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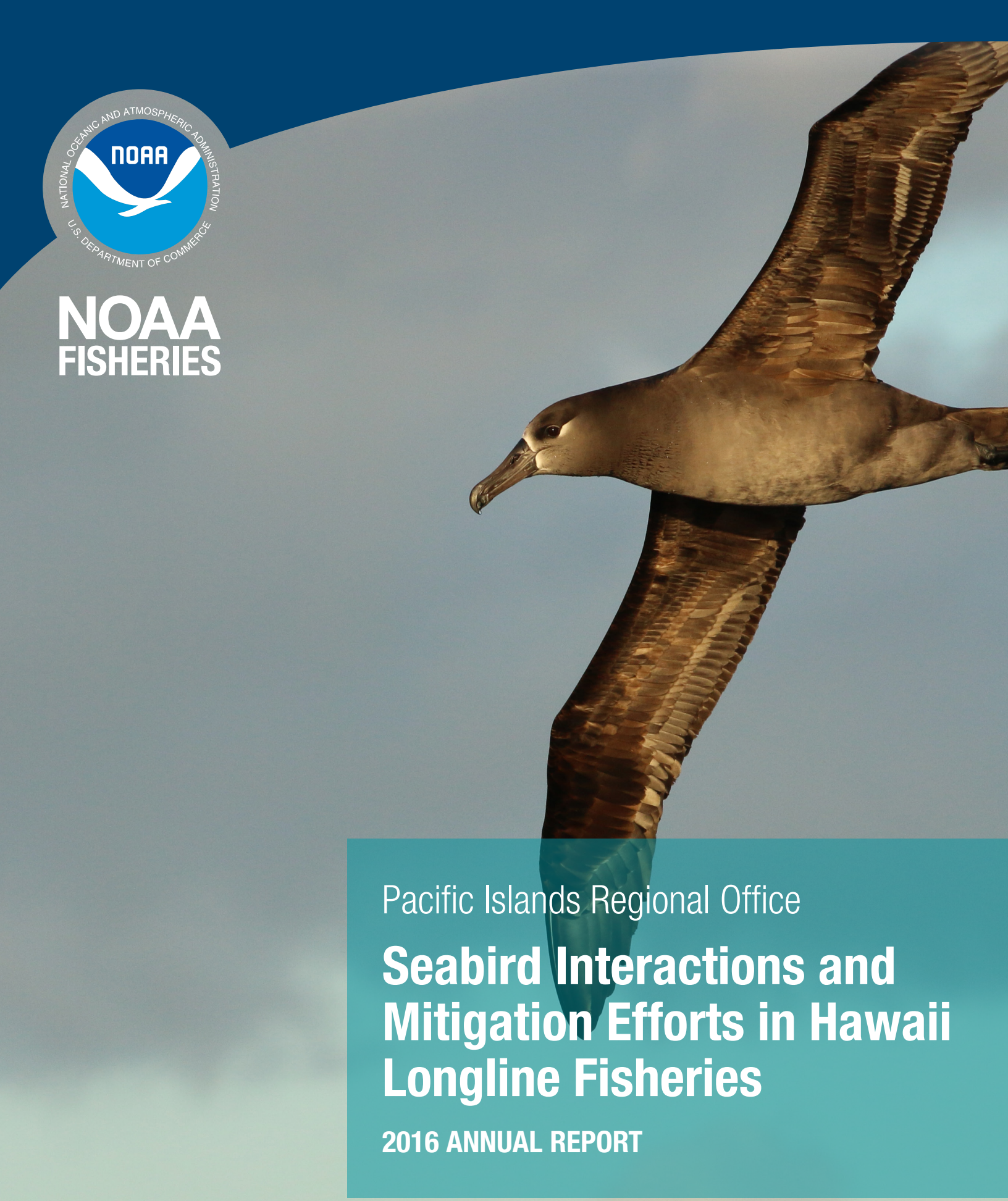

Pacific Islands Regional Office

Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

2016 ANNUAL REPORT

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Pacific Islands Regional Office
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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.

Cover image: Black-footed albatross

Red-footed booby

Contents

1. Introduction 1
   1.1 Background 1
   1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries 4
   1.3 Protected Species Workshops 6
   1.4 Fishing Effort and Observer Coverage 6
2. Interactions 7
   2.1 Species 7
   2.2 Location of Interactions 8
   2.3 Number of Interactions 10
3. ESA-listed Seabirds 13
4. Management 13
5. Research 13
6. Summary 14

Acknowledgements 14

References 15

Tables

Table 1. Number of observed Hawaii longline vessels that side- and stern-set in 2016 4

Table 2. Seabird mitigation requirements for the Hawaii longline fleet 5

Table 3. Hawaii deep- and shallow-set longline fisheries effort and observer coverage, 2015 and 2016 6

Table 4. Species recorded hooked or entangled in Hawaii longline fisheries 7

Table 5. Summary of collected seabirds from the Hawaii longline fisheries, 2016 7

Table 6. Numbers of observed seabird catch levels, fishing effort, and interaction rates in the combined Hawaii longline fisheries, 2004-2016 10

Table 7. Estimated total seabird interactions in the Hawaii deep-set longline fishery, 2016 11

Table 8. Capture and release details by species for seabird interactions in the Hawaii longline fisheries, 2016 11

Table 9. Observed interactions of seabirds with bands in the shallow-set and deep-set Hawaii longline fisheries, 2016 12

Table 10. Comparison of observed interactions in Hawaii longline fisheries, 2015 and 2016 14

Figures

Figure 1. Spatial distribution of fishing effort by the Hawaii deep-set longline fishery, 2016 2

Figure 2. Spatial distribution of fishing effort by the Hawaii shallow-set longline fishery, 2016 3

Figure 3. Locations of seabird interactions observed in Hawaii deep-set longline fishery, 2016 8

Figure 4. Locations of seabird interactions observed in Hawaii shallow-set longline fishery, 2016 9

Figure 5. Seabird interaction rates in the deep-set and shallow-set longline fisheries, 2004-2016 11

1. Introduction

The National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) attempts to reduce, as practicable, interactions between Hawaii pelagic longline fishing operations and seabirds. NMFS monitors the fisheries to determine the effectiveness of management measures implemented to reduce 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.[1] You may view this report, and similar reports from previous years, at **www.fpir.noaa.gov**.

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 m and operates mainly north-northeast and southwest of the main Hawaiian Islands (Fig. 1). The shallow-set longline fishery targets swordfish at depths to 100 m and typically operates north and east of the Hawaiian Islands (Fig. 2). The FEP contains a detailed description of the Hawaii longline fisheries (WPFMC 2009, as amended).

Since 1994, the Hawaii longline fleet has been limited to 164 permits. Activity levels in any given year since 2004 range from 11 to 35 vessels in the shallow-set longline fishery, and 122 to 139 vessels in the deep-set longline fishery. Nearly all vessels in the shallow-set longline fishery also participate, to some degree, in the deep-set longline 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. By using safe handling and release techniques, fishermen help many seabirds survive their interactions.

Effective management of the fisheries has greatly minimized interactions with seabirds. In 2000, NMFS estimated 2,433 seabird interactions in the Hawaii longline fisheries. From 2001 – 2006, NMFS implemented seabird mitigation measures. These measures have significantly reduced interactions and are described below. In 2016, there were 65 interactions in the shallow-set longline fishery. For the 2016 deep-set longline fishery, we expanded the observed interactions using the observer coverage rate and estimated 691 interactions in the deep-set longline fishery. Credit for this successful reduction in interactions is mostly due to the fishermen, who understand and implement the seabird mitigation measures. The measures include training in seabird identification, seabird-deterrent fishing gear and techniques, and special handling and release of incidentally-caught seabirds.

Northern fulmar in flight.

[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).

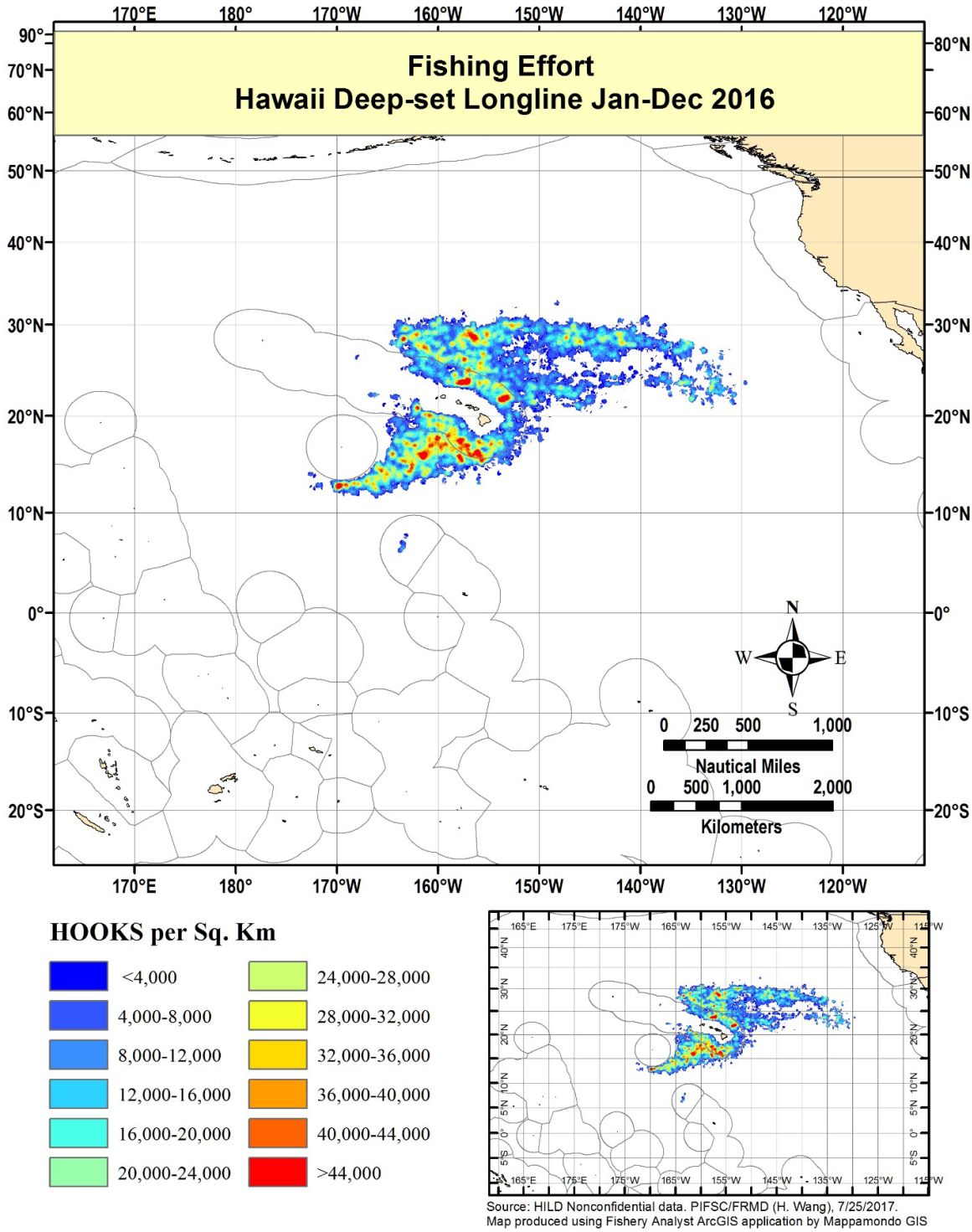

Figure 1. Spatial distribution of fishing effort by the Hawaii deep-set longline fishery, 2016.
Source: NMFS Pacific Islands Fisheries Science Center (PIFSC) logbook, unpublished data, received 7/25/2017.

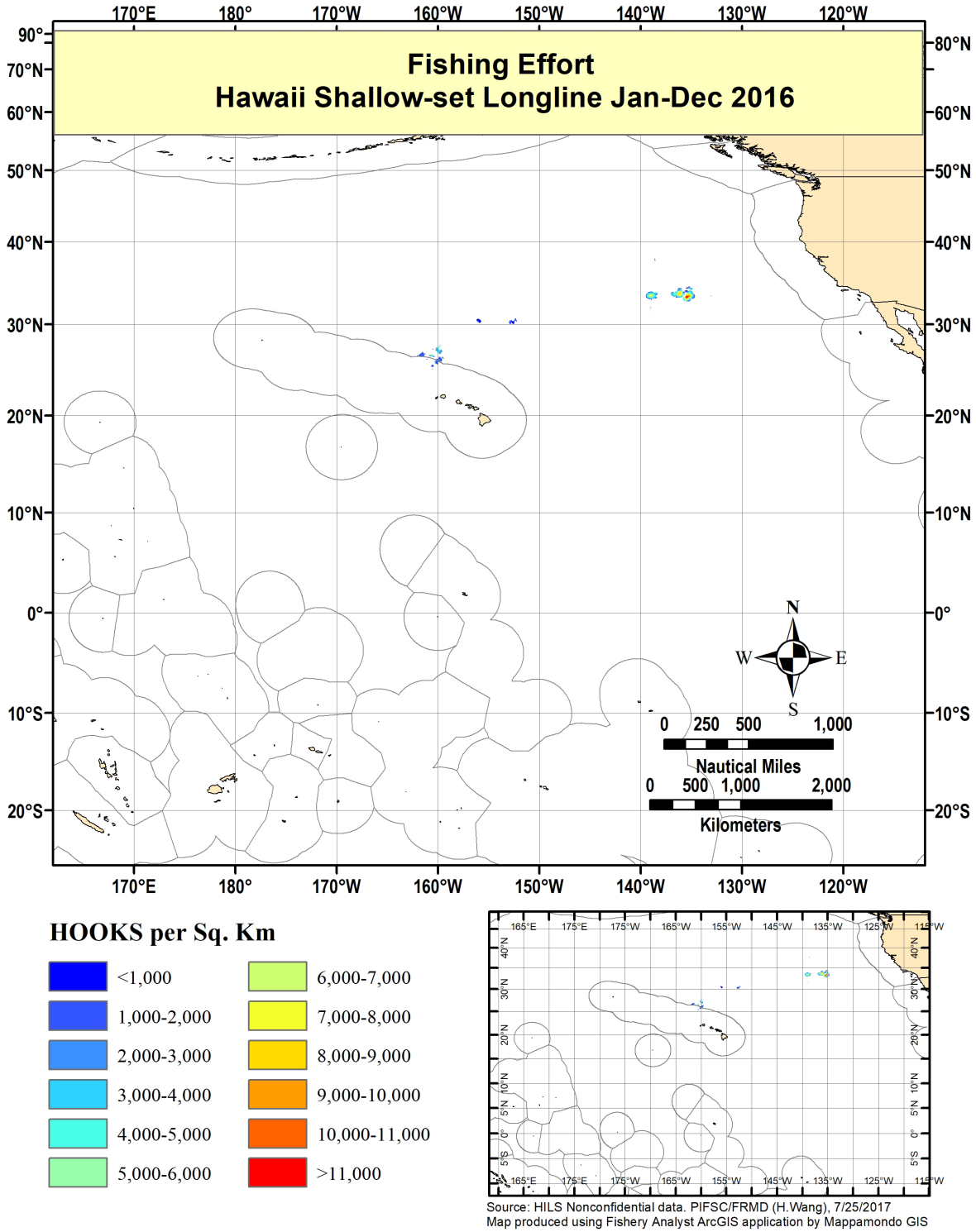

Figure 2. Spatial distribution of fishing effort by the Hawaii shallow-set longline fishery, 2016.
Source: NMFS PIFSC logbook, unpublished data, received 7/25/2017.

1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries

Most of the regulations for the Hawaii longline fisheries are identified in Title 50 of the Code of Federal Regulations **Part 600** and **Part 665** (50 CFR Parts 600 and 665). NMFS also provides a **regulation summary and compliance guides** to Hawaii longline fishermen and the general public, available from **http://www.fpir.noaa.gov/SFD/pdfs/seabird-compliance-guide_(rev.7-8-14).pdf**. 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 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 describe these measures.

Black-footed albatross competing for a bite of strategic offal discards.

Side-Setting

Side-setting involves deploying the gear from the side of the vessel, compared to the conventional method of setting from the stern. In side-setting, crew 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, by the time the vessel stern passes the location where baited hooks have been set, the baited hooks will have sunk to a depth where seabirds cannot reach them (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 pelagic longline deep- and shallow-set vessels observed to set from the stern and from the side in 2016, with some vessels operating in both deep- and shallow-set longline fisheries. In 2016, most vessels in the deep-set longline fishery and all vessels in the shallow-set longline fishery chose to stern-set.

Table 1. Number of observed Hawaii longline vessels that side- and stern-set in 2016.

Fishery	Deck setting position	Vessels
Deep-set	Stern-setting	103
Deep-set	Side-setting	26
Shallow-set	Stern-setting	13
Shallow-set	Side-setting	0

Source: NMFS PIRO Observer Program, unpublished data, 9/18/2017

Weighted Branch Lines

Fishermen place weights close to the hook on branch lines so baited hooks sink quickly and help prevent foraging seabirds from possibly becoming hooked or entangled in longline gear. When required, Hawaii longline 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.

Thawed and Blue-dyed Bait

Dyeing bait to a specific blue color reduces visibility by reducing 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 longline fishery to reduce sea turtle interactions. While fishermen may still use squid in the deep-set longline 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 to distract seabirds from attempting to steal baits from hooks before the branch lines are retrieved. Fishermen discard swordfish heads and livers on the opposite side of the vessel from fishing operations to distract birds away from the baited hooks. NMFS observers in the mid-1990s noted that strategically discarding offal reduced incidental hooking or entanglement of albatrosses, and it is now a requirement. When seabirds are present

around the vessel, fishermen that are deep-setting north of 23° N., or shallow-setting anywhere, are required to use strategic offal discards as a seabird mitigation measure when setting from the stern.

Night Setting

Night-setting as a seabird mitigation measure requires shallow-set longline 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. The night-set measure is based on the premise that seabirds cannot see baited hooks in the dark and, thus, do not attack them. 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.

What you need to do	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 the identification, safe handling, and release techniques for sea turtles, marine mammals, and seabirds. 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 on line. A valid workshop certificate is necessary for owners to obtain or renew Federal longline fishing permits. Longline vessel operators must also have on board the vessel a valid protected species workshop certificate issued by NMFS to the operator of the vessel.

In 2016, NMFS PIRO provided protected species workshop training for 263 Hawaii-based longline vessel owners and operators, and other interested individuals. Another 62 vessel owners, operators, and crewmembers completed the training in American Samoa with assistance from the PIRO Observer Program.

An example of the types of gear that are required aboard Hawaii-based longline vessels. This gear assists the crew with the release of seabirds and other protected species that become unintentionally hooked or entangled in longline fishing gear.

1.4 Fishing Effort and Observer Coverage

Table 3 summarizes effort data from 2015 and 2016 by haul date. From 2015 to 2016, effort in the deep-set longline fishery increased, and effort in the shallow-set longline fishery decreased. Deep-set fishing trips increased by 2% and shallow-set fishery trips decreased by 34%.

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 Observer Program typically bases protected species interactions in their quarterly, semiannual, and annual reports on vessel arrival date (**http://www.fpir.noaa.gov/OBS/obs_qrtrly_annual_rprts.html**). NMFS also provides summary reports from mandatory logbook data reported by longline captains.

Table 3. Hawaii deep- and shallow-set longline fisheries effort and observer coverage, 2015 and 2016.

2016					
Fishery	**Number of vessels**	**Trips**	**Sets**	**Hooks**	**Observer coverage**
Deep-set	141	1,476	19,344	51,015,174	20.13%
Shallow-set	13	46	727	796,165	100%

2015					
Fishery	**Number of vessels**	**Trips**	**Sets**	**Hooks**	**Observer coverage**
Deep-set	141	1,444	18,433	47,409,044	20.6%
Shallow-set	23	70	1,156	1,274,805	100%

Source: NMFS PIRO Observer Program, unpublished data, 9/18/2017, and NMFS PIFSC unpublished data, 8/31/2017.

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*), and northern fulmar (*Fulmarus glacialis*) (Table 4). None of these species is listed under the Endangered Species Act (ESA). 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.

Brown booby

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 2017a)	Located throughout the North Atlantic and North Pacific
Red-footed booby	More than 1 million birds (Birdlife 2017b)	Winters on tropical islands in most oceans
Brown booby	More than 200,000 adults (Birdlife 2017c)	Located throughout the pan-tropical oceans
Sooty shearwaters	20 million (Birdlife 2017d)	Nest in Australia, New Zealand, and southern South America (Birdlife 2017d)

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 2016. Most 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, 2016.

Species	Number retained
Black-footed albatross	85
Laysan albatross	24
Sooty shearwater	4
Red-footed booby	1

Note: Not all dead seabirds are collected as specimens.
Source: NMFS PIRO Observer Program, unpublished data, 9/18/2017.

2.2 Location of Interactions

Figs. 3 and 4 show the spatial distribution of observed seabird interactions in deep- and shallow-set longline fisheries, respectively, based on observations of seabirds in 2016. Most of the interactions occur north of 25° N, where seabirds are typically more abundant, and where fishing effort is more concentrated.

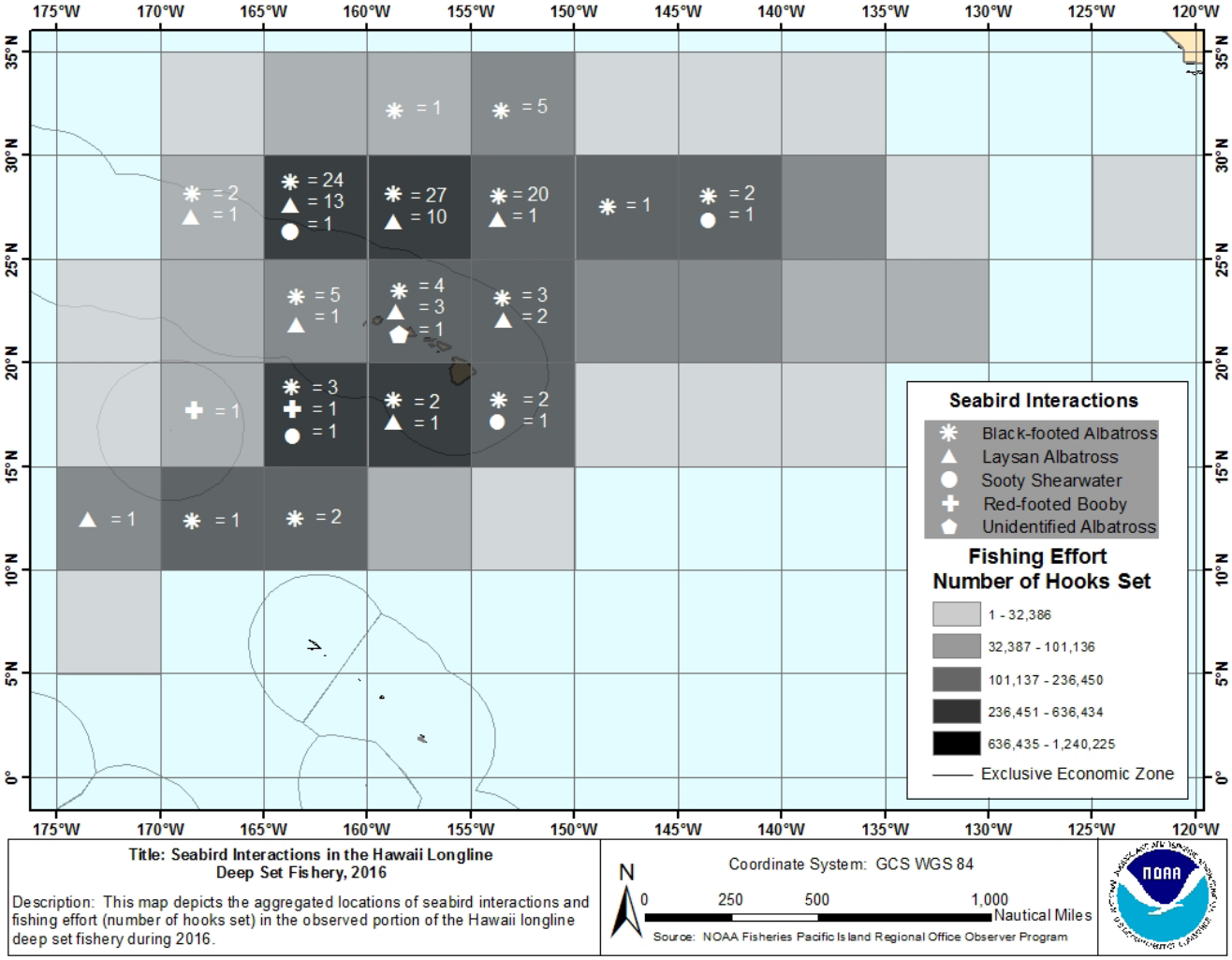

Figure 3. Locations of seabird interactions observed in Hawaii deep-set longline fishery, 2016.
Note: NMFS deployed observers on 20.13% of deep-set trips in 2016. Source: NMFS PIRO Observer Program, unpublished data, 8/3/2017.

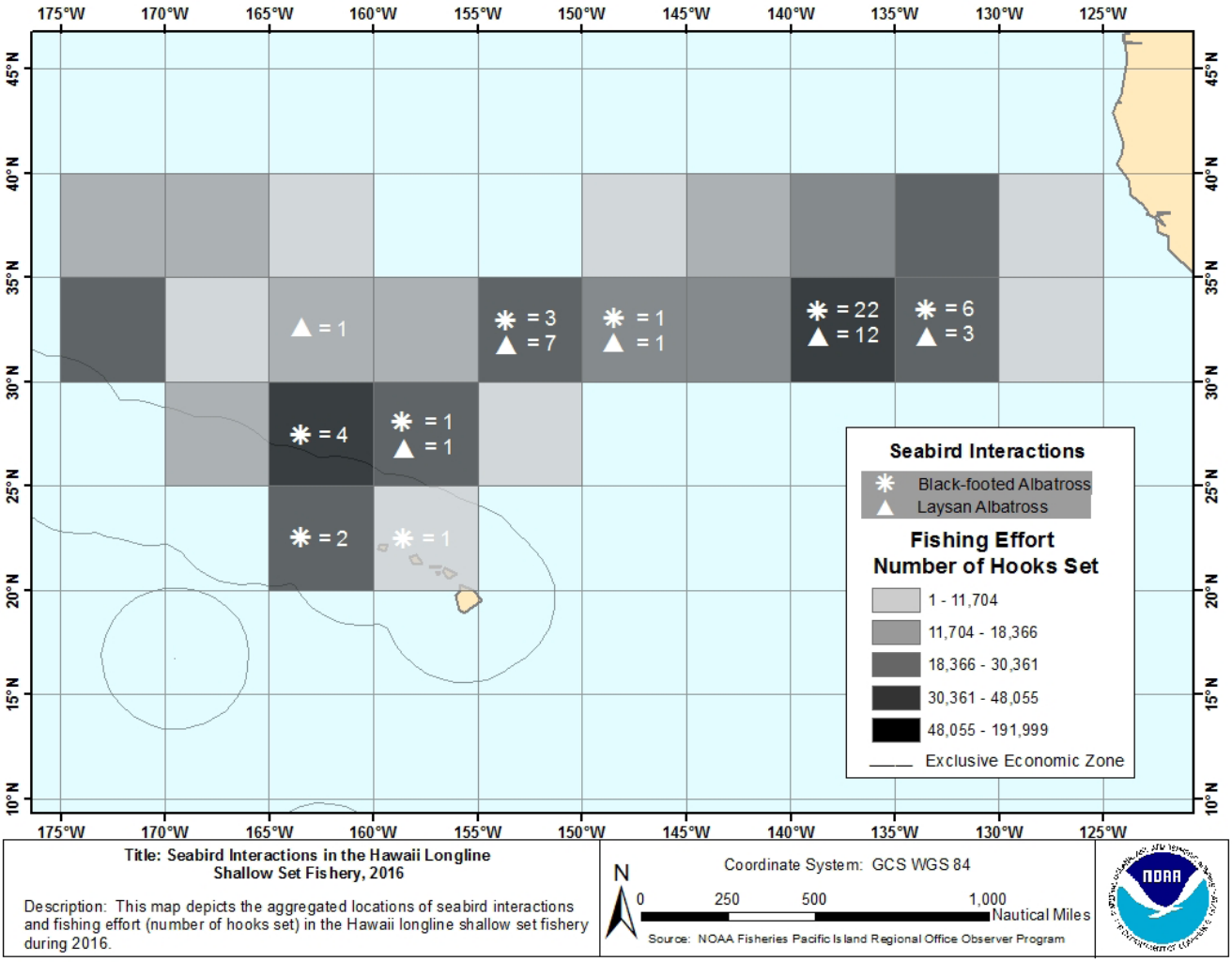

Figure 4. Locations of seabird interactions observed in Hawaii shallow-set longline fishery, 2016.
Note: NMFS deployed observers on every shallow-set trip in 2016. Source: NMFS PIRO Observer Program, unpublished data, 8/3/2017.

2.3 Number of Interactions

Table 6 summarizes the number of observed seabird interactions, and the condition of the seabirds upon release, and fishing effort in both longline fisheries from 2004 – 2016. During that period, NMFS deployed observers on 100% of shallow-set longline fishing trips; therefore, the number of interactions shown in Table 6 represents the fishery-wide totals. NMFS deployed observers on 20.13% of deep-set trips in 2016, so we expanded the observed interactions using the observer coverage rate to estimate total interactions (Table 7).

Table 6. Numbers of observed seabird catch levels, fishing effort, and interaction rates in the combined Hawaii longline fisheries, 2004-2016.

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)
DEEP-SET FISHERY									
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
SHALLOW-SET FISHERY									
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

Note: Observer Program data (unpublished, 9/18/2017) 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 departure date from the Observer Program annual reports (NMFS 2017a and NMFS 2017b). Interaction rates are calculated and rounded to the nearest thousandths (third decimal) place. Footnote: [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.

Fig. 5 shows the seabird interaction rate from 2004 to 2016 from Table 6. In recent years, the seabird interaction rates have increased.

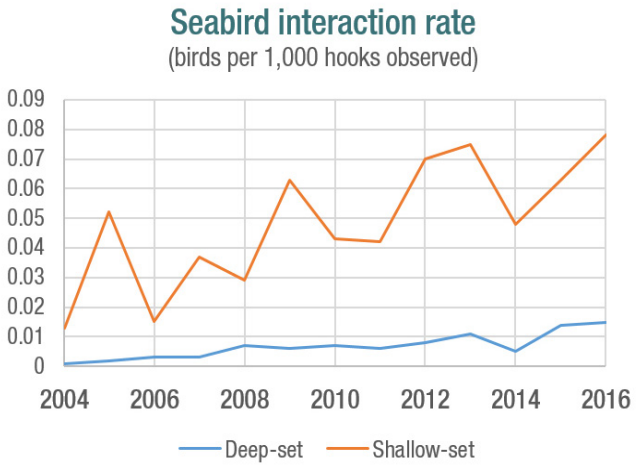

Figure 5. Seabird interaction rates in the deep-set and shallow-set longline fisheries, 2004-2016.

Almost all interactions in the deep-set longline 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 longline gear. In 2016 in the deep-set longline fishery, observers documented interactions with 33 Laysan albatrosses, 104 black-footed albatrosses, four sooty shearwaters, and two red-footed boobies, and one unidentified albatross (Table 6). Nearly all of the seabirds observed to interact with the deep-set longline fishery were dead (95%). Table 7 contains the total estimated number of interactions with Laysan albatross, black-footed albatross, shearwaters, and red-footed booby based on observer records for the deep-set fishery in 2016.

Table 7. Estimated total seabird interactions in the Hawaii deep-set longline fishery, 2016.

Species	Total annual estimate
Black-footed albatross	485
Laysan albatross	166
Unidentified albatross	7
Shearwaters	21
Red-footed booby	12

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 2016. The estimate for shearwaters represents an estimate for the number of incidental interactions by the group of species considered shearwaters. Source: McCracken 2017.

The shallow-set longline 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 2016, the shallow-set longline fishery interacted with 25 Laysan albatrosses and 40 black-footed albatrosses (Table 6). Fishermen released approximately 77% of seabirds alive.

Seabirds can be hooked, entangled, or both. Table 8 provides a summary of capture details in 2016. Regulations require fishermen to remove as much gear as safely possible from any seabirds captured before the seabirds are released.

Table 8. Summary of capture details by species for seabird interactions in the Hawaii longline fisheries, 2016.

Species	Hooked only	Entangled only	Both hooked and entangled	Not known or not recorded
Laysan albatross	46	6	5	1
Black-footed albatross	121	4	19	0
Sooty shearwater	3	1	0	0
Red-footed booby	2	0	0	0

Note: None of the seabirds released alive had any gear attached.
Source: NMFS PIRO Observer Program, unpublished data, 7/18/2017.

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 2016. 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, 2016.

Species	Disposition	Date banded	Band(s) recovery date	Location banded	Age at banding (yr)	Age at recovery (yr)
Black-footed albatross[1]	Dead	6/8/2010	5/13/2015	French Frigate Shoals (Tern Island)	<1	5
Black-footed Albatross	Dead	1/1/2001	1/17/2016	French Frigate Shoals (Tern Island)	>1	>15
Black-footed Albatross	Dead	6/28/2004	1/20/2016	Laysan Island	<1	12
Black-footed Albatross	Dead	1/4/2007	1/22/2016	Laysan Island	>1	>9
Laysan Albatross	Dead	6/9/2008	1/22/2016	French Frigate Shoals (Tern Island)	<1	8
Laysan Albatross	Dead	6/13/2006	1/23/2016	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Dead	5/28/2007	1/25/2016	French Frigate Shoals (Tern Island)	<1	9
Laysan Alabtross	Dead	4/5/2005	1/26/2016	Kauai (Kilauea Point)	>1	>11
Laysan Alabtross	Dead	4/8/2015	1/28/2016	Oahu (Kaena Point)	>1	>2
Black-footed Albatross	Dead	5/22/2008	1/29/2016	French Frigate Shoals (Tern Island)	<1	8
Black-footed Albatross	Dead	12/12/1997	2/5/2016	French Frigate Shoals (Tern Island)	>3	>22
Black-footed Albatross	Dead	6/8/2002	2/10/2016	French Frigate Shoals (Tern Island)	<1	14
Laysan Alabtross	Dead	5/30/2002	2/12/2016	Kauai (Kilauea Point)	<1	14
Black-footed Albatross	Dead	12/16/2006	2/15/2016	French Frigate Shoals (Tern Island)	>1	>10
Laysan Alabtross	Dead	6/21/2006	2/25/2016	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Injured	5/16/2010	2/27/2016	French Frigate Shoals (Tern Island)	<1	6
Black-footed Albatross	Dead	5/21/2008	2/28/2016	French Frigate Shoals (Tern Island)	>1	7
Laysan Albatross	Injured	5/14/2007	3/3/2016	Punta Sur, Guadalupe Island, Baja California, MX	<1	9
Black-footed Albatross	Dead	1/3/1998	3/13/2016	French Frigate Shoals (Tern Island)	>3	>21
Black-footed Albatross	Dead	6/6/2008	3/15/2016	French Frigate Shoals (Tern Island)	<1	8
Black-footed Albatross	Injured	5/22/2006	4/12/2016	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Dead	1/29/1998	4/19/2016	French Frigate Shoals (Tern Island)	>2	>20
Black-footed Albatross	Dead	6/11/2004	5/14/2016	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	5/31/1995	6/4/2016	French Frigate Shoals (Tern Island)	<1	21
Black-footed Albatross	Dead	5/18/2009	7/2/2016	French Frigate Shoals (Tern Island)	<1	7
Black-footed Albatross	Dead	6/8/2007	12/17/2016	French Frigate Shoals (Tern Island)	<1	>9

[1]Inadvertently excluded from 2015 seabird interactions report.
Source: USGS, USFWS, and NMFS, unpublished data, received 7/18/2017.

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 overlap with the areas where the Hawaii longline fisheries operate: the endangered short-tailed albatross and Hawaiian dark-rumped petrel (*Pterodroma sandwichensis*), and the threatened Newell's shearwater (*Puffinus auricularis newelli*). There were no sightings of short-tailed albatross on observed deep-set and shallow-set longline trips in 2016.

Short-tailed albatross

4. Management

In May 2015, consistent with the Migratory Bird Treaty Act, the USFWS issued a Special Purpose Permit to NMFS for the shallow-set longline fishery. The permit authorized the incidental take of a limited number of migratory birds in the shallow-set longline fishery until March 31, 2018. The permit included short-tailed albatross, black-footed albatross, Laysan albatross, sooty shearwater, and Northern fulmar. For further information, please visit the USFWS website (**http://www.fws.gov/pacific/migratorybirds/nepa.html**).

In December 2017, the U.S. 9th Circuit Court of Appeals reversed a District Court's judgment affirming FWS's decision to issue the Special Purpose Permit to NMFS *(Turtle Island Restoration Network; Center for Biological Diversity vs. National Marine Fisheries Service, 12-cv-00594, D-Haw)*. Specifically, the 9th Circuit Court concluded that the FWS's grant of an incidental take permit to the NMFS in reliance on the special purpose permit provision in 50 CFR 21.27 was arbitrary and capricious because the FWS's interpretation of § 21.27 does not conform to either the MBTA's conservation intent or the plain language of the regulation. The Court explained its conclusion by discussing the other "form" permits authorized under the MBTA for discrete types of takings (scientific collection, taxidermy, and rehabilitation), and then stated that the FWS's new interpretation of § 21.27's special purpose activity exception as applying to basic commercial activities like fishing that have no articulable special purpose is, therefore, inconsistent with the existing permitting scheme that the FWS has enacted.

5. Research

Shallow-set Fishery

Effective management in the Hawaii shallow-set fishery has greatly reduced seabird interactions, primarily through mitigation measures required during gear setting. Since effective implementation of these measures in 2001, approximately 75% of the remaining seabird interactions occur during gear hauling (Gilman et al. 2014). Because most shallow-set longline fishermen choose the option to stern set at night, they haul their gear primarily during the day when seabirds are more likely to be foraging. In a review of observer data from 2004 to 2012, Gilman et al. (2014) found an increasing temporal trend of albatrosses attending vessels during hauling, which may have been one of the factors that results in the observed increasing trend in the seabird standardized haul catch rate during this time.

The highest relative standardized seabird catch rates from January through March corresponded with brooding and chick rearing for mature Laysan and black-footed albatrosses, when the albatrosses forage in areas that overlap with the shallow-set longline fishery. The lowest live seabird catch rates occurred during the non-breeding season in August and September, when albatross foraging areas overlap less with the fishery (Gilman et al. 2014).

In 2016 and 2017, Eric Gilman, with funding from the National Fish and Wildlife Foundation, conducted commercial demonstrations of a bird curtain that could reduce haul interactions in the shallow-set longline fishery. Gilman interviewed Hawaii longline swordfish captains on potential haulback mitigation techniques. He asked captains to rate the following in terms of potential effectiveness: bird curtain, towed buoy, maximized crew branchline coiling rate, refraining from flicking spent bait during hauling, attaching weighted swivels close to the hook, positioning crew further forward on deck, adjusting the vessel hauling speed, and using a water spray. Gilman used the captains' responses to select the bird curtain option as the mitigation option to employ during a demonstration during three fishing trips. After the demonstration, Gilman interviewed the vessel captain and observers to document the economic viability, practicality, and safety of the bird curtain. Results

suggest that the bird curtain continues to hold promise at being both effective at avoiding bird captures during haulback and being commercially viable (Gilman and Musyl 2017). Indeed, bird curtains and side-setting are part of the suite of seabird mitigation requirements in the longline fisheries.

Deep-set Fishery

Since NMFS introduced seabird regulations in 2001 in the Hawaii deep-set longline fishery, the seabird catch rate had declined. Over the past decade, however, seabird catch levels have increased with increasing fishing effort and interaction rates. Decreasing ocean productivity in recent years may have contributed to the increasing trend in the nominal seabird interaction rate. In a review of observer data from 2004 to 2014, Gilman et al. (2016) found the bird catch rate significantly increased as annual mean multivariate El Niño Southern Oscillation index values increased. This result suggests that the decreasing ocean productivity observed in recent years in the central North Pacific may have contributed to the increasing catch rate. Higher numbers of albatrosses attending vessels, possibly linked to declining regional ocean productivity and increasing absolute abundance of black-footed albatrosses, may also have contributed to the increasing rate.

Gilman et al. (2016) found the largest opportunities for bycatch reductions are through increased efficacy of seabird mitigation measures north of 23° N, where mitigation methods are required, and during setting instead of during hauling. Both options for meeting regulatory requirements, side vs. stern setting, and blue-dyed vs. untreated bait, significantly reduced the seabird catch rate. However, side-setting had a significantly lower seabird catch rate than blue-dyed bait. There was significant spatio-temporal and seasonal variation in the risk of seabird capture with the highest catch rates in April and May, and to the northwest of the main Hawaiian Islands.

NMFS is working with the Council on investigating seabird interactions, in particular black-footed albatrosses in the deep-set longline fishery. In 2017, a student in the Ernest F. Hollings Scholarship Program worked with NMFS staff and external partners on analyzing the demographics of black-footed albatross takes in the deep-set longline fishery. Her work was included in a workshop hosted by the Council on factors influencing albatross interactions in the Hawaii longline fishery in November 2017. Workshop results will be published in Spring 2018.

6. Summary

Table 10 compares the 2015 and 2016 observed interactions in the two fisheries. The observed interactions and interaction rate for the shallow-set and deep-set longline fisheries increased from 2015 to 2016. In 2015, the shallow-set longline fishery interacted with 81 seabirds (43 Laysan albatrosses and 38 black-footed albatrosses). In 2016, the shallow-set longline fishery interacted with 65 seabirds (25 Laysan albatrosses and 40 black-footed albatrosses). In 2015, observers in the deep-set longline fishery documented interactions with 132 seabirds (25 Laysan albatross, 101 black-footed albatrosses, four sooty shearwaters, one unidentified shearwater, and one red-footed booby). In 2016, observers in the deep-set longline fishery documented interactions with 144 seabirds (33 Laysan albatrosses, 104 black-footed albatrosses, four sooty shearwaters, two red-footed boobies, and one unidentified albatross) (see Table 6).

Table 10. Comparison of observed interactions in Hawaii longline fisheries, 2015 and 2016.

Observed Interactions	2015	2016	% Change
Seabirds observed in deep-set fishery	132	144	9%
Seabirds observed in shallow-set fishery	81	65	-20%
Deep-set interaction rate (birds per 1,000 hooks observed)	0.014	0.015	7%
Shallow-set interaction rate (birds per 1,000 hooks observed)	0.063	0.078	24%

Note: There was 20.6% and 20.13% observer coverage in the deep-set longline fishery in 2015 and 2016, respectively, and 100% coverage in the shallow-set longline fishery.

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Black-footed albatross

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