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

June 30, 2021

Mr. Jean-François Pulvenis, Acting Executive Director
Inter-American Tropical Tuna Commission (IATTC)
8901 La Jolla Shores Drive
La Jolla, California 92037-1508

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 2019 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 2020.

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

Sincerely,

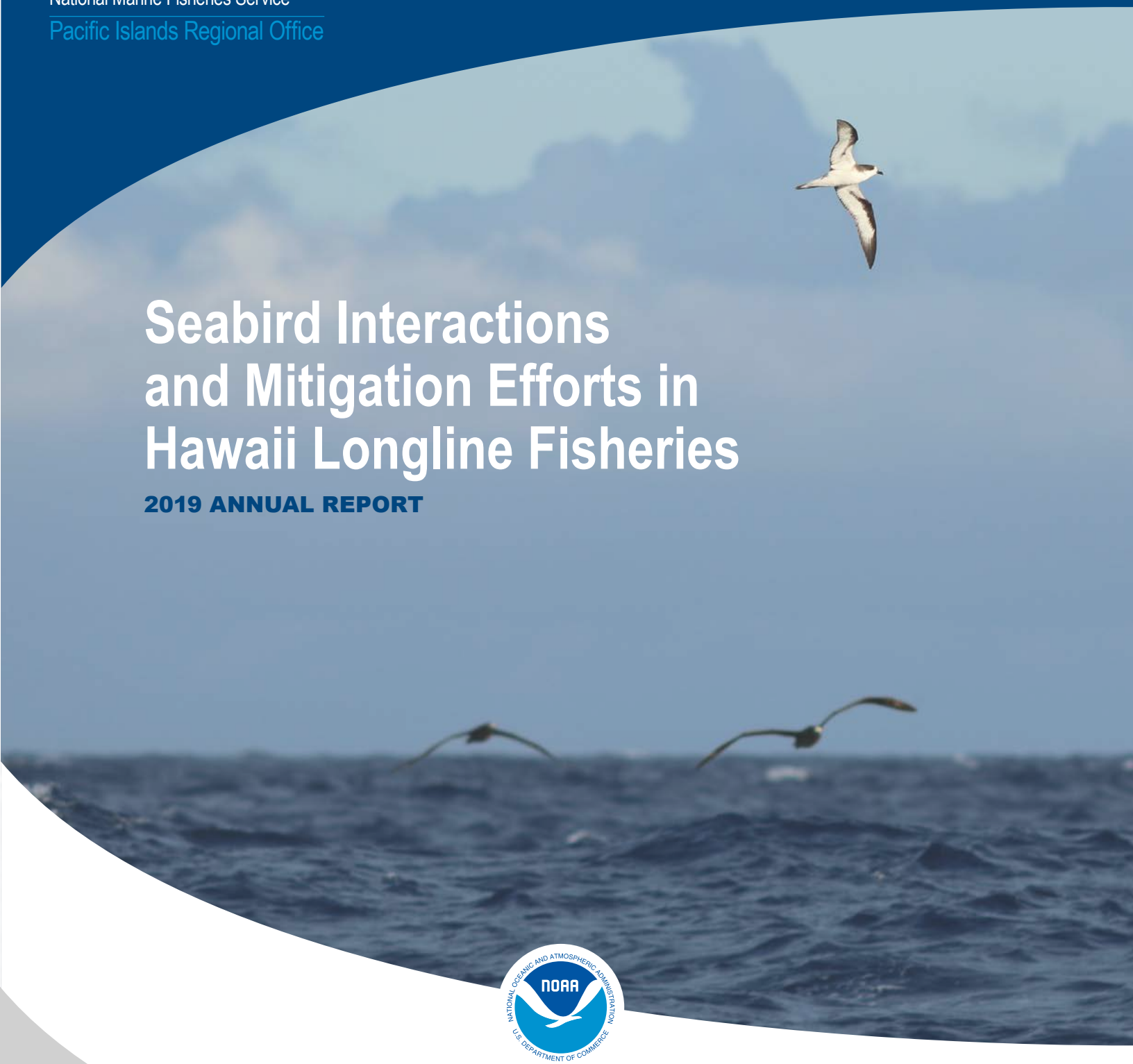
Lyle Enriquez
Highly Migratory Species Branch Chief

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

Enclosure

National Marine Fisheries Service

Pacific Islands Regional Office



Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

2019 ANNUAL REPORT

NOAA FISHERIES

Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

2019 ANNUAL REPORT

April 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: Endangered Hawaiian dark-rumped petrel spotted flying above two black-footed albatrosses. Credit: NOAA Fisheries/Hollyann Naholowaa

Back cover: Looking to the future. A tori line design flies behind a vessel during a research trial at sea. Credit: WPFMC/Hollyann Naholowaa

Black-footed albatross pair preening at sea.
Credit: NOAA Fisheries/Hollyann Naholowaa

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1. Introduction

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. To minimize interactions and their severity, NMFS monitors the fisheries to determine the effectiveness of the management measures implemented. NMFS documents interactions and mitigation efforts aboard vessels at sea, and it reports annually on fishing effort, seabird interactions, and mitigation research.[1] View this report, and similar reports from previous years online.

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; a permit allows fishing in both the shallow- and deep-set 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.

Laysan albatrosses, black-footed albatrosses, shearwaters, fulmars, boobies, and endangered short-tailed albatrosses 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 that there were 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 2019, there were 34 observed interactions in the shallow-set fishery, which has 100 percent observer coverage, and an estimated 1,002 interactions in the deep-set fishery, which has approximately 20 percent observer coverage.

[1]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).

Hawaii pelagic longline fishing vessels in port. Credit: NOAA Fisheries

1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries

Most of the regulations for Hawaii longline fisheries are identified in Title 50, Code of Federal Regulations, Parts 600 and 665 (50 CFR Parts 600 and 665). NMFS also provides a regulation summary and compliance guides to Hawaii longline fishermen and the general public.

Regulations specific to the mitigation of seabird interactions and safe handling techniques are at 50 CFR 665.815. The ways that fishermen implement required seabird mitigation measures depend on their fishing methods and locations. Mitigation measures to reduce seabird interactions differ between 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.

Side-Setting

Side-setting involves deploying the gear from the side of the vessel, compared with the conventional method of setting from the stern. 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 2019, with some vessels operating in both deep- and shallow-set longline fisheries. In 2019, most vessels in the deep-set fishery and none in the shallow-set fishery chose to stern-set.

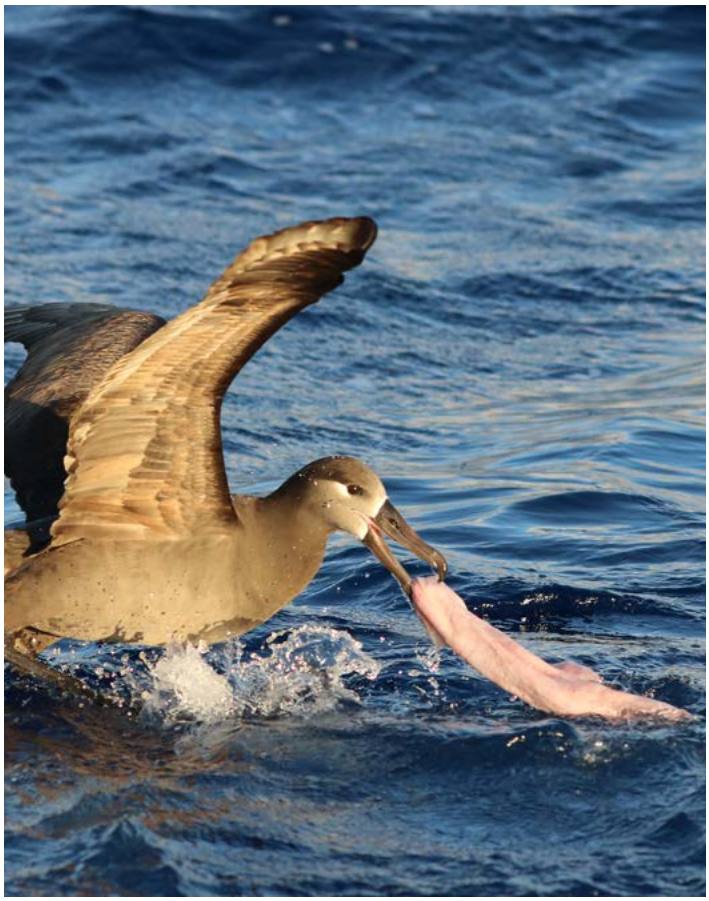
Table 1. Number of observed Hawaii longline vessels that side- and stern-set in 2019.

Fishery	Deck setting position	Vessels
Deep-set	Stern-setting	115
Deep-set	Side-setting	25
Shallow-set	Stern-setting	15
Shallow-set	Side-setting	0

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 5/12/2020.

Weighted Branch Lines

Fishermen place weights close to the hook on branch lines so that baited hooks sink quickly. This helps prevent foraging seabirds from possibly 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 to 80 g.



Black-footed albatross feeding on strategic offal discard. Credit: NOAA Fisheries/Hollyann Naholowaa

Thawed and Blue-dyed Bait

Dyeing bait to a specific blue color reduces visibility by reducing contrast with the sea surface. Fishermen first 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). To reduce sea turtle interactions, NMFS prohibits the use of squid bait in the shallow-set fishery. Fishermen may still use squid in the deep-set fishery, but the squid bait costs more than some fish bait, making it less preferred.

Strategic Offal Discards

Strategically discarding offal (swordfish heads and livers) on the opposite side of the vessel from fishing operations distracts seabirds from attempting to steal baits. Fishermen developed this technique and NMFS observers in the mid-1990s noted that it reduced incidental hooking or entanglement of albatrosses. Strategic offal discard is now 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. 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 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.

Mitigation Method	Stern-setting		Side-setting	
	Shallow-Set Anywhere	Deep-Set North of 23^0 N	Shallow-Set Anywhere	Deep-Set North of 23^0 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	-	-	-

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 (Fig. 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 taken a classroom workshop within the past three years. Owners and operators must have a valid workshop certificate to obtain or renew Federal longline fishing permits, and they must keep a copy of it on board the vessel.

In 2019, NMFS PIRO provided protected species workshop training for 283 Hawaii-based and 39 American Samoa–based longline vessel owners, operators and crew, and other interested individuals.

Protected species workshop in-person training. Credit: NOAA Fisheries

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

1.4 Fishing Effort and Observer Coverage

Table 3 summarizes fishing effort data from 2018 and 2019 by haul date. From 2018– to 2019, the number of deep-set fishing trips increased by 5.0% and shallow-set fishing trips decreased by 6.7%.

Please note that other 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. The NMFS Sustainable Fisheries Observer Program typically bases protected species interactions on vessel arrival date in their quarterly, semiannual, and annual reports. NMFS also provides summary reports from mandatory logbook data reported by captains.

Table 3. Hawaii deep- and shallow-set longline fisheries effort and observer coverage, 2018 and 2019.

2018		
	Deep-set	Shallow-set
Number of vessels	143	11
Trips	1,642	30
Sets	20,994	420
Hooks	58,500,893	486,013
Observer coverage	20.36%	100%

2019		
	Deep-set	Shallow-set
Number of vessels	150	15
Trips	1,742	28
Sets	22,513	312
Hooks	63,174,971	374,487
Observer coverage	20.54%	100%

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished shallow-set data, 5/12/2020, and NMFS 2020a and NMFS 2020b.

Fisheries Observer Hollyann Naholowaa demonstrates proper handling of a black-footed albatross before successfully releasing it back to the wild after an interaction. Credit: NOAA Fisheries

Black-footed albatross. Credit: NOAA Fisheries/ Hollyann Naholowaa

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) and both Hawaii longline fisheries have a low level 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	666,658 breeding pairs (ACAP 2017)	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	69,969 pairs (ACAP 2017)	More than 95% of the population breeds in the NWHI (ACAP 2012b)
Northern fulmars	20 million individuals (Birdlife 2020a)	Located throughout the North Atlantic and North Pacific
Red-footed booby	More than 1 million birds (Birdlife 2020b)	Winters on tropical islands in most oceans
Brown booby	More than 200,000 adults (Birdlife 2020c)	Located throughout the pan-tropical oceans
Sooty shearwaters	8,800,000 adults (Birdlife 2020d)	Nest in Australia, New Zealand, and southern South America
Glaucous-winged gull	More than 570,000 individuals (Birdlife 2020e)	Located along the Pacific coast of North America to the northern coast of Japan

Sooty shearwater. Credit: NOAA Fisheries/Hollyann Naholowaa

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 2019. NMFS observers retain as specimens 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. NMFS freezes and ships seabird specimens 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, 2019.

Species	Number retained
Black-footed albatross	55
Laysan albatross	32
Brown booby	1

Note: Not all dead seabirds are collected as specimens.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 5/12/2020.

2.2 Location of Interactions

Figs. 2 and 3 show the spatial distribution of observed seabird interactions in deep- and shallow-set fisheries, respectively, based on observations of seabirds in 2019. Most of the interactions occur north of 20° N, where seabirds are typically more abundant and fishing effort is more concentrated.

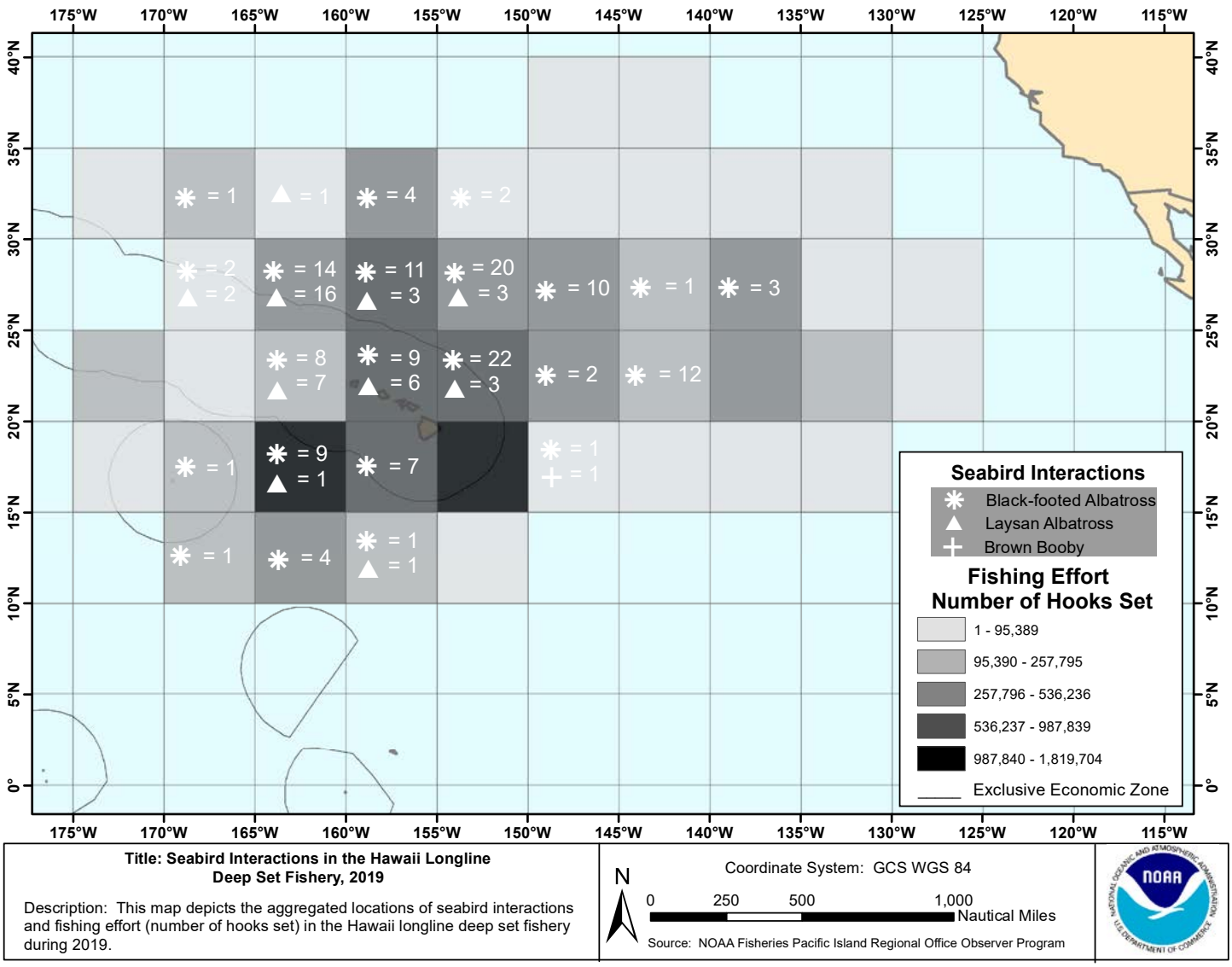


Figure 2. **Locations of seabird interactions observed in Hawaii deep-set longline fishery, 2019.**

Note: NMFS deployed observers on 20.54% of deep-set trips in 2019.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 5/12/2020.

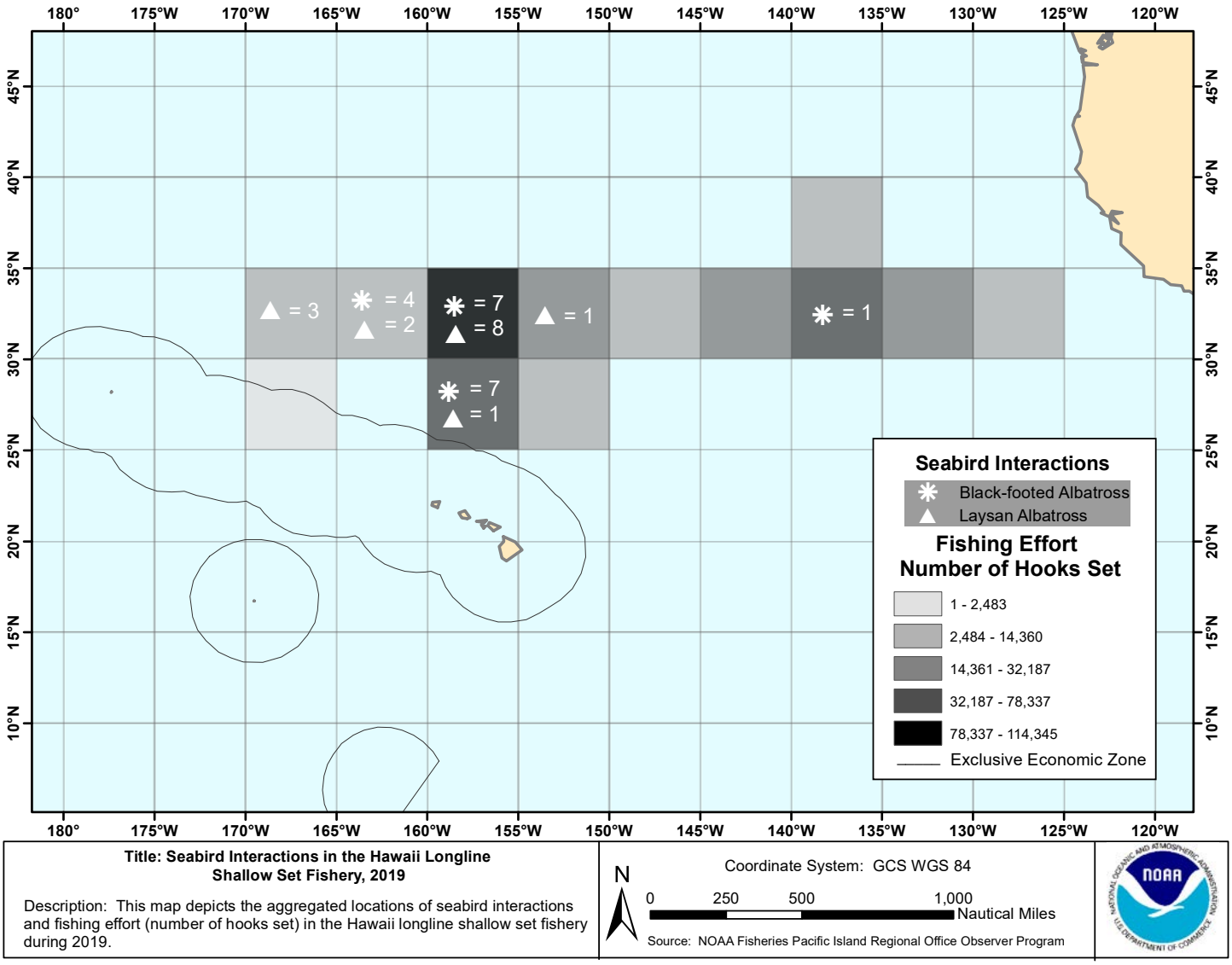


Figure 3. **Locations of seabird interactions observed in Hawaii shallow-set longline fishery, 2019.**

Note: NMFS deployed observers on every shallow-set trip in 2019.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 5/12/2020.

2.3 Number of Interactions

Table 6 summarizes the number of observed seabird interactions, condition of the seabirds upon release, and fishing effort in both fisheries from 2004-2019. 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 20.54% of deep-set trips in 2019, so we expanded the observed interactions using the observer coverage rate to estimate total interactions (Table 7). Fig. 4 shows the seabird interaction rate from 2004-2019 from Table 6.

Almost all interactions in the deep-set fishery occur when fishermen set gear during the day, when 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 2019 in the deep-set fishery, observers documented interactions with 43 Laysan albatrosses, 145 black-footed albatrosses, and 1 brown booby (Table 6). Nearly all of the seabirds observed to interact with the deep-set fishery were dead (96%). Table 7 contains the total estimated number of interactions with Laysan albatross, black-footed albatross, and brown booby based on observer records for the deep-set fishery in 2019.

Black-footed albatross interacting with a baited hook. Credit: NOAA Fisheries/Hollyann Naholowaa

Table 6. Numbers of observed seabird catch levels, fishing effort, and interaction rates in the combined Hawaii longline fisheries, 2004-2019.

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	7	-	74	5	67	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

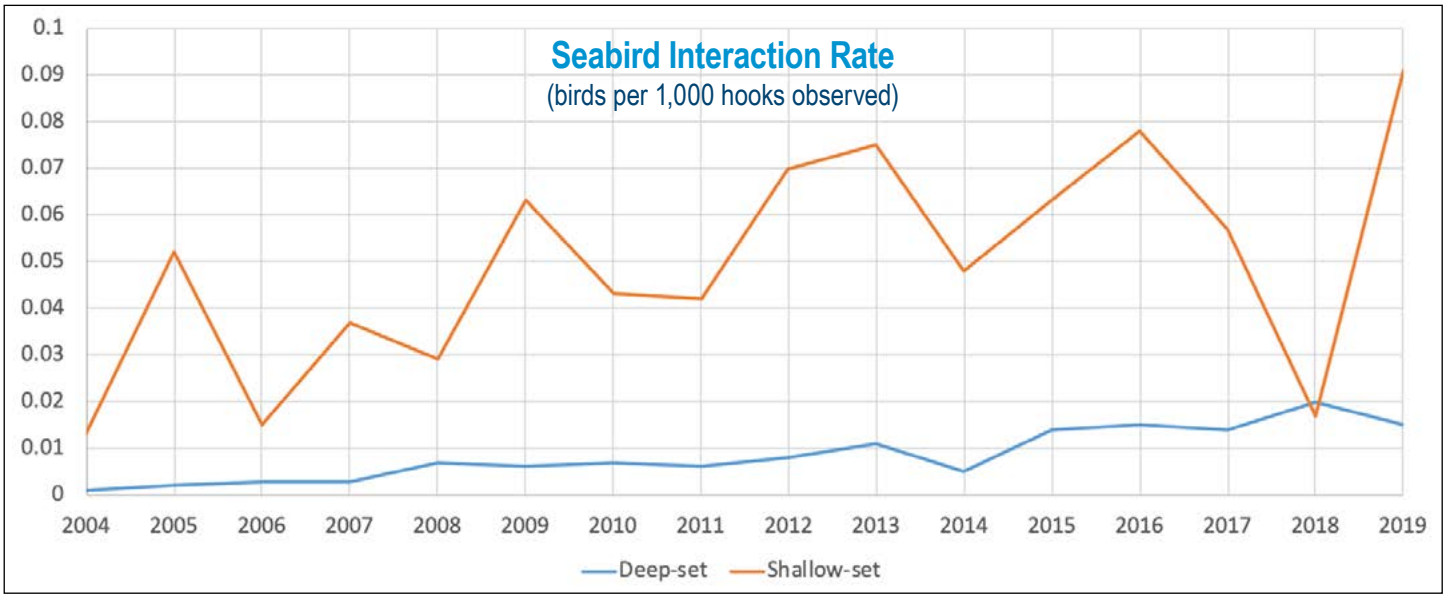
Shallow-set Fishery

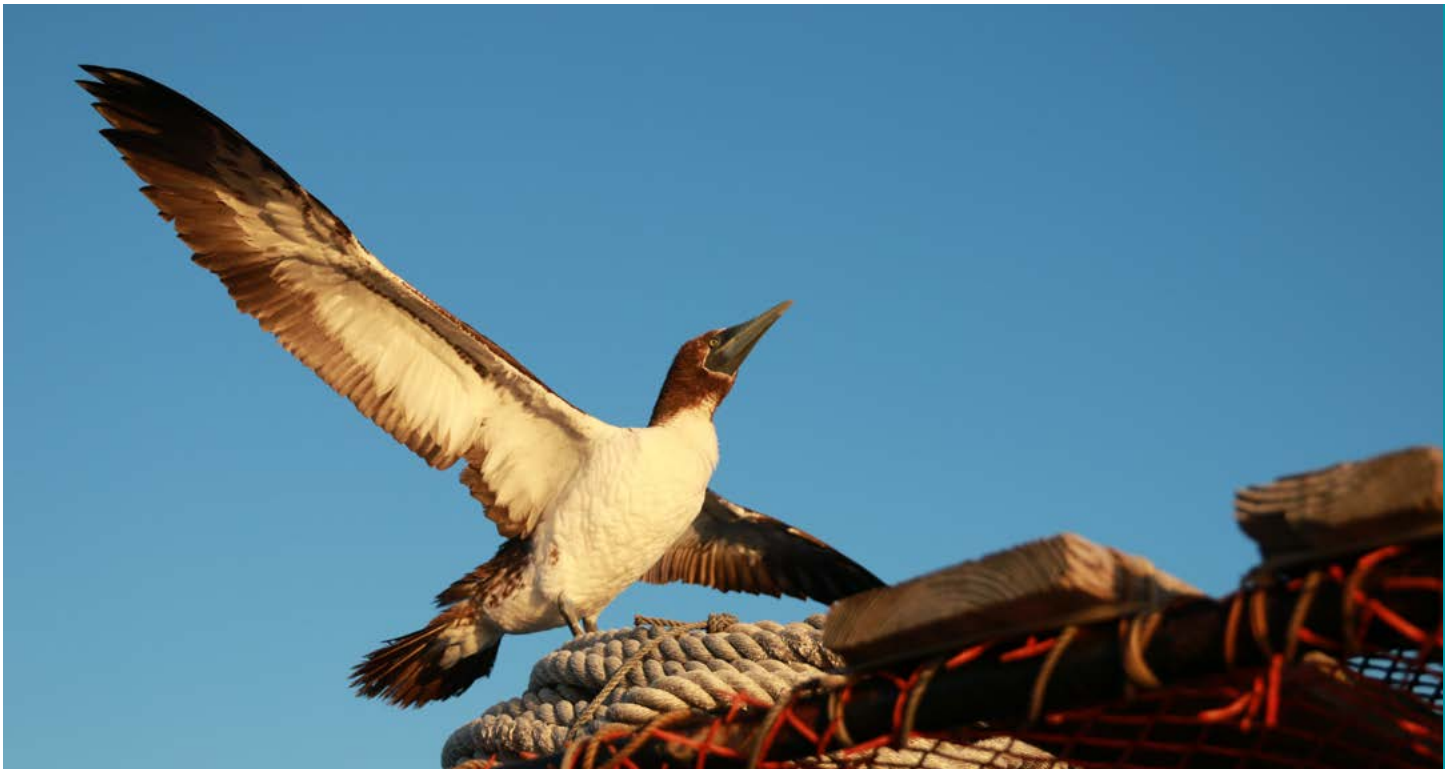
Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species caught	Total birds observed caught	Birds released injured and alive	Birds released dead	Total observed effort (hooks)	Seabird interaction rate (birds per 1,000 hooks observed)
2004	1	-	-	-	1	1	-	76,750	0.013
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	77	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

[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.

Note: Sustainable Fisheries Observer Program data (unpublished, 5/12/2020) 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 2020c and NMFS 2020d). Interaction rates are calculated and rounded to the nearest thousandths (third decimal) place.

Figure 4. Seabird interaction rates in the deep-set and shallow-set longline fisheries, 2004-2019.





Juvenile masked booby stretching its wings after resting on a fishing vessel. Credit: NOAA Fisheries/Hollyann Naholowaa

Fishermen in the shallow-set fishery typically set at night and haul gear during the day; therefore, most seabird interactions occur when fishermen retrieve the gear and birds are actively feeding. In 2019, the shallow-set fishery interacted with 15 Laysan albatrosses and 19 black-footed albatrosses (Table 6). Fishermen released approximately 76% of seabirds alive.

Seabirds can be hooked, entangled, or both. Table 8 provides a summary of capture and release conditions in 2019. Regulations require fishermen to remove as much gear as is safely possible from any seabirds captured before releasing the seabirds.

Table 7. Estimated total seabird interactions in the Hawaii deep-set longline fishery, 2019.

Species	Total annual estimate
Black-footed albatross	767
Laysan albatross	231
Brown booby	4

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 2019. Point estimates are based on the trip arrival date rather than trip haul date. Source: McCracken and Cooper 2020.

Table 8. Capture and release details by species for seabird interactions in the Hawaii longline fisheries, 2019.

	Hooked only	Entangled only	Both hooked and entangled	Not known or not recorded
Laysan albatross	45	8	5	0
Black-footed albatross	140	14	9	1
Brown booby	1	0	0	0

Note: None of the seabirds released alive had any gear attached. One black-footed albatross (dead) was recorded as entangled, but it was unknown if it was also hooked. It is included in the Entangled only column here.

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 2019. Most of the recovered bands were from albatrosses banded on French Frigate Shoals in the NWHI 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, 2019.

Species	Disposition	Band(s) recovery date	Date banded	Location banded	Age at banding (yr)	Age at recovery (yr)
Black-footed Albatross	Dead	1/4/2019	6/3/2003	French Frigate Shoals (Tern Island)	<1	16
Black-footed Albatross	Dead	1/14/2019	6/5/2002	French Frigate Shoals (Tern Island)	<1	17
Laysan Albatross	Dead	1/14/2019	6/3/2002	French Frigate Shoals (Tern Island)	<1	17
Black-footed Albatross	Dead	1/17/2019	12/14/2011	Laysan Island	>1	>8
Black-footed Albatross	Dead	1/18/2019	5/2/2008	French Frigate Shoals (Tern Island)	<1	11
Laysan Albatross	Dead	1/21/2019	5/27/1997	French Frigate Shoals (Tern Island)	<1	22
Laysan Albatross	Dead	1/22/2019	6/5/1984	French Frigate Shoals (Tern Island)	<1	35
Black-footed Albatross	Dead	1/20/2019	6/12/2010	French Frigate Shoals (Tern Island)	<1	9
Laysan Albatross	Dead	1/25/2019	6/28/2010	French Frigate Shoals (Tern Island)	<1	9
Black-footed Albatross	Dead	1/28/2019	6/4/2007	Kure Attol (Green Island)	<1	12
Laysan Albatross	Dead	1/23/2019	6/17/2004	French Frigate Shoals (Tern Island)	<1	15
Laysan Albatross	Dead	1/26/2019	6/20/2007	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	2/3/2019	2/26/1998	Oahu (Waialua)	>2	>23
Laysan Albatross	Injured	2/16/2019	5/26/1994	French Frigate Shoals (Tern Island)	<1	25
Black-footed Albatross	Dead	2/28/2019	12/26/2007	French Frigate Shoals (Tern Island)	>1	>12
Laysan Albatross	Injured	2/9/2019	6/9/2005	French Frigate Shoals (Tern Island)	<1	14
Black-footed Albatross	Dead	2/27/2019	5/22/2007	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	3/3/2019	6/2/2003	French Frigate Shoals (Tern Island)	<1	16
Black-footed Albatross	Dead	3/12/2019	6/4/2008	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	3/18/2019	5/7/2010	French Frigate Shoals (Tern Island)	<1	19
Black-footed Albatross	Dead	3/20/2019	6/4/2009	Laysan Island	<1	10
Black-footed Albatross	Dead	3/20/2019	5/30/2002	French Frigate Shoals (Tern Island)	<1	17
Laysan Albatross	Dead	3/23/2019	1/26/2004	Kauai (Kilauea Point)	>3	>18
Laysan Albatross	Injured	3/23/2019	5/14/2014	Kauai (Kilauea Point)	<1	5
Black-footed Albatross	Injured	5/18/2019	5/14/1992	French Frigate Shoals (Tern Island)	<1	27
Black-footed Albatross	Dead	5/18/2019	4/22/2011	French Frigate Shoals (Tern Island)	<1	8
Black-footed Albatross	Dead	5/29/2019	6/7/1999	French Frigate Shoals (Tern Island)	<1	20
Laysan Albatross	Dead	5/31/2019	6/4/2003	French Frigate Shoals (Tern Island)	<1	16
Black-footed Albatross	Injured	6/11/2019	6/9/2004	French Frigate Shoals (Tern Island)	<1	15
Laysan Albatross	Dead	6/18/2019	4/10/2015	Lehua Island, HI	<1	4
Laysan Albatross	Dead	6/17/2019	4/14/2008	Oahu (Kaena Point)	>1	>11

Source: USGS, USFWS, and NMFS, unpublished data, received 5/12/2020.

3. ESA Listed Seabirds

There have been no observed interactions (hooking or entanglement) between the fisheries and any ESA-listed seabirds. The distributions of three seabird species that are protected under the ESA— the endangered short-tailed albatross, the Hawaiian dark-rumped petrel (*Pterodroma sandwichensis*), and the threatened Newell's shearwater (*Puffinus newelli*)—overlap with the areas where the Hawaii longline fisheries operate. There were six sightings of short-tailed albatross on shallow-set trips in 2019 and no sightings on observed deep-set trips. Fig. 5 shows the locations of these sightings compared with the observed fishing effort.

Endangered short-tailed albatross juvenile spotted with a group of black-footed albatrosses. Credit: NOAA Fisheries

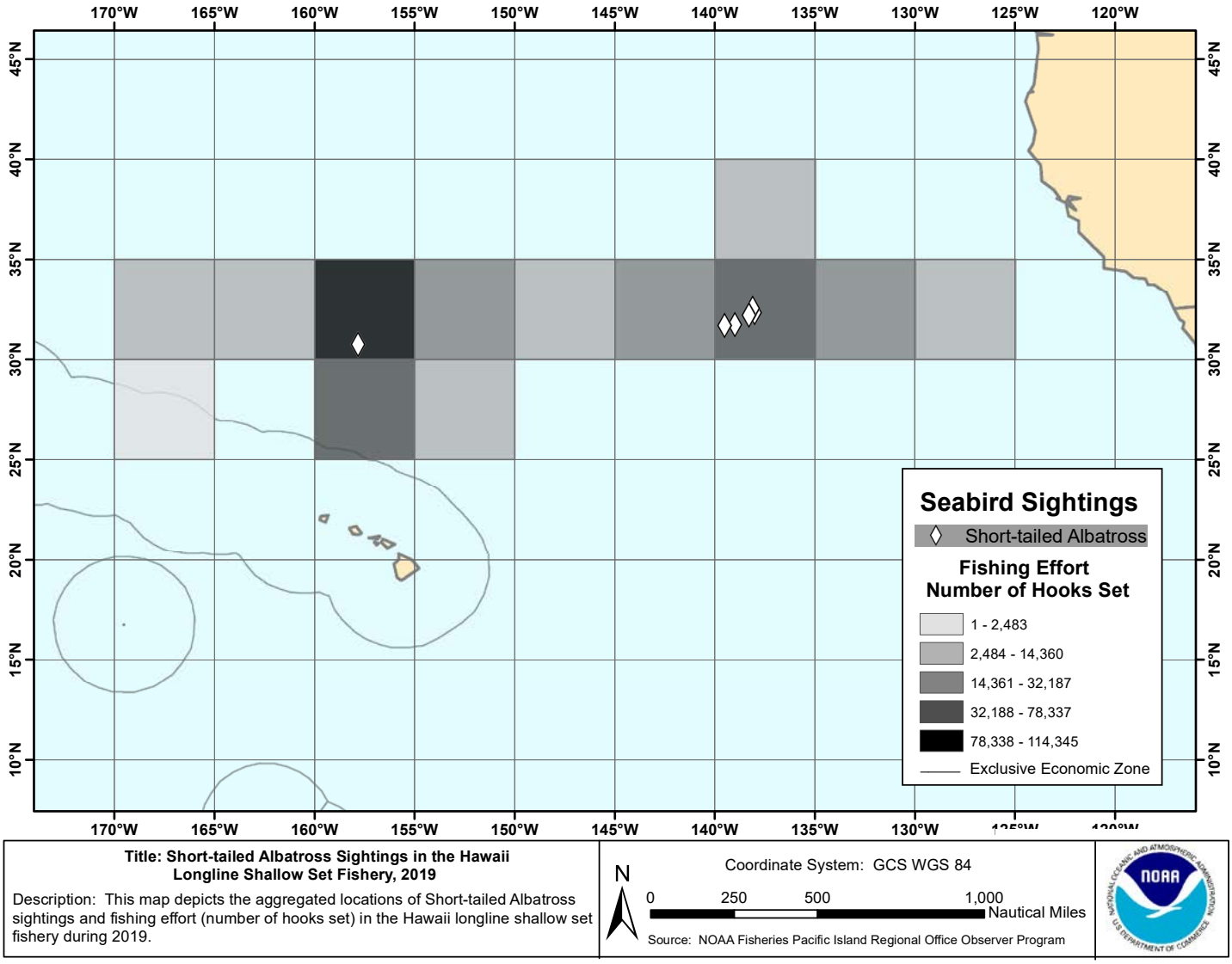


Figure 5. **Short-tailed albatross sightings and fishing effort in the Hawaii shallow-set fisheries, 2019.**

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 5/12/2020.

4. Research

Since NMFS introduced seabird regulations in the Hawaii deep-set fishery in 2001, the overall seabird catch rate had declined, with the exception of black-footed albatross catch rates that have been increasing over the past decade. In 2017, the WPFMC held a workshop to explore the cause of increased interactions with black-footed albatrosses. The workshop suggested that a positive (warm) Pacific Decadal Oscillation, with its cooler sea surface in the western Pacific and stronger westerly winds, may increase the overlap of fishing effort and black-footed albatross foraging grounds, leading to more seabird interactions in the fishery. In 2018, the WPFMC held a workshop to review seabird mitigation requirements and identify research needed to inform future fishing requirements to 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.

Tori lines were tested in the Hawaii longline fisheries in 1999, but they were considered impractical at that time due to gear entanglement problems. Subsequent trials and broad industry use of tori lines in other longline fisheries have identified tori line designs and materials that reduce the incidence of entanglement with gear and improve durability. The 2018 workshop participants agreed that tori line trials in Hawaii and the development of minimum standards would now be useful (WPFMC 2018). They also identified blue-dyed bait as a candidate for removal from the existing suite of seabird mitigation measures due to concerns with efficacy and practicality (WPFMC 2018).

In Spring 2019, the WPFMC, the Hawaii Longline Association, PIFSC, and PIRO initiated a joint research project to design and test tori lines in the deep-set longline fishery. The team researched potential tori line materials and designs, and they discussed preferences and experiences with tori lines with longline fishermen. In September 2019, the WPFMC convened a meeting with tori line experts from New Zealand and Japan who provided valuable input on tori line design for vessels similar to those in the Hawaii longline fishery. With that guidance, the Hawaii team developed alternative designs for the aerial (suspended) section and determined the most appropriate design for the drag (submerged) section of the tori line. The team then conducted land and ocean trials to determine ideal aerial and drag section combinations.

The 50m tori line in its bin (one that was chosen to use during the phase 2 portion of project). Credit: WPFMC/Hollyann Naholowaa

Ocean trials under the joint research project continued through 2019 and into 2020. The results indicate that tori lines, when used in conjunction with blue-dyed bait, significantly reduce albatross feeding attempts and contact with longline gear. They also indicate the potential for offal discharge to increase bird interactions during gear setting. 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 is set to begin in 2021 under an experimental fishing permit issued by NMFS pursuant to regulations at 50 CFR 556.17.

Colby Brady and Hollyann Naholowaa conducting tori line land trials to determine the necessary drag for each aerial section design under consideration. Credit: NOAA Fisheries/ Sarah Ellgen

Juvenile red-footed booby. Credit: NOAA Fisheries/ Hollyann Naholowaa

5. Summary

Table 10 compares the 2018 and 2019 observed seabird interactions in the two fisheries. The observed interactions and interaction rate from 2018 to 2019 decreased for the deep-set fishery and increased for the shallow-set fishery. In 2018, the shallow-set fishery interacted with nine seabirds (two Laysan albatrosses and seven black-footed albatrosses). In 2019, it interacted with 34 seabirds (15 Laysan albatrosses and 19 black-footed albatrosses). In 2018, observers in the deep-set fishery documented interactions with 236 seabirds (35 Laysan albatrosses, 190 black-footed albatrosses, nine sooty shearwaters, one brown booby, and one red-footed booby). In 2019, observers in that fishery documented interactions with 189 seabirds (43 Laysan albatrosses, 145 black-footed albatrosses, and one brown booby) (see Table 6).

Table 10. Comparison of observed interactions in Hawaii longline fisheries, 2018 and 2019.

Observed Interactions	2018	2019
Seabirds observed in deep-set fishery	236	189
Seabirds observed in shallow-set fishery	9	34
Deep-set interaction rate (birds per 1,000 hooks observed)	0.020	0.015
Shallow-set interaction rate (birds per 1,000 hooks observed)	0.016	0.091

Note: There was 20.39% and 20.54% observer coverage in the deep-set longline fishery in 2018 and 2019, respectively, and 100% coverage in the shallow-set longline fishery.

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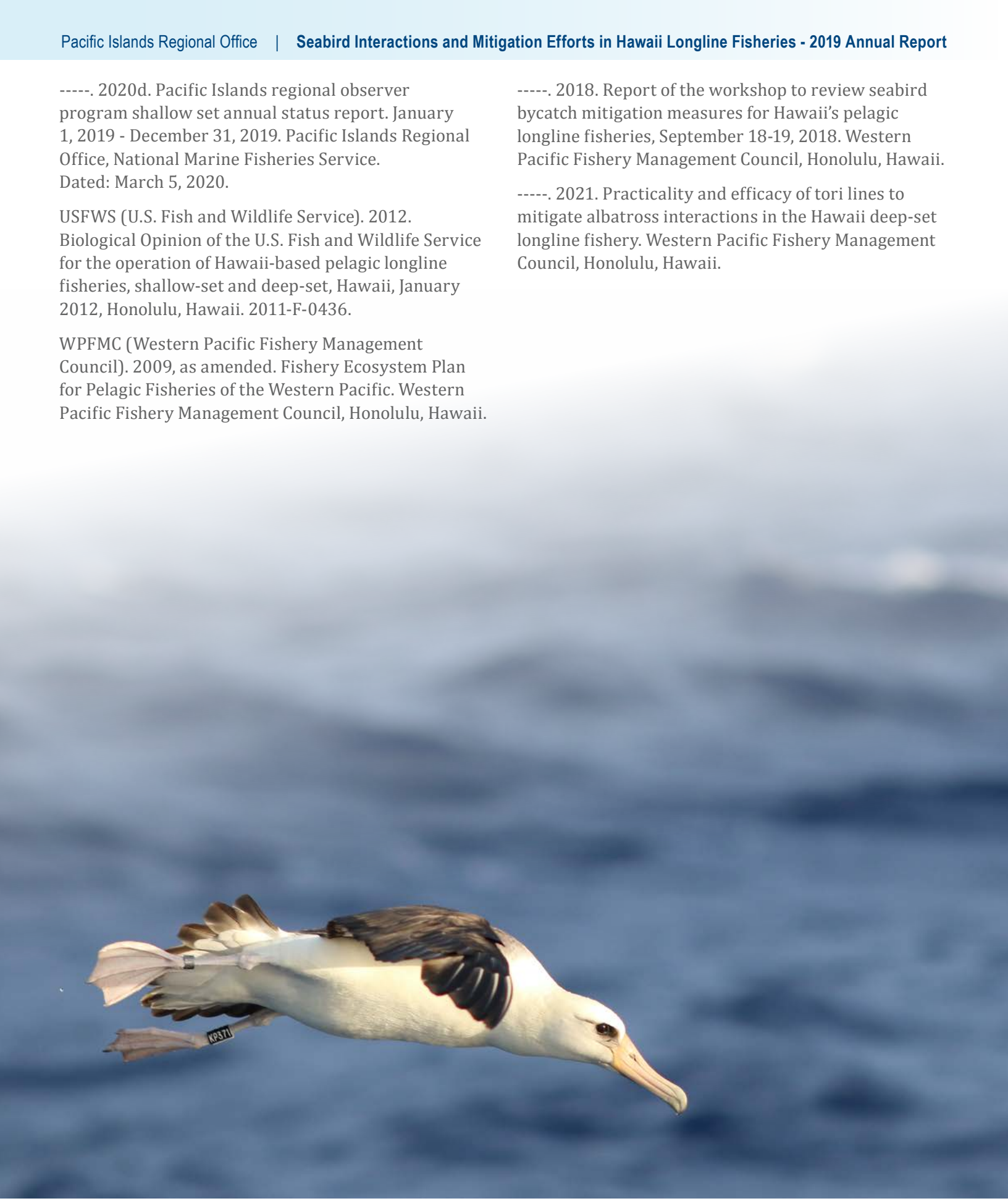

Sighting of a banded Laysan albatoss at sea. Credit: NOAA Fisheries/Hollyann Naholowaa

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