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

2017 Annual Performance Report

State:	Massachusetts
Agency:	Division of Marine Fisheries
Project Title:	Massachusetts Fishery Resource Assessment
	FA Grant Agreement: F-56-R
Segment Number:	24
ASAP ID No.	F12AF00099
Period Covered:	January 1, 2017 – December 31, 2017
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Submitted By:	Stephanie Cunningham, Federal Aid and Grants Coordinator
Date Submitted:	1/8/2018

Sport Fish Program
Massachusetts Fishery Resource Assessment: F-56-R-24
2017 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 fortieth annual spring and fall bottom trawl surveys of Massachusetts territorial waters in 2017. 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-second 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 2017 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 - 2017.

Appendix C: Corrections to the trawl survey database in 2017.

CRUISE RESULTS

R/V GLORIA MICHELLE

2017 Massachusetts Inshore Spring
Bottom Trawl Survey
Cruise No. 201791

CRUISE PERIOD AND AREA

From May 8 through May 26, 2017 the Massachusetts Division of Marine Fisheries conducted its 40th 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 and select invertebrate 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 (Fig. 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. 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 net's headrope.

Twenty-five MADMF employees participated in the survey as part of the scientific party, joined by the Commissioner of the Department of Fish and Game, one research scientist from the University of Connecticut, one research scientist from the University of Massachusetts, and one high school student (Table 1)

CRUISE SUMMARY

105 stations were attempted in 17 sampling days (Figs 1 and 2, Table 2). Ninety-nine completed stations are considered acceptable for assessment of all species, SHG <=136 (Table 3). Four station assignments were not completed with acceptable trawl hauls due to time constraints, fixed gear and strong currents. One station each in strata 28 and 29 were dropped due to R/V time constraints. One station in stratum 17 was dropped due to time constraints and strong currents and one station in stratum 35 was dropped due to fixed gear set on towable bottom. Six attempted tows were aborted due to fixed gear, ghost gear, hard bottom and one weed tow (Table 5, Fig. 3).

The primary goal of tallying weight, number, and a representative length frequency of each fish species in the catches was accomplished (Tables 6a and 6b). One record was set on the 2017 spring survey, 172 striped sea robins were recorded at station 90 in upper Buzzards Bay. Moderate catches of YOY Atlantic cod, winter flounder, whiting, longhorn sculpin and yellowtail flounder were taken North of Cape Cod. Small monkfish were encountered again at several Cape Cod Bay and Mass Bay stations. Scup, longfin squid and northern sea robin were abundant throughout Nantucket Sound, Vineyard Sound and Buzzard's Bay.

Additional sampling goals were achieved (Table 7). To aid cooperative fisheries assessments, over 1,390 scale/otolith/operculum samples, as well as sex and maturity observations, were taken from Atlantic cod, haddock, summer flounder, yellowtail flounder, winter flounder, windowpane flounder, black sea bass, scup, weakfish, tautog, American lobster and jonah crabs . Additional samples were collected to assist ongoing research by fisheries scientists from MDMF and other labs in the region.

For further information on this survey or others in the time series, contact Matthew Camisa at (508) 990-2860 ext. 139.

Table 1. MADMF Spring Cruise 2017 Staffing List

Scientific Party

Name	Affiliation	Num. Days
Matthew Camisa	MADMF	9
Vincent Manfredi	MADMF	9
Mark Szymanski	MADMF	9
Elise Koob	MADMF	8
Mike Trainor	MADMF	5
Steve Voss	MADMF	4
Greg Decelles	MADMF	4
Tiffany Vidal	MADMF	4
Kim Trull	MADMF	4
Brad Schondelmeier	MADMF	3
Ross Kessler	MADMF	3
Steve Wilcox	MADMF	3
Jake Snyder	UCONN	3
John Logan	MADMF	2
Derek Perry	MADMF	2
Justin Fleming	MADMF	2
Michael Long	UMASS	2
George Peterson	MADFG	1
Collin Farrell	MADMF	1
Jared Silva	MADMF	1
Mark Rousseau	MADMF	1
Chrissy Petitpas	MADMF	1
Mike Pol	MADMF	1
Tracy Pugh	MADMF	1
Liz Morrisey	MADMF	1
Erin Burke	MADMF	1
Mike Walsh	MADMF	1
Mike Auriama	MADMF	1
Andrea Unzueta Martinez	NORTHEASTERN	1
Chris Lauritzen	STUDENT	1
		89

R/V Gloria Michelle Crew

Name	Affiliation	Num. Days
Officers		
Andrew Reynaga	NOAA OIC	17
Chris Gallagher	NOAA JOIC	17
Steve Moulton	NOAA-CORPS	10
Mike Ball	NOAA-CORPS	6
Deck Crew		
George Morton	Contract Fisherman	17
Pete Plantamura	NMFS-Sandy Hook	11
Adam Poquette	NMFS-WH	6

Table 2. Station Information for the 2017 Massachusetts Spring Inshore Bottom Trawl Survey
Cruise No. 201791

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
1	26	5/8/2017	5:59	18	41°48.73	-70°28.51	163	0.83	5.8
2	26	5/8/2017	7:28	16	41°50.64	-70°29.48	358	0.84	5.8
3	27	5/8/2017	8:53	28	41°54.70	-70°29.26	335	0.84	5.1
4	28	5/8/2017	10:36	34	41°59.23	-70°32.59	20	0.85	4.9
5	25	5/8/2017	12:11	11	41°58.16	-70°36.08	194	0.85	5.8
6	27	5/8/2017	14:41	26	41°51.40	-70°24.66	193	0.86	5.1
7	27	5/8/2017	15:49	23	41°49.12	-70°22.82	216	0.85	5.5
8	25	5/9/2017	6:33	10	41°44.75	-70°19.22	266	0.84	10.2
9	26	5/9/2017	8:00	20	41°46.53	-70°19.83	55	0.84	6.7
10	25	5/9/2017	10:04	11	41°48.70	-70°03.95	281	0.84	10.8
11	26	5/9/2017	11:51	16	41°49.77	-70°12.43	32	0.84	9.1
12	27	5/9/2017	13:33	24	41°50.57	-70°14.71	58	0.84	7.1
13	26	5/9/2017	14:31	13	41°52.80	-70°08.88	213	0.83	10.6
14	25	5/9/2017	15:43	7	41°54.39	-70°06.54	202	0.86	12.6
15	29	5/10/2017	8:06	50	42°03.24	-70°27.98	335	0.83	4.5
16	28	5/10/2017	10:06	32	42°05.27	-70°32.79	29	0.84	5.2
17	28	5/10/2017	11:54	35	42°06.74	-70°31.68	60	0.84	4.9
18	33	5/10/2017	14:56	21	42°18.42	-70°48.86	57	0.83	5.5
19	31	5/10/2017	16:58	9	42°17.49	-70°51.85	95	0.72	7.8
20	32	5/10/2017	18:11	12	42°17.68	-70°51.37	55	0.73	6.5
21	32	5/11/2017	6:40	16	42°17.12	-70°48.40	126	0.54	5.8
22	35	5/11/2017	8:38	54	42°22.68	-70°42.03	135	0.83	4.7
23	36	5/11/2017	10:07	69	42°22.31	-70°39.74	10	0.80	4.5
24	34	5/11/2017	12:20	37	42°23.61	-70°49.56	109	0.85	4.7
25	33	5/11/2017	13:49	26	42°23.64	-70°54.23	69	0.85	5.4
26	34	5/11/2017	15:43	42	42°28.74	-70°46.05	55	0.63	4.7
27	35	5/11/2017	17:01	49	42°31.41	-70°41.92	197	0.67	4.9
28	34	5/12/2017	6:55	31	42°42.83	-70°40.58	70	0.83	5.2
29	34	5/12/2017	8:15	30	42°44.82	-70°43.22	154	0.70	5.3
30	33	5/12/2017	10:07	27	42°49.49	-70°46.46	2	0.81	5.3
31	31	5/12/2017	11:28	11	42°47.98	-70°47.99	158	0.83	8.7
32	33	5/12/2017	12:57	28	42°42.59	-70°42.03	316	0.71	5.4
33	32	5/12/2017	13:59	15	42°41.95	-70°43.36	321	0.84	6.9
34	31	5/12/2017	15:07	11	42°40.72	-70°41.69	301	0.83	7.7
35	36	5/12/2017	17:21	85	42°39.70	-70°31.11	330	0.81	4.6
36	35	5/13/2017	6:22	51	42°32.51	-70°39.88	209	0.43	4.9
37	35	5/13/2017	7:51	44	42°35.21	-70°36.22	208	0.70	5.0
38	35	5/13/2017	9:55	43	42°38.95	-70°32.84	184	0.75	4.9
39	27	5/16/2017	6:17	26	41°59.92	-70°08.97	348	0.54	8.8
40	28	5/16/2017	9:39	29	41°57.09	-70°10.43	208	0.54	10.3
41	29	5/16/2017	11:56	50	41°59.91	-70°22.77	326	0.83	5.3
42	29	5/16/2017	13:45	54	42°02.09	-70°23.53	5	0.14	N/A
43	29	5/16/2017	14:35	55	42°02.47	-70°23.45	2	0.84	4.9
44	29	5/16/2017	16:08	55	42°02.36	-70°19.52	345	0.85	5.3
45	30	5/16/2017	17:57	61	42°05.77	-70°23.03	37	0.85	4.6
46	30	5/17/2017	7:13	61	42°04.58	-70°16.99	218	0.83	5.0
47	21	5/17/2017	9:29	61	42°07.76	-70°10.51	272	0.78	5.7
48	21	5/17/2017	11:06	40	42°06.44	-70°10.18	84	0.84	6.6
49	17	5/17/2017	12:41	9	42°05.08	-70°08.12	112	0.85	9.0
50	20	5/17/2017	14:20	37	42°03.07	-70°00.81	324	0.84	7.3
51	19	5/17/2017	16:38	27	41°58.56	-69°58.23	349	0.83	8.4

Table 2 continued.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
52	18	5/17/2017	18:28	17	41°52.37	-69°56.47	349	0.03	N/A
53	17	5/18/2017	5:26	10	41°49.51	-69°55.85	346	0.86	9.4
54	20	5/18/2017	7:04	37	41°49.53	-69°53.14	330	0.77	6.7
55	18	5/18/2017	9:11	19	41°41.85	-69°52.35	227	0.84	7.9
56	18	5/18/2017	10:43	16	41°38.65	-69°53.74	213	0.02	N/A
57	18	5/18/2017	11:13	16	41°38.55	-69°53.80	219	0.58	8.7
58	15	5/19/2017	8:17	9	41°24.38	-70°28.72	15	0.55	14.5
59	15	5/19/2017	10:30	8	41°25.77	-70°21.19	68	0.85	13.0
60	16	5/19/2017	12:09	11	41°27.28	-70°10.27	268	0.80	11.9
61	16	5/19/2017	14:19	16	41°28.00	-70°02.09	285	0.67	10.5
62	16	5/19/2017	15:47	15	41°26.97	-70°06.00	252	0.84	12.3
63	15	5/19/2017	17:03	8	41°23.51	-70°11.41	68	0.84	13.6
64	16	5/19/2017	18:19	15	41°22.31	-70°6.65	81	0.85	12.6
65	16	5/20/2017	8:18	12	41°35.59	-70°5.21	49	0.84	13.3
66	15	5/20/2017	10:22	8	41°36.75	-70°7.95	75	0.41	13.9
67	15	5/20/2017	11:59	8	41°36.99	-70°9.92	262	0.54	14.7
68	16	5/20/2017	13:09	12	41°35.11	-70°12.03	265	0.83	13.7
69	16	5/20/2017	14:59	13	41°33.30	-70°18.82	252	0.79	12.8
70	16	5/20/2017	16:47	10	41°31.85	-70°25.88	238	0.54	14.0
71	17	5/21/2017	9:20	10	41°16.95	-70°20.62	81	0.84	12.3
72	18	5/21/2017	10:49	14	41°15.55	-70°15.00	118	0.83	11.3
73	17	5/21/2017	13:05	10	41°14.17	-70°01.24	276	0.83	12.9
74	18	5/21/2017	14:27	16	41°13.79	-70°02.87	270	0.73	13.2
75	19	5/21/2017	16:00	23	41°12.51	-70°07.58	263	0.77	11.7
76	18	5/21/2017	17:10	17	41°12.87	-70°08.77	266	0.78	11.8
77	12	5/22/2017	5:56	16	41°19.63	-70°34.10	275	0.80	12.5
78	12	5/22/2017	7:04	16	41°18.83	-70°31.19	285	0.84	12.4
79	11	5/22/2017	8:08	9	41°20.71	-70°34.98	96	0.82	13.1
80	11	5/22/2017	9:22	9	41°20.55	-70°39.41	90	0.83	13.1
81	13	5/22/2017	10:41	21	41°18.38	-70°35.75	78	0.83	12.1
82	13	5/22/2017	13:13	24	41°15.37	-70°46.11	17	0.87	11.2
83	14	5/22/2017	14:50	34	41°19.50	-70°54.09	122	0.83	11.1
84	14	5/22/2017	16:15	35	41°21.47	-70°55.72	226	0.81	10.6
85	12	5/23/2017	6:51	14	41°29.09	-70°48.09	63	0.84	13.1
86	12	5/23/2017	8:21	18	41°29.79	-70°54.29	36	0.28	12.8
87	12	5/23/2017	9:03	17	41°30.04	-70°54.07	30	0.84	13.0
88	12	5/23/2017	10:33	17	41°28.71	-70°50.69	51	0.84	13.9
89	11	5/23/2017	12:49	8	41°29.95	-71°03.70	183	0.81	13.3
90	12	5/23/2017	15:48	12	41°36.42	-70°43.02	205	0.83	14.1
91	11	5/23/2017	17:12	8	41°40.69	-70°41.86	199	0.52	15.0
92	16	5/24/2017	7:18	16	41°30.50	-70°13.90	256	0.82	13.2
93	15	5/24/2017	8:45	8	41°31.88	-70°20.80	132	0.54	14.1
94	15	5/24/2017	10:07	8	41°28.77	-70°15.92	148	0.83	13.5
95	16	5/24/2017	11:46	13	41°30.36	-70°10.19	74	0.85	12.5
96	15	5/24/2017	12:48	10	41°31.23	-70°12.03	76	0.83	12.6
97	15	5/24/2017	14:18	9	41°30.16	-70°07.44	26	0.84	12.1
98	12	5/25/2017	6:08	14	41°34.64	-70°44.20	224	0.84	13.6
99	13	5/25/2017	8:44	26	41°23.74	-70°49.73	259	0.81	12.1
100	13	5/25/2017	9:53	20	41°23.78	-70°47.68	251	0.84	12.1
101	13	5/25/2017	11:12	22	41°23.30	-70°46.40	43	0.50	12.1
102	11	5/25/2017	12:23	10	41°25.31	-70°45.30	63	0.67	13.2
103	15	5/26/2017	6:20	8	41°31.99	-70°34.93	266	0.47	15.4
104	16	5/26/2017	8:41	17	41°27.34	-70°18.58	271	0.54	14.0
105	15	5/26/2017	10:11	10	41°28.31	-70°21.64	301	0.62	13.6

Table 3. Sampling Effort Assigned and Accomplished by Stratum, Cruise 201791.

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	1
16	2	11	11		11	
17	3	5	4		4	
18	3	5	5		5	2
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	4		4	
29	4	5	4		4	1
30	4	2	2		2	
31	5	3	3		3	
32	5	3	3		3	
33	5	4	4		4	
34	5	4	4		4	
35	5	5	4		4	1
36	5	2	2		2	
TOTALS		103	99	0	99	6

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) Completed on Cruise 201791.
Not Advised for Indices of Abundance other than Spiny Dogfish.

Station	Stratum	SHG	Location	Description
No sub-standard tows on cruise 201791				

Table 5. Attempted Tows Aborted During Cruise 201791.

Station	Stratum	SHG	Location	Description
36	35	176	Saturday Night Ledge	Ghost gear intercepted
42	29	171	Outer Cape Cod Bay	Fixed gear intercepted
52	18	171	East of Wellfleet	Hung down
56	18	171	East of Monomay	Hard Bottom
66	15	174	South of Harwich	Large catch of weed
86	12	171	South of New Bedford	Ghost trawl gear intercepted

Table 6a. Total Catch Numbers and Weights Observed on the 2017
Massachusetts Spring Inshore Bottom Trawl Survey - Cruise 201791- Sorted by Number

Species Code	Common Name	Count	Weight (kg)
143	SCUP	46,683	6,830.466
181	NORTHERN SAND LANCE	11,685	103.854
171	NORTHERN SEAROBIN	10,664	1,727.450
503	LONGFIN SQUID	9,809	104.253
73	ATLANTIC COD	5,800	130.980
163	LONGHORN SCULPIN	4,819	848.353
72	SILVER HAKE	4,211	218.959
74	HADDOCK	4,000	2,301.256
106	WINTER FLOUNDER	3,719	660.048
105	YELLOWTAIL FLOUNDER	3,650	803.727
313	ATLANTIC ROCK CRAB	2,510	327.229
131	BUTTERFISH	1,956	109.553
26	LITTLE SKATE	1,899	1,068.576
322	LADY CRAB	1,574	119.144
77	RED HAKE	1,545	92.406
33	ALEWIFE	1,528	39.306
301	AMERICAN LOBSTER	988	300.110
78	SPOTTED HAKE	976	20.213
141	BLACK SEA BASS	837	597.778
102	AMERICAN PLAICE	753	128.000
108	WINDOWPANE	743	165.363
317	SPIDER CRAB UNCL	470	47.826
193	OCEAN POUT	449	106.976
23	WINTER SKATE	391	488.654
103	SUMMER FLOUNDER	368	204.601
172	STRIPED SEAROBIN	303	96.697
32	ATLANTIC HERRING	246	18.961
348	NORTHERN MOONSNAIL	193	16.867
177	TAUTOG	186	123.643
104	FOURSPOT FLOUNDER	162	37.957
34	BLUEBACK HERRING	102	1.818
312	JONAH CRAB	90	18.427
336	CHANNELED WHELK	77	11.339
337	KNOBBED WHELK	67	22.255
318	HORSESHOE CRAB	66	55.024
35	AMERICAN SHAD	66	3.736
401	SEA SCALLOP	48	9.460
164	SEA RAVEN	31	17.906
343	BLUE MUSSEL	27	3.148
117	SMALLMOUTH FLOUNDER	25	0.228
176	CUNNER	23	0.912
13	SMOOTH DOGFISH	21	61.290
43	BAY ANCHOVY	20	0.063

Table 6a continued.

Species Code	Common Name	Count	Weight (kg)
197	GOOSEFISH	16	2.260
107	WITCH FLOUNDER	13	4.172
116	NORTHERN PIPEFISH	12	0.020
45	RAINBOW SMELT	12	0.107
166	GRUBBY	8	0.127
413	NORTHERN QUAHOG	8	2.608
182	SNAKEBLENNY	7	0.234
403	ATLANTIC SURFCLAM	6	0.570
139	STRIPED BASS	5	2.818
180	ROCK GUNNEL	5	0.056
15	SPINY DOGFISH	5	17.280
24	CLEARNOSE SKATE	5	13.270
28	THORNY SKATE	4	3.426
402	BAY SCALLOP	4	0.309
20	SKATE UNCL	3	0.326
75	POLLOCK	3	0.744
409	OCEAN QUAHOG	3	0.414
191	WRYMOUTH	2	0.364
146	NORTHERN KINGFISH	2	0.758
323	MANTIS SHRIMP UNCL	2	0.080
183	DAUBED SHANNY	2	0.012
109	GULF STREAM FLOUNDER	2	0.076
76	WHITE HAKE	2	0.080
83	FOURBEARD ROCKLING	1	0.144
306	NORTHERN SHRIMP	1	0.008
22	BARNDOOR SKATE	1	0.180
314	BLUE CRAB	1	0.170
145	WEAKFISH	1	0.350
168	LUMPFISH	1	0.002
738	NAKED GOBY	1	0.001
338	MOON SNAIL, SHARK EYE, AND BABY-EAR	1	0.018
165	ALLIGATORFISH	1	0.001
155	ACADIAN REDFISH	1	0.408
520	LONGFIN SQUID EGG MOPS		30.184
Totals		123,921	18,126.389

Table 6b. Total Catch Numbers and Weights Observed on the 2017
Massachusetts Spring Inshore Bottom Trawl Survey - Cruise 201791- Sorted by Weight

SPP CODE	COMMON NAME	COUNT	WEIGHT(kg)
143	SCUP	46,683	6,830.466
74	HADDOCK	4,000	2,301.256
171	NORTHERN SEAROBIN	10,664	1,727.450
26	LITTLE SKATE	1,899	1,068.576
163	LONGHORN SCULPIN	4,819	848.353
105	YELLOWTAIL FLOUNDER	3,650	803.727
106	WINTER FLOUNDER	3,719	660.048
141	BLACK SEA BASS	837	597.778
23	WINTER SKATE	391	488.654
313	ATLANTIC ROCK CRAB	2,510	327.229
301	AMERICAN LOBSTER	988	300.110
72	SILVER HAKE	4,211	218.959
103	SUMMER FLOUNDER	368	204.601
108	WINDOWPANE	743	165.363
73	ATLANTIC COD	5,800	130.980
102	AMERICAN PLAICE	753	128.000
177	TAUTOG	186	123.643
322	LADY CRAB	1,574	119.144
131	BUTTERFISH	1,956	109.553
193	OCEAN POUT	449	106.976
503	LONGFIN SQUID	9,809	104.253
181	NORTHERN SAND LANCE	11,685	103.854
172	STRIPED SEAROBIN	303	96.697
77	RED HAKE	1,545	92.406
13	SMOOTH DOGFISH	21	61.290
318	HORSESHOE CRAB	66	55.024
317	SPIDER CRAB UNCL	470	47.826
33	ALEWIFE	1,528	39.306
104	FOURSPOT FLOUNDER	162	37.957
520	LONGFIN SQUID EGG MOPS		30.184
337	KNOBBED WHELK	67	22.255
78	SPOTTED HAKE	976	20.213
32	ATLANTIC HERRING	246	18.961
312	JONAH CRAB	90	18.427
164	SEA RAVEN	31	17.906
15	SPINY DOGFISH	5	17.280
348	NORTHERN MOONSNAIL	193	16.867
24	CLEARNOSE SKATE	5	13.270
336	CHANNELED WHELK	77	11.339
401	SEA SCALLOP	48	9.460
107	WITCH FLOUNDER	13	4.172
35	AMERICAN SHAD	66	3.736
28	THORNY SKATE	4	3.426

Table 6b continued.

SPP CODE	COMMON NAME	COUNT	WEIGHT(kg)
343	BLUE MUSSEL	27	3.148
139	STRIPED BASS	5	2.818
413	NORTHERN QUAHOG	8	2.608
197	GOOSEFISH	16	2.260
34	BLUEBACK HERRING	102	1.818
176	CUNNER	23	0.912
146	NORTHERN KINGFISH	2	0.758
75	POLLOCK	3	0.744
403	ATLANTIC SURFCLAM	6	0.570
409	OCEAN QUAHOG	3	0.414
155	ACADIAN REDFISH	1	0.408
191	WRYMOUTH	2	0.364
145	WEAKFISH	1	0.350
20	SKATE UNCL	3	0.326
402	BAY SCALLOP	4	0.309
182	SNAKEBLENNY	7	0.234
117	SMALLMOUTH FLOUNDER	25	0.228
22	BARNDOOR SKATE	1	0.180
314	BLUE CRAB	1	0.170
83	FOURBEARD ROCKLING	1	0.144
166	GRUBBY	8	0.127
45	RAINBOW SMELT	12	0.107
323	MANTIS SHRIMP UNCL	2	0.080
76	WHITE HAKE	2	0.080
109	GULF STREAM FLOUNDER	2	0.076
43	BAY ANCHOVY	20	0.063
180	ROCK GUNNEL	5	0.056
116	NORTHERN PIPEFISH	12	0.020
338	MOON SNAIL, SHARK EYE, AND BABY-EAR	1	0.018
183	DAUBED SHANNY	2	0.012
306	NORTHERN SHRIMP	1	0.008
168	LUMPFISH	1	0.002
738	NAKED GOBY	1	0.001
165	ALLIGATORFISH	1	0.001
Totals		123,921	18,126.389

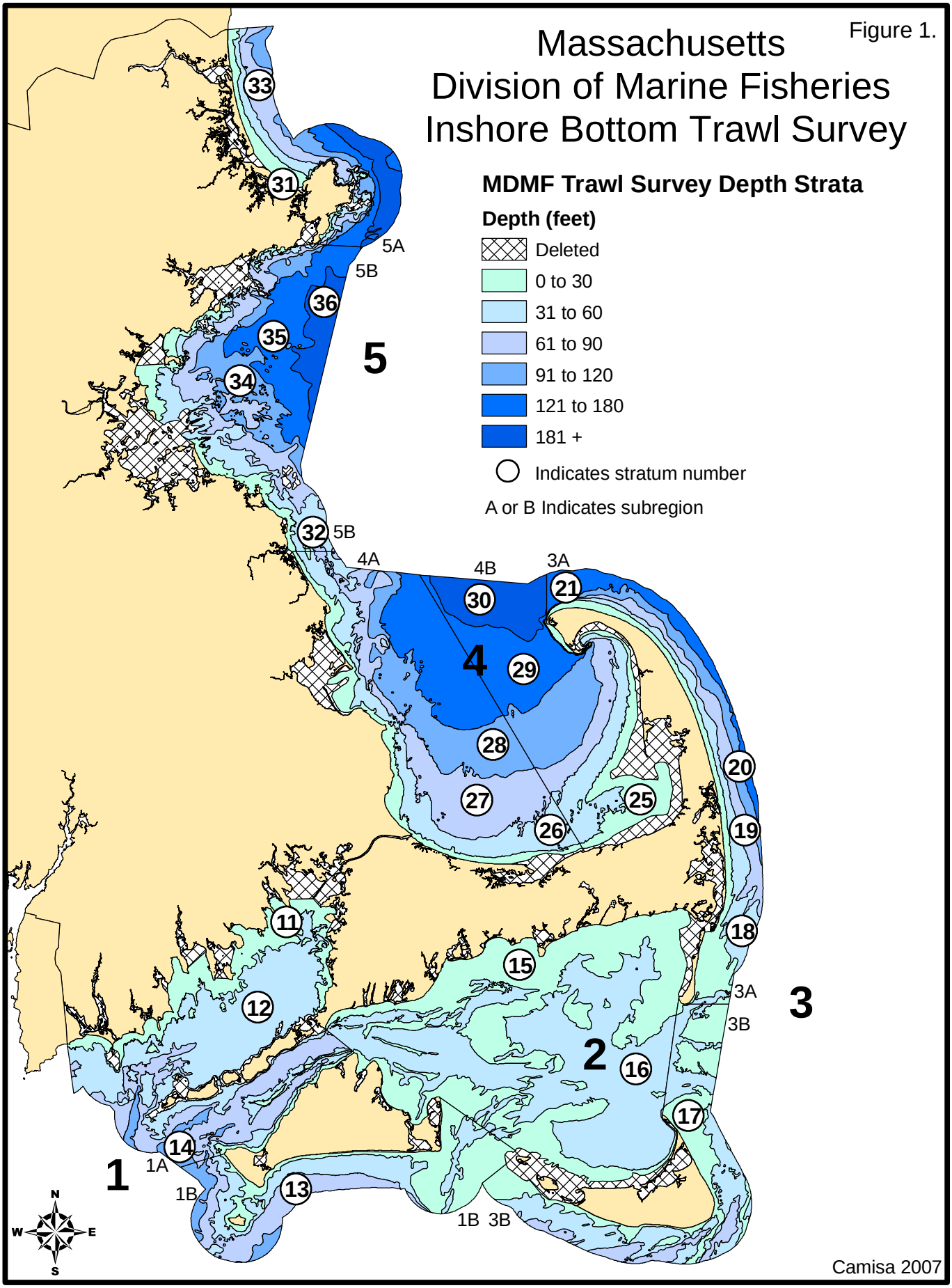
Table 7. Number of individuals obtained for age, growth, maturity and special studies during Massachusetts DMF Cruise 201791.

Species	Maturity Observation	Age and Growth Collection Scales	Otoliths	Opercula	YOY
Atlantic Cod	70		67		1
Haddock	67		67		
Summer Flounder	194		194		
Yellowtail Flounder	278	277			
Winter Flounder	568		567		
Windowpane Flounder	3		3		
Black Sea Bass	132		132		
Scup	84		84		
Weakfish	1		1		
Tautog	5		4		
American Lobster	41				
Jonah crab (Female)	7				
TOTAL	1,450	277	1,119	0	1

OTHER COLLECTIONS:
Female jonah crabs measured to 0.1 cm carapace width and egg bearing status recorded for size at maturity study (D. Perry).
1 oyster toadfish saved for Ocean Genome Project (Bernardos)
483 river herring for age and growth study (Armstrong).
700+ YOY Atlantic cod saved for age and growth study (Dean).
100+ YOY Atlantic cod saved for population study (Decelles)
4 ocean pout saved for age and growth study (Wuenschel)
2 female smooth dogfish saved for maturity study (Skomal)

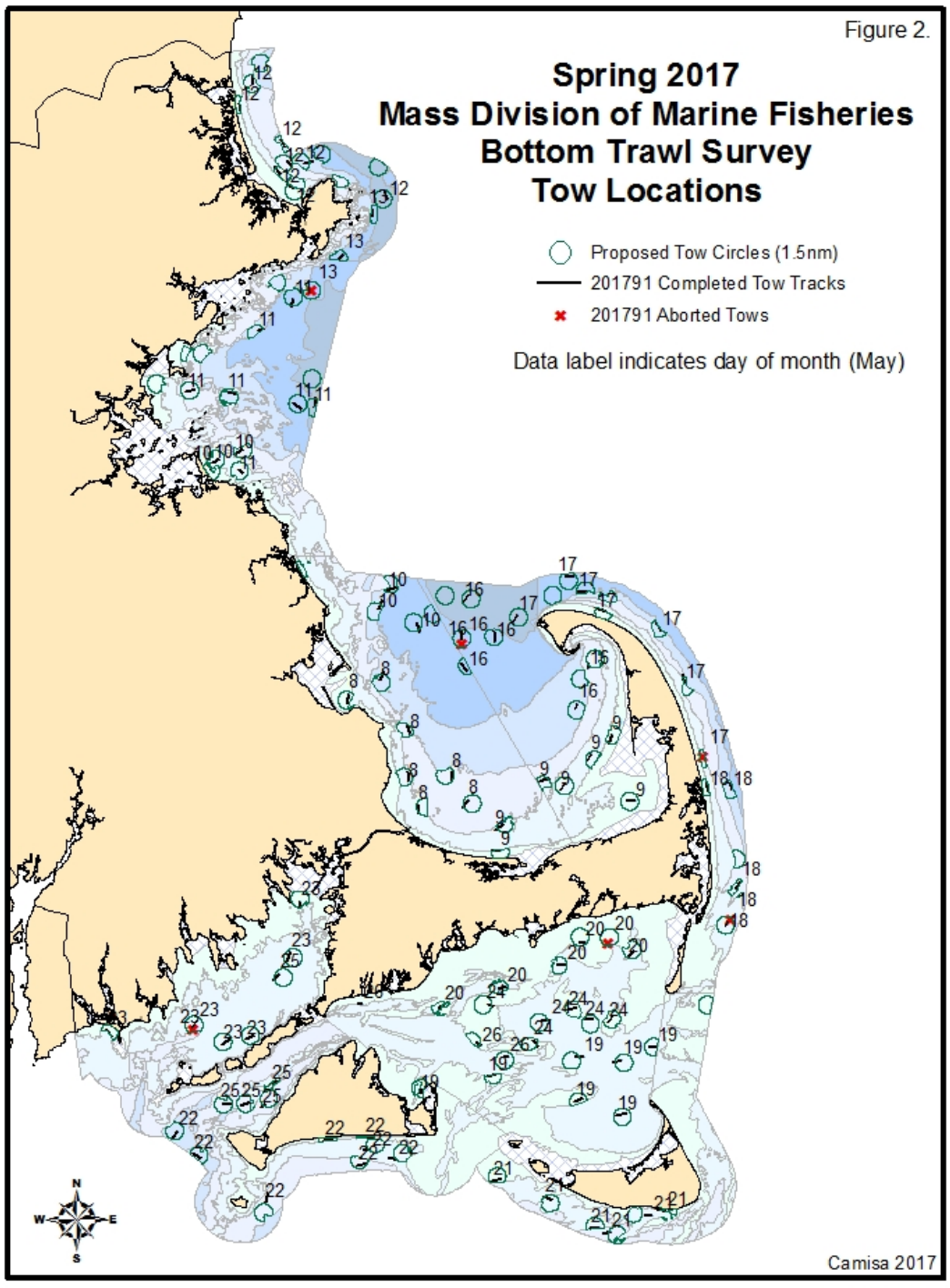
Figure 1.

Massachusetts Division of Marine Fisheries Inshore Bottom Trawl Survey



Camisa 2007

Figure 2.


Spring 2017
Mass Division of Marine Fisheries
Bottom Trawl Survey
Tow Locations
Proposed Tow Circles (1.5nm)
201791 Completed Tow Tracks
201791 Aborted Tows
Data label indicates day of month (May)
N
W
E
S
Camisa 2017

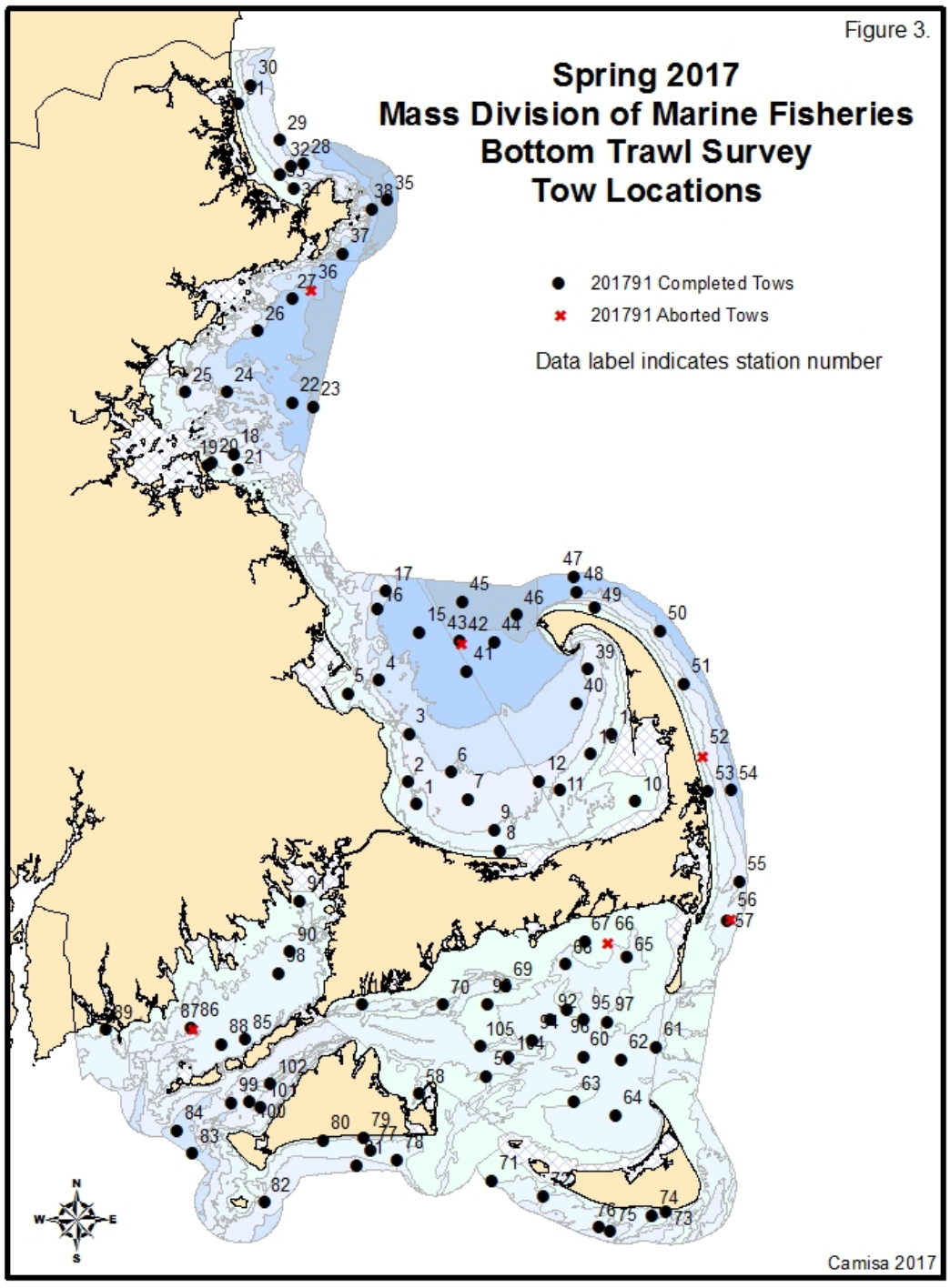


Figure 3.
Spring 2017
Mass Division of Marine Fisheries
Bottom Trawl Survey
Tow Locations
201791 Completed Tows
201791 Aborted Tows
Data label indicates station number
Camisa 2017

CRUISE RESULTS

R/V GLORIA MICHELLE

2017 Massachusetts Inshore Fall
Bottom Trawl Survey
Cruise No. 201792

CRUISE PERIOD AND AREA

From September 5 through September 25, 2017 the Massachusetts Division of Marine Fisheries conducted its 40th 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 and select invertebrate 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 (Fig. 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. 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 net's headrope.

Twenty-nine MADMF employees participated in the survey as part of the scientific party, joined one student from Northeastern University and one student from the Northeast Maritime Institute (Table 1)

CRUISE SUMMARY

99 stations were attempted in 17 sampling days (Figs 1 and 2, Table 2). Ninety-six completed stations are considered acceptable for assessment of all species, SHG <=136 (Table 3). Seven station assignments were not completed with acceptable trawl hauls, largely due to fixed gear and time constraints. One station in each strata, 26, 29, 34, and 35 were dropped due to fixed gear set on towable bottom. Two stations in stratum 16 were dropped due to time constraints resulting from tropical storm Jose. One station in stratum 18 was dropped due to R/V time constraints and strong currents. Three attempted tows were aborted due to fixed gear, hard bottom, and crossed doors (Table 5, Fig. 3).

The primary goal of tallying weight, number, and a representative length frequency of each fish species in the catches was accomplished (Tables 6a and 6b). Several interesting records were set on the 2017 fall survey. The largest abundance of Jonah crabs (206) were recorded at station 14 in Mass Bay and the largest abundance of juvenile butterfish (38,629) were recorded at station 63 South of Nantucket. The largest biomass of Atlantic herring (850kg) was recorded at station 47 in 42 meters of water off Truro and the largest biomass of female lobster (293kg, mostly large eggers) was recorded at station 50 in 10 meters of water off Wellfleet. 27 juvenile monkfish were encountered at several Cape Cod Bay and Mass Bay stations and one at 6cm was taken in Nantucket Sound. Moderate catches of winter flounder, whiting, red hake, juvenile butterfish, American lobster and haddock were taken North of Cape Cod. YOY scup, butterfish, longfin squid, bay anchovy and black sea bass were abundant throughout Nantucket Sound, Vineyard Sound and Buzzard's Bay.

Additional sampling goals were achieved (Table 7). To aid cooperative fisheries assessments, over 1,150 scale/otolith/operculum samples, as well as sex and maturity observations, were taken from Atlantic cod, haddock, summer flounder, yellowtail flounder, winter flounder, black sea bass, scup, tautog, American lobster and jonah crabs. Additional samples were collected to assist ongoing research by fisheries scientists from MDMF and other labs in the region.

For further information on this survey or others in the time series, contact Matthew Camisa at (508) 990-2860 ext. 139.

Table 1. MADMF Fall Cruise 2017 Staffing List

Scientific Party

Name	Affiliation	Num. Days
Matthew Camisa	MADMF	11
Vincent Manfredi	MADMF	10
Steve Voss	MADMF	6
Elise Koob	MADMF	5
Mark Szymanski	MADMF	5
Tiffany Vidal	MADMF	5
Bob Glenn	MADMF	4
Brendan Reilly	MADMF	4
John Logan	MADMF	4
Nicole Ward	MADMF	4
Collin Farrell	MADMF	3
Greg Decelles	MADMF	3
Mike Trainor	MADMF	3
Jill Carr	MADMF	2
Kim Trull	MADMF	2
Steve Wilcox	MADMF	2
Tanya Rogers	NORTHEASTERN	2
Alex Boeri	MADMF	1
Chrissy Petitpas	MADMF	1
Christine Cassidy	MADMF	1
Derek Perry	MADMF	1
Devon Robinson	MADMF	1
Holly Williams	MADMF	1
John Sheppard	MADMF	1
Mark Rousseau	MADMF	1
Mike Auriemma	MADMF	1
Mike Pol	MADMF	1
Ross Kessler	MADMF	1
Scott Elzey	MADMF	1
Tracy Pugh	MADMF	1
Justin Ryan	STUDENT	1
		89

R/V Gloria Michelle Crew

Name	Affiliation	Num. Days
Officers		
Andrew Reynaga	NOAA OIC	17
Chris Gallagher	NOAA JOIC	16
Calandria Decastro	NOAA-CORPS	5
Deck Crew		
George Morton	Contract Fisherman	17
Mike Bergman	NMFS-WH	11
Kristy Owen	NMFS-WH	3
Kristy Gustafson	NMFS-WH	1
Ron Peterson	WHOI	1

Table 2. Station Information for the 2017 Massachusetts Fall Inshore Bottom Trawl Survey
Cruise No. 201792

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
1	26	9/5/2017	6:10	16	41°49.44	-70°29.65	190	0.84	23.6
2	25	9/5/2017	7:30	9	41°49.78	-70°30.74	178	0.72	14.4
3	28	9/5/2017	8:52	31	41°52.57	-70°26.40	156	0.84	8.8
4	28	9/5/2017	10:02	35	41°53.91	-70°26.11	190	0.81	8.4
5	29	9/5/2017	12:39	45	42°02.38	-70°30.45	183	0.52	8.1
6	29	9/5/2017	14:04	44	42°02.59	-70°30.40	203	0.59	8.1
7	25	9/5/2017	15:28	9	42°03.22	-70°38.20	146	0.84	11.9
8	26	9/6/2017	6:18	17	41°46.34	-70°25.49	139	0.84	11.2
9	26	9/6/2017	8:17	17	41°47.87	-70°13.87	255	0.82	14.1
10	25	9/6/2017	10:20	10	41°49.08	-70°02.96	229	0.54	18.6
11	29	9/7/2017	8:34	51	42°01.18	-70°23.79	250	0.75	7.5
12	32	9/7/2017	12:03	13	42°13.63	-70°44.21	354	0.67	12.0
13	35	9/7/2017	13:47	43	42°19.35	-70°42.02	253	0.83	7.7
14	31	9/7/2017	17:03	8	42°17.42	-70°51.83	143	0.54	12.5
15	34	9/8/2017	6:53	33	42°23.37	-70°48.40	288	0.54	8.1
16	33	9/8/2017	8:55	24	42°23.59	-70°54.52	45	0.55	8.7
17	33	9/8/2017	10:17	27	42°24.34	-70°54.10	66	0.58	8.7
18	32	9/8/2017	11:55	14	42°24.60	-70°56.69	92	0.56	9.5
19	35	9/8/2017	16:28	54	42°32.30	-70°39.48	255	0.63	7.7
20	34	9/9/2017	6:48	30	42°41.77	-70°35.95	119	0.71	7.9
21	34	9/9/2017	9:22	32	42°49.99	-70°45.06	166	0.71	8.0
22	33	9/9/2017	10:48	28	42°47.06	-70°45.42	330	0.85	8.3
23	32	9/9/2017	13:04	15	42°44.83	-70°46.31	347	0.6	9.5
24	33	9/9/2017	14:39	25	42°44.47	-70°44.55	159	0.68	8.9
25	31	9/9/2017	15:46	10	42°43.65	-70°45.89	158	0.64	12.9
26	35	9/10/2017	8:36	41	42°42.56	-70°36.87	4	0.39	8.0
27	35	9/10/2017	10:15	46	42°43.81	-70°37.80	134	0.56	7.7
28	31	9/10/2017	11:47	9	42°40.84	-70°42.68	309	0.86	13.0
29	36	9/10/2017	14:02	87	42°39.63	-70°30.58	353	0.54	6.1
30	35	9/10/2017	16:16	58	42°33.89	-70°35.91	63	0.67	7.8
31	36	9/11/2017	6:40	67	42°31.27	-70°36.67	21	0.63	7.7
32	29	9/11/2017	10:32	54	42°06.47	-70°27.35	326	0.83	7.4
33	30	9/11/2017	12:10	63	42°07.23	-70°22.83	140	0.84	7.1
34	30	9/11/2017	13:27	59	42°04.74	-70°24.47	337	0.85	7.3
35	29	9/11/2017	15:16	52	42°00.71	-70°20.88	260	0.83	7.5
36	27	9/12/2017	6:05	24	41°50.00	-70°27.40	145	0.85	10.2
37	27	9/12/2017	7:53	27	41°50.76	-70°20.74	87	0.83	9.4
38	27	9/12/2017	9:09	22	41°48.92	-70°17.02	345	0.85	10.7
39	27	9/12/2017	10:19	22	41°50.81	-70°13.74	253	0.84	10.7
40	28	9/12/2017	11:38	29	41°52.49	-70°15.17	58	0.86	9.2
41	25	9/12/2017	13:32	9	41°54.67	-70°06.33	210	0.87	17.0
42	26	9/12/2017	15:07	18	41°55.23	-70°07.72	13	0.67	15.9
43	28	9/12/2017	16:53	36	41°58.59	-70°12.43	186	0.63	8.6
44	27	9/13/2017	6:22	29	41°59.94	-70°09.60	153	0.55	9.1
45	28	9/13/2017	8:32	35	41°55.48	-70°19.60	248	0.75	9.0
46	21	9/13/2017	11:05	63	42°06.60	-70°13.98	273	0.84	7.5
47	21	9/13/2017	13:54	42	42°05.53	-70°03.57	135	0.71	8.8
48	20	9/13/2017	15:14	37	42°03.72	-70°01.43	149	0.88	8.9

Table 2 continued.

Station	Stratum	Date	Time (est)	Depth (m)	Latitude	Longitude	Course	Distance (nmi)	Bottom temp °C
49	19	9/13/2017	17:06	28	41°57.25	-69°57.16	330	0.7	10.5
50	17	9/14/2017	5:57	12	41°53.02	-69°56.96	345	0.84	12.9
51	17	9/14/2017	7:11	10	41°50.39	-69°56.06	353	0.84	12.4
52	20	9/14/2017	8:31	35	41°47.20	-69°52.33	343	0.84	9.3
53	18	9/14/2017	9:55	14	41°45.73	-69°54.70	179	0.67	12.1
54	18	9/14/2017	11:19	18	41°41.61	-69°52.66	226	0.83	12.0
55	16	9/14/2017	15:19	14	41°26.76	-70°06.78	253	0.84	19.6
56	16	9/14/2017	16:36	14	41°22.46	-70°05.66	263	0.85	19.4
57	18	9/15/2017	7:29	18	41°21.37	-69°57.05	347	0.82	17.8
58	17	9/15/2017	8:43	9	41°21.66	-69°59.01	356	0.84	18.4
59	17	9/15/2017	10:40	11	41°27.53	-70°00.99	69	0.83	16.9
60	16	9/15/2017	12:50	12	41°27.19	-70°12.52	246	0.13	N/A
61	15	9/15/2017	13:50	8	41°28.08	-70°15.42	342	0.8	20.5
62	11	9/16/2017	7:25	9	41°23.66	-70°25.61	357	0.74	19.6
63	19	9/16/2017	10:11	21	41°14.62	-70°16.77	108	0.82	18.0
64	18	9/16/2017	11:20	16	41°15.77	-70°15.80	94	0.84	18.7
65	17	9/16/2017	12:30	9	41°17.21	-70°19.23	78	0.84	19.9
66	15	9/16/2017	16:10	8	41°19.71	-70°12.77	300	0.82	21.4
67	16	9/17/2017	6:05	12	41°19.41	-70°06.57	291	0.84	20.4
68	15	9/17/2017	7:27	9	41°23.77	-70°10.28	251	0.85	20.3
69	15	9/17/2017	8:41	8	41°21.18	-70°16.92	104	0.79	20.3
70	16	9/17/2017	10:00	14	41°22.78	-70°12.90	81	0.89	20.3
71	15	9/17/2017	10:54	8	41°23.35	-70°14.10	93	0.84	20.4
72	15	9/17/2017	13:49	8	41°25.58	-70°31.94	76	0.55	20.6
73	16	9/17/2017	15:13	16	41°28.49	-70°27.98	97	0.57	20.8
74	16	9/17/2017	16:23	17	41°29.38	-70°24.78	267	0.66	21.1
75	11	9/18/2017	6:29	10	41°37.91	-70°44.57	60	0.67	21.1
76	11	9/18/2017	8:01	9	41°35.71	-70°48.48	330	0.84	21.4
77	12	9/18/2017	9:17	13	41°34.58	-70°46.31	13	0.84	20.5
78	12	9/18/2017	10:34	15	41°32.60	-70°48.85	33	0.61	19.7
79	12	9/18/2017	11:49	12	41°34.58	-70°44.70	43	0.86	20.4
80	12	9/18/2017	13:26	14	41°33.66	-70°41.82	50	0.76	19.9
81	13	9/23/2017	6:14	22	41°28.65	-70°41.90	55	0.47	19.3
82	13	9/23/2017	7:32	21	41°27.68	-70°43.53	30	0.52	19.3
83	13	9/23/2017	9:20	22	41°23.61	-70°48.16	223	0.84	17.9
84	14	9/23/2017	11:04	30	41°22.28	-70°55.02	218	0.83	16.4
85	12	9/23/2017	12:38	17	41°21.59	-70°49.73	83	0.52	17.3
86	11	9/23/2017	13:52	10	41°21.26	-70°47.39	48	0.51	19.1
87	14	9/24/2017	7:24	33	41°18.68	-70°52.39	332	0.83	16.8
88	12	9/24/2017	9:03	13	41°16.57	-70°47.31	127	0.84	17.8
89	13	9/24/2017	10:02	26	41°15.62	-70°45.23	98	0.63	17.4
90	13	9/24/2017	11:28	20	41°18.77	-70°35.48	265	0.83	18.2
91	12	9/24/2017	12:40	16	41°18.89	-70°31.66	276	0.83	18.6
92	11	9/24/2017	13:46	9	41°16.93	-70°29.14	323	0.81	18.2
93	16	9/25/2017	7:09	10	41°31.59	-70°30.05	89	0.54	18.2
94	15	9/25/2017	8:46	9	41°34.81	-70°23.30	72	0.85	18.1
95	16	9/25/2017	11:03	18	41°29.93	-70°11.54	329	0.8	16.8
96	15	9/25/2017	12:57	9	41°37.85	-70°02.23	207	0.62	17.2
97	15	9/25/2017	14:00	9	41°38.25	-70°04.98	217	0.83	18.1
98	15	9/25/2017	15:18	10	41°34.56	-70°03.50	136	0.63	17.4
99	16	9/25/2017	16:32	12	41°31.03	-70°08.48	65	0.84	17.0

Table 3. Sampling Effort Assigned and Accomplished by Stratum, Cruise 201792.

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	9		9	1
17	3	5	5		5	
18	3	5	4		4	
19	3	2	2		2	
20	3	2	2		2	
21	3	2	2		2	
25	4	4	4		4	
26	4	5	4		4	
27	4	5	5		5	
28	4	5	5		5	
29	4	5	4		4	1
30	4	2	2		2	
31	5	3	3		3	
32	5	3	3		3	
33	5	4	4		4	
34	5	4	3		3	
35	5	5	4		4	1
36	5	2	2		2	
TOTALS		103	96	0	96	3

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) Completed on Cruise 201792.
Not Advised for Indices of Abundance other than Spiny Dogfish.

Station	Stratum	SHG	Location	Description
No sub-standard tows on cruise 201792				

Table 5. Attempted Tows Aborted During Cruise 201792.

Station	Stratum	SHG	Location	Description
5	29		East of Plymouth	Trawl doors crossed
26	35		North of Rockport	Fixed gear intercepted
60	16		Halfmoon shoal	Hung down

Table 6a. Total Catch Numbers and Weights Observed on the 2017
Massachusetts Fall Inshore Bottom Trawl Survey - Cruise 201792- Sorted by Number

Species Code	Common Name	Count	Weight (kg)
143	SCUP	327,246	2,378.878
131	BUTTERFISH	96,221	611.307
43	BAY ANCHOVY	47,125	49.340
503	LONGFIN SQUID	18,880	228.341
141	BLACK SEA BASS	11,218	90.356
72	SILVER HAKE	6,387	714.170
32	ATLANTIC HERRING	5,767	859.173
77	RED HAKE	4,719	643.803
106	WINTER FLOUNDER	4,492	780.951
301	AMERICAN LOBSTER	3,337	1,112.374
105	YELLOWTAIL FLOUNDER	3,072	625.602
313	ATLANTIC ROCK CRAB	2,937	366.964
322	LADY CRAB	2,904	172.928
401	SEA SCALLOP	2,344	84.639
26	LITTLE SKATE	2,062	1,116.717
181	NORTHERN SAND LANCE	1,513	8.747
163	LONGHORN SCULPIN	1,434	188.507
74	HADDOCK	1,296	651.700
108	WINDOWPANE	1,173	168.346
312	JONAH CRAB	869	147.594
102	AMERICAN PLAICE	659	92.435
171	NORTHERN SEAROBIN	635	9.332
33	ALEWIFE	619	59.289
23	WINTER SKATE	581	431.738
317	SPIDER CRAB UNCL	498	50.967
78	SPOTTED HAKE	467	49.594
103	SUMMER FLOUNDER	338	224.663
104	FOURSPOT FLOUNDER	327	53.028
13	SMOOTH DOGFISH	301	372.018
193	OCEAN POUT	270	46.390
117	SMALLMOUTH FLOUNDER	209	1.266
176	CUNNER	187	3.676
36	ATLANTIC MENHADEN	179	2.689
76	WHITE HAKE	178	9.970
116	NORTHERN PIPEFISH	176	0.761
337	KNOBBED WHELK	153	48.094
172	STRIPED SEAROBIN	136	54.838
502	NORTHERN SHORTFIN SQUID	97	15.382
177	TAUTOG	82	19.966
211	ROUND SCAD	77	0.213
318	HORSESHOE CRAB	63	70.125
107	WITCH FLOUNDER	59	18.653
336	CHANNELED WHELK	54	7.823
132	ATLANTIC MOONFISH	48	0.110

Table 6a continued.

Species Code	Common Name	Count	Weight (kg)
35	AMERICAN SHAD	45	3.801
348	NORTHERN MOONSNAIL	43	5.239
73	ATLANTIC COD	34	0.764
343	BLUE MUSSEL	34	2.470
657	DWARF GOATFISH	31	0.769
197	GOOSEFISH	29	12.153
146	NORTHERN KINGFISH	23	1.382
15	SPINY DOGFISH	23	59.677
155	ACADIAN REDFISH	21	1.458
208	MACKEREL SCAD	18	0.106
164	SEA RAVEN	16	12.346
24	CLEARNOSE SKATE	14	23.408
342	NORTHERN HORSEMUSSEL	13	2.066
145	WEAKFISH	11	0.372
121	ATLANTIC MACKEREL	11	2.056
113	ATLANTIC SILVERSIDE	10	0.082
202	GRAY TRIGGERFISH	10	8.850
196	NORTHERN PUFFER	9	0.157
180	ROCK GUNNEL	8	0.018
28	THORNY SKATE	8	8.924
402	BAY SCALLOP	8	0.674
338	MOON SNAIL, SHARK EYE, AND BABY-EAR	7	0.128
212	ROUGH SCAD	7	0.170
118	HOGCHOKER	6	0.828
135	BLUEFISH	5	3.102
323	MANTIS SHRIMP UNCL	4	0.114
34	BLUEBACK HERRING	4	0.252
413	NORTHERN QUAHOG	3	0.634
75	POLLOCK	3	0.132
403	ATLANTIC SURFCLAM	3	1.102
4	ROUGHTAIL STINGRAY	3	91.800
185	OYSTER TOADFISH	3	2.294
109	GULF STREAM FLOUNDER	2	0.018
409	OCEAN QUAHOG	2	0.550
139	STRIPED BASS	2	1.194
192	ATLANTIC WOLFFISH	2	4.824
83	FOURBEARD ROCKLING	1	0.060
640	PINFISH	1	0.052
149	SPOT	1	0.054
165	ALLIGATORFISH	1	0.006
314	BLUE CRAB	1	0.258
37	HICKORY SHAD	1	0.462
201	PLANEHEAD FILEFISH	1	0.028
168	LUMPFISH	1	0.424
22	BARNDOOR SKATE	1	0.540
45	RAINBOW SMELT	1	0.006
570	CREVALLE JACK	1	0.036
564	SHARKSUCKER	1	0.720
520	LONGFIN SQUID EGG MOPS	-	24.006
Totals		551,876	12,924.023

Table 6b. Total Catch Numbers and Weights Observed on the 2017
Massachusetts Fall Inshore Bottom Trawl Survey - Cruise 201792- Sorted by Weight

Species Code	Common Name	Count	Weight (kg)
143	SCUP	327,246	2,378.878
26	LITTLE SKATE	2,062	1,116.717
301	AMERICAN LOBSTER	3,337	1,112.374
32	ATLANTIC HERRING	5,767	859.173
106	WINTER FLOUNDER	4,492	780.951
72	SILVER HAKE	6,387	714.170
74	HADDOCK	1,296	651.700
77	RED HAKE	4,719	643.803
105	YELLOWTAIL FLOUNDER	3,072	625.602
131	BUTTERFISH	96,221	611.307
23	WINTER SKATE	581	431.738
13	SMOOTH DOGFISH	301	372.018
313	ATLANTIC ROCK CRAB	2,937	366.964
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103	SUMMER FLOUNDER	338	224.663
163	LONGHORN SCULPIN	1,434	188.507
322	LADY CRAB	2,904	172.928
108	WINDOWPANE	1,173	168.346
312	JONAH CRAB	869	147.594
102	AMERICAN PLAICE	659	92.435
4	ROUGHTAIL STINGRAY	3	91.800
141	BLACK SEA BASS	11,218	90.356
401	SEA SCALLOP	2,344	84.639
318	HORSESHOE CRAB	63	70.125
15	SPINY DOGFISH	23	59.677
33	ALEWIFE	619	59.289
172	STRIPED SEAROBIN	136.00	54.838
104	FOURSPOT FLOUNDER	327	53.028
317	SPIDER CRAB UNCL	498	50.967
78	SPOTTED HAKE	467	49.594
43	BAY ANCHOVY	47,125	49.340
337	KNOBBED WHELK	153	48.094
193	OCEAN POUT	270	46.390
520	LONGFIN SQUID EGG MOPS	-	24.006
24	CLEARNOSE SKATE	14	23.408
177	TAUTOG	82	19.966
107	WITCH FLOUNDER	59	18.653
502	NORTHERN SHORTFIN SQUID	97	15.382
164	SEA RAVEN	16	12.346
197	GOOSEFISH	29	12.153
76	WHITE HAKE	178	9.970
171	NORTHERN SEAROBIN	635	9.332
28	THORNY SKATE	8	8.924
202	GRAY TRIGGERFISH	10	8.850

Table 6b continued.

Species Code	Common Name	Count	Weight (kg)
181	NORTHERN SAND LANCE	1,513	8.747
336	CHANNELED WHELK	54	7.823
348	NORTHERN MOONSNAIL	43	5.239
192	ATLANTIC WOLFFISH	2	4.824
35	AMERICAN SHAD	45	3.801
176	CUNNER	187	3.676
135	BLUEFISH	5	3.102
36	ATLANTIC MENHADEN	179	2.689
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185	OYSTER TOADFISH	3	2.294
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37	HICKORY SHAD	1	0.462
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145	WEAKFISH	11	0.372
314	BLUE CRAB	1	0.258
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211	ROUND SCAD	77	0.213
212	ROUGH SCAD	7	0.170
196	NORTHERN PUFFER	9	0.157
75	POLLOCK	3	0.132
338	MOON SNAIL, SHARK EYE, AND BABY-EAR	7	0.128
323	MANTIS SHRIMP UNCL	4	0.114
132	ATLANTIC MOONFISH	48	0.110
208	MACKEREL SCAD	18	0.106
113	ATLANTIC SILVERSIDE	10	0.082
83	FOURBEARD ROCKLING	1	0.060
149	SPOT	1	0.054
640	PINFISH	1	0.052
570	CREVALLE JACK	1	0.036
201	PLANEHEAD FILEFISH	1	0.028
109	GULF STREAM FLOUNDER	2	0.018
180	ROCK GUNNEL	8	0.018
45	RAINBOW SMELT	1	0.006
165	ALLIGATORFISH	1	0.006
Totals		551,876	12,924.023

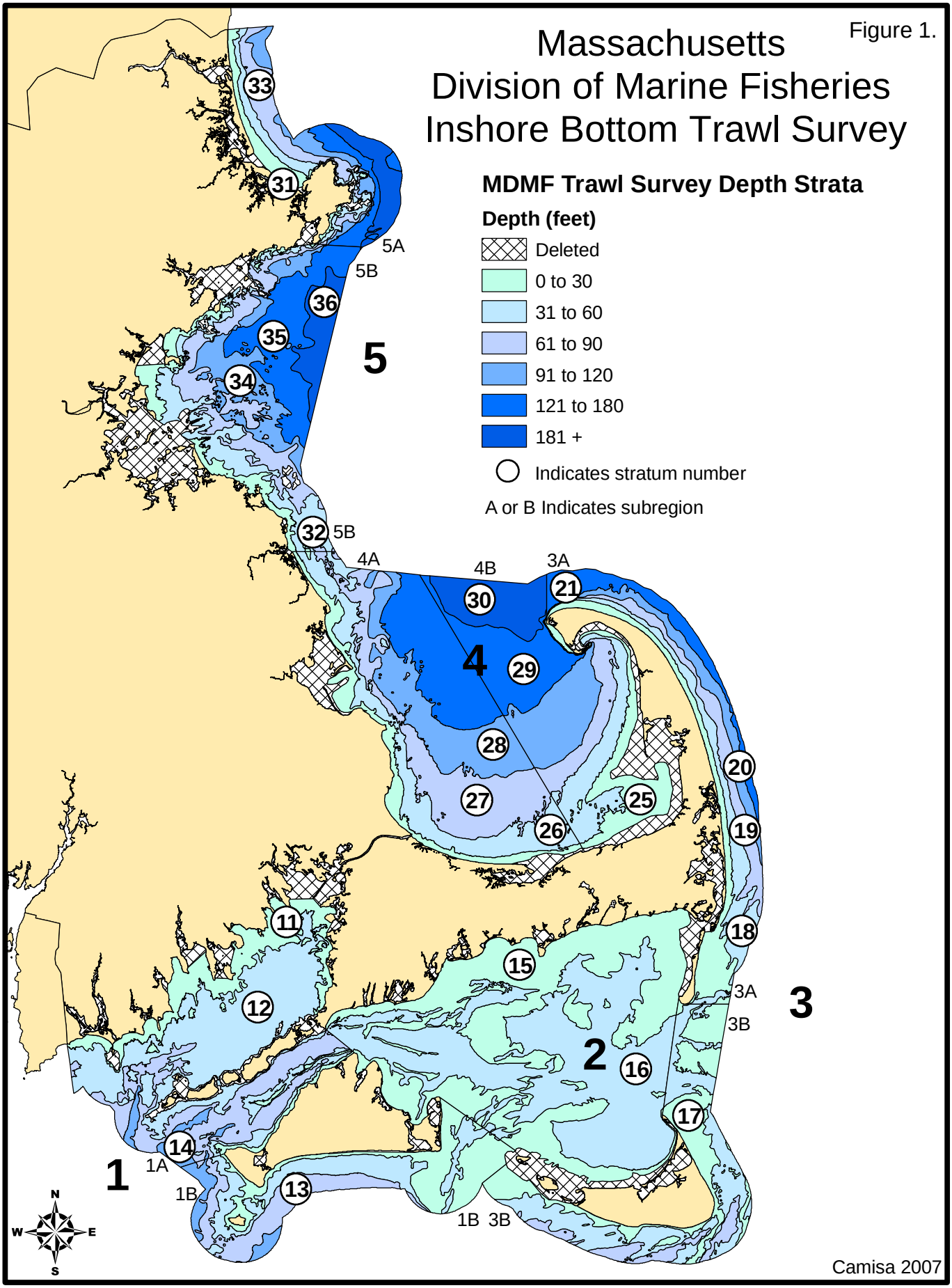
Table 7. Number of individuals obtained for age, growth, maturity and special studies during Massachusetts DMF Cruise 201792.

Species	Maturity Observation	Age and Growth Collection Scales	Otoliths	Opercula	YOY
Atlantic Cod	22		22		
Haddock	120		120		
Summer Flounder	176		169		
Yellowtail Flounder	294	293			
Winter Flounder	405		403		
Black Sea Bass	97		94		
Scup	51		51		
Tautog	7			7	
American Lobster	173				
Jonah crab (Female)	1				
TOTAL	1,346	293	859	7	0

OTHER COLLECTIONS:
Jonah crabs measured to 0.1 cm carapace width and egg bearing status recorded for size at maturity study (D. Perry).
63 male jonah crabs tagged for migration study (D. Perry).
3 oyster toadfish saved for Ocean Genome Project (Bernardos).
Longfin squid egg mops collected from 7 stations for genetics study (L. Hendrickson).
Groundfish saved from 14 stations for sex and maturity training (Decelles).
17 species saved for fish ID training (Jordaan).
40 individuals from 5 species saved for gray seal diet study (Lyssikatos).
Juvenile black sea bass saved from 9 stations for age and growth study (Koob).

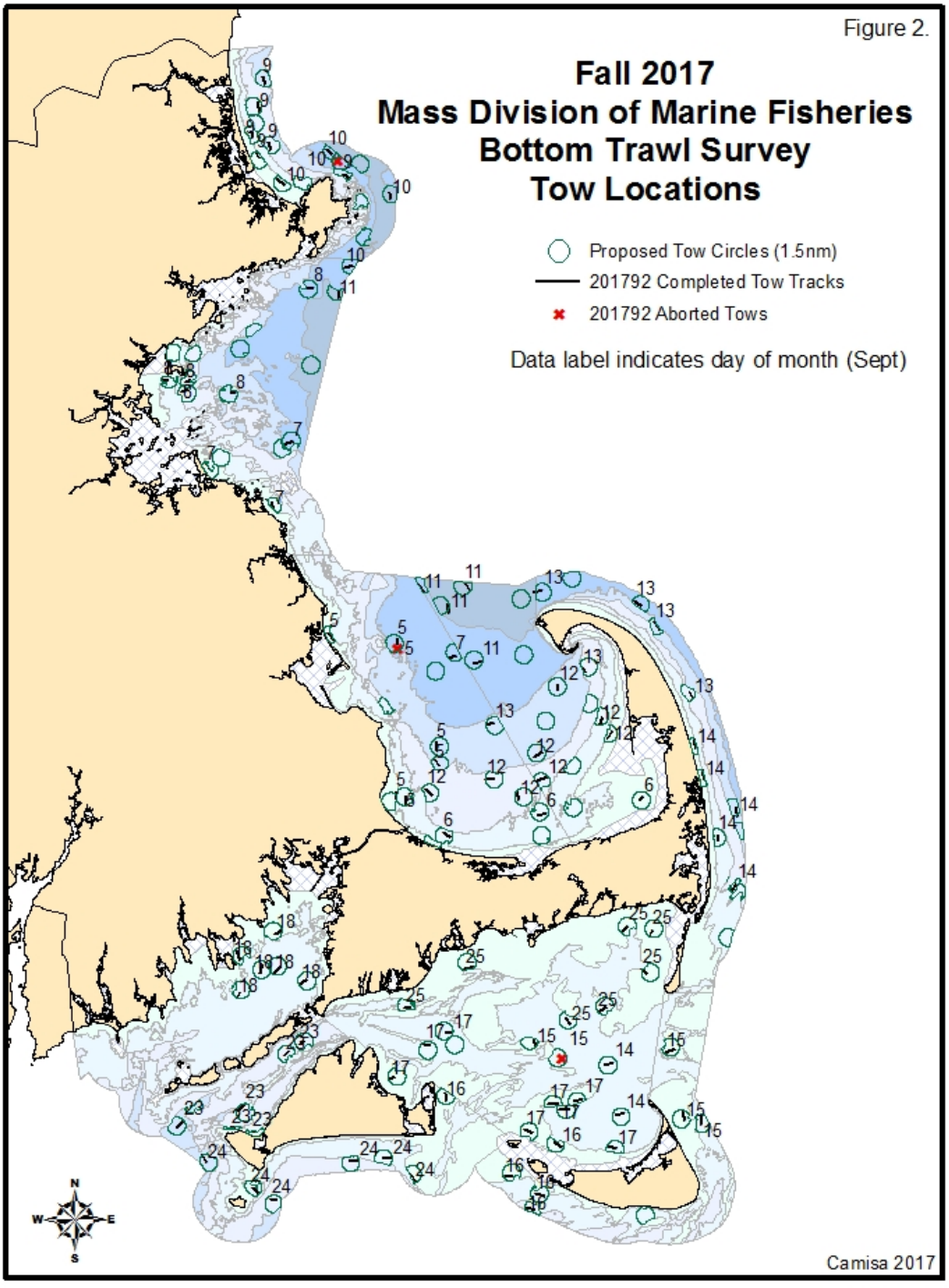
Figure 1.

Massachusetts Division of Marine Fisheries Inshore Bottom Trawl Survey



Camisa 2007

Figure 2.


Fall 2017
Mass Division of Marine Fisheries
Bottom Trawl Survey
Tow Locations
Proposed Tow Circles (1.5nm)
201792 Completed Tow Tracks
201792 Aborted Tows
Data label indicates day of month (Sept)
N
W
E
S
Camisa 2017

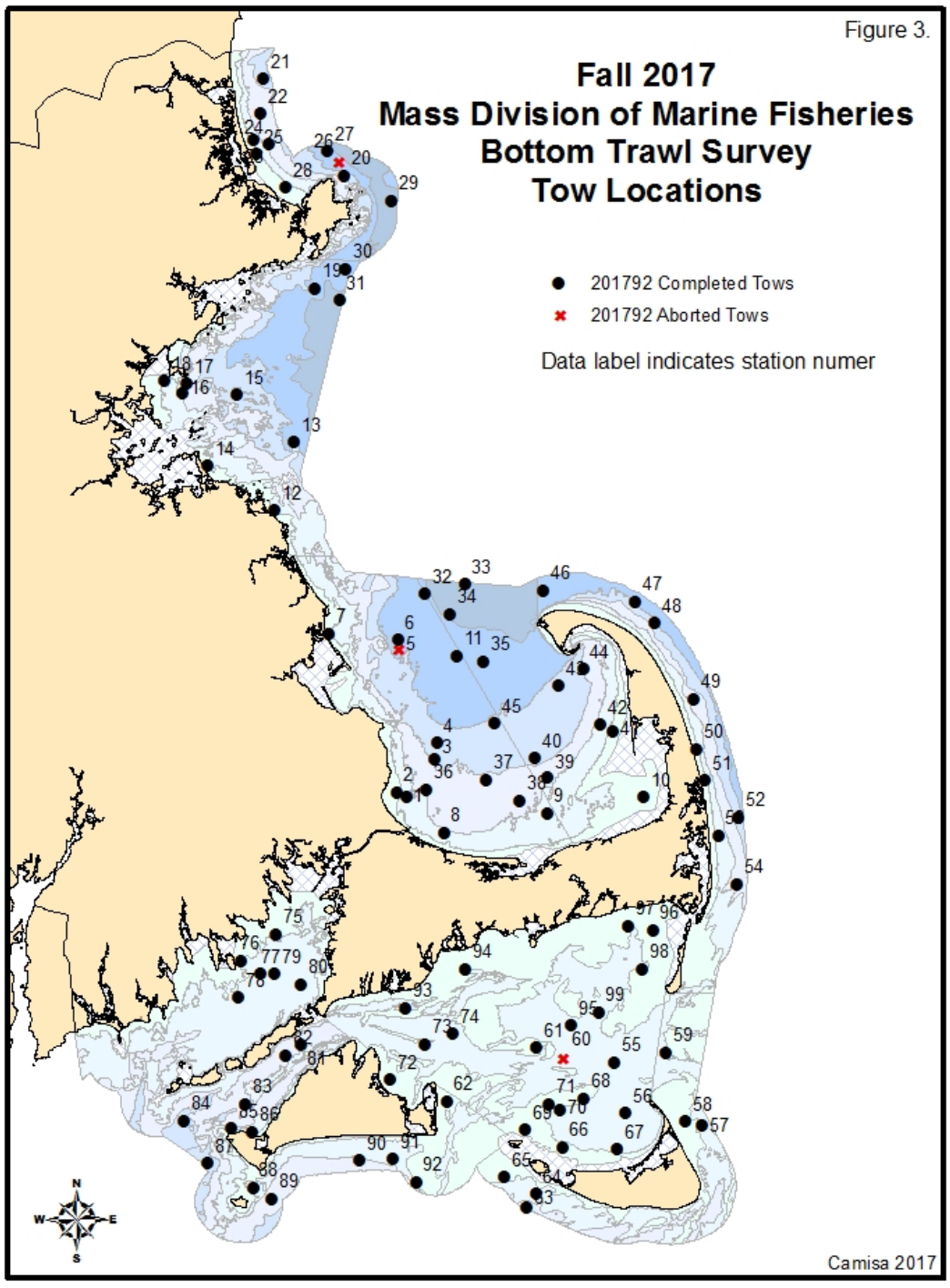


Figure 3.
Fall 2017
Mass Division of Marine Fisheries
Bottom Trawl Survey
Tow Locations
201792 Completed Tows
201792 Aborted Tows
Data label indicates station numer
Camisa 2017

SURVEY REPORT

2017 Nantucket Sound Estuarine Winter Flounder Young of the Year (YOY) Seine Survey

SURVEY PERIOD, AREA, AND PARTICIPANTS

From June 19 – July 6, 2017 the Massachusetts Division of Marine Fisheries (MDMF) conducted the 42nd 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). The survey, led by project members Vincent Manfredi and Mark Szymanski, was assisted by a list of volunteers from the MA DMF South Shore Office (Table 1).

OBJECTIVES

The primary objective of this survey is to provide a winter flounder YOY abundance index for the Southern New England Stock. All commercially and recreationally important finfish and invertebrates are counted. All species not counted are noted for presence.

METHODS

Seining of intertidal and shallow subtidal zones occurs from two hours before until two hours after high tide. 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) is determined by aggregating catch from three replicate hauls at each station. Consistent area swept is maintained using a fixed-length spreader rope. Haul distance is 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 is 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 employs stratification techniques; each estuary is considered a stratum and each station's three replicate hauls are treated as one individual sample. Stratified mean density and confidence limits were derived from standard and modified formulae for mean and variance.

SURVEY RESULTS

The 2017 pooled (all estuaries combined) winter flounder YOY index (0.291 YOY / m^2) is the highest observation since 2000 (Figure 2, Table 2). All estuary specific indices for YOY winter flounder increased in 2017 with the exception of Lewis Bay and Stage Harbor (Figure 3). The Age 1+ winter flounder index remains below the timeseries median for the 8th consecutive year (Figure 4). The YOY Fluke index decreased slightly, but is the fifth highest observation in the timeseries (Figure 5). The blue crab index increased also, and is the 7th highest observation in the timeseries (Figure 6). Forty-six species were encountered in 2017 (Table 2). All bottom temperature monitors were collected and successfully downloaded (Figure 7). For further information on this survey or others in the time series, please contact Vincent M. Manfredi (508)-990-2860 ext. 110.

Table 1. Survey Volunteers

NAME	DAYS CONTRIBUTED	AFFILIATION
Michael Auriemma	1	MA DMF
Matthew Camisa	1	MA DMF
Dr. Greg Decelles	1	MA DMF
Robert Glenn	1	MA DMF
Brendan Riley	3	MA DMF
Devon Robinson	1	MA DMF
Holly Williams	1	MA DMF
Dr. Tiffany Cunnigham	1	MA DMF
Simone Wright	1	MA DMF

Table 2. YOY Winter Flounder Index, All Estuaries.
MDMF Seine Survey: 1976-2017

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

Table 3. Catch Observations of All Species Recorded 2017 Seine Survey
(for species marked present counts are not taken but presence is noted at all hauls)

Common Name	Taxonomic Name	Total Number	Percent Occurrence
Atlantic Silverside	*Menidia menidia*	Present	92.1%
YOY Winter Flounder	*Pseudopleuronectes americanus*	2910	90.7%
Mud Snail	*Nassarius obsoletus*	Present	73.6%
Sand Shrimp	*Crangon septemspinosa*	Present	57.1%
Blue Crab	*Callinectes sapidus*	361	47.9%
Hermit Crab Uncl.	*Paguroidea*	Present	47.1%
Grass Shrimp	*Paelmonetes pugio*	Present	45.7%
Northern Pipefish	*Sygnathus fuscus*	Present	40.0%
Striped Killifish	*Fundulus majalis*	Present	29.3%
Fourspine Stickleback	*Apeltes quadracus*	Present	27.9%
YOY Summer Flounder	*Paralichthys dentatus*	49	26.4%
Spider Crab Uncl.	*Majidae*	97	25.0%
Mummichog	*Fundulus heteroclitus*	Present	23.6%
Northern Kingfish	*Menticirrihitus saxatilis*	61	17.9%
Lady Crab	*Ovalipes ocellatus*	142	15.0%
Green Crab	*Carcinus maenus*	52	12.9%
Pinfish	*Lagodon rhomboides*	26	9.3%
White Mullet	*Mugil curema*	229	8.6%
Bay Anchovy	*Anchoa mitchilli*	110	7.1%
Atlantic Rock Crab	*Cancer irroratus*	15	7.1%
Alewife / Blueback Herring	*Alosa spp.*	107	7.1%
Rainwater Killifish	*Lucania parva*	19	6.4%
Atlantic Needlefish	*Strongylura marina*	12	5.7%
Spot	*Leiostomus xanthurus*	52	5.0%
Atlantic Herring	*Clupea harengus*	10	3.6%
Striped Searobin	*Prionotus evolans*	11	3.6%
Smallmouth flounder	*Etropus microstomus*	6	2.9%
Grubby	*Myoxocephalus aeneus*	3	2.9%
Tautog	*Tautoga onitis*	5	2.9%
Horseshoe Crab	*Limulus polyphemus*	5	2.9%
Oyster	*Crassostrea virginica*	6	2.9%
Northern Quahog	*Mercenaria mercenaria*	4	2.9%
Naked Goby / Seaboard Goby	*Gobiosoma spp.*	5	3.6%
Atlantic Menhaden	*Brevorrtia tyrannus*	79	2.1%
Age 1+ Summer Flounder	*Paralichthys dentatus*	3	2.1%
Threespine Stickleback	*Gasterosteus aculeatus*	Present	2.1%
Blue Mussel	*Mytilus edulis*	94	2.1%
Sheepshead Minnow	*Cyprinodon variegatus*	2	2.1%
Mottled Dog Whelk	*Nassa vibex*	1	2.1%
White Perch	*Morone americana*	2	1.4%
Northern Sand Lance	*Ammodytes dubius*	2	1.4%
Northern Puffer	*Sphoeroides maculatus*	2	1.4%
Flat-browed Mud-Shrimp	*Upogebia affinis*	2	1.4%
Bay Scallop	*Argopecten irradians*	2	1.4%
Age 1+ Winter Flounder	*Pseudopleuronectes americanus*	1	0.7%
Scup	*Stenotomus chrysops*	11	0.7%
Asian Shore Crab	*Hemigrapsus sanguineus*	1	0.7%
Ribbed Mussel	*Guekensia demissus*	1	0.7%
Mysis	*Mysid shrimp*	Present	0.7%

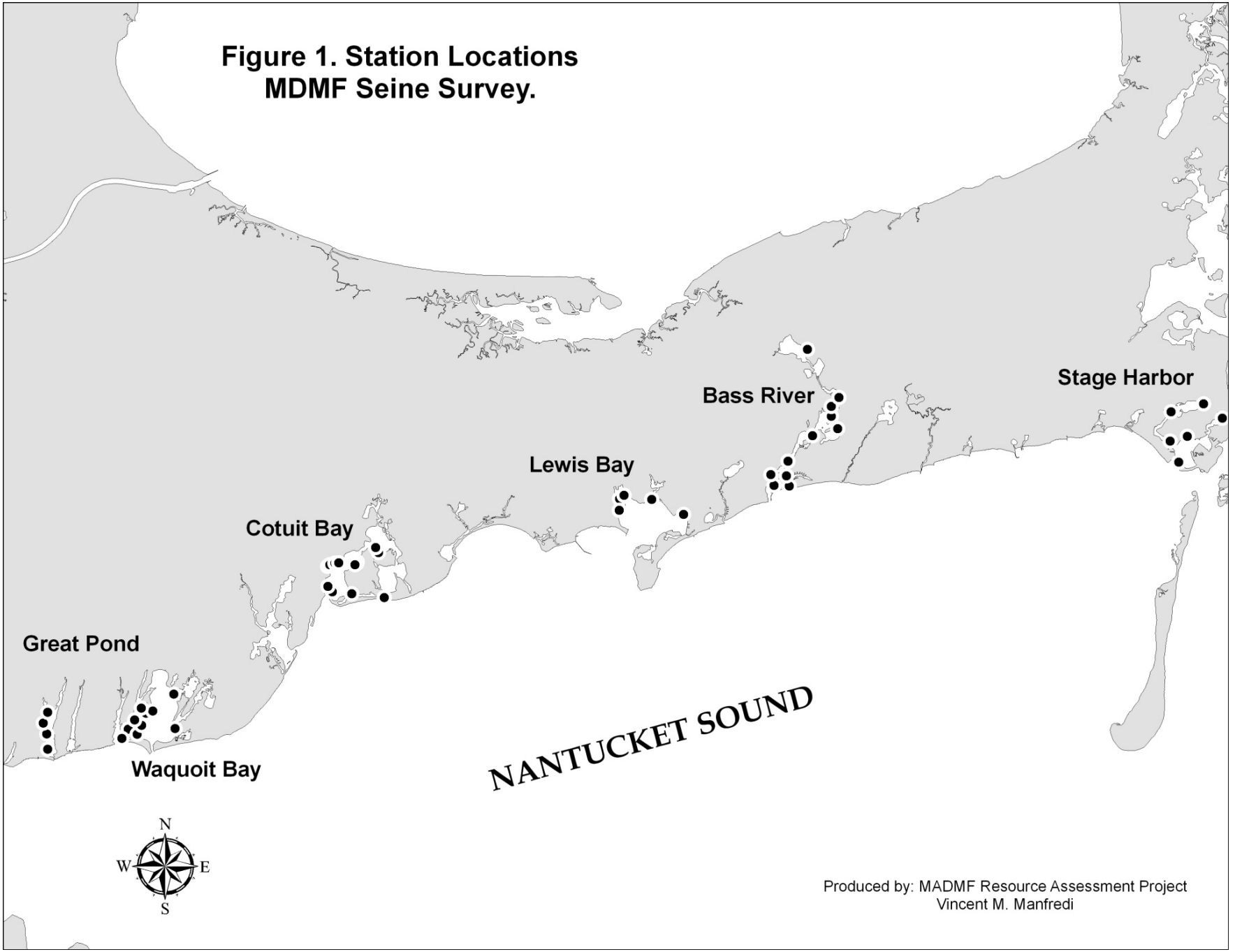
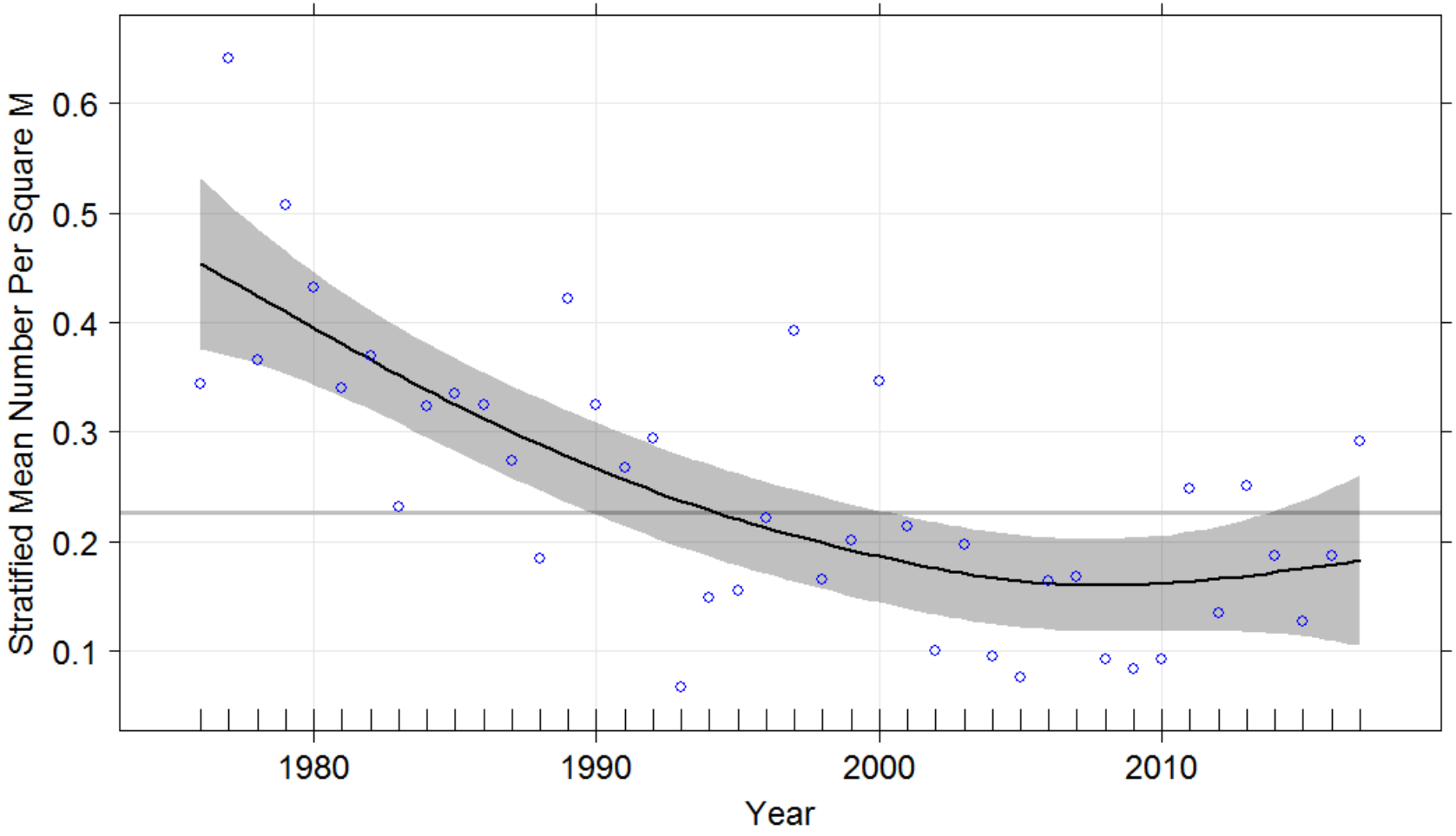


Figure 1. Station Locations
MDMF Seine Survey.
Stage Harbor
Bass River
Lewis Bay
Cotuit Bay
Great Pond
Waquoit Bay
NANTUCKET SOUND
N
W
E
S
Produced by: MADMF Resource Assessment Project
Vincent M. Manfredi

Figure 2. YOY Winter Flounder Abundance, All Estuaries
MDMF Seine Survey: 1976-2017



Black line: GAM fit.
Grey line: timeseries median.

Figure 3. Abundance of YOY winter flounder by estuary, MDMF Seine Survey 1976 – 2017.

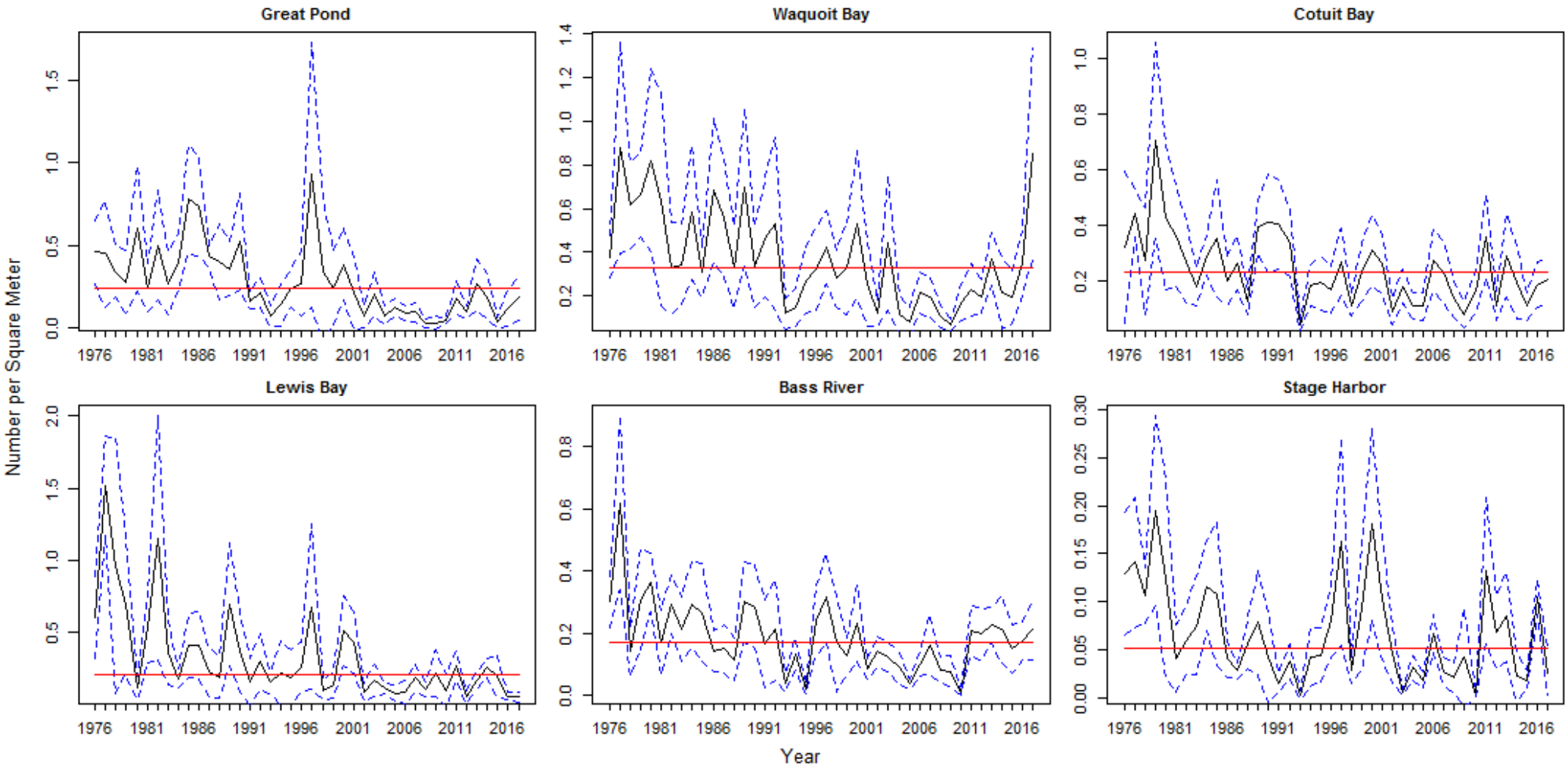
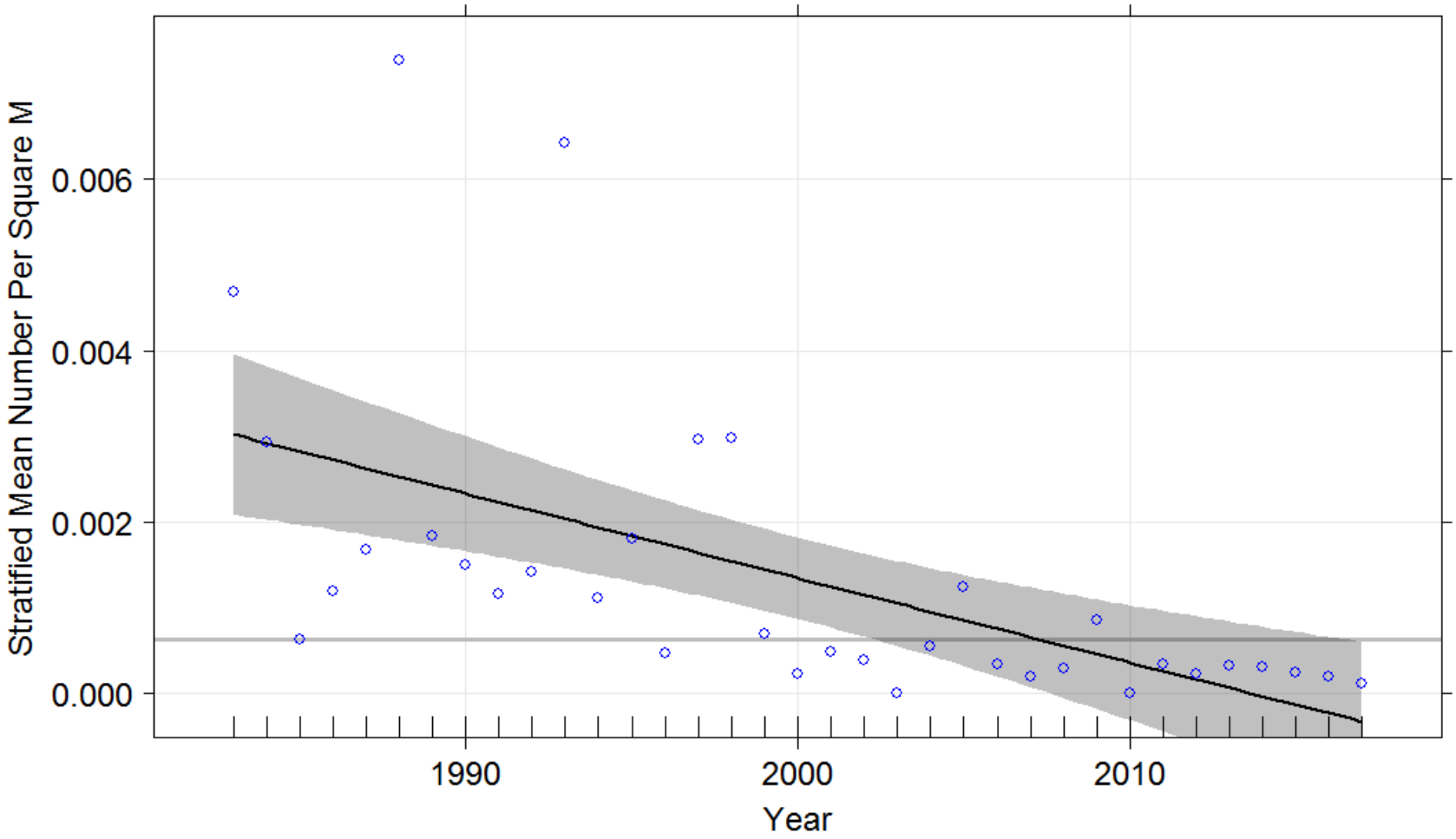
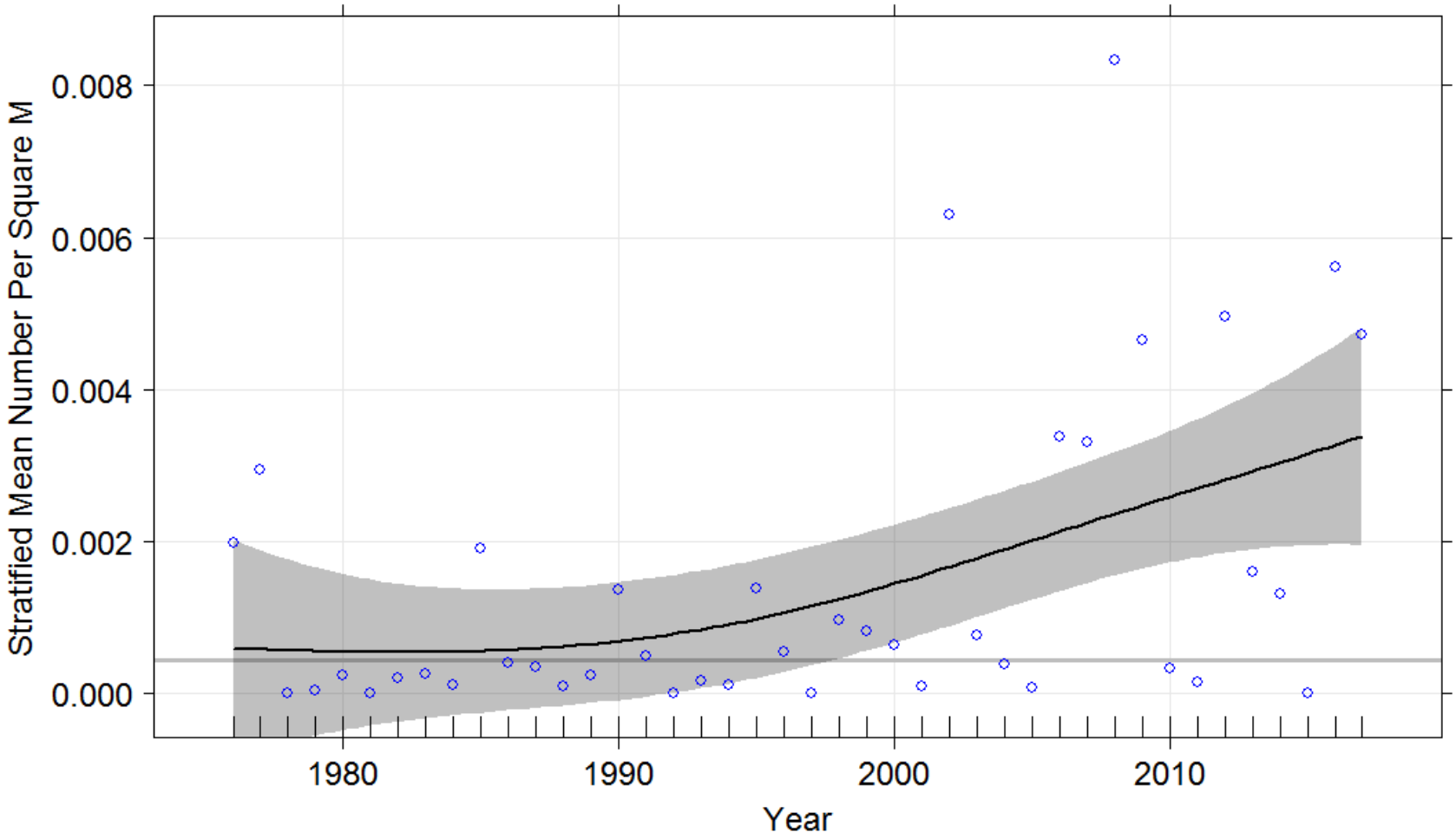


Figure 4. Age 1+ Winter Flounder Abundance
MDMF Seine Survey: 1983-2017



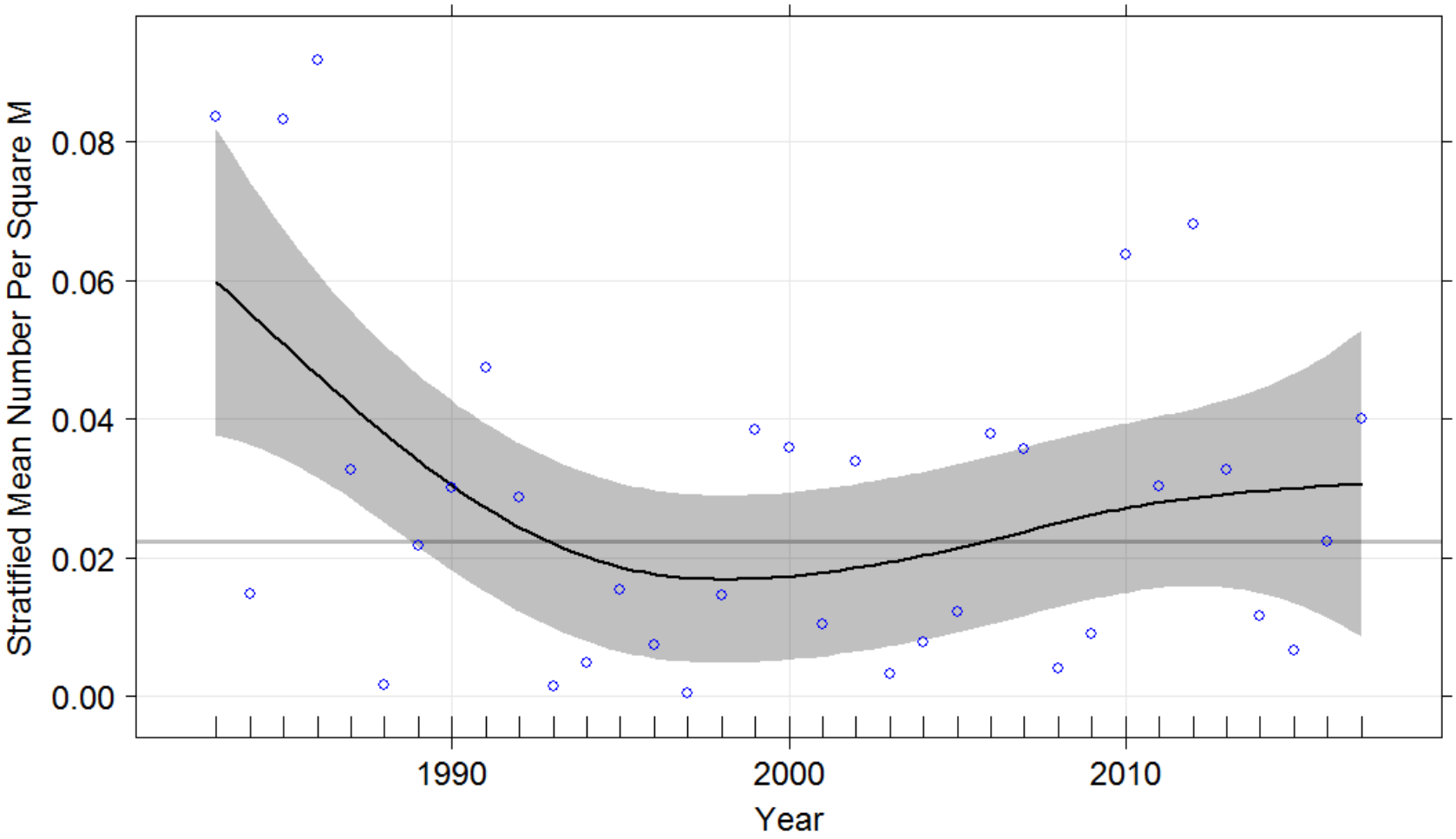
Black line: GAM fit.
Grey line: timeseries median.

Figure 5. Summer Flounder Abundance
MDMF Seine Survey: 1976-2017



Black line: GAM fit.
Grey line: timeseries median.

Figure 6. Blue Crab Abundance
MDMF Seine Survey: 1983-2017



Black line: GAM fit.
Grey line: timeseries median.

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 Matthew Camisa at 508-990-2860 ext. 139.

Contents:

Figure 3 (a – b). Stratified mean number per tow with GAM smoothed trend line. 1978 – 2017 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 **Atlantic Wolffish** Regions 3 – 5

Figure 4 (a & b). Pre-recruit stratified mean number per tow with GAM smoothed trend line. 1978 – 2017 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

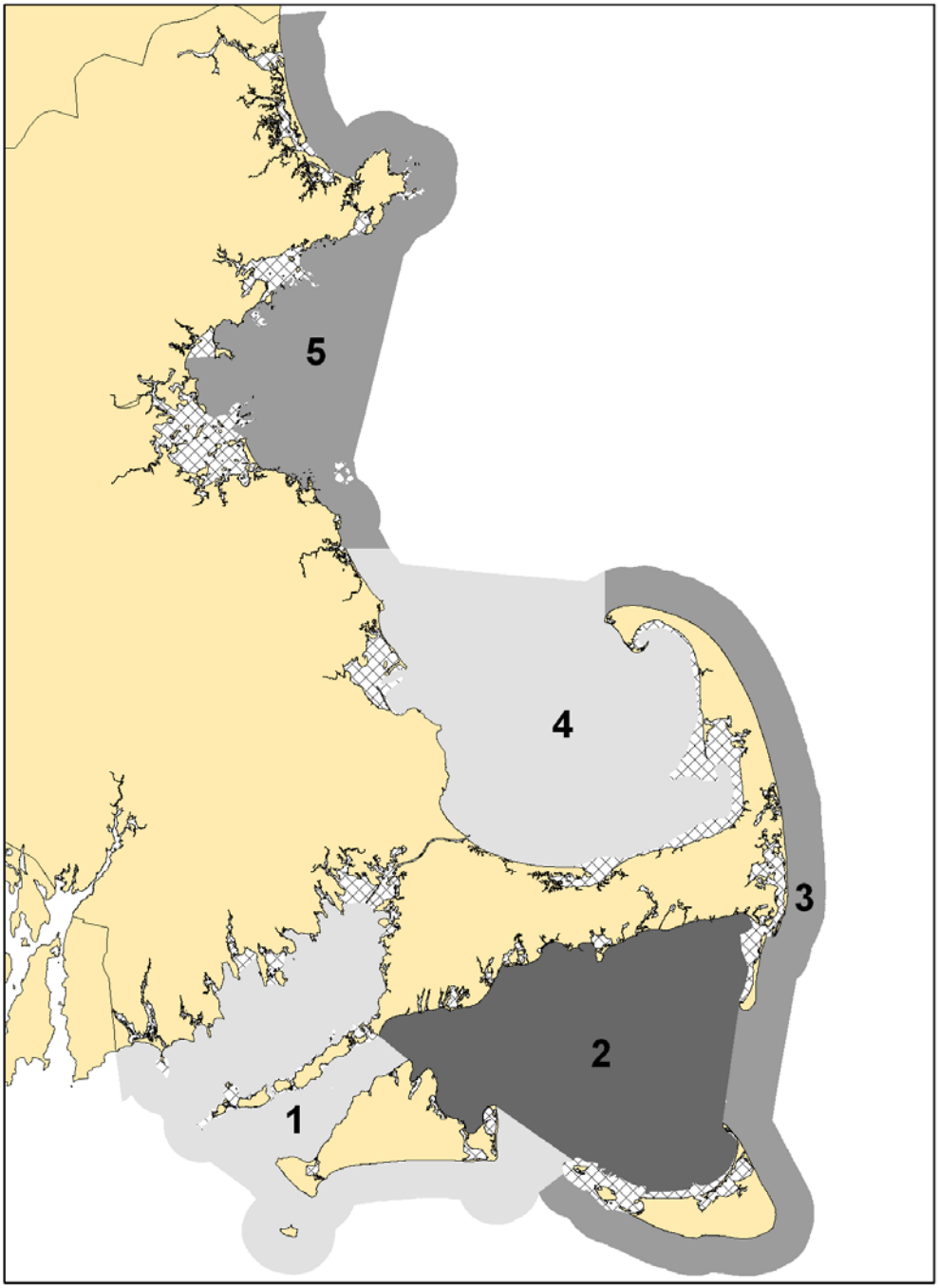


Figure 2. (a & b) Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

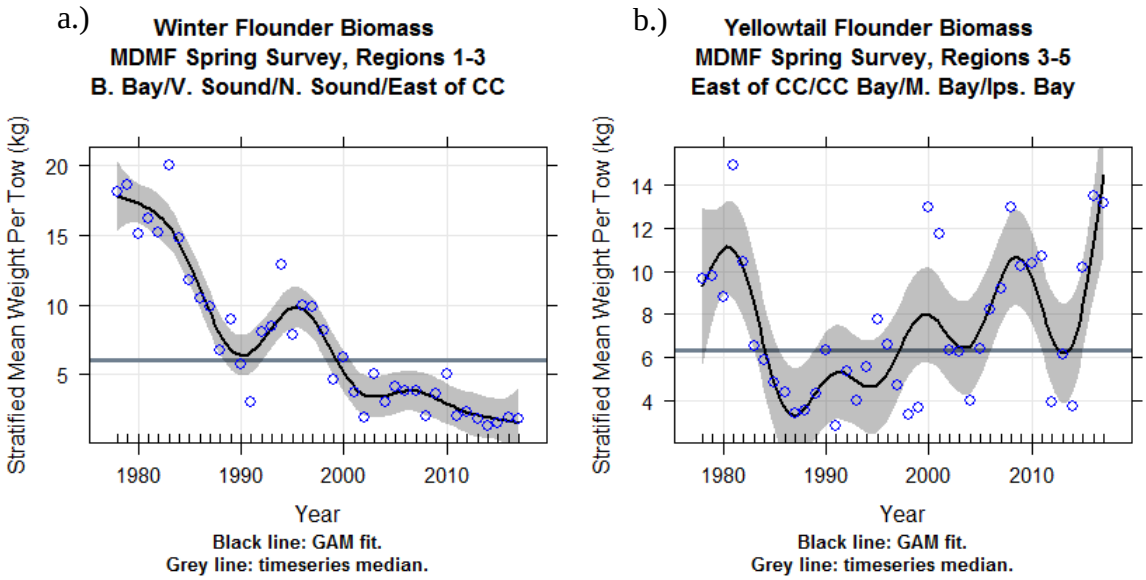


Figure 2. (c & d) Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

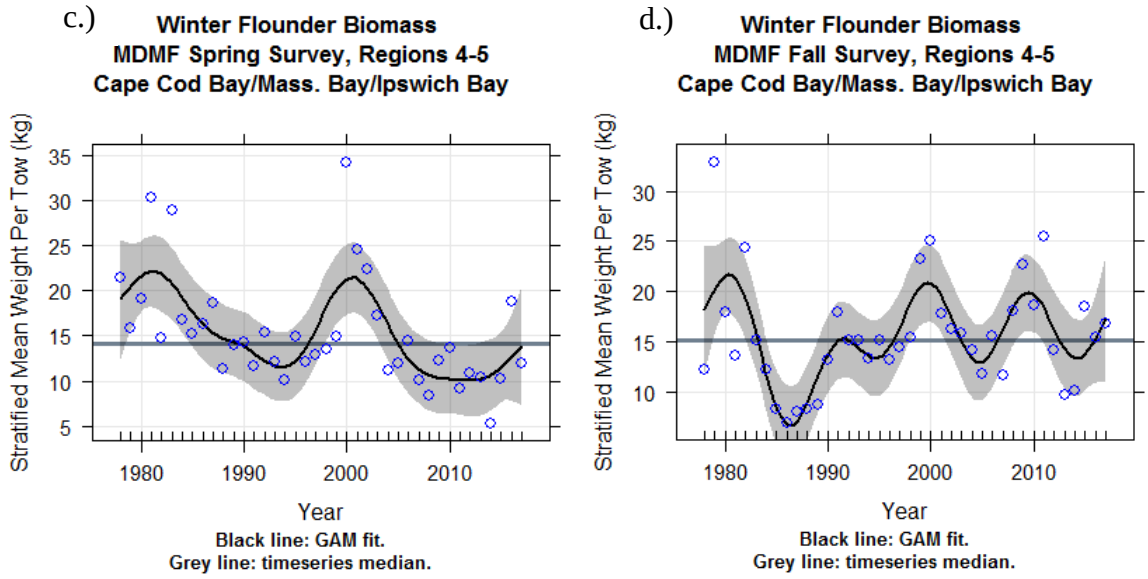


Figure 2. (e & f). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

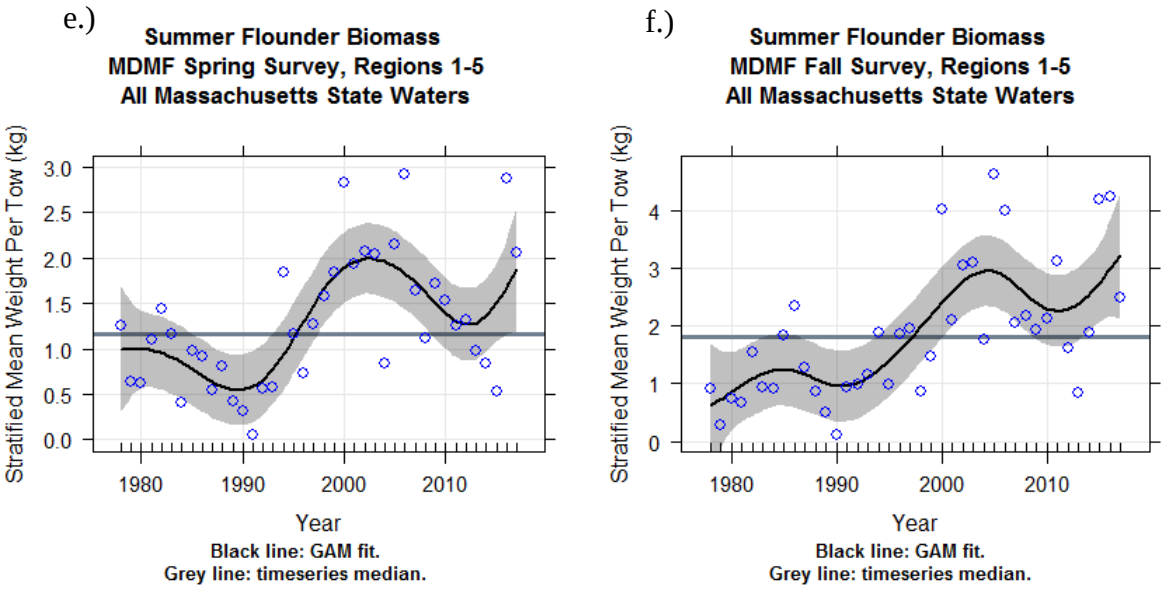


Figure 2. (g & h). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

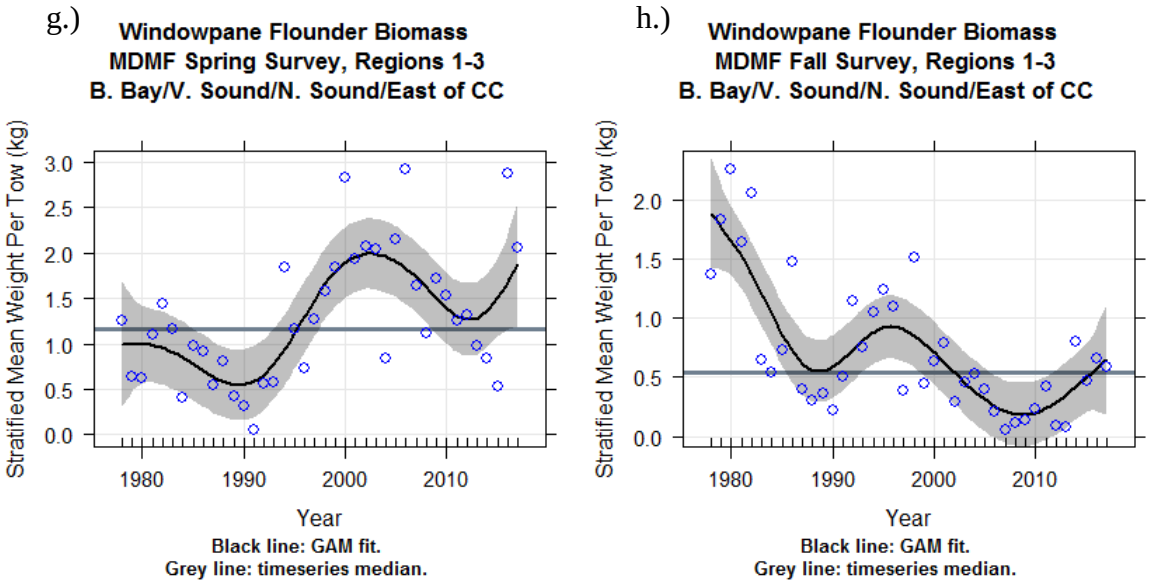


Figure 2. (i & j). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

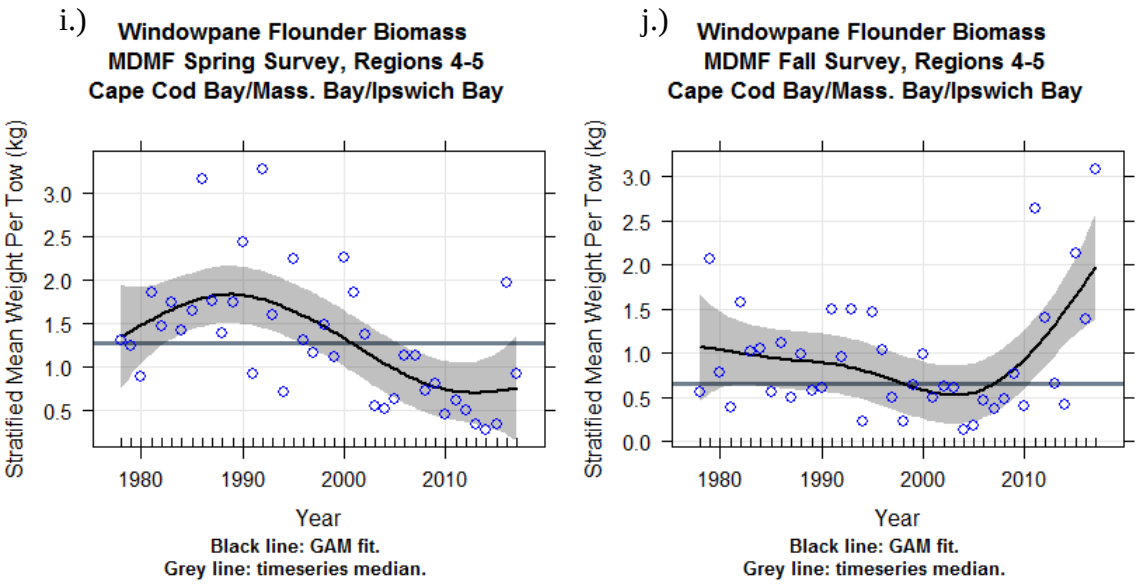


Figure 2. (k & l). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

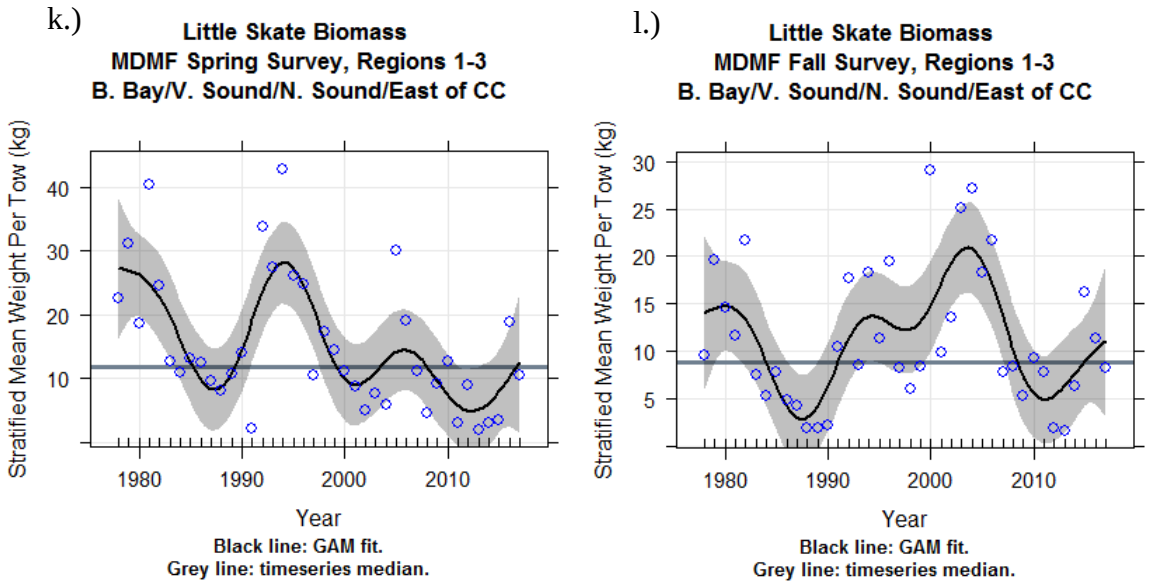


Figure 2. (m & n). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

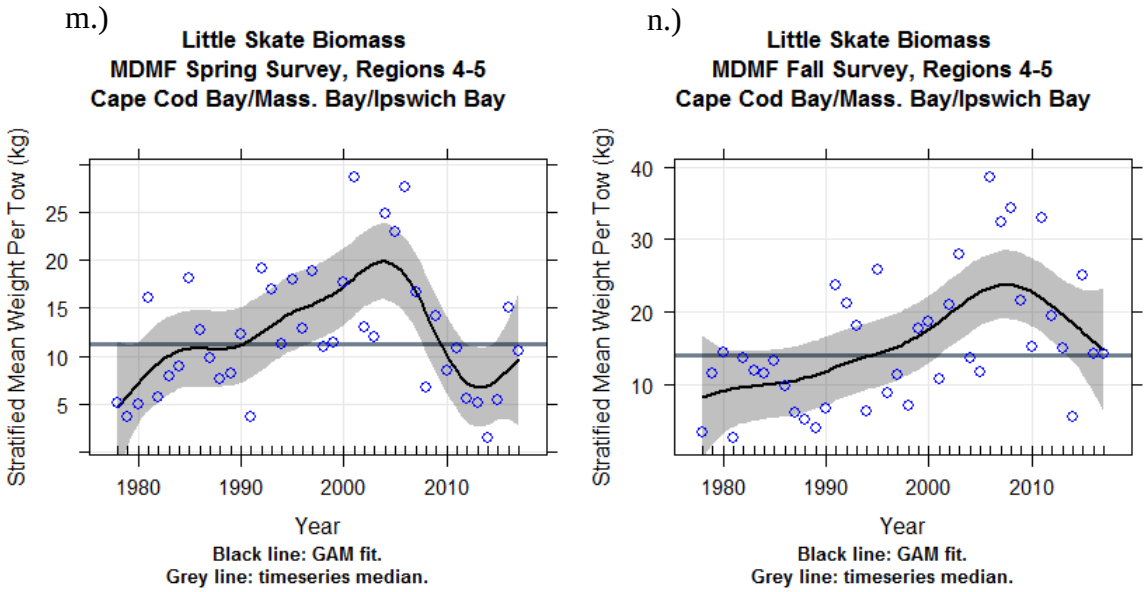


Figure 2. (o & p). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

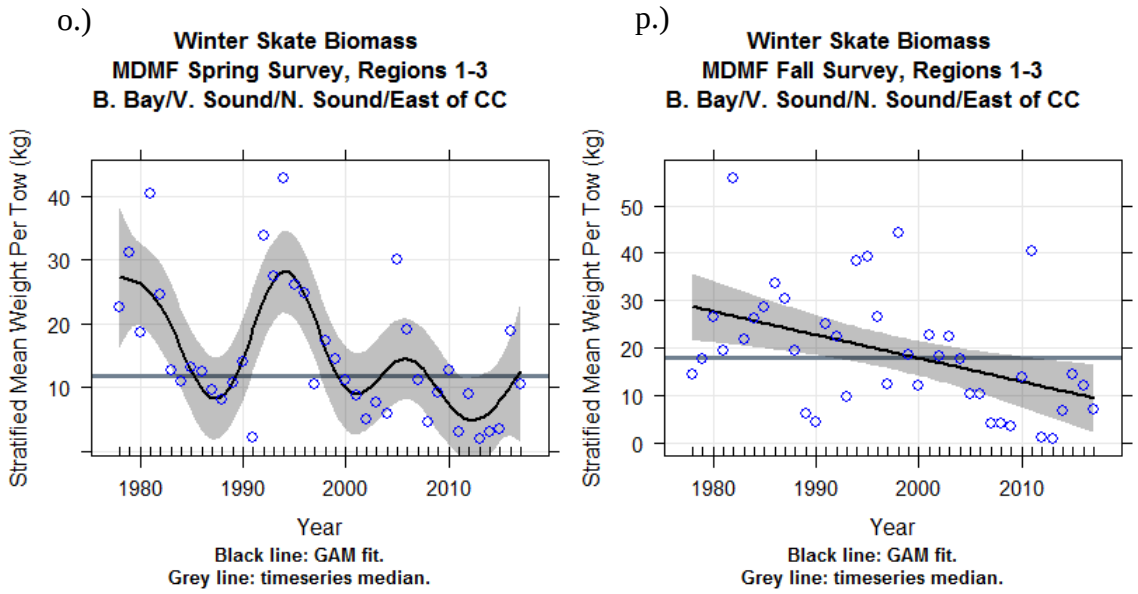


Figure 2. (q & r). Stratified mean weight per tow (kg) with GAM smoothed trend line.
1978 – 2017 Massachusetts DMF Trawl survey.

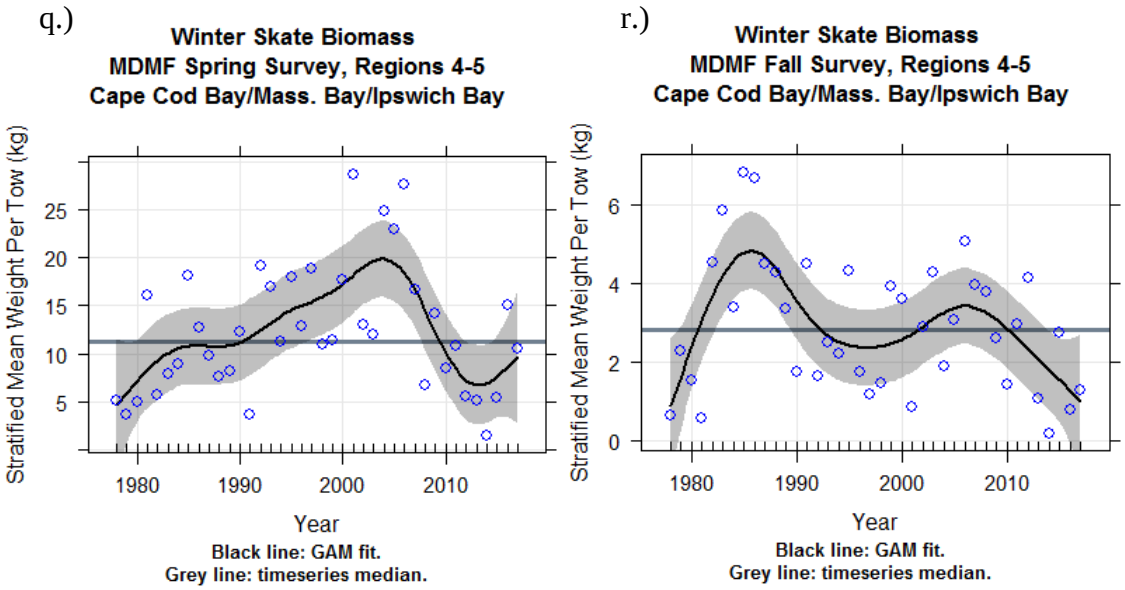


Figure 2. (s & t). Stratified mean weight per tow (kg) with GAM smoothed trend line.
1978 – 2017 Massachusetts DMF Trawl survey.

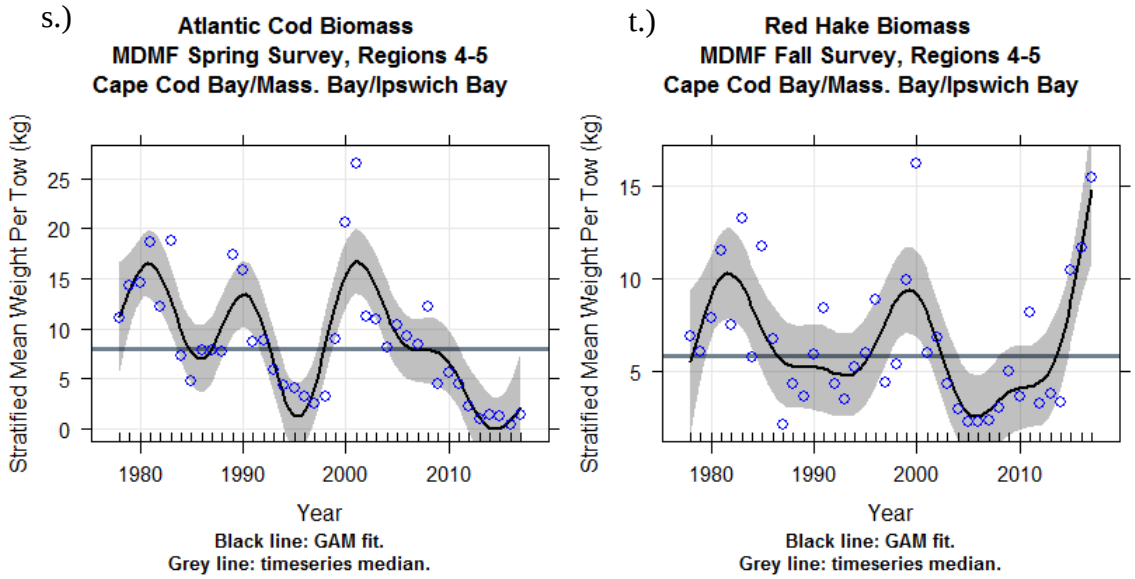


Figure 2. (u & v). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

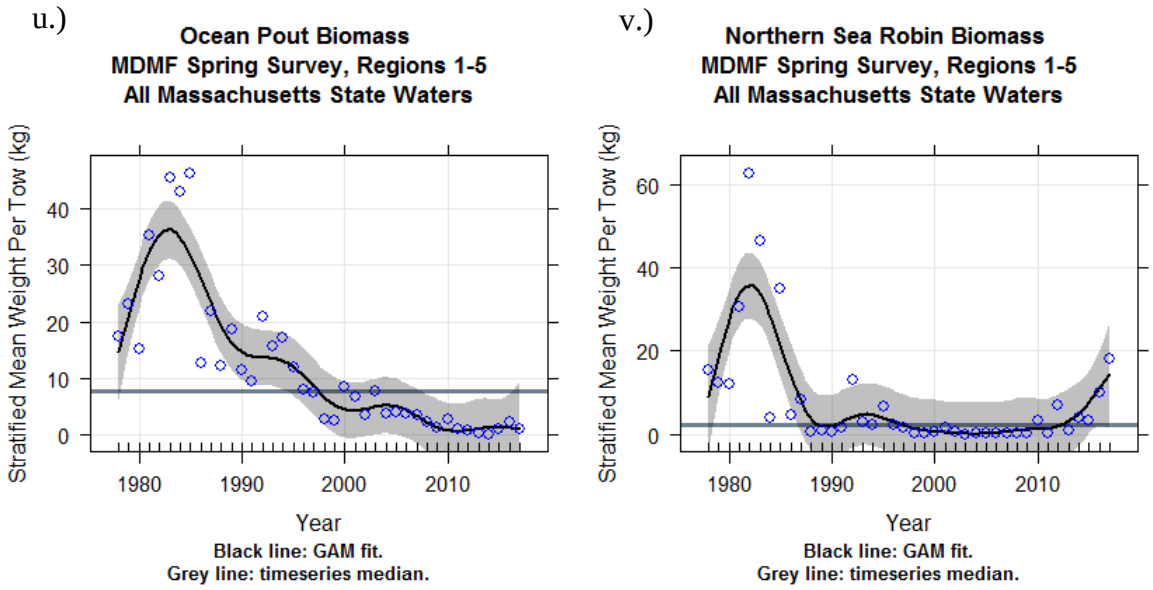


Figure 2. (w & x). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

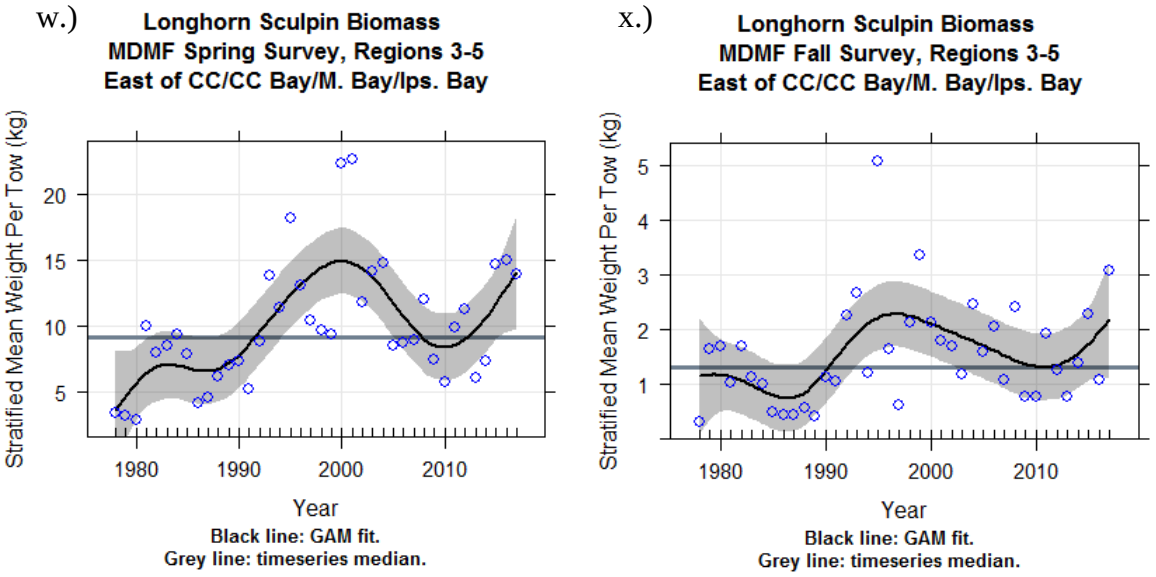
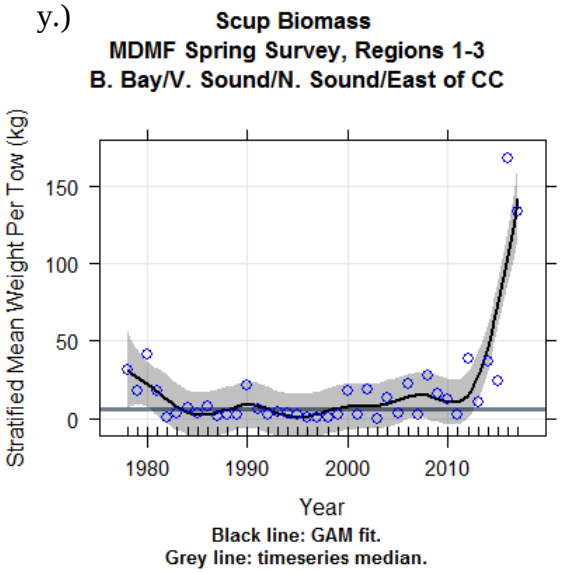


Figure 2. (y & z). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

y.)



z.)

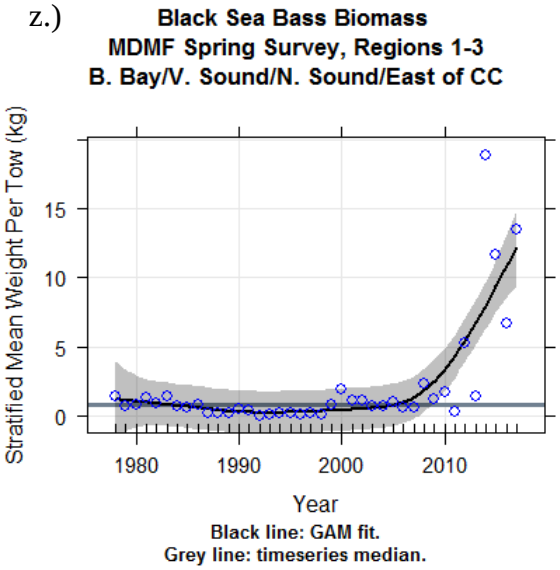
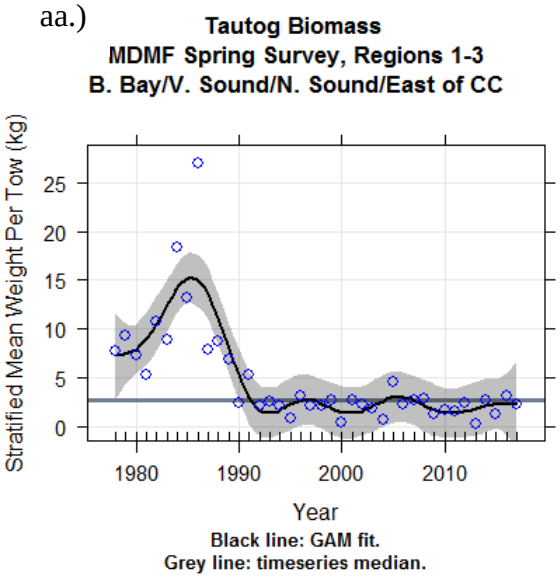


Figure 2. (aa & bb). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

aa.)



bb.)

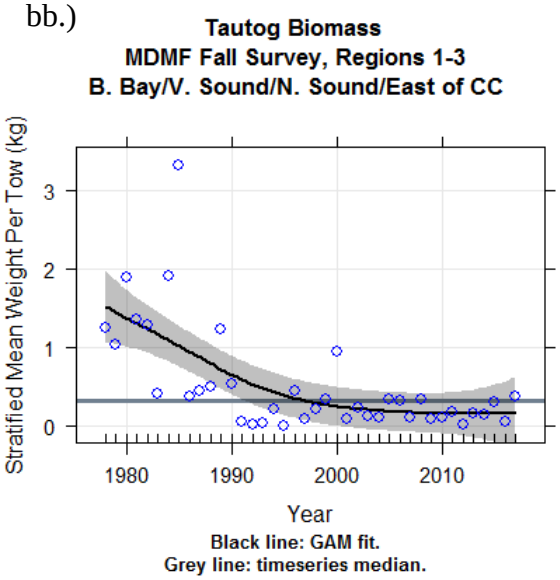
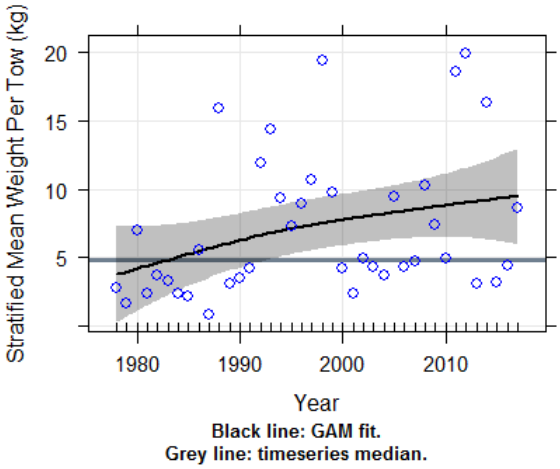


Figure 2. (cc & dd). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

cc.)



dd.)

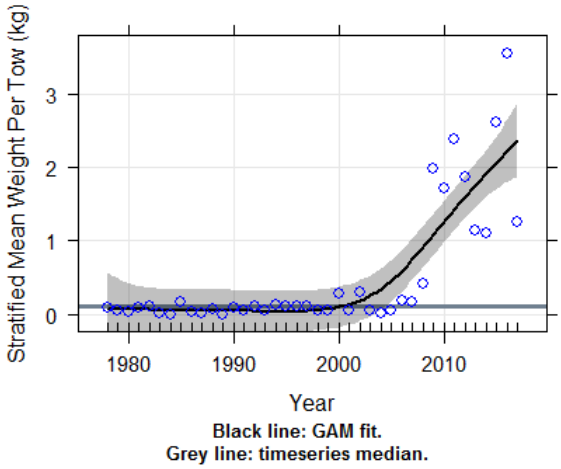
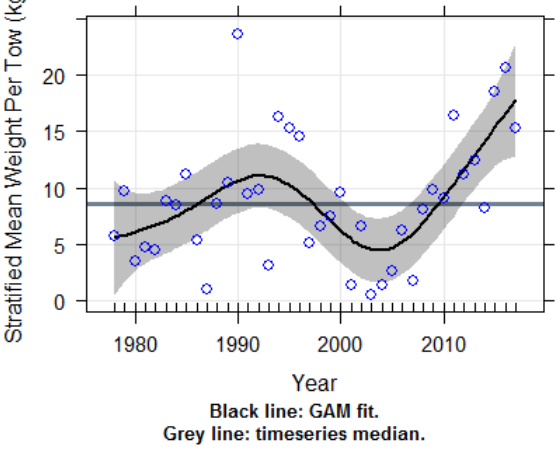


Figure 2. (ee & ff). Stratified mean weight per tow (kg) with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

ee.)



ff.)

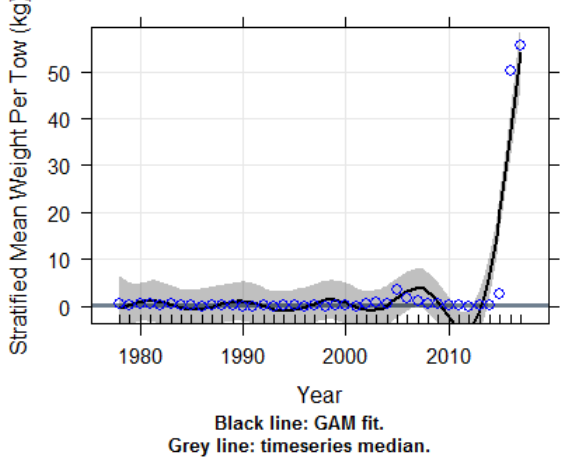


Figure 3. (a & b). Stratified mean number per tow with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

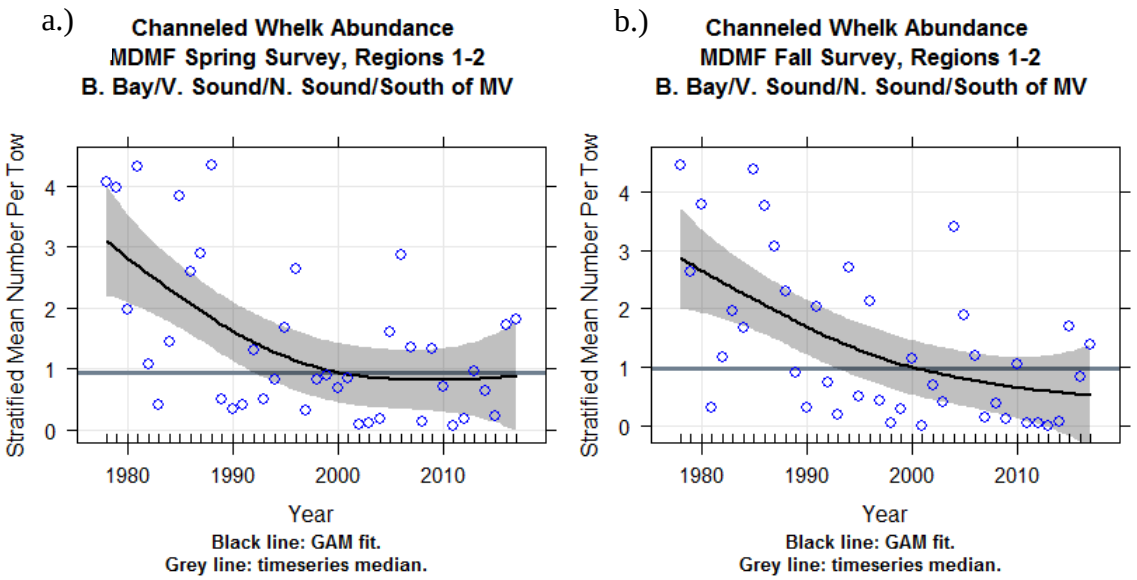


Figure 3. (c & d). Stratified mean number per tow with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

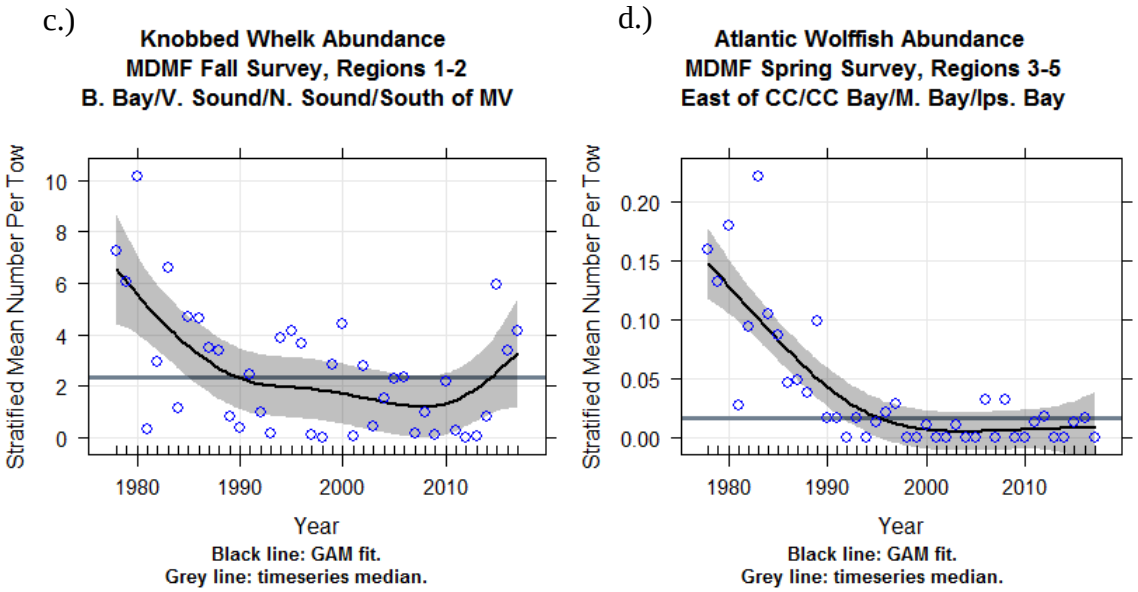
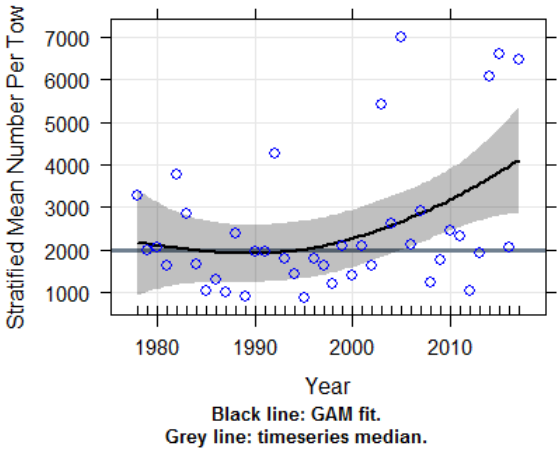
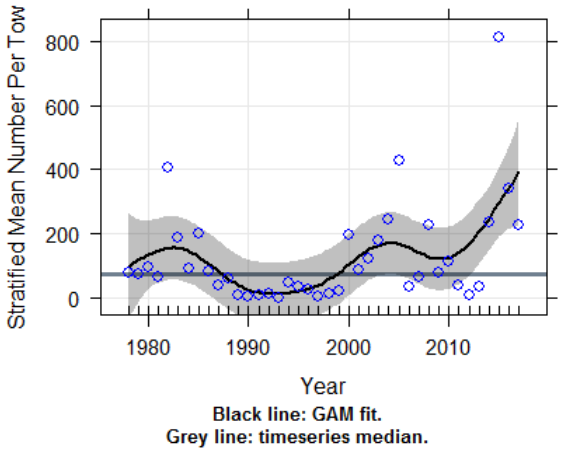


Figure 4. (a & b). Pre-recruit stratified mean number per tow with GAM smoothed trend line. 1978 – 2017 Massachusetts DMF Trawl survey.

a.)



b.)



Appendix B: Trends in Observed Bottom Temperatures Massachusetts Inshore Bottom Trawl Survey 1978 – 2017

A timeseries analysis of bottom temperatures recorded during spring and fall bottom trawl surveys is updated here to include 2017 observations. 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 as long as 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 where large dogfish catches frequently result in hauls of less than 13 minutes duration. 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 Tidbit ^{TM} temperature logger and is therefore included in the following temperature summaries. Please refer to Table 1 and 2 for a listing of data gaps.

	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
Median	12.1	11.5	10.9	9.8	12.2	11.5	9.8	9.4	9.1	6.5	5.6	9.2	8.3	7.1	6.2	5.1	4.7	7.7	7.3	5.7	5.2	4.7	4.3
Mean	12.1	11.5	10.7	9.6	12.2	11.4	9.9	9.6	9.1	6.4	5.7	9.1	8.6	7.1	6.2	5.3	4.7	7.7	7.1	5.8	5.3	4.9	4.4
Maximum	15.4	13.5	13.2	13.0	14.6	13.8	12.0	11.9	11.6	8.7	11.5	11.6	11.3	10.2	9.4	8.2	7.2	11.7	10.0	8.1	7.2	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 1. Stratum mean bottom temperatures recorded on the MDMF spring survey, 1978 – 2017.

	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
Median	18.9	18.7	17.6	16.5	19.6	19.4	16.2	16.2	14.6	9.5	8.4	16.2	13.0	10.1	9.2	8.5	7.8	14.0	11.8	10.4	9.3	8.4	7.7
Mean	18.8	18.6	17.5	16.4	19.4	19.3	16.1	15.7	14.8	9.8	8.3	15.7	13.4	10.7	9.5	8.3	7.6	14.2	12.5	10.6	9.2	8.3	7.7
Maximum	21.5	20.7	19.3	18.2	21.2	21.3	18.7	18.2	19.4	14.6	12.6	19.8	19.2	16.0	14.8	11.9	9.9	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

Table 2. Stratum mean bottom temperatures recorded on the MDMF fall survey, 1978 – 2017.

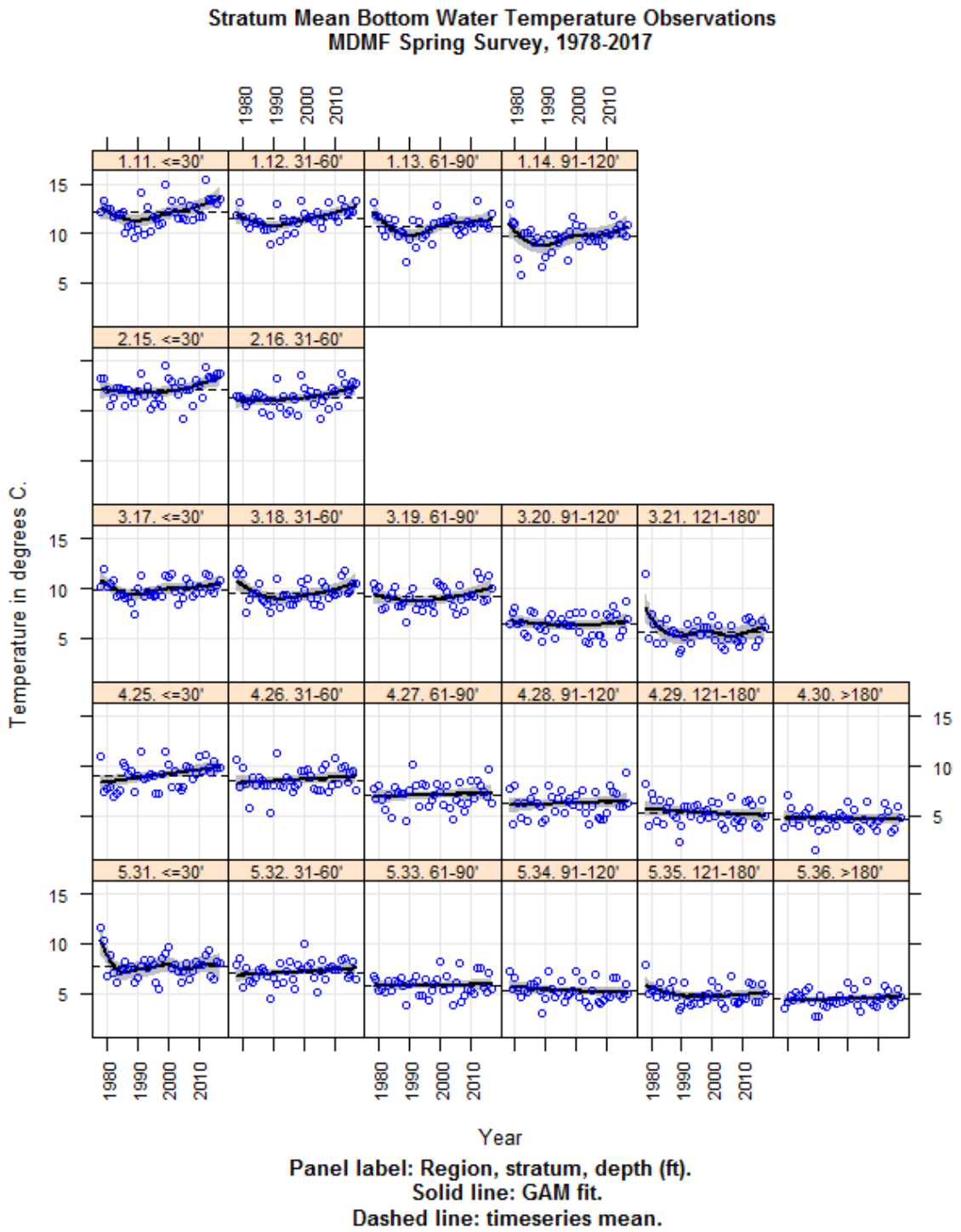

Stratum Mean Bottom Water Temperature Observations
MDMF Spring Survey, 1978-2017
1.11. <=30'
1.12. 31-60'
1.13. 61-90'
1.14. 91-120'
2.15. <=30'
2.16. 31-60'
3.17. <=30'
3.18. 31-60'
3.19. 61-90'
3.20. 91-120'
3.21. 121-180'
4.25. <=30'
4.26. 31-60'
4.27. 61-90'
4.28. 91-120'
4.29. 121-180'
4.30. >180'
5.31. <=30'
5.32. 31-60'
5.33. 61-90'
5.34. 91-120'
5.35. 121-180'
5.36. >180'
Temperature in degrees C.
Year
Panel label: Region, stratum, depth (ft).
Solid line: GAM fit.
Dashed line: timeseries mean.

Figure 1.

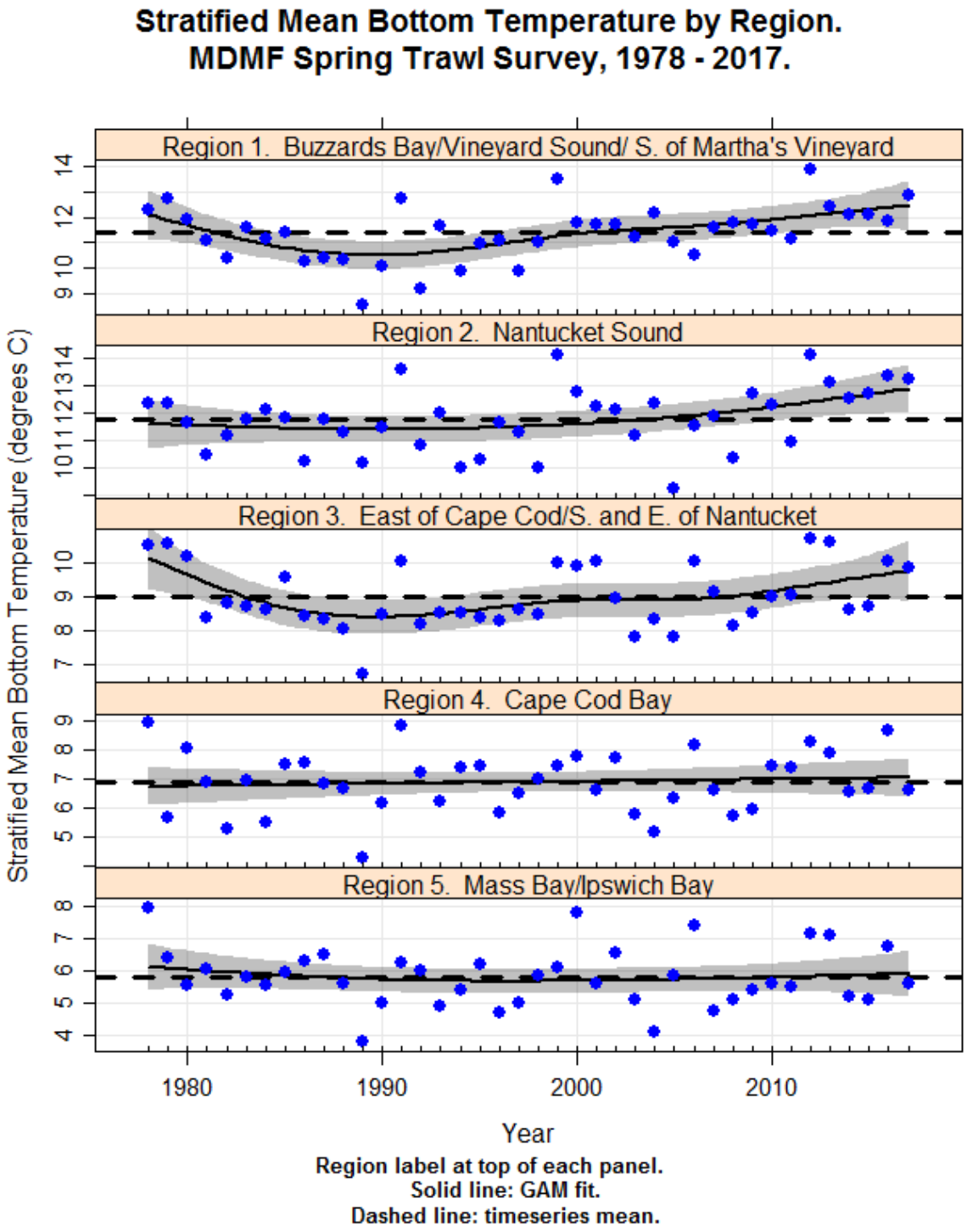

Stratified Mean Bottom Temperature by Region.
MDMF Spring Trawl Survey, 1978 - 2017.
Region 1. Buzzards Bay/Vineyard Sound/ S. of Martha's Vineyard
Region 2. Nantucket Sound
Region 3. East of Cape Cod/S. and E. of Nantucket
Region 4. Cape Cod Bay
Region 5. Mass Bay/Ipswich Bay
Stratified Mean Bottom Temperature (degrees C)
Year
1980
1990
2000
2010
Region label at top of each panel.
Solid line: GAM fit.
Dashed line: timeseries mean.

Figure 2.

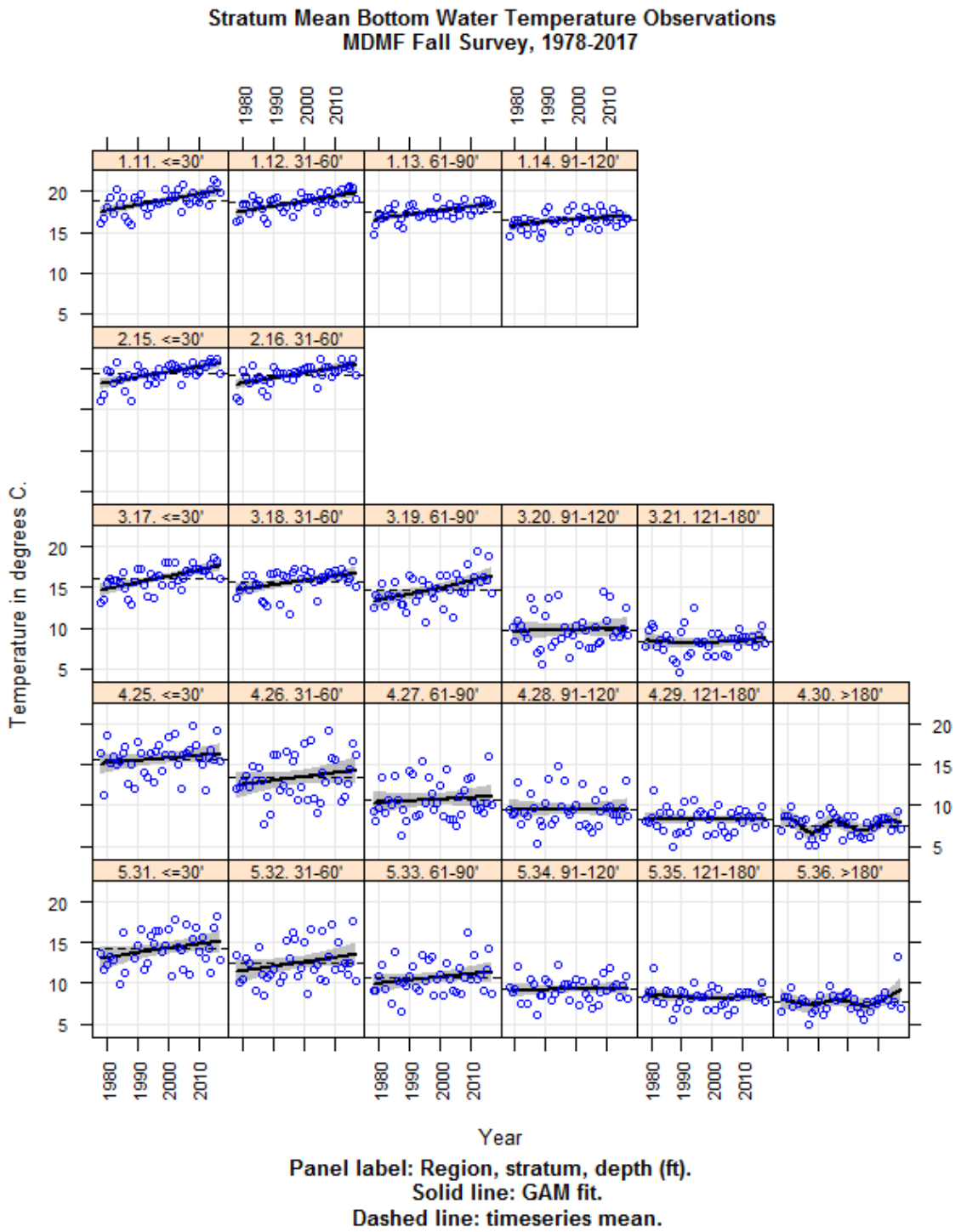

Stratum Mean Bottom Water Temperature Observations
MDMF Fall Survey, 1978-2017
1.11. <=30'
1.12. 31-60'
1.13. 61-90'
1.14. 91-120'
2.15. <=30'
2.16. 31-60'
3.17. <=30'
3.18. 31-60'
3.19. 61-90'
3.20. 91-120'
3.21. 121-180'
4.25. <=30'
4.26. 31-60'
4.27. 61-90'
4.28. 91-120'
4.29. 121-180'
4.30. >180'
5.31. <=30'
5.32. 31-60'
5.33. 61-90'
5.34. 91-120'
5.35. 121-180'
5.36. >180'
Temperature in degrees C.
Year
Panel label: Region, stratum, depth (ft).
Solid line: GAM fit.
Dashed line: timeseries mean.

Figure 3.

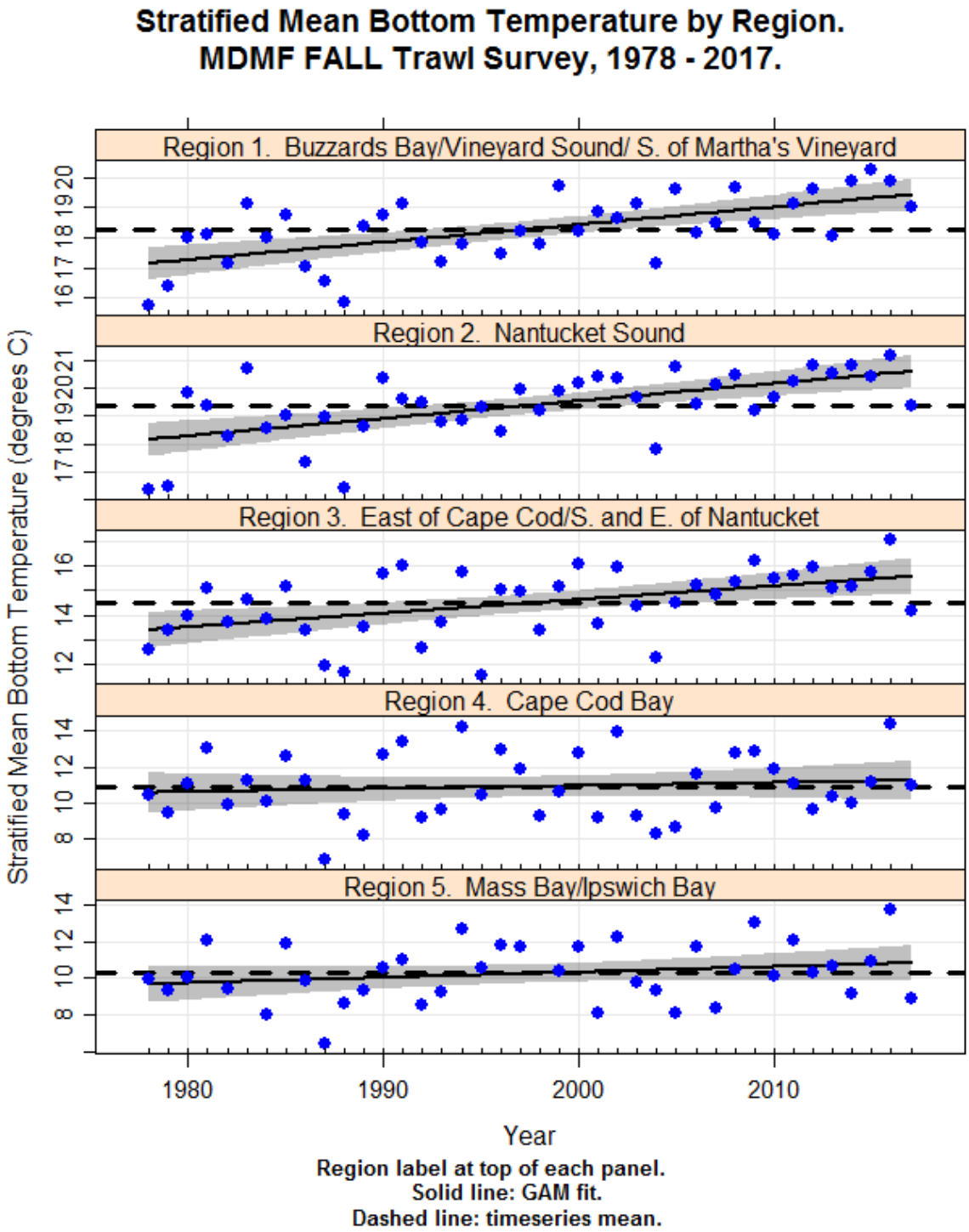

Stratified Mean Bottom Temperature by Region.
MDMF FALL Trawl Survey, 1978 - 2017.
Region 1. Buzzards Bay/Vineyard Sound/ S. of Martha's Vineyard
Region 2. Nantucket Sound
Region 3. East of Cape Cod/S. and E. of Nantucket
Region 4. Cape Cod Bay
Region 5. Mass Bay/Ipswich Bay
Stratified Mean Bottom Temperature (degrees C)
Year
1980
1990
2000
2010
Region label at top of each panel.
Solid line: GAM fit.
Dashed line: timeseries mean.

Figure 4.

Appendix C: Corrections to the trawl survey database in 2017.

Female Lobster Sex Code DB Corrections, January 2017.

From 199592 through 200992, multiple sex codes (2, 3, 4, 5, 6, 7, 8, 9) were used to describe female lobster maturities in the database which complicated female lobster data retrievals. In March of 2015 an effort was made to combine female lobster sex codes in the database. Using R script, we identified 237 stations in union_fscs_svcat that contained female lobsters with a sex code>2. We replaced the female lobster catch records at those 237 stations by combining all sex codes>1 and setting sex code to 2. There were 4,682 female lobsters (sex code>1) in union_fscs_svlen at those 237 stations. The length frequencies for all sex codes > 1 were combined and the sex code set to 2. In order to not lose the maturity data, 416 new bio records were generated using the union_fscs_svlen data for all female lobsters with sex code >2. Unfortunately, we realized that using the expanded length frequencies from union_fscs_svlen could introduce expanded bio entries for pre FSCS cruises while FSCS cruises would contain only unexpanded bio records. The database corrections were put on hold until January 2016, when we identified 27 lengths at 9 stations that were expanded due to tow duration. Those 27 individuals were removed from the new bio records. There were 389 new bio records added to union_fscs_svbio containing female lobster maturities. All catch, length and bio corrections were completed by Matt Camisa in January 2017.

Miscellaneous DB Corrections, May 2017.

Male rock crab length database corrections
Corrections made in view MDMF_LENGTH
Corrections made by MS and MC 5/17/2017

UNION_FSCS_SVLEN reads					
cruise	station	svspp	sex	length	expnumlen
198392	3	313	1	10	4
198392	3	313	1	11	2
198392	3	313	1	12	1
198392	3	313	1	21	1

UNION_FSCS_SVLEN should read					
cruise	station	svspp	sex	length	expnumlen
198392	3	313	1	10	4
198392	3	313	1	11	3
198392	3	313	1	12	1

UNION_FSCS_SVLEN reads					
200691	35	313	1	2	5
200691	35	313	1	7	3
200691	35	313	1	9	3
200691	35	313	1	10	2
200691	35	313	1	12	1
200691	35	313	1	19	1

UNION_FSCS_SVLEN should read					
200691	35	313	1	2	5
200691	35	313	1	7	3
200691	35	313	1	9	3
200691	35	313	1	10	3
200691	35	313	1	12	1