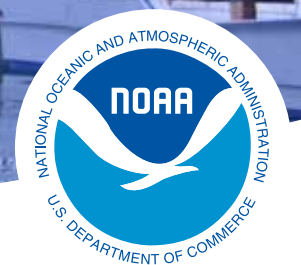


# 2011 ANNUAL REPORT



## Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries



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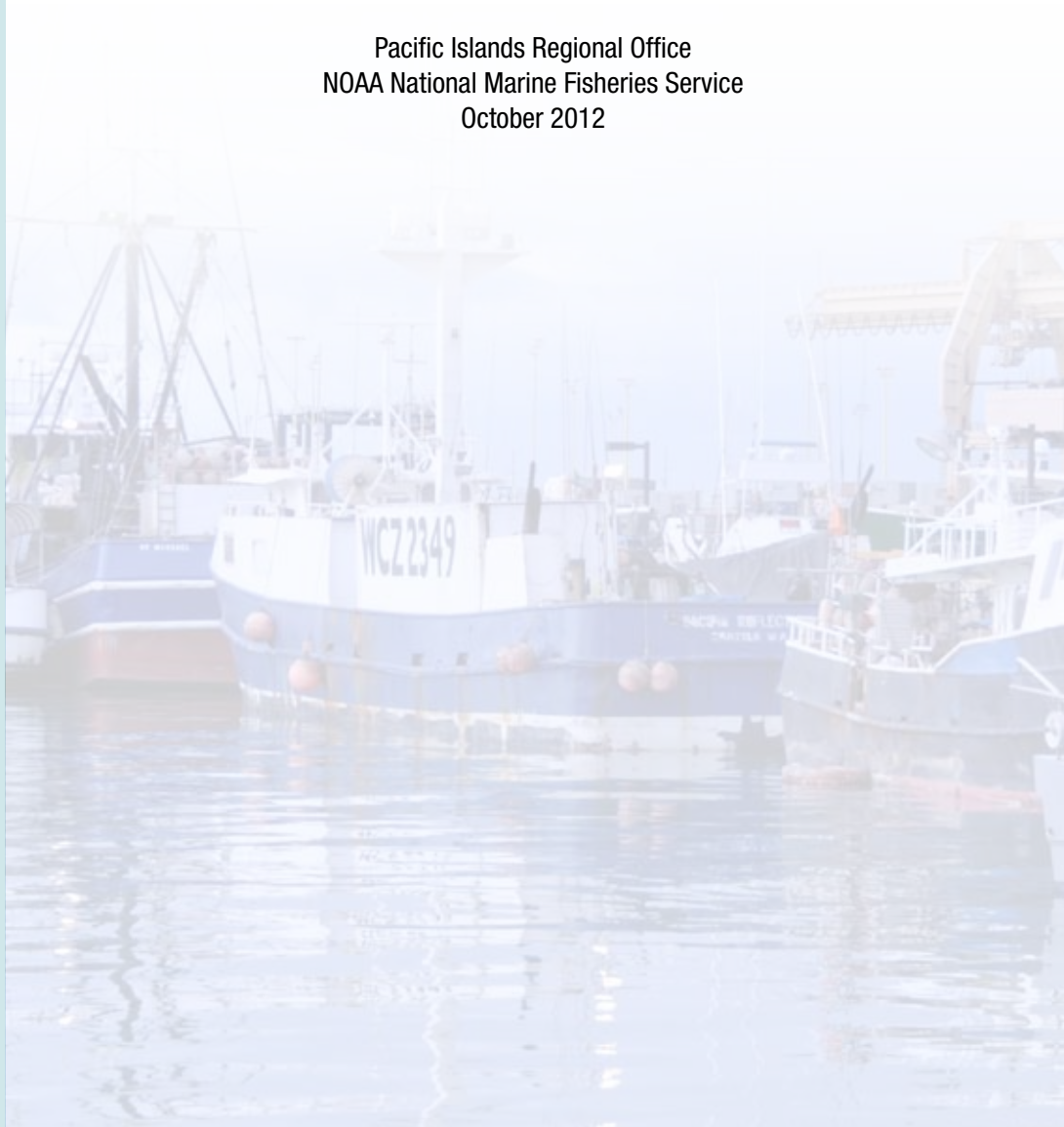
**Pacific Islands  
Regional Office**



*Red-footed Booby*

# 2011 ANNUAL REPORT Seabird Interactions and Mitigation Efforts in Hawaii Longline Fisheries

Pacific Islands Regional Office  
NOAA National Marine Fisheries Service  
October 2012



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*Black-footed Albatross*

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# 1. INTRODUCTION

This report summarizes the operations of the Hawaii deep- and shallow-set longline fisheries, the mitigation measures used to prevent and reduce seabird interactions (hooking or entanglement in longline gear), and the observed and estimated seabird interactions in 2011. The National Marine Fisheries Service (NMFS) Observer Program, with 20% observer coverage, observed 48 seabird interactions in the 2011 deep-set fishery. Extrapolating to the entire fleet, NMFS estimates that 260 seabird interactions occurred in the deep-set fishery. In the shallow-set fishery, with 100% observer coverage, observers recorded 68 seabird interactions (See Section 2.0).

Monitoring and reporting of seabird-longline interactions are integral to determining the effectiveness of seabird mitigation efforts. NMFS collects information on seabird interactions through the Observer Program and prepares this [annual report](#) for the U.S. Fish and Wildlife Service (USFWS), other government agencies, non-government organizations, the fishing industry, and the interested public<sup>1</sup>.

## 1.1 Background

Both Hawaii longline fisheries are managed under the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific Region (Pelagics FEP). The plan was developed by the Western Pacific Fishery Management Council (WPFMC 2009) and implemented by NMFS. Since 1994, the Hawaii longline fleet has been limited to 164 vessels. About 20 to 30 vessels are active in the shallow-set fishery and 120 to 130 vessels are active in the deep-set fishery during any given year. Vessels in the shallow-set fishery may also participate in the deep-set fishery. The deep-set fishery targets primarily bigeye tuna at depths to 400 meters and mainly operates to the northeast and southwest of the main Hawaiian Islands. The shallow-set fishery targets broadbill swordfish at depths to 100 meters using different fishing methods and gear than the deep-set fishery. Typically the shallow-set fishery operates over a large area of cooler water northeast to northwest of the main Hawaiian Islands. Seabird populations typically feed north of the main Hawaiian Islands (25° to 35° N. latitude) in areas where both longline fisheries operate. For a detailed description of the Hawaii longline fisheries, see the [Pelagics FEP](#) (WPFMC 2009).

During the deployment (set) and retrieval (haul) of longline gear, hooks and lines may entangle seabirds that attempt to take bait or feed on catch. Fishermen want to catch fish, not seabirds, and although a certain level of interactions is inevitable, fishermen take steps to avoid and minimize interactions so that seabird populations remain healthy, and fishermen can pursue their livelihood. During gear hauling, seabirds can be hooked or entangled and released alive. Most birds survive injuries when fishermen promptly apply required seabird handling and release techniques. Conversely, seabirds likely drown when the interaction occurs during gear deployment because the weight of the gear pulls the bird underwater.

The Hawaii longline fisheries have progressed greatly in the last decade to minimize interactions with seabirds, particularly with Laysan albatross (*Phoebastria immutabilis*) and black-footed albatross (*P. nigripes*). In 2000, NMFS estimated that 2,433 seabird interactions occurred in the Hawaii longline fisheries. Through mitigation and handling requirements implemented from 2004 to 2006, interactions declined to 328 seabirds in 2011. Credit is mostly due to the fishermen who comply with seabird mitigation requirements that include mandatory training in seabird identification, seabird deterrent gear and techniques, special handling, and release of incidentally-caught seabirds.

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<sup>1</sup> This annual report is provided as 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). NMFS is required to report on the effectiveness of seabird bycatch mitigation measures used in the Hawaii deep- and shallow-set longline fisheries, and to explore ways to further avoid and reduce interactions.

## 1.2 Seabird Mitigation Measures for the Hawaii Longline Fisheries

Fishing regulations for the Hawaii longline fisheries are in Title 50 of the Code of Federal Regulations [Part 600](#), and [Part 665](#). NMFS provides fishermen with a [regulation summary](#), which includes the current suite of seabird mitigation measures required for the Hawaii longline fisheries. Fishermen can choose one of two suites of seabird mitigation measures, depending on how longline gear is deployed and where the vessel is fishing on a shallow-set or deep-set trip (Table 1).

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

1. How do you set your gear → 2. Do you shallow-set or deep-set, and where are you → 3. What you need to do ↓	<b>STERN-SETTING</b>		<b>SIDE-SETTING</b>	
	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			

### *Side-Setting*

Side-setting involves deploying the gear from the side of the vessel, unlike the conventional approach of setting from the stern. 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 proper 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 a North Pacific albatross species cannot reach them (Gilman and Brothers, 2005, 2006, 2007a; Gilman et al. 2007b). Additionally, deploying a bird curtain inhibits the ability of seabirds to land along the side of the vessel where baits are accessible.

### *Weighted Branch Lines*

A weight attached to each hook on a branch line is intended to sink the baited hook, before foraging seabirds can take the bait and possibly be hooked or entangled. Hawaii longline vessels use a range of weight sizes from 45 to 80 grams attached within one meter of the hook to quickly sink branch lines to target depths. The current minimum weight requirement is 45 grams (when line-weighting is required).

### *Thawed and Blue-dyed Bait*

Dyeing bait to a specific blue color reduces the visibility of baits by reducing their contrast with the sea when viewed from above. The bait is thawed to sink quickly 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), sardine, and saury (sanma). NMFS prohibits the use of squid bait in the shallow-set fishery to reduce sea turtle interactions. Squid may still be used in the deep-set fishery, but fish are more common because the cost of squid is relatively high.

### *Strategic Offal Discards*

Strategically discarding offal is a technique developed by fishermen to prevent albatrosses from stealing 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 seemed to reduce incidental hookings and entanglements of albatrosses. When deep-setting north of 23° N. latitude or shallow-setting north of the Equator, and if seabirds are around the vessel, owners and operators of vessels that stern-set are required to use strategic offal discards to avoid interacting with seabirds.

### *Night-Setting*

The use of night-setting as a seabird mitigation measure requires shallow-set fishermen that stern-set to deploy their gear no earlier than one hour after local sunset and they 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. Night-setting, as a mitigation measure, is based on the premise that seabirds cannot see baited hooks in the dark and, thus, do not attack them. The effectiveness of this measure may potentially be affected by moon phase and cloud cover, vessel lighting, and the use of light sticks to illuminate baits making them more conspicuous. Night-setting has been identified as an effective seabird mitigation measure, reducing seabird interactions by 73% (McNamara et al. 1999) and 98% (Boggs 2003).

Table 2 summarizes the number of Hawaii pelagic longline deep-set and shallow-set vessels in 2011 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. Most of the vessels in both fisheries chose to stern-set in 2011.

**Table 2. Number of observed Hawaii longline vessels that side- and stern-set in 2011**

<b>Fishery and deck setting position</b>	<b>Vessels</b>
Deep-set stern setting	84
Deep-set side setting	35
Shallow-set stern setting	18
Shallow-set side setting	2

## **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. The workshop includes training in sea turtle, marine mammal, and seabird identification, safe handling and release techniques, and a review of regulatory requirements ([50 CFR 665.814](#)). Fishermen learn from oral presentations, hands-on demonstrations, videos, and printed reference materials.

Fishermen learn from oral presentations, hands-on demonstrations, videos, and printed reference materials. Online workshops are available for certain vessel owners and captains who have completed the classroom workshop.

A valid workshop certificate is necessary for owners to maintain and 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 Hawaii, 217 people participated in protected species workshops. Of those, 174 attended one of the 20 classroom workshops offered in 2011, and 43 fulfilled their annual training requirement via the online workshop. In American Samoa, 111 people participated in one of 19 workshops. NMFS conducted one workshop in the CNMI, with eight participants.

## 1.4 Fishing Effort and Observer Coverage

Fishing effort in the deep-set fishery increased from 2010 to 2011 (Table 3). Effort in the shallow-set decreased in 2011 compared to 2010; the fishery reached the sea turtle interaction limit in November and was closed (76 FR 72643). In 2011, NMFS placed observers on 20% (259 of 1,306) of deep-set fishing trips, observing (3,562 of 17,155) of deep sets, and observing 20% (8,314,744 of 40,719,827) of hooks set.

There was 100% observer coverage of shallow-set fishing effort. Fifteen shallow-set vessels also participated in the deep-set fishery. NMFS provides [summary reports](#) from mandatory logbook data reported by longline captains. Figures 1 and 2 provide the distribution of fishing effort in 2011 by the Hawaii deep-set and shallow-set longline fisheries, respectively.

**Table 3. Hawaii deep- and shallow-set fishery effort and observer coverage, 2011.**

2011 Fishery	Number of vessels	Trips	Sets	Hooks	Observer coverage
Deep-set	129	1,306	17,155	40,719,827	21%
Shallow-set	20	83	1,474	1,505,467	100%

2010 Fishery	Number of vessels	Trips	Sets	Hooks	Observer coverage
Deep-set	122	1,205	16,070	37,197,582	22%
Shallow-set	28	108	1,833	1,803,432	100%

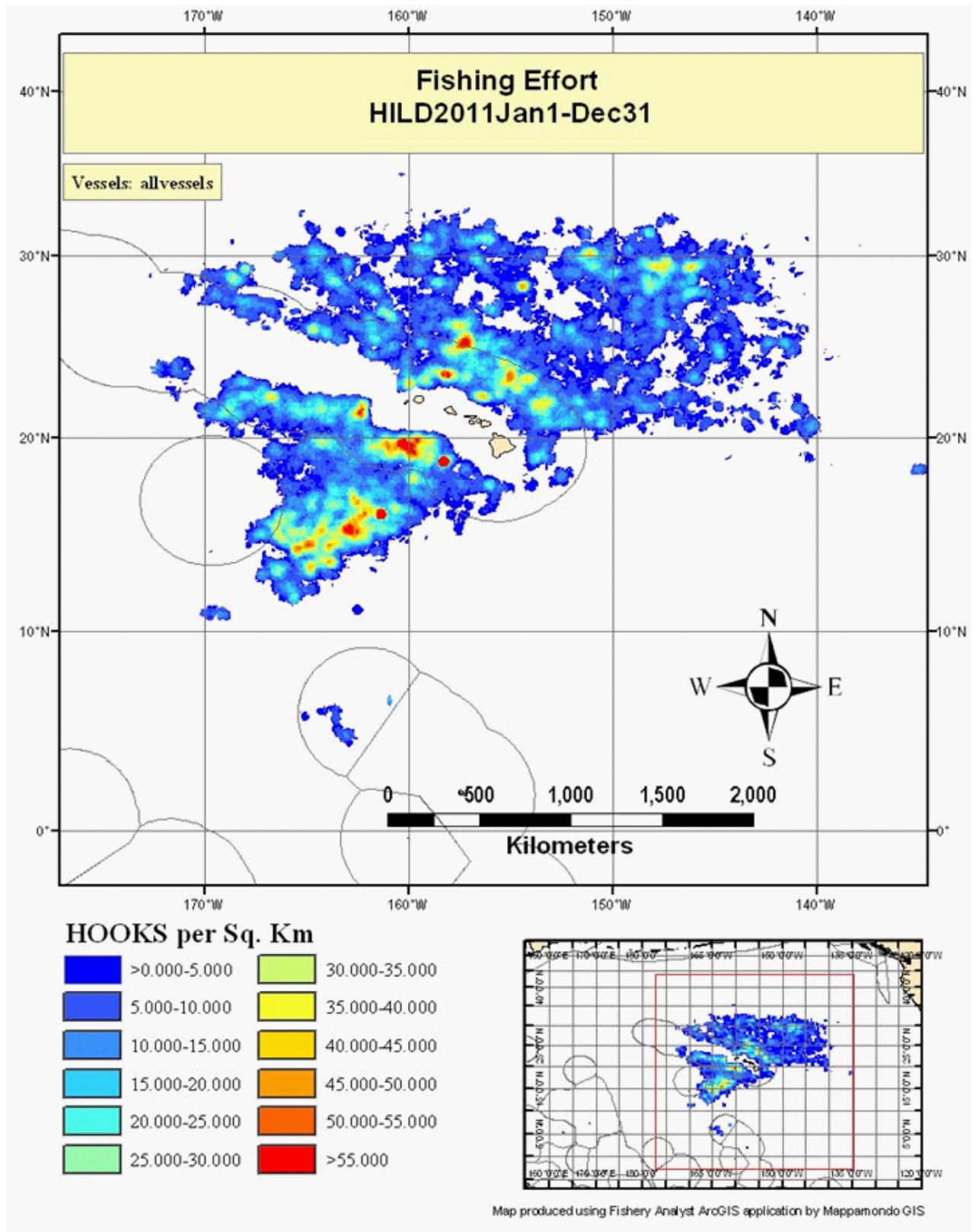
Source: NMFS PIFSC logbook data, unpublished; NMFS observer program

## 2. INTERACTIONS

### 2.1 Species

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 oceans and its total population estimate is one 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 only 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, and based on the population estimates, the fisheries have very little affect on their populations.

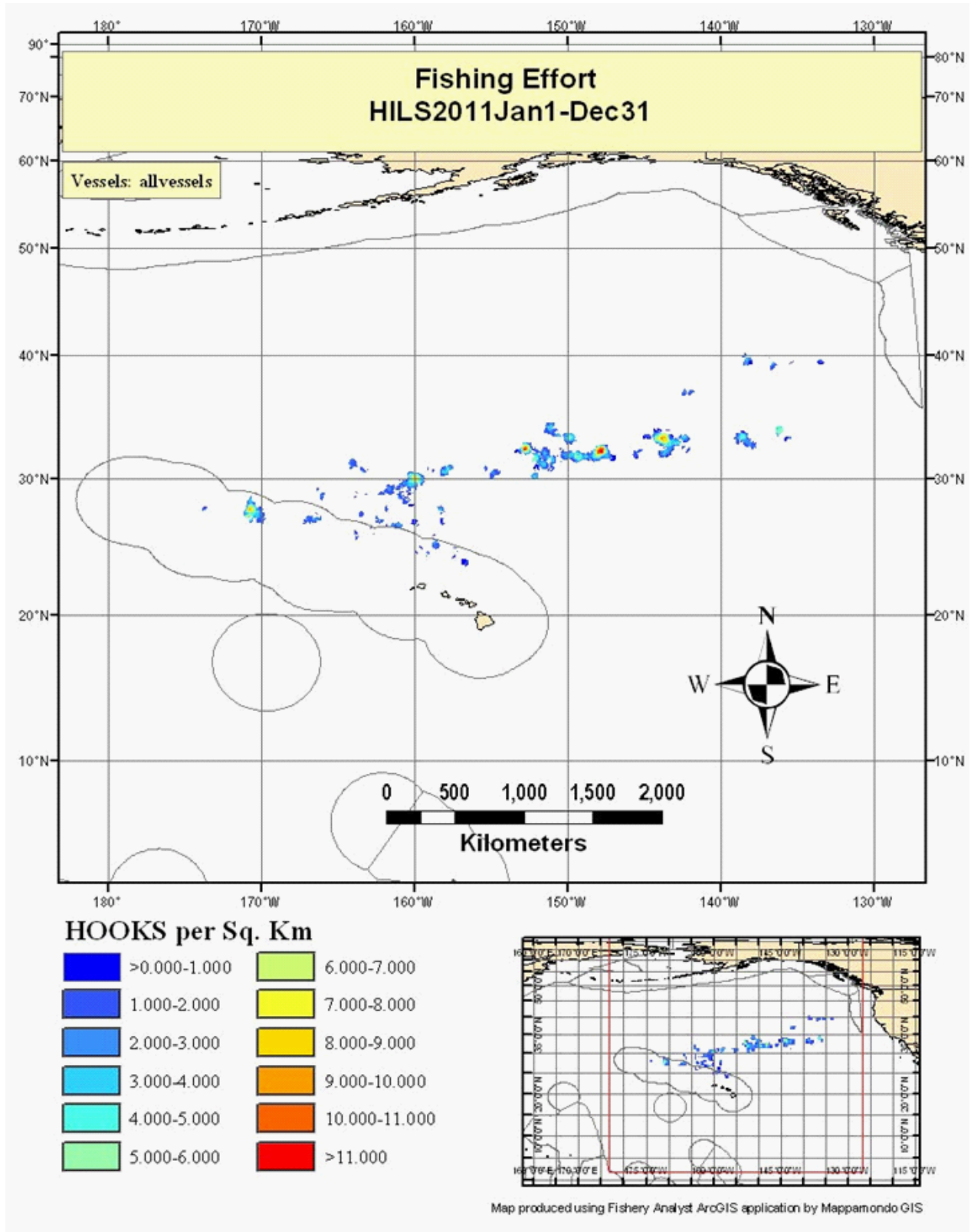
Three seabird species listed under the ESA have ranges that overlap with the areas where the Hawaii deep-set and shallow-set longline fisheries operate: short-tailed albatross (*Phoebastria albatrus*), Newell's shearwater (*Puffinus auricularis newelli*), and Hawaiian dark-rumped petrel (*Pterodroma sandwichensis*). There have been no observed interactions with these birds in either fishery since NMFS began deploying observers in 1994.



**Figure 1. Distribution of fishing effort by the Hawaii longline deep-set fishery, 2011**

*Source: NMFS PIFSC logbook data, unpublished.*





**Figure 2. Distribution of fishing effort by the Hawaii longline shallow-set fishery, 2011**

*Source: NMFS PIFSC logbook data, unpublished.*



*Short-tailed Albatross*

Figures 3 and 4 depict the distribution of observed seabird interactions in both longline fisheries, based on 2011 observations. Most of the interactions occur north of 25° N. latitude, where seabirds are typically more abundant.

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 2011. 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 seabirds collected from the Hawaii longline fisheries, 2011**

Species	No. Collected
Black-footed Albatross	15
Laysan Albatross	36
Sooty Shearwaters	3

*Source: NMFS observer program, unpublished. Note: Not all birds are collected.*

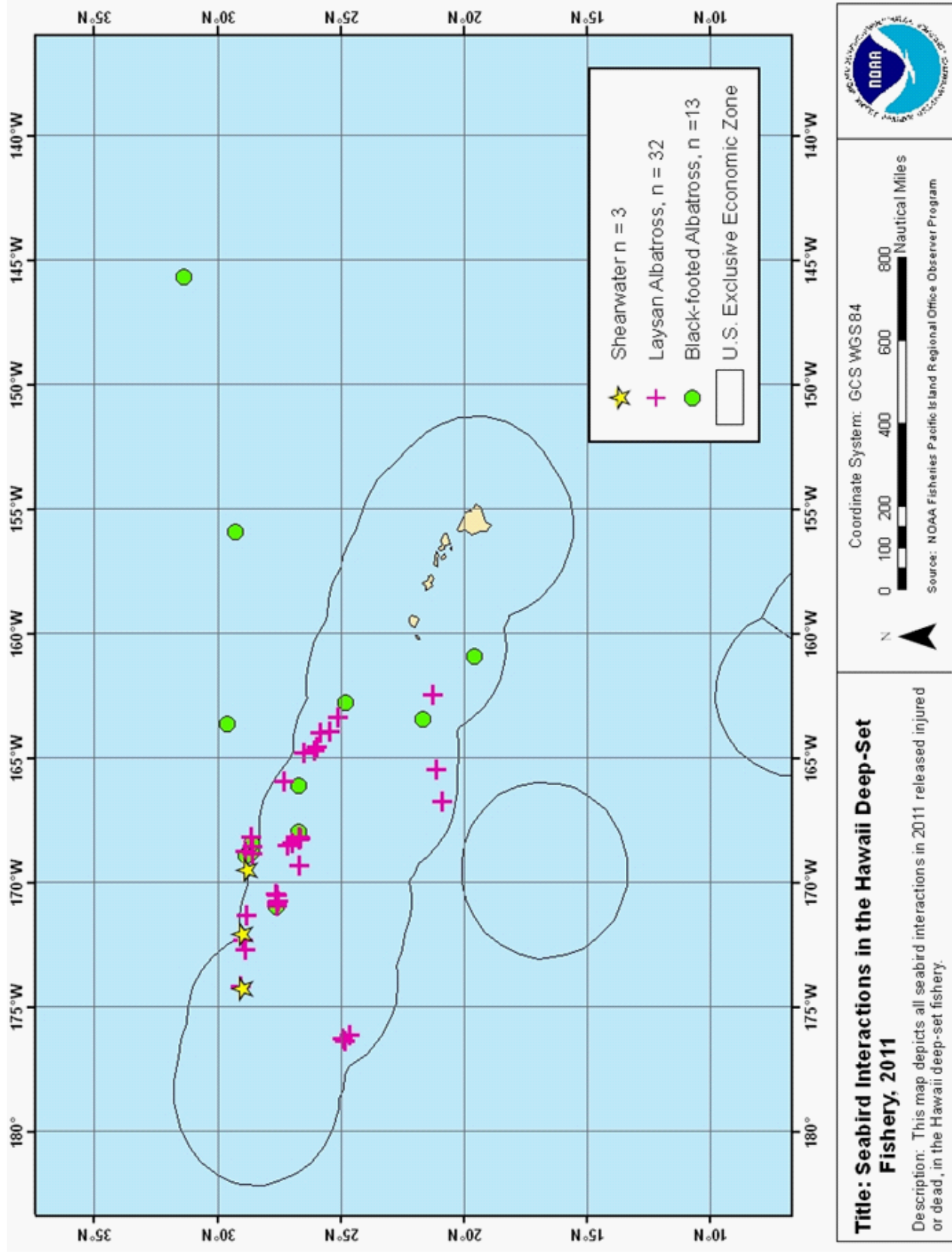


Figure 3. Locations of seabird interactions in Hawaii longline deep-set fishery, 2011

Source: NMFS PIFSC, unpublished.

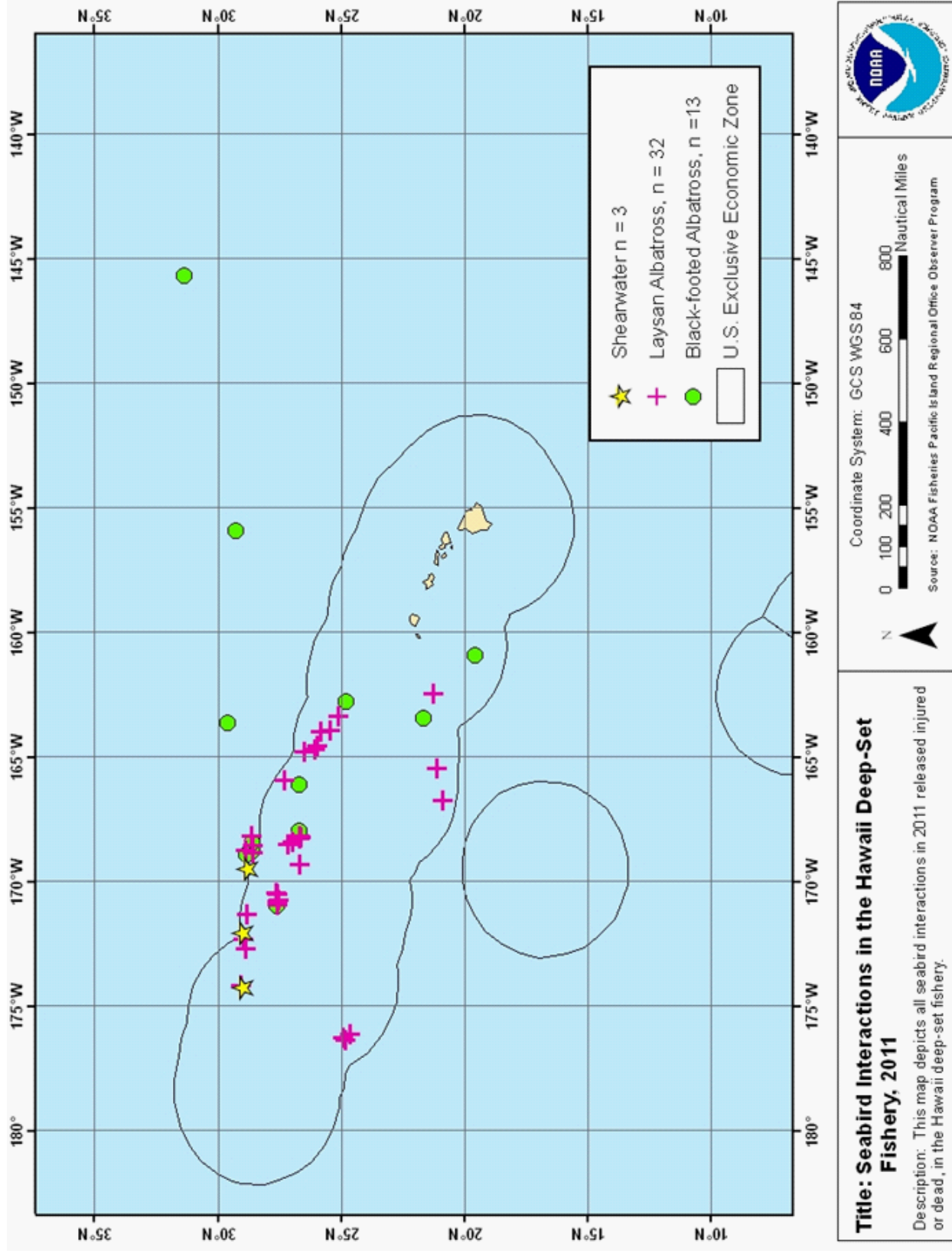


Figure 4. Locations of seabird interactions in Hawaii longline shallow-set fishery, 2011

Source: NMFS PIFSC, unpublished.

## 2.2 Interaction Rates

Table 5 summarizes 2011 observed seabird interactions, interaction rates, and condition of seabirds upon release. There was 100% observer coverage of shallow-set fishery; therefore, the number of interactions shown in Table 5 represents the fleet-wide total for 2011. Table 5 contains the number of observed interactions for the deep-set fishery, while Table 6 provides fleet-wide interaction estimates for the deep-set fishery.

**Table 5. Observed seabird catches and nominal rates in the Hawaii longline fisheries, 2011**

Year	Laysan albatross	Black-footed albatross	Sooty shearwater	No. other or unidentified bird species caught	Total no. birds observed caught	No. birds released injured and alive	No. birds released dead	Total observed effort (no. of hooks)	Seabird interaction rate (no. birds per 1,000 hooks observed)
<b>Deep-set</b>									
2004	2	5		2	1		9	7,868,613	0.000
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
<b>Shallow-set</b>									
2004	1				1	1		115,718	0.009
2005	62	7			69	47	22	1,358,247	0.05
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

Source: NMFS Observer Program, unpublished. Note: Data is based on the date and time of the beginning of the haul.

Footnotes: \* brown booby; \*\*red booby and unidentified seabird; \*\*\*northern fulmar

Almost all interactions in the deep-set fishery occur when gear is being set during the day while seabirds are actively feeding. Birds can be hooked or entangled and drown while the gear sinks. Deep-set gear is typically hauled at night and the hooked or entangled birds caught while setting are retrieved dead. Because seabirds cannot easily feed or are inactive at night, very few interactions occur when the gear is hauled. In the 2011 deep-set fishery observers documented interactions with 32 Laysan albatrosses, 13 black-footed albatrosses, and three sooty shearwaters; 4% of seabirds were released injured and alive.

The shallow-set fishery typically sets at night and hauls during the day; therefore, most of the interactions occur when fishermen retrieve the gear and birds are actively feeding. The 2011 fishery interacted with 49 Laysan albatrosses and 19 black-footed albatrosses and 78% of these seabirds were released injured and alive.

**Table 6. Fleet-wide estimates of black-footed and Laysan albatross incidental interactions for the Hawaii deep-set longline fishery, 2011**

Species	Annual Total Point Estimate	95% Confidence Interval	Nominal Interaction Rate (no. birds per 1,000 hooks)
Black-footed albatross	73	[43 - 116]	0.0018
Laysan albatross	187	[117 - 287]	0.0046

*Source: Point estimates and 95% confidence intervals are from McCracken, 2012. Total number of deep-set hooks is taken from PIFSC 2011 Hawaii longline logbook summary report for the deep-set fishery.*

Seabirds can be hooked, entangled, or both. Captured seabirds are released alive with or without gear attached. Table 7 provides a summary of capture conditions in 2011. 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) and birds rarely have gear attached to them when released.

**Table 7. Capture condition of seabirds hooked or entangled in the Hawaii longline fisheries, 2011**

Number for each species/group	MANNER OF CAPTURE			GEAR ATTACHED UPON RELEASE <sup>1</sup>			
	Hooked only	Entangled only	Both hooked and entangled	Line attached only	Hooked only	Hooked and line attached	No gear attached
Laysan albatross	72	5	4	0	0	3	37
Black-footed albatross	25	1	6	0	0	1	14
Sooty Shearwater	2	0	1	0	0	0	0

<sup>1</sup> "Released" seabirds are those that were released alive, and not dead discarded or collected seabirds.

**Tended and untended branchlines**

During the haul, crew either unclip the branchline from the mainline and coil the line on board the vessel immediately (tended line), or clip the branchline to the side or rear of the vessel to retrieve it later (untended line or "lazy line"). For example, a fisherman may stop coiling lines temporarily to help bring a fish onboard so branchlines may be dragged behind the boat or clipped to the vessel and be untended until the fish is retrieved. If the branchline with bait rises to the surface and trails behind the vessel, birds may attempt to take the bait.

In 2010, the NMFS Observer Program began to collect information on tended and untended line interactions. An analysis of this information found that, in the 2010 shallow-set fishery, 50% (39 out of 78) interactions occurred on tended lines, and only two seabirds were caught on untended lines. In the 2011 shallow-set fishery, 53% (37 out of 69) occurred on tended branch lines, and no seabirds were caught on untended lines. The rest of the seabirds were hooked or entangled while the gear was pulled to the surface, trailing behind the vessel and not yet retrieved. Because gear is usually hauled during the day, seabirds can see the bait that has risen to the surface and attempt to take the bait. In 2010 and 2011 combined, the

deep-set fishery, caught three birds on tended lines and none on untended lines; all others were likely hooked or entangled during gear deployment. The analysis reveals that untended branchlines do not tend to hook or entangle seabirds in either fishery. In the shallow-set fishery, gear that is tended or not yet retrieved accounts for almost all of the seabird interactions and almost all interactions in the deep-set occur during gear deployment. NMFS will continue to monitor interactions and fishing techniques through the Observer Program to examine ways to avoid interactions.

Table 8 provides a summary of observed birds with leg bands attached in 2011 in both Hawaii longline fisheries. All of the birds were banded at French Frigate Shoals in the Northwestern Hawaiian Islands.

**Table 8. Seabirds observed with leg bands in the Hawaii longline fisheries, 2011**

Species	Disposition	Band Recovery Date	Date Banded	Location Banded	Age at Banding (yr.)	Age at Time of Recovery (yr.)
Black-footed Albatross	Dead	3/6/2011	6/16/2004	French Frigate Shoals (Tern Island)	<1	6
Black-footed Albatross	Dead	3/6/2011	6/11/2004	French Frigate Shoals (Tern Island)	<1	6
Black-footed Albatross	Dead	3/2/2011	6/12/2004	French Frigate Shoals (Tern Island)	<1	7
Laysan Albatross	Dead	4/30/2011	1/17/2004	French Frigate Shoals (Tern Island)	>/=3	>/=9
Black-footed Albatross	Dead	5/1/2011	6/9/2001	French Frigate Shoals (Tern Island)	<1	10
Laysan Albatross	Dead	5/16/2011	12/30/2003	French Frigate Shoals (Tern Island)	>/=3	>/=11
Laysan Albatross	Dead	5/10/2011	1/13/2009	French Frigate Shoals (Tern Island)	>/=1	>/=3
Laysan Albatross	Released Injured	5/19/2011	12/23/2007	French Frigate Shoals (Tern Island)	>/=1	>/=5

### 3. SIGHTINGS OF ESA-LISTED SEABIRDS

The distribution of three seabirds listed under the ESA overlap with the areas where the Hawaii longline fisheries operate: short-tailed albatross, Newell's shearwater and Hawaiian dark-rumped petrel. The short-tailed albatross and the Hawaiian dark-rumped petrel are listed as endangered, and the Newell's shearwater is listed as threatened. Figures 5 and 6 show the locations of short-tailed albatross sightings by observers and observed fishing effort by Hawaii longline vessels in 2011. During 2011, there was one sighting of short-tailed albatross in the shallow-set fishery and two in the deep-set fishery. To date, there have been no observed interactions (hooking or entanglement) between longline gear and short-tailed albatross, Newell's shearwater or Hawaiian dark-rumped petrel in either fishery. Observers did not see any Newell's shearwater or Hawaiian dark-rumped petrel in 2011.

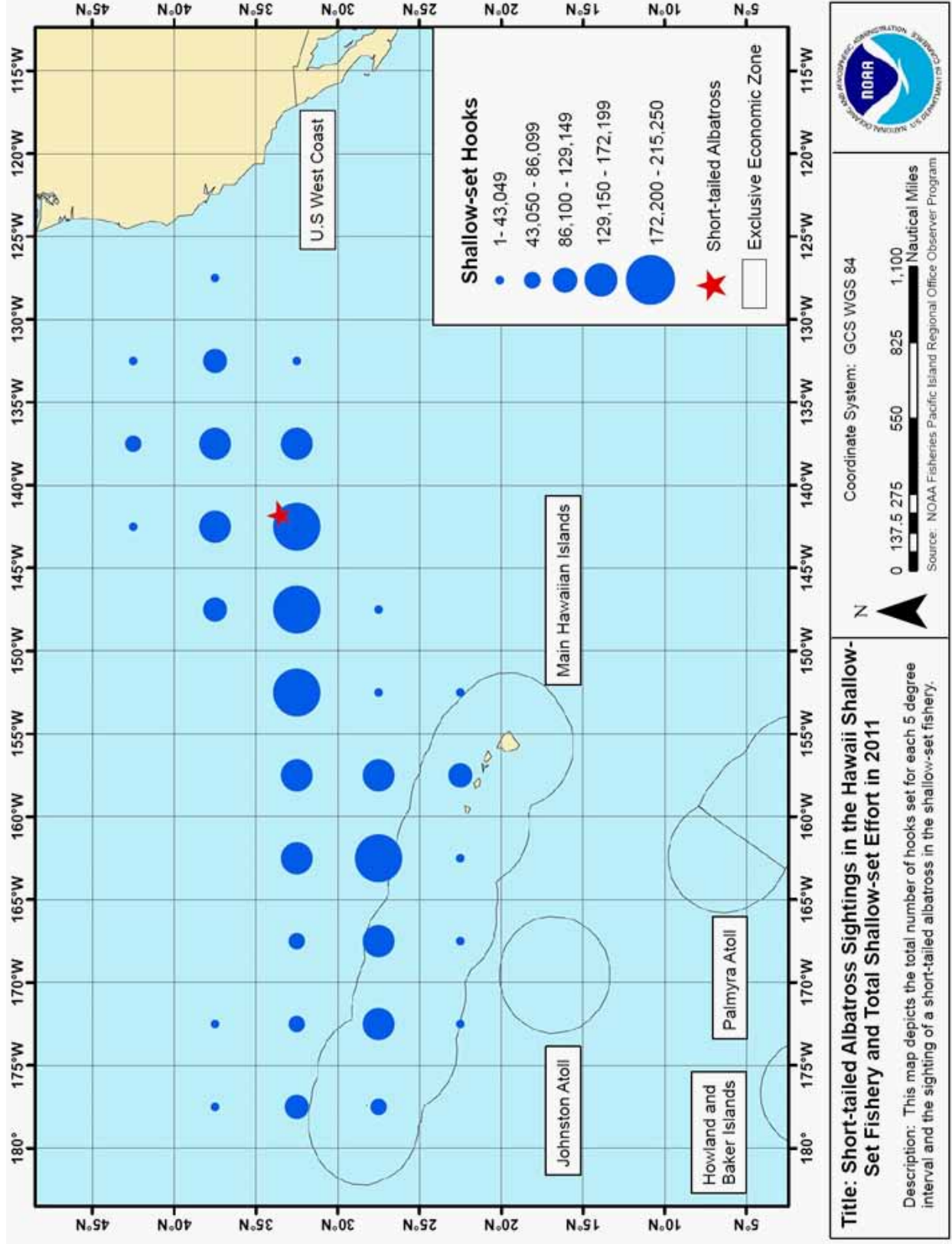


Figure 5. Short-tailed albatross sightings from trips with observers in Hawaii shallow-set fishery, 2011

Source: NMFS unpublished.



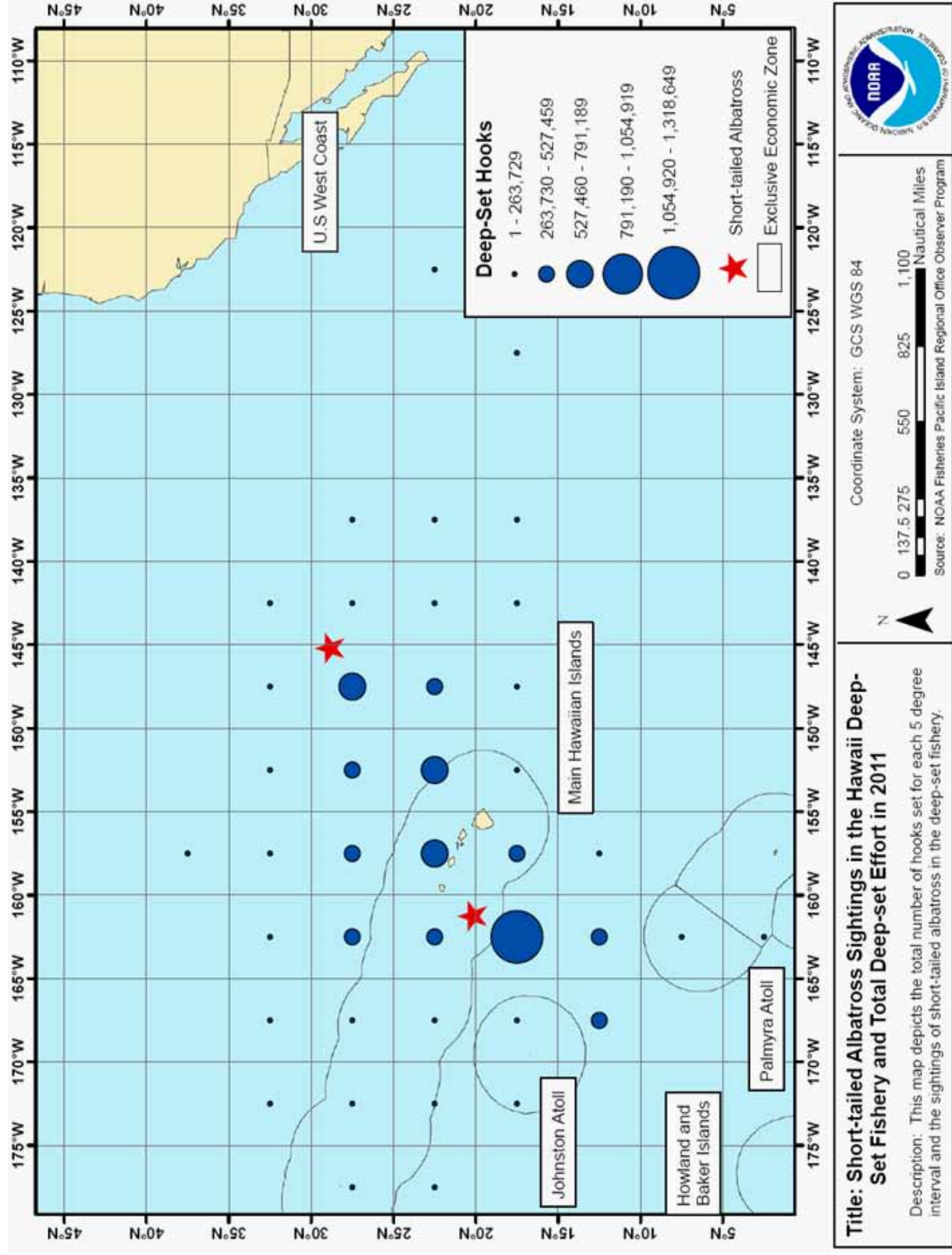


Figure 6. Short-tailed albatross sightings from trips with observers for Hawaii deep-set fishery, 2011

Source: NMFS unpublished.

## 4. MANAGEMENT

In August 2012, under the Migratory Bird Treaty Act, the USFWS issued a Special Purpose Permit to NMFS for the Hawaii shallow-set longline fishery. The permit authorizes the take of migratory birds in the fishery for three years, including short-tailed albatross, black-footed albatross, Laysan albatross, sooty shearwater, and Northern fulmar. For further information 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 in 2011 and 2010 (Table 9).

In the 2010 deep-set fishery, the NMFS observer program documented 57 seabird interactions (39 Laysan albatross, 17 black-footed albatross and one sooty shearwater). The 2011 fishery interacted with 48 seabirds (49 Laysan albatross, 19 black-footed albatross and three sooty shearwater). The fleet-wide estimate of interactions in 2010 and 2011, based on observations, were 220 and 260 seabirds, respectively.

The 2010 shallow-set fishery had interacted with 79 seabirds (40 Laysan and 38 black-footed albatrosses, and one sooty shearwater). These interaction numbers are similar to the 2011 fishery with 68 seabird interactions (49 Laysan and 19 black-footed albatross).

NMFS continues to monitor both longline fisheries to collect biological data and interaction information. This information will be used to examine ways to avoid or reduce interactions.

**Table 9. Comparison of observed interactions in Hawaii longline fisheries, 2010 and 2011**

Fishery	2010	2011
Number of seabirds observed in deep-set	57	48
Number of seabirds observed in shallow-set	79	68
Deep-set interaction rate (birds per 1,000 hooks observed)	0.007	0.040
Shallow-set interaction rate (birds per 1,000 hooks observed)	0.006	0.045

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