



Northeast Fisheries Science Center Reference Document 21-01

Estimates of Cetacean and Pinniped Bycatch in the 2018 New England Sink and Mid-Atlantic Gillnet Fisheries

August 2021



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Estimates of Cetacean and Pinniped Bycatch in the 2018 New England Sink and Mid-Atlantic Gillnet Fisheries

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This report provides estimated bycatch of 5 species of small cetaceans and pinnipeds bycaught in the New England sink gillnet (NESG) and Mid-Atlantic (MAG) gillnet fisheries. The bycatch estimation methodology approach used for these data does not differ significantly from the previous year's estimates. For details on the bycatch estimation methodology, please refer to Orphanides and Hatch (2017).

Bycatch estimates in New England were conducted with a stratified ratio estimation approach using the seasons, port groups, and management areas used in recent years (Orphanides and Hatch 2017). This time-area stratification approach was originally developed for the estimation of harbor porpoise bycatch but has been applied to bycatch of other small cetaceans and pinnipeds since 1995 (Blaylock 1995) because bycatch for other species is also largely driven by spatial and temporal patterns. The observer coverage for these New England strata was 8% (Table 1). The 2018 serious injuries and total mortalities in the NESG fishery were 93 (coefficient of variation [CV] = 0.45) common dolphins (*Delphinus delphis delphis*), 1113 (CV = 0.32) gray seals (*Halichoerus grypus atlantica*), 188 (CV = 0.36) harbor seals (*Phoca vitulina vitulina*), 92 (CV = 0.52) harbor porpoises (*Phocoena phocoena phocoena*), and 14 (CV = 0.80) harp seals (*Pagophilus groenlandicus*). The NESG estimates are based on observed bycatch consisting of 10 short-beaked common dolphins, 103 gray seals, 22 harbor seals, 9 harbor porpoises, and 2 harp seals. (Tables 2-6). Additional bycatch included several animals that could not be identified to species, and therefore could not be included in species-specific bycatch estimates, including 17 seals, 1 porpoise or dolphin, and 1 marine mammal. The percent of New England gillnet hauls containing the proper number of pingers with regards to the 2010 Harbor Porpoise Take Reduction Plan (HPTRP) was 71% in 2018. This percentage is based on the correct number of pingers used, not the pingers' functionality (Table 7).

The Mid-Atlantic ratio estimator stratification was done as in recent years by area, mesh size, soak duration, and season coinciding with previous bycatch estimates in this region (Orphanides and Hatch 2017). The spatial stratifications for 2018 Mid-Atlantic bycatch included New Jersey state fishing effort and the Waters off New Jersey HPTRP management area (Figure 1). Observer coverage for these areas and Mid-Atlantic areas can be seen in Tables 8 and 9. Seasons used for common dolphin and harbor seals were based on current and observed historical bycatch from 1994-2018 and were December through May for harbor seal and December for common dolphin. The 2018 total serious injuries and mortalities in the MAG fishery were 8 (CV = 0.91) common dolphins, and 3 (CV = 0.52) harbor seals (Table 10). The MAG estimates are based on observed bycatch consisting of 1 common dolphin and 3 harbor seal (Table 10; Figure 1). There were also 2 observed incidental takes of bottlenose dolphins (*Tursiops truncatus truncatus*) from coastal stocks, but bycatch estimates for these animals are not included in this report and will be reported elsewhere. Adherence to the HPTRP regulations on observed hauls in the 2018 MAG fishery were relatively low for large (44%) and high for small mesh gillnets (82%) (Table 11). Observed and estimated serious injuries and mortalities are summarized for the 5-year period of 2014 – 2018 in Table 12 to correspond with tables provided in the [Stock Assessment Reports](#)¹.

¹<https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports>

REFERENCES CITED

Blaylock RA, Hain JW, Hansen LJ, Palka DL, Waring GT. 1995. US Atlantic and Gulf of Mexico Marine Mammal Stock Assessments. NOAA Tech. Mem. NMFS-SEFSC-363; 211 p.

Orphanides C, Hatch J. 2017. Estimates of cetacean and pinniped bycatch in the 2015 New England sink and mid-Atlantic gillnet fisheries. US Dept Commerce, Northeast Fish Sci Cent Ref Doc. 17-18; 21 p.

Table 1. Summaries of observed hauls, observed trips, observed landings, prorated commercial landings, and observer coverage by season and port group (P) or management area (MA) for the 2018 New England sink gillnet fishery. Seasons were defined as "W"(winter; January - May), "S"(summer; June - August), and "F" (fall; September - December).

Season	Area	Observed Hauls ^a	Observed Trips	Observed Landings (mt)	Commercial Landings (mt)	Observer Coverage
W	Cape Cod South (MA)	117 (47)	36	55.28	556.88	0.10
W	East of Cape Cod (P)	34 (19)	8	18.41	177.30	0.10
W	Mid-Coast (MA)	104 (30)	21	34.18	127.81	0.27
W	North of Boston (P)	1 (0)	1	0.16	0.52	0.31
W	Offshore (MA)	16 (0)	2	3.84	42.48	0.09
W	Offshore (P)	15 (8)	2	4.82	4.21	1.14
W	South of Cape Cod (P)	16 (10)	7	7.30	100.07	0.07
W	Southern Maine (P)	34 (22)	5	9.42	18.25	0.52
W	Southern New England (MA)	337 (185)	66	206.97	1361.54	0.15
W	Stellwagen Bank (MA)	124 (35)	37	14.32	63.82	0.22
W	Subtotal	798 (356)	185	354.70	2452.88	0.14
S	East of Cape Cod (P)	52 (0)	27	73.76	3267.24	0.02
S	N. Maine	n/a (n/a)	n/a	n/a	0.28	NA
S	New Hampshire (P)	65 (0)	15	24.04	432.51	0.06
S	North of Boston (P)	70 (0)	22	30.47	221.22	0.14
S	Offshore (P)	30 (4)	5	16.55	97.55	0.17
S	South of Boston (P)	59 (0)	13	9.66	113.25	0.09
S	South of Cape Cod (P)	235 (0)	67	71.33	1561.44	0.05
S	Southern Maine (P)	62 (0)	17	20.72	205.51	0.10
S	Subtotal	573 (4)	166	246.53	5899.00	0.04
F	Cape Cod South (MA)	53 (40)	12	30.30	240.66	0.13
F	East of Cape Cod (P)	86 (49)	40	116.93	2484.84	0.05
F	Massachusetts Bay (MA)	n/a (n/a)	n/a	n/a	4.46	NA
F	Mid-Coast (MA)	138 (35)	39	56.09	363.92	0.15
F	New Hampshire (P)	10 (10)	2	1.93	31.71	0.06
F	North of Boston (P)	37 (11)	15	14.34	41.77	0.34
F	Offshore (MA)	12 (0)	1	6.77	7.63	0.89
F	Offshore (P)	31 (13)	5	13.11	63.98	0.20
F	South of Boston (P)	10 (3)	3	3.94	35.49	0.11

F	South of Cape Cod (P)	301 (66)	59	71.68	725.26	0.10
F	Southern Maine (P)	43 (14)	8	28.71	139.98	0.21
F	Southern New England (MA)	36 (24)	11	20.83	238.92	0.09
F	Stellwagen Bank (MA)	3 (0)	2	0.19	0.66	0.29
F	Subtotal	760 (265)	197	364.82	4379.28	0.08
Total		2131 (625)	548	966.05	12731.16	0.08

^a Parentheses indicate the number of limited hauls out of the total (i.e., complete + limited).

Table 2. Observed number of bycatch, estimated bycatch rates, estimated bycatch, coefficient of variation (CV), and lower (L) and upper (U) limits on 95% confidence intervals (CI) of short-beaked common dolphin (*Delphinus delphis delphis*) bycatch in the New England sink gillnet fishery for 2018 by season and port group (P) or management area (MA). Seasons were defined as "W" (winter; January - May) and "F" (fall; September - December).

Season	Area	Observed Bycatch	Bycatch Rate	Estimated Bycatch	CV	95% CI	
						L	U
W	Southern New England (MA)	3	0.014	19.06	0.67	3	63
W	Subtotal	3	-	19.06	0.67	3	63
F	South of Cape Cod (P)	4	0.064	46.42	0.77	4	191
F	Cape Cod South (MA)	2	0.066	15.88	0.76	2	56
F	Southern New England (MA)	1	0.050	11.95	0.84	1	40
F	Subtotal	7	-	74.25	0.53	25	221
	Total	10	-	93.31	0.45	38	230

Table 3. Observed number of bycatch, estimated bycatch rates, estimated bycatch, coefficient of variation (CV), and lower (L) and upper (U) limits on 95% confidence intervals (CI) of gray seal (*Halichoerus grypus atlantica*) bycatch in the New England sink gillnet fishery for 2018 by season and port group (P) or management area (MA). Seasons were defined as "W" (winter; January - May), "S" (summer; June - August), and "F" (fall; September - December).

Season	Area	Observed Bycatch	Bycatch Rate	Estimated Bycatch	CV	95% CI	
						L	U
W	Cape Cod South (MA)	45	0.668	372.00	0.76	94	1842
W	Southern New England (MA)	19	0.092	125.26	0.37	59	286
W	Stellwagen Bank	2	0.140	8.93	0.93	2	55
W	Subtotal	66	-	506.19	0.52	213	1826
S	East of Cape Cod (P)	1	0.014	45.74	0.98	1	246
S	South of Cape Cod (P)	2	0.033	51.53	0.76	2	205
S	Subtotal	3	-	97.27	0.61	20	304
F	East of Cape Cod (P)	6	0.051	126.73	0.55	40	348
F	Mid-Coast (MA)	5	0.087	31.66	0.51	9	89
F	North of Boston (P)	1	0.060	4.41	0.86	1	20
F	South of Cape Cod (P)	6	0.096	69.62	0.62	12	206
F	Cape Cod South (MA)	7	0.221	53.19	0.83	9	208
F	Southern New England (MA)	9	0.939	224.35	0.80	28	1096
F	Subtotal	34	-	509.96	0.40	254	1189
Total		103	-	1113.42	0.32	674	2391

Table 4. Observed number of bycatch, estimated bycatch rates, estimated bycatch, coefficient of variation (CV), and lower (L) and upper (U) limits on 95% confidence intervals (CI) of harbor seal (*Phoca vitulina vitulina*) bycatch in the New England sink gillnet fishery for 2018 by season and port group (P) or management area (MA). Seasons were defined as "W" (winter; January - May), and "F" (fall; September - December).

Season	Area	Observed Bycatch	Bycatch Rate	Estimated Bycatch	CV	95% CI	
						L	U
W	Cape Cod South (MA)	1	0.015	8.35	1.05	1	49
W	Southern New England (MA)	5	0.024	32.68	0.64	6	120
W	Subtotal	6	-	41.03	0.55	12	129
F	East of Cape Cod (P)	3	0.026	64.61	0.62	17	191
F	Mid-Coast (MA)	8	0.139	50.58	0.44	17	123
F	North of Boston (P)	2	0.142	5.93	0.93	2	39
F	Cape Cod South (MA)	3	0.109	26.23	1.49	3	182
F	Subtotal	16	-	147.35	0.43	62	310
	Total	22	-	188.38	0.36	91	351

Table 5. Observed number of bycatch, estimated bycatch rates, estimated bycatch, coefficient of variation (CV), and lower (L) and upper (U) limits on 95% confidence intervals (CI) of harbor porpoise (*Phocoena phocoena phocoena*) bycatch in the New England sink gillnet fishery for 2018 by season and port group (P) or management area (MA). Seasons were defined as "W" (winter; January - May) and "F" (fall; September - December).

Season	Area	Observed Bycatch	Bycatch Rate	Estimated Bycatch	CV	95% CI	
						L	U
W	Mid-Coast (MA)	1	0.030	3.83	1.11	1	35
W	Southern New England (MA)	1	0.005	6.81	0.92	1	29
W	Subtotal	2	-	10.64	0.74	2	52
F	Mid-Coast (MA)	3	0.052	18.92	0.53	5	50
F	North of Boston (P)	1	0.071	2.97	0.88	1	17
F	Cape Cod South (MA)	2	0.066	15.88	0.63	2	46
F	Southern New England (MA)	1	0.184	43.96	1.01	1	318
F	Subtotal	7	-	81.73	0.58	30	303
	Total	9	-	92.37	0.52	39	312

Table 6. Observed number of bycatch, estimated bycatch rates, estimated bycatch, coefficient of variation (CV), and lower (L) and upper (U) limits on 95% confidence intervals (CI) of harp seal (*Pagophilus groenlandicus*) bycatch in the New England sink gillnet fishery for 2018 by season and port group (P) or management area (MA). The season was defined as "W" (winter; January - May).

Season	Area	Observed Bycatch	Bycatch Rate	Estimated Bycatch	CV	95% CI	
						L	U
W	Southern New England (MA)	2	0.010	13.62	0.74	2	44
W	Subtotal	2	-	13.62	0.74	2	44
	Total	2	-	13.62	0.80	2	44

Table 7. Summary of 2018 full pinger deployment for Northeast Fisheries Observer Program observed hauls within times and areas where pingers were required by the 2010 Harbor Porpoise Take Reduction Plan (HPTRP). Seasons were defined as "Winter" (January - May) and "Fall" (September - December).

Season	Management Area	Observed Hauls	< 100% of Required Pingers	100% of Required Pingers
Fall	Cape Cod South ^a	53	27	49.1%
	Mid-Coast	138	13	90.6%
	Offshore	12	0	100.0%
	Southern New England	36	20	44.4%
	Stellwagen Bank	3	0	100.0%
Winter	Cape Cod South ^a	117	50	57.3%
	Mid-Coast	104	18	82.7%
	Offshore	16	13	18.8%
	Southern New England	337	134	60.2%
	Stellwagen Bank	124	2	98.4%
Total		940	277	70.5%

^a Cape Cod South specification includes Dec-May, matching the season used for the bycatch estimation strata.

Table 8. 2018 Mid-Atlantic gillnet fishery summaries of observed landings, commercial landings, and observer coverage by state (Figure 1b). Effort from bays and sounds is not included.

State	Observed Landings (mt)	Commercial Landings (mt)	Observer Coverage
Delaware	0.0	0.7	0.0%
Maryland	23.6	361.1	6.5%
North Carolina	131.0	2430.3	5.4%
New Jersey	242.6	2200.8	11.0%
New York	25.6	344.0	7.4%
Virginia	197.7	1585.2	12.5%
Florida	0.0	4.7	0.0%
Massachusetts	0.0	2.3	0.0%
Rhode Island	0.0	2.9	0.0%
Totals	620.5	6932.1	9.0%

Table 9. Summaries of observed hauls, observed trips, observed landings, commercial landings, and observer coverage by species, season, region, mesh size, and soak duration for strata with bycatch of common dolphin (*Delphinus delphis delphis*) and harbor seal (*Phoca vitulina vitulina*) in the 2018 Mid-Atlantic gillnet fishery.

Species	Season	Region / State	Mesh Size (in)	Soak Duration (hrs)	Observed Hauls ^a	Observed Trips	Observed Landings (mt)	Commercial Landings (mt)	Observer Coverage
Common Dolphin	Dec	NJ	>=7	<=72	59 (15)	26	43.74	336.40	13.00%
Harbor Seal	Dec-May	Waters off NJ	>=7	<=72	159 (15)	48	80.17	899.35	8.92%
Harbor Seal	Dec-May	Waters off NJ	>=7	>72	82 (2)	27	48.02	359.52	13.67%

^a Parentheses indicate number of limited hauls out of the total

Table 10. Observed number of bycatch, estimated bycatch rates, estimated bycatch, coefficient of variation (CV), and lower and upper limits on 95% confidence intervals (CI) of estimated common dolphin (*Delphinus delphis delphis*) and harbor seal (*Phoca vitulina vitulina*) bycatch in the Mid-Atlantic gillnet fishery for 2018, by season, region, mesh size, and soak duration.

Species	Season	Region / State	Mesh Size (in)	Soak Duration (hrs)	Observed Bycatch	Bycatch Rate	Estimated Bycatch	CV	95% CI
Common Dolphin	Dec	NJ	>=7	<=72	1	0.023	7.74	0.91	0-41
Harbor Seal	Dec-May	Waters off NJ	>=7	<=72	1	0.012	10.79	0.99	0-60
Harbor Seal	Dec-May	Waters off NJ	>=7	>72	2	0.042	14.76	0.64	0-47
Harbor Seal	Dec-May	All			3		25.55	0.52	7-75

Table 11. Observed number of hauls for large (7-18") and small mesh (<7") gillnets following requirements for the Mid-Atlantic 2010 Harbor Porpoise Take Reduction Plan (HPTRP). Observed hauls missing information for an assessed gear modification were assumed to be following the HPTRP for that gear characteristic. Locations are depicted in Figure 1b.

Management Area	General HPTRP non-Adherence Categories					Specific HPTRP non-Adherence Categories						Unknown Gear Compliance ^a
	Total Observed Hauls	Non-Compliant Hauls	Compliance %	Gear Modification	Closed Area	Multiple Violations per Haul	Number of Nets	Twine Size	Tie-Down Lengths	Tie-Down Use	Net Length	
Southern Mid-Atlantic Large Mesh	28	12	57%	12	0	0	0	0	0	0	0	0
Southern Mid-Atlantic Small Mesh	197	38	81%	38	0	3	4	7	0	7	18	20
Mudhole North Large Mesh	6	5	17%	5	0	0	5	0	0	0	0	6
Mudhole North Small Mesh	6	0	100%	0	0	0	0	0	0	0	0	0
Mudhole South Large Mesh	23	10	57%	10	3	0	10	0	0	0	0	14
Mudhole South Small Mesh												
Waters off New Jersey Large Mesh	71	45	37%	45	0	1	31	5	4	5	0	51
Waters off New Jersey Small Mesh	20	3	85%	3	0	2	2	3	0	0	0	0
Totals	351	113	68%	113	3	6	52	15	4	12	18	91

Table 12. Observed summaries for the 5-year period of 2014 – 2018. (A) Observer coverage by fishery and year. Observed and estimated serious injuries and mortalities of marine mammals in the (B) Northeast sink gillnet and (C) Mid-Atlantic gillnet fisheries. The “Combined Estimate” is Estimated Mortality + Estimated Serious Injury.

A. Observer coverage by fishery and year. Observed and estimated serious injuries and mortalities of marine mammals

Fishery	Years	Data Type	Observer Coverage (mt)
Northeast sink gillnet	2014-18	Obs. Data, Trip Logbook, Allocated Dealer Data	0.18, 0.14, 0.10, 0.12, 0.11
Mid-Atlantic gillnet	2014-18	Obs. Data, Trip Logbook, Allocated Dealer Data	0.05, 0.06, 0.08, 0.09, 0.09

B. Observed and estimated serious injuries and mortalities of marine mammals in the Northeast sink gillnet fishery

Species	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Combined Estimate	Estimated CV	Mean (CV) Annual Combined
Harbor Porpoise (<i>phocoena phocoena</i> <i>phocoena</i>)	0, 0, 0, 1, 0	28, 23, 11, 19, 9	0, 0, 0, 7, 0	128, 177, 125, 129, 92	128, 177, 125, 136, 92	0.27, 0.28, 0.34, 0.28, 0.52	132 (0.15)
Bottlenose Dolphin (<i>Tursiops truncatus</i> <i>truncatus</i>)	0, 0, 0, 0, 0	0, 0, 0, 1, 0	0, 0, 0, 0, 0	0, 0, 0, 8, 0	0, 0, 0, 8, 0	0, 0, 0, 0.92, 0	2 (0.92)
Common Dolphin (<i>Delphinus delphis delphis</i>)	0, 0, 1, 0, 0	11, 3, 8, 20, 10	0, 0, 0, 0, 0	111, 55, 80, 133, 93	111, 55, 80, 133, 93	0.47, 0.54, 0.38, 0.28, 0.45	77 (0.19)
Gray Seal (<i>Halichoerus grypus atlantica</i>)	0, 0, 0, 0, 0	159, 131, 43, 158, 103	0, 0, 0, 0, 0	917, 1021, 498, 930, 1113	917, 1021, 498, 930, 1113	0.14, 0.25, 0.33, 0.16, 0.32	895 (0.11)
Harbor Seal (<i>Phoca vitulina vitulina</i>)	0, 0, 0, 0, 0	59, 87, 36, 63, 22	0, 0, 0, 0, 0	390, 474, 245, 298, 188	390, 474, 245, 298, 188	0.39, 0.17, 0.29, 0.18, 0.36	319 (0.13)
Harp Seal (<i>Pagophilus groenlandicus</i>)	0, 0, 0, 0, 0	9, 12, 5, 6, 2	0, 0, 0, 0, 0	57, 119, 85, 44, 14	57, 119, 85, 44, 14	0.42, 0.34, 0.50, 0.37, 0.80	64 (0.21)

Table 12, continued. Observed summaries for the 5-year period of 2014 – 2018. (A) Observer coverage by fishery and year. Observed and estimated serious injuries and mortalities of marine mammals in the (B) Northeast sink gillnet and (C) Mid-Atlantic gillnet fisheries. The “Combined Estimate” is Estimated Mortality + Estimated Serious Injury.

C. Observed and estimated serious injuries and mortalities of marine mammals in the Mid-Atlantic gillnet fishery

Species	Observed Serious Injury	Observed Mortality	Estimated Serious Injury	Estimated Mortality	Combined Estimate	Estimated CV	Mean (CV) Annual Combined
Harbor Porpoise (<i>phocoena phocoena phocoena</i>)	0, 0, 0, 0, 0	1, 2, 2, 1,0	0, 0, 0, 0, 0	22, 33, 23, 9, 0	22, 33, 23, 9, 0	1.03, 1.16, 0.64, 0.95, 0	17 (0.55)
Common Dolphin (<i>Delphinus delphis delphis</i>)	0, 0, 0, 1, 0	1, 3, 1, 1, 1	0, 0, 0, 11, 0	17, 30, 7, 11, 8	17, 30, 7, 22, 8	0.86, 0.55, 0.97, 0.71, 0.91	17 (0.34)
Gray Seal (<i>Halichoerus grypus atlantica</i>)	0, 0, 0, 0, 0	1, 1, 1, 0, 0	0, 0, 0, 0, 0	22, 15, 7, 0, 0	22, 15, 7, 0, 0	1.09, 1.04, 0.93, 0, 0	9 (0.67)
Harbor Seal (<i>Phoca vitulina vitulina</i>)	0, 0, 0, 0, 0	1, 5, 2, 1, 3	0, 0, 0, 0, 0	19, 48, 18, 3, 26	19, 48, 18, 3, 26	1.06, 0.52, 0.95, 0.62, 0.52	23 (0.34)
Hooded Seal (<i>Cystophora cristata</i>)	0, 0, 0, 0, 0	0, 0, 1, 0, 0	0, 0, 0, 0, 0	0, 0, 3, 0, 0	0, 0, 3, 0, 0	0, 0, 1.12, 0, 0	0.6 (1.12)

FIGURES

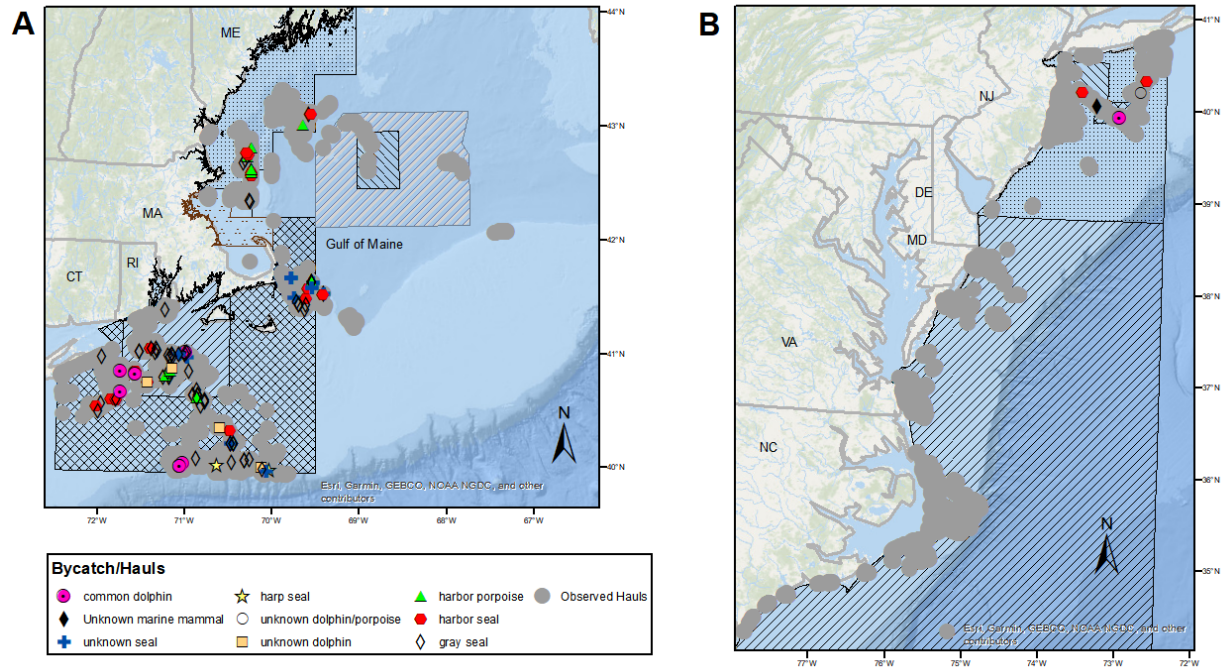


Figure 1. Locations of observed hauls and marine mammal bycatch in the 2018 New England sink (A) and Mid-Atlantic (B) gillnet fisheries. Observed bycatch consisted of harbor porpoise (*Phocoena phocoena phocoena*), common dolphin (*Delphinus delphis delphis*), gray seal (*Halichoerus grypus atlantica*), harbor seal (*Phoca vitulina vitulina*), harp seal (*Pagophilus groenlandicus*), and unknown species of dolphin and seal.

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The CRD series is obligated to conform with the style contained in the current edition of the United States Government Printing Office Style Manual. That style manual is silent on many aspects of scientific manuscripts. The CRD series relies more on the CSE Style Manual. Manuscripts should be prepared to conform with these style manuals.

The CRD series uses the American Fisheries Society's guides to names of fishes, mollusks, and decapod crustaceans, the Society for Marine Mammalogy's guide to names of marine mammals, Integrated Taxonomic Information System guidance on scientific and common names for all other species, the Biosciences Information Service's guide to serial title abbreviations, and the ISO's (International Standardization Organization) guide to statistical terms.

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