



NOAA Technical Memorandum NMFS-F/AKR-24

doi:10.25923/jtgr-1595

Seabird Bycatch Estimates for Alaska Groundfish Fisheries

2019

U.S. DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Please cite this document as:

Krieger, J.R. and Eich, A.M. 2020. Seabird Bycatch Estimates for Alaska Groundfish Fisheries: 2019. U.S. Department of Commerce, NOAA Technical Memorandum NMFS-F/AKR-24, 40 p.
[doi:10.25923/jtgr-1595](https://doi.org/10.25923/jtgr-1595).

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Introduction

Seabirds are unintentionally caught in commercial fisheries and this unintentional catch is referred to as bycatch. Federal law in the U.S. requires bycatch be minimized to the extent practicable, and specific modifications to fishing gear, deployment of mitigation gear, and practices are required by Federal regulation to reduce seabird bycatch. Off Alaska, most seabird bycatch has historically occurred in fisheries using demersal longline (i.e., hook-and-line) gear. Since 2001, seabird bycatch has decreased in fisheries using demersal longline gear off Alaska as a result of initial volunteer efforts and subsequent good compliance with seabird avoidance regulations established in 2004 (Melvin et al. 2019). While the occurrence of seabird bycatch is now relatively rare given the level of commercial fishing effort off Alaska each year (average of 0.019 birds per 1,000 hooks from 2002 through 2015; Melvin et al. 2019), bycatch of seabirds does occur and remains an issue in the Federal fisheries off Alaska.

NOAA's National Marine Fisheries Service (NOAA Fisheries) annually updates estimates of seabirds caught as bycatch in commercial groundfish and halibut fisheries operating in Federal waters off Alaska. This annual report details seabird bycatch estimates by gear type for the years 2010 through 2019 and supplements the "Seabird Bycatch and Mitigation Efforts in Alaska Fisheries Summary Report: 2007 through 2015" (Eich et al. 2016), which has been supplemented previously with data through 2018 (Krieger et al. 2019). The focus of this report is to add and describe seabird bycatch data for 2019. This report presents bycatch estimates from the following gear types: demersal longline, pelagic trawl, non-pelagic trawl, and pot¹.

Species of Interest

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. On rare occasion, the fisheries using demersal longline gear off Alaska incidentally catch short-tailed albatross. In 2019, NOAA Fisheries continued to monitor bycatch of short-tailed albatross to assess compliance with the incidental take limit established by the U.S. Fish and Wildlife Service (USFWS) in its 2015 biological opinion on the effects of the groundfish fisheries of Alaska on endangered short-tailed albatross (USFWS 2015). USFWS anticipated up to six short-tailed albatross could be reported taken bi-annually (every 2 years) as a result of groundfish fishing activities using demersal longline or trawl gear in the Bering Sea and Aleutian Islands (BSAI) and Gulf of Alaska (GOA) fishery management plan (FMP) areas (Figure 1).

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 (USFWS 2008), which means that without additional conservation efforts, they are likely to become candidates for listing under the Endangered Species Act.

Aside from the endangered short-tailed albatross, two species of eider are also listed under the U.S. Endangered Species Act. These are the threatened spectacled eider (*Somateria fischeri*) and the threatened Alaska-breeding population of Steller's eider (*Polysticta stelleri*). Two other populations of Steller's eider occur in waters off Alaska but only the Alaska-breeding population is listed under the U.S. Endangered Species Act. Prior to 2019, there had been no reported takes of either the spectacled eider or the Alaska-breeding population of Steller's eider by vessels operating in federal fisheries off Alaska. However, in October of 2019, twenty-two spectacled eider fatally collided with a demersal longline vessel from the groundfish fishery of the BSAI. These vessels were not fishing at the time of the bird strike mortality events. Since these birds were not taken by fishing gear, they are not included in the bycatch

¹ This report does not include estimates of seabird bycatch in fisheries using gillnet, seine, troll, or jig gear because NOAA Fisheries does not have independent observer data from these fisheries. These estimates also do not apply to fisheries that are State of Alaska managed.

estimates provided in this report.

At the time this report was published, NMFS had reinitiated formal consultation under section 7 of the ESA with USFWS to ensure that the BSAI and GOA groundfish fisheries are not likely to jeopardize the continued existence of the spectacled eider or adversely modify their designated critical habitat.

Groundfish and Halibut Seabird Working Group

In 2016, NOAA Fisheries established the Alaska Groundfish and Halibut Seabird Working Group to continually review the best available scientific information for methods to reduce bycatch of albatross, eiders, and other seabirds in the Federal fisheries off Alaska. This group continues to meet annually to review seabird bycatch data and trends and to provide recommendations on bycatch mitigation strategies to the North Pacific Fisheries Management Council (NPFMC).

A summary of the Working Groups recommendation is available here:

<https://meetings.npfmc.org/CommentReview/DownloadFile?p=5c2732ea-47a2-49ba-acd0-68309943faaa.pdf&fileName=B2%20NMFS%20Seabird%20Report%20to%20Council.pdf>

Data Sources and Estimation Methods

Data Sources

Total catch estimates in the groundfish and halibut fisheries off Alaska are generated by the NOAA Fisheries Alaska Region Catch Accounting System (CAS) and are used to manage approximately 600 separate groundfish quotas in the BSAI and GOA. The CAS uses information from multiple data sources to estimate total groundfish and halibut catch, including at-sea discards and estimates of bycatch of other species including seabirds. Data from the North Pacific Observer Program (Observer Program), dealer landing reports (also known as fish tickets), and at-sea production reports are combined to provide an integrated data source for fisheries monitoring and within season decision-making. 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. Starting in 2018, NOAA Fisheries integrated electronic monitoring (EM) into the Observer Program and catcher vessels (CVs) that fish with demersal longline gear were able to request entry into the EM sampling stratum. The total number of CVs allowed into the EM stratum was determined by available funding, and vessels that opted into EM were not required to carry an observer (NMFS 2017a). At-sea monitoring data, from both observers and EM, are a key part of the CAS and allow the agency to gain an independent measurement of the amount and types of species caught in the commercial groundfish and halibut fisheries in the BSAI and GOA. Observer data provide a direct estimate of species composition and weight whereas data from EM provide a direct estimate of species counts that are converted to weight. NMFS uses both of these datasets to calculate catch and bycatch rates for unobserved fishing trips.

Observers collect biological samples and fishery-dependent information on total catch and interactions with protected species (AFSC 2019), including fisheries bycatch of seabirds. The Observer Program structures at-sea observer and EM data collection using a statistically reliable sampling design (NMFS 2017a). The CAS uses these monitoring data to estimate seabird mortality, as described in the next section. Information collected by observers and EM 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 by debriefers and by specialists using a subsample of birds collected through the NOAA Pacific Seabird Necropsy Program (necropsy program). The necropsy program provides birds collected by observers from bycatch and ship strikes to a vendor to necropsy and verify the species identification. This process results in making corrections to misidentifications and also more refined species identifications where the observer used a species group code. NOAA Fisheries is currently

revising previous species identifications based on the necropsy verifications. Once updated, future versions of this report will reflect these changes.

As mentioned above, 2018 was the first year that EM was integrated into the Observer Program under regulations. In order to carry an EM system, the vessels must have a NMFS-approved Vessel Monitoring Plan (VMP) that describes how fishing operations on the vessel will be conducted and how the EM system and associated equipment are configured to meet the data collection objectives, including quantification of seabird bycatch. The VMP specifies that if any seabirds are caught, the vessel operators must hold seabirds up to the camera for 2 to 3 seconds and show certain key parts of the animal, such as the beak, to the hauler view camera². The ability to identify seabird species is similar when using observers and EM. During 2016 trials, experts found that protocols for displaying seabirds to the camera and the camera picture quality were sufficient for accurate seabird identification as long as fishermen adhered to the catch handling protocols (NMFS 2017b).

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 longline gear, seabirds may fall off a hook underwater without being seen by the observer or camera. Seabirds that fall off the hooks alongside the vessel but are seen by the observer 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 the trawl warps, 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, to determine the best method to monitor and include them in annual estimates (Fitzgerald et al. in prep).

Estimation Methods

Since 1993, NOAA Fisheries has used two methods to estimate seabird bycatch for the groundfish fisheries.³ From 1993 through 2006, the AFSC produced the seabird bycatch estimates using a ratio estimator (Fitzgerald et al. 2008; AFSC 2014). Since 2007, NOAA Fisheries Alaska Region has produced bycatch estimates using a ratio estimator in the CAS (Cahalan et al. 2014).

In the CAS, NMFS uses observer data to create seabird bycatch rates (a ratio of the estimated bycatch to the estimated total catch in sampled hauls). NMFS uses the observed information from the at-sea samples to create bycatch rates that are applied to unobserved trips. For trips that are unobserved, the bycatch rates are applied to industry supplied landings data of retained catch. Expanding on the observer and EM data that are available, the extrapolation from observed trips to unobserved trips is based on varying levels of aggregated data (post-stratification). NMFS matches data based on processing sector (e.g., catcher/processor [C/P] or CV), 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, 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

² An example VMP template with the specific seabird handling protocols is available at <https://alaskafisheries.noaa.gov/fisheries/electronic-monitoring>

³ Seabird estimation methods were similar to those used for marine mammal bycatch estimation (<http://www.afsc.noaa.gov/Publications/AFSC-TM/NOAA-TM-AFSC-167.pdf>). 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 for 2004 through 2006, respectively. For seabird bycatch estimates of fisheries using trawl gear, the CAS was 7.7 percent higher overall than the previous methods. This difference is likely due to improved ability in the CAS to extrapolate to portions of the fishery that are not directly observed.

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 in this report include some changes from previous reporting, and reflect the most recent data and estimates of the CAS. Additionally, within this report minor differences in the bycatch numbers may exist due to rounding.

For estimation, analysis, and reporting of seabird bycatch, many of the species categories identified by observers and EM are consolidated into a larger group (Table 1). This includes codes for birds that are not identifiable further than the following species groups: albatross, shearwaters, storm petrel, murre, puffin, murrelet, alcid, and unidentified gulls. For example, in this report the species group “Gull” includes all Laridae except kittiwakes, which are reported separately due to conservation interest (especially for red-legged kittiwakes). Most gulls that observers or the necropsy program identify to a specific code within this group are glaucous, glaucous-winged, or herring gulls. Gulls that observers or the necropsy program could not identify to a specific code are classified as unidentified gulls. Many of the unidentified gulls were juveniles that lack certain distinguishing features present on adults. Other birds are a group of miscellaneous birds that could be identified as loon, grebe, seaduck, jaeger/skua, or tern. Unidentified birds could be any of the seabird species listed in Table 1 that the observer could not identify.

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 (CV or CP). Vessels are either in a full coverage category (CPs, with some exceptions) and take an observer on all trips, or in the partial coverage category (CVs, with some exceptions) and take observers on a random selection of their fishing trips. This was an important change that increased the statistical reliability of data collected by the program. Second, the restructured program expanded observer coverage to previously unobserved fisheries including the Pacific halibut longline 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 the CAS provide information on numbers of seabird bycatch per metric ton of catch, but this metric is different from how seabird bycatch rates are typically reported in other regions and countries. For example, the international reporting standard for fisheries using longline 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 longline gear are provided by Melvin et al. (2019) and are also included in the summary bycatch report (Eich et al. 2016).

Results and Discussion

This report estimates seabird mortality associated with Federal groundfish (2010 through 2019) and halibut (2013 through 2019) fisheries off Alaska and provides detailed descriptions of bycatch in 2019. First, seabird bycatch estimates are provided for all gear types (longline, trawl, and pot) in the combined GOA and BSAI FMP reporting areas (Figure 1) and for each year (Table 2). Second, demersal longline bycatch estimates for the combined BSAI and GOA FMP areas (Table 3) are provided, followed by demersal longline bycatch estimates separated by major FMP area (Table 4 through Table 6), and then separated by harvest sector (CVs) and catcher processors (C/Ps), (Table 7). Third, the combined trawl fleet bycatch is shown (Table 8). Fourth, trawl bycatch separated by FMP area (BSAI or GOA) and gear type (pelagic or non-pelagic) is shown (Table 9 through Table 11). Seabird bycatch estimates for the pot fishery are

reported in Table 12. Finally, Table 13 provides seabird bycatch estimates by area, gear, target, and species or species group for 2010 through 2019.

All Gear Types and Fisheries

The 2019 estimated seabird bycatch for the combined groundfish and halibut fisheries (8,846 birds) was above the 2010 through 2019 annual average of 6,738 birds. Figure 2 depicts estimated seabird bycatch in the groundfish fisheries from 1993 through 2019 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 2019. The notable decline in estimated seabird bycatch in 2002 was due to the voluntary deployment of streamer lines as bird deterrents (Melvin et al. 2001) on many demersal longline vessels. From 2002 through 2004, staff from NMFS and the Washington Sea Grant program partnered with commercial fishing vessels (primarily from the freezer longline fleet) to develop best practices and encourage industry buy in on the use of streamer lines as bird deterrents (for further detail, see Eich et al. 2016). Seabird mitigation measures for longline vessels were implemented by regulations in 2004 and required paired or single streamer lines for vessels larger than 55 feet length overall, which accounted for the vast majority of seabird bycatch.⁴ Since then, annual seabird bycatch in the fisheries using demersal longline gear has remained below 10,000 birds, dropping as low as 2,100 birds in 2014 (Table 3).

In an analysis of 2019 seabird bycatch prepared for this paper, 71 percent (6,256 birds) of estimated seabird bycatch occurred in the Bering Sea, 22 percent (1,923 birds) in the Aleutian Islands, and 7 percent (667 birds) in the GOA. These proportions of seabird bycatch from the BS and GOA are lower compared to their 2010 through 2018 average proportions (Bering Sea [76 percent]; GOA [15 percent]). The proportion of seabird bycatch from the AI is higher than its 2010 through 2018 average (Aleutian Islands [9 percent]; Figure 3).

Seabird bycatch estimates in 2019 were dominated by shearwaters (Family Procellariidae; 58 percent; Table 2; Figure 4). Estimated shearwater bycatch (5,103 birds) is more than 5 times greater than the 2010 through 2018 average (957 birds per year). This is the highest estimated bycatch of shearwaters reported in the Federal fisheries off Alaska. The unusually high amount of shearwater bycatch in 2019 corresponds to the shearwater mortality event observed throughout Alaska that year. It is believed that changing ocean conditions have resulted in depleted food resources for shearwaters causing them to more aggressively target fishing vessels and fishing bait (USFWS 2019). Shearwater bycatch increased by an estimated 700 percent from 2018 to 2019. Shearwater bycatch has ranged from 3 percent to 58 percent of the total estimated seabird bycatch from 2010 through 2019. Average annual mortality for shearwaters from 2010 through 2019 has been 1,372 birds. The total worldwide population of short-tailed shearwaters (*Ardenna tenuirostris*) and sooty shearwaters (*Ardenna grisea*) is estimated to be 43 million birds (Denlinger 2006; calculated from Table 2 in Eich et al. 2016).

Consistent with prior years, Northern fulmar (*Fulmarus glacialis*) were among the most commonly encountered seabird bycatch species in 2019 (33 percent of total seabird bycatch; Table 2; Figure 4). Estimated Northern fulmar bycatch (2,929 birds) decreased by 19 percent compared to the 2010 through 2018 average (3,677 birds per year). Fulmar bycatch has ranged from an estimated 33 percent to 65 percent of the total seabird bycatch from 2010 through 2019. Average annual mortality for Northern fulmar since 2010 has been 3,564 birds (2010 through 2019). When compared to the estimated total population size of Northern fulmar in Alaska of 1.4 million birds (Denlinger 2006), observed fisheries account for an annual mortality of 0.25 percent. While this mortality is low, local population depletions could occur if the mortality is colony-specific (Hatch et al. 2010).

In 2019, gulls (Family Laridae) were the third most frequently occurring birds in the bycatch (3 percent of total seabird bycatch; Table 2). Gull bycatch in 2019 (244 birds) was 69 percent lower than in 2018 (781 birds) and was 76 percent lower when compared to the 2010 through 2018 average (1,022 birds per year).

⁴ See regulations at 50 CFR part 679.24(e)(2) for more specific requirements.

Estimated gull bycatch has ranged from 3 percent to 30 percent of the total estimated seabird bycatch from 2010 through 2019. Looking at overall gull bycatch (all gear types, all areas combined) for the last 10 years (2010 through 2019), bycatch levels in 2019 are the lowest during this timeframe (Table 2). Of the various gull species, the estimated total number of breeders in Alaska is roughly 366,100 birds (calculated from Table 1 in Eich et al. 2016 where population numbers were taken from Birds of North America Online – Species Accounts and Kushlan et al. 2002).

Albatross

No takes of short-tailed albatross were observed in the groundfish fisheries in 2019. The incidental take statement in the 2015 biological opinion on the groundfish fisheries anticipated the take of no more than six short-tailed albatross in a 2-year period (either by demersal longline or trawl; USFWS 2015). No observed take of short-tailed albatross has occurred in the groundfish fisheries (either by demersal longline, trawl, or pot) since December 2014.

No takes of short-tailed albatross were observed in the halibut fisheries in 2019. The incidental take statement in the 2018 biological opinion on the halibut fisheries anticipated the take of no more than two short-tailed albatross in a 2-year period (USFWS 2018). No observed take of short-tailed albatross has occurred in the halibut fisheries since 1987. Of note is that prior to the restructuring of the observer program in 2013, the halibut fisheries had no at-sea coverage. Since 2013, at-sea coverage occurs on halibut vessels greater than or equal to 40' LOA.

In addition to the endangered short-tailed albatross, there is also conservation concern for Laysan and black-footed albatross (USFWS 2008). In 2019, 309 albatross (243 black-footed albatross, 52 Laysan albatross, 14 unidentified albatross; Figure 5) were estimated to have been caught in the fisheries off Alaska; a decrease of 39 percent compared to the 2010 through 2018 average (510 birds per year). Laysan albatross bycatch in 2019 was one-sixth the bycatch estimated for this species in 2018 (289 birds), and was 70 percent lower than the 2010 through 2018 average (173 birds). Laysan albatross bycatch has ranged from less than 1 percent to 5 percent of total estimated seabird bycatch since 2010.

Black-footed albatross were the fourth most frequently occurring seabird group in the bycatch (3 percent) in 2019. Black-footed albatross bycatch was 30 percent lower in 2019 (243 birds) compared to 2018 (352 birds). However, black-footed albatross bycatch estimates in 2017 were extremely high (3.93 times greater in 2017 compared to 2016 [201 birds]). The estimated bycatch of black-footed albatross in 2019 was 24 percent less than the 2010 through 2018 average (319 birds per year). Black-footed albatross bycatch has ranged from 1 percent to 9 percent of the total estimated seabird bycatch from 2010 through 2019. The estimated population size of black-footed albatross is 61,700 breeding pairs (Naughton et al. 2007).

As noted earlier, the 2013 through 2019 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. Including these smaller vessels and the halibut fishery provide a better estimate of overall albatross bycatch in Alaska. The estimated 2013 through 2019 albatross bycatch in the sablefish fisheries (2,792 birds) surpassed the estimated bycatch from the halibut fishery (762 birds). Although albatross habitat overlaps with both the sablefish and the halibut fisheries, albatross spend more time over continental shelf break and slope habitat (Fischer et al. 2009; Suryan et al. 2007), which is most commonly associated with the sablefish fishery; the halibut fishery generally occurs in shallower water on the shelf. Thus, more interactions between albatross and sablefish vessels would be expected, unless albatross or fisheries shift their distribution in a given year.

Demersal Longline Gear

Based on standard observer sampling protocols, demersal longline gear in Alaska groundfish fisheries accounted for 78 percent of the estimated seabird mortality in 2019 (6,873 birds), which is comparatively lower than the average estimated seabird mortality from 2010 through 2018 (88 percent; range 76 to 96

percent).

From 2010 through 2019, most of the demersal longline gear estimated seabird bycatch occurred in the Bering Sea (81 percent) when compared to the Aleutian Islands (5 percent) and GOA (14 percent). In fact, most (70 percent) of the total (all gear types) seabird bycatch off Alaska occurred in the Bering Sea fisheries using demersal longline gear (range 55 percent to 86 percent from 2010 through 2019).

Consistent with results for all gear types combined, most 2019 estimated seabird bycatch by demersal longline gear was shearwaters (51 percent; 3,497 birds); Northern fulmar (38 percent; 2,588 birds); and gulls (4 percent; 244 birds; Table 3; Figure 6). While estimated bycatch of shearwaters in 2019 was the highest reported in the time series, total bycatch of Northern fulmar and gulls was comparatively lower when compared to the 2010 through 2018 times series average.

Estimates of seabird bycatch were also analyzed to compare C/Ps and CVs. In the BSAI, 99 percent of the total estimated seabird bycatch for vessels using demersal longline gear occurred on C/Ps in 2019 (6,327 birds). This is slightly higher than 2010 through 2018 time series average (96 percent; 4,654 birds; range of 1,427 to 8,831 birds). Northern fulmar, shearwaters, and gulls accounted for 96 percent of total estimated bycatch for C/Ps in 2019 (2,454; 3,437; 186 birds, respectively). On CVs, Northern fulmar accounted for 35 of the 37 total estimated seabirds caught as bycatch in the BSAI in 2019 (Table 7).

In the GOA, 86 percent of total estimated seabird bycatch for vessels using longline gear occurred on CVs in 2019 (423 birds). This proportion is similar to the 2010 through 2018 average (746 birds; 87 percent). Black-footed albatross, gulls, and Northern fulmar were the three most prevalent seabird bycatch species for CVs in 2019 (221; 32; 82 birds, respectively; Table 7). The difference in proportion of seabird bycatch attributed to CVs and C/Ps in the BSAI and GOA is most likely a reflection of the differences in fleet characteristics between the two regions. In the BSAI, most of the longline effort is by C/Ps targeting Pacific cod, while in the GOA, most of the longline effort is by CVs targeting halibut, sablefish, and Pacific cod.

Of the demersal longline fisheries that have seabird bycatch, the bulk of recent fishery effort in the Bering Sea occurs in the Pacific cod demersal longline fleet (Eich et al. 2016). While this fishery accounts for the greatest amount of seabird bycatch (2010 through 2019 average of 68 percent), it captures an average of 8 percent of the total albatross bycatch. However, nearly all of the estimated short-tailed albatross takes that have occurred since 2003 have been in the Pacific cod demersal longline fleet (24 of the total 31 birds), while the remainder were taken in the Greenland turbot demersal longline fishery. As noted earlier, no endangered short-tailed albatross takes by demersal longline gear were observed in 2019 in the Federal fisheries off Alaska.

Trawl Gear

When discussing 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, i.e., birds caught in the net and brought aboard the vessel. A number of efforts are underway to better understand 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 bycatch related to trawl gear constitutes about 12 percent (range 4 to 22 percent) of the overall estimated 2010 through 2019 seabird bycatch (Table 2 and Table 8). The 2019 proportion of estimated seabird bycatch attributed to the fisheries using trawl gear is the highest in the 2010 through 2019 time series (22 percent, 1,939 birds).

Similar to demersal longline gear described above, shearwaters dominate the estimated bycatch of seabirds from trawl gear in 2019 followed by Northern fulmar (Table 8). There is substantial inter-annual variability in bycatch of shearwaters (average of 326; range of 1 to 1,606 birds) and Northern fulmar (average of 357 birds; range of 85 to 503 birds) from 2010 through 2019 (Figure 7). This year (2019) was the first year in the current time series that kittiwakes (Genus *Rissa*) and puffin (Family Auk) bycatch

occurred in this fishery. An estimated 14 kittiwakes and 5 puffins were taken from the BSAI pelagic pollock trawl fishery.

Most estimated seabird bycatch taken by trawl gear occurs in the BSAI, averaging 90 percent of the trawl seabird bycatch from 2010 through 2019 (Table 9). Only a minimal amount of estimated Northern fulmar, black-footed-albatross, and shearwater bycatch is attributed to trawl gear in the GOA from 2010 through 2019 (Table 10).

Albatross bycatch in Alaska groundfish trawl fisheries is generally rare. No endangered short-tailed albatross takes by trawl gear have been observed in the Federal fisheries off Alaska. 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. In 2019, an estimated three Laysan albatross were taken in the trawl fishery (Table 13). In 2018, an unprecedented estimate of 93 Laysan albatross were taken in the rockfish fishery in the BSAI. From 2010 through 2017, no Laysan albatross were reported for any trawl fishery. The reasons for this high Laysan albatross estimate in 2018 are unclear. Prior to 2007, only Laysan or unidentified albatross were observed in fisheries using trawl gear (Fitzgerald et al. 2008). However, although not currently captured in the data, at-sea observers have reported Laysan albatross mortalities from gear collisions (primarily third wires) throughout the period reported here (Shannon Fitzgerald, AFSC, unpublished data). The AFSC is designing protocols to capture these reports and extrapolate the mortalities to the fleet.

No prominent differences exist between seabird bycatch in 2019 versus 2010 through 2018 for pelagic and non-pelagic trawl gear with the exception of the substantial increase in shearwater bycatch (Table 11). For 2010 through 2019, non-pelagic gear accounted for 85 percent of trawl seabird mortality. Non-pelagic gear had greater estimated seabird bycatch in 2019 (1,799 birds) which is the highest reported bycatch estimated in the 2010 through 2019 time series. Shearwater bycatch constituted 87 percent of the overall non-pelagic trawl gear bycatch in 2019 (1,596 birds). For 2010 through 2019, seabird bycatch in pelagic gear ranged from 42 to 232 birds (average of 115 birds). The first reported take of an albatross from pelagic trawl gear occurred in 2019 (3 Laysan albatross). From 2010 through 2019, most bycatch of all albatross (alcids), shearwaters, and gulls occurred in non-pelagic gear.

Less than 4 percent of the total estimated seabird bycatch from trawl fisheries from 2010 through 2019 occurred on CVs (333 birds). As such, a comparison analysis of CVs to C/Ps was not done for this gear type.

Pot Gear

Pot gear remains the gear type with the least amount of estimated seabird bycatch (Table 12), representing an average of 2.3 percent of the total seabird bycatch from all gear types from 2010 through 2019 (range 0.4 to 7.4 percent). The 2019 estimated seabird bycatch from pot gear (33 birds) was 0.37 percent of the total from all gear types, which was lowest in the 2010 through 2019 time series (next lowest was 0.38 percent in 2011). Seabird bycatch in pot fisheries occurs primarily in the BSAI with very little bycatch occurring in the GOA. In 2019, all estimated seabird bycatch by pot gear occurred in the BSAI. No birds were estimated to have been taken as bycatch by pot gear in the GOA in 2019.

Only Northern fulmars, shearwaters, gulls, murre, and alcids have been taken as bycatch in pot fisheries. It is likely that the surface and near-surface foragers (Northern fulmars, shearwaters, and gulls) are actually “captured” in pots as a result of collisions with pots on deck during bad weather, or by birds that wander into a pot on deck (as reported by several fisheries observers), and are then in the pot as it is deployed. Diving birds may enter a pot while it is fishing. Some of these birds may be regurgitated from Pacific cod stomachs when the cod are captured. Observers have collected full-sized murre (*Uria* spp.) and tufted puffins (*Fratercula cirrhata*) from Pacific cod stomachs and some seafood processing plants also reported small alcids in cod stomachs (Shannon Fitzgerald, AFSC, unpublished data), so this might be a contributing factor.

Annual Variation

A variety of factors could influence seabird bycatch and our ability to accurately estimate bycatch, including changes in fishing behavior, implementation of seabird avoidance gear, observer coverage, seabird distribution, population trends, prey availability, and other ecosystem changes. 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. Fishermen have noted in some years that the birds appear “starved” and attacked baited demersal longline gear more aggressively (AFSC 2014). This behavior was again observed in 2019 when large numbers of shearwaters were caught in demersal longline gear. This large uptick in shearwater bycatch corresponded to a large shearwater mortality event that occurred throughout Alaska. Upon examining the carcasses, starvation and possible exposure to saxitoxin (a biotoxin associated with paralytic shellfish poisoning) were determined to be the probable cause of death (USFWS 2019). In 2014, seabird bycatch off Alaska was at its lowest levels from 2010 through 2019 (driven by lower Northern fulmar and gull bycatch), but albatross numbers were still comparable to the 2010 through 2018 annual average of 509 birds. This could indicate poor ocean conditions in the North Pacific as albatross traveled from their nesting grounds (Hawaiian Islands for black-footed and Laysan albatross) to Alaska.

The demersal longline fishery off Alaska typically dominates the overall estimated bycatch trends, although we have previously noted the bias in reported trawl-related mortality estimates (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. These changes in fishing effort can affect bycatch numbers.

Seabird bycatch is best characterized as having a high degree of inter-annual variability (Figure 2). Large variation in overall seabird bycatch occurred between 2010 and 2019, with the largest change from one year to the next totaling 4,704 birds between 2010 and 2011 (Table 2). This variation could indicate changes in food availability rather than drastic changes in how well the fleet employs mitigation gear. A focused investigation of the relationship between food availability and 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.

Variation in seabird bycatch is largely driven by the demersal longline fisheries. The increased seabird bycatch estimated in the fisheries using demersal longline gear from 2018 to 2019 was due to an increase in shearwaters (from 640 birds to 3,497 birds). However, bycatch of Northern fulmar, gulls, and Laysan albatross in the fisheries using demersal longline gear decreased from 2018 to 2019 (Northern fulmar from 2,795 birds to 2,588 birds, gulls from 780 birds to 244 birds, and Laysan albatross from 196 birds to 48 birds).

An important aspect of these data is that the Observer Program was restructured in 2013 when observers were placed on vessels less than 60 feet length overall (for demersal longline, trawl, and pot gear) for the first time and also first began observing 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.

Further reducing seabird bycatch is quite challenging given the already relatively rare nature of bycatch events. Dietrich and Fitzgerald (2010) found in an analysis of 35,148 Pacific cod demersal longline sets from 2004 to 2007 that the most common species caught as bycatch, the Northern fulmar, only occurred in 2.5 percent of all observed 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, sablefish, and

halibut demersal longline—the average annual seabird bycatch for 2010 through 2018 was 4,521, 719, and 316 birds per year, respectively. In 2019, the Pacific cod, sablefish, and halibut demersal longline estimated seabird bycatch was similar with 6,385, 441, and 34 birds, respectively Table 13).

Focusing solely on the bycatch of albatross (unidentified, short-tailed, Laysan, and black-footed), the Pacific cod, sablefish, and halibut fisheries using demersal longline gear average 37, 359, and 76 albatross per year, respectively, for 2010 through 2019 (average for halibut fisheries calculated for 2013 through 2019). Seabird bycatch levels and rates are highly variable among years; however, sablefish has higher estimated albatross bycatch relative to other fisheries. Therefore, future conservation efforts for mitigating albatross bycatch should focus on the sablefish fleet for maximum benefit. For endangered species bycatch, the focus should remain on the Pacific cod fleet; however, the average estimated mortality (2010 through 2019) is about 2 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 2 short-tailed albatross were recorded taken in 2014 (only 1 bird was in the observer sample). When expanded by the CAS, the average estimated mortality (2010 through 2019) across the Greenland turbot fishery is less than 1 short-tailed albatross per year.

Acknowledgments

Special thanks to the NOAA Fisheries North Pacific Observer Program, especially the observers who collect data on bycatch of marine species, including seabirds and all the staff who train, debrief, and complete quality control measures. In parallel, thanks are also given to the vessel and plant owners, officers, and crew who host observers and who also provide the fishery catch data. Many thanks to the NOAA Fisheries Alaska Regional Office Catch Accounting Staff for generating seabird bycatch estimates. Earlier estimates were provided by Michael Perez of the AFSC Marine Mammal Laboratory. Thank you to the Alaska Groundfish and Halibut Seabird Working Group for your comments and insights. Thank you to the AFSC, USFWS, Washington Sea Grant, the commercial demersal longline industry, and other researchers for their seabird and fisheries bycatch mitigation work that has led to lower numbers of seabird bycatch on Alaska fishing grounds. NOAA Fisheries reviewers include Shannon Fitzgerald and Phil Ganz. Thank you to the fishermen, fishing communities, and fishing industry for their continued dedication to minimizing interactions between commercial fisheries and seabirds.

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Figures

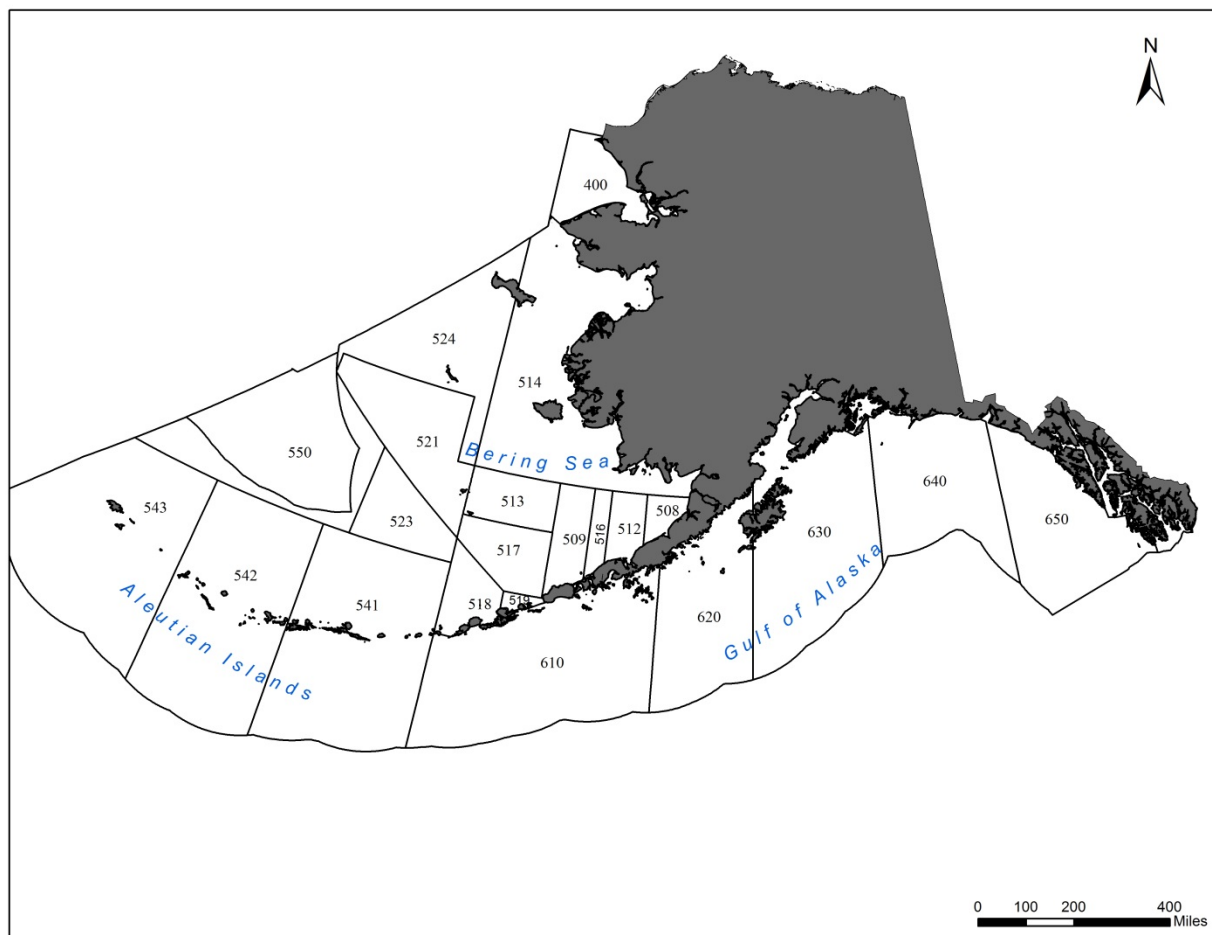


Figure 1 Boundary areas of Bering Sea, Aleutian Islands, and Gulf of Alaska reporting areas. Aleutian Islands includes areas 541 through 543, Bering Sea includes areas north of the Alaska Peninsula, and Gulf of Alaska includes areas south of the Alaska Peninsula.

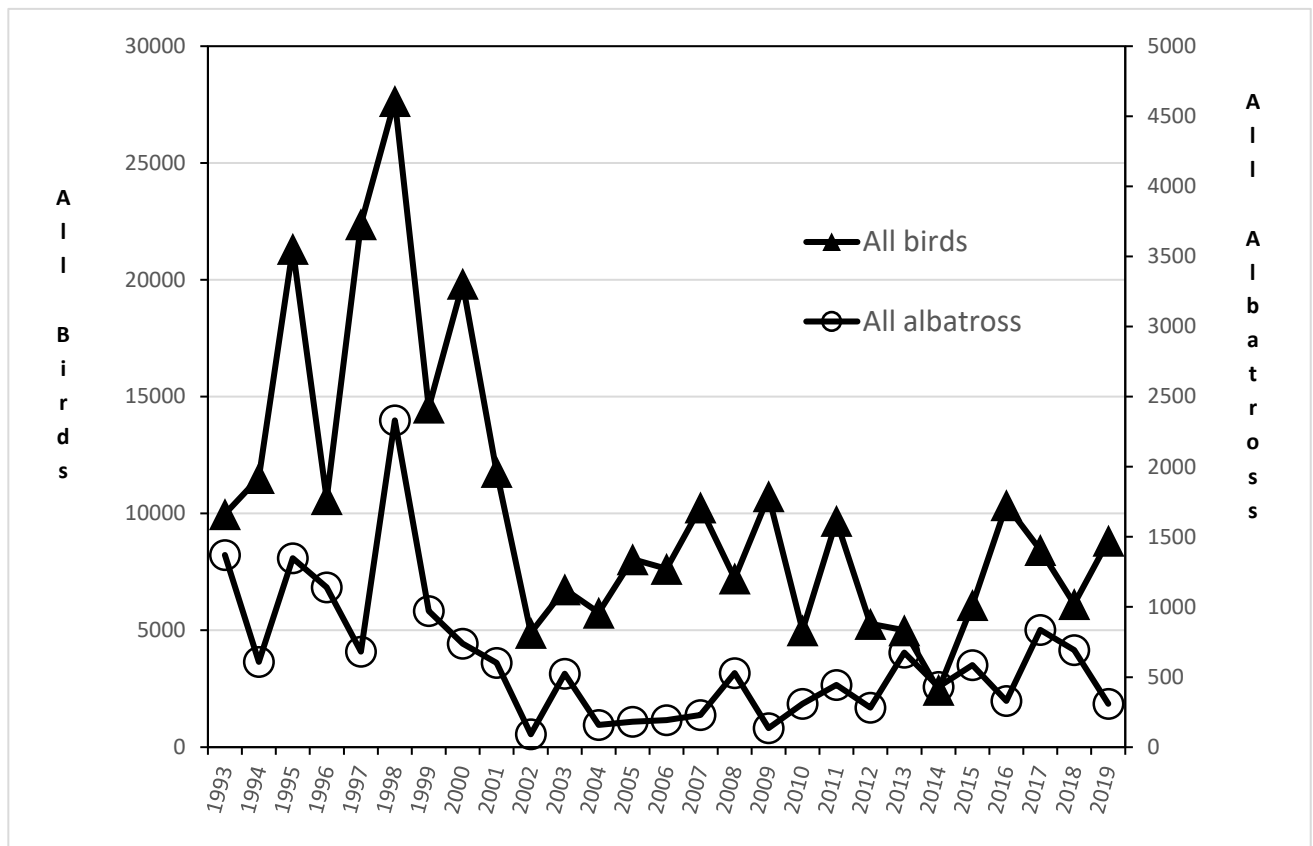


Figure 2 Seabird bycatch in Alaska groundfish fisheries (demersal longline, trawl, and pot) from 1993 through 2019 and halibut fisheries from 2013 through 2019, noting bycatch estimates for all birds (left indices; black triangles) and for albatrosses only (right indices; hollow circles). Note the difference in scale. Different data analysis methodologies were used (data from 1993 through 2006 are described in Fitzgerald et al. 2008; data from 2007 through 2019 are from the CAS). The Observer Program was restructured for deployments beginning in 2013 where most C/Ps had 100 percent coverage, most CVs (over 40 ft. length overall) were randomly selected, and the Pacific halibut fleet was incorporated into the program.

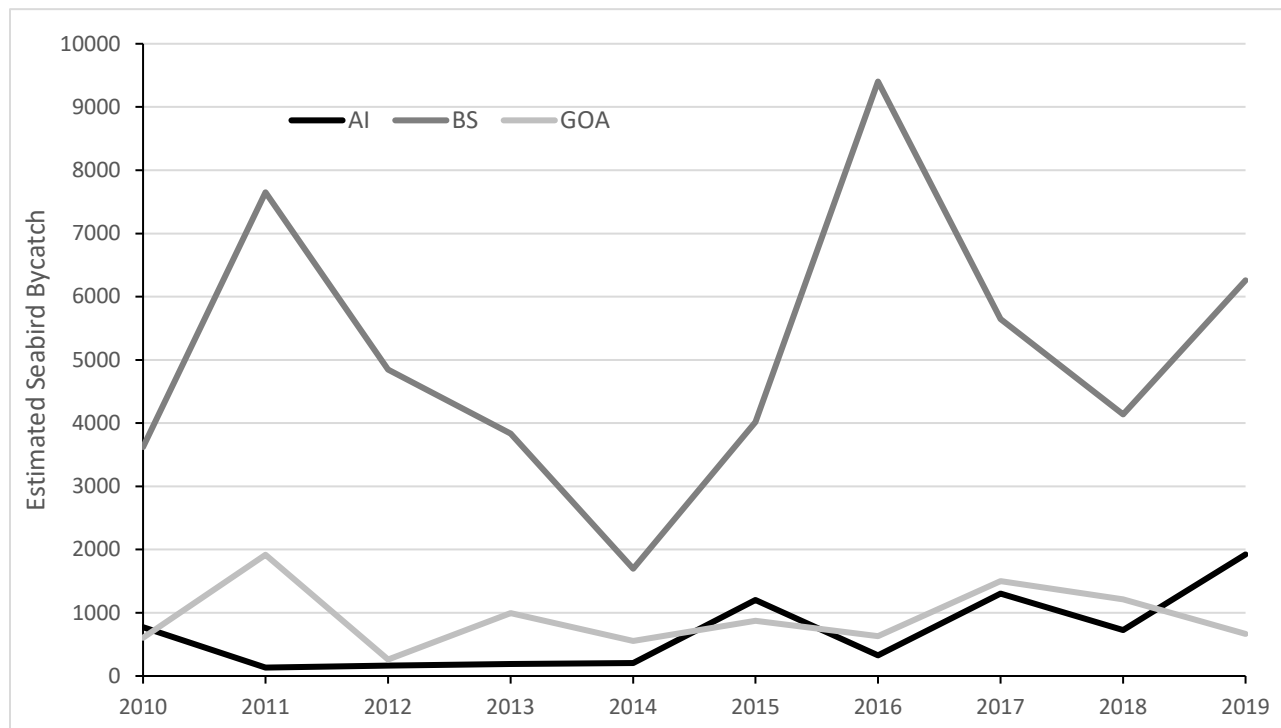


Figure 3 Estimated seabird bycatch in Alaska groundfish and halibut fisheries from 2010 through 2019, separated by region (Aleutian Islands [AI], Bering Sea [BS], and Gulf of Alaska [GOA]; halibut fisheries 2013 through 2019 only).

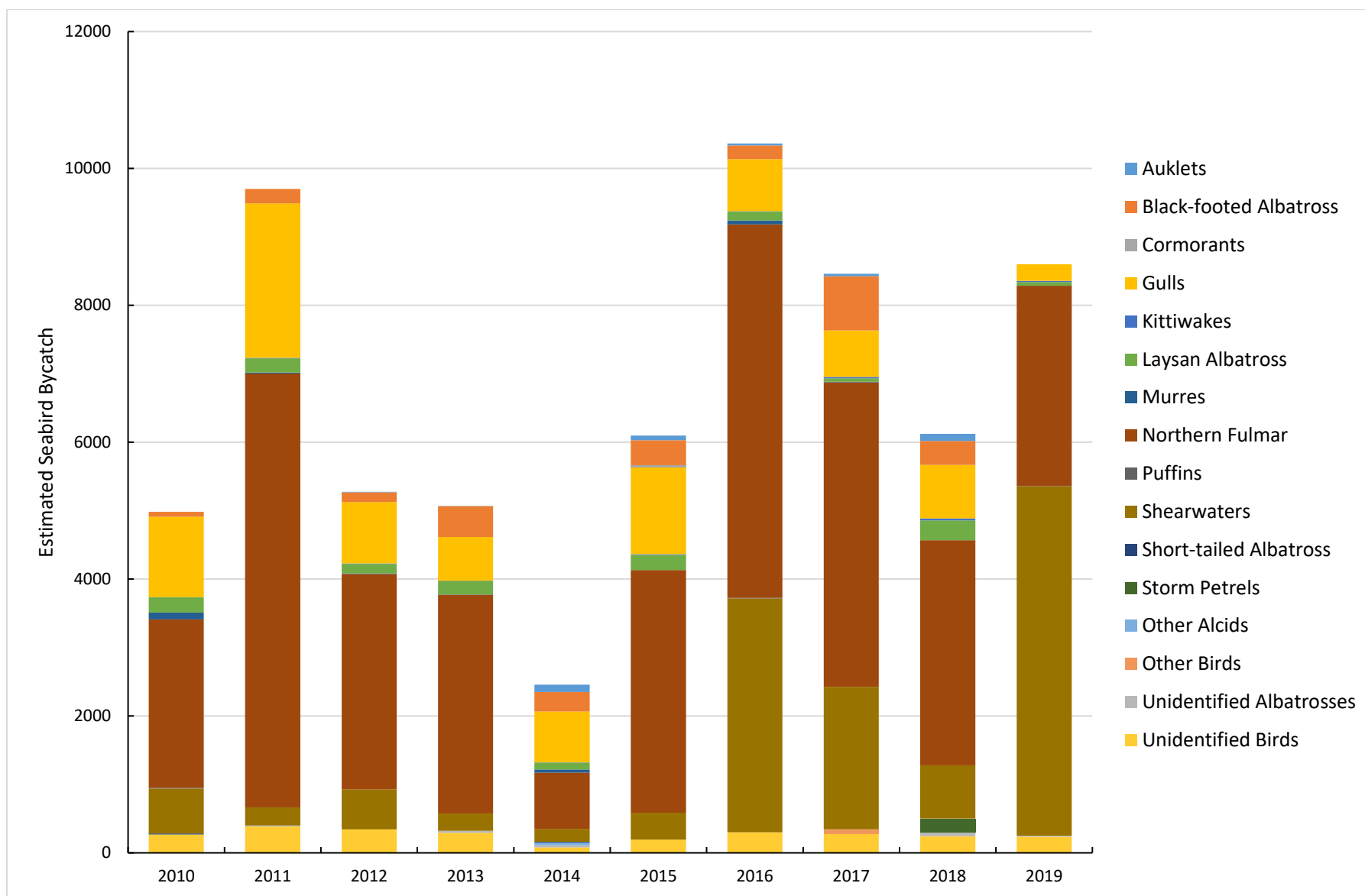


Figure 4 Estimated proportions of species / species groups of seabird bycatch in Alaska groundfish and halibut fisheries from 2010 through 2019 (halibut fisheries 2013 through 2019 only).

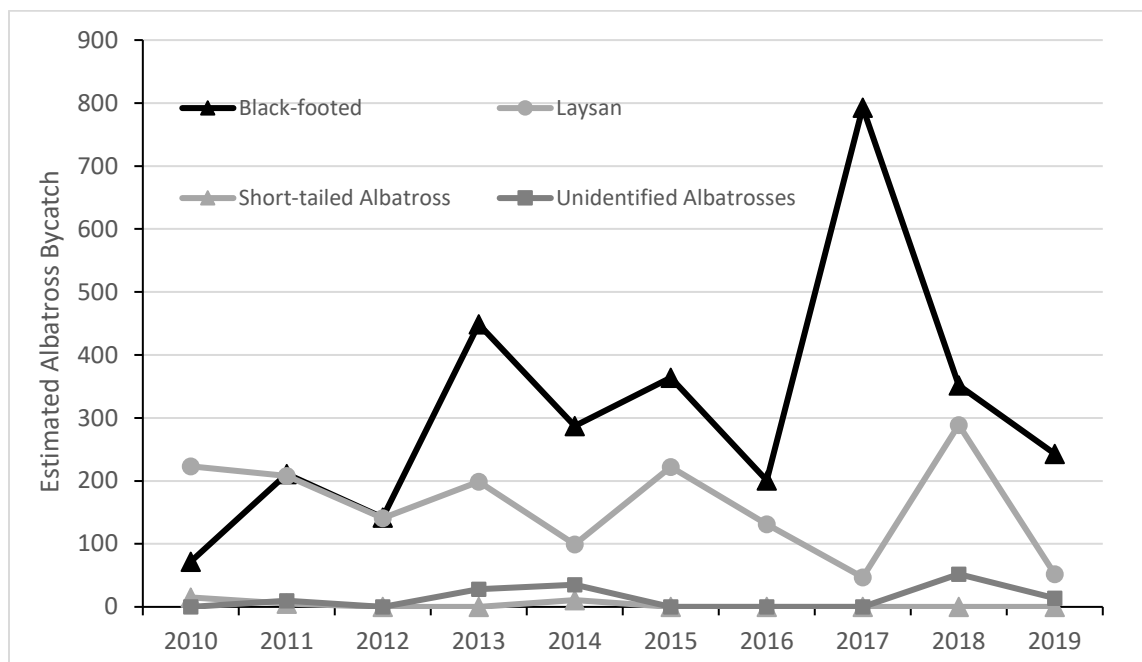


Figure 5 Estimated albatross bycatch in Alaska groundfish and halibut fisheries from 2010 through 2019 (halibut fisheries 2013 through 2019 only). Black-footed albatross denoted by black triangles, Laysan albatross by gray circles, short-tailed albatross by grey triangles and unidentified albatross by charcoal squares.

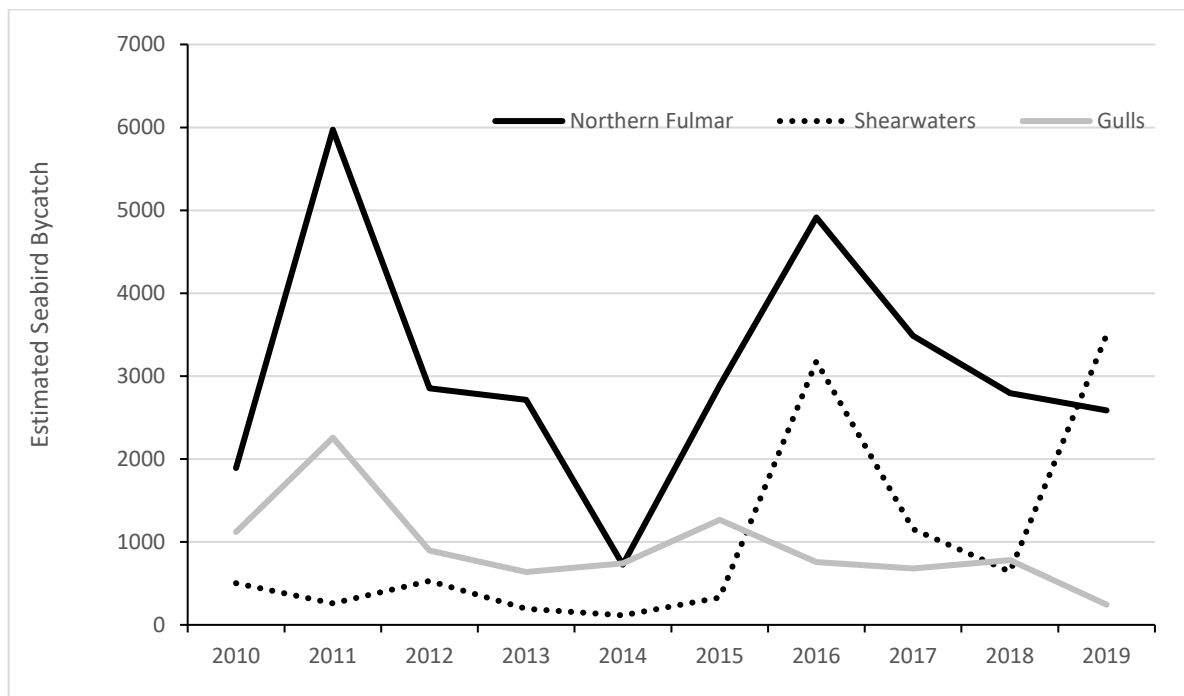


Figure 6 Estimated seabird bycatch of Northern fulmar, shearwaters, and gulls in Alaska demersal longline groundfish and halibut fisheries, all fishery management plan areas combined, from 2010 through 2019 (halibut fisheries 2013 through 2019 only).

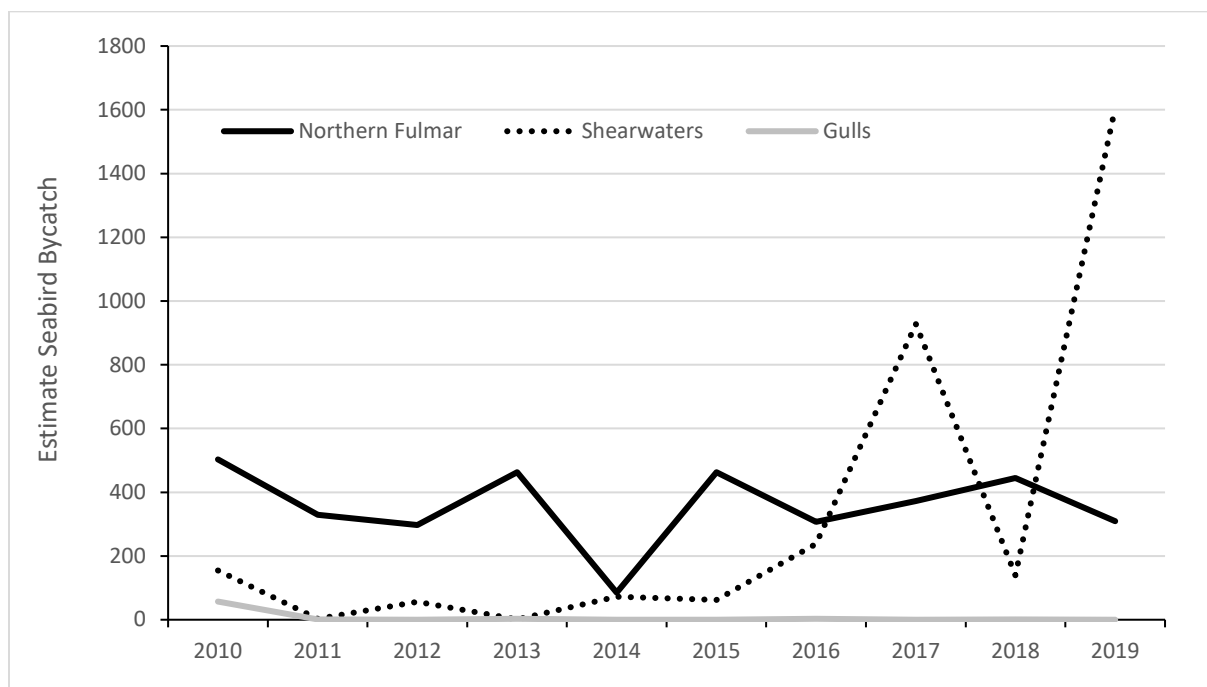


Figure 7 Estimated seabird bycatch of Northern fulmar, shearwaters, and gulls in Alaska trawl fisheries, all fishery management plan areas combined, from 2010 through 2019.

Tables

Table 1 Species and species group categories used in this 2019 annual report¹ and the individual species included in the grouping (adapted from Fitzgerald 2011a).

Species/species Group	Includes	Classification
Short-tailed Albatross	n/a	<i>Phoebastria albatrus</i>
Laysan Albatross	n/a	<i>Phoebastria immutabilis</i>
Black-footed Albatross	n/a	<i>Phoebastria nigripes</i>
Unidentified Albatross	Short-tailed, Laysan, or black-footed	n/a
Northern Fulmar	n/a	<i>Fulmarus glacialis</i>
Shearwaters	Unidentified shearwater	<i>Ardenna</i> or <i>Puffinus</i> spp.
	Sooty shearwater	<i>Ardenna grisea</i>
	Short-tailed shearwater	<i>Ardenna tenuirostris</i>
	Unidentified dark shearwater	<i>A. grisea</i> or <i>A. tenuirostris</i>
	Unidentified procellarid	Procellariiformes
Storm Petrel	Unidentified storm petrel	<i>Oceanodroma</i> spp.
	Fork-tailed storm petrel	<i>O. furcata</i>
	Leach's storm petrel	<i>O. leucorhoa</i>
Gull	Unidentified gull	Family Laridae
	Herring gull	<i>Larus argentatus</i>
	Glaucous gull	<i>Larus hyperboreus</i>
	Glaucous-winged gull	<i>Larus glaucescens</i>
	Slaty-backed gull	<i>Larus schistisagus</i>
	Gull hybrid	Family Laridae
Kittiwake	Black-footed kittiwake	<i>Rissa tridactyla</i>
	Red-legged kittiwake	<i>Rissa brevirostris</i>
Murre	Unidentified murre	<i>Uria</i> spp.
	Thick-billed murre	<i>Uria lomvia</i>
	Common murre	<i>Uria aalge</i>
Puffin	Unidentified puffin	<i>Fratercula</i> spp.
	Horned puffin	<i>F. corniculata</i>
	Tufted puffin	<i>F. cirrhata</i>
	Rhinoceros auklet	<i>Cerorhinca monocerata</i>
Auklet	Unidentified murrelet or auklet murrelet	Several genera <i>Brachyramphus</i> spp. and others
	Auklet	<i>Aethia</i> spp. and others
Other Alcid	Unidentified alcid	<i>Alcidae</i>
	Guillemot, unidentified	<i>Cephus</i> spp.
Cormorant	Unidentified cormorant	Family Phalacrocoracidae
	Pelagic cormorant	<i>Phalacrocorax pelagicus</i>
	Red-faced cormorant	<i>Phalacrocorax urile</i>
Other Birds	Miscellaneous birds – could include:	
	Loon	Family Gaviidae
	Grebe	Family Podicipedidae
	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 Observer Sampling Manual (AFSC 2019).

Table 2 Total estimated seabird bycatch in Alaska Federal groundfish and halibut fisheries, all gear types and fishery management plan areas combined, 2010 through 2019. Halibut fisheries 2013 through 2019 only. The Observer Program was restructured in 2013.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Unidentified Albatrosses	0	10	0	28	35	0	0	0	52	14	14
Short-tailed Albatross	15	5	0	0	11	0	0	0	0	0	3
Laysan Albatross	223	208	141	200	99	221	131	47	289	52	161
Black-footed Albatross	72	211	142	449	284	364	201	790	352	243	311
Northern Fulmar	2,472	6,337	3,148	3,197	822	3,546	5,452	4,441	3,290	2,929	3,564
Shearwaters	657	264	585	253	187	392	3,416	2,082	779	5,103	1,372
Storm Petrels	0	0	0	0	0	0	0	0	197	0	20
Gulls	1,176	2,258	898	584	742	1,265	758	680	781	244	945
Kittiwakes	0	6	5	3	4	12	5	22	30	19	11
Murres	102	14	6	3	47	0	58	10	0	0	24
Puffins	9	0	0	0	0	0	10	0	0	5	2
Auklets	0	0	7	4	107	69	29	36	103	0	36
Other Alcids	0	0	0	0	39	0	0	0	5	0	4
Cormorants	0	0	0	0	0	31	0	0	0	0	3
Other Birds	0	0	0	0	0	0	0	63	0	0	6
Unidentified Birds	270	387	343	295	78	193	301	279	245	236	262
Grand Total	4,996	9,700	5,275	5,016	2,455	6,093	10,361	8,450	6,123	8,846	6,738

Table 3 Summary of estimated seabird bycatch in the Alaska demersal longline groundfish and halibut fisheries, all fishery management plan areas combined, 2010 through 2019. Halibut fisheries 2013 through 2019 only.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Unidentified Albatrosses	0	10	0	28	35	0	0	0	52	14	14
Short-tailed Albatross	15	5	0	0	11	0	0	0	0	0	3
Laysan Albatross	223	208	141	199	99	222	131	47	196	48	151
Black-footed Albatross	72	211	82	449	287	364	201	793	352	243	305
Northern Fulmar	1,893	5,972	2,851	2,714	726	2,888	4,914	3,484	2,795	2,588	3,083
Shearwaters	502	261	529	195	115	330	3,178	1,155	640	3,497	1,040
Gulls	1,119	2,257	898	636	743	1,267	756	680	780	244	938
Kittiwakes	0	6	5	3	4	12	5	22	30	6	9
Murres	0	0	6	0	0	0	0	9	0	0	2
Puffins	9	0	0	0	0	0	10	0	0	0	2
Auklets	0	0	7	0	6	11	0	0	0	0	2
Other Alcids	0	0	0	0	0	0	0	0	5	0	1
Cormorants	0	0	0	0	0	28	0	0	0	0	3
Unidentified Birds	265	387	323	294	78	187	295	279	245	233	259
Grand Total	4,098	9,317	4,842	4,518	2,104	5,309	9,490	6,469	5,095	6,873	5,812

Table 4 Estimated seabird bycatch in the Aleutian Islands area demersal longline groundfish and halibut fisheries, 2010 through 2019. Halibut fisheries 2013 through 2019 only.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Unidentified Albatrosses	0	0	0	0	22	0	0	0	0	0	2
Laysan Albatross	121	12	77	109	50	150	69	14	60	0	66
Black-footed Albatross	0	5	0	12	9	19	0	0	0	0	5
Northern Fulmar	111	21	7	31	55	882	16	169	2	7	130
Shearwaters	13	42	16	0	68	23	0	128	0	334	62
Gulls	176	22	12	29	0	37	4	0	0	6	29
Unidentified Birds	17	0	0	9	0	0	0	11	4	0	4
Grand Total	438	102	112	190	204	1111	89	322	66	347	298

Table 5 Estimated seabird bycatch in the Bering Sea area demersal longline groundfish and halibut fisheries, 2010 through 2019. Halibut fisheries 2013 through 2019 only.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Unidentified Albatrosses	0	0	0	0	13	0	0	0	0	0	1
Short-tailed Albatross	15	5	0	0	11	0	0	0	0	0	3
Laysan Albatross	16	30	48	21	17	30	18	33	105	12	33
Black-footed Albatross	9	2	0	1	9	2	0	0	0	0	2
Northern Fulmar	1,738	5,132	2,825	2,567	641	1,917	4,792	2,978	2,641	2,482	2,771
Shearwaters	489	157	514	195	47	301	3,158	999	584	3,122	957
Gulls	662	1,650	835	420	586	941	602	372	510	182	676
Kittiwakes	0	6	5	3	4	12	5	22	30	6	9
Murres	0	0	6	0	0	0	0	9	0	0	2
Puffins	9	0	0	0	0	0	10	0	0	0	2
Auklets	0	0	7	0	0	0	0	0	0	0	1
Other Alcids	0	0	0	0	0	0	0	0	5	0	1
Unidentified Birds	250	377	290	279	78	154	277	268	78	233	228
Grand Total	3,188	7,359	4,530	3,486	1,406	3,357	8,862	4,681	3,953	6,037	4,686

Table 6 Estimated seabird bycatch in the Gulf of Alaska area demersal longline groundfish and halibut fisheries, 2010 through 2019. Halibut fisheries 2013 through 2019 only.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Unidentified Albatrosses	0	10	0	28	0	0	0	0	58	14	11
Laysan Albatross	85	166	17	69	32	41	44	0	28	36	54
Black-footed Albatross	63	204	82	436	269	343	201	790	300	243	299
Northern Fulmar	54	818	19	117	31	88	103	331	152	99	190
Shearwaters	0	62	0	0	0	5	20	27	57	41	19
Gulls	281	585	51	137	157	287	149	308	271	57	247
Auklets	0	0	0	0	6	11	0	0	0	0	2
Cormorants	0	0	0	0	0	28	0	0	0	0	3
Unidentified Birds	0	9	33	7	0	33	19	0	164	0	29
Grand Total	483	1,854	202	794	495	836	536	1,456	1,030	491	854

Table 7 Estimated seabird bycatch in Alaska demersal longline groundfish and halibut fisheries, by catcher/processors (CP) and catcher vessels (CV), 2010 through 2019. Halibut fisheries 2013 through 2019 only.

Region	Harvest Sector	Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
BSAI	CP	Unidentified Albatrosses	0	0	0	0	17	0	0	0	0	0	2
		Short-tailed Albatross	15	5	0	0	11	0	0	0	0	0	3
		Laysan Albatross	109	39	87	86	30	95	52	9	33	12	55
		Black-footed Albatross	9	4	0	12	0	8	0	0	0	0	3
		Northern Fulmar	1,837	5,130	2,826	2,572	646	2,713	4,740	2,675	2,640	2,454	2,823
		Shearwaters	495	174	528	195	64	309	3,158	1,084	583	3,437	1,003
		Gulls	816	1,657	837	425	579	951	589	372	503	186	692
		Kittiwakes	0	6	5	3	4	12	5	22	30	6	9
		Murres	0	0	6	0	0	0	0	9	0	0	2
		Puffins	9	0	0	0	0	0	10	0	0	0	2
		Auklets	0	0	7	0	0	0	0	0	0	0	1
		Other Alcids	0	0	0	0	0	0	0	0	5	0	1
		Unidentified Birds	263	377	289	270	76	153	277	246	81	232	226
		Total	3,553	7,392	4,585	3,563	1,427	4,241	8,831	4,417	3,875	6,327	4,821
	CV	Unidentified Albatrosses	0	0	0	0	18	0	0	0	0	0	2
		Laysan Albatross	29	3	37	45	37	85	35	38	131	0	44
		Black-footed Albatross	0	3	0	1	16	13	0	0	0	0	3
		Northern Fulmar	13	23	6	25	49	85	68	470	3	35	78
		Gulls	23	15	10	19	7	27	17	0	7	1	13
		Puffins	7	24	1	1	51	16	0	43	1	0	14
		Unidentified Birds	4	1	1	18	1	0	0	32	0	1	6
		Total	76	69	55	109	179	226	120	583	142	37	160
GOA	CP	Unidentified Albatrosses	0	6	0	0	0	0	0	0	0	0	1
		Laysan Albatross	26	80	6	0	9	5	1	0	4	3	13
		Black-footed Albatross	10	3	0	14	7	3	28	31	7	22	13
		Northern Fulmar	25	103	9	6	7	14	20	127	6	18	34
		Shearwaters	0	32	0	0	0	3	0	0	5	0	4

GOA	CP	Gulls	134	33	12	18	9	27	14	52	28	25	35
		Auklets	0	0	0	0	4	9	0	0	0	0	1
		Cormorants	0	0	0	0	0	8	0	0	0	0	1
		Unidentified Birds	0	4	13	5	0	4	0	0	0	0	3
		Total	195	261	40	43	36	73	63	210	50	68	104
	CV	Unidentified Albatrosses	0	3	0	28	0	0	0	0	58	14	10
		Laysan Albatross	59	86	11	69	23	36	43	0	24	34	39
		Black-footed Albatross	52	201	81	423	262	340	173	759	294	221	281
		Northern Fulmar	29	715	10	110	24	74	84	205	146	82	148
		Shearwaters	0	30	0	0	0	2	19	27	51	40	17
		Gulls	147	552	39	119	147	260	135	256	243	32	193
		Auklets	0	0	0	0	2	2	0	0	0	0	0
		Cormorants	0	0	0	0	0	20	0	0	0	0	2
		Unidentified Birds	0	6	20	2	0	29	18	0	164	0	24
		Total	287	1,593	161	751	458	763	472	1,247	980	423	746

Table 8 Estimated seabird bycatch for Alaska groundfish fisheries using pelagic and non-pelagic trawl gear combined, all fishery management plan areas combined, 2010 through 2019.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Laysan Albatross	0	0	0	0	0	0	0	0	93	3	10
Black-footed Albatross	0	0	60	0	0	0	0	0	0	0	6
Northern Fulmar	503	329	297	463	85	463	307	372	445	309	357
Shearwaters	155	3	56	1	72	62	238	928	139	1,606	326
Storm Petrels	0	0	0	0	0	0	0	0	197	0	20
Gulls	57	1	0	3	0	0	3	0	1	0	7
Kittiwakes	0	0	0	0	0	0	0	0	0	14	1
Murres	102	14	0	3	47	0	45	1	0	0	21
Puffins	0	0	0	0	0	0	0	0	0	5	1
Auklets	0	0	0	4	66	0	0	0	103	0	17
Cormorants	0	0	0	0	0	3	0	0	0	0	0
Other Birds	0	0	0	0	0	0	0	63	0	0	6
Unidentified Birds	3	0	0	0	0	6	6	0	0	3	2
Grand Total	820	347	413	474	270	534	599	1,364	978	1,940	774

Table 9 Estimated seabird bycatch for the Alaska groundfish Bering Sea and Aleutian Islands fishery management plan area, pelagic and non-pelagic trawl gear combined, 2010 through 2019.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Laysan Albatross	0	0	0	0	0	0	0	0	93	3	10
Northern Fulmar	383	302	297	320	65	463	307	328	262	251	298
Shearwaters	155	3	56	1	72	62	238	928	139	1,487	314
Storm Petrels	0	0	0	0	0	0	0	0	197	0	20
Gulls	57	1	0	3	0	0	3	0	1	0	7
Kittiwakes	0	0	0	0	0	0	0	0	0	14	1
Murres	102	14	0	3	47	0	45	1	0	0	21
Puffins	0	0	0	0	0	0	0	0	0	5	1
Auklets	0	0	0	4	66	0	0	0	103	0	17
Cormorants	0	0	0	0	0	3	0	0	0	0	0
Other Birds	0	0	0	0	0	0	0	63	0	0	6
Unidentified Birds	3	0	0	0	0	6	6	0	0	3	2
Grand Total	700	320	353	331	250	534	599	1,320	795	1,763	697

Table 10 Estimated seabird bycatch for the Alaska groundfish Gulf of Alaska fishery management plan area, pelagic and non-pelagic trawl gear combined, 2010 through 2019.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Black-footed Albatross	0	0	60	0	0	0	0	0	0	0	6
Northern Fulmar	121	27	0	143	20	0	0	44	182	57	59
Shearwaters	0	0	0	0	0	0	0	0	0	119	12
Grand Total	121	27	60	143	20	0	0	44	182	176	77

Table 11 Estimated seabird bycatch for the Alaska groundfish pelagic (P) and non-pelagic (N) trawl gear types across all fishery management plan areas, 2010 through 2019.

Species/ Species Group		2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Laysan Albatross	N	0	0	0	0	0	0	0	0	93	0	9
	P	0	0	0	0	0	0	0	0	0	3	0
Black-footed Albatross	N	0	0	60	0	0	0	0	0	0	0	6
	P	0	0	0	0	0	0	0	0	0	0	0
Northern Fulmar	N	435	115	207	340	34	351	223	263	403	203	257
	P	69	214	90	123	51	112	84	109	42	106	100
Shearwaters	N	133	0	44	0	69	56	229	928	139	1,596	319
	P	22	3	12	1	3	6	9	0	0	11	7
Storm Petrels	N	0	0	0	0	0	0	0	0	197	0	20
	P	0	0	0	0	0	0	0	0	0	0	0
Gulls	N	57	0	0	0	0	0	0	0	1	0	6
	P	0	1	0	3	0	0	3	0	0	0	1
Kittiwakes	N	0	0	0	0	0	0	0	0	0	0	0
	P	0	0	0	0	0	0	0	0	0	14	1
Murre	N	102	0	0	0	44	0	39	0	0	0	19
	P	0	14	0	3	3	0	6	1	0	0	3
Puffins	N	0	0	0	0	0	0	0	0	0	0	0
	P	0	0	0	0	0	0	0	0	0	5	1
Auklets	N	0	0	0	0	66	0	0	0	103	0	17
	P	0	0	0	4	0	0	0	0	0	0	0
Cormorants	N	0	0	0	0	0	0	0	0	0	0	0
	P	0	0	0	0	0	3	0	0	0	0	0
Other Birds	N	0	0	0	0	0	0	0	63	0	0	6
	P	0	0	0	0	0	0	0	0	0	0	0
Unidentified Birds	N	0	0	0	0	0	0	0	0	0	0	0
	P	3	0	0	0	0	6	6	0	0	3	2
Grand Total	N	727	115	311	340	213	407	491	1,254	936	1,799	659
	P	94	232	102	134	57	127	108	110	42	142	115

Table 12 Estimated seabird bycatch for pot vessels fishing groundfish in Alaska Federal waters, all fishery management plan areas combined, 2010 through 2019.

Species/ Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Ann Avg.
Northern Fulmar	65	37	0	20	11	197	234	593	51	33	124
Shearwaters	0	0	0	57	0	0	0	0	0	0	6
Murres	0	0	0	0	0	0	13	0	0	0	1
Auklets	0	0	0	0	35	58	29	36	0	0	18
Other Alcids	0	0	0	0	39	0	0	0	0	0	4
Unidentified Birds	0	0	20	0	0	0	0	0	0	0	2
Grand Total	65	37	20	77	85	255	276	629	51	33	155

Table 13 Estimated seabird bycatch in Alaska by groundfish and halibut fishery target, 2010 through 2019. Halibut fisheries 2013 through 2019 only.

Region	Gear	Target	Species/Species Group	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Grand Total	Ann Avg.
BSAI	Demersal Longline	Greenland Turbot	Gulls	17	0	0	0	0	0	0	0	0	0	17	2
			Kittiwakes	0	0	0	0	0	0	0	9	0	0	9	1
			Laysan Albatross	0	5	0	0	0	0	0	0	3	0	8	1
			Northern Fulmar	170	499	354	65	55	17	82	130	73	0	1,447	145
			Shearwaters	4	38	40	60	0	55	174	14	0	13	397	40
			Short-tailed Albatross	0	0	0	0	6	0	0	0	0	0	6	1
			Unidentified Birds	11	0	15	5	0	0	0	0	0	0	31	3
			Total	202	543	409	131	62	72	256	153	76	13	1,915	192
		Halibut	Black-footed Albatross	0	0	0	0	18	0	0	0	0	0	18	3
			Gulls	0	0	0	71	0	0	17	0	0	0	89	13
			Laysan Albatross	0	0	0	16	0	19	0	39	135	0	209	30
			Northern Fulmar	0	0	0	0	0	0	70	476	0	22	568	81
			Shearwaters	0	0	0	0	0	0	0	43	0	0	43	6
			Unidentified Birds	0	0	0	18	0	0	0	33	0	0	51	7
			Total	0	0	0	105	18	19	87	591	135	22	956	137
		Pacific Cod	Auklets	0	0	7	0	0	0	0	0	0	0	7	1
			Black-footed Albatross	9	0	0	0	0	0	0	0	0	0	9	1
			Gulls	732	1,644	834	413	586	941	589	372	511	187	6,809	681
			Kittiwakes	0	6	5	3	4	12	5	13	30	6	85	8
			Laysan Albatross	41	28	34	4	12	38	12	9	30	12	221	22
			Murres	0	0	6	0	0	0	0	9	0	0	15	2
			Northern Fulmar	1,641	4,633	2,478	2,502	582	2,690	4,658	2,542	2,571	2,467	26,764	2,676
			Puffins	0	0	0	0	0	0	0	0	5	0	5	1
			Shearwaters	9	0	0	0	0	0	10	0	0	0	19	2
			Short-tailed Albatross	15	5	0	0	5	0	0	0	0	0	25	2
			Other Alcids	492	125	490	135	44	243	2,984	1,071	585	3,443	9,612	961
			Unidentified Albatrosses	0	0	0	0	12	0	0	0	0	0	12	1
			Unidentified Birds	248	378	275	263	78	151	277	247	81	233	2,230	223
			Total	3,187	6,819	4,129	3,320	1,322	4,074	8,536	4,263	3,814	6,349	45,814	4,581

BSAI	Demersal Longline	Rockfish	Gulls	0	0	0	5	0	0	0	0	0	0	5	1
			Total	0	0	0	5	0	0	0	0	0	0	5	1
		Sablefish	Black-footed Albatross	0	7	0	13	0	21	0	0	0	0	41	4
			Gulls	90	28	13	12	0	37	0	0	0	0	180	18
			Laysan Albatross	96	9	90	110	54	123	75	0	0	0	557	56
			Northern Fulmar	28	21	0	30	58	92	0	0	0	0	229	23
			Shearwaters	6	35	0	0	71	27	0	0	0	0	139	14
			Unidentified Albatrosses	0	0	0	0	23	0	0	0	0	0	23	2
			Unidentified Birds	6	0	0	0	0	0	0	0	0	0	6	1
			Total	226	100	103	165	206	300	75	0	0	0	1,175	118
		Other Species	Northern Fulmar	0	0	0	0	0	0	0	3	0	0	3	0
			Unidentified Birds	0	0	0	0	0	3	0	0	0	0	3	0
			Total	0	0	0	0	0	3	0	3	0	0	6	1
	Trawl	Arrowtooth Flounder	Northern Fulmar	0	150	8	0	221	0	0	0	0	0	379	38
			Total	0	150	8	0	221	0	0	0	0	0	379	38
		Atka Mackerel	Auklets	0	0	0	0	0	0	0	0	54	0	54	5
			Northern Fulmar	84	29	8	0	0	92	0	0	221	99	533	53
			Shearwaters	75	0	44	0	0	0	184	156	139	606	1,204	120
			Storm Petrels	0	0	0	0	0	0	0	0	197	0	197	20
			Total	159	329	68	0	442	92	184	156	611	705	2,746	275
		Pacific Cod	Northern Fulmar	139	0	0	0	0	0	57	0	0	0	196	20
			Total	139	0	0	0	0	0	57	0	0	0	196	20
		Pollock	Auklets	0	0	0	4	0	0	0	0	0	0	4	0
			Cormorants	0	0	0	0	0	3	0	0	0	0	3	0
			Gulls	0	1	0	3	0	0	3	0	0	0	7	1
			Kittiwakes	0	0	0	0	0	0	0	0	0	14	14	1
			Murres	0	14	0	3	3	0	6	1	0	3	30	3
			Northern Fulmar	69	214	90	123	51	112	84	109	42	106	1,000	100
			Puffins	0	0	0	0	0	0	0	0	0	5	5	1
			Shearwaters	22	3	12	1	3	6	9	0	0	11	67	7
			Unidentified Birds	3	0	0	0	0	6	6	0	0	3	18	2
			Total	94	232	102	134	57	127	108	110	42	142	1,148	115

BSAI	Trawl	Rock Sole	Auklets	0	0	0	0	66	0	0	0	0	0	66	7
			Gulls	0	0	0	0	0	0	0	0	1	0	1	0
			Murres	24	0	0	0	0	0	0	0	0	0	24	2
			Northern Fulmar	0	0	49	112	0	0	92	0	0	0	253	25
			Other Birds	0	0	0	0	0	0	0	63	0	0	63	6
			Total	24	0	49	112	66	0	92	63	1	0	407	41
		Rockfish	Auklets	0	0	0	0	0	0	0	49	0	0	49	5
			Laysan Albatross	0	0	0	0	0	0	0	93	0	0	93	9
			Northern Fulmar	34	0	0	0	38	0	0	0	0	0	72	7
			Shearwaters	0	0	0	0	0	0	772	0	0	870	1,642	164
			Total	34	0	0	0	38	0	772	142	0	870	1,856	186
		Yellowfin Sole	Gulls	57	0	0	0	0	0	0	0	0	0	57	6
			Murres	78	0	0	0	44	0	39	0	0	0	161	16
			Northern Fulmar	57	59	0	77	14	0	74	219	0	0	500	50
			Shearwaters	58	0	0	0	63	56	45	0	0	0	222	22
			Total	250	59	0	77	121	56	158	219	0	0	940	94
	Pot	Pacific Cod	Auklets	0	0	0	0	35	19	29	36	0	0	119	12
			Murres	0	0	0	0	0	0	13	0	0	0	13	1
			Northern Fulmar	65	0	0	20	11	197	139	580	51	33	1,096	110
			Unidentified Birds	0	0	20	0	0	0	0	0	0	0	20	2
			Total	65	0	20	20	46	216	181	616	51	33	1,248	125
		Sablefish	Northern Fulmar	0	0	0	0	0	0	0	13	0	0	13	1
			Total	0	0	0	0	0	0	0	13	0	0	13	1
GOA	Demersal Longline	Halibut	Black-footed Albatross	0	0	0	51	33	0	0	343	83	0	510	73
			Gulls	0	0	0	78	99	146	43	0	0	0	366	52
			Laysan Albatross	0	0	0	0	0	20	0	0	6	0	26	4
			Northern Fulmar	0	0	0	0	19	42	60	121	0	13	255	36
			Shearwaters	0	0	0	0	0	0	0	27	49	0	76	11
			Total	0	0	0	129	151	208	103	491	138	13	1,233	176
		Pacific Cod	Auklets	0	0	0	0	6	11	0	0	0	0	17	2
			Black-footed Albatross	10	0	0	0	8	0	30	28	0	0	76	8
			Gulls	147	36	25	27	50	33	17	58	213	36	642	64

GOA	Demersal Longline	Pacific Cod	Laysan Albatross	9	0	0	0	8	0	0	0	0	0	17	2
			Northern Fulmar	35	8	19	8	12	11	25	147	15	0	280	28
			Shearwaters	0	0	0	0	0	0	0	0	7	0	7	1
			Unidentified Albatrosses	0	10	0	0	0	0	0	0	0	0	10	1
			Unidentified Birds	0	0	33	7	0	5	0	0	164	0	209	21
			Total	201	54	77	42	84	60	72	233	399	36	1,258	126
		Sablefish	Black-footed Albatross	53	204	82	385	228	343	171	423	269	243	2,401	240
			Cormorants	0	0	0	0	0	28	0	0	0	0	28	3
			Gulls	134	549	26	35	8	111	90	250	55	21	1,279	128
			Laysan Albatross	76	166	17	69	24	22	44	0	22	36	476	48
			Northern Fulmar	19	810	0	109	0	36	19	64	136	87	1,280	128
			Shearwaters	0	62	0	0	0	5	20	0	0	41	128	13
			Unidentified Albatrosses	0	0	0	28	0	0	0	0	52	14	94	9
			Unidentified Birds	0	9	0	0	0	28	19	0	0	0	56	6
			Total	282	1,800	125	626	260	573	363	737	534	442	5,742	574
	Trawl	Arrowtooth Flounder	Northern Fulmar	121	0	0	143	0	0	0	0	133	0	397	40
			Total	121	0	0	143	0	0	0	0	133	0	397	40
		Rockfish	Black-footed Albatross	0	0	60	0	0	0	0	0	0	0	60	6
			Northern Fulmar	0	27	0	0	20	0	0	44	50	57	198	20
			Shearwaters	0	0	0	0	0	0	0	0	0	119	119	12
			Total	0	27	60	0	20	0	0	44	50	176	377	38
	Pot	Pacific Cod	Auklets	0	0	0	0	0	38	0	0	0	0	38	4
			Northern Fulmar	0	37	0	0	0	0	95	0	0	0	132	13
			Other Alcids	0	0	0	0	39	0	0	0	0	0	39	4
			Shearwaters	0	0	0	57	0	0	0	0	0	0	57	6
			Total	0	37	0	57	39	38	95	0	0	0	266	27



U.S. Department of Commerce
Wilbur Ross, Secretary

National Oceanic and Atmospheric Administration
Tim Gallaudet, Assistant Secretary of Commerce
for Oceans and Atmosphere and Deputy NOAA
Administrator

National Marine Fisheries Service
Chris Oliver, Assistant Administrator for Fisheries

July 2020

www.fisheries.noaa.gov/region/alaska

OFFICIAL BUSINESS

National Marine Fisheries Service
Alaska Regional Office
PO Box 21668
Juneau, AK 99802