

Observed and Estimated Bycatch of Short-tailed Albatross in U.S. West Coast Groundfish Fisheries 2002-2017

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Executive Summary

In accordance with the National Marine Fisheries Service (NMFS) Biological Opinion (BiOp) on Continuing Operation of the Pacific Coast Groundfish Fishery, this document reports observed bycatch and estimated fleet-wide take of U.S. Endangered Species Act (ESA)-listed short-tailed albatross (*Phoebastria albatrus*) in all sectors of the west coast groundfish fishery for the latest biennium (2016–2017).

Short-tailed albatrosses are large, pelagic seabirds of the Order Procellariiformes with long narrow wings adapted for soaring just above the water surface. The largest of the three species of North Pacific albatrosses, they are continental shelf-edge specialists. Individual adults breed at 5-6 years of age, laying a single egg, and adults feed chicks prey obtained by surface seizing of squid, shrimp, fish, and fish eggs.

Bycatch of short-tailed albatrosses in commercial fisheries continues to be a major conservation concern. Since 1983, 19 short-tailed albatross takes have been documented throughout the North Pacific. The lone short-tailed albatross mortality in the Pacific Coast Groundfish Fisheries was documented off the Oregon coast on April 11, 2011 in the limited-entry sablefish longline fishery.

In response to this mortality the Pacific Fisheries Management Council adopted recommendations for seabird bycatch mitigation, requiring streamer lines be deployed during setting operations on commercial fixed gear vessels 55' (17 m) or greater in length. Outreach efforts have increased seabird bycatch awareness as has voluntary use of seabird deterrents throughout the U.S. portion of the range of this species.

No short-tailed albatross takes were documented in the West Coast groundfish fisheries in 2016–2017, and we continue to estimate bycatch over the course of the data (2002–present) using Bayesian methods. We modeled bycatch rate as constant and inferred annual expected mortality, given specified levels of observed effort and estimated fleet-wide bycatch using the proportion of fleet-wide retained catch observed. Fleet-wide estimates of mean bycatch ranged from 0.11 to 1.32 STAL/year, depending on the effort metric used, although using observed sets, observed retained catch, or observed hooks resulted in very similar estimates. The confidence limits of those annual estimates ranged from 0.00 to 2.15 STAL/year, depending on the effort metric used.

Acknowledgments

The authors gratefully acknowledge the hard work and dedication of observers from the West Coast Groundfish Observer Program and the At-Sea Hake Observer Program, as well as contributions from observer program staff, particularly Kayleigh Somers. This document was a joint effort of the Seabird Bycatch Reporting Team, which included at various times and in various roles, Jason Jannot (NWFSC, FRAMD), Thomas Good (NWFSC, CBD), Eric Ward (NWFSC, CBD), Robert Suryan (AFSC; OSU), and Ed Melvin (WA SeaGrant).

Introduction and Background

In accordance with the National Marine Fisheries Service (NMFS) Biological Opinion (BiOp) Regarding the Effects of the Continued Operation of the Pacific Coast Groundfish Fishery as governed by Pacific Coast Groundfish Fishery Management Plan and implementing regulations at 50 CFR Part 660 (USFWS 2012, p. 37), this document provides an analysis of observed takes and fleet-wide bycatch estimates of U.S. Endangered Species Act-listed short-tailed albatross (*Phoebastria albatrus*) in U.S. west coast groundfish fisheries.

Historically, the short-tailed albatross was likely the most abundant albatross in the North Pacific, with potential breeding sites also in the North Atlantic (Olson and Hearty 2003). Starting before and after the turn of the 20th century, millions of these birds were hunted for feathers, oil, and fertilizer (USFWS 2008); by 1949, no birds were observed breeding and the species was thought to be extinct. The species began to recover during the 1950s, and currently occurs throughout the North Pacific Ocean.

The short-tailed albatross was federally listed as endangered throughout its range, including the United States, on July 31, 2000 (65 FR 147:46643-46654, USFWS 2000). Under the Endangered Species Act, the Short-tailed Albatross Recovery Plan was finalized in September 2008 (USFWS 2008). There have been two 5-year reviews (USFWS 2009, 2014).

Short-tailed Albatross Life History

The short-tailed albatross is a colonial, annual breeding species, with each breeding cycle lasting about 8 months. On the main breeding colony on Torishima Island, Japan, birds begin to arrive in early October. A single egg is laid in late October to late November, and incubation lasts 64 to 65 days. Hatching occurs in late December through January (Hasegawa and Degange 1982), and chicks begin to fledge in late May into June (Austin 1949). First breeding attempts sometimes occur when birds are five years old, but more commonly when birds are aged six (USFWS 2008).

Today, breeding colonies exist on three small islands in the western Pacific. Approximately 80-85% of the breeding population nests on Torishima Island, which is an active volcano. The breeding colony in the Senkaku Islands is in disputed ownership among China, Japan and Taiwan, making access impossible since 2002. A breeding colony was re-established in 2008 on Mukojima, a non-volcanic island south of Torishima in the Ogasawara (Bonin) Islands by translocating 10 chicks. All chicks in this cohort survived to fledging, and from 2009 through 2012, 15 chicks per year were moved to Mukojima and reared to fledging (Deguchi et al. 2014). One pair nested on Mukojima in 2012 and 2013, but did not successfully hatch an egg. In May 2014, a nearly fledged chick was discovered at nearby Nakodo-jima (also in the Ogasawara Islands; USFWS 2014). In February 2015, a short-tailed albatross pair was documented on the island; both members of the pair were born on Torishima, and the female was one of the chicks translocated to Mukojima in 2009. No chick was found with the pair in 2015, but DNA test results now indicate that this pair almost certainly produced the chick discovered at the breeding site in 2014 (Japan Ministry of Environment press release, 26 March, 2015).

In 2016, a single pair appeared together on Midway Atoll's Sand Island. The male was banded at Torishima in 2003 and has been visiting the island since 2006; the unidentified partner is suspected to be an individual that was banded at Torishima in April 2008 and was first observed on Sand Island in early 2012. In 2017, following courting and nesting activity, the pair usurped a neighboring nest and raised a black-footed albatross (*P. nigripes*) chick to fledging in mid-June. The next year, the pair produced a chick of its own, confirming the gender of the unidentified partner (Cooper 2019). Previously, a short-tailed albatross pair hatched and successfully reared three chicks in four attempts on Midway Atoll's Eastern Island from the 2010/11 to 2013/14 breeding seasons; however, the male was found dead in December 2014 (Cooper 2018). The hatching in 2011 marked the first confirmed hatching of a short-tailed albatross outside of the islands surrounding Japan in recorded history. Observations of eggs and reports from the 1930s suggested that short-tailed albatross may have nested on Midway Atoll in the past.

A female-female pair of short-tailed albatross has laid eggs at Kure Atoll in the Northwestern Hawaiian Islands consistently since 2010; no eggs have hatched, presumably because they are infertile (Cooper 2018).

Short-tailed Albatross Bycatch

Bycatch of short-tailed albatrosses in commercial fisheries continues to be a major conservation concern, especially for younger age classes (ca. 2/3 of the 19 reported fishing mortalities were < 4 years old; Table 1). The most recent 5-year review (USFWS 2014) reported five short-tailed albatross mortalities observed during commercial fishing activities from 2009-2013, three off Alaska, one off Oregon, and one off Japan. Since that report, three more short-tailed albatross mortalities have been reported from observed Alaskan fisheries (NOAA Information Bulletins 49 and 52; 2014; NOAA Information Bulletin 31; 2015). There were no mortalities documented in Alaskan fisheries during the 2016-2017 period.

For U.S. fisheries, those mortalities from 2010-2013 reported in the most recent 5-year review were the first observed mortalities of short-tailed albatrosses since 1998. From 1998-2009, however, there were three reported mortalities in Russian fisheries (2002, 2003, 2006). On April 11, 2011, a short-tailed albatross was killed in the Pacific Coast Groundfish Fishery.

Specifically, it was taken by a fixed demersal long-line vessel from the limited entry sablefish fishery approximately 65 kilometers off the Oregon coast.

Following the mortality of a short-tailed albatross off the U.S. west coast in 2011, the Pacific Fisheries Management Council (PFMC), which provides oversight to fisheries management in the Pacific, adopted recommendations for seabird bycatch mitigation in November 2013. The mitigation recommended was that fishers deploy streamer lines during setting operations on commercial fixed gear vessels \geq 55 feet (17 meters) in length, with a safety exception in the event of rough weather (PFMC 2013). In 2015, the use of streamer lines on vessels \geq 55 feet long became mandatory (80 FR 71975; NMFS 2015), with tribal vessels using streamer lines voluntarily. Smaller vessels were not required to use measures to avoid seabird bycatch; consequently, voluntary adoption of streamer lines is important to address albatross conservation across the sablefish longline fleet. Research has been conducted to develop seabird bycatch options in the west coast sablefish fishery for vessels less than 55 feet in length and to confirm

the effectiveness of the regulations for vessels ≥ 55 feet using particular gear configurations (Gladics et al. in 2017). Additionally, efforts are continuing to increase seabird bycatch awareness as well as the use of seabird deterrents throughout the range of this species.

Table 1. Reported short-tailed albatross mortalities associated with North Pacific, Russian, Japanese, and West Coast fishing activities since 1983.

Date	Fishery	Observer program	In sample*	Bird age	Location	Source
7/15/1983	Net	No	n/a	4 months	Bering Sea	USFWS (2008)
10/1/1987	Halibut	No	n/a	6 months	Gulf of Alaska	USFWS (2008)
8/28/1995	IFQ sablefish	Yes	No	1 year	Aleutian Islands	USFWS (2008)
10/8/1995	IFQ sablefish	Yes	No	3 years	Bering Sea	USFWS (2008)
9/27/1996	Hook-and-line	Yes	Yes	5 years	Bering Sea	USFWS (2008)
4/23/1998	Russian salmon drift net	n/a	n/a	< 1 year	Bering Sea, Russia	USFWS (2008)
9/21/1998	Pacific cod hook-and-line	Yes	Yes	8 years	Bering Sea	USFWS (2008)
9/28/1998	Pacific cod hook-and-line	Yes	Yes	Sub-adult	Bering Sea	USFWS (2008)
7/11/2002	Russian **	n/a	n/a	3 months	Sea of Okhotsk, Russia	Yamashina Institute of Ornithology (YIO; 2011)
8/29/2003	Russian demersal longline	n/a	n/a	3 years	Bering Sea, Russia	YIO (2011)
8/31/2006	Russian **	n/a	n/a	1 year	Kuril Islands, Russia	YIO (2011)
8/27/2010	Cod freezer longline	Yes	Yes	7 years	Bering Sea/Aleutian Islands	NOAA (2010)
9/14/2010	Cod freezer longline	Yes	Yes	3 years	Bering Sea/Aleutian Islands	NOAA (2010)
4/11/2011	Sablefish demersal longline	Yes	Yes	1 year	Pacific Ocean/Oregon	USFWS (2012)
10/25/2011	Cod freezer longline	Yes	Yes	1 year	Bering Sea	NOAA (2011)
5/24/2013	Seabird bycatch mitigation research - longline	No	n/a	1 year	Pacific Ocean, Japan	YIO, pers. comm.
9/7/2014	Pacific cod hook-and-line	Yes	No	5 years	Bering Sea/Aleutian Islands	NOAA Information Bulletin 49 (2014)
9/7/2014	Pacific cod hook-and-line	Yes	Yes	Sub-adult	Bering Sea/Aleutian Islands	NOAA Information Bulletin 52 (2014)
12/16/2014	Pacific cod hook-and-line	No***	No	< 1 year	Bering Sea/Aleutian Islands	NOAA Information Bulletin 31 (2015)

* “In sample” refers to whether specimen was in catch sample analyzed by a fisheries observer

** Specifics regarding the type fishery are unknown

*** Review of on-board video documented the bird

U.S. West Coast Groundfish Fisheries

The west coast groundfish fishery (WCGF) is a multi-species fishery that utilizes a variety of gear types. The fishery harvests species designated in the Pacific Coast Groundfish Fishery Management Plan (PFMC 2011) and is managed by the Pacific Fishery Management Council. Over 90 species are listed in the groundfish FMP, including a variety of rockfish, flatfish, roundfish, skates, and sharks. These species are found in both federal (> 5.6 km off-shore) and state waters (0-5.6 km). Groundfish are both targeted and caught incidentally by trawl nets, hook-&-line gear, and fish pots.

Under the FMP, the groundfish fishery consists of four management components:

The Limited Entry (LE) component encompasses all commercial fishers who hold a federal limited entry permit. The total number of limited entry permits available is restricted. Vessels with an LE permit are allocated a larger portion of the total allowable catch for commercially desirable species than vessels without an LE permit.

The Open Access (OA) component encompasses commercial fishers who do not hold a federal LE permit. Some states require fishers to carry a state-issued permit for certain OA sectors.

The Recreational component includes recreational anglers who target or incidentally catch groundfish species. Recreational fisheries are not covered by this report.

The Tribal component includes native tribal commercial fishers in Washington State that have treaty rights to fish groundfish. Tribal fisheries are not included in this report, with the exception of the observed tribal at-sea Pacific hake (*Merluccius productus*) (also known as whiting) sector.

These four components are further subdivided into sectors based on gear type, target species, permits and other regulatory factors (see Appendix 1). The analyses in this report focus on data from the Limited Entry (LE) hook-and-line sector. The longline gear targets groundfish species, mainly sablefish, and catch is delivered to shore-based processors.

Northwest Fisheries Science Center Groundfish Observer Program

The NWFSC Groundfish Observer Program's goal is to improve estimates of total catch and discard by observing commercial sectors of groundfish fisheries along the U.S. west coast that target or take groundfish as bycatch. The observer program has two units: the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP). The WCGOP Program was established in May 2001 by NOAA Fisheries (a.k.a., National Marine Fishery Service, NMFS) in accordance with the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660) (50 FR 20609). This regulation requires all vessels that catch groundfish in the US EEZ from 3-200 miles offshore carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making has extended NMFS's ability to require vessels fishing in the 0-3 mile state territorial zone to carry observers.

The WCGOP and A-SHOP observe distinct sectors of the groundfish fishery. The WCGOP observes the following sectors: IFQ shore-based delivery of groundfish and Pacific hake, LE and OA fixed gear, and state-permitted nearshore fixed gear sectors. The WCGOP also observes several state-managed fisheries that incidentally catch groundfish, including the California halibut trawl and ocean shrimp trawl fisheries. The A-SHOP observes the IFQ fishery that delivers Pacific hake at-sea including: catcher-processor, mothership, and tribal vessels. Details on how fisheries observers operate in both the IFQ (Catch Share) and Non-IFQ sectors can be found at: <http://www.nwfsc.noaa.gov/research/divisions/fram/observation/index.cfm>.

Albatross Bycatch in West Coast Groundfish Fisheries

The primary objective of this report is to provide estimates of bycatch of the ESA-listed short-tailed albatross in observed U.S. West Coast federally permitted groundfish fisheries since the last report in 2017, which covered the years 2014-2015. Previous reporting (Jannot et al. 2011) summarized seabird bycatch through 2009, while data from 2002-2016 is summarized in a recent technical memorandum (Jannot et al. 2018). These documents have provided data on estimated bycatch of seabirds including short-tailed albatross in U.S. west coast commercial fisheries, which were derived from the WCGOP and A-SHOP data.

Groundfish Fishery Sectors with Short-tailed albatross Bycatch

The only known short-tailed albatross take in a Pacific Coast Groundfish Fishery was reported in the limited entry sablefish longline fishery off the Oregon coast in 2011.

Amount and Extent of Short-tailed Albatross Take

The 2017 Biological Opinion Regarding the Effects of the Continued Operation of the Pacific Coast Groundfish Fishery (USFWS 2017) stated:

“The USFWS anticipates take of no more than one short-tailed albatrosses in two years or an average estimated take (calculated via the Bayesian model described in sections 6.3 and 6.4, pages 40-39) of no more than five birds per two-year period as a result of this continuing action. The incidental take is expected to be in the form of injury and mortality, due to bird injured or drowned as a result of encounters with hook and line groundfish gear, or taken by collision with trawl gear, including the third wire and warp cables.

To account for interannual variability in actual take levels, a floating two-year period beginning on January 1, 2017, will be used to quantify the observed and estimated total reported take in each two-year period. Incidental take should not exceed an estimated five albatross in a two-year period or 1 observed albatross in a two-year period.”

Methods

Data Sources

Data for this analysis is from the West Coast Groundfish Observer Program, specifically the Limited Entry sablefish longline fishery sector, the source of the only short-tailed albatross take.

Observer Program Data

A list of fisheries, coverage priorities and data collection methods employed by WCGOP in each observed fishery can be found in the WCGOP training manual (NWFSC 2019). The sampling protocol of the WCGOP is focused on the discarded portion of catch. To ensure recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch weights recorded by observers are adjusted based on trip-level fish ticket records. This process is described in detail on the Data Processing webpage (https://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_processing.cfm). Data processing was applied prior to analyses presented in this report. For a list of groundfish species defined in the Pacific Coast Groundfish Fishery Management Plan see PFMC (2011).

Fish Ticket Data

For bycatch estimation, the landed amount of a particular fish species or species group is used as one measure of fishing effort. Thus, the retained landing information from fish tickets is crucial for fleet-wide total bycatch estimation for sectors of the U.S. west coast commercial groundfish fishery. Fish ticket landing receipts are completed by fish-buyers in each port for each delivery of fish by a vessel. Fish tickets are trip-aggregated sales receipts for market categories that may represent single or multiple species. Fish tickets are issued to fish-buyers by a state agency and must be returned to the agency for processing. Fish tickets are designed by the individual states (Washington, Oregon, and California) with slightly different formats by state. In addition, each state conducts species-composition sampling at the ports for numerous market categories that are reported on fish tickets. Fish ticket and species-composition data are submitted by state agencies to the PacFIN regional database. Annual fish ticket landings data, with state species composition sampling applied, were retrieved from the PacFIN database and subsequently divided into various sectors of the groundfish fishery. Observer and fish ticket data processing steps are described in detail on the WCGOP website under Data Processing Appendix (http://www.nwfsc.noaa.gov/research/divisions/fram/observer/data_processing.cfm/). Data processing steps specific to this report are described in the bycatch estimation methods below.

Documenting Short-tailed Albatross Bycatch

Designation of ‘take’ interactions

WCGOP and A-SHOP observers record a variety of fishery interactions with seabirds. A standard system for recording interactions is used by both observer programs and includes a variety of interaction categories: killed by gear, killed by propeller, previously dead, lethal removal (trailing gear), lethal removal (not trailing gear), entangled in gear (trailing gear), entangled in gear (not trailing gear), feeding on catch, deterrence used, boarded vessel, sighting only, other, and unknown. Take designations for species listed under the ESA as threatened or endangered differ from those for species that are not ESA-listed. Section 3 of the ESA specifies the term ‘take’ to mean ‘harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct’ (16 USC 1532). Any interaction encompassing the ESA definition with an ESA-listed seabird species (*i.e.*, a short-tailed albatross) was identified as a take. This designation was informed by specific details in observer notes recorded at the time

of the interaction. Observers typically detail the nature of injuries and any changes in the animal's behavior following its release. Birds documented to have exhibited bleeding, broken bones, or lost feathers were identified as takes; birds that did not fly away or return to normal behavior within a few minutes of the interaction were also considered to be takes.

Estimating Short-tailed Albatross Bycatch

Historically, for West Coast groundfish fisheries, ratio estimators were used to extrapolate seabird bycatch from observed bycatch rates using effort metrics for the fishery (*e.g.*, the ratio of observed retained catch to total retained catch; Jannot et al. 2011). However, using ratio estimators is problematic when bycatch is rare or observer coverage is low (Martin et al. 2015). Initial summaries of seabird bycatch in West Coast groundfish fisheries reported no observed short-tailed albatross takes from 2002-2009 (Jannot et al. 2011). Subsequent reporting in a risk assessment for West Coast groundfish fisheries on ESA-listed species (Ford et al. 2012) included the one documented take from 2011.

Due to the rarity of short-tailed albatross take in West Coast groundfish fisheries, the 2012 Biological Opinion (USFWS 2012) used black-footed albatross as a surrogate species to estimate short-tailed albatross bycatch. This proxy method had been used in the Hawaiian pelagic longline fisheries (see USFWS 2004, NMFS 2011) and was used for the initial short-tailed albatross bycatch report to the PFMC ESA Workgroup (Good et al. 2015).

In a recent Biological Assessment (NMFS 2016), issues concerning assumptions of the proxy estimation for short-tailed albatross bycatch were identified. These issues included: assuming risk to both albatross species from West Coast groundfish fisheries was equal; calculating proportional black-footed albatross mortality based on global population estimates (which are notoriously difficult to obtain); assuming the “at-risk area” for both species was the same; and overestimating albatross bycatch by incorporating speculative drop-off rates from pelagic longline fisheries. These assumptions and limitations led us to explore alternative approaches for estimating short-tailed albatross bycatch in West Coast groundfish fisheries.

Estimating Bycatch Using a Bayesian Modeling Approach

We explored alternative approaches to bycatch estimation of short tailed albatross by applying statistical models to characterize uncertainty in short-tailed albatross bycatch in the Limited Entry sablefish longline fishery. Because only one bird was encountered as bycatch from 2002-2017, we used simple Bayesian models while estimating variances of total bycatch. These methods have been used with other rare bycatch species, including cetaceans, delphinids, pinnipeds, sea turtles, and sharks (as cited in Martin et al. 2015). To do this, we modeled bycatch rate as constant and inferred annual expected mortality, given a specified level of effort. Fleet-wide bycatch of short-tailed albatross from the sablefish longline fleet was estimated using data on observer coverage obtained from the NWFSC West Coast Groundfish Observer Program (summarized in Table 2).

Table 2. Fishing effort (observed sets, retained catch, hooks), the proportion of the fleet-wide catch observed, and observed short-tailed albatross takes in the LE sablefish fishery 2002–2017 (data from the West Coast Groundfish Observer Program).

Year	Observed Sets (#)	Observed Hooks (#)	Retained Catch Observed (MT)	Fleet-wide Catch Observed (%)	Observed STAL takes (#)
2002	395	788,213	190.79	24	0
2003	364	743,653	222.85	21	0
2004	333	499,617	179.08	14	0
2005	681	1,462,757	481.45	36	0
2006	480	957,892	295.9	21	0
2007	524	1,045,050	298.49	27	0
2008	543	1,252,301	330.03	31	0
2009	290	658,110	97.81	7	0
2010	788	1,884,106	343.10	27	0
2011	675	1,410,945	240.74	21	1
2012	535	1,586,259	227.19	22	0
2013	353	1,047,526	166.42	22	0
2014	496	1,203,871	203.03	27	0
2015	632	1,536,820	391.96	42	0
2016	671	1,743,233	338.12	33	0
2017	701	2,107,656	396.86	37	0

The general modeling approach was to use a simple Poisson process model, where the total number of bycatch events were assumed to follow a Poisson distribution,

$$n_{take,y} \sim Poisson(\lambda_y = \theta \cdot E_y),$$

where E_y represents the effort in year y , θ is an estimated bycatch rate, λ_y represents the mean expected bycatch, and $n_{take,y}$ represents the number of observed bycatch events (or take events) in year y . The estimated bycatch rate θ is assumed constant through time, but the quantity $\theta \cdot E_y$ includes uncertainty (as θ is estimated). Thus, a time series of the mean bycatch can be generated for a given species, with a given metric of effort. All uncertainty in the time series originates from fluctuating levels of effort through time (percent observer coverage only affects the expansion). We used a Bayesian model (Martin et al. 2015) to generate mean and 95% CIs of the parameter θ , as well as for $\theta \cdot E_y$.

Because observer coverage is less than 100%, and variable through time, we also need to expand the estimated bycatch, $\theta \cdot E_y$, to the fleet-wide level. One approach for expansion would be to divide $\theta \cdot E_y$ by the percent observer coverage; however, this ignores uncertainty in the expansion. We accounted for uncertainty in the expansion by treating the observer coverage and estimated bycatch ($\theta \cdot E_y$) as known ('p', 'x', respectively) and sampling from the distribution of

total bycatch (N) in proportion to the Binomial density function. This process was repeated for each Markov Chain Monte Carlo (MCMC) draw, to propagate uncertainty in the estimates through the uncertainty in the expansion.

Results

Documented Short-tailed Albatross Bycatch

For the years 2012-2017, no short-tailed albatross takes were documented in the West Coast groundfish fisheries. The lone documented short-tailed albatross take was observed in the Limited Entry sablefish fishery in April 2011 (Ford et al. 2012). There were no recorded takes documented in West Coast groundfish fisheries from 2002-2009 (Jannot et al. 2011).

Estimated Short-tailed Albatross Bycatch

We compared models fit using three different measures of effort. First, we fit a model that used the number of observed sets as the measure of effort (Martin et al 2015). This resulted in estimates of mean expected bycatch (λ) over time (Fig. 1).

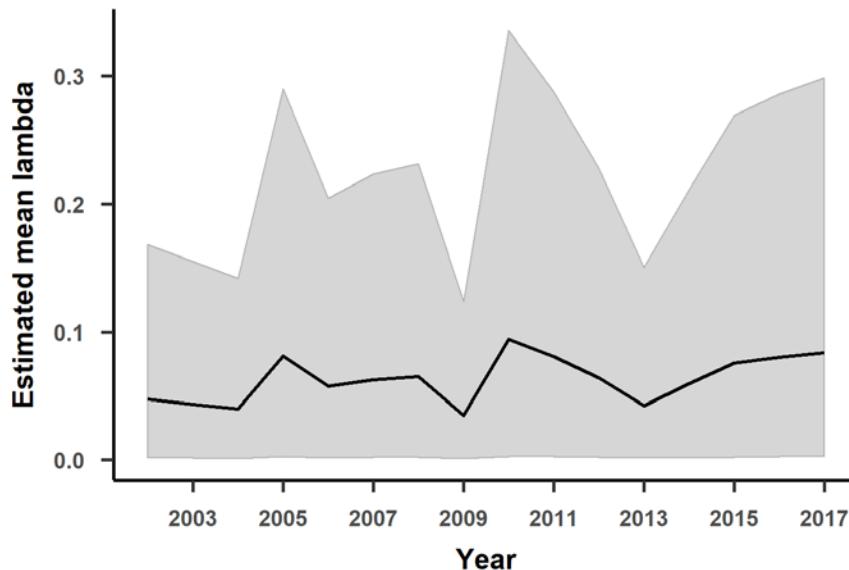


Figure 1. Mean expected bycatch of short-tailed albatross (effort = observed sets) estimated for 2002 - 2017. Black line is mean; gray area represents 95% confidence limits.

To calculate a fleet-wide estimate of short-tailed albatross bycatch, we then did a binomial expansion of expected bycatch to the fleet level using the number of observed sets as the measure of effort. Annual mean estimates using observed sets ranged from 0.11 to 1.32 STAL/year, while the 95% confidence limits ranged from 0.00 to 2.15 STAL/year (Fig. 2).

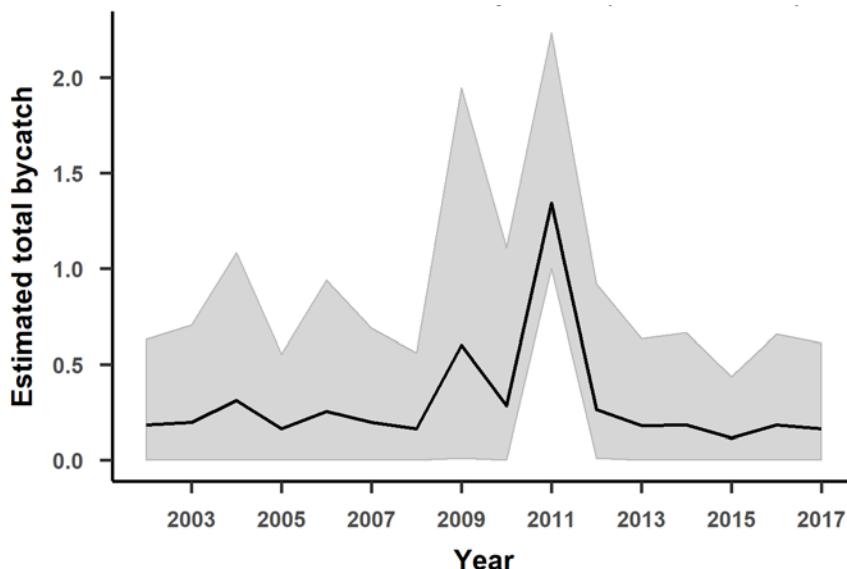


Figure 2. Fleet-wide bycatch of short-tailed albatross (effort = observed sets) estimated for 2002-2017. Black line is mean; gray area represents 95% confidence limits.

We fit a second model that used the observed retained catch as the measure of fishing effort. This resulted in estimates of mean expected bycatch (λ) over time (Fig. 3).

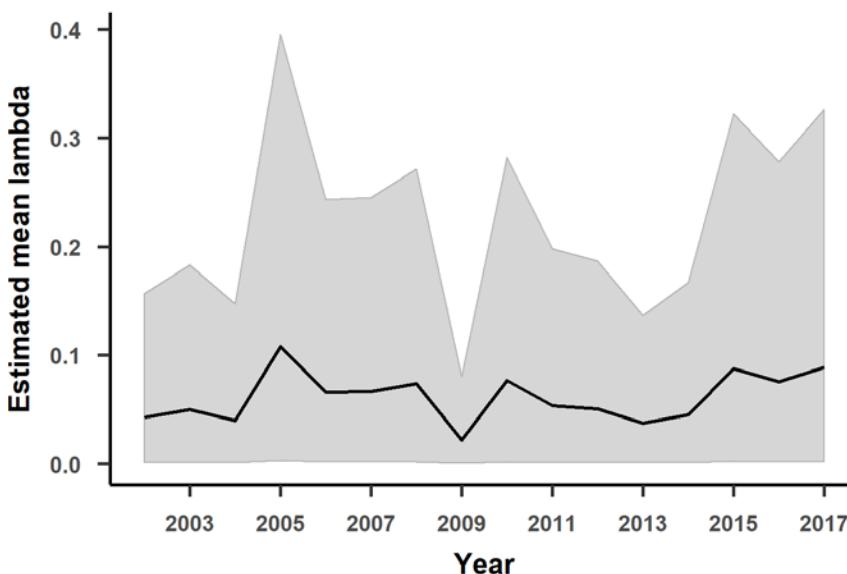


Figure 3. Mean expected bycatch of short-tailed albatross (effort = observed retained catch) estimated for 2002-2017. Black line is mean; gray area represents 95% confidence limits.

To calculate a fleet-wide estimate of short-tailed albatross bycatch, we then did a binomial expansion of expected bycatch to the fleet level that used the observed retained catch as the measure of effort. Annual mean estimates using observed retained catch ranged from 0.14 to 1.25 STAL/year, while the 95% confidence limits ranged from 0.00 to 1.92 STAL/year (Fig. 4).

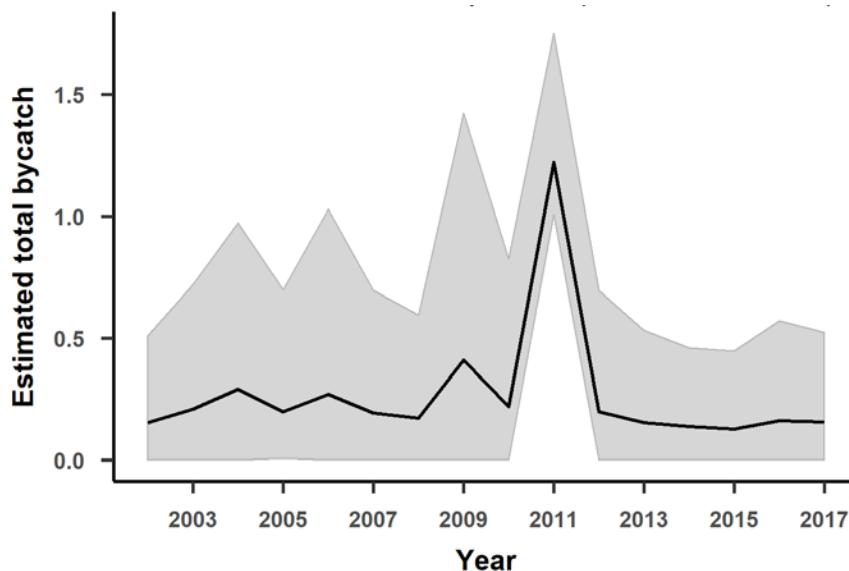


Figure 4. Fleet-wide bycatch of short-tailed albatross (effort = observed retained catch) estimated for 2002-2017. Black line is mean; gray area represents 95% confidence limits.

We fit a third model that used the number of observed hooks as the measure of fishing effort. This resulted in estimates of expected bycatch (lambda) over time (Fig. 5).

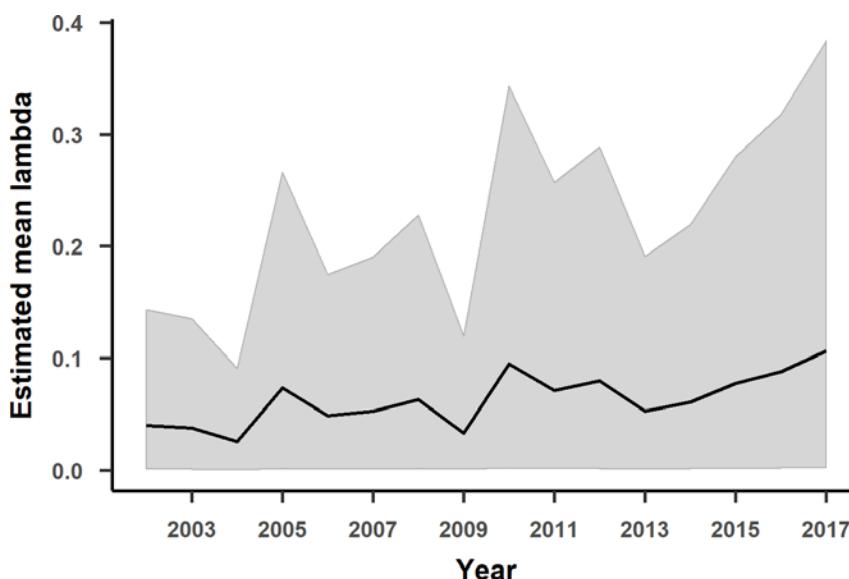


Figure 5. Estimated mean observed bycatch of short-tailed albatross (effort = observed hooks) estimated for 2002-2017. Black line is mean; gray area represents 95% confidence limits.

To calculate a fleet-wide estimate of short-tailed albatross bycatch, we then did a binomial expansion of expected bycatch to the fleet level using the number of observed hooks as the measure of effort. Annual mean estimates using observed hooks ranged from 0.11 to 1.28 STAL/year, while the 95% confidence limits ranged from 0.00 to 1.98 STAL/year (Fig. 6).

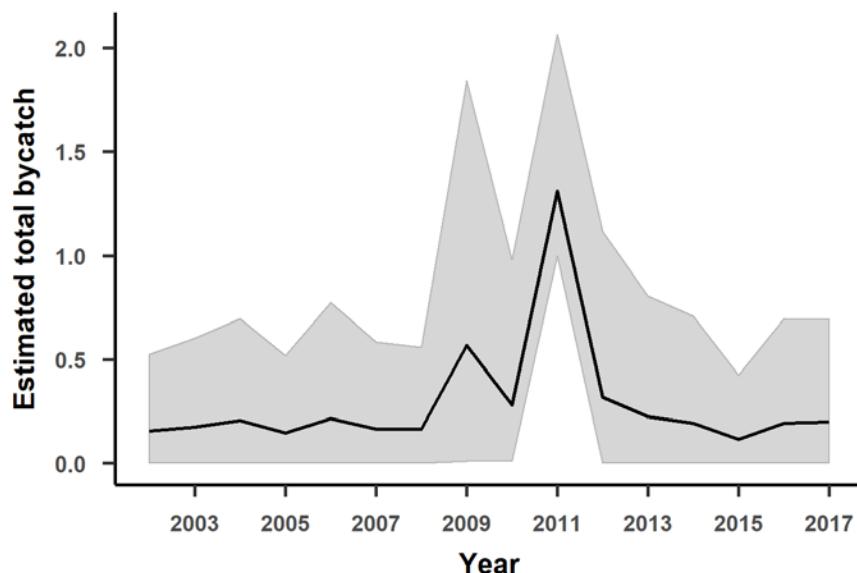


Figure 6. Fleet-wide bycatch of short-tailed albatross (effort = observed hooks) estimated for 2002–2017. Black line is mean; gray area represents 95% confidence limits.

Probability-based methods are particularly useful when bycatch is dominated by zeroes; there is reduced bias from rare events, the methods incorporate uncertainty and are less reliant on assumptions, especially relying on another species as a proxy. The resultant estimates are generally lower than proxy estimates, which were likely inflated due to assumptions of which ratio of short-tailed albatross and black-footed albatross are relevant as well as behavioral differences between the two species. The model-based Bayesian approach also reduces volatility through its formal use of all information contained in the time series, reduces arbitrary decision-making about how many years of data to combine, and it enables probabilistic inference for bycatch and mortality within years, conditional on fishing effort (Martin et al. 2015).

Other Short-tailed Albatross Interactions

Interactions and sightings of short-tailed albatross with vessels have been recorded in various commercial groundfish fishery sectors, including the 2016–2017 time period (Tables 3, 4). These opportunistic data ranged from sightings made during the course of their duties to observations of individuals feeding on catch to takes. None of the interactions apart from the 2011 take resulted in documented short-tailed albatross mortality.

The NWFSC Observer Program conducted a review of sightings to explore the decline in short-tailed albatross sightings in recent years. After combing the data, interviewing former and current observers, and reviewing documentation and protocols for collecting sightings of short-tailed albatross, the program concluded that sightings have been reported accurately in recent years. However, there is no strict protocol or methodology for sightings data; observers are simply required to record any opportunistic sightings while on deck. Thus, sightings data are little more than an index of presence. The decreased sightings recent years are likely due to the *ad hoc* nature of these data.

Table 3. Short-tailed albatross interactions recorded by observers on U.S. west coast groundfish fishery vessels (2002-17).

Year	Sector	Gear	Killed by gear	Feeding on catch	Other*
2002	Limited Entry Trawl	Bottom Trawl		2	
2009	Limited Entry Trawl	Bottom Trawl		2	
2010	Limited Entry Sablefish	Hook and Line			1
	Limited Entry Trawl	Bottom Trawl		3	
2011	Catch Shares	Bottom Trawl		4	
	Catch Shares	Hook and Line			1
	Limited Entry Sablefish	Hook and Line	1		2
	MS Catcher Vessels	Midwater Trawl		1	
	Shoreside Hake	Midwater Trawl		1	
2012	Catch Shares	Bottom Trawl		3	
	Catch Shares	Pot		2	
	Shoreside Hake	Midwater Trawl		2	
2013	Catch Shares	Bottom Trawl		3	
	Shoreside Hake	Midwater Trawl		1	
2014	Catch Shares	Bottom Trawl		4	
2015	Catch Shares	Bottom Trawl		2	1
2016	Catch Shares	Bottom Trawl		2	
2016	Catch Shares	Pot			5
2016	Limited Entry Sablefish	Hook & Line			1
2017	Catch Shares	Bottom Trawl		2	
2017	Catch Shares	Bottom Trawl			5
2017	Catch Shares EM	Pot			1
2017	Limited Entry Sablefish	Hook & Line			1
2017	OA Fixed Gear	Hook & Line			1

*Includes feeding on discarded catch, feeding on bait –floating free

Table 4. Short-tailed albatross sightings recorded opportunistically by observers on U.S. west coast groundfish fishery vessels (2002-15).

Year	Sector	Gear	Sighting
2002	Limited Entry Sablefish	Hook and Line	1
	Limited Entry Trawl	Bottom Trawl	12
2003	Limited Entry Sablefish	Hook and Line	1
	Limited Entry Trawl	Bottom Trawl	4
2004	Limited Entry Trawl	Bottom Trawl	3
2005	Limited Entry Sablefish	Hook and Line	3
	Limited Entry Trawl	Bottom Trawl	3
2006	Limited Entry Sablefish	Hook and Line	3
	Limited Entry Trawl	Bottom Trawl	1
2007	Limited Entry Sablefish	Hook and Line	2
	Limited Entry Trawl	Bottom Trawl	1
2008	Limited Entry Sablefish	Hook and Line	1
	Limited Entry Sablefish	Pot	1
2009	Limited Entry Sablefish	Hook and Line	1
	Limited Entry Trawl	Bottom Trawl	17

2010	Limited Entry Sablefish	Hook and Line	4
	Limited Entry Sablefish	Pot	2
	Limited Entry Trawl	Bottom Trawl	6
	OA Fixed Gear	Pot	1
2011	Catch Shares	Bottom Trawl	33
	Catch Shares	Pot	2
	Limited Entry Sablefish	Hook and Line	1
	Limited Entry Sablefish	Pot	2
	MS Catcher Vessels	Midwater Trawl	1
	Shoreside Hake	Midwater Trawl	2
2012	Catch Shares	Bottom Trawl	8
	Catch Shares	Hook and Line	3
	Catch Shares	Pot	2
	Limited Entry Sablefish	Hook and Line	1
	MS Catcher Vessels	Midwater Trawl	1
	Shoreside Hake	Midwater Trawl	1
2013	Catch Shares	Bottom Trawl	13
	Shoreside Hake	Midwater Trawl	1
2014	Catch Shares	Bottom Trawl	1
2015	Catch Shares	Bottom Trawl	1
2016	Catch Shares	Bottom Trawl	3
2016	Limited Entry Sablefish	Hook & Line	1
2017	Catch Shares	Bottom Trawl	4
2017	Limited Entry Sablefish	Hook & Line	1

Seabird Avoidance and Mitigation Measures

NMFS has been working with fishers and Washington Sea Grant to reduce the likelihood of seabirds to be taken by the fishery. The actual take and the estimates of short-tailed albatross bycatch presented here are based largely on years prior to consistent seabird bycatch mitigation measures, which have been shown to drastically reduce seabird bycatch in Alaskan groundfish fisheries (Melvin 2000). In this mitigation, streamer lines fly in the air above where baited gear is being deployed and provides a visual stimulus to inhibit seabirds from ingesting baited hooks and drowning. While some longline vessels in the groundfish fishery used streamer lines and other seabird avoidance gear voluntarily, organized efforts promoting the use of streamer lines did not begin until 2009. These efforts are summarized below:

- Pre-2009: some voluntary use of streamer lines and other seabird avoidance gear
- 2009: Washington Sea Grant initiated a NMFS-supported streamer line distribution pilot program with tribal fisheries; West Coast Groundfish Observer Program began documenting use and characteristics of seabird avoidance gear on fixed gear vessels
- 2009-2011: Washington Sea Grant extend free streamer line program to major longline ports in Oregon and Washington (Washington Sea Grant 2011)
- 2013-2016: distribution of free streamer lines and research to refine the design of streamer lines specifically for West Coast groundfish fisheries
- December 2015: use of streamer lines on vessels ≥ 55 feet long became mandatory (80 FR 71975), and tribal vessels use streamer lines voluntarily. Public outreach materials

detailling technical requirements of streamer lines and request for vessels both ≥ 55 feet and < 55 feet to participate in seabird bycatch

- November 2018: proposal to amend current Federal regulations to require commercial groundfish longline vessels 26 feet overall (LOA) and longer to employ streamer lines consistent with Alaska streamer line regulations or to set longlines after civil sunset and before civil sunrise when fishing in Federal waters

The most recent efforts (November 2018) are an extension of the action taken in 2013 to apply streamer line requirements to vessels 55 feet LOA and longer, as described in the final EA prepared by NMFS (2013). The purpose of the proposed action is to further reduce interactions between ESA-listed seabirds and groundfish longline gear relative to current levels of take and is needed to comply with the 2017 USFWS Biological Opinion by minimizing endangered short-tailed albatross take to levels judged not to jeopardize the continued existence of the species.

In November 2018, the Pacific Fisheries Management Council adopted the following alternatives (PFMC 2019) based on recommendations from its Groundfish Management Team.

No Action: Vessels between 26 and 54 feet LOA are not required to use seabird bycatch mitigation measures.

Alternative 1: Require Vessels between 26 and 55 Feet LOA either use streamer lines or begin setting gear only after civil dusk and before civil dawn (approximated by one hour after local sunset and one hour before local sunrise).

- Option A - when fishing south of 36° N latitude, vessels would be exempted from the requirement to deploy streamer lines or night set.
- Option B - when fishing shoreward of the 250-fathom depth contour, vessels would be exempted from the requirement to deploy streamer lines or night set.
- Option C - vessels using floated mainline gear would be required to begin setting gear after civil dusk and before civil dawn (i.e. the streamer line option would not be available to these vessels).
- Option D - a weather safety exemption different than the one currently established for vessels 56 feet LOA and longer would be established for vessels 26 to 55 feet LOA.

The Council will be considering the effects of these alternatives during their April 2019 meeting and will be proposing recommendations to NMFS at their June 2019 meeting. NMFS expects to implement new requirements in early 2020.

Additional information relevant to the BiOp/RPMs and Conservation Measures

The 2012 Biological Opinion on the continuing operation of the Pacific Coast groundfish fishery (USFWS 2017) outlined Reasonable and Prudent Measures (RPMs) and Conservation Recommendations necessary and appropriate for NMFS to minimize take of short-tailed albatross. NMFS responded to these points in the initial report to the PFMC ESA Workgroup (Good et al. 2015), including:

- NMFS developed streamer line requirements for vessels ≥ 55 feet
- NMFS facilitated outreach by Washington Sea Grant and Oregon State University
- NMFS convened a Pacific Coast Groundfish and Endangered Species Workgroup
- NMFS reports and retains short-tailed albatross takes, will report on the efficacy of streamer lines, and regularly examines observer protocols
- NMFS produces a biennial bycatch report, make use of other available data on short-tailed albatross, update risk assessments as needed, and consult on unobserved fisheries
- NMFS maintains observer coverage levels

The 2017 Biological Opinion regarding the effects of the continued operation of the Pacific Coast groundfish fishery (USFWS 2017) outlined the following reasonable and prudent measures (RPMs) were necessary and appropriate for NMFS to minimize take of short-tailed albatross:

RPM 1: NMFS shall minimize the risk of short-tailed albatross interacting with hooks and lines. Because short-tailed albatross are caught and killed by baited hooks in longline fisheries, minimization measures shall be employed to reduce the likelihood they will attack baited hooks.

T&C 1 for RPM 1: To ensure the effectiveness of the existing regulations (50 CFR Part 660.61; NMFS 2015a), NMFS shall:

- a. Amend or refine regulations to mandate vessels that use the longline gear to:
 - i) Employ streamer lines in the commercial longline fishery of the PCGF consistent with the Alaska streamer line regulations for Federal waters, including the use of single streamer lines on boats 26-55 feet in length, OR
 - ii) Set longlines after civil sunset [and before civil sunrise]
- b. Conduct research that investigates:
 - i) new or improved methods of reducing bycatch of short-tailed albatross that are safe and effective within the longline fishery.
 - ii) the effect of floating gear on albatross bycatch and improved methods to minimize risk of bycatch.
 - iii) vessel effect on seabird bycatch, and determine, if feasible, whether the use of additional minimization measures would further reduce bycatch for individual vessels.
 - iv) if new information is revealed that determines that this T&C should be updated, the BO shall be amended, as appropriate.
- c. NMFS shall implement regulation amendments as soon as practical, but initiation of implementation shall not exceed a three-year period after issuance of this biological opinion.
- d. Continue to provide assistance to the Tribes with implementation of streamer use on tribal vessels, and shall encourage and assist with the development of Tribal regulations requiring streamer use as information and resources become available.

NMFS is currently considering regulations to mandate either the use of streamer lines or night setting in the commercial longline fishery of the Pacific Coast Groundfish Fishery for non-tribal vessels 26' length or greater. NMFS is also conducting analyses on vessel size and floating gear on seabird bycatch.

T&C 2 for RPM1: To ensure appropriate implementation of measures that minimize seabird take, NMFS shall:

- a. Distribute bulletins to permit holders covering vessel instructions for proper use of streamer lines. Additional topics that shall be covered the materials include:
 - i) Status of short-tailed albatross population and observations of the species in the vicinity of the PCGF fishing area.
 - ii) Short-tailed albatross notification requirements (see T&C 1 for RPM 5).
 - iii) Disposition of short-tailed albatross specimens (see T&C 2 for RPM 5).

NMFS annually provides handouts to vessels with limited entry permits, including requirements for seabird bycatch mitigation, information on safe handling of albatross, and recommendations for bird-safe offal discharge. NMFS will provide similar handouts and education materials to vessels subject to new requirements in 2020, as noted above.

RPM 2. NMFS shall minimize the risk of short-tailed albatross interacting with trawl cables. Because short-tailed albatross are vulnerable to striking aerial trawl cables, particularly in the catcher-processor fleet, minimization measures shall be explored and implemented to reduce the likelihood that they interact with trawl gear.

T&C 1 for RPM 2: To minimize the risk of short-tailed albatross interacting with trawl cables, NMFS shall:

- a) Continue to conduct research that investigates the extent of take associated with trawl gear and new or improved management actions that minimize take as a result of interactions with trawl gear in the PCGF. Management actions that should be examined include:
 - i) The use and effectiveness of streamer lines when using trawl gear;
 - ii) The degree to which minimizing the aerial extent of trawl cables affects the risk of bird strike; and
 - iii) Feasible offal management techniques that decrease attraction of short-tailed albatross to the vicinity of aerial lines.
- b) Based on the research and findings of NMFS's investigations into trawl-associated mortality or injury, implement measures that minimize potential for short-tailed albatross interactions with trawl gear.

NMFS is entering its fourth season studying seabird interactions with trawl cables on West Coast hake catcher-processor trawl vessels using NWFSC fisheries observers. In addition, NMFS has contracted with Oregon Sea Grant to place dedicated seabird observers on

West Coast hake catcher-processor trawl vessels in 2019, with the aim of adding to and improving the data currently being collected by fishery observes in that fishery.

RPM 3: NMFS shall continue to convene a multi-stakeholder, Pacific Coast Groundfish and Endangered Species Working Group as an advisory body to NMFS and USFWS for the purposes of reducing risk to short-tailed albatross. This group will work toward eliminating data gaps and facilitate adaptive management to minimize and avoid take of short-tailed albatross.

T&C 1 for RPM 3: To ensure effectiveness of the established PCGF Endangered Species Workgroup (ESA Workgroup), NMFS shall:

- a. At a minimum, convene formally on a biennial basis and informally annually, as needed, to consider all new information, compliance with these terms and conditions, and results of take estimation (see T&C 3 for RPM 3).
- b. Consider recommendations made by the ESA Workgroup regarding changes to the PCGF that are intended to reduce risk of harm to short-tailed albatross (e.g., new analyses or reports, changes to sampling protocols, additional conservation measures to implement, updating species risk assessments, recommendations regarding compliance with these terms and conditions, and advise if reinitiation is warranted).
- c. Make ESA Workgroup recommendations available to USFWS and PFMC.

NMFS convenes the ESA Workgroup biennially, considers recommendations made by the workgroup, and makes workgroup recommendations available to the PFMC and USFWS.

T&C 2 for RPM3: NMFS shall update methods for the BA's risk assessment for short-tailed albatross as recommended by the ESA Workgroup or when reinitiation of consultation is required. Consider the following information when developing future estimates:

- a. Current available data from short-tailed albatross telemetry work.
- b. NMFS Groundfish observer program's data on all observed short-tailed albatross vessel and gear interactions and information on injured and killed short-tailed albatross.
- c. Any additional reports by other NMFS managed fisheries operating in the action area of short-tailed albatross vessel and gear interactions and information on injured and killed short-tailed albatross.
- d. PCGF fishing effort.
- e. NMFS shall report on information provided to vessel operators regarding measures minimizing seabird take.

If necessary, NMFS will update the BA's risk assessment for short-tailed albatross and consider available data on short-tailed albatross telemetry, gear interactions observed in other NMFS-managed fisheries, and PCGF fishing effort. NMFS will report on information provided to vessel operators regarding measures minimizing seabird take.

T&C 3 for RPM3: NMFS shall consult with the ESA Workgroup and USFWS to consider methods to improve the estimates of incidental take of short-tailed albatross in unobserved fisheries.

NMFS is not aware of any reports of short-tailed albatross takes in unobserved fisheries (Tribal (non-hake) fisheries, state fisheries not observed by the WCGOP, non-regulated fisheries, recreational fisheries, or research fisheries). NMFS will consult with the ESA Workgroup and USFWS to consider methods to estimate incidental take of short-tailed albatross in unobserved fisheries.

RPM 4: NMFS shall monitor and report all observed, reported and estimated take of short-tailed albatross interactions with fishing vessels and gear within the PCGF, and evaluate and report on the efficacy of avoidance and minimization measures.

T&C 1 for RPM 4: To ensure monitoring and reporting of all observed and reported interactions with fishing vessels and gear; estimate take of short-tailed albatross within the Pacific Coast Groundfish Fisheries; and evaluate and report on the efficacy of avoidance and minimization measures NMFS shall update the WCGOP to include specific guidance for endangered or threatened species, namely:

- a. Develop procedures to improve observers' prioritization of short-tailed albatross observations in the existing WCGOP.
- b. Require WCGOP to collect the following information:
 - Time of initiation and completion of observed set
 - Number of hooks deployed with each observed set.
 - Configuration of the gear used, particularly whether using floating or sinking gear.
- c. Maintain observer coverage in the OA Fixed Gear and Limited Entry Sablefish fisheries at or above historic levels.

NMFS prioritizes observations of short-tailed albatross by fishery observers. Since 2002, the WCGOP fishery observers have recorded the initiation and completion times of observed sets and the number of hooks deployed for each observed set. Since 2016, the WCGOP fishery observers have recorded the configuration of the gear used, particularly whether vessels were employing floating gear. NMFS is maintaining observer coverage in the OA Fixed Gear and Limited Entry Sablefish fisheries at or above historic levels.

T&C 2 for RPM4: To provide information that is unavailable on unobserved vessels, NMFS shall:

- a. Implement a logbook requirement for longline fisheries, especially for those fisheries with low observer coverage rates as recommended by the Pacific Fisheries Management Council (2015), the Pacific Coast Groundfish ESA Workgroup (2015), and GMT (2012),

- or at a minimum, develop methods to provide better record of gear type deployed, time of day for gear deployment, and overall effort (*i.e.*, number of hooks).
- b. This information shall be utilized to improve the short-tailed albatross risk assessment for these fisheries to and reported annually with the updated risk assessment.

In a report to the Council in March 2019, NMFS recommended the Council prioritize an action that would include developing a logbook requirement for longline fisheries starting in June 2020. While the impetus for requiring fixed gear logbooks was specific to the sablefish sector, the 2017 ESA Workgroup Report (Agenda Item F.7.a, ESA Workgroup Report, April 2017) recognized the additional benefit this information may improve bycatch estimation for protected species if broadened to all fixed gear sectors. Because of this expanded scope, and potentially pairing with actions to change allowable fishing locations, NMFS expects the development of this action to need considerable time to undertake.

(https://www.pcouncil.org/wp-content/uploads/2019/03/C5a_Supp_NMFS_Rpt1_MAR2019BB.pdf)

T&C 3 for RPM 4: NMFS shall complete a biennial report to be submitted to State Supervisor, USFWS, 2600 SE 98th Ave. Suite 100, Portland, OR 97266, and to the Pacific Coast Groundfish and Endangered Species Workgroup. The report shall include any pertinent new information and document effects of the PCGF on endangered or threatened species.

NMFS completed and submitted biennial reports to the USFWS and the ESA Workgroup in 2015 and 2017.

RPM 5: NMFS shall facilitate the salvage of short-tailed albatross carcasses taken in the PCGF. Because of their rarity and unique life history traits, every effort should be made to retain short-tailed albatross carcasses for scientific and educational purposes.

T&C 1 for RPM 5: Report and continue to require observers and commercial fishers report all mortality and injury of short-tailed albatross to:

Office	Phone Number
Newport Field Office Supervisor, Newport Oregon	Weekdays: 541-867-4558, x. 237 Cell: 541-961-6904
Law Enforcement	503-682-6131

NMFS will continue to require observers and commercial fishers to report all mortality and injury of short-tailed albatrosses.

T&C 2 for RPM 5: NMFS shall disseminate the following short-tailed albatross disposition instructions to fishers and observers within the PCGF.

1. If a dead, injured, or sick short-tailed albatross individual is located, call USFWS 503-231-6179 for handling and disposition instructions. If an observer is on board, they shall be responsible for the disposition of dead, injured, or sick birds, otherwise the boat captain shall be responsible.
2. Care should be taken in handling sick or injured specimens to ensure effective treatment and in the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured short-tailed albatross or preservation of biological materials from a dead animal, the boat captain or observer has the responsibility to carry out instructions provided by USFWS to ensure that the specimen is not unnecessarily disturbed.
3. Live birds must be retained in a safe location. Release overboard shall occur if it looks normal and exhibits all of the following traits: the bird is capable of holding its head erect, and the bird responds to noise and motion stimuli; the bird breathes without noise; the bird can flap both wings, and it can retract the wings to a normal folded position on the back; and the bird is capable of elevating itself to stand on both feet, with its toes pointed in the proper direction (forward); and it is dry.
4. Injured or sick albatross are to be retained in a safe location.
5. Dead short-tailed albatross must be frozen immediately, with identification tags attached directly to the carcass, and a duplicate identification tag attached to the bag or container holding the carcass. Ideally, the specimen should be frozen at -40 degrees Fahrenheit. Identification tags must include all of the following information: species, date of mortality, name of vessel, location (latitude and longitude) of mortality, observer or captain's name (or both), and any band numbers and colors if the specimen has any leg bands. Leg bands must remain attached to the bird.
6. If the bird is retained alive or dead, it must be surrendered as soon as possible as directed by the USFWS.

NMFS disseminates short-tailed albatross carcass disposition to fishers and observers within the PCGF through an annual mailing to permit holders.

Conservation Recommendations

Section 7(a)(1) of the Act directs Federal agencies to use their authorities to further the purposes of the Act by implementing conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities designed to minimize or avoid adverse effects of a proposed action on listed species or designated critical habitat, to assist in the implementation of recovery plans or to obtain information.

The USFWS believes the following conservation recommendation will reduce the impact of the proposed action on short-tailed albatross within the action area:

- Calculate observer coverage level within the PCGF that will provide adequate data to predict harm to short-tailed albatross within a reasonable tolerance.
- In order for the USFWS to be kept informed of actions that minimize or avoid adverse effects or benefit listed species or their habitats, the USFWS requests notification regarding the implementation of any conservation recommendation.

The A-SHOP and the WCGOP IFQ fisheries currently have 100% observer coverage and therefore provide a census of short-tailed albatross interactions with those sectors. Observer program coverage rates can be found at:

https://www.nwfsc.noaa.gov/research/divisions/fram/observation/xls/FOS_Coverage_2002-2017%202018-07-26.xlsx.

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Appendix 1. Descriptions of fishery sectors in the Pacific Coast Groundfish Fisheries.

Management								
Sector	Sub-Sector	Permits	Gear(s)	Target(s)	Vessel Length (m)	Depths (m)	2002-2010	2011-present
Federally managed Catch Shares fisheries								
Limited Entry (LE) Trawl	Limited Entry (LE) Trawl	Federal LE permit ¹ with trawl endorsement	Bottom Trawl, after Jan 1, 2011 also Hook & Line and Pot gear	Groundfish assemblage	11-29	Wide range	Cumulative two-month trip limits; depth-based closures; 14-23% observer coverage	Individual Fishing Quotas (IFQ); 100% observer coverage
	LE California Halibut	CA Halibut permit ² and LE permit with trawl endorsement ¹	Bottom Trawl	California halibut ⁵	9-22	< 55	Cumulative two-month trip-limits; depth-based closures; 3-23% observer coverage	IFQ; 100% observer coverage
At-Sea Hake	Mothership-Catcher Vessel (MSCV)	LE permit with MSCV endorsement ¹	Midwater Trawl	Pacific hake ⁶	26-45 ⁴	53-460 ⁴	Seasonal quotas for target and bycatch species of concern; 100% observer coverage	IFQ; Seasonal; 100% observer coverage
	Catcher-processors (CP)	LE permit with CP endorsement ¹	Midwater Trawl	Pacific hake	82-115	60-570	Seasonal quotas for target and bycatch species of concern; 100% observer coverage	IFQ; Seasonal; 100% observer coverage
	Tribal	(none)	Midwater Trawl	Pacific hake	< 38	53-460	Tribal; 100% observer coverage	
Shoreside Hake	n/a	LE permit with trawl endorsement ¹	Midwater Trawl	Pacific hake	17-29	Wide range	Seasonal quotas for target and bycatch species of concern; electronic monitoring	IFQ; Seasonal; 100% observer coverage

Sector	Sub-Sector	Permits	Gear(s)	Target(s)	Length (m)	Depths (m)	2002-present
Other Federally managed fisheries							
Non-Nearshore Fixed Gear	Sablefish endorsed	LE permit with fixed gear endorsement ¹ and sablefish quota	Longlines, Pots	Sablefish ⁷	11-32	> 145	Sablefish tier quotas; seven month season; 9-27% observer coverage
	Sablefish non-endorsed (a.k.a. Zero Tier)	LE permit with fixed gear endorsement ¹ w/o sablefish quota	Longlines, Pots	Sablefish, rockfish ⁸ and flatfish ⁹	5-18	> 145	Trip limits; 1-12% observer coverage
	Open Access	(none)	Longlines, Pots	Sablefish and other groundfish	3-30	> 64	Trip limits; 1-6% observer coverage
State managed fisheries							
Open Access (OA) California Halibut	CA Halibut permit ²	Bottom Trawl	California halibut	9-22	< 55		All fishing occurs within CA waters, most in the California Halibut Trawl Grounds where minimum mesh sizes, seven month season, and minimum size requirements hold; 1-16% observer coverage
Nearshore Fixed Gear ³	CA or OR state nearshore permits and endorsements	Variety of hand lines, pot gear, stick gear, rod and reel	Rockfish, Cabezon ¹⁰ , Greenlings ¹¹	3-15	< 110 (usu. < 55 in OR waters)		Federal and CA or OR state nearshore regulations; area closures; two-month trip limits; minimum size limits; 2-8% observer coverage
Pink Shrimp	WA, OR, or CA state pink shrimp permit	Shrimp trawl	Pink shrimp ¹²	11.5-33	91-256		WA, OR, or CA state pink shrimp regulations; Bycatch Reduction Devices required; trip limits on groundfish landed; 4-14% observer coverage

¹a.k.a., LE permit; all LE permits are issued by Federal agency (NOAA).

²Issued by the state of California.

³The state of WA does not conduct a nearshore fishery.

⁴Average values for catcher vessels delivering catch to motherships.

⁵*Paralichthys californicus*

⁶*Merluccius productus*

⁷*Anoplopoma fimbria*

⁸*Sebastes* spp.

⁹*Pleuronectiformes*

¹⁰*Scorpaenichthys marmoratus*

¹¹*Hexagrammidae*

¹²*Pandalus jordani*