BIOLOGICAL OPINION
of the
U.S. FISH AND WILDLIFE SERVICE
for the
EFFECTS OF THE HAWAII-BASED DOMESTIC LONGLINE FLEET
on the
SHORT-TAILED ALBATROSS (*Phoebastria albatrus*)

November 2000

TABLE OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

FIGURES

MAPS

ATTACHMENTS

I. Weights (in grams) used in the Hawaii Longline fishery

J. Incidental catch of albatrosses in the Hawaii longline fishery by set type above 23 degrees North Latitude; Number of Sets by Type Above 23 Degrees North Lat.; Number of Sets by Type Below 23 Degrees North Latitude; All observed seabird interactions with Hawaiian longline gear north of 23 degrees north latitude; All observed seabird interactions with Hawaiian longline gear north of 23 degrees north latitude; and Crude estimated take of albatross by species for tuna sets above 23 degrees north latitude.

K. Summary of estimated effectiveness of various mitigation measures in reducing the incidental catch of black-footed albatrosses (BF) and Laysan albatrosses (LA) in the Hawaii longline fishery.

United States Department of the Interior

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In reply refer to: 1-2-99-F-02

NOV 28 2000

Charles Karnella, Administrator
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Subject: Biological Opinion on the Effects of the Hawaiian Longline Fishery on the Short-tailed Albatross (*Phoebastria albatrus*) [FWS 1-2-99-F-02]

Dear Dr. Karnella:

This responds to your request for formal consultation under section 7 of the Endangered Species Act of 1973, as amended (Act), relative to Hawaiian longline fishery-related operations in the Pacific Ocean. The National Marine Fisheries Service (NMFS) is the action agency for this project. This document represents the U.S. Fish and Wildlife Service's (Service) biological opinion on the effects of the proposed project on the endangered short-tailed albatross (*Phoebastria albatrus*).

Your April 28, 1999, request for formal consultation was received on April 30, 1999. This biological opinion is based on the following information: 1) February 1999 biological assessment "Effects of the Hawaii-based Domestic Longline Fishery on the Short-tailed Albatross around the Hawaiian Islands" (BA) and NMFS' October 1999 amendment to the proposed action; 2) the biological literature (see References Cited at the end of the document; and 3) other information sources. Our log number for this consultation is FWS 1-2-99-F-02. Copies of pertinent materials and documentation are maintained in an administrative record in the Service's office in Honolulu, Hawaii.

CONSULTATION HISTORY

August 20, 1997: Field Supervisor Brooks Harper of the Pacific Islands Office of the Service recommended that NMFS initiate consultation under section 7 of the Endangered Species Act of 1973, as amended (Act), concerning the Hawaiian longline fishery operations and its potential impacts to short-tailed albatross.

February 18, 1999: NMFS Pacific Islands Area Office transmitted to the Service's Pacific Islands Office its BA, "Effects of the Hawaii-based Domestic Longline Fishery on the Short-tailed Albatross around the Hawaiian Islands."

March 19, 1999: The Service's Alaska Ecological Services Field Office issued its "Biological Opinion on the Effects of Hook-and-line Groundfish Fisheries in the Gulf of Alaska and Bering Sea/Aleutian Islands Areas on Short-tailed Albatrosses (*Phoebastria albatrus*)."

March 25, 1999: In a letter to NMFS, the Service's Pacific Islands Office acknowledged receipt of the BA from NMFS, but was unable to concur with NMFS' finding of "not likely to adversely affect" the federally listed short-tailed albatross.

April 21, 1999: In a letter to NMFS, the Service acknowledged termination of formal consultation under section 7 on this issue, due to agency disagreement on the need for formal consultation under section 7.

April 28, 1999: In a letter to the Service, NMFS requested initiation of formal consultation under section 7 with the Service on this issue, stating their commitment to "actively consult with" the Service during preparation of a biological opinion.

May 4, 1999: In a letter to NMFS, the Service agreed to conduct formal consultation under section 7 with NMFS, and clarified six points raised in the April 28, 1999, letter from NMFS.

May 14, 1999: The Service and NMFS met to consult on the development of the biological opinion. NMFS agreed to provide the Service with information pertaining to Distant Water Fishing Fleet fishing effort on the high seas of the north Pacific, as well as local fishing effort information and data results from the recently completed seabird mitigation study.

November 16, 1999: The Service and NMFS met to discuss the results of the 101st Western Pacific Regional Fishery Management Council (WPRFMC) meeting concerning regulations to mitigate interactions between the Hawaii-based longline fishery and black-footed and Laysan albatrosses and the "Proposed Action" for this consultation.

December 15, 1999: The Service delivers the "Draft Biological Opinion on the Effects of the Hawaiian Longline Fishery on the Short-tailed Albatross (*Phoebastria albatrus*)[FWS 1-2-99-F-02]" to NMFS and requests comments to be submitted by February 15, 2000.

February 15, 2000: NMFS submits comments on the draft biological opinion for the short-tailed albatross (FWS 1-2-99-F-02) to the Service.

February 25, 2000: NMFS and the Service meet to discuss NMFS comments on the draft biological opinion, and agree to the need for more information in order for the Service to complete a second draft of the biological opinion for NMFS review.

March 24, 2000: In a letter to the Service, NMFS agrees to a time limit for reporting seabird interaction data and information regarding the effectiveness of seabird mitigation methods; NMFS agrees to confirm the captain's name and observer name were collected when a short-tailed albatross is hooked or entangled on longline gear; provides rationale for giving fishers the option to select various seabird deterrent measures, rather than requiring the measures as mandatory (Charles Karnella, NMFS, pers. commun, 2000).

June 14, 2000: In a letter to the Service, NMFS requests the final biological opinion be issued by 16 June (Charles Karnella, NMFS, pers. commun, 2000).

June 16, 2000: In a letter to the Service, NMFS requests that consultation on the short-tailed albatross be extended to June 23, 2000 (Charles Karnella, NMFS, pers. commun, 2000).

June 19, 2000: In a telephone call between Charles Karnella (NMFS) and Don Palawski (Service), NMFS requests that a copy of the draft biological opinion be sent via email and hard copy mailed to the NMFS Pacific Island Area Office (Charles Karnella, NMFS, pers. commun, 2000).

June 19, 2000: The Service delivers the "Draft Biological Opinion on the Effects of the Hawaiian Longline Fishery on the Short-tailed Albatross (*Phoebastria albatrus*)[FWS 1-2-99-F-02]" to NMFS (Paul Henson, Service, pers. commun. 2000).

June 22, 2000: In a letter to the Service, NMFS requests that consultation on the short-tailed albatross be extended to July 07, 2000 (Charles Karnella, NMFS, pers. commun, 2000).

June 23, 2000: In a letter to the NMFS, the Service agrees to extend the formal consultation period to July 7, 2000 (Paul Henson, Service, pers. commun. 2000).

July 5, 2000: NMFS publishes a proposed rule in the federal register (Vol. 65, No. 129-41424) under the Pelagic Fisheries Management Plan which would require operators of vessels registered for use under Hawaii longline pelagic limited access permits to use two or more of six specific bird mitigation techniques when fishing with pelagic longline gear above 25 degrees North lat.; annually attend a protected species workshop conducted by NMFS; and release all hooked or entangled seabirds in a manner that maximizes their post-release survival.

July 7, 2000: In a letter to the Service, NMFS requests that consultation on the short-tailed albatross be extended to July 21, 2000 (Charles Karnella, NMFS, pers. commun, 2000).

July 7, 2000: In a letter to the NMFS, the Service agrees to extend the formal consultation period to July 21, 2000 (Paul Henson, Service, pers. commun. 2000).

July 17, 2000: In a letter to the Service, the NMFS provided comments on the June 16 draft of the biological opinion (Charles Karnella, NMFS, pers. commun, 2000).

July 27, 2000: In a letter to NMFS, the Service responds to comments contained in the NMFS July 17 communication (Paul Henson, Service, pers. commun. 2000).

July 31, 2000: The final rule to list the short-tailed albatross as endangered in the United States was published in the federal register Vol. 65, No. 147/Monday 7/31/00 - pgs. 46643 - 46654.

August 8, 2000: In a letter to the Assistant Regional Director (Ecological Services, Region 1, Portland, Oregon) the Field Supervisor (Ecological Services, Pacific Islands Ecoregion, Honolulu, Hawaii) provides comment on (**ER 00/540**) "Review of Proposed Rulemaking for Fisheries Off West Coast States and in the Western Pacific; Pelagics Fisheries; Measures to Reduce the Incidental Catch of Seabirds in the Hawaii Pelagic Longline Fishery (NMFS rulemaking) (Paul Henson, Service, pers. commun. 2000)."

August 14, 2000: Biologists from the Service meet with NMFS staff to discuss the draft terms and conditions of the biological opinion. Meeting participants include: From the Service - Paul Henson, Marilet Zablan and Kevin Foster and from NMFS - Charles Karnella, Alvin Katekaru, Chris Boggs and Kathy Cousins. The meeting was held at the NMFS' Pacific Islands Area Office.

September 5, 2000: In a letter to the Service, the NMFS provided comments on issues raised in the Service letter, dated July 27, and Service comments at the August 14 meeting to discuss outstanding issues pertaining to the Terms and Conditions of the draft biological opinion (Charles Karnella, NMFS, pers. commun, 2000).

September 7, 2000: In a letter to the NMFS, the Service provides brief comments on the NMFS letter of September 5 (Paul Henson, Service, pers. commun. 2000).

October 4-5, 2000: Teleconference calls between the Service and NMFS to discuss Terms and Conditions of the draft biological opinion. Meeting participants included: NMFS - Laurie Allen and Steve Leathery; Service - Paul Henson, Marilet Zablan and Kevin Foster.

October 6, 2000: In a letter to the Service, the NMFS indicates that Laurie Allen and Steve Leathery will work with the Service and NMFS PIAO office to assist finalize the draft biological opinion (Penny Dalton, NMFS, pers. commun. 2000).

October 6-26, 2000: Teleconference calls between the Service and NMFS to discuss Terms and Conditions of the draft biological opinion. Meeting participants included: NMFS - Steve Leathery; Service - Marilet Zablan and Kevin Foster.

October 27, 2000: Teleconference call between the Service and NMFS to discuss factors that influence interaction between sea turtles and longline gear. Meeting participants included: NMFS Chris Boggs; Service - Marilet Zablan and Kevin Foster.

October 31, 2000: In a phone message to the Service, NMFS indicates its final position on certain terms and conditions of the biological opinion (Steve Leathery, NMFS, pers. commun. 2000).

November 9, 2000: In a letter to the Service, the NMFS provided further comments on the proposed Terms and Conditions contained in the June 19, 2000 draft of the biological opinion (Charles Karnella, NMFS, pers. commun, 2000)

November 17, 2000: In a facsimile to the Service, the NMFS provides the attachment from the September 5, 2000 (C. Karnella pers. commun, 2000) which contained technical comments to the June 19, 2000 draft biological opinion.

NMFS provided the Service's Pacific Islands Office information requested to write this biological opinion. Fish catch and effort information and the general area where fishing operations occur were used to characterize the Hawaiian longline fishery and its impacts to short-tailed albatross. Alaskan fishery operations and their impacts to short-tailed albatross are described in this opinion. Distant water fishing fleets (*e.g.*, Japan, Korea, and Taiwan) and their operations are described in relation to their threat to short-tailed albatross.

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the continued operation of the Hawaiian longline fishery through December 31, 2006. This consultation addresses all longline fishing vessel-related activities and experimental fisheries authorized and/or managed by NMFS in the area of the Pacific Ocean where Hawaiian longline fishing vessels operate and target pelagic species within the range of the short-tailed albatross.

Hawaiian longline vessels are categorized by length as small vessels (<56 feet [ft] or 18.7 meters [m]), medium vessels (56-74 ft [18.7-24.7 m]), and large vessels (74-94 ft [24.7-31.3 m]). Currently, there are 164 vessels permitted. The Hawaii longline fishery operates under a limited entry program with vessel permits issued every five years. Fishing trips are usually defined as tuna trips, swordfish trips or mixed trips (fishing for both tuna and swordfish).

The proposed action is the Hawaiian longline fishery described above, where the Hawaiian longline fishing vessels conduct fishery-related activities that overlap with the range of the short-tailed albatross. Currently, the short-tailed albatross is listed as endangered throughout its range, including the United States. Therefore, this consultation addresses Hawaiian longline fishing activities that occur in the U.S. Exclusive Economic Zone (EEZ), which is from 3 to 200 nautical miles (5.6 to 370 km) from shore and in international waters, which are 200 nautical miles (370 km) and further from shore.

NMFS is an agency within the U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA). NMFS manages the pelagic fisheries of the western Pacific region in the EEZ off Hawaii, Guam, the Commonwealth of the Northern Mariana Islands, American Samoa and various other U.S. possessions in the Pacific under the authority of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The WPRFMC is a liaison between NMFS and the fishing industry and develops management proposals in the form of Fishery Management Plans and Amendments for NMFS' consideration and implementation.

The Hawaiian longline fishery occurs in the Pacific Ocean between 1° and 50° north latitude, as far east as 135° west longitude, and as far west as 170° east longitude. Descriptions of the Hawaiian longline fisheries, and the management of those fisheries by NMFS are contained in the following documents and meeting minutes:

1. Pelagic Fisheries Fishery Management Plan (PFMP) of the Western Pacific Region, effective March 23, 1987. The PFMP establishes a framework for pelagic fisheries management and includes: regulating foreign fishing vessels in the U.S. Pacific insular EEZ through vessel permits and area closures, prohibiting drift gillnet fishing except for experimental purposes, and defining pelagic management unit species, observer requirements, and catch reports.

2. Amendment 1 to the PFMP, June 29, 1991. Required a measurable definition of recruitment overfishing for each species or species complex in the PFMP, and defined the optimum yield for pelagic management unit species.

3. Amendment 2 to the PFMP, May 31, 1991. Required domestic longline vessels to have Federal permits and maintain Federal fishing logbooks and place observers on vessels that fish within 50 nautical miles (93 km) of the Northwestern Hawaiian Islands (NWHI); and included the Commonwealth of the Northern Mariana Islands in the PFMP.

4. Amendment 3 to the PFMP, October 18, 1991. Established a 50-nautical-mile- (93-km-) longline exclusion zone around the NWHI as a conservation measure to reduce Hawaiian longline fishing gear interaction with the federally listed endangered Hawaiian monk seal (*Monachus schauinslandi*), and a mandatory observer program to collect data on sea turtle interactions with Hawaiian longline gear.

5. Amendment 4 to the PFMP, October 16, 1991. Established a three-year moratorium (which expired on April 22, 1994) on new entrants into the Hawaiian longline fishery and established a vessel monitoring system.

6. Amendment 5 to the PFMP, March 4, 1992. Established a 50- to 75-nautical-mile- (93- to 139-km-) zone around the Main Hawaiian Islands (MHI) and a 50-nautical-mile- (93-km-) zone around Guam, which excluded longline fishing vessels.

7. Amendment 6 to the PFMP, January 1, 1992. In conjunction with the MSFCMA, included tuna species under U.S. management authority.

8. Amendment 7 to the PFMP, January 14, 1994. Established a limited entry program for the Hawaiian longline fishery, and limited the number of vessels in the fishery to 164 boats of a size not to exceed 101 ft (34 m) in length.

9. Pelagic Fisheries of the Western Pacific Region. 1997 Annual Report, October 1998. WPRFMC, Honolulu, Hawaii.

10. 100th WPRFMC Meeting, June 1999. WPRFMC discussed results of the seabird deterrent study conducted by Garcia and Associates (1999) and the seabird deterrent study conducted by Boggs (in press), and possible regulations for the Hawaiian longline fleet.

11. 101st WPRFMC Meeting, October 1999. WPRFMC adopted measures to mitigate interactions between the Hawaii-based longline fishery and the black-footed and Laysan albatrosses. These measures were proposed to NMFS, which in turn, will consider implementing them as formal measures to regulate the fishery.

12. Measures to Reduce the Incidental Catch of Seabirds in the Hawaii Longline Fishery - A Framework Adjustment to the Western Pacific Pelagic Fisheries Management Plan - Including an Environmental Assessment and Regulatory Impact Review/Regulatory Flexibility Analysis. December 12, 1999 (Revised March 2000) - Western Pacific Regional Fisheries Management Council.

13. Environmental Assessment for the Pelagic Fisheries of the Western Pacific Region - For an Interim Period Pending Completion of an Environmental Impact Statement - August 2000 Final. National Marine Fisheries Service

On October 29, 1999, NMFS amended their proposed action (BA) to include certain measures adopted by the WPRFMC (at the 101st WPRFMC meeting) concerning seabirds. The February 1999 BA reviewed, but did not propose any, use of seabird deterrent devices or measures. The measures proposed by NMFS and reviewed for this consultation now include:

1. Seabird mitigation measures will be required for all Hawaii-based longline vessels operating north of 25° north latitude.

2. Hawaii-based longline fishermen must use at least two of the following six mitigation measures when setting and hauling the longline gear:

a) Night setting: The longline set must begin at least one hour after sunset and the set must be completed at least one hour before sunrise, using only the minimum vessel lights necessary for safety. The purpose of setting fishing gear during hours of darkness is to reduce the visibility to seabirds of baited hooks at the water's surface.

b) Blue-dyed and thawed bait: An adequate quantity of blue dye must be maintained on board, and only bait dyed a color that conforms to NMFS standards may be used. All bait must be completely thawed before the longline is set. The purpose of dyeing bait blue is to reduce the attractiveness to seabirds of baited hooks at the water's surface. Also, completely thawed bait tends to sink faster than frozen bait during the longline set, thereby reducing the time that baited hooks are accessible to seabirds.

c) Towed deterrent: A line with suspended streamers (tori line) or a buoy that conforms to NMFS standards must be deployed when the longline is being set and hauled. These devices scare seabirds from baited hooks at the water's surface as well as provide a physical barrier that reduces the ability of seabirds to approach the hooks.

d) Weighted branch lines: Weights at least 45 grams must be attached to branch lines within one meter of each baited hook. The purpose of attaching weights to branchlines is to increase the sink rate of baited hooks, thereby reducing the availability of baited hooks to seabirds.

e) Line-setting machine and weighted branch lines: Weights at least 45 grams must be attached to branch lines within one meter of each baited hook. In addition, the longline must be set with a line-setting machine (line-shooter) so that the longline is set faster than the vessel's speed. The purpose of this measure is to remove line tension during the set, thereby increasing the mainline sink rate and reducing the time that baited hooks are at the surface and accessible to seabirds.

f) Discharge offal strategically: If any swordfish are landed, the liver must be removed and the head must be severed from the trunk, the bill removed and the head cut in half vertically. The heads and the livers must be periodically thrown overboard on the opposite side of the vessel to where the longline is being set or hauled to deter birds from fishing operations. In addition to swordfish, spent bait and any fish offal must be thrown overboard on the opposite side of the vessel from where the longline is being set or hauled. The intent of this measure is to divert seabirds from baited hooks to other food sources.

3. If seabirds are incidentally hooked, proper handling techniques must be followed to help ensure that birds brought onboard alive are released alive and that hooks are removed without jeopardizing the life of the birds.

4. All vessel captains must complete an annual protected species educational workshop conducted by NMFS. The workshops will be conducted with Vietnamese and Korean interpreters.

Description and History of the Hawaiian longline fishery

The Hawaiian longline fishery is comprised of vessels that make swordfish trips, mixed trips and tuna trips. It has been reported that most of the interactions between seabirds and the Hawaiian longline fishery occur when fishers target swordfish (P. Dalzell, WPRFMC, pers. commun. 1999). The manner in which gear is deployed differs when fishers target swordfish vs. tuna. Gear deployed during tuna sets is set with a line shooter and sinks rapidly, as opposed to swordfish sets in which gear is set taught and sinks slowly (Boggs 1992).

Longline gear consists of a main line, usually 20-50 nautical miles (77-93 km) of monofilament (Dollar 1991) with branch-lines spaced about every 100 - 330 feet (30 - 100m) apart (C. Boggs, National Marine Fisheries Service, pers. commun. 1999). Branch-lines are roughly 42 ft (14 m) long (J. Cook, WPRFMC, pers. commun. 1999), with one hook per branch-line. Fishers employ "J hooks" on swordfish trips, while modified J hooks or tuna hooks are used on tuna trips. Bait may consist of whole squid (*Illex* sp.) for swordfish trips, saury (*Cololabis* sp.) or mackerel (*Scomber* sp. or *Auxis* sp.) for tuna trips (J. Cook, pers. commun. 1999). Hawaii longline vessels targeting swordfish or a mixture of swordfish and bigeye tuna attach light sticks to some or all of the branch-lines to attract fish to the baited hooks (Boggs and Ito 1993).

Longline fishers that target tuna species set the main line using a shooter which deploys line faster than the vessel moves through the water. This puts slack into the line so the line can sag between floats (Boggs 1992). After sinking, the line fishes at depths of about 600 - 1,200 feet (200 - 400 m)(C. Boggs, pers. commun., 1999). When targeting swordfish, the main line is set without a line shooter at the same speed as the vessel moves through the water. Thus, the line is taught and stretches along the surface for several hundred meters behind the vessel. The main

line eventually sinks and fishes at depths between 90 and 270 ft (30 and 90 m) (C. Boggs, pers. commun. 1999). Branch-lines are weighted with about 45 to 90 grams (1.5 to 3.2 ounces) of weight in the middle of the branch-line for swordfish trips. Branch lines are weighted during tuna trips, but these weights vary in size and are usually smaller than those used for targeting swordfish (Attachment I). Floats (known as "7 by 15 foam floats") often are spaced between every 3 or 4 hooks for swordfish trips. For tuna trips, floats (360 mm or 14.2 inches) are negatively buoyant and are spaced between every 25 to 30 hooks (J. Cook, pers. commun. 1999). Fishers set 700-1,000 hooks per set during swordfish trips and 1,000-2,000 hooks per tuna trip (NMFS 1998a). Autobaiting machines are not used on either swordfish or tuna trips in the Hawaiian longline fishery.

During swordfish trips, fishers generally deploy or set their longline gear late in the afternoon to early evening, as swordfish are known to rise from deeper waters and feed near the surface at night. In about 90 percent of swordfish sets the deployment and soak occurs at night (He *et al.*, 1997). Fishing vessels travel at about 9 nautical miles (17 km) per hour when setting the line. Gear deployment usually takes about 6 hours, depending upon the length of the main line. This means that gear is fully deployed at about midnight. Gear will soak for up to 6 or 7 hours. Haulback operations begin in the early morning hours around dawn, and usually take from 8 to 10 hours to retrieve all of the gear and catch. Fishing vessels travel at about 4 to 5 nautical miles (7 to 9 km) per hour during haulback operations (J. Cook, pers. commun. 1999).

For tuna trips, gear deployment usually occurs early in the morning. For 85 percent of tuna sets made in the fishery, deployment and soak occur in the day (He *et al.*, 1997). Tuna sets usually begin at about dawn (E. Mitchell, pers. commun. 2000) and gear deployment usually takes only 3 to 4 hours, at a speed of about 6 to 9 nautical miles (11 to 17 km) per hour. The gear soaks for up to 7 hours, and then is hauled back after about 8 to 10 hours. Fishing vessels travel at about 3 to 4 nautical miles (6 to 7 km) per hour during haulback operations (J. Cook, pers. commun. 1999).

In 1998, 114 out of 164 permitted vessels actively participated in the Hawaiian longline fishery (Table 1), slightly up from the 105 permitted vessels that participated in the fishery in 1997. Total landings for longline vessels were about 28.5 million pounds in 1998, up from 27.1 million pounds in 1997 (Table 2). The total number of hooks set in 1996 was: swordfish trips (932,777), mixed trips (3,080,174) and tuna trips (10,388,580). The total number of hooks set by Hawaiian longline fishers in the following year, 1997, was: swordfish trips (840,539), mixed trips (2,512,069) and tuna trips (12,206,163). The total number of hooks set by Hawaiian longline fishers in 1998, was: swordfish trips (1,019,960), mixed trips (2,859,857) and tuna trips (13,486,035) (Table 3). In 1996, the total number of longline fishing trips came to: 92 swordfish trips, 351 mixed trips, and 652 tuna trips. In 1997, the number of longline fishing trips resulted in: 78 swordfish trips, 301 mixed trips, and 745 tuna trips. In 1998, the number of longline fishing trips resulted in: 84 swordfish trips, 296 mixed trips, and 760 tuna trips (Table 3).

In 1996 (Table 3), the catch per unit effort (CPUE) per 1,000 hooks set for swordfish trips was

highest among species of sharks (25.52), swordfish (14.17), and albacore (5.79). Mixed trip CPUE was highest for species of sharks (15.29), swordfish (7.56), bigeye (4.26) and albacore tuna (3.45), and mahimahi (3.42). Tuna trip CPUE was highest for species of bigeye (4.73) and albacore tuna (3.98), and sharks (2.90).

In 1997 (Table 3), the CPUE per 1,000 hooks set for swordfish trips was highest among species of swordfish (15.41), sharks (14.20) and mahimahi (10.24). The CPUE for mixed trips was highest for sharks (16.39), swordfish (9.97), and mahimahi (9.12). The CPUE for tuna trips was highest for bigeye (5.68) and albacore tuna (5.05).

In 1998 (Table 3), the CPUE per 1,000 hooks set for swordfish trips was highest among species of sharks (23.01), and swordfish (14.50). The CPUE for mixed trips was highest for sharks (12.16), and swordfish (9.22). The CPUE for tuna trips was highest for bigeye (6.13) and albacore tuna (3.02), and sharks (3.09).

Longline vessels have been operating in Hawaiian waters since 1917. In the early 1950s vessels landed an average of 7,000 lbs of fish per trip (Boggs and Ito 1993). Between 1948 and 1987, longline vessel landings ranged between 746,000 and 4,448,000 lbs (Table 4). In 1988, vessel landings jumped to 6,733,000 lbs, and continued to increase over the next nine years to an all time high of 27,148,000 lbs landed in 1998. A total of 1,139 trips were made in 1998 (Table 6) indicating an average CPUE of 24,000 lbs per trip, over three times higher that it was in the early years of the fishery. The increase in landings were attributed to the establishment of new fish markets in Hawaii and abroad, as well as technological advances in the practice of harvesting swordfish (Boggs and Ito 1993).

From 1991 to 1998, the average annual number of hooks set by longliners was 13,443,060 (Table 5). During this period, the frequency of tuna trips increased, while the trend to conduct mixed and swordfish trips declined (Table 6). Between 1987 and 1998, Hawaiian longline vessels targeted various billfish and tuna species. Average landings for these species during this period were: broadbill swordfish (*Xiphias gladius*) 6,007,000 lbs, blue marlin (*Makaira nigricans*) 761,000 lbs, and striped marlin (*Tetrapterus audax*) 1,024,000 lbs (Table 7); and albacore (*Thunnus alalunga*) 1,436,000 lbs, bigeye (*Thunnus obesus*) 4,137,000 lbs, and yellowfin (*Thunnus albacares*) 1,705,000 lbs (Table 8). Swordfish catch per unit effort by longline trip type for the period 1991 to 1997 averaged: 13.8 for swordfish trips, 7.8 for mixed trips and 0.2 for tuna trips (Table 9). Tuna catch per unit effort by tuna trip, by species, for the period 1991 to 1998 averaged: 2.6 for albacore, 4.9 for bigeye, and 1.2 for yellowfin (Table 10).

The number of hooks set by quarter averaged over 1991 to 1994 (Curran *et al.* 1996) (Attachment A) indicates that longline fishing effort occurred between 7° and 35° north latitude, and 145° and 180° west longitude for the first quarter (January and March) with most of the effort directed in the vicinity, and north, of the NWHI and some effort directed near, and south of the Main Hawaiian Islands (MHI). For the second quarter (April and June) the fishery occurred between 2° and 33° north latitude, and 148° west and 170° east longitude with most effort

directed north, west and some effort east, of the NWHI, and substantial effort directed south and west of the MHI. For the third quarter (July - September) the fishery occurred between 13° and 48° north latitude, and 145° west and 171° east longitude with most of the effort concentrated to the area northwest of the NWHI, some to the northeast of the NWHI and a modest amount to the south of the MHI. For the fourth quarter (October - December) the fishery occurred between 7° and 43° north latitude, and 148° west and 173° east longitude, with most of the effort concentrated north of the NWHI and a modest amount south of the MHI.

It appears that swordfish catches peaked in the first and second quarters of the year, with modest yields for the later half of the year (Attachment B). Albacore catches occurred north and east of the NWHI during the first quarter; around the MHI during the second and third quarters; and north and east of the NWHI, and north of the MHI during the fourth quarter (Attachment C). Bigeye catches concentrated around the MHI for the first quarter; south of the MHI for the second quarter; and around the MHI for the third and fourth quarters (Attachment D). Finally, yellowfin catches occurred around the MHI for the first quarter; south of the MHI for the second quarter; and concentrated around the MHI for the third and fourth quarters (Attachment E).

Some Hawaiian longline fishing vessels fish in the vicinity of Hawaii, but land their catch in other ports (*e.g.*, California). NMFS obtains landings data from Hawaii-permitted vessels fishing out of California. These landings are reported in the NMFS Western Pacific Daily Longline Fishing Log logbook program.

Additional descriptions of the Hawaii longline fishery are included in other documents (Dollar 1991, Boggs and Ito 1993, Curran *et al.* 1996, He *et al.* 1997, WPRFMC 1998, Ito and Machado 1999, Bigelow *et al.* 1999).

Below is a summary of conservation measures that have occurred in relation to the Hawaiian longline fishery that may have benefitted short-tailed albatrosses:

May 1991: The Council and NMFS establish a 50 nautical mile Protected Species Closed Areas to reduce the interactions between the Hawaii longline fishery and the endangered Hawaiian Monk Seal in 1991.

January 1994: The number and size of Hawaii longline fishing vessels are limited by Amendment 7 of the FMP, in part to limit impacts on sea turtles but with potential benefit to albatross.

February 1994: An hour of instruction in seabird identification using slides was provided by Scott Johnston of the Service for the first group of NMFS fisheries observers.

April 1996: Dr. Elizabeth Flint, of the Service, presented classroom instruction in identification techniques and assisted at a session at the Bishop Museum in Honolulu, where new observers were able to look at actual seabird specimens. The Service also provided

copies of field guides for the observers to use while at sea.

September 1996: The first Albatross Workshop for Hawaiian longline fishers was conducted by WPRFMC and the Service. The workshop reviewed albatross biology, laws protecting seabirds, and mitigation techniques. Copies of the Australian book "Catch Fish Not Birds" were disseminated to Hawaiian longline fishers. The book was translated into Korean and Vietnamese in an attempt to reach all fishers. A laminated card detailing mitigation techniques and including photographs of the three albatross species was distributed to all vessels and made available in both English and Vietnamese languages.

January 1997: A second Albatross workshop was conducted by WPRFMC and the Service. The workshop reviewed albatross biology, laws protecting seabirds, and mitigation techniques. Copies of the Australian book "Catch Fish Not Birds" were disseminated to Hawaiian longline fishers. The book was translated into Korean and Vietnamese in an attempt to reach all fishers. A laminated card detailing mitigation techniques and including photographs of the three albatross species was distributed to all vessels and made available in both English and Vietnamese languages.

March 1997: Research Vessel (R/V) Townsend-Cromwell, Cruise TC-97-03 (March 20 - April 18, 1997) deployed a Service-provided tori pole to test its effectiveness as a device to deter birds from interacting with longline gear. A short-tailed albatross was sighted during haulback operations.

September 1997: A laminated card was produced to aid fishers in identifying the three species of albatross (short-tailed, black-footed and Laysan albatross) that occur in the north Pacific. The pamphlet was produced with support from the North Pacific Longline Association, the National Audubon Society (Living Oceans), Sea Grant, the U.S. Fish and Wildlife Service, NMFS, the International Pacific Halibut Commission and A&A Printing Seattle. The laminated card was disseminated to fishers by the WPRFMC.

June 1998: Dr. Elizabeth Flint, of the Service, presented classroom instruction in identification techniques and assisted at a session at the Bishop Museum in Honolulu, where new observers were able to look at actual seabird specimens. The Service also provided copies of field guides for the observers to use while at sea.

October 1998: WPRFMC convened "The Black-footed Albatross Population Biology Workshop" to determine the population biology and the effects that the Hawaiian longline fishery is having on this species. One of the products of this effort was the development of a bird-banding relational database for the species.

Garcia and Associates Consultants began testing the effectiveness of various seabird mitigation techniques on regular fishing trips, under contract by WPRFMC.

November 1998: In a memo from Donald A. Peterson to Hawaii Longline Personnel (Collection of dead Short-tailed Albatross Data Update Circular No. 26), NMFS observers were instructed to collect and return to port any short-tailed albatross retrieved dead during longline fishing operations. The same memorandum asked that any seabirds retrieved alive have any line and hook removed if possible, be described and the characteristics recorded, have their leg band data recorded, and be photographed before release.

February 1999: The R/V Townsend-Cromwell tested the effectiveness of various seabird mitigation techniques. A report of this study is in press (C. Boggs, in press). Prior to this cruise, Service biologists trained the fisheries biologists in seabird identification.

October 1999: Western Pacific Regional Fishery Management Council proposes a menu format to allow fisher to select certain seabird deterrent measures when setting and hauling longline gear.

November 10 and 17, 1999: Dr. Elizabeth Flint, of the Service, presented classroom instruction in identification techniques and assisted at a session at the Bishop Museum in Honolulu, where new observers were able to look at actual seabird specimens. The Service also provided copies of field guides for observers to use while at sea.

January 23, 2000: A NMFS observer reported seeing a juvenile short-tailed albatross flying near a Hawaii-based longline fishing vessel while hauling back the longline. The bird was sighted at 0837am at 33°09'2" north latitude and 147°49'6" west longitude. The bird was flying in a group of about 10 to 15 black-footed albatrosses (*P. nigripes*) and was in sight of the longline vessel for approximately one and a half hours.

II. STATUS OF THE SPECIES

A. Species Description

George Steller provided the first record of the short-tailed albatross in the 1740s. The type specimen for the species was collected offshore of Kamchatka, Russia, and was described in 1769 by P.S. Pallas in Specilegia Zoologica (AOU 1998). In the order of tubenose marine birds, Procellariiformes, the short-tailed albatross is classified within the family Diomedeidae. Until recently, it was assigned to the genus *Diomedea*. Following results of the genetic studies by Nunn *et al.* (1996), the family Diomedeidae was arranged in four genera. The genus *Phoebastria*, North Pacific albatrosses, now includes the short-tailed albatross, the Laysan albatross (*P. immutabilis*), the black-footed albatross (*P. nigripes*), and the waved albatross (*P. irrorata*) (AOU 1998).

The short-tailed albatross is a large pelagic bird with long narrow wings adapted for soaring just above the water surface. The bill is disproportionately large compared to other northern hemisphere albatrosses; it is pink and hooked with a bluish tip, has external tubular nostrils, and

has a thin but conspicuous black line extending around the base. Adult short-tailed albatrosses are the only northern Pacific albatross with an entirely white back. The white head develops a yellow-gold crown and nape over several years. Newly fledged birds are dark brown-black, but soon obtain pale bills and legs that distinguish them from black-footed albatross (Tuck 1978, Robertson 1980). Subadult birds have mixed white and brown-black areas of plumage, gradually getting more white feathers at each molt until reaching fully mature plumage.

B. Life History

Available evidence from historical accounts and from current breeding sites indicates that short-tailed albatross nesting habitat is characterized by flat or sloped sites with sparse or full vegetation on isolated windswept offshore islands with restricted human access (Arnoff 1960, Sherburne 1993, DeGange 1981). Current nesting habitat on Torishima Island is steep sites on soil containing loose volcanic ash; the island is dominated by a grass, *Miscanthus sinensis* var. *condensatus*, but a composite, *Chrysanthemum pacificum*, and a nettle, *Boehmeria biloba*, are also present (Hasegawa 1977). The grass probably stabilizes the soil, provides protection from weather, and minimizes mutual interference between nesting pairs while allowing for safe, open take-offs and landings (Hasegawa 1978). The nest is a grass or moss-lined concave scoop about 2 ft (0.75 m) in diameter (Tickell 1975).

Short-tailed albatrosses are long-lived and slow to mature; the average age at first breeding is about 6 years (Service 1999). As many as 25 percent of breeding age adults may not return to the colony in a given year (Service 1999; Cochrane and Starfield, in press.). Females lay a single egg each year, which is not replaced if destroyed (Austin 1949). Adult and juvenile survival rates are high (96 percent), and an average of 0.24 chicks per adult bird in the colony survive to fledge at six months of age (Cochrane and Starfield, in press.). However, chick survival can be reduced severely in years when catastrophic volcanic or weather events occur during the breeding season.

At Torishima, birds arrive at the breeding colony in October and begin nest building. Egg-laying begins in late October and continues through late November. The female lays a single egg; incubation involves both parents and lasts for 64-65 days. Eggs hatch in late December and January, and by late May or early June the chicks are almost fully grown and the adults begin abandoning their nests (Service 1999; Hasegawa and DeGange 1982). The only known currently active breeding colonies of short-tailed albatross are on Torishima and Minami-kojima islands, Japan. The chicks fledge soon after the adults leave the colony, and by mid-July, the colony is deserted (Austin 1949). Non-breeders and failed breeders disperse from the breeding colony in late winter through spring (Hasegawa and DeGange 1982). There is no detailed information on phenology on Minami-kojima, but it is believed to be similar to that on Torishima.

Short-tailed albatrosses are monogamous and highly philopatric to breeding sites. Chicks hatched at Torishima return there to breed. However, young birds may occasionally disperse from their natal colonies to breed, as evidenced by the appearance of adult birds displaying

courtship behavior on Midway Atoll that were banded as chicks on Torishima (Service 1999, Richardson 1994).

The diet of short-tailed albatrosses includes squid, fish, flying fish eggs, shrimp and other crustaceans (Hattori in Austin 1949, Service 1999). There is currently no information on variation of diet by season, habitat, or environmental condition.

Observed population growth rates, as indicated by annual increases in adults observed, eggs laid, and chicks fledged on Torishima Island are presented in Table 11. The population at Torishima is estimated to be growing at a rate of between 6.5 and 8.0% per year (Service, 1999).

C. Population Dynamics

Breeding-age population estimates come primarily from egg counts and breeding bird observations. There were 440 breeding adults present at the beginning of the 1999-2000 breeding season on Torishima, assuming 2 adults are present for each of the 220 eggs counted (H. Hasegawa, pers. commun. 2000). The most recent population estimate on Minami-kojima is 25 breeding pairs, or 50 breeding adults. Therefore, the unadjusted total worldwide estimate is 490. It has been noted that an average of approximately 25 percent of breeding adults may not return to breed each year. It is reasonable, therefore, to estimate that approximately 122 additional breeding-aged birds may not be observed on the breeding grounds. Therefore, 612 birds is the adjusted worldwide estimate of breeding age birds.

Numbers of immature birds are more difficult to estimate because these individuals do not congregate between fledging and returning to breed at approximately 6 years of age. An estimate can be calculated by totaling the number of known fledged chicks in the last 6 years, and the average juvenile survival rate of 96 percent (Service 1999; Cochrane and Starfield, in press). Dr. Hiroshi Hasegawa of Toho University, Japan, reported that 655 chicks were fledged from the Tsubamesaki colony on Torishima between 1994 and 2000 (H. Hasegawa, pers. commun. 2000). Based on an average juvenile survival rate of 96 percent, there are an estimated 629 birds in the immature population from Torishima Island. In 1998, Hasegawa estimated the total population at Minami-kojima to be 150 birds, containing an estimate of 100 immature birds. Combining the estimated number of immature birds from Torishima Island and the estimated number of immature birds from Minami-kojima yields a worldwide immature population estimate of about 729 individuals (based on data through the 1999-2000 breeding season at Torishima and 1997-98 breeding season at Minami-kojima).

The estimated world population of short-tailed albatrosses, calculated by combining estimated breeding age birds (612) and estimated immature birds (about 750), is therefore about 1,362 birds. No measures of uncertainty are available for this estimate.

D. Distribution and Population Status

Distribution

The species once ranged throughout most of the North Pacific Ocean and Bering Sea, with known nesting colonies on numerous western Pacific Islands in Japan and Taiwan (Hasegawa 1979, King 1981). Though other undocumented nesting colonies may have existed, there is no conclusive proof that short-tailed albatross once nested at locations beyond the Japanese and Taiwanese colonies. Short-tailed albatross courtship behavior and reproductive activities have been observed at Midway Atoll NWR. The question of the future potential of Midway Atoll NWR to serve as a successful nesting colony, through either natural colonization or propagation efforts, remains unknown (Service 1999).

At the beginning of the 20th century, the species declined in population numbers to near extinction, primarily as a result of hunting at breeding colonies in Japan. Albatross were killed for their feathers and various other body parts. The feathers were used for writing quills, their bodies were processed for fertilizer, their fat was rendered, and their eggs were collected for food (Austin 1949). Hattori (in Austin 1949) commented that short-tailed albatrosses were "...killed by striking them on the head with a club, and it is not difficult for a man to kill between 100 and 200 birds daily." He also noted that the birds were "very rich in fat, each bird yielding over a pint."

Pre-exploration worldwide population estimates of short-tailed albatrosses are not known; the total number of birds harvested may provide the best estimate, as the harvest drove the species nearly to extinction. Between approximately 1885 and 1903, an estimated 5 million short-tailed albatrosses were harvested from the breeding colony on Torishima (Yamashina in Austin 1949), and harvest continued until the early 1930s, except for a few years following the 1903 volcanic eruption. One of the residents on the island, a schoolteacher, reported 3,000 albatrosses killed in December 1932 and January 1933. Yamashina (in Austin 1949) stated that "This last great slaughter was undoubtedly perpetrated by the inhabitants in anticipation of the island's soon becoming a bird sanctuary." By 1949, there were no short-tailed albatrosses breeding at any of the historically known breeding sites, including Torishima, and the species was thought to be extinct (Austin 1949).

In 1950, the chief of the weather station at Torishima, M. Yamamoto, reported nesting of the short-tailed albatross (Tickell 1973, 1975), and by 1954 there were 25 birds and at least 6 breeding pairs present on Torishima (Ono 1955). These were presumably juvenile birds that had been wandering the northern Pacific during the final several years of slaughter. Since then, as a result of habitat management projects, stringent protection, and the absence of any significant volcanic eruption events, the population has gradually increased. The average growth of the colony on Torishima Island (the colony is called "Tsubamesaki") between 1950 and 1977 was 2.5 adults per year; between 1978 and 1991 the average population growth was 11 adults per year. An average annual population growth of at least 6 percent per year (Hasegawa 1982; Cochrane and Starfield, in press) has resulted in a continuing increase in the breeding population

to an estimated 440 breeding birds on Torishima in 1999 (Service 1999). Torishima Island is under Japanese government ownership and management and is managed for the conservation of wildlife. There is no evidence that the breeding population on Torishima is nest site-limited at this point; therefore, ongoing management efforts focus on maintaining high rates of breeding success.

Two management projects have been undertaken to enhance breeding success on Torishima. First, erosion control efforts at the Tsubamesaki colony have improved nesting success. Second, there are continuing attempts to establish a second breeding colony on Torishima by luring breeding birds to the opposite side of the island from the Tsubamesaki colony through the use of decoys and recorded colony sounds. Preliminary results of this experiment are promising; the first chick was fledged from this site in 1997. The expectation is that, absent a volcanic eruption or some other catastrophic event, the population on Torishima will continue to grow, and it will be many years before the breeding sites are limited (Service 1999).

In 1971, 12 adult short-tailed albatrosses were discovered on Minami-kojima in the Senkaku Islands, one of the former breeding colony sites (Hasegawa 1984). Aerial surveys in 1979 and 1980 resulted in observations of between 16 and 35 adults. In April 1988, the first confirmed chicks on Minami-kojima were observed, and in March 1991, 10 chicks were observed. In 1991, the estimate for the population on Minami-kojima was 75 birds, including 15 breeding pairs (Hasegawa 1991).

At-sea sightings since the 1940s indicate that the short-tailed albatross, while very few in number today, is distributed widely throughout its historical foraging range of the temperate and subarctic North Pacific Ocean (Sanger 1972; Service unpublished data) and is found close to the U.S. west coast. Recent satellite tracking of black-footed and Laysan albatrosses revealed that individuals of these species travel hundreds of miles from breeding colonies during the breeding season (Service 1999). If short-tailed albatrosses are similar in behavior to black-footed and Laysan albatrosses, short-tailed albatross foraging trips may extend hundreds of miles or more from colony sites.

In summer (i.e., non-breeding season), individuals appear to disperse widely throughout the historical range of the temperate and subarctic North Pacific Ocean (Sanger 1972), with observations concentrated in the northern Gulf of Alaska, Aleutian Islands, and Bering Sea (McDermond and Morgan 1993; Sherburne 1993; Service unpublished data). Individuals have been recorded along the west coast of North America as far south as the Baja Peninsula, Mexico (Palmer 1962).

Short-tailed albatrosses have been observed on Midway Atoll since the early 1930s (Berger 1972, Hadden 1941, Fisher in Tickell 1973, Robbins in Hasegawa and DeGange 1982). There is one unconfirmed report of a short-tailed albatross breeding on Midway in the 1960s (Service 1999), but no subsequent reports of successful breeding exist. In the years following the reported observation, tens of thousands of albatrosses were exterminated from Midway Atoll to construct

an aircraft runway for the Department of the Navy, and to provide safe conditions for aircraft landings and departures. It is possible that short-tailed albatrosses on the island could have been killed during this process (Service 1999). Since the mid-1970s, approximately thirty-five sightings of short-tailed albatrosses have occurred during the breeding season on Midway Atoll. In March 1994, a courtship dance was observed between two short-tailed albatrosses (Richardson 1994), and one lone bird has occupied a nest site and laid eggs in 1993, 1995, and 1997, none of which has hatched (Service 1999). A dancing ritual was observed by Service biologists between two short-tailed albatrosses (band numbers 015 yellow and 057 blue) on Sand islet, Midway Atoll, on November 17, 1999. The U.S. Government transferred Midway Atoll from the Navy to the Department of the Interior in 1996, and has designated the Service as the conservation agency to manage Midway Atoll National Wildlife Refuge (NWR).

Observations of short-tailed albatross have also been made during the breeding season on Laysan Island, Green Island at Kure Atoll, and French Frigate Shoals, but there is no indication that these occurrences represent breeding attempts (Sekora 1977, Fefer 1989). Between 1976 and 1994, approximately six short-tailed albatross have been sighted from these islands. It is possible that short-tailed albatross could have occurred at these locations during the latter part of the 19th century and first part of the 20th century. If so, they would have been vulnerable to Japanese egg and feather collectors as thousands of black-footed and Laysan albatross were killed to support this trade during this period. In 1909, the Hawaiian Islands Bird Reservation was established by President Theodore Roosevelt (Executive Order 1019) to protect birds and their habitat, among other things.

Population Status

Between the 1950s and 1970, there were few records of the species away from the breeding grounds, according to the AOU Handbooks of North American Birds (Vol. 1, 1962) and the Red Data Book (Vol. 2, Aves, International Union for the Conservation of Nature, Morges, Switzerland, 1966) (Tramontano 1970). In the northern Pacific, there were 12 reported marine sightings in the 1970s, 55 sightings in the 1980s, and over 250 sightings reported in the 1990s to date (Sanger 1972; Hasegawa and DeGange 1982, unpublished data). This observed increase in opportunistic sightings should be interpreted cautiously, however, because of the potential temporal, spatial, and numerical biases introduced by opportunistic shipboard observations. Observation effort, total number of vessels present, and location of vessels may have affected the number of observations independent of an increase in total numbers of birds present.

The short-tailed albatross is not on the State of Hawaii's list of threatened and endangered species. However, the short-tailed albatross is considered endangered by the State of Alaska (Alaska Statutes, Article 4, Sec.16.20.19). This classification was supported by a letter to Commissioner Noerenberg from J.C. Bartonek, in which he recommended endangered status because the short-tailed albatross occurs, or was likely to occur, in State waters within the 3-nautical mile (5.6-km) limit of State jurisdiction (Sherburne 1993).

The Japanese government designated the short-tailed albatross as a protected species in 1958, as

a Special National Monument in 1962 (Hasegawa and DeGange 1982), and as a Special Bird for Protection in 1972 (King 1981). Torishima was declared a National Monument in 1965 (King 1981). These designations have resulted in tight restrictions on human activities and disturbance on Torishima (Service 1999). In 1992, the species was classified as "endangered" under the then-newly implemented "Species Preservation Act" in Japan, which makes Federal funds available for conservation programs and requires that a 10-year plan be in place, which sets forth conservation goals for the species. The current Japanese "Short-tailed Albatross Conservation and Management Master Plan" outlines general goals for continuing management and monitoring of the species, and future conservation needs (Environment Agency 1996). The principal management practices used on Torishima are legal protection, habitat enhancement, and population monitoring. Since 1976, Hasegawa has systematically monitored the breeding success and population numbers of short-tailed albatrosses breeding on Torishima.

Prior to its current listing as endangered throughout its range, the short-tailed albatross was listed as endangered under the Act, throughout its range, except in the U.S. During this period, the Service considered the short-tailed albatross to be afforded protection under the Act in all portions of its range farther than 3 nautical miles (5.6 km) from U.S. shores, and included those waters of the EEZ (3-200 mi [5.6-370 km] from shore).

The exclusion of the U.S. from the range in which the species was listed resulted from an oversight in administrative procedures, rather than from any biological evaluation of the species' status within the U.S. The species was originally listed as endangered in accordance with the Endangered Species Conservation Act of 1969 (ESCA). Pursuant to the ESCA, two separate lists of endangered wildlife were maintained, one for foreign species and one for species native to the United States. The short-tailed albatross appeared only on the List of Endangered Foreign Wildlife (35 Federal Register [FR] 8495; June 2, 1970). When the current Act became effective on December 28, 1973, it superseded the ESCA. The native and foreign lists were combined to create one list of endangered and threatened species (38 FR 1171; January 4, 1974). When the lists were combined, prior notice of the action was not given to the governors of the affected States (Alaska, California, Hawaii, Oregon and Washington) as required by the Act, because available data were interpreted as not supporting resident status for the species. Thus, native individuals of this species were not formally proposed for listing pursuant to the criteria and procedures of the Act.

On July 25, 1979, the Service published a notice (44 FR 43705) stating that, through an oversight in the listing of the short-tailed albatross and six other endangered species, individuals occurring in the U.S. were not protected by the Act. The notice stated that it was always the intent of the Service that all populations and individuals of the seven species should be listed as endangered wherever they occurred. Therefore, the notice stated that the Service intended to take action as quickly as possible to propose endangered status for individuals occurring in the U.S.

On July 25, 1980, the Service published a proposed rule (45 FR 49844; July 25, 1980) to list, in the U.S., the short-tailed albatross and four of the other species referenced above. No final action was taken on the July 25, 1980, proposal. The Service designated the species as a candidate for listing in the U.S. (62 FR 49398; September 19, 1997). The Service published a proposal to list

the short-tailed albatross as endangered in the U.S. (63 FR 58692) on November 2, 1998. A final rule was published on July 31, 2000 (65 FR 46643), listing the species as endangered throughout its range.

E. Analysis of the Species Likely to Be Affected

The proposed action is likely to adversely affect the endangered short-tailed albatross. Fishing activities covered under this consultation will occur within the U.S. EEZ and international waters. The effects of the action on this species (See Section IV, "Effects of the Action") will potentially occur where the range of the short-tailed albatross, in the North Pacific Ocean (Map 1), overlaps with the area where the Hawaiian longline fleet conducts fishing operations (Map 3).

III. ENVIRONMENTAL BASELINE

The environmental baseline describes the status of the species and factors affecting the environment of the species or critical habitat in the proposed action area contemporaneous with this formal consultation. The baseline usually includes State, local, and private actions that affect a species at the time the consultation begins. Unrelated Federal actions that have already undergone formal or informal consultation are also a part of the environmental baseline. Federal actions within the action area that may benefit listed species or critical habitat are also included in the environmental baseline.

A. Status of the Species Within the Action Area

The action area for this consultation is where the Hawaiian longline fishing vessels conduct fishery-related activities that overlap with the range of the short-tailed albatross. Based on the sighting record, an unknown number of short-tailed albatross traverse the waters near the Hawaiian archipelago, including the U.S. EEZ around Hawaii and international waters, where encounters with longline fishing vessels may occur. Therefore, the effects of the action can occur in the area where the Hawaiian longline fishery overlaps with the range of the species. The environmental baseline for this consultation includes the status of the species as a whole, as described above, including the current known natural and anthropogenic threats to the species.

B. Factors Affecting Species' Environment Within the Action Area

Recently, a federal court order required that NMFS complete an EIS for the fishery no later than April 1, 2001. The Order was entered on August 7, 2000 and requires that NMFS:

1. Continue to prohibit all activities of vessels registered under Hawaii limited entry longline permits (Hawaii-based longline vessels), and all at-sea fish transshipping operations involving such vessels, in an area between 28 degrees North latitude and 44 degrees North latitude, between 168 degrees West longitude and 150 degrees West longitude. This area, designated as "Area A" is essentially the current longline closed

area.

2. Within three days from the date of entry of the Order, limit the number of sets by Hawaii-based longline vessels made within the areas termed "Area B," which consists of the area between the longitudes of 173 degrees East and 168 degrees West longitude (between the latitudes of 28 degrees North and 44 degrees North Latitude) to maximum of 154 sets during the remainder of the year 2000, and to 77 sets between January 1, 2001 and March 14, 2001;

3. effective upon the entry of the Order, require 100 percent observer coverage of all Hawaii-based longline vessels fishing within Area B;

4. within 3 days from the date of entry of the Order, prohibit the targeting of swordfish within the area between the longitudes of 173 degrees East and 137 degrees West longitude (between 0 degrees and 28 degrees North latitude), this area is termed "Area C;"

5. within 3 days from the date of entry of the Order, require that the profits from the sale of swordfish incidentally caught by Hawaii-based longline vessels in Area C and landed in any US port be donated to charity;

6. within 45 days from the date of entry of the Order, require 10 percent observer coverage of all Hawaii-based longline vessels fishing within Area C;

7. within 90 days from the date of entry of the Order, require 20 percent observer coverage of all Hawaii-based longline vessels fishing within Area C;

8. prohibit all fishing by Hawaii-based longline vessels in Areas B and C between March 15 and May 31, 2001, or until NMFS completes its Environmental Impact Statement on this fishery (due April 1, 2001);

9. submit to the Court on the first day of each month, copies of all observer reports prepared during the previous month;

10. continue to require every vessel registered with a Hawaii longline limited entry permit to carry and use NMFS approved line clippers and dip nets to disengage any hooked or entangled sea turtles;

11. continue research into the effects of several different gear modifications.

Breeding Habitat

Short-tailed albatross face a significant threat at the primary breeding colony on Torishima due to the potential for habitat destruction from volcanic eruptions on the island. The threat is not

predictable in time nor in magnitude. Eruptions could be catastrophic or minor, and could occur at any time of year. A catastrophic eruption during the breeding season could result in chick and adult mortalities as well as destruction of nesting habitat. Significant loss of currently occupied breeding habitat or breeding adults at Torishima would delay and possibly preclude recovery of the species.

Torishima is an active volcano approximately 1182 ft (394 m) high and 1.5 mi (3 km) wide (Service 1999) located at 30.48° N and 140.32° E (Simkin and Siebert 1994). The earliest record of a volcanic eruption at Torishima is a report of a submarine eruption in 1871 (Simkin and Siebert 1994), but there is no information on the magnitude or effects of this eruption. Since the first recorded human occupation on the island in 1887, there have been four formally recorded eruption events: 1) on August 7, 1902, an explosive eruption in the central and flank vents resulted in lava flow and a submarine eruption, and caused 125 human mortalities; 2) on August 17, 1939, an explosive eruption in the central vent resulted in lava flow, and caused two human mortalities; 3) on November 13, 1965, a submarine eruption and; 4) on October 2, 1975, a submarine eruption 4.4 nautical miles (9 km) south of Torishima (Simkin and Siebert 1994). There is also reference in the literature to an additional eruption in 1940 which resulted in lava flow that filled the island's only anchorage (Austin 1949).

Austin (1949) visited the waters around Torishima in 1949 and made the following observations: "The only part of Torishima not affected by the recent volcanic activity is the steep northwest slopes where the low buildings occupied by the weather station staff are huddled. Elsewhere, except on the forbidding vertical cliffs, the entire surface of the island is now covered with stark, lifeless, black-gray lava. Where the flow thins out on the northwest slopes, a few dead, white sticks are mute remnants of the brush growth that formerly covered the island. Also on these slopes some sparse grassy vegetation is visible, but there is no sign of those thick reeds, or 'makusa' which formerly sheltered the albatross colonies. The main crater is still smoking and fumes issue from cracks and fissures all over the summit of the island."

In 1965, meteorological staff stationed on the island were evacuated on an emergency basis due to a high level of seismic activity; although no eruption followed, the island has since been considered too dangerous for permanent human occupation (Tickell 1973). In late 1997, Hasegawa observed more steam from the volcano crater, a more pronounced bulge in the center of the crater, and more sulphur crusts around the crater than were previously present (Service 1999).

The eruptions in 1902 and 1939 destroyed much of the original breeding colony sites. The remaining sites used by albatrosses are on sparsely vegetated steep slopes of loose volcanic soil. The monsoon rains that occur on the island result in frequent mud slides and erosion of these soils, which can result in habitat loss and chick mortality. A typhoon in 1995 occurred just before the breeding season and destroyed most of the vegetation at the Tsubamezaki colony. Without the protection provided by vegetation, eggs and chicks were at greater risk of mortality from monsoon rains, sand storms and wind (H. Hasegawa, pers. commun 1997.). Breeding

success at Tsubamezaki is lower in years when there are significant typhoons resulting in mud slides (Service 1999).

In 1981, a project was supported by the Environment Agency of Japan and the Tokyo Metropolitan Government to improve nesting habitat by transplanting grass and stabilizing the loose volcanic soils (Hasegawa 1991). Breeding success at the Tsubamezaki colony has increased following habitat enhancement (Service 1999). Current population enhancement efforts in Japan are concentrated on attracting breeding birds to an alternate, well-vegetated colony site on Torishima which is less likely to be affected by lava flow, mud slides, or erosion than the Tsubamezaki colony site (Service 1999). Japan's "Short-tailed Albatross Conservation and Management Master Plan" (Environment Agency 1996) identifies a possible long-term goal of establishing additional breeding grounds away from Torishima once there are at least 1,000 birds on Torishima. Midway Atoll has been identified as a possible site for establishing an additional breeding colony (Service 1999). Midway Atoll NWR is a logical candidate because it is visited by short-tailed albatross that have displayed reproductive capacity (e.g. courtship dances and egg laying). Furthermore, Midway Atoll is under the authority and control of the U.S. Federal government (Service) and the ability to regulate activities conducted on the atoll could promote expansion of the short-tailed albatross population. Until other safe breeding sites are established, short-tailed albatross survival will continue to be at risk due to the possibility of significant habitat loss and mortality from unpredictable natural catastrophic volcanic eruptions and land or mud slides caused by monsoon rains.

It should be noted that the risk of extinction caused by a catastrophic event at the breeding colony is buffered by adult and immature non-breeding birds. An average of 25 percent of breeding age adults do not return to breed each year (Service 1999), and immature birds do not return to the colony to breed until at least 6 years after fledging (Service 1999). As much as 50 percent of the current total worldwide population may be immature birds. If suitable habitat were still available on Torishima, these birds could recolonize in years following a catastrophic event.

Disease and Parasites

There are no known diseases affecting short-tailed albatrosses on Torishima or Minami-kojima today. However, the world population is vulnerable to the effects of disease because of the small population size, the extremely limited number of breeding sites, and the genetic consequences of going through a severe population bottleneck within the last century. Hasegawa (Service 1999) reports that he has observed a wing-disabled bird every few years on Torishima, but the cause of the disability is not known. An avian pox has been observed in chicks of albatross species on Midway Atoll, but it is unknown whether this pox infects short-tailed albatross or whether there is an effect on survivorship of any albatross species (Service 1999).

Historically, several parasites were documented on short-tailed albatrosses on Torishima: a blood-sucking tick that attacks its host's feet, a feather louse, and a carnivorous beetle (Austin 1949). However, current evidence suggests that there are no parasites affecting short-tailed

albatrosses on Torishima, and there is no evidence that parasites caused mortality or had population-level effects in the past (Service 1999).

Predation

Sharks may take fledgling short-tailed albatrosses as they desert the colony and take to the surrounding waters (Harrison 1979). Shark predation is well-documented among other albatross species, but has not been documented for short-tailed albatross. The crow, *Corvus* sp., is the only historically known avian predator of chicks on Torishima. Hattori (in Austin 1949) reported that one-third of the chicks on Torishima were killed by crows, but crows are not present on the island today (Service 1999). Black, or ship, rats (*Rattus rattus*) were introduced to Torishima at some point during human occupation; their effect on short-tailed albatross is unknown. Cats (*Felis cattus*) were also present, and were most likely introduced during the feather-hunting period. They have caused damage to other seabirds on the island (Ono 1955), but there is no evidence to indicate an adverse effect to short-tailed albatrosses. Cats were present on Torishima in 1973 (Tickell 1975), but Hasegawa (1982) did not find any evidence of cats on the island in 1979-1981.

Contaminants

Another potential threat is damage or injury due to oil contamination, which could cause physiological problems from petroleum toxicity and by interfering with the bird's ability to thermoregulate. Oil spills can occur in many parts of the short-tailed albatross' marine range. Oil development has been considered in the past in the vicinity of the Senkaku Islands (Hasegawa 1981, *in litt.*). This industrial development would introduce the risk of local marine contamination, or pollution due to blow-outs, spills, and leaks related to oil extraction, transfer and transportation. Historically, short-tailed albatrosses rafted together in the waters around Torishima (Austin 1949) and small groups of individuals have occasionally been observed at sea (Service, unpublished data). An oil spill in an area where individuals are rafting could affect the population significantly. The species' habit of feeding at the surface of the sea makes them vulnerable to oil contamination. Hasegawa (Service 1999) has observed some birds on Torishima with oil spots on their plumage.

Consumption of plastics may also be a factor affecting the species' survival. Albatrosses often consume plastics at sea, presumably mistaking the plastics for food items, or in consuming marine life such as flying fish eggs which are attached to floating objects. Hasegawa (Service 1999) reports that short-tailed albatrosses on Torishima commonly regurgitate large amounts of plastic debris. Plastics ingestion can result in injury or mortality to albatross if sharp plastic pieces cause internal injuries, or through reduction in ingested food volumes and dehydration (Sievert and Sileo 1993). Young birds may be particularly vulnerable to potential effects of plastic ingestion prior to developing the ability to regurgitate (Fefer 1989, *in litt.*). Auman (1994) found that Laysan albatross chicks found dead in the colony had significantly greater plastic loads than chicks injured by vehicles, a sampling method presumably unrelated to plastic ingestion, and therefore representative of the population. Hasegawa has observed a large increase in the occurrence of plastics in birds on Torishima over the last 10 years (Service 1999),

but the effect on survival and population growth is not known.

Pacific (Non-Hawaiian) Fisheries

Distant water longline fleets, such as those from Japan, Russia (minor fishery), Korea, and Taiwan, traverse the waters of the north Pacific Ocean in search of swordfish and tuna. Swordfish can be found at frontal zones: where the Kuroshiro Current converges with the coastal waters of Taiwan and Japan; where the Kuroshiro Extension Current converges with the Oyashio Current; where the Equatorial Counter Current converges with the Peru Current; and along Baja California (Mexico) and California (Sakagawa 1989). Bigeye tuna, which commands among the highest prices per pound for tuna species, are distributed from 40° north latitude and south of the equator, from Japan east to the United States and Mexico (Hampton et. al. 1998).

In 1997, most catches of swordfish by distant water longline fleets was between 20° and 40° north latitude, and 140° and 175° east longitude (WPRFMC 1999) (Figure 1). The greatest concentration of tuna catches by distant water longline fleets appeared north and east of the Hawaiian archipelago, west and north of Wake Atoll, and along the equator between 140° east and 135 ° west longitude (WPRFMC 1999) (Figure 2).

In 1995, swordfish catches by Japanese longline vessels was about 10,120 metric tons and were caught by vessels operating in the western, central, eastern and south Pacific (Figure 3) (Dinardo 1999). From 1992 - 1994, swordfish catch by coastal longline vessels ranged between 1,181 and 1,394 metric tons (Dinardo 1999).

Recent fishing effort for bigeye tuna by Japanese longline vessels appears to have declined in the western Pacific from 150,761,600 hooks set in 1995 to about 144,444,800 hooks set in 1996. Fishing effort in the eastern Pacific appears to have stabilized at about 125,000,000 hooks set in 1995 and 1996. Overall fishing effort has decreased from 360,522,000 total hooks set in 1980 to about 269,444,800 hooks set in 1996 (Hampton *et al.*1998) (Figure 4).

Clearly, the Japanese longline fishing fleet represents a tremendous amount of fishing effort that in many instances overlaps with the currently known foraging range of the short-tailed albatross. Understanding foreign distant water fishing fleet effort is an integral part of analyzing the threat of foreign longline fishing activities to short-tailed albatross. However, in many fisheries, fishers may not be required to report seabird bycatch, may not be able to identify seabirds, or may have significant disincentives to do so for fear of consequences to the future of the fishery. To our knowledge, reporting seabird bycatch and the rates at which seabirds are caught is not reported by the foreign fishing nations mentioned in this section.

U.S. groundfish fisheries in Alaska are monitored by fishery observers who collect data on seabird bycatch (Service 1999). Reports of seabird bycatch are also occasionally received directly from fishermen. There were two reported fishery-related mortalities of short-tailed albatross in the 1980s (Table 12). The first bird, a recently fledged juvenile, was found dead in a fish net north of St. Matthew Island in July 1983. The second bird, also a fledgling, was taken

by a vessel fishing for halibut in the Gulf of Alaska on October 1, 1987. In 1989, NMFS began consulting with the Service on the effects of Alaska's groundfish fisheries on short-tailed albatrosses. Since 1990, there have been five reported takes of short-tailed albatrosses in Alaska's fisheries. A sub-adult (< 2 years) taken south of the Krenitizin Islands in the hook-and-line fishery on August 28, 1995. A sub-adult (3 years) was taken in the Bering Sea Aleutian Islands (BSAI) hook-and-line fishery on October 8, 1995. A sub-adult (5 years) was taken in the Pacific Cod hook-and-line fishery on September 27, 1996. An adult (8 years) was taken in the BSAI Pacific cod hook-and-line fishery on September 21, 1998. A sub-adult bird of unknown age was taken in the BSAI Pacific cod hook-and-line fishery on September 28, 1998.

A paper describing seabird bycatch estimation methods for Alaska longline fishing vessels and procedures developed by the Service, in consultation with NMFS, is in preparation (Service 1999). Standard statistical procedures for estimating population number from a sample are used. Bycatch estimates are based on the number of seabirds by species in samples from observed hauls and the total commercial fish catch as estimated by NMFS Blend program (the Blend program estimates total catch from a variety of data sources). The unobserved weight of fish was calculated by subtracting the weight of fish on observed hauls from the known total weight of fish. The estimated total number of birds caught was the sum of observed birds in the catch and the estimated unobserved birds. The number of unobserved birds was estimated by multiplying the ratio of number of birds caught per weight of fish caught from observed hauls by the total estimated weight of fish caught on unobserved hauls. Unobserved birds were assigned to species in proportion to the species composition of observed hauls averaged over all 5 years of data for each region and month. Both the catch rate of birds (number of birds per weight of fish, or birds per 1000 hooks) and the catch rate of fish (total weight of all fish species per hook) are assumed to be equal for observed and unobserved hauls. These assumptions may not hold, not necessarily because the presence of the observer may change the fishing practices of the skipper or crew, but rather because, for some other operational reason, the smaller (unobserved) vessels may have different catch rates than the large or mid-sized vessels. The constant catch rates for birds and/or fish among vessel size categories are untested and critical assumptions. If different catch rates exist for different vessel size categories, the average area catch rates and estimates of total seabird bycatch may be over- or underestimated.

Preliminary estimates of the annual seabird bycatch for the Alaska groundfish fisheries, based on 1993 to 1997 data, indicate that approximately 14,000 seabirds are taken annually in the combined BSAI area and Gulf of Alaska (GOA) groundfish fisheries (11,600 in the BSAI; 2,400 in the GOA) at average rates of 0.09 and 0.057 birds per 1000 hooks in the BSAI and in the GOA, respectively (Service 1999). In general, the calculated expansion factor between observed bird mortalities and total estimated bird mortalities is 4 in the Bering Sea and 8 in the GOA (Service 1999). These numbers are preliminary and may change with further analysis and additional data, but represent the best available information at this time.

There have been three short-tailed albatross mortalities reported since 1993 (when fishery observers began reporting bird mortalities by species) during observed portions of the haul. All

three mortalities in the 6 year period since 1993 occurred in the Bering Sea. Applying an expansion factor of 4 to the 3 mortalities results in a total estimated mortality of 12 birds over 6 years, or 2 birds per year. In other words, 3 observed mortalities over a 6 year period probably represented 12 actual mortalities. The estimate for total short-tailed albatross mortalities in the GOA is 0 because no takes have occurred there in the observed sample. Therefore, the best available information indicates that the total take for short-tailed albatrosses in the GOA and BSAI hook-and-line fisheries since 1993 has been 2 birds per year. The incidental take anticipated and authorized is 4 short-tailed albatross during the 2-year period of 1999 and 2000, as a result of the hook-and-line groundfish fishing activities in the GOA/BSAI areas regulated by NMFS (Service 1999).

The halibut fishery in Alaskan waters is managed separately from the groundfish fishery. A separate formal section 7 consultation was conducted on the halibut fishery in 1998. The Service determined that commercial halibut longline fishing in U.S. waters off Alaska within the International Pacific Halibut Commission regulatory zones 2B, 2C, 3A, 4A, 4B, 4C, 4D, and 4E is likely to adversely affect, but not likely to jeopardize, short-tailed albatrosses. The incidental take statement accompanying the biological opinion for effects of this fishery on short-tailed albatrosses sets the expected level of incidental take of short-tailed albatrosses at 2 birds every 2 years (Service 1999).

The Alaskan groundfish observer coverage is designed to collect fisheries data deemed by the Regional Administrator to be necessary and appropriate for management, compliance monitoring, and research of groundfish fisheries for the conservation of marine resources or their environment (50 CFR Part 679.50). In the Alaskan groundfish fishery, vessels that measure 125 feet in length or longer must carry a NMFS observer 100% of the time. About 60 - 70% of all hauls conducted by these vessels are sampled by NMFS observers (Shannon Fitzgerald, pers. commun., 2000). A fishing vessel that measures between 60 and 124 feet must carry observers at least 30% of its fishing days.

Hasegawa (Service 1999) reported that 3-4 birds come ashore on Torishima Island per year entangled in fishing gear, and that some may have died as a result. He also stated that some take by Japanese handliners may occur near the nesting colonies, although no such take has been reported. There is no additional information on the potential effects of fisheries near Torishima on the species.

Air Strikes

Seabird collisions with airplanes have been documented by the Service on Midway Atoll NWR since operation of the airfield was transferred from the Department of Defense to the Department of Interior in July 1997. Since acquiring the airfield, the Service has implemented several precautionary mechanisms to reduce and document seabird collisions. Transient aircraft (primarily U.S. Military or U.S. Coast Guard C-130s) are required to obtain Prior Permission before landing at Midway Atoll NWR. Aircraft are advised to land within the parameters provided by airfield operations to reduce air collisions with seabirds.

During nesting season, November through June, about 60-70% of transient aircraft and at least 90% of the regularly scheduled Aloha Airline flights are scheduled to arrive and depart at night to reduce the incidence of seabird collisions. During non-nesting season periods of the year, aircraft land throughout the day or night.

Effective February 2000, Aloha Airlines provides weekly service from Honolulu to Midway Atoll NWR on Saturdays. Depending upon demand, a second flight may be added on Wednesdays. Aloha Airlines flies a 737-200 series aircraft to Midway Atoll NWR.

Prior to any aircraft landing or take-off, the runway and taxiways are "swept" to haze any birds resting on the airfield or upwind of the runway. In most cases, birds are simply escorted or "shooed" about 100 meters downwind of the active runway by refuge staff and Midway Phoenix Corporation (MPC) staff. These staff also remove birds that occur upwind of the runway because they have the potential of flying into the path of the oncoming plane. If these staff encounter "stubborn" adult birds that refuse to be escorted or chicks that have wandered onto the runway, the staff physically remove them to a safe distance of about 100 meters downwind of the active runway.

Due to the size of the runway at Midway Atoll NWR, refuge and MPC staff use vehicles to reach all points of the active runway, taxiways or areas upwind of the runway that are occupied by birds. During nesting seasons, runway sweeps become more involved with several crews removing birds from the runway. As many as six vehicles and 20 staff and volunteers are engaged in the pre-landing or pre-take-off sweep process (Robert Dieli, Service, pers. commun. 2000). Finally, bird activity advisories are provided to pilots and recommendations are suggested to modify approaches and landings at the airfield to avoid collisions with birds.

The Service has collected information concerning aircraft type and movement and the incidence of bird strikes since the last contingent of Navy personnel left Midway on June 30, 1997. Between July 1, 1997, and June 1, 2000, there have been approximately 750 "evolutions" (either landings or takeoffs) on the active Sand Islet runway. The following data were recorded.

Period	Evolutions	# with Strikes	# Birds Struck	# Albatross
7/1/97-12/31/97	68	13	13	3
1998	299	27	31	21
1999	301	49	78	35
1/1/00-6/1/00	80	17	22	19

Although the data suggest a significant increase in bird strikes in 1999 compared to 1998, this is likely due, in part, to more thorough search and improved documentation by airport personnel.

The Service has documented that 135 seabirds (Table 13) have collided with aircraft and died. The Service suspects that about 7 additional birds were struck by planes and killed. The Service is unable to ascertain the identity of these birds because they fall into the waters of the lagoon or into thick vegetation at the end of the runway. These unidentified birds are likely either Laysan or black-footed albatross. The Service does not consider short-tailed albatross to be among the unidentified birds since it tracks the whereabouts of all short-tailed albatross that occur on Midway Atoll on a regular basis (Table 16).

A female short-tailed albatross (band: yellow 015) has resided about 150 ft (50 m) from the end of the Midway Atoll NWR runway since 1989. It is known to reside on the island during nesting season, from November to April. Although the bird is located close to the runway, an aircraft is unlikely to collide with it because most landings and takeoffs occur at night during the period that the bird resides on Midway Atoll NWR (November - April). The bird is less likely to be in flight at night. There have been no reports of "yellow 015" having a close encounter with aircraft, according to ground crews at Midway Atoll NWR (R. Dieli, Service, pers. commun. 1999).

The Service operates a very limited air service to Tern Islet, French Frigate Shoals NWR to support ongoing conservation and research activities associated with the mission of this refuge. The Service has contracted airplane pilot Mr. Bob Justman to provide air service to Tern Islet. Mr. Justman flies a 6-seat Piper Aztek (model # PA-23-250). On average, the Service schedules about 20 round-trip flights per year from Honolulu to Tern Islet. At Tern Islet, the Service provides the same advisory information to Mr. Justman as it does on Midway Atoll NWR to avoid air strikes during landings and takeoffs. Also, the Service conducts pre-landing and takeoff "sweeps," similar to Midway Atoll NWR, to remove birds from the active runway. During the course of a year, a small number of birds are injured and killed as a result of landing- and take-off-related activities. Short-tailed albatross have never been observed on or near Tern Islet during airplane landing and take-off activities. Therefore, the Service does not consider this a threat of injury or mortality to short-tailed albatross.

Recreational Fishery Bycatch

The Service has authorized a recreational rod and reel fishery at Midway Atoll NWR. The fishery is primarily a catch-and-release activity where most fish caught are released. Target species are reef fish and pelagic fish. Certain pelagic species, such as marlin, are considered "trophy fish." If the catch is potentially record size, it is landed and recorded. Most fishing occurs from boats owned and operated by Midway Sport Fishing, a subcontractor to Midway Phoenix Corporation. In 1999, a total of 757.5 fishing hours were recorded (N. Hoffman, Service, pers. commun. 2000). Most of this fishing effort was conducted by one vessel. However, Midway Sport Fishing operated five fishing boats, but rarely were more than three boats actively fishing at the same time.

There is accidental interaction between seabirds and the line/gear used by recreational fishers at Midway Atoll. In 1999, about 9 Laysan albatross were accidentally caught on recreational line

or gear (Table 14). About 8 birds were entangled in the line and 1 bird was hooked by recreational lures. All birds were successfully released and there was no mortality associated with these interactions (N. Hoffman, Service, pers. commun. 2000).

The Laysan albatross population on Midway Atoll NWR is estimated at about 1.5 million birds over half of which are breeding adults (Rob Shallenberger, Service, pers. commun. 2000). The rate at which Laysan albatross were injured in 1999 as a result of the Midway recreational fishery is about (9/757.5) injuries per fishing hour (N. Hoffman, Service, pers. commun. 2000). This activity impacted about 0.0006% of the Laysan albatross population on Midway Atoll in 1999. No injuries were reported for black-footed albatross as a result of the recreational fishery.

Short-tailed albatross are most frequently observed at Midway between October and April. No short-tailed albatross have been observed at sea near Midway, by fishers or other boaters, during 1999 and 2000. The recreational fishery occurs primarily between April and October, so the overlap between the presence of short-tailed albatross and recreational fishing activities at Midway is only two months. In light of the above information, the Service does not believe that the recreational fishery at Midway poses a significant risk to short-tailed albatross.

Other Factors

A small number of Laysan and black-footed albatross are killed at Midway Atoll NWR due to collisions with ironwood trees, power lines, or buildings and due to entrapment in confined spaces (*e.g.* seawalls). Refuge staff have been taking steps to minimize these hazards by removing ironwood trees and unnecessary wires and poles. This effort can reduce, but never eliminate, these hazards (R. Shallenberger, Service, pers. commun. 2000).

IV. EFFECTS OF THE ACTION

NMFS began estimating the number of Laysan and blackfooted albatross killed in the Hawaiian longline fishery in 1994. Since then, several thousand Laysan and blackfooted albatross are estimated to be killed each year by fishing gear deployed by the Hawaiian longline fishery. Sighting data indicate that short-tailed albatross have been observed in the Northwest Hawaiian Islands since the 1930s. Recent information indicates that short-tailed albatross have been observed at sea where the Hawaiian longline fishery conducts fishing operations, and where Laysan and black-footed albatross have been reported to be killed by Hawaiian longline fishing gear. The short-tailed albatross population is very low compared to historical estimates (current estimate: 1,400 birds; historical estimate: about 5,000,000 birds). Furthermore, an unknown fraction of the short-tailed albatross population temporarily resides at or passes through the Hawaiian archipelago and areas where the Hawaiian longline fishery conducts fishing operations.

The NMFS requires that federal fishery observers cover about 5% of all Hawaiian longline fishing trips to record fishery and protected species information. Only a fraction of the NMFS observer time is actually spent observing the accidental interaction between seabirds and longline gear (*e.g.* baited hooks and line). Most interactions between seabirds and longline gear have

been observed to occur when the longline gear is deployed.

Although the rulemaking process is underway to require Hawaiian longline fishing vessels to employ seabird deterrent devices during fishing operations, currently there are no such regulations. The chances of observing the accidental take of a short-tailed albatross is highly remote, because seabird deterrent devices are not employed in this fishery, and very little time is spent observing seabird interactions, and only a few short-tailed albatross have been observed to occur in the vicinity of the fishing grounds. However, it is still possible that take may occur.

Therefore, in an effort to ensure the long-term sustainability and survival of the species, NMFS formally consulted with the Service under section 7 of the Act on the operation of the Hawaii-based longline fishery and the anticipated take that may occur as a result of interaction with short-tailed albatross.

A. Factors to Be Considered

The probability of short-tailed albatross being taken on longline gear and reported is a function of many factors, including: (1) temporal and spatial overlap of the distribution of short-tailed albatross at sea and the distribution of longline vessels' fishing activity, (2) observer coverage, (3) albatross foraging behavior, (4) total number of baited hooks set per unit time, and the species targeted by the longline fishing vessels (*i.e.*, swordfish set, mixed set or tuna set), and (5) use and effectiveness of seabird deterrent devices. There are numerous other factors that contribute to the probability that individual birds will be hooked, including: (1) type of fishing operation and gear used, (2) length of time longline gear is at or near the surface of the water during the set, and to a lesser degree during the haulback, (3) behavior of the individual bird, (4) water and weather conditions (e.g., sea state), (5) availability of food (including bait and offal), and (6) physical condition of the bird. The number of birds affected by longline fishing is also a function of population size; as the short-tailed albatross population increases, an increase in number of birds killed on longlines is likely to occur.

Temporal and Spatial Overlap

Short-tailed albatrosses have been observed in the vicinity of the NWHI between November and March. Since 1938, approximately 46 observations of about 15 different birds have been sighted from land (Table 15). Short-tailed albatross have been observed from Midway Atoll (Sand and Eastern Islets), Laysan Islet, French Frigate Shoals (Tern Islet) and Kure Atoll (Green Islet). Sightings of short-tailed albatross from land represent the majority of all sightings. The Pacific Ocean Biological Survey Program produced no at-sea observations of short-tailed albatross in the vicinity of the NWHI, but this survey program was conducted at a time (1960s) when the short-tailed albatross population was very low. Only two marine observations of short-tailed albatross have been recently recorded by NMFS employees.

On March 28, 1997, a short-tailed albatross was observed during haulback operations by a NMFS fishery biologist aboard the NOAA R/V Townsend-Cromwell (Attachment F). In the

early morning hours, the short-tailed albatross was observed to be flying in a clockwise circle over the baited hooks which were being hauled back at the starboard/stern area of the vessel. The biologist noted that the "short-tail was actively looking for bait on hooks in the haulback." The biologist noted that at least 30 black-footed albatross and one Laysan albatross were also observed flying over baited hooks during haulback operations. The time and position of the vessel during haulback was: haulback began at 8:04am - 30°28'070" north latitude and 153°43'570" west longitude; haulback ended at 9:21am - 30°28'822" north latitude and 153°37'952" west longitude. About 150 hooks were deployed during the set.

The biologist was undertaking a study to test the effectiveness of the "Tori Pole," a device to haze seabirds from baited hooks deployed by fishing vessels. However, the Tori Pole was not deployed at the time of the sighting. During the course of the cruise, the biologist documented the behavior of at least 91 black-footed albatrosses and 6 Laysan albatrosses during five experimental sets during the period of 24-28 March 1997. The average number of hooks set per observation was 140, with a total of 700 hooks observed.

This was the first documented sighting of a short-tailed albatross from a vessel in the vicinity of the Hawaiian Islands. This was the first time staff on a research vessel cruise in the vicinity of the NWHI included a biologist trained specifically to identify seabirds and record their behavior. In the past, NOAA Corps Officers untrained in seabird identification have recorded opportunistic sightings of seabird species. Since 1989, the R/V Townsend-Cromwell has conducted about 19 cruises that typically last about 30 days each.

On this particular cruise (Cruise TC-97-03[TC-281], March 20 - April 18, 1997), the R/V Townsend-Cromwell operated about 480 to 780 nautical miles (889 to 1445 km) off the island of Oahu, Hawaii. Longline fishing operations were conducted using monofilament longline gear in conjunction with hook timers and time-depth recorders to study the habitat utilization, hooked longevity, and vulnerability to fishing gear of broadbill swordfish (*Xiphias gladius*). During the cruise, the crew of the R/V Townsend-Cromwell tagged, released and sampled about 76 fish. The types of fish caught during the cruise included: 26 blue sharks (*Prionace glauca*), 12 broadbill swordfish (*Xiphias gladius*), 20 mahimahi (*Coryphaena hippurus*), 16 longsnout lancetfish (*Alepisaurus borealis*), 1 albacore tuna (*Thunnus alalunga*), and 1 snake mackerel (*Gempylus serpens*).

In February 1999, fishery scientists aboard the R/V Townsend-Cromwell conducted a study to test the effectiveness of several techniques to reduce seabird interaction with swordfish longline fishing gear. A portion of the experiment was conducted within 50 nautical miles (nm) (91.45 kilometers) of French Frigate Shoals, a breeding colony for black-footed and Laysan albatross and where two short-tailed albatross have been observed. The experiment was also conducted in close proximity to Laysan Island where Laysan and black-footed albatross occur. Normally, longline fishing vessels are prohibited from entering waters closer than 50 nm (91.45 kilometers) from the islands and atolls that comprise the NWHI to avoid interaction with marine mammals. However the risk to seabirds and other protected species was considered negligible, because this

was an experiment to test the effectiveness of certain seabird deterrent devices. Also, large safety pins were substituted for hooks to hold the bait (squid - *Illex sp.*) on the line, thereby significantly reducing potential impacts to seabirds. There were no reported impacts to protected species during this experiment. Data from 24 experimental sets indicate that researchers made about 5,143 observations of black-footed albatross and about 5,178 observations of Laysan albatross, among other seabird species, trailing the vessel during the study (Boggs, *in press*). Observations of seabirds were recorded as far back as 980 ft (327 m) from the stern of the vessel. Observers spent approximately 100 hours documenting seabird observations as part of the study, but did not observe any short-tailed albatross. No other species of seabirds besides black-footed or Laysan albatross interacted with the longline baits or gear.

On January 23, 2000, a short-tailed albatross was observed flying near a Hawaii-based longline fishing vessel while hauling back longline gear. The observation was recorded by a NMFS fishery observer. The sighting occurred at 0837 at 33°9'2" north latitude and 147°49'6" west longitude.

The bird was observed flying in a group of about 10 to 15 black-footed albatrosses and was in sight of the longline vessel, circling it for approximately one and a half hours. Although some of the black-footed albatrosses in this group were feeding on discarded bait, the short-tailed albatross was not observed feeding on bait. The observer judged the bird to be a juvenile. It had a bright pink and large bill with completely brown plumage. No seabird mitigation methods were employed at the time of the sighting.

On March 28, 2000, a juvenile short-tailed albatross was observed by a private citizen at the Pacific Missile Range Facility, Barking Sands, Kauai, HI (PMRF). The bird was observed at 17:30, and was observed to be resting in the grass on the mountain side of the PMRF runway.

A short-tailed albatross with band "white 000" was banded as a chick at Torishima in 1978. It was first recorded at Midway Atoll on 15 December 1984 (Tables 15 and 16). After that, it returned each year in December and left each spring, usually in April, until its disappearance in the fall of 1994. The bird was almost always seen in the same area on the south side of Sand Islet. Its pattern of behavior in the breeding season was to sit in the colony except for occasional trips of 2 or 3 days length out to sea. In March 1994, "white 000" was observed and video-taped dancing with Yellow 015, a female short-tailed albatross hatched at Torishima in 1983 that had been coming to another part of Sand Islet since 1989. "White 000" returned again in the fall of 1994 but failed to return after a routine foraging trip soon thereafter. There was heavy longline fishing activity and high black-footed and Laysan albatross mortality as measured by the observer program north of Midway Atoll during 1994. The bird has never been sighted again in any of the NWHI nor at Torishima. This bird was a young adult that had consistently established a territory over 10 years at Midway Atoll, and short-tailed albatross have no natural at-sea predators while foraging. Therefore, the Service maintains there is a possibility that "white 000" was taken in the Hawaiian longline fishery.

Observer Coverage

NMFS observers have been deployed aboard industry fishing vessels since 1994 to collect fishery-related information and to record sightings of marine mammals and turtles (on Protected Species Interactions and Sighting Record forms). Observers are currently instructed to record seabirds only if they interact with the fishing gear. With the exception of short-tailed albatross, they are specifically instructed not to record seabird sightings, only interactions (Lewis Van Fossen, NMFS, pers. commun. 1999). Because observers do not allot a portion of their time to observe seabirds, the probability is remote that a short-tailed albatross would be observed through casual sightings.

NMFS defines interaction to be contact with the gear including leaders trailing off the stern of the vessel within 300 ft (100 m) of the boat. Evidence of this contact includes observations of animals at the gear; animals stealing fish from the gear or coming in contact with the gear; and evidence of fresh marine mammal or seabird damage to the catch (not by presence of damaged fish only). Protected species retrieved during haulback are documented on a separate form, called the Protected Species Tally Sheet.

Between 1994 and 1996, observers had three options for describing deterrents that might be used by fishermen to keep birds away from fishing gear. Observers could record "yes" or "no" under "streamer," "bomb," or "other." They then were asked to describe the use of this deterrent and the results in the narrative section of their data form. In 1997, the data form was amended to include 12 different bird-catch reduction devices and techniques that could be checked off. Along with interaction and deterrent data, observers collect a suite of other information about environmental conditions, time, type of gear, technique, and location of fishing effort, which could be related to levels of bird catch.

On 17 November 1998 a new instruction was issued for observers to collect and return to port any short-tailed albatross retrieved dead during longline fishing operations. The same memorandum asked that any seabirds that are retrieved alive have any line and hook removed if possible, be described and the characteristics recorded, have their leg band data recorded, be photographed, and released.

The Service has provided training in seabird identification for NMFS observers on three occasions since the mandatory observer program started. An hour of instruction in seabird identification using slides was provided for the first group of observers in February of 1994. Again in 1996, the Service presented classroom instruction in identification techniques and then assisted at a session at the Bishop Museum, where new observers were able to look at actual specimens of the seabirds in question. At this time the Service also provided copies of field guides for the observers to use while at sea. The classroom and museum instruction were recently repeated in the fall of 1999 for a new cohort of observers.

There was an annual average of 1,078 longline trips during the period 1994-1999 (Table 17). Of

this, there was an annual average of 46 observed fishing trips (4.3 percent) (Table 17). NMFS observers work about 10 hours per day, and reserve enough time to observe about 10% of each set during tuna trips and 3% of each set during swordfish trips (L. Van Fossen, NMFS, pers. commun. 1999). The peak interaction period when seabirds interact with longline gear is during the set, although some interaction does occur during the haulback (Garcia and Associates 1999). At present, very little time is dedicated to looking for short-tailed albatross during the set, when seabirds are most likely to interact with longline fishing gear.

Foraging Behavior

Similar to Laysan and black-footed albatross, short-tailed albatross are able to locate food using well-developed eyesight and sense of smell. All three species of albatross feed at the ocean surface or within the upper three feet (one meter) by seizing, dipping or scavenging (Austin 1949, Harrison *et al.* 1983). Their diet consists primarily of squid, fish and flying fish eggs (Harrison *et al.* 1983, Austin 1949).

As demonstrated in the Alaska fishery, short-tailed, Laysan and black-footed albatross have been documented by NMFS to be killed as a result of interaction with demersal longline gear (Shannon Fitzgerald, NMFS, pers. commun. 1999). Birds attempting to steal bait may be hooked, pulled underwater as the mainline is set at its fishing depth, and drowned. In a similar manner, birds may also be killed during haulback operations. Also, if birds that attempt to steal bait are not hooked, they may be injured during the process of attempting to steal bait either from the hook, branch-line or mainline.

Ed Melvin, Marine Fisheries Specialist for the University of Washington Seagrant Program, is evaluating the effectiveness of deterrents to reduce the take of seabirds in Alaskan fisheries. The seabird deterrent study uses results collected from observations of Laysan and black-footed albatross interactions to gauge the effectiveness of seabird deterrent devices that could possibly work to deter short-tailed albatross from baited hooks (E. Melvin, pers. commun. 1999). Fishery activities are modified when a short-tailed albatross is observed in the area to avoid taking the bird. The study does not directly evaluate seabird deterrent devices on short-tailed albatross, but uses Laysan and black-footed albatross as indicators of risk. Information from this report may provide useful information that could be applied to seabird deterrent strategies in the Hawaiian longline fishery.

Hooks set per unit time and trip type

NMFS has documented the number of killed Laysan and black-footed albatross observed during haulbacks since 1994 through its Observer Program. The methodology used to estimate the number of birds killed, at 95% confidence intervals, is described in the NOAA Technical Memorandum NOAA-TM-NMFS-SWRSC-257 (NMFS 1998b).

For both species of albatross, Table 18 summarizes the annual (1994-1998) estimated rate at which birds may be killed per 1,000 hooks, the kill estimate, the 95% confidence interval, and

the total number of hooks set in the entire Hawaiian longline fishery (*e.g.*, swordfish trips, mixed trips and tuna trips) (WPRFMC 1999). Table 18 represents the conservative, or low, end of the range of birds that may be taken per 1,000 hooks in the Hawaiian longline fishery. It is feasible that between 30% to 95% of birds caught on the fishing gear during deployment and haulback may fall off the hook as a result of gear deployment/haulback operations, strong currents, scavenged by predators during the soak, or cut-off by fishers during the haulback (Gales *et al.* 1998). Therefore, the minimum rate at which birds are estimated killed per 1,000 hooks for the years 1994 - 1998 respectively was: for Laysan albatross - 0.1523 (1994), 0.1026 (1995), 0.0727 (1996), 0.0739 (1997), and 0.0887 (1998); and for black-footed albatross - 0.1662 (1994), 0.1394 (1995), 0.1063 (1996), 0.0739 (1997) and 0.1177 (1998) (K. Foster, Service, pers. commun., 1999). Conceivably, the rates at which seabirds interact with Hawaiian longline gear maybe higher.

This information can be further refined by reporting bycatch ratios by set type (Attachment J), based on information from the NMFS observer database (1994 - 1998). When fishers targeted swordfish, about 370 birds were observed caught after 488 observed sets which results in a 0.758 bird catch per set ratio. When fishers targeted both tuna and swordfish, known as a mixed set, about 472 birds were caught after 946 observed sets which results in a 0.499 bird catch per set ratio. When fishers targeted tuna, about 16 birds were observed caught after 1,250 observed sets which results in a 0.01 bird catch per set ratio. Clearly, when fishers conducted swordfish or mixed sets, they experienced a higher bird catch ratio which is likely attributed to the methodology employed. However, it is evident that the risk of interaction persists when fishers target tuna, albeit at a much reduced rate.

The approximate area in which Laysan and black-footed albatross interact with Hawaiian longline gear is illustrated in Map 2. The approximate area in which swordfish, mixed and tuna trips occur is illustrated in Map 3. Information in this biological opinion demonstrates that lethal interaction between Laysan and black-footed albatross species and the Hawaiian longline vessels occurs within the range of the short-tailed albatross. Because Laysan, black-footed and short-tailed albatross species exhibit similar feeding behavior and have been documented to be killed in other U.S. fisheries, it is reasonable to assume that short-tailed albatross are at risk of injury or mortality through contact with longline fishing gear where the Hawaiian fishery overlaps with the range of the short-tailed albatross (Map 4).

Seabird Deterrent Measures

NMFS' October 1999 amended proposed action (see "Description of the Proposed Action") specifies use of seabird deterrent measures and includes most of the measures that should be implemented to reduce the interaction between short-tailed albatross and Hawaiian longline vessels. However, minor modifications to this amended proposed action will better ensure that: a) seabird deterrent strategies will be implemented in areas where the short-tailed albatross foraging range may overlap with the Hawaiian longline fishery; b) the performance of the various combinations of seabird deterrent strategies are measurable, thus providing the Service

and NMFS with information to refine and improve upon seabird deterrent measures in the future; c) the implementation of seabird deterrent strategies are consistent with recommendations from enforcement officers.

NMFS' proposal to require seabird deterrent measures for all Hawaii-based longline vessels operating north of 25° north latitude does not adequately cover areas where the short-tailed albatross may occur. A short-tailed albatross (band: yellow 047) was observed for nine days on Tern Islet, French Frigate Shoals Atoll, Hawaiian Islands NWR during the winter of 1994. The foraging range for the short-tailed albatross that visit Midway Atoll NWR, and the unknown number of short-tailed albatross that transit through the Hawaiian archipelago, may include French Frigate Shoals Atoll.

The Service has reviewed the Garcia and Associates (1999) report, "Final Report, Hawaii Longline Seabird Mortality Mitigation Project, September 1999," commissioned and funded by WPRFMC, and the NMFS study conducted by C. Boggs, "Deterring Albatrosses from Contacting Baits During Swordfish Longline Sets" (*in press*). These reports provide the best available information regarding deterrence of seabird interactions, injuries, and mortalities associated with the Hawaiian longline fishery. These reports support reasonable measures that the Hawaiian longline fishery should implement to reduce the potential interaction between the fishing gear and the short-tailed albatross. Furthermore, the Service concurs with NMFS that "night setting, blue-dyed and thawed bait, towed deterrent, weighted branch lines, line-setting machine and weighted branch lines, and discharge offal strategically" are, to various degrees, successful in reducing interaction and mortalities between longline gear and seabirds (Attachment K).

B. Analyses for Effects of the Action

The expected, adverse effect of the proposed action is mortality of short-tailed albatrosses. Birds attempting to steal bait may be hooked, pulled underwater as the mainline is set and drowned. Birds may sustain injuries from interactions with baited hooks during the process of setting and hauling back the main line, which could seriously impair them and result in mortality.

The Service considered different approaches to estimating the number of birds taken by the Hawaiian longline fishing fleet. In this section we explain why historical levels of take cannot be used to estimate take in this fishery, and explain how we estimate take.

We have determined that short-tailed albatrosses are at risk of injury or mortality from Hawaii longline fishing operations based on the following data points: 1) documented take of Laysan and black-footed albatrosses in the fishery combined with the similarities in foraging behaviors and distributions of Laysan, black-footed, and short-tailed albatrosses, 2) observation of a short-tailed albatross "actively looking for bait on hooks in haulback" behind the R/V Townsend-Cromwell in 1997, which supported the initial discussions about the need for formal section 7

consultation, 3) observation of a short-tailed albatross in the vicinity of a Hawaiian longline fishing vessel while the vessel was conducting haulback operations, 4) the disappearance of "white 000" in 1994 and the possibility of mortality related to the Hawaiian longline fishery, and 5) repeated sightings of numerous individuals over several months each year in the Northwest Hawaiian Islands, especially Midway Atoll. There are no documented instances of short-tailed albatrosses killed in the Hawaiian fishery, probably due to the low observer coverage in the fishery (1994-1999 average coverage: less than 5%) and the fact that short-tailed albatross occurrences are likely to be relatively rare due to their low population numbers world-wide.

The absence of observed and documented takes in the fishery confounds our attempts to estimate the amount of take likely to occur as a result of the action. Historical information is lacking on which to base an estimate of take in the Hawaiian fishery. Therefore, based on the similarities in foraging behavior between short-tailed, Laysan and black-footed albatross, we considered using the take rate of Laysan and/or black-footed albatrosses to estimate the total annual take of short-tailed albatrosses. Although crude, this represents the best available information on the number of short-tailed albatrosses likely to be taken in this fishery until such time that observer coverage of short-tailed albatross interaction with the fishery operations is increased.

The following approach for estimating incidental take indicates that we can expect 2.2 short-tailed albatross per year to be taken as a result of the continued operation of the Hawaii-based longline fishery. Based on the NMFS (1998) report, "Seabird Take Estimates for the Hawaiian Longline Fishery 1994-1996," we can calculate the number of birds (Laysan and black-footed albatross) per 1,000 hooks that are killed in the Hawaiian longline fishery. We acknowledge that those rates are not directly comparable to the entire population of short-tailed albatross because of species differences, including breeding colony location and the resultant difference in distribution; however, they may provide a basis for estimating take of short-tailed albatross in the vicinity of the Hawaiian Islands.

Laysan and black-footed albatross appear in this area in greater numbers than short-tailed albatrosses because their world-wide population numbers are significantly higher, and because the primary breeding colonies for these two species are within the boundaries of the Hawaiian Islands NWR. The primary breeding colony for short-tailed albatross is Torishima Island. Due to the differences in geographic locations of these breeding colonies, we would not expect to see the worldwide population of short-tailed albatross affected by the Hawaiian longline fleet in exactly the same manner as the worldwide population of Laysan or black-footed albatross. However, because there are takes of Laysan and black-footed albatross in the vicinity of the Hawaiian Islands NWR, and we know short-tailed albatross have been sighted in this vicinity, we maintain that a small percentage of the world-wide population of short-tailed albatross may be adversely affected.

A percentage of the short-tailed (subadult and adult) population traverses the area where the Hawaiian longline fishery occurs. Furthermore, we conclude that a percentage of these birds

may be killed or injured as a result of the fishery. Between 1938 and 1999, 15 different individuals were observed about 46 times (observations range from flyovers to part-time residents), with most of the observations from land. The first at-sea observation of a short-tailed albatross in the vicinity of the Northwestern Hawaiian Islands was from the R/V Townsend-Cromwell in 1997. This observation was made by a fishery biologist who was trained in seabird identification. Coincidentally, this was the first time a biologist, trained in seabird identification, served aboard the R/V Townsend-Cromwell to observe seabird behavior.

Short-tailed albatross range from Torishima as far away as the Bering Sea, the Aleutian Islands and southern Alaska, the western coasts of Canada, the U.S. mainland and Mexico. The Service acknowledges that occurrences of short-tailed albatross in the Pacific are not necessarily evenly or randomly distributed throughout their range. However, we can use the generalized proportion of the range of the short-tailed albatross where it overlaps with the generalized area in which the Hawaiian longline fishery operates to derive a crude estimate of the proportion of the short-tailed albatross population which may be vulnerable to Hawaiian longline fishing activities.

The distribution of the short-tailed albatross is approximately 4,040,441,000 hectares (Map 1). Because most observations of short-tailed albatross beyond the Torishima breeding colony occur in the vicinity of the coastal waters of the North American continent, an "oceanic flyway" may exist between the breeding colony and North America. Based on FWS and NMFS observations of short-tailed albatross, the Service suspects that the NWHI are a part of this "flyway" for birds that transit to and from the North American foraging grounds. The Service can only estimate the percentage of the total short-tailed albatross population that may transit through this general area.

The generalized area in which the Hawaiian longline fleet operates (Attachment A) and overlaps with the range of the short-tailed albatross (Map 3) is approximately 989,651,000 hectares or 24.5% of the range of the bird. The Service understands that the Hawaiian longline fishing fleet may operate well beyond this area (*e.g.* off the west coast of north America, south of the equator, and the western Pacific Ocean). Therefore, this analysis is a crude estimate of take that may occur in the Hawaiian longline fishery.

We estimate that throughout the course of one year, about 334 (or 24.5% of the estimated 1,362 of the worldwide population) (H. Hasegawa, pers. commun. 2000) short-tailed albatross may be present within the area where the range of the bird overlaps with the Hawaiian longline fishery (Map 3). We can estimate the number of birds that may be taken as a result of the Hawaiian longline fishery by comparing the number of short-tailed albatross that may appear in the vicinity of the Hawaiian longline fishing area with the estimated proportion of black-footed albatross that are killed by the fishery in this same area. We choose to compare the short-tailed albatross with black-footed albatross because both species are larger than Laysan albatross and are more likely to outcompete Laysan albatross for food due to their size and behavior. Furthermore, the NMFS observations of short-tailed albatross (3/97 and 2/00) indicate that they were primarily flying-by in the company of black-footed albatross (BFAL). In March, 1997 a

juvenile short-tailed albatross was observed in the company of about 30 BFAL by a NMFS fishery biologist from the R/V Townsend Cromwell; in February, 2000 a juvenile short-tailed albatross was observed in the company of about 10 - 15 BFAL by a NMFS fishery observer from a Hawaiian longline fishing vessel.

The estimated number of individuals in the black-footed albatross worldwide population is about 277,675 (E. Flint, Service, pers. commun. 2000). This estimate was based on calculations and assumptions (including survivorship and reproductive success) in Cousins and Cooper (2000). Using these methods and assumptions, we determined that there are approximately 138,963 breeders and about 138,712 non-breeders in the population. This estimate is based on the proportion of the black-footed albatross world population (95%) that was counted in 1999.

Refuge Manager Brian Allen, Hawaiian Islands NWR (Tern Islet - French Frigate Shoals) reports that in hatch year 1999 on Tern Islet, there were about 1,493 black-footed albatross nests, and therefore about 2,986 breeders. Brian Allen also reports that approximately 2,230 non-breeders were captured and banded or bands read. It is likely that a sizeable proportion of the non-breeders on Tern were documented because band reading occurred everyday of the season and many individuals were observed repeatedly.

Using an average (for the years 1994 - 1998) of the total estimated kill figures represented in Table 18, we can estimate the percentage of the black-footed albatross population killed in the Hawaiian longline fleet over time. The 5-year average annual mortality estimate for black-footed albatross by the Hawaiian longline fishery is about 1831. This average (1831) represents about 0.66 percent (1,831/277,675) of the total black-footed albatross population (277,675) killed by the Hawaiian longline fishery each year. Applying this percentage to the number of short-tailed albatross (334) that may appear in the area where the Hawaiian longline fishery occurs, we estimate that about 2.2 (0.0066 x 334) birds are killed each year, or about 15 short-tailed albatross may be taken over the 7-year period addressed in this consultation. For the purposes of this biological opinion, the Service defines "interaction" as observation of a short-tailed albatross striking at the baited hooks or mainline gear when the vessel conducts setting or haulback operations. Because an interaction is a behavior that has been documented to precede take in the form of injury or mortality in Laysan and black-footed albatrosses, for the purposes of this biological opinion, an interaction will be considered to represent a take of a short-tailed albatross.

An indirect effect expected to occur as a result of the proposed action is reduction in population growth rate as a result of lost future reproductive success of the birds taken, and the temporary loss of reproductive success of the mates of any adult birds taken by this action.

C. Species Response to the Action

Lost Productivity

In evaluating the effects of the continued operation of the longline fishery, we considered the impact of lost future productivity of a bird to the species. The analysis of lost future productivity was based on our understanding of several variables that relate to the life of the short-tailed albatross (Cochrane and Starfield, in press) (Table 19).

Table 20 shows the lost-bird years from the take of one four-year-old albatross. A bird-year is defined as the quantity of services provided by one bird over the course of one year. These services include ecological services that help maintain the ecosystem, such as controlling prey species, breeding, guano deposition, etc., as well as services to society, such as being observed by bird-watchers.

We estimate that about 2.2 birds may be killed in the Hawaiian longline fishery each year, or 15 birds over the length of this consultation. Applying lost bird-year analysis to these estimates, we would expect that a maximum of 2,473 bird-years might be lost due to fishery-related impacts over the next seven years. Also, the Service estimates that about 4 short-tailed albatross will be taken in the Alaska hook-and-line fishery during the 1999 and 2000 fishing season or 2 birds taken per year. If this anticipated loss of short-tailed albatross were to continue through 2006, we would expect to realize the loss of 12 more birds, or a total of 16 birds in the Alaskan fishery. We would expect that at least an additional 2,569 bird-years (Alaska fishery) would be lost as a result of the combined U.S. fishery-related impacts to short-tailed albatross. Lost productivity (present and extrapolated) is useful in assessing the impacts of the loss of an individual bird with regard to its future potential contributions to the short-tailed albatross population, the ecosystem and society.

Population Viability Analysis

In an effort to better understand the impacts of fisheries take on the short-tailed albatross population that breeds on Torishima Island, the Service prepared a preliminary Population Viability Analysis (PVA). Data and general information for this analysis was obtained from Hiroshi Hasegawa (pers. commun. 2000) and from Cochrane and Starfield (in press). The PVA was done using VORTEX Version. 7.2, which is produced and maintained by Robert Lacy, Department of Conservation Biology, Chicago Zoological Society, Brookfield Zoo and can be obtained at no cost at internet web page: http://pweb.netcom.com/~rlacy/vortex.html.

> The PVA used the following values as the best available data on the current life-history traits of Torishima Island short-tailed albatross. Variances and average values for juvenile and adult mortalities, and for breeding rate of adults were obtained from Cochrane and Starfield (in press) (Table 19).
>
> Age at first reproduction for males and females = 7 years

Maximum life span = 50 years
Annual fecundity = 1 egg
Initial population size = 1170 birds in a stable age distribution
Breeding rate of adults = 75% ± 10% of all adults breed each year

Baseline Adult and Juvenile Survivorship:

1. Annual Adult Survivorship = 95.5% (4.5% mortality) ± 2.0%.
2. Annual Juvenile Survivorship = 91.0% (9% mortality) ± 4.0% ; note that this is for years 1-7.
3. Year 0-1 Survivorship = 56.2% (43.8% mortality) ± 5.8% This is determined from the first 6 months of survivorship from egg to fledgling and survivorship of juveniles during the first 6 months of juvenile life. Survival from egg to fledgling is determined from Hasegawa's data for years (1980-1996) without storms (See Attachment G and H; 58.9% ± 7.742%); very similar to the Cochrane and Starfield (in press) estimate of 55% average for nest success rate. Survivorship of juveniles during the first 6 months of juvenile life is the same as the baseline juvenile survivorship.

It should be noted that there are no available data on variances in the mortalities of juvenile and adult short-tailed albatross. Consequently, the comparatively low variances given above may underestimate real-world fluctuations in the size of the Torishima Island population. This underestimate may be compounded by the fact that the impacts of tropical storms or the potential eruption of the Torishima volcano are not specifically addressed in this PVA. A brief examination of Hasegawa's data indicates that storms can reduce breeding success by approximately 15%. A volcanic eruption on or near Torishima Island during the breeding season could have catastrophic effects on breeding success for that year and may also result in the death of many of the adult birds sitting on nests at the time of the eruption. These factors should be taken into consideration when evaluating the long-term dynamics of the short-tailed albatross population.

Fisheries take is a significant factor in juvenile and adult short-tailed albatross mortality. Of the 7 observed takes in the Alaska fishery, 6 were juveniles and 1 was an adult. Fishery takings were modeled as increases in juvenile and adult mortalities. These increases were maintained at the observed 6 to 1 ratio and were modeled at five levels:

- Current mortality estimates: 9% annual juvenile mortality and 4.5% annual adult mortality;
- 11% annual juvenile mortality and 4.83% annual adult mortality;
- 13% annual juvenile mortality and 5.17% annual adult mortality;
- 15% annual juvenile mortality and 5.5% annual adult mortality;
- 17% annual juvenile mortality and 5.83% annual adult mortality.

The population size results for these varying levels of mortality are presented in Attachment G.

While the PVA analysis indicates that the Torishima Island short-tailed albatross population is resilient, it is apparent from the analysis that impacts from fisheries represent a significant hurdle to reestablishing a large population with multiple breeding sites, the historic condition of this species (see Attachment G: PVA of the effects of fisheries take on juveniles and adults). The PVA analysis also indicates that relatively small increases in the taking of juvenile and adult birds can significantly slow population growth (see Attachment G):

- A 2% increase in the annual juvenile mortality (total 11%) and a 0.33% increase in the annual adult mortality (total 4.83%) will increase the time to double the current population from approximately 16 years to 21 years;
- A 4% increase in the annual juvenile mortality (total 13%) and a 0.67% increase in the annual adult mortality (total 5.17%) will increase the time to double the current population from approximately 16 years to 27 years.
- A 6% increase in the annual juvenile mortality (total 15%) and a 1% increase in the annual adult mortality (total 5.5%) will increase the time to double the current population from approximately 16 years to 50 years.
- An 8% increase in the annual juvenile mortality (total 17%) and a 1.33% increase in the annual adult mortality (total 5.83%) will increase the time to double the current population from approximately 16 years to 130 years.
- If take increases by more than 8% for annual juvenile mortality and 1.33% for annual adult mortality, then the species will most likely go extinct, given the conservative parameters used in the model (see Attachment G).

As indicated above, there is a significant jump in the time required to double the current population size when juvenile and adult mortalities exceed 13% and 5.17%, respectively: a 4% increase in the annual juvenile mortality (total 13%) and a 0.67% increase in the annual adult mortality (total 5.17%) increases the time to double the current population by approximately 6 years, whereas a 6% increase in the annual juvenile mortality (total 15%) and a 1% increase in the annual adult mortality (total 5.5%) increases this time by approximately 23 years. An 8% increase in the annual juvenile mortality (total 17%) and a 1.33% increase in the annual adult mortality (total 5.83%) increases the time to double the current population by approximately 80 years. Consequently, annual juvenile and adult mortalities that do not exceed 13% and 5%, respectively, for the Torishima Island population, should sustain the short-term rebuilding of this species.

In evaluating long-term growth of the short-tailed albatross population, it is important to note that the population growth trajectories discussed above continue to diverge through time (see

Attachment G). For instance, growth to a population size of 15,000 birds will require approximately 58 years at current levels of mortality. A 2% increase in the annual juvenile mortality (total 11%) and a 0.33% increase in the annual adult mortality (total 4.83%) will increase the time to reach 15,000 birds by approximately 21 years; a 4% increase in the annual juvenile mortality (total 13%) and a 0.67% increase in the annual adult mortality (total 5.17%) will increase this time by approximately 50 years. Consequently, a total annual mortality of around 11% for juveniles and 4.83% for adults might include both short-term reductions in population growth and longer-term rebuilding of the historic short-tailed albatross population.

Additional breeding sites can greatly assist in the rebuilding of the short-tailed albatross population from its dangerously small current size. Establishment of additional short-tailed albatross breeding sites should be considered on Pacific islands that can be managed to protect the birds. The NWHI that are on secure Service Refuge lands are an example of potential breeding sites. These U.S.-owned islands are currently managed to protect seabirds and represent a unique opportunity for conservation of short-tailed albatross. Additionally, known historic sites should be evaluated as possible sites for reintroduction of short-tailed albatross. Current loss of reproductive contribution, or a small increase in loss, due to adverse effects by the fisheries may slow the building of the short-tailed albatross population, and new sub-populations would aid in buffering the species from stochastic processes or increased fisheries takings.

According to information provided by Hasegawa, the present worldwide population of short-tailed albatross is about 1,362 birds, half are juveniles and half are adults. Based on the PVA and its assumptions, an annual level of death of about 81.9 sub-adults (17% mortality) and 11.7 adults (5.83% mortality) would lead to eventual extinction of the species. Although additional data may change the assumptions of our analysis, because the current annual estimated loss of reproductive contribution (*e.g.*, 2.2 short-tailed albatross [Hawaii] + 2 short-tailed albatross [Alaska] = 4.2 per year) due to adverse effects by U.S. fisheries falls short of those levels, the Hawaii-based longline fishery may slow population growth of the species, but is not anticipated to jeopardize the continued existence of the species.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

There is potential for oil spills to occur in the action area which could affect short-tailed albatrosses. Service refuge managers and biologists stationed at Midway Atoll NWR, Tern Islet (French Frigate Shoals) and Laysan Island - Hawaiian Islands NWR have observed that some seabirds from local breeding colonies die from oil-related impacts. The sources of the oil spills are unknown. However, it is speculated that oil released on the high seas by vessels transiting the central Pacific Ocean may be responsible for these oil-related injuries. Vessels that have

sunk in the vicinity of the Hawaiian Islands NWR may periodically release oil from fuel tanks.

Discarded plastic cigarette lighters and light sticks that drift away from longline gear, among other plastic debris, float in the water column and are consumed by seabirds while they are foraging. The ingestion of plastic may compromise seabirds and result in dehydration and starvation, intestinal blockage, internal injury, or exposure to dangerous toxins (Cousins 1998; Sievert and Sileo 1993). Both Laysan and black-footed albatross that occur within Hawaiian waters have been documented to be impacted by plastic debris (WPRFMC 1998).

Drift and trawl nets accumulate in the NWHI and entangle protected species such as sea turtles, the Hawaiian monk seal and seabirds. A multi-agency State and Federal effort is underway to remove driftnets from several locations within the Hawaiian Islands NWR. However, as long as fisheries continue to lose fishing gear, protected species will continue to become entangled.

Japanese, Taiwanese, Korean and other fishing nations operate longline vessels in areas which overlap with the known range of the short-tailed albatross and may interact with the short-tailed albatross. However, these nations do not report the rate at which seabirds are caught on longline gear. In order to estimate seabird bycatch rates, foreign vessels should report the rate at which seabirds are caught per 1,000 hooks fished. Without this information, the Service can not estimate the fishery-related adverse effects that these fishing nations may have on the short-tailed albatross.

At this time, there is not enough information about these activities and their impacts on short-tailed albatross to determine the level of impact they might have on the species.

VI. CONCLUSION

After reviewing the current status of the short-tailed albatross, the environmental baseline for the action area, the effects of the Hawaiian longline fishery and the cumulative effects, it is the Service's biological opinion that the Hawaiian longline fishery, as proposed, is not likely to jeopardize the continued existence of the short-tailed albatross. No critical habitat has been designated for this species, therefore none will be affected.

At the current population level and the current population growth rate, the level of mortality expected to result from this fishery, as described in Pelagic Fisheries of the Western Pacific Region-1997 Annual Report (October 1998) for this action, is not thought to represent a threat to the species' continued survival. However, in the event of a major population decline as a result of a natural environmental catastrophe or oil spills, the effects of longline fisheries on short-tailed albatross could be serious. Independent of exceeding incidental take, such an event would represent new information, resulting in the need for reinitiation of this consultation.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of sections 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by NMFS so that they become binding conditions of any authorization of the fishery as appropriate, for the exemption in section 7(o)(2) to apply. NMFS has a continuing duty to regulate the activity covered by this incidental take statement. If NMFS (1) fails to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, and/or (2) fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, NMFS must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(I)(3)].

Amount or Extent of Take Anticipated

The Service anticipates that 15 short-tailed albatross may be taken during the seven-year period addressed in this consultation, based on an estimate of 2.2 birds per year, from 2000 through 2006, as a result of the Hawaiian longline fishing activities regulated by NMFS. The incidental take is expected to be in the form of mortality or injury. The Service expects that documentation of this take will be a rare event due to the low current level of observer coverage (about 4.3%) and the low current rate of observer effort dedicated towards observing the setting of longline gear (about 3% - 10 % of each set), which is the time when most seabirds are affected by longline gear. The Service considers the observation of a short-tailed albatross in the vicinity of the vessel, actively looking for food, to represent an unknown number or index of short-tailed albatross that may be taken in the Hawaiian longline fishery. Given NMFS's low level of observer coverage and the absence of reported observed takes of short-tailed albatross by the Hawaii longline fishery, the Service is not able to calculate the rate at which short-tailed albatross forage for bait on hooks or "strike a hook," and the number that these observations may represent in terms of birds actually killed or injured. To better understand the rate at which birds

strike at hooks and are killed or injured, such taking will be considered in compliance with this Incidental Take Statement.

The Service defines "interaction" as observation of a short-tailed albatross striking at the baited hooks or mainline gear when the vessel conducts setting or haulback operations. Because an interaction is a behavior that has been documented to precede take in the form of injury or mortality in Laysan and black-footed albatrosses, for the purposes of this biological opinion, an interaction will be considered to represent a take of a short-tailed albatross. To summarize, either an interaction or an observed injury or mortality constitutes the take of a short-tailed albatross for this biological opinion only.

The Service will not refer the incidental take of any migratory bird (in this case, short-tailed albatross) for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

Effect of the Take

The Service has estimated that about 2.2 short-tailed albatross per year (or 15 for the duration of this consultation) may be taken as a result of the proposed action from the year 2000 through 2006. However, this is only an estimate, based on certain assumptions relative to the bird's behavior and appearance within the area of the Hawaiian islands and its possible interaction with the Hawaiian longline fishery.

The Service does not believe that this level of take is likely to result in jeopardy to the species, nor will it result in destruction or adverse modification of critical habitat, as critical habitat is not designated in the project area.

Reasonable and Prudent Measures

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the impact of the incidental take of short-tailed albatrosses:

I. Minimize attraction of short-tailed albatross to fishing gear used by the Hawaiian longline fishery.
II. Monitor the level of take and measures to minimize take.
III. Ensure survivability of injured short-tailed albatrosses.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the Act, NMFS must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and specify reporting requirements. These terms and conditions are non-discretionary.

In order to implement reasonable and prudent measure I above, the following terms and conditions apply:

I.A. Implementation Timeframe: NMFS shall promulgate regulations that require Hawaiian longline fishing vessels to comply with all seabird deterrent-related measures in the terms and conditions of this biological opinion, where said fishing activities overlap with the known range of the short-tailed albatross, whether fishing activities occur within the EEZ or in international waters (*e.g.*, high seas). Final regulations shall be implemented no later than April 15, 2001 or the resumption of the directed swordfish or mixed fisheries, whichever comes first.

I.B. Seabird Deterrent Measures: NMFS shall require and implement the following mandatory seabird-deterrent measures for all Hawaii-based longline vessels, according to set type, operating north of 23° north latitude. For the purposes of this opinion, the Service adopts the NMFS definition of set types for both deep sets and shallow sets, when deploying Hawaiian longline gear. This definition is described in the *Federal Register* (Vol.. 65, No. 214, November 3, 2000, pages 66186 - 66188).

Summary of Seabird Deterrent Measures by Set Type (NMFS Defined)

Seabird Deterrent Measure	Tuna (Deep) Sets	Swordfish/Mixed (Shallow) Sets
Thawed Baits	Required	Required
Blue Dyed Baits	Required for all Baits	Required for all Baits
Discharge Offal	Required	Required
Night Sets	Optional	Required
Line Setting Machine with weighted branch lines (minimum weight = 45gm)	Required	Optional
Weighted Branch Lines (minimum. weight. = 45gm)	Optional	Optional
Towed Deterrent	Optional	Optional

I.B.(1). Hawaii-based longline fishers must employ the following mandatory measures, by set type, when setting and hauling the longline gear north of 23° north latitude:

a). Blue-dyed and thawed bait (Mandatory For All Types of Sets):
An adequate quantity of blue dye must be maintained on board, and only bait dyed a color that conforms to WPRFMC/NMFS standards may be used. All bait must be completely thawed and dyed blue before the longline is set. Blue-dyed and thawed bait shall be employed by all

Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

b). Discharge offal strategically (Mandatory For All Types of Sets):
While gear is being set or hauled, fish, fish parts or bait must be discharged on the opposite side of the vessel from which the longline is being set or hauled. All hooks must be removed from offal and spent baits prior to discharge. If a swordfish is landed, the liver must be removed and the head must be severed from the trunk, the bill removed and the head cut in half vertically. The heads and livers must be periodically thrown overboard on the opposite side of the vessel from which the longline is being set or hauled. Because the supply of offal may be low when fish catch rates are low or tuna are the target species, this mitigation method requires the preparation and storage of offal for use during the longline set. Discharge offal strategically shall be employed by all Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

c). Night setting (Mandatory For Shallow Sets, Only):
The longline set must begin at least one hour after sunset and the set must be completed by sunrise, using only the minimum vessel lights necessary for safety. Night Setting shall be employed by all Hawaii longline vessels that conduct swordfish or mixed (shallow) sets.

d). Setting Machine with weighted branchlines (Mandatory For Deep Sets, Only):
The longline must be set with a line-setting machine (line shooter) so that the longline is set faster than the vessel's speed. In addition, weights of at least 45 grams must be attached to branch lines within one meter of each baited hook. Setting Machine with weighted branchlines shall be employed by all Hawaii longline vessels that conduct tuna (deep) sets.

I.B.(2). Hawaii-based longline fishers may employ the following measures when setting and hauling the longline gear north of 23° north latitude:

a). Weighted Branch Lines (Optional):
At least 45 grams of weight may be attached to branchlines within one meter of each baited hook. Weighted branchlines may be employed by Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

b). Towed Deterrents (Optional):
A line with suspended streamers (tori line) or a buoy that may conform to Council/NMFS standards may be deployed when the longline is being set

and hauled. Towed deterrents may be employed by Hawaii longline vessels that conduct tuna (deep), swordfish or mixed (shallow) sets.

I.C. Annual Workshops: NMFS shall conduct annual workshops to inform fishers of the risk of mortalities in the Hawaiian longline fishery to short-tailed albatross. At least one annual workshop will be conducted each year, beginning in 2000. The workshops will include: information exchange between NMFS, the WPRFMC, and fishers about: (1) the use of effective seabird deterrent devices in the fishery, and (2) status of the short-tailed albatross population and observations of the bird in the vicinity of the Hawaiian longline fishing area. Translations will be provided to Vietnamese and Korean speaking fishers with regards to all educational materials distributed to vessel captains.

NMFS shall report to the Service the results of the annual workshop with respect to the: (a) topics discussed (*e.g.* seabird deterrent devices/strategies), (b) list of participants, (c) date, time and location of the workshop.

I.D. Albatross Species Identification Card: Develop plastic-coated, weatherproof, cards that illustrate albatross species (e.g., short-tailed, Laysan and black-footed albatross) for identification purposes, and distribute them to all fishers in the Hawaiian longline fishing fleet. The card should be translated to the Korean and Vietnamese languages and distributed to those fishers whose first language is either Korean or Vietnamese.

In order to implement reasonable and prudent measure II above, the following terms and conditions apply:

II.A. Annual Reporting: NMFS shall report annually the observed and estimated total number of interactions of Laysan and black-footed albatross, and observed take of short-tailed albatross, by fishing set type (i.e., deep sets [tuna] or shallow sets [swordfish/mixed] as defined by NMFS). The information about interactions between only short-tailed albatross and Hawaiian longline gear would not provide us or NMFS with sufficient information to gauge the effectiveness of the various combinations of seabird deterrent measures/devices. Therefore, to gauge the effectiveness of these seabird deterrents it is appropriate to collect data from surrogate species (*e.g.* Laysan and black-footed albatross) that exhibit similar foraging behavior to the short-tailed albatross. NMFS currently records observed interactions and estimates total number of interactions for these species.

In addition to reporting interactions and any take as noted above, NMFS shall evaluate the effectiveness of seabird deterrent measures in reducing interactions with short-tailed albatross by measuring the rate at which Laysan and black-footed (and short-tailed, if any) albatross are caught by Hawaiian longline vessels. NMFS shall evaluate and report on the effectiveness of the seabird deterrent regime on an annual basis.

Within two months from the end of each fishing season (example: fishing season is 2000, the report would be due by March 1, 2001), NMFS will report to the Service on the effectiveness of seabird deterrent measures. The report shall include (by each trip observed and summarized over all trips observed) all reported observations and mortalities of Laysan, black-footed, and short-tailed albatross, including date, time, location, vessel, vessel type, vessel size, trip type (i.e., swordfish, tuna, or mixed), gear description, total number of hooks deployed, total number of trips observed, and all observer or reported comments. Annual reports shall be submitted by March 1 of the year following the reporting year (i.e., the report for the calendar year 2000 would be submitted by March 1, 2001, etc.) to: Field Supervisor, U.S. Fish and Wildlife Service; Pacific Islands Office; 300 Ala Moana Boulevard; Room 3-122, Box 50088; Honolulu, Hawaii 96850; telephone (808) 541-3441, facsimile (808) 541-3470.

In the event a NMFS observer sights a short-tailed albatross during an observed trip, NMFS shall make arrangements for the Service to interview the observer. The interview will occur no later than 30 days from the time the fishing trip ended. The NMFS shall make available to the Service copies of all information (*e.g.* records, pictures) collected by the observer about the sighting.

II.B. (1). Gradual observer coverage implementation: There will exist two sources for the collection of albatross data and observations. Observer Coverage for short-tailed albatross and other endangered species: This coverage will be provided by NMFS observers whose primary duties will be to observe short-tailed albatross and other endangered species during sets and haulbacks. Fishery related activities will be considered a secondary duty and may be performed when observer duties for short-tailed albatross and other endangered species are completed. Observer Coverage for other endangered species and fishery related activities: This coverage will be provided by NMFS observers whose primary duties involve observing other endangered species and conducting fishery related activities during sets and haulbacks. Given their commitment to these primary duties, observers will monitor sets and haulbacks for short-tailed albatross as a secondary duty, to the maximum extent practicable.

NMFS shall provide observers whose primary duty is to observe short-tailed albatross and other endangered species, for at least 5 percent of all Hawaiian longline fishing trips that occur above 23 degrees north latitude. A representative number of fishing trips that make shallow sets (swordfish/mixed species) and deep sets (tuna species) will be covered by observers. Beginning in 2001, at least 1 percent of all Hawaiian longline trips that operate in waters north of 23 degrees north latitude shall include a NMFS observer whose primary duty is to observe short-tailed albatross and other endangered species; in 2002, at least 3 percent of all Hawaiian longline trips that operate in waters north of 23 degrees north latitude shall include a NMFS observer whose primary duty is to observe short-tailed albatross and other endangered species;

and in 2003, at least 5 percent of all Hawaiian longline trips that operate in waters north of 23 degrees north latitude shall include a NMFS observer whose primary duty is to observe short-tailed albatross and other endangered species. Observer coverage shall remain at this level, five percent, through the culmination of the consultation period on December 31, 2006.

(2). Observer coverage for short-tailed albatross and other endangered species: NMFS observers whose primary task is to observe short-tailed albatross, and other endangered species, shall observe all sets in which Hawaiian longline gear is deployed. Also, NMFS observers will observe at least every fourth haulback (*e.g.* haulback #1, 5, 9 etc.), in its entirety, for short-tailed albatross, and other endangered species. Details of specific seabird duties are described in II. C.

(3). Observer coverage for other endangered species and fishery related activities: NMFS may employ observers whose primary duties may include observing other endangered species or fishery-related activities. As a secondary duty, these observers shall observe short-tailed albatross during longline gear deployment (set) and retrieval (haulback) to the maximum extent practicable, given their commitment to other primary duties. Details of specific seabird duties are described in II. C.

II.C. Short-tailed albatross observer duties: These duties apply to both types of observers as described in II.B.(2) and (3). NMFS shall deploy observers aboard Hawaiian longline fishing vessels with the responsibility of recording seabird behavior and interaction with longline gear during the period of this consultation. NMFS will hire qualified biologists that have received training or experience in ornithology, or extensive seabird observation experience, with emphasis on seabirds of the Pacific. NMFS will ensure that observers will be deployed on Hawaiian longline fishing vessels during regularly scheduled fishing trips. If a trip is terminated prematurely, the observer will be placed aboard another Hawaiian longline fishing vessel as soon as possible. Observers will be placed on vessels that conduct a majority of their fishing operations within the known range of the short-tailed albatross. Observers will be placed aboard Hawaiian longline fishing vessels beginning with the implementation of seabird mitigation regulations for this fishery.

NMFS observers shall record sightings and behavior of short-tailed, Laysan and black-footed albatross during the set and haulback of the main line. Observers will record seabird sightings and behavior in the vicinity of the longline gear during longline setting operations, until the observer deems that seabirds are no longer observed in the vicinity of the deployed fishing gear, or in the case of night sets, that the observer can no longer distinguish between seabird species. Similarly, observers will record seabird sightings and behavior in the vicinity of longline gear during longline haulback operations, until the observer deems that seabirds are no longer observed in the vicinity of the fishing gear being retrieved.

NMFS observers shall monitor sightings of short-tailed, Laysan and black-footed albatross on or near longline gear. NMFS observers will consider observations and takes of short-tailed albatross, and other endangered species, to be the top priorities over other observer duties. The observer will record the behavior of the short-tailed albatross and other seabirds observed, describing their location in relation to the longline gear, and whether they attempt to strike at the gear to "steal bait," and whether they are either hooked onto or injured by the gear. The observer will record their behavior, the species of each bird that attempts to strike at fishing gear, and record the number of strikes at the fishing gear per set and per haulback. The observer will record the number of albatross, by species, that are hauled back on longline gear. The observer will record whether the albatross was killed or injured during the haulback. If the albatross was recorded as injured, the observer will describe the extent of the injury to the best of their ability. In addition to the above-mentioned information, written reports will include: the date of the set, the type(s) of seabird deterrent measures used, weather conditions (wind velocity, precipitation, visibility and sea state), time set began and ended, latitude and longitude the set began and ended, number of hooks set, bait type (and whether it was frozen or thawed), amount of weight on hooks, number of birds within the vicinity of the vessel at the beginning of the set, bird behavior before and during set, time haulback began and ended, latitude and longitude haulback began and ended, a record of the number of birds, by species, touching the gear and their fate and condition. Written reports from observers shall be reported to: Field Supervisor, U.S. Fish and Wildlife Service, Pacific Islands Office; 300 Ala Moana Boulevard; Room 3-122, Box 50088; Honolulu, Hawaii 96850; facsimile (808) 541-3470; telephone (808) 541-3441 no later than two months (60 days) after the fishing trip has ended.

In order to implement reasonable and prudent measure III above, and as incidental take is permitted for this listed species, the following terms and conditions apply:

III.A. NMFS shall advise fishers and observers that every reasonable effort must be made to save injured short-tailed albatross. If a short-tailed albatross is recovered alive, it must be retained unless it exhibits all of the following traits:

1. head is held erect and bird responds to noise and motion stimuli;
2. bird breathes without noise;
3. both wings can flap and retract to normal folded position on back; and
4. bird can stand on both feet with toes pointed in the proper direction (forward).

If a recovered albatross exhibits all of these traits, it should be held until dry and then released overboard. If the recovered bird fails to exhibit even one of the above traits, it must, by law, be retained aboard and the NMFS contacted immediately. The U.S. Coast Guard may be contacted to facilitate communication between the vessel and the NMFS.

The appropriate NMFS personnel will be contacted at any one of the following telephone numbers (by availability, in the order listed):

Lewis Van Fossen	808/973-2935 extension 214
Kevin Busscher	808/973-2935 extension 215
Charles Karnella	808/973-2937

III.B. NMFS shall instruct observers and fishers that every effort must be made to recover any dead short-tailed albatross. Specimens shall be frozen immediately, with identification tags attached directly to the carcass, and a duplicate identification tag attached to the bag or container holding the carcass. Identification tags shall include species, date of mortality, name of vessel, location (latitude and longitude) of mortality, observer or captain's name (or both), and any band numbers if the specimen has a leg band. Leg bands must remain attached to the bird.

III.C. NMFS shall inform observers and fishers that specimens must be surrendered, as soon as possible to a NMFS or Service office. Specimens must remain frozen and must be shipped as soon as possible to: Vertebrate Conservation Coordinator, Ecological Services, Pacific Islands Office, US Fish and Wildlife Service, Room 3-122, Honolulu, Hawaii 96850. The contact numbers for the Pacific Islands Office are: 808/541-3441(telephone), 808/541-3470 (facsimile).

Summary of Reporting Requirements

Please note that the following is only a summary and reporting details are included in the terms and conditions above.

- NMFS shall report to the Service the results of the annual workshop with respect to the: (a) topics discussed (*e.g.* seabird deterrent devices/strategies), (b) list of participants, (c) date, time and location of the workshop (from Term and Condition I.C).

- NMFS shall report annually the observed and estimated total number of interactions of Laysan and black-footed albatross, and observed take of short-tailed albatross, by fishing set type (i.e., deep set [tuna] or shallow set [swordfish/mixed] as defined by NMFS) (from Term and Condition II.A).

- NMFS shall evaluate annually the effectiveness of all required seabird deterrent devices by measuring the rate at which Laysan, black-footed, and short-tailed albatrosses are caught by Hawaiian longline vessels, by set type (from Term and Condition II.A).

- NMFS observers shall record sightings of Laysan, black-footed, and short-tailed albatrosses during the set and haulback of the main line (from Term and Condition II.C).

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

To keep the Service informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of the following conservation recommendation:

(1) NMFS should coordinate with the governments of Japan, Korea and Taiwan the collection of fishery effort and seabird bycatch information from fishing vessels that conduct fishery operations similar to U.S. fisheries that deploy gear such as longline and hook-and-line gear. NMFS should collect catch per unit effort (per thousand hooks) data from these countries through the period of this consultation. If historical catch per unit effort (per thousand hooks) is accessible to NMFS, this information should be submitted to the Service. Concerning bycatch, NMFS should seek to obtain any and all records of short-tailed albatross that are accidentally caught by fishing vessels from these countries, and the disposition of the bird upon release. NMFS should also seek to obtain the rate at which seabirds are hooked per 1,000 hooks. These rates can be used to estimate the possible number of short-tailed albatross that may be hooked in these fisheries and the collective impact that longline fisheries may have on short-tailed albatross.

(2) NMFS should conduct a study to determine whether "C" hooks would reduce hooking related injuries to seabirds, and compare these results with hooking related injuries to seabirds caused by "J" hooks in the Hawaiian longline fishery. "C" hooks are designed to hook an animal on the jaw, thus avoiding damage to internal soft tissue. If the animal falls off the hook, it may have a greater chance at survival. If the study results indicate that "C" hooks cause fewer hooking related injuries to seabirds, then the Service would recommend that "C" hooks be selected as the only type of hook to be used in the Hawaiian longline fishery. "J" hooks are currently used in the Hawaiian longline fishery.

(3) NMFS should continue to support research into effective seabird deterrent devices and strategies that reduce risk of interaction between seabirds and Hawaiian longline gear and fishing-related activities. For example, underwater setting chutes or lining tubes that deploy gear at a depth sufficient to prevent birds from settling on hooks during gear deployment could be tested for use as a seabird deterrent. Also, Japanese tarred mainline could be tested for its effectiveness as a seabird deterrent. NMFS should coordinate with and communicate the results of these analyses to the Service. The Service would analyze the results of the research and make a determination to concur with the NMFS. If the Service concurs that the device or strategies reduces seabird interaction with Hawaiian longline gear, then the Service

may amend this biological opinion and incorporate these new seabird deterrent devices or strategies into the terms and conditions.

(4) NMFS should investigate the rate at which Laysan and blackfooted albatross "fall off" longline gear as a result of being injured, hooked, or entangled during the set. NMFS investigators should analyze the number of birds that may be injured, hooked or entangled during the set and compare this amount with the number of birds that are documented injured, hooked or entangled during the haulback. Understanding the rate at which birds may "fall off"longline gear will influence the analyses that relate to estimating the number of Laysan and black-footed albatross that are killed in the Hawaii longline fishery each year. Refining these analyses will help the NMFS and Service gauge the effectiveness of the various seabird deterrent devices and ultimately, help reduce the risk of interaction between short-tailed albatross and Hawaiian longline gear.

REINITIATION NOTICE

This concludes formal consultation on the Hawaiian longline fishery as regulated by NMFS. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation. The biological opinion satisfies section 7 requirements of the Act.

I appreciate the cooperation and assistance of your staff and NMFS headquarters in helping us prepare this biological opinion. If you have any questions concerning this biological opinion, please contact Kevin B. Foster, Fish and Wildlife Biologist; or Marilet A. Zablan, Program Leader for Vertebrate Species Conservation; at telephone (808) 541-3441 or by facsimile at (808) 541-3470.

Sincerely,

Paul Henson

Paul Henson
Field Supervisor
Ecological Services

LITERATURE AND REFERENCES CITED

American Ornithologists' Union. 1998. Checklist for North American birds. 7th ed. Allen Press: Lawrence, KS.

Arnoff, A.E. 1960. Some observations on birds at Torishima. Tori 15(76):269-279.

Auman, H.J. 1994. Plastic ingestion, biomarkers of health, PCBs and DDE in two species of albatrosses on Sand Island, Midway Atoll. M.S. Thesis. Michigan St. Univ., Department of Fisheries and Wildlife.

Austin, O.L., Jr. 1949. The status of Steller's albatross. Pacific Science 3:283-295.

Berger, A.J. 1972. Hawaiian Birdlife. University Press of Hawaii. Honolulu, HI.

Bigelow, K.A., C.H. Boggs and X. He. 1999. Environmental Effects on Swordfish and blue shark catch rates in the US North Pacific longline fishery. Fisheries Oceanography 8:3, p.178-198.

Boggs, C.H. *In press*. Deterring albatrosses from contacting baits during swordfish longline sets. National Marine Fisheries Service-Honolulu Laboratory, Honolulu, Hawaii, HI. In: E. Melvin (ed.) Proceedings of the Symposium on Seabird Bycatch: Trends, Roadblocks, and Solutions. Pacific Seabird Group - U. Washington and U. Alaska Sea Grant Program.

_____. 1999. National Marine Fisheries Service. Personal communication.

_____. and R. Ito. 1993. Hawaii's pelagic fisheries. Marine Fisheries Review 55(2):69-82.

_____. 1992. Depth, capture time, and hooked longevity of longline-caught pelagic fish: Timing Bites of fish with chips. Fishery Bulletin, U.S. 90:642-658.

Cochrane, J.F. and A.M. Starfield. *In press*. A simulated assessment of incidental take effects on short-tailed albatrosses. For U.S. Fish and Wildlife Service. 22pp.

Cook, Jim. 1999. Western Pacific Regional Fishery Management Council. Personal communication.

Cousins, K.L. 1998. Light sticks: a marine pollution problem for breeding seabirds. A paper presented to the WPRFMC, December 1998. 19pp.

_____ and J. Cooper. 2000. The population biology of the black-footed albatross in relation to mortality caused by longline fishing. Report of a workshop held in Honolulu, Hawaii, 8-10, October 1998 under the auspices of the WPRFMC. 120pp.

Curran, D.S., C.H. Boggs, and X. He. 1996. Catch and effort from Hawaii's longline fishery summarized by quarters and five degree squares. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-225, National Marine Fisheries Service. January 1996.

Dalzell, Paul. 1999. Western Pacific Regional Fishery Management Council. Personal communication.

DeGange, A.R. 1981. The short-tailed albatross, *Diomedea albatrus,* its status, distribution and natural history. U.S. Fish and Wildlife Service unpubl. rep. 36pp.

Dieli, Robert. 2000. U.S. Fish and Wildlife Service. Personal communication.

DiNardo, G.T. 1999. Proceedings of the Second International Pacific Swordfish Symposium. NOAA Technical Memorandum, NMFS - SWFSC - 263.

Dollar, R.A. 1991. Summary of swordfish longline observations in Hawaii, July 1990-March 1991. Southwest Fisheries Science Center, Administrative Report H-91-09. National Marine Fisheries Service, Southwest Fisheries Science Center, Honolulu Laboratory, Honolulu, HI. June 1991.

Environment Agency, Japan. 1996. Short-tailed albatross conservation and management master plan. Environment Agency, Japan.

Fefer, S.I. 1989. Letter to Dr. Hiroshi Hasegawa, Biology Department, Toho University on April 26, from Stewart Fefer, U.S. Fish and Wildlife Service, Honolulu HI, regarding short-tailed albatross sightings on Midway Island and ingestion of plastics by birds. 2pp.

Fitzgerald, Shannon. 2000. National Marine Fisheries Service. Personal communication.

Flint, Elizabeth. 2000. U.S. Fish and Wildlife Service. Personal communication.

Foster, Kevin. 1999. U.S. Fish and Wildlife Service. Personal communication.

Garcia and Associates. 1999. Final report: Hawaiian longline seabird mortality mitigation project. Prepared for Western Pacific Regional Fisheries Management Council, Honolulu, HI, September 1999. 93pp. + appendices.

Gales, R., N. Brothers, and T. Reid. 1998. Seabird mortality in the Japanese tuna longline fishery around Australia, 1988-1995. Biological Conservation 85-101.

Hadden, F.C. 1941. Midway Islands. Hawaiian Planter's Record 45:179-221.

Hampton, J., K. Bigelow, and M. Labelle. 1998. A summary of current information on the biology, fisheries, and stock assessment of bigeye tuna (*Thunnus obesus*) in the Pacific Ocean, with recommendations for data requirements and future research. Secretariat of the Pacific Community. Oceanic Fisheries Programme Tech. Rep. No. 36. Noumea, New Caledonia. 46pp.

Harrison, C.S. 1979. Short-tailed albatross, vigil over Torishima Island. Oceans 12(5):24-26.
___ T.S. Hida and M.P. Seki. 1983. Hawaiian seabird feeding ecology. Wildl. Monogr. 85:1-71.

Hasegawa, H. 1977. Status of the short-tailed albatross on Torishima in 1976/77. Pacific Seabird Group Bull. 4(2):13-15.

_____. 1978. Recent observations of the short-tailed albatross, *Diomedea albatrus,* on Torishima. J. Yamashina Inst. Ornithol. Misc. Rep. 10, No. 1, 2 (no. 51, 52):58-68.

_____. 1979. Status of the short-tailed albatross of Torishima and in the Senkaku Retto in 1978/79. Pacific Seabird Group Bull. 6(1):806-814.

_____. 1981. Letter of 27 July to U.S. Fish and Wildlife Service from Biology Department, Toho University, Japan. 4pp.

_____. 1982. The breeding status of the short-tailed albatross *Diomedea albatrus,* on Torishima, 1979/80-1980/81. J. Yamashina Inst. Ornithol.14:16-24.

_____. 1984. Status and conservation of seabirds in Japan, with special attention to the short-tailed albatross. Pages 487-500 in Croxall, J.P.; Evans, G.H. Schreiber, R.W. (Eds.), status and conservation of the world's seabirds. International Council for Bird Preservation Technical Publication 2. Cambridge, UK.

_____. 1991. Red Data Bird: Short-tailed albatross. World Birdwatch 13(2):10.

_____. 1997. Discussion of breeding success and influences: Personal Communication at the Short-tailed albatross population workshop, U.S. Fish and Wildlife Service Field Office, Ecological Services, Anchorage, AK.

_____. 2000. Toho University, Japan. Personal communication.

_____ and A. DeGange. 1982. The short-tailed albatross *Diomedea albatrus,* its status, distribution and natural history. Am. Birds 6(5):806-814.

He, X., K.A. Bigelow and C.H. Boggs. 1997. Cluster analysis of longline sets and fishing strategies within the Hawaii-based fishery. Fisheries Research 31- pgs. 147-158.

Hoffman, Nancy. 2000. U.S. Fish and Wildlife Service. Personal communication.

Ito, R.Y. and W.A. Machado. October, 1999. Annual Report of the Hawaii-based longline fishery for 1998. National Marine Fisheries Service, Southwest Fisheries Science Center, Honolulu Laboratory, Honolulu, HI. Administrative Report H-99-06. 62pp.

King, W.B. 1981. Endangered Birds of the World: the ICBP Bird Red Data Book. Smithsonian Institute Press and International Council for Bird Preservation, Washington, DC. 13pp.

McDermond, D.K. and K.H. Morgan. 1993. Status and conservation of North Pacific albatrosses. Pages 70-81 in Veermeer, K. Briggs, K.T. Moran, K.H. and D. Seigel-Causey (Eds), the status, ecology, and conservation of marine birds of the North Pacific. Can. Wildl. Serv. Spec. Publ., Ottawa.

Melvin, Ed. 1999. University of Washington, Seagrant Program. Personal communication.

National Marine Fisheries Service. 1998a. Biological opinion/ formal Endangered Species Act section 7 consultation on the fishery management plan for the pelagic fisheries of the western Pacific region: impacts of the Hawaii-based longline fishery on listed sea turtles.

___1998b. Estimation of sea turtle take and mortality in the Hawai'i-based longline fishery, 1994-1996. NOAA-TM-NMFS-SWFSC-257 (R.A. Skillman and P. Kleiber).

___ 1998c. Estimating Annual Takes and Kills of Sea Turtles by the Hawaiian Longline Fishery, 1991 - 97, From Observer Program and Logbook Data. Southwest Fisheries Science Center Administrative Report H-98-08 (P. Kleiber).

___ 2000. Estimation of Sea Turtle Take and Mortality in the Hawaiian Longline Fisheries. Southwest Fisheries Science Center Administrative Report H-00-06.

___2000. Environmental Assessment for the Pelagic Fisheries of the Western Pacific Region - For an interim period pending completion of an Environmental Impact Statement. August, 2000 - Final. (Penny Dalton - Assistant Administrator)

Nunn, G.B., J. Cooper, P. Jouventin, C.J.R. Robertson, and G.G. Robertson. 1996. Evolutionary relationships among extant albatrosses (Procellariiformes: Diomedeiadae) established from complete cytochrome-B gene sequences. Auk 113(4):784-801.

Ono, Y. 1955. The status of birds on Torishima; particularly of Steller's Albatross. Tori 14: pgs. 24-32.

Palmer, R.S. 1962. Short-tailed albatross (*Diomedea albatrus*). Handbook of North American Birds. Vol. 1: 116-119.

Richardson, S. 1994. Status of the short-tailed albatross on Midway Atoll. Elepaio 54:35-37.

Rivera, Kim. 1999. National Marine Fisheries Service. Personal communication.

Robertson, D. 1980. Rare birds of the west coast of North America. Woodcock Publications, Pacific Grove, CA. Pp. 6-9.

Sakagawa, G.T. 1989. Trends in fisheries for swordfish in the Pacific Ocean. In Planning the Future of Billfishes - Research and Management in the 90s and Beyond, (Marine Recreational Fisheries 13) Proceedings fo the Second International Billfish Symposium, Kailua-Kona, Hawaii (August 1 - 5, 1988), Part 1: Fishery and Stock Synopses, Data Needs and Management, Richard H. Stroud, (Ed.). Published by the National Coalition for Marine Conservation, Inc. Savannah, GA.

Sanger, G.A. 1972. The recent pelagic status of the short-tailed albatross (*Diomedea albatrus).* Pacific Grove, CA. Pp.6-9.

Sekora, P.C. 1977. Report of Short-tailed Albatross *Diomedea albatrus* from Hawaiian Islands. J. Yamashina Inst. Ornithol. Misc. Rep. 9:28.

Shallenberger, Rob. 2000. U.S. Fish and Wildlife Service. Personal communication.

Sherburne, J. 1993. Status report the of short-tailed albatross *Diomedea albatrus.* U.S. Fish and Wildlife Service unpubl. rep., Alaska Natural Heritage Program. 33pp.

Sievert, P.R. and L. Sileo. 1993. The effects of ingested plastic on growth and survival of albatross chicks in Veermeer, K. et al, eds. The status, ecology and conservation of marine birds of the North Pacific. Can. Wildl. Serv. Spec. Publ., Ottawa.

Simkin, T. and L. Siebert. 1994. Volcanoes of the world: a regional directory, gazetteer, and chronology of volcanism during the last 10,000 years. Geoscience Press, Inc. Tucson, AZ. and the Smithsonian Institution.

Tickell, W.L.N. 1973. A visit to the breeding grounds of Steller's albatross *Diomedea albatrus.* Sea Swallow 23:1-3.

_____. 1975. Observations on the status of Steller's albatross (*Diomedea albatrus)* 1973. Bulletin of the International Council for Bird Preservation XII: 125-131.

Tramontano, J.P. 1970. Winter observations of the short-tailed albatross in the western Pacific Ocean. Condor 72(1):122.

Tuck, G.S. 1978. A field guide to the seabirds of Britain and the world. Collins Co. Ltd., London. 17pp.

U.S. Fish and Wildlife Service. 1999. Biological Opinion on the effects of hook-and-line groundfish fisheries in the Gulf of Alaska and Bering Sea/Aleutian Islands areas on short-tailed albatrosses (*Phoebastria albatrus*).

Van Fossen, Lewis. 1999. National Marine Fisheries Service. Personal communication.

Western Pacific Regional Fishery Management Council. March 23, 1987. Fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. November 21, 1990. Amendment 1 and environmental assessment - fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. February, 1991. Amendment 2 and environmental assessment, fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. June 4, 1991. Amendment 3, regulatory impact review and proposed regulations, fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. June, 1991. Amendment 4, extend the Hawaii longliner moratorium for a total of 3 years - environmental assessment and regulatory impact review, fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. October 7, 1991. Amendment 5, fishery management plan for pelagic fisheries of the Western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. April 30, 1992. Amendment 6, fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. January 14, 1994. Amendment 7, proposed limited entry program for the Hawaiian longline fishery, fishery management plan for pelagic fisheries of the western Pacific region. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. October 8-10, 1998. Black-footed albatross population biology workshop. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. 1998. Pelagic fisheries of the Western Pacific region, 1997 annual report. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. 1999. Pelagic fisheries of the Western Pacific Region, 1998 annual report. 1164 Bishop Street, Suite 1405. Honolulu, HI.

_____. 2000. Measures to Reduce the Incidental Catch of Seabirds in the Hawaii Longline Fishery - A Framework Adjustment to the Western Pacific Pelagic Fisheries Management Plan, Including an Environmental Assessment and Regulatory Impact Review/Regulatory Flexibility Analysis. December 13, 1999 - Revised March 2000. 1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813.

_____. 2000. The Population Biology of the Black-footed Albatross in Relation to Mortality Caused by Longline Fishing - Report of a workshop held in Honolulu, Hawaii, 8-10 October 1998 under the auspices of the Western Pacific Regional Fishery Management Council - Katherine Cousins and John Cooper (eds). 1164 Bishop Street, Suite 1400, Honolulu, Hawaii 96813

Table 1. Hawaii longline vessel activity, 1987-98.

Year	Active Vessels	Trips
1987	50	627
1988	80	923
1989	138	1,546
1990	140	1,664
1991	141	1,670
1992	123	1,265
1993	122	1,192
1994	125	1,106
1995	110	1,125
1996	103	1,100
1997	105	1,122
1998	114	1,139
Average	105	1,105

Source: 1998 Annual Report, Pelagic Fisheries of the Western Pacific Region , December 1999, WPRFMC, Honolulu, HI.

Table 2. Hawaii longline landings, 1996-98 (thousands of pounds).

Species	1996	1997	1998
Swordfish	5,500	6,351	7,189
Blue marlin	1,000	1,074	851
Striped marlin	900	775	833
Mahimahi	400	518	331
Moonfish	800	823	922
Ono(wahoo)	100	239	262
Sharks	4,300	5,008	6,207
Other	400	590	640
Non-Tuna Subtotal	**13,400**	**15,297**	**17,235**
Albacore	2,600	3,619	2,449
Bigeye	4,000	5,399	7,100
Bluefin	50	52	36
Skipjack	100	234	168
Yellowfin	1,400	2,515	1,587
Tuna Subtotal	**8,150**	**11,819**	**11,340**
TOTAL	**21,550**	**27,116**	**28,575**

Source: 1997 Annual Report (October 1998) and 1998 Annual Report (December 1999), Pelagic Fisheries of the Western Pacific Region, WPRFMC, Honolulu, HI.

Table 3. Hawaii longline catch-per-unit-effort by trip type, 1996-1998 (per thousand hooks).

	1996				1997			
Species	**All Trips**	**Swordfish Trips**	**Mixed Trips**	**Tuna Trips**	**All Trips**	**Swordfish Trips**	**Mixed Trips**	**Tuna Trips**
Blue Marlin	0.46	0.19	0.84	0.38	0.53	0.39	1.16	0.41
Striped Marlin	1.10	0.50	1.02	1.17	0.81	0.58	1.18	0.75
Swordfish	2.65	14.17	7.56	0.17	2.55	15.41	9.97	0.14
Mahimahi	1.62	2.26	3.42	1.03	3.17	10.24	9.12	1.46
Moonfish	0.51	0.04	0.08	0.68	0.53	0.01	0.06	0.66
Ono (wahoo)	0.31	0.22	0.16	0.36	0.53	0.29	0.35	0.59
Sharks	7.01	25.52	15.29	2.90	5.52	14.20	16.39	2.68
Albacore	3.98	5.79	3.45	3.98	4.57	2.87	2.77	5.05
Bigeye Tuna	4.41	1.43	4.26	4.73	5.13	3.13	3.12	5.68
Yellowfin Tuna	1.22	0.71	1.68	1.13	1.87	1.87	3.30	1.57
Number of Trips	**1,100**	**92**	**351**	**652**	**1,124**	**78**	**301**	**745**
Number of Hooks Set	**14,401,531**	**932,777**	**3,080,174**	**10,388,580**	**15,558,771**	**840,539**	**2,512,069**	**12,206,163**
Number of Light sticks	**923,349**	**311,280**	**562,445**	**49,624**	**879,331**	**292,914**	**546,149**	**40,268**

Source: 1997 Annual Report (October 1998) and 1998 Annual Report (December 1999), Pelagic Fisheries of the Western Pacific Region, WPRFMC, Honolulu, HI.

Table 3. Hawaii longline catch-per-unit-effort by trip type, 1996-1998 (per thousand hooks) (continued).

	1998			
Species	**All Trips**	**Swordfish Trips**	**Mixed Trips**	**Tuna Trips**
Blue Marlin	0.31	0.29	0.58	0.25
Striped Marlin	0.83	0.42	0.87	0.85
Swordfish	2.52	14.50	9.22	0.20
Mahimahi	1.28	1.53	3.25	0.84
Moonfish	0.53	0.01	0.04	0.67
Ono (wahoo)	0.48	0.12	0.27	0.55
Sharks	5.75	23.01	12.16	3.09
Albacore	2.81	2.45	1.95	3.02
Bigeye Tuna	5.69	2.33	4.81	6.13
Yellowfin Tuna	1.25	0.75	1.29	1.28
Number of Trips	1,140	84	296	760
Number of Hooks Set	17,365,852	1,019,960	2,859,857	13,486,035
Number of Light sticks	1,223,780	519,595	654,367	49,818

Source: 1996-1998 Annual Reports, Pelagic Fisheries of the Western Pacific Region, WPRFMC, Honolulu, HI.

Table 4. Hawaii commercial fishing landing, pelagics by gear type, 1948-98 (x1,000). Hawaii Division of Aquatic Resources (HDAR) figures and NMFS estimates. (Longline landings only).

Year	Longline	Year	Longline	Year	Longline	Year	Longline
1948	3,476	1963	1,811	1978	1,125	1993	25,160
1949	3,491	1964	1,883	1979	1,125	1994	18,110
1950	3,859	1965	1,707	1980	1,125	1995	22,850
1951	3,790	1966	1,655	1981	1,125	1996	21,540
1952	4,290	1967	1,563	1982	1,125	1997	27,120
1953	4,332	1968	1,353	1983	1,125	1998	27,148
1954	4,448	1969	1,416	1984	1,125		
1955	3,898	1970	1,541	1985	1,125		
1956	3,443	1971	1,151	1986	1,125		
1957	2,571	1972	1,055	1987	3,893		
1958	2,645	1973	778	1988	6,733		
1959	2,636	1974	830	1989	9,844		
1960	2,173	1975	746	1990	12,790		
1961	1,972	1976	838	1991	19,970		
1962	2,022	1977	1,101	1992	21,090		

Source: Table 6 of the 1998 Annual Report, Pelagic Fisheries of the Western Pacific Region, December 1999, WPRFMC, Honolulu, HI.

Table 5. Number of hooks set* by the Hawaii-based longline fishing fleet, 1991-1998.

	Trip Type				Area			
Year	Total	Swordfish Trips	Tuna Trips	Mixed Trips	Main Hawaiian Islands	Northwestrn Hawaiian Islands	U. S. Possessions	Outside EEZ
1991	11,914,608	2,243,375	5,124,277	4,546,956	6,853,272	1,956,478	38,422	3,966,436
1992	10,946,721	2,515,909	5,072,525	3,358,287	4,880,514	694,626	16,030	5,355,551
1993	12,137,533	3,207,976	6,359,162	2,570,395	5,553,586	1,305,786	---	5,275,761
1994	11,319,023	3,079.634	6,842,517	1,296,872	5,451,028	2,225,352	172,590	3,470,053
1995	14,155,169	1,464,589	10,186,299	2,504,281	7,112,744	1,996,036	153,435	4,892,954
1996	14,141,256	913,292	10,195,560	3,032,404	5,900,867	2,855,327	223,585	5,151,597
1997	15,564,321	840,539	12,207,913	2,515,869	5,057,410	4,096,303	441,740	5,968,568
1998	17,365,852	1,019,960	13,486,035	2,859,857	4,969,630	3,095,321	1,923,471	7,362,130

Total Average 1991 - 1998 = 13,443,060

*Number of hooks set based on date of haul.

Source: R.Y. Ito and W.A. Machado. October 1999. Southwest Fisheries Science Center - Administrative Report H-99-06, Annual Report of the Hawaii-Based Longline Fishery for 1998.

Table 6. Hawaii longline vessel activity (trips), 1991-1998.

Year	Total Trips	Tuna Trips	Mixed Trips	Swordfish trips
1991	1,670	556	823	291
1992	1,265	458	530	277
1993	1,192	542	331	319
1994	1,106	568	228	310
1995	1,125	682	307	136
1996	1,100	657	351	92
1997	1,124	745	302	78
1998	1,140	760	296	84
Average	**1,216**	**621**	**396**	**199**

Source: Table 5a of the 1998 Annual Report, Pelagic Fisheries of the Western Pacific Region, December 1999, WPRFMC, Honolulu, HI.

Table 7. Hawaii longline billfish (including swordfish) landings, 1987-1998 (thousands of pounds).

Year	Swordfish	Blue Marlin	Striped Marlin	Other Marlin
1987	50	100	600	200
1988	50	200	1,100	200
1989	600	800	1,300	300
1990	3,400	800	1,300	100
1991	10,100	700	1,500	400
1992	12,640	800	1,000	280
1993	13,100	700	1,040	220
1994	7,000	800	720	220
1995	6,010	1,280	1,200	410
1996	5,520	1,030	920	260
1997	6,351	1,074	775	316
1998	7,189	851	833	389
Average	**6,001**	**761**	**1,024**	**275**

Source: Figure 13c of the 1998 Annual Report, Pelagic Fisheries of the Western Pacific Region, December 1999, WPRFMC, Honolulu, HI.

Table 8. Hawaii longline tuna landings, 1987-1998.

	Pounds Landed (x 1,000)				
Year	Albacore	Bigeye	Yellowfin	Skipjack	Bluefin
1987	300	1,800	600	3,628	0
1988	700	2,700	1,300	4,147	0
1989	600	3,100	2,200	3,276	0
1990	400	3,400	2,500	1,438	0
1991	690	3,400	1,620	2,625	0
1992	730	3,280	760	2,051	0
1993	970	4,660	1,390	2,473	0
1994	1,100	3,940	1,340	1,540	30
1995	1,930	4,580	2,150	1,651	60
1996	2,610	3,950	1,390	2,423	50
1997	3,619	5,399	2,515	2,609	52
1998	2,449	7,100	1,587	1,175	36
Average	**1,436**	**4,137**	**1,705**	**2,420**	**19**

*Source - From the Pelagic Fisheries of the Western Pacific Region, 1998 Annual Report, December 1999, Western Pacific Regional Fishery Management Council, Honolulu, HI. (Figure 14)

Table 9. Swordfish catch per unit effort (CPUE) by longline trip, 1991-1998.

	CPUE (number caught per 1,000 hooks)		
Year	Swordfish trips	Mixed trips	Tuna trips
1991	15.4	5.8	0.4
1992	14.8	8.6	0.3
1993	13.0	11.4	0.2
1994	10.3	4.3	0.2
1995	12.9	6.5	0.2
1996	14.2	7.6	0.2
1997	15.4	10.0	0.1
1998	14.5	9.2	0.2
Average	**13.8**	**7.8**	**0.2**

Source: Figure 15 of the 1998 Annual Report, Pelagic Fisheries of the Western Pacific Region, December 1999, WPRFMC, Honolulu, HI.

Table 10. Tuna CPUE by longline trip, 1991-1998.

	CPUE (number caught per 1,000 hooks)		
Year	Albacore	Bigeye	Yellowfin
1991	1.1	3.7	0.7
1992	0.9	4.7	0.5
1993	1.6	4.7	1.5
1994	2.0	5.5	1.2
1995	3.2	4.4	1.4
1996	4.0	4.7	1.1
1997	5.1	5.7	1.6
1998	3.0	6.1	1.3
Average	**2.6**	**4.9**	**1.2**

*Source - From the Pelagic Fisheries of the Western Pacific Region, 1998 Annual Report, December 1999, Western Pacific Regional Fishery Management Council, Honolulu, HI. (Figure 16)

Table 11. Observed population growth rates at the Torishima Island short-tailed albatross colony.

	Average Annual Increase 1955-1998	Average Annual Increase 1980 - 1998
Birds Observed	6.86%	6.47%
Eggs Laid	6.76%	7.59%
Chicks Fledged	7.86%	8.04%

Source: H. Hasegawa, Toho University, Japan.

Table 12. Reported take of short-tailed albatross by Alaska fisheries.

Date	Location Description	Lat/Long	Fishery	Date Banded as Chick	Age at Take	Band(s) No. and Color
July 1983	300 mi north of St. Matthew Islands	between 60N,180 and 58.5N, 175W	in net of vessel fishing for brown crab	20 March 1983	juvenile (4months)	130-01562 orange 039
1 Oct. 1987	GOA	5927.7N, and 145 53.3W	Halibut	5 April 1987	juvenile (6 months)	130-01836 red 173
28 Aug. 1995	South of Krenitizin Islands	53.31N, 165.38W	hook-and-line	16 April 1994	sub-adult (16 months)	13A0853 green 131
8 Oct. 1995	Bering Seas Aleutian Island (BSAI)	57.01 N, 170.39W	hook-and-line	21 April 1992	sub-adult (3 years)	---?? black 063
27 Sept. 1996	BSAI	5841.3N, 177 02.6W	hook-and-line	15 April 1991	sub-adult (5 yrs)	13A0518 green 057
21 Sept. 1998	BSAI	57.30 N, 173.57W	Pacific Cod hook-and-line	18 April 1990	adult (8 years)	130-04189 brown 087
28 Sept. 1998	BSAI	58.27N, 175.16 W	Pacific Cod hook-and-line	unknown	sub-adult	not known

Except for the 2nd take in 1998, leg bands were recovered from all of the above albatrosses allowing scientists to verify identification and age. Since 1977, Dr. Hiroshi Hasegawa has banded all short-tailed albatross chicks at their breeding colony on Torishima Island, Japan. (Kim Rivera, NMFS, pers. commun. 1999)

Table 13. Midway Atoll NWR bird strike data.

Date	Local Time	Aircraft Type	No. Birds	Species	Notes
07/03/97	1000	C130	1	White Tern	Take-off (T/O)-no damage
07/09/97	1130	C130	1	White Tern	T/O-no damage
07/11/97	1215	C130	1	Laysan Albatross	Landing (Ldg.)-ran over
07/11/97	0720	G1	1	L. Albatross	T/O-right prop
07/25/97	1245	P3	1	Frigatebird	Ldg.-#2 engine
07/27/97	0724	G1	1	L. Albatross	T/O
08/01/97	0717	G1	1	Black Noddy	T/O
08/06/97	1934	G1	1	Black Noddy	Ldg.
08/23/97	1310	C130	1	Tropicbird	Ldg.
09/14/97	0601	G1	1	Black Noddy	Ldg.
10/23/97	0945	C130	1	Tropicbird	T/O
10/23/97	0945	C130	1	White Tern	T/O
11/09/97	0820	G1	1	Black Noddy	T/O
02/05/98	2059	C9B	1	L. Albatross	T/O-no damage
02/04/98	1658	CL600	1	L. Albatross	T/O-no damage
02/12/98	0214	CL604	1	L. Albatross	Ldg.-no damage
02/15/98	1804	HS125	1	L. Albatross	Ldg.-no damage
03/25/98	0630	G1	2	L. Albatross	T/O-no damage
04/01/98	1843	G1	1	L. Albatross	Ldg.-no damage
04/02/98	1440	B727-200	1	L. Albatross	T/O-no damage
04/11/98	0720	C130	1	L. Albatross	T/O-no damage
04/16/98	1433	C130	4	L. Albatross	Ldg.-port fuel cover dent
04/17/98	0631	C130	1	L. Albatross	T/O-no damage
04/13/98	1313	C130	1	BF Albatross	T/O
04/18/98	1449	C130	1	L. Albatross	T/O
05/31/98	1647	C130	1	L. Albatross	Ldg.
06/12/98	2130	G1	1	Black Noddy	Ldg.
06/14/98	0817	G1	1	L. Albatross	T/O
06/24/98	1010	C130	1	White tern	Ldg.

Table 13. Midway Atoll NWR bird strike data (continued).

Date	Local Time	Aircraft Type	No. Birds	Species	Notes
07/03/98	2010	G1	1	Black Noddy	Ldg.
07/12/98	0819	G1	1	Sooty tern	T/O
07/22/98	1145	G1	1	L. Albatross	Ldg.
07/24/98	2036	G1	1	White tern	Ldg.
08/23/98	1420	P3	1	Unknown	Ldg.
09/25/98	1311	P3	1	Black Noddy	Ldg.
10/18/98	0706	G1	1	White tern	T/O
10/20/98	0924	Lear	1	Brown Noddy	T/O
12/03/98	0704	G4	1	BF Albatross	Taxi on arrival
12/24/98	1340	C130	1	BF Albatross	Ldg., RO
01/07/99	2000	F merlin(iii)	1	L. Albatross	Ldg.
01/17/99	0715	C130	2	L/BF Albatross	T/O
01/19/99	0557	BKA350		BF Albatross	T/O
01/21/99	0702	C130		L. Albatross	T/O
01/21/99	0702	C130		L. Albatross	T/O
01/22/99	1515	C130	1	White Tern	Ldg.
01/23/99	1318	C130	1	L. Albatross	Ldg.
02/03/99	1826	G1	2	L. Albatross	Ldg./Taxi
03/02/99	0740	C130	1	White Tern	Ldg.
03/02/99	0800	C130	2 1	L. Albatross White Tern	T/O (abt.)
03/04/99	1335	C9	1	L. Albatross	Ldg.
03/09/99	1800	G2	1	L. Albatross	T/O
03/11/99	1900	G1	1	L. Albatross	Ldg.
03/14/99	1900	C130		L. Albatross	Ldg.
03/20/99	1200	C130	2	L. Albatross	Ldg./Taxi
03/21/99	0645	C130	2	L. Albatross	T/O
03/24/99	0626	SH-7	2	L. Albatross	T/O
03/31/99	0910	C130	4 1	L. Albatross White Tern	T/O

Table 13. Midway Atoll NWR bird strike data (continued).

Date	Local Time	Aircraft Type	No. Birds	Species	Notes
04/01/99	1358	F-900 ex	1 1	L. Albatross White Tern	Ldg.
04/02/99	1330	B-200	1	L. Albatross	T/O
04/07/99	1740	G4	1	L. Albatross	T/O
04/10/99	1920	G1	1	L. Albatross	T/O
04/24/99	2002	G1	1	L. Albatross	Ldg.
6/8/99	911	c-120	2	White Tern	Landing
6/17/99	1828	B-737	1	Brown Noddy	Landing
6/21/99	1810	Lear L-36	1	BF Noddy	Taxi on Depart
6/21/99	2151	AC-130	1	Laysan Albatross	Taxi on Depart
6/25/99	1841	Lear L-36	1	White Tern	T/O
6/27/99	1807	B-737	1	Laysan Albatross	Landing
8/7/99	1925	B-737	2	1BN/1WT	T/O
8/15/99	1806	B-737	6	Black Noddy	Landing
8/17/99	1032	B-727	3	Brown Noddy	Landing
8/18/99	1210	G03	1	Brown Noddy	Landing
8/28/99	1750	B-737	6	Brown Noddy	Landing
9/2/99	1752	B-737	2	Brown Noddy	Landing
9/6/99	1230	G-5	1	Brown Noddy	Landing
9/8/99	1855	B-737	2	Brown Noddy	Landing
9/11/99	1810	B-737	2	Brown Noddy	Landing
9/17/9	1034	G-1	1	Brown Noddy	Landing
9/18/99	1832	C-130	1	Brown Noddy	Landing
9/24/99	9/24/99	B-737	4	Brown Noddy	Landing
9/27/99	1400	DC-9	1	Brown Noddy	Landing
9/30/99	1416	C-130	1	Brown Noddy	Landing
10/1/99	812	C-130	1	White Tern	T/O
11/8/99	1308	C-130	1	White Tern	T/O
12/6/99	730	G-1	1	BF Albatross	T/O

Table 13. Midway Atoll NWR bird strike data (continued).

Date	Local Time	Aircraft Type	No. Birds	Species	Notes
12/9/99	1430	S3B	1	L. Albatross	Abt. T/O Engine Damage
12/29/99	1846	B-727	1	BF Albatross	Landing
1/12/00	1253	C-130	1	L. Albatross	Landing
1/15/00	1800	B-737	1	L. Albatross	Landing
1/23/00	1350	BE-20	1	L. Albatross	T/O Stk under-carriage
1/23/00	1828	G-4	1	L. Albatross	Lndg ingested in port eng.
1/23/00	2230	C-130	1	L. Albatross	T/O
1/24/00	750	C-130	2	L. Albatross	T/O
2/23/00	35	B-727	1	L. Albatross	T/O
2/25/00	1022	C-130	1	L. Albatross	T/O
3/10/00	817	C-130	3	L. Albatross	Landing Damage Port Wing LE
3/18/00	2010	B-737	1	Unknown	Landing stbd eng. no damage
4/18/00	555	G-4	2	L. Albatross	T/O

Table 14. Bird interactions recorded by Midway sport fishery, 1999 fishing season.

Date	Number of Interactions	Type	Species
April 23	1	Line	Laysan albatross
April 26	1	Line	Laysan albatross
May 3	1	Line	Laysan albatross
May 4	1	Line	Laysan albatross
May 16	1	Line	Laysan albatross
May 29	1	Lure	Laysan albatross
June 5	1	Line	Laysan albatross
July 12	2	Line	Laysan albatross

Source: Midway Atoll National Wildlife Refuge,
U.S. Fish and Wildlife Service

Table 15. Hawaiian Islands short-tailed albatross sightings, 1938-1999.

Year	Month or Season	Day	Location	No. Birds	Description
1938	Dec.	---	Midway/Sand Is.	1	Immature
1939	Dec.	---	Midway/Sand Is.	1	Injured & Died
1940	Nov.	28	Midway/Sand Is.	1	Immature
1965	Winter	---	Midway Islands	1	Immature
1966	Mar.	18	Midway/Eastern Is.	1	Immature Banded*18
1972	Nov.	---	Midway/Sand Is.	1	Band 558-30754*19
1973	May	---	Midway/Sand Is.	1	Band 558-30754
1973-74	Fall - Winter	---	Midway/Sand Is.	1	Band 558-30754
1974-75	Fall - Winter	---	Midway/Sand Is.	1	Band 558-30754
1976	Mar.	---	Laysan Is.	1	Immature-unbanded
1976	Winter	---	French Frigate Shoals, Tern Is.	1	Immature-unbanded
1976	Winter	---	Midway/Sand Is.	1	Band 558-30754
1977	Dec.	---	Midway/Sand Is.	1	Band 558-30754
1978-79	Oct.-Jan.	---	Midway Is.	1	Band 558-30754
1979-80	Nov.-Jan.	---	Midway/Sand Is.	1	Band 558-30754
1980	Jan.	13	French Frigate Shoals, Tern Is.	1	Unknown
1980	Dec.	12	Midway/Sand Is.	1	Band 558-30754
1981	Oct.-Dec.	---	Midway/Sand Is.	2	Band 558-30754
1981	Feb.	25	Midway/Sand Is.		Immature-unbanded
1982	Jan.	25	French Frigate Shoals, Tern Is.	1	Unknown
1982-83	Nov.-Feb.	---	Midway/Sand Is.	1	Band 558-30754
1984	Dec.	15	Midway/Sand Is.	1	000 white *20
1985	Nov.	20	Midway/Sand Is.	1	000 white
1987	Feb.-Mar.	---	Midway/Sand Is.	1	000 white
1988	Dec.	2	Midway/Sand Is.	1	000 white
1989	Dec.	8-12	Midway/Sand Is.	2	015yellow*21 & 000 white
1990-91	Fall-Winter	---	Midway/Sand Is.	2	015yellow & 000 white

Table 15. Hawaiian Islands short-tailed albatross sightings, 1938-1999 (continued).

Year	Month or Season	Day	Location	No. Birds	Description
1991-92	Dec.-Mar.	---	Midway/Sand Is.	2	015yellow & 000 white
1992-93	Dec.-Jan.	---	Midway/Sand Is.	2	015yellow &000 white
1993-94	Oct.	26	Midway/Sand Is.	2	015yellow & 000 white
	Jan.	11			sitting on infertile egg
	Mar.	9			seen together for the first time
1994	Feb.-Mar.	9	French Frigate Shoals, Tern Is.	1	047 yellow*22
1994	Mar.	24	Kure Atoll, Green Is	1	043 yellow
1994	Nov.	3	Midway/Sand Is.	2	015yellow & 000 white
1995				1	015 yellow
1995-96	Fall-winter	8	Midway/Sand Is.	2	015 yellow sitting on infertile egg & 172 black *23
1995-96	Dec.-Feb.	---	Midway/Eastern Is	1	051 red-orange*24
1997	Nov.	4	Midway/Sand Is.	1	015 yellow sitting on infertile egg
1998-99	Nov.-Feb.	---	Midway/Sand Is.	1	015 yellow
1999	Feb.	5-6	Midway/Eastern Is.	1	057 blue*25
1999	Nov.	5	Midway/Sand Is.	1	057 blue*25

Sources: Data supplied by R. Pyle, Bishop Museum, Hawaii and Service NWR reports.
1940-1962: No records available.

*18 Chandler Robbins banded the bird with two USFWS bands (nos. 767-95701 and 767-95702)
*19 Bird was banded as a chick on Torishima 10 March 1964
*20 Bird was first banded as a chick on Torishima, March 1979
*21 Bird was first banded as a chick on Torishima, March 1982
*22 Bird was first banded as a chick on Torishima, April 1989
*23 Bird was first banded as a chick on Torishima, April 1993; bird had all dark plumage.
*24 Bird was first banded as a chick on Torishima, (either April 1987 or 1990).
*25 Bird was first banded as a chick on Torishima, April 1988.

Table 16. Short-tailed albatross observations at Midway Atoll.

Date	Number of birds	Location	Time	Notes
1993 Observations:				
26 October	1	West end of runway		Sub-adult. Gray #105 on left, metal on right
30 October	1	Between NAVFAC and Frigate Point		Sub-adult
31 October	1	Between NAVFAC and Frigate Point		Sub-adult
2 November	1	Windsock area		Adult
3 November	1	Usual site	1000	Sub-adult
5 November	1	Windsock area	1400	Adult sub-adult not present
8 November	1	Windsock area	930	Adult
8 November	1	Between perimeter road and south runway Frigate Point	920	Sub-adult
9 November	1	West of perimeter road near end of runway	1010	Sub-adult
11 November	1	Windsock area	1605	This bird observed on egg by Brown sub-adult position determined by triangulation markers placed for reference. Photographed not approached
11 November	1	Egg site	1030	Adult present
14 November	2	Windsock / egg site	1100	Adult and juvenile present
16 November	1	Egg site	940	Sub-adult present
19 November	2	Windsock / Frigate Point	930	Adult & sub-adult present
24 November	1	Egg site	800	Sub-adult present
25 November	2	Windsock / egg site	1700	Adult and sub-adult
30 November	1	Egg site	1330	Sub-adult present
1 December	1	Egg site		Sub-adult present
6 December	1	Egg site	1300	Sub-adult present
9 December	1	Egg site	930	Sub-adult present
12 December	1	Windsock / egg site	1500	Adult present
14 December	1	Windsock	1000	Adult present
14 December	0	Egg site	1130	Sub-adult not present egg collected
21 December	2	Windsock / Frigate Point	1000	015 back to position 2 miles from abandoned nest associating with Black-foots
24 December	1	Frigate Point	1000	Sub-adult present. Had been gone on intervening days
28 December	0			Neither 000 or 015 present

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
1994 Observations:				
1 January	2	Windsock/Frigate Point	1700	000 and 015 both present
4 January	1	Frigate Point	1500	015 present its yellow band is grayish with wear.
7 January	0	Frigate Point	1500	015 present; 000 not at windsock
10 January	1		1430	Neither 000 or 015 present
11 January	2	Frigate Point	800	015 present, 000 not at windsock
16 January	0	Frigate Point/cross runway	1630	Both present
2 February	0	Windsock	830	Adult absent
9 February	1	Windsock	920	Adult absent sign installed
11 February	0	Windsock		Adult by Bob Dusek
14 February	1	Frigate Point	830	Sub-adult absent
16 February	1	Windsock	830	Adult present sub-adult absent
21 February	1	Frigate Point	1500	Sub-adult, adult absent
25 February	1	Windsock / Frigate Point	1300	Adult absent sub-adult present
28 February	1	Eastern Islet southeast runway	1030	Sub-adult present
1 March	1	Windsock / Frigate Point	1300	Adult present sub-adult absent
2 March	1	Frigate Point	0830 0900	Sub-adult present at 0830 absent at 0900
4 March	1	Frigate Point	930	Sub-adult present
6 March	1	50 Feet behind sign	830	Adult present
7 March	1	Windsock	1100	Adult present
19 March	0	Windsock / Frigate Point	1100	Both absent
20 March	2	Windsock	930	Paired up 001 preening 015
21 March	1	Frigate Point	1030	Sub-adult present
26 March	0	Windsock	1330	Did not check Frigate Point
3 April	0	Windsock / Frigate Point	1430	Absent
3 April	1	Frigate Point	a.m.	Sean Adrian (PACDIV) sub-adult present
5 April	1	Across from windsock	?	Sean Adrian (PACDIV) Billy & AL adult present
6 April	1	Across from windsock	1100	Adult present
10 April	1	Across from windsock	1400	Adult did not check for 015
12 April	1	Windsock	1305	Adult 015 not present
15 April	1	Windsock	1600	Adult 000, 015 not present
17 April	0	Windsock / Frigate Point	1400	Both absent
18 April	0	Windsock / Frigate Point	900	Both absent
23 April	0	Windsock	1000	000 not present

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
25 April	0	Windsock / Frigate Point	1730	Both absent
27 April	0	Windsock / Frigate Point	1730	Both absent
24 October	1	Windsock area	a.m.	One adult to report no ID #
25 October	1	Windsock area	730	One adult - band not read
28 October	1	Windsock area	1540	Adult could not read leg band Too far away to see band & band was hidden believe it is 000
31 October	2	NAVFAC area	a.m.	Two dancing together
3 November	2	NAVFAC area & windsock area	12:00	One at each site - 015 at NAVFAC & 000 at Windsock
19 December	1	NAVFAC area, juvenile	830	Juvenile right behind protected post
22 December	1	NAVFAC posted	1300	Juvenile right behind protected post
1995 Observations:				
6 January	1	Windsock	1300	Juvenile wandering around
5 February	1	West end of runway	1530	Juvenile (015)
8 February	1	West end of runway	1300	Juvenile (015)
9 March	1	West end of runway	1630	Juvenile (015)
15 April	1	West end of runway		Juvenile (015)
7 May	0			
7 May	0			
16 May	0			
22 May	0			
25 May	0			
30 May	0			
2 June	0			
7 June	0			
13 June	0			
18 June	0			
28 June	0			
30 October	1	NAVFAC	1330	Juvenile
8 November	1	NAVFAC	1500	On egg, nice nest of sand (015)
13 November	1	NAVFAC	1000	Still on egg (015)
21 November	1	NAVFAC	1000	Still on egg (015)
28 November	1	NAVFAC	1200	Still on egg (015)
3 December	1	NAVFAC	1730	Still on egg (015)

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
12 December	1	Northeast corner		OSI reddish orange tag on right leg
13 December	1	Northeast corner		OSI reddish orange tag on right leg
14 December	1	Northeast corner		Appeared to be same bird
15 December	1	NAVFAC		Still on egg (015)
18 December	1	Northeast corner		Appeared to be same bird unable to read band
1996 Observations:				
3 January	1	West end of runway		015 on egg
5 January	1	West end of runway		015 on egg
6 January	1	West end of runway		015 on egg
8 January	0	West end of runway	1235	015 not present, abandoned egg candled, no sign of embryo, collected egg, replaced with abandoned egg from elsewhere.
9 January	0	West end of runway		
10 January	0	West end of runway		
	1	Eastern Island northeast corner	1000	#051
17 January	1	Eastern Island northeast corner	1000	#051
28 January	1	West end of runway	1600	#015
30 January	1	West end of runway	1000	#015
30 January	0	West end of runway	1700	#015
12 February	1	Southwest corner runway 6 -24, Sand Island, Frigate Point	1810	Second stage juvenile band on left leg = 172 band on right leg not read.
26 February	1	015 not present	1800	
28 February	0	Eastern Island northeast corner of island inside of trees	1530	#051
4 March	1	Eastern Island northeast corner	1315	#051
5 March	1	West end of runway	1400	#015
7 March	1	West end of runway	1400	#015
11 March	0	West end of runway	1315	
12 March	1	Eastern Island northeast corner beach	915	#051
14 March	0	End of runway	1330	015 not present
15 March	0	End of runway	1615	015 not present
18 March	1	Eastern Island northeast corner beach	845	#051
18 March	1	West end of runway		#015
19 March	1	West end of runway	1350	#015
21 March	0	West end of runway	1045	#015

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
29 March	0	West end of runway	1400	#015
2 April	1	Eastern Island northeast corner beach		#051
9 April	1	Sand Island		#015
11 April	1	Eastern Island northeast corner beach		#051
15 April	0	Sand Island end of runway	930	#051
19 April	0	West end of runway	1400	#015
26 October	1	Frigate Point / NAVFAC	p.m.	Reported sighting not confirmed
27 October	1	Frigate Point / NAVFAC	a.m.	Reported sighting not confirmed
28 October	1	Confirmed probably 015	a.m. & p.m.	Bird at its usual place
15 November	1	#015		Usual spot
25 November	1	#015		Usual spot
2 December	1	#015		Usual spot
9 December	1	#015		Usual spot
14 December	1	#015		Usual spot
27 December	1	051 on Eastern Island, southeast corner		
30 December	1	Frigate Point west of perimeter road and runway		
31 December	1	Frigate Point west of perimeter road and runway		
1997 Observations:				
1 January	0	Frigate Point spot		Absent
2 January	0	Frigate Point spot		Also Absent January 3rd & 4th.
6 January	1	Frigate Point spot-present	1530	Sleeping not disturbed.
22 January	1	Frigate Point area		Displaying with 2 BFAL
11 February	1	Frigate Point area	1700	
12-16 February	1	Frigate Point area		
17-20 February	0	Frigate Point area - absent		
17 February	1	Eastern Island		#051
21 February	1	Frigate Point area	1000	
9 March	0	Frigate Point area - absent	0800, 0400	
13 March	1	Eastern Island		
15 March	1	Frigate Point area - Sand Island	1755	
16 March	0	Frigate Point area - Sand Island	1900	
18 March	1	Eastern Island		
20 March	0	Sand Island Frigate Point area	1700	No sighting
21 March	0	Sand Island Frigate Point area	940	No Bird (Marttm absent haven't seen it for a few days)
24 March	0	Sand Island Frigate Point area	1400	No sighting

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
26 March	1	Sand Island Frigate Point area	1400	Back after 8 days.
26 March	0			
27 March	0	Sand Island Frigate Point area	1315	Not back yet
27 March	1	Sand Island Frigate Point area	1400	Returned
28 March	0	Eastern Island	1430	No sighting
28 March	1	Sand Island Frigate Point area		Bird Present
29 March	1	Sand Island Frigate Point area	800	Bird present
31 March	1	Sand Island Frigate Point area	1423	Flew in from beach?
31 March	1	Sand Island Frigate Point area	1330	Bird present and sleeping
1 April	1	Sand Island Frigate Point area	1530	
2 April	1	Sand Island Frigate Point area	1600	
03 April	1	Sand Island Frigate Point area		Bird present
3 April	1	Sand Island Frigate Point area	1045	
4 April	1	Sand Island Frigate Point area		
4 April	0	Eastern Island	1315	No sighting
5 April	1	Sand Island Frigate Point area	1440	
6 April	1	Sand Island Frigate Point area	1000	Bird present
7 April	0	Eastern Island	1000	No sighting
8 April	1	Sand Island Frigate Point area	1300	Bird present
9 April	1	Sand Island Frigate Point area		Bird present
12 April	1	Sand Island Frigate Point area	930	Bird present
13 April	0	Sand Island Frigate Point area	1030	Bird gone
15 April	0	Sand Island Frigate Point area	1030	Bird gone
17 April	0	Eastern Island		No sighting
18 April	0	Sand Island Frigate Point area	1400	Bird gone
20 April	1	Sand Island Frigate Point area	1400	Bird present seen most of day
21 April	0	Sand Island Frigate Point area	1400	Bird gone
22 April	1	Sand Island Frigate Point area	1400	Bird present
23 April	1	Sand Island Frigate Point area	1800	Bird landed about 1815
24 April	0	Sand Island Frigate Point area	1400	No sighting
24 April	1	Eastern Island	1900	Bird present slightly south of usual point
25 April	0	Sand Island Frigate Point area	1500	No bird
1 May	0	Sand Island Frigate Point area	1420	No bird
27 October	1	Sand Island Frigate Point area	1730	Immature
5 November	1	Sand Island Frigate Point area	1130	015 on egg seen first the night before
4 December	1	Sand Island Frigate Point area	930	015 on nest (on nest from November 5th)
29 December	1	Near Frigate Point		Sitting at same spot (015)

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
30 December	1	Near Frigate Point		Sitting at same spot (015)
1998 Observations:				
1 January	1	Near Frigate Point (015)	1100	Sitting at same spot 015
5 January	1	Near Frigate Point (015)		Sitting at same spot 015
6 January	1	Near Frigate Point (015)	1030	Egg unattended and collected 121-18 cm long, 34-54 cm wide, 11.05 oz candled and found air pocket on large end.
27 January		Frigate Point	1500	Resting near nest
28 January		Frigate Point	1200	Near nest site 015
3 February		Frigate Point	1700	Near nest site 015
4 February		Frigate Point	930	Near nest site 015
9 February		Frigate Point	900	Near nest site 015
3 March		Frigate Point	1020	Near nest site 015
18 March		Frigate Point	930	Near nest site 015
20 March		Frigate Point	a.m.	Near nest site 015
23 March		Frigate Point	a.m.	Near nest site 015
27 March		Frigate Point	a.m.	Near nest site 015
30 March		Frigate Point	a.m.	Near nest site 015
31 March		Frigate Point	a.m.	Near nest site 015
9 October	1	Frigate Point nest	p.m.	Sitting
20 October	1	Frigate Point above nesting site in ironwoods	1500	#015
24 October	1	Frigate Point at nesting site (015)	p.m.	
28 October	1	Frigate Point at nesting site (015)	p.m.	Sitting
29 October	1	Frigate Point at nesting site (015)	p.m.	Sitting
16 November	1	Frigate Point at nesting site (015)	p.m.	Dancing with blackfoot near/on egg?
2 December	1	Frigate Point at nesting site (015)	1730	Sitting
3 December	1	Frigate Point at nesting site (015)	a.m.	Sleeping
9 December	1	Frigate Point at nesting site (015)	a.m.	Standing
14 December	1	Frigate Point at nesting site (015)	p.m.	Sitting
18 December	1	Frigate Point at nesting site (015)	p.m.	Sitting
19 December	1	Frigate Point at nesting site (015)	a.m.	Standing (015)
21 December	1	Frigate Point Sand Island	p.m.	Standing (015)
23 December	1	Frigate Point Sand Island	a.m.	Sitting
26 December	1	Frigate Point Sand Island	p.m.	Standing (015)
30 December	1	Near wind "T" in BFAL plots along beach flying just offshore of eastern Island	a.m.	It flew away towards frigate point golden shore bird different than our bird.

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
1999 Observations:				
4 January	1	Frigate Point Sand Island	545	Sitting in Same area
6 January	1	Frigate Point Sand Island	1:30	Interacting with BFAL
11 January	1	Frigate Point Sand Island	1030	Sitting in same area
15 January	1	Usual home	p.m.	Courting with BFAL (trying)
17 January	1	Usual locality close to Frigate Point	1000	Seemed to have little less brown on lower nape and more golden tinge to lower crown, compared to January 1998
18 January	0	Not found	1000	
18 January	0	Not found	1600	
20 January	0	Not found	930	
24 January	1	Frigate Point Sand Island	1730	Same site on slope
26 January	1	Channel ½ mile north of Sand Island	1700	Flying out to sea
27 January	1	Frigate Point Sand Island	1700	Courting BFAL
30 January	1	Cross runway east side of island at edge of runway near beach	1605	Adult sitting alone no band on left leg
1 February	1	Eastern - on beach NMPS Section 3 eastern side of island, sitting amongst black foot.	1418	Adult same bird from above, - saw right band, black color maybe white or blue numbers
5 February	1	Eastern - on beach NMPS Section 3		Confirmed blue and white letters possible 057 - 057
6 February	1	Eastern Island, north tip beach section 4 on map of eastern Island		#057- Blue band with white print - full golden head shape
11 February	1	Ususal place near Frigate Point	1300	Not seen later (1630)
14 March	1	Usual place near Frigate Point	1330	Off and on lately
18 March	1	Typical location		18th is last day observed through 31st
29 March	0	Not present for part of week at Frigate		
1 April	1	Typical location Frigate Point	1600	Courting with BFAL
6 April	1	Eastern Island sector 6	1100	Full adult, band not seen
6 April	1	Frigate Point Sand Island	1700	Not seen next day
19 April	1	Frigate Point Sand Island	1530	Sitting in Same area
28 April	1	North of Frigate Point on south side of runway	1130	Sitting, Sky calls, standing #057
4 May	1	Northeast of Frigate Point south of runway	1230	Sitting on ground #057
4 May	1	Flying by beach at SB	1630	
11 May	1	Sand Island east of beach south beach	0745am	#057 seen on cart trail walking towards ocean

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
12 May	1	Sand Island near wind-T	1600	#057
15 May	1	Sand Island near wind-T	1200	Sitting close to red sand
28 October	1	Sand Island first sighting at Frigate Point	1500	Standing at southwest corner, grassy area of frigate point #015
31 October	1	Eastern Island southeast corner of alternate runway NMFS section 5	1125	#051, Red band right leg
14 November	1	Sand Island Frigate Point	1500	015 Sitting among BFAL & LAAL
17 November	1	Sand Island - before west turn in cart trail to Frigate Point on north side of south beach cart trail	1330	057, blue band sitting in grassy area
20 November	1	Sand Island - before west turn in cart trail to Frigate Point on north side of south beach cart trail	1230	051 Red band
24 November	1	057 M preferred site - F 015 at her preferred site	745	Sitting with BFAL
25 November		057 on his site 015 absent	800	
26 November		057 on his site, 015 absent	1610	Strong winds (40 - 50k) from 70 degrees
27 November		057 and 015 at their sites	930	
28 November		057 and 015 at their sites	800	
29 November		057 and 015 at their sites	1330	
30 November		057not seen, 015 at usual site	1100	
3 December		057 and 015 at usual sites	1300	
14 December	1	Sector 6 Eastern Island	1400	Red 051
15 December	1	Sector 6 Eastern Island	1400	Red 051
22 December	1	Male at Frigate Point	1300	#015
22 December	1	Eastern Island Sector 4	1500	#051 Red
23 December	1	Male at Frigate Point	1530	#015
26 December	1	Sand Island south beach area	1730	#057 blue band
27 December	0	Sand Island south beach area	1600	So STAL seen on sand
27 December	1	Eastern Island	1300	#051 Red Band, right leg - Sector 6
28 December	1	Sand Island south beach area	1830	#057 blue band
30 December	1	Sand Island south beach area	1730	#057 blue band
30 December	0	Sand Island south beach area	1735	No #015 at Frigate Point
2000 Observations:				
2 January	2	Usual spots, Sand Island	1400	Female and Male (057 & 015)
2 January	1	Frigate Point spot	1030	Female 015
3 January	2	Usual spots, Sand Island	800	Female and Male (057 & 015)
4 January	1	South beach	1500	Male at usual spot (057)
5 January	2	Sand Island Frigate Point south beach site	1430	Female and Male (057 & 015)

Table 16. Short-tailed albatross observations at Midway Atoll (continued).

Date	Number of birds	Location	Time	Notes
6 January	0	Frigate Point spot	915	Male also at 1750
6 January	1	Frigate Point spot	940	Female not found
6 January	1	Frigate Point spot	1745	Female back 015
9 January	1	South beach site	1730	057 watched for 20 minutes interacting with LAAL then circled area for 5 minutes in flight no male
10 January	1	Eastern sector 6	1400	#015
10 - 12 January	0	Frigate Point south beach	pm.	Neither female or male present
15 January	1	Frigate Point		yellow 015
16 - 22 January	1	Frigate Point Sand Island	1600	Male present on south side of runway
22 January	1	Sector 6 Eastern Island	845	#051 Red
25 January	2	Frigate south beach		Blue 057 & yellow 015
26 January	1	Eastern Island Sector 6	1430	051 red sitting in usual spot
26 January	1	South beach site		Blue 057
31 January	1	Frigate		Yellow 015
1 February	1	Eastern Island Sector 6		051 Red
4 February	1	Eastern Island Sector 6		051 Red
6 February	1	Frigate		Yellow 015
17 February	1	Sand Island Frigate Point south beach site	p.m.	Blue 057
19 February	2	Sand Island Frigate Point south beach site	a.m.	Blue 057 & yellow 015
23 February	1	Eastern Island Sector 6	1500	Red 051
2 March	0	Eastern Island Sector 6	1400	not seen 051
12 March	1	Eastern Island Sector 6	1200	Red 051 band
13 March	1	Eastern Island Sector 6	a.m.	Red 051
14 March	1	Sand Island Frigate Point south beach site	1500	
16 March	1	Sand Island Frigate Point south beach site	845	Yellow 015
27 March	1	Eastern Island Sector 6		Red 051
28 March	1	Eastern Island Sector 6		Red 051
30 March	0	Sand Island Frigate Point south beach site		Not seen 015
31 March	1	Sand Island Frigate Point south beach site		Yellow 015
31 March	1	Eastern Island end of alternate runway band not seen		Red 051 Eastern sector 6; Blue 057 female frigate south beach; Yellow 015 male
12 April	0	Eastern Island Sector 6		No red 051
16 April	0	Sand Island Frigate Point south beach site		No Yellow 015
17 April	0	Eastern Island Sector 6		No red 051

Table 17. Observer coverage of the Hawaii-based longline fishery, 1994-1999.

Year	Period	Trips Departed	Observed Trips	Observer Coverage %
1994	02/25/94 - 02/20/95	1,031	55	5.3
1995	02/20/95 - 12/31/95	937	42	4.5
1996	01/01/96 - 12/31/96	1,062	52	4.9
1997	01/01/97 - 12/31/97	1,123	40	3.6
1998	01/01/98 - 12/31/98	1,180	48	4.1
1999	01/01/99 - 12/31/99	1,136	38	3.3
(2000	*01/01/99 - 12/31/99*	*308*	*21*	*6.8)*
Average (94' - 99')		**1,078**	**46**	**4.3**

Source: NMFS Observer Program, unpub. data. Observer effort has been reported in the annual and quarterly reports in the above manner since the inception of the Hawaii Longline Observer Program (HLLOP) in February 1994. Observer coverage began on February 25, 1994 (Lewis Van Fossen, NMFS, pers. commun. 1999).

Table 18. Seabird kill estimates for Hawaii-based longline fishery (estimate of birds per thousand hooks based on total hooks set in fishery).

Laysan Albatross					
	1994	**1995**	**1996**	**1997**	**1998**
***Birds per 1000 Hooks Estimate**	0.1523	0.1026	0.0727	0.0739	0.0887
Reported Kills	73	107	31	66	56
Estimated Total Kills	1828	1457	1047	1150	1479
95% Confidence interval	933-2984	767-2308	569-1610	599-1875	822-2336
Total Hooks Set in Fishery	11,996,000	14,190,000	14,400,000	15,549,000	16,663,962

Black-footed Albatross					
	1994	**1995**	**1996**	**1997**	**1998**
***Birds per 1000 Hooks Estimate**	0.1662	0.1394	0.1063	0.0739	0.1177
Reported Kills	126	105	59	107	46
Estimated Total Kills	1994	1979	1568	1653	1963
95% Confidence interval	1508-2578	1439-2497	1158-1976	1243-2102	1479-2470
Total Hooks Set in Fishery	11,996,000	14,190,000	14,400,000	15,549,000	16,663,962

Sources: Birds per 1000 Hooks Estimate Calculated by Kevin Foster, Service (June 1999) (Estimated Total Kills/Total Hooks Set in Fishery x 1,000). Estimated Total Kills and 95% Confidence Interval Calculated by Pierre Kleiber, NMFS (June 1999). Total Hooks Set in Fishery provided by Al Katekaru and Chris Boggs, NMFS, (June 1999), Source: Pelagic Fisheries of the Western Pacific Region, 1998 Annual Report, December 1999, WPRFMC and NMFS Logbook.

Table 19. Short-tailed albatross life table (from Cochrane and Starfield, in press.).

	Survivorship	Number Surviving to age x	Prop. surv. age x	Avg. years lived , age x to age x+1	Life expectancy at age x	Expected age at death
Fledged	0.940	100	1.000	0.970	25.05	25.05
1	0.940	94	0.940	0.912	25.62	26.62
2	0.940	88	0.884	0.857	26.23	28.23
3	0.940	83	0.831	0.806	26.87	29.87
4	0.940	78	0.781	0.757	27.55	31.55
5	0.940	73	0.734	0.712	28.28	33.28
6	0.980	72	0.690	0.683	29.05	35.05
7	0.980	70	0.676	0.669	28.63	35.63
8	0.980	69	0.663	0.656	28.21	36.21
9	0.980	68	0.649	0.643	27.77	36.77
10	0.980	66	0.636	0.630	27.33	37.33
11	0.980	65	0.624	0.617	26.88	37.88
12	0.980	64	0.611	0.605	26.42	38.42
13	0.980	62	0.599	0.593	25.94	38.94
14	0.980	61	0.587	0.581	25.46	39.46
15	0.980	60	0.575	0.569	24.97	39.97
16	0.980	59	0.564	0.558	24.47	40.47
17	0.980	58	0.552	0.547	23.96	40.96
18	0.980	56	0.541	0.536	23.44	41.44
19	0.980	55	0.531	0.525	22.91	41.91
20	0.980	54	0.520	0.515	22.37	42.37
21	0.980	53	0.510	0.504	21.81	42.81
22	0.980	52	0.499	0.494	21.25	43.25
23	0.980	51	0.489	0.484	20.67	43.67
24	0.980	50	0.480	0.475	20.08	44.08
25	0.980	49	0.470	0.465	19.48	44.48
26	0.980	48	0.461	0.456	18.87	44.87
27	0.980	47	0.451	0.447	18.24	45.24
28	0.980	46	0.442	0.438	17.61	45.61
29	0.980	45	0.433	0.429	16.95	45.95
30	0.980	44	0.425	0.421	16.29	46.29
31	0.980	43	0.416	0.412	15.61	46.61
32	0.980	43	0.408	0.404	14.92	46.92
33	0.980	42	0.400	0.396	14.22	47.22
34	0.980	41	0.392	0.388	13.50	47.50
35	0.980	40	0.384	0.380	12.76	47.76
36	0.980	39	0.376	0.373	12.01	48.01
37	0.980	38	0.369	0.365	11.25	48.25
38	0.980	38	0.361	0.358	10.47	48.47
39	0.980	37	0.354	0.351	9.67	48.67
40	0.980	36	0.347	0.344	8.86	48.86
41	0.980	35	0.340	0.337	8.03	49.03
42	0.980	35	0.333	0.330	7.18	49.18
43	0.980	34	0.327	0.323	6.32	49.32
44	0.980	33	0.320	0.317	5.43	49.43
45	0.980	33	0.314	0.311	4.54	49.54
46	0.980	32	0.307	0.304	3.62	49.62
47	0.980	31	0.301	0.298	2.68	49.68
48	0.980	31	0.295	0.292	1.73	49.73
49	0.250	8	0.289	0.181	0.75	49.75
50	0.010	0	0.072	0.037	0.51	50.51

Table 20. Modeled lost productivity, based on the loss of one four-year-old albatross (from Cochrane and Starfield, in press).

Fledged	Expected Natural Deaths	Lost Juvenile BirdYrs.	Discou. Lost Juv. BirdYrs.	# of Progeny Lost	Lost Progeny BirdYrs. Disc life	Discou. Lost Progeny BirdYrs.	Discou. Total Lost BirdYrs.
1							
2							
3							
4	0.060	0.940	0.913				0.913
5	0.056	0.884	0.833				0.833
6	0.018	0.866	0.792	0.182	2.629	2.406	3.199
7	0.017	0.849	0.754	0.179	2.577	2.289	3.043
8	0.017	0.832	0.717	0.175	2.525	2.178	2.896
9	0.017	0.815	0.683	0.172	2.475	2.073	2.755
10	0.016	0.799	0.649	0.168	2.425	1.972	2.621
11	0.016	0.783	0.618	0.165	2.377	1.876	2.494
12	0.016	0.767	0.588	0.162	2.329	1.785	2.373
13	0.015	0.752	0.559	0.158	2.283	1.698	2.258
14	0.015	0.737	0.532	0.155	2.237	1.616	2.148
15	0.015	0.722	0.506	0.152	2.192	1.538	2.044
16	0.014	0.708	0.482	0.149	2.148	1.463	1.945
17	0.014	0.693	0.458	0.146	2.105	1.392	1.850
18	0.014	0.680	0.436	0.143	2.063	1.324	1.760
19	0.014	0.666	0.415	0.140	2.022	1.260	1.675
20	0.013	0.653	0.395	0.137	1.982	1.199	1.594
21	0.013	0.640	0.376	0.135	1.942	1.141	1.516
22	0.013	0.627	0.357	0.132	1.903	1.085	1.443
23	0.013	0.614	0.340	0.129	1.865	1.033	1.373
24	0.012	0.602	0.324	0.127	1.828	0.982	1.306
25	0.012	0.590	0.308	0.124	1.791	0.935	1.243
26	0.012	0.578	0.293	0.122	1.755	0.889	1.182
27	0.012	0.567	0.279	0.119	1.720	0.846	1.125
28	0.011	0.555	0.265	0.117	1.686	0.805	1.070
29	0.011	0.544	0.252	0.115	1.652	0.766	1.018
30	0.011	0.533	0.240	0.112	1.619	0.729	0.969
31	0.011	0.523	0.228	0.110	1.587	0.694	0.922
32	0.010	0.512	0.217	0.108	1.555	0.660	0.877
33	0.010	0.502	0.207	0.106	1.524	0.628	0.835
34	0.010	0.492	0.197	0.104	1.493	0.597	0.794
35	0.010	0.482	0.187	0.102	1.464	0.568	0.756
36	0.010	0.472	0.178	0.099	1.434	0.541	0.719
37	0.009	0.463	0.169	0.097	1.406	0.515	0.684
38	0.009	0.454	0.161	0.096	1.377	0.490	0.651
39	0.009	0.445	0.153	0.094	1.350	0.466	0.619
40	0.009	0.436	0.146	0.092	1.323	0.443	0.589
41	0.009	0.427	0.139	0.090	1.296	0.422	0.561
42	0.009	0.418	0.132	0.088	1.271	0.401	0.533
43	0.008	0.410	0.126	0.086	1.245	0.382	0.507
44	0.008	0.402	0.120	0.085	1.220	0.363	0.483
45	0.008	0.394	0.114	0.083	1.196	0.346	0.459
46	0.008	0.386	0.108	0.081	1.172	0.329	0.437
47	0.008	0.378	0.103	0.080	1.148	0.313	0.416
48	0.008	0.371	0.098	0.078	1.125	0.298	0.396
49	0.278	0.093	0.024	0.020	0.281	0.072	0.096
50	0.092	0.001	0.000	0.000	0.003	0.001	0.001
Total	**0.999**	**27.051**	**16.173**	**5.313**	**76.602**	**43.807**	**59.980**

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We wish to acknowledge significant contributions to this biological opinion from Janey Fadely and Greg Balogh of the Juneau and Anchorage Ecological Services Field Offices respectively, U.S. Fish and Wildlife Service.

Figure 13. Longline billfish catches in the SPC Statistical Area, 1962-1997. Source: SPC and NMFS, HL.

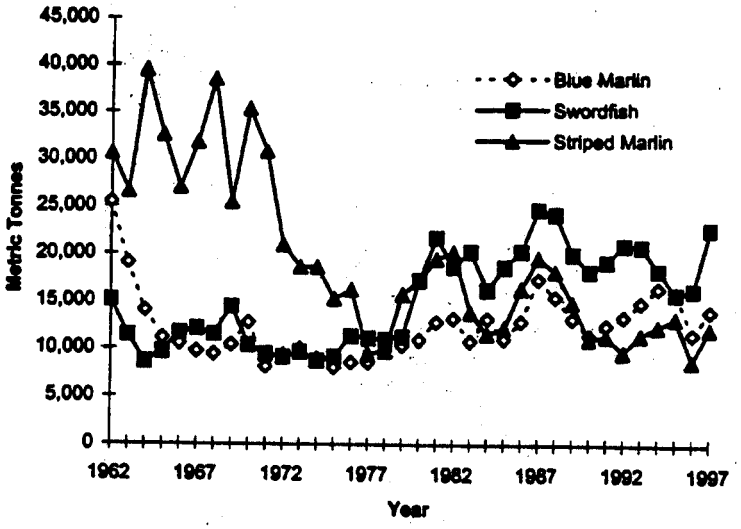
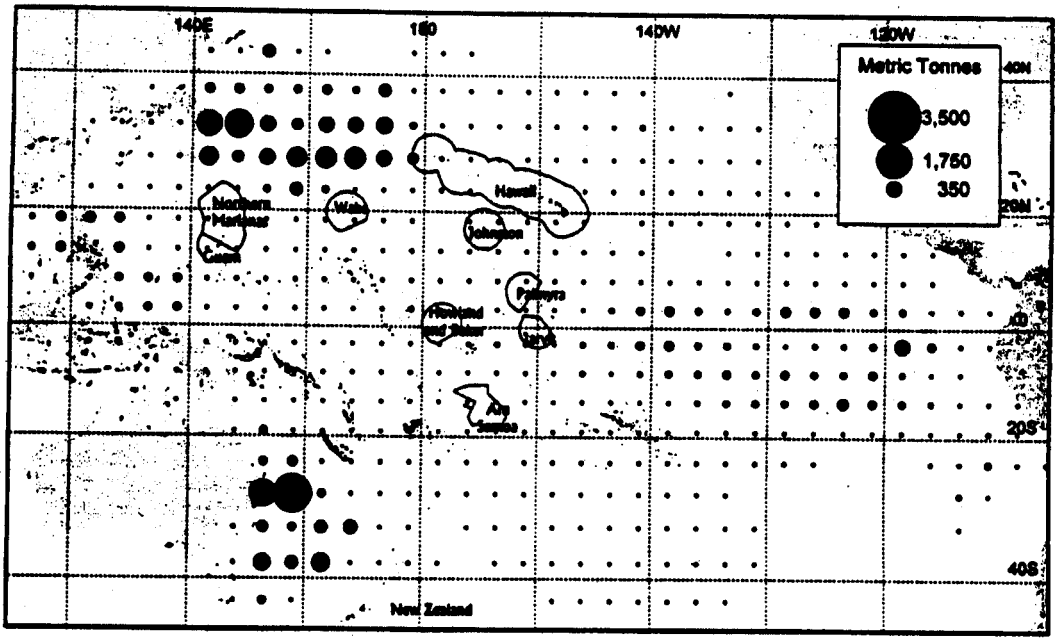


Figure 14. Distribution of longline catches of swordfish in 1997 between 40° S and 40° N, by 5° geographic square.



JAPANESE LONGLINE VESSEL CATCHES OF SWORDFISH - Distant Water Fleet

Source - 1998 Annual Report "Pelagic Fisheries of the Western Pacific Region" December, 1999-Western Pacific Regional Fishery Management Council (Honolulu, HI)(Fig.13 & 14).

FIGURE 1

Figure 7. Longline tuna catches between 40° S and 40° N, 1962-1997. Source: SPC and NMFS, HL.

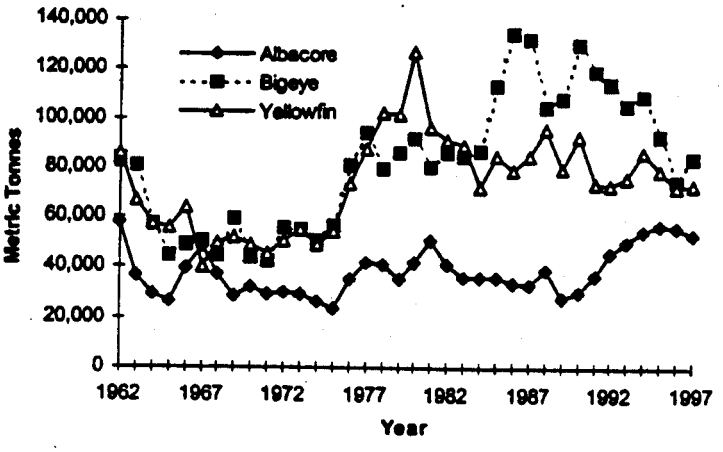
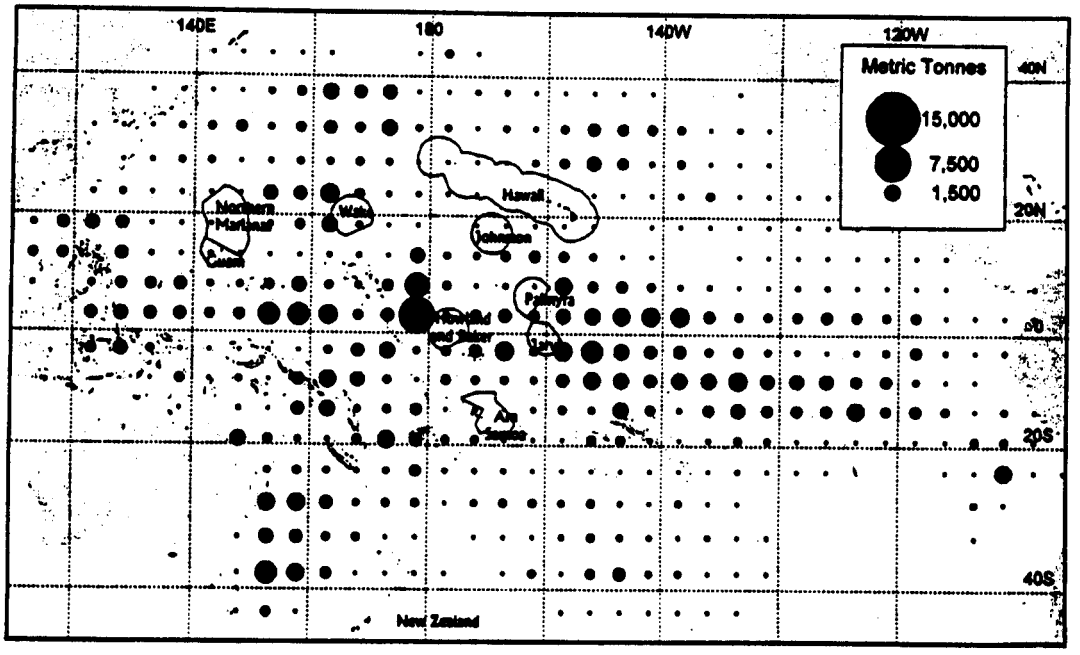


Figure 8. Distribution of longline catches of all tuna species in 1997 between 40° S and 40° N, by 5° geographic square.



JAPANESE LONGLINE VESSEL CATCHES OF TUNA- Distant Water Fleet

Source - 1998 Annual Report "Pelagic Fisheries of the Western Pacific Region" December, 1999-Western Pacific Regional Fishery Management Council (Honolulu, HI)(Fig. 7 & 8).

FIGURE 2

Table 2. Swordfish catch (metric tons) by gear type in the Pacific Ocean.

Year	Offshore and distant water longline	Coastal LL	Driftnet	Harpoon	Others	Total
1980	8,913	824	1,746	398	72	11,953
1981	10,301	675	1,848	129	125	13,078
1982	8,957	839	1,257	195	102	11,350
1983	10,272	955	1,033	166	85	12,511
1984	9,529	1,141	1,053	117	147	11,987
1985	11,607	980	1,133	191	98	14,009
1986	11,721	960	1,264	123	133	14,201
1987	12,814	819	1,051	87	97	14,868
1988	13,394	665	1,234	173	40	15,506
1989	9,633	752	1,596	362	41	12,384
1990	9,432	690	1,027	128	15	11,292
1991	8,453	799	498	153	33	9,936
1992	8,654	1,181	887	381	22	11,125
1993	12,125	1,394	292	309	48	14,168
1994	11,053	1,357	421	308	40	13,179
1995	10,120	NA	NA	NA	NA	NA

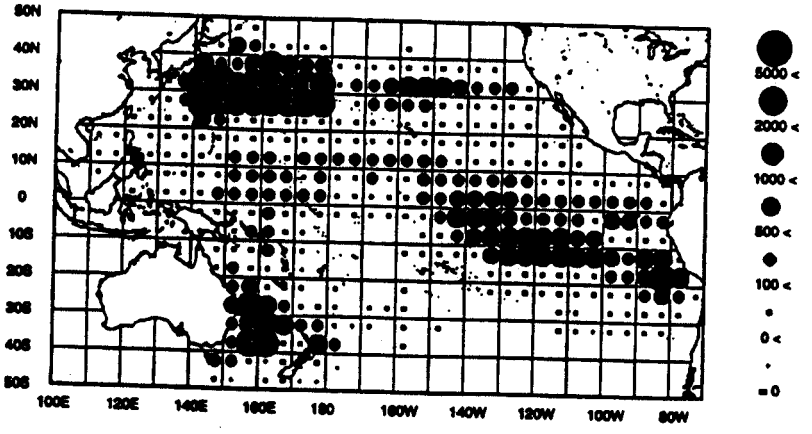


Figure 1. Geographic distribution of mean swordfish catch (thousand fish per year) of the Japanese longline fishery in the 1990s.

JAPANESE LONGLINE CATCHES OF SWORDFISH- Distant and Coastal Fleets

Source - Proceedings of the Second International Pacific Swordfish Symposium, NOAA Technical Memorandum NMFS, (NOAA-TM-NMFS-SWFSC-263), Edited by Gerard T. DiNardo, June 1999.

FIGURE 3

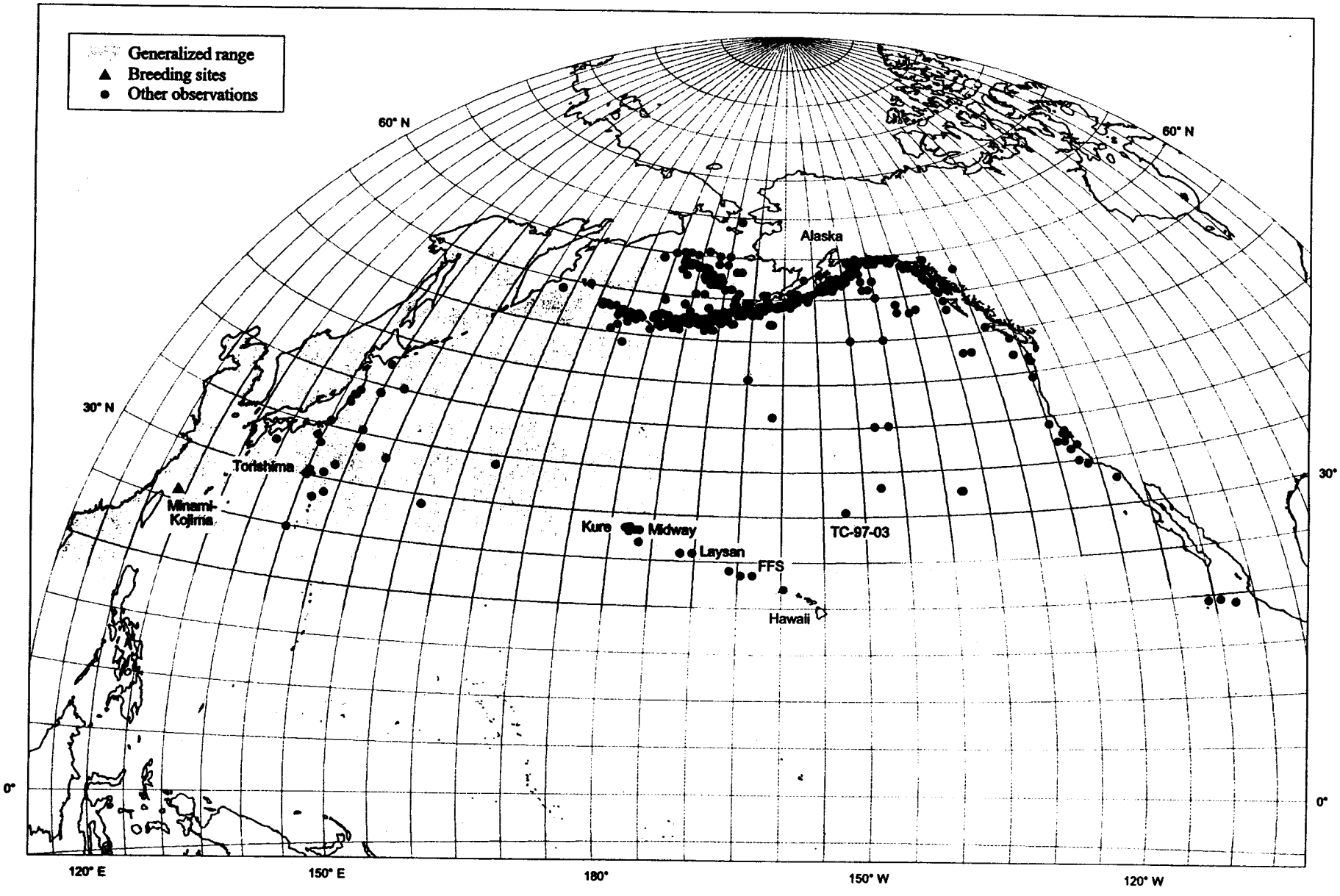
Table 4. Japanese longline effort (hooks) in the western-central (WCPO) and eastern Pacific Ocean (EPO). EPO statistics are from the IATTC (1997).

Japanese longline effort (hooks)			
Year	WCPO	EPO	Total
1980	222,381,200	138,140,800	360,522,000
1981	241,908,400	131,275,104	373,183,504
1982	224,574,300	116,199,848	340,774,148
1983	197,720,200	127,176,160	324,896,360
1984	202,896,900	119,635,456	322,532,356
1985	211,479,200	106,757,808	318,237,008
1986	183,896,700	160,552,528	344,449,228
1987	193,584,100	188,392,544	381,976,644
1988	213,026,100	182,694,224	395,720,324
1989	197,725,900	170,373,088	368,098,988
1990	182,776,300	178,419,456	361,195,756
1991	174,895,000	200,364,704	375,259,704
1992	156,768,800	191,283,709	348,052,509
1993	170,586,400	159,955,430	330,541,830
1994	163,249,300	163,976,027	327,225,327
1995	150,761,600	125,145,630	275,907,230
1996	144,444,800	125,000,000	269,444,800

JAPANESE LONGLINE VESSELS "HOOKS SET" (FROM 1980 - 1996)

Source - Secretariat of the Pacific Community "A Summary of Current Information on the Biology, Fisheries, and Stock Assessment of Bigeye Tuna (*Thunnus obesus*) in the Pacific Ocean, With Recommendations for Data Requirements and Future Research" - J. Hampton, K. Bigelow, and Marc Labelle. Oceanic Fisheries Programme Technical Report No. 36, Noumea, New Caledonia. 1998.

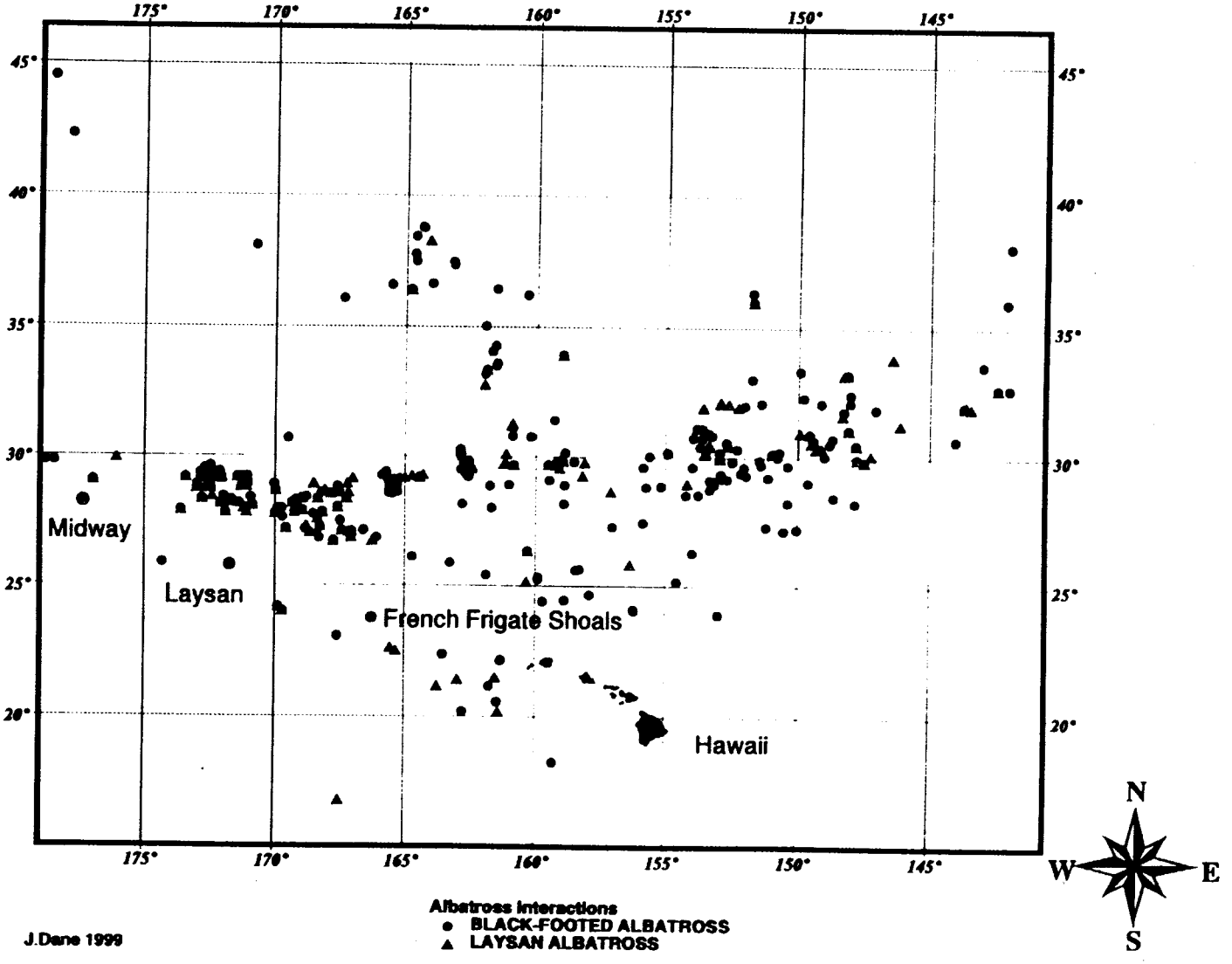
FIGURE 4

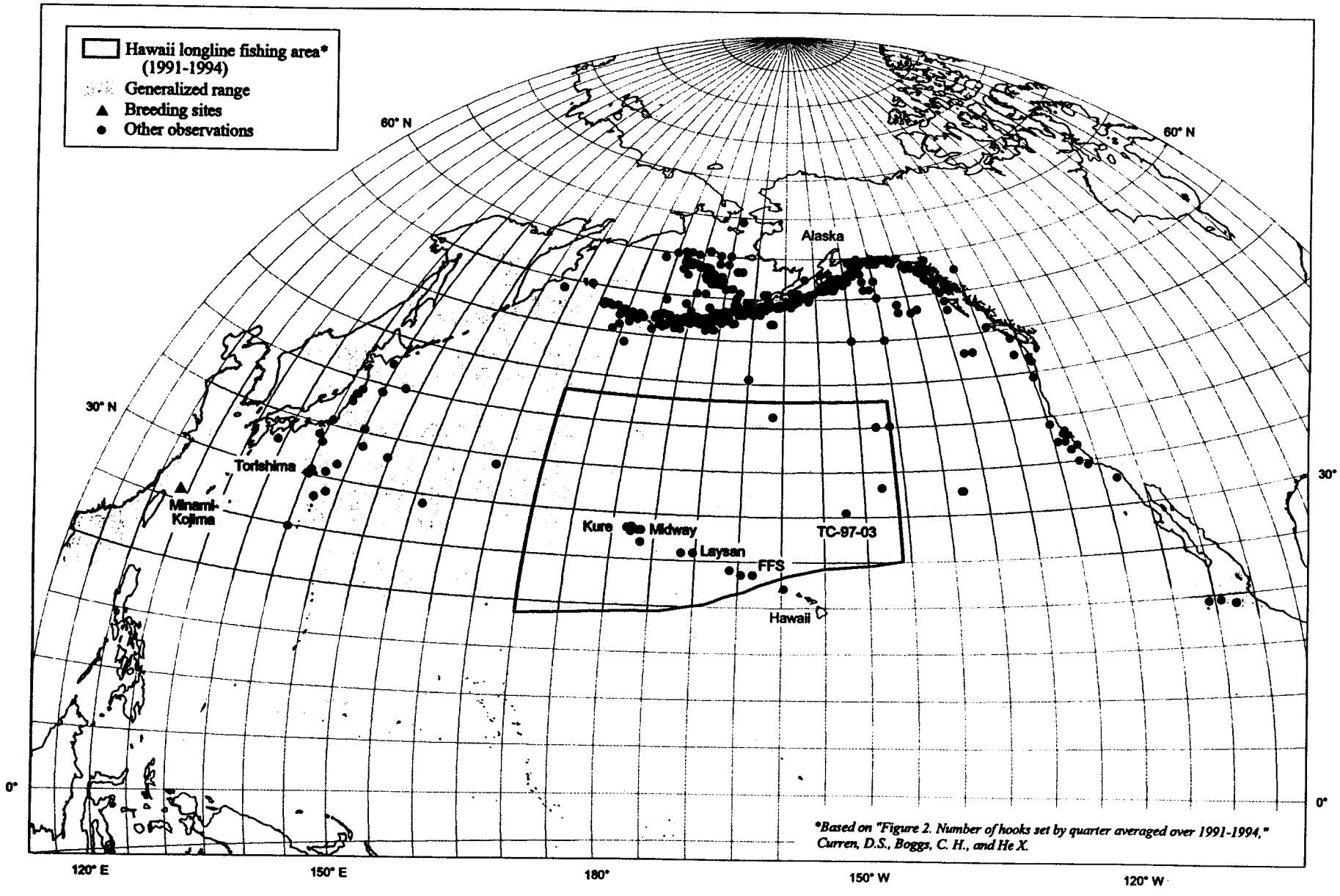


Short-Tailed Albatross Observations

MAP 1

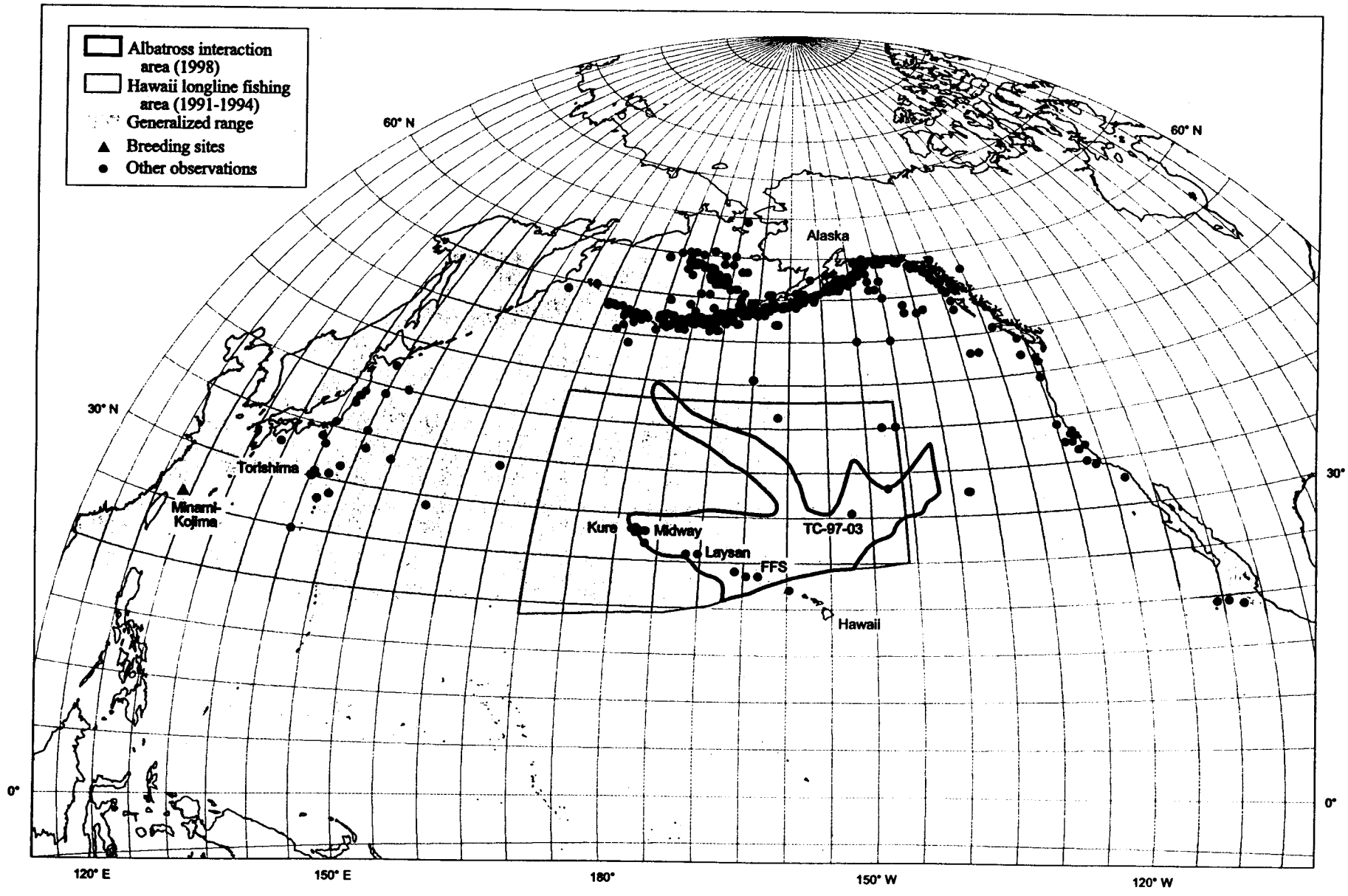
MAP 2


175°
170°
165°
160°
155°
150°
145°
45°
40°
35°
30°
25°
20°
Midway
Laysan
French Frigate Shoals
Hawaii
N
W
E
S
Albatross Interactions
BLACK-FOOTED ALBATROSS
LAYSAN ALBATROSS
J.Dane 1999



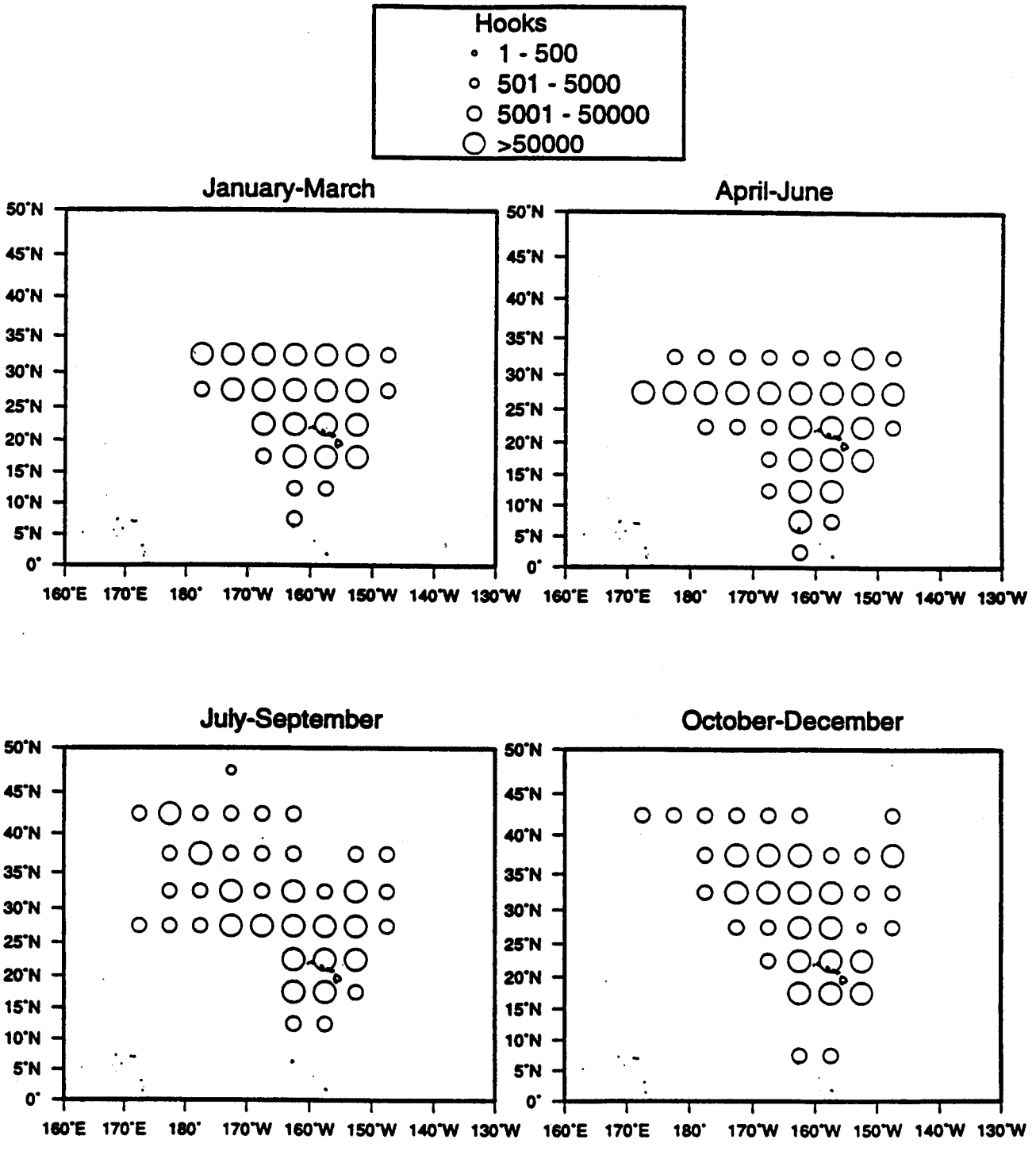
Where the Range of the Short-Tailed Albatross Overlaps with the Hawaii Longline Fishing Area

MAP 3



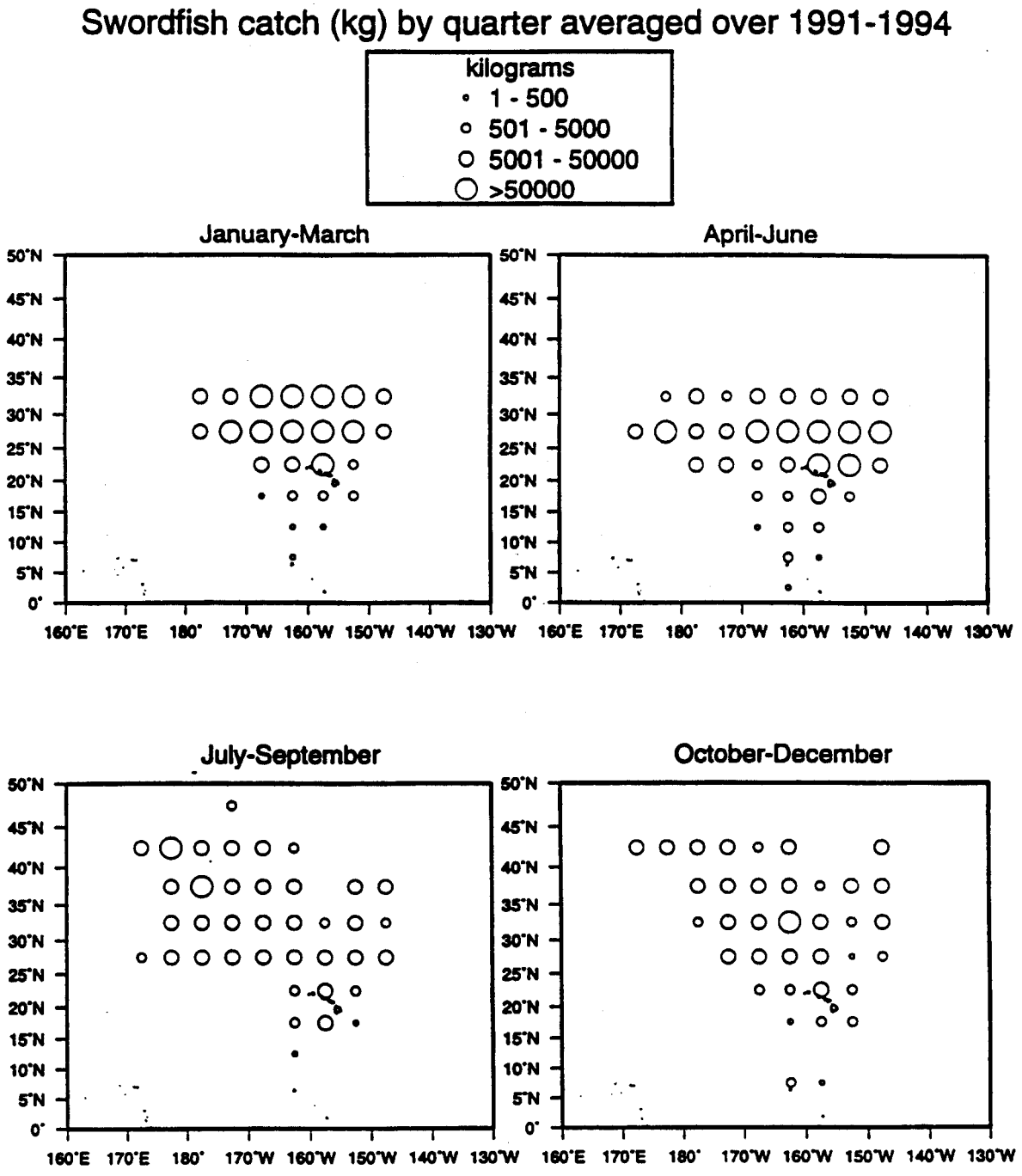
Laysan and Black-Footed Albatross Interactions **MAP 4**

Number of hooks set by quarter averaged over 1991-1994



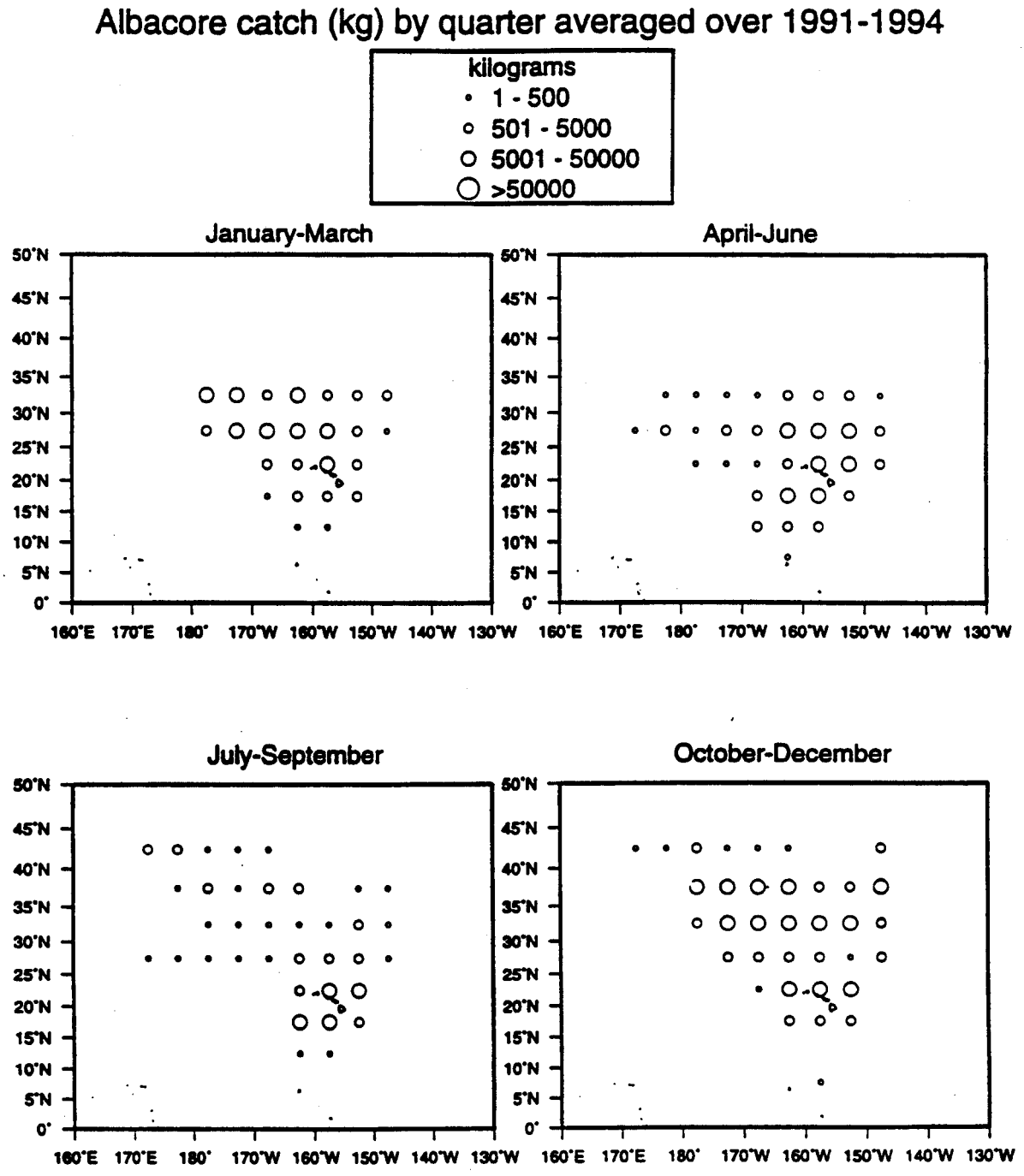
ATTACHMENT A

From D.S. Curan, C.H. Boggs and X.He. Catch and Effort From Hawaii's Longline Fishery Summarized by Quarters and Five Degree Squares, NOAA Technical Memorandum, NMFS. NOAA-TM-NMFS-SWFSC-225. January 1996.



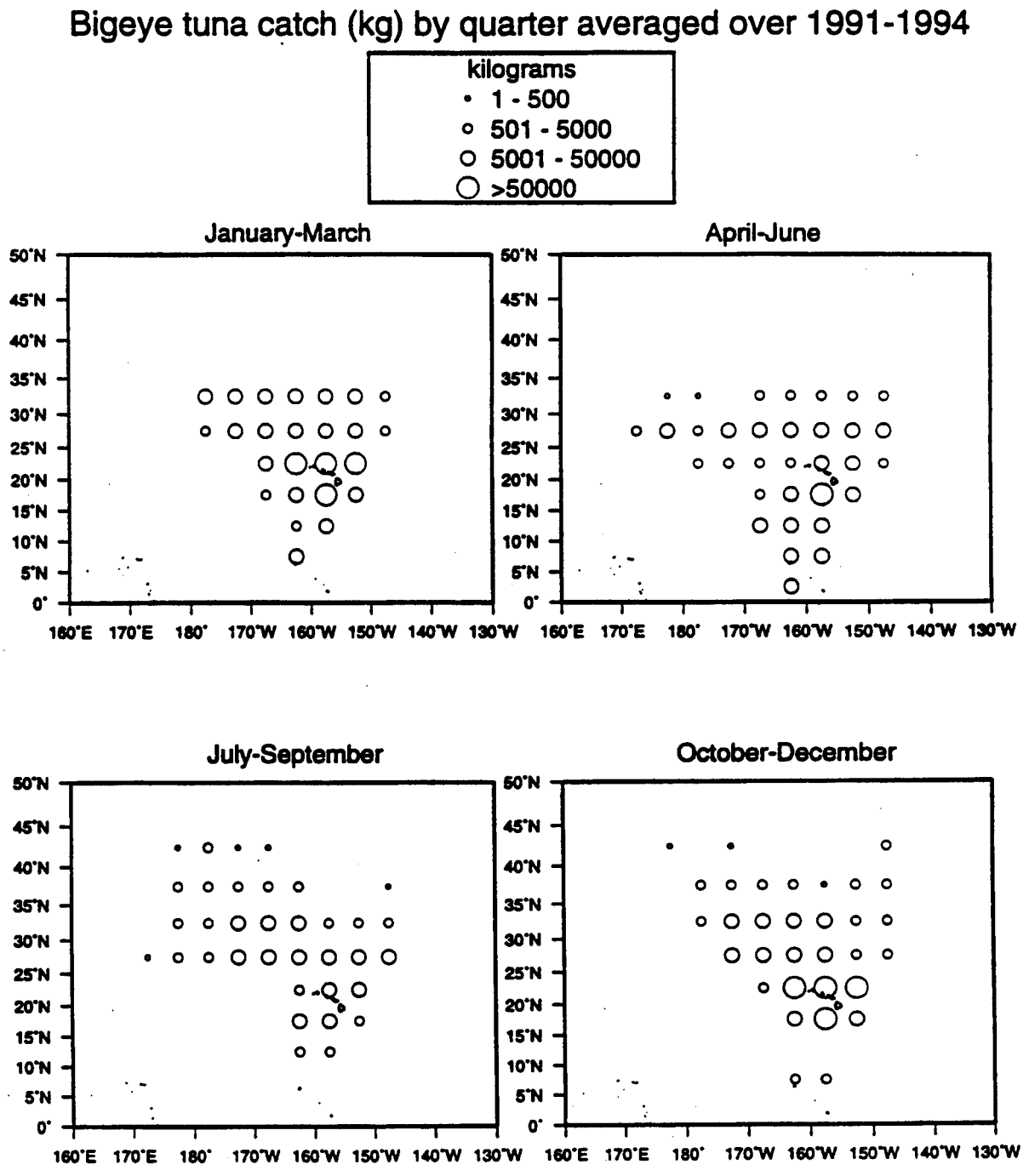
ATTACHMENT B

From D.S. Curan, C.H. Boggs and X.He. Catch and Effort From Hawaii's Longline Fishery Summarized by Quarters and Five Degree Squares, NOAA Technical Memorandum, NMFS. NOAA-TM-NMFS-SWFSC-225. January 1996.



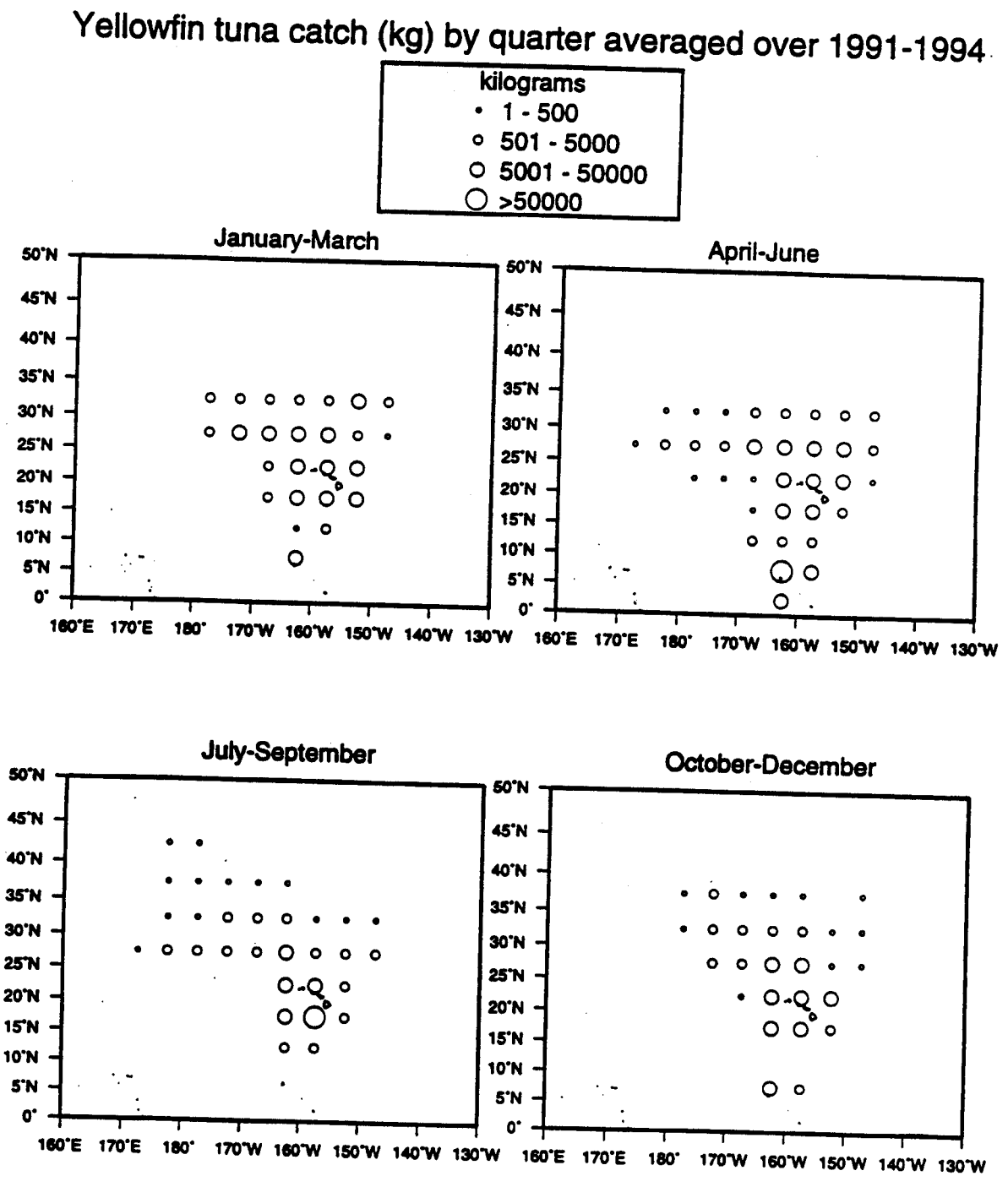
ATTACHMENT C

From D.S. Curan, C.H. Boggs and X.He. Catch and Effort From Hawaii's Longline Fishery Summarized by Quarters and Five Degree Squares, NOAA Technical Memorandum, NMFS. NOAA-TM-NMFS-SWFSC-225. January 1996.



ATTACHMENT D

From D.S. Curan, C.H. Boggs and X.He. Catch and Effort From Hawaii's Longline Fishery Summarized by Quarters and Five Degree Squares, NOAA Technical Memorandum, NMFS. NOAA-TM-NMFS-SWFSC-225. January 1996.



ATTACHMENT E

From D.S. Curan, C.H. Boggs and X.He. Catch and Effort From Hawaii's Longline Fishery Summarized by Quarters and Five Degree Squares, NOAA Technical Memorandum, NMFS. NOAA-TM-NMFS-SWFSC-225. January 1996.

BIRD/LONGLINE INTERACTION FORM

Date 03 02/28/97 Bird line deployed? yes ___ no ✓
Observer KLC

Weather conditions: wind velocity windy ✓ visibility good
precipitation yes ___ no ✓ sea state diverse +
swell height 20 ft

Time set began 03:09 ended 03:57
Latitude-Longitude set began 30,27,058 °N 153.42.795 °W ended 30,27,210 °N 153, 36.65 7 °W)

Number of hooks set 150 hooks
Bait type ½ live mackerel / ½ Squid Frozen or thawed thawed
Amount of weight on hooks 60 grams

Number of birds within 200 meters of vessel at beginning of set (by species) — Behavior before and during setting

No Birds

Time haulback began 08:04 ended 09:21
Latitude-Longitude haulback began 30,28,070 °N 153,43,570 °W ended 30,28,822 °N 153, 37, 952 °W)

List of birds touching gear in any way and their fate and condition
(species)(hooked, entangled, or struck?) (location of hook) (condition of bird - dead, alive and injured, alive and apparently unharmed)

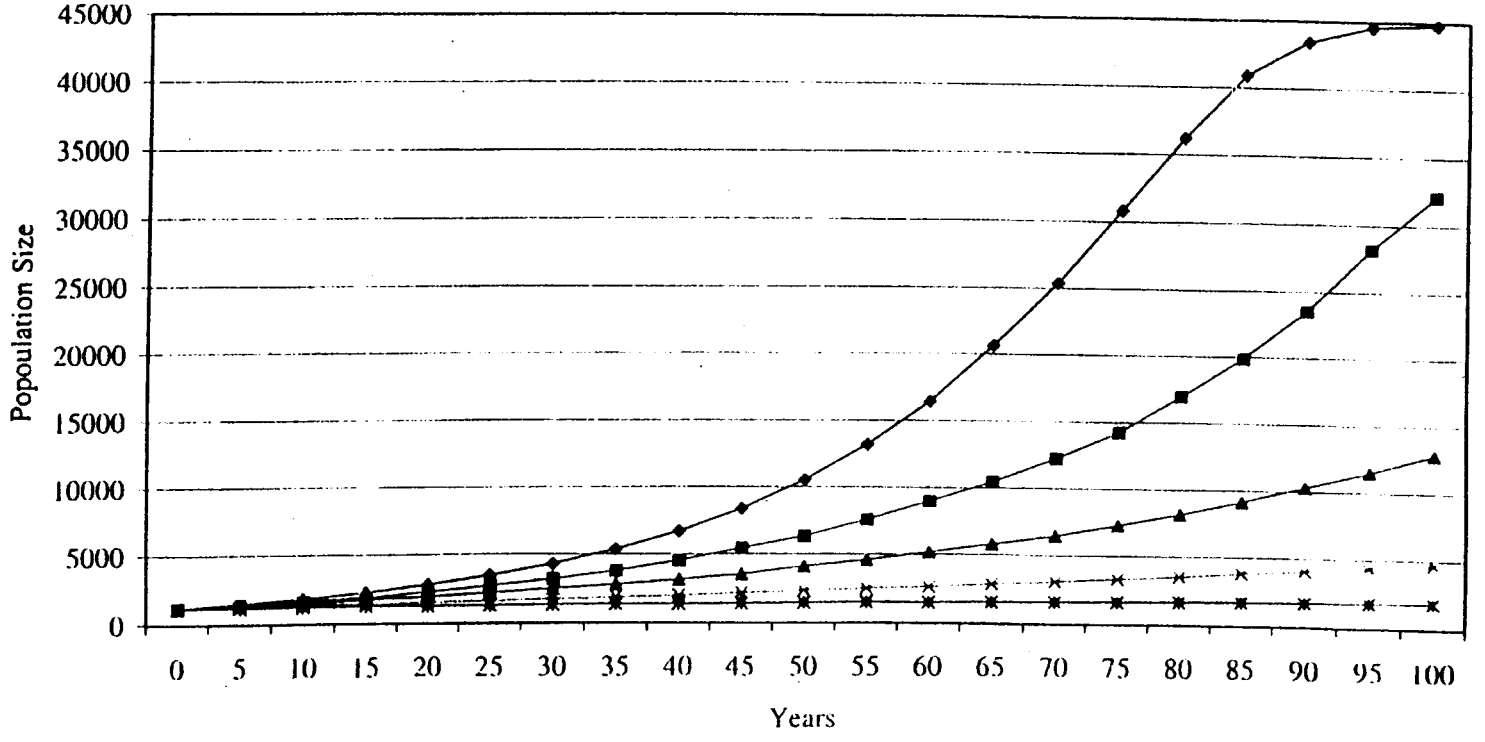
[redacted] Adult flying by haul back
30+ Black footed Albatross
1 Laysan Albatross
Shorttail was actively looking for bait on hooks in haul back

Information about catch - species composition, ⊖
number caught ⊖

ATTACHMENT F

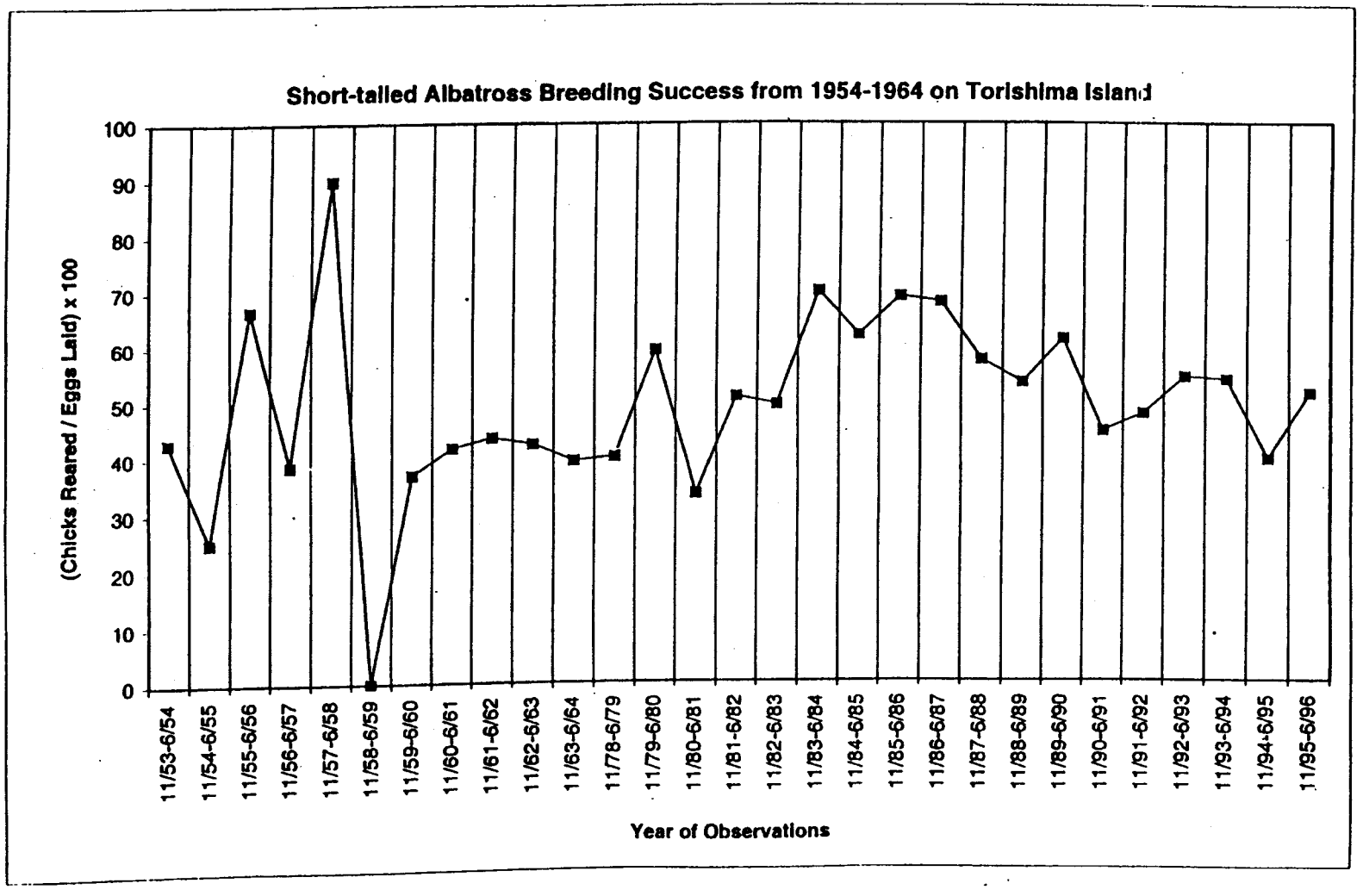
ATTACHMENT G

Short-tailed Albatross PVA:
Average Population Growth Under Various Levels of Fisheries Take on Juveniles and Adults



ATTACHMENT G

SHORT-TAILED ALBATROSS DATA FROM HIROSHI HASEGAWA (UNPUBLISHED)
Data is for Torishima Island.
Birds also breed on Minami-kojima Island = 25 breeding pairs plus 10 · juveniles = 150 total as of 1999.



ATTACHMENT G

Adults arrive in October; Egg laying begins in late October - early November; Eggs hatch in late December and January; May-June chicks fully grown and adults leave; June-mid July chicks fledge and leave.

Landslide/typhoon Frequency Since 1986 breeding season

Slide Year	Yrs Since last slide		
1987/88	2		
1988/89	1	mean	1.800 years
1990/91	2	sd	0.837 years
1991/92	1		
1994/95	3	Frequency:	0.5

landslides/typhoons	Time Interval	Total Years	typhoon or slide yrs	typhoon or slide freq.
known events	85/86-95/96	10	5	0.500
possible events	78/79-95/96	18	7	0.389
possible events	53/54-63/64	11	3	0.273
possible + known	53/54-95/96	29	10	0.345

Best Breeding Success Since 1979

Year	Breeding Success
1979/80	59.259
1981/82	50.746
1982/83	49.231
1983/84	69.863
1985/86	68.831
1986/87	67.857
1989/90	61.111
1992/93	54.110
1993/94	53.595
1995/96	51.136
	58.574 Mean of all years
	7.989 SD of all years

Minus 3 Low Yrs	Breeding Success
1979/80	59.259
1983/84	69.863
1985/86	68.831
1986/87	67.857
1989/90	61.111
1992/93	54.110
1993/94	53.595
	62.089 mean
	6.879 SD

Decrease in breeding on a good year that follows a landslide year compared to a good year that preceeded a landslide year.

Good Year Before a Landslide	Breeding Success	Good Year After a Landslide	Breeding Success	Decrease due to Landslide	
1986/87	67.857	1989/90	61.111	6.746	
1989/90	61.111	1992/93	54.110	7.002	
Same as above for Typhoons					
1993/94	53.595	1995/96	51.136	2.458	
Same as above for other possible landslide or typhoon years					
1953/54	42.857	1955/56	66.667	-23.810	exception
1955/56	66.667	1957/58	90.000	-23.333	exception
1957/58	90.000	1959/60	59.259	30.741	
1979/80	59.259	1981/82	50.746	8.513	
1983/84	69.863	1985/86	68.831	1.032	

NOTE: Decreases in breeding success due to landslides may last more than one year after the the landslide due to burial of suitable nesting areas = loss of nest sites and/or forces to use marginal nest sites with lower change of successful breeding. SO, you observe a decrease in breeding success when you compare a good breeding year that follows a landslide year to a good breeding year that preceeds a landslide year.

ATTACHMENT G

year	adults observe	eggs laid	chicks reared	(chicks/eggs)x100 = % breeding success	
11/53-6/5	25	7	3	42.857	
11/54-6/5	28	12	3	25.000	
11/55-6/5	20	12	8	66.667	
11/56-6/5	30	13	5	38.462	
11/57-6/5	25	10	9	90.000	
11/58-6/5	22	10	0	0.000	
11/59-6/6	30	19	7	36.842	
11/60-6/6	35	24	10	41.667	
11/61-6/6	44	23	10	43.478	
11/62-6/6	44	26	11	42.308	
11/63-6/6	52	28	11	39.286	
11/78-6/7	130	50	20	40.000	
11/79-6/8	130	54	32	59.259	
11/80-6/8	140	63	21	33.333	
11/81-6/8	150	67	34	50.746	plant grass
11/82-6/8	160	65	32	49.231	
11/83-6/8	172	73	51	69.863	
11/84-6/8	165	76	47	61.842	
11/85-6/86		77	53	68.831	plant grass
11/86-6/8	171	84	57	67.857	
11/87-6/8	203	89	51	57.303	landslide
11/88-6/8	223	94	50	53.191	landslide
11/89-6/9	202	108	66	61.111	control erosion
11/90-6/9	232	115	51	44.348	landslide
11/91-6/9	302	139	66	47.482	landslide
11/92-6/9	301	146	79	54.110	control erosion
11/93-6/9	324	153	82	53.595	control erosion
11/94-6/9	337	158	62	39.241	typhoon, control erosion
11/95-6/9	349	176	90	51.136	control erosion
	1953/54-1995/66		Mean	49.277	
			SD	16.557	
	1953/54-1963/64		Mean	42.415	
			SD	22.390	
	1979/80-1995/96		Mean	54.264	
			SD	10.112	

Landslide/Typhoon Decreases Breeding Success by:

Before Catastrophy Year	Breeding Success		Catastrophy Year	Breeding Success	Decrease Due to Landslide
1986/87	67.857	landslide	1987/88	57.303	10.554
1986/87	67.857	landslide	1988/89	53.191	14.666
1989/90	61.111	landslide	1990/91	44.348	16.763
1989/90	61.111	landslide	1991/92	47.482	13.629
1989/90	61.111	typhoon	1994/95	39.241	21.870
				mean	15.496
				SD	4.208

Other Possible Landslide/Typhoon events based on a substantial decrease in breeding success.

Before Landslide Year	Breeding Success	Landslide Year	Breeding Success	Decrease Due to Landslide
1953/54	42.857	1954/55	25.000	17.857
1955/56	66.667	1956/57	38.462	28.205
1957/58	90.000	1958/59	0.000	90.000
1979/80	59.259	1980/81	33.333	25.926
			mean	40.497
			SD	33.299

Adults arrive in October; Egg laying begins in late October - early November; Eggs hatch in late December and January; May-June chicks fully grown and adults leave; June-mid July chicks fledge and leave.

Volcanic Eruptions on Torishima Island beginning in:		01/01/1887	Days		
	Land eruption	08/07/1902	2043	5.60	19.7 mean days
	Land eruption	08/13/1939	13520	37.04	14.6 sd days
	Submarine eruption	11/13/1965	9589	26.27	
	Submarine eruption	10/02/1975	3610	9.89	
(37558 days since 1/1/1887)	Present date	11/01/1999	8796	24.10	

ATTACHMENT G

ASSUMPTIONS FOR EFFECTS OF VOLCANIC ERUPTIONS:

1. Erupt while breeding = kills all chicks and half of adults. The other half are out at sea.
2. Erupt before breeding = no chicks survive that season. All adults survive.
3. Erupt after breeding = no effect. Although the next year may have lower survivial - not modeled.

Short-tailed Albatross / Basic Population Data / Torishima (2000/ 5/ 6 16:43)

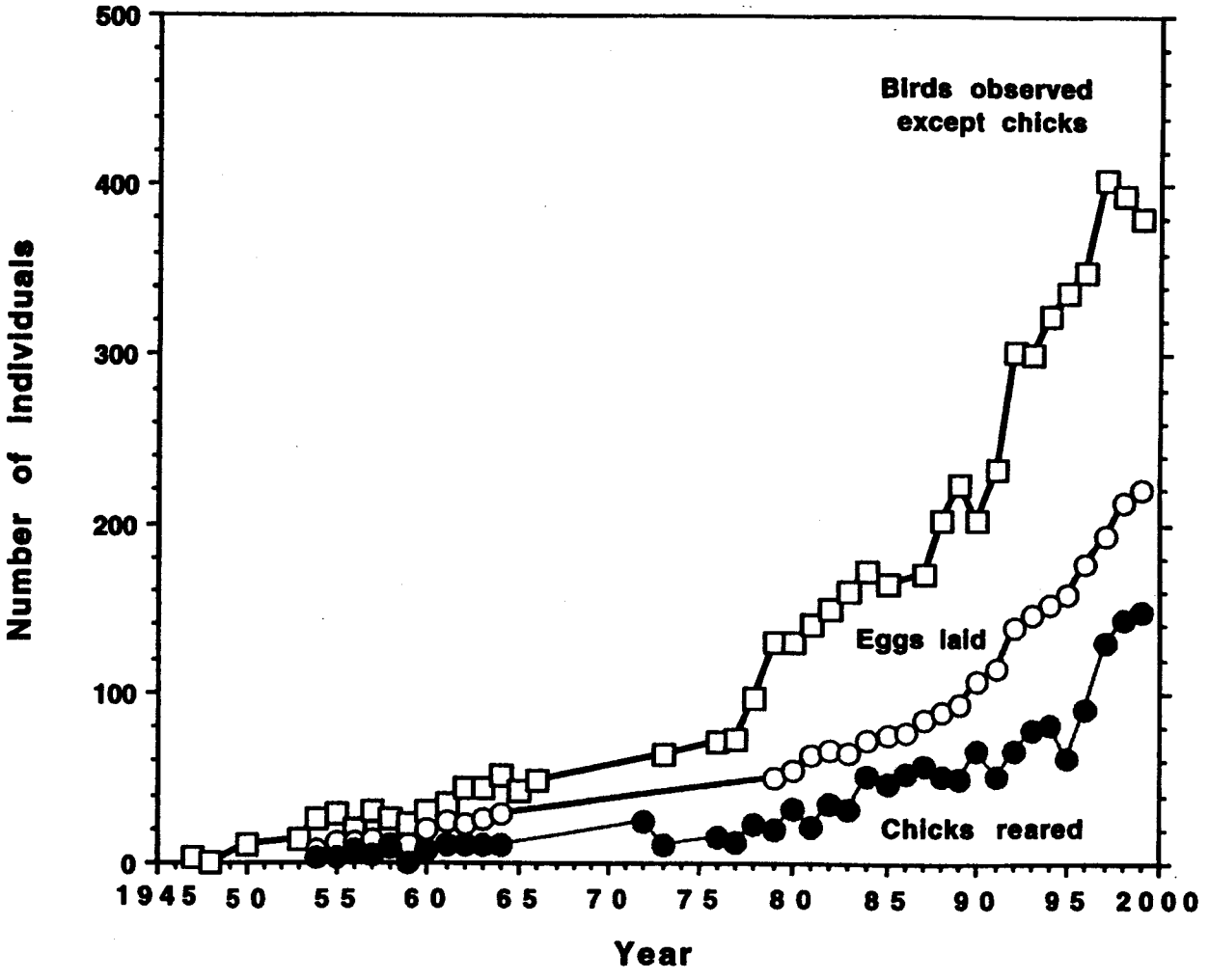
	Year	Birds observed	Nov.Count	Eggs laid	Young fledged	Success(%)	Observer
1	1945						
2	46						
3	47	3					Yomiuri News
4	48	0					O.L.Austin,Jr
5	49						
6	50	(10)					S.Yamamoto
7	51						
8	52						
9	53	13					
10	54	25		7	3	42.9	Met. Station
11	55	28		12	3	25.0	Met. Station
12	56	20		12	8	66.7	Met. Station
13	57	30		13	5	38.5	Met. Station
14	58	25		10	9	90.0	Met. Station
15	59	22		10	0	0.0	Met. Station
16	60	30		19	7	36.8	Met. Station
17	61	35		24	10	41.7	Met. Station
18	62	44		23	10	43.5	Met. Station
19	63	44		26	11	42.3	Met. Station
20	64	52		28	11	39.3	Met. Station
21	65	42					Met. Station
22	66	49					Met. Station
23	67						
24	67						
25	69						
26	70						
27	71						
28	72				24		W.L.N.Tickell
29	73	63	62		11		NHK TV team
30	74						
31	75						
32	76	71	69	(42)	15	(35.7)	H.Hasegawa
33	77	73	66	(44)	(12)	(27.3)	H.Hasegawa
34	78	96	80	(47)	22	(46.8)	H.Hasegawa
35	79	130	105	50	20	40.0	H.Hasegawa
36	80	130	96	54	32	59.3	H.Hasegawa
37	81	140	115	63	21	33.3	H.Hasegawa
38	82	150	120	67	34	50.7	H.Hasegawa
39	83	160	118	65	32	49.2	H.Hasegawa
40	84	172	114	73	51	69.9	H.Hasegawa
41	85	165	138	76	47	61.4	H.Hasegawa
42	86	—	146	77	53	68.8	H.Hasegawa
43	87	171	171	84	57	67.9	H.Hasegawa
44	88	203	163	89	51	57.3	H.Hasegawa
45	89	223	194	94	50	53.2	H.Hasegawa
46	90	202	202	108	66	61.1	H.Hasegawa
47	91	232	232	115	51	44.3	H.Hasegawa
48	92	302	258	139	66	47.5	H.Hasegawa
49	93	301	260	146	79	54.1	H.Hasegawa
50	94	324	281	153	82	53.6	H.Hasegawa
51	95	337	303	158	62	39.2	H.Hasegawa
52	96	349	309	176	90	51.1	H.Hasegawa
53	97	403	327	194	130	67.0	H.Hasegawa
54	98	394	363	213	143	67.1	H.Hasegawa
55	99	380	343	220	148	67.3	H.Hasegawa
56	2000						

by Hiroshi HASEGAWA

Source - Hiroshi Hasegawa, 2000

Source - Hiroshi Hasegawa, 2000

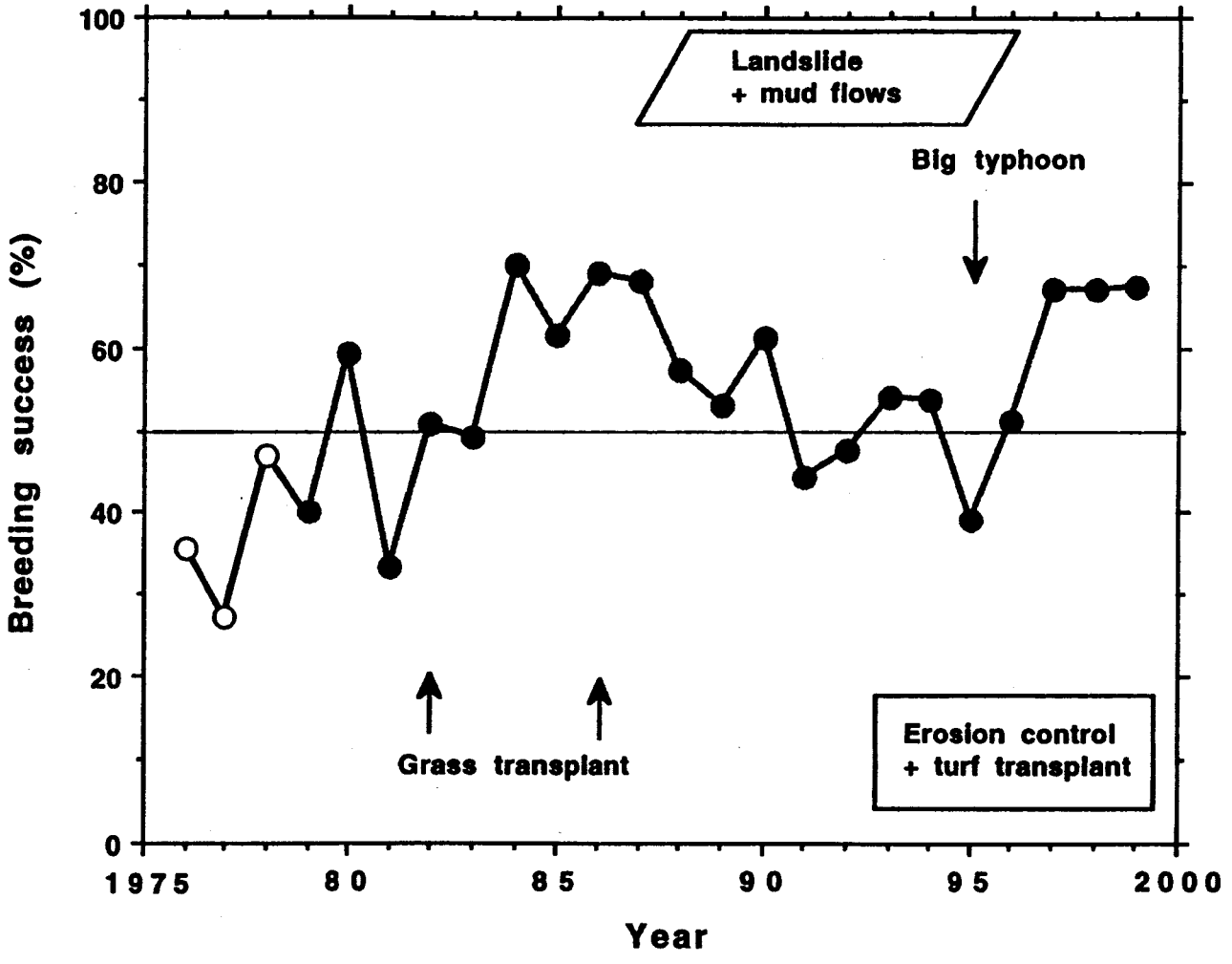
ATTACHMENT H



The growth of Short-tailed Albatross population on Torishima, Japan, since the re-discovery (compiled by Hiroshi Hasegawa).

Source - Hiroshi Hasegawa, 2000

ATTACHMENT H



Improvements in the breeding success of Short-tailed Albatrosses on Torishima by the managements of nesting habitat

BIRD-BANDING OF THE SHORT-TAILED ALBATROSSES, *Phoebastria albatrus*, ON TORISHIMA, JAPAN. All the birds were banded as the chick by Hiroshi Hasegawa*

Date	Layout		Metal bands	Plastic bands
d. m. y	Left leg	Right leg	serial number	color and number
20.3.1977	-	metal	130-00251 to 00265	-
3.1978	-	-	-	(landing unsuccessful)
20.3.1979	plastic	metal	130-00501 to 00524	White 000 to 029
19.3.1980	plastic	metal	130-00801 to 00820	Red 000 to 027
20.3.1981	plastic	metal	130-01201 to 01234	Blue 000 to 042
24.3.1982	plastic	metal	130-01310 to 01330	Yellow 000 to 028
20.3.1983	plastic	metal	130-01531 to 01564	Orange 000 to 041
14.4.1984	plastic	metal	130-01565 to 01596	Green 000 to 039
17.3.1985	plastic	metal	130-01597 to 01647	Black 000 to 057
14.4.1986	metal	plastic	130-01648 to 01695	White 030 to 087
14.4.1987	metal	plastic	130-01696 to 01748	Red 028 to 087
11.4.1988	metal	plastic	130-01901 to 01958	Blue 043 to 122
19.4.1989	metal	plastic	130-01959 to 02000 130-04001 to 04009	Yellow 029 to 085
18.4.1990	metal	plastic	130-04151 to 04201	Orange 042 to 111
15.4.1991	metal	plastic	13A 0501 to 0566	Green 040 to 128
21.4.1992	metal	plastic	13A 0567 to 0617	Black 058 to 130
8.4.1993	plastic	metal	13A 0701 to 0772	Black 131 to 185, Yellow 087 to 123
16.4.1994	plastic	metal	13A 0801 to 0879	Orange 112 to 148, Red 092 to 115, Green 129 to 151,
21.4.1995	plastic	metal	13A 0880 to 0961	*Red 000 to 056,* *Blue 000 to 040*
19.4.1996	plastic	metal	13A 0962 to 1023	Yellow 000 to 083
24.4.1997	plastic	metal	13A 1024 to 1113	Orange 000 to 110, *Blue041 to 046*
23.4.1998	metal	-	13A 1114 to 1243	
25.4.1999	-	metal	13A 1244 to 1384	
24.4.2000	-	metal	13A 1385 to 1500 13A 6951 to 6981	

Notes:

1) Plastic bands have inscribed numerical figures on two sides of the band,
White and Yellow colored bands have black figures,
Red, Blue, Orange, Green, Black bands have white figures,
Red and *Blue* (indicated by italic) bands have yellow figures.
2) Metal bands have a serial number of the Japanese Bird Banding Scheme sponsored by the Environment Agency of Japan (= Kankyocho in Japanese),
for example: Kankyocho Tokyo Japan 130-00251
or Kankyocho Tokyo Japan 13A 1243

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Weights (in grams) used in the Hawaii Longline fishery by set type based on NMFS observer and logbook data sets. Note that weight used in swordfish and mixed set types may be up to six or more meters from the baited hooks whereas in tuna sets it is one meter from each hook. (Source: NMFS, SWFSC Honolulu Laboratory, unpub. data)

Weight Used	Number of Sets		
	Swordfish	Mixed	Tuna
0	25	2	70
14	0	0	12
21	0	0	39
28	0	0	95
30	0	0	53
35	0	0	11
38	0	39	108
40	0	0	10
45	0	10	138
48	0	12	0
56	0	0	18
57	0	0	22
60	319	461	493
70	12	0	0
75	0	40	15
80	112	296	96
170	20	0	0
NA	0	86	70

Incidental catch of albatrosses in the Hawaii longline fishery by set type - (NMFS Observer Records 1994 - 1998) (Source: Letter from Charles Karnella, PIAO - NMFS, 7/17/00)

Targeted Fish During Set Type	Observed Bird Catch	Number of Observed Sets	Bird Catch/Set
Swordfish	370	488	0.758
Mixed	472	946	0.499
Tuna	16	1,250	0.013

Number of Sets by Type Above 23 Degrees North Latitude (NMFS Observer Records) (Source: Communication from Kathy Cousins, PIAO, NMFS - 7/20/00)

Number of Sets by Year						
Set Type	1994	1995	1996	1997	1998	Total
Swordfish	237	76	59	54	62	488
Mixed	34	166	234	212	146	792
Tuna	27	51	15	21	71	186

Number of Sets by Type Below 23 Degrees North Latitude (NMFS Observer Records) (Source: Communication from Kathy Cousins, PIAO, NMFS - 7/20/00)

Number of Sets by Year						
Set Type	1994	1995	1996	1997	1998	Total
Swordfish	0	0	0	0	0	0
Mixed	63	25	32	3	33	168
Tuna	140	231	278	174	244	1067

All observed seabird interactions with Hawaiian longline gear north of 23 degrees North latitude (1994 - 1998 Observer Records) (Source: Communication from Kathy Cousins, PIAO - NMFS, 7/24/00)

Observed Trips

Albatross Species	Swordfish	Tuna	Mixed
Blackfooted Albatross	185	1	236
Laysan Albatross	115	1	210

All observed seabird interactions with Hawaiian longline gear south of 23 degrees North latitude (1994 - 1998 Observer Records) (Source: Communication from Kathy Cousins, PIAO - NMFS, 7/24/00)

Observed Trips

Albatross Species	Swordfish	Tuna	Mixed
Blackfooted Albatross	0	7	0
Laysan Albatross	0	7	0

Crude Estimated Takes of Albatross by Species for Tuna Sets Above 23 degrees North latitude (1994 - 1998 Observer Records) (Source: Communication from Kathy Cousins, PIAO - NMFS, 7/25/00)

Year	Black-footed Albatross	Laysan Albatross
1994	4	5
1995	4	4
1996	3	3
1997	3	3
1998	4	4

Summary of estimated effectiveness of various mitigation measures in reducing the incidental catch of black-footed albatross (BF) and Laysan albatrosses (LA) in the Hawaii longline fishery.

Mitigation Measure	Species	Percent Reduction in Incidental Catch
Discharge Offal Strategically[1]	BF	83
	LA	91
Night Setting[1]	BF	95
	LA	40
Blue-dyed bait[1,2]	BF	95
	LA	90
Towed deterrent[1]	BF	86
	LA	71
Weighted branch lines[2]	BF	93
	LA	91
Line-setting machine with weighted branch lines[3]	BF	98
	LA	97

Source: McNamara *et al.* (1999)[1]; Boggs in press[2]; NMFS, SWFSC Honolulu Laboratory[3]. This table appears on page 26 of "Measures to Reduce the Incidental Catch of Seabirds in the Hawaii Longline Fishery - A Framework Adjustment to the Western Pacific Pelagic Fisheries Management Plan (Revised March 2000)."