

# NORTHEAST REGION

## 4.1 Northeast Region

The Northeast Region extends from Maine to Cape Hatteras, North Carolina. Geographically, the region is divided into three main oceanic areas: the Gulf of Maine, Georges Bank, and the Southern New England/Mid-Atlantic Bight. These three areas comprise the Northeast U.S. Continental Shelf Large Marine Ecosystem,<sup>1</sup> and contain some of the oldest fisheries in the Nation. The New England and Mid-Atlantic Fishery Management Councils, in conjunction with NMFS, are responsible for managing fisheries in the Northeast Region. These fisheries are diverse with respect to both the species targeted and the gear types employed.

### 4.1.1 Fisheries Overview

A total of 63 commercial fisheries are included in this report for the Northeast Region (Table 4.1.1), of which 37 are subject to a Council FMP. Landings from these fisheries were valued at approximately \$1.4 billion dollars in 2005.<sup>2</sup> For the purposes of this report, the Northeast Region Protected Resources Division elected to group certain fisheries by gear type, in accordance with current protected species stock assessment and bycatch estimation practices; these groups and the individual fisheries comprising them are listed in Table 4.1.1. Fish bycatch was estimated at the individual fishery level, while protected species bycatch was estimated, in most cases, at the grouped fishery level.

Over half (51%) of the fisheries in the Northeast Region are managed at the Federal level (Figure 4.1.1). Federal management authority overlaps with state management authority in five fisheries (four pot/trap fisheries and the Mid-Atlantic Shrimp Trawl Fishery, which has no Federal FMP) and with international management authorities in six fisheries, primarily Highly Migratory Species (HMS) fisheries targeting tuna.

Atlantic U.S. fisheries for tuna, swordfish, and billfish are managed by NMFS under the authority of the Atlantic Tunas Convention Act (ATCA) and the MSA. The ATCA authorizes the promulgation of regulations, as necessary and appropriate, to implement conservation and management recommendations adopted by the International Commission for the Conservation of Atlantic Tunas (ICCAT). The U.S. reports catch statistics on HMS species managed under the ATCA to ICCAT each year. The NMFS Office of Sustainable Fisheries, HMS Management Division, manages Atlantic HMS including tunas, sharks, swordfish and billfish. All Atlantic HMS fisheries are managed under a Secretarial FMP (the Consolidated HMS FMP), and Northeast Region staff coordinate with staff from the HMS Management Division

in the NMFS Offices of Sustainable Fisheries and Science and Technology and the Southeast Fisheries Science Center to manage these stocks.

Thirteen additional FMPs regulate the harvest of Federal stocks in the Northeast Region. Two fishery management councils, the New England Fishery Management Council (NEFMC) and the Mid-Atlantic Fishery Management Council (MAFMC), develop fisheries regulations for their respective FMPs. The NEFMC manages the Atlantic Herring; Atlantic Sea Scallop; Deep Sea Red Crab; Northeast Multi-species; Northeastern Skate Complex; and Atlantic Salmon FMPs. The Bluefish; Atlantic Mackerel, Squid, and Butterfish; Summer Flounder; Scup and Black Sea Bass; Surfclam and Ocean Quahog; and Tilefish FMPs are managed by the MAFMC. The Spiny Dogfish FMP and Monkfish FMP are joint NEFMC/MAFMC FMPs; the MAFMC is the administrative lead for the Dogfish FMP, while the NEFMC is the administrative lead for the Monkfish FMP (Table 4.1.1).

Twelve coastal states are represented within the Northeast Region: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina. Management of several fisheries crosses state/Federal boundaries. In these cases, the NMFS and the Councils work with the individual states and the Atlantic States Marine Fisheries Commission (ASMFC), a deliberative body representing the 15 Atlantic coastal states, to coordinate the management of trans-boundary species. The NMFS Northeast Region also shares management authority for Federal fisheries with the states and regional fisheries management organizations in other contexts, such as FMP development and monitoring.



Photo: Lee Benaka, NMFS

Sorting the catch.

<sup>1</sup> <http://www.lme.noaa.gov/>.

<sup>2</sup> Ex-vessel landings value. Fisheries Economics of the U.S., 2006. Available online at: [www.st.nmfs.noaa.gov/st5/publication/fisheries\\_economics\\_2006.html](http://www.st.nmfs.noaa.gov/st5/publication/fisheries_economics_2006.html).

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**Table 4.1.1**

Northeast Region fisheries included in the U.S. National Bycatch Report. Names of eight fishery groups appear in bold, each followed by the names of the individual fisheries it includes. Within each group, fisheries are listed alphabetically by fishery group name, then by management authority, and then by individual fishery name. Non-grouped fisheries are listed by management authority and then fishery name. Rows containing fisheries for which bycatch estimates are included in this report are shaded; a shaded group fishery name indicates at least one protected species bycatch estimate, and a shaded individual fishery name indicates at least one MSA fish stock or protected species bycatch estimate.

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>Mid-Atlantic Gillnet Fisheries</b>					
Mid-Atlantic Extra-Large-Mesh Gillnet <sup>d</sup>	Federal	Monkfish; Northeastern Skate Complex	Gillnet	Monkfish, skates, striped bass, other finfish	Observer data, DAS database, Vessel Trip Report, commercial landings database, North Carolina state landings
Mid-Atlantic Large-Mesh Gillnet <sup>d</sup>	Federal	Monkfish; Spiny Dogfish; Bluefish	Gillnet	Bluefish, monkfish, smooth dogfish, spiny dogfish, striped bass, other finfish	Observer data, DAS database, Vessel Trip Report, commercial landings database, North Carolina state landings
Mid-Atlantic Small-Mesh Gillnet <sup>d</sup>	Federal	Bluefish	Gillnet	Atlantic croaker, bluefish, Atlantic menhaden, other finfish	Observer data, DAS database, Vessel Trip Report, commercial landings database, North Carolina state landings
<b>New England Gillnet Fisheries</b>					
New England Extra-Large-Mesh Gillnet <sup>d</sup>	Federal	Monkfish; Northeastern Skate Complex; Northeast Multispecies; Spiny Dogfish	Gillnet	Monkfish, groundfish, skates, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
New England Large-Mesh Gillnet <sup>d</sup>	Federal	Monkfish; Northeast Multispecies; Northeastern Skate Complex; Spiny Dogfish	Gillnet	Groundfish, monkfish, skates, spiny dogfish, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
New England Small-Mesh Gillnet <sup>d</sup>	Federal	Northeast Multispecies	Gillnet	Various finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database

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Table 4.1.1 (continued)

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>New England Bottom Longline Fisheries</b>					
New England Bottom Longline	Federal	Spiny Dogfish; Northeast Multispecies	Longlines (bottom)	Spiny dogfish, groundfish, monkfish, other finfish	Observer data, DAS database, Vessel Trip Report
New England Haddock Sector Longline	Federal	Northeast Multispecies	Longlines (bottom)	Haddock	Observer data, DAS database, Vessel Trip Report
<b>Mid-Atlantic Otter Trawl Fisheries</b>					
Mid-Atlantic Large-Mesh Otter Trawl <sup>d</sup>	Federal	Summer Flounder, Scup and Black Sea Bass; Monkfish; Northeast Multispecies; Northeast Skate	Otter trawl (bottom, fish)	Summer flounder, winter flounder, other finfish	Observer data, DAS database, Vessel Trip Report
Mid-Atlantic Small-Mesh Otter Trawl <sup>d</sup>	Federal	Atlantic Mackerel, Squid, and Butterfish; Northeast Multispecies; Spiny Dogfish; Summer Flounder, Scup, and Black Sea Bass	Otter trawl (bottom, fish)	Short-finned squid, long-finned squid, silver hake, other finfish	Observer data, DAS database, Vessel Trip Report
<b>New England Otter Trawl Fisheries</b>					
New England B-Reg DAS <sup>e</sup> Large-Mesh Otter Trawl <sup>d</sup>	Federal	Northeast Multispecies; Northeast Skate; Spiny Dogfish	Otter trawl (bottom, fish)	Spiny dogfish, groundfish, skates, other finfish	Observer data, DAS database, Vessel Trip Report
New England Large-Mesh Otter Trawl <sup>d</sup>	Federal	Northeast Multispecies; Northeast Skate; Monkfish	Otter trawl (bottom, fish)	Monkfish, groundfish, skates, other finfish	Observer data, DAS database, Vessel Trip Report
New England Small-Mesh Otter Trawl <sup>d</sup>	Federal	Northeast Multispecies; Summer Flounder, Scup, and Black Sea Bass; Atlantic Mackerel, Squid, and Butterfish	Otter trawl (bottom, fish)	Short-finned squid, long-finned squid, silver hake, other finfish	Observer data, (DAS database, Vessel Trip Report
New England US/CAN Area Large-Mesh Otter Trawl <sup>d</sup>	Federal	Northeast Multispecies; Northeast Skate; Monkfish	Otter trawl (bottom, fish)	Monkfish, Atlantic cod, skates, other finfish	Observer data, DAS database, Vessel Trip Report

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Table 4.1.1 (continued)

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>New England Otter Trawl Fisheries (cont.)</b>					
New England US/CAN Area Small-Mesh Otter Trawl <sup>d</sup>	Federal	Northeast Multispecies; Atlantic Mackerel, Squid, and Butterfish	Otter trawl (bottom, fish)	Short-finned squid, long-finned squid, silver hake, other finfish	Observer data, DAS database, Vessel Trip Report
<b>Mid-Atlantic Scallop Dredge Fisheries</b>					
Mid-Atlantic General Cat. Closed Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
Mid-Atlantic General Cat. Open Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
Mid-Atlantic Limited-Access Closed Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
Mid-Atlantic Limited-Access Open Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
<b>New England Scallop Dredge Fisheries</b>					
New England General Cat. Closed Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
New England General Cat. Open Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
New England Limited-Access Closed Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report
New England Limited-Access Open Area Scallop Dredge	Federal	Atlantic Sea Scallop; Monkfish	Dredge (New Bedford)	Atlantic sea scallop, monkfish	Observer data, DAS database, Vessel Trip Report



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**Table 4.1.1** (continued)

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>Mid-Atlantic Scallop Trawl Fisheries</b>					
Mid-Atlantic General Cat. Scallop Trawl	Federal	Atlantic Sea Scallop; Summer Flounder, Scup, and Black Sea Bass	Otter trawl (bottom, scallop)	Atlantic sea scallop, summer flounder	Observer data, DAS database, Vessel Trip Report
Mid-Atlantic Limited-Access Scallop Trawl	Federal	Atlantic Sea Scallop; Summer Flounder, Scup, and Black Sea Bass	Otter Trawl (bottom, scallop)	Atlantic sea scallop, summer flounder	Observer data, DAS database, Vessel Trip Report
<b>Non-Grouped Fisheries</b>					
Mid-Atlantic Bottom Longline	Federal	Tilefish; Northeast Multispecies	Longlines (bottom)	Tilefish, Atlantic cod, other finfish	Observer data, DAS database, Vessel Trip Report, commercial landings database
Mid-Atlantic Clam/ Quahog Dredge	Federal	Surfclam and Ocean Quahog	Dredge (clam)	Atlantic surfclam, ocean quahog	Clam Vessel Trip Report, commercial dealer landings database
Mid-Atlantic Mid-Water Otter Trawl	Federal	Atlantic Herring; Atlantic Mackerel, Squid, and Butterfish	Otter trawl (midwater)	Atlantic herring, Atlantic mackerel, blueback herring, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
New England Clam/ Quahog Dredge	Federal	Surfclam and Ocean Quahog	Dredge (clam)	Atlantic surfclam, ocean quahog	Clam Vessel Trip Report, commercial dealer landings database
New England Crab Pots	Federal	Deep Sea Red Crab	Pots and traps	Deep sea red crab, Jonah crab	Vessel Trip Report, commercial dealer landings database
New England Mid-Water Otter Trawl	Federal	Atlantic Herring; Atlantic Mackerel, Squid, and Butterfish	Otter trawl (midwater)	Atlantic herring, Atlantic mackerel, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
New England Scottish Seine	Federal	Northeast Multispecies	Scottish seine	Silver hake, Atlantic cod, winter flounder, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database

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**Table 4.1.1** (continued)

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>Non-Grouped Fisheries (cont.)</b>					
Gulf of Maine Mid-Atlantic Tuna, Shark, Swordfish Hook-and-Line	Federal, international	Consolidated Highly Migratory Species	Hook and line	Bluefin tuna, swordfish	
Gulf of Maine, Mid-Atlantic Tuna, Shark, Swordfish Harpoon	Federal, international	Consolidated Highly Migratory Species	Harpoons	Bluefin tuna, swordfish	
Mid-Atlantic Hand Line	Federal, international	Summer Flounder, Scup, and Black Sea Bass; Bluefish; Atlantic Mackerel, Squid, and Butterfish; Consolidated Highly Migratory Species	Hand line	Scup, bluefish, black sea bass, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
Mid-Atlantic Purse Seine	Federal, international		Purse seine	Atlantic menhaden, other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
New England Hand Line	Federal, international	Northeast Multispecies; Summer Flounder, Scup, and Black Sea Bass; Bluefish; Consolidated Highly Migratory Species	Hand line	Atlantic cod, scup, bluefin tuna, other finfish	Observer data, DAS database, Vessel Trip Report
New England Purse Seine	Federal, international	Atlantic Herring; Northeast Multispecies; Consolidated Highly Migratory Species	Purse seine	Atlantic menhaden, Atlantic herring, bluefin tuna, other finfish	Observer data, DAS database, Vessel Trip Report
Mid-Atlantic Fish Pots and Traps	Federal, state	Summer Flounder, Scup, and Black Sea Bass	Pots and traps (fish)	Black sea bass, tautog other finfish	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
Mid-Atlantic Lobster Pots	Federal, state	Summer Flounder, Scup, and Black Sea Bass	Pots and traps (lobster)	American lobster, Jonah crab, black sea bass	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
Mid-Atlantic Shrimp Trawl	Federal, state		Otter trawl (bottom, shrimp)	Ocean shrimp, summer flounder, Atlantic sea scallop	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database

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**Table 4.1.1** (continued)

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>Non-Grouped Fisheries (cont.)</b>					
New England Fish Pots and Traps	Federal, state	Summer Flounder, Scup, and Black Sea Bass	Pots and traps (fish)	Hagfish, black sea bass, scup, other finfish	Observer data, DAS database, Vessel Trip Report, commercial landings database
New England Lobster Pots	Federal, state		Pots and traps (lobster)	American lobster, Jonah crab, rock crab	Observer data, DAS database, Vessel Trip Report, commercial dealer landings database
Atlantic Blue Crab Trap/Pot	State		Pots and traps (blue crab)	Blue crab	Observer data, published papers
Chesapeake Bay Inshore Gillnet	State		Gillnet	Various finfish	Observer data, commercial dealer landings database
Delaware River Inshore Gillnet	State		Gillnet	Various finfish	Observer data, commercial dealer landings database
Gulf of Maine Herring and Atlantic Mackerel Stop Seine	State		Stop seine	Atlantic herring, Atlantic mackerel	
Gulf of Maine Herring and Atlantic Mackerel Weir	State		Weirs	Atlantic herring, Atlantic mackerel	
Gulf of Maine Mussel	State		Dredge	Blue mussel	
Gulf of Maine Urchin Dive, Hand/Mechanical Collection	State		Hand, diving gear	Urchin	
Long Island Sound Inshore Gillnet	State		Gillnet	Various finfish	Observer data, commercial dealer landings database
Mid-Atlantic Crab Pots	State		Pots and traps	Blue crab, deep sea red crab	Commercial dealer Landings database
Mid-Atlantic Crab Stop Seine	State		Stop seine	Blue crab	
Mid-Atlantic Crab Weir	State		Weirs	Blue crab	
Mid-Atlantic Eel Trap/Pot	State		Pots and traps (eel)	American eel	
Mid-Atlantic Hand Seine	State		Other seines	Various finfish	
Mid-Atlantic Haul/ Beach Seine	State		Haul seines	Various finfish	Observer data

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**Table 4.1.1** (continued)

Fishery <sup>a</sup>	Management Authority	Federal Fishery Management Plan <sup>b</sup>	Gear Type	Target Species (common name)	Bycatch Data Sources <sup>c</sup>
<b>Non-Grouped Fisheries (cont.)</b>					
Mid-Atlantic Oyster	State		Dredge	Eastern oyster	
New England Shrimp Trawl <sup>f</sup>	State		Otter trawl (bottom, shrimp)	Northern shrimp	Observer data, DAS database, Vessel Trip Report
Northeast Atlantic Finfish Aquaculture	State		Aquaculture		
Northeast Atlantic Shellfish Aquaculture	State		Aquaculture		
RI, S. MA (to Monomoy Is.), and NY Bight (Raritan and Lower NY Bays) Inshore Gillnet	State		Gillnet	Various finfish	Commercial dealer landings database
Virginia Pound Net	State		Pound nets	Various finfish	Observer data, commercial dealer landings database

<sup>a</sup> Aquaculture fisheries are listed for consistency with the MMPA List of Fisheries, but were not analyzed for the U.S. National Bycatch Report. Recreational fisheries are not included in this report.

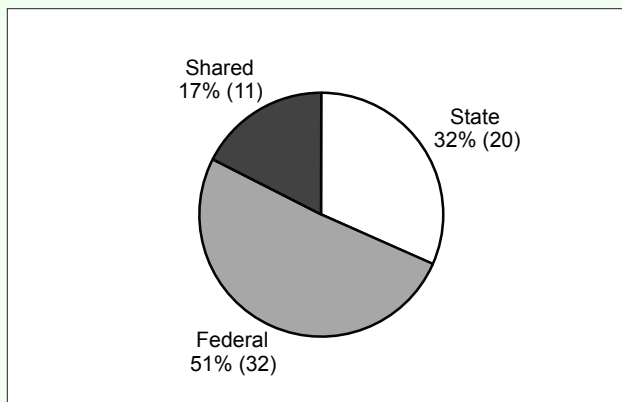
<sup>b</sup> FMPs with the same name are differentiated by managing council. Note that non-Federal FMPs were not identified through this process.

<sup>c</sup> Bycatch data sources include data used for bycatch estimation and/or for tier scoring of fisheries (see Table 4.1.3). Stranding/entanglement, environmental, and satellite data sources were also used for marine mammal and sea turtle bycatch estimates and/or for tier scoring of fisheries, but were not identified in this table. For fisheries with bycatch estimates, observer data were used to estimate bycatch rates, and vessel trip report and/or commercial data were used to expand bycatch rates to total discards. For fisheries without bycatch estimates, observer coverage was conducted on one or more occasions, but not annually, from 1995 to present. DAS = days-at-sea.

<sup>d</sup> For otter trawls, two mesh-size groups are used: small (mesh less than 5.5 inches) and large (5.5-inch mesh and greater). For gillnets, three mesh-size groups were used: small (less than 5.5 inches), large (5.5–7.99 inches), and extra-large (8.0 inches and above).

<sup>e</sup> B-Reg days (B-Regular days at sea, a management measure in place when this report was compiled in 2005) were used to target the six groundfish stocks that could sustain additional effort, in ways that did not undermine longer-term rebuilding efforts for other stocks in the fishery.

<sup>f</sup> Commonly known as Northern Shrimp Trawl.



**Figure 4.1.1**

Management jurisdiction for Northeast Region fisheries (based on numbers of fisheries rather than volume or revenues). “Shared” indicates that international, federal, state, and/or tribal authorities share management jurisdiction.

## 4.1.2. Addressing Regional Bycatch Concerns

Together with the Councils and international management authorities, the NMFS Northeast Region has implemented many regulations to monitor and reduce fisheries bycatch.

### Fish

#### *FMP Measures*<sup>3</sup>

In addition to the various fishing gear requirements described below, there are several other management measures intended to reduce bycatch.<sup>3</sup> Examples include time and area closures, such as Mid-Atlantic Gear Restricted Areas, intended to reduce the bycatch of scup in the squid fishery; and allowances for limited transfers of fish at sea, such as the scup transfer-at-sea provision. There are prohibitions on discarding certain species, e.g., under groundfish Special Access Programs (SAPs) established under the Northeast Multispecies FMP. More stringent reporting requirements were developed, such as the requirement in groundfish SAPs to report all catch on a daily basis via vessel monitoring systems. Additionally, incidental catch quotas were established that count discards against quotas, which are used in various programs established under the Northeast Multispecies FMP.

#### *Bycatch Reduction*

Collaborative efforts to reduce bycatch in the Northeast Region include the development of bycatch-reduction devices (BRDs). One recent example is the Ruhle trawl.<sup>4</sup> The Northeast Fisheries Science Center (NEFSC) and the Northeast Cooperative Research Partners Program (NCRPP) provided funds, field staff, and post-cruise data processing support to University of Rhode Island (URI) Sea Grant scientists, Rhode Island commercial fishermen, and a net manufacturer, for a collaborative effort to develop and test a new net design to reduce bycatch in the directed haddock bottom trawl fishery on Georges Bank. The new design has a selective trawl system that harvests rebuilt stocks while avoiding stocks of concern, reducing economic hardship for coastal fishing communities and also reducing bycatch.

Project design, field work, data analysis, and peer review for the Ruhle trawl occurred during 2005 and 2006. The device was evaluated during more than 100 side-by-side comparison tows completed during four seasonal sampling periods. While the catch of the target species, Georges Bank haddock (*Melanogrammus aeglefinus*), was not sig-

nificantly different between the control and test nets, the bycatch of stocks of concern, notably Atlantic cod (*Gadus morhua*) and yellowtail flounder (*Limanda ferruginea*), was significantly reduced. The bycatch ratio of haddock to cod was improved from 3:1 in the control net to 20:1 in the test trawl, and the ratio of haddock to yellowtail flounder was improved from 13:1 in the control to 151:1 in the test trawl. The modified trawl virtually eliminated the bycatch of skates (a 98% reduction). As a result, this device was awarded first prize in the World Wildlife Fund Smart Gear Competition in 2007.<sup>5</sup> A presentation describing the net and results at the 2007 International Haddock Workshop at the University of New Hampshire, partially funded by NCRPP, resulted in collaboration and net orders from England. Field tests were conducted in the North Sea during December 2007. As a follow-up to the original study, the NCRPP awarded additional funding to URI in 2007 to scale down the net size for use aboard smaller trawlers operating in the Gulf of Maine (testing was initiated in 2008). Federal regulations allowing this device can be found at 50 CFR 648.85.

Additional fish BRDs developed or currently used in the Northeast Region include increased mesh size of scallop dredge twine top, the use of the Nordmore grate in the northern shrimp trawl fishery to reduce bycatch of finfish, and the raised-footrope trawl/Maine grate raised-footrope trawl to reduce bycatch of regulated groundfish. More information on these and other BRDs can be found on the NEFSC website.<sup>6</sup>

### Protected Species

The MMPA requires NMFS to develop and implement Take Reduction Plans (TRPs) to assist in the recovery or prevent the depletion of strategic marine mammal stocks that are seriously injured or killed incidental to commercial fisheries. In the Northeast Region, TRPs have been implemented for the following stocks:

- Harbor porpoise (*Phocoena phocoena*)—Gulf of Maine/ Bay of Fundy stock<sup>7</sup>
- Bottlenose dolphin (*Tursiops truncatus*)—Western North Atlantic coastal stock<sup>8</sup>
- Large whales, including North Atlantic right whales (*Eubalaena glacialis*), fin whales (*Balaenoptera physalus*), and humpback whales (*Megaptera novaeangliae*)—Western Atlantic, Western North Atlantic, and Gulf of Maine stocks, respectively<sup>9</sup>

Additionally, a take-reduction team (TRT) for Northeast and Mid-Atlantic bottom and mid-water trawl fisheries in-

<sup>3</sup> While the text presented herein reflects the measures that were in effect in 2005, recent changes in the management of the Northeast Multispecies fishery, including the more systematic integration of selective gear into fishing operations and the transition to a catch-based management regime in which both landings and discards control fishing operations, have substantially affected the way bycatch is addressed in this FMP; this should be noted in any discussion of bycatch issues.

<sup>4</sup> [http://www.nefsc.noaa.gov/press\\_release/2008/News/NR0824/](http://www.nefsc.noaa.gov/press_release/2008/News/NR0824/)

<sup>5</sup> [http://assets.panda.org/downloads/eliminator\\_november\\_2007\\_final.pdf](http://assets.panda.org/downloads/eliminator_november_2007_final.pdf)

<sup>6</sup> <http://www.nefsc.noaa.gov/>

<sup>7</sup> [http://www.nero.noaa.gov/prot\\_res/porptrp/](http://www.nero.noaa.gov/prot_res/porptrp/)

<sup>8</sup> <http://www.nmfs.noaa.gov/pr/interactions/trt/bdtrp.htm>

<sup>9</sup> <http://www.nero.noaa.gov/whaletrp/>



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teracting with long- and/or short-finned pilot whales (*Globicephala* spp.), common dolphin (*Delphinus delphis*), and white-sided dolphin (*Lagenorhynchus acutus*) was convened in 2006.<sup>10</sup>

Many FMPs have measures in place to control fishing effort, limit fishing in certain areas or times of year, and establish total allowable catch limits. In addition to affecting catch of fish stocks, these measures may shift fishing effort and change fishing practices in ways that may also influence the bycatch of marine mammals and/or sea turtles.<sup>11</sup> Measures to reduce turtle bycatch have also been implemented within FMPs. For example, turtle excluder devices (TEDs) are required for the summer flounder fishery (see 57 FR 57358, 4 December 1992). Regulations specifying time/area closures and mandatory gear requirements further reduce bycatch of sea turtles (see 80 FR 24776, 26 April 2006).<sup>12</sup>

In addition, BRDs have been developed specifically for protected species. An example is the development of a modified pound net design to reduce bycatch of sea turtles in offshore pound nets. In 2004, NMFS prohibited the use of offshore pound net leaders (an important component of the pound net gear) in a portion of the Chesapeake Bay because of incidental takes of sea turtles in this component of the gear. In 2004 and 2005, a coordinated research study directed by the NEFSC with pound net industry participants and other interested parties was initiated to develop and test a modified pound net leader design, with the goal of eliminating or reducing sea turtle interactions while retaining an acceptable level of fish catch (DeAlteris and Silva 2008). A series of gear experiments led NMFS to publish regulations in 2006 permitting pound net fishermen to fish in previously closed areas of the Chesapeake Bay if they utilized the modified leader design. These measures should reduce incidental take of sea turtles in the Virginia pound net fishery, while enabling the fishery to continue.

Chain mats were also developed to reduce sea turtle bycatch in the Atlantic sea scallop dredge fishery. The NEFSC has been working collaboratively with the Southeast Fisheries Science Center, scallop industry, and other interested parties to reduce the severity of some sea turtle interactions with scallop dredge gear by preventing capture of the turtle in the dredge bag (DuPaul et al. 2004). Chain mats are not expected to reduce the total number of interactions (physical contact between the turtle and the dredge gear); however, they are expected to prevent injury and mortality from capture in the dredge bag. On 25 August 2006, NMFS issued a final rule requiring sea scallop dredge vessels fishing south of 41°9.0'N from 1 May to 30 November each year to have dredges equipped with chain mats (NMFS 2006b).

Another BRD developed in the Northeast is the “weak link” for gillnet and trap/pot gear. Whale interactions with commercial fixed fishing gear may occur while the whale is feeding or transiting through an area. Breakaway links or weak links are breakable sections or devices that part when subjected to certain loads. After parting, the rope will have a knotless end to prevent lodging in the whale’s baleen. Weak links with specific breaking strengths are required on fixed fishing gear to reduce the risk of whales becoming entangled, injured, or killed. Weak links placed at the surface system of buoy lines (endlines attached to the buoy and/or rope attaching the buoy to the highflyer) are designed for entanglements that involve the mouth. The NMFS is also working with the Atlantic Large Whale TRT and researchers on the development of other devices or techniques to help reduce or eliminate the risk associated with buoy line entanglements. Note that sea turtles may also become entangled in fixed gear of trap/pots, but that weak links do not reduce interactions between turtles and vertical lines.

Acoustic deterrents (pingers) were shown to reduce harbor porpoise bycatch by 92% in a controlled scientific experiment conducted in gillnets off of New Hampshire (Kraus et al. 1997). Based on the success of this experiment, a TRP to reduce harbor porpoise bycatch was developed that required Northeast gillnets to use pingers during specified times and places when there were high densities of harbor porpoises (NOAA 1998). Following the general trend seen during the scientific experiment, the harbor porpoise bycatch in the normal operational gillnet fishery decreased from above 1500 harbor porpoises per year before 1996 to below 500 harbor porpoises per year during 1999 to 2001. This decrease in bycatch was attributed mainly to the use of the pingers. However, after a while the level of compliance with the TRP decreased, which corresponded with an increase in the level of bycatch. During 2006–07, outreach activities increased to remind fishers about the TRP requirements, compliance increased, and bycatch started decreasing. In the times and areas that pingers were required, the bycatch rate in gillnet hauls without pingers was much higher than that in hauls that used the required number of pingers. The conclusion from the experiences during the controlled scientific experiment and during the normal operational fishery is that pingers appear to reduce the bycatch of harbor porpoises in gillnets, particularly when the required number of pingers are used and in nets using mesh sizes of 6 in or less (Palka et al. 2008).

Examples of other activities in the Northeast Region to reduce bycatch of protected species include requiring sinking groundlines for whale bycatch reduction, and research on acoustic-reflective nets for harbor porpoise and coastal bottlenose dolphin bycatch reduction.

<sup>10</sup> [http://www.nero.noaa.gov/prot\\_res/atgrtp/](http://www.nero.noaa.gov/prot_res/atgrtp/)

<sup>11</sup> <http://www.nero.noaa.gov/nero/fishermen/>

<sup>12</sup> <http://www.nero.noaa.gov/prot%5Fres/seaturtles/regs.html>

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Photo: William Millhouser, NOS.

A squid (*Illex illecebrosus*) cruising over a sandy area of Stellwagen Bank National Marine Sanctuary.

### 4.1.3 Data Sources

Data from commercial fishing trips have been collected in northeast ports for more than 100 years. Table 4.1.1 lists data sources used to estimate bycatch for federally managed Northeast Region fisheries and those northeast state fisheries with relevant Federal data-collection programs. In addition to observer programs, the Northeast Region collects fishing VTRs from federally permitted vessels operating under the region's FMPs.

#### 4.1.3.1 Observer Program Data

In the 1970s and 1980s, foreign vessels fishing in the U.S. Exclusive Economic Zone (EEZ) paid for the costs of fishery observer coverage on their vessels. While the foreign fleets decreased their fishing time in these waters, the number of U.S. vessels increased and the observer program expanded. Throughout the 1990s, most of the observer program's sea days were used to monitor fixed-gear commercial fisheries for takes of protected species. Today, the Northeast Fishery Observer Program (NEFOP) collects, processes, and manages data and biological samples from vessels with Federal or state commercial fishing permits operating within Federal and state waters of the U.S. EEZ from Maine to North Carolina.

Fisheries observers are required under all Northeast Region FMPs and for some fisheries by other Federal laws and authorities such as the MMPA and the ESA. The NEFOP observers record weights of kept and discarded (actual or estimated) fish and crustacean species on observed hauls, as well as biological sampling information (tags, lengths, age, and sex) for all species caught, including bycatch of marine mammals, sea turtles, and seabirds. Data on vessel and gear characteristics and fishing practices are also collected. All data are collected for scientific and fisheries management purposes. As in many observer programs, bias may arise if vessels with observers consistently catch more or less than other vessels, or fish in different areas, or if average trip duration changes. The NEFOP has devel-

oped vessel selection protocols, including random selection procedures, to ensure representative sampling. Analyses to evaluate bias in the NEFOP have indicated no systematic bias in amount of kept pounds, trip duration, or area fished (Rago et al. 2005; Wigley et al. 2007).

In 2005, the NEFOP observed over 8,900 days of commercial fishing. The region has observer programs at developing or mature levels for several fisheries, including the Atlantic sea scallop dredge, Mid-Atlantic bottom longline, Mid-Atlantic gillnet fisheries, New England large-mesh trawl, New England sink gillnet, and New England/Mid-Atlantic small-mesh trawl. Other regional fisheries (e.g., Mid-Atlantic general category scallop trawl, New England and Mid-Atlantic purse seine, New England handline, and New England shrimp trawl) are observed at baseline/pilot levels of coverage. Northeast Region observer programs and observed fisheries are listed in Table 4.1.2.

#### 4.1.3.2 Mandatory Self-Reported Data

A mandatory reporting system for landings and sales of all species was implemented by the Northeast Region in 1994. Required for all federally permitted fisheries in the Northeast, the mandatory reporting system has two components, dealer reporting and VTRs. Dealer reports contain total landings by market category, but do not contain information on trip effort, area fished, gear type, or mesh sizes. The VTRs contain information for each trip taken including catch, effort, gear characteristics, and spatial data variables. The VTR requirements apply to all trips made by vessels holding a Northeast Region Federal fishing permit for either Federal or state waters, regardless of species fished for or retained. Even if no fish are landed on a trip, the vessel owners/operators must still complete the report.

These data provide a near-census of commercial landings. Comparisons between dealer reports and VTR data have indicated general agreement between the sources, suggesting that misreporting of landings does not occur at sizeable levels (Rago et al. 2005; Wigley et al. 2008). Some extrapolation factors used to estimate total discards and the weighting factors for discard-to-kept ratios may be underestimated slightly and are being addressed through further work to identify the source of the disparities (Wigley et al. 2007).

In addition, data provided in entanglement reports submitted to the NMFS Northeast Regional Office and Southeast Regional Office by members of the National Stranding Network, large whale disentanglement teams, the U.S. Coast Guard, and civilian sources are used to estimate a minimum number of entanglements and ship strikes of large whales, though most entanglements cannot be assigned to a specific fishery (Glass et al. 2008).

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**Table 4.1.2**

Current Northeast Region Federal observer programs, fisheries observed, and coverage levels. Programs and observed fisheries are listed alphabetically. Observer programs that ended over 10 years ago are not listed.

Observer Program	National Bycatch Report Fisheries	Authority to Place Observers	Program Duration	Coverage Level
Atlantic Sea Scallop Dredge Fishery	Mid-Atlantic General Cat. Closed Area Scallop Dredge	MSA (50 CFR 648)	1999–present	2005: <3% 2006: 8–10% 2007: 8–10% 2008: 10%
	Mid-Atlantic General Cat. Open Area Scallop Dredge			
	Mid-Atlantic Limited-Access Closed Area Scallop Dredge			
	Mid-Atlantic Limited-Access Open Area Scallop Dredge			
	New England General Cat. Closed Area Scallop Dredge			
	New England General Cat. Open Area Scallop Dredge			
	New England Limited-Access Closed Area Scallop Dredge			
	New England Limited-access Open Area Scallop Dredge			
Mid-Atlantic Gillnet Fisheries	Mid-Atlantic Extra-Large-Mesh Gillnet	MSA (50 CFR 648); MMPA Cat. I (50 CFR 229)	1994–present	2005: 3% 2006: <2% 2007: <1% 2008: <3%
	Mid-Atlantic Large-Mesh Gillnet			
	Mid-Atlantic Small-Mesh Gillnet			
	Mid-Atlantic Haul/Beach Seine			
Mid-Atlantic Illex Squid Trawl	Mid-Atlantic Small-Mesh Otter Trawl <sup>a</sup>	MSA (50 CFR 648); MMPA Cat. II (50 CFR 229)	2004–present	2005: <1% 2006: <1% 2007: <1% 2008: <3%

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**Table 4.1.2** (continued)

Observer Program	National Bycatch Report Fisheries	Authority to Place Observers	Program Duration	Coverage Level
New England Groundfish Trawl and Sink Gillnet Fisheries (also bottom longline/tub, herring mid-water pair trawl, New England handline, shrimp trawl, and whiting trawl)	Mid-Atlantic Bottom Longline	MSA (50 CFR 648); MMPA Cat. I, II and III (50 CFR 229)	1990–present	2005: 5% A-days; 50% B-days 2006: 2–10% 2007: 5% 2008: 8-10%
	Mid-Atlantic Mid-Water Trawl			
	Mid-Atlantic Purse Seine			
	Mid-Atlantic Shrimp Trawl			
	New England Bottom Longline			
	New England Extra-Large-Mesh Gillnet			
	New England Haddock Sector Longline			
	New England Handline			
	New England Large-Mesh Gillnet			
	New England Mid-Water Trawl			
	New England Purse Seine			
	New England Shrimp Trawl			
New England Small-Mesh Gillnet				
New England and Mid-Atlantic Large-Mesh Trawl Fisheries	Mid-Atlantic General Cat. Scallop Trawl	MSA (50 CFR 648); MMPA Cat. II (50 CFR 229.7)	1998–present	2005: 1% 2006: 5–30% 2007: 2% 2008: <3%
	Mid-Atlantic Large-Mesh Otter Trawl			
	New England B-Reg DAS <sup>b</sup> Large-Mesh Otter Trawl			
	New England Large-Mesh Otter Trawl			
	New England US/CAN Area Large-Mesh Otter Trawl			
New England and Mid-Atlantic Small-Mesh Trawl Fisheries	Mid-Atlantic Small-Mesh Otter Trawl <sup>a</sup>	MMPA Cat. II (50 CFR 229.7); MSFCMA (50 CFR 648)	1994–present	2005: 1% 2006: 1% 2007: <1% 2008: <3%
	New England Small-Mesh Otter Trawl			
	New England US/CAN Area Small-Mesh Otter Trawl			

MSA = Magnuson-Stevens Fisheries Conservation and Management Act; CFR = Code of Federal Regulations

<sup>a</sup> The Mid-Atlantic small-mesh otter trawl fishery is listed twice in this table. It is observed under two different programs, depending on target species.

<sup>b</sup> DAS = days-at-sea

#### 4.1.4 Bycatch Estimation Methods

Northeast Region bycatch estimation methods for fish, marine mammals, and sea turtles are presented in this section. Bycatch estimation methods for seabirds are being developed for inclusion in a future edition of the U.S. National Bycatch Report.

##### 4.1.4.1 Fish Bycatch Estimation Methods for Federally Managed Commercial Fisheries

In this analysis, the 2005 NEFOP data were used to calculate discard ratios, with 2005 logbook data used to expand the NEFOP discard ratios to total discards (Wigley et al. 2008). The sampling unit was an individual fishing trip. Trips were partitioned into fleet sectors using six classification variables: calendar quarter, area fished, gear type, mesh size, access area, and trip category. Calendar quarter was based on landed date and used to capture seasonal variation in fishing activity and discard rates. Areas fished were based on the statistical reporting area; trips where area was unknown were excluded. Two areas were defined: New England (NE), comprising statistical areas 511–543, 561, and 562 (which includes southern New England, Georges Bank, and the Gulf of Maine); and Mid-Atlantic (MA), comprising statistical areas 611–639 (Figure 4.1.2).

The gear type variable was based on Northeast gear codes. Some gear codes were combined, and trips for which gear type was unknown were excluded. Mesh-size groups were formed for otter trawl and gillnet gear. Five access area categories were formed: “closed area,” “US/CAN,” “B-day,” “HOOK,” and “open area” (Wigley et al. 2008). Trip categories were employed to subdivide the scallop fishery into general (Gen) and limited (Lim) trips; all other fisheries were categorized as “all.”

Fishery codes, days-at-sea (DAS) codes, and access area codes were used to classify all VTR trips into one of five access area categories. Vessel permit number and date landed were used to link VTR trips with DAS trips. A detailed description of the method and the obstacles encountered in joining the VTR and DAS data is given in Wigley et al. (2008).

When one or no observer trips occurred in a calendar quarter, an imputation approach (Cochran 1963) was employed to fill in missing or incomplete information, using data from an adjoining stratum. In this simple imputation of temporal stratification only, the classification of calendar quarter was relaxed to half-year, recognizing that seasonal variation occurs for some species. The imputation was used to fill quarterly cells for which there were one or no observed trips. When all quarterly cells were missing or observer coverage was low, and this existed across all quarters for a fleet, the fleet was omitted and no discard estimation performed.



Photo: Nicole Gilles, NMFS

Observer measuring a striped bass.

Total annual discards were estimated using a combined  $d/k$  ratio estimator (Cochran 1963) where  $d$  = discard pounds of a given species and  $k$  = kept pounds of all species (as a measure of fishing effort). Numbers for 2005 VTR landings were used to expand the discard rate to estimate total discard weight.

The combined ratio method was based on a ratio estimate pooled over all strata and trips within each fleet. Total discards (in pounds) for species  $j$  were defined as:

$$(1) \hat{D}_j = \sum_{h=1}^Q K_h r_{c,j}$$

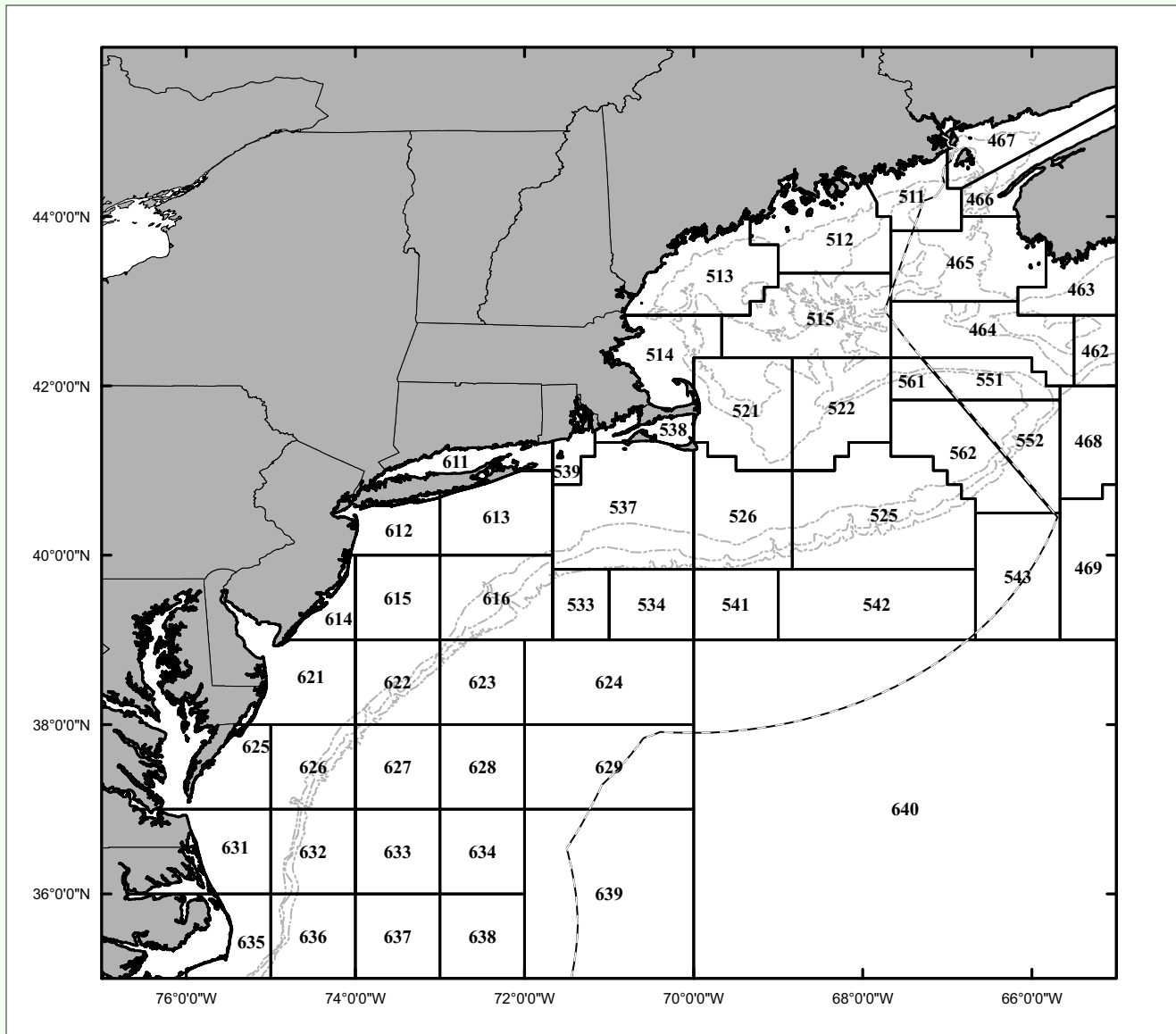
where  $\hat{D}_j$  is the total discarded pounds of species  $j$ ;  $h$  is the stratum;  $Q$  is the number of strata;  $K_h$  is the VTR total kept pounds in stratum  $h$ ; and  $r_{c,j}$  is the combined ratio of species  $j$ , calculated as:

$$(2) r_{c,j} = \frac{\sum_{h=1}^Q N_h \sum_{i=1}^{n_h} \frac{d_{jih}}{n_h}}{\sum_{h=1}^Q N_h \sum_{i=1}^{n_h} \frac{k_{ih}}{n_h}}$$

where  $N_h$  is the number of VTR trips in stratum  $h$ ;  $n_h$  is the number of observed trips in stratum  $h$ ;  $d_{jih}$  is the total discards (in pounds) of species  $j$  from trip  $i$  in stratum  $h$ ; and  $k_{ih}$  is the kept pounds of all species on trip  $i$  in stratum  $h$ .



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**Figure 4.1.2**  
Northeast statistical areas (source: Northeast Fisheries Science Center).

In Equation 2 the summation over strata  $h = 1$  to  $Q$  occurs over calendar quarters. Equation 3 (below) requires a more explicit definition of the stratum designation, since the summation over quarter relies on the annual combined ratio defined in Equation 2. Variance  $V$  of  $\hat{D}_j$  for species  $j$  was defined as:

$$(3) \quad V(\hat{D}_j) = \sum_{q=1}^4 K_{qh}^2 \left( \frac{N_{qh} - n_{qh}}{n_{qh} N_{qh}} \right) \frac{1}{\left( \frac{\sum_{i=1}^{n_h} K_{iqh}}{n_{qh}} \right)^2} \left[ \frac{\sum_{i=1}^{n_{qh}} (d_{jiqh}^2 + (r_{c,j})^2 k_{iqh}^2 - 2r_{c,j} d_{jiqh} k_{iqh})}{n_{qh} - 1} \right]$$

where  $\hat{D}_j$  is the total discards (in pounds) of species  $j$ ;  
 $K_{qh}$  is the VTR total kept pounds in quarter  $q$  and stratum  $h$ ;  
 $N_{qh}$  is the number of VTR trips in quarter  $q$  and stratum  $h$ ;  
 $n_{qh}$  is the number of observed trips in quarter  $q$  and stratum  $h$ ;  
 $k_{iqh}$  is the kept pounds of all species on trip  $i$  in quarter  $q$  and stratum  $h$ ;  
 $d_{jiqh}$  is the total discards (in pounds) of species  $j$  from trip  $i$  in quarter  $q$  and stratum  $h$ ; and  
 $r_{c,j}$  is the combined ratio of species  $j$ .

Coefficient of variation (CV) of  $\hat{D}_j$  was defined as:

$$(4) \quad CV(\hat{D}_j) = \frac{\sqrt{V(\hat{D}_j)}}{\hat{D}_j}$$

#### 4.1.4.2 Caveats for Fish Bycatch Estimation

To evaluate a diverse range of species and fleets in the Northeast Region, the combined ratio method using the ratio of discard to kept weight was selected. The combined ratio method also accommodated the varying degrees of seasonal sparseness in the current observer program coverage. This design-based estimator used numbers kept of all species; kept of all species is more verifiable than data for effort (days absent or days fished) and better utilized the information associated with kept pounds. Total kept for all species in the ratio estimator was used as a surrogate for fishing effort. It was recognized that stratification alone may be insufficient to account for the heterogeneity of fleet behaviors or other specializations within a stratum. However, this was the best available method since other measures of fishing effort such as total days fished, crew size, and so forth are difficult to obtain for the entire fleet. Moreover, measures of fishing effort for fixed gears (e.g., gillnet soak

time multiplied by net length multiplied by mesh size) were not collected for the fishery as a whole. The ratio estimator assumed a zero-intercept regression as an appropriate model of the relationship of discard to kept. Departures from linearity were recognized as a general limitation.

A total of 3,565 observed trips<sup>13</sup> were used in this analysis, with the majority of these occurring in the otter trawl, gillnet, and sea scallop dredge fleets (trips were partitioned when the trip characteristics fell into more than one fleet). Although observer coverage in 2005 was relatively high compared to previous years, some fleets had little or no observer coverage. For some fleets with limited temporal coverage by observers, imputation (Cochrane 1963) was used to derive discard estimates. However, using half-year estimates may not be appropriate for all species and, in some cases, quarterly discard ratios were based on very small sample sizes. This contributed to the lower precision (higher CV) associated with several of these estimates. Because discards were not estimated for all fisheries (due to data limitations), the total discard estimates presented in this report underestimate actual total discards in 2005.

As mentioned above, 2005 VTR landings (all species combined, live weight) by fleet and quarter were used to expand the discard ratios. Dealer data could not be used to expand the discard ratios because these data do not contain two key variables that define fisheries: mesh and area fished. As a surrogate for dealer data, VTR data were used.

In summary, a very broad stratification was used to encompass all species examined in the Northeast Regional fish analysis. The discard estimates provided in this report will differ from discard estimates derived for and used in stock assessments. For stock assessments, the stratification, as

<sup>13</sup> Observed trips (the sampling unit of the analysis) are a subset of the entire observer program's sampling activities and are not the same as number of days observed. Observed trips do not include trips where protected species sampling protocol were used, training trips, aborted trips, etc.

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Photo credit: Peter Duley, NMFS.

The North Atlantic right whale.

well as the methods, is tailored to each species/stock to capture the appropriate seasonal, geographical, and gear/mesh discarding patterns that are species/stock specific. Details of the discard estimation for this analysis, including validation of the estimation method and the underlying data, are described in Wigley et al. (2008).

#### 4.1.4.3 Marine Mammal Bycatch Estimation Methods for Federally Managed Commercial Fisheries

For all bycaught marine mammal species and all fisheries, the total number of marine mammal takes,  $B$ , was defined as the product of the observed bycatch rate and total annual fishing effort:  $B = \text{bycatch rate} \cdot \text{total effort}$ , where the bycatch rate was defined as the number of animals taken per unit of fishing effort. Fisheries with no recorded takes had estimates of zero.

Since 1990, estimates of marine mammal bycatch rates have been derived from data collected by the NEFOP. Bycatch rates have been calculated using ratio and modeling estimation methods (see Sections 4.1.4.3.1 and 4.1.4.3.2). Bycatch rates were expanded using the most appropriate measure of fishing effort for a particular fishery. An appropriate measure was defined as a measure that increased as the number of takes increased, and was available in the observed sample and for the entire fishery.

Fishing effort information was obtained from four databases: the VTR database; Northeast Dealer Report Landings database (also sometimes referred to as the weighout data-

base); North Carolina Division of Marine Fisheries trip ticket landings database; and Virginia Marine Resource Commission landings database. For some fisheries, information from the VTR or observer databases was used to prorate landings from a particular fishery to fishery-and-bycaught species-specific strata.

Standard bootstrapping techniques were used to derive the confidence intervals and CV for the bycatch estimates. The resampling unit used was usually an entire trip rather than individual hauls, to ensure that any within-trip dependence was carried over into the bycatch estimate's variance (Bisack 2003).

##### 4.1.4.3.1 Marine Mammal Bycatch Estimation Methods for Federally Managed Gillnet Commercial Fisheries

Estimates of bycatch in the gillnet fishery were made for all species bycaught. For example, estimates for grey (*Halichoerus grypus*), harbor (*Phoca vitulina concolor*), and harp (*Phoca groenlandica*) seals and for harbor porpoise (*Phocena phocena*), white sided dolphin (*Lagerorhynchus acutus*), common dolphin (*Delphinus delphis*), and coastal bottlenose dolphin (*Tursiops truncatus*) were calculated using the ratio estimator method for bycaught species-specific strata, where the unit of effort was metric tons (m ton) of kept landings. Landings were considered the most appropriate unit of effort for this fishery, because it is presently the only unit of effort that is accurately recorded and available for the entire fishery.

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The total annual number of marine mammal takes,  $B$ , was defined as the product of the observed annual bycatch rate and total annual effort within each stratum,  $S$ :

$$B = \sum_{i=1}^S \frac{\text{observed takes}_i}{\text{observed landings (m tons)}_i} \bullet \text{total landings (m tons)}_i$$

Strata were spatially and temporally specific, taking into account the seasonal and geographic distribution of the by-caught species and gillnet fishing practices. In all cases, separate estimates were calculated for the New England and mid-Atlantic gillnet fisheries, as defined in the *MMPA List of Fisheries for 2008* (NMFS 2007). Estimates for each calendar year were derived from only the corresponding year's data for all species except coastal bottlenose dolphins, where observer data were pooled over years to estimate the bycatch rate (due to the small numbers of observed takes) and effort was year-specific.

A weighted bycatch rate was calculated for strata within the Northeast gillnet fishery that had hauls fishing with and without pingers, where the weight was the proportion of hauls sampled with or without pingers.

Previous bycatch estimates for harbor porpoises are reported in Bisack (1993), Smith et al. (1993), Bravington and Bisack (1996), Bisack (1997), Rossman and Merrick (1999), Bisack (2003), Belden et al. (2006), Belden (2007), and Belden and Orphanides (2007). Previous bycatch estimates for harbor seals, gray seals, harp seals, common dolphins, and white sided dolphins are reported in Belden et al. (2006), Belden (2007), and Belden and Orphanides (2007). Bycatch estimates for coastal bottlenose dolphins during 2001 to 2005 using the ratio method and generalized linear modeling (GLM) are reported in Waring et al. (2007), and estimates from 1995 to 2000 using GLM are reported in Palka and Rossman (2001).

Currently, for harbor porpoises and seals, GLMs and generalized additive models (GAM) are being explored to better define strata to be used with the ratio method or to be used directly to estimate bycatch rate.

#### 4.1.4.3.2 Marine Mammal Bycatch Estimation Methods for Federally Managed Trawl Commercial Fisheries

For both the New England and Mid-Atlantic Regions, bycatch was estimated separately for bottom trawl and mid-water (single and paired) trawl fisheries. In brief, observer data were used to develop bycatch rate models; VTR data were used as the primary source of fishing effort to expand the bycatch rate to a total bycatch estimate; and commercial dealer-reported landings data were used to expand the VTR data to the entire fishery (if needed).

The most appropriate unit of effort for trawl fisheries was determined to be "days fished," that is, the number of days the net is in the water (not the amount of time the ship is away from port). Bycatch rate models for cetaceans (Atlantic white-sided dolphins, common dolphins, and long- and/or short-finned pilot whales (*Globicephala* spp.)) were developed using GLMs, GAMs, classification trees, and zero-inflated GLM and GAMs, assuming a Poisson distribution. Many gear characteristics, fishing practices, spatial-temporal categories, and environmental factors were investigated to determine the best fitting bycatch rate model. Observer data collected from 2001 to 2005 were pooled to develop the bycatch rate model for the bottom trawl fisheries, and data from 2003 to 2006 were pooled to develop the bycatch rate model for the mid-water trawl fisheries. Poisson regression was used to model the bycatch rate ( $y$ /effort), where the number of takes ( $y$ ) was a function of predictor variables:

$$\log(y) = \log(\text{effort}) + \beta_0 + f_1x_1 + f_2x_2 + \dots + f_jx_j$$

where  $f_j$  was a smooth function when the model was a GAM model, and  $f_j$  was a coefficient value when the model was a GLM;  $x_j$  was a predictor variable describing an environmental, gear, or fishing characteristic; and  $\log(\text{effort})$  was an offset variable with a coefficient set to 1.0 (Allison 1999).

For bottom trawl fisheries, the best-fitting quasi-Poisson GLM bycatch rate models were species-specific and included the following significant predictors: statistical area, target fish species, sea surface temperature, bottom depth, bottom slope, and vessel horse power (Rossman, 2009). For mid-water trawl fisheries, a quasi-Poisson GAM bycatch rate model indicated that the most significant predictors of marine mammal bycatch were the latitude where fishing occurred and depth of the water column (Palka pers. comm.<sup>14</sup>).

#### 4.1.4.4 Sea Turtle Bycatch Estimation Methods for all Federally Managed Commercial Fisheries

The same general estimation methods and data sources were used to estimate the bycatch of marine mammals and sea turtles. For sea turtle bycatch estimates, definitions of

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strata and significant variables in bycatch rate models were fishery-specific and differed from the marine mammal bycatch rate models. Fisheries with no observed takes were given estimates of zero.<sup>15</sup>

#### 4.1.4.4.1 Mid-Atlantic Region: Sea Turtle Bycatch Estimation Methods for Federally Managed Gillnet Commercial Fisheries

Bycatch estimates of turtles in gillnet gear were not available for inclusion in this report. However, observer data from 1994 to 2006 were examined in order to estimate sea turtle bycatch in this fishery in 2009 (see Murray 2009); updated estimates will be included in the next edition of this report.

#### 4.1.4.4.2 Mid-Atlantic Region: Loggerhead Sea Turtle Bycatch Estimation Methods for Federally Managed Scallop Dredge Commercial Fisheries

Bycatch rate models, primarily for loggerhead species, were developed using GLM and GAM, assuming either a binomial or Poisson distribution (see Section 4.1.4.3.2). The unit of effort used for estimating total loggerhead bycatch in dredge fisheries was primarily “dredge hours,” the cumulative amount of time that dredges were fishing in the water. For instance, if a vessel towed two dredges for one hour, the total number of dredge hours would be two. The primary source for commercial fishing effort in the scallop dredge fishery was VTR data.

Annual bycatch estimates for sea turtles in the scallop dredge fishery from 2001 to 2005<sup>16</sup> are reported in Murray (2004a, 2004b, 2005, and 2007).

#### 4.1.4.4.3 Mid-Atlantic Region: Sea Turtle Bycatch Estimation Methods for Federally Managed Trawl Commercial Fisheries

Bycatch was estimated separately for bottom trawl gear designed to catch fish and those designed to catch scallops. Observer data from 1994 to 2004 were pooled to develop the bycatch rate model for bottom trawl fisheries for fish. Observer data from 2004 to 2005 were pooled to develop the bycatch rate model for bottom trawl fisheries for scallops. Bycatch rate models for loggerheads were developed using ratio estimation, or GLMs and GAMs, assuming a

Poisson distribution (see section 4.1.4.3.2). The primary data source for commercial fishing effort in trawl fisheries was VTR data; however, the Northeast Dealer Report Landings database was used to adjust VTR effort for proper extrapolation of observed bycatch rates.

Bycatch estimates for sea turtles in the bottom otter trawl fishery are reported in Murray (2006). Bycatch estimates for sea turtles in the scallop trawl fishery are reported in Murray (2007).

#### 4.1.4.5 Seabird Bycatch Estimation Methods for Federally Managed Commercial Fisheries

Bycatch estimates of seabirds in all fishing gear were not available for inclusion in this report. Observer data from 1996 to 2006 are currently being examined to develop estimates of seabird species-specific bycatch in gillnet fisheries.

#### 4.1.5 Tier Classification of Northeast Region Fisheries

Data quality and bycatch estimation methods were evaluated for 52 of the 63 fisheries in the Northeast Region. Only relevant Federal data-collection programs were evaluated. Other data may be available for state, international, and tribal fisheries; however, these programs were beyond the scope of this initial report. Tier scores were assigned to 50 fisheries in the fish category and 52 in the marine mammal and other protected species categories, according to the scoring process outlined in Section 3. Two fisheries that received marine mammal/other protected species tier scores (the Atlantic blue crab trap/pot and the Mid-Atlantic haul/beach seine fisheries) were not evaluated for fish, as fish data and estimation methods were not available for evaluation. Fishery tier assignments for the Northeast Region U.S. National Bycatch Report fisheries are given in Table 4.1.3.

The largest percentage of fisheries, 68% (34), were assigned to Tier 3 (Figure 4.1.3A). Of the remaining fisheries, 8% of fisheries (4) were classified in the highest tier category, Tier 4. The remaining 12 fisheries were classified in Tiers 0, 1, and 2. For marine mammals (Figure 4.1.3B), 9% of fisheries (3) were classified as Tier 4, 65% (23) were classified as Tier 3, and 20% (7) were classified in Tiers 1 and 2. Similarly, for other protected species (Figure 4.1.3C), 9% of fisheries (3) were classified as Tier 4, with 65% (23) in Tier 3, and 20% (7) in Tier 2. No fisheries were classified as Tier 1 for other protected species.

Grouped fisheries were assigned to a single tier for the marine mammal and other protected species categories, based on current bycatch data-collection and estimation methods. Note that the total number of fisheries for marine mammal and other protected species shown in Figure 4.1.3

<sup>15</sup> Takes may have occurred in some of these fisheries; however, due to insufficient coverage and further statistical issues, the bycatch estimate is actually undefined or unknown because bycatch estimation is not feasible. Thus for simplicity at this time, a zero bycatch was assigned to fisheries.

<sup>16</sup> The bycatch estimates for sea turtles in 2001 and 2002 were for only part of the scallop dredge fishery in the Mid-Atlantic.



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is based on the number of grouped fisheries evaluated (8) plus the number of individual fisheries evaluated for fish bycatch (27). The total number of fisheries for Fish is 50 (the number of individual fisheries evaluated). The tier for each group was “cascaded” down to individual U.S. National Bycatch Report fisheries (Table 4.1.3; see Section 3.2).

Of the fisheries evaluated, two HMS fisheries managed jointly by NMFS and ICCAT, the Gulf of Maine/Mid-Atlantic tuna, shark, and swordfish hook-and-line, and the Gulf of Maine/Mid-Atlantic tuna, shark, and swordfish harpoon, were classified as Tier 0 for bycatch data/estimation methods in all categories by the NMFS HMS Management Division. Little data were available on bycatch in these fisheries..

**Table 4.1.3**

Fishery tier classifications for Northeast Region fisheries for 2005. Grouped fisheries are listed alphabetically, first by fisheries group name, then by management authority, and then by individual fishery name. Non-grouped fisheries are listed next, by management authority and then fishery name. The marine mammal and other protected species tier scores for grouped fisheries represent the tier score for the group as a whole (denoted by asterisk\*); individual fisheries were not evaluated. Shaded fisheries were evaluated for this report. Only relevant Federal data-collection programs were evaluated.

Fishery Name	Management Authority	Fish Tier	Marine Mammals Tier	Other Protected Species Tier
<b>Mid-Atlantic Gillnet Fisheries</b>				
Mid-Atlantic Extra-Large-Mesh Gillnet	Federal	3	3*	3*
Mid-Atlantic Large-Mesh Gillnet	Federal	3	3*	3*
Mid-Atlantic Small-Mesh Gillnet	Federal	3	3*	3*
<b>Mid-Atlantic Otter Trawl Fisheries</b>				
Mid-Atlantic Large-Mesh Otter Trawl	Federal	3	3*	4*
Mid-Atlantic Small-Mesh Otter Trawl	Federal	3	3*	4*
<b>Mid-Atlantic Scallop Dredge Fisheries</b>				
Mid-Atlantic General Cat. Closed Area Scallop Dredge	Federal	3	3*	4*
Mid-Atlantic General Cat. Open Area Scallop Dredge	Federal	3	3*	4*
Mid-Atlantic Limited-Access Closed Area Scallop Dredge	Federal	3	3*	4*
Mid-Atlantic Limited-Access Open Area Scallop Dredge	Federal	3	3*	4*

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Table 4.1.3 (continued)

Fishery Name	Management Authority	Fish Tier	Marine Mammals Tier	Other Protected Species Tier
<b>Mid-Atlantic Scallop Trawl Fisheries</b>				
Mid-Atlantic General Cat. Scallop Trawl	Federal	3	3*	4*
Mid-Atlantic Limited-Access Scallop Trawl	Federal	3	3*	4*
<b>New England Bottom Longline Fisheries</b>				
New England Bottom Longline	Federal	3	3*	3*
New England Haddock Sector Longline	Federal	3	3*	3*
<b>New England Gillnet Fisheries</b>				
New England Extra-Large-Mesh Gillnet	Federal	4	4*	3*
New England Large-Mesh Gillnet	Federal	4	4*	3*
New England Small-Mesh Gillnet	Federal	3	4*	3*
<b>New England Otter Trawl Fisheries</b>				
New England B-Reg DAS Large-Mesh Otter Trawl	Federal	3	4*	3*
New England Large-Mesh Otter Trawl	Federal	4	4*	3*
New England Small-Mesh Otter Trawl	Federal	4	4*	3*
New England US/CAN Area Large-Mesh Otter Trawl	Federal	3	4*	3*
New England US/CAN Area Small-Mesh Otter Trawl	Federal	3	4*	3*
<b>New England Scallop Dredge Fisheries</b>				
New England General Cat. Closed Area Scallop Dredge	Federal	3	3*	3*
New England General Cat. Open Area Scallop Dredge	Federal	3	3*	3*

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**Table 4.1.3** (continued)

Fishery Name	Management Authority	Fish Tier	Marine Mammals Tier	Other Protected Species Tier
<b>New England Scallop Dredge Fisheries (cont.)</b>				
New England Limited-Access Closed Area Scallop Dredge	Federal	3	3*	3*
New England Limited-Access Open Area Scallop Dredge	Federal	3	3*	3*
<b>Non-Grouped Fisheries</b>				
Mid-Atlantic Bottom Longline	Federal	3	3	3
Mid-Atlantic Clam/Quahog Dredge	Federal	2	3	3
Mid-Atlantic Mid-Water Otter Trawl	Federal	3	3	3
New England Clam/Quahog Dredge	Federal	2	3	3
New England Crab Pots	Federal	2	2	2
New England Mid-Water Otter Trawl	Federal	3	4	3
New England Scottish Seine	Federal	3	3	3
Gulf of Maine, Mid-Atlantic Tuna, Shark, Swordfish Harpoon	Federal, international	0	0	0
Gulf of Maine, Mid-Atlantic Tuna, Shark, Swordfish Hook-and-Line	Federal, international	0	0	0
Mid-Atlantic Hand Line	Federal, international	3	3	3
Mid-Atlantic Purse Seine	Federal, international	3	3	3
New England Hand Line	Federal, international	3	3	3
New England Purse Seine	Federal, international	3	3	3
Mid-Atlantic Fish Pots and Traps	Federal, state	3	3	3
Mid-Atlantic Lobster Pots	Federal, state	2	3	3
Mid-Atlantic Shrimp Trawl	Federal, state	3	3	3
New England Fish Pots and Traps	Federal, state	3	3	3

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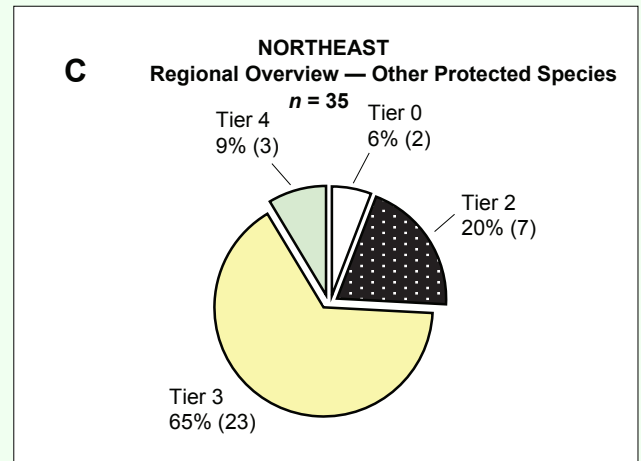
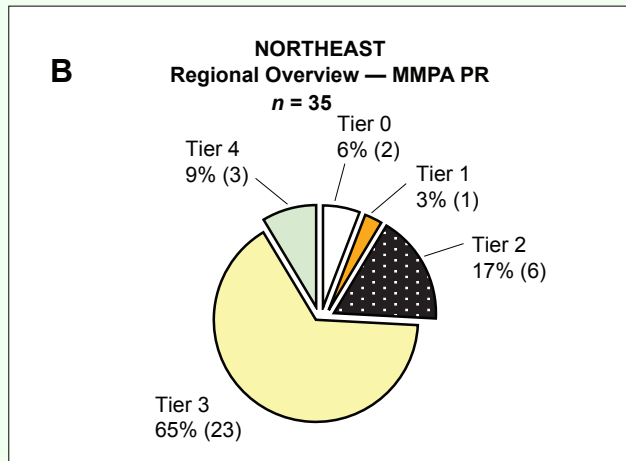
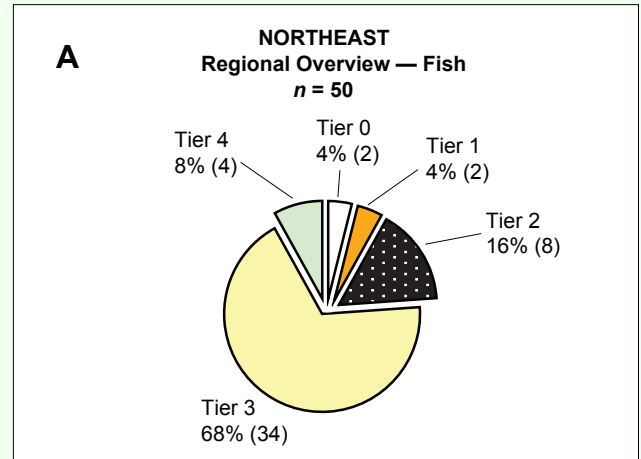
Table 4.1.3 (continued)

Fishery Name	Management Authority	Fish Tier	Marine Mammals Tier	Other Protected Species Tier
<b>Non-Grouped Fisheries (cont.)</b>				
New England Lobster Pots	Federal, state	3	3	3
Atlantic Blue Crab Trap/Pot	State		3	3
Chesapeake Bay Inshore Gillnet	State	2	2	2
Delaware River Inshore Gillnet	State	1	2	2
Gulf of Maine Herring and Atlantic Mackerel Stop Seine	State			
Gulf of Maine Herring and Atlantic Mackerel Weir	State			
Gulf of Maine Mussel	State			
Gulf of Maine Urchin Dive, Hand/Mechanical Collection	State			
Long Island Sound Inshore Gillnet	State	2	2	2
Mid-Atlantic Crab Pots	State	2	3	3
Mid-Atlantic Crab Stop Seine	State			
Mid-Atlantic Crab Weir	State			
Mid-Atlantic Eel Trap/Pot	State			
Mid-Atlantic Hand Seine	State			
Mid-Atlantic Haul/Beach Seine	State		2	2
Mid-Atlantic Oyster	State			
New England Shrimp Trawl	State	3	3	3
Northeast Atlantic Finfish Aquaculture	State			
Northeast Atlantic Shellfish Aquaculture	State			
Ri, S. MA (to Monomoy Is.) and NY Bight (Raritan and Lower NY Bays) Inshore Gillnet	State	1	2	2
Virginia Pound Net	State	2	1	2

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**Figure 4.1.3**

Number and percentage of Northeast Region fisheries in each fishery tier class, for fisheries with Federal management or Federal data-collection programs for A) fish, B) marine mammals, and C) other protected species. Tier scores are for the year 2005.



## 4.1.6 Northeast Regional Key Stocks

Fifty-five key stocks/populations were identified in the Northeast Region (Table 4.1.4). Sixty-four percent (35) are fish stocks, which includes stocks of individual key species as well as the stocks listed under the skate complex (Figure 4.1.4). All Northeast key fish stocks are listed at the species level in accordance with the regional management approach. The majority are FSSI<sup>17</sup> fish stocks, including one FSSI complex, the Northeast Skate Complex, which is made up of seven stocks. Seven FSSI fish stocks were added during the qualitative process: black sea bass (*Centropristis striata*), both FSSI stocks of haddock (*Melanogrammus aeglefinus*), redfish (*Sebastes fasciatus*), both FSSI stocks of silver hake (*Merluccius albidus*), and spiny dogfish (*Squalus acanthias*). Regulations influencing bycatch levels were cited as the reason for including haddock, while silver hake was listed due to public concern/high visibility. Three stocks, black sea bass, redfish, and spiny dogfish, were added due to their rebuilding status. A lack of data

also contributed to the Northeast Regional team's decision to add black sea bass to the key stocks list.

As in all regions, ESA-listed stocks present in the Northeast were automatically added to the list of key stocks. This included two fish stocks, six marine mammal stocks, five sea turtle populations, and two seabird populations. Six marine mammal stocks were identified as key stocks through the quantitative process: the Western North Atlantic coastal stock of bottlenose dolphin, Western North Atlantic stock of short-beaked common and Atlantic white-sided dolphins, the Gulf of Maine/Bay of Fundy stock of harbor porpoise, and long- and/or short-finned pilot whales. These were added due to bycatch in excess of the zero mortality-rate goal and/or declining or unknown population status, according to the process outlined in Section 3. No marine mammals were added to the list of key stocks during the qualitative process. One seabird population, the Atlantic red-throated loon, was added during the qualitative process due to concerns over high levels of bycatch and the documented high level of oil spill takes during previous oil spills. The red-throated loon is also on the USFWS list of Birds of Conservation Concern.

<sup>17</sup>FSSI = fish stock sustainability index, a performance measure for the 230 stocks selected for importance to U.S. commercial and recreational fisheries.



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**Table 4.1.4**

Key fish and marine mammal stocks, and key sea turtle and seabird populations for the Northeast Region. Northeast Region stocks were identified and are listed in this table at the species level for consistency with Northeast bycatch estimation methods, but were counted at the stock level in this report for consistency with other regions. Stocks are identified in the footnotes to this table. Overfishing/overfished status based on 2008 Quarter 1 FSSI report.

Key Fish Stocks Listed by FSSI			
Species/stock name		Overfishing	Overfished
Common name	Scientific name		
American plaice	<i>Hippoglossoides platessoides</i>	No	Yes
Atlantic cod <sup>a</sup>	<i>Gadus morhua</i>	Yes	Yes
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	Unknown	Yes
Black sea bass	<i>Centropristis striata</i>	No	No—rebuilding
Butterfish	<i>Peprilus triacanthus</i>	No	Yes
Haddock <sup>b</sup>	<i>Melanogrammus aeglefinus</i>	No	Yes
Monkfish <sup>c</sup>	<i>Lophius americanus</i>	No	Yes
Ocean pout	<i>Zoarces americanus</i>	No	Yes
Offshore hake	<i>Merluccius albidus</i>	Undefined	No
Red hake <sup>d</sup>	<i>Urophycis chuss</i>	Unknown/undefined	No
Redfish	<i>Sebastes fasciatus</i>	No	No—rebuilding
Scup	<i>Stenotomus chrysops</i>	Yes	Yes
Shortfin squid, northern	<i>Illex illecebrosus</i>	No	Unknown
Silver hake <sup>e</sup>	<i>Merluccius bilinearis</i>	No	No
Spiny dogfish	<i>Squalus acanthias</i>	No	No—rebuilding
Summer flounder	<i>Paralichthys dentatus</i>	Yes	Yes
Windowpane flounder <sup>f</sup>	<i>Scophthalmus aquosus</i>	No	No/yes
Yellowtail flounder <sup>g</sup>	<i>Limanda ferruginea</i>	Yes	Yes
Skate Complex <sup>h</sup>			
Barndoor skate	<i>Dipturus laevis</i>	No	No—rebuilding
Clearnose skate	<i>Raja eglanteria</i>	No	No
Little skate	<i>Leucoraja erinacea</i>	No	No
Rosette skate	<i>Leucoraja garmani</i>	No	No
Smooth skate	<i>Malacoraja senta</i>	No	No
Thorny skate	<i>Amblyraja radiata</i>	No	Yes
Winter skate	<i>Leucoraja ocellata</i>	No	Yes
Key Fish Stocks Listed by ESA			
Species/stock name		Stock status	
Common name	Scientific name		
Atlantic salmon, Gulf of Maine Distinct Population Segment	<i>Salmo salar</i>	Endangered	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	Endangered	

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**Table 4.1.4** (continued)

Key Fish Stocks Not Listed by FSSI or ESA			
Species/stock name		Stock status	
Common name	Scientific name		
None			
Key Marine Mammal Stocks Listed by ESA			
Species/stock name		Stock status	
Common name	Scientific name		
Blue whale	<i>Balaenoptera musculus</i>	Endangered	
Humpback whale	<i>Megaptera novaeangliae</i>	Endangered	
Fin whale	<i>Balaenoptera physalus</i>	Endangered	
North Atlantic right whale	<i>Eubalaena glacialis</i>	Endangered	
Sei whale	<i>Balaenoptera borealis</i>	Endangered	
Sperm whale	<i>Physeter macrocephalus</i>	Endangered	
Key Marine Mammal Stocks Not Listed by ESA			
Species/stock name		ZMRG	Stock status <sup>1</sup>
Common name	Scientific name		
Bottlenose dolphin - W. N. Atl. Coastal	<i>Tursiops truncatus</i>	Variable	Variable
Common dolphin, short beaked — W. N. Atl.	<i>Delphinus delphis</i>	100	Unknown
Harbor porpoise – Gulf of Maine/Bay of Fundy	<i>Phocoena phocoena</i>	61	Unknown
Pilot whale, long-finned	<i>Globicephala melaena (melas)</i>	24.9 <sup>j</sup>	Unknown
Pilot whale, short-finned	<i>Globicephala macrorhynchus</i>	24.9 <sup>j</sup>	Unknown
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	50.9	Unknown
Key Sea Turtle Populations			
Species/stock name		Population status	
Common name	Scientific name		
Green sea turtle	<i>Chelonia mydas</i>	Threatened (except in Florida and the Pacific coast of Mexico, where the breeding populations are endangered)	
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered	
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	

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**Table 4.1.4** (continued)

Key Seabird Populations Listed by ESA			
Species/stock name			
Common name	Scientific name	Population status	
Cahow	<i>Pterodroma cahow</i>	Endangered	
Roseate tern, Northeast nesting population	<i>Sterna dougallii dougallii</i>	Endangered	
Key Seabird Populations Not Listed by ESA			
Species/stock name			
Common name	Scientific name	Bycatch concern	Population status
Red-throated loon, Atlantic	<i>Gavia stellata</i>	Yes	Decreasing

<sup>a</sup> Atlantic cod has two stocks: Gulf of Maine and Georges Bank. Both are FSSI species, both are overfished, and overfishing is occurring for both.

<sup>b</sup> Haddock has two stocks: Gulf of Maine and Georges Bank. Both are FSSI species and both are overfished, but overfishing is not occurring.

<sup>c</sup> Monkfish have two stocks: North and South. Both are FSSI species and both are overfished, but overfishing is not occurring.

<sup>d</sup> Red hake has two stocks: Gulf of Maine/ Northern Georges Bank and Southern Georges Bank/ Middle Atlantic. Both are FSSI species. The Gulf of Maine/ Northern Georges Bank stock is not overfished and it is unknown whether overfishing is occurring. The Southern Georges Bank/ Middle Atlantic stock is not overfished and overfishing levels are undefined.

<sup>e</sup> Silver hake has two stocks: Gulf of Maine/ Northern Georges Bank and Southern Georges Bank/ Middle Atlantic. Both are FSSI species and are not overfished or undergoing overfishing.

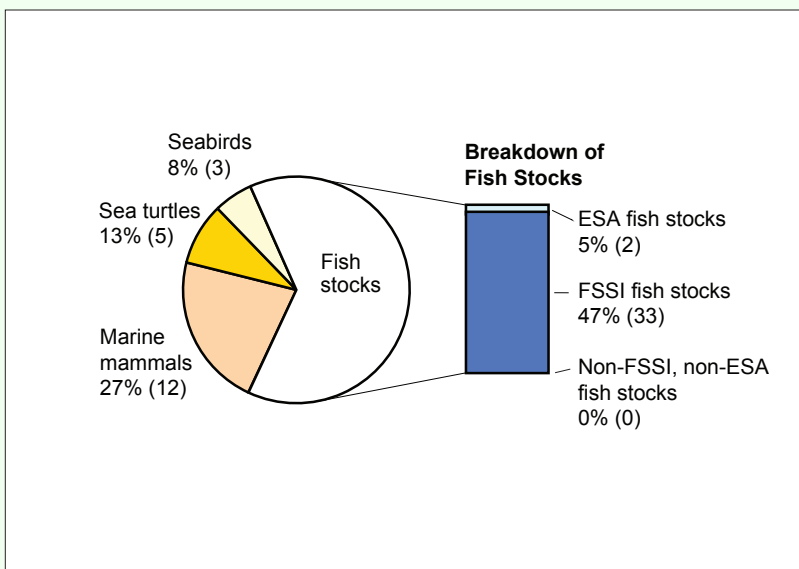
<sup>f</sup> Windowpane flounder has two stocks: Gulf of Maine/ Georges Bank and Southern New England/ Middle Atlantic. Both are FSSI species and are not overfished, but overfishing is occurring. The Southern New England/ Middle Atlantic stock is overfished; the Gulf of Maine/ Georges Bank stock is not overfished.

<sup>g</sup> Yellowtail flounder has three stocks: Southern New England/ Middle Atlantic, Georges Bank, and Cape Cod/ Gulf of Maine. All are FSSI species, are overfished, and are undergoing overfishing.

<sup>h</sup> This grouping includes the species listed in addition to unidentified skates.

<sup>i</sup> Stock status based on Waring et al. (2007). <http://www.nefsc.noaa.gov/nefsc/publications/tm/tm205/>

<sup>j</sup> Long-finned and short-finned pilot whale species are combined for the purpose of evaluating bycatch and stock status because it is not currently possible to determine potential biological removal (PBR) or serious injury and mortality estimates separately for each species.



**Figure 4.1.4**  
Number and percentage of key stocks in the Northeast Region.

## 4.1.7. Northeast Region Bycatch Estimates

Bycatch estimates for the Northeast Region by fishery are presented in Appendix 4.1, Tables 4.1.A through 4.1.D. Fish bycatch estimates are provided by individual fishery (Table 4.1.A) and by stock (Table 4.1.B). Marine mammal (Table 4.1.C) and sea turtle (Table 4.1.D) estimates are provided at the grouped fishery level and the non-grouped fishery level, according to Northeast Region protected species estimation procedures. Methods to estimate seabird bycatch are currently being developed. In this report, Northeast Region bycatch estimates were provided for 34 fish species, 6 marine mammal stocks, and 8 sea turtle populations. All fisheries with Federal observer data that had no recorded takes of marine mammals or sea turtles had estimates of zero.

### 4.1.7.1 Fish Bycatch Estimates

Fish bycatch estimates were provided for 25 fisheries. Estimates were not provided for the following Northeast Region federally managed commercial fisheries (listed alphabetically) due to limited or no at-sea observer coverage in 2005 (Table 4.1.2):

- Gulf of Maine Mid-Atlantic tuna, shark, swordfish harpoon
- Gulf of Maine, Mid-Atlantic tuna, shark, swordfish hook-and-line.
- Mid-Atlantic bottom longline
- Mid-Atlantic clam/quahog dredge
- Mid-Atlantic crab pots
- Mid-Atlantic fish pots and traps
- Mid-Atlantic general category closed area scallop dredge
- Mid-Atlantic hand line
- Mid-Atlantic large-mesh gillnet
- Mid-Atlantic limited-access scallop trawl
- Mid-Atlantic lobster pots
- Mid-Atlantic purse seine
- Mid-Atlantic small-mesh gillnet
- Mid-Atlantic shrimp trawl<sup>18</sup>
- New England clam/quahog dredge
- New England crab pots
- New England fish pots and traps
- New England Scottish seine
- New England small-mesh gillnet
- New England lobster pots

As bycatch data and estimation methods become available, estimates for these fisheries will be calculated and included in future editions of this report.

<sup>18</sup> The Mid-Atlantic shrimp trawl fishery is not managed under a Federal FMP.

### 4.1.7.2 Protected Species Bycatch Estimates

Marine mammal bycatch estimates were provided for eight grouped fisheries and five non-grouped fisheries. Sea turtle bycatch estimates were provided for seven grouped and two non-grouped fisheries. Seabird bycatch estimates are currently not available for any Northeast fisheries. Bycatch estimates of cetaceans and sea turtles were not provided for the following Northeast Region federally managed commercial fisheries (listed alphabetically) due to limited or no at-sea observer coverage in 2005:

- Mid-Atlantic bottom longline
- Mid-Atlantic clam/quahog dredge
- Mid-Atlantic crab pots
- Mid-Atlantic fish pots and traps
- Mid-Atlantic hand line
- Mid-Atlantic lobster pots
- Mid-Atlantic purse seine
- Mid-Atlantic shrimp trawl
- New England clam/quahog dredge
- New England crab pots
- New England fish pots and traps
- New England Scottish seine
- New England lobster pots

As bycatch data and estimation methods become available, estimates for these fisheries will be calculated and included in future editions of this report. Note that mortalities and/or serious injuries to ESA-listed marine mammal species that are attributed to fisheries based on entanglement data cannot be linked to a specific fishery, and were therefore not included in this report. This information is available online in Marine Mammal Stock Assessment Reports.<sup>19</sup>

### 4.1.8 Fishery Bycatch Estimation Improvement Plans

Fish bycatch estimation improvement plans were developed for the 25 Northeast Region Federal fisheries for which bycatch is currently estimated. These fisheries were identified through the quantitative process as having bycatch of key stocks/populations and/or high overall bycatch levels. Fish bycatch estimation improvement plans were also developed for the 18 Federal fisheries where data and/or bycatch estimation methods are unavailable. These fisheries were added through the qualitative process (outlined in Section 3) due to potential bycatch concerns and observer coverage levels below those stipulated by the Northeast Standardized Bycatch Reporting Methodology (SBRM; NEFMC and MAFMC 2007).

Protected species bycatch estimation improvement plans

<sup>19</sup> <http://www.nmfs.noaa.gov/pr/sars/species.htm>

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were developed for six of the eight grouped fisheries (see Table 4.1.1). Due to insufficient data, it was not possible to evaluate protected species bycatch in the New England bottom longline or the New England scallop dredge fisheries. Bycatch of protected species for these fisheries may be included in the next edition of this report if there are observed takes.

Bycatch estimation improvement plans for the New England and Mid-Atlantic mid-water trawl fisheries were developed by both fish and protected species biologists.

Due to differences in sampling protocol and coverage goals, recommendations to improve bycatch data and estimation methodology for fish and protected species are listed separately. Deficiencies and recommendations for fish are listed in Section 4.1.8.1 by individual fishery, while deficiencies and recommendations for protected species in grouped fisheries are listed in Section 4.1.8.2. The deficiencies and recommendations for joint fish/protected species bycatch estimation improvement plans are listed in Section 4.1.8.3.

Improvement plans were not developed for the following HMS fisheries:

- Gulf of Maine, Mid-Atlantic Tuna, Shark, Swordfish Harpoon
- Gulf of Maine, Mid-Atlantic Tuna, Shark, Swordfish Hook-and-Line.

Though both fisheries occur in Northeast Region waters, these fisheries are managed by NMFS Office of Sustainable Fisheries, HMS Division. Little information was available on these fisheries; both are classified as Tier 0 in all three categories. Plans are for data sources, bycatch, and any recommendations for improvement to be included in future editions of this report.

### 4.1.8.1 Bycatch Estimation Improvement Plans for Northeast Fisheries of Focus—Fish

The Northeast Regional team developed a generic improvement plan for the following fisheries identified through the quantitative and qualitative processes (listed alphabetically):

#### *Quantitative Process:*

- Mid-Atlantic extra-large-mesh gillnet
- Mid-Atlantic general category open area scallop dredge
- Mid-Atlantic general category scallop trawl
- Mid-Atlantic large-mesh otter trawl
- Mid-Atlantic limited-access closed area scallop dredge
- Mid-Atlantic limited-access open area scallop dredge
- Mid-Atlantic small-mesh otter trawl
- New England B-DAS large-mesh otter trawl
- New England bottom longline

- New England extra-large gillnet
- New England general category closed area scallop dredge
- New England general category open area scallop dredge
- New England haddock sector longline
- New England handline
- New England large-mesh gillnet
- New England large-mesh otter trawl
- New England limited-access closed area scallop dredge
- New England limited-access open area scallop dredge
- New England purse seine
- New England shrimp trawl
- New England small-mesh otter trawl
- New England US/CAN area large-mesh otter trawl
- New England US/CAN area small-mesh otter trawl

#### *Qualitative Process:*

- Mid-Atlantic bottom longline
- Mid-Atlantic clam/quahog dredge
- Mid-Atlantic crab pots
- Mid-Atlantic fish pots and traps
- Mid-Atlantic handline
- Mid-Atlantic general category closed area scallop dredge
- Mid-Atlantic large-mesh gillnet
- Mid-Atlantic limited-access scallop trawl
- Mid-Atlantic lobster pots
- Mid-Atlantic purse seine
- Mid-Atlantic shrimp trawl
- New England small-mesh gillnet
- Mid-Atlantic small-mesh gillnet
- New England clam/quahog dredge
- New England crab pots;
- New England fish pots and traps
- New England lobster pots
- New England Scottish seine

Tier classes: See individual fishery tiers in Table 4.1.3.

Bycatch data-collection and estimation concerns: The Northeast Regional team identified several deficiencies in bycatch data-collection and estimation methods common across multiple fisheries. These elements were derived directly from the tier scoring system and included: faulty assumptions of the analytical approach; integration and linkages between observer data and supplemental data; sampling coverage; species/fleet-specific discard mortality; and verification of industry data.

Recommendations: Recommendations were made in multiple fisheries to improve the analytical approach (estimation methodology) through advances in the methodology of the estimators; to implement a study of discard mortality (via special studies, study fleets, etc.); and to improve verification of industry data (via expanded audits). For some fisheries, improvements to the database infrastructure were

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also recommended. For several Northeast Region fisheries, recommendations were also made to improve the design implementation by increasing sampling coverage (see below).

The Northeast Region's recommendations for maintaining/increasing observer coverage levels were based on the stipulations of the Northeast Region Omnibus SBRM Amendment (NEFMC and MAFMC 2007). Detailed information on how these levels were calculated is available within

the SBRM Amendment. Recommendations to maintain current observer coverage levels were made for 16 fisheries (Table 4.1.5). The total cost of existing Northeast Region observer programs in 2008 was \$14.060M, including \$2.2M in industry funding that supported coverage of the Atlantic sea scallop fishery. Recommendations to implement or increase observer coverage were made for 27 fisheries. Fishery-specific recommendations for changes to observer coverage are outlined in Table 4.1.5.

**Table 4.1.5**

Summary of Northeast Region recommendations and estimated needs for implementation in terms of full-time staff and observer days-at-sea (DAS<sup>a</sup>). General recommendations are listed first; then, grouped fisheries are listed alphabetically, first by fishery group name, then by individual fishery name. Non-grouped fisheries are listed last, by fishery name. Fisheries identified during the qualitative process appear in shaded rows; fisheries in unshaded rows were identified through a quantitative process. For further discussion of recommendations, see Section 5.8.

Note that observer programs collect data on both fish and protected species. Observer recommendations specific only to protected species are identified. \*\* denotes no additional resource requirements. For further discussion of recommendations, see Section 5.8.

Recommendation <sup>b</sup>	Additional DAS <sup>c</sup>	Feasibility
<b>Recommendations for All Fisheries</b>		
Improve industry data via expanded audits.	NA	High
Improve analytic approach via advances in the methodology of estimators.	NA	High
Research on discard mortality (via special studies, study fleets, etc.) for multiple fisheries.	NA	High
Improve database infrastructure for multiple fisheries.	NA	High
Improve industry data via expanded audits (protected species).	NA	High
Implement serious-injury protocol for determining serious injuries of protected species; update observer program data-collection forms (protected species).	NA	High
Conduct needs assessment for seabird bycatch data-collection and estimation (protected species).	NA	High (work has already been initiated)
<b>Fishery-specific Recommendations</b>		
<b>Mid-Atlantic Gillnet Fisheries</b>		
Increase observer coverage of the Mid-Atlantic extra-large-mesh gillnet fishery to obtain pilot coverage. <sup>d</sup>	20	High
To achieve 30% CV across all Mid-Atlantic gillnet fisheries, increase observer coverage (protected species).	500	High
Expand fishing effort variables collected by states across all Mid-Atlantic gillnet fisheries (protected species).	NA	Low
Obtain complete list of active gillnet vessels for all Mid-Atlantic gillnet fisheries (protected species).	NA	High



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Table 4.1.5 (continued)

Recommendation <sup>b</sup>	Additional DAS <sup>c</sup>	Feasibility
<b>Fishery-specific Recommendations</b>		
<b>Mid-Atlantic Gillnet Fisheries (cont.)</b>		
Informational mailings to fishers in all Mid-Atlantic gillnet fisheries using VTR data forms (protected species).	NA	High
Implement pilot observer program for the Mid-Atlantic large-mesh gillnet fishery.	91	High
Implement pilot observer program for the Mid-Atlantic small-mesh gillnet fishery.	15	High
<b>Mid-Atlantic Otter Trawl Fisheries</b>		
Increase observer coverage in the Mid-Atlantic large-mesh otter trawl fishery.	342	High
To achieve 30% CV across all Mid-Atlantic otter trawl fisheries, increase observer coverage (protected species).	500	High
Direct observer coverage to areas of suspected high-sea turtle bycatch across all Mid-Atlantic otter trawl fisheries (protected species).	NA	Unknown
Update VTR logbooks to include fields for BRD presence/absence, and whether the BRD was functioning properly across all Mid-Atlantic otter trawl fisheries (protected species).	NA	Unknown
Increase observer coverage in the Mid-Atlantic small-mesh otter trawl fishery.	659	High
<b>Mid-Atlantic Scallop Dredge Fisheries</b>		
Implement pilot observer coverage for the Mid-Atlantic general category closed area scallop dredge fishery.	12	High
Maintain current observer program coverage levels in the Mid-Atlantic general category open area scallop dredge fishery.	**	High
Maintain current observer program coverage levels in the Mid-Atlantic limited-access closed area scallop dredge fishery.	**	High
Maintain current observer program coverage levels in the Mid-Atlantic limited-access open area scallop dredge fishery.	**	High
Hire employee to process VMS data for use in bycatch estimation in Mid-Atlantic limited-access open area scallop dredge fishery (protected species).	NA	Unknown
Implement observer program coverage for general category vessels operating in open areas (protected species).	Unknown	Unknown
Investigate the effectiveness of analyzing the sea turtle bycatch rate by pooling data over year (protected species).	NA	High
<b>Mid-Atlantic Scallop Trawl Fisheries</b>		
Maintain current observer program coverage levels in the Mid-Atlantic general category scallop trawl fishery.	**	High
Implement pilot observer coverage for the Mid-Atlantic limited-access scallop trawl fishery.	24	High
Implement observer program coverage for general category vessels operating in open areas.	Unknown	Unknown
Improve VTR gear log to capture additional gear information.	NA	Unknown
Hire employee to process VMS data for use in bycatch estimation.	NA	Unknown

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Table 4.1.5 (continued)

Recommendation <sup>b</sup>	Additional DAS <sup>c</sup>	Feasibility
<b>Fishery-specific Recommendations</b>		
<b>New England Bottom Longline Fisheries</b>		
Maintain current observer program coverage levels in the New England bottom longline fishery.	**	High
Maintain current observer program coverage levels in the New England haddock sector longline.	**	High
<b>New England Gillnet Fisheries</b>		
Maintain current observer program coverage levels for the New England extra-large-mesh gillnet fishery.	**	High
Achieve 30% CV across all New England gillnet fisheries.	600	High
Informational mailings for all fisheries in New England gillnet fisheries using VTR data forms.	NA	High
Apply new regression methods to estimate bycatch of marine mammals in New England gillnet fisheries (protected species).	NA	High
Maintain current observer program coverage levels for the New England large-mesh gillnet fishery.	**	High
Implement pilot observer coverage for the New England small-mesh gillnet fishery.	12	High
<b>New England Otter Trawl Fisheries</b>		
Maintain current observer program coverage levels in the New England B-Reg DAS large-mesh otter trawl fishery.	**	High
Maintain current observer program coverage levels in the New England large-mesh otter trawl fishery.	**	High
Increase observer coverage in the New England small-mesh otter trawl fishery.	1,562	High
To achieve 30% CV across all New England otter trawl fisheries, increase observer coverage (protected species).	10,000	Moderate
Maintain current observer program coverage levels in the New England US/CAN area large mesh otter trawl fishery.	**	High
Maintain current observer program coverage levels in the New England US/CAN area small-mesh otter trawl fishery.	**	High
<b>New England Scallop Dredge Fisheries</b>		
Maintain current observer program coverage levels but improve temporal coverage in the New England general category closed area scallop dredge fishery.	**	High
Implement pilot observer coverage in the New England general category open area scallop dredge fishery.	127	High
Maintain current observer program coverage levels in the New England limited-access closed area scallop dredge fishery.	**	High
Increase observer coverage in the New England limited-access open area scallop dredge fishery.	91	High
<b>Non-Grouped Fisheries</b>		
Implement pilot observer coverage for the Mid-Atlantic bottom longline fishery.	19	High
Implement pilot observer coverage for the Mid-Atlantic clam/quahog dredge fishery.	21	High

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**Table 4.1.5** (continued)

Recommendation <sup>b</sup>	Additional DAS <sup>c</sup>	Feasibility
<b>Non-Grouped Fisheries (cont.)</b>		
Implement pilot observer coverage for Mid-Atlantic crab pot fishery.	12	High
Implement pilot observer coverage for Mid-Atlantic fish pots/traps fishery.	20	High
Implement pilot observer coverage in the Mid-Atlantic handline fishery.	33	High
Implement pilot observer coverage for Mid-Atlantic lobster pot fishery.	22	High
Increase observer coverage in the Mid-Atlantic mid-water otter trawl fishery.	512	High
Deploy an additional observer for all paired-trawl trips in the Mid-Atlantic mid-water paired trawl fishery (protected species).	Unknown	High
Implement pilot observer coverage for the Mid-Atlantic purse seine fishery.	6	High
Implement pilot observer coverage for the Mid-Atlantic shrimp trawl fishery.	19	High
Implement pilot observer coverage for the New England clam/quahog dredge fishery.	12	High
Implement pilot observer coverage for New England crab pot fishery.	25	High
Implement pilot observer coverage for New England fish pots/traps fishery.	12	High
Increase observer coverage in the New England handline fishery to obtain pilot coverage.	110	High
Implement pilot observer coverage for New England lobster pot fishery.	110	High
Maintain current observer program coverage levels in the New England purse seine fishery.	**	High
Increase observer coverage in the New England mid-water otter trawl fishery.	35	High
Increase observer coverage of the New England single mid-water trawl fishery (protected species).	1,250	Moderate
Implement pilot observer coverage for the New England Scottish seine fishery.	23	High
Maintain current observer program coverage levels but improve temporal coverage in the New England shrimp trawl fishery.	**	High
Number of new full-time staff needed to implement all data quality and estimation method improvements recommended by the Northeast region		17
Total DAS requirement for all fish recommendations (not including "unknowns")		3,946
Total DAS requirement for all protected species recommendations (not including "unknowns")		12,850

<sup>a</sup> Some recommendations may require additional resource expenditures, such as equipment, which are not itemized.

<sup>b</sup> For some fisheries that have both fish and protected species recommendations for increased observer coverage, the FTE and DAS can be shared. Hence the requirement totals are not additive.

<sup>c</sup> One observer DAS includes the cost for the observer deployment as well as costs for associated equipment and program administrative functions (staffing).

<sup>d</sup> Pilot coverage is 0.5% of trips.

## 4.1.8.2 Bycatch Estimation Improvement Plans for Northeast Fisheries of Focus—Protected Species

Several common issues were identified by the Northeast Regional team in developing bycatch estimation improvement plans for marine mammals, sea turtles, and other protected species. In many cases, observer coverage is not sufficient to provide the recommended CV of 30% for rare-event species. In addition, a recommendation was made for all grouped fisheries to verify industry data more thoroughly through expanded audits of VTR data. Lastly, the Northeast Region recommended that the serious-injury determination protocol for cetaceans be implemented, as outlined in the Anderson et al. (2007) NMFS Technical Memorandum, including updating NEFOP data-collection forms as needed. To improve seabird bycatch data collection/estimation, the Northeast Regional team recommends completing a full assessment of needs.

### Mid-Atlantic Gillnet Fisheries

Tier Classes: Fish: various (see Table 4.1.3); Marine Mammals: 3; Other Protected Species: 3

#### Bycatch Data-collection and Estimation Concerns:

##### *Marine Mammals:*

- Observer coverage is not sufficient in at least some time-area strata to adequately evaluate the effectiveness of the recently implemented Bottlenose Dolphin TRP measures (e.g., the summer Northern North Carolina management unit) and to obtain precise bycatch estimates (i.e., CV less than or equal to 30%).
- Some of the effort data reported in the gillnet VTR database appear inaccurate and/or incomplete.
- More effort data (e.g., number of nets, hauls, and soak duration) need to be recorded for the entire fishery, so that definitions of bycatch rates other than takes/total landings can be investigated.
- A complete list of active gillnet vessels that hold state and/or Federal permits is needed to ensure representative observer coverage of the entire gillnet fleet.
- Robust analytical methods (such as regression methods) that are appropriate for rare events (e.g., bycatch of marine mammals) have not been explored for all marine mammal species that are bycaught in gillnet fisheries, and there is currently a lack of turtle bycatch estimates (however, estimates are currently being developed).

#### Recommendations:

##### *Marine Mammals:*

- Achieving bycatch estimates of coastal bottlenose dolphins and harbor porpoises that have a 30% CV was recommended. It is projected that about 900 sea days are required (Rossman 2007), which is about 500 days more than was funded in 2007. Although the additional coverage in state waters is possible, it will be more difficult (especially for small vessels). However, it should be feasible to identify and monitor all state fishing vessels.
- It was recommended that a mailing be employed to remind gillnetters using VTR data forms of what data are required, the definitions of these data, and how to report effort data more accurately.
- Currently, only VTR and Virginia State data record several variables reflecting fishing effort; it was recommended that this should be changed. It would be a very large project to change the state data-collection variables. At this time, this does not seem feasible.
- It was recommended that to obtain a complete list of active vessels, all available databases (VTR, dealer, and state databases) need to be fully explored (which is feasible and possible with current resources). In addition, the SEFSC is currently visiting North Carolina ports to obtain a complete and up-to-date list of coastal fishers, in particular those using small vessels. Funding for an additional year would ensure this project is completed.
- Currently, regression methods are being explored to estimate bycatch for harbor porpoises. It was recommended that these methods should be applied using the current level of staffing and funding, and it is recommended that these methods continue to be explored for applicability to other species within the next year or two. Methods to estimate sea turtle bycatch using current resources should also continue to be explored.

### New England Gillnet Fisheries

Tier Classes: Fish: various (see Table 4.1.3); Marine Mammals: 4; Other Protected Species: 3

#### Bycatch Data-collection and Estimation Concerns:

##### *Marine Mammals:*

- Observer coverage using the limited sampling protocol is insufficient in some time-area strata to obtain precise (CV less than or equal to 30%) bycatch estimates of marine mammals.

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- Some of the effort data reported in the gillnet VTR database appear inaccurate and/or incomplete.
- Robust analytical methods (e.g., regression methods) that are appropriate for rare events have not been explored for all marine mammal species that are bycaught in gillnet fisheries.

### Recommendations:

#### *Marine Mammals:*

- Achieving an estimate of harbor porpoise bycatch with a maximum 30% CV was recommended. It is projected that about 1,000 sea days are required, based on the estimates in Rossman (2007) plus an additional 200 days for summer coverage, which is about 600 days more than was funded in 2007.
- It was recommended that a mailing be employed to remind gillnetters using VTR data forms of what data are required, the definitions of these data, and how to report effort data more accurately.
- It was also recommended to continue exploring regression methods of estimating bycatch for harbor porpoises. It is feasible that with the current level of staffing and funding, these methods will be applied to other species within the next year or two.

#### **New England Otter Trawl Fisheries**

Tier Classes: Fish: various (see Table 4.1.3); Marine Mammals: 4; Other Protected Species: 3

### Bycatch Data-collection and Estimation Concerns:

#### *Marine Mammals:*

- Observer coverage is insufficient in some time-area strata to obtain precise (maximum 30% CV) bycatch estimates for marine mammals in this fishery. There is currently a lack of a process or protocol for determining serious injuries.<sup>20</sup>
- Differences in total landings between VTR and dealer records have not been incorporated into previous marine mammal bycatch analyses; however, this is currently being investigated.
- The VTR data should be verified more thoroughly (see discussions above).
- Information on the kite panels of otter trawls, which may

<sup>20</sup> Since 2005, great improvements have been made both in the level of observer coverage and in the methods used to estimate marine mammal bycatch.

be correlated with marine mammal bycatch rates, was previously not collected by the observer program; in 2008, the observer program began to collect this information.

### Recommendations:

#### *Marine Mammals:*

- Achieving long- and/or short-finned pilot whale bycatch estimates that have a maximum CV of 30% was recommended, it is projected that an additional 10,000 sea days are required (Rossman 2007; Wigley et al. 2007). However, these sea-day projections do not account for overlap between fish and marine mammal sampling programs; therefore, the estimate of additional sea days is over-estimated, to an unknown degree.

#### **Mid-Atlantic Otter Trawl Fisheries**

Tier Classes: Fish: various (see Table 4.1.3); Marine Mammals: 3; Other Protected Species: 4

### Bycatch Data-collection and Estimation Concerns:

#### *Marine Mammals:*

- Observer coverage is insufficient in some times and areas to obtain precise (maximum 30% CV) bycatch estimates.
- Differences in total landings between VTR and dealer records have not been incorporated into previous marine mammal bycatch analyses; however, this is currently being investigated.
- Information on the kite panels of otter trawls, which may be correlated with marine mammal bycatch rates, was previously not collected by the observer program; in 2008, the observer program began to collect this information.

#### *Sea turtles:*

- Observer coverage is insufficient in some bycatch strata to obtain precise (minimum 30% CV) bycatch estimates.
- Bycatch analyses should examine whether different types of trawl nets or TEDs affect turtle bycatch rates. In the past, the data for such an analysis were not available.
- The VTRs do not report use or condition of a TED, so it is difficult to monitor compliance and effectiveness of TED usage in reducing sea turtle bycatch. Discrepancies exist in the VTR database between what is reported on the logbooks and what is entered into the database.

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## Recommendations:

### *Marine mammals:*

- Achieving bycatch estimates for long- and/or short-finned pilot whales that have a 30% CV was recommended. It is projected that an additional 500 sea-days are required (Rossman 2007; Wigley et al. 2007). However, these sea day projections do not account for overlap between the fish and marine mammal sampling programs. Therefore, the number of additional sea days is over-estimated, but to an unknown degree.

### *Sea turtles:*

- It was recommended that observer coverage should be expanded in the Mid-Atlantic (average coverage from 1996 to 2004 was less than 1%) to improve the precision of bycatch estimates. Due to the large size and diversity of the trawl fishery, coverage could be directed to areas (e.g., warm shallow waters of the southern Mid-Atlantic) where the likelihood of turtle bycatch is highest, as determined from bycatch analyses. Analyses should be conducted to identify areas where observer coverage should be directed.
- Due to recent changes in observer data-collection protocols, observers are now collecting more information about the types of trawl nets used in the fishery, as well as different types of TEDs. It is recommended that as this type of data collection continues, the additional information will improve future bycatch analyses.
- It was also recommended that the VTRs should include a field for fishermen to indicate whether a BRD was used on their gear during a fishing trip, and ideally whether that TED was functioning properly (i.e., it was not clogged with debris or damaged in any way). More auditing procedures should be developed when VTR data are entered or scanned into the database for quality assurance.

### **Mid-Atlantic Scallop Dredge Fisheries**

Tier Classes: Fish: various (see Table 4.1.3); Marine Mammals: 3; Other Protected Species: 4

### Bycatch Data-collection and Estimation Concerns:

#### *Sea turtles:*

- There is no industry-funded observer coverage and only a low level of NMFS-funded observer coverage for vessels fishing under general category permits in open areas. Thus, there is a lack of data collection in this sector of the fishery.

- Further research is needed on factors associated with estimated bycatch rates to help design bycatch mitigation strategies.

- The VTR data have been used to expand bycatch rates to estimate an overall fishery total. Dredges are typically towed for approximately one hour, but the location of VTR fishing effort is represented by a single geographic point. As a result, the spatial distribution of estimated bycatch may not be adequately represented.

## Recommendations:

### *Sea turtles:*

- It was recommended that observers should be placed on vessels operating under general category permits in open areas, because these vessels are not part of the industry-funded program.
- To date, bycatch analyses have been conducted on an annual basis, for a very dynamic fishery regulated via rotational access areas.<sup>21</sup> It was recommended that analysis of bycatch rates should be conducted using a longer time series of data to help elucidate factors associated with bycatch rates.
- The use of VMS data (already collected in the dredge fishery) should improve bycatch estimation methods, as these data are a better representation of mobile fishing effort. It was recommended that a full- or part-time employee should be hired to process VMS data and make it easily available to users.

### **Mid-Atlantic Scallop Trawl Fisheries**

Tier Classes: Fish: various (see Table 4.1.3); Marine Mammals: 3; Other Protected Species: 4

### Bycatch Data-collection and Estimation Concerns:

#### *Sea turtles:*

- There is no industry-funded coverage for vessels fishing under general category permits in open areas, so there is a lack of data collection in this sector of the fishery.
- The VTR data have been used to derive total bycatch estimates. Because VTR fishing effort is represented only by a single geographic point, the spatial distribution of estimated bycatch may not be adequately represented.

<sup>21</sup> Rotational access areas are a system of alternating closed areas which is used to manage the Atlantic sea scallop fishery.



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## Recommendations:

### *Sea turtles:*

- It was recommended that observers should be placed on vessels operating under general category permits in open areas, because these vessels are not part of the industry-funded program.
- Further work was recommended on characterizing trawl gear designed to harvest scallops versus trawl gear designed to harvest fish, and on whether these gear differences have an impact on turtle bycatch rates.
- The VTRs use different gear codes for trawls designed to catch fish and trawls designed to catch scallops, but it was recommended that information about the gear other than what is being caught should be included, to help differentiate the gear types.
- The use of VMS data (already collected in the scallop trawl fishery) could improve bycatch estimation methods because these data are a better representation of mobile fishing effort. It was recommended that a full or part-time employee could be hired to process VMS data and make it easily available to users.

### **4.1.8.3 Bycatch Estimation Improvement Plans for Northeast Region Fisheries of Focus—Fish and Protected Species**

For two fisheries, the Mid-Atlantic mid-water trawl and the New England mid-water trawl, protected species recommendations were made at the U.S. National Bycatch Report fishery level. Combined fish/protected species improvement plans were developed for these fisheries. Based on the tier scoring system (see Appendix H for detailed descriptions of individual tier elements), the Northeast Regional team identified the following bycatch data-collection and estimation concerns for fish:

- Design implementation (sampling coverage)
- Assumptions of the analytical approach
- Species- and fleet-specific discard mortality
- Verification of industry data

Bycatch data-collection and estimation issues identified for marine mammals included concerns over the ability of a single observer to collect accurate data for paired trawl fisheries, as well as the need to observe the catcher and processor boat components that are involved in some parts of the mid-water trawl fisheries.

As in the previous sections, for both fisheries, recommendations were made for fish and protected species to verify industry data more thoroughly via extended audits.

## **Mid-Atlantic Mid-Water Trawl Fisheries**

Tier Classes: Fish: 3; Marine Mammals: 3; Other Protected Species: 3

### Bycatch Data-collection and Estimation Concerns:

#### *Fish:*

- See list above

#### *Marine Mammals:*

- In the single midwater trawl fishery, when a processing boat is involved, observers may miss bycatch because they are not on both the trawl vessel and the processing boat.
- In the paired midwater trawl fishery, observers may miss some marine mammal bycatch, because they are aboard only one of the two vessels operating a pair trawl.
- Observers may also miss recording bycatch when a processing boat is used, because not all of the catch is observed when a vessel pumps only part of the catch and then releases the rest.

### Recommendations:

#### *Fish:*

- It was recommended that sampling coverage be improved to provide baseline coverage (518 additional observer days) for this fishery.
- It was recommended that the analytical approach could be improved via advances in methodology of estimators.
- It was also recommended that studies of discard mortality (via special studies, study fleets, etc.) should be implemented.

#### *Marine Mammals:*

- It was recommended that for paired-trawl trips, two observers should be deployed, one on each vessel. Each observer would record the data only from hauls where the landings were collected by the vessel they were on.
- It was also recommended that the processor boat and all involved single midwater trawl vessels should be observed, to document the landings and bycatch that are brought aboard. Prior to a haul being brought aboard, it is not feasible for an observer to see either the species or quantity that has been released from the net while the net is still in the water.

## **New England Mid-Water Trawl Fisheries**

Tier Classes: Fish: 3; Marine Mammals: 4; Other Protected Species: 3

### Bycatch and Data-collection Concerns:

#### *Fish:*

- See above

#### Mammals:

- See above

### Recommendations:

#### *Fish:*

- It was recommended that sampling coverage could be improved by adding additional sea days. Based on the Northeast Region SBRM, 35 additional observer days are needed to supplement observer coverage in this fishery.
- Another recommendation is that the analytical approach could be improved via advances in methodology of estimators.
- It was also recommended that studies of discard mortality (via special studies, study fleets, etc.) should be implemented.

#### *Marine Mammals:*

- The recommendation was that approximately 1,500 sea days are needed to achieve a precise bycatch estimate of all marine mammals in the New England single mid-water trawl fishery (Wigley et al. 2007); this is about 1,250 additional sea days over what is usually observed. However, this predicted number of sea days is an over-estimate because it does not account for marine mammal-specific spatial-temporal distribution patterns.
- It was recommended that for paired-trawl trips, two observers should be deployed, one on each vessel. Each observer would record the data only from hauls where the landings were collected from the vessel they were on.
- It was also recommended that the processor boat and all involved single midwater trawl vessels are observed to document the landings and bycatch that are brought aboard. However, at this time the number of additional observed trips is not known.

## **4.1.8.4 Summary of Northeast Region Recommendations**

Table 4.1.5 outlines the bycatch data-collection and estimation improvements recommended by the Northeast Region. Differences in fish and protected species recommendations are based on different sampling goals. To accurately estimate bycatch of rare-event species such as marine mammals, high overall coverage levels are necessary.

A total of 68 Northeast Region recommendations are listed in Table 4.1.5. Of these, 47 apply exclusively to improving fish bycatch data collection/estimation, while the remaining 21 relate to protected species. Eighteen of the fish recommendations were for fisheries identified as fisheries of concern during the qualitative process (shaded in grey in Table 4.1.5). The known additional requirements for Northeast fisheries to meet the fish-related recommendations are 4,534 observer DAS. To meet protected species recommendations, 12,250 DAS are needed. However, it would not be accurate to add these figures together to arrive at a total set of requirements, due to the overlap in observer coverage for fish and protected species needs in individual fisheries. For example, if the recommendation for fish purposes is to increase observer coverage by 100 DAS, and the recommendation for protected species is to increase observer coverage by 200 DAS, in sum this is not a recommendation to increase observer coverage by 300 DAS. Depending on the spatial-temporal distribution of the recommended observer coverage, the recommended increase to deal with all concerns could be anywhere between 200 and 300 DAS. That is, the recommendation for increasing observer coverage by 200 DAS assumes that the first increase of 100 days would satisfy both fish and protected species recommendations. If there were no overlap between the coverage recommended for fish and coverage recommended for protected resources, then the total recommended increase would be the sum of the two requests (300 DAS). In addition, it is estimated that 17 full-time staff would be required to carry out recommendations for improvements to bycatch data and estimation quality. For all fisheries that have recommendations for increased observer coverage for both fish and protected species, staffing and DAS resources can be shared. In addition, there are many recommendations for which requirements were not determined and therefore were not included in the listed totals. These requirements would be in addition to current program resources.

The feasibility of each recommendation is listed in Table 4.1.5. All recommendations made for fish were considered feasible. Nearly all recommendations made for protected species were considered feasible. In a few fisheries, because marine mammal bycatch is rare, the number of observed sea days to estimate a bycatch rate with a CV of 30% would be extremely high.

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### 4.1.8.5 Improvements Expected From Implementation of Recommendations

The majority of Tier 3 fisheries in the Northeast Region are in the upper 33% of the Tier 3 range, indicating that only minor improvements would result in a change to Tier 4. For most of these fisheries, only minor improvements in spatial or temporal coverage will be needed, as well as improvements in industry data (expanded audits and infrastructure links between databases). The fish and protected species bycatch estimations for Northeast Region fisheries will benefit from improved industry data via expanded data audits, as well as from infrastructure improvements to link associated databases. Only minor tier changes will result from such improvements, due to the low associated values of these criteria, but this does not accurately reflect the importance of these two improvements.

The majority of Tier 2 fisheries in the NE are in the lower 50% of the Tier 2 range, indicating that substantial improvements in sampling coverage and industry data will be needed to advance the tier score.

In a few fisheries (e.g., New England otter trawl and New England single mid-water trawl), protected species bycatch is very rare (Rossman 2007). If it were necessary to precisely estimate this bycatch, it would require an extremely high level of observer coverage, which would be prohibitively expensive.

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## Appendix 4.1 Northeast Region Bycatch Estimates

**Table 4.1.A**

Subtables showing annual fish and invertebrate bycatch estimates and coefficient of variation (CV; where available) for Northeast Region fisheries. Bycatch estimates are in live pounds. Key stocks are shaded. For the skate complex, bycatch estimates are available only for a generalized stock group, indicated by an \* following the group name.

Subtable 4.1.A.1		MID-ATLANTIC EXTRA-LARGE-MESH GILLNET				MID-ATLANTIC GENERAL CAT. OPEN AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA YEAR	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic cod	<i>Gadus morhua</i>	2005	649.31	Pounds	0.67	2005	0	Pounds	
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic herring	<i>Clupea harengus</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic mackerel	<i>Scomber scombrus</i>	2005	3,854.00	Pounds	0.74	2005	0	Pounds	
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	3,997.02	Pounds	0.55	2005	233,012.93	Pounds	0.35
Atlantic surfclam	<i>Spisula solidissima</i>	2005	0	Pounds		2005	1,026.12	Pounds	0.69
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	1,038.04	Pounds	0.36
Bluefish	<i>Pomatomus saltatrix</i>	2005	10,939.37	Pounds	0.33	2005	0	Pounds	
Butterfish	<i>Peprilus triacanthus</i>	2005	0	Pounds		2005	0	Pounds	
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	0	Pounds		2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	0	Pounds		2005	0	Pounds	
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	1,234.77	Pounds	0.43
Monkfish	<i>Lophius americanus</i>	2005	491,819.01	Pounds	0.31	2005	244,138.15	Pounds	0.18
Ocean pout	<i>Zoarces americanus</i>	2005	0	Pounds		2005	325.03	Pounds	0.65
Ocean quahog	<i>Arctica islandica</i>	2005	0	Pounds		2005	1,301.47	Pounds	0.92
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	0	Pounds	
Red hake	<i>Urophycis chuss</i>	2005	0	Pounds		2005	647.78	Pounds	0.93
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	0	Pounds	
Scup	<i>Stenotomus chrysops</i>	2005	0	Pounds		2005	32.50	Pounds	0.83
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	0	Pounds		2005	14.14	Pounds	1.05

# NORTHEAST REGION

**Table 4.1.A** (continued)

(continuation of Subtable 4.1.A.1)		MID-ATLANTIC EXTRA-LARGE-MESH GILLNET				MID-ATLANTIC GENERAL CAT. OPEN AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA YEAR	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	34.86	Pounds	1.10	2005	398.63	Pounds	0.64
Skate complex*	<i>Rajidae</i>	2005	631,693.75	Pounds	0.45	2005	2,923,466.09	Pounds	0.11
Spiny dogfish	<i>Squalus acanthias</i>	2005	282,540.40	Pounds	0.31	2005	32,321.32	Pounds	0.31
Summer flounder	<i>Paralichthys dentatus</i>	2005	7,082.26	Pounds	0.34	2005	69,626.98	Pounds	0.21
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	0	Pounds		2005	0	Pounds	
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	156.88	Pounds	1.00	2005	33,722.90	Pounds	0.20
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	0	Pounds		2005	11,434.77	Pounds	0.44
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	0	Pounds		2005	518.44	Pounds	0.65
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	0	Pounds		2005	451.17	Pounds	0.58
TOTAL FISHERY BYCATCH			1,432,766.86	Pounds			3,554,711.33	Pounds	
TOTAL FISHERY LANDINGS			6,278,084.92	Pounds			28,432,781.26	Pounds	
TOTAL CATCH (Bycatch + Landings)			7,710,851.78	Pounds			31,987,492.59	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.19				0.11		

Subtable 4.1.A.2		MID-ATLANTIC GENERAL CAT. SCALLOP TRAWL				MID-ATLANTIC LARGE-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	22.76	Pounds	0.96	2005	71.57	Pounds	1.36
Atlantic cod	<i>Gadus morhua</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic herring	<i>Clupea harengus</i>	2005	38.57	Pounds	1.00	2005	0	Pounds	
Atlantic mackerel	<i>Scomber scombrus</i>	2005	0	Pounds		2005	135.28	Pounds	0.71
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	992,563.55	Pounds	0.13	2005	30,775.94	Pounds	0.83
Atlantic surfclam	<i>Spisula solidissima</i>	2005	22.76	Pounds	0.96	2005	1,000.86	Pounds	0.74

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**Table 4.1.A** (continued)

(continuation of Subtable 4.1.A.2)		MID-ATLANTIC GENERAL CAT. SCALLOP TRAWL				MID-ATLANTIC LARGE-MESH OTTER TRAWL				
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV	
Black sea bass	<i>Centropristis striata</i>	2005	303.81	Pounds	0.48	2005	11,121.83	Pounds	0.68	
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	16,970.57	Pounds	1.07	
Butterfish	<i>Peprilus triacanthus</i>	2005	108.78	Pounds	0.52	2005	8,332.53	Pounds	0.98	
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	0	Pounds		2005	4,203.63	Pounds	0.73	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	125.19	Pounds	0.59	2005	0	Pounds		
Longfinned squid	<i>Loligo pealeii</i>	2005	976.34	Pounds	0.40	2005	1,444.03	Pounds	0.59	
Monkfish	<i>Lophius americanus</i>	2005	132,857.32	Pounds	0.11	2005	65,726.01	Pounds	0.52	
Ocean pout	<i>Zoarces americanus</i>	2005	1,052.90	Pounds	0.42	2005	0	Pounds		
Ocean quahog	<i>Arctica islandica</i>	2005	4,874.24	Pounds	0.74	2005	156.12	Pounds	0.81	
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds		
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	0	Pounds		
Red hake	<i>Urophycis chuss</i>	2005	386.95	Pounds	0.51	2005	5,410.47	Pounds	1.07	
Redfish	<i>Sebastes fasciatus</i>	2005	38.57	Pounds	1.01	2005	0	Pounds		
Scup	<i>Stenotomus chrysops</i>	2005	3.81	Pounds	1.14	2005	827,700.41	Pounds	0.75	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	201.63	Pounds	0.48	2005	393.61	Pounds	1.29	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds		
Silver hake	<i>Merluccius bilinearis</i>	2005	2,077.74	Pounds	0.38	2005	5,308.73	Pounds	1.16	
Skate complex*	<i>Rajidae</i>	2005	451,525.91	Pounds	0.11	2005	8,257,235.38	Pounds	1.01	
Spiny dogfish	<i>Squalus acanthias</i>	2005	24,015.05	Pounds	0.62	2005	2,204,477.26	Pounds	0.61	
Summer flounder	<i>Paralichthys dentatus</i>	2005	1,170.76	Pounds	0.56	2005	185,965.96	Pounds	0.62	
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds		
White hake	<i>Urophycis tenuis</i>	2005	816.29	Pounds	0.53	2005	14.31	Pounds	1.41	
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	11,374.22	Pounds	0.30	2005	185,090.46	Pounds	0.87	
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	0	Pounds		2005	30,842.66	Pounds	0.91	
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	331.95	Pounds	0.41	2005	4,592.26	Pounds	0.73	
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	57.97	Pounds	0.57	2005	364.99	Pounds	1.12	
TOTAL FISHERY BYCATCH			1,624,947.27	Pounds					11,847,334.87	Pounds
TOTAL FISHERY LANDINGS			8,525,063.72	Pounds					28,685,828.55	Pounds
TOTAL CATCH (Bycatch + Landings)			10,150,010.99	Pounds					40,533,163.42	Pounds
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.16						0.29	



# NORTHEAST REGION

**Table 4.1.A** (continued)

Subtable 4.1.A.3		MID-ATLANTIC LIMITED-ACCESS CLOSED AREA SCALLOP DREDGE				MID-ATLANTIC LIMITED-ACCESS OPEN AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	89.78	Pounds	0.72	2005	2,769.78	Pounds	0.76
Atlantic cod	<i>Gadus morhua</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	28.87	Pounds	1.08
Atlantic herring	<i>Clupea harengus</i>	2005	0	Pounds		2005	55.73	Pounds	0.97
Atlantic mackerel	<i>Scomber scombrus</i>	2005	200.97	Pounds	0.47	2005	2,787.01	Pounds	1.13
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	1,743,662.58	Pounds	0.23	2005	4,462,795.92	Pounds	0.38
Atlantic surfclam	<i>Spisula solidissima</i>	2005	0	Pounds		2005	0	Pounds	
Black sea bass	<i>Centropristis striata</i>	2005	3,573.97	Pounds	0.28	2005	5,579.43	Pounds	0.69
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	0	Pounds	
Butterfish	<i>Peprilus triacanthus</i>	2005	29.07	Pounds	0.52	2005	176.71	Pounds	0.70
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	298.84	Pounds	0.58	2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	64.58	Pounds	0.83	2005	0	Pounds	
Longfinned squid	<i>Loligo pealeii</i>	2005	3,262.87	Pounds	0.39	2005	2,075.82	Pounds	0.39
Monkfish	<i>Lophius americanus</i>	2005	1,691,490.12	Pounds	0.11	2005	2,057,543.71	Pounds	0.22
Ocean pout	<i>Zoarces americanus</i>	2005	348.73	Pounds	0.54	2005	3,067.41	Pounds	0.61
Ocean quahog	<i>Arctica islandica</i>	2005	357.39	Pounds	0.72	2005	20,314.84	Pounds	0.72
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	0	Pounds	
Red hake	<i>Urophycis chuss</i>	2005	6,979.66	Pounds	0.36	2005	7,564.37	Pounds	0.49
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	668.79	Pounds	0.82
Scup	<i>Stenotomus chrysops</i>	2005	2,246.79	Pounds	0.41	2005	891.72	Pounds	0.61
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	2,635.76	Pounds	0.50	2005	697.27	Pounds	0.64
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	4,213.69	Pounds	0.21	2005	11,578.39	Pounds	0.46
Skate complex*	<i>Rajidae</i>	2005	5,576,095.28	Pounds	0.13	2005	7,773,634.11	Pounds	0.13
Spiny dogfish	<i>Squalus acanthias</i>	2005	28,681.32	Pounds	0.32	2005	29,924.16	Pounds	0.29
Summer flounder	<i>Paralichthys dentatus</i>	2005	303,960.20	Pounds	0.17	2005	501,989.68	Pounds	0.22
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds	

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Table 4.1.A (continued)

(continuation of Subtable 4.1.A.3)		MID-ATLANTIC LIMITED-ACCESS CLOSED AREA SCALLOP DREDGE				MID-ATLANTIC LIMITED-ACCESS OPEN AREA SCALLOP DREDGE				
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV	
White hake	<i>Urophycis tenuis</i>	2005	67.98	Pounds	0.71	2005	650.25	Pounds	0.94	
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	286.73	Pounds	0.60	2005	32,481.00	Pounds	0.35	
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	1,520.00	Pounds	1.09	2005	8,718.79	Pounds	0.47	
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	37,227.05	Pounds	0.16	2005	32,450.01	Pounds	0.45	
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	119.10	Pounds	0.45	2005	2,088.00	Pounds	0.66	
TOTAL FISHERY BYCATCH			9,407,412.46	Pounds		TOTAL FISHERY BYCATCH			14,960,531.77	Pounds
TOTAL FISHERY LANDINGS			60,488,181.80	Pounds		TOTAL FISHERY LANDINGS			159,845,821.40	Pounds
TOTAL CATCH (Bycatch + Landings)			69,895,594.26	Pounds		TOTAL CATCH (Bycatch + Landings)			174,806,353.17	Pounds
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.13			FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.09	

Subtable 4.1.A.4		MID-ATLANTIC MID-WATER OTTER TRAWL				MID-ATLANTIC SMALL-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	0	Pounds		2005	4,207.04	Pounds	0.61
Atlantic cod	<i>Gadus morhua</i>	2005	0	Pounds		2005	216.52	Pounds	0.54
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic herring	<i>Clupea harengus</i>	2005	618,910.69	Pounds	0.69	2005	400,211.67	Pounds	0.53
Atlantic mackerel	<i>Scomber scombrus</i>	2005	736,858.93	Pounds	0.83	2005	468,264.59	Pounds	0.64
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	0	Pounds		2005	94,258.41	Pounds	0.37
Atlantic surfclam	<i>Spisula solidissima</i>	2005	0	Pounds		2005	4,486.63	Pounds	1.95
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	142,643.63	Pounds	0.35
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	76,573.58	Pounds	0.42
Butterfish	<i>Pepilus triacanthus</i>	2005	0	Pounds		2005	1,464,288.01	Pounds	0.30
Deep sea red crab	<i>Chaceon quinquedens</i>	2005	0	Pounds		2005	847.91	Pounds	0.62
Haddock	<i>Melanogrammus aeglefinus</i>	2005	0	Pounds		2005	9,360.90	Pounds	0.60

# NORTHEAST REGION

Table 4.1.A (continued)

(continuation of Subtable 4.1.A.4)		MID-ATLANTIC MID-WATER OTTER TRAWL				MID-ATLANTIC SMALL-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	1,301,668.46	Pounds	0.26
Monkfish	<i>Lophius americanus</i>	2005	1,578.70	Pounds	0.86	2005	360,209.36	Pounds	0.19
Ocean pout	<i>Zoarces americanus</i>	2005	0	Pounds		2005	63.53	Pounds	0.43
Ocean quahog	<i>Arctica islandica</i>	2005	0	Pounds		2005	101.21	Pounds	0.89
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	20,838.18	Pounds	0.62
Pollock	<i>Pollachius virens</i>	2005	442.04	Pounds	0.86	2005	50.87	Pounds	0.63
Red hake	<i>Urophycis chuss</i>	2005	0	Pounds		2005	1,759,337.69	Pounds	0.27
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	2,495.50	Pounds	0.35
Scup	<i>Stenotomus chrysops</i>	2005	12,098.64	Pounds	0.82	2005	189,979.42	Pounds	0.33
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	0	Pounds		2005	3,062,891.05	Pounds	0.41
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	0	Pounds		2005	1,790,686.58	Pounds	0.29
Skate complex*	<i>Rajidae</i>	2005	0	Pounds		2005	4,191,935.87	Pounds	0.31
Spiny dogfish	<i>Squalus acanthias</i>	2005	349,325.85	Pounds	0.41	2005	4,619,452.67	Pounds	0.27
Summer flounder	<i>Paralichthys dentatus</i>	2005	0	Pounds		2005	568,816.42	Pounds	0.26
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	5,149.89	Pounds	0.42
White hake	<i>Urophycis tenuis</i>	2005	0	Pounds		2005	51,467.17	Pounds	0.46
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	0	Pounds		2005	118,665.65	Pounds	0.40
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	0	Pounds		2005	57,094.62	Pounds	0.82
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	0	Pounds		2005	72,456.25	Pounds	0.28
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	0	Pounds		2005	18,512.34	Pounds	0.58
TOTAL FISHERY BYCATCH			1,719,214.85	Pounds			20,857,231.63	Pounds	
TOTAL FISHERY LANDINGS			108,921,097.10	Pounds			69,347,982.19	Pounds	
TOTAL CATCH (Bycatch + Landings)			110,640,311.95	Pounds			90,205,213.82	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.02				0.23		

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Table 4.1.A (continued)

Subtable 4.1.A.5		NEW ENGLAND B-REG DAS LARGE-MESH OTTER TRAWL				NEW ENGLAND BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	17,884.69	Pounds	0.11	2005	6.80	Pounds	0.65
Atlantic cod	<i>Gadus morhua</i>	2005	118,940.85	Pounds	0.22	2005	101,274.76	Pounds	0.27
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	2,241.25	Pounds	0.23	2005	211.10	Pounds	0.36
Atlantic herring	<i>Clupea harengus</i>	2005	12,509.61	Pounds	0.40	2005	0	Pounds	
Atlantic mackerel	<i>Scomber scombrus</i>	2005	192.03	Pounds	0.33	2005	0	Pounds	
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	30,947.18	Pounds	0.32	2005	13.06	Pounds	0.69
Atlantic surfclam	<i>Spisula solidissima</i>	2005	84.63	Pounds	0.85	2005	0	Pounds	
Black sea bass	<i>Centropristis striata</i>	2005	3.06	Pounds	0.62	2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	1,466.15	Pounds	0.33	2005	0	Pounds	
Butterfish	<i>Peprilus triacanthus</i>	2005	13.34	Pounds	0.27	2005	0	Pounds	
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	13,342.57	Pounds	0.19	2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	100,172.14	Pounds	0.15	2005	80,590.68	Pounds	0.17
Longfinned squid	<i>Loligo pealeii</i>	2005	555.03	Pounds	0.36	2005	0	Pounds	
Monkfish	<i>Lophius americanus</i>	2005	155,226.61	Pounds	0.11	2005	14.65	Pounds	0.83
Ocean pout	<i>Zoarces americanus</i>	2005	24,393.96	Pounds	0.14	2005	6,580.36	Pounds	0.32
Ocean quahog	<i>Arctica islandica</i>	2005	903.46	Pounds	0.58	2005	0	Pounds	
Offshore hake	<i>Merluccius albidus</i>	2005	7.64	Pounds	0.62	2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	5,695.65	Pounds	0.38	2005	444.52	Pounds	0.58
Red hake	<i>Urophycis chuss</i>	2005	28,151.18	Pounds	0.19	2005	1,770.24	Pounds	0.27
Redfish	<i>Sebastes fasciatus</i>	2005	29,825.54	Pounds	0.29	2005	823.38	Pounds	0.25
Scup	<i>Stenotomus chrysops</i>	2005	18.71	Pounds	0.63	2005	0	Pounds	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	2,360.54	Pounds	0.22	2005	0	Pounds	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	29,438.83	Pounds	0.28	2005	3.46	Pounds	0.55
Skate complex*	<i>Rajidae</i>	2005	8,483,162.11	Pounds	0.11	2005	227,748.15	Pounds	0.20
Spiny dogfish	<i>Squalus acanthias</i>	2005	162,301.87	Pounds	0.30	2005	338,563.65	Pounds	0.21
Summer flounder	<i>Paralichthys dentatus</i>	2005	185,029.58	Pounds	0.15	2005	0	Pounds	
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	87.08	Pounds	0.53	2005	0	Pounds	

# NORTHEAST REGION

**Table 4.1.A** (continued)

(continuation of subtable 4.1.A.5)		NEW ENGLAND B-REG DAS LARGE-MESH OTTER TRAWL				NEW ENGLAND BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
White hake	<i>Urophycis tenuis</i>	2005	4,653.39	Pounds	0.17	2005	2,409.64	Pounds	0.23
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	143,132.30	Pounds	0.13	2005	6.72	Pounds	0.75
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	5,543.31	Pounds	0.22	2005	0	Pounds	
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	22,939.24	Pounds	0.10	2005	0	Pounds	
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	94,918.15	Pounds	0.18	2005	29.85	Pounds	0.69
TOTAL FISHERY BYCATCH			9,676,141.68	Pounds			760,491.02	Pounds	
TOTAL FISHERY LANDINGS			12,311,245.88	Pounds			2,746,195.36	Pounds	
TOTAL CATCH (Bycatch + Landings)			21,987,387.56	Pounds			3,506,686.38	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.44				0.22		

Subtable 4.1.A.6		NEW ENGLAND GENERAL CAT. OPEN AREA SCALLOP DREDGE				NEW ENGLAND HADDOCK SECTOR LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	251.36	Pounds	0.67	2005	19.35	Pounds	0.60
Atlantic cod	<i>Gadus morhua</i>	2005	96.68	Pounds	0.78	2005	3278.24	Pounds	0.11
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	701.53	Pounds	0.31
Atlantic herring	<i>Clupea harengus</i>	2005	0	Pounds		2005	28.63	Pounds	0.88
Atlantic mackerel	<i>Scomber scombrus</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	1,101,691	Pounds	0.32	2005	4.03	Pounds	0.88
Atlantic surfclam	<i>Spisula solidissima</i>	2005	12,181	Pounds	0.78	2005	0	Pounds	
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	0	Pounds	
Butterfish	<i>Peprilus triacanthus</i>	2005	0	Pounds		2005	0	Pounds	
Deep sea red crab	<i>Chaceon quinquedens</i>	2005	0	Pounds		2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	0	Pounds		2005	67,736.36	Pounds	0.08
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	0	Pounds	
Monkfish	<i>Lophius americanus</i>	2005	1,046.62	Pounds	0.54	2005	12.10	Pounds	0.87
Ocean pout	<i>Zoarces americanus</i>	2005	1,353.48	Pounds	0.79	2005	28.22	Pounds	0.68

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Table 4.1.A (continued)

(continuation of Subtable 4.1.A.6)		NEW ENGLAND GENERAL CAT. OPEN AREA SCALLOP DREDGE				NEW ENGLAND HADDOCK SECTOR LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Ocean quahog	<i>Arctica islandica</i>	2005	96,580.43	Pounds	0.73	2005	0	Pounds	
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	16.13	Pounds	0.70
Red hake	<i>Urophycis chuss</i>	2005	0	Pounds		2005	2,271.91	Pounds	0.20
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	322.54	Pounds	0.23
Scup	<i>Stenotomus chrysops</i>	2005	0	Pounds		2005	0	Pounds	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	0	Pounds		2005	0	Pounds	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	0	Pounds		2005	36.29	Pounds	0.78
Skate complex*	<i>Rajidae</i>	2005	334,080.91	Pounds	0.38	2005	66,607.06	Pounds	0.11
Spiny dogfish	<i>Squalus acanthias</i>	2005	0	Pounds		2005	24,198.76	Pounds	0.33
Summer flounder	<i>Paralichthys dentatus</i>	2005	386.71	Pounds	0.78	2005	0	Pounds	
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	0	Pounds		2005	2,231.19	Pounds	0.18
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	26,818.23	Pounds	0.47	2005	0	Pounds	
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	21,195.52	Pounds	0.43	2005	0	Pounds	
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	0	Pounds		2005	4.03	Pounds	0.88
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	10,555.39	Pounds	0.52	2005	0	Pounds	
TOTAL FISHERY BYCATCH			1,606,237.03	Pounds			167,496.37	Pounds	
TOTAL FISHERY LANDINGS			15,847,470.51	Pounds			1,342,529.51	Pounds	
TOTAL CATCH (Bycatch + Landings)			17,453,707.54	Pounds			1,510,025.88	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.09				0.11		

Subtable 4.1.A.7		NEW ENGLAND EXTRA-LARGE-MESH GILLNET				NEW ENGLAND GENERAL CAT. CLOSED AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	2,293.16	Pounds	0.53	2005	0	Pounds	
Atlantic cod	<i>Gadus morhua</i>	2005	74,180.52	Pounds	0.17	2005	0	Pounds	
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	7,359.52	Pounds	0.39	2005	0	Pounds	
Atlantic herring	<i>Clupea harengus</i>	2005	777.92	Pounds	0.34	2005	0	Pounds	
Atlantic mackerel	<i>Scomber scombrus</i>	2005	55,926.74	Pounds	0.66	2005	0	Pounds	



# NORTHEAST REGION

**Table 4.1.A** (continued)

(continuation of subtable 4.1.A.7)		NEW ENGLAND EXTRA-LARGE-MESH GILLNET				NEW ENGLAND GENERAL CAT. CLOSED AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	577.45	Pounds	0.39	2005	275,255.30	Pounds	0.17
Atlantic surfclam	<i>Spisula solidissima</i>	2005	10.05	Pounds	0.93	2005	8,244.65	Pounds	0.18
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	31,486.21	Pounds	0.25	2005	0	Pounds	
Butterfish	<i>Peprilus triacanthus</i>	2005	0	Pounds		2005	0	Pounds	
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	661.12	Pounds	0.50	2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	4,189.20	Pounds	0.23	2005	431.21	Pounds	0.56
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	0	Pounds	
Monkfish	<i>Lophius americanus</i>	2005	858,679.96	Pounds	0.19	2005	70,816.41	Pounds	0.18
Ocean pout	<i>Zoarces americanus</i>	2005	3,062.32	Pounds	0.80	2005	75.11	Pounds	0.87
Ocean quahog	<i>Arctica islandica</i>	2005	0	Pounds		2005	0	Pounds	
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	30,095.12	Pounds	0.20	2005	0	Pounds	
Red hake	<i>Urophycis chuss</i>	2005	50.23	Pounds	0.62	2005	1,021.43	Pounds	0.51
Redfish	<i>Sebastes fasciatus</i>	2005	4,783.26	Pounds	0.78	2005	0	Pounds	
Scup	<i>Stenotomus chrysops</i>	2005	0	Pounds		2005	0	Pounds	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	0	Pounds		2005	0	Pounds	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	317.36	Pounds	0.29	2005	102.93	Pounds	0.56
Skate complex*	<i>Rajidae</i>	2005	1,441,001.13	Pounds	0.44	2005	70,668.47	Pounds	0.09
Spiny dogfish	<i>Squalus acanthias</i>	2005	809,447.86	Pounds	0.17	2005	250.38	Pounds	1.07
Summer flounder	<i>Paralichthys dentatus</i>	2005	47,622.22	Pounds	0.26	2005	2,225.58	Pounds	1.08
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	7,096.40	Pounds	0.53	2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	23,781.18	Pounds	0.32	2005	5,041.37	Pounds	0.18
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	58.20	Pounds	0.51	2005	471.48	Pounds	1.05
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	4,300.86	Pounds	0.76	2005	3,018.45	Pounds	0.79
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	345.05	Pounds	0.53	2005	0	Pounds	
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	5,249.27	Pounds	0.87	2005	3,421.82	Pounds	0.16
TOTAL FISHERY BYCATCH			3,413,352.31	Pounds			441,044.59	Pounds	
TOTAL FISHERY LANDINGS			16,486,015.99	Pounds			2,359,046.28	Pounds	
TOTAL CATCH (Bycatch + Landings)			19,899,368.30	Pounds			2,800,090.87	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.17				0.16		

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Table 4.1.A (continued)

Subtable 4.1.A.8		NEW ENGLAND HAND LINE				NEW ENGLAND LARGE-MESH GILLNET			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	0	Pounds		2005	2,691.19	Pounds	0.26
Atlantic cod	<i>Gadus morhua</i>	2005	51,170.32	Pounds	0.42	2005	202,334.25	Pounds	0.12
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	1,736.36	Pounds	1.50
Atlantic herring	<i>Clupea harengus</i>	2005	0	Pounds		2005	10,469.35	Pounds	0.40
Atlantic mackerel	<i>Scomber scombrus</i>	2005	0	Pounds		2005	1,634.98	Pounds	0.48
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	0	Pounds		2005	20.63	Pounds	0.43
Atlantic surfclam	<i>Spisula solidissima</i>	2005	0	Pounds		2005	0	Pounds	
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	13,242.30	Pounds	0.42
Butterfish	<i>Peprilus triacanthus</i>	2005	0	Pounds		2005	0	Pounds	
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	0	Pounds		2005	1,713.14	Pounds	0.45
Haddock	<i>Melanogrammus aeglefinus</i>	2005	0	Pounds		2005	6,940.58	Pounds	0.36
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	0	Pounds	
Monkfish	<i>Lophius americanus</i>	2005	0	Pounds		2005	9,741.65	Pounds	0.25
Ocean pout	<i>Zoarces americanus</i>	2005	0	Pounds		2005	1,418.37	Pounds	1.11
Ocean quahog	<i>Arctica islandica</i>	2005	0	Pounds		2005	0	Pounds	
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	100.70	Pounds	0.43
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	74,578.13	Pounds	0.12
Red hake	<i>Urophycis chuss</i>	2005	0	Pounds		2005	931.82	Pounds	0.37
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	4,645.65	Pounds	0.20
Scup	<i>Stenotomus chrysops</i>	2005	0	Pounds		2005	0	Pounds	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	0	Pounds		2005	0	Pounds	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	0	Pounds		2005	1,851.56	Pounds	0.24
Skate complex*	<i>Rajidae</i>	2005	0	Pounds		2005	123,214.61	Pounds	0.59
Spiny dogfish	<i>Squalus acanthias</i>	2005	0	Pounds		2005	4,199,078.01	Pounds	0.12
Summer flounder	<i>Paralichthys dentatus</i>	2005	0	Pounds		2005	8.90	Pounds	0.91
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	0	Pounds		2005	24,233.90	Pounds	0.24
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	0	Pounds		2005	52.67	Pounds	0.46
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	0	Pounds		2005	9,226.73	Pounds	0.62
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	0	Pounds		2005	2,957.19	Pounds	0.70
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	0	Pounds		2005	26,106.07	Pounds	0.58
TOTAL FISHERY BYCATCH			51,170.32	Pounds			4,718,928.74	Pounds	
TOTAL FISHERY LANDINGS			606,807.70	Pounds			10,082,223.49	Pounds	
TOTAL CATCH (Bycatch + Landings)			657,978.02	Pounds			14,801,152.23	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.08				0.32		

# NORTHEAST REGION

Table 4.1.A (continued)

Subtable 4.1.A.9		NEW ENGLAND LARGE-MESH OTTER TRAWL				NEW ENGLAND LIMITED-ACCESS CLOSED AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	422,938.73	Pounds	0.13	2005	5,699.15	Pounds	0.33
Atlantic cod	<i>Gadus morhua</i>	2005	671,163.94	Pounds	0.20	2005	3,426.70	Pounds	0.27
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	10,184.33	Pounds	0.25	2005	0	Pounds	
Atlantic herring	<i>Clupea harengus</i>	2005	9,479.36	Pounds	0.29	2005	0	Pounds	
Atlantic mackerel	<i>Scomber scombrus</i>	2005	1,906.96	Pounds	0.45	2005	0	Pounds	
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	33,767.62	Pounds	0.26	2005	1,484,379.47	Pounds	0.30
Atlantic surfclam	<i>Spisula solidissima</i>	2005	10,410.17	Pounds	1.41	2005	438.52	Pounds	0.80
Black sea bass	<i>Centropristis striata</i>	2005	20,135.01	Pounds	0.52	2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	13,692.24	Pounds	0.54	2005	0	Pounds	
Butterfish	<i>Peprilus triacanthus</i>	2005	1,306.15	Pounds	0.26	2005	20.12	Pounds	0.54
Deep sea red crab	<i>Chaceon quinquedens</i>	2005	91,857.57	Pounds	0.32	2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	44,827.73	Pounds	0.22	2005	5,333.58	Pounds	0.25
Longfinned squid	<i>Loligo pealeii</i>	2005	4,376.01	Pounds	0.47	2005	27.04	Pounds	0.87
Monkfish	<i>Lophius americanus</i>	2005	812,148.35	Pounds	0.16	2005	815,902.96	Pounds	0.19
Ocean pout	<i>Zoarces americanus</i>	2005	144,860.12	Pounds	0.20	2005	2,559.13	Pounds	0.25
Ocean quahog	<i>Arctica islandica</i>	2005	8,844.45	Pounds	1.20	2005	2,593.43	Pounds	0.54
Offshore hake	<i>Merluccius albidus</i>	2005	131.55	Pounds	0.65	2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	14,639.98	Pounds	0.31	2005	60.31	Pounds	1.04
Red hake	<i>Urophycis chuss</i>	2005	34,530.02	Pounds	0.17	2005	80,032.18	Pounds	0.26
Redfish	<i>Sebastes fasciatus</i>	2005	75,882.69	Pounds	0.23	2005	0	Pounds	
Scup	<i>Stenotomus chrysops</i>	2005	141,213.74	Pounds	0.81	2005	0	Pounds	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	13,480.84	Pounds	0.30	2005	2.18	Pounds	1.07
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	47,162.82	Pounds	0.21	2005	8,783.60	Pounds	0.31
Skate complex*	<i>Rajidae</i>	2005	11,221,918.11	Pounds	0.11	2005	2,632,370.32	Pounds	0.10
Spiny dogfish	<i>Squalus acanthias</i>	2005	5,243,038.55	Pounds	0.16	2005	18,618.92	Pounds	0.34
Summer flounder	<i>Paralichthys dentatus</i>	2005	364,571.07	Pounds	0.30	2005	37,656.18	Pounds	0.22
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	853.41	Pounds	1.29	2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	15,257.74	Pounds	0.34	2005	4,152.47	Pounds	0.42
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	349,216.03	Pounds	0.29	2005	19,900.04	Pounds	0.40
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	262,080.69	Pounds	0.18	2005	105,790.81	Pounds	0.21
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	219,872.53	Pounds	0.12	2005	11,115.76	Pounds	0.29

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**Table 4.1.A** (continued)

(continuation of subtable 4.1.A.9)		NEW ENGLAND LARGE-MESH OTTER TRAWL				NEW ENGLAND LIMITED-ACCESS CLOSED AREA SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	550,227.73	Pounds	0.14	2005	272,309.34	Pounds	0.25
TOTAL FISHERY BYCATCH			20,855,976.24	Pounds		5,511,172.21			Pounds
TOTAL FISHERY LANDINGS			43,557,613.40	Pounds		100,072,621.30			Pounds
TOTAL CATCH (Bycatch + Landings)			64,413,589.64	Pounds		105,583,793.51			Pounds
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.32			0.05			

Subtable 4.1.A.10		NEW ENGLAND LIMITED-ACCESS OPEN AREA SCALLOP DREDGE				NEW ENGLAND MID-WATER OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	9,564.38	Pounds	0.86	2005	103.64	Pounds	0.37
Atlantic cod	<i>Gadus morhua</i>	2005	2,301.72	Pounds	1.01	2005	1,229.70	Pounds	0.49
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	13.00	Pounds	1.36	2005	0	Pounds	
Atlantic herring	<i>Clupea harengus</i>	2005	0	Pounds		2005	3,485,776.07	Pounds	0.49
Atlantic mackerel	<i>Scomber scombrus</i>	2005	160.34	Pounds	1.14	2005	15,514.15	Pounds	0.81
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	2,421,457.49	Pounds	0.50	2005	0	Pounds	
Atlantic surfclam	<i>Spisula solidissima</i>	2005	7,929.20	Pounds	1.36	2005	0	Pounds	
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	1,261.71	Pounds	0.48
Butterfish	<i>Peprilus triacanthus</i>	2005	0	Pounds		2005	0	Pounds	
Deep sea red crab	<i>Chaceon quinqueedens</i>	2005	0	Pounds		2005	0	Pounds	
Haddock	<i>Melanogrammus aeglefinus</i>	2005	1,825.18	Pounds	0.94	2005	129,197.10	Pounds	0.51
Longfinned squid	<i>Loligo pealeii</i>	2005	106.24	Pounds	0.62	2005	51.49	Pounds	0.58
Monkfish	<i>Lophius americanus</i>	2005	636,864.80	Pounds	0.34	2005	542.83	Pounds	0.47
Ocean pout	<i>Zoarces americanus</i>	2005	1,012.75	Pounds	0.61	2005	0	Pounds	
Ocean quahog	<i>Arctica islandica</i>	2005	703.06	Pounds	0.76	2005	0	Pounds	
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	11,367.39	Pounds	0.58
Red hake	<i>Urophycis chuss</i>	2005	39,435.60	Pounds	0.59	2005	930.16	Pounds	0.72
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	8,513.17	Pounds	0.89
Scup	<i>Stenotomus chrysops</i>	2005	85.15	Pounds	0.76	2005	0	Pounds	
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	16.03	Pounds	0.87	2005	2,507.32	Pounds	0.52

# NORTHEAST REGION

**Table 4.1.A** (continued)

(continuation of subtable 4.1.A.10)		NEW ENGLAND LIMITED-ACCESS OPEN AREA SCALLOP DREDGE				NEW ENGLAND MID-WATER OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	11,088.39	Pounds	0.69	2005	22,304.94	Pounds	0.66
Skate complex*	<i>Rajidae</i>	2005	3,821,941.96	Pounds	0.20	2005	37.08	Pounds	0.94
Spiny dogfish	<i>Squalus acanthias</i>	2005	12,507.86	Pounds	0.38	2005	427,523.97	Pounds	0.45
Summer flounder	<i>Paralichthys dentatus</i>	2005	134,392.08	Pounds	0.43	2005	0	Pounds	
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	1,261.89	Pounds	1.09	2005	971.69	Pounds	0.79
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	238,296.63	Pounds	0.66	2005	0	Pounds	
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	108,473.87	Pounds	0.28	2005	12.87	Pounds	0.81
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	25,557.86	Pounds	0.72	2005	35.51	Pounds	0.38
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	215,999.33	Pounds	0.35	2005	15.02	Pounds	0.90
TOTAL FISHERY BYCATCH			7,690,994.81	Pounds			4,107,895.81	Pounds	
TOTAL FISHERY LANDINGS			66,955,538.32	Pounds			157,559,426.00	Pounds	
TOTAL CATCH (Bycatch + Landings)			74,646,533.13	Pounds			161,667,321.81	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.10				0.03		

Subtable 4.1.A.11		NEW ENGLAND PURSE SEINE				NEW ENGLAND SMALL-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	0	Pounds		2005	75,336.52	Pounds	0.45
Atlantic cod	<i>Gadus morhua</i>	2005	0	Pounds		2005	97,527.64	Pounds	0.58
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	0	Pounds		2005	1,326.23	Pounds	0.61
Atlantic herring	<i>Clupea harengus</i>	2005	2,116,551.85	Pounds	0.62	2005	556,568.37	Pounds	1.03
Atlantic mackerel	<i>Scomber scombrus</i>	2005	543.51	Pounds	1.00	2005	2,168,206.15	Pounds	0.57
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	0	Pounds		2005	7,856.78	Pounds	0.67
Atlantic surfclam	<i>Spisula solidissima</i>	2005	0	Pounds		2005	0	Pounds	
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	3,151.14	Pounds	0.32
Bluefish	<i>Pomatomus saltatrix</i>	2005	1,322.06	Pounds	1.11	2005	3,929.07	Pounds	0.40
Butterfish	<i>Peprilus triacanthus</i>	2005	0	Pounds		2005	695,470.49	Pounds	0.41
Deep sea red crab	<i>Chaceon quinque-dens</i>	2005	0	Pounds		2005	49,696.99	Pounds	0.81

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Table 4.1.A (continued)

(subtable 4.1.A.11 continued)		NEW ENGLAND PURSE SEINE				NEW ENGLAND SMALL-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Haddock	<i>Melanogrammus aeglefinus</i>	2005	0	Pounds		2005	208,029.68	Pounds	0.52
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	681,497.60	Pounds	0.34
Monkfish	<i>Lophius americanus</i>	2005	0	Pounds		2005	365,098.00	Pounds	0.18
Ocean pout	<i>Zoarces americanus</i>	2005	0	Pounds		2005	59,721.27	Pounds	0.68
Ocean quahog	<i>Arctica islandica</i>	2005	0	Pounds		2005	101.81	Pounds	1.52
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	0	Pounds		2005	0	Pounds	
Red hake	<i>Urophycis chuss</i>	2005	0	Pounds		2005	1,317,305.02	Pounds	0.20
Redfish	<i>Sebastes fasciatus</i>	2005	0	Pounds		2005	4,012.77	Pounds	0.51
Scup	<i>Stenotomus chrysops</i>	2005	0	Pounds		2005	32,584.03	Pounds	0.43
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	0	Pounds		2005	418,777.28	Pounds	0.32
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	0	Pounds		2005	4,058,984.51	Pounds	0.27
Skate complex*	<i>Rajidae</i>	2005	29.38	Pounds	1.15	2005	1,553,176.40	Pounds	0.28
Spiny dogfish	<i>Squalus acanthias</i>	2005	9,785.14	Pounds	0.47	2005	1,897,558.52	Pounds	0.25
Summer flounder	<i>Paralichthys dentatus</i>	2005	0	Pounds		2005	298,536.16	Pounds	0.39
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	53,696.55	Pounds	0.90
White hake	<i>Urophycis tenuis</i>	2005	0	Pounds		2005	154,573.28	Pounds	0.85
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	0	Pounds		2005	35,985.42	Pounds	0.53
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	0	Pounds		2005	102,635.52	Pounds	0.47
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	0	Pounds		2005	116,748.79	Pounds	0.28
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	0	Pounds		2005	58,828.96	Pounds	0.42
TOTAL FISHERY BYCATCH			2,128,231.94	Pounds		15,076,920.95			Pounds
TOTAL FISHERY LANDINGS			36,711,560.00	Pounds		31,812,284.60			Pounds
TOTAL CATCH (Bycatch + Landings)			38,839,791.94	Pounds		46,889,205.55			Pounds
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.05			0.32			



# NORTHEAST REGION

Table 4.1.A (continued)

Subtable 4.1.A.12		NEW ENGLAND SHRIMP TRAWL				NEW ENGLAND US/CAN AREA LARGE-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	39,828.50	Pounds	0.19	2005	82,000.42	Pounds	0.10
Atlantic cod	<i>Gadus morhua</i>	2005	5,841.96	Pounds	0.36	2005	583,161.74	Pounds	0.11
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	166.44	Pounds	0.95	2005	6,227.96	Pounds	0.12
Atlantic herring	<i>Clupea harengus</i>	2005	20,022.44	Pounds	0.33	2005	5,557.39	Pounds	0.24
Atlantic mackerel	<i>Scomber scombrus</i>	2005	6,074.97	Pounds	0.55	2005	704.41	Pounds	0.19
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds		2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	216.37	Pounds	0.73	2005	71,215.71	Pounds	0.20
Atlantic surfclam	<i>Spisula solidissima</i>	2005	0	Pounds		2005	1,346.96	Pounds	0.29
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds		2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	0	Pounds		2005	11,984.66	Pounds	0.26
Butterfish	<i>Peprilus triacanthus</i>	2005	2,496.56	Pounds	0.59	2005	287.00	Pounds	0.69
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	1,671.21	Pounds	1.12	2005	61,888.39	Pounds	0.13
Haddock	<i>Melanogrammus aeglefinus</i>	2005	116.51	Pounds	0.56	2005	529,686.87	Pounds	0.11
Longfinned squid	<i>Loligo pealeii</i>	2005	0	Pounds		2005	1,378.83	Pounds	0.23
Monkfish	<i>Lophius americanus</i>	2005	7,687.26	Pounds	1.02	2005	318,719.47	Pounds	0.07
Ocean pout	<i>Zoarces americanus</i>	2005	199.73	Pounds	0.80	2005	95,300.80	Pounds	0.11
Ocean quahog	<i>Arctica islandica</i>	2005	0	Pounds		2005	7,514.01	Pounds	0.19
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds		2005	172.35	Pounds	0.65
Pollock	<i>Pollachius virens</i>	2005	249.66	Pounds	0.69	2005	18,152.22	Pounds	0.32
Red hake	<i>Urophycis chuss</i>	2005	1,090.08	Pounds	0.55	2005	82,623.28	Pounds	0.22
Redfish	<i>Sebastes fasciatus</i>	2005	2,402.22	Pounds	1.07	2005	51,173.16	Pounds	0.14
Scup	<i>Stenotomus chrysops</i>	2005	0	Pounds		2005	52.02	Pounds	0.71
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	675.60	Pounds	1.12	2005	2,647.02	Pounds	0.21
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds		2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	56,006.41	Pounds	0.27	2005	31,830.08	Pounds	0.24
Skate complex*	<i>Rajidae</i>	2005	13,214.84	Pounds	0.19	2005	19,632,726.61	Pounds	0.05
Spiny dogfish	<i>Squalus acanthias</i>	2005	66.58	Pounds	0.57	2005	745,185.03	Pounds	0.22
Summer flounder	<i>Paralichthys dentatus</i>	2005	0	Pounds		2005	537,739.01	Pounds	0.10
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	0	Pounds		2005	0	Pounds	
White hake	<i>Urophycis tenuis</i>	2005	2,181.47	Pounds	0.47	2005	12,790.65	Pounds	0.20
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	1,531.23	Pounds	0.31	2005	660,806.53	Pounds	0.10

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**Table 4.1.A** (continued)

(subtable 4.1.A.12 continued)		NEW ENGLAND SHRIMP TRAWL				NEW ENGLAND US/CAN AREA LARGE-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV	DATA SOURCE	AMOUNT	UNIT	CV
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	28,577.33	Pounds	0.40	2005	29,621.89	Pounds	0.30
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	7,207.96	Pounds	0.78	2005	78,527.31	Pounds	0.08
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	4,593.68	Pounds	0.31	2005	243,356.10	Pounds	0.10
TOTAL FISHERY BYCATCH			202,119.01	Pounds		23,904,377.88		Pounds	
TOTAL FISHERY LANDINGS			4,447,929.00	Pounds		32,685,411.98		Pounds	
TOTAL CATCH (Bycatch + Landings)			4,650,048.01	Pounds		56,589,789.86		Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.04			0.42			

Subtable 4.1.A.13		NEW ENGLAND US/CAN AREA SMALL-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV
American plaice	<i>Hippoglossoides platessoides</i>	2005	769.82	Pounds	0.12
Atlantic cod	<i>Gadus morhua</i>	2005	3,387.73	Pounds	0.13
Atlantic halibut	<i>Hippoglossus hippoglossus</i>	2005	69.60	Pounds	0.14
Atlantic herring	<i>Clupea harengus</i>	2005	8.93	Pounds	0.15
Atlantic mackerel	<i>Scomber scombrus</i>	2005	5.02	Pounds	0.14
Atlantic salmon	<i>Salmo salar</i>	2005	0	Pounds	
Atlantic sea scallop	<i>Placopecten magellanicus</i>	2005	41.06	Pounds	0.19
Atlantic surfclam	<i>Spisula solidissima</i>	2005	79.62	Pounds	0.18
Black sea bass	<i>Centropristis striata</i>	2005	0	Pounds	
Bluefish	<i>Pomatomus saltatrix</i>	2005	29.31	Pounds	1.15
Butterfish	<i>Peprilus triacanthus</i>	2005	0.06	Pounds	0.18
Deep sea red crab	<i>Chaceon quinquegens</i>	2005	272.66	Pounds	0.18
Haddock	<i>Melanogrammus aeglefinus</i>	2005	1,194.15	Pounds	0.11
Longfinned squid	<i>Loligo pealeii</i>	2005	16.52	Pounds	0.34
Monkfish	<i>Lophius americanus</i>	2005	2,062.40	Pounds	0.08
Ocean pout	<i>Zoarces americanus</i>	2005	1,057.78	Pounds	0.09
Ocean quahog	<i>Arctica islandica</i>	2005	2.52	Pounds	0.16
Offshore hake	<i>Merluccius albidus</i>	2005	0	Pounds	
Pollock	<i>Pollachius virens</i>	2005	219.39	Pounds	0.40
Red hake	<i>Urophycis chuss</i>	2005	612.03	Pounds	0.53
Redfish	<i>Sebastes fasciatus</i>	2005	78.68	Pounds	0.14

# NORTHEAST REGION

**Table 4.1.A** (continued)

(subtable 4.1.A.13 continued)		NEW ENGLAND US/CAN AREA SMALL-MESH OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AMOUNT	UNIT	CV
Scup	<i>Stenotomus chrysops</i>	2005	0.04	Pounds	0.29
Shortfin squid, northern	<i>Illex illecebrosus</i>	2005	9.36	Pounds	0.17
Shortnose sturgeon	<i>Acipenser brevirostrum</i>	2005	0	Pounds	
Silver hake	<i>Merluccius bilinearis</i>	2005	336.76	Pounds	0.40
Skate complex*	<i>Rajidae</i>	2005	133,817.52	Pounds	0.06
Spiny dogfish	<i>Squalus acanthias</i>	2005	12,375.92	Pounds	0.69
Summer flounder	<i>Paralichthys dentatus</i>	2005	3,409.43	Pounds	0.14
Tilefish	<i>Lopholatilus chamaeleonticeps</i>	2005	2.61	Pounds	0.42
White hake	<i>Urophycis tenuis</i>	2005	123.81	Pounds	0.15
Windowpane flounder	<i>Scophthalmus aquosus</i>	2005	6,445.28	Pounds	0.15
Winter flounder	<i>Pseudopleuronectes americanus</i>	2005	506.65	Pounds	0.12
Witch flounder	<i>Glyptocephalus cynoglossus</i>	2005	1,006.26	Pounds	0.13
Yellowtail flounder	<i>Limanda ferruginea</i>	2005	3,300.53	Pounds	0.12
TOTAL FISHERY BYCATCH			171,241.45	Pounds	
TOTAL FISHERY LANDINGS			260,788.84	Pounds	
TOTAL CATCH (Bycatch + Landings)			432,030.29	Pounds	
FISHERY BYCATCH RATIO (Bycatch/Total Catch)			0.40		

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**Table 4.1.B**

Summary of 2005 total bycatch estimates by species for Northeast Region fisheries. All estimates are live weights. Species bycatch ratio = total regional bycatch of a species / (total regional landings of the species + total regional bycatch of the species); see Section 3 for details on ratio calculation. Confidential landings are not presented. Key stocks have been highlighted.

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH		TOTAL SPECIES BYCATCH		SPECIES LANDINGS*		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 SPECIES LANDINGS	UNIT	RATIO
American plaice	<i>Hippoglossoides platessoides</i>	No stock bycatch estimates: all Northeast Region bycatch estimates are provided at the species level.		666,548.63	Pounds	2,975,805	Pounds	0.18
Atlantic cod	<i>Gadus morhua</i>			1,920,182.60	Pounds	13,912,261	Pounds	0.12
Atlantic halibut	<i>Hippoglossus hippoglossus</i>			30,266.19	Pounds	37,057	Pounds	0.45
Atlantic herring	<i>Clupea harengus</i>			7,236,966.58	Pounds	213,381,830	Pounds	0.03
Atlantic mackerel	<i>Scomber scombrus</i>			3,462,970.05	Pounds	93,054,471	Pounds	0.04
Atlantic salmon	<i>Salmo salar</i>			0	Pounds	–	–	±
Atlantic sea scallop	<i>Placopecten magellanicus</i>			12,988,509.88	Pounds	470,795,573	Pounds	0.03
Atlantic surfclam	<i>Spisula solidissima</i>			47,261.48	Pounds	310,553,295	Pounds	< 0.01
Black sea bass	<i>Centropristis striata</i>			187,549.92	Pounds	2,489,824	Pounds	0.07
Bluefish	<i>Pomatomus saltatrix</i>			182,897.23	Pounds	4,084,963	Pounds	0.04
Butterfish	<i>Peprilus triacanthus</i>			2,172,528.82	Pounds	963,652	Pounds	0.69
Deep sea red crab	<i>Chaceon quinquedens</i>			226,454.03	Pounds	–	–	‡
Haddock	<i>Melanogrammus aeglefinus</i>			1,189,821.62	Pounds	16,714,062	Pounds	0.07
Longfinned squid	<i>Loligo pealeii</i>			1,998,671.05	Pounds	37,405,115	Pounds	0.05
Monkfish	<i>Lophius americanus</i>			9,099,925.45	Pounds	41,857,436	Pounds	0.18
Ocean pout	<i>Zoarces americanus</i>			346,480.99	Pounds	7,962	Pounds	0.98
Ocean quahog	<i>Arctica islandica</i>			144,348.44	Pounds	250,868,896	Pounds	<0.01
Offshore hake	<i>Merluccius albidus</i>			21,250.42	Pounds	29,816	Pounds	0.42
Pollock	<i>Pollachius virens</i>			156,011.40	Pounds	14,350,792	Pounds	0.01
Red hake	<i>Urophycis chuss</i>			3,371,082.10	Pounds	947,175	Pounds	0.78
Redfish	<i>Sebastes fasciatus</i>		185,665.91	Pounds	1,243,269	Pounds	0.13	
Scup	<i>Stenotomus chrysops</i>		1,206,906.98	Pounds	9,305,230	Pounds	0.11	
Shortfin squid, northern	<i>Illex illecebrosus</i>		3,507,309.73	Pounds	24,435,237	Pounds	0.13	
Shortnose sturgeon	<i>Acipenser brevirostrum</i>		0	Pounds	0	Pounds	±	

# NORTHEAST REGION

**Table 4.1.B** (continued)

COMMON NAME	SCIENTIFIC NAME	TOTAL STOCK BYCATCH		TOTAL SPECIES BYCATCH		SPECIES LANDINGS*		SPECIES BYCATCH RATIO
		AMOUNT	UNIT	AMOUNT	UNIT	2005 SPECIES LANDINGS	UNIT	RATIO
Silver hake	<i>Merluccius bilinearis</i>	No stock bycatch estimates: all Northeast Region bycatch estimates are provided at the species level.		6,082,546.55	Pounds	16,530,387	Pounds	0.27
Skate complex	<i>Rajidae</i>			79,561,301.04	Pounds	--	--	**
Spiny dogfish	<i>Squalus acanthias</i>			21,471,238.99	Pounds	2,484,182	Pounds	0.90
Summer flounder	<i>Paralichthys dentatus</i>			3,250,189.36	Pounds	13,193,821	Pounds	0.20
Tilefish	<i>Lopholatilus chamaeleonticeps</i>			66,885.93	Pounds	1,486,993	Pounds	0.04
White hake	<i>Urophycis tenuis</i>			306,679.69	Pounds	5,886,827	Pounds	0.05
Windowpane flounder	<i>Scophthalmus aquosus</i>			1,864,498.60	Pounds	195,173	Pounds	0.91
Winter flounder	<i>Pseudopleuronectes americanus</i>			790,595.33	Pounds	8,084,186	Pounds	0.09
Witch flounder	<i>Glyptocephalus cynoglossus</i>			633,893.41	Pounds	5,845,971	Pounds	0.10
Yellowtail flounder	<i>Limanda ferruginea</i>			1,510,504.79	Pounds	9,077,978	Pounds	0.14
TOTAL BYCATCH					165,887,943.22	Pounds		

\* Landed weights are only for catch sold.

‡ Retention of Atlantic salmon and shortnose sturgeon are prohibited under the ESA.

‡ Deep sea red crab landings are confidential.

\*\*Landings are not reported because this is a species complex. The U.S. National Bycatch Report does not use landings for complexes since species in the bycatch complex may be different than species in the landings complex, even though the complex name is the same.

# U.S. NATIONAL BYCATCH REPORT

**Table 4.1.C**

Subtables of marine mammal bycatch estimates and associated coefficients of variation (CVs) for Northeast Region fisheries. Bycatch estimates include incidental mortality and serious injury. Key stocks/populations are highlighted. Where multiple years of data are indicated, the estimate is an annual average.

Subtable 4.1.C.1		MID-ATLANTIC GILLNET FISHERIES			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Bottlenose dolphin, W. N. Atl. coastal stock	<i>Tursiops truncatus</i>	2001–05	61	Individuals	0.15
Harbor porpoise — Gulf of Maine/Bay of Fundy	<i>Phocoena phocoena</i>	2001–05	177	Individuals	0.40
TOTAL FISHERY BYCATCH			238	Individuals	

Subtable 4.1.C.2		MID-ATLANTIC MID-WATER OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	2001–05	84	Individuals	0.34
Pilot whale (long- and/or short-finned)	<i>Globicephala spp.</i>	2001–05	7	Individuals	0.34
TOTAL FISHERY BYCATCH			91	Individuals	

Subtable 4.1.C.3		MID-ATLANTIC OTTER TRAWL FISHERIES			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	2001–05	29	Individuals	0.11
Common dolphin, short beaked — W. N. Atl.	<i>Delphinus delphis</i>	2001–05	118	Individuals	0.13
Pilot whale (long- and/or short-finned)	<i>Globicephala spp.</i>	2001–05	38	Individuals	0.15
TOTAL FISHERY BYCATCH			182	Individuals	

Subtable 4.1.C.4		MID-ATLANTIC SCALLOP DREDGE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	



# NORTHEAST REGION

**Table 4.1.C** (continued)

Subtable 4.1.C.5		MID-ATLANTIC SCALLOP TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

Subtable 4.1.C.6		NEW ENGLAND BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

Subtable 4.1.C.7		NEW ENGLAND HAND LINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

Subtable 4.1.C.8		NEW ENGLAND GILLNET FISHERIES			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	2001–05	31	Individuals	0.35
Common dolphin, short beaked — W. N. Atl.	<i>Delphinus delphis</i>	2001–05	5	Individuals	0.80
Harbor porpoise — Gulf of Maine/Bay of Fundy	<i>Phocoena phocoena</i>	2001–05	475	Individuals	0.16
Risso's dolphin – W. N. Atl.	<i>Grampus griseus</i>	2001–05	3	Individuals	0.93
TOTAL FISHERY BYCATCH			514	Individuals	

Subtable 4.1.C.9		NEW ENGLAND MID-WATER OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	2001–05	19	Individuals	0.35
Pilot whale (long- and/or short-finned)	<i>Globicephala</i> spp.	2001–05	1	Individuals	0.35
TOTAL FISHERY BYCATCH			20	Individuals	

# U.S. NATIONAL BYCATCH REPORT

**Table 4.1.C** (continued)

<b>Subtable 4.1.C.10</b>		<b>NEW ENGLAND OTTER TRAWL FISHERIES</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	2001–05	192	Individuals	0.13
Common dolphin, short beaked — W. N. Atl.	<i>Delphinus delphis</i>	2001–05	28	Individuals	0.13
Pilot whale (long- and/or short-finned)	<i>Globicephala</i> spp.	2001–05	19	Individuals	0.12
TOTAL FISHERY BYCATCH			239	Individuals	

<b>Subtable 4.1.C.11</b>		<b>NEW ENGLAND PURSE SEINE</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

<b>Subtable 4.1.C.12</b>		<b>NEW ENGLAND SCALLOP DREDGE</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

<b>Subtable 4.1.C.13</b>		<b>NEW ENGLAND SHRIMP TRAWL</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All marine mammal species	–	2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

# NORTHEAST REGION

**Table 4.1.C** (continued)

<b>Subtable 4.1.C.14 (SUMMARY)</b>		<b>TOTAL SPECIES BYCATCH</b>	
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>NUMBER</b>	<b>UNIT</b>
Atlantic white-sided dolphin — W. N. Atl.	<i>Lagenorhynchus acutus</i>	355	Individuals
Bottlenose dolphin — W. N. Atl. coastal stock	<i>Tursiops truncatus</i>	61	Individuals
Common dolphin, short beaked — W. N. Atl.	<i>Delphinus delphis</i>	151	Individuals
Harbor porpoise — Gulf of Maine/Bay of Fundy	<i>Phocoena phocoena</i>	652	Individuals
Pilot whale (long-and/or short-finned)	<i>Globicephala spp.</i>	65	Individuals
Risso's dolphin — W. N. Atl.	<i>Grampus griseus</i>	3	Individuals
TOTAL FISHERY BYCATCH		1,287	Individuals

# U.S. NATIONAL BYCATCH REPORT

**Table 4.1.D**

Subtables of sea turtle bycatch estimates (mortalities and individuals released alive) and associated coefficients of variation (CVs, where available), for Northeast Region fisheries. Key stocks/populations are highlighted. Where multiple years of data are indicated, the estimate is an annual average. Source: Murray (2004a, 2004b, 2005, 2007).

Subtable 4.1.D.1		MID-ATLANTIC MID-WATER OTTER TRAWL			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
All sea turtle species		2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

Subtable 4.1.D.2		MID-ATLANTIC OTTER TRAWL FISHERIES			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Loggerhead sea turtle	<i>Caretta caretta</i>	1996–2004	616	Individuals	0.23
TOTAL FISHERY BYCATCH			616	Individuals	

Subtable 4.1.D.3		MID-ATLANTIC SCALLOP DREDGE FISHERIES			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Loggerhead sea turtle	<i>Caretta caretta</i>	2003–05	310	Individuals	
TOTAL FISHERY BYCATCH			310	Individuals	

Subtable 4.1.D.4		MID-ATLANTIC SCALLOP TRAWL FISHERIES			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
Loggerhead sea turtle	<i>Caretta caretta</i>	2004–05	136	Individuals	
TOTAL FISHERY BYCATCH			136	Individuals	

Subtable 4.1.D.5		NEW ENGLAND BOTTOM LONGLINE			
COMMON NAME	SCIENTIFIC NAME	DATA SOURCE	AVERAGE NUMBER	UNIT	CV
All sea turtle species		2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

# NORTHEAST REGION

**Table 4.1.D** (continued)

<b>Subtable 4.1.D.6</b>		<b>NEW ENGLAND GILLNET</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All sea turtle species		2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

<b>Subtable 4.1.D.7</b>		<b>NEW ENGLAND MIDWATER OTTER TRAWL</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All sea turtle species		2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

<b>Subtable 4.1.D.8</b>		<b>NEW ENGLAND OTTER TRAWL</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All sea turtle species		2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

<b>Subtable 4.1.D.9</b>		<b>NEW ENGLAND SCALLOP DREDGE</b>			
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>DATA SOURCE</b>	<b>AVERAGE NUMBER</b>	<b>UNIT</b>	<b>CV</b>
All sea turtle species		2001–05	0	Individuals	
TOTAL FISHERY BYCATCH			0	Individuals	

<b>Subtable 4.1.D.10 (SUMMARY)</b>		<b>TOTAL SPECIES BYCATCH</b>	
<b>COMMON NAME</b>	<b>SCIENTIFIC NAME</b>	<b>NUMBER</b>	<b>UNIT</b>
Loggerhead sea turtle	<i>Caretta caretta</i>	1,062	Individuals

