	12	3	0	8	3	1	-	19	2	2	0	11	0	0	1	7	-	7	1
18	3	0	0	9	13	24	1	1	62	3	11	1	5	0	0	1	5	0	6	0	1	-	17	0	0	2	14	0	2	0	1	-	7	0
19	0	0	0	2	1	11	0	0	0	1	4	1	0	1	0	0	0	0	7	1	0	-	1	0	1	0	3	0	0	0	0	-	1	0
20	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	-	0	0	0	0	0	0	0	0	1	-	0	0
21	0	0	0	0	3	1	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	0	0	-	0	0
22	0	1	0	0	2	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	1	0
23	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	-	0	0	0	1	1	0	0	0	1	-	0	0
24	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
25	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	1
27	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**8**	**1**	**9**	**46**	**377**	**354**	**50**	**95**	**492**	**27**	**117**	**58**	**364**	**38**	**156**	**113**	**98**	**6**	**468**	**33**	**37**	**-**	**148**	**10**	**83**	**104**	**301**	**15**	**30**	**34**	**60**	**-**	**96**	**96**

Table 5.29. American shad length frequencies, spring, 1 cm intervals, 1989-2022.

From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

	Spring																																	
length	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
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	1	0	0	0	0	0	-	0	0
7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	-	0	0
8	0	0	0	0	2	2	4	0	0	5	1	1	0	0	1	0	3	0	0	0	0	0	0	0	1	0	0	2	0	1	2	-	0	0
9	0	0	0	0	6	0	13	0	6	4	4	4	2	13	5	1	3	0	0	0	1	0	0	0	10	7	1	14	0	1	8	-	0	1
10	0	0	0	1	4	1	12	1	12	11	12	22	1	30	3	7	6	0	0	7	6	5	1	0	31	21	21	38	0	9	12	-	1	3
11	0	0	1	2	3	1	4	4	12	16	9	24	0	71	10	1	5	0	5	19	6	7	4	3	17	20	18	51	0	6	19	-	15	3
12	0	0	1	3	1	1	2	4	14	36	10	17	2	57	5	3	4	0	9	25	13	6	8	12	23	20	23	68	1	13	16	-	17	4
13	4	0	9	5	3	3	9	5	45	49	21	12	0	30	6	11	6	0	11	53	24	15	20	23	15	12	4	135	1	10	22	-	10	9
14	13	0	29	7	2	6	10	83	54	54	24	8	0	20	0	21	14	6	20	98	29	30	41	42	10	7	5	65	0	9	16	-	7	8
15	36	1	53	10	4	16	12	108	123	55	41	13	2	20	0	24	11	32	34	82	37	47	59	64	10	2	8	61	0	8	14	-	3	1
16	20	4	40	7	4	36	32	117	194	43	30	17	4	31	1	3	3	13	25	34	26	39	16	32	9	2	2	56	0	3	3	-	5	6
17	9	4	9	16	6	36	36	37	125	53	22	15	0	18	2	3	1	1	18	17	14	8	9	14	2	1	3	95	0	0	3	-	3	4
18	5	3	3	17	3	103	27	32	55	22	10	9	0	14	0	1	0	4	7	9	12	2	3	5	2	0	2	54	0	1	2	-	0	2
19	0	2	1	16	3	271	13	15	7	11	10	4	0	3	0	1	0	1	1	2	3	3	0	0	0	1	0	32	0	0	1	-	1	4
20	1	1	2	13	2	118	5	3	1	1	17	1	0	2	1	1	4	0	1	0	2	0	0	0	1	1	0	16	0	0	2	-	1	5
21	0	2	8	12	4	40	1	6	1	0	18	0	0	2	3	1	2	0	2	3	1	2	1	0	0	0	1	0	0	0	8	-	2	7
22	0	1	14	6	3	7	0	6	2	7	31	0	0	5	2	3	6	0	1	3	1	0	0	2	8	8	7	1	0	3	12	-	0	12
23	0	2	17	14	2	11	2	10	3	1	18	4	0	2	5	1	1	0	3	0	3	0	0	8	0	8	12	2	0	2	4	-	0	10
24	0	0	8	4	1	3	0	9	0	2	10	2	2	3	0	0	2	0	4	0	0	1	0	12	0	1	4	2	0	3	15	-	0	16
25	0	2	2	3	0	3	0	5	1	5	4	0	1	1	0	0	1	0	3	0	0	0	0	10	1	1	1	2	0	0	2	-	0	5
26	0	1	1	0	0	2	0	4	0	1	1	1	0	0	0	0	2	0	3	0	0	0	0	3	0	0	0	1	0	0	1	-	0	2
27	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0	0	0	0	0	-	0	0
28	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
31	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
32	0	0	0	0	0	0	0	0	2	0	3	0	0	1	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	1	1	0	0	3	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
34	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
35	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1	-	0	0
36	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
37	0	0	0	1	0	1	0	0	2	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0
38	1	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
39	0	0	0	3	1	2	1	0	0	0	4	0	0	2	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0
40	1	0	0	2	0	1	1	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
41	0	0	1	3	2	2	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
42	0	0	1	4	2	0	0	0	1	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0
43	0	0	0	0	0	1	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	-	0	0
44	0	0	1	2	2	2	2	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
45	1	0	0	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0
46	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
47	0	0	0	0	0	1	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	-	0	0
48	0	0	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	1
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0
50	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
Total	**91**	**24**	**202**	**163**	**61**	**675**	**189**	**451**	**669**	**379**	**313**	**157**	**14**	**336**	**44**	**83**	**79**	**60**	**151**	**353**	**179**	**165**	**162**	**233**	**142**	**120**	**114**	**697**	**3**	**69**	**164**	-	**65**	**103**

Table 5.30. American shad length frequencies, fall, 1 cm intervals, 1989-2022.

From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

	Fall																																		
length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	0	0
7	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	0	0	0	0	0	-	0	0	0	1	0	0	0	0	0	-	0	0
8	0	0	2	0	0	1	0	0	2	1	1	0	0	0	0	1	2	0	0	2	0	-	1	2	0	3	0	0	0	2	0	-	0	0
9	0	0	5	1	2	5	7	0	4	0	4	0	1	1	4	4	2	0	2	2	0	-	3	2	0	6	0	2	0	1	2	-	1	0
10	0	1	1	2	3	6	9	0	9	5	5	0	3	1	5	5	0	0	5	3	10	-	2	3	0	2	4	4	2	1	1	-	0	0
11	0	0	3	3	20	20	7	1	11	9	22	0	1	0	9	1	3	0	14	1	17	-	2	1	0	0	9	1	4	2	0	-	0	4
12	0	0	5	11	29	96	12	5	20	9	28	0	1	0	18	3	4	0	15	1	12	-	1	2	1	1	9	1	9	0	0	-	0	5
13	0	0	2	10	25	112	12	2	8	4	16	0	0	0	4	1	1	0	11	2	11	-	1	0	0	1	9	3	3	1	0	-	1	10
14	0	0	2	2	23	173	12	2	5	2	5	0	0	0	0	2	0	0	6	0	28	-	1	0	0	1	4	3	0	2	0	-	0	12
15	0	0	2	0	10	72	2	0	0	2	1	0	0	0	0	0	0	0	7	0	8	-	1	0	2	4	3	6	0	3	12	-	8	10
16	0	0	1	0	7	18	1	0	4	9	1	0	1	1	1	10	1	0	2	0	2	-	3	1	1	0	1	18	3	4	66	-	22	0
17	0	0	21	7	3	2	1	0	8	54	12	2	4	10	14	67	2	1	0	0	1	-	3	1	7	0	1	62	6	9	149	-	68	3
18	0	3	57	8	6	17	24	0	19	114	37	1	15	86	37	73	10	3	2	1	19	-	17	1	10	3	4	74	19	14	63	-	121	11
19	32	31	36	33	47	40	60	0	49	176	92	15	32	113	84	83	13	3	3	5	23	-	18	4	21	6	22	60	30	34	24	-	94	16
20	65	102	17	57	160	93	163	5	63	108	109	51	23	38	72	15	30	0	4	11	50	-	21	16	22	6	43	10	61	40	19	-	16	12
21	63	40	5	45	306	136	172	10	36	15	143	53	11	6	9	6	16	0	4	17	39	-	21	36	10	3	19	1	63	32	6	-	5	8
22	28	26	0	26	302	113	64	11	9	0	139	33	3	0	6	0	13	1	6	7	22	-	11	18	5	1	17	0	23	10	4	-	1	6
23	2	1	0	4	92	84	19	8	3	0	39	6	0	0	0	0	1	0	2	0	3	-	3	3	0	0	10	0	4	5	0	-	0	3
24	0	0	0	1	24	42	2	2	0	0	13	0	1	0	0	1	0	0	0	0	0	-	0	0	0	2	5	0	0	0	1	-	0	3
25	0	0	0	0	0	8	1	2	0	0	4	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	0	0	-	0	0
26	0	0	0	3	0	6	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	1	0
27	0	0	0	0	2	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
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
37	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
38	0	0	0	0	0	0	0	0	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	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	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
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
49	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
50	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
Total	**191**	**204**	**159**	**214**	**1,061**	**1,047**	**568**	**48**	**252**	**508**	**673**	**161**	**96**	**256**	**263**	**274**	**98**	**8**	**83**	**52**	**245**	-	**109**	**90**	**79**	**40**	**161**	**245**	**227**	**161**	**347**	-	**338**	**103**

Table 5.31. American lobster length frequencies-spring, female, 1 mm intervals, 1984–2022.

Lobsters were measured from each tow.

Female	Spring																																				
	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Length	(32)	(46)	(186)	(120)	(120)	(120)	(120)	(120)	(80)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(120)	(189)	(120)	(80)	(120)	(120)	(120)	(78)	(92)	(120)	(120)	(120)	(120)	(186)	(64)	(92)	(120)	(0)	(66)	(87)
16	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
17	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	2	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
21	0	0	0	0	0	0	0	0	0	2	0	2	0	4	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	0	0	0	0	0	1	0	0	3	1	0	2	4	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	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	0	0	0	0	1	0	0	0	0	0	0	-	0	0
24	0	0	0	0	0	0	0	0	0	0	0	0	2	1	8	0	2	0	1	0	0	0	0	2	0	0	1	0	0	0	0	1	0	0	0	0	-	0	0
25	1	0	0	0	0	0	1	0	0	1	0	1	1	0	3	2	0	0	0	0	0	0	0	0	0	1	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	0	0	1	0	0	1	0	5	7	12	4	6	9	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
28	0	2	0	0	1	0	0	3	0	1	1	0	5	8	6	10	11	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0
29	0	0	1	2	0	0	0	4	0	2	0	0	13	14	7	8	13	3	2	1	1	0	0	0	0	0	0	2	1	0	0	0	0	0	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	0	0	1	5	0	0	0	0	0	0	0	-	0	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	0	0	0	0	0	0	0	0	0	0	0	-	0	0
32	0	0	0	1	0	0	13	7	2	20	0	2	15	13	18	21	23	2	2	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	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	0	0	2	0	0	0	0	0	0	0	0	-	0	0
34	0	3	0	1	0	0	5	8	15	4	0	18	7	22	64	8	37	4	8	2	3	0	0	4	0	0	1	0	0	4	0	0	0	0	0	0	-	0	0
35	4	4	3	2	0	0	9	1	4	6	4	22	15	22	59	22	48	3	5	2	1	2	0	4	0	1	0	0	1	0	1	0	1	0	0	0	-	0	0
36	5	3	2	11	0	0	9	8	6	14	0	8	14	21	41	26	48	3	5	2	0	0	0	0	0	0	0	0	4	3	2	0	1	0	0	0	-	0	0
37	0	4	1	2	0	0	10	9	6	7	11	27	21	42	58	29	36	2	3	4	0	2	0	3	3	0	0	1	4	0	0	0	0	0	0	0	-	0	0
38	2	0	0	7	2	4	6	11	13	17	1	49	10	31	72	42	35	7	10	2	3	0	1	5	0	0	1	1	2	0	0	0	0	0	0	0	-	0	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	1	2	4	1	1	3	0	0	0	0	0	-	0	0
40	1	4	2	10	4	4	7	6	17	28	8	41	18	30	98	23	68	8	10	6	5	2	3	11	1	0	3	1	1	0	3	1	0	0	0	0	-	0	0
41	2	3	1	18	2	3	22	9	10	23	8	18	18	17	71	36	58	11	8	4	2	2	2	13	1	3	2	0	1	1	1	1	0	0	0	0	-	0	0
42	1	6	3	8	1	3	17	22	9	41	11	46	18	33	143	54	65	11	18	5	6	0	0	5	2	0	1	1	1	2	2	1	0	0	0	0	-	0	0
43	1	1	1	22	0	11	19	16	11	13	11	53	27	44	59	50	84	9	6	8	6	4	1	7	1	2	1	0	3	0	1	1	0	0	1	0	-	0	0
44	1	1	2	16	6	2	13	12	14	25	9	61	22	32	43	38	117	19	15	15	4	5	4	9	3	3	0	1	4	0	0	1	1	0	0	0	-	0	0
45	0	2	1	9	1	12	11	12	5	24	8	38	22	36	135	35	138	9	14	3	3	2	2	9	0	0	1	0	1	1	2	0	0	0	0	0	-	0	0
46	4	3	1	12	3	8	4	18	26	30	2	34	22	42	88	64	102	15	22	4	0	1	4	3	3	1	1	2	3	1	1	1	0	0	0	0	-	0	0
47	2	1	4	31	2	14	4	21	8	40	8	59	35	53	70	77	91	18	20	25	7	2	5	11	3	1	0	1	5	0	4	0	0	0	0	0	-	0	0
48	2	2	2	15	6	20	22	17	28	35	12	54	31	56	104	59	72	11	17	9	7	6	2	7	3	5	3	2	1	1	5	0	0	0	0	0	-	0	0
49	4	4	4	10	4	7	13	28	19	67	15	37	32	55	198	90	89	8	15	15	5	1	3	7	2	2	0	5	6	3	3	1	0	0	0	0	-	0	0
50	6	1	6	7	4	7	16	18	5	40	21	51	43	67	139	63	104	13	21	13	6	2	0	10	6	1	0	3	2	1	3	1	0	0	1	0	-	0	0
51	4	5	6	8	3	15	33	24	22	59	16	58	48	88	133	95	109	31	17	13	5	2	4	16	6	3	1	0	3	0	5	0	0	0	2	0	-	0	0
52	9	8	3	15	3	14	29	45	32	35	33	58	57	73	165	89	125	40	25	11	6	4	3	13	3	3	1	0	4	3	4	2	0	0	0	0	-	0	1
53	10	4	4	20	5	19	14	38	31	54	24	53	47	82	167	89	83	32	26	9	6	6	5	14	3	3	0	0	2	0	2	1	0	0	0	0	-	0	0
54	2	4	6	15	2	22	38	35	18	38	29	44	45	87	140	84	152	30	41	15	6	7	2	9	3	3	1	1	3	0	1	0	0	0	0	0	-	0	0
55	9	2	8	14	3	9	26	19	26	47	17	59	64	82	191	91	132	34	38	21	8	9	11	20	6	7	2	2	4	0	4	0	2	0	0	0	-	0	0
56	6	9	11	12	14	15	31	47	16	60	17	64	56	98	152	99	85	44	24	14	10	14	2	20	7	0	3	0	4	0	4	0	0	0	1	0	-	0	0
57	10	3	6	10	11	23	24	57	61	79	24	46	60	95	159	156	102	44	28	11	7	10	7	17	12	6	1	2	0	3	3	0	0	1	0	0	-	0	0
58	1	8	7	15	6	25	38	35	27	53	17	56	62	111	144	118	118	38	35	11	12	12	7	15	9	5	5	1	3	2	2	0	0	0	1	-	1	0	0
59	10	18	7	14	7	29	13	51	28	52	37	70	66	97	144	147	105	45	32	12	12	11	9	15	4	3	5	0	12	2	2	0	1	0	0	2	-	0	0
60	6	12	11	19	9	25	34	45	43	57	30	91	76	97	114	102	97	60	48	15	16	10	3	24	6	4	1	3	2	1	2	0	1	0	0	0	-	0	0
61	5	14	11	8	12	15	33	49	31	56	44	62	62	92	181	160	79	46	40	21	6	20	13	28	7	3	2	2	3	1	0	0	2	0	0	0	-	0	0
62	12	9	5	11	4	12	57	33	34	75	46	61	67	94	118	116	75	59	46	13	11	14	9	22	10	7	2	2	4	0	0	0	0	0	0	0	-	0	0
63	4	9	10	27	9	27	56	41	25	60	44	60	70	96	133	136	66	43	41	28	14	13	6	23	11	5	4	1	5	0	3	0	1	0	0	0	-	0	0
64	10	16	9	16	8	13	38	33	41	75	24	64	91	86	176	148	110	75	46	23	11	16	8	25	10	6	1	1	0	1	2	2	0	0	0	0	-	0	0
65	9	7	9	29	15	25	46	45	26	68	28	72	78	110	169	160	84	63	48	10	16	19	12	16	13	10	0	0	0	0	0	0	1	0	0	0	-	0	0
66	11	15	18	25	10	21	43	59	48	86	26	84	87	116	147	121	99	55	39	15	19	9	3	21	23	8	1	0	4	0	2	1	0	0	1	0	-	0	0
67	6	20	22	21	14	31	33	51	41	52	28	67	62	98	148	171	90	72	42	16	23	23	9	17	8	4	4	1	7	0	3	0	1	1	0	0	-	0	0
68	21	10	12	43	11	14	41	65	37	45	29	76	73	94	142	158	107	49	48	19	20	13	14	21	15	7	4	2	1	1	2	4	0	0	0	0	-	0	0
69	10	8	18	33	16	16	36	78	56	58	30	71	57	107	148	188	76	79	52	28	16	13	1	13	19	10	2	2	1	0	1	0	0	0	0	1	-	0	0
70	15	5	14	30	13	29	51	59	37	67	27	79	74	119	157	177	86	67	57	25	21	12	6	23	20	6	6	0	1	0	0	1	4	0	0	0	-	0	0
71	10	11	12	21	12	13	29	48	49	67	44	92	88	125	117	166	91	74	45	24	15	18	10	23	14	6	3	4	2	2	2	0	2	0	0	0	-	0	0
72	11	6	20	18	8	24	40	50	48	61	30	77	91	107	157	177	98	75	80	20	13	22	10	30	15	8	0	1	2	4	2	1	2	1	0	0	-	0	0
73	13	9	18	13	14	20	47	39	54	54	37	97	69	107	171	164	99	59	61	30	17	17	8	23	18	8	6	1	3	1	3	1	1	0	0	0	-	0	0
74	10	6	17	20	8	24	24	43	52	45	39	60	74	130	153	215	104	66	70	25	11	12	9	17	13	6	5	0	2	0	2	1	0	0	0	0	-	0	0
75	15	12	17	28	7	20	67	87	56	54	25	83	68	103	181	196	124	80	47	27	16	19	9	17	14	7	5	0	0	4	0	2	0	0	0	0	-	0	0
76	14	9	20	14	8	25	67	71	41	38	24	78	69	114	229	185	102	59	45	15	9	16	11	13	25	5	9	0	4	0	1	0	0	0	0	0	-	0	0
77	9	5	15	19	15	32	41	77	69	44	20	102	65	95	160	195	109	52	39	23	16	13	17	16	11	6	3	2	1	0	1	0	0	0	0	0	-	0	0
78	24	9	15	14	13	49	60	57	63	64	22	90	61	110	177	176	93	48	55	18	7	9	15	16	16	10	4	4	1	1	2	0	3	0	0	0	-	0	0
79	23	6	24	21	10	55	42	64	35	52	30	77	92	117	179	203	98	51	52	11	10	9	13	14	12	14	3	2	3	2	0	1	1	0	0	0	-	0	0
80	22	1	18	10	11	35	34	45	31	71	41	71	79	92	180	200	91	63	41	16	15	9	11	15	8	7	9	3	4	1	0	2	1	0	0	0	-	0	0
81	10	2	7	15	13	19	69	56	49	48	34	72	86	148	170	140	85	62	33	11	15	9	9	12	16	2	8	2	0	1	1	0	1	0	0	0	-	0	0
82	9	0	3	9	5	15	28	41	36	35	21	71	57	110	108	106	47	40	21	14	8	6	5	14	10	4	5	0	1	0	0	1	1	0	0	1	-	0	0
83	9	5	5	8	3	7	25	22	16	7	7	15	31	28	65	59	41	25	17	4	4	7	3	9	14	9	2	1	1	0	0	1	2	0	0	0	-	0	0
84	3	1	7	9	4	11	15	12	7	8	4	11	19	20	7	33	14	18	18	4	4	5	3	5	7	7	2	0	3	3	0	0	1	0	0	1	-	0	0
85	5	2	5	7	6	3	11	5	7	8	8	17	20	28	22	9	15	9	7	1	5	1	0	5	6	2	1	2	0	1	0	0	1	0	0	0	-	0	0
86	9	3	6	3	6	8	14	14	3	3	2	11	23	24	23	10	12	8	11	2	0	3	0	2	7	1	4	0	0	0	1	0	0	0	0	0	-	0	0
87	10	0	3	4	8	13	17	9	7	13	15	16	11	13	12	9	8	7	4	4	1	3	3	0	1	2	1	0	2	0	0	0	0	0	0	0	-	0	0
88	2	3	8	3	9	9	6	11	3	11	2	7	13	18	17	5	1	9	1	0	1	0	0	2	5	3	2	0	0	0	0	0	2	0	0	0	-	0	0
89	3	6	5	8	5	8	12	10	12	5	2	16	12	16	13	11	8	9	5	1	1	1	0	3	0	1	0	0	0	0	0	0	2	0	0	0	-	0	0
90	15	2	4	3	8	4	5	8	11	3	3	9	15	10	11	10	7	10	4	1	4	2	0	1	4	0	0	0	0	0	0	0	0	0	1	0	-	0	0
91	5	1	1	6	2	5	11	8	1	3	0	5	7	11	6	3	2	4	0	0	0	2	1	0	0	0	2	0	1	0	0	0	1	0	0	0	-	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	3	0	0	0	0	0	0	0	0	0	0	-	0	0
93	0	1	2	1	2	1	2	1	0	0	1	0	6	3	0	2	5	0	1	0	0	0	1	0	1	0	3	0	0	0	1	0	0	0	0	0	-	0	0
94	0	2	1	1	3	1	1	2	0	1	5	1	1	1	4	1	0	1	0	1	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	-	0	0
95	0	0	1	2	2	3	8	4	0	0	0	0	0	0	6	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
96	0	1	0	0	0	2	0	1	0	1	2	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
97	1	1	1	0	3	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
98	2	2	0	1	0	1	1	0	1	0	0	0	1	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
99	3	0	2	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
100	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
101	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
102	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
103	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
106	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
109	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
110	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
111	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
112	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	451	335	469	838	405	914	1,621	1,946	1,560	2,336	1,131	3,052	2,837	4,220	6,921	5,731	4,595	2,011	1,646	709	483	458	296	737	449	238	144	69	139	56	90	30	36	3	7	7	0	1	1
legal size	81.0					81.8		82.6															83.3	84.1														

Table 5.32. American lobster length frequencies–fall, female, 1 mm intervals, 1984–2022.

Lobsters were measured from each tow.

Female	Fall																																						
Length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
	(70)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(120)	(120)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(80)	(40)	(80)	(80)	(40)	(80)	(40)	(80)	(0)	(80)	(80)	(80)	(79)	(80)	(80)	(80)	(80)	(80)	(0)	(73)	(80)
16	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
17	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
21	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
23	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
24	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
25	0	0	0	0	0	1	0	0	0	0	0	1	2	0	0	0	0	1	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
26	0	0	0	0	0	0	0	0	0	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	0	1	0	0	0	3	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
28	0	0	0	0	0	0	1	0	4	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
29	0	0	0	0	0	1	1	0	0	3	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-	0	2	0	0	0	0	0	0	0	-	0	0
30	0	0	0	0	1	0	4	0	2	5	3	0	5	7	2	0	0	0	0	0	0	0	0	0	0	1	-	0	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	0	-	0	0	0	0	0	0	0	0	0	-	0	0
32	1	0	0	0	0	0	3	1	15	4	13	1	4	5	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
33	0	0	0	2	1	1	3	12	9	2	2	0	0	1	1	5	0	0	0	0	0	0	0	0	1	0	-	1	0	0	0	0	0	0	0	0	-	0	0
34	1	0	0	0	2	1	0	6	16	3	17	2	6	8	1	8	0	0	0	0	1	0	0	0	0	0	-	1	0	0	0	0	0	0	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	0	-	1	0	0	0	0	0	0	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	0	-	0	0	3	0	0	0	0	0	0	-	0	0
37	4	0	2	0	3	2	10	22	19	2	19	5	5	7	1	8	1	0	1	0	1	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
38	3	2	2	3	3	2	8	1	24	9	23	1	18	17	2	13	1	2	0	0	0	1	0	0	0	0	-	0	0	1	0	0	0	0	0	0	-	0	0
39	6	0	10	1	1	0	9	15	32	6	22	0	7	22	2	4	1	2	1	0	0	0	2	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
40	0	0	3	1	12	14	14	20	35	16	24	12	23	15	3	8	1	1	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
41	3	0	0	5	2	6	19	21	32	22	52	8	39	15	7	13	2	0	0	1	2	1	0	0	0	0	-	1	0	0	0	1	0	0	0	0	-	0	1
42	7	0	5	0	4	2	3	36	52	21	43	7	24	49	9	17	2	3	0	0	2	0	1	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
43	5	0	2	4	4	2	16	23	30	39	52	16	20	25	5	15	3	0	1	1	1	4	0	0	0	0	-	0	1	0	0	0	0	0	0	0	-	0	0
44	29	7	1	8	1	6	11	32	32	29	63	14	46	47	9	17	5	0	2	1	2	1	0	0	0	2	-	1	1	1	0	0	0	0	0	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	1	-	0	1	0	0	0	0	0	0	0	-	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	0	-	1	0	0	0	0	0	0	0	0	-	0	0
47	21	7	3	12	2	12	18	52	47	44	41	27	32	42	5	16	2	1	0	1	2	0	0	0	0	1	-	1	0	0	0	0	0	0	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	0	-	0	0	0	0	0	0	0	0	0	-	0	0
49	29	6	7	14	15	11	15	27	77	58	47	47	19	71	11	27	10	2	4	2	4	1	1	0	0	1	-	0	0	1	0	0	0	0	0	0	-	0	1
50	27	9	6	21	12	4	31	41	52	38	69	54	28	61	13	31	10	6	2	2	2	4	3	2	3	0	-	0	0	0	0	0	0	0	0	0	-	0	0
51	35	8	2	12	3	11	10	44	73	72	94	45	41	49	15	30	13	6	3	1	2	2	0	0	1	0	-	0	1	0	0	0	0	0	0	0	-	0	0
52	26	11	3	15	3	11	21	40	66	54	59	51	42	120	18	34	13	3	6	3	5	2	1	0	0	0	-	1	0	0	0	0	0	0	0	0	-	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	3	-	0	0	1	0	0	0	0	0	0	-	0	0
54	16	8	18	11	12	14	20	41	61	83	76	38	58	82	17	45	28	8	1	3	2	2	3	1	2	3	-	1	1	0	0	1	0	0	0	0	-	0	0
55	23	10	27	21	2	6	22	59	58	59	54	39	45	102	48	32	18	9	1	3	7	8	1	1	3	1	-	3	2	0	0	0	0	0	0	0	-	0	0
56	45	10	11	36	10	24	22	29	82	87	74	45	41	90	23	32	33	12	1	3	6	0	3	2	1	6	-	3	2	0	0	0	0	0	0	0	-	0	0
57	16	15	16	18	7	7	15	52	71	71	78	50	44	121	24	39	22	13	5	2	13	5	2	1	10	6	-	2	0	0	0	0	0	0	0	0	-	0	0
58	23	16	11	19	13	17	36	55	63	119	79	69	47	114	29	31	23	14	6	5	5	8	1	2	2	5	-	1	0	1	0	0	0	0	0	0	-	0	0
59	21	11	13	26	13	23	30	79	66	110	84	48	46	110	35	36	28	18	5	6	10	4	4	0	2	5	-	0	2	1	0	0	0	0	0	0	-	0	0
60	30	18	20	18	7	17	16	74	53	115	70	53	51	140	29	35	34	8	6	9	7	6	1	4	5	2	-	1	2	0	0	0	0	0	0	0	-	0	0
61	10	4	17	24	12	14	37	46	52	91	79	51	56	119	34	37	27	9	5	2	12	7	2	1	2	6	-	1	1	0	0	0	0	0	0	0	-	0	0
62	27	16	23	21	14	32	41	64	53	107	117	44	53	133	39	44	32	19	3	5	10	3	5	1	2	8	-	1	1	1	0	0	0	0	0	0	-	0	0
63	31	14	13	22	8	20	22	53	66	130	93	58	41	126	51	45	29	19	6	6	16	12	4	4	4	5	-	0	1	0	0	0	0	0	0	0	-	0	0
64	25	10	15	29	23	31	26	71	38	100	86	79	38	139	34	44	29	21	9	12	19	5	4	4	4	7	-	0	0	0	0	0	0	0	0	0	-	0	0
65	17	9	39	24	15	28	26	77	44	93	89	49	43	146	49	42	37	18	9	6	15	9	1	2	3	9	-	0	0	0	0	0	0	0	0	0	-	0	0
66	24	26	25	23	15	16	42	70	56	90	87	82	53	126	51	43	26	19	5	5	10	7	1	4	1	6	-	0	0	1	0	0	0	0	0	0	-	0	0
67	17	24	33	11	19	16	29	38	43	78	106	51	38	117	26	53	31	17	8	11	14	6	2	3	3	8	-	0	1	0	0	0	0	0	0	0	-	0	0
68	15	8	27	18	22	30	36	41	42	94	77	48	55	124	54	44	37	19	7	6	4	8	1	6	4	4	-	0	0	0	2	0	0	0	0	0	-	0	0
69	13	18	15	27	26	32	21	34	61	104	85	38	50	136	54	47	30	22	4	8	16	12	5	1	4	3	-	1	0	0	0	0	0	0	0	0	-	0	0
70	63	18	42	27	34	23	20	36	51	122	63	60	55	128	47	35	34	23	17	4	13	5	0	4	3	3	-	0	0	0	0	2	0	0	0	0	-	0	0
71	26	21	28	34	33	40	30	50	50	94	87	62	87	127	50	40	20	20	3	6	14	2	0	2	3	6	-	2	0	0	0	0	0	0	0	0	-	0	0
72	27	16	27	32	13	12	39	58	31	81	85	38	49	150	41	53	32	25	11	12	10	3	2	3	6	4	-	0	0	0	0	0	0	0	0	0	-	0	0
73	21	29	42	24	18	15	58	46	33	74	69	60	40	106	41	47	36	24	9	6	10	5	2	6	4	5	-	1	0	1	0	2	0	0	0	0	-	0	0
74	31	17	23	29	14	21	36	30	39	85	73	44	38	111	37	49	39	19	12	7	16	9	3	2	3	1	-	1	0	1	0	1	0	0	0	0	-	0	0
75	39	14	25	24	14	12	21	31	25	66	84	31	58	122	67	50	29	28	7	7	16	5	3	7	3	1	-	1	0	1	0	0	0	0	0	0	-	0	0
76	31	14	22	36	14	13	35	27	35	112	50	38	57	113	47	43	26	21	10	8	15	5	3	4	2	3	-	0	0	0	0	0	0	0	0	0	-	0	0
77	17	16	10	26	13	14	17	37	40	74	72	36	23	64	41	31	22	18	2	1	18	5	3	4	0	1	-	0	0	0	1	1	0	0	0	0	-	0	0
78	27	17	24	27	27	21	22	24	19	57	53	19	34	96	43	38	20	33	6	15	5	8	2	2	0	2	-	0	0	0	0	0	0	0	0	0	-	0	0
79	26	19	16	37	31	13	29	33	26	72	42	28	28	91	34	28	32	21	2	9	12	6	3	5	3	5	-	0	0	0	1	0	0	0	0	0	-	0	0
80	33	11	15	20	23	12	6	14	23	65	26	25	44	91	25	32	26	19	14	2	16	4	2	5	1	4	-	0	1	0	0	0	0	0	0	0	-	0	0
81	13	7	13	14	5	10	12	18	24	36	38	36	41	61	25	28	20	20	2	4	3	4	0	0	2	5	-	3	0	0	0	1	0	0	0	0	-	0	0
82	9	2	19	6	6	2	10	14	10	39	26	25	21	52	23	23	14	7	2	5	3	8	3	2	0	5	-	0	0	1	0	0	0	0	0	0	-	0	0
83	10	5	8	12	6	12	8	3	11	17	11	12	31	20	10	6	13	7	4	1	2	9	1	5	0	4	-	0	0	0	0	0	0	0	0	0	-	0	0
84	5	6	2	7	1	1	4	10	8	17	22	10	7	17	5	4	7	6	0	0	2	1	0	0	1	3	-	0	0	1	0	0	0	0	0	0	-	0	0
85	9	1	8	6	9	3	6	17	7	8	20	5	5	13	5	2	5	3	1	0	2	1	0	1	2	1	-	0	0	0	0	0	0	0	0	0	-	0	0
86	11	2	9	10	0	1	10	12	4	10	14	1	6	12	5	2	6	1	0	0	2	1	0	0	0	1	-	0	0	0	0	0	0	0	0	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	1	-	1	0	0	0	0	0	0	0	0	-	0	0
88	9	3	9	9	3	1	3	9	9	13	8	1	20	10	7	5	2	1	0	0	0	1	0	0	0	0	-	0	0	2	0	0	0	0	0	0	-	0	0
89	3	4	6	2	7	3	5	1	8	8	12	5	13	14	1	3	3	3	0	0	0	4	0	0	1	0	-	0	0	0	0	0	0	0	0	0	-	0	0
90	8	1	3	6	0	1	6	1	5	1	15	9	5	10	1	2	1	2	1	0	0	1	0	0	0	1	-	0	0	0	0	0	0	0	0	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	1	-	0	0	0	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	2	-	0	0	0	0	1	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	0	-	0	0	0	0	0	0	0	0	0	-	0	0
94	0	2	0	1	0	0	0	2	1	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0	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	0	-	0	0	0	0	0	0	0	0	0	-	0	0
96	3	0	0	1	1	0	1	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
97	15	1	0	1	1	0	1	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
98	2	1	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
100	0	1	0	1	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
101	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
102	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
103	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
104	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
105	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
107	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
111	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
113	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
117	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	1,089	523	759	907	622	688	1,133	1,917	2,301	3,264	3,198	1,795	1,979	4,196	1,329	1,511	957	596	223	195	365	225	84	94	96	150	-	31	20	18	4	9	0	0	0	0	0	0	1
legal size:	81.0					81.8		82.6														83.3	84.1					85.7										

Table 5.33. American lobster length frequencies–spring, male, 1 mm intervals, 1984–2022.

Lobsters were measured from each tow.

Male	Spring																																				
Length	1984 (32)	1985 (46)	1986 (186)	1987 (120)	1988 (120)	1989 (120)	1990 (120)	1991 (120)	1992 (80)	1993 (120)	1994 (120)	1995 (120)	1996 (120)	1997 (120)	1998 (120)	1999 (120)	2000 (120)	2001 (120)	2002 (120)	2003 (120)	2004 (189)	2005 (120)	2006 (80)	2007 (120)	2008 (120)	2009 (120)	2010 (78)	2011 (92)	2012 (120)	2013 (120)	2014 (120)	2015 (120)	2016 (186)	2017 (64)	2018 (92)	2019 (92)	2020 (0)	2021 (66)	2022 (87)
16	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
19	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
21	0	0	0	0	0	0	3	0	0	0	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	1	0	1	0	1	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	1	0	0	1	1	0	2	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
24	0	0	0	0	0	0	0	2	0	2	0	1	0	6	0	1	3	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
25	0	0	0	0	0	0	0	0	0	0	0	1	1	0	4	6	4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
26	0	0	0	0	0	0	0	0	4	0	0	4	3	2	2	2	1	0	0	2	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	9	0	0	1	9	2	0	2	1	2	1	1	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	-	0	0
28	0	0	0	0	0	0	0	1	3	1	0	2	1	5	2	12	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0
29	0	0	0	0	0	0	0	0	9	0	0	2	3	5	0	9	3	1	0	0	0	0	0	0	0	0	3	0	0	1	0	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	0	0	0	2	0	0	1	0	0	0	-	0	0
31	0	1	0	1	1	0	0	8	4	3	2	0	8	13	14	7	18	3	4	0	0	1	1	1	0	0	0	1	0	1	0	0	0	0	0	-	0	0
32	0	0	0	0	3	6	0	6	6	8	1	8	9	12	11	16	17	2	2	5	0	0	0	2	0	0	1	1	3	2	0	0	0	1	0	-	0	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	0	0	1	0	0	0	0	0	0	0	-	0	0
34	0	0	3	2	0	1	1	5	1	6	0	27	19	16	52	12	25	2	4	1	0	0	0	5	0	0	1	0	0	0	1	0	0	0	0	-	0	0
35	2	0	2	0	0	0	4	5	9	5	1	20	12	22	26	23	33	2	5	2	4	0	1	2	1	0	0	1	2	0	1	0	0	0	0	-	0	0
36	2	4	0	1	1	7	14	4	5	7	3	17	13	24	34	19	26	6	1	3	1	2	0	6	0	0	1	3	3	0	1	0	0	0	1	-	0	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	0	0	1	0	0	0	0	0	0	0	-	0	0
38	0	1	1	5	2	7	14	9	1	26	3	18	18	21	93	12	28	3	8	4	2	1	2	7	0	0	2	1	4	0	3	1	0	0	0	-	0	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	1	0	0	1	0	0	0	0	0	0	-	0	0
40	0	2	0	7	2	8	3	5	12	17	7	25	21	41	32	20	52	8	10	2	0	1	2	4	2	0	1	3	3	2	1	2	0	0	1	-	0	0
41	0	2	2	9	1	0	11	8	7	4	10	28	19	41	75	46	55	3	13	7	3	0	1	6	3	0	2	2	2	0	0	2	0	0	0	-	0	0
42	4	2	0	3	1	9	13	10	13	42	7	39	18	46	125	36	63	14	9	10	3	5	0	16	3	2	0	3	4	1	2	0	1	0	0	-	0	0
43	1	2	1	16	0	9	14	9	12	23	5	52	26	24	70	51	32	5	9	10	5	2	2	8	1	1	1	0	2	1	1	0	0	0	0	-	0	0
44	3	0	1	15	1	3	10	11	6	42	9	17	21	50	170	44	110	10	15	9	1	0	4	12	2	1	3	3	2	0	3	1	1	0	1	1	-	0	0
45	1	5	4	22	3	7	7	20	13	45	6	39	28	46	76	50	65	17	16	20	5	3	2	9	3	1	2	2	4	3	1	3	0	0	0	-	0	0
46	0	2	2	24	2	24	7	12	25	37	9	32	22	66	155	71	74	19	18	18	4	3	2	11	0	4	1	3	2	0	6	0	0	0	0	-	0	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	2	2	1	0	0	1	0	0	0	0	-	0	0
48	6	6	5	9	1	8	20	17	7	23	6	45	32	78	93	60	57	22	29	6	3	6	5	8	4	2	2	0	2	1	5	1	0	0	0	-	0	0
49	9	3	4	24	4	22	20	45	21	40	19	46	18	82	120	87	69	16	18	8	15	3	4	16	3	3	1	0	3	0	1	0	0	0	1	-	0	0
50	7	3	1	19	4	23	10	21	25	30	21	29	35	61	66	83	110	34	22	16	7	6	4	9	4	2	0	2	2	0	3	2	0	0	0	-	0	0
51	3	4	4	12	2	20	26	42	16	75	16	62	45	57	158	90	65	24	31	19	8	8	9	10	3	5	0	0	1	0	2	0	0	0	0	-	0	0
52	9	5	2	12	2	15	23	21	25	37	31	49	52	75	81	80	100	27	27	14	10	6	2	12	3	2	2	0	7	0	3	0	0	0	1	-	0	0
53	5	9	7	17	4	10	12	33	16	41	26	60	50	56	138	69	66	25	20	11	5	7	5	19	6	4	1	0	2	1	1	1	0	0	1	-	0	0
54	10	3	16	14	7	14	30	45	36	43	29	74	49	74	210	79	110	33	38	26	15	6	5	21	5	4	1	4	4	2	0	1	1	0	0	-	0	0
55	5	3	6	18	7	23	16	42	27	50	27	46	51	82	101	101	114	38	23	18	2	9	6	12	5	3	2	1	3	4	4	0	1	0	0	-	0	0
56	3	12	11	17	10	6	34	38	37	44	14	70	54	83	130	82	95	37	29	19	13	11	9	7	7	6	6	2	4	0	3	1	0	1	0	1	0	0
57	1	7	10	26	11	17	36	30	12	51	27	54	60	68	145	93	95	43	35	22	7	6	5	21	4	3	3	3	1	1	2	2	1	0	0	2	0	0
58	12	7	5	10	4	19	44	71	31	47	35	41	83	96	111	111	99	43	46	11	12	8	5	13	8	1	2	1	2	2	0	0	1	0	0	-	0	0
59	3	13	7	12	14	25	29	57	27	88	34	71	56	67	63	144	89	43	43	13	6	11	10	24	9	7	4	2	3	0	1	1	0	0	0	-	0	0
60	1	9	14	29	8	23	49	50	37	42	34	94	84	156	121	105	105	56	35	24	8	9	6	16	9	6	1	0	4	2	3	1	0	1	0	-	0	0
61	9	14	16	12	10	22	39	56	46	62	34	77	59	102	176	123	83	51	36	28	14	10	14	11	11	6	3	3	5	2	3	0	1	0	0	1	-	0
62	11	10	13	15	6	30	44	78	36	65	54	57	58	127	152	117	84	69	44	20	11	12	7	12	16	12	2	0	5	0	2	2	0	0	0	-	0	0
63	18	15	16	28	8	24	52	65	54	44	36	59	60	101	167	132	73	54	44	24	16	13	13	19	19	5	6	2	5	3	4	2	1	0	0	-	0	0
64	8	16	12	26	8	21	45	72	43	63	27	73	90	95	153	133	98	69	46	26	10	14	8	22	16	4	8	3	5	1	0	0	0	1	1	-	0	0
65	13	8	11	20	15	20	47	55	36	73	33	77	73	97	165	111	96	75	50	30	21	17	8	16	16	8	2	1	5	1	1	5	1	0	0	-	0	0
66	5	10	11	26	16	32	49	71	31	71	23	39	73	107	223	129	64	56	39	23	31	15	6	22	23	2	6	2	0	1	0	2	3	1	0	0	-	0
67	1	5	11	26	11	32	29	57	44	39	21	69	60	118	182	149	66	77	53	24	16	14	6	33	19	1	3	1	10	1	0	0	1	0	0	-	0	0
68	5	10	13	12	7	21	33	80	48	26	34	67	64	100	147	116	81	82	32	36	22	23	11	20	19	10	5	0	0	1	2	2	1	0	0	1	-	1
69	8	9	10	19	24	25	39	71	46	43	32	57	79	101	156	140	77	73	51	25	11	20	8	16	11	4	3	4	3	2	3	2	1	0	0	1	-	0
70	8	11	14	23	7	34	38	50	51	27	24	60	77	99	158	152	85	73	44	27	21	16	9	15	21	11	5	2	5	1	2	0	1	1	1	1	-	0
71	9	5	13	22	13	29	55	66	23	48	42	85	58	91	112	152	62	71	56	20	29	20	7	4	18	5	11	3	1	0	0	1	2	1	0	0	-	0
72	6	17	13	14	17	33	40	93	42	37	41	59	85	111	145	105	72	62	42	23	13	11	8	25	15	7	4	3	5	2	0	2	0	0	0	1	-	1
73	14	5	10	21	11	28	37	94	42	34	27	93	64	82	122	109	61	63	46	15	22	16	6	13	14	3	6	1	2	3	1	0	0	0	0	-	0	0
74	6	9	27	21	11	45	40	74	36	32	33	67	71	92	146	123	74	85	40	35	15	10	2	15	8	9	5	3	4	2	1	1	2	0	0	1	-	0
75	6	3	13	15	10	35	29	63	40	48	21	84	62	73	81	120	52	72	39	21	16	14	6	19	11	5	2	3	3	0	2	0	1	0	0	-	1	0
76	12	3	20	16	18	18	33	79	23	32	23	47	48	67	143	122	49	69	50	25	9	11	4	13	8	3	4	2	5	0	0	3	1	0	0	0	-	0
77	9	7	10	14	7	22	30	69	31	24	12	50	54	66	115	97	57	63	35	24	18	17	2	8	14	10	6	2	6	0	1	0	0	0	1	-	0	0
78	18	3	18	9	11	33	46	37	29	38	20	55	35	46	113	90	37	56	55	14	9	8	4	9	13	8	0	2	3	0	0	1	1	0	0	0	-	0
79	7	9	15	21	15	22	31	77	19	41	30	36	43	64	129	83	43	57	31	14	13	9	7	13	7	12	6	4	0	4	0	0	1	0	0	0	-	0
80	5	6	9	22	5	23	34	49	22	19	32	52	37	57	77	63	47	67	39	19	8	10	6	15	9	4	7	0	1	1	0	2	0	0	0	1	-	0
81	8	0	9	11	1	34	21	53	34	31	19	43	27	70	118	67	44	45	41	11	6	8	5	11	9	10	3	1	1	2	0	0	1	1	0	0	-	0
82	2	3	2	10	4	9	18	39	25	13	13	51	27	62	97	83	23	36	31	10	7	2	1	16	8	2	2	0	1	2	1	1	1	0	1	0	-	0
83	9	0	5	9	7	18	12	33	24	6	7	15	15	47	33	41	37	25	21	4	8	4	7	2	8	6	0	3	0	1	1	0	1	0	0	0	-	0
84	5	1	8	12	2	5	10	33	9	7	3	26	8	34	28	29	24	23	21	8	7	3	3	8	10	2	2	2	2	2	0	1	1	0	0	0	-	0
85	3	2	6	8	4	6	9	28	6	3	0	14	4	49	18	20	26	23	18	2	8	3	5	5	1	2	1	1	0	0	0	1	0	0	0	0	-	0
86	1	3	5	1	6	26	8	28	7	4	2	15	13	12	19	17	30	23	15	1	8	1	1	7	6	1	2	1	0	2	0	0	0	0	0	0	-	0
87	3	0	1	13	8	9	4	31	0	0	6	3	6	30	37	23	11	15	8	3	3	1	2	1	7	4	0	2	0	1	0	0	0	0	0	0	-	0
88	0	0	5	4	1	14	2	21	2	0	4	14	4	32	15	27	12	10	13	2	2	1	1	1	4	1	1	0	0	3	0	1	2	0	0	0	-	0
89	5	0	2	2	3	2	6	21	5	0	2	11	3	33	28	23	13	10	8	2	1	3	2	0	4	4	2	0	0	0	0	0	0	0	0	0	-	0
90	0	0	0	1	5	6	5	24	2	1	0	7	7	30	25	24	16	11	9	3	0	0	1	3	3	4	0	1	0	0	1	0	2	1	0	0	-	0
91	4	0	1	7	4	7	5	26	6	1	0	7	2	25	11	20	11	14	8	3	1	4	0	0	3	2	1	1	0	0	1	0	1	0	0	0	-	0
92	2	0	2	4	2	3	1	24	1	3	0	8	11	23	15	9	8	10	10	1	0	1	1	0	1	0	0	1	1	1	0	0	0	0	0	0	-	0
93	0	0	3	6	1	10	0	5	0	1	0	8	2	6	27	4	13	9	4	0	1	1	0	5	0	0	0	0	1	0	0	1	0	0	0	0	-	0
94	0	2	1	3	0	1	0	9	1	0	0	9	2	7	16	17	11	9	4	3	2	0	1	0	3	0	0	1	0	0	0	0	0	0	1	0	-	0
95	1	0	0	5	0	0	0	1	0	1	2	7	1	4	5	8	7	0	1	2	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	-	0
96	0	0	1	1	0	0	2	8	1	1	0	6	0	1	8	4	5	2	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
97	3	3	1	2	1	9	2	2	4	0	0	3	0	6	3	4	1	2	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	-	0
98	0	0	0	3	0	0	1	1	0	0	1	0	0	2	0	0	1	0	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0
99	2	0	0	1	0	1	0	2	0	0	0	1	1	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	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	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
101	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
102	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0
104	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0
108	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
Total	317	295	436	854	375	1,030	1,362	2,429	1,371	1,906	1,064	2,690	2,389	3,875	6,112	4,554	3,624	2,198	1,633	843	541	439	266	690	451	231	149	99	154	64	77	51	36	7	7	18	0	3	0
legal size	81.0					81.8		82.6															83.3	84.1								85.7						

Table 5.34. American lobster length frequencies–fall, male, 1 mm intervals, 1984–2022.

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)	2009 (80)	2010 (0)	2011 (80)	2012 (80)	2013 (80)	2014 (79)	2015 (80)	2016 (80)	2017 (80)	2018 (80)	2019 (80)	2020 (0)	2021 (73)	2022 (80)
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
25	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
26	0	0	2	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	0	2	0	0	1	9	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
28	1	2	0	0	0	0	3	0	0	3	4	0	1	1	0	1	0	0	0	0	0	1	0	0	0	0	-	1	0	0	0	0	0	0	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	0	-	0	0	0	0	0	0	0	0	-	0	0
30	0	0	0	0	0	0	3	0	3	0	4	0	3	2	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
31	0	0	2	0	1	0	2	0	4	2	3	0	6	2	2	0	0	0	0	0	0	1	0	1	0	0	-	0	0	0	0	0	0	0	0	-	0	0
32	4	0	0	4	0	0	0	5	13	2	3	0	4	5	2	2	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
33	1	0	0	2	0	1	0	3	4	0	9	1	11	3	1	5	3	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
34	1	0	0	2	1	0	2	1	13	4	11	0	4	1	1	1	1	0	0	0	0	0	0	0	1	1	-	0	0	0	0	0	0	0	0	-	0	0
35	3	0	0	1	0	0	3	7	13	15	12	1	8	3	0	4	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
36	3	0	0	1	0	1	5	8	25	8	21	1	7	14	2	1	0	0	0	1	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
37	3	0	6	0	1	1	7	4	38	4	21	1	11	7	0	2	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
38	2	2	2	3	2	0	0	6	40	6	34	1	17	14	3	5	0	0	0	0	1	4	3	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
39	0	0	2	1	2	1	5	8	34	5	25	4	16	28	7	17	3	0	1	0	0	1	0	0	1	0	-	0	0	0	0	0	0	0	0	-	0	0
40	3	0	6	2	1	5	10	8	35	21	35	6	15	14	5	7	1	0	2	0	0	0	0	0	0	1	-	0	1	0	0	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	0	-	0	0	0	0	0	0	0	0	-	0	0
42	4	6	2	0	11	3	12	13	43	34	55	5	29	25	9	8	5	0	1	1	2	1	0	0	1	0	-	1	1	0	0	0	0	0	0	-	0	0
43	1	0	3	3	2	1	7	7	49	17	56	12	23	41	5	21	2	2	0	0	0	1	1	1	1	0	-	0	0	0	0	0	0	0	0	-	0	0
44	4	1	1	5	11	1	6	13	35	13	63	26	16	40	5	19	3	2	1	1	3	0	0	0	0	2	-	2	0	0	0	0	0	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	1	-	1	0	0	0	0	0	0	0	-	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	1	-	2	0	0	0	0	0	0	0	-	0	0
47	13	4	3	10	10	5	16	14	66	60	26	26	33	41	13	20	7	2	2	1	2	3	0	1	1	0	-	0	0	0	0	0	0	0	0	-	0	0
48	15	3	5	7	14	4	16	10	67	49	72	19	49	72	8	20	9	9	1	0	3	2	0	0	0	0	-	0	2	0	0	0	0	0	0	-	0	0
49	4	2	10	8	2	12	18	45	48	100	56	33	30	48	10	37	9	1	0	1	6	3	2	0	1	2	-	0	0	0	0	0	0	0	0	-	0	0
50	13	5	8	21	9	11	16	37	63	56	55	53	28	56	15	44	9	3	2	0	5	4	3	1	0	0	-	1	2	0	0	0	0	0	0	-	0	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	1	-	0	1	0	0	0	0	0	0	-	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	3	-	0	0	0	1	0	0	0	0	-	0	0
53	13	9	3	30	5	15	22	57	55	83	83	61	37	103	29	29	15	8	3	1	7	1	0	1	0	1	-	1	0	0	0	0	0	0	0	-	0	0
54	24	12	19	26	21	17	25	76	47	59	97	59	30	116	23	43	21	7	2	3	8	5	2	1	3	3	-	1	1	0	0	0	0	0	0	-	0	0
55	23	4	17	23	13	26	25	47	83	84	70	80	32	96	26	46	38	9	2	2	12	3	3	1	0	7	-	1	1	0	0	0	0	0	0	-	0	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	6	-	0	0	0	0	0	0	0	0	-	0	0
57	9	0	10	30	26	18	36	43	64	101	79	92	27	111	44	42	27	10	5	4	8	8	1	7	2	4	-	0	0	0	0	0	0	0	0	-	0	0
58	29	15	24	23	13	30	34	51	68	68	107	58	48	80	42	57	21	10	8	5	6	7	3	1	1	5	-	1	0	0	0	0	0	0	0	-	0	0
59	47	8	26	31	16	14	23	43	86	109	78	76	40	143	33	54	29	24	10	8	10	13	6	5	1	6	-	0	2	0	0	0	0	0	0	-	0	0
60	16	6	11	26	7	26	39	56	77	103	109	69	30	134	56	61	37	9	9	7	13	7	2	2	0	1	-	0	0	0	0	0	0	0	0	-	0	0
61	23	5	10	25	30	12	24	57	68	138	120	78	59	128	53	64	44	15	8	5	17	8	5	4	1	3	-	0	0	0	0	0	0	0	0	-	0	0
62	50	17	26	23	10	13	36	37	57	125	92	80	42	145	57	49	28	19	10	7	10	6	3	1	4	7	-	0	2	0	0	0	0	0	0	-	0	0
63	14	18	37	20	15	19	28	63	68	144	107	74	41	149	60	63	39	29	15	7	4	9	5	4	1	10	-	2	0	0	0	0	0	0	0	-	0	0
64	28	17	22	24	35	19	25	86	74	87	106	73	77	138	57	68	42	35	9	8	19	12	2	2	2	8	-	0	3	0	0	0	0	0	0	-	0	0
65	36	10	39	31	20	16	39	87	49	107	83	75	73	161	75	48	37	34	17	10	14	14	3	4	6	11	-	1	1	0	0	0	0	0	0	-	0	0
66	22	13	21	41	31	27	22	60	59	81	87	93	40	130	63	61	41	24	12	7	21	6	4	2	6	11	-	3	1	1	1	0	1	0	0	-	0	0
67	14	16	39	28	21	24	30	78	82	108	119	63	46	136	51	38	43	38	13	7	17	12	2	7	7	14	-	1	3	0	1	0	0	0	0	-	0	0
68	16	18	30	31	17	19	42	71	69	107	79	55	34	113	67	61	57	33	21	7	15	12	5	5	4	16	-	0	4	1	0	0	0	0	0	-	0	0
69	46	13	22	32	31	30	24	51	81	131	101	75	28	121	52	54	41	21	20	11	23	10	2	5	5	8	-	0	2	0	0	0	0	0	0	-	0	0
70	32	11	28	31	14	24	26	63	56	117	112	79	36	122	60	78	42	22	12	8	30	7	1	4	3	6	-	3	0	0	1	0	0	0	0	-	0	0
71	8	14	25	23	21	25	24	58	63	115	83	52	63	126	69	75	48	47	21	13	20	6	6	0	4	12	-	1	0	0	0	0	0	0	0	-	0	0
72	23	20	31	36	29	19	33	89	61	86	76	65	66	86	77	64	47	52	13	9	19	10	6	9	2	8	-	0	1	2	0	0	0	0	0	-	0	0
73	40	18	42	29	13	42	40	53	44	85	83	51	44	98	54	70	47	32	6	5	20	9	0	3	4	9	-	1	0	0	0	1	0	0	0	-	0	0
74	36	18	22	25	22	19	39	28	69	130	108	56	42	99	64	65	37	39	21	14	10	4	1	8	6	12	-	1	0	0	0	0	0	0	0	-	0	0
75	9	8	23	18	16	28	33	38	53	101	97	58	35	99	62	63	39	33	14	6	23	12	0	3	1	11	-	1	1	0	0	0	0	0	0	-	0	0
76	21	15	24	25	12	36	20	37	33	75	66	37	32	88	55	66	33	28	14	5	16	4	5	7	0	6	-	1	1	0	1	0	0	0	1	-	0	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	7	-	0	0	0	0	0	0	0	0	-	0	0
78	28	12	9	32	13	29	24	36	46	70	55	59	33	76	46	54	28	38	11	5	8	3	1	5	4	2	-	2	1	0	1	0	0	0	0	-	0	0
79	5	13	11	33	8	19	19	56	48	61	66	43	47	81	52	59	35	35	17	6	9	4	2	5	4	6	-	2	2	0	0	0	0	0	0	-	0	0
80	15	18	13	20	22	15	38	40	49	102	53	39	29	78	44	51	34	26	7	5	5	7	3	4	0	3	-	0	0	0	0	0	0	0	0	-	0	1
81	23	11	18	10	8	17	16	45	39	47	66	46	32	83	37	52	25	18	14	2	12	5	0	4	0	2	-	0	0	1	0	1	1	0	0	-	0	0
82	7	7	20	10	6	6	21	19	21	46	26	41	15	57	34	29	23	21	10	3	8	5	3	5	4	5	-	0	0	0	0	0	0	0	0	-	0	0
83	6	6	12	5	6	11	14	23	29	26	25	23	10	23	20	20	12	4	3	1	3	2	1	0	4	2	-	0	0	0	0	0	0	0	0	-	0	0
84	4	2	13	5	8	10	6	10	23	12	15	31	8	19	6	15	7	6	1	2	3	2	0	4	1	1	-	0	0	0	0	0	0	0	0	-	0	0
85	7	2	15	8	10	3	14	15	39	11	13	17	5	12	4	10	8	3	1	1	3	2	0	0	0	3	-	0	0	0	0	0	0	1	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	0	-	0	1	0	0	0	0	0	0	0	-	1	0
87	5	0	15	5	7	6	17	2	16	8	13	15	4	16	6	17	3	1	0	0	0	3	0	1	0	1	-	0	0	0	1	0	0	0	0	-	0	0
88	3	1	12	7	2	0	26	2	16	9	25	13	8	14	6	7	7	3	0	0	3	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
89	7	5	9	5	9	7	7	4	19	9	20	17	10	15	8	12	5	0	0	0	0	0	0	0	0	2	-	0	0	0	0	0	0	1	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	0	-	0	0	1	0	0	0	0	0	-	0	0
91	4	2	14	5	2	11	5	7	12	17	15	6	3	15	4	7	3	0	0	0	1	0	0	1	0	2	-	0	0	0	0	0	0	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	2	-	0	0	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	0	-	0	0	0	0	0	0	0	0	-	0	0
94	1	1	2	1	0	1	4	2	3	2	12	2	1	6	0	2	1	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
95	0	1	5	1	0	0	0	1	3	2	9	1	0	4	5	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	1
96	0	0	3	1	0	14	0	0	1	4	1	2	0	4	4	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
97	13	0	4	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	0	0	0	0	0	0	0	-	0	0
98	1	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
99	0	1	4	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
100	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
101	0	0	1	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
102	0	1	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
103	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
104	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	-	0	0
106	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0	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	0	-	0	0	0	0	0	0	0	0	-	0	0
Total	**930**	**436**	**888**	**945**	**712**	**814**	**1,198**	**2,043**	**2,853**	**3,563**	**3,673**	**2,406**	**1,750**	**4,165**	**1,783**	**2,107**	**1,202**	**814**	**375**	**200**	**454**	**266**	**101**	**126**	**100**	**235**	-	**31**	**34**	**6**	**8**	**2**	**2**	**2**	**1**	**0**	**0**	**2**	**2**
legal size:	81.0					81.8							82.6									83.3		84.1								85.7							

Table 5.35. Atlantic herring length frequencies, spring and fall, 1 cm intervals, 1989-2022.

From 1989 - 2013, Atlantic herring lengths were recorded from the first three tows of each day; since 2014, lengths have been recorded from every tow.

Spring

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
3	0	0	0	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	-	0	0
4	0	0	0	0	4	0	0	0	0	18	504	61	0	0	1	2	0	0	0	1	213	2	12	0	29	3	2	0	0	5	5	-	0	0
5	0	2	0	11	3	1	0	0	1	149	1,547	104	0	0	8	30	76	3	20	36	3,416	28	35	15	429	29	51	18	2	79	37	-	78	18
6	1	3	3	16	1	0	1	3	0	92	237	1	3	0	9	10	140	2	2	13	449	12	59	2	227	0	7	5	1	10	20	-	33	10
7	0	1	4	15	2	0	2	15	69	84	18	7	11	1	0	8	118	1	0	12	44	1	103	2	38	2	1	3	2	4	28	-	3	1
8	0	0	7	0	1	0	0	5	165	28	5	1	6	1	0	9	73	11	0	23	48	1	132	0	10	1	0	3	0	5	16	-	0	0
9	0	0	3	0	1	0	1	1	27	11	4	0	8	0	0	3	8	10	0	16	59	0	43	1	1	2	0	0	1	0	2	-	0	0
10	0	0	0	0	3	1	0	0	0	2	0	0	1	0	0	0	0	0	0	2	6	0	3	1	0	5	0	0	0	1	0	-	0	0
11	0	0	0	0	3	1	0	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	46	0	0	0	0	0	-	0	0
12	0	0	0	0	38	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	492	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	0	5	1	1	0	483	0	0	0	0	0	-	0	0
14	0	1	0	0	203	11	0	1	29	0	0	0	1	0	0	9	7	0	0	0	1	29	26	6	23	200	0	0	0	0	0	-	0	0
15	2	0	8	0	122	9	6	0	59	5	0	0	2	0	0	49	14	0	9	1	9	39	55	16	112	48	1	0	0	0	0	-	0	0
16	3	1	38	0	174	17	7	3	12	8	0	3	0	0	0	65	20	0	14	0	91	49	19	12	121	6	4	0	0	0	0	-	0	0
17	2	31	33	0	100	42	8	2	4	5	0	6	2	0	0	140	63	0	27	2	149	25	3	3	119	18	2	4	0	2	0	-	0	0
18	2	4	29	2	28	32	12	0	10	2	0	0	1	0	3	275	98	0	166	6	28	31	7	0	49	95	8	41	0	4	1	-	0	0
19	0	16	19	29	21	39	12	6	21	0	1	0	11	2	1	117	57	0	467	1	203	86	14	20	32	85	39	63	0	2	0	-	0	0
20	0	161	67	15	41	43	78	10	40	5	1	6	65	3	2	67	67	0	228	7	521	222	14	107	50	52	47	36	0	1	0	-	0	1
21	0	333	72	24	35	29	283	26	14	4	2	11	85	17	0	12	19	0	99	11	279	106	8	196	148	16	60	10	0	1	0	-	0	0
22	0	424	70	111	96	14	399	15	19	11	10	38	77	32	0	16	11	3	105	9	162	71	24	91	847	4	58	3	0	12	2	-	0	1
23	0	201	160	61	387	111	245	20	7	4	15	36	14	87	4	0	15	4	106	13	144	97	59	23	824	60	29	10	0	25	8	-	0	8
24	0	195	297	311	436	224	290	22	18	1	19	47	33	71	17	0	25	3	150	27	71	105	173	21	268	71	90	30	2	19	5	-	0	1
25	0	315	337	751	645	485	416	46	117	2	9	99	31	18	36	3	21	5	122	38	87	108	214	16	104	30	90	47	1	44	55	-	0	2
26	1	447	360	503	921	560	1,028	85	202	31	10	70	46	30	63	3	78	3	125	39	108	110	210	18	96	50	72	47	0	55	332	-	0	3
27	0	347	514	382	807	947	723	93	236	33	35	80	24	27	65	14	106	9	122	38	69	95	147	11	30	30	34	10	1	59	523	-	0	1
28	0	338	513	391	825	604	706	64	234	44	37	104	34	19	72	9	87	6	116	36	85	62	65	4	5	4	16	9	0	8	206	-	0	0
29	2	247	319	492	550	387	337	37	82	21	25	69	29	52	52	1	40	3	47	15	44	26	48	4	1	0	1	0	0	1	53	-	0	0
30	0	156	383	142	287	204	231	29	31	1	11	24	8	3	27	3	19	1	6	6	27	7	2	0	0	0	0	0	0	0	0	-	0	0
31	2	127	139	77	129	29	14	4	15	2	0	0	4	0	8	1	0	0	0	2	6	0	2	0	0	0	0	0	0	0	0	-	0	0
32	0	50	22	1	33	6	14	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
33	0	11	13	2	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
34	0	8	1	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**15**	**3,427**	**3,411**	**3,341**	**6,119**	**3,808**	**4,814**	**489**	**1,421**	**566**	**2,491**	**767**	**497**	**363**	**368**	**847**	**1,165**	**64**	**1,931**	**355**	**6,319**	**1,317**	**1,479**	**570**	**3,563**	**1,834**	**612**	**339**	**10**	**337**	**1,293**	**-**	**114**	**46**

Fall

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
7	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	0	0
8	0	0	0	99	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0	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	4	-	1	0	1	0	0	0	0	1	0	-	0	0
10	0	0	0	176	3	6	0	14	6	59	0	0	0	0	12	1	0	0	0	0	2	-	0	0	1	0	0	0	0	5	0	-	0	0
11	0	3	0	34	5	9	0	11	3	49	0	1	0	0	47	0	0	2	0	0	1	-	0	0	1	0	2	0	0	1	0	-	0	0
12	0	0	0	3	9	11	0	1	0	0	0	0	0	0	20	1	0	0	1	0	0	-	0	0	0	0	1	0	0	0	0	-	0	1
13	0	0	0	0	13	2	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
14	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	0	0	0	-	0	0
15	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
16	0	0	0	1	7	2	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	1	3	0	0	0	0	-	0	0
17	0	0	1	0	7	5	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	1	0	0	2	2	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	0	-	1	0	0	0	6	0	0	1	0	-	0	0
19	0	0	5	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0	0	0	1	0	0	1	0	-	0	0
20	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
21	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	0	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	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	1	0	0	1	0	-	0	0	0	0	1	0	0	0	0	-	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	1	0	0	1	0	-	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	2	0	0	1	0	-	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	0	0
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	0	0
Total	**0**	**3**	**12**	**642**	**110**	**40**	**0**	**27**	**12**	**112**	**0**	**2**	**0**	**0**	**80**	**3**	**3**	**2**	**2**	**1**	**9**	**-**	**4**	**0**	**3**	**3**	**19**	**0**	**0**	**14**	**0**	**-**	**0**	**1**

Table 5.36. Atlantic menhaden length frequency, spring and fall, 1 cm intervals, 1996-2022.

Menhaden are scheduled to be measured from every tow. However, the following numbers of menhaden were not measured: 5 juveniles and 4 adults in 1996, and 7 adults in 1997.

Spring

length	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	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	32	0	0	0	-	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	0	0	-	0	0
9	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	125	0	0	0	-	0	0
10	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	7	0	0	0	115	0	0	0	-	0	0
11	0	0	0	1	0	0	13	0	0	0	0	0	0	0	0	0	3	0	0	0	72	0	0	0	-	0	0
12	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	15	0	0	0	39	0	0	0	-	0	0
13	0	0	0	0	0	0	6	0	0	0	2	0	0	0	0	0	8	0	0	0	8	0	0	0	-	0	0
14	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0	0	0	-	0	0
15	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	-	0	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	-	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
19	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
20	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
21	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	3
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	-	2	10
25	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	0	1	1	1	0	1	-	3	19
26	0	0	0	0	0	0	1	0	0	0	0	4	0	0	0	0	2	3	6	0	3	8	9	6	-	18	16
27	0	0	0	0	0	0	1	0	0	0	0	6	2	3	1	4	14	25	46	24	10	15	10	21	-	36	41
28	0	1	0	0	1	0	1	0	0	0	0	5	4	9	5	10	33	32	81	53	23	36	22	33	-	38	44
29	0	1	0	0	1	0	0	1	3	0	1	5	2	2	1	18	53	59	79	75	34	40	17	35	-	28	20
30	0	1	0	0	0	0	1	1	0	0	0	4	1	5	0	10	28	27	34	54	13	18	13	35	-	13	10
31	0	3	0	0	0	0	0	0	1	0	2	4	1	0	0	1	12	13	19	20	3	4	3	2	-	2	0
32	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0	-	0	0
33	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
34	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
35	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
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	-	0	0
Total	**0**	**6**	**0**	**1**	**9**	**0**	**47**	**2**	**5**	**1**	**5**	**33**	**10**	**19**	**7**	**43**	**195**	**162**	**267**	**229**	**557**	**122**	**77**	**134**	**0**	**140**	**164**

Fall

length	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
4	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
5	0	0	0	0	0	0	0	2	0	0	0	1	0	0	-	0	0	0	0	1	0	0	0	2	-	0	0
6	0	0	0	0	0	0	0	17	1	0	0	24	0	0	-	0	1	1	0	1	0	2	0	4	-	0	0
7	1	0	0	20	12	0	2	32	26	0	1	39	2	0	-	0	0	0	0	34	1	9	1	4	-	1	0
8	0	1	18	51	73	0	6	22	178	11	0	32	2	2	-	0	0	0	0	58	1	10	0	2	-	0	0
9	0	11	53	152	128	0	8	9	135	22	0	12	6	0	-	0	0	0	0	73	0	8	0	0	-	0	1
10	1	5	120	471	125	1	9	1	143	19	0	34	3	3	-	0	1	0	2	70	0	3	1	4	-	0	0
11	0	6	49	337	51	25	14	1	47	13	2	51	2	4	-	0	0	0	1	30	2	1	0	6	-	0	0
12	0	11	44	25	35	30	10	1	18	9	8	24	1	5	-	6	0	4	5	22	11	3	2	1	-	0	1
13	0	0	20	2	15	16	14	4	1	1	1	49	0	4	-	7	1	5	0	5	42	7	3	1	-	1	0
14	0	2	0	0	6	7	20	2	0	3	2	7	0	3	-	9	0	4	0	2	112	3	1	1	-	0	2
15	0	0	0	0	2	4	24	0	0	1	0	1	1	5	-	6	1	1	0	0	90	1	2	0	-	0	0
16	0	0	0	0	2	0	8	0	0	2	1	1	4	4	-	3	0	1	0	0	19	0	0	0	-	0	0
17	0	0	0	0	3	0	12	0	0	0	0	0	3	0	-	0	1	0	0	0	2	0	0	0	-	0	0
18	0	0	0	0	0	0	17	0	0	0	0	0	0	1	-	0	2	0	0	0	0	0	0	0	-	0	0
19	0	0	0	0	0	0	16	0	0	0	0	0	0	1	-	0	2	0	0	0	0	0	0	0	-	0	0
20	0	0	0	1	0	0	2	0	0	0	0	0	0	0	-	0	2	0	0	0	0	0	0	0	-	0	0
21	0	0	0	1	0	0	1	0	0	1	0	0	0	0	-	0	1	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	0	0	0	0	0	0	0	-	0	10
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	2	83
24	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	3	1	2	1	1	-	9	149
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	1	7	5	1	2	4	12	-	11	162
26	0	0	0	0	0	0	1	0	0	0	0	3	0	0	-	0	7	2	2	14	2	3	13	34	-	22	126
27	2	0	0	0	0	0	1	0	0	1	0	21	9	4	-	4	27	6	68	131	11	11	24	101	-	56	98
28	3	1	0	3	0	0	2	0	3	4	0	35	2	7	-	18	68	13	164	249	17	22	47	180	-	43	67
29	23	17	0	6	1	0	18	5	10	21	2	31	1	1	-	48	66	12	132	233	4	14	35	192	-	15	16
30	30	25	0	28	3	0	29	8	44	54	2	18	0	5	-	30	35	14	63	100	1	11	8	93	-	2	2
31	11	17	1	42	7	1	39	8	65	43	2	7	0	2	-	4	11	5	2	18	0	4	8	38	-	0	0
32	2	6	1	27	12	0	27	3	51	21	1	2	0	0	-	2	0	1	9	2	0	1	1	5	-	0	0
33	0	1	0	19	4	2	25	2	10	5	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
34	0	0	0	1	4	0	9	1	7	2	1	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
35	0	0	0	0	1	0	5	0	1	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**73**	**103**	**306**	**1,187**	**484**	**86**	**320**	**119**	**740**	**234**	**23**	**392**	**36**	**51**	**-**	**137**	**226**	**70**	**455**	**1,051**	**317**	**117**	**151**	**681**	**-**	**162**	**717**

Table 5.37. Black sea bass length frequencies, spring, 1 cm intervals, 1986-2022.
Since 1987, black sea bass have been measured from every tow.

	Spring																																				
length	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
6	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	-	0	1
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	6	-	0	1
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	8	0	0	0	0	1	1	2	0	0	3	0	2	0	0	0	0	13	-	0	5
9	0	0	0	0	0	2	0	0	0	0	0	0	0	1	2	0	9	0	0	0	0	1	1	1	0	0	9	2	2	0	0	0	1	2	-	0	7
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	5	0	0	0	0	7	7	2	0	0	8	2	9	0	0	0	2	4	-	1	5
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0	1	2	1	0	0	11	0	10	0	0	0	0	4	-	0	1
12	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	5	0	0	0	0	1	2	2	0	1	14	0	2	1	2	0	1	3	-	0	3
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	9	0	0	0	0	2	1	1	0	1	12	1	0	0	0	0	2	1	-	0	1
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	1	0	0	0	0	0	2	0	0	0	0	1	0	1	-	2	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	2	0	0	1	7	1	0	-	9	0
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	9	2	0	-	7	1
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	4	0	0	0	14	2	0	-	13	1
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	1	0	0	6	1	0	1	15	1	0	-	14	2
19	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	14	1	1	0	12	9	0	-	12	2
20	0	1	0	1	1	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	24	9	0	2	22	15	3	-	12	3
21	0	0	0	1	0	0	0	0	1	0	1	0	0	1	1	0	1	1	1	0	0	1	1	0	0	0	1	33	9	2	0	23	7	2	-	16	3
22	0	2	0	1	0	0	0	1	1	0	1	0	0	0	1	2	0	1	0	0	1	4	2	2	1	2	2	34	6	0	2	14	24	4	-	16	5
23	0	1	0	0	2	0	0	1	1	0	3	0	1	0	1	0	1	2	1	0	0	4	3	3	1	2	4	22	10	8	2	13	25	2	-	10	1
24	0	3	0	0	0	0	1	1	3	3	2	1	2	1	8	1	5	4	0	0	0	0	0	3	1	2	1	12	19	1	5	8	27	5	-	14	5
25	2	0	0	2	0	0	1	2	2	1	0	2	1	0	0	0	2	0	1	0	0	4	1	2	0	2	1	11	39	4	6	3	51	9	-	32	14
26	0	0	1	0	1	0	1	0	1	3	0	1	1	0	1	5	2	0	1	0	0	1	2	1	1	0	3	3	67	6	4	3	87	20	-	37	31
27	0	0	0	0	0	0	0	0	1	1	0	1	1	2	2	4	1	0	1	0	0	1	0	0	2	0	6	2	93	7	5	2	124	33	-	66	33
28	1	0	0	0	4	0	0	1	0	0	0	0	0	0	3	0	2	0	1	0	1	1	0	2	0	0	3	2	125	5	2	2	155	81	-	76	46
29	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	6	0	0	1	1	2	4	0	3	0	152	17	2	1	132	92	-	53	48
30	0	0	0	1	2	0	0	1	2	0	0	1	0	1	1	3	1	0	4	0	0	0	0	2	4	1	2	0	139	41	8	14	100	119	-	24	60
31	0	0	0	0	1	0	0	0	0	0	0	1	1	1	0	3	10	0	7	0	0	0	3	2	2	2	3	1	96	51	8	6	79	138	-	31	59
32	0	0	2	0	1	0	0	2	1	0	1	4	0	1	1	3	15	1	5	0	0	4	5	2	3	3	6	6	91	94	12	10	30	141	-	16	58
33	0	0	1	0	1	0	0	0	2	0	2	1	0	0	1	11	12	1	3	0	0	1	2	2	0	1	7	5	43	91	27	10	32	128	-	14	61
34	2	0	0	1	1	0	0	0	1	0	1	1	1	1	3	6	11	1	2	0	0	3	3	4	6	1	10	9	49	106	50	13	22	108	-	25	60
35	0	0	0	0	0	0	0	1	0	0	1	3	0	0	1	7	11	2	1	1	0	5	0	4	1	3	6	4	19	129	57	13	19	90	-	25	49
36	1	0	1	0	1	0	0	1	1	2	1	0	0	1	0	3	13	0	3	4	0	5	0	7	0	2	7	8	14	107	89	31	14	51	-	41	31
37	0	0	0	0	1	0	0	0	0	0	1	1	0	2	0	5	6	2	0	1	0	1	1	3	2	5	3	10	11	81	110	52	18	42	-	34	21
38	1	0	1	0	0	1	0	0	0	0	0	0	0	1	3	2	11	3	0	1	0	1	0	4	2	4	8	4	9	62	102	60	21	20	-	38	35
39	1	0	0	0	0	2	0	0	2	0	1	0	0	0	0	3	13	1	0	1	0	0	1	7	0	5	12	6	3	56	72	60	22	20	-	38	23
40	0	0	0	1	0	1	0	0	0	0	3	0	0	0	1	2	15	2	1	0	0	2	0	4	0	3	4	9	6	38	77	80	23	17	-	31	25
41	0	0	0	0	0	3	0	0	0	0	0	0	0	1	0	3	11	4	4	4	0	1	1	5	2	2	11	8	8	37	69	62	17	23	-	16	19
42	0	1	0	1	0	0	0	0	1	1	0	0	0	1	1	1	11	3	0	4	1	0	0	7	1	2	1	2	3	21	67	44	30	19	-	15	21
43	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	5	3	2	2	0	1	1	3	0	2	6	1	0	9	53	44	34	11	-	12	23
44	2	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	5	2	1	1	1	0	0	0	0	1	2	3	1	10	36	44	22	19	-	10	13
45	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	7	0	1	0	0	1	1	0	1	0	3	2	1	4	36	25	24	11	-	7	6
46	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	6	2	1	0	0	0	1	0	0	1	2	2	2	2	25	24	22	17	-	6	16
47	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	5	0	2	0	0	1	0	2	0	0	2	1	3	1	10	17	23	13	-	14	12
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	1	0	1	4	15	14	8	15	-	9	8
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	1	0	0	0	0	0	1	3	0	4	10	20	8	12	-	5	8
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	2	2	11	9	5	-	3	10
51	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1	1	2	0	10	5	4	-	4	4
52	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	4	6	6	-	1	4
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	3	6	2	-	1	4
54	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	2	1	-	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	1	2	-	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	-	0	0
57	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0
58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
59	0	0	0	0	0	0	0	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
Total	**12**	**8**	**8**	**12**	**19**	**16**	**3**	**12**	**22**	**11**	**20**	**18**	**8**	**16**	**47**	**67**	**239**	**46**	**49**	**19**	**7**	**58**	**43**	**84**	**36**	**48**	**186**	**263**	**1,058**	**1,004**	**971**	**826**	**1,266**	**1,322**	-	**810**	**849**

Table 5.38. Black sea bass length frequencies, fall, 1 cm intervals, 1986-2022.
Since 1987, black sea bass have been measured from every tow.

																				Fall																				
length	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
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	3	0	1	0	0	1	1	-	2	0
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	2	0	0	1	-	0	1	3	3	0	1	2	2	0	-	1	4
5	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1	2	0	3	1	0	0	0	1	-	4	0	2	0	0	2	0	2	1	-	3	2
6	0	0	0	0	1	0	0	3	0	0	0	0	0	0	0	3	1	0	7	0	0	1	1	0	-	4	1	3	5	1	1	1	3	0	-	0	0
7	0	0	0	0	0	4	0	3	1	0	1	0	0	3	0	6	4	0	23	2	0	3	2	0	-	2	1	3	2	1	0	5	5	3	-	1	1
8	0	2	0	1	0	4	0	1	2	0	1	0	0	0	1	5	8	0	15	2	0	4	0	2	-	1	2	1	2	1	0	4	1	2	-	1	0
9	0	0	0	0	1	3	0	0	4	0	0	0	1	0	0	3	6	0	10	2	0	1	2	0	-	1	2	0	4	0	1	5	2	0	-	0	4
10	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	1	3	0	5	2	0	2	0	0	-	0	2	0	0	0	0	0	1	1	-	1	2
11	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	5	0	2	2	0	1	0	0	-	0	5	0	0	0	0	0	0	2	-	0	1
12	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	0	-	0	3	0	0	0	3	0	0	1	-	0	2
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	4	0	0	0	3	1	0	4	-	0	8
14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2	0	-	0	14	0	0	0	22	0	0	14	-	3	18
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	-	0	21	0	0	0	19	1	0	12	-	2	56
16	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	1	5	0	-	0	37	0	0	0	15	2	0	12	-	2	58
17	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	7	0	0	0	1	4	8	2	-	0	20	3	0	0	19	2	0	14	-	3	76
18	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	16	1	0	0	1	1	14	6	-	0	20	3	0	0	5	6	0	14	-	1	71
19	0	0	0	0	0	0	0	0	0	0	0	2	0	3	1	0	23	0	0	0	2	2	10	4	-	0	23	1	0	0	11	9	1	14	-	3	39
20	0	0	0	0	0	3	0	0	0	0	2	0	1	6	3	0	19	0	0	0	1	4	10	6	-	0	14	1	0	0	5	6	0	7	-	3	18
21	0	0	0	0	0	1	0	0	0	1	0	1	0	4	1	0	17	0	0	1	3	4	9	4	-	0	9	1	2	0	2	2	2	4	-	1	8
22	0	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0	5	0	0	0	0	1	4	3	-	0	3	8	1	0	0	3	0	1	-	11	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	4	0	1	0	0	2	0	0	-	0	6	11	2	0	1	6	2	1	-	18	1
24	0	0	2	0	0	0	0	0	0	0	1	0	0	3	0	0	2	0	0	0	0	0	0	0	-	0	0	12	1	0	0	10	4	0	-	14	0
25	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	-	0	0	14	1	0	1	5	3	1	-	13	5
26	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	-	1	0	18	2	0	1	9	2	0	-	9	4
27	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	2	-	1	1	15	3	3	5	8	3	0	-	12	3
28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	2	0	-	1	2	13	10	2	2	7	12	2	-	8	5
29	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	3	0	1	1	2	0	1	0	0	-	2	1	8	13	2	6	3	14	2	-	7	10
30	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	1	0	-	5	1	8	10	1	3	3	14	7	-	9	18
31	0	0	0	0	1	0	2	0	0	0	0	0	0	0	1	0	1	1	0	0	0	2	1	0	-	4	1	4	21	4	2	4	17	6	-	13	11
32	0	0	2	0	0	0	0	0	0	0	0	1	0	2	3	2	0	0	0	0	0	2	0	0	-	1	0	4	14	5	0	0	15	8	-	22	15
33	0	0	0	0	2	0	0	0	0	0	0	0	0	0	3	2	0	0	0	2	0	0	0	0	-	1	1	4	23	3	1	0	8	11	-	15	8
34	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2	2	0	0	1	0	1	1	0	-	1	1	0	21	9	4	0	8	20	-	9	7
35	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	3	2	1	1	0	0	0	1	1	-	2	1	1	27	11	3	0	12	18	-	4	8
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	0	0	-	0	1	2	20	8	3	1	11	16	-	8	5
37	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	9	2	0	0	0	0	1	1	0	-	3	1	3	12	6	2	2	2	13	-	6	7
38	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7	3	0	0	1	0	1	0	1	-	1	1	6	11	5	6	0	3	11	-	7	1
39	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	2	0	1	-	2	2	1	7	8	7	2	0	9	-	15	4
40	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	2	0	1	0	0	0	1	0	-	1	3	7	8	13	7	2	0	6	-	12	4
41	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	3	0	0	1	0	2	0	0	-	3	2	2	4	4	10	3	0	5	-	5	2
42	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	2	0	0	0	0	-	3	4	3	2	5	7	6	0	4	-	9	1
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	0	0	0	0	1	0	0	-	0	3	5	3	4	4	2	1	4	-	2	2
44	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	3	1	0	0	0	0	0	0	0	-	1	3	2	0	2	5	4	2	0	-	4	2
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	-	0	0	3	1	1	0	2	2	0	-	5	4
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	1	1	0	1	3	5	0	3	-	4	1
47	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	-	0	1	0	1	0	5	3	1	0	-	3	3
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	-	0	2	2	0	0	2	5	3	3	-	2	1
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	1	0	0	6	3	2	1	-	0	1
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	0	0	0	-	0	0	1	2	0	2	6	2	1	-	1	1
51	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1	0	0	0	0	1	0	1	-	2	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1	1	1	0	0	0	1	0	-	0	1
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	0	1	-	0	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	-	0	1	1	0	0	0	0	1	0	-	0	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	0	0	-	0	0
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
58	0	0	0	0	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
Total	**0**	**3**	**9**	**1**	**8**	**22**	**2**	**8**	**12**	**1**	**6**	**4**	**10**	**33**	**22**	**66**	**155**	**11**	**75**	**23**	**12**	**53**	**77**	**38**	**0**	**45**	**224**	**185**	**239**	**104**	**207**	**151**	**166**	**261**	**-**	**276**	**503**

Table 5.39. Blueback herring length frequencies, spring and fall, 1 cm intervals, 1989-2022.

From 1989 - 1990, lengths were recorded from the first three tows of each day; since 1991, lengths have been recorded from every tow.

Spring

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
6	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	0	0	0	0	-	0	0
7	0	0	2	0	2	7	2	0	0	2	0	4	1	0	3	2	1	0	0	1	0	4	0	0	5	1	17	3	0	0	4	-	0	0
8	0	0	3	0	2	76	20	4	0	5	0	10	7	12	7	9	8	1	0	8	0	1	0	0	9	8	30	13	0	0	17	-	0	0
9	0	0	2	0	3	114	11	5	21	15	0	14	5	9	23	23	14	8	1	11	7	4	3	3	9	3	24	45	0	9	17	-	1	0
10	0	0	5	10	7	74	9	19	45	45	0	18	2	9	26	47	6	23	9	14	19	19	5	18	5	1	32	52	0	22	27	-	5	0
11	0	0	3	4	9	41	9	10	258	48	0	28	1	6	11	39	10	2	3	12	25	38	9	12	8	2	29	40	0	37	7	-	0	1
12	3	0	5	0	2	9	5	3	4	16	0	18	2	3	4	20	12	0	5	2	27	8	3	5	1	2	10	23	0	4	7	-	0	0
13	0	0	0	4	0	13	5	2	0	2	0	12	1	1	1	12	3	1	3	4	17	10	6	1	1	0	3	5	0	3	2	-	0	3
14	0	0	0	15	0	5	3	1	1	1	0	3	0	0	0	0	7	0	1	1	5	4	2	0	0	0	0	1	0	6	2	-	0	1
15	0	0	1	27	1	3	4	7	0	0	1	2	0	4	0	0	8	1	2	2	9	1	0	0	0	0	0	1	0	24	1	-	0	0
16	0	0	0	65	0	8	3	7	0	3	5	1	1	1	4	4	13	2	23	1	30	4	2	2	7	0	0	0	0	78	0	-	0	0
17	0	0	1	11	3	9	1	10	4	0	5	3	10	7	4	4	11	2	37	7	64	2	12	2	5	6	0	1	0	162	2	-	0	0
18	0	1	0	2	0	3	0	4	2	0	0	5	15	2	3	3	1	2	7	3	49	1	3	2	3	11	1	2	0	143	3	-	0	0
19	0	0	0	0	1	2	4	3	2	0	0	0	3	0	0	3	2	1	3	2	17	2	1	0	1	4	0	0	0	42	1	-	0	1
20	0	0	0	4	0	1	1	0	0	0	0	2	1	1	0	0	5	2	0	1	2	0	1	0	1	3	0	0	0	23	1	-	0	0
21	2	1	2	0	0	1	1	3	0	0	0	1	3	0	0	3	2	3	2	0	1	1	0	0	7	2	1	0	0	15	3	-	0	0
22	1	0	0	1	0	3	0	4	0	1	0	3	0	0	1	0	1	0	1	1	0	1	0	0	5	2	0	1	0	6	4	-	0	0
23	0	0	3	2	0	3	2	3	1	0	0	5	0	1	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	11	-	0	1
24	0	1	2	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	2	0	0	1	0	0	1	0	0	0	0	0	2	-	0	0
25	0	0	0	1	0	1	1	1	0	0	0	1	0	0	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
26	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	0	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
Total	**6**	**3**	**29**	**147**	**30**	**373**	**83**	**90**	**338**	**140**	**11**	**136**	**52**	**56**	**89**	**173**	**104**	**49**	**101**	**71**	**272**	**102**	**47**	**45**	**68**	**47**	**153**	**187**	**0**	**574**	**113**	-	**6**	**7**

Fall

length	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	4	0	-	0	0
5	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	2	0	-	0	0
6	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
7	0	0	0	0	0	0	5	0	2	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
8	0	0	0	0	0	0	33	0	2	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
9	0	0	0	0	0	0	21	3	2	2	1	0	0	0	0	0	0	0	1	0	2	-	0	0	0	0	0	0	1	0	0	-	0	2
10	0	0	0	0	0	1	3	0	8	1	0	1	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	1	0	0	-	0	10
11	0	0	0	0	3	13	4	0	3	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	0	0	-	0	7
12	0	0	3	9	8	227	14	0	12	1	1	0	7	0	0	2	0	0	0	0	0	-	0	0	0	1	0	0	3	0	1	-	0	5
13	38	1	4	11	24	225	48	0	117	18	0	0	36	2	0	15	2	2	0	0	0	-	0	1	0	1	0	17	0	0	5	-	1	3
14	77	0	1	6	18	247	40	1	111	28	1	0	117	7	0	17	3	8	1	1	3	-	4	0	0	2	26	151	31	0	4	-	2	1
15	24	0	0	1	20	94	3	3	34	16	0	3	52	3	4	6	2	4	14	2	5	-	9	0	0	3	60	92	37	0	0	-	3	3
16	0	0	0	0	2	14	0	0	0	5	2	1	10	0	4	0	0	0	31	0	2	-	9	0	0	1	6	1	14	0	0	-	0	1
17	0	0	0	0	0	2	0	0	0	1	1	2	2	0	1	0	0	0	7	0	1	-	3	0	0	2	0	0	1	0	0	-	0	0
18	1	0	0	0	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0	0	5	-	0	0	0	0	0	0	0	0	0	-	0	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
20	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	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	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
24	0	1	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
25	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**140**	**2**	**9**	**27**	**76**	**827**	**172**	**7**	**292**	**72**	**8**	**8**	**227**	**12**	**9**	**42**	**8**	**14**	**55**	**3**	**18**	-	**25**	**1**	**0**	**10**	**94**	**261**	**88**	**6**	**10**	-	**6**	**32**

Table 5.40. Bluefish length frequencies, spring, 1 cm intervals, 1984-2022.
Bluefish lengths were recorded from every tow.

	Spring																																						
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	0
24	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	2	0	-	1	0
25	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	3	0	1	0	0	0	0	1	0	0	0	0	0	-	0	0
26	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	1	0	0	0	1	8	1	3	0	0	0	0	1	0	1	0	0	0	-	0	0
27	0	0	0	0	0	0	1	1	1	0	0	0	0	2	2	0	2	0	0	0	2	0	1	2	0	2	0	1	0	0	0	1	0	0	1	0	-	0	0
28	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	4	0	0	7	0	0	0	0	0	0	0	0	1	0	-	0	0
29	0	0	2	0	0	0	1	2	0	0	0	1	1	1	0	1	4	0	1	0	0	0	1	0	0	3	0	0	0	0	0	0	1	0	0	0	-	0	0
30	0	0	0	0	0	0	0	7	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2	1	0	0	0	0	1	0	0	0	1	0	0	0	-	0	0
31	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	1	0	0	0	0	0	0	-	0	0
32	0	0	1	0	0	0	0	11	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	-	0	0
33	0	0	0	0	0	0	0	6	0	0	0	0	0	2	0	1	0	0	1	0	0	0	2	1	0	2	0	0	2	0	0	0	0	0	0	0	-	0	0
34	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	-	0	0
35	0	0	0	1	0	0	0	9	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	1	0	0	0	1	2	0	1	0	0	0	0	0	-	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	1	-	0	0
37	0	0	0	0	0	0	0	10	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	-	0	0
38	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	1	0	1	1	0	0	0	0	0	0	0	-	0	0
39	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0
40	0	0	1	0	0	0	1	5	0	0	0	0	0	0	0	0	0	1	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
41	0	0	1	0	0	0	1	6	0	0	0	1	0	0	0	4	0	3	5	4	0	5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0
42	0	0	1	1	1	0	0	14	1	0	0	0	0	2	2	2	0	3	5	4	1	1	0	1	3	0	0	1	1	1	0	0	0	4	0	0	-	0	0
43	0	0	1	0	0	0	0	12	0	0	0	0	1	1	0	1	1	6	8	3	0	1	0	0	4	0	0	3	1	2	0	0	0	0	0	0	-	0	0
44	0	0	1	0	0	0	0	10	3	0	0	0	1	0	2	2	0	1	3	1	0	1	1	2	7	0	0	0	0	0	0	0	1	3	0	0	-	0	0
45	0	0	0	0	0	0	1	7	1	0	0	1	1	0	1	0	0	4	3	2	0	0	1	1	3	0	0	4	0	2	0	0	0	1	0	0	-	1	1
46	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	2	2	2	0	1	0	2	1	2	0	0	3	0	0	0	0	1	1	0	0	-	0	0
47	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	1	0	0	0	4	0	0	0	0	1	0	1	0	0	0	0	0	0	-	0	0
48	0	0	1	1	0	0	0	3	3	1	0	0	0	0	1	1	1	1	0	0	0	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0
49	0	0	2	1	3	0	0	1	2	2	0	0	0	0	0	5	0	1	3	1	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	-	1	0
50	0	0	2	1	1	1	0	1	8	0	0	0	2	4	2	3	1	0	5	1	1	0	3	1	1	0	0	1	0	1	0	0	0	0	0	0	-	0	0
51	0	0	0	0	4	1	1	6	4	2	0	0	1	6	1	3	0	1	4	3	5	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	-	0	0
52	0	0	2	2	3	1	0	5	3	1	1	0	2	3	0	6	2	0	3	3	1	1	4	1	0	3	0	2	1	2	0	0	1	0	1	0	-	0	0
53	0	0	2	1	3	0	0	1	4	0	1	0	0	3	2	0	0	2	3	0	2	1	2	1	0	4	0	1	1	2	0	0	0	0	0	0	-	1	0
54	0	0	3	0	4	0	0	2	0	0	1	0	0	1	0	2	0	1	4	1	1	2	0	0	0	0	0	2	0	1	0	0	0	0	0	0	-	0	0
55	0	0	1	1	7	0	1	2	0	1	0	0	3	1	1	1	1	0	2	0	0	0	0	3	1	4	0	1	0	1	0	0	0	0	0	0	-	1	0
56	0	0	2	2	3	0	0	0	0	1	0	1	0	1	3	1	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	1	0	0	0	-	0	0
57	0	0	1	0	5	0	0	2	1	1	0	0	0	0	0	1	0	1	0	1	0	1	2	0	1	1	0	0	0	0	0	0	0	0	0	0	-	0	0
58	0	1	0	0	3	1	1	0	0	1	0	0	0	0	0	1	1	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
59	0	0	0	0	3	0	0	0	0	0	1	0	0	1	0	2	0	0	0	3	1	1	1	1	0	0	0	1	0	1	0	0	0	0	0	0	-	0	0
60	0	0	0	0	1	1	0	0	1	0	1	0	0	2	0	1	0	0	0	1	0	0	0	1	1	3	1	1	0	0	1	0	0	0	0	0	-	0	2
61	0	0	3	0	1	1	0	0	1	1	3	0	0	1	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
62	0	0	0	0	1	0	0	1	0	0	3	0	0	0	1	0	0	0	0	1	0	1	0	1	1	1	0	0	0	0	0	0	1	0	0	0	-	0	0
63	0	0	1	0	0	0	0	0	1	1	1	0	0	0	2	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0
64	0	0	1	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	0	1	1	0	2	0	0	0	0	0	0	0	0	-	0	0
65	0	0	0	0	0	2	0	1	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	0	-	0	0
66	0	0	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	1	0	0	0	0	0	0	0	-	0	0
67	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	4	0	0	1	1	0	0	0	0	0	0	-	0	0
68	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	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	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
70	0	0	1	0	0	0	1	2	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
72	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
74	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
75	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
77	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
78	0	0	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
79	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0
80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**0**	**1**	**35**	**13**	**43**	**13**	**17**	**147**	**42**	**13**	**12**	**6**	**15**	**38**	**23**	**51**	**26**	**29**	**56**	**36**	**18**	**25**	**39**	**39**	**29**	**52**	**2**	**28**	**19**	**20**	**6**	**3**	**8**	**11**	**5**	**1**	-	**6**	**3**

Table 5.41. Bluefish length frequencies, fall, 1 cm intervals, 1984-2022.

Bluefish lengths were recorded from every tow.

	Fall																																				
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
6	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	1	-	0	0
7	0	1	0	0	0	0	0	2	33	0	1	0	0	3	12	2	0	1	1	0	0	0	2	0	0	0	-	0	0	0	0	0	0	0	0	1	-	0	0
8	1	5	0	2	0	0	0	14	96	1	11	1	0	13	85	40	0	15	1	0	3	1	3	1	0	1	-	0	0	0	4	0	0	0	0	4	-	1	1
9	1	6	0	3	3	0	3	38	228	4	71	0	0	135	344	252	2	25	8	8	15	76	8	30	0	28	-	0	1	0	2	2	1	0	0	14	-	1	2
10	0	4	7	16	39	3	21	115	184	27	183	6	4	941	647	720	14	89	56	33	342	308	76	86	2	93	-	4	0	2	42	13	16	12	4	43	-	6	10
11	38	13	13	79	76	76	53	200	290	56	1266	156	3	2006	1127	484	50	213	96	70	730	421	239	41	19	317	-	2	10	12	167	110	93	75	9	59	-	27	18
12	350	52	20	108	270	249	57	280	269	171	2842	397	10	2905	2008	338	42	136	149	77	748	451	349	157	120	442	-	15	36	22	363	170	268	191	27	122	-	76	46
13	958	96	45	322	332	494	49	260	123	432	2880	428	54	1258	1558	316	168	122	250	33	420	499	64	379	301	324	-	40	90	71	495	229	334	323	56	226	-	137	83
14	1483	556	138	500	183	596	99	202	96	283	2023	154	93	518	834	337	284	122	216	12	299	273	131	231	483	136	-	132	157	250	576	373	182	273	24	235	-	106	89
15	1076	1232	376	482	151	903	409	241	401	149	1763	61	510	351	433	300	126	336	126	32	129	117	110	134	225	120	-	196	501	486	305	484	121	214	17	213	-	97	130
16	1028	1284	533	399	307	1187	540	405	566	146	1033	145	1399	469	160	503	155	679	70	200	113	231	172	328	45	475	-	476	871	363	181	439	111	62	26	183	-	73	112
17	770	783	399	147	472	1155	643	681	495	552	829	497	1924	536	127	361	216	568	36	460	161	389	229	821	22	630	-	603	761	204	404	217	106	156	23	153	-	104	88
18	246	351	258	92	458	1380	729	589	498	1177	512	902	1227	407	97	190	476	363	33	697	241	668	181	1664	49	350	-	491	523	126	638	155	116	297	14	173	-	129	34
19	180	204	128	26	322	1057	493	574	340	1268	529	995	618	363	114	244	724	307	116	790	315	859	106	1733	40	116	-	278	272	53	466	138	198	323	48	179	-	139	22
20	182	64	125	6	360	499	280	383	208	854	482	602	329	188	117	446	1270	228	247	681	348	751	79	1379	49	63	-	168	185	37	330	46	229	226	49	152	-	95	22
21	64	32	44	13	172	404	227	245	56	320	321	333	158	144	82	467	976	164	370	330	328	437	29	772	20	20	-	72	127	14	156	50	172	108	82	89	-	48	16
22	38	12	48	7	171	149	102	270	25	119	336	148	17	98	115	490	491	90	407	97	293	268	43	518	7	7	-	34	75	9	115	51	159	46	101	64	-	50	36
23	30	9	38	2	22	49	48	128	3	95	133	54	15	56	100	606	350	71	316	7	257	161	21	335	1	4	-	18	36	6	43	68	103	27	48	32	-	28	37
24	19	15	9	3	12	11	49	119	1	33	184	7	3	16	181	515	230	49	236	2	214	119	22	151	2	1	-	18	30	1	25	27	76	12	34	9	-	17	50
25	0	9	6	2	6	7	14	92	0	33	81	7	4	9	189	517	107	27	120	0	126	59	6	69	0	1	-	3	18	0	17	18	24	8	19	4	-	6	28
26	0	5	0	0	1	0	5	27	0	8	54	1	0	3	108	311	9	14	29	0	42	25	6	16	1	0	-	1	5	0	9	6	26	4	5	3	-	4	12
27	2	0	0	0	0	5	4	5	0	2	8	2	0	0	59	165	0	4	21	0	11	7	8	2	0	0	-	0	2	0	0	1	1	2	7	1	-	3	2
28	0	0	0	0	0	0	0	1	0	0	1	0	0	0	4	44	0	5	1	0	8	0	2	1	0	0	-	1	2	0	0	0	1	0	2	0	-	1	2
29	0	2	0	0	0	0	0	0	0	0	0	0	0	0	4	10	0	0	0	0	2	0	0	3	2	0	-	1	1	0	1	0	1	0	0	0	-	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	0	1	0	1	-	0	0	0	1	1	2	0	2	1	-	0	0
31	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	3	0	0	1	-	0	0
32	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	2	0	0	0	-	0	2	0	1	0	3	0	2	3	-	0	0
33	0	0	0	2	0	0	4	0	0	0	0	2	0	0	1	0	0	0	2	0	10	0	2	1	0	1	-	0	2	0	4	0	4	0	6	5	-	0	0
34	0	0	0	1	0	0	8	0	1	0	0	5	0	0	1	0	0	0	7	0	39	0	3	0	0	0	-	1	3	0	5	0	3	0	8	6	-	0	0
35	0	0	0	3	1	0	9	0	2	0	0	17	0	1	0	0	0	0	6	1	41	0	1	3	0	1	-	0	1	0	4	0	10	2	11	16	-	0	0
36	1	2	0	3	1	1	11	1	2	0	6	31	0	1	1	0	0	3	12	2	58	0	12	0	2	9	-	2	2	1	3	0	3	0	15	10	-	0	0
37	3	6	1	13	1	0	29	0	19	0	4	61	0	1	1	1	2	12	15	4	129	0	15	5	3	26	-	3	3	0	17	0	10	5	19	10	-	1	2
38	11	16	5	18	1	1	70	6	44	0	7	81	2	18	8	2	13	21	24	7	197	0	32	11	17	59	-	5	11	2	12	1	19	2	22	4	-	1	4
39	14	50	30	38	5	9	75	12	74	4	23	111	0	34	20	5	18	31	44	13	231	0	18	34	25	52	-	13	7	1	7	1	23	1	10	5	-	2	4
40	40	72	57	48	12	22	127	38	85	7	57	80	11	60	31	3	46	55	82	9	159	8	17	43	24	55	-	13	11	1	2	2	42	2	2	2	-	13	2
41	24	61	62	36	12	50	118	92	84	12	58	45	7	49	15	12	83	35	70	6	53	7	8	35	11	29	-	10	9	2	0	5	27	2	0	1	-	7	0
42	18	39	81	25	16	51	101	110	55	16	75	25	12	37	15	5	50	18	57	6	22	22	9	37	6	25	-	19	4	3	2	4	14	0	0	1	-	1	1
43	14	24	20	16	15	50	55	118	22	26	50	12	10	15	13	6	23	13	29	7	11	21	2	31	7	10	-	16	6	1	4	3	2	1	0	0	-	3	1
44	5	8	12	13	22	24	20	82	17	36	20	7	10	12	12	0	11	6	8	3	7	31	0	24	5	8	-	8	3	2	2	1	0	0	0	0	-	2	0
45	1	6	8	8	10	10	5	55	18	44	12	3	13	8	18	1	5	9	2	3	8	26	2	16	5	2	-	6	4	4	0	1	2	0	0	1	-	1	0
46	8	3	27	5	9	13	8	35	21	38	3	6	18	2	16	2	2	11	2	8	12	21	0	12	6	0	-	7	3	2	0	1	2	0	0	2	-	1	0
47	5	8	36	4	16	6	17	34	51	37	4	13	43	4	13	5	7	4	6	6	16	17	1	13	5	3	-	1	4	5	0	1	5	1	1	1	-	1	0
48	3	28	24	5	11	10	5	44	72	35	1	8	45	16	15	5	5	8	8	10	21	14	3	15	9	3	-	4	1	9	3	0	1	1	0	2	-	0	0
49	18	27	28	6	8	11	12	44	107	46	8	12	29	11	18	4	9	17	6	9	26	20	3	16	11	7	-	10	2	22	0	0	3	1	0	6	-	1	0
50	13	27	25	9	11	9	17	43	112	26	5	12	26	6	10	0	15	17	6	9	33	31	3	12	15	10	-	3	3	13	0	1	8	1	1	4	-	1	0
51	12	31	18	5	5	10	19	30	98	24	8	9	12	10	14	7	17	9	7	9	26	26	1	14	14	11	-	9	4	6	1	2	11	0	0	1	-	2	1
52	16	27	14	2	9	18	10	11	101	22	17	18	10	4	5	4	26	8	13	4	10	13	7	11	14	5	-	5	5	6	0	0	12	2	0	0	-	1	1
53	15	17	7	12	9	14	6	10	61	4	25	7	7	6	3	6	14	4	6	3	12	9	5	11	14	4	-	1	3	7	0	0	19	0	0	0	-	0	0
54	11	16	7	16	2	12	1	5	54	10	36	5	8	4	6	3	8	3	5	0	13	4	5	10	8	2	-	3	2	2	2	2	29	0	0	0	-	0	0
55	9	9	2	9	6	9	4	0	36	1	20	1	2	1	3	1	8	2	7	6	18	4	2	1	4	2	-	2	3	5	0	1	32	0	0	0	-	2	0
56	8	7	2	15	1	9	1	0	28	12	17	3	5	1	1	3	1	3	3	7	14	3	2	1	3	2	-	1	3	5	0	0	17	0	0	0	-	4	1
57	5	2	2	15	0	3	0	3	26	21	15	0	5	7	1	7	2	1	9	1	34	11	5	4	0	6	-	0	0	3	0	1	11	0	0	0	-	0	1
58	2	2	7	6	6	5	3	5	16	33	4	0	4	8	3	3	6	3	2	1	25	5	3	3	4	3	-	1	0	3	2	1	6	0	1	1	-	0	1
59	2	3	8	5	6	2	0	1	13	35	7	1	4	2	3	9	0	5	7	3	14	10	2	10	1	5	-	2	3	0	8	1	9	0	1	0	-	1	3
60	5	8	3	6	4	1	2	5	4	67	9	4	4	4	3	2	6	5	2	3	11	5	3	22	4	7	-	1	0	3	5	0	7	0	2	1	-	0	0
61	1	12	2	3	4	3	3	1	6	41	11	0	4	6	2	1	5	5	1	2	7	7	3	10	7	7	-	2	1	6	1	0	9	0	0	0	-	1	0
62	2	3	3	3	5	2	2	3	7	34	8	4	2	1	5	2	1	3	2	1	11	13	0	18	4	5	-	0	1	3	1	0	6	3	0	0	-	0	0
63	0	10	8	2	10	2	7	3	4	20	12	1	0	4	5	1	5	0	4	2	10	14	2	6	6	3	-	3	4	4	2	0	17	2	0	0	-	1	0
64	0	6	10	3	4	1	7	1	4	27	12	3	1	0	3	2	8	0	1	1	12	4	1	13	0	1	-	0	0	3	4	0	17	3	0	0	-	1	1
65	0	6	1	3	8	1	6	0	8	3	27	3	0	2	4	1	3	2	4	0	10	10	2	10	5	7	-	0	0	3	0	1	14	0	0	0	-	0	0
66	0	5	7	2	7	2	9	0	1	8	28	3	1	1	4	0	4	1	5	0	6	6	1	8	5	6	-	0	0	1	4	0	10	0	0	0	-	1	3
67	0	6	4	1	7	2	3	1	2	8	21	2	2	3	1	3	3	4	1	1	3	5	0	5	9	12	-	2	2	4	2	2	6	0	0	0	-	0	3
68	1	6	5	5	13	6	4	4	0	1	30	3	0	0	1	3	3	2	3	1	5	7	0	5	6	11	-	2	2	1	4	4	2	1	0	0	-	0	4
69	0	1	3	5	4	4	8	5	4	1	5	1	2	1	1	3	0	3	4	0	7	3	0	6	4	11	-	1	1	2	0	3	2	1	0	0	-	0	0
70	0	1	9	3	4	13	5	4	6	0	10	2	0	0	1	4	3	0	5	2	5	1	0	0	8	11	-	2	0	3	3	0	2	1	0	0	-	0	1
71	1	0	4	1	3	6	10	1	5	1	7	3	3	1	0	3	5	1	2	0	1	0	0	1	3	15	-	4	0	3	1	3	0	1	0	0	-	0	2
72	1	1	2	3	4	3	9	3	6	5	4	2	0	2	1	0	1	1	3	1	4	1	0	3	2	11	-	6	1	4	1	1	3	0	0	0	-	0	1
73	0	1	1	5	3	4	7	2	9	6	3	2	1	3	0	0	1	1	1	0	2	2	0	2	1	9	-	2	4	1	1	2	1	0	0	0	-	0	0
74	0	0	2	1	0	3	5	3	10	2	3	3	5	2	2	1	1	0	1	0	1	2	0	1	1	4	-	3	1	2	0	4	0	0	0	0	-	0	0
75	2	1	3	2	9	2	8	5	7	6	2	1	2	1	2	4	0	1	0	1	0	2	0	0	0	8	-	2	2	1	1	1	6	0	0	1	-	0	0
76	0	2	1	1	2	3	7	6	3	3	5	2	3	2	0	1	0	0	2	0	2	1	0	0	1	2	-	2	0	1	2	2	1	0	0	0	-	0	1
77	0	1	0	0	1	1	3	0	3	1	3	1	5	4	1	0	0	0	1	0	1	0	0	0	0	2	-	1	2	3	0	0	3	0	0	0	-	0	0
78	0	2	2	1	0	2	1	1	2	3	2	1	0	1	0	1	0	1	0	0	0	0	0	1	0	1	-	2	0	0	1	0	4	2	0	0	-	0	0
79	0	0	0	0	1	1	0	1	2	3	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	-	1	0	0	0	0	4	0	0	0	-	0	0
80	0	1	0	0	0	0	2	0	1	0	3	0	2	0	0	1	1	0	0	0	1	0	0	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
81	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	1	0	0	0	0	0	1	0	-	0	0
82	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	1	-	0	0
83	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	1	0	0	0	-	0	0
Total	**6,738**	**5,300**	**2,740**	**2,598**	**3,645**	**8,636**	**4,671**	**5,699**	**5,225**	**6,459**	**16,232**	**5,514**	**6,688**	**10,776**	**8,789**	**7,788**	**6,112**	**3,957**	**3,395**	**3,681**	**6,489**	**6,506**	**2,064**	**9,336**	**1,667**	**3,604**	**-**	**2,735**	**3,829**	**1,809**	**4,452**	**2,650**	**2,785**	**2,395**	**698**	**2,046**	**-**	**1,197**	**878**

Table 5.42. Butterfish length frequencies, 1 cm intervals, spring and fall, 1986-1990, 1992–2022.

Prior to 2014, length frequencies of butterfish were taken from the first three tows of each day; since 2014, lengths have been recorded from every tow.

Spring

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	0	1	2	4	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
4	0	0	0	0	0	0	0	2	0	0	0	0	3	0	9	0	15	0	1	1	8	1	5	0	3	3	3	3	0	2	2	0	1	-	0	0
5	0	0	0	0	0	2	0	6	0	2	0	0	4	0	51	1	29	1	0	1	5	3	53	0	9	2	39	20	7	16	40	2	4	-	4	0
6	0	0	0	0	0	0	0	35	0	21	3	0	0	0	207	0	7	20	0	2	0	1	276	1	35	6	109	35	65	9	110	13	0	-	11	0
7	0	0	0	2	0	0	0	57	1	7	0	3	0	0	202	0	3	95	1	0	0	3	233	0	50	0	218	26	62	2	93	0	0	-	24	0
8	0	0	0	2	0	0	0	18	0	0	0	0	0	1	107	0	0	101	2	4	0	0	228	0	34	3	76	14	35	2	8	1	4	-	16	10
9	0	0	0	0	0	0	0	0	4	0	57	5	4	0	15	0	4	47	0	61	12	1	197	198	7	279	4	40	1	26	7	33	11	-	12	45
10	4	0	0	40	0	2	0	4	7	0	165	183	10	0	5	4	10	146	10	201	73	53	225	530	2	768	13	231	50	539	8	46	23	-	77	93
11	29	0	0	269	5	16	3	28	20	19	618	622	16	84	51	44	130	427	27	540	292	74	461	291	28	1,523	95	718	463	2916	46	269	14	-	201	405
12	39	0	3	208	7	32	17	45	80	190	1,005	656	55	961	272	202	616	433	216	1,632	794	409	1,426	47	217	1,489	427	608	1063	6194	231	902	32	-	465	513
13	26	0	6	34	16	88	25	75	62	485	1,598	466	152	1,265	317	656	546	201	442	3,108	531	976	1,196	110	1,347	1,214	639	326	668	3693	595	785	146	-	444	375
14	61	0	7	2	28	111	10	76	30	327	1,296	190	145	317	145	990	129	71	425	1,690	130	739	439	237	1,819	735	531	188	552	1807	371	262	108	-	349	210
15	66	0	27	3	26	50	9	117	24	255	1,033	173	122	122	236	851	137	64	234	493	234	646	237	376	1,443	396	200	107	443	1288	332	172	91	-	176	248
16	57	0	20	10	26	49	25	156	44	275	951	267	148	31	381	669	155	126	124	173	190	654	201	301	1,228	330	149	278	387	1064	498	244	224	-	226	483
17	25	0	14	7	38	41	23	92	25	178	654	175	137	47	332	490	64	107	81	104	146	396	154	61	982	237	149	313	311	645	502	279	226	-	239	471
18	20	0	0	0	18	38	10	44	14	83	307	88	106	28	284	335	36	50	71	72	85	405	113	41	599	83	129	252	359	261	182	156	187	-	174	293
19	7	0	0	4	16	27	4	9	3	48	110	70	24	23	128	249	26	21	59	84	22	179	49	5	286	35	13	150	265	45	65	93	181	-	238	422
20	0	0	1	2	7	10	0	4	1	13	72	29	27	21	53	142	16	9	12	27	18	56	9	13	67	40	14	37	39	5	7	35	70	-	149	236
21	4	0	0	1	5	1	0	0	0	2	22	3	8	7	7	26	4	1	4	1	0	1	7	0	33	0	0	7	10	1	1	3	14	-	44	81
22	4	0	0	0	7	0	1	0	0	0	0	5	3	0	1	4	4	1	0	0	0	0	0	0	0	0	0	0	6	0	1	1	4	-	13	8
23	0	0	0	0	1	2	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	1	1
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	-	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	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	0	0	0	0	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	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**	**5,509**	**2,211**	**8,191**	**7,143**	**2,808**	**3,353**	**4,788**	**18,515**	**3,099**	**3,296**	**1,340**	-	**2,863**	**3,894**

Fall

length	1986	1987	1988	1989	1990	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
3	0	0	0	0	0	0	0	0	3	0	0	0	2	0	0	0	0	2	0	0	0	0	0	-	24	0	0	0	0	0	0	0	1	-	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	6	-	0	10	8	0	0	5	30	4	7	-	1	8
5	0	3	1,141	23	3	475	436	16	268	180	33	20	13	72	69	53	52	29	260	2	152	29	324	-	78	64	71	80	108	98	85	98	49	-	9	64
6	0	10	5,778	144	62	2,429	3,144	197	426	601	461	317	250	334	409	616	685	710	658	34	1,270	230	1,997	-	345	280	662	802	981	151	304	818	519	-	345	556
7	12	146	5,728	678	173	13,780	4,344	1,701	5,055	1,540	1,614	920	3,755	2,709	1,405	1,842	4,972	9,342	2,991	162	1,951	771	9,132	-	1,075	1,559	2,164	3,546	12,643	2,448	862	3,639	2,722	-	2,594	1,701
8	117	1,093	4,844	1,425	471	22,246	5,983	7,653	11,919	3,292	5,449	4,070	24,915	8,904	3,196	7,453	5,630	18,524	14,062	1,060	4,508	4,744	18,840	-	3,621	5,148	2,395	14,503	23,067	8,977	3,402	4,866	8,628	-	7,517	7,059
9	277	2,236	5,489	3,196	2,515	22,133	7,781	17,663	12,110	5,856	11,122	14,691	53,739	16,392	4,444	14,401	3,067	13,237	18,276	4,647	5,086	8,864	16,054	-	5,715	7,742	2,127	20,159	6,886	13,489	5,562	5,006	12,747	-	8,766	16,548
10	1,143	2,017	1,068	4,927	5,886	6,614	4,001	8,178	3,765	6,674	10,645	29,516	31,244	13,110	6,002	14,408	832	13,284	16,897	9,830	7,584	6,576	5,377	-	3,197	7,792	1,662	14,199	613	11,727	8,036	8,296	10,391	-	9,054	13,339
11	919	1,204	477	1,661	2,781	634	871	2,414	832	5,493	6,050	23,892	8,496	3,528	2,997	5,682	294	4,193	8,203	5,929	6,404	4,103	1,678	-	648	3,451	798	5,337	666	4,517	5,992	8,175	4,438	-	4,500	3,478
12	623	1,041	51	216	827	65	360	1,951	346	2,344	2,849	7,162	2,009	915	2,004	430	639	982	2,391	3,266	2,614	1,812	5,041	-	2,451	1,426	382	1,474	959	1,032	2,949	4,394	927	-	1,407	618
13	409	2,477	204	45	212	94	2,400	2,610	131	976	818	675	1,156	306	1,714	264	570	218	1,265	1,173	1,122	457	9,925	-	2,295	647	867	781	836	88	669	1,070	487	-	545	123
14	259	1,946	172	144	52	50	1,721	1,238	273	2,072	289	498	481	93	2,307	247	231	350	212	281	278	4	6,842	-	729	429	2,684	1,657	384	317	138	301	233	-	228	90
15	95	1,334	196	139	234	101	797	679	597	2,104	197	272	212	30	2,026	190	95	420	188	184	405	131	2,211	-	240	670	2,051	1,342	627	928	351	330	150	-	137	377
16	106	387	197	210	415	177	390	41	951	1,196	238	388	92	151	1,521	85	156	320	203	688	420	368	1,167	-	103	1,296	1,224	836	366	1,963	1,232	438	155	-	80	250
17	184	124	228	117	133	130	124	144	853	392	335	574	158	392	391	152	66	208	137	398	228	539	836	-	120	1,318	990	502	176	1,069	1,031	340	157	-	89	111
18	48	59	115	102	83	347	54	110	429	59	407	168	80	198	310	266	8	89	177	77	145	243	117	-	84	749	821	550	74	167	797	448	207	-	119	93
19	30	10	19	27	91	16	19	2	68	34	211	263	62	106	199	206	0	29	44	39	110	11	63	-	24	105	175	188	62	75	651	316	156	-	101	63
20	4	8	2	26	8	8	3	0	0	11	20	14	7	4	155	94	13	16	11	3	1	68	15	-	1	66	30	62	16	3	220	160	68	-	82	32
21	18	2	0	0	0	1	8	1	0	0	10	62	6	1	31	15	1	1	4	0	0	1	0	-	1	0	0	3	10	0	5	25	39	-	14	16
22	0	0	0	2	0	0	8	0	0	0	0	0	0	0	0	14	1	1	1	0	0	0	0	-	0	0	0	0	4	0	6	0	8	-	6	3
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	1	-	3	1
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0	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	0	-	0	0	0	0	0	0	0	0	0	-	0	0
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**4,244**	**14,108**	**25,796**	**13,082**	**13,946**	**69,300**	**32,464**	**44,599**	**38,034**	**32,826**	**40,750**	**83,503**	**126,680**	**47,245**	**29,196**	**46,433**	**17,312**	**61,962**	**65,980**	**27,775**	**32,293**	**28,951**	**79,627**	-	**20,751**	**32,752**	**19,111**	**66,021**	**48,478**	**47,054**	**32,322**	**38,724**	**42,090**	-	**35,597**	**44,530**

Table 5.43. Clearnose skate length frequencies, spring, 1 cm intervals, 1993-2022.

	Spring																														
length	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
30	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
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
47	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1	-	0	0
48	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
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	-	0	0
50	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	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	1	0	0	0	0	0	-	1	0
52	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	1	0	-	4	1
53	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	1	0	-	2	0
54	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2	1	4	2	0	0	0	0	-	1	0
55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	-	1	0
56	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	1	1	2	0	1	0	0	2	-	2	0
57	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	1	0	1	0	0	0	0	-	1	0
58	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	1	0	2	0	0	1	-	1	0
59	0	0	0	0	0	0	0	0	0	4	1	0	0	1	2	0	0	0	1	0	0	1	0	3	0	0	4	-	3	0
60	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	1	0	0	8	0	1	0	2	1	0	0	-	0	2
61	0	0	1	0	0	0	1	0	0	2	0	0	0	0	1	0	0	0	0	7	0	2	2	5	1	1	2	-	3	1
62	0	0	0	0	0	0	2	0	0	1	0	0	0	2	0	2	2	0	0	5	1	1	2	4	2	1	1	-	5	0
63	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	1	0	0	1	3	1	1	1	3	1	2	3	-	2	0
64	0	0	0	0	0	0	0	1	0	3	0	1	0	0	1	0	1	0	1	9	0	3	2	3	0	1	0	-	8	1
65	0	0	0	0	0	0	0	0	1	1	0	0	0	0	2	2	1	0	1	4	0	2	1	2	0	2	5	-	6	3
66	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	0	1	0	4	4	2	3	1	1	2	0	4	-	5	1
67	0	0	0	0	0	0	0	0	1	2	0	0	0	1	1	1	2	0	1	9	4	1	1	4	1	1	7	-	2	1
68	0	0	0	0	0	0	1	0	0	1	0	0	1	0	1	2	1	0	1	6	2	3	2	4	0	1	6	-	8	2
69	0	0	0	0	0	0	0	0	1	4	0	1	1	0	4	0	2	0	0	7	2	4	2	5	1	1	4	-	0	3
70	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	0	4	0	3	5	3	4	1	3	2	2	3	-	1	1
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	4	0	1	1	5	2	3	3	-	2	0
72	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	1	0	0	3	1	2	1	2	2	0	3	-	2	0
73	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	5	0	0	1	4	0	0	1	-	0	1
74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1	1	1	0	1	0	1	-	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	2	1	1	0	-	2	1
76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	1	-	4	1
77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	1	-	2	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0	0	2	0	-	3	0
79	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	2	1	-	2	0
80	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	1	1	1	0	3	-	1	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	1	0	0	1	-	2	0
82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	-	0	0
83	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	1
84	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	-	0	0
85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	-	4	0
86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	-	2	0
87	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
88	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
89	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
90	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
91	0	0	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
92	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
Total	**0**	**0**	**1**	**0**	**0**	**0**	**5**	**3**	**6**	**31**	**8**	**5**	**2**	**9**	**22**	**12**	**21**	**1**	**13**	**95**	**24**	**42**	**35**	**64**	**19**	**23**	**69**	**-**	**84**	**21**

Table 5.44. Clearnose skate length frequencies, fall, 1 cm intervals, 1993-2022.

	Fall																														
length	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
16	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	0	-	0	0
19	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
20	0	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
26	0	0	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
28	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
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	1	0
43	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	-	0	1
46	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
47	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	1	0
48	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	-	2	2
49	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	2
50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	-	2	1
51	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	-	1	2
52	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	-	1	3
53	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	-	0	2
54	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	1	3	2	0	3	3	1	3	2	-	2	1
55	0	0	0	0	0	0	0	0	1	0	0	0	3	2	1	1	0	0	0	1	2	0	3	1	0	0	1	-	2	2
56	0	0	0	0	0	0	0	0	0	0	2	0	2	0	2	0	0	0	0	3	2	0	5	2	1	1	0	-	1	5
57	0	0	0	0	0	0	0	0	0	1	0	0	4	0	0	0	1	0	1	4	1	0	4	0	0	0	1	-	3	3
58	0	0	0	0	0	1	0	2	2	3	0	0	4	1	1	0	0	0	1	5	3	0	3	0	0	3	2	-	4	3
59	2	0	0	0	0	1	0	1	3	0	0	0	1	2	0	0	0	0	3	1	4	2	8	0	0	1	0	-	2	4
60	0	0	0	0	0	0	0	1	2	0	0	0	7	3	1	0	1	0	1	4	2	1	4	4	1	0	4	-	6	4
61	0	0	0	0	0	0	1	0	4	1	2	1	7	3	1	0	1	0	3	9	4	0	6	1	3	3	2	-	2	6
62	0	0	0	0	1	0	1	0	4	0	1	0	7	1	2	1	2	0	0	8	7	2	3	5	2	2	1	-	2	7
63	0	0	0	0	0	2	3	1	0	2	0	0	2	2	1	2	1	0	3	9	12	0	2	1	2	4	2	-	4	2
64	0	0	0	0	0	0	3	1	5	5	2	0	3	0	3	0	1	0	2	9	16	2	8	6	5	4	0	-	3	4
65	0	0	0	0	0	3	1	2	1	1	2	1	7	1	6	1	6	0	1	14	12	3	2	1	3	1	3	-	7	5
66	0	0	1	0	1	4	0	0	5	2	9	3	4	0	5	3	3	0	5	12	12	3	8	2	3	1	1	-	3	4
67	0	0	0	1	0	1	2	1	3	2	5	4	6	2	3	2	4	0	1	17	17	4	2	6	0	3	1	-	5	7
68	0	0	0	0	0	1	1	0	3	0	4	0	5	1	8	3	2	0	5	11	17	4	5	6	2	1	4	-	5	4
69	0	0	0	0	0	0	0	3	3	0	3	1	11	2	6	0	1	0	3	11	19	8	3	6	6	1	1	-	2	2
70	0	0	0	0	0	0	0	0	5	0	2	1	6	2	2	1	3	0	1	12	18	7	6	3	4	1	3	-	4	1
71	0	0	0	0	0	0	0	0	4	0	5	1	2	1	5	2	1	0	1	9	10	3	5	3	1	6	1	-	3	3
72	0	0	0	0	0	0	0	1	1	0	3	1	6	0	3	2	5	0	2	5	6	2	2	2	1	2	1	-	3	4
73	0	0	0	0	0	0	0	0	3	3	1	0	1	1	3	1	2	0	0	3	10	3	3	5	2	3	1	-	1	2
74	0	0	0	0	0	0	0	0	1	1	4	0	1	0	5	0	2	0	4	5	2	2	1	2	1	2	0	-	2	3
75	0	0	0	0	0	1	0	1	1	2	0	0	2	0	4	1	2	0	1	4	4	1	2	2	2	3	0	-	0	2
76	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	1	1	0	1	2	0	2	1	1	2	1	3	-	0	2
77	0	0	2	0	0	0	0	0	1	4	0	0	0	0	3	1	0	0	0	4	1	1	0	1	0	3	0	-	0	1
78	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	3	1	3	0	1	0	0	0	-	1	0
79	0	0	0	0	0	0	1	0	0	0	1	2	1	0	4	1	0	0	0	3	0	2	0	1	0	0	1	-	2	2
80	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	2	0	0	1	1	1	1	0	3	1	0	-	0	0
81	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2	1	0	0	1	0	0	2	0	0	1	2	-	0	0
82	0	0	0	0	0	1	0	0	1	0	0	0	1	0	1	0	1	0	0	0	1	0	1	1	0	0	0	-	0	1
83	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0	2	1	0	1	1	-	1	1
84	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	1
85	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	1	1	0	0	0	2	0	0	-	0	0
86	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	-	0	1
87	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	1	0
88	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	1	-	0	0
89	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	2	0	0	-	0	0
90	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
91	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
92	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	-	1	0
93	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	1	-	0	0
94	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
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	-	0	0
96	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	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	0	0	0	0	-	0	0
98	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
99	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**2**	**0**	**3**	**1**	**4**	**20**	**17**	**15**	**59**	**29**	**47**	**17**	**100**	**27**	**75**	**25**	**46**	**0**	**44**	**185**	**193**	**62**	**96**	**69**	**53**	**57**	**43**	**-**	**81**	**101**

Table 5.45. Fourspot flounder length frequencies, spring and fall, 2 cm intervals (midpoint given), 1989, 1990, 1996-2022.
Prior to 2014, Fourspot flounder lengths were recorded from the first three tows of each day; since 2014, lengths have been recorded from every tow.

Spring

length	1989	1990	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2021
13	2	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	-	0	0
15	5	2	0	0	5	5	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
17	21	8	1	3	8	12	1	2	17	2	13	0	0	6	0	0	6	2	5	1	1	0	3	0	0	0	-	0	0
19	19	19	8	16	14	61	22	5	89	8	8	0	6	7	7	4	2	1	24	2	6	3	12	2	0	2	-	2	0
21	17	42	31	60	13	28	26	4	99	6	4	1	18	11	9	10	3	10	42	11	5	1	51	6	0	3	-	2	0
23	11	341	198	161	16	32	239	42	33	8	4	14	24	9	17	6	5	45	56	20	9	1	79	10	7	0	-	6	1
25	56	528	279	353	105	72	422	181	84	124	26	71	29	44	39	37	33	157	258	185	64	19	211	53	37	14	-	16	2
27	103	225	208	456	209	97	256	300	199	228	82	75	33	105	81	91	55	150	441	209	172	52	235	105	137	75	-	24	8
29	120	139	193	392	233	81	201	245	191	187	129	64	44	170	108	127	55	107	461	189	179	87	185	104	188	152	-	56	10
31	89	60	117	192	137	66	139	153	175	163	178	68	61	121	94	90	69	93	303	139	107	77	111	48	146	126	-	31	5
33	51	27	54	76	60	60	81	45	89	88	113	52	36	52	70	51	36	49	92	100	78	41	69	15	65	123	-	28	7
35	8	33	15	22	16	25	39	11	26	47	35	31	13	43	34	31	24	27	31	27	29	26	39	9	13	34	-	15	4
37	2	12	6	3	4	7	12	8	7	12	5	11	4	9	11	7	9	9	4	16	8	6	10	6	6	8	-	11	0
39	0	4	3	0	2	1	1	2	3	6	2	3	1	7	2	0	4	5	0	0	0	3	2	0	1	1	-	0	2
41	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	1	0	0	0	0	0	-	0	0
43	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
45	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
Total	**504**	**1,440**	**1,113**	**1,734**	**822**	**548**	**1,439**	**999**	**1,015**	**879**	**602**	**394**	**271**	**585**	**472**	**455**	**302**	**655**	**1,719**	**899**	**659**	**316**	**1,007**	**358**	**600**	**538**	**-**	**191**	**39**

Fall

length	1989	1990	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2021
5	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
7	0	1	0	1	4	0	0	1	0	0	1	0	2	0	0	1	-	1	0	1	1	0	0	0	0	0	-	0	0
9	5	0	0	23	19	0	2	2	0	4	1	0	2	1	1	7	-	4	0	0	3	1	0	0	0	0	-	0	0
11	9	4	2	46	27	5	4	17	5	2	12	4	5	0	7	16	-	17	3	1	11	3	0	0	1	0	-	0	1
13	10	15	5	68	22	24	6	25	3	3	9	9	13	2	8	59	-	28	4	11	26	20	3	0	5	2	-	2	2
15	6	17	35	55	21	42	5	15	9	0	13	17	4	5	11	45	-	22	13	10	47	23	9	0	4	0	-	5	0
17	0	0	42	16	3	16	1	0	3	0	1	26	3	2	16	20	-	4	12	2	49	11	8	0	3	0	-	2	3
19	0	0	22	0	0	4	1	0	1	0	0	2	0	0	7	6	-	0	0	4	5	1	2	0	0	0	-	0	1
21	0	0	0	2	2	3	2	0	2	0	1	0	0	1	0	0	-	0	0	1	0	0	0	0	0	0	-	0	0
23	1	2	9	2	5	0	17	1	5	0	0	0	1	1	0	1	-	0	0	0	1	0	3	0	1	0	-	1	0
25	0	3	42	7	16	5	58	3	7	3	4	1	0	6	1	2	-	2	3	0	1	0	1	0	5	0	-	0	0
27	0	7	41	10	22	4	77	5	13	7	6	5	0	7	1	6	-	1	9	2	4	1	4	1	19	2	-	1	5
29	0	3	24	5	22	5	54	10	18	11	13	5	0	20	6	8	-	1	11	2	4	4	9	3	32	9	-	8	0
31	0	1	20	3	6	3	25	1	18	4	30	6	0	12	5	6	-	1	6	2	8	2	6	0	25	8	-	7	4
33	0	0	6	1	1	1	7	1	13	7	19	2	1	3	1	11	-	3	6	0	0	5	1	2	10	9	-	8	0
35	0	0	4	0	1	0	5	0	6	5	6	7	0	4	4	1	-	2	2	2	1	0	2	1	3	1	-	0	4
37	0	0	0	0	0	0	2	1	3	0	2	0	0	0	0	1	-	1	0	0	0	0	1	0	2	0	-	0	0
39	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**31**	**53**	**252**	**239**	**171**	**112**	**266**	**83**	**106**	**46**	**118**	**85**	**33**	**64**	**68**	**192**	**-**	**87**	**69**	**38**	**161**	**71**	**49**	**7**	**110**	**31**	**-**	**34**	**20**

Table 5.46. Hickory shad length frequencies, spring and fall, 1 cm intervals, 1991-2022.

Hickory shad were measured from every tow, with the exception of one fish in each of fall 1996, fall 1997, and fall 1998.

Spring

length	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
15	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
16	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
17	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	3	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
18	0	0	0	1	0	1	0	0	2	0	0	0	0	0	1	7	1	2	1	0	0	0	0	0	0	0	0	0	0	-	0	0
19	0	0	0	1	0	0	1	0	0	0	0	0	0	3	5	6	0	1	1	0	0	0	0	0	0	0	0	0	3	-	0	0
20	0	0	0	0	0	2	0	2	0	0	0	0	0	2	4	2	0	0	0	0	1	2	0	0	0	2	0	0	2	-	0	0
21	0	0	0	0	0	1	0	0	0	0	0	0	0	2	3	1	1	0	0	1	0	1	0	1	0	1	0	0	0	-	0	0
22	0	0	0	0	0	0	0	0	1	0	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	-	0	0
23	0	0	1	0	0	0	0	0	1	0	0	0	1	2	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
24	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	0	0	0	0	0	1	0	0	1	0	0	0	-	0	0
25	0	0	0	0	0	0	0	2	0	0	0	0	0	1	1	6	5	0	0	0	0	0	1	1	0	0	0	0	0	-	1	0
26	0	0	0	0	0	0	0	1	0	0	0	2	0	0	6	5	2	0	0	0	0	2	0	3	0	0	1	0	0	-	0	1
27	0	0	0	0	0	0	1	0	1	0	0	1	0	0	18	3	5	0	1	0	0	3	0	2	0	0	0	1	0	-	1	2
28	0	0	0	1	0	1	1	1	2	2	0	4	1	0	14	3	3	0	1	1	0	1	3	4	1	1	0	0	0	-	0	0
29	0	0	0	0	0	0	2	4	1	7	0	5	0	2	5	2	1	0	1	0	0	1	0	1	1	1	1	0	0	-	0	1
30	0	0	1	1	1	0	1	5	1	5	0	5	3	1	6	5	2	0	0	0	0	1	0	4	0	4	0	0	1	-	0	1
31	0	0	0	0	1	1	1	2	1	4	0	2	0	0	1	0	2	0	1	0	0	0	0	1	0	2	0	0	0	-	0	0
32	0	2	0	0	0	3	0	6	6	2	1	2	1	1	0	5	1	0	0	0	0	0	0	1	1	0	0	0	0	-	0	1
33	0	0	0	0	0	2	1	2	3	1	0	3	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	-	0	0
34	0	0	0	0	0	0	1	3	1	2	2	1	3	1	2	1	1	0	0	0	0	0	0	1	2	1	0	0	1	-	0	0
35	0	0	1	0	0	1	0	2	2	2	0	4	2	2	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0
36	0	0	0	0	0	0	0	2	1	1	0	4	1	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	-	0	0
37	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	-	0	0
38	0	0	0	0	0	0	0	1	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
40	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
41	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
46	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**1**	**2**	**3**	**4**	**2**	**12**	**9**	**34**	**24**	**26**	**10**	**40**	**16**	**20**	**75**	**53**	**27**	**3**	**6**	**2**	**1**	**14**	**5**	**20**	**9**	**16**	**2**	**2**	**7**	**-**	**2**	**6**

Fall

length	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
19	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
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
22	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
23	0	0	0	3	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	-	2	1	0	0	0	0	0	0	0	-	0	0
24	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	-	2	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	0	-	0	2	0	0	0	1	0	0	0	-	0	0
26	0	1	2	8	0	3	1	0	5	0	0	0	0	4	3	0	0	0	0	-	3	1	0	0	0	0	0	0	0	-	1	0
27	0	0	0	3	0	2	0	0	5	2	0	1	0	3	0	1	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
28	0	1	0	1	0	3	0	0	2	0	0	1	0	1	1	1	0	0	2	-	0	1	3	0	0	0	0	0	0	-	2	0
29	0	0	0	2	0	0	0	0	0	2	0	0	0	1	2	3	0	0	0	-	0	4	7	0	1	1	1	0	0	-	0	0
30	0	1	0	1	1	0	1	0	0	0	0	0	0	0	8	7	2	0	3	-	0	3	7	2	0	0	0	1	0	-	0	0
31	0	0	1	0	1	0	2	1	2	0	0	0	1	0	15	1	2	0	2	-	0	7	5	1	0	0	0	2	0	-	4	0
32	0	1	0	0	1	2	2	1	7	3	1	0	2	0	12	1	1	0	0	-	0	3	1	0	1	0	1	0	0	-	5	0
33	0	2	1	2	0	1	3	2	2	2	3	1	2	1	5	0	1	2	0	-	0	1	1	1	0	0	0	1	0	-	2	0
34	0	2	0	0	1	4	2	0	3	4	0	1	1	0	5	1	0	0	0	-	0	4	1	1	1	0	0	0	3	-	1	0
35	0	0	2	0	0	0	0	0	0	2	0	0	0	2	1	1	0	0	0	-	0	0	1	0	0	0	0	0	0	-	6	1
36	0	1	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0	-	0	1	1	1	0	0	0	0	0	-	0	0
37	0	1	1	0	0	0	1	0	2	1	0	0	0	1	2	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	1	0
38	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	1	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	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**0**	**10**	**7**	**27**	**4**	**16**	**15**	**5**	**32**	**16**	**4**	**5**	**6**	**18**	**60**	**22**	**10**	**2**	**7**	**-**	**7**	**29**	**27**	**6**	**3**	**2**	**2**	**4**	**4**	**-**	**22**	**1**

Table 5.47. Horseshoe crab length frequencies by sex, spring, 1 cm intervals, 1998-2022.
Horseshoe crabs were measured (prosomal width) from every tow.

			Spring																							
Sex	**length**	**1998***	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
F	**13**		1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
F	**14**		1	3	0	1	2	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	1	0
F	**15**		0	0	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	-	1	0
F	**16**		1	0	0	3	2	1	1	0	0	1	0	0	0	1	0	2	0	0	0	0	1	-	2	1
F	**17**		1	0	2	2	1	4	1	0	1	1	0	0	0	1	0	0	1	0	0	0	2	-	4	4
F	**18**		2	1	0	3	2	4	0	0	2	1	1	0	0	0	2	3	1	0	0	0	1	-	4	3
F	**19**		4	1	2	2	5	5	0	0	3	4	1	0	0	2	0	5	1	2	0	3	3	-	2	2
F	**20**		5	2	0	7	1	2	3	0	3	2	0	0	1	2	0	4	0	0	0	0	4	-	6	1
F	**21**		8	2	1	8	6	2	1	0	3	8	1	0	3	5	4	5	3	4	0	3	4	-	4	9
F	**22**		8	6	4	13	10	7	2	0	10	4	6	0	3	3	2	3	3	2	0	0	8	-	3	4
F	**23**		14	15	18	19	22	17	3	2	9	14	4	3	4	9	7	14	7	4	4	8	4	-	7	5
F	**24**		15	7	15	32	29	25	5	4	15	11	12	6	3	15	19	13	3	5	3	8	9	-	11	10
F	**25**		15	10	23	25	22	20	8	5	11	16	10	9	9	14	19	11	11	14	4	13	12	-	10	12
F	**26**		23	13	28	26	22	23	3	2	16	12	10	4	16	14	17	26	9	4	0	9	11	-	11	12
F	**27**		15	9	18	18	18	18	8	4	10	9	9	5	18	11	8	22	10	6	2	11	13	-	9	6
F	**28**		8	6	9	6	7	4	2	2	5	4	10	3	8	10	13	9	3	2	1	8	7	-	13	6
F	**29**		3	0	3	4	4	4	0	3	5	1	3	4	1	3	2	3	1	0	1	4	2	-	1	0
F	**30**		1	0	3	2	0	0	3	2	0	2	1	1	4	0	1	1	1	0	0	0	0	-	1	0
F	**31**		0	0	0	0	4	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	-	0	1
F	**32**		0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	1
M	**14**		0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
M	**15**		0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
M	**16**		0	0	0	2	5	2	0	1	2	0	0	2	0	0	0	0	0	0	0	1	0	-	0	0
M	**17**		5	2	4	7	9	9	0	0	3	2	3	0	1	5	0	1	1	1	0	2	2	-	2	2
M	**18**		11	8	12	19	24	21	2	0	17	10	3	2	5	7	6	9	4	3	1	4	5	-	1	7
M	**19**		22	13	32	42	25	33	3	0	19	12	10	7	7	8	16	17	7	5	1	3	13	-	11	15
M	**20**		15	16	30	20	33	31	7	0	21	10	11	7	15	13	10	13	12	2	0	12	14	-	17	10
M	**21**		18	5	13	14	16	10	1	0	6	12	5	3	3	9	6	6	7	1	0	8	6	-	0	9
M	**22**		4	5	7	6	7	6	2	0	4	2	1	1	4	5	3	1	0	0	0	2	2	-	11	6
M	**23**		1	0	3	1	4	2	1	0	0	1	1	0	0	0	2	1	0	0	0	2	1	-	1	1
M	**24**		2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0
M	**25**		0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	3	1	0	0	0	0	-	0	0
M	**26**		0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
M	**27**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
M	**28**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
M	**29**		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0
M	**30**		0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
U	**22**		1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total		**51**	**204**	**125**	**228**	**285**	**285**	**251**	**60**	**25**	**166**	**141**	**104**	**57**	**105**	**138**	**138**	**173**	**88**	**55**	**17**	**101**	**126**	-	**133**	**127**

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

Table 5.48. Horseshoe crab length frequencies by sex, fall, 1 cm intervals, 1998-2022.
Horseshoe crabs were measured (prosomal width) from every tow.

		Fall																							
Sex	**length**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
F	**13**	0	0	2	0	0	0	3	0	1	0	0	0	-	0	0	0	0	0	2	0	0	0	-	0	0
F	**14**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	1	0
F	**15**	0	0	0	0	2	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	1	-	1	0
F	**16**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	5	1
F	**17**	1	1	0	0	2	1	0	1	1	0	1	0	-	0	0	0	0	1	0	0	0	0	-	2	5
F	**18**	0	2	0	1	0	1	1	1	0	0	0	0	-	0	0	0	0	1	1	1	0	1	-	2	4
F	**19**	3	2	2	2	0	1	0	0	1	0	1	1	-	0	0	0	2	1	0	0	2	0	-	5	6
F	**20**	5	1	1	4	4	2	3	0	2	0	0	2	-	0	0	0	0	1	1	1	0	1	-	1	3
F	**21**	3	2	2	3	1	4	6	3	1	1	1	0	-	0	0	0	1	2	1	0	1	0	-	3	3
F	**22**	3	8	13	13	10	3	9	4	1	2	6	6	-	6	0	2	2	0	1	1	1	4	-	4	5
F	**23**	8	15	15	12	8	8	13	10	7	7	6	14	-	6	2	3	4	6	9	6	5	5	-	11	14
F	**24**	7	19	30	27	21	9	24	10	6	17	14	22	-	18	10	12	8	10	14	4	13	4	-	16	28
F	**25**	17	12	20	31	33	13	19	6	12	26	17	17	-	19	9	11	11	7	17	13	23	8	-	14	21
F	**26**	19	23	33	31	18	9	29	12	10	22	15	24	-	25	16	27	10	9	12	12	26	20	-	22	22
F	**27**	14	7	21	22	18	7	22	8	3	17	11	28	-	16	5	15	10	3	9	12	19	7	-	15	29
F	**28**	2	4	10	8	13	6	15	5	4	8	11	22	-	11	3	10	6	5	6	9	13	6	-	15	19
F	**29**	2	3	2	5	2	3	8	2	0	4	1	5	-	2	4	2	3	1	2	2	2	1	-	5	11
F	**30**	0	1	1	2	0	2	1	2	0	2	0	2	-	0	1	2	0	0	1	2	1	1	-	1	4
F	**31**	0	1	0	0	1	0	0	2	0	0	0	1	-	0	0	0	1	0	1	0	0	0	-	0	1
F	**32**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	1
F	**33**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
F	**34**	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**11**	0	0	0	1	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**12**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**13**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**14**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**15**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	1
M	**16**	0	0	2	1	5	3	0	0	0	1	1	0	-	1	0	0	0	0	0	0	0	0	-	2	0
M	**17**	6	5	7	6	3	5	11	0	1	3	1	2	-	3	0	1	1	1	1	1	3	3	-	7	2
M	**18**	12	14	28	18	14	15	21	3	9	3	9	18	-	13	4	2	5	1	7	2	2	5	-	16	12
M	**19**	10	20	39	27	31	11	39	13	4	12	21	14	-	9	4	6	13	3	5	6	8	8	-	13	25
M	**20**	20	23	35	32	22	8	30	12	9	19	23	31	-	10	1	17	4	9	7	8	18	10	-	26	27
M	**21**	6	11	18	15	9	4	15	4	2	10	6	13	-	7	1	7	6	4	8	8	10	2	-	9	19
M	**22**	5	3	8	4	6	0	10	2	5	6	2	5	-	6	0	5	0	1	3	4	6	1	-	7	11
M	**23**	0	0	3	2	6	1	1	0	2	3	1	3	-	0	1	2	0	0	1	1	0	1	-	1	1
M	**24**	0	0	1	3	0	0	1	0	1	2	0	2	-	0	0	0	0	0	0	1	0	1	-	0	0
M	**25**	0	0	2	0	0	0	0	0	0	0	0	1	-	0	0	1	0	0	0	0	0	0	-	0	0
M	**26**	2	0	0	3	0	0	0	0	1	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**27**	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**28**	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
M	**29**	0	0	0	1	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total		**145**	**177**	**295**	**274**	**229**	**117**	**281**	**101**	**83**	**165**	**148**	**234**	-	**152**	**61**	**125**	**87**	**66**	**109**	**94**	**155**	**90**	-	**204**	**275**

Table 5.49. Long-finned squid length frequencies, spring, 1 cm intervals, 1986-1990, 1992-2022.

From 1986 – 1990, and 1992-2013, Length frequencies of squid taken from the first three tows of each day; since 2014, lengths have been recorded from every tow.

	Spring																																				
length	**1986**	**1987**	**1988**	**1989**	**1990**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	14	0	0	0	0	1	0	0	0	2	2	0	-	3	1
3	0	0	0	0	0	0	0	0	1	5	1	18	4	11	0	6	0	6	0	1	2	111	17	1	0	5	4	5	2	4	17	33	9	-	10	8
4	0	0	3	0	0	3	9	31	48	23	11	103	10	32	5	44	11	51	1	12	8	220	66	1	6	28	17	35	36	29	35	65	43	-	107	17
5	0	1	35	0	1	7	64	137	87	39	35	323	32	36	12	48	16	70	11	18	36	220	128	5	17	45	46	63	111	70	59	123	37	-	168	13
6	0	6	53	0	0	8	99	117	175	23	46	444	20	31	15	36	6	88	20	13	35	148	141	2	45	64	31	62	117	63	45	86	24	-	125	9
7	2	2	60	0	0	17	96	108	178	33	45	324	18	20	24	27	9	65	4	9	21	66	74	9	42	40	22	41	58	52	33	89	17	-	77	12
8	3	10	30	0	3	20	49	63	141	34	42	290	18	13	26	36	12	51	7	8	19	55	30	7	15	31	22	38	52	48	26	52	27	-	44	15
9	2	2	40	2	0	20	42	83	170	40	45	159	43	24	41	18	26	24	6	12	30	54	63	4	23	59	31	44	45	39	27	58	14	-	39	18
10	2	9	53	1	9	17	47	71	248	55	51	135	47	18	52	41	24	59	10	30	50	106	67	40	38	130	57	32	83	70	38	61	38	-	67	27
11	1	23	76	4	4	28	60	141	367	75	69	67	82	39	74	49	33	84	28	61	53	173	163	72	39	155	75	40	125	144	49	86	29	-	102	32
12	19	103	152	6	11	70	133	125	367	78	98	33	88	92	90	75	53	198	51	123	60	220	317	132	77	108	78	70	213	229	61	89	58	-	118	45
13	24	232	202	12	24	58	163	133	258	95	125	50	106	111	87	72	88	321	146	163	64	112	367	171	75	60	34	99	155	313	75	95	62	-	75	25
14	22	243	294	36	43	91	163	108	146	81	180	18	99	96	52	86	74	448	208	119	58	105	209	167	65	44	26	136	166	251	92	109	58	-	81	43
15	22	368	300	48	83	87	210	79	132	77	213	13	94	101	39	62	63	414	234	137	37	75	177	133	65	37	16	146	95	160	65	78	68	-	61	44
16	14	343	271	111	146	67	289	80	80	43	166	5	71	76	34	47	41	475	227	138	36	76	114	78	50	63	16	195	70	90	54	85	39	-	75	34
17	7	479	252	81	142	53	218	67	98	42	174	14	39	59	31	46	42	352	180	102	13	61	126	73	41	24	4	113	86	90	32	54	34	-	36	42
18	36	208	223	92	145	59	195	28	66	44	105	10	41	58	16	22	27	200	134	77	21	48	99	50	41	16	18	71	54	88	22	47	27	-	22	12
19	23	361	222	95	128	30	150	24	53	24	83	5	20	32	26	12	11	144	64	40	19	20	54	60	28	21	9	65	45	70	14	39	18	-	10	23
20	24	328	143	62	90	52	80	18	65	19	78	9	22	35	22	14	15	124	81	57	11	25	42	21	44	19	8	77	45	67	21	26	16	-	26	10
21	27	214	102	30	67	45	90	13	30	15	39	1	16	24	16	18	14	136	53	33	5	34	21	35	21	36	4	46	36	26	13	24	17	-	15	8
22	13	238	100	42	53	46	43	16	17	12	51	8	12	19	17	6	12	115	53	26	9	14	22	28	16	24	3	61	26	42	7	15	12	-	16	13
23	13	160	46	40	54	22	28	7	9	4	55	3	9	18	3	9	13	49	36	32	3	7	9	14	21	13	7	53	10	32	12	21	9	-	12	9
24	13	174	33	35	48	11	23	7	5	9	61	0	16	11	10	6	14	64	41	21	6	10	16	14	23	3	4	28	5	16	7	13	12	-	16	12
25	6	195	65	28	63	9	21	9	12	0	33	3	10	14	9	2	7	40	23	22	4	3	9	9	6	6	1	30	1	14	5	10	7	-	4	8
26	6	242	37	58	32	21	37	5	26	2	36	4	3	12	9	6	5	28	28	8	4	5	12	7	2	2	0	29	1	8	0	8	4	-	11	9
27	7	197	41	27	53	13	10	4	14	2	7	1	4	6	0	1	2	17	9	9	1	2	5	0	7	4	0	12	0	4	5	6	3	-	6	10
28	2	133	19	32	51	11	27	3	0	1	10	0	2	1	4	2	0	15	9	6	1	1	4	1	0	5	0	14	1	0	1	6	4	-	7	4
29	2	86	10	8	30	15	7	2	7	3	1	3	5	0	2	3	2	5	3	4	1	1	2	0	0	2	0	9	0	0	0	0	2	-	5	3
30	5	121	24	12	31	3	1	2	9	1	14	1	0	0	1	8	2	11	0	6	1	0	3	0	3	2	0	6	0	0	0	2	0	-	2	0
31	3	78	14	11	5	4	8	1	3	0	0	0	1	1	1	0	0	3	2	2	1	0	1	0	0	0	0	1	0	1	0	0	0	-	3	1
32	0	61	7	6	9	1	7	0	0	1	0	0	0	0	1	3	0	1	1	0	0	0	1	0	2	0	0	2	0	0	0	0	0	-	0	0
33	0	25	7	7	6	9	0	1	5	0	5	0	1	1	0	1	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	-	2	0
34	0	0	0	0	9	2	2	1	8	0	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	-	2	0
35	1	38	0	0	2	0	0	1	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
36	0	38	4	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	0	-	0	0
37	2	0	0	5	2	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
40	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**301**	**4,719**	**2,918**	**896**	**1,347**	**900**	**2,371**	**1,485**	**2,825**	**880**	**1,883**	**2,044**	**933**	**993**	**721**	**809**	**622**	**3,658**	**1,670**	**1,290**	**609**	**1,986**	**2,361**	**1,134**	**812**	**1,047**	**534**	**1,625**	**1,638**	**2,020**	**817**	**1,382**	**688**	**-**	**1,347**	**507**

Table 5.50. Long-finned squid length frequencies, fall, 1 cm intervals, 1986-1990, 1992-2022.

From 1986 – 1990, and 1992-2013, Length frequencies of squid taken from the first three tows of each day; since 2014, lengths have been recorded from every tow.

	Fall																																		
length	**1986**	**1987**	**1988**	**1989**	**1990**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
<1	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	2	3
1	0	13	0	12	0	0	0	0	0	0	0	0	0	0	0	4	0	0	3	12	0	0	14	-	0	0	11	0	2	60	68	30	75	-	43	101
2	0	31	0	1	0	49	0	9	25	24	6	20	29	2	0	11	0	1	10	74	9	33	90	-	12	10	67	6	30	95	175	83	135	-	46	133
3	0	126	59	112	74	266	914	80	156	57	125	115	104	53	36	80	90	170	91	107	20	87	343	-	80	101	51	25	85	91	108	293	262	-	19	119
4	0	320	212	468	278	1,507	2,336	477	460	598	491	642	362	384	230	261	886	693	763	249	420	294	939	-	618	469	127	517	208	322	279	1,222	937	-	273	273
5	0	892	826	743	830	2,906	3,502	1,332	1,223	1,371	1,091	1,888	1,214	1,215	663	695	2,225	1,757	1,539	587	1,367	417	2,332	-	1,417	705	273	1,443	634	1,066	838	2,328	1,908	-	718	643
6	3	1,019	1,165	677	836	5,015	4,358	1,803	1,896	1,869	1,278	2,737	1,782	1,842	923	1,067	3,185	2,705	2,337	913	2,780	604	2,894	-	1,405	731	426	1,814	1,818	1,475	1,650	2,342	1,867	-	1,257	1,571
7	13	817	722	446	469	5,210	4,331	2,152	2,254	2,751	1,169	3,412	2,390	2,204	996	1,193	2,566	2,759	2,552	917	3,822	780	2,746	-	1,315	698	550	1,560	2,753	1,566	1,854	1,701	1,630	-	1,280	1,838
8	135	654	333	283	220	3,110	3,811	2,225	2,080	2,224	935	2,939	1,808	1,797	839	929	1,885	1,787	2,006	611	3,549	908	1,791	-	840	638	570	1,394	3,618	1,633	1,805	1,041	1,270	-	1,390	1,901
9	16	692	146	108	129	1,594	2,913	2,486	2,124	1,853	570	1,993	1,829	1,081	616	488	1,785	907	1,283	385	2,119	777	1,131	-	670	584	418	1,366	3,465	1,327	1,465	712	867	-	1,015	1,817
10	13	503	65	58	42	894	1,772	2,055	1,540	1,264	446	1,216	1,332	695	528	354	861	626	970	204	1,974	480	808	-	637	399	306	1,198	3,348	1,015	1,234	536	507	-	720	1,526
11	0	310	62	70	39	737	1,178	1,607	905	698	291	675	780	556	264	214	215	392	541	183	1,379	332	326	-	343	359	178	862	3,227	611	1,092	424	270	-	574	1,392
12	0	165	21	38	24	284	737	843	387	579	153	368	423	380	154	145	58	144	307	85	728	193	222	-	211	232	123	574	2,233	545	780	313	139	-	297	988
13	0	82	24	34	17	242	408	415	159	297	126	328	277	247	132	87	2	96	194	31	447	103	108	-	139	148	62	315	1,698	240	548	209	99	-	247	709
14	0	77	9	17	6	40	278	329	110	160	44	199	235	204	68	53	1	103	64	26	253	47	41	-	40	97	53	253	1,340	132	427	194	95	-	185	451
15	0	31	11	17	3	18	185	181	77	83	31	103	133	128	66	13	2	48	44	9	150	18	27	-	86	64	14	213	767	88	279	105	46	-	116	285
16	0	4	11	13	2	0	53	99	33	46	15	90	111	73	32	10	0	43	30	8	159	7	14	-	18	35	2	106	489	42	257	79	54	-	43	403
17	0	14	0	10	4	0	73	75	15	16	13	23	120	101	8	6	0	1	24	17	103	5	2	-	7	8	6	50	266	64	216	72	38	-	45	227
18	0	1	23	6	1	0	20	31	2	6	10	16	82	34	3	0	0	8	2	11	74	0	1	-	25	12	4	53	282	14	119	35	14	-	9	176
19	0	1	0	0	0	0	3	12	0	1	0	1	34	9	2	4	0	1	1	11	2	0	0	-	0	7	0	37	93	7	69	17	24	-	15	132
20	0	13	0	5	1	0	2	7	0	0	1	1	22	3	2	1	0	4	2	1	3	0	0	-	0	1	0	21	156	9	60	12	3	-	8	63
21	0	15	0	4	0	0	0	3	0	0	0	0	22	9	1	0	0	0	0	0	1	0	0	-	0	5	2	6	42	0	26	1	0	-	2	42
22	0	2	0	3	1	0	0	11	0	6	0	1	17	0	0	0	0	0	1	0	0	0	0	-	0	2	1	0	4	0	14	7	7	-	1	41
23	0	0	0	3	0	0	2	1	0	0	0	0	4	0	0	0	0	0	1	0	0	0	0	-	1	0	0	0	28	0	4	1	2	-	0	17
24	0	1	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	5	0	0	-	0	0	0	0	1	0	3	0	0	-	1	0
25	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0	0	0	0	4	0	0	2	0	-	0	21
26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	1	0	-	0	1
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	1	0	0	0	0	-	0	6
28	0	0	0	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	1
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1	0	0	0	0	0	0	0	-	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	2	0	-	0	0
Total	**180**	**5,783**	**3,689**	**3,136**	**2,976**	**21,872**	**26,877**	**16,233**	**13,446**	**13,903**	**6,795**	**16,767**	**13,111**	**11,018**	**5,563**	**5,615**	**13,761**	**12,245**	**12,765**	**4,441**	**19,364**	**5,085**	**13,829**	-	**7,864**	**5,306**	**3,244**	**11,813**	**26,594**	**10,402**	**13,370**	**11,762**	**10,249**	-	**8,306**	**14,880**

Table 5.51. Scup length frequencies, spring, 1 cm intervals, 1984-2022.
Lengths were recorded from every tow.

	Spring																																				
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	13	0	0	0	0	0	0	0	72	8	0	3	-	4	20
8	0	0	0	6	3	84	0	12	0	0	0	11	0	0	10	24	61	0	16	0	0	4	56	4	145	3	0	0	35	0	15	32	2,674	27	15	102	-	101	193
9	4	30	50	33	46	1,049	11	80	9	0	11	408	152	10	163	128	976	98	400	0	0	77	322	145	606	148	0	19	435	60	77	435	15,025	475	340	373	-	746	793
10	8	138	377	46	160	2,523	270	514	49	3	48	1,202	537	145	1,381	355	5,293	405	2,303	4	1	169	1,151	926	1,700	1,966	14	115	3,169	338	455	2,585	27,025	1,615	1,191	729	-	1,865	2,136
11	10	362	724	38	144	2,075	493	1,365	67	4	92	1,437	1,055	311	1,617	313	10,571	645	3,389	19	1	136	1,259	1,033	2,055	3,476	22	203	3,888	460	1,007	3,918	23,949	1,143	796	553	-	1,729	2,089
12	5	194	427	9	31	312	280	576	57	3	67	809	826	151	712	131	8,815	586	1,706	33	1	62	1,263	486	950	3,418	7	178	2,589	300	1,402	2,111	12,415	644	241	185	-	539	868
13	2	51	122	4	9	87	56	122	18	4	23	108	397	36	359	51	4,041	265	722	25	2	19	888	78	586	1,141	1	77	1,241	93	623	785	6,004	622	60	78	-	242	372
14	0	7	64	2	0	72	22	0	11	5	2	20	29	25	154	16	1,043	104	498	7	1	8	626	76	357	561	3	16	262	74	123	86	2,758	2,738	314	36	-	162	148
15	2	4	4	11	4	137	40	3	3	77	7	3	3	11	66	1	201	220	247	7	42	56	251	298	426	593	40	19	62	98	108	60	556	8,588	1,836	141	-	65	492
16	9	47	26	65	19	121	202	8	4	217	48	6	61	49	24	13	48	1,349	1,035	121	327	129	722	1,177	1,971	1,430	222	100	52	504	226	229	3,003	7,944	3,322	751	-	367	2,039
17	37	91	91	119	40	105	310	63	49	339	142	11	264	123	57	75	229	4,517	2,943	415	485	129	1,670	1,607	3,916	2,151	614	215	206	1,343	669	784	9,775	3,796	5,607	1,098	-	647	2,151
18	22	204	208	174	34	95	231	182	135	286	194	28	545	216	89	161	1,034	8,611	4,097	733	403	140	2,254	1,444	3,722	1,953	780	312	642	2,764	755	1,319	10,201	1,916	10,492	995	-	652	1,092
19	28	130	182	100	16	50	121	347	258	159	203	30	390	136	66	172	1,451	6,452	3,619	720	261	114	1,607	918	1,978	1,078	527	270	1,123	3,058	520	1,196	5,162	1,282	9,542	2,155	-	1,298	742
20	11	71	131	33	25	33	30	256	136	35	99	22	153	81	21	130	1,106	1,840	3,679	390	381	29	934	390	1,315	798	424	257	909	1,402	718	593	1,389	3,012	5,012	5,114	-	1,939	1,092
21	3	15	36	15	44	13	26	223	65	27	95	19	34	62	11	78	513	518	6,253	427	584	42	559	266	2,149	1,320	599	655	377	271	1,539	371	618	3,939	3,119	6,183	-	1,636	1,837
22	7	7	6	4	49	7	18	292	11	17	56	17	10	96	8	29	173	292	8,129	660	1,077	111	416	458	2,835	1,941	723	1,260	200	296	2,305	510	1,214	3,105	3,055	4,696	-	1,660	2,440
23	6	22	103	3	33	12	12	225	10	25	44	19	1	86	17	25	240	755	5,618	931	982	174	427	603	2,340	1,522	641	1,387	313	665	1,674	699	1,311	1,618	2,679	3,222	-	2,489	2,377
24	4	38	124	5	14	9	6	103	21	14	23	24	8	46	18	26	282	833	2,385	977	745	161	361	558	1,351	1,149	580	1,123	568	738	711	802	1,012	917	1,699	2,229	-	2,784	2,821
25	3	28	77	2	4	5	7	33	15	8	10	15	2	20	12	13	199	278	1,292	1,025	844	216	234	272	854	909	573	930	816	591	326	896	1,010	612	1,030	1,696	-	1,991	2,996
26	0	11	73	2	3	3	3	15	10	1	8	5	1	5	10	10	154	132	1,266	741	1,215	332	262	128	642	793	523	658	1,000	312	379	847	1,220	564	664	1,144	-	1,389	2,033
27	2	3	35	3	1	4	1	5	4	4	6	8	2	3	7	7	50	93	491	363	1,200	353	283	91	382	504	350	651	931	461	338	426	1,367	590	431	720	-	797	1,341
28	0	12	4	5	4	3	3	1	6	2	2	0	1	3	3	2	13	88	282	201	730	379	427	109	230	267	243	637	721	689	316	243	1,206	722	439	541	-	438	970
29	1	14	6	3	2	0	0	2	2	0	0	0	1	0	1	6	19	36	147	81	331	332	622	115	198	234	153	468	565	753	346	155	741	530	472	407	-	311	514
30	0	11	3	1	0	1	0	2	1	1	1	1	1	3	0	0	8	8	71	33	116	171	618	156	64	90	41	321	467	627	299	158	435	390	278	308	-	188	378
31	0	1	0	1	2	0	0	1	0	0	1	0	1	4	0	1	6	3	35	23	37	101	441	167	54	42	34	235	307	496	227	118	324	195	200	207	-	141	253
32	0	2	1	0	1	1	1	0	1	0	0	1	0	0	0	3	3	2	10	11	28	41	317	126	68	32	15	123	174	310	174	148	262	154	132	138	-	71	124
33	0	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	4	2	11	4	11	16	266	65	57	57	14	78	105	152	100	102	166	99	72	52	-	33	74
34	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	3	1	4	2	8	1	30	37	47	16	4	44	63	106	61	63	127	60	43	37	-	19	42
35	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	0	3	0	1	2	17	18	26	10	4	32	31	36	20	31	109	55	26	27	-	18	23
36	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	4	9	11	11	2	28	17	23	8	34	48	14	12	7	-	6	8
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	3	4	8	1	15	6	8	1	8	41	8	4	3	-	2	2
38	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	5	4	10	3	10	28	8	3	4	-	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	1	0	3	2	3	0	3	3	2	0	1	-	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	0	0	1	3	0	1	3	0	0	0	1	-	1	1
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	-	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0	0
Total	**166**	**1,497**	**2,877**	**684**	**689**	**6,801**	**2,143**	**4,430**	**942**	**1,232**	**1,183**	**4,204**	**4,474**	**1,624**	**4,806**	**1,771**	**36,537**	**28,134**	**50,654**	**7,955**	**9,817**	**3,506**	**18,292**	**11,764**	**31,052**	**27,623**	**7,155**	**10,435**	**21,283**	**17,042**	**15,528**	**19,760**	**131,250**	**47,392**	**53,127**	**33,937**	**-**	**24,331**	**32,461**

Table 5.52. Scup length frequencies, fall, 1 cm intervals, 1984-2022.
Lengths were recorded from every tow.

	Fall																																				
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	-	0	0
3	0	8	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	13	4	9	0	0	-	4	0	0	0	0	2	0	24	0	-	11	2
4	1	61	0	0	17	1	3	14	196	0	6	0	0	18	4	1	1	28	117	19	143	363	11	74	0	34	-	21	29	4	11	21	4	40	317	34	-	39	35
5	16	90	313	213	103	128	57	120	483	28	312	1	13	70	224	21	168	317	603	214	1,302	850	129	381	0	234	-	131	119	7	204	799	55	136	691	253	-	462	439
6	295	249	626	1,193	625	612	340	1,805	1,516	554	931	41	185	338	1,246	1,041	991	1,891	2,132	573	4,723	4,122	389	1,303	4	1,106	-	705	567	116	1,033	3,154	370	622	1,756	1,211	-	2,528	1,923
7	627	588	753	491	1,782	1,367	640	4,923	1,554	4,383	5,217	219	788	1,020	2,354	4,570	4,228	5,003	5,571	1,589	8,721	9,683	942	4,516	871	2,923	-	1,769	1,849	180	4,259	8,512	1,759	2,740	2,464	2,398	-	3,998	7,796
8	345	1,827	507	499	2,264	1,765	2,152	11,168	2,595	9,063	11,585	602	2,048	1,318	4,330	9,886	7,464	7,327	9,315	701	10,637	11,328	1,442	10,576	3,092	3,078	-	3,977	4,036	563	7,657	15,560	3,354	4,964	4,353	2,375	-	4,803	14,172
9	719	2,637	210	434	2,050	1,500	3,806	13,883	936	9,169	13,327	1,867	3,502	1,479	4,515	18,224	9,302	5,369	10,102	205	10,751	8,808	1,517	13,782	6,383	1,316	-	4,882	5,961	1275	6,878	11,241	1,747	5,374	4,135	1,608	-	5,106	10,506
10	262	2,025	84	77	656	798	2,728	5,539	250	5,754	4,712	1,916	2,667	1,184	3,126	29,863	6,831	2,837	6,754	33	5,987	5,295	459	10,376	7,196	610	-	2,365	5,770	701	3,654	5,762	697	2,624	1,109	571	-	2,495	3,990
11	8	1,064	19	12	81	95	601	1,191	78	814	432	606	525	499	728	20,073	1,806	888	2,020	3	1,896	1,973	126	2,547	1,733	75	-	632	2,695	375	1,526	2,094	1,073	676	373	115	-	1,199	1,200
12	0	9	4	22	17	124	28	88	40	12	46	103	31	191	94	6,931	467	312	488	6	344	734	256	1,316	84	10	-	112	726	118	362	532	3,881	456	60	142	-	835	392
13	14	59	41	144	53	670	51	2	304	13	4	46	39	44	56	1,190	428	229	197	87	77	680	606	1,645	27	81	-	42	154	70	205	281	6,261	1,054	206	584	-	413	994
14	30	265	322	288	274	1,449	13	46	860	70	22	403	161	130	180	198	2,744	309	276	249	159	1,158	1,101	3,269	193	598	-	248	482	288	230	1,335	5,499	1,202	592	1,188	-	568	1,988
15	86	339	603	277	649	1,102	171	305	1,393	176	68	1,283	459	517	504	459	6,889	690	854	325	268	784	1,210	4,216	367	1,890	-	883	1,483	454	537	2,361	3,665	1,117	556	1,101	-	759	1,579
16	91	473	452	149	313	487	373	910	942	251	117	1,478	491	588	738	742	10,695	762	1,403	201	130	555	801	3,003	493	2,445	-	1,425	2,233	331	589	2,667	1,753	744	338	540	-	453	537
17	46	299	361	61	111	213	362	683	465	168	103	869	299	289	446	1,583	7,208	593	1,642	92	75	359	338	1,468	330	1,777	-	1,138	2,015	203	416	1,813	575	1,039	334	147	-	194	193
18	27	170	188	29	81	87	415	242	110	70	87	262	111	101	193	1,548	3,508	225	1,370	43	37	261	179	555	110	830	-	613	1,332	83	271	735	799	1,329	941	81	-	70	282
19	8	44	55	20	85	42	309	39	28	56	57	47	51	21	72	1,196	771	294	733	175	78	234	113	676	88	320	-	293	455	176	143	218	1,942	1,027	1,849	197	-	135	469
20	21	15	36	52	93	43	266	13	145	95	34	18	75	32	33	436	396	769	621	586	189	308	147	1,121	185	343	-	110	199	505	190	241	3,058	435	2,377	572	-	403	326
21	47	8	44	87	87	34	424	56	254	111	41	9	70	34	33	289	337	967	797	693	339	194	158	1,179	228	336	-	186	212	640	151	397	1,819	451	1,885	1,150	-	691	461
22	59	38	116	88	96	34	333	64	265	88	56	4	58	39	27	460	216	655	1,214	500	447	147	128	655	238	226	-	288	388	478	201	479	802	513	1,251	1,774	-	769	663
23	75	77	133	61	18	14	101	86	181	44	38	4	23	17	16	329	189	328	1,185	315	544	88	134	365	150	190	-	408	319	164	335	337	667	409	816	1,459	-	934	919
24	93	64	84	33	17	9	34	98	27	16	33	3	7	10	7	173	124	195	1,071	506	744	104	90	189	94	170	-	649	184	179	358	248	722	250	550	836	-	1,097	1,190
25	46	49	38	27	4	6	21	47	23	12	17	1	1	12	5	66	49	96	769	726	1,072	146	59	181	123	170	-	822	112	238	277	313	576	196	380	520	-	966	1,159
26	38	53	13	28	10	3	10	19	17	10	11	0	0	4	2	13	35	55	271	720	878	173	42	170	147	167	-	643	106	162	190	516	672	173	211	308	-	613	874
27	38	64	9	36	7	1	2	13	22	10	7	0	2	1	2	19	42	27	184	558	790	212	23	91	99	128	-	502	122	129	100	400	798	133	129	177	-	325	435
28	31	18	12	11	3	1	3	6	13	7	6	0	2	1	1	4	20	11	67	261	731	214	15	78	85	107	-	383	116	108	100	232	615	198	152	98	-	227	286
29	9	21	4	7	0	0	1	1	6	4	2	0	0	0	3	2	13	14	32	101	433	174	23	32	59	86	-	341	59	135	57	145	564	159	97	92	-	97	122
30	8	16	2	1	0	0	0	0	0	3	0	0	0	0	0	0	3	4	22	75	122	101	36	27	51	35	-	196	63	116	88	95	299	91	70	78	-	75	62
31	7	7	1	1	0	0	1	2	1	0	0	0	1	0	0	1	2	3	14	23	45	46	26	43	22	28	-	111	26	47	64	98	157	91	33	30	-	44	53
32	2	1	0	0	0	0	3	0	0	0	1	0	0	0	0	1	0	0	1	14	25	18	20	37	20	21	-	76	17	36	49	76	94	47	17	17	-	26	32
33	1	2	0	3	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	5	10	3	6	27	14	13	-	31	11	24	22	67	58	33	8	11	-	23	7
34	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	5	2	10	11	13	-	16	1	9	7	18	40	31	5	8	-	11	8
35	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	1	6	7	-	10	0	7	4	12	9	13	3	2	-	2	7
36	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	1	4	2	-	7	1	2	3	5	2	3	1	2	-	6	1
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	-	2	0	1	0	5	0	0	0	0	-	1	0
38	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	1	0	3	0	0	0	0	-	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	-	0	0	0	1	0	0	0	0	0	-	0	0
Total	**3,050**	**10,641**	**5,030**	**4,344**	**9,496**	**10,592**	**13,249**	**41,363**	**12,705**	**30,983**	**37,272**	**9,782**	**11,609**	**7,957**	**18,939**	**99,319**	**64,927**	**30,198**	**49,829**	**9,602**	**51,706**	**49,133**	**10,533**	**63,921**	**22,507**	**19,371**	-	**24,021**	**31,842**	**7,925**	**30,172**	**60,772**	**44,388**	**28,370**	**28,083**	**19,679**	-	**30,378**	**53,102**

Table 5.53. Striped bass length frequencies, spring, 2 cm intervals (midpoint given), 1984–2022.

All striped bass taken in the Survey were measured, with the exception of one fish taken in 1984, one in 1988, and two in 1990.

	Spring																																			
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
11	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	-	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	-	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	8	0	0	0	1	0	0	0	0	0	0	1	-	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	3	0	0	0	1	0	0	0	-	0	0
19	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	5	0	0	5	0	0	0	1	0	0	1	-	0	2
21	0	0	0	0	0	2	3	0	0	0	0	4	1	0	2	1	3	0	8	0	0	1	0	0	0	21	0	0	5	3	0	0	3	0	0	2	-	0	0
23	0	0	0	0	0	1	1	0	1	0	0	9	0	0	11	1	8	1	22	0	0	23	0	7	1	24	1	0	10	11	0	1	10	0	0	0	-	2	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	24	1	2	8	9	1	0	15	2	1	0	-	5	7
27	0	0	0	0	0	0	5	1	2	0	2	28	2	5	30	2	24	15	38	4	1	67	1	12	4	7	1	0	8	11	0	0	9	1	1	6	-	1	0
29	0	0	0	0	1	0	9	2	0	1	1	24	4	12	21	14	28	16	27	11	4	50	1	10	6	5	0	0	8	7	2	0	21	1	1	9	-	3	3
31	0	0	0	0	0	1	6	2	1	2	2	12	4	14	20	10	29	5	17	7	5	19	1	4	4	1	0	0	5	4	1	1	9	0	3	7	-	4	3
33	0	0	0	1	0	0	0	6	1	0	3	7	8	5	20	24	7	6	12	10	10	6	2	5	4	6	0	0	2	7	1	0	3	0	7	4	-	4	1
35	0	0	0	0	1	0	3	2	1	1	0	8	20	2	19	16	3	4	7	7	13	7	6	6	1	2	1	1	2	7	5	2	1	1	6	3	-	8	1
37	0	0	0	0	0	0	3	1	0	0	1	8	26	25	25	15	2	11	12	11	11	4	5	16	2	5	2	1	3	10	12	2	3	2	13	3	-	15	1
39	0	0	0	0	0	1	0	0	0	0	3	3	19	42	23	13	2	14	14	7	4	7	6	35	2	10	3	0	3	9	33	0	1	2	13	12	-	6	0
41	0	0	0	0	0	2	2	1	3	1	3	4	17	30	25	19	6	7	20	3	2	20	2	26	2	19	1	0	1	2	31	5	0	3	14	31	-	5	5
43	0	0	0	0	0	0	0	1	3	5	1	0	7	16	17	11	3	2	17	5	1	13	4	25	6	14	0	0	4	2	12	4	0	2	10	61	-	3	4
45	0	0	0	1	0	0	0	0	5	2	2	3	12	6	19	9	4	1	17	2	3	12	2	11	7	21	0	0	5	4	12	1	3	2	13	81	-	4	5
47	0	0	0	0	2	0	0	0	0	3	6	0	7	10	15	10	5	6	9	3	2	17	0	7	10	30	2	6	1	4	22	6	3	5	7	75	-	4	7
49	0	0	0	0	2	0	2	1	2	3	4	1	5	13	14	6	4	3	8	5	6	17	1	12	9	28	7	4	1	6	19	6	1	1	9	55	-	2	16
51	0	0	0	0	0	1	0	1	4	3	4	2	7	7	12	6	4	3	9	7	1	4	6	5	10	32	2	8	5	3	13	4	6	4	6	37	-	5	14
53	0	0	0	1	0	0	0	1	2	5	4	2	7	4	8	11	5	2	5	6	6	9	6	8	12	19	5	11	1	4	6	6	6	1	6	22	-	3	10
55	0	0	0	0	0	0	1	1	1	4	2	2	5	3	13	13	7	3	8	9	3	7	6	4	12	9	7	11	5	3	10	7	8	1	0	19	-	3	11
57	0	0	0	0	0	0	0	2	2	2	8	1	2	3	6	21	4	5	9	9	6	13	3	15	12	13	8	13	6	0	2	1	6	2	0	7	-	6	22
59	0	0	0	2	0	1	0	0	0	4	2	2	2	7	7	22	4	5	10	11	4	5	5	5	8	17	6	5	6	6	3	5	3	3	2	4	-	5	9
61	0	0	0	0	0	0	0	2	1	2	5	2	3	3	2	26	4	10	17	7	6	6	4	12	5	17	3	13	1	2	4	4	6	1	0	4	-	1	11
63	0	0	0	1	1	0	0	0	1	5	1	0	2	3	2	21	8	13	6	9	7	7	4	15	5	15	2	12	1	3	2	1	1	1	3	4	-	2	9
65	0	0	0	0	0	0	0	0	0	1	4	0	3	5	10	15	10	4	13	9	4	8	6	4	1	12	4	8	2	6	2	0	1	1	0	5	-	3	10
67	0	0	0	0	0	1	0	0	1	1	0	1	3	4	6	10	9	6	19	14	6	4	3	8	4	8	1	15	4	3	1	0	0	0	1	1	-	3	11
69	0	0	0	0	0	0	2	0	0	3	3	3	1	3	1	10	3	13	15	10	5	7	2	5	3	3	2	9	4	4	2	0	0	1	2	1	-	0	4
71	0	0	0	1	0	0	1	0	0	0	1	2	1	3	1	10	5	6	6	5	3	9	1	4	5	7	2	12	3	3	1	0	1	1	5	2	-	1	6
73	0	0	0	0	0	0	0	2	0	3	0	0	7	6	2	5	8	5	12	10	2	6	3	3	3	3	2	7	1	4	0	1	0	0	3	0	-	0	2
75	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	6	1	2	4	10	5	5	1	3	0	3	4	8	3	2	1	0	1	2	2	2	-	0	7
77	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	1	3	5	2	0	6	1	5	2	1	1	0	9	0	2	0	0	1	1	2	0	-	1	2
79	0	0	0	0	0	0	0	1	1	0	0	3	2	3	0	1	2	1	7	1	1	4	2	0	1	1	1	5	1	7	5	0	0	0	0	2	-	0	2
81	0	0	0	0	0	0	0	0	1	1	0	0	0	1	1	2	2	0	4	0	2	4	1	2	2	0	1	1	2	5	0	0	0	1	2	0	-	0	1
83	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	4	0	1	1	1	0	0	0	1	0	3	0	1	0	2	3	0	-	0	1
85	0	0	0	0	0	0	0	2	0	0	0	0	2	1	0	0	0	1	3	2	0	1	0	0	0	0	0	1	1	0	1	0	0	1	0	0	-	0	1
87	0	0	0	0	0	0	0	0	1	1	1	0	1	1	1	0	0	1	0	4	2	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	-	0	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	0	0	0	1	1	0	0	3	0	0	0	-	0	1
91	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	1	0	1	0	0	0	0	2	0	0	0	0	0	0	-	1	0
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	3	1	0	0	0	0	0	1	0	0	0	0	0	-	0	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	0	0	0	1	1	0	1	0	0	0	0	-	0	0
97	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	-	0	0
101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	-	0	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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**	**382**	**69**	**165**	**125**	**160**	**205**	**59**	**128**	**46**	**137**	**461**	**0**	**100**	**192**

Table 5.54. Striped bass length frequencies, fall, 2 cm intervals (midpoint given), 1984–2022.
All striped bass taken in the Survey were measured on each tow.

	Fall																																				
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	0	0	0	0	0	0	0	0	-	0	0
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	1	1	0	0	0	0	0	0	0	-	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	7	2	0	0	0	0	0	0	0	-	0	0
27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	13	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	0	0	0	0	0	0	-	9	1	0	0	0	0	0	0	0	-	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	4	2	0	0	0	0	0	0	0	-	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	1	0	-	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	-	3	0	0	0	0	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	0	-	1	4	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	0	-	1	0	0	0	0	0	0	2	4	-	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	0	-	0	0	0	0	3	0	0	12	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	0	-	0	4	0	0	0	0	0	14	1	-	0	0
45	0	0	1	0	0	0	0	0	0	0	0	0	4	3	2	2	0	0	1	0	18	1	1	2	0	0	-	0	1	3	0	1	0	1	21	2	-	0	0
47	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	11	0	0	1	1	18	1	1	10	0	2	-	0	5	6	5	6	0	4	25	9	-	0	0
49	0	0	0	0	0	0	0	0	0	1	0	0	9	9	2	9	1	0	0	0	14	2	4	22	1	1	-	0	6	5	3	5	0	1	17	4	-	1	0
51	0	0	0	0	0	0	0	0	0	4	2	0	8	4	1	9	0	0	3	0	29	2	5	18	2	4	-	2	2	2	4	16	0	2	10	13	-	0	0
53	1	0	0	0	0	0	0	0	0	2	2	1	5	14	7	5	5	0	3	0	27	7	7	16	7	7	-	2	2	4	7	18	1	4	11	7	-	2	0
55	0	0	0	0	0	0	0	0	1	0	1	0	2	10	5	5	2	0	4	1	26	1	2	10	4	10	-	3	3	2	6	26	3	1	6	7	-	2	0
57	0	0	0	1	1	0	0	1	1	5	0	2	3	11	5	5	5	2	7	1	11	6	3	6	3	8	-	0	0	3	8	15	4	2	2	5	-	0	0
59	0	0	0	0	0	0	0	0	1	0	0	0	0	7	3	0	8	0	2	0	13	6	3	5	3	8	-	0	6	1	4	14	5	0	1	2	-	2	0
61	0	0	0	0	3	0	0	1	0	1	0	2	2	3	1	2	4	2	2	0	12	1	6	4	3	4	-	2	1	2	4	10	10	1	3	6	-	0	0
63	0	0	0	0	2	0	0	1	1	1	1	0	0	3	2	3	6	7	3	1	9	5	2	5	1	6	-	3	0	5	2	1	4	1	1	1	-	0	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	6	-	6	0	2	1	4	4	1	0	1	-	0	0
67	0	0	0	0	1	0	0	1	0	1	2	2	1	1	0	1	6	1	6	0	8	4	3	4	0	5	-	3	0	0	0	5	2	3	0	0	-	0	2
69	0	0	0	0	1	0	0	0	0	1	1	0	2	2	0	0	4	3	4	0	6	0	3	6	2	6	-	2	0	2	1	1	2	1	0	1	-	0	2
71	0	0	0	0	1	0	0	0	1	0	0	1	1	1	2	0	3	3	5	0	3	3	0	0	0	1	-	1	2	0	1	1	1	0	0	1	-	0	3
73	0	0	0	0	0	0	0	0	0	2	1	4	0	2	3	1	2	2	0	1	3	0	0	0	4	1	-	5	1	1	0	0	0	2	1	0	-	0	0
75	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	1	3	2	1	1	1	2	0	1	0	0	-	1	1	0	1	1	0	0	2	0	-	1	2
77	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	1	4	0	4	0	1	0	0	2	3	0	-	5	1	0	1	0	0	1	1	2	-	0	0
79	0	0	0	0	0	0	0	0	0	2	1	0	0	1	1	0	1	1	2	1	1	0	1	0	3	1	-	0	0	0	0	0	0	0	0	0	-	1	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	1	1	1	-	0	1
83	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0	2	0	0	0	0	0	0	-	0	1
85	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	2	1	0	1	0	3	-	1	0	0	0	1	0	1	0	0	-	0	1
87	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	-	0	0	0	0	0	0	0	0	1	-	0	2
89	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	-	1	0	0	1	0	0	0	0	0	-	0	2
91	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	-	0	0	0	0	0	0	0	0	1	-	0	0
93	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	0	0	0	0	0	0	0	1	0	-	0	1
95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	2	-	0	0	0	0	0	0	0	0	0	-	0	1
97	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	5	-	0	0	0	0	0	0	0	0	1	-	0	0
99	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
101	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
103	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
107	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
109	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
111	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
113	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**1**	**0**	**1**	**1**	**10**	**0**	**0**	**6**	**8**	**22**	**16**	**15**	**48**	**80**	**37**	**62**	**64**	**28**	**56**	**8**	**243**	**47**	**47**	**131**	**39**	**83**	-	**77**	**46**	**40**	**49**	**128**	**36**	**27**	**132**	**72**	**0**	**9**	**19**

Table 5.55. Summer flounder length frequencies, spring, 1 cm intervals, 1984-2022.

All summer flounder taken in the Survey were measured, with the exception of one fish in 1990.

	Spring																																						
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0	1	-	0	0
15	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	1	0	0	0	0	7	-	0	0
16	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	14	0	0	4	0	0	0	0	0	0	0	0	5	-	0	0
17	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	1	1	3	0	0	1	0	0	0	0	1	9	-	0	0
18	0	0	0	19	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0	2	1	0	0	26	0	1	3	0	0	0	0	2	0	0	0	15	-	0	1
19	0	0	0	17	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	11	1	2	7	0	0	0	1	3	1	0	1	11	-	0	1
20	0	0	5	22	0	0	0	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0	25	3	8	9	1	0	9	3	4	0	0	3	26	-	1	1
21	0	0	6	17	0	0	0	0	0	0	3	2	1	0	0	0	1	0	0	3	0	0	0	21	2	8	12	0	0	6	2	15	0	0	12	38	-	3	0
22	0	0	6	21	0	0	1	0	1	0	4	1	1	0	0	0	0	2	1	3	0	1	0	16	1	11	16	1	2	12	6	13	0	0	10	56	-	0	3
23	0	0	4	10	1	0	0	3	1	0	5	0	1	2	0	0	0	4	0	9	1	1	1	21	2	10	21	3	0	9	9	22	0	0	8	85	-	4	3
24	0	0	9	13	1	0	0	2	0	3	8	0	1	3	0	0	3	3	0	6	0	0	0	18	4	21	35	5	2	20	13	26	0	1	28	89	-	10	7
25	1	0	13	20	1	0	2	4	1	6	12	1	1	7	1	2	3	2	2	21	3	3	0	3	3	22	51	16	2	22	16	40	3	5	32	117	-	5	8
26	2	0	16	13	5	0	2	6	1	11	18	1	2	1	0	6	3	12	4	32	2	5	0	5	8	25	48	20	7	20	21	43	2	10	45	97	-	5	11
27	6	0	27	12	15	0	5	6	5	11	14	2	9	9	2	8	4	14	9	47	6	9	0	6	5	30	45	30	15	38	40	45	5	8	41	80	-	12	10
28	5	0	18	5	7	0	9	6	12	9	1	1	17	9	3	7	9	31	17	63	8	5	0	9	13	28	40	37	24	28	43	31	5	8	40	82	-	24	7
29	2	0	21	1	11	0	6	11	2	6	9	8	28	13	2	24	13	29	33	72	17	5	2	10	21	25	38	53	32	28	49	25	9	24	38	37	-	18	8
30	4	1	8	0	1	0	9	14	7	4	7	8	22	16	3	23	15	31	40	61	9	8	2	9	12	16	23	37	20	13	42	22	9	5	38	23	-	19	4
31	5	0	9	3	17	0	10	9	5	8	12	4	22	11	1	20	8	22	49	42	5	11	3	10	16	8	14	55	31	20	32	27	16	6	18	27	-	19	3
32	0	4	9	1	6	1	5	6	7	5	9	2	7	15	3	11	14	8	36	31	12	9	10	3	13	13	6	33	25	17	27	15	9	4	8	26	-	18	11
33	0	3	4	4	6	0	7	4	1	2	13	0	7	10	4	11	14	8	20	24	6	6	11	3	12	13	4	37	19	19	37	10	11	7	7	34	-	27	3
34	0	6	3	1	6	1	1	4	1	6	8	1	4	7	6	12	12	5	20	26	5	8	7	6	8	15	5	35	22	13	28	10	13	10	11	26	-	22	5
35	2	2	1	1	7	2	0	1	5	1	8	1	8	4	5	11	10	5	21	23	8	4	10	3	6	5	2	46	36	23	23	11	10	8	8	22	-	16	6
36	0	2	2	1	3	2	1	3	1	4	14	0	4	8	16	14	18	9	30	41	16	7	5	4	6	15	13	42	29	26	29	13	20	9	11	31	-	32	9
37	1	1	2	4	5	0	0	3	1	2	6	1	6	12	12	12	17	11	27	35	18	1	9	8	4	13	3	27	31	38	19	17	5	2	5	31	-	24	9
38	2	1	2	2	3	1	1	3	1	4	3	0	7	8	21	13	24	5	23	37	26	3	7	8	10	19	14	32	30	36	20	16	7	10	12	27	-	34	15
39	1	2	1	2	2	0	1	2	1	3	4	0	5	8	17	5	12	7	38	34	25	6	3	14	4	17	6	23	37	25	13	11	10	5	13	21	-	17	8
40	0	3	4	1	4	0	1	3	4	2	1	2	2	6	22	6	17	10	29	42	22	7	3	15	6	18	6	17	17	38	18	14	12	5	8	10	-	17	9
41	1	0	3	0	4	2	0	3	1	2	5	1	3	4	13	8	16	8	23	35	26	6	2	11	11	17	6	21	17	30	15	8	5	4	7	12	-	16	8
42	0	1	1	0	1	1	0	0	2	3	6	5	5	2	13	10	16	14	14	31	23	5	3	10	7	14	5	10	21	29	15	15	5	5	8	7	-	11	5
43	0	0	2	0	1	1	0	0	0	1	0	2	1	4	9	6	6	10	14	27	25	5	2	20	6	14	8	15	22	17	15	5	9	2	12	13	-	9	9
44	0	0	0	0	2	0	0	4	4	0	1	0	2	2	8	6	18	7	14	18	16	4	1	13	5	14	3	9	14	21	10	8	8	3	1	9	-	14	7
45	0	0	1	1	1	0	0	4	0	0	3	0	3	2	7	5	11	9	7	15	2	1	3	13	1	16	4	10	9	18	13	9	5	1	1	7	-	13	4
46	0	0	2	1	1	1	0	4	1	1	3	0	0	4	3	4	8	9	8	25	18	6	1	13	7	10	10	14	14	18	10	6	9	4	6	1	-	7	7
47	0	0	1	2	2	0	1	0	1	0	0	0	1	2	6	6	10	5	12	18	10	5	2	12	7	4	6	12	10	11	6	6	5	5	3	3	-	7	3
48	0	0	1	1	1	0	0	1	0	0	1	0	0	2	8	8	1	8	7	13	16	5	2	18	5	9	7	15	14	14	10	7	4	5	4	3	-	7	3
49	1	0	0	0	0	2	0	1	1	0	1	1	3	0	4	9	6	2	7	19	10	1	1	18	4	4	3	5	9	6	7	3	5	5	4	4	-	5	4
50	0	0	2	0	0	0	0	1	1	0	1	0	0	2	5	6	5	4	10	12	3	5	3	20	11	4	4	9	7	8	12	6	2	3	2	1	-	7	2
51	0	0	3	0	1	0	0	0	0	0	0	0	1	1	10	3	3	8	9	7	10	3	4	6	4	12	5	6	8	10	4	2	6	1	5	0	-	5	7
52	0	0	1	0	1	0	2	0	0	1	1	2	0	2	0	4	3	4	6	11	8	3	4	8	11	5	0	7	6	6	9	0	2	2	3	4	-	2	1
53	0	0	0	0	0	0	0	1	0	0	0	0	3	3	5	5	2	4	4	10	8	3	0	2	4	3	2	11	2	7	9	8	1	2	2	1	-	2	0
54	0	2	0	0	1	0	0	0	1	1	0	0	2	1	5	5	5	3	10	4	8	4	0	5	10	8	1	8	4	6	7	3	3	3	3	2	-	0	1
55	0	0	1	0	0	1	0	0	0	1	1	0	1	1	1	3	3	5	4	6	6	1	2	6	8	6	1	7	4	7	10	1	2	1	2	2	-	3	2
56	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	3	5	7	2	3	1	1	9	13	8	0	7	1	3	7	3	1	2	5	5	-	3	1
57	0	0	0	0	0	1	1	0	0	0	2	0	0	1	3	3	2	3	5	7	0	1	0	4	1	8	2	7	2	3	7	4	2	1	4	2	-	1	2
58	0	0	0	0	1	0	0	0	0	1	0	0	1	1	1	6	5	1	2	6	4	3	0	4	4	8	1	6	3	5	1	2	4	3	6	3	-	0	0
59	0	0	0	0	0	1	0	0	0	1	0	0	1	2	2	2	3	1	4	7	4	1	1	1	1	9	2	1	5	4	2	5	1	2	1	1	-	0	0
60	0	1	0	0	0	0	0	0	0	1	1	0	1	0	1	2	0	1	4	1	2	2	0	1	2	4	2	3	0	2	2	0	1	1	0	2	-	1	1
61	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	1	4	3	2	4	3	1	0	1	2	3	1	4	1	1	2	0	0	0	1	1	-	1	0
62	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	1	1	3	4	7	0	0	6	2	4	2	5	4	2	2	1	1	1	0	0	-	1	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	4	6	2	0	4	0	3	4	0	3	2	1	1	0	3	0	2	1	-	0	0
64	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	3	0	6	1	1	0	3	1	4	1	2	3	1	1	1	0	0	1	0	-	0	0
65	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	2	3	1	0	0	4	2	0	5	2	2	4	0	1	1	0	1	1	-	0	0
66	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	2	2	2	2	0	0	1	0	1	1	0	0	1	1	1	1	0	0	1	-	2	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	3	2	0	1	0	1	0	0	6	0	0	0	0	0	0	0	1	-	0	1
68	0	0	0	1	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	3	2	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	-	0	0
69	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	2	0	0	1	0	0	0	2	1	1	0	0	0	-	0	0
70	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	0	0	1	1	2	0	0	1	0	0	-	0	0
71	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	4	0	0	0	0	0	0	0	2	1	0	1	0	1	0	-	1	0
72	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0	-	0	0
73	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	0	0	2	0	0	0	0	0	0	1	-	0	0
74	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	0	0	0	0	1	0	1	0	-	0	0
75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0
76	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	2	0
77	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	-	0	0
78	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**33**	**32**	**189**	**203**	**118**	**18**	**67**	**110**	**72**	**101**	**188**	**51**	**186**	**188**	**230**	**290**	**336**	**341**	**588**	**964**	**416**	**171**	**110**	**513**	**297**	**538**	**514**	**758**	**570**	**699**	**676**	**541**	**236**	**184**	**484**	**1,121**	**0**	**447**	**210**

Table 5.56. Summer flounder length frequencies, fall, 1 cm intervals, 1984-2022.

All summer flounder taken in the Survey were measured, with the exception of two fish in 1985.

| | Fall | | |

Table 5.57. Tautog length frequencies, spring, 1 cm intervals, 1984-2022.
All tautog taken in the Survey were measured.

	Spring																																													
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
9	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1
10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	-	0	0
12	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	1	1	1	0	0	2	2	0	1	0	0	0	0	0	0	0	1	1	0	0	0	-	1	1
13	0	0	0	1	1	0	4	1	0	1	0	0	2	1	0	0	0	2	0	0	0	3	0	0	0	1	0	1	4	2	1	1	2	0	1	0	-	0	1
14	0	0	0	1	0	4	3	0	2	3	2	0	0	1	0	0	4	2	1	0	1	1	0	0	1	1	2	0	2	0	1	0	6	0	1	0	-	1	0
15	0	0	2	2	1	4	7	1	1	0	2	0	1	2	0	0	2	2	0	0	0	0	0	1	0	2	0	2	0	0	1	0	5	0	2	0	-	2	0
16	0	0	0	3	1	3	6	1	0	0	2	0	3	3	0	0	0	1	1	0	1	1	0	1	2	1	0	0	2	2	0	1	3	0	0	5	-	0	1
17	2	1	2	3	2	3	8	3	3	1	2	0	0	2	0	0	5	2	2	1	0	2	3	0	0	0	0	0	4	1	3	3	1	0	2	2	-	1	1
18	2	2	0	3	4	3	14	7	4	4	1	1	0	4	1	0	4	2	2	0	0	0	0	0	1	1	1	1	3	2	1	0	5	0	0	3	-	0	1
19	2	0	2	3	4	11	11	6	2	1	1	0	2	1	0	3	0	6	2	2	0	0	0	2	1	0	0	0	2	0	0	1	9	0	2	7	-	7	1
20	5	2	2	0	3	7	15	7	2	1	2	1	0	2	1	0	1	3	1	1	0	2	0	0	2	0	0	1	3	9	6	2	3	0	4	7	-	2	2
21	3	1	5	2	5	7	12	4	1	5	2	0	0	5	0	3	3	2	4	0	2	1	0	0	0	0	2	3	3	2	5	3	6	2	3	5	-	5	3
22	2	5	0	1	7	11	13	11	2	2	1	1	0	5	2	0	2	6	0	1	0	3	3	1	1	0	1	2	3	4	1	6	9	2	1	6	-	4	3
23	7	0	6	4	4	12	15	9	2	2	5	1	0	2	2	1	4	7	5	0	1	2	2	2	2	0	0	3	6	1	1	8	1	2	3	4	-	2	4
24	5	1	3	1	4	8	8	3	0	3	5	1	1	0	2	1	1	6	6	2	2	2	2	5	1	0	3	1	1	5	6	1	3	1	2	7	-	3	3
25	6	8	2	4	4	7	7	5	4	1	2	1	1	7	1	2	4	5	6	2	1	2	2	1	2	1	1	2	3	4	4	6	2	1	7	4	-	3	3
26	6	4	7	0	2	4	15	6	0	3	1	0	0	2	2	1	2	7	3	0	3	1	2	1	2	0	0	1	8	3	8	2	8	2	10	9	-	4	5
27	5	3	8	3	2	9	5	6	1	1	3	1	1	3	6	2	6	1	8	3	1	0	0	3	1	0	0	5	0	2	3	7	8	3	4	4	-	8	5
28	3	8	5	2	3	11	12	6	3	3	9	1	0	2	0	1	4	4	5	1	1	4	1	2	2	0	1	1	1	7	5	1	4	2	3	6	-	6	3
29	7	7	3	3	4	7	4	2	3	3	7	1	2	3	2	1	3	0	4	3	4	3	1	4	6	0	0	0	4	4	2	6	5	0	3	11	-	5	4
30	6	4	9	3	2	15	10	6	1	3	1	1	1	4	2	1	2	3	12	3	6	1	5	2	1	0	0	1	1	4	5	6	5	1	12	10	-	9	4
31	9	3	6	2	8	5	12	1	1	3	4	0	1	5	1	0	1	6	9	3	4	2	4	1	1	2	1	2	4	3	4	11	9	0	4	11	-	4	6
32	8	3	6	6	4	6	6	5	2	0	2	1	3	7	9	3	2	3	13	10	9	4	3	5	2	2	2	1	6	3	2	8	8	0	5	9	-	6	1
33	5	4	7	8	4	6	7	7	3	1	4	0	2	4	0	6	6	6	18	8	3	4	4	3	2	4	0	0	3	2	5	13	7	4	9	9	-	7	16
34	5	7	12	4	5	11	6	6	2	0	2	0	2	9	3	3	6	5	13	5	1	1	5	3	4	3	1	2	1	6	6	12	7	2	9	9	-	11	11
35	10	4	6	3	10	5	9	10	7	0	3	0	4	4	3	3	3	5	15	4	6	1	4	6	4	1	0	3	2	2	6	13	16	3	8	15	-	4	21
36	7	1	17	13	13	11	7	7	2	2	4	1	1	4	4	2	11	14	17	7	7	5	7	3	3	5	2	1	2	3	5	10	13	1	7	13	-	3	19
37	8	8	22	13	12	8	6	11	2	1	5	1	4	4	1	7	9	6	23	12	14	8	5	4	6	4	2	2	0	5	11	16	8	2	9	7	-	8	16
38	9	10	17	11	14	5	14	18	10	3	4	1	2	1	3	5	11	7	22	8	10	4	5	2	4	6	3	2	9	5	12	19	9	3	4	16	-	9	18
39	8	5	18	7	6	14	7	7	3	2	8	2	9	5	5	5	8	10	25	7	15	9	9	3	17	6	6	3	2	9	6	14	12	3	12	9	-	16	13
40	8	8	38	8	14	22	10	17	8	2	7	2	4	2	7	4	10	11	27	10	9	8	9	9	2	5	1	5	4	5	1	8	11	4	7	7	-	4	9
41	11	6	27	12	12	16	9	10	6	2	5	2	9	3	9	3	18	16	28	5	12	10	7	7	6	16	1	5	2	5	8	21	16	0	6	9	-	4	14
42	11	14	22	10	19	21	12	17	6	3	7	1	6	7	7	10	16	12	24	15	9	6	3	13	6	12	1	4	3	6	8	13	10	1	5	8	-	4	10
43	13	9	28	9	18	24	6	8	10	7	5	1	5	8	6	9	11	17	24	9	12	5	8	14	3	9	2	4	4	5	5	12	8	3	7	7	-	3	11
44	15	6	31	12	20	27	17	13	11	1	9	1	1	7	8	5	17	12	37	3	19	5	6	15	8	11	2	4	1	3	4	14	8	3	5	9	-	7	10
45	20	21	23	12	15	25	32	18	10	10	6	1	6	5	9	12	11	11	33	13	10	5	9	10	7	5	2	3	2	6	2	10	6	3	1	8	-	2	8
46	15	9	22	10	17	31	20	18	10	1	8	1	2	6	3	5	8	10	28	11	8	7	7	15	10	8	0	3	4	1	4	7	3	2	3	7	-	1	4
47	16	9	37	11	23	22	14	23	15	7	10	3	6	5	7	7	9	10	18	7	1	7	10	17	4	3	4	2	2	2	4	10	0	1	1	8	-	2	2
48	15	13	25	8	21	31	21	18	7	5	1	1	3	7	6	8	5	7	20	3	6	10	7	13	0	4	1	2	1	3	1	2	3	2	3	3	-	2	3
49	17	11	12	9	19	29	17	20	7	6	12	0	2	3	4	3	5	8	9	4	3	5	11	14	3	7	1	4	5	0	3	2	7	4	1	9	-	1	6
50	13	5	10	5	16	27	12	16	9	6	7	1	2	2	7	7	3	10	8	7	5	4	4	17	7	10	2	5	2	2	1	5	3	0	1	2	-	1	3
51	9	12	21	5	19	12	26	13	11	3	6	2	6	1	7	2	4	7	10	1	6	4	5	10	3	2	1	2	2	0	5	2	0	1	2	1	-	0	2
52	10	8	5	7	14	10	20	10	8	6	7	0	2	3	7	3	5	4	8	3	2	1	8	5	5	2	2	3	1	1	2	2	2	2	0	0	-	1	0
53	8	4	11	3	11	17	17	6	8	2	2	1	4	4	2	0	1	5	8	1	0	1	2	5	3	5	0	2	2	1	0	1	0	1	2	1	-	1	1
54	3	3	6	6	12	8	14	11	6	6	3	1	7	4	5	2	2	1	5	1	5	2	3	6	5	4	2	2	0	0	1	0	2	1	1	0	-	0	0
55	9	0	5	5	11	13	10	5	7	2	3	2	1	3	2	2	6	4	5	1	0	0	4	8	3	2	1	0	1	0	0	0	0	0	1	1	-	0	1
56	2	0	7	8	7	9	11	8	3	3	1	3	1	1	3	1	0	2	1	3	1	0	0	3	3	2	0	1	0	0	0	1	0	0	2	1	-	1	0
57	2	0	11	2	1	5	5	5	7	1	1	0	3	2	1	3	7	0	3	1	0	1	0	1	2	1	0	0	0	2	0	0	0	0	0	0	-	0	0
58	3	2	0	3	3	6	2	4	4	1	2	0	1	1	0	2	2	1	2	1	0	0	0	2	0	0	0	1	0	0	0	2	0	0	1	0	-	1	0
59	4	1	3	2	3	5	6	3	3	3	2	0	0	0	0	0	0	2	3	0	1	0	0	2	3	0	0	0	0	1	0	0	0	0	1	0	-	1	0
60	2	0	1	0	2	2	1	2	1	1	1	0	0	1	0	0	0	1	0	0	1	0	0	2	1	0	1	0	0	0	0	0	0	0	0	0	-	0	0
61	1	2	0	2	3	2	1	1	2	1	0	0	0	1	1	0	0	0	1	0	1	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	-	0	0
62	0	0	1	3	0	1	2	1	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	-	0	0
63	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0
64	0	0	0	0	0	3	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
66	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**337**	**234**	**514**	**258**	**411**	**566**	**528**	**407**	**226**	**129**	**189**	**40**	**113**	**168**	**151**	**139**	**245**	**277**	**521**	**183**	**207**	**149**	**170**	**247**	**153**	**150**	**52**	**93**	**115**	**133**	**160**	**283**	**254**	**63**	**177**	**270**	**-**	**167**	**251**

Table 5.58. Tautog length frequencies, fall, 1 cm intervals, 1984-2022.
All tautog taken in the Survey were measured.

																				Fall																				
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
11	0	0	0	0	0	0	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
12	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	2	-	0	0	0	0	0	0	0	1	0	-	0	0
13	1	0	0	3	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
14	0	0	0	0	0	0	0	0	0	0	2	1	2	0	0	2	1	0	0	0	0	0	0	0	1	0	-	0	1	0	1	4	0	1	1	1	-	0	1
15	1	0	0	2	0	0	0	0	3	0	0	0	0	0	0	2	1	0	0	0	0	0	1	0	0	0	-	0	1	0	0	0	1	0	1	0	-	1	1
16	1	0	0	0	0	0	2	0	0	0	0	0	0	0	2	1	0	0	1	0	0	0	0	1	1	0	-	1	2	0	1	1	0	1	0	0	-	0	2
17	1	0	0	1	1	0	0	0	0	1	0	0	0	0	0	3	0	1	1	0	0	0	0	0	0	0	-	0	1	2	2	1	0	0	1	0	-	0	1
18	2	0	0	2	1	0	2	1	0	0	3	0	0	0	1	4	0	1	0	1	1	1	0	0	0	2	-	2	1	3	0	1	2	1	1	1	-	3	1
19	2	0	0	2	0	0	0	0	0	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	-	1	1	0	1	0	1	0	3	1	-	1	2
20	3	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4	1	0	1	0	0	0	0	0	1	0	-	1	0	1	0	2	1	0	2	1	-	2	3
21	2	2	0	5	0	0	0	1	2	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	-	0	1	0	0	1	0	0	2	1	-	1	2
22	3	0	2	1	2	0	1	0	0	0	1	0	1	0	0	2	0	0	0	0	0	2	0	0	0	0	-	0	1	0	3	1	3	0	0	3	-	1	0
23	2	0	2	1	1	0	0	0	0	0	0	0	5	0	2	5	0	1	1	0	0	0	0	0	1	0	-	0	1	0	0	0	1	1	5	4	-	4	4
24	5	0	0	0	2	1	2	0	3	0	1	0	5	2	0	0	0	0	1	0	0	0	0	1	0	0	-	0	0	0	3	3	1	0	4	5	-	1	1
25	4	0	2	2	0	0	0	0	0	2	0	0	0	2	0	1	0	0	0	0	1	0	0	0	1	0	-	2	2	0	3	2	0	2	1	4	-	1	2
26	0	3	0	3	3	2	0	0	0	0	0	0	0	2	1	3	2	0	1	0	0	0	1	0	0	0	-	0	1	0	1	0	2	0	3	5	-	4	3
27	3	0	0	1	0	0	0	0	1	0	2	0	0	0	1	1	0	0	0	0	0	1	0	0	0	0	-	1	3	3	0	0	1	2	2	2	-	0	1
28	1	1	3	0	0	0	2	0	2	1	0	0	0	1	2	4	0	4	1	0	0	1	0	0	0	0	-	0	0	0	0	2	4	0	4	7	-	0	3
29	5	1	3	0	1	0	1	2	2	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	-	0	0	1	1	1	0	1	4	6	-	1	2
30	5	0	0	1	0	1	0	0	0	0	0	1	0	0	0	1	0	1	1	1	0	0	2	1	2	0	-	0	2	0	3	1	3	0	3	2	-	1	2
31	3	1	0	1	1	2	0	0	1	0	0	5	0	0	1	1	2	3	0	0	0	0	1	1	0	0	-	0	2	2	2	0	4	1	2	3	-	5	4
32	3	1	0	0	0	0	0	1	1	0	1	1	0	1	0	0	0	1	2	1	0	0	0	0	1	0	-	0	0	1	2	0	2	1	1	9	-	3	1
33	5	4	3	2	2	0	1	0	0	0	0	0	0	0	2	3	0	0	1	1	0	0	0	0	1	1	-	1	0	3	2	0	5	0	2	5	-	10	2
34	3	3	2	2	0	1	1	3	2	0	2	2	0	0	2	1	0	1	0	2	1	0	0	0	1	0	-	0	0	2	3	0	0	0	0	5	-	4	2
35	3	3	2	0	0	1	2	0	0	0	0	1	2	1	2	1	2	6	0	1	1	1	1	0	1	1	-	0	0	1	0	0	0	0	0	6	-	0	3
36	4	1	0	1	0	0	0	6	4	0	0	1	0	1	0	2	2	3	1	0	1	0	0	3	0	0	-	0	0	2	0	0	4	0	1	5	-	4	1
37	7	3	0	1	0	2	0	1	0	0	0	0	2	0	1	5	2	0	3	1	0	3	0	0	2	0	-	0	0	1	3	0	4	0	0	4	-	3	2
38	3	7	1	1	1	0	0	2	2	2	1	0	0	0	1	5	1	0	4	3	2	3	2	0	0	0	-	0	0	4	0	0	1	0	4	4	-	5	2
39	5	4	2	3	0	1	0	5	2	2	1	1	1	0	0	5	1	1	1	2	0	2	2	0	0	0	-	0	0	1	2	0	2	1	1	6	-	1	0
40	8	4	3	0	0	2	1	5	1	0	2	1	0	2	0	5	4	1	1	3	0	3	0	2	1	0	-	0	0	0	0	0	0	0	1	4	-	0	1
41	7	6	2	7	1	0	1	4	0	1	1	1	0	0	0	2	3	2	4	3	3	0	2	1	1	2	-	0	2	0	1	0	1	0	1	4	-	2	0
42	3	4	1	7	3	3	0	2	1	1	2	1	0	0	1	3	1	4	3	0	1	0	0	1	0	0	-	0	0	1	0	1	2	0	0	1	-	1	1
43	3	10	4	3	2	2	1	7	0	1	0	1	1	1	2	2	1	1	1	2	4	0	0	3	0	1	-	0	0	0	0	0	0	0	0	1	-	0	1
44	3	3	1	2	1	4	1	6	1	5	0	1	0	1	1	2	1	0	2	0	1	1	0	0	2	0	-	0	0	1	0	0	0	0	0	1	-	0	1
45	3	2	2	5	1	4	1	3	0	0	1	0	0	0	1	2	1	3	2	3	1	2	0	1	2	0	-	0	0	0	0	0	0	1	0	0	-	0	0
46	5	3	2	5	1	1	0	7	1	0	2	0	0	0	2	2	1	0	4	0	1	2	0	1	0	0	-	0	0	0	1	0	0	0	0	0	-	0	0
47	4	5	3	3	2	0	1	2	1	4	2	1	1	1	4	0	2	0	1	0	2	3	0	1	0	0	-	0	0	0	0	1	0	0	0	0	-	0	0
48	3	4	0	7	2	1	1	6	0	1	1	0	0	3	2	0	1	1	3	1	0	0	1	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
49	4	1	0	4	0	0	0	0	0	5	1	0	0	1	2	0	3	1	0	0	1	0	0	1	1	0	-	0	0	1	0	0	0	0	0	0	-	0	0
50	3	2	2	4	5	0	0	7	1	0	1	0	0	0	2	1	3	1	0	1	0	0	0	0	0	0	-	2	0	0	1	0	0	0	1	0	-	0	0
51	0	0	2	4	2	1	1	7	1	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	3	0	-	0	0	0	0	0	0	0	0	0	-	0	0
52	3	1	1	5	1	0	0	1	1	2	2	0	0	0	2	0	0	0	0	1	2	0	1	3	1	1	-	0	0	0	0	0	1	0	0	0	-	0	0
53	1	0	4	1	0	1	0	1	0	1	3	0	0	0	0	1	1	1	0	0	0	0	0	2	1	0	-	0	0	0	0	0	0	0	0	0	-	0	0
54	0	3	0	1	0	0	0	2	1	3	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
55	3	0	1	2	1	0	3	0	0	3	0	0	0	0	0	1	2	0	0	1	0	0	0	1	0	0	-	0	0	0	0	0	0	1	0	0	-	0	0
56	1	1	1	3	1	1	0	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
57	1	0	0	5	0	1	0	6	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
58	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
59	0	1	1	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
61	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
62	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
66	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**132**	**84**	**52**	**106**	**40**	**32**	**25**	**91**	**36**	**36**	**36**	**21**	**23**	**21**	**41**	**79**	**39**	**41**	**43**	**29**	**24**	**27**	**15**	**28**	**24**	**12**	**-**	**11**	**22**	**30**	**36**	**23**	**46**	**14**	**52**	**101**	**-**	**59**	**52**

Table 5.59. Weakfish length frequencies, spring, 2 cm intervals (midpoint given), 1984-2022.
Weakfish were measured from every tow.

	Spring																																				
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	3	0
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	3	0	1	11	2	1	8	-	74	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	3	0	3	10	4	0	3	93	6	0	50	-	73	2
23	0	0	0	0	0	0	0	0	1	0	0	3	0	0	1	0	0	1	2	1	9	3	6	1	0	1	0	2	5	8	1	0	73	6	0	20	-	13	5
25	0	0	0	0	1	0	1	0	0	0	2	3	1	0	1	2	3	4	1	2	9	10	3	0	2	0	0	0	0	6	0	0	15	9	1	4	-	3	1
27	0	0	0	0	0	0	2	4	0	0	3	5	3	5	4	1	2	13	3	0	3	27	4	4	0	0	0	2	4	10	5	0	4	7	0	1	-	1	1
29	0	0	0	0	0	0	2	4	1	3	3	7	12	12	16	5	1	20	0	0	2	22	2	4	1	1	0	0	5	12	1	0	5	7	0	2	-	1	0
31	0	0	0	0	1	0	1	6	3	3	3	7	15	21	21	8	5	9	1	0	2	20	1	0	0	0	0	0	11	8	4	0	4	4	1	2	-	2	2
33	0	0	0	0	0	0	0	12	0	3	2	1	5	19	10	10	1	5	0	0	0	11	0	3	0	0	0	0	17	1	0	0	10	13	1	6	-	3	1
35	0	0	0	0	0	1	1	13	0	0	0	0	4	11	4	3	1	2	1	0	0	0	0	1	0	0	0	1	28	2	1	0	9	12	0	4	-	5	7
37	0	0	0	1	0	0	2	5	0	0	0	1	2	2	3	1	0	0	1	0	0	1	0	2	1	0	0	2	31	3	1	0	13	8	2	10	-	3	3
39	0	0	0	0	1	0	0	4	0	0	0	0	1	1	0	2	0	0	2	0	0	0	0	1	0	0	0	3	26	6	2	0	15	6	0	6	-	4	1
41	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7	3	0	2	1	0	0	0	1	6	0	0	0	1	15	3	0	0	5	2	1	1	-	6	1
43	0	0	0	1	0	0	0	1	1	0	0	0	0	2	3	6	0	0	1	0	0	0	0	1	0	0	0	0	8	1	0	0	1	0	0	0	-	11	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0	3	1	4	0	0	0	0	0	-	7	0
47	0	0	0	0	0	0	0	1	1	0	0	0	0	1	2	2	1	0	1	0	0	0	0	2	0	0	1	0	2	2	1	0	1	1	0	0	-	14	0
49	0	0	1	0	0	0	0	0	0	0	0	1	0	1	5	3	1	0	1	0	0	0	4	1	0	0	0	0	1	4	0	0	0	0	0	0	-	7	2
51	0	0	0	0	0	1	0	1	2	0	0	0	0	0	6	3	2	0	1	0	0	0	2	0	0	0	0	0	1	3	0	0	0	3	0	1	-	5	1
53	0	0	0	0	0	0	0	0	3	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	1	0	0	0	7	3	0	0	0	1	0	1	-	4	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	0	0	0	6	4	0	1	0	0	0	1	-	0	0
57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	-	0	0
59	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	5	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	0	-	0	0
61	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	-	0	0
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	2	0	0	1	0	0	0	0	0	0	0	0	1	0	1	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	0	0	0	0	0	1	0	0	0	0	0	-	0	0
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	-	0	0
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
71	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
73	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	-	0	0
75	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
77	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	-	0	0
79	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0
81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
83	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**1**	**0**	**9**	**2**	**6**	**5**	**9**	**51**	**18**	**11**	**13**	**28**	**43**	**81**	**92**	**85**	**29**	**59**	**28**	**5**	**28**	**96**	**26**	**31**	**6**	**10**	**1**	**16**	**187**	**86**	**24**	**5**	**261**	**88**	**7**	**117**	**-**	**239**	**28**

Table 5.60. Weakfish length frequencies, fall, 2 cm intervals (midpoint given), 1984-2022.

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

	Fall																																							
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
3	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
5	0	0	0	0	2	1	0	0	0	1	0	2	0	3	0	0	24	13	0	6	0	0	1	0	0	0	-	0	6	0	0	1	0	0	0	8	-	0	0
7	0	3	51	0	13	46	2	0	48	22	16	34	34	92	0	0	1,065	89	2	357	30	8	3	101	9	9	-	9	81	23	24	10	16	1	60	181	-	48	16
9	15	70	448	15	37	247	39	11	218	76	127	74	110	431	27	53	5,951	1,054	253	1,026	1,263	11	6	904	18	117	-	83	519	127	671	177	190	58	853	802	-	515	366
11	24	168	1,625	84	63	566	130	423	233	222	413	33	366	749	110	976	7,488	3,672	1,009	1,186	4,329	197	26	2,578	70	528	-	302	1,475	276	1,418	305	457	588	1,237	831	-	1,133	1,478
13	69	187	2,191	98	60	1,152	207	522	289	340	1,586	137	713	598	589	1,748	3,650	4,135	2,455	1,108	5,940	1,246	41	4,876	492	938	-	455	1,246	379	2,358	1,071	802	1,419	2,160	855	-	1,199	1,474
15	54	474	894	22	31	1,699	519	831	292	550	2,561	566	1,529	214	788	2,802	1,641	2,124	3,740	1,153	3,909	2,538	37	4,570	931	692	-	620	1,606	485	3,602	2,305	1,785	2,110	1,556	391	-	2,051	3,394
17	17	1,196	107	3	17	750	629	949	120	503	2,538	957	2,084	356	1,160	2,889	1,821	764	1,875	590	1,168	2,739	36	2,084	594	212	-	665	1,017	239	1,586	3,109	607	1,057	702	153	-	1,632	3,689
19	5	379	50	2	3	162	312	741	35	235	665	748	1,165	651	497	2,007	1,169	366	851	132	471	1,798	27	991	253	43	-	225	332	125	396	1,780	215	281	415	59	-	938	2,459
21	2	92	2	4	0	1	57	347	22	63	146	141	187	417	104	1,147	565	250	345	29	235	413	9	645	129	2	-	82	140	78	273	793	124	121	292	11	-	362	1,466
23	1	14	10	1	0	1	6	267	9	6	71	11	8	106	50	357	100	84	94	0	74	89	1	352	15	1	-	8	50	24	101	374	1	10	123	0	-	65	493
25	1	13	1	0	0	1	0	65	2	0	0	3	0	5	0	234	22	5	13	0	31	26	0	173	6	0	-	1	8	2	14	53	1	0	23	2	-	34	64
27	0	14	0	0	0	0	0	0	2	0	0	0	0	0	0	38	0	2	13	0	0	1	0	70	0	1	-	0	1	0	3	1	7	3	3	15	-	6	0
29	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	11	0	0	0	0	1	0	0	-	9	0	1	0	0	22	18	4	51	-	25	0
31	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	1	0	0	3	0	0	7	-	10	6	5	1	14	47	37	28	111	-	67	4
33	0	0	0	0	0	0	0	0	2	0	0	3	3	0	1	0	3	0	0	1	2	0	2	0	0	12	-	16	7	3	1	20	44	29	33	92	-	106	12
35	2	1	0	0	0	0	0	1	1	1	0	6	12	8	3	1	12	0	1	0	4	0	4	0	0	14	-	21	18	22	0	16	45	12	21	33	-	83	17
37	5	0	2	1	0	0	1	0	2	0	0	13	19	18	10	0	9	3	1	0	1	2	6	0	0	9	-	9	18	11	1	15	22	10	11	9	-	39	19
39	3	0	2	0	0	0	1	2	8	2	2	16	21	31	10	3	13	7	3	1	4	4	1	2	2	6	-	8	7	24	2	16	9	10	7	9	-	16	19
41	4	2	4	1	0	0	2	1	1	3	5	23	41	37	13	5	9	18	3	0	6	6	2	3	1	1	-	2	7	13	3	6	6	8	2	3	-	2	7
43	5	1	4	4	0	0	0	9	0	8	4	38	18	43	11	14	6	24	3	0	1	6	4	3	1	0	-	1	5	12	0	2	5	11	0	5	-	2	6
45	7	4	0	3	1	0	1	9	0	8	1	27	11	28	10	15	1	22	1	0	6	2	1	1	1	0	-	4	12	6	1	1	6	6	3	5	-	6	3
47	3	6	0	5	1	0	0	20	0	3	2	9	6	15	8	8	0	34	1	1	3	3	1	0	1	0	-	6	6	4	0	0	4	4	1	8	-	12	10
49	0	1	1	0	0	0	1	22	0	1	4	5	1	10	2	9	1	8	0	0	0	3	0	1	0	1	-	10	10	4	0	0	5	7	1	8	-	20	7
51	4	1	1	1	0	0	0	26	1	0	0	4	3	2	1	5	0	5	4	0	0	0	1	0	0	0	-	11	8	3	0	0	3	8	1	4	-	24	8
53	1	0	0	0	1	0	0	19	2	2	0	0	0	2	1	0	0	2	0	0	0	0	0	0	0	1	-	6	7	2	0	1	5	3	0	0	-	15	6
55	0	1	1	0	0	0	1	4	1	0	0	0	0	4	2	3	0	2	1	0	0	0	2	0	0	0	-	2	4	1	0	0	1	0	1	2	-	9	3
57	1	2	0	0	2	0	0	0	3	0	0	0	0	2	2	4	2	0	1	0	0	0	1	0	0	0	-	2	1	1	0	0	0	0	0	0	-	6	1
59	1	1	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	-	0	2	5	0	0	0	1	1	0	-	4	0
61	0	1	0	0	0	0	0	1	3	0	0	0	0	0	0	0	2	0	3	0	0	0	1	0	0	0	-	0	0	2	0	0	0	0	0	0	-	2	2
63	0	0	0	0	0	0	0	0	3	0	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	0	-	0	0	1	0	0	0	0	0	0	-	0	1
65	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	5	0	0	0	0	0	0	0	1	0	-	0	0	0	0	0	0	1	0	0	-	0	0
67	0	2	1	0	0	0	1	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
69	1	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
71	4	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
73	7	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
75	10	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
77	5	5	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
79	2	2	4	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
81	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
83	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
85	1	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
87	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
91	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**259**	**2,650**	**5,413**	**246**	**234**	**4,628**	**1,911**	**4,270**	**1,299**	**2,047**	**8,141**	**2,850**	**6,332**	**3,823**	**3,404**	**12,331**	**23,561**	**12,683**	**10,686**	**5,592**	**17,478**	**9,092**	**216**	**17,355**	**2,524**	**2,594**	**-**	**2,567**	**6,599**	**1,878**	**10,455**	**10,070**	**4,429**	**5,813**	**7,538**	**3,648**	**-**	**8,421**	**15,024**

Table 5.61. Windowpane flounder length frequencies, spring, 1 cm intervals, 1989, 1990, 1994-2022.

Prior to 2014, lengths were recorded from the first three tows of each day; since 2014, lengths have been recorded from every tow.

	Spring																														
length	**1989**	**1990**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
4	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	-	0	0
5	4	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	2	0	0	2	3	1	0	2	0	-	0	0
6	0	0	0	0	0	2	0	2	5	1	1	10	2	0	0	1	0	4	4	9	0	0	10	2	8	1	8	6	-	0	0
7	0	0	0	0	1	4	2	4	17	2	7	22	3	0	0	7	3	8	9	9	5	0	7	0	26	5	10	11	-	0	3
8	0	2	4	1	3	5	4	3	27	7	6	23	6	0	0	31	5	17	10	20	19	10	41	2	47	26	15	21	-	3	7
9	0	40	16	3	2	9	5	2	11	10	21	20	11	0	0	18	6	10	13	24	16	4	31	1	133	34	31	32	-	9	10
10	25	66	67	12	34	15	7	8	17	13	12	11	19	7	2	4	11	23	8	10	10	16	24	3	168	56	24	28	-	15	14
11	69	96	169	86	79	37	19	20	5	29	8	3	24	12	1	4	11	8	7	11	10	20	8	3	105	42	24	19	-	23	9
12	89	74	305	148	162	76	60	40	3	23	10	7	25	16	7	8	17	4	20	2	0	16	10	3	77	16	6	13	-	18	1
13	337	53	362	259	288	136	131	37	10	29	5	9	58	25	12	22	13	6	72	9	3	8	15	9	35	11	5	3	-	12	1
14	430	66	232	189	381	309	200	45	11	26	8	13	100	22	34	28	44	17	93	7	7	10	18	4	17	8	10	1	-	9	0
15	414	124	152	180	487	362	211	96	24	43	15	13	101	23	42	60	51	37	107	15	32	19	15	11	9	0	5	3	-	4	1
16	305	180	126	89	310	606	177	123	27	55	12	15	72	37	36	107	119	62	117	19	64	16	21	25	2	1	9	4	-	5	0
17	174	212	209	70	331	754	130	165	23	73	9	15	65	22	48	129	137	97	166	23	81	17	26	36	4	0	5	9	-	7	0
18	78	178	372	99	339	588	165	160	32	94	24	23	56	4	45	132	116	90	104	58	133	20	37	32	4	4	12	20	-	6	4
19	65	132	357	139	548	440	260	194	26	78	19	26	45	16	20	110	101	75	124	58	155	30	37	46	7	9	19	39	-	4	3
20	174	144	289	143	604	366	362	386	75	89	15	31	60	13	24	130	76	51	76	47	135	40	71	27	16	8	23	77	-	14	8
21	216	116	217	85	567	429	461	357	136	95	22	45	32	22	24	186	122	50	88	66	97	62	75	26	16	10	59	82	-	18	5
22	299	143	139	82	401	438	311	301	166	232	45	50	42	29	27	246	155	63	172	75	97	121	102	49	30	23	70	96	-	35	12
23	319	108	163	57	409	368	229	217	138	290	110	92	39	42	28	181	216	92	198	107	117	140	170	57	49	33	85	112	-	46	13
24	270	103	147	54	280	323	227	217	125	245	141	123	66	36	41	158	132	84	199	122	128	166	229	95	79	31	80	143	-	82	18
25	177	87	183	54	236	231	188	206	121	208	133	111	109	47	31	162	118	82	155	134	121	142	228	96	83	52	79	126	-	59	42
26	189	103	184	70	235	191	178	136	106	126	114	76	100	52	52	186	103	67	161	120	118	138	175	108	87	59	75	97	-	74	31
27	138	79	138	56	187	222	162	161	91	88	69	88	86	49	37	104	100	60	148	103	102	86	145	89	68	41	54	85	-	44	13
28	148	38	70	44	117	145	138	97	56	83	62	68	71	29	38	100	111	45	103	69	100	55	111	50	36	24	41	60	-	37	18
29	78	26	68	24	97	98	67	53	47	59	41	37	48	24	24	65	52	30	146	42	70	41	56	42	14	25	31	38	-	30	11
30	99	35	42	27	66	75	58	42	37	39	42	35	51	20	14	33	46	24	51	24	45	27	27	21	10	9	11	23	-	7	6
31	50	20	25	12	31	23	34	39	12	25	19	22	32	13	8	14	22	11	67	25	33	12	21	13	5	9	8	15	-	3	1
32	8	15	13	4	25	12	13	26	16	21	17	9	16	5	2	23	19	6	21	7	7	6	11	4	2	2	3	6	-	6	4
33	16	3	2	9	5	8	6	3	8	15	7	2	10	1	3	2	5	1	33	14	13	8	5	3	2	2	3	1	-	3	1
34	0	5	5	0	4	1	1	1	2	5	4	4	9	3	0	4	5	2	20	11	11	4	9	0	4	0	1	1	-	1	0
35	0	4	5	1	3	0	3	4	5	10	2	4	5	0	0	3	3	3	11	1	4	2	5	3	1	1	1	1	-	0	0
36	0	4	2	2	1	1	0	0	1	2	0	5	0	2	0	0	1	0	0	0	1	0	1	0	0	0	0	0	-	0	0
37	0	0	0	1	0	0	3	1	1	2	2	1	1	0	0	0	0	0	8	0	0	0	0	0	0	0	0	1	-	0	0
38	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
39	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	-	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
42	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**4,171**	**2,256**	**4,064**	**2,001**	**6,234**	**6,274**	**3,812**	**3,147**	**1,381**	**2,118**	**1,002**	**1,015**	**1,365**	**571**	**600**	**2,258**	**1,920**	**1,129**	**2,511**	**1,244**	**1,734**	**1,236**	**1,744**	**863**	**1,146**	**542**	**810**	**1,173**	-	**574**	**236**

Table 5.62. Windowpane flounder length frequencies, fall, 1 cm intervals, 1989, 1990, 1994-2022.

Prior to 2014, lengths were recorded from the first three tows of each day; since 2014, lengths have been recorded from every tow.

	Fall																														
length	**1989**	**1990**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
6	1	0	1	0	0	0	0	0	3	1	0	0	3	0	0	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	0
7	5	0	5	0	6	0	1	0	0	0	0	2	0	0	0	0	0	4	-	1	0	0	0	0	0	0	0	0	-	0	0
8	8	3	18	5	24	15	1	0	6	9	0	5	11	14	5	4	0	15	-	4	2	2	1	0	0	0	0	0	-	0	0
9	25	2	28	6	70	17	2	2	2	2	0	21	15	49	2	6	2	15	-	2	3	1	4	3	0	0	0	0	-	0	0
10	18	11	78	10	165	50	2	4	3	9	1	20	22	67	1	14	5	17	-	9	6	7	9	1	0	0	2	0	-	3	1
11	15	9	60	22	227	75	31	11	7	14	0	13	27	111	5	18	3	24	-	19	1	7	13	1	2	0	2	0	-	2	1
12	16	12	50	15	270	107	33	6	9	9	1	6	16	155	2	26	15	29	-	31	5	6	7	0	1	0	0	3	-	2	3
13	23	6	30	10	285	173	47	3	11	9	6	0	14	145	8	44	43	19	-	19	10	10	14	0	5	0	4	1	-	2	1
14	33	14	11	13	306	154	48	5	23	6	0	4	8	109	3	36	58	27	-	36	14	10	14	4	9	3	5	1	-	4	5
15	58	23	23	9	250	110	39	6	18	3	5	8	3	62	2	37	38	25	-	43	18	11	10	12	15	3	19	7	-	3	4
16	140	38	15	16	181	60	34	3	11	3	5	9	3	33	0	30	28	31	-	41	19	13	24	8	24	5	24	7	-	4	6
17	188	44	35	26	112	78	33	11	30	7	14	4	9	12	7	21	20	35	-	72	37	13	19	11	66	16	45	11	-	5	6
18	91	53	47	48	101	119	54	11	15	12	8	11	2	8	19	19	16	47	-	70	19	19	28	16	63	34	57	27	-	9	16
19	46	46	49	47	145	179	95	44	29	6	10	7	11	20	32	26	10	45	-	52	44	31	12	19	86	48	39	28	-	4	28
20	49	28	39	48	131	213	96	67	30	13	9	6	18	30	39	39	31	24	-	41	50	29	18	18	62	93	29	36	-	9	30
21	21	11	23	24	125	165	69	38	52	18	9	11	35	50	25	36	40	28	-	35	87	23	27	21	20	86	23	21	-	16	44
22	14	14	16	19	65	123	37	18	28	22	21	2	25	48	25	42	25	26	-	51	58	28	34	23	8	51	20	12	-	9	31
23	3	10	20	6	67	63	32	12	37	30	39	6	10	14	12	32	27	20	-	47	79	30	43	29	13	24	34	12	-	18	22
24	9	4	7	9	25	49	13	11	33	19	39	11	15	13	9	19	32	23	-	40	45	15	55	24	9	8	43	16	-	21	15
25	4	3	6	3	22	28	9	6	18	19	25	14	8	10	10	6	9	9	-	16	24	29	50	28	14	13	43	20	-	26	23
26	2	0	8	3	19	29	9	4	16	9	10	18	4	3	4	8	16	6	-	18	22	17	29	25	15	15	29	15	-	17	25
27	6	2	3	1	11	17	8	3	5	11	12	17	4	5	3	4	5	4	-	7	14	16	21	24	21	8	19	12	-	28	24
28	2	1	4	1	3	12	1	1	4	5	6	9	2	3	3	3	2	7	-	9	1	13	7	5	5	12	8	11	-	15	14
29	2	2	0	1	2	17	0	1	6	3	1	4	2	3	1	3	2	1	-	2	0	2	4	9	5	5	4	7	-	20	9
30	2	1	2	1	0	5	0	0	1	2	2	2	0	1	1	0	0	0	-	3	1	2	2	2	2	6	3	1	-	12	7
31	0	0	0	0	0	0	0	0	0	1	0	3	1	2	0	0	2	1	-	0	0	1	1	3	0	0	1	2	-	5	8
32	1	0	0	1	0	0	0	0	0	0	0	2	0	1	0	0	0	1	-	0	1	0	0	0	0	0	1	1	-	1	0
33	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	1	-	1	2
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Total	**782**	**337**	**578**	**344**	**2,613**	**1,858**	**694**	**267**	**397**	**242**	**223**	**215**	**268**	**968**	**218**	**473**	**429**	**484**	-	**668**	**560**	**335**	**446**	**286**	**445**	**430**	**454**	**252**	-	**236**	**326**

Table 5.63. Winter flounder length frequencies, April-May, 1 cm intervals, 1984-2022.
Winter flounder were measured from every tow.

	April-May																																				
length	**1984**	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
6	0	0	0	0	0	0	0	0	0	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
7	0	0	0	0	0	0	0	0	0	36	4	2	3	0	0	1	0	2	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
8	0	0	5	8	3	1	10	3	1	72	26	28	4	2	5	7	2	5	0	1	5	5	0	1	6	2	1	1	0	0	1	0	1	0	0	-	0	0
9	1	7	6	52	16	17	38	29	7	208	41	97	21	15	41	18	3	20	4	2	22	32	0	2	19	13	7	6	7	0	6	4	4	0	0	1	-	0	0
10	3	9	35	49	29	70	139	54	18	433	137	307	61	75	128	50	23	55	5	11	36	73	5	10	85	42	35	21	22	3	12	6	7	0	6	3	-	2	0
11	26	28	188	114	135	312	375	121	75	698	442	618	246	260	283	135	84	161	34	28	129	164	6	37	238	147	117	67	72	12	20	28	22	0	15	15	-	1	5
12	35	127	455	239	359	628	1,117	228	136	921	835	877	461	528	492	252	145	256	88	57	174	278	55	73	367	229	179	113	139	20	46	37	28	0	34	22	-	8	12
13	149	284	617	483	869	954	2,563	342	170	713	1,006	772	582	497	554	252	169	239	148	50	188	337	48	91	322	220	174	110	162	12	33	42	51	0	25	17	-	9	18
14	196	219	733	820	1,378	1,260	3,243	729	180	528	1,149	854	788	517	488	225	185	223	132	54	132	209	39	80	233	169	152	107	128	16	20	42	48	2	14	14	-	11	16
15	255	308	808	1,060	1,882	1,424	3,847	1,127	254	526	1,487	792	956	484	481	204	177	162	148	50	81	163	19	80	142	119	146	68	101	25	24	27	39	2	8	10	-	9	12
16	177	467	771	1,033	1,819	1,579	3,627	1,169	323	485	1,680	766	992	553	574	214	210	159	174	66	53	128	16	163	136	155	109	53	67	39	12	10	29	1	2	10	-	12	4
17	182	473	763	1,028	1,953	1,651	3,544	1,568	373	501	1,540	698	1,099	599	713	290	254	245	160	76	41	122	40	180	74	147	112	53	60	52	17	19	21	0	3	9	-	8	8
18	153	574	730	1,006	1,507	1,724	3,145	1,648	398	580	1,467	692	1,149	666	658	313	248	251	206	86	65	108	52	203	85	237	138	73	65	99	13	30	20	0	5	6	-	2	4
19	117	794	780	855	1,596	1,532	3,054	1,690	397	542	1,217	632	1,032	574	622	283	327	313	317	142	72	117	41	242	94	214	130	73	58	99	11	26	28	2	8	20	-	12	6
20	169	607	665	666	1,136	1,462	2,434	1,676	344	624	896	515	1,012	529	685	296	311	362	364	174	59	148	65	246	51	232	160	101	110	108	12	22	16	2	9	12	-	4	3
21	108	591	600	592	1,045	1,358	1,904	1,493	277	626	742	469	821	429	592	320	314	308	353	127	79	125	54	194	59	166	109	122	122	77	8	18	22	2	4	14	-	6	2
22	104	486	534	552	963	1,407	1,481	1,332	302	549	556	367	795	444	524	218	289	306	353	87	53	69	45	156	56	129	108	118	133	66	24	15	22	1	6	14	-	10	7
23	63	479	521	442	897	1,160	1,416	1,099	212	426	359	346	676	402	486	290	266	233	337	84	48	71	28	135	67	100	72	84	141	41	21	13	15	0	8	9	-	13	10
24	81	346	427	377	748	971	1,092	1,113	278	418	310	311	701	401	544	260	218	205	395	79	47	51	22	128	55	48	89	109	82	34	28	14	27	3	9	9	-	6	3
25	74	318	341	374	520	1,015	1,018	939	202	349	296	318	692	377	529	344	228	244	311	97	46	49	28	137	60	44	92	105	69	35	40	13	25	3	12	11	-	7	10
26	90	187	375	333	541	982	846	858	242	383	219	231	719	461	527	304	223	249	285	129	61	36	13	144	62	42	58	95	58	35	35	10	25	1	6	11	-	4	7
27	62	232	240	281	420	736	639	788	181	320	216	318	568	496	505	360	251	259	259	150	84	36	23	168	81	39	67	102	82	50	58	7	20	1	12	14	-	5	9
28	43	129	244	230	366	648	586	598	181	197	173	260	549	416	518	418	252	311	187	170	92	25	29	168	84	35	75	72	52	51	66	14	34	3	7	6	-	8	22
29	29	86	189	220	253	502	525	511	160	221	122	244	460	401	466	389	285	326	248	200	103	32	17	200	73	28	77	81	70	78	66	22	38	4	15	12	-	3	16
30	42	70	178	154	266	339	305	397	133	178	103	180	540	365	448	362	279	299	215	206	96	35	20	186	86	28	52	72	58	47	71	22	34	2	18	11	-	7	15
31	24	71	124	151	120	247	307	241	96	200	117	130	367	313	323	321	300	286	201	166	112	33	27	136	93	32	55	58	56	59	81	38	17	4	18	9	-	12	14
32	20	85	77	113	169	163	171	157	98	142	91	76	375	260	277	249	227	228	171	167	95	38	28	133	87	42	45	65	47	61	60	48	33	3	16	19	-	5	6
33	7	69	86	61	111	73	218	108	60	139	72	63	267	193	195	228	262	172	155	138	122	45	20	87	90	36	34	79	63	75	69	50	43	0	19	12	-	3	7
34	7	45	56	85	69	47	113	107	38	159	65	42	190	166	140	191	220	189	109	116	94	48	20	74	99	43	37	51	51	80	59	69	43	0	18	10	-	3	8
35	12	19	42	47	54	68	70	65	35	112	52	30	119	136	136	159	195	189	107	115	88	31	20	50	80	45	28	50	42	76	48	58	53	2	21	10	-	5	7
36	4	11	39	53	33	65	44	30	26	79	49	33	84	89	79	103	150	143	94	73	91	34	18	53	61	44	28	26	37	66	42	38	27	0	13	9	-	1	6
37	4	8	15	20	25	20	24	25	26	36	25	12	50	68	32	90	120	133	60	53	93	27	15	24	36	20	25	27	27	61	41	31	20	2	6	4	-	2	2
38	0	15	17	19	15	18	48	7	4	10	21	16	28	37	37	35	80	77	59	79	46	25	4	17	18	17	16	23	18	43	32	19	7	0	10	7	-	2	3
39	0	4	18	11	22	3	18	13	0	17	15	14	12	18	13	18	54	70	24	44	56	25	6	9	6	9	14	16	18	27	28	9	9	0	3	0	-	1	3
40	0	0	18	8	9	8	12	9	3	3	16	7	13	10	5	20	16	35	32	38	34	11	3	2	7	5	19	16	7	29	22	12	8	0	2	4	-	0	2
41	0	0	1	2	6	7	3	1	0	5	6	3	1	6	3	14	20	26	11	17	18	7	5	9	5	4	9	7	2	21	15	1	9	0	4	1	-	0	1
42	0	1	3	0	8	3	8	5	0	2	6	3	6	2	2	4	7	10	9	7	9	9	1	9	2	2	4	6	2	6	4	5	1	0	3	3	-	0	1
43	0	0	2	3	3	0	1	1	0	2	1	0	2	1	0	3	11	3	4	13	1	3	0	3	3	2	1	2	3	7	2	3	1	0	3	3	-	1	1
44	0	1	4	0	2	1	1	1	1	0	0	1	3	0	1	3	4	1	1	3	7	2	0	1	1	0	0	1	1	6	4	2	2	0	2	2	-	1	0
45	0	1	0	1	1	0	8	1	0	0	0	0	0	0	0	1	2	0	3	4	2	2	1	2	2	0	2	2	1	1	1	0	0	0	0	1	-	0	0
46	0	1	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	0	0	0	3	2	0	2	1	0	0	0	1	0	0	2	0	0	0	0	-	0	0
47	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	-	0	0
48	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	-	0	0
49	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
50	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
51	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
53	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	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**	**2,887**	**2,576**	**2,235**	**2,234**	**1,617**	**1,152**	**826**	**850**	**40**	**364**	**345**	**-**	**183**	**250**

Table 5.64. Winter flounder length frequencies, fall, 1 cm intervals, 1984-2022.

Winter flounder were measured from every tow.

	Fall																																						
length	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
5	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
6	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
7	0	0	0	0	1	0	1	1	3	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
8	0	0	0	1	7	0	0	1	5	43	0	1	2	0	0	0	0	0	0	0	2	2	0	0	0	0	-	0	0	0	0	0	1	0	0	0	-	0	0
9	0	0	0	0	3	4	0	1	8	83	3	0	3	4	2	0	0	0	0	0	0	1	0	0	0	3	-	0	0	0	0	0	0	0	0	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	0	-	1	0	0	0	0	0	0	0	0	-	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	1	-	0	2	0	0	0	0	0	0	0	-	0	0
12	9	16	16	8	34	38	6	34	18	159	63	28	54	23	20	3	5	13	0	1	21	4	1	3	2	11	-	2	4	0	1	3	0	0	0	0	-	0	0
13	18	37	43	47	97	127	34	72	72	331	149	67	157	77	68	44	20	62	6	1	41	28	6	9	10	21	-	5	14	0	3	8	0	0	0	0	-	1	0
14	25	57	82	54	243	343	130	139	85	409	230	87	218	113	137	128	53	123	24	5	65	77	8	10	23	36	-	7	38	1	3	12	6	0	0	0	-	2	1
15	31	63	116	67	295	367	260	144	149	435	219	96	255	165	190	194	111	122	37	10	61	98	17	9	45	51	-	19	59	3	7	12	11	0	2	1	-	3	3
16	60	55	104	72	302	293	345	91	182	377	187	77	225	176	192	243	156	116	40	9	48	99	23	9	60	48	-	28	62	3	12	21	5	1	0	4	-	3	3
17	65	49	118	53	207	315	327	110	140	247	146	61	173	175	160	268	170	80	43	11	37	66	11	6	43	50	-	22	61	5	9	10	1	0	0	1	-	4	1
18	89	53	86	72	167	213	319	99	111	151	142	64	132	116	87	225	169	66	33	10	19	52	5	10	49	35	-	25	50	6	12	9	5	1	0	3	-	1	2
19	111	41	50	79	212	199	326	108	99	85	141	41	119	126	60	158	148	32	31	8	21	33	5	7	25	31	-	18	26	4	10	9	7	0	1	0	-	2	0
20	97	36	45	83	184	146	310	95	97	68	124	32	136	78	46	108	107	28	35	9	7	24	7	16	17	14	-	11	25	3	8	4	4	1	0	0	-	2	7
21	100	37	27	53	184	121	245	96	84	51	111	23	96	65	25	86	89	25	23	10	8	14	4	19	6	10	-	11	16	0	8	9	4	0	1	0	-	3	0
22	67	33	22	54	138	105	176	79	68	39	56	19	97	38	28	52	62	20	38	10	4	9	7	15	6	4	-	5	15	3	3	10	6	1	0	1	-	2	1
23	63	22	17	44	104	107	146	73	42	39	38	13	65	55	24	29	41	16	28	17	2	6	3	17	4	5	-	7	22	2	2	3	1	0	2	1	-	2	0
24	38	17	13	25	77	68	91	40	37	38	24	10	58	32	15	27	47	33	31	15	1	1	3	18	4	2	-	4	20	4	4	10	6	0	0	0	-	0	0
25	34	14	9	21	40	85	53	48	28	29	26	5	47	23	14	29	35	24	28	10	0	7	2	9	9	6	-	4	30	2	5	5	3	1	0	1	-	1	0
26	36	10	7	14	32	39	49	20	17	30	28	2	25	26	11	19	30	31	27	18	5	6	2	12	10	0	-	2	20	5	2	2	1	1	1	0	-	1	2
27	16	10	1	5	32	43	38	13	8	22	13	3	27	20	13	17	21	15	20	21	3	5	0	8	9	3	-	7	20	3	9	2	5	1	1	0	-	2	0
28	34	6	2	11	12	33	16	17	13	10	8	3	14	14	8	13	25	20	9	11	4	5	0	4	6	0	-	6	16	2	3	1	4	2	0	0	-	4	0
29	13	3	1	5	9	30	12	7	7	12	10	1	17	7	7	17	15	22	10	10	6	1	0	4	7	3	-	5	7	3	4	4	2	1	1	0	-	2	1
30	14	6	2	3	13	10	14	5	7	7	7	0	10	7	3	8	13	17	8	10	2	1	1	9	13	1	-	3	5	4	5	3	5	1	1	0	-	0	0
31	8	1	2	2	4	12	1	8	3	8	8	2	13	5	11	7	8	4	4	16	2	1	0	7	8	1	-	2	7	1	2	5	5	1	1	0	-	0	0
32	6	0	1	2	6	4	3	2	1	4	3	1	4	2	4	5	6	4	6	11	3	1	0	6	3	4	-	2	7	3	1	3	0	0	0	0	-	1	1
33	5	1	2	0	1	1	4	6	0	3	2	1	3	4	5	9	9	6	10	12	2	1	1	0	4	1	-	2	4	1	2	5	2	0	1	0	-	0	0
34	1	2	0	0	0	1	0	1	1	2	2	0	3	3	5	1	10	2	7	10	3	0	0	0	5	2	-	3	4	1	1	1	1	0	1	0	-	1	0
35	4	0	0	4	0	3	1	0	0	0	1	1	1	1	3	4	6	3	4	4	3	1	0	2	3	0	-	1	5	1	2	2	2	0	1	0	-	0	0
36	1	0	1	0	0	0	1	0	0	0	1	0	2	0	0	2	4	3	4	4	2	1	0	2	3	2	-	4	0	1	2	0	2	1	1	0	-	0	0
37	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	0	1	1	3	1	2	2	0	1	3	2	-	2	2	0	2	3	5	0	1	1	-	1	1
38	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	2	1	5	4	2	2	0	0	4	2	-	1	4	0	1	8	3	0	0	0	-	1	0
39	2	0	0	0	0	0	0	0	0	3	0	0	0	1	0	1	1	3	5	0	2	2	0	0	2	0	-	0	1	0	1	1	0	0	0	0	-	2	1
40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	3	2	2	0	1	3	2	-	0	0	0	0	1	0	0	0	0	-	1	0
41	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	3	3	0	0	2	0	0	0	0	-	1	1	0	2	1	0	0	0	0	-	0	1
42	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	-	0	0	0	1	0	0	0	0	0	-	0	1
43	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	-	0	0	0	0	3	0	0	0	1	-	0	0
44	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0	1	0	0	0	1	0	-	0	0
45	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	-	0	0	0	0	0	0	0	0	0	-	0	0
46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	-	1	0	0	0	0	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**	**351**	-	**211**	**547**	**61**	**128**	**170**	**97**	**13**	**17**	**14**	-	**42**	**26**

Table 5.65. Winter skate length frequencies, spring and fall, 2 cm intervals (midpoint given), 1995-2022.
Winter skate were scheduled to be measured from every tow. However, the following numbers of skate were not measured: 4 in 1995, 10 in 1996, and 2 in 1997.

Spring

length	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
27	0	0	0	0	0	1	0	0	0	0	0	0	0	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	0	0	0	0	0	-	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0
33	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	-	0	1
35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	0	0	0	1	2	-	1	1
37	0	0	0	0	0	0	1	0	0	3	0	0	1	1	1	1	1	7	7	2	0	0	1	0	0	-	3	0
39	0	0	0	0	0	0	0	1	2	2	0	0	1	0	1	0	1	5	3	3	2	1	2	0	5	-	6	1
41	0	0	0	0	0	0	0	1	1	2	0	0	1	1	1	2	0	4	3	5	1	0	0	1	2	-	0	0
43	0	0	0	0	0	3	0	1	2	4	1	0	0	1	2	1	0	0	9	3	0	0	0	0	0	-	2	0
45	0	0	0	0	1	3	0	0	0	6	0	0	2	1	1	2	0	7	5	4	0	0	0	0	1	-	2	0
47	0	0	0	0	0	2	0	0	0	4	3	0	3	0	0	0	1	1	3	5	0	1	0	0	0	-	0	0
49	0	0	0	0	0	2	0	0	1	2	1	1	1	2	2	0	0	3	2	7	1	0	0	0	2	-	1	1
51	0	1	0	1	0	0	0	1	1	0	1	0	0	0	1	0	0	3	3	2	1	2	0	0	3	-	3	1
53	0	0	0	0	1	3	1	0	1	0	0	1	1	0	1	0	0	1	3	6	2	1	0	0	2	-	0	0
55	0	0	2	3	1	1	0	0	1	1	1	4	3	0	1	0	0	2	5	5	4	1	0	0	0	-	1	0
57	1	2	4	3	2	0	0	0	6	0	0	1	2	1	3	0	2	2	4	2	3	1	1	0	1	-	0	0
59	5	4	1	5	3	2	0	1	1	2	0	1	0	0	2	1	0	2	2	3	2	2	0	0	3	-	0	0
61	1	5	2	1	0	0	3	1	1	1	3	1	1	3	2	0	1	2	4	1	1	1	0	0	1	-	0	0
63	2	2	2	4	1	0	0	1	2	3	2	2	0	1	1	0	2	1	3	1	1	0	0	0	0	-	0	0
65	4	2	4	7	0	0	0	0	0	0	1	1	1	2	0	0	2	3	2	0	0	1	0	0	0	-	0	0
67	1	1	2	2	1	1	0	1	1	1	3	3	0	1	1	1	2	3	2	2	0	0	0	0	3	-	0	0
69	2	0	1	4	2	0	0	1	4	1	0	1	2	3	2	0	3	1	2	4	0	1	1	0	0	-	0	0
71	1	3	2	3	1	2	2	1	2	2	0	1	2	3	0	0	0	4	1	1	2	0	0	0	3	-	0	0
73	0	3	0	0	0	1	2	4	0	2	1	4	3	1	1	1	3	5	2	3	0	3	0	0	1	-	0	0
75	4	4	1	5	3	1	2	1	3	1	0	1	4	3	3	4	3	5	0	0	1	0	0	1	2	-	0	0
77	0	2	3	6	7	2	1	1	1	1	0	0	2	4	0	1	2	0	1	3	1	0	0	0	2	-	0	0
79	1	2	1	4	1	1	2	3	1	1	1	0	4	3	2	1	4	2	0	0	1	0	1	0	3	-	0	0
81	0	4	0	3	2	1	1	2	3	3	0	1	1	1	1	0	2	3	0	1	0	0	0	0	0	-	1	0
83	0	3	0	2	0	0	1	0	1	1	0	0	1	0	3	1	1	4	0	2	1	0	0	0	0	-	0	0
85	0	2	1	1	0	3	1	2	1	0	0	0	0	0	0	0	0	3	1	0	1	0	0	0	0	-	0	0
87	0	0	0	0	0	0	1	1	1	0	0	0	0	1	0	0	0	1	0	1	0	0	0	0	1	-	0	0
89	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	-	1	0
91	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
93	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
95	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0
Total	**22**	**40**	**27**	**55**	**26**	**29**	**18**	**26**	**37**	**45**	**18**	**23**	**37**	**35**	**32**	**16**	**30**	**77**	**72**	**67**	**25**	**15**	**6**	**3**	**39**	**-**	**21**	**5**

Fall

length	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	-	0	0	0	0	0	0	0	0	0	-	0	1
39	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	-	0	2	0	0	0	0	0	0	0	-	0	0
41	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	-	0	1	0	0	0	0	1	0	0	-	0	0
43	0	0	2	0	0	0	0	2	0	0	0	0	0	1	0	-	2	1	1	0	1	0	0	0	0	-	1	0
45	2	0	1	0	0	0	0	1	0	0	0	0	0	0	0	-	0	4	3	2	1	0	1	0	1	-	0	0
47	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	-	0	1	0	1	0	0	1	0	0	-	1	0
49	1	5	1	0	0	0	0	0	0	0	1	0	0	0	0	-	0	1	4	1	0	0	0	0	0	-	0	0
51	0	0	1	0	2	0	2	0	0	0	0	0	0	1	0	-	0	2	1	0	0	0	0	0	0	-	0	0
53	2	0	2	1	0	0	1	1	0	0	1	0	0	0	0	-	0	2	0	1	0	0	0	0	0	-	0	0
55	1	2	1	0	1	0	4	0	0	0	0	0	0	1	0	-	0	0	1	2	0	1	0	0	0	-	0	0
57	2	6	2	0	0	0	0	3	0	0	2	0	0	1	1	-	3	0	0	0	0	0	1	0	0	-	0	0
59	2	2	2	1	0	0	1	1	0	0	0	0	0	0	1	-	0	1	0	0	1	1	0	0	0	-	0	0
61	0	5	0	0	0	0	3	0	0	0	0	0	1	0	0	-	0	0	1	1	1	0	1	0	0	-	0	0
63	1	4	1	0	0	0	1	0	0	0	2	0	0	0	0	-	0	0	1	1	0	0	0	0	0	-	0	0
65	2	3	0	1	1	0	0	1	0	3	0	0	0	1	1	-	1	0	0	0	0	0	1	0	0	-	0	1
67	1	2	2	1	0	0	2	0	0	0	3	0	1	1	1	-	0	0	1	2	1	0	1	0	0	-	0	0
69	0	2	1	1	0	0	0	1	0	0	0	0	1	1	1	-	0	1	3	0	0	0	2	0	0	-	0	0
71	0	0	0	0	0	0	0	1	0	2	0	0	2	1	1	-	0	0	1	2	0	0	2	0	0	-	0	0
73	0	2	1	1	1	0	0	2	0	1	1	0	0	0	0	-	1	1	0	1	0	0	0	0	0	-	0	0
75	1	3	1	0	1	0	1	1	0	1	1	0	1	1	1	-	0	1	0	0	0	0	2	0	0	-	0	0
77	0	1	0	0	0	0	1	2	0	1	0	0	0	2	0	-	0	0	0	0	0	0	0	0	0	-	0	0
79	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	-	0	0	0	0	0	0	0	0	0	-	0	0
81	0	0	0	1	0	0	1	1	0	0	1	0	1	1	1	-	0	1	0	0	0	0	0	0	0	-	0	0
83	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	-	0	1	0	0	0	0	0	0	0	-	0	0
85	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
87	0	0	0	0	0	0	2	0	0	0	0	0	0	1	0	-	0	0	0	0	0	0	0	0	0	-	0	0
Total	**15**	**37**	**19**	**7**	**7**	**1**	**20**	**19**	**0**	**9**	**13**	**0**	**7**	**16**	**11**	**-**	**7**	**20**	**17**	**14**	**5**	**2**	**13**	**0**	**1**	**-**	**2**	**2**

FIGURES 5.1 - 5.18
LISTS

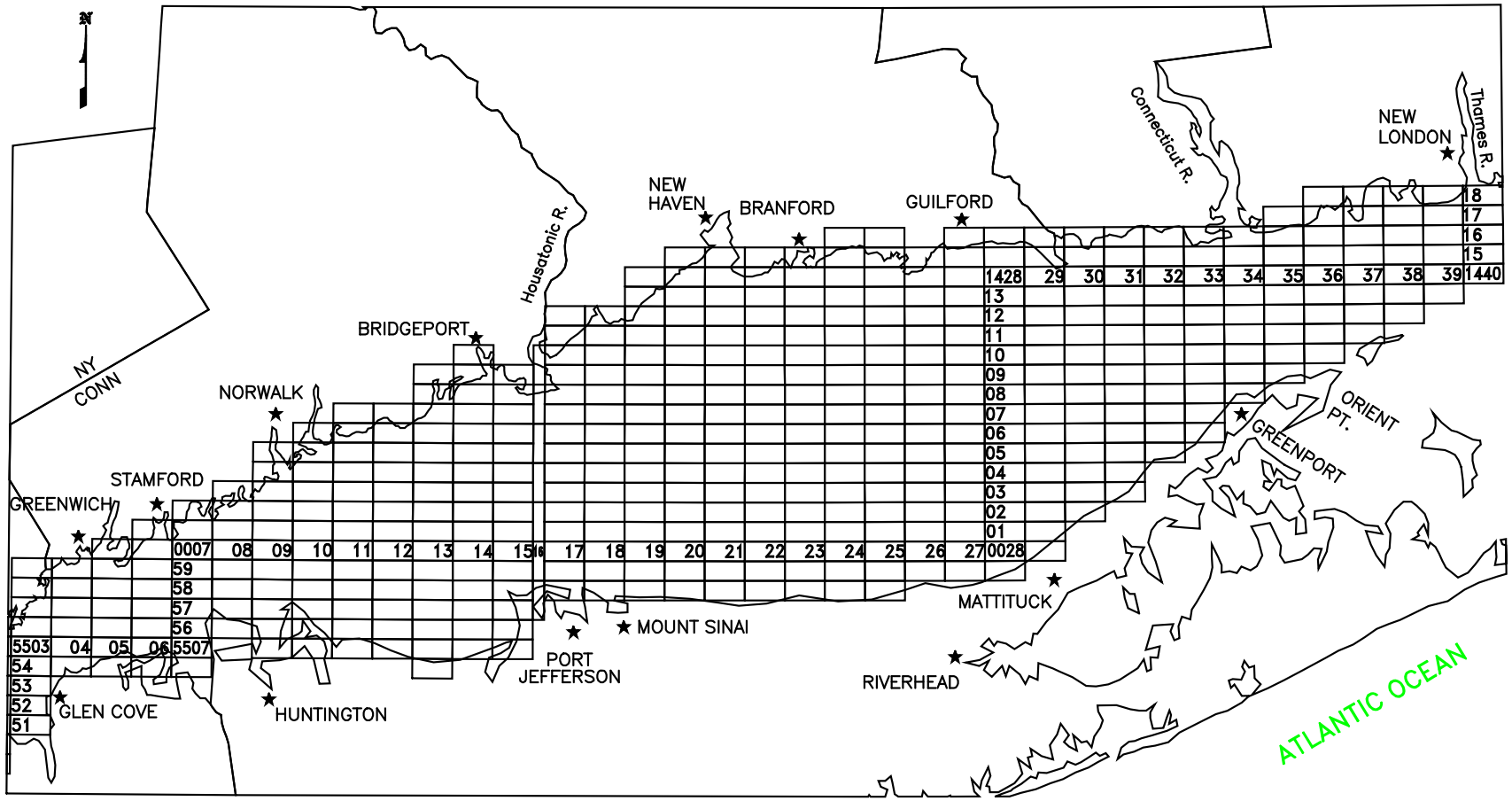
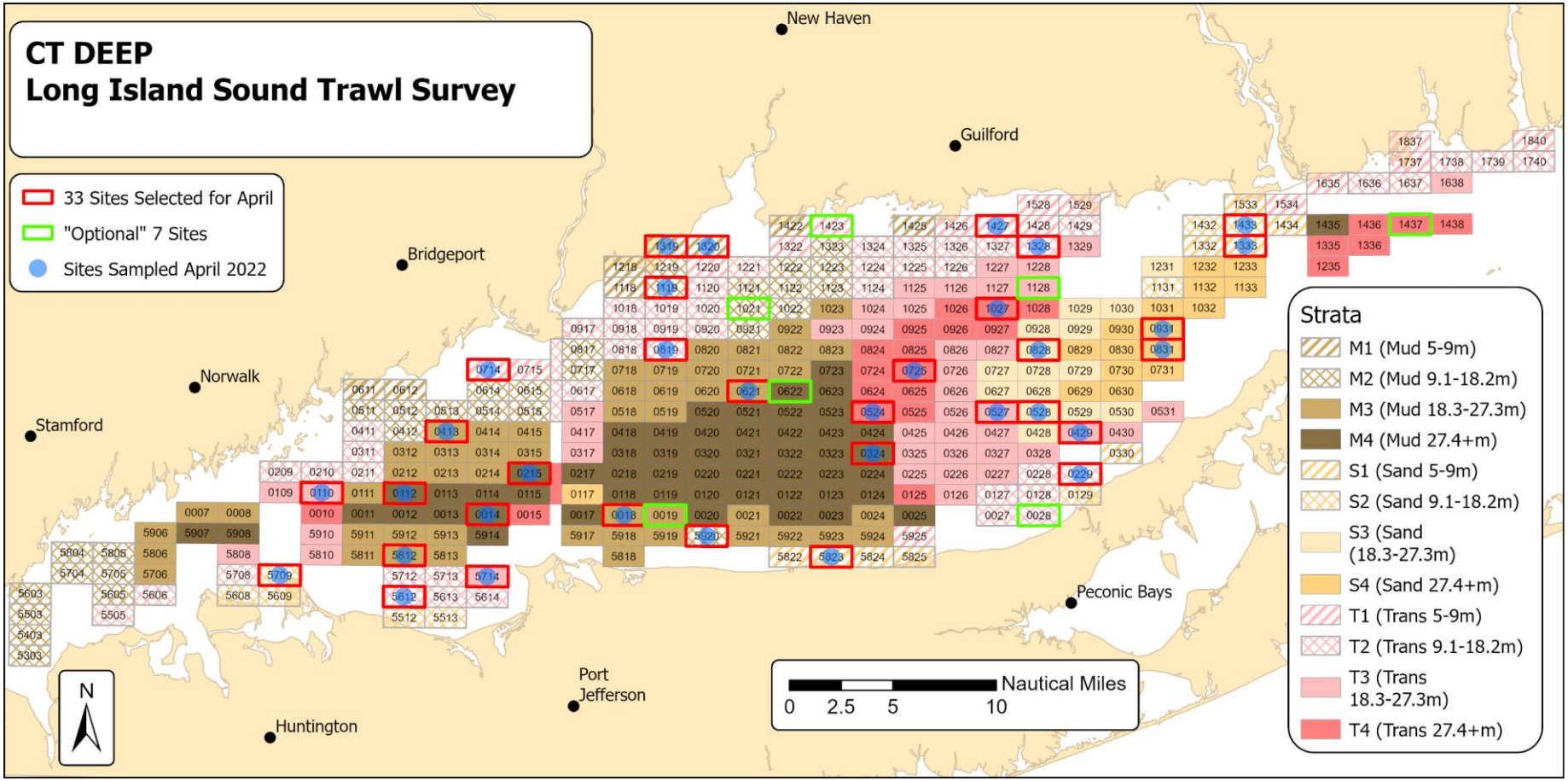


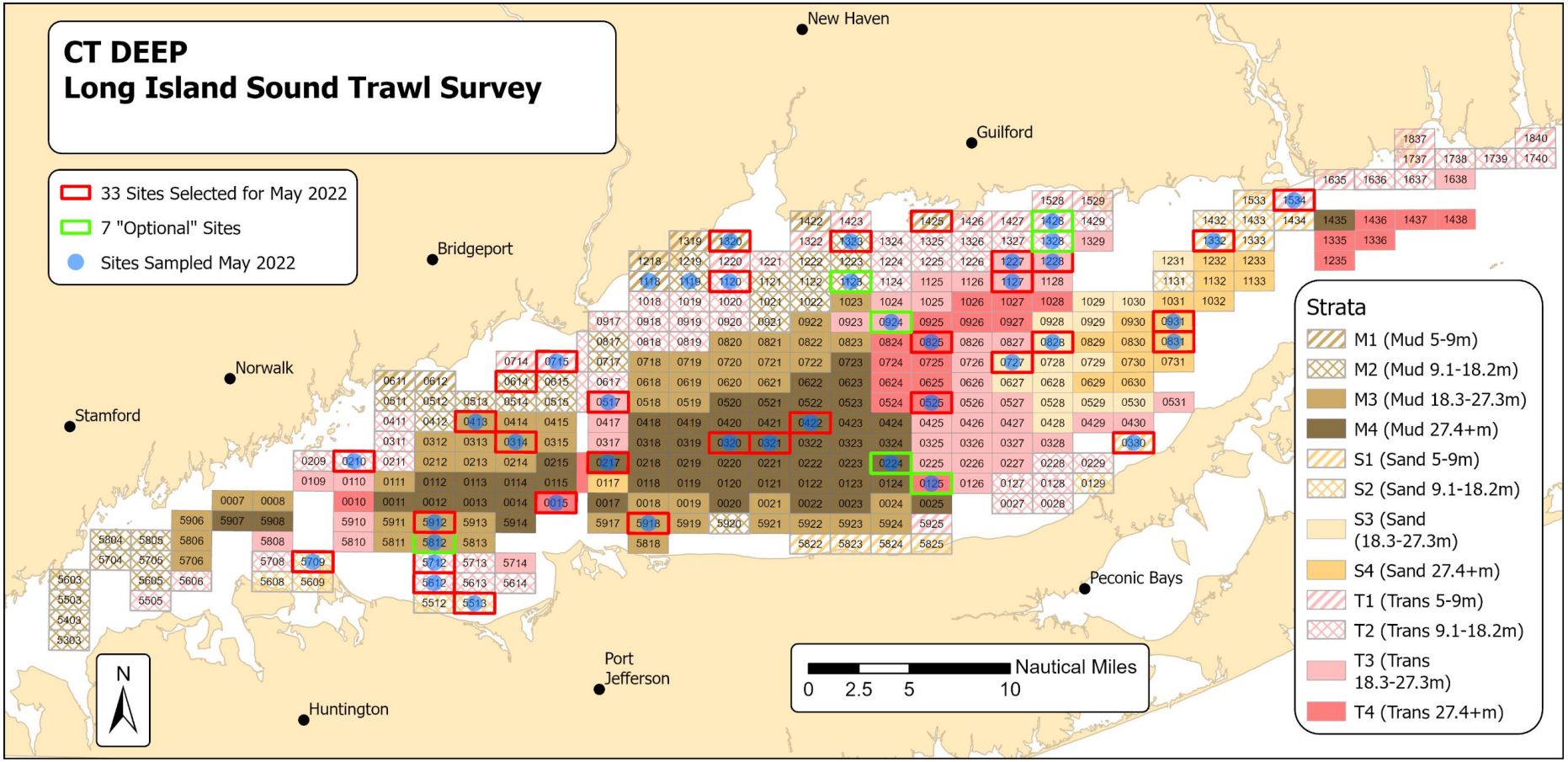
Figure 5.1. Trawl Survey site grid. *Each sampling site is 1x2 nmi (nautical miles). A four-digit number identifies the site: the first two digits are the row numbers (corresponding to minutes of latitude) and the last two digits are the column numbers (corresponding to two nautical miles in length on 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 5.2. April 2022 sites selected and sampled. *The standard 40 sites were selected for this month. The red outlined rectangles are the 33 of the 40 sites selected to allow for reduced sampling if needed, as described in text. The green outlined rectangles are the remaining 7 sites selected that were considered "optional" and to be done if time permitted after completing the first 33 (red) sites. The blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



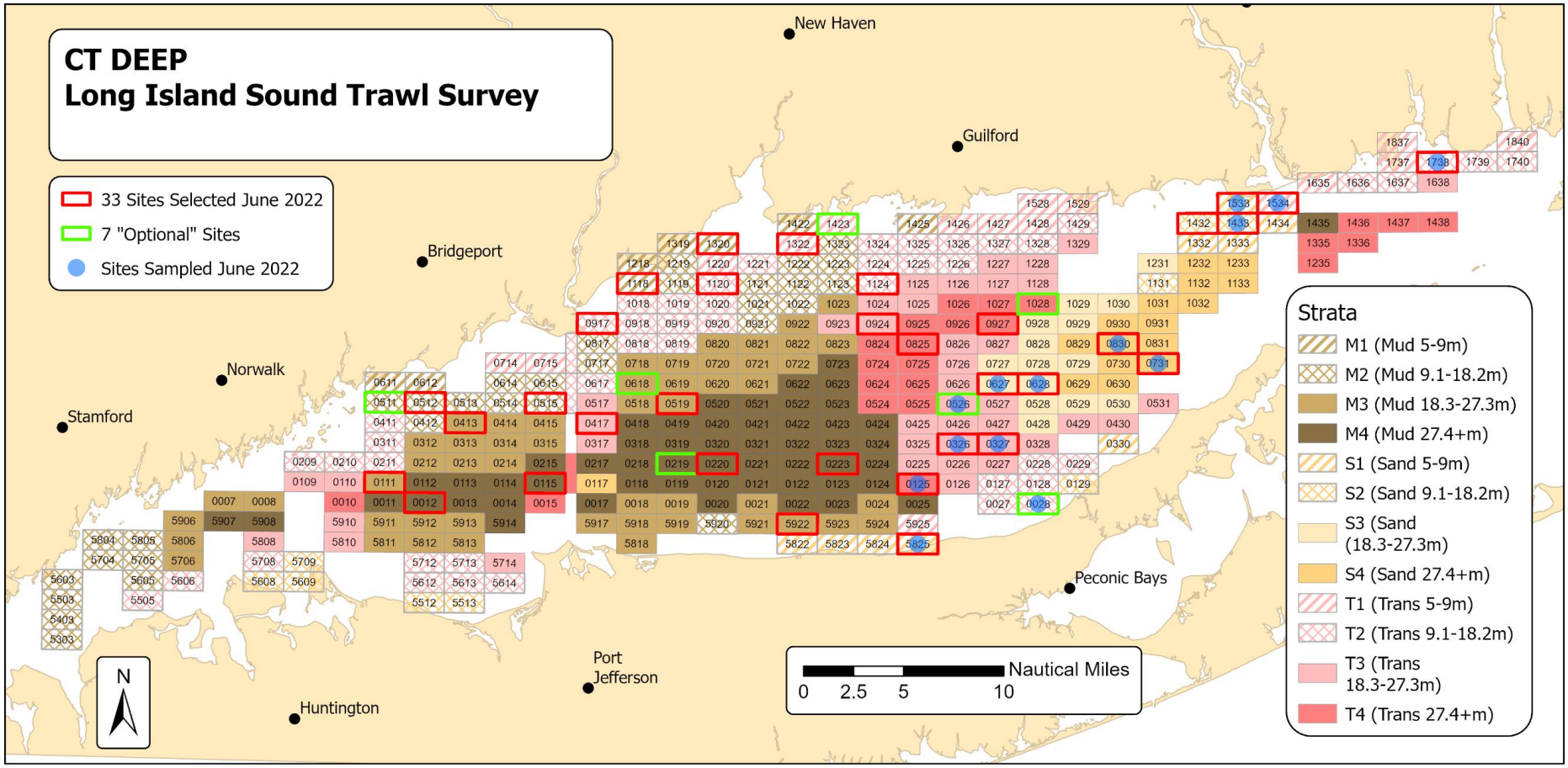
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
					No sites were moved during this cruise

Figure 5.3. May 2022 sites selected and sampled. *The standard 40 sites were selected for this month. The red outlined rectangles are the 33 of the 40 sites selected to allow for reduced sampling if needed, as described in text. The green outlined rectangles are the remaining 7 sites selected that were considered "optional" and to be done if time permitted after completing the first 33 (red) sites. The blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



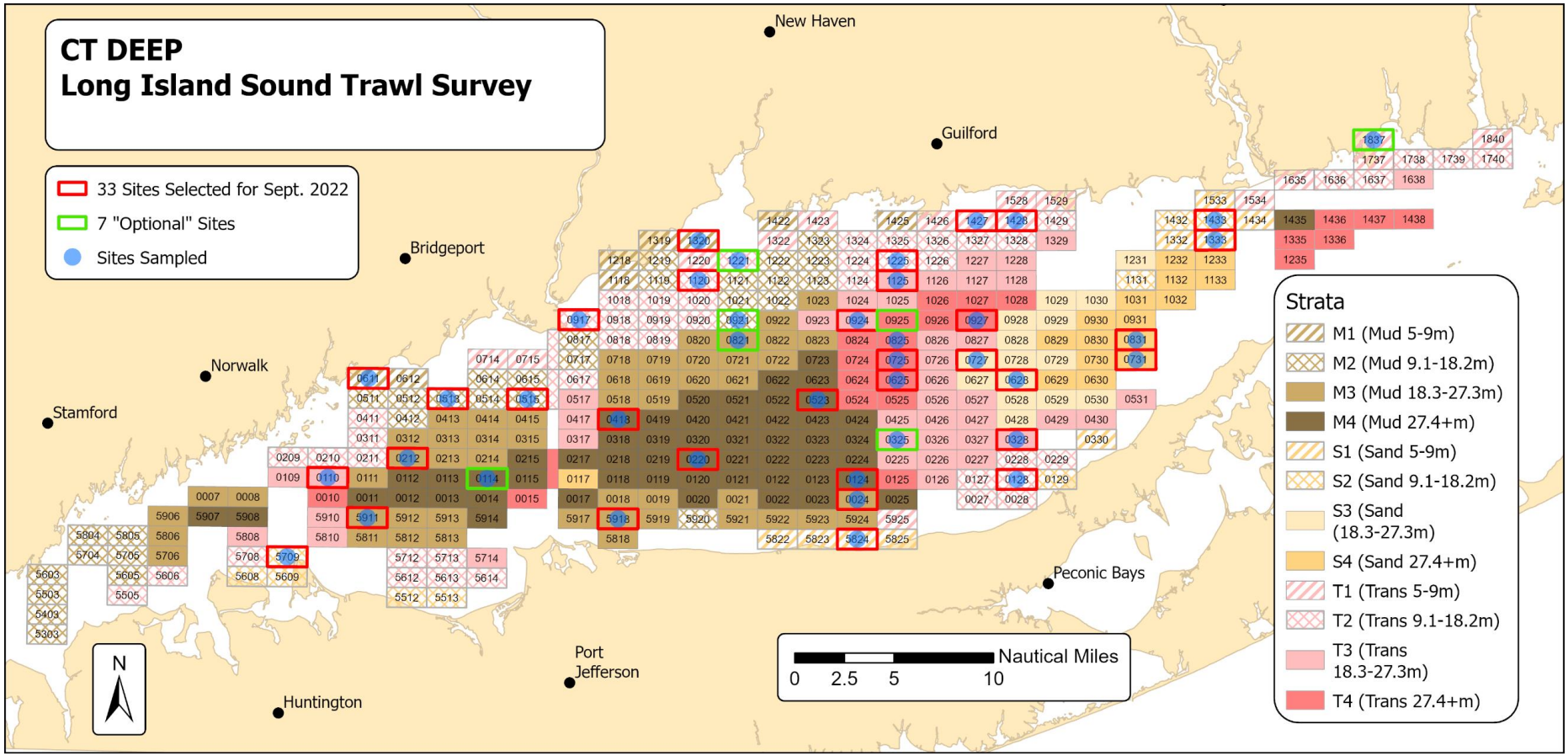
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
SP2022053	1119	M2	0614	M2	1119 was sampled instead of 1118, moved 0614 so that we could keep the tow
SP2022054	1118	M1	1425	M1	Too many pots in the area of 1425 to attempt tow

Figure 5.4. June 2022 sites selected and sampled. *The standard 40 sites were selected for this month. The red outlined rectangles are the 33 of the 40 sites selected to allow for reduced sampling if needed, as described in text. The green outlined rectangles are the remaining 7 sites selected that were considered "optional" and to be done if time permitted after completing the first 33 (red) sites. The blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



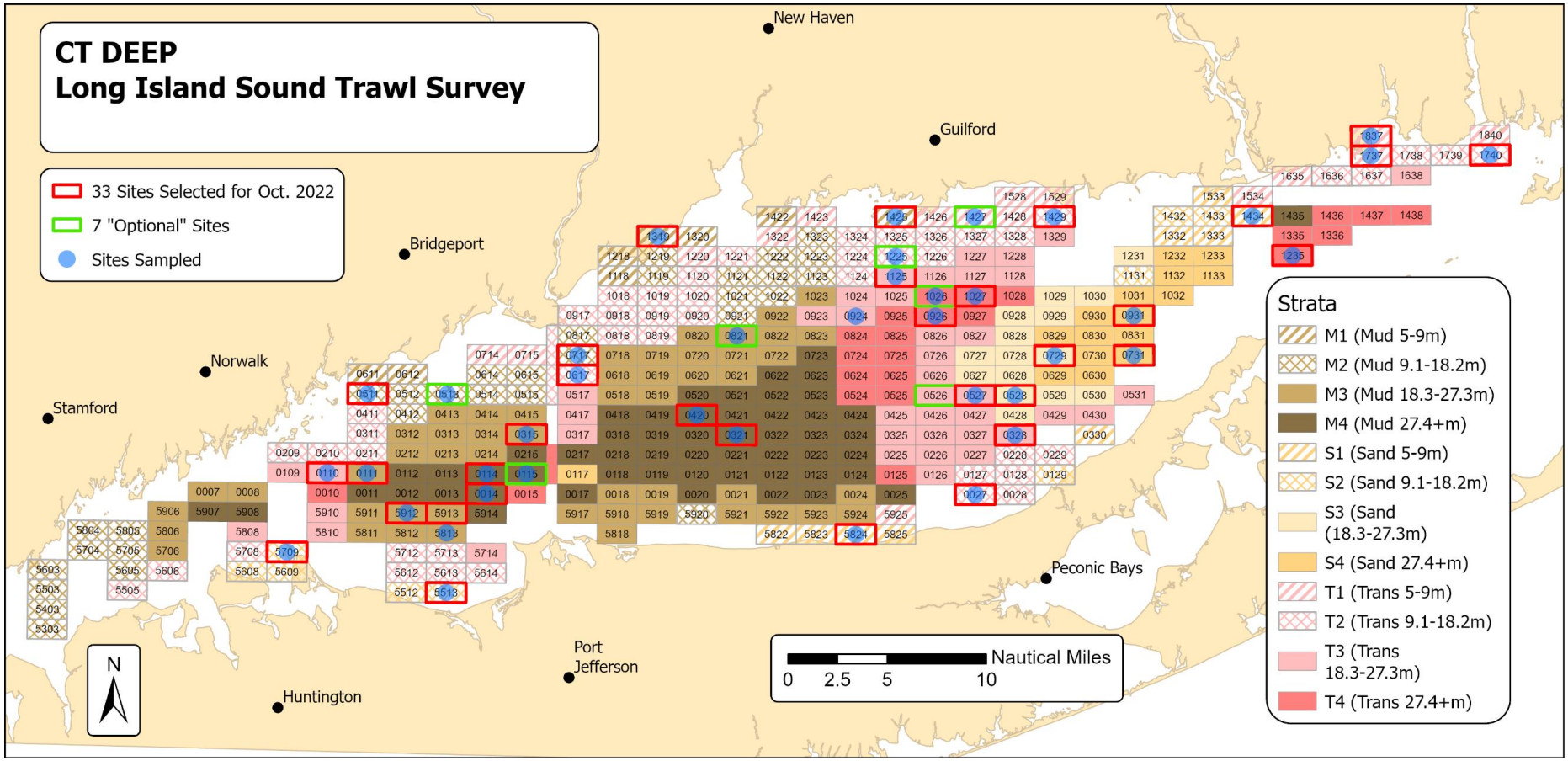
Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
					No sites were moved during this cruise

Figure 5.5. September 2022 sites selected and sampled. *The standard 40 sites were selected for this month. The red outlined rectangles are the 33 of the 40 sites selected to allow for reduced sampling if needed, as described in text. The green outlined rectangles are the remaining 7 sites selected that were considered "optional" and to be done if time permitted after completing the first 33 (red) sites. The blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
FA2022036	0825	T4	0925	T4	Weather was not conducive to a N-S tow

Figure 5.6. October 2022 sites selected and sampled. *The standard 40 sites were selected for this month. The red outlined rectangles are the 33 of the 40 sites selected to allow for reduced sampling if needed, as described in text. The green outlined rectangles are the remaining 7 sites selected that were considered "optional" and to be done if time permitted after completing the first 33 (red) sites. The blue dots are the sites sampled. Samples collected from a different site than published in the "**Notice to Fishermen**" are noted in table below map.*



Sample	Site Sampled	Sampled Strata	Site Selected	Selected Strata	Reason Moved
FA2022070	5813	M3	5923	M3	Typo on original map, moved site to one with recent towpaths
FA2022077	0924	T3	0526	T3	Weather was more conducive to a N-S tow

Figure 5.7. Number of finfish species observed annually, 1984-2022. *Note: not all years have the same number of tows. See Table 5.4 for details on number of tows completed each year. Average number of finfish species caught per year is 57.3 for the time-series*

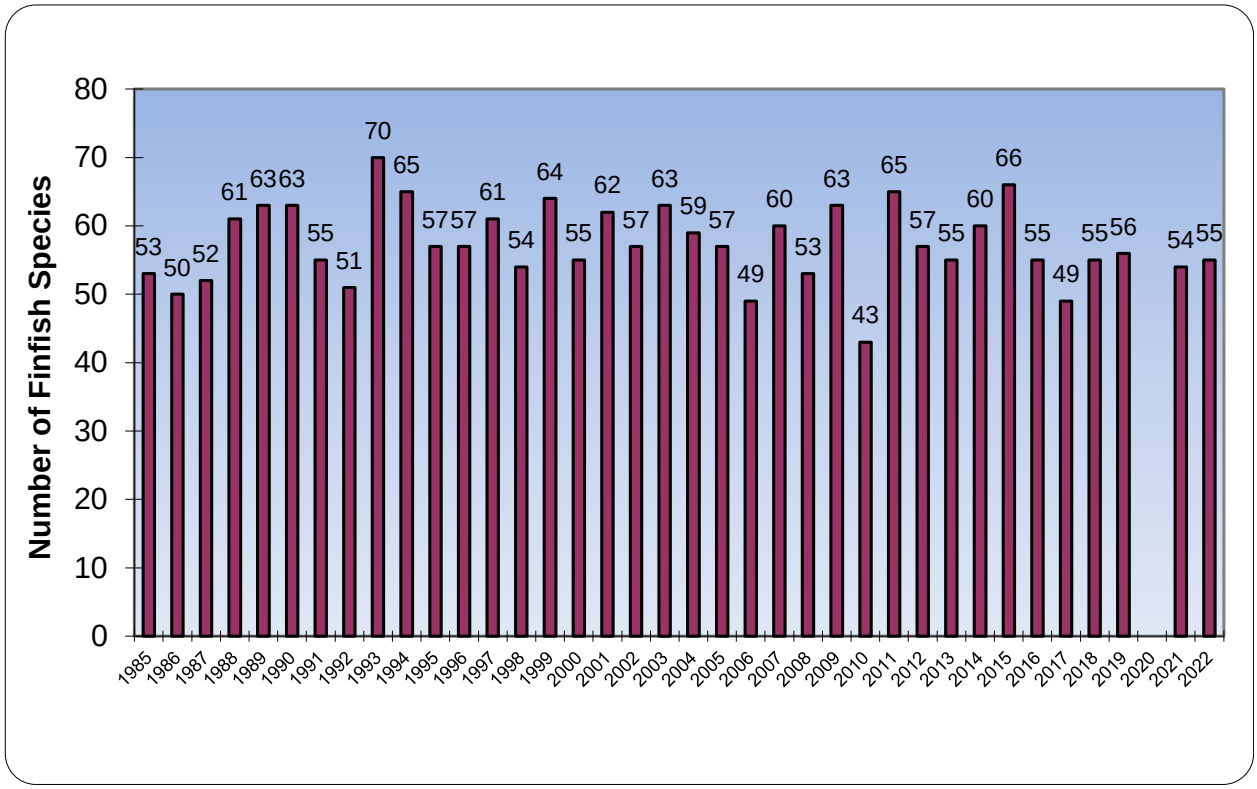
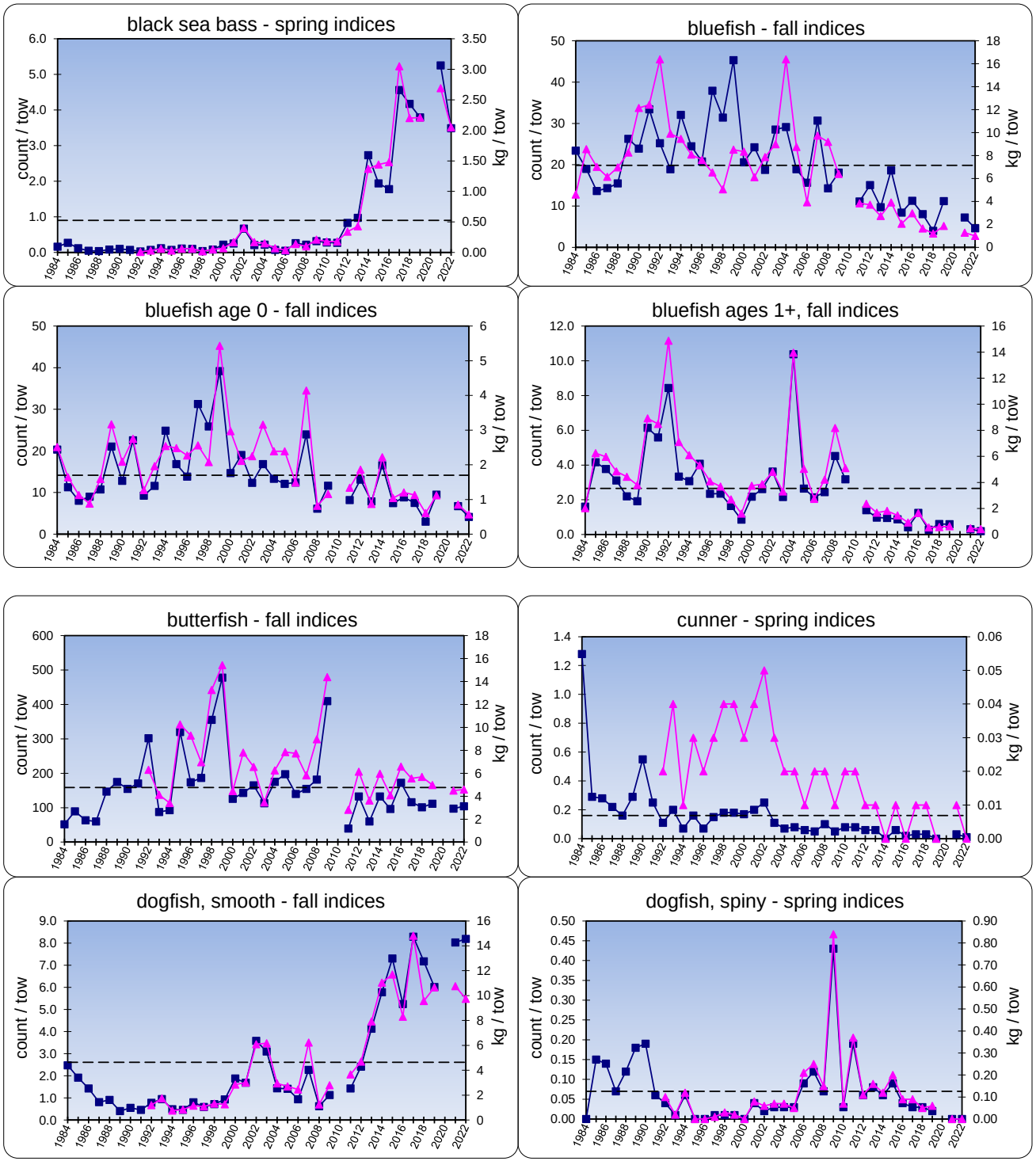


Figure 5.8. Plots of abundance indices for: black sea bass, bluefish (total, age 0, and ages 1+), butterfish, cunner, and dogfish (smooth and spiny).



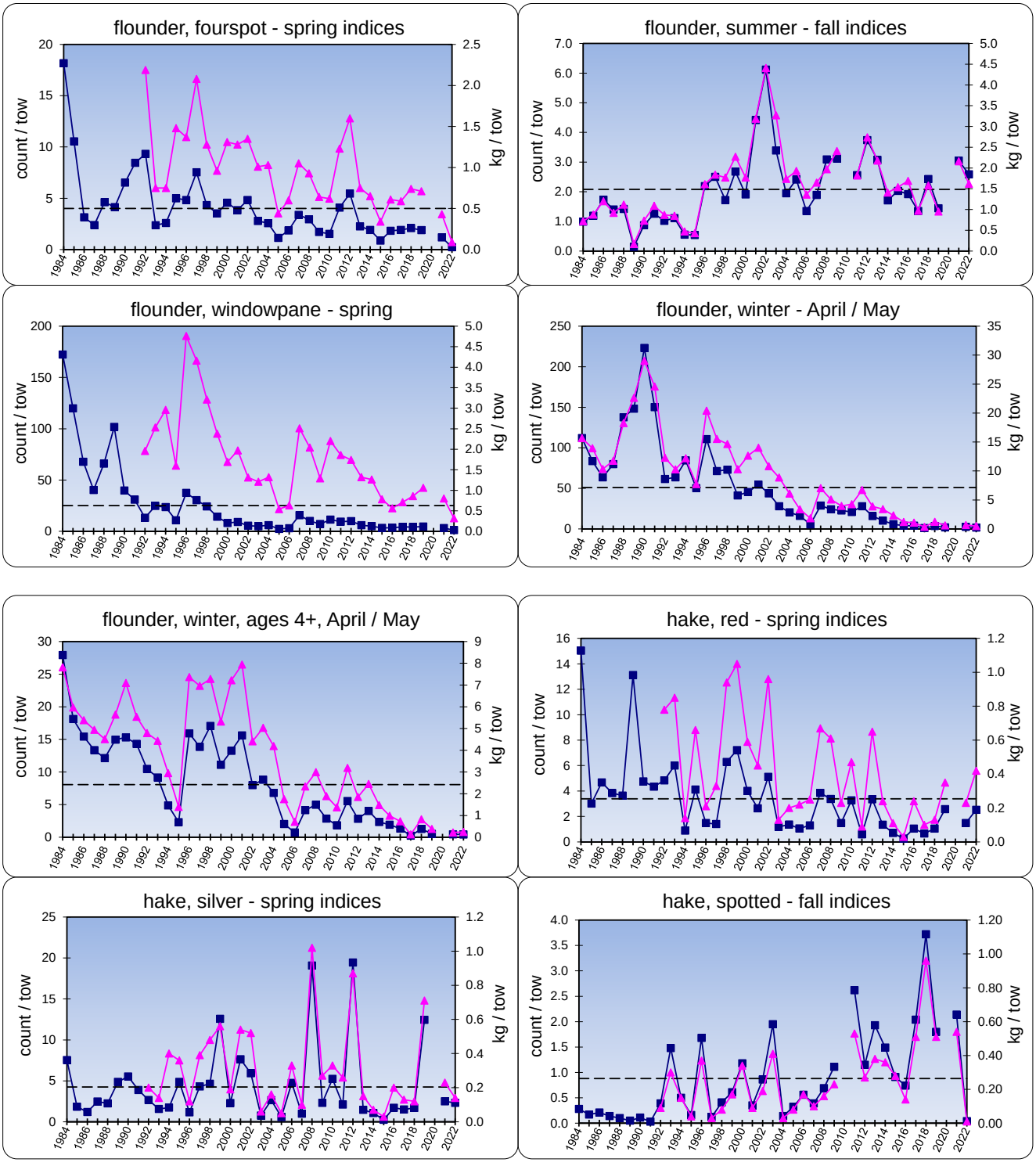
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 5.9. Plots of abundance indices for: flounders (fourspot, summer, windowpane, winter, and winter ages 4+) and hakes (red, silver, and spotted).



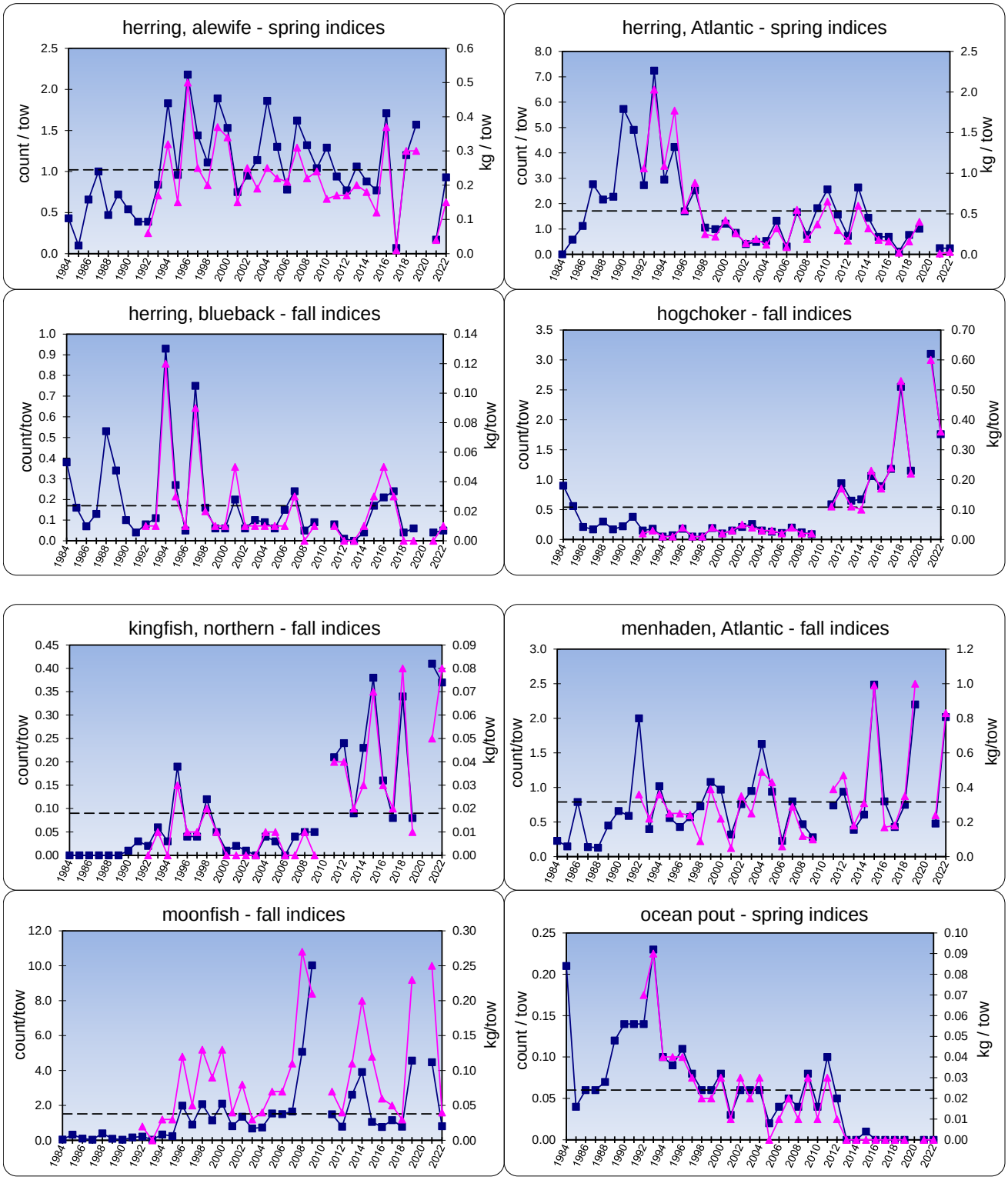
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 5.10. Plots of abundance indices for: herrings (alewife, Atlantic, and blueback), hogchoker, Northern kingfish, Atlantic menhaden, moonfish, and ocean pout.



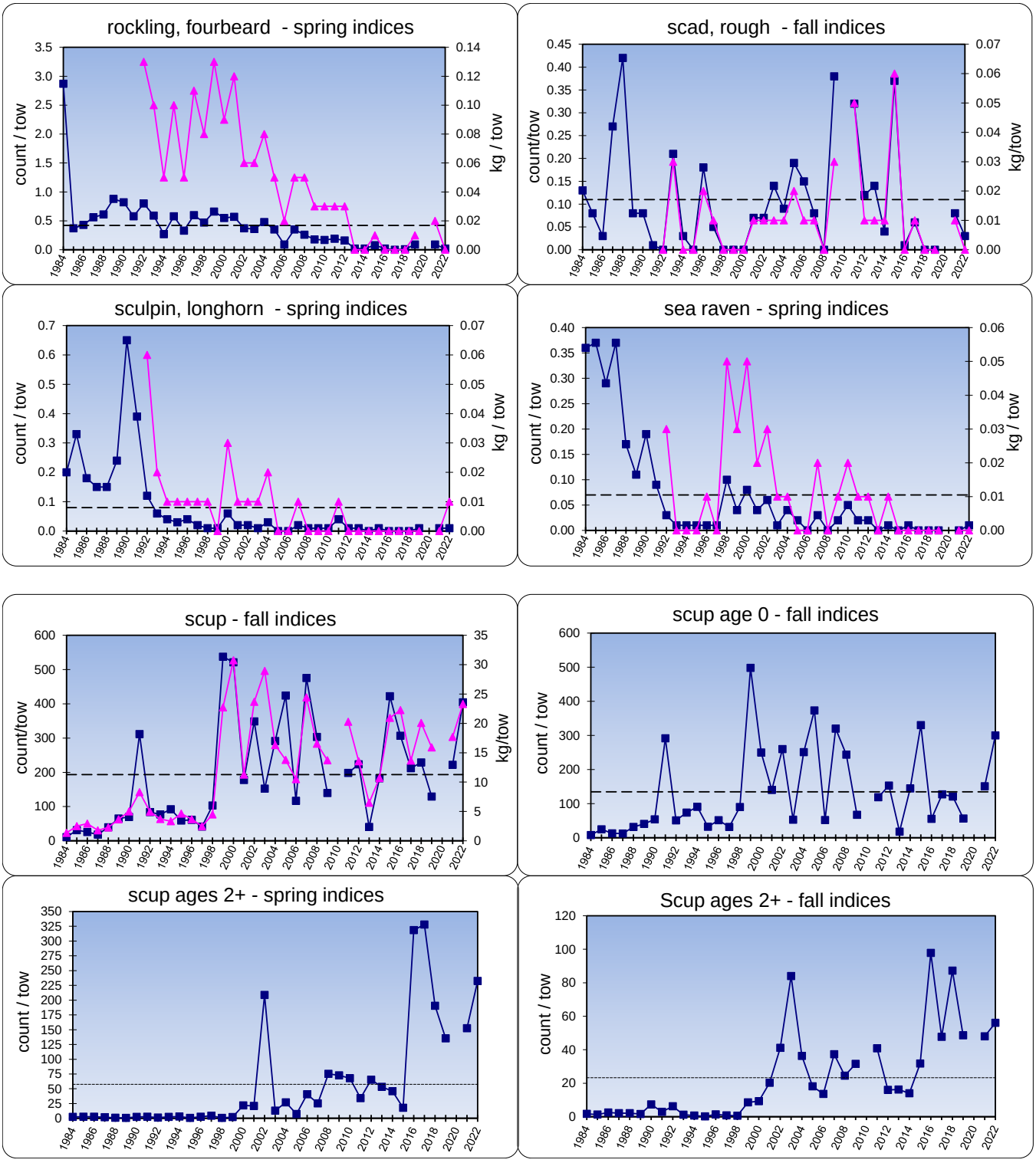
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 5.11. Plots of abundance indices for: fourbeard rockling, rough scad, longhorn sculpin, sea raven, and scup (all ages, age 0, and ages 2+).



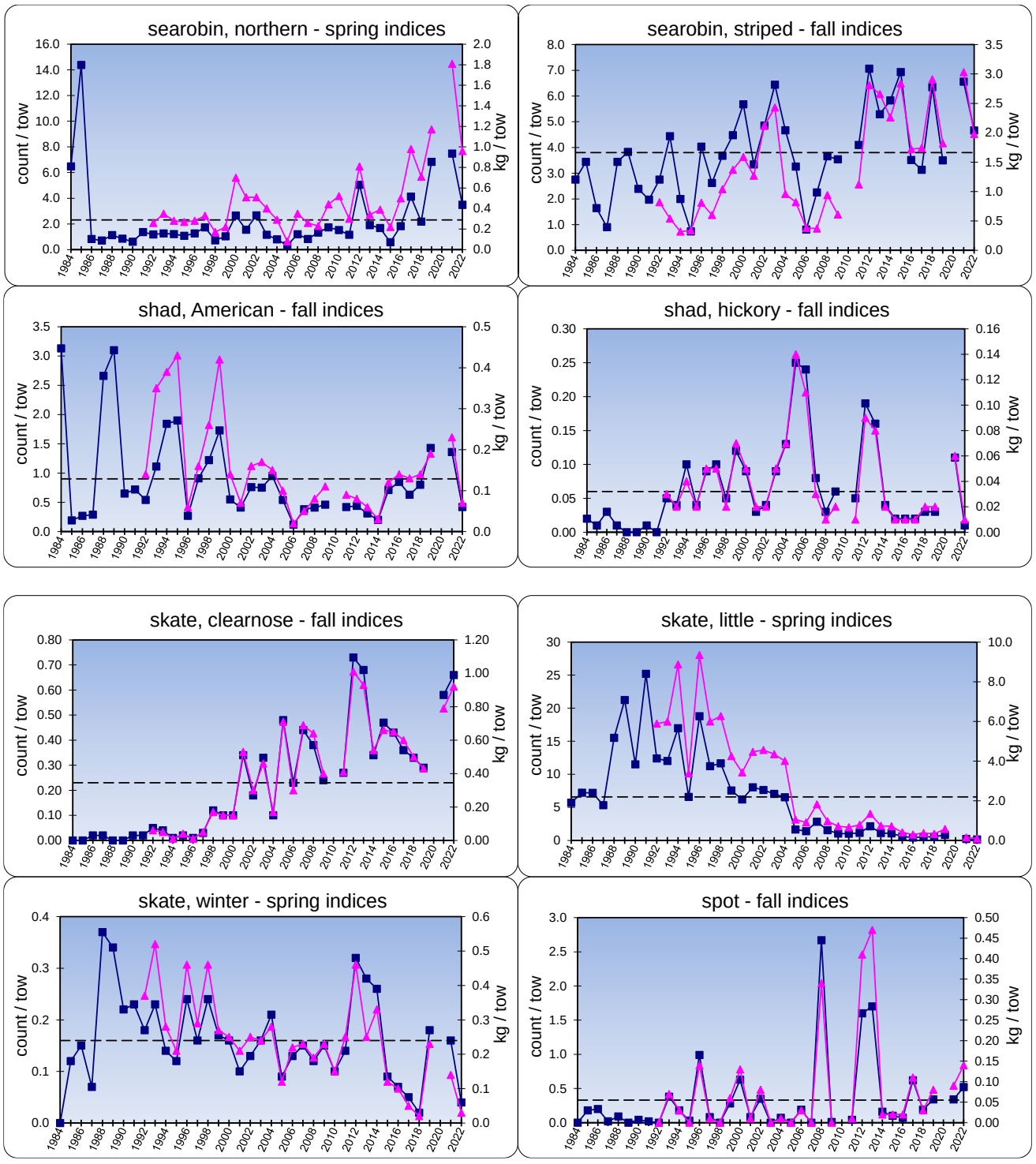
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 5.12. Plots of abundance indices for: searobins (striped and northern), shad (American and hickory), skates (clearnose, little, and winter), and spot.



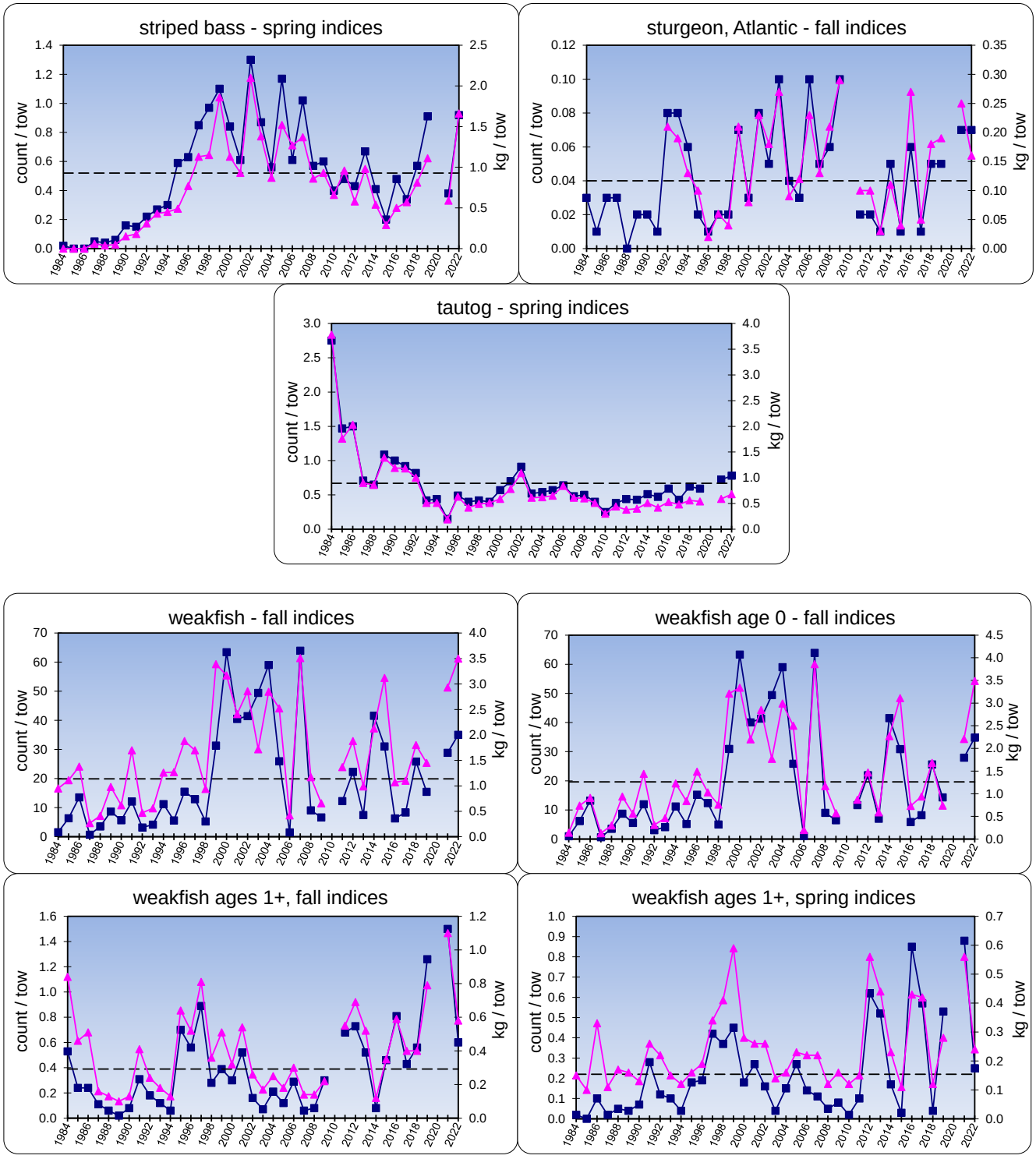
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 5.13. Plots of abundance indices for: striped bass, Atlantic sturgeon, tautog, and weakfish (all ages, age 0, and ages 1+).



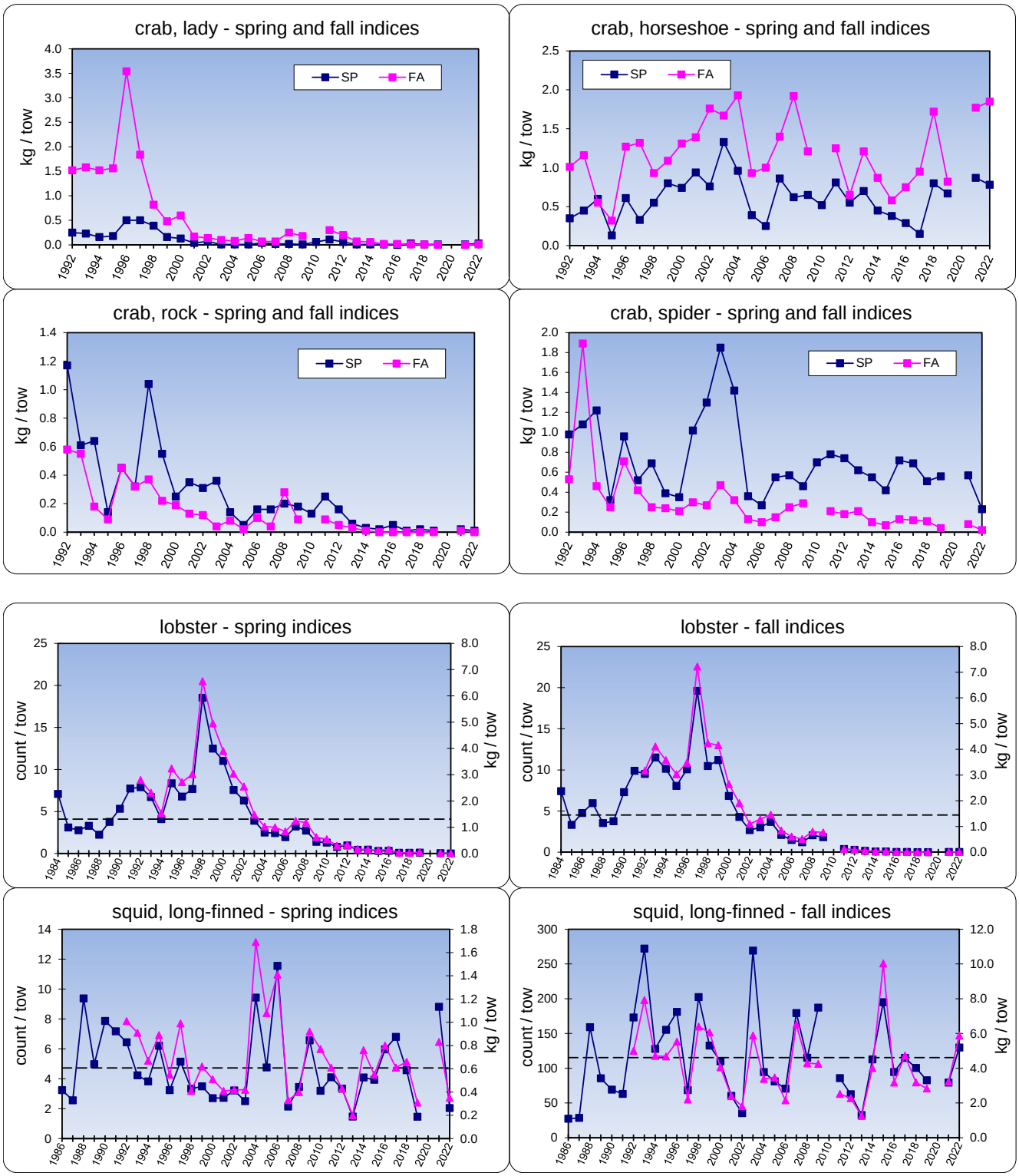
Legend:

■ = count / tow

▲ = kg / tow

---- = mean count / tow

Figure 5.14. Plots of abundance and biomass indices for: crabs (lady, rock, and spider), horseshoe crab, American lobster, and long-finned squid.



Legend for bottom four graphs:

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

Figure 5.15. Mean number of finfish species per sample, spring and fall, 1984-2022. This index measures the diversity of species supported within the Sound's various habitats.

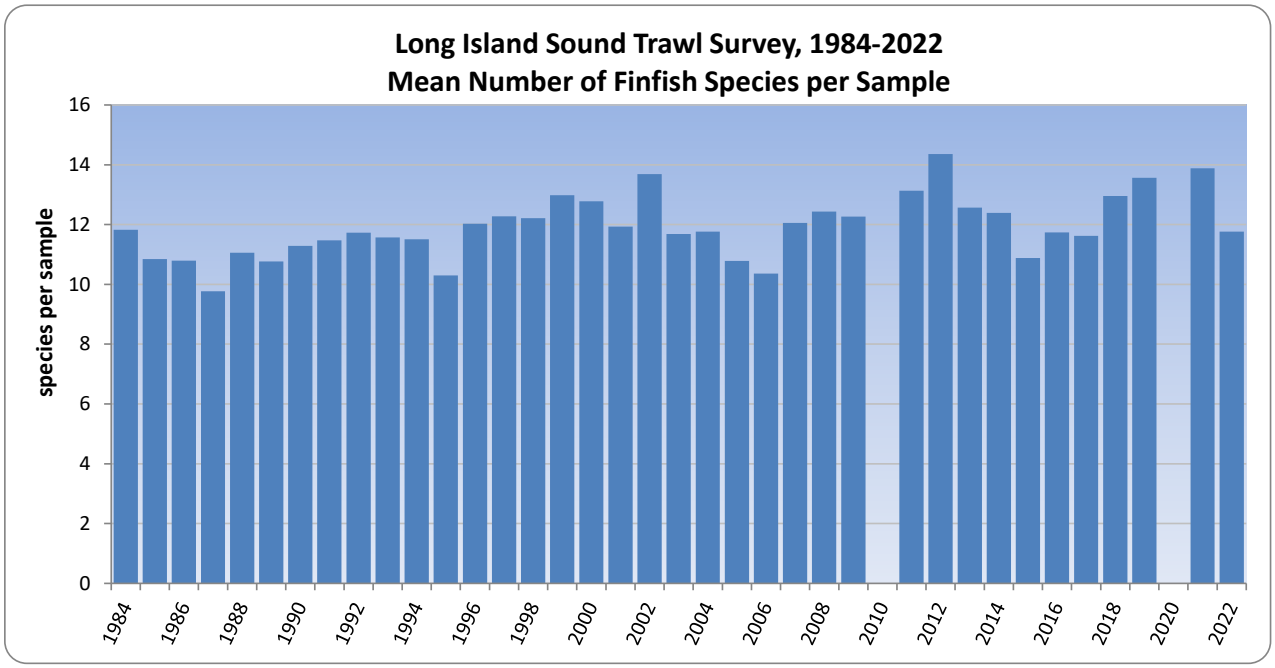


Figure 5.16. Open water forage abundance, 1992-2022. The geometric mean is calculated as the aggregate sample biomass per tow of 14 of the most common forage species sampled in the survey. This index measures the available food base which supports both resident and migratory species. The average since 1992 is 14.43 kg/tow (red line).

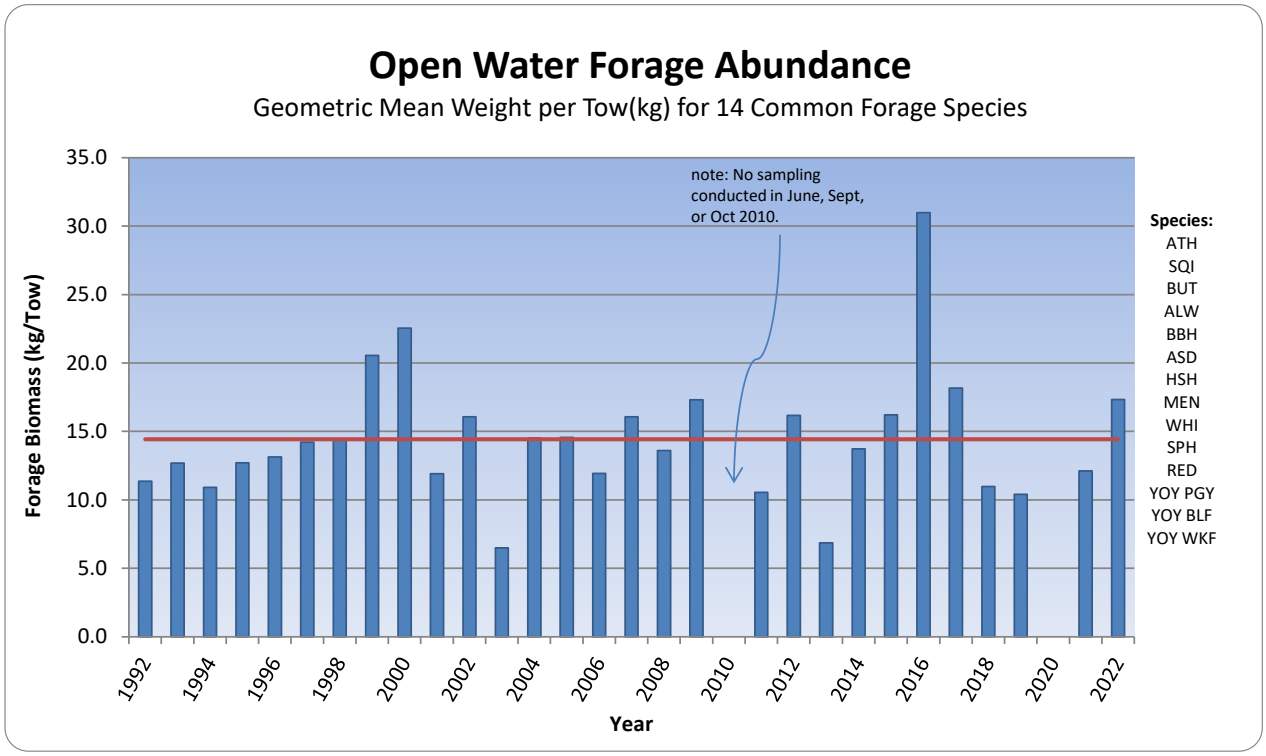
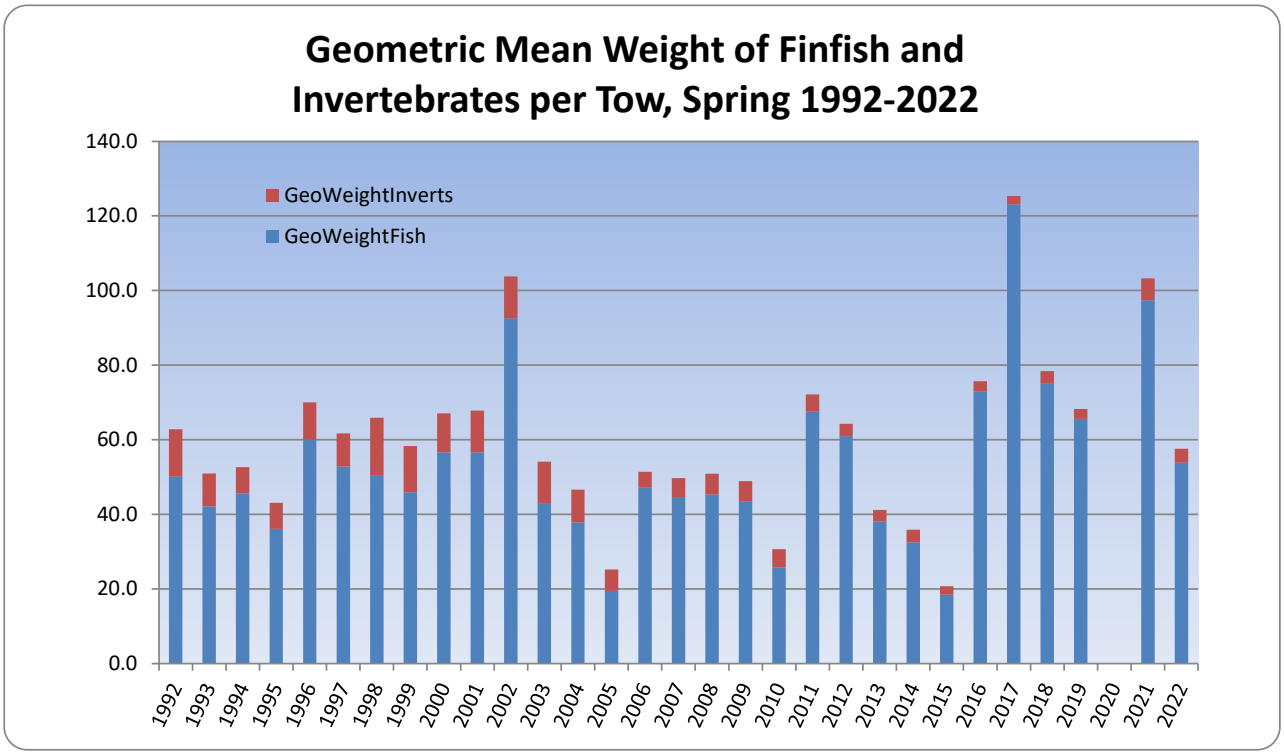


Figure 5.17. Geometric mean biomass of finfish and invertebrates per sample, spring and fall, 1992-2022. This index measures the diversity of species supported within the Sound's various habitats.



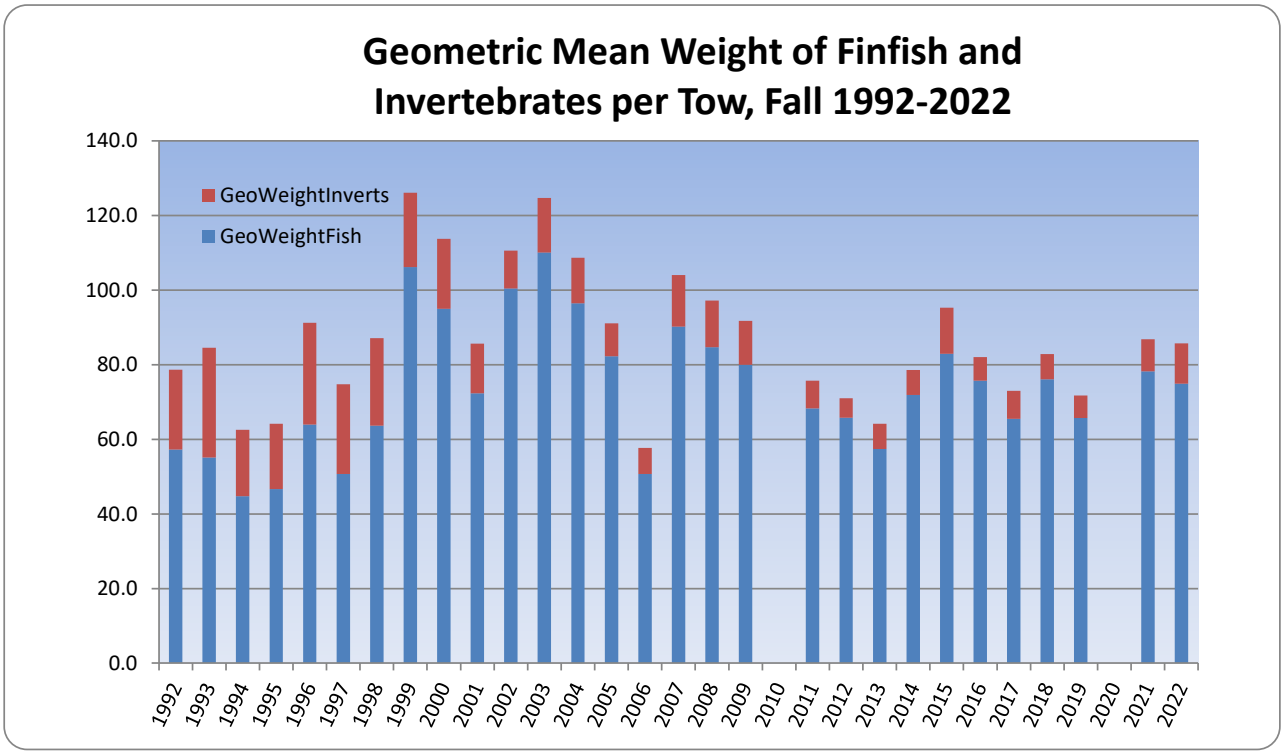
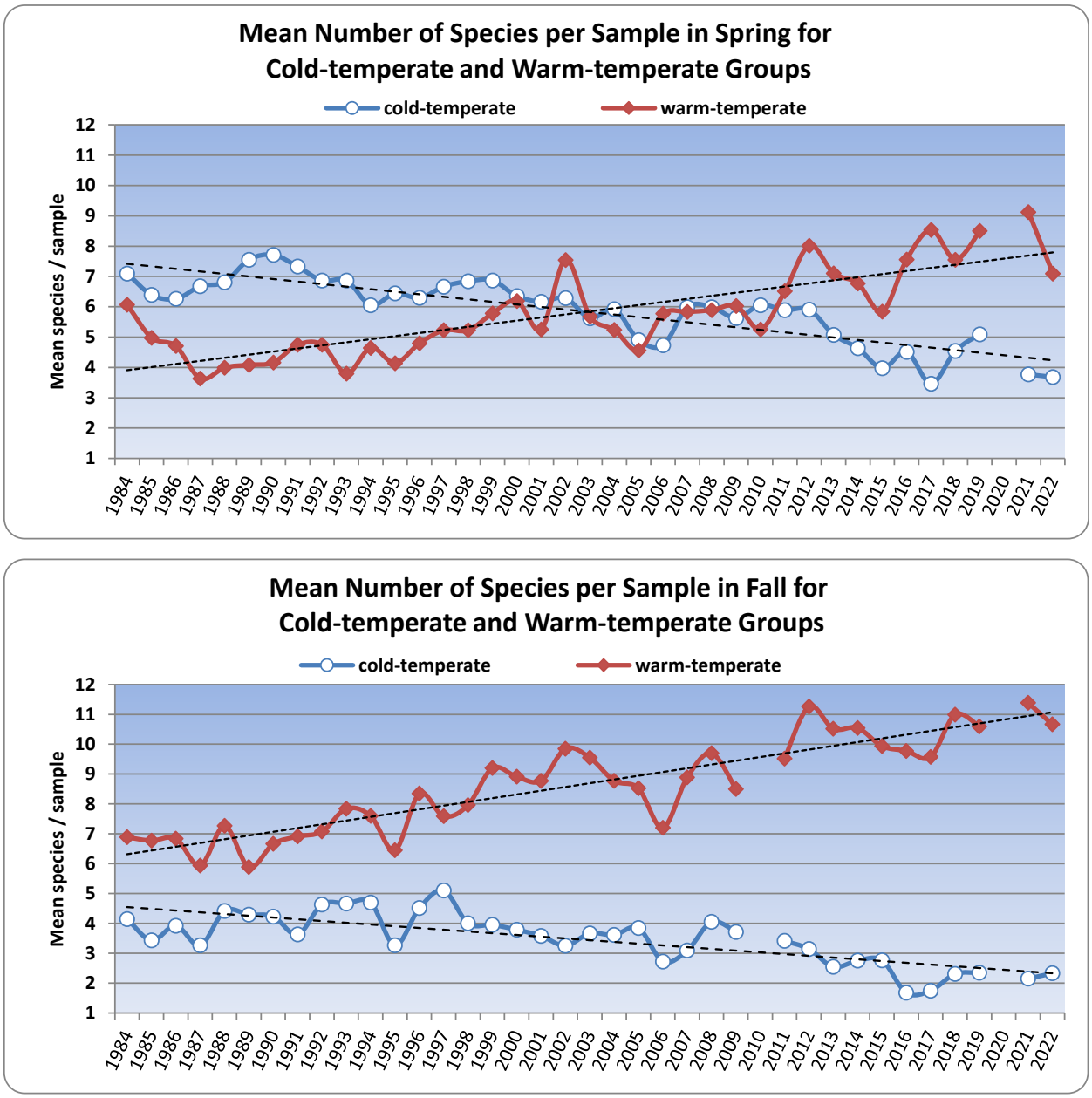


Figure 5.18. Trends in the number of cold temperate versus warm temperate species per sample captured in spring and fall, 1984-2022. See Appendix 2.5 for list of species included in analysis.



APPENDICES
LISTS

Appendix 5.1. List of finfish species identified by A *Study of Marine Recreational Fisheries in Connecticut* (F54R) and other CT DEEP Marine Fisheries programs. LISTS has collected one hundred-thirteen (113) finfish species from 1984-2022. *This appendix contains a list of 158 species identified from all sampling programs conducted since 1984* ***except*** *Marine Angler Surveys (Jobs 1-3). Species are listed alphabetically by common name (Nelson et al. 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 (non-F54R & F54R)	Inshore Seine Surveys in CT and/or TH rivers	1979 to present	15.2m (50 ft) bag seine set by boat
LISTS (F54R)	Long Island Sound Trawl Survey	1984 to present	14m (50 ft) trawls with 2" codend mesh
MISC	misc sampling conducted on R/V Dempsey	various	various
NCA	"inshore" EPA NCA C2K sampling	2000	skiff trawls
NRRWS	sampling in western end of LIS, the "Narrows"	2000-2007	14m (50 ft) trawls with 2" codend mesh
SNFH (F54R)	Study of Nearshore Finfish Habitat	1995-1996	plankton net
SS (F54R)	Summer Survey	1991-1993, 1996	14m (50 ft) trawls with codend liner in LIS
TN	Trap Net Survey	1997-1998	trap nets in rivers

Common Name	Scientific Name	Survey
anchovy, bay	*Anchoa mitchilli*	LISTS;NRRWS;ESS;ISS;IS;SS;NCA;MISC
anchovy, striped	*Anchoa hepsetus*	LISTS;ESS;IS;SS
banded rudderfish	*Seriola zonata*	LISTS;ESS
bass, largemouth	*Micropterus salmoides*	ISS;ESS;TN;CTR
bass, rock	*Ambloplites rupestris*	ISS; TN;CTR
bass, smallmouth	*Micropterus dolomieu*	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	*Centropristis striata*	LISTS;NRRWS;ESS;IS; SS;NCA;MISC;EPA
blenny, feather	*Hypsoblennius hentz*	LISTS;ESS
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
butterfly fish, banded	*Chaetodon striatus*	ESS
carp	*Cyprinus carpio*	ISS;NCA;TN;CTR
catfish, channel	*Ictalurus punctatus*	ISS;NCA;TN;CTR
catfish, white	*Ameiurus catus*	NCA;TN;CTR
cod, Atlantic	*Gadus morhua*	LISTS;SS
cornetfish, bluespotted	*Fistularia tabacaria*	LISTS;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 undulates*	LISTS;ISS;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
dace	*Rhinichthys spp.*	ISS
darter, tessellated	*Etheostoma olmstedi*	ISS
dogfish, smooth	*Mustelus canis*	LISTS;NRRWS;ESS;IS;SS;MISC;EPA
dogfish, spiny	*Squalus acanthias*	LISTS;NRRWS;MISC
drum, black	*Pogonias cromis*	LISTS
eel, American	*Anguilla rostrata*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA;EPA;TN;CTR
eel, conger	*Conger oceanicus*	LISTS;IS;SS;ESS
fallfish	*Semotilus corporalis*	ISS
filefish, orange	*Aluterus schoepfi*	LISTS;IS;SS
filefish, planehead	*Stephanolepis hispidus*	LISTS;EPA
filefish, scrawled	*Aluterus scriptus*	IS

Appendix 5.1 cont.

Common Name	Scientific Name	Survey
flounder, American plaice	*Hippoglossoides platessoides*	LISTS
flounder, fourspot	*Paralichthys oblongus*	LISTS;NRRWS;IS;SS;MISC;EPA
flounder, smallmouth	*Etropus microstomus*	LISTS;NRRWS;ESS;IS;SS;NCA;MISC
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;CTR
flounder, yellowtail	*Limanda ferruginea*	LISTS;IS
goatfish, dwarf	*Upeneus parvus*	LISTS
goatfish, red	*Mullus auratus*	LISTS
goby, code	*Gobiosoma robustum*	IS
goby, naked	*Gobiosoma bosc*	LISTS;ESS;ISS;IS
goldfish	*Carassius auratus*	CTR
goosefish	*Lophius americanus*	LISTS;IS;SS;MISC
grubby	*Myoxocephalus aeneus*	LISTS;ESS;ISS;IS;SNFH;SS;EPA
gunnel, banded	*Pholis fasciata*	ESS;IS
gunnel, rock	*Pholis gunnellus*	LISTS;ESS;ISS;IS;SNFH;SS
gurnard, flying	*Dactylopterus volitans*	ESS
haddock	*Melanogrammus aeglefinus*	LISTS;SS
hake, red	*Urophycis chuss*	LISTS;NRRWS;IS;SS;MISC;EPA
hake, silver	*Merluccius bilinearis*	LISTS;NRRWS;SS;MISC;EPA
hake, spotted	*Urophycis regia*	LISTS;NRRWS;ESS;IS;SS;MISC;EPA
harvestfish	*Peprilus paru*	LISTS
herring, Atlantic	*Clupea harengus*	LISTS;NRRWS;ISS;IS;SNFH;SS;MISC;EPA
herring, Atlantic thread	*Opisthonema oglinum*	LISTS
herring, alewife	*Alosa pseudoharengus*	LISTS;NRRWS;ESS;ISS;SNFH;SS;MISC;EPA;TN;CTR
herring, blueback	*Alosa aestivalis*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;EPA;TN;CTR
herring, round	*Etrumeus teres*	LISTS;EPA
hogchoker	*Trinectes maculatus*	LISTS;NRRWS;ESS;ISS;IS;SS;MISC;EPA;TN
jack, blue runner	*Caranx crysos*	LISTS;EPA;ESS;ISS
jack, crevalle	*Caranx hippos*	LISTS;NRRWS;ESS;ISS;EPA
jack, yellow	*Caranx bartholomaei*	LISTS;NRRWS;ESS;IS;MISC;EPA
killifish, rainwater	*Lucania parva*	ESS
killifish, striped	*Fundulus majalis*	ESS;IS
kingfish, northern	*Menticirrhus saxatilis*	LISTS;NRRWS;ESS;ISS;IS;SS;EPA
lamprey, sea	*Petromyzon marinus*	LISTS;IS;TN
lizardfish, inshore	*Synodus foetens*	LISTS;NRRWS;ESS;ISS;IS;SS;MISC
lookdown	*Selene vomer*	LISTS;ISS
lumpfish	*Cyclopterus lumpus*	LISTS;IS;SNFH
mackerel, Atlantic	*Scomber scombrus*	LISTS;ISS;SS;EPA
mackerel, Spanish	*Scomberomorus maculatus*	LISTS;SS;EPA
menhaden, Atlantic	*Brevoortia tyrannus*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA;MISC;EPA
minnow, sheepshead	*Cyprinodon variegatus*	ESS;ISS
moonfish	*Selene setapinnis*	LISTS;NRRWS;ESS;SS;MISC;EPA
mullet, striped	*Mugil cephalus*	ISS
mullet, white	*Mugil curema*	LISTS;ESS;ISS
mummichog	*Fundulus heteroclitus*	ESS;ISS;IS
needlefish, Atlantic	*Strongylura marina*	ESS;ISS
ocean pout	*Zoarces americanus*	LISTS;NRRWS;MISC;EPA
oyster toadfish	*Opsanus tau*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;EPA
perch, white	*Morone americana*	LISTS;NRRWS;ESS;ISS;IS;SNFH;NCA;TN;CTR
perch, yellow	*Perca flavescens*	ISS;SNFH;TN;CTR
perch, silver	*Bairdiella chrysoura*	LISTS;ESS
pickerel, chain	*Esox niger*	ISS;TN
pike, northern	*Esox lucius*	ISS;TN;CTR
pinfish	*Lagodon rhomboides*	LISTS
pipefish, northern	*Syngnathus fuscus*	LISTS;NRRWS;ESS;ISS;IS;SNFH;SS;NCA;EPA
pollock	*Pollachius virens*	LISTS;NRRWS;SNFH;SS;EPA
pompano, African	*Alectis ciliaris*	LISTS;ISS
puffer, northern	*Sphoeroides maculatus*	LISTS;NRRWS;ESS;ISS;IS;SS

Appendix 5.1 cont.

Common Name	Scientific Name	Survey
Puffer, smooth	*Lagocephalus laevigatus*	LISTS
pumpkinseed	*Lepomis gibbosus*	ESS;ISS;NCA;TN;CTR
radiated shanny	*Ulvaria subbifurcata*	SNFH
ray, bluntmose stingray	*Dasyatis say*	LISTS
ray, bullnose	*Myliobatis freminvillei*	LISTS
ray, cownose	*Rhinoptera bonasus*	LISTS
ray, roughtail stingray	*Dasyatis centroura*	LISTS
rockling, fourbeard	*Enchelyopus cimbrius*	LISTS;NRRWS;ESS;IS;SNFH;SS;MISC;EPA
salmon, Atlantic	*Salmo salar*	LISTS;TN
sand lance, American	*Ammodytes americanus*	LISTS;ESS;IS;SNFH;SS
scad, bigeye	*Selar crumenophthalmus*	LISTS;SS;MISC
scad, mackerel	*Decapterus macarellus*	LISTS;SS
scad, rough	*Trachurus lathami*	LISTS;NRRWS;SS;MISC;EPA
scad, round	*Decapterus punctatus*	LISTS;NRRWS;ESS
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;ESS;ISS;TN
shad, hickory	*Alosa mediocris*	LISTS;NRRWS;ISS;SS;MISC;EPA;CTR
shark, sand tiger shark	*Carcharias taurus*	LISTS
shark, sandbar (brown) shark	*Carcharhinus plumbeus*	LISTS
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
skilletfish	*Gobiesox strumosus*	ESS
smelt, rainbow	*Osmerus mordax*	LISTS;ESS;IS;SNFH;SS;TN;CTR
snapper, glasseye	*Heteropriacanthus cruentatus*	LISTS
snapper, grey	*Lutjanus griseus*	ESS;IS
snapper, mahogany	*Lutjanus mahogoni*	LISTS
spot	*Leiostomus xanthurus*	LISTS;NRRWS;ESS;ISS;IS;SS;MISC;EPA
stargazer, northern	Astroscopus guttatus	LISTS;ESS
stickleback, blackspotted	*Gasterosteus wheatlandi*	ESS
stickleback, four-spine	*Apeltes quadracus*	ESS;IS
stickleback, nine-spine	*Pungitius pungitius*	ESS;IS
stickleback, three-spine	*Gasterosteus aculeatus*	ESS;IS;TN
sturgeon, Atlantic	*Acipenser oxyrinchus*	LISTS
sucker, white	*Catostomus commersonii*	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;ISS
walleye	*Sander vitreus*	ISS;ESS;TN
weakfish	*Cynoscion regalis*	LISTS;NRRWS;ESS;ISS;IS;SS;NCA;MISC;EPA

Appendix 5.2. Annual total count of finfish, lobster, horseshoe crab and squid taken in the LISTS, 1984-2022.

Counts include all tows- number of tows conducted shown in second row. Refer to Appendix 5.4 for details on number of tows conducted per month. Note: nc = not counted. Anchovy spp., (yoy), Atlantic herring (yoy), and sand lance, (yoy) are estimated.

Common name	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(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	160	200	78
anchovy, bay	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	548	2,303	443	992	2,434	1,523	814	1,492	2,440	1,128	11,128	475
anchovy, striped	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	11	0	0	216	0	47	0	2	0	0	0	6	1	5	0
anchovy, spp (yoy-est)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	2,667	15,700	935	1,515	3,410	13,110	3,254	2,179	1,267	8,537	1,135	0
bigeye	0	0	0	1	2	2	1	0	0	0	1	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0
bigeye, short	1	2	0	0	1	2	0	0	0	1	1	0	3	2	0	0	0	1	5	0	0	0	0	0	0	0	0
black sea bass	34	53	44	24	22	21	39	39	5	20	34	12	27	22	18	50	69	134	394	64	124	42	19	116	122	121	37
blenny, feather	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
blue runner	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	34	0
bluefish	9,927	8,946	5,712	3,517	3,857	12,568	8,195	5,845	5,269	6,469	16,245	5,524	6,705	10,815	8,814	7,843	6,135	3,986	3,450	3,766	6,504	6,532	2,100	9,378	1,699	3,657	2
bonito, Atlantic	0	2	0	1	1	1	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
burrfish, striped	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
butterfish	37,137	67,944	44,624	42,519	60,746	94,928	80,778	40,537	95,961	67,087	54,378	64,930	49,360	70,985	136,926	191,100	60,490	45,264	66,550	36,133	94,735	92,996	50,022	49,137	48,766	108,087	2,894
cod, Atlantic	0	0	0	0	0	0	1	0	0	0	0	2	0	1	0	0	1	0	0	58	33	10	0	0	0	15	21
Gadus spp. (yoy/larvae)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	34	8
cornetfish, red	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
cornte fish, blue spotted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
crab, horseshoe	0	0	0	0	0	0	0	0	0	0	0	0	0	204	303	384	420	503	517	450	534	161	109	333	289	340	58
croaker, Atlantic	0	0	0	0	0	0	0	0	0	41	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
cunner	359	98	97	129	72	268	196	75	30	65	25	41	17	43	65	51	50	51	55	42	21	24	8	16	26	18	11
cusk-eel, fawn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
cusk-eel, striped	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
dogfish, smooth	846	919	850	526	564	374	284	193	304	420	361	168	275	167	310	305	467	598	1,019	570	503	467	332	580	328	588	10
dogfish, spiny	89	252	173	76	434	99	417	14	6	14	58	0	1	7	18	10	4	48	17	85	38	41	11	32	35	148	3
drum, black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
eel, American	2	0	1	0	0	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0
eel, american (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	0	0	1	0	0	0
eel, conger	0	0	0	0	0	0	0	0	1	3	0	2	1	0	0	2	0	2	0	3	0	0	0	0	0	0	0
eel, conger (yoy/larvae)	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	nc	1	0	0	0	0	0	0
filefish, orange	0	1	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
filefish, planehead	4	20	1	0	25	13	23	1	0	10	1	0	3	0	0	3	0	1	0	1	0	0	1	0	1	1	0
flounder, American plaice	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
flounder, fourspot	2,691	2,759	2,126	2,112	4,653	2,924	4,698	3,553	2,774	1,447	1,674	2,584	2,815	4,122	1,908	1,393	2,590	2,167	1,859	1,877	1,406	688	466	1,094	902	1,036	402
flounder, smallmouth	2	0	2	15	39	13	4	20	12	30	17	19	41	58	97	96	61	98	139	49	50	44	7	48	89	96	31
flounder, summer	208	249	716	531	414	47	242	263	186	293	282	121	434	486	436	582	555	875	1,356	1,181	644	506	203	733	477	881	517
flounder, windowpane	26,200	18,936	22,514	15,588	26,919	31,082	14,738	8,482	2,980	8,526	6,678	3,815	14,116	10,324	6,483	4,643	2,488	3,065	1,991	2,177	2,275	1,982	1,077	4,051	3,511	2,496	2,850
flounder, winter	13,921	13,851	19,033	22,696	36,706	45,563	59,981	26,623	9,548	16,843	21,481	15,558	22,722	14,701	15,697	10,288	8,867	9,826	6,884	4,676	4,021	4,692	1,699	4,550	4,973	4,068	2,579
flounder, yellowtail	0	0	0	0	7	0	1	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0	1	1	2	1	0
glasseye snapper	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	4	8	1	6	0
goatfish, dwarf	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
goatfish, red	1	0	0	0	0	0	2	1	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
goby, naked	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
goosefish	1	8	1	1	1	15	3	8	10	4	8	4	1	2	3	2	1	1	3	0	1	2	1	0	0	0	0
grubby	0	1	1	1	5	9	6	0	0	0	5	1	2	11	5	2	0	0	1	2	0	2	0	1	0	0	0
gunnel, rock	0	6	0	6	5	10	9	0	0	0	1	0	3	0	0	0	3	1	1	6	2	9	2	1	2	2	29
haddock	0	0	0	0	0	0	0	0	0	0	0	2	0	1	7	1	0	0	0	26	7	2	0	0	0	0	0
hake, red	3,696	1,161	3,061	2,258	3,808	7,365	3,300	2,085	1,606	4,183	546	1,977	872	748	3,015	2,973	2,393	1,382	2,103	873	829	585	625	2,788	1,723	897	990
hake, silver	1,525	724	1,464	1,848	3,427	3,551	4,243	1,537	544	508	2,136	1,941	489	1,973	1,870	5,126	679	3,945	2,013	496	1,417	165	1,267	290	6,587	947	1,747
hake, spotted	78	69	96	55	255	12	42	73	68	497	184	72	384	77	142	381	1,425	606	798	656	230	234	321	340	1,267	327	665
harvestfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
herring, alewife	284	37	242	819	415	473	287	103	122	934	1,431	386	1,402	1,194	456	1,393	1,572	638	855	746	859	742	573	1,537	931	1,175	172
herring, Atlantic	112	510	2,536	2,549	2,721	2,560	25,029	4,003	4,565	6,271	3,850	9,135	972	3,455	893	2,511	770	497	365	459	851	1,168	66	1,932	356	6,330	1,318
herring, Atlantic (yoy-est)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,540	1,542	1,380	9,046	539	1,007	10,334	12	3,255	47
herring, Atlantic thread	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
herring, blueback	1,722	117	267	104	247	367	124	38	175	106	1,199	255	97	630	211	19	143	279	68	110	218	111	63	156	74	291	101
herring, round	22	15	0	1	0	0	0	0	2	6	2	0	0	0	31	0	0	5	0	0	0	0	0	0	0	0	0
hogchoker	293	282	140	87	113	118	259	104	61	73	37	17	45	15	12	39	40	85	100	92	83	61	22	78	38	39	34
jack, crevalle	0	1	0	1	4	0	0	0	0	6	8	1	0	3	0	8	0	0	1	2	2	2	0	2	0	1	0
jack, yellow	0	0	0	0	0	41	8	11	2	2	6	32	6	2	6	20	3	3	13	1	1	28	0	0	0	1	0
kingfish, northern	0	0	0	0	0	1	1	4	2	10	7	25	6	7	15	6	2	2	1	1	5	4	0	4	3	7	0
lamprey, sea	0	0	0	1	1	0	1	1	0	2	0	0	1	1	0	0	0	0	0	1	0	0	0	1	1	0	0
lizardfish, inshore	0	0	0	0	0	2	0	0	0	0	1	0	0	2	1	7	1	21	1	0	0	1	4	2	10	2	0

Appendix 5.2 cont.

Common name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
(number of tows)	172	200	200	199	200	196	144	172	200	0	139	167	7,805
anchovy, bay	4,693	1,296	1,350	1,424	399	1,239	1,069	641	1,346	-	1,618	443	41,238
anchovy, striped	1	3	1	0	2	8	0	222	21	-	326	62	934
anchovy, spp (yoy-est)	2,382	93	2,004	9,786	19,220	2,536	12,888	2,492	1,391	-	243	702	107,446
bigeye	0	0	0	0	1	0	1	0	3	-	0	1	16
bigeye, short	0	0	0	0	1	0	0	0	0	-	1	0	21
black sea bass	91	410	449	1,295	1,109	1,181	980	1,434	1,584	-	1,089	1,351	12,681
blenny, feather	0	0	0	0	0	0	0	0	0	-	0	0	4
blue runner	24	27	0	10	68	15	1	195	59	-	13	12	463
bluefish	2,765	3,851	1,829	4,457	2,650	2,793	2,408	702	2,048	-	1,203	881	199,045
bonito, Atlantic	0	0	0	0	0	0	0	0	0	-	0	0	9
burrfish, striped	1	0	0	0	0	0	0	0	0	-	1	0	3
butterfish	42,141	60,539	29,569	69,372	53,265	65,596	35,814	42,025	43,434	-	38,461	48,429	2,383,659
cod, Atlantic	109	0	0	5	5	1	4	11	15	-	14	15	321
Gadus spp. (yoy/larvae)	17	0	0	5	16	2	0	17	7	-	3	6	151
cornetfish, red	0	0	1	0	14	0	0	0	0	-	0	0	17
cornte fish, blue spotted	0	0	0	1	0	0	0	0	0	-	0	0	1
crab, horseshoe	257	199	265	261	159	164	112	264	218	-	339	402	7,243
croaker, Atlantic	1	0	1	2	6	0	0	1	0	-	0	0	56
cunner	14	20	20	2	13	4	4	4	0	-	5	1	2,038
cusk-eel, fawn	0	0	0	0	0	0	0	0	2	-	0	0	6
cusk-eel, striped	2	0	0	6	0	3	0	1	0	-	0	0	15
dogfish, smooth	613	610	1,051	1,197	1,438	1,338	1,624	1,598	1,243	-	1,728	1,331	26,099
dogfish, spiny	58	16	21	15	19	9	3	5	4	-	0	0	2,281
drum, black	0	0	0	1	0	0	2	0	0	-	0	0	3
eel, American	0	0	0	0	0	0	0	0	1	-	0	1	11
eel, american (yoy/larvae)	0	0	0	0	3	0	0	0	0	-	0	0	4
eel, conger	3	1	1	0	1	0	0	0	2	-	1	1	24
eel, conger (yoy/larvae)	0	1	0	0	0	0	0	1	0	-	0	2	5
filefish, orange	0	0	0	0	0	0	0	0	0	-	0	0	4
filefish, planehead	0	0	0	4	2	0	0	1	1	-	4	1	122
flounder, American plaice	1	0	0	0	0	0	0	0	0	-	0	0	3
flounder, fourspot	1,400	2,597	1,144	820	386	1,056	366	711	570	-	224	59	68,052
flounder, smallmouth	67	258	128	152	73	148	44	86	186	-	191	150	2,659
flounder, summer	1,051	980	1,071	859	808	462	354	753	1,309	-	796	501	22,360
flounder, windowpane	2,831	3,536	2,096	2,191	1,150	1,593	974	1,266	1,427	-	812	561	268,422
flounder, winter	3,092	3,365	1,912	1,372	1,340	1,108	112	500	422	-	266	313	435,846
flounder, yellowtail	1	0	0	0	2	0	0	0	0	-	0	0	20
glasseye snapper	0	0	1	0	2	0	1	0	0	-	0	0	27
goatfish, dwarf	0	0	0	0	0	0	0	0	0	-	0	0	1
goatfish, red	0	0	21	1	0	0	0	0	0	-	0	0	29
goby, naked	0	0	0	0	0	0	1	0	0	-	0	0	2
goosefish	0	2	0	0	2	70	0	1	2	-	0	3	162
grubby	4	0	0	0	0	0	0	0	0	-	0	0	59
gunnel, rock	4	1	0	0	1	0	0	0	0	-	0	0	105
haddock	0	0	5	0	0	1	0	1	0	-	0	0	52
hake, red	278	1,720	849	398	480	668	152	361	1,215	-	533	1,287	65,782
hake, silver	948	7,519	519	323	100	891	309	450	4,348	-	565	745	69,175
hake, spotted	725	626	927	505	302	2,456	1,253	1,015	2,027	-	886	110	20,184
harvestfish	0	1	2	0	0	0	0	2	1	-	0	0	6
herring, alewife	512	708	376	555	485	2,811	38	1,052	1,401	-	125	388	28,228
herring, Atlantic	1,482	571	3,566	1,838	630	340	10	352	1,294	-	114	47	96,025
herring, Atlantic (yoy-est)	48	623	11,196	487	587	817	1,341	1,207	952	-	0	41	46,001
herring, Atlantic thread	0	0	0	0	1	0	0	0	0	-	0	0	1
herring, blueback	72	46	68	58	249	448	89	579	124	-	12	39	9,075
herring, round	0	2	0	0	1	0	0	0	0	-	0	0	87
hogchoker	147	340	250	246	255	354	391	811	383	-	704	410	6,657
jack, crevalle	4	2	0	2	4	1	1	6	4	-	4	0	70
jack, yellow	0	0	0	0	0	0	0	0	0	-	0	0	186
kingfish, northern	34	59	14	51	97	31	11	75	14	-	76	190	765
lamprey, sea	0	0	0	0	1	0	0	0	0	-	0	0	12
lizardfish, inshore	43	0	0	30	0	4	1	7	2	-	116	0	258

Appendix 5.2 cont.

Common name	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
(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	160	200	78
lobster, American	5,995	3,549	4,924	6,923	6,032	7,645	9,696	8,524	8,160	12,583	9,123	9,944	9,490	16,467	16,211	13,922	10,481	5,626	3,880	2,923	1,843	1,389	748	1,648	1,096	853	293
lookdown	0	0	0	0	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
lumpfish	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
mackerel, Atlantic	68	17	20	29	45	376	46	2	4	17	11	1	5	8	13	21	2	0	5	8	0	37	0	9	0	5	0
mackerel, Spanish	0	0	0	0	0	11	0	2	1	233	106	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
menhaden, Atlantic	161	304	718	600	335	623	407	348	1,115	298	411	318	88	116	306	1,187	492	86	366	799	746	235	28	426	47	69	7
moonfish	7	226	23	7	142	60	10	24	62	6	149	33	921	287	1,188	645	1,817	225	424	133	182	356	361	979	689	2,575	0
mullet, white	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ocean pout	26	3	14	14	30	58	39	42	18	66	42	30	26	15	13	17	18	6	13	14	18	3	5	12	9	22	6
perch, silver	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
perch, white	0	0	0	0	0	2	0	0	0	4	1	0	1	4	0	1	1	0	0	8	2	0	0	0	4	1	0
pinfish	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
pipefish, northern	1	0	1	0	3	0	0	0	5	21	2	2	0	1	0	2	4	4	2	6	2	4	3	2	0	2	4
pollock	5	0	3	8	6	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	18	2
pompano, African	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
puffer, northern	1	2	6	0	3	2	2	5	1	28	4	1	3	1	28	14	4	8	6	3	5	5	0	8	0	5	0
puffer, smooth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ray, bluntnose stingray	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ray, bullnose ray	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ray, cownose	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ray, roughtail stingray	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	0	1	0	0	0	1	0	0
rockling, fourbeard	376	89	184	312	563	686	393	163	150	242	93	169	109	199	133	233	185	251	106	113	173	106	14	87	81	47	35
rudderfish, banded	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
salmon, Atlantic	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sand lance, American	nc	nc	nc	nc	nc	nc	nc	nc	nc	3	25	95	0	2	4	178	4	4	3	19	70	6	0	30	7,495	1,227	13,061
sand lance, (yoy-est)	nc	nc	nc	nc	nc	nc	nc	nc	nc	0	1,000	5	0	0	100	1,075	0	430	0	0	0	0	5,444	2	3,750	7,932	0
scad, bigeye	0	0	0	0	15	63	1	1	0	0	3	0	2	1	1	21	0	0	0	0	0	0	0	0	0	0	0
scad, mackerel	0	0	0	0	0	0	1	2	6	0	4	1	3	0	1	0	0	0	0	0	0	0	0	2	0	0	0
scad, rough	34	32	19	89	180	81	41	1	0	100	13	0	35	65	0	0	0	10	10	12	14	62	14	13	0	59	0
scad, round	0	0	0	0	0	0	0	0	0	0	0	0	0	2	4	1	2	0	0	4	11	12	0	3	0	1	0
sculpin, longhorn	14	82	51	32	107	107	263	139	31	11	7	5	7	4	2	2	14	5	3	5	5	0	0	3	2	2	1
scup	8,806	18,054	16,449	9,761	12,566	37,642	21,193	45,790	13,646	32,218	38,456	13,985	16,087	9,582	23,742	101,095	101,464	58,325	100,481	26,926	61,521	52,642	28,829	75,681	53,560	46,991	7,157
sea raven	57	59	70	88	52	34	44	19	4	1	1	2	2	3	30	9	19	7	11	3	7	3	0	5	0	5	6
sea turtle, kemp's ridley	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
sea turtle, loggerhead	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
seahorse, lined	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
searobin, northern	585	2,267	546	280	605	381	357	609	313	951	878	1,317	672	579	360	547	2,014	1,594	2,123	1,632	784	265	630	691	809	2,012	1,128
searobin, striped	1,434	2,295	2,035	1,482	2,086	2,211	2,353	865	857	1,491	1,298	682	1,008	819	1,321	1,690	3,129	2,061	2,394	2,235	1,308	757	366	755	612	1,507	141
seasnail	0	0	0	0	1	0	8	0	0	0	0	0	0	0	0	0	0	4	0	0	4	2	0	0	0	0	0
sennet, northern	1	0	0	0	0	1	0	0	0	2	0	0	0	0	0	6	0	1	2	0	0	8	0	2	0	5	0
shad, American	1,852	425	642	1,036	3,208	4,007	550	361	380	1,142	1,723	755	501	922	901	987	316	109	593	689	356	177	68	236	405	422	165
shad, gizzard	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	1	1	2	0	1	0	0	0
shad, hickory	71	4	7	6	4	40	2	1	12	10	31	6	29	25	40	56	42	14	45	41	39	136	75	37	5	13	2
shark, sand tiger	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
shark, sandbar (brown)	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
sharksucker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
silverside, Atlantic	0	0	0	0	0	0	0	0	1	54	3	39	0	2	0	1	2	1	0	1	0	0	0	1	2	3	1
skate, barndoor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
skate, clearnose	0	0	3	2	1	1	3	2	8	8	1	4	1	4	20	22	18	65	59	68	22	102	36	97	37	69	1
skate, little	2,751	4,614	4,303	3,847	9,471	9,349	11,902	6,479	3,495	6,051	6,714	2,372	6,203	4,068	4,305	3,686	3,340	4,311	4,242	4,071	3,044	1,317	593	1,277	682	709	281
skate, winter	1	20	34	17	114	120	85	50	31	62	51	41	88	48	62	41	31	38	45	82	53	31	23	44	51	44	16
smelt, rainbow	0	0	0	0	5	4	2	2	0	9	9	4	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
snapper, mahogany	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
spot	0	34	38	10	29	0	8	2	0	124	53	3	195	10	0	45	204	13	52	1	8	0	14	0	308	1	0
squid, long-finned	0	0	11,018	15,135	33,400	21,304	23,789	12,322	32,780	58,312	25,396	23,974	22,720	13,048	27,443	21,580	16,585	9,080	8,034	21,350	23,022	17,542	7,802	24,212	10,490	24,130	1,906
stargazer, northern	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
striped bass	10	13	12	30	31	59	117	38	42	81	81	165	232	319	400	397	293	214	469	383	378	469	144	422	199	466	71
sturgeon, Atlantic	11	3	6	6	7	13	9	3	30	60	60	6	3	5	17	39	7	18	18	29	8	9	21	18	7	18	1
tautog	734	773	796	624	629	791	693	501	265	164	224	61	136	190	194	217	287	319	565	225	232	179	186	280	179	163	53
toadfish, oyster	3	4	9	0	0	3	4	1	0	2	0	1	0	0	3	2	6	2	8	9	1	0	1	5	3	3	0
tomcod, Atlantic	2	1	0	8	2	3	3	4	8	5	2	4	2	1	0	1	0	0	0	0	2	0	0	0	0	1	0
triggerfish, gray	0	1	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
weakfish	366	2,740	7,751	327	1,341	5,914	2,246	4,320	1,317	2,060	8,156	2,881	6,375	3,904	3,495	12,416	23,595	12,739	10,713	8,183	17,505	9,191	241	17,386	2,531	2,604	1
Total	**122,527**	**152,574**	**153,383**	**136,139**	**216,479**	**294,027**	**277,183**	**174,235**	**186,975**	**230,301**	**204,795**	**163,532**	**165,756**	**170,761**	**258,082**	**392,831**	**271,608**	**172,622**	**229,284**	**131,812**	**250,439**	**200,991**	**109,330**	**215,638**	**164,948**	**239,154**	**39,340**

Appendix 5.2 cont.

Common name	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
(number of tows)	172	200	200	199	200	196	144	172	200	0	139	167	7,805
lobster, American	230	349	144	178	92	74	12	15	25	-	6	4	181,096
lookdown	0	0	0	1	0	0	0	0	0	-	0	0	7
lumpfish	0	0	0	0	0	0	0	0	0	-	0	0	2
mackerel, Atlantic	0	0	0	2	4	0	3	10	0	-	5	20	793
mackerel, Spanish	0	0	0	0	0	0	1	1	65	-	2	2	426
menhaden, Atlantic	181	426	234	723	1,279	876	239	227	815	-	303	881	16,818
moonfish	640	262	868	2,200	891	265	273	143	2,270	-	2,255	235	21,834
mullet, white	1	1	0	0	0	0	0	0	0	-	0	0	2
ocean pout	27	14	0	0	2	0	0	0	0	-	0	0	621
perch, silver	1	0	0	2	0	0	0	0	0	-	0	0	3
perch, white	1	1	0	1	0	0	0	0	2	-	0	0	34
pinfish	0	2	0	0	0	1	0	0	0	-	0	0	3
pipefish, northern	4	1	2	1	2	0	0	3	5	-	0	2	91
pollock	5	0	1	0	0	1	0	0	0	-	0	0	57
pompano, African	0	0	0	0	0	0	0	0	0	-	0	0	1
puffer, northern	9	47	3	10	11	5	4	5	9	-	56	85	389
puffer, smooth	0	0	0	0	0	0	0	0	1	-	0	0	1
ray, bluntnose stingray	0	0	0	0	0	1	0	0	0	-	0	0	1
ray, bullnose ray	0	0	2	0	0	0	0	0	0	-	0	0	2
ray, cownose	0	0	0	0	0	0	0	0	0	0	0	1	
ray, roughtail stingray	1	1	0	0	1	1	0	2	1	-	0	0	13
rockling, fourbeard	43	43	3	4	20	3	0	1	20	-	10	4	5,443
rudderfish, banded	0	0	0	1	0	0	0	0	0	-	0	0	2
salmon, Atlantic	0	0	0	0	0	0	0	0	0	-	0	0	1
sand lance, American	9,535	2	7	12	4	0	7	0	0	-	1	1	31,795
sand lance, (yoy-est)	15,600	0	0	0	0	0	0	0	0	-	200	1	35,539
scad, bigeye	0	0	0	0	3	0	0	0	0	-	3	28	142
scad, mackerel	0	0	0	1	0	0	0	0	0	-	21	0	42
scad, rough	150	19	28	5	144	1	7	0	0	-	11	5	1,255
scad, round	1	0	1	1	1	0	0	0	0	-	0	0	44
sculpin, longhorn	9	1	1	0	2	0	0	0	1	-	1	2	921
scup	34,457	53,119	24,961	45,705	80,534	175,632	75,763	81,228	53,617	-	54,698	85,562	1,797,925
sea raven	3	5	0	1	0	1	0	0	0	-	0	1	552
sea turtle, kemp's ridley	0	0	0	0	1	0	0	0	0	-	0	0	1
sea turtle, loggerhead	0	0	0	0	0	0	0	0	0	-	2	1	4
seahorse, lined	0	0	0	0	0	0	0	0	0	-	0	0	1
searobin, northern	803	3,642	1,934	2,584	805	3,178	1,430	2,949	3,112	-	4,135	2,021	51,522
searobin, striped	1,630	2,973	2,724	2,544	2,728	5,886	3,942	4,223	3,181	-	3,460	1,653	74,135
seasnail	0	0	0	0	0	0	0	0	0	-	0	2	21
sennet, northern	1	3	0	0	0	2	0	0	1	-	0	0	35
shad, American	271	321	222	162	275	944	230	230	512	-	403	206	26,702
shad, gizzard	0	1	0	0	0	0	0	0	0	-	0	0	9
shad, hickory	8	42	33	30	12	18	4	6	11	-	24	7	989
shark, sand tiger	0	0	0	0	0	1	0	0	0	-	1	0	2
shark, sandbar (brown)	0	0	0	0	0	0	0	0	0	-	0	0	1
sharksucker	0	0	0	0	0	0	0	0	0	-	0	0	1
silverside, Atlantic	0	0	3	1	5	3	0	0	0	-	0	0	123
skate, barndoor	0	0	0	0	0	0	0	0	0	-	0	0	1
skate, clearnose	56	280	218	104	131	134	73	81	113	-	165	122	2,130
skate, little	674	1,406	583	770	387	377	113	151	418	-	50	56	118,459
skate, winter	37	97	91	82	30	17	19	3	41	-	24	7	1,770
smelt, rainbow	0	0	0	0	0	0	0	0	0	-	0	0	37
snapper, mahogany	0	0	0	0	1	0	0	0	0	-	0	0	1
spot	5	858	1,917	20	14	12	114	36	66	-	90	105	4,388
squid, long-finned	13,020	9,767	5,393	13,436	28,266	12,424	14,186	13,146	10,934	-	9,652	15,385	651,983
stargazer, northern	0	0	1	0	0	0	0	1	0	-	0	0	3
striped bass	243	170	200	255	187	167	73	269	535	-	109	211	7,952
sturgeon, Atlantic	5	7	4	13	1	12	1	7	9	-	19	47	557
tautog	106	135	161	194	308	306	77	230	373	-	225	302	12,076
toadfish, oyster	1	0	5	2	2	4	1	2	4	-	10	1	102
tomcod, Atlantic	2	0	0	0	0	0	0	0	0	-	0	0	51
triggerfish, gray	0	0	0	0	0	0	0	0	0	-	0	0	4
weakfish	2,583	6,785	1,964	10,477	10,077	4,689	5,904	7,544	3,766	-	8,661	15,050	247,797
Total	**146,254**	**170,798**	**102,413**	**177,250**	**211,566**	**293,181**	**162,833**	**169,361**	**146,967**	**-**	**135,078**	**180,493**	**7,220,939**

Appendix 5.2 cont.

Total count of finfish, lobster, horseshoe crab and squid taken in the LISTS, 1984-2022.

Year	Tows	Total Count
1984	200	122,527
1985	246	152,574
1986	316	153,383
1987	320	136,139
1988	320	216,479
1989	320	294,027
1990	297	277,183
1991	200	174,235
1992	160	186,975
1993	240	230,301
1994	240	204,795
1995	200	163,532
1996	200	165,756
1997	200	170,761
1998	200	258,082
1999	200	392,831
2000	200	271,608
2001	200	172,622
2002	200	229,284
2003	200	131,812
2004	199	250,439
2005	200	200,991
2006	120	109,330
2007	200	215,638
2008	160	164,948
2009	200	239,154
2010	78	39,340
2011	172	146,254
2012	200	170,798
2013	200	102,413
2014	199	177,250
2015	200	211,566
2016	196	293,181
2017	144	162,833
2018	172	169,361
2019	200	146,967
2020	0	-
2021	139	135,078
2022	167	180,493
	7,805	7,220,939

Appendix 5.3. Annual total weight (kg) of finfish, lobster, horseshoe crab and squid taken in LISTS, 1992-2022.

Weights include all tows – number of tows shown in second row. Refer to Appendix 5.4 for details on number of tows conducted per month. Note: nw = not weighed.

Common name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	200	200	199	200	196	144	172	200	0	139	167	5,586
anchovy, bay	nw	nw	nw	nw	nw	nw	nw	5.6	12.2	3.6	6.6	13.3	10.3	5.8	8.3	14.5	7.7	35.3	2.8	10.5	8.6	6.8	9.4	3.1	8.7	7.7	3.3	6.6	-	6.0	2.1	**198.8**
anchovy, striped	nw	nw	nw	nw	0.2	0.0	0.0	6.1	0.0	1.2	0.0	0.1	0.0	0.0	0.0	0.1	0.1	0.4	0.0	0.1	0.2	0.1	0.0	0.1	0.5	0.0	4.1	0.4	-	3.7	1.1	**18.5**
Anchovy, spp (yoy-est)	nw	nw	nw	nw	nw	nw	nw	0.5	4.5	0.8	1.5	2.0	3.0	1.5	0.6	0.8	5.1	0.7	0.0	1.0	0.4	1.3	2.6	3.3	3.1	7.9	1.7	1.4	-	0.4	0.7	**44.8**
bigeye	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.2	-	0.0	0.1	**0.9**
bigeye, short	0.0	0.1	0.1	0.0	0.3	0.2	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	0.1	0.0	**1.2**
black sea bass	1.8	6.4	11.0	4.7	12.1	10.5	10.6	17.2	22.6	74.8	188.3	49.6	40.5	26.4	9.3	46.8	29.8	59.5	20.1	54.2	141.0	181.2	543.3	678.0	823.4	714.8	690.7	816.7	-	521.6	578.8	**6,385.7**
blenny, feather	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.2**
blue runner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.3	0.0	2.3	0.0	1.7	2.7	0.0	0.9	6.7	1.5	0.1	19.9	3.8	-	1.0	0.9	**41.9**
bluefish	2,462.9	2,226.1	2,341.7	1,156.1	1,118.2	977.6	899.0	1,218.0	1,408.0	751.2	1,099.7	791.6	2,140.6	1,333.8	358.6	1,801.3	641.4	1,157.4	6.1	584.7	532.7	517.7	522.7	324.4	1,118.7	263.6	161.4	224.5	-	171.0	178.1	**28,488.8**
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**12.0**
burrfish, striped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.3	0.0	**1.3**
butterfish	1,357.3	1,450.1	1,202.2	1,664.5	1,844.7	2,017.2	3,661.1	4,171.6	1,458.3	1,834.0	1,924.2	682.8	1,842.7	2,097.3	1,631.4	1,446.2	1,442.0	3,186.9	166.9	1,600.8	1,891.3	1,252.5	1,707.6	1,011.2	2,036.1	1,426.0	1,412.7	1,114.1	-	1,034.8	1,272.9	**50,841.4**
cod, Atlantic	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.1	0.0	0.0	2.8	4.7	0.9	0.0	0.0	0.0	1.0	2.1	9.2	0.0	0.0	0.3	4.7	4.9	0.1	3.2	5.1	-	2.0	18.7	**60.2**
Gadus spp. (yoy/larvae)	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	1.5	0	0	0	1.8	0.3	0.4	0	0	0.4	1.1	0.2	0	0.4	0.2	-	0.1	0.2	**6.6**
cornetfish, red	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.6	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.8**
cornetfish, blue spotted	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-	0.0	0	**0.1**
crab, horseshoe	514.1	807.9	463.1	116.8	717	472.4	489.4	634.1	689.4	870.7	862.9	751	873.4	304.2	205.8	596.4	496.8	645.8	112.2	505.2	385.8	531.8	497.3	288.3	315.5	224.4	512.3	391.9	-	583.3	714.8	**15,574.0**
croaker, Atlantic	0.0	2.5	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.1	0.2	1.5	0.0	0.0	0.1	0.0	-	0.0	0.0	**5.0**
cunner	3.7	6.2	2.1	4.4	2.6	4.1	8.1	5.9	5.3	5.9	7.2	6.7	3.7	4.1	1.3	3.0	3.6	1.8	1.3	1.9	2.8	1.8	0.2	1.8	0.5	0.5	0.5	0.0	-	0.9	0.1	**92.0**
cusk-eel, fawn	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	-	0.0	0.0	**0.3**
cusk-eel, striped	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.6	0.0	0.1	0.0	0.1	0.0	-	0.0	0.0	**1.2**
dogfish, smooth	863.2	1,339.1	934.6	566.8	862.8	527.3	989.8	923.0	1,038.5	1,407.6	2,814.3	1,527.4	1,435.3	1,421.7	1,176.6	2,110.2	1,134.2	2,213.3	34.4	2,031.7	1,833.3	2,162.3	2,799.2	2,804.1	2,785.6	3,391.3	3,024.9	2,957.2	-	2,909.3	2,054.1	**52,073.1**
dogfish, spiny	30.7	58.4	199.6	0.0	2.1	13.7	44.5	51.1	9.9	128.6	48.0	239.5	104.7	102.0	47.0	122.3	127.7	545.7	16.2	203.5	62.8	91.5	62.2	80.8	43.6	15.6	16.7	23.8	-	0.0	0.0	**2,492.2**
drum, black	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	0.2	0	0	-	0	0	**0.3**
eel, American	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	-	0.0	0.9	**4.6**
eel, American (yoy)	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.3**
eel, conger	0.1	0.2	0.0	1.2	0.1	0.0	0.0	0.5	0.0	0.3	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.3	1.2	0.0	0.3	0.0	0.0	0.0	0.3	-	0.2	0.3	**7.2**
eel, conger (yoy)	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	nw	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	-	0.0	0.1	**0.4**
filefish, orange	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.2**
filefish, planehead	0.0	0.8	0.1	0.0	0.3	0.0	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.4	0.2	0.0	0.0	0.1	0.1	-	0.2	0.1	**3.1**
flounder, American plaice	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.3**
flounder, fourspot	382.4	193.6	202.4	402.9	407.2	615.3	306.0	203.9	398.6	362.7	326.9	350.1	309.3	125.9	88.1	224.9	186.3	169.8	92.0	224.2	454.5	203.4	145.0	76.3	175.3	67.9	147.6	147.8	-	51.2	14.2	**7,055.7**
flounder, smallmouth	0.6	2.6	1.5	1.2	2.3	2.4	6.4	5.2	2.7	3.8	4.9	3.0	2.8	2.4	0.6	2.6	3.2	4.7	1.4	3.5	7.5	5.2	6.0	3.6	4.2	2.0	2.9	4.1	-	4.3	2.9	**100.5**
flounder, summer	142.1	193.1	173.0	79.6	266.4	326.0	431.3	459.8	471.3	628.1	989.3	845.7	627.2	406.1	180.5	590.9	398.0	694.4	229.6	713.0	718.5	726.6	567.4	449.3	386.4	244.0	397.0	464.3	-	511.2	305.2	**13,615.3**
flounder, windowpane	286.1	578.9	597.2	356.2	1,223.6	986.1	741.1	594.2	368.8	475.5	343.3	378.8	333.7	177.5	128.9	510.8	524.0	342.8	449.3	395.9	501.1	326.6	365.6	191.1	154.7	127.1	189.6	242.5	-	142.8	95.7	**12,129.5**
flounder, winter	1,344.8	1,898.0	2,060.9	1,614.7	3,335.0	2,439.4	2,450.3	2,011.7	1,921.4	1,993.6	1,584.1	1,421.9	839.9	566.1	271.2	951.3	751.9	524.0	450.5	613.8	604.9	576.8	459.7	319.7	261.0	27.7	132.2	103.1	-	55.9	71.5	**31,657.0**
flounder, yellowtail	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.4	1.0	0.4	0.2	0.0	0.3	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	-	0.0	0.0	**3.7**
glasseye snapper	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.7	0.1	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	0.0	-	0.0	0.0	**2.0**
goatfish, red	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.9**
goby, naked	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	-	0.0	0.0	**0.2**
goosefish	2.5	0.5	2.0	3.3	0.1	1.6	3.2	0.3	0.2	0.4	0.6	0.0	0.1	0.7	1.2	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.1	23.3	0.0	0.9	0.8	-	0.0	1.7	**44.3**
grubby	0.0	0.0	0.3	0.1	0.2	0.7	0.3	0.2	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**2.4**
gunnel, rock	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.2	0.1	0.1	0.4	0.2	0.6	0.1	0.1	0.2	0.2	0.5	0.2	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	**3.4**
haddock	0.0	0.0	0.0	0.2	0.0	0.1	0.5	0.1	0.0	0.0	0.0	1.3	0.6	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.0	1.6	-	0.0	0.0	**5.1**
hake, red	127.7	254.4	63.9	145.6	95.5	80.5	217.5	226.5	162.6	109.7	206.6	73.4	51.6	56.0	37.4	200.4	141.3	59.5	64.3	25.1	148.6	61.1	33.5	44.5	50.3	11.9	25.8	77.5	-	35.9	78.2	**2,966.8**
hake, silver	22.0	21.9	127.6	61.6	20.0	70.8	88.3	99.6	28.8	152.2	89.6	13.9	27.3	7.1	37.7	14.6	208.5	50.0	35.4	40.3	171.0	23.6	10.6	6.5	32.9	12.3	18.3	126.1	-	21.2	23.3	**1,663.0**
hake, spotted	10.3	55.9	32.4	6.5	42.6	19.0	12.2	38.8	92.3	34.9	48.2	70.4	37.8	17.4	24.3	23.9	65.8	32.1	15.8	76.8	64.2	66.8	59.5	40.1	113.8	111.2	151.7	178.3	-	73.4	4.5	**1,620.9**
harvestfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.2	0.1	-	0.0	0.0	**0.6**
herring, Atlantic	797.5	1,120.0	769.3	1,631.7	189.8	515.1	74.6	45.4	124.1	72.6	63.9	89.1	58.3	131.1	10.3	234.2	52.1	239.2	179.0	199.4	61.5	321.2	91.2	71.8	37.1	1.1	45.0	302.7	-	0.5	3.1	**7,531.9**
herring, Atlantic (yoy-est)	nw	nw	nw	nw	nw	nw	nw	nw	nw	1.5	1.9	2.8	2.4	1.2	0.2	4.2	0.4	1.9	0.3	0.5	1.2	7.3	0.5	1.3	1.3	0.7	1.5	0.9	-	0	0.4	**32.4**
herring, Atlantic thread	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0	0	0	0	-	0	0	**0.1**
herring, alewife	9.2	54.5	83.2	24.6	134.6	81.3	35.1	107.6	96.0	41.7	70.2	55.3	56.1	47.6	49.5	101.3	51.1	96.0	14.3	29.8	47.0	34.1	43.2	30.5	132.0	2.0	87.5	86.1	-	7.4	22.1	**1,730.9**
herring, blueback	8.5	4.7	31.2	7.5	6.2	16.5	5.1	1.1	6.8	11.1	2.4	4.0	6.5	5.4	2.5	9.1	3.2	14.6	3.4	3.2	1.6	4.3	4.2	7.1	12.2	3.5	36.5	6.0	-	0.4	1.0	**229.8**
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	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	**1.6**
hogchoker	5.6	7.3	3.9	1.7	5.4	1.8	1.9	5.0	5.9	10.5	13.3	8.6	9.5	8.7	3.2	11.4	5.6	4.5	4.4	16.8	30.7	27.2	27.8	31.2	41.8	50.1	98.9	50.8	-	87.5	52.3	**633.3**
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	0.1	0.0	0.1	0.0	0.4	0.2	0.0	0.2	0.4	0.1	0.1	0.5	0.2	-	0.2	0.0	**5.6**
jack, yellow	0.2	0.2	0.4	2.1	0.5	0.2	0.7	1.9	0.2	0.3	1.4	0.1	0.1	3.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**11.4**
kingfish, northern	0.2	1.0	0.5	2.5	0.6	0.9	1.3	0.6	0.3	0.2	0.2	0.6	0.5	0.6	0.0	0.4	0.4	0.4	0.0	3.7	8.4	2.3	3.2	7.1	4.8	2.3	9.9	1.9	-	6.5	13.4	**74.7**
lamprey, sea	0.0	1.0	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0	-	0.0	0.0	**5.2**
lizardfish, inshore	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.5	0.1	2.2	0.1	0.0	0.0	0.1	0.4	0.2	0.5	0.2	0.0	4.6	0.0	0.0	2.8	0.0	0.3	0.1	0.5	0.1	-	9.3	0.0	**22.4**
lobster, American	1,537.9	2,700.3	1,956.1	2,141.9	2,113.5	3,800.9	3,873.9	3,397.9	2,184.5	1,531.2	1,005.7	690.9	481.5	364.3	197.9	396.5	314.1	244.0	83.6	52.0	70.0	37.3	31.5	24.0	25.2	4.0	3.8	7.6	-	2.4	1.4	**29,275.8**
lookdown	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.5**
lumpfish	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.2**
mackerel, Atlantic	1.0	1.3	0.9	0.1	0.5	1.7	1.1	3.1	0.8	0.0	2.5	1.9	0.0	5.7	0.0	0.8	0.0	0.4	0.0	0.0	0.0	0.0	0.2	0.4	0.0	1.3	0.7	0.0	-	0.3	1.7	**26.4**

Appendix 5.3 cont.

Common name	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
(number of tows)	160	240	240	200	200	200	200	200	200	200	200	200	199	200	120	200	160	200	78	172	200	200	199	200	196	144	172	200	0	139	167	5,586
mackerel, Spanish	1.5	5.3	6.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	3.7	-	0.3	0.1	**19.8**
menhaden, Atlantic	60.6	103.9	87.8	41.9	40.5	38.5	9.2	90.9	31.8	4.7	96.3	344.9	110.7	77.9	5.5	63.9	10.4	18.0	2.7	69.8	144.6	87.5	267.8	361.2	69.4	72.2	80.5	280.7	-	95.3	223.3	**2,992.4**
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	19.5	0.0	6.3	3.6	10.0	23.2	14.6	5.2	4.2	2.6	22.6	-	28.6	3.7	**258.4**
mullet, white	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.2**
ocean pout	7.7	16.4	9.1	6.5	7.2	4.8	2.7	3.9	4.9	2.3	4.3	2.9	5.4	0.7	0.9	3.2	2.1	4.8	1.4	4.5	2.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	-	0.0	0.0	**98.2**
perch, silver	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.3**
perch, white	0.0	0.3	0.3	0.0	0.1	0.9	0.0	0.4	0.2	0.0	0.0	1.4	0.5	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.2	-	0.0	0.0	**5.0**
pinfish	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	-	0.0	0.0	**0.3**
pipefish, northern	0.4	0.6	0.2	0.1	0.0	0.1	0.0	0.1	0.2	0.3	0.2	0.4	0.2	0.3	0.2	0.2	0.0	0.2	0.3	0.3	0.1	0.2	0.1	0.2	0.0	0.0	0.2	0.2	-	0.0	0.1	**5.4**
pollock	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.8	0.1	0.5	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	-	0.0	0.0	**2.1**
pompano, African	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.1**
puffer, northern	0.1	0.9	0.4	0.1	0.3	0.1	0.5	1.1	0.4	0.7	0.3	0.3	0.4	0.3	0.0	0.5	0.0	0.4	0.0	0.9	3.1	0.3	1.3	0.8	0.9	0.7	0.3	1.4	-	2.1	2.0	**20.6**
puffer, smooth	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	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	**0.1**
ray, bluntnose stingray	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	-	0.0	0.0	**0.6**
ray, bullnose ray	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**5.7**
ray, cownose	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	2.6	**2.6**
ray, roughtail stingray	0.0	0.0	0.0	0.0	0.0	50.6	3.4	0.0	0.0	2.5	24.4	0.0	4.1	0.0	0.0	0.0	3.0	0.0	0.0	13.0	5.0	0.0	0.0	7.8	45.4	0.0	18.9	16.8	-	0.0	0.0	**194.9**
rockling, fourbeard	12.8	15.7	8.5	14.7	8.6	17.3	11.6	28.8	14.7	21.5	9.7	9.2	13.0	6.8	1.5	7.6	7.1	3.9	2.9	4.0	3.5	0.2	0.4	2.0	0.3	0.0	0.1	1.3	-	1.2	0.3	**229.2**
rudderfish, banded	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.4**
salmon, Atlantic	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.1**
sand lance, American	nw	0.3	0.6	0.4	0.0	0.1	0.3	0.3	0.3	0.3	0.1	0.2	0.2	0.2	0.0	0.3	7.2	2.0	5.2	7.5	0.2	0.1	0.2	0.1	0.0	0.1	0.0	0.0	-	0.1	0.1	**26.4**
sand lance, (yoy - est)	nw	0.0	0.8	0.1	0.0	0.0	0.1	0.4	0.0	0.6	0.0	0.0	0.0	0.0	2.9	0.1	0.2	2.3	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.1	0.1	**11.5**
scad, bigeye	0.0	0.0	0.3	0.0	0.1	0.1	0.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	-	0.2	1.3	**3.8**
scad, mackerel	0.2	0.0	0.4	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	-	0.4	0.0	**1.5**
scad, rough	0.0	4.4	0.2	0.0	1.5	2.0	0.0	0.0	0.0	0.7	0.7	0.5	0.7	1.9	0.5	0.7	0.0	2.8	0.0	6.8	1.1	1.3	0.5	7.1	0.1	0.6	0.0	0.0	-	0.5	0.3	**34.9**
scad, round	0.0	0.0	0.0	0.0	0.0	0.2	0.3	0.1	0.2	0.0	0.0	0.3	0.3	0.3	0.0	0.3	0.0	0.1	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	**2.5**
sculpin, longhorn	9.0	3.2	1.6	1.3	2.1	0.8	1.0	0.3	5.0	1.5	0.9	2.0	3.4	0.0	0.0	0.8	0.3	0.3	0.4	2.0	0.2	0.4	0.0	0.7	0.0	0.0	0.0	0.1	-	0.3	0.6	**38.2**
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	6,509.9	6,332.1	1,971.6	6,759.5	6,170.2	5,945.6	5,161.4	6,045.5	16,006.0	9,616.8	12,947.0	11,169.0	-	8,184.6	10,840.0	**174,059.8**
sea raven	3.9	0.6	0.2	0.7	1.5	0.4	11.3	4.9	9.2	4.1	4.1	1.6	2.4	0.5	0.0	3.6	0.0	1.7	1.6	0.9	1.1	0.0	1.5	0.0	0.2	0.0	0.0	0.0	-	0.0	0.3	**56.3**
sea turtle, kemp's ridley	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	-	0.0	0.0	**3.8**
sea turtle, loggerhead	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	136.1	75.0	
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	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.1**
searobin, northern	35.6	97.9	66.7	166.9	57.4	60.4	39.4	52.0	251.2	222.7	267.3	252.2	112.0	21.3	74.5	74.2	58.8	194.3	149.5	85.5	405.2	161.7	225.9	133.2	452.1	196.2	460.8	450.5	-	727.1	366.1	**5,918.6**
searobin, striped	305.1	260.0	208.6	277.5	278.7	230.5	509.7	497.0	1,036.1	861.0	1,065.0	805.1	465.4	183.7	113.5	217.0	263.0	471.8	66.4	558.7	1,086.4	1,112.5	1,020.8	1,058.2	1,964.4	1,400.0	1,582.6	1,264.4	-	1,281.7	616.6	**21,061.4**
seasnail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.1	**0.8**
sennet, northern	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.1	0.2	0.0	0.0	0.7	0.0	0.2	0.0	0.4	0.0	0.1	0.3	0.0	0.0	0.0	0.2	0.0	0.0	0.1	-	0.0	0.0	**3.0**
shad, American	63.3	138.9	165.8	81.4	36.2	66.8	60.2	117.3	25.8	9.6	40.3	40.8	24.2	18.2	6.1	15.8	20.2	28.9	8.6	17.5	25.3	15.3	12.3	24.7	46.2	21.0	17.6	32.3	-	26.6	19.3	**1,226.5**
shad, gizzard	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.1	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.9**
shad, hickory	4.9	4.4	7.6	2.5	10.2	9.1	15.9	19.4	17.1	6.7	19.6	20.1	14.2	43.1	19.1	10.4	1.1	3.6	0.4	1.5	14.1	10.8	10.5	5.5	4.2	1.3	2.2	3.1	-	9.1	2.5	**294.2**
shark, sand tiger	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.8	0.0	0.0	0.0	-	8.4	0.0	**21.8**
sharksucker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.3**
silverside, Atlantic	0.1	1.0	0.3	0.9	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.3	0.1	0.0	0.0	0.3	0.1	0.4	0.3	0.0	0.0	0.0	-	0.0	0.0	**4.6**
skate, barndoor	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.4**
skate, clearnose	10.3	11.3	1.8	11.0	1.7	7.4	36.8	39.4	37.9	132.4	107.3	130.8	48.2	187.1	52.4	193.3	78.1	148.5	4.5	109.8	491.7	387.0	207.7	225.0	228.7	147.1	149.8	213.8	-	278.7	191.2	**3,870.7**
skate, little	1,389.0	2,534.8	3,091.5	1,055.3	2,801.8	1,945.8	2,085.5	1,829.6	1,604.7	2,022.6	2,121.9	2,187.3	1,689.8	682.5	310.6	697.0	327.4	390.0	148.3	359.4	657.9	317.8	428.2	192.0	193.1	63.0	82.4	220.9	-	24.8	29.4	**31,484.3**
skate, winter	105.3	220.9	139.2	89.2	212.7	109.7	180.7	89.8	66.5	112.2	133.5	162.1	100.3	59.9	60.0	117.8	140.8	108.5	37.7	101.2	179.8	111.2	133.8	51.8	31.6	34.1	4.1	72.7	-	21.3	5.8	**2,994.2**
smelt, rainbow	0.0	0.6	0.6	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**1.7**
snapper, mahogany	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	-	0.0	0.0	**0.1**
spot	0.0	10.6	4.3	0.3	14.1	1.1	0.0	5.7	17.8	1.3	7.2	0.1	0.9	0.0	1.2	0.0	21.3	0.2	0.0	0.7	107.5	195.4	1.8	1.7	1.7	10.5	3.8	8.2	-	11.4	16.6	**445.4**
squid, long-finned	844.9	1,629.1	965.4	796.4	720.4	515.2	767.0	826.4	582.3	346.2	279.9	573.2	953.4	683.5	326.0	773.6	330.1	648.4	161.4	370.7	333.9	170.8	582.3	1,366.2	464.4	584.5	408.8	368.4	-	360.3	701.1	**18,434.2**
stargazer, northern	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.0	-	0.0	0.0	**0.4**
striped bass	89.4	210.3	198.6	185.3	373.5	509.9	484.2	815.4	602.6	472.5	855.2	770.3	811.8	675.1	418.7	888.0	456.3	897.4	173.2	721.9	278.0	421.0	407.5	405.2	261.9	186.8	457.4	773.6	-	164.6	583.1	**14,548.7**
sturgeon, Atlantic	244.8	633.6	848.6	145.5	19.9	37.8	189.7	498.6	79.0	270.6	275.3	550.2	117.6	152.7	368.7	336.4	111.3	286.6	5.6	181.9	154.2	98.0	272.4	15.8	318.3	60.9	98.6	104.7	-	378.6	608.7	**7,464.6**
tautog	508.3	320.0	373.9	95.1	225.9	271.8	347.1	326.6	463.5	491.2	921.1	346.0	353.7	269.2	301.4	551.4	309.4	285.4	83.1	151.7	128.9	160.8	192.5	339.7	288.5	99.0	209.0	351.9	-	193.9	302.0	**9,262.0**
toadfish, oyster	0.0	1.2	0.0	0.5	0.0	0.0	0.9	1.8	2.5	0.4	4.7	5.0	0.8	0.0	1.2	2.0	1.9	0.8	0.0	0.2	0.0	0.9	0.6	0.9	1.7	0.3	0.8	1.1	-	3.8	0.4	**34.4**
tomcod, Atlantic	1.3	0.8	0.3	0.8	0.3	0.1	0.0	0.7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**4.8**
triggerfish, gray	0.0	0.9	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	**3.2**
weakfish	94.8	121.2	344.5	275.7	414.9	362.0	268.2	771.3	554.5	415.0	442.0	194.8	426.9	449.9	52.2	584.8	116.1	108.7	1.0	192.6	409.2	203.7	334.8	530.4	297.6	311.2	270.2	245.5	-	612.4	725.4	**10,131.5**
Total	**14,545.1**	**20,214.3**	**18,679.6**	**14,022.0**	**18,386.1**	**17,763.5**	**20,136.1**	**23,914.0**	**22,617.2**	**21,748.8**	**32,213.8**	**19,710.6**	**21,370.3**	**13,830.5**	**11,233.6**	**19,312.0**	**15,386.5**	**20,294.8**	**4,812.3**	**17,144.4**	**18,361.7**	**16,592.2**	**17,288.4**	**17,313.4**	**29,304.2**	**19,532.4**	**24,002.8**	**22,955.2**	**0.0**	**18,797.8**	**20,834.7**	**572,318.3**

Appendix 5.4. 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 5.4. 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 5.4. 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 5.4. 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 5.4. 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 5.4. 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 5.4. 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 5.4. 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 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1992.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=160.

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

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

Appendix 5.4. 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	%	species	count	%	weight	%
butterfish	35,361	33.0	847.8	7.1	goosefish	3	0	0.3	0
scup	18,785	17.6	581.4	4.8	American sand lance	3	0	0.3	0
winter flounder	16,090	15.0	1,855.7	15.4	Atlantic bonito	2	0	6.4	0.1
windowpane flounder	7,953	7.4	547.6	4.6	lumpfish	2	0	0.2	0
Atlantic herring	6,269	5.9	1,119.8	9.3	moonfish	2	0	0.2	0
little skate	5,186	4.8	2,172.3	18.1	sea lamprey	2	0	1.0	0
bluefish	4,402	4.1	1,343.2	11.2	Atlantic salmon	1	0	0.1	0
red hake	3,963	3.7	232.0	1.9	American eel	1	0	1.6	0
fourspot flounder	1,262	1.2	182.3	1.5	northern sennet	1	0	0.1	0
weakfish	1,142	1.1	60.3	0.5	orange filefish	1	0	0.1	0
striped searobin	1,079	1.0	165.4	1.4	round herring	1	0	0.1	0
northern searobin	935	0.9	96.8	0.8	red cornetfish	1	0	0.1	0
American shad	791	0.7	101.1	0.8	red goatfish	1	0	0.1	0
alewife	788	0.7	48.2	0.4	short bigeye	1	0	0.1	0
silver hake	500	0.5	21.1	0.2	sea raven	1	0	0.6	0
spotted hake	331	0.3	36.7	0.3	yellow jack	1	0	0.1	0
smooth dogfish	283	0.3	857.6	7.1	**Total**	**107,035**		**12,012.4**	
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	**Invertebrates**				
tautog	157	0.1	308.2	2.6	American lobster	10,306	20.6	2,173.5	34.4
Spanish mackerel	136	0.1	2.2	0	long-finned squid	39,723	79.4	1,176.5	18.6
blueback herring	96	0.1	4.3	0	blue mussel	nc	nc	945.1	15.0
rough scad	92	0.1	3.8	0	horseshoe crab	nc	nc	673.8	10.7
striped bass	78	0.1	198.7	1.7	spider crab	nc	nc	511.2	8.1
ocean pout	66	0.1	16.4	0.1	lady crab	nc	nc	428.0	6.8
cunner	64	0.1	6.1	0.1	rock crab	nc	nc	155.9	2.5
Atlantic sturgeon	60	0.1	633.6	5.3	flat claw hermit crab	nc	nc	45.7	0.7
winter skate	59	0.1	213.2	1.8	starfish spp.	nc	nc	37.4	0.6
spot	57	0.1	4.5	0	boring sponge	nc	nc	36.6	0.6
hogchoker	56	0.1	5.2	0	whelks	nc	nc	34.0	0.5
Atlantic silverside	54	0.1	1.0	0	mantis shrimp	nc	nc	31.6	0.5
northern puffer	23	0	0.4	0	lion's mane jellyfish	nc	nc	27.6	0.4
smallmouth flounder	23	0	2.1	0	bluecrab	nc	nc	20.0	0.3
Atlantic croaker	20	0	1.1	0	northern moon snail	nc	nc	8.9	0.1
black sea bass	16	0	5.0	0	common oyster	nc	nc	2.0	0
spiny dogfish	14	0	58.4	0.5	surf clam	nc	nc	1.0	0
Atlantic mackerel	11	0	0.9	0	hard clams	nc	nc	0.9	0
longhorn sculpin	11	0	3.2	0	purple sea urchin	nc	nc	0.7	0
planehead filefish	9	0	0.7	0	arks	nc	nc	0.7	0
hickory shad	9	0	4.1	0	mud crabs	nc	nc	0.4	0
northern pipefish	9	0	0.4	0	star coral	nc	nc	0.3	0
rainbow smelt	9	0	0.6	0	blood star	nc	nc	0.2	0
crevalle jack	5	0	0.4	0	common slipper shell	nc	nc	0.2	0
northern kingfish	5	0	0.6	0	sand shrimp	nc	nc	0.1	0
Atlantic tomcod	5	0	0.8	0	sand dollar	nc	nc	0.1	0
clearnose skate	4	0	7.7	0.1	northern red shrimp	nc	nc	0.1	0
white perch	4	0	0.3	0	polychaetes	nc	nc	0.1	0
conger eel	3	0	0.2	0	**Total**	**50,029**		**6,313**	

Appendix 5.4. 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 5.4. 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 5.4. 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	%	species	count	%	weight	%
butterfish	49,360	37.0	1,844.7	12.4	northern puffer	3	0	0.3	0
winter flounder	22,722	17.0	3,335.0	22.5	rock gunnel	3	0	0.2	0
scup	16,087	12.0	739.4	5.0	short bigeye	3	0	0.3	0
windowpane flounder	14,116	10.6	1,223.6	8.2	Atlantic sturgeon	3	0	19.9	0.1
bluefish	6,705	5.0	1,118.2	7.5	bigeye scad	2	0	0.1	0
weakfish	6,375	4.8	414.9	2.8	grubby	2	0	0.2	0
little skate	6,203	4.6	2,801.8	18.9	sea raven	2	0	1.5	0
fourspot flounder	2,815	2.1	407.2	2.7	Atlantic tomcod	2	0	0.3	0
alewife	1,402	1.0	134.6	0.9	clearnose skate	1	0	1.7	0
striped searobin	1,008	0.8	278.7	1.9	conger eel	1	0	0.1	0
Atlantic herring	972	0.7	189.8	1.3	gizzard shad	1	0	0.1	0
moonfish	921	0.7	11.6	0.1	goosefish	1	0	0.1	0
red hake	872	0.7	95.5	0.6	sea lamprey	1	0	0.7	0
northern searobin	672	0.5	57.4	0.4	spiny dogfish	1	0	2.1	0
American shad	501	0.4	36.2	0.2	white perch	1	0	0.1	0
silver hake	489	0.4	20.0	0.1	**Total**	**133,546**		**14,835.2**	
summer flounder	434	0.3	266.4	1.8					
spotted hake	384	0.3	42.6	0.3	**Invertebrates**				
smooth dogfish	275	0.2	862.8	5.8	American lobster	9,490	29.5	2,113.5	39.1
striped bass	232	0.2	373.5	2.5	lady crab	nc	nc	1,160.4	21.5
spot	195	0.1	14.1	0.1	long-finned squid	22,720	70.5	720.4	13.3
tautog	136	0.1	225.9	1.5	horseshoe crab	nc	nc	717.0	13.3
fourbeard rockling	109	0.1	8.6	0.1	spider crab	nc	nc	293.9	5.4
blueback herring	97	0.1	6.2	0	rock crab	nc	nc	162.7	3.0
Atlantic menhaden	88	0.1	40.5	0.3	lion's mane jellyfish	nc	nc	42.7	0.8
winter skate	88	0.1	212.7	1.4	blue mussel	nc	nc	42.5	0.8
hogchoker	45	0	5.4	0	flat claw hermit crab	nc	nc	39.4	0.7
smallmouth flounder	41	0	2.3	0	whelks	nc	nc	33.0	0.6
rough scad	35	0	1.5	0	mantis shrimp	nc	nc	20.9	0.4
hickory shad	29	0	10.2	0.1	boring sponge	nc	nc	19.2	0.4
black sea bass	27	0	12.1	0.1	bushy bryozoan	nc	nc	15.2	0.3
ocean pout	26	0	7.2	0	starfish spp.	nc	nc	6.2	0.1
cunner	17	0	2.6	0	arks	nc	nc	4.3	0.1
striped anchovy	11	0	0.2	0	northern moon snail	nc	nc	4.3	0.1
longhorn sculpin	7	0	2.1	0	bluecrab	nc	nc	4.0	0.1
northern kingfish	6	0	0.6	0	hard clams	nc	nc	3.2	0.1
yellow jack	6	0	0.5	0	surf clam	nc	nc	1.4	0
Atlantic mackerel	5	0	0.5	0	mud crabs	nc	nc	0.3	0
planehead filefish	3	0	0.3	0	purple sea urchin	nc	nc	0.1	0
mackerel scad	3	0	0.1	0	**Total**	**32,210**		**5,405**	

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1997.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

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

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

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 1998.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	136,926	64.0	3,661.1	24.4
scup	23,742	11.1	740.5	4.9
winter flounder	15,697	7.3	2,450.3	16.3
bluefish	8,814	4.1	899.0	6.0
windowpane flounder	6,483	3.0	741.1	4.9
little skate	4,305	2.0	2,085.5	13.9
weakfish	3,495	1.6	268.2	1.8
red hake	3,015	1.4	217.5	1.4
fourspot flounder	1,908	0.9	306.0	2.0
silver hake	1,870	0.9	88.3	0.6
striped searobin	1,321	0.6	509.7	3.4
moonfish	1,188	0.6	13.4	0.1
American shad	901	0.4	60.2	0.4
Atlantic herring	893	0.4	74.6	0.5
alewife	456	0.2	35.1	0.2
summer flounder	436	0.2	431.3	2.9
striped bass	400	0.2	484.2	3.2
northern searobin	360	0.2	39.4	0.3
smooth dogfish	310	0.1	989.8	6.6
Atlantic menhaden	306	0.1	9.2	0.1
blueback herring	211	0.1	5.1	0
tautog	194	0.1	347.1	2.3
spotted hake	142	0.1	12.2	0.1
fourbeard rockling	133	0.1	11.6	0.1
smallmouth flounder	97	0	6.4	0
cunner	65	0	8.1	0.1
winter skate	62	0	180.7	1.2
hickory shad	40	0	15.9	0.1
round herring	31	0	0.6	0
sea raven	30	0	11.3	0.1
northern puffer	28	0	0.5	0
clearnose skate	20	0	36.8	0.2
black sea bass	18	0	10.6	0.1
spiny dogfish	18	0	44.5	0.3
Atlantic sturgeon	17	0	189.7	1.3
northern kingfish	15	0	1.3	0
Atlantic mackerel	13	0	1.1	0
ocean pout	13	0	2.7	0
hogchoker	12	0	1.9	0
haddock	7	0	0.5	0
yellow jack	6	0	0.7	0
grubby	5	0	0.3	0
round scad	4	0	0.3	0
American sand lance	4	0	0.3	0

species	count	%	weight	%
goosefish	3	0	3.2	0
oyster toadfish	3	0	0.9	0
gray triggerfish	2	0	2.3	0
longhorn sculpin	2	0	1.0	0
bigeye scad	1	0	0.1	0
inshore lizardfish	1	0	0.1	0
mackerel scad	1	0	0.1	0
roughtail stingray	1	0	3.4	0
Total	**214,025**		**15,005.7**	
Invertebrates				
American lobster	16,211	36.7	3,873.9	60.2
long-finned squid	27,443	62.1	767.0	11.9
horseshoe crab	303	0.7	489.4	7.6
blue mussel	nc	nc	309.0	4.8
lady crab	nc	nc	291.2	4.5
rock crab	nc	nc	241.4	3.8
spider crab	nc	nc	157.2	2.4
lion's mane jellyfish	nc	nc	63.1	1.0
flat claw hermit crab	nc	nc	56.0	0.9
bushy bryozoan	nc	nc	55.6	0.9
boring sponge	nc	nc	24.9	0.4
knobbed whelk	51	0.1	22.5	0.3
starfish spp.	nc	nc	18.2	0.3
bluecrab	49	0.1	12.8	0.2
channeled whelk	40	0.1	10.1	0.2
whelks	52	0.1	9.8	0.2
northern moon snail	nc	nc	8.6	0.1
mantis shrimp	nc	nc	5.6	0.1
common oyster	nc	nc	5.4	0.1
hard clams	nc	nc	3.7	0.1
arks	nc	nc	2.0	0
red bearded sponge	nc	nc	1.4	0
surf clam	nc	nc	1.1	0
sea grape	nc	nc	0.8	0
mud crabs	nc	nc	0.7	0
boreal squid	18	0	0.7	0
purple sea urchin	nc	nc	0.6	0
common slipper shell	nc	nc	0.5	0
star coral	nc	nc	0.4	0
moon jelly	nc	nc	0.2	0
ghost shrimp	nc	nc	0.1	0
Total	**44,167**		**6,434**	

Appendix 5.4. 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 5.4. 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 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2001.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay anchovy, striped anchovy, and American sand lance and Atlantic herring are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
scup	58,325	37.7	5,828.4	30.7
butterfish	45,264	29.3	1,834.0	9.7
weakfish	12,739	8.2	415.0	2.2
winter flounder	9,826	6.4	1,993.6	10.5
little skate	4,311	2.8	2,022.6	10.6
bluefish	3,986	2.6	751.2	4.0
silver hake	3,945	2.6	152.2	0.8
windowpane flounder	3,065	2.0	475.5	2.5
fourspot flounder	2,167	1.4	362.7	1.9
striped searobin	2,061	1.3	861.0	4.5
northern searobin	1,594	1.0	222.7	1.2
red hake	1,382	0.9	109.7	0.6
summer flounder	875	0.6	628.1	3.3
alewife	638	0.4	41.7	0.2
spotted hake	606	0.4	34.9	0.2
smooth dogfish	598	0.4	1,407.6	7.4
Atlantic herring	497	0.3	72.6	0.4
bay anchovy	443	0.3	3.6	0
tautog	319	0.2	491.2	2.6
blueback herring	279	0.2	11.1	0.1
fourbeard rockling	251	0.2	21.5	0.1
moonfish	225	0.1	3.8	0
striped bass	214	0.1	472.5	2.5
black sea bass	134	0.1	74.8	0.4
American shad	109	0.1	9.6	0.1
smallmouth flounder	98	0.1	3.8	0
Atlantic menhaden	86	0.1	4.7	0
hogchoker	85	0.1	10.5	0.1
clearnose skate	65	0	132.4	0.7
cunner	51	0	5.9	0
spiny dogfish	48	0	128.6	0.7
striped anchovy	47	0	1.2	0
winter skate	38	0	112.2	0.6
inshore lizardfish	21	0	2.2	0
Atlantic sturgeon	18	0	270.6	1.4
hickory shad	14	0	6.7	0
spot	13	0	1.3	0
rough scad	10	0	0.7	0
northern puffer	8	0	0.7	0
sea raven	7	0	4.1	0
ocean pout	6	0	2.3	0
round herring	5	0	0.1	0
longhorn sculpin	5	0	1.5	0
fawn cusk-eel	4	0	0.2	0
northern pipefish	4	0	0.3	0
American sand lance	4	0	0.3	0
seasnail	4	0	0.3	0
yellow jack	3	0	0.3	0
conger eel	2	0	0.3	0
northern kingfish	2	0	0.2	0
oyster toadfish	2	0	0.4	0
Atlantic silverside	1	0	0.1	0

species	count	%	weight	%
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 5.4. 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 5.4. 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 5.4. 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 5.4. 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 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in LISTS in 2006.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=120.

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

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2007.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

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

Note: nc= not counted

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2008.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=120.

species	count	%	weight	%
scup	53,560	38	6,509.9	45.7
butterfish	48,766	34.6	1,442.0	10.1
American sand lance	7,495	5.3	7.2	0.1
silver hake	6,587	4.7	208.5	1.5
winter flounder	4,973	3.5	751.9	5.3
windowpane flounder	3,511	2.5	524.0	3.7
weakfish	2,531	1.8	116.1	0.8
red hake	1,723	1.2	141.3	1.0
bluefish	1,699	1.2	641.4	4.5
spotted hake	1,267	0.9	65.8	0.5
bay anchovy	1,128	0.8	7.7	0.1
alewife	931	0.7	51.1	0.4
fourspot flounder	902	0.6	186.3	1.3
northern searobin	809	0.6	58.8	0.4
moonfish	689	0.5	13.4	0.1
little skate	682	0.5	327.4	2.3
striped searobin	612	0.4	263.0	1.8
summer flounder	477	0.3	398.0	2.8
American shad	405	0.3	20.2	0.1
Atlantic herring	356	0.3	52.1	0.4
smooth dogfish	328	0.2	1,134.2	8.0
spot	308	0.2	21.3	0.1
striped bass	199	0.1	456.3	3.2
tautog	179	0.1	309.4	2.2
black sea bass	122	0.1	29.8	0.2
smallmouth flounder	89	0.1	3.2	0
fourbeard rockling	81	0.1	7.1	0
blueback herring	74	0.1	3.2	0
winter skate	51	0	140.8	1.0
Atlantic menhaden	47	0	10.4	0.1
hogchoker	38	0	5.6	0
clearnose skate	37	0	78.1	0.5
spiny dogfish	35	0	127.7	0.9
cunner	26	0	3.6	0
inshore lizardfish	10	0	0.5	0
ocean pout	9	0	2.1	0
Atlantic sturgeon	7	0	111.3	0.8
hickory shad	5	0	1.1	0
feather blenny	4	0	0.2	0
white perch	4	0	0.1	0
northern kingfish	3	0	0.4	0
oyster toadfish	3	0	1.9	0
Atlantic silverside	2	0	0.2	0
rock gunnel	2	0	0.2	0
longhorn sculpin	2	0	0.3	0
yellowtail flounder	2	0	0.4	0
Atlantic croaker	1	0	0.1	0
planehead filefish	1	0	0.1	0
glasseye snapper	1	0	0.1	0
pollock	1	0	0.1	0
roughtail stingray	1	0	3.0	0
sea lamprey	1	0	0.8	0
striped anchovy	1	0	0.1	0
Total	**140,777**		**14,239.8**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
horseshoe crab	289	2.2	496.8	29.2
long-finned squid	10,490	80.5	330.1	19.4
American lobster	1,096	8.4	314.1	18.5
spider crab	nc	nc	145.8	8.6
rock crab	nc	nc	64.0	3.8
bushy bryozoan	nc	nc	54.2	3.2
lady crab	nc	nc	36.3	2.1
starfish spp.	nc	nc	32.1	1.9
boring sponge	nc	nc	30.1	1.8
channeled whelk	177	1.4	29.3	1.7
mixed sponge species	nc	nc	27.8	1.6
hydroid spp.	nc	nc	24.6	1.4
flat claw hermit crab	nc	nc	22.8	1.3
common slipper shell	nc	nc	15.7	0.9
lion's mane jellyfish	520	4	14.3	0.8
mantis shrimp	244	1.9	9.1	0.5
sea grape	nc	nc	6.6	0.4
arks	124	1	6.1	0.4
knobbed whelk	17	0.1	5.9	0.3
blue mussel	nc	nc	5.8	0.3
northern moon snail	1	0	5.6	0.3
sand shrimp	nc	nc	4.0	0.2
blue crab	16	0.1	3.8	0.2
mud crabs	nc	nc	3.5	0.2
rubbery bryzoan	nc	nc	3.1	0.2
common oyster	1	0	2.1	0.1
hard clams	8	0.1	1.4	0.1
purple sea urchin	15	0.1	0.9	0.1
northern red shrimp	21	0.2	0.7	0
deadman's fingers sponge	nc	nc	0.6	0
surf clam	9	0.1	0.6	0
red bearded sponge	nc	nc	0.4	0
Jonah crab	2	0	0.4	0
star coral	nc	nc	0.3	0
sea cucumber	2	0	0.3	0
tunicates, misc	nc	nc	0.3	0
anemones	nc	nc	0.2	0
coastal mud shrimp	1	0	0.1	0
green crab	1	0	0.1	0
moon jelly	1	0	0.1	0
northern cyclocardia	1	0	0.1	0
Total	**13,036**		**1,700.1**	

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2009.

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

species	count	%	weight	%
butterfish	108,087	53.6	3,186.9	17
scup	46,991	23.3	6,332.1	33.8
bay anchovy	11,128	5.5	35.3	0.2
Atlantic herring	6,330	3.1	239.2	1.3
winter flounder	4,068	2	524.0	2.8
bluefish	3,657	1.8	1,157.4	6.2
weakfish	2,604	1.3	108.7	0.6
moonfish	2,575	1.3	19.5	0.1
windowpane flounder	2,496	1.2	342.8	1.8
northern searobin	2,012	1	194.3	1
striped searobin	1,507	0.7	471.8	2.5
American sand lance	1,227	0.6	2.0	0
alewife	1,175	0.6	96.0	0.5
fourspot flounder	1,036	0.5	169.8	0.9
silver hake	947	0.5	50.0	0.3
red hake	897	0.4	59.5	0.3
summer flounder	881	0.4	694.4	3.7
little skate	709	0.4	390.0	2.1
smooth dogfish	588	0.3	2,213.3	11.8
striped bass	466	0.2	897.4	4.8
American shad	422	0.2	28.9	0.2
spotted hake	327	0.2	32.1	0.2
blueback herring	291	0.1	14.6	0.1
tautog	163	0.1	285.4	1.5
spiny dogfish	148	0.1	545.7	2.9
black sea bass	121	0.1	59.5	0.3
smallmouth flounder	96	0	4.7	0
clearnose skate	69	0	148.5	0.8
Atlantic menhaden	69	0	18.0	0.1
rough scad	59	0	2.8	0
fourbeard rockling	47	0	3.9	0
winter skate	44	0	108.5	0.6
hogchoker	39	0	4.5	0
blue runner	34	0	2.3	0
ocean pout	22	0	4.8	0
Atlantic sturgeon	18	0	286.6	1.5
cunner	18	0	1.8	0
pollock	18	0	0.8	0
Atlantic cod	15	0	1.0	0
hickory shad	13	0	3.6	0
northern kingfish	7	0	0.4	0
glasseye snapper	6	0	0.6	0
Atlantic mackerel	5	0	0.4	0
northern sennet	5	0	0.4	0
northern puffer	5	0	0.4	0
sea raven	5	0	1.7	0
striped anchovy	5	0	0.4	0
Atlantic silverside	3	0	0.3	0
oyster toadfish	3	0	0.8	0
inshore lizardfish	2	0	0.2	0
northern pipefish	2	0	0.2	0
rock gunnel	2	0	0.2	0
longhorn sculpin	2	0	0.3	0
crevalle jack	1	0	0.1	0
planehead filefish	1	0	0.1	0
round scad	1	0	0.1	0
striped cusk-eel	1	0	0.1	0
spot	1	0	0.2	0
northern stargazer	1	0	0.1	0
Atlantic tomcod	1	0	0.1	0
white perch	1	0	0.1	0
yellow jack	1	0	0.1	0
yellowtail flounder	1	0	0.2	0
Total	**201,476**		**18,750**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
long-finned squid	24,130	91.4	648.4	30.2
horseshoe crab	340	1.3	645.8	30
American lobster	853	3.2	244	11.3
spider crab	.	.	144.1	6.7
lion's mane jellyfish	641	2.4	89.3	4.2
lady crab	.	.	63.6	3
rock crab	.	.	42.4	2
common slipper shell	.	.	37	1.7
flat claw hermit crab	.	.	33.8	1.6
bushy bryozoan	.	.	33.3	1.5
starfish spp.	.	.	26.6	1.2
channeled whelk	127	0.5	26	1.2
hydroid spp.	.	.	25.7	1.2
knobbed whelk	39	0.1	11.6	0.5
mantis shrimp	215	0.8	10.7	0.5
Tubularia, spp.	.	.	9	0.4
northern moon snail	.	.	7.2	0.3
anemones	.	.	5.6	0.3
mixed sponge species	.	.	5.4	0.3
sea grape	.	.	5.0	0.2
boring sponge	.	.	4.2	0.2
blue crab	19	0.1	4.1	0.2
sand shrimp	.	.	3.8	0.2
deadman's fingers sponge	.	.	3.5	0.2
blue mussel	8	0	3.5	0.2
mud crabs	.	.	3.1	0.1
common oyster	1	0	3.1	0.1
arks	2	0	2.5	0.1
surf clam	18	0.1	1.7	0.1
hard clams	4	0	1.1	0.1
red bearded sponge	.	.	0.8	0
purple sea urchin	4	0	0.8	0
rubbery bryozoan	.	.	0.6	0
star coral	.	.	0.2	0
ghost shrimp	2	0	0.2	0
coastal mud shrimp	2	0	0.1	0
northern cyclocardia	1	0	0.1	0
northern red shrimp	1	0	0.1	0
sea cucumber	1	0	0.1	0
tunicates, misc	1	0	0.1	0
Total	**26,409**		**2,148.2**	

Note: nc= not counted

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2010.

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

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

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

Note: nc= not counted

Finfish not ranked

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

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2011.

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

species	count	%	weight	%
butterfish	42,141	36.7	1,600.8	9.9
scup	34,458	30.0	6,759.0	41.7
American sand lance	9,535	8.3	7.5	0.0
bay anchovy	4,693	4.1	10.5	0.1
winter flounder	3,092	2.7	613.8	3.8
windowpane flounder	2,831	2.5	395.9	2.4
bluefish	2,765	2.4	584.7	3.6
weakfish	2,583	2.3	192.6	1.2
striped searobin	1,630	1.4	558.7	3.4
Atlantic herring	1,482	1.3	199.4	1.2
fourspot flounder	1,400	1.2	224.2	1.4
summer flounder	1,051	0.9	713.0	4.4
silver hake	948	0.8	40.3	0.2
northern searobin	803	0.7	85.5	0.5
spotted hake	725	0.6	76.8	0.5
little skate	674	0.6	359.4	2.2
moonfish	640	0.6	6.3	0
smooth dogfish	613	0.5	2,031.7	12.5
alewife	512	0.4	29.8	0.2
red hake	278	0.2	25.1	0.2
American shad	271	0.2	17.5	0.1
striped bass	243	0.2	721.9	4.5
Atlantic menhaden	181	0.2	69.8	0.4
rough scad	150	0.1	6.8	0
hogchoker	147	0.1	16.8	0.1
Atlantic cod	109	0.1	9.2	0.1
tautog	106	0.1	151.7	0.9
black sea bass	91	0.1	54.2	0.3
blueback herring	72	0.1	3.2	0
smallmouth flounder	67	0.1	3.5	0
spiny dogfish	58	0.1	203.5	1.3
clearnose skate	56	0	109.8	0.7
inshore lizardfish	43	0	4.6	0
fourbeard rockling	43	0	4.0	0
winter skate	37	0	101.2	0.6
northern kingfish	34	0	3.7	0
ocean pout	27	0	4.5	0
blue runner	24	0	1.7	0
cunner	14	0	1.9	0
northern puffer	9	0	0.9	0
longhorn sculpin	9	0	2.0	0
hickory shad	8	0	1.5	0
Atlantic sturgeon	5	0	181.9	1.1
pollock	5	0	0.5	0
spot	5	0	0.7	0
crevalle jack	4	0	0.4	0
grubby	4	0	0.1	0
northern pipefish	4	0	0.3	0
rock gunnel	4	0	0.2	0
conger eel	3	0	1.1	0
sea raven	3	0	0.9	0
striped cusk-eel	2	0	0.2	0
Atlantic tomcod	2	0	0.2	0
American plaice	1	0	0.1	0
Atlantic croaker	1	0	0.2	0
northern sennet	1	0	0.1	0
round scad	1	0	0.1	0
roughtail stingray	1	0	13.0	0.1
striped burrfish	1	0	0.5	0
striped anchovy	1	0	0.1	0
silver perch	1	0	0.1	0
oyster toadfish	1	0	0.2	0
white perch	1	0	0.1	0
white mullet	1	0	0.1	0
yellowtail flounder	1	0	0.3	0
Total	**114,706**		**16,210.3**	

Finfish not ranked

anchovy spp, yoy

Atlantic herring, yoy

American sand lance (yoy)

Invertebrates

horseshoe crab	257	1.7	505.2	33.5
long-finned squid	13,020	86.4	370.7	24.6
spider crab	.	.	151.8	10.1
lady crab	.	.	132.4	8.8
American lobster	230	1.5	52.0	3.4
rock crab	.	.	45.5	3.0
hydroid spp.	.	.	30.5	2.0
mantis shrimp	971	6.4	29.6	2.0
bushy bryozoan	.	.	24.9	1.7
knobbed whelk	62	0.4	23.8	1.6
flat claw hermit crab	.	.	22.1	1.5
channeled whelk	99	0.7	19.0	1.3
starfish spp.	.	.	14.4	1.0
blue crab	69	0.5	12.4	0.8
lion's mane jellyfish	345	2.3	11.3	0.7
mixed sponge species	.	.	11.0	0.7
blue mussel	1	0	6.7	0.4
northern moon snail	.	.	5.6	0.4
boring sponge	.	.	5.5	0.4
hard clams	.	.	5.3	0.4
common slipper shell	.	.	5.2	0.3
sand shrimp	.	.	4.5	0.3
Tubularia, spp.	.	.	3.5	0.2
mud crabs	.	.	2.6	0.2
rubbery bryzoan	.	.	1.7	0.1
common oyster	1	0	1.6	0.1
sea grape	.	.	1.5	0.1
arks	.	.	1.4	0.1
surf clam	7	0	1.0	0.1
purple sea urchin	3	0	0.6	0
red bearded sponge	.	.	0.3	0
northern comb jelly	.	.	0.3	0
anemones	6	0	0.2	0
star coral	.	.	0.2	0
coastal mud shrimp	1	0	0.1	0
common razor clam	1	0	0.1	0
ghost shrimp	1	0	0.1	0
northern red shrimp	1	0	0.1	0
polychaetes	.	.	0.1	0
tunicates, misc	.	.	0.1	0
water jelly	1	0	0.1	0
Total	**15,076**		**1,505.0**	

Note: nc= not counted

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2012.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

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

species	count	%	weight	%
longhorn sculpin	1	0	0.2	0
white perch	1	0	0.2	0
white mullet	1	0	0.1	0
Total	**159,770**		**17,570.3**	
Finfish not ranked				
anchovy spp, yoy				
Atlantic herring, yoy				
American sand lance (yoy)				
Invertebrates				
horseshoe crab	199	1.7	385.8	30.6
long-finned squid	9,767	84.5	333.9	26.5
spider crab	.	.	162.4	12.9
American lobster	349	3.0	70.0	5.6
boring sponge	.	.	47.9	3.8
lady crab	.	.	45.3	3.6
rock crab	.	.	40.7	3.2
mantis shrimp	846	7.3	26.6	2.1
bushy bryozoan	.	.	20.4	1.6
flat claw hermit crab	.	.	18.3	1.5
blue crab	72	0.6	14.5	1.2
knobbed whelk	36	0.3	13.8	1.1
channeled whelk	76	0.7	13.7	1.1
blue mussel	1	0.0	9.4	0.7
common slipper shell	.	.	9.4	0.7
mixed sponge species	.	.	7.4	0.6
Tubularia, spp.	.	.	5.0	0.4
hydroid spp.	.	.	4.8	0.4
lion's mane jellyfish	50	0.4	4.4	0.3
mud crabs	.	.	3.9	0.3
starfish spp.	.	.	3.3	0.3
northern red shrimp	118	1.0	3.0	0.2
northern moon snail	.	.	1.8	0.1
sand shrimp	.	.	1.7	0.1
arks	.	.	1.4	0.1
hard clams	3	0	1.3	0.1
red bearded sponge	.	.	1.2	0.1
sea grape	.	.	1.1	0.1
deadman's fingers sponge	.	.	0.8	0.1
purple sea urchin	7	0	0.8	0
common oyster	.	.	0.8	0
surf clam	10	0.1	0.8	0
star coral	.	.	0.4	0
rubbery bryzoan	.	.	0.4	0
sea cucumber	3	0	0.4	0
tunicates, misc	16	0	0.4	0
water jelly	4	0	0.3	0
coastal mud shrimp	1	0	0.2	0
northern comb jelly	.	.	0.1	0
moon jelly	.	.	0.1	0
Total	**11,558**		**1,257.9**	

Note: nc= not counted

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2013.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
butterfish	29,569	35.4	1,252.5	7.9
scup	24,961	29.9	5,945.6	37.5
Atlantic herring	3,566	4.3	321.2	2.0
striped searobin	2,724	3.3	1,112.5	7.0
windowpane flounder	2,096	2.5	326.6	2.1
weakfish	1,964	2.4	203.7	1.3
northern searobin	1,934	2.3	161.7	1.0
spot	1,917	2.3	195.4	1.2
winter flounder	1,912	2.3	576.8	3.6
bluefish	1,829	2.2	517.7	3.3
bay anchovy	1,350	1.6	6.8	0.0
fourspot flounder	1,144	1.4	203.4	1.3
summer flounder	1,071	1.3	726.6	4.6
smooth dogfish	1,051	1.3	2,162.3	13.6
spotted hake	927	1.1	66.8	0.4
moonfish	868	1.0	10.0	0.1
red hake	849	1.0	61.1	0.4
little skate	583	0.7	317.8	2.0
silver hake	519	0.6	23.6	0.1
black sea bass	449	0.5	181.2	1.1
alewife	376	0.5	34.1	0.2
hogchoker	250	0.3	27.2	0.2
Atlantic menhaden	234	0.3	87.5	0.6
American shad	222	0.3	15.3	0.1
clearnose skate	218	0.3	387.0	2.4
striped bass	200	0.2	421.0	2.7
tautog	161	0.2	160.8	1.0
smallmouth flounder	128	0.2	5.2	0.0
winter skate	91	0.1	111.2	0.7
blueback herring	68	0.1	4.3	0.0
hickory shad	33	0.0	10.8	0.1
rough scad	28	0.0	1.3	0.0
red goatfish	21	0.0	0.5	0.0
spiny dogfish	21	0.0	91.5	0.6
cunner	20	0.0	1.8	0.0
northern kingfish	14	0.0	2.3	0.0
American sand lance	7	0.0	0.1	0.0
haddock	5	0.0	0.4	0.0
oyster toadfish	5	0.0	0.9	0.0
Atlantic sturgeon	4	0.0	98.0	0.6
Atlantic silverside	3	0.0	0.3	0.0
northern puffer	3	0.0	0.3	0.0
fourbeard rockling	3	0.0	0.2	0.0
bullnose ray	2	0.0	5.7	0.0
harvestfish	2	0.0	0.2	0.0
northern pipefish	2	0.0	0.2	0.0
conger eel	1	0.0	1.2	0.0
Atlantic croaker	1	0.0	0.1	0.0
glasseye snapper	1	0.0	0.1	0.0
pollock	1	0.0	0.1	0.0
round scad	1	0.0	0.1	0.0
red cornetfish	1	0.0	0.1	0.0
longhorn sculpin	1	0.0	0.4	0.0
striped anchovy	1	0.0	0.1	0.0
northern stargazer	1	0.0	0.1	0.0
Total	**83,413**		**15,843.7**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
blue mussel	3	0.0	622.1	31.9
horseshoe crab	265	3.4	531.8	27.3
long-finned squid	5,393	69.6	170.8	8.8
spider crab	nc		156.5	8.0
lion's mane jellyfish	1,067	13.8	150.0	7.7
common slipper shell	nc		61.0	3.1
American lobster	144	1.9	37.3	1.9
bushy bryozoan	nc		26.8	1.4
boring sponge	nc		26.1	1.3
mantis shrimp	646	8.3	21.6	1.1
flat claw hermit crab	nc		21.4	1.1
knobbed whelk	51	0.7	18.7	1.0
channeled whelk	95	1.2	18.6	1.0
hydroid spp.	nc		13.2	0.7
lady crab	nc		13.2	0.7
rock crab	nc		13.0	0.7
blue crab	52	0.7	10.4	0.5
Tubularia, spp.	nc		6.7	0.3
common oyster	nc		5.3	0.3
mud crabs	nc		3.5	0.2
sand shrimp	nc		2.9	0.1
northern moon snail	nc		2.9	0.1
surf clam	8	0.1	2.4	0.1
starfish spp.	1	0.0	2.1	0.1
sea grape	nc		2.1	0.1
arks	nc		1.9	0.1
hard clams	6	0.1	0.9	0.0
comb jelly spp	nc		0.8	0.0
red bearded sponge	nc		0.6	0.0
rubbery bryzoan	nc		0.5	0.0
purple sea urchin	10	0.1	0.5	0.0
coastal mud shrimp	4	0.1	0.3	0.0
deadman's fingers sponge	nc		0.3	0.0
mixed sponge species	nc		0.3	0.0
star coral	nc		0.2	0.0
sea cucumber	2	0.0	0.2	0.0
fan worm tubes	nc		0.1	0.0
ghost shrimp	1	0.0	0.1	0.0
Japanese shore crab	1	0.0	0.1	0.0
northern red shrimp	1	0.0	0.1	0.0
ribbed mussel	nc		0.1	0.0
Total	**7,750**		**1,947.4**	

Note: nc= not counted

Appendix 5.4. cont. Total number and weight (kg) of finfish and invertebrates caught in 2014.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=199.

species	count	%	weight	%
butterfish	69,372	45.3	1,707.6	10.6
scup	45,705	29.9	5,161.4	31.9
weakfish	10,477	6.8	334.8	2.1
bluefish	4,457	2.9	522.7	3.2
northern searobin	2,584	1.7	225.9	1.4
striped searobin	2,544	1.7	1,020.8	6.3
moonfish	2,200	1.4	23.2	0.1
windowpane flounder	2,191	1.4	365.6	2.3
Atlantic herring	1,838	1.2	91.2	0.6
bay anchovy	1,424	0.9	9.4	0.1
winter flounder	1,372	0.9	459.7	2.8
black sea bass	1,295	0.8	543.3	3.4
smooth dogfish	1,197	0.8	2,799.2	17.3
summer flounder	859	0.6	567.4	3.5
fourspot flounder	820	0.5	145.0	0.9
little skate	770	0.5	428.2	2.6
Atlantic menhaden	723	0.5	267.8	1.7
alewife	555	0.4	43.2	0.3
spotted hake	505	0.3	59.5	0.4
red hake	398	0.3	33.5	0.2
silver hake	323	0.2	10.6	0.1
striped bass	255	0.2	407.5	2.5
hogchoker	246	0.2	27.8	0.2
tautog	194	0.1	192.5	1.2
American shad	162	0.1	12.3	0.1
smallmouth flounder	152	0.1	6.0	0.0
clearnose skate	104	0.1	207.7	1.3
winter skate	82	0.1	133.8	0.8
blueback herring	58	0.0	4.2	0.0
northern kingfish	51	0.0	3.2	0.0
hickory shad	30	0.0	10.5	0.1
inshore lizardfish	30	0.0	2.8	0.0
spot	20	0.0	1.8	0.0
spiny dogfish	15	0.0	62.2	0.4
Atlantic sturgeon	13	0.0	272.4	1.7
American sand lance	12	0.0	0.2	0.0
blue runner	10	0.0	0.9	0.0
northern puffer	10	0.0	1.3	0.0
striped cusk-eel	6	0.0	0.6	0.0
Atlantic cod	5	0.0	0.3	0.0
rough scad	5	0.0	0.5	0.0
planehead filefish	4	0.0	0.4	0.0
fourbeard rockling	4	0.0	0.4	0.0
crevalle jack	2	0.0	0.2	0.0
Atlantic croaker	2	0.0	0.2	0.0
cunner	2	0.0	0.2	0.0
Atlantic mackerel	2	0.0	0.2	0.0
silver perch	2	0.0	0.2	0.0
oyster toadfish	2	0.0	0.6	0.0
Atlantic silverside	1	0.0	0.1	0.0
black drum	1	0.0	0.1	0.0
blue spotted cornetfish	1	0.0	0.1	0.0
lookdown	1	0.0	0.1	0.0
mackerel scad	1	0.0	0.1	0.0
northern pipefish	1	0.0	0.1	0.0
round scad	1	0.0	0.1	0.0
red goatfish	1	0.0	0.1	0.0
banded rudderfish	1	0.0	0.4	0.0
sea raven	1	0.0	1.5	0.0
white perch	1	0.0	0.2	0.0
Total	**153,100**		**16,173.8**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
longfin inshore squid	13,436	86.3	582.3	37.9
horseshoe crab	261	1.7	497.3	32.4
spider crab	nc		145.6	9.5
blue mussel	nc		52.2	3.4
lion's mane jellyfish	1,262	8.1	48.2	3.1
American lobster	178	1.1	31.5	2.1
bushy bryozoan	nc		24.8	1.6
mixed sponge species	nc		20.6	1.3
common slipper shell	nc		18.8	1.2
mantis shrimp	332	2.1	14.4	0.9
flat claw hermit crab	nc		14.0	0.9
knobbed whelk	34	0.2	12.3	0.8
lady crab	nc		9.3	0.6
sea grape	nc		7.3	0.5
channeled whelk	29	0.2	5.9	0.4
hydroid spp.	nc		5.3	0.3
rock crab	nc		4.8	0.3
northern moon snail	nc		4.6	0.3
Tubularia, spp.	nc		4.6	0.3
boring sponge	nc		4.3	0.3
sand shrimp	nc		4.1	0.3
blue crab	18	0.1	3.0	0.2
arks	nc		2.7	0.2
mud crabs	nc		2.6	0.2
starfish spp.	2	0.0	1.6	0.1
ribbed mussel	nc		1.6	0.1
comb jelly spp	nc		1.4	0.1
star coral	nc		0.7	0.0
purple sea urchin	4	0.0	0.6	0.0
surf clam	4	0.0	0.5	0.0
coastal mud shrimp	1	0.0	0.3	0.0
rubbery bryzoan	nc		0.3	0.0
tunicates, misc	nc		0.3	0.0
anemones	5	0.0	0.2	0.0
brown shrimp	2	0.0	0.2	0.0
common razor clam	1	0.0	0.2	0.0
hard clams	nc		0.2	0.0
common oyster	nc		0.2	0.0
red bearded sponge	nc		0.1	0.0
deadman's fingers sponge	nc		0.1	0.0
ghost shrimp	1	0.0	0.1	0.0
water jelly	1	0.0	0.1	0.0
Total	**15,571**		**1,529.2**	

Note: nc= not counted

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2015.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
scup	80,534	49.3	6,045.5	38.7
butterfish	53,265	32.6	1,011.2	6.5
weakfish	10,077	6.2	530.4	3.4
striped searobin	2,728	1.7	1,058.2	6.8
bluefish	2,650	1.6	324.4	2.1
smooth dogfish	1,438	0.9	2,804.1	17.9
winter flounder	1,340	0.8	319.7	2.0
Atlantic menhaden	1,279	0.8	361.2	2.3
windowpane flounder	1,150	0.7	191.1	1.2
black sea bass	1,109	0.7	678.0	4.3
moonfish	891	0.5	14.6	0.1
summer flounder	808	0.5	449.3	2.9
northern searobin	805	0.5	133.2	0.9
Atlantic herring	630	0.4	71.8	0.5
alewife	485	0.3	30.5	0.2
red hake	480	0.3	44.5	0.3
bay anchovy	399	0.2	3.1	0.0
little skate	387	0.2	192.0	1.2
fourspot flounder	386	0.2	76.3	0.5
tautog	308	0.2	339.7	2.2
spotted hake	302	0.2	40.1	0.3
American shad	275	0.2	24.7	0.2
hogchoker	255	0.2	31.2	0.2
blueback herring	249	0.2	7.1	0.0
striped bass	187	0.1	405.2	2.6
rough scad	144	0.1	7.1	0.0
clearnose skate	131	0.1	225.0	1.4
silver hake	100	0.1	6.5	0.0
northern kingfish	97	0.1	7.1	0.0
smallmouth flounder	73	0.0	3.6	0.0
blue runner	68	0.0	6.7	0.0
winter skate	30	0.0	51.8	0.3
fourbeard rockling	20	0.0	2.0	0.0
spiny dogfish	19	0.0	80.8	0.5
red cornetfish	14	0.0	0.6	0.0
spot	14	0.0	1.7	0.0
cunner	13	0.0	1.8	0.0
hickory shad	12	0.0	5.5	0.0
northern puffer	11	0.0	0.8	0.0
Atlantic croaker	6	0.0	1.5	0.0
Atlantic silverside	5	0.0	0.4	0.0
Atlantic cod	5	0.0	4.7	0.0
crevalle jack	4	0.0	0.4	0.0
Atlantic mackerel	4	0.0	0.4	0.0
American sand lance	4	0.0	0.1	0.0
bigeye scad	3	0.0	0.3	0.0
planehead filefish	2	0.0	0.2	0.0
glasseye snapper	2	0.0	0.1	0.0
goosefish	2	0.0	0.1	0.0
ocean pout	2	0.0	0.5	0.0
northern pipefish	2	0.0	0.2	0.0
longhorn sculpin	2	0.0	0.7	0.0
striped anchovy	2	0.0	0.1	0.0
oyster toadfish	2	0.0	0.9	0.0
yellowtail flounder	2	0.0	0.7	0.0
Atlantic sturgeon	1	0.0	15.8	0.1
bigeye	1	0.0	0.1	0.0
conger eel	1	0.0	0.3	0.0
mahogany snapper	1	0.0	0.1	0.0
round herring	1	0.0	0.1	0.0
round scad	1	0.0	0.1	0.0
rock gunnel	1	0.0	0.1	0.0
roughtail stingray	1	0.0	7.8	0.0
short bigeye	1	0.0	0.1	0.0
sea lamprey	1	0.0	1.2	0.0
Atlantic thread herring	1	0.0	0.1	0.0
Total	**163,223**		**15,625**	
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
longfin inshore squid	28,266	97.0	1366.2	69.6
horseshoe crab	159	0.5	288.3	14.7
spider crab	nc		133.3	6.8
common slipper shell	nc		29.8	1.5
American lobster	92	0.3	24.0	1.2
knobbed whelk	37	0.1	15.7	0.8
bushy bryozoan	nc		10.1	0.5
mantis shrimp	187	0.6	9.8	0.5
flat claw hermit crab	nc		8.1	0.4
sea grape	1	0.0	7.8	0.4
boring sponge	nc		7.6	0.4
lion's mane jellyfish	347	1.2	6.5	0.3
mixed sponge species	nc		6.3	0.3
channeled whelk	26	0.1	5.8	0.3
blue crab	22	0.1	4.7	0.2
blue mussel	nc		4.2	0.2
northern moon snail	1	0.0	4.0	0.2
hydroid spp.	nc		3.9	0.2
rock crab	nc		3.8	0.2
sand shrimp	nc		3.7	0.2
mud crabs	nc		2.9	0.1
starfish spp.	nc		2.5	0.1
lady crab	nc		2.4	0.1
arks	nc		1.5	0.1
common oyster	nc		0.8	0.0
rubbery bryzoan	nc		0.7	0.0
Tubularia, spp.	nc		0.5	0.0
coastal mud shrimp	2	0.0	0.4	0.0
surf clam	2	0.0	0.4	0.0
red bearded sponge	nc		0.3	0.0
deadman's fingers sponge	nc		0.3	0.0
fan worm tubes	nc		0.3	0.0
hard clams	1	0.0	0.3	0.0
polychaetes	nc		0.3	0.0
brown shrimp	2	0.0	0.2	0.0
comb jelly spp	nc		0.2	0.0
star coral	nc		0.2	0.0
ghost shrimp	1	0.0	0.2	0.0
purple sea urchin	2	0.0	0.2	0.0
anemones	nc		0.1	0.0
sand dollar	1	0.0	0.1	0.0
common razor clam	1	0.0	0.1	0.0
tunicates, misc	nc		0.1	0.0
Total	**29,150**		**1,958.6**	
Note: nc= not counted				

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2016.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=196.

species	count	%	weight	%
scup	175,632	63.4	16,006.2	56.2
butterfish	65,596	23.7	2,036.1	7.1
striped searobin	5,886	2.1	1,964.4	6.9
weakfish	4,689	1.7	297.6	1.0
northern searobin	3,178	1.1	452.1	1.6
alewife	2,811	1.0	132.0	0.5
bluefish	2,793	1.0	1,118.7	3.9
spotted hake	2,456	0.9	113.8	0.4
windowpane flounder	1,593	0.6	154.7	0.5
smooth dogfish	1,338	0.5	2,785.6	9.8
bay anchovy	1,239	0.4	8.7	0.0
black sea bass	1,181	0.4	823.4	2.9
winter flounder	1,108	0.4	261.0	0.9
fourspot flounder	1,056	0.4	175.3	0.6
American shad	944	0.3	46.2	0.2
silver hake	891	0.3	32.9	0.1
Atlantic menhaden	876	0.3	69.4	0.2
red hake	668	0.2	50.3	0.2
summer flounder	462	0.2	386.4	1.4
blueback herring	448	0.2	12.2	0.0
little skate	377	0.1	193.1	0.7
hogchoker	354	0.1	41.8	0.1
Atlantic herring	340	0.1	37.1	0.1
tautog	306	0.1	288.5	1.0
moonfish	265	0.1	5.2	0.0
striped bass	167	0.1	261.9	0.9
smallmouth flounder	148	0.1	4.2	0.0
clearnose skate	134	0.0	228.7	0.8
goosefish	70	0.0	23.3	0.1
northern kingfish	31	0.0	4.8	0.0
hickory shad	18	0.0	4.2	0.0
winter skate	17	0.0	31.6	0.1
blue runner	15	0.0	1.5	0.0
Atlantic sturgeon	12	0.0	318.3	1.1
spot	12	0.0	1.7	0.0
spiny dogfish	9	0.0	43.6	0.2
striped anchovy	8	0.0	0.5	0.0
northern puffer	5	0.0	0.9	0.0
cunner	4	0.0	0.5	0.0
inshore lizardfish	4	0.0	0.3	0.0
oyster toadfish	4	0.0	1.7	0.0
Atlantic silverside	3	0.0	0.3	0.0
fourbeard rockling	3	0.0	0.3	0.0
striped cusk-eel	3	0.0	0.1	0.0
northern sennet	2	0.0	0.2	0.0
bluntnose stingray	1	0.0	0.6	0.0
Atlantic cod	1	0.0	4.9	0.0
crevalle jack	1	0.0	0.1	0.0
haddock	1	0.0	0.1	0.0
pinfish	1	0.0	0.1	0.0
pollock	1	0.0	0.1	0.0
roughtail stingray	1	0.0	45.4	0.2
rough scad	1	0.0	0.1	0.0
sea raven	1	0.0	0.2	0.0
sand tiger shark	1	0.0	21.8	0.1
Total	**277,166**		**28,495**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
longfin inshore squid	12,424	94.1	464.4	41.1
horseshoe crab	164	1.2	315.5	28.0
spider crab	nc		140.6	12.5
lion's mane jellyfish	221	1.7	72.1	6.4
American lobster	74	0.6	25.2	2.2
common slipper shell	nc		19.2	1.7
bushy bryozoan	nc		11.2	1.0
mantis shrimp	206	1.6	9.5	0.8
knobbed whelk	23	0.2	8.8	0.8
flat claw hermit crab	nc		8.7	0.8
boring sponge	nc		7.4	0.7
rock crab	nc		6.8	0.6
channeled whelk	29	0.2	6.0	0.5
hydroid spp.	nc		5.9	0.5
blue crab	20	0.1	5.0	0.4
hard clams	22	0.2	3.2	0.3
mud crabs	nc		2.5	0.2
mixed sponge species	nc		1.9	0.2
sand shrimp	nc		1.8	0.2
lady crab	nc		1.7	0.2
Tubularia, spp.	nc		1.5	0.1
northern moon snail	nc		1.3	0.1
arks	3	0.0	1.3	0.1
starfish spp.	1	0.0	0.9	0.1
blue mussel	1	0.0	0.8	0.1
common oyster	5	0.0	0.6	0.1
surf clam	1	0.0	0.5	0.0
comb jelly spp	nc		0.2	0.0
star coral	nc		0.2	0.0
ghost shrimp	1	0.0	0.2	0.0
anemones	nc		0.1	0.0
bobtail squid	1	0.0	0.1	0.0
red bearded sponge	nc		0.1	0.0
common razor clam	1	0.0	0.1	0.0
Japanese shore crab	1	0.0	0.1	0.0
polychaetes	1	0.0	0.1	0.0
tunicates, misc	nc		0.1	0.0
purple sea urchin	nc		0.1	0.0
water jelly	1	0.0	0.1	0.0
Total	**13,200**		**1,125.8**	

Note: nc= not counted

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2017.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=144.

species	count	%	weight	%
scup	75,763	56.4	9,616.8	51.4
butterfish	35,814	26.7	1,426.0	7.6
weakfish	5,904	4.4	311.2	1.7
striped searobin	3,942	2.9	1,400.0	7.5
bluefish	2,408	1.8	263.6	1.4
smooth dogfish	1,624	1.2	3,391.3	18.1
northern searobin	1,430	1.1	196.2	1.0
spotted hake	1,253	0.9	111.2	0.6
bay anchovy	1,069	0.8	7.7	0.0
black sea bass	980	0.7	714.8	3.8
windowpane flounder	974	0.7	127.1	0.7
hogchoker	391	0.3	50.1	0.3
fourspot flounder	366	0.3	67.9	0.4
summer flounder	354	0.3	244.0	1.3
silver hake	309	0.2	12.3	0.1
moonfish	273	0.2	4.2	0.0
Atlantic menhaden	239	0.2	72.2	0.4
American shad	230	0.2	21.0	0.1
red hake	152	0.1	11.9	0.1
spot	114	0.1	10.5	0.1
little skate	113	0.1	63.0	0.3
winter flounder	112	0.1	27.7	0.1
blueback herring	89	0.1	3.5	0.0
tautog	77	0.1	99.0	0.5
clearnose skate	73	0.1	147.1	0.8
striped bass	73	0.1	186.8	1.0
smallmouth flounder	44	0.0	2.0	0.0
alewife	38	0.0	2.0	0.0
winter skate	19	0.0	34.1	0.2
northern kingfish	11	0.0	2.3	0.0
Atlantic herring	10	0.0	1.1	0.0
American sand lance	7	0.0	0.1	0.0
rough scad	7	0.0	0.6	0.0
Atlantic cod	4	0.0	0.1	0.0
cunner	4	0.0	0.5	0.0
hickory shad	4	0.0	1.3	0.0
northern puffer	4	0.0	0.7	0.0
Atlantic mackerel	3	0.0	1.3	0.0
spiny dogfish	3	0.0	15.6	0.1
black drum	2	0.0	0.2	0.0
Atlantic sturgeon	1	0.0	60.9	0.3
blue runner	1	0.0	0.1	0.0
bigeye	1	0.0	0.1	0.0
crevalle jack	1	0.0	0.1	0.0
glasseye snapper	1	0.0	0.1	0.0
inshore lizardfish	1	0.0	0.1	0.0
naked goby	1	0.0	0.1	0.0
Spanish mackerel	1	0.0	0.1	0.0
oyster toadfish	1	0.0	0.3	0.0
Total	**134,295**		**18,710.9**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
longfin inshore squid	14,186	96.5	584.5	54.5
horseshoe crab	112	0.8	224.4	20.9
spider crab	nc		129.4	12.1
boring sponge	nc		46.9	4.4
common slipper shell	nc		20.8	1.9
bushy bryozoan	nc		12.1	1.1
flat claw hermit crab	nc		8.3	0.8
knobbed whelk	36	0.2	7.3	0.7
mantis shrimp	173	1.2	7.3	0.7
blue crab	18	0.1	4.1	0.4
American lobster	12	0.1	4.0	0.4
lion's mane jellyfish	102	0.7	3.7	0.3
lady crab	nc		3.5	0.3
blue mussel	nc		2.7	0.3
channeled whelk	18	0.1	2.4	0.2
sand shrimp	nc		1.6	0.1
hard clams	5	0.0	1.2	0.1
comb jelly spp	24	0.2	1.2	0.1
hydroid spp.	nc		1.1	0.1
arks	6	0.0	1.1	0.1
mud crabs	nc		1.1	0.1
northern moon snail	nc		1.0	0.1
rock crab	nc		0.8	0.1
surf clam	10	0.1	0.8	0.1
red bearded sponge	nc		0.5	0.0
purple sea urchin	3	0.0	0.4	0.0
star coral	nc		0.2	0.0
anemones	nc		0.1	0.0
ghost shrimp	1	0.0	0.1	0.0
jingle shell clams	1	0.0	0.1	0.0
common oyster	nc		0.1	0.0
mixed sponge species	nc		0.1	0.0
Total	**14,707**		**1,072.9**	

Note: nc= not counted

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2018.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=172.

species	count	%	weight	%
scup	81,228	53.4	12,947.2	56.1
butterfish	42,025	27.6	1,412.7	6.1
weakfish	7,544	5.0	270.2	1.2
striped searobin	4,223	2.8	1,582.6	6.9
northern searobin	2,949	1.9	460.8	2.0
smooth dogfish	1,598	1.0	3,024.9	13.1
black sea bass	1,434	0.9	690.7	3.0
windowpane flounder	1,266	0.8	189.6	0.8
alewife	1,052	0.7	87.5	0.4
spotted hake	1,015	0.7	151.7	0.7
hogchoker	811	0.5	98.9	0.4
summer flounder	753	0.5	397.0	1.7
fourspot flounder	711	0.5	147.6	0.6
bluefish	702	0.5	161.4	0.7
bay anchovy	641	0.4	3.3	0.0
blueback herring	579	0.4	36.5	0.2
winter flounder	500	0.3	132.2	0.6
silver hake	450	0.3	18.3	0.1
red hake	361	0.2	25.8	0.1
Atlantic herring	352	0.2	45.0	0.2
striped bass	269	0.2	457.4	2.0
American shad	230	0.2	17.6	0.1
tautog	230	0.2	209.0	0.9
Atlantic menhaden	227	0.1	80.5	0.3
striped anchovy	222	0.1	4.1	0.0
blue runner	195	0.1	19.9	0.1
little skate	151	0.1	82.4	0.4
moonfish	143	0.1	2.6	0.0
smallmouth flounder	86	0.1	2.9	0.0
clearnose skate	81	0.1	149.8	0.6
northern kingfish	75	0.0	9.9	0.0
spot	36	0.0	3.8	0.0
Atlantic cod	11	0.0	3.2	0.0
Atlantic mackerel	10	0.0	0.7	0.0
Atlantic sturgeon	7	0.0	98.6	0.4
inshore lizardfish	7	0.0	0.5	0.0
crevalle jack	6	0.0	0.5	0.0
hickory shad	6	0.0	2.2	0.0
northern puffer	5	0.0	0.3	0.0
spiny dogfish	5	0.0	16.7	0.1
cunner	4	0.0	0.5	0.0
northern pipefish	3	0.0	0.2	0.0
winter skate	3	0.0	4.1	0.0
harvestfish	2	0.0	0.2	0.0
roughtail stingray	2	0.0	18.9	0.1
oyster toadfish	2	0.0	0.8	0.0
Atlantic croaker	1	0.0	0.1	0.0
planehead filefish	1	0.0	0.1	0.0
goosefish	1	0.0	0.9	0.0
haddock	1	0.0	1.6	0.0
fourbeard rockling	1	0.0	0.1	0.0
striped cusk-eel	1	0.0	0.1	0.0
Spanish mackerel	1	0.0	0.1	0.0
northern stargazer	1	0.0	0.2	0.0
Total	**152,220**		**23,074.2**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
horseshoe crab	264	1.9	512.3	44.3
longfin inshore squid	13,146	92.2	408.8	35.3
spider crab	nc		77.1	6.7
bushy bryozoan	nc		39.4	3.4
common slipper shell	nc		29.4	2.5
lion's mane jellyfish	458	3.2	13.8	1.2
mantis shrimp	297	2.1	11.6	1.0
mixed sponge species	nc		10.8	0.9
hydroid spp.	nc		10.2	0.9
flat claw hermit crab	nc		8.7	0.7
knobbed whelk	15	0.1	6.5	0.6
American lobster	15	0.1	3.8	0.3
channeled whelk	23	0.2	3.4	0.3
Tubularia, spp.	nc		3.2	0.3
rock crab	nc		2.7	0.2
blue crab	18	0.1	2.7	0.2
sand shrimp	nc		1.7	0.1
northern moon snail	nc		1.3	0.1
arks	nc		1.2	0.1
hard clams	3	0.0	1.2	0.1
lady crab	nc		1.1	0.1
star coral	nc		0.9	0.1
fan worm tubes	nc		0.8	0.1
mud crabs	nc		0.7	0.1
sea grape	nc		0.6	0.1
surf clam	4	0.0	0.6	0.0
blue mussel	nc		0.4	0.0
Jonah crab	nc		0.4	0.0
comb jelly spp	nc		0.4	0.0
red bearded sponge	nc		0.3	0.0
water jelly	3	0.0	0.2	0.0
purple sea urchin	2	0.0	0.2	0.0
Japanese shore crab	nc		0.2	0.0
boring sponge	nc		0.1	0.0
coastal mud shrimp	1	0.0	0.1	0.0
green sea urchin	1	0.0	0.1	0.0
jingle shell clams	1	0.0	0.1	0.0
green crab	1	0.0	0.1	0.0
polychaetes	nc		0.1	0.0
Total	**14,252**		**1,156.5**	

Note: nc= not counted

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2019.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=200.

species	count	%	weight	%
scup	53,617	40.2	11,169.4	50.3
butterfish	43,434	32.5	1,114.1	5.0
silver hake	4,348	3.3	126.1	0.6
weakfish	3,766	2.8	245.5	1.1
striped searobin	3,181	2.4	1,264.4	5.7
northern searobin	3,112	2.3	450.5	2.0
moonfish	2,270	1.7	22.6	0.1
bluefish	2,048	1.5	224.5	1.0
spotted hake	2,027	1.5	178.3	0.8
black sea bass	1,584	1.2	816.7	3.7
windowpane flounder	1,427	1.1	242.5	1.1
alewife	1,401	1.0	86.1	0.4
bay anchovy	1,346	1.0	6.6	0.0
summer flounder	1,309	1.0	464.3	2.1
Atlantic herring	1,294	1.0	302.7	1.4
smooth dogfish	1,243	0.9	2,957.2	13.3
red hake	1,215	0.9	77.5	0.3
Atlantic menhaden	815	0.6	280.7	1.3
fourspot flounder	570	0.4	147.8	0.7
striped bass	535	0.4	773.6	3.5
American shad	512	0.4	32.4	0.1
winter flounder	422	0.3	103.1	0.5
little skate	418	0.3	220.9	1.0
hogchoker	383	0.3	50.8	0.2
tautog	373	0.3	351.9	1.6
smallmouth flounder	186	0.1	4.1	0.0
blueback herring	124	0.1	6.0	0.0
clearnose skate	113	0.1	213.8	1.0
spot	66	0.0	8.2	0.0
Spanish mackerel	65	0.0	3.7	0.0
blue runner	59	0.0	3.8	0.0
winter skate	41	0.0	72.7	0.3
striped anchovy	21	0.0	0.4	0.0
fourbeard rockling	20	0.0	1.3	0.0
Atlantic cod	15	0.0	5.1	0.0
northern kingfish	14	0.0	1.9	0.0
hickory shad	11	0.0	3.1	0.0
Atlantic sturgeon	9	0.0	104.7	0.5
northern puffer	9	0.0	1.4	0.0
northern pipefish	5	0.0	0.2	0.0
crevalle jack	4	0.0	0.2	0.0
spiny dogfish	4	0.0	23.8	0.1
oyster toadfish	4	0.0	1.1	0.0
bigeye	3	0.0	0.2	0.0
conger eel	2	0.0	0.3	0.0
fawn cusk-eel	2	0.0	0.1	0.0
goosefish	2	0.0	0.8	0.0
inshore lizardfish	2	0.0	0.1	0.0
white perch	2	0.0	0.2	0.0
American eel	1	0.0	0.6	0.0
planehead filefish	1	0.0	0.1	0.0
harvestfish	1	0.0	0.1	0.0
northern sennet	1	0.0	0.1	0.0
roughtail stingray	1	0.0	16.8	0.1
longhorn sculpin	1	0.0	0.1	0.0
Total	**133,439**		**22,184.7**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
horseshoe crab	218	1.8	391.9	33.3
longfin inshore squid	10,934	92.1	368.4	31.3
spider crab	nc		115.9	9.9
common slipper shell	nc		71.8	6.1
lion's mane jellyfish	386	3.3	67.6	5.8
bushy bryozoan	nc		60.2	5.1
mixed sponge species	nc		43.2	3.7
American lobster	25	0.2	7.6	0.6
mantis shrimp	223	1.9	7.2	0.6
flat claw hermit crab	nc		6.5	0.6
hydroid spp.	nc		5.7	0.5
knobbed whelk	17	0.1	4.8	0.4
blue crab	21	0.2	3.9	0.3
common oyster	nc		3.8	0.3
channeled whelk	22	0.2	3.3	0.3
sand shrimp	nc		2.5	0.2
rock crab	nc		1.7	0.1
hard clams	10	0.1	1.4	0.1
lady crab	nc		1.4	0.1
mud crabs	nc		1.3	0.1
northern moon snail	nc		1.1	0.1
Tubularia, spp.	nc		1.0	0.1
arks	nc		0.8	0.1
deadman's fingers sponge	nc		0.6	0.0
blue mussel	nc		0.4	0.0
fan worm tubes	nc		0.4	0.0
star coral	nc		0.3	0.0
comb jelly spp	nc		0.3	0.0
sea cucumber	2	0.0	0.2	0.0
sea grape	nc		0.2	0.0
green sea urchin	2	0.0	0.1	0.0
red bearded sponge	nc		0.1	0.0
northern red shrimp	1	0.0	0.1	0.0
polychaetes	nc		0.1	0.0
coastal mud shrimp	1	0.0	0.1	0.0
ghost shrimp	1	0.0	0.1	0.0
Japanese shore crab	nc		0.1	0.0
moon jelly	nc		0.1	0.0
starfish spp.	nc		0.1	0.0
surf clam	1	0.0	0.1	0.0
purple sea urchin	1	0.0	0.1	0.0
Total	**11,865**		**1,176.2**	

Note: nc= not counted

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2021.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=139.

species	count	%	weight	%
scup	54,698	43.9	8,184.6	46.2
butterfish	38,461	30.9	1,034.9	5.8
weakfish	8,661	6.9	612.4	3.5
northern searobin	4,135	3.3	727.1	4.1
striped searobin	3,460	2.8	1,281.7	7.2
moonfish	2,255	1.8	28.6	0.2
smooth dogfish	1,728	1.4	2,909.3	16.4
bay anchovy	1,618	1.3	6.0	0.0
bluefish	1,203	1.0	171.0	1.0
black sea bass	1,089	0.9	521.6	2.9
spotted hake	886	0.7	73.4	0.4
windowpane flounder	812	0.7	142.8	0.8
summer flounder	796	0.6	511.2	2.9
hogchoker	704	0.6	87.5	0.5
silver hake	565	0.5	21.2	0.1
red hake	533	0.4	35.9	0.2
American shad	403	0.3	26.6	0.2
striped anchovy	326	0.3	3.7	0.0
Atlantic menhaden	303	0.2	95.3	0.5
winter flounder	266	0.2	55.9	0.3
tautog	225	0.2	193.9	1.1
fourspot flounder	224	0.2	51.2	0.3
smallmouth flounder	191	0.2	4.3	0.0
clearnose skate	165	0.1	278.7	1.6
alewife	125	0.1	7.4	0.0
inshore lizardfish	116	0.1	9.3	0.1
Atlantic herring	114	0.1	0.5	0.0
striped bass	109	0.1	164.6	0.9
spot	90	0.1	11.4	0.1
northern kingfish	76	0.1	6.5	0.0
northern puffer	56	0.0	2.1	0.0
little skate	51	0.0	25.0	0.1
hickory shad	24	0.0	9.1	0.1
winter skate	23	0.0	21.2	0.1
mackerel scad	21	0.0	0.4	0.0
Atlantic sturgeon	19	0.0	378.6	2.1
Atlantic cod	14	0.0	2.0	0.0
blue runner	13	0.0	1.0	0.0
blueback herring	12	0.0	0.4	0.0
rough scad	11	0.0	0.5	0.0
fourbeard rockling	10	0.0	1.2	0.0
oyster toadfish	10	0.0	3.8	0.0
cunner	5	0.0	0.9	0.0
Atlantic mackerel	5	0.0	0.3	0.0
crevalle jack	4	0.0	0.2	0.0
planehead filefish	4	0.0	0.2	0.0
bigeye scad	3	0.0	0.2	0.0
Spanish mackerel	2	0.0	0.3	0.0
conger eel	1	0.0	0.2	0.0
American sand lance	1	0.0	0.1	0.0
short bigeye	1	0.0	0.1	0.0
striped burrfish	1	0.0	0.3	0.0
longhorn sculpin	1	0.0	0.3	0.0
sand tiger shark	1	0.0	8.4	0.0
Total	**124,630**		**17,715.0**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
horseshoe crab	339	3.0	583.3	38.4
longfin inshore squid	9,652	85.9	360.3	23.7
boring sponge	nc		153.3	10.1
bushy bryozoan	nc		148.6	9.8
common slipper shell	nc		81.4	5.4
spider crab	nc		61.4	4.0
mantis shrimp	813	7.2	27.3	1.8
knobbed whelk	95	0.8	25.3	1.7
flat claw hermit crab	nc		16.0	1.1
lion's mane jellyfish	151	1.3	12.8	0.8
channeled whelk	64	0.6	9.9	0.7
blue crab	60	0.5	8.9	0.6
arks	nc		7.1	0.5
hydroid spp.	nc		5.2	0.3
American lobster	6	0.1	2.4	0.2
mud crabs	nc		2.3	0.2
hard clams	25	0.2	2.1	0.1
rock crab	nc		2.0	0.1
common oyster	nc		1.8	0.1
sand shrimp	nc		1.1	0.1
lady crab	nc		0.8	0.1
sea grape	nc		0.8	0.1
deadman's fingers sponge	nc		0.6	0.0
blue mussel	nc		0.6	0.0
star coral	nc		0.5	0.0
northern moon snail	nc		0.5	0.0
purple sea urchin	10	0.1	0.4	0.0
brown shrimp	16	0.1	0.4	0.0
mixed sponge species	nc		0.3	0.0
fan worm tubes	nc		0.3	0.0
Tubularia, spp.	nc		0.3	0.0
comb jelly spp	nc		0.2	0.0
rubbery bryzoan	nc		0.2	0.0
tunicates, misc	nc		0.1	0.0
starfish spp.	nc		0.1	0.0
surf clam	2	0.0	0.1	0.0
bay scallop	1	0.0	0.1	0.0
red bearded sponge	nc		0.1	0.0
nemerteans	nc		0.1	0.0
wavy astarte	1	0.0	0.1	0.0
Total	**11,235**		**1,518.8**	

Note: nc= not counted

Appendix 5.4. cont. . Total number and weight (kg) of finfish and invertebrates caught in 2022.
Finfish species are in order of descending count. Invertebrate species are in order of descending weight (nc = not counted). Young-of-year gadids, bay and striped anchovy are neither separated by species or quantified; young-of-year Atlantic herring and American sand lance are not quantified. Number of tows (sample size)=167.

species	count	%	weight	%
scup	85,562	52.2	10,840.3	56.0
butterfish	48,429	29.5	1,272.9	6.6
weakfish	15,050	9.2	725.4	3.8
northern searobin	2,021	1.2	366.1	1.9
striped searobin	1,653	1.0	616.6	3.2
black sea bass	1,351	0.8	578.8	3.0
smooth dogfish	1,331	0.8	2,054.1	10.6
red hake	1,287	0.8	78.2	0.4
bluefish	881	0.5	178.1	0.9
Atlantic menhaden	881	0.5	223.3	1.2
silver hake	745	0.5	23.3	0.1
windowpane flounder	561	0.3	95.7	0.5
summer flounder	501	0.3	305.2	1.6
bay anchovy	443	0.3	2.1	0.0
hogchoker	410	0.3	52.3	0.3
alewife	388	0.2	22.1	0.1
winter flounder	313	0.2	71.5	0.4
tautog	302	0.2	302.0	1.6
moonfish	235	0.1	3.7	0.0
striped bass	211	0.1	583.1	3.0
American shad	206	0.1	19.3	0.1
northern kingfish	190	0.1	13.4	0.1
smallmouth flounder	150	0.1	2.9	0.0
clearnose skate	122	0.1	191.2	1.0
spotted hake	110	0.1	4.5	0.0
spot	105	0.1	16.6	0.1
northern puffer	85	0.1	2.0	0.0
striped anchovy	62	0.0	1.1	0.0
fourspot flounder	59	0.0	14.2	0.1
little skate	56	0.0	29.4	0.2
Atlantic herring	47	0.0	3.1	0.0
Atlantic sturgeon	47	0.0	608.7	3.1
blueback herring	39	0.0	1.0	0.0
bigeye scad	28	0.0	1.3	0.0
Atlantic mackerel	20	0.0	1.7	0.0
Atlantic cod	15	0.0	18.7	0.1
blue runner	12	0.0	0.9	0.0
hickory shad	7	0.0	2.5	0.0
winter skate	7	0.0	5.8	0.0
rough scad	5	0.0	0.3	0.0
fourbeard rockling	4	0.0	0.3	0.0
goosefish	3	0.0	1.7	0.0
northern pipefish	2	0.0	0.1	0.0
longhorn sculpin	2	0.0	0.6	0.0
Spanish mackerel	2	0.0	0.1	0.0
seasnail	2	0.0	0.1	0.0
bigeye	1	0.0	0.1	0.0
cownose ray	1	0.0	2.6	0.0
conger eel	1	0.0	0.3	0.0
cunner	1	0.0	0.1	0.0
American eel	1	0.0	0.9	0.0
planehead filefish	1	0.0	0.1	0.0
American sand lance	1	0.0	0.1	0.0
sea raven	1	0.0	0.3	0.0
oyster toadfish	1	0.0	0.4	0.0
Total	**163,951**		**19,340.5**	

species	count	%	weight	%
Finfish not ranked				
anchovy spp, (yoy)				
Atlantic herring, (yoy)				
American sand lance (yoy)				
gadid spp, (yoy)				
Invertebrates				
horseshoe crab	402	2.3	714.8	39.9
longfin inshore squid	15,385	86.7	701.1	39.1
bushy bryozoan	nc		139.4	7.8
boring sponge	nc		70.3	3.9
lion's mane jellyfish	1,134	6.4	37.9	2.1
common slipper shell	nc		33.8	1.9
spider crab	nc		31.8	1.8
mantis shrimp	714	4.0	24.3	1.4
channeled whelk	44	0.2	8.2	0.5
knobbed whelk	22	0.1	5.5	0.3
lady crab	nc		3.5	0.2
flat claw hermit crab	nc		3.5	0.2
arks	nc		2.5	0.1
blue crab	14	0.1	2.1	0.1
hard clams	18	0.1	1.4	0.1
American lobster	4	0.0	1.4	0.1
sand shrimp	nc		1.3	0.1
deadman's fingers sponge	nc		1.2	0.1
star coral	nc		1.0	0.1
fan worm tubes	nc		1.0	0.1
rock crab	nc		1.0	0.1
mud crabs	nc		0.9	0.1
Tubularia, spp.	nc		0.8	0.0
common oyster	nc		0.4	0.0
northern moon snail	nc		0.3	0.0
hydroid spp.	nc		0.3	0.0
purple sea urchin	7	0.0	0.3	0.0
surf clam	5	0.0	0.2	0.0
red bearded sponge	nc		0.2	0.0
polychaetes	nc		0.2	0.0
blue mussel	nc		0.1	0.0
cleaner/peppermint shrimp	2	0.0	0.1	0.0
sea grape	nc		0.1	0.0
starfish spp.	nc		0.1	0.0
anemones	nc		0.1	0.0
coastal mud shrimp	1	0.0	0.1	0.0
green crab	1	0.0	0.1	0.0
northern red shrimp	1	0.0	0.1	0.0
mixed sponge species	nc		0.1	0.0
Total	**17,754**		**1,791.0**	

Note: nc= not counted

Appendix 5.5 Endangered Species Interactions, 2022: Forty-seven (47) Atlantic sturgeon were captured on six (6) of the 167 tows completed in 2022; an encounter rate (3.6%) comparable to the average for the LISTS time series of tows (2.5%). The captures occurred in deep transition and mud sites off the North shore of Long Island and near Falkner's Island. One (1) loggerhead turtle was captured at site 01-28; an encounter rate of 0.5%. All encounters were reported to NMFS within 24 hours and all animals were released alive and uninjured. Details are provided below:

Sample	Date	Site	Tow Start	Duration (min)	Species	Total Length (mm)	Standard Length (mm)	Weight (kg)	Left Pec T-bar	Dorsal T-bar	PIT	Tissue Sample	Photo	Release Time	Release Latitude	Release Longitude
SP2022081	6/13/2022	03-26	10:48	30	ATS	1,430	1,400	28.12	-	-	ADDED	Y	Y	11:46	41.0624	-72.7041
SP2022081	6/13/2022	03-26	10:48	30	ATS	1,760	1,600	45.36	-	-	RECAP	N	Y	11:44	41.0621	-72.7047
SP2022086	6/14/2022	01-25	12:02	30	ATS	1,125	969	8.25	-	-	ADDED	Y	Y	12:47	41.0174	-72.7072
FA2022003	9/8/2022	01-28	12:43	30	LST	900	810	>65	-	-	N/A	N/A	Y	13:40	41.0550	-72.5847
FA2022018	9/16/2022	01-24	10:00	30	ATS	760	670	2.53	-	-	-	N	N	11:51	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	840	720	3.15	-	-	-	N	N	11:55	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	910	790	4.20	-	-	-	N	N	11:41	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	940	811	4.55	-	-	-	N	N	12:05	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	970	850	5.26	-	-	-	N	N	11:39	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	973	854	5.33	-	-	-	N	N	12:03	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,016	880	5.85	-	-	-	N	N	11:57	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,020	890	6.06	-	-	-	N	N	11:47	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,030	910	6.48	-	-	-	N	N	11:53	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,070	960	7.64	-	-	-	N	N	12:01	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,138	990	8.40	-	-	-	N	N	11:49	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,140	1,000	8.67	-	-	-	N	N	11:59	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,145	1,000	8.67	-	-	-	N	N	11:45	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,154	1,047	9.98	-	-	-	N	N	11:19	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,194	1,060	10.37	-	-	-	N	N	10:55	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,200	1,005	8.80	-	-	-	N	N	11:43	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,208	1,050	10.07	-	-	-	N	N	11:01	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,235	1,091	11.33	-	-	-	N	N	11:11	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,255	1,140	12.97	-	-	-	N	N	10:57	41.0166	-72.8015

*Due to the large number of fish captured in a single tow (FA2022018), steps were taken to prioritize the survival of the fish. These steps included not taking individual weights, weights here reflects estimated weight based on a length-weight relationship of previously caught fish on LISTS. Release time is an estimate and latitude/longitude for this tow was where the last fish was released. A PIT tag reader malfunction prohibited the fish being scanned for tags or the addition of new tags. With no way to identify the samples, there were no tissue samples taken.

Appendix 5.5. Cont. Endangered Species Interactions, 2022: Forty-seven (47) Atlantic sturgeon were captured on six (6) of the 167 tows completed in 2022; an encounter rate (3.6%) comparable to the average for the LISTS time series of tows (2.5%). The captures occurred in deep transition and mud sites off the North shore of Long Island and near Falkner's Island. One (1) loggerhead turtle was captured at site 01-28; an encounter rate of 0.5%. All encounters were reported to NMFS within 24 hours and all anima ls were released alive and uninjured. Details are provided below:

Sample	Date	Site	Tow Start	Duration (min)	Species	Total Length (mm)	Standard Length (mm)	Weight (kg)	Left Pec T-bar	Dorsal T-bar	PIT	Tissue Sample	Photo	Release Time	Release Latitude	Release Longitude
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,262	1,128	12.55	-	-	-	N	N	11:25	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,266	1,135	12.80	-	-	-	N	N	11:13	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,283	1,134	12.76	-	-	-	N	N	11:15	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,298	1,159	13.65	-	-	-	N	N	11:03	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,303	1,195	14.99	-	-	-	N	N	10:51	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,306	1,160	13.68	-	-	-	N	N	11:35	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,316	1,136	12.83	-	-	-	N	N	11:37	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,349	1,162	13.76	-	-	-	N	N	11:31	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,370	1,196	15.03	-	-	-	N	N	11:17	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,375	1,200	15.19	-	-	-	N	N	11:29	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,388	1,214	15.74	-	-	-	N	N	11:23	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,404	1,235	16.59	-	-	-	N	N	11:05	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,405	1,284	18.70	-	-	RECAP	N	N	10:45	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,405	1,240	16.80	-	-	-	N	N	10:53	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,405	1,234	16.55	-	-	-	N	N	11:21	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,454	1,287	18.84	-	-	-	N	N	10:49	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,496	1,289	18.93	-	-	-	N	N	11:33	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,500	1,288	18.88	-	-	-	N	N	11:27	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,575	1,435	26.33	-	-	-	N	N	11:09	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,635	1,450	27.18	-	-	-	N	N	11:07	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,750	1,535	32.39	-	-	-	N	N	10:59	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,870	1,640	39.70	-	-	-	N	N	10:47	41.0166	-72.8015
FA2022018	9/16/2022	01-24	10:00	30	ATS	1,305	1,173	14.16	-	-	-	N	N	12:07	41.0166	-72.8015
FA2022050	10/18/2022	05-27	11:29	30	ATS	1,459	1,281	18.50	-	-	ADDED	Y	N	12:16	41.1073	-72.6043
FA2022056	10/19/2022	10-27	14:08	30	ATS	1,355	1,222	14.25	-	-	ADDED	Y	N	14:59	41.2225	-72.7933

*Due to the large number of fish captured in a single tow (FA2022018), steps were taken to prioritize the survival of the fish. These steps included not taking individual weights, weights here reflects estimated weight based on a length-weight relationship of previously caught fish on LISTS. Release time is an estimate and latitude/longitude for this tow was where the last fish was released. A PIT tag reader malfunction prohibited the fish being scanned for tags or the addition of new tags. With no way to identify the samples, there were no tissue samples taken.

Appendix 5.6: Cold and warm temperate species captured in LISTS. Thirty-three (33) species are included in the cold temperate group, while thirty-four (34) species are included in the warm temperate group. Cold temperate species are defined as being more abundant north of Cape Cod, MA than south of New York, behaviorally adapted to cold temperatures including subfreezing but prefers ~3-15^{0}C, and spawns at lower end of temperature tolerance. Warm temperate species are defined as being more abundant south of New York than north of Cape Cod, MA, behaviorally avoids temperatures < 7-10^{0}C; prefers ~11-22^{0}C, and spawns at higher end of temperature tolerance.

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

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

JOB 6: STUDIES IN CONSERVATION ENGINEERING

JOB 6: STUDIES IN CONSERVATION ENGINEERING

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JOB 6: STUDIES IN CONSERVATION ENGINEERING

GOAL

Evaluate new technologies and methodologies for potential inclusion in the Long Island Sound Trawl Survey or other Surveys of this Project.

OBJECTIVES

1) *Characterize catch composition and selectivity patterns using different gear combinations for Connecticut's marine fishery-independent monitoring surveys. Particular emphasis will be placed on evaluating modern trawl net design/materials and door combinations for potential use on the Long Island Sound Trawl Survey.*

2) *Evaluate impacts of gear changes on associated thirty–year time series data which are used in numerous coastal stock assessments, management decisions, essential fish habitat analysis and climate change studies.*

3) *Assess electronic data acquisition systems for fisheries research for potential benefits of modernizing the Long Island Sound Trawl Survey or other Surveys of this Project.*

4) *Assess new software applications to integrate the components of an onboard electronic data acquisition system with a computerized database for data collection and QA/QC for the Long Island Sound Trawl Survey or other Surveys of this Project.*

INTRODUCTION

Work during this segment focused solely on Objectives 2, however future segments may focus on other Objectives.

Progress has been made in acquiring more information on net mensuration equipment appropriate for the gear type currently being used on this survey. One of the greatest concerns with the use of net mensuration equipment on the LISTS is the size and subsequent effect this gear will have on our gear type. Compared to the commercial sector and other federal bottom trawl surveys, our gear is relatively small leading to possible performance changes with the use of net mensuration equipment. The goal of project staff is to identify equipment appropriate for our gear size and type that will provide baseline net geometry and performance so that we can test newer more readily available replacement gear like net building material, net floats, and combinations thereof. For example, the survey utilizes floats on the headrope of the net that are no longer available. While the project has a small inventory of these irreplaceable floats, net mensuration equipment would allow staff to test net geometry and performance using more modern products.

METHODS

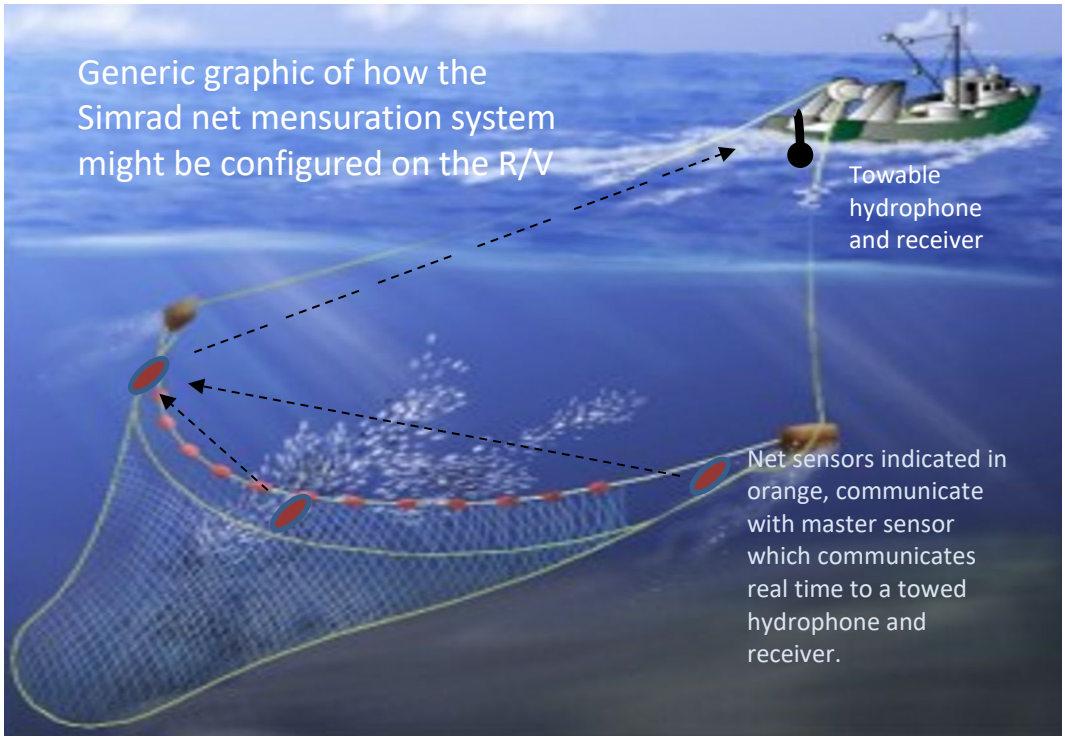
One of the main concerns in maintaining the integrity of the LISTS 39 year time series is conducting it in a consistent manner year after year. To date there have been very few

modifications to the gear used to complete the Survey. The biggest change being a vessel swap years ago. During that process, side-by-side comparison tows were conducted to explore differences between vessels. Catch was used to help verify consistency between vessels. Small adjustments to vessel operation were made and the conclusion was that the new vessel towed the net the same as the old vessel. Moving forward, net mensuration equipment will allow a much finer scale investigation of such changes.

In the past, staff investigated this equipment and found that the components used (actual net and door sensors) were bulky and cumbersome, far too robust for use on LISTS nets and doors. Staff spent considerable time in 2020 researching literature available on the internet as well as consulting with technical staff at VIMS (Virginia Institute of Marine Sciences) to identify if contemporary equipment has been scaled down to sizes more appropriate for our gear type.
It has been identified that there are multiple companies offering different configurations of this equipment both in size and functionality. Many of the manufacturers are now producing smaller scale components capable of generating different data aspects.

With the help of technical experts from VIMS, staff have identified Kongsburg Maritime the owner of Simrad as the company offering net mensuration equipment fit for LISTS gear type. The Simrad system offers relatively small net sensors with configurations that do not require door sensors. Historically, one of the more significant concerns with this type of equipment was the need for door sensors which would have required major modifications to our relatively small trawl doors. Staff have been very reluctant to make modifications such as these with the assumption that this would greatly alter the performance of our trawl doors.

The Simrad net mensuration system as selected for LISTS would consist of three removable sensors attached to the net. A headrope sensor capable of reading the distance from the headrope to the sea floor and two wing sensors capable of reading the distance from each other. One of the wing sensors while communicating with the other sensors is also relaying real time data to a towable hydrophone. This type of system is perfect for generating baseline net geometry while being towed. As an added benefit, measurements such as temperature can be recorded.



Schematic of how the components of the Simrad net mensuration system might be situated on the R/V John Dempsey and net.

RESULTS

Staff have recently worked with the sales team at Simrad to modify the original quote which included two door sensors and associated mounting equipment as well as a depth sensor that was included in headrope sensor pod. The two door sensors will be attached to the head of the net wings, removing the need for door mounting hardware. The depth sensor in the headrope pod will be replaced with a sensor capable of monitoring headrope height from the sea floor. Staff will be initiating the purchase of this system as soon as the new quote is received from Simrad.

Once the equipment is purchased, installation for testing outside the parameters of LISTS trawl season will commence. Staff will work with technical advisors to devise a sensor attachment method as well as optimal net placement to understand equipment dynamics and effects on our net. Once baseline net geometry is well understood, efforts will be made to test new equipment like headrope floats to determine consistency of new configurations.

MODIFICATIONS

Due to the nature of evaluating new technologies, it is not known ahead of time which ideas will be implemented. Therefore, the specific Objectives of this Job are likely to change over time. In the next segment of the Project, we expect to have the manufacturer identified and the equipment purchased.

JOB 7: ALOSINE SURVEY

JOB 7: ALOSINE SURVEY

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JOB 7: ALOSINE SURVEY

GOAL

Goal: Monitor abundance and distribution of American shad and forage species in Connecticut's major rivers and nearshore waters.

OBJECTIVES

Provide:

1) Information characterizing adult American shad spawning populations: size composition, age structure, spawning history, and sex ratio.

2) Annual indices of relative abundance for juvenile shad and forage species.

STUDY PERIOD AND AREA

This report contains information on adult American shad monitoring and seine studies on juvenile American shad (*Alosa sapidissima*) and common nearshore species in 2022. Areas of the Connecticut River sampled, range from Holyoke, MA to Essex, CT. Time series data collected under previous funding sources are also included for comparative purposes.

INTRODUCTION

Annual spawning migrations of American shad in the Connecticut River have supported both recreational and commercial fisheries in the State of Connecticut, as well as recreational fisheries in upriver states, for generations. There are currently small commercial and recreational fisheries that occur in the Connecticut portion of the Connecticut River. The Connecticut River is the only river system in the state that allows shad harvest and requires annual licenses for both commercial and recreational fisheries. Sustainable fisheries for states have been managed since 2012 under the Atlantic States Marine Fisheries Commission (ASMFC) Amendment 3 to the coast wide Fishery Management Plan for American shad. Connecticut monitors 3 metrics on an annual basis to determine the overall sustainability of the shad stock. Sustainability metrics are: fish passage counts for adults, relative juvenile abundance, and adult escapement. The commercial fishery is managed through area, gear, seasonal restrictions, and rest days. The recreational fishery is managed through a daily bag limit of 10 fish (a combined aggregate of American and hickory shad).

Historically, American shad ranked among the top five most economically significant commercial finfish species in Connecticut in terms of landings. The commercial fishery is conducted in the main stem of the Connecticut River, south of the Putnam Bridge in Glastonbury, CT. Data for this

fishery is collected from mandatory annual reports of landings by commercial shad license holders. This information is compiled and used to estimate the maximum losses to the spawning stock from fishing.

The recreational fishery predominantly takes place north of Hartford, CT at River Kilometer (RKM) 83 and south of the Holyoke Dam in Massachusetts (RKM 139). The last collection of information on the recreational fishery in CT was conducted through a roving creel survey in 2010. In 2023, the Connecticut River Conservancy proposed a pilot Connecticut River Creel Survey in Massachusetts and northern Connecticut.

The Connecticut Department of Energy and Environmental Protection (CT DEEP) has conducted annual fisheries independent research studies on adult American shad in the CT River since 1974, to monitor annual changes in stock composition. Holyoke Gas and Electric (HGE) monitors fish passage, which includes adult American Shad passage, at the first main stem dam on the CT River in Holyoke, Massachusetts. The HGE staff compiles daily tallies of fish passed through the fish lift facility, samples periodically for size structure and sex ratio, and collects scale samples. CT DEEP processes and interprets scale samples collected by HGE staff to estimate age structure and spawning history (i.e., proportion of the run comprised of repeat spawners).

Juvenile shad are monitored by CT DEEP through an annual seine survey conducted since 1978. The seine survey provides an annual index of relative abundance for juvenile American shad, which is used to characterize year class strength and potential recruitment to the spawning run in future years.

METHODS

American shad adults

Fishery Dependent Data

Commercial fishermen are required by regulation to report daily landings and fishing effort for American shad annually to CT DEEP. Landings information was compiled and used to estimate the maximum losses to the spawning stock from fishing. Harvest was tallied by pounds of shad landed by sex.

Fishery Independent Data

Holyoke Lift

Scale samples from American shad are collected by Holyoke Gas & Electric (HGE) staff, at the Holyoke Dam Fish Lift, located at river kilometer 139, in Holyoke, MA. In 2022, trapping and biological sampling of American shad occurred and daily counts of American shad at the fish lift were documented. Information on the number of fish lifted daily and the number of lift days (days the lift is in operation) at Holyoke were collected and obtained from the HGE staff.

Adult shad collected at the Holyoke Lift are sexed, measured to fork length (mm), weighed (g), and 15-25 scales are removed. Scale samples collected are separated by sex and stratified into 1 cm length groups. All viable scale samples collected were cleaned using an ultrasonic cleaner, dried, and mounted between 2 glass microscope slides.

Scales are magnified with a microscope using transmitted light, viewed through a Luminera camera, and displayed on a computer screen using Image Pro Premier Software. Digital photos are taken of each sample and cataloged. Image files of each scale sample are identified only by a sample number.

Age determinations were made with consensus of two or more readers on the displayed images by counting annuli and spawning scars according to the criteria of Cating (1953). When discrepancies between the two readers could not be resolved, the scales were examined by a third reader. Samples that were poor quality or did not have two or more viable scales were not aged. Shad were noted to be repeat spawners when the presence of spawning scar(s) at the periphery of the scale were identified. All annuli and spawning scars on scale images were digitally marked and stored as a line profile using Image Pro Premier Software.

Prior to 2015, Scale samples were processed by cleaning with an ultrasonic cleaner and pressed onto acetate using a roller press. The pressed scale images were read using a microfiche reader. When the new image analysis system was implemented, comparisons of scale ages were made using both the Microfiche and Image analysis equipment to ensure that the interpretation of scale ages remained consistent.

Juvenile Seine Survey

A single seine haul was conducted at fixed site locations, one day a week, from mid-July through mid-October. Seine haul locations and techniques were identical to those used in past Connecticut River seine surveys. The sampling sites were previously chosen based on location, physical conditions, and accessibility (Crecco et al. 1981; Marcy 2004). The stations were sampled during daylight hours with an 18.3 m nylon bag seine (0.5 cm delta mesh) and 30.5 m lead ropes. The seine was fished with the aid of a boat to deploy it upstream and offshore to sweep down through the site. Using the lead ropes, the seine was towed in a downstream arc to the shore and hauled by hand in to shore. Clupeids (*Alosa sapidissima, A. aestivalis, A. pseudoharengus*, and *Brevoortia tyrannus*) were returned to the laboratory for measurement and identification. All fish species other than family clupeidae, were identified, quantified, or estimated and released. Invertebrate species are either counted or noted as present. In the laboratory, juvenile clupeids were identified to species by the criteria of Lippson and Moran (1974) and counted. For each sample, up to 40 randomly selected clupeids of each species were measured to total length (mm).

A relative abundance index for young of the year American shad was calculated as a geometric mean catch per unit effort. The geometric mean is the preferred method when reporting to ASMFC for annual compliance reports because it normalizes clustered data. See Job 5 (Gottschall et al. 2022) for methods used to calculate the geometric mean. Forage species are reported as percent occurrence.

RESULTS

The results gathered from March 1, 2022, through February 28, 2023, are detailed below. The alosine project's field activities and sample collections in 2022 were notably challenging due to staffing shortages and challenging environmental conditions. The dense growth of aquatic invasive vegetation, especially Hydrilla, continues to make it difficult for survey staff to access nearshore seine site locations. The time series data provided includes previous sampling efforts funded by other sources.

Commercial Fishery Landings

In 2022, the commercial fishery for American shad in the Connecticut River reported a total catch of 15,827 lbs (Figure 7.1). While only five boats reported landings and eight commercial shad licenses were sold, participation in the fishery remains low. The number of boats fishing for shad each year continues to be minimal due to the lack of new entrants into the fishery. Commercial shad landings accounted for approximately 8% of the total number of shad reported at the Holyoke fish lift in 2022, which provides a minimal estimate of the total population.

Commercial shad catch reports were skewed towards females (87%), with males accounting for 13% of the reported landings (Table 7.1). Males are most likely underreported and less represented in the catch due to mesh size selectivity. Male shad are often discarded because they are less valuable to sell to markets.

Connecticut River Adult American Shad Age Structure

The shad sample collections at the Holyoke fish lift were conducted following normal operating procedure in 2022. Manual fish counts were collected throughout the season, and a back-up video recording system and software was used to supplement and/or confirm manual counts. Early morning and late evening passage operations commenced once the shad run reached a daily total of 12,500 fish from the previous day.

The Holyoke Fish lift was open for fish passage from April 6, 2022. Ice buildup delayed the start of the season from April 1 to April 3. Operations were suspended from April 9-12 and April 19-21 due to high river discharge and poor visibility. Normal operations resumed on April 22. On May 26, lift operations were delayed for repairs, and on May 28, operations were interrupted due to hazardous weather. The final lift for the shad passage season was on June 30. After this date, there were additional lift closures, but these are less relevant to the impact on shad passage.

Water temperatures during the 2022 fish passage season increased above 10 degrees C during mid-April and remained above that temperature through the rest of the month. The peak period of shad passage occurred during increases in water temperature occurring during the third week of May when daily mean water temperatures increased from 13.4°C to 19.2°C and May 21 and 22 when daily mean temperatures were at 18.4°C and 18.9°C, respectively (Figure 7.2; Normandeau 2022).

The number of American shad lifted upstream annually at the Holyoke Dam (Figure 7.3) has been highly variable through the time series, however 192,298 was below the long term mean of 308,000 and is the lowest annual lift value since 2011. During the last decade, the annual lift counts have experienced a general declined. Despite the recent general decline in lift counts, 3 of the 10 highest lift counts occurred during the last 10 years: 536,670 in 2017, 412,656 in 2013, and 385,930 in 2016.

For the 2022 biological sampling, there were 1,000 American shad collected for scale samples, representing 0.5% of the annual fish passage count. Scale samples were collected over 59 of the 72 lift days from April 26 through June 29. Samples were collected during 91% of the days when 65 days of shad passage occurred at the lift (Normandeau 2022).

The 2022 shad run sex ratio and length frequency (Figure 7.5), was derived from information collected at the Holyoke fish lift which is located at River Kilometer 139, upstream of both the commercial and sport fisheries. The combined impact of these modest fisheries is likely not significant enough to affect the composition of the run. The 2022 weighted sex ratio of shad sampled at Holyoke was 49% male and 51% female. As is typical, the male fish are smaller in size than females.

Length frequency of American shad collected at the Holyoke lift in 2022 ranged from 325-475 mm FL for male shad and 343-521 mm FL among female shad. The average size among males was 396 mm FL and among females was 443 mm FL.

The preliminary 2022 examination of the adult shad population revealed that the age structure was primarily composed of fish from the 2015-2019 year classes. Among the male shad, the majority (64.6%) were five-year-old fish. Four-year-old fish made up 30.02% of the population, while six-year-old fish accounted for 4.76%. Three-year-old fish represented a minor portion, at 0.62%. Notably, there were no seven-year-old male fish.

In terms of the female shad sampled in 2022, most (66.6%) were five years old. Six-year-old fish contributed to 11.3% of the population, and four-year-old fish made up 21.9%. Seven-year-old fish were scarce, representing only 0.30% of the population.

The final QA/QC of the 2022 shad age structure and analysis of scale samples to determine the overall incidence of repeat spawning is still in progress.

Juvenile Seine Survey

The Connecticut River was sampled for juvenile alosines from July 21 to September 29, 2022. Over the course of the season, a total of 1,898 juvenile American shad were collected. The

highest catch of the year was recorded in mid-September at the Holyoke site, with 499 shad representing 26% of the total seasonal catch (see Table 7.2). The Holyoke site accounted for a significant portion of the annual catch, with a total of 1,558 shad, or 82% of the annual catch.

The catches at subsequent sites were as follows: Wilson (13.86%), Salmon River (3.85%), Deep River (0.11%), and Essex (0.11%). The geometric mean catch per unit effort value for American shad in 2022 was 3.93. This value ranks 34th out of 45 when ordered from highest to lowest, indicating a weak year class in the time series (Table 7.5).

The challenge of sampling in fixed-site nearshore areas has increased due to a combination of factors. The changes to the river bottom, characterized by silt and mud, pose a significant challenge to the sampling process. This issue is further exacerbated by the infestation of the invasive aquatic plant, *Hydrilla verticillata*.

The efficiency of the hand-hauled seine gear, a critical tool in our sampling process, is also impacted by several physical challenges. These include bank erosion and fallen trees, which are physical barriers to the gear. Increased siltation affects the mobility of the gear. Increasing densities of aquatic vegetation can entangle the gear, hindering its functionality. These challenges highlight the need for adaptive strategies and alternative solutions to ensure the efficiency of future survey sampling processes.

In 2022, a total of 51 seine hauls were completed, resulting in the collection of over 45,000 fish. These fish represented 34 different species or taxonomic groups (Table 7.6). To ensure minimal mortality and expedite the process of returning large catches to the water, certain fish were identified only at the family or genus level. This included species such as shiners, sunfish, catfish, and killifish. For common species that were caught in large numbers, visual counts were used to estimate their quantity. This approach helped to reduce handling and processing time. Blueback herring were found at the stations in Deep River and Essex, CT, with a total count of 4,570 fish. Menhaden were predominantly found in the lower river stations, with a total count of 18,401 fish (Table 7.4). The five most abundant species or groups collected in 2022 were menhaden, shiners, blueback herring, American shad, and sunfish (Tables 7.3-7.6).

Additional Activies:

Interstate fisheries management accomplishments

During this project segment the ASMFC benchmark coast wide stock assessment data update for Connecticut's river herring stocks was submitted. The CT River portion of the river herring stock assessment includes fisheries independent time series data.

MODIFICATIONS

Because of the continued staffing constraints for alosine work, CT DEEP is continuing to evaluate the extent of alosine monitoring that can be realistically maintained. The situation is further complicated by challenges related to sampling, from changes in land cover and the spread of invasive aquatic vegetation near the shore. These factors necessitate a critical evaluation of the effectiveness of the seine gear currently used in the CT River juvenile alosine survey.

The Atlantic States Marine Fisheries Commission Benchmark Stock Assessment of American Shad recommends the use of otolith ages as the preferred method for determining age. However, the extraction of otoliths necessitates the sacrifice of the fish, and it remains unclear when CT DEEP will be able to secure a sufficient number of shad otolith samples. The processing and imaging of otoliths would demand additional time and personnel resources. One of the benefits of using scales for aging is that they can reveal any prior spawning history of the fish. However, processing and examining both scales and otoliths would double the current workload, which is already unmanageable. Until there is an increase in staffing, current staff do not have the capacity to process both scales and otoliths.

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Table 7.1. Annual American shad commercial fishery harvest. Landings are reported by weight (lbs.) and by sex, 2009-2022.

Year	Total (lbs)	Male Wt (lbs)	Female Wt (lbs)
2009	40,680	4,045	32,187
2010	24,641	2,994	21,192
2011	32,805	3,354	29,451
2012	61,975	10,187	51,788
2013	63,324	10,406	52,918
2014	62,707	7,789	54,918
2015	52,713	6,661	46,052
2016	33,998	3,081	30,917
2017	42,191	6,589	35,602
2018	19,939	1,606	18,334
2019	5,496	426	5,070
2020	21,414	3,411	18,004
2021	25,001	1,546	23,455
2022	15,826	2,107	13,719

Table 7.2 Seine Survey catch and effort for CT River juvenile American shad, 2022.

Date	Holyoke	Wilson	Salmon River	Deep River	Essex	Catch	Effort
7/14/2022	0	0	1	1	1	3	5
7/21/2022	74	3	28	0		105	4
7/28/2022	282	0	4	0	0	286	5
8/4/2022	3	0	19	0	0	22	5
8/10/2022	18	2	9	0	0	29	5
8/18/2022	41	86	2	0		129	4
8/25/2022	1	3	4	0	0	8	5
9/1/2022	17	91	2	0	1	111	5
9/8/2022	275	2	2	0		279	4
9/15/2022	499		2	0		501	3
9/22/2022	276		0			276	2
9/29/2022	72	76	0	1		149	4
Total	1558	263	73	2	2	1898	51

Table 7.3 Seine Survey catch and effort for CT River juvenile blueback herring, 2022.

Date	Holyoke	Wilson	Salmon River	Deep River	Essex	Catch	Effort
7/14/2022	0	0	12	58	3	73	5
7/21/2022	0	1	29	58		88	4
7/28/2022	0	0	147	2	0	149	5
8/4/2022	0	0	974	0	0	974	5
8/10/2022	0	0	8	8	1	17	5
8/18/2022	0	0	671	31		702	4
8/25/2022	0	0	42	6	0	48	5
9/1/2022	0	78	360	80	0	518	5
9/8/2022	0	0	480	567		1047	4
9/15/2022	0	0	175	72		247	3
9/22/2022	0	0	42	0		42	2
9/29/2022	0	44	536	85		665	4
Total	0	123	3476	967	4	4570	51

Table 7.4 Seine Survey catch and effort for CT River juvenile menhaden, 2022.

Date	Holyoke	Wilson	Salmon River	Deep River	Essex	Catch	Effort
7/14/2022	0	0	19	402	1	422	5
7/21/2022	0	0	7	1		8	4
7/28/2022	0	0	0	122	0	122	5
8/4/2022	0	0	101	22	0	123	5
8/10/2022	0	0	39	5577	0	5616	5
8/18/2022	0	0	6	7		13	4
8/25/2022	0	0	477	2242	0	2719	5
9/1/2022	0	0	960	171	1	1132	5
9/8/2022	0	0	376	5625		6001	4
9/15/2022	0		99	1780		1879	3
9/22/2022	0		41			41	2
9/29/2022	0	0	325	0		325	4
Total	0	0	2450	15949	2	18401	51

Table 7.5 Geometric mean relative abundance index (CPUE) of juvenile American shad(ASD), 1978-2022.

Year	Juv ASD	Year	Juv ASD
1978	5.89	2000	4.42
1979	7.84	2001	2.73
1980	9.21	2002	5.55
1981	6.05	2003	6.88
1982	1.81	2004	5.62
1983	4.99	2005	10.08
1984	3.37	2006	1.82
1985	7.14	2007	8.15
1986	6.29	2008	5.06
1987	9.89	2009	3.40
1988	5.68	2010	10.23
1989	4.85	2011	3.08
1990	10.39	2012	3.03
1991	4.26	2013	3.16
1992	7.55	2014	8.09
1993	9.49	2015	8.53
1994	12.22	2016	16.70
1995	1.34	2017	5.00
1996	6.50	2018	22.76
1997	7.15	2019	4.52
1998	3.65	2020	Incomplete sampling
1999	5.47	2021	16.68
		2022	3.93

Table 7.6. List of fish species or group and percent frequency of occurrence of fish collected in Connecticut River seine survey, 2022.
**includes more than one species*

Species or Group	% abundance	Species or Group	% abundance
Alewife	0.05	Golden Shiner	0.10
American Eel	0.01	Hogchoker	0.07
American Shad	3.99	Killifish & Mummichog*	1.60
Atlantic Needlefish	0.01	Largemouth Bass	0.11
Atlantic Silverside	0.86	Menhaden	40.24
Bay Anchovy	0.05	Northern Kingfish	0.01
Black Crappie	0.19	Northern Pike	<0.01
Blue Crab	0.03	Pipefish	0.01
Blueback Herring	9.61	Rock Bass	0.08
Bluefish	0.01	Shiner*	36.32
Bowfin	0.01	Smallmouth Bass	0.35
Carp	0.02	Striped Bass	<0.01
Catfish*	0.01	Sunfish*	2.58
Chain Pickerel	0.01	Tessellated Darter	0.81
Crayfish*	0.01	White Perch	0.22
Fallfish	0.09	White Sucker	1.60
Gizzard Shad	<0.01	Yellow Perch	0.94

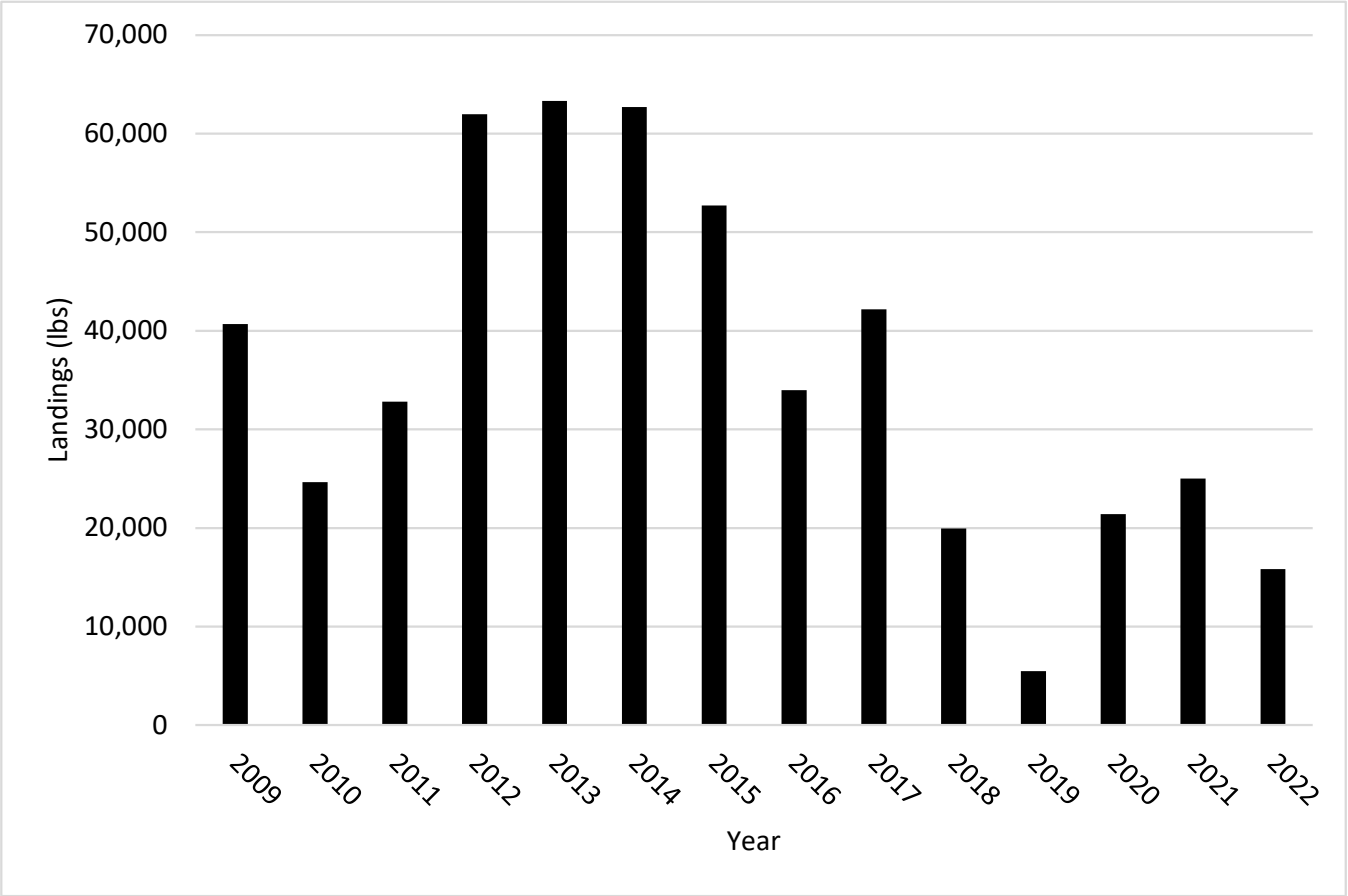

Figure 7.1. Commercial Landings (lbs) for CT River adult American shad, 2009-2022.

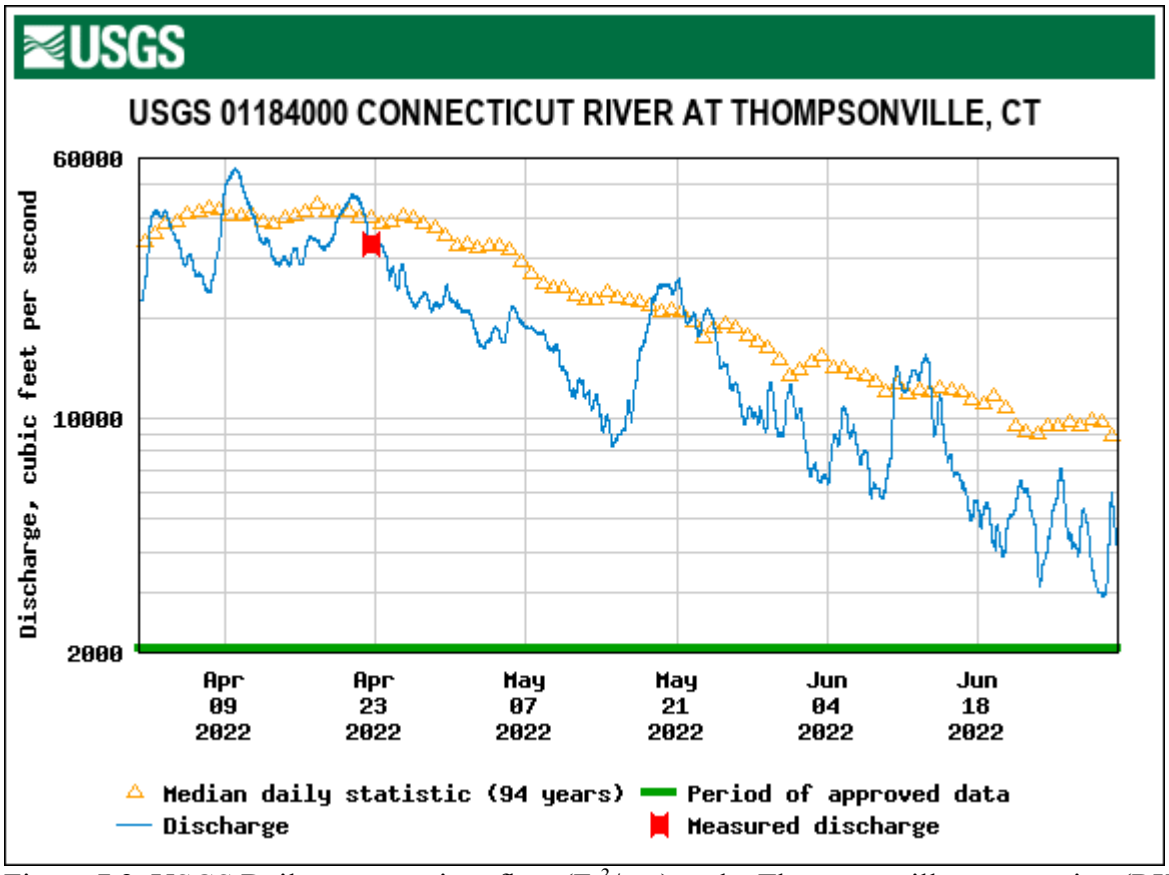

Figure 7.2 USGS Daily average river flow (Ft^3/sec) at the Thompsonville gage station (RKM 110) compared to median flows, during 2022 American Shad passage.

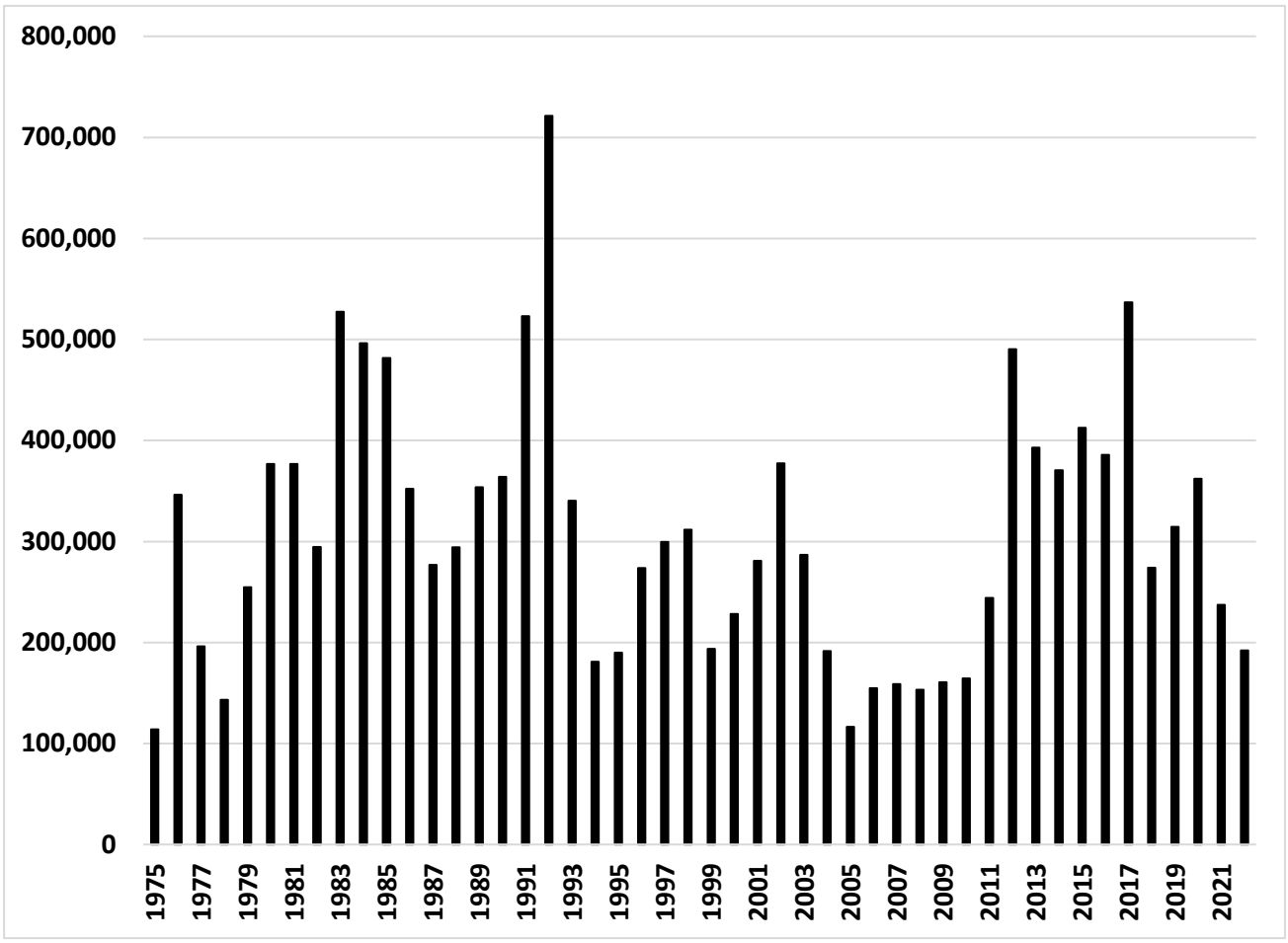

Figure 7.3 Number of adult American Shad lifted at the Connecticut River Holyoke Dam (RKM 139), 1975-2022

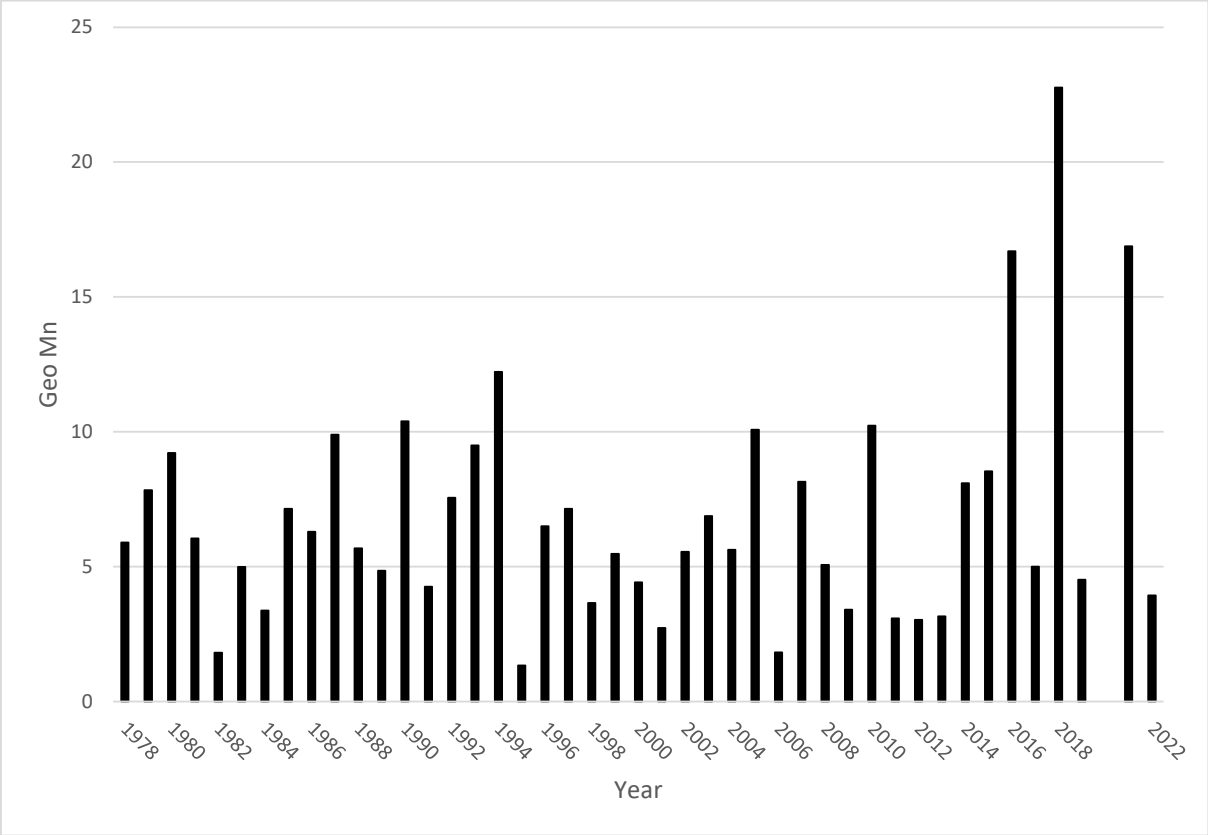

Figure 7.4 Annual geometric mean catch per unit effort of Connecticut River juvenile American shad by station,1978-2022. An index was not calculated in 2020 due to low sample size.

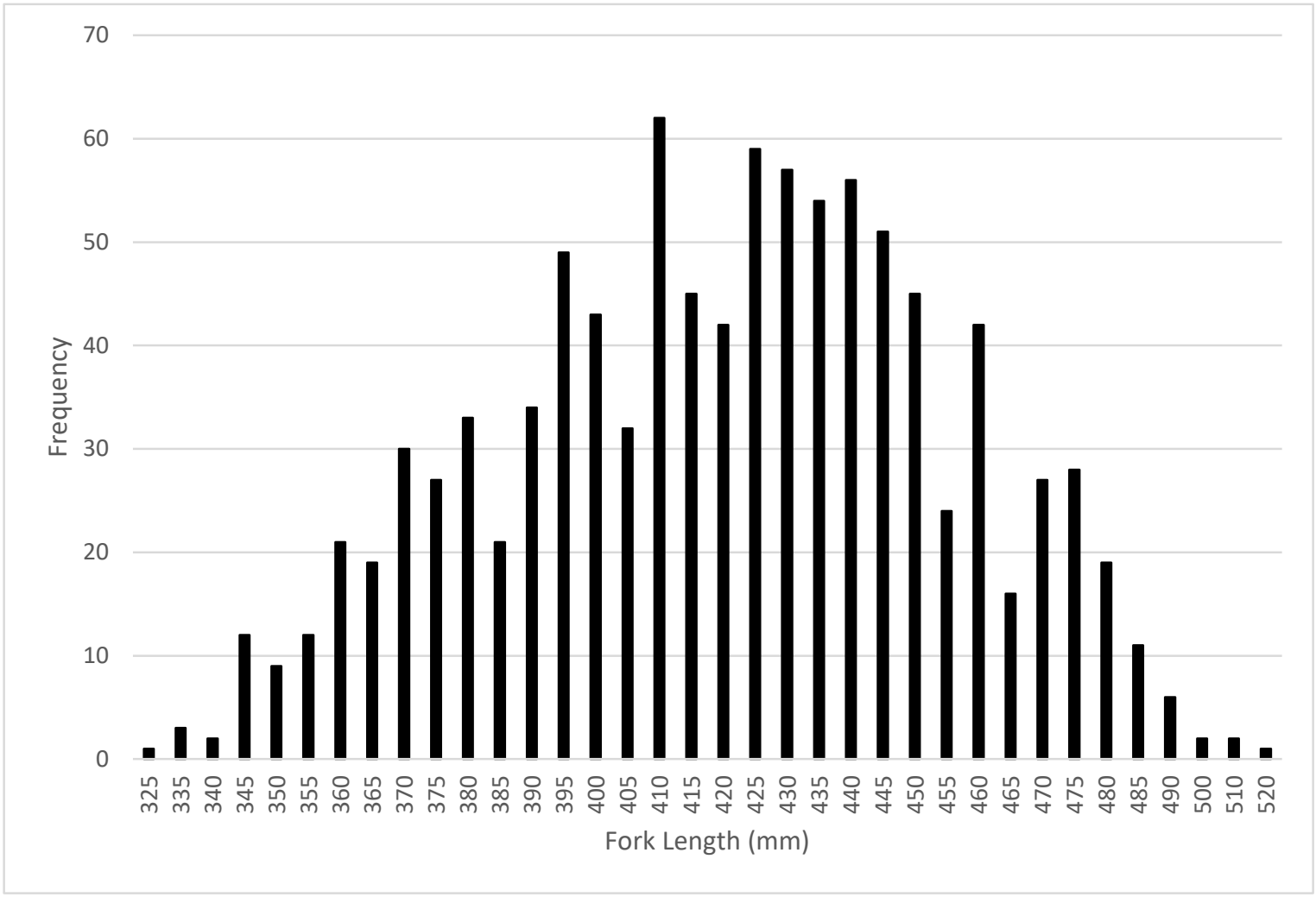

Figure 7.5. Length frequency (mm) of American shad, sampled from the Holyoke Lift,2022.

JOB 8: ESTUARINE SEINE SURVEY

JOB 8: ESTUARINE SEINE SURVEY

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Beach seining with 25' bag seine.

JOB 8: ESTUARINE SEINE SURVEY

GOAL

To monitor the abundance and size composition of near-shore young-of-year and forage fish resources, with physical habitat parameters, in order to evaluate the effects of fishing and environmental conditions on the distribution and abundance of marine resources in Long Island Sound.

OBJECTIVES

1) *Provide an annual index of recruitment for winter flounder (Age0, 1+), all finfish species taken, and all crab species.*
2) *Provide an annual total count for all finfish taken.*
3) *Provide an index for shallow subtidal forage species abundance.*

METHODS

Eight sites (Figure 8.1) are sampled during September using an eight-meter (25 ft.) bag seine with 6.4mm (0.25 in.) bar mesh. Area swept is standardized to 4.6 m (15 ft.), width by means of a taut spreader rope and a 30m (98 ft.), measured distance, parallel to, or at a 45º angle to the shoreline, against the current or tide if present. At each site, six seine hauls are taken within two hours before and after low slack tide during daylight hours. All sites have been sampled since 1988 except Milford which was added in 1990.

Finfish, crabs, and other invertebrates taken in each sample are identified to species or lowest practical taxon (full listing given in Appendix 8.1, 8.2) and counted. One exception is inland silverside, which are not separated from Atlantic silverside 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 (retransformed natural log) mean catch per standard haul is calculated for total finfish catch and individually for the 22 most abundant species, with separate indices for young-of-year (YOY) and winter flounder age 1 and older. Winter flounder YOY catch is also reported for each site. Confidence intervals (95%) for each geometric mean are retransformations of the corresponding log intervals. Frequency of occurrence is given as a percentage of all samples taken each year.

Diversity in the catch, or species richness, was computed for finfish species captured in the Survey over the time series. Species were divided into three groups based on their temperature preferences and seasonal spawning habits as documented in the literature. Criteria used to assign species into a cold temperate group, warm temperate group, or subtropical group are listed in Job 5.

RESULTS

A total of 48 seine hauls were taken in 2022 at eight sites, yielding a total catch of 7,678 fish of 24 species and 9,463 invertebrates of 10 species. Geometric mean catch of all finfish (fish/haul) in 2022 was 160 fish/haul, below the 30-year time series median of 161 fish/haul (Figure 8.2). Although total catch varies considerably from year to year, the increasing trend is significant (df=33, r^2=0.30, p<0.001). Dominant species contributing to this increase include menhaden, scup (porgy), young-of-year (YOY) black sea bass, northern kingfish, and a resurgence of five forage species. Catch slightly increased from 2021 to 2022, species that contributed to high total catch in 2022 compared to 2021 were Atlantic Menhaden (42%), Bluefish (16%), Hickory Shad (100%), Naked Goby (100%), Northern Puffer (5%), Northern Searobin (8%), Scup (11%), Striped Bass (100%), Striped Searobin (24%) and Striped Killifish (5%).

Geometric means were calculated for 30 species commonly captured since the survey began in 1988 (Table 8.1). The most frequently caught species was Atlantic silverside, which occurred in all samples, followed by striped killifish, scup, Atlantic menhaden, black sea bass, mummichog, northern kingfish, northern pipefish, sheepshead minnow, and northern puffer (Table 8.2). This rank order has changed from previous years, with a decrease in recreationally important species such as black sea bass, scup, and tautog along with mummichog, northern pipefish, and striped killifish (Table 8.2).

Scup and black sea bass occurrence and abundance increased well above the 34-year time series average in 2021 and 2022 (Tables 8.1 and 8.2). Occurrence of Atlantic silversides, striped killifish, and Atlantic menhaden also ranked high in the time series. Windowpane flounder was again absent in 2022 after re-occurring at low abundance in 2011 and 2014, but absent in 2009-10, 2012-13, and 2015-22 (Table 8.1).

Relative Abundance of Juvenile Winter Flounder and Tautog

The 2022 index of YOY winter flounder (0.27 fish/haul) decreased 23% from the 2021 index. An all-time low occurred in 2022 with the second lowest abundance recorded in 2013 (Table 8.3, Figure 8.3). Total catch in 2022 decreased 9% from 2021 (Table 8.4). The time series has a significant negative trend (df=33, r^2=0.46, p<0.00001), and indicates that a relatively strong year class has not been produced since 1996 (Table 8.1, Figure 8.3). As in previous years, highest abundance was seen at eastern sites (Groton, and Waterford and Old Lyme) and Milford, Bridgeport, Clinton, New Haven and Greenwich had no catch (Table 8.3) and the frequency of occurrence of this species has decreased over the time series (Figure 8.3) indicating that juvenile production has contracted in several areas of the Sound. Mean length of YOY winter flounder captured at all sites in 2022 was 68.8mm and shows no trend over the 33-year time series, ranging from 47.3 to 104mm.

The 2022 index of YOY tautog (0.8 fish/haul) was below the series average of 1.11 tautog fish/haul, increasing from 2013 (0.59 fish/haul) and decreasing from 2015 (4.80 fish/haul) which was the highest abundance in the time series (Table 8.1, Figure 8.4). Overall, the time series has a significant increasing trend (df=33, r^2=0.28, p<0.001). Relatively

abundant year classes have been produced in 1998-99, 2002-04, 2007-08, 2012 and 2014-15, 2017-2020. The frequency of occurrence of this species has also increased over the time series (Table 8.2) indicating that juvenile production and survival is improving in several areas of the Sound.

Presence of Other Important Recreational Finfish

YOY scup and black sea bass are recent additions to the seine survey (Table 8.1, Figures 8.5 and 8.6). Scup occurred in 1999 but the highest relative abundance has been in the last eight years of the time series. Record numbers for YOY scup occurred in 2015 (9.4 fish/haul), with a time series high occurring in 2018 (10.6 fish/haul), which is above the time series mean (1.71 fish/haul). The 2022 index for scup was 7.3 fish/haul, which is the fifth highest in the time series.

YOY black sea bass first appeared in Survey catches in 1991 and every year since 1998, reaching their record highest abundance in 2015 (16.3 fish/haul). The 2016 index (5.8 fish/haul) is third highest behind 2014 and 2015. The 2022 index was 3.6 fish/haul, slightly lower than 2013 index of abundance. Total catch in 2019 increased 67% from 2018 and increased again in 2020 by 13% from 2019 (Table 8.4). Total catch in 2022 decreased 23% from 2021 (Table 8.4).

YOY bluefish show a pattern similar to black seabass, first appearing in the catch in 1991 and almost consistently since 1998. Their abundance increased dramatically in 2014 and 2015, returning to abundance near the time series mean (0.3 fish/haul) in 2016 (Table 8.1). No juvenile bluefish (snappers) were captured in 2017, making it the eighth time in the 34-year time series that no snappers were seen. In 2018, juvenile bluefish reappeared with an abundance of 0.44 fish/haul and increased in 2019 with an abundance of 0.62 fish/haul then decreased in 2020, 2021, and 2022 (0.2 fish/haul, 0.3 fish/haul, and 0.3 fish/haul respectively).

Relative Abundance of Forage Species

Seine survey catches are numerically dominated by forage species, defined here as short-lived, highly fecund species that spend the majority of their life cycle inshore where they are common food items for piscivorous fish. An index of forage fish abundance was generated using the catch of four of the most common forage species caught: Atlantic silverside, striped killifish, mummichog, and sheepshead minnow (Figure 8.7). The 2022 index (81 fish/haul) was below the series average (104 fish/haul).

Although numerically driven by the abundance of silverside, all four forage fish species increased in abundance and occurrence in 2017-2020 and were at or above their time series mean of 104 fish/haul. The time series high occurred in 2003, with a mean catch of 206 forage fish (Table 8.7). Although the forage index varies considerably from year to year, common for short-lived forage species, the increasing trend is significant (r^2 =0.14, p=0.03, Figure 8.7).

Relative Abundance of Invertebrate Species

A total of 9,499 invertebrates of 10 species or taxon groups were captured in 2022 (Table 8.6, Appendix 8.2), a total similar to 2018 (10,030). Six crab species were present in the seine hauls, along with two shrimp species. Mud snail and shore shrimp were the most abundant and at 42% and 38% occurrence, respectively (Table 8.6).

Fifty-three blue crabs were captured in 2022, an increase from 2021 (twenty-two blue crabs). Blue crabs were captured at Groton, Old Lyme, Clinton, Waterford, Greenwich, New Haven, and Milford sites but continued at relatively low abundances in 2017, 2018 (n=11 and 19 crabs) down from a time series high in 2009 (n=333 crabs). The 2022 index (n=53 blue crabs) is fifth highest behind 2019 and 2020. The Japanese shore crab re-appeared in 2015 and 2016, with only one captured at the Old Lyme site. No Japanese shore crabs were captured in 2017, 2018, 2021 or 2022, but one was captured in 2019 and 2020. The shore shrimp returned to moderate abundance in 2016, 2017, after increasing substantially in 2014-15, then decreasing in 2018-2020 with a slight increase in 2021 (Table 8.6). Shore shrimp abundance in 2022 was second highest in the time series (n= 3,588) with a time series high in 2015 (n= 4,795). Sand shrimp decreased significantly from 2015 until 2016, then increased significantly in 2017 until 2022 (Table 8.6). Spider crab abundance has also increased nearly ten-fold from 2011 until 2017 compared to earlier years, with the highest catch in 2017, and decreased significantly in 2018-2022 (Table 8.6).

MODIFICATIONS

None.

Beach seining with 25’ bag seine at the Old Lyme site.

Table 8.1: Geometric mean catch of finfish species commonly captured in seine samples, 1988-2022.
See Appendix 8.1 for complete taxonomic names.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
alewife	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
American sand lance	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
American shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Atlantic menhaden	0.1	0.0	0.0	0.0	0.5	0.0	0.1	0.0	0.0	0.1	0.4	0.4	0.4	0.0	1.0	8.2
Atlantic silverside	68.2	31.6	45.0	88.5	51.2	42.7	37.7	27.0	17.7	23.1	74.3	102.5	99.7	36.1	80.1	113.6
Atlantic tomcod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
black sea bass	0.0	0.0	0.0	0.1	0.0	0.0	0.2	0.1	0.0	0.0	0.1	0.1	0.0	1.0	0.4	0.2
blueback herring	0.0	0.1	0.0	0.5	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1
bluefish	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9	0.0	0.1	0.0	0.2
cunner	0.2	0.3	0.0	0.1	0.2	0.0	0.3	0.2	0.3	0.0	0.3	0.5	0.3	0.2	0.3	0.2
fourspine stickleback	0.3	0.4	0.0	0.7	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0
grubby	0.8	0.1	0.0	0.1	0.5	0.1	0.4	0.3	0.2	0.3	0.2	0.5	0.1	0.2	0.3	0.5
inshore lizardfish	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.4	0.1	0.2	0.2	1.2	0.0	0.0
mummichog	2.8	1.6	1.1	1.9	1.6	3.7	3.3	0.7	1.2	0.5	2.0	0.8	3.2	1.4	3.4	2.9
naked goby	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
northern kingfish	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.1	0.0	0.1	0.1	0.1	0.0	0.2	0.1	0.2
northern pipefish	0.7	0.3	0.4	1.0	0.9	0.9	1.1	0.5	1.0	0.4	2.1	1.0	1.0	1.4	0.5	0.3
northern puffer	0.1	0.3	0.1	0.4	0.1	0.4	0.2	0.5	0.2	0.1	0.1	0.2	0.6	0.2	0.7	0.7
rainbow smelt	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
scup	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.6
sheepshead minnow	0.8	1.0	0.1	0.6	0.0	0.0	0.0	0.1	0.0	0.1	0.1	0.1	0.4	0.2	0.6	0.7
smallmouth flounder	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.0	0.3	0.0	0.1	0.0	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	0.1
striped killifish	11.9	7.9	5.9	4.2	3.1	4.9	5.1	3.9	2.0	1.5	7.2	4.5	8.6	7.5	14.5	14.9
striped searobin	0.2	0.2	0.1	0.2	0.1	0.9	0.1	0.0	0.1	0.4	1.9	0.6	0.1	0.4	0.3	0.7
summer flounder	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tautog	0.3	0.1	0.3	0.7	0.4	0.2	0.8	0.7	0.3	0.2	0.9	1.3	0.5	0.6	1.5	1.1
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	0.2
windowpane flounder	0.6	0.1	0.2	0.2	0.3	0.3	0.1	0.2	0.7	0.4	0.1	0.1	0.1	0.0	0.0	0.1
winter flounder-age 1+	0.2	0.1	0.0	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.0	0.0	0.0
winter flounder YOY	15.4	1.7	2.9	5.2	11.9	5.7	14.2	10.1	19.2	7.5	9.2	8.7	4.3	1.3	3.1	8.1

Table 8.1 continued: Geometric mean catch of finfish species commonly captured in seine samples, 1988-2022.
See Appendix 8.1 for complete taxonomic names.

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
alewife	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
American sand lance	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
American shad	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Atlantic menhaden	0.4	0.2	0.4	0.6	0.1	0.3	0.0	0.1	0.0	0.1	1.2	9.9	0.4	0.5	1.6	1.4	0.8	1.7	6.2
Atlantic silverside	85.1	81.3	37.7	74.9	57.5	66.8	96.9	66.5	45.0	35.0	64.8	114.5	73.0	75.9	117.4	111.3	116.9	65.2	44.7
Atlantic tomcod	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
black sea bass	0.4	0.1	0.5	0.6	0.3	1.1	0.4	3.2	5.2	3.7	10.8	16.3	5.8	3.2	4.6	2.8	5.1	5.4	3.6
blueback herring	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	0.8	0.0	0.3	0.0	0.0
bluefish	0.2	0.1	0.2	0.0	0.0	0.3	0.0	0.2	0.4	0.1	0.8	3.4	0.3	0.0	0.4	0.6	0.2	0.3	0.3
cunner	0.5	0.3	0.1	0.5	0.1	0.2	0.1	0.0	0.4	0.0	0.5	0.1	0.0	0.2	0.2	0.2	0.2	0.0	0.0
fourspine stickleback	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0
grubby	1.3	0.8	0.3	0.3	0.2	0.5	0.3	0.7	0.2	0.2	0.2	0.2	0.0	0.3	0.1	0.6	0.1	0.8	0.4
inshore lizardfish	0.0	0.0	1.9	0.2	0.3	0.2	0.1	0.2	0.2	0.1	1.6	0.4	0.0	0.4	0.3	0.6	0.0	1.7	0.9
mumichog	2.3	1.5	2.5	7.3	2.9	3.8	1.7	3.1	1.6	0.9	5.0	5.3	2.2	3.3	4.5	5.6	4.1	3.8	2.8
naked goby	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
northern kingfish	0.3	0.1	0.0	0.0	0.2	0.3	0.5	0.2	0.5	0.7	1.1	1.0	0.1	0.8	0.3	2.0	1.0	2.3	1.4
northern pipefish	0.7	0.5	0.6	0.8	0.7	1.9	0.6	1.1	1.4	1.7	2.6	2.0	0.5	0.8	2.2	1.4	1.9	1.7	1.1
northern puffer	0.7	0.5	0.4	1.2	0.2	0.3	0.4	0.4	0.9	1.1	1.1	1.4	0.2	0.2	0.6	1.5	1.2	0.9	0.9
rainbow smelt	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
scup	0.2	0.9	0.1	1.0	0.1	1.9	0.1	0.2	2.1	0.1	2.6	9.4	1.3	2.5	10.6	2.7	7.0	8.5	7.3
sheepshead minnow	0.5	0.2	0.2	3.3	1.2	0.5	0.3	0.5	0.8	0.2	0.6	0.3	0.5	0.5	1.8	1.0	2.0	1.5	1.1
smallmouth flounder	0.0	0.0	0.0	0.0	0.1	0.2	0.1	0.9	0.4	0.5	0.1	0.2	0.1	0.0	0.1	0.0	0.1	0.2	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	0.0	0.0	0.0
striped killifish	12.9	19.4	7.1	21.2	21.7	12.3	15.9	28.7	5.3	3.8	14.5	17.1	10.2	10.4	23.7	20.2	18.3	19.7	16.9
striped searobin	0.5	0.2	0.1	0.3	0.3	0.8	0.2	0.1	0.1	0.2	1.1	0.7	0.0	0.0	0.0	0.4	0.1	0.2	0.2
summer flounder	0.0	0.0	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
tautog	1.4	0.7	0.4	2.4	1.0	0.4	0.4	0.3	1.3	0.6	3.5	4.8	1.1	1.3	3.7	1.5	2.2	1.3	0.8
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	0.1	0.0	0.0	0.0	0.0
windowpane flounder	0.2	0.2	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
winter flounder	0.1	0.2	0.1	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
winter flounder YOY	11.0	5.6	0.9	4.7	2.0	0.8	1.0	1.1	0.3	0.3	0.5	0.6	0.6	1.0	0.4	0.7	0.4	0.4	0.3

Table 8.2: Frequency of occurrence of finfish species commonly captured in seine samples, 1988-2022.

See Appendix 8.1 for complete taxonomic names.

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
alewife	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.02
American sand lance	0.00	0.00	0.00	0.00	0.02	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Atlantic menhaden	0.06	0.05	0.04	0.04	0.19	0.06	0.10	0.04	0.00	0.06	0.06	0.15	0.10	0.02	0.27	0.58
Atlantic silverside	0.97	0.93	0.96	1.00	1.00	0.96	1.00	0.96	0.94	0.92	0.98	0.94	1.00	0.92	1.00	0.96
Atlantic tomcod	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00
black sea bass	0.00	0.00	0.00	0.04	0.00	0.00	0.15	0.04	0.00	0.00	0.06	0.08	0.02	0.25	0.17	0.13
blueback herring	0.00	0.05	0.04	0.13	0.04	0.00	0.06	0.02	0.00	0.00	0.02	0.08	0.02	0.00	0.04	0.06
bluefish	0.00	0.00	0.00	0.10	0.02	0.00	0.02	0.00	0.00	0.02	0.13	0.46	0.04	0.13	0.02	0.10
cunner	0.17	0.19	0.04	0.10	0.15	0.00	0.23	0.15	0.13	0.02	0.21	0.23	0.19	0.15	0.13	0.17
fourspine stickleback	0.17	0.19	0.00	0.23	0.15	0.04	0.02	0.00	0.04	0.00	0.13	0.04	0.02	0.06	0.00	0.00
grubby	0.33	0.07	0.04	0.10	0.31	0.06	0.33	0.25	0.19	0.29	0.17	0.27	0.10	0.17	0.21	0.29
inshore lizardfish	0.06	0.00	0.04	0.00	0.00	0.06	0.10	0.00	0.00	0.29	0.06	0.17	0.19	0.56	0.04	0.00
mummichog	0.47	0.48	0.35	0.40	0.38	0.50	0.42	0.35	0.42	0.15	0.42	0.29	0.44	0.42	0.54	0.44
naked goby	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.02	0.00	0.08	0.02	0.02
northern kingfish	0.00	0.00	0.00	0.06	0.08	0.10	0.04	0.15	0.04	0.13	0.10	0.08	0.04	0.13	0.04	0.15
northern pipefish	0.42	0.31	0.37	0.63	0.35	0.50	0.58	0.33	0.44	0.33	0.73	0.48	0.54	0.48	0.19	0.25
northern puffer	0.08	0.24	0.09	0.27	0.08	0.31	0.17	0.40	0.15	0.06	0.10	0.19	0.35	0.17	0.35	0.31
rainbow smelt	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
scup	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.23	0.35	0.25
sheepshead minnow	0.31	0.31	0.09	0.21	0.04	0.02	0.02	0.04	0.00	0.04	0.04	0.06	0.17	0.10	0.15	0.19
smallmouth flounder	0.03	0.00	0.00	0.02	0.00	0.13	0.10	0.06	0.04	0.04	0.00	0.21	0.06	0.13	0.00	0.00
striped bass	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.06
striped killifish	0.78	0.67	0.65	0.73	0.58	0.65	0.58	0.69	0.54	0.40	0.75	0.67	0.63	0.71	0.85	0.81
striped searobin	0.11	0.12	0.11	0.10	0.08	0.48	0.10	0.02	0.10	0.35	0.60	0.38	0.10	0.29	0.25	0.40
summer flounder	0.00	0.00	0.00	0.00	0.00	0.04	0.10	0.00	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00
tautog	0.22	0.05	0.22	0.42	0.31	0.19	0.33	0.33	0.13	0.17	0.38	0.46	0.23	0.40	0.54	0.50
weakfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
windowpane flounder	0.31	0.10	0.13	0.23	0.23	0.19	0.17	0.19	0.35	0.23	0.13	0.13	0.06	0.00	0.02	0.10
winter flounder –age 1+	0.25	0.12	0.00	0.15	0.08	0.23	0.17	0.19	0.10	0.15	0.10	0.06	0.15	0.04	0.02	0.00
winter flounder YOY	0.97	0.71	0.74	0.92	0.98	0.88	0.98	0.94	1.00	0.94	0.92	0.88	0.77	0.58	0.79	0.85

Table 8.2 cont.: Frequency of occurrence of finfish species commonly captured in seine samples, 1988-2022. *See Appendix 8.1 for complete taxonomic names.*

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
alewife	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.10	0.00
American sand lance	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
American shad	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.13	0.1	0.00	0.03	0.00	0.00
Atlantic menhaden	0.08	0.06	0.13	0.17	0.02	0.15	0.02	0.02	0.04	0.04	0.23	0.54	0.1	100	0.29	0.23	0.76	1.75	6.16
Atlantic silverside	1	1	1	1	1	1	1	1	0.98	1	4	1	1	0	1	1	116.86	65.21	44.65
Atlantic tomcod	0.02	0.02	0.00	0.00	0.02	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00
black sea bass	0.25	0.08	0.23	0.23	0.15	0.27	0.13	0.58	0.75	0.58	0.77	0.9	0.88	0.77	0.94	0.50	5.10	5.42	3.55
blueback herring	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0	0.02	0.00	0.00	0.02	0.00	0.00	0.23	0.00	0.27	0.00	0.00
bluefish	0.15	0.04	0.08	0	0.02	0.15	0.02	0.1	0.21	0.08	0.23	0.77	0.21	0.00	0.27	0.35	0.19	0.27	0.27
cunner	0.29	0.21	0.13	0.25	0.1	0.17	0.08	0.04	0.23	0.02	0.31	0.1	0.00	0.13	0.13	0.15	0.23	0.02	0.02
fourspine stickleback	0.02	0.00	0.02	0.00	0.00	0.02	0.00	0.04	0.00	0.00	0.15	0.00	0.04	0.06	0.08	0.00	0.35	0.00	0.00
grubby	0.5	0.46	0.27	0.15	0.19	0.27	0.21	0.42	0.23	0.2	0.19	0.15	0.02	0.19	0.08	0.40	0.12	0.77	0.39
inshore lizardfish	0.06	0.00	0.6	0.13	0.19	0.15	0.13	0.1	0.15	0.13	0.6	0.25	0.00	0.29	0.29	0.31	0.00	1.75	0.93
mummichog	0.35	0.27	0.48	0.65	0.48	0.5	0.4	0.42	0.35	0.27	0.54	0.65	0.4	0.5	0.54	0.65	4.06	3.83	2.79
naked goby	0.04	0.00	0.08	0.00	0.02	0.00	0.00	0.02	0.08	0.06	0.08	0.02	0.02	0.04	0.04	0.00	0.02	0.02	0.02
northern kingfish	0.17	0.1	0.02	0.02	0.19	0.17	0.23	0.13	0.29	0.35	0.4	0.38	0.1	0.4	0.21	0.56	1.03	2.29	1.43
northern pipefish	0.48	0.25	0.29	0.42	0.23	0.52	0.4	0.44	0.6	0.6	0.69	0.75	0.31	0.5	0.83	0.58	1.89	1.68	1.07
northern puffer	0.4	0.31	0.29	0.44	0.23	0.23	0.21	0.31	0.42	0.38	0.48	0.31	0.21	0.23	0.38	0.54	1.17	0.90	0.89
rainbow smelt	0.08	0.00	0.00	0.00	0.00	0.00	0.00	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	0.13	0.29	0.04	0.29	0.02	0.38	0.04	0.06	0.42	0.08	0.48	0.71	0.38	0.71	0.96	0.54	6.97	8.52	7.30
sheepshead minnow	0.15	0.15	0.06	0.4	0.27	0.13	0.1	0.13	0.25	0.07	0.17	0.13	0.13	0.15	0.4	0.23	2.02	1.48	1.10
smallmouth flounder	0.00	0.00	0.02	0.00	0.13	0.15	0.06	0.4	0.17	0.29	0.06	0.15	0.13	0.02	0.1	0.02	0.15	0.18	0
striped bass	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.04
striped killifish	0.73	0.96	0.65	0.88	0.94	0.75	0.9	0.98	0.65	0.58	0.88	0.88	0.79	0.85	1	0.94	18.28	19.69	16.94
striped searobin	0.38	0.13	0.13	0.27	0.19	0.4	0.17	0.06	0.08	0.15	0.49	0.29	0.02	0.04	0.04	0.21	0.06	0.24	0.20
summer flounder	0.00	0.00	0.19	0.06	0.15	0.02	0.04	0	0.08	0.12	0.06	0.13	0.02	0.02	0.04	0.04	0.02	0.03	0.00
tautog	0.54	0.42	0.17	0.54	0.42	0.35	0.31	0.23	0.6	0.33	0.63	0.83	0.67	0.5	0.85	0.65	2.25	1.29	0.81
weakfish	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.08	0.00	0.03	0.00	0.00
windowpane flounder	0.21	0.15	0.06	0.04	0.1	0.00	0.04	0.02	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
winter flounder –age 1+	0.17	0.21	0.15	0.08	0.15	0.04	0.04	0.04	0.05	0.00	0.06	0.04	0.02	0.06	0.02	0.04	0.05	0.04	0.02
winter flounder YOY	0.98	0.94	0.46	0.92	0.71	0.52	0.6	0.63	0.27	0.23	0.33	0.46	0.35	0.48	0.4	0.46	0.42	0.43	0.27

Table 8.3: Mean catch of young-of-year winter flounder at eight sites sampled by seine, 1988-2022. BPT=Bridgeport, CLT=Clinton, GRT=Groton, GRW=Greenwich, MIL=Milford, OLM=Old Lyme, WTF=Waterford

Year	BPT	CLT	GRT	GRW	MIL	NHH	OLM	WTF	All Sites
1988	*18.72	2.73	11.39	9.63	-	38.66	58.19	29.57	**15.4**
1989	1.7	1.14	1.53	0.7	-	2.14	2.04	2.99	**1.7**
1990	3.97	0.19	2.21	0.51	1.62	5.69	16.83	2.64	**2.9**
1991	1.77	4.1	5.62	1.99	2.46	6.45	15.32	18.25	**5.2**
1992	3.34	5.53	6.25	9.42	4.29	40.15	47.99	32.52	**11.9**
1993	1.22	1.4	8.59	4.33	3.62	11.47	13.34	16.66	**5.7**
1994	4.46	8.11	38.36	4.26	4.62	35.34	61.65	21.03	**14.2**
1995	1.94	3.19	30.28	7.22	1.77	18.93	34.23	36.58	**10.1**
1996	7.67	11.81	15.67	*12.61	*6.58	*49.29	91.34	30.53	***19.2**
1997	2.87	6.61	23.69	3.43	1.64	3.79	52.01	11.25	**7.5**
1998	1.24	4.03	17.63	8.12	0.91	22.37	57.19	21.89	**9.2**
1999	1.04	2.6	25.7	7.95	3.49	0.94	*137.07	36.12	**8.7**
2000	2.14	0.51	0.76	6.65	0.78	1.74	48.34	*41.56	**4.3**
2001	0.2	1.12	4.12	1.24	0.59	0	0.91	9.1	**1.3**
2002	0.91	2.66	3.06	5.08	0.26	1.08	15.55	8.98	**3.1**
2003	1.88	4.61	*45.78	5.88	0.89	1.7	51.13	32.3	**8.1**
2004	1	*18.36	33.84	11.27	3.36	33.06	11.13	13.04	**11**
2005	1.94	11.14	16.7	7.71	5.14	1.64	4.06	7.3	**5.6**
2006	0.12	1.38	5.53	0.12	0	0	3.3	1.29	**0.9**
2007	0.78	5.65	17.9	4.44	0.78	6.42	7.89	7.11	**4.7**
2008	0.51	2.45	10.84	0.51	0	1.57	2.62	5.94	**2**
2009	0.91	1.62	2.29	0.12	0.51	0.12	0.12	1.75	**0.8**
2010	0.41	1.11	1.71	1.33	0.12	0.41	1.88	1.57	**1**
2011	0.12	0.98	1.18	2.26	0.78	0.12	4.27	1.45	**1.1**
2012	0	0.26	0.7	0.76	0	0.12	0.26	0.44	**0.3**
2013	0	0	1.14	0.26	0	0	0.65	0.57	**0.28**
2014	0.12	0.12	1.82	0.26	0.12	0.12	1.35	0.65	**0.47**
2015	0	0.59	1.96	0.7	0.12	0.12	0.51	2.4	**0.64**
2016	0.12	0	1.49	0.2	0	0	1.14	6.03	**0.63**
2017	0	0.12	13.53	0.91	0.26	0.26	0.12	4.19	**1.03**
2018	0	0.31	1.29	0.41	0	0	0.41	1.8	**0.42**
2019	0	0.65	2.56	0.44	0.26	0.12	0.41	2.91	**0.69**
2020	0	1.00	1.14	0.41	0	0	0.12	1.72	**0.42**
2021	0	1.22	1.17	0	0	0	0.25	1.35	**0.43**
2022	0	0	2	0	0	0	0.20	0.51	****0.27**

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

Table 8.4: Total catch of finfish species commonly captured in seine samples, 1988-2022. *See Appendix 8.1 for complete taxonomic names.*

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Atlantic Menhaden	3	2	2	4	1,074	3	9	2		11	2,003	377	1,236	1	1,284	5,098	1,117
Atlantic Silverside	4,750	3,316	5,356	6,383	5,468	5,263	6,311	2,352	1,942	3,249	6,345	10,120	8,738	4,417	5,730	13,278	5,122
Black Sea Bass				10			41	43			27	14	2	687	63	27	110
Bluefish			3	194	10		5	2			3	24	1		13	5	23
Cunner	15	27	2	5	19		42	24	63	1	23	142	26	15	110	15	54
Fourspine Stickleback	33	76		183	11	21	1		3		24	3	1	7			9
Grubby	111	3	2	7	61	6	38	19	21	28	17	55	15	73	33	95	143
Inshore Lizardfish	5		2			4	6			46	6	16	15	103	2		3
Mummichog	1,031	197	171	765	573	1,256	1,943	78	149	190	396	115	1,008	246	811	702	637
Naked Goby			1	4				1			1	1		4	2	2	2
Northern Kingfish				3	4	23	2	9	3	10	7	6	5	17	5	21	38
Northern Pipefish	65	23	33	106	120	82	117	52	241	38	295	141	96	189	87	25	72
Northern Puffer	4	22	13	34	4	37	15	40	25	5	5	13	63	14	79	101	75
Northern Searobin		2	1				1	1					3	40	24	5	4
Rainwater Killifish									3	4			2		6	35	53
Scup												1		58	172	131	50
Sheepshead Minnow	174	815	5	345	4	1	2	30		14	19	12	267	59	402	276	205
Smallmouth Flounder	1			1		8	14	7	2	5		40	3	12			
Striped Killifish	1,511	1,383	748	659	465	773	1,923	520	269	289	1,066	539	1,797	1,494	1,698	3,410	1,548
Striped Searobin	22	12	5	94	5	71	5	1	9	40	178	51	7	33	33	62	38
Summer Flounder						2	6		1		1						
Tautog	23	5	23	72	32	16	104	88	42	19	135	174	67	59	153	140	145
Windowpane Flounder	49	4	22	19	35	30	9	13	71	50	12	10	4		1	5	15
Winter Flounder 1+	12	6		7	6	14	13	12	21	282	9	4	7	2	3		9
Winter Flounder YOY	900	117	276	410	1,055	483	1,401	916	1,486	874	999	1,497	708	138	302	1,310	914

Table 8.4 cont.: Total catch of finfish species commonly captured in seine samples, 1988-2022. *See Appendix 8.1 for complete taxonomic names.*

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Atlantic Menhaden	75	117	144	21	54	3	43	2	14	3,404	3,948	150	703
Atlantic Silverside	5,089	3,267	5,087	3,245	4,156	7,063	4,657	4,142	3,958	3,832	7,549	6,459	4,869
Black Sea Bass	15	82	109	33	304	86	489	783	1,197	1,950	1,794	500	338
Bluefish	8	30		7	53	1	26	54	17	194	289	45	
Cunner	35	18	58	8	28	15	2	42	1	73	7		28
Fourspine Stickleback		2			8		2			13		2	3
Grubby	76	31	32	16	51	25	55	18	19	18	16	1	35
Inshore Lizardfish		169	18	26	22	10	16	23	11	135	38		30
Mummichog	543	398	1,203	498	857	299	775	329	199	1,098	999	519	676
Naked Goby		13		2			2	4	4	6	5	1	7
Northern Kingfish	11	1	1	23	42	76	30	54	81	149	113	10	142
Northern Pipefish	92	82	75	156	307	49	248	152	204	413	142	48	63
Northern Puffer	93	34	241	19	41	51	28	98	202	97	448	18	17
Northern Searobin	13	2	10			1	9		6	35	105		45
Rainwater Killifish	19	3										4	55
Scup	154	6	170	14	413	21	30	375	18	485	1,573	198	212
Sheepshead Minnow	28	104	1,439	304	203	82	219	238	59	154	60	742	352
Smallmouth Flounder		1		14	21	5	114	63	49	15	13	7	1
Striped Killifish	1,470	1,063	1,994	1,874	1,508	1,300	1,964	720	493	1,158	1,531	1,482	961
Striped Searobin	19	6	32	36	82	14	4	7	14	121	84	1	2
Summer Flounder		16	8	8	1	6		6	7	3	11	1	2
Tautog	64	93	321	131	25	33	27	123	73	467	446	75	140
Windowpane Flounder	15	3	2	17		2	4			2			
Winter Flounder 1+	11	7	6	13	2	2	2	2		3	2	1	3
Winter Flounder YOY	470	110	365	190	72	71	86	22	24	48	48	74	140

Table 8.4 cont.: Total catch of finfish species commonly captured in seine samples, 1988-2022. *See Appendix 8.1 for complete taxonomic names.*

Species	2018	2019	2020	2021	2022	Total
Atlantic Menhaden	614	1,514	515	824	2,003	**26,374**
Atlantic Silverside	6,963	6,999	7,377	2,897	2,753	**188,502**
Black Sea Bass	267	537	611	329	252	**10,700**
Bluefish	44	55	22	21	29	**1,178**
Cunner	23	15	18	1	1	**956**
Fourspine Stickleback	11		64			**477**
Grubby	4	50	9	39	26	**1,248**
Inshore Lizardfish	19	62		83	64	**934**
Mummichog	748	791	671	475	386	**21,732**
Naked Goby	2		1		1	**66**
Northern Kingfish	24	199	113	124	111	**1,457**
Northern Pipefish	147	126	118	85	68	**4,357**
Northern Puffer	56	163	96	54	60	**2,365**
Northern Searobin	41	143	47	29	34	**601**
Rainwater Killifish	6		7			**197**
Scup	646	532	715	368	458	**6,800**
Sheepshead Minnow	296	340	258	229	225	**7,962**
Smallmouth Flounder	10	1	13	31		**451**
Striped Killifish	1,412	1,358	1,264	986	1,080	**43,710**
Striped Searobin	2	45	5	13	21	**1,174**
Summer Flounder	2	2	1	1		**85**
Tautog	255	141	153	101	60	**4,025**
Windowpane Flounder						**394**
Winter Flounder 1+	1	2	3	2	1	**470**
Winter Flounder YOY	29	51	29	23	21	**15,659**

Table 8.5: Total catch of finfish species infrequently captured in seine samples, 1988-2022. *See Appendix 8.1 for complete taxonomic names*

Species	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Alewife							1								28	1	
American Eel	1	3					1				5						
American Sand Lance					1		10										
American Shad		18	1								151						
Anchovy, spp (YOY)																	
Atlantic Needlefish																	
Atlantic Tomcod						3					1						1
Banded Butterflyfish																	
Banded Gunnel											2	3					4
Banded Rudderfish																	
Bay Anchovy								4	69		27			1	11		1
Black Spotted Stickleback																	
Blue Spotted Coronet Fish												1					
Blueback Herring		26															
Burrfish, Striped				15	2		1			1	9	142	3	8	2	17	
Butterfish												1					
Crevalle Jack	6							1									
Feather Blenny																	
Flying Gurnard																	
Gizzard Shad																	
Grey Snapper			1														
Hickory Shad																	
Hogchoker							2										
Lined Seahorse							4			1			2				
Little Skate										1					1		
Moonfish																	
Northern Sennet																	
Northern Star Gazer		5															
Oyster Toadfish	5			1						1	1			1		1	2
Pumpkin Seed				2													3
Rainbow Smelt						5	2										34
Rock Gunnel			1		1	1	1			3							1
Smooth Dogfish			1														
Spot																	
Striped Anchovy																	
Striped Bass												1				6	
Threespine Stickleback														11			
Weakfish																15	
Web Burrfish																	
White Mullet	1	1	8		3										1		
White Perch																	
Yellow Jack																	

Table 8.5 cont.: Total catch of finfish species infrequently captured in seine samples, 1988-2022. *See Appendix 8.1 for complete taxonomic names.*

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
Alewife															1		12		**43**
American Eel								1		2	15			2	1				**31**
American Sand Lance						13													**24**
American Shad											42			50		3			**265**
Anchovy, spp (YOY)				15								3,051							**3,066**
Atlantic Needlefish				2								1				1			**4**
Atlantic Tomcod	3			1			8								2				**19**
Banded Butterflyfish														3					**3**
Banded Gunnel	2	3	1	3			1												**19**
Banded Rudderfish						1													**1**
Bay Anchovy	12					1				520	24					39		1	**710**
Black Spotted Stickleback														2		3			**5**
Blue Spotted Coronet Fish										2							1		**4**
Blueback Herring			9			3		1	1		11			165		50			**266**
Burrfish, Striped							10		4							1			**215**
Butterfish									21							6			**28**
Crevalle Jack						1													**8**
Feather Blenny								36					7			3			**46**
Flying Gurnard			1																**1**
Gizzard Shad							4												**4**
Grey Snapper																			**1**
Hickory Shad																		4	**4**
Hogchoker					1														**3**
Lined Seahorse			2	7	2	1	2					1	4	7		3			**36**
Little Skate																			**2**
Moonfish													16						**16**
Northern Sennet		1																	**1**
Northern Star Gazer																	1		**6**
Oyster Toadfish	1	1	1	2	1				6	2	4	2	4	3		2	13	13	**67**
Pumpkin Seed																			**5**
Rainbow Smelt																			**41**
Rock Gunnel				1															**9**
Smooth Dogfish																			**1**
Spot										6									**6**
Striped Anchovy					3														**3**
Striped Bass				1											1	1		6	**16**
Threespine Stickleback																			**11**
Weakfish										4				10		3			**32**
Web Burrfish		1				1													**2**
White Mullet		7	7	11		75	68		22			15	31	16		16	54		**336**
White Perch	3			11			6										11		**31**
Yellow Jack						1													**1**

Table 8.6: Total catch of invertebrate species captured in seine samples, 2004-2022. *See Appendix 8.2 for complete taxonomic names.*

Species	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Blue crab	1	2	84	31	4	333	35	23	27	18	17	18	6	11	19	79	81	22	53
Boreal squid				1															
Brown shrimp			11										3					17	
Channeled whelk							1				3								1
Common Oyster																			
Common slipper shell			13																
Flat-claw hermit crab	761	532	703	153	244	539	558	441	283	367	562	308	2,878	829	658	1,157	838	698	815
Green crab	234	266	341	147	644	176	308	228	175	253	273	213	256	460	432	345	359	248	294
Horseshoe crab													1						
Japanese shore crab	1		1	1				6	1			1	1			1	1		
Jonah crab						2													
Knobbed whelk																1			
Lady crab	298	119	66	195	92	42	19	24	18	13	41	102	12	20	2	52	17	30	45
Mantis shrimp									1										
Mole crab	1	5																	
Moon jellyfish							319						461	16	200	200			
Mud crab	60	55	74	30	85	67	308	80	80	1,100	43	142	9	1	20	31	43	11	17
Mud snail	948	2,071	4,478	3,569	3,810	3,128	2,699	2,683	3,072	5,787	6,938	11,132	11,687	6,061	6,927	9,422	3417	3210	4,005
Northern comb jelly						346	36			3,620	1,200		185	1,648	111	300	267	200	
Northern moon snail														6		2			
Oyster drill			38												69				
Rock crab	2						1												
Sand shrimp	278	373	1,027	525	2,625	762	902	1,507	246	1,794	662	207	33	518	650	531	560	641	637
Scallop (bay)											3	3	1	2			3	16	
Shore shrimp	990	404	1,149	707	1,390	535	619	762	402	511	1,011	4,795	478	1,517	921	526	621	643	3,588
Spider crab	4	5	6	1	3	1	7	33	13	20	14	45	53	161	21	8	31	4	8
Squid (longfin)												6					2		
Starfish spp.							1												

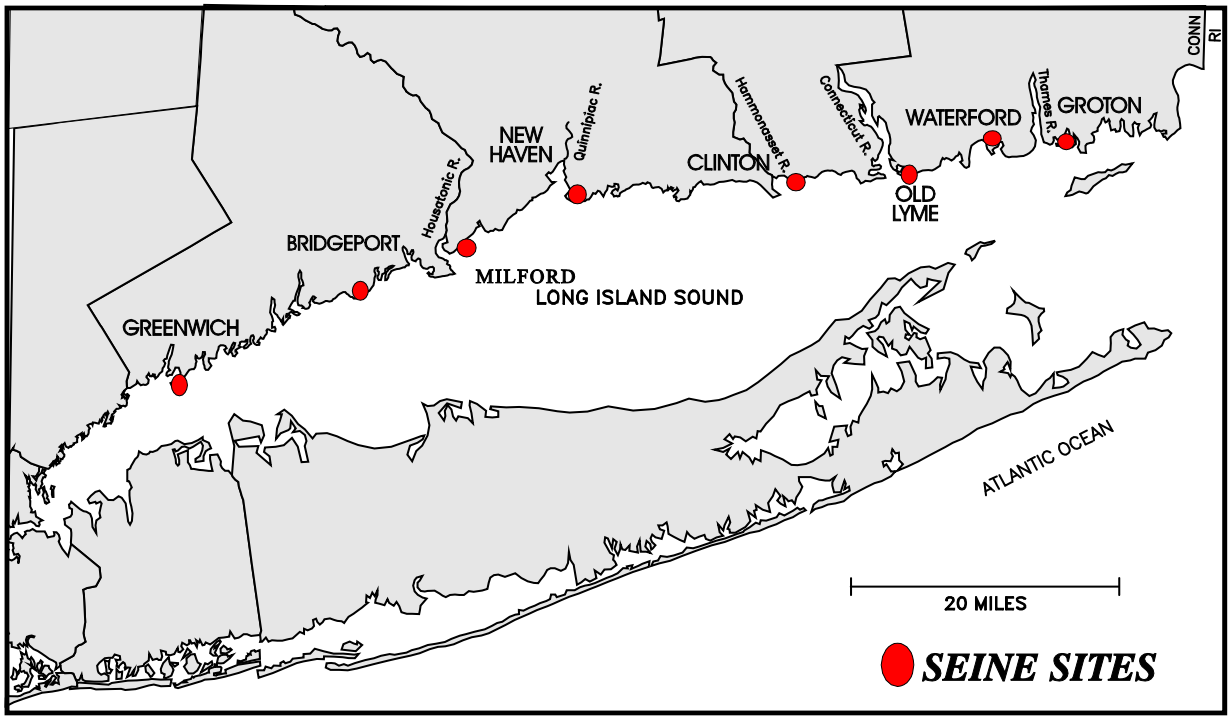

Figure 8.1: **Sampling locations of the Estuarine Seine Survey.**

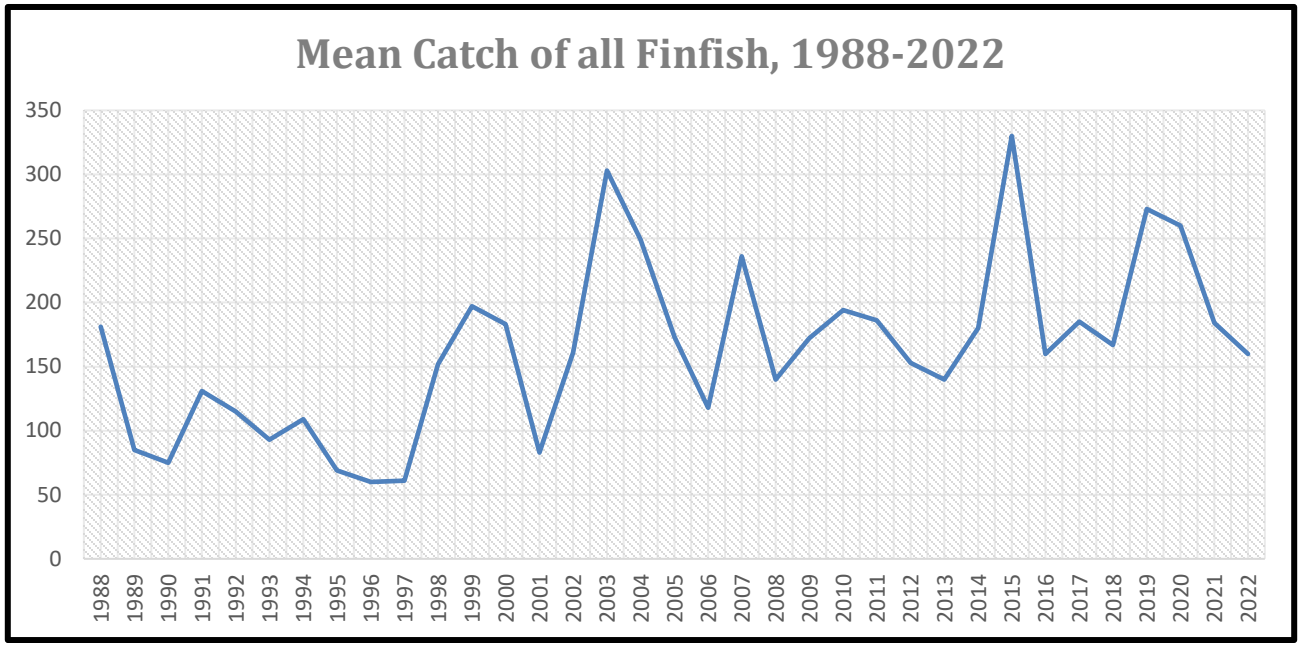

Figure 8.2: Mean catch of all finfish captured in seine samples, 1988-2022. *Mean catch (numbers) per haul includes samples at all sites. Note that sampling at the Milford site began in 1990.*

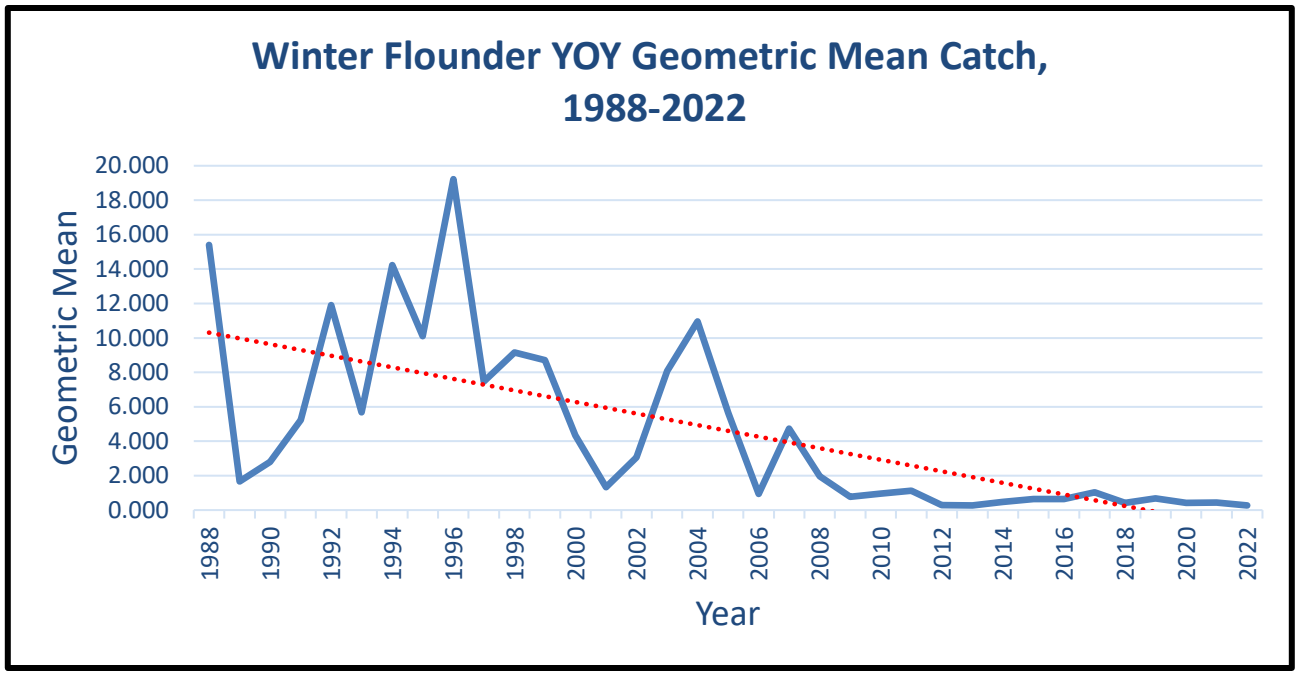

Figure 8.3: Mean catch and occurrence of young-of-year winter flounder, 1988-2022. *The negative trend (dashed line) is significant (r^2 =0.46, p<0.00001, df =33).*

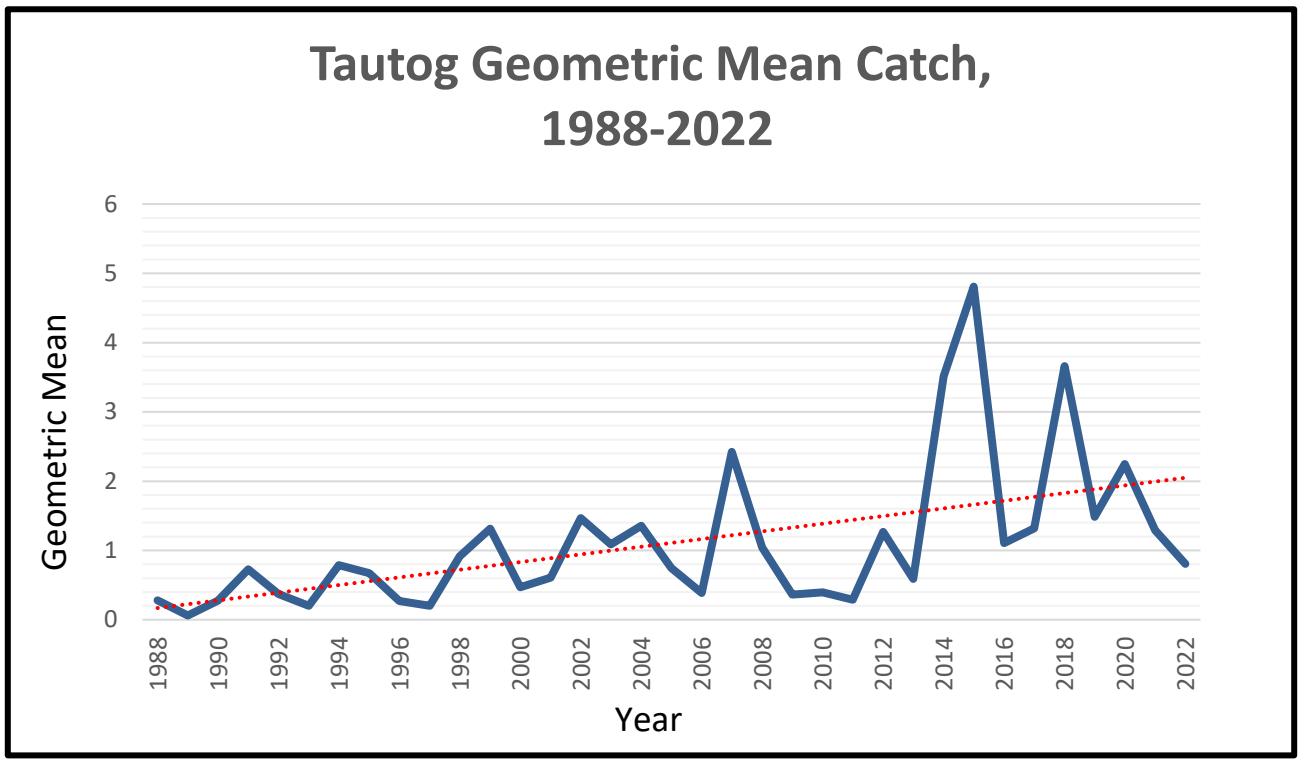

Figure 8.4: Mean catch and occurrence of young-of-year tautog, 1988-2022. *The positive trend (dashed line) is significant (r^2 =0.28, p<0.001, df= 33).*

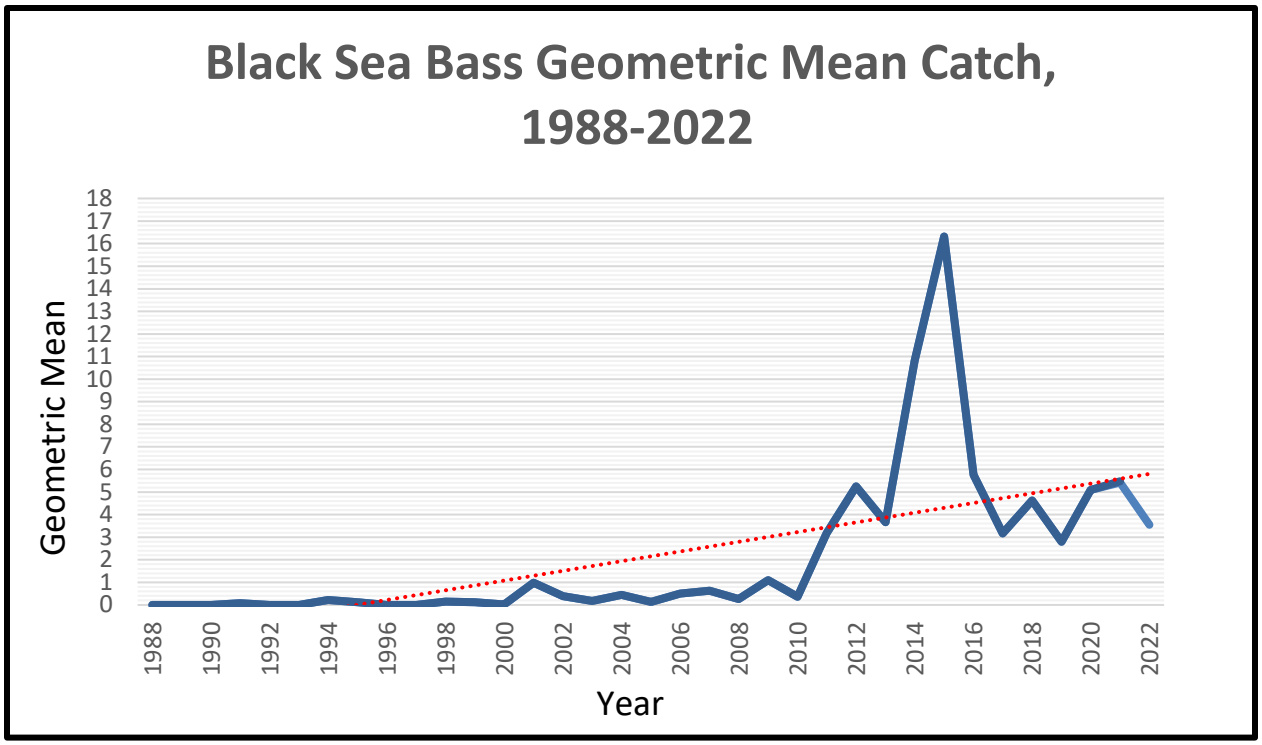

Figure 8.5: Mean catch of black seabass young-of-year, 1988-2022. *The positive trend (dashed line) is significant (r^2 =0.40, p<0.0001, df= 33).*

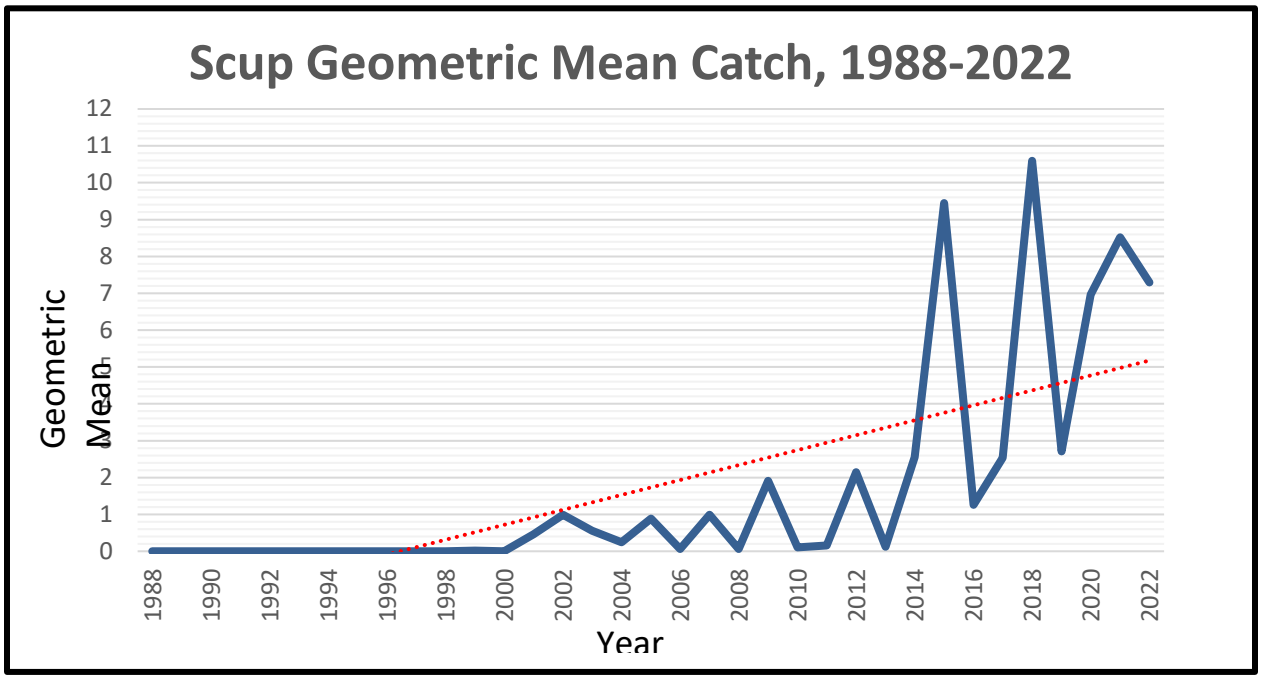

Figure 8.6: Mean catch of scup young-of-year, 1988-2022. Annual percent of hauls catching one or more scup are also shown. *The positive trend (dashed line) is significant (r^2 =0.48, p<0.0001, df= 33).*

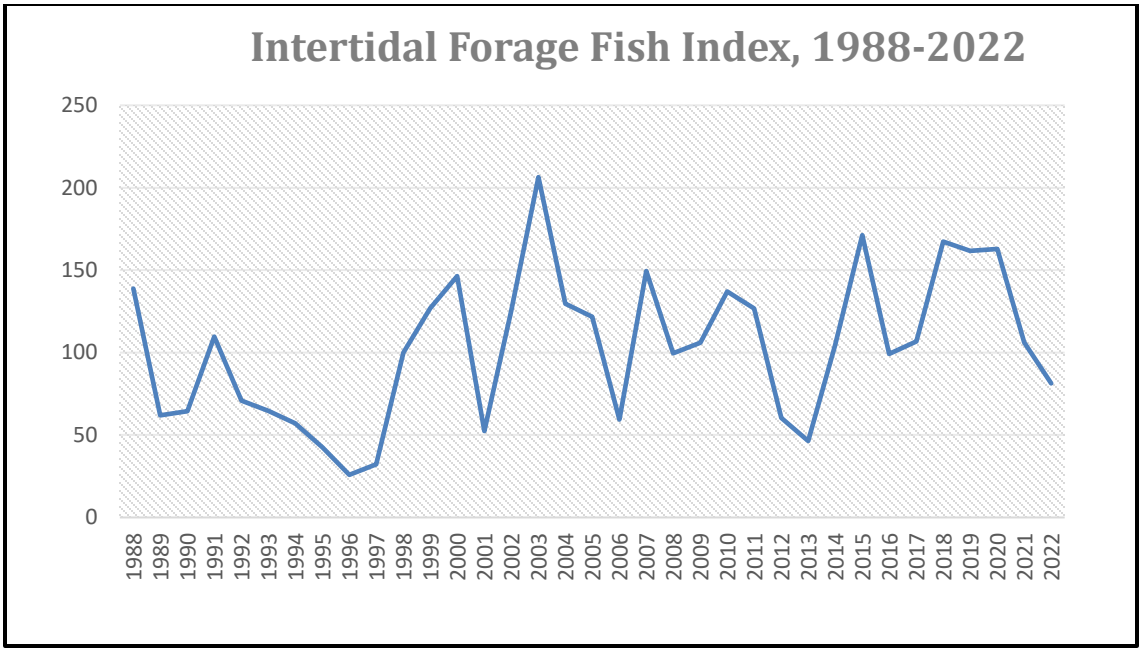

Figure 8.7: Mean catch of forage fish, 1988-2022. *Forage species included in the index are Atlantic silversides, striped killifish, mummichog, and sheepshead minnow. See Appendix 8.1 for complete taxonomic names.*

Table 8.7: Mean catch of forage fish, 1988-2022.

1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
139	62	64	110	71	65	57	42	26	32	100	127

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
146	52	125	206	130	122	59	149	100	106	137

2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
127	60	46	104	171	99	107	167	162	163	106	81

Appendix 8.1: Finfish species captured in the Estuarine Seine Survey, 1988-2022.

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 butterflyfish	**BBF**	*Chaetodon striatus*
Banded gunnel	**BGN**	*Pholis fasciata*
Banded rudderfish	**RUD**	*Seriola zonata*
Bay anchovy	**ACH**	*Anchoa mitchilli*
Black-spot stickleback	**BSS**	*Gasterosteus wheatlandi*
Black sea bass	**BSB**	*Centropristis striata*
Blueback herring	**BBH**	*Alosa aestivalis*
Bluefish	**BLF**	*Pomatomus saltatrix*
Blue spotted coronetfish	**BSC**	*Fistularia tabacaria*
Crevalle jack	**CRJ**	*Caranx hippos*
Cunner	**CUN**	*Tautogolabrus adspersus*
Feather Blenny	**FBL**	*Hypsoblennius hentzi*
Flying Gurnard	**FGD**	*Dactylopterus volitans*
Four-spine stickleback	**FSS**	*Apeltes quadracus*
Gizzard Shad	**GIZ**	*Dorosoma cepedianum*
Gray snapper	**GRA**	*Lutjanus griseus*
Grubby	**GRB**	*Myoxocephalus aeneus*
Hickory Shad	**HSS**	*Alosa mediocris*
Hogchoker	**HOG**	*Trinectes maculatus*
Inshore lizardfish	**LIZ**	*Synodens foetens*
Little skate	**LSK**	*Raja erinacea*
Menhaden	**MEN**	*Brevoortia tyrannus*
Moonfish	**MOO**	*Mene maculata*
Mummichog	**MUM**	*Fundulus heteroclitus*
Naked goby	**NKG**	*Gobiosoma bosci*
Nine-spine stickleback	**NSS**	*Pungitius pungitius*
Northern kingfish	**NKF**	*Menticirrhus saxatilis*
Northern pipefish	**PIP**	*Syngnathus fuscus*
Northern puffer	**PUF**	*Sphaeroides maculatus*
Northern searobin	**NSR**	*Prionotus carolinus*
Northern stargazer	**STR**	*Astroscopus guttatus*
Pumpkinseed	**PUM**	*Lepomis gibbosus*
Rainbow smelt	**RSM**	*Osmerus mordax*
Rainwater killifish	**RWK**	*Lucania parva*
Rock gunnel	**RGN**	*Pholis gunnellus*
Northern seahorse	**SEH**	*Hippocampus erectus*
Northern sennet	**NOS**	*Sphyraena borealis*
Scup	**PGY**	*Stenotomus chrysops*
Sheepshead minnow	**SHM**	*Cyprinodon variegates*
Shorthorn Sculpin	**SHS**	*Myoxocephalus scorpius*
Skilletfish	**SKT**	*Gobiesox strumosus*
Smallmouth flounder	**SMF**	*Etropus microstomus*
Smooth dogfish	**SMD**	*Mustelus canis*
Spotted hake	**SPH**	*Urophycis regius*
Striped anchovy	**STA**	*Anchoa hepsetus*
Striped bass	**STB**	*Morone saxatilis*
Striped burrfish	**SBF**	*Chilomycterus schoepfi*
Striped killifish	**SKF**	*Fundulus majalis*
Striped searobin	**SSR**	*Prionotus evolans*
Summer flounder	**SFL**	*Paralichthys dentatus*
Tautog	**BKF**	*Tautoga onitis*
Three-spine stickleback	**TSS**	*Gasterosteus aculeatu*

Appendix 8.1, continued:

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 8.2: Invertebrate species captured in the Estuarine Seine Survey, 1988-2022.

COMMON NAME	**SPECIES CODE**	***SCIENTIFIC NAME***
Bay Scallop	**SCA**	*Argopecten irradians*
Blue crab	**BCR**	*Callinectes sapidus*
Brown Shrimp	**BNS**	*Panaeus aztecus*
Channeled Whelk	**CHW**	*Busycotypus canaliculatus*
Common Slipper Shell	**CSL**	*Crepidula fornicata*
Northern Comb Jelly	**COM**	*Bolinopsis infundibulum*
Green crab	**GCR**	*Carcinus maenas*
Flat-claw hermit crab	**HER**	*Pagurus spp.*
Horseshoe crab	**HSC**	*Limulus polyphemus*
Japanese crab	**JSC**	*Hemigrapsus sanguineus*
Jonah crab	**JCR**	*Cancer borealis*
Knobbed whelk	**KNW**	*Busycon carica*
Lady crab	**LCR**	*Ovalipes ocellatus*
Long-finned squid	**SQI**	*Loligo pealeii*
Mantis shrimp	**MAN**	*Squilla empusa*
Moon Jelly	**MOJ**	*Aurelia aurita*
Mud crab	**BMC**	*Panopeus spp.*
Mole crab	**MLR**	*Emerita talpoida*
Mud snail	**MSN**	*Nassarius obsoletus*
Northern moon snail	**NMS**	*Lunatia heros*
Oyster drill	**OYD**	*Urosalpinx cinerea*
Rock crab	**RCR**	*Cancer irroratus*
Sand shrimp	**CRG**	*Crangon septemspinosa*
Sea Star	**STF**	*Asterias forbesi*
Shore shrimp	**PAL**	*Palaemonetes spp.*
Spider crab	**SPI**	*Libinia emarginata*

2022 Long Island Sound Hypoxia Season Review

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Stamford Government Center, 888 Washington Blvd., Suite 9-11,
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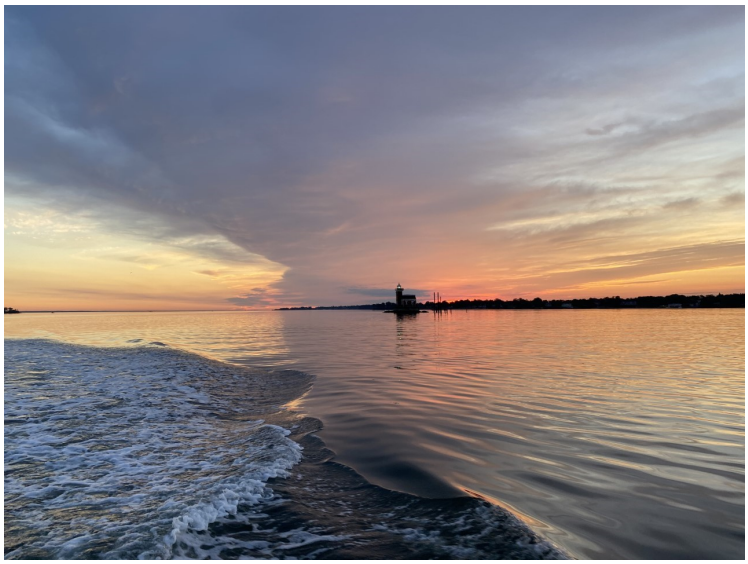
Introduction

Designated as an estuary of national significance by Congress in 1987, Long Island Sound (LIS) is home to a diverse network of flora and fauna, with over four (4) million people living in the Sound's coastal communities. It is an estuary of recreational, commercial, and socioeconomic value. The Sound is bordered by the states of Connecticut and New York and has a watershed area extending through Massachusetts, New Hampshire, Vermont, Maine, and Quebec that encompasses over 16,000 square miles. Nearly nine (9) million people live within the watershed. Over time, the Sound has been subject to the effects of increased nutrient loading as a result of urbanization and changes in land use (Latimer *et al.*, 2014).

The term "hypoxia" means low dissolved oxygen (DO) concentrations in the water. Marine organisms need oxygen to live, and low concentrations, depending on the duration and the size of the area affected, can have serious consequences for a marine ecosystem. As defined by the Long Island Sound Study (LISS), hypoxia exists when DO drops below a concentration of 3 milligrams per liter (mg/L), although ongoing national research suggests that there may be adverse affects to organisms even above this level. Nutrients, especially nitrogen, fuel the growth of microscopic algae called phytoplankton in the Sound. The phytoplankton die and settle to the bottom. Bacteria break down the organic material from the algae for food and fuel while using up oxygen. Seasonal weather patterns, particularly during the summer months, exacerbate the effects of nutrient loading. Calm weather patterns limit the mixing of the water column and replenishment of oxygen to the bottom waters, resulting in a decrease in bottom water DO over the course of the summer. Hypoxic conditions are mainly confined to the western Sound.

In response to the critical need to document summer hypoxic conditions in Long Island Sound, the Connecticut Department of Energy and Environmental Protection (CT DEEP) and the Interstate Environmental Commission (IEC) have monitored dissolved oxygen, as well as other key water quality parameters relevant to hypoxia, since 1991. This report presents a summary of data collected by CT DEEP and IEC during the 2022 hypoxia season.



Methods Overview

Since 1991, CT DEEP has conducted an intensive year-round water quality monitoring program on LIS. Physico-chemical parameters (temperature, salinity, DO, pH, and water clarity), nutrient samples, and plankton samples are collected monthly from 17 sites on a year-round basis. Beginning in mid-June and extending through mid-September, an additional survey is added that samples up to 48 stations every other week for physico-chemical parameters (Figure 1).

IEC has conducted summer season monitoring in the far Western LIS (WLIS, Figure 1, map inset) and the Upper East River since 1991. Since 2014, IEC's monitoring program has implemented modifications, including the collection of nutrients, to align it with CT DEEP's program. IEC collects physico-chemical data from 22 stations weekly along with nutrient data biweekly (Figure 1). Beginning in October 2018, IEC expanded its WLIS monitoring program to sample year-round.

The Long Island Sound Integrated Coastal Observing System (LISICOS) was established in 2003 as a component of a regional/national ocean observing system. The system was conceptualized as part of a water quality monitoring program that combined the traditional ship-based point sampling surveys with continuous, real-time sampling stations. LISICOS continuously monitors in situ water quality parameters and meteorological parameters at up to eight stations across the Sound. Sensors are attached to a moored buoy at surface, middle, and bottom depths. Data are transmitted every 15 minutes in real-time via satellite where they are stored in a database and uploaded to the LISICOS website. The system is maintained by the University of Connecticut.

CT DEEP and IEC data provide a snapshot of hypoxic conditions during a specific timeframe while the LISICOS data provide a continuous measurement of hypoxia at specific buoy locations. Together, these monitoring programs are better able to characterize the extent and duration of hypoxia across LIS. Both types of data contribute to a better understanding of hypoxia in LIS.

Further information on sampling and analytical methods for water quality parameters can be found in the EPA-approved DEEP, IEC, and LISICOS Quality Assurance Project Plans.

Dissolved oxygen data from 13 of IEC's 22 stations and all of CT DEEP's stations are incorporated into hypoxia maps and areal estimates that are presented in this report. The 13 IEC stations (A1, A2M, A3, A4, HA-3, HB, A5, HC1, HC, B1S, B2, B3M, B4) represent open water portions of the Western Narrows. DO data collected from IEC's embayment stations are not utilized in areal estimates.

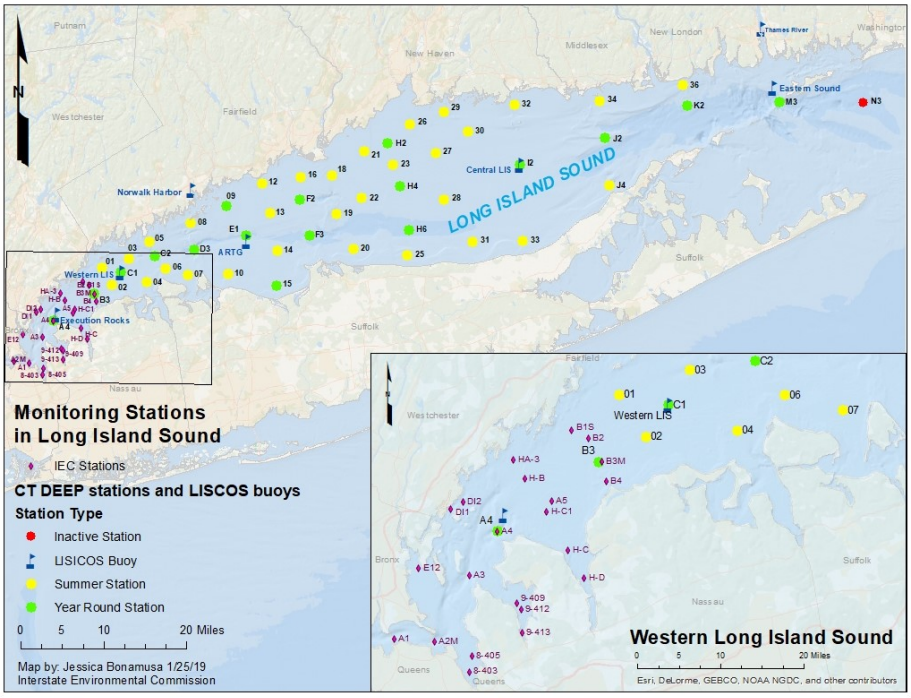
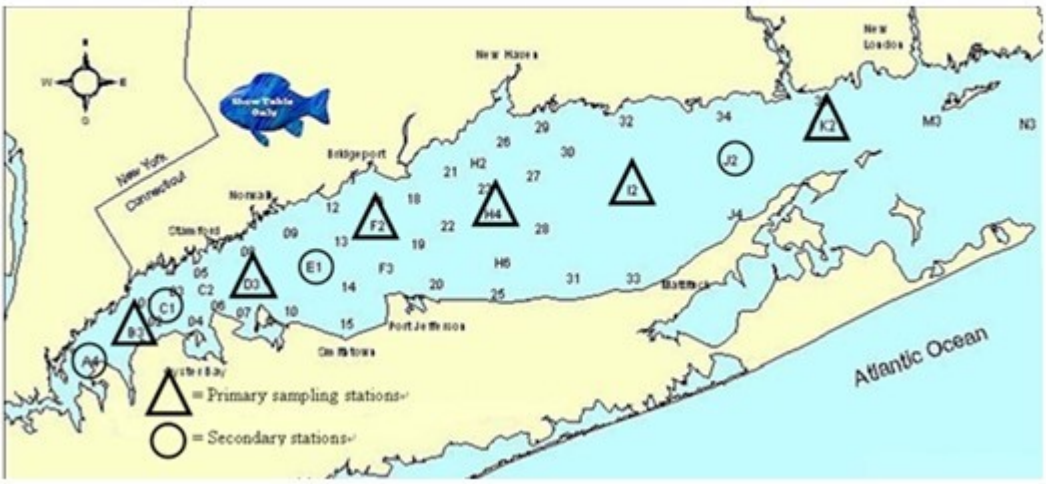


Figure 1. Hypoxia Monitoring Stations in Long Island Sound

CT DEEP collects monthly surface and bottom water samples from ten stations (triangles and circles, Figure 2) distributed across LIS for phytoplankton community analyses. Stations were chosen to examine the "spatial distribution and temporal dynamics of phytoplankton population structure and diversity in LIS" as well as to "investigate the potential contribution of the settlement of the phytoplankton materials from the surface water to hypoxia/anoxia in the bottom water" (Zhang and Lin 2018). Samples are processed and analyzed by researchers with the Marine Sciences Department at the University of Connecticut. Collection methods and processing methods are available in an EPA approved Quality Assurance Project Plan. Results are detailed in a project report submitted to CT DEEP annually. Results from 2022 are not yet available.

CT DEEP also collects monthly composite water samples and conducts oblique plankton tows from six stations (triangles, Figure 2) for zooplankton community analyses. Samples are processed and analyzed by researchers within the Marine Sciences Department at the University of Connecticut. Collection methods and processing methods are available in an EPA approved Quality Assurance Project Plan. Similarly to the phytoplankton surveys, results from the zooplankton analyses are detailed in a project report submitted to CT DEEP annually. Results from 2022 are not yet available.

Figure 2. Location of Plankton Sampling Stations across Long Island Sound



Quality Assurance

The IEC and CTDEEP have been collecting data from the Sound since 1991. Both IEC and CTDEEP programs are designed to collect high quality data. IEC and CTDEEP sample collection and handling procedures are outlined in EPA-approved Quality Assurance Project Plans (QAPPs) and method-specific standard operating procedures (SOPs, see Methods section for hyperlinks to program quality assurance documents). Shared program goals include maintaining a long-term database of collected information and monitoring the extent of hypoxia within the Sound throughout the summertime (late June through mid-September) to assess achievement of the Comprehensive Conservation and Management Plan (CCMP) for restoring LIS.

Measures of data quality include completeness, representativeness, and comparability.

In 2022, IEC achieved an overall completeness rate of 100%. All 20 runs were completed as scheduled and no stations or sample collections were missed. Some measurements could not be taken at some stations due to issues with equipment. CT DEEP completed 364 station visits in 2021. CT DEEP missed 40 station visits due to the cancellation of the WQJAN21, WQFEB21, and CHFEB21 surveys because of the COVID-19 pandemic, resulting in a 90.1% completeness rate for 2021.

IEC and CT DEEP met their data quality objectives for representativeness and comparability as specified in their respective QAPPs. Station locations for both programs were chosen to be representative of ambient conditions Sound-wide. Since the expansion of IEC's program to year-round monitoring in the fall of 2018, both programs sample representative temporal conditions. Most sampling and analytical procedures have remained unchanged over the course of the monitoring program. Consistent field and laboratory procedures, well-documented by the appropriate SOPs, help ensure consistent and reproducible data. Quality Control checks performed by the programs' analytical laboratories, including continuing calibration verifications (CCV), blanks, duplicates, and spike samples, are used to flag suspect data and to ensure accuracy and precision of the results. Additionally, CT DEEP's analytical laboratory participates in a multi-lab comparison program that provides data specifically to assess its ability to produce data comparable to several other laboratories located in the Northeast and Mid-Atlantic regions of the United States. IEC began participating in this multi-lab comparison program in 2019.

RESULTS

During the summer of 2022, CT DEEP conducted eight surveys between June 2nd and September 13th while IEC conducted twelve surveys between June 28th and September 15th (Table 1). Hypoxia maps and in situ profiles from stations in WLIS are available in Appendices A-F. All data are available upon request. Summaries of CT DEEP bi-weekly sampling are available on the Department's website, and summaries of IEC weekly sampling are available on the Commission's website.

Dissolved Oxygen

For LIS, DO levels below 3.0 mg/L are considered hypoxic, causing mobile animals to leave and sessile animals to die or be physically or behaviorally impaired. However, early studies in LIS by CT DEEP Marine Fisheries biologists found that DO can become limiting below 4.8 mg/L for sensitive fish species, while more tolerant species are not affected until DO falls below 2.0 mg/L (Simpson et al, 1995, 1996). This study documented a 4% reduction in finfish biomass when DO levels are between 3.0-3.9 mg/L, a 41% reduction occurs at 2.0-2.9 mg/L DO, and an 82% reduction in waters with concentrations between 1.0 and 1.9 mg/L. Finfish biomass is reduced by 100% (total avoidance) in waters with DO less than 1.0 mg/L (Simpson et al, 1995, 1996).

Hypoxic conditions were documented during four CT DEEP surveys (Table 1), with stations A4, B3, C1, C2, D3, E1, I1, I2, I2, I4, and I5 exhibiting dissolved oxygen concentrations below 3.0 mg/L at some point during the course of the season.

Hypoxic conditions were found during seven IEC surveys. All 13 of IEC's open-water stations exhibited hypoxic conditions at some point over the course of the season.

Timing and Duration

The 2022 hypoxic event lasted an estimated **58 days** beginning on July 10th and ending on September 5th. This is also evident in the continuous data collected by the LISICOS Execution Rocks Buoy. Compared to the previous 35 years, 2022 was slightly above the average of 53 days (Figure 3).

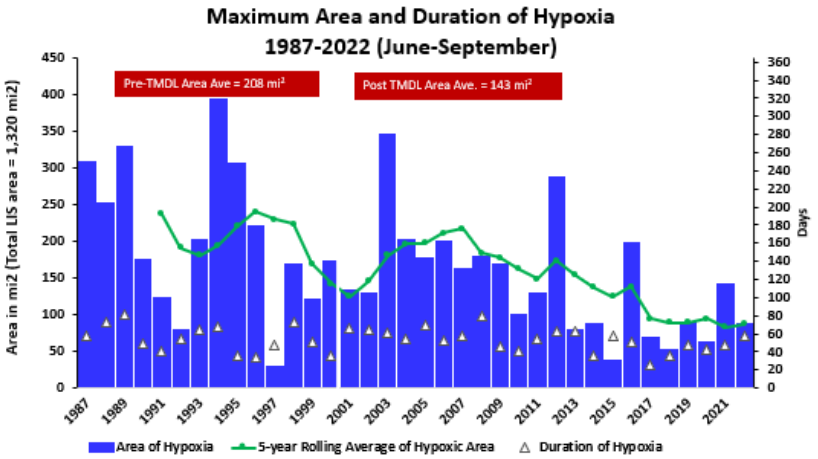


Figure 3. Maximum Area and Duration of Hypoxia. Blue bars represent area, white triangles represent duration, and the green line is the five-year rolling average of hypoxic area. The total area of Long Island Sound is 1,320 mi^2.

Table 1. CT DEEP and IEC Cruise Summary Information. See Figure 1 for station locations.

Cruise	Start Date	End Date	Number of Stations Sampled	Number of Hypoxic Stations	Hypoxic Area (mi^2)	Minimum DO	Station where Minimum DO Occurred
WQJUN22	6/2/2022	6/6/2022	17	0	0	6.89	B3
HYJUN22	6/14/2022	6/14/2022	23	0	0	5.95	A4
IEC RUN #1	6/28/2022	6/28/2022	22	0	NC		
WQJUL22	7/6/2022	7/8/2022	42	0	0	3.64	A4
IEC RUN #2	7/6/2022	7/6/2022	22	0	NC	7.17	H-D*
IEC RUN #3	7/12/2022	7/12/2022	22	2	NC	1.93	9-413*
HYJUL22	7/18/2022	7/20/2022	40	2	18.76	2.77	A4
IEC RUN #4	7/19/2022	7/19/2022	22	5	NC	2.16	A5
IEC RUN #5	7/26/2022	7/26/2022	22	16	NC	0.55	H-D*
WQAUG22	**8/1/2022**	**8/3/2022**	**42**	**6**	**86.64**	**1.43**	**A4**
IEC RUN #6	**8/2/2022**	**8/2/2022**	**22**	**13**	**NC**	**0.87**	**H-C**
IEC RUN #7	8/12/2022	8/12/2022	22	12	NC	0.98	H-C
IEC RUN #8	8/16/2022	8/16/2022	22	4	NC	2.57	9-413*
HYAUG22	8/17/2022	8/19/2022	40	7	18.76	2.47	14
IEC RUN #9	8/23/2022	8/23/2022	22	13	NC	0.95	9-413*
IEC RUN #10	8/30/2022	8/30/2022	22	10	NC	1.72	H-B
WQSEP22	8/31/2022	9/2/2022	41	6	59.19	1.90	A4
IEC RUN #11	9/9/2022	9/9/2022	22	0	NC	3.28	9-413*
HYSEP22	9/13/2022	9/13/2022	18	0	0	4.51	A4
IEC RUN #12	9/15/2022	9/15/2022	22	0	NC	3.45	A2M

Bold= Maximum Extent of Hypoxia

NC= Not Applicable

* Embayment Station

Area estimates

In order to maintain the continuity and comparability of the long-term data set, areal estimates are based on CT DEEP data only. It is expected that data from 1991-2022 will be re-interpolated using both the CT DEEP and IEC stations at some point in the future. CT DEEP and IEC data are synoptic and provide a snapshot of hypoxic conditions during a specific timeframe over a broad area, while the LISICOS data provide a continuous measurement of hypoxia at specific buoy locations over a more detailed span of time. This often results in disparity between the datasets.

Estimated Maximum Area Between 3.0 and 4.8 mg/L

In 2022, the maximum area of LIS bottom waters between 3.0 and 4.8 mg/L occurred during the WQSEP22 survey (conducted 31 August - 02 September) and was estimated at 369.04 mi^2. From 1991-2022, the yearly area affected by concentrations between 3.0 and 4.8 mg/L averaged 482 mi^2 and varied from 369 to 596 mi^2.

Estimated Maximum Area Below 3.0 mg/L

The 2022 peak hypoxic event occurred during the WQAUG22 cruises between 01 August and 03 August. The maximum area was **86.64 square miles**. Compared to the previous 32-year average (154.2 mi^2), 2022 was below average in area (Figure 3). The lowest dissolved oxygen concentration (0.87 mg/L) documented by IEC during 2022 occurred on 8/02/212 at Station H-C1 (Appendix E). The lowest dissolved oxygen concentration documented by CT DEEP during 2022 at an open water station was 1.43 mg/L and occurred on 8/2/2022 at Station A4 (Appendix D). The Execution Rocks Buoy (Station A4) recorded its lowest reading, 0.12 mg/L, on 8/07/21.

Estimated Maximum Area Below 2.0 mg/L

Based on CT DEEP data, in 2022 the maximum area below 2.0 mg/L was **52.90 square miles**. The average area with concentrations less than 2.0 mg/L, calculated from 1991-2022, is 47.13 mi^2. The IEC documented concentrations below 2.0 mg/L at three of their open-water stations on 26 July, seven of their open-water stations on 2 August, five of their open-water stations on 12 August, and one on 30 August. At the LISICOS Execution Rocks Buoy, there was 32.42 cumulative days below 2.0 mg/L.

Estimated Maximum Area Below 1.0 mg/L

CT DEEP documented 0 stations with a DO concentration below 1 mg/L.. The IEC documented concentrations below 1 mg/L at their open-water stations at Station H-D on 26 July and Station H-C on 2 and 12 August. The LISICOS Execution Rocks Buoy documented a minimum DO of 0.12 mg/L and 10.71 cumulative days of DO concentrations less than 1.0 mg/L. The overall average area affected from 1991-2022 is 10.40 mi^2. The greatest area with DO below 1 mg/L (62 square miles) was during the summer of 2003.

Frequency

Figure 4 shows the frequency of hypoxia occurrence for stations over the 1994-2022 period. The percent of WLIS stations that experience hypoxic conditions continues to be between 90 and 100% (Figure 4).

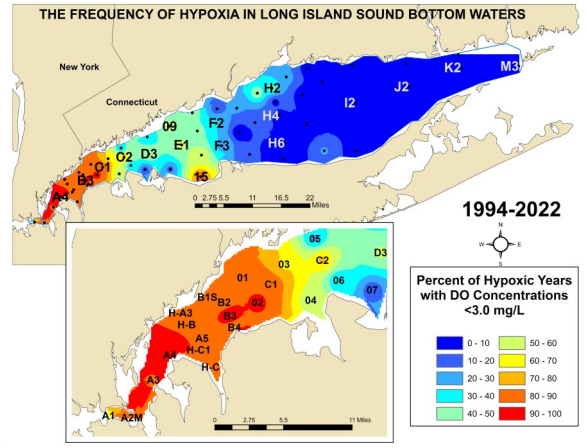


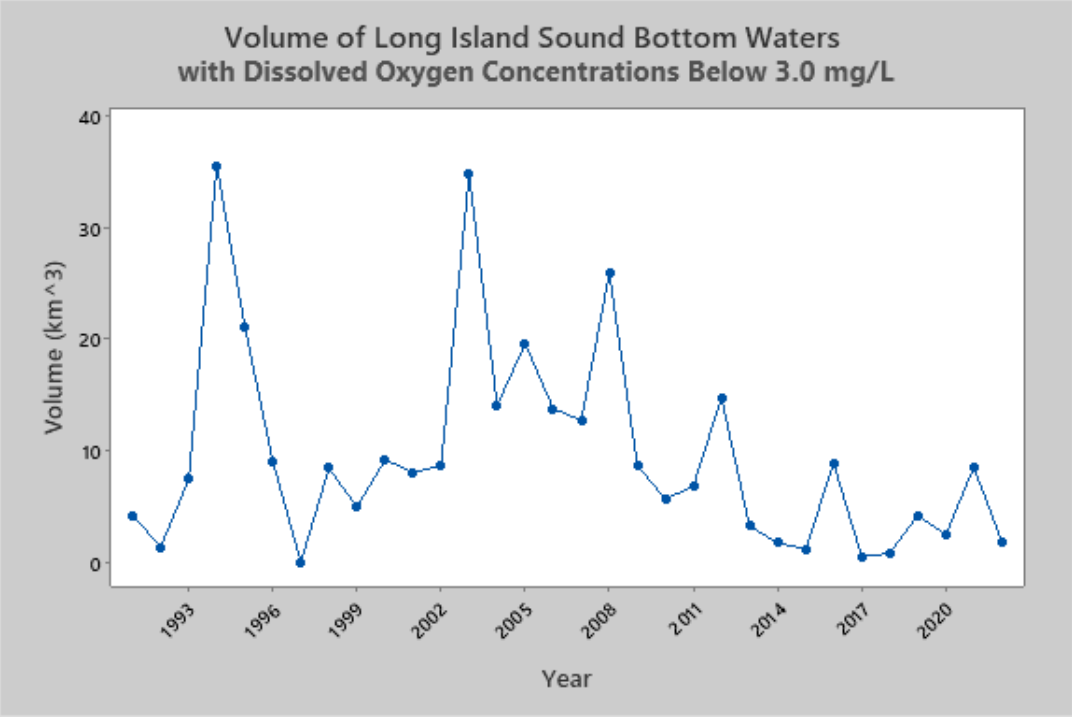
Figure 4. Frequency of Hypoxia in Long Island Sound Bottom Waters

Volume estimates

In 2019, CT DEEP and the O'Donnell lab at UCONN Marine Sciences undertook a project to develop a tool to calculate the hypoxic volume of Long Island Sound. The tool is available to the public and allows users to calculate area and volume estimates on the fly for any survey from 1991-present. The tool utilizes CT DEEP and IEC data. The tool also allows users to create profile graphs of *in situ* data.

The maximum volume of water with concentrations below 3.0 mg/L occurred during the WQAUG22 survey and was 1.82 km^3 (0.44 mi^3).

	Area (km^2)			Volume (km^3)		
CRUISE	2 mg/l	3 mg/l	4.8mg/l	2 mg/l	3 mg/l	4.8 mg/l
WQJUN20	0	0	0	0	0	0
HYJUN20	0	0	0	0	0	0
WQJUL20	0	0	292	0	0	4.77
HYJUL20	12	144	1484	0.1	1.86	57.31
WQAUG20	52	**192**	1496	0.45	**2.46**	53.12
HYAUG20	0	0	1112	0	0	35.3
WQSEP20	0	24	856	0	0.22	22.85
HYSEP20	No Cruise Conducted					
WQJUN21	0	0	0	0	0	0
HYJUN21	0	0	0	0	0	0
WQJUL21	0	0	44	0	0	2.72
HYJUL21	0	0	512	0	0	8.1
WQAUG21	64	204	1408	0.99	2.37	47.97
HYAUG21	108	**360**	1400	0.26	**8.51**	52.96
WQSEP21	20	56	856	0	0.32	22.08
HYSEP21	0	0	284	0	0	5.6
WQJUN22	0	0	0	0	0	0
HYJUN22	0	0	0	0	0	0
WQJUL22	0	0	220	0	0	1.76
HYJUL22	0	0	416	0	0	11.2
WQAUG22	104	200	1104	0.51	1.82	38.05
HYAUG22	0	136	1168	0	1.22	37.6
WQSEP22	44	152	1092	0	0.54	32.29
HYSEP22	0	0	100	0	0	1.7



WATER TEMPERATURE

Water temperature plays a major role in the timing and severity of the summer hypoxia events. Water temperature differences in the Western Sound during the summer months are particularly influential in contributing to the difference in dissolved oxygen content between surface and bottom waters. Density stratification in the water column creates a barrier between the surface and bottom waters, and it is this barrier, the pycnocline (where the change in density with depth is at its greatest), that prevents mixing between the layers.

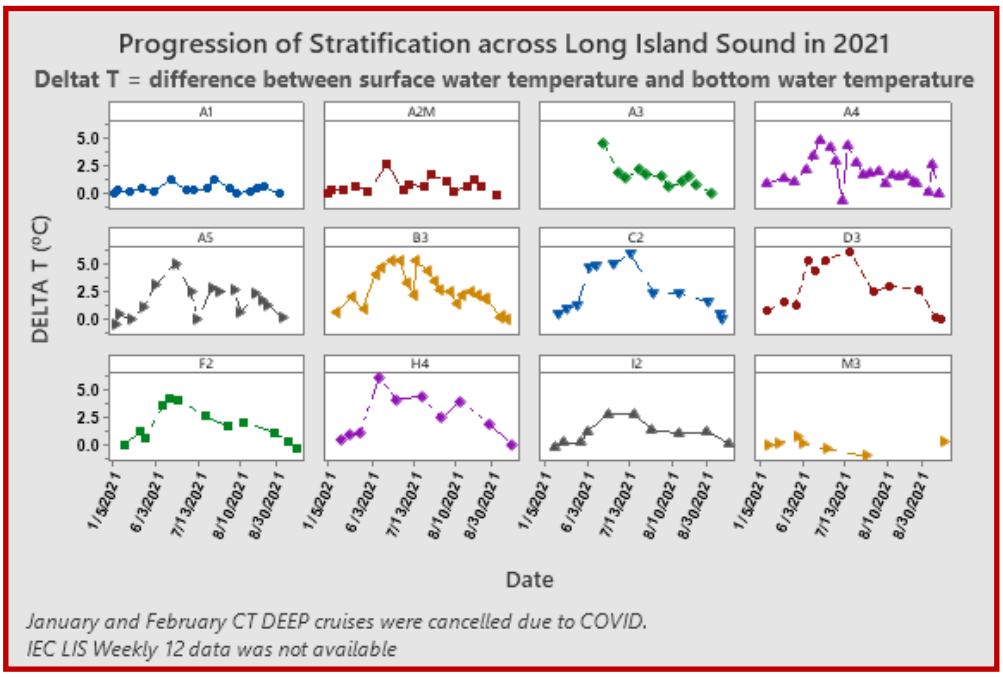


Figure 5. Progression of stratification across Long Island Sound in 2021 where Delta T= surface water temperature minus bottom water temperature.

In 2021, stratification began to set up in April with delta t's (the difference between surface and bottom water temperature) reaching around or above 1.0ºC (Figure 5) . Delta T's peaked at most stations in early-mid July. Destratification (fall turnover) began around mid–August, however station A3 had a delta t of –9.32ºC , which is the largest difference in temperature seen during the entire year. The 2021 maximum surface temperature was 25.25ºC recorded on August 17 at Station 28. The minimum surface temperature was 2.12ºC at Station E1 recorded on March 9. The 2021 maximum bottom temperature was 24.86ºC recorded on August 17 at Station 9-413. The minimum bottom temperature was 2.21ºC at Station 15 recorded on March 9.

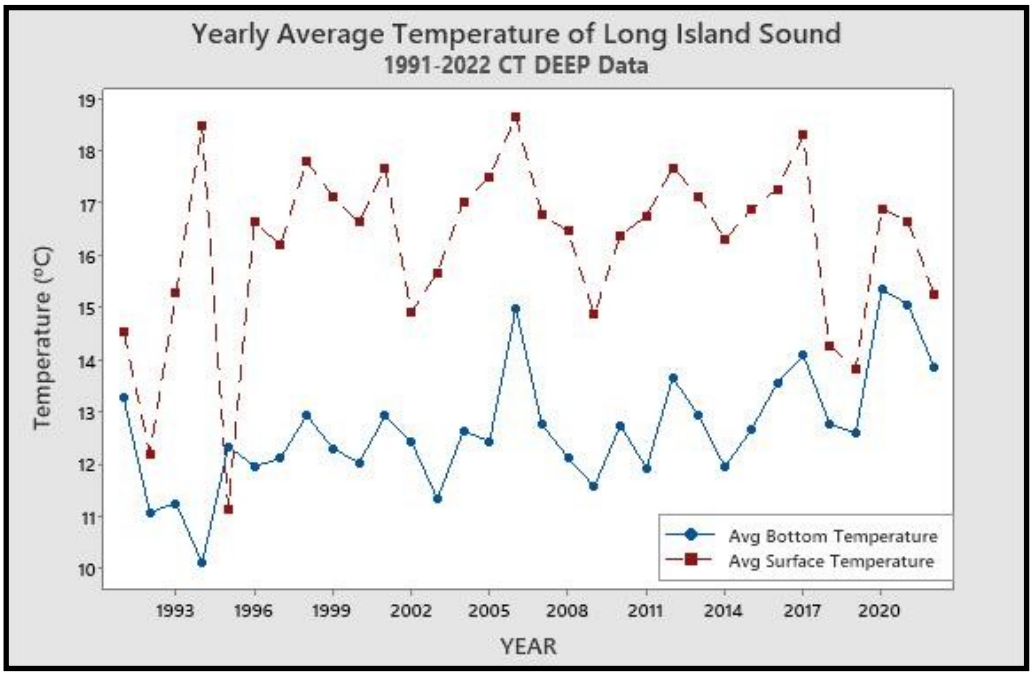


Figure 6. Yearly Average Water Temperatures of Long Island Sound.

Both surface and bottom water temperatures in LIS appear to be increasing. The surface and bottom temperatures from four of CT DEEP's 17 year round monitoring stations are plotted in Figure 6.

Additional information is available on the LISS website.

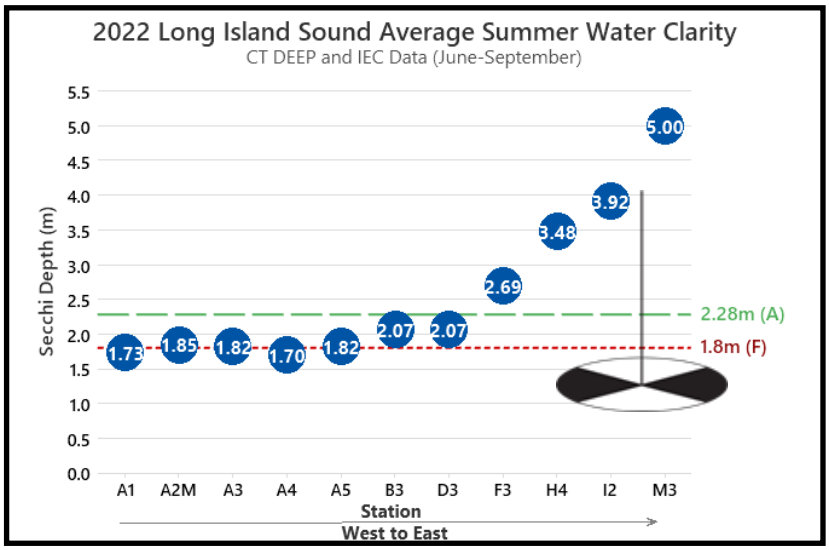
Water Clarity

Water clarity, a measure of how much light penetrates the water column, is an important indicator of the health of seagrass beds, and thus, the ecosystem as a whole (see page 15). In Long Island Sound, water clarity improves as you move eastward. The eastern portion of the Sound is a wide and deep channel with considerable influx from the Atlantic Ocean, whereas the Western Sound is more narrow and shallow, and its surrounding land is densely populated and developed. This results in less of an exchange of waters on the western end and also increases the concentrations of pollutants in the water that may affect water clarity. The graphs below (Figure 7) highlight this water clarity gradient. In 2022, the western-most axial station (A1 near Whitestone Bridge) had an average Secchi disk depth of 1.7 meters for the summer and 1.7 meters for the year. In both graphs, the average Secchi disk depths gradually increase, reaching a summer average of 2.6 meters and a yearly average of 4.4 meters at the eastern-most axial station (M3 near Fishers Island).

Using average Secchi disk depths, the Long Island Sound Report Card developed by Save the Sound utilizes the following water clarity depth thresholds to "grade" each station: averages <1.8 meters receive an F (<60%), averages 1.8 to <1.95 meters receive a D (60-70%), averages 1.95 to <2.12 meters receive a C (70-80%), averages 2.12 to <2.28 meters receive a B (80-90%), and averages >2.28 meters receive an A (90-100%). Updates to the Report Card are now posted through the Sound Health Explorer.

According to that criteria, Stations A1 and A4 get an F; Stations A2M, A3, and A5 receive a D; Stations B3 and D3 receive a C, and Stations F3, H4, I2 and M3 get an A for the summer of 2022 (Figure 7a).

Some improvements are seen when using the full-year data (Figure 7b), as Stations A4 and A5 go from an F to a B and C, respectively, Stations B3 and D3 go from a C to an A. Station F3 and H4 remain at an A despite slight changes in clarity. However, water clarity at Stations A1 and A2M worsened, the former remaining at an F while the latter goes from a D to an F.



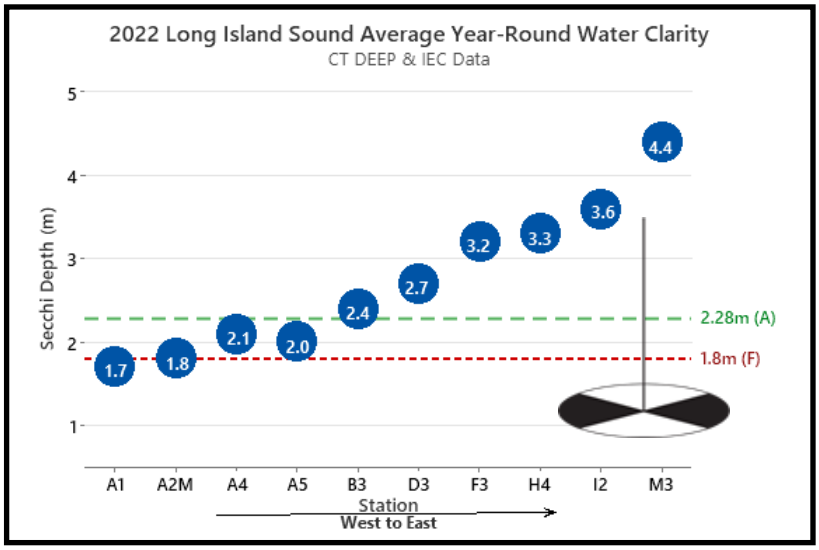


Figure 7. Average water clarity across Long Island Sound in 2022. a) Summer and b) Year-round

Chlorophyll-a

The spring phytoplankton bloom occurs in Long Island Sound between February and April. Historically high levels of chlorophyll-a (chl-a) in the Western Sound during this time have been linked to summertime hypoxia conditions. The 2022 spring bloom began in February. Year-round chlorophyll-a data collected by CT DEEP in 2022 show smaller blooms at the start of the Summer season, however data past June has not been processed and therefore could not be noted. IEC began collecting year round data in the fall of 2018. Some IEC data was not collected or processed in June, some summer runs, and November. The maximum chl-a concentration measured at an axial station was 75.12 ug/L at Station 9-413 on August 2.

Western Sound data collected by IEC between January and December 2022 and CT DEEP data collected between February and June 2022 are available in Appendix H. Data from additional stations and years are available upon request.

Nutrients

DEEP has collected monthly nutrient data from 17 stations year round since 1991. IEC began collecting bi-weekly nutrient data in the summer of 2014 at 11 of their 22 stations. Samples are analyzed for dissolved organic carbon (DOC), dissolved inorganic phosphorus (DIP), dissolved silica (SiO2), and nitrate + nitrite (NOx), particulate silica, particulate carbon, particulate nitrogen, ammonia, particulate phosphorus, orthophosphate, and total suspended solids . Data for these nutrient parameters from all 17 of DEEPs stations and 11 IEC stations are available upon request. The Western Sound LISICOS Buoy is also equipped with near surface (~3 meters deep) SUNA v2 Nitrate and Cycle Phosphate sensors. The Execution Rocks and CLIS Buoys are also equipped with near surface SUNA Nitrate sensors.

pH

In Long Island Sound, eutrophication can contribute to coastal acidification (Wallace et. al., 2014). Excess nutrients fuel algae and phytoplankton growth. As the phytoplankton die and decay, carbon dioxide (CO_2) is released. This release has the same effect on pH as carbon dioxide from atmospheric deposition (NECAN undated; Appendix D, pg. D4). EPA released guidelines for measuring changes in pH and carbonate chemistry in eastern coastal waters in 2018 (Pimenta and Grear, 2018). Two of four parameters are needed to describe the seawater carbonate system - pCO2 (partial pressure of carbon dioxide), DIC (dissolved inorganic carbon), alkalinity, and pH, along with temperature and salinity measurements. As of 2018, CT DEEP and IEC only collect one of the four needed parameters - pH. Data from 2021 are available upon request.

In 2018, the LISICOS Western Sound buoy was equipped with near bottom pH (SeaBird Hydrocat) and pCO2 (SunBurst) sensors. The sensors were installed at a depth of ~21 meters. The Central LIS Buoy is also equipped with near bottom pCO2 and pH sensors. UCONN is still performing internal QA/QC on the data. However, preliminary data show prolonged periods of decreased pH and increased pCO2 concentrations over the summer months. The sensors are currently being recalibrated/ reconditioned by the manufacturer and will be reinstalled as soon as possible.

Researchers from UCONN began collecting data in May 2019 for the RESPIRE Project. Piggybacking on CT DEEP cruises, the study aims to quantify components of the respiration process by examining key parameters including organic matter degradation rates, nutrients, DO, pCO2, pH, total alkalinity, and temperature. The project is expected to last two years. Due to COVID restrictions, UCONN researchers weren't able to accompany DEEP staff aboard the R/V Dempsey in 2020. However, DEEP staff were able to run the instrumentation to collect the continuous data and collect grab samples which were then processed by UCONN. Preliminary data from 2019 were presented in an On-Demand session of the Restore America's Estuaries Conference held 29 September—1 October 2020. In January of 2021, the first LIS-Respire publication was published, which found that while hypoxic conditions in the Sound are being reduced, further intervention will be needed in order to combat the changes caused by a warming climate. Another manuscript is awaiting publication, while two others are planned to be submitted in 2022.

As part of the National Coastal Condition 2020 sampling (See the NCCA write up for additional details), CT DEEP and EPA Contractors collected surface Total Alkalinity samples from 23 LIS proper stations and 60 embayment stations. The NCCA intensification continued at an additional 60 embayment stations in 2021.

Discussion

Weather

The Northeast Regional Climate Center (NRCC) at Cornell University is tasked with disseminating climate data and information for 12 states, including NY and CT.

The summer of 2022 was within the top 20 hottest recorded summers for 27 major climate sites, and the hottest on record for Newark, NJ. The beginning of June started with varied average temperatures across New England, with temperatures ranging from 2°F below normal in parts of Maine and New York, to 3°F above normal in parts of New Jersey. Temperatures remained varied for the 2nd half of June, with average temperatures ranging from 3°F cooler than normal in most of northeastern New England to 3°F warmer in western Pennsylvania and West Virginia. Temperature variation continued into the first half of July, with averages roughly matching those of the 2nd half of June. By the 2nd half of July, temperatures in New England were more than 3°F above normal, with 33 of 35 major climate sites reporting a hotter-than-normal July. During this time, New England experienced a heatwave from July 19-25 in which temperature highs were at or above 90°F and lows were at or above 70°F. Temperatures in August ranged from near normal in western Pennsylvania to 6°F above normal along the coastline. Temperatures would continue to remain well above the normal, closing out August as one of the hottest on record for 8 major climate sites, including Hartford, CT and Islip, NY.

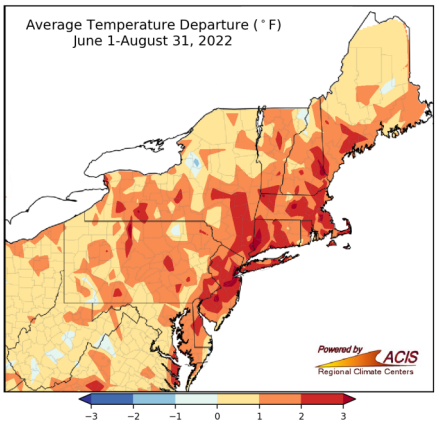


Figure 11. 2022 Northeast Average Summer

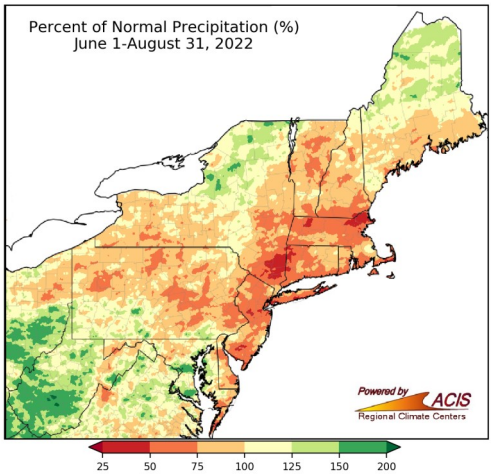


Figure 12. 2022 Northeast Total Summer Precipitation in Inches. From NRCC.

Before the beginning of the summer season, parts of New England were experiencing drought conditions. By the end of August, drought conditions had expanded and intensified throughout almost the entirety of New England, with the region surrounding Long Island Sound being in a severe drought. Precipitation in June varied, with rainfall ranging from 25% of normal to more than 200% of normal for New England. In July, precipitation in New England was below average, with areas around Long Island Sound receiving less than 25% of normal rainfall for the first half of the month, and 25-75% of normal rainfall for the second half. In the first half of August, precipitation was once again less than 25% of normal for all of Long Island Sound and most of New England By the 2nd half of August, rainfall varied across the northeast, ranging from 25%-200% of normal. Long Island Sound, however, was still below the normal.

CCMP Goals

The Long Island Sound Study (LISS) updated the Comprehensive Conservation and Management Plan (CCMP) for LIS in 2015. One of the four CCMP Goals is to improve water quality by reducing contaminant and nutrient loads to the Sound. To achieve the goals, the LISS identified ecosystem targets and indicators related to **hypoxia, nitrogen loading, and water clarity**.

Hypoxia

- *The maximum area of hypoxia in the bottom waters of LIS (shall) measurably be reduced from pre-2000 TMDL averages to increase attainment of water quality standards for dissolved oxygen by 2035, as measured by the five-year running average size of the zone.*

Meeting the ecosystem target for maximum area of hypoxia is ahead of schedule. The LIS pre-2000 baseline for maximum area of hypoxia is 208 square miles. The 2018-2022 five-year running average is 86.6 square miles (Figure 3). This is a 58% reduction from the pre-TMDL baseline. However, further work is needed to achieve water quality standards and meet the CCMP goal. Considerable variability from year to year still exists and the extent is influenced by weather.

While outside the scope of this report, it would be beneficial to examine each station for attainment of water quality standards with respect to the 3.0 mg/L threshold, as well as the 4.8 mg/L threshold. This would be a better measure of the progress towards DO criteria attainment. Additionally, it would be useful to examine the duration of DO in the 3.0 –4.8 mg/L tiers at each station and examine the water column profiles at each station.

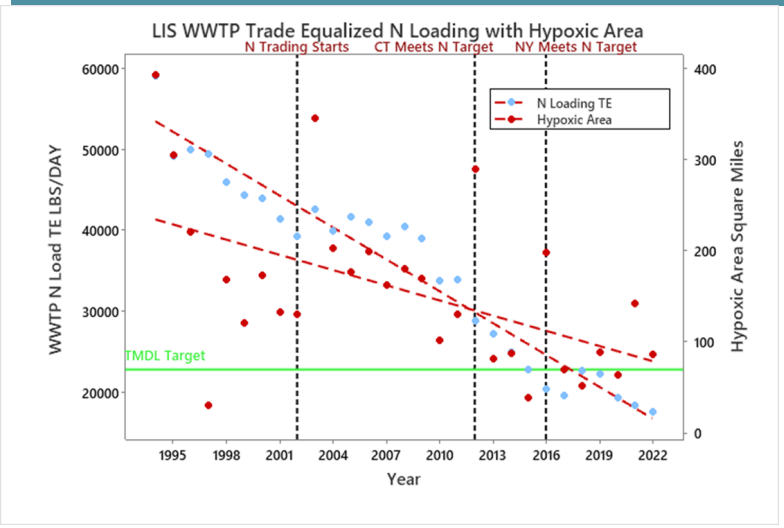


Figure 13. Graph of WWTP Nitrogen Discharge versus Hypoxic Area

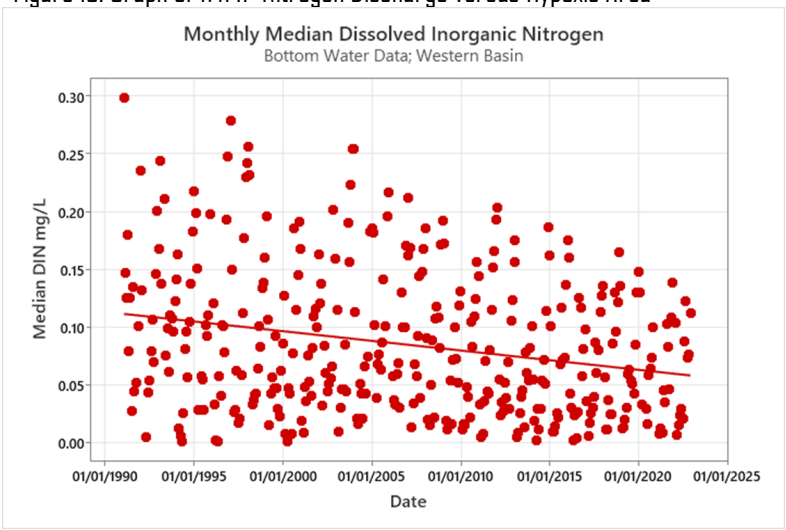


Figure 14. Graph of Monthly Median Bottom Dissolved Inorganic Nitrogen Concentrations from Western Long Island Sound

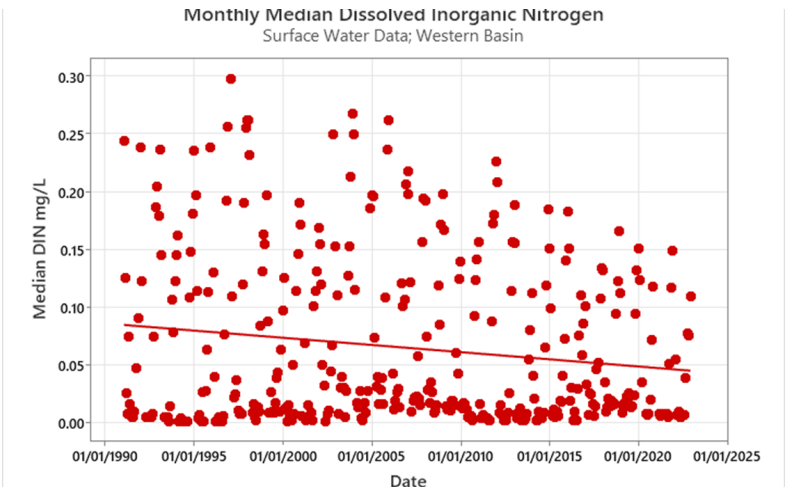


Figure 15. Graph of Monthly Median Surface Dissolved Inorganic Nitrogen Concentrations from Western Long Island Sound

Nitrogen Loading

Another goal of the CCMP relates to point source nitrogen loading from waste water treatment plants (WWTPs). The LIS 2000 Dissolved Oxygen TMDL specifies the primary pollutant contributing to hypoxia in LIS is nitrogen. The major source of nitrogen to LIS are WWTPs, combined sewer overflows, nonpoint sources including stormwater, and atmospheric deposition.

The TMDL requires a 58.5% reduction in nitrogen entering LIS via point source discharges (i.e., WWTPs).

- *Attain wastewater treatment facility nitrogen loading at the recommended 2000 Dissolved Oxygen Total Maximum Daily Load allocation level by 2017 and maintain the loading cap. Have all practices and measures installed to attain the allocations for stormwater and nonpoint source inputs from the entire watershed by 2025.*

Figure 13 illustrates the downward movement in hypoxic area as well as a downward trend in nitrogen discharges from both NY and CT WWTPs. 2021 however, did see the highest hypoxic area since 2016. Connecticut began requiring nitrogen reductions in WWTP discharges in 1998. The CT Nitrogen Trading program began in 2002, and the New York nitrogen reductions began in 2010.

Since 2018, when nitrogen loading increased for the first time since 2011, loading in the Sound has continued to decrease and is currently sitting below 20,000 TE lbs/day, well beneath the TMDL target

Dissolved Inorganic Nitrogen (nitrate + nitrite + ammonia) is the most bioavailable form of nitrogen used by phytoplankton. Figures 14 and 15 illustrate the monthly median concentration of Dissolved Inorganic Nitrogen measured from the surface and bottom waters of western LIS at CT DEEP stations. The general tendency of the data are in a downward direction.

Water Clarity

- *Improve water clarity by 2035 to support healthy eelgrass communities and attainment of the eelgrass extent target.*

Water clarity is a measure of how much light penetrates through the water column of Long Island Sound and is important in nearshore waters for the growth of eelgrass. Eelgrass, *Zostera marina,* is a rooted, underwater grass that provides habitat and protection for fish and invertebrates and food for many migratory birds. Healthy eelgrass beds also trap sediment and reduce wave energy during storms, improving water quality and protecting coastal areas from erosion. Eelgrass in Long Island Sound is currently limited to embayments in the far eastern Sound, having disappeared from most of its historic range. Most of the eelgrass in Long Island Sound is found in <4 m of water, except where water quality is exceptionally good (i.e. seagrass beds near Fisher's Island). The depth limitation of seagrass in the Eastern Sound is used as the standard by which water clarity is judged throughout the Sound, including areas which do not currently support seagrass.

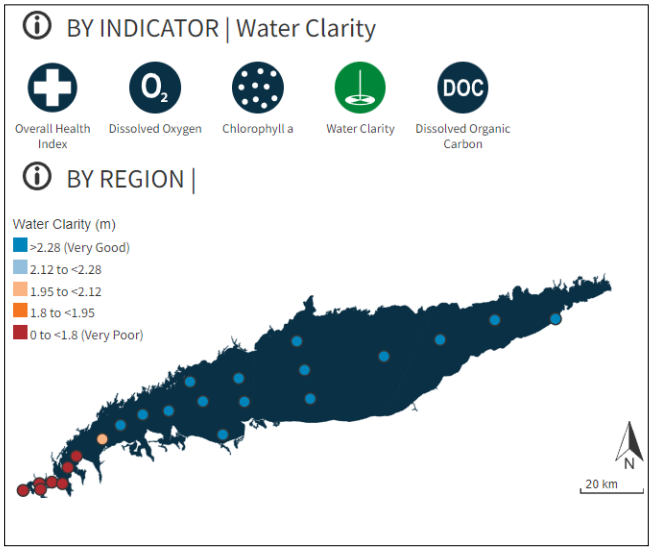


Figure 16. Image from the Long Island Sound Report Card showing station data for the water clarity indicator. Image shows 2018 data.

The CCMP target utilizes 2015 data as the baseline and threshold values developed as part of the Long Island Sound Report Card to track progress (Figure 16). Generally, eelgrass beds need about 22% of the light at the surface to reach the plant; at 3.65 m of total water depth, this equates to a Secchi depth of ~2.4 m. At 1.1 m of total water depth (almost too shallow for eelgrass), this equates to a Secchi depth of ~0.7 m. These two endpoints were used to develop an equation to relate Secchi depth to a score, where <0.7 m gets a 0% and >2.4m gets a 100%. Annual average Secchi disk depths greater than 2.28 meters are considered very good and receive an A, (90-100%) while depths less than 1.8 meters are considered very poor (an F, <60%).

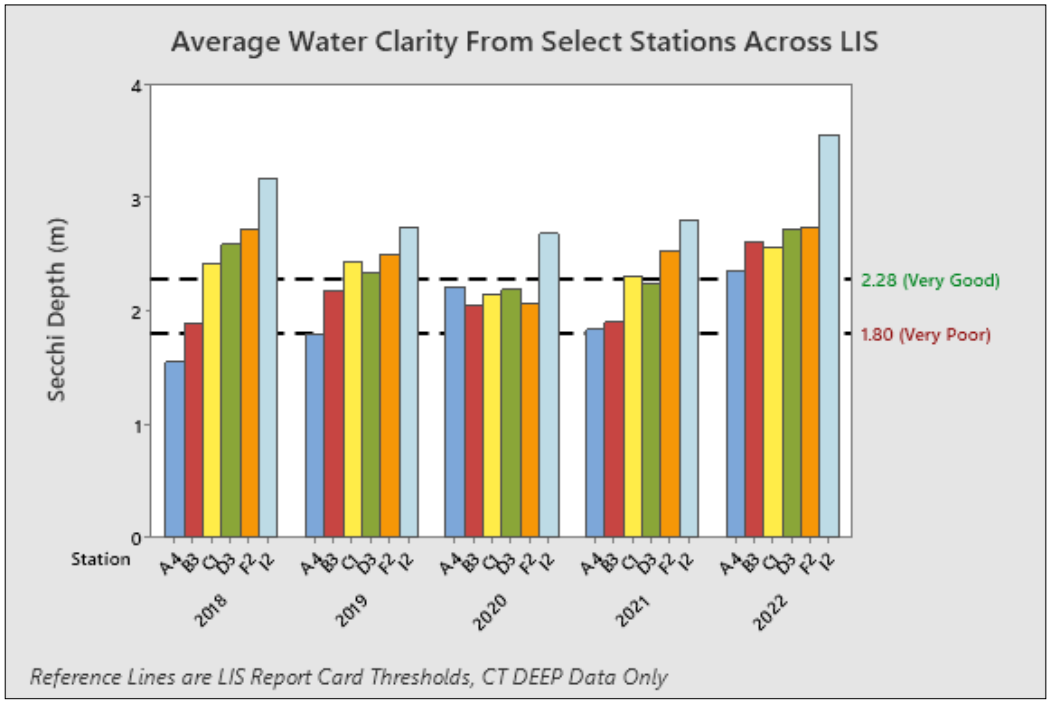


Figure 17. Year round averages of water clarity data from select stations across LIS.

Generally, with the exception of stations in the Western Narrows, water clarity across LIS is good (Figure 17). Water clarity in the Western Sound is especially impacted by suspended sediments, organic matter, and plankton in the water column.

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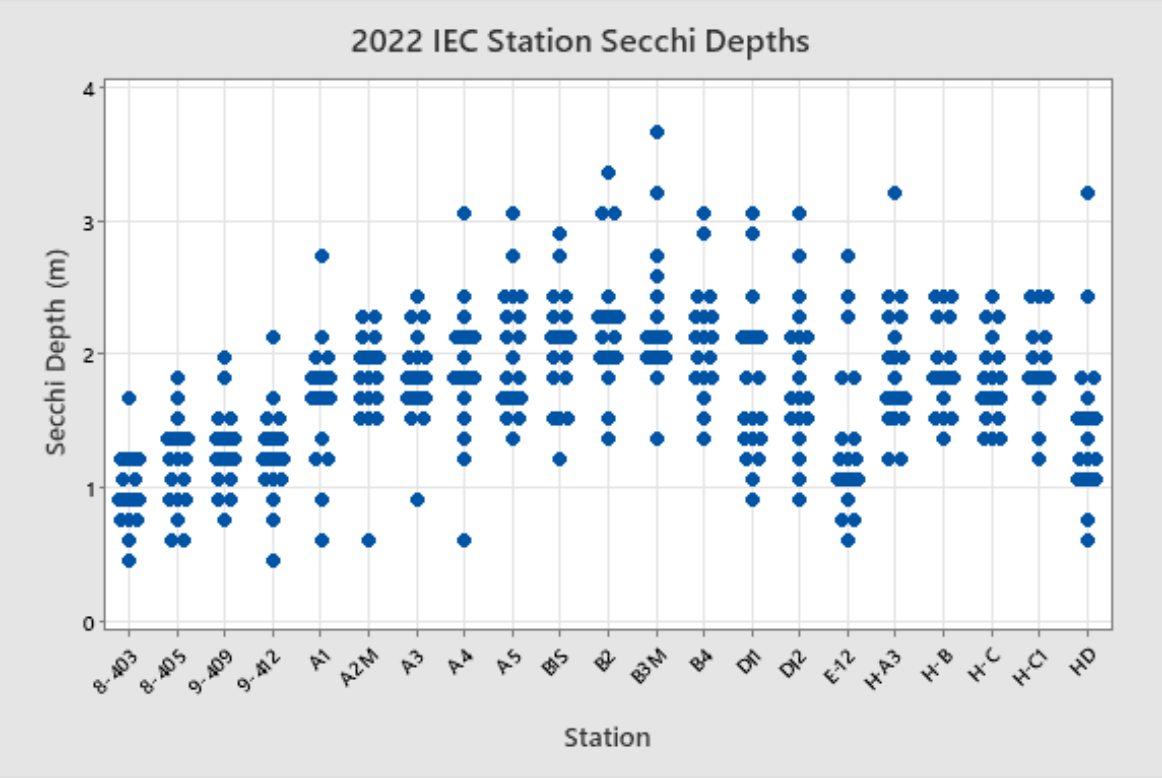
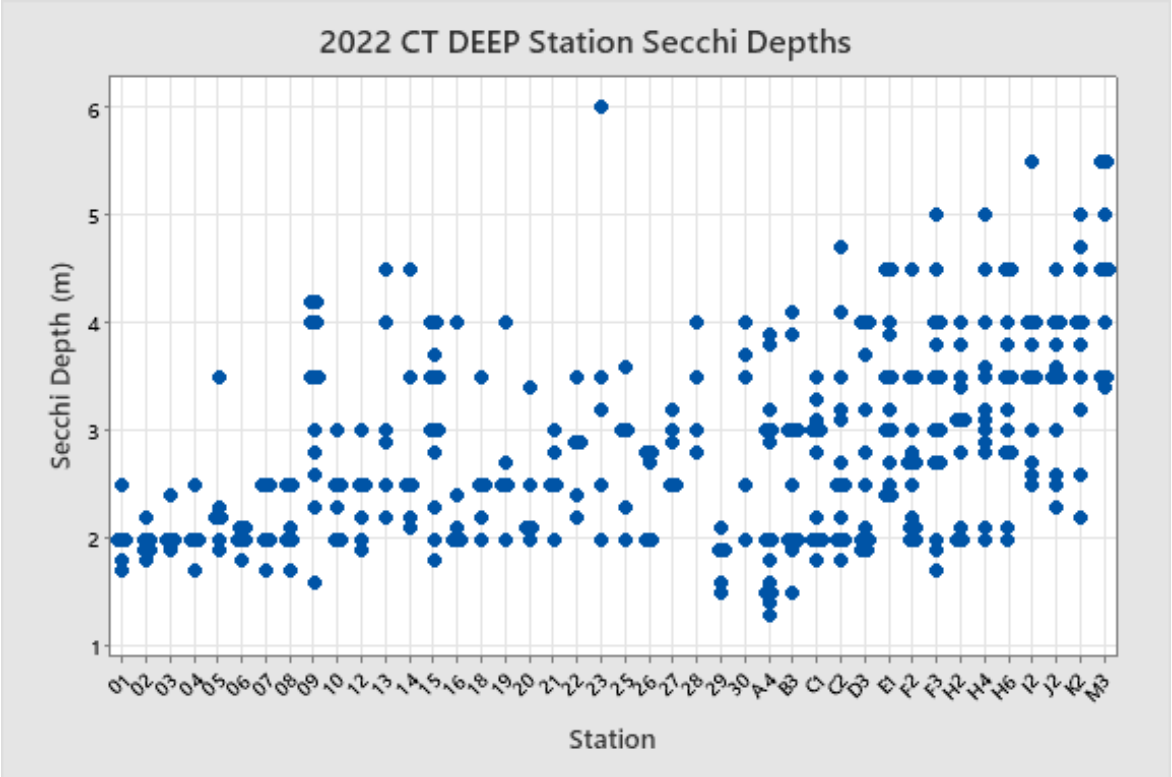
2022 DEEP Summer (June-September) Profile Data

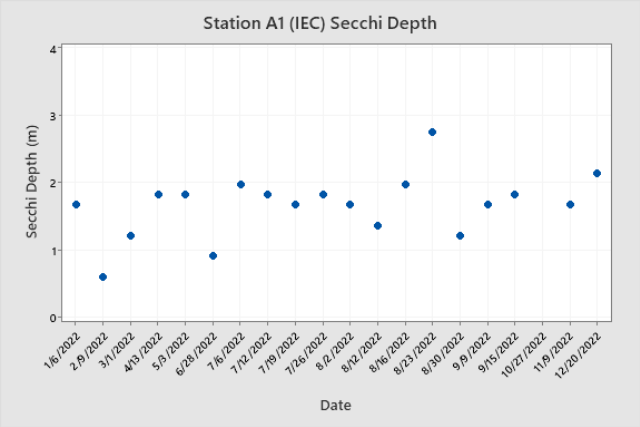
2022 IEC Data (January-December)

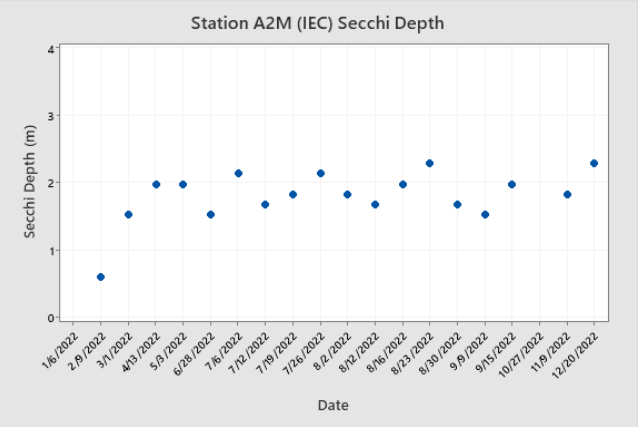
Appendix I – 2022 Year-Round Water Clarity Data

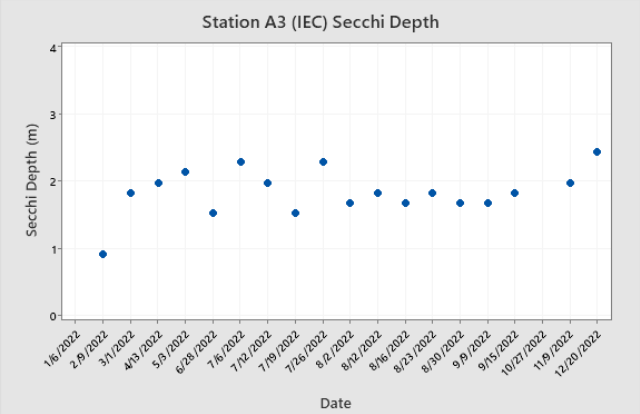
Individual value plots showing each Secchi disk depth recorded by the IEC and CT DEEP in 2022.
Data from select stations are presented temporally on the following pages. See Figure 1 for station locations.

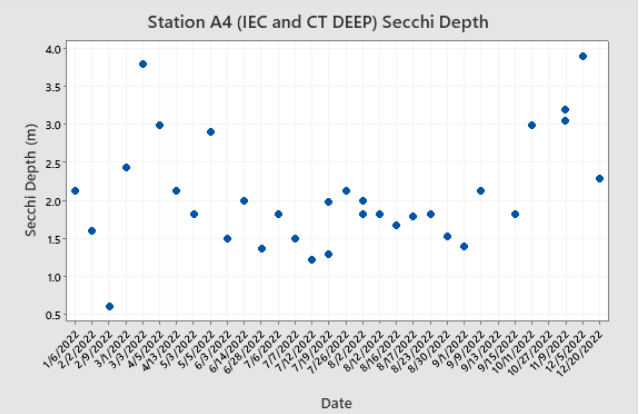


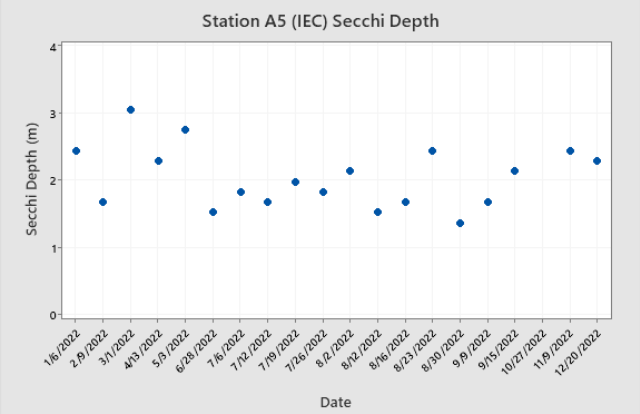


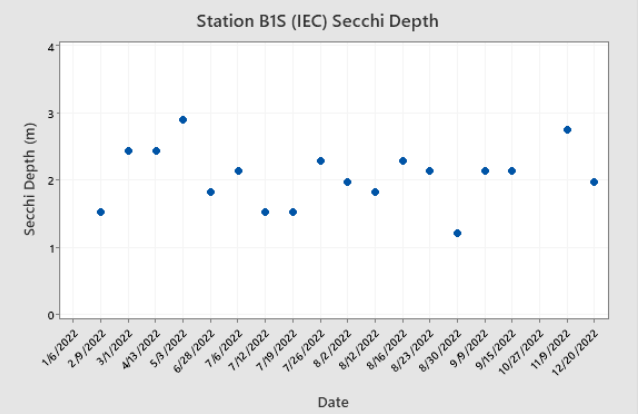

Station A1 (IEC) Secchi Depth
Secchi Depth (m)
Date

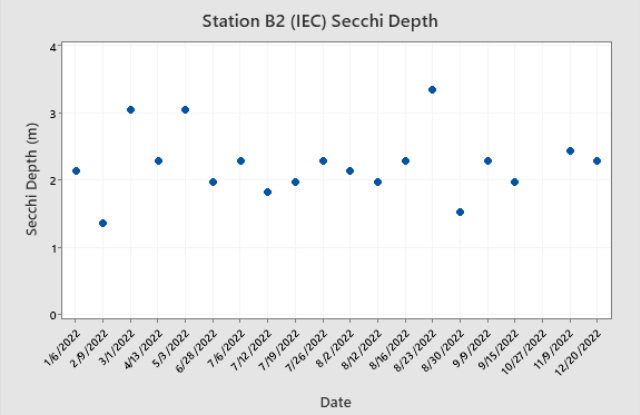

Station A2M (IEC) Secchi Depth
Secchi Depth (m)
Date

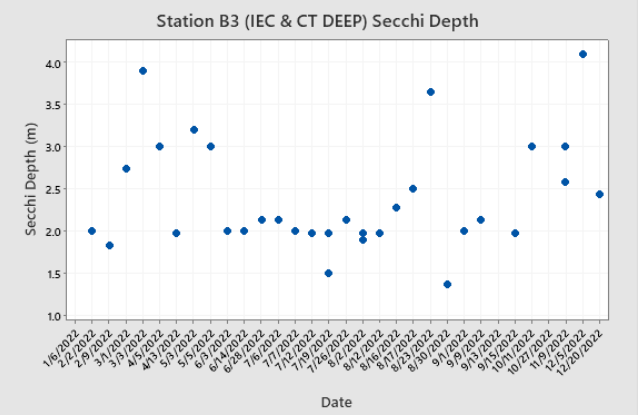

Station A3 (IEC) Secchi Depth
Secchi Depth (m)
Date

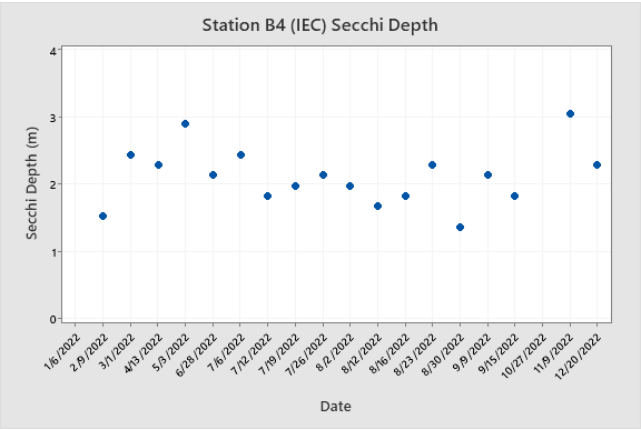

Station A4 (IEC and CT DEEP) Secchi Depth
Secchi Depth (m)
Date

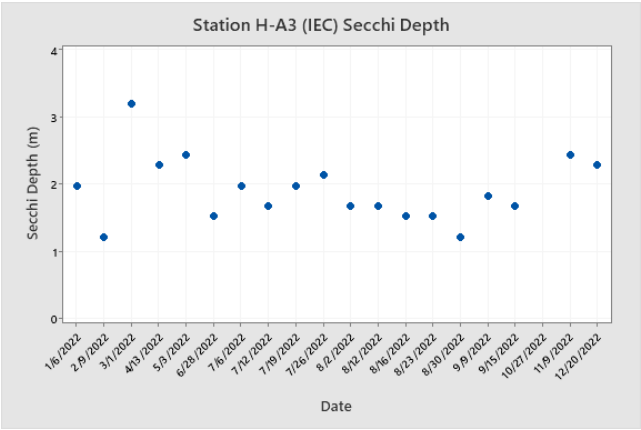

Station A5 (IEC) Secchi Depth
Secchi Depth (m)
Date

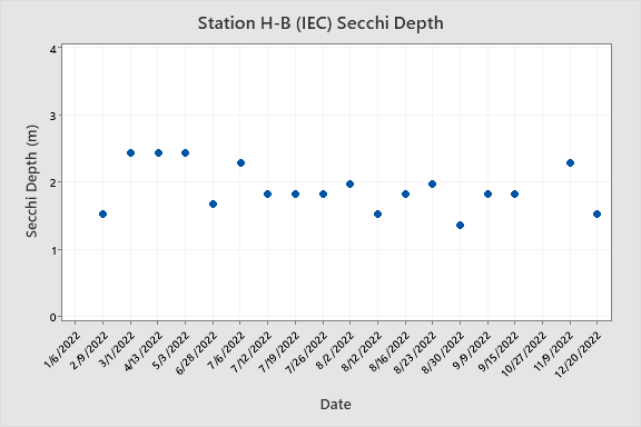

Station B1S (IEC) Secchi Depth
Secchi Depth (m)
Date

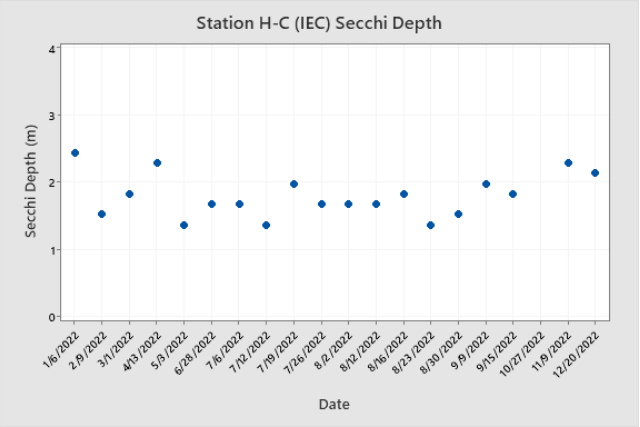

Station B2 (IEC) Secchi Depth
Secchi Depth (m)
Date

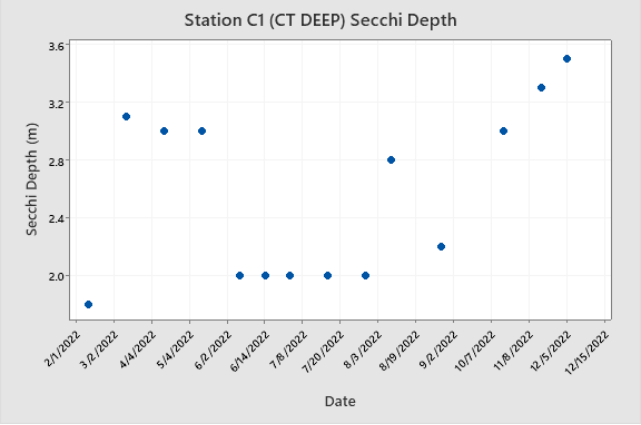

Station B3 (IEC & CT DEEP) Secchi Depth
Secchi Depth (m)
Date

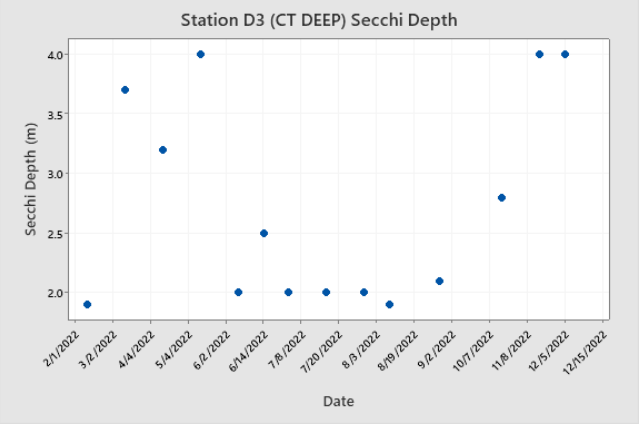

Station B4 (IEC) Secchi Depth
Secchi Depth (m)
Date

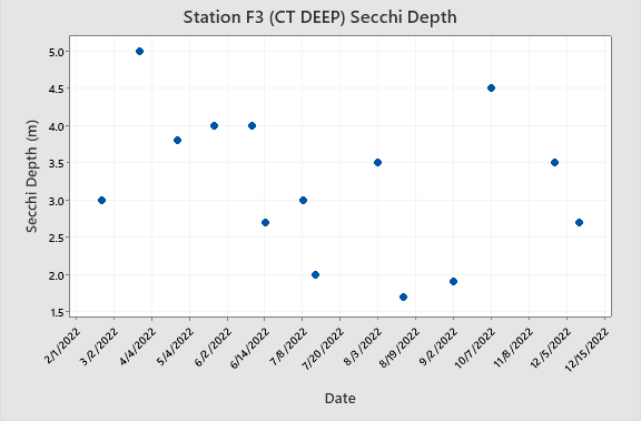

Station H-A3 (IEC) Secchi Depth
Secchi Depth (m)
Date

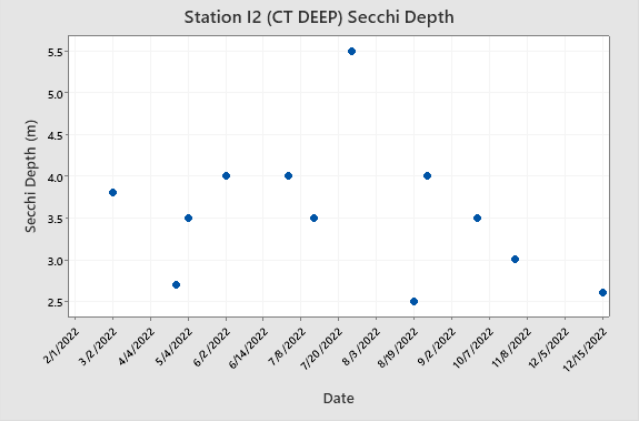

Station H-B (IEC) Secchi Depth
Secchi Depth (m)
Date


Station H-C (IEC) Secchi Depth
Secchi Depth (m)
Date


Station C1 (CT DEEP) Secchi Depth
Secchi Depth (m)
Date

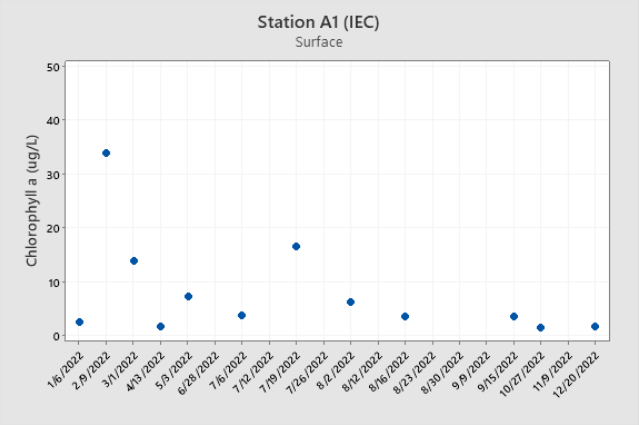

Station D3 (CT DEEP) Secchi Depth
Secchi Depth (m)
Date

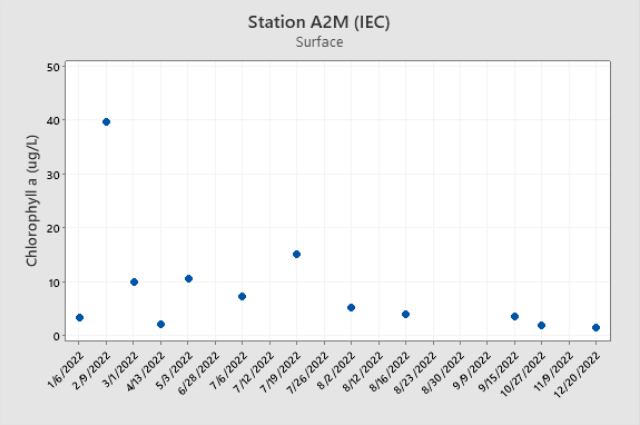

Station F3 (CT DEEP) Secchi Depth
Secchi Depth (m)
Date

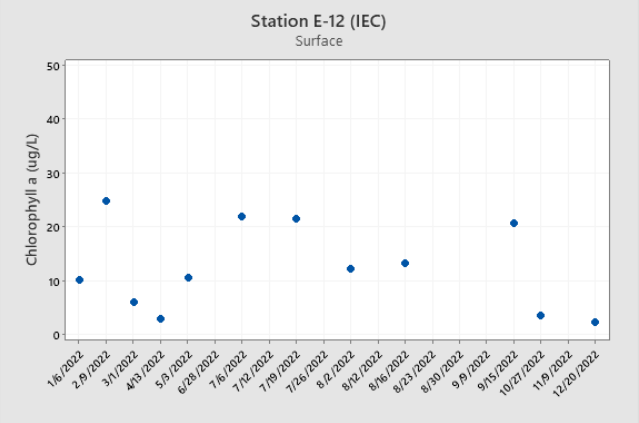

Station I2 (CT DEEP) Secchi Depth
Secchi Depth (m)
Date

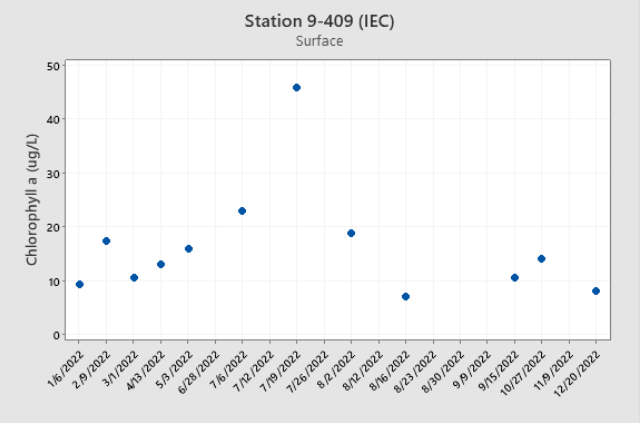
Appendix J – 2022 Year-Round Chlorophyll Data

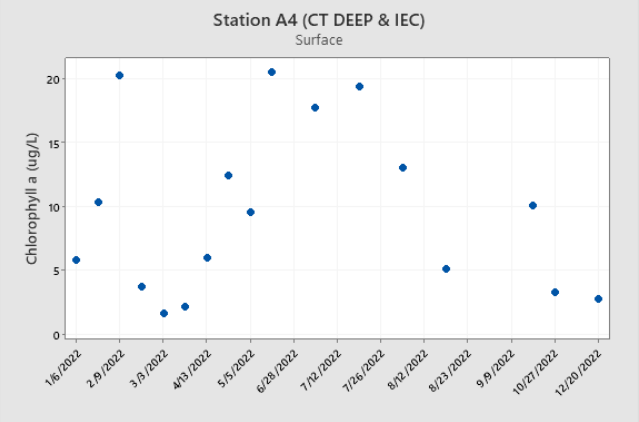
Individual value plots showing each chlorophyll a concentration recorded by the IEC and CT DEEP. CT DEEP data collected between February and June 2022. IEC data collected between January and December 2022. Additional stations are available upon request. See Figure 1 for station locations.

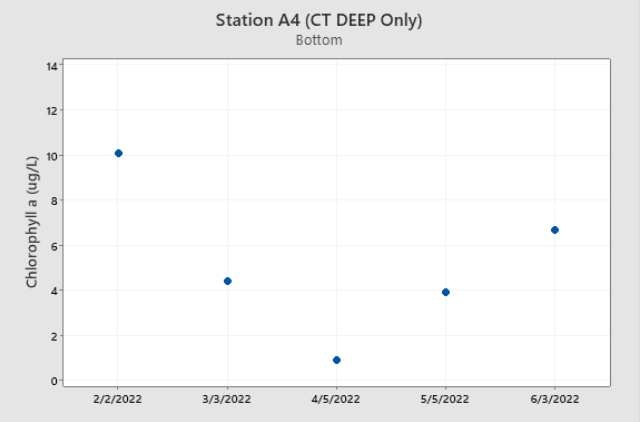


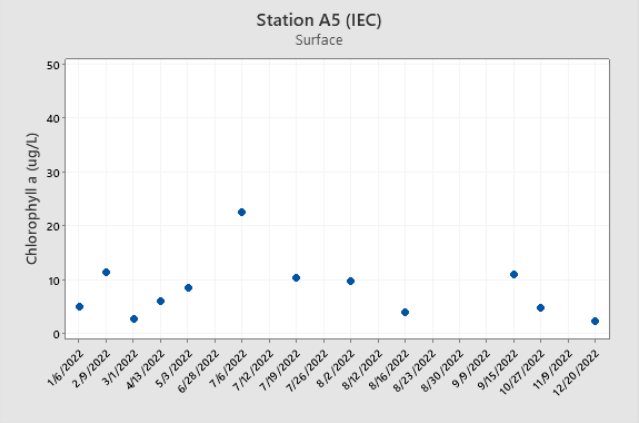


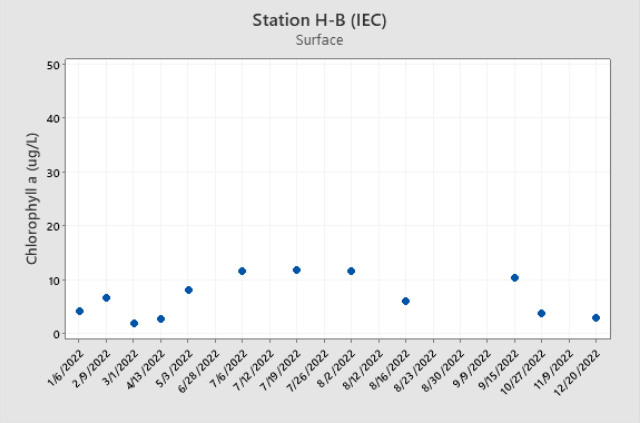


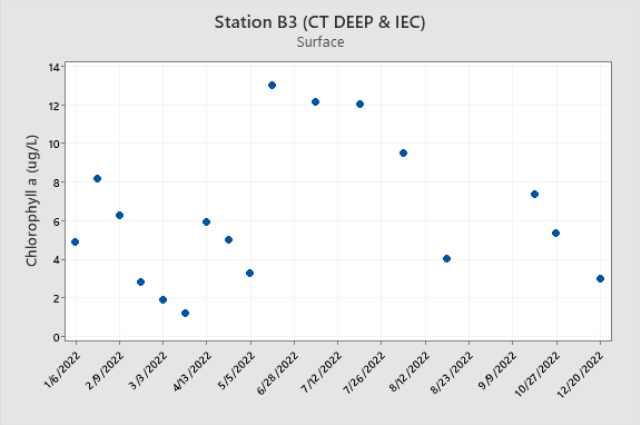











Station B3 (CT DEEP & IEC)
Surface
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
14
1/6/2022
2/9/2022
3/8/2022
4/13/2022
5/5/2022
6/28/2022
7/12/2022
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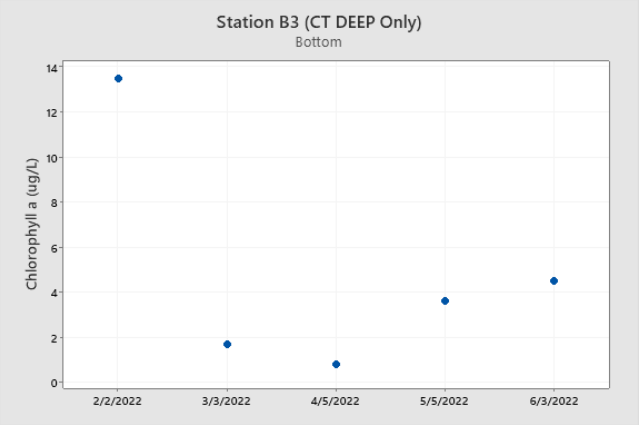
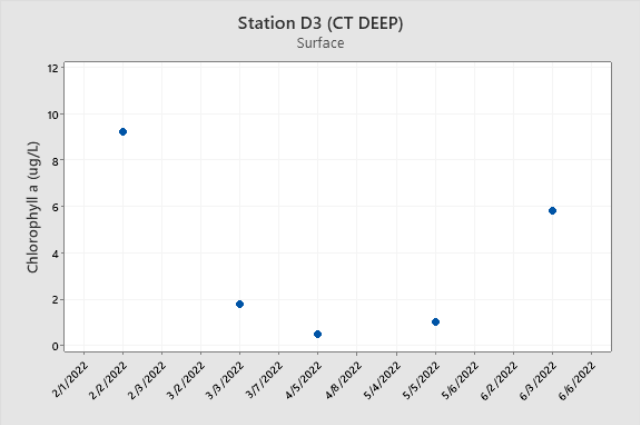
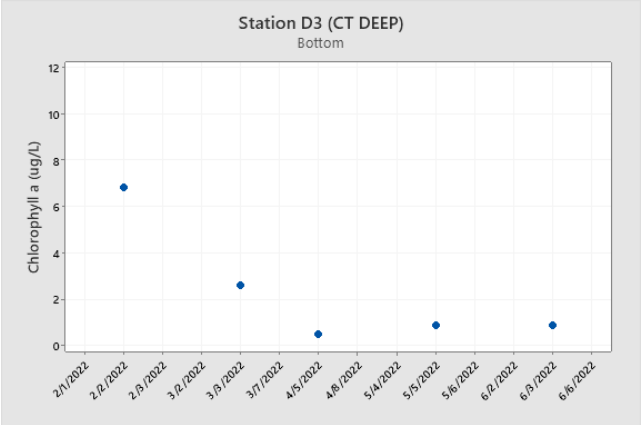
9/9/2022
10/27/2022
12/20/2022


Station B3 (CT DEEP Only)
Bottom
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
14
2/2/2022
3/3/2022
4/5/2022
5/5/2022
6/3/2022


Station D3 (CT DEEP)
Surface
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
2/1/2022
2/2/2022
2/8/2022
3/2/2022
3/8/2022
3/7/2022
4/5/2022
4/8/2022
5/4/2022
5/5/2022
5/6/2022
6/2/2022
6/3/2022
6/6/2022


Station D3 (CT DEEP)
Bottom
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
2/1/2022
2/2/2022
2/8/2022
3/2/2022
3/8/2022
3/7/2022
4/5/2022
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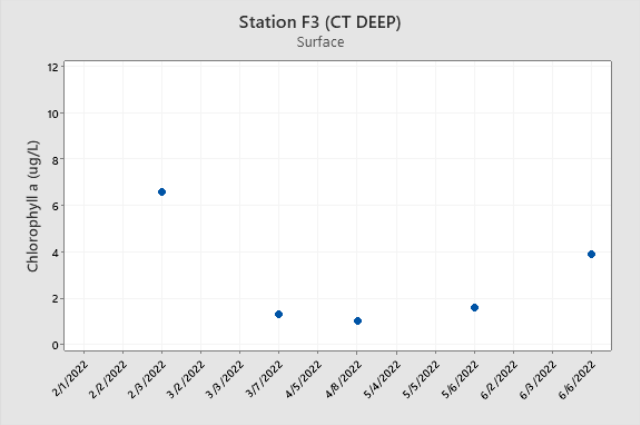
6/3/2022
6/6/2022


Station F3 (CT DEEP)
Surface
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
2/1/2022
2/2/2022
2/8/2022
3/2/2022
3/8/2022
3/7/2022
4/5/2022
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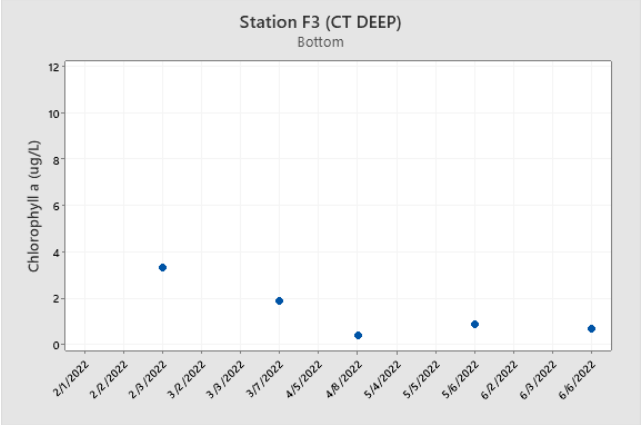
6/3/2022
6/6/2022


Station F3 (CT DEEP)
Bottom
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
2/1/2022
2/2/2022
2/8/2022
3/2/2022
3/8/2022
3/7/2022
4/5/2022
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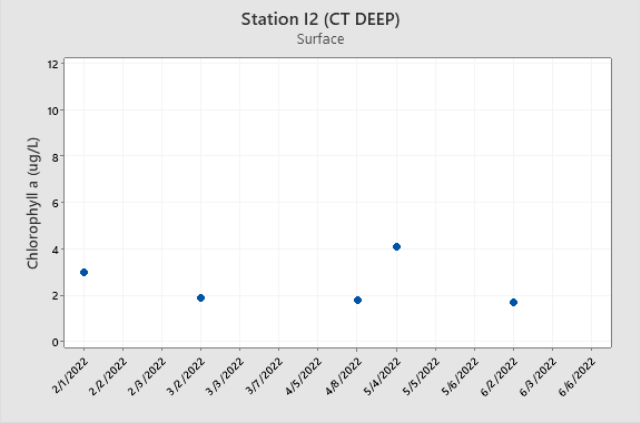
6/3/2022
6/6/2022


Station I2 (CT DEEP)
Surface
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
2/1/2022
2/2/2022
2/8/2022
3/2/2022
3/8/2022
3/7/2022
4/5/2022
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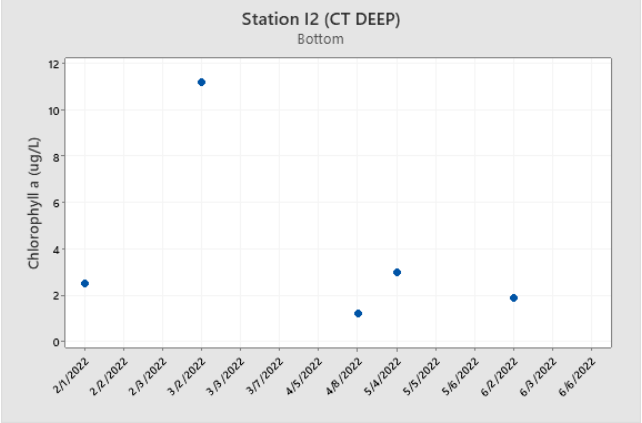
6/3/2022
6/6/2022


Station I2 (CT DEEP)
Bottom
Chlorophyll a (ug/L)
0
2
4
6
8
10
12
2/1/2022
2/2/2022
2/8/2022
3/2/2022
3/8/2022
3/7/2022
4/5/2022
4/8/2022
5/4/2022
5/5/2022
5/6/2022
6/2/2022
6/3/2022
6/6/2022

Acknowledgements

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