United States Department of Interior
Fish and Wildlife Service
Region 5
Wildlife and Sport Fish Restoration Program

2024 Annual Performance Report

State:	Massachusetts
Agency:	Division of Marine Fisheries
Project Title:	Massachusetts Fishery Resource Assessment
	FA Grant Agreement: F-56-R
Segment Number:	30
Grant ID No.	F24AF00876
Period Covered:	January 1, 2024 – December 31, 2024
Prepared By:	Steve Wilcox, Aquatic Biologist III Mark Szymanski, Aquatic Biologist II Vincent Manfredi, Aquatic Biologist II (January 1 – January 13) Jacob Wilson, Aquatic Biologist II (April 21 – December 31) Gary Nelson, Environmental Analyst IV
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Date Submitted:	1/31/2025

Sport Fish Program
Massachusetts Fishery Resource Assessment:
F-56-R-30 2024 Performance Report

List of Active Jobs:

Job No. 1: Fishery Resource Assessment, Coastal Massachusetts
The Massachusetts Division of Marine Fisheries Resource Assessment Project completed the forty-sixth annual spring and fall bottom trawl surveys of Massachusetts territorial waters in 2024. Detailed reports of the activities of each cruise follow.

Job No. 2: Winter Flounder Year-Class Strength
The Massachusetts Division of Marine Fisheries Resource Assessment Project completed the forty-nineth annual seine survey of Nantucket Sound estuaries on the south shore of Cape Cod to assess southern New England stock winter flounder YOY cohort abundance. A report of the 2024 seine survey follows.

Appendix A: Indices of biomass, abundance, and recruitment for select species.

Appendix B: Trends in observed bottom temperatures - Massachusetts bottom trawl survey, 1978 - 2024.

Appendix C: Corrections to the trawl survey database in 2024.

CRUISE RESULTS

R/V GLORIA MICHELLE

2024 Massachusetts Inshore Spring Bottom Trawl Survey Cruise No. 202491

CRUISE PERIOD AND AREA

From May 6 through May 23, 2024, the Massachusetts Division of Marine Fisheries conducted its 46th spring bottom trawl survey. The survey extended from New Hampshire to Rhode Island boundaries seaward to three nautical miles including Cape Cod Bay and Nantucket Sound.

OBJECTIVES

Cruise objectives were 1) to determine the spring distribution, relative abundance, and size composition of fish species; and 2) to collect biological samples. Requested special collections were also undertaken.

METHODS

The study area is stratified based on five bio-geographic regions and six depth zones (Figure 1). Trawl sites are allocated in proportion to stratum area and randomly chosen in advance within each sampling stratum. Randomly chosen stations in locations known to be untowable due to hard bottom are reassigned. Sampling intensity is approximately 1 station per 19 square nautical miles. A minimum of two stations are assigned to each stratum.

A standard tow of 20-minute duration at 2.5 knots was attempted at each station during daylight hours with a 3/4 size North Atlantic type two seam otter trawl (11.9 m headrope/15.5 m footrope) rigged with a 7.6 cm rubber disc sweep; 19.2 m, 9.5 mm chain bottom legs; 18.3 m, 9.5 mm wire top legs; and 1.8 X 1.0 m, 147 kg wooden trawl doors. The codend contains a 6.4 mm knotless liner to retain small fish. Prior to setting the net at each station, NOAA Corps officers surveyed the site by visually scanning for buoys marking fixed gear as well as determining the suitability of the bottom for towing the net based on the sounder image. Whenever necessary, sites were relocated due to untowable bottom or concentrations of fixed gear. Abbreviated tows of 13-19 minute duration were accepted as valid and expanded to the 20 minute standard.

Standard bottom trawl survey techniques were used when processing the catch. The total weight and length-frequency of each species were recorded directly into Fisheries Scientific Computer System (FSCS) data tables. From 2010 through 2018, FSCS version 1.6 was utilized for electronic data collection. Starting in 2019, we upgraded to FSCS

version 2.0. Collections of age and growth material, and biological observations were undertaken during the measuring operation. Specimens were also saved to fulfill requests. Bottom temperatures were continuously recorded with an Onset Water Temp Pro v2 attached to the doors.

Twenty-nine MDMF employees participated in the survey as part of the scientific party along with two biologists from NOAA, one biologist from University of Massachusetts Amherst, one biologist from University of Massachusetts Dartmouth, one biologist from Massachusetts Department of Environmental Protection, one biologist from Gloucester Marine Genomics Institute, and one biologist from Responsible Offshore Science Alliance (Table 1).

CRUISE SUMMARY

There were 108 stations attempted in 18 sampling days (Figures 1 and 2, Table 2). 103 completed stations were considered acceptable for assessment of all species, SHG <=136 (Table 3) and no substandard tows were processed (Table 4). Five attempted tows were aborted during the survey. Aborts were caused by hard bottom and hangs (Table 5, Figure 3). All planned stations were completed.

The geographic distribution, relative abundance, relative biomass, and representative length frequencies of all fish and invertebrate species were documented (Tables 6a and 6b). Several records were set on the 2024 spring survey at individual stations. The largest tow for Atlantic Menhaden abundance (22 individuals) and biomass (6.07 kg) was observed at station 65 east of Great Point. The largest tow for Atlantic Sturgeon (7 individuals) and biomass (228.164 kg) was observed just east of the Merrimack River.

There were several other notable species trends observed during this survey. Atlantic Cod set a record low for biomass. Little Skate, Fourspot Flounder, and Sea Raven set new records for lowest abundance and biomass. This year saw a record low in biomass for Longfin Squid following a record high biomass last year. Yellowtail Flounder were observed at the lowest percentage of stations in the timeseries history.

Except for Longfin Squid, survey wide species trends followed those of recent years. Scup dominated the catches south of Cape Cod and accounted for 44% of all catch by number and 52% of all biomass throughout the survey. Northern Searobins were the second most common species tallying 22% of all catch by number and biomass, though almost all of them were from one stratum 18 tow south of Nantucket. North of Cape Cod had moderate catches of Winter Flounder, Longhorn Sculpin, Yellowtail Flounder, Silver Hake, Red Hake, Atlantic Herring, and Alewives.

Additional sampling goals were achieved (Table 7). To aid cooperative fisheries assessments over 1,300 otolith samples and over 1,500 sex and maturity observations were taken from Atlantic Cod, Haddock, Summer Flounder, Yellowtail Flounder, Winter Flounder, Black Sea Bass, Scup, Tautog, and American Lobster. Additional samples and catch information were collected to assist ongoing research by fisheries scientists from

UMass Amherst, Gloucester Marine Genomics Institute, Center for Coastal Studies, NOAA, Natural History Museum of LA County, University of New Hampshire, Woods Hole Science Aquarium, and MDMF.

For further information on this survey or others in the time series, contact Steve Wilcox at (508) 742-9731.

Table 1. Staffing list for spring cruise 202491.

Scientific Party

Name	Affiliation	Num. Days
Steve Wilcox	MADMF	10
Brendan Reilly	MADMF	9
Mark Szymanski	MADMF	8
Jack Wilson	MADMF	8
Elise Koob	MADMF	4
Steve Voss	MADMF	4
Amanda Meli	MADMF	4
Michele Heller	MADMF	3
Alex Boeri	MADMF	3
Mike Blanco	MADMF	3
Sandy Sutherland	NOAA/NEFSC-WH	3
Emma Gallagher	MADMF	3
Malik Neron	MADMF	3
Katrina Zarella-Smith	UMASS Amherst	2
Tara Dolan	MADMF	2
Dylan Comb	GMGI	2
Dave Chosid	MADMF	2
Laura Tomlinson	MADMF	2
Jacob Dorothy	MADMF	2
Chrissy Petitpas	MADMF	2
Stephanie Berkman	MADMF	2
Cathy Barba	MADMF	2
Adrianna Bourget	UMASS Dartmouth	1
Vinny Manfredi	MADEP	1
Mike Pol	ROSA	1
Kiera Lawlor	MADMF	1
Sasha Milsky	MADMF	1
John Logan	MADMF	1
Derek Perry	MADMF	1
Erin Burke	MADMF	1
Kevin Creighton	MADMF	1
Eric Robillard	NOAA/NEFSC-WH	1
Scott Elzey	MADMF	1
Brad Schondelmeier	MADMF	1
Forest Schenck	MADMF	1
Jillian Swinford	MADMF	1
Total		97

R/V Gloria Michelle Crew

Name	Affiliation	Num. Days
Officers		
Trevor Grams	NOAA OIC	18
Forrest Foxen	NOAA JOIC	18
Deck Crew		
Lizie Alonzo	Contract Fisherman	18
Chris Shepard	Contract Fisherman	18

Table 2. Station information for the spring cruise 202491.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom Temp °C
1	26	5/6/2024	6:25	16	41° 45.37	-70° 20.90	291	0.84	6.8
2	25	5/6/2024	7:51	10	41° 44.70	-70° 22.69	293	0.84	7.9
3	26	5/6/2024	9:33	21	41° 47.56	-70° 15.21	254	0.85	6.8
4	25	5/6/2024	11:10	10	41° 47.21	-70° 07.68	249	0.82	9.5
5	26	5/6/2024	12:37	16	41° 50.27	-70° 11.87	231	0.31	7.7
6	26	5/6/2024	13:23	17	41° 50.82	-70° 11.72	196	0.81	7.6
7	27	5/6/2024	14:44	23	41° 54.68	-70° 09.88	228	0.84	6.6
8	27	5/6/2024	17:04	24	41° 49.72	-70° 22.81	229	0.85	6.2
9	28	5/7/2024	6:55	31	41° 52.05	-70° 20.84	323	0.85	5.9
10	29	5/7/2024	8:38	41	41° 56.19	-70° 20.80	15	0.82	5.5
11	28	5/7/2024	10:29	38	41° 54.31	-70° 23.27	336	0.86	5.5
12	27	5/7/2024	12:07	31	41° 55.64	-70° 29.91	169	0.53	5.7
13	25	5/7/2024	13:36	10	41° 57.48	-70° 36.36	32	0.86	7
14	28	5/7/2024	15:01	36	42° 00.24	-70° 31.69	158	0.84	5.5
15	27	5/7/2024	17:09	26	41° 50.21	-70° 25.46	38	0.84	6.2
16	29	5/8/2024	7:29	43	42° 04.17	-70° 31.38	153	0.83	5.4
17	29	5/8/2024	9:18	47	42° 04.19	-70° 30.96	346	0.83	5.4
18	26	5/8/2024	11:41	19	42° 08.95	-70° 40.88	141	0.53	6.5
19	32	5/8/2024	14:13	18	42° 16.86	-70° 48.98	88	0.22	
20	33	5/8/2024	15:39	23	42° 18.75	-70° 48.12	250	0.56	6
21	32	5/8/2024	17:27	13	42° 17.69	-70° 51.34	86	0.55	8.1
22	32	5/9/2024	6:03	19	42° 18.26	-70° 48.94	278	0.00	
23	32	5/9/2024	6:26	19	42° 18.24	-70° 49.03	275	0.85	6.8
24	33	5/9/2024	8:20	23	42° 23.50	-70° 54.67	81	0.85	5.9
25	31	5/9/2024	9:32	9	42° 24.84	-70° 57.40	209	0.07	
26	31	5/9/2024	9:55	9	42° 24.68	-70° 57.46	208	0.64	9.3
27	34	5/9/2024	11:39	31	42° 26.36	-70° 52.10	104	0.57	5.4
28	34	5/9/2024	12:43	38	42° 26.51	-70° 50.38	43	0.60	5.3
29	36	5/9/2024	14:47	75	42° 28.37	-70° 38.78	196	0.84	5.2
30	35	5/9/2024	16:24	52	42° 32.59	-70° 39.70	224	0.84	5.2
31	35	5/10/2024	7:09	39	42° 42.32	-70° 36.43	132	0.83	5.2
32	33	5/10/2024	9:36	27	42° 49.40	-70° 46.47	19	0.83	6
33	32	5/10/2024	10:38	17	42° 49.49	-70° 47.67	2	0.73	9.4
34	31	5/10/2024	11:50	10	42° 49.72	-70° 48.33	11	0.86	10.1
35	31	5/10/2024	13:37	10	42° 47.07	-70° 47.82	186	0.76	9.9
36	34	5/10/2024	15:20	31	42° 42.98	-70° 41.80	109	0.69	5.5
37	36	5/11/2024	6:44	66	42° 36.19	-70° 32.44	83	0.52	5.2
38	34	5/11/2024	8:18	33	42° 41.52	-70° 35.24	329	0.82	5.6
39	33	5/11/2024	9:35	23	42° 41.84	-70° 40.72	105	0.83	6.4
40	35	5/11/2024	10:52	40	42° 42.53	-70° 38.08	107	0.83	5.3
41	35	5/11/2024	12:48	53	42° 34.24	-70° 36.56	247	0.79	5.3
42	35	5/11/2024	14:42	57	42° 30.12	-70° 42.53	75	0.85	5.2

Table 2 continued.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom Temp °C
43	30	5/12/2024	9:33	60	42° 06.19	-70° 24.88	340	0.84	5.2
44	30	5/12/2024	10:48	59	42° 04.68	-70° 21.93	317	0.83	5.4
45	29	5/12/2024	12:28	47	41° 59.75	-70° 17.41	353	0.58	6
46	29	5/12/2024	13:31	48	42° 00.74	-70° 14.57	329	0.86	6.1
47	28	5/12/2024	14:53	34	42° 00.26	-70° 10.44	217	0.87	6.3
48	28	5/12/2024	15:59	35	41° 58.11	-70° 12.09	350	0.77	6.3
49	25	5/13/2024	8:02	8	41° 56.47	-70° 05.84	215	0.87	9.6
50	27	5/13/2024	9:41	26	41° 59.87	-70° 09.22	174	0.52	6.6
51	26	5/13/2024	10:41	17	42° 00.72	-70° 06.87	192	0.88	7.5
52	21	5/13/2024	14:12	45	42° 05.61	-70° 03.05	146	0.85	6.4
53	21	5/13/2024	15:25	48	42° 04.78	-70° 01.33	162	0.86	6.1
54	20	5/13/2024	16:30	37	42° 03.81	-70° 01.52	163	0.85	6.6
55	17	5/13/2024	17:58	9	41° 58.08	-69° 59.41	341	0.84	9.6
56	18	5/14/2024	6:14	18	41° 51.91	-69° 56.31	4	0.84	7.9
57	20	5/14/2024	7:26	35	41° 49.44	-69° 53.30	6	0.84	6.5
58	19	5/14/2024	8:37	22	41° 50.00	-69° 54.91	189	0.83	7.2
59	18	5/14/2024	9:33	16	41° 49.55	-69° 55.36	183	0.55	7.5
60	17	5/14/2024	10:39	9	41° 47.47	-69° 55.47	202	0.85	8.9
61	16	5/14/2024	14:41	14	41° 28.79	-70° 01.74	264	0.83	10.6
62	18	5/14/2024	16:01	11	41° 25.51	-70° 00.35	283	0.90	10.8
63	15	5/15/2024	5:58	10	41° 20.49	-70° 02.26	234	0.82	13
64	16	5/15/2024	7:30	13	41° 23.34	-70° 06.25	63	0.87	11.3
65	17	5/15/2024	9:23	9	41° 23.64	-69° 59.14	65	0.89	10.1
66	17	5/15/2024	10:40	9	41° 22.76	-69° 59.17	193	0.84	10.5
67	15	5/15/2024	13:11	8	41° 29.70	-70° 07.44	315	0.70	11.7
68	16	5/15/2024	14:01	11	41° 28.63	-70° 08.81	336	0.86	11.7
69	16	5/15/2024	15:22	14	41° 28.71	-70° 13.34	306	0.84	12.5
70	16	5/15/2024	16:37	14	41° 26.70	-70° 11.50	336	0.86	12.4
71	12	5/16/2024	5:48	15	41° 32.40	-70° 45.32	79	0.17	
72	12	5/17/2024	5:59	15	41° 35.00	-70° 41.38	216	0.89	12.8
73	11	5/17/2024	7:39	10	41° 35.49	-70° 48.36	360	0.88	13.5
74	11	5/17/2024	9:37	8	41° 34.20	-70° 54.05	356	0.88	12.8
75	12	5/17/2024	11:23	18	41° 30.61	-70° 51.28	85	0.87	11.8
76	12	5/17/2024	13:38	18	41° 28.41	-71° 05.75	101	0.56	11.5
77	12	5/17/2024	15:58	15	41° 28.90	-70° 49.06	44	0.85	14.2
78	12	5/17/2024	17:03	15	41° 32.37	-70° 45.36	65	0.84	11.9
79	13	5/18/2024	7:26	21	41° 23.57	-71° 01.82	59	0.85	11.1
80	14	5/18/2024	9:12	31	41° 20.97	-70° 56.29	52	0.84	10.2
81	14	5/18/2024	10:40	32	41° 18.38	-70° 52.00	356	0.85	9.9
82	12	5/18/2024	12:02	17	41° 18.98	-70° 49.74	167	0.83	10.7
83	13	5/18/2024	13:30	25	41° 15.43	-70° 46.09	28	0.86	10.5
84	13	5/18/2024	15:39	21	41° 24.71	-70° 48.43	242	0.86	11.8

Table 2 continued.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom Temp °C
85	13	5/18/2024	17:13	21	41° 28.16	-70° 42.70	240	0.57	13.1
86	11	5/19/2024	8:19	10	41° 17.26	-70° 24.33	56	0.82	11.3
87	18	5/19/2024	10:33	17	41° 15.80	-70° 15.98	115	0.84	11
88	17	5/19/2024	11:52	11	41° 15.42	-70° 11.30	134	0.83	11.2
89	18	5/19/2024	13:29	16	41° 13.55	-70° 05.42	54	0.54	11.4
90	15	5/20/2024	8:00	8	41° 33.98	-70° 02.79	332	0.65	11.7
91	15	5/20/2024	8:51	8	41° 36.11	-70° 03.07	197	0.84	11.9
92	15	5/20/2024	9:56	9	41° 37.69	-70° 05.48	185	0.55	11.9
93	16	5/20/2024	11:07	13	41° 33.95	-70° 09.71	92	0.87	11.2
94	16	5/20/2024	12:17	10	41° 34.15	-70° 12.74	102	0.85	11.7
95	15	5/20/2024	13:22	9	41° 32.33	-70° 12.67	87	0.86	10.8
96	16	5/20/2024	15:17	12	41° 25.59	-70° 08.53	286	0.81	9.9
97	16	5/20/2024	16:41	14	41° 22.99	-70° 09.10	234	0.85	11.8
98	19	5/21/2024	10:26	20	41° 13.69	-70° 13.67	310	0.86	10.7
99	12	5/21/2024	12:53	16	41° 18.83	-70° 31.46	104	0.70	11.9
100	11	5/21/2024	13:53	9	41° 20.58	-70° 32.27	99	0.85	12.8
101	13	5/21/2024	15:45	24	41° 18.08	-70° 39.62	265	0.55	11.6
102	15	5/22/2024	7:16	8	41° 34.07	-70° 16.72	299	0.54	13.5
103	15	5/22/2024	8:09	10	41° 32.36	-70° 15.73	292	0.53	13.3
104	15	5/22/2024	9:06	10	41° 31.96	-70° 17.10	295	0.53	13.9
105	15	5/22/2024	11:34	8	41° 31.73	-70° 20.84	137	0.56	14.1
106	16	5/22/2024	13:18	14	41° 26.18	-70° 16.26	100	0.83	13.3
107	16	5/22/2024	15:18	16	41° 28.04	-70° 28.52	113	0.83	13.8
108	11	5/23/2024	9:22	9	41° 21.89	-70° 45.92	224	0.54	12.4

Table 3. Sampling effort assigned and accomplished by stratum, cruise 202491.

Stratum	Region	Assigned Stations	Number of Stations Completed			Aborted Tows
			All Accepted	Sub-Standard	Standard	
11	1	5	5		5	
12	1	7	7		7	1
13	1	5	5		5	
14	1	2	2		2	
15	2	10	10		10	
16	2	11	11		11	
17	3	5	5		5	
18	3	5	5		5	
19	3	2	2		2	
20	3	2	2		2	
21	3	2	2		2	
25	4	4	4		4	
26	4	5	5		5	1
27	4	5	5		5	
28	4	5	5		5	
29	4	5	5		5	
30	4	2	2		2	
31	5	3	3		3	1
32	5	3	3		3	2
33	5	4	4		4	
34	5	4	4		4	
35	5	5	5		5	
36	5	2	2		2	
TOTALS		103	103	0	103	5

Note:
Standard Tows. SHG <=136. Recommended for use in all indices of abundance.
Sub-Standard Tows. SHG 141 - 166. Not recommended for use in indices other than spiny dogfish.
Aborted Tows. Catch data not recommended for use.

Table 4. Sub-standard tows (SHG 141-166) for cruise 202491. Not advised for indices of abundacnce other than Spiny Dogfish.

Station	Stratum	SHG	Location	Description
No sub-standard tows on cruise 202491				

Table 5. Aborted tows during the spring survey, cruise 202491.

Station	Stratum	SHG	Location	Description
5	26	171	Eastern Cape Cod Bay	slowed down and hauled early
19	32	171	NW of Cohasset harbor	slowed and hung down but no net damage 5mins
22	32	171	Massachusetts Bay	saw sign on sounder and hauled early
25	31	171	Massachusetts Bay	slowed down and hauled early
71	12	171	Buzzards Bay-Woods Hole	slowed down but no net damage 5mins

Table 6a. Total catch by number and weight from 2024 spring survey sorted by number.

Species Code	Common Name	Count	Weight (kg)
143	SCUP	40,325	8,185.825
171	NORTHERN SEAROBIN	20,704	3,472.302
72	SILVER HAKE	4,901	460.520
163	LONGHORN SCULPIN	4,701	767.495
32	ATLANTIC HERRING	4,175	17.943
106	WINTER FLOUNDER	3,217	475.180
105	YELLOWTAIL FLOUNDER	2,035	414.796
73	ATLANTIC COD	1,856	8.890
77	RED HAKE	1,762	189.593
503	LONGFIN SQUID	1,481	24.207
33	ALEWIFE	1,198	65.656
102	AMERICAN PLAICE	724	98.229
131	BUTTERFISH	681	31.472
141	BLACK SEA BASS	622	124.855
181	NORTHERN SAND LANCE	521	4.442
108	WINDOWPANE	467	81.294
317	SPIDER CRAB UNCL	377	53.240
193	OCEAN POUT	375	112.824
301	AMERICAN LOBSTER	339	125.431
26	LITTLE SKATE	319	169.737
313	ATLANTIC ROCK CRAB	280	40.271
103	SUMMER FLOUNDER	261	102.542
78	SPOTTED HAKE	198	12.343
177	TAUTOG	157	117.182
34	BLUEBACK HERRING	155	4.527
23	WINTER SKATE	117	101.352
35	AMERICAN SHAD	97	4.593
401	SEA SCALLOP	57	3.256
36	ATLANTIC MENHADEN	54	13.269
172	STRIPED SEAROBIN	51	16.566
43	BAY ANCHOVY	49	0.107
74	HADDOCK	40	23.532
322	LADY CRAB	39	3.755
104	FOURSPOT FLOUNDER	38	7.731
117	SMALLMOUTH FLOUNDER	30	0.607
343	BLUE MUSSEL	24	0.918
318	HORSESHOE CRAB	23	27.229
75	POLLOCK	23	0.077
348	NORTHERN MOONSNAIL	19	2.660
44	STRIPED ANCHOVY	16	0.087
121	ATLANTIC MACKEREL	11	1.317
164	SEA RAVEN	11	7.160
312	JONAH CRAB	10	2.563

Figure 6a continued.

Species Code	Common Name	Count	Weight (kg)
15	SPINY DOGFISH	9	26.820
13	SMOOTH DOGFISH	8	28.210
380	ATLANTIC STURGEON	7	228.164
139	STRIPED BASS	7	17.666
176	CUNNER	7	0.570
197	GOOSEFISH	7	1.868
180	ROCK GUNNEL	6	0.038
45	RAINBOW SMELT	6	0.074
323	MANTIS SHRIMP UNCL	6	0.349
336	CHANNELED WHELK	5	0.813
314	BLUE CRAB	4	0.598
182	SNAKEBLENNY	3	0.183
337	KNOBBED WHELK	3	0.283
155	ACADIAN REDFISH	3	0.610
116	NORTHERN PIPEFISH	2	0.004
146	NORTHERN KINGFISH	2	0.593
24	CLEARNOSE SKATE	2	4.440
118	HOGCHOKER	1	0.229
403	ATLANTIC SURFCLAM	1	0.104
149	SPOT	1	0.188
165	ALLIGATORFISH	1	0.019
166	GRUBBY	1	0.015
76	WHITE HAKE	1	0.135
Totals		92,633	15,689.548

Table 6b. Total catch by number and weight from 2024 spring survey sorted by weight.

Species Code	Common Name	Count	Weight (kg)
143	SCUP	40,325	8,185.825
171	NORTHERN SEAROBIN	20,704	3,472.302
163	LONGHORN SCULPIN	4,701	767.495
106	WINTER FLOUNDER	3,217	475.180
72	SILVER HAKE	4,901	460.520
105	YELLOWTAIL FLOUNDER	2,035	414.796
380	ATLANTIC STURGEON	7	228.164
77	RED HAKE	1,762	189.593
26	LITTLE SKATE	319	169.737
301	AMERICAN LOBSTER	339	125.431
141	BLACK SEA BASS	622	124.855
177	TAUTOG	157	117.182
193	OCEAN POUT	375	112.824
103	SUMMER FLOUNDER	261	102.542
23	WINTER SKATE	117	101.352
102	AMERICAN PLAICE	724	98.229
108	WINDOWPANE	467	81.294
33	ALEWIFE	1,198	65.656
317	SPIDER CRAB UNCL	377	53.240
313	ATLANTIC ROCK CRAB	280	40.271
131	BUTTERFISH	681	31.472
13	SMOOTH DOGFISH	8	28.210
318	HORSESHOE CRAB	23	27.229
15	SPINY DOGFISH	9	26.820
503	LONGFIN SQUID	1,481	24.207
74	HADDOCK	40	23.532
32	ATLANTIC HERRING	4,175	17.943
139	STRIPED BASS	7	17.666
172	STRIPED SEAROBIN	51	16.566
36	ATLANTIC MENHADEN	54	13.269
78	SPOTTED HAKE	198	12.343
73	ATLANTIC COD	1,856	8.890
104	FOURSPOT FLOUNDER	38	7.731
164	SEA RAVEN	11	7.160
35	AMERICAN SHAD	97	4.593
34	BLUEBACK HERRING	155	4.527
181	NORTHERN SAND LANCE	521	4.442
24	CLEARNOSE SKATE	2	4.440
322	LADY CRAB	39	3.755
401	SEA SCALLOP	57	3.256
348	NORTHERN MOONSNAIL	19	2.660
312	JONAH CRAB	10	2.563
197	GOOSEFISH	7	1.868

Table 6b continued.

Species Code	Common Name	Count	Weight (kg)
121	ATLANTIC MACKEREL	11	1.317
343	BLUE MUSSEL	24	0.918
336	CHANNELED WHELK	5	0.813
155	ACADIAN REDFISH	3	0.610
117	SMALLMOUTH FLOUNDER	30	0.607
314	BLUE CRAB	4	0.598
146	NORTHERN KINGFISH	2	0.593
176	CUNNER	7	0.570
323	MANTIS SHRIMP UNCL	6	0.349
337	KNOBBED WHELK	3	0.283
118	HOGCHOKER	1	0.229
149	SPOT	1	0.188
182	SNAKEBLENNY	3	0.183
76	WHITE HAKE	1	0.135
43	BAY ANCHOVY	49	0.107
403	ATLANTIC SURFCLAM	1	0.104
44	STRIPED ANCHOVY	16	0.087
75	POLLOCK	23	0.077
45	RAINBOW SMELT	6	0.074
180	ROCK GUNNEL	6	0.038
165	ALLIGATORFISH	1	0.019
166	GRUBBY	1	0.015
116	NORTHERN PIPEFISH	2	0.004
Totals		92,633	15,689.548

Table 7. Total samples obtained for age, growth, maturity, and special studies during MDMF spring cruise 202491.

Species	Maturity Observation	Age and Growth Collection Scales	Otoliths	YOY
Atlantic Cod	5		5	
Haddock	27		27	
Summer Flounder	138		135	
Yellowtail Flounder	243		242	
Winter Flounder	595		587	
Black Sea Bass	114		114	
Scup	171		171	
Tautog	62		62	
American Lobster	161		0	
TOTAL	1,516	0	1,343	0

OTHER COLLECTIONS:

All crabs measured to 0.1 cm carapace width and egg bearing status recorded for females (MDMF)
Channeled Whelks saved for genetic study (Natural History Museum of LA County)
Water samples collected for eDNA analysis (GMGI)
Atlantic Cod DNA samples (UNH)
Animals for Woods Hole Science Aquarium
Squid egg locations (CCS)
Squid biological samples (NOAA)

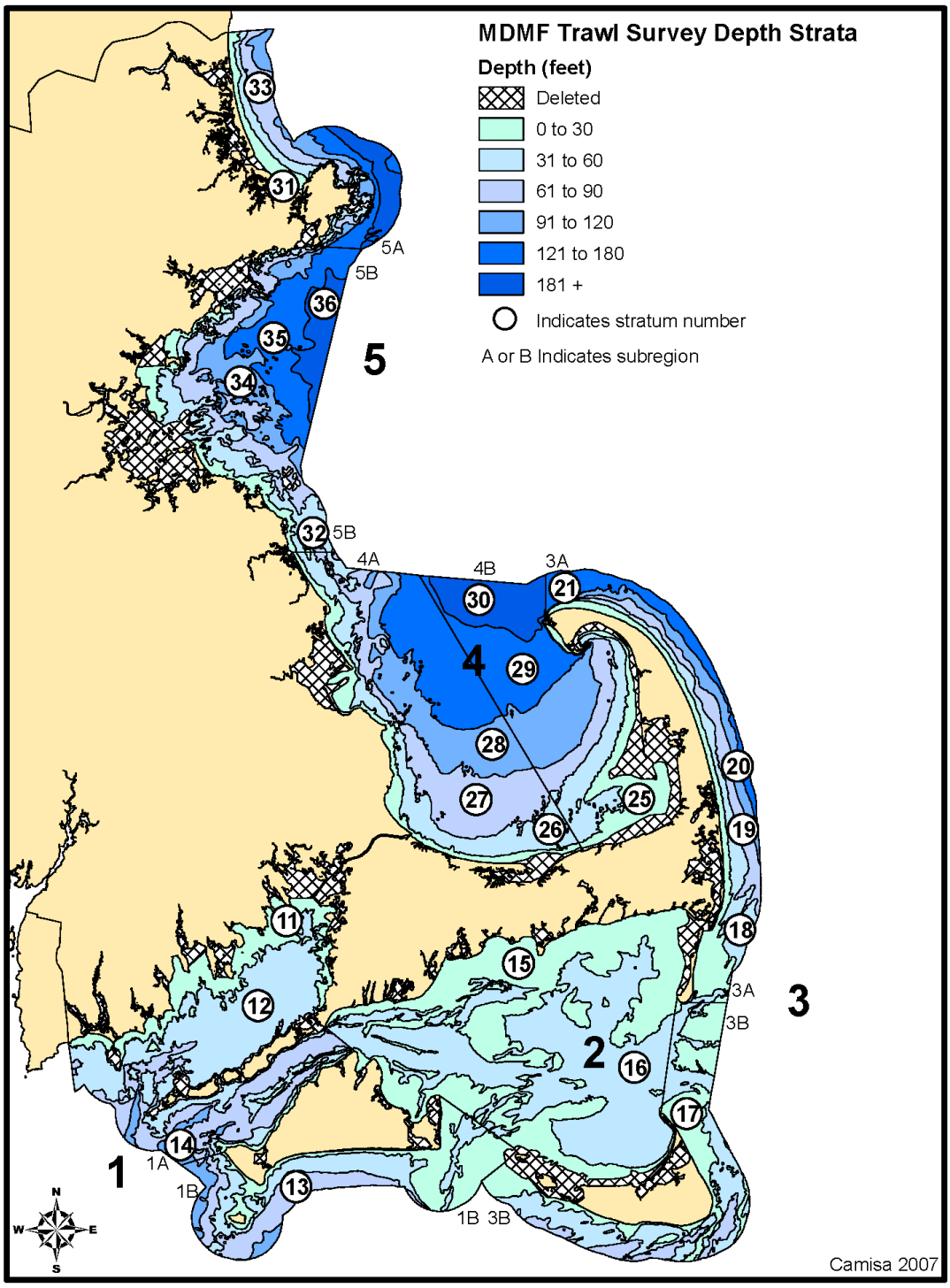


Figure 1. MDMF inshore bottom trawl survey region and strata map.

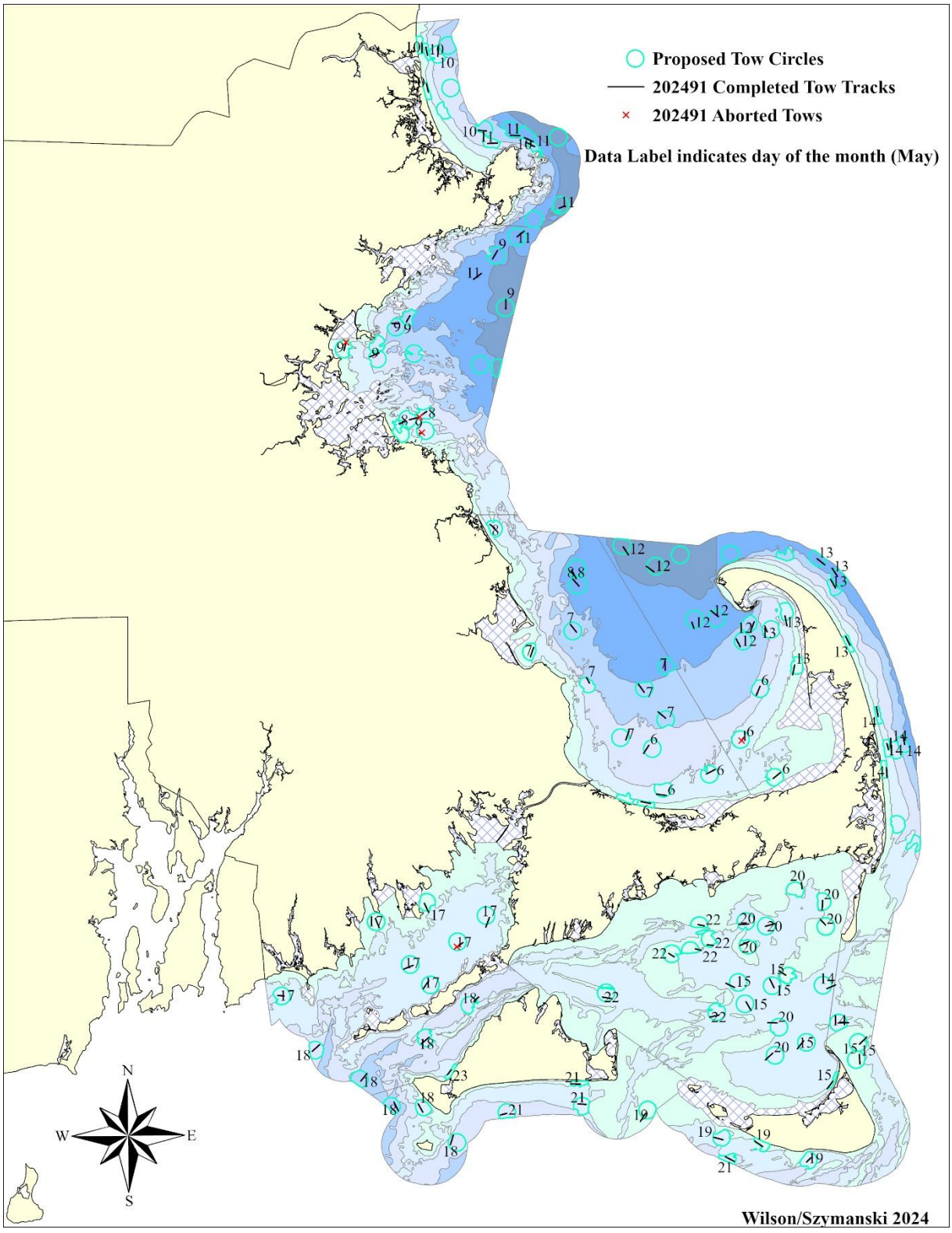


Figure 2. All proposed spring 2024 stations including completed and aborted tows by date.

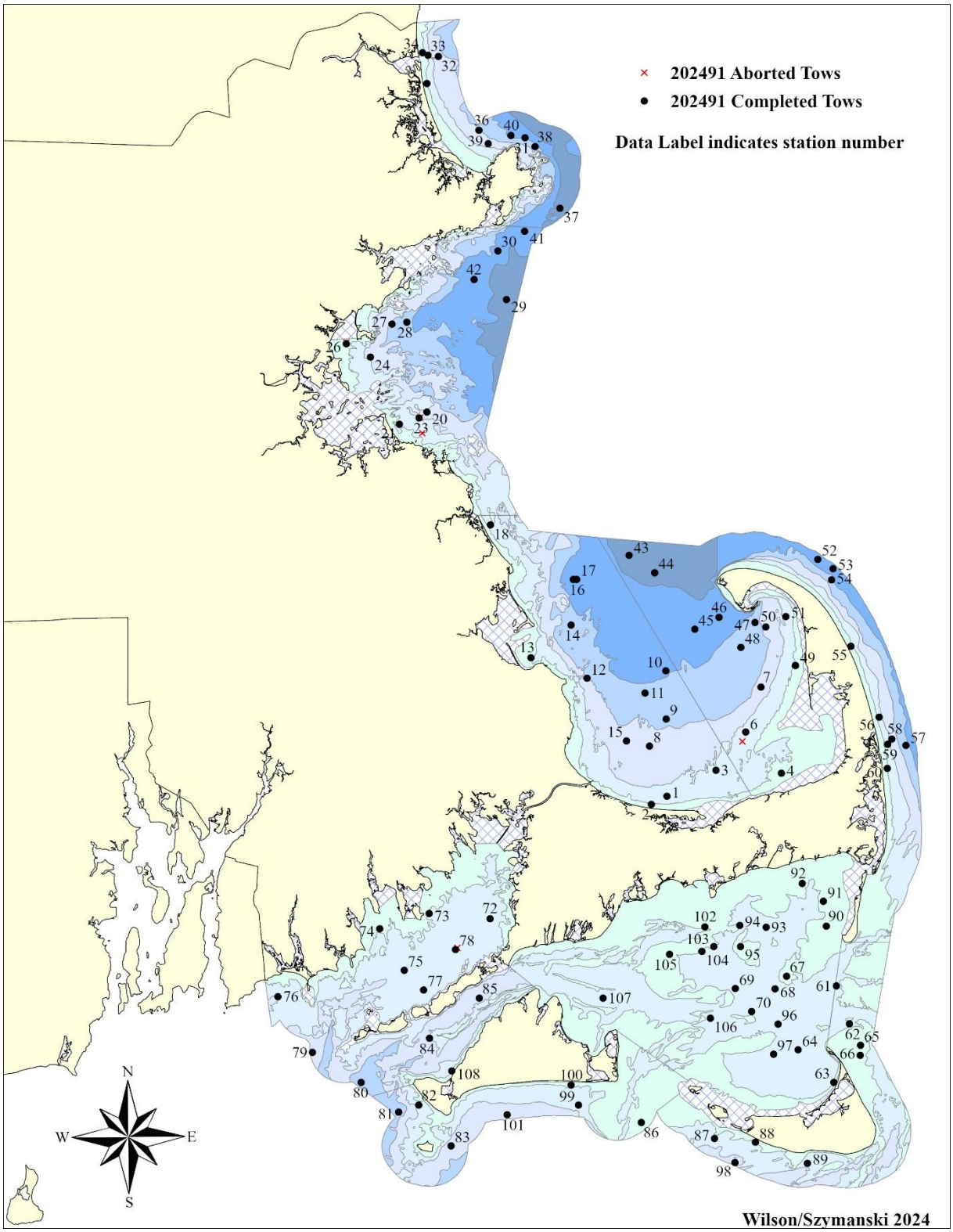
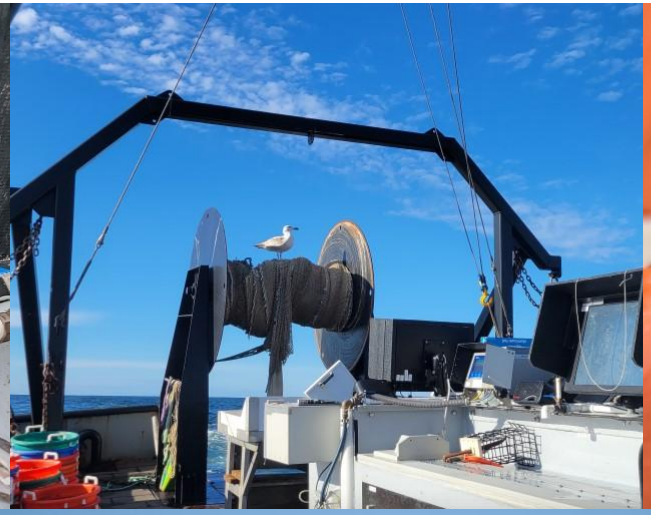


Figure 3. All attempted spring 2024 survey stations in chronological order.



Spring Cruise 202491

CRUISE RESULTS

R/V GLORIA MICHELLE

2024 Massachusetts Inshore Fall
Bottom Trawl Survey
Cruise No. 202492

CRUISE PERIOD AND AREA

From September 15 through October 3, 2024, the Massachusetts Division of Marine Fisheries conducted its 46th fall bottom trawl survey. The survey extended from New Hampshire to Rhode Island boundaries seaward to three nautical miles including Cape Cod Bay and Nantucket Sound.

OBJECTIVES

Cruise objectives were 1) to determine the fall distribution, relative abundance, and size composition of fish species; and 2) to collect biological samples. Requested special collections were also undertaken.

METHODS

The study area is stratified based on five bio-geographic regions and six depth zones (Figure 1). Trawl sites are allocated in proportion to stratum area and randomly chosen in advance within each sampling stratum. Randomly chosen stations in locations known to be untowable due to hard bottom are reassigned. Sampling intensity is approximately 1 station per 19 square nautical miles. A minimum of two stations are assigned to each stratum.

A standard tow of 20-minute duration at 2.5 knots was attempted at each station during daylight hours with a 3/4 size North Atlantic type two seam otter trawl (11.9 m headrope/15.5 m footrope) rigged with a 7.6 cm rubber disc sweep; 19.2 m, 9.5 mm chain bottom legs; 18.3 m, 9.5 mm wire top legs; and 1.8 X 1.0 m, 147 kg wooden trawl doors. The codend contains a 6.4 mm knotless liner to retain small fish. Prior to setting the net at each station, NOAA Corps officers surveyed the site by visually scanning for buoys marking fixed gear as well as determining the suitability of the bottom for towing the net based on the sounder image. Whenever necessary, sites were relocated due to untowable bottom or concentrations of fixed gear. Abbreviated tows of 13-19 minute duration were accepted as valid and expanded to the 20 minute standard.

Standard bottom trawl survey techniques were used when processing the catch. The total weight and length-frequency of each species were recorded directly into Fisheries Scientific Computer System (FSCS) data tables. From 2010 through 2018, FSCS version 1.6 was utilized for electronic data collection. Starting in 2019, we upgraded to FSCS

version 2.0. Collections of age and growth material, and biological observations were undertaken during the measuring operation. Specimens were also saved to fulfill requests. Bottom temperatures were continuously recorded with an Onset Water Temp Pro v2 attached to the doors.

Twenty-three MDMF employees participated in the survey as part of the scientific party along with one biologist from Department of Environmental Protection, one biologist from NOAA, two biologists from University of Massachusetts Dartmouth (one from School for Marine Science and Technology, and one from main campus), one biologist from Woods Hole Aquarium, and one biologist from Center for Coastal Studies (Table 1).

CRUISE SUMMARY

There were 102 stations attempted in 17 sampling days (Figures 1 and 2, Table 2). Ninety-five completed stations were considered acceptable for assessment of all species, SHG <=136 (Table 3). One station in stratum 31, one station in stratum 32, two stations in stratum 33, two stations in stratum 34, and two stations in stratum 35 were dropped due to a combination of hard bottom, dense aggregations of fixed fishing gear, and time constraints. Seven attempted tows were aborted due to fixed gear, ghost gear, or hard bottom (Table 5, Figure. 3).

The geographic distribution, relative abundance, relative biomass, and representative length frequencies of all fish and invertebrate species were documented (Tables 6a and 6b). Several records were set on the 2024 fall survey at individual stations. Station 3 in upper Buzzards Bay recorded the highest number (175) and biomass (26.75 kg) of Spot. Station 35 south of Martha's Vineyard observed the highest count (132) and weight (1.465 kg) of Striped Cusk Eels. Station 96 in Nantucket Sound recorded the highest abundance (2) and biomass (0.894 kg) of Sharksuckers as well as the highest biomass (627.98 kg) of Smooth Dogfish. New abundance records occurred for Winter Flounder (1333 individuals) at station 14 in Mass Bay and Round Scad (63 individuals) at station 47 east of Nantucket. One other single station biomass record was 21.856 kg of Cunner at station 24 in Mass Bay.

There were several notable species trends for all stations combined in the fall of 2024. Spot and Striped Cusk Eels set new record highs for abundance and biomass. This fall the Atlantic Menhaden biomass was the highest observed, while Longhorn Sculpin had the second highest abundance and biomass to date. Scup set a record low abundance and Longfin Squid had the second lowest abundance and biomass recorded.

General catch trends followed a similar pattern to recent surveys. While lower than typical, Scup still dominated the catches south of Cape Cod and accounted for 49% of all catch by number and 18% of all biomass this survey. Scup, Butterfish, Longfin Squid, and Bay Anchovies made up much of the total catch by count and Scup, Butterfish, and Smooth Dogfish by weight for stations south of Cape Cod. North of Cape Cod had moderate catches of Winter Flounder, Silver Hake, Red Hake, and Longhorn Sculpin.

Additional sampling goals were achieved (Table 7). To aid cooperative fisheries assessments over 1,000 otolith samples and over 1,400 sex and maturity observations were taken from Atlantic Cod, Haddock, Summer Flounder, Yellowtail Flounder, Winter Flounder, Black Sea Bass, Scup, Weakfish, Tautog and American Lobster. Additional samples and catch information were collected to assist ongoing research by fisheries scientists from MDMF, UMass Dartmouth, UMass Amherst, University of New Hampshire, and Center for Coastal Studies.

For further information on this survey or others in the time series, contact Steve Wilcox at (508) 742-9731.

Table 1. Staffing list for fall cruise 202492.

Scientific Party

Name	Affiliation	Num. Days
Steve Wilcox	MADMF	11
Mark Szymanski	MADMF	10
Jack Wilson	MADMF	9
Brendan Reilly	MADMF	6
Michael Blanco	MADMF	6
Mitchell Parizek	MADMF	5
Giovanni Aulizio	MADMF	5
Steve Voss	MADMF	3
Drake Gross	SMAST	3
John Sheppard	MADMF	3
Colby Fitzgibbons	MADMF	3
Evan Weig	MADMF	3
Jacob Dorothy	MADMF	3
Laura Tomlinson	MADMF	3
Broke Dejadon	MADMF	3
Jillian Swinford	MADMF	2
Alex Boeri	MADMF	2
Michael Burgess	MADMF	2
Brad Chase	MADMF	2
Vinny Manfredi	MADEP	2
Melissa Campbell	MADMF	2
Ross Kessler	MADMF	2
Sarah Shea	Woods Hole Aquarium	2
Rose Capek	UMASS Dartmouth	2
Eric Robillard	NOAA/NEFSC-WH	2
Chrissy Petitpas	MADMF	1
Bob Glenn	MADMF	1
Tracy Pugh	MADMF	1
Tommy Tucker	Center Coastal Studies	1
Total		100

R/V Gloria Michelle Crew

Name	Affiliation	Num. Days
Officers		
Trevor Grams	NOAA OIC	17
Forrest Foxen	NOAA JOIC	17
Deck Crew		
Chris Shepard	Contract Fisherman	17
Dan Storer	Contract Fisherman	17

Table 2. Station information for the fall cruise 202492.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
1	12	9/15/2024	6:33	13	41°35.15	-70°44.03	238	0.89	20.8
2	11	9/15/2024	8:09	7	41°36.43	-70°48.92	156	0.84	21.6
3	12	9/15/2024	9:25	12	41°34.96	-70°46.26	38	0.84	21.0
4	11	9/15/2024	11:01	7	41°39.46	-70°43.46	316	0.82	21.7
5	26	9/15/2024	14:15	17	41°47.97	-70°29.17	334	0.55	11.1
6	25	9/15/2024	15:26	8	41°45.63	-70°26.68	312	0.84	16.9
7	26	9/15/2024	16:41	18	41°45.73	-70°22.98	289	0.83	11.3
8	28	9/16/2024	6:40	35	41°56.69	-70°28.04	262	0.53	8.4
9	28	9/16/2024	9:49	34	42°05.35	-70°32.52	354	0.67	8.7
10	29	9/16/2024	11:22	54	42°06.06	-70°28.33	197	0.83	7.8
11	32	9/16/2024	14:53	15	42°14.36	-70°44.73	168	0.27	12.2
12	33	9/16/2024	16:20	20	42°18.52	-70°49.04	103	0.78	10.7
13	32	9/16/2024	17:23	13	42°17.69	-70°51.33	85	0.86	12.2
14	34	9/17/2024	6:37	33	42°23.43	-70°48.77	298	0.76	8.9
15	36	9/17/2024	10:31	80	42°28.34	-70°37.94	193	0.52	8.1
16	36	9/17/2024	13:56	69	42°44.38	-70°36.39	168	0.64	7.3
17	35	9/17/2024	15:06	49	42°43.96	-70°37.73	153	0.63	8.5
18	34	9/18/2024	7:36	35	42°43.59	-70°40.56	146	0.72	9.3
19	33	9/18/2024	9:08	25	42°45.63	-70°45.20	167	0.55	9.9
20	32	9/18/2024	10:16	19	42°42.88	-70°44.07	342	0.54	10.4
21	31	9/18/2024	11:10	11	42°41.24	-70°43.11	326	0.83	10.8
22	31	9/18/2024	12:14	13	42°40.66	-70°41.11	303	0.25	12.4
23	36	9/18/2024	14:06	74	42°42.95	-70°34.07	333	0.61	7.1
24	35	9/19/2024	7:19	50	42°28.69	-70°44.22	322	0.53	8.6
25	35	9/19/2024	9:06	41	42°27.37	-70°48.92	77	0.34	8.5
26	35	9/19/2024	10:24	39	42°27.13	-70°49.82	82	0.55	8.4
27	31	9/19/2024	12:04	10	42°24.17	-70°57.59	22	0.54	14.8
28	12	9/20/2024	9:26	17	41°25.93	-70°44.97	251	0.81	19.6
29	13	9/20/2024	10:48	24	41°24.08	-70°45.50	232	0.86	18.7
30	14	9/20/2024	12:37	30	41°23.87	-70°52.48	259	0.86	17.3
31	12	9/23/2024	8:49	17	41°19.74	-70°42.63	101	0.82	18.6
32	13	9/23/2024	10:23	21	41°18.90	-70°36.87	112	0.83	18.7
33	12	9/23/2024	11:41	13	41°19.25	-70°29.97	259	0.84	18.6
34	11	9/23/2024	12:40	10	41°19.14	-70°28.53	270	0.83	18.6
35	11	9/23/2024	14:05	10	41°20.63	-70°37.73	98	0.84	19.0
36	13	9/23/2024	15:26	23	41°17.82	-70°40.99	86	0.83	18.2
37	13	9/24/2024	6:45	25	41°22.30	-70°50.21	87	0.83	17.4
38	14	9/24/2024	8:07	33	41°18.62	-70°52.39	337	0.84	15.9
39	13	9/24/2024	9:32	27	41°22.63	-70°53.43	74	0.85	17.5
40	11	9/24/2024	11:42	10	41°29.94	-71°03.75	146	0.83	18.3
41	12	9/24/2024	13:01	17	41°29.17	-70°59.42	264	0.87	18.9
42	12	9/24/2024	14:39	19	41°28.17	-70°52.99	57	0.83	18.6

Table 2 continued.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
43	16	9/25/2024	9:24	17	41°29.54	-70°03.45	82	0.68	16.7
44	18	9/25/2024	10:59	18	41°26.38	-70°01.58	166	0.51	17.1
45	18	9/25/2024	11:47	17	41°26.67	-70°01.35	172	0.72	17.1
46	17	9/25/2024	13:09	10	41°24.51	-69°57.85	240	0.81	17.3
47	17	9/25/2024	14:33	10	41°21.73	-69°59.10	47	0.84	17.1
48	16	9/25/2024	16:31	14	41°23.31	-70°06.28	64	0.82	16.8
49	15	9/26/2024	6:30	9	41°21.11	-70°16.66	126	0.83	17.4
50	15	9/26/2024	9:04	10	41°30.90	-70°06.05	247	0.84	17.3
51	15	9/26/2024	10:11	9	41°33.56	-70°04.44	195	0.84	17.3
52	15	9/26/2024	11:18	8	41°36.25	-70°03.08	185	0.82	17.9
53	16	9/26/2024	12:27	12	41°32.74	-70°07.79	86	0.86	17.8
54	16	9/26/2024	13:48	10	41°30.11	-70°08.24	270	0.85	17.5
55	16	9/26/2024	15:29	15	41°21.78	-70°07.24	7	0.85	17.5
56	15	9/26/2024	16:47	9	41°19.27	-70°04.15	262	0.86	17.0
57	18	9/27/2024	9:30	14	41°13.30	-70°03.92	80	0.82	16.8
58	19	9/27/2024	10:53	23	41°12.44	-70°07.04	88	0.87	16.4
59	18	9/27/2024	12:26	17	41°15.80	-70°15.97	124	0.83	18.0
60	17	9/27/2024	13:35	10	41°17.07	-70°19.90	94	0.84	18.1
61	29	9/28/2024	9:59	50	42°00.78	-70°24.58	150	0.84	9.7
62	29	9/28/2024	10:55	51	42°00.68	-70°20.94	268	0.84	9.5
63	29	9/28/2024	12:12	52	42°02.50	-70°25.51	82	0.71	9.6
64	30	9/28/2024	13:20	59	42°05.53	-70°23.48	229	0.84	8.9
65	30	9/28/2024	14:15	56	42°03.83	-70°22.30	335	0.86	8.9
66	28	9/28/2024	16:38	30	41°57.08	-70°09.87	44	0.55	13.9
67	19	9/29/2024	9:01	23	41°52.18	-69°55.68	17	0.83	13.1
68	17	9/29/2024	10:23	10	41°50.00	-69°55.94	7	0.82	14.3
69	18	9/29/2024	11:34	17	41°47.06	-69°54.81	13	0.83	13.9
70	17	9/29/2024	12:41	10	41°44.38	-69°55.15	13	0.76	16.0
71	20	9/29/2024	13:53	34	41°48.07	-69°52.69	175	0.85	11.6
72	20	9/29/2024	15:02	34	41°50.17	-69°53.67	182	0.84	12.8
73	29	9/30/2024	6:03	47	42°01.10	-70°13.53	357	0.84	9.4
74	18	9/30/2024	7:59	16	42°05.52	-70°08.98	120	0.79	16.5
75	21	9/30/2024	8:56	42	42°06.43	-70°10.28	98	0.85	11.2
76	21	9/30/2024	10:02	62	42°07.45	-70°11.24	87	0.68	9.6
77	27	9/30/2024	12:35	27	41°58.01	-70°08.33	209	0.84	14.6
78	26	9/30/2024	13:44	16	41°56.20	-70°07.30	207	0.67	15.8
79	27	9/30/2024	14:54	23	41°52.66	-70°11.60	60	0.86	15.0
80	28	9/30/2024	16:17	33	41°54.81	-70°16.26	190	0.68	11.4
81	27	10/1/2024	5:58	27	41°51.59	-70°24.67	198	0.69	15.1
82	28	10/1/2024	7:17	34	41°54.12	-70°20.02	264	0.84	12.7
83	28	10/1/2024	8:24	31	41°52.30	-70°17.96	356	0.84	12.8
84	26	10/1/2024	9:53	16	41°50.44	-70°10.85	273	0.86	15.2

Table 2 continued.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
85	25	10/1/2024	10:58	10	41°49.37	-70°10.61	46	0.73	16.0
86	25	10/1/2024	12:04	10	41°49.39	-70°05.79	308	0.85	16.7
87	25	10/1/2024	13:47	9	41°44.81	-70°18.25	83	0.84	17.1
88	26	10/1/2024	14:48	18	41°46.04	-70°20.59	82	0.84	15.2
89	27	10/1/2024	15:51	22	41°48.03	-70°18.66	78	0.85	14.9
90	27	10/1/2024	16:45	25	41°49.55	-70°19.17	86	0.84	14.9
91	16	10/2/2024	11:54	14	41°29.16	-70°28.17	301	0.79	19.0
92	15	10/2/2024	13:13	9	41°26.05	-70°27.14	62	0.62	18.9
93	16	10/2/2024	14:20	14	41°28.59	-70°25.31	121	0.02	
94	16	10/2/2024	14:39	15	41°28.56	-70°25.18	117	0.57	18.4
95	16	10/2/2024	15:57	21	41°27.27	-70°19.81	107	0.86	18.6
96	15	10/3/2024	7:12	9	41°34.98	-70°20.45	302	0.83	18.5
97	15	10/3/2024	8:47	8	41°31.40	-70°20.24	320	0.85	18.3
98	16	10/3/2024	10:05	12	41°32.60	-70°13.72	302	0.85	18.1
99	15	10/3/2024	11:16	10	41°36.49	-70°12.54	285	0.86	18.1
100	16	10/3/2024	12:26	16	41°33.19	-70°11.75	69	0.83	17.9
101	15	10/3/2024	13:25	10	41°31.23	-70°12.04	91	0.83	18.0
102	16	10/3/2024	14:22	18	41°30.22	-70°14.31	96	0.82	18.2

Table 3. Sampling effort assigned and accomplished by stratum, cruise 202492.

Stratum	Region	Assigned Stations	Number of Stations Completed			Aborted Tows
			All Accepted	Sub-Standard	Standard	
11	1	5	5		5	
12	1	7	7		7	
13	1	5	5		5	
14	1	2	2		2	
15	2	10	10		10	
16	2	11	11		11	1
17	3	5	5		5	
18	3	5	5		5	1
19	3	2	2		2	
20	3	2	2		2	
21	3	2	2		2	
25	4	4	4		4	
26	4	5	5		5	
27	4	5	5		5	
28	4	5	5		5	1
29	4	5	5		5	
30	4	2	2		2	
31	5	3	2		2	1
32	5	3	2		2	1
33	5	4	2		2	
34	5	4	2		2	
35	5	5	3		3	1
36	5	2	2		2	1
TOTALS		103	95	0	95	7

Note:
Standard Tows. SHG <=136. Recommended for use in all indices of abundance.
Sub-Standard Tows. SHG 141 - 166. Not recommended for use in indices other than spiny dogfish.
Aborted Tows. Catch data not recommended for use.

Table 4. Sub-standard tows (SHG 141-166) for cruise 202492. Not advised for indices of abundacnce other than Spiny Dogfish.

Station	Stratum	SHG	Location	Description
No sub-standard tows on cruise 202492				

Table 5. Aborted tows during the fall survey, cruise 202492.

Station	Stratum	SHG	Location	Description
8	28	171	East of Manomet	caught ghost trawl at 12mins
11	32	172	Cowen Rocks	string of pots and tears in the wings
15	36	177	outer Massachusets Bay	port idler cable broke at haulback
22	31	172	Ipswich Bay	took hit and slowed at 6mins and hauled early
25	35	171	Massachusetts Bay	took hit and slowed at 9mins and hauled early
44	18	176	Pollock Rip Channel	slowed down at 11mins hauled early, ghost pots
93	16	171	Nantucket Sound main channel	slowed down at set out, hauled early no damage

Table 6a. Total catch by number and weight from 2024 fall survey sorted by number.

Species Code	Common Name	Count	Weight (kg)
143	SCUP	48,656	1,137.079
503	LONGFIN SQUID	13,801	103.271
131	BUTTERFISH	7,688	357.592
106	WINTER FLOUNDER	4,756	744.601
72	SILVER HAKE	3,740	362.793
77	RED HAKE	3,520	513.812
43	BAY ANCHOVY	1,901	1.498
163	LONGHORN SCULPIN	1,544	194.904
44	STRIPED ANCHOVY	1,521	5.349
132	ATLANTIC MOONFISH	1,186	6.146
141	BLACK SEA BASS	783	82.129
105	YELLOWTAIL FLOUNDER	772	148.685
301	AMERICAN LOBSTER	757	397.569
26	LITTLE SKATE	718	403.456
135	BLUEFISH	652	8.354
149	SPOT	619	90.656
145	WEAKFISH	601	26.405
108	WINDOWPANE	563	80.939
23	WINTER SKATE	461	355.553
322	LADY CRAB	375	27.564
13	SMOOTH DOGFISH	372	820.607
313	ATLANTIC ROCK CRAB	370	36.769
176	CUNNER	328	26.154
74	HADDOCK	313	8.146
103	SUMMER FLOUNDER	215	109.457
33	ALEWIFE	211	18.575
193	OCEAN POUT	195	27.377
317	SPIDER CRAB UNCL	173	10.696
102	AMERICAN PLAICE	158	26.225
212	ROUGH SCAD	138	1.398
188	STRIPED CUSK-EEL	135	1.522
171	NORTHERN SEAROBIN	123	10.302
401	SEA SCALLOP	105	3.714
116	NORTHERN PIPEFISH	101	0.210
146	NORTHERN KINGFISH	82	11.510
104	FOURSPOT FLOUNDER	79	12.393
32	ATLANTIC HERRING	78	5.289
312	JONAH CRAB	68	10.694
117	SMALLMOUTH FLOUNDER	66	0.866
78	SPOTTED HAKE	59	10.041
15	SPINY DOGFISH	54	86.262
155	ACADIAN REDFISH	51	3.355
172	STRIPED SEAROBIN	48	17.545
196	NORTHERN PUFFER	43	1.801
76	WHITE HAKE	38	5.054
73	ATLANTIC COD	35	10.156

Table 6a continued.

Species Code	Common Name	Count	Weight (kg)
36	ATLANTIC MENHADEN	34	5.184
177	TAUTOG	27	13.474
318	HORSESHOE CRAB	26	36.088
107	WITCH FLOUNDER	17	3.866
121	ATLANTIC MACKEREL	16	2.826
35	AMERICAN SHAD	16	1.749
181	NORTHERN SAND LANCE	16	0.196
657	DWARF GOATFISH	15	0.173
24	CLEARNOSE SKATE	11	17.210
164	SEA RAVEN	10	6.729
556	GLASSEYE SNAPPER	9	0.523
182	SNAKEBLENNY	8	0.306
211	ROUND SCAD	7	0.127
129	BLUE RUNNER	5	0.391
323	MANTIS SHRIMP UNCL	5	0.178
197	GOOSEFISH	5	3.871
439	SNAKEFISH	4	0.051
570	CREVALLE JACK	4	0.181
83	FOURBEARD ROCKLING	3	0.212
502	NORTHERN SHORTFIN SQUID	3	0.514
336	CHANNELED WHELK	3	0.724
118	HOGCHOKER	3	0.431
45	RAINBOW SMELT	3	0.126
348	NORTHERN MOONSNAIL	2	0.275
567	REMORA	2	0.894
201	PLANEHEAD FILEFISH	2	0.063
596	VERMILION SNAPPER	2	0.011
101	ATLANTIC HALIBUT	2	0.521
34	BLUEBACK HERRING	1	0.055
403	ATLANTIC SURFCLAM	1	0.079
694	NORTHERN SENNET	1	0.078
489	RED CORNETFISH	1	0.027
597	SNAPPER UNCL	1	0.005
4	ROUGHTAIL STINGRAY	1	18.679
22	BARNDOOR SKATE	1	0.425
180	ROCK GUNNEL	1	0.015
337	KNOBBED WHELK	1	0.201
109	GULF STREAM FLOUNDER	1	0.037
204	BANDED RUDDERFISH	1	0.191
435	INSHORE LIZARDFISH	1	0.032
913	BROWN SHRIMP	1	0.080
139	STRIPED BASS	1	3.050
202	GRAY TRIGGERFISH	1	1.010
134	BIGEYE	1	0.063
Totals		98,528	6,445.394

Table 6b. Total catch by number and weight from 2024 fall survey sorted by weight.

Species Code	Common Name	Count	Weight (kg)
143	SCUP	48,656	1,137.079
13	SMOOTH DOGFISH	372	820.607
106	WINTER FLOUNDER	4,756	744.601
77	RED HAKE	3,520	513.812
26	LITTLE SKATE	718	403.456
301	AMERICAN LOBSTER	757	397.569
72	SILVER HAKE	3,740	362.793
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149	SPOT	619	90.656
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141	BLACK SEA BASS	783	82.129
108	WINDOWPANE	563	80.939
313	ATLANTIC ROCK CRAB	370	36.769
318	HORSESHOE CRAB	26	36.088
322	LADY CRAB	375	27.564
193	OCEAN POUT	195	27.377
145	WEAKFISH	601	26.405
102	AMERICAN PLAICE	158	26.225
176	CUNNER	328	26.154
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135	BLUEFISH	652	8.354
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44	STRIPED ANCHOVY	1,521	5.349
32	ATLANTIC HERRING	78	5.289
36	ATLANTIC MENHADEN	34	5.184
76	WHITE HAKE	38	5.054
197	GOOSEFISH	5	3.871
107	WITCH FLOUNDER	17	3.866

Table 6b continued.

Species Code	Common Name	Count	Weight (kg)
401	SEA SCALLOP	105	3.714
155	ACADIAN REDFISH	51	3.355
139	STRIPED BASS	1	3.050
121	ATLANTIC MACKEREL	16	2.826
196	NORTHERN PUFFER	43	1.801
35	AMERICAN SHAD	16	1.749
188	STRIPED CUSK-EEL	135	1.522
43	BAY ANCHOVY	1,901	1.498
212	ROUGH SCAD	138	1.398
202	GRAY TRIGGERFISH	1	1.010
567	REMORA	2	0.894
117	SMALLMOUTH FLOUNDER	66	0.866
336	CHANNELED WHELK	3	0.724
556	GLASSEYE SNAPPER	9	0.523
101	ATLANTIC HALIBUT	2	0.521
502	NORTHERN SHORTFIN SQUID	3	0.514
118	HOGCHOKER	3	0.431
22	BARNDOOR SKATE	1	0.425
129	BLUE RUNNER	5	0.391
182	SNAKEBLENNY	8	0.306
348	NORTHERN MOONSNAIL	2	0.275
83	FOURBEARD ROCKLING	3	0.212
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204	BANDED RUDDERFISH	1	0.191
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657	DWARF GOATFISH	15	0.173
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134	BIGEYE	1	0.063
34	BLUEBACK HERRING	1	0.055
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435	INSHORE LIZARDFISH	1	0.032
489	RED CORNETFISH	1	0.027
180	ROCK GUNNEL	1	0.015
596	VERMILION SNAPPER	2	0.011
597	SNAPPER UNCL	1	0.005
Totals		98,528	6,445.394

Table 7. Total samples obtained for age, growth, maturity, and special studies during MDMF fall cruise 202492.

Species	Maturity Observation	Age and Growth Collection Scales	Otoliths	YOY
Atlantic Cod	17		17	
Haddock	36		36	
Summer Flounder	127		125	
Yellowtail Flounder	218		215	
Winter Flounder	353		347	
Black Sea Bass	171		171	
Scup	143		138	
Weakfish	24		24	
Tautog	14		14	
American Lobster	373		0	
TOTAL	1,476	0	1,087	0

OTHER COLLECTIONS:

All crabs measured to 0.1 cm carapace width and egg bearing status recorded for females (MDMF)
Squid egg locations (CCS)
Various samples for fish ID class (UMASS Amherst)
Various samples for fish ID class (UMASS Dartmouth)
Atlantic Cod DNA samples (UNH)

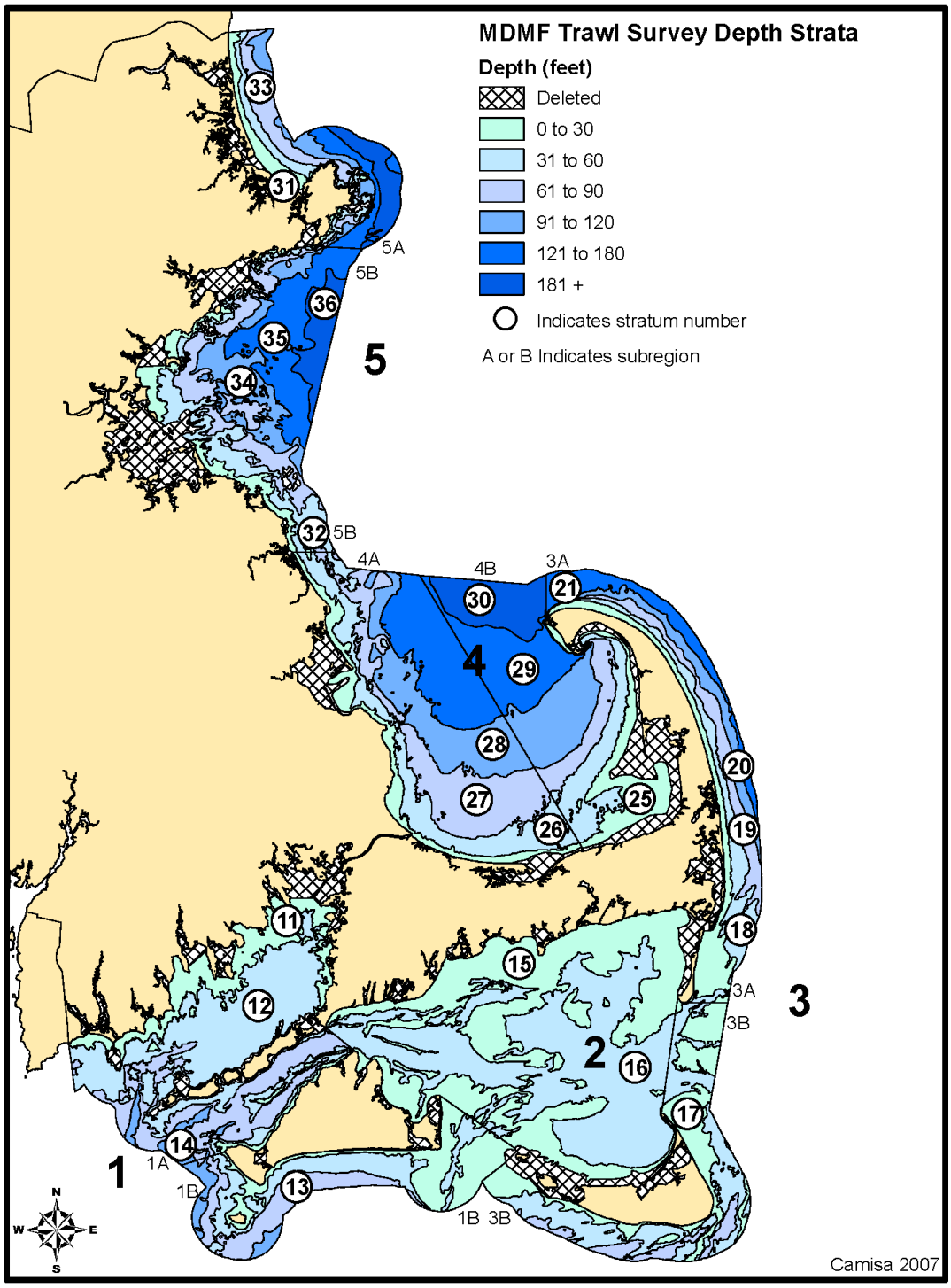


Figure 1. MDMF inshore bottom trawl survey region and strata map.

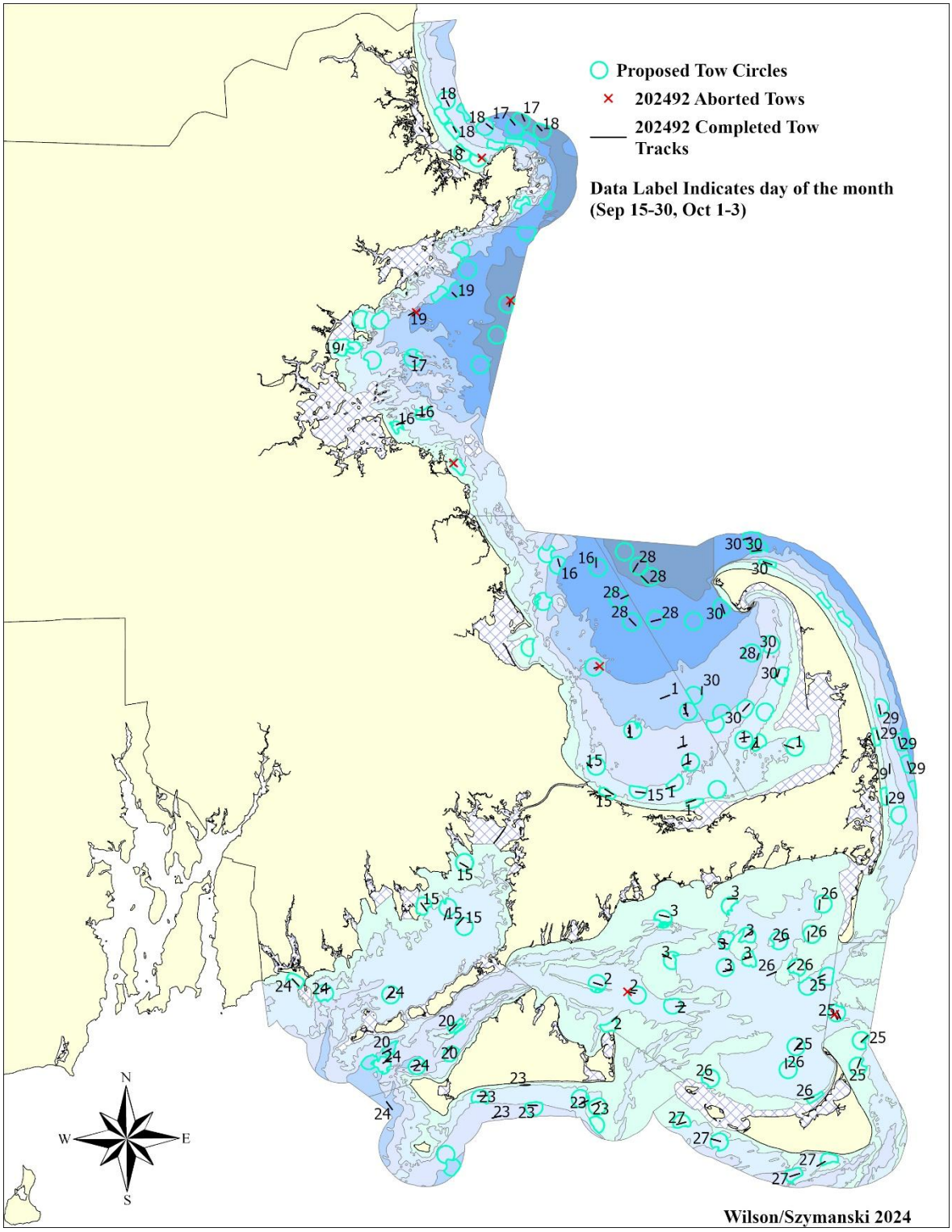


Figure 2. All proposed fall 2024 stations including completed and aborted tows by date.

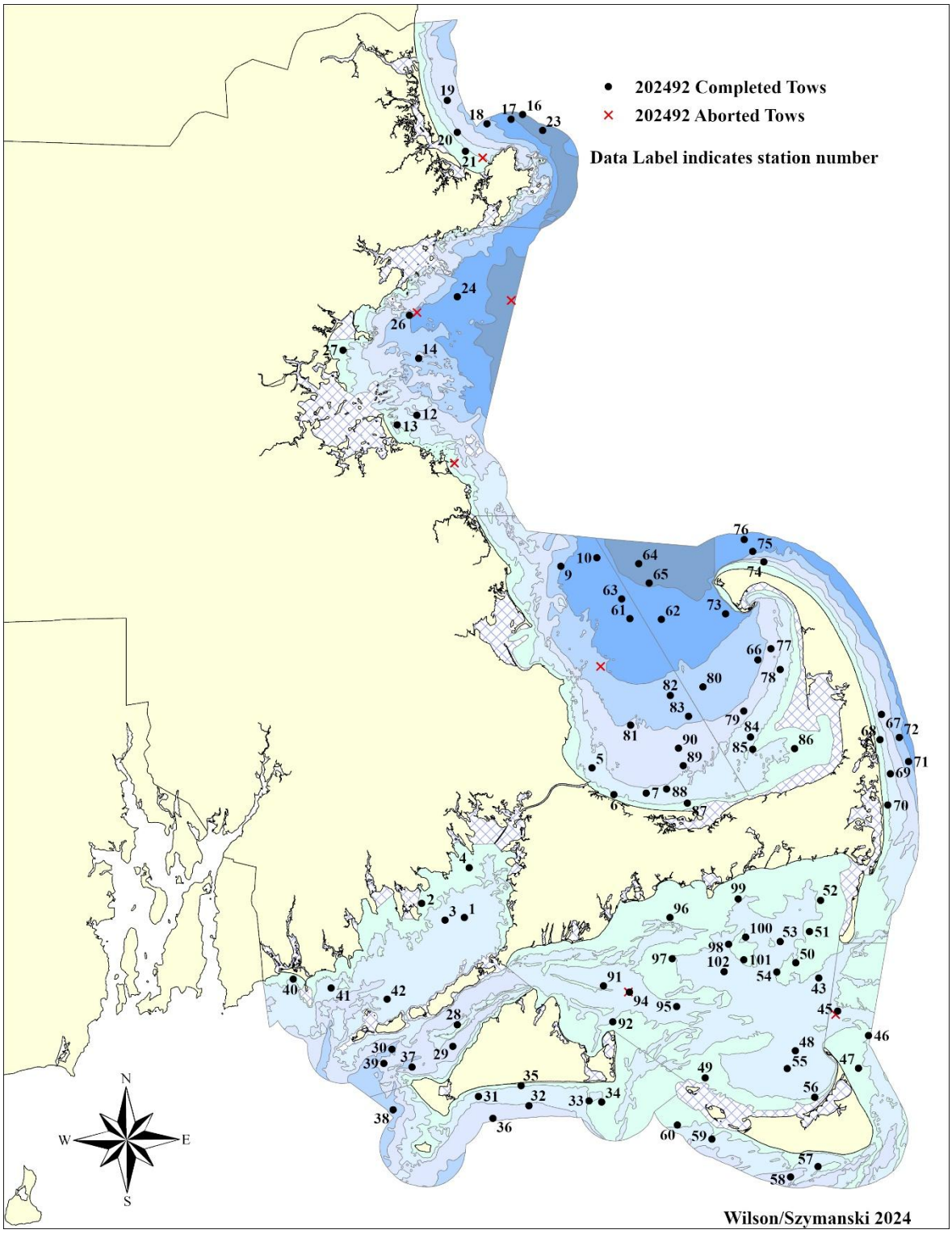
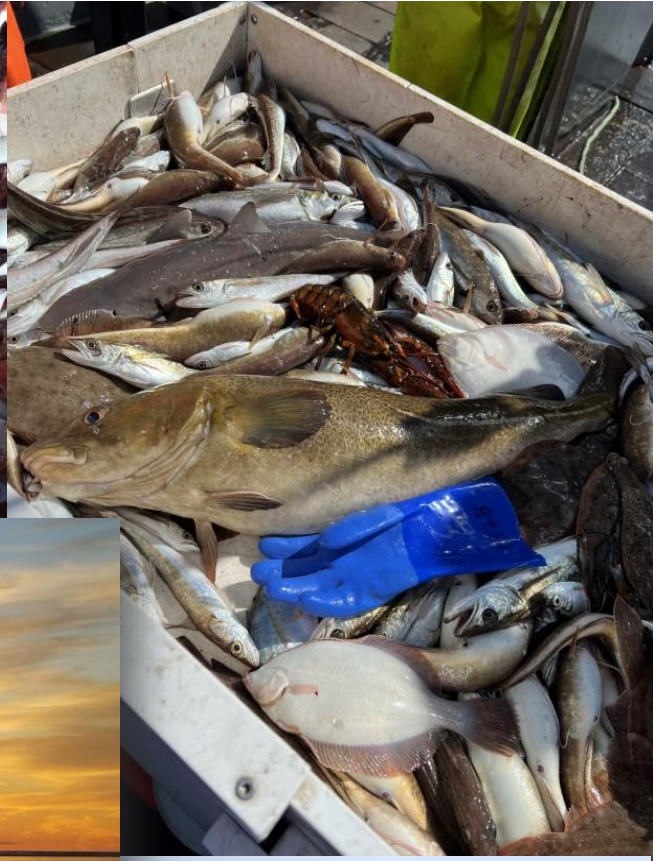


Figure 3. All attempted fall 2024 survey stations in chronological order




Fall Cruise 202492

SURVEY REPORT
2024 Nantucket Sound Estuarine Winter Flounder
Young of the Year (YOY)
Seine Survey

SURVEY PERIOD AND AREA

From June 12 – July 3, 2024, the Massachusetts Division of Marine Fisheries (MDMF) conducted its 49th Nantucket Sound Estuarine Winter Flounder YOY Seine Survey. The survey covers six Nantucket Sound estuaries on the south side of Cape Cod – Great Pond, Waquoit Bay, Cotuit Bay, Lewis Bay, Bass River and Stage Harbor (Figure 1).

OBJECTIVES

Survey objectives were 1) to provide a Winter Flounder YOY abundance index for the Southern New England Stock; and 2) count all commercially and recreationally important finfish species encountered. All species not counted are noted for presence.

METHODS

Each survey occurs between the Monday of the first full week of June (Julian dates 160-166) and the Friday of the first full week of July (Julian dates 187-193). Sampling takes place during daylight hours Monday through Friday within two hours of the earliest morning high tide. The first 9 days that meet the protocol during this timeframe are used. Weekends, Holidays, and afternoons are avoided to reduce recreational use conflicts at site locations. Forty-nine fixed stations, originally chosen for efficient seining (i.e., smooth sediment bottom generally devoid of attached vegetation) and historic availability of 0-group winter flounder, were proportionately allocated by each estuary's littoral perimeter. A 6.4 meter straight seine of 4.8 mm nylon mesh equipped with a weighted lead line footrope to minimize escapement was set and hauled perpendicular to shore from depths between 0.9 to 1.2 meters.

Winter flounder density (# YOY per square meter) was determined by aggregating catch from three replicate hauls at each station. Consistent area swept was maintained using a fixed-length spreader rope. Haul distance was calculated as the hypotenuse of a right triangle, using the measurements of distance over the water's surface and depth at the beginning of the seine haul. Distance over the water's surface was measured with a sonic digital rangefinder (SONIN Multi-Measure Combo Pro™) and water depth at the beginning of the seine haul was measured with a weighted and marked line. When inclement weather prevents use of the rangefinder, distance over ground was measured by pacing. Statistical analysis of seine data employed stratification techniques; each estuary was considered a stratum and each station's three replicate hauls were treated as one individual sample. Stratified mean density and confidence limits were derived from standard and modified formulae for mean and variance. Eleven MDMF employees participated in the survey as part of the scientific party (Table 1).

RESULTS

139 seine hauls were conducted at 49 stations over 9 sampling days. Eight replicate hauls were dropped at six stations due to decreased beach area, shoreline vegetation, wave action, and obstructions: Fairfield, Washburn Island 4, Crowell Road, Heirs Landing, Mill Pond, and Vineyard Avenue. Forty species were encountered in 2024 (Table 2). The 2024 pooled (all estuaries combined) Winter Flounder YOY index (0.196 YOY / m^2) fell below the time series median (0.223 YOY / m^2) (Figure 2, Table 3). The Age 1+ Winter Flounder index remained below the timeseries median for the 16th consecutive year with only one fish encountered (Figure 3). YOY Winter Flounder indices for each of the six estuaries decreased from 2023 and fell below their respective time series median except for Waquoit Bay (Figure 4). The YOY Summer Flounder index decreased from its high in 2023 to just above the times series median in 2024 (Figure 5). However, the age1+ Summer Flounder abundance was the highest for the time series (Figure 6). All bottom temperature monitors were collected, successfully downloaded and redeployed in four estuaries (Figure 7). For further information on this survey or additional data, please contact Mark Szymanski (508)-742-9727.

Table 1. Annual seine survey staff list

Name	Affiliation	Num. Days
Mark Szymanski	MADMF	9
Adrianna Bourget	UMASSD	3
Amanda Davis	MADMF	3
Malik Neron	MADMF	3
Jack Wilson	MADMF	3
Brendan Reilly	MADMF	2
Giovanni Aulizio	MADMF	1
Vincent Manfredi	MADEP	1
Sasha Milsky	MADMF	1
Derek Perry	MADMF	1

Table 2. Catch observations of all recorded species for the annual seine survey (species without counts are recorded as present if encountered in a haul).

Common Name	Taxonomic Name	Total Number	% Occurrence
YOY Winter Flounder	*Pseudopleuronectes americanus*	1820	93.5%
Atlantic Silverside	*Menidia menidia*		86.3%
Blue Crab	*Callinectes sapidus*	1044	76.3%
Sand Shrimp	*Crangon septemspinosa*		72.7%
Mud Snail	*Nassarius obsoletus*		59.0%
Striped Killifish	*Fundulus majalis*		51.1%
Grass Shrimp	*Paelmonetes pugio*		48.9%
Northern Pipefish	*Sygnathus fuscus*		38.1%
Northern Kingfish	*Menticirrihitus saxatilis*	164	25.9%
Rainwater Killifish	*Lucania parva*	72	20.9%
Northern Puffer	*Sphoeroides maculatus*	149	19.4%
Alewife / Blueback Herring	*Alosa spp.*	119	19.4%
Green Crab	*Carcinus maenus*	59	18.7%
Threespine Stickleback	*Gasterosteus aculeatus*		18.0%
Atlantic Needlefish	*Strongylura marina*	76	16.5%
Mummichog	*Fundulus heteroclitus*		16.5%
White Mullet	*Mugil curema*	582	15.1%
Lady Crab	*Ovalipes ocellatus*	81	12.2%
Spider Crab Uncl.	*Majidae*	45	10.8%
Striped Searobin	*Prionotus evolans*	52	9.4%
Sheepshead Minnow	*Cyprinodon variegatus*		8.6%
YOY Summer Flounder	*Paralichthys dentatus*	16	8.6%
Northern Quahog	*Mercenaria mercenaria*	16	7.9%
Atlantic Rock Crab	*Cancer irroratus*	16	5.8%
Naked Goby	*Gobiosoma bosci*	13	5.8%
American Eel	*Anguilla rostrata*	7	5.0%
Oyster	*Crassostrea virginica*	8	5.0%
Scup YOY	*Stenotomus chrysops*	105	4.3%
Age 1+ Summer Flounder	*Paralichthys dentatus*	6	2.9%
Spot	*Leiostomus xanthurus*	3	2.2%
Tautog	*Tautoga onitis*	6	2.2%
Black Sea Bass	*Centropristis striata*	2	1.4%
Horseshoe Crab	*Limulus polyphemus*	2	1.4%
Atlantic Herring	*Clupea harengus*	1	0.7%
Alewife	*Alosa pseudoharengus*	1	0.7%
Age 1+ Winter Flounder	*Pseudopleuronectes americanus*	1	0.7%
Smallmouth flounder	*Etropus microstomus*	1	0.7%
Northern Sand Lance	*Ammodytes dubius*	1	0.7%
Asian Shore Crab	*Hemigrapsus sanguineus*	1	0.7%
Ribbed Mussel	*Guekensia demissus*	1	0.7%
Bay Scallop	*Argopecten irradians*	1	0.7%
Cockle	*Anadara ovalis*	1	0.7%

Table 3. MDMF Seine Survey YOY Winter Flounder index, estuaries combined.

Year	Stratified Mean	Standard Error	Lower CI	Upper CI
1976	0.344	0.042	0.236	0.452
1977	0.641	0.062	0.508	0.774
1978	0.366	0.057	0.235	0.498
1979	0.507	0.060	0.366	0.648
1980	0.432	0.057	0.306	0.559
1981	0.340	0.056	0.208	0.471
1982	0.370	0.055	0.246	0.494
1983	0.231	0.027	0.176	0.287
1984	0.323	0.036	0.248	0.399
1985	0.335	0.039	0.254	0.415
1986	0.325	0.039	0.244	0.406
1987	0.274	0.032	0.208	0.340
1988	0.184	0.024	0.133	0.234
1989	0.421	0.046	0.325	0.518
1990	0.325	0.038	0.247	0.402
1991	0.267	0.038	0.188	0.346
1992	0.294	0.047	0.196	0.392
1993	0.067	0.009	0.047	0.086
1994	0.148	0.019	0.108	0.188
1995	0.154	0.023	0.107	0.201
1996	0.221	0.027	0.165	0.277
1997	0.392	0.053	0.278	0.506
1998	0.165	0.029	0.104	0.226
1999	0.201	0.028	0.143	0.258
2000	0.347	0.043	0.258	0.435
2001	0.214	0.028	0.157	0.272
2002	0.100	0.011	0.077	0.122
2003	0.197	0.032	0.128	0.267
2004	0.095	0.012	0.070	0.120
2005	0.075	0.010	0.054	0.096
2006	0.164	0.018	0.126	0.202
2007	0.167	0.021	0.125	0.210
2008	0.092	0.011	0.069	0.115
2009	0.083	0.013	0.056	0.109
2010	0.092	0.014	0.063	0.122
2011	0.247	0.026	0.194	0.301
2012	0.135	0.014	0.106	0.163
2013	0.250	0.025	0.198	0.302
2014	0.186	0.028	0.130	0.242
2015	0.127	0.018	0.090	0.163
2016	0.187	0.020	0.146	0.228
2017	0.291	0.050	0.182	0.400
2018	0.111	0.021	0.065	0.156
2019	0.145	0.019	0.104	0.185
2020	0.238	0.049	0.133	0.342
2021	0.223	0.031	0.160	0.286
2022	0.231	0.028	0.175	0.287
2023	0.451	0.088	0.258	0.643
2024	0.196	0.028	0.137	0.256
	0.223	**timeseries median**		

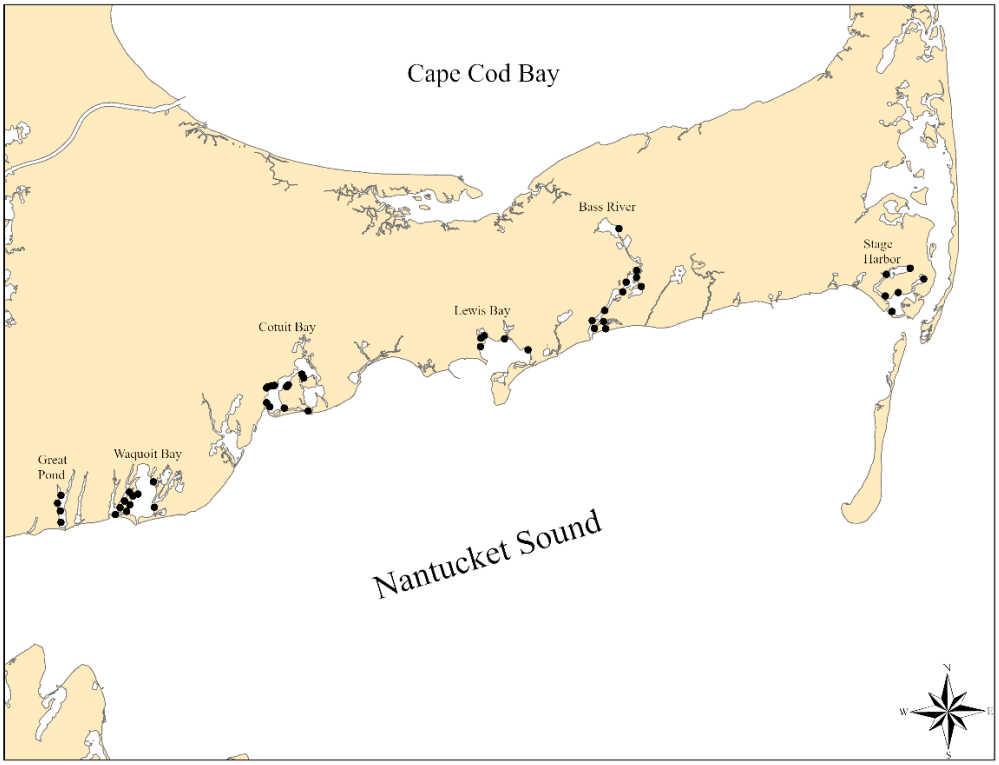


Figure 1. Seine Survey Sites sampled and used in the stratified indices.

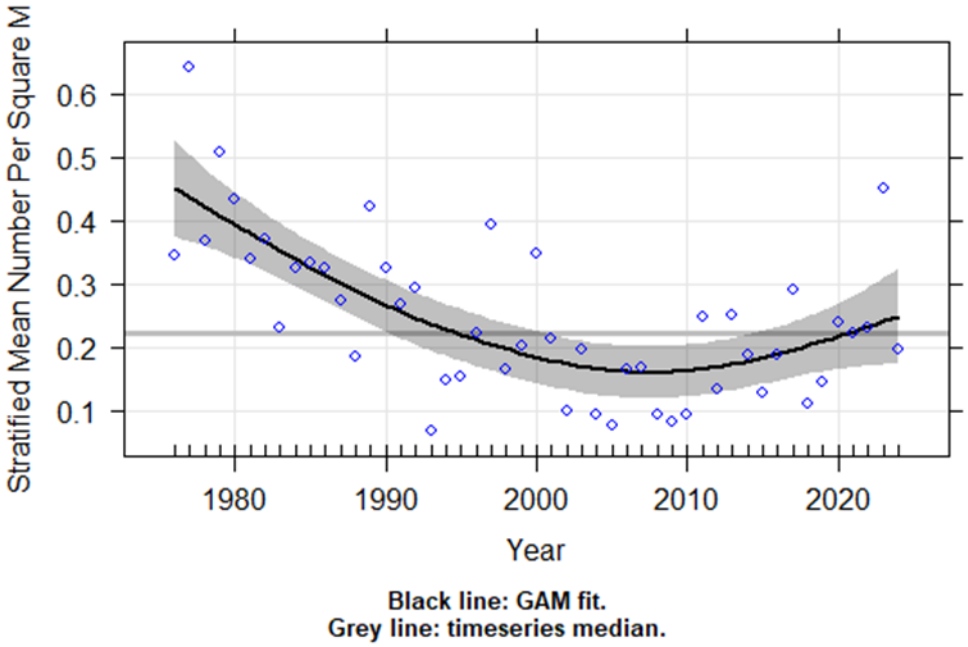


Figure 2. Seine survey cumulative YOY Winter Flounder abundance.

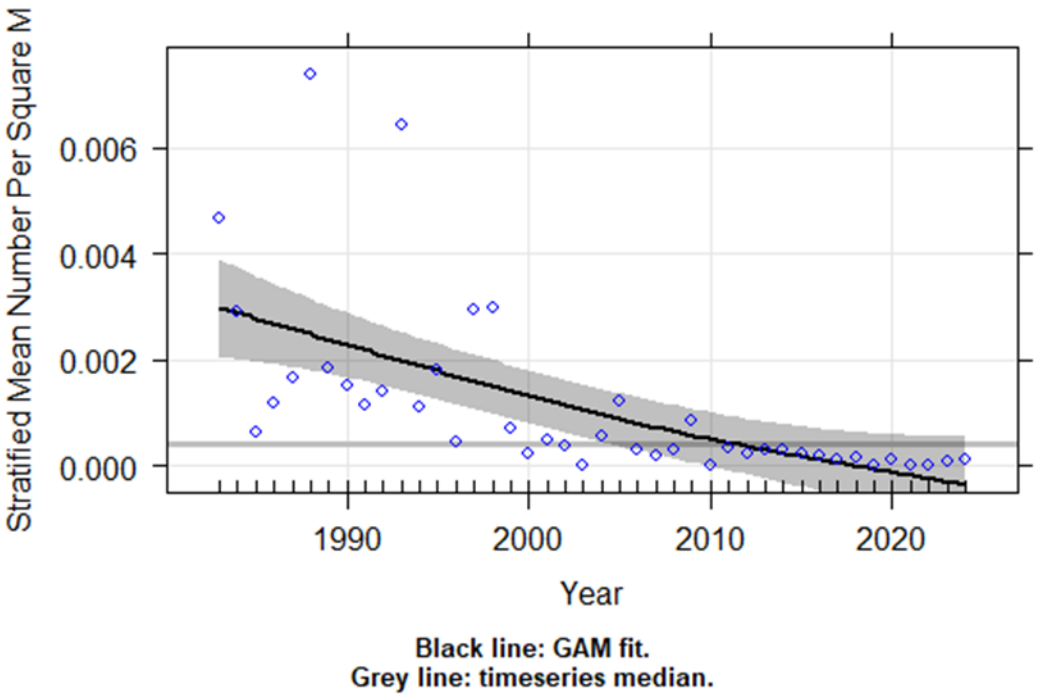


Figure 3. Age 1 + Winter Flounder index, MDMF Seine Survey (started recording age 1+ in 1983).

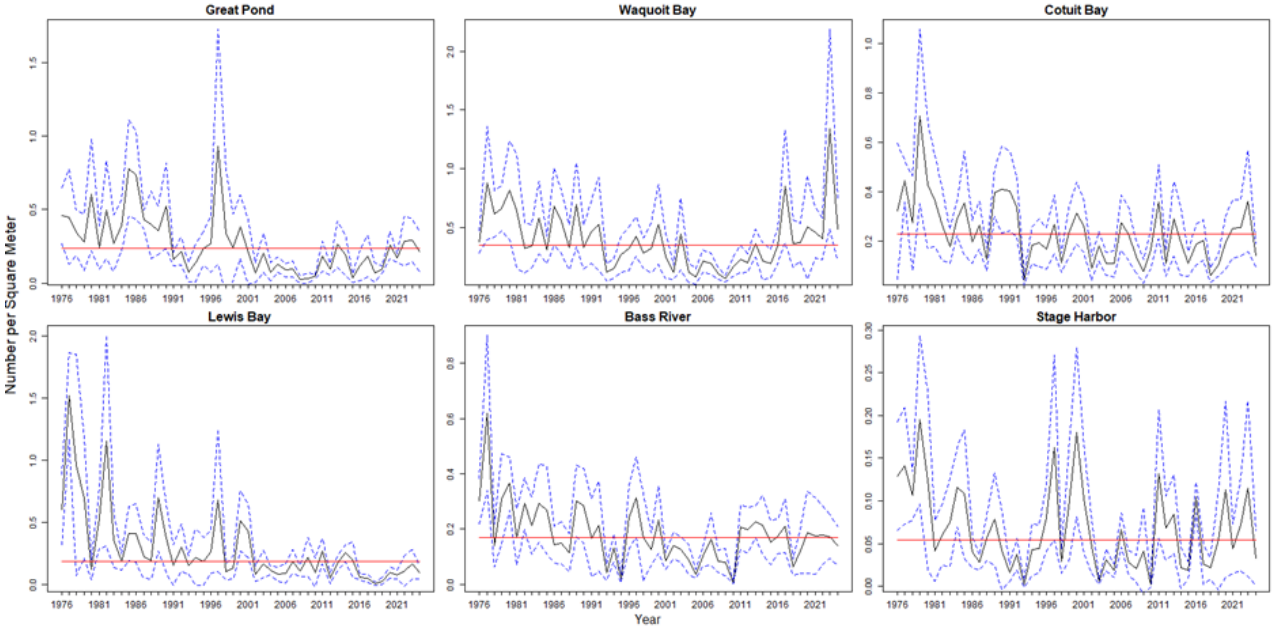


Figure 4. YOY Winter Flounder Indices for each estuary, MDMF Seine Survey (Dashed lines = 95% Confidence Intervals, Horizontal line = Timeseries Median for each estuary and Y-axis scales differ in magnitude).

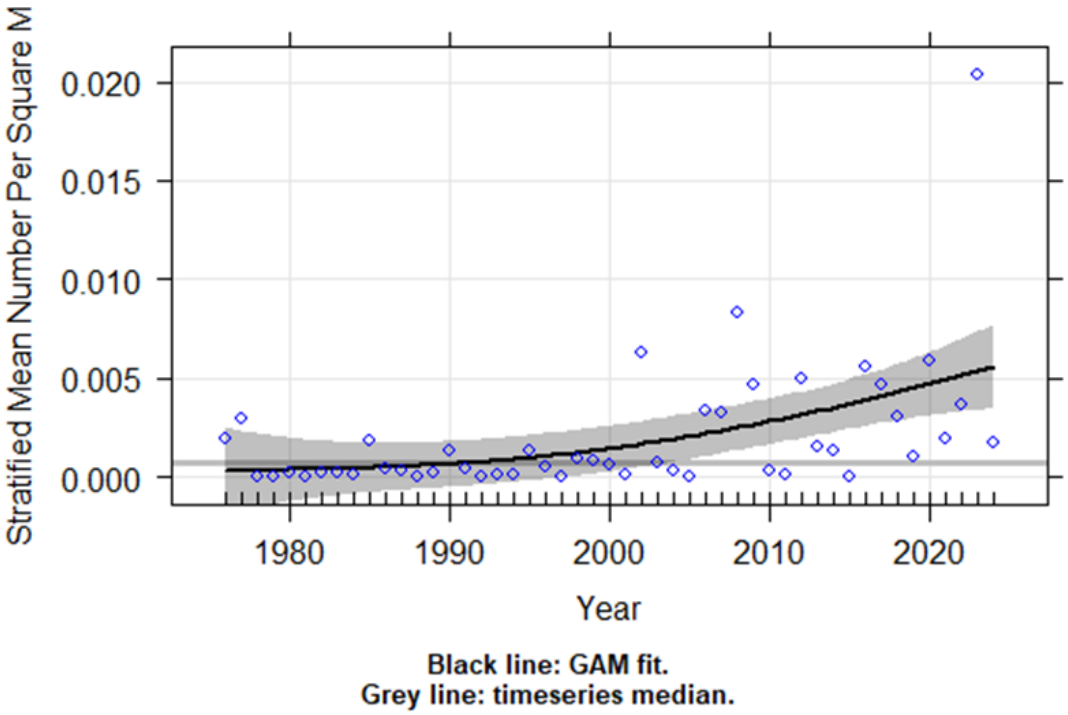


Figure 5. YOY Summer Flounder index MDMF Seine Survey.

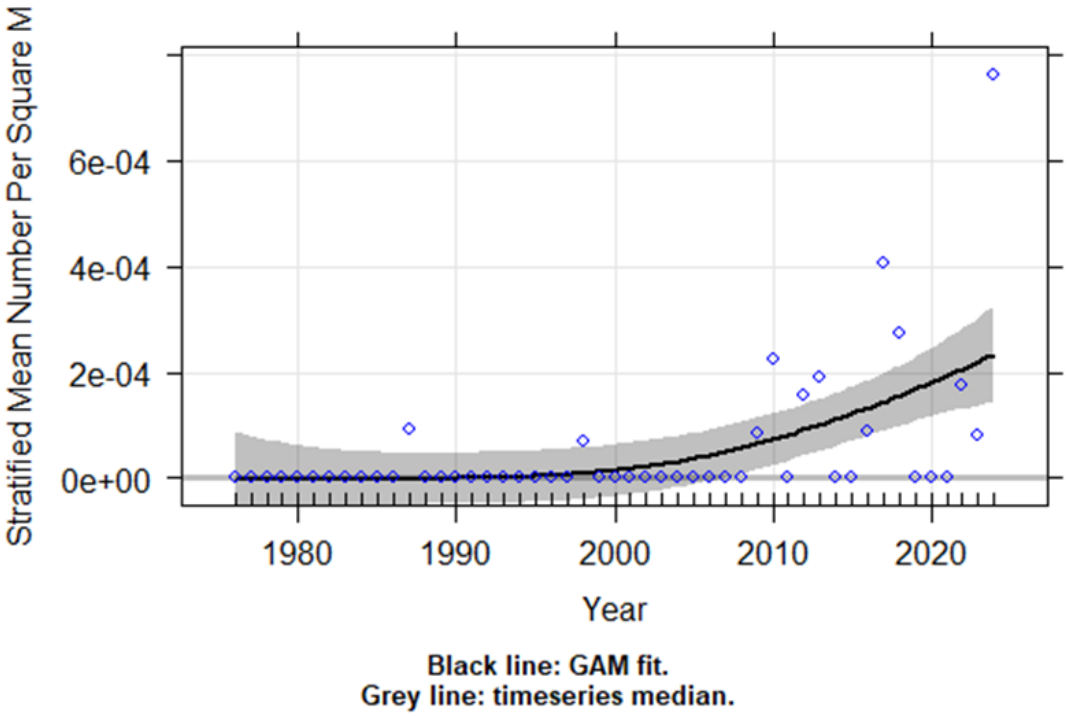


Figure 6. Age 1+ Summer Flounder index MDMF Seine Survey.

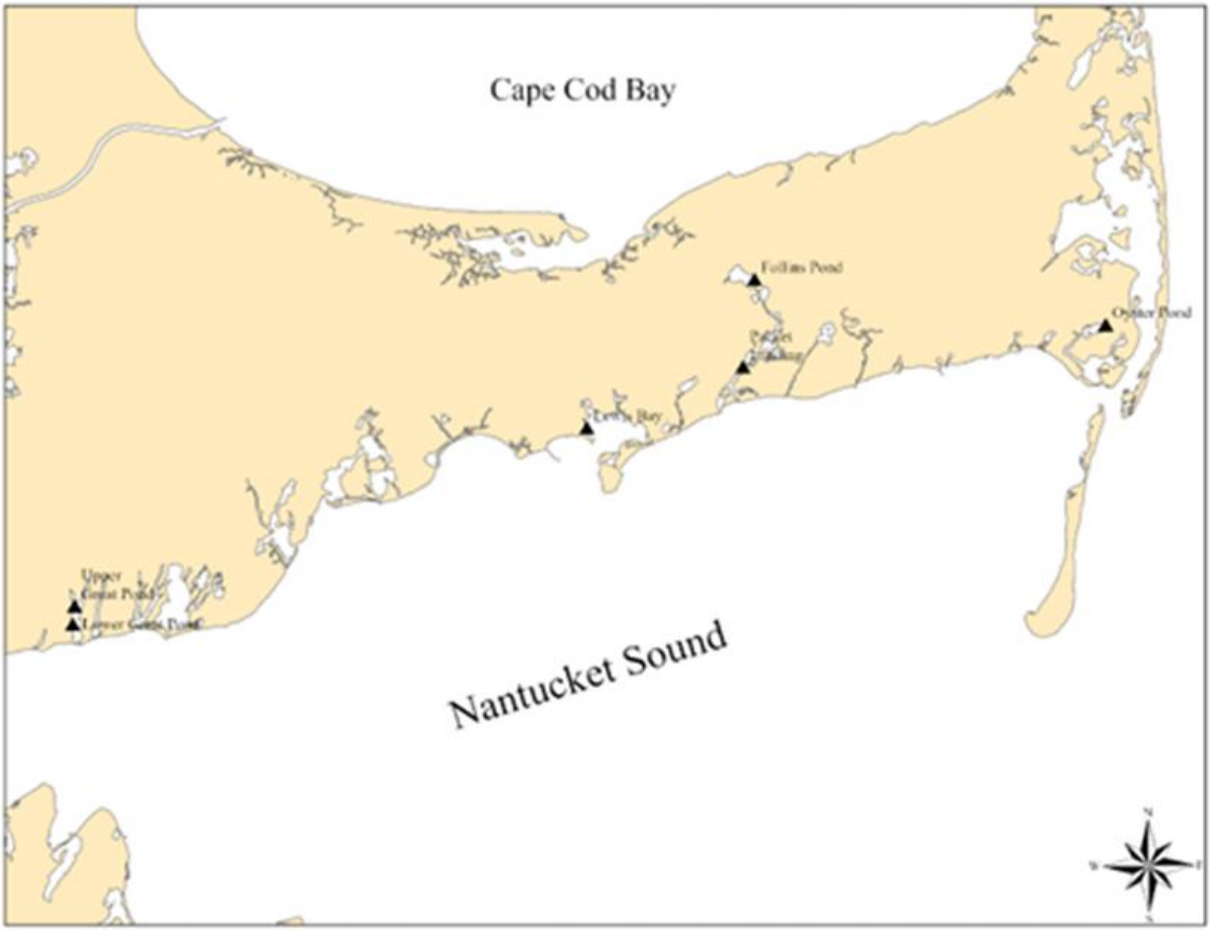


Figure 7. MDMF seine survey temperature monitor locations.

Appendix A: Massachusetts Inshore Bottom Trawl Survey Indices of Biomass, Abundance, Recruitment, and Abundance at Age for Select Species

The Massachusetts Division of Marine Fisheries has been conducting a bottom trawl survey of Massachusetts territorial waters every spring and fall since 1978. Survey indices provide a useful fishery-independent metric for tracking the relative abundance or biomass of many demersal fish and invertebrates in the survey area. Updated survey indices are presented here for 1) species or stocks routinely requested by staff from within the Massachusetts Division of Marine Fisheries as well as by other governmental and non-governmental scientific bodies, academic researchers and consultants and/or 2) those species which have been a large part of the survey biomass and/or demonstrate a particularly strong trend over the time series.

Additional survey data can be requested by contacting Steve Wilcox at 508-742-9731 or steve.wilcox@mass.gov.

Contents:

Figure 3 (a – b). Stratified mean number per tow 1978 – 2024 Massachusetts DMF trawl survey.

(a) Spring **Channeled Whelk** Regions 1 - 2
(b) Fall **Channeled Whelk** Regions 1 - 2
(c) Fall **Knobbed Whelk** Regions 1 - 2
(d) Spring **Spotted Hake** Regions 1 - 5

Figure 4 (a – b). Pre-recruit stratified mean number per tow 1978 – 2024 Massachusetts DMF trawl survey.

(a) Fall **Age-0 Scup** (<13 cm) Regions 1 – 3
(b) Fall **Age-0 Black Sea Bass** (<12 cm) Regions 1 - 3

Figure 1. Massachusetts trawl survey regions. Gulf of Maine (GOM) = Regions 4-5. Southern New England (SNE) = Regions 1-3.

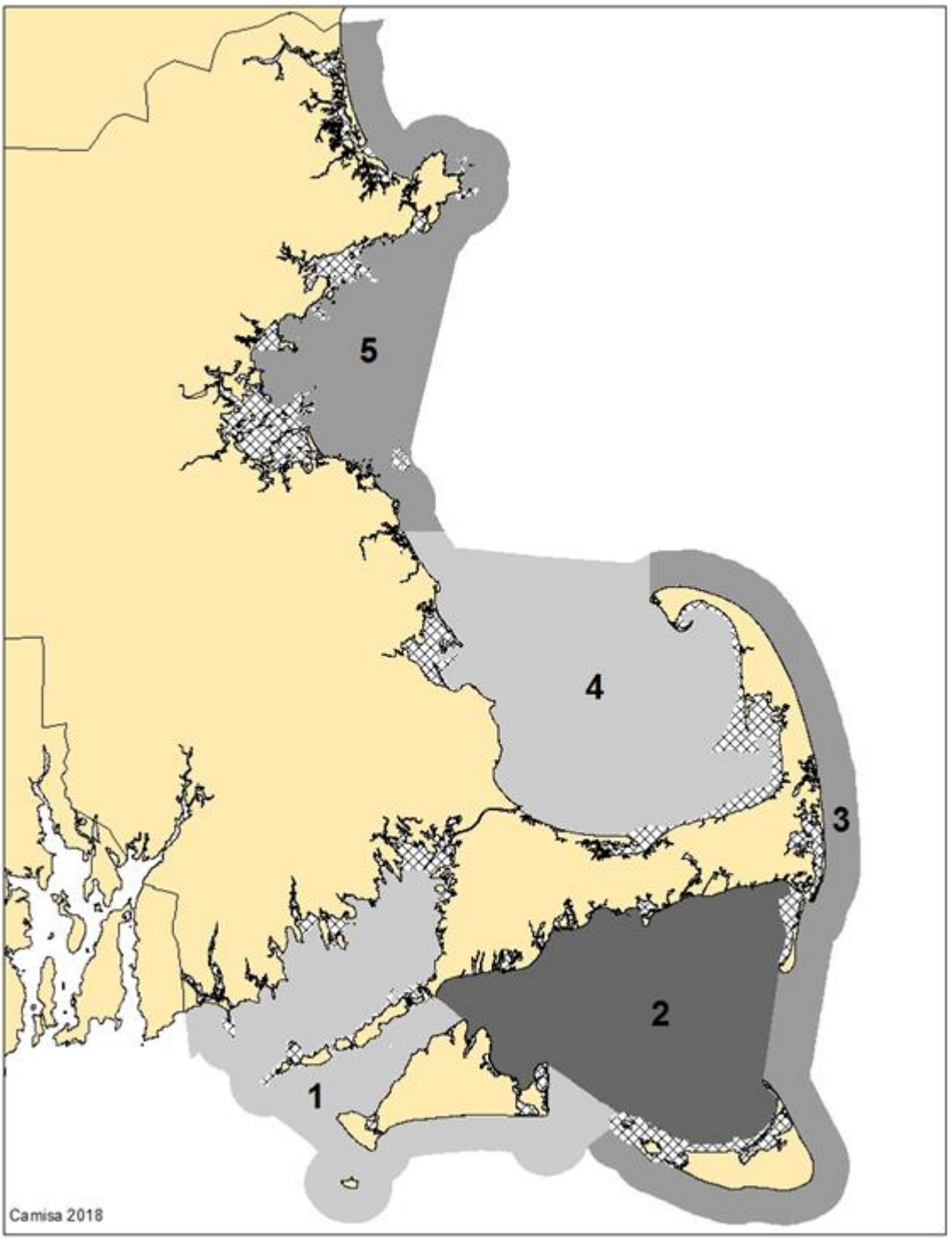
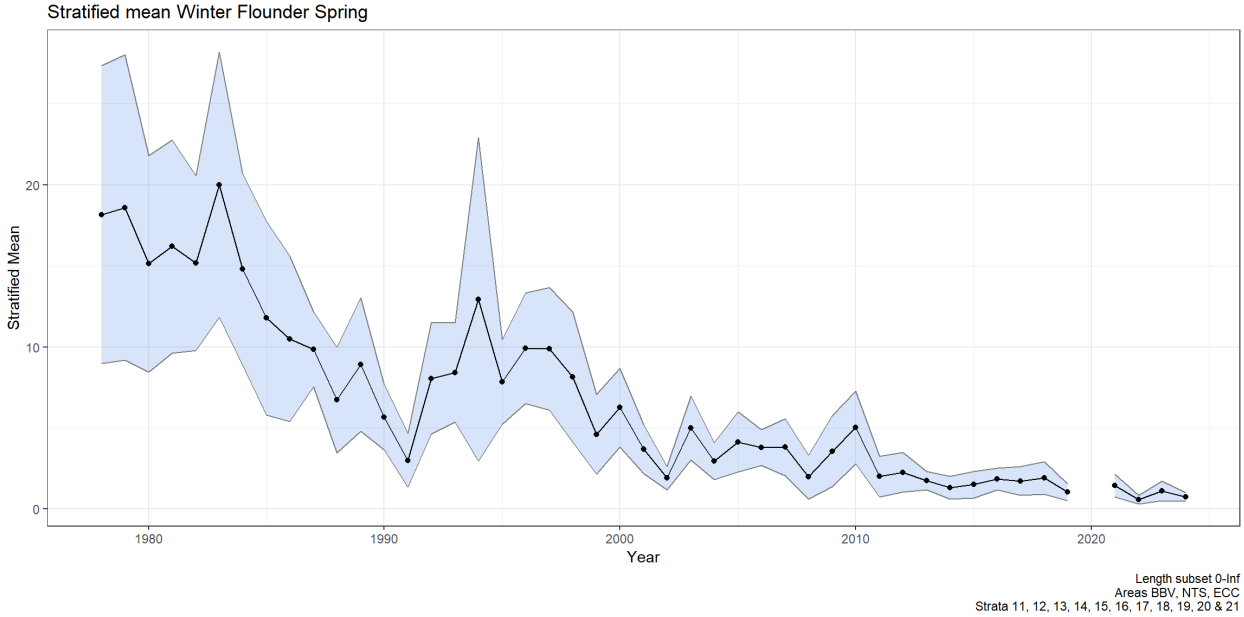


Figure 2. (a & b). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

a.)



b.)

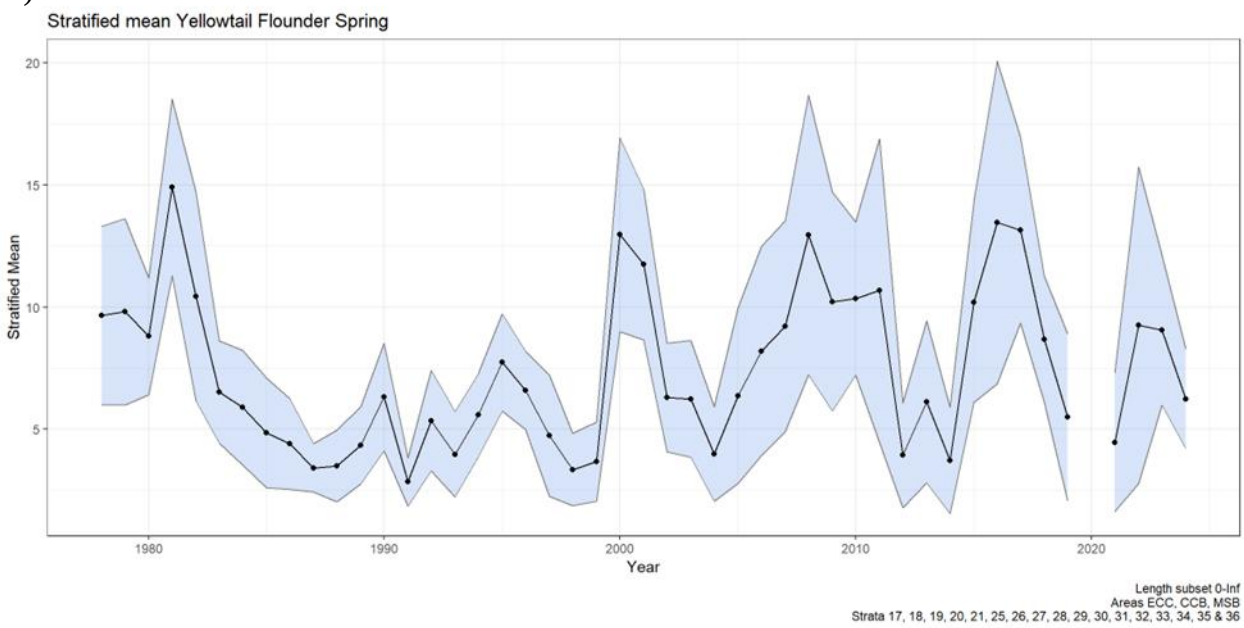
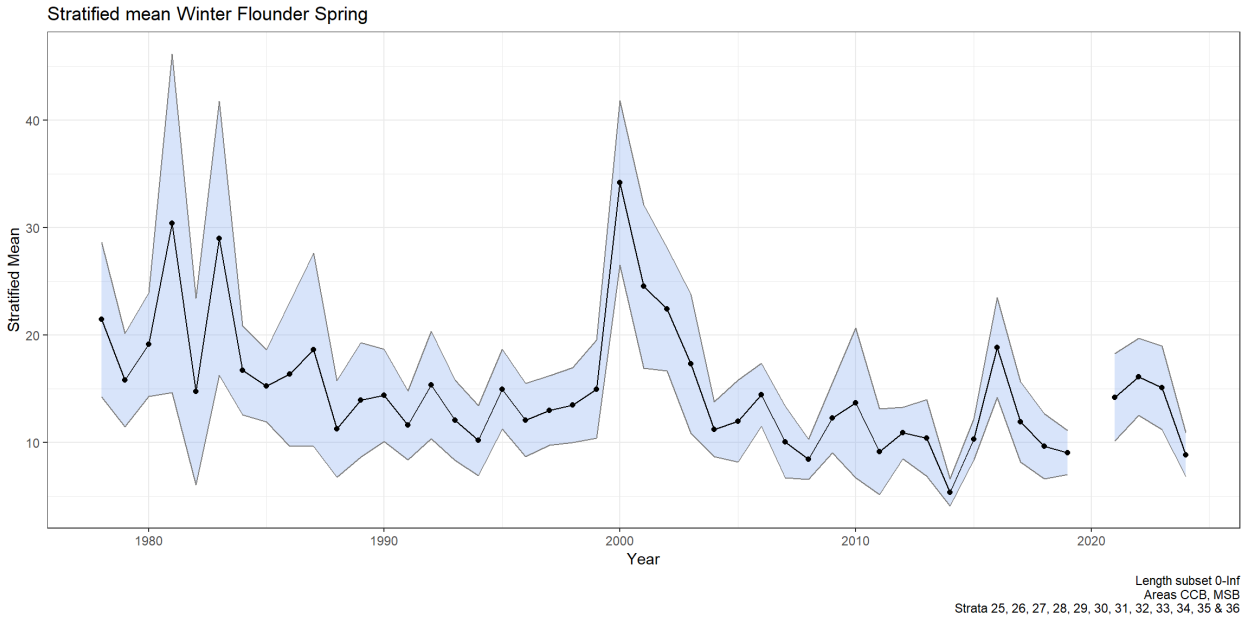


Figure 2. (c & d). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

c.)



d.)

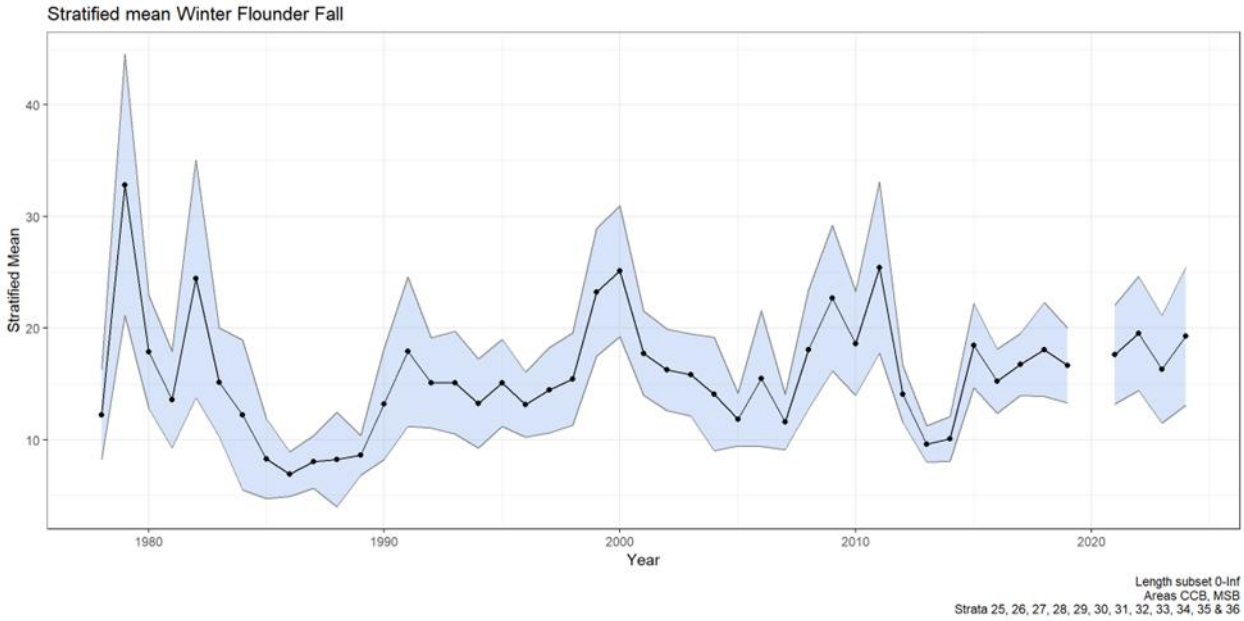
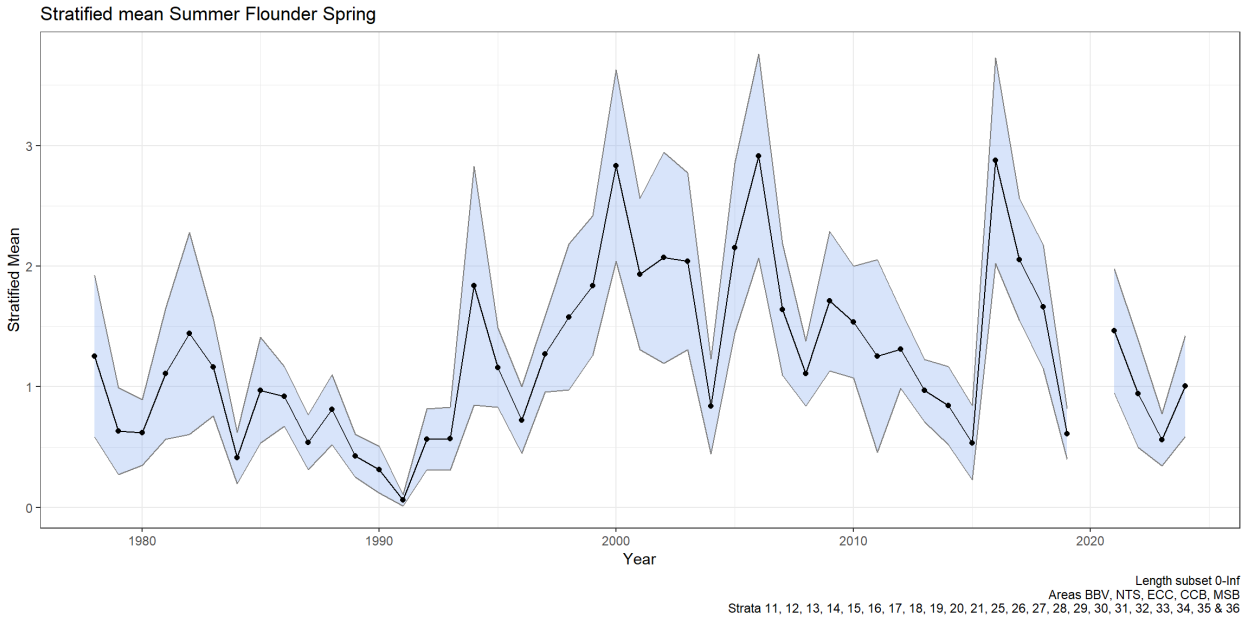


Figure 2. (e & f). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

e.)



f.)

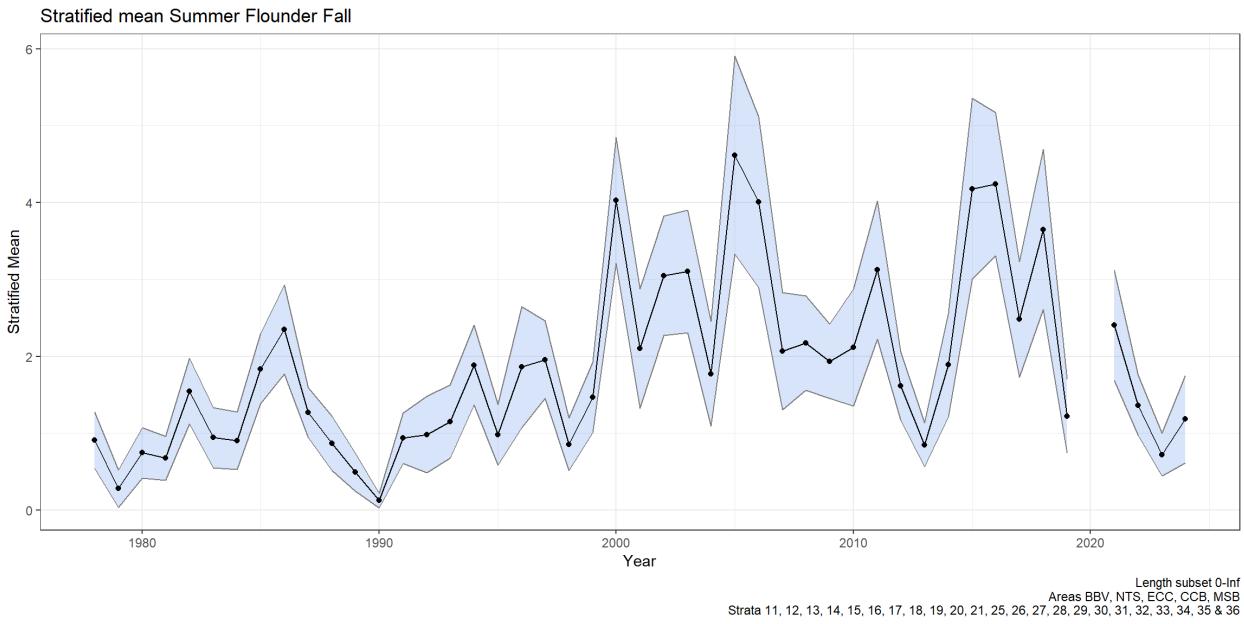
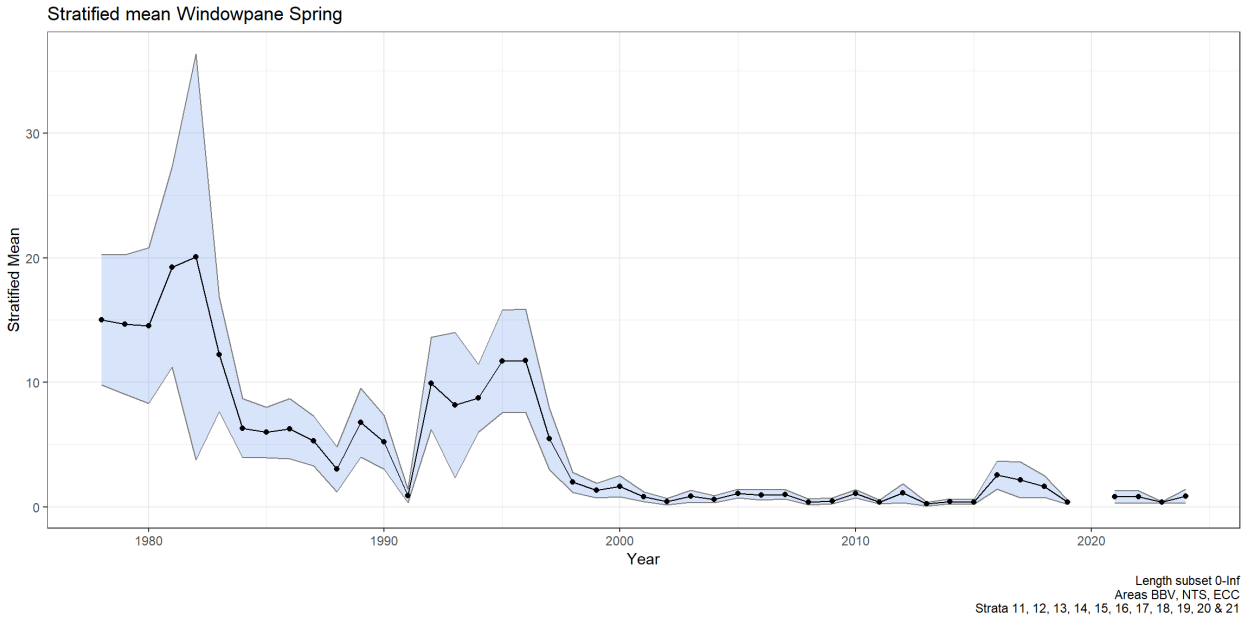


Figure 2. (g & h). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

g.)



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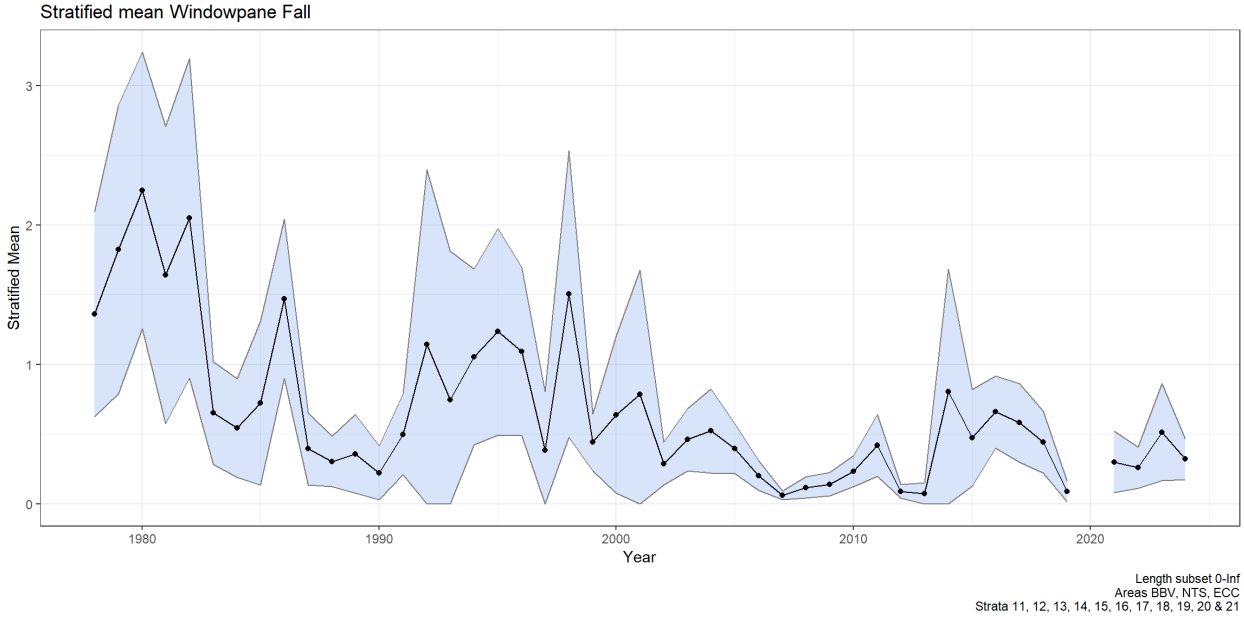
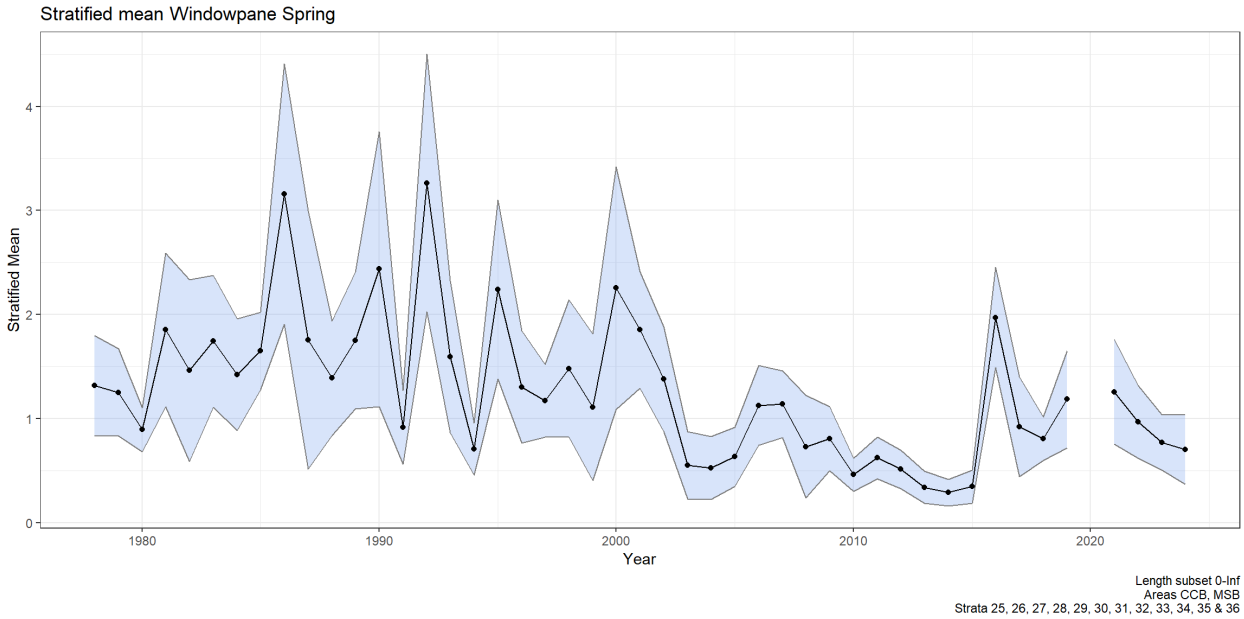


Figure 2. (i & j). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

i.)



j.)

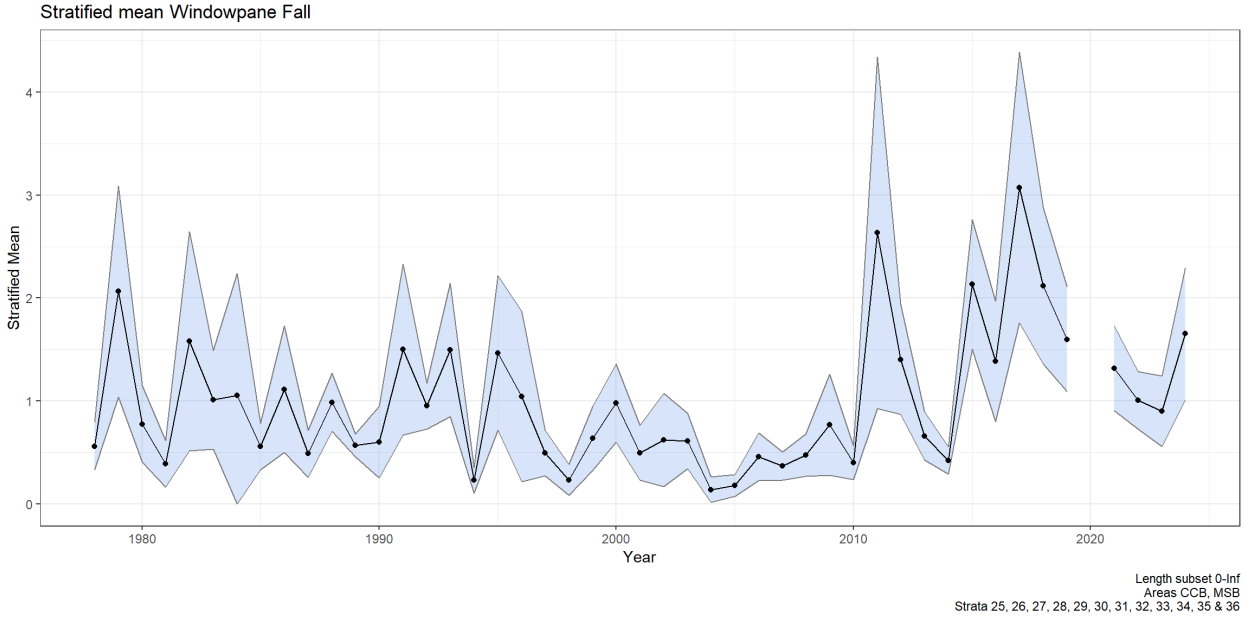
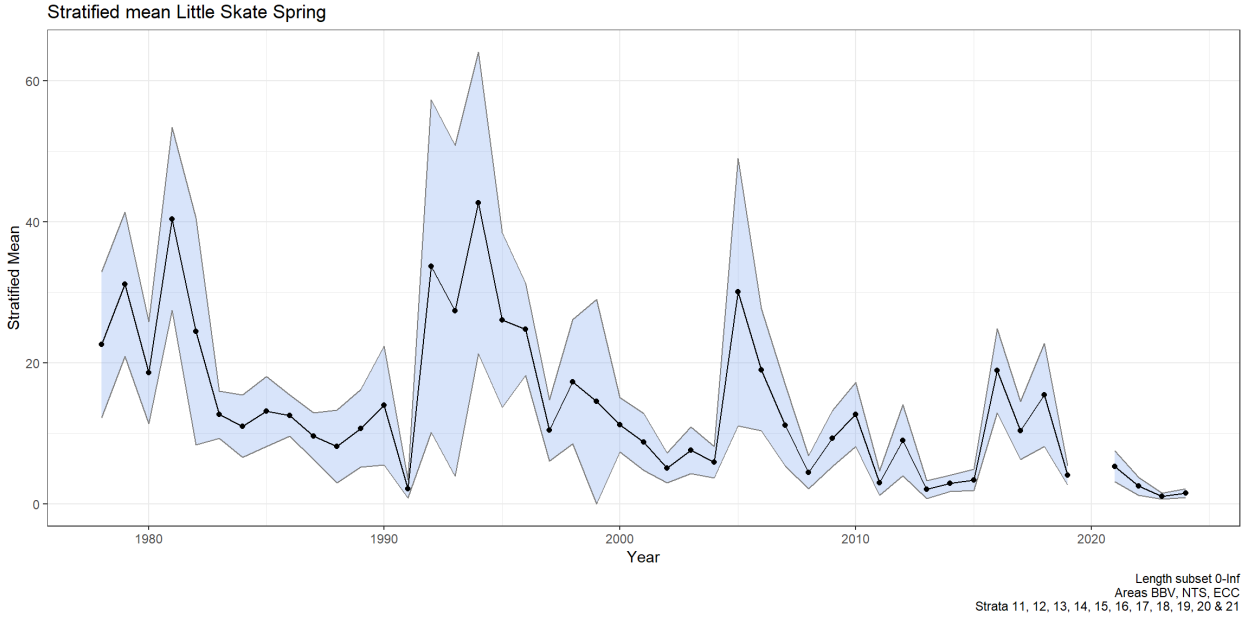


Figure 2. (k & l). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

k.)



l.)

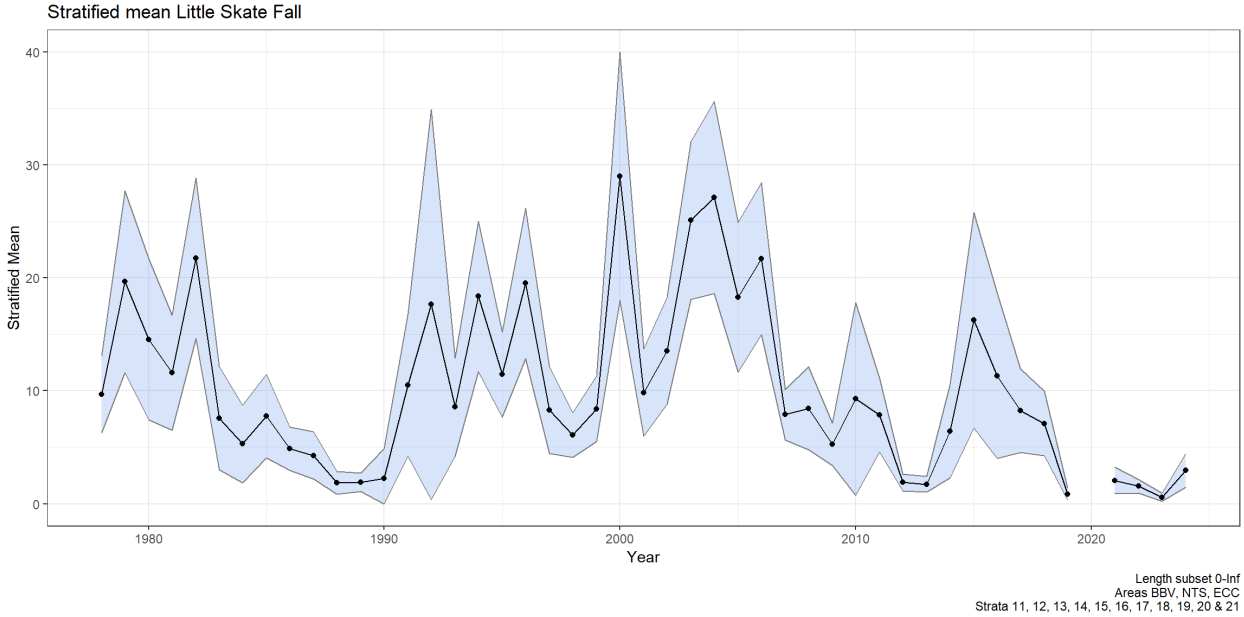
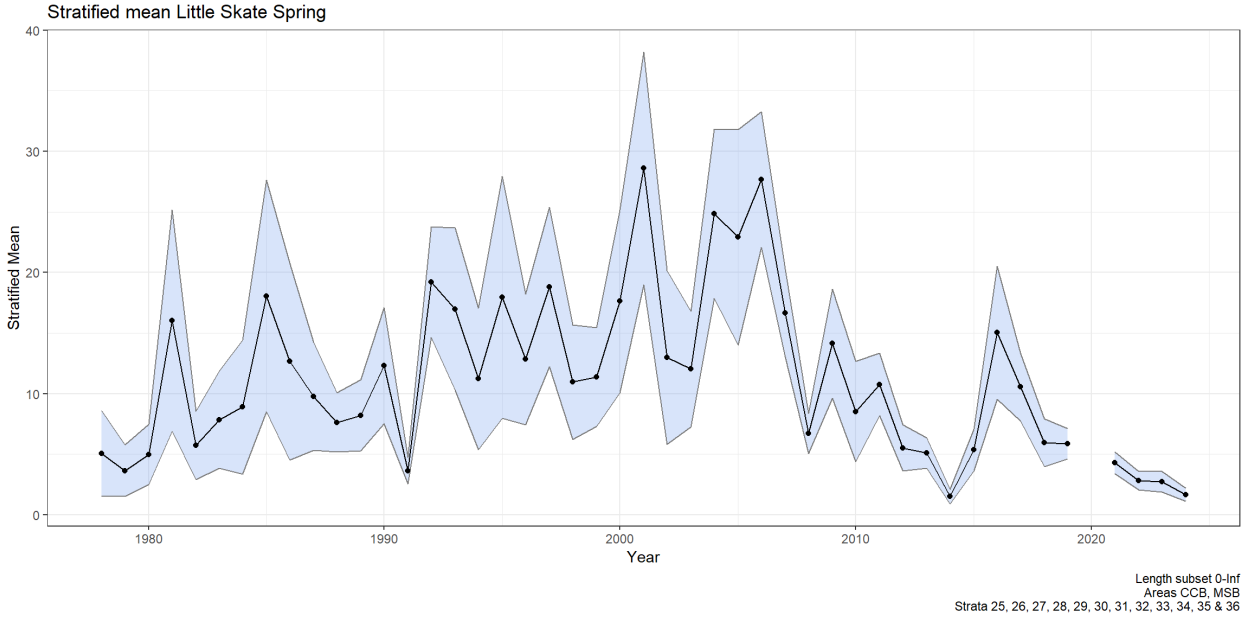


Figure 2. (m & n). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

m.)



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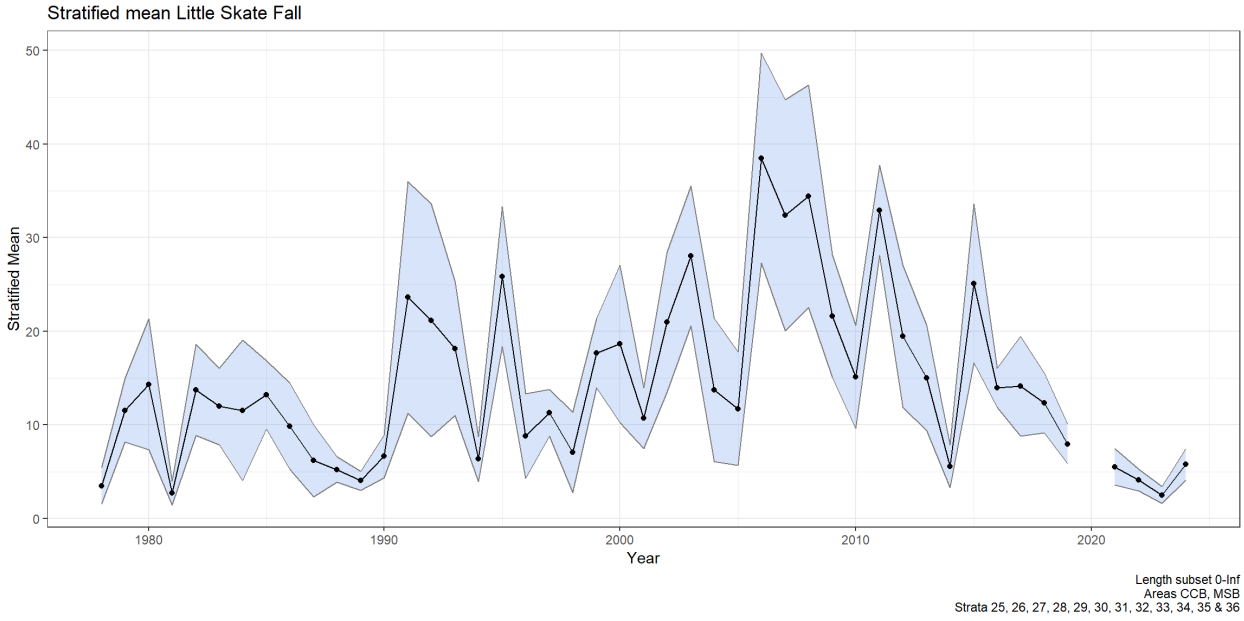
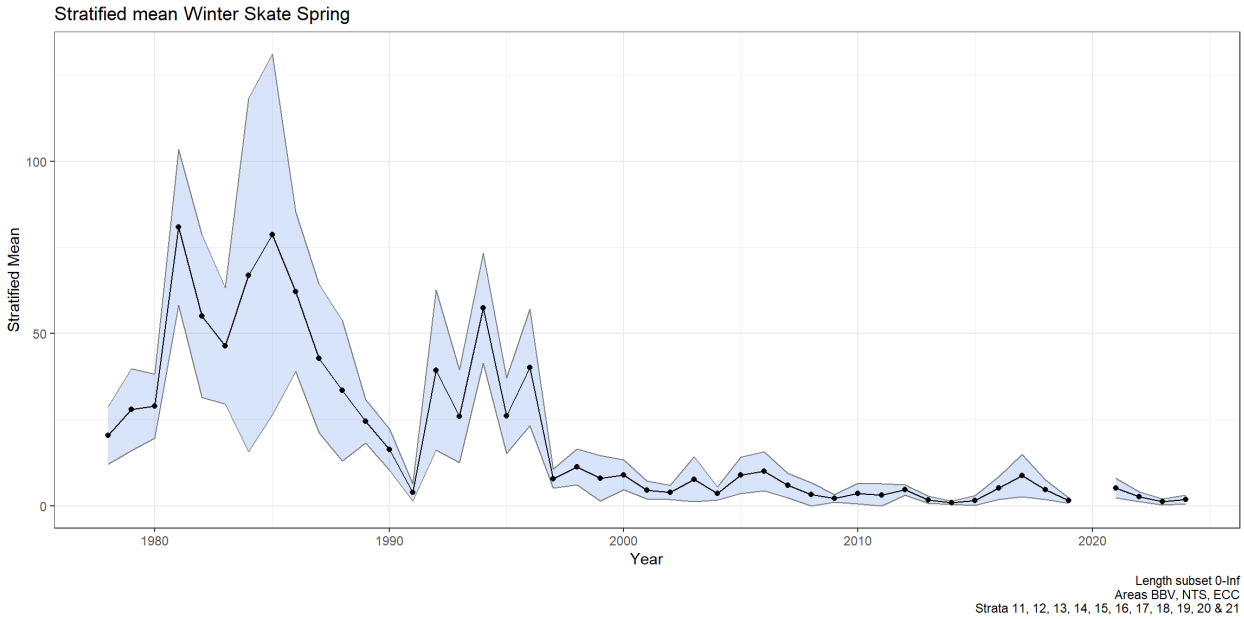


Figure 2. (o & p). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

o.)



p.)

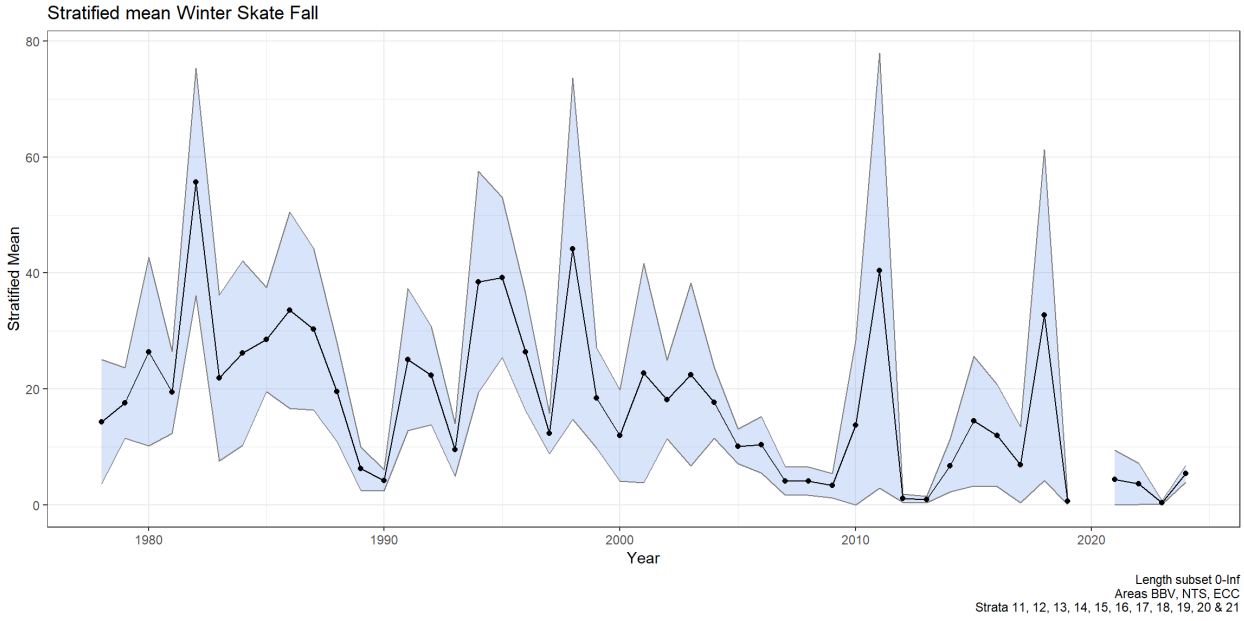
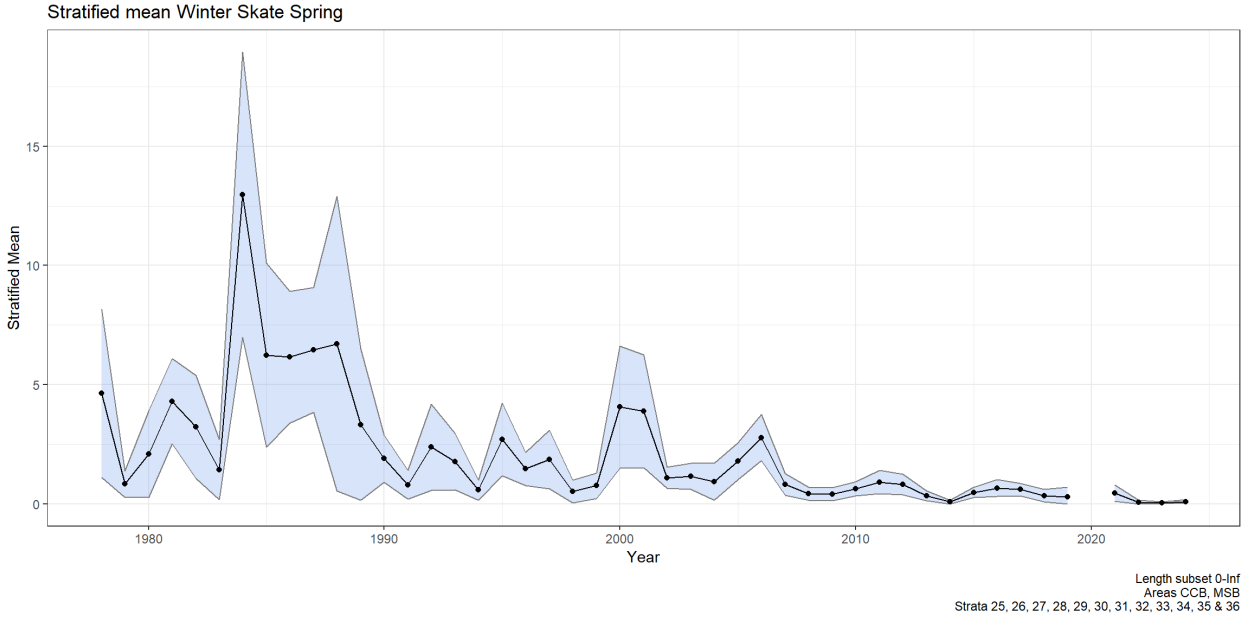


Figure 2. (q & r). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

q.)



r.)

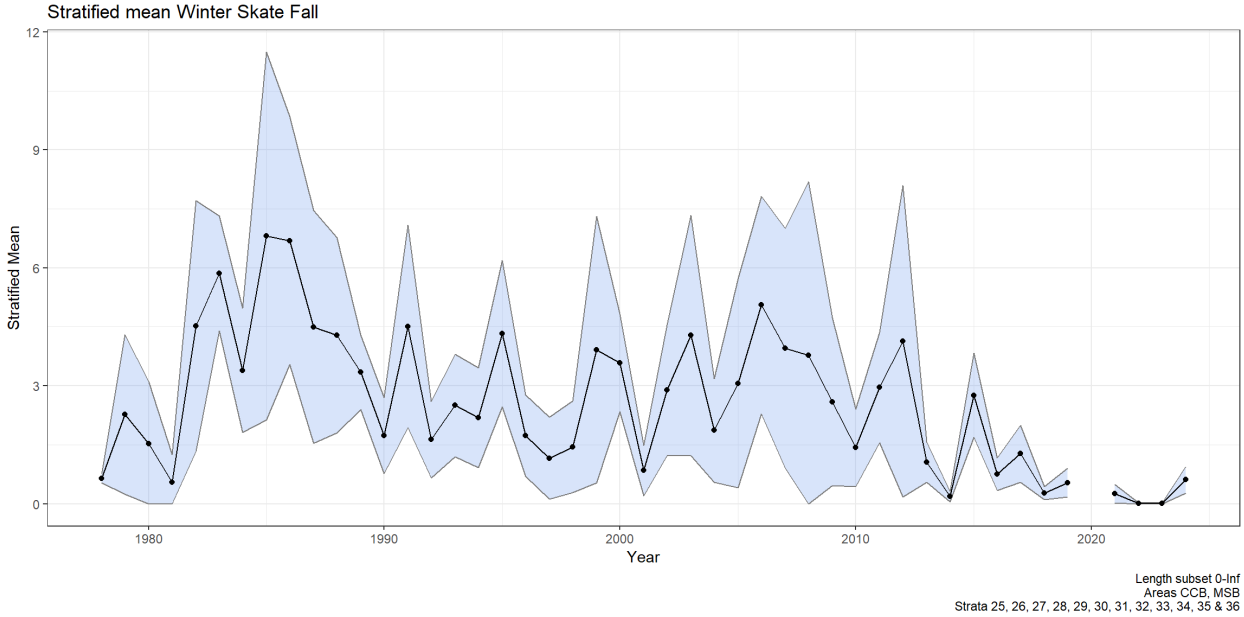
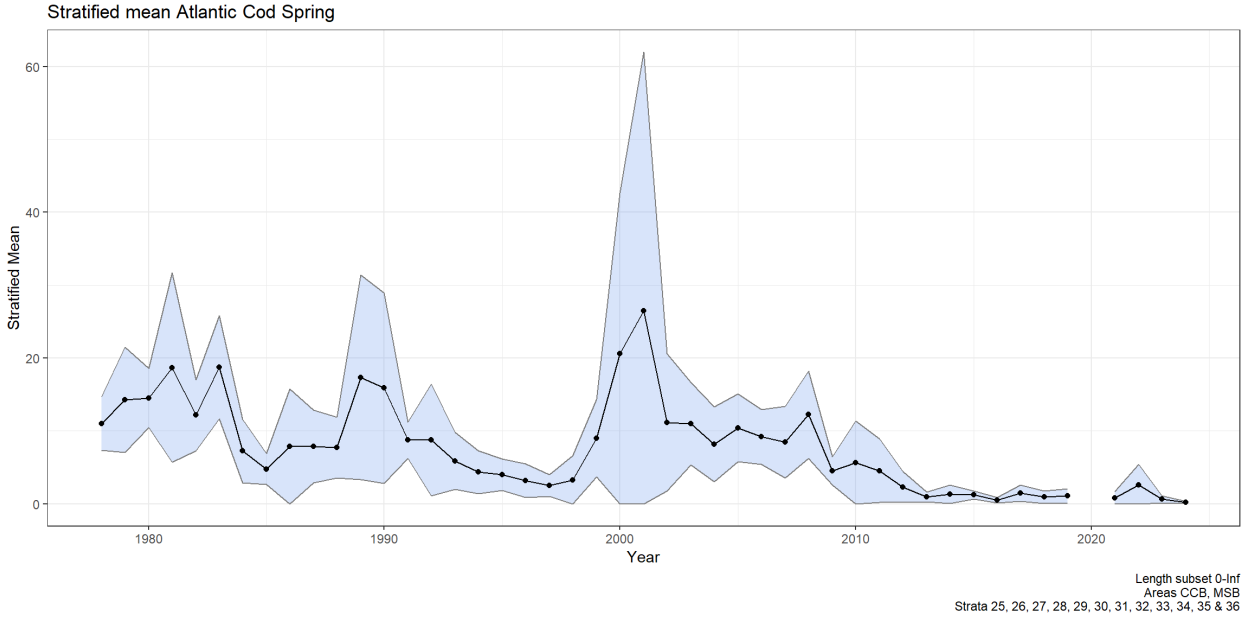


Figure 2. (s & t). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

s.)



t.)

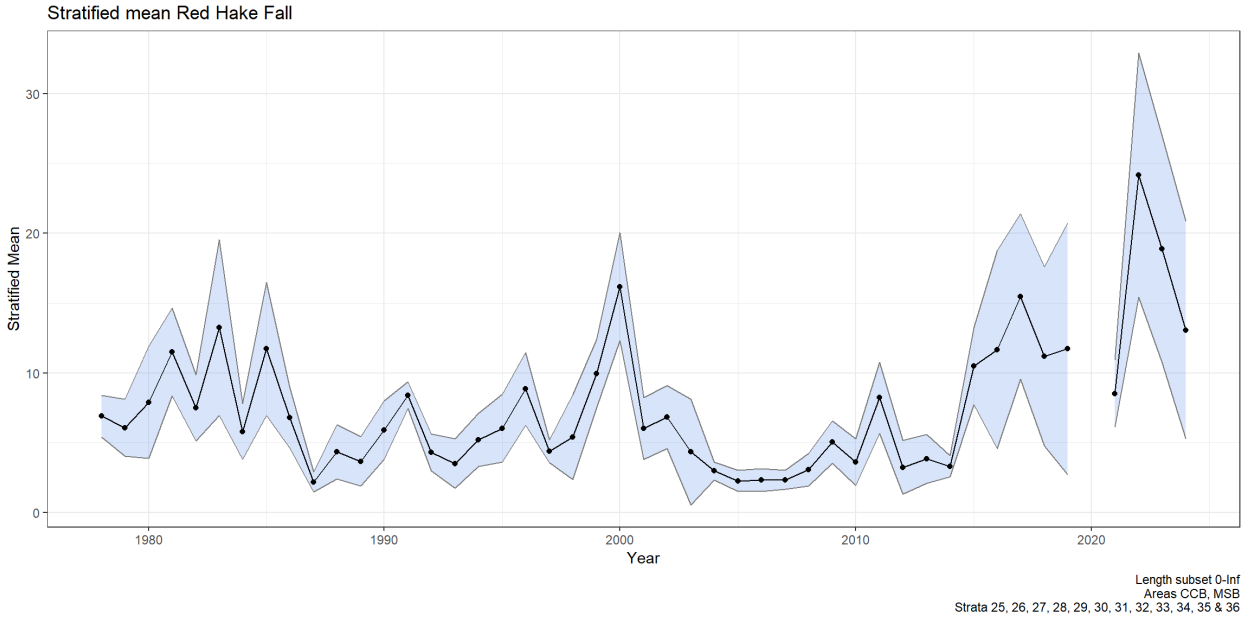
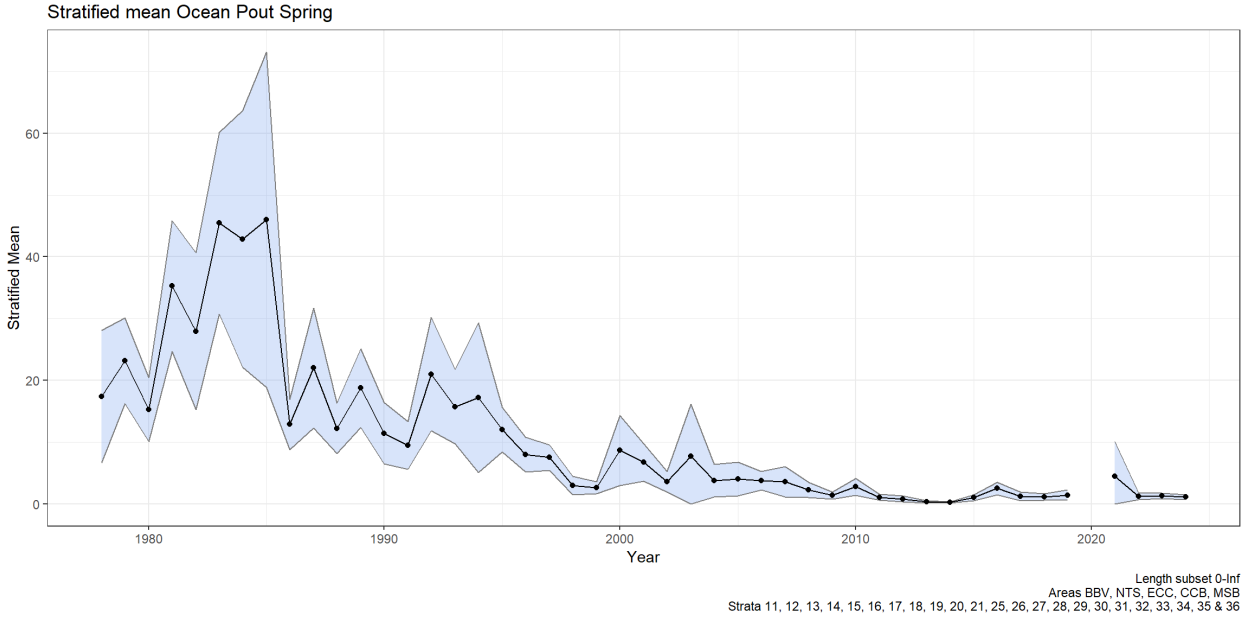


Figure 2. (u & v). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

u.)



v.)

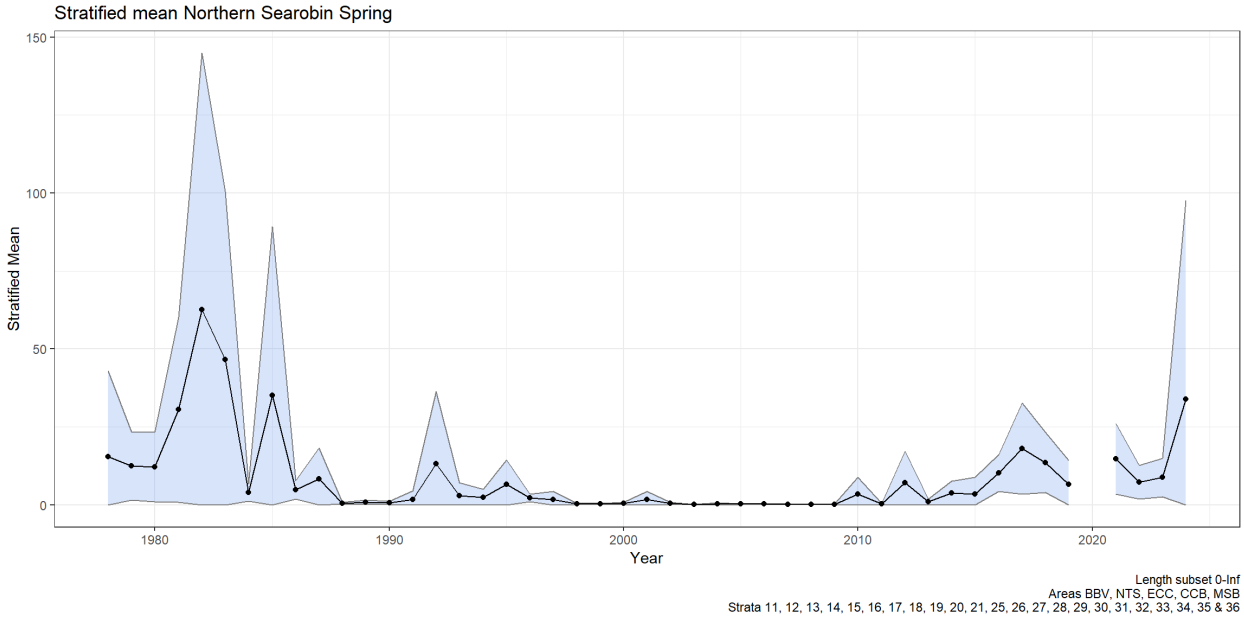
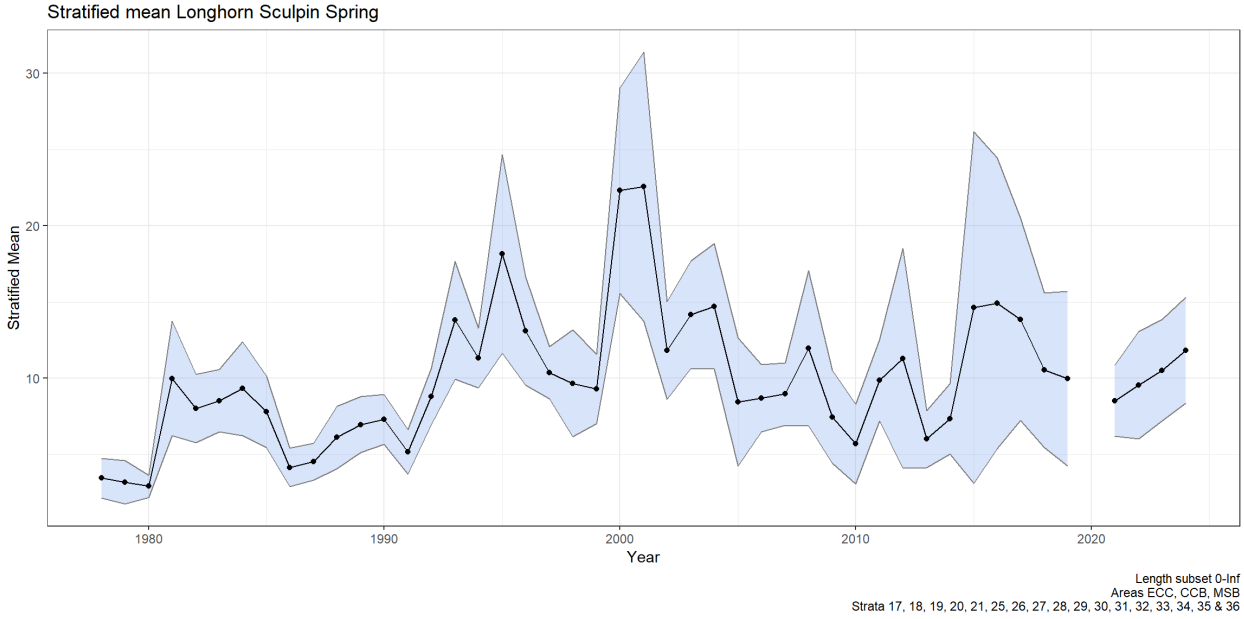


Figure 2. (w & x). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

w.)



x.)

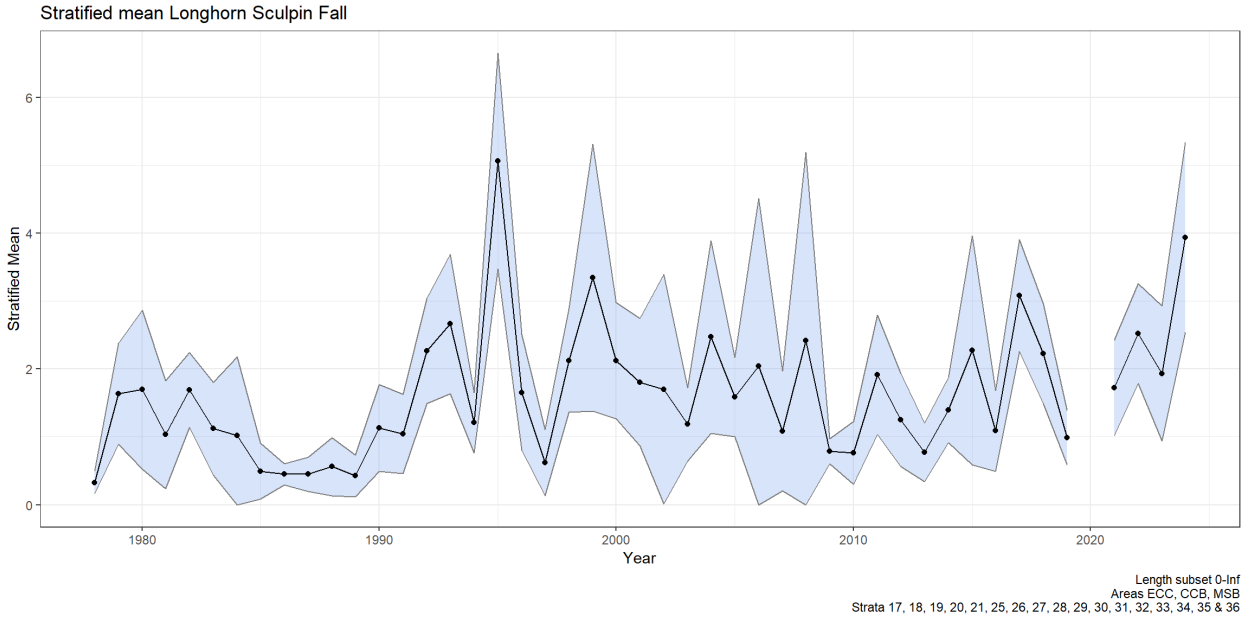
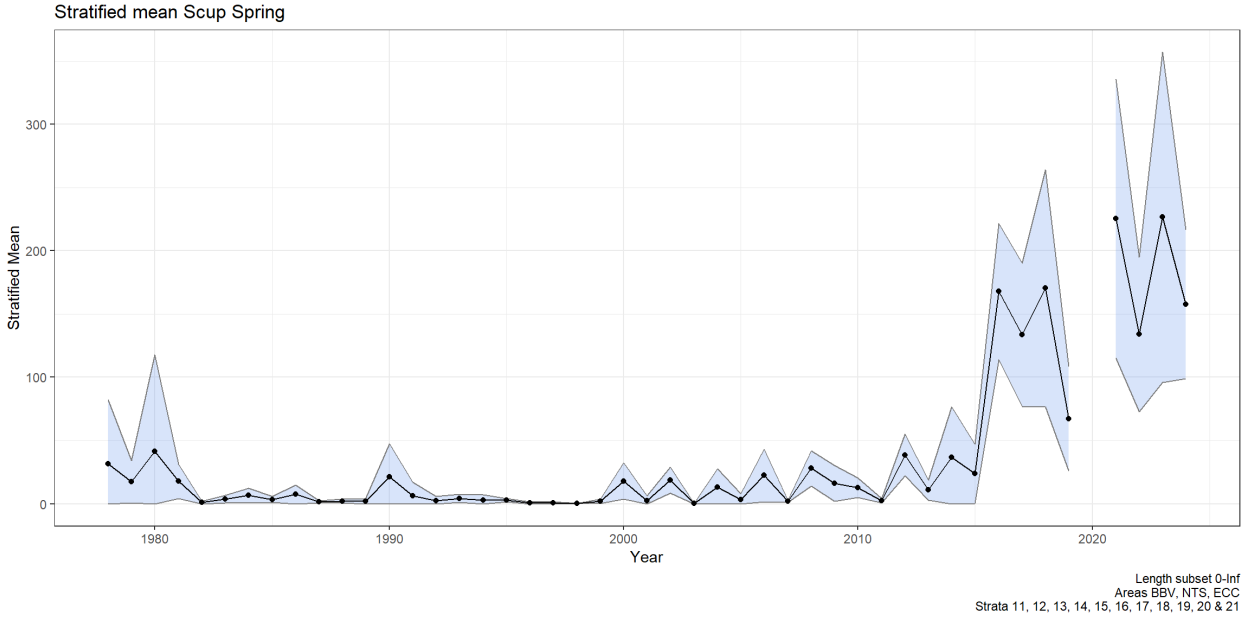


Figure 2. (y & z). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

y.)



z.)

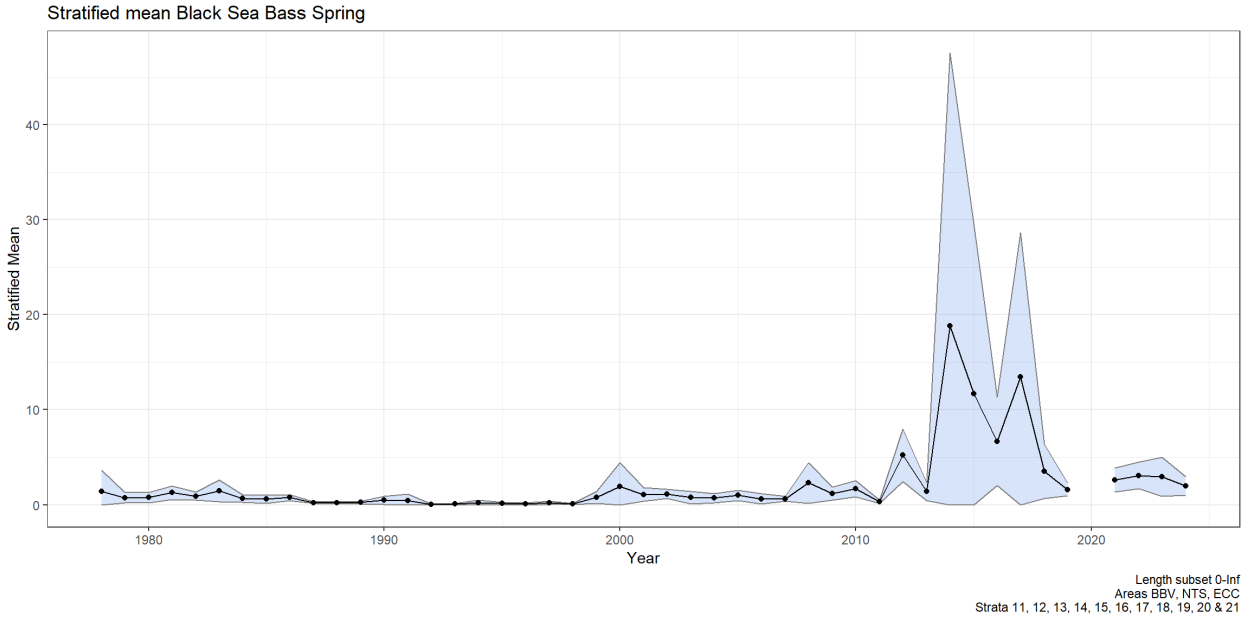
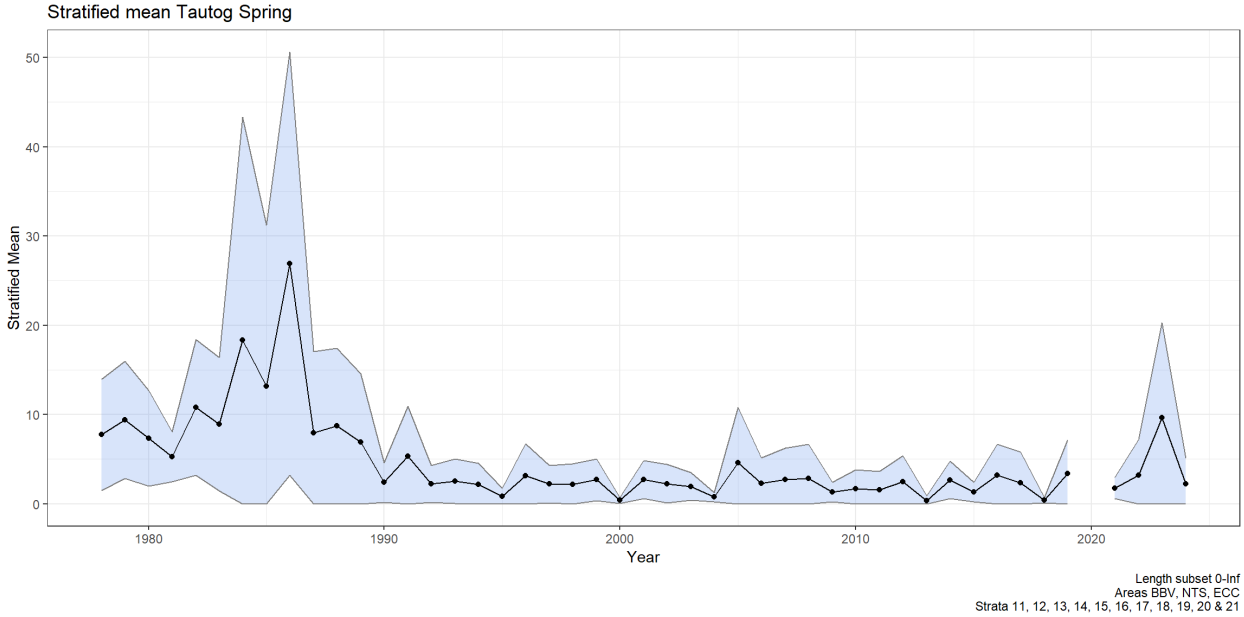


Figure 2. (aa & bb). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

aa.)



bb.)

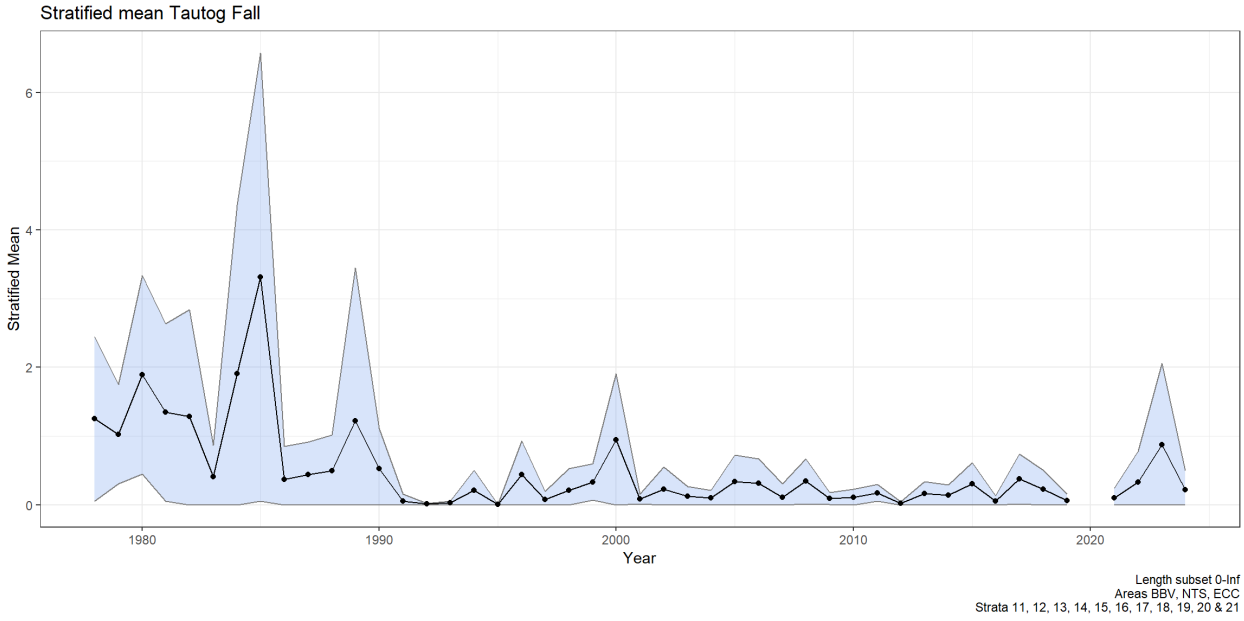
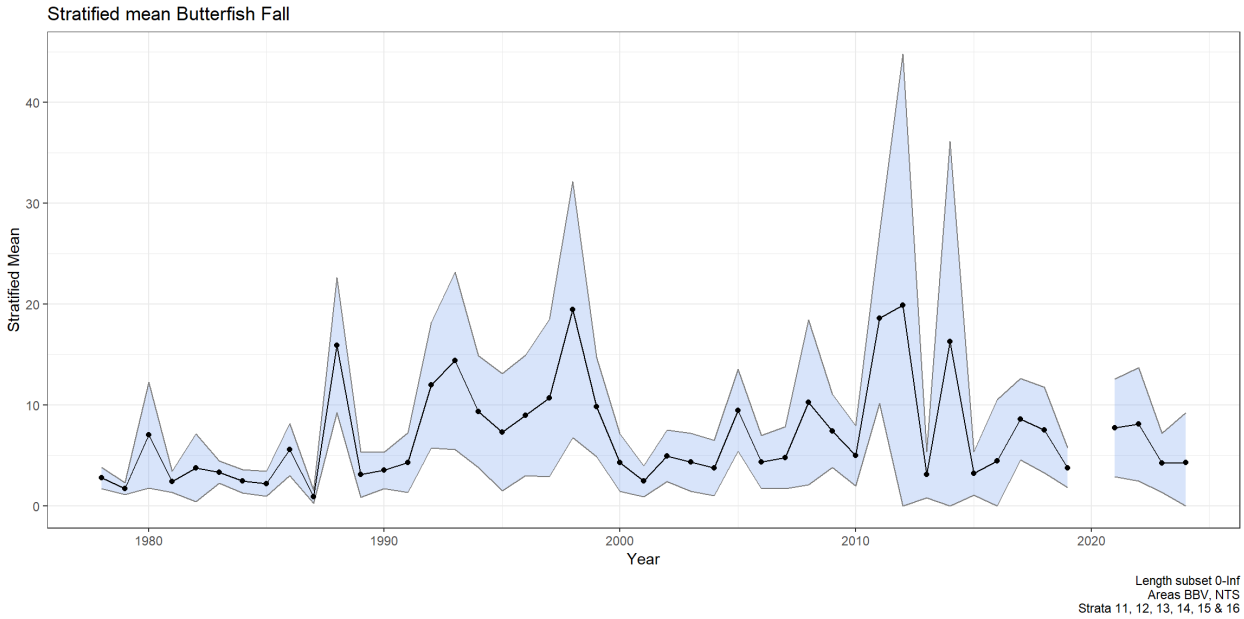


Figure 2. (cc & dd). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

cc.)



dd.)

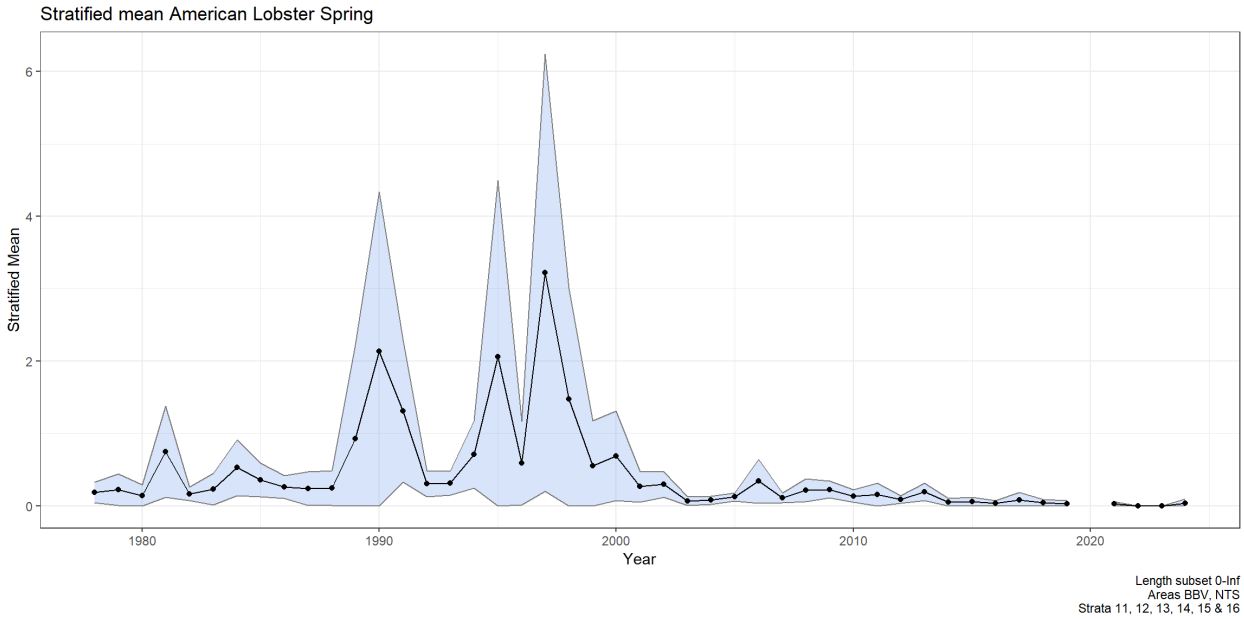
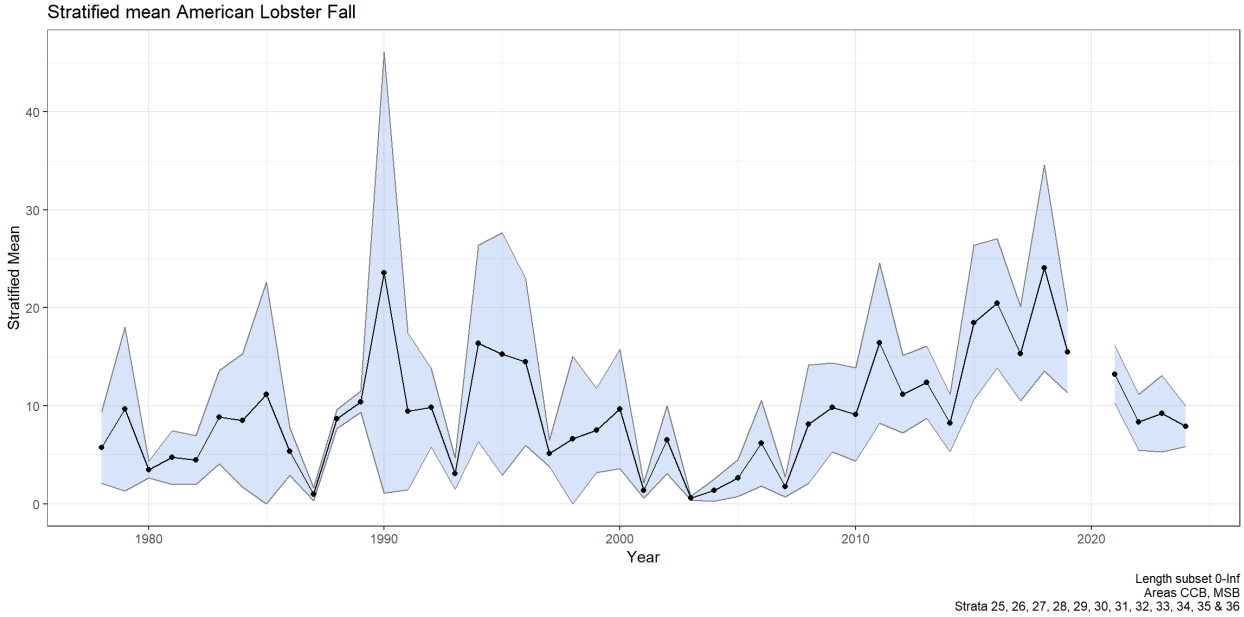


Figure 2. (ee & ff). Stratified mean weight per tow (kg) 1978 – 2024 Massachusetts DMF Trawl survey.

ee.)



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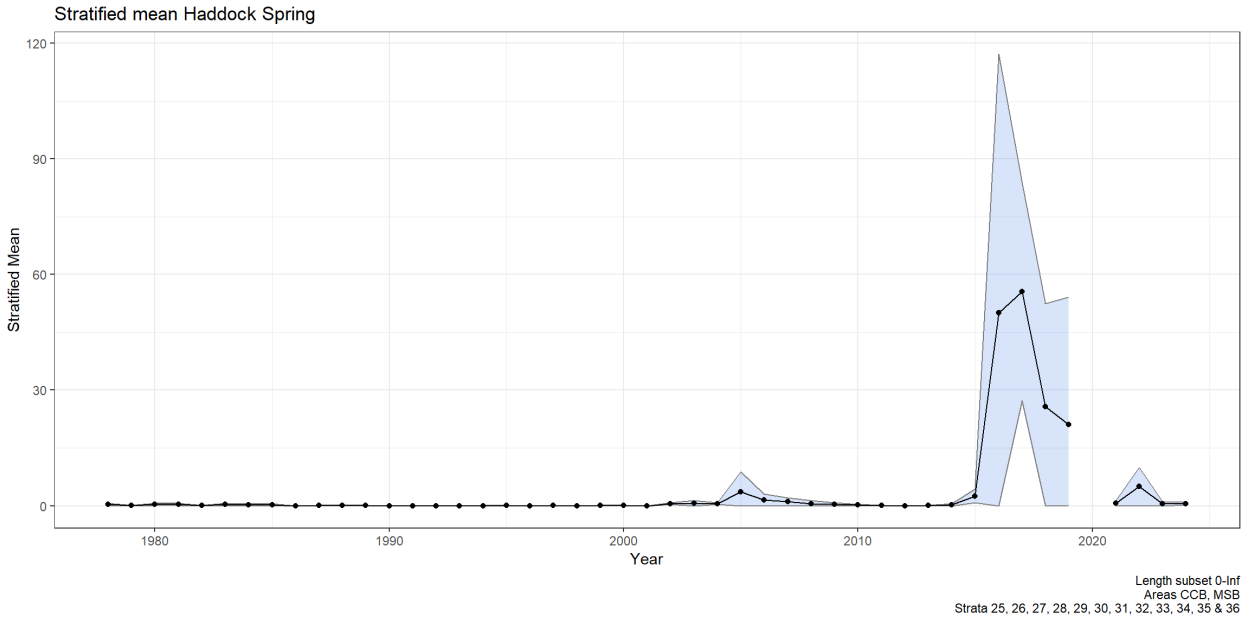
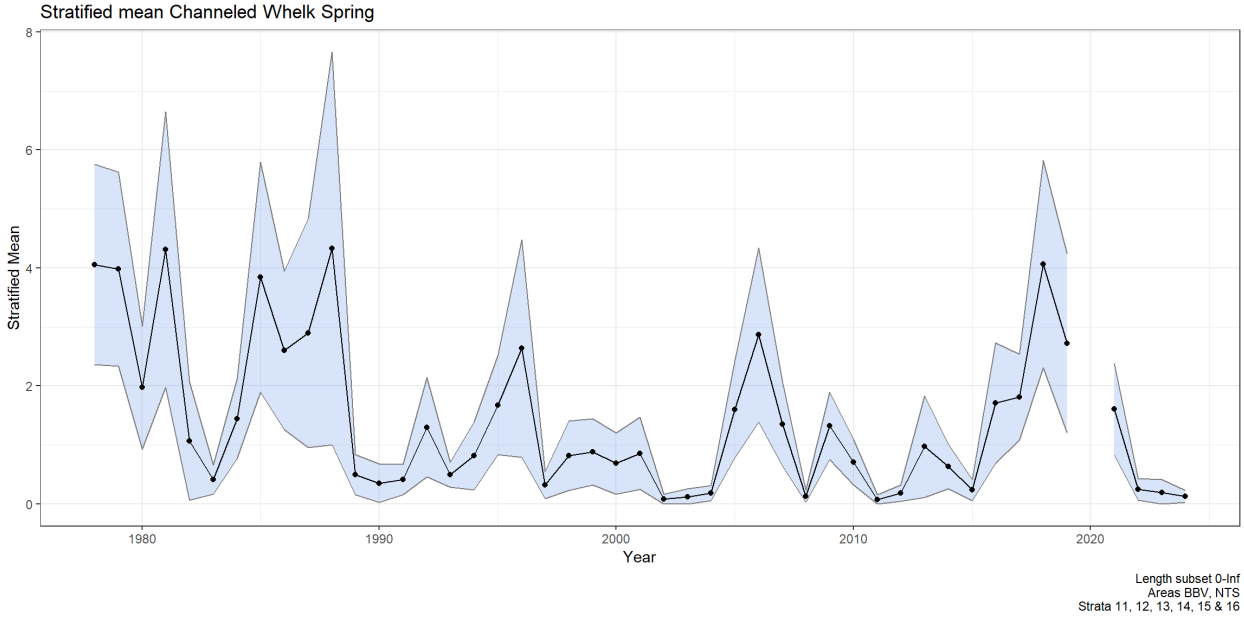


Figure 3. (a & b). Stratified mean number per tow 1978 – 2024 Massachusetts DMF Trawl survey.

a.)



b.)

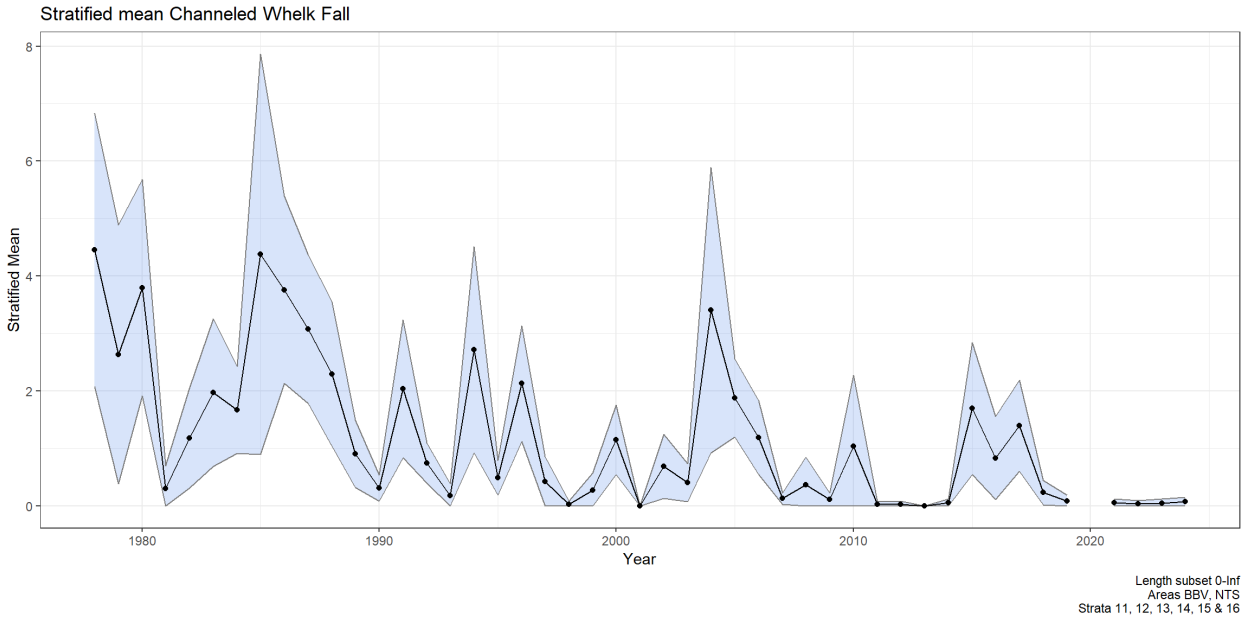


Figure 3. (c & d). Stratified mean number per tow 1978 – 2024 Massachusetts DMF Trawl survey.

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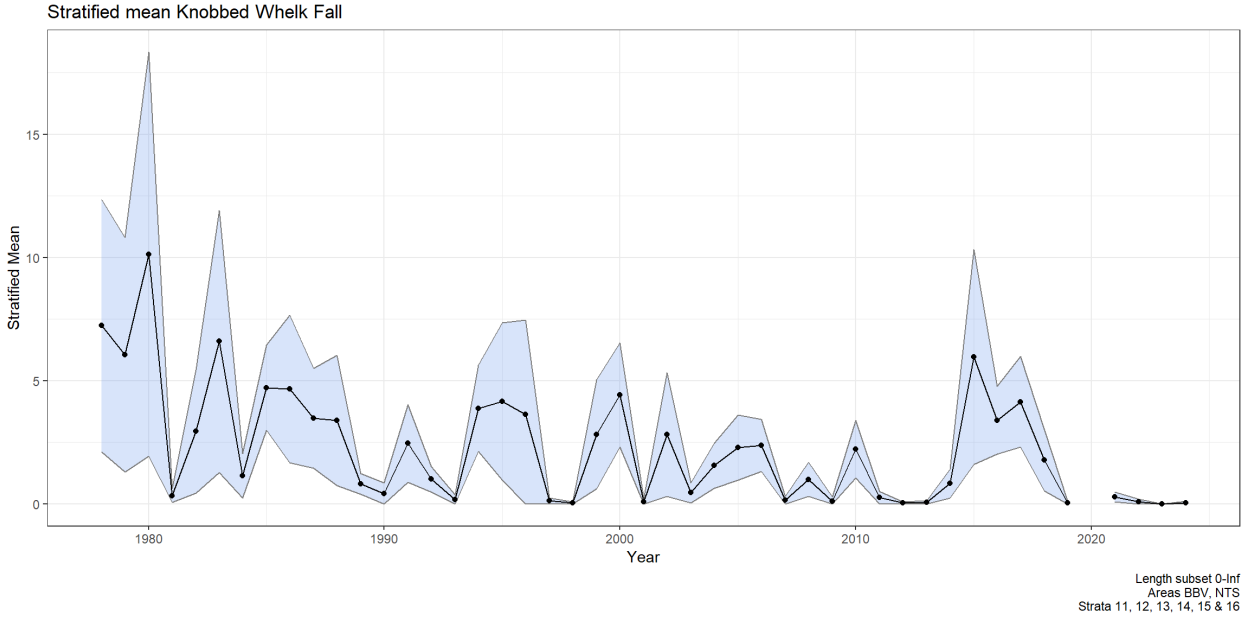


d.)

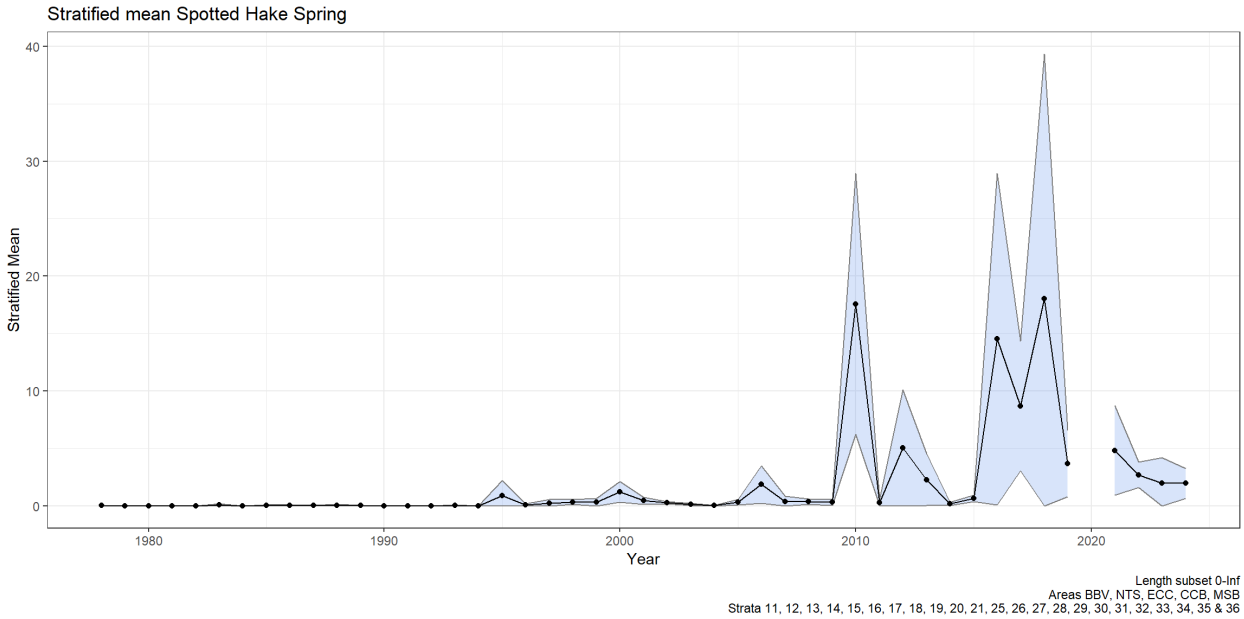
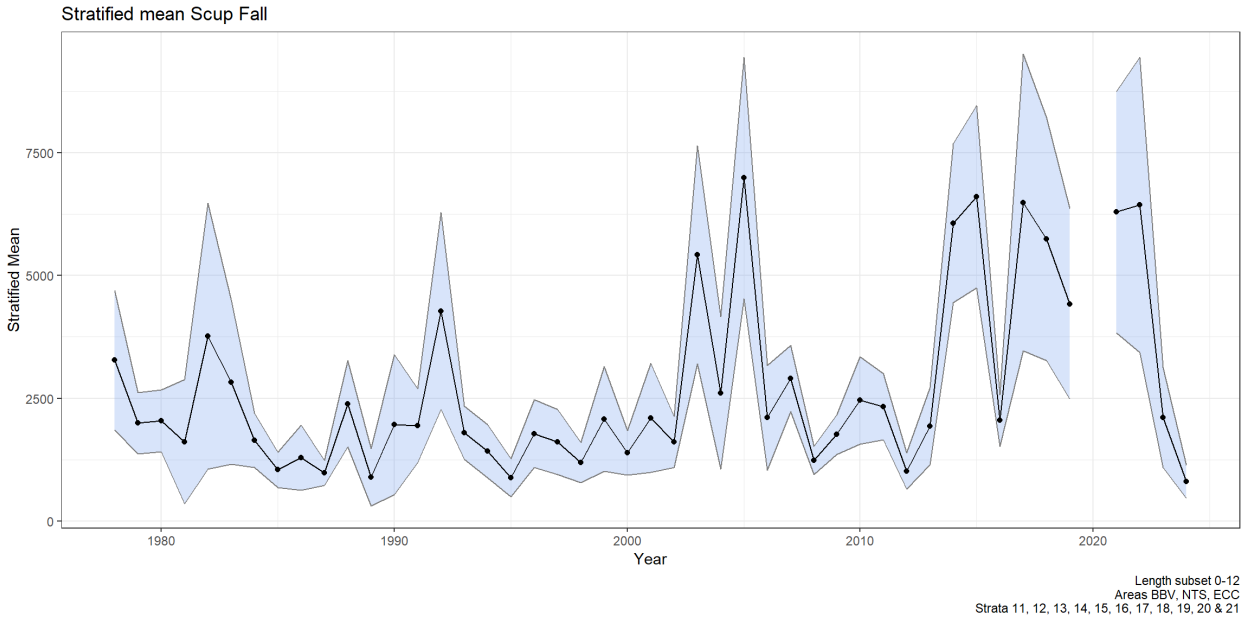
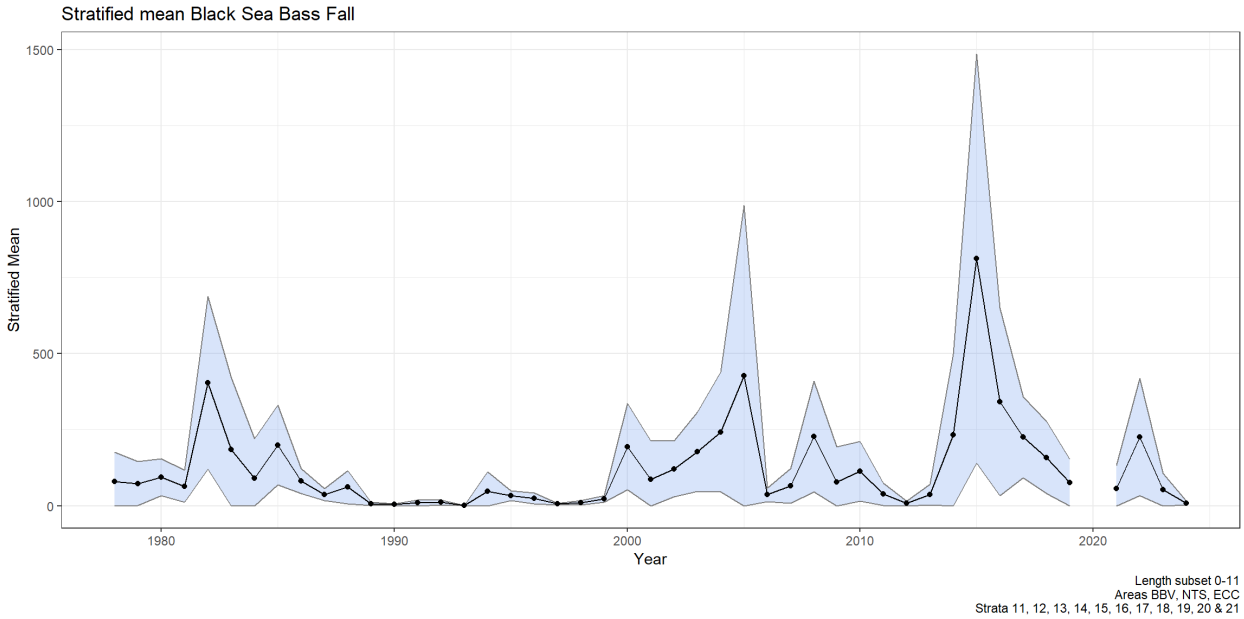


Figure 4. (a & b). Pre-recruit stratified mean number per tow 1978 – 2024 Massachusetts DMF Trawl survey.

a.)



b.)



Appendix B.

Trends in Observed Bottom Temperatures
Massachusetts Bottom Trawl Survey.
1978 – 2024

A timeseries analysis of bottom temperatures recorded during spring and fall bottom trawl surveys is updated to include 2024 observations. No data was collected in 2020, due to cancellations of both spring and fall trawl surveys due to the COVID-19 Pandemic. For a detailed interpretation and description of methods used in data preparation and analysis, refer to the 2006 annual report, (2006 Annual Performance Report, F-56-R, Massachusetts Fishery Resource Assessment, Appendix E).

There is one difference between the methods employed in 2006 and the methods reported here. Temperature observations from non-representative stations (SHG >136) are included in the dataset beginning in Fall 2004 if the tow duration is at least 5 minutes (the minimum time necessary for the temperature logger to acclimate). Some of these observations were omitted from the 2006 analysis. Elimination of temperature observations from non-representative stations had the effect of producing fall temperature data gaps in region 3. In some years there were many tow durations of less than 13 minutes due to frequent large dogfish catches. These tows, though non-representative for generation of abundance and biomass indices for most species, are used when generating spiny dogfish indices. The temperature data collected at these 'dogfish tows' since 2004 is consistent with temperature data collected at all other stations utilizing the Onset Computer Corporation temperature loggers and is therefore included in the following temperature summaries. Please refer to Table 1 and 2 for a listing of data gaps.

Table 1. Stratum mean bottom temperatures recorded on the MDMF spring survey.

	Region 1				Region 2		Region 3					Region 4						Region 5					
Year	11	12	13	14	15	16	17	18	19	20	21	25	26	27	28	29	30	31	32	33	34	35	36
1978	12.1	11.8	13.1	13.0	13.2	11.5	10.3	11.5	10.5	6.5	11.5	11.1	10.7	7.8	7.8	8.2	N/A	11.7	7.8	6.8	7.2	7.9	N/A
1979	13.3	13.1	11.8	11.3	13.3	11.5	12.0	11.9	9.9	7.5	5.0	7.3	7.9	6.7	4.2	4.0	3.9	10.4	8.5	6.4	5.5	4.9	3.5
1980	12.5	11.7	11.8	11.1	12.2	11.1	10.2	11.5	10.1	8.0	7.4	7.8	9.8	8.1	8.0	7.2	7.2	6.7	5.6	5.3	6.5	5.2	4.2
1981	12.4	11.0	10.4	7.5	10.5	10.4	10.5	7.6	7.9	6.5	6.5	7.9	8.2	6.5	6.3	6.6	5.8	8.8	7.6	5.4	5.3	5.4	4.8
1982	11.7	10.5	9.8	5.8	11.4	11.0	10.9	8.9	8.0	6.6	4.6	7.0	5.8	5.6	4.9	4.4	4.4	7.1	6.3	5.1	4.7	4.7	4.3
1983	11.9	11.7	11.6	10.1	12.4	11.2	9.2	9.5	9.0	5.5	6.5	7.2	8.9	7.0	6.2	6.5	5.0	6.0	6.1	6.2	5.3	6.0	5.0
1984	12.1	11.0	10.6	10.1	12.3	11.9	9.3	9.6	9.6	5.2	4.5	7.6	8.1	4.8	4.5	4.1	4.0	7.3	6.6	5.2	5.1	4.9	4.9
1985	12.1	11.1	11.4	10.5	12.1	11.6	9.4	10.6	10.1	7.8	7.0	10.3	8.9	8.0	6.8	5.8	5.0	7.6	7.3	6.2	5.9	4.7	4.5
1986	10.1	10.8	9.7	9.1	10.5	9.9	9.0	9.0	8.3	7.5	5.7	10.0	8.5	7.3	7.5	6.4	5.3	8.1	7.5	6.2	6.0	5.5	5.3
1987	10.7	10.4	10.2	9.5	12.1	11.4	9.2	8.7	8.3	6.4	5.9	9.1	8.1	7.2	6.2	5.1	5.7	7.4	7.3	6.6	6.2	6.2	5.6
1988	10.8	10.4	10.0	9.1	11.5	11.1	8.6	8.4	8.6	6.0	5.5	9.4	8.1	7.2	5.9	4.8	4.4	7.7	6.8	5.8	5.3	4.6	4.1
1989	9.5	9.0	7.1	6.7	10.9	9.5	7.5	7.5	6.6	4.7	3.6	7.4	5.4	4.4	4.3	2.4	1.5	6.1	4.5	3.8	3.0	3.3	2.6
1990	10.4	10.5	9.4	7.6	12.0	11.0	9.9	8.8	9.2	5.9	3.8	9.0	8.0	7.5	4.7	4.0	3.5	6.5	6.6	5.9	4.5	3.7	2.6
1991	14.1	13.0	11.3	9.9	13.8	13.3	11.4	10.9	10.0	7.0	5.2	11.6	11.3	10.2	8.1	6.0	5.0	7.8	5.9	6.2	7.2	6.1	4.7
1992	9.9	9.2	8.6	8.1	11.4	10.3	9.2	8.1	7.9	7.5	6.5	8.7	8.1	8.0	7.0	5.9	5.2	8.4	8.1	6.7	5.4	4.1	3.8
1993	12.6	11.5	11.1	9.9	12.4	11.5	9.7	9.4	8.6	5.0	4.5	8.9	7.9	6.0	5.4	5.0	3.7	7.6	6.1	4.7	4.6	3.7	3.7
1994	10.3	9.9	9.6	9.1	10.3	9.8	9.4	9.4	7.8	6.5	5.7	9.2	8.9	8.3	6.7	6.0	4.7	8.4	7.2	4.7	5.1	4.0	4.3
1995	11.7	11.2	9.9	9.6	10.6	10.0	9.2	8.4	8.5	6.9	6.8	9.0	8.6	8.0	7.6	6.0	4.9	7.9	8.2	6.5	6.2	4.7	4.1
1996	11.6	11.3	10.3	9.8	11.7	11.5	9.4	8.4	8.5	6.4	5.4	7.3	7.4	5.9	5.4	4.6	4.1	6.1	6.3	4.2	4.1	4.0	4.0
1997	10.9	10.1	9.0	7.3	11.4	11.2	9.9	8.9	8.4	6.2	6.1	7.2	7.9	6.6	6.4	5.5	5.3	5.5	5.4	5.2	4.7	4.7	4.7
1998	11.0	11.1	11.0	10.2	10.5	9.6	9.2	9.1	7.7	7.4	6.1	9.3	8.2	7.0	6.8	5.6	5.0	8.5	7.8	6.0	5.0	4.3	4.2
1999	15.0	13.3	12.7	11.7	14.6	13.6	11.3	10.6	10.7	6.2	5.5	11.5	9.6	8.2	6.1	4.8	4.7	9.1	7.3	6.4	5.2	4.9	4.3
2000	12.1	12.0	11.2	10.8	13.3	12.2	11.1	9.9	10.4	7.6	7.2	10.2	9.5	7.4	7.1	6.3	6.5	9.7	10.0	8.1	7.2	6.2	6.0
2001	13.3	11.5	11.2	8.8	12.9	11.6	11.5	11.1	10.2	5.7	4.9	7.9	9.7	6.1	6.0	4.9	4.6	7.6	7.7	5.2	4.7	4.5	4.5
2002	12.2	11.7	11.5	10.8	12.2	12.0	9.6	9.1	9.8	7.5	6.3	9.4	9.1	8.0	7.5	6.3	5.6	7.9	8.0	6.7	6.2	5.7	5.5
2003	11.5	11.3	11.2	9.7	11.6	10.8	8.4	8.5	9.1	4.7	4.2	7.9	7.7	5.8	5.2	4.1	3.8	7.2	6.5	5.4	4.2	4.0	3.9
2004	13.3	12.1	11.7	9.3	12.9	11.8	9.9	9.0	8.3	4.5	3.9	7.6	7.6	4.7	4.1	3.6	3.5	6.0	5.1	3.8	3.6	3.4	3.2
2005	11.6	11.2	10.4	9.8	9.3	9.2	9.1	8.2	7.4	5.3	5.0	7.9	7.6	6.6	6.0	5.1	4.6	7.2	7.3	6.1	5.3	5.0	4.4
2006	11.4	10.5	9.9	9.2	12.1	10.9	11.0	10.7	10.4	7.5	6.4	10.1	9.6	8.5	7.3	6.8	6.5	8.0	8.4	8.1	7.0	6.7	6.2
2007	12.8	11.6	10.7	9.2	12.2	11.6	10.5	10.2	8.8	5.3	4.9	9.9	10.1	6.2	4.8	4.4	4.3	6.3	6.3	4.2	4.1	4.2	4.1
2008	11.3	13.1	10.2	10.0	10.5	10.2	9.2	9.0	7.8	5.3	4.6	8.7	7.3	5.5	4.7	4.6	3.9	7.2	7.5	4.8	4.0	4.0	3.8
2009	12.6	11.8	11.1	8.8	13.1	12.4	9.5	9.5	9.2	4.4	4.2	9.2	8.1	6.3	4.7	3.8	3.6	8.2	7.7	5.5	4.3	4.1	3.6
2010	11.6	11.7	11.1	10.0	12.7	12.0	10.1	9.4	9.3	7.5	4.8	11.0	10.8	8.5	5.2	4.5	4.5	7.8	7.4	5.3	4.7	4.6	4.6
2011	11.6	11.2	10.6	9.9	11.3	10.6	9.6	9.6	9.2	7.1	7.0	9.5	8.2	6.7	8.1	6.4	4.8	7.9	7.4	5.0	4.7	4.5	4.4
2012	15.4	13.5	13.2	11.8	14.4	13.8	11.4	11.2	11.6	8.3	7.2	11.2	9.9	8.5	7.3	6.6	6.3	8.9	8.4	7.5	6.6	6.2	5.7
2013	13.5	12.7	11.2	10.3	13.5	12.8	11.3	11.8	11.0	7.4	6.6	9.8	10.1	8.0	7.3	6.1	5.5	9.4	8.6	7.6	6.5	5.9	5.2
2014	13.4	12.1	11.0	10.9	13.2	11.8	9.9	9.5	8.7	5.1	4.2	9.3	8.3	7.4	6.0	4.1	3.4	6.7	6.6	5.6	4.7	4.1	3.9
2015	13.4	12.2	10.8	10.1	13.3	12.2	9.5	9.7	8.9	5.8	4.9	10.5	9.3	6.8	6.0	3.7	3.6	6.4	6.9	5.1	4.5	4.2	4.1
2016	13.0	12.1	10.5	9.7	13.8	13.0	10.3	10.5	11.4	8.7	6.8	9.9	9.6	9.6	9.4	6.6	6.0	8.2	8.3	7.1	6.0	5.9	5.5
2017	13.5	13.2	11.9	10.9	13.7	12.8	10.9	10.6	10.1	7.0	6.2	9.9	7.6	6.3	6.3	5.0	4.8	8.1	6.4	5.4	5.0	4.9	4.6
2018	12.2	11.8	11.4	10.7	12.7	11.7	9.9	9.4	9.3	6.9	5.8	9.8	7.6	6.0	5.5	5.1	5.0	8.0	6.7	5.6	5.1	4.9	4.8
2019	11.7	11.3	10.8	9.5	11.2	11.0	10.2	10.0	10.7	6.7	5.8	8.9	7.9	6.9	6.5	5.0	4.7	7.3	7.6	6.0	4.9	4.6	4.5
2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2021	12.7	11.5	10.7	8.0	14.3	13.7	10.3	10.2	9.8	8.4	6.5	10.5	9.8	9.8	8.2	7.2	5.9	8.2	8.3	7.4	6.8	6.4	6.2
2022	13.4	12.5	12.1	11.6	12.8	12.4	11.1	10.4	11.1	9.7	7.8	9.2	8.7	9.2	8.7	8.2	8.0	8.5	8.8	7.6	7.3	6.8	5.7
2023	14.1	13.2	12.5	10.9	14.7	13.5	11.3	11.8	11.7	8.8	6.5	11.2	9.9	9.0	7.7	6.5	6.3	8.6	9.5	7.6	6.8	6.5	6.0
2024	12.6	12.1	11.6	10.1	12.6	11.8	10.1	9.7	9.0	6.6	6.3	8.5	7.0	6.3	5.9	5.7	5.3	9.8	8.1	6.1	5.5	5.2	5.2
Median	12.1	11.6	11.0	9.9	12.3	11.5	9.9	9.5	9.2	6.6	5.8	9.2	8.3	7.1	6.3	5.3	4.8	7.9	7.4	5.9	5.3	4.8	4.5
Mean	12.2	11.6	10.8	9.7	12.3	11.5	10.0	9.7	9.3	6.6	5.8	9.2	8.6	7.2	6.3	5.4	4.9	7.8	7.3	5.9	5.4	5.0	4.5
Maximum	15.4	13.5	13.2	13.0	14.7	13.8	12.0	11.9	11.7	9.7	11.5	11.6	11.3	10.2	9.4	8.2	8.0	11.7	10.0	8.1	7.3	7.9	6.2
Minimum	9.5	9.0	7.1	5.8	9.3	9.2	7.5	7.5	6.6	4.4	3.6	7.0	5.4	4.4	4.1	2.4	1.5	5.5	4.5	3.8	3.0	3.3	2.6

Table 2. Stratum mean bottom temperatures recorded on the MDMF fall survey.

	Region 1				Region 2		Region 3					Region 4						Region 5					
Year	11	12	13	14	15	16	17	18	19	20	21	25	26	27	28	29	30	31	32	33	34	35	36
1978	16.0	16.3	14.7	14.5	16.1	16.5	13.0	13.7	12.6	N/A	7.8	16.5	12.0	9.4	9.6	8.2	7.0	13.7	13.6	9.2	9.5	8.1	6.5
1979	16.7	16.5	15.8	16.0	16.9	16.1	13.6	14.7	14.2	10.2	9.7	11.3	12.3	8.1	8.9	7.9	8.8	11.7	10.0	9.1	8.8	8.8	8.2
1980	18.1	18.5	17.4	16.5	19.9	19.8	15.5	15.1	13.7	8.4	10.6	18.7	12.9	9.6	9.2	8.6	8.8	12.3	10.5	10.9	9.2	9.1	8.4
1981	19.2	18.4	16.8	16.6	19.6	19.1	16.2	16.4	15.5	11.0	10.2	15.3	13.7	13.5	12.9	11.9	9.9	13.4	13.1	12.2	12.0	11.8	9.6
1982	17.3	17.4	16.9	15.4	18.3	18.3	15.9	14.7	12.6	10.4	7.7	16.1	12.3	9.2	7.8	7.5	7.8	13.0	12.5	9.4	7.5	7.7	7.1
1983	20.3	19.5	17.8	16.7	20.9	20.5	16.0	16.6	14.1	9.5	8.5	15.0	14.9	10.8	9.2	9.0	8.3	N/A	N/A	N/A	N/A	N/A	N/A
1984	18.6	18.5	17.2	14.7	18.6	18.6	15.5	15.5	13.9	8.7	7.3	15.4	13.0	10.0	8.8	6.9	6.4	10.0	9.1	7.5	7.5	7.5	7.4
1985	19.3	18.8	18.5	16.5	19.1	19.0	16.9	15.4	15.6	13.6	9.1	16.4	14.6	13.6	11.6	9.8	8.2	16.2	14.4	13.8	10.4	9.2	8.1
1986	16.9	17.8	16.0	15.5	17.3	17.4	15.0	13.3	14.0	12.3	8.5	17.2	13.1	10.6	9.7	9.0	8.4	11.4	11.0	10.2	9.9	8.9	7.8
1987	16.4	16.7	16.7	16.3	19.2	18.7	13.5	13.1	12.9	7.0	6.1	12.7	7.8	6.4	5.4	5.0	5.1	N/A	8.6	6.4	6.2	5.6	4.9
1988	16.0	16.2	15.5	14.3	16.1	16.7	13.0	12.7	12.9	7.3	5.7	15.1	11.0	9.6	8.1	6.6	5.9	N/A	10.7	10.1	8.5	6.9	6.4
1989	19.3	18.9	17.2	14.9	19.0	18.3	15.7	16.7	11.9	5.6	4.5	12.0	8.9	8.1	7.5	6.8	5.1	13.0	11.2	9.6	8.5	7.7	6.8
1990	19.0	19.0	18.4	17.5	20.5	20.3	17.3	16.7	16.4	11.5	9.5	17.9	16.3	14.2	10.3	9.1	7.2	14.6	11.6	10.9	10.5	9.1	7.8
1991	19.6	19.2	18.6	18.1	19.5	19.7	17.2	16.8	16.1	13.7	10.7	16.4	16.2	13.8	13.3	10.5	9.0	16.6	N/A	12.1	10.2	8.9	8.5
1992	18.2	18.0	17.6	16.5	19.6	19.4	15.3	12.8	13.2	7.7	6.5	14.1	12.0	8.7	7.7	6.7	6.2	11.7	10.0	9.4	8.0	6.8	6.2
1993	17.1	17.5	16.9	16.2	18.1	19.4	13.9	16.6	14.2	8.4	7.0	13.6	12.4	8.8	8.3	7.7	6.9	12.6	11.0	9.0	8.8	8.0	6.9
1994	18.2	18.1	17.2	16.6	18.8	18.9	16.6	16.3	15.9	14.1	12.6	16.4	16.6	15.5	14.8	10.6	9.7	15.8	15.2	13.4	12.4	10.1	9.8
1995	N/A	N/A	N/A	N/A	19.2	19.4	13.7	11.7	10.7	8.7	8.3	12.8	11.7	10.4	9.8	8.8	9.2	14.9	13.0	10.3	9.3	8.6	8.5
1996	18.8	16.8	17.6	16.5	18.2	18.6	16.2	17.0	15.3	10.2	8.2	16.6	15.4	13.5	13.0	9.4	8.6	16.5	16.2	12.8	10.0	8.3	8.0
1997	18.4	18.6	17.5	17.7	20.2	19.7	16.4	17.2	14.3	9.3	8.3	17.4	16.3	11.4	9.3	8.9	8.1	16.5	15.4	13.3	9.8	8.2	8.3
1998	18.7	18.1	16.6	15.2	19.0	19.4	15.4	14.9	13.8	6.3	6.5	14.3	10.7	9.4	8.8	6.4	5.7	13.9	10.8	8.4	7.9	6.8	N/A
1999	20.3	19.8	19.3	18.2	19.9	19.9	18.1	16.0	14.9	9.2	7.7	16.2	12.2	10.2	9.5	8.4	7.8	14.6	11.8	10.4	9.7	8.6	8.7
2000	18.9	18.7	17.0	16.2	20.4	20.0	18.0	17.3	16.6	10.4	9.4	18.5	17.7	12.4	10.1	9.2	8.8	16.7	15.1	11.0	10.4	9.7	8.9
2001	19.5	19.3	17.8	16.9	20.7	20.2	15.2	16.2	12.2	7.9	6.5	16.2	10.7	8.7	7.4	6.6	6.4	10.9	8.7	8.5	7.3	6.8	6.9
2002	19.4	19.2	17.0	16.8	20.4	20.3	18.1	16.8	16.5	10.7	9.4	18.8	18.1	14.4	12.6	10.1	8.7	17.9	16.7	12.5	10.2	9.2	8.1
2003	20.2	19.0	18.6	18.0	20.0	19.4	15.8	15.6	14.7	9.7	8.7	15.0	10.9	8.3	7.7	7.5	6.8	14.4	11.6	10.5	8.6	7.3	7.2
2004	17.5	17.4	16.7	15.5	18.0	17.6	14.7	13.2	11.2	7.5	6.7	12.0	9.2	8.4	7.3	6.8	6.1	14.0	12.2	9.1	8.0	7.5	6.3
2005	20.9	20.0	18.1	17.5	20.3	21.2	16.1	15.9	16.6	7.5	6.5	16.2	10.3	7.5	6.7	6.2	5.9	11.6	10.4	8.8	6.9	6.0	5.5
2006	18.9	18.6	17.0	16.5	19.5	19.3	17.0	16.3	15.8	10.1	8.7	16.4	14.1	11.1	10.7	9.1	7.9	17.2	16.4	11.8	10.0	8.4	7.7
2007	18.4	19.0	18.1	15.3	19.9	20.3	16.8	16.3	14.5	8.2	8.7	16.8	12.8	8.8	7.6	6.8	6.1	11.1	10.3	8.7	7.4	6.7	6.6
2008	19.8	20.1	19.1	18.2	20.8	20.2	18.2	16.9	14.3	8.4	7.7	19.8	19.2	12.0	9.4	8.4	7.4	15.4	13.3	10.7	8.9	8.4	7.6
2009	19.0	18.7	17.8	17.6	19.3	19.1	17.2	16.8	17.9	14.6	10.0	17.4	15.8	13.3	12.0	9.5	8.4	16.9	17.2	16.2	11.3	8.9	7.5
2010	18.7	18.5	17.1	16.3	19.6	19.7	17.3	17.0	15.1	10.9	8.9	15.9	15.6	13.5	9.6	8.0	7.7	13.8	11.7	10.5	9.1	8.5	8.0
2011	19.7	19.8	17.7	16.6	20.7	19.9	17.1	16.2	16.4	13.9	9.0	15.0	13.1	10.3	9.9	9.3	8.5	15.6	15.0	13.5	11.8	9.0	8.0
2012	19.6	20.2	18.8	17.8	20.3	21.3	17.0	17.3	19.4	9.0	8.3	11.8	10.4	9.5	8.9	8.8	8.5	13.0	11.8	10.4	9.6	8.9	8.9
2013	18.2	18.5	17.6	15.7	20.8	20.3	16.5	16.6	15.7	9.5	9.0	15.9	11.2	9.7	9.0	8.6	8.4	14.2	12.5	11.2	9.9	8.8	7.9
2014	20.3	20.4	19.0	17.2	21.2	20.5	17.9	15.6	16.3	8.9	7.8	16.8	12.7	9.0	8.1	7.3	6.9	11.3	11.1	9.1	8.4	7.9	7.3
2015	21.5	20.7	18.9	16.2	20.9	20.1	18.7	16.2	15.9	10.0	9.2	15.7	14.5	10.3	9.7	8.7	7.8	16.9	12.5	11.7	9.7	8.4	7.7
2016	21.1	20.4	18.3	16.8	21.2	21.2	18.2	18.2	18.8	12.5	10.4	19.3	17.7	16.0	13.0	9.9	9.4	18.3	17.7	14.3	10.9	10.1	13.4
2017	19.9	19.2	18.4	16.6	19.4	19.3	16.1	15.2	14.3	9.1	8.2	15.5	16.2	10.0	8.8	7.6	7.2	12.8	10.3	8.7	8.0	7.7	6.9
2018	21.3	20.3	19.9	19.0	21.7	21.2	17.9	16.5	16.6	11.0	10.4	18.7	14.8	11.3	11.0	10.3	10.0	16.0	14.7	12.1	11.2	10.8	9.2
2019	20.5	19.9	18.0	17.0	18.7	19.5	18.1	18.4	16.8	11.3	10.0	17.3	14.0	9.6	8.8	8.1	8.1	15.7	15.6	12.9	10.2	8.3	N/A
2020	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2021	21.6	21.4	20.5	19.3	22.6	22.1	18.8	18.6	16.3	10.7	10.3	18.7	18.9	13.0	11.8	10.5	9.6	14.7	12.3	11.6	11.0	10.0	9.8
2022	21.0	20.9	19.7	18.4	21.3	21.6	18.9	19.1	17.5	12.2	11.0	14.6	12.3	11.7	10.3	9.4	9.4	17.9	17.1	14.3	11.8	10.5	9.1
2023	19.4	19.6	17.7	15.0	20.2	20.4	17.1	16.2	15.5	9.9	9.2	17.2	12.8	10.9	9.8	9.2	8.8	15.7	12.6	11.2	10.6	9.5	8.6
2024	19.8	19.4	18.1	16.6	17.9	17.9	16.6	16.5	14.8	12.2	10.4	16.7	13.7	14.9	11.9	9.2	8.9	12.8	11.3	10.3	9.1	8.5	7.2
Median	19.2	18.9	17.7	16.6	19.6	19.6	16.5	16.3	15.0	9.9	8.7	16.2	13.0	10.3	9.4	8.7	8.1	14.4	12.2	10.5	9.6	8.5	7.8
Mean	19.1	18.8	17.7	16.6	19.6	19.5	16.4	15.9	14.9	10.0	8.6	15.9	13.5	10.9	9.7	8.4	7.8	14.3	12.7	10.8	9.4	8.5	7.8
Maximum	21.6	21.4	20.5	19.3	22.6	22.1	18.9	19.1	19.4	14.6	12.6	19.8	19.2	16.0	14.8	11.9	10.0	18.3	17.7	16.2	12.4	11.8	13.4
Minimum	16.0	16.2	14.7	14.3	16.1	16.1	13.0	11.7	10.7	5.6	4.5	11.3	7.8	6.4	5.4	5.0	5.1	10.0	8.6	6.4	6.2	5.6	4.9

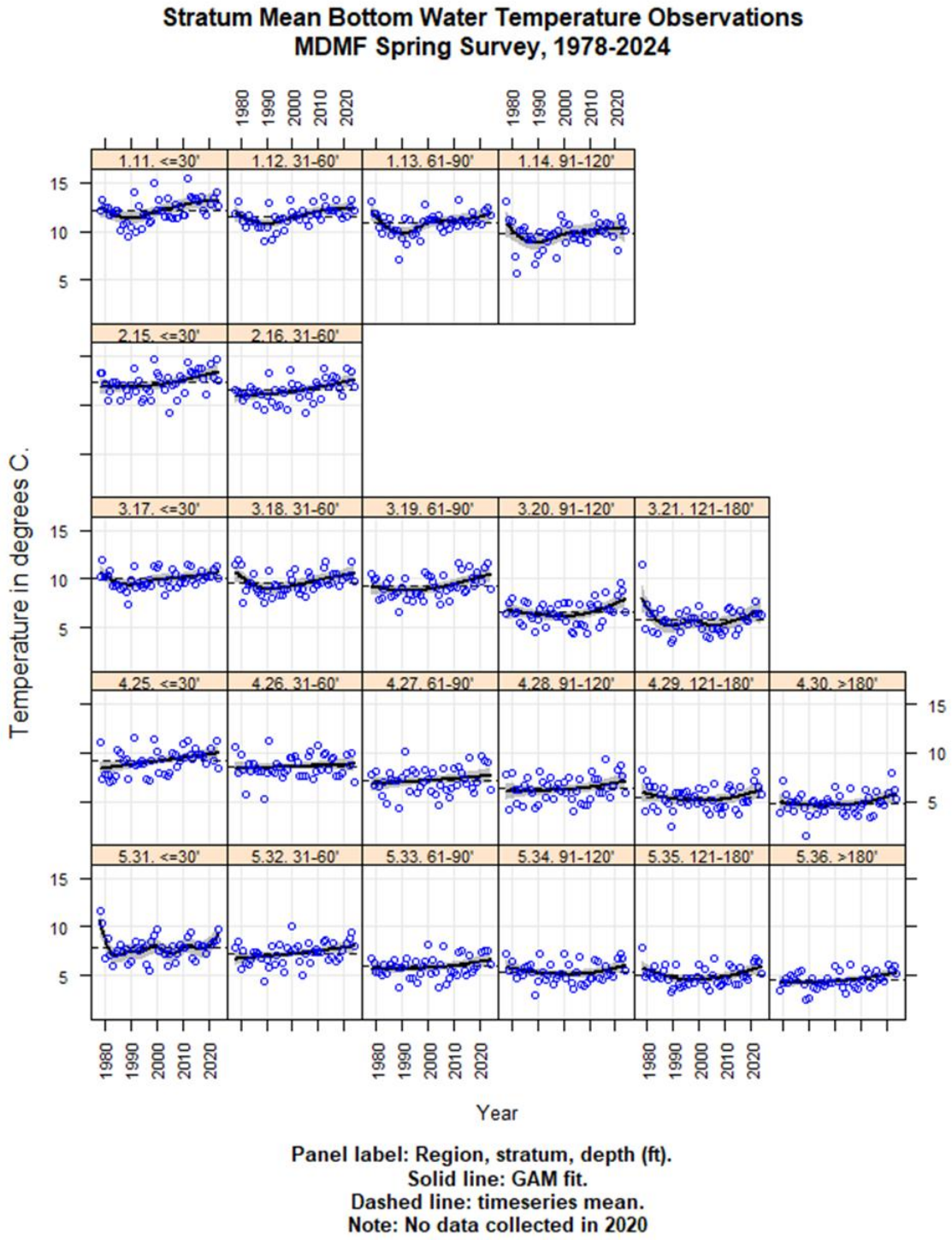


Figure 1. Stratum mean bottom water temperatures recorded on the MDMF spring survey.

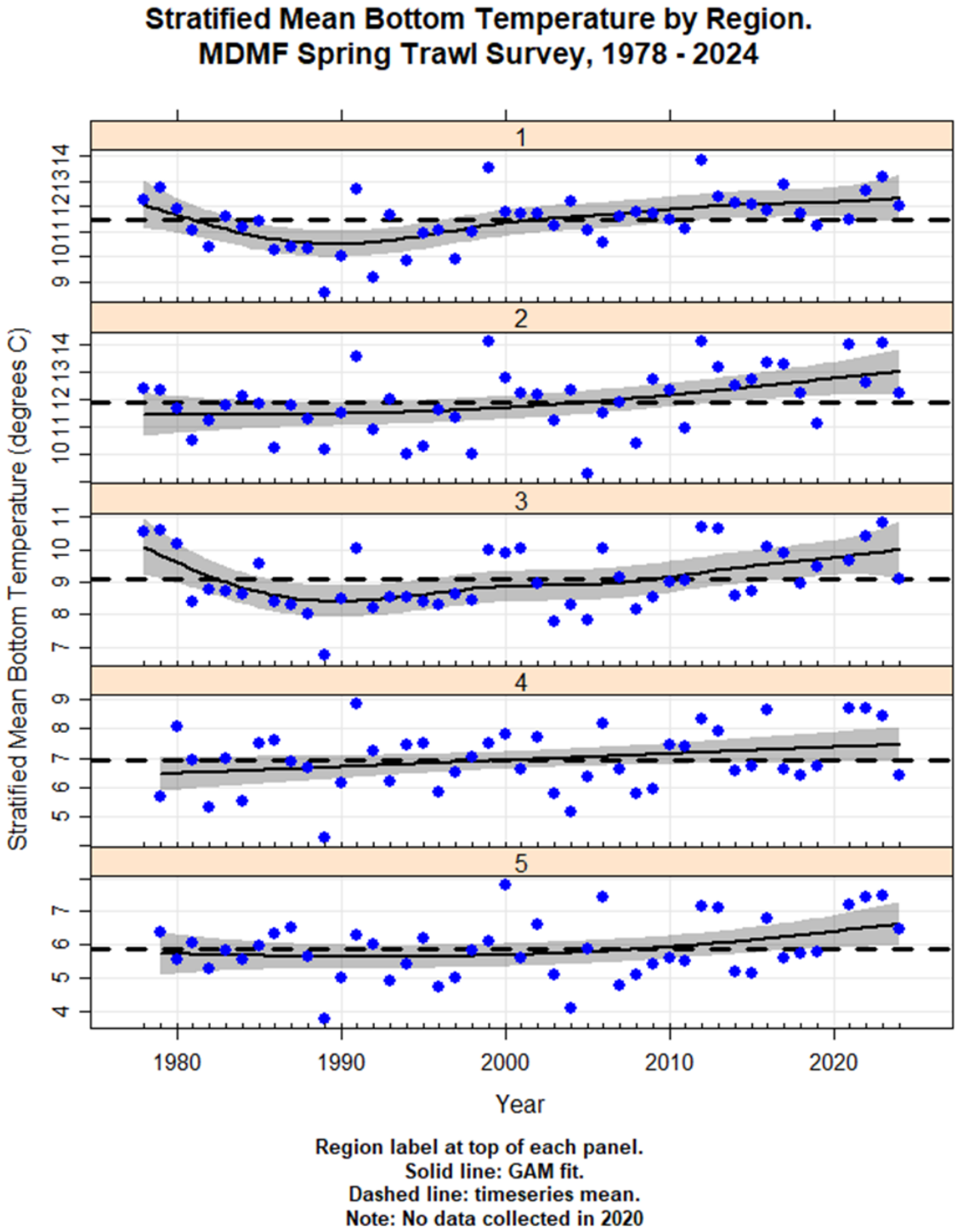


Figure 2. Stratified mean bottom water temperatures recorded on the MDMF spring survey by region.

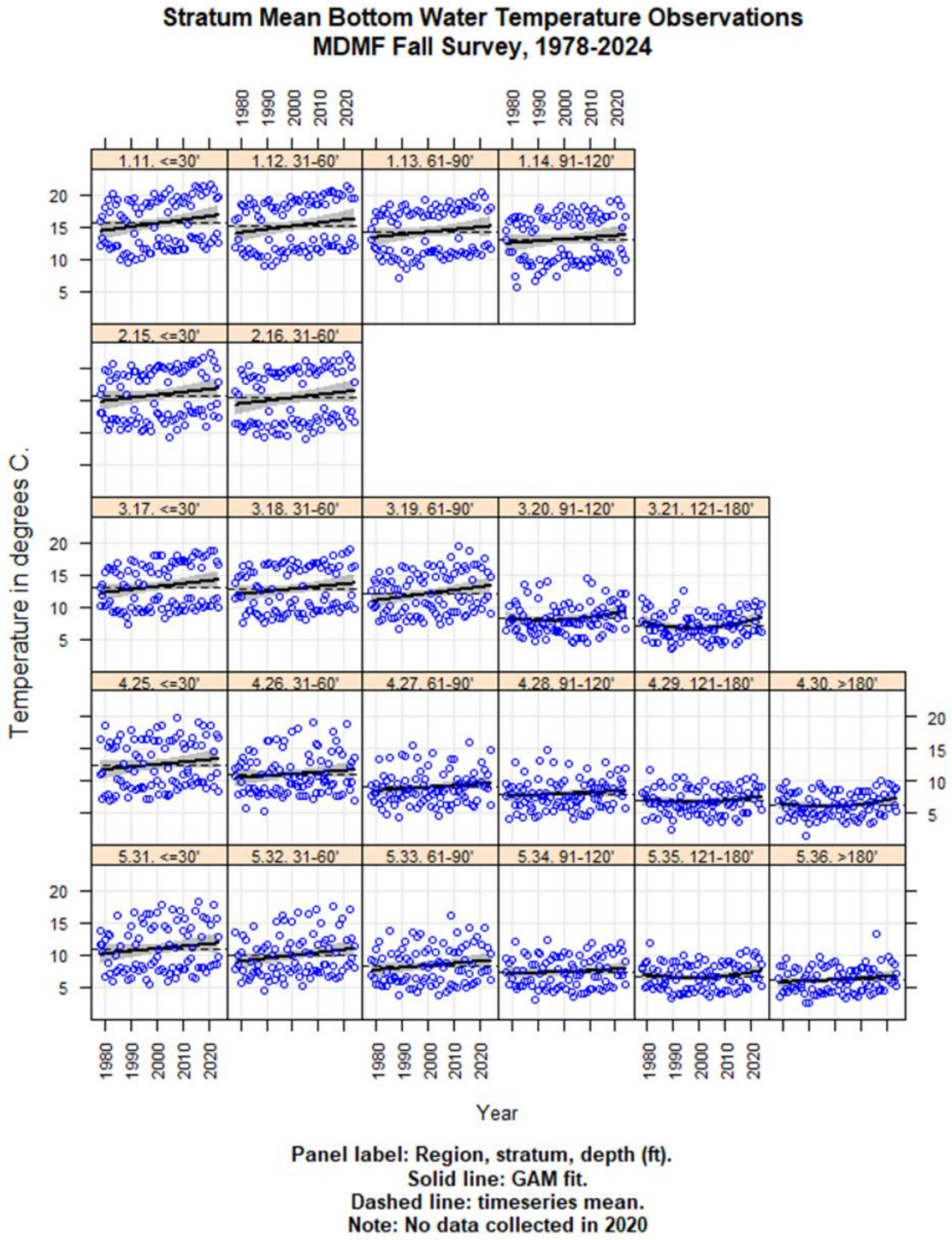


Figure 3. Stratum mean bottom water temperatures recorded on the MDMF fall survey by strata.

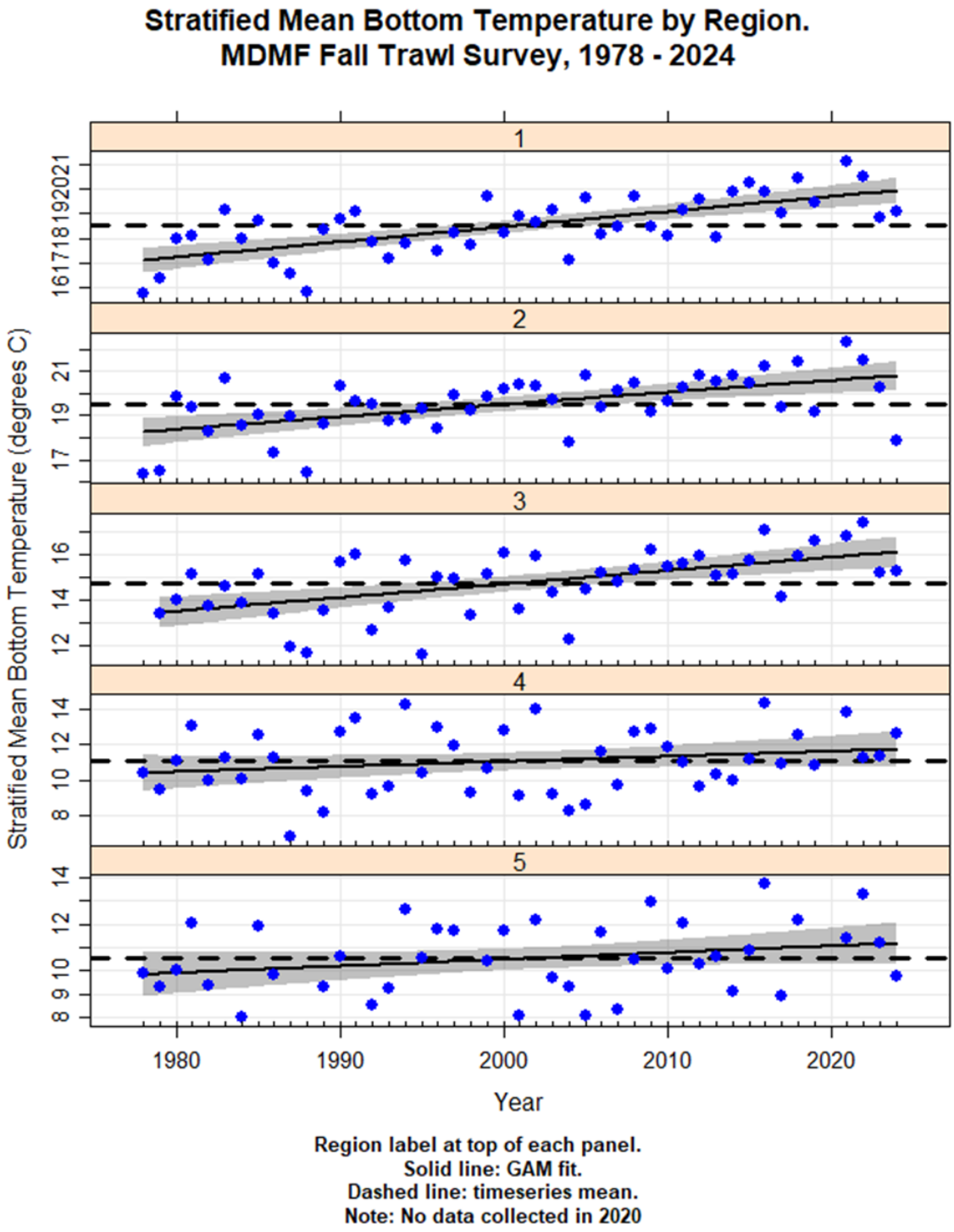


Figure 4. Stratified mean bottom water temperatures recorded on the MDMF fall survey by region.

Appendix C. Corrections to the trawl survey database in 2024

Cruises 201392 and 201792 changed the species name to Sharksucker in the catch and length tables. Catch comments were also added with appearance characteristics based on photos.

Cruise 201692 station 33 had a problem with catch expansion because of a late button press issue at the start of the tow. The tow duration was correct in the database at 15mins, but the software had computed it to be 8 minutes due to the late button press. The catch data was improperly expanded from 8 minutes instead of the actual tow time of 15 minutes. Original catch data resided in .CSV flat files and was computed correctly using our Audit spreadsheet. Catch weights and length frequencies in the SVDBS tables were corrected in the database for all the species that had the improper expansion applied.

Cruise 202292 station 53 had a female lobster length of 10.95cm which was changed to 11.0cm because the length data for lobsters are supposed to be stored to 1 decimal place in the database.

Cruise 202292 station 25 and station 35 had a Rock Crab length that rounded to zero. These lengths were updated to 1cm due to slight measurement error.

Cruise 202292 station 80 had three Loligo Squid that rounded to zero cm. These three measurements were updated to one cm.

Cruise 202391: The tow expansion for tows less than 20 minutes and greater than or equal to 13.0 minutes from the spring 2023 cruise was not included in master data. The tow expansion script was used, but the resulting expansion did not stick in master data. The data was made available in the audit views within the SVDBS table structure, and the expansion was re-applied. All data from cruise 202391 are now correct.

Cruise 202391 station 30 had 7 Yellowtail Flounder with a length of 0cm. It appeared that an individual fish weight was accidently entered as a length during the data collection. The number was then rounded to zero and because Yellowtail Flounder were subsampled, the zero length was expanded by a factor of 7. The entire row was removed from the length table for that station. The catch table was updated to reflect the removal of 7 individuals.

Cruise 202492 station 96 a *Remora remora* was incorrectly identified as a species in the catch when it should have been a Sharksucker (*Echeneis naucrates*). The species code was changed from 567 to 564 in the catch table and length table. A note was also made in the comment section; based on photos the smaller of the two individuals may be a Whitefin Sharksucker (*Echeneis neucratoides*). In photos the smaller fish appears to have 21 laminae while the larger fish has 23. The coloration of the smaller individual also more closely resembles a Whitefin, but there is no code associated with that species in the database. A catch comment was left indicating the possibility.