Summary of Harbor Porpoise Bycatch in the Southern Mid-Atlantic

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SUMMARY
Since the implementation of the harbor porpoise Take Reduction Plan (TRP) on January 1, 1999, harbor porpoise bycatch in waters in the Southern Mid-Atlantic region has been relatively small. The takes observed were during February to April. This manuscript documents the bycatch patterns in the waters in the Southern Mid-Atlantic region during February to April.

During February to April in the years 1999 to 2007, out of the 4673 gillnet hauls observed in this time and area, 8 harbor porpoises takes were observed. Takes were observed in gear targeting American shad, monkfish and striped bass. The bycatch rates were highest in March.

Hauls with four (4) of the observed takes were using very-small mesh sizes (<= 5 inches). These hauls were targeting American shad in 1999 or 2000, using twine sizes of 0.81 or 0.52, and were in strings that were 600 ft or less, during March. The ocean-intercept American Shad and River Herring fishery has been completely closed since 2005, and was slowly phased out since 2000. Thus, in the future while this fishery is closed, these kinds of takes may not occur.

Hauls with the other four (4) observed takes were in strings using large mesh sizes, were targeting either monkfish or striped bass, using twine sizes of 0.66 or 0.9, in strings that were between 1200 and 4500 ft, in February (1), March (1) and April (2). These four large mesh hauls were out-of-compliance with the TRP. Thus, the bycatch rate of large mesh hauls in the Southern Mid-Atlantic region during February to April that were in-compliance (182 observed hauls) was zero.

Over all of the observed small mesh hauls, about 65% were completely in compliance. No harbor porpoise takes were observed in small mesh gillnets in this time and area. Most of the hauls that were out-of compliance were using twine sizes that were too small.

Over all of the observed large mesh hauls, only 21% were completely in compliance. Most of the hauls out-of-compliance were using twine sizes that were too small. About half of the observed large mesh hauls did not use tie downs (as the TRP mandates). And about 30% of the observed large mesh hauls were during the closed period, 15 February to 15 March.

INTRODUCTION

For the waters off the mid-Atlantic states, the Harbor Porpoise Take Reduction Plan (TRP) divides these waters into the "New Jersey Mudhole", "Waters off New Jersey (excluding the Mudhole)", and "Southern Mid-Atlantic". The TRP divides gillnets into "large mesh" [7-18 inches] and "small mesh" [>5 to <7 inches]. The TRP management measures for these areas are in Table 1. This paper will concentrate only on the Southern Mid-Atlantic waters.

During 01 January 1999 to 31 May 2007, in the Southern Mid-Atlantic region, harbor porpoise bycatch was only observed during February through April, the same time period the Southern Mid-Atlantic waters are regulated by the TRP.

This paper will concentrate only on the Southern Mid-Atlantic observed trips taken during 01 February through 30 April after the TRP was in effect (January 1, 1999). Using data collected by the Northeast Fisheries Observer Program (NEFOP), the patterns in the harbor porpoise bycatch are described, and the levels of compliance to the TRP mitigation measures are documented. Only bycatch of harbor porpoises are explored in this investigation.

DATA

The variables collected by the NEFOP that were used in these investigations are described in Appendix 1. In addition, to these variables for the data collected during 1999 to 2006, a variety of environmental variables which are associated with the location and date of the haul were added (Appendix 1).

The observer data used in this investigation were only hauls that have complete latitude-longitude information. Thus, this restriction eliminated some hauls that were used in other analyses (e.g., bycatch estimates), and so the statistics may not match exactly to other analyses.

Data from 2007, which include only data collected during January 1 to May 31, are still preliminary and so have not been processed as completely as the older data.

GENERAL BYCATCH PATTERNS

During 01 January 1999 to 31 May 2007, the Southern Mid-Atlantic region has been observed year round (Figure 1). Harbor porpoise bycatch was only observed during February through April (Figure 2), the same time period the Southern Mid-Atlantic waters are regulated by the TRP.

In the Southern Mid-Atlantic region during 01 February to 30 April of the years 1999 to 2007, there were 4673 hauls observed, which were from 930 trips and 214 unique vessels. This was 271 to 782 hauls observed per year, which were from 54 to 169 trips per year, and from 26 to 66 vessels per year (Table 2).

The distributions of observed hauls each year do not appear to be evenly distributed up and down the coast. In particular, waters off of Maryland and Delaware were not observed in a couple of the years, 2005 to 2006 (Figure 3 and Table 3).

Of the 4673 hauls observed there were only 8 hauls that took a harbor porpoise, each haul took one (1) harbor porpoise. The bycatch rates were highest in March (Table 4).

Four (4) of the observed takes were in strings using "very-small" mesh sizes (<= 5 inches), and the other four were in strings using large mesh sizes (7-18 inches). The bycatch rate was nearly three times higher in the large mesh strings than in the very-small mesh strings: 0.0095 versus 0.0279 takes/landings (Table 4; Figure 4).

The four hauls using very-small mesh sizes that had takes were all targeting American shad in 1999 or 2000, using twine sizes of 0.81 or 0.52, in strings that were 600 ft or less, and were during March.

The four hauls using large mesh sizes that had takes were targeting either monkfish or striped bass, using twine sizes of 0.66 or 0.9, in strings that were between 1200 and 4500 ft long, and in February (1), March (1) and April (2). All of these large mesh hauls with takes were out-of-compliance with the TRP (see details below).

COMPLIANCE

Small Mesh

During February 1 to April 30 of 1999 to 2007, 721 observed hauls (from 184 trips and 85 vessels) used small mesh in the Southern Mid-Atlantic. No harbor porpoise takes were observed in small mesh gillnets in this time and area. Overall, about 65% of the observed hauls using small mesh were completely in compliance (Table 5).

Looking only at the gear length requirement, there were 53 (7.4%) hauls (20 trips from 14 vessels) that were using small mesh sizes (5.3 to 6.5 inches) and had total gear lengths greater than 2118 ft (the limit set in the TRP). The lengths ranged from 2160 to 6600 ft. The 53 hauls were observed in each month, and most years: February (15), March (23) and April (15), and in 1999 (24), 2000 (8), 2003 (3), 2004 (5), and 2007 (13). These out-of-compliance hauls were targeting a variety of species: bluefish (1), smooth dogfish (15), spiny dogfish (32), and summer flounder (5).

Looking only at the twine size requirements, there were 206 hauls (29%) from 54 trips and 33 vessels that used small mesh (5.13 to 6.5 inches) and twine sizes less than 0.81 mm (0.47 to 0.74 mm). The 206 hauls were observed in each month and most years: February (32), March (69) and April (105), and in 1999 (32), 2000 (67), 2001 (10), 2002 (3), 2003 (6), 2004 (8), 2005 (41), and 2007 (39). These out-of-compliance hauls were targeting a variety of species: shads (American shad and herring), croaker, bluefish, kingfish, red drum, dogfish (smooth and spiny), striped bass, flounders (southern and summer), and weakfish.

Large Mesh

During February 1 to April 30, of 1999 to 2007, 874 observed hauls (from 229 trips and 45 vessels) used large mesh in the Southern Mid-Atlantic. Overall, only 21% of the observed hauls using large mesh were completely in-compliance (Table 5). Four harbor porpoises were observed taken in large mesh nets; all of which were not in-compliance.

Looking only at the gear length requirements, in the Southern Mid-Atlantic during February to April, there were 211 hauls (24%) from 69 trips and 17 unique vessels that used large mesh and floatline lengths greater than 3900 ft (4200 to 6000 ft). The 211 hauls were observed mostly in April, and in most years: February (3), March (12) and April (183), and in 1999 (2), 2001 (77), 2002 (88), 2004 (14), 2005 (3) and 2007 (14). All of these out-of-compliance hauls were targeting monkfish.

Looking only at the twine size requirements, there were 90 hauls (10%) from 32 trips and 18 vessels that used large mesh (7 to 8 inches) and twine sizes less than 0.9 mm (0.47 to 0.81 mm). The 90 hauls were observed in each month and in most years: February (29), March (37) and April (24), and in 1999 (16), 2000 (13), 2001 (18), 2002 (4), 2003 (1), 2004 (5), 2005 (2), 2006 (3) and 2007 (28). These out-of-compliance hauls were targeting monkfish (43), smooth dogfish (5) and striped bass (42).

Looking only at the closure requirements, there were 251 observed hauls (30%) using large mesh in the Southern Mid-Atlantic region during 15 February to 15 March.

Looking only at the requirement to use tie downs, 473 (54%) of the observed hauls did not use tie downs. This was 108 trips and 23 unique vessels.

REFERENCE

Federal Register 1998. Taking of Marine Mammals incidental to commercial fishing operations: Harbor porpoise take reduction plan regulations. Vol. 63, No 231 pg 66464-66490.

Appendix 1. Some variables collected by the NEFOP and additional environmental variables.

Variable Name	Description
LOCATION/TIME VARIABLES	
Day of year	Day of year: 1 = Jan. 1 for each year
Year	Year: 1999 to 2007
Month	Month: January to April
Longitude	Longitude
Latitude	Latitude
Steam time	Time spent steaming to fishing grounds from port
Bottom depth	Bottom depth (fathoms)
Distance to 50m	Distance to the 50 m depth contour
Distance to 100m	Distance to the 100 m depth contour
Distance to 200m	Distance to the 200 m depth contour
Distance to 500m	Distance to the 500 m depth contour
Distance to the coast	Distance to the nearest coastline (m)
N. Atlantic Oscillation	N. Atlantic Oscillation (NAO) monthly value
NAO - 1	NAO value including a 1 year lag
NAO - 2	NAO value including a 2 years lag
Winter NAO	Winter NAO monthly value
Winter NAO - 1	Winter NAO monthly value with 1 year lag
Winter NAO - 2	Winter NAO monthly value with 2 years lag
SST	Sea surface temperature (celcius)
Bottom water temperature	Bottom water temperature (celcius)
Bottom slope	Bottom slope
Chlorophyll	Chlorophyll level (from satellite)
log10(Chlorophyll)	log10(Chlorophyll level) (from satellite)
Sediment	Type of bottom sediment
FISHING PRACTICES	
Soak duration	Time net in the water (hrs)
Target species	Species captain said they were trying to get
Temporary home port	Temporary home port
Vessel gross tonnage	Vessel gross tonnage
Vessel length	Length of fishing vessel
Haul duration	Length of time of haul back (hrs)
Days absent	Number of days absent from a port
State landed	State that catch were landed in
Weather	Weather conditions
Wave height	Wave height

Appendix 1. continued. Some variables collected by the NEFOP and additional environmental variables.

Variable Name	Description
GEAR CHARACTERISTICS	
Twine size	Size of the twine (mm)
Mesh count	Number of meshs in the vertical direction of the net
Gear length	Total length of gear and spaces between nets
Net height	Height of net
Average mesh size	Average mesh size (inches)
Hang ratio	Hang ratio
Number of nets set	Number of nets that were set
Number of nets hauled	Number of nets that were hauled back
Used tie downs?	Were tie downs used: yes, no, unknown
Length tie downs	Length of tie downs
Used anchors?	Were anchors used: yes, no, unknown
Number of anchors	Number of anchors used on the string
Type of anchor	Type of anchor used
Anchor weight	Total weight of anchors (pounds)
Used additional weights?	Were additional weights used: yes, no, unknown
Additional weights	Amount of additional weights used (pounds)
Used droplines?	Were droplines used: yes, no, unknown
Lead line depth	Depth the lead line of the net is at (fathoms)
Weight of lead line	Total weight of the lead line
Used spaces?	Were spaces between the nets: yes, no, unknown
Space width	Width of spaces between nets
Number of spaces	Number of spaces between nets
Color of net	Color of net
Float distance	Distance between floats
Total number of floats	Total number of floats
OBSERVER PRACTICE	
Type of trip	Observer protocol: complete, limited

Table 1. Management measures for the large and small mesh gillnet fishery in the Mid-Atlantic.

LARGE MESH FISHERY (7 inches to 18 inches)

Floatline length:	
NJ Mudhole	<= 3,900 ft
NJ waters (excluding the Mudhole)	<= 4,800 ft
Southern Mid-Atlantic waters	<= 3,900 ft
Twine Size	>= 0.90 mm
Tie Downs	Required
Net Number per Vessel	80 nets
Net Size	<= 300 ft
Net Tagging	Required
Number of Nets within a Net String	
NJ Mudhole	<= 13 nets
NJ waters (excluding the Mudhole)	<= 16 nets
Southern Mid-Atlantic waters	<= 13 nets
Time/Area Closures:	
NJ waters (including the Mudhole)	Closed from April 1 – 20
NJ Mudhole	Closed from February 15 - March 15
Southern Mid-Atlantic waters	Closed from February 15 - March 15
Gear Modification Requirements:	
NJ waters (excluding the Mudhole)	January 1 – March 30 and April 21 – 30
NJ Mudhole	January 1 – February 14; March 16 – March 31; and April 21 – 30
Southern Mid-Atlantic waters	February 1 – February 14 and March 16 – April 30

SMALL MESH FISHERY (> 5 inches to < 7 inches)

Floatline length:	
NJ waters (including the Mudhole)	<= 3,000 ft
Southern Mid-Atlantic waters	<= 2,118 ft
Twine Size	>= 0.81 mm
Tie Downs	Prohibited
Net Number per Vessel	45 nets
Net Size	<= 300 ft
Net Tagging	Required
Number of Nets within a Net String	
NJ Waters (including the Mudhole)	<= 10 nets
Southern Mid-Atlantic waters	<= 7 nets
Time/Area Closures:	
NJ Mudhole	Closed from February 15 - March 15
Gear Modification Requirements:	
NJ waters (excluding Mudhole)	January 1 – April 30
NJ Mudhole	January 1 – February 14 and March 16 – April 30
Southern Mid-Atlantic waters	February 1 – April 30

Table 2. Descriptive statistics about the bycatch of harbor porpoises in the Southern Mid-Atlantic waters during February to April 1999 to 2007.

	Year									Total
	1999	2000	2001	2002	2003	2004	2005	2006	2007	
Number of observed hauls	698	782	776	456	271	371	377	313	629	4673
Number of observed trips	129	150	169	80	54	81	87	59	121	930
Number of observed vessels	56	57	43	26	33	50	50	34	66	214
Number of observed hauls with one or more take	3	1	1	0	0	2	0	0	1	8
Total number of observed takes	3	1	1	0	0	2	0	0	1	8
Bycatch rate (observed total takes/observed number of hauls)	0.004	0.001	0.001	0	0	0.005	0	0	0.002	0.002
Bycatch rate (observed total takes/observed mt of landings)	0.028	0.008	0.008	0	0.000	0.026	0	0.000	0.009	0.010

Table 3. Number of hauls observed during February to April 1999 to 2007, by the state the catch was landed at.

State Landed	Year									Total
	1999	2000	2001	2002	2003	2004	2005	2006	2007	
DE	35	120	53	0	0	0	0	0	0	208
MD	75	39	0	41	5	31	0	0	6	197
VA	197	253	376	310	128	96	79	61	111	1611
NC	391	370	347	105	138	244	298	252	512	2657

Table 4. Using observer data from February to April, 1999 to 2007, the number of observed hauls and takes, plus the resulting bycatch rates by month and by mesh size.

	Month			Mesh Size			
	Feb	Mar	Apr	Very Small <= 5 in	Small >5 to<7 in	Large 7-18 in	Unk
number of observed hauls	1369	1592	1712	3005	721	878	69
Number of observed takes	1	5	2	4	0	4	0
bycatch rate (obs takes/obs hauls)	0.0007	0.0031	0.0012	0.0013	0	0.0046	0
bycatch rate (obs takes/obs mt of landing)	0.0041	0.0155	0.0101	0.0095	0	0.0279	0

Table 5. Number of hauls and number of takes in hauls that were in and out of compliance in the Southern Mid-Atlantic region during February to April, 1999 to 2007.

ALL HAULS	In compliance?	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
	No	125	138	219	182	45	50	88	10	92	949
	Yes	573	644	557	274	226	321	289	303	537	3724
	% in compliance	0.821	0.824	0.718	0.601	0.834	0.865	0.767	0.968	0.854	0.797
Number of hauls	TOTAL	698	782	776	456	271	371	377	313	629	4673
	No	0	0	1	0	0	2	0	0	1	4
	Yes	3	1	0	0	0	0	0	0	0	4
Number of takes	TOTAL	3	1	1	0	0	2	0	0	1	8

SMALL MESH	In compliance?	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
	No	56	74	10	3	9	13	41	0	47	253
	Yes	152	136	44	40	12	14	1	13	56	468
	% in compliance	0.731	0.648	0.815	0.93	0.571	0.519	0.024	1	0.544	0.649
Number of hauls	TOTAL	208	210	54	43	21	27	42	13	103	721
	No	0	0	0	0	0	0	0	0	0	0
	Yes	0	0	0	0	0	0	0	0	0	0
Number of takes	TOTAL	0	0	0	0	0	0	0	0	0	0

LG MESH	In compliance?	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
	No	69	64	208	179	36	35	47	10	44	692
	Yes	0	0	102	2	3	7	4	46	18	182
	% in compliance	0	0	0.329	0.011	0.077	0.167	0.078	0.821	0.29	0.208
Number of hauls	TOTAL	69	64	310	181	39	42	51	56	62	874
	No	0	0	1	0	0	2	0	0	1	4
	Yes	0	0	0	0	0	0	0	0	0	0
Number of takes	TOTAL	0	0	1	0	0	2	0	0	1	4

VERY SMALL	Not regulated	1999	2000	2001	2002	2003	2004	2005	2006	2007	Total
Number of hauls	Not regulated	396	507	411	232	211	300	284	244	416	3078
Number of takes	Not regulated	3	1	0	0	0	0	0	0	0	4

Figure 1. By year, number of observed hauls in the Southern Mid-Atlantic region during 01 January 1999 to 30 May 2007.

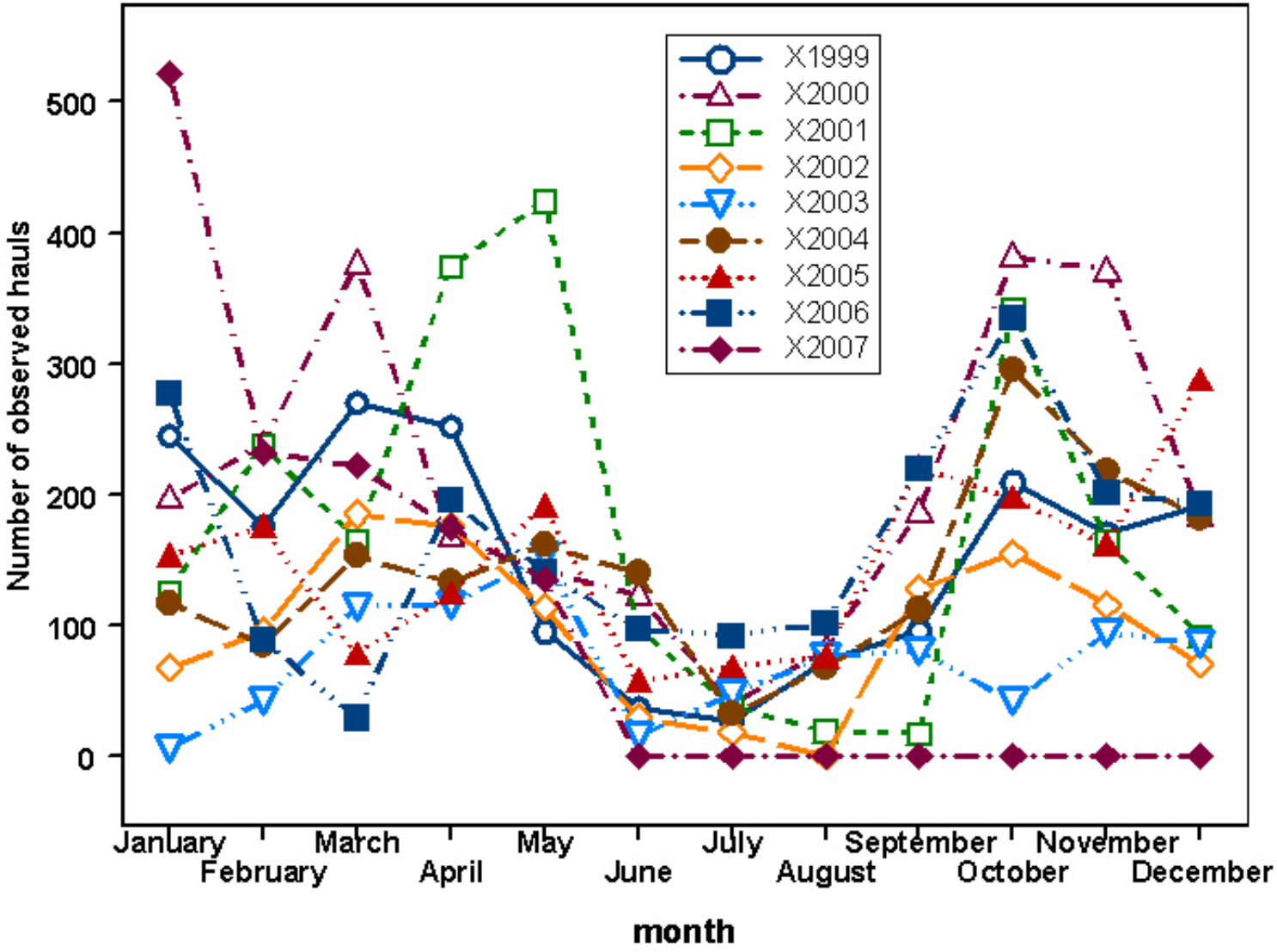

Figure 2. Locations of observed hauls during January 1999 to May 2007 and the location and months of the observed takes within the Southern Mid-Atlantic region. The depth contours are 30, 50, and 100m.

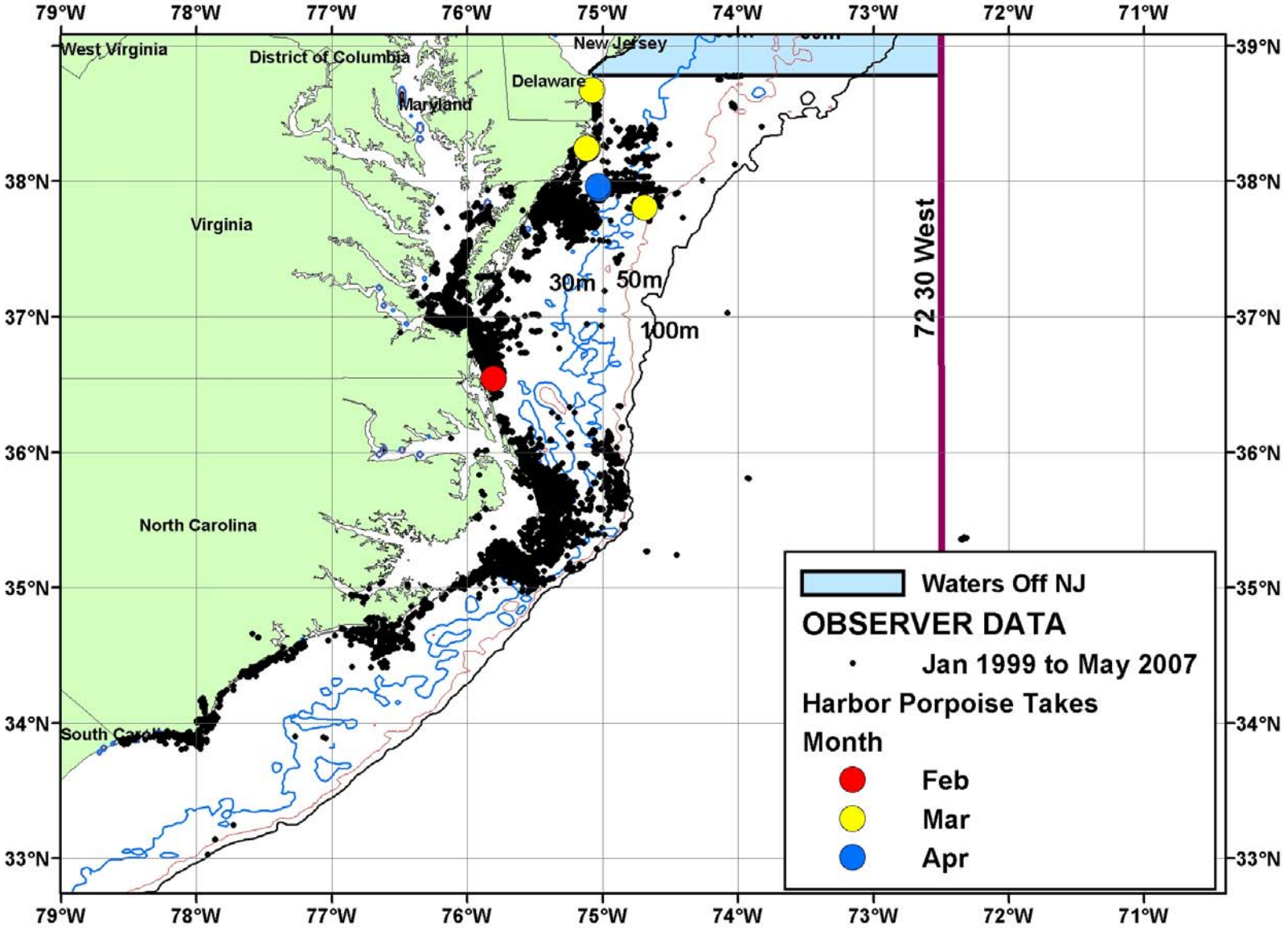

Figure 3. Location of hauls, by year (colored dot) and hauls with takes (diamonds). Data used were from February to April during 1999 to 2007.

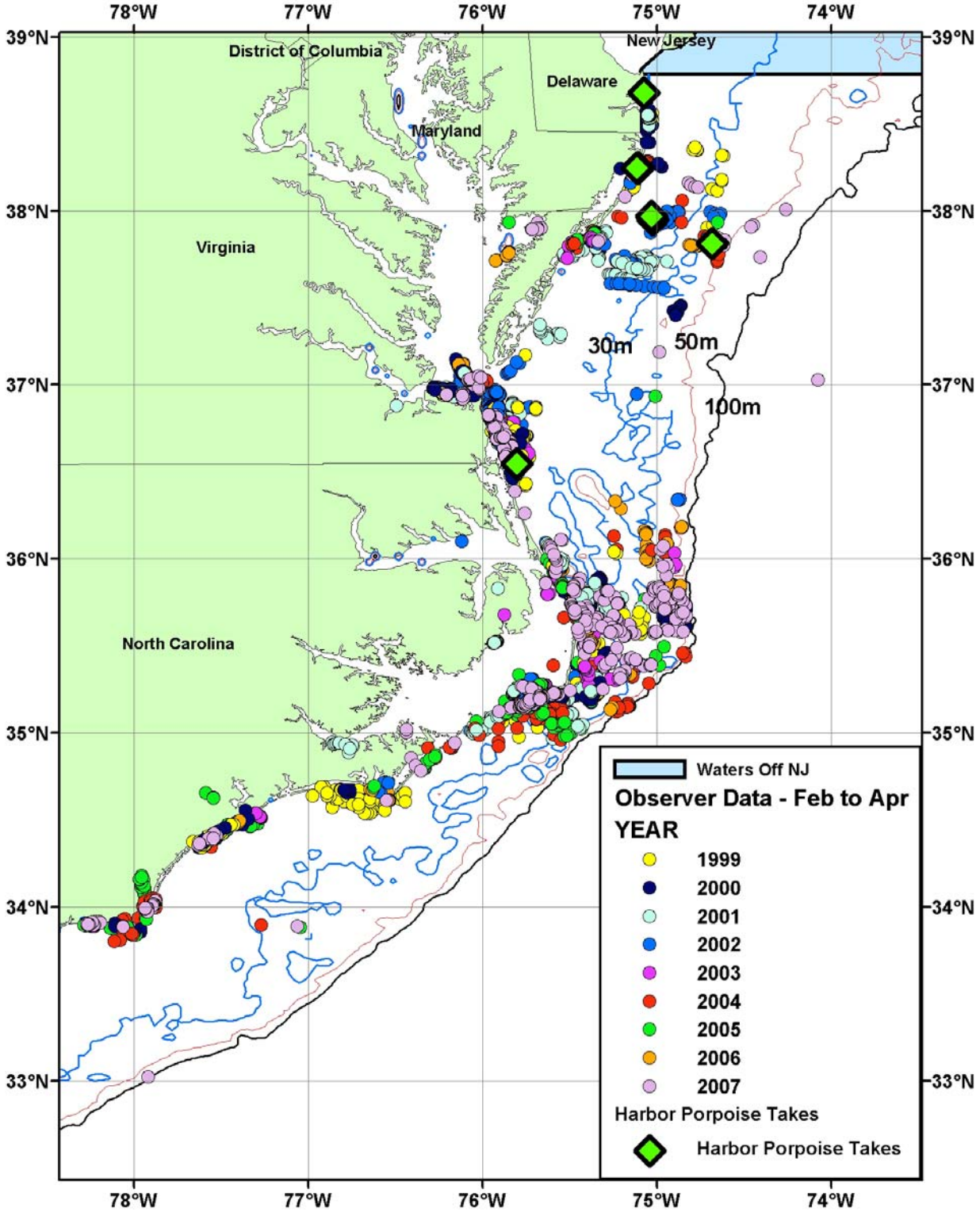
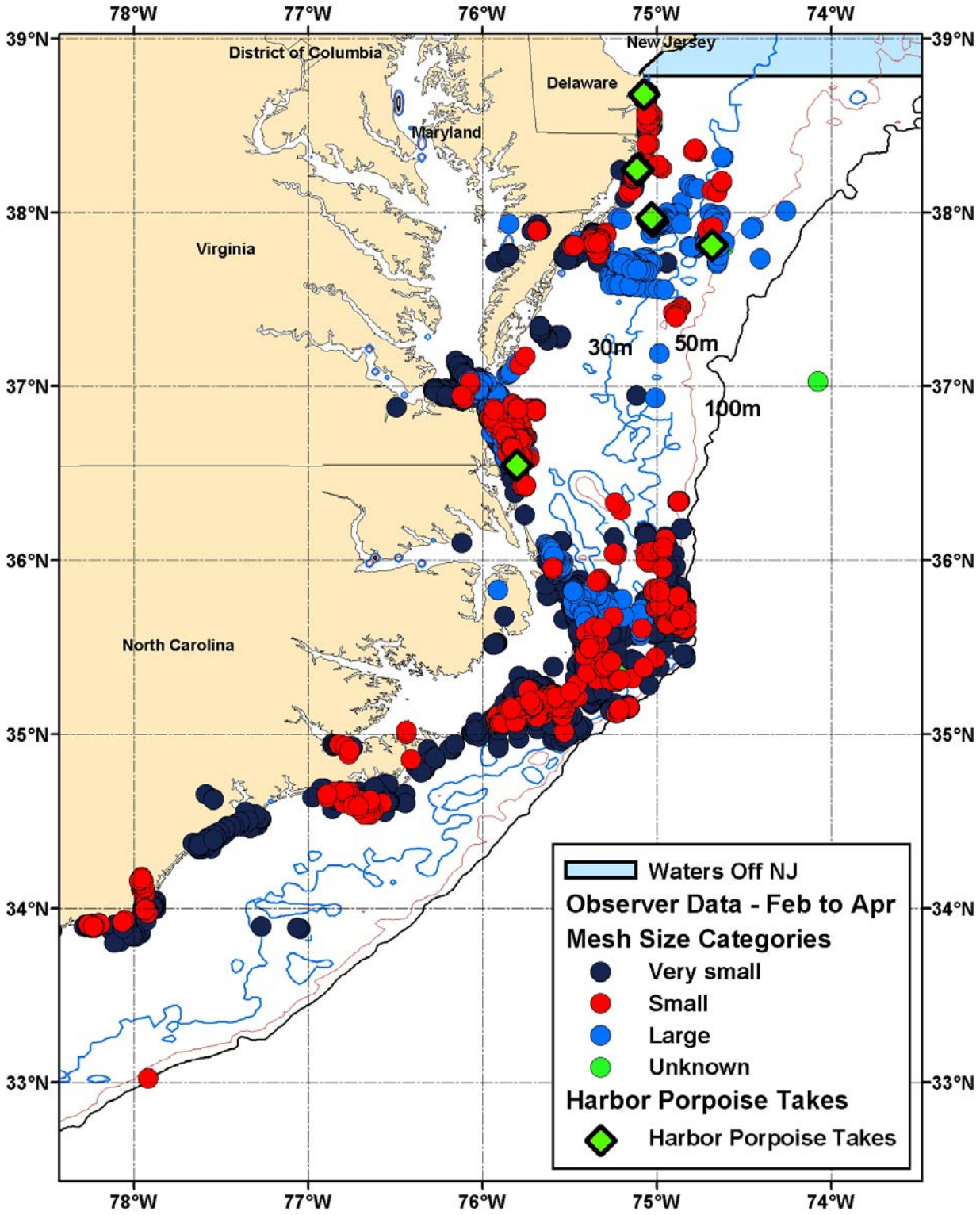
Figure 4. Location of hauls, by mesh size categories (colored dot) and hauls with takes (diamonds). Data used were from February to April during 1999 to 2007.