Northeast Fisheries Science Center Reference Document 07-20

Estimates of Cetacean and Pinniped Bycatch in the 2006 Northeast Sink Gillnet and Mid-Atlantic Coastal Gillnet Fisheries

by Dana Belden and Christopher D. Orphanides

December 2007

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ABSTRACT

This report provides incidental take estimates for six marine mammal species taken in the 2006 Northeast Sink Gillnet (NESG) and Mid-Atlantic Coastal Gillnet (MACG) fisheries and documents the methodology used to produce the estimates. For the NESG fishery, the estimated take was 20 common dolphins (CV = 105%), 514 harbor porpoises (CV = 31 %), 41 Atlantic white-sided dolphins (CV = 71%), 248 gray seals (CV = 47%), 87 harbor seals (CV = 58%), and 65 harp seals (CV = 66%). For the MACG fishery, the estimated 2006 takes was 512 harbor porpoises (CV = 32%), 11 common dolphins (CV = 103%), and 26 harbor seals (CV = 98%).

ACRONYMS

CV	=	coefficient of variation
MA	=	Mid-Atlantic
MACG	=	Mid-Atlantic Coastal Gillnet
MMPA	=	Marine Mammal Protection Act
mtons	=	metric tons
NE	=	Northeast
NEFOP	=	Northeast Fisheries Observer Program
NEFSC	=	Northeast Fisheries Science Center
NESG	=	Northeast sink gillnet
NMFS	=	National Marine Fisheries Service
NOAA	=	National Oceanic and Atmospheric Administration
SAR	=	stock assessment report
SSOP	=	Sea Sampling Observer Program
VTR	=	Vessel Trip Report

INTRODUCTION

Pursuant to the 1994 amendments of the Marine Mammal Protection Act (MMPA), Section 117 states that estimates of annual human-caused mortality and serious injury to marine mammal stocks must be reported in annual stock assessment reports (SAR) for each stock of marine mammal that occurs in waters under U.S jurisdiction.

The Northeast Fisheries Science Center (NEFSC) Sea Sampling Observer Program (SSOP), presently known as the Northeast Fisheries Observer Program (NEFOP), was initiated in 1989 to document the bycatch of marine mammals taken incidentally to commercial fishing operations (Waring et al. 2004). Since the initiation of the observer program, the estimation of total takes for harbor porpoise (*Phocoena phocoena*) has been the focus of much attention due to frequent observations of incidental takes occurring in the NESG fishery (NMFS 1998). This attention led to the development of a stratification method designed to estimate the total annual takes of harbor porpoise (Bisack 1993; Smith et al. 1993; Bravington and Bisack 1996; Bisack 1997; Rossman and Merrick 1999; Bisack 2003). The regional scope of the SSOP was expanded into the Mid-Atlantic (MA) region in 1995 in an effort to learn more about marine mammal interactions occurring in MA gillnet fisheries.

Rossman and Merrick (1999) documented the methods used to estimate harbor porpoise bycatch in the NESG and MACG fisheries. These methods have also been used by the NEFSC to estimate the bycatch of other marine mammals observed bycaught in the NESG and MACG fisheries (Blaylock et al. 1995; Waring et al. 1997; Waring et al. 2004; Belden et al. 2006; Belden 2007).

Historically, the NESG fishery extended from Maine to Connecticut and was dominated by bottom-tending sink gillnets. Less than 1% of the fishery utilized a drift gillnet (not tending the ocean bottom). Monofilament twine was typically used with stretched mesh sizes ranging from 6 to 12 inches. String lengths ranged from 600 to 10,500 feet. Mesh size and string lengths varied by the primary fish species targeted for catch.

The MACG fishery ranged from Connecticut to North Carolina and utilized both drift and sink gillnets. These nets were most frequently attached to the bottom, although unanchored drift or sink nets were also utilized to target specific species. Monofilament twine was again the dominant material and was used with stretched mesh sizes ranging from 2.5 to 12 inches. String lengths ranged from 150 to 8400 feet. The mesh size and string lengths varied by the primary fish species targeted for catch (Waring et al. 2004). Due to recent fishing patterns, the division between the Northeast and Mid-Atlantic has changed from Connecticut to Rhode Island. This will be discussed further in this report.

The same ratio estimator methodology was used to calculate cetacean and seal bycatch for the 2006 NESG and MACG fisheries as was used in Belden et al. (2006) and Belden (2007). However, there were a few changes in the stratification; these changes and the resulting bycatch estimates are described in this report. As in previous years, bottlenose dolphin bycatch was not estimated in this document. Bottlenose dolphin estimates can be found in the upcoming 2008 U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Report (Waring et al. in prep.), and in an upcoming paper by Rossman (in prep.).

METHODS

Data Sources

Three databases were used to estimate the total marine mammal takes in 2006: the NEFOP database, Northeast (NE) Dealer Reports, and Northeast Vessel Trip Reports (VTR). First, the NEFOP database provided data on the observed bycatch of marine mammals. The NEFOP has two types of sampling protocols when observing fishing trips: (1) complete fish sampled trips where the observer samples the catch for fish discard information (the observer is not able to watch the net as it is being hauled), and (2) limited fish sampled trips where the observer watches the net for incidental takes as it is being hauled. In the NESG fishery only, hauls observed from both trip sampling protocols were used to estimate the bycatch rates from observed incidental takes. Only limited fish sampling trips were used in the MACG fishery to estimate the bycatch rates of most species.

Second, the NE Dealer Report landings database was used to determine the total landings in 2006 of all finfish caught in the Northeast and Mid-Atlantic gillnet fishery.

Lastly, the NE VTR database was used to assign (prorate) the NE Dealer Report landings from the NESG fishery to spatial and temporal strata historically used to estimate takes of harbor porpoise in the NESG fishery (Rossman and Merrick 1999; Bisack 2003).

For purposes of this report, a "take" is defined as any observed incidental take where the animal's condition was recorded as either alive with injuries or dead (fresh or under various stages of decomposition). All incidental takes are identified to species by the fishery observer whenever possible. There were several incidental takes that were not identified to species: two unknown porpoise/dolphin species and eight unknown seal species. These animals were not included in the bycatch estimates for the strata in which they were caught..

The level of sampling (observer coverage) for each stratum was calculated by dividing the observed metric tons (mtons) of fish caught by the prorated metric tons of fish recorded in the dealer database. This value represented the fraction of total landings that were sampled.

Analysis

Data Stratification

The strata defined in Rossman and Merrick (1999) were used to estimate takes in 2006. The NESG data were stratified temporally by season, spatially by port group-area and time/area closures, and by bycatch avoidance techniques via the use of pingers (Table 1). Seasons are defined as winter (January to May), summer (June to August), and fall (September to December).

Connecticut (CT) gillnet fishing effort has historically been included in the Mid-Atlantic region bycatch analyses. Spatial analysis of 2005 and 2006 VTR and observer data indicated that CT vessels are currently fishing in the same time and area as vessels from the Northeast region fishing in the South of Cape Cod port group (Figure 1). Therefore, CT trips were included in the 2006 Northeast South of Cape Cod port group bycatch estimates (Table 1). This change affected the estimated bycatch of harbor porpoise, common dolphin, gray seal, harbor seal, and harp seal.

As indicated in Belden et al. (2006), until 2004 MACG bycatch estimates have been calculated by month for each state. In 2005 and 2006, observer and VTR trip locations indicate

New Jersey (NJ) MACG trips during January to April fished in a similar area (Figure 2). So, a winter season (January to April) was used for the 2006 analyses (Table 2) of harbor porpoise and harbor seal takes in New Jersey waters.

In January 2006, a common dolphin take was observed off the coast of NJ. Rather than creating a winter category as we had done for harbor porpoise and harbor seal, we calculated a bycatch rate for only the month of January, due to uncertainty about the distribution of common dolphins during that time of year. The take was observed on a complete sampling trip. No common dolphin bycatch was observed on limited sampling trips. Historically, MA cetacean bycatch estimates have been calculated using only limited trips (Rossman and Merrick 1999; Belden et al. 2006; Belden 2007), but since the observed bycatch occurred on a complete trip, we used both complete and limited trips to estimate bycatch for common dolphins. Use of both types of trips is likely more representative of bycatch than complete trips alone, since the observer on complete trips is not able to watch the net as it is being hauled. Using both trip types also increased the sample size of observed hauls from 38 to 106, providing a more robust estimate.

New York (NY) gillnet fishing effort has historically been included in the MA region bycatch analyses. Spatial analysis of 2006 VTR and observer data indicated that some NY vessels, including a vessel on which takes were observed, fished in the same time and area as vessels from the Northeast region fishing in the South of Cape Cod port group or time/area closure (Figure 3). Therefore, the NY observed trips that were east of the 72º30'W line were included in the 2006 Northeast South of Cape Cod port group or time/area closure bycatch estimates (Table 1). This fits in well with the List of Fisheries definition for NESG fisheries, which states that the MA area is from 72º30'W south to 36º33'03"N. This change affected the estimated bycatch of harbor porpoise, common dolphin, gray seal, harbor seal, and harp seal.

The VTR effort for NY was divided between the NE and MA regions using the 72º30'W line, as was the observer data. Next, the proportion of NY VTR tons assigned to the South of Cape Cod port group or area was calculated for each month. These proportions were then applied to the NY dealer data to get the prorated dealer tons to be used in the bycatch estimates for the appropriate port group or area in the NE region. Thus, the NY data from the observer and VTR databases were divided into the NE region (Tables 1 and 2) and MA region (Table 3).

Bycatch Rates

The number of marine mammal takes (B) is the product of the observed bycatch rate multiplied by the total effort in each stratum (S). The observed bycatch rate for each stratum is defined as the number of observed takes divided by the observed mtons (effort) of fish landed.

$$B = \sum_{i=1}^{S} \frac{number\ \ observed\ \ takes_i}{observed\ \ effort_i} \bullet total\ \ effort_i$$

There is a possibility that strings could be either equipped or not equipped with pingers in the NESG fishery. Therefore, a weighted bycatch rate was calculated for strata where there were hauls with and without pingers. Within a stratum, the weighted bycatch rate was calculated as the sum of two weighted bycatch rates, one from hauls with pingers and one from hauls without pingers. Each bycatch rate was weighted by the proportion of hauls sampled with or without pingers within its respective stratum.

Standard bootstrapping techniques were used to derive the confidence intervals and coefficients of variation (CV) for the bycatch estimates for each stratum. The re-sampling unit used was an entire trip rather than individual hauls to ensure that any within trip dependence was carried over into the bycatch estimate's CV (Bisack 2003).

RESULTS

Northeast Region

The overall observer coverage in the NESG was 3.6%, ranging from 1.3% in the summer to 6.0% in the winter (Table 1). This level is lower than in 2005, which was 7.3%, ranging from 4.2% in the fall to 11.5% in the winter (Belden 2007). One common dolphin, 26 harbor porpoises, 2 white-sided dolphins, 2 unknown porpoise/dolphins, 9 gray seals, 3 harbor seals, 3 harp seals, and 8 unknown seals were observed taken in the 2006 NESG fishery. Unidentified animals were not included in this analysis.

The 2006 estimated total takes of cetaceans in the NESG fishery included 20 (CV = 105%) common dolphins (Table 4), 514 (CV = 31%) harbor porpoises (Table 5), and 41 (CV = 71%) white-sided dolphins (Table 6). The 2006 estimated total takes of pinnipeds in the NESG fishery included 248 (CV = 47%) gray seals (Table 7), 87 (CV = 58%) harbor seals (Table 8), and 65 (CV = 66%) harp seals (Table 9).

Mid-Atlantic Region

The 2006 observer coverage for the MACG fishery using only limited trips was 3.7% (Table 2) and using both complete and limited trips was 4.3% (Table 3). The 2006 observer coverage for the winter off of NJ was 3.9% (Table 10). The 2006 observer coverage for January off of NJ was 9.0% (Table 11). There were 20 harbor porpoises, 1 common dolphin, and 1 harbor seal observed taken in the MACG fishery in 2006.

The 2006 estimated total takes for cetaceans in the MACG fishery included 512 (CV = 32%) harbor porpoises (Table 12) and 11 (CV = 103%) common dolphins (Table 13). The 2006 estimated total takes for pinnipeds in the MASG fishery was 26 (CV = 98%) harbor seals (Table 14).

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Table 1. Using both limited and complete observed trips, 2006 Northeast sink gillnet totals for observed trips, observed hauls, observed metric tons of fish landed, prorated dealer metric tons of fish landed, and percent observer coverage, by season.

2006 Winter (Jan-May)	Observed Trips	Observed Hauls	Observed Mtons	Prorated Dealer Mtons	Coverage (mtons) %
Port Group-Area Strata					
Northern Maine	0	0	0.00	0.00	0.00
Southern Maine	1	4	0.39	1.34	29.10
New Hampshire	0	0	0.00	28.45[a]	0.00
North of Boston	61	284	28.37	450.59	6.30
South of Boston	21	96	11.45	437.41	2.62
South Of Cape Cod[b]	46	192	69.22	1411.60	4.90
East Of Cape Cod	27	140	51.33	532.11	9.65
Offshore	2	4	2.38	5.19	45.86
Closure Strata					
Offshore Closure	4	54	22.86	86.11	26.55
Cashes Ledge Closure	0	0	0.00	0.45	0.00
Midcoast Closure	10	25	3.20	138.65	2.31
Mass Bay Closure	25	68	4.59	112.69	4.07
Cape Cod Bay Closure	0	0	0.00	0.00	0.00
South Cape Closure[b]	61	172	41.82	701.60	5.96
Great S. Channel Closure	0	0	0.00	4.43	0.00
Subtotal	258	1039	236	3882	6.07
Summer (Jun-Aug)	**Observed Trips**	**Observed Hauls**	**Observed Mtons**	**Prorated Dealer Mtons**	**Coverage (mtons) %**
Port Group-Area Strata					
Northern Maine	0	0	0.00	36.46[a]	0.00
Southern Maine	7	18	5.67	203.74	2.78
New Hampshire	9	45	10.83	400.70[a]	2.70
North of Boston	3	12	2.91	943.36	0.31
South of Boston	9	28	3.18	818.50	0.39
South Of Cape Cod[b]	15	53	8.78	798.84	1.10
East Of Cape Cod	12	46	45.40	2506.46	1.81
Offshore	1	1	0.17	530.10	0.03
Closure Strata					
Northeast Closure	0	0	0.00	1.37[a]	0.00
Great S. Channel Closure	0	0	0.00	43.40	0.00
Subtotal	56	203	77	5844	1.32
Fall (Sep-Dec)	**Observed Trips**	**Observed Hauls**	**Observed Mtons**	**Prorated Dealer Mtons**	**Coverage (mtons) %**
Port Group-Area Strata					
Northern Maine	0	0	0.00	6.10[a]	0.00
Southern Maine	4	27	7.64	13.01	58.72
New Hampshire	5	17	5.00	78.00[a]	14.93
North of Boston	27	95	13.29	380.56	3.49
South of Boston	11	47	6.51	837.99	0.78
South Of Cape Cod[b]	33	134	25.34	966.61	2.62
East Of Cape Cod	21	99	34.26	1245.53	2.75
Offshore	5	86	41.50	333.94	12.43
Closure Strata					
Northeast Closure	0	0	0.00	0.00	0.00
Offshore Closure	3	37	27.25	293.40	9.29
Midcoast Closure	62	218	52.40	730.13	7.18
Mass Bay Closure	14	41	7.84	349.34	2.24
South Cape Closure[b]	3	14	2.46	72.64	3.39
Subtotal	188	815	223	5223	4.28
2006 Total	502	2057	536	14950	3.59

[a] VTR mtons instead of prorated dealer mtons (no dealer mtons reported)

[b] Totals for South of Cape Cod port group and closure stratum include effort from Connecticut and New York trips that fished east of 72º30'W.

Table 2. Using only limited observed trips, 2006 Mid-Atlantic gillnet totals for observed trips, observed metric tons of fish landed, prorated dealer metric tons of fish landed, and percent observer coverage, by season.

2006 Winter (Jan - May)	Observed Trips	Observed Mtons	Prorated Dealer Mtons	Coverage (mtons) %
New York[a]	2	2.02	177.16	1.1%
New Jersey	46	50.48	1367.94	3.7%
Delaware	4	0.21	37.36	0.6%
Maryland	1	0.69	75.19	0.9%
Virginia	31	22.94	515.39	4.5%
North Carolina	130	114.81	2475.29	4.6%
Subtotal	214	191.15	4648.33	4.1%
Summer (Jun - Aug)	**Observed Trips**	**Observed Mtons**	**Prorated Dealer Mtons**	**Coverage (mtons) %**
New York[a]	7	2.94	315.85	0.9%
New Jersey	26	34.87	832.96	4.2%
Delaware	0	0.00	30.05	0.0%
Maryland	0	0.00	5.32	0.0%
Virginia	36	11.76	243.17	4.8%
North Carolina	16	1.75	48.84	3.6%
Subtotal	85	51.32	1476.19	3.5%
Fall (Sept - Dec)	**Observed Trips**	**Observed Mtons**	**Prorated Dealer Mtons**	**Coverage (mtons) %**
New York[a]	6	2.40	133.44	1.8%
New Jersey	42	23.89	1026.41	2.3%
Delaware	0	0.00	20.93	0.0%
Maryland	3	2.49	93.90	2.7%
Virginia	56	20.19	675.67	3.0%
North Carolina	100	32.55	681.05	4.8%
Subtotal	207	81.52	2631.4	3.1%
Annual Totals	506	323.99	8755.92	3.7%

[a] Only includes effort from New York trips that fished west of 72º30'W.

Table 3. Using both complete and limited observed trips, 2006 Mid-Atlantic gillnet totals for observed trips, observed metric tons of fish landed, prorated dealer metric tons of fish landed, and percentage observer coverage, by season.

2006 Winter (Jan - May)	Observed Trips	Observed Mtons	Prorated Dealer Mtons	Coverage (mtons) %
New York[a]	5	3.01	177.16	1.7%
New Jersey	67	72.12	1367.94	5.3%
Delaware	4	0.21	37.36	0.6%
Maryland	1	0.69	75.19	0.9%
Virginia	32	23.81	515.39	4.6%
North Carolina	133	114.88	2475.29	4.6%
Subtotal	242	214.72	4648.33	4.6%
Summer (Jun - Aug)	**Observed Trips**	**Observed Mtons**	**Prorated Dealer Mtons**	**Coverage (mtons) %**
New York[a]	7	2.94	315.85	0.9%
New Jersey	41	47.16	832.96	5.7%
Delaware	0	0.00	30.05	0.0%
Maryland	0	0.00	5.32	0.0%
Virginia	36	11.76	243.17	4.8%
North Carolina	16	1.75	48.84	3.6%
Subtotal	100	63.61	1476.19	4.3%
Fall (Sept - Dec)	**Observed Trips**	**Observed Mtons**	**Prorated Dealer Mtons**	**Coverage (mtons) %**
New York[a]	7	2.43	133.44	1.8%
New Jersey	57	39.35	1026.41	3.8%
Delaware	0	0.00	20.93	0.0%
Maryland	3	2.49	93.90	2.7%
Virginia	56	20.19	675.67	3.0%
North Carolina	100	32.55	681.05	4.8%
Subtotal	223	97.01	2631.4	3.7%
Annual Totals	565	375.34	8755.92	4.3%

[a] Only includes effort from New York trips that fished west of 72º30'W.

Table 4. 2006 common dolphin bycatch estimate in the NESG.

2006 Winter (Jan-May)	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	1[b]	0.014	20	105%	1-67
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Offshore Closure	0	0.000	0		
Cashes Ledge Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
Cape Cod Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	1		20	105%	1-67
Summer (Jun-Aug)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	0		0		
Fall (Sep-Dec)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Offshore Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Subtotal	0		0		
2006 Total	1		20	105%	1-67

[a] Totals for South of Cape Cod port group and closure stratum includes effort from Connecticut and New York trips that fished east of 72º30'W.

[b] Observed take from haul not equipped with pingers.

Table 5. 2006 harbor porpoise bycatch estimate in the NESG.

2006 Winter (Jan-May)	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	3[b]	0.111[c]	50	71%	3-124
South of Boston	1[b]	0.087	38	99%	1-128
South Of Cape Cod[a]	13[b]	0.188	265	48%	52-561
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Offshore Closure	0	0.000	0		
Cashes Ledge Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
Cape Cod Bay Closure	0	0.000	0		
South Cape Closure[d]	5[b]	0.095[c]	67	80%	5-188
Great S. Channel Closure	0	0.000	0		
Subtotal	22		420	36%	168-740
Summer (Jun-Aug)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	1[b]	0.092	37	108%	1-134
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	1		37	108%	1-134
Fall (Sep-Dec)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	1[b]	0.081[c]	31	104%	1-110
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Offshore Closure	0	0.000	0		
Midcoast Closure	2[d]	0.035[c]	26	71%	2-69
Mass Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Subtotal	3		57	66%	1-143
2006 Total	26		514	31%	236-863

[a] Totals for South of Cape Cod port group and closure stratum includes effort from Connecticut and New York trips that fished east of 72º30'W.

[b] Observed take from haul not equipped with pingers.

[c] A weighted bycatch rate (observed hauls with and without pingers were used to calculate a weighted bycatch rate)

[d] Observed take from haul equipped with pingers.

Table 6. 2006 white-sided dolphin bycatch estimate in the NESG

2006 Winter (Jan-May)	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	2[b]	0.029	41	71%	2-106
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Offshore Closure	0	0.000	0		
Cashes Ledge Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
Cape Cod Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	2		41	71%	2-106
Summer (Jun-Aug)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	0		0		
Fall (Sep-Dec)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Offshore Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Subtotal	0		0		
2006 Total	2		41	71%	2-106

[a] Totals for South of Cape Cod port group and closure stratum includes effort from Connecticut and New York trips that fished east of 72º30'W.

[b] Observed take from haul not equipped with pingers.

Table 7. 2006 gray seal bycatch estimate in the NESG

2006 Winter (Jan-May)	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	1[b]	0.014	20	107%	1-68
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Offshore Closure	0	0.000	0		
Cashes Ledge Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
Cape Cod Bay Closure	0	0.000	0		
South Cape Closure[a]	1[c]	0.034[d]	24	83%	1-62
Great S. Channel Closure	0	0.000	0		
Subtotal	2		44	66%	2-105
Summer (Jun-Aug)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	2[b]	0.185	74	104%	2-261
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	2		74	104%	2-261
Fall (Sep-Dec)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	1[b]	0.131	2	130%	1-7
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	2[b]	0.077[d]	74	95%	2-239
East Of Cape Cod	1[b]	0.029	36	98%	1-120
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Offshore Closure	0	0.000	0		
Midcoast Closure	1[b]	0.025[d]	18	112%	1-69
Mass Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Subtotal	5		130	62%	5-303
2006 Total	9		248	47%	63-488

[a] Totals for South of Cape Cod port group and closure stratum includes effort from Connecticut and New York trips that fished east of 72º30'W.

[b] Observed take from haul not equipped with pingers.

[c] Observed take from haul equipped with pingers.

[d] A weighted bycatch rate (observed hauls with and without pingers were used to calculate a weighted bycatch rate)

Table 8. 2006 harbor seal bycatch estimate in the NESG

2006 Winter (Jan-May)	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V (%)	95% C.I.
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	1[b]	0.014	20	102%	1-66
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Offshore Closure	0	0.000	0		
Cashes Ledge Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
Cape Cod Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	1		20	102%	1-66
Summer (Jun-Aug)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	1[b]	0.176	36	92%	1-111
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	1		36	92%	1-111
Fall (Sep-Dec)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	1[b]	0.081[c]	31	106%	1-108
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Offshore Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Subtotal	1		31	106%	1-108
2006 Total	3		87	58%	19-197

[a] Totals for South of Cape Cod port group and closure stratum includes effort from Connecticut and New York trips that fished east of 72º30'W.

[b] Observed take from haul not equipped with pingers.

[c] A weighted bycatch rate (observed hauls with and without pingers were used to calculate a weighted bycatch rate)

Table 9. 2006 harp seal bycatch estimate in the NESG

2006 Winter (Jan-May)	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	1[b]	0.037[c]	17	96%	1-53
South of Boston	1[b]	0.087	38	101%	1-130
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	1[b]	0.019	10	81%	1-25
Offshore	0	0.000	0		
Closure Strata					
Offshore Closure	0	0.000	0		
Cashes Ledge Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
Cape Cod Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	3		65	66%	3-160
Summer (Jun-Aug)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore[e]	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Great S. Channel Closure	0	0.000	0		
Subtotal	0		0		
Fall (Sep-Dec)	**Observed Takes**	**Bycatch Rate (Take/MTon)**	**Estimated Takes**	**C.V. (%)**	**95% C.I.**
Port Group-Area Strata					
Northern Maine	0	0.000	0		
Southern Maine	0	0.000	0		
New Hampshire	0	0.000	0		
North of Boston	0	0.000	0		
South of Boston	0	0.000	0		
South Of Cape Cod[a]	0	0.000	0		
East Of Cape Cod	0	0.000	0		
Offshore	0	0.000	0		
Closure Strata					
Northeast Closure	0	0.000	0		
Offshore Closure	0	0.000	0		
Midcoast Closure	0	0.000	0		
Mass Bay Closure	0	0.000	0		
South Cape Closure[a]	0	0.000	0		
Subtotal	0		0		
2006 Total	3		65	66%	3-160

[a] Totals for South of Cape Cod port group and closure stratum includes effort from Connecticut and New York trips that fished east of 72º30'W.

[b] Observed take from haul not equipped with pingers.

[c] A weighted bycatch rate (observed hauls with and without pingers were used to calculate a weighted bycatch rate)

Table 10. 2006 totals for winter in waters off New Jersey for observed trips, observed hauls, observed metric tons of fish landed, prorated dealer metric tons of fish landed, and percent observer coverage by season.

2006 Month	2006 State	Observed Trips	Observed Hauls	Observed MTons	Prorated Dealer MTons	Coverage (MTons) %
Winter (Jan-Apr)	New Jersey	31	113	32.23	824.00	3.91

Table 11. 2006 totals for January in New Jersey for observed trips, observed hauls, observed metric tons of fish landed, prorated dealer metric tons of fish landed, and percent observer coverage by season.

2006 Month	2006 State	Observed Trips	Observed Hauls	Observed MTons	Prorated Dealer MTons	Coverage (MTons) %
January	New Jersey	32	106	29.69	328.99	9.02

Table 12. 2006 Mid-Atlantic harbor porpoise bycatch estimate in the MACG

2006 Month	2006 State	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Winter (Jan-Apr)	New Jersey	20	0.621	512	32%	245 - 874

Table 13. 2006 Mid-Atlantic common dolphin bycatch estimate in the MACG

2006 Month	2006 State	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
January	New Jersey	1	0.034	11	103%	1 - 39

Table 14. 2006 Mid-Atlantic harbor seal bycatch estimate in the MACG

2006 Month	2006 State	Observed Takes	Bycatch Rate (Take/MTon)	Estimated Takes	C.V. (%)	95% C.I.
Winter (Jan-Apr)	New Jersey	1	0.031	26	98%	1 - 82

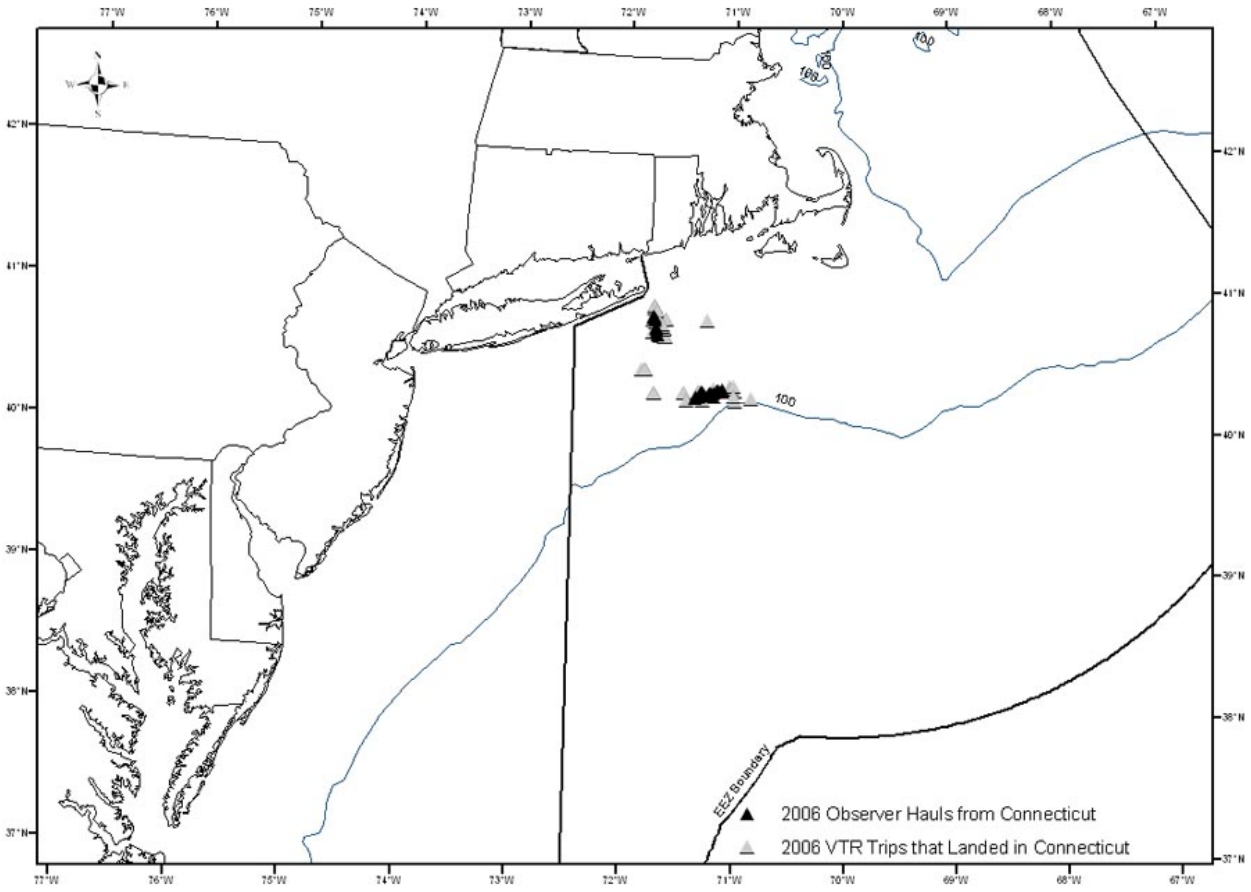

Figure 1. Location of all 2006 observed hauls and VTR trips for Connecticut. Vertical line at 72 º30'W is division between Northeast and Mid-Atlantic regions. Also displayed is the 100m depth contour and EEZ boundary.

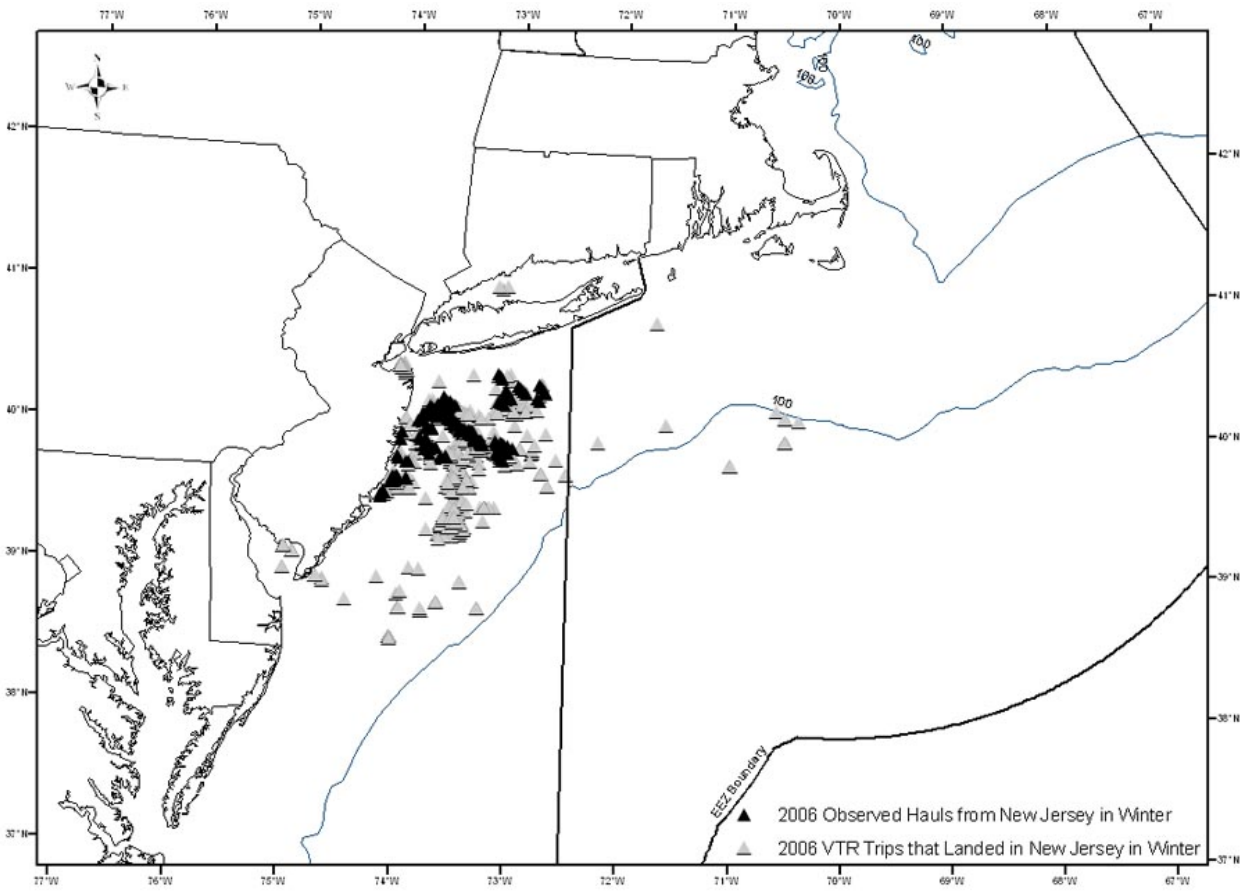

Figure 2. Location of all 2006 observed hauls and VTR trips from New Jersey in the winter (January – April). Vertical line at 72 º30'W is division between Northeast and Mid-Atlantic regions. Also displayed is the 100m depth contour and EEZ boundary.

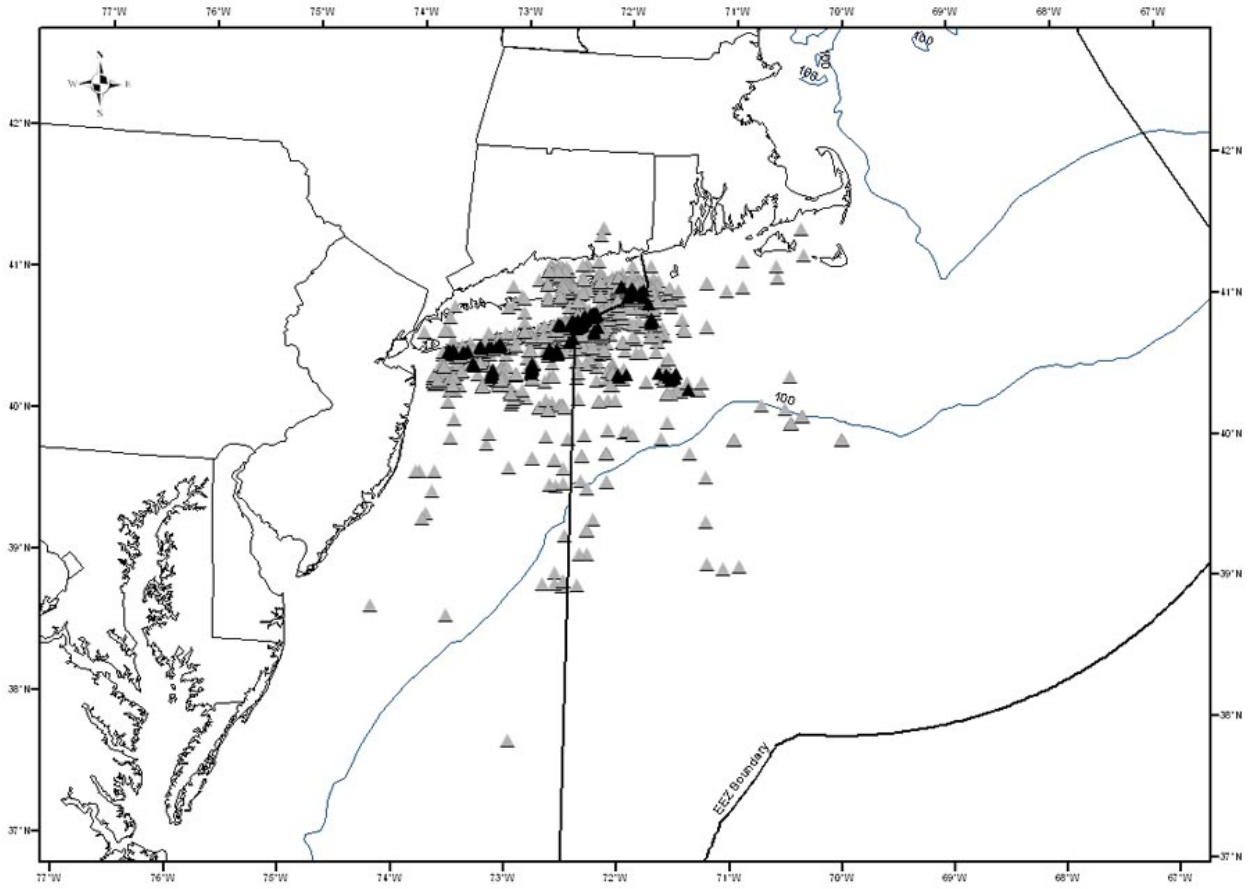

Figure 3. Location of all 2006 observed hauls and VTR trips for New York. Vertical line at 72 º30'W is division between Northeast and Mid-Atlantic regions. Also displayed is the 100m depth contour and EEZ boundary.

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