

Butterfish (*Peprilus triacanthus*) Data Update

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March 1, 2016

This document addresses the request by Dr. Christopher Moore, Executive Director of the Mid-Atlantic Fisheries Management Council (MAFMC), in his letter to Dr. William Karp, Northeast Fisheries Science Center (NEFSC) on 20 January 2016. Specifically, the MAFMC requested that the NEFSC provide the following data updates for butterfish:

- Updated catch, landings and discards (in relation to the quota and by geographical location over time)
- Updated survey indices and length composition from the NEFSC trawl surveys
- Trends in mean size in the NEFSC trawl surveys

Catch

Butterfish landings averaged 576 mt from 2002 to 2012 (Table 1, Figure 1). Following the re-establishment of a directed fishery for butterfish in January 2013, landings increased to 1,081 mt in 2013 and 3,135 mt in 2014, but then decreased to 2,131 mt in 2015.

Butterfish discards were highly variable from 2002 to 2012 (Table 1, Figure 1), with a mean and median of 1,480 and 1,079 mt, respectively. CVs during this time period ranged from 0.15 in 2011 to 1.38 in 2003 (Table 2). The discard estimate for 2013 was 444 mt, while the estimate for 2014 increased to 1,144 mt. A discard estimate for 2015 will be available in May 2016.

Total catch was also highly variable during the period 2002 to 2012 (Table 1, Figure 1), with a mean and median of 2,056 and 1,679 mt, respectively (Table 1, Figure 1). Total catch for 2014 was above both these values. The CV associated with this catch estimate was 0.05, the lowest in the time series (Table 2). A catch estimate for 2015 will be available in May 2016.

The following distribution maps for butterfish are contained in the Appendix: commercial landings 2005–2009 (Figure A1) and 2010–2014 (Figure A2); observed discards 2005–2009 (Figure A3) and 2010–2014 (Figure A4); and VTR landings in 2015 (Figure A5).

Survey indices

The NEFSC fall offshore strata (Figure 2) defined in the most recent butterfish stock assessment (NEFSC 2014) were used to calculate the survey indices. Stratified mean number per tow averaged 182.9 during 1989–2015 (Table 3, Figure 3). The 2015 abundance value (290.9) was the fourth largest value in the time series. The CV associated with the 2015 abundance index was 0.30.

Stratified mean weight per tow averaged 5.3 kg over the course of the time series (Table 3, Figure 3). The 2015 value (9.0) was above this average. The CV associated with the 2015 biomass index was 0.23.

Butterfish lengths ranged from 1 cm to 22 cm over the period 1989–2015 (Table 4). Length compositions varied over the course of the time series, with years exhibiting unimodal distributions, and other years exhibiting bimodal or trimodal distributions (Figure 4).

References

- Miller TJ, Das, C. Politis PJ, Miller AS, Lucey SM, Legault CM, Brown RW, Rago PJ. 2010. Estimation of Albatross IV to Henry B. Bigelow Calibration Factors. NEFSC Ref. Doc. 10-05. 233 p. <http://www.nefsc.noaa.gov/publications/crd/crd1005/>.
- NEFSC. 2014. 58th Northeast Regional Stock Assessment Workshop (58th SAW) *Assessment Report*. NEFSC Ref Doc 14-04. 784 p. <http://www.nefsc.noaa.gov/publications/crd/crd1404/>.

Table 1. Butterfish USA landings (mt), historic USA discards (mt), estimated USA discards (mt), foreign catch (mt), and total catch (mt), 1965–2015. See NEFSC (2014) for further details of historic data.

Year	US Landings	Historic USA Discards	USA Discards	Foreign Catch	Total Catch
1965	2944		11474	749	15167
1966	2461		10997	3865	17323
1967	2245		10174	2316	14735
1968	1585		9856	5437	16878
1969	2198		9421	15378	26997
1970	1731		8760	12450	22941
1971	1566		7977	8913	18456
1972	704		6653	12221	19578
1973	1521		6696	31679	39896
1974	1778		6197	15465	23440
1975	1973		5658	12764	20395
1976	1376	152	6193	14437	22006
1977	1296	152	7255	3312	11863
1978	3615	61	8675	1699	13989
1979	2646	185	9193	1107	12946
1980	5172	184	9956	1392	16520
1981	4855		9531	1400	15786
1982	8837	68	11098	1578	21513
1983	4743	162	10911	630	16284
1984	11715	257	10257	429	22401
1985	4633	106	8328	804	13765
1986	4418		7936	164	12518
1987	4578		7351		11929
1988	2107		7352		9459
1989	3216		4480		7696
1990	2298		533		2831
1991	2189		4887		7076
1992	2754		5025		7779
1993	4608		7577		12185
1994	3634		6694		10328
1995	2067		6353		8420
1996	3555		1049		4604
1997	2794		1134		3928
1998	1966		6412		8378
1999	2110		8867		10977
2000	1449		7044		8493
2001	4404		4969		9373
2002	872		2350		3222
2003	536		2088		2624
2004	497		1323		1820
2005	428		647		1075
2006	555		856		1411
2007	679		239		918
2008	452		1029		1481

Table 1 continued.

Year	US Landings	Historic USA Discards	USA Discards	Foreign Catch	Total Catch
2009	435		1079		1514
2010	576		4017		4593
2011	664		1612		2276
2012	640		1039		1679
2013	1081		444		1525
2014	3135		1144		4279
2015	2131		NA		NA

Table 2. Estimated USA Butterfish discards (mt) and total catch (mt) from Table 1, and respective coefficients of variation (CV), 1989–2014.

Year	USA Discards	CV	Year	USA Catch	CV
1989	4480	0.85	1989	7696	0.49
1990	533	0.37	1990	2831	0.07
1991	4887	0.99	1991	7076	0.68
1992	5025	0.54	1992	7779	0.35
1993	7577	0.32	1993	12185	0.20
1994	6694	0.41	1994	10328	0.26
1995	6353	0.49	1995	8420	0.37
1996	1049	0.71	1996	4604	0.16
1997	1134	0.84	1997	3928	0.24
1998	6412	1.87	1998	8378	1.43
1999	8867	0.36	1999	10977	0.29
2000	7044	0.23	2000	8493	0.19
2001	4969	0.54	2001	9373	0.29
2002	2350	1.25	2002	3222	0.91
2003	2088	1.38	2003	2624	1.10
2004	1323	0.28	2004	1820	0.20
2005	647	0.21	2005	1075	0.13
2006	856	0.71	2006	1411	0.43
2007	239	0.60	2007	918	0.16
2008	1029	0.64	2008	1481	0.44
2009	1079	0.30	2009	1514	0.22
2010	4017	0.33	2010	4593	0.29
2011	1612	0.15	2011	2276	0.10
2012	1039	0.35	2012	1679	0.21
2013	444	0.21	2013	1525	0.06
2014	1144	0.19	2014	4279	0.05

Table 3. Butterfish stratified mean number per tow, stratified mean weight (kg) per tow, and respective coefficients of variation (CV) from NEFSC fall surveys, 1989–2015. Bigelow data (2009–2015) are calibrated using the coefficients in Miller et al. (2010).

Year	Number	CV	Weight	CV
1989	377.64	0.29	11.37	0.23
1990	380.22	0.20	9.18	0.20
1991	188.52	0.34	4.85	0.31
1992	247.73	0.22	4.54	0.22
1993	249.15	0.22	9.89	0.21
1994	510.75	0.43	12.98	0.32
1995	117.17	0.22	5.69	0.23
1996	79.40	0.20	2.67	0.26
1997	220.97	0.12	3.94	0.14
1998	215.10	0.26	6.58	0.33
1999	248.29	0.35	4.80	0.28
2000	203.94	0.24	7.29	0.22
2001	63.69	0.27	2.44	0.34
2002	92.61	0.18	2.13	0.19
2003	187.98	0.12	3.56	0.16
2004	75.50	0.24	2.18	0.25
2005	39.19	0.25	1.01	0.24
2006	179.31	0.22	4.87	0.19
2007	41.21	0.19	1.28	0.26
2008	131.93	0.18	2.70	0.19
2009	186.09	0.21	6.46	0.22
2010	126.94	0.21	5.51	0.27
2011	256.67	0.24	9.47	0.24
2012	67.03	0.29	3.49	0.39
2013	63.92	0.20	2.12	0.19
2014	96.78	0.19	3.09	0.13
2015	290.91	0.30	8.98	0.23

Table 4. Butterfish stratified mean number per tow at length (cm) from NEFSC fall surveys, 1989–2015.

Year	1	2	3	4	5	6	7	8	9	10	11
1989	0	0.828	1.117	1.288	2.254	3.408	2.750	3.318	23.775	125.949	109.228
1990	0	0.052	0.492	1.546	2.627	4.327	19.093	15.496	54.119	128.979	70.411
1991	0.003	0.086	0.382	0.617	0.681	0.330	2.376	5.913	38.724	71.787	32.637
1992	0	0.255	0.636	0.785	1.059	3.759	7.928	35.682	96.710	67.621	14.337
1993	0.003	0.076	0.184	0.200	0.144	0.226	0.348	1.318	10.150	35.868	44.211
1994	0	0.014	0.096	0.120	0.230	0.308	1.140	160.637	103.529	56.635	80.530
1995	0	0.133	0.467	0.543	0.496	0.578	1.878	6.955	6.950	6.324	6.021
1996	0.023	0.858	3.072	3.648	6.557	2.037	0.545	0.319	1.064	5.670	10.454
1997	0	0.197	0.357	1.140	1.971	2.689	13.768	32.798	79.437	53.806	10.548
1998	0	0.057	0.115	0.319	0.519	0.907	1.696	8.230	38.562	80.956	31.488
1999	0	0.011	0.104	0.139	0.277	0.432	0.934	3.292	44.217	132.564	37.384
2000	0.019	0.341	0.826	1.236	1.378	3.987	11.149	23.057	26.891	34.739	28.184
2001	0	0.223	0.767	2.122	1.729	1.314	0.746	2.539	1.432	2.362	4.490
2002	0.002	0.164	0.486	0.817	1.496	2.415	4.638	7.636	18.080	15.771	16.023
2003	0.070	3.127	12.323	16.976	12.658	9.186	14.135	20.248	23.604	16.399	9.451
2004	0.045	1.133	1.275	1.684	2.042	1.414	2.360	1.596	9.895	20.042	6.343
2005	0	0.031	0.228	0.863	1.834	1.007	0.438	1.224	2.936	9.139	10.714
2006	0	0.005	0.268	1.090	2.627	4.495	5.667	10.514	30.584	35.821	28.297
2007	0	0.490	3.996	5.282	3.265	2.175	1.508	1.739	1.415	1.097	0.558
2008	0	0.177	0.379	0.552	3.472	7.638	10.677	12.723	14.542	19.830	29.826
2009	0	0.001	0.108	1.062	2.329	6.027	7.492	6.067	3.991	10.288	44.342
2010	0	0	0.144	2.622	4.360	3.847	3.981	5.944	5.419	3.000	14.163
2011	0	0	0	0.106	1.982	3.689	1.395	5.018	9.465	12.946	60.506
2012	0	0.002	0.005	0.041	0.229	0.205	0.238	0.550	1.475	5.026	8.620
2013	0	0	0.016	0.144	0.726	1.680	7.320	11.694	5.624	1.814	1.668
2014	0	0.012	0.585	3.504	6.464	7.888	7.282	4.584	10.680	7.729	3.321
2015	0	0	0.003	0.059	0.141	0.464	0.768	14.578	69.602	26.284	46.139

Table 4 continued.

Year	12	13	14	15	16	17	18	19	20	21	22
1989	36.176	22.219	23.892	13.770	5.838	1.347	0.382	0.097	0.006	0	0
1990	40.680	16.717	9.621	5.647	4.605	4.052	1.517	0.074	0.171	0	0
1991	11.376	5.267	7.165	8.225	2.408	0.399	0.118	0.028	0	0	0
1992	3.621	2.534	3.397	5.336	2.900	0.954	0.167	0.028	0.021	0	0
1993	69.433	34.629	17.630	19.683	12.084	2.675	0.196	0.060	0.032	0	0
1994	51.260	25.212	9.813	11.833	7.833	1.100	0.447	0.012	0	0	0
1995	2.589	15.576	40.699	21.488	5.287	1.004	0.135	0.034	0.012	0	0
1996	18.865	11.409	6.419	5.878	1.918	0.382	0.279	0.007	0.000	0	0
1997	4.351	3.643	4.062	7.181	3.814	0.954	0.229	0.013	0.012	0	0
1998	11.822	4.194	3.177	9.285	15.609	7.124	0.400	0.626	0.012	0.002	0
1999	17.116	6.915	1.993	0.870	1.629	0.326	0.056	0.027	0	0	0
2000	10.070	5.315	14.117	25.620	12.561	3.297	0.879	0.216	0.054	0.002	0
2001	15.217	13.571	9.107	4.348	2.866	0.636	0.127	0.081	0.013	0.007	0
2002	12.291	5.127	2.121	2.490	1.728	0.834	0.321	0.157	0.008	0	0.004
2003	16.703	18.109	7.161	5.354	2.101	0.301	0.074	0	0	0	0
2004	6.614	7.785	3.555	1.839	2.379	2.869	2.207	0.332	0.089	0.005	0
2005	5.371	1.929	1.035	1.141	0.726	0.419	0.146	0.005	0.001	0	0
2006	25.413	10.592	4.199	9.479	7.993	1.632	0.585	0.049	0	0	0
2007	1.524	3.786	7.709	5.507	0.860	0.241	0.059	0	0	0	0
2008	17.407	5.210	3.955	3.614	1.546	0.287	0.089	0.003	0.002	0	0
2009	51.703	29.067	13.543	8.299	1.571	0.158	0.037	0.005	0	0	0
2010	12.897	24.320	23.692	16.458	5.436	0.579	0.058	0.025	0	0	0
2011	76.064	63.069	14.495	4.037	2.760	0.809	0.302	0.032	0.001	0	0
2012	2.158	13.908	11.431	16.107	6.352	0.578	0.060	0.040	0.002	0	0
2013	7.038	14.891	6.387	2.973	1.371	0.472	0.075	0.025	0.006	0	0
2014	5.355	13.577	14.328	8.545	2.060	0.522	0.240	0.087	0.020	0.002	0
2015	73.027	35.995	10.917	9.166	2.571	0.854	0.151	0.089	0.091	0.008	0

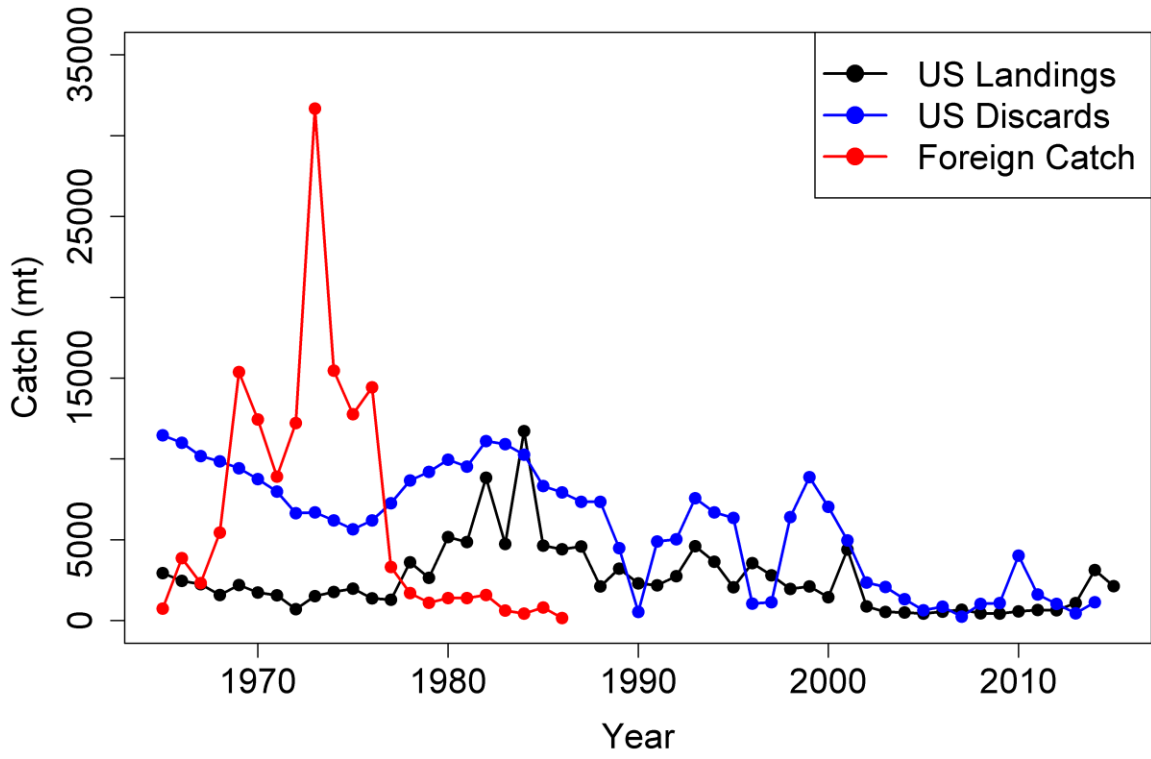


Figure 1. US landings, US discards, and foreign catch of butterfish, 1965–2015.

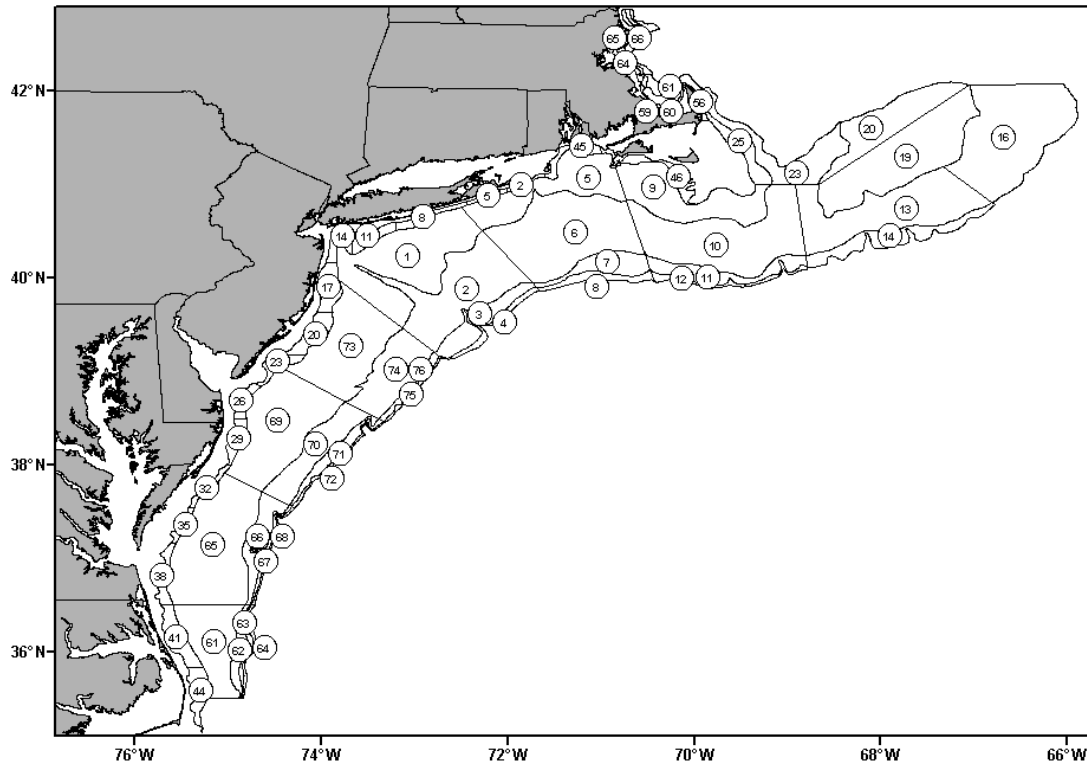


Figure 2. NEFSC strata defined in the most recent butterfish stock assessment (NEFSC 2014) as offshore. Strata include the outermost inshore strata (2, 5, 8, 11, 14, 17, 20, 23, 26, 29, 32, 35, 38, 41, 44–46, 56, 59–61 and 64–66) and offshore strata (1–14, 16, 19, 20, 23, 25 and 61–76).

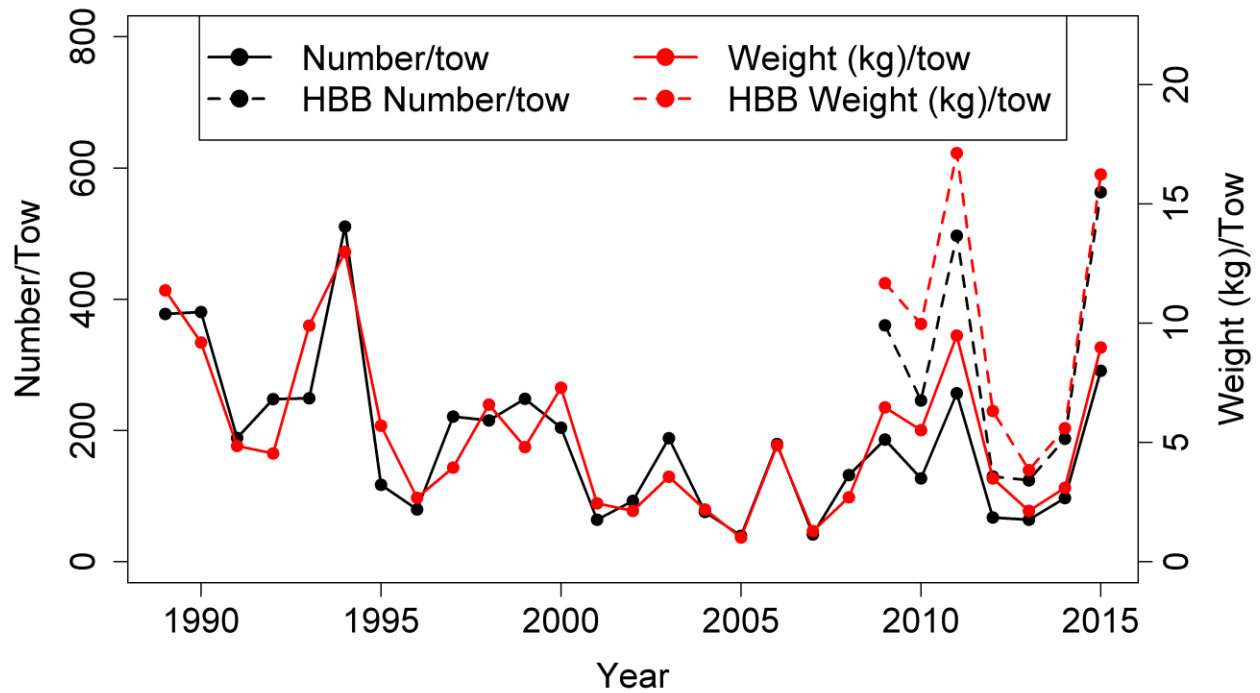


Figure 3. NEFSC fall offshore survey stratified mean number per tow and mean weight per tow for butterfish. Un-calibrated Bigelow (HBB) data (2009–2015) are also shown.

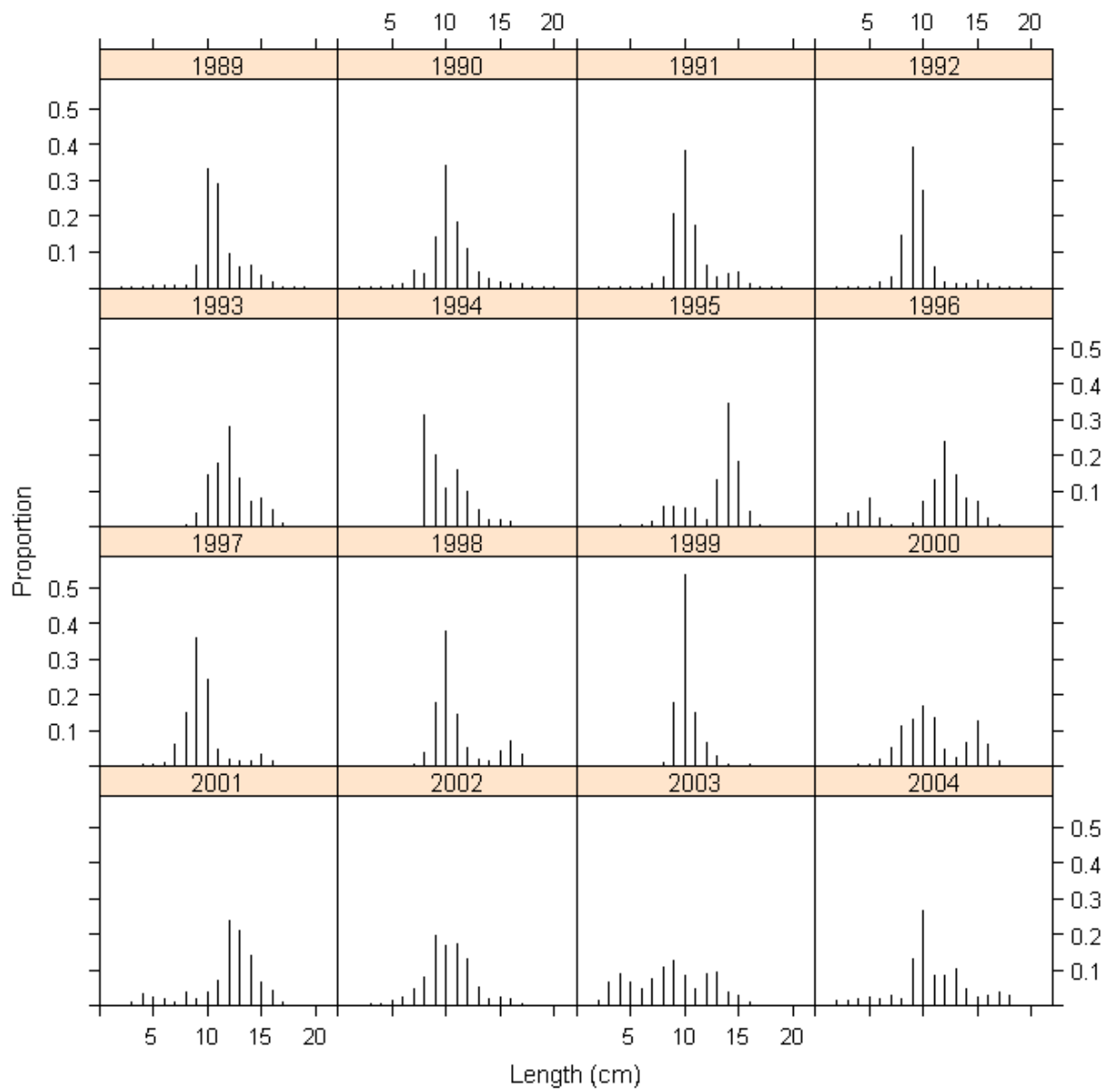


Figure 4. Butterfish length composition from NEFSC fall surveys, 1989–2015.

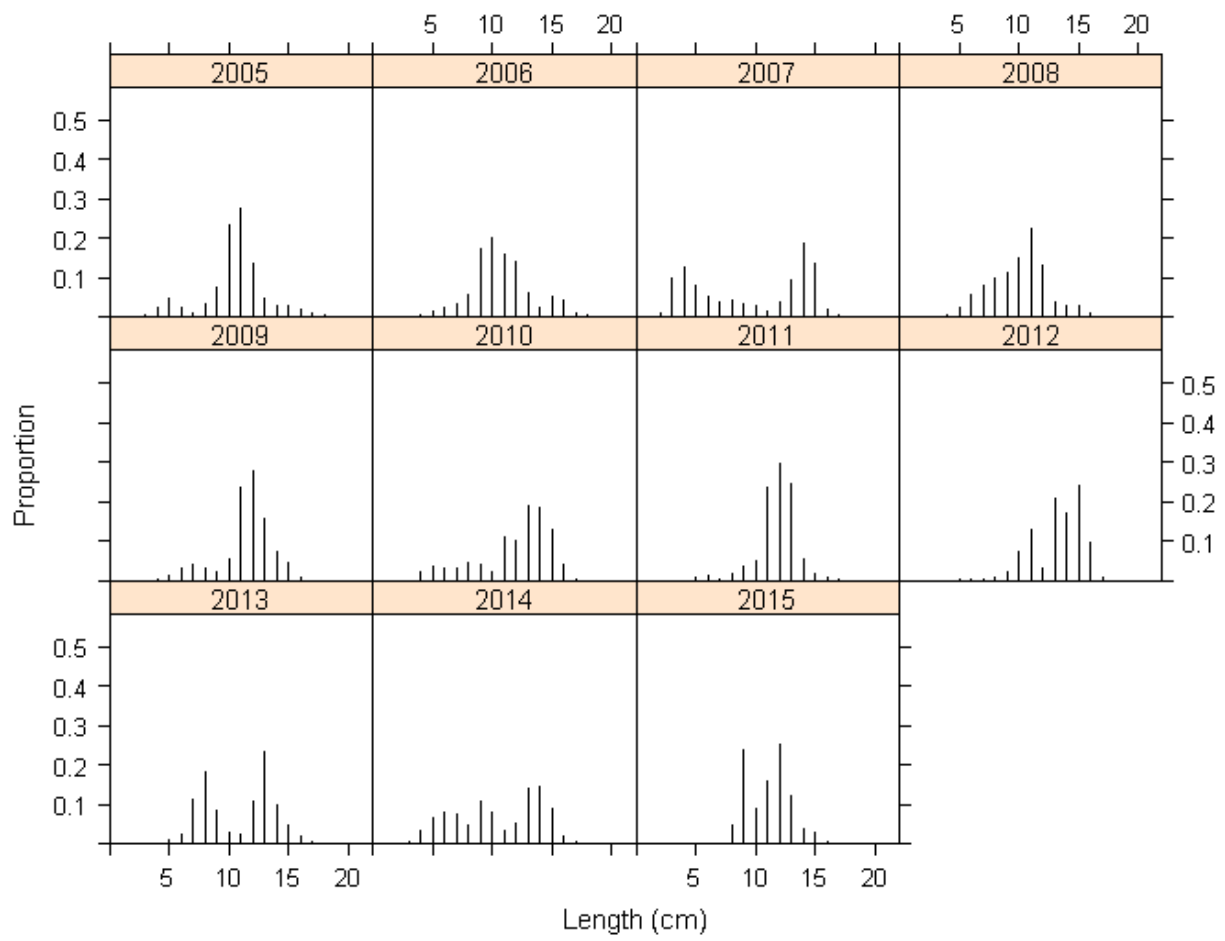


Figure 4 continued.

Appendix:
Distribution Maps

Butterfish

Peprilus triacanthus

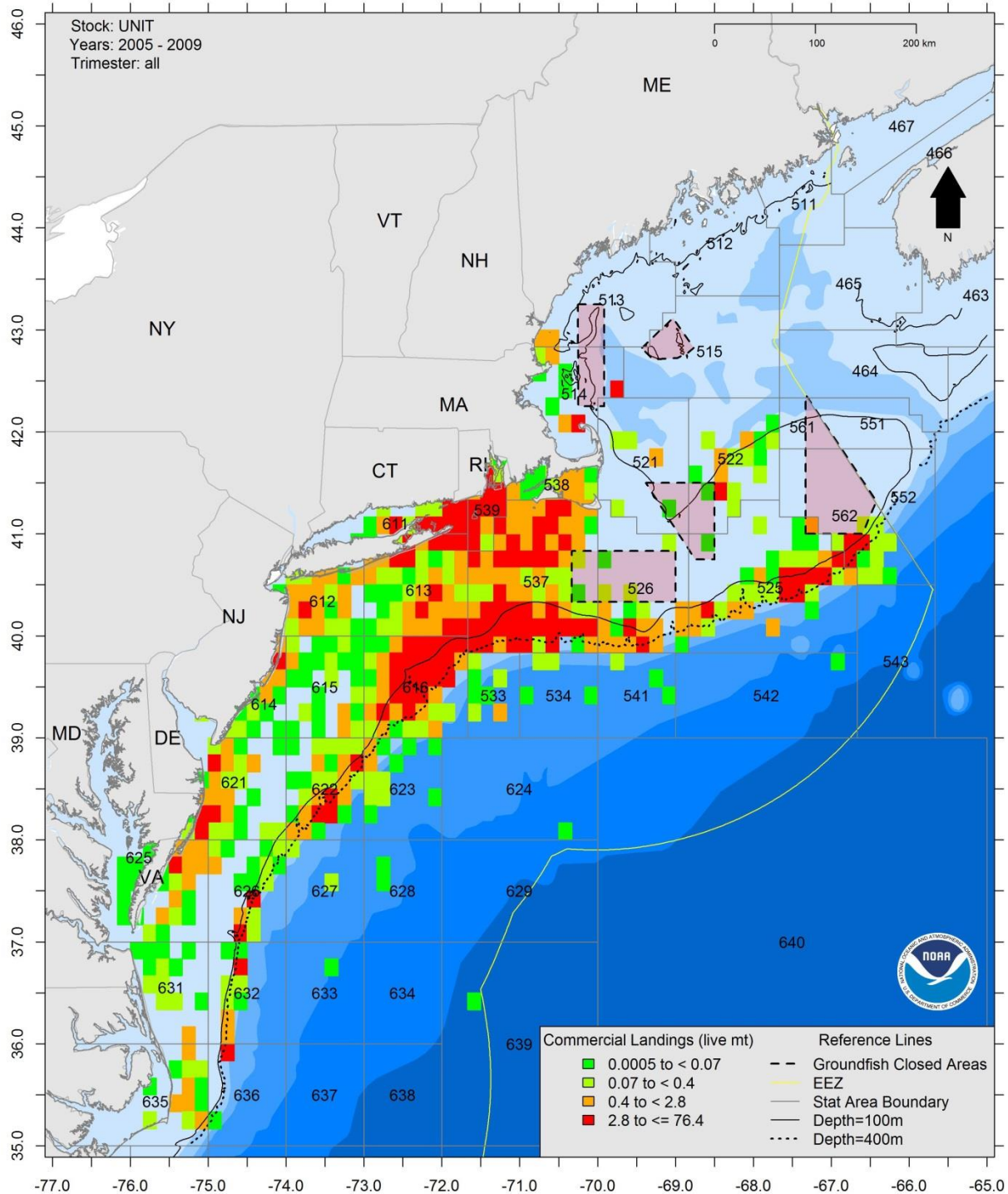


Figure A1. Commercial landings for butterfish, 2005–2009. Landings were taken from dealer reports. Data shown are restricted to dealer trips matched to a Vessel Trip Report (ALEVEL=A) to ensure accuracy of gear and area information. Total commercial landings reported: 2,555 mt. Commercial landings from trips with location data: 1,468 mt (57.5% of total).

Butterfish

Peprilus triacanthus

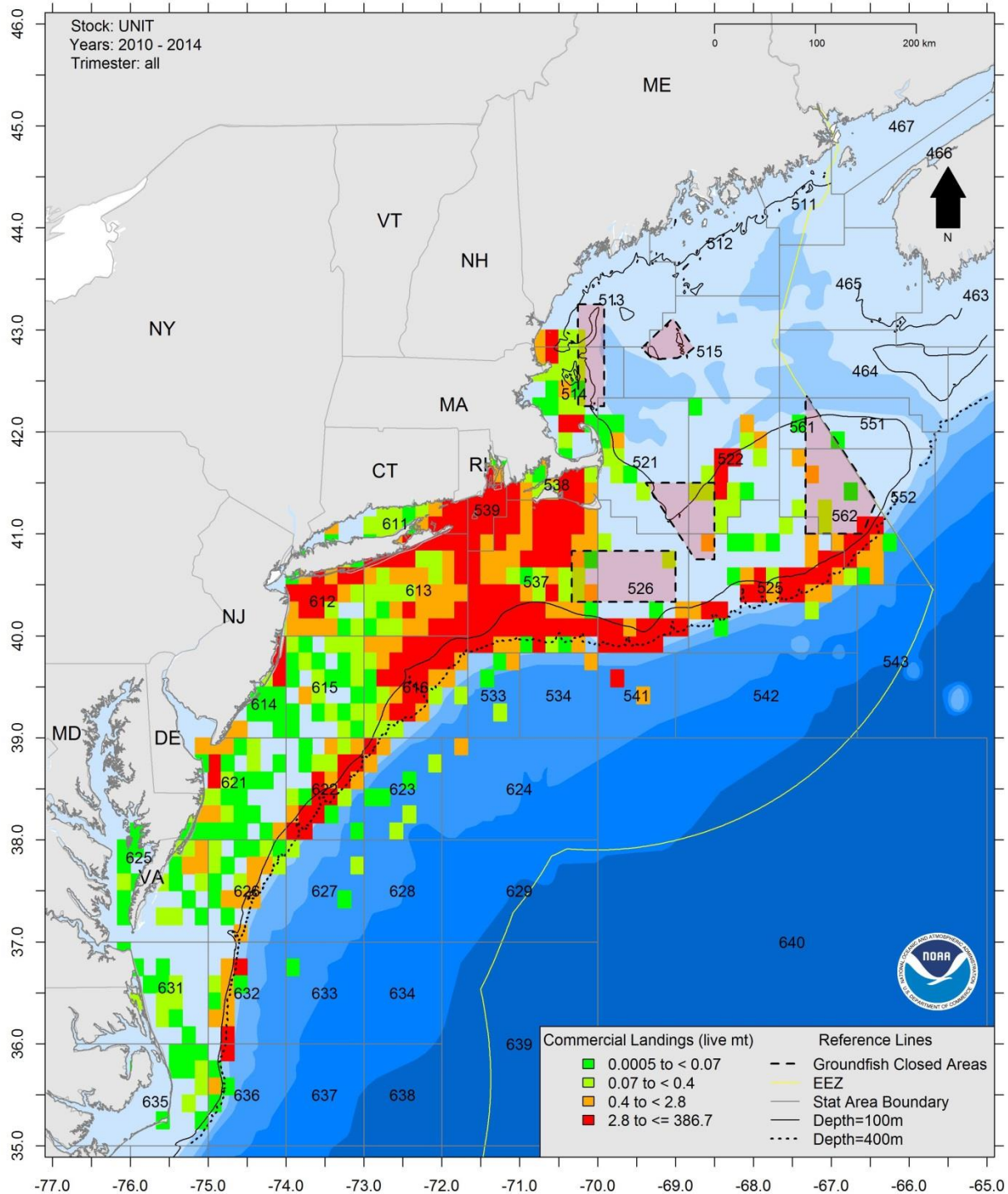


Figure A2. Commercial landings for butterfish, 2010–2014. Landings were taken from dealer reports. Data shown are restricted to dealer trips matched to a Vessel Trip Report (ALEVEL=A) to ensure accuracy of gear and area information. Total commercial landings reported: 6,105 mt. Commercial landings from trips with location data: 4,547 mt (74.5% of total).

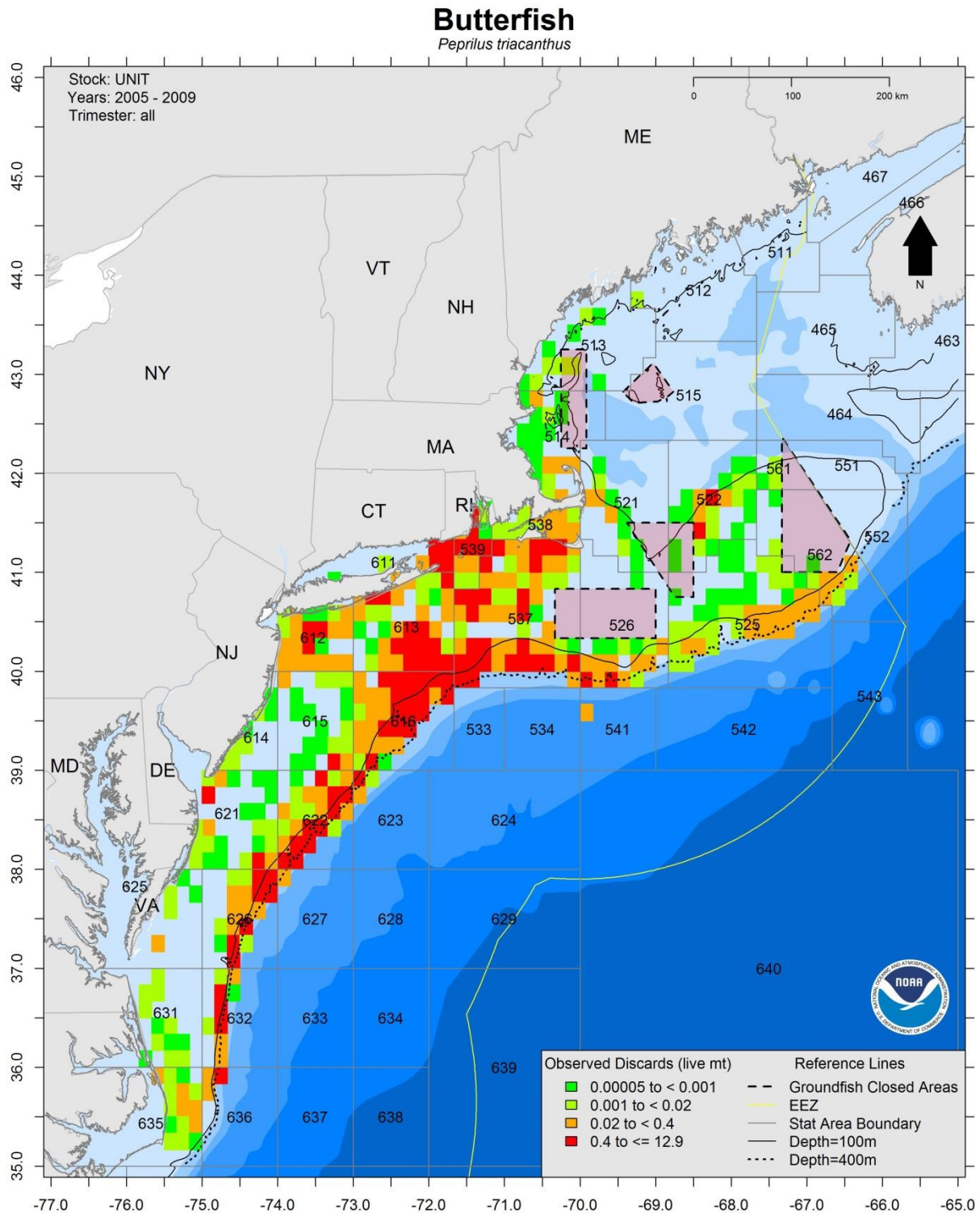


Figure A3. Observed discards for butterfish, 2005–2009. Discards were recorded by at-sea observers/monitors and reported via the Northeast Fisheries Observer Program database. Total observed discards reported: 224 mt. Observed discards from trips with location data: 224 mt (100.0% of total).

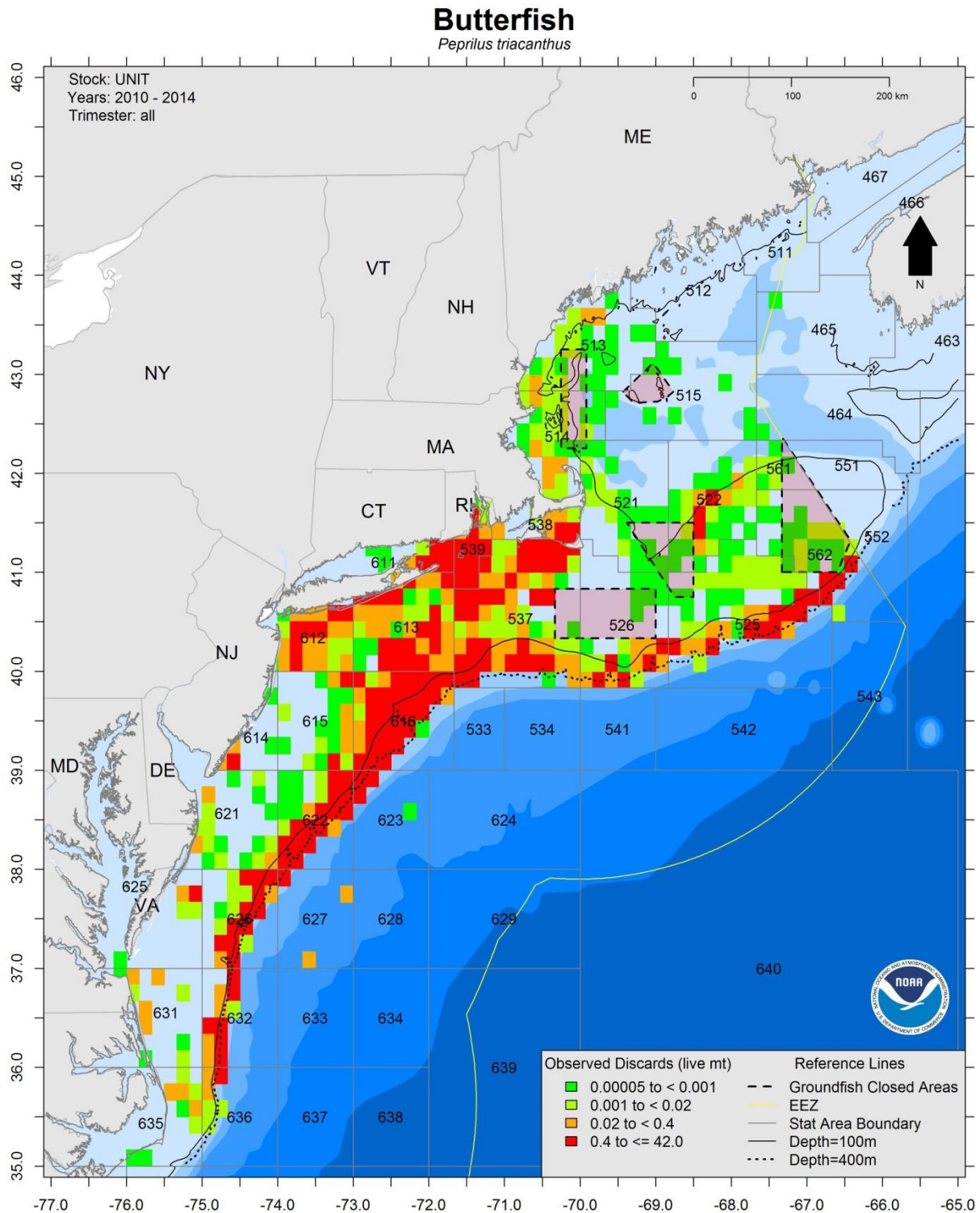


Figure A4. Observed discards for butterfish, 2010–2014. Discards were recorded by at-sea observers/monitors and reported via the Northeast Fisheries Observer Program database. Total observed discards reported: 598 mt. Observed discards from trips with location data: 598 mt (100.0% of total).

Butterfish

Peprilus triacanthus

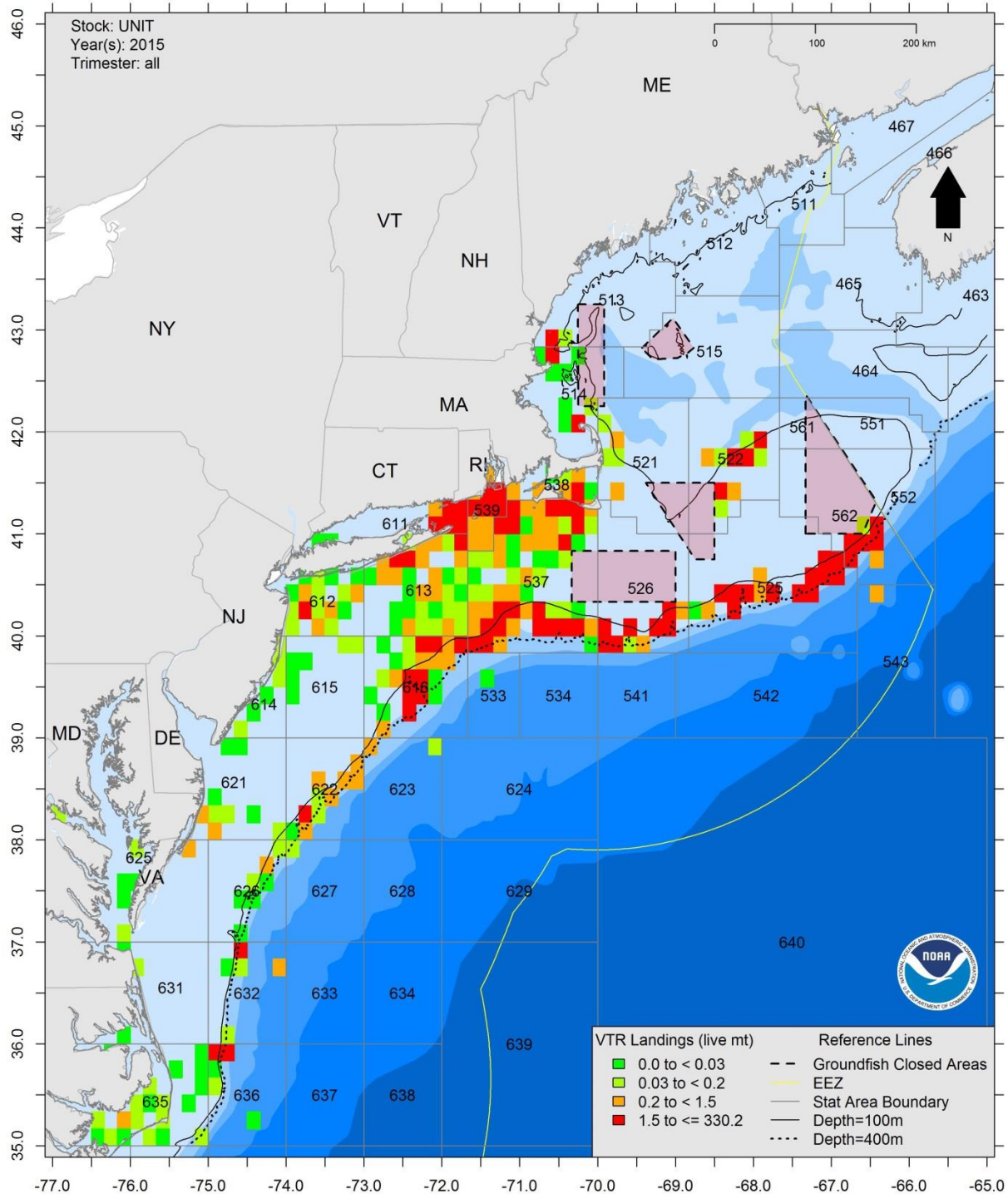


Figure A5. VTR landings for butterfish, 2015. Only data with valid locations are plotted. Total VTR landings reported: 1,943 mt. VTR Landings from trips with location data: 1,693 mt (87.1% of total)