Mid-Atlantic Fishery Management Council
800 North State Street, Suite 201, Dover, DE 19901
Phone: 302-674-2331 | FAX: 302-674-5399 | www.mafmc.org
Michael P. Luisi, Chairman | G. Warren Elliott, Vice Chairman
Christopher M. Moore, Ph.D., Executive Director

MEMORANDUM

Date: July 11, 2018

To: Council

From: Jason Didden

Subject: Annual RH/S Progress and Cap Review

In 2015 the Council set a river herring/shad (RH/S) cap of 82 mt (180,779 pounds) for 2016-2018 for the mackerel fishery. Along with deciding on mackerel rebuilding a new RH/S cap will need to be set for 2019 and beyond at the August 2018 Council meeting. The Framework document for the action describes several RH/S cap options. The Mackerel, Squid, and Butterfish (MSB) Monitoring Committee has often discussed the RH/S cap and observed the following on 5/23/17 – the current FMAT for the mackerel action shares the same sentiments:

> *The MC noted that its perspective has not substantively changed from last year: given the lack of stock abundance information, a variety of cap options are likely justifiable as long as the Council clearly describes its rationale related to controlling incidental RH/S catch/bycatch - in situations like RH/S where biologically-based catch limits are unavailable, setting the cap is a policy choice. The MC noted that for any cap (and especially a constant cap), because it is not directly tied to RH/S abundance, possibilities exist that it may either become very hard for the fishery to avoid RH/S if their abundances increase, or if RH/S abundances decrease the fishery will not have to work hard to avoid RH/S because there will not be many RH/S around. The first situation would suggest that a cap increase may be warranted while the second would suggest a cap reduction may be warranted. Without better assessment information it is not possible to quantitatively determine the appropriateness of such changes however.*

This document reviews a variety of RH/S information to help facilitate Council decision making. In October 2014, the Council approved a list of questions to form the basis of an annual RH/S Progress Review. The RH/S Committee requested that additional state indices and bycatch information be added to this report. Some relevant information has been added.

1. How has the Atlantic mackerel RH/S cap performed?

The table below describes performance for 2015-2018. 2014 was the first year of the cap and a partial year. The cap was set at 236 MT and the estimated cap catch was 6 MT.

Table 1.

Catch Cap	Year	Permit Count	Trip Count	RHS Catch Rate[2]	Est. RHS (mt)	Herring (mt)	Mackerel (mt)	Total catch (mt)	Observed Trips	CV[4]	Coverage Percent
RHS Mackere	2015	13	55	0.1%	12	3,564	4,591	8,739	4	0.23	7%
	2016	13	55	0.1%	13	5,684	4,599	10,436	13	0.68	24%
	2017	17	71	0.3%	39	6,360	5,822	12,396	17	0.38	24%
	2018[1]	12	57	0.9%	109	3,891	7,944	12,130	4	0.34	7%

Due to the overlap in the Atlantic herring and mackerel fisheries, their RH/S cap catches cannot be added together to produce a total catch across caps - RH/S on a trip with both Atlantic herring and mackerel can count against both the Atlantic herring and mackerel RH/S caps. Because the cap amounts were set considering this circumstance, double counting is not a problem for monitoring. The Monitoring Committee has not found any operational issues with the cap.

The Council has asked about the proportions of RH/S in the caps and size of fish in the caps. That information is not currently available aligned exactly to the caps and how total catches are expanded, but the portside sampling program run by the State of Massachusetts and SMAST provided their weighted 2015-2017 portside sampling data for mid-water trawl landings in Massachusetts and 2015-2016 bottom trawl data in Rhode Island, which should provide a general picture of the RH/S proportions and their sizes in the RH/S caps for those years.

The table below is simply the proportions of RH/S within all the RH/S bycatch on sampled herring/mackerel trips, expanded within trips (but not the fisheries) and aggregated by cap types. No amount/weight of bycatch, or bycatch rates should be calculated using these tables. These tables also mask high year-to-year variability (annual data may violate data confidentiality requirements).

Table 2. Proportions of RH/S in portside sampling data by cap type.

	Cap Strata					
	Area1A-MWT	Area2-MWT	Area2-SMBT	CC521-MWT	TOTAL from Herring trips in cap areas	TOTAL from Mackerel cap trips
Alewife	41%	15%	61%	60%	30%	36%
Blueback	53%	83%	36%	31%	66%	61%
Am Shad	6%	2%	3%	9%	4%	3%
Total	100%	100%	100%	100%	100%	100%

The three tables below show the RH/S fork length proportions, expanded for each trip, then numbers of fish aggregated by cap strata to find proportion at length. Again, it has not been expanded to landings.

Table 3. Proportions of alewife by length in portside sampling data by cap type

Alewife fork lengths					
length (cm)	Area1A-MWT	Area2-MWT	Area2-SMBT	CC521-MWT	Mackerel
10	0%	0%	0%	0%	0%
11	0%	1%	0%	0%	0%
12	0%	4%	2%	0%	0%
13	0%	6%	2%	1%	0%
14	0%	12%	8%	0%	1%
15	0%	9%	8%	1%	0%
16	1%	10%	14%	2%	0%
17	2%	10%	5%	3%	2%
18	5%	11%	11%	9%	12%
19	6%	7%	13%	9%	11%
20	9%	4%	10%	8%	8%
21	11%	2%	6%	5%	6%
22	25%	5%	6%	7%	13%
23	15%	6%	6%	16%	12%
24	10%	6%	4%	18%	12%
25	10%	3%	3%	10%	10%
26	2%	1%	2%	5%	5%
27	2%	1%	0%	7%	7%
28	2%	0%	0%	0%	1%
29	0%	0%	0%	0%	0%

Table 4. Proportions of blueback herring by length in portside sampling data by cap type

BLUEBACK fork lengths					
length (cm)	Area1A-MWT	Area2-MWT	Area2-SMBT	CC521-MWT	Mackerel
10	0%	0%	0%	0%	0%
11	0%	0%	0%	0%	0%
12	0%	0%	0%	0%	0%
13	0%	1%	1%	0%	0%
14	0%	1%	2%	0%	0%
15	1%	1%	1%	1%	0%
16	1%	4%	4%	1%	0%
17	3%	10%	7%	6%	2%
18	7%	19%	44%	9%	8%
19	6%	15%	24%	17%	15%
20	11%	11%	3%	14%	14%
21	23%	7%	3%	14%	17%
22	19%	9%	4%	21%	18%
23	19%	10%	1%	9%	12%
24	9%	8%	5%	6%	9%
25	2%	3%	0%	2%	4%
26	1%	1%	0%	1%	1%
27	0%	0%	0%	0%	0%
28	0%	0%	0%	0%	0%
29	0%	0%	0%	0%	0%

Table 5. Proportions of American shad by length in portside sampling data by cap type

	AMERICAN SHAD fork lengths				
length (cm)	Area1A-MWT	Area2-MWT	Area2-SMBT	CC521-MWT	Mackerel
13	0%	0%	0%	2%	0%
14	0%	7%	23%	0%	5%
15	3%	0%	0%	0%	0%
16	0%	2%	26%	0%	0%
17	0%	0%	0%	0%	0%
18	0%	0%	0%	3%	3%
19	0%	0%	0%	4%	0%
20	3%	0%	0%	0%	0%
21	16%	4%	0%	0%	0%
22	15%	28%	14%	7%	18%
23	13%	16%	0%	14%	20%
24	3%	29%	37%	17%	37%
25	5%	11%	0%	9%	8%
26	17%	0%	0%	10%	0%
27	4%	3%	0%	8%	7%
28	3%	0%	0%	3%	0%
29	7%	0%	0%	7%	3%
30	7%	0%	0%	0%	0%
31	3%	0%	0%	8%	0%
32	0%	0%	0%	0%	0%
33	0%	0%	0%	3%	0%
34	0%	0%	0%	0%	0%
35	0%	0%	0%	0%	0%
36	0%	0%	0%	0%	0%
37	0%	0%	0%	0%	0%
38	0%	0%	0%	0%	0%
39	0%	0%	0%	0%	0%
40	0%	0%	0%	0%	0%
41	0%	0%	0%	4%	0%
42	0%	0%	0%	0%	0%
43	0%	0%	0%	0%	0%
44	0%	0%	0%	0%	0%
45	0%	0%	0%	0%	0%
46	0%	0%	0%	0%	0%
47	0%	0%	0%	0%	0%
48	0%	0%	0%	2%	0%

2. What has recent coastal RH/S catch been?

The NEFSC (Kiersten Curti) updated their RH/S incidental catch estimates through 2017. Following Amendment 14, total incidental catch of river herring (alewife and blueback herring) and hickory and American shad (RHS) was quantified by fleet. Fleets included in the analyses were those sampled by the Northeast Fisheries Observer Program (NEFOP) and were stratified by area fished (Mid-Atlantic versus New England), time (year and quarter), gear group, and mesh size. Region fished was defined using Statistical Areas for reporting commercial fishery data. The Mid-Atlantic region included Statistical Areas greater than 600, and New England included Statistical Areas 464 through 599.

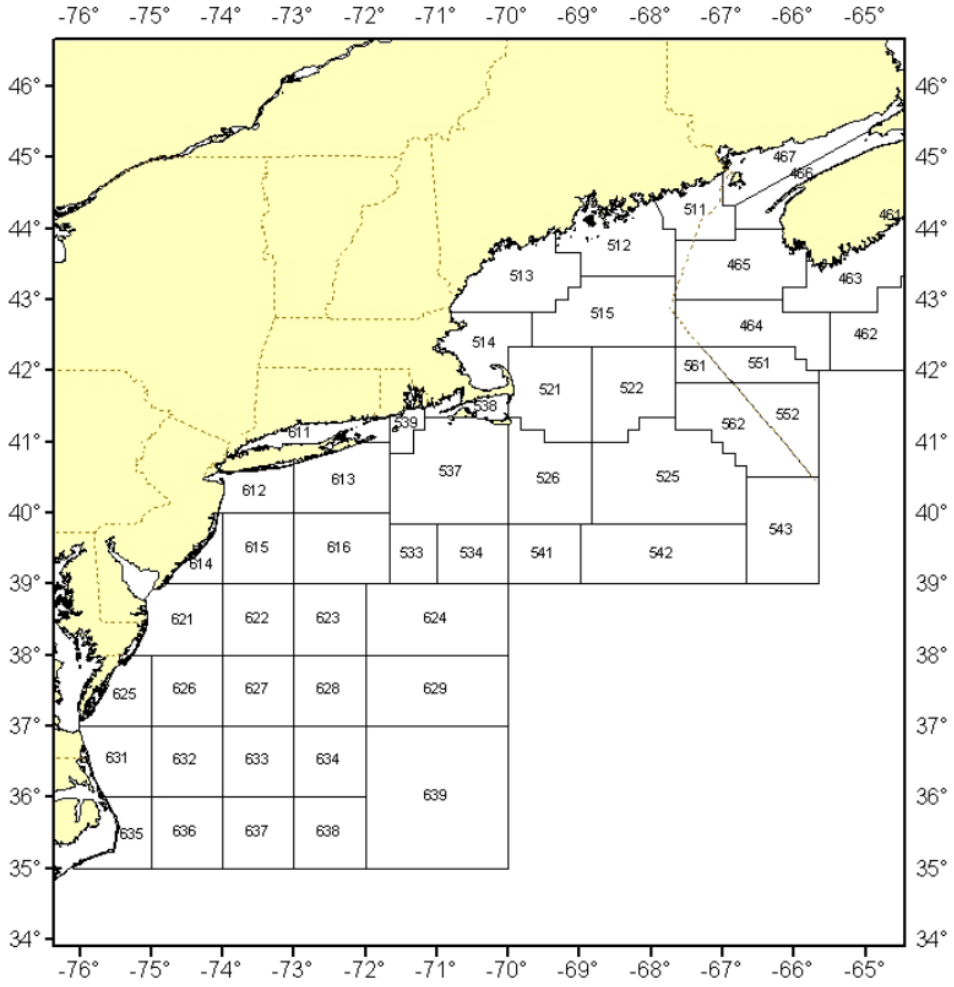


Figure 1. NMFS Statistical Areas

Gear groups included in the analyses were: bottom trawls, paired midwater trawls, single midwater trawls, gillnets, dredges, handlines, haul seines, longlines, pots/traps, purse seines, scallop trawl/dredge, seines and shrimp trawls. Bottom trawls and gillnets were further stratified into the following mesh categories:

Table 6. Gear Definitions

Mesh category	Bottom Trawl	Gillnet
small	mesh ≤ 3.5	mesh < 5.5
medium	3.5 < mesh < 5.5	---
large	mesh ≥ 5.5	5.5 ≤ mesh < 8
x-large	---	mesh ≥ 8

For bottom trawl fleets, mesh category was determined for trips with missing mesh information based on the primary species caught. For gillnets, trips with missing mesh information were assumed to come from the large mesh category.

Single and paired midwater trawls were split into separate fleets because the majority of both mackerel and herring landings during 2005-2010 were from paired midwater trawls, and the total catch-to-kept ratios varied between midwater trawl types. Incidental catch estimates for the midwater trawl fleets are only provided beginning in 2005 because these estimates are most accurate as a result of improved sampling methodologies.

For each trip, NEFOP data were used to calculate a total catch to kept (t/k) ratio, where t represents the total (retained+discarded) catch of an individual species (e.g., alewife, American shad) and k is the kept weight of all species. The t/k ratios were expanded using a raising factor to quantify total incidental catch. With the exception of the midwater trawl fleets, total landed weight of all species (from the dealer database) was used as the raising factor. VTR data were used as the expansion factor for the MWT fleets.

See tables below.

Table 7. Species-specific total annual incidental catch (mt) and the associated coefficient of variation across all fleets and regions. Midwater trawl estimates were only included beginning in 2005. Total RHS represents the sum of the four river herring and shad species (alewife, American shad, blueback herring and hickory shad). (Table A1 of Amendment 14 Appendix 2)

	Alewife		American shad		Blueback herring		Herring NK		Hickory shad		Total RHS	
	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV	Catch	CV
1989	44.16	0.49	229.10	0.98	37.65	0.42	17.53	1.13	0.00		310.92	0.73
1990	101.63	0.85	45.20	0.34	170.01	0.45	681.30	0.59	0.00		316.83	0.37
1991	148.56	0.44	176.09	0.25	285.07	0.40	265.61	0.51	39.35	0.00	649.07	0.23
1992	65.74	0.43	168.95	0.28	1190.98	0.42	786.21	0.39	0.00		1425.67	0.36
1993	381.05	2.42	211.34	1.00	745.60	0.28	135.86	4.83	0.00		1337.98	0.76
1994	5.56	0.30	109.93	0.64	240.17	0.87	58.34	0.47	0.95	0.82	356.61	0.53
1995	8.44	0.61	127.43	0.38	348.33	0.44	99.87	1.23	0.53	0.64	484.72	0.34
1996	704.10	1.14	64.52	0.39	2800.04	2.09	451.39	0.39	222.46	1.04	3791.11	1.75
1997	49.42	1.36	65.95	0.61	1593.60	0.69	90.27	5.09	20.64	1.25	1729.61	0.64
1998	145.64	1.47	161.03	0.23	76.81	1.52	228.12	2.08	479.82	0.72	863.31	0.55
1999	6.12	1.16	82.03	0.41	359.21	0.60	3457.27	0.74	208.75	0.94	656.11	0.44
2000	112.22	0.82	262.42	0.78	109.57	0.45	70.95	0.78	2.41	0.76	486.62	0.47
2001	189.63	0.84	67.82	0.39	309.86	0.32	2.51	0.44	330.44	0.27	897.76	0.30
2002	4.35	3.35	43.81	0.40	269.14	0.33	124.05	1.88	1.87	0.83	319.18	0.28
2003	388.04	1.43	60.20	0.54	526.83	0.56	26.21	1.17	18.80	0.85	993.87	0.63
2004	163.18	0.64	53.06	0.36	231.67	0.46	237.06	0.74	401.75	1.13	849.66	0.57
2005	404.42	0.40	94.50	0.28	254.68	0.34	29.46	0.58	27.42	0.34	781.01	0.27
2006	78.73	0.83	78.23	9.73	190.78	0.66	267.81	1.10	25.07	0.78	372.81	2.08
2007	543.58	0.71	79.08	0.56	187.99	1.42	357.43	0.91	16.72	0.90	827.37	0.79
2008	159.16	0.42	74.04	0.29	539.31	0.56	1668.44	0.50	2.91	0.86	775.42	0.40
2009	154.22	0.26	106.70	1.99	195.41	0.30	352.25	0.66	10.05	0.72	466.38	0.50
2010	134.60	0.19	60.61	0.16	132.42	0.20	106.67	0.32	1.26	0.59	328.90	0.15
2011	96.62	0.34	103.34	0.12	28.36	0.30	126.62	0.28	0.09	0.77	228.41	0.16
2012	173.85	0.24	76.53	0.16	249.35	0.31	91.72	0.30	0.51	0.55	500.25	0.21
2013	238.86	0.33	73.34	0.41	28.92	0.46	75.02	0.69	0.41	0.76	341.54	0.26
2014	83.68	0.14	63.54	0.19	29.65	0.24	76.69	0.44	0.68	0.39	177.55	0.11
2015	123.68	0.31	46.45	0.15	82.48	0.48	40.43	0.75	2.29	0.75	254.90	0.23
2016	101.61	0.29	41.95	0.17	54.04	0.19	53.20	0.55	21.16	0.47	218.75	0.16
2017	141.02	0.19	44.23	0.14	82.61	0.26	182.31	0.30	2.79	0.32	270.65	0.15

THIS SECTION LEFT BLANK

Table 8. Proportion of 2005-2017 incidental catch of all river herring and shad species (alewife, blueback herring, American shad and hickory shad) by region, fleet and quarter for the dominant gears. (Table 3 of Amendment 14 Appendix 2)

	BT			Gillnet			Paired MWT	Single MWT	Total MWT	Grand Total
Quarter	sm	med	lg	sm	lg	xlg				
1	0.030	0.002	0.001	0.003	0.007	0.000	0.183	0.044	0.227	0.270
2	0.019	0.001	0.001	0.000	0.005	0.000	0.010	0.004	0.014	0.041
3	0.045	0.000	0.001	0.000	0.004	0.000	0.000	0.002	0.002	0.053
4	0.020	0.002	0.001	0.001	0.005	0.000	0.005	0.000	0.005	0.034
	0.114	0.005	0.004	0.005	0.020	0.000	0.198	0.050	0.248	0.397
1	0.083	0.000	0.006	0.000	0.005	0.000	0.025	0.011	0.036	0.131
2	0.053	0.000	0.007	0.000	0.009	0.000	0.038	0.031	0.069	0.138
3	0.078	0.000	0.005	0.000	0.020	0.000	0.045	0.009	0.054	0.157
4	0.056	0.000	0.005	0.000	0.013	0.000	0.082	0.020	0.102	0.176
	0.269	0.001	0.023	0.000	0.047	0.000	0.190	0.071	0.262	0.603
	0.383	0.007	0.028	0.005	0.067	0.000	0.388	0.122	0.510	1.000

Table 9. Proportion of 2005-2017 incidental catch of American and hickory shad by region, fleet and quarter for the dominant gears. (Table 4 of Amendment 14 Appendix 2)

		BT			Gillnet			Paired MWT	Single MWT	Total MWT	Grand Total
Area fished	Quarter	sm	med	lg	sm	lg	xlg				
MA	1	0.037	0.008	0.004	0.017	0.036	0.000	0.041	0.005	0.046	0.149
MA	2	0.033	0.004	0.003	0.002	0.026	0.000	0.004	0.000	0.004	0.072
MA	3	0.067	0.001	0.002	0.002	0.019	0.000	0.000	0.000	0.000	0.092
MA	4	0.023	0.005	0.003	0.007	0.025	0.000	0.001	0.000	0.001	0.064
MA		0.161	0.018	0.013	0.028	0.106	0.000	0.046	0.006	0.052	0.377
NE	1	0.048	0.001	0.020	0.000	0.027	0.000	0.008	0.003	0.010	0.107
NE	2	0.043	0.001	0.022	0.000	0.047	0.001	0.015	0.005	0.020	0.133
NE	3	0.062	0.001	0.016	0.000	0.104	0.001	0.021	0.008	0.029	0.212
NE	4	0.037	0.001	0.018	0.000	0.067	0.000	0.032	0.014	0.046	0.170
NE		0.190	0.005	0.076	0.000	0.245	0.002	0.077	0.030	0.106	0.623
Total		0.350	0.023	0.089	0.028	0.351	0.002	0.122	0.035	0.158	1.000

Table 10. Proportion of 2005-2017 incidental catch of river herring (alewife and blueback herring) by region, fleet and quarter for the dominant gears. (Table 5 of Amendment 14 Appendix 2)

		BT			Gillnet			Paired MWT	Single MWT	Total MWT	Grand Total
Area fished	Quarter	sm	med	lg	sm	lg	xlg				
MA	1	0.028	0.001	0.001	0.000	0.000	0.000	0.216	0.053	0.269	0.299
MA	2	0.016	0.000	0.001	0.000	0.000	0.000	0.012	0.005	0.016	0.033
MA	3	0.040	0.000	0.000	0.000	0.000	0.000	0.000	0.003	0.003	0.043
MA	4	0.019	0.001	0.001	0.000	0.000	0.000	0.006	0.001	0.006	0.026
MA		**0.103**	**0.002**	**0.002**	**0.000**	**0.000**	**0.000**	**0.234**	**0.061**	**0.294**	**0.402**
NE	1	0.092	0.000	0.003	0.000	0.000	0.000	0.029	0.013	0.042	0.137
NE	2	0.055	0.000	0.003	0.000	0.000	0.000	0.043	0.038	0.081	0.139
NE	3	0.081	0.000	0.002	0.000	0.000	0.000	0.051	0.009	0.060	0.144
NE	4	0.060	0.000	0.002	0.000	0.000	0.000	0.094	0.022	0.115	0.178
NE		**0.288**	**0.000**	**0.011**	**0.000**	**0.000**	**0.000**	**0.217**	**0.081**	**0.298**	**0.598**
Total		**0.391**	**0.003**	**0.013**	**0.000**	**0.000**	**0.000**	**0.451**	**0.142**	**0.593**	**1.000**

The estimated catches and proportions above are by gear and area which follows the standard estimation protocol and ensures trips are assigned to unique gear/area fleets. One question that often follows review of these tables is what directed fishery was responsible for the small mesh and gillnet catches (mid-water trawl is going to be mackerel/herring).

In order to get a general sense of the answer to this question, Council staff binned the raw observed catch data by whatever species was retained the most (by weight) on each trip. No extrapolations have been done. After tagging each observer record with a "most retained species" label, the RH/S catch was sorted by these labels. Since the raw amount of observed RH/S in the tables depends on the encounter rate, the fishery effort, and the observer coverage rate, the order of the top species is not meaningful – but the tables likely provide a general indication of which fisheries are responsible for observed RH/S catch. This results of approach are likely highly sensitive to how the RH/S catch in binned.

Table 11. Bottom Trawl river herring catch by trips' primary landed species

2013-2017 Percent of bottom trawl river herring raw observed catch with given species as primary landed catch on trip (>2% only)	Primary Landed Species on Trip
61%	HERRING, ATLANTIC
11%	SQUID, ATL LONG-FIN
9%	HAKE, SILVER (WHITING)
7%	MACKEREL, ATLANTIC
4%	ALEWIFE
4%	SCUP

Table 12. Bottom Trawl shad catch by trips' primary landed species

2013-2017 Percent of bottom trawl shad raw observed catch with given species as primary landed catch on trip (>2% only)	Primary Landed Species on Trip
29%	SQUID, ATL LONG-FIN
21%	HAKE, SILVER (WHITING)
15%	SCUP
7%	HERRING, ATLANTIC
5%	SQUID, SHORT-FIN
4%	REDFISH, NK (OCEAN PERCH)
3%	MACKEREL, ATLANTIC
2%	ALEWIFE
2%	BUTTERFISH
2%	POLLOCK

Table 13. Gillnet shad catch by trips' primary landed species

2013-2017 Percent of gillnet shad raw observed catch with given species as primary landed catch on trip (>2% only)	Primary Landed Species on Trip
32%	SHAD, HICKORY
26%	POLLOCK
18%	DOGFISH, SPINY
6%	MENHADEN, ATLANTIC
4%	HAKE, WHITE
4%	MONKFISH (GOOSEFISH)
3%	COD, ATLANTIC
2%	KINGFISH, SOUTHERN

In the 2018-2020 squid specifications environmental assessment, rough RH/S catch extrapolations in the longfin squid fishery were made based on 2014-2016 landings and observer data, which estimated that around 57 MT of RH/S (mostly alewife and American shad) would be caught incidentally in a year if 14,000 MT of squid was landed in a year (14,000 MT was the average landings 2014-2016).

THIS SECTION LEFT BLANK

The following four tables provide an inventory of observed trips and total trips and illustrate observer coverage levels on a trip basis.

Table 14. Mid-Atlantic Trawl Trips

	Number of trips									
	Bottom trawl						Midwater trawl			
	Small mesh		Medium mesh		Large mesh		Single		Paired	
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	VTR	Observer	VTR
1989	29	4,180	7	412	4	2,627				
1990	31	3,745	19	386	0	2,864			0	0
1991	61	3,994	20	361	4	3,699	5	0	0	0
1992	39	3,080	12	283	14	4,719			9	0
1993	9	2,965	7	103	12	5,904			14	0
1994	8	3,857	8	156	21	4,865	1	64	30	44
1995	60	4,731	3	330	55	6,745	0	120	33	50
1996	70	4,699	10	652	18	6,500	0	252	0	14
1997	41	5,174	10	692	9	6,554	0	205	0	6
1998	29	5,269	4	784	13	6,866	0	238	0	34
1999	28	4,655	9	777	8	6,712	0	207	0	26
2000	28	4,575	12	806	26	5,938	5	193	1	74
2001	42	3,783	13	879	50	6,493	0	169	0	58
2002	15	3,475	18	998	39	6,958	0	71	1	107
2003	21	2,168	53	795	16	7,107	0	115	5	196
2004	111	2,408	156	692	109	6,796	2	99	8	249
2005	74	1,422	109	466	93	8,441	4	75	11	224
2006	101	2,349	54	736	71	6,938	8	74	6	184
2007	86	2,196	139	714	160	5,976	1	86	2	84
2008	68	2,253	86	701	132	6,159	8	17	8	146
2009	169	2,504	126	661	167	6,945	5	27	20	166
2010	183	2,305	193	420	276	5,555	4	15	13	84
2011	235	2,283	155	585	254	6,297	4	3	22	44
2012	133	2,420	111	738	169	5,115	4	35	7	40
2013	219	2,229	195	949	251	4,749	1	45	2	33
2014	228	2,113	227	895	269	4,177	1	47	0	18
2015	176	1,717	201	811	231	4,367	2	32	1	25
2016	394	2,378	298	1029	286	4,184	2	26	1	14
2017	612	2,614	370	991	332	3,184	4	32	2	14

Table 15. Mid-Atlantic Gillnet/Other Trips

	Number of trips							
	Gillnet						Other	
	Small mesh		Large mesh		X-large mesh			
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	Dealer
1989	0	67	0	1,646			0	15,494
1990	0	137	0	2494	0	3	1	16,633
1991	0	121	0	3364			8	17,948
1992	0	100	0	2627			15	17,042
1993	0	80	0	2856			42	17,467
1994	83	85	58	2844	20	24	42	15,086
1995	137	185	207	4028	73	294	44	13,440
1996	146	343	174	5073	65	638	24	14,109
1997	106	422	136	10134	111	1,021	27	18,541
1998	104	699	132	5750	73	1,403	36	16,378
1999	44	848	23	5402	19	1,443	57	15,424
2000	49	1,110	18	4972	18	1,954	75	15,308
2001	54	1,280	17	3834	17	2,193	97	15,747
2002	34	1,267	10	3701	11	2,139	96	16,653
2003	25	750	4	3838	13	2,104	115	17,997
2004	12	1,303	6	3292	38	1,409	330	16,892
2005	19	1,270	4	4122	82	1,739	408	23,185
2006	20	1,160	7	3512	32	1,470	144	25,122
2007	19	1,231	13	5760	32	2,045	245	27,634
2008	7	905	2	4558	44	2,029	514	25,958
2009	9	1,252	8	7132	43	1,693	435	25,787
2010	12	851	52	3851	91	1,455	282	16,538
2011	11	1,529	24	5901	62	2,275	261	22,035
2012	0	1,142	3	4719	68	2,035	225	20,543
2013	8	890	9	7392	29	1,789	202	22,373
2014	29	1,181	44	5914	85	1,623	318	19,222
2015	162	1,118	141	5100	126	1,427	395	20,431
2016	246	1,182	249	5624	162	1,304	552	21,642
2017	359	1,121	205	5172	152	1,138	551	19,515

Table 16. New England Trawl Trips

	Number of trips									
	Bottom trawl						Midwater trawl			
	Small mesh		Medium mesh		Large mesh		Single		Paired	
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	VTR	Observer	VTR
1989	72	5,060	15	528	57	21,439			0	0
1990	33	4,850	4	355	54	21,518			0	0
1991	84	4,372	13	156	78	22,429	2	0	0	0
1992	56	4,157	1	120	68	22,518	0	0	0	0
1993	21	5,054	10	153	44	21,468	0	0	7	0
1994	13	5,522	5	239	36	21,084	0	306	4	53
1995	37	4,217	3	154	68	20,376	4	785	2	11
1996	48	3,893	2	52	44	19,750	0	897	0	18
1997	19	3,788	4	100	29	17,417	0	701	0	93
1998	5	4,198	1	94	13	18,156	0	512	0	170
1999	19	3,915	0	214	41	16,345	1	521	2	164
2000	8	3,338	9	124	103	17,473	7	462	0	368
2001	8	2,834	11	173	157	17,372	1	336	0	629
2002	35	2,184	30	221	220	17,480	0	373	0	653
2003	46	2,226	27	184	387	16,813	2	251	18	617
2004	88	1,822	85	152	531	13,384	23	253	60	585
2005	84	1,507	173	131	1350	11,902	43	265	91	465
2006	49	1,939	37	299	619	10,612	10	194	21	490
2007	58	2,145	18	213	621	10,760	10	87	11	235
2008	46	2,381	16	175	753	11,013	11	33	36	185
2009	195	2,296	26	270	879	10,936	10	47	67	225
2010	206	2,601	55	251	1054	9,423	29	57	106	215
2011	164	1,854	31	246	1597	8,351	24	59	89	252
2012	138	2,146	30	390	1551	8,357	30	122	131	246
2013	191	1,855	56	510	1095	7,343	27	181	69	235
2014	281	1,972	56	540	1198	6,404	28	141	74	237
2015	242	2,092	60	538	897	6,106	6	154	10	193
2016	282	3,097	60	711	632	5,091	21	163	28	131
2017	589	2,616	166	597	633	5,069	12	92	17	124

Table 17. New England Gillnet/Other Trips

	Number of trips							
	Gillnet						Other	
	Small mesh		Large mesh		X-large mesh			
Year	Observer	Dealer	Observer	Dealer	Observer	Dealer	Observer	Dealer
1989	0	10	0	12,688	0	1	40	28,547
1990	0	10	0	13303	0	26	32	30,641
1991	0	50	0	13336	0	2	79	33,019
1992	0	5	0	13367	0	47	144	33,575
1993	0	2	0	13184	0	81	118	33,704
1994	0	3	61	13510	40	934	107	28,590
1995	0	8	105	12798	46	2,030	101	31,949
1996	0	21	55	10957	23	1,533	62	35,391
1997	0	12	51	9487	19	1,214	32	35,427
1998	3	14	115	9579	15	1,061	15	32,176
1999	1	7	98	7122	21	1,352	74	25,032
2000	0	17	107	7547	50	1,881	234	21,397
2001	1	17	69	7086	33	2,530	28	22,574
2002	0	14	91	7095	41	2,827	30	23,240
2003	0	20	326	7857	190	2,990	72	20,577
2004	1	16	699	5922	536	2,973	240	16,706
2005	0	39	587	5833	459	2,958	489	39,381
2006	0	67	142	6683	79	2,421	262	47,112
2007	2	78	132	7905	164	2,102	319	43,577
2008	3	27	170	9453	112	2,274	370	55,743
2009	2	12	313	10014	76	1,989	243	66,370
2010	0	22	1267	7837	771	2,653	384	150,358
2011	0	9	1589	6515	715	2,847	375	161,043
2012	0	6	1379	5844	454	2,502	611	170,606
2013	0	4	620	3432	323	2,272	432	168,246
2014	0	9	919	3338	588	2,339	364	168,043
2015	0	4	471	1951	450	2,451	564	170,042
2016	1	6	278	2021	218	2,525	368	183,969
2017	1	3	225	1626	310	2,792	510	178,262

The ASMFC annual fishery management plan reviews are available at http://www.asmfc.org/species/shad-river-herring. Summary landings data from 2012-2017 for river herring and American shad from ME-FL are provided below. The reviews have data on hickory shad but landings are relatively low. Most of these landings are in-river but there may be some incidental catch that is overlapped with the tables above, so the numbers cannot be added.

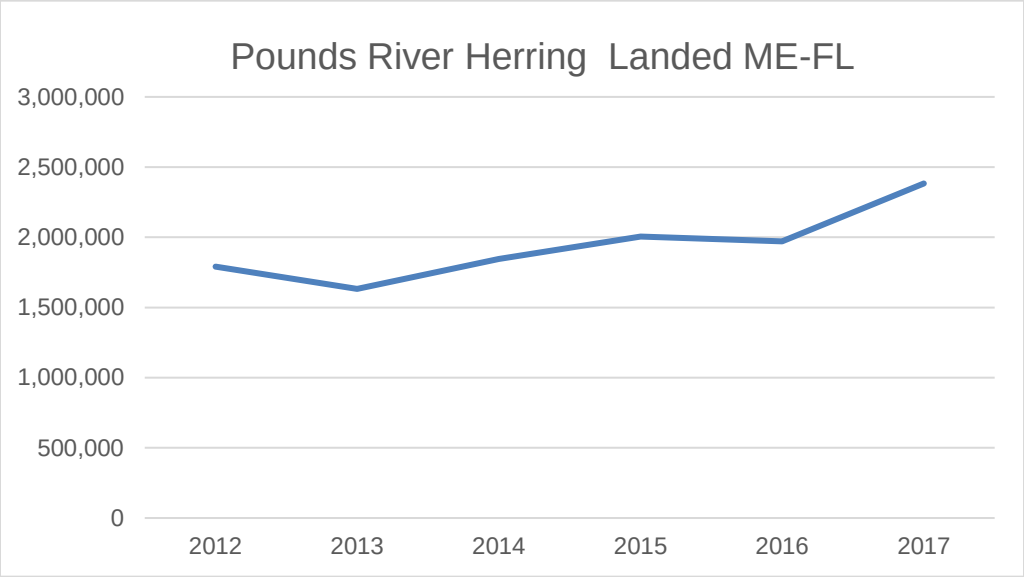


Figure 2. River herring landings reported by states

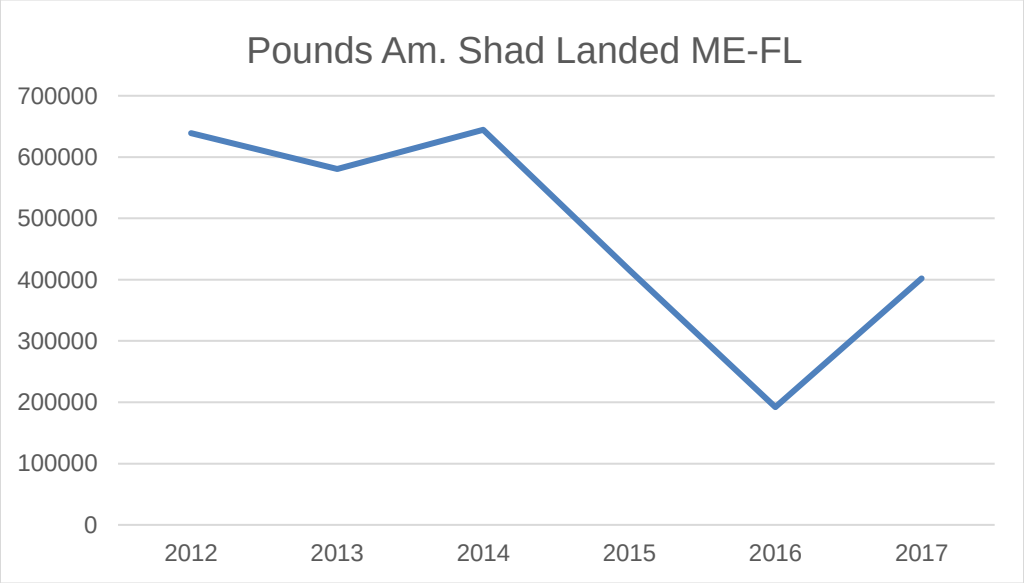


Figure 3. American shad landings reported by states

3. What levels of observer coverage have been achieved in relevant fisheries?

See above inventory of trip tables (Tables 14-17).

4. Was a cap set for RH/S for the following year?

2014 was the first year of the cap. The cap was set at 236 MT and the mackerel DAH was 33,821 MT. 236 MT was the median of the values generated when the annual RH/S catch to all retained catch ratios on mackerel trips 2005-2012 (from observer data) were applied to the quota (33,821 MT). The critical ratio of cap to mackerel was 0.70% and the ratio of cap to all catch on mackerel trips (accounting for mostly Atlantic herring) was 0.50%. Above those ratios the fishery would have had an early shut down. The estimated cap catch was 6 MT.

In 2015 there was a slight adjustment to identifying cap trips made, but the same basic procedure was used to generate a cap of 155 MT for a mackerel DAH of 20,872 MT. The Council included a provision that the cap starts out lower, at 89 MT (the median of actual RH/S catches by the mackerel fishery 2005-2012) until 10,000 MT of mackerel landings, so that there was still a strong incentive to avoid RH/S catches even at the low levels of mackerel catch then occurring. Until landings got above 10,000 MT the critical ratio of cap to mackerel was 0.89% and the ratio of cap to all catch on mackerel trips (accounting for mostly Atlantic herring) was 0.64%. To catch the full mackerel quota the critical ratio of cap to mackerel was 0.74% and the ratio of cap to all catch on mackerel trips (accounting for mostly Atlantic herring) was 0.53%. The estimated cap catch was 13 MT.

For 2016-2018 the mackerel DAH dipped below 10,000 MT to 9,177 MT. The Council applied the 0.89% ratio to that quota to get a cap of 82 MT. The estimated cap catch was 13 MT in 2016 and 39 MT in 2017. In 2018, the directed fishery caught 109 MT of RH/S when it was shut down and 8,072 MT of mackerel, for a ratio of 1.35%.

5. Was the cap based on recent catch or more directly tied to RH/S population dynamics?

The cap was originally based on catch ratios expanded up to the mackerel quota. Given the low RH/S cap catches and low mackerel quota, the Council has reduced the RH/S cap in recent years. With the current 82 mt mackerel cap, in order to catch the mackerel quota the fishery must maintain a RH/S catch rate around the median value for 2005-2012.

6. What progress has been made on aligning cap operation with the Atlantic herring fishery's cap?

Given the degree of alignment created by the current estimation procedures and the potential for the Councils to disagree on year to year cap amounts even if a joint framework was established, it is not clear to staff that there likely would be substantial gains from moving from the status quo cap setting procedures. If a cap was based on a biologically-derived amount, then more explicitly aligning the caps *may* be more important. See previous memo on this topic at http://www.mafmc.org/s/Tab16_ED-Report.pdf for additional background. If the Councils could agree on an area/gear cap that matched the SBRM then a joint cap could be theoretically feasible.

7. What other RH/S coordination with other management partners has occurred (NMFS, NEFMC, ASMFC, states, NGOs, academia, TEWG, etc.)?

The TEWG continues to keep a variety of parties engaged in RH conservation issues. The summary from the last TEWG meeting is available at https://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/. The leaders of the various TEWG subgroups, let by Dr. Jon Hare, have been developing a river herring review paper that summarizes recent science on river herring. The new TEWG co-chairs are also charging the group to expand beyond data gap identification to conservation action identification. J. Didden, as co-chair of the TEWG fisheries subgroup, has scheduled a fisheries subgroup meeting for August 30 to begin updating the Fisheries Data Gaps and Conservation Ideas document (https://www.greateratlantic.fisheries.noaa.gov/protected/riverherring/tewg/fisheries/tewg_fisheries_-_data_gaps_and_cons_ideas_update_nov_2015.pdf) and consider other tasks for the Fisheries Subgroup.

Council and ASMFC staffs are in regular contact to keep each other updated on RH/S-relevant on-goings and issues.

8. How has the Scientific and Statistical Committee (SSC) been involved?

There have been preliminary discussions with the SSC regarding a working group to evaluate the feasibility of developing a biologically-based cap but the lack of reference points has made progress difficult. Staff is aware that SSC-member Dr. Yan Jiao has been seeking funding for a graduate student to explore alternative options for RH/S stock assessment.

9. What other actions have been taken by the Council that could affect RH/S?

The primary work from staff over the last year that could affect RH/S involves the TEWG and associated review paper, tracking and supporting New England's RH/S actions, and work on mackerel rebuilding and the associated RH/S cap. Council staff has also promoted the existing RH/S voluntary bycatch programs (SMAST/Cornell) through communication with industry. For a summary of New England's recent decision on its approach to RH/S, see http://s3.amazonaws.com/nefmc.org/NEFMC-Reaffirms-River-HerringShad-Approach-Launches-Atlantic-Herring-Specs-June-29-2018.pdf.

10. What information is available on RH/S abundance trends?

RH had an assessment update in 2017 and American shad is scheduled to undergo an assessment updates in 2018 respectively. Benchmarks are scheduled for five years after the updates, though if new data or modeling improvements suggest a benchmark would be appropriate sooner, then sooner is also a possibility for benchmarks. Waiting until after 2020 for benchmarks should allow some of the improvements in data collection being worked on through the TEWG to be useful for an assessment. Also, if state moratoria and/or RH/S catch caps have had positive impacts there would be more time to observe those impacts. The ASMFC does provide selected run counts in its FMP reviews, available at http://www.asmfc.org/species/shad-river-herring.

The 2017 RH assessment update, utilizing data through 2015, found that of the 54 in-river stocks of river herring for which data were available, 16 experienced increasing trends over the ten most recent years of the update assessment data time series, 2 experienced decreasing trends, 8 were stable, 10 experienced no discernible trend/high variability, and 18 did not have enough data to assess recent trends, including 1 that had no returning fish. The coastwide meta-complex of river herring stocks on the US Atlantic coast remains depleted to near historic lows. A depleted status indicates that there was evidence for declines in abundance due to a number of factors, but the relative importance of these factors in reducing river herring stocks could not be determined. The assessment update is available at http://www.asmfc.org/species/shad-river-herring.

Staff requested updated survey information from a variety of contacts and that information is provided in Appendices following.

Appendix 1 – NEFSC Trawl Indices

River herring (alewife and blueback herring) and American shad indices from the NEFSC spring and fall bottom trawl surveys for fall 1975 – spring 2018

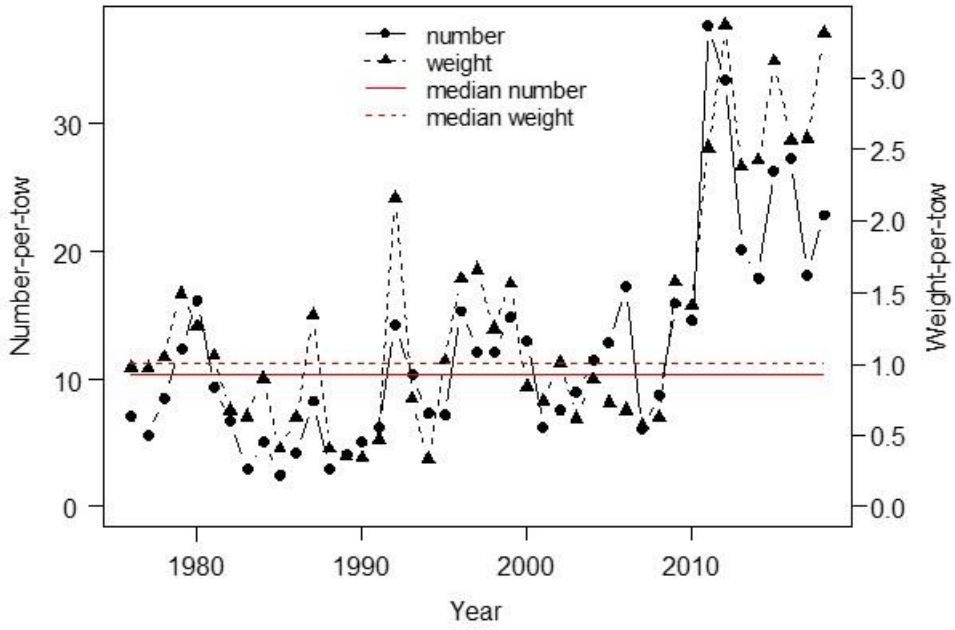
7 July 2018

References:

NEFSC 2015. River herring and shad indices from the NEFSC bottom trawl surveys, submitted to the MAFMC in May 2015. http://static1.squarespace.com/static/511cdc7fe4b00307a2628ac6/t/554a867de4b054602b5dc84f/1430947453597/RHS_NEFSC_Indices.pdf

Figure 1: Alewife relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC spring bottom trawl survey for 1976-2018. Indices from 2009-2018 were converted to Albatross units. The median number- and weight-per-tow values represent the median indices over 1976-2018. The full strata set was not sampled in 2014 due to delays in the survey (offshore strata 61-68 south of Maryland were not sampled). Previous comparisons did not show notable differences in survey estimates based on full versus abbreviated strata sets (NEFSC 2015).

A)



B)

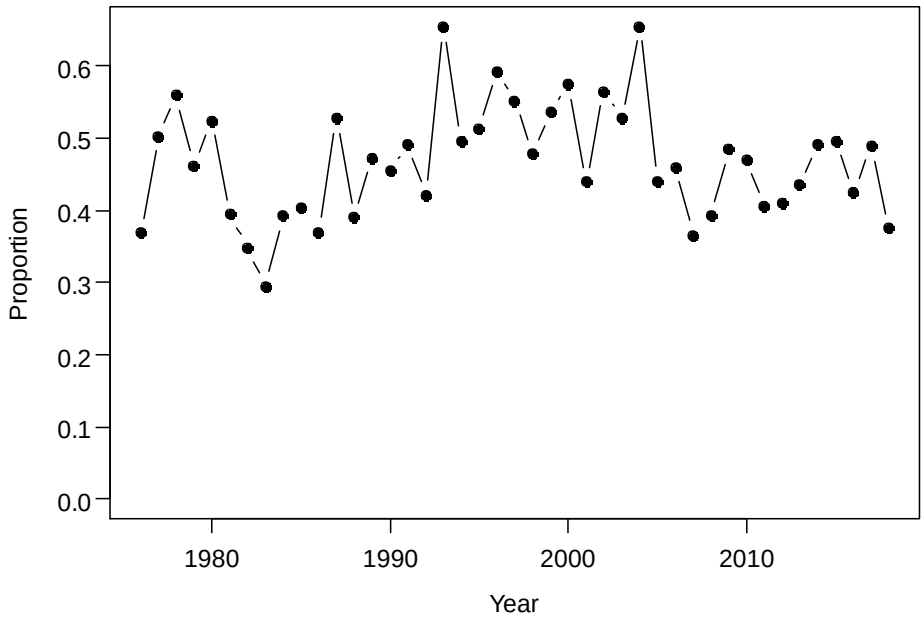
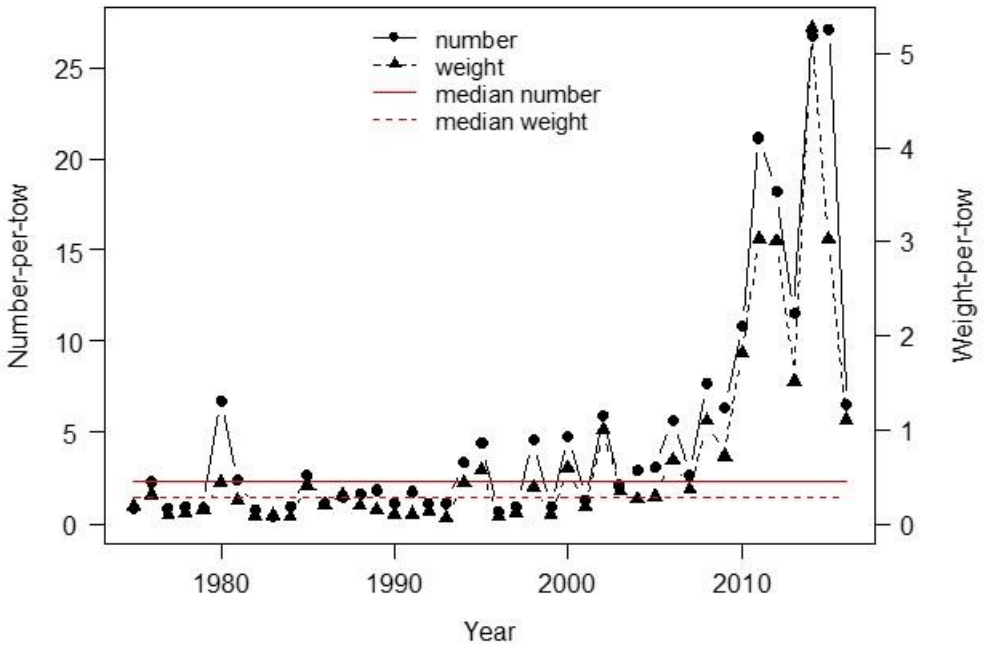


Figure 2: Alewife relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC fall bottom trawl survey for 1975-2016. Indices from 2009-2016 were converted to Albatross units. The median number- and weight-per-tow values represent the median indices over 1975-2016. Indices from the 2017 fall bottom trawl survey are not available because the full survey was not completed due to vessel mechanical issues.

A)



B)

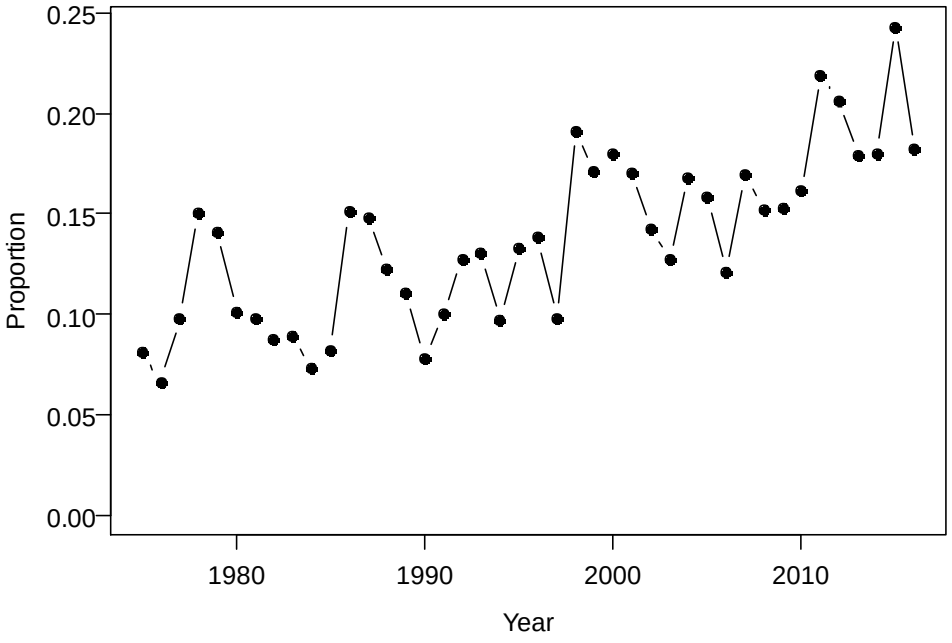
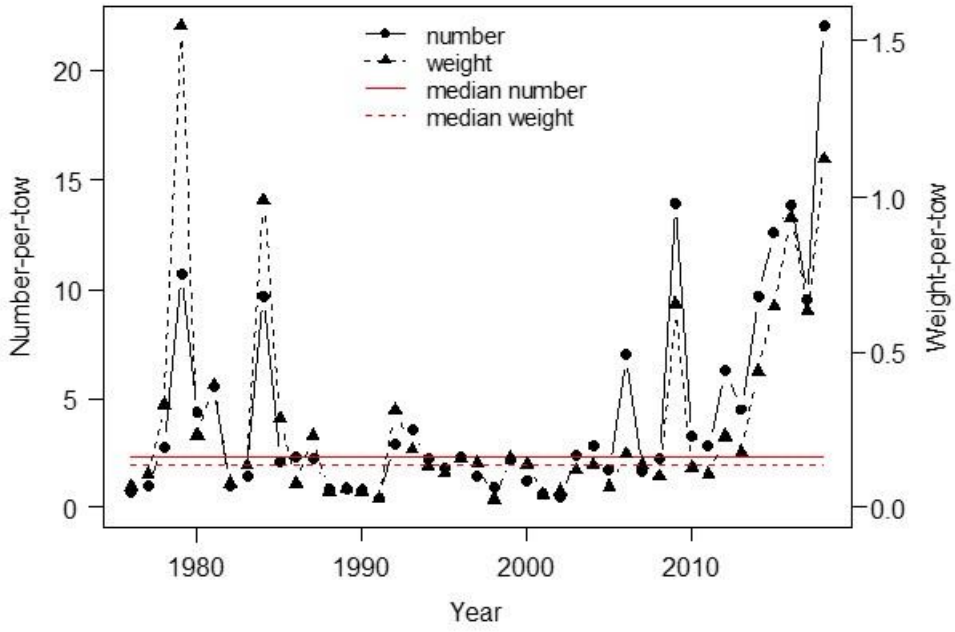


Figure 3: Blueback herring relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC spring bottom trawl survey for 1976-2018. Indices from 2009-2018 were converted to Albatross units. The median number- and weight-per-tow values represent the median indices over 1976-2018. The full strata set was not sampled in 2014 due to delays in the survey (offshore strata 61-68 south of Maryland were not sampled). Previous comparisons did not show notable differences in survey estimates based on full versus abbreviated strata sets (NEFSC 2015).

A)



B)

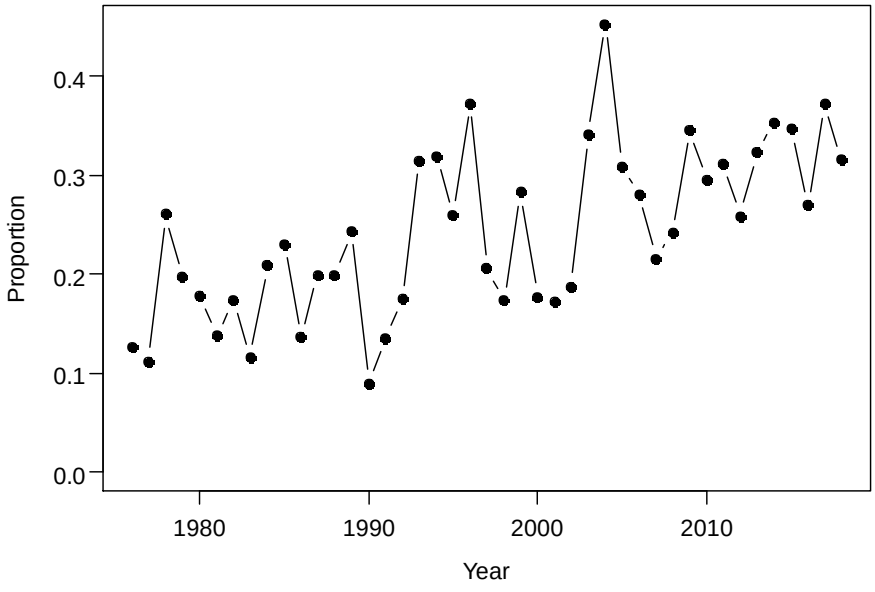
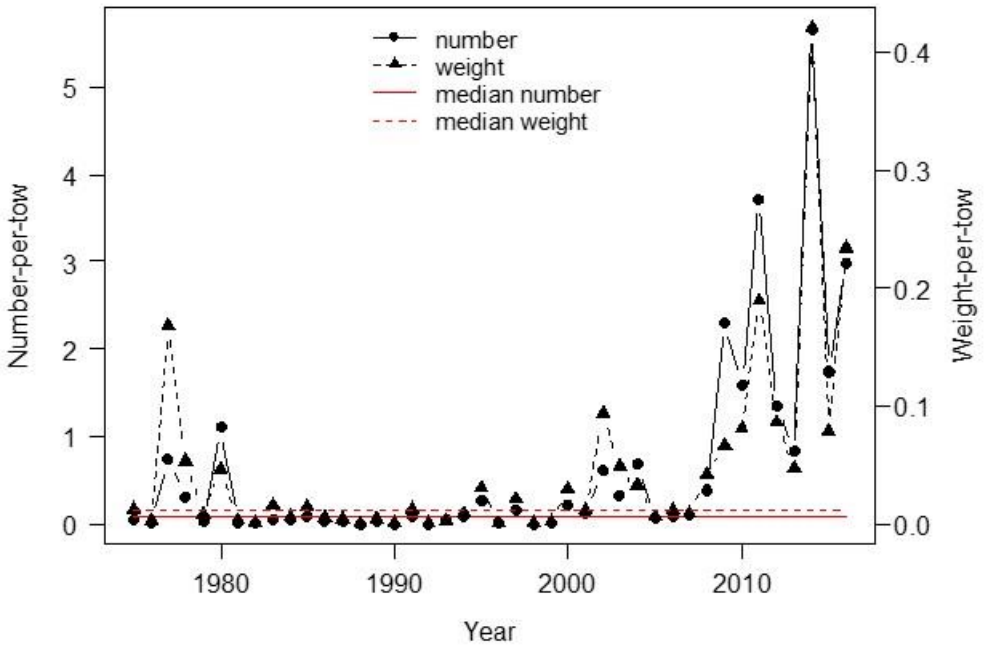


Figure 4: Blueback herring relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC fall bottom trawl survey for 1975-2016. Indices from 2009-2016 were converted to Albatross units. The median number- and weight-per-tow values represent the median indices over 1975-2016. Indices from the 2017 fall bottom trawl survey are not available because the full survey was not completed due to vessel mechanical issues.

A)



B)

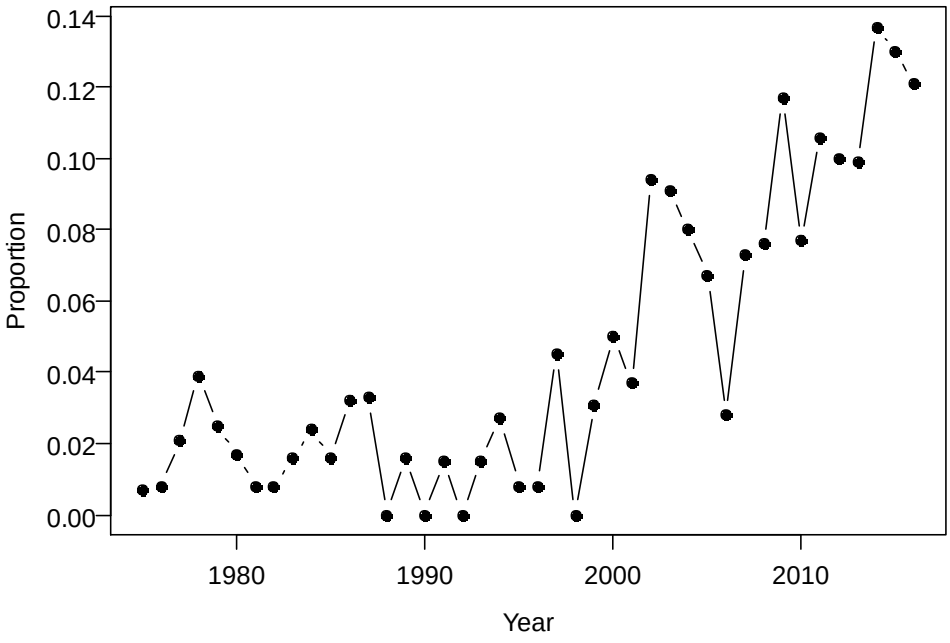
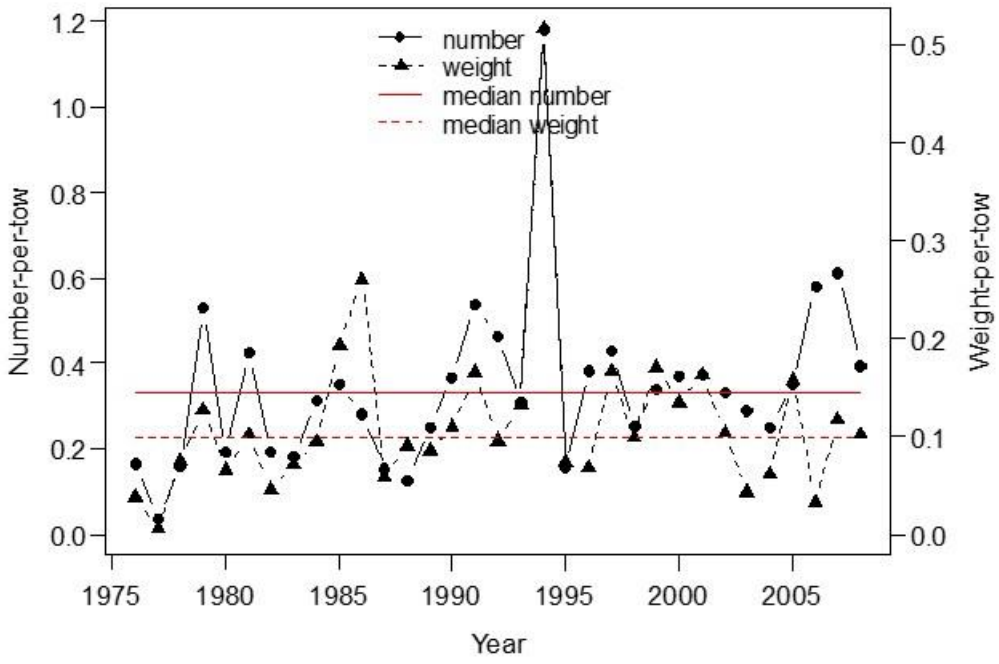


Figure 5: American shad relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC spring bottom trawl survey for 1976-2008. Vessel (Bigelow to Albatross) conversion coefficients were not available for American shad; therefore, the time series was split in 2008. The median number- and weight-per-tow values represent the median indices over 1976-2008.

A)



B)

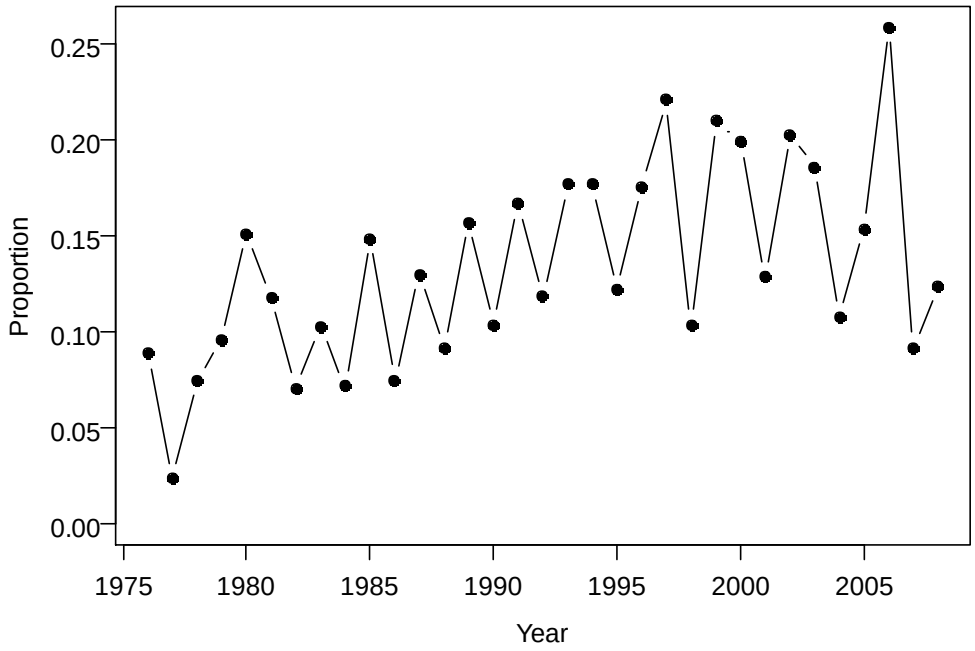
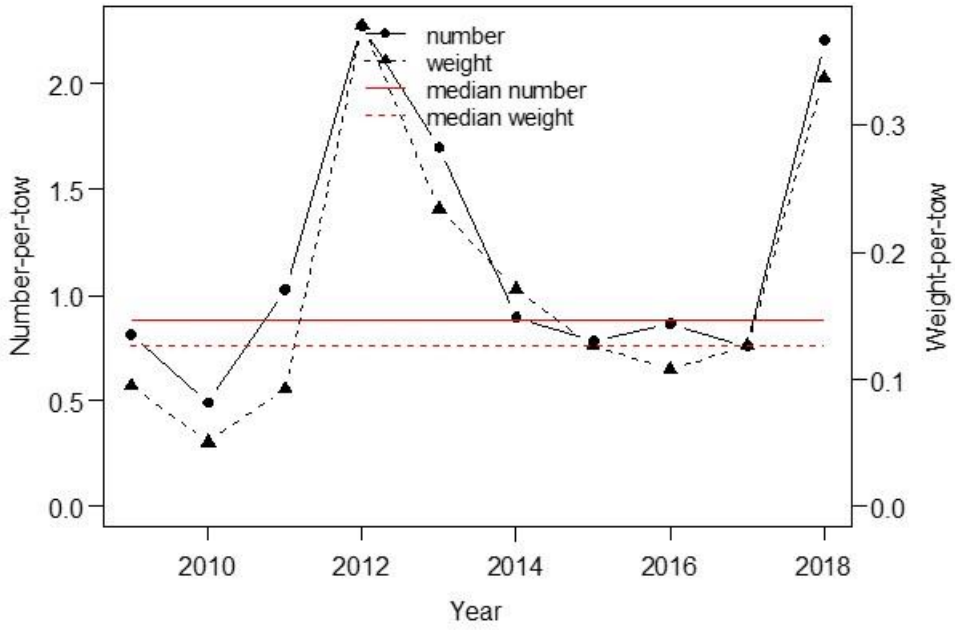


Figure 6: American shad relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC spring bottom trawl survey for 2009-2018 (Bigelow units). The median number- and weight-per-tow values represent the median indices over 2009-2018. The full strata set was not sampled in 2014 due to delays in the survey (offshore strata 61-68 south of Maryland were not sampled). Previous comparisons did not show notable differences in survey estimates based on full versus abbreviated strata sets (NEFSC 2015).

A)



B)

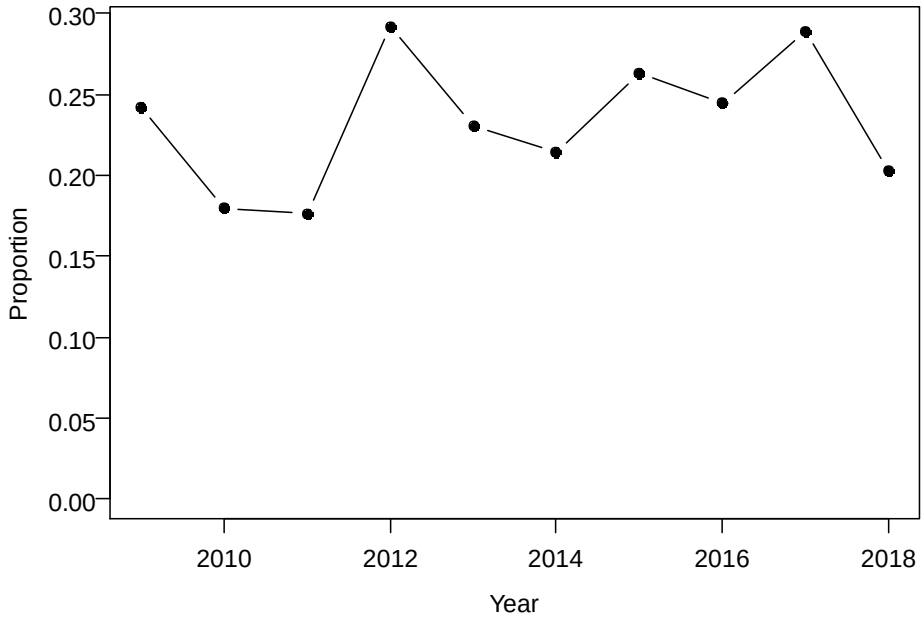
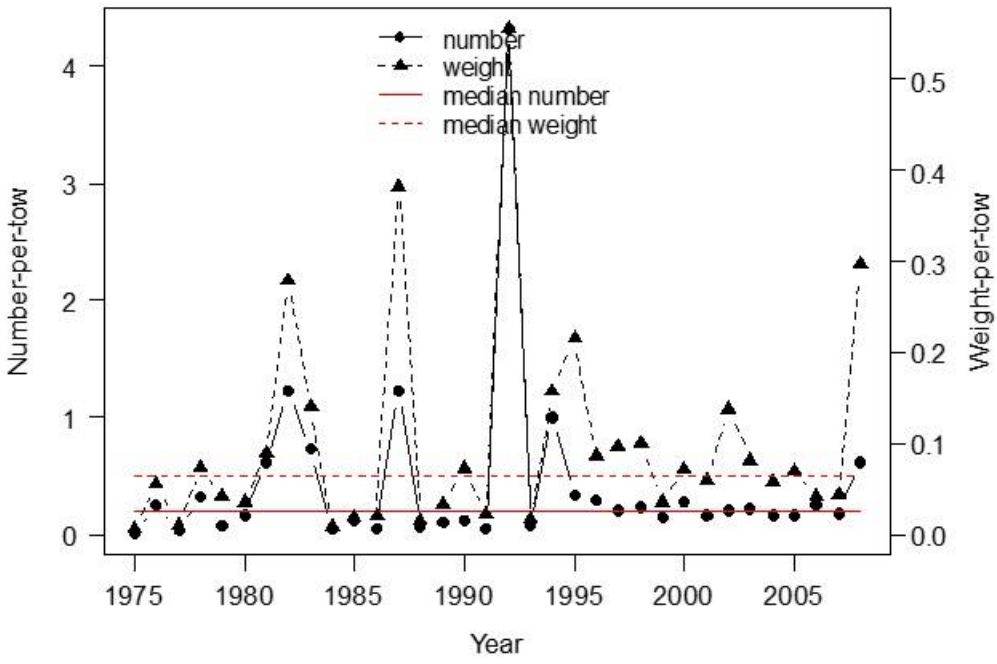


Figure 7: American shad relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC fall bottom trawl survey for 1975-2008. Vessel (Bigelow to Albatross) conversion coefficients were not available for American shad; therefore, the time series was split in 2008. The median number- and weight-per-tow values represent the median indices over 1975-2008.

A)



B)

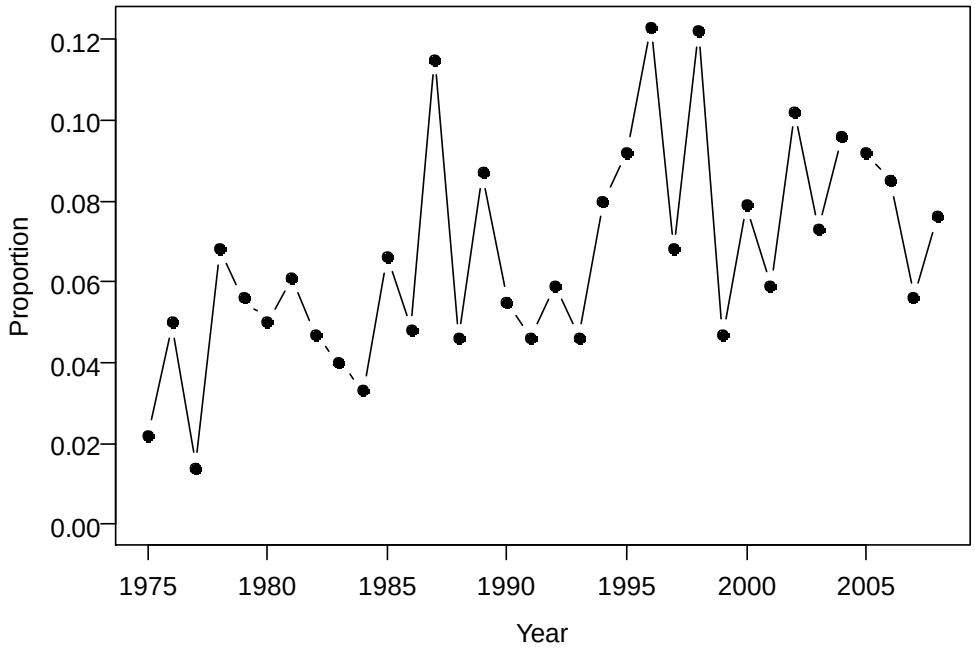
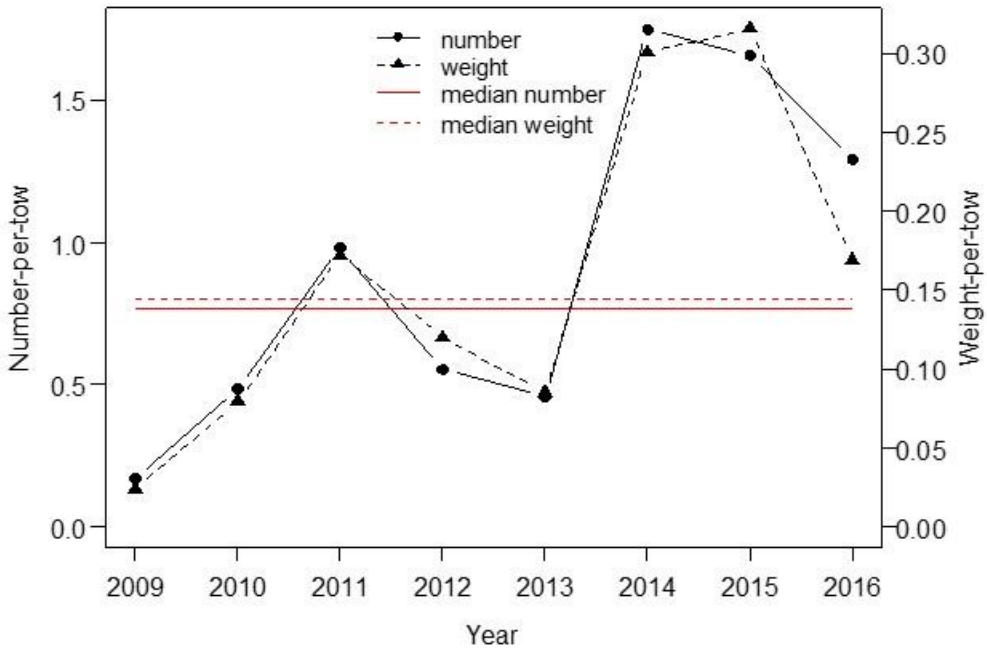
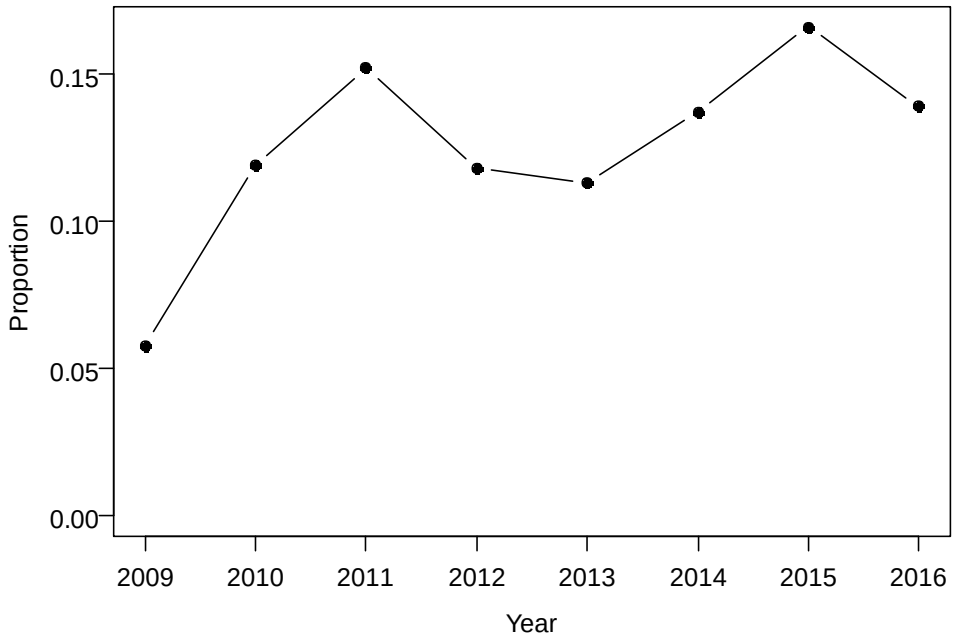


Figure 8: American shad relative abundance (stratified mean number-per-tow) and biomass (stratified mean kg-per-tow) indices (A) and the proportion of positive tows (B) derived from the NEFSC fall bottom trawl survey for 2009-2016 (Bigelow units). The median number- and weight-per-tow values represent the median indices over 2009-2016. Indices from the 2017 fall bottom trawl survey are not available because the full survey was not completed due to vessel mechanical issues.

A)



B)



Appendix 2 – NEAMAP Trawl Indices

Note from VIMS: Spring 2017 data probably should be ignored because the survey was truncated to only 63 stations in the northern strata, due to both a funding shortfall and the fire on the Darana R.

Figure 1. Spring Alewife (ends 2018)

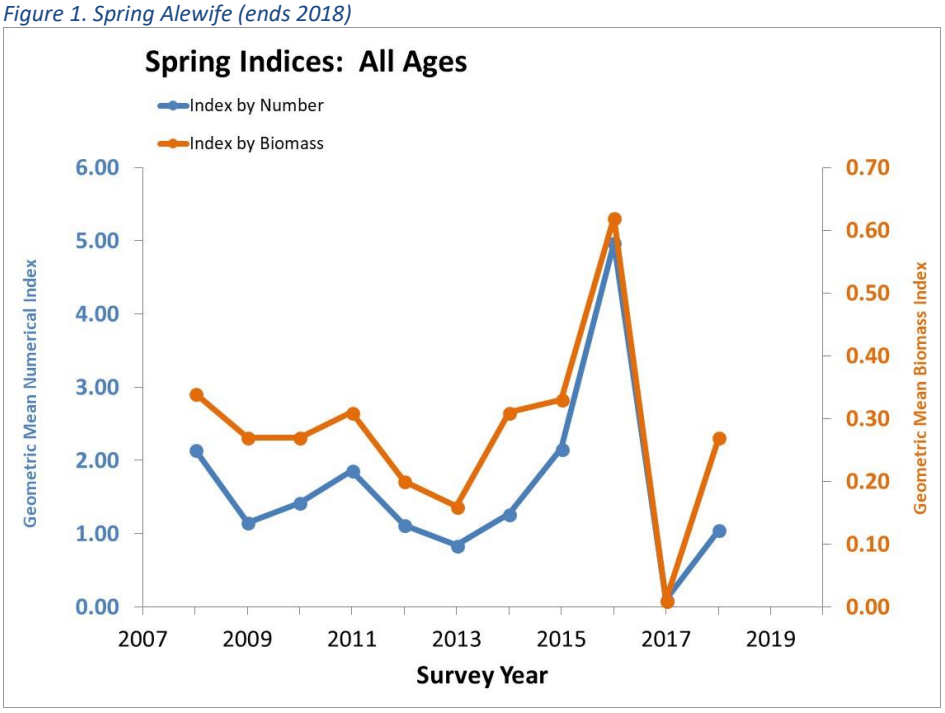
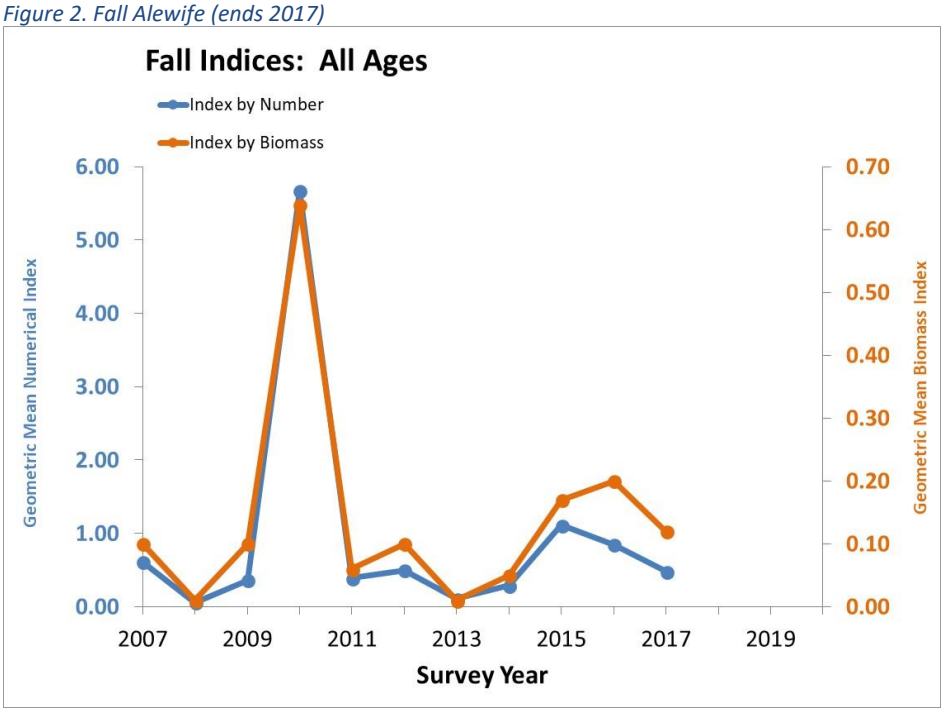


Figure 2. Fall Alewife (ends 2017)



Appendix 2 – NEAMAP Trawl Indices

Note from VIMS: Spring 2017 data probably should be ignored because the survey was truncated to only 63 stations in the northern strata, due to both a funding shortfall and the fire on the Darana R.

Figure 3. Spring Blueback (ends 2018)

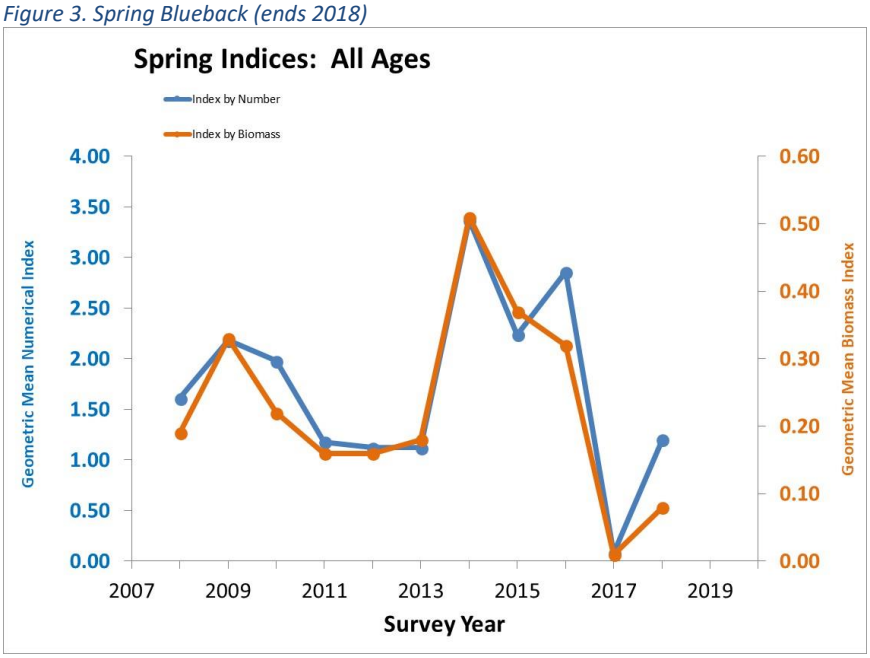
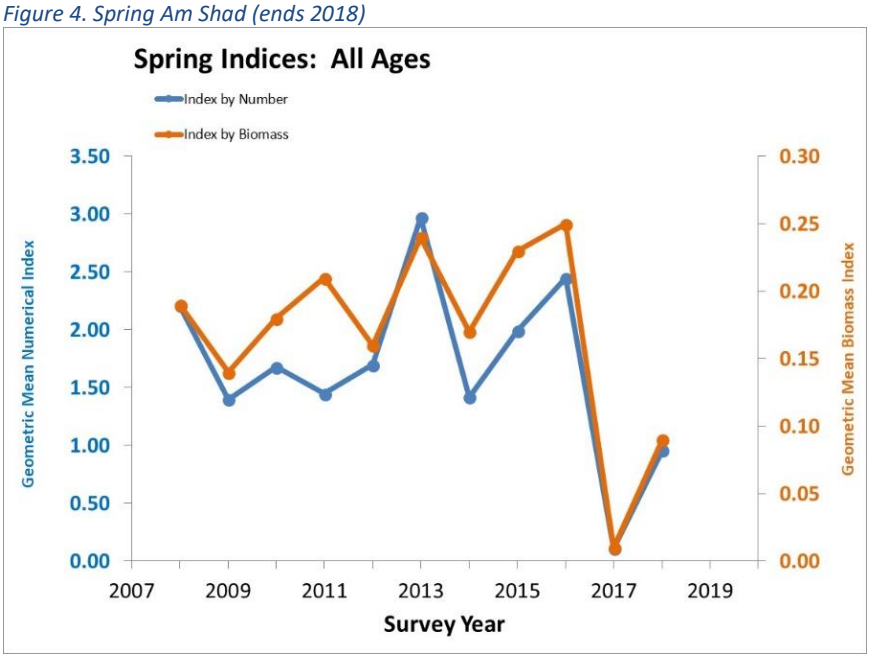


Figure 4. Spring Am Shad (ends 2018)



Appendix 3 – NC Indices (through 2017)

Staff Notes:

It's important to note that for American shad, adequate sampling of the areas utilized by this species has not occurred, nor the specific areas determined. The eleven core seine sites are designed to specifically sample river herring habitat and may not be suitable for juvenile American Shad. Trends and abundance for American Shad from these surveys should be used with caution.

Description of work - Juvenile Abundance Index (JAI)

Eleven seine stations were sampled by DMF monthly with an 18.5 m (60 ft.) bag seine in the western Albemarle Sound area during June-October 2017. Juvenile Abundance Indices (JAI) for Blueback Herring, Alewife, and American Shad were calculated for the eleven core stations sampled from 1972 through 2017. One unit of effort is one haul of the seine. Samples were sorted by species and 30 randomly selected individuals of each alosine species present were measured. Other species present were also noted. Water temperature, salinity, and other environmental characteristics were measured and recorded.

Figure 1. NC Alewife JAI

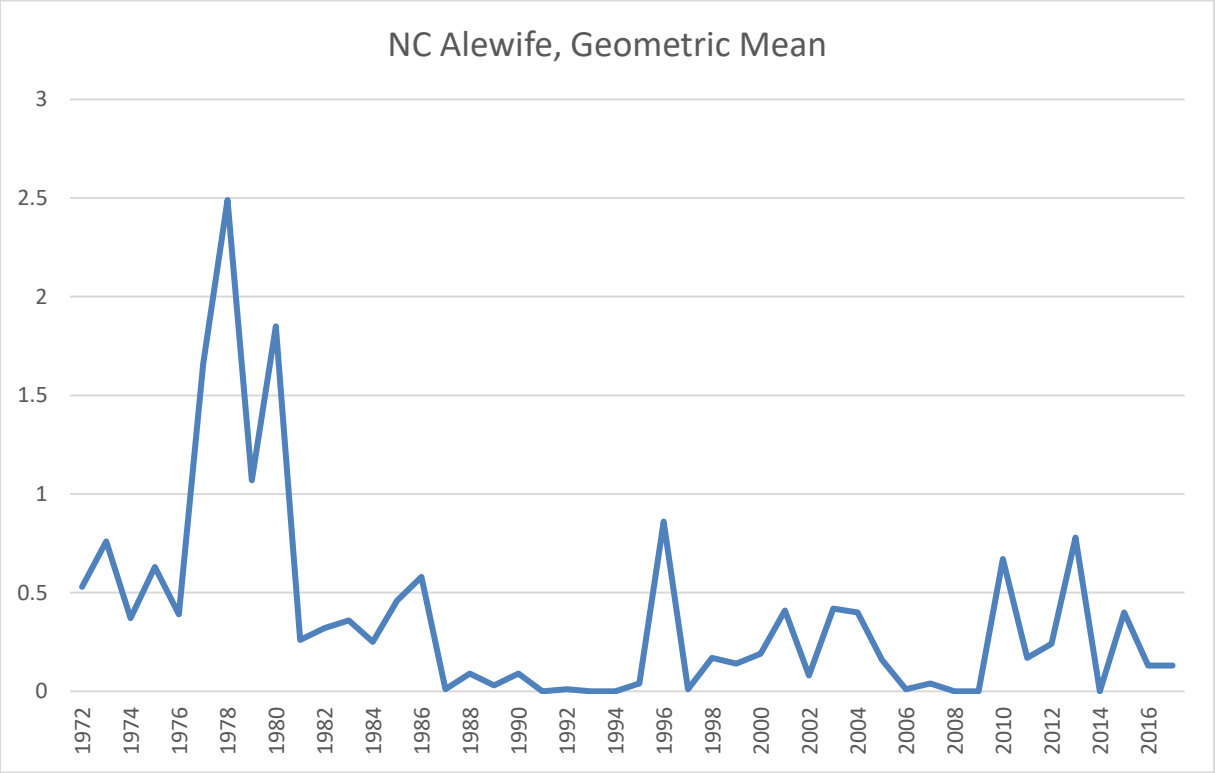


Figure 2. NC Blueback JAI

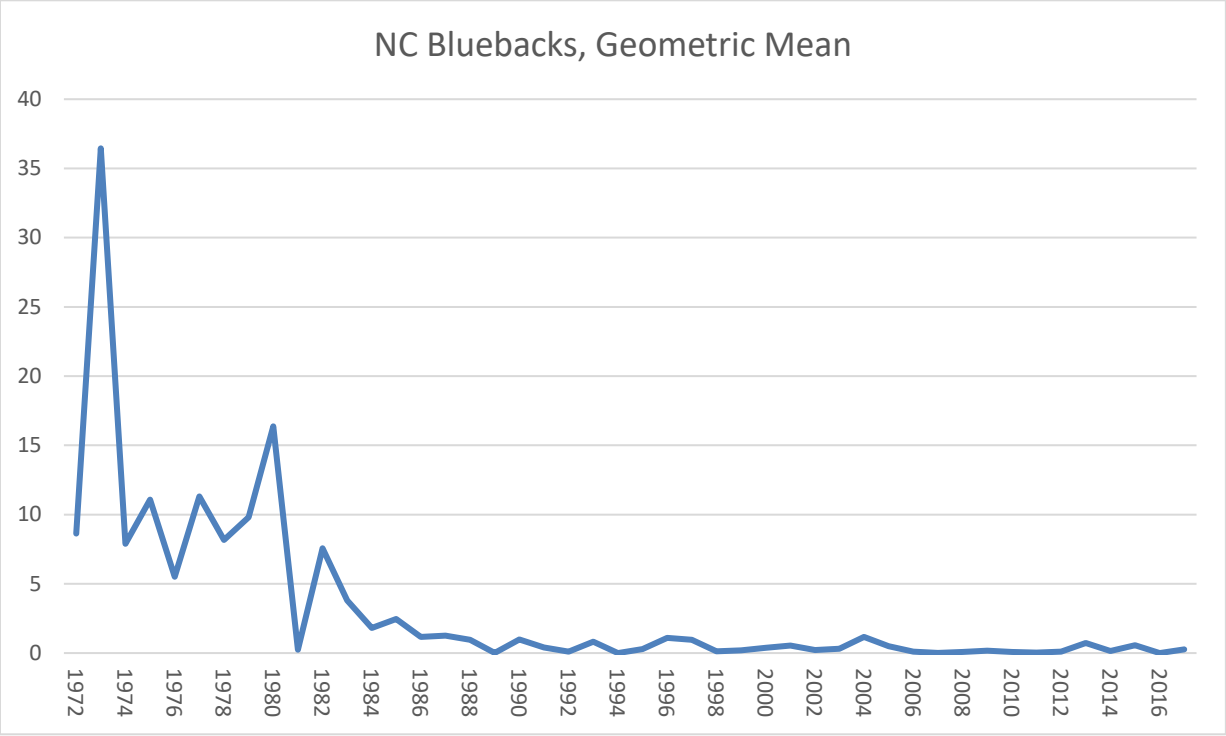


Figure 3. NC Am. Shad JAI

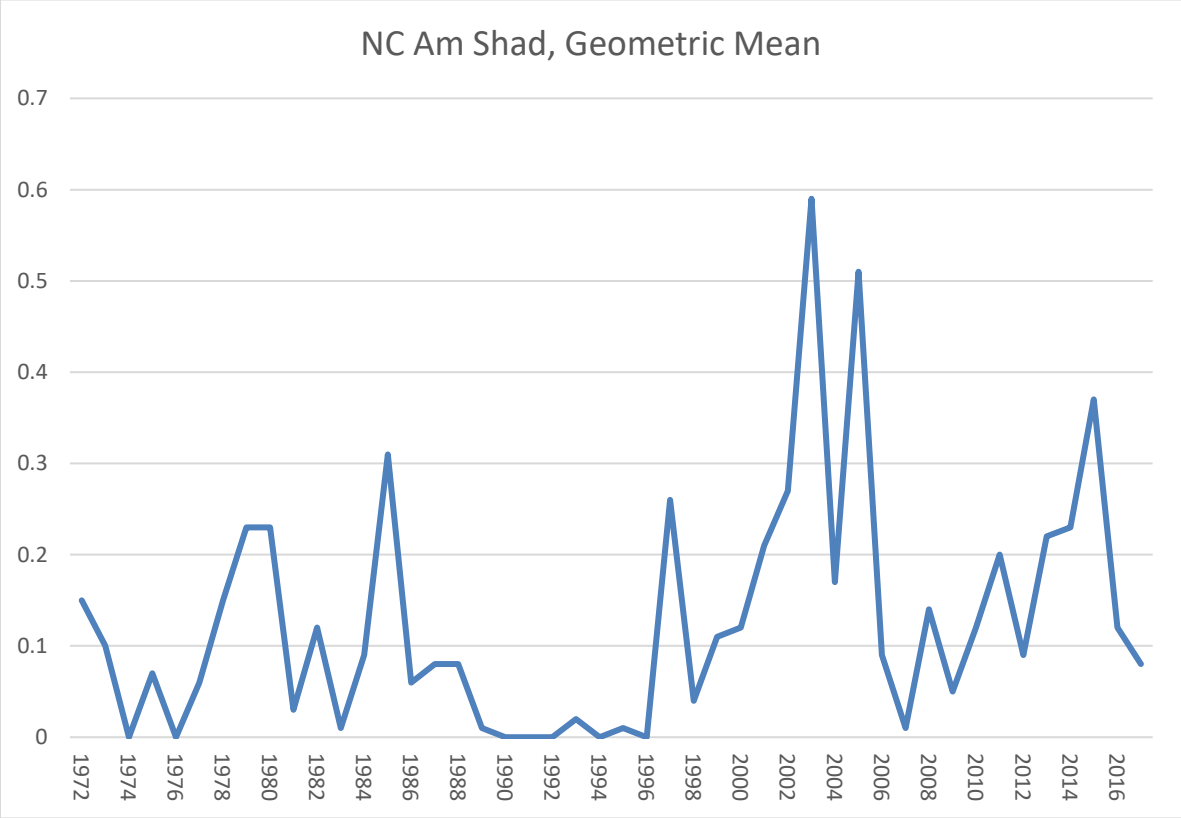


Figure 4. Blueback herring and alewife collection number from DMF Independent Gill Net Survey in the 2.5 inside stretch mesh, Albemarle Sound Management Area, NC, 1991-2014.

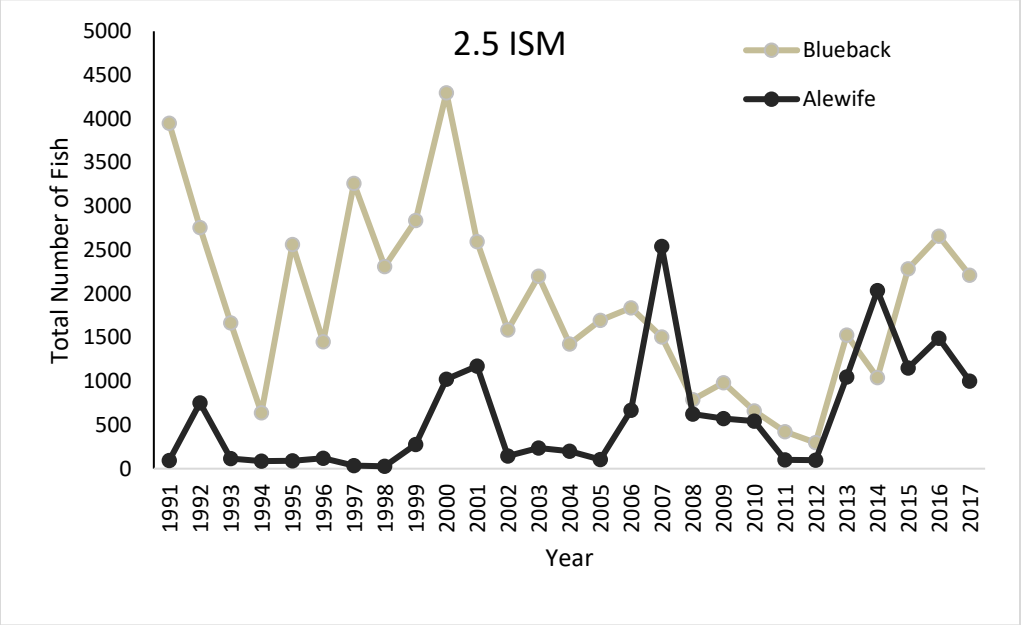
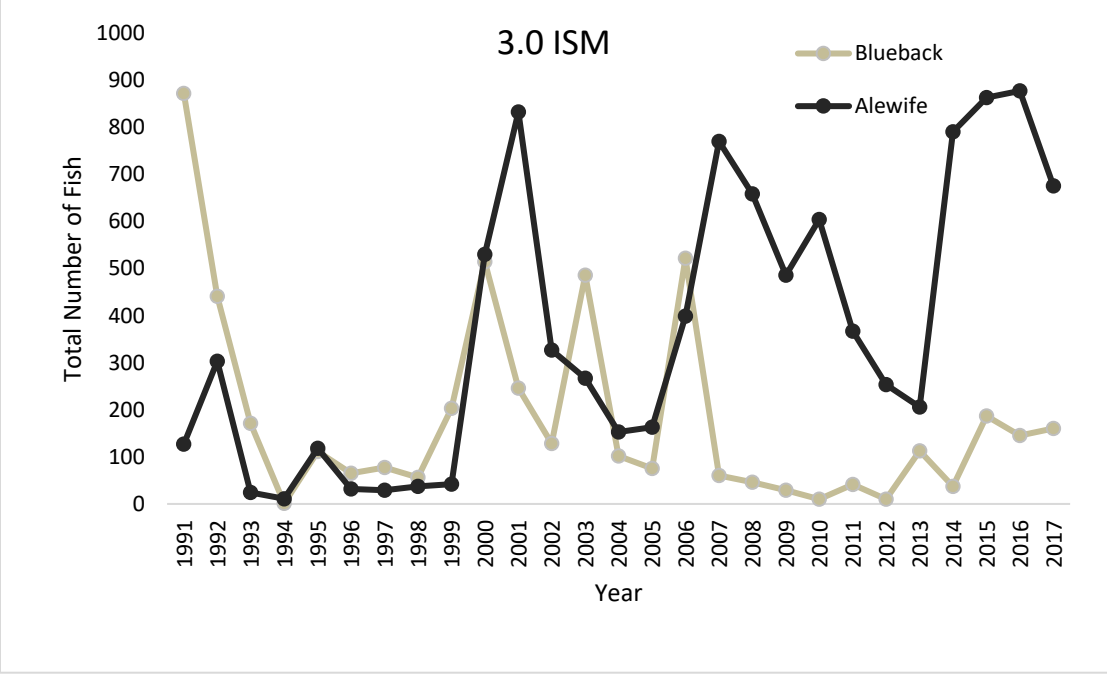
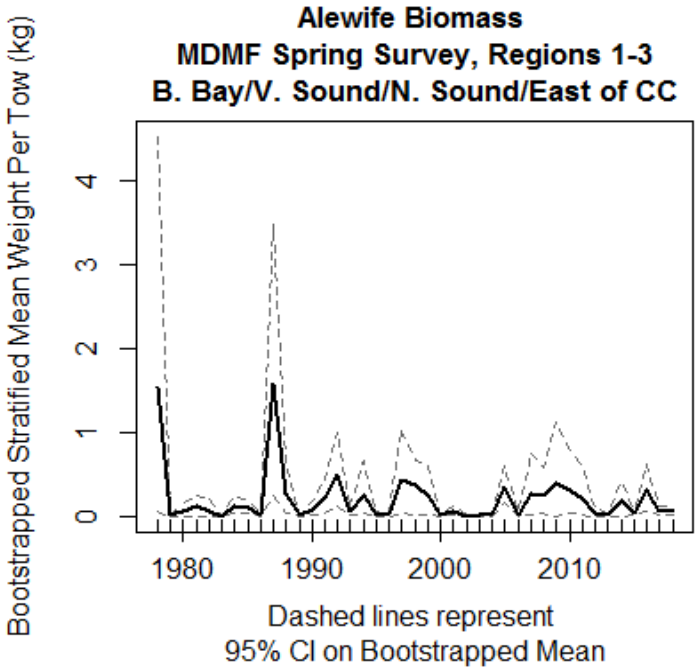


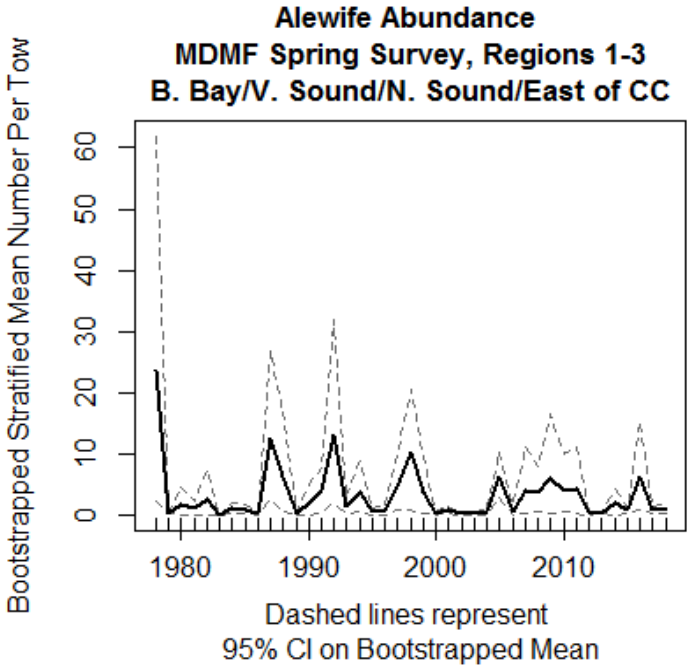
Figure 5. Blueback herring and alewife collection number from DMF Independent Gill Net Survey in the 3.0 inside stretch mesh, Albemarle Sound Management Area, NC, 1991-2014.

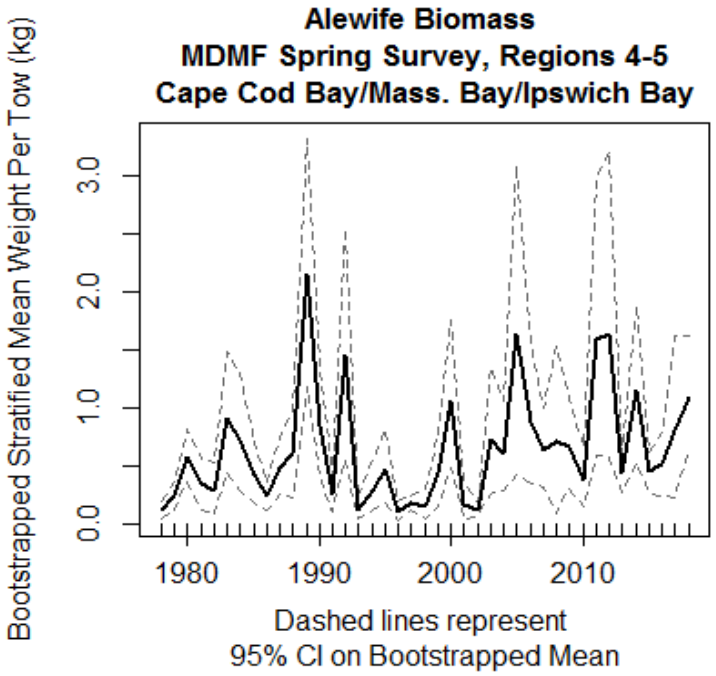


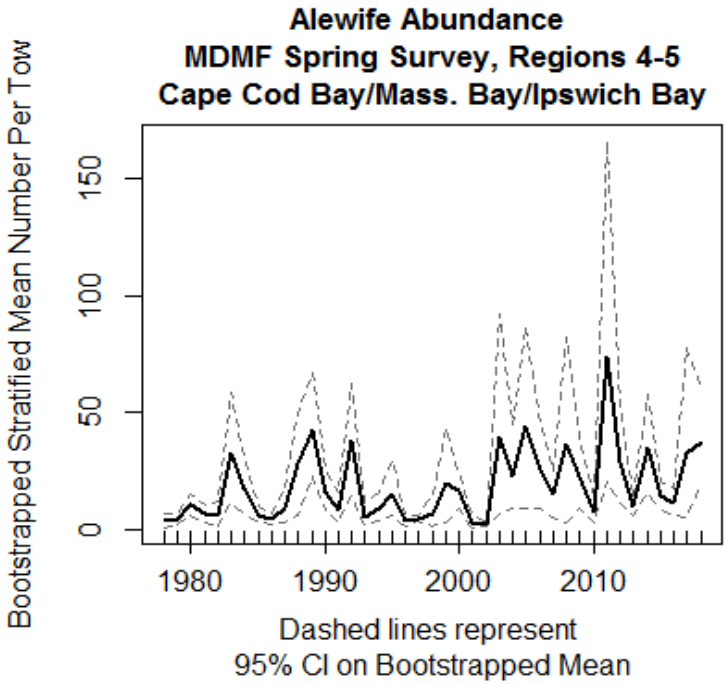
Appendix 4 – Massachusetts State Trawl Indices (through spring 2018)

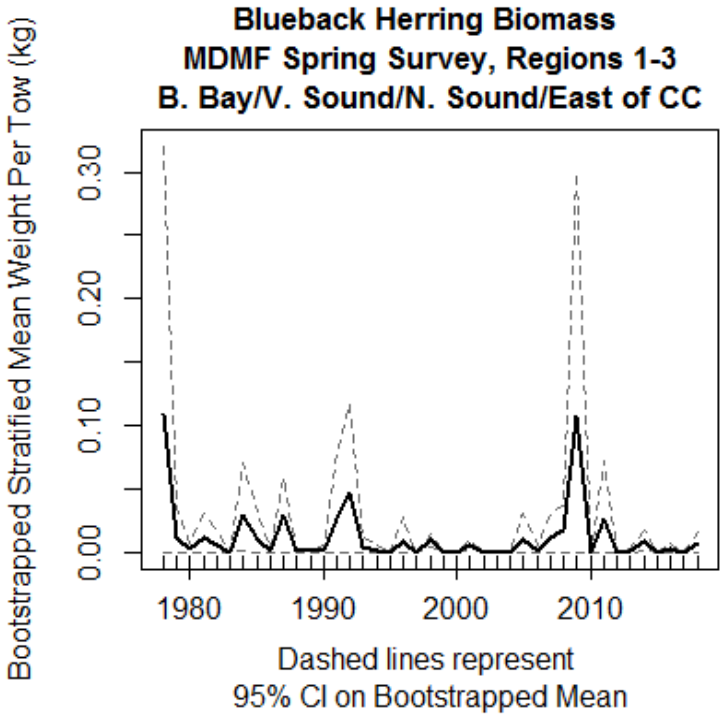
Spr_033_r1-3 Southern New England Mass Trawl Alewife

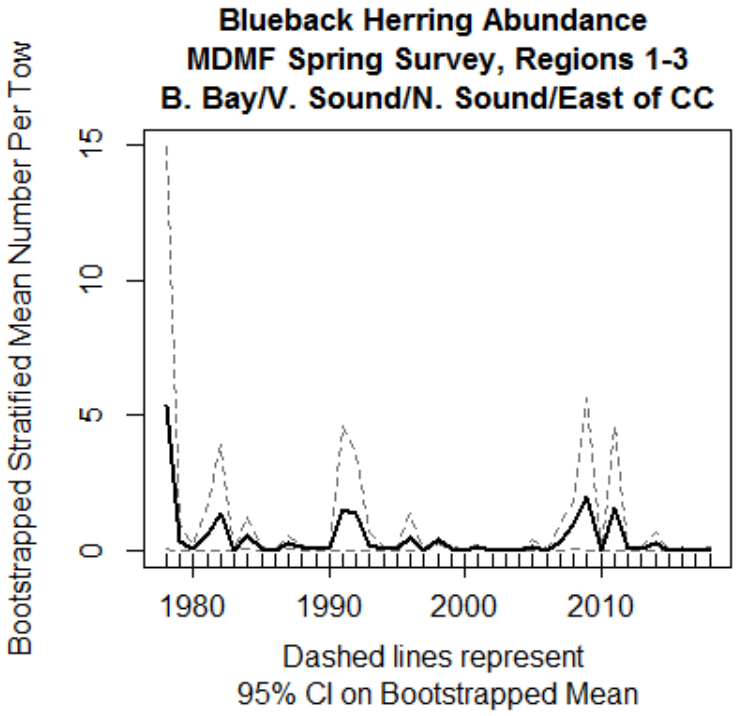


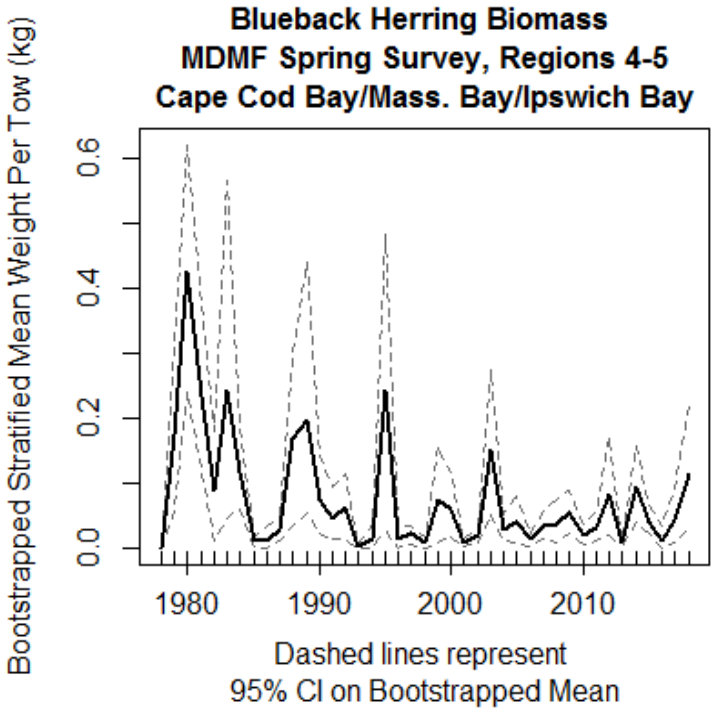


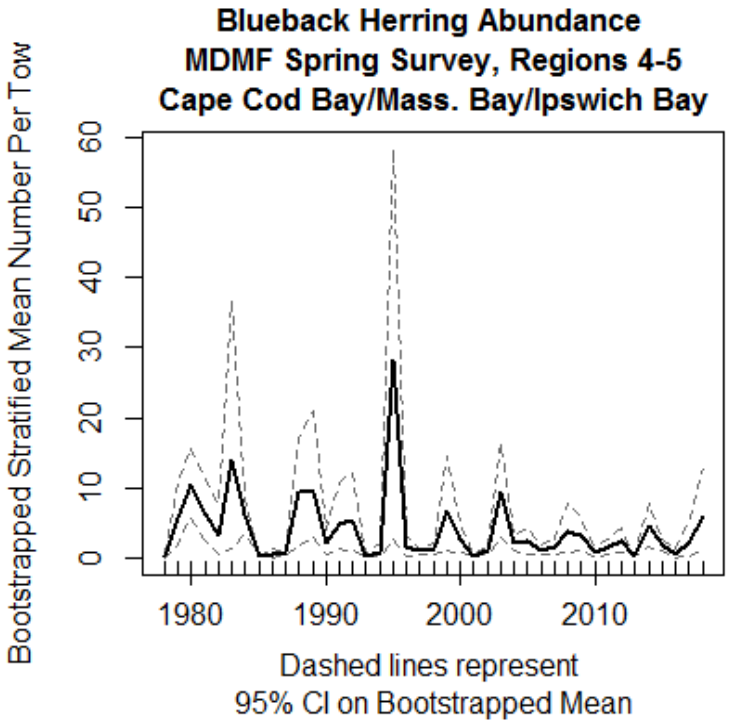

Alewife Biomass
MDMF Spring Survey, Regions 4-5
Cape Cod Bay/Mass. Bay/Ipswich Bay
Bootstrapped Stratified Mean Weight Per Tow (kg)
0.0
1.0
2.0
3.0
1980
1990
2000
2010
Dashed lines represent
95% CI on Bootstrapped Mean


Alewife Abundance
MDMF Spring Survey, Regions 4-5
Cape Cod Bay/Mass. Bay/Ipswich Bay
Bootstrapped Stratified Mean Number Per Tow
0
50
100
150
1980
1990
2000
2010
Dashed lines represent
95% CI on Bootstrapped Mean


Blueback Herring Biomass
MDMF Spring Survey, Regions 1-3
B. Bay/V. Sound/N. Sound/East of CC
Bootstrapped Stratified Mean Weight Per Tow (kg)
0.00
0.10
0.20
0.30
1980
1990
2000
2010
Dashed lines represent
95% CI on Bootstrapped Mean


Blueback Herring Abundance
MDMF Spring Survey, Regions 1-3
B. Bay/V. Sound/N. Sound/East of CC
Bootstrapped Stratified Mean Number Per Tow
0
5
10
15
1980
1990
2000
2010
Dashed lines represent
95% CI on Bootstrapped Mean


Blueback Herring Biomass
MDMF Spring Survey, Regions 4-5
Cape Cod Bay/Mass. Bay/Ipswich Bay
Bootstrapped Stratified Mean Weight Per Tow (kg)
0.0
0.2
0.4
0.6
1980
1990
2000
2010
Dashed lines represent
95% CI on Bootstrapped Mean


Blueback Herring Abundance
MDMF Spring Survey, Regions 4-5
Cape Cod Bay/Mass. Bay/Ipswich Bay
Bootstrapped Stratified Mean Number Per Tow
0
10
20
30
40
50
60
1980
1990
2000
2010
Dashed lines represent
95% CI on Bootstrapped Mean

Appendix 5 – New Jersey State Indices

Figure 1. Upper Tidal DE River Seine

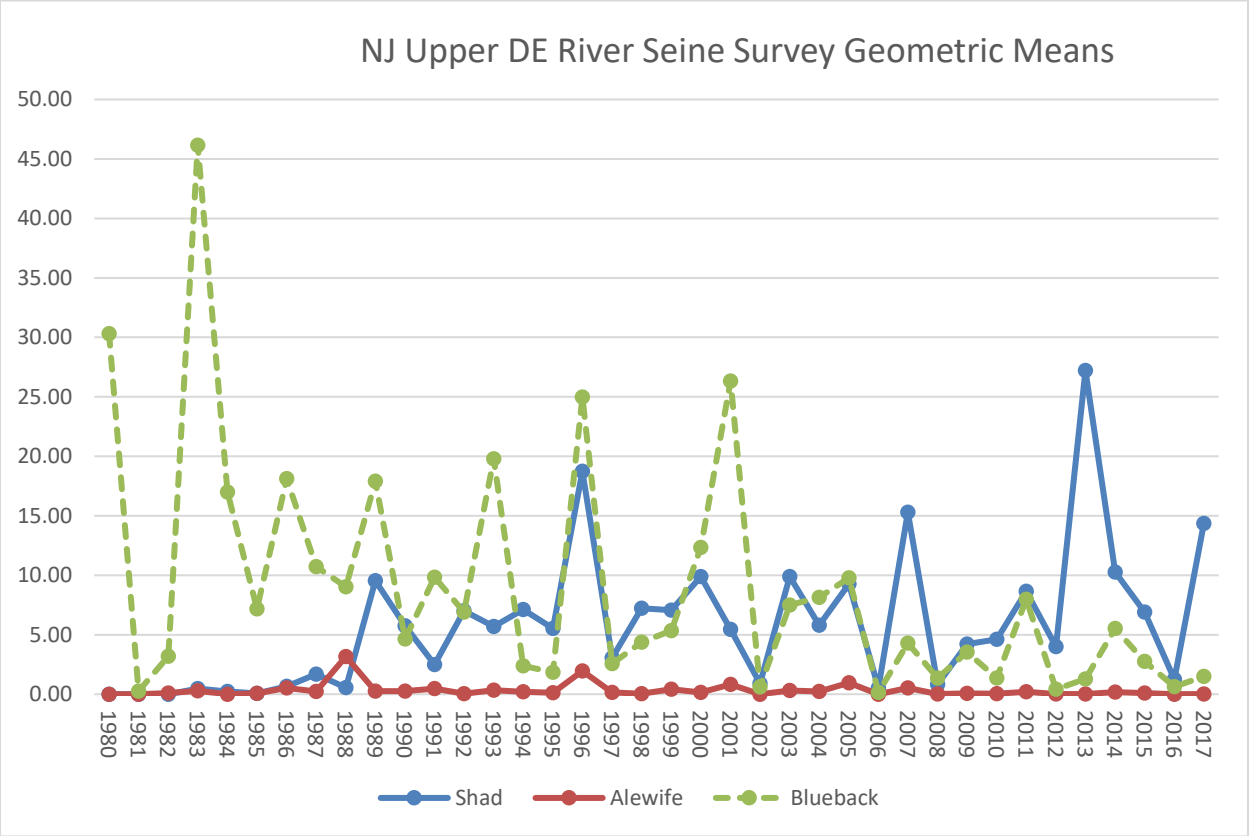


Figure 2. NJ Ocean Trawl Alewife

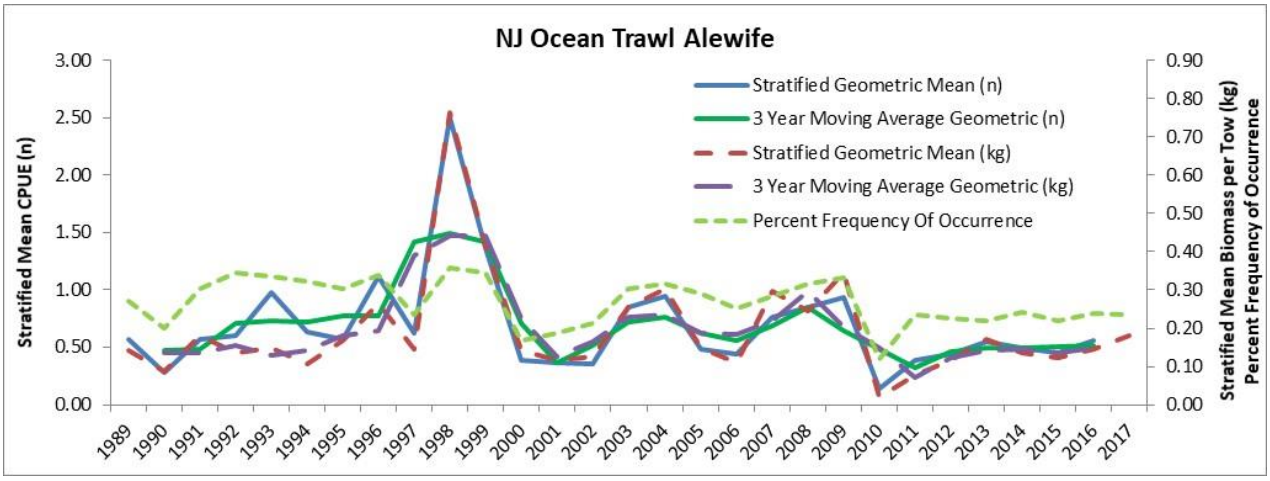


Figure 3. NJ Ocean Trawl Blueback

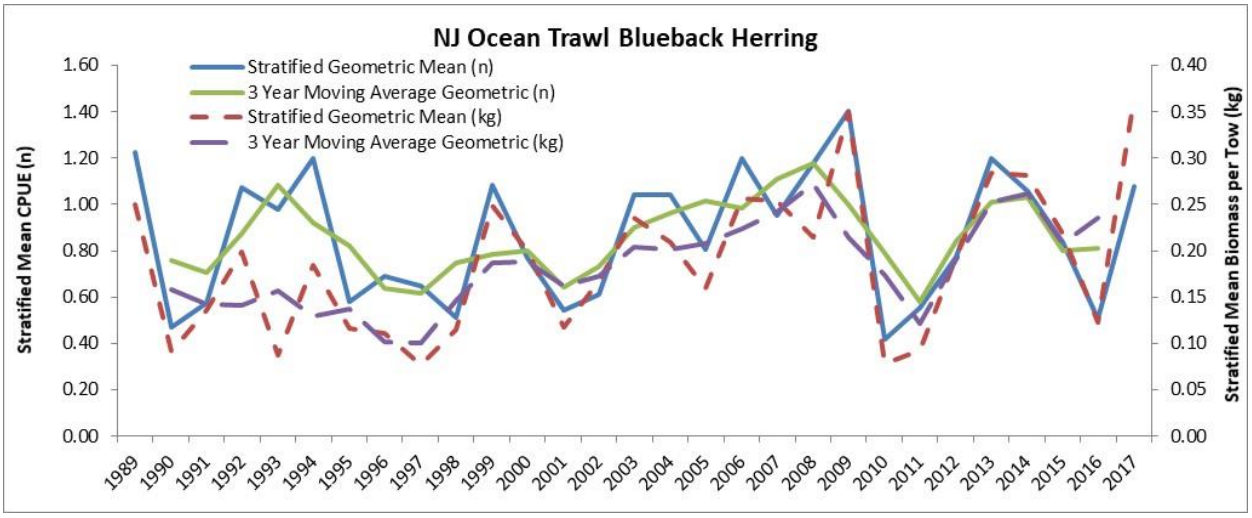
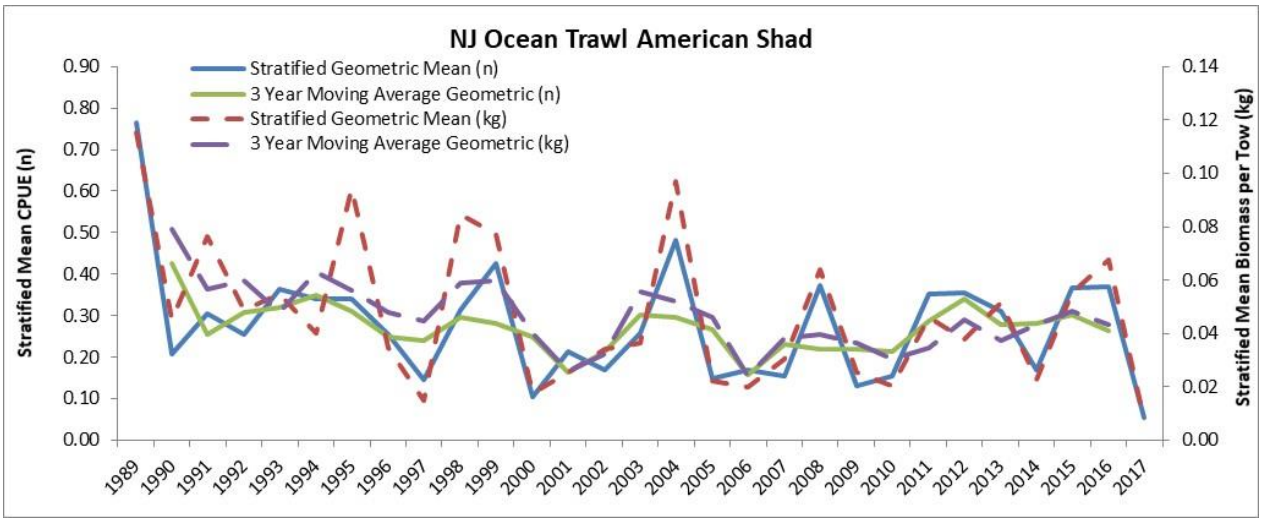


Figure 4. NJ Ocean Trawl Am Shad



Appendix 6 – Delaware State Trawl Indices

Figure 1. Alewife YOY

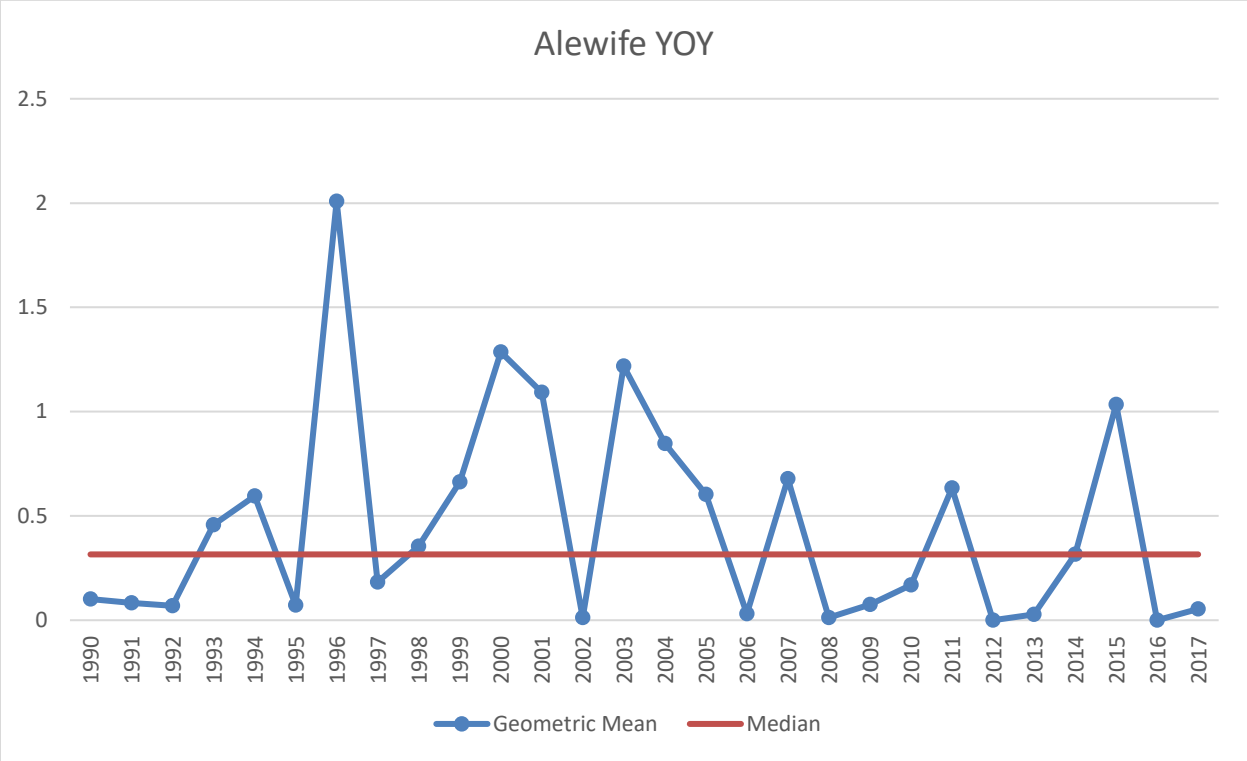


Figure 2. Alewife Age 1

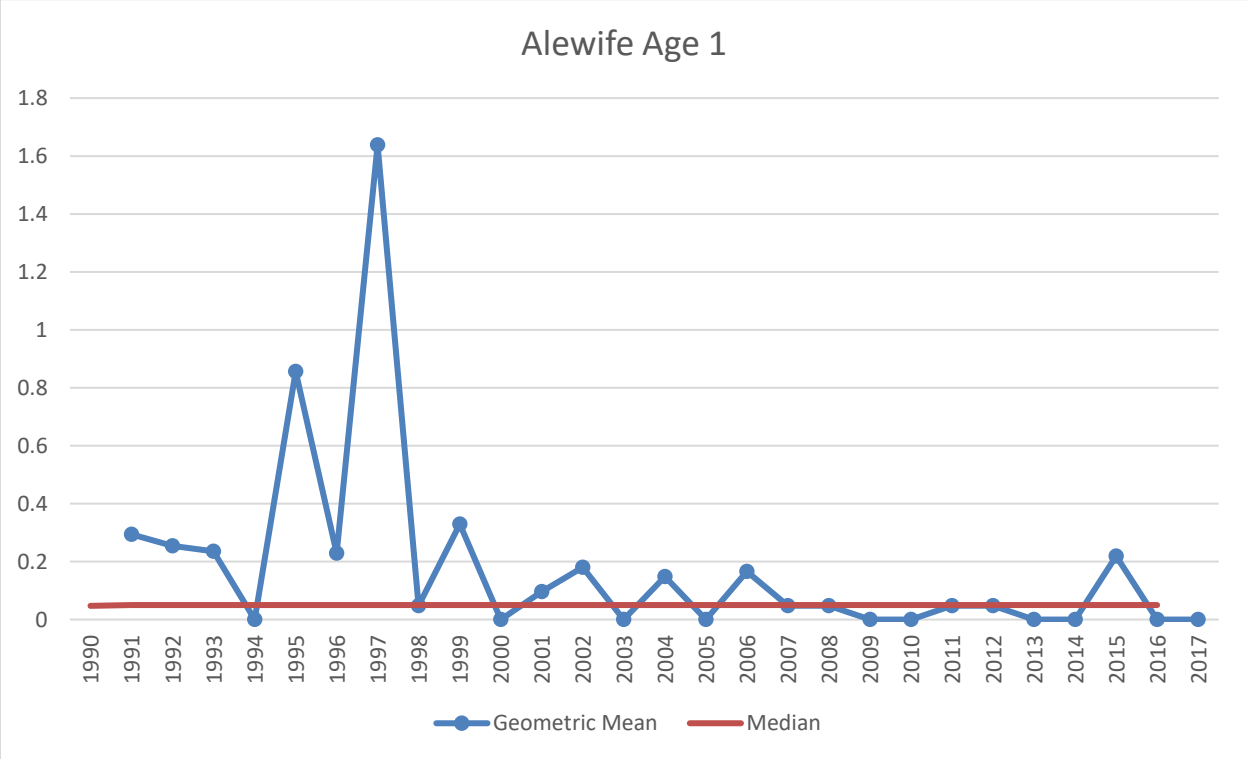


Figure 3. Blueback YOY

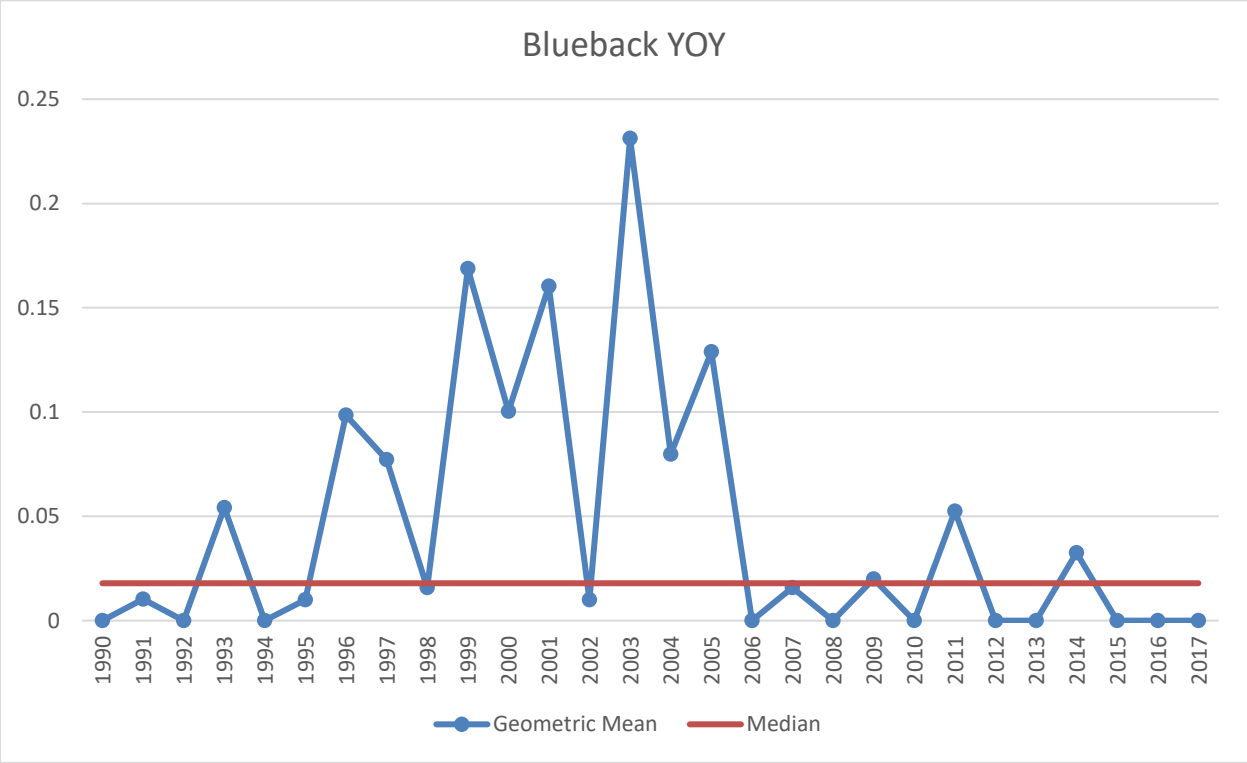


Figure 4. Blueback Age 1

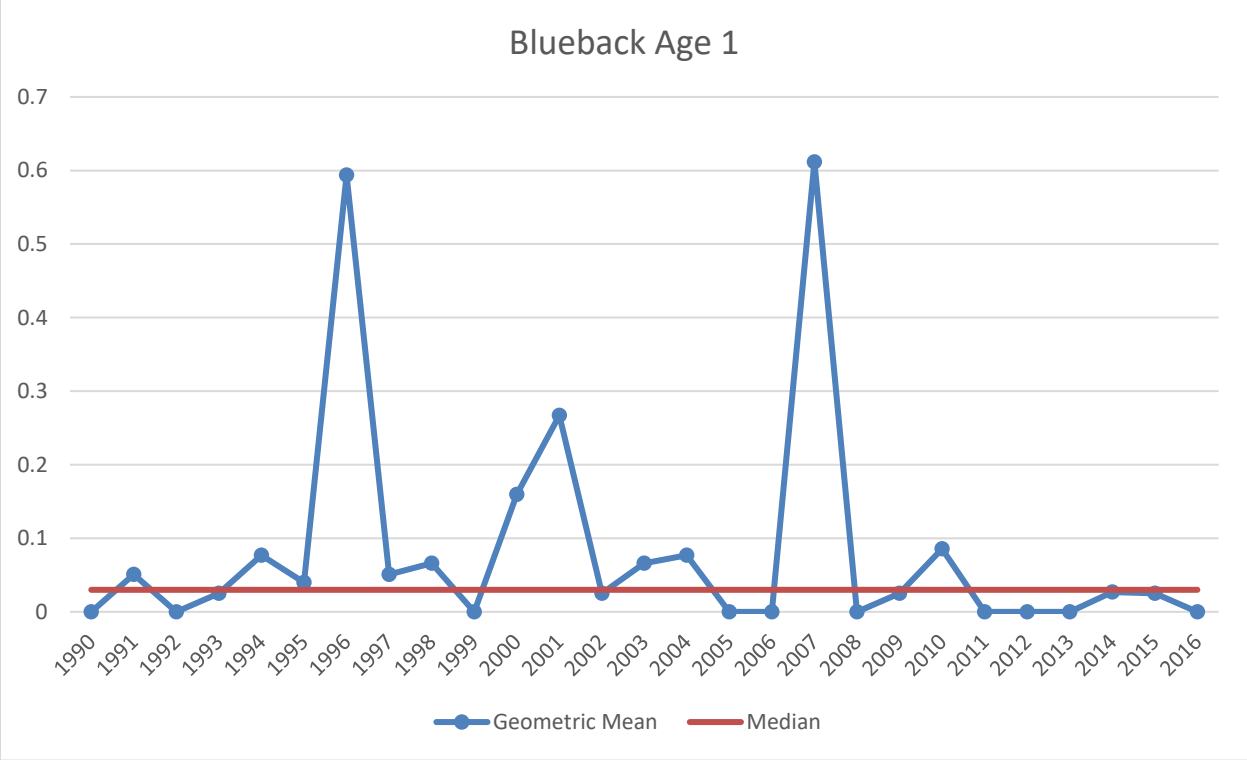


Figure 5. Am Shad YOY

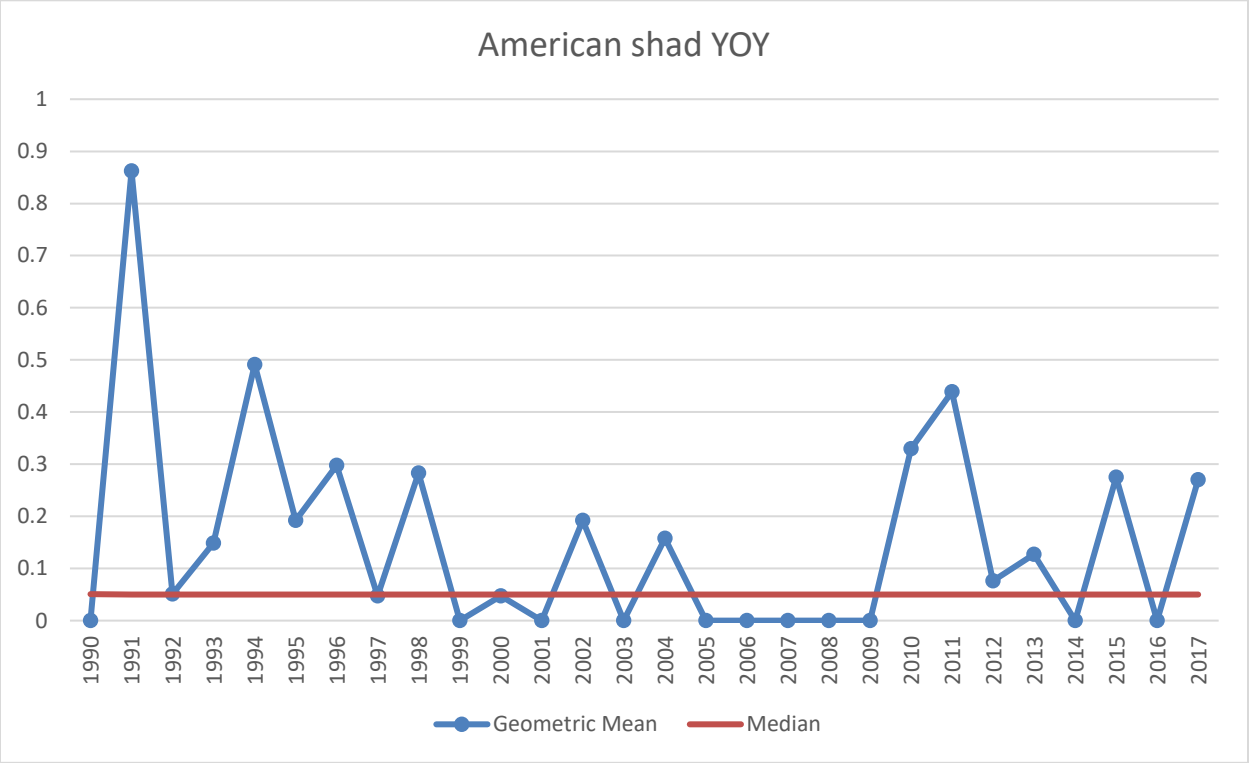
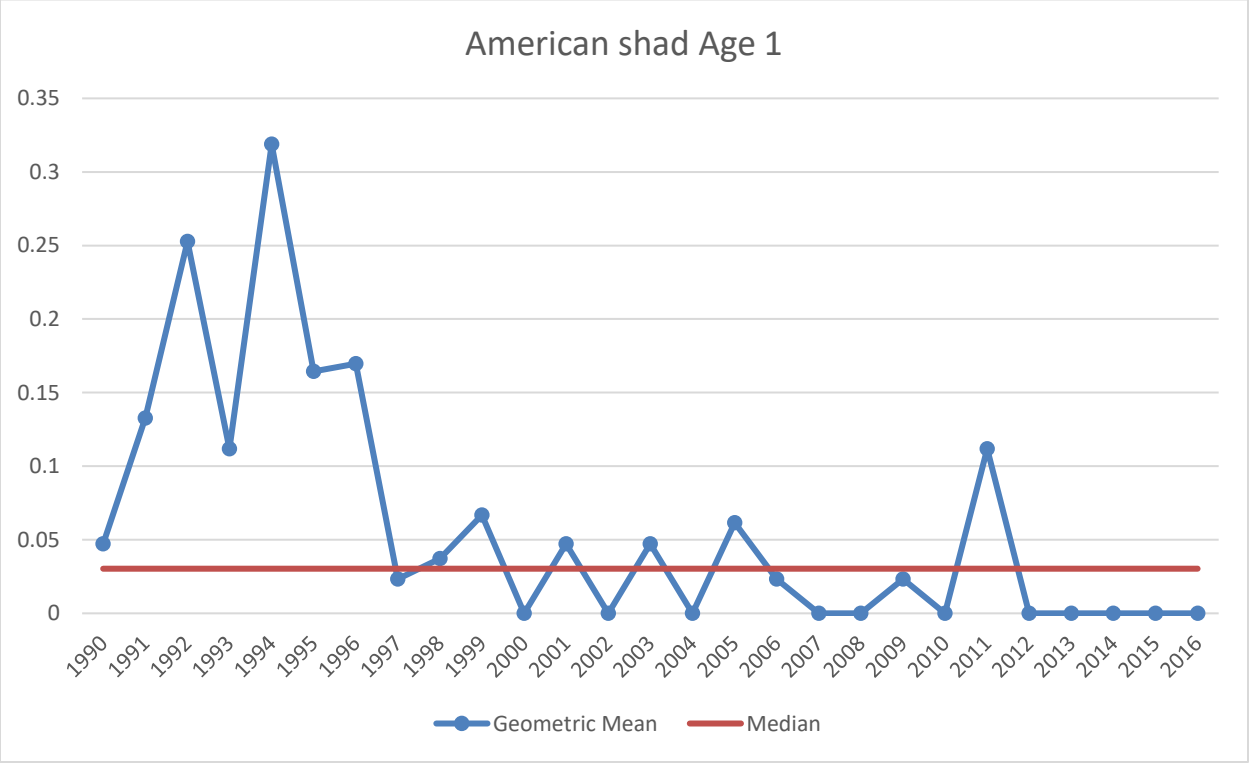


Figure 6. Am Shad Age 1



Appendix 7 – VA State Indices

From 2017 Annual Report: Monitoring the Abundance of American Shad and River Herring in Virginia's Rivers. (RH/S starting in 2017) https://scholarworks.wm.edu/reports/1182/

Figure 7. Recent (1998-2017) and historic values of the catch index of female American shad on the James River.

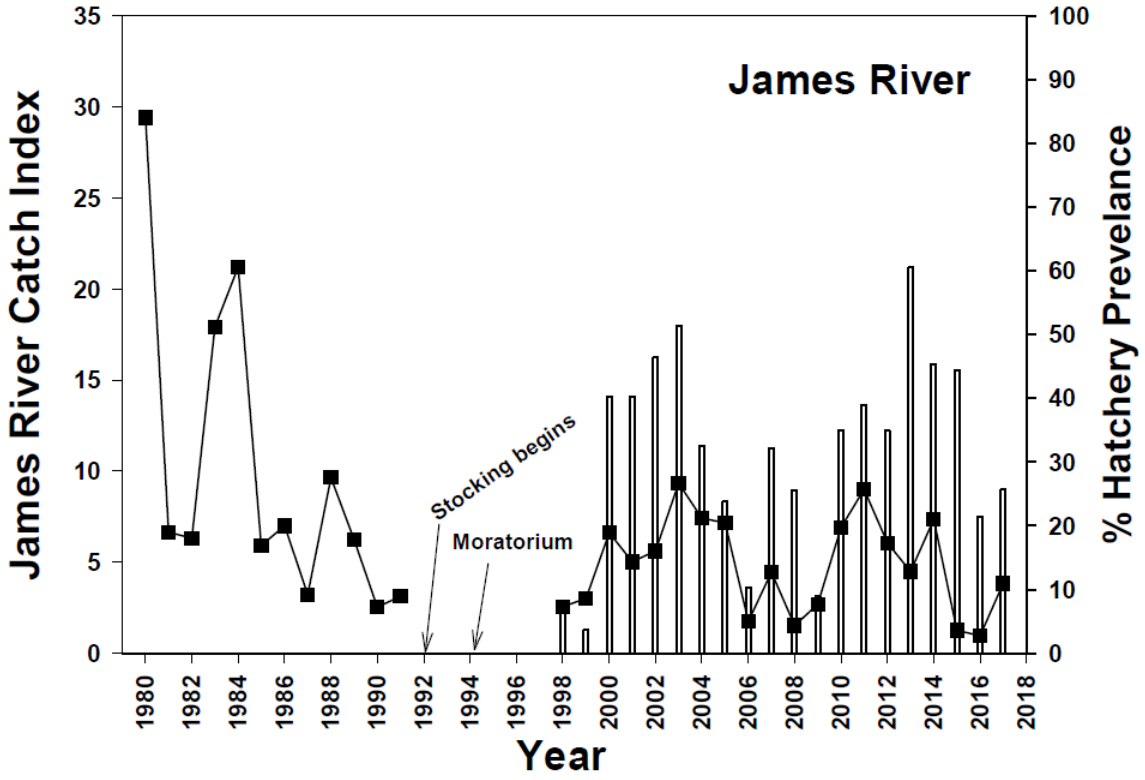


Figure 8. Recent (1998-2017) and historic values of the catch index of female American shad on the York River.

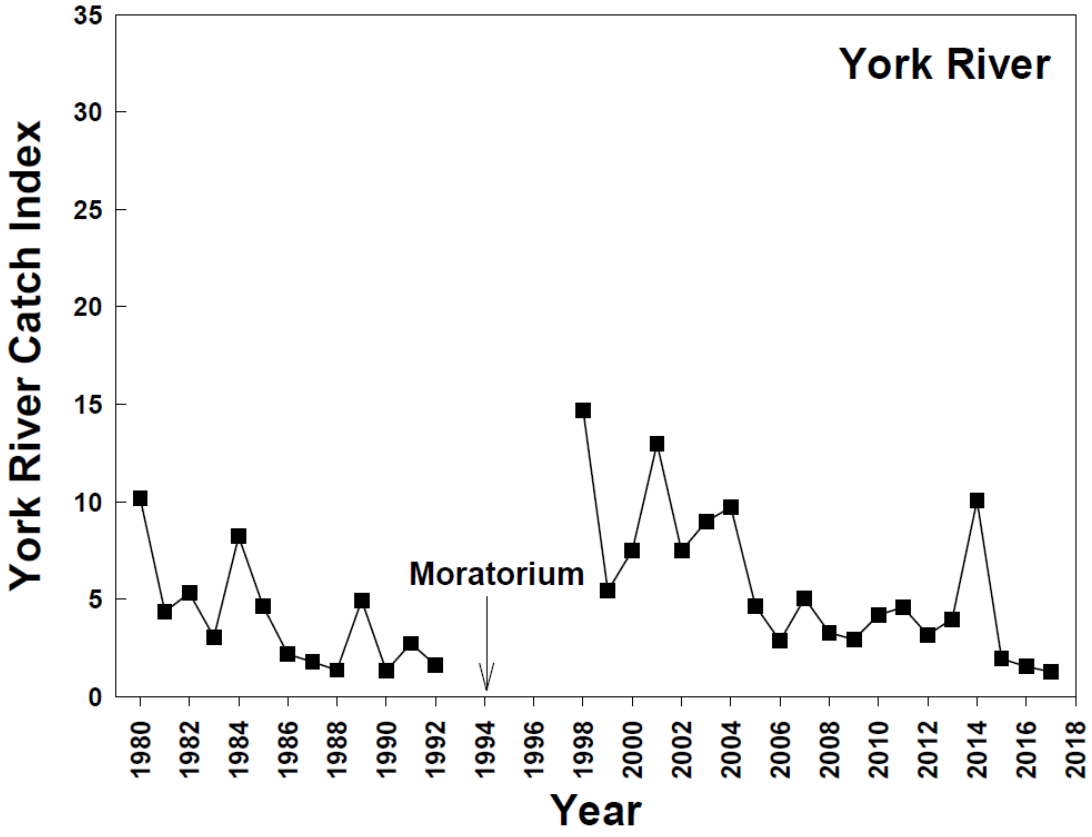


Figure 10. Recent (1998-2017) and historic values of the catch index of female American shad on the Rappahannock River.