

2012 ANNUAL REPORT

Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries



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Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

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Red-footed boobies perched on boat rail

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1. Introduction

Monitoring of longline-seabird interactions around Hawaii and periodic reporting of these interactions are integral to determining the effectiveness of seabird mitigation efforts. The National Marine Fisheries Service (NMFS) collects information on seabird interactions through the Observer Program in the Pacific Islands Regional Office (PIRO), and the Sustainable Fisheries Division prepares this annual report¹.

1.1 Background

NMFS and the Western Pacific Fishery Management Council (WPFMC) manage the two Hawaii longline fisheries under the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FEP). Since 1994, the Hawaii pelagic 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 129 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. The deep-set fishery targets primarily bigeye tuna at up to 400 meters (m) deep, and operates over broad areas mainly to the north-northeast and southwest of the main Hawaiian Islands. The shallow-set fishery targets swordfish at depths up to 100 m, and typically operates over a large area north of the Hawaiian Islands. The Pelagics FEP contains a detailed description of the Hawaii longline fisheries (WPFMC 2009).

During deployment (set or setting) and retrieval (haul or hauling) of longline fishing gear, hooks and line may hook or entangle seabirds that attempt to take bait or catch. As a result, incidental interactions between seabirds and longline fishing operations can occur. Fishermen want to catch fish, not seabirds, and although a certain level of interaction is 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 can ensure that many seabirds survive their injuries. Seabirds are more likely to drown when the interaction occurs during gear deployment because the weight of the gear can pull the seabird underwater.

Seabirds feed around the Hawaiian Islands in areas where both longline fisheries operate. The Hawaii longline fisheries have, however, progressed greatly in the last decade to

minimize interactions with seabirds, particularly with the Laysan albatross (*Phoebastria immutabilis*) and the black-footed albatross (*P. nigripes*). In 2000, NMFS estimated 2,433 seabird interactions occurred in the Hawaii longline fisheries. Implementation of seabird safe handling and mitigation measures after 2004 significantly reduced annual interactions. Credit is mostly due to the fishermen, who comply with the seabird mitigation requirements, which include mandatory training in seabird identification, seabird deterrent fishing gear and techniques, and special handling and release of incidentally-caught seabirds.

1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries

Most regulations for the Hawaii longline fisheries are in Title 50 of the Code of Federal Regulations **Part 600**, and **Part 665** (50 CFR Parts 600 and 665). NMFS provides a **regulation summary** for the Hawaii longline fleet. Regulations specific to the mitigation of seabird interactions and safe handling techniques are found at 50 CFR 665.815. Seabird requirements depend on how fishermen deploy longline gear and where the vessel is fishing (Table 1). Descriptions of the following mitigation measures are in the 2012 Biological Opinion of the U.S. Fish and Wildlife Service (USFWS) for the operation of the Hawaii-based pelagic longline fisheries (USFWS 2012).

Side-Setting

Side-setting involves deploying the gear from the side of the vessel, compared to the conventional approach 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, 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 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 along the side of the vessel where baits are accessible.

Weighted Branch Lines

Weights placed close to the hook on branch lines quickly sink baited hooks before foraging seabirds can take the 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).

and possibly become hooked or entangled in longline gear. When required, Hawaii longline fishermen must use at least a 45 gram (g) weight within 1 m of the hook to sink their branch lines quickly, and fishermen commonly use weights from 45 to 80 g. Regardless of the requirements, nearly all fishermen in the deep- and shallow-set fisheries use weighted branch lines.

Thawed and Blue-dyed Bait

Dyeing bait to a specific blue color is a means to diminish visibility by reducing contrast with the sea surface. The bait is thawed 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 fusiform fish: mackerel (saba), sardines, and saury (sanma). Using squid for bait is prohibited in the shallow-set fishery to reduce sea turtle interactions. While fishermen may still use squid in the deep-set fishery, the cost is currently higher than some fish bait.

Strategic Offal Discards

Strategically discarding offal is a technique developed by fishermen to distract albatrosses from attempting to steal baits from hooks before the branch lines can be retrieved.

Fishermen throw swordfish heads and livers over the side of the vessel to distract albatrosses away from the baited hooks. NMFS observers in the mid-1990s noted that strategically discarding offal reduced incidental hookings and entanglements of albatrosses. When deep-setting north of 23° N. latitude or shallow-setting north of the Equator and when seabirds are around the vessel, fishermen are required to use strategic offal discards as a seabird bycatch mitigation measure when setting from the stern.

Night Setting

The use of night-setting as a seabird mitigation measure requires shallow-set fishermen, that stern-set, to start deploying their gear no earlier than one hour after local sunset and complete the set no later than the following sunrise, using only the minimum number of lights 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 an effective seabird mitigation measure, reducing seabird interactions from 73% (McNamara et al. 1999) to 98% (Boggs 2003).

Table 1. Seabird bycatch mitigation methods required for the Hawaii longline fleet.

1. How do you set your gear →	STERN-SETTING		SIDE-SETTING	
	Shallow-Set Anywhere	Deep-Set North of 23° N	Shallow-Set Anywhere	Deep-Set North of 23° N
2. Do you shallow-set or deep-set, and where are you →				
3. What you need to do ↓				
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			

Table 2 summarizes the number of Hawaii pelagic longline deep- and shallow-set vessels in 2012 that were observed to set from the stern and from the side. There is some overlap of vessels reported in each fishery because some vessels operate in both fisheries. The majority of vessels in both fisheries chose to stern-set in 2012.

Table 2. Number of observed Hawaii longline vessels that side- and stern-set in 2012.

Fishery	Deck setting position	Vessels
Deep-set	Stern-setting	92
Deep-set	Side-setting	36
Shallow-set	Stern-setting	16
Shallow-set	Side-setting	2

Source: NMFS PIRO Observer Program, unpublished.



Protected Species Workshop, Pier 38, Honolulu

1.3 Protected Species Workshops

In addition to 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 sea turtle, marine mammal, and seabird identification, safe handling and release techniques, and a review of regulatory requirements and compliance updates. In a classroom setting, fishermen learn from oral presentations, hands-on demonstrations, videos, and printed reference materials. NMFS also offers workshops online. A valid workshop certificate is necessary for owners to receive 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 2012, NMFS PIRO provided protected species workshop training for 234 Hawaii-based longline vessel owners and captains, one CNMI-based owner/operator, and 14 U.S. Coast Guard personnel. Another 98 vessel owners, captains,

and crewmembers completed protected species workshop training in American Samoa with assistance from the PIRO Observer Program.

1.4 Fishing Effort and Observer Coverage

Fishing effort in the deep-set fishery increased from 2011 to 2012 (Table 3). Effort in the shallow-set fishery decreased slightly from 2011 to 2012. In 2012, NMFS placed observers on 20.4% of deep-set fishing trips and 100% of shallow-set fishing trips. NMFS provides summary reports from mandatory logbook data reported by longline captains. Effort data for 2012 are summarized in this section by haul date. Please note that other summaries throughout this report (and elsewhere) may vary slightly depending upon the source date or whether databases have been revised or updated. For example, data obtained from seabird interactions on observed trips can be reported by date of trip departure or arrival, set date, or haul date in a given year. Likewise, a quarterly report might vary from an annual report if, for example, double counting occurred and was corrected after evaluating data collection methods.

Table 3. Hawaii deep- and shallow-set fisheries effort and observer coverage, 2011 and 2012.

2012

	Deep-set fishery	Shallow-set fishery
Number of vessels	128	18
Trip	1,361	84
Sets	18,113	1,353
Hooks	44,061,911	1,449,246
Observer coverage	20.4%	100%

2011

	Deep-set fishery	Shallow-set fishery
Number of vessels	129	20
Trip	1,306	83
Sets	17,155	1,474
Hooks	40,719,827	1,505,467
Observer coverage	21%	100%

Source: NMFS PIFSC logbook data, unpublished; NMFS observer program

Figs. 1 and 2 illustrate the spatial distribution of fishing effort in 2012 by the Hawaii deep- and shallow-set longline fisheries, respectively.

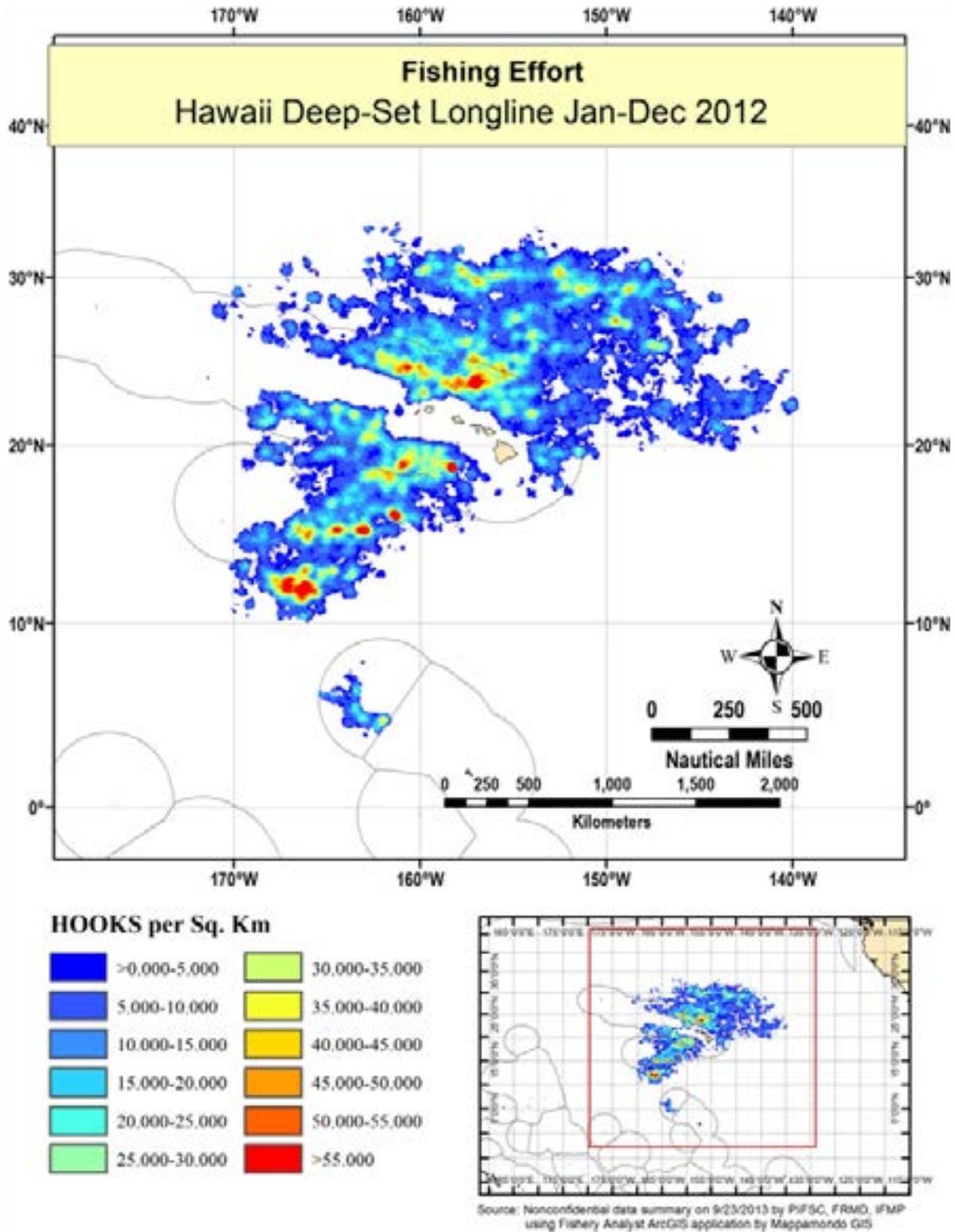


Figure 1. Spatial distribution of fishing effort by the Hawaii longline deep-set fishery, 2012.

Source: NMFS PIFSC logbook data, unpublished.

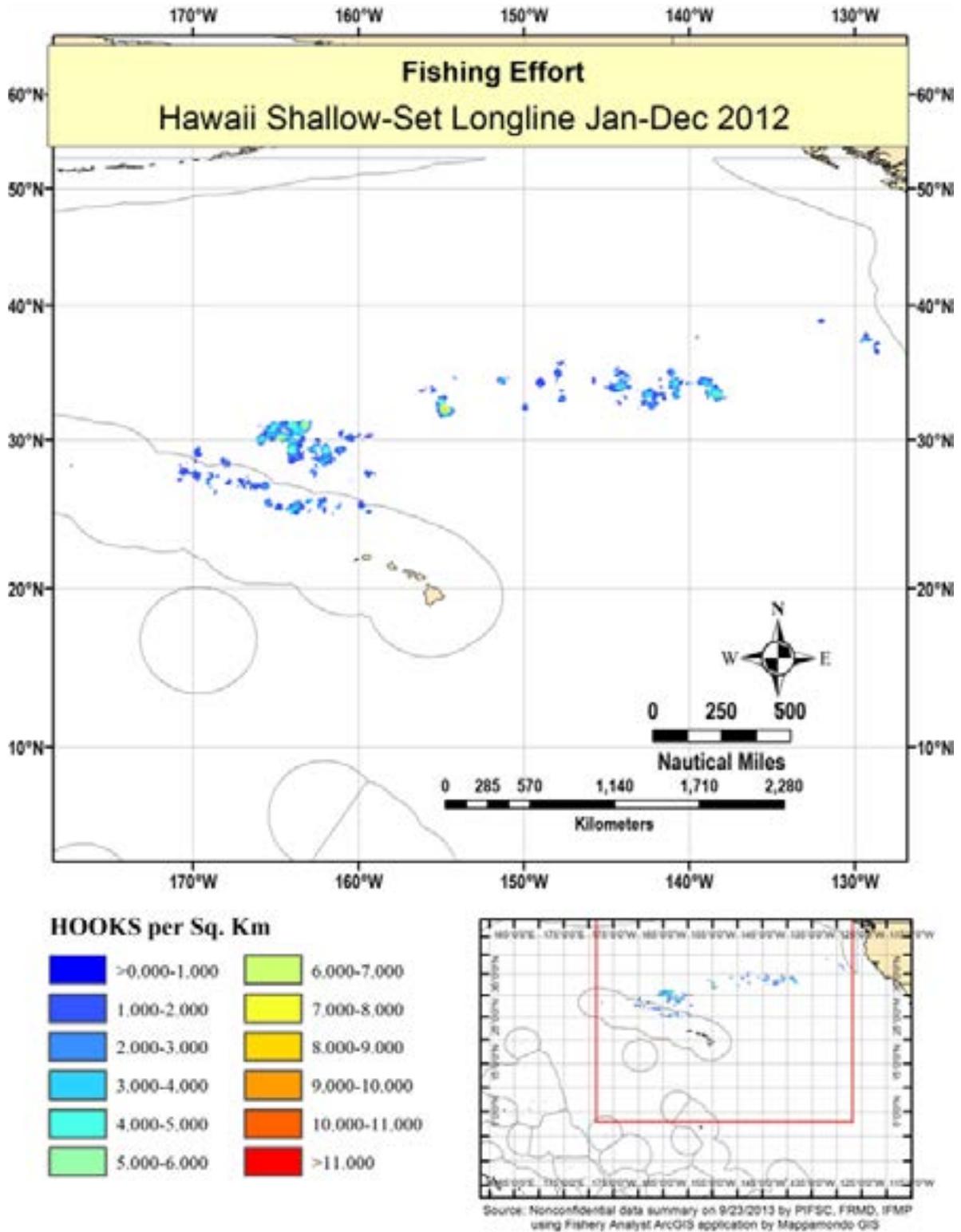


Figure 2. Spatial distribution of fishing effort by the Hawaii longline shallow-set fishery, 2012.

Source: NMFS PIFSC logbook data, unpublished.

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 and black-footed albatrosses, sooty shearwater (*Puffinus griseus*), unidentified shearwaters, brown booby (*Sula leucogaster*), red-footed booby (*S. sula*), and Northern fulmar (*Fulmarus glacialis*). These species are not protected under the Endangered Species Act (ESA).

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 2012.

Most of the interactions occur north of 25° N. latitude, where seabirds are typically more abundant.

The Laysan albatross population estimate is about 1.2 million adults. Midway and Laysan Islands in the Northwestern Hawaiian Islands (NWHI) have the world's largest colonies, and together support more than 90% of the global breeding population (ACAP 2010). The global breeding population of black-footed albatross estimate is 245,234, with 95% breeding in the NWHI (USFWS 2012). The estimated worldwide population of Northern fulmars is 10-12 million individuals, and the North American breeding population estimate is 2.1 million individuals. The red-footed booby winters on tropical islands in most

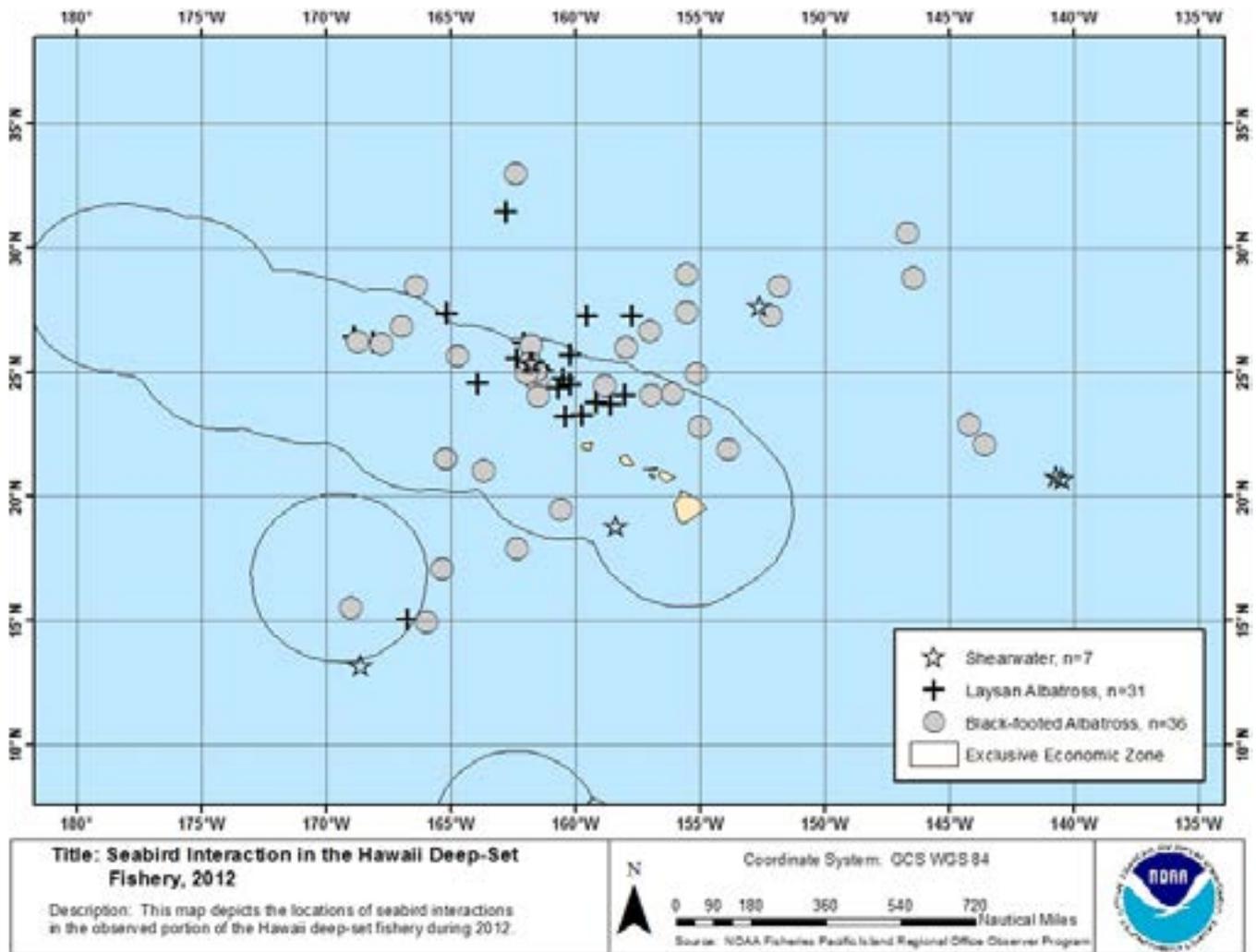


Figure 3. Locations of seabird interactions observed in Hawaii longline deep-set fishery, 2012.

Note: NMFS deployed observers on 20.4% of deep-set trips in 2012. Source: NMFS PIRO Observer Program, unpublished.

oceans, and its total population estimate is 1 million birds (Birdlife 2011a). The brown booby is found throughout the pan-tropical oceans with a population estimate of 200,000 adults (Birdlife 2011b). The total world population of sooty shearwaters estimate is more than 20 million mature individuals. These birds nest in Australia, New Zealand, and southern South America (Birdlife 2011c). Both Hawaii longline fisheries have a low level of interactions with these species and, based on the population estimates, the fisheries have very little affect on their populations.

Some seabirds, especially shearwaters, are difficult to identify. Table 4 provides a summary of seabird specimens collected for identification and biological study by observers after capture in the Hawaii longline fisheries in 2012. Most seabird specimens are frozen and shipped to the California

Department of Fish and Game, Office of Spill Prevention and Response, Marine Wildlife Veterinary Care and Research Center, in Santa Cruz, California.

Table 4. Summary of collected seabirds from the Hawaii longline fisheries, 2012.

Species	Number retained
Black-footed albatross	46
Laysan albatross	35
Sooty shearwater	5

Note: Not all dead seabirds are collected as specimens. Source: NMFS PIRO Observer Program, unpublished.

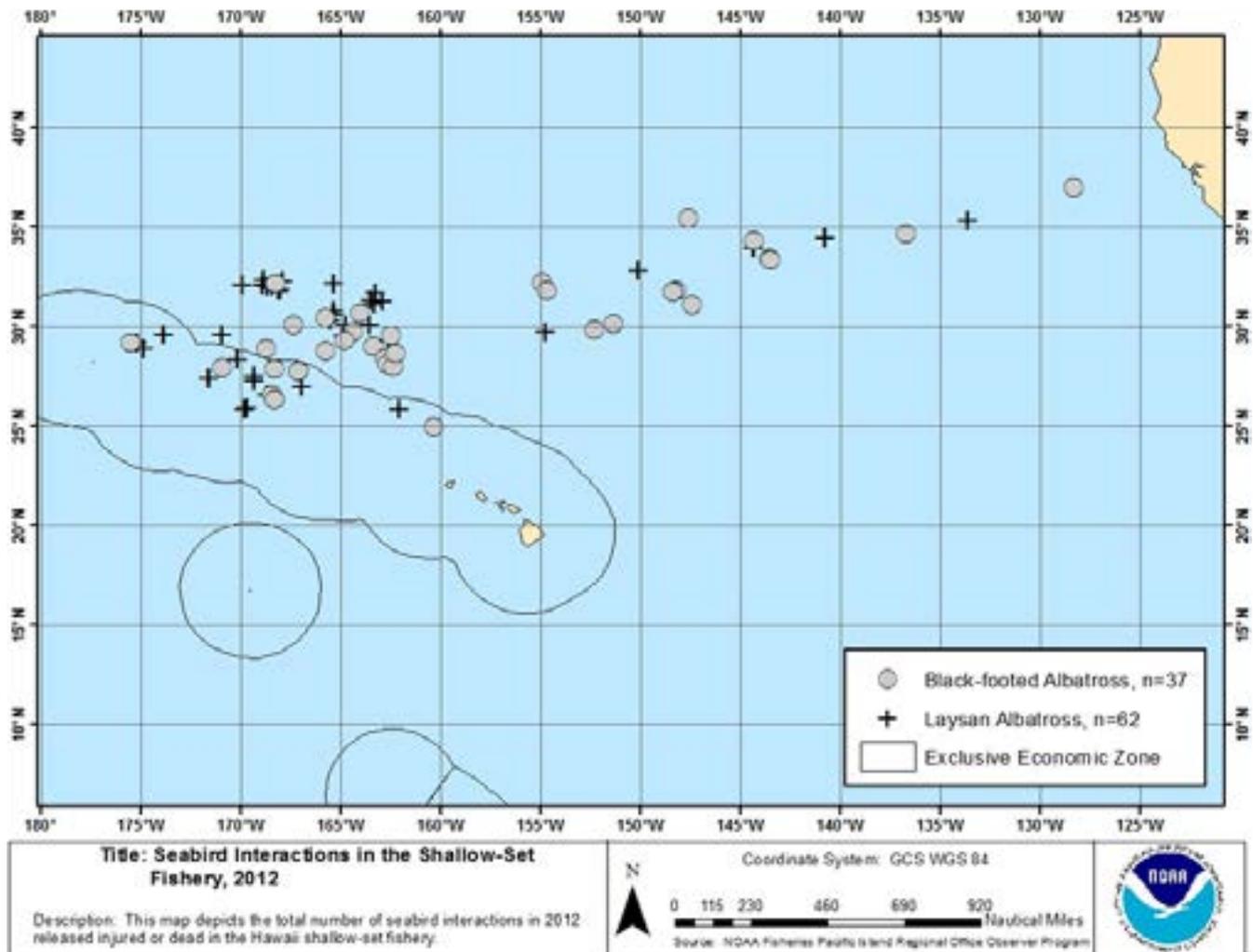


Figure 4. Locations of seabird interactions observed in Hawaii longline shallow-set fishery, 2012.

Note: NMFS deployed observers on every shallow-set trip in 2012. Source: NMFS PIRO Observer Program, unpublished.

2.2 Interaction Rates

Table 5 summarizes observed seabird interactions, including the condition of seabirds upon release, and fishing effort in both Hawaii-based longline fisheries from 2004-2012. During this period there was 100% observer coverage of the shallow-set fishery; therefore, the number of interactions shown in Table 5 represents the fishery-wide totals. Table 6 contains the total estimated number of interactions from observer records for the deep-set fishery in 2012.

Almost all interactions in the deep-set fishery occur when gear is being set during the day while seabirds are

actively feeding. Seabirds may be hooked or entangled and then drown while the gear sinks. Deep-set gear is typically hauled at night and the hooked or entangled seabirds caught while setting are retrieved dead. Because most seabirds are inactive at night, very few interactions occur during gear hauling in the deep-set fishery. In 2012, observers in the deep-set fishery recorded interactions with 31 Laysan albatrosses, 36 black-footed albatrosses, and seven sooty shearwaters. Nearly all of the seabirds observed to interact with the deep-set fishery were retrieved dead (93%).

Table 5. Numbers of observed seabird catches, nominal interaction rates, and fishing effort in the Hawaii longline fisheries, 2004-2012.

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									
2004	2	5		2	9		9	7,868,613	0.001
2005	6	11		1*	18		18	9,328,681	0.002
2006	1	17	5		23		23	7,437,498	0.003
2007	7	18			25		25	7,728,502	0.003
2008	14	30	14	2**	60	4	56	8,747,496	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	8,314,744	0.006
2012	31	36	7		74	5	67	8,845,848	0.008
Shallow-set									
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***	79	61	18	1,832,471	0.043
2011	49	19			68	53	15	1,505,467	0.045
2012	62	37			99	77	21	1,476,969	0.067

Note: Data are based on the date and time of the beginning of the haul. Interaction rates are rounded to the nearest thousandths (third decimal) place. Footnote: *brown booby; **red-footed booby and unidentified seabird; ***Northern fulmar. Source: NMFS PIRO Observer Program.

Table 6. Estimated number of total seabird interactions in the Hawaii deep-set longline fishery, 2012.

Species	Total annual estimate	95% confidence interval
Black-footed albatross	166.57	110 - 234
Laysan albatross	135.61	60 - 217
Shearwater	36.39	23 - 71

Note: Table lists extrapolated 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 2012. The estimate for shearwaters represents an estimate for the number of incidental interactions by the group of species considered shearwaters. Source: McCracken 2013.

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 2012, the shallow-set fishery interacted with 62 Laysan albatrosses and 37 black-footed albatrosses, and approximately 21% of seabirds were retrieved dead.

Seabirds can be hooked, entangled, or both. Table 7 provides a summary of capture and release conditions in 2012. Most birds are hooked in the beak or wing. Over half of the birds captured were released alive (mostly injured and alive from the shallow-set fishery). Regulations require fishermen to remove as much gear as safely possible from any seabirds captured before they are released, so seabirds rarely have gear attached to them when released.

Analysis of Seabird Interactions in the Hawaii Shallow-set Fishery

To better understand seabird bycatch during hauling operations, NMFS analyzed observer data collected from the Hawaii shallow-set longline fishery. Over the study period, May 2004 to October 2012, 75% (on average) of seabirds retrieved during the haul were alive. Of those interactions, 77% were the only interactions that occurred during a haul.

Fishermen normally unclip the branch line from the mainline and retrieve the line on board the vessel immediately (tended line). Alternatively, they may clip the branch line to the side or rear of the vessel to retrieve it later (untended or “lazy” line). As one of many possible scenarios during a haul, fishermen may stop retrieving lines temporarily to help bring a fish on board, so they may clip one or more branch lines to the vessel. These lines may be untended until the fish is retrieved. This can result in branch lines extending from the vessel if the vessel has momentum. When branch lines with bait rise to the surface, seabirds may attempt to take the bait and can be hooked or entangled. This can occur with tended and untended branch lines. NMFS found that 81% of seabird interactions during the haul were on tended lines and 15% were on temporarily untended branch lines. The remaining interactions were either on branch lines that were still attached to the mainline or entanglements in the mainline.

State and federal agencies and other groups conduct bird banding as a technique to study the movement, survival, and other characteristics of birds. Table 8 provides a summary of observed seabirds with leg bands attached from interactions in 2012 with both Hawaii longline fisheries.

Table 7. Capture and release details by species for seabird interactions in the Hawaii longline fisheries, 2012.

Number for each species/group	MANNER OF CAPTURE				GEAR ATTACHED UPON RELEASE ¹			
	Hooked only	Entangled only	Both hooked and entangled	Not known or not recorded	Line attached only	Hooked only	Hooked and line attached	No gear attached ²
Laysan albatross	63	16	11	3	0	0	1	92
Black-footed albatross	58	5	8	2	0	1	1	71
Sooty Shearwater	7	0	0	0	0	0	0	7

Note: ¹ Released seabirds are those that were released alive, discarded dead, or dead seabirds collected as specimens. ² This column includes seabirds with unknown or unrecorded manner of capture. Source: NMFS PIRO Observer Program, unpublished.

Table 8. Seabirds observed with bands from interactions with the Hawaii longline fisheries, 2012.

Species	Disposition	Date banded	Band(s) recovery date	Location banded	Age at banding (yr)	Age at recovery (yr)
Laysan Albatross	Injured	6/9/2005	1/22/2012	French Frigate Shoals (Tern Island)	<1	7
Black-footed Albatross	Dead	6/16/2004	2/11/2012	French Frigate Shoals (Tern Island)	<1	8
Laysan Albatross	Dead	6/7/2000	2/11/2012	French Frigate Shoals (Tern Island)	<1	12
Laysan Albatross	Dead	6/6/2003	2/8/2012	French Frigate Shoals (Tern Island)	<1	9
Laysan Albatross	Dead	6/13/2002	2/15/2012	French Frigate Shoals (Tern Island)	<1	10
Laysan Albatross	Dead	12/18/2000	2/20/2012	Kauai (Kilauea Point)	≥3	≥15
Black-footed Albatross	Dead	5/17/1993	3/2/2012	French Frigate Shoals (Tern Island)	<1	19
Black-footed Albatross	Injured	12/29/2006	3/6/2012	Laysan Island	<1	6
Laysan Albatross	Dead	12/17/2002	2/29/2012	French Frigate Shoals (Tern Island)	<1	10
Black-footed Albatross	Dead	1/18/2007	3/9/2012	Laysan Island	<1	6
Black-footed Albatross	Injured	1/5/2007	4/20/2012	Laysan Island	<1	6
Black-footed Albatross*	Injured	Unknown	3/30/2012	Unknown	Unknown	Unknown
Black-footed Albatross	Injured	6/5/1998	3/31/2012	French Frigate Shoals (Tern Island)	<1	14
Laysan Albatross	Injured	1/12/1984	4/1/2012	French Frigate Shoals (Tern Island)	<1	30
Laysan Albatross	Dead	6/18/2004	4/4/2012	French Frigate Shoals (Tern Island)	<1	8
Black-footed Albatross*	Injured	Unknown	4/9/2012	Unknown	Unknown	Unknown
Black-footed Albatross	Dead	6/7/2000	4/19/2012	French Frigate Shoals (Tern Island)	<1	12
Black-footed Albatross	Dead	12/15/1997	4/23/2012	French Frigate Shoals (Tern Island)	≥3	>18
Black-footed Albatross	Dead	1/12/2011	4/24/2012	French Frigate Shoals (Tern Island)	≥1	≥2
Black-footed Albatross	Dead	12/10/1997	4/27/2012	French Frigate Shoals (Tern Island)	≥2	≥7
Laysan Albatross	Injured	3/6/2008	4/24/2012	Kauai (Kilauea Point)	1	5
Black-footed Albatross	Dead	1/17/2007	5/7/2012	Laysan Island	<1	6
Black-footed Albatross	Dead	12/4/2005	7/3/2012	French Frigate Shoals (Tern Island)	≥1	≥8
Black-footed Albatross	Dead	5/19/2009	8/18/2012	Green Island, Honolulu County, HI	<1	3
Laysan Albatross	Dead	3/12/2007	12/18/2012	Kauai (Kilauea Point)	<1	≥5
Laysan Albatross	Dead	5/28/2004	12/27/2012	Kauai (Kilauea Point)	≥1	≥8

*Band numbers were not recorded. Source: USGS, USFWS, and NMFS, unpublished.

3. Sightings of ESA-Listed Seabirds

The distributions of three seabirds protected under the ESA overlap with the areas where the Hawaii longline fisheries operate: short-tailed albatross (*Phoebastria albatrus*), Newell’s shearwater (*Puffinus auricularis newelli*), and Hawaiian dark-rumped petrel (*Pterodroma sandwichensis*). The ESA lists the short-tailed albatross and the Hawaiian dark-rumped petrel as endangered, and the Newell’s shearwater as threatened. Fig. 5 shows the locations of short-tailed albatross sightings by observers and observed fishing effort by Hawaii longline vessels that shallow set in 2012. There were no sightings of short-tailed albatross on observed deep-set trips during 2012. Observers recorded no sightings of a Newell’s shearwater or Hawaiian dark-rumped petrel during 2012 in either fishery. To date, there have been no observed interactions

(hooking or entanglement) between either of the Hawaii longline fisheries and the short-tailed albatross, Newell’s shearwater, or Hawaiian dark-rumped petrel.



Juvenile short-tailed albatross

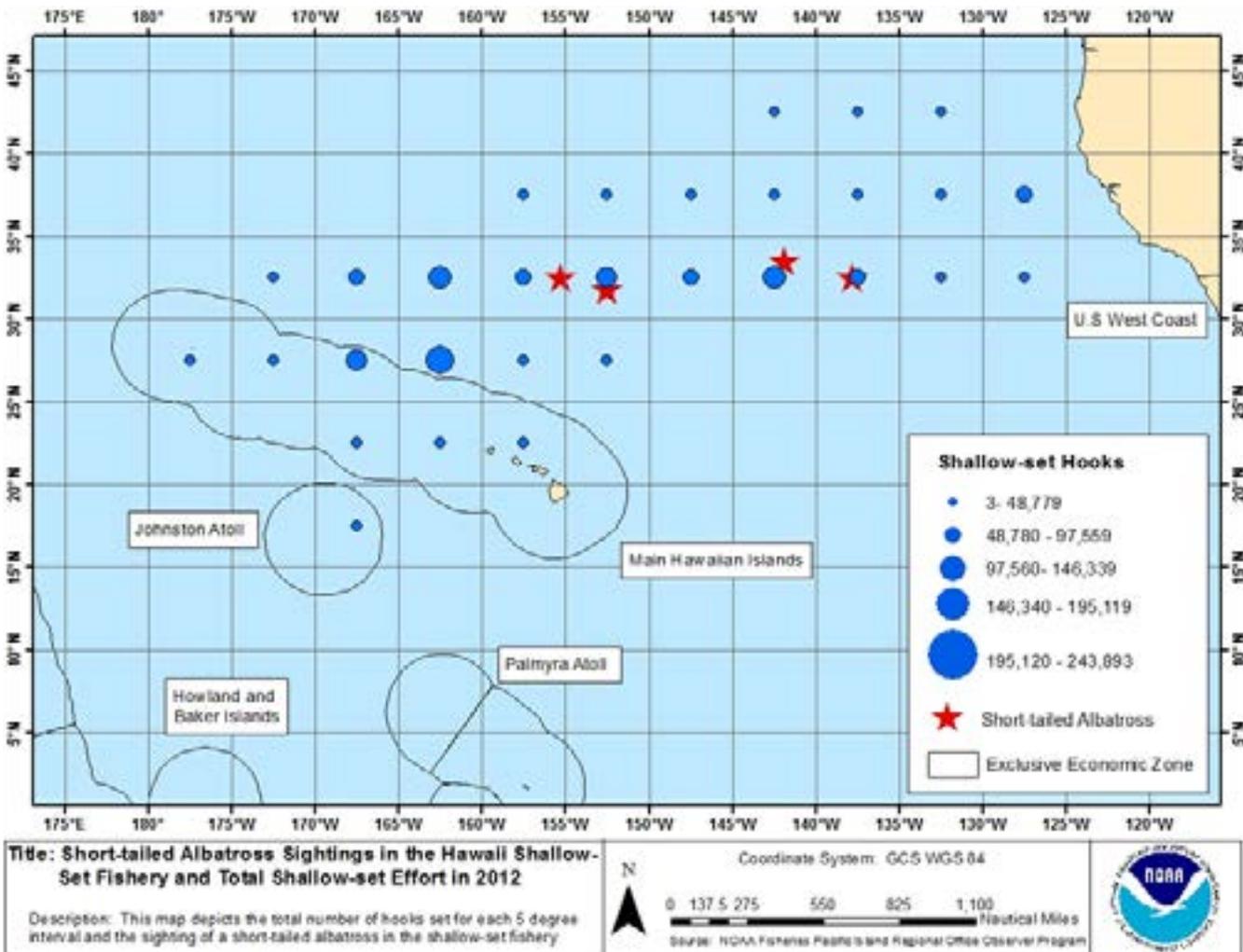


Figure 5. Short-tailed albatross sightings in Hawaii shallow-set fishery, 2012.

Source: NMFS PIRO Observer Program, unpublished.

4. Management

Migratory Birds

In August 2012, under the Migratory Bird Treaty Act, the USFWS issued a Special Purpose Permit to NMFS for the shallow-set fishery. The permit authorizes the take of a limited number of migratory birds in the fishery for three years, and includes 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. Summary

Both Hawaii longline fisheries interacted with a low level of seabirds from 2011 and 2012 (Table 9).

Table 9. Comparison of observed interactions in Hawaii longline fisheries, 2011 and 2012.

	2011	2012
Seabirds observed in deep-set	48	74
Seabirds observed in shallow-set	68	99
Deep-set interaction rate (birds per 1,000 hooks observed)	0.006	0.008
Shallow-set interaction rate (birds per 1,000 hooks observed)	0.045	0.067

Note: Since 2004, NMFS has targeted observer coverage in the deep-set fishery at 20% annually and has placed observers on every trip in the shallow-set fishery.

In 2011, the NMFS Observer Program documented 48 seabird interactions in the deep-set fishery (32 Laysan albatrosses, 13 black-footed albatrosses, and three sooty shearwaters). In 2012, observers documented fishery interactions with 74 seabirds (31 Laysan albatrosses, 36 black-footed albatrosses, and seven sooty shearwaters).

In 2011, the shallow-set fishery interacted with 68 seabirds (49 Laysan and 19 black-footed albatross) and with 99 seabirds in 2012 (62 Laysan albatross, 37 black-footed albatross).

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