Short-tailed Albatross
(Phoebastria albatrus)

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Anchorage Fish and Wildlife Field Office
Anchorage, Alaska

5-YEAR REVIEW

Species reviewed: Short-tailed Albatross (*Phoebastria albatrus*)

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5-YEAR REVIEW
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1.0 GENERAL INFORMATION

1.1 Reviewers:

Kim Rivera, National Seabird Coordinator, NOAA Fisheries
Judy Jacobs, Endangered Species Biologist, USFWS, Alaska
Paul Sievert, Assistant Unit Leader, USGS, Massachusetts Cooperative Fish and Wildlife Research Unit,

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Lead Field Office Greg Balogh, Anchorage Fish and Wildlife Field Office, Anchorage, Alaska, 907-271-2778

Cooperating Field Office(s) None

Cooperating Regional Office(s) None

1.2 Methodology used to complete the review:

This review represents an individual effort by Greg Balogh, Endangered Species Branch Chief at the Anchorage Fish and Wildlife Field Office, using information that resulted from a Short-tailed Albatross Recovery Team meeting held in Cape Town, South Africa in August, 2008, and information excerpted from the Short-tailed Albatross Recovery Plan, completed in September, 2008. Recovery criteria were developed by the Short-tailed Albatross Recovery Team with the assistance of: 1) a stochastic Population Viability Analysis that was contracted out to Myra Finkelstein at the University of California, Santa Cruz; and 2) a deterministic population model developed by Dr. Paul Sievert at the University of Massachusetts Cooperative Fish and Wildlife Research Unit.

1.3 Background:

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.

We made the draft recovery plan for the short-tailed albatross available for public comment from October 27th to December 27th, 2005 (70 FR 61988). We considered information we received during this public comment period and information received from five peer reviewers and the Government of Japan in our preparation of the final recovery plan. The Short-tailed Albatross Recovery Team has taken into account these comments in redrafting the recovery plan and in revising and justifying the new recovery criteria set forth in the final plan. The final plan was approved by the Regional Director, Region 7, Alaska, on September 17, 2008. It is available at: http://alaska.fws.gov/fisheries/endangered/pdf/stal_recovery_plan.pdf

1.3.1 FR Notice citation announcing initiation of this review: 74 FR (96) 23739-23741

1.3.2 Listing history

The short-tailed albatross was originally listed as endangered in accordance with the Endangered Species Conservation Act of 1969 (ESCA). Pursuant to the ESCA, two separate lists of endangered wildlife were maintained, one for foreign species and one for species native to the United States. The short-tailed albatross appeared only on the List of Endangered Foreign Wildlife (35 FR 8495; June 2, 1970). When the Act became effective on December 28, 1973, it superseded the ESCA.

The native and foreign lists were combined to create one list of endangered and threatened species (39 FR 1171; January 4, 1974). When the lists were combined, prior notice of the action for the short-tailed albatross was not given to the governors of the affected States (Alaska, California, Hawaii, Oregon, and Washington), as required by the Act, because available data were interpreted as not supporting resident status for the short-tailed albatross. Thus, native individuals of this species were never formally proposed for listing pursuant to the criteria and procedures of the Act.

On July 25, 1979, we published a notice (44 FR 43705) stating that, through an oversight in the listing of the short-tailed albatross and six other endangered species, individuals occurring in the United States were not protected by the Act. The notice stated that our intent was that all populations and individuals of the seven species should be listed as endangered wherever they occurred. Therefore, the notice stated that we intended to take action to propose endangered status for individuals occurring in the United States. On July 25, 1980, we published a proposed rule (45 FR 49844; July 25, 1980) to list, in the United States, the short-tailed albatross and four of the other species referred to above. No final action was taken on the July 25, 1980, proposal.

In 1996, we designated the short-tailed albatross as a candidate for listing in the United States (62 FR 49398; September 19, 1997). On November 2, 1998, we issued an updated proposed rule to list the short-tailed albatross as endangered in the United States (63 FR 58692; November 2, 1998).

Original Listing

FR notice: See above history

Date listed: pre-ESA
Entity listed: Species
Classification: Endangered (Foreign Wildlife)

Revised Listing, if applicable
FR notice: 65 FR 147:46643-46654
Date listed: July 31, 2000
Entity listed: Species
Classification: Endangered (throughout its range)

1.3.3 Associated rulemakings: None

1.3.4 Review History:
Status Report: October 25, 1993
Final Listing: July 31, 2000
Draft Recovery Plan: October 27, 2005
Final Recovery Plan: September 17, 2008

1.3.5 Species' Recovery Priority Number at start of 5-year review: 8

1.3.6 Recovery Plan or Outline

Name of plan or outline: Short-tailed Albatross Recovery Plan
Date issued: September 17, 2008
Dates of previous revisions, if applicable: None

2.0 REVIEW ANALYSIS

2.1 Application of the 1996 Distinct Population Segment (DPS) policy

2.1.1 Is the species under review a vertebrate?

___x__Yes, go to section 2.1.2.
_____No, go to section 2.2.

2.1.2 Is the species under review listed as a DPS?

____ ***Yes**, go to section 2.1.3.*
___x_ ***No**, go to section 2.1.4*

2.1.3 Was the DPS listed prior to 1996?

____ ***Yes**, give date and go to section 2.1.3.1.*
____ ***No**, go to section 2.1.4.*

2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?

____ ***Yes,*** *provide citation and go to section 2.1.4.*
____ ***No****, go to section 2.1.3.2.*

2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?

____ ***Yes****, discuss how it meets the DPS policy, and go to section 2.1.4.*
____ ***No****, discuss how it is not consistent with the DPS policy and consider the 5-year review completed. Go to section 2.4., Synthesis.*

2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?

____ ***Yes****, provide citation(s) and a brief summary of the new information; explain how this new information affects our understanding of the species and/or the need to list as DPSs.*

__x__ ***No****, go to section 2.2., Recovery Criteria.*

2.2 Recovery Criteria

2.2.1 Does the species have a final, approved recovery plan[1] containing objective, measurable criteria?

__x__ ***Yes****, continue to section 2.2.2.*

____ ***No****, consider recommending development of a recovery plan or recovery criteria in section IV, Recommendations for Future Actions, and go to section 2.3., Updated Information and Current Species Status.*

2.2.2 Adequacy of recovery criteria.

2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?

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[1] Although the guidance generally directs the reviewer to consider criteria from final approved recovery plans, criteria in published draft recovery plans may be considered at the reviewer's discretion.

__x__ ***Yes,*** *go to section 2.2.2.2.*
____ ***No****, go to section 2.2.3, and note why these criteria do not reflect the best available information. Consider developing recommendations for revising recovery criteria in section 4.0.*

2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and is there no new information to consider regarding existing or new threats)?

__x__ ***Yes****, go to section 2.2.3.*
____ ***No****, go to section 2.2.3, and note which factors do not have corresponding criteria. Consider developing recommendations for revising recovery criteria in section 4.0.*

2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information

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 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.

All recovery and reclassification criteria address listing factors A, B, C, D, and E. All of these factors can affect population growth and decline, and are, therefore, relevant.

2.3 Updated Information and Current Species Status

The status quo of the species has not changed since the release of the final recovery plan in September, 2008. This recovery plan contains a great deal of new information generated and/or obtained since publication of the final rule to list this species throughout its range (65 FR 147:46643, July 31, 2000).

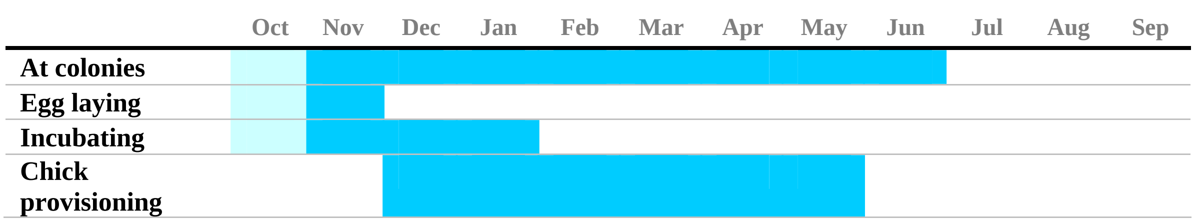
2.3.1 Biology and Habitat

2.3.1.1 New information on the species' biology and life history:

Breeding Biology

The species is known to breed on only two remote islands in the western Pacific: Torishima (Japan) and Minami-kojima, a site in the Senkaku Islands, to the southwest of Torishima. 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 1). There is little information on timing of breeding on Minami-kojima.

Table 1. Breeding cycle of short-tailed albatross (Hasegawa and DeGange 1982, Austin 1949).



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 1) (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).

By late May or early June, the chicks are almost fully grown, and the adults begin abandoning the colony site (Hasegawa and DeGange 1982, 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 of the birds did not occur, due to difficulty of access for humans. Torishima, where vegetated, is dominated by a clump-forming grass, *Miscanthus sinensis* var. *condensatus*. 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*, are also present (Hasegawa 1977).

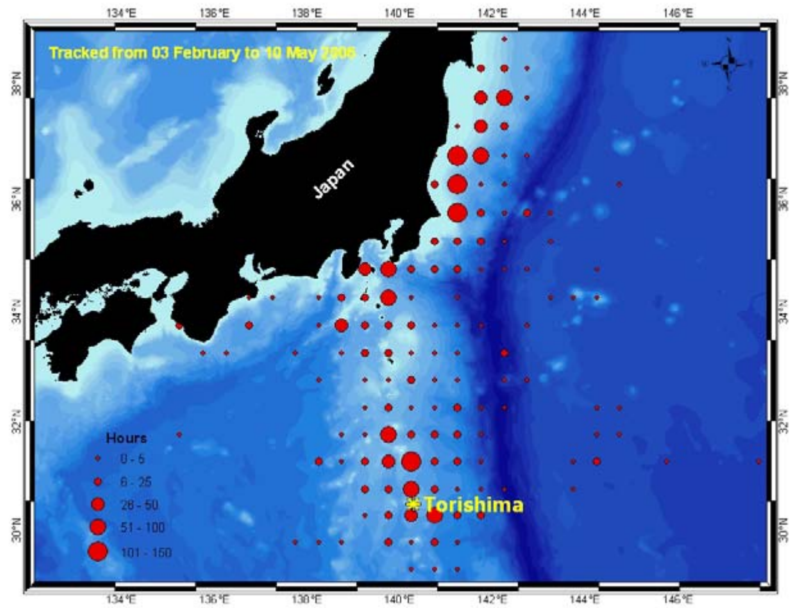


Figure 1. Use of marine habitat by short-tailed albatross breeding adults during the chick-rearing period. Data were generated from satellite telemetry data, and the hours spent by tagged short-tailed albatross in each 0.5 degree block were summed.

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 shelfbreak from the Alaska Peninsula out towards St. Matthew Island (Suryan et al. 2007a, Tickell 2000). The shelfbreak 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 shelfbreak, 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 shelfbreak where surface chlorophyll a (chl. a) standing stocks were at a maximum, although they also foraged at other locations where the concentrations of chl. a were far lower (Figure 2) (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 (2,000-6,000 meters deep) 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 (birds carrying satellite transmitters taped to their back feathers)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).

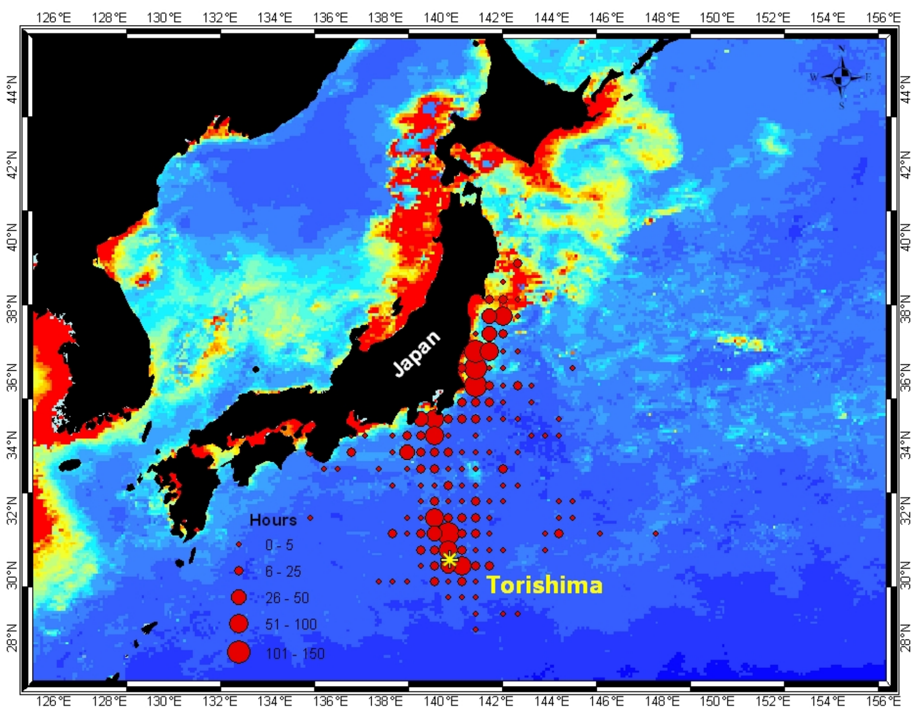


Figure 2. Locations of breeding short-tailed albatross from February through April, 2006, during their brood-rearing season overlaid upon a chart showing Chl a concentrations along the east coast of Honshu Island, Japan. Chl a concentration gradient is from low (blue) to high (red).

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 northern California, primarily along continental shelf margins (Figure 3). 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^{o} 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 4). Birds were more active during the day than at night (Balogh and Suryan 2005, Suryan et al. 2007b).

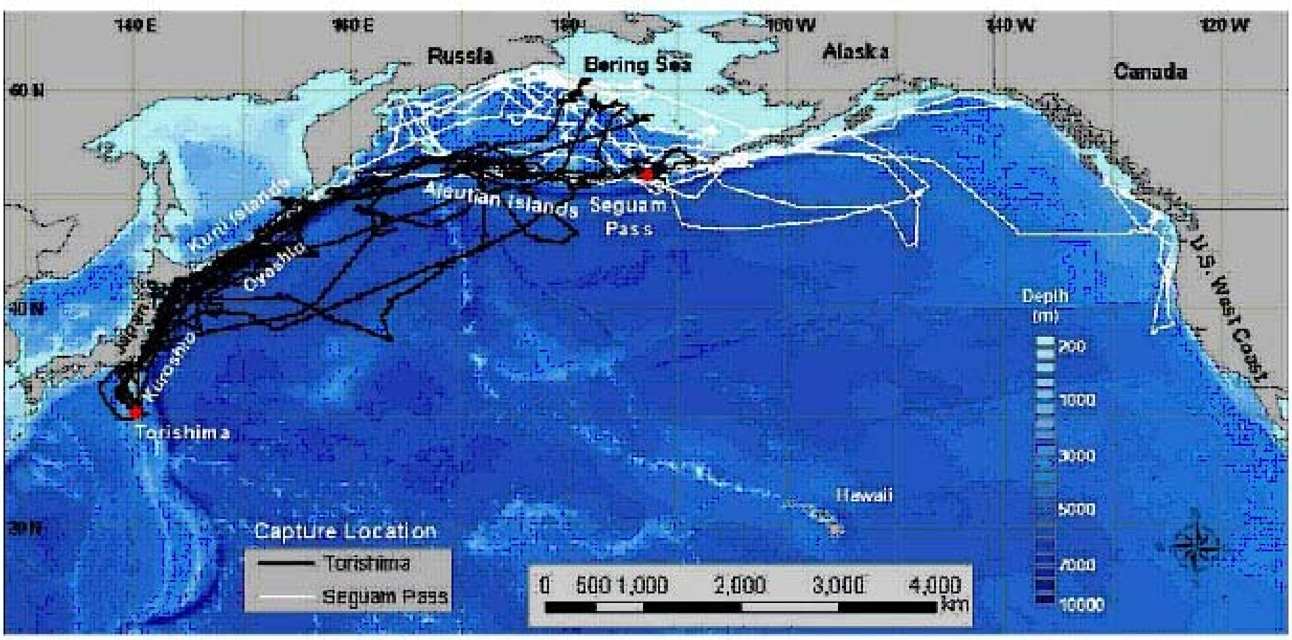


Figure 3. Representative track lines for short-tailed albatross during the post breeding and non-breeding season. Short-tailed albatross tagged at Torishima (noted by black lines) were non-breeders or breeders captured at the end of the breeding season in May 2001-2003. Those tagged in Alaska at sea during 2003, 2005, and 2006 (noted in white lines) were tagged in late July though August, and include adults, sub-adults, and juveniles.

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 4) (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 5). 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).

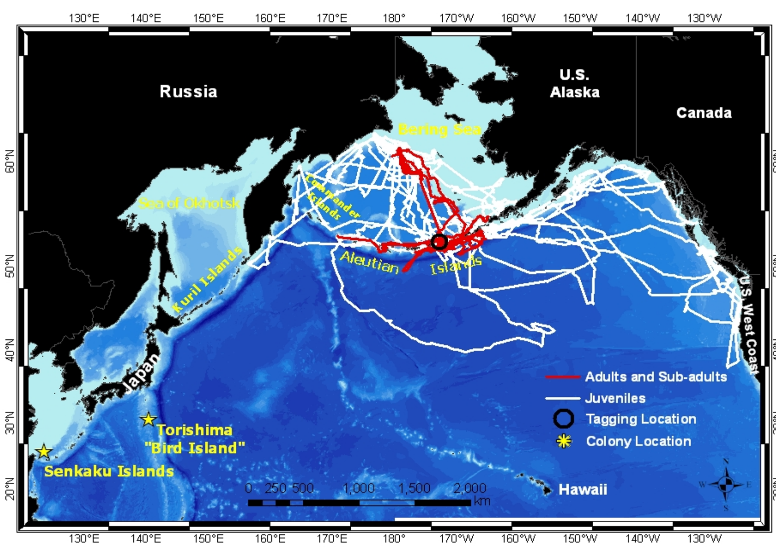


Figure 4. Satellite track lines for adults and sub-adults vs. juveniles captured at sea in Alaska near Seguam Pass. Note the wide ranging track lines for juveniles vs. adults.

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 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 information will allow us to determine which fisheries, in addition to Alaska's, may potentially be affecting short-tailed albatrosses. For example, distribution information is needed along the west coast of North America where seabird deterrents are currently not required 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 forage 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).

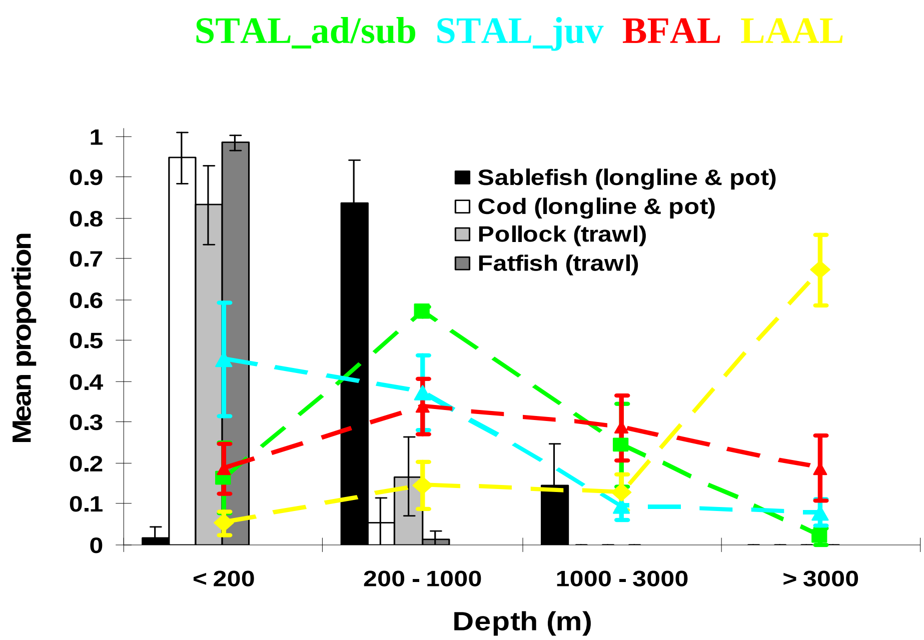


Figure 5.   Use of different depth regimes by three North Pacific albatross species, and the relative use of these different depth regimes by the most common longline, pot, and trawl fisheries in Alaska. STAL= short-tailed albatross, BFAL = black-footed albatross, LAAL = Laysan albatross.

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, creatures that float when they die, and organisms that undergo 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.

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,Yamashina Institute, pers. comm. 2005). 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 6 and 7).

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 (Table 2). Low breeding success would be likely in years when catastrophic volcanic or weather events occur during the breeding season.

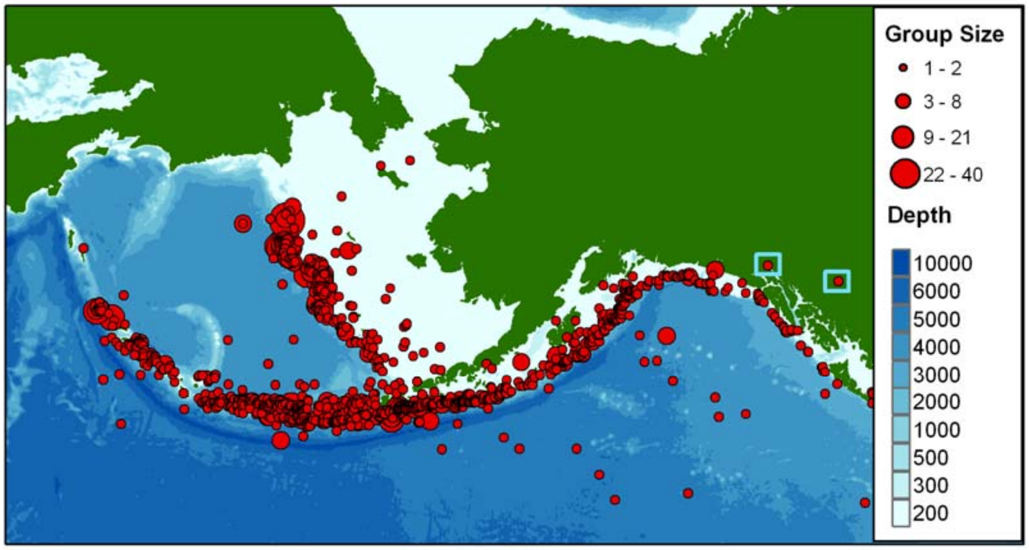


Figure 6. Opportunistic sightings (n=1432) of short-tailed albatross in the North Pacific 1940-2004). Opportunistically collected data suggests that this species is closely associated with the continental shelf edge of the Gulf of Alaska and Bering Sea, and along the Aleutian Islands. The largest congregations 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.

2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:

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. 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.

Estimate of adult (breeding age) birds:

1. Torishima - The 2008-2009 population estimates of short-tailed albatross indicate 418 breeding pairs (or 836 breeding adults) (H. Hasegawa unpublished report, November 2009). Assuming that 20-25% of 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 1045 at Torishima** in the 2008-2009 nesting season (for this example, we assume 20% of breeders do not breed in a given year).

Figure 7. 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.

2. 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 2008-09 might be 160. Assuming that here too, some 20 percent of the adults do not return to breed each year, we would estimate the adult population of Minami-kojima to be about 200 in the 2008-09 nesting season. Adding these figures, the **total worldwide estimate for breeding age short-tailed albatrosses as of the 2008-2009 nesting season is 1,245 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).

1. Torishima - Based on H. Hasegawa’s reports, 1,346 chicks were fledged from the Tsubame-zaki and Hatsune-zaki colonies on Torishima from 2003-04 through 2008-09 (Table 2). Applying an average post-fledging juvenile/subadult survival rate of 94 percent results in an estimate of **1,114 birds in the 2008-2009 subadult population originating from Torishima Island.**

2. Minami-kojima - Fewer fledging data are available for this colony (Table 2). If we assume that the proportion of breeders to non-breeders (sub-adults) is the same on Minami-kojima as on Torishima, then we would estimate **the subadult short-tailed albatross population at Minami-kojima to be 213.**

3. 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 1,327** individuals. This number, added to the worldwide adult population of 1,245, would **indicate a 2008-2009 total population of some 2,572 short-tailed albatross worldwide**.

This arithmetic estimate, calculated using the stated assumptions, compares favorably with Sievert's 2007-2008 estimate of 2719 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 8.

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 2, Figure 8).

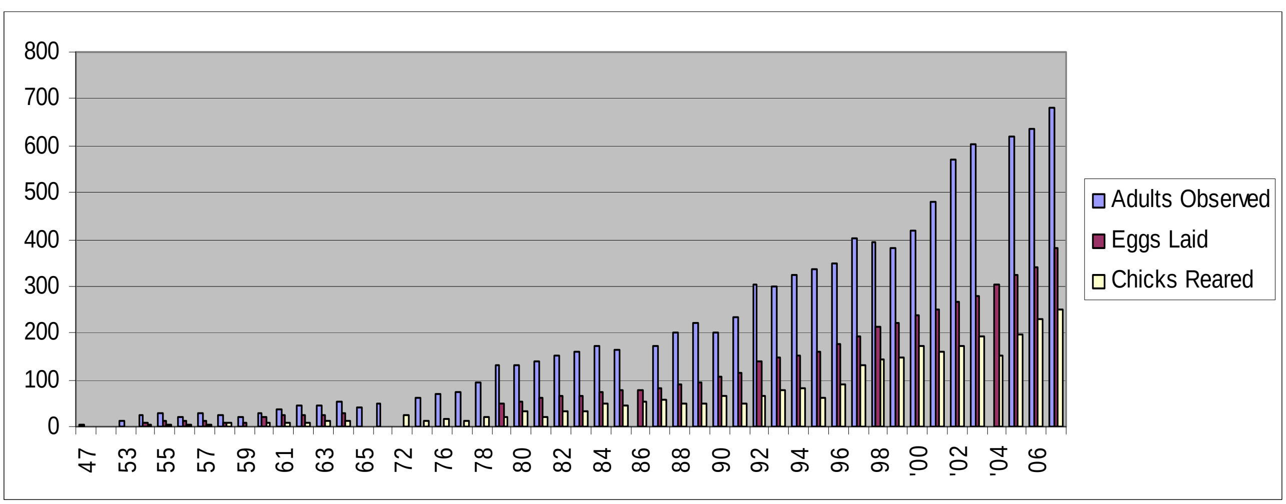


Figure 8. Counts of short-tailed albatross breeding adults, eggs, and nearly-fledged chicks on Torishima Island, Japan, from 1947-2007. Figure based on unpublished data from H. Hasegawa.

Table 2. 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
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
2008-09	unknown	418	306	37	73%	unknown	15

[1]The10 chicks fledged from Mukojima were removed from Tsubamezaki and hand-reared to fledging.

Population Viability Analysis

A 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 STAL 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 STAL 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.

Because the STAL 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 STAL 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 STAL 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 STAL 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 9)(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 10). 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 emmigration 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.

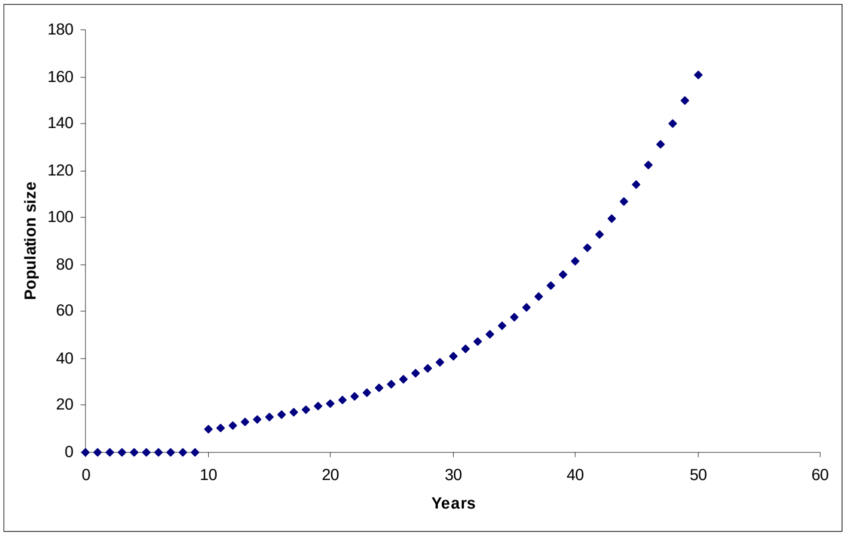


Figure 9. Mean population size (of 1000 simulations) from stochastic model results. In 50 years, the mean population size on the colony established by 10 breeding pairs (derived from returning translocated chicks) is 161 birds.

2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):

There is no pre-exploitation genetic information for this species. There was almost certainly some loss of genetic diversity when the species declined from millions to dozens of individuals from the late 1800's to early 1900's. There have been no directed genetic studies conducted on this species to date, although genetic samples are gathered opportunistically. There is conjecture in the Japanese scientific community that the population of short-tailed albatrosses breeding on Minami-kojima island may be genetically distinct from those breeding on Torishima Island, but we are unaware of the evidence upon which this theory is based.

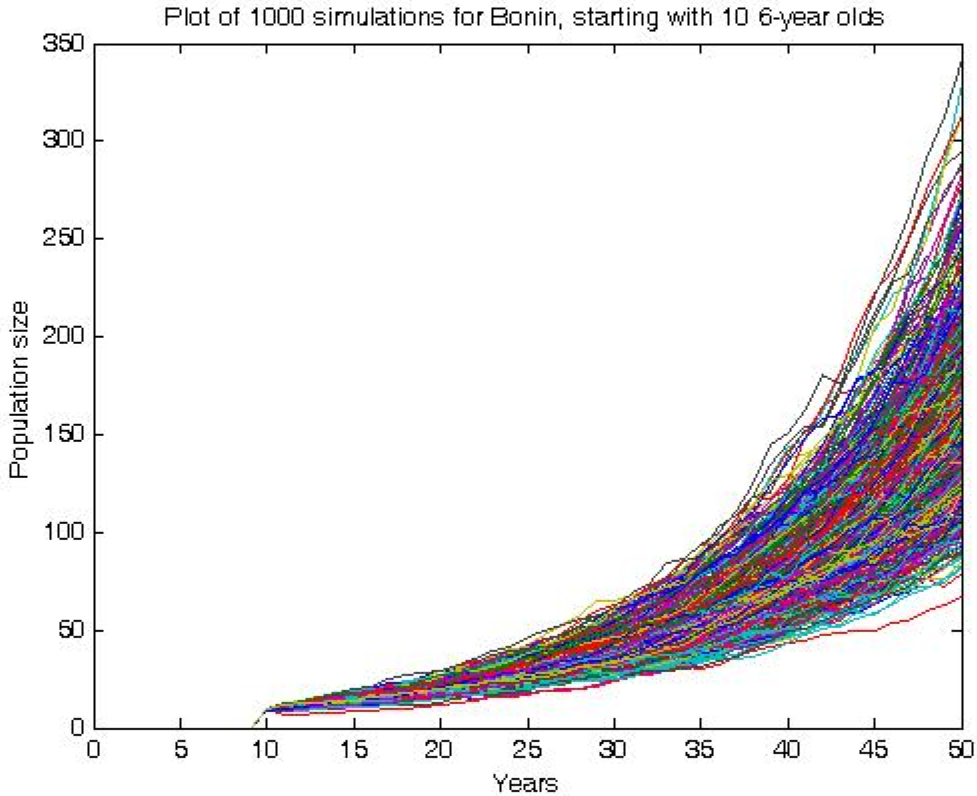


Figure 10. Stochastic model results of STAL population growth trajectory for translocation colony. The plot of 1000 model simulations demonstrates the variability of the population growth over the next 50 years.

2.3.1.4 Taxonomic classification or changes in nomenclature:

Domain: Eukaryota - Whittaker & Margulis,1978
Kingdom: Animalia - Linnaeus, 1758 - animals
Subkingdom: Bilateria - (Hatschek, 1888) Cavalier-Smith, 1983
Branch: Deuterostomia - Grobben, 1908
Infrakingdom: Chordonia - (Haeckel, 1874) Cavalier-Smith, 1998
Phylum: Chordata - Bateson, 1885 - Chordates
Subphylum: Vertebrata - Cuvier, 1812 - Vertebrates
Infraphylum: Gnathostomata - Auct. - Jawed Vertebrates
Superclass: Tetrapoda - Goodrich, 1930
Class: Aves - Linnaeus, 1758 - Birds
Subclass: Neornithes - Gadow, 1893
Infraclass: Neoaves
Superorder: Passerimorphae
Order: Ciconiiformes - Bonaparte, 1854 - Albatrosses, Alcids
Suborder: Ciconii - ?
Infraorder: Ciconiides - ?
Parvorder: Ciconiida
Superfamily: Procellarioidea

Family: Procellariidae - Leach, 1820 - Petrels, Shearwaters
Genus: Phoebastria (changed from Diomedea in 1996; Nunn et al. 1996)
Specific name: albatrus - (Pallas, 1769)
Scientific name: - Phoebastria albatrus (Pallas, 1769)

2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.):

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 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 3, 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).

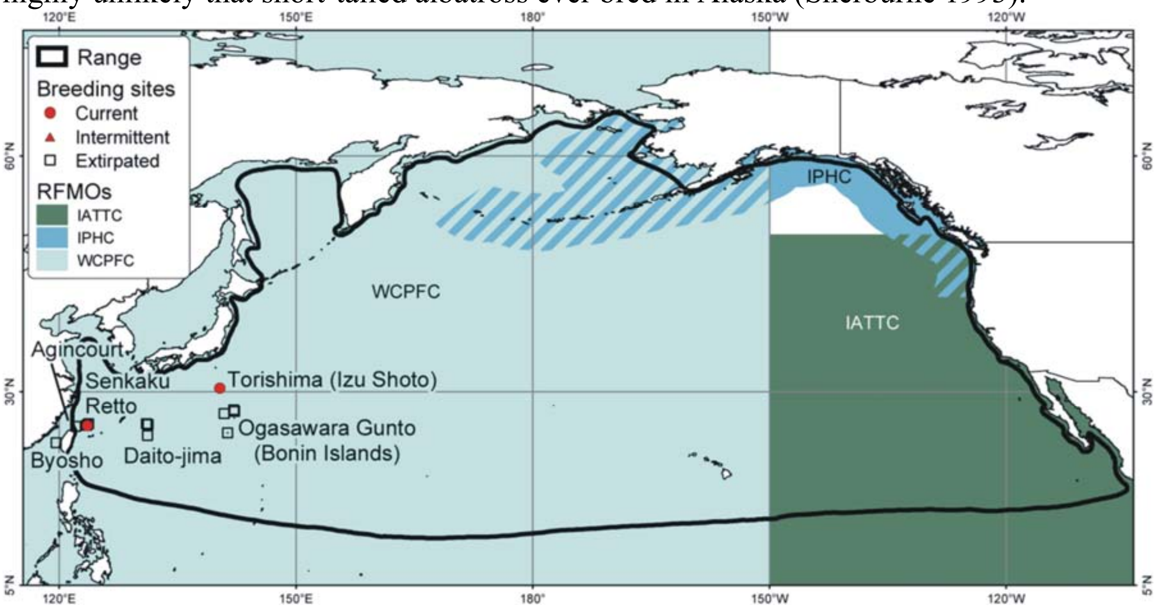


Figure 11. Former and current breeding range and at-sea range of short-tailed albatross. This species range overlaps with at least three Regional Fishery Management Organizations (shown), and the Exclusive Economic zones of up to eight nations. The majority of the time this species spends at sea is within the Western and Central Pacific Fisheries Commission area.

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

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).

Table 3. 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°

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).

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 30.48^{o} N and 140.32^{o} 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 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 4) 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 11). 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).

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.

Table 4. Growth of the Hatsunezaki colony, Northwest Slope of Torishima, 1995/1996 through 2008/2009 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
2008-09	50	37

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. In 2008-

09, the same effort occurred, this time translocating 15 chicks from Torishima to Mukojima. All 15 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.

With very few exceptions, all short-tailed albatross that fledge from Torishima are banded with metal leg bands (85-90% of the world population). None of the birds that fledge from Minami-kojima are banded (15-20% of the world population). 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 *Phoebastria albatrus* 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, Rob Suryan, Oregon State University, pers. comm.. 2009). 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 6). The southern limit of 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 shelfbreak associated species. However, because sightings came mostly from heavily fished areas near the coastal and shelfbreak 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 2009, scientists from Japan and the USA have collaborated in attaching satellite tags to 76 birds (nearly 3% of the world population); 23 of which were non-breeding adults, post-breeding adults, or subadults tagged on Torishima. Between 2006 and 2009, 27 short-tailed albatross breeding on Torishima were tagged to determine where they foraged to provision their chicks (Figures 1 and 12); 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 and 2009, joint U.S. and Japan efforts resulted in tagging chicks (n= 24) 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 13) (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 shelfbreak 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).

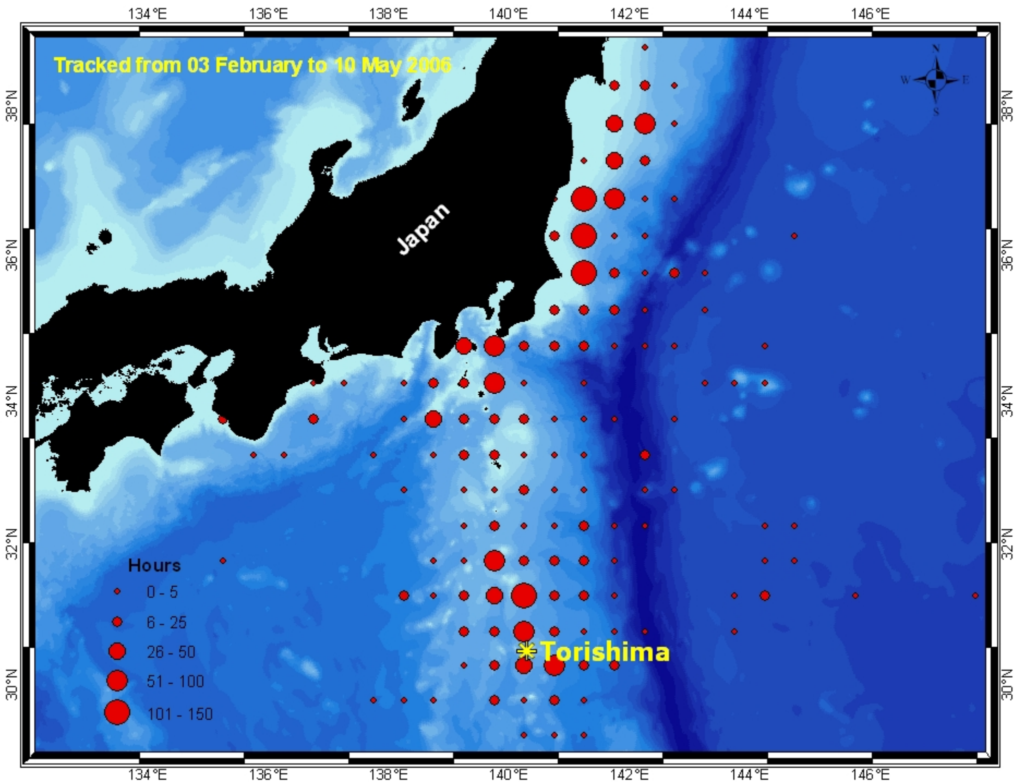


Figure 12. Use of marine habitat by short-tailed albatross breeding adults during the chick-rearing period. Data were generated from satellite telemetry data, and the hours spent by tagged short-tailed albatross in each 0.5 degree block were summed.

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 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 6); these are the only known concentrations of this species away from their breeding islands.

Figure 13. Photo of satellite transmitter affixed to the back of a short-tailed albatross. Satellite transmitter is the dark box located midway between the wings.

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).

2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):

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.*

There appears to be abundant suitable nesting habitat available within the species formerly occupied range (prior to exploitation), and the ecosystem conditions on these islands remains relatively unchanged from what existed at the time exploitation began. It is more difficult to assess and compare oceanic conditions during pre-exploitation times and what exists now. However, one can infer from the very rapid population growth of this species that it is not currently limited by anything in its habitat.

2.3.1.7 Other: None

2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

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 are noted below (Table 5).

Table 5. 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

Threat Category	Threat	Known (K) or Potential (P) Threat	Listing Factor*
	High seas and other countries(China, Taiwan, Korea)	P	D/E
Pelagic longline fisheries	U.S.	P	D/E
	Japan	P	D/E
	Russia (uncertain of existence of Russian pelagic longline fisheries)	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
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

Threat Category	Threat	Known (K) or Potential (P) Threat	Listing Factor*
	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.

2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

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.

a. 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. 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, 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.

b. 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

a. Climate Change - According to the 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.

b. 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 60^0S to 70^0N (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.

2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

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 (the approximate world population when this modeling effort was conducted), 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 6.5-7.5% 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 about 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 despite whatever number of short-tailed albatross have been taken there. Nevertheless, the way in which fisheries are prosecuted changes constantly, both domestically and internationally. 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 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, see page 51 for discussion of this topic)) 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 take 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.

a. 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, a result widely attributed to adoption of streamer lines by the Alaska demersal longline fleet). 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.).

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.	53.31°N x 165.38°W
10/8/1995 13A-00570	10/8/1995	3 year old STAL taken in the Bering Sea IFQ hook-and-line fishery. Bird was not in the observed sample.	57.01°N x 170.39°W
09/27/1996 13A-00518	09/27/1996	5-year-old STAL taken in the Bering Sea hook-and-line fishery. Bird was in the observed sample.	58.69°N x 177.04°W
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	60.08°N x 172.57°E
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.	57.30°N x 173.57°W
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.	58.27°N x 175.16°W
07/11/2002 13A-07557	04/24/2002	Hatch-year bird found dead, probably from Russian fishing net entanglement in Sea of Okhotsk, 120km south from Magadan, Russia	58.13°N x 151.35°E
08/29/2003 13A-01499	04/23/2000	3 year old bird taken in Russian longline fishery in Bering Sea.	60.38°N x 179.05°E
08/31/(2005 or 2006) 13B-07102	08/31/2006	0-1 year old bird found dead from fishing net entanglement 120km Southeast offshore Simusil Island, Kuril Islands, Kamchatka O., Russia	46.12°N x 153.18°W

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

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		
	5%	9	22	45
1800	5.5%	10	25	50
	6%	11	27	54
	5%	15	38	75
3000	5.5%	17	41	83
	6%	18	45	90
	5%	35	88	175
7000	5.5%	39	96	193
	6%	42	105	210

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 (IPHC) management Area 4E north of 60^0 and east of 160^0 (NOAA 2008). The remainder of IPHC Area 4E still requires use of seabird avoidance gear due to the presence of satellite telemetry data indicating use of these waters by short-tailed albatross. The North Pacific

Fisheries Management Council acknowledges that the lifting of restrictions in each of these areas would be readdressed if short-tailed albatross were found to use these waters.

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.

b. 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 23^0 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^o 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 23^0 N latitude, suggesting that a southward shift of this regulatory boundary may be appropriate for conserving other albatross species (Gilman and Kobayashi 2007).

c. 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 interactions with wires and cables associated with trawl fishing operations. 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.

d. 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.)

e. 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-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, Far Seas Fisheries Research Institute, Japan. pers. comm. 2008).

f. 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 59N 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).

g. 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).

h. 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.

2.3.2.3 Disease or predation:

Disease

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. Body burdens of contaminants may increase susceptibility to disease.

Parasites

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).

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).

2.3.2.4 Inadequacy of existing regulatory mechanisms:

Invasive Species

Although ships must have special permission to make landfall on Torishima and Minami-kojima islands, adequate enforcement or emergency response may be inadequate to prevent accidental introduction of invasive species to these islands. 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.

Fisheries

In the recent past, regulations in the U.S. were inadequate to prevent take of albatross in demersal longline fisheries. This regulatory inadequacy has been successfully addressed through the adoption of a series of seabird bycatch regulations promulgated by the National Oceanic and Atmospheric Administration. However, regulatory inadequacies may be lacking in other parts of this species range.

2.3.2.5 Other natural or manmade factors affecting its continued existence:

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.

a. 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 Torishima 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 Torishima 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 were 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 Torishima 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.

b. 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 oiled 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 7). 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.

c. 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.

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. 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.

2.4 Synthesis

The main threat to this species results from its current limited breeding distribution. About 85% of the population breeds on a steep eroding slope of an active volcano where it is subject to volcanic activity, high winds, flash floods and severe erosion of the colony site. Volcanism can result in a sudden notable loss of breeding adults and young, although modeling suggests that the population can recover from these effects. Winds, flash floods and erosion combine to reduce productivity of the species. However, the species is currently growing at near its maximum biological potential. The remaining population inhabits an island that is politically unstable and sits atop vast natural gas reserves. The future of this island is completely unpredictable. Currently, it functions as a de facto reserve, because political instability prevents any development from occurring there. However, development could begin at any time should a political solution be reached as to ownership of the island or the natural resources beneath it.

Commercial fishing in the United States appears to be of limited threat to the species; a result of proactive measures taken by the commercial fishing industry in Alaska and regulatory requirements and fisheries management by NOAA Fisheries. The magnitude of threat to this species imposed by foreign fishing fleets remains largely unknown.

All northern hemisphere albatrosses ingest plastic found on the ocean's surface. Studies have found that plastic ingestion negatively affects productivity of Laysan albatross. We do not have evidence to suggest whether plastic ingestion has a measurable effect on short-tailed albatross productivity, but the recovery team considers it a known threat.

Predation of young has occurred in the past, both by Sea Eagles and presumably by cats. It has been many years since Sea Eagle predation of albatross chicks has been observed on Torishima, and cats have presumably died out on the island (none have been observed for many years). Both raptors and cats are considered known threats to this species, but are not considered to be current threats. Rats remain a known threat on Torishima, but evidence of direct predation by rats upon chicks and eggs remains undocumented (unlike locations in the southern hemisphere where rats and albatross colonies co-occur).

Invasive plant species occur on Torishima Island as well. They have the potential to degrade nesting habitat. However, only native grasses have established a presence on the eroding slope where the colony is located, and invasive plants are not currently a threat at this site. This may be due in large part to the severity of erosion on the site, which has already been cited as one of the primary threats to the species in this location.

3.0 RESULTS

3.1 Recommended Classification:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist (*Indicate reasons for delisting per 50 CFR 424.11):*
    ____ *Extinction*
    ____ *Recovery*
    ____ *Original data for classification in error*
__x__ No change is needed

3.2 New Recovery Priority Number: 8 (no change)

Brief Rationale: The status of the species has not changed enough since listing to warrant a change in classification. Approved recovery and reclassification thresholds have not been reached.

3.3 Listing and Reclassification Priority Number, if reclassification is recommended *(see Appendix E)*

Reclassification (from Threatened to Endangered) Priority Number: ____
Reclassification (from Endangered to Threatened) Priority Number: ____
Delisting (Removal from list regardless of current classification) Priority Number: ____

Brief Rationale:

4.0 RECOMMENDATIONS FOR FUTURE ACTIONS –

All foreseeable recovery actions entertained by the Short-tailed albatross Recovery Team were included in the 2008 Recovery Plan. The team and associated cooperators are actively pursuing seven of the top 10 recovery tasks. In addition, many other of the 56 listed tasks are being, or have recently been, implemented). High priority recommended future actions that are not currently being implemented include: 1) assessment of the status of the colony on Minami-kojima; 2) examination of fisheries effort in areas within the species' at-sea range; and 3) initiation of a food habits study. However, the highest priority recovery action is indisputably the continuation of the short-tailed albatross chick translocation project until such time as it is determined that the technique is unsuccessful, or until 100 chicks have been translocated to Mukojima Island. Continued maintenance of the integrity of the Tsubamezaki and Hatsunezaki colony sites on Torishima are also of utmost importance.

Population Monitoring

The Tsubamezaki breeding colony on Torishima has been monitored annually since the mid-1950's (Figure 8), and essentially all chicks have been banded by Hiroshi Hasegawa since 1977. A subsample of chicks has been color-banded, beginning in 1979 (Appendix 1). Annual productivity monitoring and banding of chicks (START Rank 2) is anticipated to continue well into the future. Monitoring of the Senkaku population (START Rank 5) has occurred less regularly (Table 2); access to that colony is difficult both logistically and politically. However, START remains vigilant for opportunities to conduct colony site surveys on Minami -Kojima. Future monitoring of activity on Mukojima Island, site of the chick translocation project, will occur as well (START Rank 4).

Breeding Site Enhancement

Breeding site enhancements at the Tsubamezaki colony (START Rank 10) have improved nesting success. These efforts are anticipated to continue in the future as needed and as funding is available. Establishment of a second safer colony on Torishima is a recovery task that was formerly viewed as a very high priority, but is now considered to have been completed. A brief history of breeding site enhancement follows.

In 1981, a habitat improvement project was initiated by Hiroshi Hasegawa with the support of Japan's Ministry of the Environment. 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). 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 4). 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 2009, the size of this colony grew to 50 pairs, and 37 fledging chicks.

Establishing New Colonies

The START ranks the translocation of short-tailed albatross chicks from Torishima to Mukojima Island as the most important recovery task (START Rank1), with the anticipated goal of establishing a new colony on a non-volcanic island. This effort was partially implemented in 2008 and 2009, with continued translocation efforts anticipated to occur in 2010, 2011, and 2012. A brief history of how this highest priority task has been implemented to date follows.

In preparing biologists for the task of translocating and hand-rearing short-tailed albatross, 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 in March, 2006. 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 to Mukojima from Nakodojima, their natal island 5 miles away. 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 STAL 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. The same effort was undertaken in February of 2009, this time moving 15 chicks from Torishima to Mukojima Island, where all 15 chicks fledged at about the same time as the Torishima chicks.

In 2008, five of the translocated Mukojima chicks, and five of the naturally-reared chicks from Torishima were equipped with solar-powered GPS satellite transmitters affixed to back feathers. In 2009, seven chicks from each site were similarly tagged. In 2008, 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. Data is still being received for chicks tagged in 2009.

Satellite Telemetry

Satellite telemetry of breeding birds (START rank 12) is viewed as a nearly completed recovery task, with perhaps one or two more years of effort planned. Tracking of subadults and post-breeders (START Rank 14) is viewed as a completed task, with no future plans to intentionally track non-breeding birds captured on the colony. Tracking of birds captured in Alaska at sea (Unranked START task) is unlikely to occur in the Aleutians, although tracking of birds captured in congregations along the Bering Sea Shelf remains a possible future recovery action. Tracking of fledgelings (START Rank 3) remains a high priority task that is in the process of being implemented and will continue in the near future. A brief history of satellite tracking efforts to date follows.

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. In 2003, 2005, and 2006, telemetry 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. During years in which chick translocations occurred, roughly half of the translocated birds carried PTTs with them when they fledged. The same number of chicks from Torishima Island also were outfitted with PTTs. 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.

Fisheries-Related Research and Management

Fisheries-related bycatch research and reduction efforts have seen their greatest gains in the Alaska demersal longline fisheries. Further work in reducing bycatch in demersal longline has been identified as a recovery task of moderate priority (START Rank 16). This work would likely entail improvements in existing designs of streamer lines, advances in gear that have rapid sinking rates, and introduction of new designs and techniques. The greatest gains in future minimization of short-tailed albatross are likely to occur in Russia and Japan. However, such a claim is somewhat speculative until such time as we have accurately characterized those foreign fisheries (START Rank 13), and examined the extent to which those fisheries spatially and temporally overlap with short-tailed albatrosses (START Rank 5). And although we do not yet have perfect information regarding foreign fishing activities in Russia and Japan, we have begun addressing the need for bycatch reduction research (START Rank 16), primarily in working with Russian longliners and tori lines. Additional work on this front is expected to continue as funding becomes available.

Initial studies suggest that the Bering Sea trawlers within the U.S. EEZ do not take short-tailed albatrosses; encounters between the ships gear and albatrosses were not observed in two years of limited observer effort while gear was being towed (addresses START Rank 32). However, there is anecdotal information that suggests certain trawl fisheries along the Aleutians may have higher albatross encounter rates. We hope to eventually assess interaction rates in these trawl fisheries, and, if needed, develop measures to minimize any encounters that may be occurring there (START Rank 28). A brief history of seabird bycatch reduction efforts that have occurred to date follows.

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 support 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 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 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 identified 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 23^0 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 USFWS and NOAA Fisheries 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

Many of the recovery tasks outlined in the Recovery Plan have an outreach component implied as part of the action. However, several as-yet implemented tasks are specifically outreach oriented tasks. Creating outreach materials for international meetings such as the International Fishers Forum (START Rank 32) is an ill-defined recovery task in need of future attention. There are doubtless other international fora at which seabird bycatch outreach materials or albatross conservation materials would be appropriate. Generating a list of such opportunities (START Rank 38) that may foster international cooperation in reducing seabird bycatch is a task that has yet to be addressed, but which should be addressed in the future. The Start also believes that it would be worthwhile to organize an international seabird bycatch reduction workshop for North Pacific Rim countries (START Rank 37). A brief history of albatross and seabird bycatch-related outreach efforts that have taken place thus far follows.

The Service has established, and NOAA Fisheries has continued, 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 14). 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, NOAA Fisheries, 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 were 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.

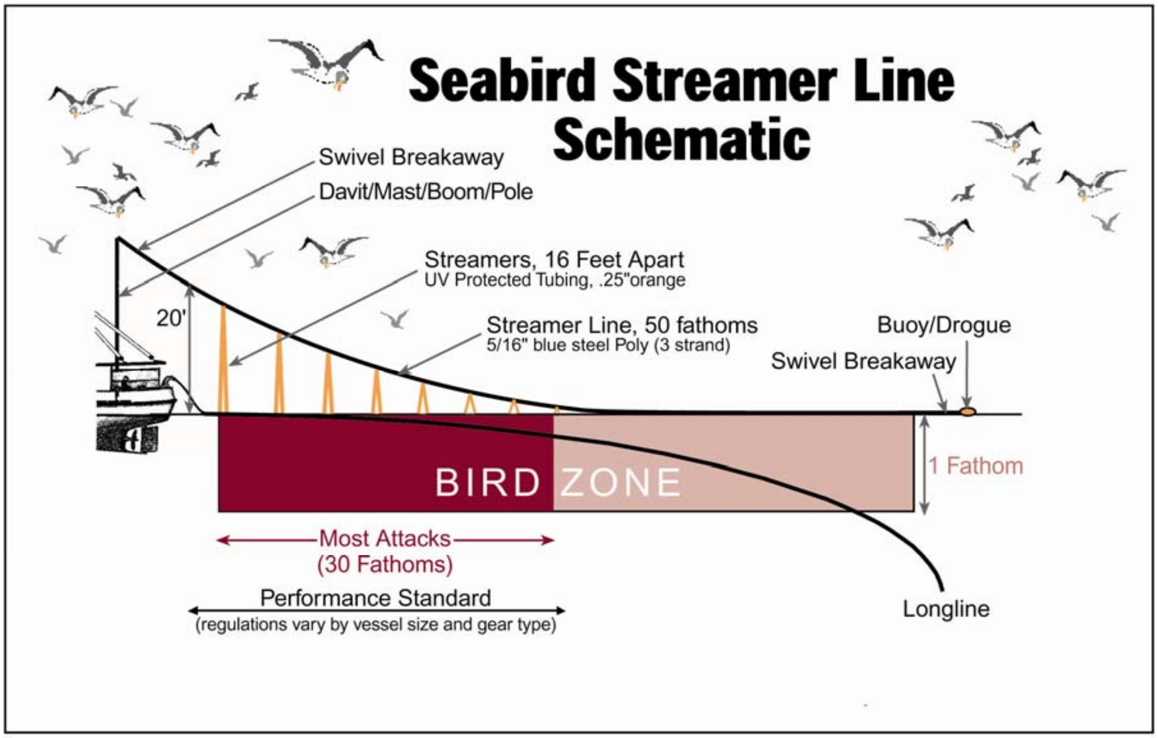


Figure 14. Profile of streamer line deployed above longline gear during gear deployment. Streamer line design and performance measures developed by the Washington Sea Grant Program. Steamer lines have been made available to Alaskan fishermen free of charge since 2000 through funding from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service. Manufacture and distribution of streamer lines is managed by the Pacific States Marine Fisheries Commission.

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 the14 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 2009, the Short-tailed albatross was listed as an ACAP species. The ACAP species assessment for the Short-tailed albatross is in the process of being finalized, and should help serve as one of the outreach tools in the international outreach toolbox

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 15). 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:

a) Creating new colonies with decoys and sound systems in likely locations, to lure breeding birds to a selected site/s;
b) Translocating and hand-rearing post-guard stage chicks from Torishima to selected and prepared site/s;
c) 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 4). As of 2008, the colony had increased dramatically in size to 36 eggs resulting in 23 fledged chicks (Table 4). 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, decoys and recorded playback of colony sounds are also being used to enhance the attractiveness of the site to prospecting birds.

Figure 15. Photo of 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.

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, September 8, 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 but one of the birds 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 5. 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.

5.0 REFERENCES - *List all information and data sources used in this review. Include on this list any experts used and their affiliations and note whether they provided information or if they acted as peer-reviewers, or both.*

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of Short-tailed Albatross

Current Classification:

Recommendation resulting from the 5-Year Review:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
__x__ No change needed

Appropriate Listing/Reclassification Priority Number, if applicable:

Review Conducted By:

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve ____________________ Date 9/24/09

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve ____________________ Date 9/24/09

Cooperating Regional Director, Fish and Wildlife Service

_____Concur _____ Do Not Concur

Signature ____________________ Date______