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Seabird Bycatch Estimates for Alaska Groundfish Fisheries

Annual Report: 2015

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Introduction

Seabirds are unintentionally caught in commercial fisheries off Alaska; this unintentional catch is referred to as bycatch. Federal law requires bycatch be minimized to the extent practicable, and specific modifications to fishing gear and practices are required by Federal regulation to reduce seabird bycatch. Off Alaska, most seabird bycatch occurs in fisheries using hook-and-line (primarily longline) gear. Compliance with seabird avoidance regulations has decreased seabird bycatch by thousands of birds in fisheries using demersal longline gear off Alaska; however, hundreds (often thousands) of seabirds are still taken as bycatch in the fisheries each year.

NOAA's National Marine Fisheries Service (NOAA Fisheries) annually updates estimates of seabirds caught as bycatch in commercial groundfish fisheries operating in Federal waters off Alaska. This annual report provides detailed seabird bycatch estimates by gear type for the years 2007 through 2015 and supplements "Seabird Bycatch and Mitigation Efforts in Alaska Fisheries Summary Report: 2007 through 2015" (Eich et al. 2016). This report presents estimates from the gear types hook-and-line (specifically demersal longline), pot, pelagic trawl, and non-pelagic trawl. The estimates provided here do not apply to gillnet, seine, troll, or jig gear.

Albatross are a focal seabird species group for conservation efforts (for more information, see Eich et al. 2016). Short-tailed albatross (*Phoebastria albatrus*) are listed as endangered under the U.S. Endangered Species Act (ESA). On rare occasion, the fisheries using hook-and-line gear off Alaska incidentally catch short-tailed albatross. In 2015, NOAA Fisheries closely monitored bycatch of short-tailed albatross, especially for compliance with the incidental take limit established by the U.S. Fish and Wildlife Service (USFWS) in its 2003 biological opinion on the effects of the groundfish fisheries of Alaska on endangered short-tailed albatross (USFWS 2003).[1] USFWS anticipated up to four short-tailed albatross could be reported taken bi-annually (every 2 years) as a result of the hook-and-line groundfish fishing activities in the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) areas regulated by NOAA Fisheries.

In addition to the endangered short-tailed albatross, two other species of albatross forage in waters off Alaska, Laysan (*Phoebastria immutabilis*) and black-footed (*Phoebastria nigripes*) albatross. Laysan and black-footed albatross are listed as birds of conservation concern by the USFWS, which means that without additional conservation efforts, they are likely to become candidates for listing under the ESA (USFWS 2008).

In 2016, NOAA Fisheries established a seabird working group to continually review the best available scientific information for methods to reduce bycatch of albatross and other seabirds in the Federal fisheries off Alaska.

[1] Starting January 2016, a new incidental take limit was established by the USFWS in its 2015 biological opinion on the effects of the groundfish fisheries of Alaska on endangered short-tailed albatross (USFWS 2015).

Data Sources and Estimation Methods

Data Sources

The data used to estimate seabird mortality were collected by at-sea observers through the North Pacific Observer Program (Observer Program) using a statistically-reliable sampling design (NMFS 2014). The Observer Program is operated by the NOAA Fisheries Alaska Fisheries Science Center (AFSC) which trains and oversees deployment of NOAA Fisheries-certified observers (observers) to collect scientific information. Observers collect biological samples and fishery-dependent information on total catch and interactions with protected species (AFSC 2015), including fisheries bycatch of seabirds. Information collected by observers provides the best available scientific information to manage the fisheries and to develop measures to minimize bycatch.

Observers collect data on seabird bycatch as part of their species composition sample. Observers identify each bird in their sample to the most accurate species or species group that they can. Species identification is verified for bird specimens collected through an AFSC-managed necropsy program. Through this program, birds collected by observers from bycatch and ship strikes are provided to a vendor to complete a necropsy and verification of the species identification. NOAA Fisheries is currently in the process of revising previous species identifications based on the necropsy verifications. Future versions of this report will reflect these upcoming changes.

There are known sampling biases in estimating total seabird mortality in some commercial fisheries off Alaska (Gilman et al. 2013; Fitzgerald et al. in prep; and summarized in Eich et al. 2016). For example, in the fisheries using hook-and-line gear, seabirds may fall off a hook underwater without being seen by the observer. Seabirds that fall off the hooks alongside the vessel are recorded if they occur within the observer sampling period. On trawl vessels, "cryptic" (i.e., not readily detectable by observers) seabird mortality can occur due to interactions with gear such as net-monitoring equipment (paravanes or third wires) or when seabirds are caught in the net wings and not landed with the fish catch. These mortalities are not included in the estimates reported below. The AFSC is evaluating these additional sources of mortality on trawl vessels, which can be three times the bycatch recorded in standard sampling, and how best to monitor and include them in annual estimates (Fitzgerald et al. in prep).

Estimation Methods

Since 1993, two methods have been used to estimate seabird bycatch[2]. The AFSC produced the

[2] The AFSC produced the seabird bycatch estimates using a ratio estimator for 1993 through 2006 (Fitzgerald et al. 2008; AFSC 2014). Detailed methods used for seabirds were not published but the same methods were used for marine mammal bycatch estimation and are published here: http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-167.pdf. Starting in 2007, bycatch estimates have been produced by the CAS (Cahalan et al. 2014). Both methods use the same primary data sources and a ratio estimator; however the details, including the methods used for post-stratification, varied between the two approaches. To enable a comparison and transition to the CAS, seabird bycatch estimates were produced using both methods for 2004 through 2006 (Fitzgerald 2011a, 2011b). That comparison showed that the CAS seabird bycatch estimates were higher than the previous methods (Fitzgerald et al. in prep) in the fisheries using longline gear by 4.8 percent, 6.1 percent, and 13.6 percent

seabird bycatch estimates using a ratio estimator for 1993 through 2006 (Fitzgerald et al. 2008; AFSC 2014). Starting in 2007, bycatch estimates have been produced by the NOAA Fisheries Alaska Region using a ratio estimator in the Catch Accounting System (CAS) (Cahalan et al. 2014).

In the CAS, observer data are used to create seabird bycatch rates (a ratio of the estimated bycatch to the estimated total catch in sampled hauls). The observed information from the at-sea samples is used to create bycatch rates that are applied to unobserved vessels. For trips that are unobserved, the bycatch rates are applied to industry supplied landings data of retained catch. Expanding on the observer data that are available, the extrapolation from observed vessels to unobserved vessels is based on varying levels of aggregated data (post-stratification). Data are matched based on processing sector (e.g., catcher/processor or catcher vessel), week, target fishery, gear, and Federal reporting area. Further detail on the estimation procedure, including levels of post-stratification, is available in Cahalan et al. (2014) and Cahalan et al. (2010).

At each data run, the CAS produces estimates based on current data sets, which may have changed over time. Data can be updated as a result of observer debriefing, data quality checks, and analysis. Examples of the possible changes in the underlying data are changes in species identification, deletion of data sets where data collection protocols were not properly followed, and changes in the landing or at-sea production reports where data entry errors were found. The totals provided in this report include some changes from previous reporting, and reflect the most recent data and estimates of the CAS.

For estimation, analysis, and reporting of seabird bycatch, many of the species categories identified by observers are consolidated into a larger group (Table 1). For example, in this report the species group "Gull" includes all Laridae except kittiwakes, which are reported separately. Most gulls that observers or our necropsy program identified to a specific code within this group are glaucous, glaucous-winged, or herring gulls. Codes are also used for unidentified (typically juvenile) gulls.

The Observer Program was originally structured as an interim program with coverage requirements based on groundfish vessel overall length and processing volume. In 2013, the program was restructured and changes were implemented regarding the method to deploy observers, how observer coverage is funded, and which vessels and processors must have some or all of their operations observed (77 FR 70062, November 21, 2012). The restructured program has two features that affect seabird bycatch estimates. First, the vessel length-based observer coverage requirements were discontinued, and coverage is now based primarily on fishing mode (catcher vessel or catcher/processor). Vessels are either in a full coverage category and take an observer on all trips or in the partial coverage category and take observers on a random selection of their fishing trips. This was an important change that increased the

for 2004 through 2006, respectively. For seabird bycatch estimates of fisheries using trawl gear, CAS was 7.7 percent higher overall than the previous methods. This difference is likely due to improved ability in CAS to extrapolate to portions of the fishery that are not directly observed.

statistical reliability of data collected by the program. Second, the new program expanded observer coverage to previously unobserved fisheries including the Pacific halibut hook-and-line fishery. Seabird bycatch data are now available from this fishery whereas in previous years, small amounts of halibut fishery information were collected when an operator had both halibut and sablefish individual fishing quota.

The seabird bycatch estimates from CAS provide information on numbers of seabird bycatch per metric ton of catch, but this metric varies from how seabird bycatch rates are typically reported in other regions and countries. For example, the international reporting standard for fisheries using hook-and-line gear is seabird bycatch per 1,000 hooks. NOAA Fisheries is developing procedures that will report total effort and bycatch rates consistent with international reporting standards. Preliminary estimates of seabird bycatch per 1,000 hooks for Federal fisheries off Alaska using hook-and-line gear provided by Melvin et al. (in prep) are included in the summary bycatch report (Eich et al. 2016).

Results and Discussion

This report provides estimates for seabird mortality associated with Federal groundfish (2007 through 2015) and halibut (2013 through 2015) fisheries off Alaska. First, seabird bycatch estimates are provided for all gear types (pot, hook-and-line, and trawl) in the GOA and BSAI fishery management plan (FMP) areas (Figure 1) for each year (Table 2). Second, hook-and-line bycatch estimates for the combined GOA and BSAI FMP areas (Table 3) are provided, followed by hook-and-line bycatch estimates separated by major FMP area (Table 4 through Table 6). Third, the combined trawl fleet bycatch is shown (Table 7). Fourth, the trawl bycatch separated by FMP area (BSAI or GOA) or by gear type (pelagic or non-pelagic) are shown (Table 8 through Table 10). Seabird bycatch estimates for the pot fishery are reported in a single table (Table 11). Finally, Table 12 through Table 17 provide seabird bycatch estimates in the format of area, gear, target, and species or species group for each of the most recent years, 2010 through 2015.

All gear types and fisheries

The 2015 estimated seabird bycatch for the combined groundfish and halibut fisheries (6,057 birds) was below the 2007 through 2015 annual average of 6,851 birds. Looking at overall bycatch (all gear types, all areas combined), 2015 had the highest estimated bycatch levels since 2011 but remained under the long-term (2007 through 2014) average of 6,950 birds per year (Table 2). However, the 2015 total was a 43 percent increase over the 3-year period from 2012 through 2014. Figure 2 depicts estimated seabird bycatch in the groundfish fisheries from 1993 through 2015 using results from the two analytical methods noted above—the AFSC internal analysis for 1993 through 2006 (Fitzgerald et al. 2008) and the CAS for 2007 through 2015. There was a decline in estimated seabird bycatch in 2002 due to the voluntary deployment of streamer lines as bird deterrents on many hook-and-line vessels (for further detail, see Eich et al. 2016). Seabird mitigation measures were implemented by regulations in 2004 and required paired or single streamer lines for larger vessels which accounted for the

vast majority of seabird bycatch[3].

Sixty-six percent (3,990 birds) of the 2015 estimated seabird bycatch was attributed to the Bering Sea, 14 percent (876 birds) to the GOA, and 20 percent (1,192 birds) to the Aleutian Islands. These proportions are similar to the 2007 through 2014 average proportions in the Bering Sea (78 percent) and in the GOA (16 percent). However, the 2015 estimated seabird bycatch in the Aleutian Islands was 196 percent higher than the 2007 through 2014 average proportion of 6 percent (402 birds).

Consistent with prior years, seabird bycatch estimates in 2015 were dominated by Northern fulmar (*Fulmarus glacialis*) (59 percent). Estimated Northern fulmar bycatch increased by 336 percent from 2014 to 2015 but was only 49 percent above the most recent 3-year period (2012 through 2014) (2,379 birds per year). Fulmar bycatch has ranged from an estimated 33 percent to 72 percent of the total seabird bycatch since 2007. Average annual mortality for Northern fulmar since 2007 has been 3,919 birds. When compared to estimates of the total population size in Alaska of 1.4 million birds (Denlinger 2006), observed fisheries account for an annual mortality of 0.28 percent. While this mortality is low, local population depletions could occur if the mortality is colony-specific (Hatch et al. 2010).

In 2015, gulls (Family Laridae) were the second most frequently occurring birds in the bycatch (21 percent). Gull bycatch increased by an estimated 71 percent from 2014 to 2015 and was 70 percent above the most recent 3-year period (2012 through 2014) (734 birds per year). Gull bycatch has ranged from 12 percent to 30 percent of the total estimated seabird bycatch since 2007. Average annual mortality for gulls since 2007 has been 1,209 birds. Of the various gull species, estimates of the total number of breeders in Alaska is roughly 366,100 birds (calculated from Table 1 in Eich et al. 2016).

In 2015, shearwaters (Family Procellariidae) were the third most frequently occurring birds in the bycatch (6 percent). Shearwater bycatch increased by 106 percent from 2014 to 2015 and was 12 percent above the most recent 3-year period (2012 through 2014) (341 birds per year). Estimated shearwater bycatch has ranged from 3 percent to 35 percent of the total estimated seabird bycatch since 2007. Average annual mortality for shearwaters since 2007 has been 862 birds. The total worldwide population of short-tailed (*Puffinus tenuirostris*) and sooty shearwaters (*Ardenna grisea*) is estimated to be 43 million birds (calculated from Table 2 in Eich et al. 2016; Denlinger 2006).

Albatross

No takes of short-tailed albatross were observed in the groundfish fisheries in 2015. The incidental take statement in the 2015 biological opinion on the groundfish fisheries exempts the take of six short-tailed albatross in a 2-year period (USFWS 2015). Between September 16, 2013, and September 15, 2015, three takes of short-tailed albatross were observed in the hook-and-line groundfish fishery: two in September 2014 and one in December 2014. There have been no observed takes of short-tailed albatross in the groundfish fisheries (either by hook-

[3] See regulations at 50 CFR part 679.24(e)(2) for more specific requirements

and-line, trawl, or pot) since December 2014.

In addition to the endangered short-tailed albatross, there is also conservation concern for Laysan and black-footed albatross (USFWS 2008). In 2015, 581 albatross (364 black-footed, 217 Laysan albatross) were estimated to have been caught in the fisheries off Alaska, an increase of 25 percent compared to the 2012 through 2014 average of 465 albatross. Overall, Laysan and black-footed albatross bycatch increased by 47 percent and 24 percent, respectively, compared to the previous 3-year average (2012 through 2014).

The reasons for the increase in albatross bycatch are unknown. As noted earlier, the 2013 through 2015 bycatch estimates included two sources of seabird mortality that previous years did not include: vessels less than 60 feet length overall in the groundfish fisheries and the entire halibut fishery. The restructured Observer Program resulted in monitoring of the small vessel sablefish longline fleet operating in Southeast Alaska where previous years did not. Those vessels and halibut fishery vessels Alaska-wide contributed to these additional mortalities (although additional bycatch rate analyses are required to determine if other underlying issues such as ocean conditions, population changes, or fishery practices are driving this change). The estimated 2013 through 2015 albatross bycatch in the sablefish fisheries (1,460 birds) far surpassed the estimated contribution from the halibut fishery (141 birds); which is interesting to note because the halibut fishery had been a target of much interest by several non-governmental groups since the mid-1990s. In 2013, albatross bycatch numbers (4 birds) decreased in the Pacific cod hook-and-line fleet. However, in 2014 (42 birds) and 2015 (38 birds) albatross bycatch was comparable to the 2007 through 2012 estimated average of 39 birds per year.

Hook-and-line gear

Based on standard observer sampling protocols, hook-and-line gear[4] in Alaska groundfish fisheries accounted for 87 percent of the estimated seabird mortality in 2015, which is similar to the average estimated seabird mortality for 2007 through 2015 (88 percent; range 80 to 96 percent).

From 2007 through 2015, most of the hook-and-line gear estimated seabird bycatch occurred in the Bering Sea (average of 77 percent) versus the Aleutian Islands (average of 6 percent) and GOA (average of 12 percent). In fact, most (68 percent) of the total (all gear types) seabird bycatch off Alaska occurred in the Bering Sea in fisheries using hook-and-line gear (range 60 percent to 86 percent from 2007 through 2015).

Consistent with results for all gear types combined, most 2015 estimated seabird bycatch by hook-and-line gear was Northern fulmar (55 percent); gulls (24 percent); and shearwaters (6 percent) (Table 3).

Of the fisheries that have seabird bycatch, the bulk of 2015 fishery effort in the Bering Sea was in the Pacific cod hook-and-line fleet (Eich et al. 2016). While this fishery accounts for the

[4] Specifically, this report presents seabird bycatch estimates from demersal longline.

greatest amount of seabird bycatch, it captures the fewest albatross. However, nearly all of the short-tailed albatross takes that have occurred since 2003 have been in the Pacific cod hook-and-line fleet. No endangered short-tailed albatross takes by hook-and-line gear were observed in 2015 in the Federal fisheries off Alaska.

Trawl gear

In a discussion of seabird bycatch attributed to trawl gear it is important to remember that standard observer sampling does not account for all seabird mortality. This discussion focuses only on the numbers reported, which were generated from the standard observer sample. A number of efforts are underway to get a better handle on the amount of cryptic mortality related to trawl vessels and how to properly extrapolate that to provide a fleet-wide estimate. Those numbers will be provided pending completion of ongoing research and development.

Seabird mortality related to trawl gear constitutes about 10 percent (range 4 to 17 percent) of the overall estimated 2007 through 2015 seabird bycatch (Tables 2 and 7). This is consistent with the 2015 proportion of estimated seabird bycatch attributed to the fisheries using trawl gear (9 percent; 534 birds).

For trawl gear, Northern fulmar again dominate the estimated bycatch of seabirds followed by shearwaters (spp.) and gulls (spp.) (Tables 8 and 9). While Northern fulmar bycatch is more consistent over the years (range 85 to 652, average 440 birds), shearwaters range from 1 to 726 (average 125 birds), and gulls range from zero in three years up to an estimate of 303 (average 51 birds).

Most estimated seabird bycatch taken by trawl gear occurs in the BSAI, averaging 90 percent of the trawl seabird bycatch from 2007 through 2015. Most 2015 seabird bycatch from trawl gear in Alaska fisheries was Northern fulmar (87 percent; 463 birds), followed by shearwaters (12 percent; 62 birds).

No endangered short-tailed albatross takes by trawl gear have been observed in the Federal fisheries off Alaska. Traditionally, only Laysan (or unidentified) albatross have been observed in fisheries using trawl gear, with an estimate of only nine taken in the BSAI (Table 7 and Table 8) for the period reported here; in fact, all nine were taken in 2009. In 2012, a black-footed albatross mortality was observed in the trawl fleet for the first time since monitoring started in 1993, extrapolating to an estimated 60 birds taken for the GOA fleet that year.

No prominent differences exist between seabird bycatch in 2015 versus 2007 through 2014 for pelagic and non-pelagic trawl gear (Table 10). Across all years reported here, non-pelagic gear accounted for 67 percent of trawl seabird mortality. Non-pelagic gear had greater seabird bycatch estimates in seven of the nine years reported here, ranging from 1,099 to 115 birds (average 468 birds) (Table 10). Seabird bycatch in pelagic gear ranged from 601 to 57 birds (average 224 birds). All albatross occurred in non-pelagic gear, as did most alcids, shearwaters, and gulls. Only Northern fulmar had higher bycatch in pelagic fisheries in some years (4 of 9 years).

Pot gear

The pot fishery remains the gear type with the least amount of seabird bycatch (Table 11), representing an overall average of 4 percent of the total (range 0.4 to 4 percent). Seabird bycatch in the pot fishery occurs primarily in the Bering Sea and GOA with very little bycatch attributed to the Aleutian Islands. In 2015, 85 percent (215 birds) of the seabird bycatch attributed to pot gear was in the Bering Sea and 15 percent (39 birds) were attributed to the GOA. No birds were estimated to have been taken as bycatch by pot gear in the Aleutian Islands in 2015.

Only Northern fulmar, shearwaters, gulls, and various alcid species have been taken in this fishery. It is most likely that the surface and near-surface foragers (procellarids and gulls) are actually "captured" in pots as a result of collisions with pots during bad weather, as reported by several fisheries observers. Although 2015 had the highest amount of bycatch since 2007 for this gear type, pot-fishing does not represent a conservation concern for Alaska seabirds.

Annual variation

We are now able to look at six years of comparative data: 2010 through 2012, the three years preceding Observer Program restructuring, and 2013 through 2015, the three years after restructuring. Tables 12 through 17 provide a breakdown of seabird bycatch by Region, Gear, and "target" fishery.

In these tables the Bering Sea and Aleutian Islands are combined, which follows standard fishery management practices in Alaska for many species. These tables only include those fisheries in a year that had seabird bycatch, so there are fisheries that appear in some years and not in others. The BSAI Pacific cod hook-and-line fleet predominates each year with the highest levels of estimated seabird bycatch.

Through all years, the GOA hook-and-line sablefish fishery predominates as the highest estimated takes of albatross. It appears that this fishery has greater overlap with black-footed albatross distribution. In the pre- and post-3-year periods around Observer Program restructuring, the estimated bycatch of Laysan albatross in the BSAI and GOA groundfish and halibut hook-and-line fleets remained about the same with a before and after average of 189 and 172 birds per year, respectively. This indicates that most of the groundfish and halibut fleet that overlaps with Laysan albatross distribution, which is primarily in the BSAI, already had observer coverage. The expansion of observer monitoring has occurred to a great extent in the GOA, with more hook-and-line vessels receiving coverage (NMFS 2014) due to their smaller size and halibut fishery effort. This has affected the estimated bycatch of black-footed albatross, which has a pre- and post-restructuring estimate in the BSAI and GOA groundfish and halibut hook-and-line fleets of 125 versus 369 birds per year, respectively.

A variety of factors could influence seabird bycatch numbers including changes in fishing behavior, implementation of seabird avoidance gear, observer coverage, and ecosystem changes. The hook-and-line fishery off Alaska typically dominates the overall estimated bycatch trends, although we have previously noted the bias in trawl-related mortality estimates reported (for further detail, see Eich et al. 2016). Fishing effort has been known to shift based

on market prices for particular fish species, the available harvest levels of target and non-target fish species, prohibited species limits, and weather. Bycatch in the fisheries using hook-and-line gear showed a marked decline in 2002 (Figure 2) due to the deployment of streamer lines as bird deterrents (for further detail, see Eich et al. 2016). Since then, annual seabird bycatch in the fisheries using hook-and-line gear has remained below 10,000 birds, dropping as low as 2,087 in 2014.

Each of the higher seabird bycatch years has been followed by a lesser year. Hook-and-line bycatch numbers increased to 9,560 in 2009, but fell back to 4,105 in 2010, just as bycatch numbers increased to 9,284 in 2011, but fell back to 4,840 in 2012. Hook-and-line bycatch remained similar in 2013 (4,434 birds), decreased to 2,087 in 2014, then increased to 5,269 in 2015. The increased seabird bycatch estimated in the fisheries using hook-and-line gear from 2014 to 2015 was due to a threefold increase in gulls (*Larus* spp.; from 730 to 1,247) and Northern fulmar (from 716 to 2,886). Bycatch of shearwaters and Laysan albatross in the fisheries using hook-and-line gear also increased from 2014 to 2015 (shearwaters from 114 to 320; Laysan albatross from 99 to 217).

An important aspect of these data is that the Observer Program was restructured in 2013 when observers were placed on vessels less than 60 ft length overall (of all gear types) for the first time and in the previously unobserved halibut fishery. The addition of observers to many vessels in the GOA contributed important data for our understanding of seabird bycatch patterns and quantities. For many years there has been great interest in seabird bycatch levels and rates in the halibut fishery, and some assumptions that it could greatly exceed that of other fisheries. Note that in 2014, the year after the halibut fishery was added, the overall estimated seabird bycatch in the groundfish and halibut fisheries, for all gear types combined, was the lowest ever at 2,442 birds. However, bycatch numbers increased again to 6,057 birds in 2015.

Determining how seabird bycatch numbers and trends are linked to changes in ecosystem components is difficult because many covariates affect seabird bycatch rates, and the relative importance of the different factors is difficult to parse. Some factors that may influence annual variation in bycatch rates include seabird distribution, population trends, prey supply, and fisheries activities. There appears to be a link between poor ocean conditions and peak bycatch years, on a species-group basis. Fishermen have noted in some years that the birds appear "starved" and attack baited hook-and-line gear more aggressively (AFSC 2014). In 2014, seabird bycatch off Alaska was at its lowest levels from 2007 through 2015 (driven by lower Northern fulmar and gull bycatch), but albatross numbers were still above the 2007 through 2015 annual average of 394 birds. This could indicate poor ocean conditions in the North Pacific as albatross traveled from the Hawaiian Islands to Alaska.

Large variation in overall seabird bycatch (up to 5,753 birds per year) occurred between 2007 and 2015. This probably indicates changes in food availability rather than drastic changes in how well the fleet employs mitigation gear. A focused investigation of this aspect of seabird bycatch is needed and could inform management of poor ocean conditions if seabird bycatch rates (reported in real time) were substantially higher than normal.

The challenge to further reduce seabird bycatch is great given the relatively rare nature of bycatch events. Dietrich and Fitzgerald (2010) found in an analysis of 35,148 Pacific cod hook-and-line sets from 2004 to 2007 that the most predominant species, Northern fulmar, only occurred in 2.5 percent of all sets. Albatross, a focal species for conservation efforts, occurred in less than 0.1 percent of sets. However, given the vast size of the fishery, the total bycatch can add up to thousands of Northern fulmar or hundreds of albatross.

Fisheries

Examining the three fisheries responsible for the majority of seabird bycatch, Pacific cod hook-and-line, sablefish hook-and-line, and halibut hook-and-line, the average seabird bycatch for 2013 through 2015 was 2,946, 713, and 180 birds per year, respectively. In 2015, the Pacific cod hook-and-line, sablefish hook-and-line, and halibut hook-and-line, estimated seabird bycatch of 4,111, 865, and 217 birds, respectively (Table 17).

Focusing solely on the bycatch of albatross in these fisheries (unidentified, short-tailed, Laysan, and black-footed) the Pacific cod, sablefish, and halibut fisheries using hook-and-line gear average 28, 487, and 47 albatross per year, respectively, for 2013 through 2015. Seabird bycatch levels and rates are highly variable among years, and a 3-year average may not be representative of the true underlying bycatch. However, this pattern seems reasonable and future conservation efforts for mitigating albatross bycatch should be focused on the sablefish fleet. The endangered species focus should remain on the Pacific cod fleet, however, with an average estimated mortality (2010 through 2015) of about four short-tailed albatross per year. Takes of short-tailed albatross have not been observed in the sablefish fishery since the mid-1990s. The only other fishery with a short-tailed albatross take is the BSAI Greenland turbot fishery in which two short-tailed albatross were recorded taken in 2014 (only one bird was in the observer sample). When expanded by the CAS, the average estimated mortality (2010 through 2015) across the Greenland turbot fishery is about 1 short-tailed albatross per year.

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Table 1 Species and species group categories used in this 2015 annual report[1] and the individual species included in the grouping.

Species/species Group	Includes	Classification
Short-tailed Albatross	n/a	*Phoebastria albatrus*
Laysan Albatross	n/a	*Phoebastria immutabilis*
Black-footed Albatross	n/a	*Phoebastria nigripes*
Unidentified Albatross	Short-tailed, Laysan, or black-footed	n/a
Northern Fulmar	n/a	*Fulmarus glacialis*
Shearwaters	Unidentified shearwater	*Ardenna or Puffinus* spp.
	Sooty shearwater	*Ardenna grisea*
	Short-tailed shearwater	*Puffinus tenuirostris*
	Unidentified dark shearwater	*A. grisea or P. tenuirostris*
	Unidentified procellarid	Procellariiformes
Storm Petrel	Unidentified storm petrel	*Oceanodroma* spp.
	Fork-tailed storm petrel	*O. furcata*
	Leach's storm petrel	*O. leucorhoa*
Gull	Unidentified gull	Family Laridae
	Herring gull	*Larus argentatus*
	Glaucous gull	*Larus hyperboreus*
	Glaucous-winged gull	*Larus glaucescens*
	Slaty-backed gull	*Larus schistisagus*
	Gull hybrid	Family Laridae
Kittiwake	Black-footed kittiwake	*Rissa tridactyla*
	Red-legged kittiwake	*Rissa brevirostris*
Murre	Unidentified murre	*Uria* spp.
	Thick-billed murre	*Uria lomvia*
	Common murre	*Uria aalge*
Puffin	Unidentified puffin	*Fratercula* spp.
	Horned puffin	*F. corniculata*
	Tufted puffin	*F. cirrhata*
	Rhinoceros auklet	*Cerorhinca monocerata*
Auklet	Unidentified murrelet or auklet murrelet	Several genera *Brachyramphus* spp. and others
		Aethia spp. and others
	Auklet	
Other Alcid	Unidentified alcid	*Alcidae*
	Guillemot, unidentified	*Cepphus* spp.
Other Birds	Miscellaneous birds – could include:	
	Loon	Family Gaviidae
	Grebe	Family Podicipedidae
	Cormorant	Family Phalacrocoracidae
	Seaduck	Family Anatidae
	Jaeger/skua	Family Stercorariidae
	Tern	Family Sternidae
Unidentified Seabird	All of the above	

[1] A complete list of the species and species group categories used by the North Pacific Observer Program is available in the 2015 Observer Sampling Manual (AFSC 2015).

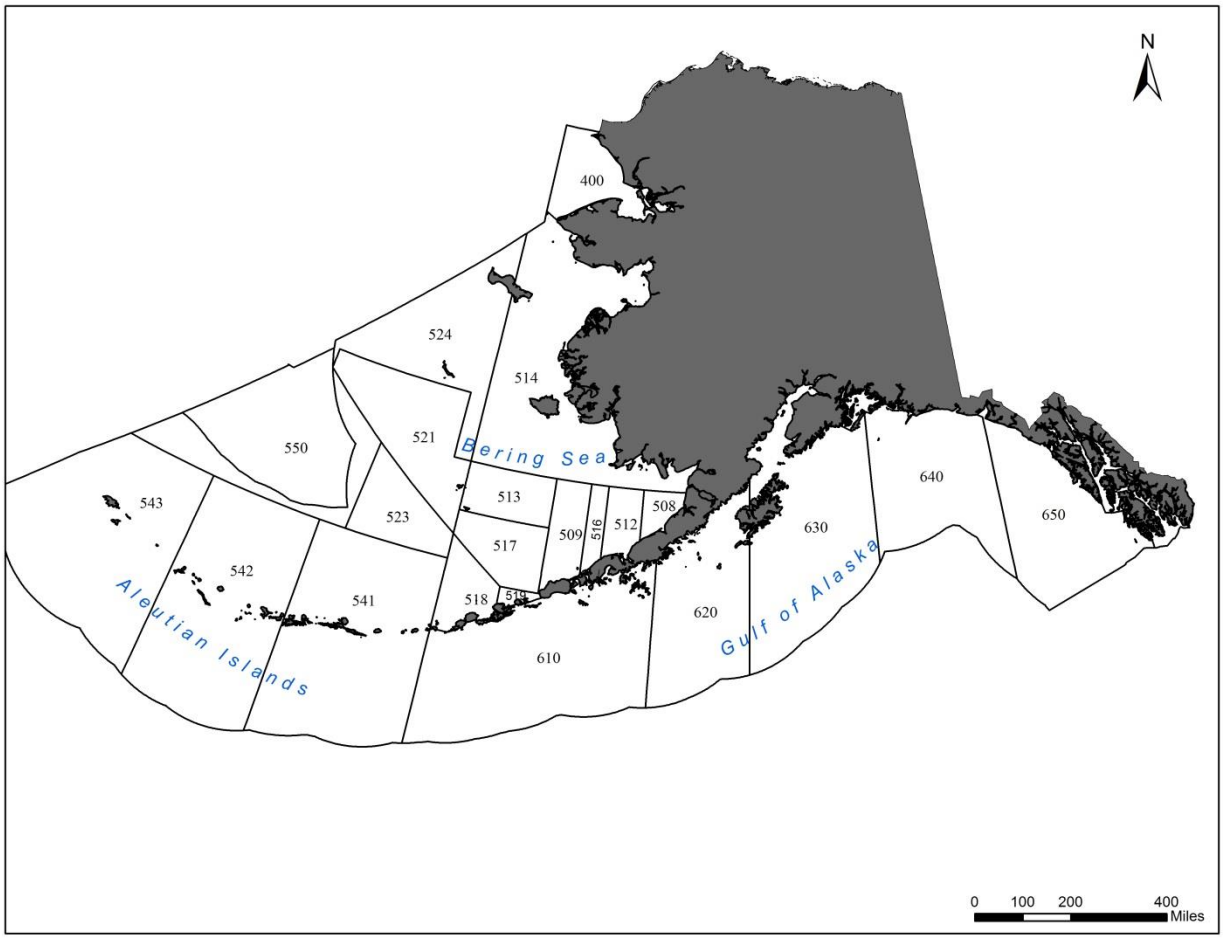


Figure 1 Bering Sea, Aleutian Islands, and Gulf of Alaska reporting areas.

Table 2 Total estimated seabird bycatch in Alaska Federal groundfish and halibut fisheries, all gear types and fishery management plan areas combined, 2007 through 2015. Halibut fisheries 2013 through 2015 only.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Unidentified Albatrosses	17	0	0	0	10	0	28	33	0
Short-tailed Albatross	0	0	0	15	5	0	0	9	0
Laysan Albatross	13	226	80	222	205	141	201	99	217
Black-footed Albatross	200	302	56	71	222	141	448	294	364
Northern Fulmar	4,701	3,332	7,757	2,474	6,330	3,148	3,177	812	3,544
Shearwaters	3,586	1,224	620	657	262	585	253	186	382
Storm Petrels	1	44	0	0	0	0	0	0	0
Gulls	1,216	1,550	1,268	1,173	2,227	898	575	730	1,247
Kittiwakes	10	0	16	0	6	5	3	9	12
Murres	6	6	13	102	14	6	3	47	0
Puffins	0	0	0	9	0	0	0	0	0
Auklets	0	3	0	0	0	7	4	107	69
Other Alcids	0	0	105	0	0	0	0	39	0
Cormorants	0	0	0	0	0	0	0	0	31
Other Birds	0	0	136	0	0	0	0	0	0
Unidentified Birds	514	541	696	270	387	343	292	77	190
Grand Total	10,265	7,228	10,747	4,994	9,668	5,274	4,985	2,442	6,057

Table 3 Summary of estimated seabird bycatch in the Alaska demersal hook-and-line groundfish and halibut fisheries, all fishery management plan areas combined, 2007 through 2015. Halibut fisheries 2013 through 2015 only.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Unidentified Albatrosses	17	0	0	0	10	0	28	33	0
Short-tailed Albatross	0	0	0	15	5	0	0	9	0
Laysan Albatross	13	226	71	222	205	141	201	99	217
Black-footed Albatross	200	302	56	71	222	81	448	294	364
Northern Fulmar	3,678	2,761	7,000	1,902	5,965	2,851	2,694	716	2,886
Shearwaters	2,861	1,211	574	502	259	529	195	114	320
Gulls	914	1,481	1,186	1,116	2,226	898	572	730	1,247
Kittiwakes	10	0	10	0	6	5	3	9	12
Murres	5	6	13	0	0	6	0	0	0
Puffins	0	0	0	9	0	0	0	0	0
Auklets	0	0	0	0	0	7	0	6	11
Cormorants	0	0	0	0	0	0	0	0	28
Unidentified Birds	498	541	652	267	387	322	292	77	184
Grand Total	8,194	6,528	9,560	4,105	9,284	4,840	4,434	2,087	5,269

Table 4 Estimated seabird bycatch in the Aleutian Islands area demersal hook-and-line groundfish and halibut fisheries, 2007 through 2015. Halibut fisheries 2013 through 2015 only.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Unidentified Albatrosses	0	0	0	0	0	0	0	22	0
Laysan Albatross	11	51	26	122	12	76	109	50	147
Black-footed Albatross	0	0	0	0	5	0	12	4	18
Northern Fulmar	62	97	120	110	21	7	31	54	876
Shearwaters	53	39	10	13	42	16	0	68	23
Gulls	31	19	36	175	22	12	24	0	36
Unidentified Birds	5	1	1	17	0	0	8	0	0
Grand Total	162	206	192	436	104	112	183	198	1,100

Table 5 Estimated seabird bycatch in the Bering Sea area demersal hook-and-line groundfish and halibut fisheries, 2007 through 2015. Halibut fisheries 2013 through 2015 only.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Unidentified Albatrosses	0	0	0	0	0	0	0	11	0
Short-tailed Albatross	0	0	0	15	5	0	0	9	0
Laysan Albatross	2	7	14	16	30	48	19	17	28
Black-footed Albatross	18	7	5	9	2	0	1	5	2
Northern Fulmar	2,520	1,811	6,726	1,739	5,132	2,825	2,549	631	1,923
Shearwaters	2,776	1,172	564	489	157	514	195	46	292
Gulls	422	1,339	829	662	1,650	835	413	573	925
Kittiwakes	10	0	10	0	6	5	3	9	12
Murres	5	6	13	0	0	6	0	0	0
Puffins	0	0	0	9	0	0	0	0	0
Auklets	0	0	0	0	0	7	0	0	0
Unidentified Birds	444	267	463	250	377	289	276	77	151
Grand Total	6,197	4,609	8,624	3,190	7,358	4,529	3,456	1,379	3,333

Table 6 Estimated seabird bycatch in the Gulf of Alaska area demersal hook-and-line groundfish and halibut fisheries, 2007 through 2015. Halibut fisheries 2013 through 2015 only.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Unidentified Albatrosses	17	0	0	0	10	0	28	0	0
Laysan Albatross	0	168	31	84	163	17	73	33	42
Black-footed Albatross	182	295	51	62	215	81	436	284	344
Northern Fulmar	1,096	853	154	54	811	19	114	31	88
Shearwaters	32	0	0	0	61	0	0	0	6
Gulls	461	123	320	279	554	51	135	157	286
Auklets	0	0	0	0	0	0	0	6	11
Cormorants	0	0	0	0	0	0	0	0	28
Unidentified Birds	48	274	188	0	9	33	7	0	33
Grand Total	1,836	1,714	744	479	1,822	200	794	510	837

Table 7 Estimated seabird bycatch for Alaska groundfish fisheries using pelagic and non-pelagic trawl gear combined, all fishery management plan areas combined.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Laysan Albatross	0	0	9	0	0	0	0	0	0
Black-footed Albatross	0	0	0	0	0	60	0	0	0
Northern Fulmar	652	537	633	503	329	297	463	85	463
Shearwaters	726	13	41	155	3	56	1	72	62
Storm Petrels	1	44	0	0	0	0	0	0	0
Gulls	303	9	82	57	1	0	3	0	0
Kittiwakes	0	0	6	0	0	0	0	0	0
Murres	2	0	0	102	14	0	3	47	0
Auklets	0	3	0	0	0	0	4	66	0
Other Alcids	0	0	105	0	0	0	0	0	0
Cormorants	0	0	0	0	0	0	0	0	3
Other Birds	0	0	136	0	0	0	0	0	0
Unidentified Birds	16	0	44	3	0	0	0	0	6
Grand Total	1,700	606	1,057	821	347	413	474	270	534

Table 8 Estimated seabird bycatch for the Alaska groundfish Bering Sea and Aleutian Islands fishery management plan area, pelagic and non-pelagic trawl gear combined.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Laysan Albatross	0	0	9	0	0	0	0	0	0
Northern Fulmar	562	498	633	383	302	297	320	65	463
Shearwaters	726	13	41	155	3	56	1	72	62
Storm Petrels	1	44	0	0	0	0	0	0	0
Gulls	303	9	82	57	1	0	3	0	0
Kittiwakes	0	0	6	0	0	0	0	0	0
Murres	2	0	0	102	14	0	3	47	0
Auklets	0	3	0	0	0	0	4	66	0
Other Alcids	0	0	105	0	0	0	0	0	0
Cormorants	0	0	0	0	0	0	0	0	3
Other Birds	0	0	136	0	0	0	0	0	0
Unidentified Birds	16	0	44	3	0	0	0	0	6
Grand Total	1,609	567	1,057	700	320	353	331	250	534

Table 9 Estimated seabird bycatch for the Alaska groundfish Gulf of Alaska fishery management plan area, pelagic and non-pelagic trawl gear combined.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Black-footed Albatross	0	0	0	0	0	60	0	0	0
Northern Fulmar	91	39	0	121	27	0	143	20	0
Grand Total	91	39	0	121	27	60	143	20	0

Table 10 Estimated seabird bycatch for the Alaska groundfish pelagic (P) and non-pelagic (N) trawl gear types across all fishery management plan areas.

Species/Species Group	Trawl	2007	2008	2009	2010	2011	2012	2013	2014	2015
Laysan Albatross	N	0	0	9	0	0	0	0	0	0
	P	0	0	0	0	0	0	0	0	0
Black-footed Albatross	N	0	0	0	0	0	60	0	0	0
	P	0	0	0	0	0	0	0	0	0
Northern Fulmar	N	101	248	333	435	115	207	340	34	351
	P	552	290	300	69	214	90	123	51	112
Shearwaters	N	705	0	38	133	0	44	0	69	56
	P	21	13	3	22	3	12	1	3	6
Storm Petrels	N	0	44	0	0	0	0	0	0	0
	P	1	0	0	0	0	0	0	0	0
Gulls	N	294	0	79	57	0	0	0	0	0
	P	9	9	3	0	1	0	3	0	0
Kittiwakes	N	0	0	0	0	0	0	0	0	0
	P	0	0	6	0	0	0	0	0	0
Murres	N	0	0	0	102	0	0	0	44	0
	P	2	0	0	0	14	0	3	3	0
Auklets	N	0	0	0	0	0	0	0	66	0
	P	0	3	0	0	0	0	4	0	0
Other Alcids	N	0	0	105	0	0	0	0	0	0
	P	0	0	0	0	0	0	0	0	0
Cormorants	N	0	0	0	0	0	0	0	0	0
	P	0	0	0	0	0	0	0	0	3
Other Birds	N	0	0	133	0	0	0	0	0	0
	P	0	0	3	0	0	0	0	0	0
Unidentified Birds	N	0	0	7	0	0	0	0	0	0
	P	16	0	37	3	0	0	0	0	6
Grand Total	N	1,099	292	704	727	115	311	340	213	407
	P	601	315	353	94	232	102	134	57	127

Table 11 Estimated seabird bycatch for pot vessels fishing groundfish in Alaska Federal waters, all fishery management plan areas combined.

Species/Species Group	2007	2008	2009	2010	2011	2012	2013	2014	2015
Northern Fulmar	371	34	125	69	37	0	20	11	195
Shearwaters	0	0	5	0	0	0	57	0	0
Gulls	0	60	0	0	0	0	0	0	0
Auklets	0	0	0	0	0	0	0	35	58
Other Alcids	0	0	0	0	0	0	0	39	0
Unidentified Birds	0	0	0	0	0	20	0	0	0
Grand Total	371	94	130	69	37	20	77	85	254

Table 12 Estimated seabird bycatch in Alaska by groundfish fishery target in 2010.

Fishery					
Region	**Gear**	**Target**	**Total**	**Species/Species Group**	**Number**
BSAI	Hook-and-line	Pacific Cod	3,200	Short-tailed Albatross	15
				Black-footed Albatross	9
				Laysan Albatross	41
				Northern Fulmar	1,652
				Shearwaters	492
				Gulls	733
				Puffins	9
				Unidentified Birds	249
		Sablefish	223	Laysan Albatross	97
				Northern Fulmar	26
				Shearwaters	6
				Gulls	88
				Unidentified Birds	6
		Greenland Turbot	202	Northern Fulmar	171
				Shearwaters	4
				Gulls	17
				Unidentified Birds	11
	Trawl	Atka Mackerel	159	Northern Fulmar	84
				Shearwaters	75
		Pacific Cod	139	Northern Fulmar	139
		Pollock	94	Northern Fulmar	69
				Shearwaters	22
				Unidentified Birds	3
		Rockfish	34	Northern Fulmar	34
		Rock Sole	24	Murres	24
		Yellowfin Sole	250	Northern Fulmar	57
				Shearwaters	58
				Gulls	57
				Murres	78
	Pot	Pacific Cod	69	Northern Fulmar	69
GOA	Hook-and-line	Pacific Cod	201	Laysan Albatross	9
				Black-footed Albatross	10
				Northern Fulmar	35
				Gulls	147
		Sablefish	278	Laysan Albatross	75
				Black-footed Albatross	52
				Northern Fulmar	19
				Gulls	132
	Trawl	Arrowtooth Flounder	121	Northern Fulmar	121
Grand Total					**4,994**

Table 13 Estimated seabird bycatch in Alaska by groundfish fishery target in 2011.

Fishery					
Region	**Gear**	**Target**	**Total**	**Species/Species Group**	**Number**
BSAI	Hook-and-line	Pacific Cod	6,819	Short-tailed Albatross	5
				Laysan Albatross	28
				Northern Fulmar	4,633
				Shearwaters	125
				Gulls	1,644
				Kittiwakes	6
				Unidentified Birds	378
		Sablefish	100	Laysan Albatross	9
				Black-footed Albatross	7
				Northern Fulmar	21
				Shearwaters	35
				Gulls	28
		Greenland Turbot	543	Laysan Albatross	5
				Northern Fulmar	499
				Shearwaters	38
	Trawl	Atka Mackerel	29	Northern Fulmar	29
		Pollock	232	Northern Fulmar	214
				Shearwaters	3
				Gulls	1
				Murres	14
		Yellowfin Sole	59	Northern Fulmar	59
GOA	Hook-and-line	Pacific Cod	53	Unidentified Albatrosses	10
				Northern Fulmar	8
				Gulls	36
		Sablefish	1,769	Laysan Albatross	163
				Black-footed Albatross	215
				Northern Fulmar	804
				Shearwaters	61
				Gulls	517
				Unidentified Birds	9
	Trawl	Rockfish	27	Northern Fulmar	27
	Pot	Pacific Cod	37	Northern Fulmar	37
Grand Total					**9,668**

Table 14 Estimated seabird bycatch in Alaska by groundfish fishery target in 2012.

Fishery					
Region	**Gear**	**Target**	**Total**	**Species/Species Group**	**Number**
BSAI	Hook-and-line	Pacific Cod	4,129	Laysan Albatross	34
				Northern Fulmar	2,478
				Shearwaters	490
				Gulls	834
				Kittiwakes	5
				Murres	6
				Auklets	7
				Unidentified Birds	275
		Sablefish	103	Laysan Albatross	90
				Gulls	13
		Greenland Turbot	409	Northern Fulmar	354
				Shearwaters	40
				Unidentified Birds	15
	Trawl	Atka Mackerel	52	Northern Fulmar	8
				Shearwaters	44
		Pollock	102	Northern Fulmar	90
				Shearwaters	12
		Rock Sole	49	Northern Fulmar	49
		Arrowtooth Flounder	150	Northern Fulmar	150
	Pot	Pacific Cod	20	Unidentified Birds	20
GOA	Hook-and-line	Pacific Cod	76	Northern Fulmar	19
				Gulls	25
				Unidentified Birds	33
		Sablefish	123	Laysan Albatross	17
				Black-footed Albatross	81
				Gulls	26
	Trawl	Rockfish	60	Black-footed Albatross	60
Grand Total					**5,273**

Table 15 Estimated seabird bycatch in Alaska by groundfish and halibut fishery target in 2013.

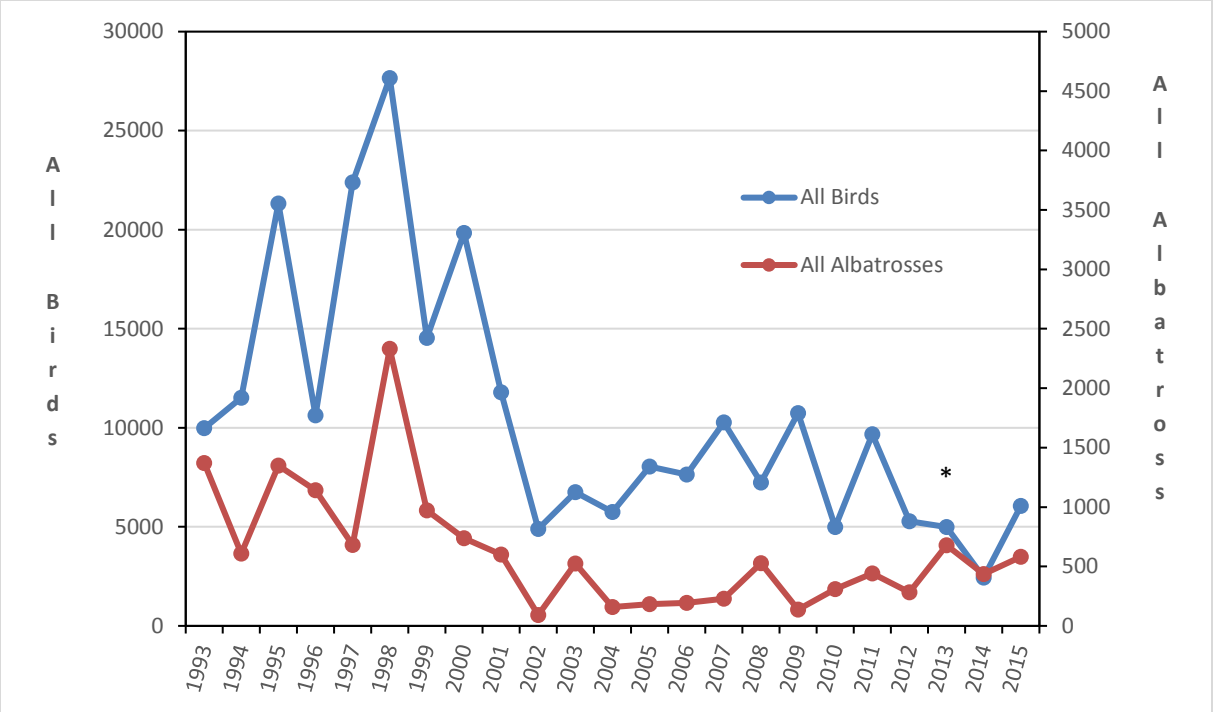
Fishery					
Region	**Gear**	**Target**	**Total**	**Species/Species Group**	**Number**
BSAI	Hook-and-line	Pacific Cod	3,300	Laysan Albatross	4
				Northern Fulmar	2,485
				Shearwaters	135
				Gulls	408
				Kittiwakes	3
				Unidentified Birds	264
		Halibut	40	Laysan Albatross	14
				Gulls	11
				Unidentified Birds	15
		Rockfish	5	Gulls	5
		Sablefish	164	Laysan Albatross	109
				Black-footed Albatross	13
				Northern Fulmar	30
				Gulls	12
		Greenland Turbot	131	Northern Fulmar	65
				Shearwaters	60
				Unidentified Birds	5
	Trawl	Arrowtooth Flounder	8	Northern Fulmar	8
		Pollock	134	Northern Fulmar	123
				Shearwaters	1
				Gulls	3
				Auklets	4
				Murres	3
		Rock Sole	112	Northern Fulmar	112
		Yellowfin Sole	77	Northern Fulmar	77
	Pot	Pacific Cod	20	Northern Fulmar	20
GOA	Hook-and-line	Pacific Cod	43	Northern Fulmar	8
				Gulls	27
				Unidentified Birds	7
		Halibut	125	Black-footed Albatross	51
				Gulls	74
		Sablefish	627	Unidentified Albatrosses	28
				Laysan Albatross	73
				Black-footed Albatross	385
				Northern Fulmar	106
				Gulls	35
	Trawl	Arrowtooth Flounder	143	Northern Fulmar	143
	Pot	Pacific Cod	57	Shearwaters	57
Grand Total					**4,985**

Table 16 Estimated seabird bycatch in Alaska by groundfish and halibut fishery target in 2014.

Fishery					
Region	**Gear**	**Target**	**Total**	**Species/Species Group**	**Number**
BSAI	Hook-and-line	Pacific Cod	1,300	Unidentified Albatrosses	10
				Short-tailed Albatross	3
				Laysan Albatross	12
				Northern Fulmar	573
				Shearwaters	43
				Gulls	573
				Kittiwakes	9
				Unidentified Birds	77
		Halibut	9	Black-footed Albatross	9
		Sablefish	206	Unidentified Albatrosses	23
				Laysan Albatross	54
				Northern Fulmar	58
				Shearwaters	71
		Greenland Turbot	62	Short-tailed Albatross	6
				Northern Fulmar	55
	Trawl	Pollock	57	Northern Fulmar	51
				Shearwaters	3
				Murres	3
		Rock Sole	66	Auklets	66
		Yellowfin Sole	127	Northern Fulmar	14
				Shearwaters	69
				Murres	44
	Pot	Pacific Cod	46	Northern Fulmar	11
				Auklets	35
GOA	Hook-and-line	Pacific Cod	84	Laysan Albatross	8
				Black-footed Albatross	8
				Northern Fulmar	12
				Gulls	50
				Auklets	6
		Halibut	150	Black-footed Albatross	33
				Northern Fulmar	19
				Gulls	99
		Sablefish	276	Laysan Albatross	24
				Black-footed Albatross	243
				Gulls	8
	Trawl	Rockfish	20	Northern Fulmar	20
	Pot	Pacific Cod	39	Other Alcids	39
Grand Total					**2,442**

Table 17 Estimated seabird bycatch in Alaska by groundfish and halibut fishery target in 2015.

Fishery					
Region	**Gear**	**Target**	**Total**	**Species/Species Group**	**Number**
BSAI	Hook-and-line	Pacific Cod	4,051	Laysan Albatross	38
				Northern Fulmar	2,696
				Shearwaters	233
				Gulls	925
				Kittiwakes	12
				Unidentified Birds	147
		Halibut	15	Laysan Albatross	15
		Other Groundfish	4	Unidentified Birds	4
		Sablefish	290	Laysan Albatross	122
				Black-footed Albatross	20
				Northern Fulmar	85
				Shearwaters	26
				Gulls	36
		Greenland Turbot	72	Northern Fulmar	17
				Shearwaters	55
	Trawl	Arrowtooth Flounder	221	Northern Fulmar	221
		Atka Mackerel	92	Northern Fulmar	92
		Pollock	127	Northern Fulmar	112
				Shearwaters	6
				Cormorants	3
				Unidentified Birds	6
		Rockfish	38	Northern Fulmar	38
		Yellowfin Sole	56	Shearwaters	56
	Pot	Pacific Cod	215	Northern Fulmar	195
				Auklets	19
GOA	Hook-and-line	Pacific Cod	60	Northern Fulmar	11
				Gulls	33
				Auklets	11
				Unidentified Birds	5
		Halibut	202	Laysan Albatross	19
				Northern Fulmar	40
				Gulls	142
		Sablefish	575	Laysan Albatross	22
				Black-footed Albatross	344
				Northern Fulmar	36
				Shearwaters	6
				Gulls	110
				Cormorants	28
				Unidentified Birds	28
	Pot	Pacific Cod	39	Auklets	39
Grand Total					**6,057**



** The Observer Program was restructured in 2013.*

Figure 2 Seabird bycatch in Alaska groundfish fisheries (hook-and-line, trawl, and pot) from 1993 through 2015, noting bycatch estimates for all birds (left indices) and for albatross only (right indices). Note the difference in scale. Different data analysis methodologies were used (data from 1993 through 2006 are described in Fitzgerald et al. 2008; data from 2007 through 2015 are from the CAS). The Observer Program was restructured for deployments beginning in 2013 where all catcher/processors had 100 percent coverage, all catcher vessels regardless of length overall were randomly selected, and the Pacific halibut fleet was incorporated into the program.

U.S. Department of Commerce
Wilbur Ross, Secretary

National Oceanic and Atmospheric Administration
Tim Gallaudet, Acting Administrator

National Marine Fisheries Service
Chris Oliver, Assistant Administrator for Fisheries

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