



NOAA
FISHERIES

Seabird Interactions and Mitigation Efforts in Hawai'i Pelagic Longline Fisheries 2023 Annual Report

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Please note: Data in this report is 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.

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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 Hawai'i-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 Hawai'i 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 earlier 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 Hawai'i 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. In 2023, Hawai'i longline vessels ranged between 49 and 98 feet in length. The FEP has a detailed description of the two fisheries (WPFMC 2009, as amended).

Since 1994, the Hawai'i longline fleet has been limited to 164 permits, which allow fishing in both the shallow- and deep-set fisheries. Beginning in 2004, vessels were required to declare if they would be shallow or deep fishing before leaving on a fishing trip. 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 take part, to some degree, in the deep-set fishery during the year. In 2023, based on preliminary data received as of March 2024, 150 vessels made 21,102 deep-sets in 1,594 trips and set 66,222,140 hooks, and 23 vessels made 852 shallow-sets in 70 trips and set 1,076,796 hooks (NMFS 2024a).

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 try 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 this report, the statistics on seabird interactions are based on observations from observers—NMFS monitors onboard fishing vessels. In 2000, NMFS estimated 2,433 seabird interactions in the Hawai'i 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 2023, there were 38 observed interactions in the shallow-set fishery, which has 100 percent observer coverage, and an estimated 293 interactions in the deep-set fishery, which had 17.41 percent observer coverage (McCracken and Cooper 2024).

Data 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. In 2021, the NMFS Sustainable Fisheries Observer Program began accounting for protected species interactions in their [quarterly, semiannual, and annual reports](#) based on the date that the haul on which the interaction occurred began. In earlier years, interactions were based on the vessel arrival date. NMFS also provides summary reports from mandatory logbook data reported by captains.

1.2 Seabird Mitigation Measures for the Hawai'i Longline Fisheries

Most of the regulations for Hawai'i longline fisheries are in Title 50, Code of Federal Regulations, [Parts 600 and 665](#) (50 CFR 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](#), a [compliance guide for reducing seabird interactions](#), and [seabird handling guidelines](#) to Hawai'i longline fishermen and the general public.

The ways that fishermen carry out 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.

New seabird mitigation measures that modify requirements for Hawai'i deep-setting longline vessels that set gear from the stern went into effect on April 1, 2024. Because these were not yet in effect for the annual period covered by this report, they will be only briefly discussed here.

Stern-Setting versus Side-Setting

Stern-setting is the most common method of deploying longline fishing gear. Crewmen use 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 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, the crew sets 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 Hawai'i deep- and shallow-set vessels observed to set from the stern and from the side in 2023. In 2023, most vessels chose to stern-set.

Table 1: Number of observed Hawai'i longline vessels that side- and stern-set in 2023.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 05/30/2024

Fishery	Deck setting position	Vessels
Deep-set	Stern-setting	117
Deep-set	Side-setting	22
Shallow-set	Stern-setting	23
Shallow-set	Side-setting	2

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 while shallow- side-setting anywhere, Hawai'i 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 Hawai'i longline fisheries consists of the fish mackerel (saba), sardines, saury (sanma), and, beginning in 2022, herring and milkfish. NMFS prohibits 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 therefore less preferred.

Strategic Offal Discharge

Fishermen developed the technique of strategically discharging offal on the opposite side of the vessel during fishing operations to distract seabirds from trying to steal baits. NMFS observers in the mid-1990s noted that this technique reduced incidental hooking or entanglement of albatrosses, though recent research results show offal discharge can have the unintended effect of attracting more seabirds (Gilman et al. 2021). Strategic offal discharge is 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 therefore are not attracted to them. The measure requires shallow-set fishermen, when stern-setting, to start deploying gear no earlier than 1 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 percent (McNamara et al. 1999, Boggs 2003).

Tori Lines

Revised regulations took effect April 1, 2024, requiring a tori line (bird-scaring streamer) on deep-set longline vessels that set gear from the stern and fish north of lat. 23°. These vessels are no longer required to use thawed, blue-dyed bait and strategic offal (fish, fish parts, or spent bait) discharge. All other pelagic longline seabird mitigation regulations stay in effect and are listed in 50 CFR 665.815. Requirements have not changed for shallow-setting vessels or deep-setting vessels that set gear from the side. More detailed information on this mitigation modification will be provided in the 2024 annual report. Additional information on this regulatory change is described in the regulatory amendment (WPRFMC and NMFS 2023), which can be viewed online at: <https://www.regulations.gov/document/NOAA-NMFS-2022-0131-0006>.

Table 2 summarizes the seabird mitigation requirements for 2023 before the 2024 regulatory amendment.

Table 2: Seabird mitigation requirements for the Hawai'i longline fleet in 2023.

What you need to do	Stern-setting		Side-setting	
	Shallow-set Anywhere	Deep-set North of 23° N	Shallow-set Anywhere	Deep-set North of 23° 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 set			Yes	Yes
Deploy gear so that hooks do not resurface			Yes	Yes
Attach 45 g or heavier weights within 1 m of each hook		Yes	Yes	Yes
Use a line shooter to set the mainline		Yes		
Keep two 1-pound containers of blue-dye bait 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. The workshop also reviews regulatory and compliance requirements. 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. In 2023, NMFS PIRO provided protected species workshop training for 330 Hawai'i-based and 27 American Samoa-based longline vessel owners, operators and crew, and other interested individuals.

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. None of these species is listed under the Endangered Species Act (ESA). Both Hawai'i longline fisheries have low levels of interactions with these species. Based on the population estimates, the fisheries likely have little to no effect on these populations.

Some seabirds, especially shearwaters, are difficult to identify. Table 3 gives a summary of seabird specimens that NMFS observers collected for identification and biological study after capture in the Hawai'i longline fisheries in 2023. Under normal circumstances, NMFS observers collect 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. 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. In 2023, NOAA Fisheries won the Presidential Migratory Bird Federal Stewardship Award for the "Seabird Conservation through Fishery-Based Data: The NOAA-Oikonos Seabird Bycatch Project." The award was presented to NOAA at the 2024 Council for the Conservation of Migratory Birds meeting on June 10, 2024.

Table 3: Summary of collected seabirds from the Hawai'i longline fisheries, 2023.

Note: Not all dead seabirds are collected as specimens.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 05/31/2024.

Species	Number collected
Black-footed albatross	21
Laysan albatross	8
Sooty shearwater	1

2.2 Location and Date of Interactions

The spatial distribution of observed seabird interactions in 2023 in the deep- and shallow-set fisheries are shown in Figures 1 and 2, respectively. Most of the interactions occur north of 20° N, where seabirds are typically more abundant and fishing effort is more concentrated. Figures 3 and 4 show the quarter of the year during which observed seabird interactions occurred in 2023 and cumulatively since 2004 in the deep- and shallow-set fisheries, respectively. Most of the interactions occurred in the first and second quarters (January through June) in 2023 and since 2004, with few interactions occurring in the third quarter.

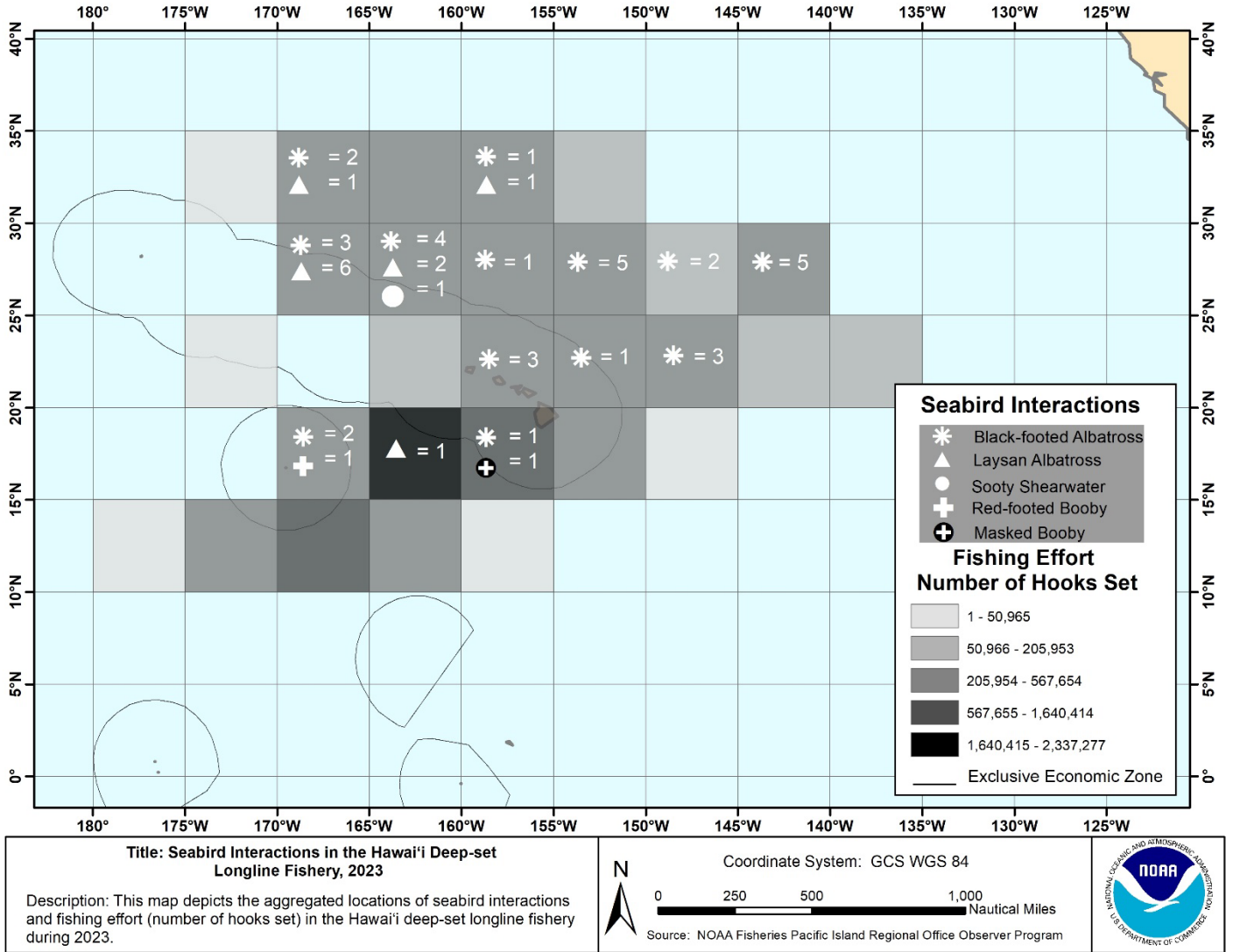


Figure 1: Locations of seabird interactions observed in Hawai'i deep-set longline fishery, 2023.

Note: NMFS deployed observers on 17.41% of deep-set trips in 2023.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 06/17/2024.

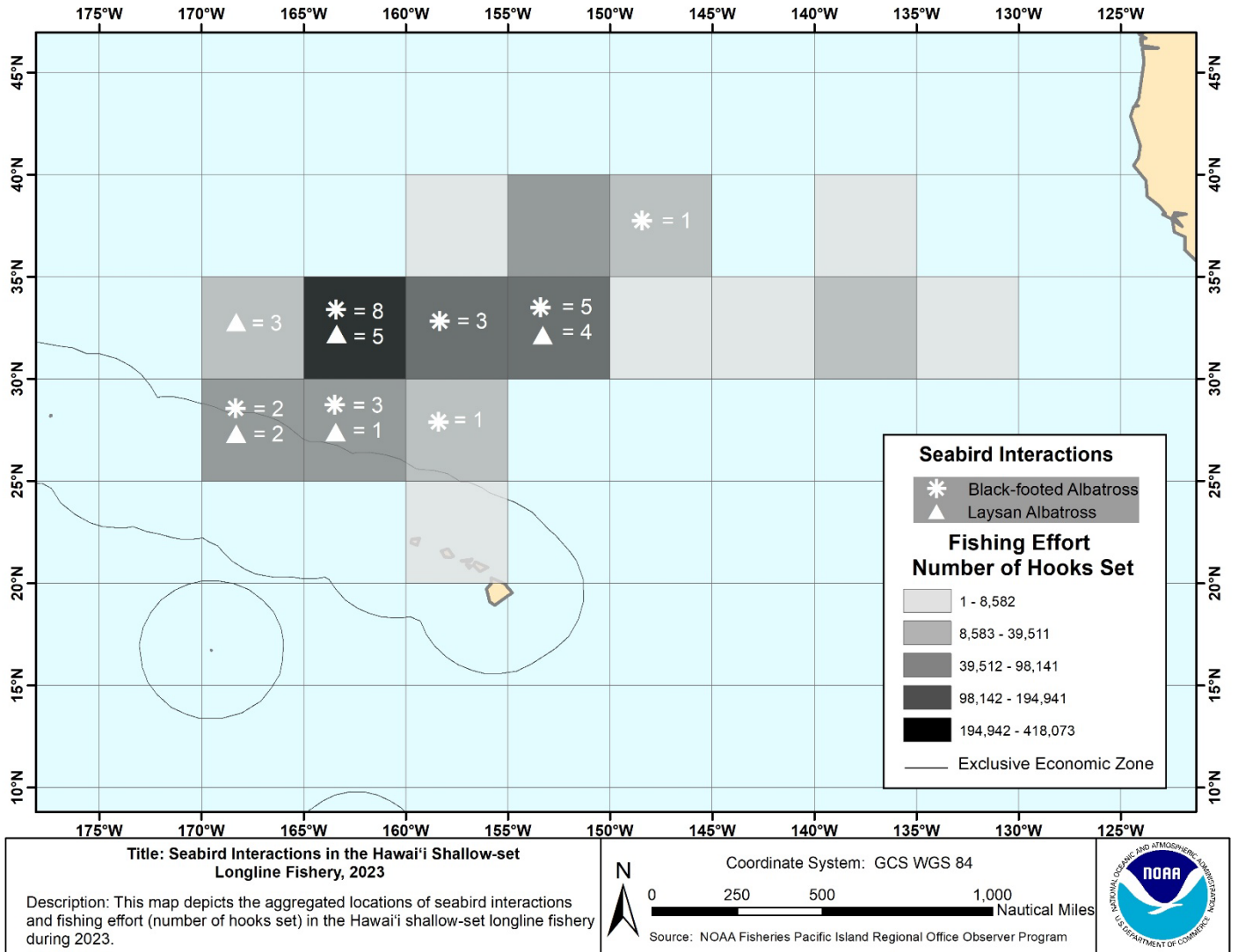


Figure 2: Locations of seabird interactions observed in Hawai'i shallow-set longline fishery, 2023.

Note: NMFS deployed observers on every shallow-set trip in 2023.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 06/18/2024.

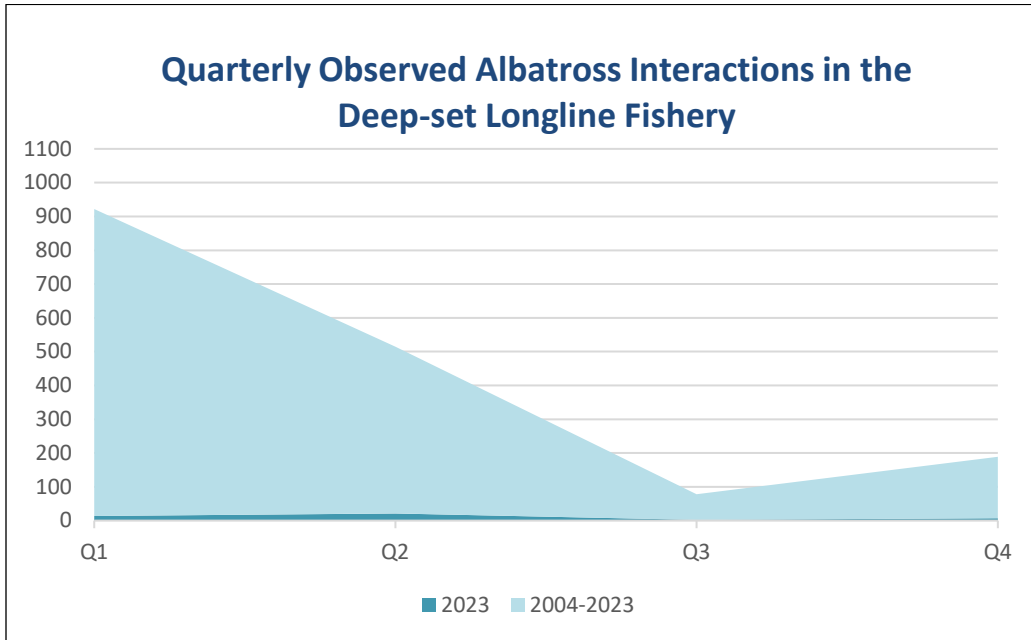


Figure 3: Number of observed seabird interactions in the deep-set longline fishery, 2004–2023 and 2023, in each date by quarter (Q).

Note: Q1 = January 1st–March 31st, Q2 = April 1st–June 30th, Q3 = July 1st–September 30th, and Q4 = October 1–December 31st.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 05/31/2024.

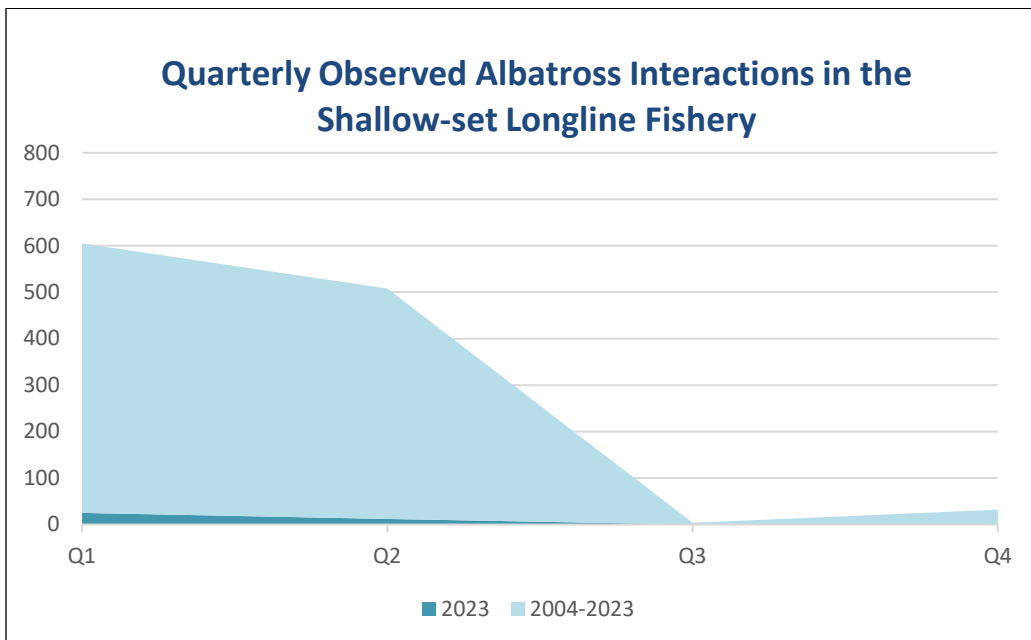


Figure 4: Number of observed seabird interactions in the shallow-set longline fishery, 2004–2023 and 2023, in each date by quarter (Q).

Note: Q1 = January 1st–March 31st, Q2 = April 1st–June 30th, Q3 = July 1st–September 30th, and Q4 = October 1–December 31st.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 05/31/2024.

2.3 Number of Interactions and Effort

Seabirds can be hooked, entangled, or both, but are most commonly hooked only. Regulations require fishermen to remove as much gear as is safely possible from any captured seabirds before releasing them. Albatross interactions are relatively rare events in the Hawai'i longline fisheries. In 2023, there were no albatross interactions on 92 percent of observed deep-set trips and 76 percent of shallow-set trips. Table 4 summarizes the number of observed seabird interactions, the condition of the seabirds upon release, and fishing effort in both fisheries from 2004–2023.

During that period, NMFS deployed observers on 100 percent of shallow-set fishing trips, so the number of interactions shown in Table 4 represents the fishery-wide totals. NMFS deployed observers on approximately 17 percent of deep-set trips in 2023, so we expanded the observed interactions using the observer coverage rate to estimate total interactions (Table 5). Figure 5 shows the seabird interaction rate from 2004–2023 based on the data from Table 4.

Table 4: Numbers of observed seabird catch levels, fishing effort, and interaction rates in the combined Hawai'i longline fisheries, 2004–2023.

Source: Sustainable Fisheries Observer Program data (unpublished, 05/30/2024) and from the Sustainable Fisheries Observer Program annual reports (NMFS 2024b and NMFS 2024c).

Note: Observed seabird catch and effort are based on the date and time of the beginning of the haul. Interaction rates are calculated and rounded to the nearest thousandths (third decimal) place.

Deep-set Fishery

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species	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	4,013,212	0.002
2005	6	11	-	1 ¹	18	-	18	9,328,681	0.002
2006	1	17	5	-	23	-	23	7,434,798	0.003
2007	7	18	-	-	25	-	25	7,728,502	0.003
2008	14	30	14	2 ²	60	4	56	8,747,946	0.007
2009	18	23	4	-	45	-	45	7,872,668	0.006
2010	39	17	1	-	57	1	56	8,161,800	0.007
2011	32	13	3	-	48	2	46	8,328,872	0.006
2012	31	36	6	-	73	5	68	8,845,848	0.008
2013	48	49	8	-	105	5	100	9,296,069	0.011
2014	12	38	1	-	51	6	45	9,556,918	0.005

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species	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)
2015	25	101	4	2 ⁴	132	19	113	9,309,682	0.014
2016	33	104	4	3 ⁵	144	7	137	9,901,279	0.015
2017	38	103	-	1 ⁶	142	13	129	10,190,504	0.014
2018	35	190	9	2 ⁸	236	28	208	11,907,869	0.020
2019	43	145	-	1 ⁹	189	8	181	12,739,655	0.015
2020	59	95	1	1 ¹⁰	156	13	143	8,849,665	0.018
2021	38	87	-	2 ¹²	127	10	117	11,460,814	0.011
2022	56	47	-	1 ¹⁴	104	2	102	12,417,687	0.008
2023	11	33	1	2 ¹⁵	47	2 ¹⁶	45	10,997,973	0.004

Shallow-set Fishery

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species	Total birds 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	-	115,718	0.009
2005	62	7	-	-	69	47	22	1,358,247	0.051
2006	8	3	-	-	11	5	6	676,716	0.016
2007	40	8	-	-	48	40	8	1,353,761	0.035
2008	33	6	-	-	39	24	15	1,460,042	0.027
2009	81	30	1	-	112	88	24	1,694,550	0.066
2010	40	38	-	1 ³	79	61	18	1,835,182	0.043
2011	49	19	-	-	68	53	15	1,505,467	0.045
2012	62	37	-	-	99	78	21	1,476,969	0.067

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	Other or unidentified bird species	Total birds caught	Birds released injured and alive	Birds released dead	Total observed effort (hooks)	Seabird interaction rate (birds per 1,000 hooks observed)
2013	45	28	2	-	75	48	27	1,074,909	0.070
2014	39	32	1	-	72	56	16	1,470,683	0.049
2015	43	38	-	-	81	65	16	1,274,805	0.064
2016	25	40	-	-	65	50	15	796,165	0.082
2017	6	53	-	1 ⁷	60	38	22	1,083,216	0.055
2018	2	7	-	-	9	7	2	486,013	0.019
2019	15	19	-	-	34	26	8	374,487	0.091
2020	26	5	-	1 ¹¹	32	32	-	624,579	0.051
2021	10	45	1	1 ¹³	57	45	12	1,026,373	0.056
2022	38	71	-	-	109	84	25	1,242,997	0.088
2023	15	23	-	-	38	32 ¹⁶	6	1,139,864	0.033

Footnote: ¹brown booby; ²red-footed booby and unidentified seabird; ³northern fulmar; ⁴red-footed booby and unidentified shearwater; ⁵two red-footed boobies and one unidentified albatross; ⁶unidentified gull; ⁷glaucous-winged gull; ⁸one brown booby and one red-footed booby; ⁹brown booby; ¹⁰brown booby; ¹¹northern fulmar; ¹²unidentified shearwater; ¹³unidentified shearwater; ¹⁴brown booby; ¹⁵one masked booby and one red-footed booby; ¹⁶none of the seabirds released alive in 2023 had any gear attached

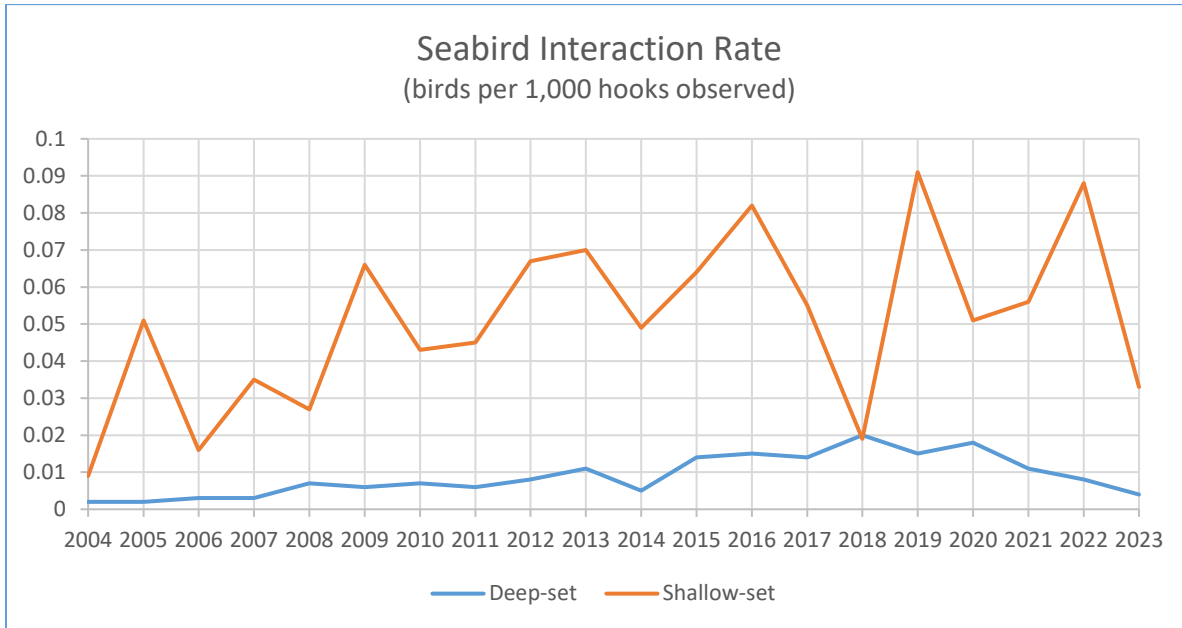


Figure 5: Seabird interaction rates in the deep-set and shallow-set longline.

Almost all interactions in the deep-set fishery occur when fishermen set gear during the day while seabirds are actively feeding. Because most seabirds are inactive at night, very few interactions occur when fishermen typically haul deep-set gear. In 2023, in the deep-set fishery observers documented interactions with 11 Laysan albatrosses, 33 black-footed albatrosses, 1 sooty shearwater, 1 masked booby, and 1 red-footed booby (Table 4). Nearly all of the seabirds observed to interact with the deep-set fishery were dead at the vessel (96%). Of the two that were released alive, neither had any gear left attached. Table 5 shows the total estimated number of interactions with Laysan albatrosses, black-footed albatrosses, and shearwaters based on observer records for the deep-set fishery in 2023.

Table 5: Estimated total seabird interactions in the Hawai'i deep-set longline fishery, 2023.

Note: Table lists point estimates and standard error of the total number of incidental interactions by species in the Hawai'i deep-set longline fishery based on observed interactions during 2023. Point estimates are based on the trip arrival date rather than haul date. Source: McCracken and Cooper 2024.

Species	Total annual estimate	Standard error
Black-footed albatross	208	49.3
Laysan albatross	68	43.9
Masked booby	5	4.2
Red-footed booby	7	6.0
Sooty Shearwater	5	4.6

Because the shallow-set fishery typically sets at night and hauls the gear during the day, most of the interactions occur when fishermen retrieve the gear and birds are actively feeding. In 2022, the shallow-set fishery interacted with 15 Laysan albatrosses and 23 black-footed albatrosses (Table 4). Nearly all of the seabirds observed to interact with the shallow-set fishery were alive at the vessel (84%). None of the seabirds released alive had any gear attached. These numbers reflect the total catch due to there being 100 percent observer coverage for this fishery.

When albatross interactions do occur, it is common for more than one albatross interaction to occur per trip, resulting in a large percentage of the annual albatross interactions occurring on a small number of trips. In 2023, 44 albatross in the deep-set fishery were caught over 21 individual trips (8%), and 22 of those albatross (50%) were caught on just four individual trips (1%). In the shallow-set fishery, 38 albatross were caught over 18 individual trips (24%), and 71 of those albatross (45%) were caught on just three individual trips (4%).

Table 6: Number of observed deep-set and shallow-set longline trips by the number of albatross interactions per trip, 2023. The total number of observed trips in this period was 270 for deep-set and 74 for shallow-set.

Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 05/31/2024.

Deep-set longline			Shallow-set longline		
Number of albatross per trip	Number of trips ¹	% of total albatross caught	Number of albatross per trip	Number of trips ¹	% of total albatross caught
0	249	0	0	56	0
1	12	27.3	1	11	28.9
2	5	22.7	2	2	10.5
≥3	4	50	3	2	15.8
-	-	-	≥4	3	44.7

Footnote: ¹based on begin haul date

3. ENDANGERED SPECIES ACT-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 Hawai'i longline fisheries operate. There was one sighting of a short-tailed albatross from a shallow-set vessel in 2023, but no interaction with fishing gear occurred. Figure 6 shows the location of the sighting compared to the observed fishing effort.

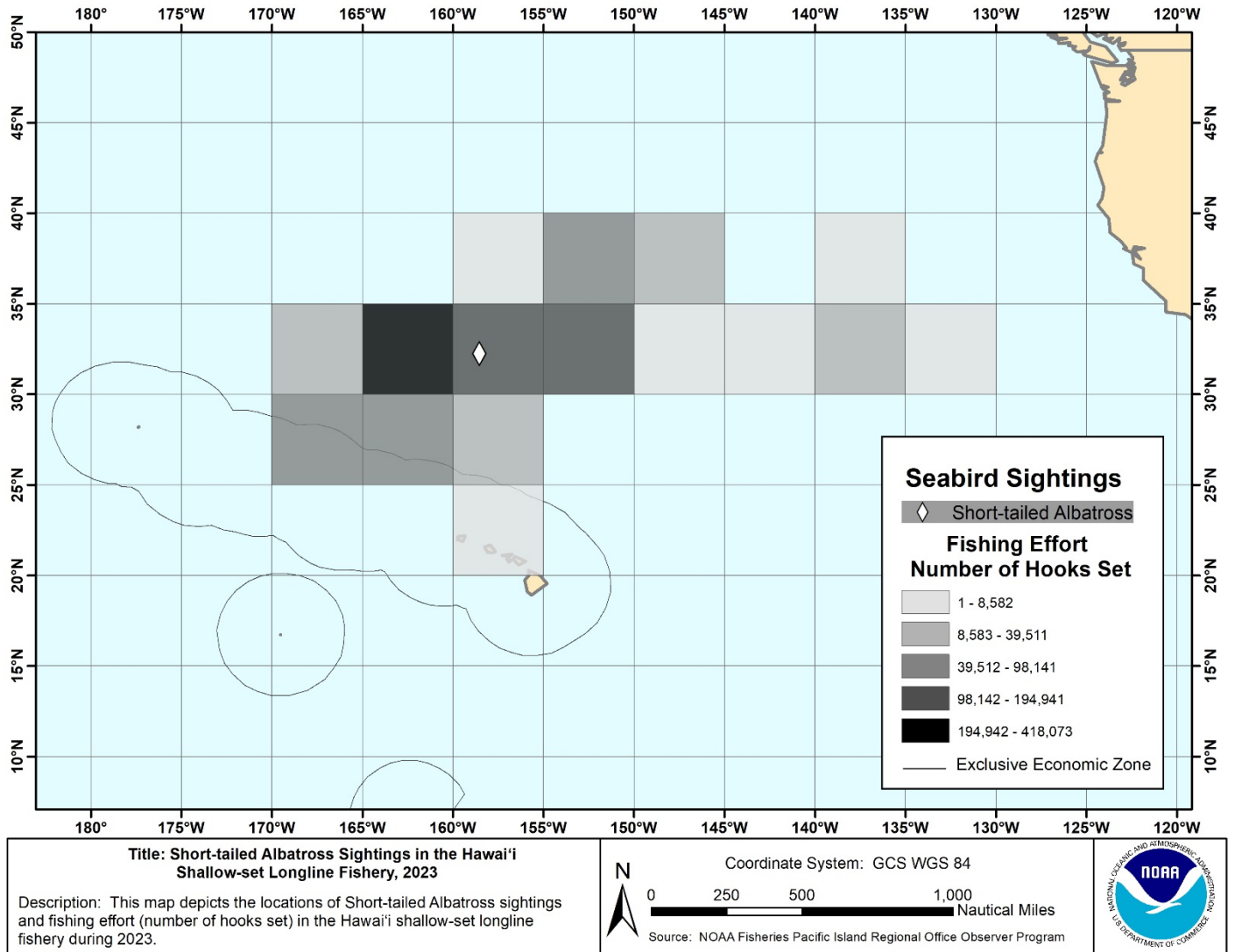


Figure 6: Short-tailed albatross sightings and fishing effort in the Hawai'i shallow-set fisheries, 2023.
Source: NMFS PIRO Sustainable Fisheries Observer Program, unpublished data, 06/20/2024.

4. RESEARCH AND COUNCIL ACTIONS

Since 2001, when NMFS introduced seabird regulations to the Hawai'i longline fishery, the overall seabird catch rate has declined; however, catch rates in both longline fisheries had been increasing until recently. Beginning in 2015, interactions with albatross in the deep-set longline fishery, were substantially higher compared to previous years with the highest number observed in 2018. From 2019 to 2023, the observed number of interactions has declined every year returning to pre 2015 interaction rates in 2023. While there is greater annual fluctuation in the shallow-set longline fishery, in part due to fishery closures and the seasonality of albatross, interaction rates peaked in 2019. In 2023 albatross interactions were low compared to recent years with the fishery operating year-round (Figure 5).

Variability in annual interaction rates are driven by the overlap of fishing effort with nesting albatross foraging habitat. The extent of this overlap is likely driven in part by large-scale climate variabilities. For example, black-footed albatross nest in the Northwestern Hawaiian Islands, and their main foraging habitat while nesting are the productive fronts to the north and east of the Hawaiian Islands. During a positive Pacific Decadal Oscillation (PDO), an intensification of the westerly winds displaces the frontal region to the south bringing with it cold productive waters, which increases the overlap between the albatross forage area and the deep-set longline fishing grounds, which in turn contributes to an increase in interactions with the longline fleet (Wren et al. 2019; Hyrenbach et al. 2021). During a negative PDO, the westerly winds relax and the productive fronts the birds forage in are displaced northward, reducing the overlap between the albatross foraging grounds and the deep-set longline fishing grounds, which result in a reduction in interactions. The most recent positive PDO ended in 2016, and current conditions are in a negative PDO phase. PDO works in combination with El Niño Southern Oscillation (ENSO) where El Niño enhances (dampens) a positive (negative) PDO while a La Niña dampens (enhances) it. These large scale climate variabilities may in part explain why black-footed albatross interactions with the deep-set longline fishery peaked in 2019, which was a negative PDO and El Niño year, and has been declining ever since (negative PDO and La Niña).

The WPFMC held workshops in 2017 and 2018 to explore the causes of higher black-footed albatross interactions as well as to review seabird mitigation requirements and the best scientific information available for the Hawai'i longline fishery. The workshops identified certain mitigation measures, including tori lines (bird-scaring streamers), as a high priority for further research and development due to their potential to offer an effective alternative to blue-dyed bait.

Deep-set longline

In spring 2019, the WPFMC, the Hawai'i Longline Association, NMFS Pacific Islands Fisheries Science Center (PIFSC), and PIRO started a joint cooperative research project to design and test tori lines in the deep-set longline fishery. The statistically significant results from a 2020 study showed 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. Project results also showed that discharging offal and spent bait during setting might exacerbate rather than mitigate seabird catch risk (Gilman et al. 2021).

More research to test the effectiveness of tori lines without blue-dyed bait and offal discharge was conducted under a NMFS experimental fishing permit (EFP) per regulations at 50 CFR 556.17 from February to June 2021 (WPFMC 2021). The results showed that albatross attempts are 1.5 times less likely, contacts are 4 times less likely, and captures are 14 times less likely on tori line sets compared with blue-dyed bait sets (Chaloupka et al. 2021).

At its 189th meeting held December 7–9, 2021, the Council took final action and recommended regulatory amendments to improve the overall operational practicality and mitigation efficacy of required measures for the Hawai'i deep-set longline fishery. Specifically, the Council recommended replacing blue-dyed thawed bait and strategic offal discharge measures required for stern-setting deep-set longline vessels with a new tori line requirement. Instead a regulatory requirement for a strategic offal discharge measure, the Council recommended implementing best practices training on offal management as part of the annual protected species workshop. The Council additionally recommended tori line regulatory specifications to ensure the tori lines will produce similar results to the lines tested in the two studies. NMFS published the proposed rule for this regulatory amendment on October 17, 2023 (88 FR 71523) and final rule on March 1, 2024 (89 FR 15062). The regulatory amendment took effect on April 1, 2024. More history on this regulatory change is described in the regulatory amendment (WPRFMC and NMFS 2023), which can be viewed online at: <https://www.regulations.gov/document/NOAA-NMFS-2022-0131-0006>.

Shallow-set longline

At its 185th meeting in March 2021, the Council considered options for modifying seabird mitigation measures for the shallow-set longline fishery. Because conditions and interactions with seabirds differ between the shallow-set and deep-set longline fisheries, the Council recommended more research under an EFP for the development of an appropriate combination of mitigation measures for the shallow-set longline fishery. The recommendation also included a priority to identify a combination of mitigation measures that maintain effectiveness of seabird deterrence during dusk compared to the existing night-setting suite of measures, to offer operational flexibility in starting the setting operations before sunset.

NMFS received an EFP application from the Hawai'i Longline Association in November 2021 to conduct a pilot study in the shallow-set longline fishery in which the setting of two tori lines with gear will start at dusk (86 FR 71234). The Council recommended the issuance of the EFP at its 189th meeting in December 2021. NMFS issued the EFP on March 24, 2022 (87 FR 15383). Field trials were completed in early 2024. The project report will be discussed at the 153rd meeting of the Scientific and Statistical Committee and the 200th meeting of the Council in September 2024.

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