

# U.S. National Bycatch Report First Edition Update 2

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<sup>1</sup> Formerly the Northeast Region.

## **Executive Summary**

Since 2011, NOAA's National Marine Fisheries Service (NMFS) has published a series of National Bycatch Reports and Updates because estimating bycatch rates in fisheries in order to understand bycatch levels, as well as fishery interactions with protected species, is important to effective living marine resource management. These reports, along with other information sources, are expected to help improve NMFS' ability to monitor bycatch trends and set fishery monitoring priorities, as well as serve as a useful data tool for NMFS and its management partners.

The First Edition of the National Bycatch Report (NMFS 2011) documented bycatch estimates, using observer data and self-reported logbook data, for all fisheries for which this information was available in 2005. NMFS completed Update 1 (NMFS 2013a) in late 2013 and published it online in early 2014. Update 1 included bycatch estimates based for the most part on 2010 data only.

This report, Update 2, includes three sets of bycatch estimates based on data from 2011, 2012, and 2013. The Second Edition of the National Bycatch Report, scheduled for publication in late 2017, will include bycatch estimates based on data from 2014 and 2015, as well as National and regional bycatch ratios; discussion of the Tier Classification System, Key Stocks, and Fisheries of Focus; and a detailed discussion of bycatch estimation improvement plans.

### **Fish**

In terms of weight, estimated fish bycatch for the U.S. commercial fisheries considered in this report for 2011 totaled approximately 714.2 million pounds. Associated (retained) landings for these fisheries totaled approximately 6.1 billion pounds. In terms of weight, estimated fish bycatch for the U.S. commercial fisheries considered in this report for 2012 totaled approximately 601.7 million pounds. Associated landings for these fisheries totaled approximately 6.0 billion pounds. In terms of weight, estimated fish bycatch for the U.S. commercial fisheries considered in this report for 2013 totaled approximately 689.1 million pounds. Associated landings for these fisheries totaled approximately 6.1 billion pounds.

### **Marine Mammals**

Bycatch estimates for marine mammals are based on numbers of lethal takes and serious injuries for 29 individual fisheries, as well as eight fishery groups from the Greater Atlantic and Alaska Regions. These eight fishery groups comprised 15 individual Greater Atlantic fisheries, which were classified into six groups, as well as eight individual Alaska fisheries, which were classified into two groups. This report also includes marine mammal bycatch estimates for 2012 and 2013 for the "Alaska statewide salmon fisheries."<sup>2</sup>

### **Sea Turtles**

Sea turtle bycatch estimates are provided for 12 individual fisheries, as well as three Greater Atlantic Region fishery groups, which comprised 13 individual fisheries. (Sea turtle estimates

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<sup>2</sup> The term "Alaska statewide salmon fisheries" reflects the formal list of fisheries established for the National Bycatch Report. For the bycatch estimates presented in this report, it may be more appropriate to refer to this fishery as "subdistricts of the Southeast Alaska drift gillnet fishery."

were not available for individual fisheries within groups.) This report does not include sea turtle bycatch estimates for the Gulf of Mexico Shrimp Trawl fishery and the Southern Atlantic Shrimp Trawl fishery, because no new sea turtle bycatch estimates were feasible for these fisheries. NMFS published a [Biological Opinion dated April 18, 2014](#), which contains the most recent analysis of sea turtle mortalities in these fisheries, as well as a discussion of related data limitations. (For more information, see Section 4.7.)

## Seabirds

Estimates of seabird bycatch are provided for 27 individual fisheries from various regions, as well as two fishery groups from the Alaska Region. These two fishery groups comprised eight individual Alaska fisheries; seabird estimates were not available for individual fisheries within the groups. This report does not include new seabird bycatch estimates for Greater Atlantic Region fisheries.

## Highlights by Region

This report documents improvements in bycatch monitoring and reductions in bycatch in each region of the country. For example, in the **Greater Atlantic** Region, bycatch of loggerhead sea turtles in the mid-Atlantic gillnet fishery has been decreasing. Specifically, the average estimated bycatch rates in large mesh gear in warm southern mid-Atlantic waters declined from 2007 to 2011 relative to 1996 to 2006, along with total commercial fishing effort in this fishery. In addition to the decreased fishing effort, this decline in bycatch rate may have been due to regulatory measures such as the large mesh rolling closures for monkfish, which began in May 2000.

In the **Southeast** Region, the NMFS Southeast Fisheries Science Center calculated bycatch estimates for the Southeastern Atlantic Coastal Gillnet Fishery (including North Carolina) for the first time for this report. The fishery bycatch ratio<sup>3</sup> for the Gulf of Mexico shrimp trawl fishery has remained at or below 0.64 for the 3-year period documented in this report. This continues to be below the ratio of 0.76 reported in the First Edition of the National Bycatch Report.

In the **Alaska** Region, this report includes marine mammal bycatch estimates for 2012 and 2013 for the Alaska statewide salmon fisheries; the previous National Bycatch Report did not include such estimates. With the restructured North Pacific Groundfish and Halibut Observer Program in 2013, the Alaska longline halibut fishery had observer coverage for the first time in 2013, and NMFS' Alaska Fisheries Science Center has produced bycatch estimates for this fishery, including the first seabird bycatch estimates.

The **West Coast** Region's bycatch estimates were enhanced greatly through the 2011 implementation of a new management system for the West Coast groundfish trawl fishery, which required 100 percent at-sea observer coverage and 100 percent monitoring of shoreside landings. The West Coast region was able to provide coefficients of variation (CVs)<sup>4</sup> for estimated fish bycatch in many of its fisheries; the previous National Bycatch Report did not include these CVs.

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<sup>3</sup> Fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings.

<sup>4</sup> Coefficient of variation is the ratio of the square root of the variance of the bycatch estimate (i.e., the standard error) to the estimate, itself. For more information, see NMFS 2004.

In addition, the NMFS Northwest Fisheries Science Center included estimated weights for protected fish species that are managed based on the number of individuals, allowing for calculation of fishery bycatch ratios for 11 out of 13 West Coast fisheries in this report, as opposed to only four out of 13 West Coast fisheries in Update 1.

In the **Pacific Islands** Region, tuna and non-tuna fish bycatch for the American Samoa longline fishery declined from 17 percent of the total catch in 2011 to 13 percent in 2013. Green sea turtle bycatch in this fishery also declined, from an estimated 32 takes in 2011 to 0 takes in 2012 and 19 takes in 2013. This decline in bycatch is due to changes in the longline gear configuration in late 2011 to protect green sea turtles, and a higher level of retention of some fish species.

### **What's Next**

For the Second Edition of the National Bycatch Report, scheduled for publication in late 2017, NMFS will continue to expand and improve bycatch estimates for 2014 and 2015, with some bycatch trend analyses for 2011–2015; attempt to estimate a national bycatch ratio and regional bycatch ratios; discuss the Tier Classification System, Key Stocks, and Fisheries of Focus; and report progress on and update bycatch estimation improvement plans. In addition, we expect that efforts to minimize bycatch through management regulations implemented by Regional Fishery Management Councils and other partners, as well as innovative conservation engineering research, will continue to reduce bycatch rates over time.

# 1. Introduction

## 1.1 Definition of Bycatch

The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSA)<sup>5</sup> defined the term *bycatch* and required that it be minimized to the extent practicable. Bycatch, as defined by the MSA (16 U.S.C. § 1802 (2)), “means fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such a term does not include fish released alive under a recreational catch and release fishery management program.” In addition, the MSA defines fish as “finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds” at 16 U.S.C. § 1802 (12).

The MSA definition of fish bycatch distinguishes between economic and regulatory discards. According to the MSA at 16 U.S.C. § 1802 (9), economic discards are “fish which are the target of a fishery, but which are not retained because they are of an undesirable size, sex, or quality, or for other economic reasons.” Regulatory discards are defined by the MSA at 16 U.S.C. § 1802 (38) as “fish harvested in a fishery which fishermen are required by regulation to discard whenever caught, or are required by regulation to retain but not sell.” In more practical terms, an economic discard is a fish that is caught but is discarded because it has a low market value – it may be too small, too large, of poor quality, or discarded for other economic reasons. A regulatory discard is a fish that is discarded because regulations do not allow fishermen to retain the fish when it is caught. Bycatch monitoring programs typically are not designed to identify whether bycatch consists of economic or regulatory discards.

NOAA’s National Marine Fisheries Service (NMFS) supports programs designed not only to minimize bycatch of fish, but also to reduce fishery interactions with protected species. NMFS is responsible for addressing interactions with protected species under the ESA, the Marine Mammal Protection Act (MMPA), and the U.S. National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries. Because of these broad mandates, *bycatch* for the purposes of this report is defined as:

Discarded catch of any living marine resource plus unobserved mortality<sup>6</sup> due to a direct encounter with fishing gear.

Because information on unobserved mortality of fish is rarely available, it is not included in this report. Unobserved mortality is included in bycatch estimates for protected species where the data permit.

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<sup>5</sup> See Appendix 1 for a complete list of acronyms used in this report.

<sup>6</sup> Unobserved mortality is the mortality of living marine resources due to a direct encounter with fishing gear that does not result in the capture of the species. This includes mortality due to lost or discarded fishing gear, as well as fish and other species that escape from fishing gear before it is retrieved but die due to the stress or injury resulting from the encounter ([NMFS 2004](#)).

In some fisheries, especially in the Pacific Islands, incidental fish catch that might otherwise be discarded as bycatch is retained. Retaining this incidental catch and utilizing it for consumption, bait, or processing (e.g., to create fish meal) can reduce bycatch rates.

## 1.2 The Problem of Bycatch

Bycatch occurs when fishing methods are not sufficiently selective for the target species (including targeted size range and/or sex), or when incidental take of marine mammals, sea turtles, fish listed under the ESA, or seabirds occurs as a result of fishing activities. Bycatch may also occur when regulatory restrictions prohibit retention of particular species, sexes, or size ranges. Fisheries with less-selective fishing gear or methods can result in higher rates of bycatch, especially in areas where the fisheries overlap with protected species.

Bycatch should be examined in the context of biological, ecological, economic, and social impacts to provide a comprehensive evaluation of its overall significance. Biological impacts of bycatch have been demonstrated at the species, population/stock, and ecosystem levels (Hall et al. 2000; Kelleher 2004; Lewison et al. 2004; Read et al. 2006). These impacts include declines in populations, reduced reproductive rates, and less-resilient ecosystems.

Economic impacts may be substantial when current or potential future exploitable finfish or shellfish biomass is not available for harvest (Pascoe 1997; Larson et al. 1998; Patrick and Benaka 2013). In addition, when bycatch results in the mortality of protected or otherwise prohibited species, recovery efforts are undermined (for example, see Guy et al. 2013). Other issues arise when mortality of living marine resources results in lost productivity of commercially or recreationally important stocks, or when the public perceives bycatch as a waste (Hall et al. 2000). Costs for monitoring and mitigating bycatch may be high,<sup>7</sup> but these activities are an important part of sustainable fisheries management today.

Overall fishing mortality can be estimated only through an understanding of the magnitude of bycatch, as well as fishery interactions with protected species. In some cases, even very low overall bycatch levels (both mortality and interactions) may be of concern, especially if the bycaught species are protected or otherwise prohibited.

## 1.3 U.S. Laws and Regulations to Address Bycatch

The primary authorities for monitoring and reducing bycatch are contained in three statutes: the MSA, 16 U.S.C. 1801 et seq.; the MMPA, 16 U.S.C. 1361 et seq.; and the ESA, 16 U.S.C. 1531 et seq. Further information on these, as well as other statutes and international agreements pertaining to bycatch, is provided in the *U.S. National Bycatch Report First Edition* (first edition; NMFS 2011) and the *U.S. National Bycatch Report First Edition Update 1* (referred to hereafter as Update 1; NMFS 2013a).

Management measures have been implemented in many U.S. fisheries to reduce bycatch; these include regulatory measures that limit bycatch quantities and/or close target fisheries when

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<sup>7</sup> For example, in 2012, total funding from all sources, including industry funding, for federal fisheries observer programs was \$69 million (NMFS 2013b).



bycatch limits are reached. In some cases, other mitigation measures such as gear modifications have also been required.

In other cases, NMFS and Regional Fishery Management Councils have implemented catch share programs designed to reduce both the unintended harvest of their target species (e.g., undersized fish) and incidental species (wrong species). For example, in 2011, NMFS implemented the [West Coast Groundfish Trawl Catch Share Program](#), which implemented an Individual Fishing Quota (IFQ) program for the shorebased trawl fleet, and cooperative programs for the at-sea mothership and catcher/processor trawl fleets. Instead of a single, fleet-wide quota to determine how many fish can be sustainably harvested, the catch shares system divides the total amount of an overall allowable catch or quota into shares controlled by individual fishermen or groups of fishermen (cooperatives). The program holds fishermen accountable for their target catch, as well as bycatch.

#### 1.4 Purpose of This Report

The first edition of this report, published in 2011, documented bycatch estimates, using observer data and self-reported logbook data, for all fisheries for which this information was available in 2005. The first edition was the beginning of a series of updates and comprehensive reports that will document bycatch in additional U.S. fisheries over time, as well as improve consistency in reporting bycatch data. NMFS completed Update 1 (NMFS 2013a) in late 2013 and published it online in early 2014. Update 1 included bycatch estimates based on 2010 data. This report, Update 2, includes three sets of bycatch estimates based on data from 2011, 2012, and 2013.

NMFS developed these reports because estimating bycatch rates in fisheries in order to understand bycatch levels, as well as fishery interactions with protected species, is important to effective living marine resource management. These reports were designed to determine the extent to which reliable quantitative bycatch information exists for federally managed fisheries and for fisheries with relevant federal data-collection programs. In addition to describing the “state of bycatch reporting and estimation,” these reports were designed as a resource to, along with other information sources, help address and prioritize sampling and estimation improvements in NMFS observer programs.

The first edition and its two updates focus only on commercial fisheries. The National Bycatch Report (NBR) Steering Committee (see Appendix 2) will explore ways to include fish bycatch estimates for recreational fisheries with established release mortality rates, as well as information about protected species interactions with recreational fisheries, in the next edition of the NBR, due to be published in late 2017. NMFS is attempting to address the lack of recreational fishery bycatch estimates through its Action Plan for Fish Release Mortality Science (Benaka et al. 2016), which will support improved estimation of release and discard mortality rates in recreational and commercial fisheries.

The first edition also provided four new monitoring and bycatch tracking tools: (1) Tier Classification System; (2) Key Stocks; (3) Fisheries of Focus; and (4) Bycatch Estimation Improvement Plans. (NMFS 2011 discusses these tools in detail.)

These reports and updates provide an ever-expanding national compilation of bycatch estimates in commercial U.S. fisheries, as well as an objective framework for evaluating the quality of bycatch estimates. Future editions and updates will include additional bycatch estimates as new fisheries are monitored. Over time, the reports, along with other information sources, should improve NMFS' ability to monitor bycatch trends and set fishery monitoring priorities, as well as serve as a useful data tool for NMFS' management partners.

### 1.5 About the Numbers Presented in This Report

This report presents an extensive set of numeric fish and protected species bycatch estimates. Fish bycatch estimates are expressed mostly in units of pounds, but in some fisheries fish bycatch estimates are expressed in units of individuals. In addition, bycatch estimates for protected species such as marine mammals, sea turtles, and seabirds are expressed in terms of individuals.

This report also presents numerous fishery and species bycatch ratios. A fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings. Likewise, a species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings. When species bycatch estimates are calculated in units of individuals, then it is impossible to present fishery or species bycatch ratios due to the difference in units required for the calculation (i.e., individuals versus pounds).

The first edition estimated a national bycatch ratio<sup>8</sup> of 0.17, which was lower than comparably defined estimates provided by the Food and Agriculture Organization of the United Nations (Kelleher 2004) and Harrington et al. (2005). Kelleher (2004) and Harrington et al. (2005) obtained bycatch estimates and associated landings data from published and grey literature, whereas the NBR and its updates used data from NMFS observer programs and landings records to develop estimates. The ratio identified in Kelleher (2004) was calculated as recorded discards divided by total recorded landings. Harrington et al. (2005) extrapolated the total amount of discarded fish for each component of a fishery using the ratio of discards to landings and the reported level of landings.

### 1.6 National Bycatch Report Publication Schedule

Soon after publication of the first edition in 2011, NMFS determined that, due to the time and resources required to compile the first comprehensive report, the report would be updated in 2013 and 2015 (rather than annually) with short national and regional overviews, including progress on addressing report recommendations, as appropriate. These updates would include new species-specific bycatch estimates for species from the first edition for which estimates are available, as well as new bycatch estimates for species not included in the first edition. The updates also would include updated bycatch estimates for all fisheries in the first edition that continue to be observed (with some consolidation of fisheries), as well as estimates for any newly observed fisheries.

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<sup>8</sup> The national bycatch ratio was defined as the ratio of bycatch to total catch, where total catch equals landings plus bycatch.

On May 9, 2012, NMFS Office of Science and Technology staff, on behalf of the National Bycatch Report Steering Committee, received approval from the NMFS Science Board<sup>9</sup> to prepare biennial online bycatch updates for the report beginning in 2013, with a comprehensive bycatch report every 6 years, beginning in 2017. Unlike the biennial online updates, the next comprehensive report (second edition) in 2017 will include a:

- National and regional bycatch ratios.
- Discussion of the Tier Classification System, Key Stocks, and Fisheries of Focus.
- Detailed discussion of bycatch estimation improvement plans.

A timeline for updates through 2023 is shown in Table 1.1.

**Table 1.1 Timeline for U.S. National Bycatch Reports and updates**

<b>Year</b>	<b>Document Type</b>	<b>Data Years Included<sup>10</sup></b>
2011	Comprehensive Report (first edition)	2005
2013	Online Update (first edition update 1)	2010
2015	Online Update (first edition update 2)	2011-2013
2017	Comprehensive Report (second edition)	2014-2015 + Analysis of trends for 2010--2015
2019	Online Update (second edition update 1)	2016-2017
2021	Online Update (second edition update 2)	2018-2019
2023	Comprehensive Report (third edition)	2020-2021 + Analysis of trends for 2016–2021

<sup>9</sup> The NMFS Science Board is made up of the NMFS Chief Science Advisor, the Director of the NMFS Office of Science and Technology, and the Directors of each of the six regional NMFS Fisheries Science Centers.

<sup>10</sup> In some instances—especially for protected, rare-event species—a range of years was used to determine an average estimate across multiple years.

## 2. National Overview

### 2.1 Improvements in Bycatch Rates and Estimation

This report includes several notable improvements compared to Update 1. For example, in the Greater Atlantic Region, estimates of the mean annual mid-Atlantic gillnet bycatch of loggerhead turtles (*Caretta caretta*) declined from 350 animals during 1995–2006 to 89 animals during 2007–2011.

In the Southeast Region, the estimated bycatch ratio<sup>11</sup> for the Atlantic and Gulf of Mexico Pelagic Longline fishery decreased from 0.27 in 2011 to 0.18 in 2013. In addition, NMFS provided species bycatch ratios for six species for 2011–2013, an increase over the bycatch ratios for only two species in Update 1.

For the Alaska Region, NMFS provided marine mammal bycatch estimates for 2012 and 2013 in a recently observed Alaska salmon fishery; Update 1 did not include such estimates. With the restructured North Pacific Groundfish and Halibut Observer Program, the Alaska longline halibut fishery had observer coverage for the first time in 2013, and NMFS produced bycatch estimates for this fishery, including the first seabird bycatch estimates for this fishery. In addition, the bycatch ratio for arrowtooth flounder (*Reinhardtius stomias*), a species with a high amount of bycatch in Alaska, decreased again because the fishing industry has continued to develop markets for the species. Based on feedback from the North Pacific Fishery Management Council (NPFMC), the NBR Steering Committee removed the Gulf of Alaska Pacific Cod Jig fishery from Update 2 due the lack of observer data for that fishery.

In 2011, NMFS implemented a new management system for the West Coast groundfish trawl fishery, which required 100 percent at-sea observer coverage and 100 percent monitoring of landings shoreside. The West Coast region was able to provide CVs for estimated fish bycatch in many of its fisheries; Update 1 did not include these CVs. In addition, the Northwest Fisheries Science Center included estimated weights for protected fish species that are managed based on the number of individuals, allowing for calculation of fishery bycatch ratios for 11 out of 13 West Coast fisheries in this report, an increase from four out of 13 West Coast fisheries in Update 1. Additionally, the West Coast Region provided discard estimates for all fish and invertebrate species observed, which was not the case in Update 1.

For the Pacific Islands Region, NMFS provided fish bycatch estimates for the American Samoa Pelagic Longline fishery; these estimates were not generated for Update 1. In addition, fishery bycatch ratios decreased from 2011 to 2013 for the American Samoa Pelagic Longline fishery and the Hawaii-Based Shallow-Set Pelagic Longline Fishery for Swordfish and remained stable in the Hawaii-Based Deep-Set Pelagic Longline Fishery for Tuna.

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<sup>11</sup> Fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, or bycatch divided by bycatch plus landings.

## 2.2 Data Sources for Estimating Bycatch

Data sources vary among regions, as well as among fisheries, primarily due to differences in data-collection goals, objectives, and available resources. Commercial fisheries vary greatly in scale and fishing practice, and these factors impact bycatch data-collection programs. The major sources of data used for the bycatch estimates presented in this update were observer data and self-reported logbook data, as well as landings data in some cases. Pursuant to section 402(b) of the MSA, this update does not include certain landings data or bycatch estimates in order to protect confidential information.

The NBR Regional Teams (see Appendix 2) uploaded bycatch estimates and footnotes into a database specially developed by the NMFS Office of Science and Technology for these reports and updates. A version of this database is accessible by members of the public via a [NMFS website](#).

The commercial landings data used in this report were derived from the most recently updated datasets available and have been checked by the NBR Steering Committee for accuracy. All of the landings data were queried at the same time, as opposed to different time periods for different regions. North Carolina, whose landings are split between the Greater Atlantic and Southeast Regions, was able to provide spatial information that allowed for a direct assignment of landings to the appropriate Region. Because landings data are constantly updated as new information becomes available, readers should use caution when comparing landings data in this report to the first edition of the NBR or to other landings datasets for the same time period.

Data sources for commercial landings in the various regions are as follows:

- Greater Atlantic Region, Maine through North Carolina (north of Cape Hatteras): Atlantic Coastal Cooperative Statistics Program (ACCSP) and NMFS Greater Atlantic Region Fisheries Office
- Southeast Region, North Carolina (south of Cape Hatteras) through Texas: ACCSP and NMFS Southeast Fisheries Science Center
- West Coast Region (Washington, Oregon, California): Pacific Fisheries Information Network
- Alaska: Alaska Fisheries Information Network
- Pacific Islands: Western Pacific Fisheries Information Network

Regional divisions used in this report that occur within the state boundaries of North Carolina were established with assistance from the North Carolina Department of Environment and Natural Resources and the ACCSP.

### 2.3 Bycatch and Landings Summary

In terms of weight,<sup>12</sup> estimated fish bycatch for the U.S. commercial fisheries considered in this report for 2011 totaled approximately 714.2 million pounds. Associated landings for these fisheries totaled approximately 6.1 billion pounds (Table 2.1).

**Table 2.1 2011 Total estimated fisheries bycatch and landings for each NMFS region for fisheries included in this report.** Weights are live weights and are rounded to the nearest pound. Data sources are described in Section 2.2 above. Landings and bycatch in this table do not represent all Regional fisheries but rather the fisheries for which this report provides bycatch estimates. Appendix 3 indicates which Regional fisheries have fish bycatch estimates for 2011.

<b>Region</b>	<b>Fish Bycatch (lb)</b>	<b>Fish Landings (lb)</b>
Greater Atlantic	140,390,426	895,070,175
Southeast	297,849,791	175,387,692
Alaska	247,966,998	4,330,032,390
West Coast	17,132,532	633,681,461
Pacific Islands	10,810,845	33,864,791
<b>Totals</b>	<b>714,150,592</b>	<b>6,068,036,509</b>

In terms of weight, estimated fish bycatch for the U.S. commercial fisheries considered in this report for 2012 totaled approximately 601.7 million pounds. Associated landings for these fisheries totaled approximately 6.0 billion pounds (Table 2.2).

**Table 2.2 2012 Total estimated fisheries bycatch and landings for each NMFS region for fisheries included in this report.** Weights are live weights and are rounded to the nearest pound. Data sources are described in Section 2.2 above. Landings and bycatch in this table do not represent all Regional fisheries but rather the fisheries for which this report provides bycatch estimates. Appendix 3 indicates which Regional fisheries have fish bycatch estimates for 2012.

<b>Region</b>	<b>Fish Bycatch (lb)</b>	<b>Fish Landings (lb)</b>
Greater Atlantic	135,792,252	906,795,534
Southeast	207,330,118	168,710,178
Alaska	232,869,918	4,438,602,276
West Coast	15,461,611	476,763,946
Pacific Islands	10,198,589	35,011,084
<b>Totals</b>	<b>601,652,488</b>	<b>6,025,883,018</b>

In terms of weight, estimated fish bycatch for the U.S. commercial fisheries considered in this report for 2013 totaled approximately 689.1 million pounds. Associated landings for these fisheries totaled approximately 6.1 billion pounds (Table 2.3).

<sup>12</sup> Bycatch and landings weights used in the NBR are live weights as opposed to live and landed weights. Specifically, live weight refers to the weight of a fish when it is taken out of the water, whereas landed weight refers to the weight of a fish post-processing (for example, the weight of scallop meat after it has been removed from its shell).

**Table 2.3 2013 Total estimated fisheries bycatch and landings for each NMFS region for fisheries included in this report.** Weights are live weights and are rounded to the nearest pound. Data sources are described in Section 2.2 above. Landings and bycatch in this table do not represent all Regional fisheries but rather the fisheries for which this report provides bycatch estimates. Appendix 3 indicates which Regional fisheries have fish bycatch estimates for 2013.

<b>Region</b>	<b>Fish Bycatch (lb)</b>	<b>Fish Landings (lb)</b>
Greater Atlantic	140,219,526	738,953,648
Southeast	243,558,458	156,063,630
Alaska	279,161,533	4,545,327,715
West Coast	15,562,500	643,331,523
Pacific Islands	10,628,968	33,277,790
<b>Totals</b>	<b>689,130,985</b>	<b>6,116,954,306</b>

Total fish landings in Tables 2.1, 2.2, and 2.3 represent total landings for the 78 fisheries with fish bycatch estimates included in this report. These tables do not include individual fish bycatch estimates for Southeast and West Coast Regions. These Regions estimate some bycatch in units of individuals due to the design of particular observer programs or because the bycatch consists of protected fish species. Please see Sections 4 (Southeast Region) and 6 (West Coast Region) of this report for additional information on these individual fish bycatch estimates.

NMFS has estimated bycatch totals for marine mammals, sea turtles, and seabirds for each of its Regions where this protected species bycatch occurred. The fisheries with protected species bycatch estimates can vary from year to year within a region, and readers should refer to subsequent regional overviews and linked tables for specifics on estimation timeframes for marine mammals, sea turtles, fish listed under the ESA, and seabirds, as well as actual protected species bycatch estimates for particular fisheries.

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) is a fish species protected under the ESA that is captured as bycatch in U.S. commercial fisheries considered in this report. NMFS published a [Biological Opinion dated December 16, 2013](#), which contains current information on the anticipated bycatch of Atlantic sturgeon in several fisheries authorized by NMFS under their respective fishery management plans (FMPs).

This report includes bycatch estimates for marine mammals, based on numbers of lethal takes and serious injuries, for 32 individual fisheries, as well as eight fishery groups from the Greater Atlantic and Alaska Regions. These eight total fishery groups comprised 15 individual Greater Atlantic fisheries, which were classified into six groups, as well as eight individual Alaska fisheries, which were classified into two groups. Estimates were not available for individual fisheries within groups. Fisheries with marine mammal bycatch estimates can vary from year to year within a Region, and readers should refer to subsequent Regional overviews and linked tables for specifics on estimation timeframes for marine mammal bycatch estimates.

With some exceptions, marine mammal bycatch estimates reported here are primarily annual averages over five years, as recommended by NMFS' guidelines for assessing marine mammal stocks (NMFS 2005). Interactions between individual fisheries and marine mammals are typically rare events, and several years of data are needed to provide statistically robust

estimates. Multi-year averages also have been used for some other protected species for these reasons.

This report includes sea turtle bycatch estimates for 12 individual fisheries, as well as three Greater Atlantic Region fishery groups, which comprised 13 individual fisheries. Sea turtle estimates were not available for individual fisheries within groups. Fisheries with sea turtle bycatch estimates can vary from year to year within a region, and readers should refer to subsequent regional overviews and linked tables for specifics on estimation timeframes for sea turtle bycatch estimates. This report does not include sea turtle bycatch estimates for the Gulf of Mexico Shrimp Trawl fishery and the Southern Atlantic Shrimp Trawl fishery, because no new sea turtle bycatch estimates were produced for this report for these fisheries. However, NMFS published a [Biological Opinion dated April 18, 2014](#), which contains more current sea turtle estimates.

This report also provides estimates of seabird bycatch for 27 individual fisheries, as well as two fishery groups from the Alaska Region. These two fishery groups represent eight individual Alaska fisheries. Seabird estimates were not available for individual fisheries within groups. This report does not include seabird bycatch estimates for Greater Atlantic Region fisheries because no new seabird bycatch estimates were produced for this report for these fisheries. Fisheries with seabird bycatch estimates can vary from year to year within a Region, and readers should refer to subsequent Regional overviews and linked tables for specifics on estimation timeframes for seabird bycatch estimates.

Appendix 3 lists the fisheries that have been identified for the NBR. The fisheries generally are identified as federal, state, tribal, international, or some combination of these categories. NMFS is not able to provide fish/invertebrate, marine mammal, sea turtle, and/or seabird bycatch estimates for each of these fisheries individually. However, for 2011–2013, NMFS was able to provide fish/invertebrate, marine mammal, sea turtle, and/or seabird bycatch estimates for the following proportions of federally managed<sup>13</sup> fisheries for each region:

- Greater Atlantic—24 out of 48 (50%)
- Southeast—10 out of 21 (48%)
- Alaska—25 out of 27 (93%)
- West Coast—11 out of 19 (58%)
- Pacific Islands—3 out of 17 (18%)

Appendix 3 indicates which fisheries have fish/invertebrate, marine mammal, sea turtle, and/or seabird bycatch estimates.

#### 2.4 Expected Improvements in Bycatch Estimates

For the *U.S. National Bycatch Report Second Edition*, scheduled for publication in late 2017, NMFS plans to continue to expand and improve bycatch estimates; attempt to estimate a national bycatch ratio and regional bycatch ratios; discuss the Tier Classification System, Key Stocks,

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<sup>13</sup> In this instance, “federally managed” means fisheries that are solely federally managed, or managed federally in partnership with state, tribal, or international organizations.



and Fisheries of Focus; and report progress on and update bycatch estimation improvement plans (see NMFS 2011 for more information on these performance metrics).

NMFS also plans to continue to increase consistency regarding how fish bycatch is reported among Regions, especially for the Southeast, which estimates bycatch as individuals in many fisheries, thereby preventing the calculation of fishery bycatch ratios. The NMFS Southeast Fisheries Science Center (SEFSC) is investigating the calculation of conversion rates so that individuals can be reported in pounds, where feasible.

The SEFSC also is completing an independent statistical review of the Gulf of Mexico Reef Fish Observer Program, which should provide improved methodologies for vessel selection protocols, as well as bycatch estimation techniques for both abundant and rare species. In addition, an independent statistical review of Southeast observer program sampling designs is being finalized; this analysis was designed to examine current sampling designs and recommend various approaches, if warranted, to enhance bycatch estimation.

NMFS is continuing to enhance observer program documentation of deep-sea coral and sponge bycatch species that can form large, complex structures used by fish and invertebrates as habitats in the Greater Atlantic, West Coast, and Alaska Regions. NMFS is continuing to provide training to fishery observers to help them identify corals and sponges, which should lead to more detailed bycatch estimates in the second edition.

A revised Standardized Bycatch Reporting Methodology was implemented in 2015 to estimate bycatch and appropriate levels of observer coverage in all federally managed fisheries in the Greater Atlantic Region. This methodology could result in increased coverage to new fisheries and more precise bycatch estimates.

In Alaska, the restructured North Pacific Groundfish and Halibut Observer Program, which went into effect on January 1, 2013, will continue to enable NMFS to deploy observers using a more statistically robust sampling plan and implement an annual review process that provides flexibility in the deployment to meet scientifically based estimation needs within the constraints of the available budget. Also in Alaska, beginning in 2017, NMFS plans to estimate seabird mortality on trawl vessels due to interactions with trawl warps, third wires, and net wings, which are not monitored through standard observer sampling.

The next few years will see continued focus by NMFS and its partners on electronic monitoring to supplement observer programs, consistent with its May 2013 [Policy on Electronic Technologies and Fishery-Dependent Data Collection](#). These new electronic monitoring efforts may help increase the number of bycatch estimates, particularly in difficult-to-observe fisheries. Additionally, the *U.S. National Bycatch Report Second Edition* may consider recreational fisheries issues, including post-release mortality estimates and protected species interactions.

Finally, continued efforts to minimize bycatch through management regulations implemented by Regional Fishery Management Councils and other partners (e.g., [Chinook salmon bycatch reduction](#) for Alaska pollock fisheries, as well as Pacific halibut bycatch reduction in groundfish

trawl fisheries), as well as innovative conservation engineering research (e.g., through NMFS' [Bycatch Reduction Engineering Program](#)), will continue to reduce bycatch rates over time.

### **3. Greater Atlantic<sup>14</sup> Overview**

#### 3.1 Summary of Fisheries Included in This Report

This report provides 2011, 2012, and 2013 fish bycatch estimates for 23, 23, and 24 Greater Atlantic Region commercial fisheries, respectively (see Appendix 3; Blaylock et al. 2015), compared to 29 in Update 1 (NMFS 2013a, Blaylock et al. 2013). Fish bycatch estimates were derived for the 2012 and 2013 New England lobster pot fishery as a result of expanded observer coverage into that fishery for these years. Fish bycatch estimates were not derived for a few fisheries in 2011, 2012, and 2013 because there was either no or insufficient observer coverage as a result of the sea day allocation/prioritization process and/or low industry activity within the fishery. See Blaylock et al. 2015 for a summary of observer coverage by fishery and year. Details of observer coverage, sea-day allocation/prioritization, and funding corresponding to bycatch estimates for 2010 (Update 1) and 2011, 2012, and 2013 (this report) are summarized in documents associated with Greater Atlantic Region's Standardized Bycatch Reporting Methodology (available online at <http://www.nefsc.noaa.gov/femad/fsb/SBRM/>).

Similar to Update 1 (NMFS 2013a), this report provides mean annual marine mammal bycatch estimates based on multi-year annual averages from years ranging from 2006 to 2012 for six Greater Atlantic Region commercial fishery groups (Waring et al. 2013, Waring et al. 2014, Waring et al. 2015).

Similar to Update 1 (NMFS 2013a), this report provides mean annual sea turtle bycatch estimates based on multi-year annual averages from varying time periods ranging from 2007 to 2014 for three Greater Atlantic Region commercial fishery groups: mid-Atlantic gillnet (Murray 2013), bottom trawl (Murray 2015a), and scallop dredge fisheries (Murray 2015b).

This report does not include seabird bycatch estimates for Greater Atlantic Region fisheries because no new seabird bycatch estimates were produced for this report.

#### 3.2 Changes to Observer Coverage

Compared to 2010, slightly fewer commercial fisheries were observed in 2011, 2012, and 2013 (as described above), and there were fewer observed commercial fishing trips. For fish bycatch estimation, there were 5,632 trips in 2011, 5,034 trips in 2012, and 3,702 trips in 2013 (Blaylock et al. 2015) that were observed versus 5,008 trips in 2010 (Blaylock et al. 2013). Over all fisheries, the annual observer coverage was 4.7 percent of fishing trips in 2010, 5.5 percent in 2011, 5.1 percent in 2012, and 4.3 percent in 2013. Observer monitoring remains high due to the implementation of sector management in the New England multispecies groundfish fishery on May 1, 2010.

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<sup>14</sup> Formerly the Northeast Region and referred to as Northeast Region in NMFS 2011 and NMFS 2013a. For more information, see [http://www.nero.noaa.gov/stories/2014/07\\_nero\\_name\\_change.html](http://www.nero.noaa.gov/stories/2014/07_nero_name_change.html)

### 3.3 Changes to Catch and/or Bycatch Estimation Methods

The methods used to estimate fish, marine mammal, sea turtle, and seabird bycatch in this update were the same as those used in the first edition (NMFS 2011) and Update 1 (NMFS 2013a). These methods are described in detail in Wigley et al. 2008; Warden 2010; NMFS 2011; Blaylock et al. 2013; Murray 2013; NMFS 2013a; Waring et al. (2013, 2014, 2015); Hatch and Orphanides 2014; Blaylock et al. 2015; Lyssikatos 2015; Murray 2015a; and Murray 2015b.

### 3.4 Progress on Bycatch Estimation Improvement Plans

The first edition of the report presented 49 recommendations for fish in the Greater Atlantic Region, including four general recommendations and 45 fishery-specific recommendations (see [Table 4.1.5](#) in NMFS 2011). Between 2010 and 2015, progress has continued on recommendations pertaining to all fisheries. Consistent with the Greater Atlantic Region's [Standardized Bycatch Reporting Methodology Omnibus Amendment](#), discard estimation and sample size analyses continue to be conducted annually to support the deployment of observers among fisheries to achieve the precision performance standard of a 30 percent CV on the total discard estimate for all species within a given FMP.

The Northeast Cooperative Research Program has continued to support collaborative projects aimed at reducing the bycatch and discard mortality of finfish. In addition, a multi-year initiative has been undertaken to modernize the fishery-dependent data collection systems in the Greater Atlantic Region. This initiative is expected to improve the supplemental data used in bycatch estimation.

### 3.5 Fish Bycatch

This section presents fish and invertebrate bycatch estimates in Greater Atlantic Region fisheries based on data from 2011, 2012, and 2013. The 34 stocks presented in this update are managed under 13 federal fishery management plans and represent 71 percent, 66 percent, and 70 percent of all Greater Atlantic Region fish and invertebrate bycatch in 2011, 2012 and 2013, respectively.

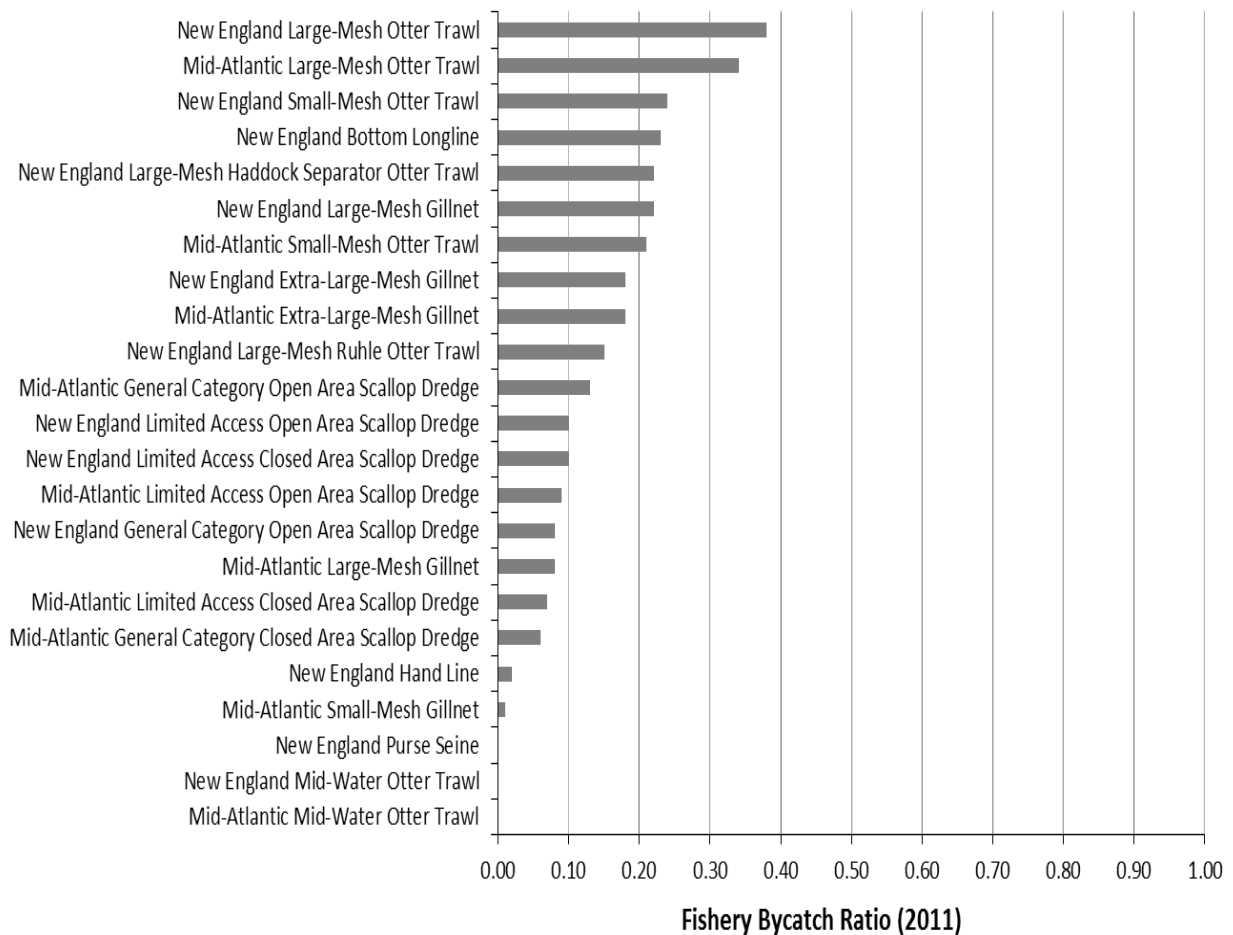
Other marine fish and invertebrate species were observed in the Greater Atlantic Region in 2011–2013, but these species were not under federal management at the time and are therefore not included in this section. For 2011, this constitutes 241 species with a combined estimate of 57.5 million pounds, or 29 percent of all Greater Atlantic Region fish and invertebrate bycatch. For 2012, this constitutes 242 species with a combined estimate of 71.3 million pounds, or 34 percent of all Greater Atlantic Region fish and invertebrate bycatch. For 2013, this constitutes 273 species with a combined estimate of 59.4 million pounds, or 30 percent of all Greater Atlantic Region fish and invertebrate bycatch.

This section also includes fishery bycatch ratios as well as species bycatch ratios for each year.

### 3.5.1 Fish Bycatch Estimates for 2011

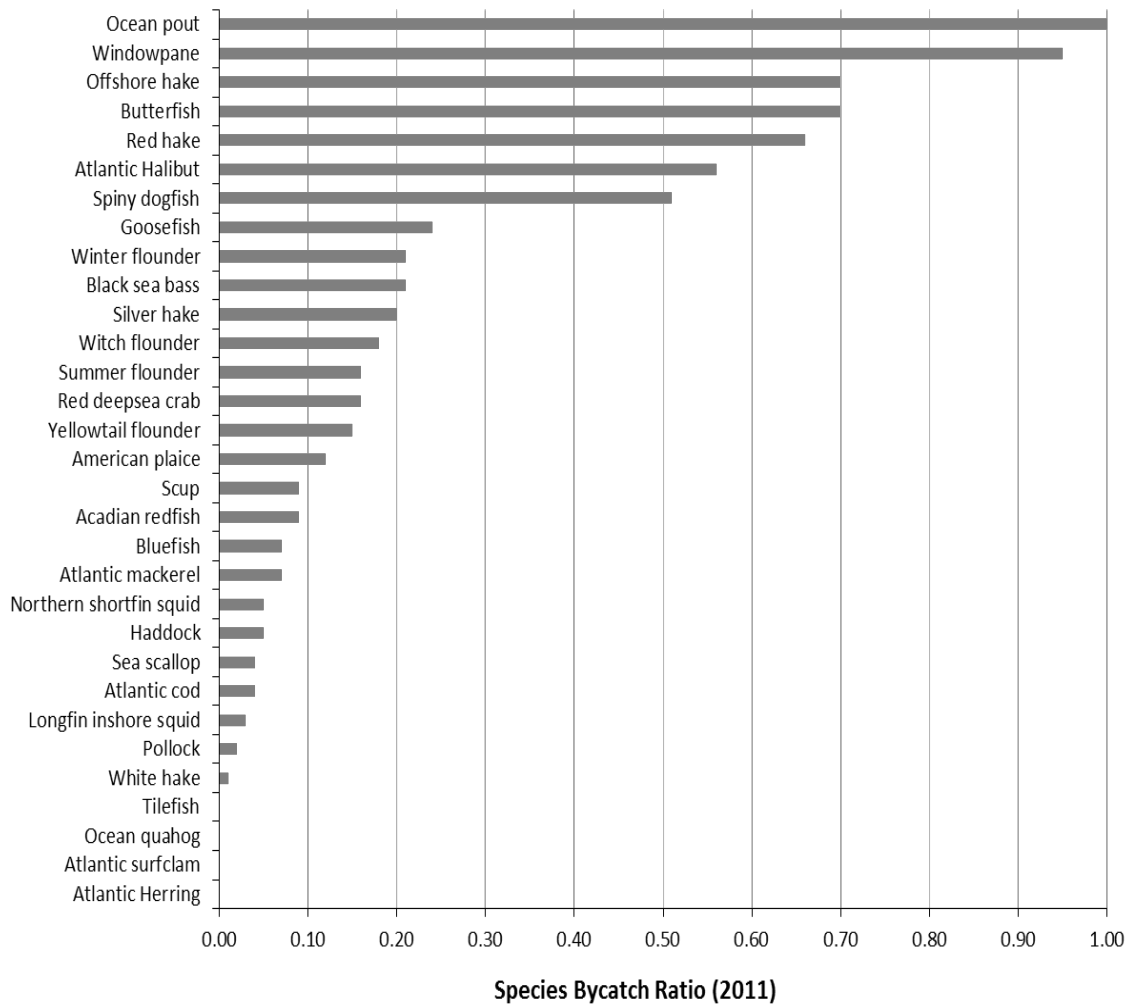
Fishery bycatch estimates based on 2011 data ranged from 6,342 pounds in the New England purse seine fishery to 40.2 million pounds in the New England large mesh otter trawl fishery (Table 3.5.1a). Figure 3.1 shows fishery bycatch ratios for 23 Greater Atlantic Region fisheries based on 2011 data. This report includes fish and invertebrate estimates based on 2011 data for 34 Greater Atlantic Region species (Table 3.5.1b). Figure 3.2 shows fish and invertebrate bycatch ratios for 34 Greater Atlantic Region species based on 2011 data. (Species are referred to using [Fish Stock Sustainability Index](#) (FSSI) stock names; FSSI stock names may not correspond to regional FMP names.)

A few species and complexes do not appear in Figure 3.2 for a variety of reasons. Atlantic wolffish landings for 2011 were confidential, and therefore landings and a bycatch ratio are not reported. In addition, species bycatch ratios are not reported in the NBR for ESA fish species such as Atlantic salmon.



**Figure 3.1 Greater Atlantic Region Fishery Bycatch Ratios for 2011** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is

bycatch plus landings). The ratios for New England Purse Seine, New England Mid-Water Otter Trawl, and Mid-Atlantic Mid-Water Otter Trawl are not 0.00 but are less than 0.01.



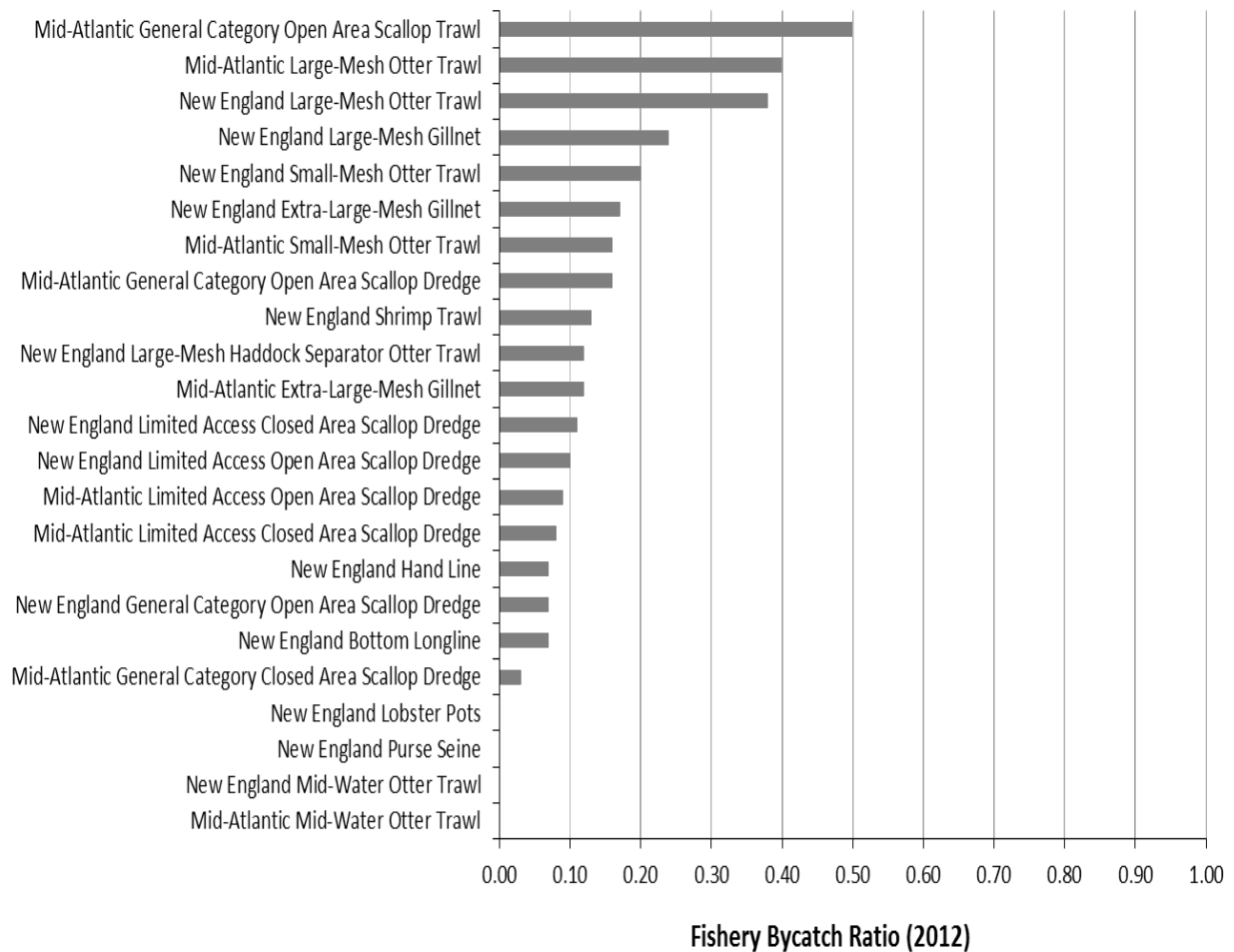
**Figure 3.2 Greater Atlantic Region Species Bycatch Ratios for 2011** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for tilefish (*Lopholatilus chamaeleonticeps*), ocean quahog (*Artica islandica*), Atlantic surfclam (*Spisula solidissima*), and Atlantic herring (*Clupea harengus*) are not 0.00 but are less than 0.01. Goosefish (*Lophius* spp.) is also commonly called monkfish. Tilefish refers to golden tilefish as opposed to blueline tilefish (*Caulolatilus microps*).

### 3.5.2 Fish Bycatch Estimates for 2012

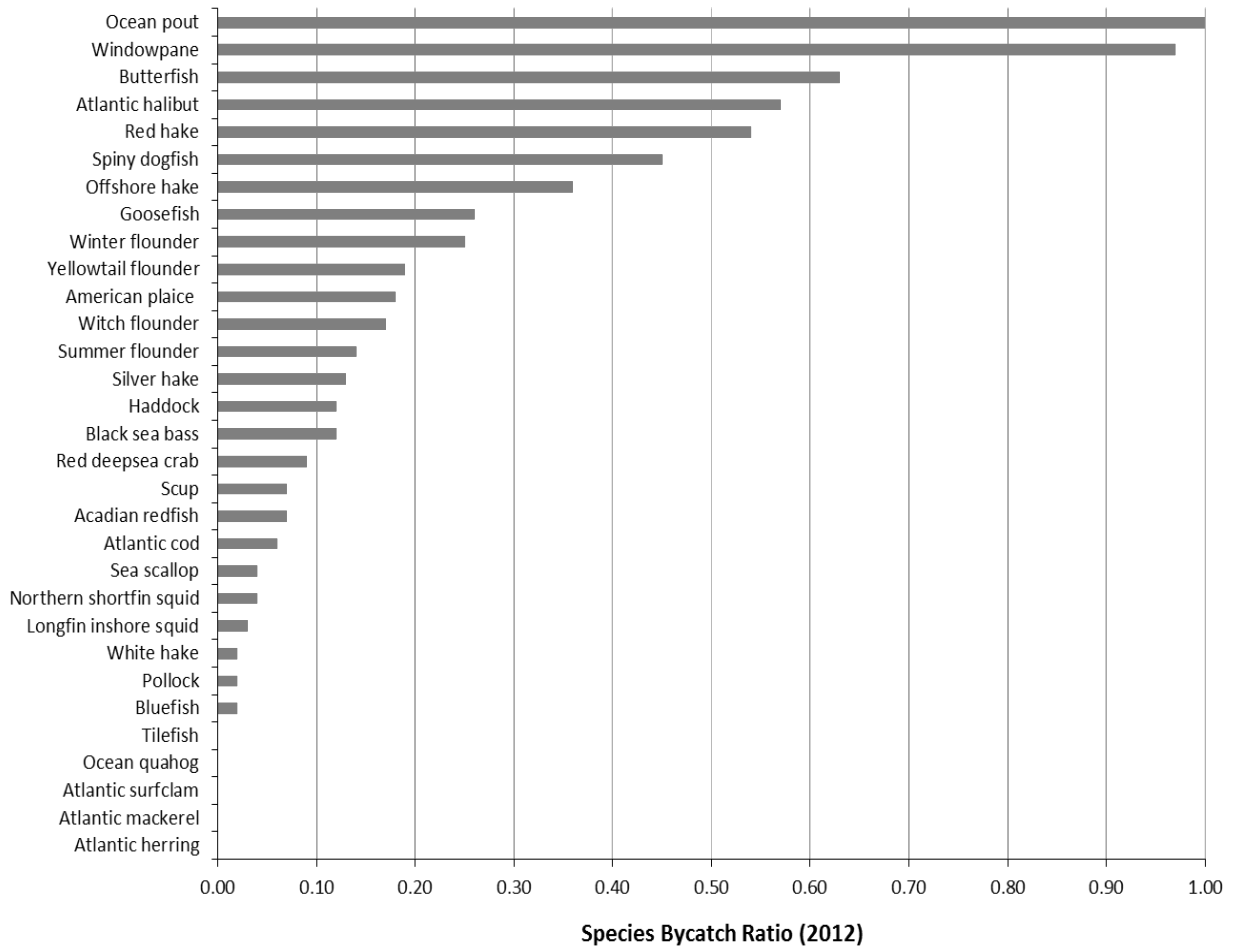
Fishery bycatch estimates based on 2012 data ranged from 808 pounds in the New England purse seine fishery to 42.1 million pounds in the New England large mesh otter trawl fishery (Table 3.5.2a). Figure 3.3 shows fishery bycatch ratios for 23 Greater Atlantic Region fisheries based

on 2012 data. This report includes fish and invertebrate estimates based on 2012 data for 34 Greater Atlantic Region species (Table 3.5.2b). Figure 3.4 shows fish and invertebrate bycatch ratios for 34 Greater Atlantic Region species based on 2012 data.

A few species do not appear in Figure 3.4 for a variety of reasons. Atlantic wolffish (*Anarhichas lupus*) landings for 2012 were confidential, and therefore landings and a bycatch ratio are not reported. In addition, species bycatch ratios are not reported in the NBR for ESA fish species such as Atlantic salmon.



**Figure 3.3 Greater Atlantic Region Fishery Bycatch Ratios for 2012** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). The ratios for New England Lobster Pots, New England Purse Seine, New England Mid-Water Otter Trawl, and Mid-Atlantic Mid-Water Otter Trawl are not 0.00 but are less than 0.01.



**Figure 3.4 Greater Atlantic Region Species Bycatch Ratios for 2012** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for tilefish, ocean quahog, Atlantic surfclam, Atlantic mackerel (*Scomber scombrus*), and Atlantic herring are not 0.00 but are less than 0.01. Goosefish is also commonly called monkfish. Tilefish refers to golden tilefish as opposed to blueline tilefish.

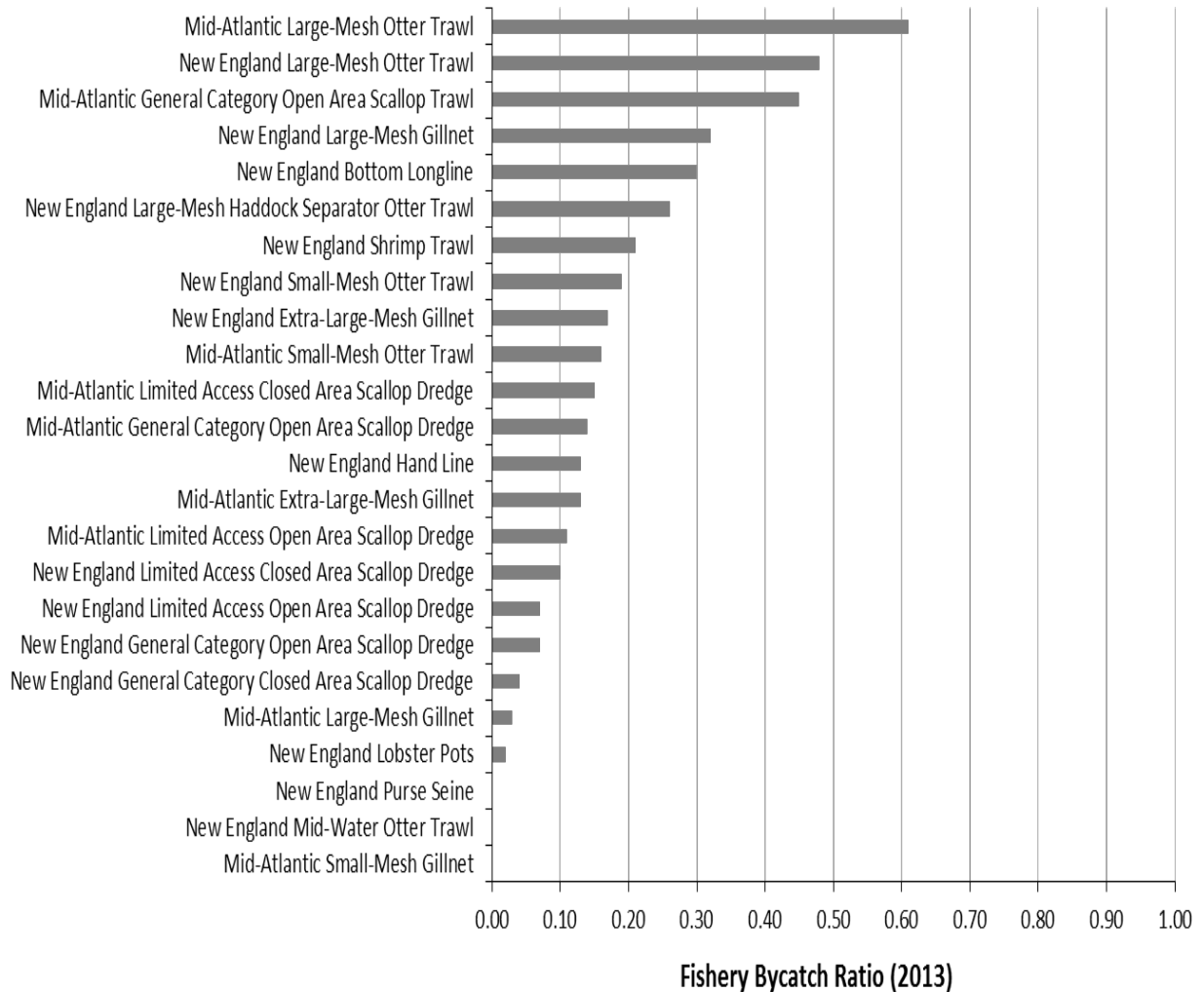
### 3.5.3 Fish Bycatch Estimates for 2013

Fishery bycatch estimates based on 2013 data ranged from 8,901 pounds in the New England purse seine fishery to 56.1 million pounds in the New England large mesh otter trawl fishery (Table 3.5.3a). Figure 3.5 shows fishery bycatch ratios for 24 Greater Atlantic Region fisheries based on 2013 data. This report includes fish and invertebrate estimates based on 2013 data for 34 Greater Atlantic Region species (Table 3.5.3b). Figure 3.6 shows fish and invertebrate bycatch ratios for 34 Greater Atlantic Region species based on 2013 data.

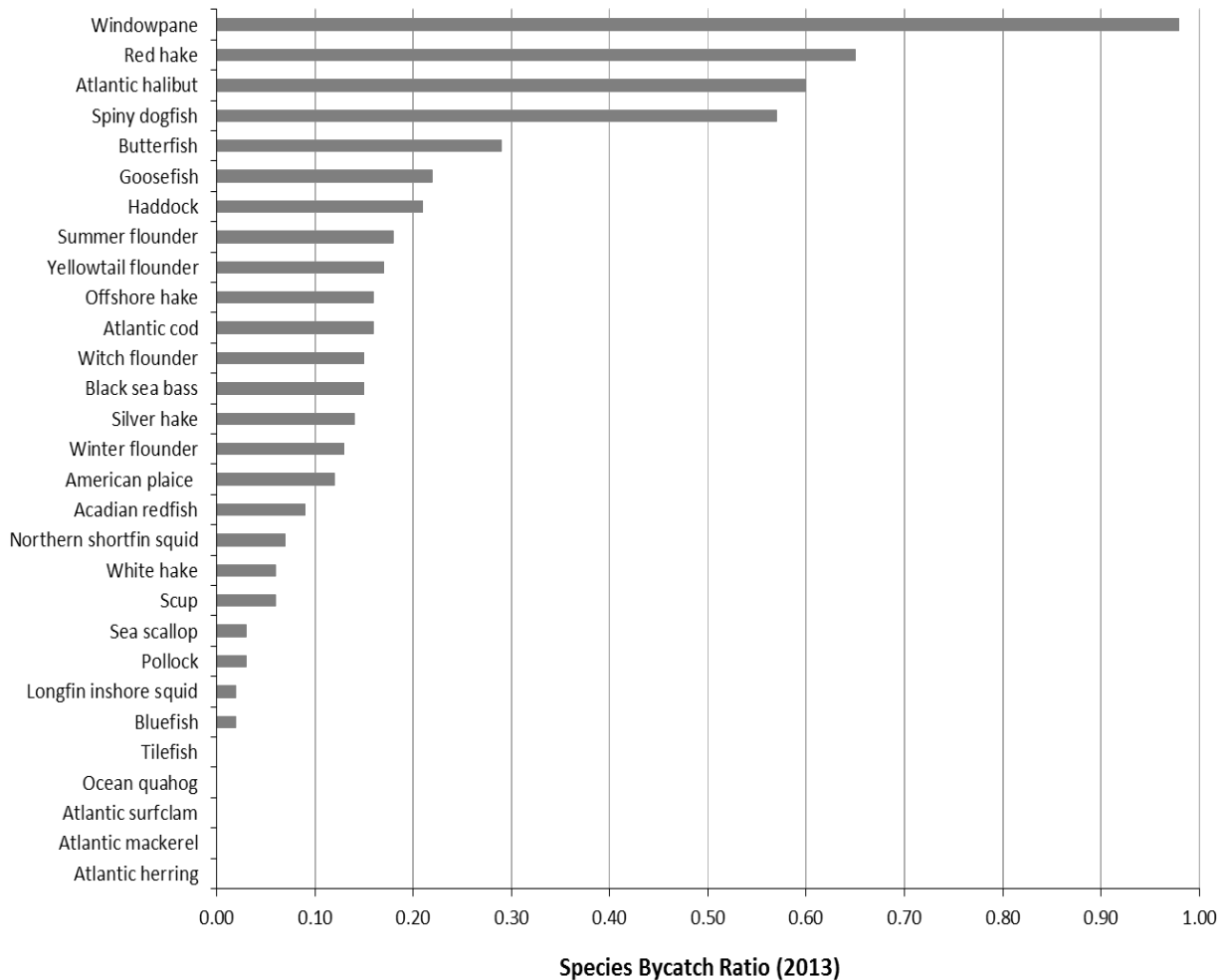
A few species do not appear in Figure 3.6 for a variety of reasons. Atlantic wolffish, ocean pout (*Zoarces americanus*), and red deepsea crab (*Chaceon quinque-dens*) landings for 2013 were confidential, and therefore landings and a bycatch ratio are not reported. In addition, species



bycatch ratios are not reported in the NBR for ESA fish species such as Atlantic salmon (*Salmo salar*).



**Figure 3.5 Greater Atlantic Region Fishery Bycatch Ratios for 2013** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). The ratios for New England Purse Seine, New England Mid-Water Otter Trawl, and Mid-Atlantic Small-Mesh Gillnet are not 0.00 but are less than 0.01.



**Figure 3.6 Greater Atlantic Region Species Bycatch Ratios for 2013** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for tilefish, ocean quahog, Atlantic surfclam, Atlantic mackerel, and Atlantic herring are not 0.00 but are less than 0.01. Goosefish is also commonly called monkfish. Tilefish refers to golden tilefish as opposed to blue-line tilefish.

The skate complex (Rajidae) does not appear in Figures 3.2, 3.4, and 3.6 because these figures derive species bycatch ratios based on landings from the [Fisheries of the United States](#) reports and because species in the bycatch complex may be different than species in the landings complex, even though the complex name is the same. Skate landings are incorporated into the ratios derived for Figures 3.1, 3.3, and 3.5 because those landings are not derived from the Fisheries of the United States reports.

#### 3.5.4 Protected and/or Prohibited Fish Bycatch Estimates

ESA-listed Atlantic salmon and other prohibited species that also have an FMP (such as Atlantic wolffish and thorny skate [*Amblyraja radiata*], which is included in the skate complex), are reported in the fish bycatch estimate Tables 3.5.1b, 3.5.2b, and 3.5.3c. Atlantic salmon bycatch was only observed in 2013, when 79.48 pounds were estimated for the New England Large-Mesh Gillnet fishery (see Tables 3.5.3a and 3.5.3b). The Greater Atlantic Region does not currently include other protected fish species in this report. An estimate for Atlantic sturgeon bycatch in Greater Atlantic Region fisheries is anticipated in the future and may be provided in subsequent editions of this report.

#### 3.5.5 Discussion

In each year, the majority of fish and invertebrate bycatch by weight comprised three species—skate complex, spiny dogfish (*Squalus acanthias*), and sea scallop (*Placopecten magellanicus*)—with skate complex having the highest bycatch estimates. The CVs for these three species were low (less than 0.13). The remaining species each represented less than 5 percent of the total annual bycatch in each year. The CVs for these species varied across species and year; the highest CVs were typically associated with species with small annual bycatch estimates.

Again, the skate complex does not appear in Figures 3.2, 3.4, and 3.6 because these figures derive species bycatch ratios based on landings from the [Fisheries of the United States](#) reports and because species in the bycatch complex may be different than species in the landings complex, even though the complex name is the same.

In each year, the majority of species had bycatch ratios less than 0.25. Species bycatch ratios were highest for species that cannot be retained due to regulations (such as ocean pout, windowpane [*Scophthalmus aquosus*], and Atlantic wolffish) and species with trip limits (such as Atlantic halibut [*Hippoglossus hippoglossus*]), and lowest for ocean quahog, Atlantic surfclam, Atlantic herring, and tilefish.

In each year, over half of the bycatch came from two or three fisheries and the associated CVs of these fisheries were low (less than 0.12). The remaining fleets each represented less than 10 percent of the total annual discards for a given year. Fishery bycatch ratios were highest in the New England large mesh otter trawl, Mid-Atlantic large mesh otter trawl, and Mid-Atlantic General Category Open Area scallop trawl fisheries. Although the Mid-Atlantic General Category Open Area scallop trawl fishery has one of the highest fishery bycatch ratios, the bycatch estimates are low for this fishery. The patterns described above are similar to those in 2010.

#### 3.6 Marine Mammal Bycatch

Table 3.6 shows annual average marine mammal bycatch estimates for 13 marine mammal stocks and six Greater Atlantic Region commercial gear types/fisheries. Excluding coastal bottlenose dolphin (*Tursiops truncatus*) stocks, the total marine mammal bycatch estimate was 2,960 animals per year. Due to uncertainty in stock identification, bycatch estimates for the

coastal bottlenose dolphins are not additive across stocks (Waring et al. 2014). Gillnet gear continues to be the largest contributor to total marine mammal bycatch, taking an average 2,102 and 386 animals annually in the New England and Mid-Atlantic fisheries, respectively. Marine mammal stocks with the highest average annual bycatch estimates across all six gear types included the western North Atlantic gray seal (*Halichoerus grypus*; 1,086), Gulf of Maine/Bay of Fundy stock of harbor porpoise (*Phocoena phocoena*; 640 animals), western North Atlantic harbor seal (*Phoca vitulina concolor*; 442 animals), short-beaked common dolphin (*Delphinus delphis*; 287 animals), and western North Atlantic white-sided dolphin (*Lagenorhynchus acutus*; 116 animals). The [Marine Mammal Stock Assessment Reports](#) contain more information on the status of these stocks.

### 3.7 Sea Turtle Bycatch

Table 3.7 shows annual average sea turtle bycatch estimates for three Greater Atlantic Region commercial gear types/fisheries. For sea turtles, the Greater Atlantic Region has focused on bycatch as “take” under the ESA,<sup>15</sup> and therefore bycatch estimates from this Region may include animals that interact with gear below the surface of the ocean but are not actually captured in the gear.<sup>16</sup> Other Regional sea turtle bycatch estimates include live and dead releases only; that is, only captured individuals as opposed to turtles that may pass in and out of fishing gear before the gear is hauled.

This report includes bycatch estimates for loggerhead turtles only, because these were the only species with enough observed interactions to produce robust, model-based estimates. However, other turtles such as leatherback (*Dermochelys coriacea*), green (*Chelonia mydas*), and Kemp’s ridley (*Lepidochelys kempii*) also are bycaught in these fisheries. The latest estimate of loggerhead interactions in bottom trawl gear (for fish and scallops) declined from 353 (CV=0.12) animals during 2005–2008 to 231 (CV=0.13, 95% CI: 182-298) loggerheads during 2009–2013 (Murray 2015a). Mid-Atlantic scallop dredge fishery mean annual observable turtle interactions, plus unobserved, quantifiable interactions declined from 125 (CV=0.15, 95% CI: 88-163) sea turtles (95 of which were loggerheads) during 2006–2008 to 22 loggerheads per year (CV=0.73, 95% CI: 4-67) during 2009–2014 (Murray 2015b). Mean annual mid-Atlantic gillnet bycatch of loggerhead turtles declined from 350 (CV=0.20, 95% CI: 234-504) during 1995–2006 to 95 hard-shelled turtles (CV=0.21, 95% CI: 60-138) during 2007–2011 (89 of which were loggerheads) (Murray 2013).

### 3.8 Seabird Bycatch

NMFS did not produce new seabird bycatch estimates for this report for Greater Atlantic Region fisheries. The latest seabird bycatch estimates created for the NBR, comprising seven individual Greater Atlantic fisheries that were classified into two groups, can be seen in [Table 3.5](#) of Update

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<sup>15</sup> The definition of “take” under the ESA is “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct” (ESA 1973) and therefore includes both mortality and non-mortality events.

<sup>16</sup> The distinction between the terms “bycatch” and “take” applies to estimates reported as “interactions” with trawl or dredge gear. The distinction is made because gear modifications (i.e., turtle excluder devices, chain mats, and turtle deflector dredges) will prevent turtles from being captured and observed, even though the take still occurred.

1. These estimates cover bycatch of common (*Gavia immer*) and red-throated loons (*Gavia stellata*) attributed to New England and Mid-Atlantic gillnet fisheries.

## **4. Southeast Overview**

### 4.1 Summary of Fisheries Included in this Report

A total of 43 commercial fisheries are included in this report for the Southeast Region (see Appendix 3). Several changes were made in the list of fisheries in Update 1 compared to the list of fisheries presented in the first edition. Four new fisheries were added to the list, while 10 were taken off, either because they are no longer prosecuted or because they were combined with another fishery due to updated name changes. No new fisheries were added or deleted for this report.

The Gulf of Mexico shrimp trawl fishery and the Atlantic and Gulf of Mexico highly migratory species (HMS) pelagic longline fishery were the only two fisheries for which both fish bycatch and landings information were available in weight. Bycatch estimates for the other nine fisheries were calculated in number of individuals. Therefore, fish bycatch ratios (i.e., bycatch÷total catch) were calculated for only these two fisheries, as in the first edition and Update 1.

Southeast Region fisheries reflect the diverse fauna of the region, with relatively few large fisheries and many small ones. Southeast Region fisheries have catches from around 200 stocks of fish and fishery resources, and employ a variety of gear types. Two fisheries economically dominate the region: the menhaden purse seine fishery and the shrimp trawl fishery. Although the menhaden purse seine fishery produces the most landings, the shrimp trawl fishery generates the most revenue regionally.

### 4.2 Changes to Observer Coverage

Five observer programs operate out of the Southeast Region, including the Pelagic Longline Observer Program, the Gulf of Mexico Reef Fish Observer Program (Bottom Longline and Vertical Line), the Shark Bottom Longline Observer Program that includes the Shark Research Fishery, the Southeast Coastal Gillnet Observer Program, and the Shrimp Trawl Observer Program (otter trawl, skimmer, and butterfly net). The North Carolina Coastal Gillnet Alternative Sampling Program was discontinued in 2009, and the Shark Gillnet Program was greatly reduced in 2010 compared to 2005 because of the very small size of the fishery. However, the reduction in shark gillnet effort has allowed NMFS to expand observer coverage to other gillnet fisheries, and that program has now evolved into the Southeast Coastal Gillnet Observer Program.

Observer data from the Gulf of Mexico shrimp skimmer trawl and butterfly net fishery are not included in this report, but these data are available for 2012 and 2013 (Pulver et al. 2012, Pulver et al. 2014). Observer data from a 2011 pilot program for the Gulf of Mexico menhaden fishery were not used in this update in order to protect confidential information pursuant to section 402(b) of the MSA.

### 4.3 Changes to Catch and Bycatch Estimation Methods

The methodologies used to estimate bycatch are the same as those outlined in the first edition. Although NMFS is working to upgrade and improve methodologies and estimation procedures, these new procedures will not be used until NMFS provides the Southeast Region bycatch estimates in the second edition of the *U.S. National Bycatch Report* in 2017.

### 4.4 Progress on Bycatch Estimation Improvement Plans

Over the past few years, NMFS has made progress regarding several of the recommendations outlined in the Bycatch Estimate Improvement Plans in the first edition. In the Gulf of Mexico Reef Fish fisheries (i.e., Bottom Longline and Vertical Line), NMFS has initiated a mandatory at-sea observer program and increased the number of sea days of observation by the at-sea observer program each year. During the 2011–2013 period, NMFS provided a 5 percent observer coverage rate for this generalized fishery grouping. NMFS also contracted an independent statistical review of the Gulf of Mexico Reef Fish Observer Program that will provide improved methodologies for vessel selection protocols, as well as bycatch estimation techniques for both abundant and rare species. This review is near completion, and its results will help NMFS with estimates in future editions of this report.

A couple of pilot projects have been completed to ascertain the feasibility of using electronic video monitoring of bycatch from both the Gulf of Mexico Reef Fish Bottom Longline and the Vertical Line segments of the fishery. A pilot project has also been conducted to evaluate electronic video monitoring in the Vertical Line segment of the Southeastern Atlantic Snapper-Grouper fishery. Discussions with fishery stakeholders are currently underway to continue development of this type of electronic bycatch monitoring methodology that would enhance the data collected by the at-sea observer program.

For the Shrimp Trawl fisheries (i.e., Atlantic and Gulf of Mexico) progress in recommendations included development of a mandatory at-sea observer program from the voluntary observer program that began in 1992. During 2011–2013, NMFS provided a 2 percent coverage rate for this generalized fishery grouping. An electronic logbook program was developed and put into full production, which gave NMFS improved estimates of shrimp trawl effort in the offshore areas of the Gulf of Mexico. This in turn has helped to provide better bycatch estimates from this area. A similar program is being developed for the Atlantic portion of this fishery.

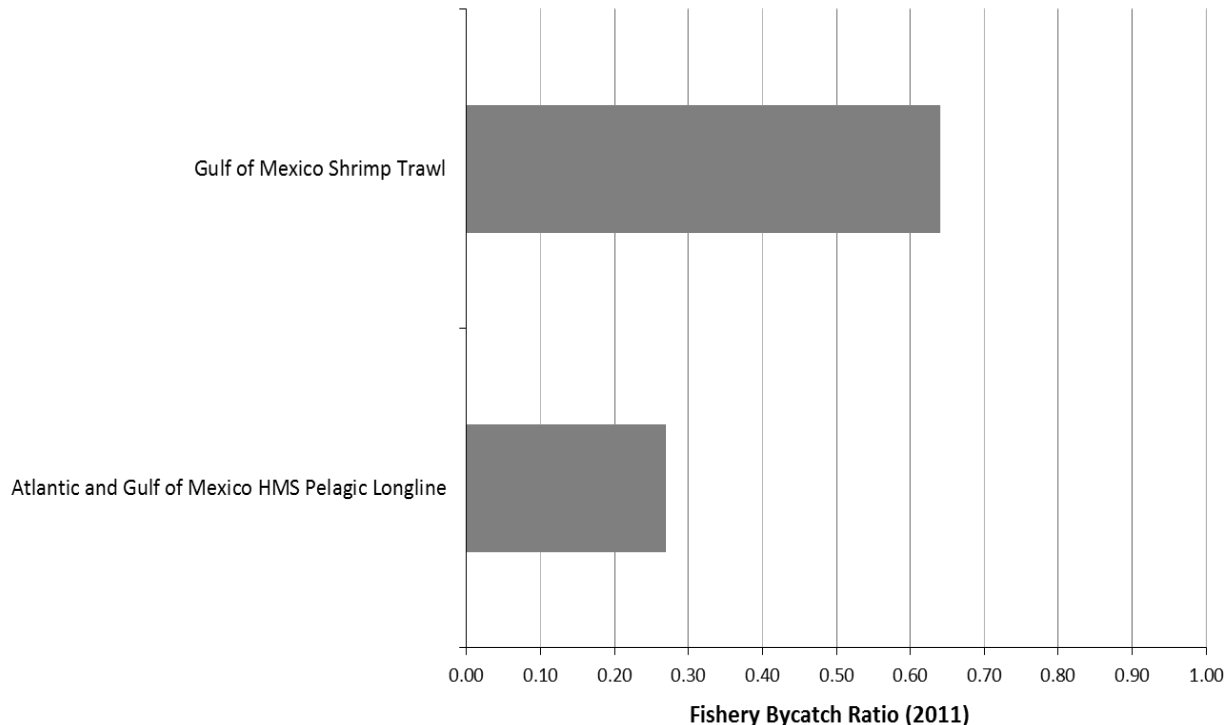
To better document and improve bycatch estimates for marine mammals in the Shrimp Trawl fisheries, the SEFSC has developed and implemented a comprehensive marine mammal data form. Development of this observer form will help NMFS refine marine mammal bycatch estimates in future editions. Annual estimates of marine mammal bycatch in the shrimp otter trawl fishery were published for 1997 through 2011 in Soldevilla et al. 2015.

## 4.5 Fish Bycatch

This section presents fish and invertebrate bycatch estimates in Southeast Region fisheries based on data from 2011, 2012, and 2013. This section also includes fishery bycatch ratios as well as species bycatch ratios for each year, where available.

### 4.5.1 Fish Bycatch Estimates for 2011

Fishery bycatch estimates based on 2011 data ranged from 3,325 individuals in the Southeastern Atlantic and Gulf of Mexico shark bottom longline fishery to 295.8 million pounds in the Gulf of Mexico shrimp trawl fishery (Table 4.5.1a). This report includes fish and invertebrate estimates based on 2011 data for 183 Southeast Region stocks and species groups (Table 4.5.1b). The bycatch-to-landings ratio for the Atlantic and Gulf of Mexico HMS pelagic longline fishery was 0.27 in 2011 (2.10 million pounds of bycatch and 5.64 million pounds of landings). The bycatch-to-landings ratio for the Gulf of Mexico shrimp trawl fishery was 0.64 in 2011 (295.75 million pounds of bycatch and 169.75 million pounds of landings). (See Figure 4.1.)

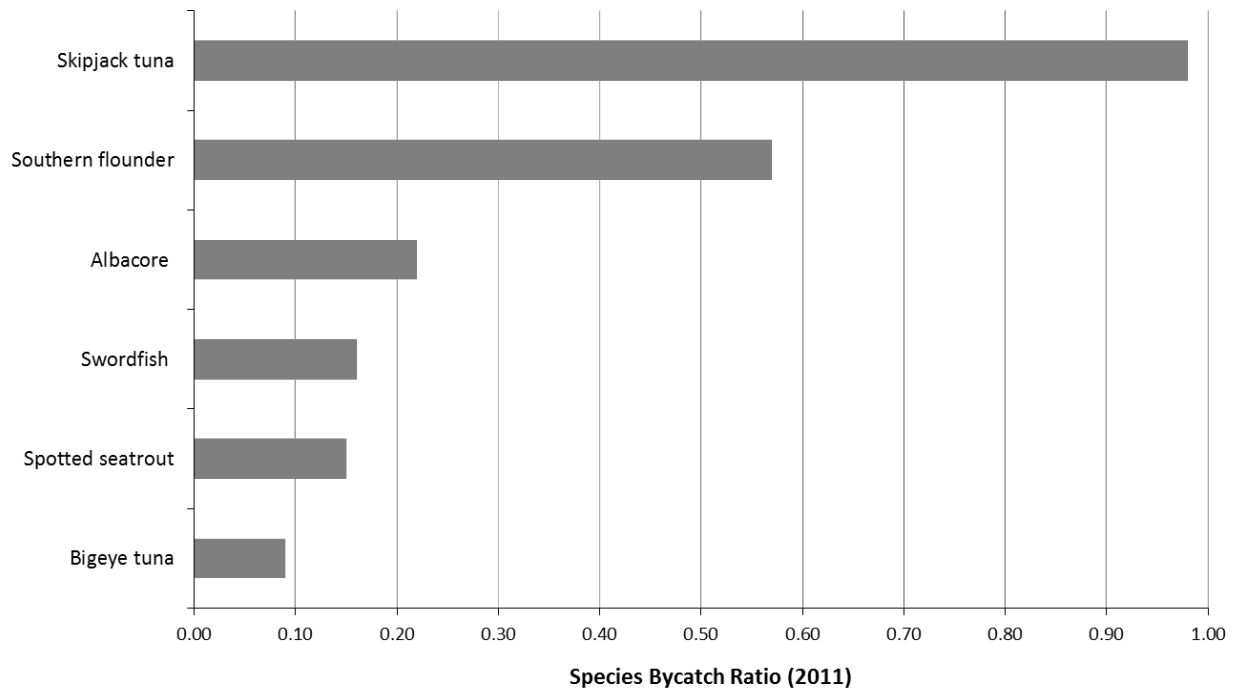


**Figure 4.1 Southeast Region Fishery Bycatch Ratios for 2011** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings).

As in the first edition and Update 1, some Southeast Region bycatch estimates were reported by weight, and others were reported in numbers. Therefore, NMFS could only develop bycatch ratios (pounds of bycatch divided by the total weight of fishery) for a subset of the Southeast Region species (Figure 4.2). Bycatch ratios have not been calculated and do not appear in Figure



4.2 for species where bycatch ratios were reported in both weight and numbers of fish (except when the number of fish reported is very low). Nevertheless, NMFS was able to provide species bycatch ratios for six species for 2011, an increase over the bycatch ratios for only two species in Update 1. (Species are referred to using [FSSI](#) stock names; FSSI stock names do not correspond to regional FMP names.)



**Figure 4.2 Southeast Region Species Bycatch Ratios for 2011** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landing). The swordfish ratio does not include estimated bycatch of 7.5 individual swordfish.

For the fish stocks where bycatch-to-landings ratios could be calculated for 2011, the highest ratio was for skipjack tuna (*Katsuwonus pelamis*; 0.98), followed by southern flounder (*Paralichthys lethostigma*; 0.57), albacore (*Thunnus alalunga*; 0.22), swordfish (*Xiphias gladius*; 0.16), spotted seatrout (*Cynoscion nebulosus*; 0.15), and bigeye tuna (*Thunnus obesus*; 0.09). The bycatch ratio of 0.16 for swordfish is a slight underestimate because it does not include the estimated bycatch of 7.5 individual swordfish in the calculation.

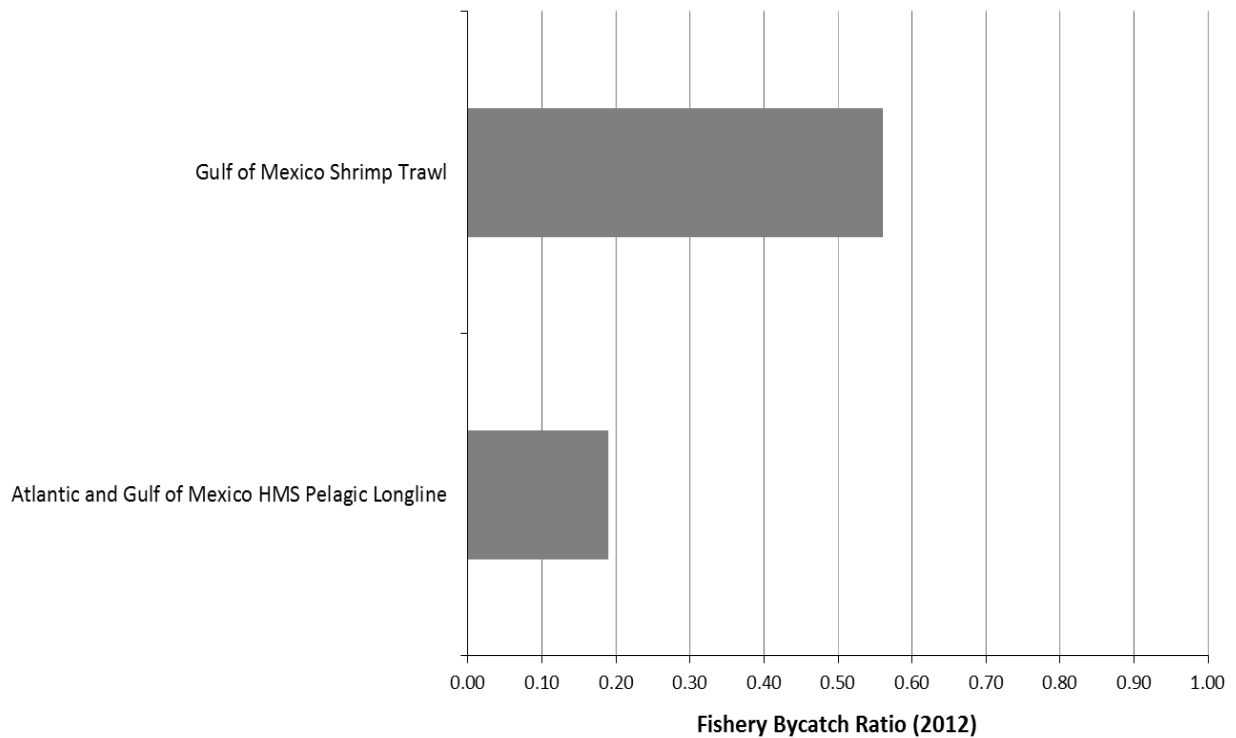
For the stocks where bycatch ratios could not be developed, the highest bycatch estimates by number of individuals for 2011 included red grouper (*Epinephelus morio*; 2.01 M), red snapper (*Lutjanus campechanus*; 1.25 M), yellowtail snapper (*Ocyurus chrysurus*; 0.23 M), vermilion snapper (*Rhomboplites aurorubens*; 0.15 M), greater amberjack (*Seriola dumerili*; 0.04 M), and king mackerel (*Scomberomorus cavalla*; 0.10 M).

For additional stocks or species groups where bycatch ratios could not be developed, the greatest bycatch estimates by weight in 2011 included Atlantic croaker (*Micropogonias undulates*; 75.47 million pounds), *Cynoscion* (24.44 million pounds), non-penaeid shrimp crustaceans (24.18

million pounds), non-crustacean invertebrates (21.06 million pounds), longspine porgy (*Stenotomus caprinus*; 9.63 million pounds), and Atlantic sharpnose shark (*Rhizoprionodon terraenovae*; 1.80 million pounds).

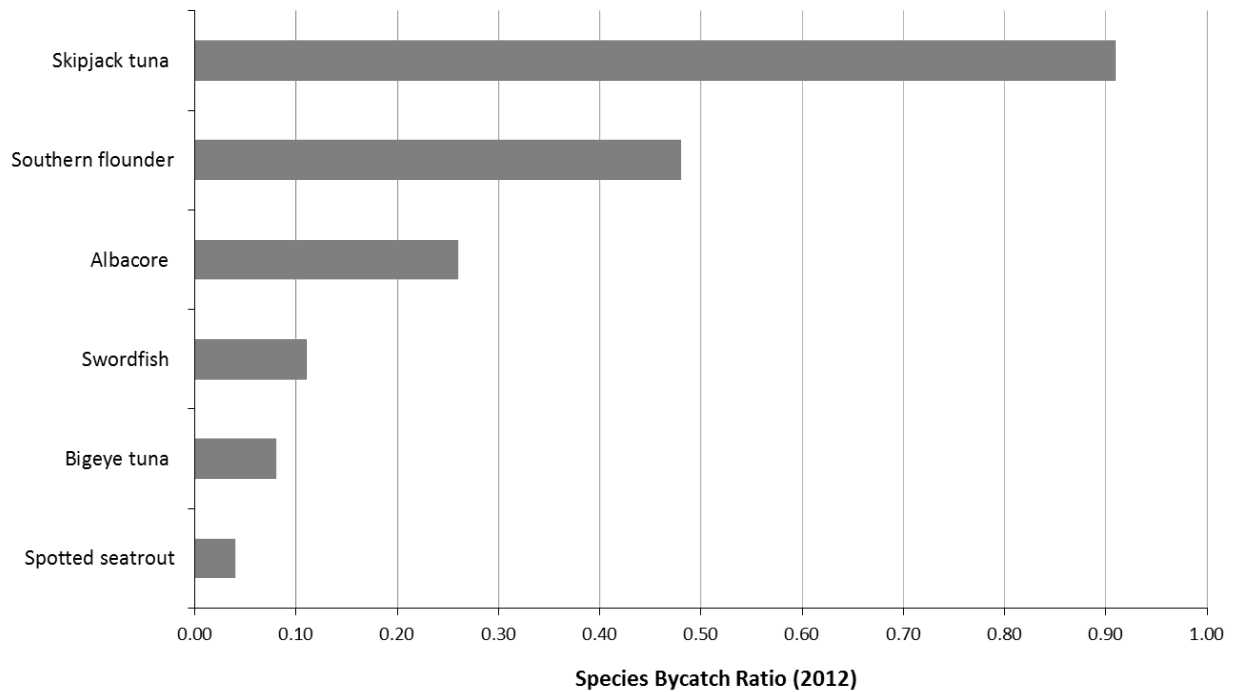
#### 4.5.2 Fish Bycatch Estimates for 2012

Fishery bycatch estimates based on 2012 data ranged from 2,208 individuals in the Gulf of Mexico coastal migratory pelagic gillnet fishery to 205.5 million pounds in the Gulf of Mexico shrimp trawl fishery (Table 4.5.2a). This report includes fish and invertebrate estimates based on 2012 data for 167 Southeast Region stocks and species groups (Table 4.5.2b). The bycatch-to-landings ratio for the Atlantic and Gulf of Mexico HMS pelagic longline fishery was 0.19 in 2012 (1.82 million pounds of bycatch and 7.61 million pounds of landings). The bycatch-to-landings ratio for the Gulf of Mexico shrimp trawl fishery was 0.56 in 2012 (205.51 million pounds of bycatch and 161.10 million pounds of landings). (See Figure 4.3.)



**Figure 4.3 Southeast Region Fishery Bycatch Ratios for 2012** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings).

NMFS was able to provide species bycatch ratios for six species for 2012, an increase over the bycatch ratios for only two species in Update 1 (Figure 4.4). Bycatch ratios have not been calculated and do not appear in Figure 4.4 for species where bycatch ratios were reported in both weight and numbers of fish (except when the number of fish reported is very low).



**Figure 4.4 Southeast Region Species Bycatch Ratios for 2012** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). Albacore ratio does not include estimated bycatch of 20.8 individual albacore.

For the fish stocks where bycatch-to-landings ratios could be calculated for 2012, the highest ratio was for skipjack tuna (0.91), followed by southern flounder (0.48), albacore (0.26), swordfish (0.11), bigeye tuna (0.08), and spotted seatrout (0.04). The bycatch ratio of 0.26 for albacore is a slight underestimate because it does not include the estimated bycatch of 20.8 individual albacore in the calculation.

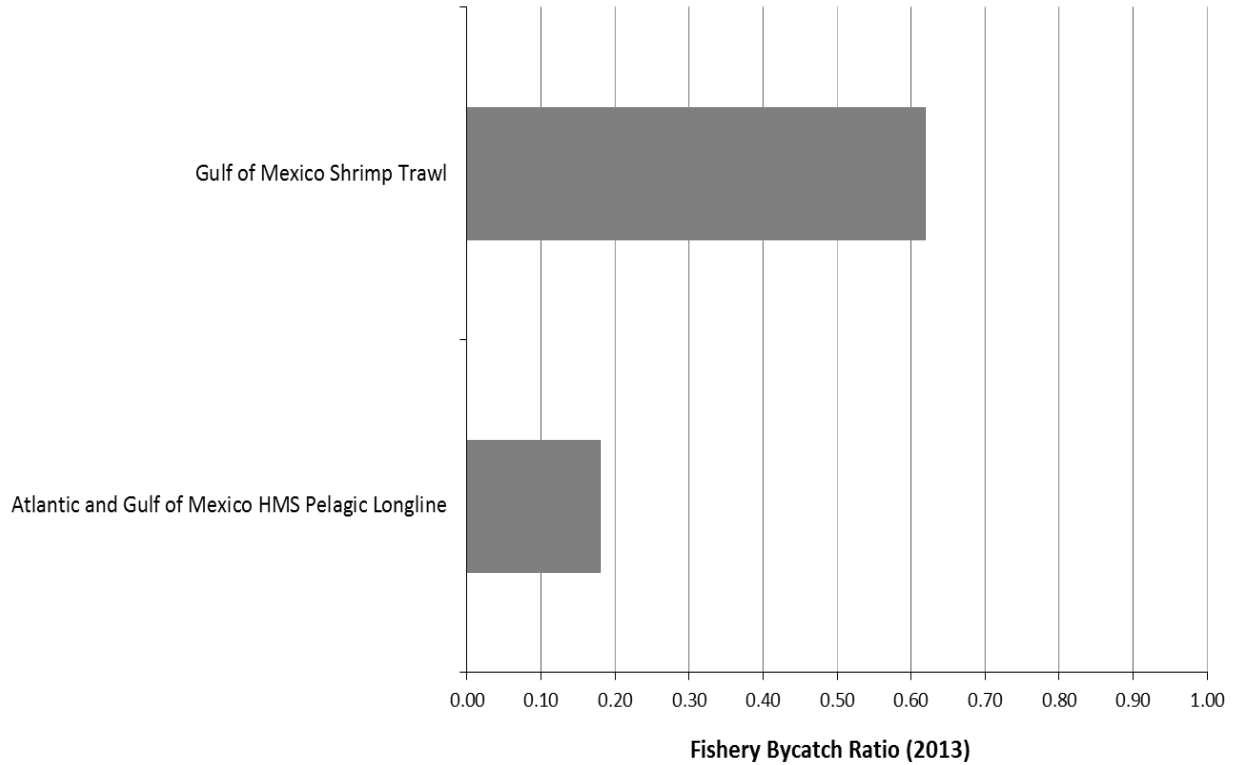
For the stocks where bycatch ratios could not be developed, the species with the highest bycatch estimates by number of individuals for 2012 included red grouper (1.74 million), red snapper (1.43 million), yellowtail snapper (0.57 million), vermilion snapper (0.55 million), greater amberjack (0.31 million), and king mackerel (0.08 million).

For additional stocks or species groups where bycatch ratios could not be developed, the greatest bycatch estimates by weight for 2012 included Atlantic croaker (48.02 million pounds), *Cynoscion* (18.17 million pounds), non-penaeid shrimp crustaceans (14.94 million pounds), longspine porgy (13.52 million pounds), non-crustacean invertebrates (12.40 million pounds), and Atlantic sharpnose shark (2.14 million pounds).

#### 4.5.3 Fish Bycatch Estimates for 2013

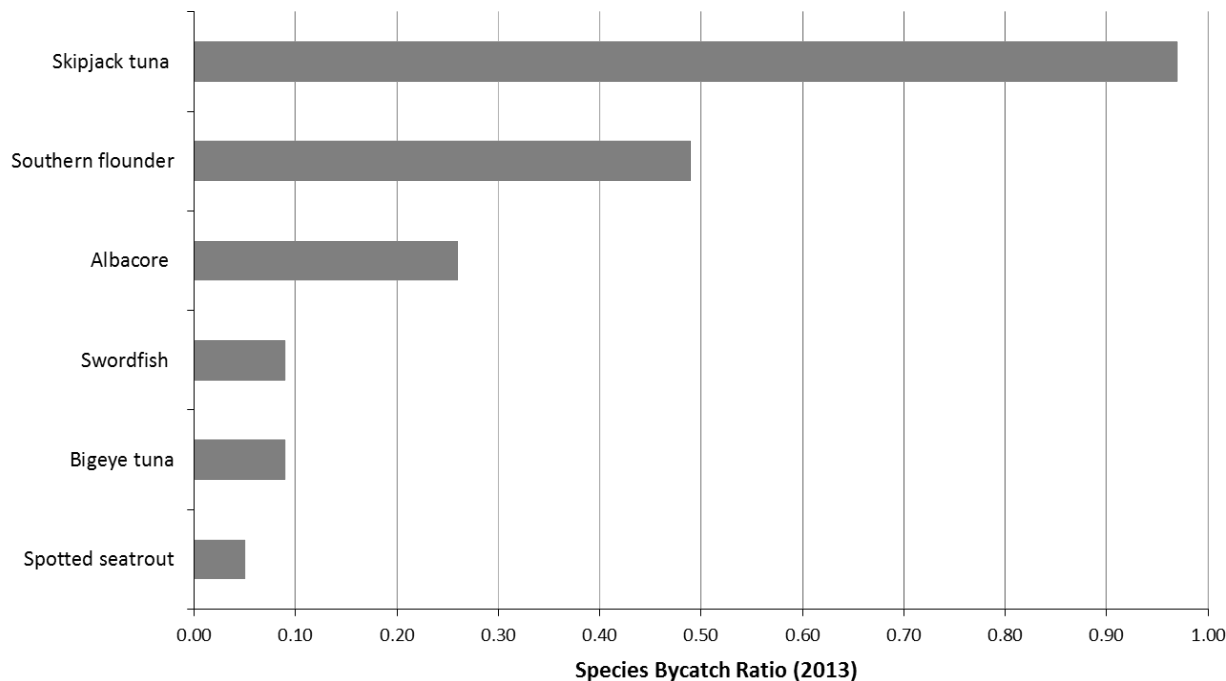
Fishery bycatch estimates based on 2013 data ranged from 1,411 individuals in the Gulf of Mexico coastal migratory pelagic gillnet fishery to 242.2 million pounds in the Gulf of Mexico shrimp trawl fishery (Table 4.5.3a). This report includes fish and invertebrate estimates based on 2013 data for 161 Southeast Region stocks and species groups (Table 4.5.3b). The bycatch-to-

landings ratio for the Atlantic and Gulf of Mexico HMS pelagic longline fishery was 0.18 in 2013 (1.37 million pounds of bycatch and 6.16 million pounds of landings). The bycatch-to-landings ratio for the Gulf of Mexico shrimp trawl fishery was 0.62 in 2013 (242.18 million pounds bycatch and 149.90 million pounds of landings). (See Figure 4.5.)



**Figure 4.5 Southeast Region Fishery Bycatch Ratios for 2015** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings).

NMFS was able to provide species bycatch ratios for six species for 2013, an increase over the bycatch ratios for only two species in Update 1 (Figure 4.6). Bycatch ratios have not been calculated and do not appear in Figure 4.6 for species where bycatch ratios were reported in both weight and numbers of fish (except when the number of fish reported is very low).



**Figure 4.6 Southeast Region Species Bycatch Ratios for 2013** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). Spotted seatrout ratio does not include estimated bycatch of 673.8 individual spotted seatrout.

For the eight fish stocks where bycatch-to-landings ratios could be calculated, the highest ratios were for the skipjack tuna (0.97), followed by southern flounder (0.49), albacore (0.26), swordfish (0.09), bigeye tuna (0.09), and spotted seatrout (0.05). The bycatch ratio of 0.05 for spotted seatrout is a slight underestimate because it does not include the estimated bycatch of 673.8 individual spotted seatrout in the calculation.

For the stocks where bycatch ratios could not be developed, the six species with the highest bycatch estimates by number of individuals for 2013 included red grouper (1.25 million), red snapper (0.54 million), greater amberjack (0.31 million), yellowtail snapper (0.26 million), vermilion snapper (0.12 million), and king mackerel (0.08 million).

For additional stocks or species groups where bycatch ratios could not be developed, the greatest bycatch estimates by weight for 2013 included Atlantic croaker (52.35 million pounds), non-penaeid shrimp crustaceans (24.16 million pounds), non-crustacean invertebrates (18.89 million pounds), *Cynoscion* (18.53 million pounds), longspine porgy (11.55 million pounds), and Atlantic sharpnose shark (1.37 million pounds).

#### 4.5.4 Discussion

In Update 1, the fish bycatch estimate for the HMS pelagic longline fishery was 1.20 million pounds, and landings were about 3.92 million pounds, resulting in a bycatch ratio of 0.23 (NMFS 2011). This ratio was the same that was reported in the first edition (NMFS 2013a). The bycatch-to-landings ratio was 0.27 in 2011, 0.19 in 2012, and 0.18 in 2013. With 5 years of data

now available from the first edition and Updates 1 and 2, bycatch-to-landings ratios for the HMS pelagic longline fishery range from 0.18 to 0.23.

In Update 1, fish bycatch was estimated for the offshore portion of the Gulf of Mexico shrimp trawl fishery at 229.24 million pounds. Landings for the Gulf of Mexico shrimp trawl fishery were 129.54 million pounds. The resulting bycatch-to-landings ratio was 0.64 (NMFS 2013a). This value was lower than the 0.76 estimate in the first edition (NMFS 2011). The reduced shrimp trawl effort in recent years, and resulting high catch per unit effort of shrimp for the fishery, was the most likely cause of the reduced ratio of bycatch to total catch between the first edition and Update 1. The bycatch-to-landings ratio for the Gulf of Mexico shrimp trawl fishery was 0.64 in 2011, 0.56 in 2012, and 0.62 in 2013. With 5 years of data now available from the first edition and Updates 1 and 2, bycatch-to-landings ratios for the Gulf of Mexico shrimp trawl fishery range from 0.56 to 0.76.

The fluctuation in number of estimates for fish stocks and species groups in this report (183 in 2011, 167 in 2012, and 161 in 2013) is expected due to the many diverse species that inhabit the Southeast Region. Many minor stocks have very small bycatch values and may not occur in every year.

#### 4.6 Marine Mammal Bycatch

This report includes bycatch estimates for seven different marine mammal stocks in one Southeast Region commercial fishery (Atlantic and Gulf of Mexico HMS pelagic longline fishery). For 2011, the total bycatch estimate was 350 individuals, including 305 short-finned pilot whales (*Globicephala macrohynchus*) (Western North Atlantic) (Figure 4.6.1). For 2012, the total bycatch estimate was 293 individuals, including 170 short-finned pilot whales (Western North Atlantic) and 62 bottlenose dolphins (Western North Atlantic offshore) (Figure 4.6.2). For 2013, the total bycatch estimate was 145 individuals, including 124 short-finned pilot whales (Western North Atlantic) (Figure 4.6.3).

Although not included in this report, annual estimates of marine mammal bycatch in the shrimp otter trawl fishery are available for 1997 through 2011 (Soldevilla et al. 2015). Increased observer coverage and comprehensive data collection for marine mammal interactions in the commercial shrimp fishery are underway, and annual bycatch estimates will be included in future editions and updates of the NBR.

For more information on marine mammal bycatch in Southeast Region fisheries, see Garrison and Stokes (2014). The [Marine Mammal Stock Assessment Reports](#) contain more information on the status of these stocks. The lack of estimates for other Southeast Region fisheries is due to lack of data and does not mean that the HMS pelagic longline fishery is the only fishery with marine mammal issues in the Southeast Region.

#### 4.7 Sea Turtle Bycatch

The First Edition of the National Bycatch Report (NMFS 2011) included sea turtle mortality estimates for the Gulf of Mexico Shrimp Trawl fishery from Epperly et al. (2002) and the NMFS

2002 Biological Opinion on the continued implementation of the sea turtle conservation regulations under the ESA and the continued authorization of the southeast U.S. shrimp fisheries in federal waters under the MSA (NMFS 2002). Epperly et al. (2002) and NMFS (2002) included a detailed discussion of the underlying data sources, bycatch calculation methods, constraints of those methods, and the assumptions under which those calculations were made.

New mortality estimates for loggerhead and leatherback sea turtles were included in Update 1 (NMFS 2013a). The SEFSC produced the estimates generally based on the same bycatch estimation methods and underlying catch-per-unit-effort data as the 2002 mortality estimates, but applied 2009 effort data.<sup>17</sup>

Since Update 1 was completed, NMFS has produced two new biological opinions on southeastern shrimp fisheries. NMFS (2002) was superseded by a new biological opinion dated May 8, 2012 (NMFS 2012a). That opinion was then superseded a [biological opinion dated April 18, 2014](#).

Table 39 of the 2014 biological opinion includes estimates of the number of interactions, captures, and mortalities for shrimp fisheries in the Southeast Region, based on the best available information. These estimates are much higher than those estimated in Update 1 (NMFS 2013a). The methodology used for the biological opinion was quite different than that used for the estimates in the NBR first edition and Update 1. Incorporation of population growth estimates for Kemp's ridley and green sea turtles, and the incorporation of turtle excluder device compliance data, are largely responsible for the increase in the biological opinion's estimates of interactions, captures, and mortalities. In addition, the shrimp bycatch estimates produced in the 2014 biological opinions rely on bycatch studies conducted in the late 1990s and/or early 2000s. These studies, which were also used as the basis for the estimates generated in 2002 and which were then subject to many variables, assumptions, and biases to overcome data gaps to produce the 2014 estimates, are now fifteen years old or more. Therefore, in the 2014 biological opinion, NMFS found the bycatch estimates to be unacceptably uncertain and did not rely on them extensively in analyzing impacts. NMFS determined that the best available information was too uncertain to draw a reliable point estimate conclusion. Consequently, no new bycatch estimates for the Gulf of Mexico Shrimp Trawl fishery were produced for this report.

This report does provide new estimates of sea turtle bycatch for three fisheries for 2011 (Table 4.7.1), five fisheries for 2012 (Table 4.7.2), and two fisheries for 2013 (Table 4.7.3). All the estimated bycatch values presented in the text and tables are for total sea turtle bycatch (live and dead releases).

The collective total sea turtle bycatch estimates for 2011 were 764 individuals, including an estimated bycatch of 681 individuals (240 leatherback sea turtles, 438 loggerhead sea turtles, and 4 olive ridley (*Lepidochelys olivacea*) sea turtles) in the Atlantic and Gulf of Mexico HMS pelagic longline fishery (Table 4.7.1).

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<sup>17</sup> Source: January 5, 2011 Dr. Bonnie Ponwith to Dr. Roy Crabtree memorandum, "Data Analysis Request: update of turtle bycatch in the Gulf of Mexico and southeastern Atlantic shrimp fisheries, NMFS Southeast Fisheries Science Center

The collective total sea turtle bycatch estimates for 2012 were 1,636 individuals, including an estimated bycatch of 1,220 individuals (596 leatherback sea turtles, 609 loggerhead sea turtles, and 15 unclassified sea turtles) in the Atlantic and Gulf of Mexico HMS pelagic longline fishery (Table 4.7.2).

The collective total sea turtle bycatch estimates for 2013 were 755 individuals, including an estimated bycatch of 743 individuals (366 leatherback sea turtles and 377 loggerhead sea turtles) in the Atlantic and Gulf of Mexico HMS pelagic longline fishery (Table 4.7.3).

#### 4.8 Seabird Bycatch

This report includes seabird bycatch estimates for only one Southeast Region commercial fishery, the Atlantic and Gulf of Mexico HMS pelagic longline fishery. The estimated average bycatch total for the period 1992–2011 was 100 seabirds. Average bycatch for the period 1992–2012 was 50 seabirds, and the average bycatch for the period 1992–2013 was 34 seabirds (Table 4.8).



## 5. Alaska Overview

### 5.1. Summary of Fisheries Included in This Report

This report provides 2011, 2012, and 2013 fish bycatch estimates for 23, 23, and 26 Alaska Region commercial fisheries, respectively, with federal or joint federal/international management authority (see Appendix 3), compared to 25 in Update 1 (NMFS 2013a). This report categorizes landings and bycatch as belonging to a fishery by using a combination of area fished, gear, and the predominant retained fish species or species group (i.e., realized catch).

The number of fisheries with 2011 fish bycatch estimates represents 85 percent of that year's total number of Alaska Region federal fisheries. The number of fisheries with 2012 fish bycatch estimates represents 85 percent of that year's total number of Alaska Region federal fisheries. The number of fisheries with 2013 fish bycatch estimates represents 90 percent of that year's total number of Alaska Region fisheries under federal or joint federal/international management.

Landings from Alaska commercial fisheries (state and federal) were valued between \$1.692 and \$1.893 billion in 2011–2013 (NMFS 2012b, NMFS 2013c, and NMFS 2014a). The groundfish fishery is an important segment of the Alaska fisheries and was valued between \$878 and \$1,051 million in those years (Fissel et al. 2012, Fissel et al. 2014a, and Fissel et al. 2014b).

In the first edition of the National Bycatch Report (NMFS 2011) and in Update 1 (NMFS 2013a), fish bycatch estimates for the Bering Sea/Aleutian Islands Pacific Cod Jig and Gulf of Alaska Pacific Cod Jig fisheries were included. There is no observer coverage in jig fisheries, so at-sea discard estimates are only generated occasionally when there is incidental observer data (for example, on a trip when both jig and longline gear were fished). As a result, these bycatch estimates did not represent catch from the entire fishery and therefore have not been included in this report. If monitoring occurs in the jig fisheries in the future, either through human observers or electronic monitoring, and at-sea discards for the fishery can be estimated, fish bycatch estimates will again be included in this report.

New information on fish bycatch estimates for the Alaska Halibut Longline fishery is included for the first time in this report for 2013. Prior to 2013, there was little or no observer coverage in the directed halibut fisheries. With the restructure of the North Pacific Groundfish and Halibut Observer Program (NPGHOP) in 2013 (see Section 5.2), the Alaska Halibut Longline fishery had observer coverage for the first time in 2013, and NMFS was able to produce bycatch estimates for this fishery.

This report provides marine mammal bycatch estimates based on multi-year annual averages (typically five) for nine individual federally managed groundfish fisheries and two federally managed groundfish fishery groups in 2011, and eight individual federally managed groundfish fisheries and two federally managed groundfish fishery groups in 2012 and 2013. This compares to nine individual federally managed groundfish fisheries and two federally managed groundfish fishery groups in Update 1 (NMFS 2013a). In each case, the two federally managed groundfish fishery groups comprise eight individual fisheries. This report also provides 2012 and 2013

marine mammal bycatch estimates based on 2-year annual averages for one commercial fishery under state management authority.

Update 1 (NMFS 2013a), and 2011 monitoring efforts reported here, did not evaluate state-managed fisheries for marine mammal bycatch and other protected species because there was no data collection program for these species in those years. However, this report provides marine mammal bycatch estimates for 2012 and 2013 in one of the fisheries included in the statewide Alaska salmon fisheries grouping.

This report provides seabird bycatch estimates for nine individual federally managed groundfish fisheries and two federally managed groundfish fishery groups for 2011 and 2012 where seabird bycatch was greater than zero. This report provides seabird bycatch estimates for seven individual federally managed groundfish fisheries and two federally managed groundfish fishery groups for 2013 where seabird bycatch was greater than zero. This report also provides 2013 seabird estimates for a halibut fishery that is under joint federal/international management authority. This compares to 10 individual federally managed groundfish fisheries and two federally managed groundfish fishery in Update 1 (NMFS 2013a). The number of fisheries with seabird bycatch estimates will increase when NMFS is able to incorporate into this report analyses that are being developed for trawl fishery seabird mortality that occurs outside the standard observer sampling regime.

As with the fish bycatch estimates, 2013 seabird bycatch estimates for the above-mentioned Alaska Halibut Longline fishery are included for the first time in this report. Prior to 2013 there was little or no observer coverage in the halibut fisheries, so estimating bycatch amounts for the fishery was not possible. With the restructure of the NPGHOP in 2013 (see Section 5.2), the fishery had observer coverage for the first time.

## 5.2 Changes to Observer Coverage

In 2011, implementation of Amendment 91 to the FMP for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP) required a change in observer coverage. The action established transferable allocations of Chinook salmon (*Oncorhynchus tshawytscha*) for American Fisheries Act (AFA) pollock cooperatives participating in an Incentive Plan Agreement and the need for at-sea observers on all vessels and processors participating in the Bering Sea pollock fishery. Catcher/processors and motherships participating in the AFA pollock fishery already had full observer coverage prior to 2011, but this action also implemented full observer coverage for all catcher vessels fishing for pollock in the Bering Sea and at shoreside processors receiving Bering Sea pollock deliveries.

Aside from this change, observer coverage under the NPGHOP in 2011 and 2012 was unchanged from 2010. Groundfish vessels under 60 feet length overall (LOA) were not required to carry observers; vessels longer than 60 feet but shorter than 125 feet LOA were required to carry a NMFS-certified observer during 30 percent of their fishing days in each calendar quarter of the year in which they fished more than 3 days; vessels 125 feet or longer participating in groundfish fisheries were required to carry a NMFS-certified observer 100 percent of the time while fishing for groundfish; and vessels participating in catch share programs, such as the Western Alaska

Community Development Quota (CDQ) Program and the Gulf of Alaska (GOA) Rockfish Program, were required to carry one or two observers on each trip.

In 2012, observers collected data onboard 264 vessels and at 20 processing facilities, for a total of 40,000 observed days at sea and 4,800 days on shore in the BSAI and GOA groundfish trawl, longline, and pot fisheries (NMFS 2013c).

Beginning in January 2013, two changes went into effect that impacted observer coverage in the North Pacific. First, regulations were implemented that required the BSAI longline catcher/processor fleet directed fishing for Pacific cod (*Gadus microcephalus*) to operate with either two observers onboard so that all catch could be sampled or to have one observer onboard and use a flow scale to account for retained Pacific cod catch prior to processing. The selected monitoring option is required to be used when the vessel is operating in either the BSAI or GOA groundfish fisheries when directed fishing for Pacific cod is open in the BSAI, or while the vessel is fishing for groundfish under the CDQ Program. These regulatory amendments addressed the need for enhanced catch accounting, monitoring, and enforcement created by the formation of a voluntary cooperative by the BSAI longline catcher/processor subsector in 2010.

Second, under the restructured NPGHOP, important changes were made to how observers are deployed, how observer coverage is funded, and which vessels and processors must have some or all of their operations observed. These changes increased the statistical reliability of data collected by the program, addressed cost inequality among fishery participants, and expanded observer coverage to previously unobserved fisheries.

The “restructured” portion of the NPGHOP impacted vessels and processors that had been required to use less than 100 percent observer coverage in the federal fisheries, including previously unobserved sectors such as the commercial halibut sector and vessels in the groundfish sector that are less than 60 feet in length. The restructured program was established to enable NMFS to contract directly with observer companies to deploy observers according to a scientifically valid sampling and deployment plan that is funded through a landings fee. Landings from all vessels in the partial coverage category are assessed a fee of 1.25 percent of the ex-vessel value of the landed catch. The fee percentage is set in regulation and may be reviewed periodically by the Council. In the future, the Council could recommend changes to the fee percentage, but that percentage could not exceed the statutory limit of 2 percent. The regulations governing the new NPGHOP went into effect in January 2013 (77 Federal Register 225 (November 12, 2012), pp. 70062-70103).

Observer program restructuring created two portions of the observer program: full coverage and partial coverage. Vessels in partial coverage do not carry an observer for all of their fishing activity. Instead, observer deployment is based on a random sampling of fishing events for vessels in the partial coverage category. Observer coverage in the partial coverage category is further divided into strata according to an Annual Deployment Plan (ADP) (for example, see NMFS 2013d). In 2013 the partial coverage sampling strata were based on vessel length or gear: the no selection strata for vessels less than 40 feet LOA or fishing jig gear; the vessel selection strata for vessels greater than or equal to 40 feet LOA and less than 57.5 feet LOA and fishing

fixed gear; and the trip selection strata for vessels fishing trawl gear and vessels greater than 57.5 feet LOA fishing fixed gear.

In 2013, the partial coverage category of the restructured observer program resulted in 3,538 observer days and the full coverage category resulted in 37,137 observer days, for a total of 40,675 observer days (NMFS 2014a).

The Alaska Marine Mammal Observer Program (AMMOP) conducted observer coverage of the state-managed fisheries classified as Category II under the [MMPA List of Fisheries](#). Of the 14 MMPA Category II fisheries managed by the State of Alaska, AMMOP has observed eight since its establishment in 1990. These AMMOP-observed fisheries include the Prince William Sound drift and set gillnet fisheries (1990–1991), the Alaska Peninsula drift gillnet fishery (1990), the Cook Inlet drift and set gillnet fisheries (1999–2000), the Kodiak set gillnet fishery (2002 and 2005), the Yakutat set gillnet fishery (2007–2008), and the Southeast Alaska drift gillnet fishery (2012–2013). AMMOP monitors fisheries on rotational observation periods based on available funding.

AMMOP did not observe any fisheries in 2010 or 2011. AMMOP observed the Southeast Alaska drift gillnet fishery during the 2012 and 2013 fishing seasons, and these efforts are reflected in Tables 5.6.2 and 5.6.3 of this report as the Alaska Statewide Salmon Fisheries. Based on available funding, AMMOP observed fishing operations in the Alaska Department of Fish and Game (ADF&G) Management Districts 6 and 8, as well as part of District 7 in the Anita Bay terminal harvest area.

As funds allow, AMMOP plans to monitor Southeast Alaska drift gillnet fishery operations in the remaining ADF&G Management Districts in subsequent years, over a total expected time frame of 8 years. A new sampling design approach has also been developed to increase efficiency of data collection and reduce cost. Data collected from this program are important relative to concerns over bycatch of harbor porpoise.

### 5.3 Changes to Catch and Bycatch Estimation Methods

The methodologies used to estimate catch and bycatch of fish as described in Section 4.3.4.1 of the first edition of the NBR (NMFS 2011) were the same employed to produce estimates for Update 1 (NMFS 2013a) and, for the most part, for the 2011 and 2012 estimates in this report. Total catch estimates in the groundfish fisheries off Alaska are generated using the Catch Accounting System (CAS). Cahalan et al. (2010) describes in detail the catch estimation methods for these years.

The manner in which Chinook salmon were estimated in the CAS changed in 2011 with the implementation of Amendment 91 to the BSAI FMP. Prior to Amendment 91, salmon bycatch in the Bering Sea was estimated by extrapolating observer sampling data to unobserved fishing events. Amendment 91 implemented the enumeration of all salmon caught so extrapolation was replaced with census counts of salmon.

Additional modifications were made to the CAS in 2013. CAS procedures changed to complement the sampling procedures established under the restructured observer program, including changes to post-stratification in the CAS and providing catch estimation on vessels retaining Pacific halibut (*Hippoglossus stenolepis*). Cahalan et al. (2014) describe in detail the catch estimation methods for 2013 and subsequent years under the restructured observer program.

The statistical methods used to derive the marine mammal bycatch estimates in the federally managed fisheries are much the same as described in Section 4.3.4.2.1 of the first edition of the NBR and as described by Perez 2006, although the manner in which the data are organized and processed for the bycatch analysis has changed since 2006. Breiwick (2013) describes the current marine mammal bycatch estimation methods in greater detail. The methods used to estimate marine mammal bycatch in one of the statewide Alaska salmon fisheries can be found in Manly 2015.

The marine mammal bycatch estimates for federally managed groundfish fisheries in this report are provided as an average annual estimate of bycatch based on 5 years of data: 2007–2011 for 2011, 2008–2012 for 2012, and 2009–2013 for 2013. The estimates also include bycatch that was observed in hauls that were not sampled for fish composition. For these events, the bycatch is observed, but the fishing effort in those hauls (i.e., groundfish weight landed) is undetermined. That is, the total catch weight landed is known, but the portion of catch that is groundfish cannot be determined. Therefore, the bycatch from those hauls is not extrapolated for effort. Rather, the bycatch is simply reported as the unextrapolated number, with no associated CV.

Although marine mammal bycatch estimates presented in this report are based on observer data, there are other sources of data on mortality and serious injury, such as stranding databases. See the [Marine Mammal Stock Assessment Reports](#) for more information.

The methodology to derive the annual estimates of seabird bycatch in the groundfish fisheries has been redesigned (see Fitzgerald 2012). The estimates are derived in the CAS using the same methods as other non-target species as described in Cahalan et al. 2010 for 2011 and 2012 and in Cahalan et al. 2014 for 2013. However, the CAS uses only the standard observer sample information. Additional seabird bycatch occurs on trawl vessels outside the standard sample. NMFS implemented protocols for additional observer monitoring in 2010 for trawl vessels, but extrapolation techniques have not yet been developed. That work currently is in progress.

Estimates of uncertainty are currently not available for fish or seabird bycatch. The methods to calculate variance of fish catch estimates are being developed and are expected to be provided in the next update of this report.

#### 5.4 Progress on Bycatch Estimation Improvement Plans

Since the last update of the NBR, significant progress has been made on the bycatch data collection and estimation improvement plans for the groundfish fisheries. NMFS, the NPFMC, and the fishing industry have made important changes to address longstanding issues related to the structure, scope, and funding for the NPGHOP. The restructured observer program

addressed concerns about the quality and utility of the information being collected under the previous program because some boats were not being observed and the sampling regime for deploying observers was flawed. The new restructured observer program:

- Expands coverage to nearly all catcher/processor vessels, the halibut and sablefish IFQ fisheries, and vessels between 40 feet and 60 feet length overall;
- Uses a scientific method to deploy observers; and
- Equitably distributes costs by charging a fixed 1.25 percent fee on all groundfish and halibut landings in the partial coverage category.

Each year, an ADP and Annual Review are developed using the best available scientific information and are used to evaluate deployment. These reports receive scientific review and Council input to annually determine deployment methods and sample allocation among partial coverage strata.

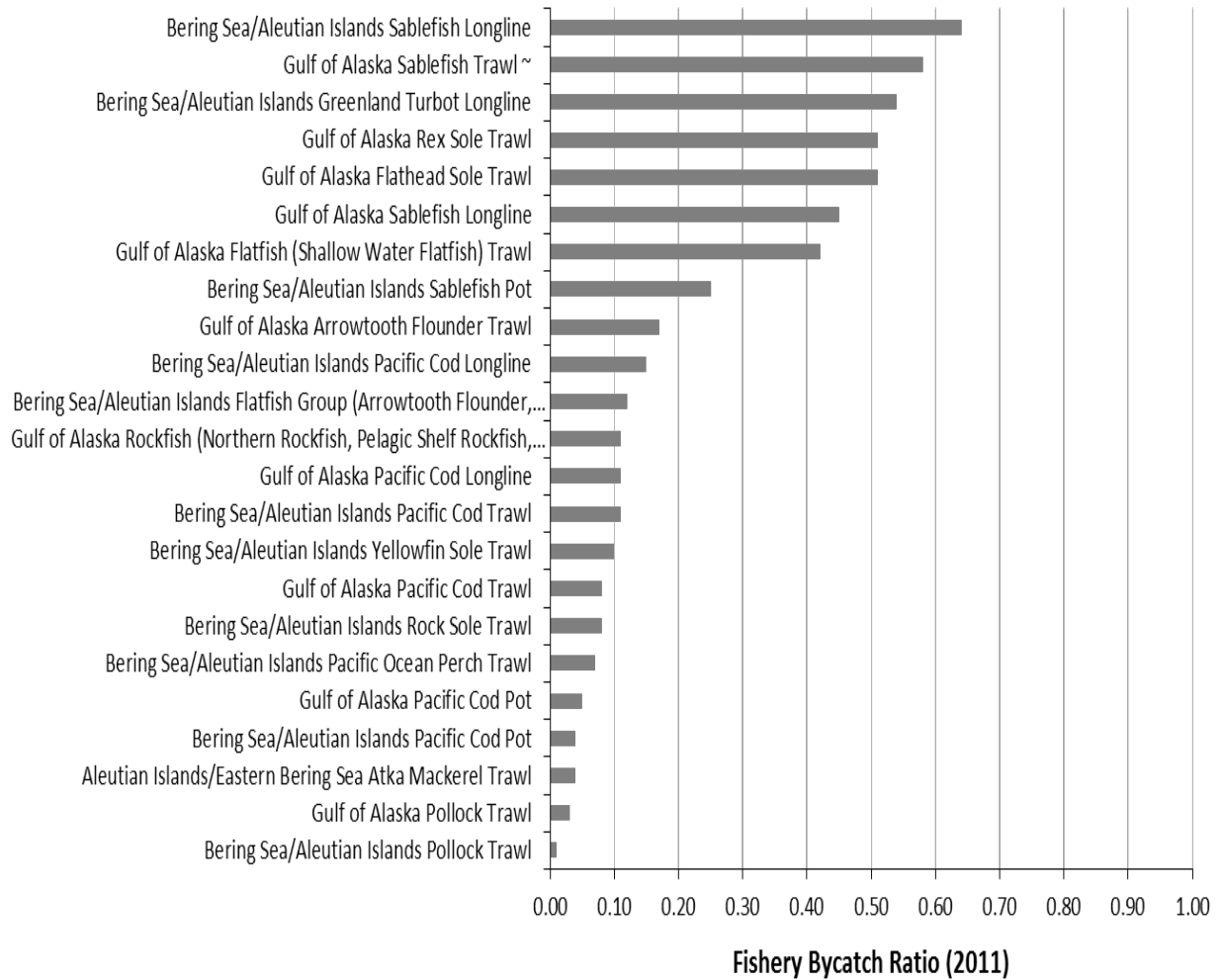
The iterative process of the ADP and Annual Report cycle provides flexibility in observer deployment to meet scientifically based estimation needs within the constraints of the available budget, and it enables ongoing evaluation and improvements to deployment of observers and bycatch estimation. For example, the 2013 Annual Report of the NPGHOP (NMFS 2014b) provided information to assess the degree to which the objectives of the observer program restructuring were met, to evaluate the performance of the 2013 ADP, and to provide recommendations for possible improvements to the deployment process for 2015. Deployment rates during the first year of the restructured observer program were met for many, but not all, strata, and observer coverage was mostly representative for vessels in the trip selection pool. However, the sampling frame was not adequately defined for the vessel selection pool and the use of conditional releases led to some biases. Based on these findings, NMFS recommended that participants in the vessel selection pool be placed in the trip selection pool to correct for sampling frame problems for the 2015 ADP (NMFS 2014c). The issuance of conditional releases was also restricted to help with sampling frame problems and to lessen the impact on spatial distribution of observer coverage.

## 5.5 Fish Bycatch

This section presents fish bycatch estimates in the Alaska Region fisheries based on data from 2011, 2012, and 2013. This section also includes fishery bycatch ratios as well as species bycatch ratios for each year.

### 5.5.1 Fish Bycatch Estimates for 2011

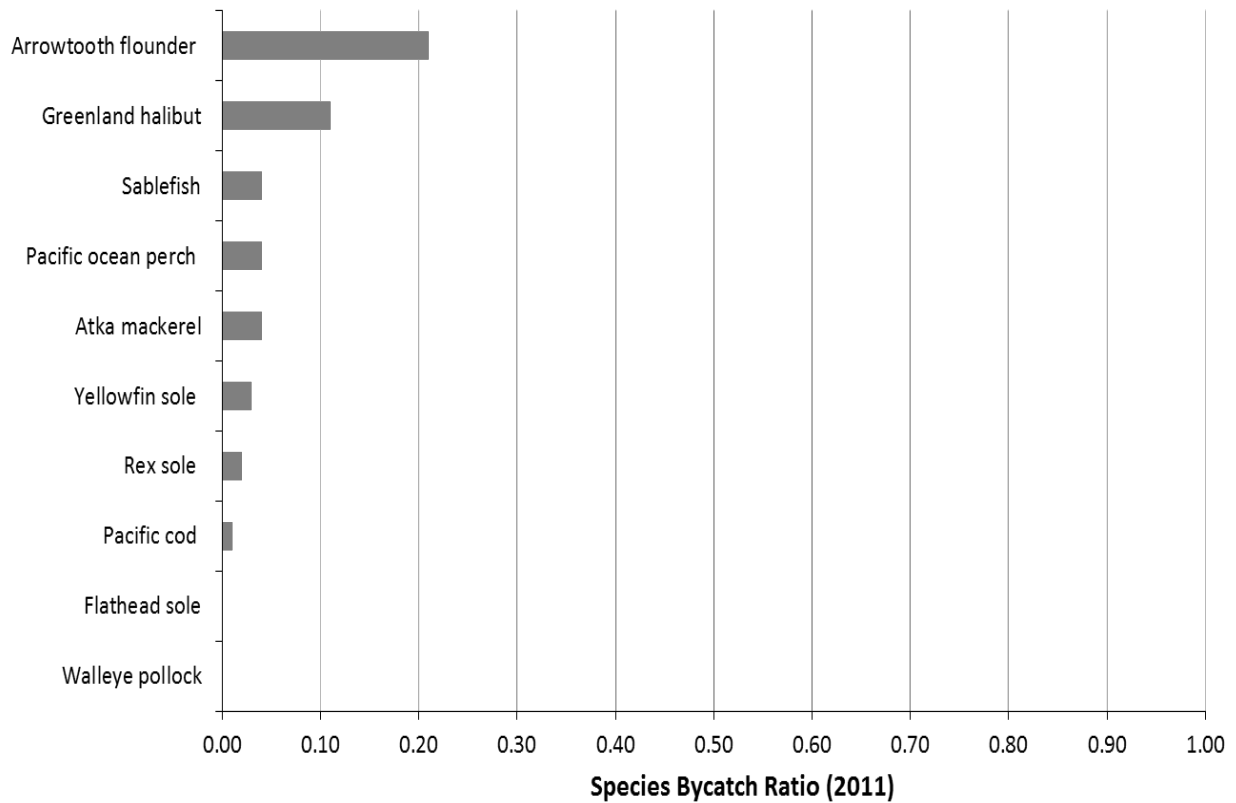
Fishery bycatch estimates based on 2011 data ranged from 407,631 pounds in the BSAI sablefish pot fishery to 47.3 million pounds in the BSAI Pacific cod longline fishery (Table 5.5.1a). Figure 5.1 shows fishery bycatch ratios for 23 Alaska Region fisheries based on 2011 data. Fishery bycatch ratios for the Alaska Region ranged from 0.01 in the BSAI Pollock trawl fishery to 0.64 in the BSAI sablefish longline fishery.



**Figure 5.1 Alaska Region Fishery Bycatch Ratios for 2011** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). ~Vessels participating in the “Gulf of Alaska sablefish trawl fishery” were part of the Gulf of Alaska rockfish trawl fishery; trips were designated as sablefish trawl when sablefish (*Anoplopoma fimbria*) was the predominant retained species.

This report includes estimates for 70 fish and invertebrate stocks (or species or species groups) based on 2011 data. Estimated fish bycatch by stock, species, or species group ranged from less than 100 pounds of miscellaneous deep fish (unidentified) to 40.6 million pounds of skates (Table 5.5.1b).

Figure 5.2 shows fish bycatch ratios for 10 Alaska Region species based on 2011 data. Fish species bycatch ratios ranged from <0.01 for flathead sole (*Hippoglossoides elassodon*) to 0.21 for arrowtooth flounder. (Species are referred to using [FSSI](#) stock names; FSSI stock names do not correspond to regional FMP names.)

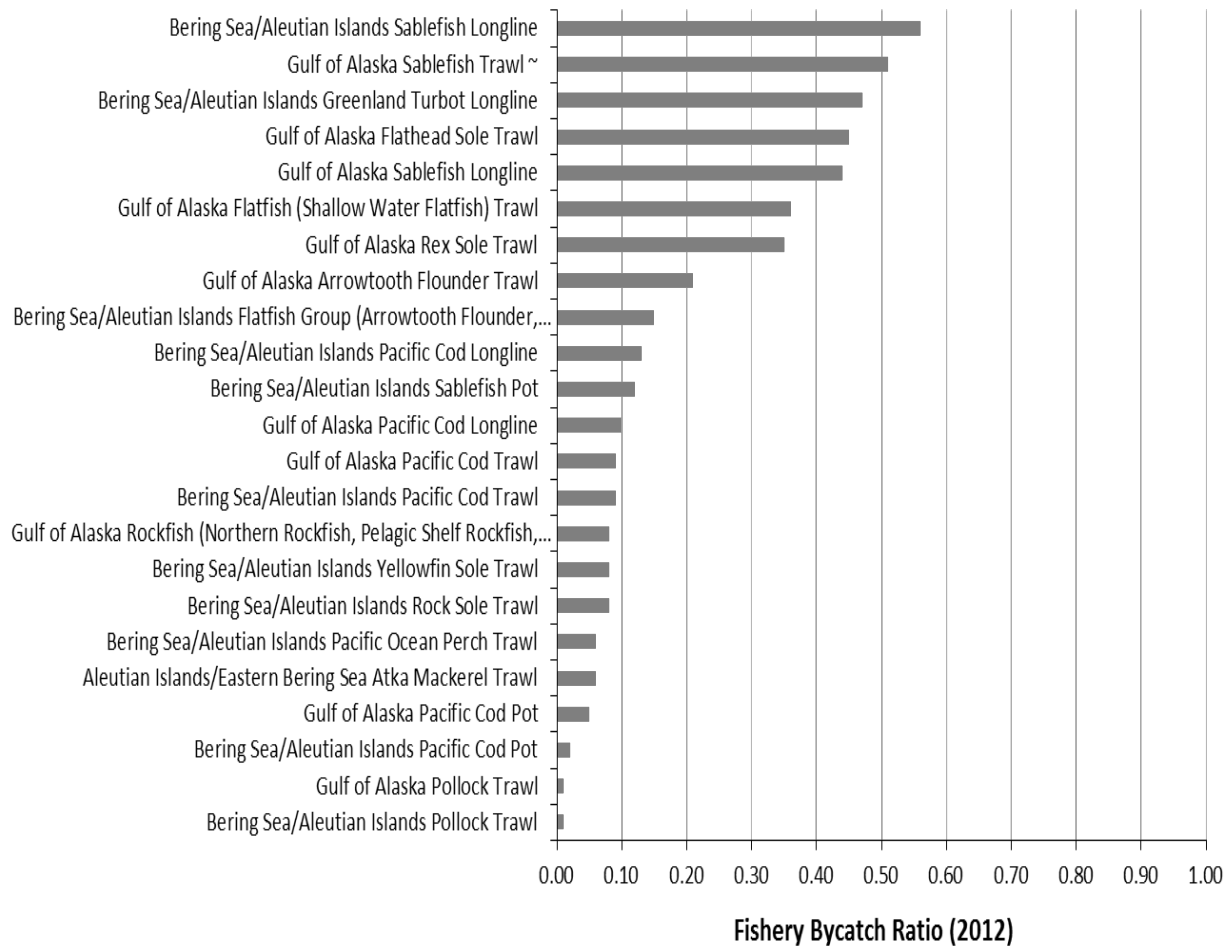


**Figure 5.2 Alaska Region Species Bycatch Ratios for 2011** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for flathead sole and Walleye pollock (*Theragra chalogramma*) are not 0.00 but are less than 0.01.

### 5.5.2 Fish Bycatch Estimates for 2012

Fishery bycatch estimates based on 2012 data ranged from 148,713 pounds in the BSAI sablefish pot fishery to 47.7 million pounds in the BSAI Pacific cod longline fishery (Table 5.5.2a). Figure 5.3 shows fishery bycatch ratios for 23 Alaska Region fisheries based on 2012 data. Fishery bycatch ratios for the Alaska Region ranged from 0.01 in the BSAI Pollock trawl fishery and GOA Pollock trawl fishery to 0.56 in the BSAI sablefish longline fishery.

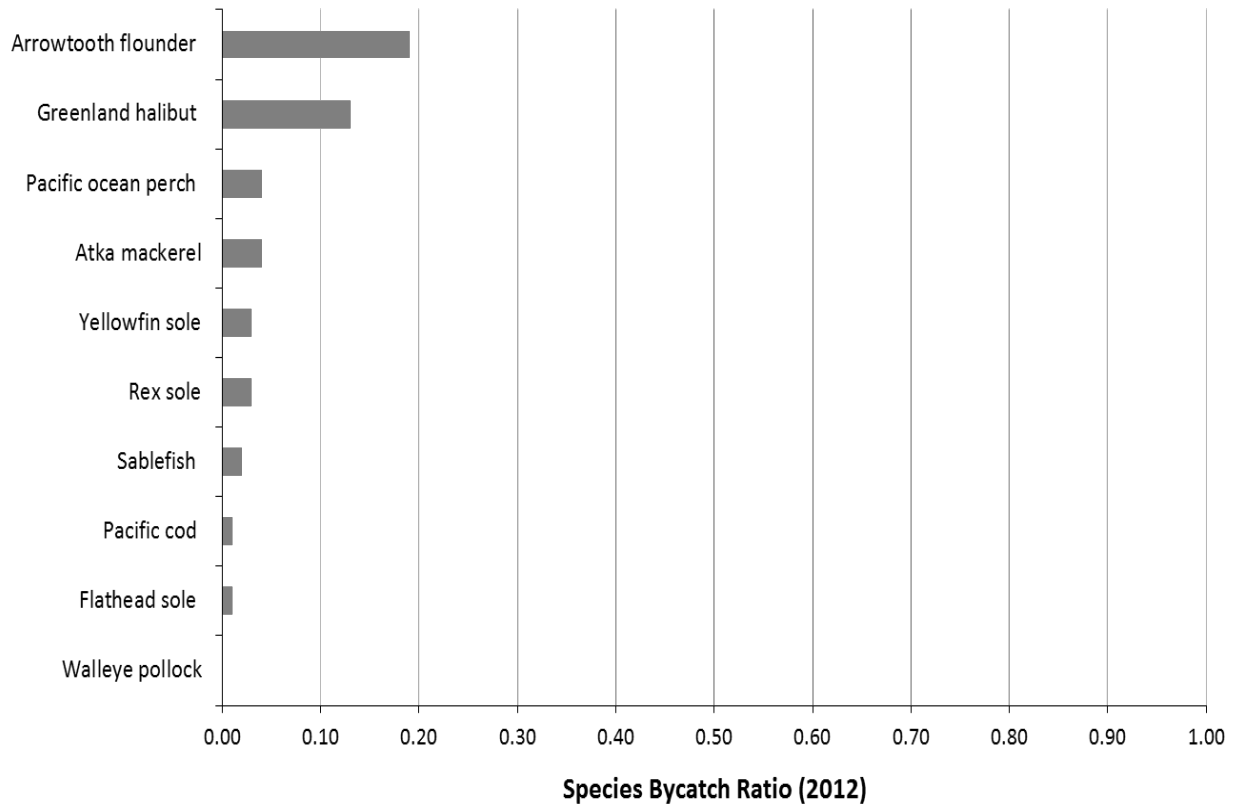




**Figure 5.3 Alaska Region Fishery Bycatch Ratios for 2012** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). ~Vessels participating in the “Gulf of Alaska sablefish trawl fishery” were part of the Gulf of Alaska rockfish trawl fishery; trips were designated as sablefish trawl when sablefish was the predominate retained species.

This report includes bycatch estimates for 70 fish and invertebrate stocks (or species or species groups) based on 2012 data. Estimated fish bycatch by stock, species, or species group ranged from less than 100 pounds of miscellaneous deep fish (unidentified) to 41.8 million pounds of skates (Table 5.5.2b).

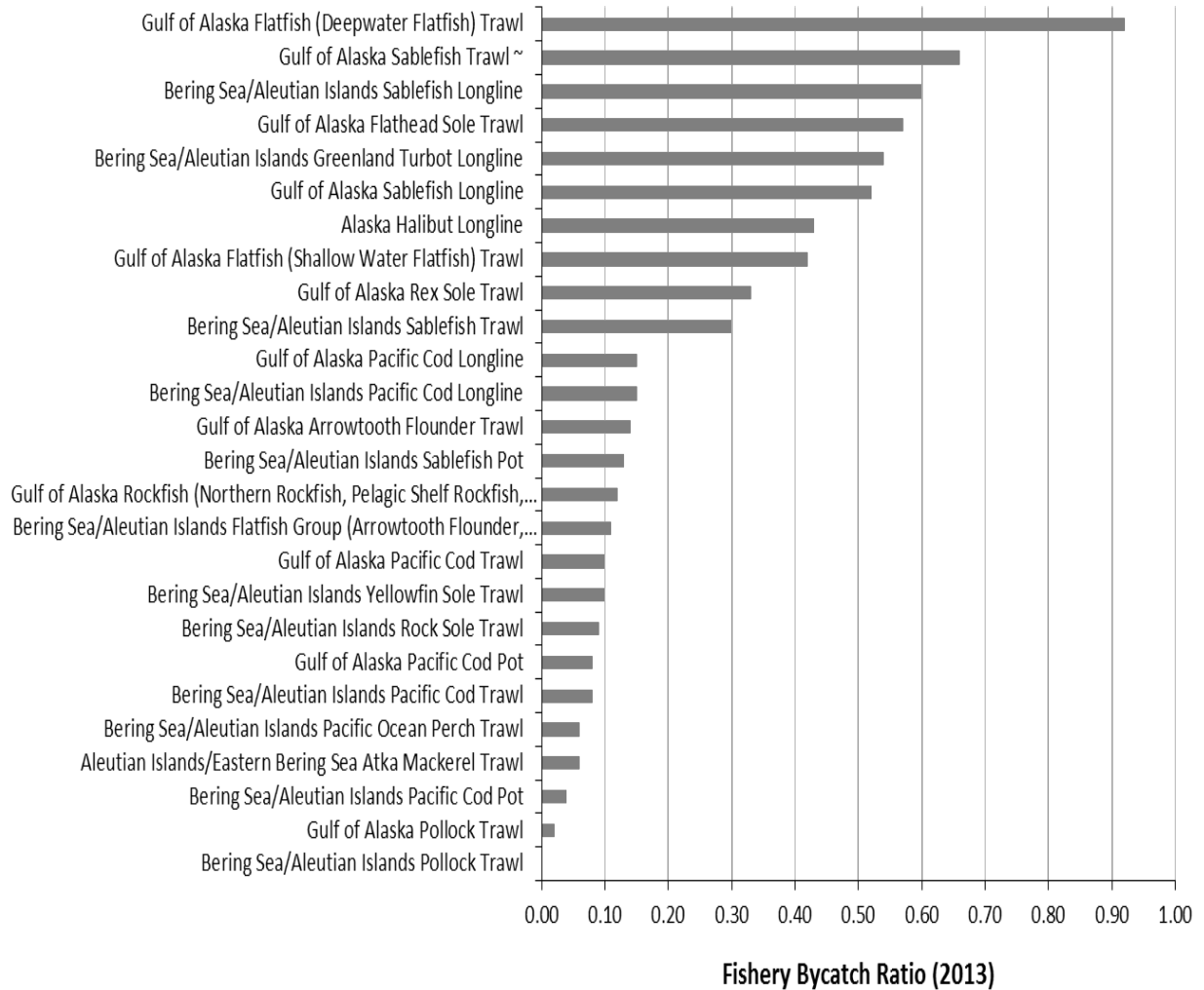
Figure 5.4 shows fish and invertebrate bycatch ratios for 10 Alaska Region species based on 2012 data. Fish species bycatch ratios ranged from 0.01 for Pacific cod and flathead sole to 0.19 for arrowtooth flounder.



**Figure 5.4 Alaska Region Species Bycatch Ratios for 2012** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratio for Walleye pollock is not 0.00 but is less than 0.01.

### 5.5.3 Fish Bycatch Estimates for 2013

Fishery bycatch estimates based on 2013 data ranged from 9,753 pounds in the BSAI sablefish trawl fishery to 52.0 million pounds in the BSAI Pacific cod longline fishery (Table 5.5.3a). Figure 5.5 shows fishery bycatch ratios for 26 Alaska Region fisheries based on 2013 data. Fishery bycatch ratios for the Alaska Region ranged from <0.01 in the BSAI Pollock trawl fishery to 0.92 in the GOA Flatfish (Deepwater Flatfish) trawl fishery.

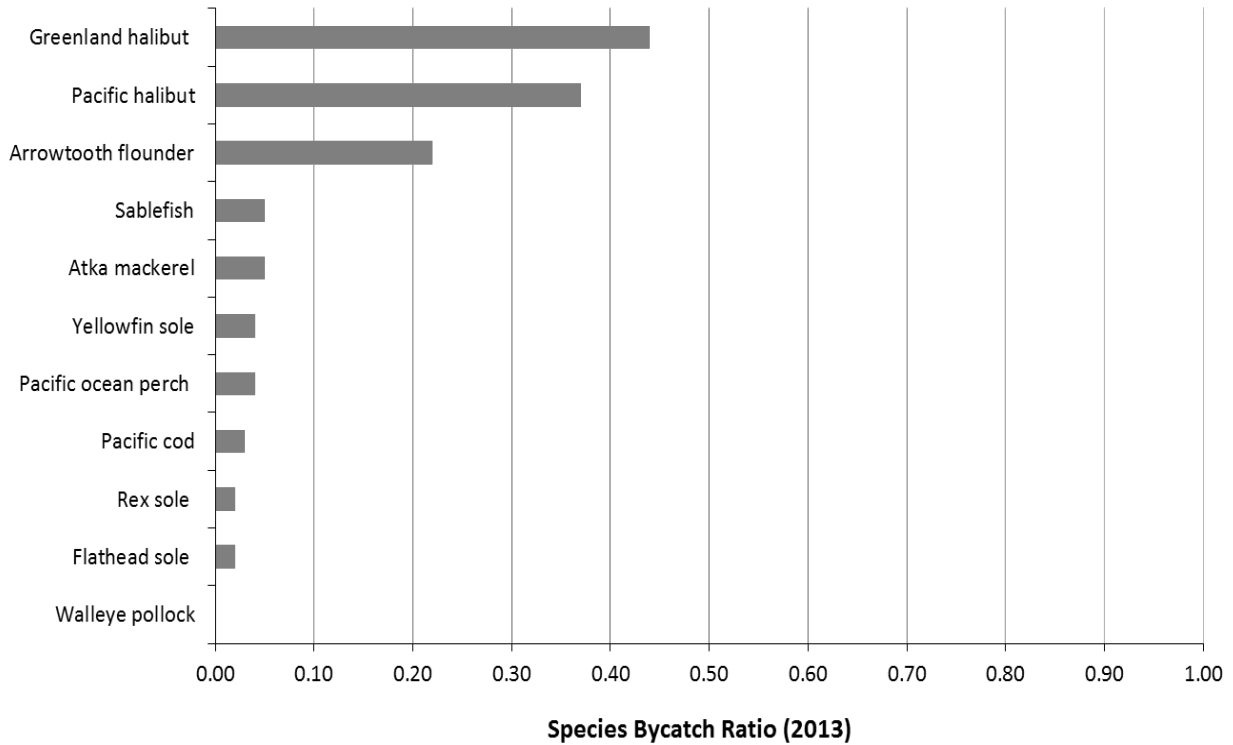


**Figure 5.5 Alaska Region Fishery Bycatch Ratios for 2013** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). ~Vessels participating in the “Gulf of Alaska sablefish trawl fishery” were part of the Gulf of Alaska rockfish trawl fishery; trips were designated as sablefish trawl when sablefish was the predominate retained species. The ratio for Bering Sea/Aleutian Islands Pollock Trawl is not 0.00 but is less than 0.01.

This report includes bycatch estimates for 70 fish and invertebrate stocks (or species or species groups) based on 2013 data. Estimated fish bycatch by stock, species, or species group ranged from less than 100 pounds of Pacific sand lance (family *Ammodytidae*) to 46.0 million pounds of skates (Table 5.5.3b).

Figure 5.6 shows fish bycatch ratios for 11 Alaska Region species based on 2013 data. Fish species bycatch ratios ranged from 0.02 for flathead sole and rex sole (*Glyptocephalus zachirus*)

to 0.44 and 0.37 for Greenland halibut (*Reinhardtius hippoglossoides*) and Pacific halibut, respectively.<sup>18</sup>



**Figure 5.6 Alaska Region Species Bycatch Ratios for 2013** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratio for Walleye pollock is not 0.00 but is less than 0.01.

#### 5.5.4 Protected and/or Prohibited Fish Bycatch Estimates

Bycatch management measures for groundfish fisheries in the BSAI and GOA have specific requirements to limit or reduce the incidental catch of species that are harvested by other fisheries. The catch of these species is referred to as Prohibited Species Catch (PSC). This report includes bycatch estimates for nine PSC species or species groups, including Chinook salmon, non-Chinook salmon, golden king crab (*Lithodes aequispinus*), red king crab (*Paralithodes camtschaticus*), blue king crab (*Paralithodes platypus*), snow crab, Tanner crab (*Chionoecetes bairdi*), Pacific halibut, and Pacific herring. In the groundfish fisheries, regulations require that PSC species be returned to the sea immediately with minimal injury, or donated under a salmon or halibut PSC donation program. In CAS, crab and salmon are estimated as numbers of individuals for management and have been estimated in weight for this report using average weights derived from samples taken by observers.

<sup>18</sup> Greenland halibut is also commonly called Greenland turbot. Greenland turbot is the market name and fishery name for this species in Alaska.

### 5.5.5 Discussion

In 2011, 2012, and 2013, the BSAI Pacific cod longline fishery had the highest fishery bycatch estimates. In each case, skates comprised a majority of the bycatch in the fishery. Prior to 2011, BSAI skates were managed as a part of the “other species” group along with sculpins, sharks, and octopus. Beginning in 2011 and also for 2012 and 2013, BSAI skates were assigned an annual specification of overfishing levels, acceptable biological catch (ABC), and total allowable catch (TAC). In each of these years, the skate fishery was closed to directed fishing, and skates were only caught incidentally in other fisheries. The retention of incidentally caught large skates occurs, indicative of their market value, but no directed fishery occurs. In 2011, TACs in the BSAI FMP were adjusted downward for several species that are not part of the directed fishery, including skates ([76 FR 11139, March 1, 2011](#)). This final TAC set for skates was exceeded in 2011, 2012, and 2013. However, exceeding the skate TAC does not pose a biological concern as the TACs were set well below the ABC in each year, and the total catch did not approach those ABC levels. BSAI skate biomass estimates have fluctuated yearly around a level of 822 million pounds since 1990 (Ormseth 2013). Following a large recruitment event in the 1980s, skates increased in biomass to 2013 levels (Ormseth 2014).

The GOA deepwater flatfish trawl fishery had the highest fishery bycatch ratio in 2013, following 2 years with no fishery bycatch ratios. The GOA deepwater flatfish trawl fishery typically has a low TAC and consists of species that are not normally targeted. The fishery opened by regulation each year, but also closed to directed fishing in each of the 3 years due to trawl gear halibut PSC limits for all the deepwater species fisheries and in 2012 to limit incidental catch of Pacific Ocean perch (*Sebastes alutus*). In 2011 all of the incidental groundfish catch was retained, so no bycatch was reported. Because no trips were identified with deepwater flatfish as the target in 2012, no discards are attributed to the fishery in that year. In 2013, 2.7 million pounds of grenadiers were discarded in the fishery.

In addition to the bycatch in the GOA flatfish (deepwater flatfish) trawl fishery in 2013, grenadiers comprised a vast majority of the bycatch in the BSAI sablefish longline fishery, which had the highest fishery bycatch ratios in 2011 and 2012. In 2015, FMP and regulatory amendments added grenadiers to the BSAI and GOA groundfish FMPs as ecosystem components ([80 FR 11897, March 5, 2015](#)). Grenadiers are not a targeted species group, are not generally retained for sale or personal use, and have no current or foreseeable economic value. At the current level of catch, grenadiers are not subject to overfishing, overfished, or approaching an overfished condition, and are not likely to become subject to overfishing or overfished in the absence of conservation and management measures (NMFS 2014d). Adding grenadiers to the FMPs in the ecosystem component category acknowledges their role in the ecosystem and limits the groundfish fisheries’ impact on grenadiers.

Although arrowtooth flounder had the highest species bycatch ratio and the third highest bycatch estimate (23.9 M lb) in 2011 and 2012, total catch estimates (89.0 M lb landings and 77.2 M lb bycatch) were below the ABC level in the BSAI and the GOA (Spies et al. 2012; Turnock 2012). In the past, arrowtooth flounder has not been considered marketable for human consumption and was therefore caught as bycatch in other fisheries and discarded. However, industry has continued to develop markets for the species, and the bycatch ratio of arrowtooth flounder has

decreased from 0.44 in 2005 for the first edition of the report, to 0.27 in 2010 in the first update to the report, to between 0.19 and 0.22 for 2011–2013.

The Greenland halibut bycatch ratio jumped from 0.11 and 0.13 in 2011 and 2012, respectively, to 0.44 in 2013. Because estimates of biomass decreased for Greenland halibut in 2013, the TACs in the BSAI for this species were lowered significantly in 2013 (i.e., 11.68 million pounds in 2012 to 3.17 million pounds in 2013 in the Bering Sea; 5.36 million pounds in 2012 to 0.84 million pounds in 2013 in the Aleutian Islands). As a result, the Bering Sea and Aleutian Islands fisheries were closed to directed fishing prior to the start of the fishery in 2013.

Catcher/processors in the hook-and-line and Amendment 80 fleets that target Greenland halibut were only allowed to retain maximum retainable amounts (MRA) of Greenland halibut because of the closures, which led to a higher bycatch ratio for the species in 2013. Greenland halibut is common bycatch when directed fishing for arrowtooth flounder and Kamchatka flounder, both of which are targeted by the Amendment 80 fleet. NMFS was able to open the Bering Sea to directed Greenland halibut fishing later in the season, when the Amendment 80 fleet had moved on to yellowfin sole fishing (which does not typically have Greenland halibut bycatch), allowing the hook-and-line catcher/processors to target the Greenland halibut TAC.

In 2011 and 2012, the reported Pacific halibut bycatch reflects PSC in the groundfish fisheries. Halibut that are incidentally caught in federally managed groundfish fisheries are required by regulations to be discarded, regardless of whether the fish is living or dead. To increase the survival of incidentally caught halibut that are released, regulations require that halibut be returned to the sea following careful release methods. However, despite careful handling, many fish die from being caught and handled, and the probability of mortality depends on the target fishery and gear. The International Pacific Halibut Commission (IPHC) uses viability (injury and condition) data collected by observers to generate halibut discard mortality rates (DMRs) in Alaska groundfish fisheries (Williams 2013). DMRs are applied to halibut discard information when NMFS tracks PSC limits for the groundfish fisheries to estimate the portion of halibut bycatch that dies.

With the restructured observer program, the commercial halibut sector was subject to observer coverage for the first time in 2013, and the CAS was modified to provide catch estimation on vessels retaining Pacific halibut. In the halibut (IFQ fishery there is a length retention requirement of 32 inches, below which halibut must be discarded. As a result, the Pacific halibut bycatch in 2013 contains both PSC in the groundfish fisheries and undersized Pacific halibut bycatch in the directed Alaska longline halibut fishery. The IPHC uses a DMR of 0.16 for halibut fishery discards in its assessment and management of the halibut stock, so a DMR of 0.16 was applied to Pacific halibut bycatch in the directed Alaska longline halibut fishery in the 2013 update of the NBR (Gilroy and Stewart 2013).

## 5.6 Marine Mammal Bycatch

This report includes marine mammal bycatch estimates for 20 stocks or species. Marine mammal bycatch was observed in nine individual federally managed groundfish fisheries, two federally managed groundfish fishery groups comprising eight individual fisheries, and one state-managed fishery.

Table 5.6.1 shows annual average marine mammal bycatch estimates for 2007–2011, which include 17 marine mammal stocks or species, nine individual federally managed groundfish fisheries, and two federally managed groundfish fishery groups. Bycatch estimates of marine mammals in the groundfish fisheries ranged from an average of 0 to 15 animals per year, for a total of 33 estimated animals (annual estimates are based on a multi-year average, so estimates in Table 5.6.1 are fractional).

Table 5.6.2 shows annual average marine mammal bycatch estimates for 2008–2012, which include 16 marine mammal stocks or species, eight federally managed groundfish fisheries, two federally managed fishery groups, and one state-managed fishery. Bycatch estimates of marine mammals in the groundfish and salmon fisheries ranged from an average of 0 to 26 animals per year, for a total of 59 estimated animals (annual estimates are based on a multi-year average, so estimates in Table 5.6.2 are fractional).

Table 5.6.3 shows annual average marine mammal bycatch estimates for 2009–2013, which include 18 marine mammal stocks or species, eight federally managed groundfish fisheries, two federally managed fishery groups, and one state-managed fishery. Bycatch estimates of marine mammals in the groundfish and salmon fisheries ranged from an average of 0 to 26 animals per year, for a total of 57 estimated animals (note that the annual estimates are based on a multi-year average, so estimates in Table 5.6.3 are fractional).

These estimates of bycatch are comparable to the total annual estimate reported for 2001–2005 in the first edition of the NBR (62 individuals) and for 2007–2010 in the first update (33 individuals). However, as noted in the observer coverage section, data were not collected in 2010 or 2011 under the AMMOP, so estimates for state-managed fisheries are not provided for those years. Therefore, the lower overall bycatch in 2011 probably represents a lack of available data, not an overall trend in reduced marine mammal bycatch in those years.

Bycatch estimates were numerically very low for the majority of fisheries, although even a small amount of bycatch can be important if stock abundance is also low. Western Steller sea lions (*Eumetopias jubatus*), which are listed as endangered, had the highest amount of bycatch (almost 45% of the total marine mammal bycatch in 2011, 29% in 2012, and 27% in 2013), followed by northern fur seals (*Callorhinus ursinus*) (14% of the total marine mammal bycatch) in 2011, and Southeast Alaska harbor porpoise (20% of the total marine mammal bycatch) in 2012 and 2013. The estimated bycatch in the BSAI Pollock Trawl and BSAI Flatfish Trawl Fisheries accounted for the majority (83%) of the total marine mammal bycatch in 2011 and in conjunction with the statewide salmon fisheries account for 90 percent of the total marine mammal bycatch in 2012 and 86 percent of the total marine mammal bycatch in 2013. The [Marine Mammal Stock Assessment Reports](#) contain more information on the status of these stocks.

## 5.7 Sea Turtle Bycatch

No sea turtles were observed caught in 2011, 2012, or 2013 in Alaska Region fisheries under federal or joint federal/international management authority.

## 5.8 Seabird Bycatch

This report includes seabird bycatch estimates for 10 species (or species groups) summarized from observer data. Observers identify seabirds to the species level whenever possible. Seabird bycatch is monitored in all fisheries where observers are deployed, but seabird bycatch is rare or nonexistent in most fisheries. This report includes seabird bycatch estimates for nine individual federally managed groundfish fisheries, two federally managed groundfish fishery groups comprising eight individual fisheries, and one halibut fishery under joint federal/international management authority. In all other fisheries seabird bycatch was zero, based on estimates derived from standard observer species composition sampling. When NMFS completes its trawl seabird mortality project, NMFS will be able to expand the list of fisheries with identified seabird bycatch.

Table 5.8.1 shows seabird bycatch estimates for 10 Alaska Region federally managed groundfish fisheries (or fishery groups) for 2011. Bycatch estimates in the groundfish fisheries ranged from 27 to 6,821 individuals, for a total of 9,665 estimated seabirds.

Table 5.8.2 shows seabird bycatch estimates for 10 Alaska Region federally managed groundfish fisheries (or fishery groups) for 2012. Bycatch estimates in the groundfish fisheries ranged from 21 to 3,994 individuals, for a total of 5,141 estimated seabirds.

Table 5.8.3 shows seabird bycatch estimates for nine Alaska Region federally managed groundfish fisheries (or fishery groups) and one halibut fishery under joint federal/international management authority for 2013. Bycatch estimates in these fisheries ranged from 19 to 3,296 individuals, for a total of 4,846 estimated seabirds.

In each year, Northern fulmar (*Fulmarus glacialis*) was the most commonly caught seabird species and accounted for over half of the estimated annual seabird bycatch each year. Total fulmar bycatch ranged from 6,209 birds for 2011 to 3,262 birds for 2013. Large inter-annual variation is the norm for seabird bycatch in Alaska fisheries. There were also large changes in gull bycatch, ranging from 2,224 birds for 2011 to 555 birds for 2013.

Longline fisheries' seabird bycatch accounted for roughly 90 percent of the overall estimated seabird bycatch each year. However, studies have shown that seabird bycatch numbers from trawl fisheries are biased low when based solely on the observer species composition sample, as with the numbers in this report. (For more information, see the [Alaska Fisheries Science Center \(AFSC\) website](#).) The AFSC has conducted research on additional sources of mortality for seabirds in the trawl fisheries and is currently preparing reports. This research resulted in changes in observer responsibilities, and the resulting standard sampling procedures are applied to the trawl fleet, which should result in improved estimates of seabird bycatch.



In 2012 and 2013, bycatch in longline fisheries was lower than the estimated 6,353 birds caught in the longline fisheries in 2005 (NMFS 2011), with an estimated 4,707 birds caught in 2012 and an estimated 4,288 birds caught in 2013. Bycatch in the longline fisheries has showed a marked decline beginning in 2002 due to the deployment of streamer lines as bird deterrents. Since then, annual bycatch has remained below 10,000 birds. The Pacific cod freezer longline fishery accounts for the vast majority of overall seabird bycatch, with primarily northern fulmars, gulls, and shearwaters being taken. This fishery typically does not take many albatross, although all takes of the endangered short-tailed albatross (*Phoebastria albatrus*) since 1995 have been observed in this fleet. A single albatross was observed incidentally hooked in 2011 in the BSAI Pacific cod longline fishery and extrapolated to an estimate of five birds caught in the fishery. There was no further bycatch of the short-tailed albatross observed in the 2012 or 2013 fisheries.

In addition to the ESA-listed short-tailed albatross, NMFS is interested in the conservation of Laysan (*Phoebastria immutabilis*) and black-footed (*Phoebastria nigripes*) albatross. It is important to note that several environmental groups have for many years shared NMFS' interest in seabird bycatch, especially albatross bycatch, in the previously unobserved Alaska Halibut Longline fishery. The 2013 results for this Alaska Halibut Longline fishery are the first available fleet-wide information from this fishery and confirm that albatross bycatch does occur in this fishery, although probably at numbers lower than expected by some organizations. This report estimates bycatch of 53 black-footed albatross in 2013 for this fishery. Also in 2013, there were only four Laysan albatross estimated for the BSAI Pacific Cod Longline fishery, but 191 black-footed albatross and 181 Laysan albatross in the BSAI and GOA Sablefish Longline fisheries. The sablefish fisheries operate primarily on the continental shelf slope, which is also important albatross habitat. However, this is just a single year's (2013) data, and inter-annual variability is common. Under the restructured observer program, NMFS now should be able to track whether this pattern holds among these three major longline fisheries (Alaska halibut, Pacific cod, and sablefish) over time.

## 6. West Coast Overview

### 6.1 Summary of Fisheries Included in This Report

This report combines the previous Northwest and Southwest regions into a single West Coast Region. This report provides 2011, 2012, and 2013 fish bycatch estimates for a total of 13 West Coast Region commercial fisheries (see Appendix 3), which is equivalent to the number of fisheries the NBR First Edition Update 1, although the composition has changed slightly (NMFS 2013a).

Vessels carrying limited entry trawl permits can fish with fixed gear beginning in 2011, due to management structure changes to the West Coast limited entry bottom trawl; bottom and midwater trawl fishery. Bycatch estimates for this sector of the fishery are provided as West Coast limited entry bottom trawl; fixed gear in this report. Additionally, the small-mesh drift gillnet fishery is no longer observed.

This report provides marine mammal bycatch estimates for 10 West Coast fisheries for 2011. In addition, this report provides marine mammal bycatch estimates for 10 West Coast fisheries for 2012, and estimates for nine West Coast fisheries for 2013. Estimates were calculated using ratio estimations of five-year bycatch rates for all fisheries other than the (1) West Coast Limited Entry Bottom Trawl; Fixed Gear, West Coast Limited Entry Bottom Trawl; (2) Groundfish Bottom and Midwater Trawl; and (3) West Coast Mid-Water Trawl for Whiting, Shoreside Processing, which use three-year bycatch rates for estimation (Jannot et al. 2011, Carretta et al. 2015a, Feist et al. 2015, Hanson et al. 2015). The management of those three fisheries changed substantially in 2011, so it would be inappropriate to include estimates from previous years (NMFS 2005). Marine mammal bycatch was estimated in three observed commercial fisheries as zero in 2011 and 2012. In addition, marine mammal bycatch was estimated in four observed commercial fisheries as zero in 2013.

Sea turtle bycatch was observed only in 2012 in the California/Oregon drift gillnet (mesh size >14 in) for swordfish and thresher shark fishery. No other sea turtle bycatch was observed from 2011 to 2013 in the 12 other observed West Coast Region fisheries (for additional information, see Eguchi et al. 2015).

This report provides 2011, 2012, and 2013 seabird bycatch estimates based on ratio estimations of single-year bycatch rates for six, six, and three Northwest Region commercial fisheries when bycatch was observed, respectively (Jannot et al. 2011, Guy et al. 2013, Good et al. 2015), compared to seven in the NBR First Edition Update 1 (NMFS 2013a). In 2013 no estimate was available for the California halibut/white seabass and other species set gillnet (>3.5 in mesh). Seabird bycatch of the endangered short-tailed albatross remains closely monitored due to a documented mortality in the U.S. West Coast groundfish fishery in 2011.

Current sampling and analytical methods provide estimates of seabird mortalities from standard observer sampling techniques only. Estimates of seabird bycatch outside of regular sampling, including interactions with fishing gear that do not result in seabirds falling into an observer's species composition sample (i.e., are not randomly sampled), are reported as opportunistic

observations. Because of the non-random nature of opportunistic observations, they are not included in expansions of fleet-wide bycatch. An account of opportunistic observations of black-footed and short-tailed albatross for the period 2011–2013 can be found in Table 3 of Good et al. (2015). Opportunistic observations of other seabird species can be found in Jannot et al. 2014 (Marine Mammal, Seabird, Sea Turtle Annual Summary of Observations, currently available upon request to Northwest Fisheries Science Center Observer Program).

## 6.2 Changes to Observer Coverage

In 2011, NMFS implemented a new management system for the West Coast groundfish trawl fishery. The new framework, known as a catch shares system, transformed how groundfish are harvested off the West Coast. The trawl catch share program, also called the trawl rationalization program, consists of an IFQ program for the shore-based trawl fleet and cooperative programs for the at-sea mothership and catcher/processor trawl fleets. This management program requires 100 percent observer coverage at sea and 100 percent monitoring of landings shoreside. This IFQ program also allows fishermen to use midwater trawl, pot, or hook-and-line gears, in addition to bottom trawl gear.

NMFS began targeting 30 percent observer coverage in the California/Oregon Drift Gillnet (Mesh Size >14 in) for Swordfish and Thresher Shark Fishery in 2013. Observer coverage in 2013 was 37.4 percent of total fishing effort. Target observer coverage in this fishery had been 20 percent since 1990.

In September 2013, NMFS instituted a temporary 100 percent observer coverage zone in the California/Oregon Drift Gillnet (Mesh Size >14 in) for Swordfish and Thresher Shark Fishery in waters deeper than 2,000 meters. The increased observer coverage was required to monitor potential interactions with sperm whales (*Physeter microcephalus*). The 100 percent observer coverage zone expired in August 2014.

## 6.3 Changes to Catch and Bycatch Estimation Methods

Although the use of ratio estimators to estimate bycatch at the fleet level used in the former Northwest Region fisheries remains unchanged from Update 1 (NMFS 2013a), the estimation methods for unsampled discard in fisheries with 100 percent observer coverage differs from those fisheries with lower coverage rates. In 100-percent-observed fisheries, the small amount of unsampled discards was expanded for fish and seabird bycatch, based on the type of discard and related observed bycatch rates. Marine mammal estimation did not include expansions in fisheries with 100 percent observer coverage, because observers are required to sample every marine mammal in the catch. Additional description of these methods can be found in Somers et al. 2015.

NMFS now includes CVs for the total estimated bycatch of each species, summed across the strata in many West Coast Region fisheries, calculated using the following formula with an assumption of independence between strata:

$$CV\left(\sum_s \widehat{D}_s\right) = \frac{\sqrt{\text{var}(\sum \widehat{D}_s)}}{\sum \widehat{D}_s} = \frac{\sqrt{K_1^2 \cdot s(\widehat{R}_1)^2 + K_2^2 \cdot s(\widehat{R}_2)^2 + \dots + K_s^2 \cdot s(\widehat{R}_s)^2}}{\widehat{D}_1 + \widehat{D}_2 + \dots + \widehat{D}_s}$$

Where,

$s$  = strata identifier

$\widehat{D}$  = estimated total discard (of a species in a strata)

$K$  = total landed weight of target species in a strata

$\widehat{R}$  = estimated discard ratio

$s(\widehat{R})$  = standard error of estimated discard ratio

In the following fisheries with 100 percent coverage, NMFS does not list CVs, as the amount of uncertainty is too small to detect with confidence:

- West Coast Limited Entry Bottom Trawl; Fixed Gear
- West Coast Limited Entry Bottom Trawl; Groundfish Bottom and Midwater Trawl
- West Coast Mid-Water Trawl for Whiting, At-Sea Processing
- West Coast Mid-Water Trawl for Whiting, Shoreside Processing

This report does not present CVs for a small number of protected fish species, as data at the level of aggregation needed for this report were unavailable. However, measures of uncertainty at differing levels of stratification for eulachon, green sturgeon, and salmon species are available in recent independent bycatch reports (Gustafson et al. 2015, Lee et al. 2015, Somers et al. 2015, respectively).

This report includes estimated weights for protected fish species that are managed based on the number of individuals, allowing for calculation of fishery bycatch ratios for 11 out of 13 West Coast fisheries in this report, as opposed to only four out of 13 West Coast fisheries in Update 1 (NMFS 2013a). However, this report also provides protected fish species bycatch estimates as individual fish, as opposed to estimated weights, for 2011, 2012, and 2013, in Tables 6.3.1, 6.3.2, and 6.3.3, respectively.

To estimate marine mammal bycatch, the West Coast Region used mortality and serious injury determinations made by NMFS' marine mammal experts per NMFS' policy (NMFS 2012c).

## 6.4 Progress on Bycatch Implementation Improvement Plans

NMFS has made further progress to address Northwest Region improvement plan recommendations outlined in [Section 4.4.8](#) of the first edition of the report (NMFS 2011). NMFS now provides discard estimates for all fish and invertebrate species seen in observed fisheries. However, it should be noted that the sampling protocol and expansion techniques used by the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP) were developed for fish species and have not been extensively tested for sponges, corals, or invertebrates. The WCGOP also provides CVs for bycatch. With the introduction of the IFQ program and mandated 100 percent coverage, only a very small amount of discard in some fisheries needs to be estimated. For these fisheries, uncertainty in estimates is so low that the CV cannot be calculated with confidence and has not been reported.

As well as maintaining observer coverage levels in observed fisheries, coverage has been expanded to include additional fishing sectors targeting or discarding groundfish. Electronic monitoring also is currently being tested in the IFQ program, including whiting<sup>19</sup> catcher vessels. Additional analyst staff has been added to the WCGOP observer program to expand and improve bycatch estimates. Marine mammal injury determinations are also now being made by regional NMFS marine mammal experts.

By including weight estimates as well as counts for protected fish species that are managed by counts of individuals, the WCGOP and A-SHOP have improved the accuracy of total fishery level bycatch ratio estimates. In addition, the WCGOP now provides bycatch estimations for all seabird species that were observed as bycatch.

NMFS began targeting 30 percent fleet-wide observer coverage in the California/Oregon drift gillnet (mesh size >14 in) fishery for swordfish and thresher shark in 2013. This increase was instituted to address a Southwest Region improvement plan recommendation in the first edition of the report (NMFS 2011). Target observer coverage in this fishery had been 20 percent since 1990.

## 6.5 Fish Bycatch

This section presents fish bycatch estimates in West Coast Region fisheries based on data from 2011, 2012, and 2013. This section also includes both fishery bycatch ratios and species bycatch ratios for each year.

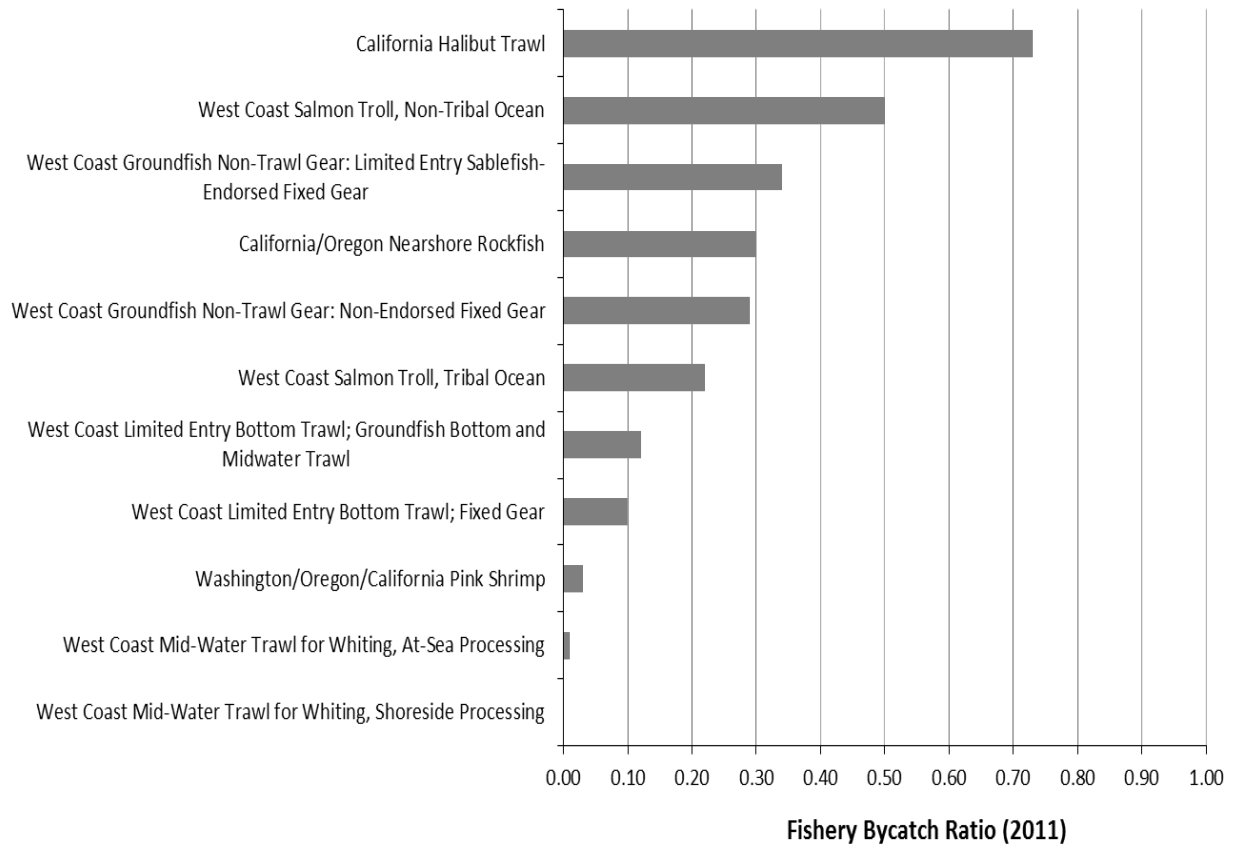
### 6.5.1 Fish Bycatch Estimates for 2011

Fishery bycatch estimates based on 2011 data calculated as weights ranged from ~286,100 lbs in the fixed gear portion of the West Coast limited entry bottom trawl fishery to more than 5.3 million pounds in the trawl portion of the West Coast limited entry bottom trawl fishery; estimates calculated as individuals ranged from 2,488 individuals in the California/Oregon drift

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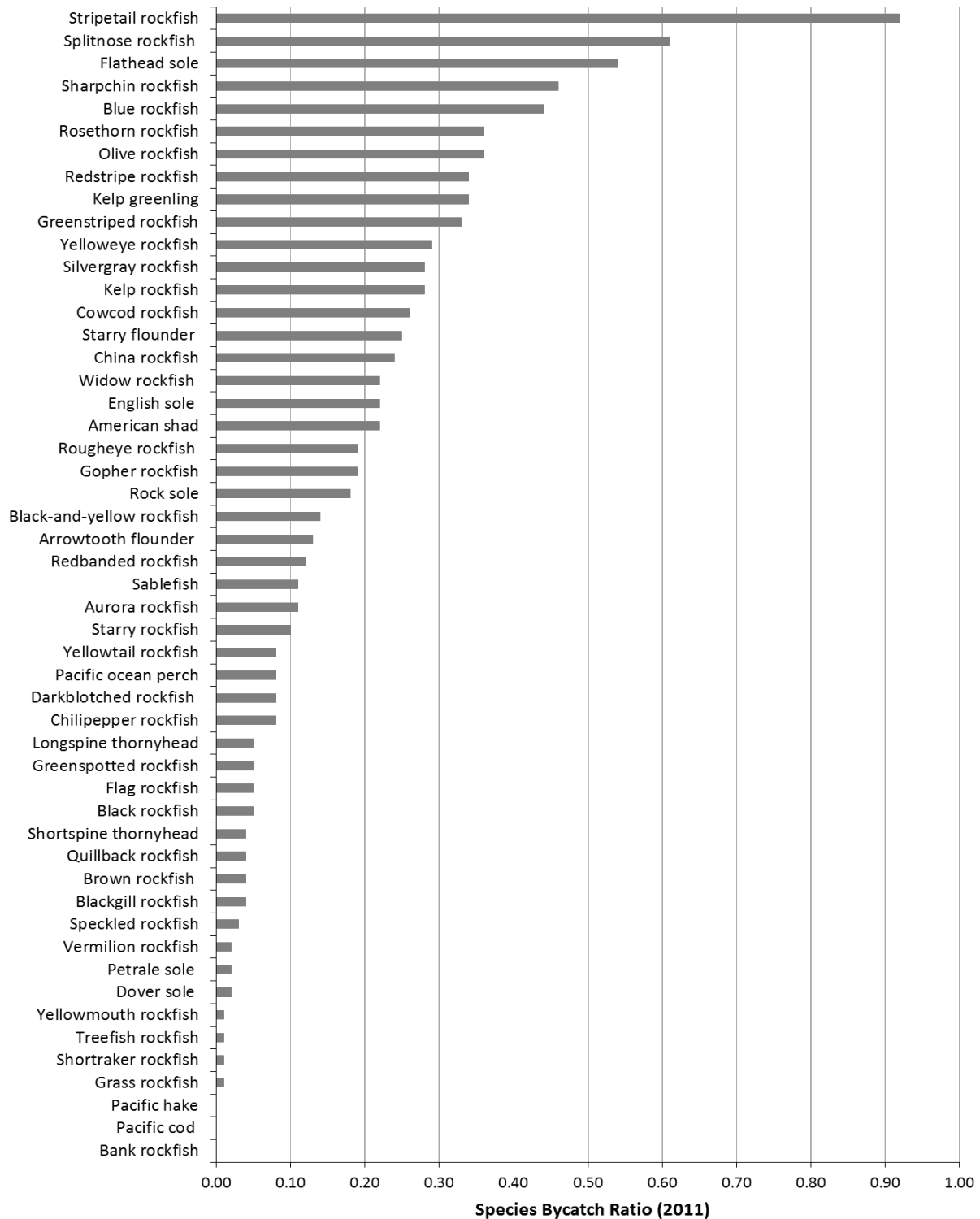
<sup>19</sup> The term whiting is sometimes used interchangeably to describe Pacific hake (*Merluccius productus*) and the fishery in general (i.e., West Coast Mid-Water Trawl for Whiting). In this report, the terms are used interchangeably due to historical reasons.

gillnet fishery to 134,257 individuals in the non-tribal West Coast salmon troll ocean fishery (Table 6.5.1a). Figure 6.1 shows fishery bycatch ratios for 11 West Coast Region fisheries based on 2011 data.



**Figure 6.1 West Coast Region Fishery Bycatch Ratios for 2011** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). The ratio for West Coast Mid-Water Trawl for Whiting, Shoreside Processing is not 0.00 but is less than 0.01.

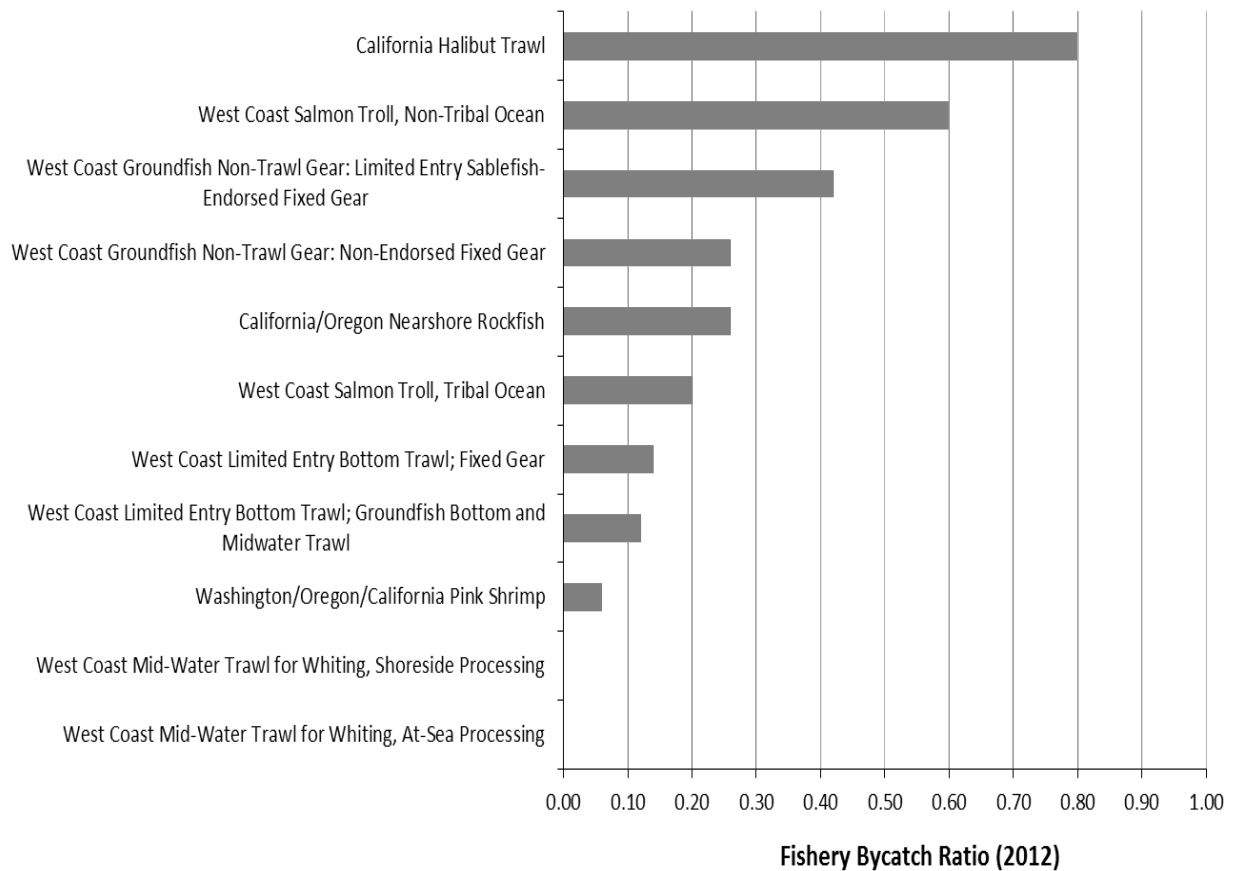
This report includes fish and invertebrate estimates based on 2011 data for 814 West Coast Region stocks, species, and groups (Table 6.5.1b). Figure 6.2 shows fish and invertebrate bycatch ratios for 51 West Coast Region stocks, species, and groups based on 2011 data. (Species are referred to using [FSSI](#) stock names; FSSI stock names do not correspond to regional FMP names.)



**Figure 6.2 West Coast Region Species Bycatch Ratios for 2011** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for Pacific hake (*Merluccius productus*), Pacific cod, and bank rockfish (*Sebastes rufus*) are not 0.00 but are less than 0.01.

### 6.5.2 Fish Bycatch Estimates for 2012

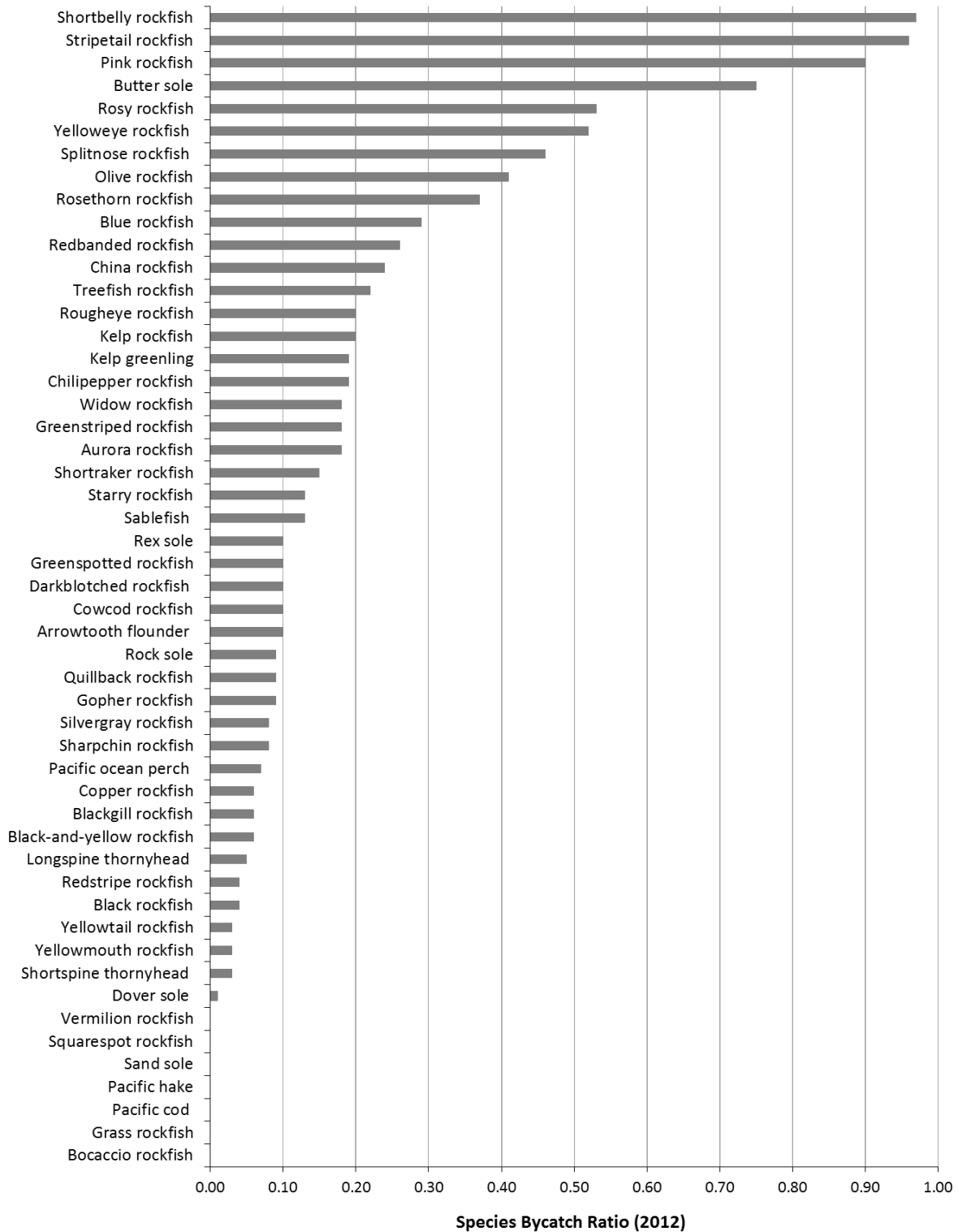
Fishery bycatch estimates based on 2012 data calculated as weights ranged from ~320,400 lbs in the shoreside processing portion of the West Coast mid-water trawl for whiting fishery to more than 5 million lbs in the West Coast limited entry trawl fishery; estimates calculated as individuals ranged from 3,348 individuals in the California/Oregon drift gillnet fishery to more than 500,000 individuals in the non-tribal West Coast salmon troll ocean fishery (Table 6.5.2a). Figure 6.3 shows fishery bycatch ratios for 11 West Coast Region fisheries based on 2012 data.



**Figure 6.3 West Coast Region Fishery Bycatch Ratios for 2012** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). The ratios for West Coast Mid-Water Trawl for Whiting, Shoreside Processing and West Coast Mid-Water Trawl for Whiting, At-Sea Processing, are not 0.00 but are less than 0.01.

This report includes fish and invertebrate estimates based on 2012 data for 817 West Coast Region stocks, species, and groups (Table 6.5.2b). Figure 6.4 shows fish and invertebrate bycatch ratios for 51 West Coast Region stocks, species, and groups based on 2012 data.

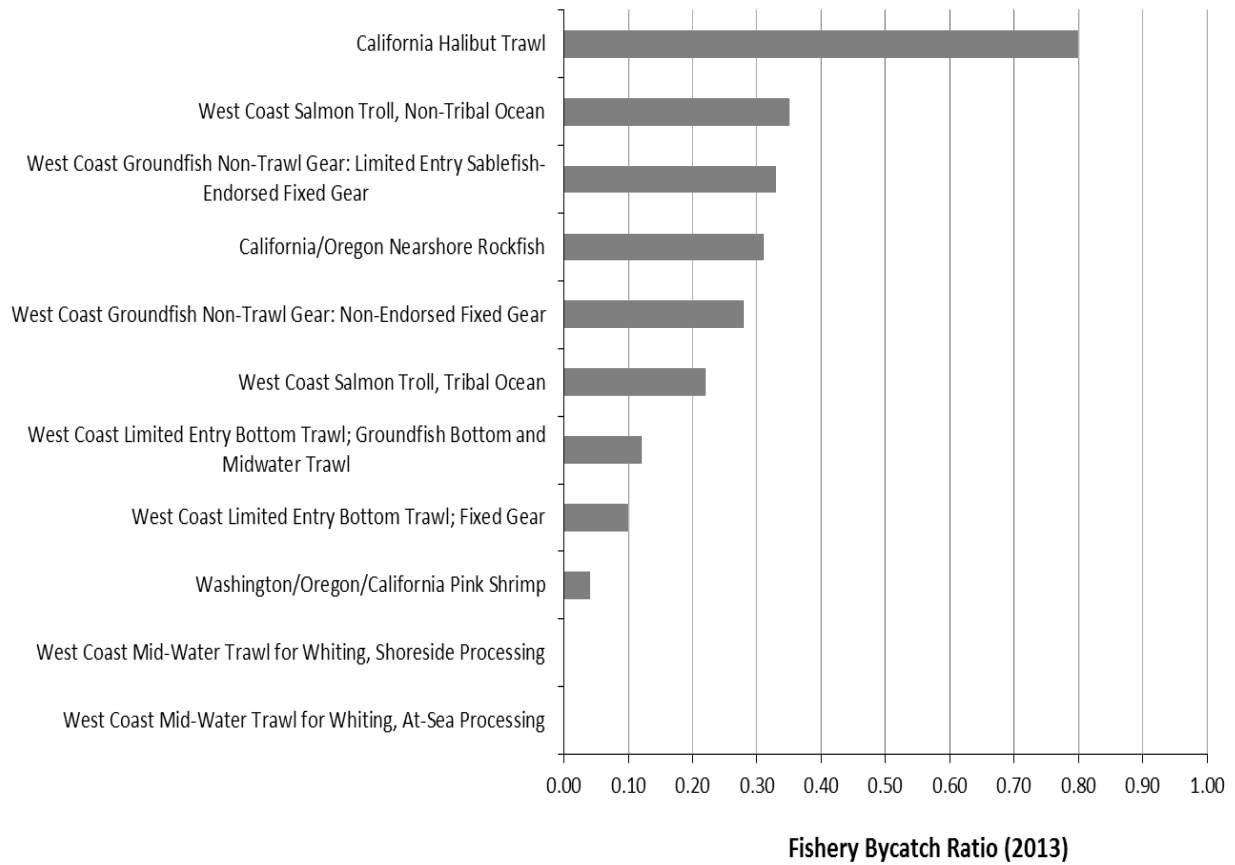




**Figure 6.4 West Coast Region Species Bycatch Ratios for 2012** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for vermilion rockfish (*Sebastes miniatus*), squarespot rockfish (*Sebastes hopkinsi*), sand sole (*Psettichthys melanostictus*), Pacific hake, Pacific cod, grass rockfish (*Sebastes rastrelliger*), and bocaccio rockfish (*Sebastes paucispinis*) are not 0.00 but are less than 0.01.

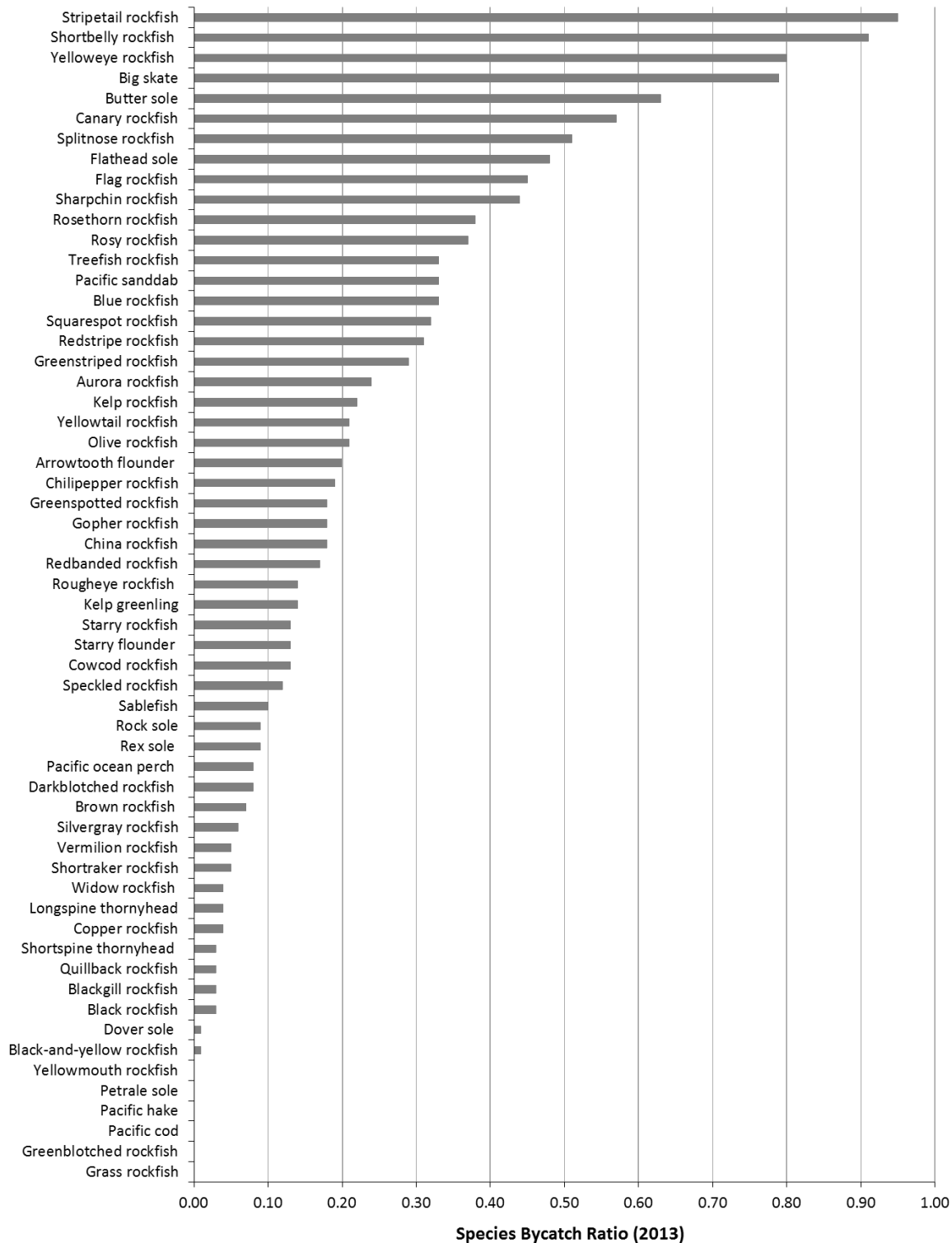
### 6.5.3 Fish Bycatch Estimates for 2013

Fishery bycatch estimates based on 2013 data calculated as weights ranged from ~136,000 lbs in the fixed gear portion of the West Coast limited entry trawl fishery to more than 5.9 million lbs in the trawl portion of the West Coast limited entry trawl fishery; estimates calculated as individuals ranged from 4,099 individuals in the California/Oregon drift gillnet fishery to more than 266,000 individuals in the non-tribal West Coast salmon troll ocean fishery (Table 6.5.3a). Figure 6.5 shows fishery bycatch ratios for 11 West Coast Region fisheries based on 2013 data.



**Figure 6.5 West Coast Region Fishery Bycatch Ratios for 2013** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings). The ratios for West Coast Mid-Water Trawl for Whiting, Shoreside Processing and West Coast Mid-Water Trawl for Whiting, At-Sea Processing, are not 0.00 but are less than 0.01.

This report includes fish and invertebrate estimates based on 2013 data for 826 West Coast Region stocks, species, and groups (Table 6.5.3b). Figure 6.6 shows fish and invertebrate bycatch ratios for 58 West Coast Region stocks, species, and groups based on 2013 data.



**Figure 6.6 West Coast Region Species Bycatch Ratios for 2013** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for yellowmouth rockfish (*Sebastes reedi*), petrale sole (*Eopsetta jordani*), Pacific hake, Pacific cod, greenblotched rockfish (*Sebastes rosenblatti*), and grass rockfish are not 0.00 but are less than 0.01.

#### 6.5.4 Discussion

In the former Northwest Region, total annual bycatch from 2011 to 2013 has been almost 3,000 mt less than that in 2010. With the introduction of individual fishing quota management to the bottom trawl fishery, bycatch rates and discard amounts decreased sharply between 2010 and 2011 (Bellman et al. 2012). Twice the number of species decreased in amount of bycatch from 2010 to 2013 compared to those that increased. Spiny dogfish (*Squalus suckleyi*) shark bycatch has decreased through 2013, to almost half the level of 2010. Arrowtooth flounder and dover sole (*Solea solea*) both decreased from 2010 to 2012, but increased slightly in 2013. Longspine thornyhead (*Sebastolobus altivelis*) bycatch has decreased to 10 percent of 2010 levels, while dark-blotched rockfish (*Sebastes crameri*) has decreased to 7 percent and Pacific Ocean perch to 8 percent of 2010 levels.

#### 6.6 Marine Mammal Bycatch

Table 6.6.1 shows annual average marine mammal bycatch estimates for 2011, which include 13 marine mammal stocks/species/groups and 10 West Coast Region commercial gear types/fisheries where bycatch was estimated. Table 6.6.2 shows annual average marine mammal bycatch estimates for 2012, which include 13 marine mammal stocks/species/groups and 10 West Coast commercial gear types/fisheries where bycatch was estimated. Table 6.6.3 shows annual average marine mammal bycatch estimates for 2013, which include 14 marine mammal stocks and nine West Coast commercial gear types/fisheries where bycatch was estimated.

The five-year mean estimate of California sea lions (*Zalophus californianus*) in the California Halibut Trawl fishery decreased slightly from 19 to 17 individuals per year from 2011 to 2013. The five-year mean estimated bycatch of harbor seals (*Phoca vitulina richardii*) in the California/Oregon Nearshore Rockfish fishery also decreased, from 5 to 0 individuals annually over the same time period. The five-year mean estimated bycatch of northern elephant seals (*Mirounga angustirostris*) increased slightly from 1 to 2 individuals annually in the West Coast Groundfish Non-Trawl Gear: Limited Entry Sablefish-Endorsed Fixed Gear fishery from 2011 to 2013.

Due to the estimation process used in the California/Oregon Drift Gillnet (Mesh Size >14 in) Fishery for Swordfish and Thresher Shark, and the California Halibut/White Seabass and Other Species Set Gillnet (>3.5 in Mesh) fishery, estimates for each marine mammal stock were similar across the three sets of estimates in this report for these two fisheries. Two bottlenose dolphin individuals were caught in 2013, although they had not been observed in the previous 2 years for these fisheries. The total number of bycaught harbor seals, California sea lions, northern right whale dolphins (*Lissodelphis borealis*), long-beaked common dolphins (*Delphinus capensis*), Risso's dolphins (*Grampus griseus*), and short-beaked common dolphins were estimated at constant levels from 2011 to 2013 for these two fisheries. In addition, Pacific white-sided dolphin (*Lagenorhynchus obliquidens*) bycatch was greater in 2013 than in the two previous years by three individuals. Three sperm whales also were estimated as bycatch in 2012 and 2013. The [Marine Mammal Stock Assessment Reports](#), particularly Caretta et al. (2015b), contain more information on the status of these stocks.

## 6.7 Sea Turtle Bycatch

Table 6.7.1 shows 2012 sea turtle bycatch estimates for the single West Coast Region commercial gear types/fisheries where bycatch was observed, when five leatherback sea turtles were estimated as bycatch. In all other observed fisheries and years, no sea turtles were observed caught.

## 6.8 Seabird Bycatch

Table 6.8.1 shows 2011 seabird bycatch estimates for six West Coast Region commercial fisheries where bycatch was observed. Table 6.8.2 shows 2012 seabird bycatch estimates for six West Coast Region commercial fisheries where bycatch was observed. Table 6.8.3 shows 2013 seabird bycatch estimates for three West Coast Region commercial fisheries where bycatch was observed. In 2013, no seabird estimate was available for the California Halibut/White Seabass and Other Species Set Gillnet (>3.5 in Mesh) fishery; in all other cases, a lack of reported bycatch estimates for an observed fishery in the tables above represents zero bycatch.

In 2013, only seven seabird stocks/species/groups were bycaught, compared to 10 in 2011 and 13 in 2012. Black-footed albatross bycatch was observed in a species composition sample in a single fishery in 2013. In addition, a number of individuals were sampled opportunistically but were unable to be used in expanded estimates. The number of western gulls (*Larus occidentalis*) estimated as bycatch greatly decreased. The estimated number of northern fulmar individuals remained at four, the same estimated in 2012. For a small number of stocks/species/groups, the amount of bycatch increased. In 2011 and 2012, no Cassin's auklet (*Ptychoramphus aleuticator*) or Leach's storm petrel (*Oceanodroma leucorhoa*) individuals were observed, but in 2013 two of each species/stock were estimated as bycatch. The estimated bycatch of unidentified and sooty shearwaters (*Puffinus griseus*) was greater in 2013 than in either 2011 or 2012.

## **7. Pacific Islands Overview**

### 7.1 Summary of Fisheries Included in This Report

This report provides 2011, 2012, and 2013 fish bycatch estimates for Hawaii-based deep-set pelagic longline and shallow-set pelagic longline fisheries and the American Samoa-based deep-set pelagic longline fishery in the Pacific Islands Region (PIR) commercial fisheries (see Appendix 3). The report covers three fisheries, compared to two fisheries in the NBR First Edition Update 1 (NMFS 2013a). The number of fisheries from 2011 to 2013 with fish, marine mammal, sea turtle, and seabird bycatch estimates represent ~90 percent of PIR landings. This report also provides marine mammal, sea turtle, and seabird bycatch estimates for 2011, 2012, and 2013 for the PIR commercial fisheries, although no marine mammal or seabird interactions were observed in the American Samoa fishery in 2012.

### 7.2 Changes to Observer Coverage

There have been no substantial changes to the longline observer program or coverage. From 2011 to 2013, annual coverage ranged from 20.3 to 20.4 percent for Hawaii-based deep-set fishery and 19.4 to 33.3 percent in American Samoa-based deep-set fishery. Annual coverage in the Hawaii-based shallow-set fishery remains 100 percent.

### 7.3 Changes to Catch and Bycatch Estimation Methods

There have been no changes by NMFS in bycatch estimation methods for fish, marine mammals, sea turtles, and seabirds since Update 1 (NMFS 2013a). A review of fish length-to-weight conversions was completed (Curran and Bigelow 2016), and these conversions were applied to 2011 to 2013 fish bycatch estimates.

### 7.4 Progress on Bycatch Improvement Plans

The highest NMFS Pacific Islands priority in the NBR first edition was to expand the pilot observer program in American Samoa, which had inadequate coverage and funding in 2005. NMFS has made significant progress to address this recommendation, with observer coverage ranging from 19.4 to 33.3 percent in the American Samoa-based deep-set fishery. Marine mammal, sea turtle, and seabird bycatch estimates were provided for the American Samoa fishery in Update 1 (NMFS 2013a), and bycatch estimates are included for all taxa in this report.

Various gear regulations were enacted in 2011 for the American Samoa-based longline fishery by deploying the longline hooks deeper in the water column in order to reduce interactions with green sea turtles (76 Federal Register 164 (August 24, 2011), pp. 52888-52889). Regulations requiring the use of “weak” circle hooks were implemented in 2013 for the Hawaii-based deep-set fishery to reduce the proportion of false killer whale (*Pseudorca crassidens*) interactions resulting in mortality or serious injury (77 Federal Register 230 (November 29, 2012), pp. 71259-71286).

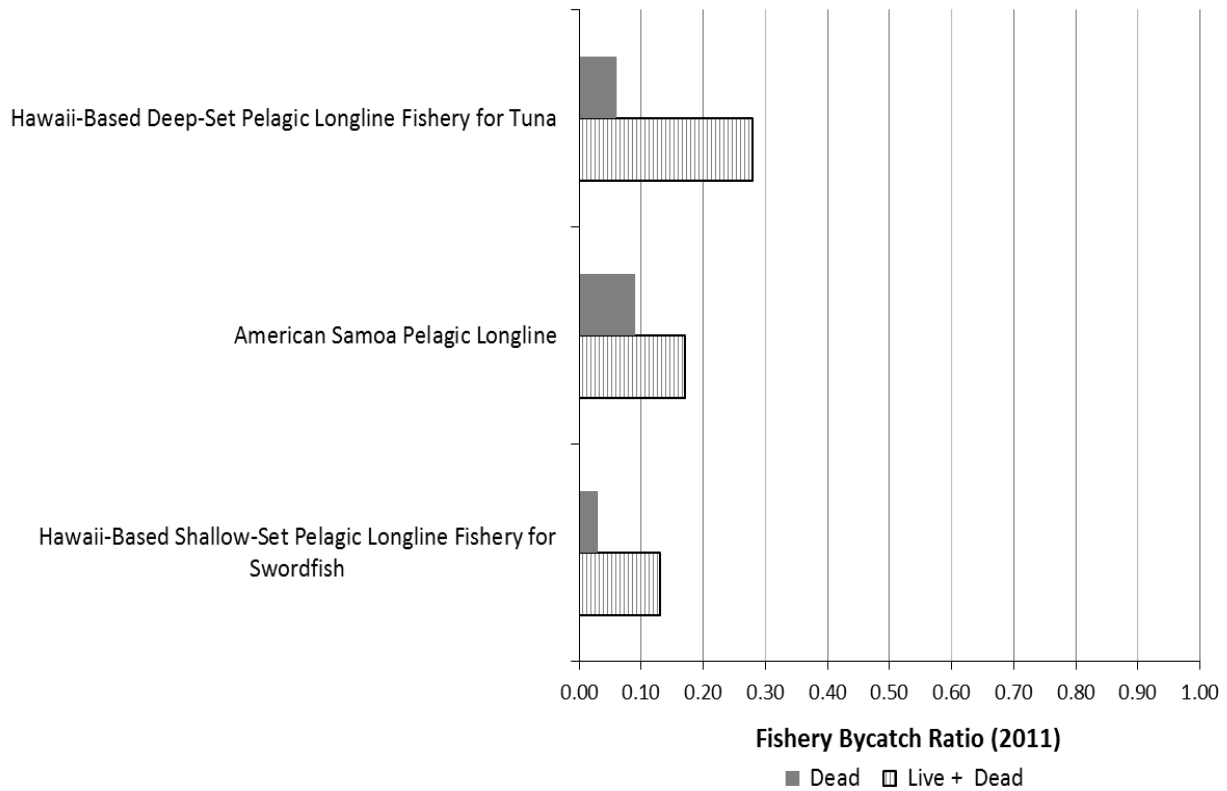
## 7.5 Fish Bycatch

This section presents fish bycatch estimates in PIR fisheries based on data from 2011, 2012, and 2013. This section also includes fishery bycatch ratios as well as species bycatch ratios for each year.

### 7.5.1 Fish Bycatch Estimates for 2011

Fishery bycatch estimates based on 2011 data were 8,767,882 lbs, 530,879 lbs, and 1,512,084 lbs, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.5.1a).

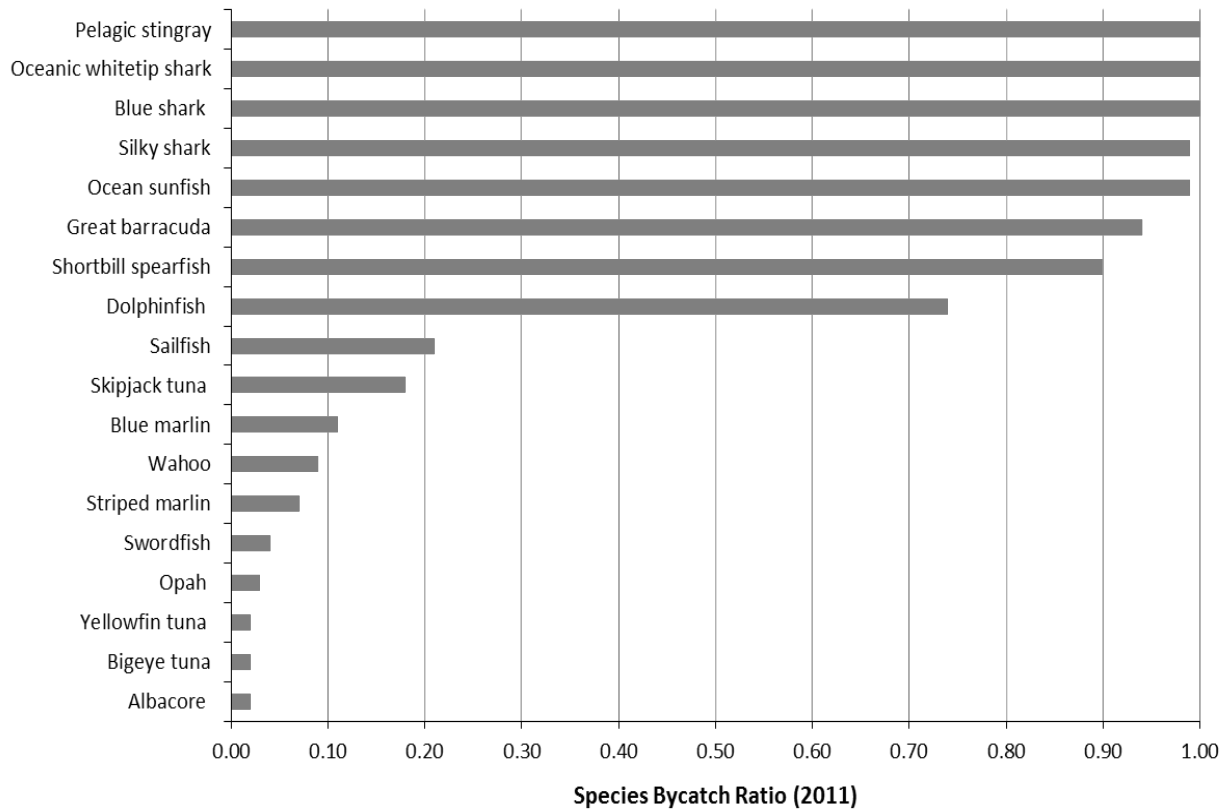
Fishery bycatch ratios were 0.28, 0.13, and 0.17; respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery. Pelagic longline observers recorded the condition of bycatch species upon release from the vessel. If the definition of bycatch used in this report (see Section 1.1) distinguished between live and dead discarded catch, the bycatch estimates and ratios for these three fisheries would be lower. If bycatch was defined as species that are dead when discarded, then fishery bycatch estimates were 2,005,704 lbs, 112,892 lbs, and 808,956 lbs, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.5.1a). The corresponding fishery bycatch ratios considering dead bycatch would be 0.06, 0.03, and 0.09 (Figure 7.1).



**Figure 7.1 Pacific Islands Region Fishery Bycatch Ratios for 2011** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings).

Fish bycatch estimates in 2011 included 71 PIR stocks (Table 7.5.1b). Landings were available for 18 of the 71 stocks. The 18 stocks had bycatch ratios that ranged from 0.02 to 1.0. Eight of the 18 stocks had bycatch ratios less than 0.15. Five stocks (blue shark *Prionace glauca*, ocean sunfish *Mola mola*, oceanic white-tip shark *Carcharhinus longimanus*, pelagic stingray *Pteroplatytrygon violacea*, and silky shark *Carcharhinus falciformis*) had bycatch ratios greater than 0.95 and represent species that were landed rarely in relation to the frequency of catch. Figure 7.2 illustrates fish bycatch ratios for 18 PIR stocks based on 2011 data. (Species are referred to using FSSI stock names; FSSI stock names do not correspond to regional FMP names.)



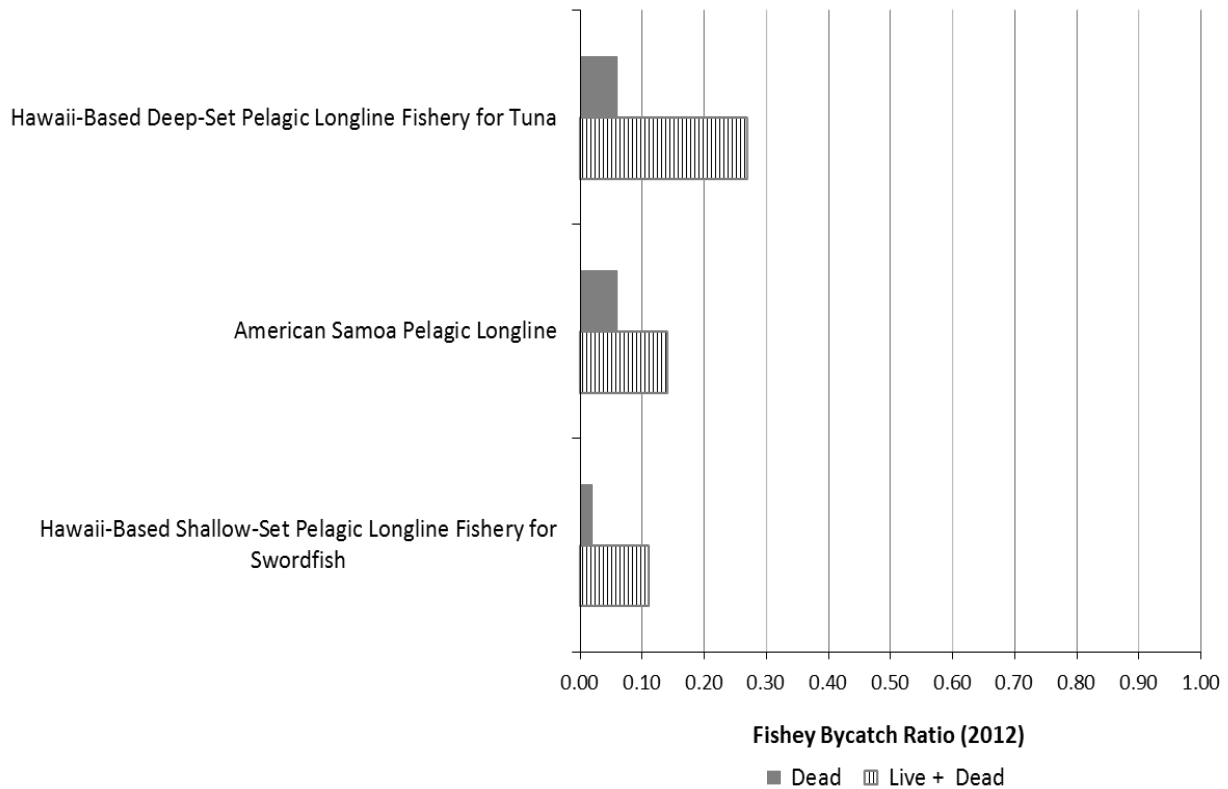


**Figure 7.2 Pacific Islands Region Species Bycatch Ratios (Live + Dead) for 2011** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings).

### 7.5.2 Fish Bycatch Estimates for 2012

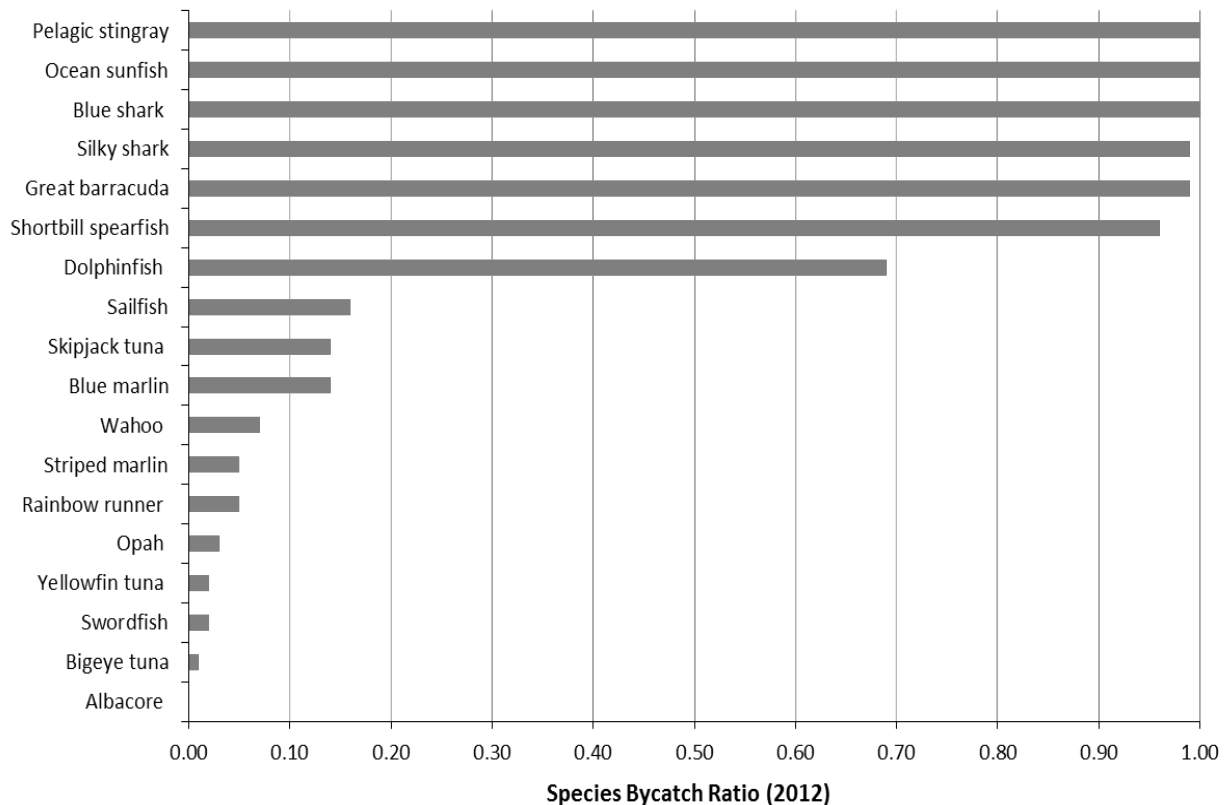
Fishery bycatch estimates based on 2012 data were 8,344,692 lbs, 335,486 lbs, and 1,498,409 lbs, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.5.2a).

Fishery bycatch ratios were 0.27, 0.11, and 0.14, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery. If bycatch was defined as species that are dead when discarded, then fishery bycatch estimates were 1,966,413 lbs, 67,161 lbs, and 588,879 lbs, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.5.2a). The corresponding fishery bycatch ratios considering dead bycatch would be 0.06, 0.02, and 0.06 (Figure 7.3).



**Figure 7.3 Pacific Islands Region Fishery Bycatch Ratios for 2012** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings).

Fish bycatch estimates in 2012 included 71 Pacific Islands stocks (Table 7.5.2b). Landings were available for 18 of the 71 stocks. The 18 stocks had bycatch ratios that ranged from 0.01 to 1.0. Ten of the 18 stocks had bycatch ratios less than 0.15. Six stocks (blue shark, great barracuda *Sphyraena barracuda*, ocean sunfish, pelagic stingray, shortbill spearfish *Tetrapturus angustirostris*, and silky shark) had bycatch ratios greater than 0.95 and represent species that were landed rarely in relation to the frequency of catch. Figure 7.4 illustrates fish bycatch ratios for 18 PIR stocks based on 2012 data.

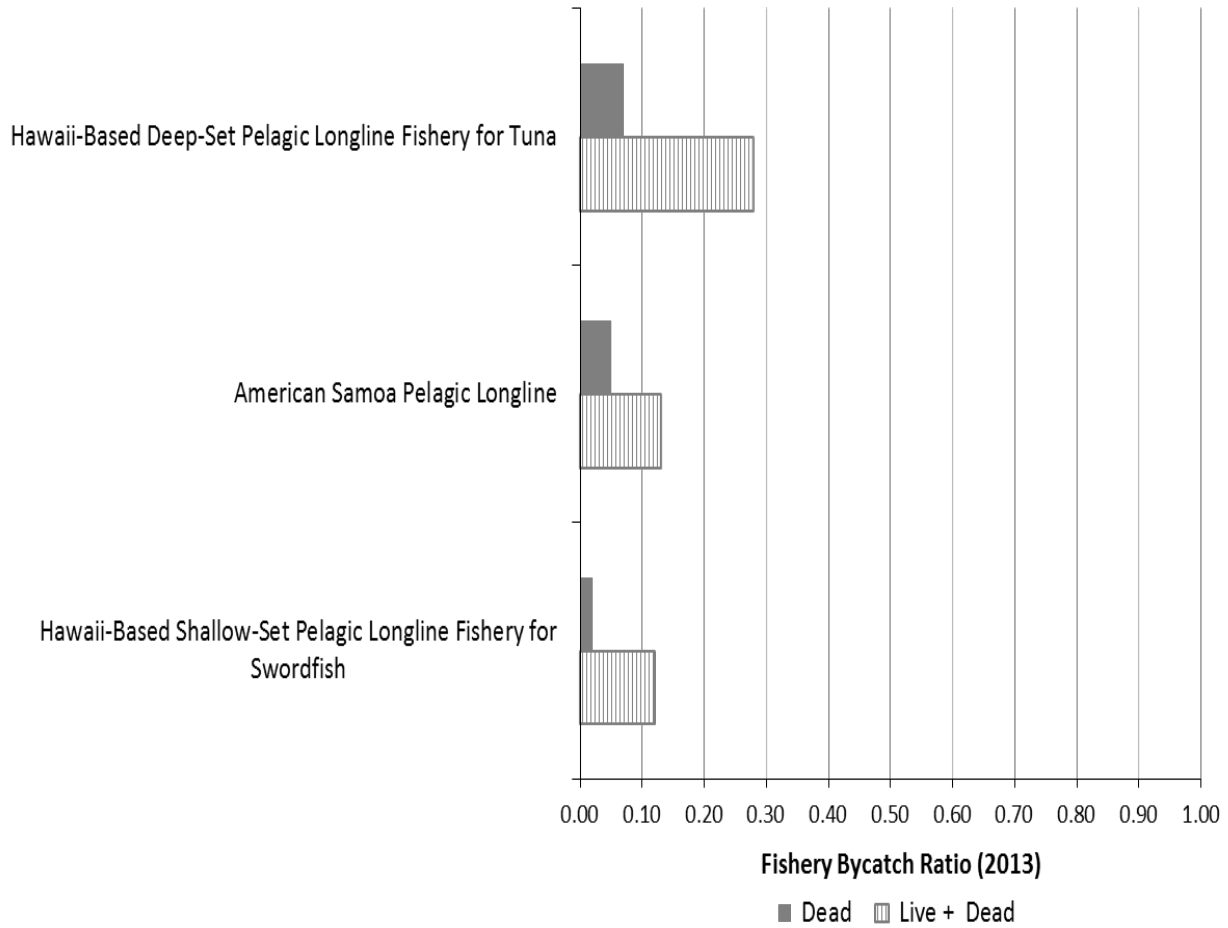


**Figure 7.4 Pacific Islands Region Species Bycatch Ratios (Live + Dead) for 2012** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The albacore ratio is not 0.00 but is less than 0.01.

### 7.5.3 Fish Bycatch Estimates for 2013

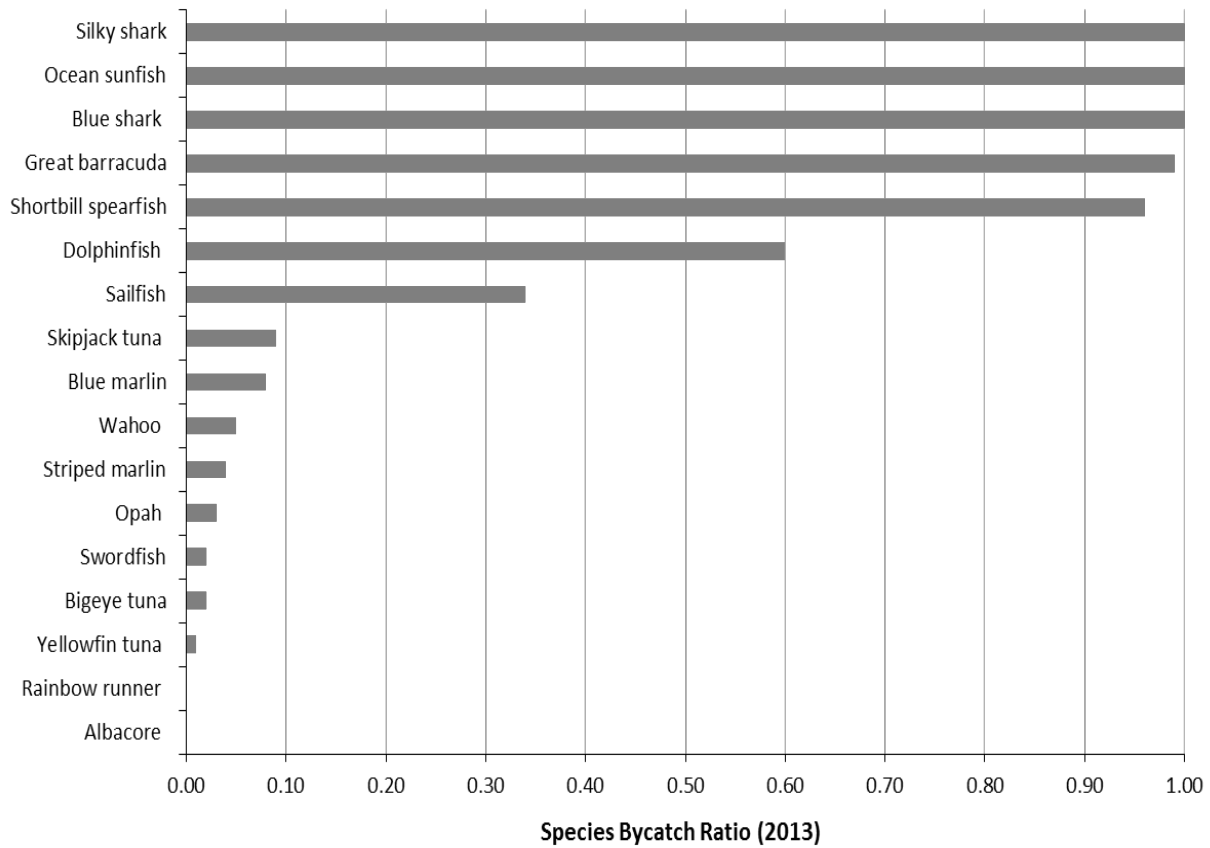
Fishery bycatch estimates based on 2013 data were 9,417,811 lbs, 302,614 lbs, and 908,542 lbs, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.5.3a).

Fishery bycatch ratios were 0.28, 0.12, and 0.13, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery. If bycatch was defined as species that are dead when discarded, then fishery bycatch estimates were 2,496,713 lbs, 61,829 lbs, and 347,669 lbs, respectively, for the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.5.3a). The corresponding fishery bycatch ratios considering dead bycatch would be 0.07, 0.02, and 0.05 (Figure 7.5).



**Figure 7.5 Pacific Islands Region Fishery Bycatch Ratios for 2013** (fisheries for which fish bycatch estimates were available; fishery bycatch ratio is the ratio of the total fishery bycatch to total fishery catch, where total catch is bycatch plus landings).

Fish bycatch estimates in 2013 included 70 PIR stocks (Table 7.5.3b). Landings were available for 17 of the 70 stocks. The 17 stocks had bycatch ratios that ranged from 0.01 to 1.0. Nine of the 17 stocks had bycatch ratios less than 0.15. Five stocks (blue shark, great barracuda, ocean sunfish, shortbill spearfish, and silky shark) had bycatch ratios greater than 0.95 and represent species that were landed rarely in relation to the frequency of catch. Figure 7.6 illustrates fish bycatch ratios for 17 PIR stocks based on 2013 data.



**Figure 7.6 Pacific Islands Region Species Bycatch Ratios (Live + Dead) for 2013** (species bycatch ratio is the ratio of bycatch of a single stock to total catch of that stock within the Region, where total catch of that stock is the species bycatch plus species landings). The ratios for rainbow runner and albacore are not 0.00 but are less than 0.01.

### 7.6 Marine Mammal Bycatch

This report includes marine mammal bycatch estimates for three longline fisheries. Marine mammal estimates are disaggregated by exclusive economic zone (EEZ) and outside EEZ for the Hawaii-based deep-set pelagic longline and shallow-set pelagic longline fisheries. Annual averages over 5 years are provided for years terminating in 2011 (2007–2011), 2012 (2008–2012), and 2013 (2009–2013) for the Hawaii-based deep-set and shallow-set pelagic longline fisheries. Single year estimates are provided for the American Samoa-based deep-set pelagic longline fishery because observer coverage was low prior to 2009. All marine mammal estimates for the PIR include mortalities and serious injuries. Marine mammal stocks with the highest average annual bycatch estimates across the three fisheries included false killer whale, Risso’s dolphin, and striped dolphin (*Stenella coeruleoalba*). For more information on estimation methods for false killer whales and pilot whales, see McCracken (2010).

An estimated 65 marine mammals were caught in 2011 (2007–2011) with 34, 7, and 25 mammals caught, respectively, in all areas of the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Tables 7.6.1a and 7.6.1b).

An estimated 41 marine mammals were caught in 2012 (2008–2012) with 35 and 6 mammals caught, respectively, in the Hawaii-based deep-set pelagic longline and Hawaii-based shallow-set pelagic longline fishery (Table 7.6.2). No marine mammal interactions were observed in the American Samoa-based longline fishery in 2012; therefore, the annual estimate was zero.

An estimated 58 marine mammals were caught in 2013 (2009–2013) with 38, 7, and 13 mammals caught, respectively, in the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Tables 7.6.3a and 7.6.3b). The [Marine Mammal Stock Assessment Reports](#) contain more information on the status of these stocks.

### 7.7 Sea Turtle Bycatch

An estimated 127 sea turtles were caught in 2011 with 55, 32, and 40 sea turtles caught, respectively, in the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.7.1). Four species of sea turtles (green, leatherback, olive ridley, and loggerhead) were caught in the three fisheries in 2011, with green sea turtles (41 individuals) representing the predominant species caught.

An estimated 65 sea turtles were caught in 2012 with 40, 13, and 12 sea turtles caught, respectively, in the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.7.2). Three species of sea turtles (leatherback, olive ridley, and loggerhead) were caught in the three fisheries in 2012, with olive ridley (40 individuals) representing the predominant species caught.

An estimated 126 sea turtles were caught in 2013 with 73, 17, and 36 sea turtles caught, respectively, in the Hawaii-based deep-set pelagic longline, shallow-set pelagic longline, and American Samoa-based deep-set pelagic longline fishery (Table 7.7.3). Four species of sea turtles (green, leatherback, olive ridley, and loggerhead) were caught in the three fisheries in 2013, with olive ridley (46 individuals) representing the predominant species caught.

### 7.8 Seabird Bycatch

In 2011, 68 seabirds were caught in the Hawaii-based shallow-set pelagic longline fishery. In addition, an estimated 279 seabirds were caught in the Hawaii-based deep-set pelagic longline fishery, and an estimated 2 seabirds were caught in the American Samoa-based deep-set pelagic longline fishery (Table 7.8.1). The three fisheries caught an estimated total of 236 Laysan and 92 black-footed albatrosses and 21 shearwaters.

In 2012, 99 seabirds were caught in the Hawaii-based shallow-set pelagic longline fishery. In addition, an estimated 438 seabirds were caught in the Hawaii-based deep-set pelagic longline fishery (Table 7.8.2). No seabird interactions were observed in the American Samoa-based longline fishery in 2012; therefore, the annual estimate was zero. The two fisheries caught an estimated total of 198 Laysan and 204 black-footed albatrosses, and 36 shearwaters.

In 2013, 75 seabirds were caught in the Hawaii-based shallow-set pelagic longline fishery. An estimated 536 seabirds were caught in the Hawaii-based deep-set pelagic longline, and an estimated 5 seabirds were caught in the American Samoa-based deep-set pelagic longline fishery (Table 7.8.3). The three fisheries caught an estimated total of 281 Laysan and 285 black-footed albatrosses, 45 sooty shearwaters, and five lesser frigatebirds (*Fregata ariel*).

For more information about seabird interactions, see the [NMFS annual reports on seabird interactions and mitigation efforts in Hawaii longline fisheries](#).

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## **Appendix 1. List of Acronyms and Terms Used in This Report**

ABC	Acceptable Biological Catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ADF&G	Alaska Department of Fish and Game
ADP	Annual Deployment Plan
AFA	American Fisheries Act
AFSC	Alaska Fisheries Science Center
AMMOP	Alaska Marine Mammal Observer Program
A-SHOP	At-Sea Hake Observer Program
BSAI	Bering Sea Aleutian Islands
CAS	Catch Accounting System
CDQ	Community Development Quota
CV	Coefficient of variation
DMR	Discard mortality rate
EEZ	Exclusive economic zone
ESA	Endangered Species Act
FMP	Fishery management plan
FSSI	Fish Stock Sustainability Index
GOA	Gulf of Alaska
HMS	Highly migratory species
IFQ	Individual fishing quota
IPHC	International Pacific Halibut Commission
LOA	Length overall
MMPA	Marine Mammal Protection Act
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NBR	National Bycatch Report
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NPGHOP	North Pacific Groundfish and Halibut Observer Program
PIR	Pacific Islands Region
PSC	Prohibited Species Catch
SBRM	Standardized Bycatch Reporting Methodology
SEFSC	Southeast Fisheries Science Center
TAC	Total Allowable Catch
Update 1	U.S. National Bycatch Report First Edition Update 1
Update 2	U.S. National Bycatch Report First Edition Update 2
WCGOP	West Coast Groundfish Observer Program



## Appendix 2. Steering Committee, Regional Teams, and Other Partners

### *National Bycatch Report Steering Committee*

<b>Name</b>	<b>Affiliation</b>
Lee Benaka, Chair	Office of Science and Technology
Kristy Long	Office of Protected Resources
Derek Orner	Office of Sustainable Fisheries
Randy Blankinship	Office of Sustainable Fisheries, Atlantic HMS Division
Briana Dema	General Counsel
Paul Rago	Northeast Fisheries Science Center
Jim Nance	Southeast Fisheries Science Center
Jennifer Mondragon	Alaska Regional Office
Kim Rivera	National Seabird Program
Jon McVeigh	Northwest Fisheries Science Center
Lyle Enriquez	West Coast Regional Office
Keith Bigelow	Pacific Islands Fisheries Science Center

### *National Bycatch Report Regional Team Membership*

<b>Name</b>	<b>Affiliation</b>	<b>General Area of Expertise</b>
<b><i>Greater Atlantic</i></b>		
Diane Borggaard	Regional Office	Fisheries
Joseph Desfosse	Highly Migratory Species	Fisheries
Josh Hatch	Science Center	Fisheries
Marjorie Lyssikatos	Science Center	Protected Resources (Marine Mammals)
Debra Palka	Science Center	Protected Resources (Marine Mammals)
Michael Pentony	Regional Office	Fisheries
Douglas Potts	Regional Office	Fisheries
Chris Tholke	Science Center	Fisheries
Susan Wigley	Science Center	Fisheries
<b><i>Southeast</i></b>		
Steve Branstetter	Regional Office	Fisheries
John Carlson	Science Center	Fisheries (Observer Program)
Joseph Desfosse	Highly Migratory Species	Fisheries
Lance Garrison	Science Center	Protected Resources (Marine Mammals)
Jennifer Lee	Regional Office	Protected Resources
Jack McGovern	Regional Office	Fisheries
Paul Richards	Science Center	Protected Resources (Sea Turtles)

<i>Alaska</i>		
Robyn Angliss	Science Center	Protected Resources (Marine Mammals)
Bob Foy	Science Center	Protected Resources
Jason Gasper	Regional Office	Fisheries
Jim Ianelli	Science Center	Fisheries
Bridget Mansfield	Regional Office	Protected Resources
Chris Rilling	Science Center	Fisheries
<i>West Coast</i>		
Jim Carretta	Southwest Science Center	Protected Resources (Marine Mammals)
John Childers	Southwest Science Center	Fisheries (Observer Program)
Craig D'Angelo	Regional Office	Business and Industry
Peter Dygert	Regional Office	Fisheries
Tom Good	Northwest Science Center	Protected Resources (Seabirds)
Garth Griffin	Regional Office	Protected Resources (Marine Mammals)
Robert Kope	Northwest Science Center	Fisheries
Dan Lawson	Regional Office	Protected Resources
Kayleigh Somers	Northwest Science Center	Fisheries (Observer Program)
Vanessa Tuttle	Northwest Science Center	Fisheries (Observer Program)
<i>Pacific Islands</i>		
Christofer Boggs	Science Center	Fisheries
Melanie Brown	Regional Office	Fisheries
Sarah Ellgen	Regional Office	Fisheries
Dawn Golden	Regional Office	Fisheries
Marti McCracken	Science Center	Fisheries

*Other Important Partners*

<b>Name</b>	<b>Affiliation</b>
Tanushri Banerjee	Office of Science and Technology
Stephen Brown	Office of Science and Technology
Michael Lewis	Office of Science and Technology
Julie Defilippi	Atlantic Coastal Cooperative Statistics Program
Stephanie McInerney	North Carolina Department of Environment and Natural Resources
Kimberly Lowe	Western Pacific Fisheries Information Network
Rob Ames	Alaska Fisheries Information Network/Pacific Fisheries Information Network
Robert Ryznar	Alaska Fisheries Information Network/Pacific Fisheries Information Network