MoP3 Inf 08
Agenda Item 7.3

Agreement on the Conservation of Albatrosses and Petrels

Third Meeting of the Parties

Bergen, Norway, 27 April – 1 May 2009

Species Information – Black-footed Albatross (*Phoebastria nigripes*)

USA

Black-footed Albatross
Phoebastria nigripes

Albatros à pieds noirs
Albatros de pata negra
Ka'upu (Hawaiian)
黒足信天翁

CRITICALLY ENDANGERED | **ENDANGERED** | VULNERABLE | NEAR THREATENED | LEAST CONCERN | NOT LISTED

Sometimes referred to as
black albatross, black gooney
Albatros à pattes noires
Albatros patinegro, Albatros pies negros

TAXONOMY
Order: Procellariiformes
Family: Diomedeidae
Genus: *Phoebastria*
Species: *nigripes*

Originally described as *Diomedea nigripes* (Audubon 1839), the American Ornithologist's Union (AOU) temporarily placed the three North Pacific albatrosses in the subgenus *Phoebastria* [1,2]. Genetic analysis supported the former designation of the genus *Phoebastria* [3], a classification that was subsequently adopted by the AOU [4]. There are no recognized subspecies [5], but a recent study based on cyt-b mtDNA revealed significant genetic differentiation between Hawaiian and Japanese breeding populations [6].

CONSERVATION LISTINGS AND PLANS

International
- 2007 IUCN Red List of Threatened Species – Endangered [7]
- Convention on Migratory Species - Listed in Appendix II (listed as *Diomedea nigripes*) [8]
- USA - Canada Convention for the Protection of Migratory Birds [9]
- USA - Mexico Convention for the Protection of Migratory Birds and Game Mammals (family *Diomedeidae* listed) [10]
- USA - Japan Convention for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment (listed as *Diomedea nigripes*) [11]
- USA - Russia Convention Concerning the Conservation of Migratory Birds and Their Environment (listed as *Diomedea nigripes*) [12]
- Japan - China Agreement Protecting Migratory Birds and their Habitats (listed as *Diomedea nigripes*) [13]
- Conservation Action Plan for Black-footed Albatross and Laysan Albatross [14]

National - Canada
- Migratory Bird Convention Act [15]
- COSEWIC (Committee on the Status of Endangered Wildlife in Canada) - Special Concern [16]
- National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries [17]

National - China
- Law of the People's Republic of China on the Protection of Wildlife [18]

National - Japan

- Wildlife Protection and Hunting Law [19]
- Japan's National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries [20]

National - Mexico

- Norma Oficial Mexicana NOM-059-ECOL-2001 - Listed as Amenazada (Threatened) [21]

National - Russia

- On the Protection and Use of Wild Animals [18]

National - United States of America

- Migratory Bird Treaty Act - Listed Migratory Bird [22]
- Bird of Conservation Concern [23]
- United States National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries [24]

Taiwan (Chinese Taipei)

- Taiwan National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries [25]

Regional - Hawaii, USA

- Listed as Threatened by the State of Hawaii [26]

BREEDING BIOLOGY

P. nigripes is a colonial, annual breeding species; adult birds will skip breeding in some years [27]. Birds first arrive at the colonies in mid- to late-October and most eggs are laid from mid-November to mid-December (Table 1). The incubation period averages 65–66 days and most eggs hatch between mid-January and mid-February [27]. Young depart the colony during June through mid-July [27, 28]. Each breeding cycle lasts about 8 months. Juvenile birds return to the island at 3–4 years of age [27]. The youngest recorded breeding is at 5 years of age and average age at first breeding is 7 years [27,29].

Table 1. Breeding Cycle

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

BREEDING SITES

P. nigripes breeds on oceanic islands across the tropical/subtropical North Pacific Ocean (Figure 1). The low coral islands of the Northwestern Hawaiian Islands (NWHI) are the core of the breeding range supporting >95% of the global breeding population (Table 2). Smaller colonies exist in the Izu and Ogasawara islands of Japan and on the Senkaku Islands [30,31]. Individual pairs have attempted to breed at Wake Atoll in the central Pacific since 1996, but none have successfully fledged young [32]. The breeding range expanded into the eastern Pacific when individual pairs bred on the Mexican islands of Guadalupe in 1998 and San Benedicto in 2000 [33], however, birds have not bred at either location in recent years [34]. *P. nigripes* formerly bred on many more islands in the eastern and central Pacific, but colonies on Johnston Atoll, the Northern Mariana Islands, Minami Torishima, Iwo Jima, Nishinoshima, Chichijima Retto (Anijima), and several islands in the Hahajima and Mukojima rettos were extirpated and have not been recolonized (Figure 1) [31,35, 36]. The total breeding population was estimated to be approximately 64,200 pairs in 2007 (Table 3).

Table 2. Distribution of the global *P. nigripes* population among breeding range states.

	United States	Japan	Mexico
Breeding pairs	96%	4%	-

Figure 1. The approximate range of P. nigripes *inferred from tracking, band recoveries, and shipboard surveys. The boundaries of Regional Fisheries Management Organizations (RFMOs) are also shown (IATTC = Inter-American Tropical Tuna Commission, IPHC = International Pacific Halibut Commission, WCPFC = Western and Central Pacific Fisheries Commission).*

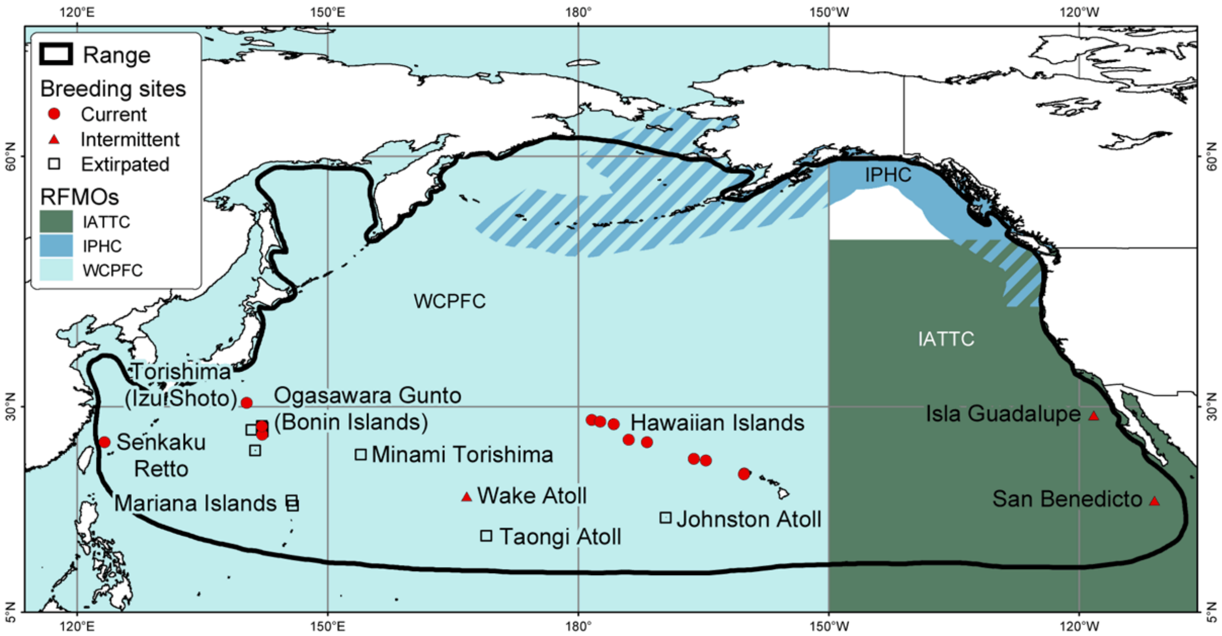


Table 3. Monitoring methods and estimates of colony size (annual breeding pairs) for active breeding sites. Table based on unpublished data from U.S. Fish and Wildlife Service (Hawaii); H. Hasegawa (Torishima), Toho University; T. Deguchi and N. Nakamura (Ogasawaras), Yamashina Institute for Ornithology; and R. W. Henry (Mexico), University of California, Santa Cruz. (see Glossary for monitoring method and reliability codes).

Breeding site location	Jurisdiction	Years monitored	Monitoring method	Monitoring reliability	Pairs (last census) (Hatch Year)	
Central Pacific						
Hawaii						
Kure Atoll 23°03′ N, 161°56′ W	USA	2003–2007	B	Mod	2,540[1]	(2007)
Midway Atoll 28°15′ N, 177°20′ W	USA	1991–2007	A	High	25,320	(2008)
Pearl and Hermes Reef 27°50′ N, 175°50′ W	USA	opportunistic	B	Low	6,116[1]	(2003)
Lisianski Island 26°04′ N, 173°58′ W	USA	opportunistic	B	Low	2,126[1]	(2006)
Laysan Island 25°46′ N, 171°45′ W	USA	1992–2007[2]	A	High	19,672	(2008)
French Frigate Shoals 23°145′ N, 66°10′ W	USA	1980–2007	A	High	5,725	(2007)
Necker Island 23°35′ N, 164°42′ W	USA	opportunistic	B	Low	112[1]	(1995)
Nihoa Island 23°03′ N, 161°56′ W	USA	opportunistic	B	Low	1[1]	(2007)
Kaula 21°39′ N, 160°32′ W	USA	opportunistic	B	Low	3[1]	(1993)
Lehua 22°01′ N, 160°06′ W	USA	opportunistic	A	Med	25	(2007)
Marshall Islands						
Wake Atoll 19°18′ N, 166°35′ E	USA	opportunistic	A	Med	0	(2008)
Western Pacific						
Izu Shoto						
Torishima 30°29' N, 140°19' E	Japan	1956-2008	B	High	1,560[1]	(2003)
Ogasawara Gunto (Bonin Islands)						
Mukojima Retto 27°40' N, 142°07' E	Japan				967[1]	(2006)
Hahajima Retto 26°39' N, 142°10' E	Japan				11[1]	(2006)
Ryukyu Shoto						
Senkaku Retto 25°45' N, 123°30' E	Japan/PRC/ROC[3]	opportunistic	A&B		56[1]	(2002)
Eastern Pacific						
Isla Guadalupe 29°02′ N, 118°17′ W	Mexico	2003–2008	A&B	High	0	(2008)
Islas Revillagigedos						
San Benedicto 19°19′ N, 110°48′ W	Mexico	opportunistic	A&B		0	(2004)
Total Pairs (rounded to nearest hundred)					**64,200**	

1. Estimate of breeding pairs based on a survey of chicks, adjusted for nest failure. 2. Standardized count of active nests since 1998; estimates derived from transect samples for period 1992–1997. 3. Senkaku or Diaoyutai Islands are disputed territory: Japan, Peoples Republic of China and Republic of China (Taiwan)

CONSERVATION LISTINGS AND PLANS FOR THE BREEDING SITES

International

Black-footed Albatross Colonies

- Conservation Action Plan for Black-footed Albatross and Laysan Albatross) [14]

Ogasawara Islands, Japan

- UNESCO World Heritage Site (tentative) [37]

Northwestern Hawaiian Islands, United States

- UNESCO World Heritage Site (tentative) [37]

National - Japan

Torishima

- Natural Monument [38]
- National Wildlife Protected Area [39]

Ogasawara Islands

- Ogasawara National Park [40,41]

National - Mexico

Isla Guadalupe

- Isla Guadalupe Biosphere Reserve [42]

San Benedicto

- Archipiélago de Revillagigedo Biosphere Reserve [42,43]

National - United States

Northwestern Hawaiian Islands

- Papahānaumokuākea Marine National Monument (encompassing: Midway Atoll and Hawaiian Islands National Wildlife Refuges, and Kure Atoll Seabird Sanctuary) and Draft Management Plan 2008 [44]
- Regional Seabird Conservation Plan, Pacific Region [45]

POPULATION TRENDS

Northwestern Hawaiian Islands

Populations of all three North Pacific albatrosses were devastated by feather hunters around the turn of the 20th century [46]. In response to this destruction, the Hawaiian Islands Bird Reservation (later renamed the Hawaiian Islands National Wildlife Refuge) was established in 1909. It was unlawful to kill or molest the birds within the Reservation, which extended from Kure to Nihoa (except Midway), but there was little enforcement and feather raids continued in the Hawaiian Islands until at least 1915 [46,47]. There are no population estimates prior to these exploitations. When Wetmore visited the NWHI in 1923, albatross nesting populations were at their lowest level – approximately 11,500 chicks [35, 48, 49].

The population increased following the cessation of feather hunting, and by 1956–1958, the breeding population had increased to approximately 55,000 pairs [35]. The most recent estimate is approximately 64,200 pairs (Table 3). Most of the recent population data are derived from 3 islands: Midway Atoll, Laysan Island, and French Frigate Shoals which together support >75% of the global breeding population of *P. nigripes* [50]. The two largest colonies, at Midway Atoll and Laysan Island, comprise >70% of the total breeding population.

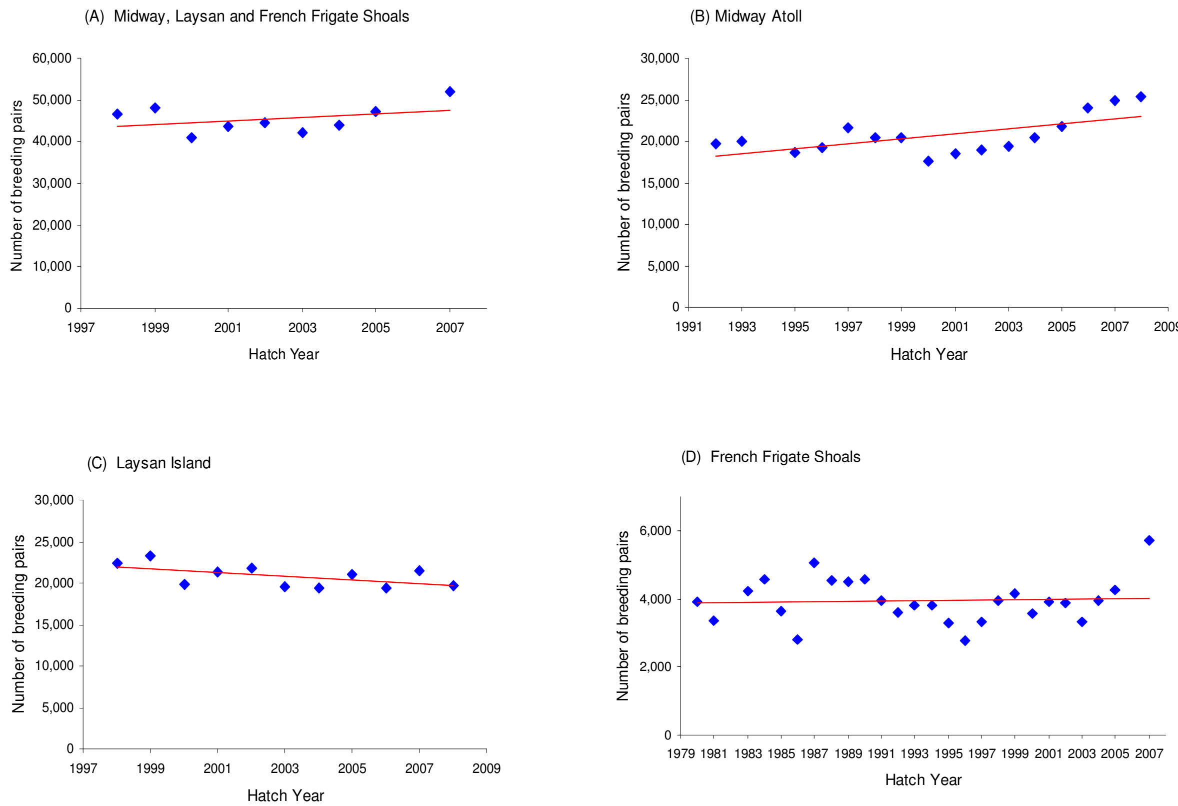
The size of the colonies at Laysan, Lisianski, and Pearl and Hermes Reef have declined over the past 50 years but these losses has been offset by increases at Midway, Kure, and French Frigate Shoals (the three NWHI formerly occupied by the military) [35, 49]. Examining the data from the three regularly monitored colonies (Midway, Laysan and French Frigate Shoals) Arata et al. [49] found a decreasing trend for the period 1992–2005. However, the combined counts have steadily increased since 2003, and the inclusion of the most recent counts indicates an increasing population trend for these three sites (Table 4, Figure 2).

Table 4. Summary of trend data for three *P. nigripes* colonies. These data are based on standardized counts of active nests by U.S. Fish and Wildlife Service (unpublished data) [50,51].

Breeding Site	Current Monitoring	Trend Years (Hatch Year)	% average change per year [52] (95% Confidence Interval)	Trend
Midway Atoll	Yes	1992 – 2008[1]	1.30 (1.24, 1.36)	Increasing
Laysan Island	Yes	1998 – 2008	-1.06 (-1.18, 0.94)	Decreasing
French Frigate Shoals	Yes	1980 – 2007[2]	0.28 (0.20, 0.36)	Stable/Increasing
All Three Islands	Yes	1998 – 2007	1.11 (0.99, 1.22)	Increasing

1. Midway Atoll – missing data: 1994, 2. French Frigate Shoals – missing data: 1982, 2006, 2008

Figure 2. Total counts of P. nigripes nests at the main breeding colonies (Midway Atoll, Laysan Island and French Frigate Shoals) with a simple linear regression fitted. Figure based on unpublished USFWS data[50, 51].



Midway Atoll

Midway Atoll is the most altered of the NWHI, having sustained continuous human occupation for more than a century, starting with the U.S. Marines and Pacific Cable Company (1903–1952), Pan American Airlines (1935–1947), the U.S. Navy (1939–1997), and finally the U.S. Fish and Wildlife Service (1988–present) [53]. Initially, changes by island residents enhanced the habitat for albatross nesting but military activities associated with World War II and beyond (including base developments that led to loss and degradation of habitat, and large scale albatross control programs intended to increase the safety of aircraft operations), had a negative effect on the size of the albatross colonies [35, 54, 55]. Numbers of all nesting seabirds increased following establishment of the National Wildlife Refuge in 1988.

The size of the *P. nigripes* colony prior to the exploitations of feather hunting are not known but during a 1902 visit Byran [56] noted that “thousands upon thousands” of albatrosses had been killed and based on the number of carcasses, estimated that *P. nigripes* were three times more abundant than *P. immutabilis*. In 1923, Wetmore estimated 2,000 young and the population increased to nearly 20,000 pairs by the early 1940s [35, 48]. The colony size was considerably reduced by 1957 (8,700 pairs) [35] and 1961 (6,900 pairs) [55] after almost two decades of military occupation. There were no more full colony counts until the USFWS began standardized counts in 1992. Between 1992 and 2008, the nesting population increased at an average annual rate of 1.3% (Table 4); and, has steadily increased since 2000 (Figure 2). Midway Atoll supplanted Laysan Island as the largest colony in 2004.

Laysan Island
Laysan Island was never occupied by the military, but guano mining (1890–1910) and introduced rabbits 1904-1923) greatly altered the habitat [47]. Rabbits nearly denuded the island of all vegetation before they were eradicated in 1923 [47]. Dill estimated 85,000 birds (42,300 pairs) during his visit to Laysan Island in 1911 after the 1908–1910 feather raids, and Bryan who had visited Laysan eight years earlier, stated that conservatively “fully one-half the number of birds of both species of albatross that were so abundant in 1903 have been killed” [57]. Bailey counted only 7,722 nests in 1912 [58]. Feather raids continued at least through 1915 [47] and by May 1923, Wetmore reported only 4,700 large chicks [35, 48] (approximately 8,500 pairs when adjusted for nest loss [49]). The number of nesting pairs at Laysan rebounded with the end of feather hunting and by 1957 the colony had increased to 34,000 pairs [35]. Since then, there have been no observable changes to the amount or quality of the *P. nigripes* nesting habitat on the island but the size of the colony has decreased by almost 40%; the most recent counts indicate between 19,500 and 21,500 pairs (Figure 2) [50, 51]. Standardized counts have been conducted since 1998 and these indicate a continuing slow decline of 1.06% per annum (Table 4).

French Frigate Shoals
The longest time-series of recent population data come from French Frigate Shoals which has been monitored almost continuously since 1980 (no counts in 1982, 2006, 2008) [50]. Compared to Laysan and Midway, French Frigate Shoals is a small colony (<5% of the total breeding population). There were no estimates of colony size prior to exploitation by feather hunting. In 1923, Wetmore counted 405 young [48] (approximately 730 nesting pairs [49]) and by 1957, the colony had increased to 1,500 pairs [35]. The U.S. Navy occupied the atoll during World War II and afterwards the U.S. Coast Guard operated a LORAN Station, until the station was closed in 1979. Administration of the atoll was transferred to the USFWS in 1979 and the number of breeding pairs increased from 3,926 in 1980 to 5,725 pairs in 2007 [50].

The islands of French Frigate Shoals are low and vulnerable to winter storms and sea level rise. In 1997, after years of erosion, Whale-Skate Island was lost; this represented a significant loss of nesting habitat at the atoll. From 1980–1990, approximately one-third of the atoll’s *P. nigripes* had nested on Whale-Skate [50]. Between 1980 and 2007, counts at French Frigate Shoals have fluctuated, but overall the number of breeding pairs is relatively stable or slightly increasing (Table 4). Although the number of breeding pairs declined precipitously between 1987 and 1996 (>5.0% per year, Table 4); since 1996, the colony has experienced a moderate increase in numbers (approximately 2% per year; Table 4, Figure 2) perhaps due, at least in part, to redistribution of the birds that had nested on Whale-Skate.

BREEDING SITES: THREATS
By 1997, the military had closed its bases on Kure, Midway, and French Frigate Shoals and management of the islands had been transferred to state and federal wildlife agencies. Many of the threats to the NWHI colonies have been addressed through management actions[45]. All introduced mammals, except house mice (*Mus musculus*) on Midway, have been eradicated from the NWHI. Polynesian rats (*Rattus exulans*) were eradicated from Kure in 1993, as were black rats (*R. rattus*) from Midway in 1997. Non-native plants such as golden crown-beard (*Verbesina encelioides*) and ironwood (*Casuarina equisetifolia*) have degraded nesting habitat for albatrosses at Kure, Midway, and Pearl and Hermes Reef. *Verbesina* forms dense stands that limit available

nesting habitat. The USFWS is actively working to control or eradicate this invasive species but this is a long-term and costly endeavor [14, 45]. Potential sea level rise is a threat to the low-lying islands and atolls of the NWHI and central Pacific [14].

Outside of the NWHI, an eradication program for feral cats (*Felis catus*) at Wake Atoll appears to have been successful, but black rats and Asian rats (*R. tanezumi*) remain a threat at this site [32]. Polynesian rats are present on Lehua and black rats on Kaula [14]. Goats (*Capra hircus*) significantly altered and degraded habitat on Isla Guadalupe before a successful eradication program was initiated in 2004 and feral cats remain a major threat to nesting and colonizing albatrosses [34]. Eradication programs have been considered or are planned for mammalian predators at all of the sites discussed above. Non-native predators may be a factor inhibiting recolonization at some historical sites. Military training exercises at Kaula Rock may be affecting this small colony [14].

Table 5. *Summary of known threats at the breeding sites of P. immutabilis. Table based on unpublished data and input from J. Klavitter, B. Flint, and B. Zaun, U.S. Fish and Wildlife Service (Hawaii, except Oahu); L. Young, University of Hawaii (Oahu); A. Hebshi, Pacific Air Force and M. Rauzon, Marine Endeavors (Wake); N. Nakamura, Yamashina Institute for Ornithology (Japanese Islands); and, B. Tershy and R. W. Henry, University of California, Santa Cruz (Mexico). (see Glossary for codes).*

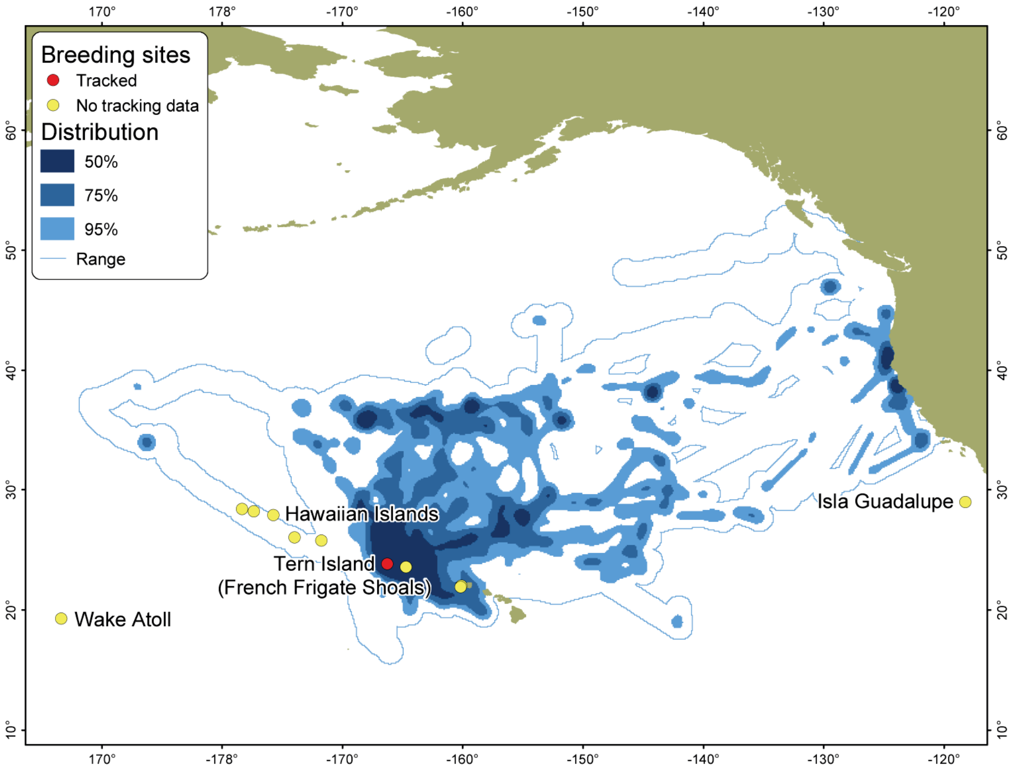
Breeding site location	Human disturbance	Human take	Natural Disaster	Sea level rise	Habitat alteration (human)	Habitat alteration (alien species)	Predation (alien species)	Increased impact by native species	Contamination
Central Pacific									
Kure Atoll	No	No	No	Low	Low	Yes	No	No	Low
Midway Atoll	Low	No	No	Low	Yes	Yes	No	No	Low
Pearl and Hermes Reef	No	No	No	Low	No	Yes	No	No	No
Lisianski Island	No	No	No	Low	No	Yes	No	No	No
Laysan Island	No	No	No	Low	No	Yes	No	No	No
French Frigate Shoals	No	No	No	Low	Yes	Yes	No	No	No
Necker Island	No	No	No	No	No	Yes	No	No	No
Nihoa Island	No	No	No	No	No	Yes	No	No	No
Kaula	Med	No	No	No	Yes	Yes	Yes	No	No
Lehua	No	No	No	No	No	Yes	Yes	No	No
Johnston Atoll	No	No	No	Low	Yes	Yes	No	No	Low
Wake Atoll	Low	No	Low	Low	Low	Low	Low	No	Unk
Western Pacific									
Torishima (Izu Shoto)	No	No	High	No	No		No		
Mukojima Retto	No	No	No	No	No		No		
Hahajima Retto	No	No	No	No	No		No		
Senkaku Retto	Unk	No	No	No	No	Unk	Unk	Unk	Unk
Eastern Pacific									
Isla Guadalupe	Low	No	No	No	No	No	Yes	No	No
San Benedicto	No	No	Low	No	No	No	No	Unk	Unk

MARINE DISTRIBUTION

P. nigripes ranges over most of the North Pacific Ocean, from the Bering Sea (approximately 62ºN) and the Sea of Okhotsk, south to approximately 10ºN (Figure 1); although, occasionally as far south as 4º 30'N [59]. The species occurs throughout international waters and within the Exclusive Economic Zones (EEZs) of Mexico, the United States, Canada, Russia, Japan, China, North and South Korea, the Federated States of Micronesia, and the Republic of the Marshall Islands [14,60,61].

Satellite tracking data suggest that *P. nigripes* utilizes a broader range of marine habitats than *P. immutabilis*; frequenting all depth domains, and dispersing more into subtropical and tropical waters. Adults travel to Alaskan waters or to the California Current when provisioning their young [62, 63, 64]; and juveniles may disperse as widely as adults [65]. Satellite-tagged *P. nigripes* that dispersed from their capture location in the central Aleutian Islands traveled extensively south of 45ºN and remained almost entirely east of the International Date Line [66].

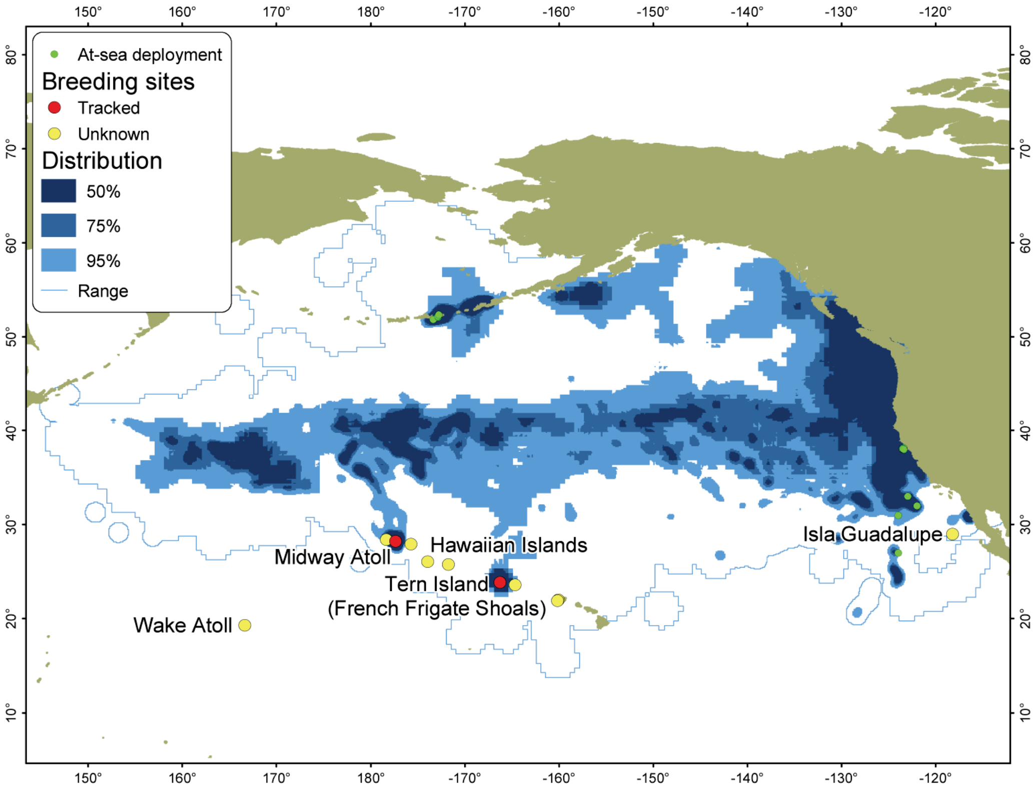
Figure 3. Satellite-tracking data of breeding adult P. nigripes. Map based on data contributed to BirdLife Global Procellariiform Tracking Database by: S. Shaffer, M. Kappes, Y. Tremblay, D. Costa, R. Henry, D. Croll (University of California Santa Cruz) and D. Anderson, J. Awkerman (Wake Forest University).



Carbon stable isotope ratios ($\delta^{13}C$) suggest that *P. nigripes* forages at more southern latitudes than *P. immutabilis* and that the two species largely utilize distinctly different regions of the North Pacific [67]. *P. nigripes* favors nutrient-rich waters associated with steep depth gradients and along convergence fronts [64,, 68, 69, 70, 71]. Although frequently found over relatively shallow continental shelf waters, they generally occur in areas seaward of the shelfbreak (i.e., deeper than 200m) [63, 64, 68, 70, 71]. *P. nigripes* are widely dispersed over pelagic areas of the North Pacific and spend most of their time transiting or foraging over abyssal waters, occasionally foraging along the edge of the continental shelf [63, 64, 72, 73] as well as over shallow seamounts [16]. Although they do forage along the shelfbreak [63] it is suggested that other than when they are attracted there by fishing vessels and associated seabird feeding flocks, *P. nigripes* are no more concentrated at the shelfbreak than anywhere else [74].

Based on satellite-tracking of birds during the breeding season, the at-sea distribution of *P. nigripes* overlaps predominantly with the Western and Central Pacific Fisheries Commission (WCPFC) area, as well as to a lesser extent with the Inter-American Tropical Tuna Commission (IATTC) and the International Pacific Halibut Commission (IPHC) areas (Figures 1 and 3) [64]. Throughout the non-breeding season, the species tends to concentrate along in the eastern North Pacific Ocean, where it overlaps extensively with the IATTC [75, 76], as well as the IPHC and the WCPFC areas (Figures 1and 4). Satellite tracked fledglings initially disperse northward toward the North Pacific Transition Zone and then travel east and west at latitudes between 35 and 40° N [65].

Figure 4. Satellite-tracking data of non-breeding adults and fledgling P. nigripes. Map based on data contributed to BirdLife Global Procellariiform Tracking Database by: S. Shaffer, M. Kappes, Y. Tremblay, D. Costa, R. Henry, D. Croll (University of California Santa Cruz); D. Anderson, J. Awkerman (Wake Forest University); M. Hester, D. Hyrenbach (Oikonos - Ecosystem Knowledge & Duke University); R. Suryan, K. Fischer (Oregon State University); and G. Balogh (U.S. Fish and Wildlife Service).



FORAGING ECOLOGY AND DIET

P. nigripes forages either singly or in groups (occasionally in the 100's) [77, 78] taking prey by surface-seizing, and occasionally by partially submerging. They feed upon carrion, including birds [79], and readily scavenge fisheries offal [80]. Although they do forage at night, *P. nigripes* captures most prey during the day [81]. Diet information comes primarily from chick regurgitation samples collected in Hawaiian colonies (1978-1980) [79]; and from stomach samples of birds killed in North Pacific driftnets [82].

Summarizing the information from Hawaii, about 10% (by volume) was stomach oil; when that was excluded, chick diet consisted of approximately 50% fishes, 32% squids, and 5% crustaceans (by volume). The main food items were flying fish eggs (*Exocoetidae*); and squid (*Ommastrephida*) [79].

P. nigripes scavenged extensively from driftnets, primarily on neon flying squids (*Ommastrephes bartrami*) and Pacific pomfrets (*Brama japonica*), which accounted for approximately 67% and 18% (by mass), respectively. Other items, thought to be consumed before becoming entangled in nets were primarily squids from the families *Gonatidae* (*Berryteuthis anonychus*, *Gonatopsis borealis*, *Gonatus* sp.), *Cranchiidae* (*Galiteuthis phyllura, Leachia dislocata*, *Taonius pavo*), *Onychoteuthidae* (*Onychoteuthis borealijaponicus*), and *Octopoteuthidae* (*Octopoteuthis deletron*); all occurred at rates higher than 5% frequency of occurrence [82].

MARINE THREATS

Fisheries bycatch is a noted source of mortality for both *P. nigripes* and *P. immutabilis* in the North Pacific Ocean [49, 83, 84]. The development of pelagic longline fisheries for tuna and billfish in the early 1950s, and the pelagic driftnet fishery in the late 1970s added a new mortality source for the species [49, 84]. Both species preyed heavily on food made available by driftnet fishing operations and an estimated 4,400 *P. nigripes* were killed in these high seas squid and large-mesh driftnet fisheries in 1990 [83]. The large number of seabirds and other marine animals caught by driftnets caused the fishery to close in 1992 (resulting from a

United Nations high-seas driftnet moratorium, UNGA Resolution 46/215) [36]. The fishery closure resulted in a significant reduction of the overall number of *P. nigripes* killed [49]. Although these fisheries killed significantly more *P. immutabilis* than *P. nigripes*, the impact was greater on *P. nigripes* given its smaller population size. Overall, the high seas driftnet and pelagic longline fisheries have been the most important sources of mortality for these species over the past 50 years [49].

In contrast to the now inactive high seas driftnet fishery, pelagic longline fisheries continue to threaten Pacific albatrosses. Currently, pelagic longline fisheries in the North Pacific are considered the primary threat to P. nigripes and P. immutabilis [49, 84]. Fleets from the United States, Japan, Korea, and Taiwan operate in the North Pacific [85] and albatrosses have likely been incidentally killed in this fishery since at least 1951 [49]. The total impact of the pelagic longline fisheries on *P. nigripes* will only be known once seabird bycatch data becomes available for all fisheries incurring bycatch mortality.

Reliable estimates of the number of albatrosses killed annually as a result of fisheries interactions are difficult to determine because of the paucity of data from most fisheries. Bycatch numbers have been estimated from data that are available for a relatively small subset of the North Pacific fisheries: high seas driftnet (international), pelagic longline (USA), and demersal longline (Canada, USA) [49] and trawl (USA).

Arata et al. [49] compiled the existing bycatch information and estimated total bycatch for the period from 1951 to 2005. Their estimates indicated a bimodal distribution; bycatch estimates generally ranged between 6,000–10,000 birds per year, but peaked in 1961 and 1988 with 15,290 and 16,215 birds, respectively. The peak in 1988 was due to the combined effect of pelagic driftnet and pelagic longline fisheries, while the 1961 peak was due solely to longline fishing effort [49].

In recent years, U.S. North Pacific longline fleets have implemented seabird deterrence measures that have reduced seabird bycatch in longline gear. The bycatch of *P. nigripes* in the Hawaii-based pelagic longline fishery has decreased from over 1,300 birds taken annually in 1999 and 2000 to less than 100 in 2007 [86]. The annual bycatch from to other fisheries (trawl and demersal longline) off Alaska was estimated at 82 *P. nigripes* (50–136; 95% CI) from 2002 through 2006 [87]. Bycatch in the halibut fisheries is unknown.

Taiwan's first reports of estimated seabird bycatch in its longline fisheries in the Pacific Ocean, based on observer trips from 2002 to 2006, indicate one of the areas with highest bycatch occurred between 25° to 40°N [88], where the bycatch sample consisted of *P. nigripes* and *P. immutabilis* [89]. Mexican longline fisheries have reported take of *P. immutabilis* [90] and *P. nigripes* may also be vulnerable.

Various methods have been used to better understand the impacts of fisheries bycatch on *P. nigripes*. Bycatch data from observed fisheries, were used to extrapolate and estimate levels of bycatch for fisheries where observer data were not available. This assessment indicated that population declines may occur as a result of cumulative bycatch of *P. nigripes* across all longline fleets in the North Pacific [84]. A modeling analysis of adult survival rates during the period 1997–2002 indicated population-level impacts on *P. nigripes* were likely correlated with longline fishing [91].

High levels of organochlorine contaminants [92, 93, 94] and mercury [95] have been documented in *P. nigripes*. Mean PCB levels were one or two orders of magnitude higher than those of southern albatrosses [94] and concentrations of PCBs and DDE in *P. nigripes* increased over the last decade [95]. One study found birds sufficiently contaminated to be at risk from eggshell thinning and decreased egg viability, enough to reduce productivity by 2–3% [96]. Another study found significant associations between high mercury and organochlorine concentrations and altered immune function in *P. nigripes* [97]. Diet is thought to be the primary route of exposure [95].

Over the past 30 years, there have been several oil spills in the vicinity of the large albatross colonies in the NWHI [98]. Oiled albatrosses have been recorded at the colonies but the number of affected birds is relatively small and the source of the oil is unknown [99]. Given the vast at-sea distribution of both species, they could be encountering oil anywhere in the North Pacific.

North Pacific albatrosses ingest a wide variety of plastics and there have been several studies investigating the effects of plastic ingestion on Laysan albatross chick survival [100, 101, 102]. *P. nigripes* chicks have a lower incidence and abundance of plastic than *P. immutabilis* chicks, and contain higher amounts of plastic fiber that is suspected to be derived from fishing gear [100, 103].

KEY GAPS IN SPECIES ASSESSMENT

Standardized counts at the three Hawaiian colonies (Midway, Laysan and French Frigate Shoals) provide a very precise and accurate reflection of the annual breeding effort at these three colonies, which support >75% of the breeding population. However, not all adults breed in a given year and inter-annual variability can be high, making it difficult to determine population trends from colony counts alone, especially over relatively short time periods. In addition, juvenile mortality will not be reflected in these counts for 5–15 years. These factors, coupled with the lack of accurate estimates of fishery bycatch throughout the range, complicate efforts to assess the impacts of fishery bycatch and other threats on the population. U.S. Geological Survey (USGS) and USFWS are conducting a status assessment for both *P. immutabilis* and *P. nigripes* [49]; this assessment needs to be finalized.

Researchers and managers have conducted various modeling exercises to estimate the status and trends of the *P. nigripes* population, and the population-level effects of fisheries. Unfortunately, because these investigations were forced to rely on limited or inadequate data, the conclusions reached by the various models were not always in agreement. There is a critical need for targeted, standardized, documented data collection to accurately assess albatross status and trends, and to evaluate the relative effects of all threats [14]. To address this need, USFWS initiated a new monitoring program in 2005 at Midway, Laysan and French Frigate Shoals, based on mark and recapture of uniquely marked individuals. This will provide annual estimates of adult survival, the proportion of adults that skip nesting in a given year, and reproductive success.

The other colonies in the NWHI are surveyed opportunistically, usually late in the season, and assessing trends for colony size are complicated since nest loss prior to the counts is unknown. Standardized, early season counts of colonies at Kure, Pearl and Hermes Reef, and Lisianski, at c.10 year intervals, would provide valuable information for all of the large NWHI colonies (>95% of the breeding population).

The colony at Laysan Island has decreased in size over the past 50 years by almost 40%. Although, this loss has been balanced by increases at the Midway and French Frigate Shoals colonies, understanding the causal factors for the decline could provide valuable insight for future management and conservation. Investigations at the colony and at-sea are needed.

Currently, fisheries bycatch is the greatest known source of mortality for *P. nigripes*, yet only a small fraction of the nations' commercial fleets fishing in the North Pacific monitor and report seabird bycatch. Characterization of the North Pacific fishing fleets (*e.g.,* gear, vessel size/configuration, target species, spatial/temporal distribution of effort, type of bycatch monitoring, mitigation required/used, and management authority) and bycatch monitoring for all fleets that potentially catch albatrosses, is needed.

Considerable data on habitat utilization at-sea have been collected over the past three to four decades by ships of opportunity, and in more recent years via satellite and GPS tracking. Most of the tracking data for breeding birds have been obtained from the relatively small colony at Tern Island (French Frigate Shoals). Over the past few years, fledglings (2006–2008) and breeding adults (2007) were tagged at Midway Atoll [65]. Comparison of marine distribution and habitat utilization by birds from the two colonies will provide valuable insight into whether colony specific differences exist. Tracking birds from Laysan Island could potentially provide insight into the cause of the decreasing trend for this colony.

In order to effectively protect *P. nigripes*, there is a recognized need to integrate at-sea survey results with satellite and GPS tracking data, to derive a more complete understanding of its spatio-temporal use of the North Pacific Ocean [14]. Through the integration of all marine distributional data, associations with oceanographic features could be characterized and mapped at a basin-wide level. These maps, overlaid with seasonal fishing effort data, would provide range states with valuable tools to identify high-risk areas and high-risk fisheries.

REFERENCES

1 American Ornithologists' Union. 1931. Check-list of North American birds, 4th Edition. Lancaster, Pa.

2 American Ornithologists' Union. 1944. Nineteenth supplement to the American Ornithologists' Union check-list of North American birds. Auk 61:441-464.

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

4 American Ornithologists' Union. 1997. Forty-first supplement to the American Ornithologists' Union check-list of North American birds. Auk 114:542-552.

5 Robertson, C.J.R. and G.B. Nunn. 1998. Towards a new taxonomy for albatrosses. Pages 13–19 in G. Robertson and R. Gales, editors. Albatross biology and conservation. Surrey Beatty & Sons, Chipping Norton, Australia.

6 Walsh, H.E., and S.V. Edwards. 2005. Conservation genetics and Pacific fisheries bycatch: mitochondrial differentiation and population assignment in Black-footed Albatrosses (*Phoebastria nigripes*). Conservation Genetics 6:289–295.

7 BirdLife International (2007) Species factsheet: *Phoebastria nigripes*. Downloaded from http://www.birdlife.org on 30 April 2008.

8 Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animals). http://www.cms.int/documents/appendix/additions_II.pdf.

9 Convention Between the United States and Great Britain (for Canada) for the Protection of Migratory Birds (39 Stat. 1702; TS 628), as amended.

10 Convention between the United States of America and the United Mexican States for the Protection of Migratory Birds and Game Mammals (50 Stat. 1311; TS 912), as amended.

11 Convention Between the Government of the United States of America and the Government of Japan for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment (25 UST 3329; TIAS 7990), as amended.

12 Convention Between the United States of America and the Union of Soviet Socialist Republics Concerning the Conservation of Migratory Birds and Their Environment, T.I.A.S. 9073.

13 Japan and China. Agreement concerning the protection of migratory birds and their habitats (with annex and exchange of notes). Beijing, 3 March 1981. United Nations Treaty Series No. 21945.

14 Naughton, M.B, M.D. Romano, T.S. Zimmerman. 2007. A Conservation Action Plan for Black-footed Albatross (*Phoebastria nigripes*) and Laysan Albatross (*P. immutabilis*), Ver. 1.0. http://www.fws.gov/pacific/migratorybirds/conservation.htm

15 Migratory Birds Convention Act, 1994. http://laws.justice.gc.ca/en/M-7.01/.

16 COSEWIC 2006. COSEWIC assessment and status report on the Black-footed Albatross (*Phoebastria nigripes*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. http://www.sararegistry.gc.ca/document/dspDocument_e.cfm?documentID=1418.

17 Department of Fisheries and Oceans. 2007. National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries. Communications Branch, Fisheries and Oceans Canada. Cat. No. Fs23-504/2007. Ottawa, Ontario, Canada.

18 Harrison, C.S., H. Fen-Qi, K. Su Choe, and Y.V. Shibaev. 1992. The laws and treaties of North Pacific rim nations that protect seabirds on land and at sea. Colonial Waterbirds 15: 264-277.

19 Wildlife Protection and Hunting Law (Law No.32; 1918) http://www.env.go.jp/en/nature/biodiv/law.html

20 Japan's National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries February 2001, (Partly revised in March 2005), Fisheries Agency of Japan, Government of Japan.

21 Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT). 2002. NORMA Oficial Mexicana NOM-059-ECOL-2001. Protección ambiental - Especies nativas de México de flora y fauna silvestres. Categorías de riesgo y especificaciones para su inclusión, exclusión o cambio. Lista de especies en riesgo. (www.imacmexico.org/ev_es.php?ID=17754_201&ID2=DO_TOPIC)

22 Migratory Bird Treaty Act of 1918 (16 U.S.C. 703–712), as amended. http://www.access.gpo.gov/uscode/title16/chapter7_subchapteri_.html.

23 U.S. Fish and Wildlife Service. 2002. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, Virginia.

24 National Marine Fisheries Service, 2001. Final United States National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries. Silver Spring, MD, USA. Dept. of Commerce, NOAA, National Marine Fisheries Service. February 2001.

25 Taiwan Fisheries Agency 2006. Taiwan's National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries - NPOA-Seabirds. Taiwan Fisheries Agency, Council of Agriculture of the Executive Yuan, the Republic of China Taipei, 2006

26 Mitchell, C.C. Ogura, D. Meadows, A. Kane, L. Strommer, S. Fretz, D. Leonard, and A. McClung. 2005. Hawaii's Comprehensive Wildlife Conservation Strategy. Department of Land and Natural Resources. Honolulu, Hawaii. 722 pp.

27 Rice, D.W., and K.W. Kenyon. 1962. Breeding cycles and behavior of Laysan and Black-footed albatrosses. Auk 79:517–567.

28 Frings, H. and M. Frings. 1961. Some biometric studies on the albatrosses of Midway Atoll. Condor 63: 304–312.

29 Viggiano, A. 2001. Investigating demographic and life history characteristics of the black-footed albatross. Thesis Master of Science. University of Washington.
30 Hasegawa, H.I. 1984. Status and conservation of seabirds in Japan, with special attention to the Short-tailed Albatross. Pp. 487–500 *In* Status and conservation of the world's seabirds (J. P. Croxall, P. G.H. Evans, and R.W. Schreiber, Eds.). ICBP Tech. Publ. No. 2. ICBP, Cambridge, UK.
31 Tickell, W.L.N. 2000. Albatrosses. Yale University Press, New Haven, Connecticut.
32 Rauzon, M.J., D.P. Boyle, W.T. Everett, and R.B. Clapp. 2004. Status of birds of Wake Atoll, with special notes on the Wake Rail. Unpublished Report.
33 Pitman, R.L., and L.T. Ballance. 2002. The changing status of marine birds breeding at San Benedicto Island, Mexico. Wilson Bulletin 114:11–19.
34 R. William Henry, University of California Santa Cruz, California. Personal communication.
35 Rice, D.W., and K.W. Kenyon. 1962. Breeding distribution, history, and populations of North Pacific albatrosses. Auk 79:365–386.
36 Dr. Noboru Nakamura, Yamashina Institute for Ornithology, Japan. Personal communication.
37 United Nations Educational, Scientific and Cultural Organization, http://whc.unesco.org/en/tentativelists/5095/. and http://whc.unesco.org/en/tentativelists/5250/
38 King, W.B. 1981. Endangered birds of the world: ICBP Bird Red Data Book. Smithsonian Institute Press and International Council for Bird Preservation, Washington, DC. 13 pp.
39 Hasegawa, H. and A. DeGange. 1982. The short-tailed albatross Diomedea albatrus, its status, distribution and natural history. American Birds 6(5):806-814.
40 Hayes, S., and D. Egli. 2002. Directory of Protected Areas in East Asia: People, Organisations and Places. IUCN, Gland, Switzerland and Cambridge, UK. Xi + 98 pp.
41 Japan Integrated Biodiversity Information System http://www.biodic.go.jp/english/jpark/np/ogasawar_e.html
42 Comisión Nacional de Áreas Naturales Protegidas (CONANP), Reservas de la Biosfera. http://www.conanp.gob.mx/anp/rb.php
43 Programa de Conservación Y Manejo Reserva de la Biosfera Archipiélago de Revillagigedo. 2004. Comisión Nacional de Áreas Naturales Protegidas.
44 Papahānaumokuākea Marine National Monument Draft Management Plan 2008 http://hawaiireef.noaa.gov/management/mp.html
45 U.S. Fish and Wildlife Service. 2005. Seabird Conservation Plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region, Portland, Oregon. http://www.fws.gov/pacific/migratorybirds/conservation.htm
46 Spennemann, D. H. R. 1998. Excessive exploitation of Central Pacific seabird populations at the turn of the 20th Century. Marine Ornithology 26:49–57.
47 Ely, C.A., and R.B. Clapp. 1973. The natural history of Laysan Island, Northwestern Hawaiian Islands. Atoll Research Bulletin 171.
48 Olson, S.L. 1996. History and ornithological journals of the *Tanager* expedition of 1923 to the Northwestern Hawaiian Islands, Johnston and Wake Islands. Atoll Research Bulletin No. 433.
49 Arata, J., P. Sievert, and M. Naughton. In prep. Status assessment of Laysan and black-footed albatross populations.
50 Flint, E. 2007. Hawaiian Islands National Wildlife Refuge and Midway Atoll National Wildlife Refuge – Annual nest counts through hatch year 2007. Unpublished report, U.S. Fish and Wildlife Service, Honolulu, Hawaii.
51 U.S. Fish and Wildlife Service, unpublished data.
52 Pannekoek, J., and A. van Strien. 2006. TRIM 3.53 (TRends & Indices for Monitoring data). Statistics Netherlands, Voorburg. http://www.cbs.nl/en-GB/menu/themas/natuur-milieu/methoden/trim/default.htm
53 Speulda, L.A., A. Raymond, and V. Parks. 1999. Midway Atoll National Wildlife Refuge historic preservation plan. Unpublished Report. U.S. Fish and Wildlife Service, Midway Atoll NWR, Honolulu, Hawaii.
54 Fisher, H.I., and P.H. Baldwin. 1946. War and the birds of Midway Atoll. Condor 48:3–15.
55 Robbins, C.S. 1966. Birds and aircraft on Midway Islands: 1959–63 investigations. Special Scientific Report – Wildlife 85.
56 Bryan, W.A. 1906. Report of a visit to Midway Island. B.P. Bishop Museum Occasional Papers 2(4):37-45.
57 Dill, H.R., and W.A. Bryan. 1912. Report of an expedition to Laysan Island in 1911. U.S. Department of Agriculture Biological Survey Bulletin 42:1–30.
58 Bailey, A.M. 1952. Laysan and black-footed albatrosses. Museum Pictorial No. 6:1–78.
59 Sanger, G.A. 1974. Black-footed Albatross *Diomedea nigripes*. Pages 96-128 *in*: Pelagic studies of seabirds in the Central and Eastern Pacific Ocean. (King, W.B., ed.). Smithsonian Institution, Washington D.C., USA.
60 Shuntov, V.P. 1972. Seabirds and the biological structure of the ocean. Far-Eastern Publishing House, Vladivostok. Translated from Russian by I. Allardt (1974).
61 Robbins, C. S., and D. W. Rice. 1974. Recoveries of banded Laysan Albatrosses (*Diomedea immutabilis*) and Black-footed albatrosses (*D. nigripes*). Pages 232-277 *in*: Pelagic studies of seabirds in the Central and Eastern Pacific Ocean. (King, W.B., ed.). Smithsonian Institution, Washington D.C., USA.
62 Fernández, P., D.J. Anderson, P.R. Sievert, and K.P. Huyvaert. 2001. Foraging destinations of three low-latitude albatross (*Phoebastria*) species. Journal of Zoology 254:391-404.
63 Hyrenbach, K.D., P. Fernández, and D.J. Anderson. 2002. Oceanographic habitats of two sympatric North Pacific albatrosses during the breeding season. Marine Ecology Progress Series 233:283-301.
64 Kappes, K.A., S.A. Shaffer, Y. Tremblay, P.W. Robinson, D.J. Anderson, J.A. Awkerman, S.J. Bograd, D.G. Foley, D.M. Palacios, D.P. Costa (in review) Interannual variability in oceanographic habitat use by Hawaiian albatrosses. Progress In Oceanography.
65 Dr. Scott Shaffer, University of California Santa Cruz, TOPP. Personal communication.
66 Fischer, K.N. 2007. Marine Habitat Use of Black-footed and Laysan Albatrosses During the Postbreeding Season and Their Spatial and Temporal Overlap with Commercial Fisheries. A thesis submitted to Oregon State University in partial fulfillment of the requirements for the degree of Master of Science. 111 pp.
67 Finkelstein, M., B.S. Keitt, D.A. Croll, B. Tershy, W.M. Jarman, S. Rodriguez-Pastor, D.J. Anderson, P.R. Sievert, and D.R. Smith. 2006. Albatross species demonstrate regional differences In North Pacific marine contamination. Ecological Applications 16: 678–686.

68 McDermond, D.K., and K.H. Morgan. 1993. Status and conservation of North Pacific albatrosses. Pages 70–81 *in*: The status, ecology, and conservation of marine birds of the North Pacific. (K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegel-Causey, eds.). Canadian Wildlife Service Special Publication, Ottawa, ON, Canada.
69 Miller, L. 1940. Observations on the Black-footed Albatross. Condor 42: 229-238.
70 Briggs, K.T., W.B. Tyler, D.B. Lewis, and D.R. Carlson. 1987. Bird communities at sea off California: 1975 to 1983. Studies in Avian Biology 11. Cooper Ornithological Society.
71 Kenyon, J.K., K.H. Morgan, M.D. Bentley, L.A. McFarlane Tranquilla, and K.E. Moore. *in prep*. Atlas of pelagic seabirds off the west coast of Canada and adjacent areas. Canadian Wildlife Service Technical Report Series No. xx. Pacific and Yukon Region, Delta, BC, Canada.
72 Springer, A.M., J.F. Piatt, V.P. Shuntov, G.B. van Vliet, V.L. Vladimirov, A.E. Kuzin, and A.S. Perlov. 1999. Marine birds and mammals of the Pacific Subarctic Gyres. Progress in Oceanography 43: 443-487.
73 Piatt, J.F., J. Wetzel, K. Bell, A.R. DeGange, G.R. Balogh, G.S. Drew, T. Geernaert, C. Ladd, and G.V. Byrd. 2006. Predictable hotspots and foraging habitat of the endangered short-tailed albatross (*Phoebastria albatrus*) in the North Pacific: Implications for conservation. Deep-Sea Research II 53: 387-398.
74 Gould, P.J., D.J. Forsell, and C.J. Lensink. 1982. Pelagic distribution and abundance of seabirds in the Gulf of Alaska and eastern Bering Sea. USA Department of Interior, Fish and Wildlife Service, FWS/OBS-82/48, Washington, D.C., USA.
75 BirdLife International 2006. Analysis of albatross and petrel distribution within the IATTC area: results from the Global *Procellariiform* Tracking Database, Report prepared for the 7th meeting of the Inter-American Tropical Tuna Commission - Working Group to Review Stock Assessments. Document Sar-7-05b. La Jolla, California, USA. 15-19 May, 2006.
76 Shaffer, S.A., D.M. Palacios, K.A. Kappes, Y. Tremblay, S.J. Bograd, D.G. Foley, and D.P. Costa (in prep) Segregation at sea? A tale of two albatross hotspots.
77 Wahl, T.R., and D. Heinemann. 1979. Seabirds and fishing vessels: co-occurrence and attractions. Condor 81:390-396.
78 Morgan, K.H., K. Vermeer, and R.W. McKelvey. 1991. Atlas of pelagic birds of western Canada. Canadian Wildlife Service, Occasional Paper Number 72, Ottawa.
79 Harrison, C.S., T.S. Hida, and M.P. Seki. 1983. Hawaiian seabird feeding ecology. Wildl. Monog. 85: 1-71.
80 Whittow, G.C. 1993. Black-footed Albatross (Diomedea nigripes). *in*: The Birds of North America, No. 65. (Poole, A., and F. Gill, eds.). Philadelphia: The Academy of Natural Sciences; Washington, DC: The American Ornithologists' Union.
81 Fernández, P., and D.J. Anderson. 2000. Nocturnal and diurnal foraging activity of Hawaiian albatrosses detected with a new immersion monitor. Condor 102: 577-584.
82 Gould, P., P. Ostrom, and W. Walker. 1997. Trophic relationships of albatrosses associated with squid and large-mesh drift-net fisheries in the North Pacific Ocean. Can. J. Zool. 75: 549-562.
83 Gould P, P Ostrom, W Walker, and K Pilichowski 1998. Laysan and black-footed albatrosses: trophic relationships and driftnet fisheries associations of non-breeding birds. Pp. 199–207 *In*: G. Robertson and R. Gales (Eds.), Albatrosses: Biology and Conservation. Surrey Beatty & Sons, Chipping Norton, Australia.
84 Lewison R.L. and L.B. Crowder. 2003. Estimating fishery bycatch and effects on a vulnerable seabird population. Ecological Applications 13:743-753.
85 Kinan, I. 2003. Annual report on seabird interactions and mitigation efforts in the Hawaii-based longline fishery for calendar years 2000 and 2001. NMFS Technical Report, 43 pp.
86 NMFS. 2008. Annual report on seabird interactions and mitigation efforts in the Hawaii longline fishery for 2007. Administrative Report. US Dept of Commerce, NOAA, NMFS, PIRO, April 2008.
87 Shannon Fitzgerald, National Marine Fisheries Service, USA. Personal Communication.
88 Inter-American Tropical Tuna Commission (IATTC). 2008b. Preliminary estimation of seabird bycatch of Taiwanese longline fisheries in the Pacific Ocean. IATTC Document SARM-9-11c. http://www.iattc.org/PDFFiles2/SARM-9-11c-TWN-Seabird-bycatch.pdf
89 Yu-Min Yeh, Nanhua University, Chia-Yi, Taiwan. Personal Communication.
90 Inter-American Tropical Tuna Commission (IATTC). 2008a. Seabirds and Fisheries in IATTC Area: An Update. IATTC Document SARM-9-11a. http://www.iattc.org/PDFFiles2/SARM-9-11a-USA-Seabirds-and-Fisheries-in-IATTC-Area-Update.pdf
91 Veran, S., O. Gimenez, E. Flint, W. Kendall, P. Doherty Jr., and J.-D. Lebreton. 2007. Quantifying the impact of longline fisheries on adult survival in the black-footed albatross. Journal of Applied Ecology 44:942–952.
92 Jones, P.D, D.J. Hannah, S. J. Buckland, P.J. Day, S.V. Leathem, L.J. Porter, H.I. Auman, J.T. Sanderson, C. Summer, J.P. Ludwig, T.L. Colborn and J.P. Giesy. 1996. Persistent synthetic chlorinated hydrocarbons in albatross tissue samples from Midway Atoll. Environmental Toxicology and Chemistry 15:1793–1800.
93 Auman, H.J., J.P. Ludwig, C.L. Summer, D.A. Verbrugge, K.L. Froese, T. Colborn, and J.P. Giesy. 1997. PCBs, DDE, DDT, and TCDD–EQ in two species of albatross on Sand Island, Midway Atoll, North Pacific Ocean. Environmental Toxicology and Chemistry 16:498–504.
94 Guruge, K.S., H. Tanaka, and S. Tanabe. 2001. Concentration and toxic potential of polychlorinated biphenyl congeners in migratory oceanic birds from the north Pacific and the Southern Ocean. Marine Environmental Research 52:271–288.
95 Finkelstein, M.E., B.S. Keitt, D.A. Croll, B. Tershy, W.M. Jarman, S. Rodriguez-Pastor, D.J. Anderson, P.R. Sievert, and D.R. Smith. 2006. Albatross species demonstrate regional differences in North Pacific marine contamination. Ecological Applications 16:678–686.
96 Ludwig, J.P., C.L. Summer, H.J. Auman, V. Gauger, D. Bromley, J.P. Giesy, R. Rolland, and T. Colborn. 1998. The roles of organochlorine contaminants and fisheries bycatch in recent population changes of black-footed and Laysan albatrosses in the North Pacific Ocean, pp. 225–238 *In* Albatross Biology and Conservation. G. Robertson and R. Gales (eds.). Surrey Beatty & Sons, Chipping Norton, Australia.
97 Finkelstein, M.E., K.A. Grasman, D.A. Croll, B.R. Tershy, B.S. Keitt, W.M. Jarman, and D.R. Smith. 2007. Contaminant-

associated alteration of immune function in black-footed albatrosses (*Phoebastria nigripes*), a North Pacific predator. Environmental Toxicology and Chemistry 26(9):1896–1903.

98 NOAA. 1992. Oil spill case histories 1967 – 1991. HMRAD Report No. 92-11. NOAA/Hazardous Materials Response and Assessment Division Seattle, Washington

99 Fefer, S.I., C.S. Harrison, M.B. Naughton, and R.J. Shallenberger. 1984. Synopsis of results of recent seabird research in the Northwestern Hawaiian Islands. Pp. 9–76 *In* R. W. Grigg and K. Y. Tanoue (eds.). Proceedings of the second symposium on resource investigations in the Northwestern Hawaiian Islands. Vol. 1. University Hawaii Sea Grant College Program, Honolulu, Hawaii.

100 Sievert, P.R., and L. Sileo. 1993. The effects of ingested plastic on growth and survival of albatross chicks, Pp. 212–217. *In* K. Vermeer, K.T. Briggs, K.H. Morgan, and D. Siegal-Causey (eds.). The status, ecology, and conservation of marine birds of the North Pacific. Canadian Wildlife Service Special Publication, Ottawa, Canada.

101 Fry, M.D., S.I. Fefer, and L. Sileo. 1987. Ingestion of plastic debris by Laysan albatrosses and wedge-tailed shearwaters in the Hawaiian Islands. Marine Pollution Bulletin 18:339–343.

102 Auman, H.J., J.P. Ludwig, J.P. Giesy, and T. Colborn. 1998. Plastic ingestion by Laysan Albatross chicks on Sand Island, Midway Atoll, in 1994 and 1995. Pp 239–244 *In* G. Robertson and R. Gales (Eds.) Albatross biology and conservation. Surrey Beatty & Sons, Chipping Norton, Australia.

103 Gould, P.J., P. Ostrom, W. Walker, and K. Pilichowski. 1997. Laysan and black-footed albatrosses: Trophic relationships and driftnet fisheries associations of non-breeding birds. Pp 199–207. *In* R. Robertson and R. Gales (eds.), Albatross Biology and Conservation. Surrey Beatty & Sons, Chipping Norton, Australia.

COMPILED BY

Maura Naughton, U.S. Fish and Wildlife Service, USA
Ken Morgan, Environment Canada, Canada
Kim Rivera, National Oceanographic and Atmospheric Administration (NOAA) - Fisheries, USA

CONTRIBUTORS

ACAP Status and Trends Working Group, Wieslawa Misiak and Rosemary Gales, Contact: wieslawa.misiak@acap.aq, Rosemary.Gales@dpiw.tas.gov.au

BirdLife International, Global Seabird Programme, Cleo Small and Frances Taylor, Cleo.Small@rspb.org.uk, Satellite Tracking Data contributors – Tern Island, French Frigate Shoals and Midway Atoll: Scott A. Shaffer, Michelle Kappes, Yann Tremblay, Daniel P. Costa, Bill Henry, Don A. Croll (University of California Santa Cruz); and, Dave J. Anderson, Jill Awkerman (Wake Forest University). At-Sea: Michelle Hester, David Hyrenbach (Oikonos - Ecosystem Knowledge & Duke University); Rob Suryan, Karen Fischer (Oregon State University); and, Greg Balogh (U.S. Fish and Wildlife Service)

Tomohiro Deguchi, Yamashina Institute for Ornithology, Japan
Shannon Fitzgerald, NOAA Fisheries, Washington
Elizabeth Flint, U.S. Fish and Wildlife Service, Hawaii
Aaron Hebshi, Pacific Air Force, Hawaii
R. William Henry, University of California Santa Cruz, California
Ed Melvin, Washington Sea Grant, University of Washington
Noboru Nakamura, Yamashina Institute for Ornithology, Japan
Mark Rauzon, Marine Endeavors, California
Marc Romano, U.S. Fish and Wildlife Service, Oregon
Scott A. Shaffer, University of California Santa Cruz, California
Paul Sievert, Massachusetts Cooperative Fish & Wildlife Research Unit
Chris Swenson, U.S. Fish and Wildlife Service, Hawaii
Bernie Tershy, University of California, Santa Cruz
Lewis VanFossen, NOAA Fisheries, Hawaii
Brenda Zaun, U.S. Fish and Wildlife Service, Hawaii

PHOTOGRAPHY

Maura Naughton
Marc Romano
Greg Balogh
Roy Lowe
Anthony T. Santos

RECOMMENDED CITATION

Naughton, M., K. Morgan. K.S. Rivera 2008. Species Information---Black-footed Albatross (*Phoebastria nigripes*). Unpublished report.

GLOSSARY AND NOTES

(Adapted from Glossary and Notes in ACAP Species Assessment for Shy Albatross)

(i) Years.

The "split-year" system is used. Any count (whether active nests with eggs, breeding pairs, or chicks) is reported as the year in which the chick hatched; i.e. the second half of the split year, (e.g., eggs laid in 2007, chicks hatched and fledged in 2008, counts reported as 2008).

If a range of years is presented, it should be assumed that the monitoring was continuous during that time. If the years of monitoring are discontinuous, the actual years in which monitoring occurred are indicated.

(ii) Methods Rating Matrix

METHOD

A Counts of nests with eggs (Errors here are detection errors (the probability of not detecting a bird despite its being present during a survey), the "nest-failure error" (the probability of not counting a nesting bird because the nest had failed prior to the survey, or had not laid at the time of the survey) and sampling error).

B Counts of chicks and extrapolation (Errors here are detection error, sampling and nest-failure error. The latter is probably harder to estimate later in the breeding season than during the incubation period, due to the tendency for egg- and chick-failures to show high interannual variability compared with breeding frequency within a species).

(iii) Population Survey Accuracy

High Within 10% of stated figure;
Medium Within 50% of stated figure;
Low Within 100% of stated figure (eg coarsely assessed via area of occupancy and assumed density)
Unknown

(vii) Threats

level of threat:

High a threat that is likely to be the main cause of a rapid or catastrophic decline, or reversal of recovery of a population, and lead to the local extinction of a species from the breeding area.
Medium a threat that is causing a gradual decline, or slowing of recovery of a population, at a known breeding area.
Low an existing threat that may cause decline or slow recovery of a population, or localized extinction in a breeding area.
Yes, No or Unknown available information is insufficient to assign threat level

(viii) Maps

"The distribution maps shown were created from platform terminal transmitter (PTT) and global-positioning system (GPS) loggers. The tracks were sampled at hourly intervals and then used to produce kernel density distributions, which have been simplified in the maps to show the 50%, 75% and 95% utilization distributions (i.e. where the birds spend x% of their time). The full range (i.e. 100% utilization distribution) is also shown. Note that the smoothing parameter used to create the kernel grids was 1 degree, so the full range will show the area within 1 degree of a track. In some cases the PTTs were duty-cycled: if the off cycle was more than 24 hours it was not assumed that the bird flew in a straight line between successive on cycles, resulting in isolated 'blobs' on the distribution maps. It is important to realize that these maps can only show where tracked birds were, and blank areas on the maps do not necessarily indicate an absence of the particular species".