

PROGRESS REPORT

State: NEW HAMPSHIRE Grant: F-61-R-24/F21AF00591

Grant Title: NEW HAMPSHIRE'S MARINE FISHERIES INVESTIGATIONS

Project III: MULTI-SPECIES EVALUATION

Job 3: ESTUARINE SURVEY OF JUVENILE FINFISH

Objective: To monitor the relative abundance of juvenile finfish utilizing New Hampshire estuaries for nursery habitat.

Period Covered: January 1, 2021 - December 31, 2021

ABSTRACT

The monitoring of finfish is necessary for the management of riverine, estuarine, and marine environments. Between January 1, 2021 and December 31, 2021, the New Hampshire Fish and Game Department conducted 90 investigations to monitor the relative abundance of juvenile finfish utilizing New Hampshire estuaries for nursery habitat.

Thirty finfish species were captured during the 2021 seine survey season. Atlantic Silverside *Menidia menidia*, Atlantic Menhaden *Brevoortia tyrannus*, Atlantic Herring *Clupea harengus*, Blueback Herring *Alosa aestivalis*, and Striped Killifish *Fundulus majalis*, accounted for 96.18% of the total catch. Since the inception of the survey in 1997, Atlantic Silverside have remained the most abundant finfish species captured. Overall relative abundance in 2021 exceeded the 10-year geometric mean CPUE, and five out of the six species of special interest showed an increase in abundance: Alewife *Alosa pseudoharengus*, Winter Flounder *Pseudopleuronectes americanus*, Blueback Herring, American Shad *Alosa sapidissima*, and Atlantic Silverside. Rainbow Smelt *Osmerus mordax* remained stable in abundance compared to the 10-year mean. Above average temperatures were recorded in 2021, while the salinity fell below the 10-year mean.

INTRODUCTION

Estuaries are highly productive ecosystems, known to provide diverse habitat utilized as nurseries and forage grounds by an array of estuarine species. Many of these estuarine species are commercially, recreationally, and culturally significant. Monitoring spawning success and recruitment of finfish species is necessary for the effective management of local populations and fisheries.

Beach seining is an established sampling method for estuarine-based juvenile finfish surveys (NHFG 1981, 1982; Howell and Molnar 1993; MD DNR 1994; Young et al. 1994; NAI 1995). Juvenile finfish captured by beach seine allows for positive identification and the opportunity to collect important biological information; with appropriate sampling procedures in place, an index of relative abundance can be calculated for each species. Evaluation of each index can provide an indication of spawning success and recruitment of important finfish species, such as Alewife *Alosa pseudoharengus*, Atlantic Herring *Clupea harengus*, Bluefish *Pomatomus saltatrix*, and Winter Flounder *Pseudopleuronectes americanus*, which utilize estuaries on the Atlantic coast as nursery habitat (MD DNR 1994; Young et al. 1994).

The estuarine survey of juvenile finfish was initiated in 1997. It was designed as a fixed station survey, as opposed to a stratified random survey, because strong tidal currents, rocky shorelines, and various anthropogenic shoreline structures limit the amount of suitable seining areas, particularly in the Great Bay Estuary. Many fixed sampling locations chosen for this survey were sites used by beach seine surveys conducted in New Hampshire (NH) estuaries in the past (NAI 1979; NHFG 1981, 1982; Grout and Heckman 1996). This provides the opportunity to compare data from the current program with historical survey data.

The primary objective of this beach seine survey is to monitor relative abundance of juvenile finfish that utilize NH estuaries for nursery habitat each year. As designed, it is intended to be a general purpose survey, though there are six finfish species of special interest: Alewife, Blueback Herring *Alosa aestivalis*, American Shad *Alosa sapidissima*, Rainbow Smelt *Osmerus mordax*, Atlantic Silverside *Menidia menidia*, and Winter Flounder.

PROCEDURES

A bag seine is used to sample for juvenile finfish in NH tidal waters; the dimensions of the seine are 30.5 m long and 1.8 m high with 6.4 mm mesh, with a bag where the height, width, and depth each measure 1.8 m. A single

seine haul is performed monthly from June through November at 15 fixed stations: four in the Hampton/Seabrook Estuary (HSE), three in Little Harbor (GBE1), three in the Piscataqua River (GBE2), and five in Little Bay/Great Bay (GBE3) (Table 3.3-1 and Figures 3.3-1 through 3.3-3).

Seine hauls are performed during daylight between 2 hours before and 2 hours after low tide. Seine hauls are set by boat 15-25 m from the shoreline, ideally in water depths less than 2 m in order to prevent the foot rope of the seine from lifting off of the bottom.

All captured finfish are identified to the lowest possible taxon, measured in total length to the nearest millimeter with a maximum of 25 individual lengths recorded per species per seine haul, and enumerated. Extremely large catches are subsampled by filling two quart-sized sample jars, then counting the number of individuals of each species in each jar. The average number of each species per jar from the two sample jars counted is multiplied by the total number of sample jars required to account for the remainder of the individuals captured in the seine haul. Water surface temperature (°C), salinity (ppt), and substrate type are recorded at each fixed station for each seine haul.

Catch distributions for many forage species or juveniles of some species can be heavily skewed due to a few large catches as a result of schooling behavior. In these instances, one or two large catches can often inflate the value of an arithmetic mean by orders of magnitude resulting in a false characterization of the true relative abundance of a species. To compensate for this potential bias, a log transformation of the catch data was used to produce a normal (as opposed to skewed) catch distribution and the resulting mean of the log-transformed data can be transformed back to produce a geometric mean (Sokal and Rohlf 1969). In recent years the geometric mean has often replaced the arithmetic mean as a measure of relative abundance for juvenile finfish because it is a more statistically robust value (Howell and Molnar 1993; MD DNR 1994; Young et al. 1994; NAI 1995).

RESULTS

Between January 1, 2021 and December 31, 2021, the New Hampshire Fish and Game Department conducted 90 investigations to monitor the relative abundance of juvenile finfish utilizing New Hampshire estuaries for nursery habitat.

Fifteen stations were surveyed once a month from June through November, resulting in a total of 90 seine hauls. Substrate type was recorded each month during sampling to identify habitat type and possible changes over time (Table

3.3-1). The majority of the stations had substrate types of "mud/sand" or "sand", followed by "mud/shell" or "mud", and "mud/gravel".

Thirty finfish species were captured in 2021 (Table 3.3-2). The five most frequently encountered species were, in order of abundance: Atlantic Silverside, Atlantic Menhaden, Atlantic Herring, Blueback Herring, and Striped Killifish *Fundulus majalis*, in total accounting for 96.18% of the catch.

Table 3.3-3 shows the geometric mean of species caught in three or more years between 2011 and 2021. Species caught in less than three years were omitted from the table unless caught in the 2021 survey. Overall relative abundance in 2021 was above the 10-year mean CPUE. Five of the six species of special interest, Alewife, Winter Flounder, Blueback Herring, American Shad, and Atlantic Silverside, exceeded their respective 10-year means. Rainbow Smelt abundance remained stable compared to the 10-year mean. Fifteen of the remaining finfish species encountered in 2021 increased in abundance compared to their 10-year means, while six decreased, and three remained stable (Table 3.3-3).

In comparison to all other stations, Station 29 had the lowest overall geometric mean CPUE while Station 35 had the highest (Table 3.3-4). Station 33 had the lowest species diversity, with only three species observed. In contrast, Stations 30, 72, and 147 had the greatest species diversity, each with 17 different species captured. Atlantic Silverside dominated the catch composition at all stations except Station 93, where both Striped Killifish and Mummichog *Fundulus heteroclitus* were more abundant. September had the highest geometric mean CPUE value for all species combined in 2021, while July had the lowest (Table 3.3-5). The 2021 survey season was the first occurrence of the Atlantic Seasnail *Liparis atlanticus* and Northern Sea Robin *Prionotus carolinus* in the time series, the first re-occurrence of Silver Hake *Merluccius bilinearis* since 2014, the first Northern Puffer *Sphoeroides maculatus* since 2003, and the first Atlantic Mackerel *Scomber scombrus* since 1996 (Table 3.3-3).

Throughout the 2021 sampling season 3,325 individuals were measured for total length in millimeters (Table 3.3-6). Length frequencies were weighted by catch and plotted for the species of special interest (Figure 3.3-4).

Mean surface water temperature in 2021 was 17.9°C, which exceeded the 10-year average of 17.0°C and was the highest mean temperature observed since 2011. A low of 8.2°C was observed at Station 39 in November and a high of 26.1°C at Station 39 in August (Tables 3.3-7 and 3.3-8). Little Harbor exhibited the coldest annual mean surface temperatures of all the areas sampled, with a mean temperature of 16.0°C, followed by the Hampton/Seabrook Estuary with 17.1°C, and

the Piscataqua River with 18.3°C. The Little Bay/Great Bay area exhibited the warmest annual mean surface temperatures, with a mean temperature of 19.3°C.

Historical annual mean salinity has ranged from a minimum of 22.8 ppt in 2021 to a maximum of 29.2 ppt in 2016 (Table 3.3-7). The mean salinity in 2021 fell below the 10-year mean, which averaged 26.3 ppt. Individual salinity measurements in 2021 ranged from 0.2 ppt at Station 107 in July to 32.9 ppt at Station 5 in October (Table 3.3-9). The range in recorded salinities was greatest at Station 107, which ranged from 0.2 ppt to 16.8 ppt, with a difference of 16.6 ppt; in contrast, Station 23 experienced minor changes in salinity, which ranged from 29.1 ppt to 32.5 ppt, and differed by only 3.4 ppt. Equipment failure occurred during at least 10 known samples during August and November (Table 3.3-8) where temperatures and/or salinity were not measured.

DISCUSSION

Thirty finfish species were captured during the 2021 survey season. As has been the case since the inception of the survey in 1997, only a few species account for the vast majority of the total number of individuals captured (Grout and Smith 1998). Five finfish species comprised 96.18% of the total catch, listed in order of abundance: Atlantic Silverside, Atlantic Menhaden, Atlantic Herring, Blueback Herring, and Striped Killifish (Table 3.3-2). Overall relative abundance in 2021 increased by 25% from 2020; 67% of the finfish species observed were more abundant in 2021 compared to their 10-year means, while 20% were less abundant, and 13% remained the same (Table 3.3-3).

The diversity in annual catch is reflective of the general purpose design of the survey; however, Alewife, Blueback Herring, Winter Flounder, Rainbow Smelt, American Shad, and Atlantic Silverside are the primary species of interest. With the exception of American Shad, all of these species of interest have been caught in each of the last ten years of the survey. American Shad have been encountered in three out of the last five years (2017, 2019, and 2021) after a 13-year absence. The relative abundance in 2021 compared to the 10-year time series geometric mean was particularly high for Alewife, Atlantic Herring, and Blueback Herring, all of which reached abundances nearly double their respective means (Table 3.3-3). Atlantic Menhaden was over five times more abundant than the 10-year mean. Atlantic Mackerel were caught during the 2021 sampling season at Station 25 in September after having been absent from the survey since 1996 (Tables 3.3-3, 3.3-4, and 3.3-5). Silver Hake was caught for the first time since 2014 at Station 30 in November and Northern Puffer for the first time since 2006 at Station 25 in August. Atlantic Seasnail was

encountered for the first time in the history of the survey in July at Station 7, as was Northern Sea Robin at Station 25 in September. Inter-annual variation is inherent in natural systems due to fluctuations in both biotic and abiotic factors, therefore while some species exhibit peaks one year and potential lows the next, this survey is effective in monitoring trends in relative abundance over time, providing insight into the overall health of the populations and ecosystem.

Environmental conditions, both biotic and abiotic, can influence the distribution of fish especially in an estuary where these changes can be abrupt. Water temperature is thought to play an important role in species abundance and movement (Roessig et al. 2004). Within NH estuaries, observed finfish abundance tended to be greater in the late summer and early fall months with warmer water temperatures (Table 3.3-8). Geometric mean catch peaked in September, after which water temperatures decreased notably at all 15 stations (Tables 3.3-5 and 3.3-8). However, it should be noted that two of the most abundant species, Atlantic Silverside and Striped Killifish, are primarily driving this abundance level in September.

In 2021, the annual mean salinity was 22.8 ppt and the annual mean temperature was 17.9°C. The annual average temperature in 2021 was above the 10-year mean, while the salinity was below (Table 3.3-7).

The Atlantic coast's river herring (Alewife and Blueback Herring) have been declining since 2003 and are currently listed as a "Species of Concern" by the National Oceanic and Atmospheric Administration's Fisheries Service (NOAA Fisheries) and the NH Fish and Game Department (NHFG). While no single factor has been determined for the cause of the overall general decline, certain factors such as habitat loss and degradation, impediments to spawning areas, fishing, and predation (e.g., Striped Bass) may all play a role in the general decline of coastwide river herring populations (ASMFC 2012). Relative abundance of both Alewives and Blueback Herring decreased from 2020 by 6% and 9%, respectively. However, in 2021, both species were caught in quantities well above the 10-year geometric mean CPUE (Table 3.3-3) which may reflect improvements conducted in their migration routes, including recent dam removals, and supplemental stocking efforts.

Rainbow Smelt is designated as a "Species of Concern" by NOAA Fisheries and NHFG. The Rainbow Smelt population has been declining over the last 30 years, and 5 of the last 10 years have yielded quantities below the 10-year mean. Two other NHFG surveys that investigating Rainbow Smelt illustrate a similar decline, though their spawning and migratory patterns are poorly

understood (See Project I-2 and II-1). It is believed that populations of Rainbow Smelt throughout the northwestern Atlantic have declined over the past few decades due to overfishing, pollution, unfavorable changes in ocean conditions (e.g., rising temperatures), poor water quality, physical obstructions (e.g., poorly designed culverts, dams), and degradation and loss of spawning habitat (Enterline et al. 2012). In response to the observed decline in adult Rainbow Smelt populations, the NHFG implemented a catch reduction for recreational harvest from 10 liquid quarts to 4 liquid quarts in 2015 and are currently attempting a stocking program to supplement the population. Although the population remains at low levels compared to those seen prior to 2008, Rainbow Smelt were one of the top ten encountered species in 2019 and their relative abundance stayed fairly consistent over the 2020 and 2021 seine survey seasons (Table 3.3-3).

Atlantic Silverside accounted for 79.97% of the total catch in 2021 (Table 3.3-2), and is consistently the most numerous species caught in the survey (Table 3.3-3). Furthermore, it was the most spatially diverse finfish species, having been captured at all stations (Table 3.3-4), and was the most abundant finfish species in all months except June (Table 3.3-5). Atlantic Silversides are an important forage fish and documented food source for Bluefish and Striped Bass (Collette and Klein-MacPhee 2002).

Winter Flounder abundance has fluctuated over the history of the survey, with general abundance in 2021 well above the 10-year average (Table 3.3-3), though averages prior to 2009 were significantly higher than in recent years. In 2021, Winter Flounder were captured each month of the survey and observed at 13 out of the 15 stations, suggesting the species occupies a widespread area in NH's estuaries (Tables 3.3-4 and 3.3-5). While a large portion of Winter Flounder populations are harvested in federal waters, the majority of the stock is composed of smaller localized populations that return inshore each year to spawn (ASMFC 2007). The decline in the spawning success and recruitment to the localized populations in NH over time could be the result of overfishing, pollution, habitat loss and degradation, and power plant entrainment and impingement (ASMFC 2012).

In summary, of the 30 finfish species captured in the 2021 seine survey, the five most plentiful species in order of abundance were; Atlantic Silverside, Atlantic Menhaden, Atlantic Herring, Blueback Herring, and Striped Killifish, which together represented 96.18% of the total catch. Overall, relative species abundance was above the 10-year mean and Atlantic Silverside continue to be the most abundant species captured annually. Five of the six species of interest

exceeded average relative abundance, while one remained stable. Mean water surface temperature in 2021 was above the 10-year mean, while salinity was below the mean.

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Table 3.3-1. Station number and area code, location, coordinates, and substrate type, as well as historical seine data for each station, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Station #	Area	Station location	Latitude/longitude	Substrate	Historical data
5	GBE1	Fort Stark (Little Harbor)	43°03'28.0"N 070°42'51.7"W	sand	Grout & Heckman (1996)
7	GBE1	Wentworth (Little Harbor)	43°03'25.6"N 070°43'25.7"W	mud/sand	Grout & Heckman (1996)
9	GBE1	Odiorne Beach (Little Harbor)	43°03'07.9"N 070°43'22.9"W	sand	Grout & Heckman (1996)
30	GBE2	Schiller Plant (Piscataqua)	43°05'59.3"N 070°47'15.5"W	mud/gravel	NAI (1979)
35	GBE2	General Sullivan Bridge Cove (Piscataqua)	43°07'00.1"N 070°49'23.6"W	mud	NHFG (1981,1982)
39	GBE2	Upper Piscataqua (Power Lines)	43°10'16.2"N 070°49'43.9"W	mud/sand	None
54	GBE3	Broad Cove (Little Bay)	43°07'07.9"N 070°50'51.8"W	mud/sand	NHFG (1981)
72	GBE3	Fox Point (Little Bay)	43°07'15.0"N 070°51'33.2"W	mud/sand	NHFG (1981,1982)
93	GBE3	Herods Cove (Great Bay)	43°04'16.6"N 070°51'27.2"W	mud/sand	NHFG (1981,1982)
107	GBE3	Moody Point (Lamprey/Squamscott)	43°04'07.0"N 070°54'12.5"W	mud	NHFG (1981)
147	GBE3	Oyster River	43°07'19.3"N 070°52'23.4"W	mud/shell	None
23	HSE	Smith & Gilmore (Hampton)	42°54'03.4"N 070°49'10.0"W	mud/shell	Grout & Heckman (1996)
25	HSE	Yankee Coop (Seabrook)	42°53'33.0"N 070°49'11.1"W	mud/sand	Grout & Heckman (1996)
29	HSE	Blackwater River	42°53'42.9"N 070°49'29.8"W	sand	Grout & Heckman (1996)
33	HSE	Brown's River	42°53'56.3"N 070°49'33.4"W	sand	Grout & Heckman (1996)

Area codes	Area names
HSE	Hampton/Seabrook Estuary
GBE1	Little Harbor
GBE2	Piscataqua River
GBE3	Little Bay/Great Bay

Table 3.3-2. Geometric mean catch per seine haul, and standard deviation values for all species captured, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Species	Scientific name	Geometric		Total catch (N)	Percent of total catch
		Mean	SD		
Alewife	<i>Alosa pseudoharengus</i>	0.31	1.42	400	0.72
Bass, Largemouth	<i>Micropterus salmoides</i>	0.03	0.17	4	0.01
Bass, Striped	<i>Morone saxatilis</i>	0.01	0.08	1	0.00
Bluefish	<i>Pomatomus saltatrix</i>	0.09	0.44	22	0.04
Crab, Green	<i>Carcinus maenas</i>	2.77	1.83	511	0.92
Crab, Horseshoe	<i>Limulus polyphemus</i>	0.11	0.35	16	0.03
Crab, Rock	<i>Cancer irroratus</i>	0.05	0.27	9	0.02
Cunner	<i>Tautoglabrus adspersus</i>	0.03	0.15	4	0.01
Eel, American	<i>Anguilla rostrata</i>	0.01	0.08	1	0.00
Flounder, Smooth	<i>Pleuronectes putnami</i>	0.10	0.40	18	0.03
Flounder, Windowpane	<i>Scophthalmus aquosus</i>	0.01	0.08	1	0.00
Flounder, Winter	<i>Pseudopleuronectes americanus</i>	0.77	1.33	178	0.32
Grubby	<i>Myoxocephalus aeneus</i>	0.41	0.88	75	0.14
Hake, Red	<i>Urophycis chuss</i>	0.02	0.11	2	0.00
Hake, Silver	<i>Merluccius bilinearis</i>	0.01	0.08	1	0.00
Herring, Atlantic	<i>Clupea harengus</i>	0.38	2.32	2,410	4.36
Herring, Blueback	<i>Alosa aestivalis</i>	0.30	1.81	1,709	3.09
Killifish, Striped	<i>Fundulus majalis</i>	2.39	4.02	1,534	2.78
Lance, American Sand	<i>Ammodytes americanus</i>	0.08	0.55	39	0.07
Lobster, American	<i>Homarus americanus</i>	0.01	0.08	1	0.00
Mackerel, Atlantic	<i>Scomber scombrus</i>	0.04	0.43	29	0.05
Menhaden, Atlantic	<i>Brevoortia tyrannus</i>	0.65	2.57	3,303	5.98
Mummichog	<i>Fundulus heteroclitus</i>	0.95	2.22	440	0.80
Perch, White	<i>Morone americana</i>	0.03	0.19	5	0.01
Pipefish, Northern	<i>Syngnathus fuscus</i>	0.17	0.42	24	0.04
Puffer, Northern	<i>Sphoeroides maculatus</i>	0.01	0.08	1	0.00
Robin, Northern Sea	<i>Prionotus carolinus</i>	0.01	0.08	1	0.00
Seasnail, Atlantic	<i>Liparis atlanticus</i>	0.01	0.08	1	0.00
Shad, American	<i>Alosa sapidissima</i>	0.03	0.31	12	0.02
Silverside, Atlantic	<i>Menidia menidia</i>	25.38	11.83	44,193	79.97
Smelt, Rainbow	<i>Osmerus mordax</i>	0.30	1.19	181	0.33
Stickleback, Fourspine	<i>Apeltes quadracus</i>	0.44	1.14	111	0.20
Stickleback, Ninespine	<i>Pungitius pungitius</i>	0.01	0.08	1	0.00
Tomcod, Atlantic	<i>Microgadus tomcod</i>	0.12	0.43	21	0.04
All species				55,259	100.00

Table 3.3-3. Geometric mean (*standard deviation*) catch per seine haul for all species caught in juvenile finfish seine survey conducted in New Hampshire estuaries, 2011–2021.

Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean (2011-2020)
Alewife	0.08(0.44)	0.02(0.23)	0.22(1.49)	0.05(0.25)	0.31(1.09)	0.15(0.96)	0.21(0.93)	0.23(0.88)	0.07(0.49)	0.33(1.61)	0.31(1.42)	0.16(0.86)
Bass, Largemouth	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.03(0.34)	0.01(0.08)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.03(0.17)	0.01(0.10)
Bass, Striped	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.01(0.08)	0.01(0.08)	0.02(0.13)	0.01(0.08)	0.01(0.08)	0.02(0.15)	0.01(0.08)	0.01(0.08)
Bluefish	0.08(0.37)	0.35(1.14)	0.41(1.22)	0.05(0.33)	0.00(0.00)	0.02(0.13)	0.02(0.15)	0.25(1.09)	0.00(0.00)	0.14(0.55)	0.09(0.44)	0.12(0.57)
Crab, Green	1.69(1.58)	3.28(2.39)	3.59(2.97)	2.35(2.57)	1.71(1.77)	3.79(2.45)	3.30(2.24)	1.61(1.71)	1.49(2.07)	1.81(1.92)	2.77(1.83)	2.35(2.17)
Crab, Horseshoe	0.05(0.22)	0.02(0.11)	0.02(0.15)	0.00(0.00)	0.02(0.13)	0.05(0.22)	0.04(0.28)	0.04(0.21)	0.04(0.17)	0.11(0.44)	0.11(0.35)	0.04(0.21)
Crab, Jonah	0.01(0.12)	0.00(0.00)	0.02(0.11)	0.01(0.08)	0.01(0.12)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.01(0.07)
Crab, Rock	0.06(0.31)	0.00(0.00)	0.04(0.29)	0.01(0.08)	0.00(0.00)	0.03(0.20)	0.02(0.13)	0.05(0.25)	0.00(0.00)	0.01(0.08)	0.05(0.27)	0.02(0.17)
Cunner	0.02(0.11)	0.09(0.36)	0.03(0.17)	0.02(0.11)	0.00(0.00)	0.01(0.08)	0.02(0.11)	0.02(0.13)	0.02(0.13)	0.03(0.17)	0.03(0.15)	0.02(0.15)
Eel, American	0.00(0.00)	0.01(0.12)	0.00(0.00)	0.01(0.08)	0.02(0.11)	0.02(0.15)	0.01(0.08)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.01(0.07)
Flounder, Smooth	0.87(1.63)	0.33(0.79)	0.08(0.31)	0.58(1.28)	0.38(1.15)	0.21(0.68)	0.11(0.39)	0.36(1.00)	0.36(1.04)	0.08(0.34)	0.10(0.40)	0.32(0.87)
Flounder, Windowpane	0.00(0.00)	0.02(0.15)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.02(0.11)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.03(0.15)	0.01(0.08)	0.01(0.07)
Flounder, Winter	0.20(0.44)	0.57(0.86)	0.38(0.79)	0.32(0.66)	0.64(0.93)	1.48(1.71)	0.90(1.40)	0.36(0.73)	0.27(0.61)	0.85(1.26)	0.77(1.33)	0.56(0.94)
Grubby	0.31(0.72)	0.33(0.79)	0.09(0.37)	0.19(0.48)	0.39(0.76)	0.20(0.61)	0.21(0.49)	0.18(0.45)	0.20(0.51)	0.19(0.50)	0.41(0.88)	0.23(0.57)
Gunnel, Rock	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.12)	0.01(0.12)	0.02(0.11)	0.00(0.00)	0.02(0.13)	0.00(0.00)	0.01(0.07)
Hake, Red	0.02(0.13)	0.03(0.19)	0.00(0.00)	0.04(0.31)	0.14(0.48)	0.04(0.21)	0.02(0.13)	0.04(0.20)	0.10(0.29)	0.06(0.26)	0.02(0.11)	0.05(0.24)
Hake, Silver	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(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)	0.01(0.08)	0.00(0.02)
Hake, White	0.01(0.08)	0.00(0.00)	0.01(0.08)	0.02(0.11)	0.03(0.19)	0.08(0.31)	0.00(0.00)	0.00(0.00)	0.01(0.10)	0.00(0.00)	0.00(0.00)	0.01(0.12)
Herring, Atlantic	0.05(0.33)	0.01(0.12)	0.16(0.95)	0.17(0.68)	0.15(0.82)	0.04(0.26)	0.38(1.87)	0.36(2.54)	0.39(1.88)	0.13(1.13)	0.38(2.32)	0.18(1.09)
Herring, Blueback	0.05(0.19)	0.08(0.50)	0.04(0.22)	0.14(0.64)	0.06(0.39)	0.21(1.20)	0.30(1.48)	0.34(1.29)	0.17(0.78)	0.33(1.40)	0.30(1.81)	0.17(0.84)
Killifish, Striped	3.19(5.08)	1.49(3.05)	1.02(2.67)	1.39(3.15)	2.05(3.77)	2.67(4.44)	2.31(4.85)	2.55(4.66)	2.09(3.90)	2.05(3.34)	2.39(4.02)	2.02(3.83)

Table 3.3-3 (cont.)

Species	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Mean (2011-2020)
Lance, American Sand	0.20(1.10)	0.09(0.43)	0.11(0.48)	0.04(0.42)	0.08(0.46)	0.06(0.35)	0.02(0.25)	0.00(0.00)	0.05(0.29)	0.02(0.23)	0.08(0.55)	0.07(0.44)
Lobster, American	0.00(0.00)	0.01(0.08)	0.01(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(0.08)	0.01(0.08)	0.00(0.04)
Lumpfish	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.02(0.11)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.13)	0.00(0.00)	0.00(0.00)	0.00(0.04)
Menhaden, Atlantic	0.02(0.15)	0.26(1.90)	0.00(0.00)	0.06(0.42)	0.03(0.23)	0.04(0.28)	0.31(1.71)	0.09(0.56)	0.09(0.37)	0.37(1.79)	0.65(2.57)	0.12(0.82)
Mackerel, Atlantic	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.39(0.43)	0.00(0.00)
Mullet, White	0.01(0.08)	0.01(0.08)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.04)
Mummichog	0.66(1.76)	1.09(2.47)	0.44(1.27)	0.53(1.77)	0.86(2.19)	1.23(3.01)	0.85(2.29)	0.58(1.78)	0.73(1.29)	0.80(2.13)	0.95(2.22)	0.76(1.97)
Perch, White	0.02(0.13)	0.02(0.15)	0.03(0.19)	0.35(1.26)	0.01(0.08)	0.02(0.15)	0.20(0.89)	0.04(0.28)	0.24(1.10)	0.03(0.17)	0.03(0.19)	0.09(0.51)
Pipefish, Northern	0.11(0.42)	0.21(0.48)	0.22(0.56)	0.09(0.34)	0.10(0.31)	0.19(0.49)	0.08(0.27)	0.13(0.46)	0.09(0.33)	0.09(0.28)	0.17(0.42)	0.13(0.40)
Puffer, 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)	0.01(0.08)	0.00(0.00)
Pumpkinseed	0.00(0.00)	0.02(0.16)	0.01(0.08)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.06)
Robin, Northern Sea	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)
Seasnail, Atlantic	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.01(0.08)	0.00(0.00)
Shad, American	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.00(0.00)	0.02(0.16)	0.01(0.08)	0.00(0.00)	0.01(0.08)	0.00(0.00)	0.03(0.31)	0.00(0.06)
Silverside, Atlantic	26.38(12.98)	18.67(9.57)	11.20(9.42)	24.77(12.19)	18.87(11.81)	21.78(10.15)	19.21(9.23)	21.17(15.59)	12.94(11.64)	21.70(11.24)	25.38(11.83)	19.12(11.23)
Smelt, Rainbow	0.49(4.45)	0.24(3.31)	0.13(2.35)	0.41(4.33)	0.56(3.51)	0.15(3.60)	0.51(3.10)	0.21(4.00)	0.29(1.26)	0.22(0.94)	0.31(1.19)	0.31(1.38)
Stickleback, Fourspine	0.85(2.06)	0.40(0.94)	0.37(1.13)	0.36(1.49)	0.28(0.79)	0.14(0.52)	0.23(0.76)	0.29(0.89)	0.53(1.44)	0.21(0.67)	0.44(1.14)	0.35(1.06)
Stickleback, Ninespine	0.78(3.09)	0.05(0.25)	0.41(1.94)	0.41(1.48)	0.05(0.28)	0.04(0.21)	0.22(0.92)	0.22(0.91)	0.11(0.36)	0.02(0.11)	0.01(0.08)	0.21(1.00)
Stickleback, Threespine	0.06(0.29)	0.02(0.11)	0.01(0.08)	0.05(0.19)	0.02(0.13)	0.00(0.00)	0.01(0.08)	0.03(0.15)	0.00(0.00)	0.02(0.18)	0.00(0.00)	0.02(0.14)
Tomcod, Atlantic	0.05(0.25)	0.06(0.25)	0.11(0.48)	0.30(0.98)	0.09(0.39)	0.19(0.79)	0.23(0.87)	0.29(1.25)	0.23(0.82)	0.17(0.61)	0.12(0.43)	0.17(0.69)
All species	80.15(6.51)	46.59(6.58)	36.34(6.45)	64.47(7.00)	53.31(6.77)	59.60(6.07)	55.20(7.16)	51.87(11.40)	42.26(6.73)	60.25(5.86)	75.34(7.45)	53.81(6.99)

Table 3.3-4. Geometric mean catch per seine haul, by station and species for all months combined, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Species	Station														
	Little Harbor			Hampton/Seabrook Estuary				Piscataqua River			Little Bay/Great Bay				
	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147
Alewife	0.00	0.00	0.12	0.00	0.00	0.00	0.00	1.56	0.12	1.03	0.84	0.44	0.00	0.62	0.96
Bass, Largemouth	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	0.12	0.12
Bass, Striped	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bluefish	0.00	0.00	0.00	0.00	1.09	0.12	0.00	0.00	0.00	0.12	0.12	0.12	0.00	0.00	0.12
Crab, Green	2.36	1.51	1.85	3.55	4.46	0.59	0.31	15.69	7.62	1.64	1.62	4.58	6.05	0.26	6.12
Crab, Horseshoe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.29	0.59	0.35	0.00	0.00
Crab, Rock	0.00	0.00	0.12	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00
Cunner	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.41
Eel, American	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12
Flounder, Smooth	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.31	0.00	0.38	0.12	0.12	0.51	0.00
Flounder, Windowpane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
Flounder, Winter	0.41	5.00	2.63	0.00	3.82	0.35	0.12	0.35	0.51	0.26	0.26	1.62	0.00	0.74	0.51
Grubby	0.12	1.22	0.35	0.47	0.12	0.12	0.00	2.73	0.12	0.00	0.00	0.20	0.12	0.00	3.82
Hake, Red	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.00	0.00	0.00	0.00	0.00	0.00
Hake, Silver	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Herring, Atlantic	0.00	0.00	0.38	0.00	0.00	0.00	0.00	1.02	2.55	1.53	0.79	0.20	0.00	1.01	0.20
Herring, Blueback	0.00	0.00	0.00	0.00	1.20	0.00	0.00	2.40	0.00	0.26	0.26	0.65	0.12	1.37	0.00
Killifish, Striped	0.00	1.47	0.31	0.91	0.59	0.00	0.00	0.00	9.45	2.73	5.85	4.34	68.18	6.36	11.85
Lance, American Sand	0.12	0.00	0.00	0.00	0.65	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lobster, American	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mackerel, Atlantic	0.00	0.00	0.00	0.00	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Menhaden, Atlantic	0.88	0.38	0.00	0.00	0.00	0.00	0.00	1.84	1.70	7.69	0.55	0.78	0.26	1.70	0.12
Mummichog	0.00	0.62	0.00	0.12	0.12	0.00	0.00	0.00	2.81	0.78	1.86	0.44	28.20	1.68	3.92
Perch, White	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.35	0.00
Pipefish, Northern	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.12	0.12	0.12	0.00	0.82	0.51	0.00	1.49
Puffer, Northern	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Robin, Northern Sea	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Seasnail, Atlantic	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shad, American	0.00	0.00	0.00	0.00	0.53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Silverside, Atlantic	12.50	13.21	13.30	7.96	8.60	0.91	1.85	339.26	535.19	17.75	198.46	116.82	22.20	17.68	45.72
Smelt, Rainbow	0.00	0.26	0.00	0.00	0.20	0.00	0.00	0.12	3.09	0.12	2.42	0.59	0.12	0.00	0.12
Stickleback, Fourspine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.12	0.98	0.94	0.00	1.07	1.94	7.31
Stickleback, Ninespine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.00
Tomcod, Atlantic	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.12	0.00	0.47	0.00	0.12	0.00	0.00	1.77
All species	26.13	51.94	45.34	23.94	37.03	2.96	3.18	708.42	1354.33	160.53	357.21	217.78	171.01	69.20	112.58

Table 3.3-5. Geometric Mean catch per seine haul, by species and month, for all stations combined, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Species	June	July	August	September	October	November
Alewife	0.05	1.16	1.20	0.00	0.00	0.00
Bass, Largemouth	0.00	0.18	0.00	0.00	0.00	0.00
Bass, Striped	0.00	0.00	0.00	0.05	0.00	0.00
Bluefish	0.00	0.10	0.18	0.25	0.05	0.00
Crab, Green	5.53	4.16	4.46	1.55	2.14	0.94
Crab, Horseshoe	0.18	0.15	0.10	0.08	0.18	0.00
Crab, Rock	0.00	0.00	0.00	0.19	0.05	0.05
Cunner	0.10	0.05	0.00	0.00	0.00	0.05
Eel, American	0.00	0.00	0.00	0.05	0.00	0.00
Flounder, Smooth	0.05	0.50	0.08	0.05	0.00	0.00
Flounder, Windowpane	0.05	0.00	0.00	0.00	0.00	0.00
Flounder, Winter	0.49	1.87	1.07	0.94	0.15	0.53
Grubby	0.52	0.75	0.33	0.17	0.41	0.34
Hake, Red	0.00	0.00	0.00	0.05	0.05	0.00
Hake, Silver	0.00	0.00	0.00	0.00	0.00	0.05
Herring, Atlantic	2.18	0.85	0.05	0.00	0.00	0.14
Herring, Blueback	0.11	0.26	1.41	0.37	0.05	0.00
Killifish, Striped	1.35	0.86	4.81	4.23	2.27	2.50
Lance, American Sand	0.00	0.05	0.05	0.00	0.46	0.00
Lobster, American	0.00	0.05	0.00	0.00	0.00	0.00
Mackerel, Atlantic	0.00	0.00	0.00	0.25	0.00	0.00
Menhaden, Atlantic	0.00	0.00	0.00	1.00	3.30	1.34
Mummichog	1.36	0.75	1.15	0.91	0.83	0.76
Perch, White	0.00	0.08	0.08	0.05	0.00	0.00
Pipefish, Northern	0.26	0.27	0.10	0.20	0.05	0.18
Puffer, Northern	0.00	0.00	0.05	0.00	0.00	0.00
Robin, Northern Sea	0.00	0.00	0.00	0.05	0.00	0.00
Seasnail, Atlantic	0.00	0.05	0.00	0.00	0.00	0.00
Shad, American	0.00	0.00	0.19	0.00	0.00	0.00
Silverside, Atlantic	1.68	5.64	57.61	93.36	46.87	70.49
Smelt, Rainbow	0.00	0.28	0.00	1.12	0.65	0.10
Stickleback, Fourspine	0.37	0.10	0.32	0.54	0.69	0.76
Stickleback, Ninespine	0.05	0.00	0.00	0.00	0.00	0.00
Tomcod, Atlantic	0.22	0.30	0.08	0.08	0.00	0.10
All species	30.51	30.41	132.09	134.73	109.07	99.61

Table 3.3-6. Arithmetic mean, minimum, and maximum total length (cm), as well as sample size (N), for all fish species measured, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Species	Total length (cm)			
	AM	Minimum	Maximum	N
Alewife	6.53	4.00	10.20	99
Bass, Largemouth	4.58	3.20	5.30	4
Bass, Striped	43.20	43.20	43.20	1
Bluefish	8.27	4.40	13.50	22
Cunner	6.15	4.00	8.70	4
Eel, American	18.10	18.10	18.10	1
Flounder, Smooth	4.51	3.00	7.00	18
Flounder, Windowpane	3.20	3.20	3.20	1
Flounder, Winter	5.63	2.60	61.00	173
Grubby	5.08	2.60	9.60	75
Hake, Red	3.45	2.80	4.10	2
Hake, Silver	7.00	7.00	7.00	1
Herring, Atlantic	6.86	4.80	12.40	136
Herring, Blueback	8.56	3.90	26.40	96
Killifish, Striped	5.36	2.80	12.00	535
Lance, American Sand	10.43	7.50	11.80	36
Mackerel, Atlantic	14.18	12.30	19.20	25
Menhaden, Atlantic	6.43	3.40	11.80	178
Mummichog	5.38	3.70	9.20	281
Perch, White	7.76	5.60	12.30	5
Pipefish, Northern	17.68	12.60	23.20	23
Puffer, Northern	2.70	2.70	2.70	1
Robin, Northern Sea	3.80	3.80	3.80	1
Seasnail, Atlantic	3.40	3.40	3.40	1
Shad, American	10.12	9.20	11.00	12
Silverside, Atlantic	8.25	3.10	12.90	1,364
Smelt, Rainbow	6.26	4.20	11.10	98
Stickleback, Fourspine	3.90	2.90	5.30	110
Stickleback, Ninespine	4.00	4.00	4.00	1
Tomcod, Atlantic	9.88	6.80	22.10	21
			Total	3,325

Table 3.3-7. Mean, minimum, and maximum water surface temperature and salinity, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2011–2021.

Year	Temperature (°C)			Salinity (ppt)		
	Mean	Min	Max	Mean	Min	Max
2011	17.2	5.7	28.2	23.7	1.6	30.2
2012	17.1	6.2	28.2	26.1	4.7	31.1
2013	16.2	3.5	27.9	25.1	2.3	32.1
2014	16.8	7.2	28.1	26.9	6.2	34.4
2015	16.8	10.8	26.2	27.8	9.2	31.9
2016	17.4	8.6	30.6	29.2	11.7	32.3
2017*	16.0	5.6	25.6	28.0	10.4	31.6
2018	17.5	2.4	27.6	24.6	0.2	31.4
2019*	17.2	5.8	30.8	26.6	7.1	31.8
2020	17.2	8.6	27.7	28.4	14.5	31.5
2021*	17.9	8.2	26.1	22.8	0.2	32.9
Mean	17.0			26.3		

*Data for some samples not collected due to instrument failure

Table 3.3-8. Water surface temperature (°C) by month and station, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Month	Station #															Monthly mean
	Little Harbor			Hampton/Seabrook Estuary				Piscataqua River			Little Bay/Great Bay					
	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147	
June	13.9	14.6	14.9	15.2	16.4	18.0	17.2	16.6	16.4	21.6	18.3	19.1	20.6	23.1	20.7	17.8
July	19.3	19.6	20.5	19.4	20.1	19.9	20.0	19.5	19.9	21.3	20.1	20.5	20.5	20.0	20.5	20.1
August	19.5	20.1	20.6	21.1	22.0	23.5	22.4	22.8	22.3	26.1	22.8	23.4	25.9	25.3	25.7	22.7
September	13.8	16.0	16.3	18.0	19.0	19.9	19.4	18.2	18.4	21.8	20.1	22.5	23.2	21.1	22.6	19.4
October	12.2	11.6	10.7	17.0	10.8	10.9	17.6	17.7	17.7	18.0	17.6	18.0	19.3	19.1	18.5	15.8
November	11.8	*	*	11.1	10.9	10.6	10.5	11.3	10.9	8.2	10.5	10.6	9.2	9.4	9.5	10.3
Site mean	15.1	16.4	16.6	17.0	15.4	15.9	17.9	17.7	17.6	19.5	18.2	19.0	19.8	19.7	19.6	
Area mean	16.0			17.1				18.3			19.3					

*Data for some samples not collected due to instrument failure

Table 3.3-9. Salinity (ppt) by month and station, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

Month	Station #															Monthly mean
	Little Harbor			Hampton/Seabrook Estuary				Piscataqua River			Little Bay/Great Bay					
	5	7	9	23	25	29	33	30	35	39	54	72	93	107	147	
June	30.3	30.7	30.5	30.9	30.6	29.6	30.6	29.9	28.8	19.9	27.7	27.9	24.2	8.5	26.3	27.1
July	27.5	26.8	25.6	29.1	27.5	25.7	27.2	19.7	18.4	4.8	18.9	17.3	13.7	0.2	12.3	19.6
August	28.7	28.6	28.6	29.9	29.7	29.4	30.0	*	*	*	*	*	*	*	*	29.2
September	32.5	30.0	30.5	31.1	30.6	29.3	30.4	27.3	24.5	8.5	22.0	21.5	18.9	3.1	18.2	23.9
October	32.9	31.5	31.5	32.5	30.8	31.1	32.2	32.0	31.4	16.5	29.9	29.7	27.6	16.8	28.3	29.0
November	30.9	*	*	32.1	32.0	30.5	30.7	25.9	24.3	6.3	22.5	22.3	17.8	9.5	18.7	23.3
Site mean	30.5	29.5	29.3	30.9	30.3	29.2	30.2	27.0	25.5	11.2	24.2	23.7	20.4	7.6	20.8	
Area mean	29.8			30.1				21.2			19.4					

*Data for some samples not collected due to instrument failure

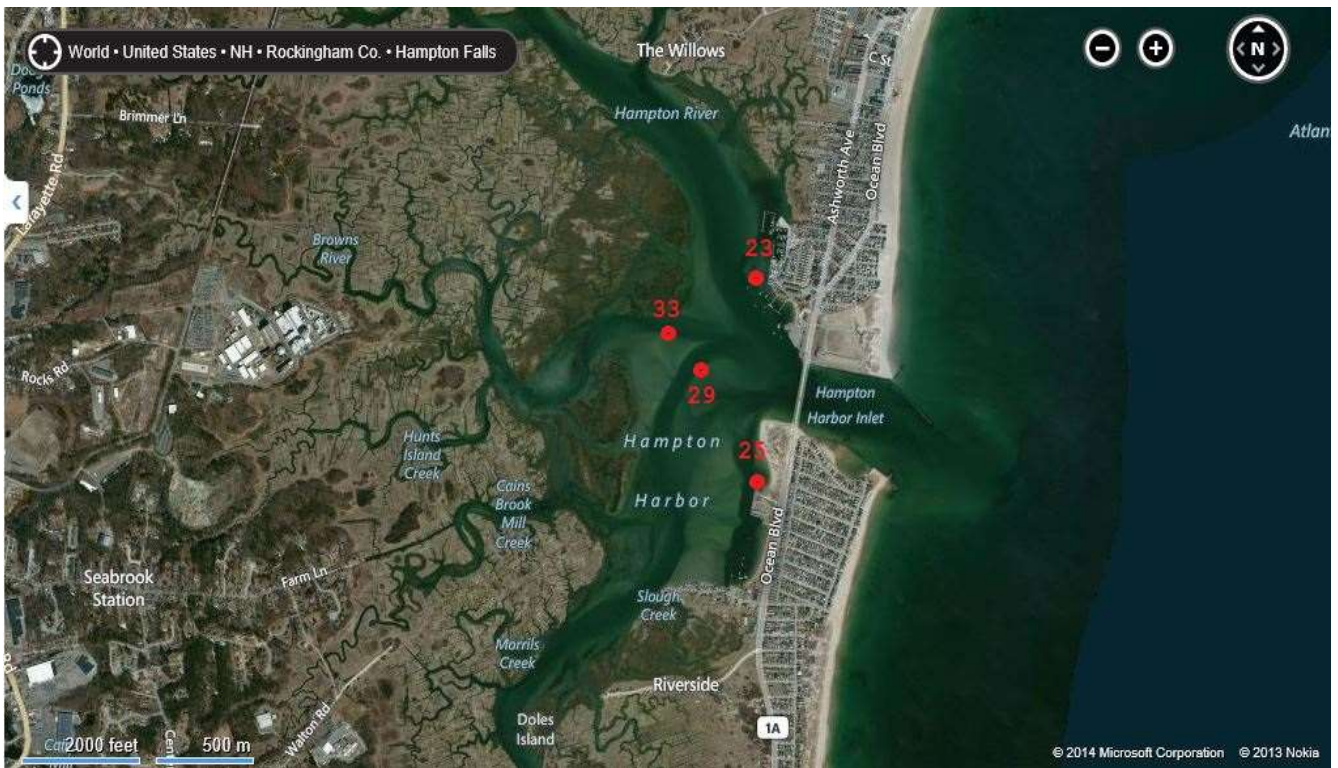


Figure 3.3-1. Sampling stations in Hampton/Seabrook Estuary, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.



Figure 3.3-2. Sampling stations in Little Harbor, from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

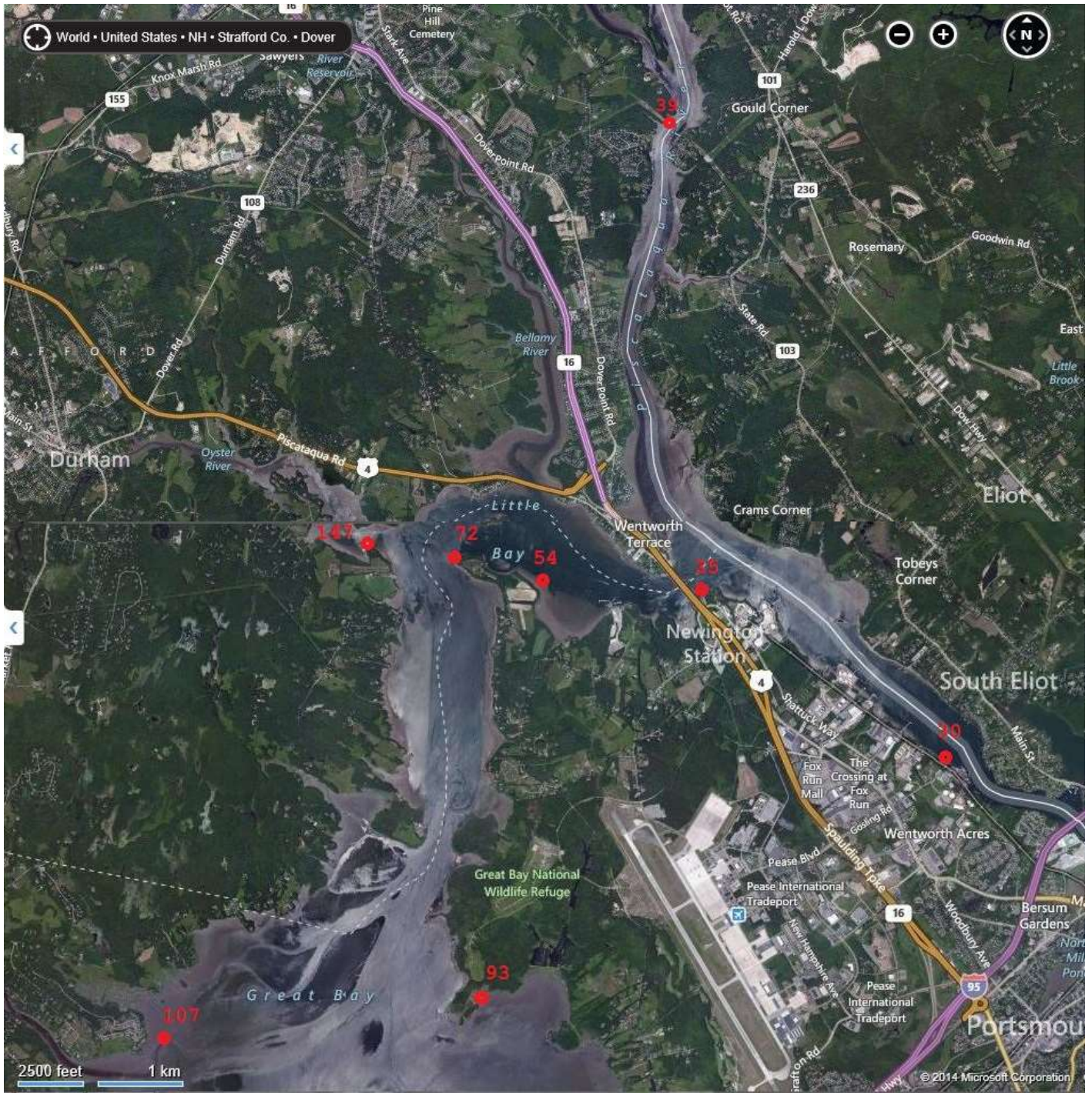


Figure 3.3-3. Sampling stations in the Piscataqua River and Little Bay/Great Bay area from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.

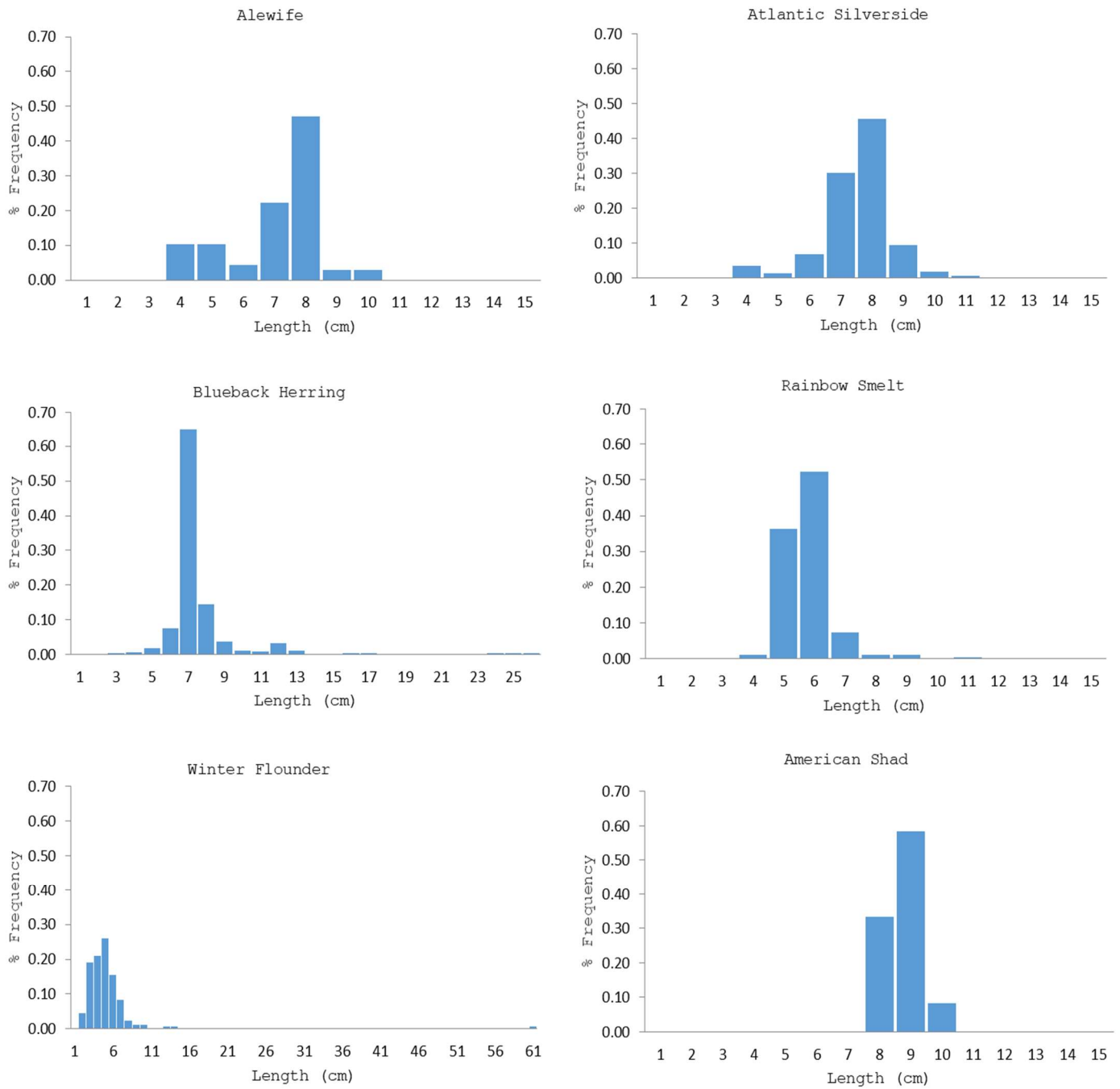


Figure 3.3-4. Weighted length frequencies of six finfish species of special interest captured from a juvenile finfish seine survey conducted in New Hampshire estuaries, 2021.