U.S. Fish and Wildlife Service

Short-Tailed Albatross
Recovery Plan

September 2008

Disclaimer:

Recovery plans describe actions which the best scientific information indicates are required to recover and protect listed species. The Endangered Species Act of 1973, as amended, requires Recovery Plans to be prepared for all listed species whose conservation status would benefit by having such a plan. Recovery plans must incorporate: (1) a description of site-specific actions necessary to achieve conservation and survival of the species; (2) objective, measurable criteria, which, when met, would allow removal of the species from the list; and (3) estimates of the time and costs required to implement measures in the plan. Plans are published by the U.S. Fish and Wildlife Service and the NMFS, sometimes prepared with the assistance of recovery teams, contractors, state agencies, and others. The recovery plan is an advisory document. It provides a guide, but it does not obligate any party to carry out the actions it describes.

The parties involved will consider their available funds and other priorities when deciding whether to fund the tasks and achieve the objectives presented in this recovery plan. Nothing in this plan should be construed as a commitment or requirement that any agency obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation.

Recovery plans do not necessarily represent the views or the official positions or approval of any individuals or agencies involved in the plan formulation, other than the U.S. Fish and Wildlife Service. They represent the official position of the Fish and Wildlife Service only after they have been signed by the Regional Director. Approved recovery plans are subject to modification as dictated by new information, changes in species status, and the completion of recovery actions. Please check for updates or revisions at the website below before using.

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Cover photos of Short-Tailed Albatross,
Hiroshi Hasegawa, Biology Department, Toho University, Chiba, Japan

Short-Tailed Albatross
(*Phoebastria albatrus*)
Recovery Plan

Prepared by the Short-Tailed Albatross Recovery Team for:

Region 7
U.S. Fish and Wildlife Service
Anchorage, Alaska

Approved: Thomas O. Melius
Regional Director, Alaska Region,
U.S. Fish and Wildlife Service

Date: Sept. 17, 2008

A Short Primer on Recovery Teams

- A recovery team is a formal advisory group that provides advice on recovery needs and opportunities for species listed as endangered or threatened.
- Recovery teams are not required; they are convened at the discretion of a U.S. Fish and Wildlife Service Regional Director.
- The Service has administrative responsibility for preparing and approving recovery plans.
- The recovery team focuses on recovery plan development and may also be involved with recovery plan implementation.

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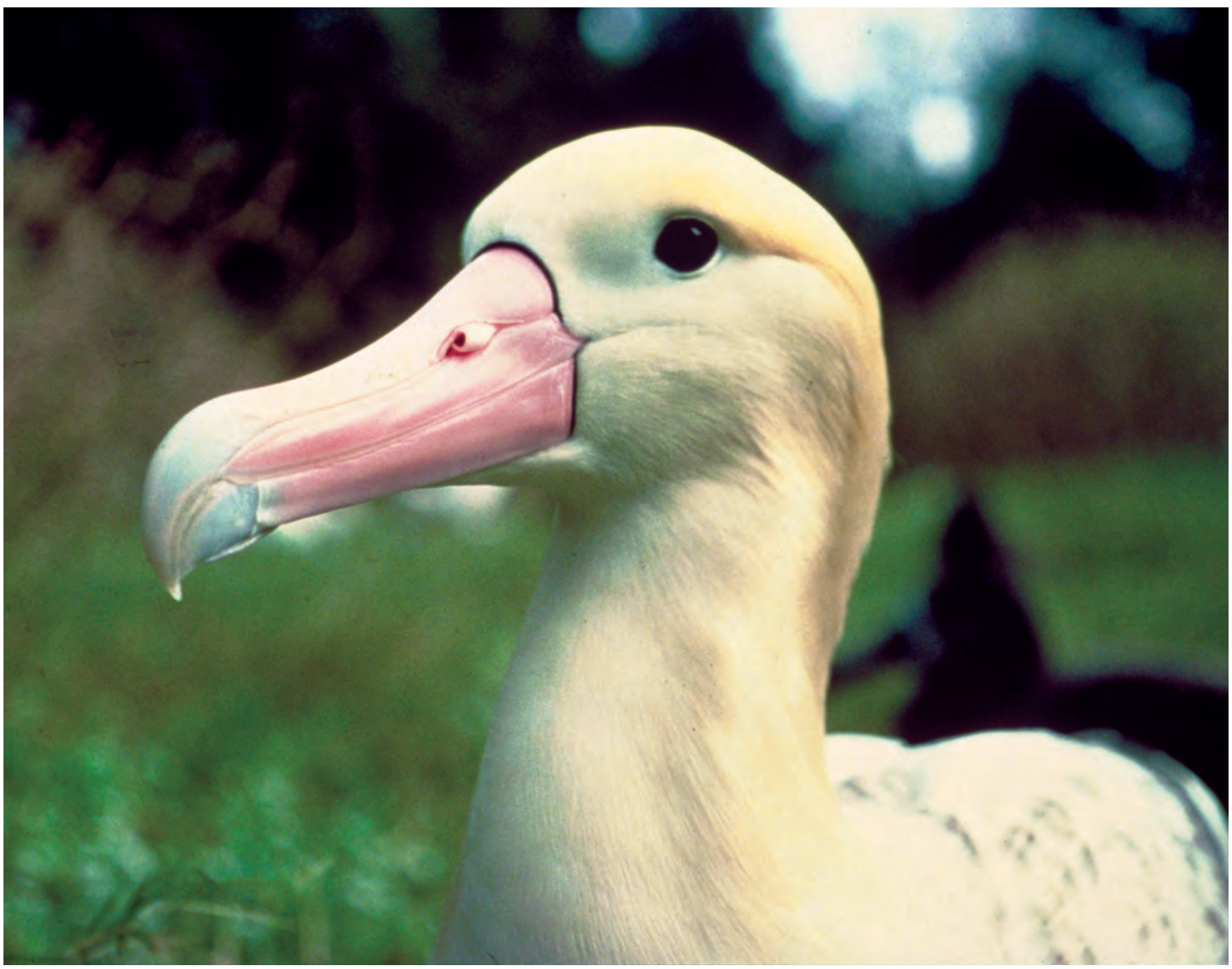
Executive Summary

Species Status

The short-tailed albatross *(Phoebastria albatrus)* was federally listed as endangered throughout its range, including the United States, on July 31, 2000 (65 FR 147:46643-46654). Prior to that, it had been listed as endangered throughout its range except within the United States and its territorial waters. At the time of listing, designation of critical habitat was determined to be not prudent. See 65 FR 147:46651-46653 for a detailed description of the critical habitat determination.

Prior to its exploitation, the short-tailed albatross was possibly the most abundant of the three North Pacific albatross species. Millions of these birds were harvested by feather hunters prior to and following the turn of the 20th century, resulting in the near-extinction of the species by the mid-20th century. In June, 2008, about 2400 short-tailed albatross were known to exist, with about 450-500 breeding pairs. The species is known to breed on only two remote islands in the western Pacific. Torishima, where 80 to 85 percent of short-tailed albatross breed, is an active volcano. The Tsubamezaki colony on Torishima where most of these birds breed, is susceptible to mud slides and erosion. An additional colony on Torishima, Hatsunezaki is located on a less hazardous site. As of the 2007-2008 breeding , 36 pairs nested at Hasunezaki, and an estimated 23 chicks fledged. The remainder of known short-tailed albatross breed at a site in the Senkaku Islands, to the southwest of Torishima, where volcanism is not a threat. However political uncertainty and the potential for oil development create potential threats. The Japanese Government designated the short-tailed albatross as a Natural Monument in 1958, a special Natural Monument in 1962, and a Special Bird for Protection in 1972. Torishima has also been designated a National Wildlife Protection Area (1954) and a Natural Monument (1958).



Adult short-tailed albatross displaying golden crest, white body plumage, and disproportionately large pink bill with black base and blue tip.

Habitat Requirements and Limiting Factors

Short-tailed albatross apparently require remote islands for breeding habitat. These birds nest in open, treeless areas with low or no vegetation. Short-tailed albatross spend much of their time feeding in continental shelf-break areas (200-1000 m depth, where the continental shelf ends and depths begin to increase markedly) east of Honshu, Japan during breeding, and in shelf (0-200 m depth) and shelf break areas of the Bering Sea, Aleutian chain and in other Alaskan, Japanese and Russian waters. The major threat of over-exploitation that led to the species' original endangered status no longer occurs. The most notable existing threat to the species' recovery is the possibility of an eruption of Torishima, their main breeding site. A minor eruption occurred there in August of 2002, after the end of the breeding season. Other existing threats include incidental catch in commercial fisheries, ingestion of plastics, contamination by oil and other pollutants, the potential for depredation or habitat degradation by non-native species, and adverse effects related to global climate change. These secondary threats will be considered discountable to the recovery of the species as long as the population continues growing at a high and steady rate, as indicated in the criteria below.

Recovery Criteria

The short-tailed albatross may be **reclassified from endangered to threatened** under the following conditions:

- The total breeding population of short-tailed albatross reaches a minimum of 750 pairs; AND
- At least three breeding colonies each exhibiting a 3-year running average growth rate of ≥6% for ≥7 years, at least two of which occupy island groups other than Torishima with a minimum of ≥50 breeding pairs each.

The species may be **delisted** under the following conditions:

- The total breeding population of short-tailed albatross reaches a minimum of 1000 pairs (population totaling 4000 or more birds); AND
- The 3-year running average growth rate of the population as a whole is ≥6% for ≥7 years; AND
- At least 250 breeding pairs exist on 2 island groups other than Torishima, each exhibiting ≥6 growth for ≥7 years; AND
- A minimum of 75 pairs occur on a site or sites other than Torishima and the Senkaku Islands.

The species may be **reclassified from threatened to endangered** under the following conditions:

- Fewer than 750 breeding pairs exist, and the population has had a negative growth rate for at least 3 years; OR
- Breeding colonies occur on fewer than three island groups.

Date of Recovery

Assuming that we translocate 15 chicks each year for the next 4 years, and assuming new colony establishment is successful, we estimate that the short-tailed albatross may be delisted in the year 2033. Assuming that the rate of growth observed over the past 30 years continues, our models assume that the total world population at that time will be comprised of 5,485 pairs.

Important Recovery Actions

Although this plan lays out a detailed recovery budget for only the first 5 years of recovery implementation, the Service remains committed to implementing recovery actions for this species until it no longer requires the protections afforded it by the Endangered Species Act. All recovery actions taking place outside of the U.S. will take place in close coordination with appropriate governmental entities. Initially, the highest priority short-tailed albatross recovery actions include:

1. Continue to monitor population and manage habitat on Torishima;
2. Monitor the size and productivity of the Senkaku Island population;
3. Continue telemetry studies to determine at-sea habitat use, spatial and temporal distribution relative to environmental conditions, and potential for interactions with particular fisheries;
4. Establish one or more breeding colonies on non-volcanic islands as insurance against catastrophic events on Torishima;
5. Continue research on fisheries operations and mitigation measures that will help managers reduce take of short-tailed albatross throughout their range;
6. Conduct other research that will facilitate recovery;
7. Conduct other management-related activities that will facilitate recovery;
8. Conduct outreach and international negotiations that will raise awareness of this species situation among stakeholders and management agencies in albatross range states.
9. Compile protocols for all aspects of recovery work.

Detailed recovery task explanations appear in the recovery plan narrative outline. Cost estimates appear in Table 1.

Estimated Cost
(U.S. Dollars x 1000): Cost estimates reflect costs for specific actions needed to promote short-tailed albatross conservation. Estimates do not include costs that agencies or other entities normally incur as part of their mission or normal operating expenses. Table 1 indicates cost estimates for recovery actions listed in the Implementation Schedule of this document.

Table 1. Total Estimated Cost of Recovery ($000's):

Year	Action 1	Action 2	Action 3	Action 4	Action 5	Action 6	Action 7	Action 8	Action 9	TOTAL
2009	79	50	166	470	170	105	3	10		1053
2010	57		194	380	165	105	68	7	32	1008
2011	45		189	380	70	200	18	17		919
2012	45	50	135	380	70	145	53	14		892
2013	15		160	380	50	110	3	17		735
2014	9			30						39
2015	9	50		30						89
2016	9			30						39
2017	9			30						39
2018	9	50		30						89
2019	9			30						39
2020	9			30						39
2021	9	50		30						89
2022	9			30						39
2023	9			30						39
2024	9	50		30						89
2025	9			30						39
2026	9			30						39
2027	9	50		30						89
2028	9			30						39
2029	9			30						39
2030	9			30						39
TOTAL	394	350	844	2500	525	665	145	65	32	5520

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SHORT-TAILED ALBATROSS RECOVERY PLAN

Background

STATUS

The short-tailed albatross *(Phoebastria albatrus)* was originally listed in 1970, under the Endangered Species Conservation Act of 1969, prior to the passage of today's Endangered Species Act (35 FR 8495). However, as a result of an administrative error (and not from any biological evaluation of status), the species was listed as endangered throughout its range *except* within the United States (50 CFR 17.11). On July 31, 2000, this error was corrected when the Service published a final rule listing the short-tailed albatross as endangered throughout its range (65 FR 147:46643-46654). Critical habitat has not been designated for this species. In the 2000 final rule, the Service determined that designation of Critical Habitat was not prudent due to the lack of habitat-related threats to the species, the lack of specific areas in U.S. jurisdiction that could be identified as meeting the definition of Critical Habitat, and the lack of recognition or educational benefits accruing to the American people as a result of such designation.

DESCRIPTION

The short-tailed albatross is a large pelagic bird with long narrow wings adapted for soaring just above the water surface. The bill, which is disproportionately large compared to the bills of other northern hemisphere albatross, is pink with a bluish hooked tip and a conspicuous thin black line around the base. Like all birds in the Order Procellariiformes (tube-nosed marine birds), the short-tailed albatross' beak has conspicuous external nostrils.

Of the three species of North Pacific albatross, the short-tailed albatross is the largest, with a body length of 33-37 inches (in) (84-94 centimeters (cm)), as compared with body lengths of 31-32 in (79-81 cm) for Laysan *(Phoebastria immutabilis)* and 27-29 in (68-74 cm) for black-footed *(Phoebastria nigripes)* albatross. The wingspan of the short-tailed albatross is also the largest of the three species, at 84-90 in (213-229 cm) (Harrison 1985). Short-tailed albatross adults have greater body mass than either Laysan or black-footed albatross 3.7-6.6 kg vs. 2.2-3.3 kg vs. 2.4-3.4 kg respectively (Suryan 2008, Fisher 1971, Frings and Frings 1961). Bones of short-tailed albatross at archeological sites are readily distinguished from those of black-footed and Laysan albatross based on size (Porcasi 1999).

Short-tailed albatross are also the only North Pacific albatross that develops an entirely white back at full maturity. The white heads of both sexes develop a yellow-gold crown and nape over several years. Fledged juveniles are dark brown-black, but soon develop the pale bills and legs that distinguish them from black-footed and Laysan albatross (Tuck 1978, Roberson 1980). Observations of short-tailed albatross chicks indicate that their bills begin to turn pink just prior to fledging (Tomohiro Deguchi, Yamashina Institute, pers. comm. 2008). Sightings of numerous juveniles among the Aleutian Islands during June confirm that all fledglings have developed pink bills by the time they reach Alaskan waters (Greg Balogh, USFWS pers. comm. 2007).

TAXONOMY

The type specimen for the species was collected by George Steller during his travels with Commander Vitus Jonassen Bering in Kamchatka, Russia and the Bering Sea in the 1740's. P.S. Pallas described the species as *Diomedea albatrus* in Spicilegia Zoologica in 1769 (American Ornithologists' Union 1998). The short-tailed albatross is classified within the family Diomedeidae, in the order Procellariiformes. Following the results of genetic studies by Nunn et al. (1996), the family Diomedeidae was arranged into four genera. The genus *Phoebastria*, North Pacific albatross, now includes the short-tailed albatross, the Laysan albatross, the black-footed albatross, and the waved albatross (*P. irrorata*) (AOU 1998). Recent analyses, based on complete nucleotide sequencing of mitochondrial cytochrome b gene, confirm this arrangement (Penhallurick and Wink 2004).

HISTORICAL DISTRIBUTION (PRE-EXPLOITATION)

The short-tailed albatross once ranged throughout most of the North Pacific Ocean and Bering Sea. A recent discovery of a fossil breeding site on Bermuda confirms that this species also formerly nested in the North Atlantic during the middle Pleistocene (420-362 thousand years ago) (Olson and Hearty, 2003). These authors speculate that short-tailed albatross were extirpated from the

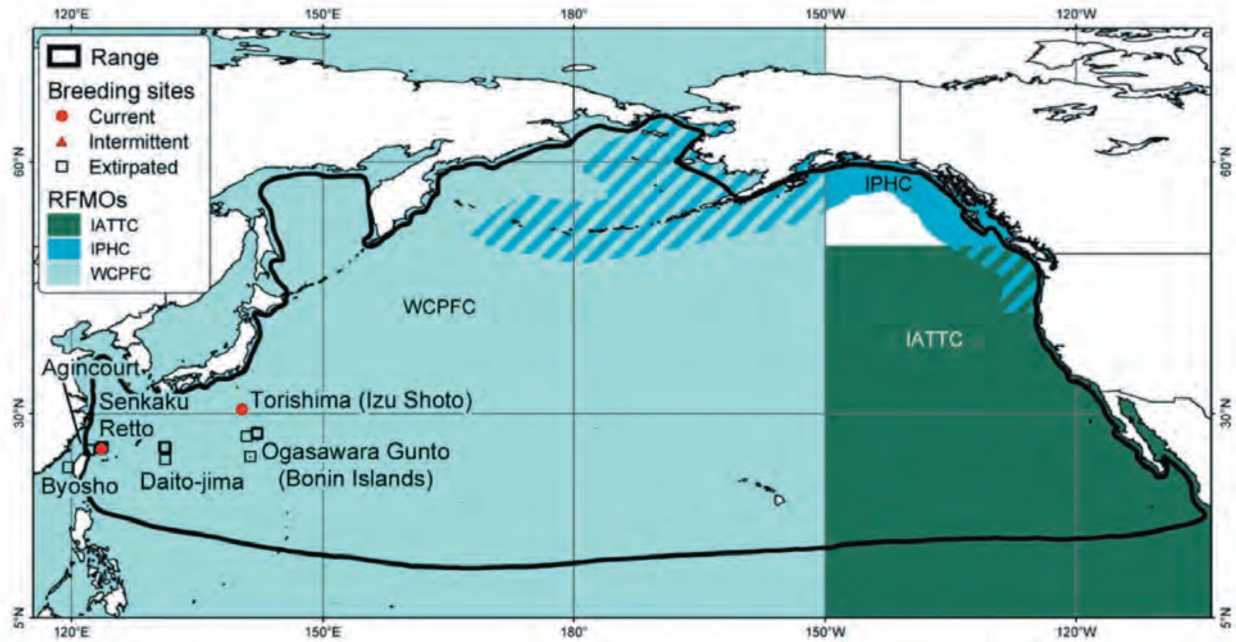


Figure 1. Former and current breeding range and at-sea range of short-tailed albatross. This species range overlaps with at least three Regional Fishery Management Organizations (shown), and the Exclusive Economic zones of up to eight nations. The majority of the time this species spends at sea is within the Western and Central Pacific Fisheries Commission area. Map by Wieslawa Misiak.

North Atlantic during an interglacial period in which sea level rose more than 20 meters higher than present, with violent storm surges.

In the North Pacific, short-tailed albatross are known to have nested on the following islands:
Japan: Torishima in the Seven Islands of Izu; Mukojima, Nishinoshima, Yomeshima, and Kitanoshima in the Bonin Islands; Kita-daitojima, Minami-daitojima, and Okino-daitojima of the Daito group; Senkaku Retto of southern Ryukyu Islands, including Minami Kojima, Kobisho, and Uotsurijima; and Iwo Jima in the western Volcanic Islands (Senkaku-Retto);
Taiwan: Agincourt Island (= P'eng-chia-Hsu); and Pescadore Islands, including Byosho Island (Table 2, Figure 1) (Hasegawa 1979, King 1981). Other undocumented nesting colonies may have existed.

Recent observations of infertile short-tailed albatross eggs, together with reports from the 1930s, suggest that the short-tailed albatross may have once nested on Midway Atoll at the northwestern end of the Hawaiian Archipelago. Short-tailed albatross have been observed on Midway Atoll since the 1930s (Berger 1972, Hadden 1941, Fisher *in* Tickell 1973, Tickell 1996, Robbins in Hasegawa and DeGange 1982). Although nesting attempts have been observed, there have never been more than two short-tailed albatross individuals reported on the Atoll during the same year, and no successful nesting has been confirmed there. Eggs have been produced, but were likely infertile; none have hatched (B. Flint, U.S. Fish and Wildlife Service, Honolulu, pers. comm. 2002). No historical breeding accounts have been confirmed for Midway Atoll.

Midway Atoll, the only area within U.S. jurisdiction where short-tailed albatross have attempted to breed, is a National Wildlife Refuge, managed by the Service for the conservation of seabirds and other fish and wildlife and their habitats. Approximately 2 million black-footed and Laysan albatross nest throughout the islands. Observations of individual 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 this species breeds in these locations (Sekora 1977, Fefer 1989).

Early naturalists believed that short-tailed albatross bred in the Aleutian Islands, because high numbers of birds were seen nearshore during the summer and fall months (Yesner 1976). Alaskan Aleut lore referred to local breeding birds, and the explorer Otto Von Kotzebue reported that Natives harvested short-tailed albatross eggs. However, while adult bones were found in Aleut middens, fledgling remains were not recorded in over 400 samples (Yesner 1976). These findings led Yesner (1976) to believe that short-tailed albatross did not breed in the Aleutians but were harvested offshore outside of the breeding season. Given the midwinter constraints on winter breeding at high latitudes and the southerly location of their known breeding areas, it is highly unlikely that short-tailed albatross ever bred in Alaska (Sherburne 1993).

Historical information on the species' range away from known breeding areas is scant. Evidence from archeological studies in middens suggests that indigenous hunters in kayaks had access to an abundant nearshore supply of short-tailed albatross from California north to St. Lawrence Island 4,000 years ago (Howard and Dodson 1933, Yesner and Aigner 1976, Murie 1959). In the 1880s and 1890s, short-tailed albatross abundance and distribution during the non-breeding season was generalized by statements such as "more or less numerous" in the vicinity of the Aleutian Islands (Yesner 1976). The species was reported as highly abundant around Cape Newenham, in western Alaska (DeGange 1981). Veniaminof (in Gabrielson and Lincoln 1959) regarded them as abundant near the Pribilof Islands. In 1904, they were considered "tolerably common on both coasts of Vancouver Island, but more abundant on the west coast" (Kermode in Campbell et al. 1990).

At-sea sightings since the 1940s indicate that short-tailed albatross are distributed widely throughout their historic foraging range in the temperate and subarctic North Pacific Ocean (Sanger 1972; USFWS, unpublished data). Reported observations are concentrated along the edge of the continental shelf, in the northern Gulf of Alaska, Aleutian Islands, and Bering Sea (McDermond and Morgan 1993, Sherburne 1993, USFWS unpublished data). Sightings of individual short-tailed albatross have been recorded along the west coast of North America, as far south as the Baja Peninsula, Mexico (Palmer 1962).

HISTORICAL POPULATION STATUS

At the beginning of the 20th century, short-tailed albatross declined in population numbers to near extinction, primarily as a result of hunting at the breeding colonies in Japan. Albatross were killed for their feathers and various other body parts. The down feathers were used for quilts and pillows, and wing and tail feathers were used for writing quills; their bodies were processed into fertilizer, their fat was rendered (about one pint per bird), and their eggs were collected for food (Austin 1949). Pre-exploitation worldwide population estimates of short-tailed albatross are not known. Dr. Hiroshi Hasegawa estimated there were at least 300,000 breeding pairs on Torishima alone. The total number of birds harvested over the course of one generation provides the best estimate of the pre-exploitation population size. Between approximately 1885 and 1903, an estimated five million short-tailed albatross were harvested from the breeding colony on Torishima (this estimate is based upon the mass of feathers exported) (Yamashina *in* Austin 1949). Harvest continued until the early 1930s (except for a few years following a 1903 volcanic eruption). Even as late as the 1930s, substantial albatross harvest continued. A schoolteacher resident on Torishima reported 3,000 short-tailed albatross killed in December 1932 and January 1933. By 1949, there were no short-tailed albatross breeding at any of the historically known breeding sites, including Torishima, and the species was thought to be extinct (Austin 1949).

In 1950, however, the chief of the weather station at Torishima, Mr. M. Yamamoto, reported nesting of the short-tailed albatross (Tickell 1973, Tickell 1975). In January, 1951, about 10 short-tailed

Table 2. Breeding sites from which short-tailed albatross have been extirpated.

Islands with Extirpated Colonies	Alternate Name	Island Group	North Latitude	East Longitude
Nishinoshima	Rosario Island	Bonin	27.25°	140.90°
Mukojima Island		Bonin	27.69°	142.18°
Yomeshima		Bonin	27.50°	142.20°
Kitanoshima		Bonin	27.72°	142.10°
Kita-daitojima		Daito	25.95°	131.03°
Minami-daitojima		Daito	25.83°	131.23°
Okino-daitojima		Daito	24.47°	131.18°
Kobisho		Senkaku Retto of southern Ryukyu Islands	25.93°	123.68°
Uotsurijima		Senkaku Retto of southern Ryukyu Islands	25.74°	123.47°
Iwo Jima	Sulphur Island	Volcano Islands	24.78°	141.32°
Agincourt Island	P'eng-chia-Hsu	unknown	25.63°	122.08°
Byosho Island		Pescadore Islands	23.57°	119.60°

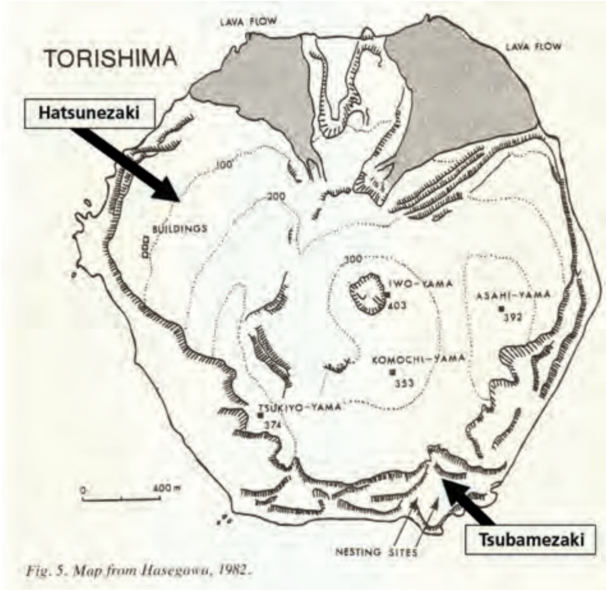


Figure 2. Torishima Island showing the locations of the two active breeding colonies. Tsubamezaki is home to 80-85% of the world population. As of 2008, Hatsunezaki was used by 36 pairs of breeding short-tailed albatross.

albatross were observed on Torishima (Hasegawa 2001). By 1954 there were 25 birds and at least 6 pairs (Ono 1955). These were presumably birds that had been wandering the North 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 increased. The average recruitment rate of the short-tailed albatross population on Torishima between 1950 and 1977 was 2.5 adults per year; between 1978 and 1991 the average recruitment rate was 11 adults per year. An annual population growth of 6 to 8 percent per year (Hasegawa 1982, Cochrane and Starfield 1999) has resulted in a continuing increase in the breeding population to an estimated 375 breeding pairs using Torishima in 2007 (H. Hasegawa, Toho University, Chiba, Japan, pers. comm. 2007).

In 1971, 12 adult short-tailed albatross were discovered on Minami-kojima in the Senkaku Islands, one of the former breeding colony sites (Hasegawa 1984). Aerial surveys in 1979 and 1980 revealed an estimated 16 to 35 adults. In April 1988, the first confirmed chicks on Minami-kojima were observed; in March 1991, 10 chicks were observed. In 1991, the estimate for the population on Minami-kojima was 75 birds and 15 breeding pairs (Hasegawa 1991). There is no information available on historical numbers at this breeding site.

CURRENT BREEDING DISTRIBUTION

As of 2008, 80-85% of the known breeding short-tailed albatross use a single colony, Tsubamezaki, on Torishima Island. Torishima is an active volcano, approximately 1182 ft (394 m) high and 1.5 mi (3 km) wide (USFWS 2000a) located at 30.48º N and 140.32º E (Simkin and Siebert 1994). Torishima is under Japanese Government ownership and is managed for the conservation of wildlife. Ongoing management efforts focus on maintaining high rates of breeding success. However, the location of this colony, on the fluvial outwash plain of the active volcano's caldera, is precarious. A minor eruption occurred here in 2002, and it is said by Japanese scientists that a major eruption is overdue. A new colony, Hatsunezaki, has recently formed on the northwest side of Torishima Island, on a safer, less actively eroding site (Figure 2) as a result of the efforts put forth by the Yamashina Institute for Ornithology in Japan. The colony is currently undergoing rapid growth in size (Table 3) and use by non-breeders exhibiting courting behavior at the site is increasing markedly. The establishment of the Hatsunezaki colony, through the use of decoys and recorded playback of breeding colony sounds, marks what is probably the most significant conservation measure achieved for this species to date.

The remaining known breeding birds nest in the Senkaku Island group almost entirely on Minami-kojima, (Figure 1). In 2002 a short-tailed albatross chick also fledged from Kita-kojima, an island near Minami-kojima. The Senkaku Island chain sits atop large natural gas reserves, and may be slated for future petroleum development (BBC 2003). Ownership of the Senkakus is under dispute among Japan, China, and Taiwan (Central Intelligence Agency 2002 World Factbook website at http://www.faqs.org/docs/factbook/fields/2070.html).

Table 3. Growth of the Hatsunezaki colony, Torishima, 1995/1996 through 2007/2008 breeding seasons.

Breeding Season	P. albatrus eggs	P. albatrus fledglings
1995-96	1	1
1996-97	2	0
1997-98	1	1
1998-99	1	1
1999-00	1	1
2000-01	1	1
2001-02	1	0
2002-03	1	1
2003-04	1	1
2004-05	4	4
2005-06	15	14
2006-07	24	16
2007-08	36	23

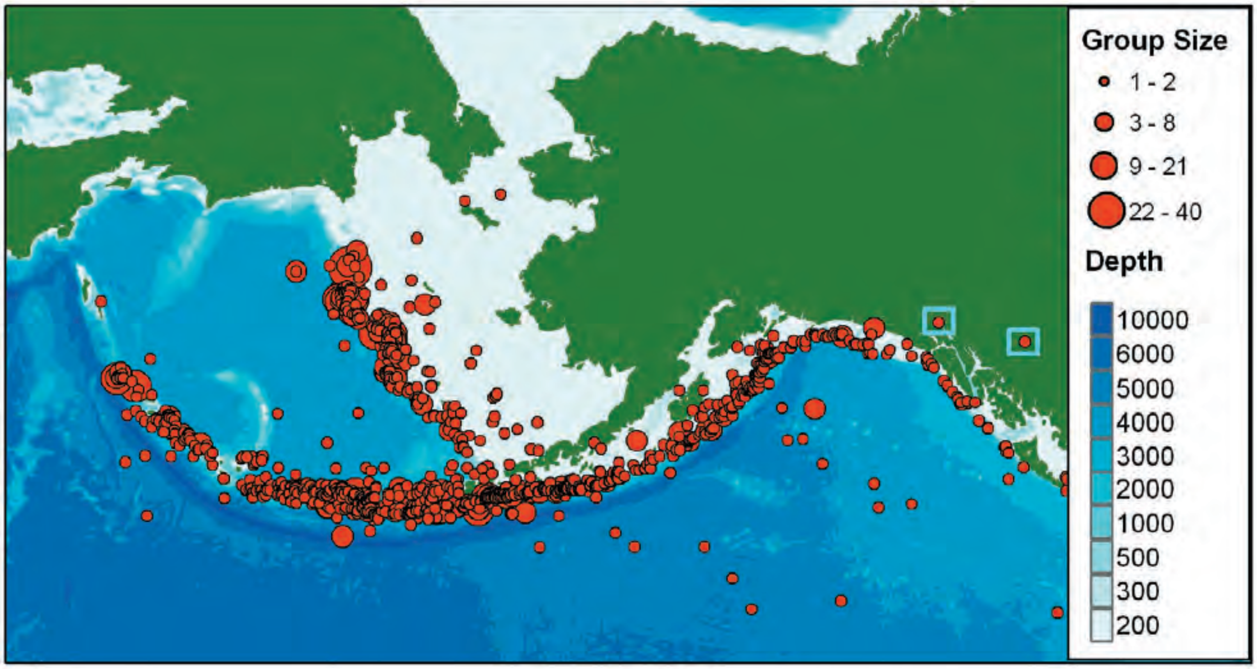


Figure 3. Opportunistic sightings (n=1432) of short-tailed albatross in the North Pacific 1940-2004). Opportunistically collected data suggests that this species is closely associated with the continental shelf edge of the Gulf of Alaska and Bering Sea, and along the Aleutian Islands. The largest congregations of short-tailed albatross were reported near the heads of canyons along the Bering Sea shelf. Sightings over land (in blue boxes) presumably represent errors in the coordinates that were reported (Piatt et al. 2006).

Since 1938, approximately 50 observations of about 17 different short-tailed albatross have been noted in the vicinity of the Northwestern Hawaiian Islands, typically between November and April. Short-tailed albatross have been observed from Midway Atoll (Sand and Eastern Islets), Laysan Island, French Frigate Shoals (Tern Islet), Pearl and Hermes Reef (Southeast Islet), and Kure Atoll (Green Islet). A single individual short-tailed albatross periodically nests on Midway Island, but is not known to have produced any viable eggs (Beth Flint, USFWS, pers. comm. 2003). No other confirmed records of short-tailed albatross breeding are known from the Hawaiian Islands.

In 2000, a pair of short-tailed albatross with an egg were observed on Yomejima, an island within the Mukojima Retto; a group of islands within the Ogasawara Gunto (Bonin Islands) (Asahi Shimbun and Yomiuri Shimbun newspapers, 28 December 2000). The egg did not hatch.

In February, 2008, ten 9-week-old short-tailed albatross chicks were translocated from Torishima Island to Mukojima Island, and were hand-reared to fledging. All ten chicks fledged. This translocation effort was undertaken in the hopes of establishing a second breeding colony on a non-volcanic island within their historic breeding range. The Service, Japan ministry of the Environment (JMOE), Yamashina Institute, and others are pursuing funding to continue this effort until at least 100 chicks have been translocated.

Some mariners have indicated to the Service that because they observe few banded short-tailed albatross at sea, one or more additional short-tailed albatross breeding colonies may exist. However, the bands are difficult to see when these birds are in flight or on the water. Furthermore, all short-tailed albatross carcasses found dead thus far (including all birds caught in fishing gear) have had leg bands. Eleven of 12 short-tailed albatross live captured at sea in Alaska were banded as chicks on Torishima. It therefore seems unlikely that notable numbers of short-tailed albatross are nesting in undiscovered colonies.

CURRENT MARINE DISTRIBUTION

The range of the short-tailed albatross covers most of the North Pacific Ocean, as well as a few observations from the Sea of Okhotsk and the East China Sea (Birdlife International 2007). The species occurs throughout international waters and within the Exclusive Economic Zones (EEZ) of Mexico, the United States (US), Canada, Russia, Japan, China, North and South Korea, the Federated States of Micronesia, and the Republic of the Marshall Islands. Although short-tailed albatross have been observed near the Diomede Islands (65° 45'N) (Tickell 2000), it is likely that they seldom occur north of St. Lawrence Island (approx. 63° N, Figure 3). The southern limit of

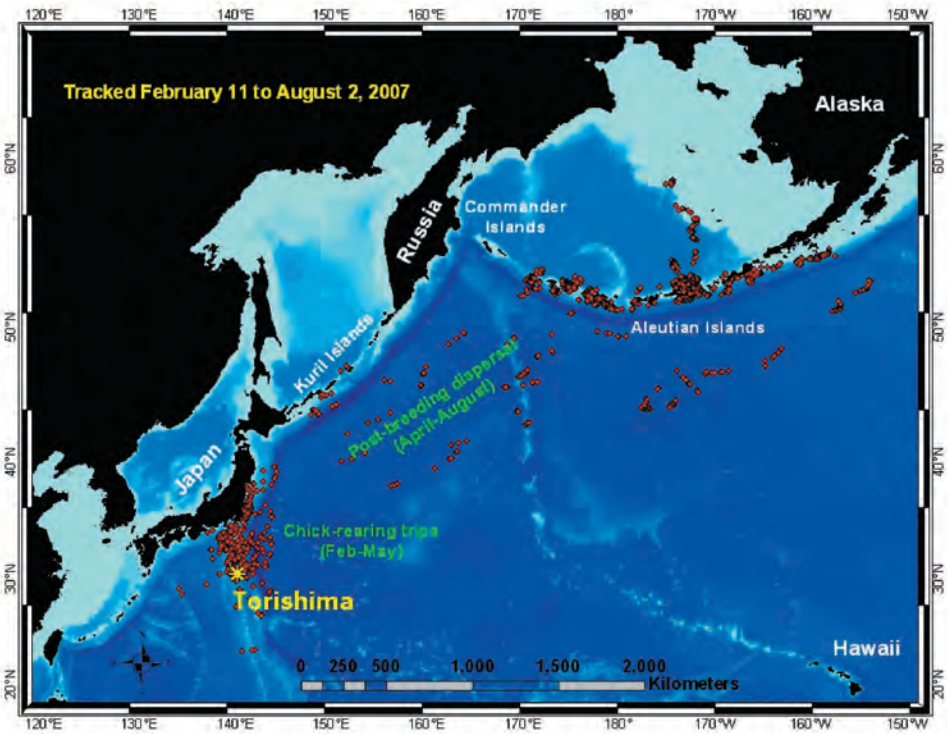


Figure 4. Locations of breeding birds from February to August, 2007, showing areas used for foraging trips just north of Torishima, post-breeding dispersal east of the Kuril islands, and summer foraging, primarily along the Aleutians

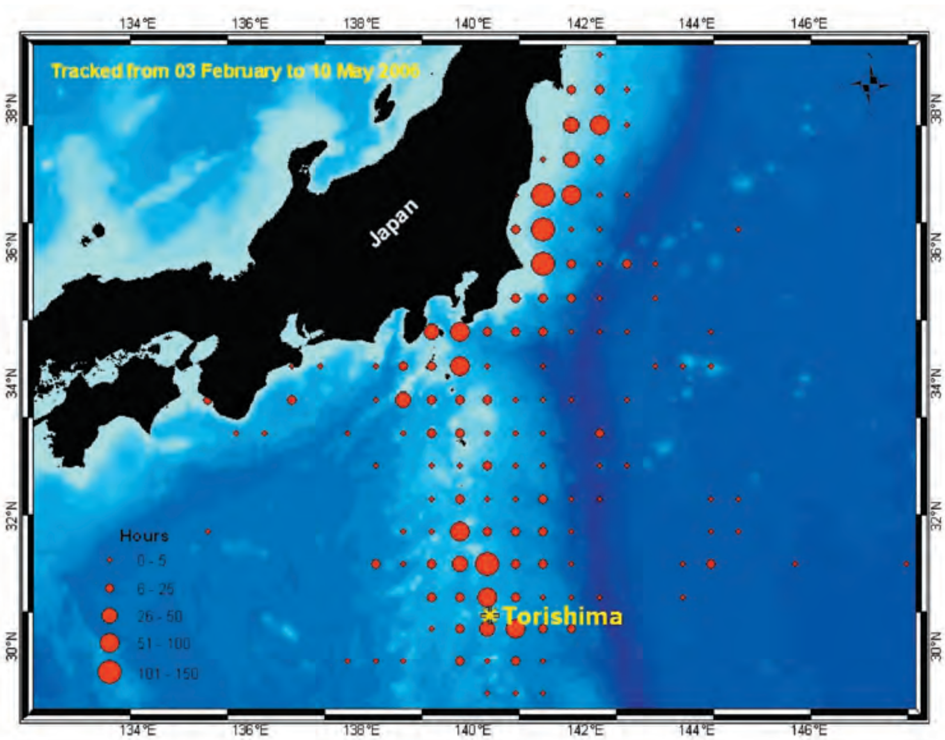


Figure 5. Use of marine habitat by short-tailed albatross breeding adults during the chick-rearing period. Data were generated from satellite telemetry data, and the hours spent by tagged short-tailed albatross in each 0.5 degree block were summed.

short-tailed albatross is unknown, but probably coincides with the northern edge of the North Equatorial Current.

Historic records suggested that the species was presumably abundant in coastal North America (Hasegawa and Degange 1982, McDermond and Morgan 1993). The bones of short-tailed albatross have been found in midden sites from many locations along the west coast of North America, including California (USA) (Howard and Dodoson 1933), British Columbia (Canada) (McAllister 1980) and Alaska (USA) (Friedman 1934, Murie 1959, Yesner 1976, Lefevre et al. 1997.). Based upon those midden records, as well as the relative scarcity of pelagic observations, short-tailed albatross have been characterized as either a coastal (Hasegawa and DeGange 1982) or a nearshore species (Howard and Dodoson 1933). Prior to the late 1990's, nearly all known sightings of short-tailed albatross at sea were from US-based fishermen and fishery observers (Piatt et al. 2006). The resulting distribution suggested that this was a coastal and shelf break associated species. However, because sightings came mostly from heavily fished areas near the coastal and shelf break zones, the resulting distribution was likely biased; indicating that short-tailed albatross occurred most frequently in areas that were commercially fished. It was not until the advent of satellite telemetry that an unbiased view of this species distribution began to be realized. Telemetry data indicate that short-tailed albatross generally do not commonly disperse widely throughout the subarctic North Pacific (Suryan et al. 2006).

Satellite tagging efforts have been conducted regularly on short-tailed albatross since 1996, with small numbers of birds tagged every year since 2000. Tagging from 1996-1998 was conducted by Japanese researchers in accordance with the "Japanese Short-tailed Albatross Breeding Project Program". Tagging from 2000-2008 was conducted by U.S. and Japanese researchers as a joint project, with support from the U.S. and Japanese governments, North Pacific Research Board, National Fish and Wildlife foundation, Yamashina Institute, University of Massachusetts, and Oregon State University.

As of 2008, scientists from Japan and the USA have collaborated in attaching satellite tags to 56 birds (over 2% of the world population); 23 of which were non-breeding adults, post-breeding adults, or subadults tagged on Torishima. Between 2006 and 2008, 21 short-tailed albatross breeding on Torishima were tagged to determine where they foraged to provision their chicks (Figures 4 and 5); as well as to study post-breeding dispersal (Suryan 2008). In addition, 12 short-tailed albatross were captured at sea in Alaska and fitted with satellite tags (Suryan 2008). A few of the birds that were tagged at sea were newly fledged, and exhibited markedly different movement patterns than older birds, with the immature birds covering more than twice the average daily distance flown by older birds (Suryan et al. 2007a). In 2008, joint U.S. and Japan efforts began tagging chicks just prior to fledging to study post fledging dispersal and survival of both translocated and naturally-reared chicks. All tags were attached to birds' back feathers and molt off within months of attachment (Figure 6) (Suryan 2008). Initial dispersal patterns of naturally-reared and translocated fledglings are remarkably similar (Suryan et al. 2008).

During the non-breeding season, short-tailed albatross range along the Pacific Rim from southern Japan to northern California, primarily along continental shelf margins.

The distribution of squids is one plausible explanation for the association of short-tailed albatross with shelf break and slope regions of the Northwest Pacific Ocean and the Bering Sea (Suryan et al. 2006). Further, the telemetry data showed that short-tailed albatross did not disperse widely throughout the subarctic North Pacific and were consistent with ship-based observations in central gyres (Suryan et al. 2006, McDermond and Morgan 1993, Anderson et al. 1997). Consequently, it has been suggested that short-tailed albatross may be relatively common nearshore, but only where upwelling ''hotspots'' occur in proximity to the coast; and that it would be more accurate to label the species as a "continental shelf-edge specialist" than a coastal or nearshore species (Piatt et al. 2006).

Other than the waved albatross *(P. irrorata)*, which forages almost exclusively over a relatively small triangle between the Galapagos Islands and the continental shelf off Ecuador and Peru (Tickell

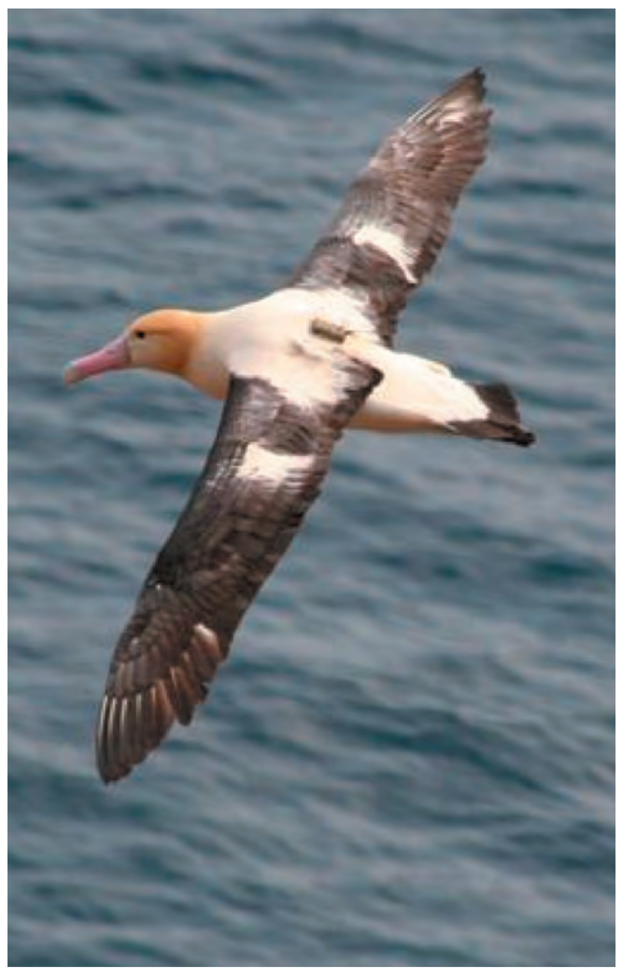


Figure 6. Photo of satellite transmitter affixed to the back of a short-tailed albatross. Satellite transmitter is the dark box located midway between the wings. Photo: N. Nakamura.

2000, Anderson et al. 1997), no other species of albatross has such a narrow and predictable range of foraging habitat as short-tailed albatross (at least in Alaskan waters) (Piatt et al. 2006). From December through April, the distribution of adult and immature short-tailed albatross is primarily concentrated near the breeding colonies (McDermond and Morgan 1993, Suryan 2008), although foraging trips may extend hundreds of miles or more from the colony sites (Suryan 2008). Immature birds exhibit two patterns of post-breeding dispersal: while some move relatively rapidly north to the western Aleutian Islands, other individuals stay within the coastal waters of northern Japan and the Kuril Islands throughout the summer. Then, in early September these individuals move into the western Aleutian Islands; once in the Aleutians, most birds travel east toward the Gulf of Alaska (Suryan et al. 2006, COSEWIC 2003). Both satellite data and at-sea opportunistic sightings indicate a prevalence of juvenile and sub-adult short-tailed albatross off the west coasts of Canada and the US (Kenyon et al. in prep., Environment Canada 2008, Wyatt 1963, Helm 1980). In late September, large flocks of short-tailed albatross have been observed over the Bering Sea canyons (Piatt et al. 2006) (Figure 3); these are the only known concentrations of this species away from their breeding islands.

Movement patterns may differ between gender and age classes. Limited data suggests that upon leaving Torishima, females tend to spend more time offshore of Japan and the Kuril Islands and Kamchatka Peninsula, Russia, compared to males, which spend more time within the Aleutian Islands and Bering Sea north of 50° N latitude (Suryan et al. 2006, Suryan et al. 2007b). Tagged yearlings traveled nearly twice the distance per day (245 ± 8 km/d) on average than all older albatross (133 ± 8 km/d). In general, short-tailed albatross are more active during the day (mean movement rate = 14 km/h ± 1.5 SE) than at night (Suryan et al. 2007b). Seven of 11 tagged birds with sufficient data for comparison had significantly greater movement rates during the day than at night, which is consistent with reports from the other two species of North Pacific albatross (Suryan et al. 2007b, Fernandez et al. 2001, Hyrenbach and Dodson, 2003. Because short-tailed albatross foraged extensively along continental shelf margins, the majority of time was spent within national EEZs, particularly US (off Alaska), Russia, and Japan, rather than over international waters (Suryan et al. 2007a, Suryan et al. 2007b).

Overall, short-tailed albatross spent the greatest proportion of time off Alaska, and secondarily Russia, during the post-breeding season, regardless of whether the birds were tagged in Japan or Alaska. Satellite-tagged birds spent relatively little time in central gyres but did transit these regions north of 35°N latitude (Suryan et al. 2007a). During their post-breeding migration, females may have a prolonged exposure to fisheries in Japanese and Russian waters compared to males, which spent more time within the Aleutian Islands and Bering Sea. Juvenile birds have greater exposure to fisheries on the Bering Sea shelf and off the west coasts of Canada and the US (Suryan et al. 2007a).

CURRENT POPULATION STATUS

Population estimates are derived from Torishima colony counts of adults, eggs, chicks, and productivity estimates made by Hiroshi Hasegawa and staff of the Yamashina Institute. (Figure 7, Table 4) Dr. Hasegawa has also made a few counts of birds on Minami-Kojima. In making world population estimates, we extrapolate older Minami-Kojima survey data under the assumption that population growth parameters on Minami-Kojima are the same as on Torishima.

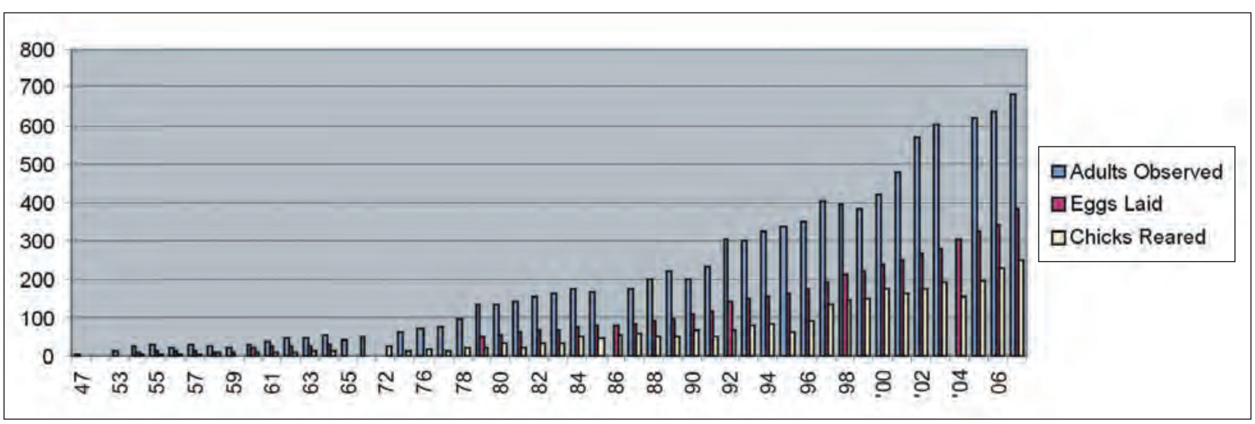


Figure 7. Counts of short-tailed albatross breeding adults, eggs, and nearly-fledged chicks on Torishima Island, Japan, from 1947-2007. Figure based on unpublished data from H. Hasegawa.

Table 4. Short-tailed Albatross productivity data on Torishima and Minami Kojima.

Nesting Season	Birds observed on colony (except chicks)	Eggs laid	Chicks reared at Tsubamezaki	Chicks fledged at Hatsunezaki	Torishima fledging success	Chicks fledged at Minami Kojima	Chicks fledged at Mukojima[1]
1987-88						7	
1990-91						10	
1991-92						11	
1994-95	324	153	82	0	54%	unknown	
1995-96	337	158	62	1	39%	unknown	
1996-97	349	176	90	0	51%	unknown	
1997-98	403	194	130	1	67%	unknown	
1998-99	394	213	143	1	67%	unknown	
1999-00	380	220	148	1	67%	unknown	
2000-01	420	238	173	1	73%	24	
2001-02	481	251	161	0	64%	33	
2002-03	569	267	171	1	64%	unknown	
2003-04	603	277	193	1	70%	unknown	
2004-05	Unknown	302	151	4	50%	unknown	
2005-06	620	325	195	14	60%	unknown	
2006-07	635	341	231	16	68%	unknown	
2007- 08	Unknown	382	270[1]	23	71%	unknown	10

[1]The 10 chicks fledged from Mukojima were removed from Tsubamezaki and hand-reared to fledging.

Estimate of adult (breeding age) birds:

- Torishima - The 2007-2008 population estimates of short-tailed albatross indicate 343 breeding pairs (or 686 breeding adults) (H. Hasegawa unpublished report, November 2007). Assuming that 25 percent of breeding-age adults do not return to breed each year (H. Hasegawa pers. comm. December 2002), this would represent an **adult population of 915 at Torishima** in the 2007-2008 nesting season.
- Minami-kojima (Senkaku Island group)- In the spring of 2002, H. Hasegawa counted 33 fledglings at this breeding colony. Assuming a fledging success rate of 64 percent, this would represent 52 nesting pairs, or 104 adults in 2002-03 (P. Sievert, U. Mass. pers. comm. 2003). If this population is growing at 7.5 percent per year, the number of breeders in 2007-08 might be 149. Assuming that here too, some 25 percent of the adults do not return to breed each year, we would estimate the **adult population of Minami-kojima to be about 199** in the 2007-08 nesting season.

Adding these figures, the **total worldwide estimate for breeding age short-tailed albatross as of the 2007-2008 nesting season is 1,114 individuals.**

Estimate of subadult (pre-breeding age) birds:

Estimating the number of immature birds (juveniles and subadults) is more difficult, because these individuals are not known to congregate between fledging and returning to breed at 5 or 6 years of age (although there is some evidence of congregations occurring above the Bering Sea shelf canyons during late summer and early fall). An estimate can be calculated by totaling the number of known fledged chicks in the last 6 years, and applying the average annual post-fledging juvenile/subadult survival rate (H. Hasegawa, Toho Univ. pers. comm. , Cochrane and Starfield 1999).

- Torishima - Based on H. Hasegawa's reports, 1,211 chicks were fledged from the Tsubamezaki and Hatsunezaki colonies on Torishima from 2002-03 through 2007-08 (Table 4). Applying an average post-fledging juvenile/subadult survival rate of 94 percent annually results in an estimate of **1,061 birds in the 2007-2008 subadult population originating from Torishima Island**.
- Minami-kojima - Fewer fledging data are available for this colony (Table 4). If we assume that the estimated 199 breeding adults comprise 46.3 percent of the population (as is derived for Torishima, where [915 / (915 + 1061)] x 100 = 46.3%), then we would estimate **the subadult short-tailed albatross population at Minami-kojima to be 231.**
- Combining the estimated number of immature birds from Torishima Island and the estimated number of immature birds from Minami-kojima yields a **worldwide subadult population estimate of 1,292** individuals. This number, added to the adult population of 1,114, would **indicate a 2007-2008 total population of some 2,406 short-tailed albatross worldwide.** This

Table 5. Breeding cycle of P. albatrus (Hasegawa and DeGange 1982, Austin 1949).

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
At colonies		■	■	■	■	■	■	■	■			
Egg laying		■										
Incubating		■	■	■								
Chick provisioning			■	■	■	■	■	■				

arithmetic estimate, calculated using the stated assumptions, compares favorably with Sievert's estimate of 2,719 short-tailed albatross, calculated using a deterministic model (P. Sievert, pers. comm. 2007, Appendix 6). In his simulation model Sievert assumed higher values of adult survival, subadult survival, reproductive success, and percentage of adults breeding on the Senkakus. He also estimated the number of fledglings coming from Torishima, rather than use the actual numbers. The observed growth of the Tsubamezaki colony since the 1950s is shown in Figure 7.

Population growth rates are determined by annual increases in adults observed, eggs laid, and chicks fledged on Torishima Island. The population at Torishima is growing at an annual rate of between 6.5% and 8.0% (H. Hasegawa, Toho Univ. pers. comm.) (Table 4, Figure 7).

LIFE HISTORY

Breeding Biology

The short-tailed albatross is a colonial, annual breeding species; each breeding cycle lasts about 8 months. Birds may breed at 5 years of age, but first year of breeding is more commonly at 6 (H. Hasegawa pers. comm. 2002). Birds arrive on Torishima in October, but as many as 25 percent of breeding age adults may not return to the colony in a given year (H. Hasegawa pers. comm. 2003). A single egg is laid in late October to late November, and is not replaced if destroyed (Austin 1949). Bi-parental incubation lasts 64 to 65 days. Hatching occurs from late December through January (Hasegawa and DeGange 1982). During the brood-rearing period, most foraging bouts are along the eastern coastal waters of Honshu Island, Japan (Suryan et al. 2008). Chicks begin to fledge in late May into June (Austin 1949) (Table 5). There is little information on timing of breeding on Minami-kojima.

Nests consist of a divot on the ground lined with sand and vegetation. Tickell (1975) describes the nest as a grass or moss-lined concave scoop about 2 ft. (0.61 m) in diameter. Parents alternate foraging trips that may last 2-3 weeks while taking turns at incubating. When one bird is foraging, the other stays on the nest without eating or drinking. Yamashina Institute staff observed 24 days to be the longest period between nest exchanges of a single observed pair (Fumio Sato, Yamashina Institute, pers. comm. 2001).

Eggs hatch in late December and January. For the first few days after hatching the chick is fed on stomach oil, a heavy oil, very rich in calories and Vitamin A,. This oil also provides a source of water once metabolized, which is important when chicks may be left for several days in high temperatures on dry islands. Soon after hatching, the chicks are fed more solid food, such as squid and flying fish eggs. During the first few weeks after hatching, one adult broods the chick and the other forages at sea. Later, when the chick can regulate its body temperature, both parents leave their chick,while they forage simultaneously. When chicks are left alone without a parent, they are at the post-guard stage.

Parents forage primarily off the east coast of Honshu Island, Japan, almost entirely north of Torishima and south of Ishinomaki, Japan (Figure 5) (Suryan et al. 2008), where the warm Kuroshio current from the south collides with the cold Oyashio current from the north (Suryan et al. 2008, Balogh 2008).

Figure 8. *Miscanthus sinensis* var. *condensatus* provides nesting habitat for short-tailed albatross by stabilizing loose soil. It may also increase productivity within constricted area of the colony by providing a visual screen that helps reduce antagonistic behavior among neighboring birds.

By late May or early June, the chicks are almost fully grown, and the adults begin abandoning the colony site (Hasegawa and DeGange 1982,

Figure 9. ***Boehmeria biloba*** **and C*hrysanthemum pacificum,* two native plants on the volcanic landscape of Torishima Island.**

Suryan et al. 2008). The chicks fledge soon after the adults leave the colony. By mid-July, the breeding colony is empty (Austin 1949). Non-breeders and failed breeders disperse earlier from the breeding colony, during late winter through spring (Hasegawa and DeGange 1982). There is no detailed information on timing of breeding on Minami-kojima.

Short-tailed albatross are monogamous and highly philopatric to nesting areas (they return to the same breeding site year after year). Chicks hatched at Torishima return there to breed. However, young birds may occasionally disperse from their natal colonies to attempt to breed elsewhere, as evidenced by the appearance of adult birds on Midway Atoll that were banded as chicks on Torishima (H. Hasegawa pers. comm. 1997; Richardson 1994).

In summer (the nonbreeding season), short-tailed albatross disperse widely throughout the temperate and subarctic North Pacific Ocean (Sanger 1972; Suryan et al. 2007b).

Breeding Habitat

Short-tailed albatross nest on isolated, windswept, offshore islands, with restricted human access. Nest sites may be flat or sloped, with sparse or full vegetation (Aronoff 1960, Sherburne 1993, DeGange 1981). On Torishima, most birds nest on a steep site containing loose volcanic ash (Tsubamezaki), however, a new colony on a vegetated gentle slope (Hatsunezaki) is growing rapidly. Nesting at the eroding Tsubamezaki site may be an artifact of where commercial harvest did not occur, due to difficulty of access for humans. Torishima, where vegetated, is dominated by a clump-forming grass, *Miscanthus sinensis* var. *condensatus* (Figure 8). The grass helps to stabilize the soil, provide protection from weather, and acts as a beneficial visual barrier between nesting pairs that minimizes antagonistic interactions. In addition, it allows for safe, open takeoffs and landings (Hasegawa 1977). During one site visit to a colony, the carcass of a dead breeding adult was observed entangled in woody brush on the edge of the Tsubamezaki colony (Greg Balogh, USFWS, pers. comm. 2008). A tansy-like composite, gold-and-silver chrysanthemum *(Chrysanthemum pacificum)* and a nettle, *Boehmeria biloba* (Figure 9), are also present (Hasegawa 1977).

Marine Habitat

The North Pacific marine environment most heavily used by short-tailed albatross is characterized by regions of upwelling and high productivity along the northern edge of the Gulf of Alaska, along the Aleutian Chain, and along the Bering Sea shelf break from the Alaska Peninsula out towards St. Matthew Island (Suryan et al. 2007a, Tickell 2000). The shelf break in these areas has been described as a "greenbelt" of high chlorophyll concentration and primary productivity (Springer et al. 1996). The interaction of strong tidal currents, with the abrupt, steep shelf break, promotes upwelling that brings nutrients to the surface (Suryan et al. 2006, Piatt et al. 2006). As a result, primary production in these areas remains elevated throughout summer (Suryan et al. 2006). Satellite tracked short-tailed albatross foraged along the Bering Sea shelf break where surface chl. a standing stocks were at a maximum, although they also foraged at other locations where the concentrations of chl. a was far lower (Figure 10)

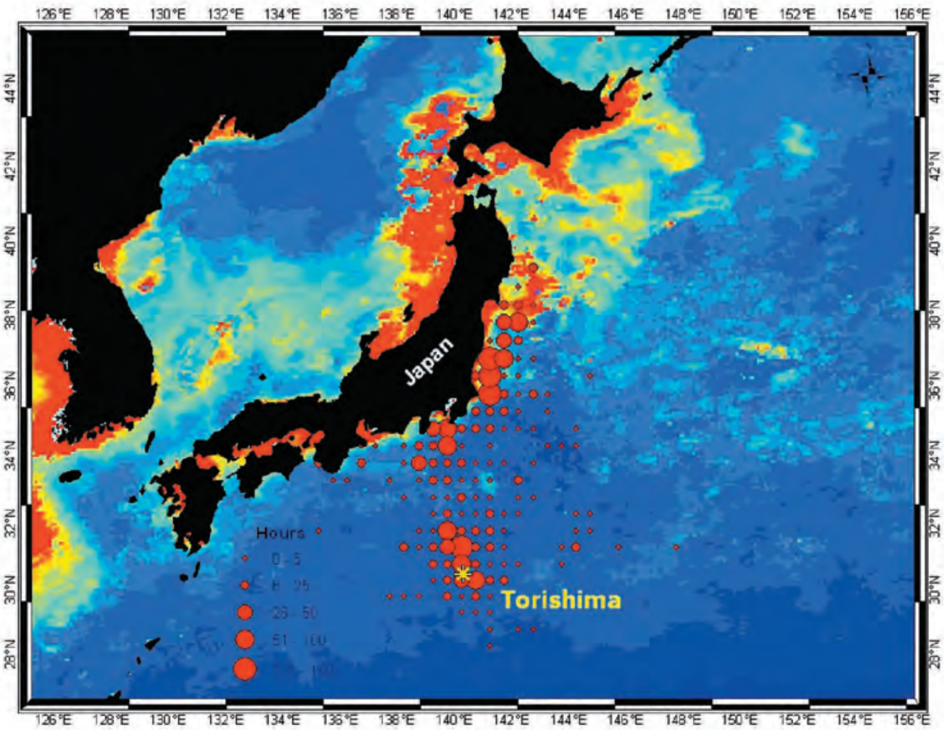


Figure 10. Locations of breeding short-tailed albatross from February through April, 2006, during their brood-rearing season overlaid upon a chart showing Chl a concentrations along the east coast of Honshu Island, Japan. Chl a concentration gradient is from low (blue) to high (red).

(Suryan et al. 2006). Short-tailed albatross are not planktivores (Austin 1949, Tickell 2000). Rather, they are likely drawn to areas of high productivity, presumably because their prey items occur there in higher density, although we lack data supporting this assumption.

Tagged short-tailed albatross also used the less productive abyssal waters away from regions of upwelling, but the paucity of observations from those areas suggests that the birds that were tracked there may simply have been transiting between preferred foraging habitats (Suryan et al. 2007b). Short-tailed albatross adults spent less than 20% of their time over waters exceeding 3000m deep (Suryan et al. 2007b) whereas, adults and subadults frequented areas with waters shallower than 1000m deep more than 70% of the time, and juveniles almost 80% of the time (Suryan et al 2007b). Juvenile short-tailed albatross spent about 80% of their time in these shallower waters <1000m in depth. Short-tailed albatross adults spent less than 5% of their time in waters >3000m deep and exclusively within Japanese waters (Rob Suryan, Oregon State University, 2007 pers. comm.).

During post-breeding season migration, PTT-tagged birds ranged widely throughout the North Pacific Rim, spending the majority of time within the exclusive economics zones of Japan, Russia (Kuril Islands and Kamchatka Peninsula), and the United States (Aleutian Islands and Bering Sea, Alaska). Suryan et al (2007a) found evidence for gender and age-related differences in distribution and, therefore, potential interaction with regional fisheries. Overall, short-tailed albatross spent the greatest proportion of time within the Alaska exclusive economic zone. Within Alaska, short-tailed albatross occurred most frequently in fishery management zones that encompassed the Aleutian Islands, Bering Sea, and waters south of the Alaska Peninsula. Short-tailed albatross had the greatest potential overlap with fisheries that occurred along continental shelf break and slope regions, e.g., longlining for sablefish *(Anoplopoma fimbria)*, where albatross occurred most often. Some birds, however, also made frequent excursions onto the extensive Bering Sea shelf, suggesting potential for interactions with the large-scale walleye pollock *(Theragra halcogramma)* and Pacific cod *(Gadus macrocephalus)* fisheries (Suryan et al. 2007a)

During August, 2003, in an effort to define further where the short-tailed albatross are foraging after the breeding season, short-tailed albatross were captured at sea and tagged with PTTs. Preliminary results of this effort have given us an indication of where these birds captured in Alaskan waters range and forage, as compared with birds tagged earlier in the season on Torishima. Such information will allow us to determine whether other fisheries, in addition to Alaska's longline fishery, may potentially be affecting short-tailed albatross. For example, a juvenile short-tailed albatross was the first and only tagged bird to travel along the west coast of North America where seabird deterrents are not used in commercial fisheries (Balogh and Suryan 2005). During the non-breeding season, short-tailed albatross ranged along the Pacific Rim from southern Japan to

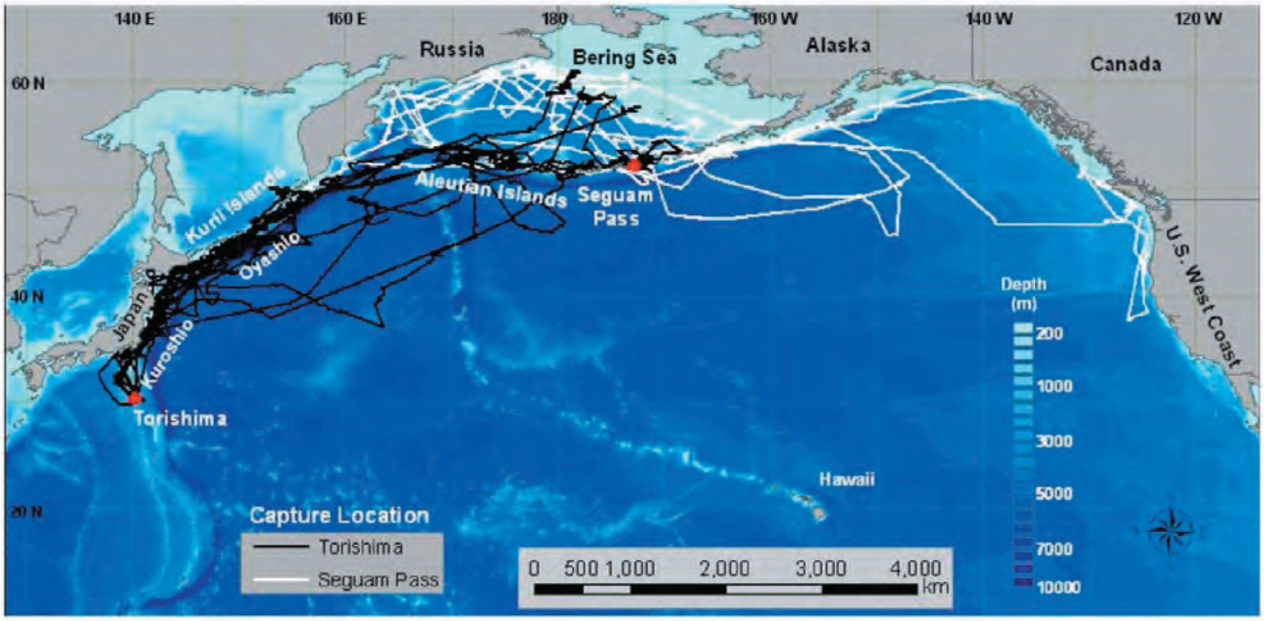
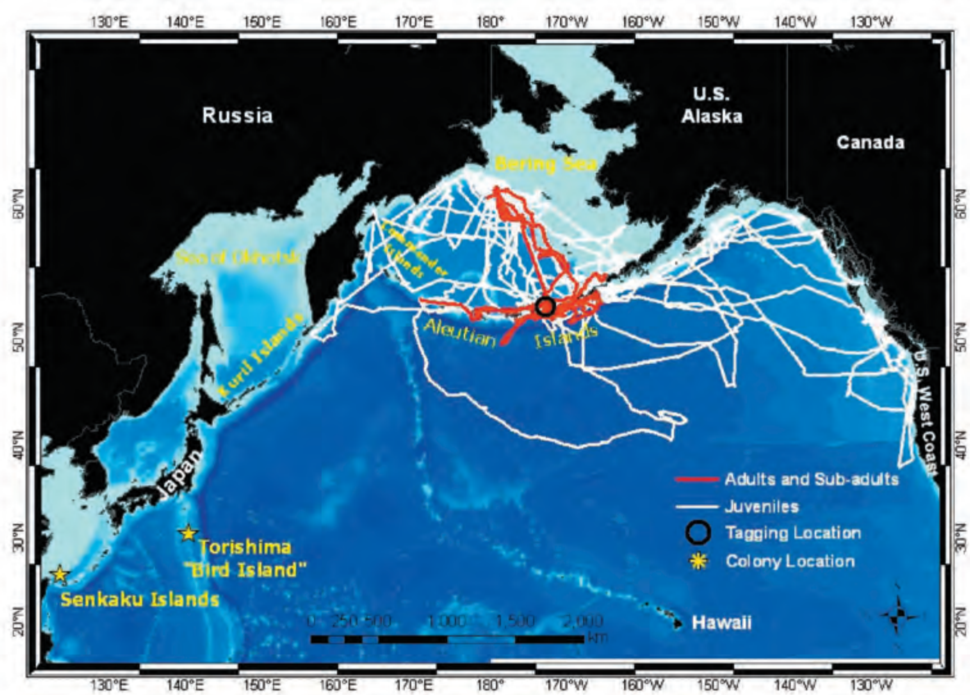


Figure 11. Representative track lines for short-tailed albatross during the post breeding and non-breeding season. Short-tailed albatross tagged at Torishima (noted by black lines) were non-breeders or breeders captured at the end of the breeding season in May 2001-2003. Those tagged in Alaska at sea during 2003, 2005, and 2006 (noted in white lines) were tagged in late July though August, and include adults, sub-adults, and juveniles.

Figure 12. Satellite track lines for adults and sub-adults vs. juveniles captured at sea in Alaska near Seguam Pass. Note the wide ranging track lines for juveniles vs. older birds.



northern California, primarily along continental shelf margins (Figure 11). Movement patterns differed between gender and age classes. Upon leaving Torishima, females spent more time (75.9%, SE = 16.2, n = 4) offshore of Japan and the Kuril Islands and Kamchatka Peninsula, Russia, compared to males (35.9%, SE = 6.9, n = 6), which spent more time within the Aleutian Islands and Bering Sea (north of 50 N latitude). Observed differences were not likely a sampling artifact, as deployment durations were similar or in favor of females. Age-specific differences in movement patterns were evident for <1-year-old birds. These hatch year birds traveled nearly twice the distance per day (245 ± 8 km d_1) and total distance (26,033 ± 1782 km) on average than all older albatross (133 ± 8 km d_1 and 15,064 ± 1800 km, respectively). One of these younger birds traveled from the Torishima to the Aleutians, down the US west coast to California, north to the Gulf of Alaska, South nearly to the Northwest Hawaiian Islands, and back north to the Aleutians before we lost its signal (Figure 12). Birds were more active during the day than at night (Balogh and Suryan 2005, Suryan et al. 2007b).

Albatross arriving from Japan spent the greatest amount of time in the western and central Aleutian Islands, whereas albatross tagged in Alaska were more widely distributed among fishing zones in the Aleutian Islands, Bering Sea, and the Alaska Peninsula. Although satellite-tagged albatross spent relatively little time in international waters of the Bering Sea, five of the 11 tagged birds did transit international waters and could, therefore, potentially interact with fisheries that may occur in this region (Figure 12) (Suryan et al. 2007b).

Although, short-tailed albatrosses in Alaska had the greatest spatial overlap with sablefish longline fisheries, there was some overlap with the much larger and more extensive trawl fisheries and Pacific cod longline fisheries, including those on the Bering Sea shelf (Figure 13). Only four of the eleven albatrosses tracked in Alaska spent three or more days in zones bordering the Bering Sea shelf, however, bathymetric domains inhabited by these particularly younger age class birds were notably different than birds in other areas, in that they spent a similar amount of time, on average, in shelf (38% ± 9 SE) versus shelf break (30% ± 9) domains. Greater use of shelf habitat in the Bering Sea was particularly true within zone 521; the four albatrosses that entered this zone averaged significantly greater percent time on the shelf (68% ± 9 SE) versus shelf break (18% ± 9), slope (10 ± 4) and oceanic waters (Suryan et al. 2007b).

Initial tracking data suggested that during their post-breeding migration, female short-tailed albatross may have a prolonged exposure to fisheries in Japanese and Russian waters compared to males and that juvenile birds have greater exposure to fisheries in shelf waters (in the Bering Sea and elsewhere) and off the west coasts of

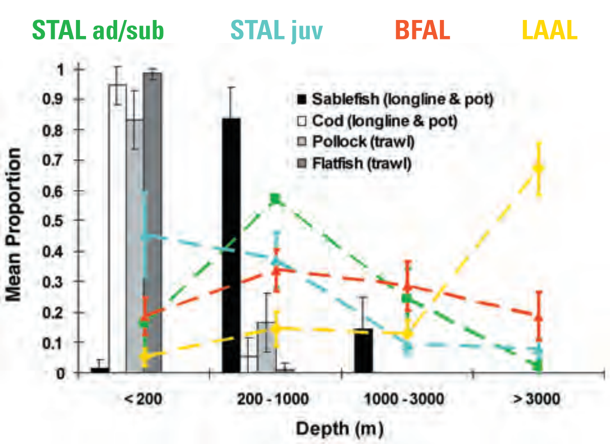


Figure 13. Use of different depth regimes by three North Pacific albatross species, and the relative use of these different depth regimes by the most common longline, pot, and trawl fisheries in Alaska.

Canada and the United States. In fact, two of only five hatch-year short-tailed albatrosses tagged in Alaska traveled to the west coasts of Canada and the United States coast of North America (Balogh and Suryan 2005, Suryan et al. 2007, unpubl. data). Opportunistic sightings of short-tailed albatross confirm the prevalence of primarily juvenile and sub-adult birds off the west coast of Canada and the US (Piatt et al. 2006). Such at-sea distribution information will allow us to determine which fisheries, in addition to Alaska's may potentially be affecting short-tailed albatrosses. For example, along the west coast of North America where seabird deterrents are currently not used in commercial fisheries.

Foraging Ecology and Diet

The diet of short-tailed albatross during breeding is not well-known, but observations of food brought to nestlings (H. Hasegawa, Toho University, unpublished data) and of regurgitated material (Austin 1949) indicate that the diet includes squid (especially the Japanese common squid [*Todarodes pacificus*]), shrimp, fish (including bonitos [*Sarda* sp.], flying fishes [*Exocoetidae*] and sardines [*Clupeidae*]), flying fish eggs, and other crustaceans (Hasegawa and DeGange 1982, Tickell 1975, Tickell 2000). Short-tailed albatross may formerly have scavenged salmon (*Oncorhynchus* sp.) from shallow coastal estuaries (Tickell 2000). This species has also been reported to scavenge discarded marine mammals and blubber from whaling vessels, and they readily scavenge fisheries offal (Hasegawa and Degange, 1982). Short-tailed albatross forages diurnally and possibly nocturnally (Hasegawa and Degange, 1982), either singly or in groups (occasionally in the 100's) (Piatt et al. 2006) predominantly taking prey by surface-seizing (Piatt et al. 2006, Prince and Morgan 1987, Duke University, 2008).

What little diet information exists for this species at sea during the non-breeding season suggests that squids, crustaceans, and fishes are important prey (Hasegawa and DeGange 1982). In the Bering Sea, prey items comprised of mid-water squid concentrations (primarily *Berryteuthis magister,* and *Gonatopsis borealis* in the upper layer [200–500 m]) were greatest near the outer continental shelf and slope (Sinclair et al. 1999). Mid-water prey may become available to albatross through: scavenging on discards from subsurface predators and fisheries, positively buoyant post-mortem organisms, and vertical migration (Lipinski and Jackson 1989, Croxall and Prince 1994). The Japanese common squid, a known diet item of short-tailed albatross (Suryan et al. 2006), is abundant within the Kuroshio-Oyahio transition zone west of 160° E (Mori et al. 2002), a region that was visited by all albatross tracked from Torishima Island.

Figure 14. Large flock of short-tailed albatross (estimated at a minimum size of 153) sighted in the Bering Sea west of St. Matthew Island along the U.S.- Russia border adjacent to international waters known as the "Donut Hole". Photo by Josh Hawthorne of the F/V Blue Gadus.

Researchers from the Yamashina Institute have observed rafts of short-tailed albatross off the Tsubamezaki colony on Torishima, feeding on what was likely dead giant squid (*Architeuthis spp.*) tissue (2m by 2m in size). They have also observed that chicks and adults regurgitate small squid and squid beaks, primarily during May, prior to chick fledging N. Nakamura 2005 yamashina Institute, pers. comm.). Rafts of short-tailed albatross, possibly feeding aggregations, have also been observed in the northern Bering Sea above canyons along the Bering Sea shelfbreak (Piatt et al. 2006) (Figures 3 and 14).

This species of albatross visits and follows commercial fishing vessels in Alaska that target sablefish (*Anoplopoma fimbria*), Pacific cod (*Gadus macrocephalus*), Pacific halibut (*Hippoglossus stenolepis*), and pollock (*Theragra chalcogramma*) (Melvin et al. 2001). Although at-sea processing offal and commercial longlining bait is not likely a part of the short-tailed albatross normal diet, it may now constitute a notable portion of the caloric intake for these birds.

Demography

Short-tailed albatross are long-lived and slow to mature; the average age at first breeding is 5 or, more commonly, 6 years (H. Hasegawa pers. comm. 2002). As many as 25 percent of breeding age adults may not return to the colony in a given year (H. Hasegawa pers. comm. 2002). Females lay a single egg each year, which is not replaced if destroyed (Austin 1949). Survival rates for all adults and post-fledging juvenile/subadults combined are high (96 percent; H. Hasegawa pers. comm. 2002). Actual juvenile survival rates are unknown, but are probably lower than those of adults. Cochrane and Starfield (1999) assume a juvenile/subadult survival rate of 94 percent. Breeding success (the percent of eggs laid that result in a fledged chick) has varied between approximately 60 and 70 percent in recent years (see Table 4). Low breeding success would be likely in years when catastrophic volcanic or weather events occur during the breeding season.

Population Viability Analysis

Population Viability Analysis (PVA) was completed for short-tailed albatross in 2007 at the request of the Recovery Team and peer reviewers of the draft recovery plan (Finkelstein et al. 2007). PVAs are useful in predicting population trends and have been used widely in the past decade to assess how discrete threats are affecting the continued survival of species of conservation concern (Arnold et al. 2006, Crowder et al. 1994, Lewison and Crowder 2003). Objectives of this PVA were to (1) build an age-based stochastic matrix model for the Torishima and Senkaku short-tailed albatross populations (two-colony model), (2) compare the stochastic growth rate and probability of extinction of a two-colony model with a three-colony model that adds a newly established colony at a specified year in the future, (3) assess the effect of volcanic eruptions on Torishima and other sources of adult mortality on the stochastic growth rate and probability of extinction for short-tailed albatross populations, and (4) evaluate the uncertainty in model assessments arising due to data gaps and parameter uncertainty (Finkelstein et al. 2007).

The stable age distribution of the deterministic matrix places 36% of the population in the juvenile class (ages one to four), 21% in the sub-adult stage (ages five to eight), 41% in the adult class (ages nine and above), and 2% in the widow classes. When mortality rates are kept at current levels, the Torishima and Senkaku populations in the two and three-colony models reached large population sizes at the end of 50 and 100 years because of the high mean population growth rate and low overall environmental stochasticity in vital rates, despite volcanic eruptions on Torishima. In the three colony model with a new colony establishing in 10 years, Torishima reached 39,352 birds, Senkaku reached 11,987 birds, and the new colony reached 32 birds by 2056, for a total global population of 51,372 birds in 50 years (Finkelstein et al. 2007). The projection for the third colony derived by Finkelstein et al. assumed a starting point of a single breeding pair. Our translocation plan has intensified since Finkelstein et al.'s model was developed, and as such, we have assumed elsewhere a third colony starting point of 10 breeding pairs.

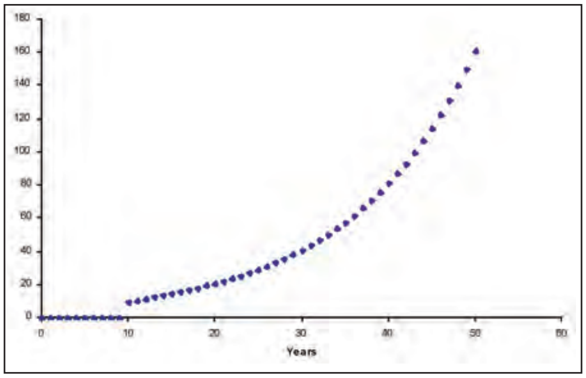


Figure 15. Mean population size (of 1000 simulations) from stochastic model results. In 50 years, the mean population size on the colony established by 10 breeding pairs (derived from returning translocated chicks) is 161 birds (Finkelstein et al. 2007).

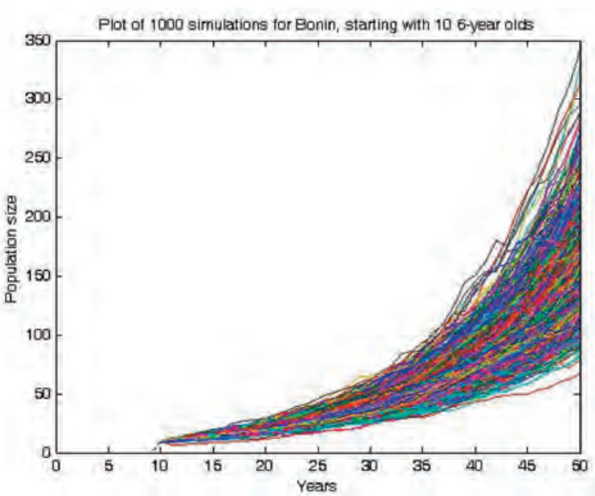


Figure 16. Stochastic model results of short-tailed albatross population growth trajectory for translocation colony. The plot of 1000 model simulations demonstrates the variability of the population growth over the next 50 years (Finkelstein et al. 2007).

Because the short-tailed albatross population is currently undergoing very high population growth (near their maximum biological growth potential), the annual survivorships for post-fledgling age classes are also very high compared to other albatross species. The continuation of these high survivorships and, thus, high population growth rate for short-tailed albatross is uncertain, given that most other albatross species are undergoing population-level declines (Gales 1998). Factors that may cause added mortality and lead to a decline in short-tailed albatross population growth rate include fisheries bycatch and disease. The PVA model indicates that 1% added mortality of all age classes greater than one-year olds caused ~1% decline in mean stochastic lambda (population growth rate) while the inclusion of random volcanic eruptions at a rate equal to historic eruptions caused a maximum ~0.3% decline in mean stochastic lambda. Thus, adding 1% annual mortality caused ~3-fold greater decline in stochastic lambda than the occurrence of volcanic eruptions for the short-tailed albatross population. Consequently, while the threat of volcanic eruptions is dramatic, a volcanic eruption is less likely to threaten short-tailed albatross viability than less dramatic, but more continuous, threats to juvenile and adult survival rates. Indeed, the model indicated that there would need to be about a 20% likelihood of volcanic eruption *each year* before the population would enter into long-term decline. A key recommendation arising from this work is the need to frequently update survival analysis of the banding records taken each year at the main breeding colony (Finkelstein et al. 2007).

The Senkaku short-tailed albatross population is vital to help buffer against global population-level extinctions during different volcanic eruption scenarios on Torishima Island. A third colony can also provide additional buffering against catastrophic events on Torishima, recognizing that the effort and time needed to establish a population that can contribute to the global short-tailed albatross population is substantial. The model predicted that a new population started by two 6-year-old birds in 10 years would not exceed the quasi-extinction threshold of 100 breeding birds (aged eight and older) until 79 years in the future (2085/2086) (Finkelstein et al. 2007). Increasing our translocation efforts such that we start a new colony with 10 6-year old birds rather than a single pair would allow the new colony to surpass the quasi-extinction threshold of 100 birds in about 43 years (Figure 15)(Myra Finkelstein, UC Santa Cruz, pers. comm. 2008). The model indicated that, starting with a population of 10 pairs and given current observed population growth parameters, the new colony was highly unlikely to become extirpated (Figure 16). However, these colony growth projections assume, perhaps optimistically, that productivity will remain as high as it currently is. It also assumes, perhaps pessimistically, that no immigration from Torishima or Minami-kojima will occur as these colonies become more crowded with time. Should density dependent factors begin to affect birds on Torishima or Minami-kojima, one can expect that new colony growth may progress even faster than predicted by this model. This enhanced colony growth may be aided by the use of decoys and playback of recorded colony sounds on Mukojima.

CURRENT THREATS

The activity that led to the endangerment of Commercial harvest, the activity that led to the endangerment of short-tailed albatross, no longer occurs. However, a number of other factors currently threaten the species' continued existence and continued recovery. Discussion of threats was covered in detail at the first meeting of the Short-tailed Albatross Recovery Team (START). The threat factors discussed and categorized at that meeting are described below.

Catastrophic Events – Habitat Alteration and Loss

Significant loss of breeding habitat or breeding adults at the Tsubamezaki colony could delay recovery of the species (Finkelstein et al. 2007). Until other safe breeding sites are established, short-tailed albatross recovery will continue to be at risk due to the possibility of significant habitat loss and mortality from unpredictable catastrophic volcanic eruptions and land or mud slides caused by monsoon rains.

Volcanic activity

Habitat destruction from volcanic eruption poses a significant threat to short-tailed albatross at the primary breeding colony on Torishima. The threat is not predictable in time or magnitude; eruptions could be catastrophic or minor, and could occur at any time of year. While modeling predicts that random volcanic eruptions would reduce the growth rate of this population by 0.3% (Finkelstein et al. 2007), we believe it is imprudent to base this species' recovery strategy upon this volcano behaving as it has in the recent geologic past. A worst-case scenario is that about 63% of the Torishima population could be killed in a catastrophic eruption (Finkelstein et al. 2007), or about 54% of the world population. A catastrophic eruption could also render currently-used breeding habitat on Torishima uninhabitable.

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 five recorded eruptions:

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 occurred.
4. On October 2, 1975, a submarine eruption was recorded 4.4 nautical miles (9 km) south of Torishima (Simkin and Siebert 1994).
5. On August 11, 2002, a minor eruption sent ash plumes up to 5000 feet, but caused no vegetation or landscape changes or known albatross mortalities. We do not know whether the earlier eruptions resulted in short-tailed albatross mortalities, but it is not likely that they caused much, if any, mortality, since they occurred outside the main breeding season (December to April).

The literature also refers to an eruption in 1940, which resulted in lava flow that filled the island's only suitable anchorage. Austin (1949) visited the waters around Torishima 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' that 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.*

While a catastrophic eruption could, in a worst-case scenario, kill up to 54% of the world population, this assumes the highly unlikely situation that all breeding adults that attempt to nest on Torishima in a particular year are killed in the eruption (Finkelstein et al 2007). In this scenario, the non-breeding adult and immature birds that remain at sea year round would serve as an "extinction buffer." An estimated 20-25 percent of breeding age adults fail to return to breed each year, and immature birds do not typically return to the colony to breed until 5-6 years after fledging. Currently, over 50 percent of the 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. There is no information to suggest what the birds may do in the complete absence of suitable breeding habitat. We also cannot predict whether population demographics may change with time. So population level effects that the volcano may have now and in the future remain speculative.

Our PVA assumes, perhaps optimistically, that suitable nesting habitat will remain abundant following a catastrophic eruption. However,

Table 6. Date, description and location of known short-tailed albatross mortalities associated with North Pacific fishing activities since 1990. Data from USFWS unpublished data and Kiyoaki Ozaki, Yamashina institute, pers. comm. 2008). "Observed sample" refers to whether a specimen was in a sample of catch analyzed by a fisheries observer.

Report Date Band #	Take Date	Incident	Location
08/28/1995 13A-00853	08/28/1995	1 year old taken in the Individual Fishing Quota sablefish fishery in the western Gulf of Alaska south of the Krenitzin Islands. Bird was not in the observed sample.	53.31ºN x 165.38ºW
10/8/1995 13A-00570	10/8/1995	3 year old short-tailed albatross taken in the Bering Sea IFQ hook-and-line fishery. Bird was not in the observed sample.	57.01ºN x 170.39ºW
09/27/1996 13A-00518	09/27/1996	5-year-old short-tailed albatross taken in the Bering Sea hook-and-line fishery. Bird was in the observed sample.	58.69ºN x 177.04ºW
07/08/1998 13A-01202	04/23/1998	Hatch Year bird found dead from Russian salmon drift net entanglement in Bering Sea, 140km east of Cape Oljtorskij, Russia	60.08ºN x 172.57ºE
09/21/1998 130-04189	09/21/1998	8-year-old bird taken in the cod hook-and-line fishery in the Bering Sea. Bird was in the observed sample.	57.30ºN x 173.57ºW
09/28/1998	09/28/1998	Subadult bird taken in the cod hook-and-line fishery in the Bering Sea. Bird was in the observed sample.	58.27ºN x 175.16ºW

it seems reasonable to assume that overall productivity of birds on Torishima could be suppressed for a prolonged but unknown period of time following an eruption that covers vegetation and smooth ash fields with jagged volcanic rock or steep slopes. This occurred on other portions of Torishima in 1940, and the area remains inhospitable to albatrosses to this day.

For reasons associated with volcanism, as well as the inherent vulnerability of having such a large proportion of the species present at one site, the recovery team remains committed to the notion of establishing new colonies on other non-volcanic islands.

Monsoon Rains

The eruptions in 1902 and 1939 destroyed much of the original breeding habitat on Torishima. The remaining site used by albatross is on a sparsely vegetated steep slope of loose volcanic soil. The monsoon rains that occur on the island result in frequent mud slides and severe erosion at this site, which can result in habitat loss, nest destruction, and chick mortality. In 1987, a landslide occurred on the nesting slope at Tsubamezaki, and subsequent mud flows reduced the short-tailed albatross' breeding success to less than 50% that year (Hasegawa 2001). 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 are at greater risk of mortality from monsoon rains, erosion, slides, sand storms and wind (H. Hasegawa, Toho Univ. pers. comm. 1997). Breeding success at Tsubamezaki is lower in years when there are significant typhoons (USFWS 2000a).

Global Changes

Climate Change

According to the recently published report, *Impacts of a Warming Arctic* (ACIA 2004), and Bates et al. (2008) the Arctic is now experiencing some of the most rapid and severe climate change on Earth. In the past few decades, average arctic temperature has risen at almost twice the rate of temperatures in the rest of the world. Arctic warming has been accompanied by widespread melting of glaciers and sea ice and rising permafrost temperatures. Increases in glacial melt and river runoff add more fresh water to the ocean, raising global sea level and possibly altering the ocean circulation and patterns of upwelling. Perturbations of these oceanic parameters may affect the availability of food for the short-tailed albatross and other marine birds. Climate changes may also affect vegetation and other characteristics of the short-tailed albatross breeding colony sites. An acceleration of these climatic trends is projected to occur during this century, due to ongoing increases in concentrations of greenhouse gases in the earth's atmosphere (ACIA 2004). While climate change is not expected to affect the breeding colonies through sea level rise, changes in weather patterns that result from climate change could affect the birds either negatively or positively. However, as the Bering Sea warms, many benthic and pelagic species are shifting their ranges northward (Bering Sea Ecosystem Study Science Plan [www.arcus.org/bering]). Northward shifts in the albatross prey base could reasonably be expected to increase the caloric expenditures of birds travelling to their foraging grounds in the North Pacific.

Ocean Regime Shift

Indices of climate-ocean conditions indicate that several "regime shifts" in atmospheric sea level pressure and upper ocean temperature structure have occurred in the Pacific Basin. Changes in temperature-pressure regimes have occurred in the North Pacific in 1925, 1947, 1977, 1989 and possibly1998 (Benson and Trites 2002), affecting the ocean's thermal structure from 60º S to 70º N. (Stephens et al. 2001). Such large-scale changes suggest that an as yet unidentified common global event may be responsible for the shift. It appears that changes in atmospheric pressure alter wind patterns that affect oceanic circulation and physical properties such as salinity and depth of the thermocline. These in turn affect primary and secondary production, which in turn affects the higher trophic levels such as fish and marine birds and mammals. These regional ocean regime shifts may have positive or negative effects on the abundance of marine organisms, depending on the species in question and the magnitude and direction of the changes (Benson and Trites 2002). This natural factor should be kept in mind as a potential source of variation in albatross population dynamics over the long term.

Commercial Fishing

Unlike many southern hemisphere procellarids, short-tailed albatross populations are not declining due to seabird bycatch in commercial fisheries. Modeling efforts indicate that 5-6% additional annual mortality above that which is currently occurring would be needed before this species would begin to decline in numbers. At a population of 2600 birds, that is 130-156 birds per year above current mortality (above the mortality that is occurring naturally and that is occurring due to commercial fisheries as they are currently operating worldwide). We know of 9 reported instances of short-tailed albatross taken by commercial fishers since 1988 (Table 6). While this reported take is doubtlessly underestimated, one must remember that whatever the take rate has been in the past 20 years, the short-tailed albatross population continued to grow at a rate of about 6.5% per year. If we were to assume a detection rate of 10% for bycaught birds in North Pacific fisheries, we would need to be observing 13 dead short-tailed albatross per year before we were to conclude that a population of 2600 birds were being driven towards decline due to commercial fishing bycatch (Table 7, from Finkelstein et al 2007).

While we have virtually no seabird bycatch information from Japanese fisheries, and grossly inadequate seabird bycatch information from Russian fisheries, we do know that the short-tailed albatross population has continued to increase

Table 7. Number of observed dead short-tailed albatross that triggers management concern given an action and a probability of observing a dead bird. The examples in the table are calculated as follows: population size*mortality level that triggers management concern = actual number of dead birds. Because determining the actual number of dead birds per year is not feasible, the observed number of dead birds = actual number of dead birds*probability of observing a dead bird. For example, with a population size of 1800 birds, a management concern trigger of 6% mortality, and a 10% probability of observing a dead bird, 11 observed dead birds (circled) would trigger management concern.

Population size	Mortality that triggers management concerns	Probability of observing dead birds		
		10%	25%	50%
		Observed # of dead birds		
1800	5%	9	22	45
	5.5%	10	25	50
	6%	11	27	54
3000	5%	15	38	75
	5.5%	17	41	83
	6%	18	45	90
7000	5%	35	88	175
	5.5%	39	96	193
	6%	42	105	210

despite whatever number of short-tailed albatross have been taken there. Nevertheless, the way in which fisheries are prosecuted worldwide changes constantly. Therefore, it is important that we continue to make efforts to acquire adequate seabird bycatch information from all fisheries within the range of the short-tailed albatross, so that we can detect which fisheries may begin to have deleterious population-level effects upon this species in the future.

Demersal longline fisheries in the Russian Exclusive Economic Zone (EEZ), and in the US EEZ off Alaska (Bering Sea/Aleutian Islands area and Gulf of Alaska) are a known threat to short-tailed albatross. No known takes of short-tailed albatross have been reported in domestic pelagic longline fisheries in the North Pacific. However, it seems probable that such take may have occurred in pelagic fisheries in Japan's EEZ, especially where adults forage for food during brood rearing off the east coast of Honshu (especially so, given that adult birds have been observed on Torishima with fishhooks in their mouths of the same type used in Japanese commercial fisheries. Short-tailed albatross have also been taken in driftnets in the Russian EEZ (Table 6).

Seabirds, including albatross, attack baited hooks of both pelagic and demersal longlines after the hooks are deployed. If birds are hooked or snagged, they can be pulled underwater with the rest of the gear and drown. The rate of incidental take of seabirds declined by nearly an order of magnitude between 1999 (when streamer lines became available to fishermen free of charge) and 2004 in Alaska's demersal longline fishery (NOAA 2006). Albatross bycatch during that time declined by about 70%. In addition, seabird (and albatross) bycatch rates have declined in Hawaii's pelagic longline fishery since bycatch reduction regulations were promulgated (Gilman and Kobayashi, 2007).

Biological opinions issued by the Service currently limit incidental of short-tailed albatross in Alaska fisheries to two birds in two years for the Pacific halibut (Hippoglossus stenolepis) longline fishery, four birds in two years for the groundfish longline fishery, and two birds in five years for the trawl fishery (USFWS 2003). The number of birds actually taken is discussed below.

Demersal Groundfish Longline Fisheries in Alaska

United States-based demersal groundfish longline fisheries in Alaska are monitored by fishery observers, who collect data on incidental catch of seabirds, including short-tailed albatross. Reports of short-tailed albatross takes are also occasionally received directly from fishermen. There were two reported fishery-related takes of short-tailed albatross in the 1980's. The first bird was found dead in a fish net north of St. Matthew Island in July 1983. The second was taken in October, 1987, by a halibut vessel in the Gulf of Alaska. Both takes were reported by fishermen. Since 1990 fisheries observers have reported five short-tailed albatross takes in Alaska's fisheries (Table 6). All known takes occurred in demersal longline groundfish fisheries; none has been reported in groundfish trawl or pot fisheries. Although fisheries-related take of short-tailed albatross has also occurred in the Gulf of Alaska, all take in the *observed* sample has occurred in the Bering Sea (Table 6).

An estimated average of 183 black-footed albatross and 533 Laysan albatross were taken annually in Alaska demersal longline fisheries from 1993 to 2004 (NOAA 2006). Albatross take rates since 2001 have dropped off notably. From 2002-2006, average take for black-footed albatross was 82 (range 33-165), and for Laysan albatross, was 101 (range 52-194) (Shannon Fitzgerald, NMFS, 2007 pers. comm.). All reported longline takes of short-tailed albatross in Alaska have occurred on demersal gear, but none have been definitively reported by observers since 1998. Since 1998, at least 4 albatross suspected of being short-tailed albatross were brought up to the surface on gear, but were not retrieved by rollermen or gaffers as directed by observers, and the birds were not able to be positively identified (Kim Rivera, NMFS, 2007 pers. comm.).

As per regulations (NMFS 2004a), only the largest groundfish vessels over 124 feet in length overall (LOA) have observers for 100% of their fishing days. Medium vessels (60 to 124 feet LOA) have observers on board for 30% of their trips in each calendar quarter. Smaller groundfish vessels (less than 60 feet LOA) have no observer requirements. No Pacific halibut longline vessels are required to carry observers, regardless of size. About 21% to 25% of the hooks are monitored in the Bering Sea demersal groundfish longline fishery while 7 to 13% of Gulf of Alaska hooks are monitored (excluding the halibut and state-managed inshore fisheries) (NPFMC 2002). Fishery observers use sampling schemes to subsample the total number of hooks retrieved. The observed take events can then be extrapolated to provide an estimated number of takes for the entire fishery. Two separate analyses for the demersal groundfish longline fisheries have estimated that, on average, one short-tailed albatross is taken in the Bering Sea hook-and-line fishery each year (Stehn et al. 2001). This rate has likely declined since this estimate was developed in 2001.

Also during 2001, the North Pacific Fishery Management Council (the body overseeing fisheries management in the region) unanimously approved recommended changes to the existing regulations for seabird avoidance measures required in the groundfish and halibut fisheries off Alaska. These changes, designed to address the seabird incidental catch issue, were based on research results from Melvin et al. (2001), with modifications considered necessary to accommodate vessel length, vessel type, gear type, and area fished. Final regulations which incorporated these recommendations were published in the Federal Register by the National Marine Fisheries Service (NMFS 2004a) and became effective in February 2004 (69 FR 1930-1951). Subsequent minor changes to these regulations have been approved allowing for longline fishing without seabird avoidance gear in waters where North Pacific albatross have not been recorded by observers or satellite telemetry in protected waters of Cook Inlet, Prince William Sound, Chatham Straight, Dixon Entrance, and in portions of the International Pacific Halibut Commission management Area 4E north of 60° and east of 160° (NOAA 2008). The North Pacific Fisheries Management Council acknowledges that lifting of restrictions in these areas would be readdressed if short-tailed albatross are observed there.

The most notable aspects of modifications to fishing regulations with respect to seabirds in Alaska are that industry has been supportive of the changes all along, and has occasionally pushed for them, and the North Pacific Fisheries Management Council has used information from researchers to initiate management decisions even before the researchers published their findings.

Pelagic longline fishing in the U.S.

U.S.-based pelagic longline swordfish and tuna fisheries in the vicinity of the Hawaiian Islands also have the potential to affect short-tailed albatross. Until recently, the amount and likelihood of take in these fisheries was difficult to determine because of the low rate of observer coverage. NMFS observer records from 1994 to 2000 (based on 4% observer coverage) estimate take of 1,380 black-footed albatross and 1,163 Laysan albatross per year. No takes of short-tailed albatross in any U.S.-based pelagic fishery have been reported. Satellite telemetry suggests very little overlap between this species and areas fished by U.S. pelagic longliners.

The Hawaii-based swordfish longline fishery (a shallow-set pelagic fishery), which was formerly responsible for the majority of seabird incidental catch (USFWS 2000b), was closed by court order from April, 2001, through April, 2004, (Paul Dalzell, Western Pacific Region Fisheries management Council, pers. comm. 2005) due to concerns over incidental catch of sea turtles. Combined albatross incidental catch in Hawaii's shallow and deep-set pelagic longline fisheries decreased by an order of magnitude with the closure of the shallow-set pelagic longline fishery in 2001 (NMFS 2007). The shallow-set swordfish longline fishery was reopened on a limited basis in 2004. Observer coverage in the shallow-set swordfish longline fishery is currently at 100%, and seabird avoidance regulations are in place (NMFS 2007). Participants in the fishery set gear employing a suite of seabird avoidance techniques (70 FR 75075, Dec. 19, 2005) including side setting, or a combination of night setting, use of thawed and blue-dyed bait, and strategic offal discharge (NMFS 2007). These measures reduced albatross take in the swordfish fishery by 90-99% of historical rates (WPRFMC 2005).

In 2001, the observer requirement in the tuna fleet was increased to 20% coverage, and actually exceeded this coverage rate from 2001-2003 (NMFS 2004b). In the Hawaii-based tuna, or deep-set pelagic longline fishery, fishing vessels are not required to use any seabird deterrents when fishing south of 23° N latitude. This is approximately the latitude of the southernmost short-tailed albatross observations near Hawaii. Preliminary satellite telemetry information suggests that the waters exploited by these fisheries are not commonly used by short-tailed albatross (Suryan et al. 2007a). Our database of opportunistic short-tailed albatross sightings from 1942 to present supports this observation (Piatt et al. 2006).

When fishing north of 23° N latitude, these vessels are required to use side setting, or a line-setting machine, minimum 45g weights on branch lines, thawed and blue-dyed bait, and strategic offal discharge (NMFS 2007). As a result, the seabird bycatch rate in this fishery has declined by 83% following the promulgation of seabird bycatch regulations. This dramatic decline demonstrates the effectiveness of relevant seabird avoidance methods in this fishery. Notably, 40% of the albatross caught in this fishery were taken south of 23° N latitude, suggesting that a southward shift of this regulatory boundary may be appropriate for conserving other albatross species (Gilman and Kobayashi 2007).

Trawl fishing in the U.S.

From 2002-2004, U.S.-based trawl fisheries averaged 1057 bird mortalities per year, mostly northern fulmars and short-tailed shearwaters. From 2000-2004, Alaskan trawlers took an estimated 313 Laysan albatross total (NMFS data as reported by Dietrich and Melvin, 2007). The authors caution that this estimate does not account for most birds that would have been injured or killed from wire strikes. Rather, 313 albatross is an estimate of the number of birds having fatal interactions with the trawl netting or that otherwise showed up on deck. Birds can be scooped up and drowned in trawl nets, especially as nets are short-wired (towed at the surface full of fish while previously caught fish are still being processed below decks). Birds may also become entangled on the outside of nets towed at or near the surface. Birds taken by wire and cable strikes are not likely to show up on the vessels deck to be sampled. The third wire (or paravane or net sonde cable) is part of the sonar equipment mounted on the trawl net that transmits sonar data to the ship's bridge. Warp cables are the large cables that connect the trawl net to the vessel. We believe that trawl warp cables and net sonde cables pose a greater risk to albatross than do the trawlers' nets. Indeed, due to substantial albatross mortality resulting from wire strikes, third wire cables have been prohibited in several southern hemisphere fisheries since the early 1990's (Bartle 1991, Weimerskirch et al. 2000). Third wire cables have a longer aerial extent (>100 ft from stern) and are less visible than wider diameter warp cables, and thus may pose a greater risk to seabirds.

Paravanes (outboard wireless sonar transducer cables) are also a threat to albatrosses, and have been anecdotally reported to take albatross at high rates in Atka mackerel fisheries along the Aleutians. An investigator aboard an Atka Mackerel trawler near Buldir Island, Alaska, reported bird / cable strike rates in excess of one per minute in May, 1995 (Ian Jones, Memorial University, pers. comm. 1998). Most strikes were with the net sonde cable, but warp cables were also involved in collisions. The investigator estimated that one in five collisions resulted in bird injury or death, and further estimated that over a 10 day period, their vessel caused about 2,600 bird mortalities. He assumed that the other 6 vessels similarly configured and fishing in the same area at that time caused a similar number of bird mortalities. Most of the collisions involved northern fulmars, but many Laysan albatross also collided with cables. A follow-up beach survey found Laysan albatross washed up dead on the beaches of Buldir Island (Ian Jones, Memorial University, pers. comm. 1998).

Seabirds attracted to offal and discards from trawl vessels may strike any of these cables while they fly about, presumably in search of offal. They may also get pinned against any wire or cable by hydrostatic pressure and forced underwater if the cable comes upon them as they sit on the water. Third wire cable strikes can occur at particularly high rates when the third wire enters the water within or near the offal plume emanating from a vessel. This is especially likely to occur when a vessel changes course while towing gear or when cables are towed through plumes of offal.

Gathering bird-strike data is not part of fisheries observers normal required duties. Consequently, their observations of take by trawl and sonar cables certainly underreports such interactions. Of 3000+ records of bird observations from 1993 to 2001 (including pot, longline, and trawl vessels), there were 25 reports of birds striking or being drowned by third wire and paravane cables, and one report of birds striking a trawl warp cable (NOAA 2006; USFWS Observer Notes Database). The third wire incidents that were noted involved 92 birds, including about 30 northern fulmars and 19 Laysan albatross (NOAA 2006; USFWS Observer Notes Database). In a pilot study of trawl mitigation measures, Melvin et al. (2004) reported 19 contacts per hour between trawl gear and seabirds while aboard a trawler in the Bering Sea during August 1-100, 2004. Sixteen contacts per hour were with the third wire, the remainder with warp cables. No bird injuries or mortalities were observed in this study.

Washington Sea Grant, University of Washington, is investigating techniques for minimizing rates of interaction between trawl gear and seabirds, with a focus on streamer lines to protect all cables, a snatch block to protect birds from the third wire, and a warp boom to protect bird from trawl warps. (see section J.5, Current Research and Recovery Actions, below).

In some southern hemisphere fisheries, most notably in the CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) area, outboard transducer and third wire cables have been outlawed since the early 1990's, due to bird collision problems, and have been replaced by wireless (through-the-hull) transducers (e.g. Bartle 1991; Weimerskirch et al. 2000). Even so, wireless sonar systems have not eliminated the seabird-trawler collision problem. Graham Robertson, Australian Antarctic Division, (pers. comm. 2002) reports that large diameter warp cables of the 30- to 40-vessel trawl fishery around the Falkland Islands struck about 900 albatross between mid-September and late December, 2002 (Sullivan and Reid 2004).

Trawlers in the North Pacific have not embraced wireless sonar technology. They consider third-wire systems more advantageous than wireless systems because they provide an uninterrupted signal, allow a wider array of information to be transmitted, and will more easily accommodate future technological improvements to net monitoring systems that may require higher data transmission capability (Dietrich and Melvin 2007). Nevertheless, if take of short-tailed albatross by trawlers is documented in trawl fisheries, the issue will be addressed in future formal section 7 consultations between National Marine Fisheries Service and the U.S. Fish and Wildlife Service, resulting in non-discretionary terms and conditions designed to minimize take of short-tailed albatross.

Commercial fishing in Russia

Cod and halibut demersal longline fisheries occur in the Russian Far East mostly along the Kamchatka Coast and around the Northern Kuril Islands. These medium-sized vessels (about 40-50m in length) remain relatively near the coast, fishing along the 200m isobath. Short-tailed albatross satellite telemetry data shows that this area is used by short-tailed albatross during their movements between Japan and Alaska.

In the Kamchatka region the Russian demersal longline fleet expends far less effort than the corresponding U.S. fleet, with Russians setting on average 133 million hooks annually in 2001-2006 (Yuri Artukhin, Kamchatka Branch of the Pacific Institute of Geography, Russian Academy of Science, 2007 pers. comm.) compared to 280 million hooks set each year in the Alaska EEZ from 2000-2004. Although demersal longline fishing effort is lower in Russia than in the U.S., we still lack fishery observer data from this sizable Russian fishery. And, although our satellite telemetry information suggests that short-tailed albatross make less use of coastal Russian waters than they do waters of the U.S. EEZ, we do have a report of a short-tailed albatross taken in the Russian demersal longline fishery in the western Bering Sea in August of 2003 (Artukhin et al. 2006).

Seabird bycatch rate in the Russian longline fishery spikes dramatically during June (Artukhin et al. 2006), when short-tailed albatross breeders and fledglings are transiting along this corridor from Japan to Alaska. We suspect that additional short-tailed albatross have been taken in this fishery, especially since so little effort was expended when Russian observers recorded their single short-tailed albatross mortality .

All longline vessels in this portion of the Russian EEZ are Russian domestic vessels. Foreign fishing effort in Russia is comprised mostly of squid jiggers in the Sea of Japan; these are mostly vessels registered in Japan, Korea and China. Squid jigging poses far less threat to short-tailed albatross than does longlining (Yuri Artukhin, Kamchatka Branch of the Pacific Institute of Geography, Russian Academy of Science, 2007 pers. comm.). Telemetry information indicates little use of the Sea of Japan by Short-tailed albatross (Rob Suryan, Oregon State University, 2008 pers. comm.)

Commercial Fishing in Japan

Little is known about seabird bycatch rates for fisheries in Japan. Along the shelf edge off Northeastern Japan, there are various small scale demersal fisheries targeting cod, pollock, flatfish and rockfish. Pelagic fisheries there target sardine, mackerel, squid, shark, and tuna. In the area used by breeding short-tailed albatross during brood-

Short-tailed albatross chick with parent on Torishima Island. Photo: H. Hasegawa.

rearing, purse seining, gill-netting, and trawling occur and are regulated by local governments. While effort and catch data may eventually become available to us, bycatch data is unlikely to exist (Masashi Kiyota, Fisheries research Agency, Japan. pers. comm. 2008). Japan's fishery Agency indicates that the only likely threat to short-tailed albatross in Japanese fisheries is from long-line fishing for tuna, which is required to report bycatch of albatross and other seabirds. Long-line fishing for tuna does not occur on the continental shelf (the area indicated by our research as an important foraging area for brood-rearing albatross), but there is some long-line fishing for salmon shark (Lamna ditropis) off the shore of Tohoku area (Masashi Kiyota, Fisheries research Agency, Japan. pers. comm. 2008).

Driftnet Fishing in the North Pacific

Driftnet salmon fishing, long illegal in the United States, is still practiced in Russia. Research Institutes of Fishery and Oceanography had long been using proceeds from driftnet operations to fund their research operations. The fishery operates as a scientific fishery used for salmon stock assessment. But these institutes have recently been converted from a quasi-for-profit method of operation to one that operates strictly on an allocated budget. Thus, they can no longer benefit from the proceeds that their catch produces. This suggests that they will conduct less driftnet fishing in the future. However, conventional commercial driftnet operations still exist in Russia. At least one short-tailed albatross has been taken in this fishery (on July 8, 1998 at about 59°N x 170°E)(Yuri Artukhin, Kamchatka Branch of the Pacific Institute of Geography, Russian Academy of Science, 2007 pers. comm.).

There is also a Japanese driftnet salmon fishery that operates in the Russian EEZ. These vessels carry fishery observers, and were observed to have taken an average of 186,000 seabirds per year from 1993-1998 (Artukhin et al. 1999).

Non-U.S. fishing Operations

Understanding the non-U.S. fishing effort in the North Pacific is an integral part of analyzing the global threat of commercial fishing activities to the short-tailed albatross. Despite significant international initiatives in recent years to address this problem globally, there is still little information available on the magnitude of threat posed by many fisheries. We know that longline vessels from Taiwan, China, Japan, the Republic of Korea, and Russia fish in the northwestern Pacific. Distant water longline fleets, such as those from the U.S., Japan, Russia, Korea, and Taiwan, fish for swordfish and tuna throughout the North Pacific Ocean. Japan fishes its EEZ heavily, including the areas used by short-tailed albatross for obtaining food for chicks (Rob Suryan, Oregon State University pers. comm. 2007). The Government of Japan has issued special fishing gear restrictions applicable to a 20-nautical mile area around Torishima, to protect short-tailed albatross during the main breeding season (see section J.5 below and Appendix 4). However, recent satellite telemetry data indicates that this protection area does not protect birds that are actively feeding because these birds venture far beyond the 20-nautical mile buffer. Rather, it protects birds that seem to be loafing on the island near their nesting colony.

In most fisheries, fishermen are not required to report seabird incidental catch, may not be able to identify seabirds, or may have significant disincentives for reporting seabird take. Reports of short-tailed albatross taken outside the US EEZ are scarce. Hasegawa (pers. comm. 2002) noted that a short-tailed albatross was hooked by a Japanese vessel jig fishing for bonito in 1986, but the bird was released alive. We also have a report of a subadult short-tailed albatross (originally marked on Torishima in 2000) that was taken by a Russian longliner in the western Bering Sea in August of 2003 (M. Williams, World Wildlife Fund, pers. comm. 2003).

Fishing vs. Albatross Food Supply

The effects of commercial longline and trawl fishing on the forage base of the short-tailed albatross are considered discountable, for a number of reasons. First, the albatross are naturally very strong and wide-ranging fliers, not restricted to a limited foraging area. Second, the albatross' diet is believed to consist primarily of squid, shrimp, and crustaceans. Demersal and pelagic longline and trawl fisheries in U.S. EEZ waters most often used by short-tailed albatross do not currently target these species. Third, the short-tailed albatross population represents such a small fraction of historical levels that its resource base, which once supported millions of birds, ought to be able to support many tens or hundreds of thousands of birds. The rapid growth of the short-tailed albatross population is a testament to the notion that this species is not currently resource limited.

Contaminants

Environmental contaminants are known to adversely affect birds (for reviews see Beyer et al. 1996; Fairbrother et al. 1996; Giesy et al. 2003). Briefly, the effects of contaminants can include impaired reproduction, decreased immune function, inability to thermoregulate, disrupted endocrine balance, genetic mutations, and direct mortality. A number of studies have measured contaminant concentrations in tissues of Laysan and black-footed albatross (Auman 1994; Auman et al. 1997; Burger and Gochfeld, 2000; Elliott et al. 2005; Finkelstein et al. 2006; Fry et al. 1987; Fujihara et al. 2004; Gurge et al. 2000; Sievert and Sileo 1993; Tanabe et al 2004). Fewer studies have investigated the behavioral and physiological effects of contaminant loads in these albatross (Sievert and Sileo 1993; Auman 1994; Finklestein 2003; Finkelstein et al. 2006). Published literature documenting contaminant concentrations in short-tailed albatross tissues is even more limited (Ikemoto et al. 2003; Nakanishi et al. 2003; Kunisue et al. 2006), and no studies have investigated the effects of sublethal exposure to contaminants in this species.

Organochlorines, pesticides and metals

Albatross and other birds may be exposed to organochlorine contaminants such as polychlorinated biphenyls (PCBs) and pesticides, and to toxic metals (e.g. mercury, lead) via atmospheric and oceanic transport. Uptake of these toxins through the food chain may affect these birds throughout their growth and development.

Tanabe et al. (2004) measured dioxins, furans and PCB congeners in five species of albatross from the North Pacific and Southern Oceans. North Pacific species (black-footed and Laysan) had higher concentrations of several dioxin and furan compounds than species from the Southern Oceans. Previous studies by these same researchers indicated that concentrations of PCBs and organochlorine pesticides (e.g., DDTs, HCHs) were also higher in North Pacific albatross. Auman et al. (1997) measured concentrations of PCBs and organochlorine insecticides in chick and adult plasma and in eggs of Laysan and black-footed albatross on Sand Island, Midway Atoll. Concentrations of DDE in Laysan albatross eggs were found to be well below the threshold for eggshell thinning, but were approximately one-half of the threshold concentrations necessary for eggshell thinning in black-footed albatross eggs. These researchers also found PCB concentrations near levels that could be having subtle population-level effects in black-footed, but not in Laysan, albatrosses, likely due to the different trophic niches each species occupies (Suryan et al. 2007a).

Nakanishi et al. (2003) analyzed persistent organochlorine pollutants (POPs) in eggs, pectoral muscles, and stomach oil of short-tailed and black-footed albatross from Torishima. They detected polychlorinated dibenzo-*p*-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in all the samples they analyzed. Concentrations of both PCDDs and PCDFs were higher in black-footed albatross eggs and muscle tissue than in short-tailed albatross samples. Overall, residue levels of POPs in albatross eggs from Torishima were higher than those of other offshore bird species from the northern hemisphere.

Concentrations of p,p –DDE were within the range that causes eggshell thinning in other bird species; however, the sample size was inadequate to consider the effects of this chemical on short-tailed albatross reproductive success. Kunisue et al. (2006) measured dioxins and related compounds (DRC) in eggs, nestlings and adult black-footed albatross and short-tailed albatross collected from Toroshima Island. They also measured DRC in regurgitated stomach contents of black-footed albatross nestlings. They found that DRC were higher in black-footed albatross matrices than in short-tailed albatross, however sample sizes were very small for short-tailed albatross (n=egg/1; nestling/1 and adult/2). They surmise that feeding habit differences led to higher DRC accumulations in black-footed albatross: black-footed albatross feed mainly on fish while short-tailed albatross are thought to eat mainly squid. It is also possible that black-footed albatross feed in areas that are more contaminated than short-tailed albatross. Despite differences in concentrations between the two species, the authors note that both species have higher concentrations of DRC than other oceanic species collected off the coasts of California and the Canadian Arctic. They were also higher than inland and coastal birds from Japan, Canada and the Great Lakes. The albatross from Toroshima were only slightly lower in dioxins and certain polychlorinated biphenyls (PCB) than herons and cormorants from the highly contaminated Galveston Bay. These results indicate that the adult albatross have been exposed to high levels of DRC and transfer large amounts of these contaminants to their eggs.

These authors also compared toxicity threshold values between chickens, several wild bird species and albatross using toxic equivalency quotients (TEQs). TEQs are used to measure the total toxicity of all dioxin-like compounds in a matrix, and by using a formula generated by the World Health Organization toxicity can be compared among different species. Results of this comparison indicate that the exposure of these two North Pacific albatross to DRCs and the concentration in their eggs exceed toxicity thresholds for other bird species. It implies that embryos have a high risk of dioxin toxicity. A missing piece of this puzzle, however, is the lack of information regarding the sensitivity of albatross to dioxins.

Metal concentrations have been measured in tissues of several albatross species (Elliott 2005; Finkelstein et al. 2003; Finkelstein et al. 2006; Fujihara et al. 2004; Ikemoto et al 2004). Few studies have evaluated the physiological or behavioral consequences of contaminant exposure, however Finkelstein et al. (2007) recently investigated the effects of contaminants (including metals) on immune function of black-footed albatross. They found that contaminant concentration varied widely among individuals, and that organochlorine and mercury concentrations were associated with decreased immune response.

Recent attention has been focused on the high concentrations of lead that was measured in local populations of Laysan albatross on Midway Island National Wildlife Refuge. Finkelstein et al. (2003) documented elevated lead concentrations in the blood of Laysan chicks nesting near buildings with lead-based paint. High lead concentrations in some of these chicks caused damage to their peripheral nervous systems, visible as "droopwing," a symptom of lead poisoning which affects wing muscle control. Chicks with high lead concentrations were likely to die from direct lead poisoning or the inability to fly due to nerve damage. Two published studies have documented concentrations of metals in three short-tailed albatross eggs (Ikemoto et al. 2003; Ikemoto et al. 2005). Contents from only one egg could be analyzed because the other eggs were not whole.

In these studies, the authors measured metal and trace element concentration in eggs from short-tailed albatross and eggs and blood from black-footed albatross. They reported that mercury was elevated in both black-footed and short-tailed albatross eggs from Toroshima Island, Japan (1.1 and (mean) 3.4 ug/g dry weight, respectively). Mean background for other seabirds has been documented at <0.5 ug/g (Thompson 1996). Mercury was also measured in whole blood and feathers from three short-tailed albatross captured on the Bering Sea, Alaska (K. Trust unpubl data). In feathers, concentrations were similar to those in black-footed albatross from Japan and Midway atoll, but much higher than in loons from Alaska and New England. Concentration in blood, however was lower than Alaskan or Canadian loons.

Oil

Adverse effects of petroleum on marine birds and their prey are widely known (Yamato et al. 1996, Glegg et al. 1999, Trust et al. 2000, Esler et al. 2000, Custer et al. 2000), and petroleum products released into the marine environment can remain for years (Hayes and Michel 1999). Oil contamination can harm short-tailed albatross either through acute toxicity from being directly oil or as a result of chronic or sublethal exposure to low levels of oil. Petroleum exposure may: (1) compromise seabirds' thermoregulation through fouling of feathers; (2) cause direct toxicity through ingestion (e.g., during preening); (3) contaminate the birds' food resources; (4) reduce prey availability from toxic effects on prey species; and (5) cause embryotoxic effects.

Oiling decreases the feathers' insulating qualities and can lead to hypothermia and death (Golightly et al. 2002; Nariko 1999). Oiled breast feathers on incubating adults can also lead to embryo mortality. Studies have shown that less than a microliter of crude oil on a common eider egg will kill the incubating chick (Brunstrom et al. 1990). Documenting the effects of sublethal petroleum exposure on avian species in the wild is more difficult. However, Custer et al. (2000) reported changes in enzyme induction and somatic chromosomal damage in sea ducks after exposure to petroleum hydrocarbons. Additionally, Trust et al. (2000) and Esler et al. (2000) found physiological and potential population-level effects on sea ducks from residual oil in the environment nine years after the Exxon-Valdez oil spill in Prince William Sound, Alaska.

Oil spills can occur in many parts of the short-tailed albatross' marine range. The Senkaku Islands (the island chain in which Minami-kojima occurs) is a candidate for future oil development (BBC 2003). This industrial development would introduce the risk of local marine pollution from blow-outs, spills, and leaks related to oil extraction, transfer and transportation. Historically, short-tailed albatross rafted together in the waters around Torishima (Austin 1949), and in recent times, flocks of short-tailed albatross along Torishima's coast numbered in the low hundreds (Greg Balogh U.S. Fish and Wildlife Service, pers. comm. 2008). Flocks have occasionally been observed at sea numbering in the dozens to low hundreds (Service, unpublished data, Figure 14). An oil spill in an area where large numbers of short-tailed albatross are rafting could negatively affect the population significantly. The birds' habit of feeding at the water's surface makes them vulnerable to oil contamination. Hasegawa (pers. comm. 2002) has observed some birds on Torishima with oil spots on their plumage, but effects on short-tailed albatross reproduction have not been investigated.

Plastics

Consumption of plastics may also be a factor affecting the species' survival. Moore et al. (2001) found that in the North Pacific central gyre the mass of plastic was approximately six times that of plankton in surface waters. Albatross often consume plastics at sea, presumably mistaking them for food items, or consuming plastic objects to which flying fish eggs have adhered. Plastics have been found in most, if not all, species of albatross. In necropsies conducted on 251 Laysan albatross chicks, Auman et al. (1997) found that more than 97% of the chicks contained plastic. The plastic items found within the chicks included resin fragments, beads, fishing line, buttons, checkers, disposable cigarette lighters, toys, PVC pipe, golf tees, dish-washing gloves, magic markers and cyalume light sticks. Beverage bottle caps and disposable lighters were among the most common plastic items seen in the Midway albatross colony in December of 2004 (Balogh pers. obs. 2004).

Short-tailed albatross on Torishima commonly regurgitate large amounts of plastic debris (H. Hasegawa pers. comm. 2002). Ingestion of sharp plastic pieces can result in internal injury or mortality to the birds. Large volumes of ingested plastic can result in a reduction of gut volume available for food and water absorption, leading to malnutrition 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) reported 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 as a whole). This study suggests that plastics ingestion reduces chick survival. Auman et al. (1997) also report that birds with heavy plastics loads have reduced resistance to the effects of lead poisoning and the avian pox virus.

Ingestion of plastic pellets may also be a direct source of toxic contaminants. For example, PCBs can reach "parts per million" concentrations on plastic resin pellets, and PCB tissue residues in some seabird species were positively correlated with mass of ingested plastic pellets (Tanabe et al. 2004). Hasegawa (pers. comm. 2002) has observed an increase in the occurrence of plastics in birds on Torishima over the last 10 years, but the effect on survival and population growth is not known.

In summary, available evidence indicates that a variety of contaminants may adversely affect short-tailed albatross population performance in the future. The paucity of information regarding contaminant exposure and effects demonstrates the need for research in this area.

Disease and Parasites

No known diseases affect short-tailed albatross on Torishima or in the Senkakus 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 (pers. comm. 2002) reports that he observes a wing-disabled bird every few years on Torishima, but the cause of the disability or injury 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 (USFWS 2000a). Avian influenza, West Nile virus, fungal and bacterial infections are other pathogens to which short-tailed albatross could be vulnerable. As indicated above, body burdens of contaminants may increase susceptibility to disease.

Historically, several parasites were documented from short-tailed albatross on Torishima: a blood-sucking tick that attacks its host's feet, a feather louse, and a carnivorous beetle (Austin 1949). More recently, Ushijima et al. (2003) report collecting a tick, (*Carios capensis*) from black-footed albatross on Torishima. However, there is no evidence that these or other parasites have had population-level effects to short-tailed albatross (USFWS 2000a).

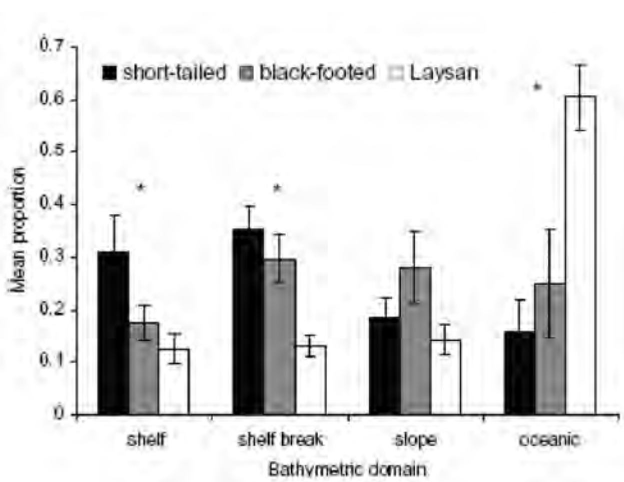


Figure 17. Proportion of time within bathymetric domains of shelf (<200m), shelf break (200-1000m), slope (1000-3000m), and oceanic (>3000m) for three species of albatross tracked July-November 2005 and 2006. Asterisks note significant differences in partitioning among species in that domain.

Predation

Sharks may take fledgling short-tailed albatross as they depart their natal 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 short-tailed albatross chicks on Torishima. Hattori (in Austin 1949) reported that one-third of the short-tailed albatross chicks on Torishima were killed by crows, but crows are apparently not present on the island today (USFWS 2000a). There is a record from the 1960s of a short-tailed albatross chick being taken by a Steller's sea eagle (*Haliaeetus pelagicus*). In recent years, these sea eagles have been seen taking an occasional black-footed albatross chick on Torishima, but are not believed to be a major threat to short-tailed albatross (H. Hasegawa, Toho Univ. pers. comm. 2002).

Natural Competition

At-sea interference competition from other albatross species, especially from Laysan albatross, may be hindering the rate of recovery of short-tailed albatross. It is possible that the ecological void left by short-tailed albatross after its near annihilation has allowed other albatrosses to flourish in the absence of short-tailed albatross. Evidence to support this theory includes the recent establishment of new Laysan albatross colonies off the North American West Coast and in the main Hawaiian Islands. In addition, Laysan albatross have become a regular summer species in the California Current, where short-tailed albatross once dwelled (David Ainley, 2005 pers. comm.).

While it is difficult to fully discount this theory, recent satellite telemetry and diet (stable isotope) data indicates that even though ranges of Laysan and short-tailed albatross overlap in places, they tend to occupy different pelagic habitats and show significant foraging niche partitioning (Suryan et al. 2007a). Of the Laysan Albatross tracked in Alaskan waters, 60% of their time was spent in the pelagic domain (>3000m), a depth used by short-tailed albatross only about 20% of the time. Instead, short-tailed albatross made more extensive use of shallower waters. Short-tailed albatross adults and subadults used waters less than 1000m over 70% of the time. Juvenile short-tailed albatross, which are more prone to wandering, spent about 80% of their time in waters <1000m in depth (Figure 17) (Suryan et al. 2007a).

Satellite telemetry suggests that black-footed albatross are not as strongly associated with waters overlaying any particular bathymetric domain, which stands in contrast to what we see for both of the other North Pacific albatross species. In addition, black-footed albatross are far less numerous than Laysan albatross, and are thought to be in decline (IUCN 2007). Furthermore, black-footed albatross from Hawaii (where the majority of population breeds) in general spend more time in the eastern North Pacific than the western North Pacific and Bering Sea, where short-tailed albatross spend most of their time. Indeed, short-tailed albatross were the only albatross species to make extensive use of the Bering Sea (Suryan et al 2007a). Taken together, this information suggests that short-tailed albatross are not suffering the effects of competition for food due to the habits of the other two North Pacific albatross species.

Invasive Species

Black, or ship, rats (*Rattus rattus*) were introduced to Torishima at some point during human occupation. The effect of these rats on short-tailed albatross is unknown, but rats are known to feed on chicks and eggs of other seabird species (Atkinson 1985), and there have been numerous efforts of rat eradication to protect seabird colonies (Taylor et al. 2000; USFWS 2003). We are unaware of any instances of rats predating short-tailed albatross eggs on Torishima, nor are we aware of instances of rats preying upon short-tailed albatross chicks. Cats (Felis cattus) were also historically present on Torishima, most likely from introductions during the feather-hunting period. They have caused damage to other seabirds on the island (Ono 1955), but there is no evidence of adverse effects to short-tailed albatross. 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, and they are not currently present on the island (H. Hasegawa pers. comm. 2008).

In addition to non-native animals such as cats and rats, non-native plants, such as shrubs, can limit or destroy suitable nesting habitat on breeding islands. A list of plant species on Torishima was made in the 1950's (H. Hasegawa, Toho Univ. pers. comm. 2002). Although there is currently no known invasive plant problem on Torishima, accidental introductions remain a threat as long as humans work on the island. Presence and control of invasive plants may be a concern on proposed reintroduction sites, where the public are allowed to make day visits.

Air Strikes

Seabird collisions with airplanes have been documented by the Service on Midway Atoll National Wildlife Refuge since operation of the Henderson 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 (Beth Flint, U.S. Fish and Wildlife Service, pers. comm. 2003). The Service has documented 135 seabird collisions with aircraft at Midway that resulted in bird mortality. An additional 7 birds may have been struck by planes and killed. However, the Service was unable to ascertain the identity of these birds because they fell into the waters of the lagoon or into thick vegetation at the end of the runway. Monitoring data suggest that these unidentified birds are likely either Laysan or black-footed (not short-tailed) albatross. Although there is a small risk of short-tailed albatross striking aircraft on Midway, the opportunities for aircraft strikes having population-level effects upon this species are considered discountable at this time.

Other Human Activities

A number of other human activities, both deliberate and unintentional, were considered by the START as having the potential to impact short-tailed albatross recovery. In the past, direct take through hunting and egging decimated the population. Such activities are unlikely to occur now, since the birds and their habitat are protected both legally and because their current breeding colonies are so remote and difficult to access. As new colonies become established, colony monitoring may be required if human disturbance becomes an issue.

Even if intentional lethal take is no longer having population-level effects for this species, unintentional take and human disturbance can impact individual short-tailed albatross. Researchers conducting telemetry and other studies on Torishima cause some level of disturbance, particularly on breeding albatross (H. Hasegawa, Toho Univ. pers. comm. 2002), but they strive to minimize this disturbance. Evidence suggests that handling of birds during hot weather may have played a role in at least one death. Field handling protocols that would standardize procedures for minimizing future take are being developed, in accordance with this recovery plan. In the future, any new colonies established should be managed to minimize the impacts of ecotourism, including contaminants from cruise ships and direct disturbance. Potential new colony sites should be carefully evaluated to minimize the possibility of future impacts from nearby military activities or other sources. Human disturbance is not currently considered to be a significant threat to short-tailed albatross.

Stochastic and Genetic Factors

As discussed by Gilpin (1987), small populations will have difficulty surviving the combined effects of demographic and environmental stochasticity (i.e. uncertainty). Demographic stochasticity refers to random events that affect the survival and reproduction of individuals (Goodman 1987). Environmental stochasticity is due to random, or at least unpredictable, changes in factors such as weather, catastrophic events, food supply, and populations of predators (Shaffer 1987). The estimated 2008 world population of short-tailed albatross is under 2800 birds (see ***Current Population Status*** section on page 8). This small population size puts them at some risk to the deleterious effects of demographic and environmental stochasticity. However, our Population Viability analysis suggests that with current rates of population growth, the world population could suffer significant loss due to catastrophic events and still recover. However, sustained increases in mortality in the range of 5-7% could reverse this species recovery (Finkelstein et al. 2007). Increasing the loss of adult birds due to the additive mortality associated with human-related threats, in combination with natural mortality and a major catastrophic event, could potentially destabilize the population, decrease recruitment, and slow or preclude the recovery of this species.

All known and potential threats discussed above are summarized in Table 8, along with the appropriate listing factor category. This table results from a thorough review of threats conducted at the first Short-tailed Albatross Recovery Team meeting.

Dr. Rob Suryan prepares to attempt capture of a short-tailed albatross (far left) near Seguam Pass in Alaska's Aleutian Islands. Photo: G. Balogh.

Table 8. Known and Potential Threats to Short-tailed Albatross. For known threats, there is evidence of past or current harm. Potential threats are those where harm is believed to be reasonably possible, but for which there is no evidence of past or ongoing occurrence.

Threat Category	Threat	Known (K) or Potential (P) Threat	Listing Factor*
Catastrophic events at breeding colonies	Volcanism (lava, gas, pyroclastic flows, habitat destruction)	K	A
	Earthquakes	P	A
	Landslides	K	A
	Typhoons (and associated erosion, wind, wave action, and flooding)	K	A
Global changes	Climate change (effect on breeding colony climate or food supply)	P	E
	Oceanic regime shift and effect on food supply	P	E
Demersal longline fisheries	(US) Alaska	K	E
	US (lower 48)	P	E
	Russia	K	D/E
	Canada	P	D/E
	High seas and other countries(China, Taiwan, Korea)	P	D/E
Pelagic longline fisheries	U.S.	P	D/E
	Japan	P	D/E
	Russia (ask Ed)	P	D/E
	High seas and other countries (China, Taiwan, Korea)	P	D/E
Gillnet fisheries	Japan	P	D/E
	Russia	K	D/E
	High seas and other countries	P	D/E
Jig/troll fisheries	Japan	K	D/E
	U.S.	P	D/E
	High seas and other countries	P	D/E
Trawl fisheries	U.S.	P	D/E
	Japan	P	D/E
	Russia	P	D/E
	High seas and other countries	P	D/E
	Lost gillnets, longlines, trawl nets, seines, pots	P	D/E
Offal Discharge	Increases risk of bycatch	P	D/E
	hooks in offal	P	D/E
	Supplemental feeding leads to dependence	P	D/E
	Concentrates contaminants	P	D/E
Resource Depletion	Direct take of squid or other foods by humans	P	D/E
	Competition with other species in food chain	P	D/E
Contaminants - oil	Oil Spills (note shipping route traffic in certain locations.	P	D/E
	Chronic oiling	P	D/E
	Future Oil Development in at-sea range	P	D/E
	Future Oil Development near colonies	P	D/E
Contaminants - plastics	Physical impacts of plastic ingestion	K	D/E
	Plastic ingestion as vector for other contaminants	P	D/E

Table 8. Continued.

Threat Category	Threat	Known (K) or Potential (P) Threat	Listing Factor*
Contaminants	Mercury	P	D/E
	other metals	P	D/E
	Persistent organic pollutants	P	
Air strikes	e.g. at Midway Island	P	D/E
Disease/parasitism	Avian Influenza	P	C
	West Nile Virus, avian pox, Ticks, etc.	P	C
Predation	Sea eagles	K	C
	Sharks	P	C
	Crows	P	C
Other natural factors	Phytoplankton blooms (toxic diatoms and coccolithophores)	P	E
Competition	Competition for nest sites with black-footed albatross	P	E
	Competition for resources from other species	P	E
	Chick harassment by black-footed albatross	K	E
Invasive species	Rats	KP	C
	Snakes	P	C
	Cats	KP*	C
	Invasive Plants	K	A
Other human activities	Ecotourism (Bonin Islands)	P	E
	Contaminants from cruise ships	P	E
	Researcher disturbance	K	E
	Wind and wave energy development, harvesting birds, egging	P	B
	Political turmoil	P	E
	Military exercises	P	E
	Eco-vandalism and Illegal take on land and at sea	P	B
Genetic/Stochastic	Genetic bottleneck, inbreeding depression, genetic drift, due to suppressed numbers	P	E

Listing Factors (as enumerated in Section 4(a)(1) of the Endangered Species Act:

A – Destruction or curtailment of habitat or range

B – Overutilization for commerce, recreation, education, or scientific purposes

C – Disease or predation

D – Inadequacy of existing laws

E – Other natural or human-related factors

* Known to be a threat in the past, but not currently a known threat.

Figure 18. Japanese researchers have been using albatross decoys and a sound system playing colony calls to attract breeding birds to Hatsnezaki, a gently sloping and vegetated site on Torishima.

CURRENT RESEARCH AND RECOVERY ACTIONS

Population Monitoring

The Tsubamezaki breeding colony on Torishima has been monitored annually since the mid-1950's (Figure 7), and all chicks have been banded since 1977. A subsample of chicks has been color-banded, beginning in 1979 (Appendix 1). The Senkaku population has been monitored less regularly (Table 4); access to that colony is difficult both logistically and politically. The START ranks as a high priority both continued monitoring of the Tsubamezaki breeding colony and regular monitoring of the Senkaku population.

Breeding Site Enhancement

Breeding site enhancements at the Tsubamezaki colony have improved nesting success. In 1981, a habitat improvement project was initiated, with the support of the Environment Agency of Japan. Grass was transplanted to nesting areas, and loose volcanic soils were stabilized. Breeding success at this colony improved following the habitat enhancement efforts (Hasegawa 1991). Volcanic ash, which accumulates in breeding habitat, is partially removed annually, and other supplementary colony management tasks are undertaken each year (H. Hasegawa, Toho Univ. pers. comm. 2007).

In 1991, the Yamashina Institute of Ornithology initiated efforts to attract breeding birds to an alternate, relatively level, well-vegetated site on the northwest side of Torishima (Hatsunezaki), which is less likely than the main colony to be affected by lava flows, mud slides or erosion. Realistic albatross decoys and continuous recordings of short-tailed albatross vocalizations are used to lure the birds to the Hatsunezaki site, (K. Ozaki, Yamashina Institute, pers. comm. 2002 Figure 18). In 1997, a satellite video system was installed at Hatsunezaki, which transmits live to Tokyo. This system allows remote observation of many previously unobserved aspects of parental behavior and chick development without disturbing the birds.

As stated above, one pair has nested at the new colony site for several years, producing seven chicks between 1996 and 2004 (Table 3). In the 2004-2005 nesting season, three additional pairs have nested, and each has hatched an egg at this colony site. During 2005, four chicks fledged from the colony, and visitation rate by nonbreeders was increasing. By 2008, the size of this colony grew to 36 pairs, and 23 fledging chicks.

Establishing new colonies

In preparing biologists for the task of translocating and hand-rearing short-tailed albatross, in early March of 2006, ten Laysan albatross chicks were moved from Midway NWR (where there is a thriving colony of over half a million) to Kilauea Point NWR, Kauai. Under the direction of Tomohiro Deguchi, Yamashina Institute, chicks were weighed and measured daily. Their diet consisted of chopped fish, pediolyte for hydration, and seabird vitamins.

Unfortunately, March of 2006 was one of the rainiest and coldest months on record for Kauai. Two of the chicks died, most likely from exposure, before they were moved into shelter. Another chick died shortly after the chicks were put back out on their rearing site during clear weather.

The remaining seven chicks thrived and grew well. However, one chick developed wing droop due to a dislocated carpus (wrist), and was unable to fledge. This bird now does live shows at the San Diego Zoo. Close to fledging time, two more chicks suddenly died from "massive bacterial infections." The remaining 4 chicks fledged by mid-July.

In March of 2007, 10 black-footed albatrosses were moved from Nakodojima to Mukojima, a nearby island in Japan where short-tailed albatross were to eventually be translocated. Sterile procedures and handling methods for chick rearing were greatly improved over the previous year's effort with Laysan albatross. Nine of ten chicks fledged, with one mortality attributed to suffocation from a bone stuck in its throat during regurgitation. Fledging time for these nine chicks matched those of nearby parentally-reared black-footed albatross.

On February 19, 2008, ten short-tailed albatross chicks, about 6 weeks old, were captured on Torishima and flown to Mukojima by helicopter. Sterile handling procedures continued to evolve, and each short-tailed albatross chick had its own set of feeding equipment. Rubber gloves were used and disinfected between feeding each chick. All feeding equipment was sterilized daily. At first, the chicks were fed a slurry of pureed squid and fish, and fed through a stomach tube. As they grew older, they were given chopped, then whole, fish and squid by hand. Weighing and measuring was minimized to once every few days. All ten short-tailed albatross chicks fledged from May 19 to May 25, slightly earlier than their Torishima counterparts.

Five of the translocated Mukojima chicks, and five of the naturally-reared chicks from Torishima were equipped with solar-powered satellite transmitters affixed to back feathers. Eight of ten tagged fledglings (four translocated birds and four control birds) were tracked to the Aleutians and spent much time feeding in coastal areas along Japan, Russia and Alaska.

Satellite Telemetry

In 1996, Japanese researchers, supported by the Environment Agency of Japan, began using satellite telemetry tags ("platform-transmitting terminals," or PTTs) to track movements of subadult short-tailed albatross. U.S.-based field crews began participating in the Torishima tracking efforts beginning in 2001. Starting in 2003, efforts expanded to include tracking of birds captured at sea in Alaska in or near Seguam Pass near Seguam and Amlia islands. In 2006, Torishima-based satellite tracking efforts switched from non-breeding birds to breeding birds (Table 9). At sea captures in Alaska occurred in 2003, 2005, and 2006. The objectives of this satellite telemetry work include determination of the birds' migration routes, foraging areas, movements relative to environmental factors and bathymetry, and determination of potential interactions with fisheries. Results to date are discussed in detail in the Marine Habitat and Marine Distribution sections, and appear elsewhere throughout this document.

Protected Status of Breeding Birds and Habitat

The Japanese Government designated the short-tailed albatross as a Natural Monument in 1958, as a Special Natural Monument in 1962 (Hasegawa and DeGange 1982) and as a Special Bird for Protection in 1972 (King 1981). Torishima was declared a Natural Monument in 1965 (King 1981). These designations have resulted in tight restrictions on human activities and have prevented disturbance on Torishima (H. Hasegawa pers. comm. 1997). In 1993, the species was designated as a Domestic Endangered Species under the Species Conservation Act in Japan, which makes National Government funds available for conservation programs established as appropriate. The Japanese "Short-tailed Albatross Conservation and Breeding Project Program" outlines general goals for continuing management and monitoring of the species, and future conservation needs (Environment Agency Japan 1993 -- See also Appendix 4). The principal management practices used on Torishima are legal protection, habitat enhancement, and population monitoring. A complete list of protections that apply to this species follows.

International

- 2007 IUCN Red List of Threatened Species, Vulnerable, VU D2 (IUCN 2007)
- Convention on International Trade of Endangered Species (Appendix I) (www.cites.org/eng/app/appendices.shtml)
- Convention on Migratory Species - Listed Species (Appendix I; as Diomedea albatrus) (www.cms.int/documents/appendix/additions_II.pdf)
- North American Waterbird Conservation Plan – High Conservation Concern (Kushlan et al. 2002)

National –Canada

- Migratory Bird Convention Act (laws.justice.gc.ca/en/M-7.01/)
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada) – Threatened (COSEWIC 2003)
- Species At Risk Act, Listed as Threatened (www.sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=797)
- Recovery Strategy for the Short-tailed Albatross (Phoebastria albatrus) and the Pink-footed Shearwater (Puffinus creatopus) in Canada (Environment Canada 2008)
- Wings Over Water: Canada's Waterbird Conservation Plan – High Conservation Concern (Milko et al. 2003)
- National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (Department of Fisheries and Oceans 2007)

National –China

- Law of the People's Republic of China on the Protection of Wildlife (Harrison et al. 1992)
- Protected under Treaty between Japan and China (listed as Diomedea albatrus) (United Nations 1981)

Table 9. Attachment method and transmission duration for satellite transmitters attached to short-tailed albatross on Torishima Island, Japan and for those attached to birds captured at sea near Seguam and Amlia Islands in Alaska.

Year	No. Tracked	Breeding status	Attachment method	Capture Month	Tracking Duration (days)	Color Band Information
1996	3	Non- or Post-breeders	Glue	May	3-50	
1997	3	Non- or Post-breeders	Glue	May	13-37	
1998	1	Non- or Post-breeders	Glue	May	84	
2001	3	Non- or Post-breeders	Harness	May	18-120	none
2002	9	Non- or Post-breeders	Glue/tape	May	2-132	none
2003	7	Non- or Post-breeders	Glue/tape	May	51-113	1 yellow, 1 blue, 1 green, 1 red, 1 red over blue, 1 white, 1 black w/ white letters (A1921)
2003*	4	Juvenile and Non- or Post-breeders	Tape	August	15-111	none
2005*	2	Non- or Post-breeders	Tape	August	13-60	A01-A02 red w/ white letters
2006	8	breeders	Glue/tape	February	121-207	J0033-J0040, black w/ white letters
2006*	6	Juvenile and Non- or Post-breeders	Tape	July	19-132	A03-A08 red w/ white letters
2007	8	breeders	Glue/Tape	February	10-172	A01-A02, A-04-A08, A10 yellow w/ black letters
2008	6	breeders	Tape	February	77->151 (still tracking)	A11-A16 yellow w/ black letters
2008	10	chicks	Tape	May	9-> 68 (still tracking)	Y02-Y05, Y09 red w/ white letters

*captured at sea in Alaska

National – Japan

- Natural Monument (1958) (Hasegawa and DeGange 1982)
- Special Natural Monument (1962) (Hasegawa and DeGange 1982)
- Special Bird for Protection (1972) (King 1981)
- Wildlife Protection and Hunting Law (www.env.go.jp/en/nature/biodiv/law.html)
- Law for the Conservation of Endangered Species of Wild Fauna and Flora (1992, Law No 75) (www.env.go.jp/en/nature/biodiv/law.html)
- Domestic Endangered Species (1993) (Environment Agency, Japan 1993)
- Short-tailed Albatross Recovery Plan (1993) (Environment Agency, Japan 1993)
- Japan's National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (ftp://ftp.fao.org/FI/DOCUMENT/IPOAS/national/japan/NPOA-seabirds.pdf)
- Red Data Book of Japan (listed as Diomedea albatrus) – Vulnerable (www.biodic.go.jp/cgi-db/gen/rdb_g2000_do_e.rdb_result)

National – Mexico

- Protected under Treaty between Mexico and USA (family Diomedeidae listed) (www.fws.gov/le/pdffiles/mexico_mig_bird_treaty.pdf)

National – Russia

- On the Protection and Use of Wild Animals (Harrison et al 1992)
- Protected under the Union of Soviet Socialist Republic, Convention Concerning the Conservation of Migratory Birds and Their Environment. (USA-Russia) 1976. (listed as Diomedea albatrus) (www.fws.gov/le/pdffiles?USSR_Mig_Bird_Treaty.pdf)

National – United States

- Migratory Bird Treaty Act of 1918 (www.fws.gov/laws/lawsdigest/migtrea.html)
- Endangered Species Act (1973) (ESA) (USFWS 2000a)
- Listed as endangered throughout its range in 2000

Regional – Alaska, USA

- Listed as Endangered (State of Alaska, Article 4, section 16.20.19)
- Ranked as S1 (Critically Imperiled) (www.natureserve.org/explorer/servlet/NatureServe)

Regional - Hawaii, USA

- Ranked as S1 (Critically Imperiled) (www.natureserve.org/explorer/servlet/NatureServe)

Fisheries-Related Research and Management

Seabird bycatch reduction efforts began in the US in 1997, well before this species was listed as endangered in the U.S in 2000. Bycatch reduction work was initiated by the fishing industry itself. They were instrumental in getting the North Pacific Fisheries Management Council to recommend seabird bycatch regulations to NMFS for subsequent promulgation. They also helped to gain buy-in from individual unassociated fishermen within Alaska's longline fleet through extensive outreach efforts. Subsequent to listing, the fishing industry assisted in management of this species by advocating for recovery funding. Of the nearly $5 Million spent to date on seabird bycatch reduction and short-tailed albatross recovery, about $4 Million would not have been obtained but for the efforts and advocation of the fishing industry and fisheries managers in Alaska.

Streamer lines

In 1999 and 2000, controlled and large scale field studies conducted by the Washington Sea Grant Program (WSGP), in close cooperation with Alaska's commercial longline fishing industry, indicated that properly deployed paired streamer lines (Figure 19)are effective at reducing seabird attacks on the gear by 85-100% (Melvin et al. 2001). The effectiveness of streamer lines is borne out by bycatch data, which shows continued reduction in bycatch rate since fishermen began using the lines in 1999 (NOAA 2007). The studies' results and recommendations were incorporated into National Marine Fisheries Service's 2004 revised seabird bycatch regulations. Under these regulations, vessels over 55 feet are required to deploy paired streamer lines while setting gear, while vessels 26-55 feet are usually required to deploy one streamer line while setting gear. Some geographic areas not used by albatross are exempt from these rules. Regulations vary according to vessel structure and area fished. Consult 69 FR 1930-1951 and refer to http://www.fakr.noaa.gov for updated regulations.

Integrated Weight Lines

In addition to their streamer line work, WSGP, in cooperation with the Alaska demersal longline industry, has investigated whether integrated-weight groundlines, with their faster sink rates, are effective in reducing seabird bycatch. Results suggest that 50 g/m line is the optimal weighting, in terms of performance in auto-bait longline systems, sink rate, and ease of handling. Work conducted in 2004 and 2005 compared the catch rates of all species, the abundance and behavior of

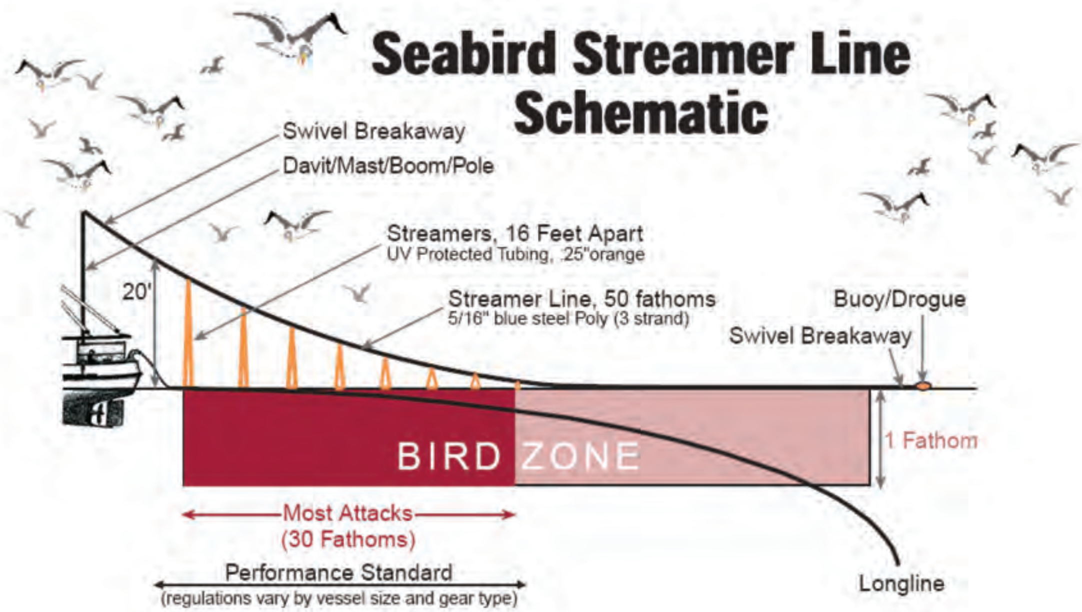


Figure 19. Profile of streamer line deployed above longline gear during gear deployment. Streamer line design and performance measures developed by the Washington Sea Grant Program. Steamer lines have been made available to Alaskan fishermen free of charge since 2000 through funding from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Manufacture and distribution of streamer lines is managed by the Pacific States Marine Fisheries Commission.

seabirds, and the sink rate of groundlines under different combinations of 50 g/m integrated weight and unweighted groundlines and streamer lines (Melvin et al. Unpublished data 2008). Integrated weight lines performed similarly to unweighted gear set with paired streamer lines in reducing catch of surface foraging birds (e.g. albatross and fulmars) by 91-98% compared to the control (unweighted gear set without streamer lines). They note that rates of seabird attacks on bait was a poor proxy for predicting seabird bycatch rate. Results also indicate that integrated weight lines deployed with paired streamer lines comprise the core of best management practices for seabird conservation in demersal longline fisheries using autoline systems, reducing catch of surface foraging species by 100%. Used alone, integrated weight lines were approximately as effective as paired streamer lines at reducing seabird bycatch (Melvin et al. Unpublished data 2008).

Reducing Wire Strikes

Washington Sea Grant has conducted preliminary at-sea trials investigating methods to minimize interactions between birds and cables. They tested paired streamer lines as a way to keep birds away from cables. They also used snatch blocks to bring the third wire cable in closer to the vessel hull where normally it would enter the water well aft of the stern, in an area more heavily used by birds. Streamer sleeves and bouys affixed to cables were dismissed as viable deterrent devices due to issues relating to safety and impracticality. They found that interaction rates increased when vessel maneuvers caused cables to pass through vessel offal discharge plumes. Seabird incidental catch reduction has also been investigated in Alaska's trawl fisheries. Results indicate that streamer lines, warp booms, snatch block, and fish oil all have potential as seabird deterrents for the trawl fishery (Melvin et al. 2004). In southern hemisphere trawl fisheries, Sullivan et al. (2004) reported that streamer lines and a device called a "warp scarer" significantly reduced seabird contact rates with trawl cables, as compared with controls. This research, conducted in the Falkland Islands by the Seabirds at Sea Team and the Falklands Fisheries Department, has resulted in the mandatory use of tori lines as a licensing requirement for finfish vessels for the Falklands' second season of 2004 (Sullivan and Reid 2004).

WSGP is also analyzing the spatio-temporal distribution of short-tailed albatross and other seabirds, based on survey data from Alaska Department of Fish and Game, IPHC, and NMFS. This analysis has helped to determine the relative distribution of seabirds on the longline fishing grounds and has identify areas where seabird mitigation may not be necessary, specifically inside waters along Alaska's Gulf Coast.

A number of measures are already in place for Hawaii-based pelagic longline fisheries when fishing north of 23º N latitude, including use of a line-setting machine; minimum 45 g weights on branch lines; thawed and blue-dyed bait; and strategic offal discharge. With the reopening of a limited swordfish fishery in Hawaii, NMFS and the Western Pacific Fisheries Management Council will be reviewing and revising these seabird avoidance measures (H. Freifeld, U.S. Fish and Wildlife Service, Pacific Islands ES Office, pers. comm. 2004).

At its 23rd Session in 1999 the Committee on Fisheries of the Food and Agriculture Organization of the United Nations (FAO) adopted its International Plan of Action-Seabirds, a voluntary instrument, which encourages member nations to assess the levels of seabird mortality in their longline fisheries, and if found warranted to produce their own National Plans of Action to reduce this mortality. FAO member nations agreed to develop national plans to address fleet capacity and to control the size of distant-water fishing fleets, preferably by 2003 and no later than 2005.

Japan completed their National Plan of Action (NPOA) in February 2001 (Appendix 4). The Plan includes specific area restrictions within 20 nautical miles of Torishima from October to May, the main part of the short-tailed albatross breeding season. Many of the regulatory, research, and outreach measures called for in Japan's NPOA are similar to measures that are being implemented by the U.S. This underscores the need for close communication with Japan in the implementation of these plans. The U.S. NPOA, also completed in 2001, can be accessed as indicated in Appendix 4.

As part of their Bering Sea Program, the World Wildlife Fund (WWF) has initiated research and outreach to the Russian longline fishing fleets regarding methods for seabird bycatch reduction. Outreach measures include distribution of a Cyrillic Guide to North Pacific Albatross funded by the Marine Conservation Alliance. Russian fleets have no mandatory observer program. However, the pilot observer program facilitated by WWF has provided some insight into this question, as indicated by the following quote, excerpted from a report (April, 2004) to WWF by Dr. Yuri Artyukhin, a Far East bird specialist working on the WWF Bering Sea Project:

> *During the fishing activity in the Commander Islands zone, in December of 2003 a short-tailed albatross (young individual) was observed, which for the course of several hours remained near the vessel during the setting and pulling up of the lines. This bird actively attacked the bait on hooks during the setting, putting its life in danger. This observation along with the documented mortality of a short-tailed albatross near Navarin Cape in August of 2003 again demonstrated that the longline fishery in the Russian waters of the Far East presents a realistic threat to this rare species.*

Since there are no mandatory gear restrictions on the Russian fishing fleet, WWF, with Service support, is approaching the solution by demonstrating to the fishermen how much money they can save by reducing bait loss when using streamer lines and other bird deterrent devices. Through the WWF program Mark Lundsten, a retired longline fisherman, and Ed Melvin, (University of Washington Sea Grant) visited Russian fishermen in spring, 2004, to share and exchange ideas. Thorn Smith, North Pacific Longline Association, paved their way by providing introductory presentations to Russian Dignitaries on short-tailed albatross conservation and the Seabird bycatch situation in Alaska's fisheries.

In 2003, a snapper fisherman from New Zealand, and a tuna fisherman from Australia shared a prize in an SEO/Birdlife International competition held to find ways to stop seabirds being killed during longline fishing operations. They independently submitted the same idea of dripping fish liver oil onto the water behind vessels as they are bait-setting. This technique shows promise, and subsequent tests by other researchers have shown significant reductions in the number of seabirds both following vessels and diving for bait when fish oil is dripped onto the water (W. Norden and J. Pierre, pers. comm. 2005; E. Melvin, U. Wash. Sea Grant, pers. comm. 2005). Although the idea of using fish oil as a deterrent seems counter-intuitive (prodellarids are thought to home in on concentrations of prey by scent), further tests need to be conducted to determine the birds' response under different conditions and whether the oil itself could result in feather fouling. In U.S. waters, discharge of any oil, including fish oil, is prohibited under the Oil Pollution Act of 1990 (33 USC 2701).

Outreach

The Service has established a program for providing streamer lines free of charge to the Alaska longline fleet and free demonstration streamer lines to foreign Pacific longline fisheries upon request. Information on how to obtain these is available on the NMFS Alaska website, at: http://www.fakr.noaa.gov/protectedresources/seabirds/streamers.htm. The Washington Sea Grant Program has produced an information pamphlet that provides further details, including a schematic, of the streamer lines and their proper deployment (Figure 19). A cooperative program to develop and distribute lighter weight streamer lines, designed specifically for smaller vessels, is presently being conducted by the Washington Sea Grant Program, Alaska Sea Grant, the Service, and Pacific States Marine Fisheries Commission.

Laminated guides to North pacific albatrosses and Alaska seabirds have been made available to fishermen and fishery observers. The albatross ID guides werer translated into Cyrillic and distributed to Russian longliners by the World Wildlife Fund (Thorn Smith, pers. comm. 2003)

An educational video for fishermen in Alaska, entitled *Off the Hook,* is also available. The video was produced jointly by the Washington Sea Grant Program and the University of Alaska, Fairbanks, Marine Advisory Program, with funding from the U.S. Fish and Wildlife Service. It has been duplicated and distributed, with funding from the Alaska Department of Fish Game, to all Alaska Federal Fisheries (hook-and-line endorsement or IFQ) Permit holders affected by the new seabird bycatch avoidance regulations. Video clips may also be downloaded from the Washington Sea Grant website: http://www.wsg.washington.edu/outreach/mas/fisheries/seabirdvideo.html. Spanish and Russian language versions of this video are also available.

A recent publication (Gilman 2004) lists available educational materials addressing seabird bycatch in pelagic and demersal longline fisheries worldwide. A recent report by BirdLife International (Small 2005) evaluates the performance in seabird incidental catch reduction of the 14 Regional Fisheries Management Organizations (RMFOs) whose areas overlap with albatross distribution. RMFOs are of central importance to sustainable, ecosystem-based management of the world's oceans.

The Agreement on the Conservation of Albatross and Petrels (ACAP) was established "to achieve and maintain a favorable conservation status for albatross and petrels." This Agreement, which became effective on 1 February 2004, focuses on Southern Hemisphere species but provides outreach about albatross in general and may spawn research, for example, in reduction of seabird bycatch in fisheries that is relevant to our northern hemisphere species. Conservation of southern hemisphere albatross received increased media attention resulting from Prince Charles' visit to New Zealand in March 2005.

In 2005, Hawaii seabird mitigation methods were presented to an audience of longline fishermen from 26 countries at the Third International Fishermen Forum held in Yokohama (WPRFMC 2005. International Tuna Fishers Conference on Responsible Fisheries & Third International Fishers Forum, 25-29 July, 2005, Inter-Continental Grand, Yokohama, Japan, http://www.fishersforum.org).

Representatives from Alaska's commercial fisheries have made numerous short-tailed albatross presentations around the Pacific Rim and in Moscow and Washington D.C. (Thorn Smith, pers. comm. 2003). Scientists from the Service, Oregon State University, and the University of Washington Sea grant Program have made over 50 presentations on various aspects of the short-tailed albatross recovery program throughout the U.S., and in Japan, Uruguay, South Africa, Australia, Mexico, and Russia. Other outreach products include an ever-growing number of peer-reviewed research papers, articles in popular periodicals such as Audubon Magazine, an essay in a book on albatrosses of the world (Balogh in De Roy et al. 2008), a streamer line booth at the second International Fishers Forum and at Fishcomm in Alaska, radio stories, over 40 newspaper articles, a Japanese television documentary, and sessions of recovery team meetings that are open to the public.

In Japan, the Ministry of the Environment is working with the Yamashina Institute to gain buy-in of relevant authorities, fishery unions, local NGO's, and others regarding translocation of short-tailed albatross chicks to Mukojima. This work began in November, 2005 and continues (Yoshihiro Natori, JMOE pers. comm. 2005).

RECOVERY STRATEGY

As indicated in the Final Rule listing the short-tailed albatross as an endangered species (USFWS 2000a), the primary threat leading to the species' decline was over-harvest. Small population size, limited number of breeding sites, and potential volcanic eruptions were seen as the current major threats to the species, and threats to the species' recovery from marine pollution and interactions with commercial fishing operations were also noted.

Unlike most endangered species, the primary factor originally leading to the short-tailed albatross' endangerment (i.e. hunting on a massive scale) no longer occurs. Furthermore, observed rates of reproduction indicate that the species is not currently experiencing density-dependent or notable human-related limitations to population growth. High rates of reproduction can be expected from a once-numerous species that is extremely depleted (less than .03 percent of estimated historical population) (Wilson 1971). In theory, this species would seem to have a higher chance of achieving recovery than many other endangered species, which are victims of habitat destruction and fragmentation.

Addressing Factor A, *the present or threatened destruction, modification, or curtailment of its habitat or range* is of primary importance in bringing about the recovery of this species. Although Torishima is protected as a Natural Monument by the Japanese Government, no one can protect the Tsubamezaki breeding colony on Torishima from the threat of a volcanic eruption (Figure 20). Likewise, threats of flood waters, erosion and severe weather there are high and are difficult or impractical to mitigate. While the team recognizes that population models predict increases in chronic mortality as having a greater effect upon the species recovery than periodic catastrophic events, current levels of chronic mortality do not appear to be notably hindering recovery of the species. Thus, the current recovery emphasis is focused on reducing the potential for catastrophic events to hinder recovery.

Managing for Volcanic Events

The START believes that having 80-90% of the population nesting in a single precarious colony site that is vulnerable to volcanism, erosion, floods, severe winds, and introduced predators is currently the most serious threat to the species. As mentioned previously, the main colony, Tsubamezaki, is situated on a highly erodible slope over which flows the outwash from the caldera of an active volcano. Monsoons send ash and torrents of water down this slope across the surface of this colony. A volcanic eruption could also send lava, ash or poisonous gasses down this same slope through the colony site. A single feral dog or cat introduced to the area could devastate the species in very little time. Establishing viable breeding colonies in other safer locations is paramount to ensuring the survival and recovery of this species.

Consequently, the START has unanimously agreed that establishment of additional colonies on safe (i.e. not subject to volcanic activity and protected) sites will be a recovery prerequisite. This goal may be attained by several means, including:

- Creating new colonies with decoys and sound systems in likely locations, to lure breeding birds to a selected site/s;
- Translocating and hand-rearing post-guard stage chicks from Torishima to selected and prepared site/s;
- Locating and encouraging the growth of heretofore unknown breeding colonies of this bird.

Creating New colonies

The two methods considered for creating new colonies are passive attraction and chick translocation. The two methods are not mutually exclusive, since the equipment used for passive attraction (i.e. decoys and sound system) would also be used at a chick translocation colony site.

Passive attraction of birds to a new colony site has been initiated on Torishima. From the 1996 through the 2003-04 breeding seasons, a single pair bred at the new site, successfully rearing seven chicks during that interval (Table 3). As of 2008, the colony had increased dramatically in size to 36 eggs resulting in 23 fledged chicks (Table 3). Visitation rates of prospecting breeders and non-breeders are increasing dramatically with time (Kiyoaki Ozaki, Yamashina Institute, pers. comm. 2008).

On Mukojima, the receiving location for translocated short-tailed albatross chicks, (Figure 21) decoys and recorded playback of colony sounds are also being used to enhance the attractiveness of the site to prospecting birds.

Figure 20. Torishima during its 2002 eruption event. The volcano has erupted three times in the past 100 years. Volcano-induced mortality of short-tailed albatross is one reason that the recovery team has stressed the importance of establishing new colonies of the species on non-volcanic islands.

Figure 21. Map of Mukojima Island showing the location to which short-tailed albatross chicks were translocated and hand-reared to fledging. New colony site is noted as "Decoy and Hand-rearing Site". If short-tailed albatross are successful in breeding here, Mukojima will become the first island containing breeders of all three North Pacific albatross species.

Chick Translocation

Immediate success of chick translocation will be difficult to assess, since short-tailed albatross do not return to breed until age 5 or 6. Furthermore, Gummer (2003), in reviewing chick translocation, cites experiments conducted by Fisher (1971) in which Laysan albatross chicks older than about one month of age tended to return to their natal site, rather than to their release site. This implies that chick translocation is likely to be more successful with younger chicks that will require some amount of hand-rearing. Additionally, there are concerns that any chicks removed from the Tsubamezaki colony for translocation purposes will slow the recovery of that established population. However, this becomes less of a concern as the Tsubamezaki population continues to increase (H. Haswgawa, pers. comm. 2004) and may at some point become nest site-limited. The team has stressed the importance of testing all phases of translocation work on a surrogate species prior to attempting to translocate short-tailed albatross chicks. This has been done.

In further preparation for short-tailed albatross chick translocation to the Ogasawara Islands, a natural environment survey was conducted for plants, insects, terrestrial mollusks and birds, and the effects of translocation upon endemic species was assessed. It was during this process that Mukojima island was determined to be the best recipient site for albatross chicks.

The Japanese Ministry of Environment was concerned over local opposition to short-tailed albatross chick translocation. Specifically, they were concerned that local fishers, fearing the potential for future fishing restrictions should the colony become established, would oppose the effort. However, the ministry found that only one longline vessel fishes the Ogasawara Islands, and it has not caught any birds during its operations. Therefore, fishing restrictions around Mukojima do not appear to be warranted (JMOE 2005, Meeting summary of Japanese Short-tailed Albatross conservation and Breeding Committee, September8, 2005). Further coordination with local stakeholders and partners in the project was conducted to: develop guidelines for project implementation, move decoys from Torishima to Mukojima, install a new audio system on the island, gain support from the Japanese coast guard for inter-island transport of equipment, gathering of fishing and bycatch information in the Ogasawaras, and amending the Japanese Short-tailed Albatross Conservation and Breeding Program Plan to allow for the translocation effort.

All of Mukojima Island, as well as the surrounding islands in the Ogasawaras (Nakuodojima, Yomejima, and Kitanoshima) are located within the Ogasawara National Park, and large portions of these islands are designated as "Special Protection Zones" which strictly regulate human use. Constructing facilities within these areas is prohibited without special permits. Translocation field crews needed to obtain special permits simply to erect tents and remain overnight on Mukojima (JMOE pers. comm. 2005). Erection of permanent monitoring facilities on these islands is likely impossible.

Finding Additional Colonies

We do not expect that searches will yield notable new short-tailed albatross breeding colonies, as many areas have already been checked (H. Hasegawa, Toho Univ. pers. comm. 2002), and all birds that have been handled at sea bear the tags of Torishima banding operations. However, we will remain alert for indications that unknown colonies exist. Future marine-based satellite telemetry may aid in the discovery of any such sites.

Additional Recovery Tasks

The remaining high-priority recovery tasks address threats that fall under Factor E, *Other Factors* mentioned in the final rule. These focus primarily on contaminants and fisheries interactions, and will be addressed through education, outreach, and research. Most of these additional tasks address the threats listed in Table 8. Some of these tasks fill in knowledge gaps that may hinder us from effective management (e.g. genetics studies will help us determine how many unique genetic stocks comprise this species). Not all listed threats have a corresponding recovery task. In these cases, the recovery team decided that the threat was not perceived as sufficiently urgent to warrant addressing, at least until more pressing threats have been adequately addressed. Additional recovery tasks may become appropriate, as new information is obtained. Recovery tasks fall under several categories: species management, habitat management, education and outreach, and research. The prioritization of recovery tasks generally follows the perceived level of threat to the species if that task is not accomplished.

The recovery program for the short-tailed albatross differs from that of most of the Service's listed species in that many major recovery actions for this species will likely be conducted outside the United States. Recovery implementation for this species will involve coordination with foreign governments and institutions and will require much at-sea work. Achieving recovery objectives for this species will thus require extensive funding and a truly long-term commitment from all partners.

Recovery

In establishing recovery and reclassification criteria for the short-tailed albatross, the short-tailed albatross recovery team used a stochastic population viability analysis developed specifically for the short-tailed albatross by Finkelstein et al (2007), a deterministic population model developed for the short-tailed albatross by Sievert (Appendix 6), a stochastic population model developed for the short-tailed albatross by Cochrane and Starfield (1999), and expert opinion in interpreting the results of these models.

GOAL

The goal of this recovery plan is to bring about the recovery of the short-tailed albatross, such that protection of the Endangered Species Act is no longer required.

OBJECTIVES

The major objectives of this recovery plan are to:

- outline a strategy and describe actions that will result in minimizing threats to, and increasing numbers of, the short-tailed albatross, AND;
- encourage establishment of breeding populations in locations within the historic breeding range of the species that minimize terrestrial threats during their breeding season.

CRITERIA

Reclassification for the short-tailed albatross may be considered when the following conditions are met:

Endangered to Threatened

The short-tailed albatross may be reclassified from endangered to threatened under the following conditions:

- The total breeding population of short-tailed albatross reaches a minimum of 750 pairs; AND
- At least three breeding colonies each exhibiting a 3-year running average growth rate of ≥6% for ≥7 years, at least two of which occupy islands other than Torishima with a minimum of >50 breeding pairs each.

Mated pair of short-tailed albatross. Pairs mate for life. Photo: H. Hasegawa.

Delisted

The short-tailed albatross may be delisted under the following conditions:

- The total breeding population of short-tailed albatross reaches a minimum of 1000 pairs; (population totaling 4000 or more birds); AND
- The 3-year running average growth rate of the population as a whole is ≥6% for ≥7 years; AND
- At least 250 breeding pairs exist on 2 island groups other than Torishima, each exhibiting ≥6% growth for ≥7 years; AND
- A minimum of 75 pairs occur on a site or sites other than Torishima and the Senkaku Islands.

Threatened to Endangered

The short-tailed albatross may be reclassified from threatened to endangered under the following conditions:

- Fewer than 750 breeding pairs exist, and the population has had a negative growth rate for at least 3 years; OR
- Breeding colonies occur on fewer than three island groups.

RECOVERY CRITERIA JUSTIFICATION

Endangered to Threatened

These reclassification criteria will be met when short-tailed albatross exceed the quasi-extinction threshold of about 100 breeding pairs set forth by Morris and Doak (2002) for animals sharing albatross life history attributes. In developing this criteria, the START noted that when observed mean demographic values and demographic variation from the short-tailed albatross were used as inputs into the often used population modeling software VORTEX (with average variation values for all albatross worldwide used in instances where specific short-tailed albatross data was lacking), short-tailed albatross never went extinct on Torishima. In addition, when modelers increased chronic mortality by 3% and 5% above existing mortality, the model indicated no instances of extinction within 100 years using 1000 trial runs, assuming constant rates of productivity equal to observed rates.

Given this information, even if bycatch or some other mortality factor increased mortality rate of this species by an additional 5%, when this population grows to 750 breeding pairs, managers would likely have several decades (up to 100 years) to address this added mortality before the species is again threatened with extinction. It is unlikely that both of these criteria for reclassification from endangered to threatened will be reached simultaneously, and modeling suggests that the Torishima population will consist of 2,208 pairs and 9,366 birds by the time there are 50 breeding pairs on two additional islands. The team notes that this scenario does not address factors that may be associated with socially facilitated breeding because we have no information that allows us to do so. It is possible that there may be some minimum population size that is needed to trigger successful breeding in this species. However we believe that socially facilitated breeding is not an important aspect of this species biology after having observed the growing colony at Hatsunezaki, and noting several instances of breeding attempts by single pairs of short-tailed albatross on isolated islands (e.g. Midway, Katinoshima and Yomejima). Nevertheless, even if socially facilitated breeding is important to this species, it seems evident from this species history that 50 pairs at each site satisfies their social breeding requirements.

Delisted

It is highly unlikely that the short-tailed albatross will reach all four recovery criteria at the same time. Critics of this set of recovery criteria may focus on the small number of pairs (75) needed on a site other than the Senkakus to consider delisting. However, by the time the species meets all of these delisting requirements, our models estimate that the total population will contain 5,485 breeding pairs and will continue to be exhibiting long term rapid growth.

Under the ESA, a minimum of 5 years post-delisting monitoring is required following delisting. However, it is likely that this species will be monitored for more than the minimum 5-year period called for in the ESA, during which any population declines or island extirpations would be detected.

Threatened to Endangered

These two criteria for reclassifying from threatened back to endangered represent the mirror image of the criteria needed to reclassify the species from endangered to threatened, except that a population decline, rather than a reduction in population growth rate, would be needed to consider this reclassification.

SHORT-TAILED ALBATROSS RECOVERY PLAN NARRATIVE OUTLINE

At the May, 2004, START meeting, the Team developed and ranked 55 potential recovery tasks. The tasks are shown in ranked order in. At the August 2008 START meeting, the Team took into account new information and re-ranked the recovery tasks. These tasks are shown in ranked order in Table I-2, following the Implementation Schedule. The narrative outline that follows refers to tasks by task number. These narratives are *not* in order of priority. See Appendix 5 for a ranked list of these tasks

1.0. Support ongoing population monitoring and habitat management on Torishima

Hiroshi Hasegawa from Toho University has 1.0. Support ongoing population monitoring and habitat management on Torishima - Hiroshi Hasegawa from Toho University has been monitoring the Tsubamezaki breeding colony since the early 1980s. Researchers from the Yamashina Institute have also conducted studies and management activities critical to the recovery of these birds and our understanding of them. It is essential to ensure that this ongoing (and future) work continues. The Japanese government and industries have been funding this work, but a predictable source of funding is required for conducting the work in the future. The mechanism of *Cooperative Agreements* and *Grant Agreements* with the academic and non-profit institutions involved in short-tailed albatross research, monitoring and management is seen as the most expedient way for the U.S. to support this work in Japan, and allows for the most flexibility for Japanese resource managers to implement recovery.

1.1. Continue annual monitoring of Tsubamezaki and Hatsunezaki on Torishima

This work has been ongoing at Torishima Island since the early 1980s and is essential for our understanding of population status and trends. Monitoring of the Minami-Kojima population in the Senkaku Islands has been less consistent, but is considered a high priority (see Implementation Schedule, Task 2.0). Support of annual population monitoring should be provided, as necessary, to ensure a data base that allows for analysis of population abundance and trends relative to the species recovery criteria. If possible, a feather should be collected from each banded fledgling to determine gender via genetic techniques.

1.2. Erosion control

The portion of Torishima Island where the majority of birds nest is unstable. Efforts to stabilize this colony site have been undertaken in the past. Revegetation has been partially successful. Gabions reduce influx of ash only temporarily. Erosion control measures need to continue to promote stability of nest sites.

1.2.1. Torishima erosion control; dig new drainage swale around Tsubamezaki colony

Runoff water and eroding ash from a portion of the volcano's caldera flows through the colony site during and after storms. Reconfiguring the drainage channel to flow around the colony site should alleviate the threat of egg destruction and chick mortality.

1.2.2. Torishima erosion control; maintain existing gabions above Tsubamezaki colony

The existing gabions are full to capacity or are corroding away or have been bypassed by drainage. These need to be enlarged, repaired, or replaced.

1.3. Conduct decoy & sound system maintenance at new colonies

Since 1991, Japanese researchers have been taking measures to lure adult birds and new breeders to a more stable (less steep, more vegetated) site on Torishima Island, through use of realistic decoys and continuous playback of breeding colony sounds during the breeding season. This site, Hatsunezaki, is used by many black-footed albatross, and as of 2008, had grown in size to 36 breeding pairs of short-tailed albatrosses. The decoys need to be maintained (cleaned, painted), and the sound system maintained, regularly. Managers will also be evaluating the success of the new colony in attracting breeders to a more stable site, especially as the chicks that have been produced at Hatsunezaki attain breeding age.

1.4. Develop and employ appropriate leg bands

1.4.1. Develop and deploy abrasion-resistant leg band (titanium or Darvic)

On long-lived birds such as short-tailed albatross, loss of standard stainless steel or incoloy leg bands can occur, resulting in loss of valuable long-term survival data. A more wear-resistant band made of titanium or Darvic Tm should be researched, tested, and used, as appropriate. This is a 10 year plus commitment in order to get the demographic information for input into a PVA.

1.4.2. Develop and deploy diamond-like coating for color bands for obtaining demographic information

Standard color bands become unreadable after several years, likely due to abrasion in the volcanic ash environment on the breeding grounds. Application of wear-resistant color bands are needed to obtain the longer-term information used in generating demographic data for this long-lived species.

1.4.3. Resume color banding operations

Recently, Dr. Hasegawa discontinued color banding of chicks because they became too numerous for him to accomplish the job without unduly disturbing birds on the colony. An assistant will allow him to begin again his color banding effort. Having an additional person on the island may actually save money in charter vessel expenses if the vessel ends up spending less time standing by awaiting completion of field work.

2.0. Monitor Senkaku population

Regular monitoring of the Senkaku population has not been feasible. The START indicates that demographic from this colony should be obtained on a continuing and regular basis. Ideally, scientists would make two trips per breeding season to Minami-kojima in the Senkakus to record the number of eggs laid, and the number of chicks ready to fledge. Due to the difficulties associated with Senkaku Island access, it remains unclear how we can proceed with this task. Developments in aircraft-based remote sensing technology may be a viable option.

3.0. Conduct telemetry studies

Telemetry studies, primarily using satellite, or "platform-transmitting terminal" (PTT) telemetry, are needed to understand the movements of these far-ranging birds and to identify any important foraging areas or areas where birds may congregate. Telemetry work should be planned with clear goal statements, so that we understand how each study fits in to the overall scheme of information we seek, and so that we recognize when our goals have been met.

3.1. Conduct Torishima telemetry work

In order to protect short-tailed albatross, it is essential to learn where they forage during both breeding and non-breeding seasons. To this end, satellite telemetry has been conducted on a few subadult and post-breeding albatross captured at the Torishima colony site since 1996. This work should be continued and extended to adult birds in future years. Support for future telemetry work would include costs of equipment, travel, and analysis. Include collection of feathers from known-age birds for contaminants analysis as well as gender determination)

3.1.1. Conduct Torishima telemetry work; breeders during breeding season

Data obtained since the late 90's on post-breeding season distribution of breeders and non-breeders has shown us the different routes that the birds take from Japan to Alaska and Russia, and the different rates of dispersion from the colony.

3.1.2. Conduct Torishima telemetry work; fledglings, sub-adults, post-breeders

This task continues work ongoing since 1996. Analysis of data from 23 tagged sub-adult and post-breeding birds is ongoing. Obtaining additional telemetry data for sub-adult and post-breeding birds was identified as a lower rank (18th) than obtaining data from breeding birds (ranked 5th). The priority of obtaining telemetry data from fledglings was not explicitly stated, but is considered to be of lower importance than obtaining data from breeding birds during breeding season.

3.2. Conduct at-sea capture and telemetry to determine marine distribution during non-breeding season

Satellite telemetry of short-tailed albatross captured at sea (i.e. away from the main colony site) can yield information not only about the birds' use of marine habitat, but also indicate whether they visit other islands, thus providing insight into potential translocation colony sites. Initial indications are that this is an extraordinarily expensive way to obtain satellite telemetry data, but until transmitters are affixed to birds so that they yield data for more than a few months at a time, at-sea capture may be necessary to obtain movement data for these birds during certain times of year (i.e. October to May).

3.2.1 Conduct at-sea telemetry on birds captured in the Aleutian islands soon after the breeding season

Tagging birds in Alaska waters yields longer data sets of these birds' use of the North Pacific areas near Alaska, Russia and Canada. Most transmitters deployed in Japan are nearly done transmitting or are nearly shed from the birds' backs by the time they arrive in Alaska. Tagging birds at-sea will provide better information on potential interactions between this species and commercial fisheries in the area.

3.2.2 Conduct research on albatross hotspots at sea

Large congregations of birds have been observed along the heads of Bering Sea Shelf canyons during late September. We remain unaware of the reason for these congregations, and hope that direct observations made during tag deployment, along with data received from tagged birds, will shed light on this phenomenon. In addition, tagging birds in late September will allow us to fill one of two remaining gaps in the birds annual cycle; that of their return migration to their breeding areas.

3.3. Evaluate methodologies

Research needs to be conducted to test the performance and safety of various field methodologies (e.g. dipnet versus drive net or harness versus tape attachment of transmitters). Performance and practicality of certain pieces of field equipment (e.g. archival tags versus. standard PTTs versus. solar-powered PTTs) also needs to be tested. Effects of tagging on survival rates of birds should be assessed when feasible.

3.3.1. Conduct PTT attachment evaluation

Harness attachment of PTTs potentially allows greater attachment time, thus more continuous (up to year-round) positional data streams from birds. However, the effects of harness attachment on the birds' behavior and survival have been questioned (see e.g. Phillips et al. 2002; Freeman et al. 1997; Petrie and Rogers 1997). Preliminary tests have been conducted with attaching PTTs on time-release harnesses to a surrogate species, the black-footed albatross (K. Ozaki, pers. comm. 2004). The second generation of this time-release mechanism succeeded in three of eight instances; longer-term effects of harnesses to the birds (especially unreleased harnesses that remain in place) are not yet known. Solar-powered PTTs attached to harnesses could even result in multi-year data streams from an individual, if harness effects are discountable.

3.3.2. Evaluate / deploy archival tags

Archival tags provide a means for acquiring data on an animal's movements, diving depth, light regime, body temperature, and ambient temperature. They are generally smaller and less costly than PTT (satellite telemetry) tags and can provide more than just location information. However, to obtain any of these data, current technology requires that these birds be recaptured. Research underway may result in the development of a radio link by which archival data could be downloaded without retrieving the tag (Laboratory for Applied Biotelemetry & Biotechnology, Texas A&M University). Development of this methodology should be monitored and archival tags deployed on short-tailed albatross as appropriate.

3.4. Develop clear goal statement of telemetry work

Telemetry work is expensive. In order to make certain that we are allocating our scarce recovery resources effectively, the team should develop a clear goal statement for all phases of telemetry work so that we know when our goals have been reached and intense efforts to obtain additional telemetry data can or should cease. The statement should consider information needs relative to age class, gender, time of breeding cycle, considerations regarding different colonies, and year-to-year variability.

3.5. Determine at-sea distribution; get assistance from an NGO to organize international data collection from ships of opportunity

The U.S keeps a dataset of at-sea observations made opportunistically at sea, mostly from fishing and research vessels. The team indicated a desire to try obtaining like data from other countries, and preliminarily determined that an international non-profit organization may be the best entity to take this task on.

4.0 Establish One or More Nesting Colonies on Non-Volcanic Islands

This task, although complex and costly, is a keystone task to achieving expeditious recovery of the short-tailed albatross. The main colony site on Torishima, where about 85 percent of the world population breeds, is vulnerable to damage or destruction from volcanic eruptions, runoff from torrential rain, and typhoon-induced erosion. Post-guard chicks at this site are vulnerable to being toppled down the steep slope by high winds.

Japanese resource managers believe that the most promising site for new colony establishment is in the Ogasawara group of the Bonin Islands. These islands, located about 1000 kilometers south of Tokyo and 300 kilometers south of Torishima, belong to the Metropolis of Tokyo. Waters off these islands are commercially fished and the area is becoming increasingly popular with eco-tourists, with visitation rates escalating (JMOE 2005 pers. comm.). Large natural gas reserves likely underlie the area (Hsiao 2007). Therefore, there exists the potential for conflict of use if establishment of a new colony implies future closure of island areas to visitors or the perception that fishing restrictions could eventually become implemented. While the existence of an additional short-tailed albatross colony in the area is unlikely to curtail natural gas development (especially by China), any such development would present a new risk to the bird that would have to be considered in planning future recovery actions.

Within the Bonins, initial focus for establishing a new colony is on Mukojima island, which is part of the Ogasawara National Park. This park is roughly the equivalent of a U.S. National Park in that it has special use restrictions (e.g. no camping and no construction of any buildings or facilities without undergoing a public process to gain the appropriate permits). There are records of short-tailed albatross nesting on these islands as recently as the 1920's, including a sizeable colony on Kitanoshima. Although there are no records of short-tailed albatross harvest from Kitanoshima, photos in a Japanese picture book from 1939 show short-tailed albatross on katinoshima, with a caption stating that short-tailed albatross were harvested there (Noboru Nakamura, Yamashina Institute, pers. comm. 2008). Although Kitanoshima is suitable for short-tailed albatross breeding, access to the island is prohibitively difficult. Mukojima Island is considered by the Japanese Government to be biologically and logistically most suitable for an initial attempt at colony establishment. A nearby and larger island, Yomejima, has had several immature short-tailed albatross visiting it every year, has a number of black-footed albatross nesting there, and a single adult short-tailed albatross was observed brooding an egg there in 2001 and 2002.

The Ogasawara islands are home to a number of endemic species that are being threatened by the spread of introduced invasive species, including feral goats (JMOE 2005 pers. comm.). The ecosystems of Yomejima and Kitanoshima are currently more intact than are the ecosystems of Mukojima and Nakoudojima, largely due to the absence of goats on the former two islands. In addition, Yomejima is logistically less suitable for colony establishment than is Mukojima Island. Therefore, Japanese resource managers have determined that Mukojima is superior to Yomejima for any albatross translocation efforts (JMOE 2005 pers. comm.). They caution, however, that care be taken during the chick translocation process to avoid the introduction of additional invasive species. Upon departure, no trace of camps will be allowed to remain.

4.1. Conduct feasibility study of other potential colony re-establishment sites

The START team recommended a feasibility study for potential colony reestablishment at its May 2004 meeting. Attempts to characterize the suitability of breeding sites should include an assessment of the following habitat parameters: risk of erosion, colony site aspect, prevailing wind direction, topography, wind shear hazard, plant community, presence/absence of potential predators, presence of introduced species (both plants and animals), ease of access, presence of other nesting seabirds, and observed visits by short-tailed albatross. Frequency of human visitation, other socio-political factors, and land status must also be considered, as these affect the ability to conduct new colony work.

Since 2004, the Japanese government has conducted a thorough environmental assessment of suitable colony sites in the Mukojima Island group (a process akin to the U.S. National Environmental Protection Act (NEPA) process), and has determined that Mukojima Island proper is the best site to attempt establishment of a new short-tailed albatross colony on a non-volcanic island.

Reports detailing the presence of endemic flora and fauna have been developed. The Japanese Ministry of the Environment has determined that Mukojima is the most suitable site upon taking into consideration a suite of factors, including the presence of endemic species, logistical constraints, protective status of the islands, and use of islands by local residents and tourists. We are unaware of the specifics of the decision-making process, but defer to local land management experts. We note that since the selection of the Mukojima site as the receiving location for short-tailed albatross translocated chicks, breeding aged short-tailed albatross have been observed flying around and landing at the site of the proposed colony. Japanese law prohibits permanent human structures from being erected on Mukojima. Field crews work out of tents. We are unaware of any introduced predators on Mukojima that are known to reduce short-tailed albatross productivity or degrade habitat.

Japanese sites were chosen as a translocation receiving site over sites in the Northwest Hawaiian Islands (NWHI) for a number of reasons. Chief among them is that short-tailed albatross are not known to have successfully bred here. In addition, satellite telemetry indicates that the NWHI are far from the regularly used travel corridors for this species. Recent research conducted by Suryan et al indicates that for reasons having to do with prevailing weather patterns, wing-loading of this species, and location of suitable foraging grounds, the NWHI would be an inferior choice over the Ogasawaras for attempting to establish a new colony (Rob Suryan, unpublished data, 2008).

4.2. Prepare selected new translocation colony site

Any necessary site management, such as removal of invasive plant or animal species should be conducted, as appropriate. Agreement should be reached among the wide range of stakeholders and proper permissions obtained from site owners and government entities to ensure effective site management.

4.3. Attempt passive attraction of birds to new site using decoys and recorded colony sounds

A first (and least costly) means of inducing new colony establishment is to use decoys and a sound system playing back recorded sounds from the Tsubamezaki colony, as has been done at Hatsunezaki on Torishima Island. Given the ongoing visits of some albatross to the Bonin Island sites (especially Mukojima), this method, may help in inducing a new short-tailed albatross breeding colony. However, preparatory work towards translocation efforts should proceed simultaneous to this passive attraction effort in case passive attraction alone proves ineffective.

4.4. Conduct surrogate species translocation study

Prior to translocation of short-tailed albatross chicks, biologists should conduct a test translocation effort (or translocation dress rehearsal) using black-footed albatross from Torishima Island. They should be moved to, and reared to fledging at, the intended new short-tailed albatross colony site. This effort will test the effectiveness of translocation methodologies and will help determine the behavior of young albatross released into a "social vacuum."

4.5. Translocate short-tailed albatross to new colony site.

A number of options were considered for accomplishing this task. The recovery team discussed translocation of: eggs, newly-hatched chicks, post-guard chicks, or near fledglings. Each of these options has certain advantages and disadvantages, in terms of the amount of time and energy required for chick rearing, disturbance to breeding birds at Torishima to capture these birds, and the greater or lesser potential for chicks imprinting on humans and imprinting on (and thus returning as breeders to) the translocation site. After further discussions with world albatross and seabird experts at an albatross translocation workshop held in August, 2004, in Montevideo, Uruguay the START has concluded that translocation of post-guard chicks is the method of choice. H. Hasegawa (pers. comm. 2008) has indicated that a total of 100 short-tailed albatross should be used in translocation efforts at a rate of up to 20 chicks per year, given the current size and productivity of the Tsubamezaki colony.

4.5.1. Translocation of post-guard chicks from Torishima to new island colony site

This has been determined by the START to be the method of choice and is therefore the task under this subsection. In this translocation scenario, chicks would be removed from the colony site as soon as parents began leaving the chick alone while they both forage at sea. The key assumption to this approach is that geographic imprinting on the nesting island occurs after this time, and translocated chicks that fledge and return to breed will return to their fledging site, not their hatching site. This approach helps minimize the cost of the

Decoys used in passive attraction efforts require annual touch up and repair. Paint at the base of the bills is often worn away from birds conducting courtship displays with the decoys.

translocation operation and probability of success of the rearing effort, in that chicks will not require the very specialized diet of hatchlings, and will not need to be tended to for as long. Parental investment in the chicks at this point will have been moderate, and the likelihood that they will have the physiological resources to breed again the following year may be increased by removal of the chick at this stage.

Part of this task entails the training of individuals in caretaking of albatross chicks. Individuals should remain available to conduct this work for a number of years. If possible, training by experts in albatross husbandry techniques (in New Zealand and Hawaii) should be acquired. If this training is not available, detailed observations of short-tailed albatross parental behavior at Tsubamezaki may be substituted.

4.5.2. Translocation of fledglings from Tsubamezaki to Hatsunezaki colony on Torishima

This translocation effort represents a minimal investment of money and effort. It entails only the movement of near-fledging chicks from one side of Torishima Island (Tsubamezaki) to the other (Hatsunezaki) in the hopes that the fledged birds will return to breed at their fledging site rather than their natal site, thus bolstering the breeding population there. The chance of success may be low, given the "super-stimulus" of the main colony nearby, but the risk and costs are also low. This translocation effort could conceivably occur simultaneously with other translocation efforts if the number of chicks at the Tsubamezaki colony is sufficiently great to allow dual translocation efforts. The recent rapid growth of Hatsunezaki may obviate the need for this task to be undertaken.

After developing good translocation methodologies, the translocation operation should continue for at least 5 years. At that time, we may begin to determine if translocated chicks return to their release site, or the site at which their parents deposited them as eggs. A proportion of translocated individuals could be followed via telemetry, to determine their movements, compared with the movements of "control" birds from Torishima Island.

4.6. Monitor and maintain new colony site

The translocation site should be monitored annually, to observe nesting rate and fledging success of short-tailed albatross. Translocated individuals would not be expected to return for at least 5 years (the minimum age of reproductive maturity); however, some breeding-age albatross could be attracted to the site prior to this time, and pre-breeders could stop in for visits. Decoys and sound systems at these sites should be maintained, while vegetation and vertebrate pest populations (rats, snakes, goats) are monitored and controlled.

5.0. Continue research on fisheries operations and mitigation measures.

Great progress has been made in developing seabird bycatch avoidance measures that minimize seabird bycatch in Alaska demersal longline fisheries. This work needs to be continued, and further research needs to be conducted on other aspects of commercial fisheries (e.g. pelagic longline and trawl fisheries).

5.1. Conduct fisheries related bycatch reduction research; integrated weight line research

Although some research has been conducted, researchers should conduct further research to develop integrated weighted line technology as a practical and effective seabird mitigation alternative for demersal fisheries.

5.2. Conduct fisheries related bycatch reduction research; trawl gear interaction rate study

Researcher should investigate the frequency of seabird collisions with cables employed in the trawl fishery in Alaskan waters. As part of a Biological Opinion issued by the Service in 2003, NMFS is required to: (1) document whether short-tailed albatross interaction/collision with trawl vessel gear occurs in Alaskan waters, and if so, (2) estimate the rate of such take. A report of the interactions between short-tailed albatross and trawl gear shall be submitted to the Service by December 31, 2006.

5.3. Conduct fisheries related bycatch reduction research; trawl gear interaction minimization study

If investigations conducted in 5.2 reveal adverse effects to seabirds, researchers should develop effective and practical mitigation strategies. Certain methodologies are already being tested (Sullivan et al. 2004). Recent contests by the BirdLife International and Smartgear may reveal additional creative approaches to solving this problem (see section J.6 above).

5.4. Conduct fisheries related bycatch reduction research; pelagic longline gear interaction minimization study

Researchers should develop further refinements to existing mitigation devices for pelagic fisheries in the North Pacific, and should development new ones as warranted. Mitigation measures developed in Hawaii and in the southern hemisphere should be incorporated into north pacific pelagic longline fisheries as appropriate.

5.5 Conduct fisheries related bycatch reduction management; refine U.S. and foreign mitigation measures in fisheries

Incorporate into commercial fishing practices all of the measures developed by research conducted in appropriate fisheries that may minimize seabird bycatch.

5.6. Characterize fisheries throughout the range of the short-tailed albatross.

Determining the spatial and temporal distribution of all the different fisheries occurring in the North Pacific will aid greatly in determining where seabird bycatch avoidance measures would most benefit this species, and would allow us to focus our efforts to implement these measures in these areas as a high priority.

6.0. Conduct Other Research

6.1. Conduct Genetic analyses to detect differences between Torishima and Senkaku Short-tailed albatross

Preliminary genetic analyses of these two albatross populations have been conducted. Initial indications suggest marked genetic separation of Torishima vs. Minami-kojima populations (H. Higuchi, pers. comm. 2004). Genetic analyses should be conducted to clarify this genetic issue. Such work may also provide an understanding of the severity of genetic effects resulting from population “bottlenecking” that occurred when populations were limited to a very few birds. Feather samples of translocated and naturally-reared chicks receiving PTTs will create a material database to help answer future questions that may arise surrounding the genetics of new colonies and the survival rates of translocated or tagged chicks.

6.2. Investigate food habits of short-tailed albatross

A more exact idea of what the birds are eating and where they are foraging will allow us to better focus our outreach and management measures for fisheries-related and ocean pollution threats. It will also aid us in translocation efforts if we must provide a healthy balance of food to translocated young.

6.3. Conduct contaminants analyses

it is unknown whether and to what extent environmental contaminants may be affecting individual short-tailed albatross health, survival rates or reproductive rates. It is also unknown whether contaminants may be having effects upon population growth.

6.3.1. Conduct contaminants analysis on addled eggs, feathers, and dead chicks

These analyses would occur on an “as-available” basis following a standard contaminants sampling and analysis protocol (task 9.4).

6.3.2. Study correlation between black-footed albatross reproductive success and contaminant load (Hg, other metals, persistent organic pollutants [POPs]) as surrogate for short-tailed albatross

Previous studies at Midway have initiated this work. Future work may occur on Black-footed albatross in Japan.

6.3.3. Overlay short-tailed albatross distribution with oil tanker routes, high potential oil exploration areas

This information, once obtained, should be relayed to Japan’s Maritime Safety Agency and to other appropriate oil tanker traffic regulatory bodies.

6.3.4. Develop oil spill contingency plans for high-risk areas

If investigations reveal particularly high risk areas, conduct outreach that will minimize the probability of, or damage caused by, an oil spill.

6.3.5. Conduct studies with museum specimens

Such studies allow comparisons between current and historical contaminant loads.

6.3.5.1. Compare eggshell thickness of new and museum short-tailed albatross eggs

Different eggshell thicknesses across time may suggest contaminant effects either now or in the past.

6.3.5.2. Compare mercury concentrations between historic and recent short-tailed albatross feathers

Mercury concentrations in seafood are often perceived as a human health issue. Albatross may bioaccumulate mercury to levels that affect their rates of survival or reproduction.

6.3.6. Investigate incidence and effects of plastics ingested by short-tailed albatross

Include information on necropsy protocol. Maintain investigator presence on Torishima throughout breeding season for 2 or more years to collect information on bolus and plastic samples (and feathers from known age birds and eggshell fragments).

7.0. Conduct other management-related activities.

Other miscellaneous management activities that don't fit under the above headings, but that may be necessary to achieve recovery of this species, appear below.

7.1. Invite/ encourage participation of Japanese Ministry of Fisheries, and potentially, representatives of Canadian and Russian fisheries organizations, at START meetings

The Team's communication with these agencies, particularly with Japan, is essential in developing a mutual understanding of albatross conservation efforts in these countries and sharing seabird avoidance methodologies. It would also likely pave the way to interagency and intergovernmental cooperation in achieving albatross recovery goals.

7.2. Overlay short-tailed albatross distribution with areas being considered or developed for offshore development (wind farms, tidal energy, fish farming).

Energy developers seem to be taking great interest in offshore projects that could impact birds. In addition offshore developments related to fish farming may result in unanticipated ecological effects. The recovery team wishes to be kept apprised of offshore projects that may affect this species so that it can make the appropriate recommendations to managers.

7.3. Complete short-tailed albatross recovery plan; update in 5 years

This plan addresses this task. An updated plan is due in 2014.

7.4. Hold recovery team meetings periodically

Meeting arrangements are difficult and expensive due to the international composition of this recovery team. Although this task does not appear on the ranked list of recovery tasks, it is a prerequisite to moving forward with an informed, coherent and flexible recovery strategy.

8.0. Conduct outreach and international negotiations as appropriate

Outreach efforts have been conducted within U.S. fisheries, with apparent success. Such efforts should also occur in other nations' fisheries and in areas that may be affected by, or that may have an effect upon, short-tailed albatross breeding colonies.

8.1. Organize seabird bycatch reduction outreach/ workshops for other countries fishing in North Pacific

The results of research to develop state-of-the-art seabird mitigation measures need to be communicated to those countries with longline fisheries within the range of the short-tailed albatross, and such countries should be encouraged to adopt seabird bycatch avoidance measures like those established in the United States.

Outreach efforts may best be accomplished through a combination of workshops or seminars (similar to those in place for the Hawaiian longline fishery), dissemination of outreach materials, and government-to-government relations. Costs for travel, workshops, and publications are shown separately in the implementation schedule.

8.2. Maintain list of formal international outreach opportunities

Attending international fishery-related meetings, or providing information to our meeting delegates would foster international understanding of, and cooperation in, implementing state-of-art seabird bycatch reduction methods. Example meetings include: IFF3, U.S.-Japan Bilateral Fishery meeting, Russia Intergovernmental Consultative Committee, Bilateral or Trilateral Migratory Bird Treaty meetings among the U.S., Japan, and Russia).

8.3. Create outreach materials for international meetings

The team indicated that Powerpoint presentations and other materials should be prepared and made ready and available for team members to take to meetings that they may be attending for other purposes.

8.4. Translate important documents into Japanese, English

This will foster better understanding. A draft of this recovery plan has already been translated into Japanese, and a final plan will also be translated. If Russian participation in the Team increases in the future, Russian translations may also be required.

8.5. Pursue additional support from Japanese government

Discuss options at bilateral migratory bird treaty meetings and other appropriate venues.

9.0. Develop models and protocols as needed

To ensure comparable results between separate studies and across time, sampling and analytical protocols are needed. Models have already proved useful in the recovery planning process for this species, and will likely continue to be of value to the team and other managers.

9.1. Develop/refine Population Viability Analysis

Thorough population modeling is helpful in developing realistic and measurable recovery criteria (e.g. how many individuals reproducing at what rate, in how many separate locations, are required to constitute recovery?). Demographic parameters need to be determined to make the model accurate and useful. Specifically, we need to refine estimates of fledging-to-breeding survivorship, percentage of non-breeding adults, and adult survival rates.

9.2. Develop protocol for necropsy/carcass processing

A protocol needs to be developed and adopted to ensure that the maximum amount of information is extracted from any short-tailed albatross accidentally killed or found dead. The protocol would include methods for preparing samples for analyses of contaminant load, diet, genetic make-up, and evidence of disease or parasites.

9.3. Develop protocols for field handling

This protocol would ensure that data collection in the future are collected in a manner least disturbing to breeding birds and most compatible with previous data collection.

9.4. Develop protocol for contaminants sampling

This protocol would ensure that data and samples collected by various researchers in different places are accomplished with maximal consistency. Several different protocols may be required for sampling of different contaminants (e.g. plastics vs. pesticides).

9.5. Develop protocol for research methodologies (e.g. plastics sampling at colony site)

Consistent research methods are essential to facilitating repeatability of a study; which allows for measurement of trends across time.

9.6. Develop protocols for population monitoring data collection

Protocols for data collection (survival, age at first breeding, proportion of breeding aged adults that attempt to breed, baseline population information, behavior) should be developed in order to ensure consistency of data collection into the future.

9.7 Develop and make available protocols for all aspects of short-tailed albatross work

Once all of the various protocols identified above are developed, care should be taken that they are actually distributed to all applicable managers and researchers so that they may be implemented.

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Implementation Schedule

The Implementation Schedule that follows outlines actions and estimated costs for the short-tailed albatross recovery program as set forth in this recovery plan. It is a guide for meeting the objectives discussed in this plan. This implementation schedule indicates action priority numbers (defined below), action numbers from the narrative outline, START action rank, listing factors (defined below) action descriptions, anticipated duration of actions, responsible parties, and lastly, estimated costs. The initiation and completion of these actions is subject to the availability of funds, as well as other constraints affecting the parties involved.

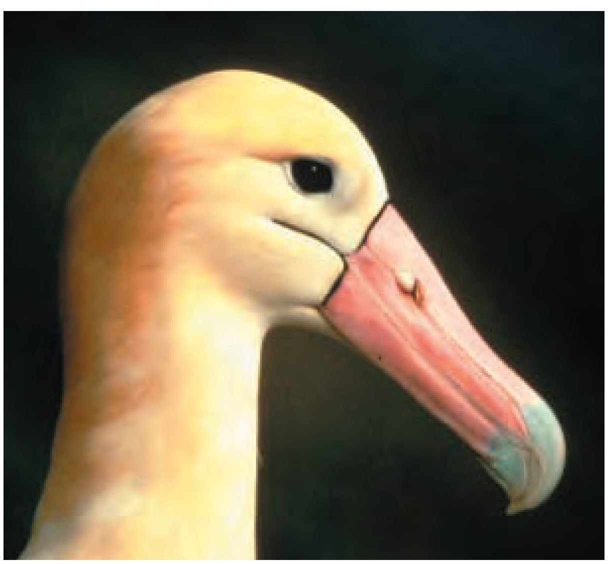
The listing of a party in the implementation schedule does not require, nor imply a requirement, that the identified party has agreed to implement the action(s) or to secure funding for implementing the action(s).

Definition of Action Priorities

Priority 1 — An action that must be taken to prevent extinction or prevent the species from declining irreversibly in the foreseeable future.

Priority 2 — An action that must be taken to prevent a significant decline in species population or habitat quality, or some other significant negative impact short of extinction.

Priority 3 — All other actions necessary to meet the recovery objectives.



Definition of Action Durations

Continual (C) — An action that will be implemented on a routine basis once begun.

Ongoing — An action that is currently being implemented and will continue until no longer necessary.

Periodic — An action that will be conducted one or more times on an as-needed basis.

To Be Determined (TBD) — The action duration is not known at this time or implementation of the action is dependent on the outcome of other recovery actions.

Acronyms used in the Implementation Schedule

Bonin — Institute for Boninology

CCG — Canadian Coast Guard

DOS — U.S. Department of State

FWS — U.S. Fish and Wildlife Service

JCG – Japan Coast Guard

JFA — Japanese Fisheries Agency

NGO — Non-government organization

NMFS — National Marine Fisheries Service

OSU — Oregon State University

TBD — To be determined
(i.e. Not known at this time)

Toho — Toho University

Tokyo — Tokyo Metropolitan Government

UMass — University of Massachusetts

USCG — U.S. Coast Guard

WSGP — Washington Sea Grant Program

WWF — World Wildlife Fund

YIO — Yamishina Institute for Ornithology

Listing Factors Addressed by Each Task

A — the present or threatened destruction, modification, or curtailment of species' habitat or range;

B — overutilization for commercial, recreational, scientific, or educational purposes;

C — disease or predation;

D — the inadequacy of existing regulatory mechanisms (i.e., laws);

E — other natural or manmade factors affecting species' continued existence.

Table 10. IMPLEMENTATION SCHEDULE for Short-tailed Albatross. The Implementation Schedule serves a number of functions in a Recovery Plan. It is used to *prioritize tasks;* it establishes an i*nitial timeframe for accomplishing tasks;* it allows *tracking of recovery accomplishments.* The Implementation Schedule also *estimates costs of tasks,* and it can be used to obligate funds or to help justify obtaining funds from any appropriate source. Although it identifies "Responsible Parties" (i.e. those entities in the best position to implement the action), it does not *obligate any party* to provide funding or implement the action. The following table lists only the most detailed level tasks under each heading.

							Action Expenses (in thousands)						
Action Number	START Rank	Priority	Listing Factor1	Action Description	Action Duration	Responsible Party	FY 1	FY 2	FY 3	FY 4	FY 5	5 Year Total	Comments/Notes
1.1	2	1	A-E	Continue annual monitoring of Tsubamezaki and Hatsunezaki on Torishima (active pairs, eggs, fledglings)	Ongoing	Toho, YIO	5	5	5	5	5	25	
1.2.2	10	2	A	Torishima erosion control; maintain existing gabions above Tsubamezaki colony and remove sediment from central drainage through Tsubamezaki slope	4 years	YIO and others	30	30	30	30		120	
1.3	5	1	A	Conduct decoy & sound system maintenance at Mukojima colony	Annual	YIO	4	4	4	4	4	20	
1.4.1	21	3	A-E	Develop and deploy abrasion-resistant leg band (titanium, Darvic) to replace incoloy	2 years/ ongoing	TBD	15	15	3	3	3	39	
1.4.2	25	3	A-E	Develop and deploy diamond-like coating for color bands for obtaining demographic information	1 year/ ongoing	Toho	15	3	3	3	3	27	
1.4.3	18	3	A-E	Resume color banding of chicks on Torishima	Ongoing	Toho, YIO	0	0	0	0	0	0	
2	5	1	A-E	Monitor Senkaku population	Ongoing/ periodic	TBD	24	24	24	24	24	120	
3.1.1	12	1	A-E	Conduct Torishima telemetry work; breeders during breeding season	4 years	YIO, OSU, UMass, FWS	50	50	50	50		200	
3.1.2	14	2	A-E	Conduct Torishima telemetry work; sub-adults, post-breeders	5 years	YIO, OSU, UMass, FWS	50	50	50	50	50	250	
3.1.3	3	2	A-E	Conduct telemetry work on Mukojima fledglings and Torishima fledglings	5 years	YIO, OSU, UMass, FWS	50	50	50	50	50	250	
3.2.1	N/A	2	B-D	Conduct at-sea telemetry on birds captured in the Aleutian islands soon after the breeding season	3 years	OSU, FWS	0	150		150		300	completed
3.2.2	11	2	B-D	Conduct research on albatross hotspots at sea.	3 years	FWS, OSU							
3.3.1	N/A	2	B	Conduct PTT attachment evaluation (harness types, glue, tape)	3 years	OSU, YIO	5	4	4			13	completed

Action Number	START Rank	Priority	Listing Factor1	Action Description	Action Duration	Responsible Party	Action Expenses (in thousands) FY 1	FY 2	FY 3	FY 4	FY 5	5 Year Total	Comments/Notes
3.3.2	29	2	B-D	Evaluate / deploy archival tags (involves recapture)	3 years	OSU, YIO		30	25	25		80	
3.4	N/A	3	B	Develop clear goal statement of telemetry work.	1 year	OSU, YIO	1					1	
3.5	22	2	A,B,D,E	Determine at-sea distribution; get assistance from an NGO to organize international data collection from ships of opportunity	Ongoing	FWS/ TBD	10	10	10	10	10	50	
4.1	N/A	1	A	Conduct feasibility study of other potential colony re-establishment sites	2 years	Toho, YIO, Bonin	40					40	completed
4.2	N/A	1	A	Prepare selected new translocation colony site (including arranging access, government permits, local outreach, building construction)	1 year	Toho, YIO, Bonin		140				140	completed
4.3	8	1	A	Conduct passive attraction of birds to Mukojima using decoys and recorded colony sounds following annual translocation effort.	1 year & ongoing	Toho, YIO, Bonin	120	10	10	10	10	160	
4.4	N/A	1	A	Conduct surrogate species translocation study (best age for translocation, hand rearing at colony site devoid of adults)	2 years	Toho, YIO, Bonin	150	150				300	completed
4.5.1	1	1	A-E	Translocation of post-guard chicks from Torishima to new island colony site.	5+ years	Toho, YIO, Bonin	350	350	350	350		1400	Year 1 complete
4.5.2	N/A	1	A-E	Translocation of fledglings from Tsubamezaki to Hatsunezaki colony on Torishima	TBD	TBD							not currently a priority task
4.6	4	1	A	Monitor and maintain Mukojima site	10 years	Toho, YIO, Bonin		20	20	20	20	80	
5.1	N/A	2	B-D	Conduct fisheries related bycatch reduction research; integrated weight line research	2 years	WSGP							completed
5.2	33	2	B-D	Conduct fisheries related bycatch reduction research; trawl gear interaction rate study	2 years	WSGP, NMFS			55			55	
5.3	29	2	B-D	Conduct fisheries related bycatch reduction research; trawl gear interaction minimization study	Ongoing	WSGP, NMFS		60	30			90	
5.4	16	2	B-D	Conduct fisheries related bycatch reduction research; pelagic longline gear interaction minimization study.	Ongoing	WSGP, NMFS		60	30			90	

							Action Expenses (in thousands)						
Action Number	START Rank	Priority	Listing Factor1	Action Description	Action Duration	Responsible Party	FY 1	FY 2	FY 3	FY 4	FY 5	5 Year Total	Comments/Notes
5.5	16	2	B-D	Conduct fisheries related bycatch reduction research; refine US and foreign mitigation measures in fisheries	Ongoing	WSGP, WWF, NMFS	50	50	50	50	50	250	
5.6	13	2	B-D	Characterize fisheries throughout the range of short-tailed albatross.	Ongoing	NMFS, TBD							
5.5.1	5	2	B-D	Examine fisheries-albatross range overlap including Japanese, Russian, Korean, Taiwanese, US, Canadian, Chinese fisheries.	2 years	TBD			20	20		40	
5.5.4	29	2	B-D	Develop GIS showing albatross range based on sightings from vessels of opportunity	Ongoing	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
6.1	38	1	E	Conduct Genetic analyses to detect differences between Torishima and Senkaku STAL	3 years	TBD			40	30	30	100	
6.2	9	2	E	Initiate formal study to collect and analyse food habits of STAL	3 years	YIO	20	20	20	20	20	100	
6.3.1	22	2	A,D,E	Conduct contaminants analysis on addled eggs, feathers, and dead chicks	Ongoing	TBD	60	60	60	60	60	300	
6.3.2	22	2	A,D,E	Add short-tailed component to the study of BFAL contaminants load and foraging relative to reproductive success (Hg, other metals, POPs).	2 years	TBD	25	25				50	
6.3.3	19	3	A,D,E	Overlay STAL distribution with oil tanker routes, high potential oil exploration areas, and relay information to appropriate entities	1 year	TBD			30			30	
6.3.4	41	3	A,D,E	Develop oil spill contingency plans/ conduct outreach for high-risk areas	4 years	FWS, JCG, USCG, CCG							
6.3.5.1	38	3	A,D,E	Compare eggshell thickness of new & museum STAL eggs	1 year	TBD				35		35	
6.3.5.2	25	3	A,D,E	Compare mercury concentrations between historic and recently collected STAL feathers	1 year	TBD			50			50	
6.3.6	29	2	A,D,E	Investigate incidence and effects of plastics ingested by short-tailed albatross	4 years	TBD	TBD	TBD	TBD	TBD	TBD	TBD	
7.1	19	2	B-D	Invite and encourage participation of Japanese Ministry of Fisheries at START meetings	1 year/ Ongoing	DOS	3	3	3	3	3	15	

Action Number	START Rank	Priority	Listing Factor1	Action Description	Action Duration	Responsible Party	Action Expenses (in thousands) FY 1	FY 2	FY 3	FY 4	FY 5	5 Year Total	Comments/Notes
7.2	14	3	AB,D,E	Overlay short-tailed albatross distribution with areas being considered or developed for offshore development (wind farms, tidal energy, fish farming).	Ongoing	TBD							
7.3	N/A	2	A-E	Complete short-tailed albatross recovery plan; update every 5 years	2 years	FWS		15	15			30	completed
7.4	25	2	A-E	Hold recovery team meetings periodically	Ongoing	FWS		50		50		100	
8.1	37	2	A-E	Organize seabird bycatch reduction outreach/ workshops for other countries fishing in North Pacific	Ongoing	FWS			7	7	7		
8.2	38	2	B,D,E	Maintain list of formal international outreach opportunities to foster international cooperation in implementing state-of-art seabird bycatch reduction methods & conduct outreach	Ongoing	TBD		5	5	5	5	20	
8.3	33	2	B,D,E	Create outreach materials for international meetings	Periodic	FWS	5		3		3	11	
8.4	33	2	E	Translate important documents into Japanese, English	Ongoing	TBD	5	2	2	2	2	13	
8.5	33	2	A,B,D,E	Pursue additional support from Japanese government (through bilateral migratory bird treaty or other means)	Ongoing	FWS TBD							
9.1	N/A	2	A-E	Develop/refine Population Viability Analysis		FWS, UMass	TBD						completed
9.2	N/A	3	A-E	Develop protocol for necropsy/carcass processing	1 year	FWS, YIO		2				2	
9.3	N/A	2	A-E	Develop protocols for field handling	1 year	OSU, YIO, UMass		2				2	
9.4	N/A	3	A-E	Develop protocol for contaminants sampling	1 year	FWS		2				2	
9.5	N/A	3	A-E	Develop protocol for research methodologies (e.g. plastics sampling at colony site)	1 year	TBD		2				2	
9.6	N/A	3	A-E	Prepare protocols for population monitoring data collection (1st breeding age, % adults breeding, baseline pop info., behavior)		TBD	10					10	
9.7	25	3	A-E	Develop and make available protocols for all aspects of short-tailed albatross work		TBD							

Appendix 1

Leg band schedule for short-tailed albatross banded on Torishima Island by Dr. Hiroshi Hasegawa

Banding Records of the Short-tailed albatross, *Phoebastria Albatrus*, on Torishima, Japan. All the birds were banded as chicks by Hiroshi Hasegawa*

	Layout			
Date	Left Leg	Right Leg	Metal Band Serial Number	Plastic Band Color and Number
20 Mar. 1977		metal	130-00251 to 00265	
20 Mar. 1979	plastic[1]	metal[2]	130-00501 to 00524	White 000 to 029
19 Mar. 1980	plastic	metal	130-00801 to 00820	Red 000 to 027
20 Mar. 198l	plastic	metal	130-01201 to 01234	Blue 000 to 042
24 Mar. 1982	plastic	metal	130-01310 to 01330	Yellow 000 to 028
20 Mar. 1983	plastic	metal	130-01531 to 01564	Orange 000 to 041
14 Apr. 1984	plastic	metal	130-01565 to 01596	Green 000 to 039
17 Mar. 1985	plastic	metal	130-01597 to 01647	Black 000 to 057
14 Apr. 1986	metal	plastic	130-01648 to 01695	White 030 to 087
14 Apr. 1987	metal	plastic	130-01696 to 01748	Red 028 to 087
11 Apr. 1988	metal	plastic	130-01901 to 01958	Blue 043 to 122
19 Apr. 1989	metal	plastic	130-01959 to 02000	Yellow 029 to 085
18 Apr. 1990	metal	plastic	130-04151 to 04201	Orange 042 to 111
15 Apr. 1991	metal	plastic	13A 0501 to 0566	Green 040 to 128
21 Apr. 1992	metal	plastic	13A 0567 to 0617	Black 058 to 130
8 Apr. 1993	plastic	metal	13A 0701 to 0772	Black 131 to 185
16 Apr. 1994	plastic	metal	13A 0801 to 0879	Orange 112 to 148 Red 092 to 115 Green 129 to 151
21 Apr. 1995	plastic	metal	13A 0880 to 0961	Red 000 to 056 Blue 000 to 040
19 Apr. 1996	plastic	metal	13A 0962 to 1023	Yellow 000 to 083
24 Apr. 1997	plastic	metal	13A 1024 to 1113	Orange 000 to 110 Blue 041 to 046
23 Apr. 1998	metal		13A 1114 to 1243	
25 Apr. 1999		metal	13A 1244 to 1384	
24 Apr. 2000		metal	13A 1385 to 1500 13A 6951 to 6981	
27 Apr. 2001		metal	13A 6982 to 7150	
24 Apr. 2002		metal	13A 7501 to 7659	
7 May 2002	plastic	metal	13A 7660	Blue 138 at Kita-kojima in the Senkaku Islands

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, and 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 Ministry of the Environment of Japan (=Kankyosho in Japanese). For example: Kankyosho Tokyo Japan 130-00251 or Kankyosho Tokyo Japan 13A 1243

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Appendix 2

Short-tailed Albatross Conservation and Breeding Project Program

26 November, 1993
Environment Agency, Government of Japan

Project target

At one time a large number of Short-tailed Albatross bred on the oceanic island such as Izu Islands and far west of Ogasawara Islands. But their population decreased by overcatching, and they were considered extinct in those days. After that, they were re-discovered on Torishima Island in the Izu Islands in 1951. As of 1993 their population is estimated as approximately 600. The breeding of this species was confirmed only on Torishima Island in Izu Islands and Minami-kojima Island in Senkaku Islands, and most of them bred on the steep slope at the southern tip of Torishima Island.

This project aims to keep and improve the environmental condition of existing breeding sites and to expand the breeding colony by producing new breeding sites for the stable survival of this species for the future.

Area of this project: Torishima Island, Tokyo

Project outline

Improvement of the breeding sites

(1) Improvement of the existing breeding site

The existing breeding site, which is located on the steep slope at the southern end of Torishima Island, should be maintained and be improved from the unstable situation such as erosion.

Concretely, efforts will be made to remove the piled sand out of the breeding site to build the facility to protect the site from erosion, and to ease the slope, and to plant native species for the stable environment of their breeding site.

(2) Establishment of a new breeding site

The existing breeding site is not in good condition, for example, area suitable for breeding is small, geographical condition is severe, etc. Also the existing one might be in danger of big damage caused by typhoons and other natural disasters in the future. In this context, a new breeding site shall be established, besides the existing one, on the steady and safe area. Therefore, the new breeding site should be established by attracting sub-adults of this species that would be led by decoys or tape-recorded song.

Research on living status of Short-tailed Albatross

The research of Short-tailed Albatross on their distribution, home range, habitat and breeding status shall be continuously conducted for appropriate and effective implementation of this program. And also the fledglings should be banded for individual identification.

Influences by negative factors such as alien species; roof rat (*Rattus rattus*) etc.; for Short-tailed Albatross shall be accessed, and measures need to be taken as the occasion demands.

Promote public awareness

Public awareness on their habitat, necessity of conservation of this species, and situation of this project implementation shall be promoted widely.

Appendix 3

Requirements for Vessels using Hook-and-Line (i.e. longline) gear in the Groundfish and Halibut Fisheries off Alaska

These requirements reflect a revision to previous requirements and were published in the Federal Register Vol. 72 pages 71601-71605, on December 18, 2007.
or more information, visit: http://fakr.noaa.gov/protectedresources/seabirds/guide.htm

Who Must Use the New Seabird Avoidance Measures?

Seabird avoidance measures apply to the operators of vessels longer than 26 ft LOA using hook-and-line gear for:

- Pacific halibut in the Individual Fishing Quota (IFQ) and Community Development Quota (CDQ) management programs (0 to 200 nautical miles (nm)),
- IFQ sablefish in EEZ waters (3 to 200 nm) and waters of the State of Alaska (0 to 3 nm), except waters of Prince William Sound and areas in which sablefish fishing is managed under a State of Alaska limited entry program (Clarence Strait, Chatham Strait), and
- groundfish (except IFQ sablefish) with hook-and-line gear in the U.S. EEZ waters off Alaska (3 to 200 nm).
- Other than noted above, vessel operators using hook-and-line gear and fishing for groundfish in waters of the State of Alaska must refer to seabird avoidance measures in State regulations.
- Exemption: Operators of vessels 32 ft (9.8 m) LOA or less using hook-and-line gear in IPHC Area 4E in waters shoreward of the EEZ are exempt from seabird avoidance regulations.

What are the Seabird Avoidance Requirements?

The primary requirements are:

- Seabird avoidance gear must be onboard, made available for inspection upon request by specified persons, and must be used while hook-and-line gear is being deployed.
- Use of a line or lines designed to deter seabirds from taking baited hooks (paired streamer line, single streamer line, or buoy bag line).
- Offal discharge methods, including removal of hooks from any offal that is discharged.
- Collecting all seabirds that are incidentally taken on the observer-sampled portions of hauls using hook-and-line gear.

What are the New Seabird Avoidance Requirements?

- Standards for streamer lines must be used on hook-and-line vessels greater than 26 ft (7.9 m) and less than or equal to 55 ft (16.8 m) fishing in the EEZ (see the regulations for the specific standards).
- Seabird avoidance requirements are no longer required for all hook-and-line vessels fishing in Prince William Sound (NMFS Area 649), the State waters of Cook Inlet, and Southeast Alaska (NMFS Area 659) EXCEPT for certain areas in the inside waters of Southeast Alaska.
- The 3 exception areas are:
  1. Lower Chatham Strait south of a straight line between Point Harris (latitude 56° 17.25 N.) and Port Armstrong,
  2. Dixon Entrance defined as the State groundfish statistical areas 325431 and 325401, and
  3. Cross Sound west of a straight line from Point Wimbledon extending south through the Inian Islands to Point Lavinia (longitude 136° 21.17 E.).
- The Seabird Avoidance Plan is no longer required.
- The requirement to use one “other device” is removed.
- Vessels greater than 26 ft (7.9 m) and less than or equal to 55 ft (16.8 m) may use discretion with seabird avoidance requirements when winds exceed 30 knots (near gale or Beaufort 7 conditions).

What Type of 'Bird Scaring Line' Must be Used?

The type of 'bird scaring line' you are required to use depends on the area you fish, the length of your vessel, the superstructure of your vessel, and the type of hook-and-line gear you use (e.g. snap gear). See Table 20 [follows] and the actual regulations at 50 CFR Part 679.24(e)(2) for your specific requirements.

- Larger vessels [greater than 55 ft (16.8 m) length overall (LOA)] in the EEZ must use paired streamer lines of a specified performance and material standard.
- Smaller vessels [greater than 26 ft (7.9 m) LOA and less than or equal to 55 ft LOA] must use a single streamer line or, in limited instances, a buoy bag line. Required performance and material standards are now specified for smaller vessels.
- See Table 20 of Part 679 (following page)

Is 'Night-Setting' an Option as a Seabird Avoidance Measure?

No. Night-setting, the use of a line shooter, or the use of a lining tube (for underwater setting of gear) must be accompanied by the applicable seabird avoidance gear requirements as specified in the regulation.

Are Free Streamer Lines Still Available?

Yes. See the free Streamer Line web page: http://www.fakr.noaa.gov/protectedresources/seabirds/streamers.htm for the nearest Streamer Line distribution center.

What Do I Do if I Accidentally Hook Birds While Hauling Gear and They Come Onboard Alive?

The new regulations continue to require that every reasonable effort be made to ensure that birds brought on board alive are released alive. The U.S. Fish & Wildlife Service (USFWS) says that these live birds should be released on site if they meet ALL of the following criteria:

- Bird can stand and walk using both feet.
- Bird can flap both wings and there is no apparent wing droop.
- Bird is alert, active, holds its head up and reacts to stimuli.
- Bird is not bleeding freely.
- Wing and tail feathers have not been lost and are in good condition.
- Bird is waterproof (water beads up on feathers).

If the bird does not meet all of these criteria, then see Appendix 2 of the USFWS Biological Opinion on the Effects of the Total Allowable Catch-Setting Process for the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish Fisheries to the Endangered Short-tailed Albatross (Phoebastria albatrus) and Threatened Steller's Eider (*Polysticta stelleri*), September 2003, for details on how to care for the bird.

When Are the New Regulations Effective?

The new regulations were effective January 17, 2008, 30 days after the publication of the final regulations in the Federal Register (72 FR 71601, December 18, 2007).

Table 20 to Part 679. Seabird Avoidance Gear Requirements for Vessels, based on Area, Gear, and Vessel Type

(see § 679.24(e) for complete seabird avoidance program requirements; see § 679.24(e)(1) for applicable fisheries)

If you operate a vessel deploying hook-and-line gear, other than snap gear, in waters specified at § 679.24(e)(3), and your vessel is....	Then you must use this seabird avoidance gear in conjunction with requirements at § 679.24(e)...
> 26 ft (7.9 m) to 55 ft (16.8 m)LOA and without masts, poles, or rigging	minimum of one buoy bag line
> 26 ft (7.9 m) to 55 ft (16.8 m) LOA and with masts, poles, or rigging	minimum of a single streamer line of a standard specified at § 679.24(e)(4)(ii)
> 55 ft (16.8 m) LOA	minimum of a paired streamer lines of a standard specified at § 679.24(e)(4)(iii)

If you operate a vessel deploying hook-and-line gear, and use snap gear in waters specified at § 679.24(e)(3), and your vessel is....	Then you must use this seabird avoidance gear in conjunction with requirements at § 679.24(e)...
> 26 ft (7.9 m) to 55 ft (16.8 m)LOA and without masts, poles, or rigging	minimum of one buoy bag line
> 26 ft (7.9 m) to 55 ft (16.8 m) LOA and with masts, poles, or rigging	minimum of a single streamer line of a standard specified at § 679.24(e)(4)(iv)
> 55 ft (16.8 m) LOA	minimum of a single streamer line of a standard specified at § 679.24(e)(4)(iv)

If you operate a vessel < 32 ft (9.8 m) LOA in the State waters of IPHC Area 4E,or operate a vessel in NMFS Reporting Area 649 (Prince William Sound), State waters of Cook Inlet, and NMFS Reporting Area 659 (Eastern GOA Regulatory Area, Southeast Inside District), but not including waters in the areas south of a straight line at latitude 56º 17.25 N between Point Harris and Port Armstrong in Chatham Strait, State statistical areas 325431 and 325401, and west of a straight line at longitude 136º21.17 E from Point Wimbledon extending south through the Inian Islands to Point Lavinia	Then you are exempt from seabird avoidance regulations.

Appendix 4

Links to the United Nations Food and Agriculture Organization's International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries, and to Final National Plans of Action for Reducing Seabird Bycatch for States within the range of the short-tailed albatross.

FAO:	http://www.fao.org/fishery/ipoa-seabirds
United States:	http://www.fakr.noaa.gov/protectedresources/seabirds/npoa/npoa.pdf
Canada:	http://www.dfo-mpo.gc.ca/npoa-pan/npoa-pan/npoa-seabirds-eng.htm
Japan:	ftp://ftp.fao.org/FI/DOCUMENT/IPOAS/national/japan/NPOA-seabirds.pdf
Russia:	Not available as of 9/30/08
China:	Not available as of 9/30/08
South Korea:	Not available as of 9/30/08
Taiwan:	Not available as of 9/30/08

Appendix 5

Recovery Tasks in order of priority as determined by the Short-tailed Albatross Recovery Team in 2008

TaTask rank was determined by the Short-tailed Albatross Recovery Team during their 4th meeting in August, 2008 at Cape Town, South Africa. Each recovery team member present (n = 11) cast from 0-5 votes for each task, with 40 votes allocated to each team member.

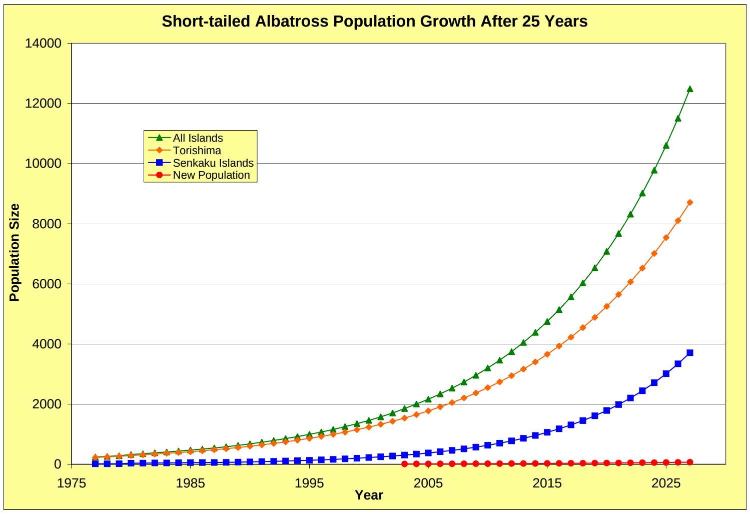
START Rank	Action Number	Action Description	Votes
1	4.5.1	Translocation of post-guard chicks from Torishima to new island colony site.	46
2	1.1	Continue annual monitoring of Tsubamezaki and Hatsunezaki on Torishima (active pairs, eggs, fledglings).	40
3	3.1.3	Conduct telemetry work on Mukojima fledglings and Torishima fledglings.	35
4	4.6	Monitor and maintain Mukojima site.	30
5	1.3	Conduct decoy & sound system maintenance at Mukojima colony.	24
5	2	Monitor Senkaku population.	24
5	5.5.1	Examine fisheries-albatross range overlap including Japanese, Russian, Korean, Taiwanese, US, Canadian, Chinese fisheries.	24
8	4.3	Conduct passive attraction of birds to Mukojima using decoys and recorded colony sounds following annual translocation effort.	23
9	6.2	Initiate formal study to collect and analyse food habits of short-tailed albatross.	22
10	1.2.2	Torishima erosion control; maintain existing gabions above Tsubamezaki colony and remove sediment from central drainage through Tsubamezaki slope.	19
11	3.2.2	Conduct research on albatross hotspots at sea.	17
12	3.1.1	Conduct Torishima telemetry work; breeders during breeding season.	15
13	5.6	Characterize fisheries throughout the range of short-tailed albatross.	13
14	3.1.2	Conduct Torishima telemetry work; sub-adults, post-breeders.	11
14	7.2	Overlay short-tailed albatross distribution with areas being considered or developed for offshore development (wind farms, tidal energy, fish farming).	11
16	5.4	Conduct fisheries related bycatch reduction research; pelagic longline gear interaction minimization study.	10
16	5.5	Conduct fisheries related bycatch reduction research; refine US and foreign mitigation measures in fisheries.	10
18	1.4.3	Resume color banding of chicks on Torishima.	9
19	6.3.3	Overlay STAL distribution with oil tanker routes, high potential oil exploration areas and relay information to appropriate entities.	8
19	7.1	Invite/ encourage participation of Japanese Ministry of Fisheries at START meetings.	8
21	1.4.1	Develop and deploy abrasion-resistant leg band (titanium, Darvic) to replace incoloy.	7
22	6.3.2	Add short-tailed component to the study of BFAL contaminants load and foraging relative to reproductive success (Hg, other metals, POPs).	6
22	6.3.1	Conduct contaminants analysis on addled eggs, feathers, and dead chicks.	6
22	3.5	Determine at-sea distribution; get assistance from an NGO to organize international data collection from ships of opportunity.	6

START Rank	Action Number	Action Description	Votes
25	1.4.2	Develop and deploy diamond-like coating for color bands for obtaining demographic information.	5
25	6.3.5.2	Compare mercury concentrations between historic and recently collected short-tailed albatross feathers.	5
25	7.4	Hold recovery team meetings periodically.	5
25	9.7	Develop and make available protocols for all aspects of short-tailed albatross work: Including for population monitoring data collection (1st breeding age, % adults breeding, baseline pop info., behavior), necropsy/carcass processing, field handling, contaminants sampling, research methodologies (e.g. plastics sampling at colony site).	5
29	3.3.2	Evaluate / deploy archival tags (involves recapture).	4
29	5.3	Conduct fisheries related bycatch reduction research; trawl gear interaction minimization study.	4
29	5.5.4	Develop GIS showing albatross range based on sightings from vessels of opportunity.	4
29	6.3.6	Investigate incidence and effects of plastics ingested by short-tailed albatross.	4
33	5.2	Conduct fisheries related bycatch reduction research; trawl gear interaction rate study.	3
33	8.3	Create outreach materials for international meetings.	3
33	8.4	Translate important documents into Japanese, English.	3
33	8.5	Pursue additional support from Japanese government (through bilateral migratory bird treaty or other means).	3
37	8.1	Organize seabird bycatch reduction outreach/ workshops for other countries fishing in North Pacific.	2
38	6.1	Conduct Genetic analyses to detect differences between Torishima and Senkaku short-tailed albatross.	1
38	6.3.5.1	Compare eggshell thickness of new & museum STAL eggs.	1
38	8.2	Maintain list of formal international outreach opportunities to foster international cooperation in implementing state-of-art seabird bycatch reduction methods & conduct outreach.	1
41	6.3.4	Develop oil spill contingency plans/conduct outreach for high-risk areas.	0
N/A	3.4	Develop clear goal statement of telemetry work.	Not prioritized
N/A	3.2.1	Conduct at-sea capture and telemetry to determine marine distribution during non-breeding season.	Done
N/A	3.3.1	Conduct PTT attachment evaluation (harness types, glue, tape).	Done
N/A	7.3	Complete short-tailed albatross recovery plan; update every 5 years.	Done
N/A	9.1	Develop/refine Population Viability Analysis.	Done
N/A	4.4	Conduct surrogate species translocation study (best age for translocation, hand rearing at colony site devoid of adults).	Done
N/A	5.1	Conduct fisheries related bycatch reduction research; integrated weight line research.	Done
N/A	4.1	Conduct feasibility study of other potential colony re-establishment sites.	Done
N/A	4.2	Prepare selected new translocation colony site (including arranging access, government permits, local outreach, building construction).	Done

Appendix 6

Deterministic Population Model

This is a visual representation of a model developed by Dr. Paul Sievert, START member. The model allows users to vary the magnitude and timing of potential volcanic events and predict resultant population effects. Working copies of this model are available from Dr. Sievert.



Volcanic Effects - Torishima	
Year of Eruption	
Season of Eruption (1-8)	
Adults Surviving	
Subadults Surviving	
Eggs Surviving	
Chicks Surviving	
Breeding after Eruption	
1 Year After	
2 Years After	
3 Years After	
4 Years After	
5 Years After	

			Season of Eruption				
1	2	3	4	5	6	7	8
Arrival (Oct)	Incubation (Nov-Dec)	Brooding (Jan)	Early Chick (Feb)	Mid Chick (Mar-Apr)	Late Chick (May-Jun)	Absent (Jul-Sep)	No Eruption
0.80	0.60	0.60	0.90	0.95	0.98	1.00	1.00
0.95	0.80	0.60	0.50	0.40	0.90	1.00	1.00
1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00
1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
0.20	0.05	0.05	0.25	0.30	0.35	0.45	1.00
0.40	0.20	0.20	0.45	0.50	0.55	0.65	1.00
0.50	0.40	0.40	0.65	0.70	0.75	0.85	1.00
0.70	0.60	0.60	0.75	0.80	0.85	0.93	1.00
0.85	0.80	0.80	0.90	0.95	0.95	0.97	1.00

TORISHIMA		
Population Parameters		
Reproductive Success		0.640
Annual Survival:	Subadults	0.941
	Adults	0.967
Proportion Breeding		0.750
Bycatch rate:	Subadults	0.000
	Adults	0.000
Model Predictions		
Population Growth Rate =		0.000
Pop. Size in 25 yrs (2027) =		0

SENKAKU ISLANDS		
Population Parameters		
Reproductive Success		0.750
Annual Survival:	Subadults	0.965
	Adults	0.980
Proportion Breeding		0.800
Bycatch rate:	Subadults	0.000
	Adults	0.000
Model Predictions		
Population Growth Rate =		0.000
Pop. Size in 25 years (2027) =		0

NEW ISLAND (BONIN?)		
Population Parameters		
Reproductive Success		0.640
Annual Survival:	Subadults	0.941
	Adults	0.967
Proportion Breeding		0.750
Bycatch rate:	Subadults	0.000
	Adults	0.000
Model Predictions		
Population Growth Rate =		0.000
Pop. Size in 25 yrs (2027) =		0

COMBINED POPULATIONS		
Population Parameters		
Reproductive Success		0.695
Annual Survival:	Subadults	0.953
	Adults	0.974
Proportion Breeding		0.775
Bycatch rate:	Subadults	0.000
	Adults	0.000
		0.000
Model Predictions		
Population Growth Rate =		0.000
Pop. Size in 25 years =		0