



International Pacific  
Halibut Commission

# The Distribution of Seabirds on Alaskan Longline Fishing Grounds: 2002 Data Report

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## Introduction

Seabird mortality in longline fisheries is a worldwide marine conservation problem (Robertson and Gales 1998). Comprehensive estimates of total takes are lacking; however, hundreds of thousands of seabirds are probably taken in world longline fisheries annually. In the Southern Hemisphere, longline mortality is strongly linked to declines of several albatross species (Weimerskirch and Jouventin 1987, Nel et al. 2002). Reflecting the extent of international concern for the unsustainable incidental take of seabirds, the United Nation's Food and Agriculture Organization (FAO) calls on all longline nations to develop a National Plan of Action (FAO 1999) to quantify and reduce their incidental catch of seabirds.

Typically, hundreds to thousands of seabirds attend individual fishing operations, feeding on discarded offal and bait. In longline fisheries this attraction can prove fatal to seabirds and can negatively affect fish catch rates. Seabirds can become hooked and drown as they attack baited hooks during gear deployment. Baits lost to birds result in fewer baited hooks available to catch fish. Seabirds can also be hooked as gear is hauled; however, in most cases the birds can be returned safely to the sea using proper handling techniques. Because many seabirds are long-lived species with delayed maturity and limited reproductive capability, they are highly vulnerable to adult mortality. Even low levels of adult mortality can halt population growth or cause decline (Croxall et al. 1990, Weimerskirch et al. 1997).

In the Alaskan groundfish longline fisheries, incidental seabird mortality averaged 14,295 birds per year from 1993 to 2002, ranging from a high of 26,000 seabirds in 1998 to a low of 4,000 in 2002

(Table 1; National Marine Fisheries Services [NMFS] 2003). Most were northern fulmars (*Fulmarus glacialis*; 58%) and gull species (*Larus* spp. 20%), both resident breeders. Albatrosses (*Phoebastria* spp.; 6%) and shearwaters (*Puffinus* spp.; 3%), which are seasonal migrants, were caught in smaller numbers. Most albatrosses taken were Laysan (*P. immutabilis*; 4.3%) and black-footed (*P. nigripes*; 1.3%). The US Fish and Wildlife Service (USFWS) estimate that two short-tailed albatrosses (*P. albatrus*) are taken on average each year (USFWS 2003). None have been observed taken since 1998 (NMFS 2003). The extent of seabird mortality in the Pacific halibut (*Hippoglossus stenolepis*) longline fishery is poorly understood owing to the lack of at-sea catch monitoring in this fishery.

Regulatory and conservation attention in these fisheries is focused on bycatch of the short-tailed albatross, an endangered species under the US Endangered Species Act (ESA). The USFWS' Biological Opinion specifies that short-tailed albatross takes exceeding six within a 2-year period (four in the groundfish fishery and two in the Pacific halibut fishery) would trigger an ESA Section 7 consultation and could interrupt or close Alaska's \$250 million (ex-vessel value) demersal longline fisheries (USFWS 2003). The Biological Opinion requires that mitigation devices be used in these fisheries and that research be conducted to test their effectiveness.

Although not currently listed under the US ESA, recent shifts in the designated conservation status of black-footed and Laysan albatrosses by the World Conservation Union (IUCN), an international conservation consortium, reflect an increasing need for fishery managers to address the mortality of all three Pacific albatross species (IUCN 2003). In 2003, the black-footed albatross was upgraded from "vulnerable" to "endangered"; the Laysan albatross was upgraded from "least concern" to "vulnerable".

In December of 2001, the North Pacific Fishery Management Council (Council) took final action to revise seabird avoidance measures required in the Alaska longline fisheries for groundfish and Pacific halibut (NMFS 2001). The proposed regulations were based primarily on the results of an extensive two-year study in the sablefish (*Anoplopoma fimbria*) fishery in the Gulf of Alaska and Aleutian Islands and the Pacific cod (*Gadus macrocephalus*) fishery in the Bering Sea (Melvin et al. 2001). Testimony to the Council reflected concern that many vessels, especially smaller vessels fishing inside waters (NMFS management areas 649, 659 and state waters of Cook Inlet), encounter few albatrosses, suggesting that seabird mitigation might be unnecessary in these areas. The Council's Scientific and Statistical Committee acknowledged that short-tailed albatrosses are unlikely to occur within some inside waters, especially southeast Alaska, and that less stringent measures may be appropriate in these areas. However, they also acknowledged that data on the distribution of albatrosses and other seabirds were insufficient to rule out the need for seabird mitigation in inside waters. The final regulations, which went into effect in February 2004, call for towing a buoy, single streamer, or paired streamer lines according to a performance standard while setting longline gear (69 FR 1930 January 13, 2004). To address concerns of the small vessel operators, regulators developed different requirements based on the best available information and apply to vessels as a function of vessel size, vessel type, gear type and area fished.

Given the paucity of data on seabird distribution in Alaskan waters and the need to manage Alaska's longline fisheries efficiently, the Washington Sea Grant Program (WSGP) developed a collaborative program with the International Pacific Halibut Commission (IPHC), NMFS Auke Bay Laboratory, and Alaska Department of Fish and Game (ADFG) to collect seabird data in the course of Pacific halibut and sablefish stock assessment surveys on longline vessels. This report summarizes seabird data collected during the 2002 season, the inaugural year of this program.

## Methods

Seabird data were collected during four longline stock assessment surveys in 2002:

1. IPHC coastwide halibut survey,
2. ADFG Northern Southeast Inside (NSEI) sablefish survey,
3. ADFG Southern Southeast Inside (SSEI) sablefish survey, and
4. NMFS sablefish survey.

WSGP staff trained fish samplers to identify and quantify North Pacific seabirds. Immediately after hauling operations, samplers recorded the number of seabirds by species or species group on the water and in the air within a 50-meter radius of the vessel's stern (Figure 1). All albatross species, northern fulmars, and red-legged (*Rissa brevirostris*) and black-legged kittiwakes (*R. tridactyla*) were identified to the species level. Gulls, terns, shearwaters, storm petrels, jaegers, alcids, and cormorants were identified to the species group level. This "snap shot" methodology yields information on the presence and absence of species and their relative abundance. All hauls were monitored for incidental seabird mortality. IPHC received and managed data from all surveys.

### Description of IPHC Survey

The IPHC stock assessment survey occurs annually and encompasses offshore waters of the west coasts of Oregon, Washington, British Columbia, Southeast Alaska (inside and outside waters), Gulf of Alaska (GOA), Aleutian Islands (AI), and the Bering Sea (BS) Edge. The survey provides catch information and biological data for the halibut stock assessment that is independent of the commercial fishery. Thirteen vessels completed 1,241 sets (1,233 stations) located on a 10 x 10 nautical mile square grid (18.5 km) from June 2, 2002 to September 2, 2002. Five 1800-foot (549 m) skates of standardized gear, consisting of 500 size 16/0 circle hooks on gangions spaced 18 feet (5.5 m) apart, were set at each station. Survey depths ranged from 16 to 330 fathoms (29–603 m). Vessels deployed two streamer lines while deploying gear.

### Description of ADFG Survey

Two commercial vessels fished 37 stations concurrently: 19 in northern Clarence Strait and 18 in southern Clarence Strait and Dixon Entrance during the ADFG SSEI survey conducted between May 21 and May 26, 2002 (Holum 2003). Three commercial vessels fished 44 stations concurrently in Chatham Strait during the ADFG NSEI survey from August 13 to August 18, 2002 (Richardson 2003).

The primary goal of these surveys was to estimate the relative abundance of sablefish, enumerate bycatch species, collect biological data from a subsample of sablefish and thornyheads (*Sebastolobus* sp.), collect biological data from all rockfish, and enumerate seabirds. Twenty-five standard skates, each consisting of 45 size 13/0 Mustad circle hooks on medium lay #60 gangions spaced 6.6 feet (2 m) apart, were set at each station. Survey depths ranged from 186 to 405 fathoms (340–741 m). In 1988, survey stations were randomly selected in depths greater than 200 fathoms (366 m) in locations within the management area where the majority of commercial fishing occurred. A single streamer line was deployed while setting gear.

### Description of NMFS Survey

One vessel completed 148 sets at 87 stations during the NMFS sablefish survey in the Gulf of Alaska and eastern Aleutian Islands from June 4 to September 3, 2002 (Rutecki 2003). The primary goal of the survey was to determine the relative abundance and size composition of sablefish. One hundred sixty 328-foot (100 meter) standardized skates, consisting of 45 size 13/0 Mustad hooks on medium lay gangions spaced 2 meters apart, were set at each station. Survey depths ranged from 91 to 1,035 fathoms (166–1,893 m). Paired streamer lines were deployed during setting operations.

### Analysis of Seabird Observations

Observations were plotted as a function of location and density using ArcGIS (ESRI, Redlands, CA). Mean number of seabirds per haul-observation (seabirds/observation) were calculated for each species or species group by NMFS Management Area and IPHC Regulatory Area and were contrasted for inside and outside waters. Inside waters include Southeast Alaska (NMFS Area 659) and Prince William Sound (NMFS Area 649). As only one survey station occurs in the state waters of Cook Inlet, Cook Inlet was not included in our analysis of inside waters.

## Results

Seabird data were collected on 80 of 81 ADFG survey sets, 1,228 of 1,241 IPHC sets and 142 of 148 NMFS sets for a total of 1,450 observations (Figure 2 and Appendix 1). A total of 79,131 birds were observed in the course of these surveys for an average of 54.6 seabirds per observation (Table 2 and Appendix 2). Most seabirds were northern fulmars (75%). Albatrosses (11%) and gulls (8%) were also common (Table 2). Seabirds were absent in 223 (15.4%) post-haul observations, 43% of which were in inside waters.

Seabird densities were highest in the Central GOA (NMFS Areas 620) and the AI (NMFS Areas 541 to 543), averaging 101 and 96 seabirds per observation, respectively (Table 2). The inside waters of Southeast Alaska (3.3 seabirds/obs) and Prince William Sound (PWS; 0.8 seabirds/obs) had the fewest seabirds observed.

Laysan albatrosses occurred exclusively in outside waters (Figures 3-4). With the exception of a single bird sighted off central Oregon, Laysan albatrosses were restricted to the Central GOA, the AI, and the BS (NMFS Areas 509 to 530). Laysan concentrations were dramatically higher (21.7 birds/obs.) in the AI than any other area (Table 2 and Figure 3).

Black-footed albatrosses were observed in all outside waters (Figure 5). They had highest concentrations from Washington and Oregon (8.1 birds/obs) north to the Western GOA (NMFS Area 610), peaking in the West Yakutat area (NMFS Area 640; 9.5 birds/obs). They were rare in the AI and BS (0.44 and 0.18 birds/obs, respectively). Black-footed albatrosses were absent in Alaska inside waters with one exception: three birds were seen during a single observation at the entrance to Chatham Strait just inside the NMFS area 659 boundary (Figure 6A).

Short-tailed albatrosses were rare in the defined observation zone (Figure 1) and seen only in the Western GOA, the AI and the BS. None occurred in inside waters. Sightings were consistent with those reported to the USFWS since 1994 during a similar time frame (May through June; Figure 7).

Northern fulmars were seen in all outside waters but were absent from the inside waters of Southeast Alaska and PWS. Fulmars were most abundant from West Yakutat through the AI and the BS, peaking at 84.1 birds per observation in the Central GOA (NMFS Area 620; Figure 8 and Table 2). There were relatively few fulmars in the outside waters of Southeast Alaska (NMFS Area 650; 14.5 birds/obs; Figure 6B), British Columbia (2.7 birds/obs), and Washington and Oregon (3.8 birds/obs; Table 2).

Shearwaters, like black-footed albatrosses and northern fulmars, were sighted in all outside waters (Figure 9), but in relatively low numbers, peaking at 1.5 birds per observation in the Western GOA (Table 2). In Southeast Alaska, shearwaters were sighted in the entrance to Chatham Strait in a single observation just inside the boundary of NMFS area 659 (Figure 6C). None was sighted in the inside waters of PWS.

Unlike all other seabirds, gulls were sighted in all outside and inside waters throughout the range of the surveys (Figure 10 and 6D), peaking in West Yakutat (13.6 birds/obs) and the AI (12.9 birds/obs). Densities were least in the BS (0.08 birds/obs) and PWS (0.5 birds/obs).

Both kittiwake species were absent from the waters off British Columbia, Washington, and Oregon (Table 2). Black-legged kittiwakes peaked in the Bering Sea (0.7 birds/obs) and the Central GOA (0.4 birds/obs) and were sighted in the inside waters of PWS albeit in low numbers (0.3 birds/obs; Table 2). Red-legged kittiwakes were rare. They were absent from all inside waters and all but three outside water areas (Table 2).

For other species or species groups sighted during the survey (Table 3), storm petrels were most common. They occurred in all areas except PWS and ranged from a high of 4.3 birds per observation in the Central GOA to a low of 0.02 birds per observation in the inside waters of Southeast Alaska. Jaegers, terns, alcids, and cormorants made up the balance of the birds seen during surveys. No birds were caught during the IPHC and ADFG surveys. Data on seabird incidental mortality during the NMFS survey were unavailable.

## Discussion

Albatrosses occurred throughout the fishing grounds in outside waters. Only 11 of the over 9,000 albatrosses sighted were short-tailed albatrosses. With the exception of a single Laysan albatross sighted off the Oregon Coast, short-tailed and Laysan albatrosses did not occur south of the Central GOA. Black-footed albatrosses, northern fulmars, and shearwaters were more common, occurring in all outside waters.

Few seabirds typically caught on observed longline vessels occurred in Alaskan inside waters. Gulls were the only species sighted in all inside and outside areas. No albatrosses, petrels, or shearwaters were sighted in PWS, but this area had the fewest observations (12) limited to five days in June. With the exception of the sighting of four black-footed albatrosses and five shearwaters in the same observation just inside NMFS Area 659 boundary at the entrance to Chatham Strait, no albatrosses, petrels, or shearwaters occurred in the inside waters of Southeast Alaska.

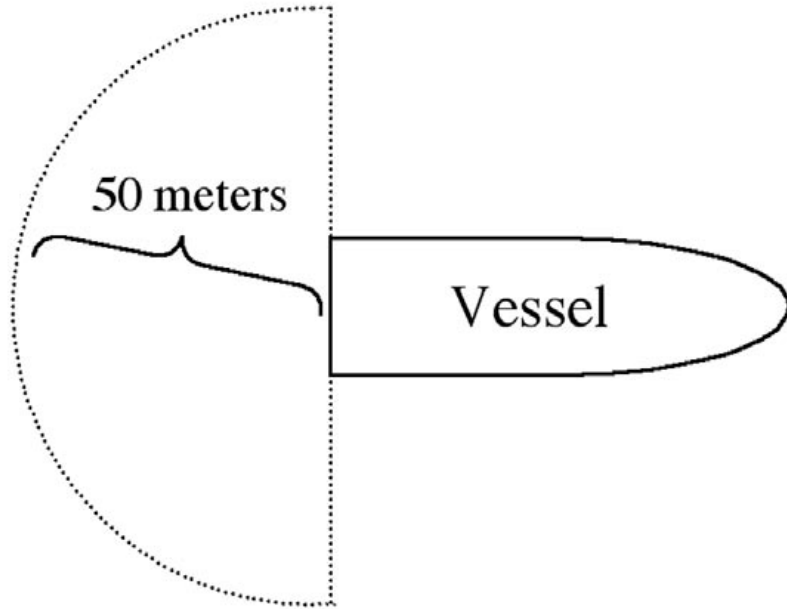
Although limited temporally to a 3-month period from June to August in a single year, these data strongly suggest that albatrosses, petrels, and shearwaters are rare to absent in the inside waters of Alaska in this time period. Data from the 2003 and 2004 surveys and potentially beyond will be used to confirm these results. This information and data from other sources could be used to delineate areas where these seabirds are at risk from longline fisheries and where mitigation measures are necessary. This collaboration emphatically demonstrates the power of using existing fishery survey vessels to gather information on seabirds that is essential to ecosystem-level fishery management. Expansion of this protocol to other fishery survey efforts could increase the temporal extent of these data and their usefulness for management.

## Acknowledgements

This project would not have been possible without the dedicated support and commitment of the IPHC. We thank the IPHC, ADFG, and NMFS biologists who were instrumental in incorporating seabird observations into their existing research protocols, specifically V. O'Connell, D. Holum, B. Richardson, C. Lunsford, S. Romain, and K. Orwig. We also greatly appreciate the efforts of A. Ranta, IPHC, who designed the seabird database and helped us create numerous queries. We also thank B. Leaman and M. Duke for helpful comments on earlier drafts. Funding for data processing and analyses was provided by the IPHC, ADFG, and the WSGP.

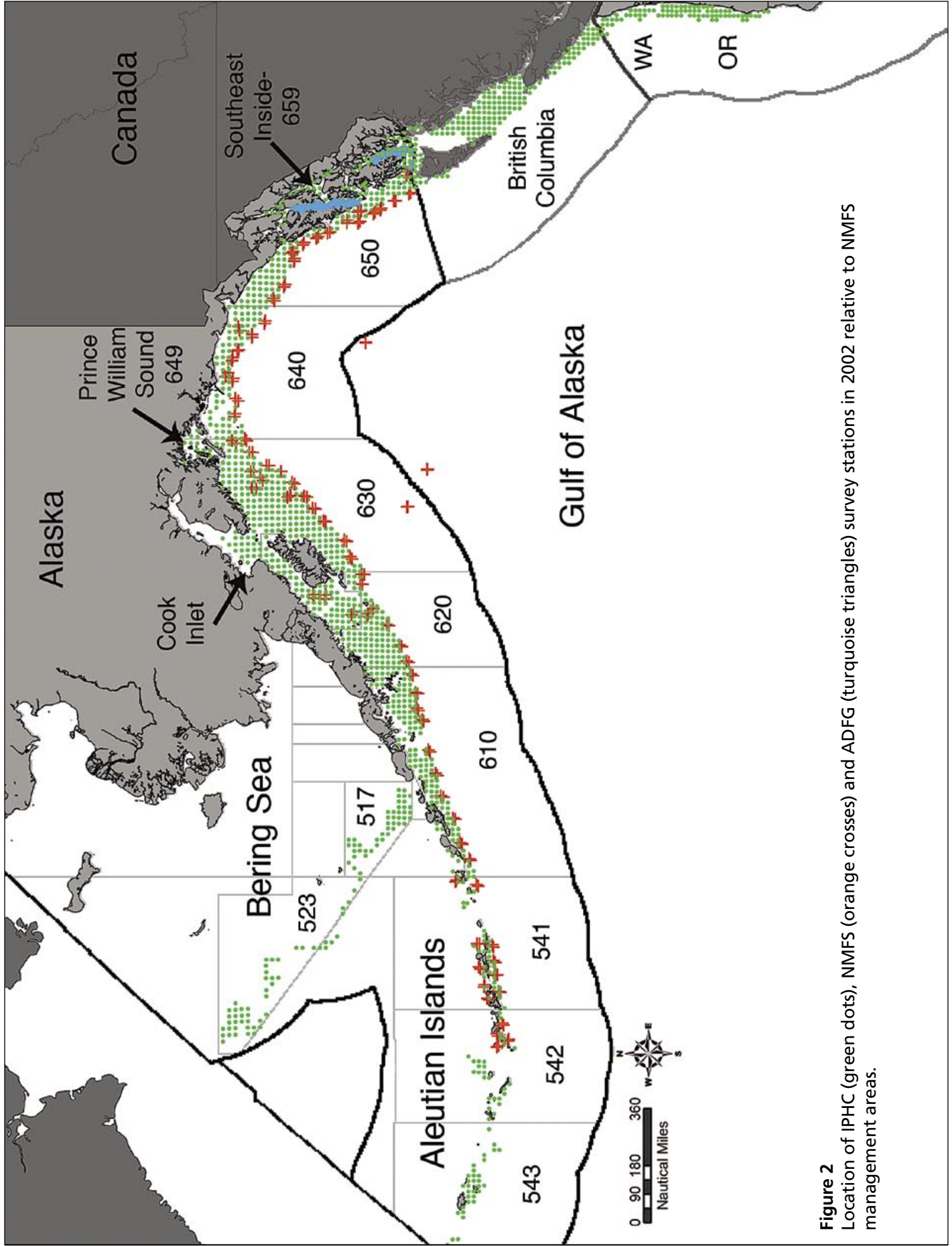
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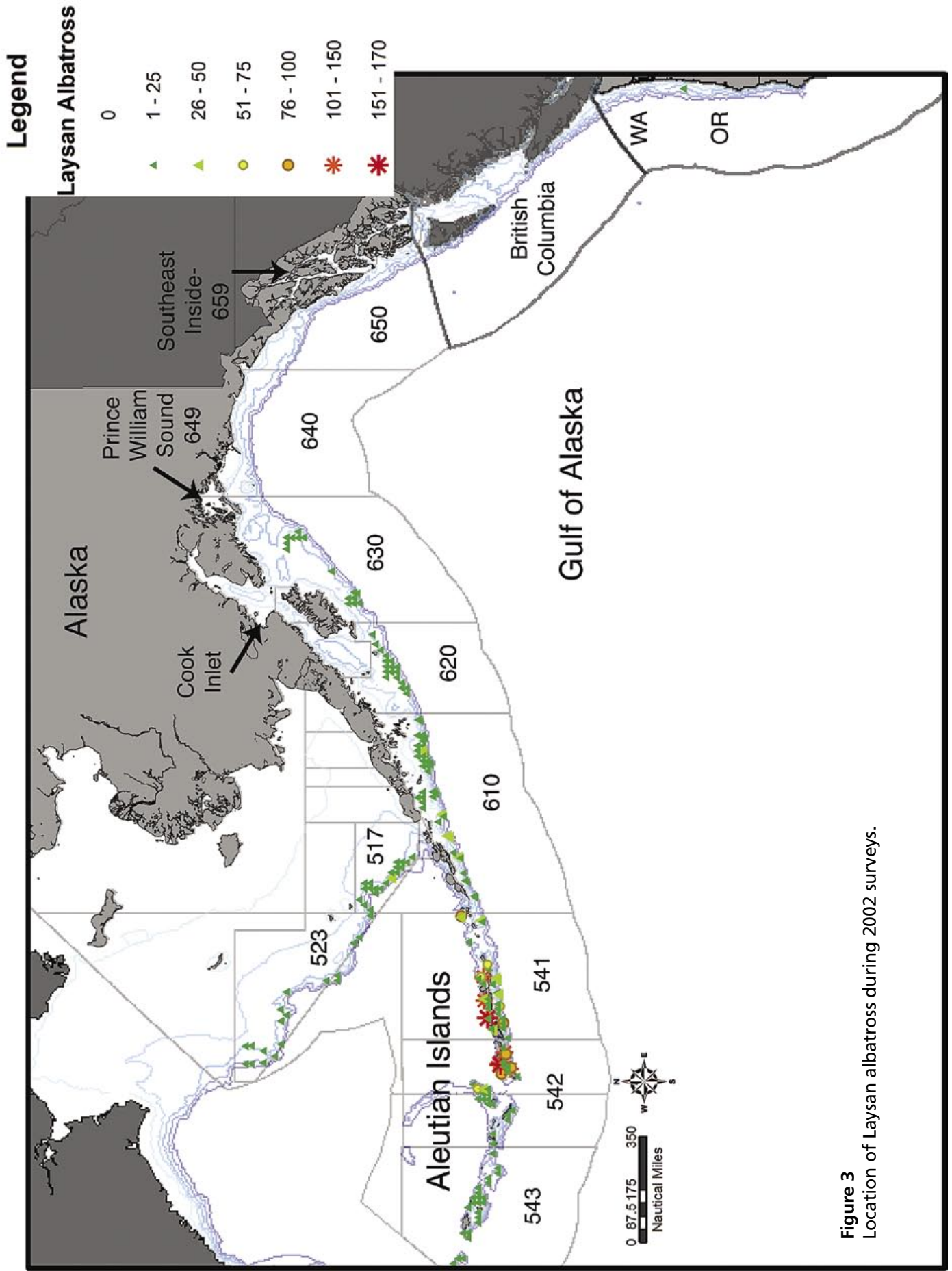


**Figure 1**

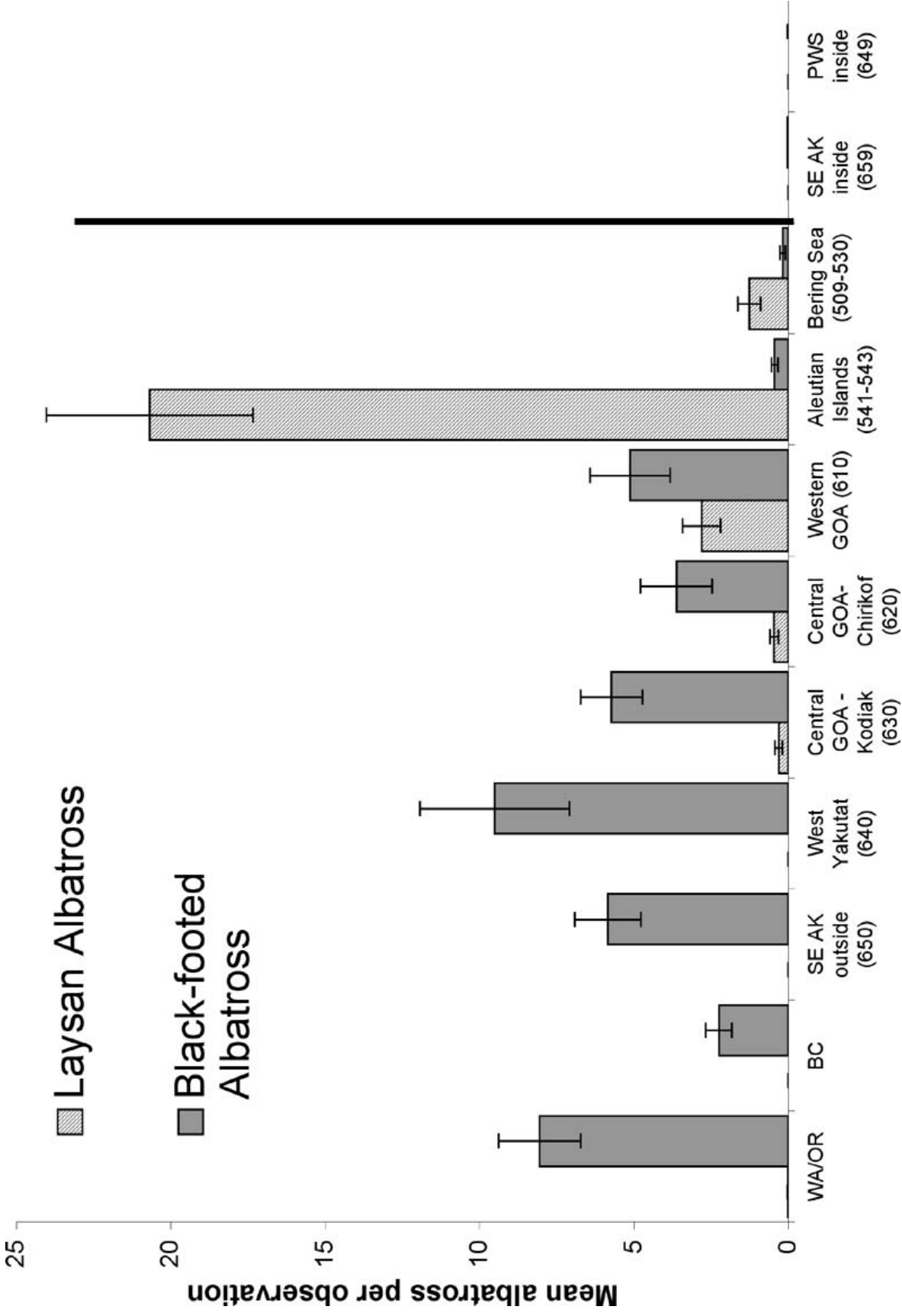
Seabird counts were performed within a 50-meter hemisphere at the stern immediately after longline gear was hauled.



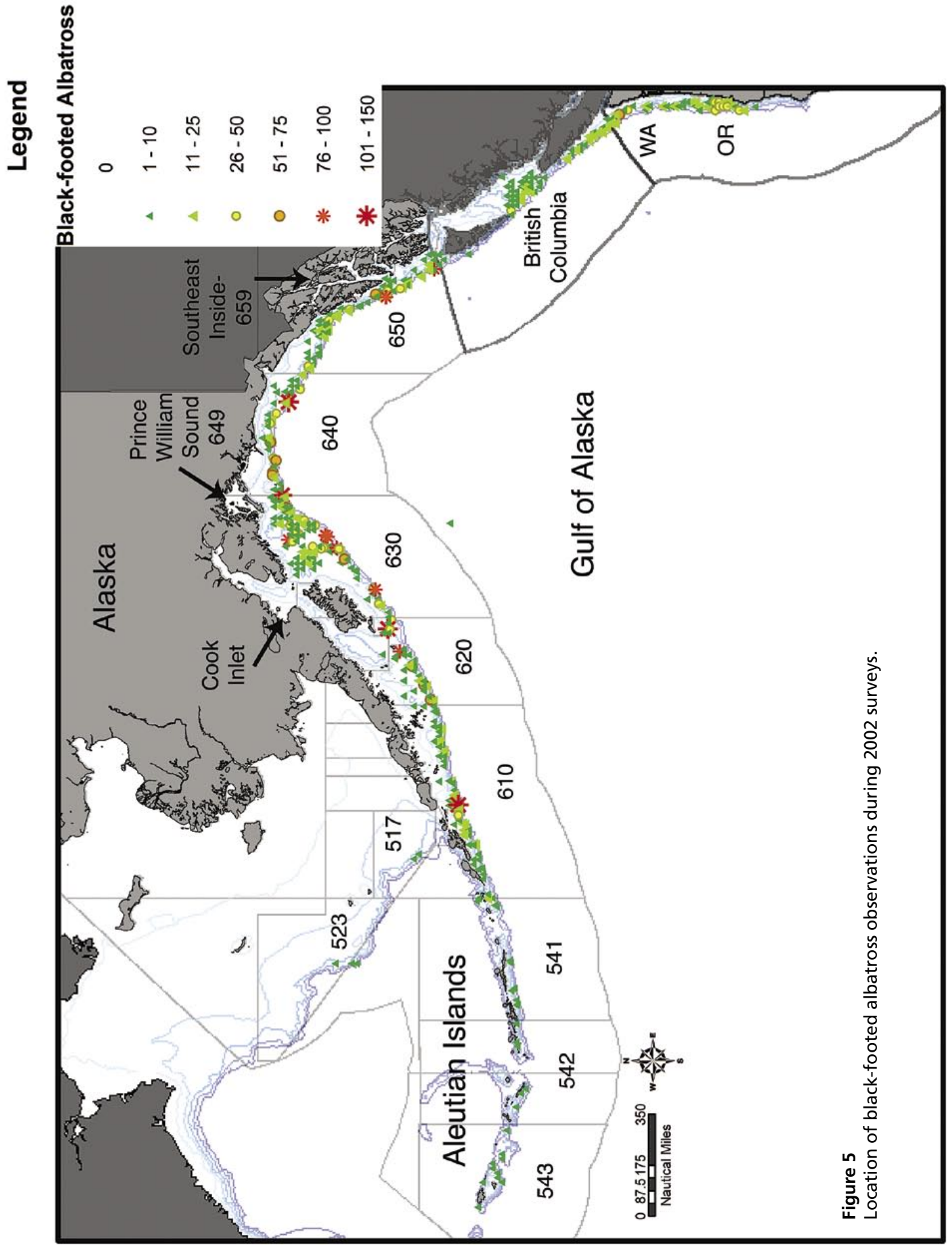
**Figure 2** Location of IPHC (green dots), NMFS (orange crosses) and ADFG (turquoise triangles) survey stations in 2002 relative to NMFS management areas.



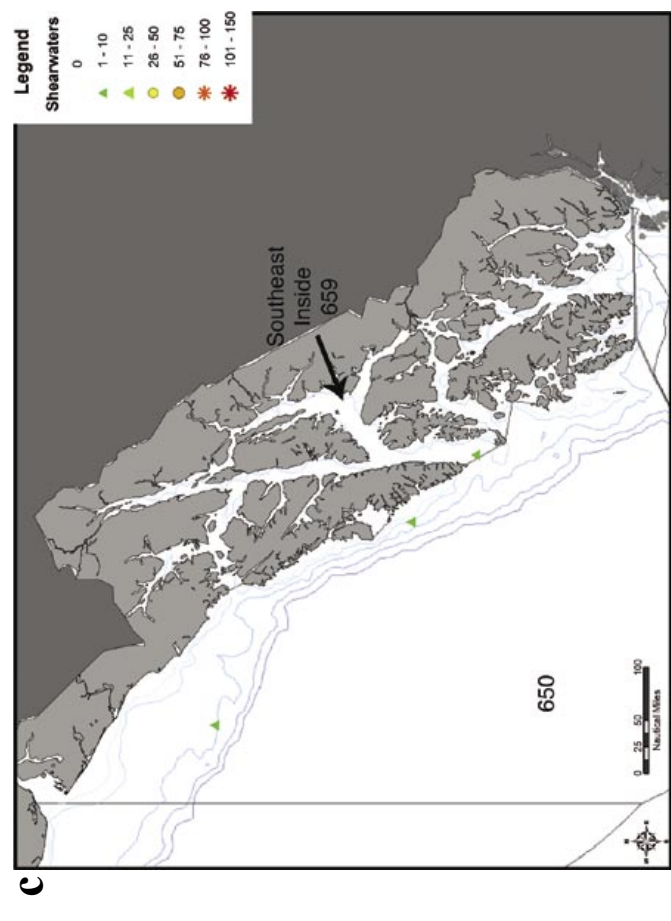
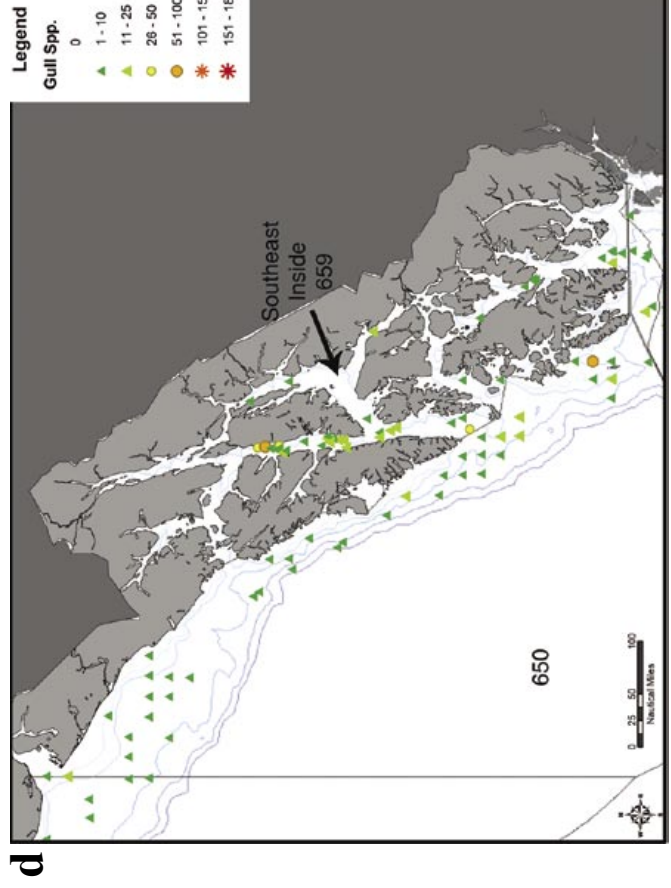
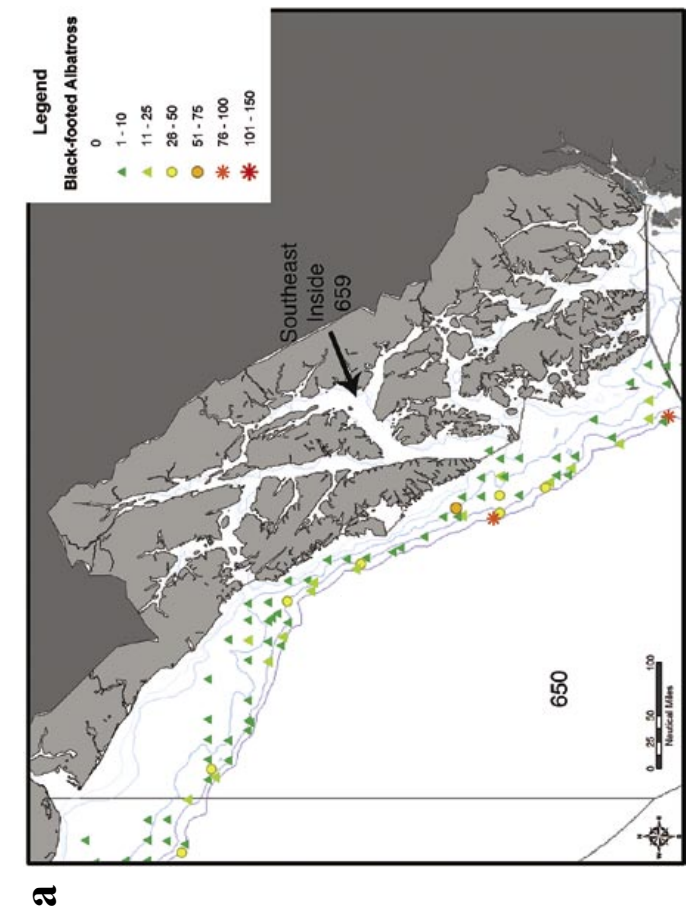
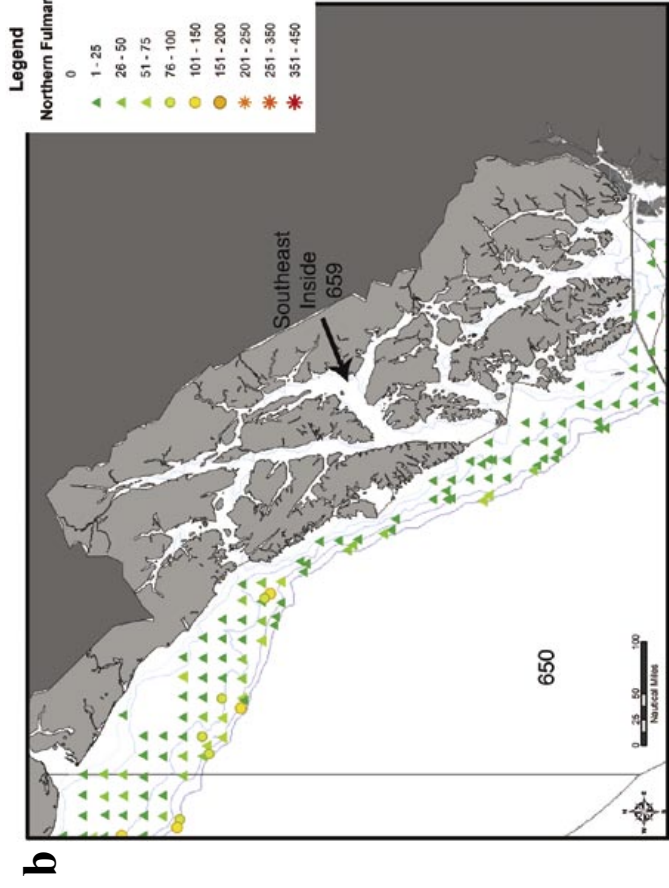
**Figure 3**  
Location of Laysan albatross during 2002 surveys.



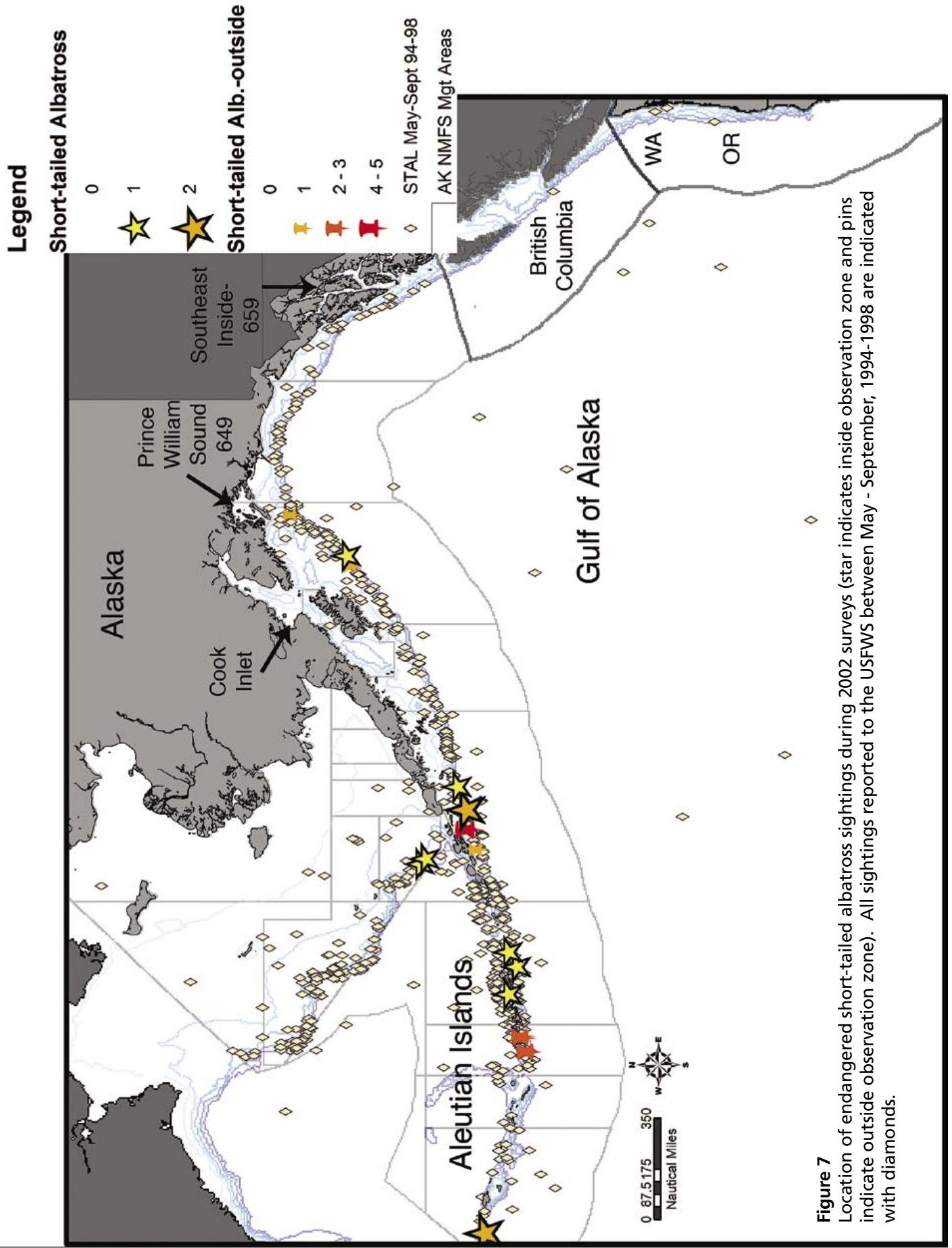
**Figure 4**  
 Mean observation rates of Laysan and black-footed albatrosses among NMFS management areas. Most observations occurred in outside waters (areas to left of black bar).



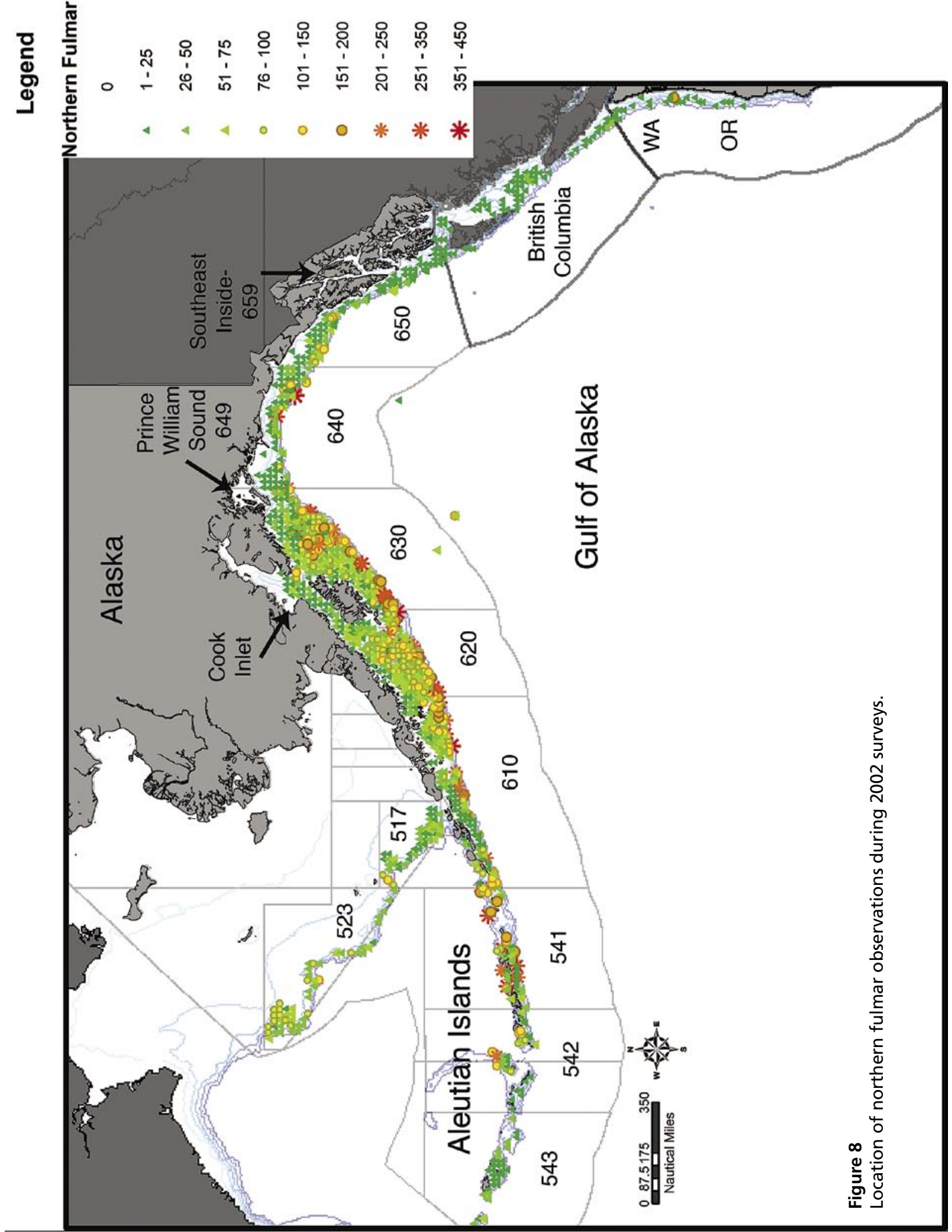
**Figure 5**  
Location of black-footed albatross observations during 2002 surveys.



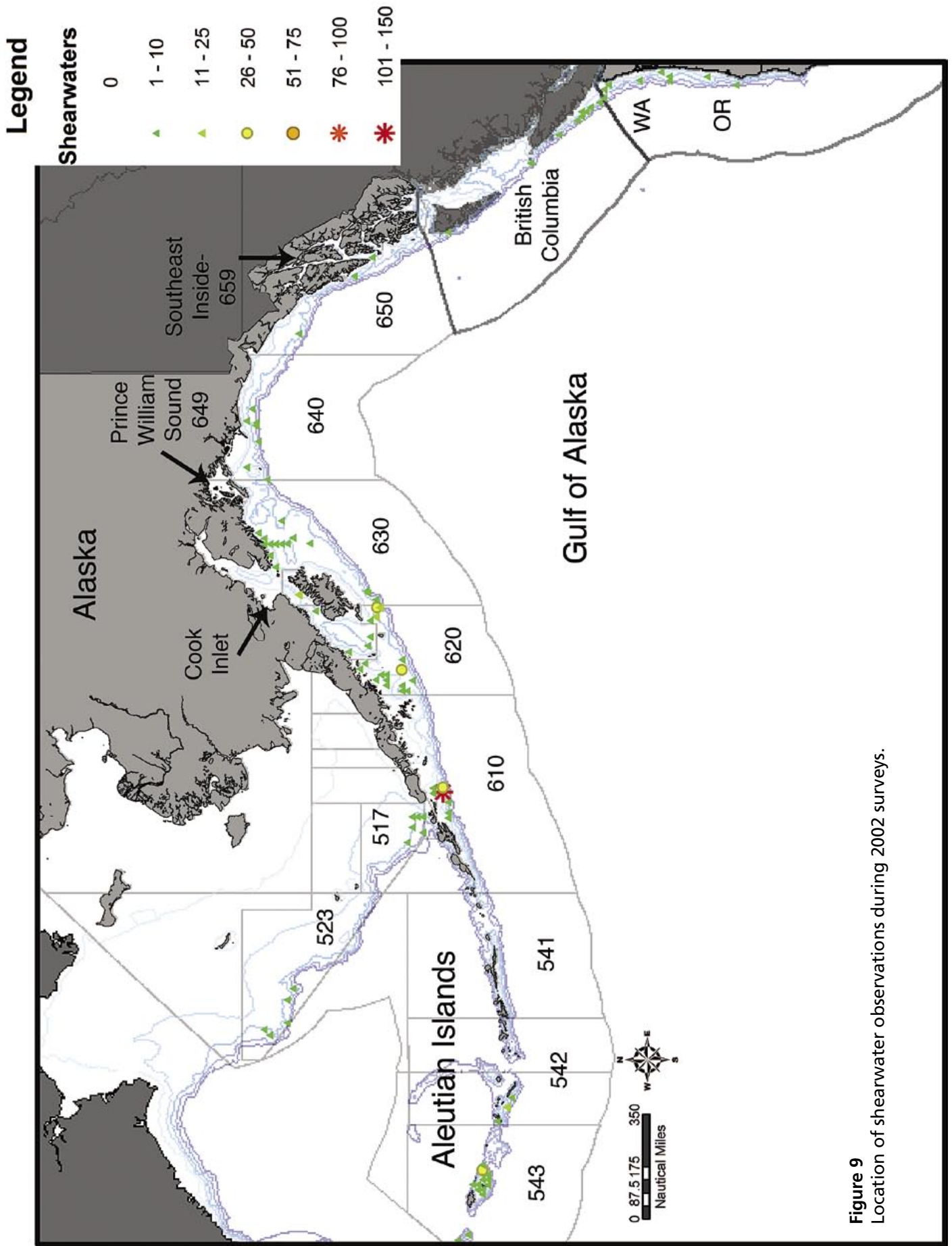
**Figure 6**  
Location of black-footed albatross (a), northern fulmar (b), shearwater (c), and gull (d) sightings during 2002 surveys in southeast Alaska



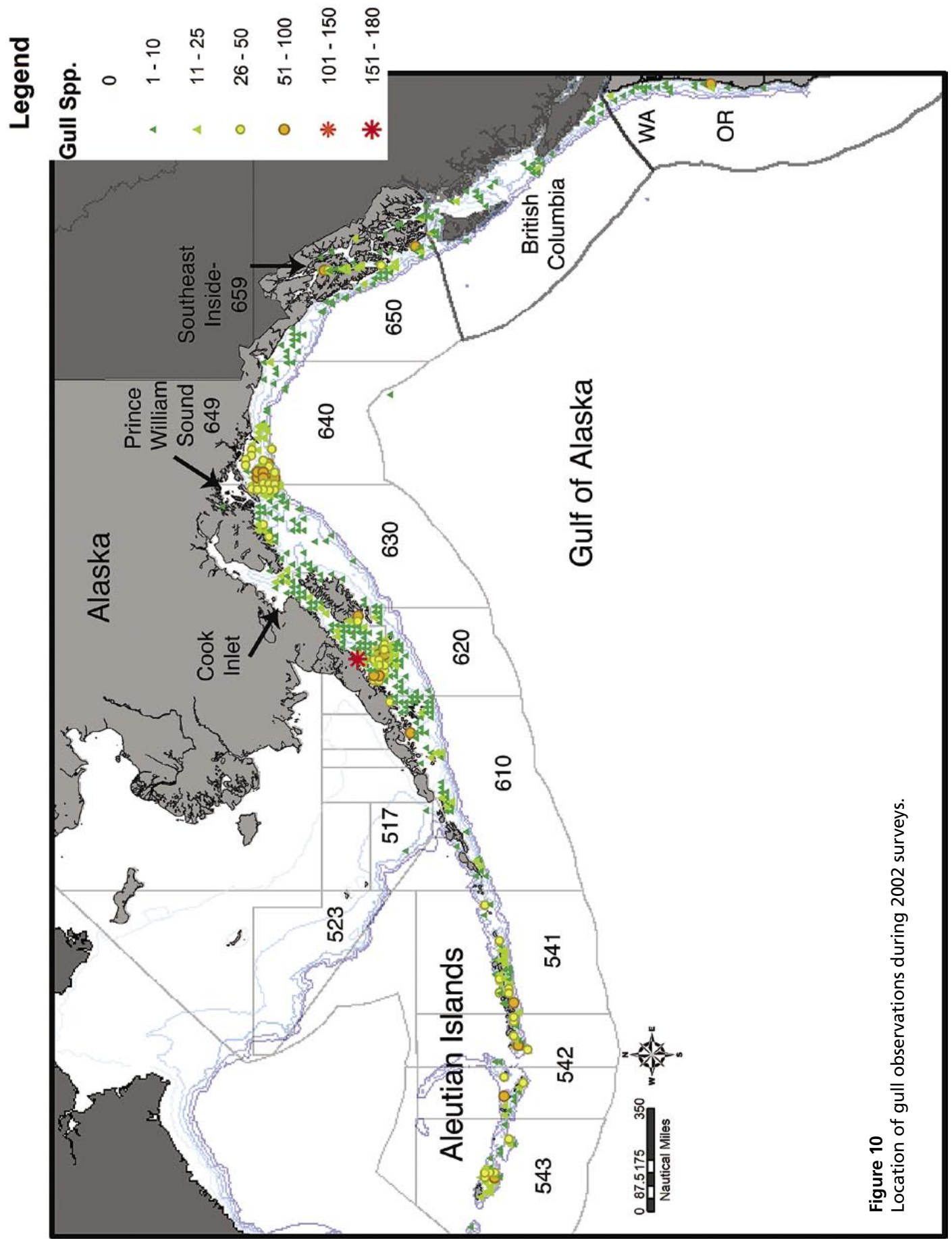
**Figure 7** Location of endangered short-tailed albatross sightings during 2002 surveys (star indicates inside observation zone and pins indicate outside observation zone). All sightings reported to the USFWS between May - September, 1994-1998 are indicated with diamonds.



**Figure 8**  
Location of northern fulmar observations during 2002 surveys.



**Figure 9**  
Location of shearwater observations during 2002 surveys.



**Figure 10**  
Location of gull observations during 2002 surveys.

**Table 1**

NMFS estimates of seabird bycatch in Alaska demersal groundfish longline fisheries (excluding halibut; NMFS 2003).

<b>Year</b>	<b>Fulmar</b>	<b>Gull</b>	<b>Albatross</b>	<b>Shearwater</b>	<b>Other/ Unidentified</b>	<b>Total</b>
1993	5,084	898	1,137	123	2,042	9,284
1994	5,084	1,764	608	701	3,008	11,165
1995	10,148	4,053	1,246	369	4,917	20,733
1996	6,301	1,608	1,130	501	571	10,111
1997	13,918	2,801	505	309	1,044	18,577
1998	16,452	4,466	1,962	1,144	2,063	26,087
1999	8,120	2,566	976	499	1,341	13,502
2000	11,238	4,683	704	556	1,715	18,896
2001	5,747	2,557	588	477	1,135	10,504
2002	830	2,606	87	154	418	4,095

**Table 2**

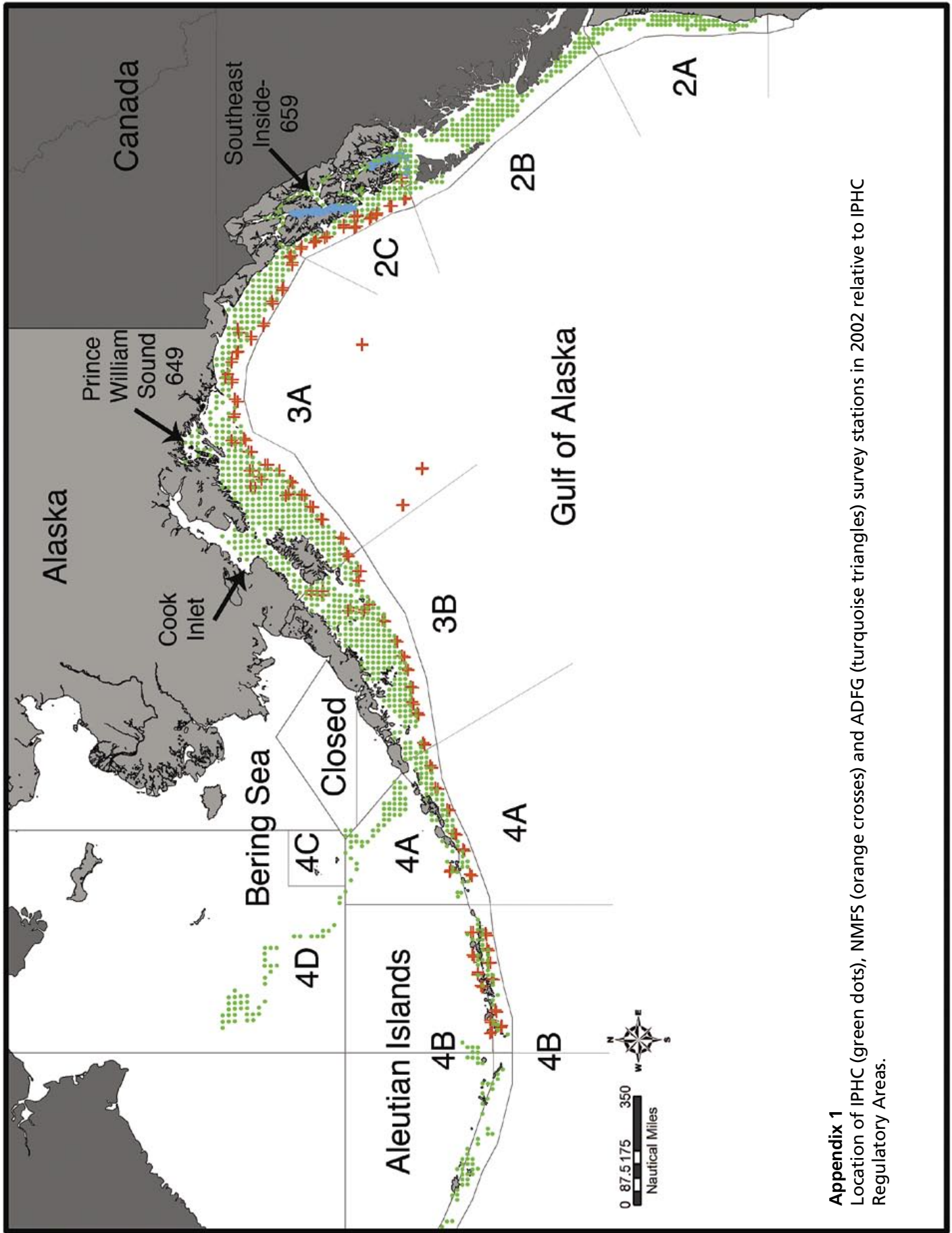
Mean seabirds per observation within several large geographic regions and NMFS management areas in Alaska. WA/OR includes sets made offshore of Washington and Oregon; BC includes sets made in British Columbia; Southeast Alaska (SE AK) is split between outside (NMFS management area 650) and inside (area 659) waters; Prince William Sound (PWS) includes area 649. Zero Birds indicates the percent of sets without any seabirds sighted in the observation zone.

	WA/OR	BC	SE AK outside (650)	West Yakutat (640)	Central GOA- Kodiak (630)	Central GOA- Chirikof (620)	Western GOA- (610)	Aleutian Islands (541-543)	Bering Sea (509-530)	SE AK inside (659)	PWS inside (649)	TOTAL
N sets	82	169	155	93	261	176	144	122	107	129	12	1450
LAAL	0.01	0.00	0.00	0.00	0.31	0.46	2.81	20.68	1.26	0.00	0.00	2.2
BFAL	8.05	2.25	5.84	9.51	5.72	3.63	5.13	0.44	0.18	0.03	0.00	4.0
STAL	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.04	0.02	0.00	0.00	0.0
Alb. Total	8.06	2.25	5.84	9.51	6.04	4.09	7.95	21.16	1.46	0.03	0.00	6.2
Fulmar	3.80	2.72	14.52	35.19	63.73	84.10	64.36	60.39	48.53	0.00	0.00	41.1
Shearwater	0.15	0.15	0.01	0.09	0.21	0.89	1.47	0.75	0.36	0.04	0.00	0.4
Gull Total	1.99	0.55	1.95	13.62	2.72	8.93	3.03	12.93	0.08	3.19	0.50	4.5
BLKW	0.00	0.00	0.08	0.16	0.23	0.38	0.04	0.07	0.72	0.00	0.33	0.2
RLKW	0.00	0.00	0.00	0.00	0.00	0.07	0.00	0.01	0.02	0.00	0.00	0.0
Other	0.15	1.81	3.17	2.52	4.11	2.94	1.97	0.67	1.21	0.05	0.00	2.2
Grand Total	14.1	7.5	25.6	61.1	77.0	101.4	78.8	96.0	52.4	3.3	0.8	54.6
Zero Birds	24%	37%	17%	8%	3%	0%	2%	0%	0%	67%	83%	15%

**Table 3**

Species sighted in the observation zone (Figure 1) during 2002 surveys.

Common Name	Scientific Name
Black-footed Albatross	<i>Phoebastria nigripes</i>
Laysan Albatross	<i>Diomedea immutabilis</i>
Short-tailed Albatross	<i>Diomedea albatrus</i>
Northern Fulmar (light & dark phase)	<i>Fulmarus glacialis</i>
Shearwater, unid.	<i>Puffinus</i> spp.
Sooty Shearwater	<i>Puffinus griseus</i>
Short-tailed Shearwater	<i>Puffinus tenuirostris</i>
Pink-footed Shearwater	<i>Puffinus creatopus</i>
Kittiwake, unid.	<i>Rissa</i> spp.
Black-legged Kittiwake	<i>Rissa tridactyla</i>
Red-legged Kittiwake	<i>Rissa brevirostris</i>
Storm-petrel, unid	<i>Oceanodroma</i> spp.
Leach's Storm-petrel	<i>Oceanodroma leucorhoa</i>
Fork-tailed Storm-petrel	<i>Oceanodroma furcata</i>
Gull, unid.	<i>Larus</i> spp.
Mew Gull	<i>Larus canus</i>
Herring Gull	<i>Larus argentatus</i>
Glaucous-winged Gull	<i>Larus glaucescens</i>
Puffin, unid.	<i>Fratercula</i> spp.
Tufted Puffin	<i>Fratercula cirrhata</i>
Rhinoceros Auklet	<i>Cerorhinca moncerata</i>
Murre, unid.	<i>Uria</i> spp.
Jaeger, unid.	<i>Stercorarius</i> spp.
Pomarine Jaegar	<i>Stercorarius pomarinus</i>
Parasitic Jaegar	<i>Stercorarius parasiticus</i>
Tern, unid.	<i>Sterna</i> spp.
Arctic Tern	<i>Sterna hirundo</i>
Cormorant, unid.	<i>Phalacrocorax</i> spp.
Pelagic Cormorant	<i>Phalacrocorax pelagicus</i>



**Appendix 1**  
 Location of IPHC (green dots), NMFS (orange crosses) and ADFG (turquoise triangles) survey stations in 2002 relative to IPHC Regulatory Areas.

**Appendix 2**  
Mean seabirds per observation within IPHC Regulatory Areas. Areas correspond to map in Appendix 1.

	2A	2B	2C	3A	3B	4A	4B	4D	Grand Total
N sets	82	171	222	429	257	127	111	51	1450
LAAL	0.01	0.00	0.00	0.19	0.98	3.96	21.26	0.53	2.2
BFAL	8.05	2.22	3.21	5.97	3.18	4.68	0.34	0.31	4.0
STAL	0.00	0.00	0.00	0.00	0.00	0.03	0.05	0.00	0.0
Alb. Total	8.06	2.22	3.21	6.16	4.16	8.67	21.65	0.84	6.2
Fulmar	3.80	2.70	3.16	48.93	84.14	52.13	52.89	58.39	41.1
Shearwater	0.15	0.15	0.03	0.13	0.65	1.85	0.82	0.31	0.4
Gull Total	1.99	0.56	2.98	4.76	7.21	1.68	13.71	0.00	4.5
BLKW	0.00	0.00	0.05	0.19	0.28	0.29	0.08	0.78	0.2
RLKW	0.00	0.00	0.00	0.00	0.05	0.02	0.01	0.00	0.0
Other	0.15	1.80	1.69	3.32	3.05	0.66	0.74	1.35	2.2
Grand Total	14.1	7.4	11.1	63.5	99.5	65.3	89.9	61.7	54.6
Zero Birds	24%	37%	46%	8%	0%	2%	1%	2%	15%

For more information visit: [www.wsg.washington.edu/outreach/mas/fisheries/fisheries.html](http://www.wsg.washington.edu/outreach/mas/fisheries/fisheries.html)  
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