

2015 ANNUAL REPORT

Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries



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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, Lisianski Island.



Nesting albatross, Midway Island.

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1. Introduction

Among many management objectives, 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 to reduce interactions and the severity of interactions that do occur. 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 Region (FEP) and implementing regulations. The deep-set fishery primarily targets bigeye tuna at depths to 400 m, and operates over broad areas mainly to the north-northeast and southwest of the main Hawaiian Islands (Fig. 1). The shallow-set fishery targets swordfish at depths to 100 m, and typically operates over a large area north and east of the Hawaiian Islands (Fig. 2). The FEP contains a detailed description of the Hawaii longline fisheries (WPFMC 2009).

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 active vessels in the shallow-set fishery, and 122 to 139 active vessels in the deep-set fishery. Nearly all vessels in the shallow-set fishery also participate in the deep-set fishery during the year.

Seabirds that feed around the Hawaiian Islands in areas where the longline fisheries operate include Laysan albatross, black-footed albatross, shearwaters, fulmars, boobies, and the endangered short-tailed albatross. 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 so that seabird populations remain healthy, and fishermen can pursue their livelihood. 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. By 2004, NMFS had fully implemented safe seabird handling and mitigation measures which have significantly reduced interactions. In 2015, there were 81 interactions in the shallow-set fishery. For the deep-set fishery, we expanded the observed interactions using the observer coverage rate and estimated 687 interactions in 2015 (see Tables 5 and 6). Credit for this successful reduction in interactions over the years is mostly due to the fishermen, who understand and routinely implement the seabird mitigation requirements. The requirements include training in seabird identification, seabird deterrent fishing gear and techniques, and special handling and release of incidentally-caught seabirds.



Laysan albatross attempting to feed on longline bait.

¹This 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).

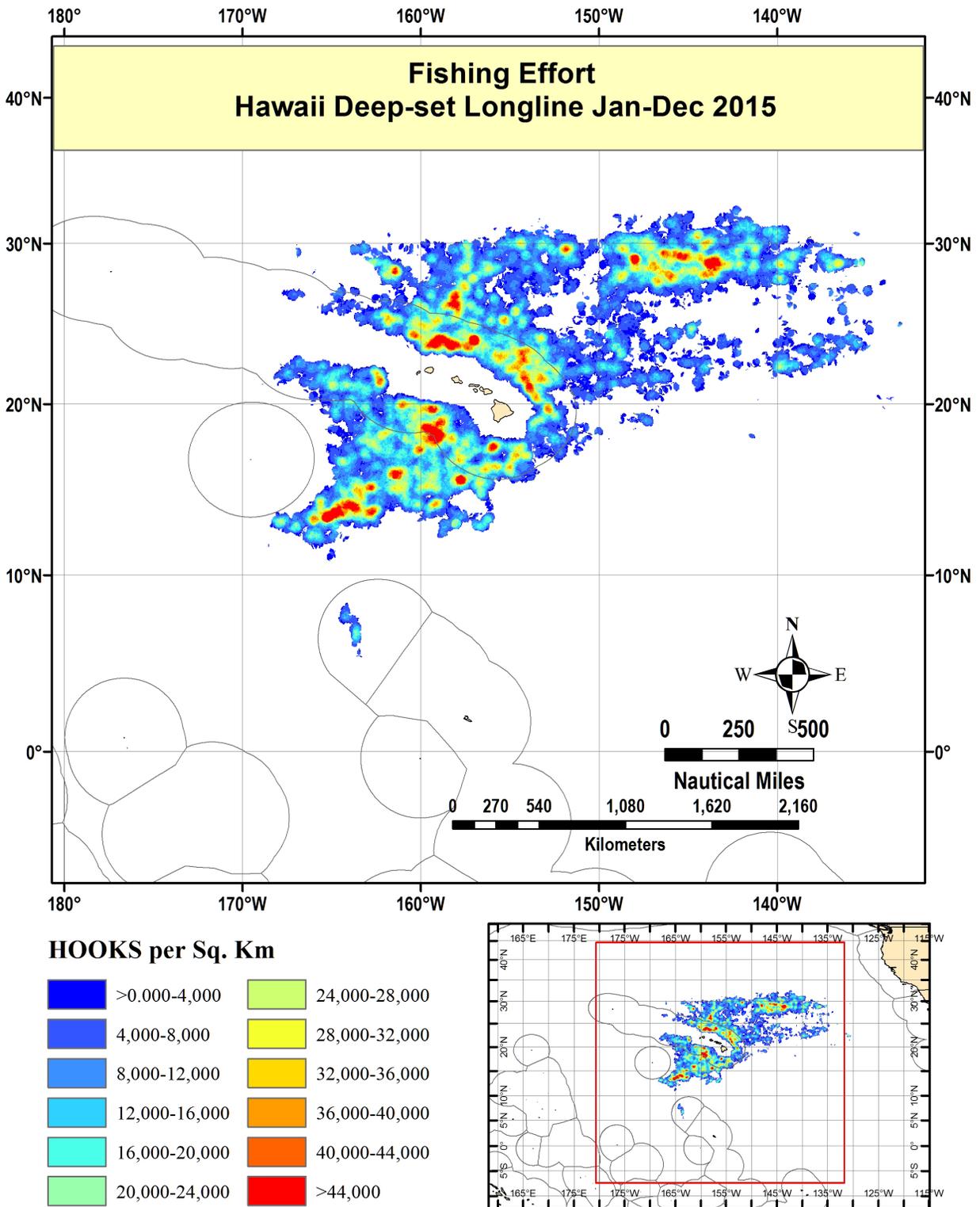


Figure 1. Spatial distribution of fishing effort by the Hawaii deep-set longline fishery, 2015.

Source: NMFS unpublished logbook data, received 12/9/2016.

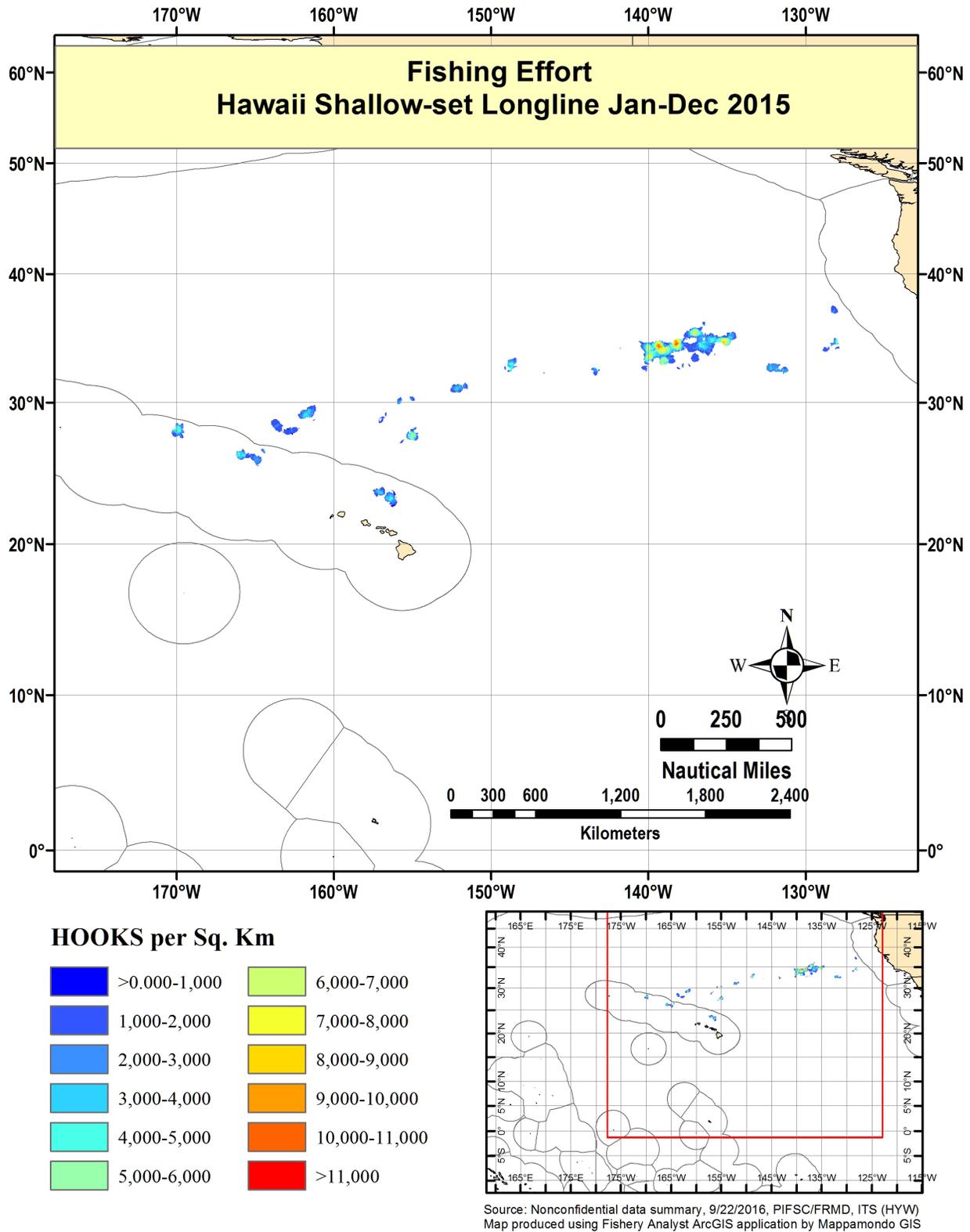


Figure 2. Spatial distribution of fishing effort by the Hawaii shallow-set longline fishery, 2015.

Source: NMFS unpublished logbook data, received 12/9/2016.

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. 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 *Biological Opinion of the U.S. Fish and Wildlife Service for the operation of the Hawaii-based pelagic longline fisheries, shallow-set and deep-set, Hawaii* (USFWS 2012) also describe these measures.

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 them. With required branch line weighting (see below), 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, such as albatrosses, 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 the ability of seabirds to land 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 2015, with some vessels operating in both deep- and shallow-set fisheries. In 2015, the majority of vessels in the deep-set fishery and all of the vessels in the shallow-set fishery chose to stern-set.

Table 1. Number of observed Hawaii longline vessels that side- and stern-set in 2015.

Fishery	Deck setting position	Vessels
Deep-set	Stern-setting	97
Deep-set	Side-setting	32
Shallow-set	Stern-setting	23
Shallow-set	Side-setting	0

Source: NMFS unpublished observer data, 10/4/2016.

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 become 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.



Blue-dyed bait.

Thawed and Blue-dyed Bait

Dyeing bait to a specific blue color is a means to reduce 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 fishery to reduce sea turtle interactions. While fishermen may still use squid in the deep-set fishery, it costs more than some fish bait and is, thus, less preferred.

Strategic Offal Discards

Fishermen developed the technique of strategically discarding offal to distract albatrosses 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 albatrosses 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 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 requirement to night-set 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 management measures.

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

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 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 requirements to reduce or deter 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 and annually 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 2015, NMFS PIRO provided protected species workshop training for 264 Hawaii-based longline vessel owners and operators, and other interested individuals. Another 56 vessel owners, operators, and crewmembers completed protected species workshop training in American Samoa with assistance from the PIRO Observer Program.



Protected Species Workshop, NOAA Honolulu Service Center at Pier 38.

1.4 Fishing Effort and Observer Coverage

From 2014 to 2015, fishing effort in the deep-set fishery increased, and effort in the shallow-set fishery decreased (Table 3). In 2015, NMFS placed observers on 20.6% of deep-set fishing trips and on 100% of shallow-set fishing trips. NMFS provides summary reports from mandatory logbook data reported by longline captains.

Table 3 summarizes effort data for 2015 by haul date. 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. Protected species interactions reported in the observer program quarterly, semiannual, and annual reports are typically based on vessel arrival date.

Table 3. Hawaii deep- and shallow-set fisheries effort and observer coverage, 2014 and 2015.

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%

2014					
Fishery	Number of vessels	Trips	Sets	Hooks	Observer coverage
Deep-set	139	1,350	17,702	45,517,150	20.8%
Shallow-set	20	81	1,334	1,466,866	100%

Source: NMFS unpublished observer data, 10/4/2016, and unpublished logbook data, 12/1/2016.

2. Interactions

2.1 Species

NMFS observers have recorded the following 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*). These species are not listed under the Endangered Species Act (ESA).

The Laysan albatross population estimate is 656,000 breeding pairs (ACAP 2016). The low coral islands of the Northwestern Hawaiian Islands (NWHI) have the world's largest colonies, and together support more than 99% of the global breeding population (ACAP 2012a). The estimated global breeding population of black-footed albatross is 69,900 pairs (ACAP 2016), with more than 95% breeding in the NWHI (ACAP 2012b). Northern fulmars are located throughout the North Atlantic and North Pacific. The estimated worldwide population is 15 to 30 million individuals (Birdlife 2016a). The red-footed booby winters on tropical islands in most oceans, and its total population estimate is more than 1 million birds (Birdlife 2016b). The brown booby are located throughout the pan-tropical

oceans, with a population estimate of more than 200,000 adults (Birdlife 2016c). The estimated total world population of sooty shearwaters is more than 20 million adults. These birds nest in Australia, New Zealand, and southern South America (Birdlife 2016d). Both Hawaii longline fisheries have a low level of interactions with these species; and based on the population estimates, the fisheries likely have very little effect on these populations.

Some seabirds, especially shearwaters, are difficult to identify. Table 4 provides a summary of seabird specimens that NMFS observers collected for identification and biological study after capture in the Hawaii longline fisheries in 2015. 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 4. Summary of collected seabirds from the Hawaii longline fisheries, 2015.

Species	Number retained
Black-footed albatross	77
Laysan albatross	24
Sooty shearwater	4

Note: Not all dead seabirds are collected as specimens. Source: NMFS unpublished observer data, 10/4/2016.



Black-footed albatross, Pearl and Hermes Reef.

2.2 Location of Interactions

Figs. 3 and 4 show the spatial distribution of observed seabird interactions in deep- and shallow-set fisheries, respectively, based on observations of seabirds in 2015. Most of the interactions occur north of 25° N, where seabirds are typically more abundant, and where fishing effort is more concentrated.

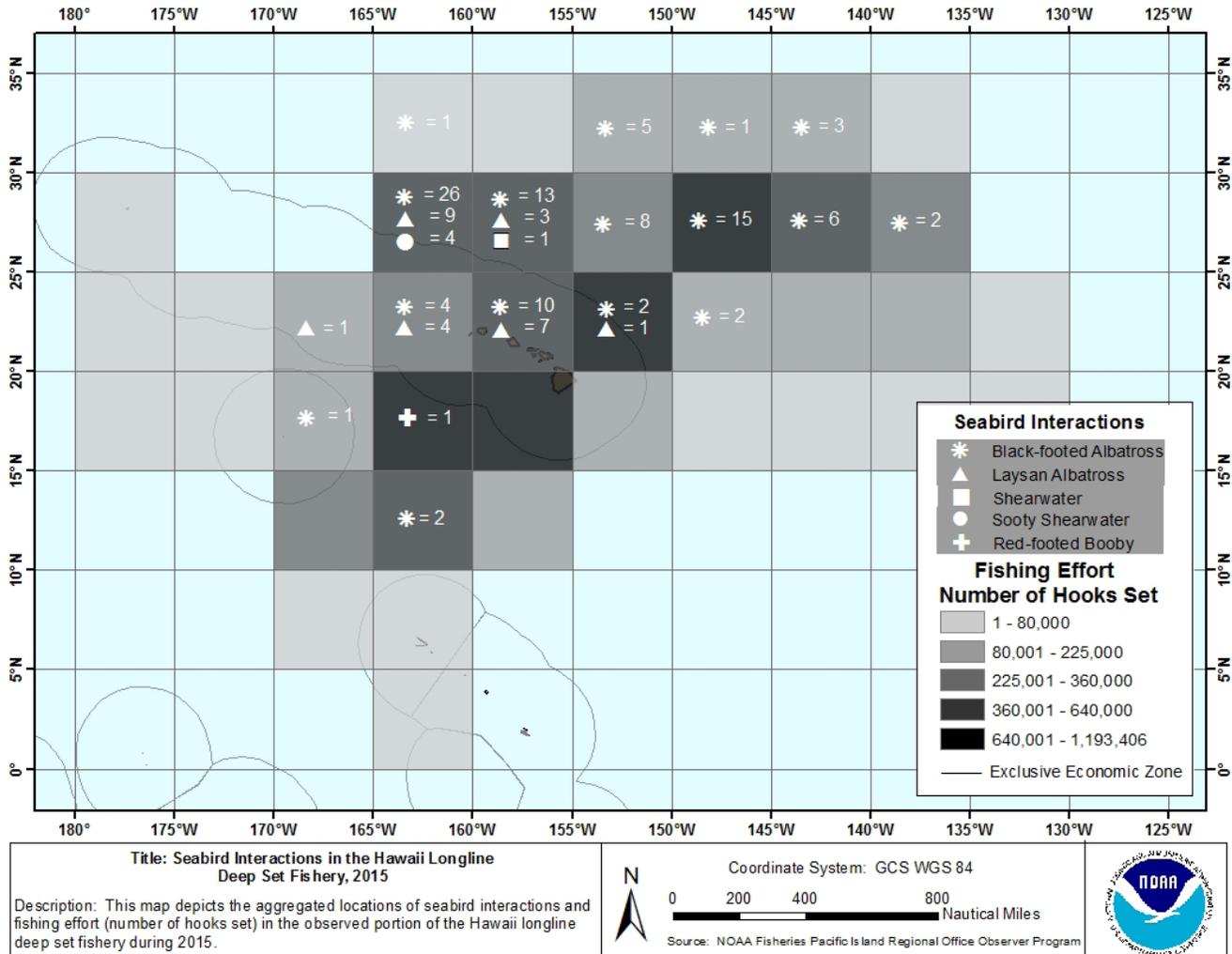


Figure 3. Locations of seabird interactions observed in Hawaii deep-set longline fishery, 2015.

Note: NMFS deployed observers on 20.6% of deep-set trips in 2015. Source: NMFS unpublished observer data, 11/23/2016.

2.3 Number of Interactions

Table 5 summarizes the number of observed seabird interactions, including the condition of seabirds upon release, and fishing effort in both longline fisheries from 2004 to 2015. During this period, NMFS deployed observers on 100% of shallow-set fishing trips; therefore, the number of interactions shown in Table 5 represents the fishery-wide totals. NMFS deployed observers on 20.6% of deep-set trips in 2015, so we expanded the observed interactions using the observer coverage rate to estimate total interactions (Table 6).

Table 5. Numbers of observed seabird catch levels, fishing effort, and nominal interaction rates in the Hawaii longline fisheries, 2004-2015.

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*	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**	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***	132	19	113	9,393,234	0.014
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****	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	0		81	65	16	1,286,628	0.063

Note: NMFS unpublished observer data (10/4/2016) 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 2016a and NMFS 2016b). Interaction rates are calculated and rounded to the nearest thousandths (third decimal) place. Footnote: *brown booby; **red-footed booby and unidentified seabird; ***red-footed booby and unidentified shearwater; ****Northern fulmar

Almost all interactions in the deep-set fishery occur when fishermen set gear during the day while seabirds are actively feeding. Seabirds may be hooked or entangled, and then drown while the gear sinks. Because most seabirds are inactive at night, very few interactions occur when fishermen typically haul deep-set gear. In 2015 in the deep-set fishery, observers documented interactions with 25 Laysan albatrosses, 101 black-footed albatrosses, four sooty shearwaters, one unidentified shearwater, and one red-footed booby (Table 5). Nearly all of the seabirds observed to interact with the deep-set fishery were dead (86%). Table 6 contains the total estimated number of interactions with Laysan albatross, black-footed albatross, and shearwaters based on observer records for the deep-set fishery in 2015.

Table 6. Estimated number of total seabird interactions in the Hawaii deep-set longline fishery, 2015.

Species	Total annual estimate	95% confidence interval
Black-footed albatross	541	387-682
Laysan albatross	119	53-177
Shearwater	21	6-49
Red-footed booby	6	1-21

Note: Table lists point estimates of the total number of incidental interactions by species, and corresponding 95% confidence intervals, in the Hawaii deep-set longline fishery from observed interactions during 2015. The estimate for shearwaters represents an estimate for the number of incidental interactions by the group of species considered shearwaters. Source: McCracken 2016.

The shallow-set fishery typically sets at night and hauls the gear during the day; therefore, most of the interactions occur when fishermen retrieve the gear and birds are actively feeding. In 2015, the shallow-set fishery interacted with 43 Laysan albatrosses and 38 black-footed albatrosses (Table 5). Fishermen released approximately 80% of seabirds alive.

Seabirds can be hooked, entangled, or both. Table 7 provides a summary of capture and release conditions in 2015. Regulations require fishermen to remove as much gear as safely possible from any seabirds captured before they are released.



Hooked Laysan albatross.

Table 7. Capture and release details by species for seabird interactions in the Hawaii longline fisheries, 2015.

Number for each species/group	MANNER OF INTERACTION				GEAR ATTACHED UPON RELEASE ¹			
	Hooked only	Entangled only	Both hooked and entangled	Not known or not recorded	Line only	Hook only	Hook and line	No gear attached ²
Laysan albatross	52	9	7	0	0	0	0	40
Black-footed albatross	110	13	14	2	0	0	0	43
Sooty Shearwater	4	0	0	0	0	0	0	1

¹ Released seabirds are those that were released alive.

² This column does not include seabirds with unknown or unrecorded manner of capture.

Source: NMFS unpublished observer data, 10/4/2016.

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 8 provides a summary of observed seabirds with leg bands from Hawaii longline fisheries interactions in 2015. Most of the recovered bands were from albatross banded on French Frigate Shoal in the NWHI and incidentally caught in the first half of the year.

Table 8. Seabirds observed with bands from interactions with the shallow-set and deep-set Hawaii longline fisheries, 2015.

Species	Disposition	Date banded	Band(s) recovery date	Location banded	Age at banding (yr)	Age at recovery (yr)
Black-footed Albatross	Dead	6/9/2008	1/1/2015	French Frigate Shoals (Tern Island)	<1	7
Black-footed Albatross	Dead	5/26/2007	1/17/2015	Lehua Island, HI	<1	8
Laysan Albatross	Dead	5/30/2007	2/14/2015	Kauai (Kilauea Point)	>1	19
Laysan Albatross	Dead	4/11/2007	2/21/2015	Kauai (Kilauea Point)	>1	>/=9
Black-footed Albatross	Dead	1/4/2007	2/23/2015	Laysan Island	>1	>/=9
Laysan Albatross	Dead	5/27/1997	2/18/2015	French Frigate Shoals (Tern Island)	<1	18
Laysan Albatross	Dead	1/16/2008	2/28/2015	Kauai (Kilauea Point)	>1	>/=8
Black-footed Albatross	Dead	6/12/2004	3/25/2015	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Injured	6/21/2001	3/18/2015	French Frigate Shoals (Tern Island)	<1	14
Laysan Albatross	Dead	6/5/1989	4/1/2015	French Frigate Shoals (Tern Island)	<1	26
Black-footed Albatross	Dead	12/27/2007	4/5/2015	Laysan Island	>/=1	>/=8
Laysan Albatross	Injured	4/14/2005	4/13/2015	Kauai (Kilauea Point)	<1	10
Laysan Albatross	Injured	6/8/2005	4/20/2015	French Frigate Shoals (Tern Island)	<1	10
Laysan Albatross	Injured	5/30/1991	4/30/2015	French Frigate Shoals (Tern Island)	<1	24
Black-footed Albatross	Injured	6/5/1998	5/4/2015	French Frigate Shoals (Tern Island)	<1	17
Black-footed Albatross	Injured	6/1/1995	5/4/2015	French Frigate Shoals (Tern Island)	<1	20
Black-footed Albatross	Injured	6/7/2015	5/6/2015	French Frigate Shoals (Tern Island)	<1	15
Black-footed Albatross	Injured	6/8/2001	5/9/2015	French Frigate Shoals (Tern Island)	<1	14
Laysan Albatross	Dead	6/22/2014	5/10/2015	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	12/9/2003	5/7/2015	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	6/7/1999	5/29/2015	French Frigate Shoals (Tern Island)	<1	16
Laysan Albatross	Dead	6/5/1996	6/2/2015	French Frigate Shoals (Tern Island)	<1	19
Black-footed Albatross	Dead	6/8/2001	6/6/2015	French Frigate Shoals (Tern Island)	<1	13
Black-footed Albatross	Dead	6/8/2001	6/6/2015	French Frigate Shoals (Tern Island)	<1	13
Black-footed Albatross	Dead	6/3/2005	6/6/2015	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Dead	Unknown	6/8/2015	Unknown	Unknown	Unknown
Black-footed Albatross	Injured	Unknown	6/8/2015	Unknown	Unknown	Unknown
Laysan Albatross	Dead	6/1/1995	6/14/2015	French Frigate Shoals (Tern Island)	<1	20
Black-footed Albatross	Dead	6/4/2003	6/24/2015	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	6/14/2004	5/18/2015	French Frigate Shoals (Tern Island)	<1	11
Black-footed Albatross	Dead	5/30/2002	7/15/2015	French Frigate Shoals (Tern Island)	<1	13

Source: USGS, USFWS, and NMFS unpublished observer data, 10/4/2016.

3. 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 have been no observed interactions (hooking or entanglement) between the fisheries and any ESA-listed seabirds. There were no sightings of short-tailed albatross on observed deep-set and shallow-set trips in 2015.

4. Management

In May 2015, under the Migratory Bird Treaty Act, the USFWS issued a Special Purpose Permit to NMFS for the shallow-set fishery. The permit authorizes the incidental take of a limited number of migratory birds in the shallow-set longline fishery until March 31, 2018, including 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>).

5. Research

Analysis of Seabird Interactions in the Hawaii Shallow-set Fishery

Since NMFS introduced seabird regulations in 2001, in the Hawaii shallow-set fishery the seabird catch rate has declined approximately 91%, primarily through mitigation measures required during longline gear setting (gear deployment). Since effective implementation of these measures, approximately 75% of the remaining seabird interactions occur during gear hauling (Gilman et al. 2014). As most shallow-set 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 catch rates from January to 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 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). Eric Gilman with the Safina Center is currently conducting commercial demonstrations of a bird curtain that could reduce haul interactions in the shallow-set fishery.

Analysis of Seabird Interactions in the Hawaii Deep-set Fishery

Since NMFS introduced seabird regulations in 2001, in the Hawaii deep-set fishery the seabird catch rate has declined approximately 74% (Gilman et al. 2016). Over the past decade, however, seabird catch levels have increased due to increasing trends in both effort and nominal seabird catch rates.

Decreasing ocean productivity in recent years may have contributed to the increasing trend in the nominal seabird catch rate. In a review of observer data from 2004 to 2014, Gilman et al. 2016 found the 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 catch reductions are through increased efficacy of seabird mitigation 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 WPFMC on investigating seabird interactions, in particular black-footed albatross, in the deep-set fishery. In Summer 2017, NMFS may also host a scholar under the Ernest F. Hollings Scholarship Program to study seabird interactions.

6. Summary

Table 9 compares the 2014 and 2015 observed interactions in the two fisheries. The observed interactions and interaction rate for the shallow-set and deep-set fisheries increased from 2014 to 2015.

In 2014, the shallow-set fishery interacted with 72 seabirds — 39 Laysan albatrosses, 32 black-footed albatrosses, and one sooty shearwater. In 2015, the shallow-set fishery interacted with 81 seabirds — 43 Laysan albatrosses and 38 black-footed albatrosses.

In 2014, observers in the deep-set fishery documented interactions with 51 seabirds — 12 Laysan albatrosses, 38 black-footed albatrosses, and one sooty shearwater. In 2015, observers documented interactions with 132 seabirds — 25 Laysan albatross, 101 black-footed albatrosses, four sooty shearwaters, one unidentified shearwater, and one red-footed booby (see Table 5).

Table 9. Comparison of observed interactions in Hawaii longline fisheries, 2014 and 2015.

Observed Interactions	2014	2015
Seabirds observed in deep-set fishery	51	132
Seabirds observed in shallow-set fishery	72	81
Deep-set interaction rate (birds per 1,000 hooks observed)	0.005	0.014
Shallow-set interaction rate (birds per 1,000 hooks observed)	0.048	0.063

Note: There was 20.8% and 20.6% observer coverage in the deep-set fishery in 2014 and 2015, respectively, and 100% coverage in the shallow-set fishery.

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References

- ACAP (Agreement on the Conservation of Albatrosses and Petrels). 2012a. Species assessments: Laysan Albatross (*Phoebastria immutabilis*). Downloaded from <http://www.acap.aq> on January 12, 2016.
- 2012b. Species assessments: Black-footed Albatross (*Phoebastria nigripes*). Downloaded from <http://www.acap.aq> on January 12, 2016.
- 2016. Report of the Population and Conservation Status Working Group. Ninth Meeting of the Advisory Committee. La Serena, Chile, May 9-13, 2016.
- BirdLife International. 2016a. Species factsheet: Northern Fulmar (*Fulmarus glacialis*). Downloaded from <http://www.birdlife.org> on December 2, 2016.
- 2016b. Species factsheet: Red-footed Booby (*Sula sula*). Downloaded from <http://www.birdlife.org> on December 2, 2016.
- 2016c. Species factsheet: Brown Booby (*Sula leucogaster*). Downloaded from <http://www.birdlife.org> on December 2, 2016.
- 2016d. Species factsheet: Sooty Shearwater (*Puffinus griseus*). Downloaded from <http://www.birdlife.org> on December 2, 2016.
- Boggs, C.H. 2003. Annual report on the Hawaii longline fishing experiments to reduce sea turtle bycatch under ESA Section 10 Permit 1303. U.S. National Marine Fisheries Service Honolulu Laboratory, Honolulu. 42 pp.
- Gilman, E., N. Brothers, and D. Kobayashi. 2005. Principles and approaches to abate seabird bycatch in longline fisheries. *Fish and Fisheries* 6(1): 35-49.
- Gilman, E., and N. Brothers. 2006. Technical assistance for Hawaii pelagic longline vessels to change deck design and fishing practices to side set. Hawaii Longline Association, U.S. NOAA Fisheries Pacific Islands Fisheries Science Center and Pacific Islands Regional Office, and Western Pacific Fishery Management Council: Honolulu, Hawaii.
- 2007a. Comparison of three seabird bycatch avoidance methods in Hawaii-based pelagic longline fisheries. *Fisheries Science* 73: 208-210.
- Gilman, E., T. Moth-Poulsen, and G. Bianchi. 2007b. Review of measures taken by inter-governmental organizations to address problematic sea turtle and seabird interactions in marine capture fisheries. *Fisheries Circular No. 1025*, ISSN 0429-0329. Food and Agriculture Organization of the United Nations, Rome.
- Gilman, E., M. Chaloupka, B. Wiedoff, and J. Willson. 2014. Migrating seabird bycatch during hauling by pelagic longline vessels. *PLOS ONE*: 9(1): e84499. Doi:10.1371/journal.pone.0084499.
- Gilman, E., M. Chaloupka, J. Peschon, S. Ellgen. 2016. Risk factors for seabird bycatch in a pelagic longline tuna fishery. *PLoS ONE* 11(5):e0155477. Doi:10.1371/journal.pone.0155477.
- McCracken, M. 2016. Estimation of incidental interactions with seabirds in the 2015 Hawaii permitted deep-set longline fishery. Pacific Islands Fisheries Science Center, National Marine Fisheries Service, Honolulu, HI. PIFSC Internal Report IR-17-002. Issued December 22, 2016. 1 pp.
- McNamara, B., L. Torre, and G. Kaaialii. 1999. Hawaii longline seabird mortality mitigation project. Western Pacific Fishery Management Council, Honolulu.
- NMFS. 2016a. Pacific Islands Regional Observer Program deep set annual status report. January 1, 2015- December 31, 2015. Pacific Islands Regional Office. National Marine Fisheries Service. Dated: January 29, 2015.
- 2016b. Pacific Islands Regional Observer Program shallow set annual status report. January 1, 2015- December 31, 2015. Pacific Islands Regional Office. National Marine Fisheries Service. Dated: March 3, 2015.
- USFWS (U.S. Fish and Wildlife Service). 2012. Biological Opinion of the U.S. Fish and Wildlife Service for the operation of Hawaii-based pelagic longline fisheries, shallow-set and deep-set, Hawaii, January 2012, Honolulu, HI. 2011-F-0436. 53 pp.
- WPFMC (Western Pacific Fishery Management Council). 2009, as amended. Fishery ecosystem plan for pelagic fisheries of the western Pacific region. WPFMC, Honolulu, Hawaii.



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