

**APPENDIX I.** Estimated serious injury and mortality (SI&M) of Western North Atlantic marine mammals listed by U.S. observed fisheries for ~~2002-2003-~~  
~~2006-2007~~. Marine mammal species with zero (0) observed SI&M during ~~2002-2003~~ to ~~2006-2007~~ are not shown in this table.

(tbd = to be determined; n/a = not available; unk = unknown; JV = Joint Venture).

Category, Fishery (estimated # of vessels/persons), Species	Yrs. observed	%-observer coverage	Est. SI by Year (CV)	Est. Mortality by Year (CV)	Mean Annual Mortality (CV)	PBR
<b>CATEGORY I</b>						
<b>Gillnet Fisheries: Northeast gillnet (unk)</b>						
Harbor porpoise - after Take Reduction Plan	<del>2002-2003-</del> <del>2006-2007</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>444(.37),</del> 592 (.33), 654(.36), 630(.23), 514(.31), <del>395(.37)</del>	<del>557</del> <del>(0.14)</del> <del>567</del> <del>(.14)</del>	610
<del>White-Atlantic white</del> sided dolphin	<del>2002-2003-</del> <del>2006-2007</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>30(.74),</del> 31 (.93), 7(.98), 59(.49), 41(.71), <del>0</del>	<del>34(.33)</del>	509
Short-beaked common dolphin	<del>2002-2003-</del> <del>2006-2007</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>0, 0, 0, 0,</del> 26(.8), 20(1.05), <del>11(1.08)</del>	<del>9-11</del> <del>(.6454)</del>	1,00 0
Risso's dolphin	<del>2002-2003-</del> <del>2006-2007</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>0, 0, 0,</del> 15 (.93), <del>0, 0</del>	3(.93)	129
Bottlenose dolphin (offshore)	2002-2006	.02, .03, .06, .07, .04		0, 0, 0, unk, unk	unk	566
Harbor seal	<del>2002-2003-</del> <del>2006-2007</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>787(.32),</del> 542 (.28), 792(.34), 719(.20), 87(.58), <del>92(.48)</del>	<del>585</del> <del>446</del> <del>(.15)</del>	2,74 6
Gray seal	<del>2003-</del> <del>2007-2002-</del> <del>2006</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>0(0),</del> 242 (.47), 504(.34), 574(.44), 248(.47), <del>886(0.24)</del>	<del>314(.22)</del> <del>4</del> <del>90(0.16)</del>	n/a
Harp seal	<del>2003-</del> <del>2007-2002-</del> <del>2006</del>	<del>.02-.03, .06, .07,</del> <del>.04, .07</del>		<del>0, 0,</del> 303(.30), 35(.68), 65(.66), <del>119(.35)</del>	<del>80</del> <del>(.31)</del> <del>104</del> <del>(.21)</del>	n/a
Hooded seal	2001-2005	.04, .02, .03, .06, .07		82(1.14), 0, 0, 43(.95), 0	25(.82)	n/a
<b>Gillnet Fisheries:US Mid-Atlantic gillnet (unk)</b>						
Harbor porpoise - after Take Reduction Plan	<del>2002-2003-</del> <del>2006-2007</del>	<del>.01-.01, .02, .03,</del> <del>.04, .06</del>		<del>unk,</del> 76 (1.13), 137(.91), 470(.23), 511(.52), <del>58(1.03)</del>	<del>299(.27)</del> <del>2</del> <del>50(0.26)</del>	610
Bottlenose dolphin (offshore)	2002-2006	.01, .01, .02, .03, .04		unk, 0, 0, unk, unk	unk	566
<del>Short-beaked common dolphin</del>	<del>2003-2007</del>	<del>.01, .02, .03, .04,</del> <del>.06</del>		<del>0,0,0,0,0</del>	<del>2(1.03)</del>	<del>1.00</del> <del>0</del>
Harbor seal	<del>2002-2003-</del> <del>2006-2007</del>	<del>.01-.01, .02, .03,</del> <del>.04, .06</del>		<del>unk,</del> 0, 15(.86), 63(.67), 26 (.98), <del>0</del>	<del>26-21</del> <del>(.49)</del>	2,74 6
Gray seal	<del>2002-2003-</del> <del>2006-2007</del>	<del>.01-.01, .02, .03,</del> <del>.04, .06</del>		<del>unk,</del> 0, 69(.92), 0, <del>0, 0</del>	<del>17-13</del> <del>(.92)</del>	n/a
<b>Longline Fisheries: Pelagic longline (excluding NED-E)<sup>a</sup></b>						

Risso's dolphin	<del>2002</del> 2003- <del>2006</del> 2007	<del>.05</del> -.09, .09, .06, .07, .08	<del>8(1.0)</del> , 40(.63), 28(.72), 3(1.0), 0, <u>9</u> (.65)	<del>20(86)</del> , 0, 0, 0, 0, <u>0</u>	<del>20</del> -16 (.3841)	129
Long and short-finned pilot whale	<del>2002</del> 2003- <del>2006</del> 2007	<del>.05</del> -.09, .09, .06, .07, .08	<del>52(48)</del> , 21(.49), 74(.42), 212(.21), 169(.50), <u>57</u> (	<del>2(1.0)</del> , 0, 0, 0, 16 (1.0), <u>0</u>	<del>109</del> -110 (.2050)	249
Unidentified beaked whale	<del>2002</del> 2003- <del>2006</del> 2007	<del>.05</del> -.09, .09, .06, .07, .08	<del>0</del> , 5.3(1.0), 0, 0, 0, <u>0</u>	0, 0, 0, 0, 0	1(1.0)	17
<b>Longline Fisheries: Pelagic longline (NED-E area only)<sup>a</sup></b>						
Risso's dolphin	<del>2002</del> -2003	<del>1.0</del> -1.0	<del>3(0)</del> -0	<del>0</del> -1 (0)	<del>2</del> -1 (0)	129
<b>CATEGORY II</b>						
<b>Mid-Atlantic Mid-Water Trawl – Including Pair Trawl</b>						
White-sided dolphin	<del>2002</del> 2003- <del>2006</del> 2007	<del>.003</del> -.018, .064, .084, .089, <u>.034</u> <u>94</u>	0, 0, 0, 0, 0	<del>unk</del> , 51(.46), 105(.38), 97(.76), 54(.57), <u>3.2</u> (.70)	<del>776</del> 2(.21)	509
<u>Short-beaked common dolphin</u>	2003-2007	<u>.018</u> , <u>.064</u> , <u>.084</u> , <u>.089</u> , <u>.034</u> <u>439</u>	0, 0, 0, 0, 0	0, 0, 0, 0, <u>3.2</u> (.70)	<u>1</u> (.70)	<u>1.00</u> <u>0</u>
Long and short-finned pilot whale	<del>2002</del> 2003- <del>2006</del> 2007	<del>.003</del> -.018, .064, .084, .089, <u>.034</u> <u>439</u>	0, 0, 0, 0, 0	3.9(.46), 8.1(.38), 7.5(.76), 0, <u>4.9</u> (.70)	5( <u>3431</u> )	249
<b>Trawl Fisheries: Northeast bottom trawl (unk)</b>						
Harp seal	<del>2002</del> 2003- <del>2006</del> 2007	<del>.03</del> -.04, .05, .12, .06, <u>.22</u> <u>06</u>	0, 0, 0, 0, 0	<del>0</del> -0, 0, unk, 0, <u>0</u>	unk	n/a
Harbor seal	2003- <del>2007</del> 2002- <del>2006</del>	<del>.03</del> -.04, .05, .12, .06, <u>.06</u>	0, 0, 0, 0, 0	<del>unk</del> , 0, 0, unk, 0, <u>unk</u>	unk	2,74 6
Gray Seal	2003- <del>2007</del> 2002- <del>2006</del>	<del>.03</del> -.04, .05, .12, .06, <u>.06</u>	0, 0, 0, 0, 0	<del>0</del> -0, 0, unk, 0, <u>unk</u>	unk	n/a
Long and short-finned pilot whale <sup>b</sup>	2003- <del>2007</del> 2002- <del>2006</del>	<del>.03</del> -.04, .05, .12, .06, <u>.06</u>	0, 0, 0, 0, 0	<del>22(26)</del> , 20(.26), 15(29) 15(.30), 14(.28), <u>12</u> (.35)	<del>1715</del> (0.4 413)	249
Short-beaked common dolphin <sup>b</sup>	2003- <del>2007</del> 2002- <del>2006</del>	<del>.03</del> -.04, .05, .12, .06, <u>.06</u>	0, 0, 0, 0, 0	<del>26(29)</del> , 26(.29), 26(.29), 32(.28), 25(.28), <u>24</u> (.28)	27 (.4312)	1,00 0
<u>White Atlantic white</u> -sided dolphin <sup>b</sup>	2003- <del>2007</del> 2002- <del>2006</del>	<del>.03</del> -.04, .05, .12, .06, <u>.06</u>	0, 0, 0, 0, 0	<del>170(32)</del> , 216(.27), 200(.30), 213(.28), 164(.35), <u>147</u> (.35)	<del>193</del> -188 (0.4312)	509
Minke whale	2003- <del>2007</del> 2002- <del>2006</del>	<del>.03</del> -.04, .05, .12, .06, <u>.06</u>	0, 0, 0, 0, 0	unk	unk	19

Harbor porpoise	<del>2003-2007</del> 2002-2006	<del>.03, .04, .05, .12, .06, .06</del>	0, 0, 0, 0, 0	<del>0, unk, 0, unk, unk, 0</del>	unk	610
<b>Mid-Atlantic Bottom Trawl</b>						
<del>White</del> Atlantic white-sided dolphin <sup>b</sup>	<del>2003-2007</del> 2002-2006	<del>.01, .01, .03, .03, .02, .03</del>	0, 0, 0, 0, 0	<del>25(.17), 31(.25), 26(.20), 38(.29), 26(.25), 21(.24)</del>	<del>29-28</del> (.11)	509
Long and short-finned pilot whale <sup>b</sup>	<del>2003-2007</del> 2002-2006	<del>.01, .01, .03, .03, .02, .03</del>	0, 0, 0, 0, 0	<del>38(.36), 31(.31), 35(.33), 31(.31), 37(.34), 36(.38)</del>	34(.15)	249
Short-beaked common dolphin	<del>2003-2007</del> 2002-2006	<del>.01, .01, .03, .03, .02, .03</del>	0, 0, 0, 0, 0	<del>87(.27), 99(.28), 159(.30), 141(.29), 131(.28), 66(.27)</del>	123 (.12)	1,000
<b>Northeast Mid-Water Trawl Including Pair Trawl (25)</b>						
Long and short-finned pilot whale	<del>2002</del> 2003- <del>2006</del> 2007	<del>.0, .031, .126, .199, .031, +0.08</del>	0, 0, 0, 0, 0	<del>unk-1.9(.56), 1.4(.58), 1.1(.68), 0, 0</del>	1(.35)	249
White-sided dolphin	<del>2002</del> 2003- <del>2006</del> 2007	<del>.0, .031, .126, .199, .031, +0.08</del>	0, 0, 0, 0, 0	<del>unk-24(.56), 19(.58), 15(.31), 19(.44), 0</del>	<del>+915</del> (.26)	509
<b>Gillnet Fisheries:SE U.S. Atlantic shark gillnet (12)</b>						
Bottlenose dolphin (Central Florida, coastal)	2002-2006	1, .34, .43, 1, 1	0, 0, 0, 0, 0	1(0), 2(.64), 1(.64), 0, 0	0.8(.36)	n/a

NOTES: The estimated number of vessels/participants is expressed in terms of the number of active participants in the fishery, when possible. If this information is not available, the estimated number of vessels or persons licensed for a particular fishery is provided. Beginning with the 2001 Stock Assessment Report, Canadian records were incorporated into the mortality and serious injury rates to reflect the effective range of this stock.

- An experimental program to test effects of gear characteristics, environmental factors, and fishing practices on marine turtle bycatch rates in the Northeast Distant (NED-E) water component of the fishery was conducted from June 1, 2001 - December 31, 2003. Observer coverage was 100% during this experimental fishery. Summaries are provided for the pelagic longline EXCLUDING the NED-E area in one row and for ONLY the NED in the second row (Garrison, 2003; Garrison and Richard, 2004).
- A new method was used to develop preliminary estimates of mortality for the Mid-Atlantic and Northeast trawl fisheries for pilot whales, common dolphins and white-sided dolphins during 2000-~~2006~~2007. They are a product of bycatch rates predicted by covariates in a model framework and effort reported by commercial fishermen on mandatory vessel logbooks. This method differs from the previous method used to estimate mortality in these fisheries prior to 2000. Therefore, the estimates reported prior to 2000 can not be compared to estimates during 2000-~~2006~~2007.

APPENDIX II. Summary of the confirmed human-caused mortality and serious injury ('SI') events involving baleen whale stocks along the Gulf of Mexico coast, U.S. East coast and adjacent Canadian Maritimes, 2003 - 2007, with number of events attributed to entanglements or vessel collisions by year.

	Mean annual mortality and SI rate (and PBR)	Entanglements			Vessel Collisions		
		Annual rate (US waters / Canadian waters)	Confirmed mortalities (2003, 2004, 2005, 2006, 2007)	Confirmed SI's (2003, 2004, 2005, 2006, 2007)	Annual rate (US waters / Canadian waters)	Confirmed mortalities (2003, 2004, 2005, 2006, 2007)	Confirmed SI's (2003, 2004, 2005, 2006, 2007)
Western North Atlantic right whale	<b>3.2</b> (0)	<del>0.8</del> <b>1.0</b> (0.6 <del>8</del> / 0.2)	<b>3</b> (0, 1, 0, 1, 1)	<b>2</b> (1, 0, 0, 1, 0)	<b>2.2</b> (1.6 / 0.6)	<b>9</b> (1, 2, 2, 4, 0)	<b>2</b> (0, 0, 1, 1, 0)
Gulf of Maine humpback whale <sup>1</sup>	<b>4.4</b> (1.1)	<b>2.8</b> (2.4 / 0.4)	<b>4</b> (1, 1, 0, 1, 1)	<b>10</b> (4, 1, 0, 3, 2)	<b>1.6</b> (1.6 / 0)	<b>8</b> (1, 1, 0, 3, 3)	<b>0</b>
Western North Atlantic fin whale	<b>2.6</b> (4.0)	<b>1.0</b> (0.8 / 0.2)	<b>3</b> (0, 1, 0, 0, 2)	<b>3</b> (0, 1, 0, 1, 1)	<b>1.6</b> (1.2 / 0.4)	<b>8</b> (0, 2, 4, 0, 2)	<b>0</b>
Nova Scotian sei whale	<b>0.8</b> (0.3)	<b>0.2</b> (0.2 / 0)	<b>0</b>	<b>1</b> (0, 0, 0, 1, 0)	<b>0.6</b> (0.6 / 0)	<b>3</b> (1, 0, 0, 1, 1)	<b>0</b>
Western North Atlantic blue whale <sup>2</sup>	<b>0</b> (-)	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
Canadian East Coast minke whale	<b>2.4</b> (9.2)	<b>2.0</b> (2.0 / 0)	<b>9</b> (5, 3, 0, 0, 1)	<b>1</b> (0, 0, 0, 0, 1)	<b>0.4</b> (0.4 / 0)	<b>2</b> (0, 1, 1, 0, 0)	<b>0</b>
Western North Atlantic Brydes whale	<b>0.2</b> (0.3)	<b>0.2</b> (0.2 / 0)	<b>1</b> (1, 0, 0, 0, 0)	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

## 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 [2007-2008 List of Fisheries](#), is published in the *Federal Register*, (72 FR [66048, November 27, 2007](#), [14466, March 28, 2007](#)). 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 6-8 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. ~~This Prior to 2007, this was a~~ voluntary program administered by SEFSC in cooperation with the Gulf and South Atlantic Fisheries Foundation. The program ~~is~~ 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. ~~The~~

shrimp fishery observer program has been very recently expanded and began including mandatory coverage during 2007.

### **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 between the states of Maine and 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 required to register under the Marine Mammal Authorization Program (MMAP) in order to lawfully capture a marine mammal incidental to fishing operations. All vessel owners, regardless of the category of fishery they are operating in, are required to report 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 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.

### **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; and Canadian Department of Fisheries and Oceans (DFO). These data, photographs, etc. are maintained by the Protected Species Branch at the Northeast Fisheries Science Center (NEFSC) and the 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.

## 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 ~~2006~~2007, ~~approximately 1,500~~101 federal northeast permit holders identified sink gillnet as a potential gear type.

Number of Active Permit Holders: In ~~2006~~2007, ~~approximately 220~~318 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 ~~2006-2007~~ were 22,933, 18,681, 14,487, 14, 634, 15,201, 17,680, 19,080, 15,390, ~~and 14,950~~, ~~and 15,808xxx~~ 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 ~~r~~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 ~~2002-2003 to 2006~~to2007 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 has been defined as a ~~category~~Category I fishery, and both the Northeast anchored float and Northeast drift gillnet fisheries as ~~category~~Category II fisheries, in the ~~2006-2009~~ List of Fisheries (73~~1~~ FR162FR 73065, December 1, 2008, 50 CFR Part 229). This gear is managed by several federal and state FMPs that range North and East of the 72 degree 30 min line; and the Atlantic Large Whale Take Reduction Plan. This fishery operates from the U.S./Canada border to Long Island, NY, at 72° 30' W long. south to 36° 33.03' N lat. and east to the eastern edge of the EEZ, not including 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-~~2006~~2007, 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%, ~~and 4%, and xx7%~~ respectively.

Comments: Effort patterns in this fishery are heavily influenced by [pinger requirements, marine mammal time/area closures, fish time/area closures, and gear restrictions due to fish conservation measures, time/area closures and gear restrictions under the ALWTRP, and pinger requirements and time/area closures under the Harbor Porpoise Take Reduction Plan \(HPTRP\).](#)

Protected Species Interactions: Documented interaction with ~~Harbor harbor Porpoise porpoise, White white-sided Dolphin dolphin, Harbor harbor Seal seal, Gray gray Seal seal, Harp harp Seal seal, Hooded Seal seal, Long long-finned Pilot pilot Whale whale, Offshore offshore Bottlenose bottlenose Dolphin dolphin, Risso's Dolphin dolphin, and Common common Dolphin 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 0.57-0.60mm, 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 Harbor Porpoise](#) 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 ~~2006~~2007, approximately ~~700-650~~ federal mid-Atlantic permit holders identified sink gillnet as a potential gear type.

**Number of Active Permit Holders:** In ~~2006~~2007, approximately ~~230-178~~ 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 ~~2006-2007~~ were 15,494, 19,130, 16,333, 14,855, 13,389, 13,107, 15,124, 12, 994, ~~and 8,755, and xxx17,941~~ 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. During 1998 it was estimated that 302 full- and part-time sink gillnet vessels and an undetermined number of drift gillnet vessels participated in this fishery. This is the number of unique vessels in the Commercial Landings Database (Weighout) that reported catch from this fishery during 1998 from the states of Connecticut to North Carolina. This does not include a small percentage of records where the vessel number was missing.

**Temporal and Spatial Distribution:** This fishery operates year-round, extending from New York to North Carolina. It is comprised of a combination of small vessels that target a variety of fish species. This fishery can be prosecuted right off the beach (6 feet) or in nearshore coastal waters to offshore waters (250 feet). Figures 6-10 document the distribution of sets and marine mammal interactions observed from ~~2002-2003~~ to ~~2006-2007~~ 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 8400 feet. The mesh size and string length vary by the primary fish species targeted for catch.

**Management and Regulations:** The Mid-Atlantic Gillnet Fishery has been defined as a Category I fishery in the ~~2007~~ 2009 List of Fisheries (~~72 FR 14466~~ 73 FR 73065, ~~March 28, 2007~~ December 1, 2008, 50 CFR Part 229). This gear is managed by several federal FMPs, Inter-State Fishery Management Plans (ISFMP's) managed by the Atlantic States Marine Fisheries Commission (ASMFC), the Atlantic Large Whale TRP, the Harbor Porpoise TRP, and the Bottlenose Dolphin TRP (BDTRP). This fishery operates west of a line drawn at 72° 30' W long. south to 36° 33.03' N lat. ~~N lat.~~ and east to the eastern edge of the EEZ, and north of the North Carolina/South Carolina border, not including waters where Category II and III inshore gillnet fisheries operate in bays, estuaries, and rivers. 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-~~2006~~2007, the estimated percent observer coverage was 5%, 4%, 3%, 5%, 2%, 2%, 2%, 1%, 1%, 2%, 3%, ~~and 4%, and 6%~~ respectively.

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

Protected Species Interactions: Documented interaction with Harbor-harbor Porpoise-porpoise, White-white-sided Dolphin-dolphin, Harbor-harbor Sealseal, Gray-gray Sealseal, Harp-harp Sealseal, Coastal-coastal Bottlenose-bottlenose Dolphin-dolphin, Offshore-offshore Bottlenose-bottlenose Dolphin-dolphin, Common-common Dolphin-dolphin, Minke minke Whale-whale (Canadian East Coast stock), Humpback-humpback Whale-whale (Gulf of Maine stock), and Longlong-Finned-finned and Shortshort-Finned-finned Pilot-pilot Whalewhale were reported in this fishery. Not mentioned here are possible interactions with sea turtles and sea birds.

### 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 2006-2007, approximately 830-750 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 2006-2007, approximately 500-252 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 2006-2007 was 27,521, 26,525, 24,362, 27,890, 28,103, 25,725, 22,303, 15,070, ~~and~~ 12,457, and 11,279 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 2006-2007 were 373, 278, 262, 102, 175, 310, 238, 231, 0, ~~and~~ 117, and 88 respectively (NMFS). Total effort, measured in trips, for the *Illex* Squid Fishery from 1998 to 2006-2007 were 412, 141, 108, 51, 39, 103, 445, 181, ~~and~~ 159, and 103 respectively (NMFS). Total effort, measured in trips, for the *Loligo* Squid Fishery from 1998 to 2006-2007 were 1,048, 495, 529, 413, 3,585, 1,848, 1,124, 1,845, ~~and~~ 3,058, and 2,127 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 2002-2003 ~~to~~ 2006-2007 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 has been defined as a Category II fishery in the ~~2007 List~~ 2009 List of Fisheries (~~72 FR 14466-73 FR 73067, December 1, 2008, March 28, 2007~~). There are at least 2 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 managed by the Atlantic Trawl Gear Take Reduction Team.

**Observer Coverage:** During the period 1996-~~2006~~2007, estimated 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%, ~~and 2%~~, and 3% respectively.

During the period 1996-~~2006~~2007, estimated percent observer coverage (trips) in the *Illex* Fishery was 3.7%, 6.21%, 0.97%, 2.84%, 11.11%, 0.00%, 0.00%, 8.74%, 5.07%, 6%, ~~and 15%~~, 14% respectively. During the period 1996-~~2006~~2007, 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%, 4.00%, ~~and 3%~~, and 2% respectively. During the period 1997-~~2006~~2007, 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%, ~~and 3%~~, and 2% 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 common dolphin, long-finned pilot whale, short-finned pilot whale and white-sided dolphin were reported in this fishery ~~White-sided Dolphin, Common Dolphin, Long-finned Pilot Whale, Short-finned Pilot Whale, Harbor Seal, Gray Seal, and Harp Seal~~. 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 ~~2006~~2007, ~~approximately 1,600-2,274~~ 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 ~~2006~~2007, ~~approximately 600-568~~ 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 North Atlantic Bottom Trawl Fishery from 1998 ~~to 2006 was to 2007~~ ~~was~~ 13,263, 10,795, 12,625, 12,384, 12,711, 11,577, 10,354, ~~and 10,803, and 8,603~~ respectively (NMFS). An average mean of 970 (CV=0.04) vessels (full- and part time) participated annually in the fishery during 1989-1993. The number of days absent from port, or days at sea, is yet to be determined.

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 ~~2002-2003~~ to ~~2006-2007~~ 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 has been defined as a Category II fishery in the ~~2009~~7 List of Fisheries (~~72 FR 14466, March 28, 2007~~73 FR 73067, December 1, 2008). This gear is managed by several federal and state FMPs that range from Maine to Connecticut ~~and by the Atlantic Trawl Gear Take Reduction Team~~. 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 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 1994-~~2006~~2007, 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%, 0, 4%, 0, 5%, 0, 12%, 0, and 6%, 0, and 6%, 0~~ 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 [common dolphin, harbor seal, harp seal, long-finned pilot whale, short-finned pilot whale and white-sided dolphin](#) were reported in this fishery. ~~White-sided Dolphin, Common Dolphin, Harbor Porpoise, Harbor Seal, and Harp Seal.~~ 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 2007~~6~~, [approximately 1,000-1,285](#) federal Northeast permit holders identified mid-water trawl as a potential gear type.

**Number of Active Permit Holders:** In ~~2006~~2007, approximately [20-16](#) 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 1970's. 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 has been defined as a Category II fishery in the 2009~~7~~ List of Fisheries ([72 FR 14466, March 28, 2007](#) [73 FR 73067, December 1, 2008](#)). Atlantic herring are managed jointly by the MAFMC and ASMFC as one migratory stock complex, [and by the Atlantic Trawl Gear Take Reduction Team](#). There has been a domestic resurgence in a directed fishery on the adult stock due to the recovery of the adult stock biomass.

**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 [2002-2003](#) to [2006-2007](#) respectively.

**Total Effort:** Total effort, measured in trips, for the Northeast Mid-Water Trawl Fishery (across all gear types) from 1997 to [2006-2007](#) was 578, 289, 553, 1,312, 2,404, 1,736, 2,158, 1,564, 717, ~~and 590~~, [and xxx286](#) respectively (NMFS).

**Observer Coverage:** During the period 1997-~~2006~~2007, estimated [percent](#) observer coverage (trips) was ~~0.00%~~, ~~0.00%~~, ~~0.73%~~, ~~0.46%~~, ~~0.06%~~, ~~0%~~, ~~2.25%~~, ~~11.48%~~, ~~19.9%~~, ~~and 3.1%~~, ~~and xxx8.04%~~ respectively. 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](#)~~White-sided Dolphin and Long-finned Pilot Whale.~~ ~~There were no marine mammal takes observed from the domestic Mid-Water Trawl Fishery trips during the period 1997-2002.~~ 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 ~~2006~~2007, ~~approximately 400-360~~ federal mid-Atlantic permit holders identified mid-water trawl as a potential gear type.

Number of Active Permit Holders: In 2007~~6~~, ~~approximately 5-3~~ 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 has been defined as a Category II fishery in the ~~2007-2009~~ List of Fisheries (~~72 FR 14466, March 28, 2007~~73 FR 73067, December 1, 2008).

Temporal and Spatial Distribution: To be determined. Figures 26-30 document the distribution of tows and marine mammal interactions observed from ~~2002-2003~~ to ~~2006-2007~~ respectively.

Total Effort: Total effort, measured in trips, for the mid-Atlantic Mid-Water Trawl Fishery (across all gear types) from 1997 to ~~2006-2007~~ was 331, 223, 374, 166, 408, 261, 428, 360, 359, ~~and 405, and xxx312~~ respectively (NMFS).

Observer Coverage: During the period 1997-~~2006~~2007, estimated percent observer coverage (trips) was ~~0.00%, 0.00%, 1.01%, 8.43%, 0.00%, 0.77%, 3.50%, 12.16%, 8.40% and 8.90%, and xxx%3.85~~ respectively.

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 [bottlenose dolphin, common dolphin, long-finned pilot whale, Risso's dolphin, short-finned pilot whale and white-sided dolphin were reported in this fishery](#)~~White-sided dolphins and Pilot Whale spp.~~ 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-harbor Porpoise-porpoise](#) and [Minke-minke Whales](#) were reported in this fishery. Right [Whales-whales](#) are also vulnerable to entrapment, though very rarely. The last two [Minke-minke](#) whales in a Grand Manan weir were safely released, unharmed, through the partial disassembly of the weir.

### **Gulf Of Maine Atlantic Herring Purse Seine Fishery**

Target Species: Atlantic Herring.

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 ~~2002-2004~~2007 there were ~~7, 6, and 411~~ 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](http://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 has been defined as a Category III fishery in the 2008~~97~~ List of Fisheries (~~72 FR 14466, March 28, 2007~~ [73 FR 73070, December 1, 2008](http://www.federalregister.gov)). 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 ~~2002-2003~~ to ~~2006~~2007, respectively.

**Total Effort:** Total metric tons of fish landed from 1998 to ~~2006-2007~~ were 24,256, 39,866, 29,609, 20,691, 20,096, 17,939, 19,958, ~~49,129~~16,306, and ~~16,030~~18,700, and 31,019 respectively (NMFS, Unpubl.). Total effort, measured in trips, for the Gulf of Maine Atlantic Herring Purse Seine Fishery from 2002 to 2006 was 343, 339, 276, 202, and 173, respectively (NMFS, Unpubl.).

**Observer Coverage:** During the period 1994 to 2002, estimated observer coverage (number of trips observed/total commercial trips reported) was 0%. From 2003 to ~~2006~~2007, observer coverage was 0.34%, 9.8%, 0.27%, ~~and 0%~~ and ~~3.2%~~, respectively. The coverage in 2004 may be considered a ‘pilot’ program, as sampling priorities and data collection methods were refined over the course of the year.

**Protected Species Interactions:** Documented interactions with [minke whale](#), [harbor porpoise](#), harbor seals, gray seals, and ~~unidentified seals~~ [white-sided dolphin](#) were reported in this fishery.

### Northeast/Mid-Atlantic American Lobster Trap/Pot

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 1970’s. Fishing effort is intense and increasing throughout the range of the resource. 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. 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.

American lobster is the most valuable fishery in the eastern US, with total landings of 92.5-83.2 million lbs. valued at \$395-384.6 million in 2006/2007. Combined landings from Maine and Massachusetts vessels comprised 90% of the landings for 2006, with Maine landing nearly 73-65 million lbs. in 2006/2007. In 2007, approximately 3,223 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 waters. 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.

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). Documented interaction with minke whales were reported in this fishery.

#### **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: < 200

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 to the FLS for the entire Atlantic Ocean not including the Gulf of Mexico was 163. This declined to an annual average of 74-72 for the period between 2001 and 2006. Seventy-four~~Sixty-three~~ vessels reported pelagic longline effort in the Atlantic during 2006/2007. 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 2005/2006, a mean of 4,5164.475 sets (3-163.15 million hooks) was reported each year. During 2006/2007, the total reported fishing effort in the Atlantic Ocean component of the fishery was 4,2444.839 sets and 3-083.37 million hooks (Fairfield Walsh and Garrison 2007)(Fairfield Walsh and Garrison 2007/2008).

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 2006/2007, the majority of fishing effort in the Atlantic was reported in the Mid-Atlantic Bight (Virginia to New Jersey, 1,0811.887 sets) and the

South Atlantic Bight (Georgia to North Carolina, ~~543–1,070~~ sets) fishing areas ([Fairfield Walsh and Garrison 2007](#))(~~Fairfield Walsh and Garrison 2007~~2008).

**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 ([72 FR 14466, March 28, 2007](#) [73 CFR 73066, December 1, 2008](#)). 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 Team](#). 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.

**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 2006, observer coverage as a percentage of reported sets in the Atlantic component of the fishery was 4%, 4%, 4%, 7%, 9%, 6%, and 7%. The observer coverage during ~~2006-2007~~ was 7% of reported sets; however, coverage was often >10% in some areas and seasons ([Fairfield Walsh and Garrison 2007](#))(~~Fairfield Walsh and Garrison 2007~~2008). These values do not include the experimental portion of the fishery in the Northeast Distant Water (NED) area, which was 100% of sets during 2001-2003. Observed longline sets and marine mammal interactions are shown for ~~2002-2006~~2003-2007 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 2003; 2005; Fairfield Walsh and Garrison 2006; Fairfield Walsh and Garrison 2007; Fairfield and~~

[Garrison 2008](#)). 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.

Protected Species Interactions: Documented interactions with ~~Minke Whale~~, Risso's ~~Dolphin~~dolphin, ~~Longlong~~-finned ~~Pilot-pilot~~ Whalewhale, ~~Shortshort~~-finned ~~Pilot-pilot~~ Whalewhale, ~~Common-common~~ ~~Dolphin~~dolphin, Atlantic ~~Spotted~~ ~~ppotted~~ ~~Dolphin~~dolphin, ~~Pantropical-pantropical~~ ~~Spotted-spotted~~ ~~Dolphin~~dolphin, ~~bottlenose~~ dolphin, ~~Cuvier's~~ beaked whale, ~~Mesoplodon~~ beaked whale ~~Striped~~ Dolphin, ~~Offshore~~ Bottlenose Dolphin, ~~Pygmy~~ Sperm Whale, ~~and~~ ~~Northern~~ ~~northern~~ ~~Bottlenose~~-~~bottlenose~~ ~~W~~whale ~~were~~ reported in this fishery, ~~and~~ ~~unidentified~~ ~~Beaked~~ ~~Whales~~. 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

Number of Active 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. It is difficult to identify these different gear types and distinguish sets targeting sharks from those targeting finfish in the reported logbook data. 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). No strike sets were observed in 2007.

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 ~~waters south of~~ 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 29° 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 strikenetting-fishing for shark is permitted with limited exemptions. If special provisions are met (72 FR 34632, June 25, 2007). During the restricted periods shark drift gillnet fishing effort remains restricted to waters south of 27° 51' N latitude.

Gear Characteristics: Drift gillnet fishing is characterized by large-mesh (5-10 inches) nets that are typically greater than 1500 feet long and have 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).

**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 ([72 FR 14466, March 28, 2007](#) [73 FR 73066, December 1, 2008](#)). 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. The ALWTRP, which](#) includes seasonal restriction of gillnet fishing in the Southeast U.S. Restricted Area [North](#), special provisions for [shark gillnet/strike net](#) 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 annual observer coverage of the drift gillnet fishery was 68%, 85%, 50%, 66%, 58%, and 48%, respectively. The 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, effort levels for the fishery and estimated observer coverage for 2007 are not available.](#) The locations of observed strike, drift, and sink sets and marine mammal interactions in the shark gillnet fishery are shown in Figures 41-45. 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-coastal Bottlenose-bottlenose Dolphin-dolphin](#) and Atlantic [Spotted-spotted Dolphin-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**

The Blue Crab Trap/Pot Fishery is broadly distributed in estuarine and nearshore coastal waters throughout the mid and south Atlantic. The fishery is estimated to have >16,000 participants deploying gear on a year-round basis. 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. 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](#)) ([McFee and W. 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, but from 2002-2006<sup>67</sup>, SEFSC stranding data show

53 confirmed bottlenose dolphin mortalities due to interactions with blue crab pot gear and 11 bottlenose dolphin disentanglements with live releases. There are also documented interactions with the West Indian manatee, Florida stock. The fishery has been defined as a Category II fishery in the 2007-2009 List of Fisheries (72 FR 14466, March 28, 2007; 73 FR 73067, December 1, 2008). It is managed under the Bottlenose Dolphin Take Reduction Plan and the Atlantic Large Whale Take Reduction Plan.

### **Mid-Atlantic Haul/Beach Seine**

This beach-based fishery operates primarily along North Carolina's Outer Banks using small and large mesh gillnets. Small mesh gillnets are generally used in the spring and fall to target gray trout (weakfish), speckled trout, spot, kingfish (sea mullet), bluefish, and harvest fish (star butters). Large mesh gillnets are used to target Atlantic striped bass during the winter and are regulated via North Carolina Fisheries rules and proclamations. Small mesh nets are generally constructed in the manner of a beach seine, although the net material is a combination of multifilament and monofilament. The beach seine system uses a bunt and a wash net that is attached to the beach and fished in the surf (Steve *et al.* 2001). Conversely, large mesh nets are constructed of all monofilament material and generally used to fish during the Atlantic Ocean striped bass beach seine fishery. Although construction and characteristics of large and small mesh nets differ, they are set and hauled similarly. Nets are deployed out of the stern of the surf dories and set perpendicular to the shoreline. A truck is generally used to haul the net ashore by attaching one end of the net to the truck and pulling it ashore while the other end remains fixed until the end of the haul. North Carolina Division of Marine Fisheries (NCDMF) finalized regulations in October 2008 requiring fishermen participating in the Atlantic Ocean striped bass beach seine fishery to use nets constructed of all multifilament material (NCDMF Proclamation FF-51-2008), thereby moving closer to the traditional manner of beach seine fishing for large mesh nets. Small mesh nets are not included under NCDMF's regulations for the Atlantic Ocean striped bass beach seine fishery, and therefore, still operate more in the manner of gillnets rather than beach seines because of their construction with monofilament material and fishing practices. Subsequently, they are listed as a Category I Mid-Atlantic Gillnet fishery in the 2009 List of Fisheries (73 FR 73054, December 1, 2008). Therefore, the Atlantic Ocean striped bass beach seine fishery using large mesh gillnets is now the only fishery included under the Mid-Atlantic Haul/Beach Seine Fishery for North Carolina. The Mid-Atlantic Haul/ Beach Seine Fishery (NC only) is listed as a Category II fishery in the 2009 List of Fisheries (73 FR 73054, December 1, 2008). Because of the manner in which both large and small mesh nets are constructed and fished, they are operating more in the manner of gillnets rather than beach seines and are technically a component of the listed as a Category I Mid-Atlantic Gillnet fishery in the 2009 List of Fisheries (73 FR 73054, December 1, 2008). However, North Carolina Department of Marine Fisheries has finalized is currently proposing regulations requiring fishermen participating in the Atlantic striped bass beach seine fishery to use nets constructed of all multifilament material, thereby moving closer to the traditional manner of beach seine fishing. Once this regulation is finalized, This regulation went into effect in October 2008; the Atlantic striped bass beach seine fishery using large mesh gillnets will is now be the only fishery included under the Mid-Atlantic Haul/Beach Seine Fishery for North Carolina. The Mid-Atlantic Haul/ Beach Seine Fishery (NC only) is listed as a Category II fishery in the 2009 List of Fisheries (73 FR 73054, December 1, 2008). North Carolina beach-based fishing has been observed since April 7, 1998 by the NMFS Fisheries Sampling Program (Observer Program) based at the NEFSC. Through 2001, there were 101 sets observed during the winter season (Nov-Apr) and 65 sets observed during the summer season (May-Oct). There were no sets observed during the summer of 2001. This fishery has observed interactions with coastal bottlenose dolphin. The fishery has been defined as a Category II fishery in the 2007 List of Fisheries (72 FR 14466, March 28, 2007)

### **North Carolina Long Haul Seine**

The Long Haul Seine is an estuarine fishery operating in North Carolina waters with 10-15 participants statewide. 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 Coastal Bottlenose Dolphins have been reported. The fishery has been defined as a Category II fishery in the 2007 List of Fisheries (72 FR 14466, March 28, 2007; 73 FR 73067, December 1, 2008).

### **North Carolina Roe Mullet Stop Net**

The Stop Net Fishery is unique to Bogue Banks, North Carolina. 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 Coastal Bottlenose Dolphins have been reported; however, the total number of interactions has not been estimated. The fishery has been defined as a Category II fishery in the 2007 List of Fisheries ([72 FR 14466, March 28, 2007](#); [73 FR 73067, December 1, 2008](#)).

### **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, and Croaker. The NEFOP began observing effort in this fishery in 2001. In 2004 and 2005 an experimental fishery was conducted in an area of the Chesapeake Bay that was closed to commercial fishing effort from May to July for sea turtle conservation measures. Occasional interactions with Coastal Bottlenose Dolphins have been observed while monitoring for sea turtle interactions in both the commercial and experimental fisheries. In some cases it is not clear whether pound nets were the cause of death due to entanglement in other gear (monofilament). 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. Stranded Bottlenose Dolphins have also shown evidence of interactions with pound nets. From 2002 to 2007, 2016 bottlenose dolphins were removed dead from Virginia pound nets, and at least 3 dolphins were disentangled and released alive (Sue Barco, Virginia Aquarium). The fishery has been defined as a Category II fishery in the 2007-2009 List of Fisheries ([72 FR 14466, March 28, 2007](#); [73 FR 73068, December 1, 2008](#)).

### **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. 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. Occasional interactions with Coastal Bottlenose Dolphins have been recorded historically in this fishery. However, there is no observer coverage in this fishery, and the level of incidental interactions with marine mammals is undocumented. The Mid-Atlantic Menhaden Purse Seine Fishery has been defined as a Category II fishery in the 2007-2009 List of Fisheries ([72 FR 14466, March 28, 2007](#); [73 FR 73067, December 1, 2008](#)).

### **Southeastern U.S. Atlantic Shrimp Trawl**

The Shrimp Trawl Fishery operates from North Carolina through northern Florida 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). The gear consists of relatively fine-meshed trawls typically fished in a paired fashion on either side of a fishing vessel. 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 is typically very sparse and non-systematic. 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. The Shrimp Trawl fishery has been defined as a Category III fishery in the [2007-2009 List of Fisheries \(73 FR 73068, December 1, 2008; 72 FR 14466, March 28, 2007\)](#).

### 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 35°N to 41°N and 69°W to 72°W. Approximately 50% of the total effort was within a one degree square at 39°N, 72°W, 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. This is a voluntary program administered by SEFSC in cooperation with the Gulf and South Atlantic Fisheries Foundation. The program is funding and project

~~dependent, and therefore observer coverage is not necessarily randomly allocated across the fishery. 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.

## **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 required to register under the Marine Mammal Authorization Program (MMAAP) in order to lawfully capture a marine mammal incidental to fishing operations. All vessel owners, regardless of the category of fishery they are operating in, are required to report 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 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.

## **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: < 200

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 ~~70-66~~ for the period between 2001 and ~~2005~~2006. The total number of fishing vessels reporting effort in the Gulf of Mexico during 2006 was ~~4755~~, 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. During ~~2006~~2007, the total reported fishing effort in the Gulf of Mexico component of the fishery was ~~3,3373,956~~ sets and ~~2.58-91~~ million hooks ([Fairfield Walsh and Garrison 2007](#))([Fairfield Walsh and Garrison 2008](#)7). ~~This reflects a significant decrease over previous years due to the effects of Hurricanes Katrina and Rita on the Gulf fleet.~~

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 ~~2009 LOF~~ due to frequently observed interactions with marine mammals (~~72 FR 14466, March 28, 2007~~73 FR 73066, [December 1, 2008](#)). 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 Team](#). 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 2006, observer coverage of reported sets in the Gulf of Mexico component of the fishery was 4%, 4%, 3%, 5%, 5%, 7%, and 8%. Observer coverage in the Gulf of Mexico during ~~2006~~2007 was ~~8-15.5%~~ of reported sets. ~~This high coverage rate reflects significantly elevated coverage during the second quarter (51.6%) associated with increased observer effort to document bluefin tuna interactions ; however, coverage was as high as 9.0% in some seasons-~~([Fairfield Walsh and Garrison 2007](#))([Fairfield Walsh and Garrison 2008](#)7). Observed longline sets and marine mammal interactions in the Gulf of Mexico are shown for ~~2002~~2003-~~2006~~2007 in Figures 46 through 50. Only two marine mammal interactions, one with an unidentified dolphin and one with a pilot whale, have been observed during this period.

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); however, there have been very few interactions with marine mammals observed in the last five years.

Protected Species Interactions: Gulf of Mexico stocks of Risso's ~~Dolphin~~dolphin, ~~Pantropical~~pantropical ~~Spotted~~spotted ~~Dolphin~~dolphin, Atlantic ~~Spotted~~spotted ~~Dolphin~~dolphin, ~~Pilot~~pilot ~~Whales~~whales, ~~Un-identified~~ ~~B~~beaked ~~W~~whales and Offshore ~~Bottlenose~~bottlenose ~~Dolphin~~dolphin.

### **Gulf of Mexico Shrimp Trawl**

The Shrimp Trawl Fishery operates along the Gulf coast of the U.S. virtually year round. Hundreds of thousands of fishing trips are reported annually in the Gulf of Mexico with effort occurring in estuarine, nearshore coastal, and offshore continental shelf waters (Epperly *et al.* 2002). The gear consists of relatively fine-meshed trawls typically fished in a paired fashion on either side of a fishing vessel. Observer coverage is typically very sparse and is not systematic; however, the program has become mandatory and increased observer coverage beginning in 2007. The Shrimp Trawl Fishery has long been the focus of management actions associated with significant bycatch of both fish species and sea turtles. Occasional interactions with Bottlenose Dolphins have been observed in both the Gulf and Atlantic components of this fishery, and there is infrequent evidence of interactions from stranded animals. During 2004-2006, 54 un-identified dolphins and one bottlenose dolphin were observed dead in shrimp fishery vessels. The animals were caught in water depths between 7 and 87 m. These un-identified animals were likely either bottlenose dolphins or Atlantic spotted dolphins based upon location and depth. In 2007, a bottlenose dolphin was observed killed in the shrimp fishery in 7m of water in the western Gulf of Mexico. The Shrimp Trawl Fishery is listed as a Category III fishery in the 2007-2009 List of Fisheries (72-14466, March 28, 2007; 73 FR 73068, December 1, 2008).

Protected Species Interactions: Gulf of Mexico stocks of ~~C~~oastal and continental shelf ~~B~~bottlenose ~~D~~dolphin and Atlantic ~~S~~spotted ~~D~~dolphin.

### **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)(~~McFee and W. 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; although, Southeast Fishery Science Center stranding data document one bottlenose dolphin interaction in 2002 and one in 2003. The fishery has been defined as a Category III fishery in the 2007-2009 List of Fisheries (72-73 FR 73069, December 1, 2008; 73 FR 73069, March 28, 2007).

### **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 [Coastal-coastal Bottlenose bottlenose Dolphins dolphins](#) have been reported through the MMAP and historically through an observer program carried out by Louisiana State University from 1994 to 1996. The fishery has been defined as a Category II fishery in the [2007-2009 List of Fisheries \(72 FR 14466, March 28, 200773 FR 73067, December 1, 2008\)](#).

### **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 run-around gillnets are currently in use in Louisiana, Mississippi, and Alabama. In the Gulf of Mexico, coastal migratory pelagic resources are the only [Federallyfederally](#) managed species for which gillnet gear is authorized, and only run-around gillnetting for these species allowed (CMR FMP). In state waters, state and Gulf States Marine Fisheries Commission (GSMFC) Interstate FMPs apply. No marine mammal mortalities associated with [commercial gGillnet fFisheries](#) 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 mortalities of bottlenose dolphins resulted from gillnet entanglements in Texas and Louisiana during 2003, 2004, 2006, and 2007. The 3 Texas mortalities were a result of fisheries sampling and reasearch by Texas Parks and Wildlife, and the Louisiana mortality \(2006\) occurred during a gulf sturgeon research project for the Army Corps of Engineers.](#) The Gulf of Mexico Gillnet Fisheries are listed as Category II fisheries in the [2007-2009 List of Fisheries \(72 FR 14466, March 200773 FR 73066, December 1, 2008\)](#).

### **LITERATURE CITED**

- [Baremore, I.E., J.K. Carlson, L.D. Hollensead and D.M. Bethea 2007. Catch and bycatch in the U.S. southeast gillnet fisheries, 2007. NOAA Tech. Memo. NMFS-SEFSC-565. 19 pp.](#)
- [Becker, P.R., D. Wilkinson and T. Lillestolen 1994. Marine Mammal Health and Stranding Response Program: Program Development Plan. NOAA Tech. Memo. NMFS-OPR-94-2. 35 pp.](#)
- [Bellmund, S.A., J.A. Musick, R.C. Klinger, R.A. Byles, J.A. Keinath and D.E. Barnard 1997. Ecology of sea turtles in Virginia, final report to National Marine Fisheries Service Northeast Region. Virginia Institute of Marine Science, Gloucester Point, Virginia. Contract number NA80FAC-00004.](#)
- [Burdett, L.G. and W.E. McFee 2004. Bycatch of bottlenose dolphins in South Carolina, USA, and an evaluation of the Atlantic blue crab fishery categorisation. J. Cetacean Res. Manage. 6: 231-240.](#)
- [Carlson, J.K. and D.M. Bethea 2007. Catch and bycatch in the shark gillnet fishery: 2005-2006. NOAA Tech. Memo. NMFS-SEFSC-552. 26 pp.](#)
- [Clark, S.H. 1998. Status of Fishery Resources off the Northeastern United States for 1998. NOAA Tech. Memo. NMFS-NE-115. 160 pp.](#)
- [Epperly, S.L., L.P. Garrison, T. Henwood, W. Hoggard, J. Mitchell, J. Nance, J. Poffenberger, C. Sasso, E. Scott-Denton and C. Yeung 2002. Analysis of sea turtle bycatch in the commercial shrimp fisheries of southeast U.S. waters and the Gulf of Mexico. NOAA Tech. Memo. NMFS-SEFSC-490. 88 pp.](#)
- [Fairfield Walsh, C. and L.P. Garrison 2006. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2005. NOAA Tech. Memo. NOAA NMFS-SEFSC-539. 52 pp.](#)
- [Fairfield Walsh, C. and L.P. Garrison 2007. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2006. NOAA Tech. Memo. NOAA NMFS-SEFSC-560. 54 pp.](#)
- [Garrison, L.P. 2003. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001-2002. NOAA Tech. Memo. NMFS-SEFSC-515. 52 pp.](#)
- [Garrison, L.P. 2005. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2004. NOAA Tech. Memo. NMFS-SEFSC-531. 57 pp.](#)
- [Garrison, L.P. 2007. Estimated marine mammal and turtle bycatch in the shark gillnet fisheries along the Southeast U.S. Atlantic coast: 2000-2006. NMFS, Southeast Fisheries Science Center, Protected Resources and Biodiversity Division. PRD-07/08-02. 22 pp.](#)
- [Gerrior, P., A.S. Williams and D.J. Christensen 1994. Observations of the 1992 U.S. pelagic pair trawl fishery in the](#)

- [Northwest Atlantic. Mar. Fish. Rev. 56\(3\): 24-27.](#)
- [Goudy, C.A. 1995. The 1994 experimental pair trawl fishery for tuna in the Northwest Atlantic. Massachusetts Institute of Technology, Sea Grant, Cambridge, MA. MITSWG 95-6 10 pp.](#)
- [Goudy, C.A. 1996. The 1995 experimental pair trawl fishery for tuna in the Northwest Atlantic. Massachusetts Institute of Technology, Sea Grant, Cambridge, MA MITSG 96-17: 13.](#)
- [McFee, W.E. and W. Brooks, Jr., 1998. Fact finding meeting of marine mammal entanglement in the crab pot fishery: a summary. U.S. Fish and Wildlife Service. Unpublished Report.](#)
- [NMFS-NEFSC. 2003. Fishery Sampling Branch. National Marine Fisheries Service-Northeast Fisheries Science Center, accessed on 11/05/2003, from <http://www.nefsc.noaa.gov/fsb/>.](#)
- [NMFS-OPR 2003. Marine Mammal Authorization Program. National Marine Fisheries Service-Office of Protected Resources. \[http://www.nmfs.noaa.gov/prot\\\_res/PR2/Fisheries Interactions/MMAP.html\]\(http://www.nmfs.noaa.gov/prot\_res/PR2/Fisheries\_Interactions/MMAP.html\). accessed on 11/05/2003](#)
- [NMFS 2003. Guide for complying with the regulations for Atlantic tunas, swordfish, sharks, and billfish. National Marine Fisheries Service. September 2003. \[http://www.nmfs.noaa.gov/sfa/hms/2003 ComplianceGuide.pdf\]\(http://www.nmfs.noaa.gov/sfa/hms/2003\_ComplianceGuide.pdf\)](#)
- [Northridge, S. 1996. Estimation of cetacean mortality in the U.S. Atlantic swordfish and tuna driftnet and pair trawl fisheries. NMFS. 40ENNF500160 21 pp.](#)
- [Smith, J.W., E.A. Hall, N.A. McNeil and W.B. O'Bier 2002. The distribution of purse-seine sets and catches in the Gulf Menhaden fishery in the Northern Gulf of Mexico, 1994-1998. Gulf of Mexico Science 20: 12-24.](#)
- [Steve, C., J. Gearhart, D. Borggaard, L. Sabo and A.A. Hohn 2001. Characterization of North Carolina Commercial Fisheries with Occasional Interactions with Marine Mammals. NOAA Tech. Memo. NMFS-SEFSC-458. 60 pp.](#)
- [Wigley, S., M. Terceiro, A. DeLong and K. Sosebee 1998. Proration of 1994-96 USA Commercial Landings of Atlantic Cod, Haddock and Yellowtail Flounder to Unit Stock Areas. Northeast Fish. Sci. Cent. Ref. Doc. 98-02.](#)

**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 <i>et al.</i> 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 <i>et al.</i> 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 modified direct duplicate or Palka & Hammond analysis methods, depending on the presence of responsive movement.	Y	

							Plane: one team data analyzed by DISTANCE.		
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 2008.	Y	
18	2002	Jul-Aug	plane (Twin Otter)	7,465	Georges Bank to Maine	NEC	Same as for plane in survey 15.	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 <i>et al.</i> 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 <i>et al.</i> 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 15.	Y	(Palka 2006)
23	2006	Aug	plane (Twin Otter)	10,676	Georges Bank to Bay of Fundy	NEC	Same as for plane in survey 15.	Y	Palka 2008 (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 15.	Y	Palka 2008 (in prep)
25	2007	July-Aug	plane		Canadian waters from Nova Scotia to Newfoundland	DFO	uncorrected counts	N	(Lawson and Gosselin 2008)
26	2008	Aug	plane (Twin Otter)	6,267	NY to Maine in US waters	NEC	Same as for plane in survey 15.	Y	Palka 2008 (in prep)
27	2001	May-June	plane	na	Maine coast	NEC/UM	corrected counts	N	(Gilbert <i>et al.</i> 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 continental shelf, OCS)	northern Gulf of Mexico bays and sounds, coastal waters from shoreline to 18m isobath, and OCS waters from 18m isobath to 9.3km past the 183m isobath	SEC	One team data analyzed with Line-transect theory	N	(Scott <i>et al.</i> 1989)
30	1991-1994	Apr- June	ship (Oregon II)	22,041	northern Gulf of Mexico from 200m to U.S. EEZ	SEC	One team data analyzed by DISTANCE	N	(Hansen <i>et al.</i> 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 18m isobath, and OCS waters from 18m isobath to 9.3km past the 183m 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 18m isobath, and OCS waters from 18m isobath to	GOMEX94	One team data analyzed by DISTANCE	N	NMFS unpub. data

					9.3km past the 183m isobath				
33	1996-1997, 1999-2001	Apr-June	ship (Oregon II and Gunter)	12,162	northern Gulf of Mexico from 200m 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, 20-200m)	SEC	One team data analyzed by DISTANCE	N	(Fulling <i>et al.</i> 2003)
35	2003-2004	Jun-Aug (2003) Apr-Jun (2004)	ship (Gunter)	10,933	northern Gulf of Mexico from 200m 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 <i>et al.</i> 2007)
37	2004		plane		Gulf of St Lawrence and Nova Scotia Eastern Shore	DFO	Pup count		1 (Hammill 2005)

**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 <i>et al.</i> 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	
		<b>2006</b>	<b>847</b>	<b>0.55</b>	<b>23</b>	
		2008			26	
Fin Whale	Western North Atlantic	1995	2,200	0.24	12	
		1999	2,814	0.21	18	
		2002	2,933	0.49	18	
		2004	1,925	0.55	22	
		<b>2006</b>	<b>2,269</b>	<b>0.37</b>	<b>23</b>	
		2008			26	
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	
		<b>2004</b>	<b>386</b>	<b>0.85</b>	<b>23</b>	

		2006	207	0.62	24	
		2008			26	
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	
		<b>2006</b>	<b>3,312</b>	<b>0.74</b>	<b>23</b>	
		2007	3,242		25	
			26			
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	
		<b>2004</b>	<b>4,804</b>	<b>0.38</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
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	
		<b>2004</b>	<b>395</b>	<b>0.4</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
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	
		<b>2004</b>	<b>3,513</b>	<b>0.63</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
		2006	922	1.47	23	

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	
		<b>2004</b>	<b>20,479</b>	<b>0.59</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
		2006	14,408	0.38	23	
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	
		<b>2004</b>	<b>31,139</b>	<b>0.27</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
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	
		<b>2006</b>	<b>63,368</b>	<b>0.27</b>	<b>(18+23)/2</b>	<b>average of #18 and #23</b>
		2007	5,796		25	
2008			26			
White-beaked	Western	1982	573	0.69	1	

Dolphin	North Atlantic		5,500			(Alling and Whitehead 1987)
		1982	3,486	0.22		(Alling and Whitehead 1987)
		<b>2006</b>	<b>2,003</b>	<b>0.94</b>	<b>23</b>	
		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	
		<b>2004</b>	<b>120,743</b>	<b>0.23</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
		2006	84,000	0.36	24	
2007	53,625		25			
Atlantic 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	
		<b>2004</b>	<b>50,978</b>	<b>0.42</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
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	
		<b>2004</b>	<b>4,439</b>	<b>0.49</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
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	
		<b>2004</b>	<b>94,462</b>	<b>0.4</b>	<b>21+22</b>	<b>Estimate summed from north and south surveys</b>
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	
		<b>2004</b>	<b>81,588</b>	<b>0.17</b>	<b>20+21+22</b>	<b>Estimate summed from north and south surveys and 2002 survey</b>
Harbor	Gulf of	1991	37,500	0.29	3	

Porpoise	Maine/Bay of Fundy	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	
		<b>2006</b>	<b>89,054</b>	<b>0.47</b>	<b>24</b>	
		2007	4,862		25	
	2008		26			
Harbor Seal	Western North Atlantic	2001	99,340	0.097	27	
Gray Seal	Western North Atlantic	1999	5,611		28	
		2001	1,731		27	
		2004	52,500	0.15	37	Gulf of St Lawrence and Nova Scotia Eastern Shore
			208,720	0.14		
			216,490	0.11		
2004	223,220	0.08	36	Sable Island		
Bryde's Whale	Northern Gulf of Mexico	1991-1994	35	1.10	30	
		1996-2001	40	0.61	33	
		<b>2003-2004</b>	<b>15</b>	<b>1.98</b>	35	
Sperm Whale	Northern Gulf of Mexico	1991-1994	530	0.31	30	
		1996-2001	1,349	0.23	33	
		<b>2003-2004</b>	<b>1,665</b>	<b>0.20</b>	35	
Kogia spp.	Northern Gulf of Mexico	1991-1994	547	0.28	30	
		1996-2001	742	0.29	33	
		<b>2003-2004</b>	<b>453</b>	<b>0.35</b>	35	
Cuvier's Beaked Whale	Northern Gulf of Mexico	1991-1994	30	0.50	30	
		1996-2001	95	0.47	33	
		<b>2003-2004</b>	<b>65</b>	<b>0.67</b>	35	
Mesoplodon spp.	Northern Gulf of Mexico	1996-2001	106	0.41	33	
		<b>2003-2004</b>	<b>57</b>	<b>1.40</b>	35	
Killer Whale	Northern Gulf of Mexico	1991-1994	277	0.42	30	
		1996-2001	133	0.49	33	
		<b>2003-2004</b>	<b>49</b>	<b>0.77</b>	35	
False killer Whale	Northern Gulf of Mexico	1991-1994	381	0.62	30	
		1996-2001	1,038	0.71	33	
		<b>2003-2004</b>	<b>777</b>	<b>0.56</b>	35	
Short-finned Pilot Whale	Northern Gulf of Mexico	1991-1994	353	0.89	30	
		1996-2001	2,388	0.48	33	
		<b>2003-2004</b>	<b>716</b>	<b>0.34</b>	35	
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	
Pygmy Killer Whale	Northern Gulf of Mexico	1991-1994	518	0.81	30	
		1996-2001	408	0.60	33	
		<b>2003-2004</b>	<b>323</b>	<b>0.60</b>	35	
Risso's	Northern	1991-1994	2,749	0.27	30	

Dolphin	Gulf of Mexico	1996-2001	2,169	0.32	33	
		<b>2003-2004</b>	<b>1,589</b>	<b>0.27</b>	35	
Pantropical Spotted Dolphin	Northern Gulf of Mexico	1991-1994	31,320	0.20	30	
		1996-2001	91,321	0.16	33	
		<b>2003-2004</b>	<b>34,067</b>	<b>0.18</b>	35	
Striped Dolphin	Northern Gulf of Mexico	1991-1994	4,858	0.44	30	
		1996-2001	6,505	0.43	33	
		<b>2003-2004</b>	<b>3,325</b>	<b>0.48</b>	35	
Spinner Dolphin	Northern Gulf of Mexico	1991-1994	6,316	0.43	30	
		1996-2001	11,971	0.71	33	
		<b>2003-2004</b>	<b>1,989</b>	<b>0.48</b>	35	
Clymene Dolphin	Northern Gulf of Mexico	1991-1994	5,571	0.37	30	
		1996-2001	17,355	0.65	33	
		<b>2003-2004</b>	<b>6,575</b>	<b>0.36</b>	35	
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	
Fraser's Dolphin	Northern Gulf of Mexico	1991-1994	127	0.90	30	
		1996-2001	726	0.70	33	
		2003-2004	0	-	35	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	
Bottlenose Dolphin	Northern Gulf of Mexico Oceanic	1996-2001	2,239	0.41	33	
		<b>2003-2004</b>	<b>3,708</b>	<b>0.42</b>	35	
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 Mexico Coastal (3 stocks)	Eastern 1994	9,912	0.12	32	
		Northern 1993	4,191	0.21	31	
		Western 1992	3,499	0.21	31	Current best population size estimate for each of these 3 stocks is unknown because data are more than 8 years old.
Bottlenose Dolphin	Northern Gulf of Mexico Bay, Sound and Estuarine (33 stocks)	Barataria Bay, 2001	138	0.08		(Miller 2003)
		St. Joseph Bay, 2005-2006	81	0.14		(Balmer <i>et al.</i> 2008)
		St. Vincent Sound, Apalachicola	537	0.09		(Tyson 2008)

		Bay, St. George Sound, 2008				
		Remaining 30 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.

## REFERENCES CITED

- Alling, A.K. and H.P. Whitehead 1987. A preliminary study of the status of white-beaked dolphins, *Lagenorhynchus albirostris*, and other small cetaceans off the coast of Labrador. *Can. Field-Nat.* 101(1): 131-135.
- Balmer, B.C., R.S. Wells, S.M. Nowacek, D.P. Nowacek, L.H. Schwacke, W.A. McLellan, F.S. Scharf, T.K. Rowles, L.J. Hansen, T.R. Spradlin and D.A. Pabst 2008. Seasonal abundance and distribution patterns of common bottlenose dolphins (*Tursiops truncatus*) near St. Joseph Bay, Florida, USA. *J. Cetacean Res. Manage.* 10(2): 157-167.
- Barlas, M.E. 1999. The distribution and abundance of harbor seals (*Phoca vitulina concolor*) and gray seals (*Halichoerus grypus*) in southern New England, winter 1998-summer 1999. M.A. thesis. Graduate School of Arts and Sciences Boston University, Boston, MA. 52 pp.
- Blaylock, R.A. and W. Hoggard 1994. Preliminary estimates of bottlenose dolphin abundance in southern U.S. Atlantic and Gulf of Mexico continental shelf waters. NOAA Tech. Memo. NMFS-SEFSC-356. 10 pp.
- Bowen, W.D., J.I. McMillan and W. Blanchard 2007. Reduced population growth of gray seals at Sable Island: Evidence from pup production and age of primiparity. *Mar. Mamm. Sci.* 23: 48-64.
- CETAP 1982. A characterization of marine mammals and turtles in the mid- and north Atlantic areas of the U.S. outer continental shelf, final report. Washington, DC, Bureau of Land Management. #AA551-CT8-48 538 pp.
- Clapham, P.J., J. Barlow, T. Cole, D. Mattila, R. Pace, D. Palka, J. Robbins and R. Seton 2003. Stock definition, abundance and demographic parameters of humpback whales from the Gulf of Maine. *J. Cetacean Res. Manage.* 5(13-22).
- Fulling, G.L., K.D. Mullin and C.W. Hubbard 2003. Abundance and distribution of cetaceans in outer continental shelf waters of the U.S. Gulf of Mexico. *Fish. Bull.* 101: 923-932.
- Garrison, L.P. 2003. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001-2002. NOAA Tech. Memo. NMFS-SEFSC-515. 52 pp.
- Garrison, L.P., S.L. Swartz, A. Martinez, C. Burks and J. Stamates 2003. A marine mammal assessment survey of the Southeast US continental shelf, February-April 2002. NOAA Tech. Memo. NMFS-SEFSC-492.
- Gilbert, J.R., G.T. Waring, K.M. Wynne and N. Guldager 2005. Changes in abundance and distribution of harbor seals in Maine, 1981-2001. *Mar. Mamm. Sci.* 21: 519-535.
- Hammill, M.O. 2005. Abundance of Northwest Atlantic grey seals in the Gulf of St. Lawrence and along the Nova Scotia Eastern Shore. Canadian Department of Fisheries and Oceans. Ottawa, Ontario. DFO Research Document 2005/036. 11 pp. [http://www.dfo-mpo.gc.ca/csas/Csas/Publications/ResDocs-DocRech/2005/2005\\_036\\_e](http://www.dfo-mpo.gc.ca/csas/Csas/Publications/ResDocs-DocRech/2005/2005_036_e).
- Hansen, L.J., K.D. Mullin and C.L. Roden 1995. Estimates of cetacean abundance in the northern Gulf of Mexico from vessel surveys. Southeast Fisheries Science Center, Miami, FL. Contribution No. MIA-94/95-25. 9 pp.
- Kingsley, M.C.S. and R.R. Reeves 1998. Aerial surveys of cetaceans in the Gulf of St. Lawrence in 1995 and 1996. *Can. J. Zool.* 76: 1529-1550.
- Lawson, J.W. and J.-F. Gosselin 2008. Distribution and preliminary abundance estimates for cetaceans seen during Canada's Marine Megafauna Survey - A component of the 2007 TNASS. *Can. Sci. Advisory Sec. Res. Doc.* 208/nnn. 33 pp.
- Mercer, M.C. 1975. Modified Leslie-DeLury population models of the long-finned pilot whale (*Globicephala melana*) and annual production of the short-finned squid (*Illex illecebrosus*) based upon their interactions at Newfoundland. *J. Fish. Res. Board Can* 32(7): 1145-1154.
- Miller, C. 2003. Abundance trends and environmental habitat usage patterns of bottlenose dolphins (*Tursiops truncatus*) in lower Barataria and Caminada Bays, Louisiana. Ph.D. thesis. Louisiana State University, Baton Rouge. 125 pp.

- Mitchell, E. 1974. Present status of northwest Atlantic fin and other whale stocks. Pages 108-169 *in*: W. E. Schevill, (ed.) The whale problem: A status report. Harvard University Press, Cambridge, MA.
- Mitchell, E. and D.G. Chapman 1977. Preliminary assessment of stocks of northwest Atlantic sei whales (*Balaenoptera borealis*). Rep. Int. Whal. Comm. (Special Issue) 1: 117-120.
- Mullin, K.D. 2007. Abundance of cetaceans in the oceanic Gulf of Mexico based on 2003-2004 ship surveys. Available from: NMFS, Southeast Fisheries Science Center, P.O. Drawer 1207, Pascagoula, MS 39568, 26 pp.
- Mullin, K.D. and G.L. Fulling 2003. Abundance of cetaceans in the southern U.S. North Atlantic Ocean during summer 1998. Fish. Bull. 101: 603-613.
- Mullin, K.D. and G.L. Fulling 2004. Abundance of cetaceans in the oceanic northern Gulf of Mexico. Mar. Mamm. Sci. 20(4): 787-807.
- NMFS 1990. Cruise results, NOAA Ship CHAPMAN, Cruise No. 90-05. Marine Mammal Sighting Survey. National Marine Fisheries Service. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026. 5 pp.
- NMFS 1991. Northeast cetacean aerial survey and inter-platform study. National Marine Fisheries Service. NOAA-NMFS-SEFSC and NEFSC. 4 pp.
- NMFS 1993. Cruise results, NOAA ship DELAWARE II, Cruise No. DEL 93-06, Marine Mammal Survey. National Marine Fisheries Service. NOAA NMFS NEFSC, Woods Hole Laboratory, Woods Hole, MA, 5 pp.
- NMFS 1994. Cruise results, NOAA ship RELENTLESS, Cruise No. RS 9402, Marine Mammal Survey/Warm Core Ring Study. National Marine Fisheries Service. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-102. 8 pp.
- Palka, D.L. 1995. Abundance estimate of Gulf of Maine harbor porpoise. Rep. Int. Whal. Comm. (Special Issue) 16: 27-50.
- Palka, D.L. 1996. Update on abundance of Gulf of Maine/Bay of Fundy harbor porpoises. Northeast Fish. Sci. Cent. Ref. Doc. 96-04. 35 pp. <http://www.nefsc.noaa.gov/nefsc/publications/crd/crd9604.pdf>
- Palka, D.L. 2006. Summer abundance estimates of cetaceans in US North Atlantic Navy Operating Areas. Northeast Fish. Sci. Cent. Ref. Doc. 06-03. 41 pp. <http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0603/crd0603.pdf>
- Scott, G.P., D.M. Burn, L.J. Hansen and R.E. Owen 1989. Estimates of bottlenose dolphin abundance in the Gulf of Mexico from regional aerial surveys. CRD 88/89-07. Available from: NMFS, Southeast Fisheries Science Center, 75 Virginia Beach Dr., Miami, FL 33149.
- Smith, T., D. Palka and K. Bisack 1993. Biological significance of by-catch of harbor porpoise in the Gulf of Maine Demersal Gillnet Fishery. Northeast Fish. Sci. Cent. Ref. Doc. 93-23. 15 pp.
- Tyson, R.B. 2008. Abundance of bottlenose dolphins (*Tursiops truncatus*) in the Big Bend of Florida, St. Vincent Sound to Alligator Harbor. M. Sc. thesis. Florida State University, Tallahassee. 65 + ix pp.
- Waring, G.T. 1998. Results of the summer 1991 R/V Chapman marine mammal sighting survey. Northeast Fish. Sci. Cent. Ref. Doc. 98-09. 21 pp.
- Waring, G.T., C.P. Fairfield, C.M. Ruhsam and M. Sano 1992. Cetaceans associated with Gulf Stream Features off the Northeastern USA Shelf. ICES [Int. Counc. Explor. Sea] C.M. 1992/N:12.