UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
Sustainable Fisheries Division
501 West Ocean Boulevard, Suite 4200
Long Beach, California 90802

**August 18, 2022**

Mr. Jean-François Pulvenis, Acting Executive Director
Inter-American Tropical Tuna Commission (IATTC)
8901 La Jolla Shores Drive
La Jolla, California 92037-1509

**Subject: Submission of Annual Seabird Report on Implementation of Mitigation Measures and Bycatch Data**

Dear Mr. Pulvenis:

The United States is submitting this letter pursuant to Resolution C-11-02 (*Resolution to Mitigate the Impacts on Seabirds of Fishing for Species Covered by the IATTC*). Please find enclosed the final 2020 Annual Report on Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries. This report contains information on the implementation of mitigation measures for U.S. vessels operating inside and outside of the IATTC Convention Area. Additionally, we have attached the estimated interaction rates with seabirds specific to the IATTC Convention Area for 2021.

Please contact William Stahnke at (562) 980-4088 or william.stahnke@noaa.gov with any questions.

Sincerely,

Lyle Enriquez
Highly Migratory Species Branch Chief

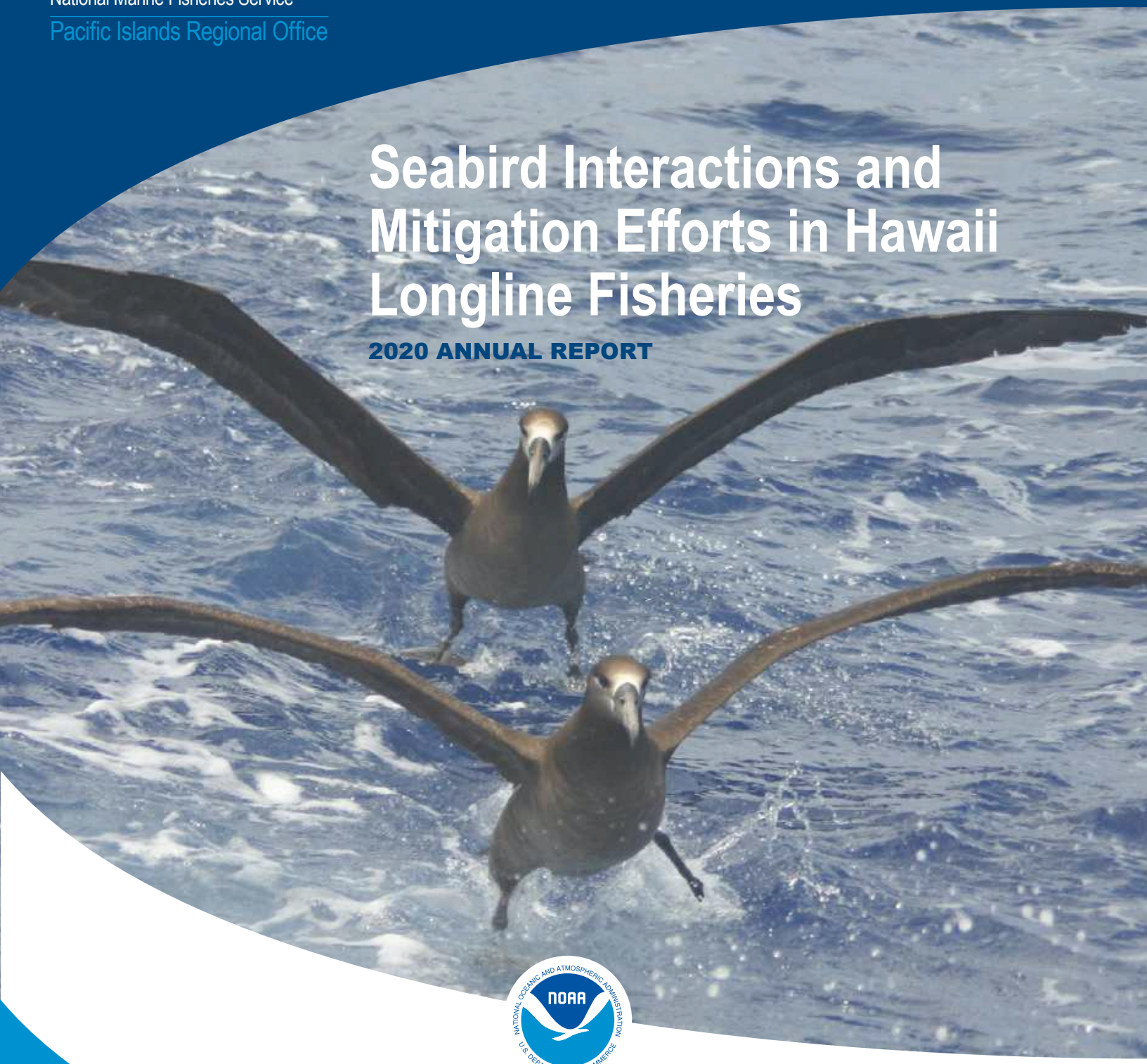
cc: David Hogan, U.S. Department of State
Ryan J. Wulff, NMFS, West Coast Region
Keith Bigelow, NMFS, Pacific Islands Fisheries Science Center
Administrative File: 150413WCR2014SF00073:WJS

National Marine Fisheries Service

Pacific Islands Regional Office

# Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

## 2020 ANNUAL REPORT



NOAA FISHERIES

# Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

## 2020 ANNUAL REPORT

**November 2021**

Pacific Islands Regional Office
NOAA National Marine Fisheries Service
1845 Wasp Blvd.
Honolulu, HI 96818
**www.fisheries.noaa.gov/pacific-islands**

*Please note: Data in this report are considered to be preliminary, and may be revised as better information becomes available. For the most current data, please contact the NMFS Pacific Islands Regional Office.*

*Front cover: A pair of black-footed albatross. Credit: NOAA Fisheries.*
*Back cover: Red-footed booby landing on a railing of a fishing vessel. Credit: NOAA Fisheries.*

*Hawaii longline vessels docked at Pier 17, Honolulu. Credit: NOAA Fisheries.*

## Contents



## Tables



## Figures

# 1. Introduction

This annual report is required in the Terms and Conditions of the 2012 Biological Opinion of the U.S. Fish and Wildlife Service for the Operation of Hawaii-based Pelagic Longline Fisheries (USFWS 2012).

The National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) is responsible for minimizing, as practicable, interactions between Hawaii pelagic longline fishing operations and seabirds. NMFS monitors the fisheries to determine the effectiveness of management measures implemented to minimize interactions and the severity of interactions. NMFS documents interactions and mitigation efforts aboard vessels at sea and reports annually on fishing effort, seabird interactions, and mitigation research. View this report and similar reports from previous years online at https://www.fisheries.noaa.gov/pacific-islands/bycatch/seabird-interactions-pelagic-longline-fishery.

## 1.1 Background

NMFS and the Western Pacific Fishery Management Council (WPFMC) manage two Hawaii pelagic longline fisheries under the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific (FEP) and implementing regulations. The deep-set longline fishery targets primarily bigeye tuna at depths to 400 meters (m) and operates mainly north-northeast and southwest of the main Hawaiian Islands. The shallow-set longline fishery targets swordfish at depths to 100 m and typically operates north and east of the Hawaiian Islands. The FEP contains a detailed description of the two fisheries (WPFMC 2009, as amended).

Since 1994, the Hawaii longline fleet has been limited to 164 permits. Permits allow fishing in both the shallow- and deep- set longline fisheries. Activity levels in any given year since 2004 range from 11 to 35 vessels in the shallow-set fishery, and 111 to 150 vessels in the deep-set fishery. Nearly all vessels in the shallow-set fishery also participate, to some degree, in the deep-set fishery during the year.

Laysan albatross, black-footed albatross, shearwaters, fulmars, boobies, and the endangered short-tailed albatross feed around the Hawaiian Islands in areas where the longline fisheries operate. During the deployment (setting) and retrieval (hauling) of longline fishing gear, hooks and line may occasionally hook or entangle seabirds that attempt to take bait or catch. Seabirds are more likely to drown when the interaction occurs during setting because the weight of the gear may pull the seabird underwater. Although some interactions are inevitable, fishermen take steps to avoid and minimize interactions.

In 2000, NMFS estimated 2,433 seabird interactions in the Hawaii longline fisheries. Beginning in 2001, NMFS implemented a series of seabird mitigation measures, including seabird-deterrent fishing gear and techniques that have reduced interactions. In 2020, there were 32 observed interactions in the shallow-set fishery, which has 100% observer coverage, and an estimated 917 interactions in the deep-set fishery, which has approximately 15% observer coverage (McCracken and Cooper 2021). Observer coverage in the deep-set fishery was reduced in 2020 from the usual 20% due to health, safety, and travel restrictions.

## 1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries

Most of the regulations for Hawaii longline fisheries are in Title 50, Code of Federal Regulations, Parts 600 and 665 (50 CFR Parts 600 and 665). Regulations specific to the mitigation of seabird interactions and safe handling techniques are at 50 CFR 665.815. NMFS also provides a regulation summary and seabird handling guidelines to Hawaii longline fishermen and the general public at https://www.fisheries.noaa.gov/pacific-islands/bycatch/seabird-interactions-pelagic-longline-fishery.

The ways that fishermen implement required seabird mitigation measures depend on how and where fishermen fish. Mitigation measures to reduce seabird interactions differ between the two options of stern-setting and side-setting. The following sections describe each of the main gear and operation requirements. The 2012 Biological Opinion (USFWS 2012) also describes these measures.

## Stern-Setting versus Side-Setting

Stern-setting is the most common method of deploying longline fishing gear. Crewmen employ a line shooter to set baited hooks from the back of the vessel. Crews that set gear using this method must bait hooks with thawed, blue-dyed bait; attach a weight of at least 45 grams (g) within 1 m of the hook on each branch line; strategically discharge fish, fish parts, or spent bait (together known as "offal"); and remove all hooks from offal discharge as seabird mitigation measures.

In side-setting, crewmen set baited hooks forward and close to the side of the vessel's hull where seabirds are unable or unwilling to pursue the hooks. With required branch line weighting, the baited hooks will have sunk to a depth where seabirds cannot reach them by the time the vessel stern passes the location where baited hooks have been set (Gilman and Brothers 2006; Gilman et al. 2005, 2007a, 2007b). Additionally, deploying a required bird curtain aft of where crew is deploying the gear inhibits seabirds from landing on the water along the side of the vessel where baits are accessible.

Table 1 summarizes the number of Hawaii deep- and shallow-set vessels observed to set from the stern and from the side in 2020, with some vessels operating in both deep- and shallow-set longline fisheries. In 2020, most vessels in the deep-set fishery and all vessels in the shallow-set fishery chose to stern-set.

**Table 1. Number of observed Hawaii longline vessels that side- and stern-set in 2020.**

| Fishery | Deck setting position | Vessels |
|---|---|---|
| Deep-set | Stern-setting | 105 |
| Deep-set | Side-setting | 21 |
| Shallow-set | Stern-setting | 15 |
| Shallow-set | Side-setting | 0 |

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 10/15/2021.

## Weighted Branch Lines

Fishermen place weights close to the hook on branch lines so baited hooks sink quickly and help prevent foraging seabirds from becoming hooked or entangled in longline gear. When deep-setting north of 23° N (either stern- or side-setting), or shallow- and side-setting anywhere, Hawaii fishermen must attach a weight of at least 45 g within 1 m of the hook to sink the branch line quickly. Fishermen commonly use weights from 45–80 g.

## Thawed and Blue-dyed Bait

Dyeing bait to a specific blue color decreases visibility of the bait by reducing its contrast with the sea surface. Fishermen thaw the bait to increase sink rates and to allow a more effective penetration of the blue dye. Almost all bait used in the Hawaii longline fisheries consists of the fusiform fishes mackerel (saba), sardines, and saury (sanma). NMFS prohibits the use of squid bait in the shallow-set fishery to reduce sea turtle interactions. While fishermen may still use squid in the deep-set fishery, the squid bait costs more than some fish bait and is, thus, less preferred.

## Strategic Offal Discards

Fishermen developed the technique of strategically discarding offal on the opposite side of the vessel from fishing operations to distract seabirds from attempting to steal baits. NMFS observers in the mid-1990s noted that this technique reduced incidental hooking or entanglement of albatrosses, though recent experience is raising the question of whether offal discard can have the unintended effect of attracting more seabirds. Further analysis is ongoing. Strategic offal discard is currently required when stern- and deep-setting north of 23° N, or stern- and shallow-setting anywhere.

## Night-Setting

Night-setting as a seabird mitigation measure in the shallow-set fishery is based on the premise that seabirds cannot see baited hooks in the dark and, thus, do not attack them. The measure requires shallow-set fishermen, when stern-setting, to start deploying gear no earlier than one hour after local sunset and complete the set no later than the following sunrise. The measure also requires using the minimum lighting necessary to conform to navigation rules and best safety practices. Night-setting has been a very effective seabird mitigation measure, reducing seabird interactions by as much as 98% (McNamara et al. 1999, Boggs 2003).

Table 2 summarizes the seabird mitigation requirements.

**Table 2.** Seabird mitigation requirements for the Hawaii longline fleet.

| What you need to do | Stern-setting | | Side-setting | |
|---|---|---|---|---|
| | Shallow-Set Anywhere | Deep-Set North of 23⁰ N | Shallow-Set Anywhere | Deep-Set North of 23⁰ N |
| Deploy mainline from port or starboard side at least 1 m forward of stern corner | - | - | Yes | Yes |
| If line shooter is used, mount it at least 1 m forward from stern corner | - | - | Yes | Yes |
| Use a specified bird curtain aft of the setting station during the set | - | - | Yes | Yes |
| Deploy gear so that hooks do not resurface | - | - | Yes | Yes |
| Attach 45 g or heavier weights within 1 m of hook of each hook | - | Yes | Yes | Yes |
| Use a line shooter to set the mainline | - | Yes | - | - |
| Keep two 1-pound containers of blue-dye on boat | Yes | Yes | - | - |
| Use completely thawed and blue-dyed bait | Yes | Yes | - | - |
| Keep fish parts and spent bait with all hooks removed for strategic offal discard | Yes | Yes | - | - |
| Cut all swordfish heads in half, and use heads and livers for strategic offal discard | Yes | Yes | - | - |
| Night Set - begin set 1 hour after local sunset and finish 1 hour before next sunrise and keep lighting to a minimum | Yes | - | - | - |

*Black-footed albatross biting on baited hook. Credit: NOAA Fisheries.*

**Figure 1.** Illustrated seabird handling guidelines developed for use and distribution in protected species workshops.


## 1.3 Protected Species Workshops

In addition to gear and operational mitigation measures to deter or reduce seabird interactions, owners and operators of pelagic longline vessels must complete a protected species workshop each year (50 CFR 665.814). The workshop includes training in identification, safe handling, and release techniques for sea turtles, marine mammals, and seabirds (Figure 1). The workshop also reviews regulatory and compliance requirements. In a classroom setting, fishermen learn from oral presentations, hands-on demonstrations, videos, and printed reference materials. NMFS also offers the workshops online for those who have completed at least one in-person workshop training within the past 3 years. A valid workshop certificate is necessary to obtain or renew Federal longline fishing permits, and operators must keep a copy of the certificate on board the vessel while fishing.

**Table 3.** Hawaii deep- and shallow-set longline fisheries effort and observer coverage, 2019 and 2020.

| 2019 | | | | | |
|---|---|---|---|---|---|
| Fishery | Number of vessels | Trips | Sets | Hooks | Observer coverage |
| Deep-set | 150 | 1,724 | 22,513 | 63,174,971 | 20.54% |
| Shallow-set | 15 | 28 | 312 | 374,487 | 100% |

| 2020 | | | | | |
|---|---|---|---|---|---|
| Fishery | Number of vessels | Trips | Sets | Hooks | Observer coverage |
| Deep-set | 146 | 1,645 | 20,785 | 59,668,443 | 15.25% |
| Shallow-set | 15 | 37 | 479 | 624,579 | 100% |

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished shallow-set data, 10/15/2021, and NMFS 2021a and NMFS 2020.

In 2020, NMFS PIRO provided protected species workshop training for 267 Hawaii-based and 39 American Samoa-based longline vessel owners, operators and crew, and other interested individuals. Starting in March 2020, NMFS live webinar format has increased convenience and accessibility to vessel owners and operators. In addition, NMFS PIRO completed an illustrated guide for proper handling, release, and identification of protected species and, with the WPFMC, translated the guide into languages commonly spoken by operators (Vietnamese) and crew (Tagalog, Indonesian). NMFS distributed all language version copies to all workshop students.

## 1.4 Fishing Effort and Observer Coverage

Please note that summaries throughout this report and elsewhere may vary slightly depending upon the data source, including revisions. For example, observers may report seabird interactions by date of trip (departure or arrival), set date, or haul date in a given year. NMFS typically bases observer coverage levels on the trip departure date. Alternatively, the NMFS Sustainable Fisheries Observer Programs accounts for protected species interactions based on the vessel arrival date in quarterly, semiannual, and annual reports, https://www.fisheries.noaa.gov/pacific-islands/fisheries-observers/pacific-islands-longline-quarterly-and-annual-reports. NMFS also provides summary reports from mandatory logbook data reported by captains.

Table 3 summarizes fishing effort data and observer coverage from 2019 and 2020 by haul date. Observer placement aboard deep-set longline vessels halted temporarily in early 2020 in consideration of COVID-19 and the health and safety of fishermen and observers. NMFS waived placement of observers on 43 trips in the Hawaii deep-set fishery that would typically have carried observers. With enhanced health and safety protocols, observer assignments resumed in May 2020 for the deep-set Hawaii longline fisheries. In the shallow-set fishery, there was no disruption in observer coverage and observers were present on all shallow-set trips. From 2019 to 2020, deep-set fishing trips decreased by 4.6% and shallow-set fishing trips increased by 32.1%.

# 2. Interactions

## 2.1 Species

NMFS observers have recorded the following bird species being hooked or entangled in the longline fisheries since 1994, when NMFS began deploying observers: Laysan albatross (*Phoebastria immutabilis*), black-footed albatross (*P. nigripes*), sooty shearwater (*Puffinus griseus*), unidentified shearwaters, brown booby (*Sula leucogaster*), red-footed booby (*S. sula*), Northern fulmar (*Fulmarus glacialis*), glaucous winged gull (*Larus glaucescens*), and an unidentified gull (Table 4). None of these species is listed under the Endangered Species Act (ESA). Both Hawaii longline fisheries have low levels of interactions with these species. Based on the population estimates, the fisheries likely have very little effect on these populations.

**Table 4. Species recorded hooked or entangled in Hawaii longline fisheries.**

| Species | Global population estimate | Demographic information |
|---|---|---|
| Laysan albatross | 806,693 breeding pairs (ACAP 2021) | The Northwestern Hawaiian Islands (NWHI) has the world's largest colonies and more than 99% of the global breeding population (ACAP 2012a) |
| Black-footed albatross | 70,524 pairs (ACAP 2021) | More than 95% of the population breeds in the NWHI (ACAP 2012b) |
| Northern fulmar | 7 million individuals (Birdlife 2021a) | Located throughout the North Atlantic and North Pacific |
| Red-footed booby | More than 1 million birds (Birdlife 2020a) | Winter on tropical islands in most oceans |
| Brown booby | More than 200,000 adults (Birdlife 2020b) | Located throughout the pan-tropical oceans |
| Sooty shearwater | 8,800,000 adults (Birdlife 2021b) | Nest in Australia, New Zealand, and southern South America |
| Glaucous-winged gull | More than 570,000 individuals (Birdlife 2020c) | Located along the Pacific coast of North America to the northern coast of Japan |

Some seabirds, especially shearwaters, are difficult to identify. Table 5 provides a summary of seabird specimens that NMFS observers collected for identification and biological study after capture in the Hawaii longline fisheries in 2020. NMFS observers retain specimens of the first dead Laysan and black-footed albatrosses recovered from each trip, any banded Laysan and black-footed albatrosses, and all other non-Laysan and black-footed albatross species recovered dead from fishing operations. Seabird specimens are frozen and shipped to the Marine Wildlife Veterinary Care and Research Center in Santa Cruz, California. Since 2007, staff with the organization Oikonos have been collecting morphometric data on shipped specimens.

**Table 5. Summary of collected seabirds from the Hawaii longline fisheries, 2020.**

| Species | Number retained |
|---|---|
| Black-footed albatross | 30 |
| Laysan albatross | 22 |
| Brown booby | 1 |

Note: Not all dead seabirds are collected as specimens

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 10/18/2021.

## 2.2 Location of Interactions

Figures 2 and 3 show the spatial distribution of observed seabird interactions in 2020 in the deep- and shallow-set fisheries, respectively. Most of the interactions occur north of 20° N, where seabirds are typically more abundant and fishing effort is more concentrated.

**Figure 2. Locations of seabird interactions observed in Hawaii deep-set longline fishery, 2020.**

Note: NMFS deployed observers on 15.25% of deep-set trips in 2020.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 10/12/2021.

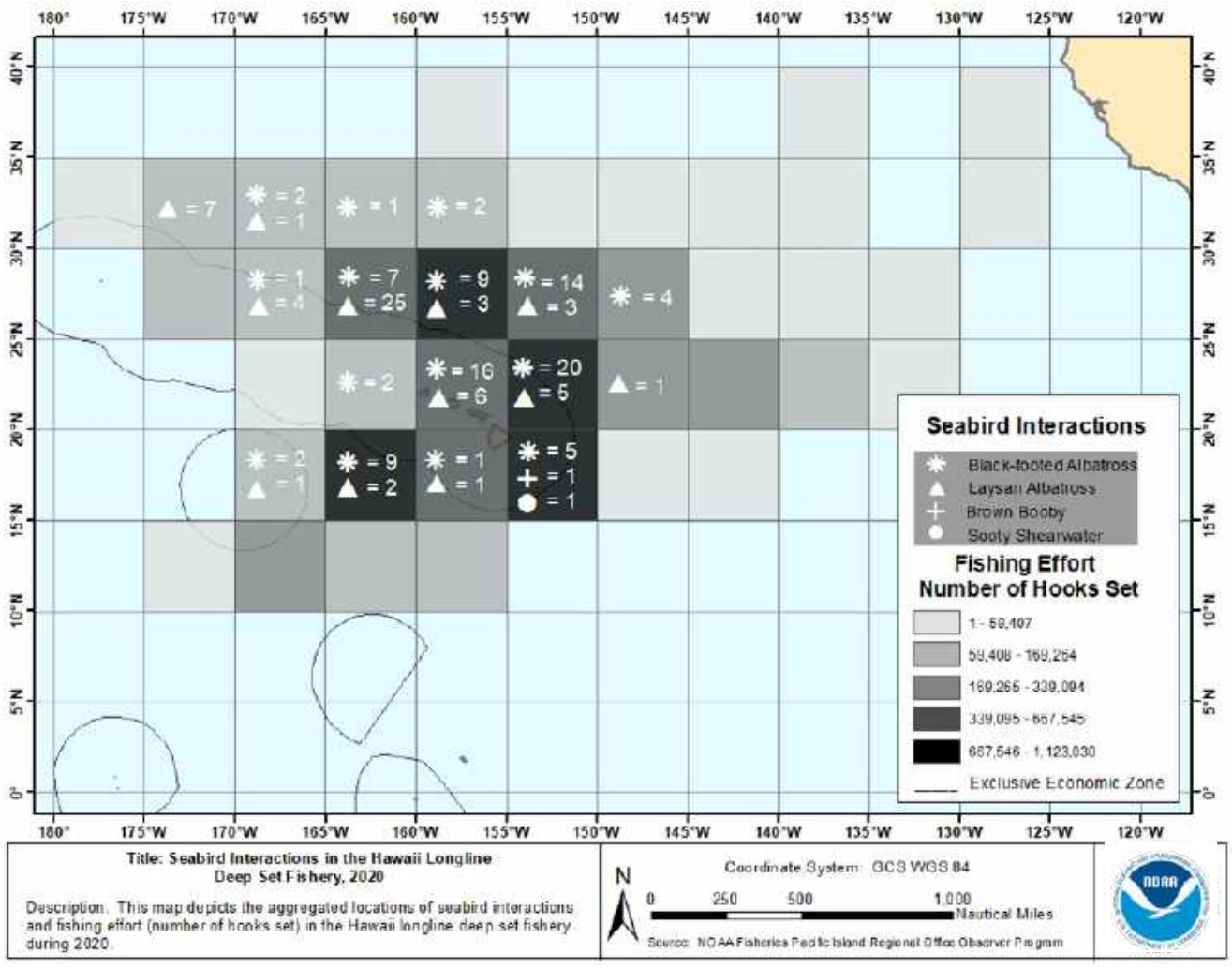
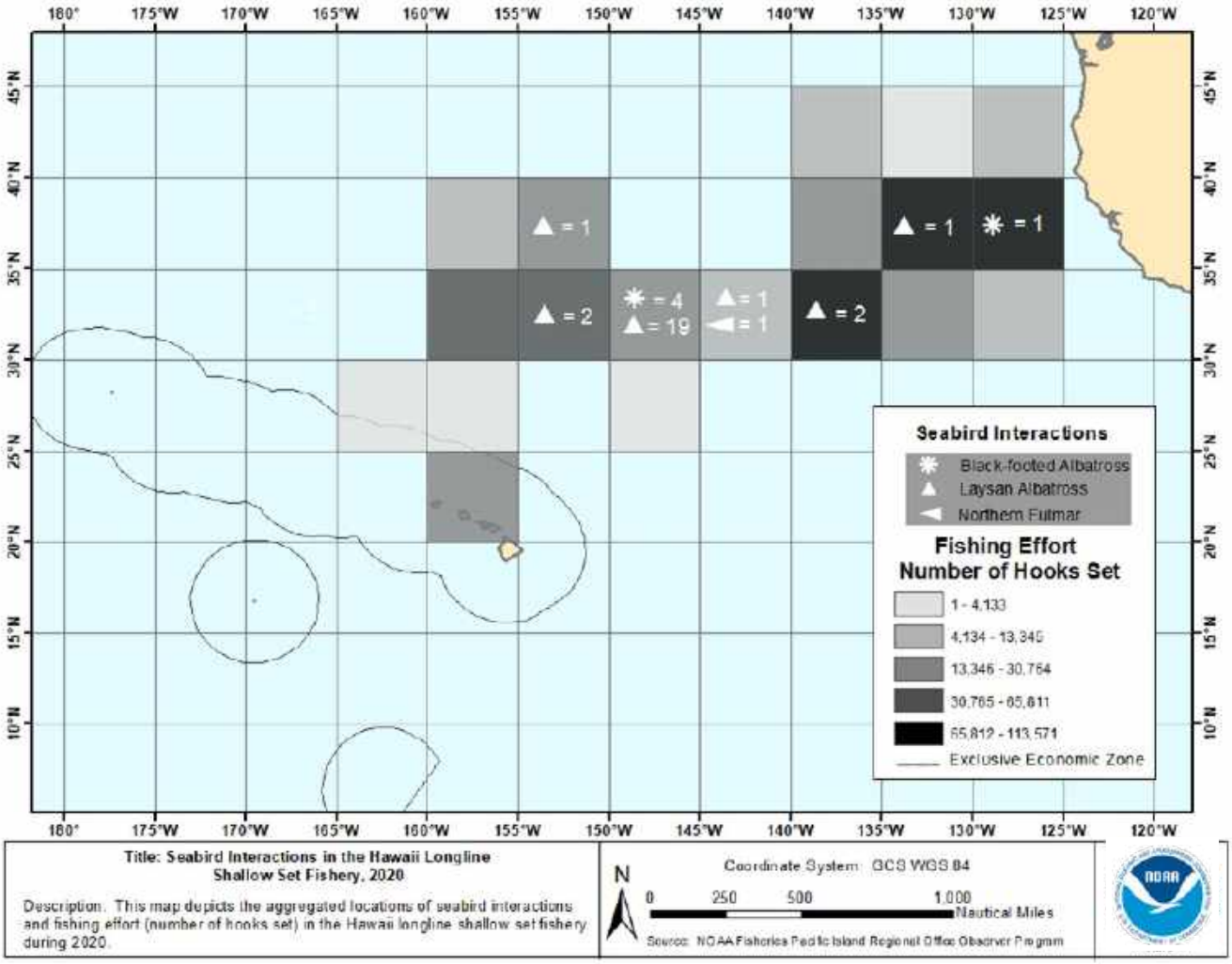


**Figure 3.** Locations of seabird interactions observed in Hawaii shallow-set longline fishery, 2020.

Note: NMFS deployed observers on every shallow-set trip in 2020.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 10/12/2021.



## 2.3 Number of Interactions

Table 6 summarizes observed seabird interactions in both fisheries from 2004–2020. During that period, NMFS deployed observers on 100% of shallow-set fishing trips; therefore, the number of interactions shown in Table 6 represents the fishery-wide totals. NMFS deployed observers on 15.25% of deep-set trips in 2020, so we expanded the observed interactions using the observer coverage rate to estimate total interactions (Table 7). Figure 4 shows the seabird interaction rate from 2004–2020 using the data from Table 6.

Almost all interactions in the deep-set fishery occur when fishermen set gear during the day while seabirds are actively feeding. Seabirds may be hooked or entangled and then drown while the gear sinks. Because most seabirds are inactive at night, very few interactions occur when fishermen typically haul deep-set gear. In 2020 in the deep-set fishery, observers documented interactions with 59 Laysan albatrosses, 95 black-footed albatrosses, 1 brown booby, and 1 sooty shearwater (Table 6). Nearly all of the seabirds observed to interact with the deep-set fishery were dead (92%). Table 7 contains the total estimated number of interactions with Laysan albatrosses, black-footed albatrosses, brown boobies, and sooty shearwaters based on observer records for the deep-set fishery in 2020.

**Table 6. Numbers of observed seabird catches, fishing effort, and interaction rates in the combined Hawaii longline fisheries, 2004-2020.**

### Deep-set Fishery

| Year | Laysan albatross | Black-footed albatross | Sooty shearwater | Other or unidentified bird species caught | Total birds observed caught | Birds released injured and alive | Birds released dead | Total observed effort (hooks) | Seabird interaction rate (birds per 1,000 hooks observed) |
|---|---|---|---|---|---|---|---|---|---|
| **2004** | 2 | 5 | - | 2 | 9 | - | 9 | 7,900,681 | 0.001 |
| **2005** | 6 | 11 | - | 1[1] | 18 | - | 18 | 9,360,671 | 0.002 |
| **2006** | 1 | 17 | 5 | - | 23 | - | 23 | 7,540,286 | 0.003 |
| **2007** | 7 | 18 | - | - | 25 | - | 25 | 7,620,083 | 0.003 |
| **2008** | 14 | 30 | 14 | 2[2] | 60 | 4 | 56 | 8,775,951 | 0.007 |
| **2009** | 18 | 23 | 4 | - | 45 | - | 45 | 7,877,861 | 0.006 |
| **2010** | 39 | 17 | 1 | - | 57 | 1 | 56 | 8,184,127 | 0.007 |
| **2011** | 32 | 13 | 3 | - | 48 | 2 | 46 | 8,260,092 | 0.006 |
| **2012** | 31 | 36 | 6 | - | 73 | 5 | 68 | 8,768,728 | 0.008 |
| **2013** | 48 | 49 | 8 | - | 105 | 5 | 100 | 9,278,133 | 0.011 |
| **2014** | 12 | 38 | 1 | - | 51 | 6 | 45 | 9,608,244 | 0.005 |
| **2015** | 25 | 101 | 4 | 2[4] | 132 | 19 | 113 | 9,393,234 | 0.014 |
| **2016** | 33 | 104 | 4 | 3[5] | 144 | 7 | 137 | 9,882,920 | 0.015 |
| **2017** | 38 | 103 | - | 1[6] | 142 | 13 | 129 | 10,148,195 | 0.014 |
| **2018** | 35 | 190 | 9 | 2[8] | 236 | 28 | 208 | 11,751,242 | 0.020 |
| **2019** | 43 | 145 | - | 1[9] | 189 | 8 | 181 | 12,948,077 | 0.015 |
| **2020** | 59 | 95 | 1 | 1[10] | 156 | 13 | 143 | 8,738,011 | 0.018 |

## Shallow-set Fishery

| Year | Laysan albatross | Black-footed albatross | Sooty shearwater | Other or unidentified bird species caught | Total birds observed caught | Birds released injured and alive | Birds released dead | Total observed effort (hooks) | Seabird interaction rate (birds per 1,000 hooks observed) |
|---|---|---|---|---|---|---|---|---|---|
| **2004** | 1 | - | - | - | 1 | 1 | - | 76,750 | 0.013 |
| **2005** | 62 | 7 | - | - | 69 | 47 | 22 | 1,328,806 | 0.052 |
| **2006** | 8 | 3 | - | - | 11 | 5 | 6 | 745,125 | 0.015 |
| **2007** | 40 | 8 | - | - | 48 | 40 | 8 | 1,292,036 | 0.037 |
| **2008** | 33 | 6 | - | - | 39 | 24 | 15 | 1,350,127 | 0.029 |
| **2009** | 81 | 30 | 1 | - | 112 | 88 | 24 | 1,767,128 | 0.063 |
| **2010** | 40 | 38 | - | 1[3] | 79 | 61 | 18 | 1,828,529 | 0.043 |
| **2011** | 49 | 19 | - | - | 68 | 53 | 15 | 1,611,395 | 0.042 |
| **2012** | 62 | 37 | - | - | 99 | 78 | 21 | 1,418,843 | 0.070 |
| **2013** | 45 | 28 | 2 | - | 75 | 48 | 27 | 1,000,084 | 0.075 |
| **2014** | 39 | 32 | 1 | - | 72 | 56 | 16 | 1,509,727 | 0.048 |
| **2015** | 43 | 38 | - | - | 81 | 65 | 16 | 1,286,628 | 0.063 |
| **2016** | 25 | 40 | - | - | 65 | 50 | 15 | 830,177 | 0.078 |
| **2017** | 6 | 53 | - | 1[7] | 60 | 38 | 22 | 1,051,426 | 0.057 |
| **2018** | 2 | 7 | - | - | 9 | 7 | 2 | 546,371 | 0.016 |
| **2019** | 15 | 19 | - | - | 34 | 26 | 8 | 374,487 | 0.091 |
| **2020** | 26 | 5 | - | 1[11] | 32 | 32 | - | 588,481 | 0.054 |

[1]brown booby; [2]red-footed booby and unidentified seabird; [3]northern fulmar; [4]red-footed booby and unidentified shearwater; [5]two red-footed boobies and one unidentified albatross; [6]unidentified gull; [7]glaucous-winged gull; [8]one brown booby and one red-footed booby; [9]brown booby; [10]brown booby; [11]northern fulmar.

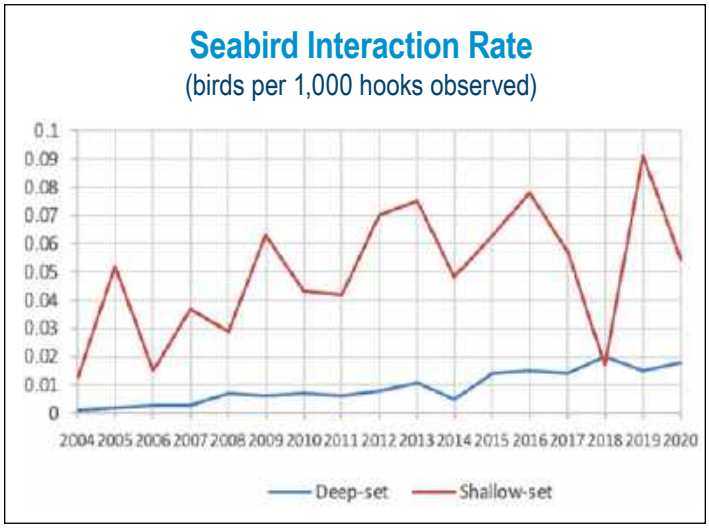
Note: Sustainable Fisheries Observer Program data (unpublished, 10/18/2021) are based on the date and time of the beginning of the haul, with the exception of the total observed effort (hooks), which is based on arrival date from the Sustainable Fisheries Observer Program annual reports (NMFS 2021b and NMFS 2021c). Interaction rates are calculated and rounded to the nearest thousandths (third decimal) place.

**Table 7.** Estimated total seabird interactions in the Hawaii deep-set longline fishery, 2020.

| Species | Total annual estimate |
|---|---|
| Black-footed albatross | 590 |
| Laysan albatross | 315 |
| Brown booby | 5 |
| Sooty Shearwater | 7 |

Note: Table lists point estimates of the total number of incidental interactions by species in the Hawaii deep-set longline fishery based on observed interactions during 2020. Point estimates are based on the trip arrival date rather than trip haul date. Source: McCracken and Cooper 2021.

**Figure 4.** Seabird interaction rates in the deep-set and shallow-set longline fisheries, 2004-2020.



The shallow-set fishery typically sets at night and hauls the gear during the day; therefore, most of the interactions occur when fishermen retrieve the gear and birds are actively feeding. In 2020, the shallow-set fishery interacted with 26 Laysan albatrosses, 5 black-footed albatrosses, and 1 Northern fulmar (Table 6). Fishermen released all seabirds alive.

Seabirds can be hooked, entangled, or both. Table 8 provides a summary of capture and release conditions in 2020. Regulations require fishermen to remove as much gear as safely possible from any seabirds captured before releasing the seabirds.

**Table 8. Capture details by species for seabird interactions on observed trips in the Hawaii longline fisheries, 2020.**

| | MANNER OF INTERACTION | | | |
|---|---|---|---|---|
| | Hooked only | Entangled only | Both hooked and entangled | Not known or not recorded |
| Laysan albatross | 74 | 5 | 6 | 0 |
| Black-footed albatross | 85[1] | 3 | 12 | 0 |
| Brown booby | 1 | 0 | 0 | 0 |
| Sooty Shearwater | 0 | 1 | 0 | 0 |
| Northern Fulmar | 1 | 0 | 0 | 0 |

Note: Regardless of species or manner of capture, all seabirds which were released alive were released without any gear attached to the bird. [1]One dead black-footed albatross (included here) was recorded as hooked, and it was unknown if it was also entangled.

## Recovered Seabird Bands

State and Federal agencies and other groups attach identification bands to the legs of birds to study bird movement, survival, and other characteristics. Table 9 provides a summary of observed seabirds with leg bands from Hawaii longline fisheries interactions in 2020.

Most of the recovered bands were from albatrosses banded on French Frigate Shoals in the Northwestern Hawaiian Islands and caught incidentally in the first half of the year.

**Table 9. Observed interactions of seabirds with bands in the shallow-set and deep-set Hawaii longline fisheries, 2020.**

| Species | Disposition | Band(s) recovery date | Date banded | Location banded | Age at banding (yr) | Age at recovery (yr) |
|---|---|---|---|---|---|---|
| Laysan Albatross | Dead | 1/18/2020 | 5/27/1994 | French Frigate Shoals (Tern Island) | <1 | 26 |
| Laysan Albatross | Dead | 1/19/2020 | 6/6/2003 | French Frigate Shoals (Tern Island) | <2 | 17 |
| Black-footed Albatross | Dead | 1/30/2020 | 5/20/2008 | French Frigate Shoals (Tern Island) | <1 | 12 |
| Black-footed Albatross | Dead | 1/23/2020 | 12/28/2003 | French Frigate Shoals (Tern Island) | >3 | >20 |
| Laysan Albatross | Dead | 2/3/2020 | 12/21/2005 | French Frigate Shoals (Tern Island) | <1 | 15 |
| Black-footed Albatross | Dead | 2/8/2020 | 6/5/2002 | French Frigate Shoals (Tern Island) | <1 | 18 |
| Laysan Albatross | Dead | 2/5/2020 | 5/29/2009 | Kauai (Kilauea Point) | <1 | 11 |
| Black-footed Albatross | Dead | 2/6/2020 | 5/22/2019 | Oahu (Kahuku) | <1 | 1 |
| Black-footed Albatross | Injured | 2/12/2020 | 1/2/2007 | Midway Atoll (Eastern Island) | >1 | >13 |
| Black-footed Albatross | Dead | 2/26/2020 | 11/29/2005 | French Frigate Shoals (Tern Island) | >1 | >15 |

| Species | Disposition | Band(s) recovery date | Date banded | Location banded | Age at banding (yr) | Age at recovery (yr) |
|---|---|---|---|---|---|---|
| Black-footed Albatross | Dead | 2/6/2020 | 6/15/2010 | French Frigate Shoals (Tern Island) | <1 | 10 |
| Black-footed Albatross | Dead | 2/6/2020 | 5/31/2002 | French Frigate Shoals (Tern Island) | <1 | 18 |
| Laysan Albatross | Dead | 2/8/2020 | 6/5/1990 | French Frigate Shoals (Tern Island) | <1 | 30 |
| Laysan Albatross | Dead | 2/8/2020 | 12/14/2011 | Kauai | >1 | >9 |
| Black-footed Albatross | Dead | 2/9/2020 | 2/1/1998 | French Frigate Shoals (Tern Island) | >1 | >22 |
| Laysan Albatross | Dead | 2/10/2020 | 12/9/2002 | French Frigate Shoals (Tern Island) | >3 | >21 |
| Laysan Albatross | Dead | 2/10/2020 | 1/15/1981 | French Frigate Shoals (Tern Island) | >3 | >39 |
| Black-footed Albatross | Dead | 2/27/2020 | 6/16/2010 | French Frigate Shoals (Tern Island) | <1 | 10 |
| Laysan Albatross | Dead | 2/19/2020 | 6/14/2001 | French Frigate Shoals (Tern Island) | <1 | 19 |
| Laysan Albatross | Dead | 2/19/2020 | 5/14/1992 | French Frigate Shoals (Tern Island) | <1 | 28 |
| Laysan Albatross | Dead | 3/5/2020 | 12/9/2002 | French Frigate Shoals (Tern Island) | >3 | >21 |
| Black-footed Albatross | Dead | 3/7/2020 | 12/9/2015 | Midway Atoll (Eastern Island) | >1 | >6 |
| Black-footed Albatross | Dead | 3/16/2020 | 6/5/2006 | French Frigate Shoals (Tern Island) | <1 | 14 |
| Black-footed Albatross | Dead | 6/7/2020 | 5/16/2010 | French Frigate Shoals (Tern Island) | <1 | 10 |
| Laysan Albatross | Dead | 6/11/2020 | 4/16/2007 | Oahu (Kaena Point) | <1 | 13 |

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 10/19 /2021.

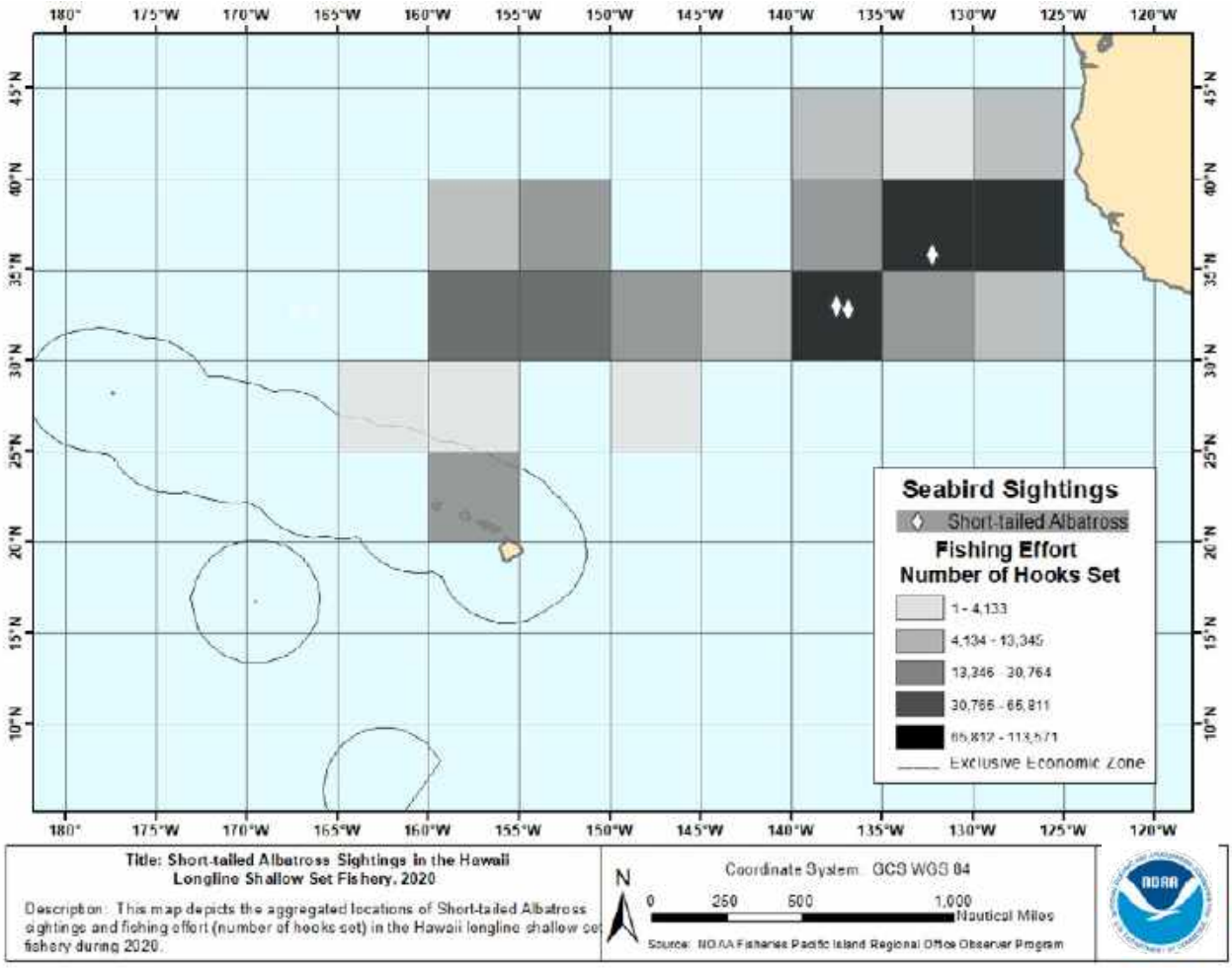
*Banded Laysan albatross in flight. Credit: NOAA Fisheries.*

# 3. ESA-listed Seabirds

There have been no observed interactions (hooking or entanglement) between the fisheries and any ESA-listed seabirds. Three ESA-listed seabird species can be found in areas where the Hawaii longline fisheries operate and are protected under the ESA. These species are the endangered short-tailed albatross *(Phoebastria albatrus),* the Hawaiian dark-rumped petrel *(Pterodroma sandwichensis)*, and the threatened Newell's shearwater *(Puffinus newelli)*. There were four sightings of short-tailed albatross on shallow-set trips in 2020 and no sightings on observed deep-set trips. Figure 5 shows the locations of these sightings compared to the observed fishing effort.

**Figure 5. Short-tailed albatross sightings and fishing effort in the Hawaii shallow-set fisheries, 2020.**

Note: Two short-tailed albatross sightings occurred on the same haul and in the same geographic area. These sightings are represented together as one diamond.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 10/12/2021.



# 4. Research

Since NMFS introduced seabird regulations to the Hawaii deep-set fishery in 2001, the overall seabird catch rate has declined, with the exception of black-footed albatross catch rates. These rates have been increasing over the past decade and in 2017, the WPFMC held a workshop to explore the cause of increased interactions with black-footed albatross. The workshop suggested this increase may be due to a positive (warm) Pacific Decadal Oscillation—with its cooler sea surface in the Western Pacific and stronger westerly winds—that may increase the overlap of fishing effort and black-footed albatross foraging grounds. In 2018, the WPFMC held a workshop to review seabird mitigation requirements and identify research needed to inform future fishing requirements that would reduce interactions with seabirds. That workshop identified certain mitigation measures, including tori lines, as a high priority for further research and development due to their potential to provide an effective alternative to blue-dyed bait.

In spring 2019, the WPFMC, the Hawaii Longline Association, NMFS Pacific Islands Fisheries Science Center (PIFSC), and PIRO initiated a joint cooperative research project to design and test tori lines in the deep-set longline fishery. The team researched potential tori line materials and designs and discussed tori line preferences and experiences with longline fishermen. In September 2019, the WPFMC convened a meeting with New Zealand and Japanese tori line experts who provided valuable input on tori line design for vessels similar to the Hawaii longline fishery. With that guidance, the project team developed a tori line with a 50 m–long aerial section with a "light" ultra-high molecular weight polyethylene (UHMWPE) backbone with two 50 cm–long streamers attached every 1 m along the aerial section. The tori line also has a non-anchored 55 m–long drag section consisting of braided ¼" co-polymer "blue steel" line to be used during ocean trials.

Between February and July 2020, four commercial longline vessels conducted ocean trials, deploying 175 longline sets during 17 trips. Trial sets included control sets with blue-dyed bait and strategic offal discards, and experimental sets with tori lines in conjunction with blue-dyed bait and strategic offal discards (Gilman et al. 2021). Control and experimental trials utilized electronic monitoring (EM) technology and stern "bird cam" video for data acquisition and posttrip review analysis and verification. The statistically significant results from the 2020 study indicated that tori lines, when used in conjunction with blue-dyed bait and strategic offal discard practices, significantly reduce albatross feeding attempts and contact with longline gear.

*Tori lines deployed from a fishing vessel. Credit: NOAA Fisheries.*

On tori line sets, 99.7% of the attempts and contacts by Laysan and black-footed albatrosses occurred within the aerial section of the tori line. Albatross attempts to contact baited hooks were two times less likely for sets equipped with tori lines rather than without tori lines, and contacts with baited hooks were three times less likely for tori line-equipped sets. Albatrosses were also less likely to be captured in tori line sets, but captures during the study were too few to support strong inference compared with the contact

rates. Project results also indicated that discharging offal and spent bait during setting might exacerbate rather than mitigate seabird catch risk. Offal discharge during setting was associated with higher seabird interactions—but that inference was not strong since offal discharge and blue-dyed bait were confounded treatments in some sets (Gilman et al. 2021).

The project results led the WPFMC to identify the need for additional research to test the effectiveness of tori lines without blue-dyed bait and offal discharge (WPFMC 2021). That research began in January 2021 under an experimental fishing permit issued by NMFS pursuant to regulations at 50 CFR 556.17.

# 5. Summary

Table 10 compares the 2019 and 2020 observed interactions in the two fisheries. The interaction rate from 2019 to 2020 increased for the deep-set fishery and decreased for the shallow-set fishery. In 2019, the shallow-set fishery interacted with 34 seabirds (15 Laysan albatrosses and 19 black-footed albatrosses). In 2020, it interacted with 32 seabirds (26 Laysan albatrosses, 5 black-footed albatrosses, and 1 Northern fulmar). In 2019, observers in the deep-set fishery documented interactions with 189 seabirds (43 Laysan albatrosses, 145 black-footed albatrosses, and 1 brown booby). In 2020, observers in that fishery documented interactions with 156 seabirds (59 Laysan albatrosses, 95 black-footed albatrosses, 1 brown booby, and 1 sooty shearwater) (see Table 6).

**Table 10. Comparison of observed interactions in Hawaii longline fisheries, 2019 and 2020.**

| Observed Interactions | 2019 | 2020 |
|---|---|---|
| Seabirds observed in deep-set fishery | 189 | 156 |
| Seabirds observed in shallow-set fishery | 34 | 32 |
| Deep-set interaction rate (birds per 1,000 hooks observed) | 0.015 | 0.018 |
| Shallow-set interaction rate (birds per 1,000 hooks observed) | 0.091 | 0.054 |

Note: There was 20.54% and 15.25% observer coverage in the deep-set longline fishery in 2019 and 2020, respectively, and 100% coverage in the shallow-set longline fishery.

# Acknowledgements

NMFS PIRO Sustainable Fisheries Division staff, notably H. Cronin, L. Rassel, and J. Peschon prepared this report, with contributions from M. McCracken of NMFS PIFSC. For more information, please contact Lynn Rassel, PIRO Sustainable Fisheries, at Lynn Rassel@noaa.gov.

# References

ACAP (Agreement on the Conservation of Albatrosses and Petrels). 2021. Report of the Population and Conservation Status Working Group. Eleventh Meeting of the Advisory Committee. Virtual meeting, August 31-September 2, 2021.

-----. 2012a. Species assessments: Laysan Albatross (Phoebastria immutabilis). Downloaded from http://www.acap.aq on September 13, 2017.

-----. 2012b. Species assessments: Black-footed Albatross (Phoebastria nigripes). Downloaded from http://www.acap.aq on September 13, 2017.

BirdLife International. 2021a. Species factsheet: Northern Fulmar (Fulmarus glacialis). Downloaded from http://www.birdlife.org on September 22, 2021.

----. 2021b. Species factsheet: Sooty Shearwater (Ardenna grisea). Downloaded from http://www.birdlife.org on September 22, 2021.

BirdLife International. 2020a. Species factsheet: Red-footed Booby (Sula sula). Downloaded from http://www.birdlife.org on August 3, 2020.

-----. 2020b. Species factsheet: Brown Booby (Sula leucogaster). Downloaded from http://www.birdlife.org on August 3, 2020.

-----. 2020c. Species factsheet: Glaucous-winged Gull (Larus glaucescens). Downloaded from http://www.birdlife.org on August 3, 2020.

Boggs, C.H. 2003. Annual report on the Hawaii longline fishing experiments to reduce sea turtle bycatch under ESA Section 10 Permit 1303. Honolulu Laboratory, National Marine Fisheries Service, Honolulu, Hawaii.

Gilman, E., and N. Brothers. 2006. Technical assistance for Hawaii pelagic longline vessels to change deck design and fishing practices to side set. Prepared for Hawaii Longline Association; Pacific Islands Fisheries Science Center and Pacific Islands Regional Office, National Marine Fisheries Service; and Western Pacific Fishery Management Council; Honolulu, Hawaii.

Gilman, E., N. Brothers, and D. Kobayashi. 2005. Principles and approaches to abate seabird bycatch in longline fisheries. Fish and Fisheries 6(1):35-49.

-----. 2007a. Comparison of three seabird bycatch avoidance methods in Hawaii-based pelagic longline fisheries. Fisheries Science 73: 208-210.

Gilman, E., M. Chaloupka, A.Ishizaki, M. Carnes, H. Naholowaa, C. Brady, S. Ellgen, and E. Kingma. 2021. Tori lines mitigate seabird bycatch in a pelagic longline fishery. Rev Fish Biol Fisheries 31 (653–666). Doi:10.1007/s11160-021-09659-7

Gilman, E., T. Moth-Poulsen, and G. Bianchi. 2007b. Review of measures taken by inter-governmental organizations to address problematic sea turtle and seabird interactions in marine capture fisheries. Fisheries Circular No. 1025, ISSN 0429-0329. Food and Agriculture Organization of the United Nations, Rome.

McCracken, M. and B. Cooper. 2021. Data report. Hawaii longline fishery 2020 seabird and sea turtle bycatch for the entire fishing grounds, within the IATTC convention area, and seabird bycatch to the north of 23°N and 23°N-30°S. Pacific Islands Fisheries Science Center, National Marine Fisheries Service, Honolulu, Hawaii.

McNamara, B., L. Torre, and G. Kaaialii. 1999. Hawaii longline seabird mortality mitigation project. Western Pacific Fishery Management Council, Honolulu, Hawaii.

NMFS (National Marine Fisheries Service). 2020. The Hawaii and California-based pelagic longline vessels annual report for 1 January - 31 December, 2019. Fisheries Research and Monitoring Division, Pacific Islands Fisheries Science Center, National Marine Fisheries Service. PIFSC Data Report DR-20-011. Issued 4 September 2020 https://doi.org/10.25923/sxxz-z763.

-----.2021a. The Hawaii and California-based pelagic longline vessels annual report for 1 January - 31 December, 2020. Fisheries Research and Monitoring Division, Pacific Islands Fisheries Science Center, National Marine Fisheries Service. PIFSC Data Report DR-12-047. Issued 19 February 2021

-----. 2021b. Pacific Islands regional observer program deep-set annual status report. January 1, 2020 - December 31, 2020. Pacific Islands Regional Office, National Marine Fisheries Service. Dated: April 16, 2021.

-----. 2021c. Pacific Islands regional observer program shallow set annual status report. January 1, 2020 - December 31, 2020. Pacific Islands Regional Office, National Marine Fisheries Service. Dated: April 16, 2021.

USFWS (U.S. Fish and Wildlife Service). 2012. Biological Opinion of the U.S. Fish and Wildlife Service for the Operation of Hawaii-based Pelagic Longline Fisheries, Shallow Set and Deep Set, Hawaii, January 2012, Honolulu, Hawaii. 2011-F-0436.

WPFMC (Western Pacific Fishery Management Council). 2009, as amended. Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific. Western Pacific Fishery Management Council, Honolulu, Hawaii.

-----. 2018. Report of the workshop to review seabird bycatch mitigation measures for Hawaii's pelagic longline fisheries, September 18-19, 2018. Western Pacific Fishery Management Council, Honolulu, Hawaii.

-----. 2021. Practicality and efficacy of tori lines to mitigate albatross interactions in the Hawaii deep-set longline fishery, February 8, 2021. Western Pacific Fishery Management Council, Honolulu, Hawaii.

U.S. Secretary of Commerce
Gina M. Raimondo

Acting Under Secretary of Commerce
for Oceans and Atmosphere
Rick W. Spinrad

Assistant Administrator for Fisheries
Janet Coit

November 2021

www.fisheries.noaa.gov

OFFICIAL BUSINESS

National Marine
Fisheries Service
Pacific Islands Regional Office
NOAA Inouye Regional Center
1845 Wasp Blvd., Building 176
Honolulu, HI 96818
www.fisheries.noaa.gov/pacific-islands