APPENDIX I: Estimated serious injury and mortality (SI&M) of Western North Atlantic marine mammals listed by U.S. observed fisheries. Marine mammal species with zero (0) observed SI&M are not shown in this table. (unk = unknown).

Category, Fishery, Species	Yrs. observed	observer coverage	Est. SI by Year (CV)	Est. Mortality by Year (CV)	Mean Annual Mortality (CV)	PBR
CATEGORY I						
Gillnet Fisheries: Northeast gillnet						
Harbor porpoise - after Take Reduction Plan	2006-2010	.04, .07, .05, .04, .17		514(.31), 395(.38), 666 (.48), 591(.23), 387(.30)	511(.17)	*
Atlantic white sided dolphin	2006-2010	.04, .07, .05, .04, .17		41(.71), 0, 81(.57), 0, 66(1.0)	38(.46)	*
Short-beaked common dolphin	2006-2010	.04, .07, .05, .04, .17		20(1.05), 11(0.94), 34(.77), 43(.77), 42 (.94)	30(.42)	529
Bottlenose dolphin (offshore)	2002-2006	.02, .03, .06, .07, .04		0, 0, 0, unk, unk	unk	566
Harbor seal	2006-2010	.04, .07, .05, .04, .17		87(.58), 93 (.49), 243(.41), 516(.28), 461(.30)	280(.17)	undet.
Gray seal	2006-2010	.04, .07, .05, .04, .17		248(.47), 889(0.24), 618(.23), 1063(.26), 1,115(.31)	794(.13)	unk
Harp seal	2006-2010	.04, .07, .05, .04, .17		65(.66), 119(.35), 238(.38), 415(.27), 253(.62)	218(.20)	unk
Gillnet Fisheries:US Mid-Atlantic gillnet						
Harbor porpoise - after Take Reduction Plan	2006-2010	.04, .06, .03, .03, 04		511(.32), 58(1.03), 350(.75), 201(.55), 257(.89)	275(.29)	*
Bottlenose dolphin (offshore)	2002-2006	.01, .01, .02, .03, .04		unk, 0, 0, unk, unk	unk	566
Short-beaked common dolphin	2006-2010	.04, .06, .03, .03, 04		11(1.03), 0, 0, 0, 31(.65)	8.4(.55)	529
Risso's dolphin	2006-2010	.04, .06, .03, .03, 04		0, 34(.73), 0, 0, 0	6.8(.73)	*
Harbor seal	2006-2010	.04, .06, .03, .03, 04		26 (.98), 0, 88(.74), 47(.68), 88(.41)	50(.34)	undet.
Harp Seal	2006-2010	.04, .06, .03, .03, 04		0, 38(.9), 176(.74), 70(.67), 32(.93)	63(.46)	unk
Gray Seal	2006-2010	.04, .06, .03, .03, 04		0, 0, 0, 0, 265(.76)	53(.76)	unk
Longline Fisheries: Pelagic longline (excluding NED-E)						
Risso's dolphin	2006-2010	.07, .07, .07, .10, .08	0, 9 (.65), 17(.73), 11(.71), 0	0, 0, 0, 0, 0	7.4(.71)	*

Long and short-finned pilot whale [a]	2006-2010	.07, .07, .07, .10, .08	212(.21), 169(.50), 57(.65), 98(.42), 17(.70)	0, 16 (1.0), 0, 0, 0	114 (.20)	172/93[c]
Short-beaked common dolphin	2006-2010	.07, .07, .07, .10, .08	0, 0, 0, 0, 0	0, 0, 0, 8.5(1.0), 0	1.7(1.0)	529
CATEGORY II						
Mid-Atlantic Mid-Water Trawl – Including Pair Trawl						
Risso's dolphin	2006-2010	.089, .039, .13, .13, .25	0, 0, 0, 0, 0	0, 0, 0.2 (unexpanded), 0, 0	0.2	*
White-sided dolphin	2006-2010	.089, .039, .13, .13, .25	0, 0, 0, 0, 0	29(.74), 12(.98), 15(.73), 4.3(.92), 0	12(0.45	*
Short-beaked common dolphin	2006-2010	.089, .039, .13, .13, .25	0, 0, 0, 0, 0	0, 3.2(.70), 0, 0, 0	0.6 (.70)	529
Long and short-finned pilot whale	2006-2010	.089, .039, .13, .13, .25	0, 0, 0, 0, 0	0, 0, 12 (.99), 0, 0	2.4(.99)	172/93[c]
Gray Seal	2006-2010	.089, .039, .13, .13, .25	0, 0, 0, 0, 0	0, 0, 0, 0, unk	unk	unk
Trawl Fisheries:Northeast bottom trawl						
Harp seal	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	unk, 0, 0, 0, unk	unk	unk
Harbor seal	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	unk, 0, unk, 0, unk, 0	0.8	undet.
Gray Seal	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	0, unk, unk, unk, unk	unk	unk
Long and short-finned pilot whale [a]	2005-2009	.12, .06, .06, .08, .09	0, 0, 0, 0, 0	15(.30), 14(.28), 12 (.35), 10(.34), 8.6(.35)	12(0.14)	172/93[c]
Short-beaked common dolphin	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	25(.28), 24(.28), 17(.29), 19(.30), 17(.28)	20 (.13)	529
Atlantic white-sided dolphin	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	164(.34), 147(.35), 147(.32), 131(.26), 119(.39)	142(.15)	*
Minke whale	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	3.7 (.73), 3.2(.72), 2.9(.73), 2.9(.75), 0	2.6(.46)	*
Harbor porpoise	2006-2010	.06, .06, .08, .09, .16	0, 0, 0, 0, 0	6.5(.49), 5.6(.46), 5.3(.47), 5.1(.50), 0	4.5(.30)	*
Mid-Atlantic Bottom Trawl						
Atlantic white-sided dolphin	2006-2010	.02, .03, .03, .05, .06	0, 0, 0, 0, 0	26(.25), 21(.24), 16(.18), 16(.16), 22(.14)	20(.09)	*
Long and short-finned pilot whale [a]	2005-2009	.03, .02, .03, .03, .05	0, 0, 0, 0, 0	31(.31), 37(.34), 36(.38), 24(.36). 23(.36)	30(.16)	172/93[c]
Short-beaked common dolphin	2006-2010	.02, .03, .03, .05, .06	0, 0, 0, 0, 0	131(.28), 66(.27), 108(.28), 104(.29), 104(.29)	103 (.13)	529
Risso's Dolphin	2006-2010	.02, .03, .03, .05, .06	0, 0, 0, 0, 0	0, 0, 0, 0, 3 (unexpanded)	3	*
Northeast Mid-Water Trawl Including Pair Trawl						

Long and short-finned pilot whale	2005-2009	.199, .031, .08, .20, .42	0, 0, 0, 0,0	0, 0, 0, 16(.61), 0	3.2(.61)	172/93[c]
Short-beaked common dolphin	2006-2010	.031, .08, .20, .42, .54	0, 0, 0,0 ,0	0, 0, 0,0 ,na	na	529
Harbor seal	2006-2010	.031, .08, .20, .42, .54	0, 0, 0,0 ,0	0, 0, 0, 1.3 (.81), na	0.7(.81)	undet.

NOTES:
* PBR under review.
a. As of 2010, the PBR for pilot whales has been split. Short-finned pilot whale PBR is 172 and long-finned pilot whale is 93.

Appendix II. Summary of the confirmed human-caused mortality and serious injury (SI) events involving baleen whale stocks along the Gulf of Mexico Coast, US East Coast, and adjacent Canadian Maritimes, 2006-2010, with number of events attributed to entanglements or vessel collisions by year.

Stock	**Mean annual mortality and SI rate** (PBR[1] for reference)	**Entanglements**			**Vessel Collisions**		
		Annual rate **(US waters / Canadian waters)**	**Confirmed mortalities** **(2005, 2006, 2007, 2008, 2009)**	**Confirmed SIs** **(2005, 2006, 2007, 2008, 2009)**	**Annual rate** **(US waters / Canadian waters)**	**Confirmed mortalities** **(2005, 2006, 2007, 2008, 2009)**	**Confirmed SIs** **(2005, 2006, 2007, 2008, 2009)**
Western North Atlantic right whale *(Eubalaena glacialis)*	**2.8** (0.9)	**1.8** (1.6/ 0.2)	(1, 1, 0, 0, 2)	(0, 0, 1, 2, 2)	**1.2** (0.8 / 0.4)	(4, 0, 0, 0, 1)	(1, 0, 0, 0, 0)
Gulf of Maine humpback whale *(Megaptera novaeangliae)*	**7.8** (2.7)	**5.8** (5.6 / 0.2)	(1, 1, 2, 2, 3)	(4, 2, 4, 3, 7)	**2.0** (2.0 / 0)	(3, 3, 1, 0, 3)	**0**
Western North Atlantic fin whale *(Balaenoptera physalus)*	This report is still under review.						
Nova Scotian sei whale *(B. borealis)*	This report is still under review.						
Western North Atlantic blue whale *(B. musculus)*	**0** (0.9)	**0**	**0**	**0**	**0**	**0**	**0**
Canadian East Coast minke whale *(B. acutorostrata)*	This report is still under review.						
Western North Atlantic Bryde's whale *(B. edeni)*	**0.2** (0.1)	**0**	**0**	**0**	**0.2** (0.2 / 0)	(0, 0, 0, 1, 0)	**0**

[1] Potential Biological Removal (PBR)

Appendix III
Fishery Descriptions

This appendix is broken into two parts: Part A describes commercial fisheries that have documented interactions with marine mammals in the Atlantic Ocean; and Part B describes commercial fisheries that have documented interactions with marine mammals in the Gulf of Mexico. A complete list of all known fisheries for both oceanic regions, the 2012 List of Fisheries, is published in the *Federal Register*, (76 FR 73912;November 29, 2011). Each part of this appendix contains three sections: I. data sources used to document marine mammal mortality/entanglements and commercial fishing effort trip locations, II. fishery descriptions for Category I, II and III fisheries that have documented interactions with marine mammals and their historical level of observer coverage, and III. historical fishery descriptions.

Part A. Description of U.S Atlantic Commercial Fisheries

I. Data Sources

Items 1-5 describe sources of marine mammal mortality, serious injury or entanglement data; items 6-9 describe the sources of commercial fishing effort data used to summarize different components of each fishery (i.e. active number of permit holders, total effort, temporal and spatial distribution) and generate maps depicting the location and amount of fishing effort.

1. Northeast Region Fisheries Observer Program (NEFOP)

In 1989 a Fisheries Observer Program was implemented in the Northeast Region (Maine-Rhode Island) to document incidental bycatch of marine mammals in the Northeast Region Multi-species Gillnet Fishery. In 1993 sampling was expanded to observe bycatch of marine mammals in Gillnet Fisheries in the Mid-Atlantic Region (New York-North Carolina). The Northeast Fisheries Observer Program (NEFOP) has since been expanded to sample multiple gear types in both the Northeast and Mid-Atlantic Regions for documenting and monitoring interactions of marine mammals, sea turtles and finfish bycatch attributed to commercial fishing operations. At sea observers onboard commercial fishing vessels collect data on fishing operations, gear and vessel characteristics, kept and discarded catch composition, bycatch of protected species, animal biology, and habitat (NMFS-NEFSC 2003).

2. Southeast Region Fishery Observer Programs

Three Fishery Observer Programs are managed by the Southeast Fisheries Science Center (SEFSC) that observe commercial fishery activity in U.S. Atlantic waters. The Pelagic Longline Observer Program (POP) administers a mandatory observer program for the U.S. Atlantic Large Pelagics Longline Fishery. The program has been in place since 1992 and randomly allocates observer effort by eleven geographic fishing areas proportional to total reported effort in each area and quarter. Observer coverage levels are mandated under the Highly Migratory Species Fisheries Management Plan (HMS FMP, 50 CFR Part 635). The second program is the Shark Gillnet Observer Program that observes the Southeastern U.S. Atlantic Shark Gillnet Fishery. The Observer Program is mandated under the HMS FMP, the Atlantic Large Whale Take Reduction Plan (ALWTRP) (50 CFR Part 229.32), and the Biological Opinion under Section 7 of the Endangered Species Act. Observers are deployed on any active fishing vessel reporting shark drift gillnet effort. In 2005, this program also began to observe sink gillnet fishing for sharks along the southeastern U.S. coast. The observed fleet includes vessels with an active directed shark permit and fish with sink gillnet gear (Carlson and Bethea 2007). The third program is the Southeastern Shrimp Otter Trawl Fishery Observer Program. Prior to 2007, this was a voluntary program administered by SEFSC in cooperation with the Gulf and South Atlantic Fisheries Foundation. The program was funding and project dependent, therefore observer coverage is not necessarily randomly allocated across the fishery. In 2007, the observer program was expanded, and it became mandatory for fishing vessels to take an observer if selected. The program now includes more systematic sampling of the fleet based upon reported landings and effort patterns. The total level of observer coverage for this program is approximately 1% of the total fishery effort. In each Observer Program, the observers record information on the total target species catch, the number and type of interactions with protected species (including both marine mammals and sea turtles), and biological information on species caught.

3. Regional Marine Mammal Stranding Networks

The Northeast and Southeast Region Stranding Networks are components of the Marine Mammal Health and Stranding Response Program (MMHSRP). The goals of the MMHSRP are to facilitate collection and dissemination of data, assess health trends in marine mammals, correlate health with other biological and environmental parameters, and coordinate effective responses to unusual mortality events (Becker *et al.* 1994). Since 1997, the Northeast Region Marine Mammal Stranding Network has been collecting and storing data on marine mammal strandings and entanglements that occur from Maine through Virginia. The Southeast Region Strandings Program is responsible for data collection and stranding response coordination along the Atlantic coast from North Carolina to Florida, along the U.S. Gulf of Mexico coast from Florida through Texas, and in the U.S. Virgin Islands and Puerto Rico. Prior to 1997, stranding and entanglement data were maintained by the New England Aquarium and the National Museum of Natural History, Washington, D.C. Volunteer participants, acting under a letter of agreement, collect data on stranded animals that include: species; event date and location; details of the event (i.e., signs of human interaction) and determination on cause of death; animal disposition; morphology; and biological samples. Collected data are reported to the appropriate Regional Stranding Network Coordinator and are maintained in regional and national databases.

4. Marine Mammal Authorization Program

Commercial fishing vessels engaging in Category I or II fisheries are automatically registered under the Marine Mammal Authorization Program (MMAP) in order to lawfully take a non-endangered/threatened marine mammal incidental to fishing operations. These fishermen are required to carry an Authorization Certificate onboard while participating in the listed fishery and must be prepared to carry a fisheries observer if selected. All vessel owners, regardless of the category of fishery they are operating in, are required to report, within 48 hours of the incident even if an observer has recorded the take, all incidental injuries and mortalities of marine mammals that have occurred as a result of fishing operations (NMFS-OPR 2003). Events are reported by fishermen on the Marine Mammal Mortality/Injury forms then submitted to and maintained by the NMFS Office of Protected Resources. The data reported include: captain and vessel demographics; gear type and target species; date, time and location of event; type of interaction; animal species; mortality or injury code; and number of interactions. Reporting forms are available online at http://www.nmfs.noaa.gov/pr/pdfs/interactions/mmap_reporting_form.pdf.

5. Other Data Sources for Protected Species Interactions/Entanglements/Ship Strikes

In addition to the above, data on fishery interactions/entanglements and vessel collisions with large cetaceans are reported from a variety of other sources including the New England Aquarium (Boston, Massachusetts); Provincetown Center for Coastal Studies (Provincetown, Massachusetts); U.S. Coast Guard; whale watch vessels; Canadian Department of Fisheries and Oceans (DFO)); and members of the Atlantic Large Whale Disentanglement Network.. These data, photographs, etc. are maintained by the Protected Species Division at the Northeast Regional Office (NERO), the Protected Species Branch at the Northeast Fisheries Science Center (NEFSC) and the Southeast Fisheries Science Center (SEFSC).

6. Northeast Region Vessel Trip Reports

The Northeast Region Vessel Trip Report Data Collection System is a mandatory, but self-reported, commercial fishing effort database (Wigley *et al.* 1998). The data collected include: species kept and discarded; gear types used; trip location; trip departure and landing dates; port; and vessel and gear characteristics. The reporting of these data is mandatory only for vessels fishing under a federal permit. Vessels fishing under a federal permit are required to report in the Vessel Trip Report even when they are fishing within state waters.

7. Southeast Region Fisheries Logbook System

The Fisheries Logbook System (FLS) is maintained at the SEFSC and manages data submitted from mandatory Fishing Vessel Logbook Programs under several FMPs. In 1986 a comprehensive logbook program was initiated for the Large Pelagics Longline Fishery and this reporting became mandatory in 1992. Logbook reporting has also been initiated since the early 1990s for a number of other fisheries including: Reef Fish Fisheries; Snapper-Grouper Complex Fisheries; federally managed Shark Fisheries; and King and Spanish Mackerel Fisheries. In each case, vessel captains are required to submit information on the fishing location, the amount and type of fishing gear used, the total amount of fishing effort (e.g., gear sets) during a given trip, the total weight and composition of the catch, and the disposition of the catch during each unit of effort (e.g., kept, released alive, released dead). FLS data are used to estimate the total amount of fishing effort in the fishery and thus expand bycatch rate estimates from observer data to estimates of the total incidental take of marine mammal species in a given fishery.

8. Northeast Region Dealer Reported Data

The Northeast Region Dealer Database houses trip level fishery statistics on fish species landed by market category, vessel ID, permit number, port location and date of landing, and gear type utilized. The data are collected by both federally permitted seafood dealers and NMFS port agents. Data are considered to represent a census of both vessels actively fishing with a federal permit and total fish landings. It also includes vessels that fish with a state permit (excluding the state of North Carolina) that land a federally managed species. Some states submit the same trip level data to the Northeast Region, but contrary to the data submitted by federally permitted seafood dealers, the trip level data reported by individual states does not include unique vessel and permit information. Therefore, the estimated number of active permit holders reported within this appendix should be considered a minimum estimate. It is important to note that dealers were previously required to report weekly in a dealer call in system. However, in recent years the NER regional dealer reporting system has instituted a daily electronic reporting system. Although the initial reports generated from this new system did experience some initial reporting problems, these problems have been addressed and the new daily electronic reporting system is providing better real time information to managers.

9. Northeast At Sea Monitoring Program

At-sea monitors collect scientific, management, compliance, and other fisheries data onboard commercial fishing vessels through interviews of vessel captains and crew, observations of fishing operations, photographing catch, and measurements of selected portions of the catch and fishing gear. At-sea monitoring requirements are detailed under Amendment 16 to the NE Multispecies Fishery Management Plan with a planned implementation date of May 1st, 2010. At-sea monitoring coverage is an integral part of catch monitoring to ensure that Annual Catch Limits are not exceeded. At-sea monitors collect accurate information on catch composition and the data are used to estimate total discards by sectors (and common pool), gear type, and stock area. Coverage levels are expected around 30%.

II. U.S Atlantic Commercial Fisheries

Northeast Sink Gillnet (text includes descriptions of Northeast anchored float and Northeast drift gillnets)

Target Species: Atlantic Cod, Haddock, Pollock, Yellowtail Flounder, Winter Flounder, Witch Flounder, American Plaice, Windowpane Flounder, Spiny Dogfish, Monkfish, Silver Hake, Red Hake, White Hake, Ocean Pout, and Skate spp.

Number of Permit Holders: In 2010, 1,266 federal northeast permit holders identified sink gillnet as a potential gear type.

Number of Active Permit Holders: In 2010, 233 federal northeast permit holders reported the use of sink gillnets in the Northeast Region Dealer Reported Landings Database.

Total Effort: Total metric tons of fish landed from 1998 to 2010 were 22,933, 18,681, 14,487, 14, 634, 15,201, 17,680, 19,080, 15.390, 14,950, 15,808, 18,808, 17,207, and 18,170 respectively (NMFS). Data on total quantity of gear fished (i.e., number of sets) have not been reported consistently among commercial gillnet fishermen on vessel logbooks, and therefore will not be reported here.

Temporal and Spatial Distribution: Effort is distributed throughout the Gulf of Maine, Georges Bank, and Southern New England Regions. Effort occurs year-round with a peak during May, June, and July primarily on the continental shelf region in depths ranging from 30 to 750 feet. Some nets are set in water depths greater than 800 feet. Figures 1-5 document the distribution of sets and marine mammal interactions observed from 2006 to 2010, respectively.

Gear Characteristics: The Northeast Sink Gillnet Fishery is dominated by a bottom-tending (sink) net. Less than 1% of the fishery utilizes a gillnet that either is anchored floating or drift (i.e. Northeast anchored float and Northeast drift gillnet fisheries). Monofilament is the dominant material used with stretched mesh sizes ranging from 6 to 12 inches. String lengths range from 600 to 10,500 feet long. The mesh size and string length vary by the primary fish species targeted for catch.

Management and Regulations: The Northeast Sink Gillnet Fishery is defined as a Category I fishery, and both the Northeast anchored float and Northeast drift gillnet fisheries as Category II fisheries, in the 2012 List of Fisheries 76 FR 73912;November 29, 2011). This gear is addressed by several federal and state FMPs that range North and East of the 72 degree 30 min line; the Atlantic Large Whale Take Reduction Plan (ALWTRP) and Harbor Porpoise Take

Reduction Plan (HPTRP). This fishery operates from the U.S./Canada border to Long Island, NY, at 72º 30' W long. south to 36º 33.03'N lat (corresponding with the Virginia-North Carolina border) and east to the eastern edge of the EEZ, excluding Long Island Sound or other waters where gillnet fisheries are listed as Category II or III. The relevant FMPs include, but may not be limited to: the Northeast Multi-species (FR 67, CFR Part 648.80 through 648.97); Monkfish (FR 68(81), 50 CFR Part 648.91 through 648.97); Spiny Dogfish (FR 65(7), 50 CFR Part 648.230 through 648.237); Summer Flounder, Scup and Black Sea Bass (FR 68(1), 50 CFR part 648.100 through 648.147); Atlantic Bluefish (FR 68(91), 50 CFR Part 648.160 through 648.165); and Northeast Skate Complex (FR 68(160), 50 CFR part 648.320 through 648.322). These fisheries are primarily managed by total allowable catch (TACs); individual trip limits (i.e., quotas); effort caps (i.e., limited number of days at sea per vessel); time and area closures; and gear restrictions.

Observer Coverage: During the period 1990-2010, estimated percent observer coverage (number of trips observed/total commercial trips reported) was 1, 6, 7, 5, 7, 5, 4, 6, 5, 6, 6, 4, 2, 3, 6, 7, 4, 7, 5, 4 and 17 respectively.

Comments: Effort patterns in this fishery are heavily influenced by fish time/area closures, and gear restrictions due to fish conservation measures, time/area closures and gear restrictions under the ALWTRP, and seasonal pinger requirements and time/area closures under the HPTRP.

Protected Species Interactions: Documented interaction with harbor porpoise, white-sided dolphin, harbor seal, gray seal, harp seal, hooded seal, long-finned pilot whale, offshore bottlenose dolphin, Risso's dolphin, humpback whale,minke whale, North Atlantic right whale and common dolphin were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds.

Bay of Fundy Sink Gillnet

Target Species: Atlantic cod and other groundfish.

Number of Permit Holders: To Be Determined

Number of Active Permit Holders: To Be Determined

Total Effort: To Be Determined

Temporal and Spatial Distribution: In Canadian waters the Gillnet Fishery occurs during the summer and early autumn months mostly in the western portion of the Bay of Fundy.

Gear Characteristics: Typical gillnet strings are 300 m long (three 100 m panels), 4 m deep, with stretched mesh size of 15 cm, strand diameter of 0.57-0.60 mm, and are usually set at a depth of about 100 m for 24 hours.

Management and Regulations: To Be Determined

Observer Coverage: During the period 1994 to 2001, the estimated percent observer coverage of the Grand Manan portion of the sink gillnet fishery was 49, 89, 80, 80, 24, 11, 41, and 56. The fishery was not observed during 2002 and 2003.

Comments: Marine mammals in Canadian waters are regulated by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). DFO Maritimes Region has developed a Harbour Porpoise Conservation Strategy that has set a maximum take of 110 Harbor Porpoise per year in the Bay of Fundy. Bycatch mitigation measures include acoustic pingers and nylon barium-sulphate netting that target cetacean and sea bird bycatch reduction goals, and fishery effort restrictions that target fish management goals.

Protected Species Interactions: Documented interactions with bottlenose dolphin, common dolphin, fin whale, gray seal, harbor porpoise, harbor seal, harp seal, hooded seal, humpback whale, minke whale, North Atlantic right whale, Risso's dolphin, white-sided dolphin and sea birds were reported in this fishery.

Mid-Atlantic Gillnet

Target Species: Monkfish, Spiny and Smooth Dogfish, Bluefish, Weakfish, Menhaden, Spot, Croaker, Striped Bass,

Coastal Sharks, Spanish Mackerel, King Mackerel, American Shad, Black Drum, Skate spp., Yellow perch, White Perch, Herring, Scup, Kingfish, Spotted Seatrout, and Butterfish.

Number of Permit Holders: In 2010, 640 federal mid-Atlantic permit holders identified sink gillnet as a potential gear type.

Number of Active Permit Holders: In 2010, approximately 207 federal mid-Atlantic permit holders reported the use of sink gillnets in the Northeast Region Dealer Reported Landings Database.

Total Effort: Total metric tons of fish landed from 1998 to 2010 were 15,494, 19,130, 16,333, 14,855, 13,389, 13,107, 15,124, 12, 994, 8,755, 9,359, 8,622, 8,703, and 10,725 respectively (NMFS). Data on total quantity of gear fished (i.e. number of sets) have not been reported consistently among commercial gillnet fishermen on vessel logbooks, therefore will not be reported here.

Temporal and Spatial Distribution: This fishery operates year-round, extending from New York to North Carolina, not including waters where Category II and III inshore gillnet fisheries operate in bays, sounds, estuaries, and rivers. It is comprised of a combination of small vessels that target a variety of fish species. This fishery includes any residual large pelagic driftnet effort in the mid-Atlantic, shark and dogfish gillnet effort in the mid-Atlantic, and those North Carolina small and large mesh beach-anchored gillnets formerly placed in the Category II Mid-Atlantic haul/ beach seine fishery in the mid-Atlantic zone described. This fishery can be prosecuted right off the beach (6 feet) or in nearshore coastal waters to offshore waters (250 feet). The eastern boundary of this fishery is a line drawn at 72° 30' W long. from Long Island south to 36º 33.03' N lat., then east to the EEZ, and then south to the North Carolina/South Carolina border. The area does not include waters where Category II and III inshore gillnet fisheries operate in bays, estuaries, and rivers.Figures 6-10 document the distribution of sets and marine mammal interactions observed from 2006 to 2010 respectively.

Gear Characteristics: The Mid-Atlantic Gillnet Fishery utilizes both drift and sink gillnets, including nets set in a sink, stab, set, strike, or drift fashion. These nets are most frequently attached to the bottom, although unanchored drift or sink nets are also utilized to target specific species. Monofilament twine is the dominant material used with stretched mesh sizes ranging from 2.5 to 12 inches. String lengths range from 150 to 8,400 feet. The mesh size and string length vary by the primary fish species targeted for catch.

Management and Regulations: The Mid-Atlantic Gillnet Fishery is defined as a Category I fishery in the 2012 List of Fisheries 76 FR 73912;November 29, 2011).. This gear is addressed by several federal FMPs, Inter-State Fishery Management Plans (ISFMP's) managed by the Atlantic States Marine Fisheries Commission (ASMFC), the ALWTRP, the HPTRP, and the Bottlenose Dolphin TRP (BDTRP). The relevant FMPs include, but may not be limited to: Atlantic Bluefish (FR 68(91), 50 CFR Part 648.160 through 648.165); Weakfish (FR 68(191), 50 CFR 697.7); Shad and River Herring (ASMFC ISFMP 2002); Striped Bass (FR68(202), 50 CFR part 697.7); Spanish Mackerel (FR 65(92), 50 CFR 622.1 through 622.48); Monkfish (FR 68(81), 50 CFR Part 648.91 through 648.97); Spiny Dogfish (FR 65(7), 50 CFR Part 648.230 through 648.273); Summer Flounder, Scup and Black Sea Bass (FR 68(1), 50 CFR part 648.100 through 648.147); Northeast Skate Complex (FR 68(160), 50 CFR part 648.320 through 648.322); and Atlantic Coastal Sharks (FR 68(247), 50 CFR 600-635). These fisheries are primarily managed by TACs; individual trip limits (i.e., quotas); effort caps (i.e., limited number of days at sea per vessel); time and area closures; and gear restrictions.

Observer Coverage: During the period 1995-2010, the estimated percent observer coverage was 5, 4, 3, 5, 2, 2, 2, 1, 1, 2, 3, 4, 4, 3, and 3 and 4 respectively.

Comments: Effort patterns in this fishery are heavily influenced by marine mammal time/area closures and /or gear restrictions under the ALWTRP, HPTRP, and BDTRP; and gear restrictions due to fish conservation measures.

Protected Species Interactions: Documented interactions with harbor porpoise, white-sided dolphin, harbor seal, gray seal, harp seal, estuarine bottlenose dolphin, coastal bottlenose dolphin, offshore bottlenose dolphin, common dolphin, minke whale (Canadian East Coast stock), humpback whale (Gulf of Maine stock), Risso's dolphin, white- sided dolphin and long-finned and short-finned pilot whale were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds and interactions with large whale species in which the gear may not be

identified to a specific area or gear.

Mid-Atlantic Bottom Trawl

Target Species: Include, but are not limited to: Atlantic Cod, Haddock, Pollock, Yellowtail Flounder, Winter Flounder, Witch Flounder, American Plaice, Atlantic Halibut, Redfish, Windowpane Flounder, Summer Flounder, Spiny and Smooth Dogfish, Monkfish, Silver Hake, Red Hake, White Hake, Ocean Pout, Scup, Black Sea Bass, Skate spp, Atlantic Mackerel, *Loligo* Squid, *Illex* Squid, and Atlantic Butterfish.

Number of Permit Holders: In 2010, 818 federal mid-Atlantic permit holders identified bottom trawl (including beam, bottom fish, bottom shrimp, and bottom scallop trawls) as a potential gear type.

Number of Active Permit Holders: In 2010, approximately 359 federal mid-Atlantic permit holders reported the use of bottom trawls in the Northeast Region Dealer Reported Landings Database.

Mixed Groundfish Bottom Trawl Total Effort: Total effort, measured in trips, for the Mixed Groundfish Trawl from 1998 to 2010 was 27,521, 26,525, 24,362, 27,890, 28,103, 25,725, 22,303, 15,070, 12,457, 11,279, 10,785, 10,497, and 10,849 respectively (NMFS). The number of days absent from port, or days at sea, is yet to be determined.

Squid, Mackerel, Butterfish Bottom Trawl Total Effort: Total effort, measured in trips, for the domestic Atlantic Mackerel Fishery in the Mid-Atlantic Region (bottom trawl only) from 1997 to 2010 was 373, 278, 262, 102, 175, 310, 238, 231, 0, 117, 88, 0, 66 and 19 respectively (NMFS). Total effort, measured in trips, for the *Illex* Squid Fishery from 1998 to 2010 was 412, 141, 108, 51, 39, 103, 445, 181, 159, 103, 172, 177 and 231respectively (NMFS). Total effort, measured in trips, for the *Loligo* Squid Fishery from 1998 to 2010 was 1,048, 495, 529, 413, 3,585, 1,848, 1,124, 1,845, 3,058, 2,137, 2,578, 2,234 and 2.039 respectively (NMFS). Atlantic Butterfish is a bycatch (non-directed) fishery, therefore effort on this species will not be reported. The number of days absent from port, or days at sea, is yet to be determined.

Temporal and Spatial Distribution: The Mixed Groundfish Fishery occurs year-round from Cape Cod, Massachusetts to Cape Hatteras, North Carolina. Because of spatial and temporal differences in the harvesting of *Illex* and *Loligo* Squid and Atlantic Mackerel, each one of these sub-fisheries is described separately. Figures 11-15 document the distribution of tows and marine mammal interactions observed from 2006 to 2010 respectively.

***Illex* Squid**

The U.S. domestic fishery for *Illex* Squid, ranging from Southern New England to Cape Hatteras, North Carolina, reflects patterns in the seasonal distribution of *Illex* Squid (*Illex illecebrosus*). *Illex* is harvested offshore (along or outside of the 100-m isobath), mainly by small-mesh otter trawlers, when the Squid are distributed in continental shelf and slope waters during the summer months (June-September) (Clark 1998).

***Loligo* Squid**

The U.S. domestic fishery for *Loligo* Squid (*Loligo pealeii*) occurs mainly in Southern New England and mid-Atlantic waters. Fishery patterns reflect *Loligo* seasonal distribution, therefore most effort is directed offshore near the edge of the continental shelf during the fall and winter months (October–March) and inshore during the spring and summer months (April–September) (Clark 1998).

Atlantic Mackerel

The U.S. domestic fishery for Atlantic Mackerel (*Scomber scombrus*) occurs primarily in the Southern New England and mid-Atlantic waters between the months of January and May (Clark 1998). An Atlantic Mackerel Trawl Fishery also occurs in the Gulf of Maine during the summer and fall months (May–December) (Clark 1998).

Atlantic Butterfish

Atlantic Butterfish (*Peprilus triacanthus*) undergo a northerly inshore migration during the summer months, a southerly offshore migration during the winter months, and are mainly caught as bycatch to the directed Squid and Mackerel Fisheries. Fishery Observers suggest that a significant amount of Atlantic Butterfish discarding occurs at sea.

Gear Characteristics: The Mixed Groundfish Bottom Trawl Fishery gear characteristics have not yet been determined or summarized. The *Illex* and *Loligo* Squid Fisheries are dominated by small-mesh otter trawls, but substantial landings of *Loligo* Squid are also taken by inshore pound nets and fish traps during the spring and summer months (Clark 1998). The Atlantic Mackerel Fishery is prosecuted by both mid-water (pelagic) and bottom trawls.

Management and Regulations: The Mid-Atlantic Bottom Trawl Fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011). There are at least two distinct components to this fishery. One is the mixed groundfish bottom trawl fishery. It is managed by several federal and state FMPs that range from Massachusetts to North Carolina. The relevant FMPs include, but may not be limited to, Monkfish (FR 68(81), 50 CFR Part 648.648.91 through 648.97); Spiny Dogfish (FR 65(7), 50 CFR Part 648.230 through 648.237); Summer Flounder, Scup, and Black Sea Bass (FR 68(1), 50 CFR part 648.100 through 648.147); and Northeast Skate Complex (FR 68(160), 50 CFR part 648.320 through 648.322). The second major component is the squid, mackerel, butterfish fishery. This component is managed by the federal Squid, Mackerel, Butterfish FMP (50 CFR Part 648.20 through 648.24). The *Illex* and *Loligo* Squid Fisheries are managed by moratorium permits, gear and area restrictions, quotas, and trip limits. The Atlantic Mackerel and Atlantic Butterfish Fisheries are managed by an annual quota system. Mid-Atlantic Bottom Trawl Fisheries are all included in the Atlantic Trawl Gear Take Reduction Strategy which recommends voluntary measures to reduce incidental interactions with marine mammals.

Observer Coverage: During the period 1996-2010, estimated percent observer coverage (measured in trips) for the Mixed Groundfish Bottom Trawl Fishery was 0.24, 0.22, 0.15, 0.14,1, 1, 1, 1, 3, 3, 2, 3, 3, 5 and 5 respectively.

During the period 1996-2010, estimated percent observer coverage (trips) in the *Illex* Fishery was 3.7, 6.21, 0.97, 2.84, 11.11, 0, 0, 8.74, 5.07, 6, 15, 14, 5, 10 and 14 respectively. During the period 1996-2010, estimated percent observer coverage (trips) of the *Loligo* Fishery was 0.37, 1.07, 0.72, 0.69, 0.61, 0.95, 0.42, 0.65, 5.07, 4, 3, 2, 2, 7 and 8 respectively. During the period 1997-2010, estimated percent observer coverage (trips) of the domestic Atlantic Mackerel Fishery was 0.81, 0, 1.14, 4.90, 3.43, 0.97, 5.04, 18.61, 0, 3, 2, 0, 8 and 11 respectively. Mandatory 100% observer coverage is required on any Joint Venture (JV) fishing operation. The most recent Atlantic Mackerel JV fishing activity occurred in 1998 and 2002 where 152 and 62 transfers from USA vessels were observed respectively. Only the net transfer operations from the USA vessel to the foreign processing vessel are observed. The actual net towing and hauling operations conducted on the USA vessel are not observed.

Comments: Mobile Gear Restricted Areas (GRAs) were put in place for fishery management purposes in November 2000. The intent of the GRAs is to reduce bycatch of scup. The GRAs are spread out in time and space along the edge of the Southern New England and Mid-Atlantic Continental Shelf Region (between 100 and 1000 meters). These seasonal closures are targeted at trawl gear with small-mesh sizes (<4.5 inches inside mesh measurement). The Atlantic Herring and Atlantic Mackerel Trawl Fisheries are exempt from the GRAs. Access to the GRAs to harvest non-exempt species (*Loligo* Squid, Black Sea Bass, and Silver Hake) can be granted by a special permit. For detailed information regarding GRAs refer to (FR 70(2), (50 CFR Part 648.122 parts A and B)).

Protected Species Interactions: Documented interaction with harbor seal, common dolphin, long-finned pilot whale, short-finned pilot whale, Risso's dolphin, offshore bottlenose dolphin, and white-sided dolphin were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds.

Northeast Bottom Trawl

Target Species: Atlantic Cod, Haddock, Pollock, Yellowtail Flounder, Winter Flounder, Witch Flounder, American Plaice, Atlantic Halibut, Redfish, Windowpane Flounder, Summer Flounder, Spiny Dogfish, Monkfish, Silver Hake, Red Hake, White Hake, Ocean Pout, *Loligo* squid and Skate spp.

Number of Permit Holders: In 2010, 1,227 federal northeast permit holders identified bottom trawl (including beam, bottom fish, bottom shrimp, and bottom scallop trawls) as a potential gear type.

Number of Active Permit Holders: In 2010, 218 federal northeast permit holders reported the use of bottom trawls in the Northeast Region Dealer Reported Landings Database.

Total Effort: Total effort, measured in trips, for the Northeast Bottom Trawl Fishery from 1998 to 2010 was 13,263, 10,795, 12,625, 12,384, 12,711, 11,577, 10,354, 10,803, 8,603, 8,950, 8,900 and 6,791 respectively (NMFS).

Temporal and Spatial Distribution: Effort occurs year-round with a peak during May, June, and July primarily on the continental shelf and is distributed throughout the Gulf of Maine, Georges Bank and Southern New England Regions. Figures 16-20 document the distribution of tows and marine mammal interactions observed from 2006 to 2010 respectively.

Gear Characteristics: The average footrope length for the bottom trawl fleet was about 84 feet from 1996 – 1999; in 2000 there was a sharp increase to almost 88 feet followed by a steady decline to 85 feet in 2004. Seasonality was evident, with larger footrope lengths in the first quarter, which drop sharply from March to the low in May, and followed by a steady increase in size until December. There are some differences in mean gear size between species. Compared to other species, gear size was smaller for trips that caught winter flounder, cod, yellowtail flounder, fluke, skate, dogfish, and Atlantic herring. Trips that caught haddock, *Illex* squid, and monkfish tended to have larger gear. For most species, seasonal variation was limited. Seasonality was evident for witch flounder, American plaice, scup, butterfish, both squid species, and monkfish. Further characterization of the Northeast and Mid-Atlantic bottom and mid-water trawl fisheries based on Vessel Trip Report (VTR) data can be found at http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0715/).

Management and Regulations: The Northeast Bottom Trawl Fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011). This gear is managed by several federal and state FMPs that range from Maine to Connecticut and included in the Atlantic Trawl Gear Take Reduction Strategywhich recommends voluntary measures to reduce incidental interactions with marine mammals. The relevant FMPs include, but may not be limited to: the Northeast Multi-species (FR 67, CFR Part 648); Monkfish (FR 68(81), 50 CFR Part 648.91 through 648.97); Spiny Dogfish (FR 65(7), 50 CFR Part 648.230 through 648.237); Summer Flounder, Scup and Black Sea Bass (FR 68(1), 50 CFR part 648.100 through 648.147); Atlantic Bluefish (FR 68(91), 50 CFR Part 648.160 through 648.165); and Northeast Skate Complex (FR 68(160), 50 CFR part 648.320 through 648.322). These fisheries are primarily addressed by TACs; individual trip limits (i.e., quotas); effort caps (i.e., limited number of days at sea per vessel); time and area closures; and gear restrictions.

Observer Coverage: During the period 1994-2010, estimated percent observer coverage (measured in trips) was 0.4, 1.1, 0.2, 0.2, 0.1, 0.3, 1.0, 1.0, 3, 4, 5, 12, 6, 6, 8, 9 and 16 respectively.

Vessels in the Northeast Bottom Trawl Fishery, a Category II fishery under the MMPA, were observed in order to meet fishery management needs rather than monitoring for bycatch of marine mammals.

Comments: Mobile Gear Restricted Areas (GRAs) were put in place for fishery management purposes in November 2000. The intent of the GRAs is to reduce bycatch of Scup. The GRAs are spread out in time and space along the edge of the Southern New England and mid-Atlantic continental shelf region (between 100 and 1000 meters). These seasonal closures are targeted at trawl gear with small-mesh sizes (<4.5 inches inside mesh measurement). The Atlantic Herring and Atlantic Mackerel Trawl Fisheries are exempt from the GRAs. For detailed information regarding GRAs refer to (50 CFR Part 648.122 parts A and B).

Protected Species Interactions: Documented interaction with offshore bottlenose dolphin, common dolphin, harbor porpoise, gray seal, harbor seal, harp seal, long-finned pilot whale, short-finned pilot whale, Risso's dolphin and white-sided dolphin were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds.

Northeast Mid-Water Trawl Fishery (includes pair trawls)

Target Species: Atlantic Herring and miscellaneous pelagic species.

Number of Permit Holders: In 2010, 698 federal Northeast permit holders identified mid-water trawl as a potential gear type.

Number of Active Permit Holders: In 2010, 14 federal northeast permit holders reported the use of mid-water trawls in the Northeast Region Dealer Reported Landings Database.

Gear Characteristics: Historically, the Atlantic Herring resource was harvested by the Distant Water Fleet (DWF) until the fishery collapsed in the late 1970s. There has been no DWF since then. A domestic fleet has been harvesting the Atlantic Herring resource utilizing both fixed and mobile gears. Only a small percentage of the resource is currently harvested by fixed gear due to a combination of reduced availability and less use of fixed gear (Clark 1998). The majority of the resource is currently harvested by domestic mid-water (pelagic) trawls (single and paired).

Management and Regulations: The Northeast Mid-Water Trawl Fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011). Atlantic herring are managed jointly by the MAFMC and ASMFC as one migratory stock complex. There has been a domestic resurgence in a directed fishery on the adult stock due to the recovery of the adult stock biomass. Northeast Mid-Water Trawl Fishery is included in the Atlantic Trawl Gear Take Reduction Strategy which recommends voluntary measures to reduce incidental interactions with marine mammals..

Temporal and Spatial Distribution: The current fishery occurs during the summer months when the resource is distributed throughout the Gulf of Maine and Georges Bank regions. The stock continues on a southerly migration into mid-Atlantic waters during the winter months. Figures 21-25 document the distribution of tows and marine mammal interactions observed from 2006 to 2010 respectively.

Total Effort: Total effort, measured in trips, for the Northeast Mid-Water Trawl Fishery (across all gear types) from 1997 to 2010 was 578, 289, 553, 1,312, 2,404, 1,736, 2,158, 1,564, 717, 590, 286, 236, 236 and 294 respectively (NMFS).

Observer Coverage: During the period 1997-2010, estimated percent observer coverage (trips) was 0, 0, 0.73, 0.46, 0.06, 0, 2.25, 11.48, 19.9, 3.1, 8.04, 19.92, 42 and 53 respectively. Observer coverage for 2010 includes both observers and at-sea monitors. A U.S. JV Mid-Water (pelagic) Trawl Fishery was conducted on Georges Bank from August to December 2001. A total allowable landings of foreign fishery (TALFF) was also granted during the same time period. Ten vessels (3 foreign and 7 American), fishing both single and paired mid-water trawls, participated in the 2001 Atlantic Herring JV Fishery. Two out of the three foreign vessels also participated in the 2001 TALFF and fished with paired mid-water trawls. The NMFS maintained 74% observer coverage (243 hauls) on the JV transfers and 100% observer coverage (114 hauls) on the foreign vessels granted a TALFF.

Comments: Mobile Gear Restricted Areas (GRAs) were put in place for fishery management purposes in November 2000. The intent of the GRAs is to reduce bycatch of Scup. The GRAs are spread out in time and space along the edge of the Southern New England and mid-Atlantic continental shelf region (between 100 and 1000 meters). These seasonal closures are targeted at trawl gear with small-mesh sizes (<4.5 inches inside mesh measurement). The Atlantic Herring and Atlantic Mackerel Trawl Fisheries are exempt from the GRAs. For detailed information regarding GRAs refer to (50 CFR Part 648.122 parts A and B)

Protected Species Interactions: Documented interaction with harbor seal, long-finned pilot whale, short-finned pilot whale, and white-sided dolphin were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds.

Mid-Atlantic Mid-Water Trawl Fishery (includes pair trawls)

Target Species: Atlantic Mackerel, Chub Mackerel and other miscellaneous pelagic species.

Number of Permit Holders: In 2010, 498 federal mid-Atlantic permit holders identified mid-water trawl as a potential gear type.

Number of Active Permit Holders: In 2010, 17 federal mid-Atlantic permit holders reported the use of mid-water trawls in the Northeast Region Dealer Reported Landings Database.

Management and Regulations: The Mid-Atlantic Mid-Water Trawl Fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011). This fishery is included in the Atlantic Trawl Gear Take Reduction Strategy which recommends voluntary measures to reduce incidental interactions with marine mammals.

Temporal and Spatial Distribution: Figures 26-30 document the distribution of tows and marine mammal interactions observed from 2006 to 2010 respectively.

Total Effort:. Total effort, measured in trips, for the Mid-Atlantic Mid-Water Trawl Fishery (across both gear types) from 1997 to 2010 was 331, 223, 374, 166, 408, 261, 428, 360, 359, 405, 312, 255, 280 and 173 respectively (NMFS).

Observer Coverage:. During the period 1997-2010, estimated percent observer coverage (trips) was 0, 0, 1.01, 8.43, 0, 0.77, 3.50, 12.16, 8.40, 8.90, 3.85, 13.33, 13.2 and 25 respectively. Observer coverage for 2010 includes both observers and at-sea monitors.

Comments: Mobile Gear Restricted Areas (GRAs) were put in place for fishery management purposes in November 2000. The intent of the GRAs is to reduce bycatch of Scup. The GRAs are spread out in time and space along the edge of the Southern New England and mid-Atlantic continental shelf region (between 100 and 1000 meters). These seasonal closures are targeted at trawl gear with small-mesh sizes (<4.5 inches inside mesh measurement). The Atlantic Herring and Atlantic Mackerel Trawl Fisheries are exempt from the GRAs. For detailed information regarding GRAs refer to (50 CFR Part 648.122 parts A and B).

Protected Species Interactions: Documented interaction with offshore bottlenose dolphin, common dolphin, long-finned pilot whale, Risso's dolphin, short-finned pilot whale and white-sided dolphin were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds.

Bay of Fundy Herring Weir

Target Species: Atlantic Herring

Number of Permit Holders: According to Canadian DFO officials, for 1998 there were 225 licenses for herring weirs on the New Brunswick and Nova Scotia sides of the Bay of Fundy (60 from Grand Manan Island, 95 from Deer and Campobello Islands, 30 from Passamaquoddy Bay, 35 from the East Charlotte area, and 5 from the Saint John area). The number of licenses has been fairly consistent since 1985 (Ed Trippel, pers. comm.)

Number of Active Permit Holders: In 2002 around Grand Manan Island, the only area surveyed for active weirs, there were 22 active weirs. In 2003 the number of active weirs included: 20 around Grand Manan Island, 9 around the Wolves Islands, 10 around Campobello Island, 2 at Deer Island, and 43 in Passamaquoddy Bay and the western Bay of Fundy. The numbers in the eastern Bay of Fundy are unknown, but some do exist.

Total Effort: Effort is difficult to measure. Weirs may or may not have twine (i.e., be actively fishing) on them in a given year and the amount of time the twine is up varies from year to year. Most weirs tend to fish (i.e., have twine on them) during July, August, and September. Some fishermen keep their twine on longer, into October and November, if it is a good year or there haven't been any storms providing incentive to take the twine down. Effort cannot simply be measured by multiplying the number of weirs with twine times the average number of fishing days (this will provide a very generous estimation of effort) because if a weir fills up with fish the fisherman will pull up the drop (close the net at the mouth) which prevents loss of fish, but also means no new fish can get in, therefore the weir is not actively fishing during that period.

Temporal and Spatial Distribution: In Canadian waters, the Herring Weir Fishery occurs from May to October along the southwestern shore of the Bay of Fundy, and is scattered along the coasts of western Nova Scotia.

Gear Characteristics: Weirs are large, heart-shaped structures (roughly 100 feet across) consisting of long wooden stakes (50-80 feet) pounded 3-6 feet into the sea floor and surrounded by a mesh net (the "twine") of about ¾ inch stretch mesh. Weirs are typically located within 100-400 feet of shore. The twine runs from the sea floor to the surface, and the only opening (the "mouth") is positioned close to shore. Herring swimming along the shore at night, encounter a fence (net of the same twine from sea floor to surface) that runs from the weir to the shoreline and directs the fish into the weir. At dawn, the weir fisherman tends the weir and if Herring are present, he/she may close off the weir until the fish can be harvested. Harvesting takes place when the tidal current is the slackest, usually just before low tide. A large net ("seine") is deployed inside the weir, and, much like a purse seine, it is drawn up to the surface so that the fish become concentrated. They are then pumped out with a vacuum hose into the waiting carrier for transport to the processing plant.

Management and Regulations: To Be Determined

Observer Coverage: From mid-July to early September, on a daily basis, scientists from the Grand Manan Whale & Seabird Research Station check only the weirs around Grand Manan Island for the presence of cetaceans.

Comments: Marine mammals occasionally swim into weirs, in which they can breathe and move about. Marine mammals are vulnerable during the harvesting/seining process where they can become tangled in the seine and suffocate if care is not taken to remove them from the net or to remove them from the weir prior to the onset of the seining process. Small marine mammals, like porpoises, can be removed from the net, lifted into small boats, and taken out of the weir for release without interrupting the seining process. Larger marine mammals, such as whales, must be removed from the weir either through the creation of a large enough escape hole in the back of the weir (taking down the twine and removing some poles) or sometimes by sweeping them out with a specialized mammal net, although this approach carries with it a few more risks to the animal than the "escape hole" technique.

Through the cooperation of weir fishermen and the Grand Manan Whale & Seabird Research Station, weir-associated mortality of cetaceans is relatively low. Over 91% of all entrapped porpoises, dolphins and whales are successfully released from weirs around Grand Manan Island. Thus the total number of entrapments (which can vary annually from 6 to 312) is in no way reflective or indicative of cetacean mortality caused by this fishery.

Protected Species Interactions: Documented interactions with harbor porpoise and minke whales were reported in this fishery. Right whales are also vulnerable to entrapment, though very rarely.

Gulf of Maine Atlantic Herring Purse Seine Fishery

Target Species: Atlantic Herring.

Number of Permit Holders: In 2010, 365 northeast federal permit holders identified herring purse seine as a potential gear type.

Number of Active Permit Holders: The Atlantic Herring FMP distinguishes between vessels catching herring incidentally while pursuing other species and those targeting herring by defining vessels that average less than 1 metric tons of herring caught per trip (in all areas) as incidental herring vessels. In 2010 there were 11 active federal permits reported in the Northeast Region Dealer Reported Landings Database.

Gear Characteristics: The purse seine is a deep nylon mesh net with floats on the top and lead weights on the bottom. Rings are fastened at intervals to the lead line and a purse line runs completely around the net through the rings (www.gma.org, Gulf of Maine Research Institute, GOMRI). One end of the net remains in the vessel and the other end is attached to a power skiff or "bug boat" that is deployed from the stern of the vessel and remains in place while the vessel encircles a school of fish with the net. Then the net is pursed and brought back aboard the vessel through a hydraulic power block. Purse seines vary in size according to the size of the vessel and the depth to be fished. Most purse seines used in the New England Herring Fishery range from 30 to 50 meters deep (100-165 ft) (NMFS 2005). Purse seining is a year round pursuit in the Gulf of Maine, but is most active in the summer when herring are more abundant in coastal waters and are mostly utilized at night, when herring are feeding near the surface. This fishing technique is less successful when fish remain in deeper water and when they do not form "tight" schools.

Management and Regulations: The Gulf Of Maine Atlantic Herring Purse Seine Fishery is defined as a Category III fishery in the 2010 List of Fisheries (74 FR 58859, November 16, 2009).fishery. This gear is managed by federal and state FMPs that range from Maine to North Carolina. The relevant FMPs include, but may not be limited to the Atlantic Herring FMP (FR 70(19), 50 CFR Part 648.200 through 648.207) and the Northeast Multi-species (FR 67, CFR Part 648.80 through 648.97). This fishery is primarily managed by total allowable catch (TACs).

Temporal and Spatial Distribution: Most U.S. Atlantic herring catches occur between May and October in the Gulf of Maine, consistent with the peak season for the lobster fishery. The connection between the herring and lobster fisheries is the reliance of the lobster industry on herring for bait. In addition, there is a relatively substantial winter fishery in southern New England, and catches from Georges Bank have increased somewhat in recent years. There is a very small recreational fishery for Atlantic herring that generally occurs from early spring to late fall, and herring is caught by tuna boats with gillnets for use as live bait in the recreational tuna fisheries. In addition, there is a Canadian fishery for Atlantic herring from New Brunswick to the Gulf of St. Lawrence, which primarily utilizes fixed gear. Fish caught in the New Brunswick (NB) weir fishery are assumed to come from the same stock (inshore component) as that targeted by U.S. fishermen (http://www.nefmc.org/herring/index.html, Northeast Fisheries Management Council, NEFMC). Figures 31-35 document the distribution of sets and marine mammal interactions observed from 2006 to 2010, respectively.

Total Effort: Total metric tons of fish landed from 1998 to 2010 were 24,256, 39,866, 29,609, 20,691, 20,096, 17,939, 19,958, 16,306, 18,700, 31,019, 27,327, 22,547, and 8,566 respectively (NMFS, Unpbl.). Total effort, measured in trips, for the Gulf of Maine Atlantic Herring Purse Seine Fishery from 2002 to 2010 was 343, 339, 276, 202, 173, 249, 344, 249, 228 and 242 respectively (NMFS, Unpbl.).

Observer Coverage: During the period 1994 to 2002, estimated observer coverage (number of trips observed/total commercial trips reported) was 0. From 2003 to 2010, percent observer coverage was 0.34, 9.8, 0.27, 0, 3.2, 12, 21 and 12 respectively.

Protected Species Interactions: Documented interactions with humpback whale, fin/sei whale, minke whale, harbor porpoise, harbor seal, gray seal and white-sided dolphin have been reported in this fishery, though generally the animals have been released from the net unharmed.

Northeast/Mid-Atlantic American Lobster Trap/Pot

Number of Permit Holders: In 2010, approximately 3,147 vessels held permits to fish for and harvest lobsters in Federal waters, which does not include the several thousand vessels coastwide authorized to harvest lobster in state water.

Total Effort: American lobster is the most valuable fishery in the eastern US, with total landings of 116.9 million lbs. valued at $401.7 million in 2010. Combined landings from Maine and Massachusetts vessels comprised 93% of the landings for 2010, with Maine landing 96.2 million lbs. in 2010. The majority of vessels harvest lobster with traps, with about 2-3% of the harvest taken by mobile gear (trawlers and dredges). The offshore fishery in Federal waters has developed in the past 15 years, largely due to technological improvements in equipment and lower competition in the offshore areas.

Management and Regulations: A cooperative state and Federal management plan is in place to manage the lobster resource and the plan is administered under the authority of the Atlantic Coastal Act, with oversight provided by the Atlantic States Marine Fisheries Commission (ASMFC). The ASMFC's role is to develop coastal fishery management programs, oversee state implementation of the coastal measures in state waters, and provide recommendations for the Federal government to implement complementary regulations in Federal waters. States implement management measures from 0-3 miles within their respective jurisdictions in compliance with the measures adopted in the management plan. The National Marine Fisheries Service is obliged to enact measures that support the plan in Federal waters, from 3-200 miles from shore, codified under 50 CFR 697. In January 1997, NMFS changed the classification of the Gulf of Maine and Mid-Atlantic Lobster Pot Fisheries from Category III to Category I (1997 List of Fisheries 62 FR 33, January 2, 1997) based on examination of 1990 to 1994 stranding and entanglement records of large whales (including Right, Humpback and Minke whales). Both the EEZ and state fishery are operating under Federal regulations from the ALWTRP (50 CFR 229.32).

Temporal and Spatial Distribution: In the United States (US), the American lobster, *Homarus americanus*, is distributed from Maine to North Carolina and is most abundant in relatively shallow coastal zones. Inshore landings have increased since the 1970s. Approximately 80% of lobster landings are derived from state waters which occur from 0-3 miles from shore. There are three distinctly identified stock areas for the American lobster: 1) Gulf of Maine, 2) Southern New England, and 3) Georges Bank.

Protected Species Interactions: harbor seal, humpback whale, minke whale, North Atlantic right whale.

Atlantic Ocean, Caribbean, Gulf of Mexico Large Pelagics Longline

Target Species: Large pelagic fish species including: Swordfish, Yellowfin Tuna, Bigeye Tuna, Bluefin Tuna, Albacore Tuna, Dolphin Fish, Shortfin Mako Shark, and a variety of other shark species.

Number of Permit Holders: < 100

Number of Active Permit Holders: The number of fishing vessels in the Pelagic Longline Fishery has been declining since a peak number of 361 vessels reporting longline effort during 1995. Over the period between 1995 and 2000, the mean number of vessels reporting effort for the entire Atlantic Ocean not including the Gulf of Mexico was 163. This declined to an annual average of 72 for the period between 2001 and 2007. Seventy-seven vessels reported pelagic

longline effort in the Atlantic during 2008. It is likely that some of these vessels also reported effort in the Gulf of Mexico.

Total Effort: The total fishing effort in the Atlantic component of the Pelagic Longline Fishery has been declining since a peak reported effort of 12,318 sets (7.41 million hooks) during 1995. The mean effort reported to the Fisheries Logbook System between 1995 and 2000 was 9,370 sets (5.62 million hooks). Between 2001 and 2007, a mean of 4,551 sets (3.19 million hooks) was reported each year. During 2008, the total reported fishing effort in the Atlantic Ocean component of the fishery was 5,684 sets and 4.16 million hooks (Garrison *et al.* 2009).

Temporal and Spatial Distribution: Fishing effort occurs year round and operates in waters both inside and outside the U.S. EEZ throughout Atlantic, Caribbean and Gulf of Mexico waters. The "Atlantic" component of the fleet operates both in coastal and continental shelf waters along the U.S. Atlantic coast from Florida to Massachusetts. The fleet also operates in distant waters of the Atlantic including the central equatorial Atlantic Ocean and the Canadian Grand Banks. Fishing effort is reported in 11 defined fishing areas including the Gulf of Mexico. During 2008, the majority of fishing effort in the Atlantic was reported in the Mid-Atlantic Bight (Virginia to New Jersey, 1,911 sets) and the South Atlantic Bight (Georgia to North Carolina, 1,126 sets) fishing areas (Garrison *et al.* 2009).

Gear Characteristics: The pelagic longline gear consists of a mainline of >700-lb test monofilament typically ranging between 10 and 45 miles long. At regular intervals along the mainline, bullet-shaped floats are suspended and long sections of the gear are marked by "high-flyers" or radio beacons. Suspended from the mainline are long gangion lines of 200 to 400-lb test monofilament that are typically 100 to 200 feet in length. Fishing depths are most typically between 40 and 120 feet. Hooks of various sizes are attached by a steel swivel leader. Longline sets targeting tunas are typically set at dawn and soak throughout the day with recovery near dusk. Those sets targeting swordfish are more typically night sets. The total amount of time the gear remains in the water including set, soak, and haul times is typically 10-14 hours. As a result of a recent Biological Opinion on interactions between Atlantic longline gear targeting Tunas and Swordfish and endangered sea turtles, a comprehensive change in the fishing gear occurred in the longline fishery. After August 2004, only circle shaped hooks of 16/0 or 18/0 size can be used throughout the fishery.

Management and Regulations: The Large Pelagics Longline Fishery is listed as a Category I fishery under the MMPA due to frequently observed interactions with marine mammals in the 2012 List of Fisheries (76 FR 73912;November 29, 2011). The directed fishery is managed under the FMP for Atlantic Tunas, Swordfish, and Sharks (HMS FMP, 50 CFR Part 635) and the Pelagic Longline Take Reduction Plan. The fishery has also been the focus of management actions relating to bycatch of billfish. Amendment One to the Atlantic Billfish FMP also pertains to the Large Pelagics Longline Fishery and is consistent with the regulations in the HMS FMP. This fishery is also regulated under the Endangered Species Act resulting from frequent interactions with sea turtle species including both Loggerhead and Leatherback Turtles in the Atlantic and Gulf of Mexico. A Biological Opinion issued by the NMFS Southeast Regional Office in June 2004 mandated the use of circle hooks throughout the fishery, mandated the use of de-hooking and disentanglement gear by fishermen to reduce the mortality of captured sea turtles, reopened the Northeast Distant Water fishing area, and mandated increased reporting and monitoring of the fishery. As of 2009, the fishery also became managed under the Pelagic Longline Take Reduction Plan (http://www.nmfs.noaa.gov/pr/pdfs/fr/fr74-23349.pdf).

Observer Coverage: The Pelagic Longline Observer Program (POP) is a mandatory observer program managed by the SEFSC that has been in place since 1992. Observers are placed upon randomly selected vessels with total observer effort allocated on a geographic basis proportional to the total amount of fishing effort reported by the fleet. Between 2000 and 2010, observer coverage as a percentage of reported sets in the Atlantic component of the fishery was 4, 7, 9, 6, 7, 7, 7, 10, and 8. Observed longline sets and marine mammal interactions are shown for 2006-2010 in Figures 36 through 40.

Comments: This fishery has been the subject of numerous management actions since 2000 associated with bycatch of both billfish and sea turtles. These changes have resulted in a reduction of overall fishery effort and changes in the behaviors of the fishery. The most significant change was the closure of the NED area off the Canadian Grand Banks and near the Azores as of June 1, 2001 (50 CFR Part 635). An experimental fishery was conducted in this area during both 2001 and 2002 to evaluate gear characteristics and fishing practices that increase the bycatch rate of sea turtles. Several marine mammals, primarily Risso's Dolphins, were seriously injured during this experimental fishery. In addition, there have been a number of time-area closures since late 2000 including year-round closures in the DeSoto

Canyon area in the Gulf of Mexico and the Florida East Coast area; and additional seasonal closures in the Charleston Bump area and off of New Jersey (NMFS 2003). Additionally, a ban on the use of live fish bait was initiated in 1999 due to concerns over billfish bycatch. The June 2004 Biological Opinion has resulted in a significant change in the gear and fishing practices of this fishery that will likely impact marine mammal bycatch. The majority of interactions with marine mammals in this fishery have been with Pilot Whales and Risso's Dolphin. These interactions primarily occurred along the shelf break in the Mid-Atlantic Bight region during the third and fourth quarters (Garrison 2003; 2005; Fairfield Walsh and Garrison 2006; Fairfield Walsh and Garrison 2007, Garrison *et al.* 2009). The Pelagic Longline Take Reduction Team was convened during 2005 to develop approaches to reduce the serious injury of pilot whales in the mid-Atlantic, and the resulting take reduction plan is currently being implemented by NOAA Fisheries (http://www.nmfs.noaa.gov/pr/pdfs/fr/fr74-23349.pdf).

Protected Species Interactions: Documented interactions with Risso's dolphin, long-finned pilot whale, short-finned pilot whale, common dolphin, Atlantic spotted dolphin, pantropical spotted dolphin, bottlenose dolphin, dwarf or pygmy sperm whale, pygmy sperm whale, sperm whale, killer whale, Cuvier's beaked whale, Mesoplodon beaked whale, and northern bottlenose whale were reported in this fishery. Not mentioned here are documented interactions with sea turtles and sea birds.

Southeastern U.S. Atlantic Shark Gillnet

Target Species: Large and small coastal sharks including: Blacktip, Blacknose, Finetooth, Bonnethead, and Sharpnose Sharks

Number of Permit Holders: ~30

Total Effort: Gillnets targeting sharks in the southeastern U.S. Atlantic are fished in a variety of configurations including long soak drift sets, short soak encircling strike sets, and short duration sink sets. In addition, sink gillnets are used to target other finfish species. The same fishing vessels will fish the different types of sets. In the reported logbook data, it is difficult to identify these different gear types and distinguish sets targeting sharks from those targeting finfish. The total amount of effort was therefore estimated based upon observer data and reported fishing gear and catch characteristics (Garrison 2007). Between 2001 and 2005, an annual average of 74 drift sets, 40 strike sets, and 241 sink sets targeting sharks were reported and/or observed. The number of drift sets has been declining steadily while the number of strike sets has been increasing. During 2006, there were 8 drift sets, 40 strike sets, and 301 sink sets targeting sharks reported or observed (Garrison 2007). However, there is direct evidence of under-reporting as some observed sets were not reported to the FLS system, and the total effort remains highly uncertain. In 2007, a total of 85 drift net sets were observed with 4 of those targeting sharks and the remainder Spanish mackerel. A total of 112 sink net sets were observed, with 60 of those targeting sharks and the remainder targeting various fish species (Baremore *et al.* 2007). During 2008, there was very limited targeted fishing for sharks off the coast of Florida due to the closure of the large coastal shark fishery during the first half of the year, and there were no strike sets observed targeting sharks and only a few sink sets (Passerotti and Carlson 2009).

Temporal and Spatial Distribution: The Shark Gillnet fleet operates primarily in the coastal waters of Florida and Georgia, but sink sets targeting sharks are reported as far north as Cape Hatteras, NC (Carlson and Bethea 2007; Garrison 2007). Prior to 2007, shark drift gillnet fishing was restricted under the ALWTRP off the coast of Georgia (from 32° N latitude) and Florida to 27° 51' N latitude between 15 November to 31 March. Outside of this season, the drift and strike fishing vessels operated primarily north of Cape Canaveral, Florida, and along the Georgia coast. In 2007, the restricted area was expanded under the ALWTRP to include the area between 32° N latitude west of 80° W longitude and within 35 nautical miles of the South Carolina coast (Southeast U.S. Restricted Area North) with a closure to all gillnet gear from November 15 to April 15. The area between 29° N latitude and 27° 51' N latitude west of 80° W longitude (Southeast U.S. Restricted Area South) is also closed to gillnetting from December 1 through March 31, but fishing for shark is permitted with limited exemptions if special provisions are met (72 FR 34632, June 25, 2007).

Gear Characteristics: Historically, shark drift gillnet fishing was characterized by large-mesh (5-10 inches) nets that were typically greater than 1500 feet long with long, night-time soak durations exceeding 10 hours. However, in recent years, an increasing proportion of the fishing effort consists of "strike sets" in which schools of sharks are targeted and encircled. Strike sets are of much shorter duration (typically < 1 hour) than drift sets, have large mesh sizes, and use deep fishing nets (Carlson and Bethea 2007). Sink nets typically use smaller mesh sizes than strike nets,

the nets are shallower and shorter, and the soak duration average approximately 2 hours (Garrison 2007). Likewise, large mesh, long soak-time drift net fishing has largely ended. Drift gillnets targeting sharks (observed off the coast of North Carolina) are of much shorter duration with total fishing times averaging less than 3 hours (Passerotti and Carlson 2009).

Management and Regulations: The Southeastern U.S. Atlantic Shark Gillnet Fishery is listed as a Category II fishery under the MMPA due to occasional interactions with marine mammals in the 2012 List of Fisheries (76 FR 73912;November 29, 2011). The directed fishery effort is managed under an amendment to the HMS FMP (50 CFR Part 635, 66 FR 17370 March 30, 2001) that mandates observer coverage outside of the season, defined by the ALWTRP, at levels sufficient to achieve precise estimates (coefficient of variation < 0.3) of marine mammal and sea turtle bycatch. The fishery is also managed under the ALWTRP (50 CFR Part 229.32) and the Bottlenose Dolphin Take Reduction Plan (BDTRP). The ALWTRP includes seasonal restriction of gillnet fishing in the Southeast U.S. Restricted Area North, special provisions for shark gillnet gear in the Southeast U.S. Restricted Area South, including 100% observer coverage, and the use of Vessel Monitoring Systems (VMS) in lieu of 100% observer coverage for shark gillnets with webbing of 5" or greater stretched mesh in the newly created Southeast U.S. Monitoring Area (72 FR 57104, October 5, 2007) , and restrictions on setting shark gillnets with webbing of 5" or greater stretched mesh 3 nm from large whales in the newly created Other Southeast Gillnet Waters. Similar provisions are also included in the Biological Opinion on the fishery under section 7 of the Endangered Species Act.

Observer Coverage: A dedicated observer program for the Shark Drift Gillnet Fishery has been in place since 1998. Due to the provisions of the ALWTRP, observer coverage has been high during winter months since 2000. However, due to limits on available resources, observer coverage outside of this period was generally low (< 5%) prior to 2000 but has been increasing during the last several years. In 2005, the observer program was expanded to include a limited number of sink gillnets targeting both fish and sharks (Carlson and Bethea 2007). Due to the difficulties in identifying the reported effort, the percentage of observer coverage by gear type is difficult to quantify. From 2001 to 2006, the percent annual observer coverage of the drift gillnet fishery was 68, 85, 50, 66, 58, and 48, respectively. The percent annual coverage of the strike component from 2001 to 2006 was 63, 86, 72, 81, and 84, respectively. The sink component of the fishery was observed in 2005 and 2006 with coverage levels of 10% and 22%, respectively. However, given the uncertainties surrounding the level of reported effort in the FLS, these estimates of observer coverage are highly uncertain (Garrison 2007). Due to these uncertainties, and continuing changes in the execution and observer coverage of the fishery, effort levels for the fishery and estimated observer coverage for 2007 and 2008 are not available. There have been no observed marine mammal interactions since 2003.

Comments: There is a significant level of uncertainty surrounding estimating the total level of effort in this fishery. There is direct evidence of inconsistency in reporting. It is not possible to reliably distinguish trips targeting sharks from those targeting other fish species, and it is not possible to distinguish different types of sets in the logbook data. However, the overall marine mammal and sea turtle bycatch rate is very low, therefore it is unlikely that even severe biases would result in large increases in the estimated total protected species bycatch in this fishery. In addition to marine mammal interactions, this fishery has been the subject of management concern due to recent interactions with endangered sea turtles including leatherback and loggerhead turtles.

Protected Species Interactions: Documented interactions with coastal bottlenose dolphin and Atlantic spotted dolphin were reported in this fishery. There are two documented cases of possible interactions between North Atlantic right whales and the shark drift gillnet fishery off the Florida coast.

Atlantic Blue Crab Trap/Pot

Target Species: Atlantic blue crab

Number of Permit Holders: As of 2011, the fishery was estimated to have approximately 7,734 permits. This is likely an overestimate due to the fact that the state of Florida does not differentiate permits for blue crab between the Gulf and Atlantic coast.

Temporal and Spatial Distribution: The fishery occurs year-round from the south shore of Long Island at 72° 30'W. long. in the Atlantic and east of the fishery management demarcation line between the Atlantic Ocean and the Gulf of Mexico (50 CFR 600.105), including estuarine and nearshore coastal waters throughout the mid and south Atlantic.

Gear Characteristics: Pots are baited with fish or poultry and are typically set in shallow water. The pot position is marked by either a floating or sinking buoy line attached to a surface buoy.

Management and Regulations: The fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912; November 29, 2011). It is managed under state Fishery Management Plans, the Bottlenose Dolphin Take Reduction Plan, and Atlantic Large Whale Take Reduction Plan.

Protected Species Interactions: Bottlenose dolphin, Northern North Carolina (NC) Estuarine System; Bottlenose dolphin, Southern NC Estuarine System; Bottlenose dolphin, Charleston Estuarine System; Bottlenose dolphin, Northern Georgia (GA)/Southern South Carolina (SC) Estuarine System; Bottlenose dolphin, Southern GA Estuarine System; Bottlenose dolphin, Jacksonville Estuarine System; Bottlenose dolphin, Indian River Lagoon Estuarine System; Bottlenose dolphin, Northern Migratory Coastal; Bottlenose dolphin, Southern Migratory Coastal; Bottlenose dolphin, Northern Florida (FL) Coastal; Bottlenose dolphin, Central FL Coastal; Bottlenose dolphin, SC/GA Coastal; West Indian manatee, FL

In recent years, reports of strandings with evidence of interactions between bottlenose dolphins and both recreational and commercial crab pot fisheries have been increasing in the Southeast region (McFee and Brooks 1998; Burdett and McFee 2004). Interactions with crab pots appear to generally involve a dolphin becoming wrapped in the buoy line. The total number of these interactions and associated mortality rates has not been documented; however, based on stranding data from 2004-2008, there have been 13 reports of interactions between bottlenose dolphins and blue crab trap/pot gear, and 4 interactions that were a result of pot fisheries that could not be definitively identified to a specific fishery.

Mid-Atlantic Haul/Beach Seine

Target Species: Striped bass, mullet, spot, weakfish, sea trout, bluefish, kingfish, and harvestfish.

Number of Permit Holders: 874

Temporal and Spatial Distribution: The fishery occurs in waters west of 72° 30′ W. long. and north of a line extending due east from the North Carolina/South Carolina border.

Gear Characteristics: This fishery uses seines with one end secured (e.g., swipe nets and long seines); both ends secured; or those anchored to hauled up on the beach. The beach seine system is generally constructed of a wash, wing, and bunt that are attached to the beach and extend into the surf and are traditionally used to encircle or encompass fish. The only haul/beach seine gear operating in North Carolina included in this Category II fishery is the ‘‘Atlantic Ocean striped bass beach seine fishery’’ during the winter, as regulated by North Carolina Marine Fisheries Commission rules (NCDMF) and NCDMF proclamations. NCDMF defines a beach seine operating under the Atlantic Ocean Striped Bass beach seine fishery as a ‘‘swipe net constructed of multifilament, multifiber webbing fished from the ocean beach that is deployed from a vessel launched from the ocean beach where the fishing operation takes place, and one end of the beach seine is attached to the shore at all times during the operation.’’

Observer Coverage: North Carolina beach-based fishing has been observed since April 7, 1998 by the NMFS Fisheries Sampling Program (Observer Program) based at the NEFSC. The numbers of observed beach seine sets from 1998 to 2008 were 63, 60, 52, 12, 6, 23, 36, 29, 9, 27, and 39.

Management and Regulations: The fishery is managed under several state and Interstate Fishery Management Plans and is an affected fishery under the BDTRP. Large mesh nets are regulated in North Carolina via North Carolina Marine Fisheries Commission rules and NCDMF proclamations. The fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912; November 29, 2011).

Protected Species Interactions: Bottlenose dolphin, Northern North Carolina Estuarine System; Bottlenose dolphin, Northern Migratory Coastal; Bottlenose dolphin, Southern Migratory Coastal.

North Carolina Inshore Gillnet Fishery

Target Species: Include, but are not limited to southern flounder, weakfish, bluefish, Atlantic croaker, striped mullet, spotted seatrout, Spanish mackerel, striped bass, spot, red drum, black drum, and shad.

Number of Permit Holders: 2,250

Temporal and Spatial Distribution: This fishery includes any gillnet effort for any target species inshore of the COLREGS demarcation lines in North Carolina (COLREGS demarcation lines delineate those waters upon which mariners shall comply with the International Regulations for Preventing Collisions at Sea and those waters upon which mariners shall comply with the Inland Navigation Rules).

Gear Characteristics: This fishery includes any fishing effort using any type of gillnet gear, including set (float and sink), drift, and runaround gillnet.

Observer Coverage: Observer coverage, up to 10% in some cases, is provided by the North Carolina Division of Marine Fisheries, primarily during the fall flounder fishery in Pamlico Sound. The Northeast Fishery Observer Program has observed the fishery at low levels, as well as the North Carolina Alternative Platform Observer Program.

Management and Regulations: This fishery is managed under state and Interstate Fishery Management Plans, applying net and mesh size regulations, and seasonal area closures in the Pamlico Sound Gillnet Restricted Area. It is an affected fishery under the BDTRP. The fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912; November 29, 2011).

Protected Species Interactions: Bottlenose dolphin, Northern North Carolina Estuarine System; Bottlenose dolphin, Southern North Carolina Estuarine System.

North Carolina Long Haul Seine

The Long Haul Seine is an estuarine fishery operating in North Carolina waters with 372 permits. The fishery includes fishing with long haul seine gear to target any species in waters off North Carolina, including estuarine waters in Pamlico and Core Sounds and their tributaries. The seine consists of a 1000-1200 yard long net pulled by two boats for distances of 1-2 nautical miles (Steve *et al.* 2001). Fish are encircled by pulling the net around a fixed stake. The fishery targets Weakfish, Spot, Croaker, Menhaden, Bluefish, Spotted Seatrout, and Hagfish, and operates in Pamlico and Core sounds and tributaries. The fishery operates primarily between June and October. Occasional interactions with estuarine and coastal bottlenose dolphins have been reported. The fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011)and is managed under the Bottlenose Dolphin Take Reduction Plan.

North Carolina Roe Mullet Stop Net

The Stop Net Fishery is unique to Bogue Banks, North Carolina with approximately 13 participants. The gear consists of a stationary, multi-filament anchored net extended perpendicular to the beach to stop the alongshore migration of Striped Mullet. Once the catch accumulates near the end of the stop net, a beach haul seine is used to capture fish and bring them ashore. The stop net is traditionally left in the water for 1 to 5 days during the fishery season from October to November, but can be left as long as 15 days (Steve *et al.* 2001). Interactions between this fishery and estuarine and coastal bottlenose dolphins have been reported; however, the total number of interactions has not been estimated. There has not been Federal observer coverage in this fishery; however, the NMFS Beaufort laboratory observed this fishery in 2001-2002. The fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011) and is managed under the Bottlenose Dolphin Take Reduction Plan.

Virginia Pound Net

Pound Nets are a stationary gear fished in nearshore coastal and estuarine waters of Virginia. The gear consists of a large mesh lead posted perpendicular to the shoreline extending outward to the corral, or “heart”, where the catch accumulates. Target species included Weakfish, Spot, Spanish mackerel, Bluefish,and Croaker. There has not been formal observer coverage in this fishery; however, the Northeast Fishery Observer Program (NEFOP) has monitoring and characterization that occurs sporadically in this fishery. As of 2011, the fishery was estimated to have approximately 66 permits. In 2004 and 2005 an experimental fishery was conducted in an area of the Chesapeake Bay that was closed to commercial pound net fishing effort from May to July for sea turtle conservation. The results from these studies determined a modified pound net leader could be used for pound net fishing while providing sea turtle conservation benefits. Occasional interactions with coastal bottlenose dolphins have been observed while monitoring for sea turtle interactions in both the commercial and experimental fisheries. Three takes of coastal bottlenose dolphins

were observed in 2003, 2004, and 2009. Stranded bottlenose dolphins have also shown evidence of interactions with pound nets. From 2002 to 2009, 21 bottlenose dolphins were removed dead from Virginia pound nets, and 4 dolphins were disentangled alive (Sue Barco, Virginia Aquarium). Data from the Chesapeake Bay suggest that the likelihood of Bottlenose Dolphin entanglement in pound net leads may be affected by the mesh size of the lead net (Bellmund *et al.* 1997), but the information is not conclusive. A recent study conducted by Barco *et al.* in 2009 examined the use of modified pound net leaders adopted for sea turtle conservation because they believed it would also be effective in reducing bottlenose dolphin interactions in pound net leads. The study took place in the lower Chesapeake Bay and evaluated the effect of modified pound net leaders on finfish bycatch to ensure it maintained catch efficiency. Results show modified pound net leaders had similar or greater catches of finfish compared to traditional leaders (e.g., leaders that were not modified for sea turtle conservation). The fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011) and is managed under the Bottlenose Dolphin Take Reduction Plan.

Mid-Atlantic Menhaden Purse Seine

Between 1994 and 1997, about 18-20 menhaden purse-seine vessels for reduction operated out of two processing facilities in Chesapeake Bay at Reedville, Virginia. Another fleet of vessels 2-5 vessels operated out of a smaller processing facility at Beaufort, North Carolina. Since 1998, only one plant has been operational in Virginia with a total fleet of about 10 vessels. Between 1998 and 2004 the factory at Beaufort operated with 2-3 vessels. After the 2004 fishing season, the factory at Beaufort closed permanently. A majority of the fishing effort by the Virginia fleet occurs in the Virginia portion of Chesapeake Bay, and along the ocean beaches of Eastern Shore Virginia. As of 2011, there are 56 participants. Most sets in Chesapeake Bay are in the main stem of the Bay, greater than one mile from shore. In summer, the Virginia fleet occasionally ranges as far north as northern New Jersey. Purse-seining for reduction purposes is prohibited by state law in Maryland, Delaware, and New Jersey; hence, purse-seine sets in the ocean off Delmarva and New Jersey are by definition greater than 3 miles from shore. The Virginia fleet ranges south into NC coastal waters during November and December, but this segment of the fishery is highly weather-dependent. Large vessels (up to 200 ft) carrying two small purse seine boats are used for fishing effort, with some smaller vessels (called snapper rigs) about 60-75 feet in length. Schools of menhaden are generally spotted from larger vessels and/or spotter planes. The purse seine is deployed over the school vertically from the large vessel or the two smaller boats. The net floatline and leadline has a series of rings threaded with a purse line that is winched closed around the school, and the net is retrieved by power block. The purse seine net is made of nylon fiber with a bar mesh from ¾ to 7/8 inch (about 1-3/4 inch stretched mesh). Net length ranges from 1,000-1,400 feet, with a net dept averaging 65-90 feet. Occasional interactions with coastal bottlenose dolphins have been recorded historically in this fishery. In 2008 and 2009, there was very limited observer coverage; however, there was no systematic coverage prior to these years and the level of incidental interactions with marine mammals is undocumented. The Mid-Atlantic Menhaden Purse Seine Fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011) and is affected under the Bottlenose Dolphin Take Reduction Plan.

Southeastern U.S. Atlantic/Gulf of Mexico Shrimp Trawl

The Shrimp Trawl Fishery operates from North Carolina through the Texas coast virtually year-round, moving seasonally up and down the coast. A recent estimate of fishing effort based upon state dealer trip reports included approximately 23,000 shrimping trips (Epperly *et al.* 2002). As of 2010, there were an estimated 5,000 participants. The most commonly employed gear in this fishery is a double-rig otter trawl, which normally includes a lazy line attached to each bag's codend. The lazy line floats free during active trawling, and as the net is hauled back, it is retrieved with a boat- or grappling-hook to assist in guiding and emptying the trawl nets. Shrimp trawl soak time is about three hours. Effort occurs in both estuarine and nearshore coastal waters. The Shrimp Trawl Fishery has long been the focus of management actions associated with significant bycatch of both fish species and sea turtles. Observer coverage was historically very sparse and non-systematic. However, in 2007, the observer coverage expanded and became mandatory for fishing vessels to take an observer if selected. Observer coverage currently averages about 1% of the total fishery effort. Occasional interactions with bottlenose dolphins have been observed in the Atlantic and Gulf of Mexico, and there is infrequent evidence of interactions from stranded animals. NMFS observed 12 dolphin takes (of which 11 were serious injuries or mortalities) since 1993; 11 of which were taken since 2002. Further, Marine Mammal Authorization Program (MMAP) records list 1 dolphin take in shrimp trawl gear in South Carolina in 2002. Lastly, 13 dolphin takes, 10 of which were taken since 2002, have been documented by NMFS in Southeast U.S. research trawl operations, and/or relocation trawls conducted. The Shrimp Trawl fishery is defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011), and is therefore, affected under the Bottlenose Dolphin Take Reduction Plan in the Atlantic portion of its range.

III. Historical Fishery Descriptions

Atlantic Foreign Mackerel

Prior to 1977, there was no documentation of marine mammal bycatch in DWF activities off the Northeast coast of the U.S. With implementation of the Magnuson Fisheries Conservation and Management Act (MFCMA) in that year, an Observer Program was established which recorded fishery data and information on incidental bycatch of marine mammals. DWF effort in the U.S. Atlantic Exclusive Economic Zone (EEZ) under MFCMA had been directed primarily towards Atlantic Mackerel and Squid. From 1977 through 1982, an average mean of 120 different foreign vessels per year (range 102-161) operated within the U.S. Atlantic EEZ. In 1982, there were 112 different foreign vessels; 16%, or 18, were Japanese Tuna longline vessels operating along the U.S. east coast. This was the first year that the Northeast Regional Observer Program assumed responsibility for observer coverage of the longline vessels. Between 1983 and 1991, the numbers of foreign vessels operating within the U.S. Atlantic EEZ each year were 67, 52, 62, 33, 27, 26, 14, 13, and 9 respectively. Between 1983 and 1988, the numbers of DWF vessels included 3, 5, 7, 6, 8, and 8 respectively, Japanese longline vessels. Observer coverage on DWF vessels was 25-35% during 1977-1982, and increased to 58%, 86%, 95% and 98%, respectively, in 1983-1986. One hundred percent observer coverage was maintained during 1987-1991. Foreign fishing operations for Squid ceased at the end of the 1986 fishing season and for Mackerel at the end of the 1991 season. Documented interactions with white sided dolphins were reported in this fishery.

Pelagic Drift Gillnet

In 1996 and 1997, NMFS issued management regulations which prohibited the operation of this fishery in 1997. The fishery operated during 1998. Then, in January 1999 NMFS issued a Final Rule to prohibit the use of drift net gear in the North Atlantic Swordfish Fishery (50 CFR Part 630). In 1986, NMFS established a mandatory self-reported fisheries information system for Large Pelagic Fisheries. Data files are maintained at the SEFSC. The estimated total number of hauls in the Atlantic Pelagic Drift Gillnet Fishery increased from 714 in 1989 to 1,144 in 1990; thereafter, with the introduction of quotas, effort was severely reduced. The estimated number of hauls from 1991 to 1996 was 233, 243, 232, 197, 164, and 149 respectively. Fifty-nine different vessels participated in this fishery at one time or another between 1989 and 1993. In 1994 to 1998 there were 11, 12, 10, 0, and 11 vessels, respectively, in the fishery. Observer coverage, expressed as percent of sets observed, was 8% in 1989, 6% in 1990, 20% in 1991, 40% in 1992, 42% in 1993, 87% in 1994, 99% in 1995, 64% in 1996, no fishery in 1997, and 99% coverage during 1998. Observer coverage dropped during 1996 because some vessels were deemed too small or unsafe by the contractor that provided observer coverage to NMFS. Fishing effort was concentrated along the southern edge of Georges Bank and off Cape Hatteras, North Carolina. Examination of the species composition of the catch and locations of the fishery throughout the year suggest that the Drift Gillnet Fishery was stratified into two strata: a southern, or winter, stratum and a northern, or summer, stratum. Documented interactions with North Atlantic right whales, humpback whales, sperm whales, pilot whale spp., Mesoplodon spp., Risso's dolphins, common dolphins, striped dolphins and white sided dolphins were reported in this fishery.

Atlantic Tuna Purse Seine

The Tuna Purse Seine Fishery occurring between the Gulf of Maine and Cape Hatteras, North Carolina is directed at large medium and giant Bluefin Tuna (BFT). Spotter aircraft are typically used to locate fish schools. The official start date, set by regulation, is 15 July of each year. Individual Vessel Quotas (IVQs) and a limited access system prevent a derby fishery situation. Catch rates for large medium and giant Tuna can be high and consequently, the season can last only a few weeks, however, over the last number of years, effort expended by this sector of the BFT fishery has diminished dramatically due to the unavailability of BFT on the fishing grounds.

The regulations allocate approximately 18.6% of the U.S. BFT quota to this sector of the fishery (5 IVQs) with a tolerance limit established for large medium BFT (15% by weight of the total amount of giant BFT landed.

Limited observer data is available for the Atlantic Tuna Purse Seine Fishery. Out of 45 total trips made in 1996, 43 trips (95.6%) were observed. Forty-four sets were made on the 43 observed trips and all sets were observed. A total of 136 days were covered. No trips were observed during 1997 through 1999. Two trips (seven hauls) were observed in October 2000 in the Great South Channel Region. Four trips were observed in September 2001. No marine mammals were observed taken during these trips. Documented interactions with pilot whale spp. were reported in this fishery.

Atlantic Tuna Pelagic Pair Trawl

The Pelagic Pair Trawl Fishery operated as an experimental fishery from 1991 to 1995, with an estimated 171 hauls in 1991, 536 in 1992, 586 in 1993, 407 in 1994, and 440 in 1995. This fishery ceased operations in 1996 when

NMFS rejected a petition to consider pair trawl gear as an authorized gear type in the Atlantic Tuna Fishery. The fishery operated from August to November in 1991, from June to November in 1992, from June to October in 1993 (Northridge 1996), and from mid-summer to December in 1994 and 1995. Sea sampling began in October of 1992 (Gerrior *et al.* 1994) where 48 sets (9% of the total) were sampled. In 1993, 102 hauls (17% of the total) were sampled. In 1994 and 1995, 52% (212) and 55% (238), respectively, of the sets were observed. Nineteen vessels have operated in this fishery. The fishery operated in the area between 35N to 41N and 69W to 72W. Approximately 50% of the total effort was within a one degree square at 39N, 72W, around Hudson Canyon, from 1991 to 1993. Examination of the 1991-1993 locations and species composition of the bycatch, showed little seasonal change for the six months of operation and did not warrant any seasonal or areal stratification of this fishery (Northridge 1996). During the 1994 and 1995 Experimental Pelagic Pair Trawl Fishing Seasons, fishing gear experiments were conducted to collect data on environmental parameters, gear behavior, and gear handling practices to evaluate factors affecting catch and bycatch (Goudy 1995, 1996), but the results were inconclusive. Documented interactions with pilot whale spp., Risso's dolphin and common dolphins were reported in this fishery.

Part B. Description of U.S. Gulf of Mexico Fisheries

I. Data Sources

Items 1 and 2 describe sources of marine mammal mortality, serious injury or entanglement data, and item 3 describes the source of commercial fishing effort data used to generate maps depicting the location and amount of fishing effort and the numbers of active permit holders. In general, commercial fisheries in the Gulf of Mexico have had little directed observer coverage and the level of fishing effort for most fisheries that may interact with marine mammals is either not reported or highly uncertain. With the exception of the Large Pelagics Longline Fishery, no incidental take estimates are possible for Gulf of Mexico commercial fisheries.

1. Southeast Region Fishery Observer Programs

Two fishery observer programs are managed by the SEFSC that observe commercial fishery activity in the U.S. Gulf of Mexico. The Pelagic Longline Observer Program (POP) administers a mandatory observer program for the U.S. Atlantic Large Pelagics Longline Fishery. The program has been in place since 1992, and randomly allocates observer effort by eleven geographic fishing areas proportional to total reported effort in each area and quarter. Observer coverage levels are mandated under the Highly Migratory Species FMP (HMS FMP, 50 CFR Part 635). The second is the Southeastern Shrimp Otter Trawl Fishery Observer Program. Prior to 2007, this was a voluntary program administered by SEFSC in cooperation with the Gulf and South Atlantic Fisheries Foundation. The program was funding and project dependent, therefore observer coverage is not necessarily randomly allocated across the fishery. In 2007, the observer program was expanded, and it became mandatory for fishing vessels to take an observer if selected. The program now includes more systematic sampling of the fleet based upon reported landings and effort patterns. The total level of observer coverage for this program is ~ 1% of the total fishery effort. In each Observer Program, the observers record information on the total target species catch, the number and type of interactions with protected species (including both marine mammals and sea turtles), and biological information on species caught. In each Observer Program the observers record information on the total target species catch, the number and type of interactions with protected species including both marine mammals and sea turtles, and biological information on species caught.

2. Regional Marine Mammal Stranding Networks

The Southeast Regional Stranding Network is a component of the Marine Mammal Health and Stranding Response Program (MMHSRP). The goals of the MMHSRP are to facilitate collection and dissemination of data, assess health trends in marine mammals, correlate health with other biological and environmental parameters, and coordinate effective responses to unusual mortality events (Becker *et al.* 1994). The Southeast Region Strandings Program is responsible for data collection and stranding response coordination along the U.S. Gulf of Mexico coast from Florida through Texas. Prior to 1997, stranding and entanglement data were maintained by the New England Aquarium and the National Museum of Natural History, Washington, D.C. Volunteer participants, acting under a letter of agreement with NOAA Fisheries, collect data on stranded animals that include: species; event date and location; details of the event including evidence of human interactions; determinations of the cause of death; animal disposition; morphology; and biological samples. Collected data are reported to the appropriate Regional Stranding Network Coordinator and are maintained in regional and national databases.

3. Southeast Region Fisheries Logbook System

The FLS is maintained at the SEFSC and manages data submitted from mandatory fishing vessel logbook programs under several FMPs. In 1986, a comprehensive logbook program was initiated for the Large Pelagics Longline Fisheries, and this reporting became mandatory in 1992. Logbook reporting has also been initiated since the early 1990s for a number of other fisheries including: Reef Fish Fisheries; Snapper-Grouper Complex Fisheries; federally managed Shark Fisheries; and King and Spanish Mackerel Fisheries. In each case, vessel captains are required to submit information on the fishing location, the amount and type of fishing gear used, the total amount of fishing effort (e.g., gear sets) during a given trip, the total weight and composition of the catch, and the disposition of the catch during each unit of effort (e.g., kept, released alive, released dead). FLS data are used to estimate the total amount of fishing effort in the fishery and thus expand bycatch rate estimates from observer data to estimates of the total incidental take of marine mammal species in a given fishery.

4. Marine Mammal Authorization Program

Commercial fishing vessels engaging in Category I or II fisheries are automatically registered under the Marine Mammal Authorization Program (MMAP) in order to lawfully take a non-endangered/threatened marine mammal incidental to fishing operations. These fishermen are required to carry an Authorization Certificate onboard while participating in the listed fishery and must be prepared to carry a fisheries observer if selected. All vessel owners, regardless of the category of fishery they are operating in, are required to report, within 48 hours of the incident even if an observer has recorded the take, all incidental injuries and mortalities of marine mammals that have occurred as a result of fishing operations (NMFS-OPR 2003). Events are reported by fishermen on the Marine Mammal Mortality/Injury forms then submitted to and maintained by the NMFS Office of Protected Resources. The data reported include: captain and vessel demographics; gear type and target species; date, time and location of event; type of interaction; animal species; mortality or injury code; and number of interactions. Reporting forms are available online at http://www.nmfs.noaa.gov/pr/pdfs/interactions/mmap_reporting_form.pdf.

II. Gulf of Mexico Commercial Fisheries

Atlantic Ocean, Caribbean, Gulf of Mexico Large Pelagics Longline

Target Species: Large pelagic fish species including: Swordfish, Yellowfin Tuna, Bigeye Tuna, Bluefin Tuna, Albacore Tuna, Dolphin Fish, Shortfin Mako Shark, and a variety of other shark species.

Number of Permit Holders: <100

Number of Active Permit Holders: The number of active fishing vessels in the pelagic longline fishery has been declining since a peak number of 361 vessels reporting longline effort during 1995. Over the period between 1995 and 2000, the mean number of vessels reporting effort to the FLS in the Gulf of Mexico was 112. This declined to an annual average of 64 for the period between 2001 and 2007. The total number of fishing vessels reporting effort in the Gulf of Mexico during 2008 was 53, though some of these vessels likely also reported fishing effort in other areas.

Total Effort: The total fishing effort in the Gulf of Mexico component of the Pelagic Longline Fishery has ranged between 2.5 and 4.1 million hooks since 1992. The mean effort reported to the FLS between 1995 and 2000 was 4,545 sets and 3.32 million hooks. Between 2001 and 2007, a mean of 4,522 sets (3.40 million hooks) was reported each year. During 2008, the total reported fishing effort in the Gulf of Mexico component of the fishery was 3,246 sets and 2.39 million hooks (Garrison *et al.* 2009).

Temporal and Spatial Distribution: Fishing effort occurs year round and operates in waters both inside and outside the U.S. EEZ throughout Atlantic, Caribbean and Gulf of Mexico waters. The Gulf of Mexico component of the fleet operates both in continental shelf and deep continental slope waters from Florida to Texas.

Gear Characteristics: The pelagic longline gear consists of a mainline of >700-lb test monofilament typically ranging between 10 and 45 miles long. At regular intervals along the mainline, bullet-shaped floats are suspended and long sections of the gear are marked by “high-flyers” or radio beacons. Suspended from the mainline are long gangion lines of 200 to 400-lb test monofilament that are typically 100 to 200 feet in length. Fishing depths are most typically between 40 and 120 feet. Hooks of various sizes are attached by a steel swivel leader. Longline sets targeting tunas are typically set at dawn and soak throughout the day with recovery near dusk. Those sets targeting swordfish are more typically night sets. The total amount of time the gear remains in the water including set, soak, and haul times is typically 10-14 hours. As a result of a recent Biological Opinion on interactions between Atlantic longline gear targeting Tunas and Swordfish and endangered sea turtles, a comprehensive change in the fishing gear occurred in the

longline fishery. After August 2004, only circle shaped hooks of 16/0 or 18/0 size can be used throughout the fishery.

Management and Regulations: The Large Pelagics Longline Fishery is listed as a Category I fishery under the MMPA's 2012 LOF due to frequently observed interactions with marine mammals ((76 FR 73912;November 29, 2011). The directed fishery is managed under the FMP for Atlantic Tunas, Swordfish, and Sharks (Highly Migratory Species FMP, 50 CFR Part 635) and the Pelagic Longline Take Reduction Plan implementing regulations (74 FR 23349, May 19, 2009). The fishery has also been the focus of management actions relating to bycatch of billfish. Amendment One to the Atlantic Billfish FMP also pertains to the Large Pelagics Longline Fishery and is consistent with the regulations in the Highly Migratory Species FMP. This fishery is also regulated under the Endangered Species Act resulting from frequent interactions with endangered sea turtle species including both Loggerhead and Leatherback Turtles in the Atlantic and Gulf of Mexico. A Biological Opinion issued by the NMFS Southeast Regional Office in June 2004 mandated the use of circle hooks throughout the fishery, mandated the use of de-hooking and disentanglement gear by fishermen to reduce the mortality of captured sea turtles, and mandated increased reporting and monitoring of the fishery.

Observer Coverage: The Pelagic Longline Observer Program (POP) is a mandatory observer program managed by the SEFSC that has been in place since 1992. Observers are placed upon randomly selected vessels with total observer effort allocated on a geographic basis proportional to the total amount of fishing effort reported by the fleet. The target observer coverage level was 5% of reported sets through 2001, and was elevated to 8% of total sets in 2002. Between 2000 and 2007, percent observer coverage of reported sets in the Gulf of Mexico component of the fishery was 4, 4, 3, 5, 5, 7, 8, and 16. Observer coverage in the Gulf of Mexico during 2008 was 24.8% of reported sets. This high coverage rate reflects significantly elevated coverage during the second quarter (58.2%) associated with increased observer effort to document bluefin tuna interactions (Garrison *et al.* 2009). Observed longline sets and marine mammal interactions in the Gulf of Mexico are shown for 2006-2010 in Figures 41 through 45.

Comments: This fishery has been the subject of numerous management actions over the last four years associated with bycatch of both billfish and sea turtles. These changes have resulted in a reduction of overall fishery effort and in the behaviors of the fishery. The most significant change was the closure of the Northeast Distant Water Area off the Canadian Grand Banks and near the Azores as of June 1, 2001 (50 CFR Part 635). In the Gulf of Mexico, a year round closure was implemented in two areas in DeSoto Canyon (NMFS 2003). Additionally, a ban on the use of live fish bait was initiated in 1999 due to concerns over billfish bycatch. The June 2004 Biological Opinion has resulted in a significant change in the gear and fishing practices of this fishery that will likely impact marine mammal bycatch. The majority of interactions with marine mammals in this fishery in the Gulf of Mexico have been with Risso's Dolphin (Garrison 2003a). There have been more interactions with marine mammals observed recently in association with the very high observer coverage between April and June.

Protected Species Interactions: Gulf of Mexico stocks of Risso's dolphin, pantropical spotted dolphin, Atlantic spotted dolphin, pilot whales, pygmy sperm whales, unidentified beaked whales, sperm whales, killer whales, and offshore bottlenose dolphin.

Spiny Lobster Trap/Pot Fishery

Target Species: Caribbean spiny lobster (*Panulirus argus*), smooth tail spiny lobster (*Panulirus lauvicauda*) and spotted spiny lobster (*Panulirus guttatus*). These species are commonly referred to as crawfish.

Number of Permit Holders: As of May 19, 2009, there were 1,268 State of Florida issued spiny lobster permits (A. Herndon, NMFS, pers. comm., 2010). There are no federal permits for this fishery since the State of Florida issues permits that are also valid in federal waters.

Number of Active Permit Holders: The number of spiny lobster endorsements or licenses (also known as trap numbers) required for any person using traps to harvest spiny lobster in commercial quantities (F.A.C. Chapter 68B-24.0055(1) Florida Statutes) in state waters has declined from nearly 2,500 licenses in the 1998-1999 season to 1,241 licenses for the 2007-2008 season. In state waters, recreational fishers wishing to use traps to harvest spiny lobster are required to have a Special Recreational Crawfish License (SRCL). The number of SRCL holders has also decreased from over 350 licenses in the 1998-1999 season to approximately 200 in the 2007-2008 season.

Total Effort: Over the last 10 years, commercial trap fishing has been the dominant gear type in the spiny lobster

fishery, accounting for approximately 70 percent of all commercial landings (Robson 2006). The remaining landings are collected via divers by hand or via bully nets (which accounts for only a very small percentage). A trap limitation program initiated by the State of Florida in 1993 has reduced the number of lobster traps available annually from approximately one million to 485,891 trap tag certificates for the 2010 season (A. Podey, Florida Fish and Wildlife Conservation Commission (FFWCC) to A. Herndon, NMFS, pers. comm., 2010).

Commercial landings of spiny lobster in the contiguous United States have been reported in Florida, Alabama, Georgia, Mississippi, South Carolina and Texas since 1962. However, in 35 of the 45 years from 1962 through 2006, Florida landings, mostly from the Florida Keys, accounted for all of the annual commercial landings; and in each of the other 10 years, annual landings in Florida represented at least 94% of the total pounds commercially landed that year. In 2006, 100% of all 4,773,995 pounds of spiny lobster landings were within the State of Florida. Also 80% of fishing effort for this fishery is within state of Florida waters.

Trap fishing is the most common gear type used in the Florida Keys. Vessels operating in the lower Florida Keys typically fish up to 2,000 traps, but a few fishers may use as many as 5,000 traps (D. Gregory, Florida Sea Grant, to A. Herndon, NMFS, pers. comm., 2006). Vessels fishing off the upper Florida Keys are generally smaller day crafts that carry no more than 500-800 traps. Unlike the larger vessels fishing in the Lower Keys, these fishers tend to pull 100-300 traps per day.

Recreational fishing for spiny lobsters is primarily conducted by divers using scuba equipment, hookah rigs or free-diving to collect lobsters by hand (GMFMC and SAFMC 1987). Recreational fishers without a SRCL are not allowed to use traps to capture lobster.

Temporal and Spatial Distribution: The distribution of the commercial and recreational spiny lobster harvest off Florida is almost exclusively limited to the waters of the Florida Keys (GMFMC and SAFMC 1982). Effort occurs on both the Atlantic and Gulf side of the Florida Keys; however, diving for lobster is most common on the Gulf side (NMFS 2009). Fishing occurs from very nearshore areas out to water depths of 200 ft, although most fishing occurs in waters less than 100 ft.

The commercial and regular recreational spiny lobster seasons (in both state and federal waters of Florida and other Gulf states) start on August 6 and end on March 31 (F.A.C. Chapter 68B-24.005(1) Florida Statutes; 50 CFR 640.20(b)) with the exception of the two-day sport season in which trap gear is prohibited.
Gear Characteristics: Spiny lobster trap/pot gear most commonly used in the commercial fishery is a cube made of wooden slats. Wire traps are occasionally used, but more frequently in deeper water. Concrete is typically poured in the bottom of traps to weight them. A buoy is attached to the trap via a float line and floated at the surface. Buoys attached to spiny lobster traps must be marked with the letter "C." Tags displaying the crawfish endorsement number are also required on all traps.

The type of bait used in traps depends on fisher preference. Some traps are set unbaited, some are baited with fish scraps, sardines, cat food or cowhide, while others are baited with legal sized or undersized lobsters used to attract larger lobsters. Soak times average from 8 to 28 days, with soak times increasing as the season progresses and catch rates decline (Matthews 2001).

Larger vessels in the Lower Florida Keys may set traps several miles apart and usually allow traps to soak for up to two weeks (Powers and Bannerot 1984). Vessels of this size are also capable of fishing 500 traps a day (GMFMC and SAFMC 1982). The smaller vessels of the Upper Florida Keys also stay closer to shore and the duration of their trips is shorter than the larger vessels operating out of the Lower Keys (GMFMC and SAFMC 1987).

Management and Regulations: The spiny lobster trap/pot fishery is currently a Category III fishery under the MMPA's 2012 List of Fishery (76 FR 73912;November 29, 2011) due to a remote likelihood of serious injuries or mortalities to marine mammals (50 CFR 229). Bottlenose dolphin stocks with documented and confirmed interactions with the spiny lobster fishery include the Biscayne Bay and Florida Bay Stocks. However, based on the overlap between this fishery and stranding data, other bottlenose stocks such as the Northern Florida Coastal Stock, Central Florida Coastal Stock and the Indian River Lagoon Estuarine System Stock are also potentially impacted by this fishery.

There is not fishery management plan for Spiny Lobster, but rather, the federal and state fishery is managed by the

Florida Fish and Wildlife Commission in order to streamline state and federal management.

The fishery is currently managed via bag limits, minimum size limits, regulated fishing seasons for the commercial and recreational sectors, gear restrictions, trap construction requirements and a trap limitation and permitting program.

Observer Coverage: There is no observer coverage in this fishery.

Comments: Based on the similar gear type used in a number of different trap/pot fisheries (e.g., blue crab, stone crab, etc.) especially in coastal Florida waters, bottlenose dolphin strandings associated with this fishery are likely underestimated. Derelict trap/pot gear is also a substantial concern for marine life entanglements. It is estimated that between 10-20% of all traps (i.e., 50,000-100,000) are lost annually.

Protected Species Interactions: Based on bottlenose dolphin stranding data from the United States' Atlantic coast between 2002-April 2009, there have been two bottlenose dolphin strandings likely to have resulted from the lobster pot fishery. Gear determination was based on local knowledge and gear analyses techniques. These animals were most likely associated with the Biscayne Bay or Central Florida Coastal Stocks. An additional eight bottlenose dolphin strandings in Florida had trap/pot gear on the carcass, but the gear could not be definitively identified to a target species or specific fishery. Therefore, based on known interactions with trap/pot gear and bottlenose dolphin stocks in times and areas where the spiny lobster trap/pot fishery is known to occur, the following bottlenose dolphin stocks may also be affected by this fishery: Northern Florida Coastal Stock, Indian River Lagoon Estuarine System Stock, Florida Bay Stock and Biscayne Bay Stock.

Southeastern U.S. Atlantic, Gulf of Mexico Stone Crab Trap/Pot Fishery

Target Species: Florida stone crab (*Menippe mercenaria*)

Number of Permit Holders: In 2010, the State of Florida issued 1,282 stone crab licenses and 1,190,285 stone crab trap tags. Currently, there are no federal reporting requirements for the federal stone crab fishery. All data regarding the fishery have been collected via partnership with the State of Florida, through its trip ticket program.

Total Effort: Due to the Stone Crab Trap Reduction Schedule [F.A.C Chapter 68B-13.010(3)(f) Florida Statutes], the number of commercial trap certificates issued by the State of Florida has decreased from approximately 1,475,000 in the 2002-2003 fishing season to 1,190,285 in the 2010 fishing season. The Stone Crab Trap Reduction Schedule [F.A.C Chapter 68B-13.010(3)(f) Florida Statutes] will eventually reduce the number of trap tags to 600,000 trap/pots statewide. Pots will be reduced by a pre-specified percentage each year until the number of trap tags reaches 600,000 (Muller *et al.* 2006).

Florida state regulations limit recreational stone crab trap/pot numbers to five per person [F.A.C. Chapter 68B-13] Florida Statutes]. Because no documentation or registration is required for recreational stone crab fishing, no accurate estimate of the magnitude of this fishery is possible (Bert *et al.* 1978).

Temporal and Spatial Distribution: The season for commercial and recreational stone crab harvest is from October 15 to May 15.

This commercial fishery operates primarily nearshore in the State of Florida (stone crab fishing outside of this area is likely very minimal). The stone crab trap/pot fishery occurs on both sides of Florida Keys (Gulf of Mexico and Atlantic), but is much more extensive along the Gulf of Mexico side. Crabbers place their traps in waters of 65 foot depth or less and intense trapping extends from the boundary of Everglades National Park through the Gulf of Mexico side of the Marquesa Keys (T. Bert, Florida Fish and Wildlife Conservation Commission (FFWCC), to A. Herndon, NMFS, pers. comm. 2006). Crabbers off Marathon, Florida, typically set traps deeper than the smaller operations of the Upper and Lower Keys, and often work thousands of traps per season (Bert *et al.* 1978).

Distribution of the stone crab trap/pot fishery varies throughout the Gulf of Mexico side of Florida. The stone crab fishery off Collier County is centered in Chokoloskee. It generally extends from the Shark River Basin to Cape Romano and seaward to approximately a 65 foot depth. Crabbers generally work from 1,000 to 3,000 traps per season; a few crabbers fish as many as 8,000 traps per season (Bert *et al.* 1978; T. Bert, FFWCC, to A. Herndon, NMFS, pers.

comm. 2008). In Lee and Charlotte counties of Florida, the crabbers often fish fewer than 200 trap/pots per season in waters less than 20 feet deep. Within Tampa and Sarasota Bay, crabbers fish between a few hundred to a few thousand traps per season. Crabbers in Tarpon Springs and Homasassa fish thousands of traps seasonally and the fishery offshore from this area appears to be the most heavily fished of any area in the state (T. Bert, FFWCC, unpublished data). Within the Taylor, Dixie, Levy, and Citrus counties of Florida, crabbers may use up to 1,000 traps per season. There are few commercial stone crabbers in the Florida panhandle region.

Gear Characteristics: Traps are the exclusive gear type used for the commercial stone crab fishery. Stone crab traps are constructed of pressure-treated pine or cypress slats or of plastic (Bert *et al.* 1978). The tops of the traps have a hinged lid that is opened to gain access to the catch. A 4-inch by 6-inch plastic opening in the center of the lid serves as the mouth of the trap, which allows crabs to enter. Fishers pour concrete into the bottom of these traps to weight them.

All traps must be designed to conform to the specifications established under 50 CFR 654.22, as well as State of Florida statutes. A marking buoy and line are attached to each commercial trap (GMFMC 1979) which is denoted with the letter "X." No trap is allowed to be larger than 24 by 24 by 24 inches and several requirements also exist for escape vents, throat, sizes and configuration (50 CFR 654.22).

Traps are baited with bait fish or fish remnants. Mullet, grouper or snapper heads and skeletons, jacks, sharks and skates or rays are commonly used baits (GMFMC 1979). Pigs' feet and cowhide have also become common baits in recent years. One-to-three pounds of bait is generally used per trap. Bait configuration within the trap depends on fisher preference. Some fishers simply place the bait on the bottom of the trap; some place it in a bait container, and others suspend the bait from the top of the trap. Baits may last anywhere from two days to several weeks, depending upon their type, amount and placement inside the trap (Bert *et al.* 1978).

Baited traps are frequently set in a double line formation, generally 100-300 ft apart, running parallel to a bottom contour. Some fishers prefer to lay traps in a grid, crisscross or circular pattern. Traps are usually set on sandy or grassy bottom with scattered sponges, rocks, soft corals or small coral heads (Bert *et al.* 1978). The margins of seagrass flats and bottoms with low rocky relief are also favored areas for trap placement (T. Bert, FFWCC, to A. Herndon, NMFS, pers. comm., 2006).
Fishers who operate large vessels usually allow their traps to soak for 10 to 21 days. After the trap has been retrieved, the catch is removed, the trap is re-baited, minor repairs are made to the trap if necessary, and then the trap is reset. Stone crab fishing is conducted almost entirely during one-day trips (GMFMC 1979).

Depending on the experience of the crew, a three-man crew may haul and reset anywhere from 25 to 100 traps per hour. This rate is also highly dependent on tide, weather conditions, smoothness of operation and the condition of equipment. Sixty traps an hour is considered an average rate for larger vessels (Bert *et al.* 1978). Per season, stone crab fishers operating large vessels may set from 1,500 to 8,000 traps or more; a few leaders in the fishery may own several vessels ranging 60-85 ft in length and fish up to 10,000 traps per season (T. Bert, FFWCC, to A. Herndon, pers. comm., 2006).

Small vessels (30 ft or less) generally fish shallower waters and pull their traps every few days. They use the same techniques described above to set and retrieve their traps, but powered haulback devices are rarely employed. The number of traps worked per day by these single man crews, ranges from less than 25 to 300. Over a season, the number of traps set by these smaller operators varies but may be as high as 1,500 (Bert *et al.* 1978).

The recreational stone crab trap/pot fishery is composed of crabbers that use much of the same equipment and techniques as the commercial crabbers described above. Most recreational trap fishers fish only a few traps (Florida state regulations limit recreational stone crab trap number to 5 per person [F.A.C. Chapter 68B-13, Florida Statutes]) and set them in shallow water (20 ft or less). The State of Florida has no specific marking requirement for recreational crab trap/pots.

Management and Regulations: The stone crab trap/pot fishery is currently a Category II fishery under the MMPA's 2012 List of Fishery (76 FR 73912;November 29, 2011) due to occasional interactions with marine mammals (50 CFR 229). Based on stranding data and confirmation of gear to the stone crab fishery, the bottlenose dolphin stocks with known interactions with this fishery include the Biscayne Bay Stock and Eastern Coastal Stock (Gulf of Mexico). Other bottlenose dolphin stocks with stranding data documenting interactions with trap pot gear for which the gear

may be stone crab include the Caloosahatchee River Stock, Central Florida Coastal Stock (Atlantic Ocean), and Jacksonville Estuarine System Stock. Based on the stone crab fishery effort, all bay, sound, and estuary stocks in Florida are potentially impacted by this fishery.

The State of Florida and the Gulf of Mexico Fishery Management Council (GMFMC) manage this fishery jointly (GMFMC 2001). The GMFMC and NMFS both acknowledge the fishery is primarily a state fishery, and requires cooperative state/federal management. Federal management of the stone crab fishery consists primarily of the concurrent regulations established to support existing State of Florida regulations.

Under the FMP, the federal management area for the stone crab trap/pot fishery is defined as the EEZ off the coast of Florida from a line extending directly south from the Alabama/Florida boundary (87°31'06" W. long.) to a line extending directly east from the Dade/Monroe County, Florida, boundary (25º20.4' N. lat.) (as a federal management area, this does not include state waters within three miles of shore although the regulations are concurrent with state waters). The stone crab management area overlaps jurisdictions of the GMFMC and the South Atlantic Fishery Management Council (SAFMC). Due to this overlap, the GMFMC acts as the lead federal agency for developing, amending, and managing the stone crab fishery and its FMP while working concurrently with the State of Florida, though any federal management decisions are submitted to the SAFMC for review as well.

The fishery is currently managed through seasonal closures, effort limitations, harvest limitations, permit requirements, trap construction requirements, and a passive trap limitation program managed by the State of Florida. Recreational fishers must follow the same guidelines as commercial fishers unless otherwise noted.

Observer Coverage: There is no observer coverage in this fishery.

Comments: Based on the similar gear type used in a number of different pot fisheries (e.g., blue crab, spiny lobster, etc.) especially in coastal Florida waters, bottlenose dolphin strandings associated with this fishery are likely underestimated. Derelict trap/pot gear is also a substantial concern for marine life entanglements.

Protected Species Interactions: Based on Florida Atlantic stranding data from 2002-April 2009 and Florida Gulf of Mexico Stranding Data from 2002-2010, there have been 5 bottlenose dolphin strandings that have resulted from the stone crab trap/pot fishery and 8 bottlenose dolphin strandings that are a result of pot fisheries that could not be definitively identified to a specific fishery. Based on stranding data and confirmation of gear to the stone crab fishery, the bottlenose dolphin stocks with known interactions with this fishery include the Biscayne Bay Stock and Eastern Coastal Stock (Gulf of Mexico). Other stocks with stranding data documenting interactions with trap pot gear for which the gear may be stone crab include the Caloosahatchee River Stock, Central Florida Coastal Stock (Atlantic Ocean), and Jacksonville Estuarine System Stock.

Gulf of Mexico Blue Crab Trap/Pot Fisheries

The Blue Crab Trap/Pot Fishery is broadly distributed in estuarine and nearshore coastal waters along the Gulf coast. The fishery is estimated to have approximately 4,000 participants deploying gear on a year-round basis. Pots are baited with fish or poultry and are typically set in rows in shallow water. Pot position is marked by either a floating or sinking buoy line attached to a surface buoy. In recent years, reports of strandings in the Atlantic with evidence of interactions between bottlenose dolphins and both recreational and commercial crab pot fisheries have been increasing in the Southeast region (McFee and Brooks 1998). Interactions have also been reported in the Gulf, including both stranding mortalities and entanglements/live releases. Interactions with crab pots appear to generally involve a dolphin becoming wrapped in the buoy line. The total number of these interactions and associated mortality rates has not been documented. However, based on Gulf of Mexico Stranding Data from 2002-2010, there has been 1 mortality from the blue crab trap/pot fishery, and 1 mortality and 4 bottlenose dolphin disentanglements with live releases that were a result of pot fisheries that may have been blue crab but could not be definitively identified to a specific fishery. The fishery has been defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011).

Gulf of Mexico Menhaden Purse Seine Fishery

This fishery operates in coastal waters along the Gulf coast, with the majority of fishing effort concentrated off Louisiana and Mississippi. Fishing effort occurs both in bays, sounds, and in nearshore coastal waters. Between 1994 and 1998, fishery effort averaged approximately 23,000 sets annually (Smith *et al.* 2002). No observer data is available for the Gulf of Mexico Menhaden Fishery; however, recent interactions with bay, sound and estuary and

coastal bottlenose dolphins have been reported through the MMAP and historically through an observer program carried out by Louisiana State University from 1994 to 1996. Takes reported through the MMAP likely affected the following stocks: Western Coastal Stock; Northern Coastal Stock; Mississippi Sound, Lake Borgne, Bay Boudreau Stock; Mississippi River Delta Stock; and Barataria Bay Estuarine System Stock. The fishery has been defined as a Category II fishery in the 2012 List of Fisheries (76 FR 73912;November 29, 2011).

Gulf of Mexico Gillnet Fishery

The Gulf of Mexico gillnet fishery uses strike and straight gillnets to target a wide variety of species including, but not limited to, black drum, sheepshead, weakfish, mullet, spot, croaker, king mackerel, Spanish mackerel, Florida pompano, flounder, shark, menhaden, bluefish, blue runner, ladyfish, spotted seatrout, croaker, kingfish, and red drum. This fishery operates year-round in waters north of the U.S.-Mexico border and west of the fishery management council demarcation line between the Atlantic Ocean and the Gulf of Mexico. Gillnets are not used in Texas, and large gillnets were excluded from Florida state waters after July 1995, but fixed and runaround gillnets are currently in use in Louisiana, Mississippi, and Alabama. In the Gulf of Mexico, coastal migratory pelagic resources are the only federally managed species for which gillnet gear is authorized, and only run-around gillnetting for these species is allowed (CMPR FMP). In state waters, state and Gulf States Marine Fisheries Commission (GSMFC) Interstate FMPs apply. No marine mammal mortalities associated with commercial gillnet fisheries have been reported in these states, but stranding data suggest that marine mammal interactions with gillnets do occur, causing mortality and serious injury. There are no effort or observer data available for these fisheries. Four research-related gillnet mortalities occurred between 2003 and 2007 in Texas and Louisiana and an additional research gillnet entanglement (released alive) occurred during 2008 in Texas. All of the research-related interactions were likely with animals belonging to the following bay, sound and estuary stocks: Copano Bay, Aransas Bay, San Antonio Bay, Redfish Bay, Espiritu Santo Bay Stock (2 mortalities); Mississippi River Delta Stock (1 mortality); and Matagorda Bay, Tres Palacios Bay, Lavaca Bay Stock (1 mortality, 1 released alive). The Gulf of Mexico Gillnet Fisheries are listed as Category II fisheries in the 2011 List of Fisheries (76 FR 73912;November 29, 2011).

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Appendix III: Fishery Descriptions - List of Figures

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Figure 16. 2006 Northeast bottom trawl observed tows (A) and incidental takes (B).
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Figure 42. 2007 Observed sets and marine mammal interactions in the pelagic longline fishery - Gulf of Mexico.
Figure 43. 2008 Observed sets and marine mammal interactions in the pelagic longline fishery - Gulf of Mexico.
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Figure 45. 2010 Observed sets and marine mammal interactions in the pelagic longline fishery - Gulf of Mexico.

Figure 1. 2006 Northeast sink gillnet observed hauls (A) and observed takes (B).

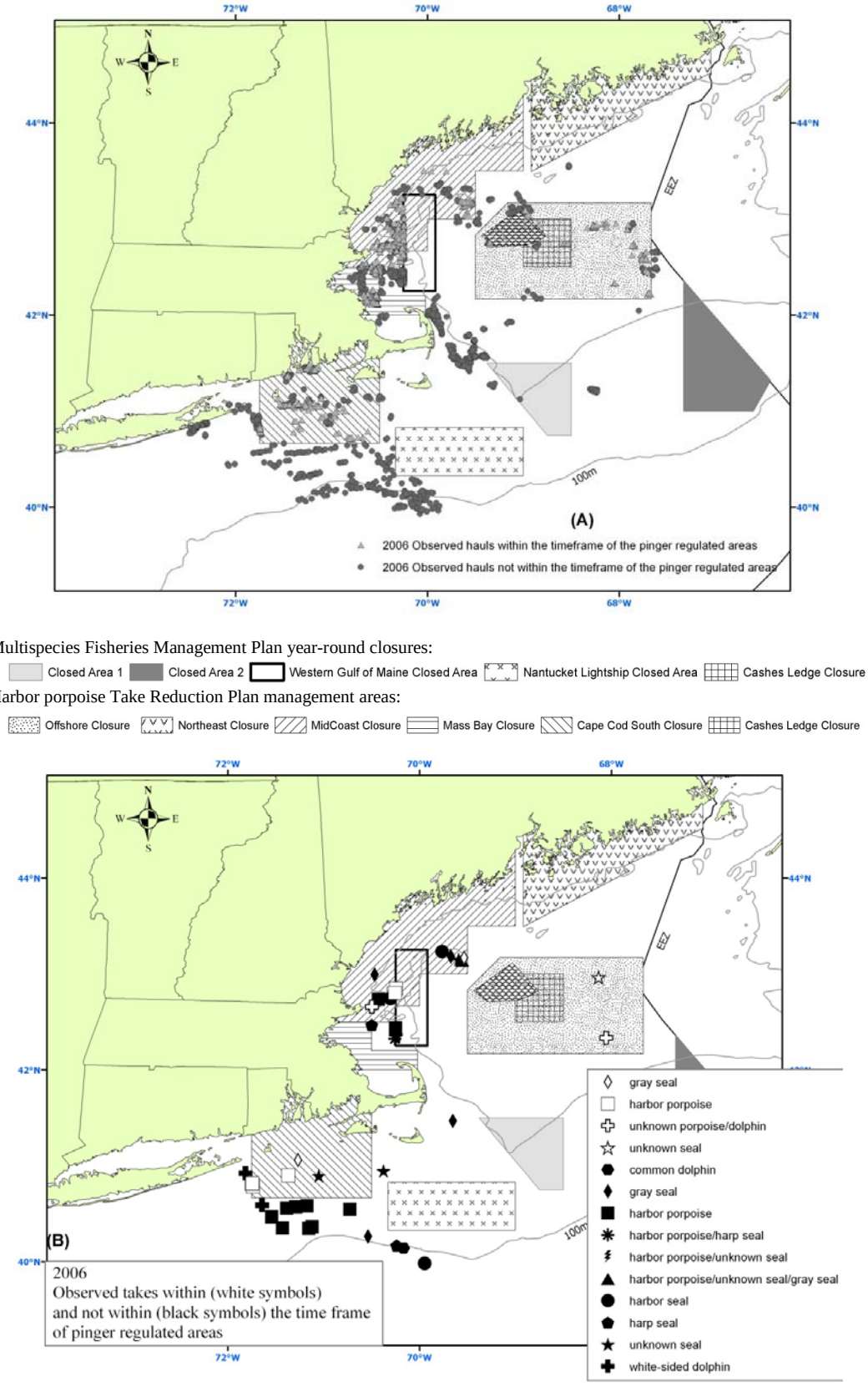


Figure 2. 2007 Northeast sink gillnet observed hauls (A) and observed takes (B).

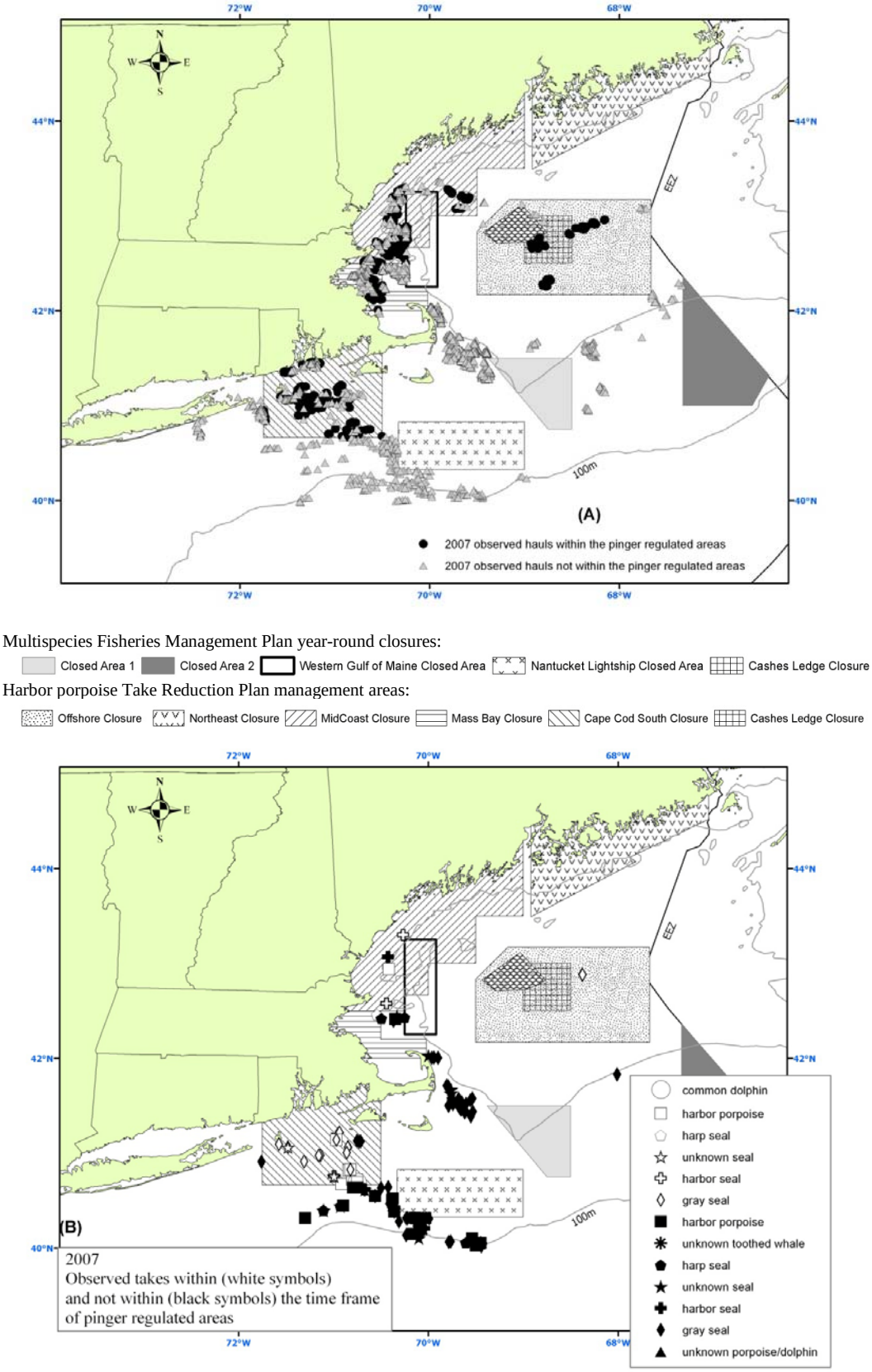
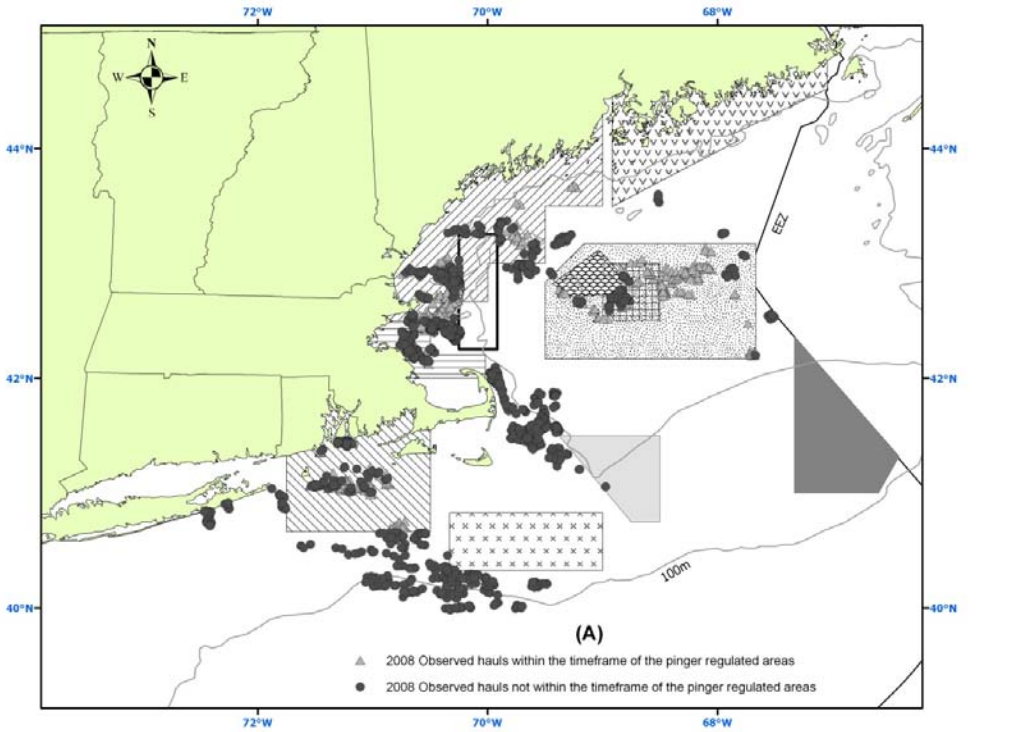


Figure 3. 2008 Northeast sink gillnet observed hauls (A) and observed takes (B).



Multispecies Fisheries Management Plan year-round closures:

Closed Area 1 | Closed Area 2 | Western Gulf of Maine Closed Area | Nantucket Lightship Closed Area | Cashes Ledge Closure

Harbor porpoise Take Reduction Plan management areas:

Offshore Closure | Northeast Closure | MidCoast Closure | Mass Bay Closure | Cape Cod South Closure | Cashes Ledge Closure

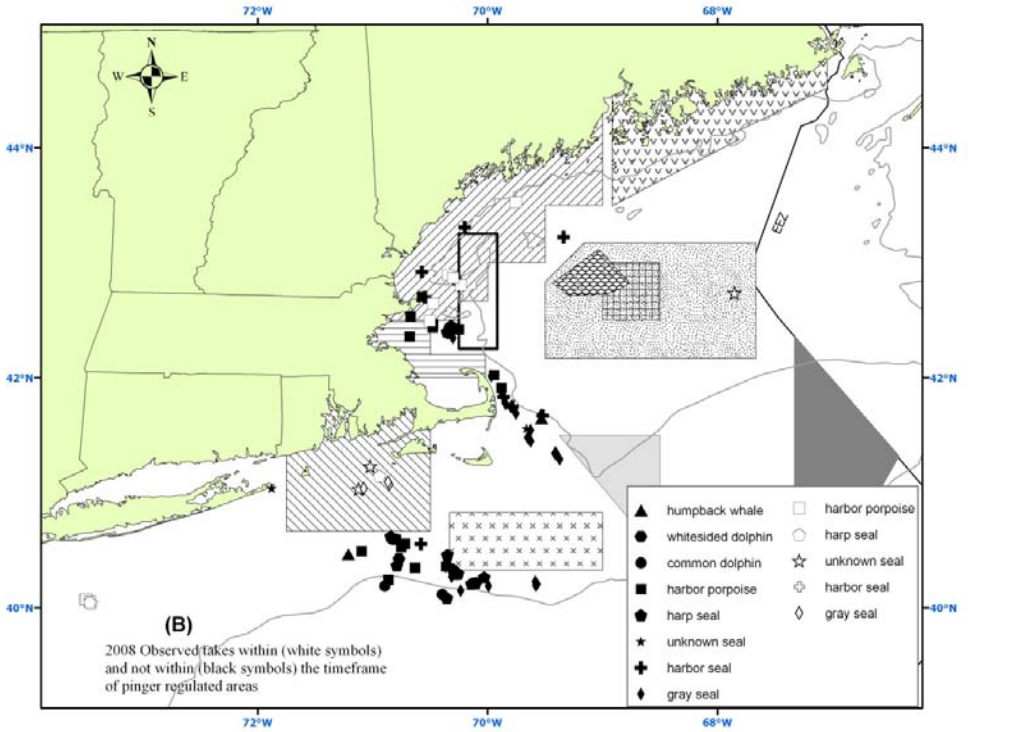
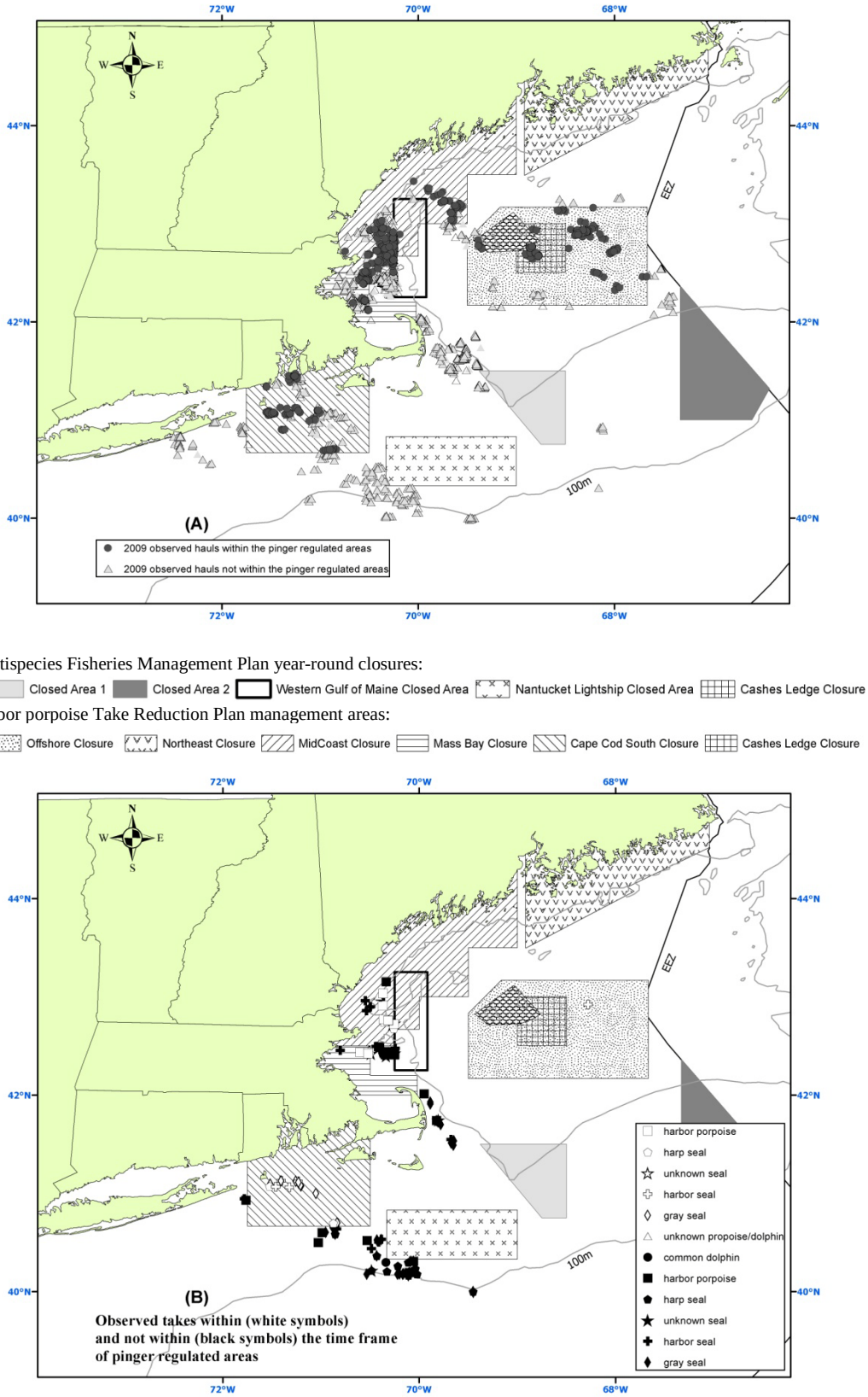


Figure 4. 2009 Northeast sink gillnet observed hauls (A) and observed takes (B).



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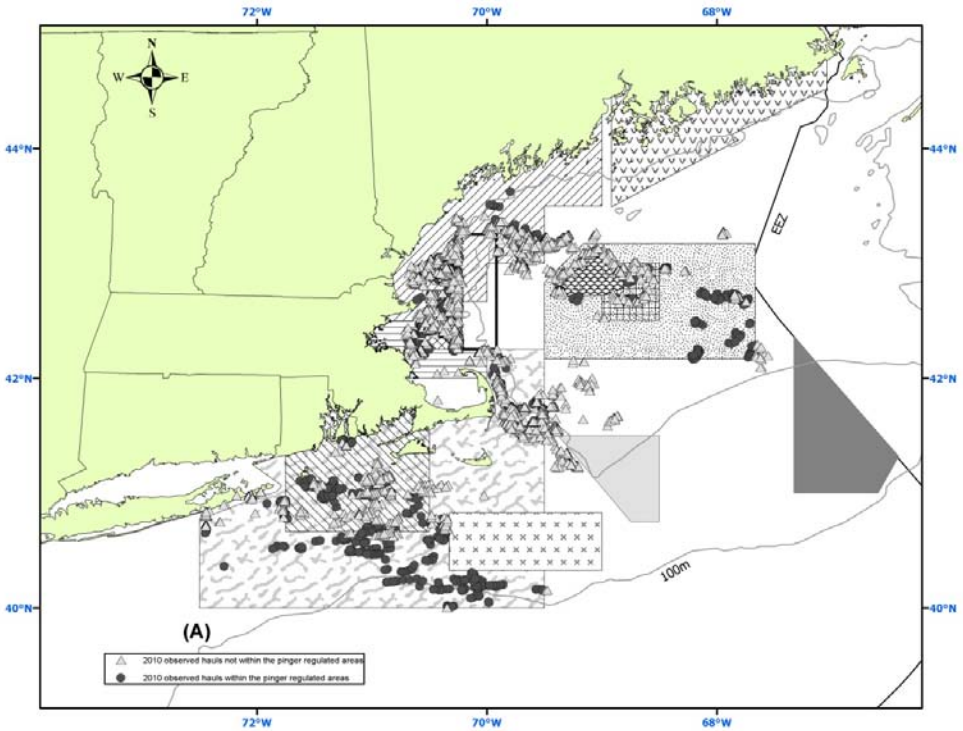


Multispecies Fisheries Management Plan year-round closures:

Harbor porpoise Take Reduction Plan management areas:

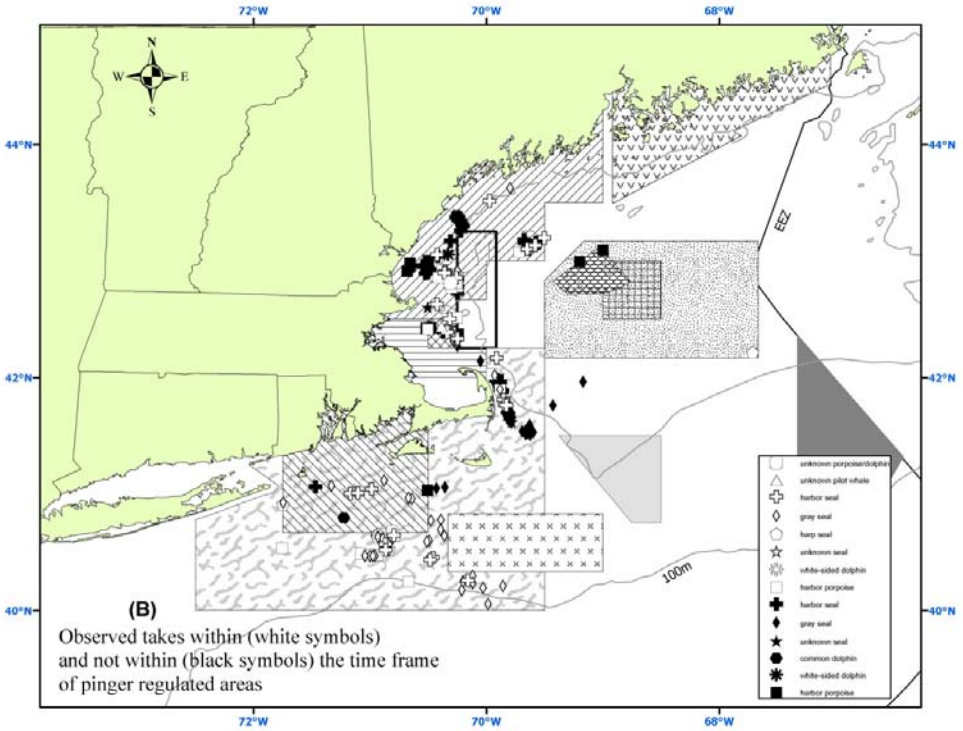


Figure 6. 2006 Mid-Atlantic gillnet observed hauls (A) and observed takes (B).

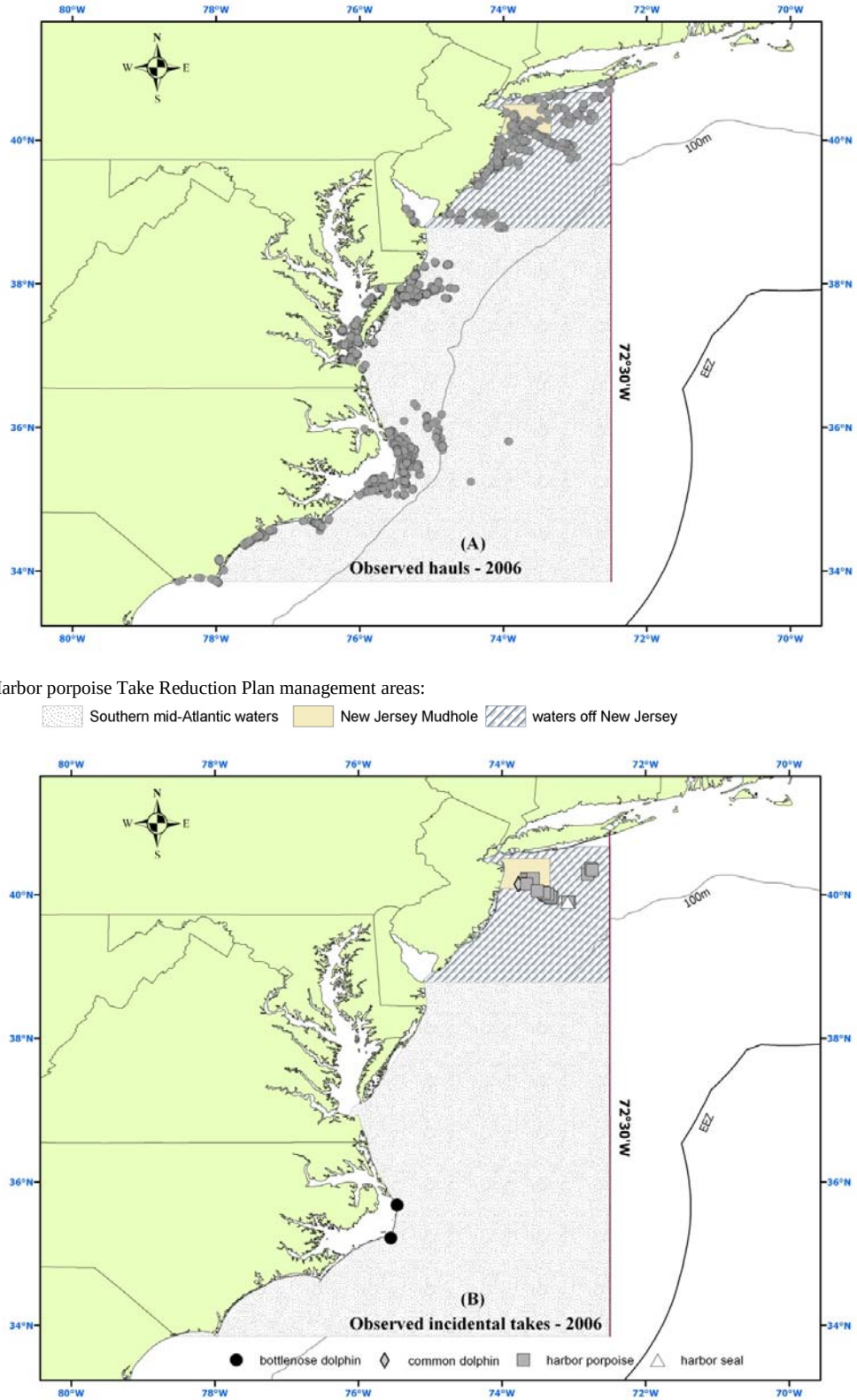


Figure 7. 2007 Mid-Atlantic gillnet observed hauls (A) and observed takes (B).

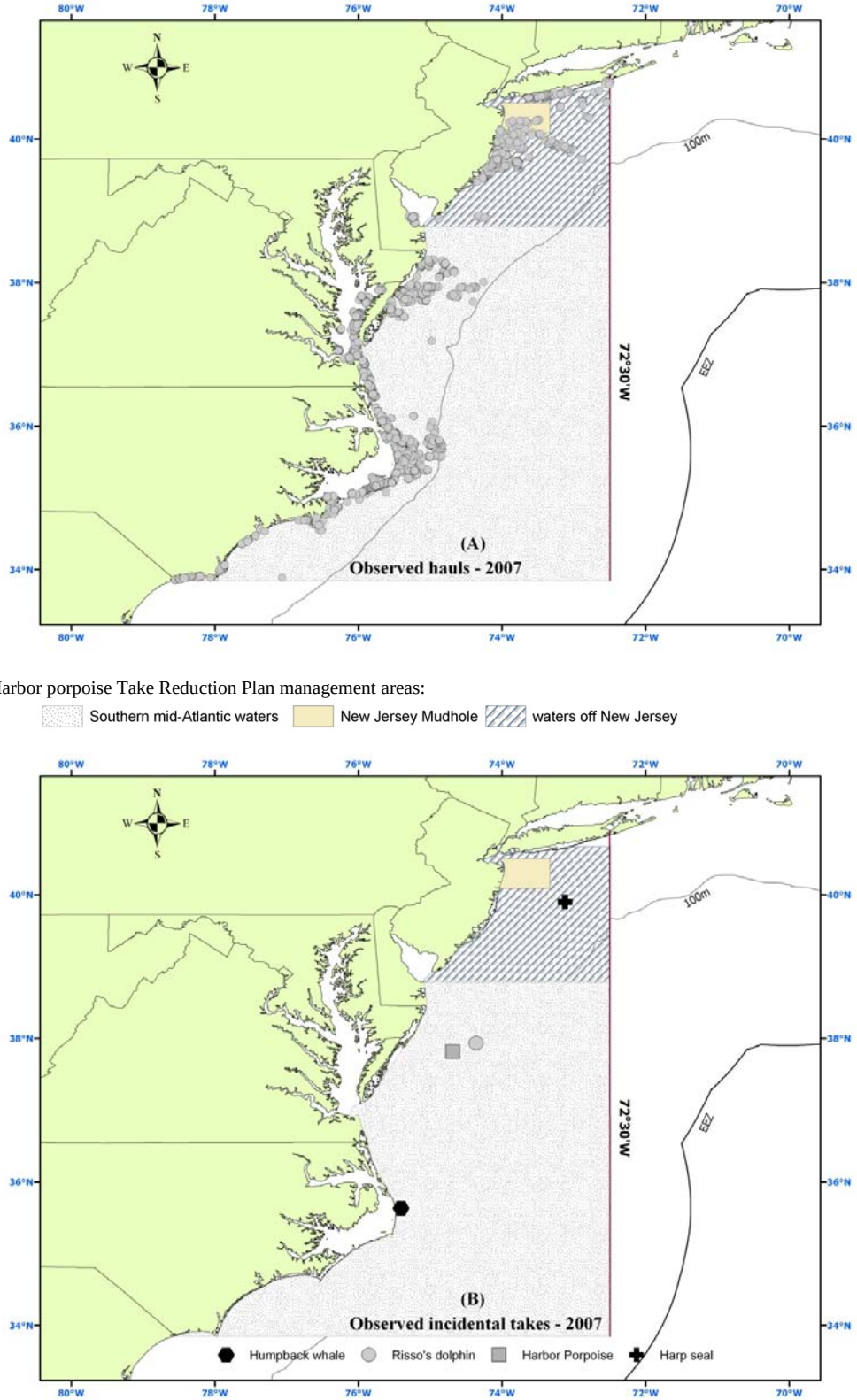
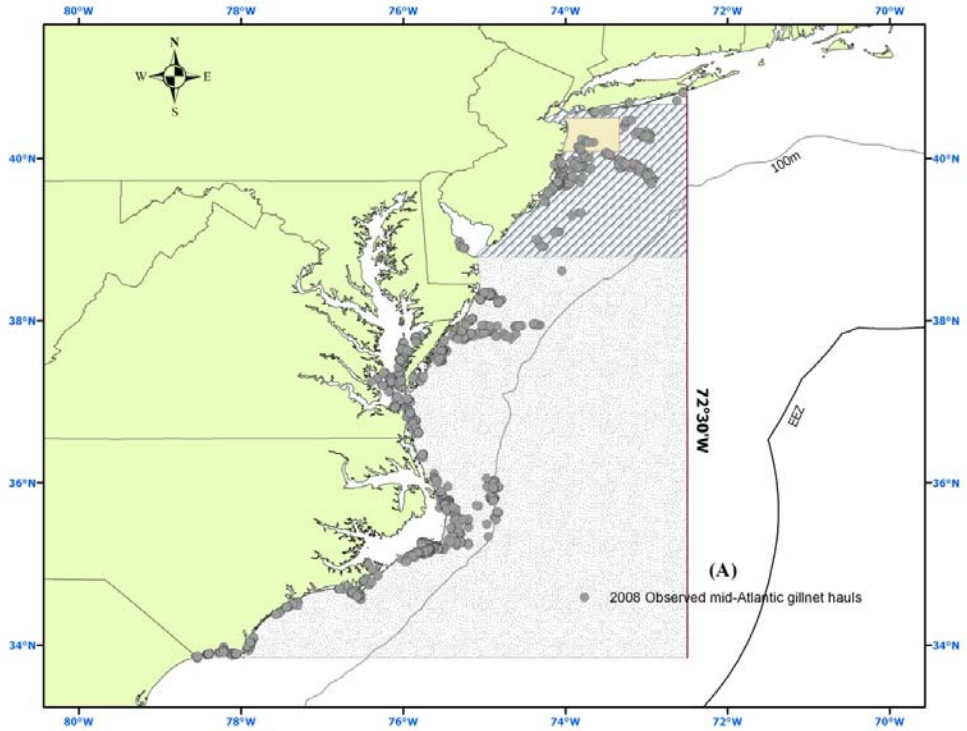


Figure 8. 2008 Mid-Atlantic gillnet observed hauls (A) and observed takes (B).



Harbor porpoise Take Reduction Plan management areas:

Southern mid-Atlantic waters | New Jersey Mudhole | waters off New Jersey

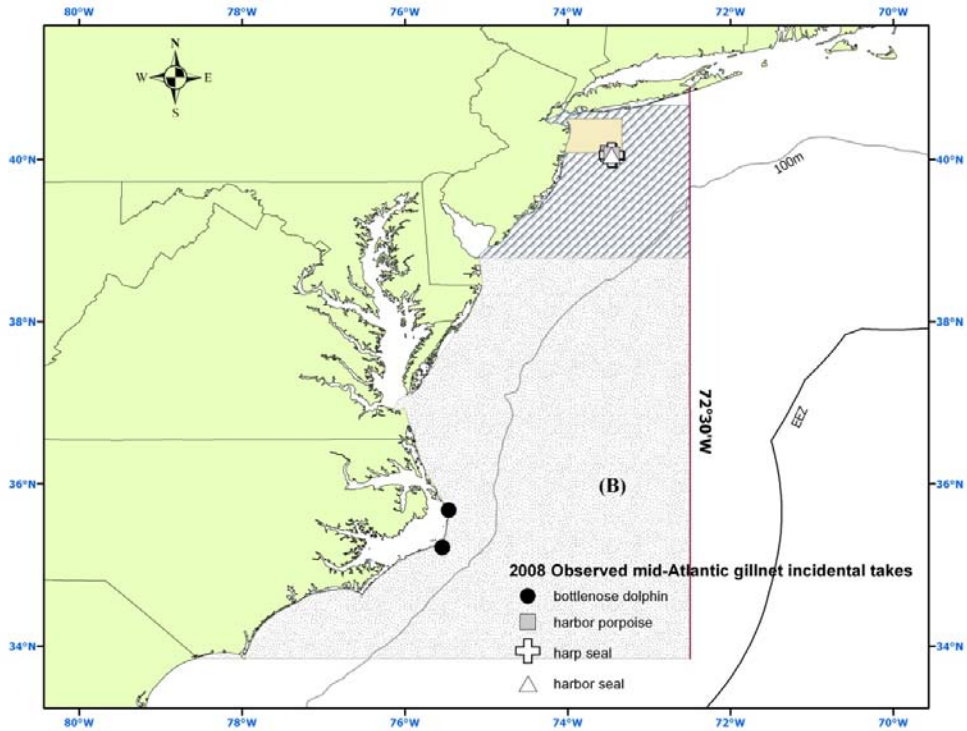
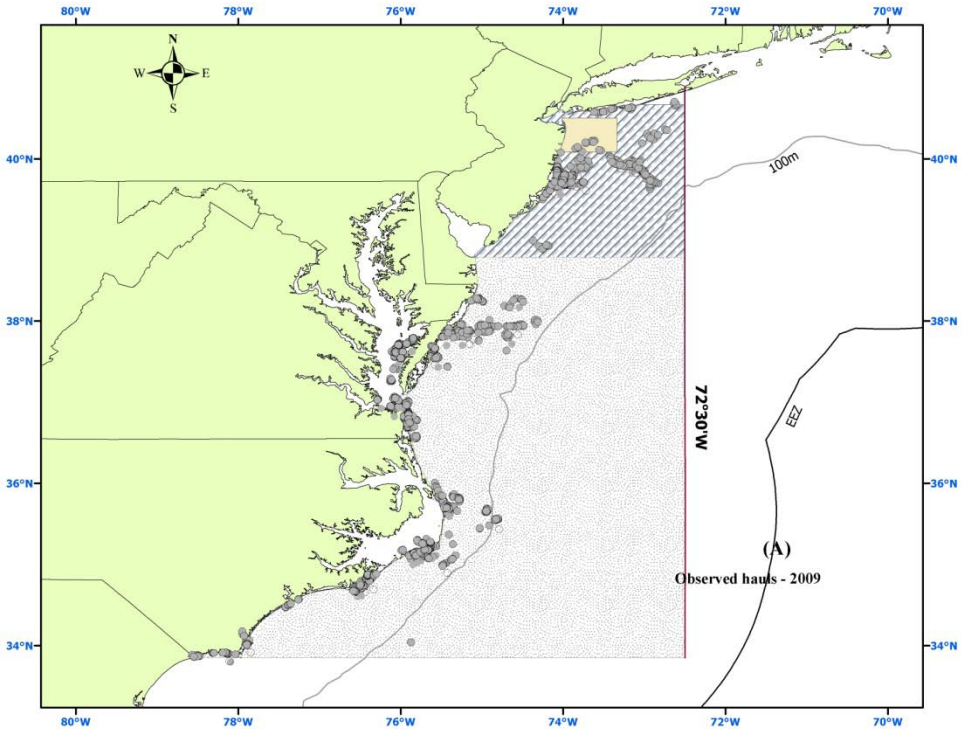


Figure 9. 2009 Mid-Atlantic gillnet observed hauls (A) and observed takes (B).



Harbor porpoise Take Reduction Plan management areas:

Southern mid-Atlantic waters | New Jersey Mudhole | waters off New Jersey

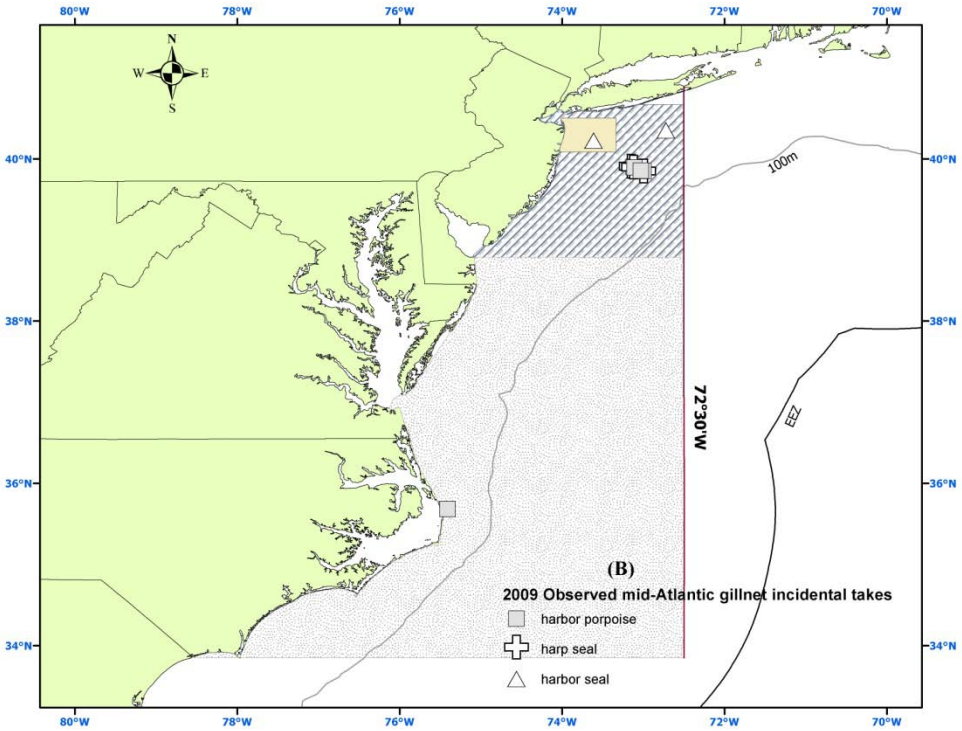
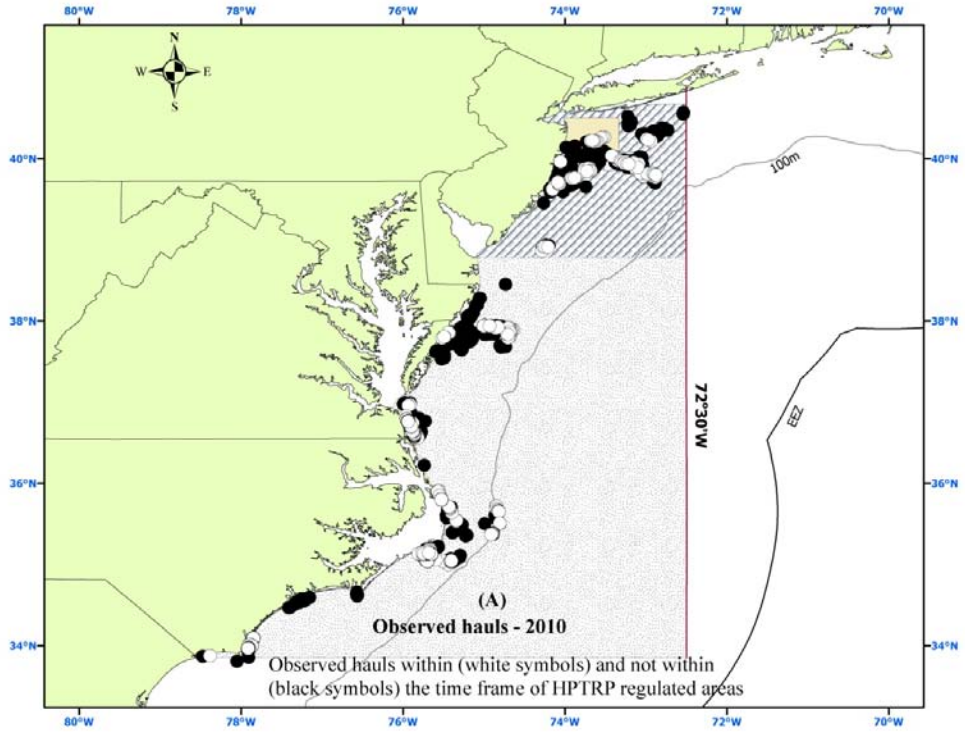


Figure 10. 2010 Mid-Atlantic gillnet observed hauls (A) and observed takes (B).



Harbor porpoise Take Reduction Plan management areas:

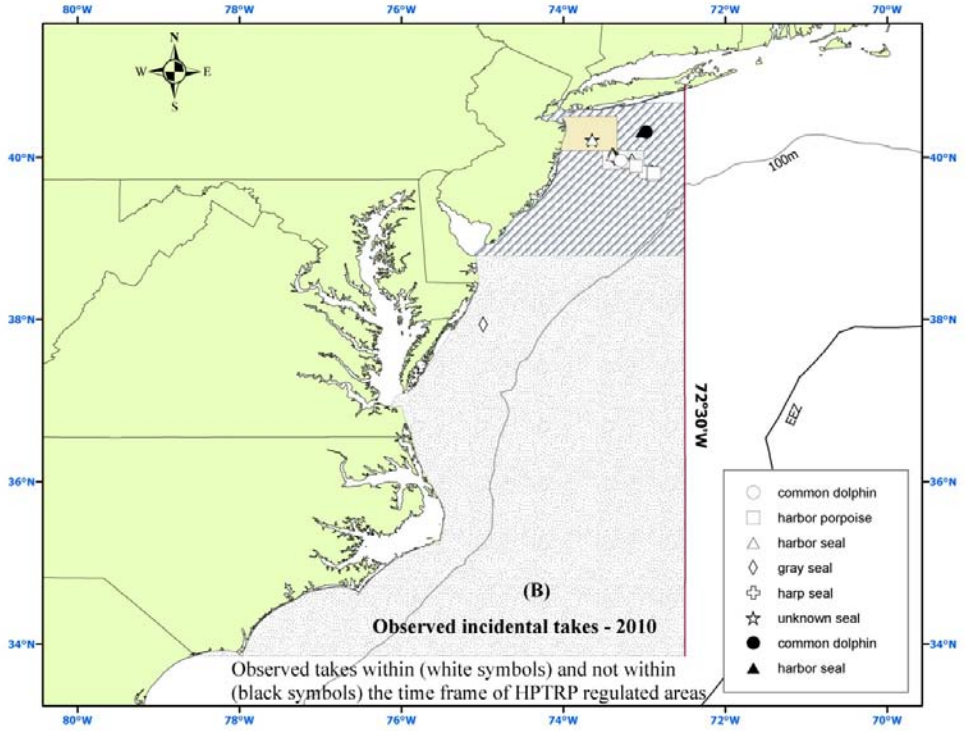


Figure 11. 2006 Mid-Atlantic bottom trawl observed tows (A) and observed takes (B).

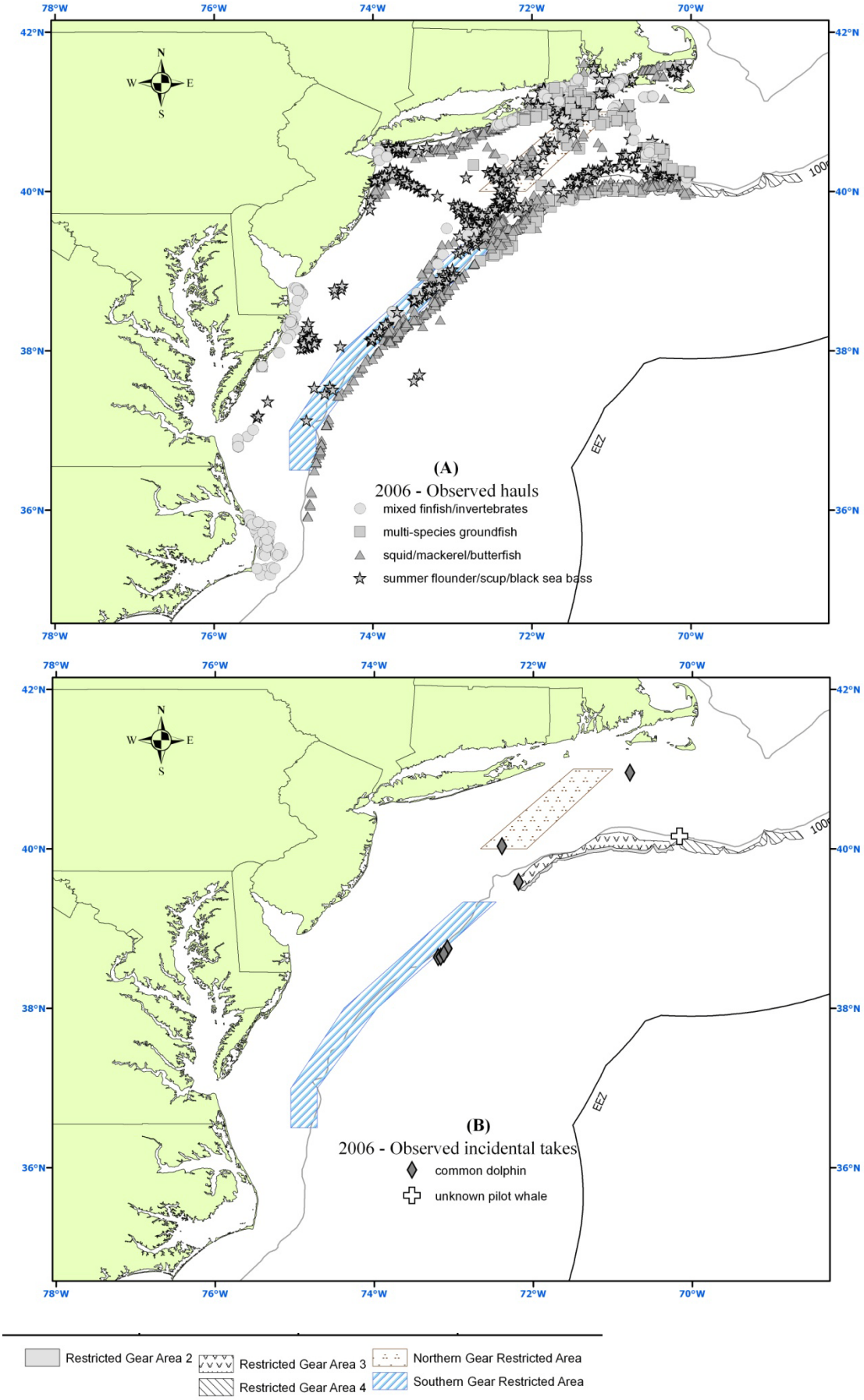


Figure 12. 2007 Mid-Atlantic bottom trawl observed tows (A) and observed takes (B).

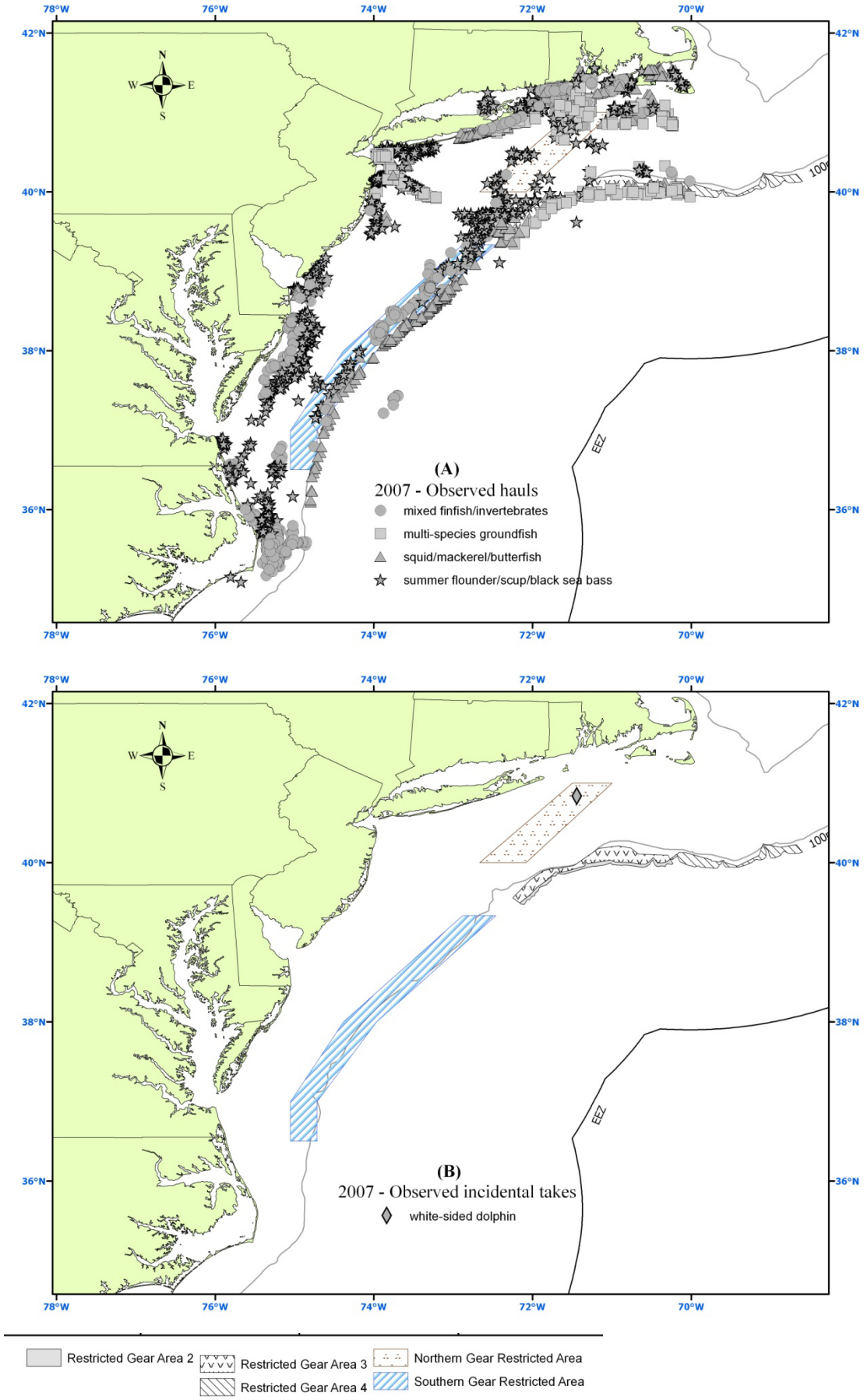


Figure 13. 2008 Mid-Atlantic bottom trawl observed tows (A) and observed takes (B).

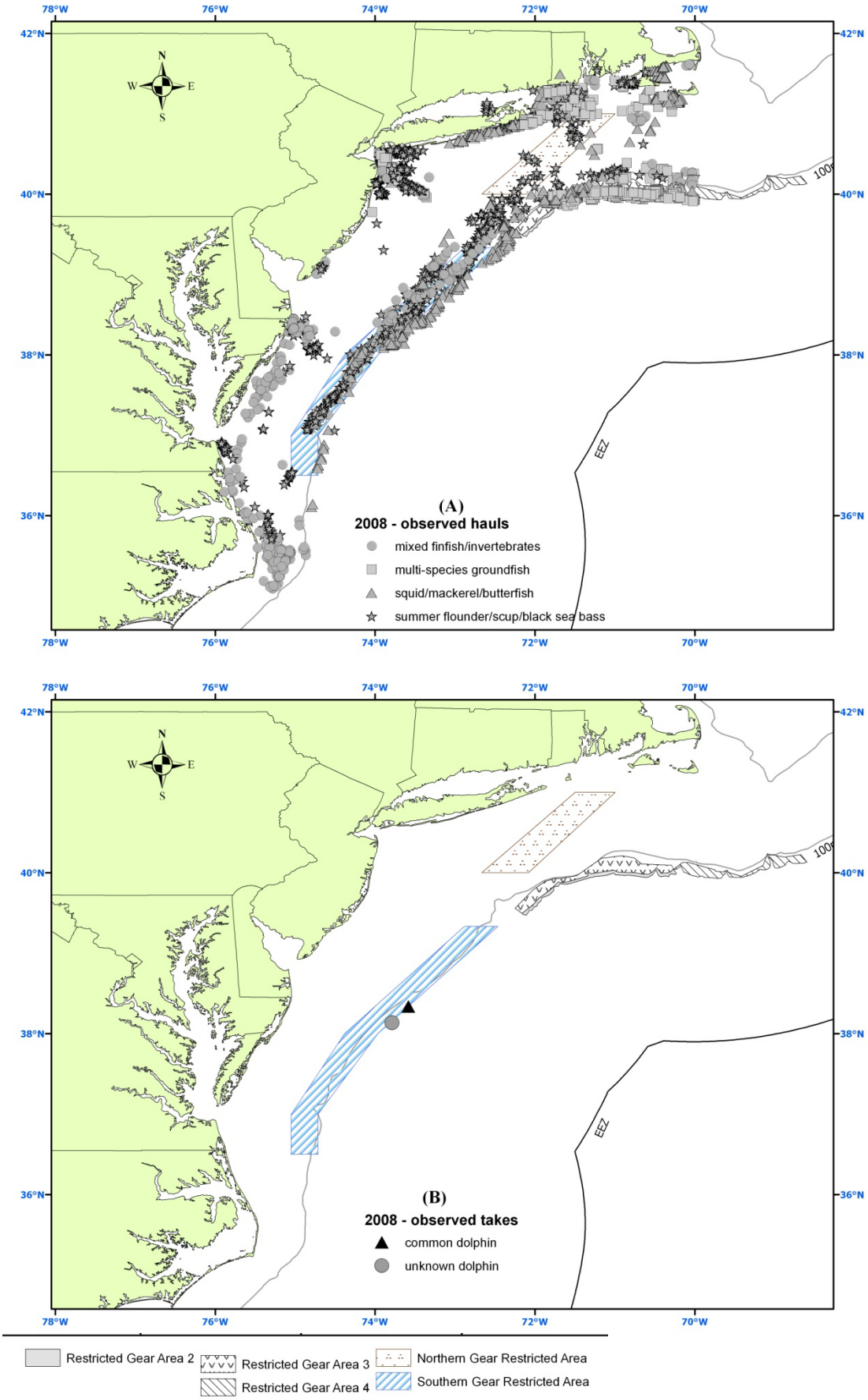


Figure 14. 2009 Mid-Atlantic bottom trawl observed tows (A) and observed takes (B).

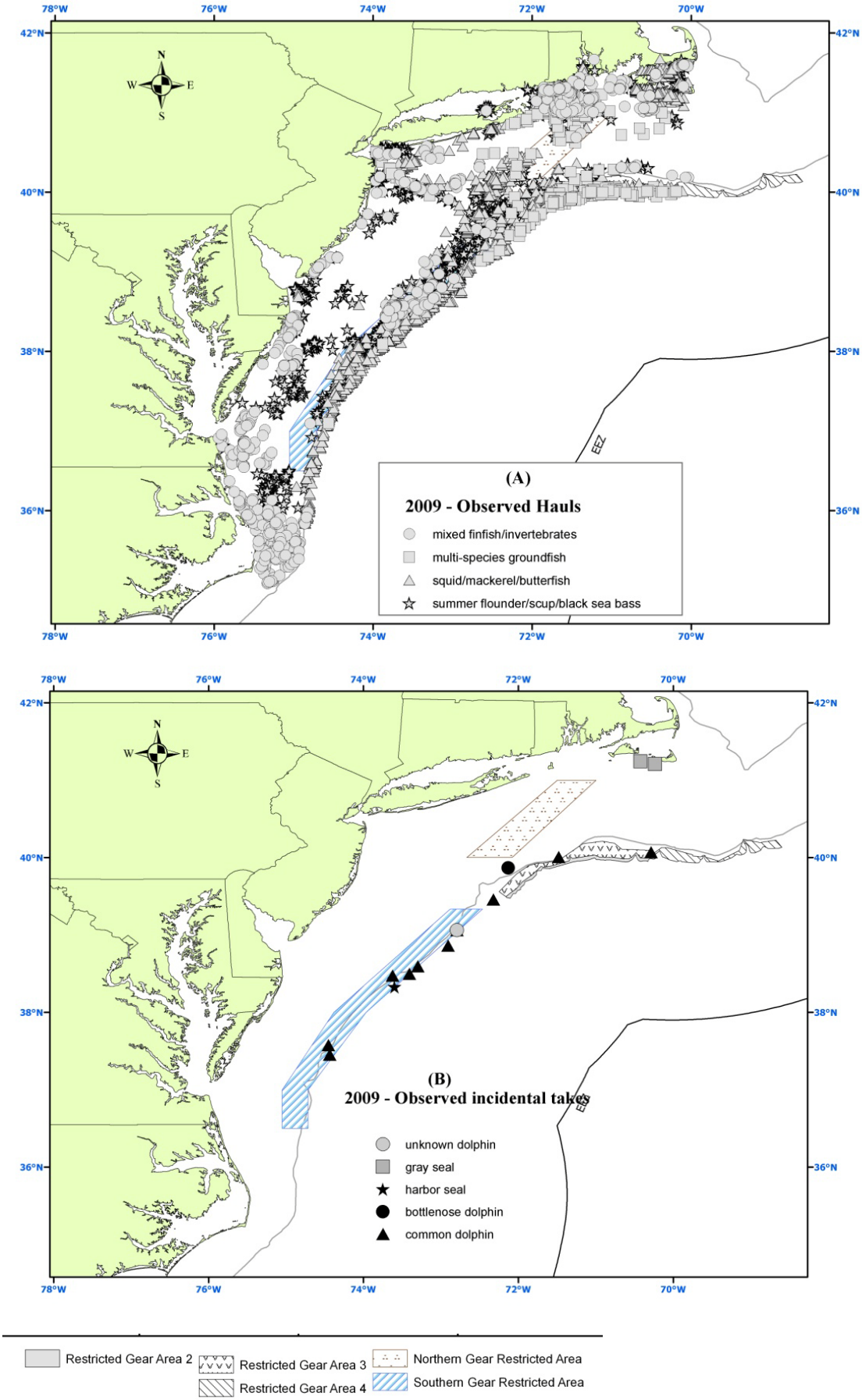


Figure 15. 2010 Mid-Atlantic bottom trawl observed tows (A) and observed takes (B).

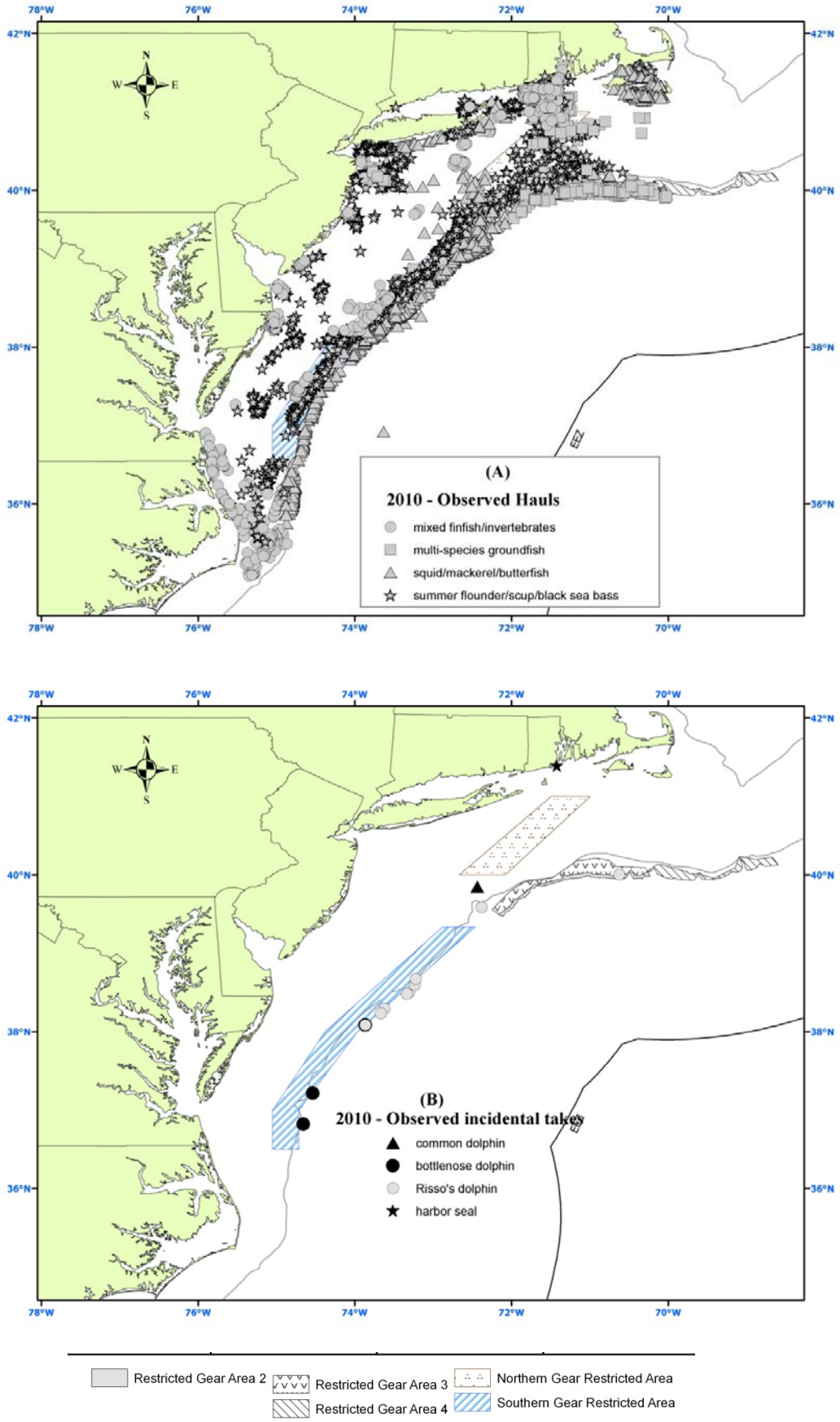


Figure 16. 2006 Northeast bottom trawl observed tows (A) and observed takes (B).

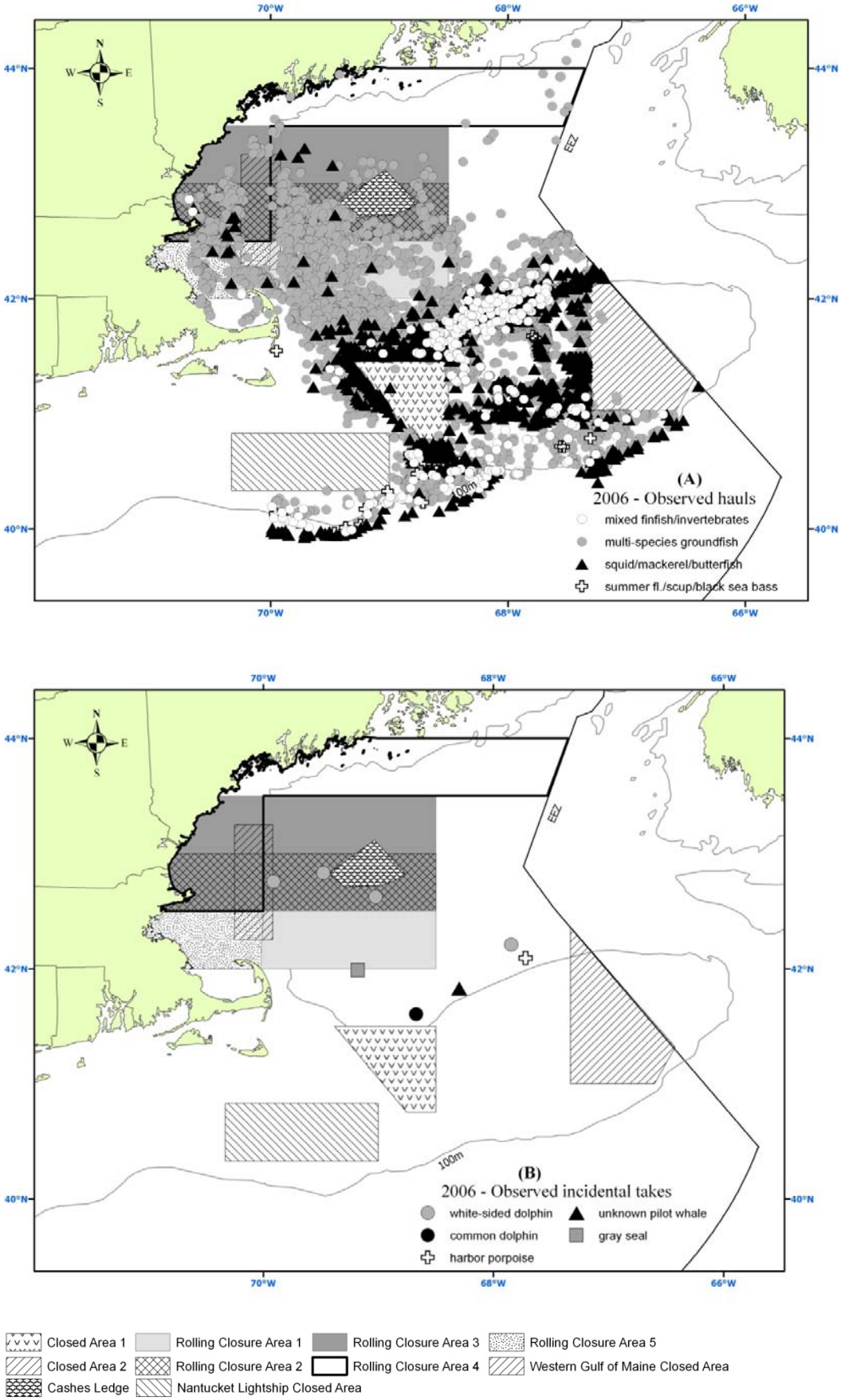


Figure 17. 2007 Northeast bottom trawl observed tows (A) and observed takes (B).

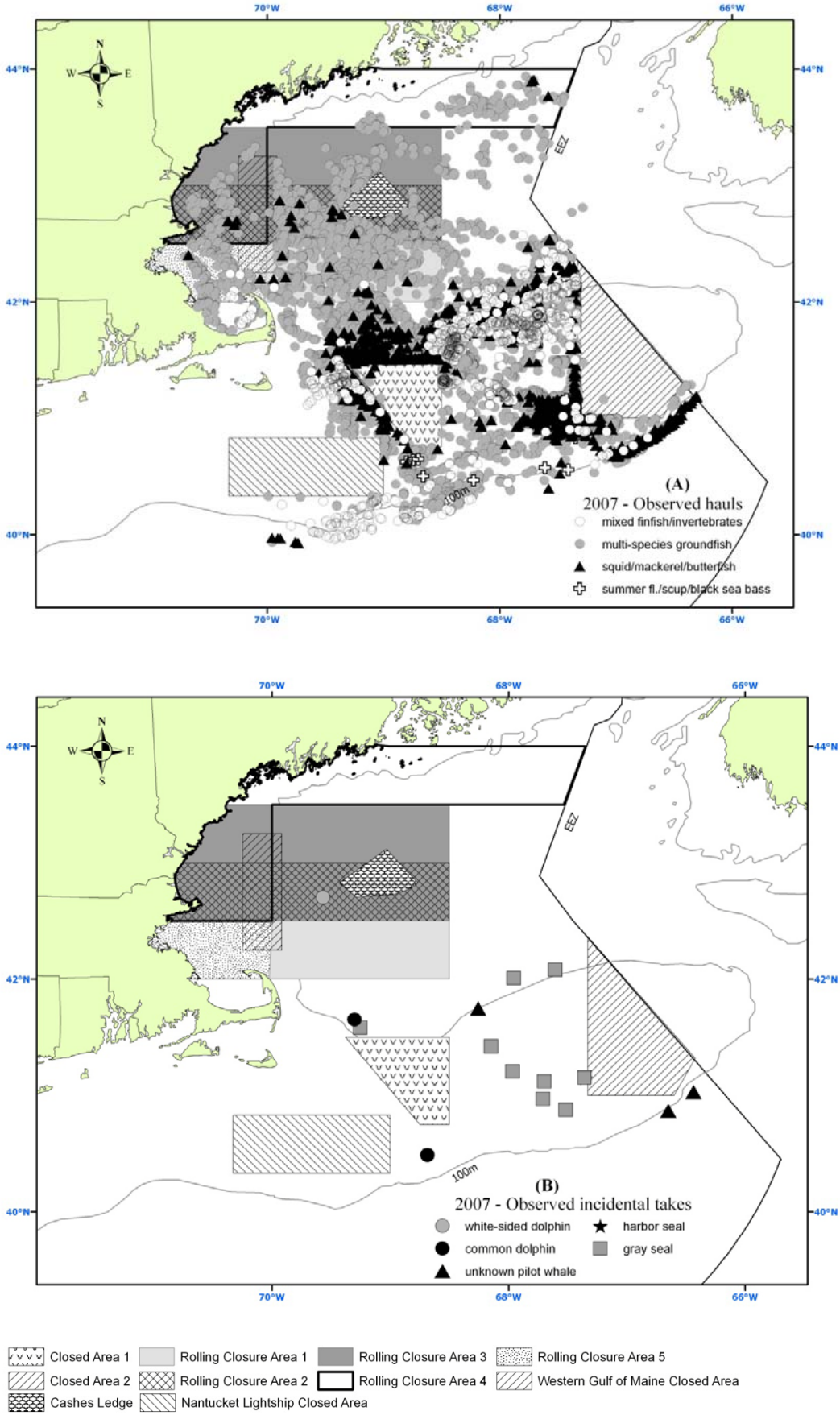


Figure 18. 2008 Northeast bottom trawl observed tows (A) and observed takes (B).

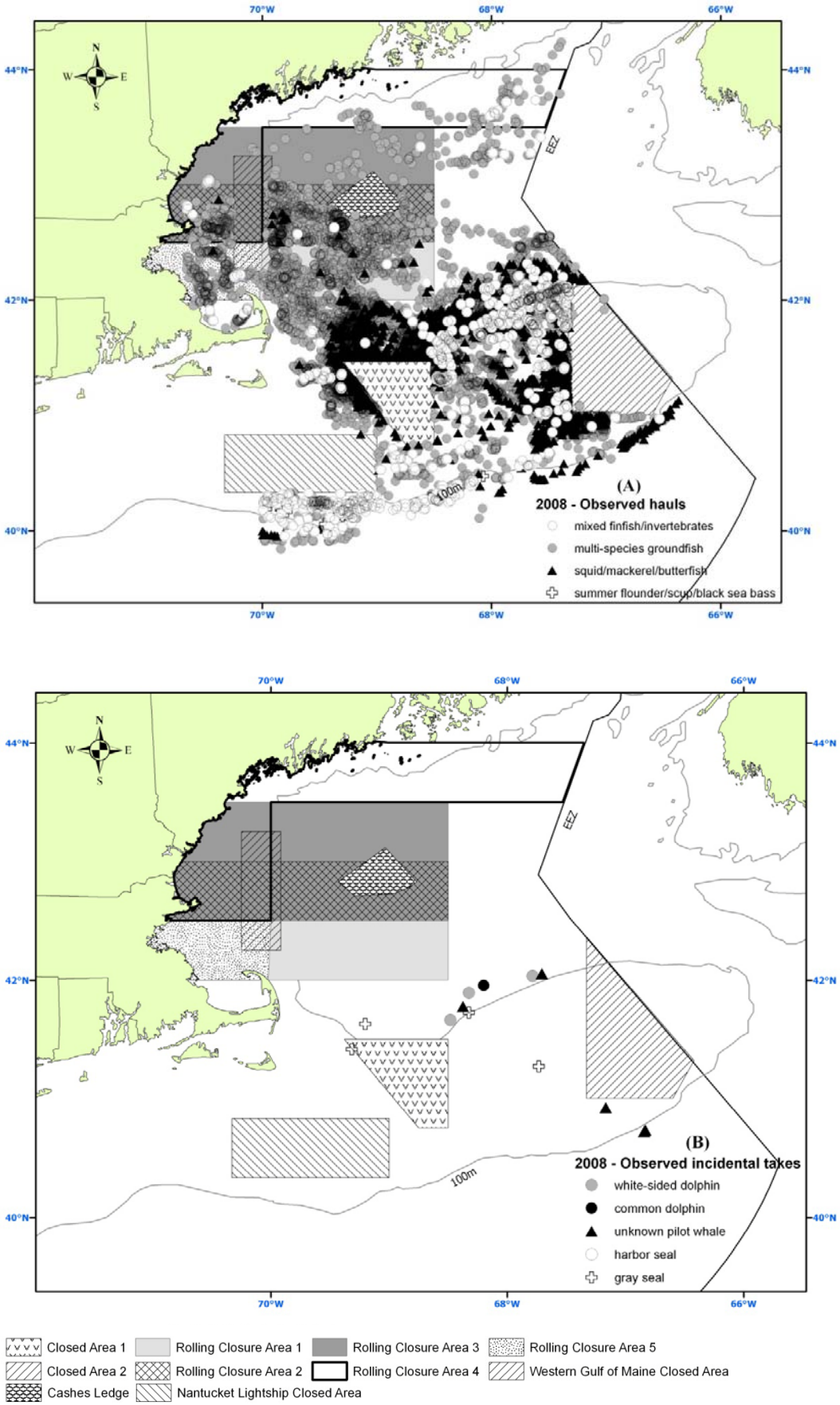


Figure 19. 2009 Northeast bottom trawl observed tows (A) and observed takes (B).

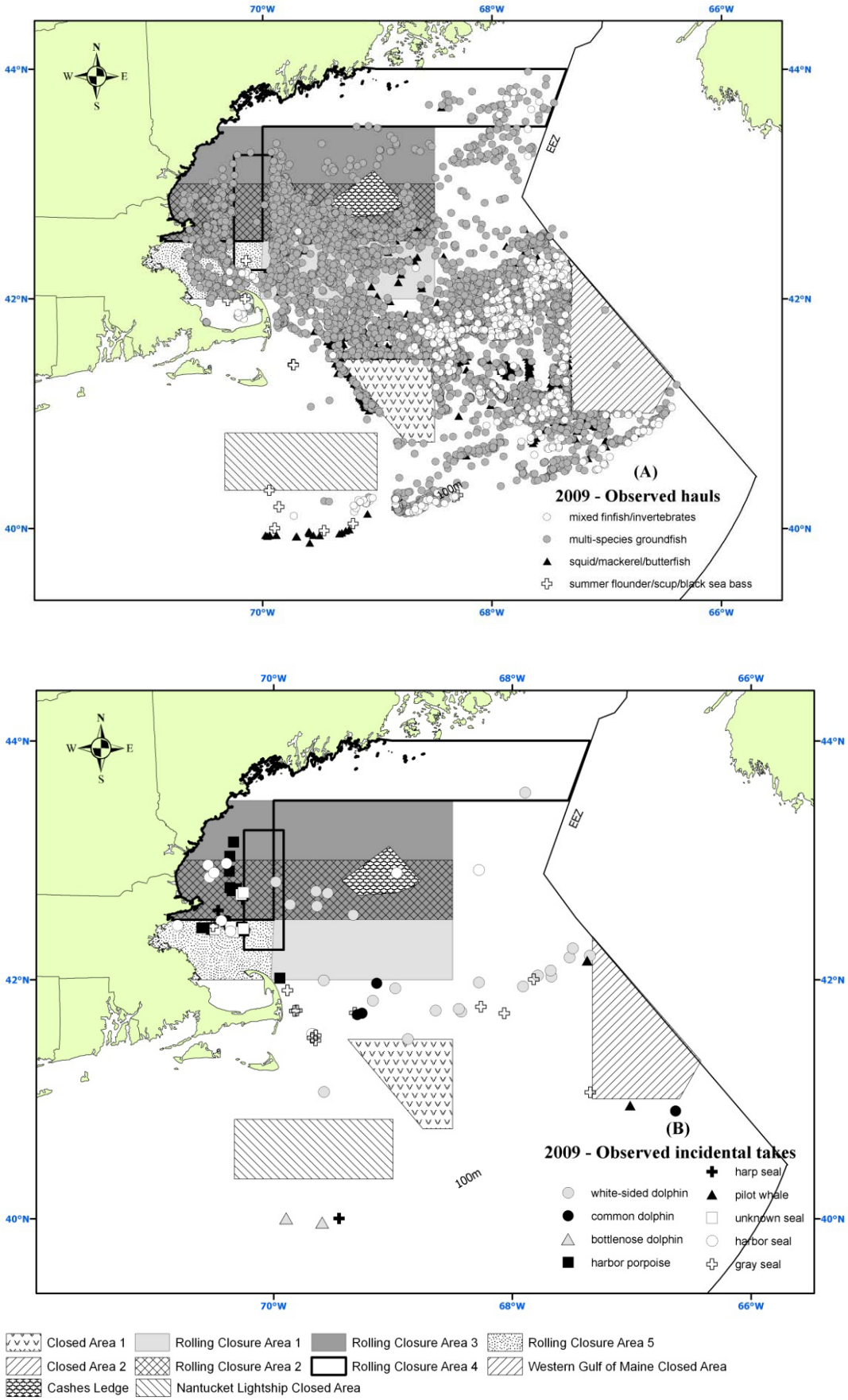


Figure 20. 2010 Northeast bottom trawl observed tows (A) and observed takes (B).

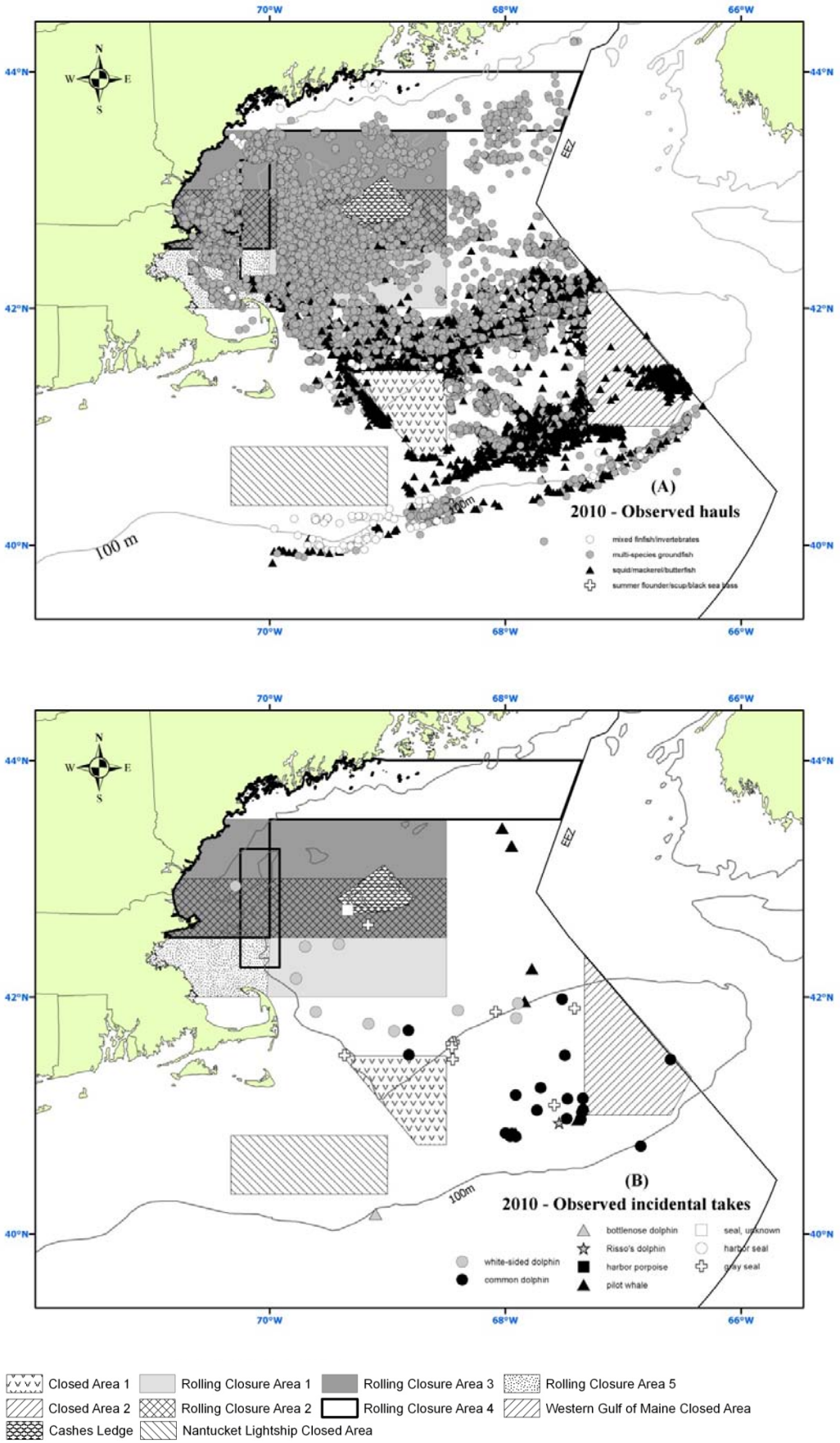


Figure 21. 2006 Northeast mid-water trawl observed tows (A) and observed takes (B).

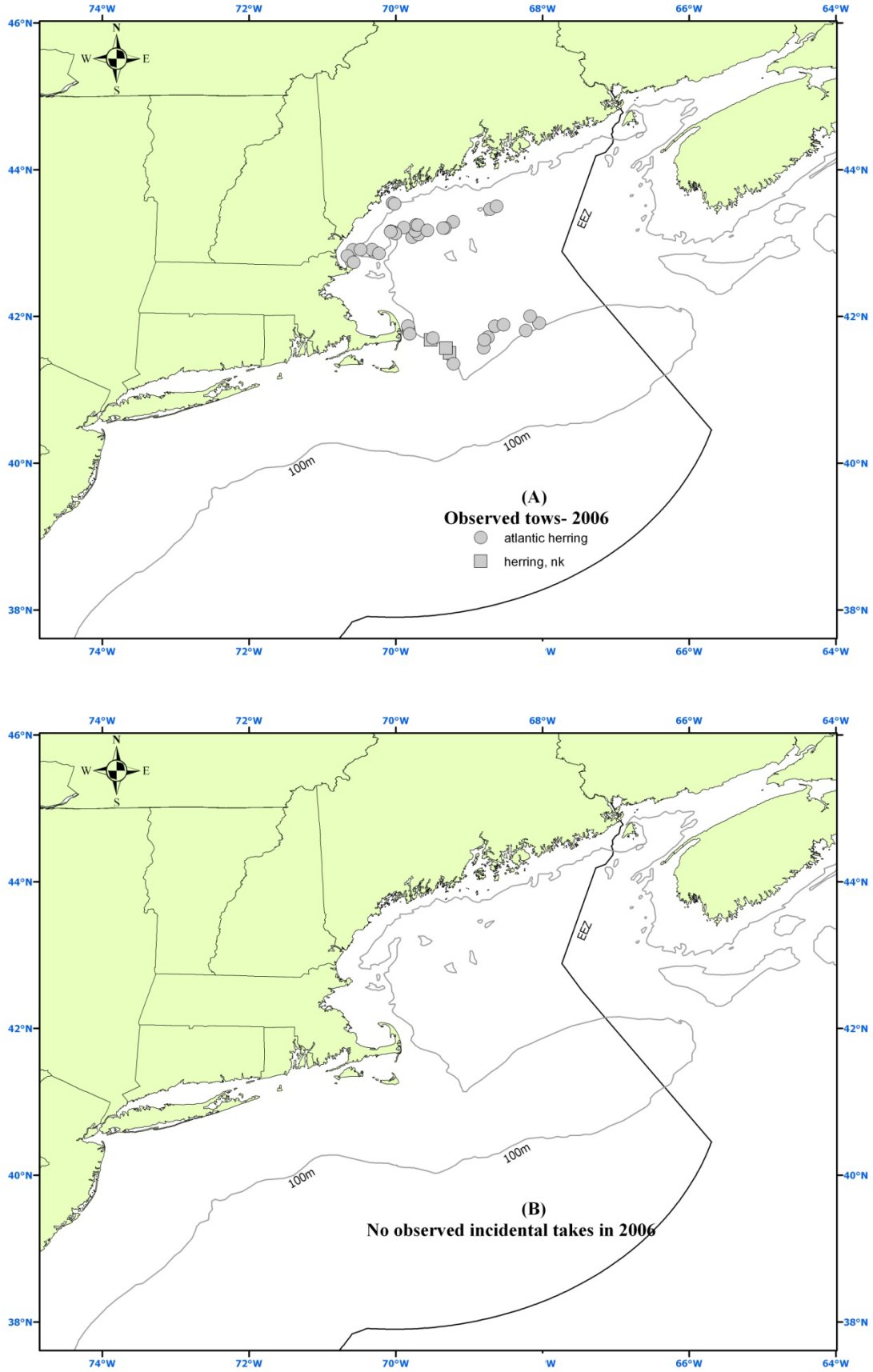


Figure 22. 2007 Northeast mid-water trawl observed tows (A) and observed takes (B).

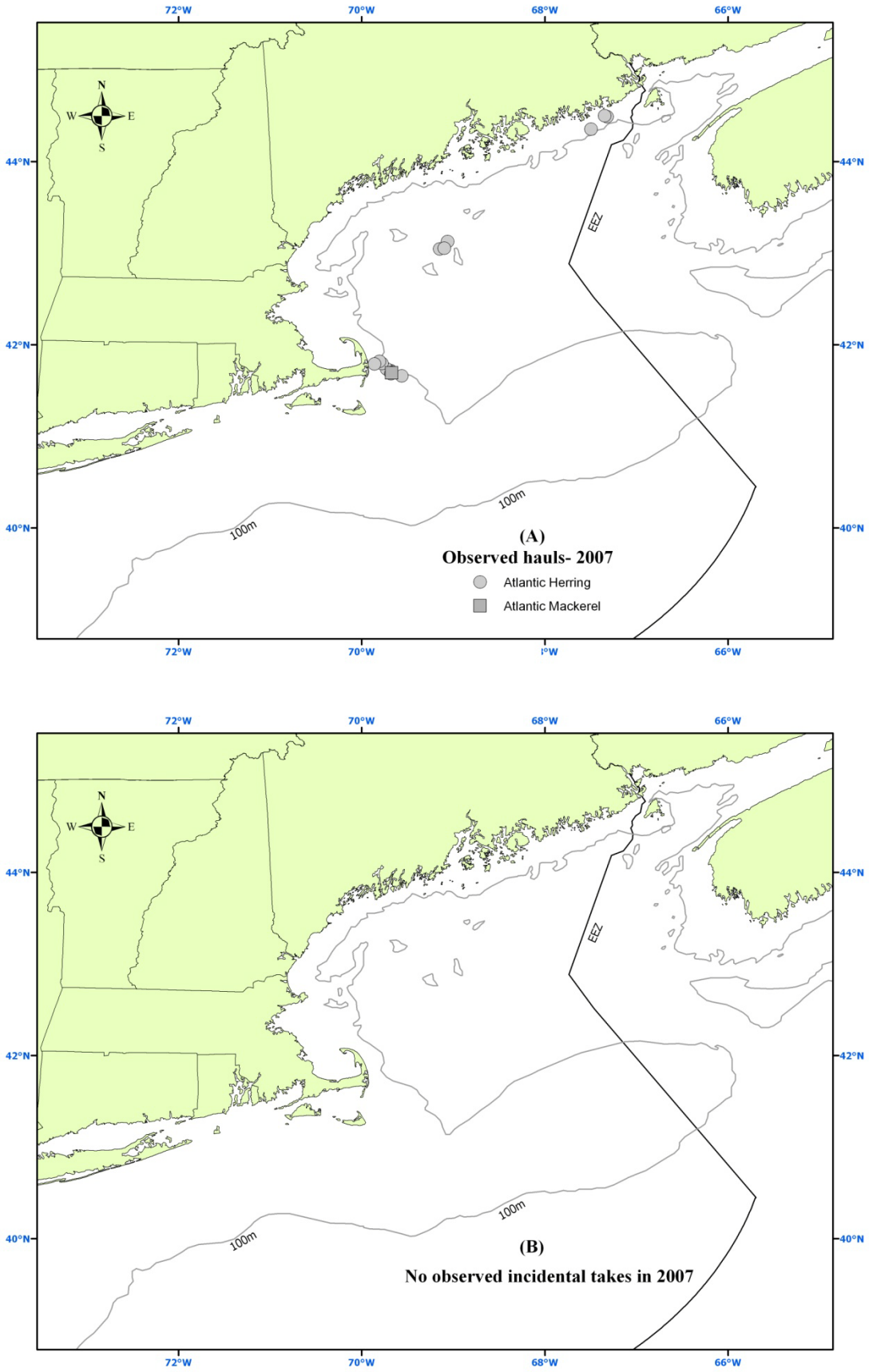
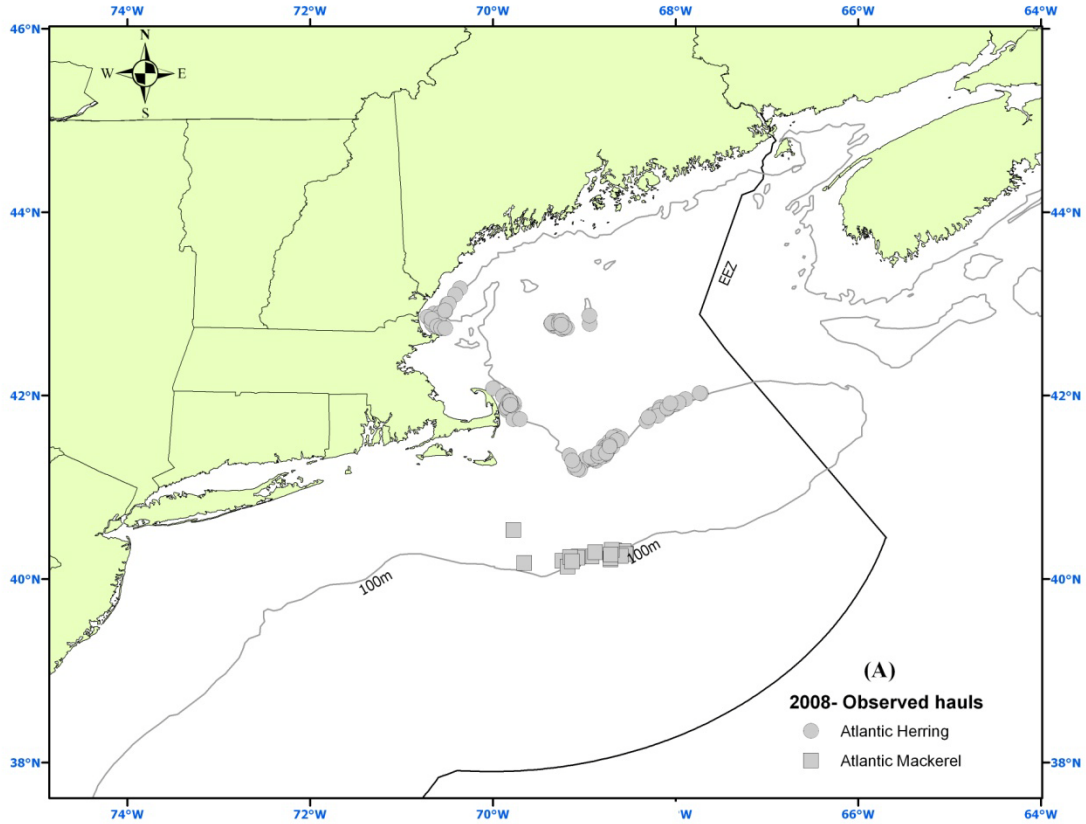


Figure 23. 2008 Northeast mid-water trawl observed tows (A) and observed takes (B).



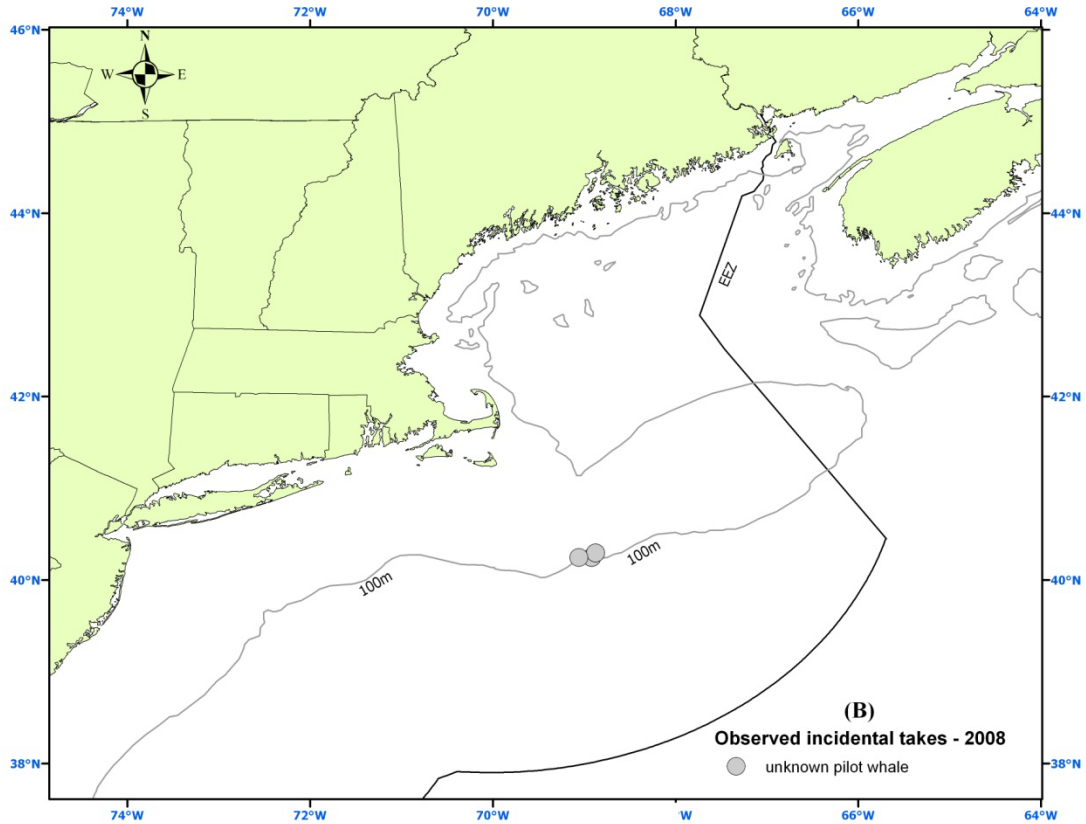
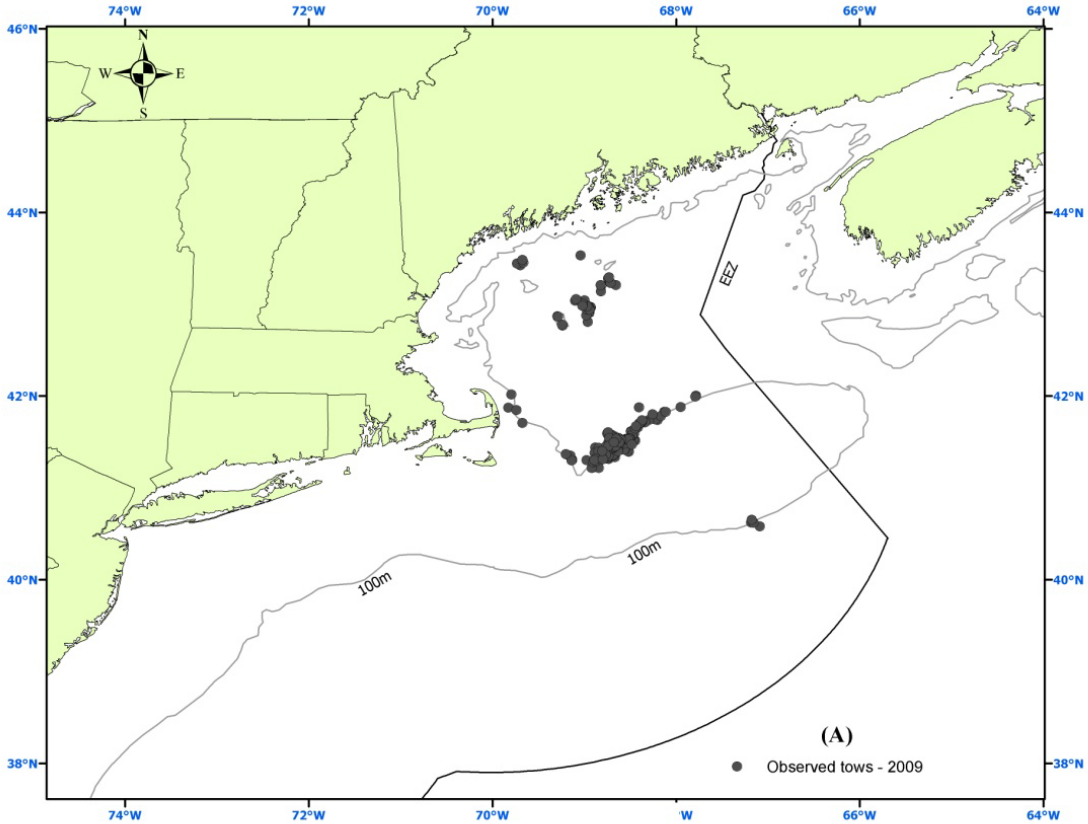


Figure 24. 2009 Northeast mid-water trawl observed tows (A) and observed takes (B).



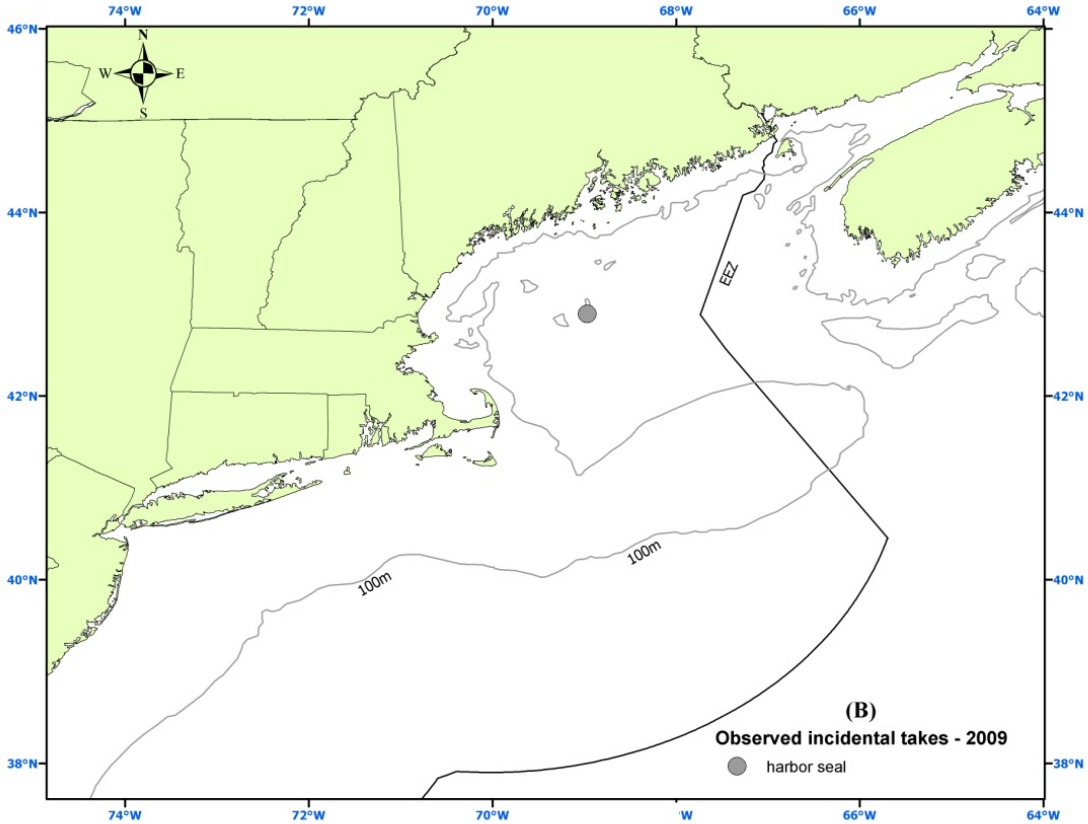
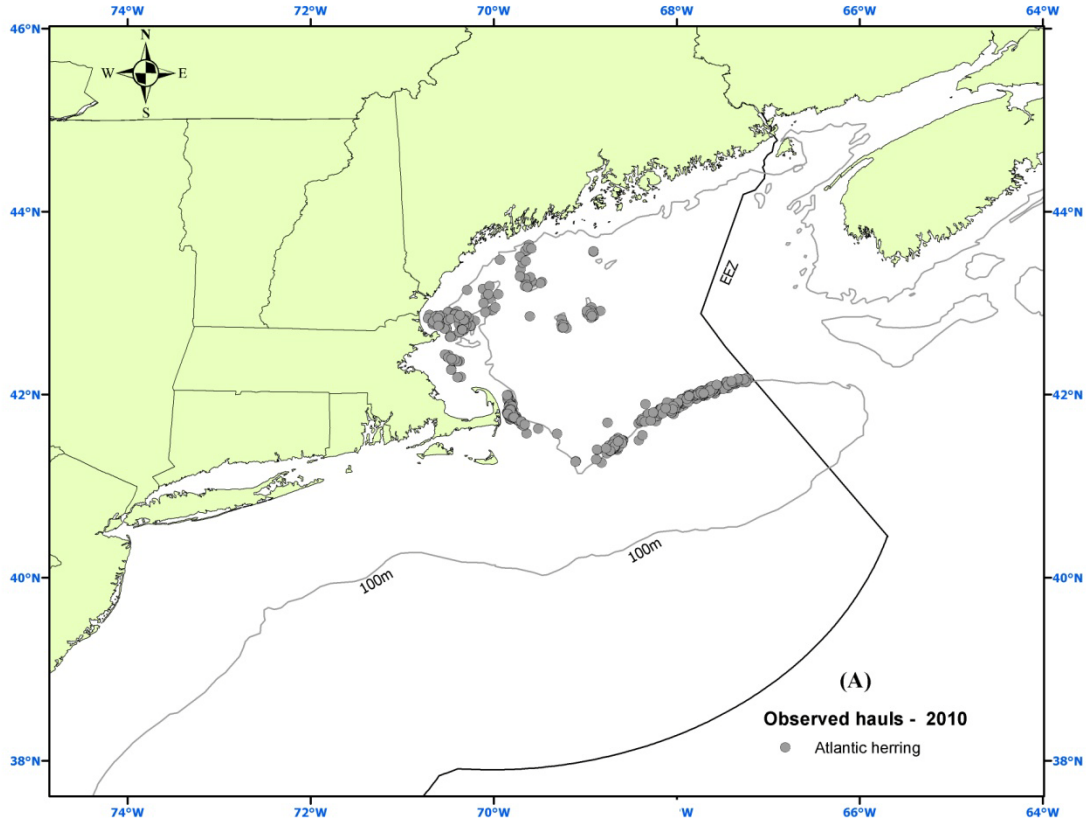


Figure 25. 2010 Northeast mid-water trawl observed tows (A) and observed takes (B).



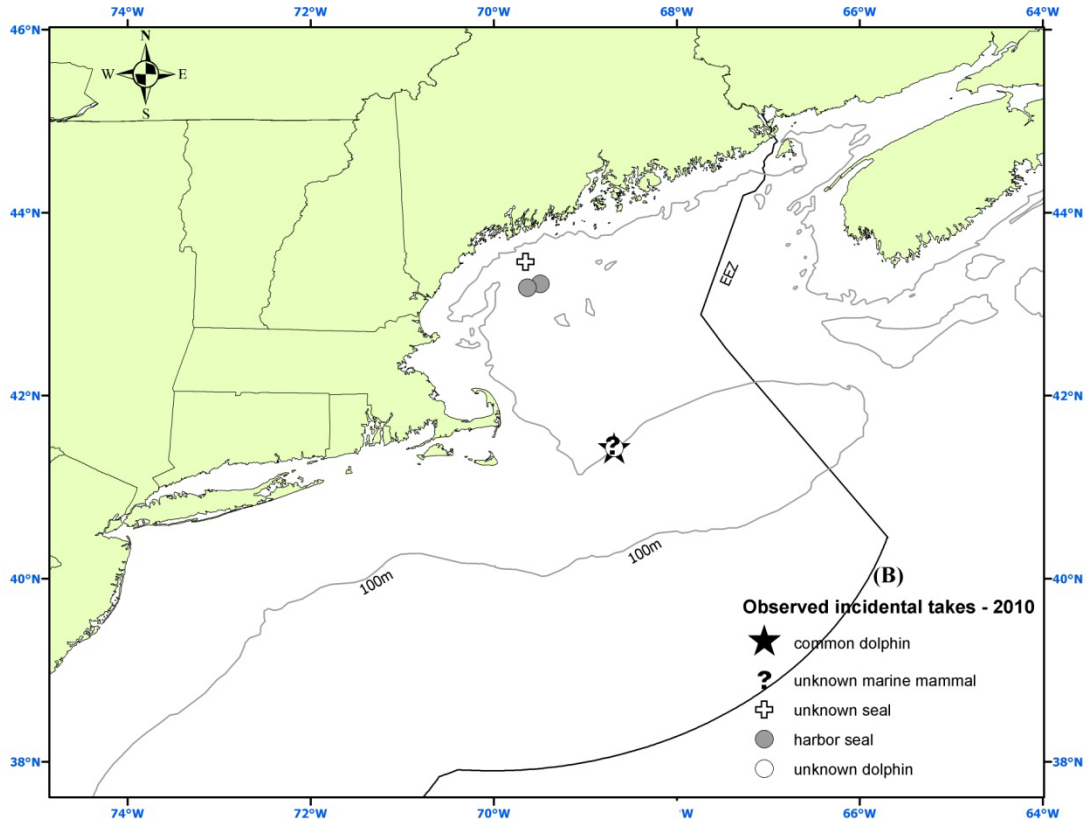


Figure 26. 2006 Mid-Atlantic mid-water trawl observed tows (A) and observed takes (B).

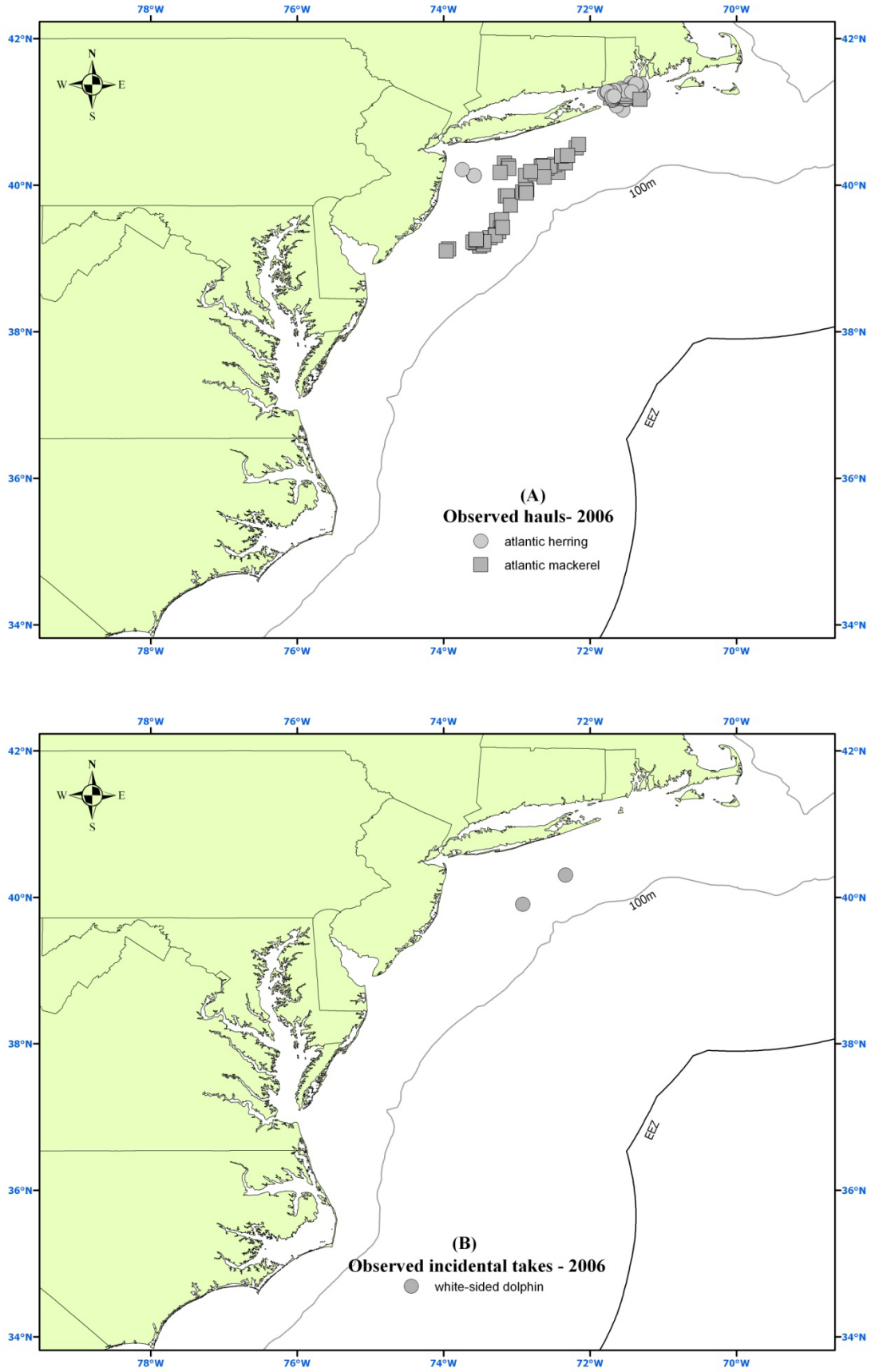


Figure 278. 2007 Mid-Atlantic mid-water trawl observed tows (A) and observed takes (B).

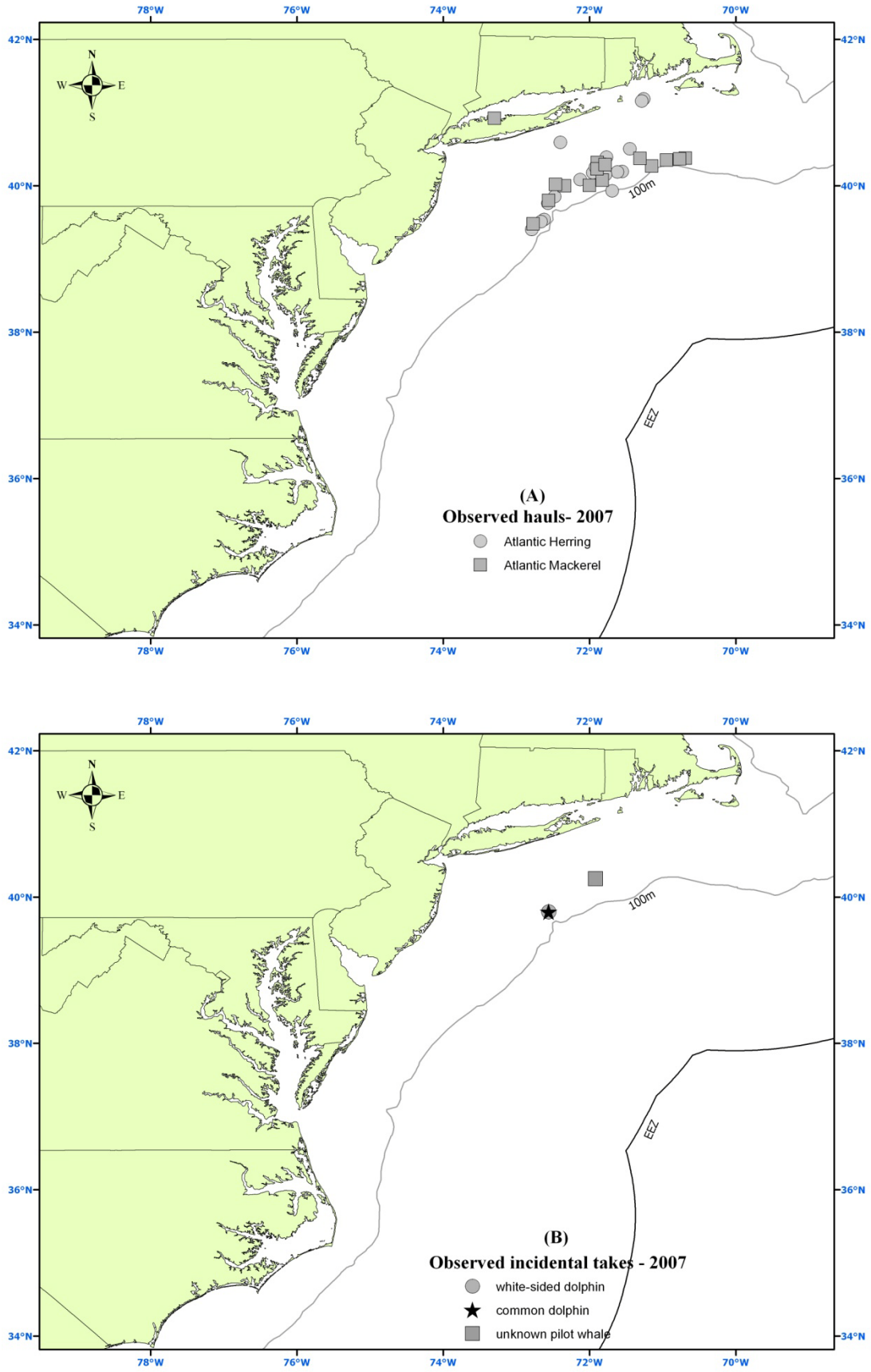
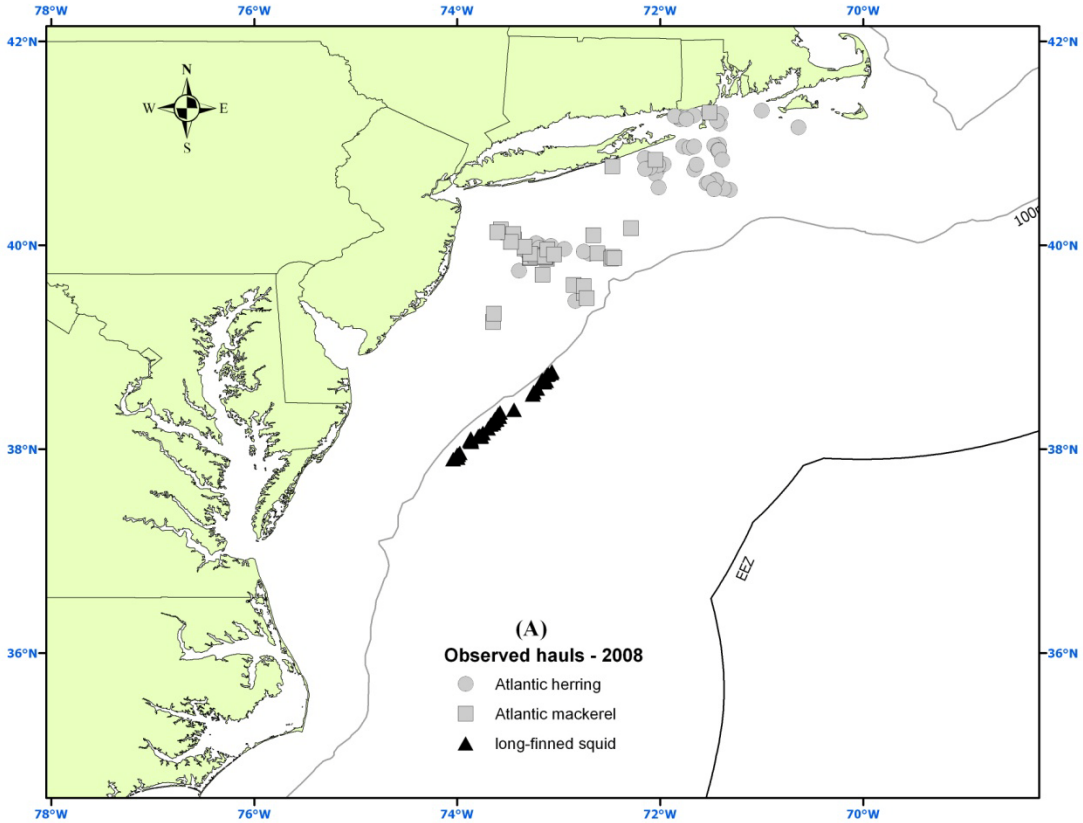


Figure 28. 2008 Mid-Atlantic mid-water trawl observed tows (A) and observed takes (B).



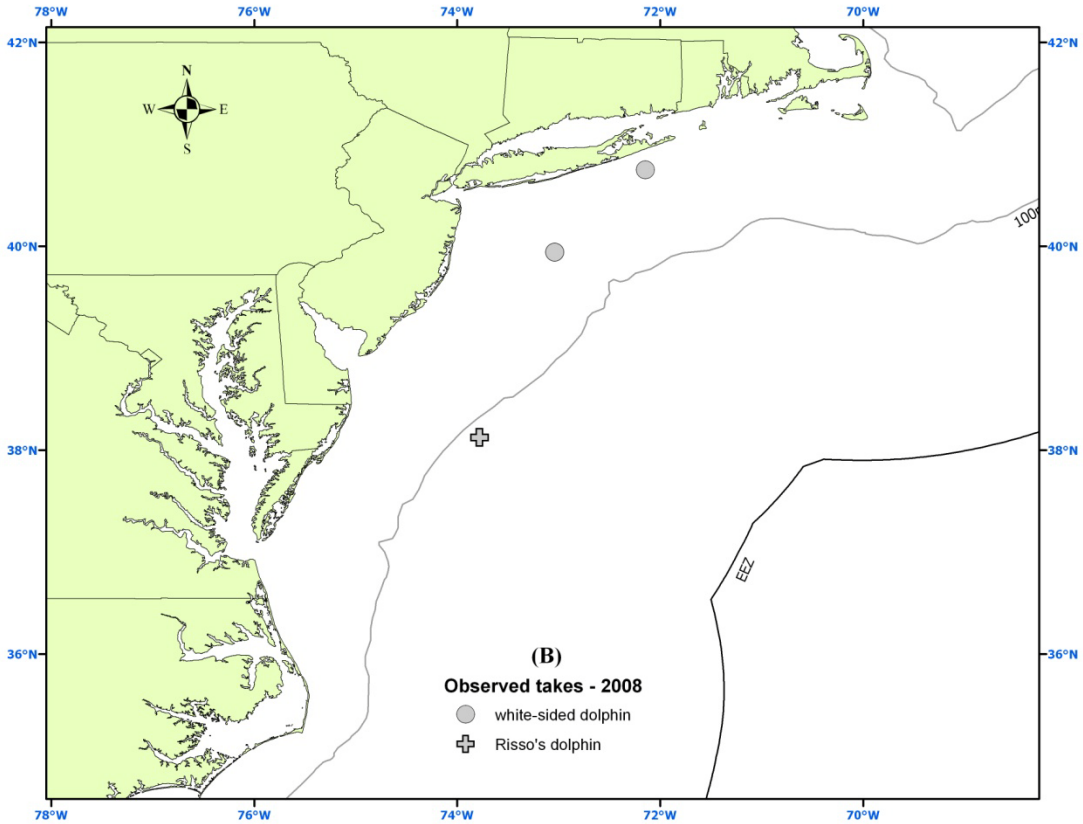


Figure 29. 2009 Mid-Atlantic mid-water trawl observed tows (A) and observed takes (B).

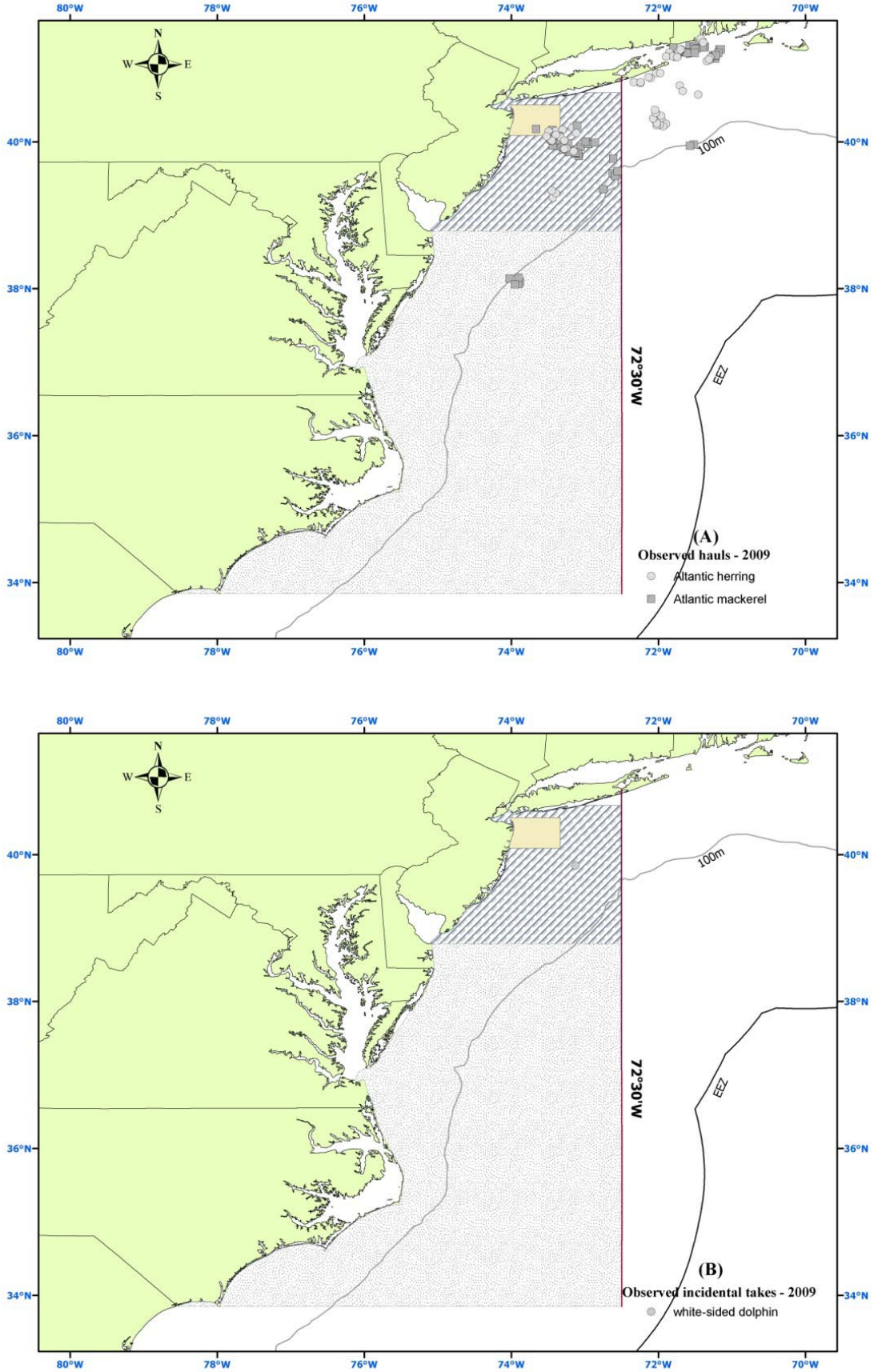


Figure 30. 210 Mid-Atlantic mid-water trawl observed tows (A) and observed takes (B).

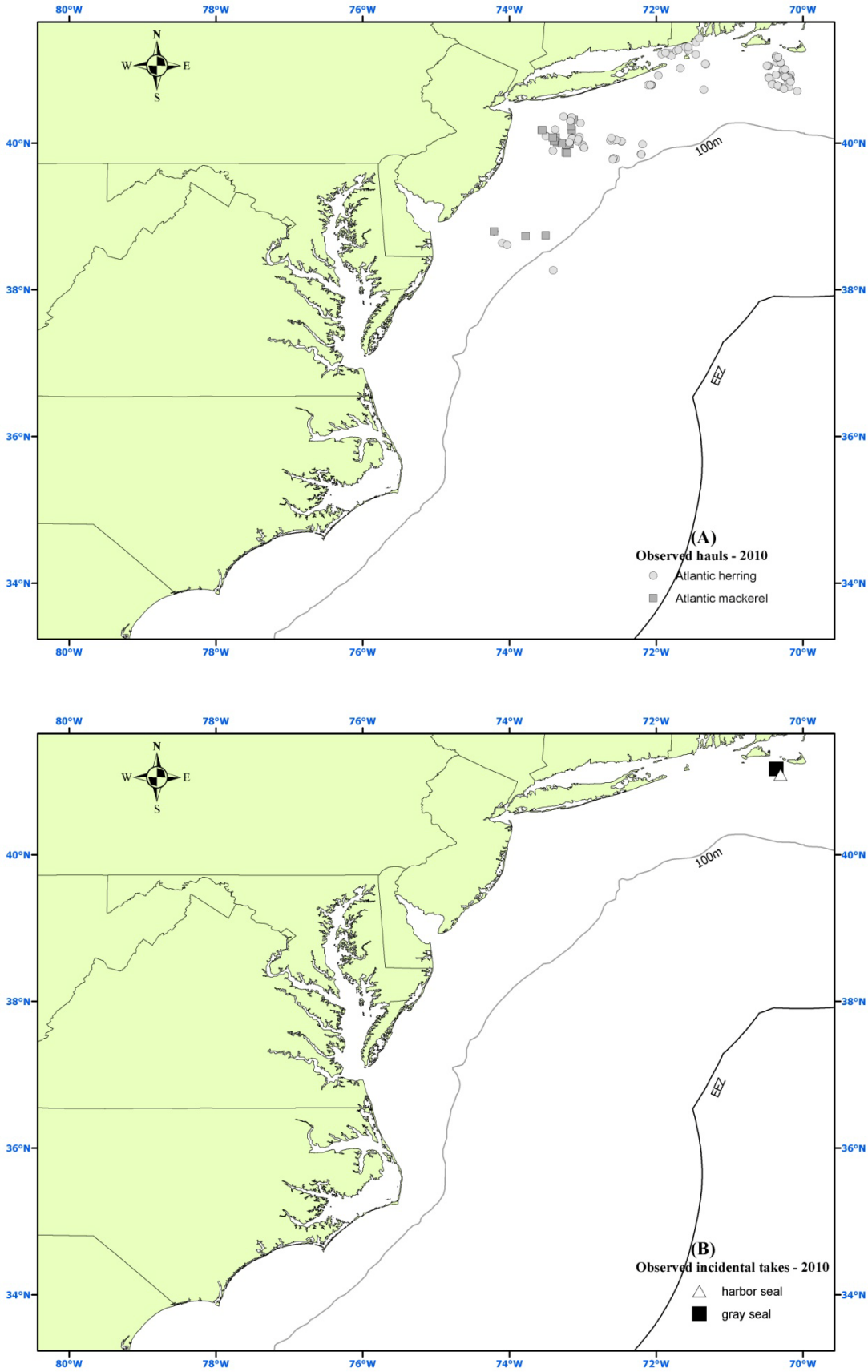
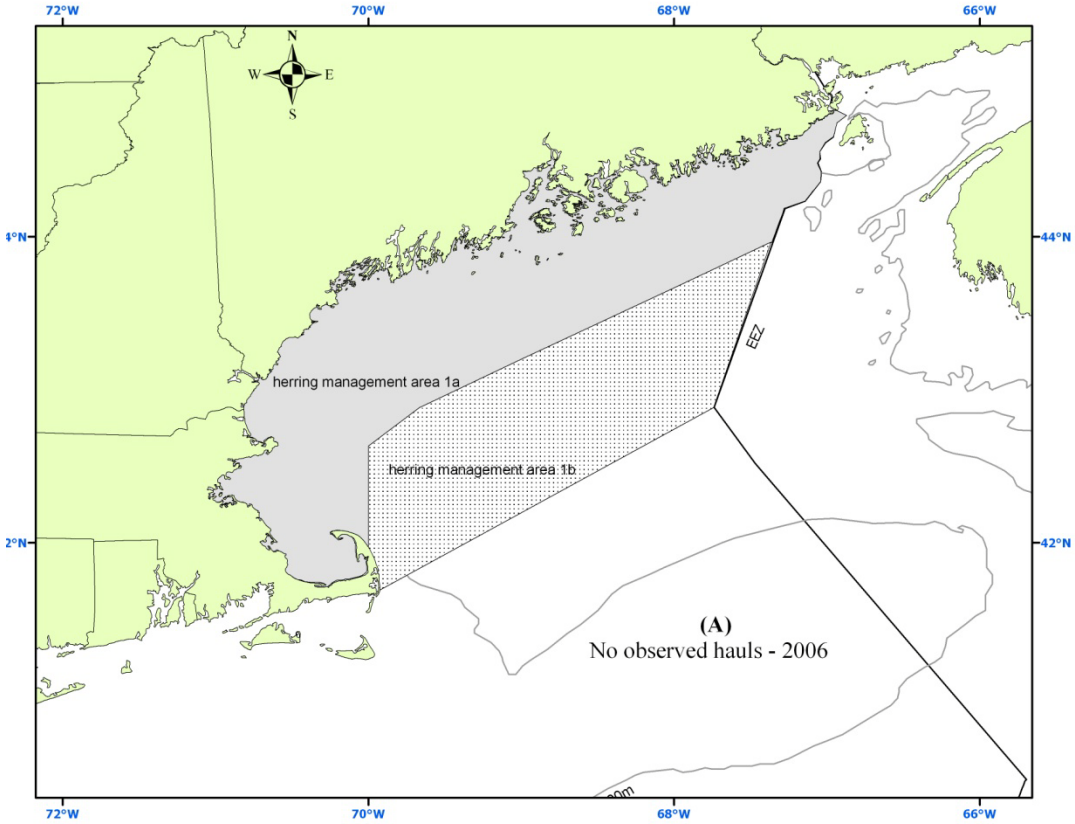


Figure 31. 2006 Herring Purse Seine observed hauls (A) and observed takes (B).



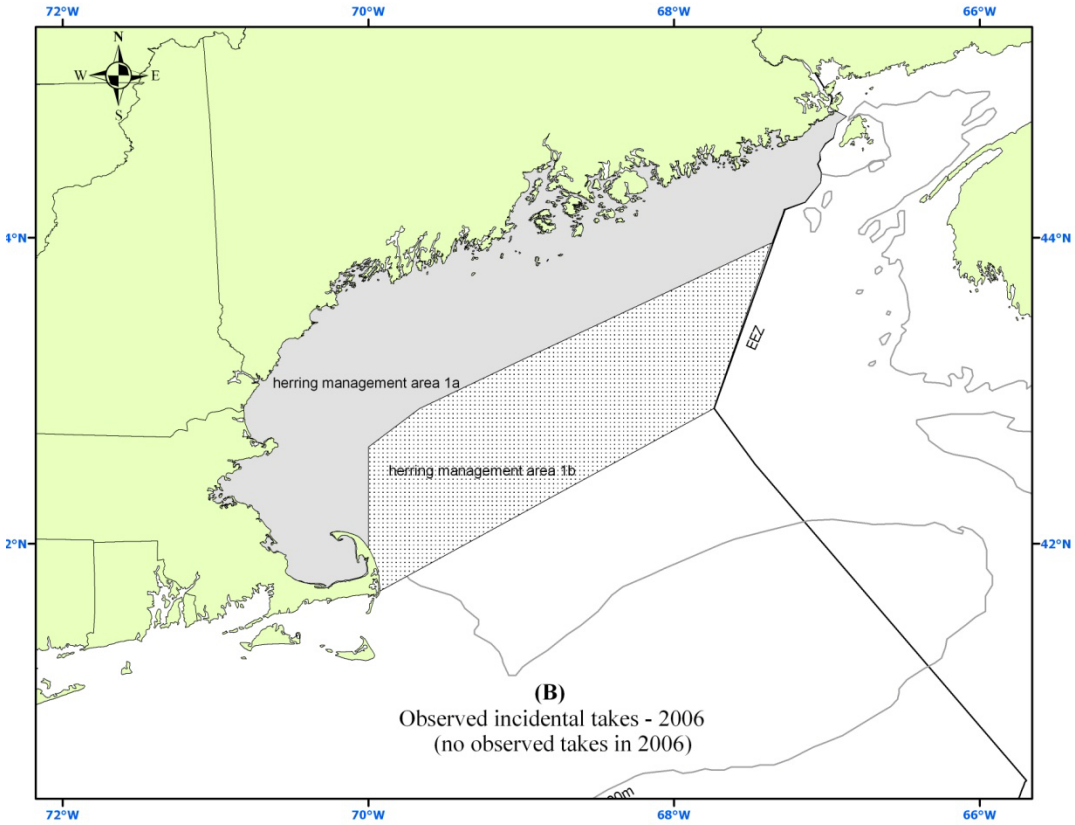


Figure 32. 2007 Herring Purse Seine observed hauls (A) and observed takes (B).

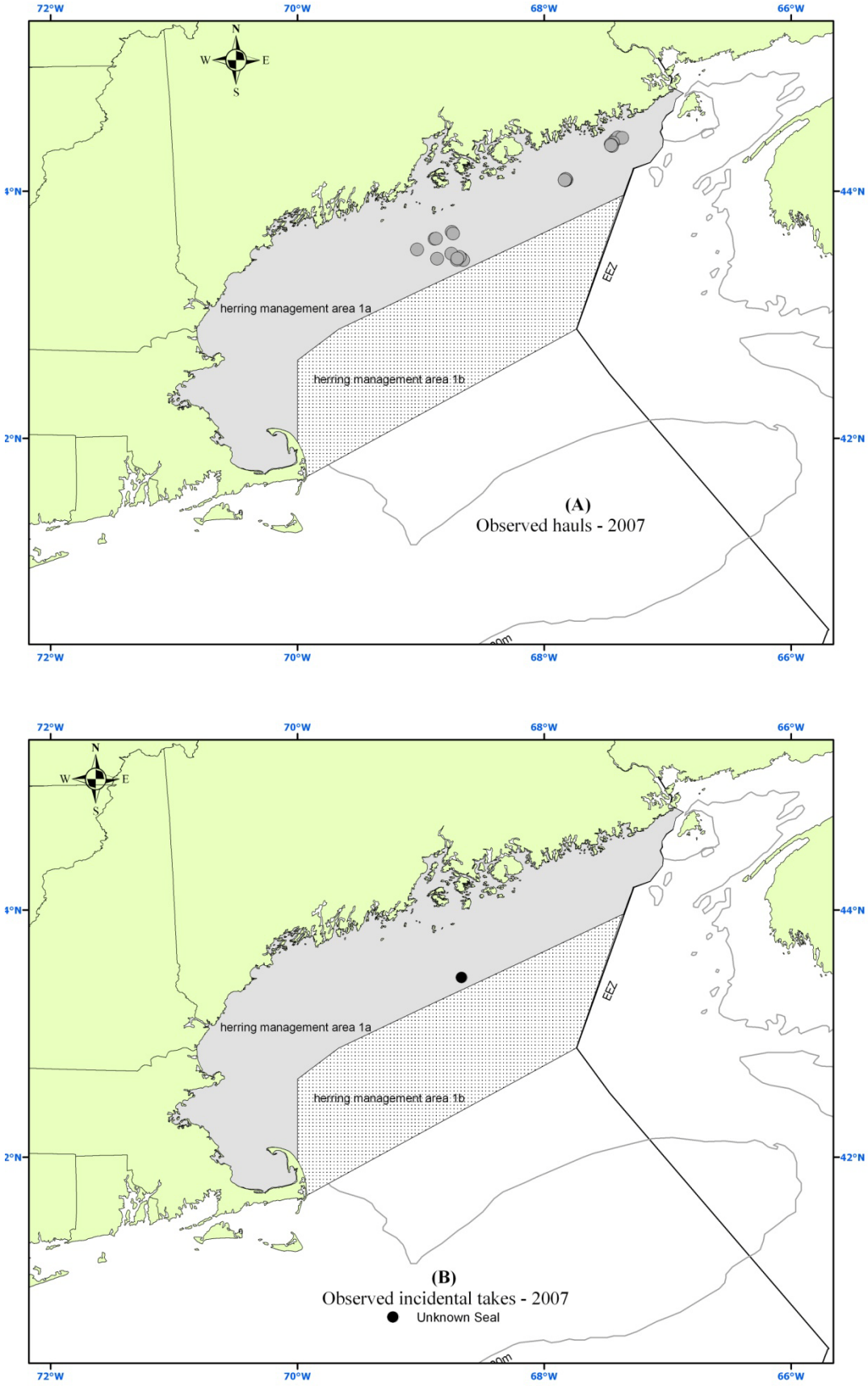


Figure 33. 2008 Herring Purse Seine observed hauls (A) and observed takes (B).

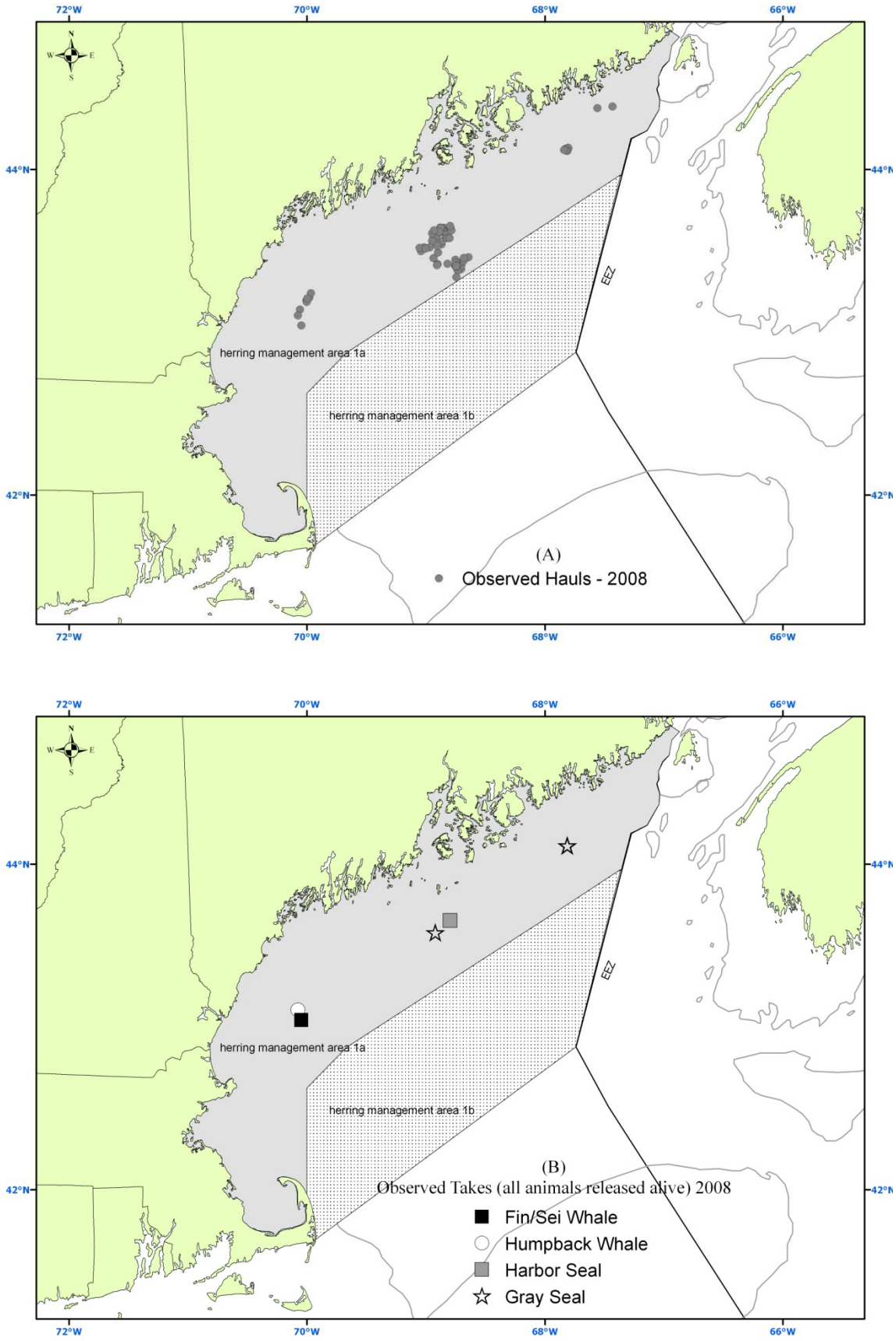


Figure 34. 2009 Herring Purse Seine observed hauls (A) and observed takes (B).

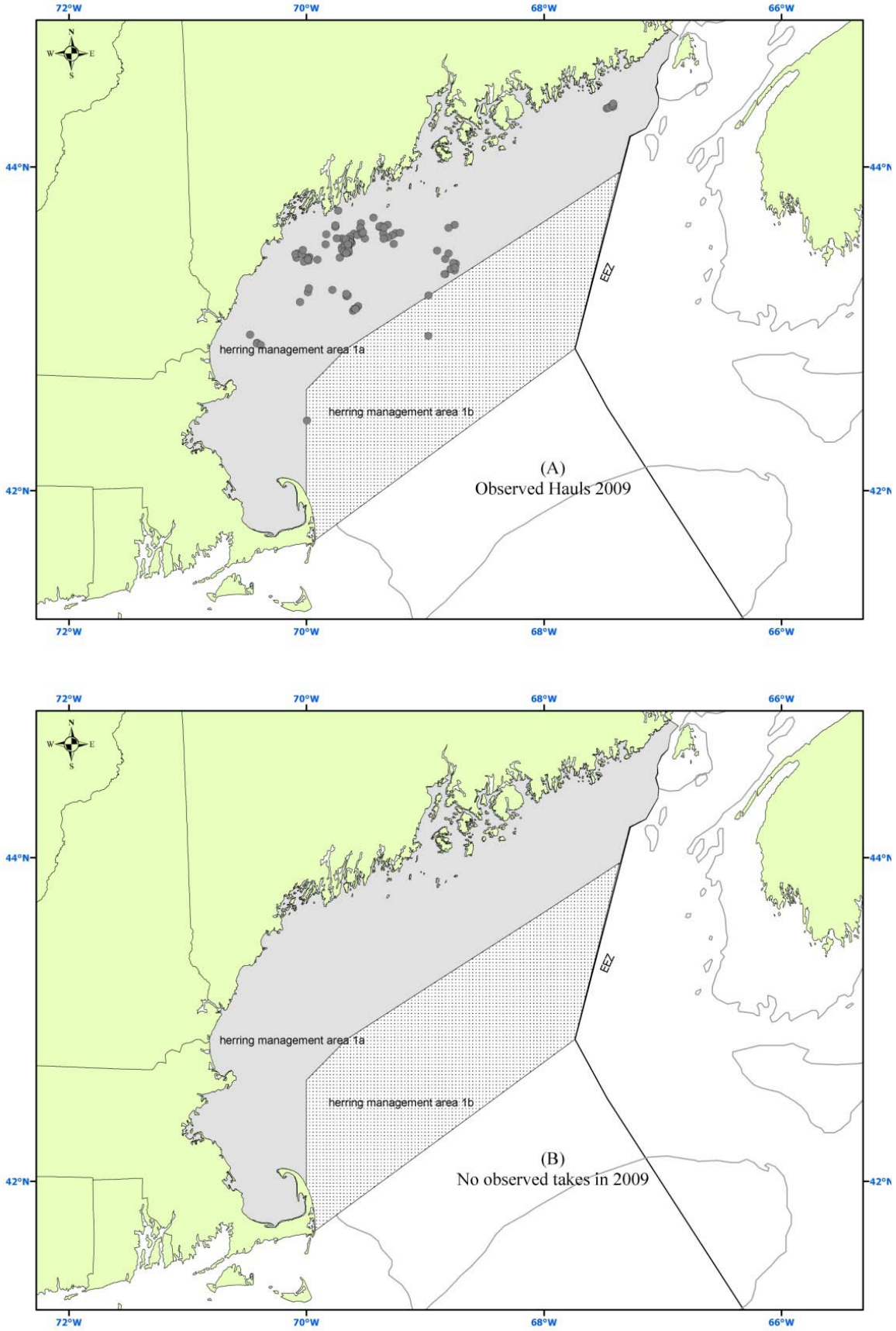


Figure 35. 2010 Herring Purse Seine observed hauls (A) and observed takes (B).

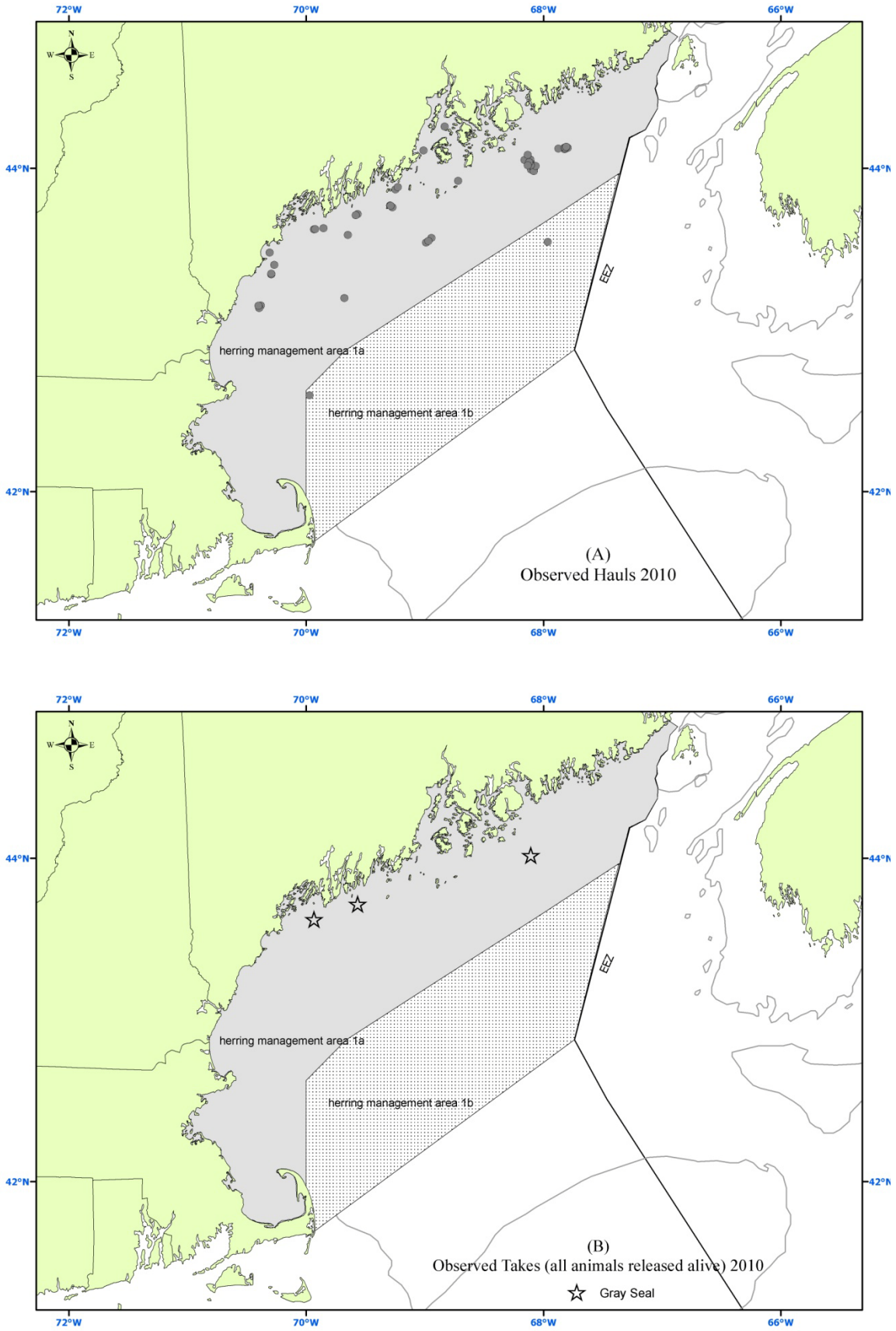


Figure 36. Observed sets and marine mammal interactions in the Pelagic longline fishery along the U.S. Atlantic coast during 2006. The boundaries of the Florida East Coast (FEC), South Atlantic Bight (SAB), Mid-Atlantic Bight (MAB), Northeast Coastal (NEC), and Sargasso Sea (SAR) fishing areas are shown. Seasonal closed areas instituted in 2001 under the HMS FMP are shown as hatched areas.

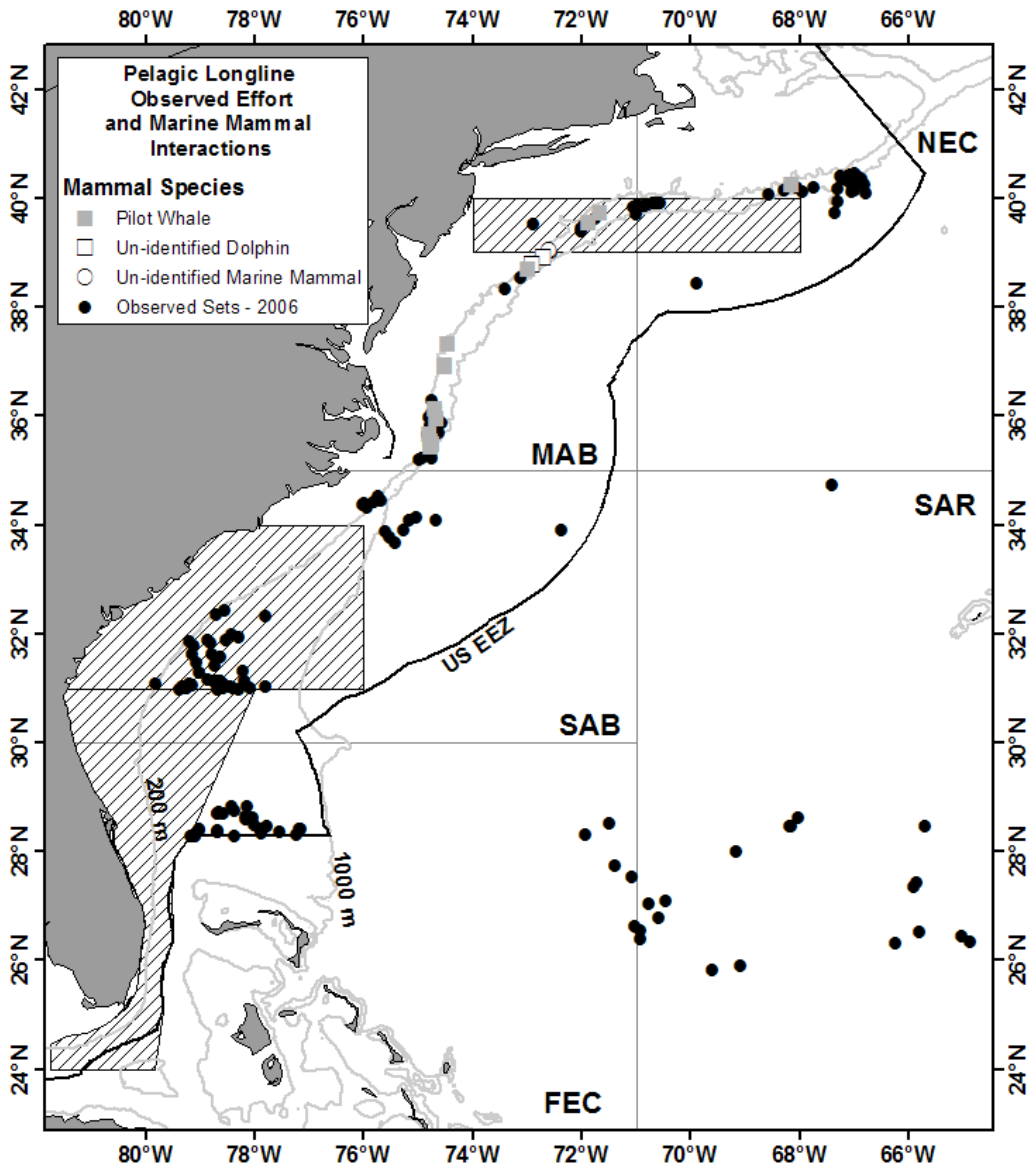


Figure 37. Observed sets and marine mammal interactions in the Pelagic longline fishery along the U.S. Atlantic coast during 2007. The boundaries of the Florida East Coast (FEC), South Atlantic Bight (SAB), Mid-Atlantic Bight (MAB), Northeast Coastal (NEC), and Sargasso Sea (SAR) fishing areas are shown. Seasonal closed areas instituted in 2001 under the HMS FMP are shown as hatched areas.

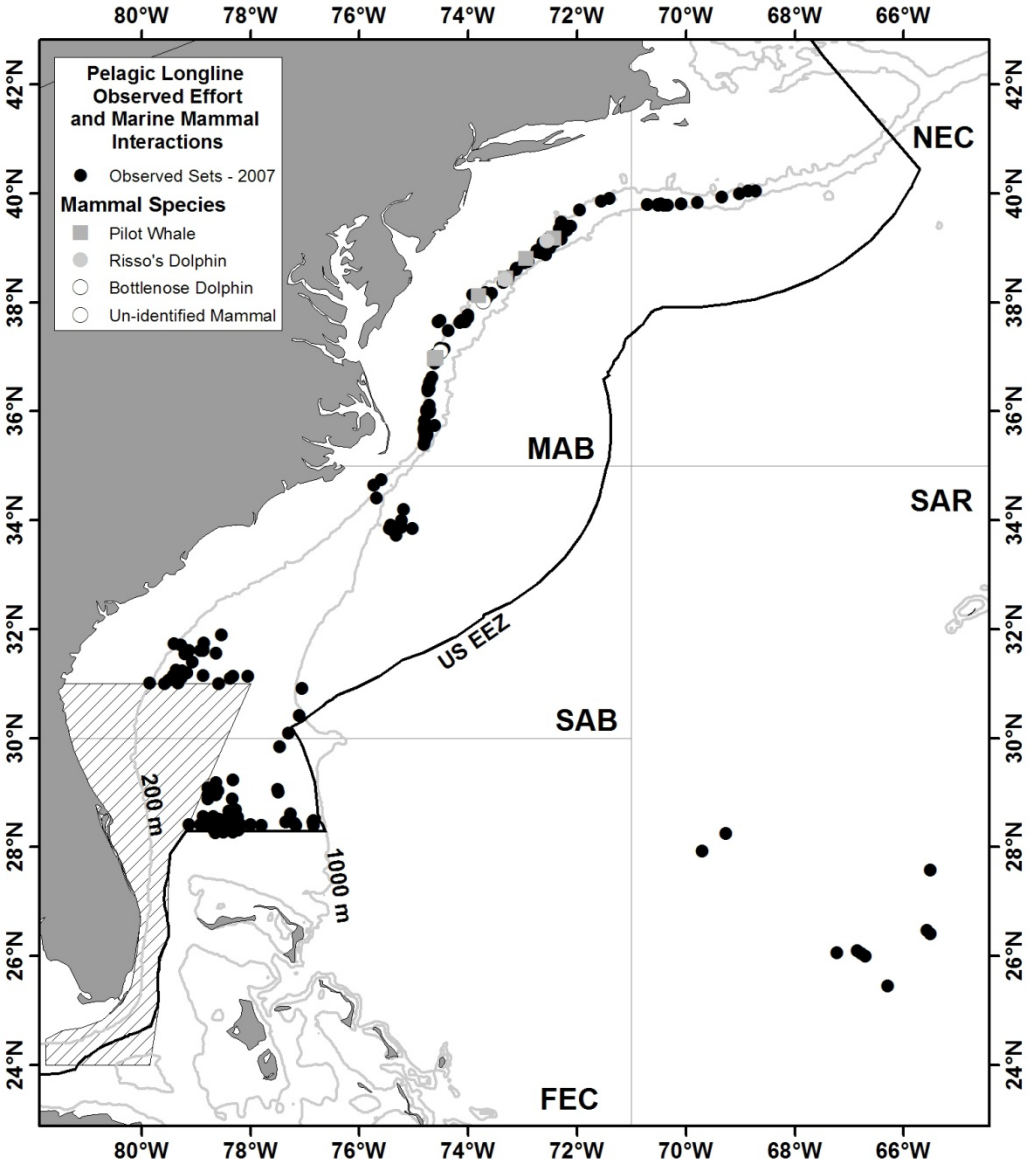


Figure 38. Observed sets and marine mammal interactions in the Pelagic longline fishery along the U.S. Atlantic coast during 2008. The boundaries of the Florida East Coast (FEC), South Atlantic Bight (SAB), Mid-Atlantic Bight (MAB), Northeast Coastal (NEC), and Sargasso Sea (SAR) fishing areas are shown. Seasonal closed areas instituted in 2001 under the HMS FMP are shown as hatched areas.

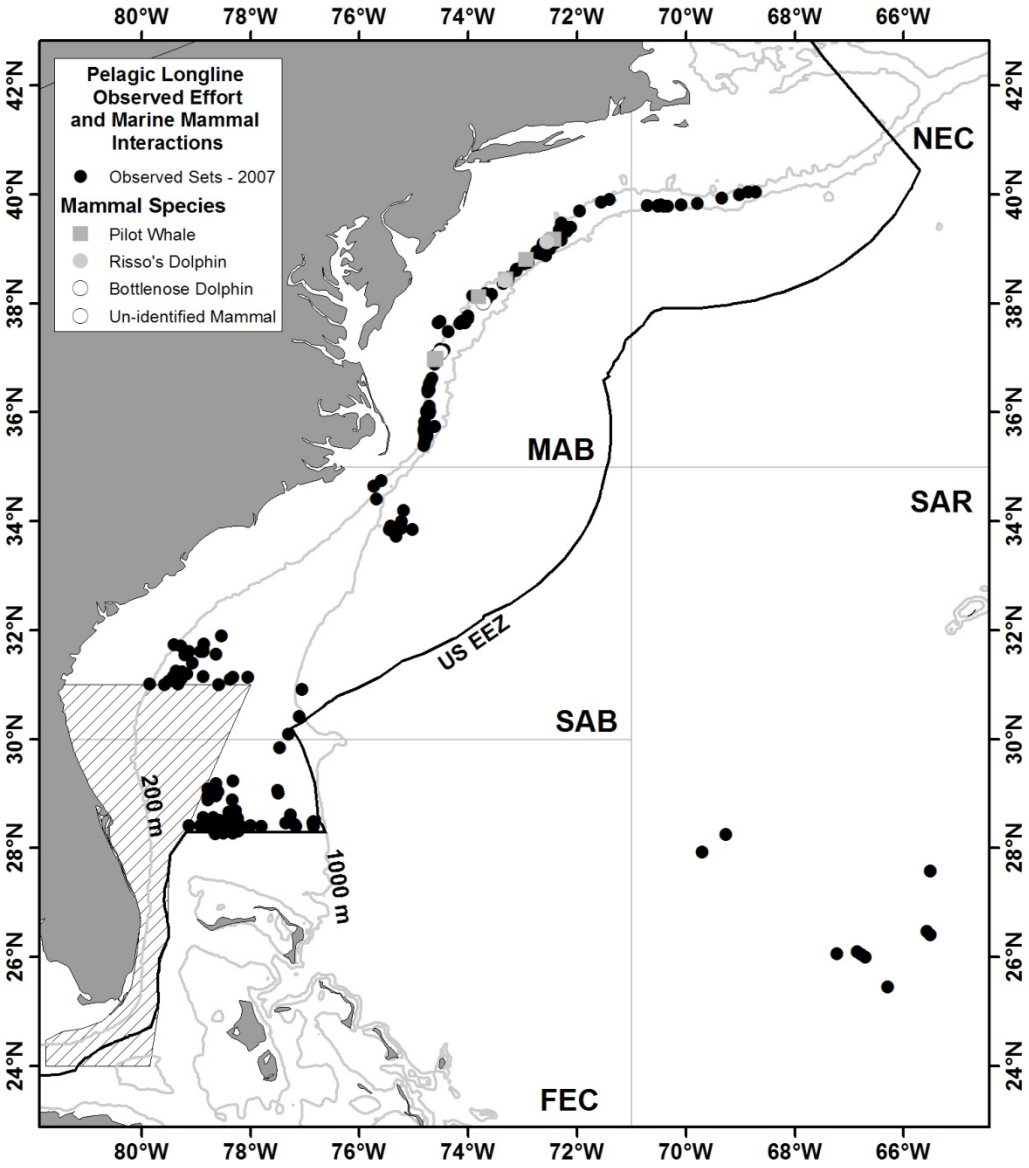


Figure 39. Observed sets and marine mammal interactions in the Pelagic longline fishery along the U.S. Atlantic coast during 2009. The boundaries of the Florida East Coast (FEC), South Atlantic Bight (SAB), Mid-Atlantic Bight (MAB), Northeast Coastal (NEC), and Sargasso Sea (SAR) fishing areas are shown. Seasonal closed areas instituted in 2001 under the HMS FMP are shown as hatched areas.

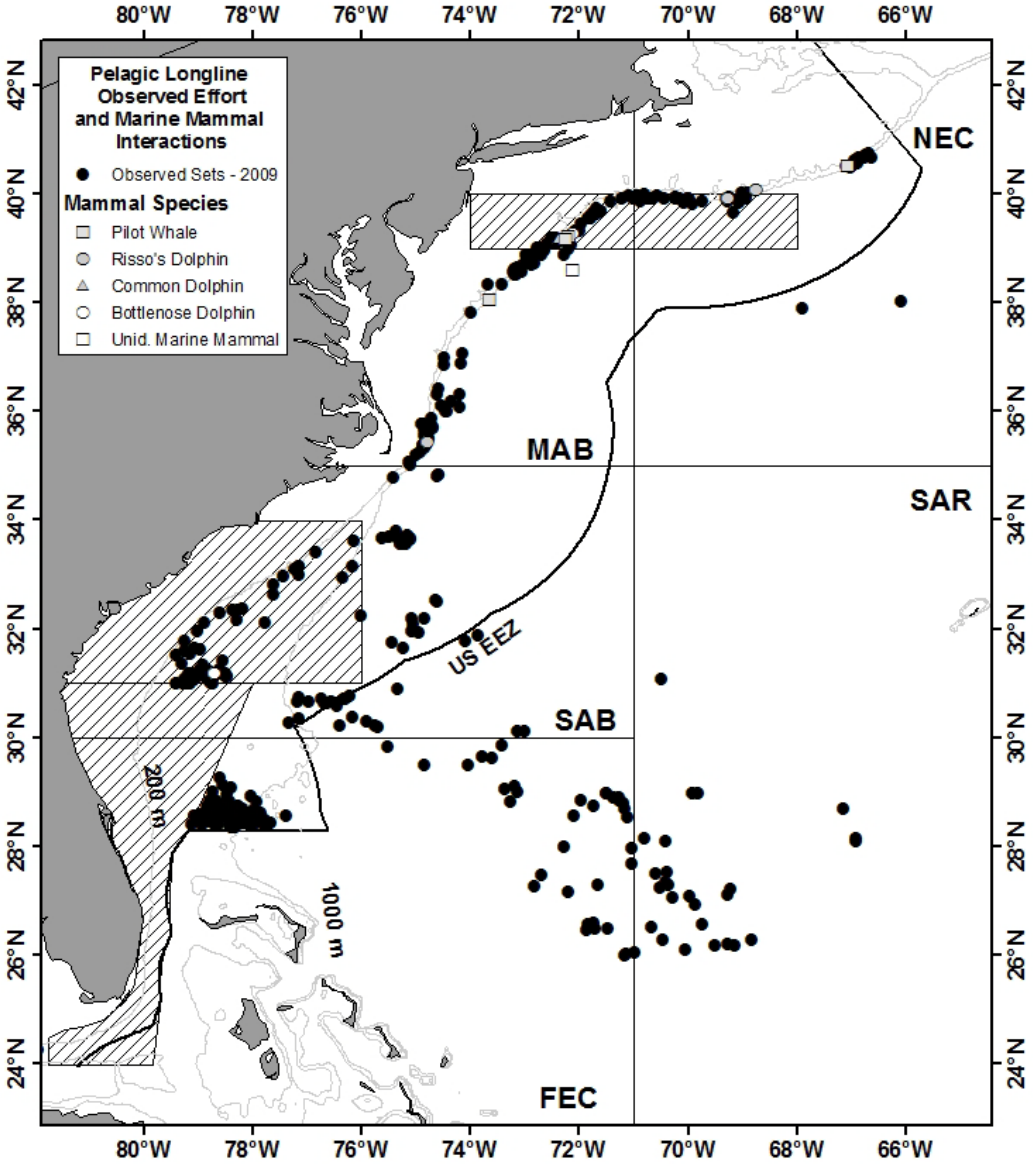


Figure 40. Observed sets and marine mammal interactions in the Pelagic longline fishery along the U.S. Atlantic coast during 2010. The boundaries of the Florida East Coast (FEC), South Atlantic Bight (SAB), Mid-Atlantic Bight (MAB), Northeast Coastal (NEC), and Sargasso Sea (SAR) fishing areas are shown. Seasonal closed areas instituted in 2001 under the HMS FMP are shown as hatched areas.

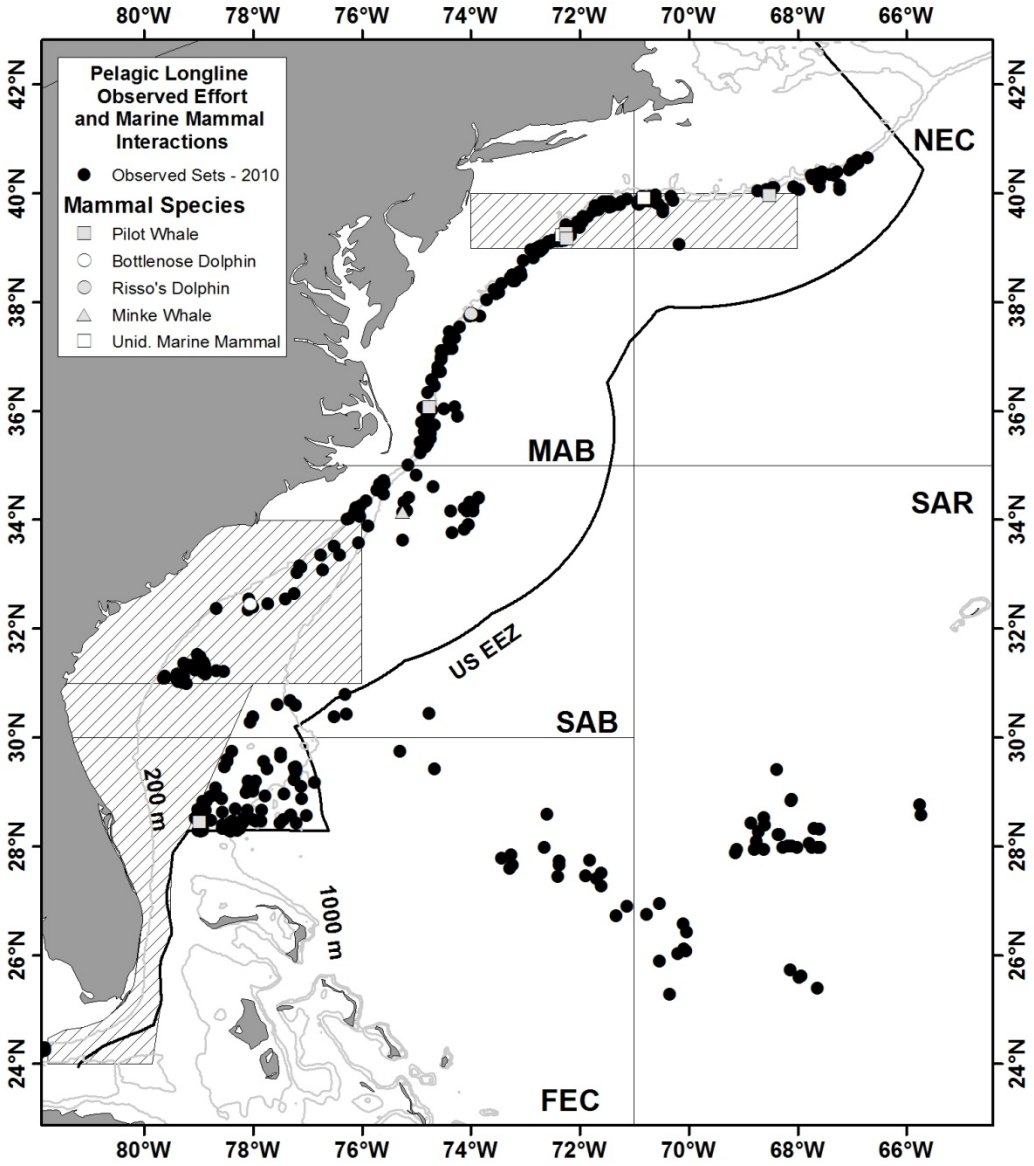


Figure 41. Observed sets in the Pelagic longline fishery in the Gulf of Mexico during 2006. Closed areas in the DeSoto canyon instituted in 2001 are shown as hatched areas.

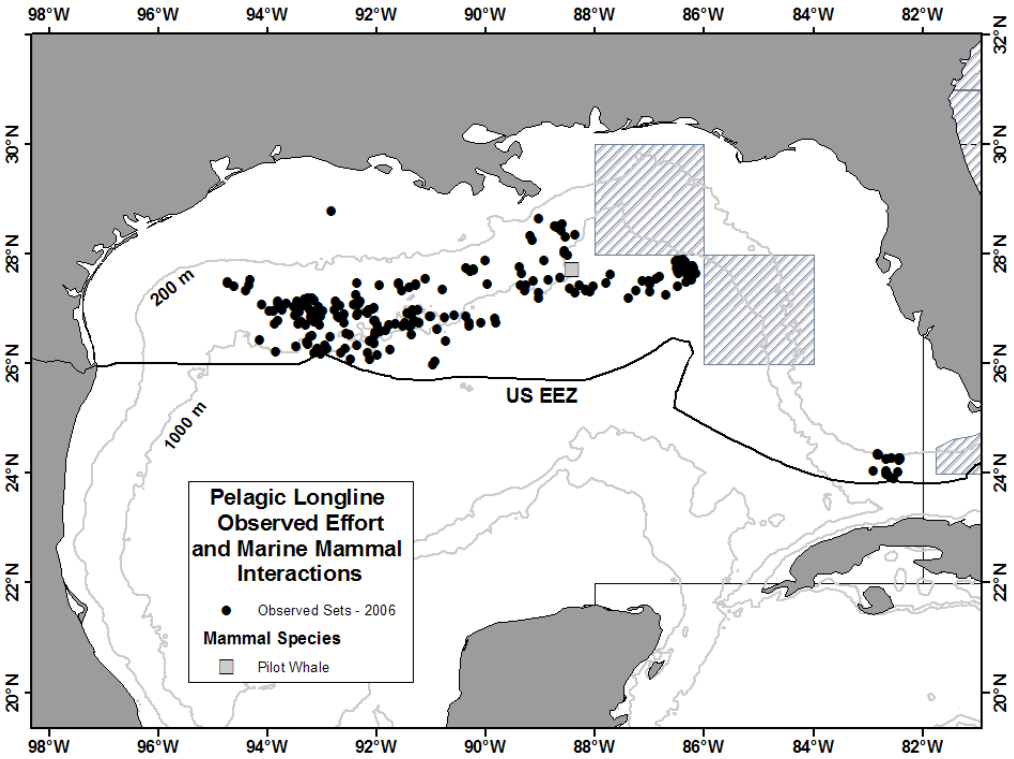


Figure 42. Observed sets in the Pelagic longline fishery in the Gulf of Mexico during 2007. Closed areas in the DeSoto canyon instituted in 2001 are shown as hatched areas.

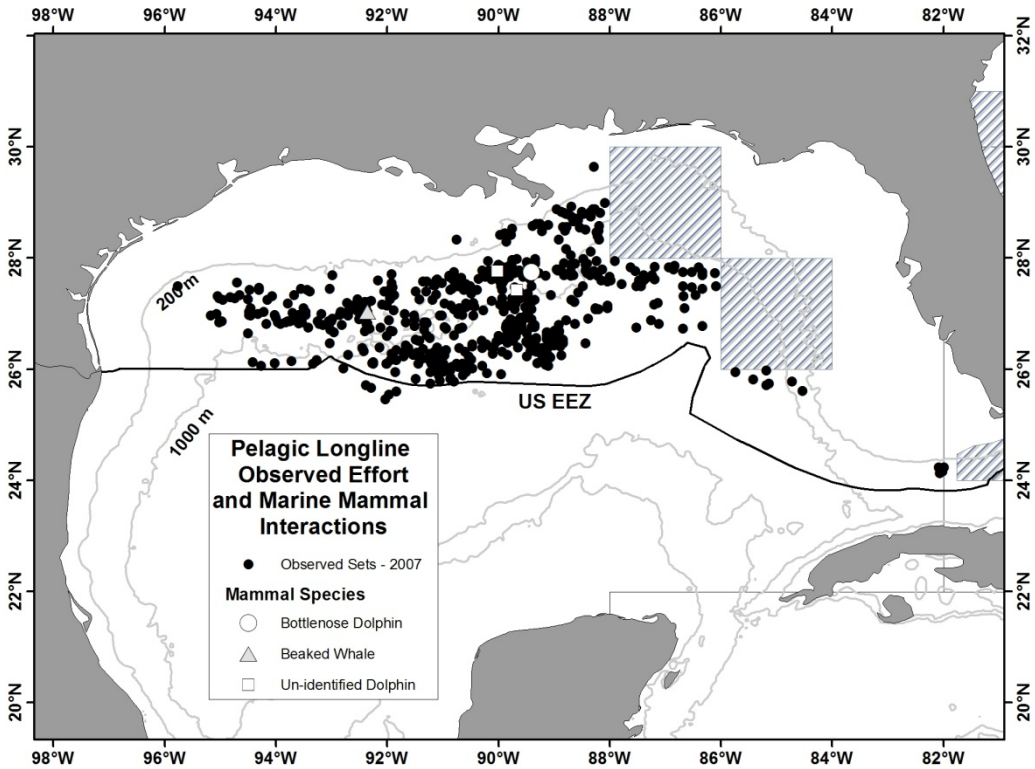


Figure 43. Observed sets in the Pelagic longline fishery in the Gulf of Mexico during 2008. Closed areas in the DeSoto canyon instituted in 2001 are shown as hatched areas.

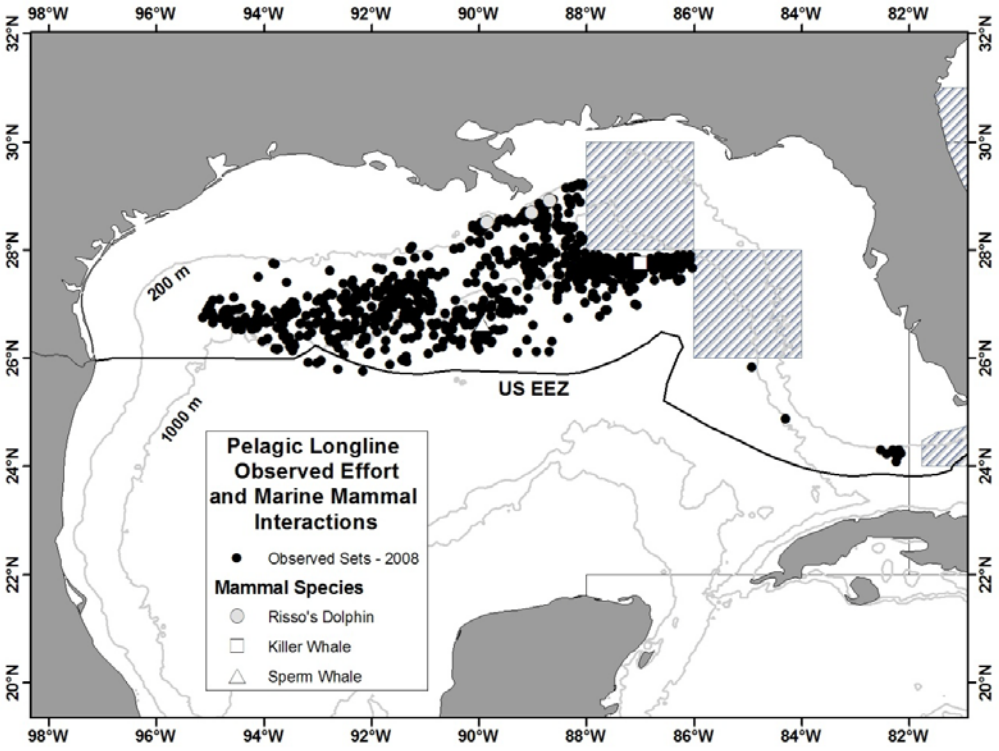


Figure 44. Observed sets in the Pelagic longline fishery in the Gulf of Mexico during 2009. Closed areas in the DeSoto canyon instituted in 2001 are shown as hatched areas.

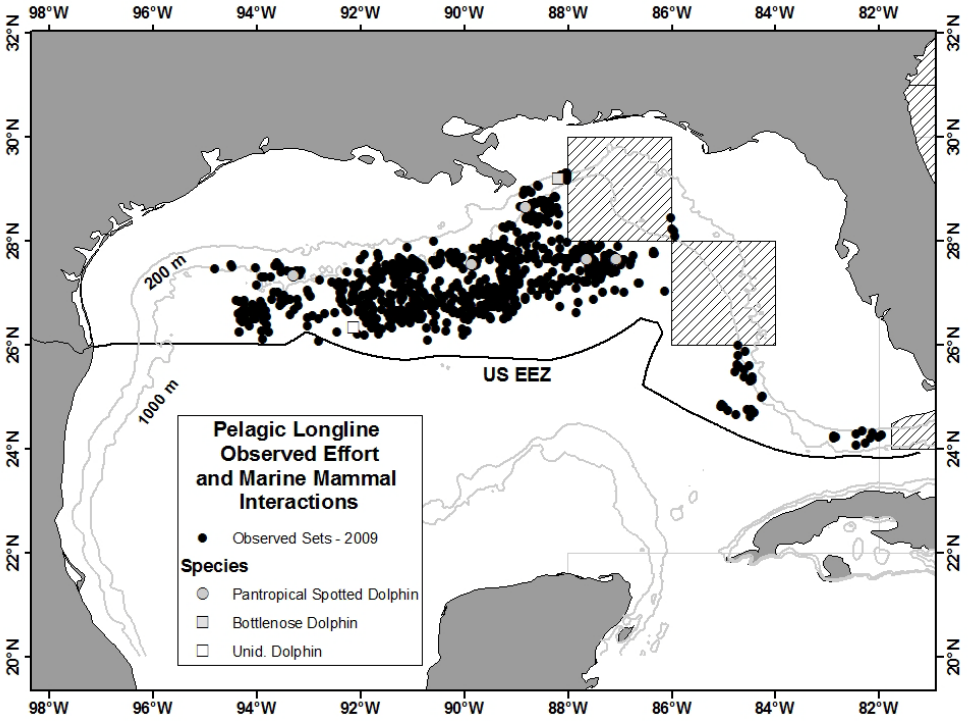
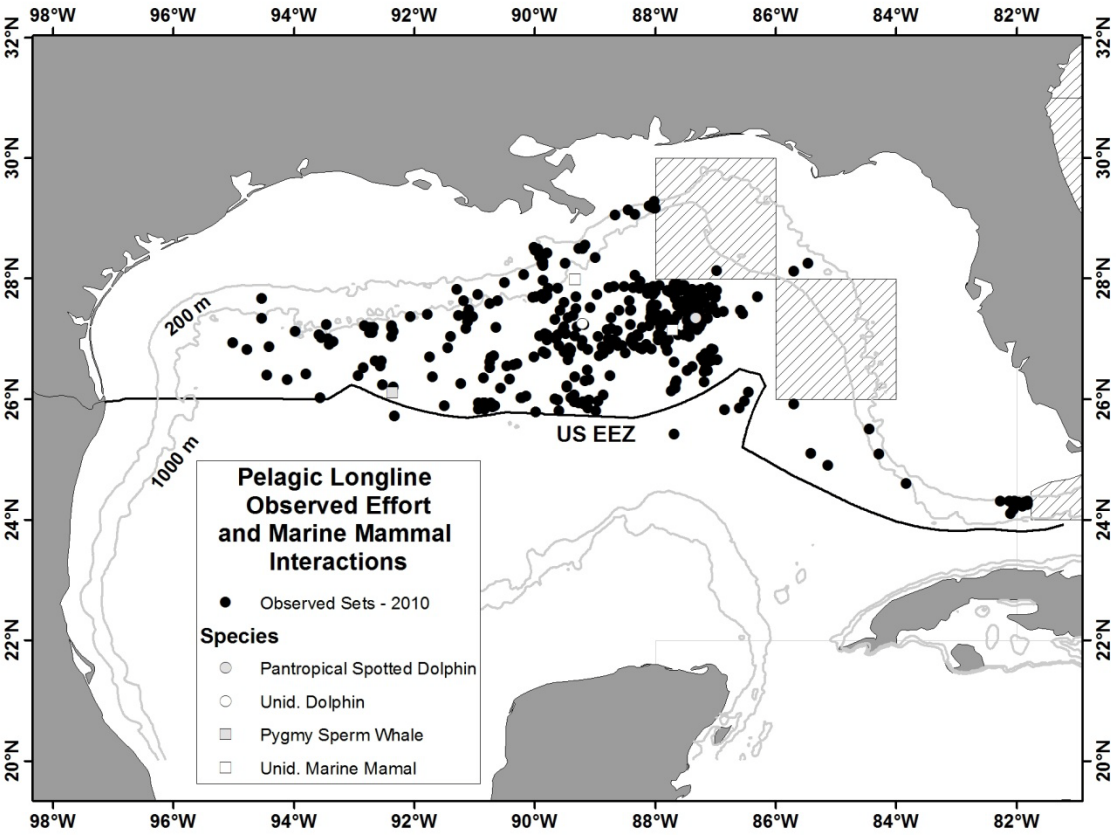


Figure 45. Observed sets in the Pelagic longline fishery in the Gulf of Mexico during 2010. Closed areas in the DeSoto canyon instituted in 2001 are shown as hatched areas.



APPENDIX IV: Table A. Surveys

Survey Number	Year	Season	Platform	Track line length (km)	Area	Agency/ Program	Analysis	Corrected for g(0)	Reference
1	1982	year-round	plane (AT-11; 1978-1982)	211,585	Cape Hatteras, NC to Nova Scotia, continental shelf and shelf edge waters	CETAP	Line transect analyses of distance data	N	(CETAP 1982)
2	1990	Aug	ship (Chapman)	2,067	Cape Hatteras, NC to Southern New England, North wall of the Gulf Stream	NEC	One team data analyzed by DISTANCE.	N	(NMFS 1990)
3	1991	Jul–Aug	ship (Abel-J)	1,962	Gulf of Maine, lower Bay of Fundy, southern Scotian Shelf	NEC	Two independent team data analyzed with modified direct duplicate method.	Y	(Palka 1995)
4	1991	Aug	boat (Sneak Attack)	640	inshore bays of Maine	NEC	One team data analyzed by DISTANCE.	Y	(Palka 1995)
5	1991	Aug–Sep	plane 1(AT-11)	9,663	Cape Hatteras, NC to Nova Scotia, continental shelf and shelf edge waters	NEC/SEC	One team data analyzed by DISTANCE.	N	(NMFS 1991)
6	1991	Aug–Sep	plane 2 (Twin Otter)		Cape Hatteras, NC to Nova Scotia, continental shelf and shelf edge waters	NEC/SEC	One team data analyzed by DISTANCE.	N	(NMFS 1991)
7	1991	Jun–Jul	ship (Chapman)	4,032	Cape Hatteras to Georges Bank, between 200 and 2,000m isobaths	NEC	One team data analyzed by DISTANCE.	N	(Waring *et al.* 1992; Waring 1998)
8	1992	Jul–Sep	ship (Abel-J)	3,710	N. Gulf of Maine and lower Bay of Fundy	NEC	Two independent team data analyzed with modified direct duplicate method.	Y	(Smith *et al.* 1993)
9	1993	Jun–Jul	ship (Delaware II)	1,874	S. edge of Georges Bank, across the Northeast Channel, to the SE. edge of the Scotian Shelf	NEC	One team data analyzed by DISTANCE.		(NMFS 1993)

10	1994	Aug–Sep	ship (Relentless)	534	shelf edge and slope waters of Georges Bank	NEC	One team data analyzed by DISTANCE.	N	(NMFS 1994)
11	1995	Aug–Sep	plane (Skymaster)	8,427	Gulf of St. Lawrence	DFO	One team data analyzed using quenouille's jackknife bias reduction procedure that modeled the left truncated sighting curve	N	(Kingsley and Reeves 1998)
12	1995	Jul–Sep	2 ships (Abel-J and Pelican) and plane (Twin Otter)	32,600	Virginia to the mouth of the Gulf of St. Lawrence	NEC	Ship: two independent team data analyzed with modified direct duplicate method. Plane: one team data analyzed by DISTANCE.	Ship: Y. Plane: Y (only harbor porpoise) N (rest of species)	(Palka 1996)
13	1996	Jul–Aug	plane	3,993	Northern Gulf of St. Lawrence	DFO	Quenouille's jackknife bias reduction procedure on line transect methods that modeled the left truncated sighting curve	N	(Kingsley and Reeves 1998)
14	1998	Jul–Aug	ship	4,163	south of Maryland	SEC	One team data analyzed by DISTANCE.	N	(Mullin and Fulling 2003)
15	1998	Aug–Sep	plane (1995 and 1998)		Gulf of St. Lawrence	DFO			(Kingsley and Reeves 1998)
16	1998	Jul–Sep	ship (Abel-J) and plane (Twin Otter)	15,900	north of Maryland	NEC	Ship: two independent team data analyzed with the modifed direct duplicate or Palka & Hammond analysis methods, depending on the presence of responsive movement. Plane: one team data analyzed by DISTANCE.	Y	
17	1999	Jul–Aug	ship (Abel-J) and plane (Twin Otter)	6,123	south of Cape Cod to mouth of Gulf of St. Lawrence	NEC	Ship: two independent team data analyzed with modified direct duplicate or Palka & Hammond analysis methods, depending on the presence of responsive movement. Plane: circle-back data pooled with aerial data collected in 1999, 2002, 2004, 2006, 2007, and 2008 to calculate pooled g(0)'s and year-species specific abundance estimates for all years except	Y	

							2008.		
18	2002	Jul–Aug	plane (Twin Otter)	7,465	Georges Bank to Maine	NEC	Same as for plane in survey 17.	Y	(Palka 2006)
19	2002	Feb–Apr	ship (Gunter)	4,592	SE US continental shelf Delaware - Florida	SEC	One team data analyzed by DISTANCE.	N	(Garrison *et al.* 2003)
20	2002	Jun–Jul	plane	6,734	Florida to New Jersey	SEC	Two independent team data analyzed with modified direct duplicate method.	Y	(Garrison 2003)
21	2004	Jun–Aug	ship (Gunter)	5,659	Florida to Maryland	SEC	Two independent team data analyzed with modified direct duplicate method.	Y	(Garrison et al. in prep)
22	2004	Jun-Aug	ship (Endeavor) and plane (Twin Otter)	10,761	Maryland to Bay of Fundy	NEC	Same methods used in survey 17.	Y	(Palka 2006)
23	2006	Aug	plane (Twin Otter)	10,676	Georges Bank to Bay of Fundy	NEC	Same as for plane in survey 17.	Y	Palka (in prep)
24	2007	Aug	ship (Bigelow) and plane (Twin Otter)	8,195	Georges Bank to Bay of Fundy	NEC	Ship: Tracker data analyzed by DISTANCE. Plane: same as for plane in survey 17.	Y	Palka (in prep)
25	2007	July–Aug	plane	46,804	Canadian waters from Nova Scotia to Newfoundland	DFO	uncorrected counts	N	(Lawson and Gosselin 2009)
26	2008	Aug	plane (Twin Otter)	6,267	NY to Maine in US waters	NEC	Same as for plane in survey 17.	Y	Palka (in prep)
27	2001	May–June	plane	na	Maine coast	NEC/UM	corrected counts	N	(Gilbert *et al.* 2005)
28	1999	March	plane	na	Cape Cod	NEC	uncorrected counts	N	(Barlas 1999)
29	1983 -1986	1983 (Fall) 1984 (Winter, Spring, Summer) 1985 (Summer, Fall) 1986 (Winter)	plane (Beechcraft D-18S modified with a bubblenose)	103,490 total 25,627 (bays and sounds) 36,685 (coastal) 41,178 (outer	northern Gulf of Mexico bays and sounds, coastal waters from shoreline to 18-m isobath, and OCS waters from 18-m	SEC	One team data analyzed with Line-transect theory	N	(Scott *et al.* 1989)

				continental shelf, OCS)	isobath to 9.3 km past the 18-m isobath				
30	1991-1994	Apr–June	ship (Oregon II)	22,041	northern Gulf of Mexico from 200 m to U.S. EEZ	SEC	One team data analyzed by DISTANCE	N	(Hansen *et al.* 1995)
31	1992-1993	Sep–Oct	plane (Twin Otter)	5,578 (bays and sounds) 4,806 (coastal) 7,678 (outer continental shelf, OCS)	northern Gulf of Mexico bays and sounds, coastal waters from shoreline to 18-m isobath, and OCS waters from 18-m isobath to 9.3 km past the 18-m isobath	GOMEX92 GOMEX93	One team data analyzed by DISTANCE	N	(Blaylock and Hoggard 1994)
32	1994	Sep–Nov	plane (Twin Otter)	1,155 (bays and sounds) 1,953 (coastal) 1,879 (outer continental shelf, OCS)	northern Gulf of Mexico bays and sounds, coastal waters from shoreline to 18-m isobath, and OCS waters from 18-m isobath to 9.3 km past the 18-m isobath	GOMEX94	One team data analyzed by DISTANCE	N	NMFS unpub. data
33	1996-1997, 1999-2001	Apr–June	ship (Oregon II and Gunter)	12,162	northern Gulf of Mexico from 200 m to U.S. EEZ	SEC	One team data analyzed by DISTANCE	N	(Mullin and Fulling 2004)
34	1998-2001	end Aug–early Oct	ship (Gunter and Oregon II)	2,196	northern Gulf of Mexico outer continental shelf (OCS, 20-200 m)	SEC	One team data analyzed by DISTANCE	N	(Fulling *et al.* 2003)
35	2003-2004	Jun–Aug (2003) Apr–Jun (2004)	ship (Gunter)	10,933	northern Gulf of Mexico from 200 m to U.S. EEZ	SEC	One team data analyzed by DISTANCE	N	(Mullin 2007)
36	2004	12–13 Jan	helicopter		Sable Island	DFO	Pup count	na	(Bowen *et al.* 2007)
37	2004		plane		Gulf of St Lawrence and Nova Scotia Eastern Shore	DFO	Pup count		(Hammill 2005)
38	2009	10 June–13 August	ship	4,600	northern Gulf of Mexico from 200m to U.S. EEZ	SEC	One team data analyzed by DISTANCE	N	

39	2007	17 July–8 August	plane		northern Gulf of Mexico from shore to 200m (majority of effort 0-20m)	SEC	One team data analyzed by DISTANCE	N	
40	2011	4 June–1 August	ship (Bigelow)	3,107	Virginia to Massachusetts (waters that were deeper than the 100-m depth contour out to beyond the US EEZ)	NEC	Two-independent teams, both using big-eyes. Analyzed using DISTANCE, the independent observer option assuming point independence.	Y	(Palka 2012)
41	2011	7–26 August	Plane (Twin Otter)	5,313	Massachusetts to New Brunswick, Canada (waters north of New Jersey and shallower than the 100-m depth contour, through the US and Canadian Gulf of Maine and up to and including the lower Bay of Fundy)	NEC	Two-independent teams, both using naked eye in the same plane. Analyzed using DISTANCE, the independent observer option assuming point independence.	Y	(Palka 2012)
42	2011		Ship (Gunther)			SEC		Y	

APPENDIX IV: Table B. Abundance estimates – "Survey Number" refers to surveys described in Table A. "Best" estimate for each species in bold font.

Species	Stock	Year	Nbest	CV	Survey Number	Notes
Humpback Whale	Gulf of Maine	1992	501			minimum pop'n size estimated from photo-ID data
		1993	652	0.29		YONAH sampling (Clapham *et al.* 2003)
		1997	497			minimum pop'n size estimated from photo-ID data
		1999	902	0.45	17	
		2002	521	0.67	18	
		2004	359	0.75	22	
		2006	847	0.55	23	
		2008	**823**			Mark-recapture estimate Robbins 2010
		2011	335	0.42	40+41	
Fin Whale	Western North	1995	2,200	0.24	12	
		1999	2,814	0.21	18	

	Atlantic	2002	2,933	0.49	18	
		2004	1,925	0.55	22	
		2006	2,269	0.37	23	
		2007	**3,522**	**0.27**	**25**	
		2011	*	*	40+41	
Sei Whale	Nova Scotia	1977	1,393-2,248			based on tag-recapture data (Mitchell and Chapman 1977)
		1977	870			based on census data (Mitchell and Chapman 1977)
		1982	280		1	
		2002	71	1.01	21	
		2004	**386**	**0.85**	**23**	
		2006	207	0.62	24	
		2011	*	*	40+41	
Minke Whale	Canadian East Coast	1982	320	0.23	1	
		1992	2,650	0.31	3+8	
		1993	330	0.66	9	
		1995	2,790	0.32	12	
		1995	1,020	0.27	11	
		1996	620	0.52	13	
		1999	2,998	0.19	17	
		2002	756	0.9	18	
		2004	600	0.61	22	
		2006	**3,312**	**0.74**	**23**	
		2007	20,741	0.30	25	
		2011	*	*	40+41	
Sperm Whale	North Atlantic	1982	219	0.36	1	
		1990	338	0.31	2	
		1991	736	0.33	7	
		1991	705	0.66	6	
		1991	337	0.5	5	
		1993	116	0.4	9	
		1994	623	0.52	10	
		1995	2,698	0.67	12	
		1998	2,848	0.49	16	
		1998	1,181	0.51	14	
		2004	2,607	0.57	22	
		2004	2,197	0.47	21	
		2004	**4,804**	**0.38**	**21+22**	Estimate summed from north and south surveys
		2011	*	*	40+41	
Kogia spp.	Western North Atlantic	1998	115	0.61	16	
		1998	580	0.57	14	
		2004	358	0.44	22	

		2004	37	0.75	21	
		2004	395	0.4	21+22	Estimate summed from north and south surveys
Dwarf Sperm Whale	Western North Atlantic	**2011**	**1,042**	**0.65**	**40+41**	
Pygmy Sperm Whale	Western North Atlantic	**2011**	**741**	**0.40**	**40+41**	
Beaked Whales	Western North Atlantic	1982	120	0.71	1	
		1990	442	0.51	2	
		1991	262	0.99	7	
		1991	370	0.65	6	
		1991	612	0.73	5	
		1993	330	0.66	9	
		1994	99	0.64	10	
		1995	1,519	0.69	12	
		1998	2,600	0.4	16	
		1998	541	0.55	14	
		2004	2,839	0.78	22	
		2004	674	0.36	21	
		2004	3,513	0.63	21+22	**Estimate summed from north and south surveys**
		2006	922	1.47	23	
Cuvier's Beaked Whale	Western North Atlantic	**2011**	*****	*****	**40+41**	
Gervais' Beaked Whale	Western North Atlantic	**2011**	*****	*****	**40+41**	
Sowerby's Beaked Whale	Western North Atlantic	**2011**	*****	*****	**40+41**	
Risso's Dolphin	Western North Atlantic	1982	4,980	0.34	1	
		1991	11,017	0.58	7	
		1991	6,496	0.74	5	
		1991	16,818	0.52	6	
		1993	212	0.62	9	
		1995	5,587	1.16	12	
		1998	18,631	0.35	17	
		1998	9,533	0.5	15	
		1998	28,164	0.29	15+17	Estimate summed from north and south surveys
		2002	69,311	0.76	18	
		2004	15,053	0.78	21	
		2004	5,426	0.54	22	
		2004	**20,479**	**0.59**	**21+22**	Estimate summed from north and south surveys
		2006	14,408	0.38	23	
		2011	*	*	40+41	
Pilot Whale	Western North Atlantic	1951	50,000			Derived from catch data from 1951-1961 drive fishery (Mitchell 1974)
		1975	43,000-96,000			Derived from population models (Mercer 1975)
		1982	11,120	0.29	1	

		1991	3,636	0.36	7	
		1991	3,368	0.28	5	
		1991	5,377	0.53	6	
		1993	668	0.55	9	
		1995	8,176	0.65	12	
		1995	9,776	0.55	12+16	Sum of US (#12) and Canadian (#16) surveys
		1998	1,600	0.65	16	
		1998	9,800	0.34	17	
		1998	5,109	0.41	15	
		2002	5,408	0.56	18	
		2004	15,728	0.34	22	
		2004	15,411	0.43	21	
		2004	**31,139**	**0.27**	**21+22**	**Estimate summed from north and south surveys**
		2006	26,535	0.35	23	
		2007	6,134		25	
Atlantic white-sided Dolphin	Western North Atlantic	1982	28,600	0.21	1	
		1992	20,400	0.63	2+7	
		1993	729	0.47	9	
		1995	27,200	0.43	12	
		1995	11,750	0.47	11	
		1996	560	0.89	13	
		1999	51,640	0.38	17	
		2002	109,141	0.3	18	
		2004	2,330	0.8	22	
		2006	17,594	0.3	23	
		2006	63,368	0.27	(18+23)/2	average of #18 and #23
		2007	5,796	0.43	25	
		2011	*****	*****	**40+41**	
White-beaked Dolphin	Western North Atlantic	1982	573	0.69	1	
			5,500			(Alling and Whitehead 1987)
		1982	3,486	0.22		(Alling and Whitehead 1987)
		2006	**2,003**	**0.94**	**23**	
		2007	1,1842		25	
		2008			26	
Common Dolphin	Western North Atlantic	1982	29,610	0.39	1	
		1991	22,215	0.4	7	
		1993	1,645	0.47	9	
		1995	6,741	0.69	12	
		1998	30,768	0.32	17	
		1998	0		15	
		2002	6,460	0.74	21	
		2004	90,547	0.24	22	
		2004	30,196	0.54	21	
		2004	120,743	0.23	21+22	Estimate summed from north and south surveys
		2006	84,000	0.36	24	
		2007	53,625	0.22	25	

		2011	**67,191**	**0.29**	**40+41**	
Altantic Spotted Dolphin	Western North Atlantic	1982	6,107	0.27	1	
		1995	4,772	1.27	12	
		1998	32,043	1.39	16	
		1998	14,438	0.63	14	
		2004	3,578	0.48	22	
		2004	47,400	0.45	21	
		2004	50,978	0.42	21+22	Estimate summed from north and south surveys
		2011	**26,798**	**0.66**	**40+41**	
Pantropical Spotted Dolphin	Western North Atlantic	1982	6,107	0.27	1	
		1995	4,772	1.27	12	
		1998	343	1.03	16	
		1998	12,747	0.56	14	
		2004	0		22	
		2004	4,439	0.49	21	
		2004	**4,439**	**0.49**	**21+22**	**Estimate summed from north and south surveys**
Striped Dolphin	Western North Atlantic	1982	36,780	0.27	1	
		1995	31,669	0.73	12	
		1998	39,720	0.45	16	
		1998	10,225	0.91	14	
		2004	52,055	0.57	22	
		2004	42,407	0.53	21	
		2004	94,462	0.4	21+22	Estimate summed from north and south surveys
		2011	**46,882**	**0.33**	**40+41**	
Bottlenose Dolphin	Western North Atlantic Offshore	1998	16,689	0.32	16	
		1998	13,085	0.4	14	
		2002	26,849	0.19	20	
		2002	5,100	0.41	18	
		2004	9,786	0.56	22	
		2004	44,953	0.26	21	
		2004	**81,588**	**0.17**	**20+21+22**	**Estimate summed from north and south surveys and 2002 survey**
Harbor Porpoise	Gulf of Maine/Bay of Fundy	1991	37,500	0.29	3	
		1992	67,500	0.23	8	
		1995	74,000	0.2	12	
		1995	12,100	0.26	11	
		1996	21,700	0.38	14	
		1999	89,700	0.22	18	survey discovered portions of the range not previously surveyed
		2002	64,047	0.48	21	
		2004	51,520	0.65	23	
		2006	**89,054**	**0.47**	**24**	
		2007	4,862	0.31	25	
		2011	*	*	40+41	
Harbor Seal	Western North Atlantic	2001	99,340	0.097	27	
Gray Seal	Western	1999	5,611		28	

	North Atlantic	2001	1,731		27	
		2004	52,500	0.15	37	Gulf of St Lawrence and Nova Scotia Eastern Shore
		2004	208,720 216,490 223,220	0.14 0.11 0.08	36	Sable Island
Bryde's Whale	Northern Gulf of Mexico	1991-1994	35	1.10	30	
		1996-2001	40	0.61	33	
		2003-2004	15	1.98	35	
		2009	**33**	**1.07**	**38**	
Sperm Whale	Northern Gulf of Mexico	1991-1994	530	0.31	30	
		1996-2001	1,349	0.23	33	
		2003-2004	1,665	0.20	35	
		2009	**763**	**0.38**	**38**	
Kogia spp.	Northern Gulf of Mexico	1991-1994	547	0.28	30	
		1996-2001	742	0.29	33	
		2003-2004	453	0.35	35	
		2009	**186**	**1.04**	**38**	
Cuvier's Beaked Whale	Northern Gulf of Mexico	1991-1994	30	0.50	30	
		1996-2001	95	0.47	33	
		2003-2004	65	0.67	35	
		2009	**74**	**1.04**	**38**	
Mesoplodon spp.	Northern Gulf of Mexico	1996-2001	106	0.41	33	
		2003-2004	57	1.40	35	
		2009	**149**	**0.91**	**38**	
Killer Whale	Northern Gulf of Mexico	1991-1994	277	0.42	30	
		1996-2001	133	0.49	33	
		2003-2004	49	0.77	35	
		2009	**28**	**1.02**	**38**	
False killer Whale	Northern Gulf of Mexico	1991-1994	381	0.62	30	
		1996-2001	1,038	0.71	33	
		2003-2004	777	0.56	35	
Short-finned Pilot Whale	Northern Gulf of Mexico	1991-1994	353	0.89	30	
		1996-2001	2,388	0.48	33	
		2003-2004	716	0.34	35	
		2009	**2,415**	**0.66**	**38**	
Melon-headed Whale	Northern Gulf of Mexico	1991-1994	3,965	0.39	30	
		1996-2001	3,451	0.55	33	
		2003-2004	2,283	0.76	35	
		2009	**2,235**	**0.75**	**38**	
Pygmy Killer Whale	Northern Gulf of Mexico	1991-1994	518	0.81	30	
		1996-2001	408	0.60	33	
		2003-2004	323	0.60	35	
		2009	**152**	**1.02**	**38**	
Risso's Dolphin	Northern Gulf of Mexico	1991-1994	2,749	0.27	30	
		1996-2001	2,169	0.32	33	
		2003-2004	1,589	0.27	35	

		2009	**2,442**	**0.57**	**38**	
Pantropical Spotted Dolphin	Northern Gulf of Mexico	1991-1994	31,320	0.20	30	
		1996-2001	91,321	0.16	33	
		2003-2004	34,067	0.18	35	
		2009	**50,880**	**0.27**	**38**	
Striped Dolphin	Northern Gulf of Mexico	1991-1994	4,858	0.44	30	
		1996-2001	6,505	0.43	33	
		2003-2004	3,325	0.48	35	
		2009	**1,849**	**0.77**	**38**	
Spinner Dolphin	Northern Gulf of Mexico	1991-1994	6,316	0.43	30	
		1996-2001	11,971	0.71	33	
		2003-2004	1,989	0.48	35	
		2009	**11,441**	**0.83**	**38**	
Clymene Dolphin	Northern Gulf of Mexico	1991-1994	5,571	0.37	30	
		1996-2001	17,355	0.65	33	
		2003-2004	6,575	0.36	35	
		2009	**129**	**1.00**	**38**	
Atlantic Spotted Dolphin	Northern Gulf of Mexico	1991-1994 oceanic	3,213	0.44	30	
		1996-2001 oceanic	175	0.84	33	
		1998-2001 OCS	37,611	0.28	34	This abundance estimate is from 2000-2001 surveys only. Current best population size estimate is unknown because data from the continental shelf portion of this species' range are more than 8 years old.
		2003-2004 oceanic	0	-	35	
		2009	2968	0.67	38	
Fraser's Dolphin	Northern Gulf of Mexico	1991-1994	127	0.90	30	
		1996-2001	726	0.70	33	
		2003-2004	0	-	35	
		2009	**0**	**-**	**38**	Current best population size estimate is unknown.
Rough-toothed Dolphin	Northern Gulf of Mexico	1991-1994 oceanic	852	0.31	30	
		1996-2001 oceanic	985	0.44	33	
		1998-2001 OCS	1,145	0.83	34	This abundance estimate is from 2000-2001 surveys only. Current best population size estimate is unknown because data from the continental shelf portion of this species' range are more than 8 years old.
		2003-2004 oceanic	1,508	0.39	35	
		2009	624	0.99	0.05	
Bottlenose Dolphin	Northern Gulf of Mexico Oceanic	1996-2001	2,239	0.41	33	
		2003-2004	3,708	0.42	35	
		2009	**5,806**	**0.39**	**38**	
Bottlenose Dolphin	Northern Gulf of Mexico Continental Shelf	1998-2001	17,777	0.32	34	This abundance estimate is from 2000-2001 surveys only. Current best population size estimate is unknown because data from the continental shelf are more than 8 years old.
Bottlenose Dolphin	Northern Gulf of	Eastern 1994	9,912	0.12	32	
		Eastern 2007	**7,702**	**0.19**	**39**	

	Mexico Coastal (3 stocks)	Northern 1993	4,191	0.21	31	
		Northern 2007	**2,473**	**0.25**	**39**	
		Western 1992	3,499	0.21	31	Current best population size estimate for this stocks is unknown because data are more than 8 years old.
Bottlenose Dolphin	Northern Gulf of Mexico Bay, Sound and Estuarine (33 stocks)	Choctawhatchee Bay, 2007	179	0.04		(Conn *et al.* 2011)
		St. Joseph Bay, 2005-2007	146	0.18		(Balmer *et al.* 2008)
		St. Vincent Sound, Apalachicola Bay, St. George Sound, 2008	439	0.14		(Tyson *et al.* 2011)
		Sarasota Bay, Little Sarasota Bay, 2007	160	-		Direct count
		Remaining 28 stocks	unknown	undetermined	31	Current best population size estimate for each of these 30 stocks is unknown because data are more than 8 years old.

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APPENDIX V: Reports not updated in 2012

(All reports available online at http://www.nefsc.noaa.gov/publications/tm/tm219/)

	Year Updated
Blue Whale (*Balaenoptera musculus*): Western North Atlantic Stock	2010
Killer Whale (*Orcinus orca*): Western North Atlantic Stock	1995
Pygmy Killer Whale (*Feresa attenutta*): Western North Atlantic Stock	2007
Northern Bottlenose Whale (*Hyperoodon ampullatus*): Western North Atlantic Stock	2008
Melon-Headed Whale (*Peponocephala electra*): Western North Atlantic Stock	2007
Long-finned Pilot Whale (*Globicephala melas*): Western North Atlantic Stock	2011
Short-finned Pilot Whale (*Globicephala machrorhynchus*): Western North Atlantic Stock	2011
White-Beaked Dolphin (*Lagenorhynchus albirostris*): Western North Atlantic Stock	2007
Pantropical Spotted Dolphin (*Stenella attenuata*): Western North Atlantic Stock	2007
Fraser's Dolphin (*Lagenodelphis hosei*): Western North Atlantic Stock	2007
Rough-Toothed Dolphin (*Steno bredanensis*): Western North Atlantic Stock	2008
Clymene Dolphin (*Stenella clymene*): Western North Atlantic Stock	2007
Spinner Dolphin: (*Stenella longirostris*): Western North Atlantic Stock	2007
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Offshore Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Northern Migratory Coastal Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Southern Migratory Coastal Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic South Carolina/Georgia Coastal Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Northern Florida Coastal Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Western North Atlantic Central Florida Coastal Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Southern North Carolina Estuarine System Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Charleston Estuarine System Stock	2009
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Northern Georgia/Southern South Carolina Estuarine System Stock	2009
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Southern Georgia Estuarine System Stock	2009
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Jacksonville Estuarine System Stock	2009
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Indian River Lagoon Estuarine System Stock	2009
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Biscayne Bay Stock	2009
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Florida Bay Stock	2009
Hooded Seal (*Cystophora cristata*): Western North Atlantic Stock	2007
Sperm Whale (*Physeter macrocephalus*): Puerto Rico and U.S. Virgin Islands Stock	2010
Bottlenose Dolphin (*Tursiops truncatus truncatus*): Puerto Rico and U.S. Virgin Islands Stock	2011
Cuvier's Beaked Whale (*Ziphias cavirostris*): Puerto Rico and U.S. Virgin Islands Stock	2011
Short-finned Pilot Whale (*Globicephala machrorhynchus*): Puerto Rico and U.S. Virgin Islands Stock	2011
Spinner Dolphin: (*Stenella longirostris*): Puerto Rico and U.S. Virgin Islands Stock	2011

APPENDIX VI: West Indian Manatee Stock Assessments – Florida and Antilles stocks

Revised: 11/2009

WEST INDIAN MANATEE *(Trichechus manatus)*
FLORIDA STOCK
(Florida subspecies, *Trichechus manatus latirostris*)

U.S. Fish and Wildlife Service, Jacksonville, Florida

STOCK DEFINITION AND GEOGRAPHIC RANGE

Florida manatees are found throughout the southeastern United States. Because manatees are a sub-tropical species with little tolerance for cold, they are generally restricted to the inland and coastal waters of peninsular Florida during the winter, when they shelter in and/or near warm-water springs, industrial effluents, and other warm water sites (Hartman 1979, Lefebvre *et al.* 2001, Stith *et al.* 2007). In warmer months, manatees leave these sites and can disperse great distances. Individuals have been sighted as far north as Massachusetts, as far west as Texas, and in all states in between (Rathbun *et al.* 1982, Schwartz 1995, Fertl *et al.* 2005, USFWS Jacksonville Field Office, unpub. data 2008a). Warm weather sightings are most common in Florida and coastal Georgia.

Previous studies of the manatee in Florida identified four, relatively distinct, regional management units (formerly referred to as subpopulations): an Atlantic Coast unit that occupies the east coast of Florida, including the Florida Keys and the lower St. Johns River north of Palatka; an Upper St. Johns River unit that occurs in the river south of Palatka; a Northwest unit that occupies the Florida Panhandle south to Hernando County; and a Southwest unit that occurs from Pasco County south to Whitewater Bay in Monroe County (USFWS 2001 and 2007). See Figure 1. Each of these management units includes individual manatees that tend to return to the same warm-water site(s) each winter and have similar non-winter distribution patterns. The exchange of individuals between these units is limited during the winter months, based on data from telemetry studies (Rathbun *et al.* 1990, Reid *et al.* 1991, Weigle *et al.* 2001, Deutsch *et al.* 1998 and 2003) and photo-identification studies (Rathbun *et al.* 1990, USGS FISC Sirenia Project, unpubl. data 2007, Higgs, pers. comm. 2007a, b).

While the Florida manatee population has been separated into management units, the Service identifies the Florida manatee population as a single stock. As stated, the management unit construct was originally based on studies of regional manatee wintering sites. The management units are a useful construct for assessing unit-specific population trends and threats; the Service and its collaborators evaluate these parameters for each unit using a core biological model (CBM) developed by Runge *et al.* (2004). Consistent with requirements of the Endangered Species Act of 1973, as amended, threats are then appropriately addressed through methods identified in Service recovery plans (and the State of Florida's Manatee Management Plan). This approach has been successful for efforts to manage Florida manatees and the Service believes that using SARs for each of the management units would provide little added benefit to existing efforts.

Significant genetic differences between the manatees of Florida and Puerto Rico do exist and, as a result, these populations are identified as separate stocks (Vianna *et al.* 2006). Vianna *et al.* (2006) identified a gene flow barrier between Florida and Puerto Rico using mtDNA analyses.

POPULATION SIZE

One to three times each winter, a coordinated series of statewide aerial surveys and ground counts, known as the synoptic surveys, are conducted by the Florida Fish and Wildlife Conservation Commission (FWC) to count wintering manatees (FWC FWRI Manatee Synoptic Aerial Surveys 2009). These counts, conducted since 1991, identify a number of animals observed in wintering sites at the time of the count and suggest that there is at least this number of manatees in the population, if not more. Because the counts do not include the number of manatees located away from the wintering sites on the day of the count, the counts do not accurately represent the total number of manatees in the population. Weather and other environmental factors influence count conditions, adding additional variability.

Furthermore, survey methods preclude any analysis of precision and variability in the counts. In the absence of a comprehensive count, these counts cannot be used to describe population trends. Information based on Florida manatee population demographic data obtained from photo-identification studies is used to accurately describe population trends as they relate to growth rates, adult survival rates, and reproductive rates. Management decisions are based on these more accurate, scientifically supportable numbers and trends.

Minimum Population Estimate

The best available count of Florida manatees is 3,802 animals, based on a single synoptic survey of warm-water refuges in January 2009 (FWC FWRI Manatee Synoptic Aerial Surveys 2009).

Current Population Trends

Recent demographic analyses indicate that, with the exception of the Southwest management unit, manatee populations are increasing or stable throughout much of Florida. See Table 1. The analyses are based on photo-ID based mark-recapture analyses using a manatee-specific core biological model. Population growth rates reported by Runge *et al.* (2004 and 2007a) are as follows: the Northwest Region 4.0% (95% CI 2.0 to 6.0%), the Upper St. Johns River Region 6.2% (95% CI 3.7 to 8.1%), the Atlantic Coast Region 3.7% (95% CI 1.1 to 5.9%), and the Southwest Region -1.1% (95% CI -5.4 to +2.4%). In three of the four management units, reproductive rates and adult survival rates are cited as positive (Runge *et al.* 2007a, Kendall *et al.* 2004, Langtimm *et al.* 2004, and Koelsch 2001). In southwest Florida, estimates of adult survival and reproduction are less precise than for manatees in other regions of Florida because the data time series is comparatively shorter for this unit and no demographic data is available for manatees in the southernmost part of this region. Craig and Reynolds (2004) additionally suggested that populations of wintering manatees in the Atlantic Coast Region have been increasing at rates of between 4 and 6% per year since 1994. Growth rates for each management unit are current through 2000.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

The Marine Mammal Protection Act defines net productivity rate as "the annual per capita rate of increase in a stock resulting from additions due to reproduction, less losses due to natural mortality." Recently published information on Florida manatee population demographics include studies by Runge *et al.* (2004 and 2007a), Craig and Reynolds (2004), Kendall *et al.* (2004), and Langtimm *et al.* (2004). Per Runge *et al.* (2004), the maximum growth rate for Florida manatees (incorporating reproductive and adult survival rates), is 6.2% (95%, CI 3.7 to 8.1%**).** This rate, reported for the Upper St. Johns River management unit, is identified as R_{max} inasmuch as it describes a maximum rate of increase and reflects both additions and losses to this population, including losses due to both natural and human-causes.

POTENTIAL BIOLOGICAL REMOVAL (PBR)

PBR is the product of three elements: the minimum population estimate (N_{min}), half of the maximum net productivity rate (0.5 R_{max}), and a recovery factor (F_r). Recovery factor values range between 0.1 and 1.0 and population simulation studies demonstrate that a default value of 0.1 should be used for endangered (depleted) stocks and a default value of 0.5 should be used for threatened stocks or stocks of unknown status (NMFS 2005).

N_{min}= 3,802
R_{max}= 6.2%
F_r= 0.1

PBR = (3,802) (0.031) (0.1) = 11.80 (or 12)

HUMAN CAUSED MORTALITY AND SERIOUS INJURY

Sources of human caused manatee mortality and injury include watercraft, water control structures, recreational and commercial fishing gear, and others. These sources were identified and are documented through manatee carcass

salvage and rescue programs (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b and 2008c, Rommel *et al.* 2007, Lightsey *et al.* 2006, Pitchford *et al.* 2005, Wright *et al.* 1995, Ackerman *et al.* 1995, O'Shea *et al.* 1985, Bonde *et al.* 1983). The Service elected to use data describing the 2003 through 2007 period inasmuch as this data had been verified for completeness and accuracy. (Verifications of the 2008 injury and mortality datasets were incomplete at the time of writing.)

From 1978 through 2007, 6,373 manatee carcasses were salvaged in the southeastern United States. Of these carcasses, 1,877 were of animals that died from human causes. Eighty-two percent of manatees (1,538) that died from human causes were killed by watercraft. Water control structures (including flood gates and navigation locks) killed 182 manatees and the deaths of the remaining 157 manatees were attributed to other human causes (including entanglement in and ingestion of marine debris [including fishing gear], entrapment in pipes and culverts, etc.) (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data, 2008c). For the period 2003 – 2007, annual estimated average human-caused mortality was 86.6 or 87 manatees per year (FWC FWRI Manatee Mortality Statistics 2008).

While "serious injury" has been described by the National Marine Fisheries Service "as any injury that will likely result in mortality" (NMFS 2005), the Service has not defined "serious injury." Absent a definition, the Service receives reports of distressed or injured manatees that may or may not meet the NMFS definition of "serious injury" and responds to these reports through a manatee rescue, rehabilitation, and release program. Responses to reports of distressed or injured manatees can include assisting a superficially injured manatee *in situ* or may involve transporting a more than superficially injured animal to a rehabilitation center for further treatment. It is assumed that animals treated *in situ* have not been seriously injured.

Human-caused Mortality

Data on manatee mortality in the southeastern United States have been collected since 1974 by the Manatee Carcass Salvage Program (O'Shea *et al.* 1985, Ackerman *et al.* 1995, Lightsey *et al.* 2006). Based on these data, primary human-related threats include watercraft-related strikes (direct impact and/or propeller) which cause injury and death (Rommel *et al.* 2007, Lightsey *et al.* 2006), entrapment and/or crushing in water control structures (gates, locks, *etc.*), and, as previously described, entanglement in fishing gear, and ingestion of marine debris. Natural threats include exposure to cold and red tide. Mortality associated with these natural threats includes cold stress syndrome and brevetoxicosis, respectively.

Causes of death for many salvaged carcasses cannot be determined. These "undetermined" causes can be the result of a carcass that is too decomposed to diagnose, a carcass that was reported but never retrieved, or when no specific factor or set of factors can be identified as a cause of death. In addition, small manatees (less than or equal to 150 cm in length) that die at or near the time of birth and whose deaths cannot be attributed to one of the known human-related causes are described as "perinatal" deaths, an undetermined cause.

During the most recent five year period for which data have been verified (2003 – 2007), 1,805 manatee carcasses were salvaged in the southeastern United States. See Table 2. Of these carcasses, 433 were of animals that died from human causes. Based on this, the annual estimated average human-caused mortality is 87 (86.6) manatees per year. Eighty-nine percent of manatees (386) that died from human causes were killed by watercraft. Water control structures (including flood gates and navigation locks) killed 18 manatees and the deaths of the remaining 29 manatees were attributed to other human causes (including entanglement in and ingestion of marine debris [including fishing gear], entrapment in pipes and culverts, etc.) (FWC FWRI Manatee Mortality Statistics 2008).

Fisheries-related Mortality and Injury

Manatees are known to entangle in and/or ingest fishing gear used by both commercial and recreational fisheries. As reported in death and rescue reports, fishing gear used by commercial fishers known to entangle or be ingested by manatees includes shrimp trawls, shrimp nets, crab traps (traps and/or associated buoys and lines), seines, shiner nets and hoop nets, and trot lines. Similarly, recreational fishery gear known to either entangle or be ingested by manatees includes monofilament fishing line and/or associated tackle, cast nets, and crab traps. Manatees also become entangled in ropes and lines, possibly related to recreational and commercial fisheries (*e.g.*, float lines detached from traps, etc.) (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b and 2008c, Smith 1998, Nill 1998). Manatees are struck and killed or injured by a variety of watercraft, including watercraft of a size and type comparable to those used by commercial and recreational fishers (Rommel *et al.* 2007, Lightsey *et al.* 2006, Pitchford *et al.* 2005).

Mortalities

For the most recent five year period (2003 - 2007), at least 10 manatees died due to entanglements in/ingestion of marine debris; six of these deaths were associated with fishing line and/or associated gear, two deaths were attributed to research nets, and two to other sources (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b, Nill 1998, Smith 1998). See Table 3. There were no known sources of commercial fishery gear implicated in these deaths.

Injuries

The Service's manatee rescue, rehabilitation, and release program has rescued injured or distressed manatees since 1973. From 2003 to 2007, there were 80 rescues associated with fishing gear and other sources of marine debris. Thirty-five of these were related to crab trap entanglements, 15 to fishing line and/or associated gear, and 5 were due to net entanglements. Nine of the 35 crab trap-related rescues required treatment at rehabilitation centers and the remaining 26 were resolved in the field (USFWS Jacksonville Field Office, unpub. data 2008b). See Table 4. Crab trap- related rescues likely involve gear from both commercial and recreational fishers, who use the same type of gear.

Commercial Fishing Gear-related Interactions

The majority of known fishing gear interactions have occurred in Florida waters (280 of 290 known deaths and rescues, including interactions that occurred before 1978). Prior to 1995, when the State of Florida adopted a statewide, in-shore net ban, manatees were known to entangle in a variety of fishing gear used by commercial fishers, including blue crab fishery gear. Subsequent to 1995, entanglements in non-blue crab fishery gear used by commercial fishers are virtually unknown, both in the State of Florida and elsewhere (there is a single record of a manatee being rescued from commercial fishing gear in 1997 in Georgia, when a manatee was rescued from an inshore bait shrimp trawl) (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b and 2008c, Nill 1998, Smith 1998). However, blue crab fishery gear entanglements continue in Florida. From 2003 to 2007, no manatee deaths and 35 rescues are attributable to the blue crab fisheries.

Given greater fishing effort by commercial blue crab fishers in contrast to blue crab fishing efforts by recreational fishers (which suggests more commercial fishing gear in the water than recreational gear in the water), it's thought that a majority of manatee entanglements in blue crab fishing gear should be attributed to the commercial blue crab fisheries. In the past, efforts to distinguish between animals entangled in commercial blue crab trap gear versus recreational blue crab trap gear were hindered by a lack of gear data collection protocols for rescuers and salvagers and state gear identification requirements were not necessarily adequate to identify gear ownership. Protocols have subsequently been modified, as have state regulations requiring better identification of gear owners, and the attribution of entangling gear to its source has significantly improved.

Two commercial blue crab fisheries identified in NMFS' "2009 List of Fisheries" (73 FR 73032; December 1, 2008) known to entangle Florida manatees include:

Atlantic blue crab trap/pot fishery

The Category II Atlantic blue crab trap/pot fishery targets blue crabs using pots baited with fish or poultry typically set in rows in shallow water. The pot position is marked by either a floating or sinking buoy line attached to a surface buoy. The fishery occurs year round and involves more than 16,000 vessels/persons. Twenty-seven percent of Florida's 2006 blue crab landings came from Florida's Atlantic Coast Region, within the operational area of the Atlantic blue crab trap/pot fishery (FWC FWRI 2007).

Gulf of Mexico blue crab trap/pot fishery

The Category III Gulf of Mexico blue crab trap/pot fishery targets blue crabs using pots baited with fish or poultry typically set in rows in shallow water. The pot position is marked by either a floating or sinking buoy line attached to a surface buoy. The fishery occurs year round and involves more than 4,113 vessels/persons. Seventy-three percent of Florida's 2006 blue crab landings came from Florida's Gulf Coast Region, within the operational area of the Gulf of Mexico blue crab trap/pot fishery (FWC FWRI 2007).

Fifty-five percent of known Florida manatee-crab fishery interactions occurring between 2003 and 2007 were documented within the area of the Gulf of Mexico blue crab trap/pot fishery. The majority of these interactions occurred in southwest Florida, with most occurring in Lee County (seven rescues occurred in this county alone) (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b). Within the area of the Atlantic blue crab trap/pot fishery, most interactions occurred in east central Florida (Brevard County) (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b).

The NMFS' "2009 List of Fisheries" (73 FR 73032; December 1, 2008) also identifies the Category III "Southeastern U.S. Atlantic/Gulf of Mexico shrimp trawl fishery" as a fishery known to take Florida manatees.

Southeastern U.S. Atlantic/Gulf of Mexico shrimp trawl fishery

The Category III Southeastern U.S. Atlantic/Gulf of Mexico shrimp trawl fishery targets a variety of pelagic shrimp species (brown, pink, white, rock, etc.) by means of a large trawl net towed behind a single shrimp trawler. Nets, held open by paired doors, are towed on coastal bottoms for varying lengths of time. This fishery occurs year round and involves more than 18,000 vessels/persons. Shrimp trawling occurs along Florida's Atlantic and Gulf coasts, well outside of Florida shoreline areas regulated pursuant to Florida net ban regulations.

From 2003 to 2007, no manatee deaths or injuries attributable to this fishery have been reported from the Atlantic and Gulf coasts in the southeastern U.S. Furthermore, this commercial fishery is not known to have taken any manatees since 1987, when the last confirmed report of a manatee captured and drowned in this fishery was recorded. (Three unconfirmed deaths were documented in 1990. Necropsy findings and/or circumstances associated with these cases suggested that an inshore bait shrimp fishery may have been responsible for the deaths but definitive information was lacking. A manatee that died in a shrimp trawl in 1997 was captured by a research trawler investigating excluder devices; the researchers used a shrimp trawl, identical to those used by commercial fishers, but they were not engaged in commercial fishing operations.)

STATUS OF STOCK

The Florida manatee is protected by the State of Florida under the Florida Manatee Sanctuary Act of 1978, as amended (§ 379.2431(2), FS). Federally, Florida manatees were originally listed as an endangered species in 1967 under the Endangered Species Preservation Act of 1966. The original listing was subsequently adopted under the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.), as amended, and manatees continue to be identified as a federally endangered species. As an endangered species, manatees are considered by default to be a "strategic stock" and "depleted" under the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq*.).

The recent threats assessment (Runge *et al* 2007b) states that "watercraft-related mortality is having the greatest impact on manatee population growth and resilience" and "elimination of this threat alone would greatly reduce the probability of quasi-extinction. Anticipated losses of winter warm-water habitat could also be a significant, long-term threat." The threats assessment describes mortality associated with fisheries interactions and red tides as "noticeable" and, when compared to other anthropogenic threats, is thought to have less of an impact on the persistence of the manatee population (Runge *et al* 2007b).

The Service and its recovery partners have taken significant steps to reduce the number of human caused manatee mortalities and injuries. To address the threat of watercraft collisions, the most significant source of human-caused mortality and injury, the Service and FWC have adopted manatee protection areas (Federal manatee refuges and sanctuaries and State manatee protection zones) in areas of high manatee use and potential watercraft conflict. Water control structures have been retrofitted with devices that eliminate crushings and many culverts and pipes have been grated to prevent manatee entrapment.

Efforts have also been made to reduce the incidence of lethal and non-lethal entanglements in and ingestion of marine debris, including fishing gear (Spellman *et al.*, 2003 and 1999). Manatees entangled in or ingesting marine debris are rescued each year by the manatee rescue and rehabilitation program; manatee mortalities and serious injuries are minimized as a result of this activity (FWC FWRI Manatee Mortality Statistics 2008, USFWS Jacksonville Field Office, unpub. data 2008b and 2008c, Nill 1998, Smith 1998). The Service has funded studies to

assess manatee behavior in the presence of fishing gear and to identify "manatee-safe" crab fishing gear that, if used, will minimize the number of manatee-crab trap entanglements (Bowles *et al.* 2003 and Bowles 2000). Derelict crab trap removals and monofilament removal and recycling programs are helping to reduce the likelihood of manatee interactions with this gear (Koelsch *et al.* 2003). In February 2009, FWC adopted regional blue crab harvest closures across the state; derelict crab traps are removed during the closures, further reducing the likelihood of crab trap gear entanglements (FWC 2009).

While the threats posed by watercraft and the anticipated loss of wintering habitat on the Florida manatee are significant, the threat posed by commercial fishery activities is very small and has a comparatively lesser impact on the persistence of the Florida manatee population. The number of lethal and live takes of manatees in blue crab trap/pot fishery gear during the past year (no lethal takes and nine live takings) is well below the calculated PBR level of 12 takings. Over the past five years, there have been no lethal takings of manatees in the blue crab fishery and a total of 35 non-lethal takings of crab fishery gear-entangled manatees (rescued by the manatee rescue and rehabilitation program), an average of 6.8 takes per year. Similarly, there are no known lethal or non-lethal takes of manatees in the shrimp trawl fishery for this period. Therefore, the annual estimated level of incidental mortality and serious injury due to the shrimp trawl fishery is zero. Given the largely non-lethal effect of these takings, total commercial fishery mortality and serious injury for this stock is less than the calculated PBR and, therefore, can be considered insignificant and approaching a zero mortality and serious injury rate.

Inasmuch as an optimal sustainable population (OSP) level has not been identified for the Florida manatee, we do not know what this stock's status is in relation to OSP. In the face of existing threats, "the Florida manatee population is exhibiting positive growth, good reproductive rates, and high adult survival throughout most of the state" (USFWS 2007).

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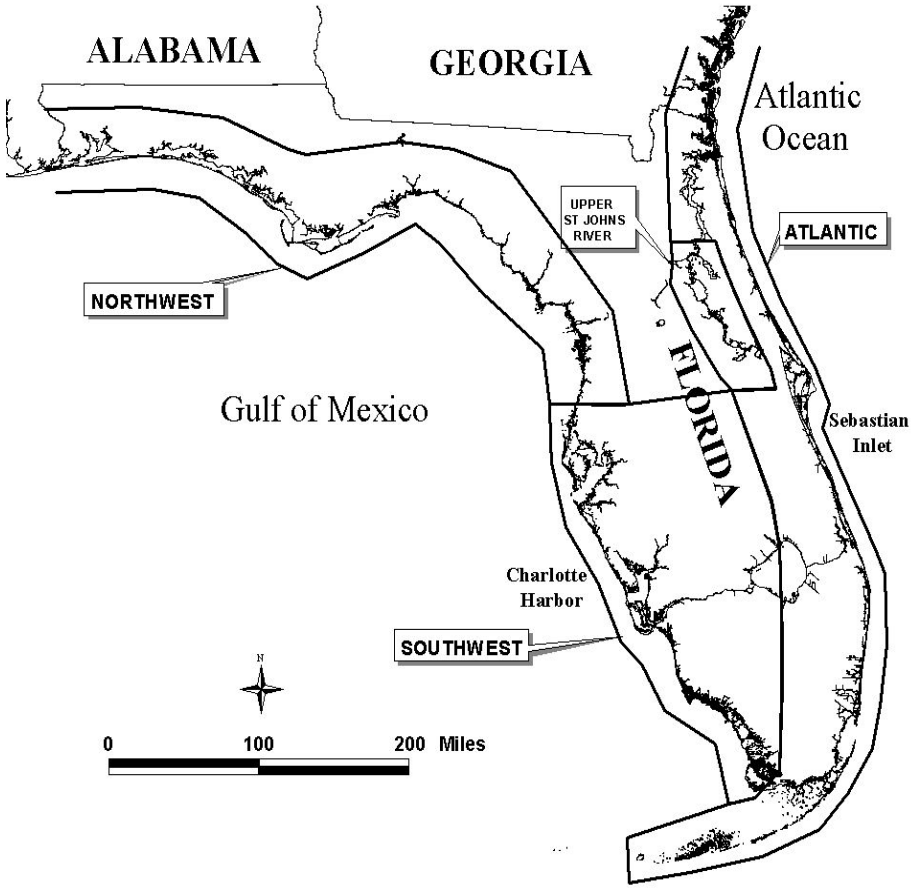


Figure 1. Florida manatee distribution within the four designated regional management units. USFWS (2001).

Table 1. Demographic indicators for Florida manatees by management unit.

Management Unit	Population Growth Rate (per year)	Minimum Population Size	Annual Conditional Reproductive Rate	Adult Survival Rates	Comments
Northwest	**4.0%** **(95% CI 2.0 to 6.0%)** **1986 – 2000** (Runge *et al.* 2007a)	**377** (FWC Manatee Synoptic Aerial Surveys 2009)	**0.43** **(95% CI 0.22 – 0.54)** **1982 – 1999** (Kendall *et al*. 2004)	**0.959** **SE 0.006** **1986 – 2000** (Runge *et al.* 2007a)	The number of manatees throughout the region, including Crystal River and Kings Bay, has been increasing since the 1960s. A recent high count of 274 manatees was documented in 2005 (Kleen, *pers. comm*. 2006).
Upper St. Johns River	**6.2%** **(95% CI 3.7 to 8.1%)** **1990 – 1999** (Runge *et al.* 2004)	**112** (FWC Manatee Synoptic Aerial Surveys 2009)	**0.61** **(95% CI 0.51 – 0.71)** **1980 – 2000** (Runge *et al.* 2004)	**0.960** **SE 0.011** **1990 – 1999** (Langtimm *et al.* 2004)	The number of manatees using Blue Spring has increased significantly. A recent high count of manatees (182) was documented during the 2005 – 2006 winter season (Hartley, *pers. comm.* 2006). At this site, survival of 1st year calves was estimated at 0.810 (0.727 – 0.873) and 2nd year calves at 0.915 (0.827-0.960) (Langtimm *et al.* 2004).
Atlantic Coast	**3.7%** **(95% CI 1.1 to 5.9%)** **1986 – 2000** (Runge *et al.* 2007a)	**1447** (FWC Manatee Synoptic Aerial Surveys 2009)	**0.38** **(95% CI 0.29 – 0.47)** **1982 – 1999** (Kendall *et al*. 2004)	**0.963** **SE 0.010** **1986 – 2000** (Runge *et al.* 2007a)	In contrast to FWC's estimate, Craig and Reynolds (2004) estimated the population size of animals using Atlantic Coast power plants in 2001 at 1606 (Bayesian credible interval: 1353 – 1972) They also identified trends in corrected aerial counts: 1982-1989, 5 to 7%;1990-1993, 0 to 4%; and, since 1994: 4 to 6%.
Southwest[1]	**-1.1%** **(95% CI -5.4 to +2.4%)** **1995 – 2000** (Runge *et al.* 2004)	**1364** (FWC Manatee Synoptic Aerial Surveys 2009)	**0.60** **(95% CI 0.42 – 0.75)** **1993 – 1997** (Koelsch 2001)	**0.908** **SE 0.019** **1995 – 2000** (Langtimm *et al.* 2004)	Estimated conditional, annual reproductive rate based on warm weather data from Sarasota Bay only, may not be representative of other regions.

[1]Parameter estimates for the Southwest have broader confidence intervals than those for the other management units. This is due to a number of factors, including: fewer years of photo-identification monitoring data, turbid water making photography difficult, and warmer weather in the south reducing the number of cold days when manatees are available for photography. Nonetheless, the current parameter estimates are the first published for this region and therefore reflect the best available information. More reliable information is expected for this management unit as geographic coverage, sample size, and years of study increase over time.

Table 2. All manatee deaths (number of deaths, percent of annual total), 2003-2007. (Source: FWC FWRI Manatee Mortality Statistics 2008)

Year	Human-caused Mortality	Perinatal	Cold Stress	Other[2]	Total
2003	85 (22%)	72 (19%)	48 (13%)	178 (46%)	383
2004	76 (27%)	72 (26%)	52 (18%)	82 (29%)	282
2005	94 (24%)	89 (22%)	29 (7%)	186 (47%)	398
2006	96 (23%)	70 (17%)	21 (5%)	233 (55%)	420
2007	82 (25%)	59 (18%)	19 (6%)	162 (50%)	322
TOTAL	433 (24%)	362 (20%)	169 (9%)	841 (47%)	1805
5-Year Avg.	86.6	72.4	33.8	168.2	361

[1]Numbers include reported, dead manatees that were salvaged and confirmed/verified carcasses that were not salvaged (included in "Other").

[2]Includes known and/or suspected red tide deaths, including 96 in 2003, 92 in 2005, 62 in 2006, and 38 in 2007.

Table 3. Manatee mortality due to marine debris, 2003-2007. (Source: FWC FWRI Manatee Mortality Statistics 2008)

Year	Crab trap(s) and associated gear	Net(s) and asociated gear	Fishing line, tackle, and associated gear	Rope and miscellaneous marine debris	Total no. of deaths
2003		**1**	**1**	**1**	**3**
2004			**1**		**1**
2005					**0**
2006			**3**		**3**
2007		**1**	**1**	**1**	**3**
TOTAL	**0**	**2**	**6**	**2**	**10**
5-Year Avg.	**0.00**	**0.40**	**1.20**	**0.40**	**2.00**

Note: numbers only include reported dead manatees that were salvaged. Numbers do not include reported, dead manatees that were not salvaged.

Table 4. Manatee rescue, rehabilitation, and release, 2003-2007. (Source: USFWS Jacksonville Field Office, unpub. data 2008b)

Year	Crab trap(s) and associated gear		Net(s) and asociated gear		Fishing line, tackle, and associated gear		Rope and miscellaneous marine debris		Total no. of rescues
	Rescues	Assist and Releases	Rescues	Assist and Releases	Rescues	Assist and Releases	Rescues	Assist and Releases	
2003	3	5			1	3	3	1	16
2004	4	4	1		1	4	1	1	16
2005	1	4				3	3	2	13
2006		5		2		3		5	15
2007	1	8		2		1	1	7	20
TOTAL	9	26	1	4	2	14	8	16	80
5-Year Avg.	1.80	5.20	0.20	0.80	0.40	2.80	1.60	3.20	16.00

Note: numbers only include reported, distressed manatees that were either rescued or assisted and released. Numbers do not include reported, distressed manatees that were not rescued.

11/2009

WEST INDIAN MANATEE *(Trichechus manatus)*
PUERTO RICO STOCK
(Antillean subspecies, Trichechus manatus manatus)

U.S. Fish and Wildlife Service, Caribbean Field Office, Boquerón, Puerto Rico

STOCK DEFINITION AND GEOGRAPHIC RANGE

Manatees belong to the Order Sirenia with two known families. Family Dugongidae is represented by the extant genera *Dugong* that is found in the Indo-Pacific region and the extinct genera *Hydromalis* the only member of the order adapted to cold water. Family Trichechidae is represented by one genus *Trichechus* and three species: *T. senegalensis*, the West African manatee, *T. inunguis*, the Amazonian manatee, and *T. manatus*, the West Indian manatee. The West Indian manatee is distributed in Caribbean coastal areas and river systems from Virginia, USA to Espiritu Santo, Brazil (Shoshani 2005).

Hatt (1934) recognized two *T. manatus subspecies:* the Antillean manatee (*Trichechus manatus manatus*) and the Florida manatee (*Trichechus manatus latirostris*). Domning and Hayek (1986) tentatively divided the West Indian manatee into the Florida manatee *T. m. latirostris* and the Antillean manatee *T. m. manatus* based on cranial characters. They suggested that such subspeciation may reflect reproductive isolation brought on by the intemperate northern coast of the Gulf of Mexico and characteristically strong currents found in the Straits of Florida.

García-Rodríguez *et al.* (1998) compared mitochondrial DNA (mtDNA) from eight locations of *T. manatus* and found that despite the sharing of sixteen haplotypes (a segment of DNA containing closely linked gene variations that are inherited as a unit) among these locations, there was a strong geographic structuring of mtDNA diversity in three sites: Florida and the West Indies, the Gulf of Mexico to the Caribbean rivers of South America, and the northeast Atlantic coast of South America; units which are not concordant with the previous sub-species designations. Vianna *et al.* (2005) studied 291 samples mtDNA from the four Sirenia species, including samples of *T. manatus* from 10 countries. Colombia has the highest diversity of haplotypes with eight, while Puerto Rico has three haplotypes and the Dominican Republic only has two. Although Puerto Rico and the Dominican Republic share haplotype A with Florida, Vianna *et al.* (2005) found a high differentiation between the manatees in Florida, and the manatees in the Dominican Republic and Puerto Rico.

Slone *et al*. 2006 indicates that haplotype (mitochondrial DNA) distribution is further geographically divided in Puerto Rico. For example, only the A haplotype (haplotype also unique to Florida) was found along the north of the island and B haplotype was observed from the south shore. The authors found a mixture of A and B haplotype located along the eastern and western ends of the island, suggesting mixing between the south and north groups. Furthermore, the mitochondrial DNA is maternally inherited and is not reflective of the additional gene flow from males. Radio-tagging techniques in Puerto Rico have documented general behavior of manatee populations, in which males seem to move more extensively than females (Slone *et al.* 2006). Males may travel hundreds of kilometers while mother/calf distribution patterns could be more restricted. The authors state that if male movements are made during the breeding season, then relatively healthy mixing between geographical areas established by females might be expected. Further research by Kellogg (2008) indicates that nuclear DNA subpopulation separation was not as severe, suggesting that the manatees in Puerto Rico do travel and breed throughout the population to some degree.

The Antillean manatee is found in eastern Mexico and Central America, northern and eastern South America, and in the Greater Antilles (Lefebvre *et al.* 1989). It inhabits riverine and coastal systems in the subtropical Western Atlantic Coastal Zone from the Bahamas to Brazil, including the Gulf of Mexico. The distribution of the Antillean manatee extends eastward only to Puerto Rico, except for one 1988 report in St. Thomas, U.S. Virgin Islands; however, transient animals are know to occur in the Lesser Antilles (Lefebvre *et al*. 2001).

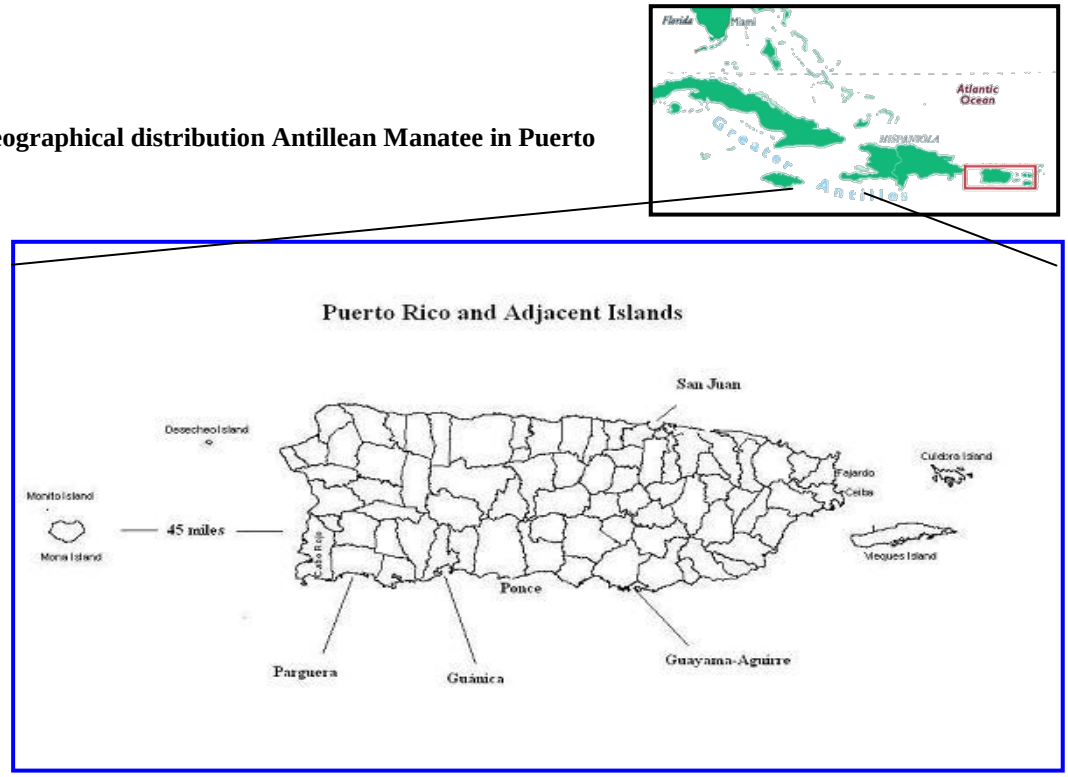
Genetically, the Puerto Rico population is isolated from the Florida manatee and has an additional haplotype when compared to the Dominican Republic. Antillean manatees occur around Hispaniola. While only a 90-mile stretch separates the two islands, manatee sightings have only occurred in areas close to the coast in Puerto Rico. The prevailing winds and currents are mostly from the northeast. This possibly creates a barrier to regular migration. Mona Island is located mid-way between Hispaniola and Puerto Rico. Extensive studies of Taino Indian archeological

evidence did not reveal manatee bones, suggesting that manatees were not readily available as a food item here. Additionally, threats by commercial and artisanal fisheries and conservation efforts are different between islands. For these reasons, we have made a determination to treat the Puerto Rico population of the Antillean manatee as a separate stock.

Powell *et al.* (1981) describes the manatee population in Puerto Rico as small and widely distributed. Rathbun *et al.* (1985) states that the population of manatees in Puerto Rico was not even and that distribution did not vary from 1976-78, when Powell conducted his studies. All studies suggest that manatees in Puerto Rico are most often detected in protected areas around cays, in secluded bays and shallow seagrass beds east of San Juan, the east, south, and southwest coasts, and not far from fresh water sources. The manatees are most consistently detected in two areas: Jobos Bay area between Guayama and Salinas, Fajardo and Roosevelt Roads Naval Station, Ceiba (Powell *et al.* 1981; Rathbun *et al.* 1985; Freeman and Quintero 1990; Mignucci-Giannoni *et al.* 2004: US Fish and Wildlife Service 2007, USFWS unpublished data 2007). Manatees are not abundant on the north coast, although they are seen in areas immediately to the west of San Juan (Powell *et al.* 1981; Mignucci-Giannoni 1989).

Five offshore islands are the most significant biogeographic features in Puerto Rico: (west to east) are Desecheo, Mona, Caja de Muertos, Culebra, and Vieques islands (Figure 1). Manatees have not been detected in the first three. Manatees have not been seen in the Mona Passage or Mona Island, 45 miles west of Puerto Rico. This passage may constitute a migratory barrier to the area since it is permeated by a strong east to west current and high surfs. Although there is available habitat in Caja de Muertos Island, manatees have not been detected by any of the authors suggesting they prefer available habitat closer to the coast. The island lacks fresh water, and easterly strong currents and high surf are prevalent between Caja de Muertos and the south coast of Puerto Rico that may hinder traveling to this island. Vieques Island seems to be within the range of the species (14 miles) and manatees have been seen traveling to and from the east coast (Magor 1979). This suggests that the manatees in Vieques may be a subset of the east coast populations as increased numbers were detected from the east coast and there were often decreased detection around Vieques and vise versa. Manatees have been reported irregularly in Culebra Island through the years; the individuals usually staying only for a couple of weeks. In 2006, a 5-foot manatee was photographed close to Tamarindo Beach on the east side of Culebra (Teresa Tallevast 2006 pers. com.). Although Culebra Island has available habitat, it lacks fresh water, which may hinder longer stays by manatees. The U.S. has jurisdictional responsibilities for the Antillean subspecies only in Puerto Rico and the U.S. Virgin Islands.

Figure 1. Geographical distribution Antillean Manatee in Puerto Rico



POPULATION SIZE

Barrett (1935) suggests that in pre-columbian times manatees in Puerto Rico were so plentiful along the coast, swamps, and bayous that the Spaniards gave the Arawak name Manatí to a locality. He noticed that when he visited the island that silting-up of the waters behind the town of Manatí drove the manatees out to sea. Evermann (1900) describes the manatee in Puerto Rico as rare. Erdmann (1970) describes that manatees were rare around Puerto Rico and absent from the Virgin Islands. In the absence of replicable population estimates, it is unclear if population size was greater in the past than today. Manatees are seen in groups of up to 8 individuals but never in large aggregations. With 350 miles of coastline and fresh water readily available, manatees appear to exploit most protected nearshore shallow bays and coves and move between sites. This makes them more difficult to detect from shore or during surveys.

Minimum Population Estimate

Deutsch *et al.* (2007) estimated the population levels of mature Antillean manatees at 2,600 in all of the 41 countries of the wider Caribbean but, optimistic 'estimates' from researchers and peers suggests the it may actually be in the range of 5,600 individuals. Deutsch *et al.* (2007) describes the population size in Puerto Rico at a minimum of 128 with a projected population estimate of 300. The exact number of Antillean manatees known to occur in Puerto Rico is unknown. Aerial surveys have been used to obtain distribution patterns or determine minimum population counts in some areas (Magor 1979, Rice 1990, and Mignucci-Giannoni *et al.* 2003, 2004) or throughout the island (Powell *et al.* 1981; Freeman and Quintero 1990; Rathbun *et al.* 1985; USFWS 2007 unpublished data). Each survey was different, with surveys conducted several months in various years, surveys every month for a year, and surveys of unequal number of months for 12 years. In spite of the high variability between and within surveys, the data can be used to determine the highest number of manatees sighted within a time period (one island survey).

Powell *et al.* (1981) detected an average of 22.6 manatees during ten surveys with the highest count of 51. They found that manatee population in Puerto Rico appears to be small and widely distributed. Rathbun *et al.* (1985) determined that manatees sighted per survey averaged 43.6 (S.D. = 13.1) with a minimum count of 20 and a maximum of 62, higher than previously reported. The Service conducted 23 aerial surveys from 1991 to 2002 and one survey in 2009. The average number of manatees sighted was 67 (S.D. = 20) per survey, with a high of 117, a low of 22. The average number of adults was 63.40 per survey and calf numbers averaged 4.72 per survey. The 2009 survey counted a total of 72 manatees, including 64 adults and eight calves. We have determined 72 is the most current minimum population estimate for the Puerto Rico stock of the Antillean manatee.

Current Population Trends

Quantitative information is limited regarding trends in the abundance of the Antillean manatee in Puerto Rico and the U.S. Virgin Islands. In Puerto Rico, Deutsch *et al.* (2007) describes the manatee as stable. USFWS (2007) also suggests that the Puerto Rico population of the West Indian manatees is at least stable and possibly slightly increasing due to increasing numbers detected in annual surveys. Plotted data from all surveys through time suggest an increase in detection in spite of differences in observer experience (Figure 2). Detection conditions varied between surveys and within surveyed areas mostly due to heterogeneous habitats. However, since mass mortality and numbers of stranded/dead manatees have not exceeded 13 per year (Mignucci-Giannoni 2006, DNER 2009 unpublished data), high variability between surveys may be related to detection rather than actual numbers of manatees.

The mean number of manatees per survey increased from 22.6 manatees (Powell *et al.* 1981) to 43.6 manatees per survey (Rathbun *et al.* 1985). From 1994 to 2009, surveys produced a mean of 68.12 manatees per survey. The proportion of calves detected per survey was about the same with 6.4% in 1979-1980 (Powell *et al.* 1981), 7.6% in 1984-1985 (Rathbun *et al.* 1985), and 6.9% in 1991–2009. In 2009, seven years since the 2002 survey, one synoptic survey detected a total of 72 manatees sighted, eight of which were calves; this figure is closer to the average detection levels of previous surveys. Although the average manatee sighted per survey has increased by about 40% since 1985, the average number of manatees per surveys has been maintained relatively stable since 1991.

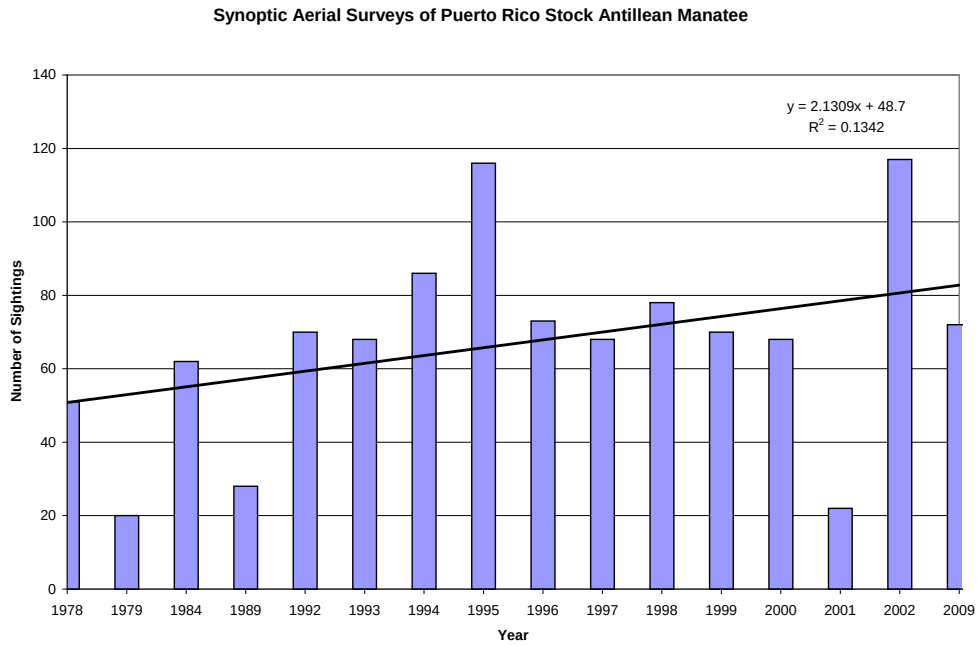


Figure 2. Synoptic Aerial Surveys Puerto Rico Stock of Antillean Manatee

Efforts to quantify population levels and trends are ongoing as part of a cooperative agreement between North Carolina State University, Puerto Rico's Department of Natural and Environmental Resources (DNER), and the U.S. Fish and Wildlife Service, Caribbean Field Office. The cooperators will conduct aerial surveys and develop a statistically robust population model incorporating factors such as detection probability of manatees in heterogeneous habitats.

CURRENT AND MAXIMUM NET PRODUCTIVITY RATES

The Marine Mammal Protection Act (MMPA) defines net productivity rate as "the annual per capita rate of increase in a stock resulting from additions due to reproduction, less losses due to natural mortality." Since 1994 to 2009, an average of 63.22 adults and 4.96 calves has been reported from synoptic surveys. Mignucci-Giannoni (2006) reports that 23.9% of all mortality detected were those of dependent calves. For instance, in 2002, aerial surveys detected 6 calves, while mortality records only show 1 dependent calf. At present, we do not have clear data on recruitment; however, based on previously reported data, the mortality rates of dependent calves from natural causes remains the same. Similarly, the natural death for all ages remains at about 43%. The number of calves detected per year has not changed dramatically and they usually are in concordance to the total number of sightings. However, in the absence of a statistical value on net productivity rates we have followed the recommendation of using a 0.04 value for manatees and cetaceans (NMFS 2005).

POTENTIAL BIOLOGICAL REMOVAL

The West Indian manatee is federally listed as endangered. The Service has recent survey data, which indicate the Puerto Rico stock of the West Indian (Antillean manatee) is relatively stable.

The potential biological removal (PBR) formula was developed during the 1994 amendments to the MMPA as a tool to reduce incidental commercial fisheries-related marine mammal mortalities and serious injuries to insignificant levels. PBR is the product of three elements: the minimum population estimate (N_{min}), half of the maximum net productivity rate (0.5 R_{max}), and a recovery factor (F_r). Recovery factor values range between 0.1 and 1.0 and population simulation studies demonstrate that a default value of 0.1 should be used for endangered (depleted) stocks and a default value of 0.5 should be used for threatened stocks or stocks of unknown status (NMFS 2005).

The recovery factor for the Puerto Rico stock of the Antillean manatee should be between 0.1 and 0.5. Though the population is stable, the default value of 0.1 is used due to the small size of the population and the current endangered

status. Given a minimum population estimate of 72 and an R_{max} of 0.04 (because it is unknown) the PBR for Puerto Rico stock of the Antillean manatees is as follows:

$$\mathbf{PBR = (N_{min})\ (½ \text{ of } R_{max})\ (F_r)}$$

$N_{min} = 72$
$R_{max} = 4.0\%$
$F_1 = 0.1$

PBR = (72) (0.02) (0.1) = 0. 144 (or 0)

HUMAN-CAUSED MORTALITY AND SERIOUS INJURY

Rescues

From 1990 to 2005 a total of 23 manatees were rescued by the Caribbean Stranding Network (CSN) (Mignucci-Giannoni 2006). Of these, 21 were calves; one was a sub-adult and one an adult. Two were rehabilitated and released, two were released immediately after rescue, 17 died in rehabilitation, and one died in transport, and one is currently in rehabilitation. Of the four manatees that were released, only one has died; one year after its release. Since 2005, only two manatees were rescued, one adult died in transport and a calf was in rehabilitation at the Juan A. Rivero Zoo in Mayaguez for almost a year. This manatee died in July 2009 due to an intestinal infection. An average of 1.4 calves is rescued every year, but most have died due to illness (Mignucci-Giannon1 2006; DNER 2009 unpublished data).

Mortality

Carcass salvage efforts were initiated in April 1974 by the Service and local entities and continued through 1989. The CSN then initiated a dedicated salvage, rescue, and rehabilitation program, assuming responsibility for all carcass recovery efforts in Puerto Rico. Currently, carcass salvage efforts are performed by DNER. From 1990 through 2008, a total 130 manatees have been found dead (Mignucci-Giannoni 2006; DNER 2009 unpublished data).

There is no record in Puerto Rico of serious injury to manatees by propellers, except the mortality of a mating herd impacted by a big vessel in 2006. In Puerto Rico, single Antillean manatee strandings are the rule. Only one multi-individual manatee death was recorded in 2006 when 5 adult individuals, 4 males and one female, were impacted by a big vessel in San Juan Bay. Unlike Florida, mass mortality does not occur in Puerto Rico since the etiological cause, red tide, or need for warm water habitats do not present an issue to a coastal tropical marine species. Moreover, except for mating herds, manatee groups detected during aerial surveys are small, mostly single sightings or 2-3 individuals (e.g., mother, year calf, and immature adult).

	Natural		**Human**	**Undetermined**	**Total**
	Dependent Calves/Perinatal	**Illness**	**Watercraft**		
Year					
2004	**2**	**1**		**5**	**8**
2005	**4**	**1**	**2**	**1**	**8**
2006	**2**	**3**	**5**	**2**	**12**
2007	**2**	**1**		**2**	**5**
2008	**1**	**1**	**2**	**4**	**8**
Totals	**11 (27%)**	**7 (17%)**	**9 (22%)**	**14 (34%)**	**41**
5-Year Avg.	**2.2**	**1.4**	**1.8**	**2.8**	**8.2**

Table 1. Manatee mortality from 2004 to 2008. (Mignucci-Giannoni 2006. Data 2000-2005; DNER 2009. Data 2006-2008)

During the 2004-2008 period a total of 41 manatees were reported dead (Table 1). Natural Causes comprised most of reported cases 18 (44%) while watercraft related death were 9 (22%). In most cases, manatees are killed by a blunt trauma to the head, which produces an internal hemorrhage and subsequent death. In 2006, an unusual manatee death was reported when a mating heard was impacted by the propellers of a big vessel. Other than this event, necropsies did not report propeller marks like in Florida. The cause of death in most of cases, i.e., 14, was deemed as Undetermined (34%). The Undetermined cause of death (COD) category means that assessment of a natural or human related cause was negative (no evidence that COD can be assigned to any of the available categories, either natural or human related).

In most cases, the reporting of a stranded manatee takes days. Warm water and remote locations of stranding may hinder recovery of manatee carcasses, making it difficult to conduct a timely determination of mortality. The DNER's Marine Mammal Stranding Program has developed a protocol to report and quickly act on marine mammal strandings, mostly manatees. This program is institutionalized and first responders are usually DNER rangers that have the mandate and capacity to quickly act to increase detection and prevent death of animals. Because of this system, the number of strandings currently reported by DNER may help to provide a better estimate of manatee mortality in Puerto Rico. We will continue to support their efforts to determine if this mortality trend continues and what relationship it has to other population parameters.

Until the mid 1980's, some coastal families captured manatees for special events. Manatees were captured in gill and/or turtle nets purposely or inadvertently during fishing activities. Mignucci-Giannoni *et al.*, (1993) indicates that from 1974 until 1988, 41.5 percent of the documented mortality was attributed to poaching. He indicated that meat was sold to ready buyers, although the extent to which this occurred was unknown. After the rescue of a baby manatee in 1991, and subsequent media uproar because its mother was poached, capture by fisherman has been virtually eliminated.

Fisheries

The fisheries in the U.S. Caribbean are multi-species, multi-gear, artisanal in nature, and principally coral reef-based (NOAA 2004). Boats used are wooden or fiberglass, 17-21 feet long. Traps are the most common used gear but line is almost as common now. Traps are deployed in the shallow nearshore zone around coral reefs in algal plains, sand, and seagrass beds but, not on top of corals at depths ranging from 20-62 meters. Among fishers, 68% use buoys to mark the trap line and 32% use none at all. Matos-Caraballo (2004) reported that, of interviewed commercial fishers, 36% were full time and 64% part time fishers. A total of 17% fished in the shore, 83% on the continental shelf. Within gears, 5% use beach seines, 36% gillnets, 14% trammel, and 45% used cast nets.

Seventeen species of marine mammals have been described from Puerto Rican and U.S. and British Virgin Island waters (Mignucci-Giannoni 1989). However, NOAA (2004), reports that the commercial and recreational fisheries under jurisdiction of the Caribbean Council are listed as Category III fisheries, the category with the lowest level of serious injury and mortality to marine mammals. The two Category III commercial fisheries that have been identified in NMFS' "2009 List of Fisheries" (73 FR 73032; December 1, 2008) as known to take Antillean manatees are the Caribbean gillnet, which involves more than 991 vessels/persons and the Caribbean haul/beach seine fishery, which involves 15 vessels/persons. However, neither the DNER nor the Service has data to support that there is take by these commercial/artisanal fisheries, including entanglement with fishing gear, collisions with fishing vessels, and bycatch.

In the past, the carcass recovery program described few fisheries interaction incidents with manatees and several reports were anecdotal. Nets have been banned altogether in the U.S. Virgin Islands except for shallow small nets for bait fish. In Puerto Rico Regulation 678 of the 2004 Fisheries Law have prohibited some types of nets and limit the deployment and size of others. All haul/beach seine nets have been prohibited in Puerto Rico. Gill and trammel nets have been prohibited from use in river mouths, rivers and lagoons (DNER 2004). Mesh size should not be less than 2 inches or more than 6 inches when stretched. This measure, although targeted to prevent sea turtle poaching, may further prevent the accidental entanglement of manatees. Commonwealth, NMFS and Service law enforcement measures currently in place are curtailing turtle poaching with a positive effect to manatees. We believe that fisheries interactions, either intentional or accidental, may not significantly affect the status of the Puerto Rico stock of the Antillean manatee. We acknowledge that there may be limits to the data available because, although unlikely, it is possible take could occur and may not be observed or reported. However, protocols for necropsies and assigning probable cause of death categories are reviewed thoroughly. Table 1 of this SAR shows watercraft as the only human related deaths. The only possible evidence for commercial fisheries interaction would be within the 34%

undetermined COD category. In addition, we believe that manatees injured by commercial fisheries interactions would most likely present signs of the activity and every necropsy includes a specific evaluation of human interactions. From 1990-2008, only one manatee had a COD potentially related to commercial fisheries interaction. In 2006, one freshly dead manatee was found with its right flipper entangled in monofilament; however the COD was undetermined. In accordance with the previous statements and the presence of current bans and restrictions in place prohibiting the use of nets, the Service believes that incidental mortality and serious injury related to commercial fisheries in Puerto Rico and the U.S. Virgin Islands should be considered minimal or approaching zero.

STATUS OF STOCK

The West Indian manatee is listed as endangered under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531 *et seq*.), as amended and a Recovery Plan developed in 1986 for the Puerto Rico population of the Antillean subspecies (USFWS 1986). As an endangered species, the Puerto Rico stock of Antillean manatees is considered a strategic stock and depleted as defined in Section 3(19) of the Marine Mammal Protection Act of 1972, as amended.

We currently do not have sufficient information on the Puerto Rican manatee population to determine the Optimum Sustainable Population (OSP). The Antillean manatee is not impacted by cold spells and red tide like Florida manatees and it is mostly a coastal species. This precludes the use of Florida data on survival rates and reproduction to reach an OSP.

The main threats to the species in Puerto Rico are watercraft collisions and habitat degradation (e.g., marine construction activities, propeller scarring on sea grass beds, impacts on sea grass beds related to anchoring, oil spills, and availability of fresh water sources). A number of mechanisms are in place to lessen the impact of these factors. There is a strong outreach and education effort and a gill net prohibition in place. Most development activities within the water are reviewed by the Corps of Engineers and the Service based on provisions in the Endangered Species Act and the Marine Mammal Protection Act. Therefore, the U.S. Fish and Wildlife Service, when engaged in consultation under the ESA related to manatees, will provide recommendations to consulting agencies to avoid a take.

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