A Conservation Action Plan for Black-footed Albatross (*Phoebastria nigripes*) and Laysan Albatross (*P. immutabilis*)

Photograph by Marc D. Romano, USFWS

Version 1.0

Contributors
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I. INTRODUCTION

The black-footed albatross (*Phoebastria nigripes*) and Laysan albatross (*P. immutabilis*), are distinguished from most other species of albatross by their Northern Hemisphere distribution and sub-tropical breeding range. As of 2005 there were 21 islands that supported black-footed or Laysan albatross colonies, from the Senkaku Islands in the East China Sea to the Islas Revillagigedos, Mexico in the eastern Pacific (Figure 1). The core of the breeding range is the Hawaiian Islands, where the majority of birds nest on the small islands and atolls of the Northwestern Hawaiian Islands. The primary threats to black-footed and Laysan albatrosses include incidental mortality in fishing operations (bycatch), predation by introduced mammals, reduced reproductive output due to contaminants, and nesting habitat loss and degradation due to invasive plant species. The loss of nesting habitat due to sea level rise is a potential future threat that, coupled with the paucity of secure nesting habitat on high islands, could have serious consequences, particularly in the core breeding range in the Northwestern Hawaiian Islands. When combined, some of these threats may have synergistic or cumulative effects as well.

Globally, the black-footed albatross is listed by the IUCN as Endangered and the Laysan albatross is listed as Vulnerable (BirdLife International 2007). Both species are listed as Threatened in Mexico (6 March 2002 www.ine.gob.mx/ueajei/norma59.html) and in Canada, the black-footed albatross is a Species of Special Concern (COSEWIC 2007). The U.S. Fish and Wildlife Service (USFWS) is currently reviewing a petition to list the black-footed albatross under the Endangered Species Act (Earth Justice 2004)and both black-footed albatross and Laysan albatross are designated Birds of Conservation Concern (USFWS 2002). The black-footed albatross is designated as Threatened by the State of Hawaii.

In recognition of their conservation status and the ongoing threats facing these two species, this Conservation Action Plan (hereinafter "Plan") is intended to provide a framework for partnership-based conservation and management actions. The purpose of the Plan is to facilitate a collaborative, proactive approach to albatross conservation. Implementing actions identified in this plan, to reduce threats and prevent or stem population declines in the present, will aid in preserving future management options and minimizing the cost of management and recovery. Furthermore, the conservation actions outlined in this Plan may be considered in any future listing determinations under the Endangered Species Act in the United States (see Legal Status).

This Plan is the product of a diverse group of agencies, organizations, and individuals with a responsibility or interest in albatross conservation (Appendix A). To facilitate partnerships and plan development, the USFWS convened two workshops (Honolulu, Hawaii and Seattle, Washington) focused on albatross conservation at the breeding colonies and at sea, respectively. Workshop participants developed albatross population goals and objectives, identified information gaps, itemized priority needs, and developed recommendations for specific actions deemed necessary to effectively conserve black-footed and Laysan albatrosses. A broad range of participants attended the workshops, representing government agencies, fishery management councils, university researchers and non-profit organizations (Appendix A). Smaller group meetings were convened after the workshops to refine specific action items.

The breeding and foraging ranges of black-footed and Laysan albatrosses encompass most of the North Pacific Ocean, overlapping multiple agency and management jurisdictions. While this

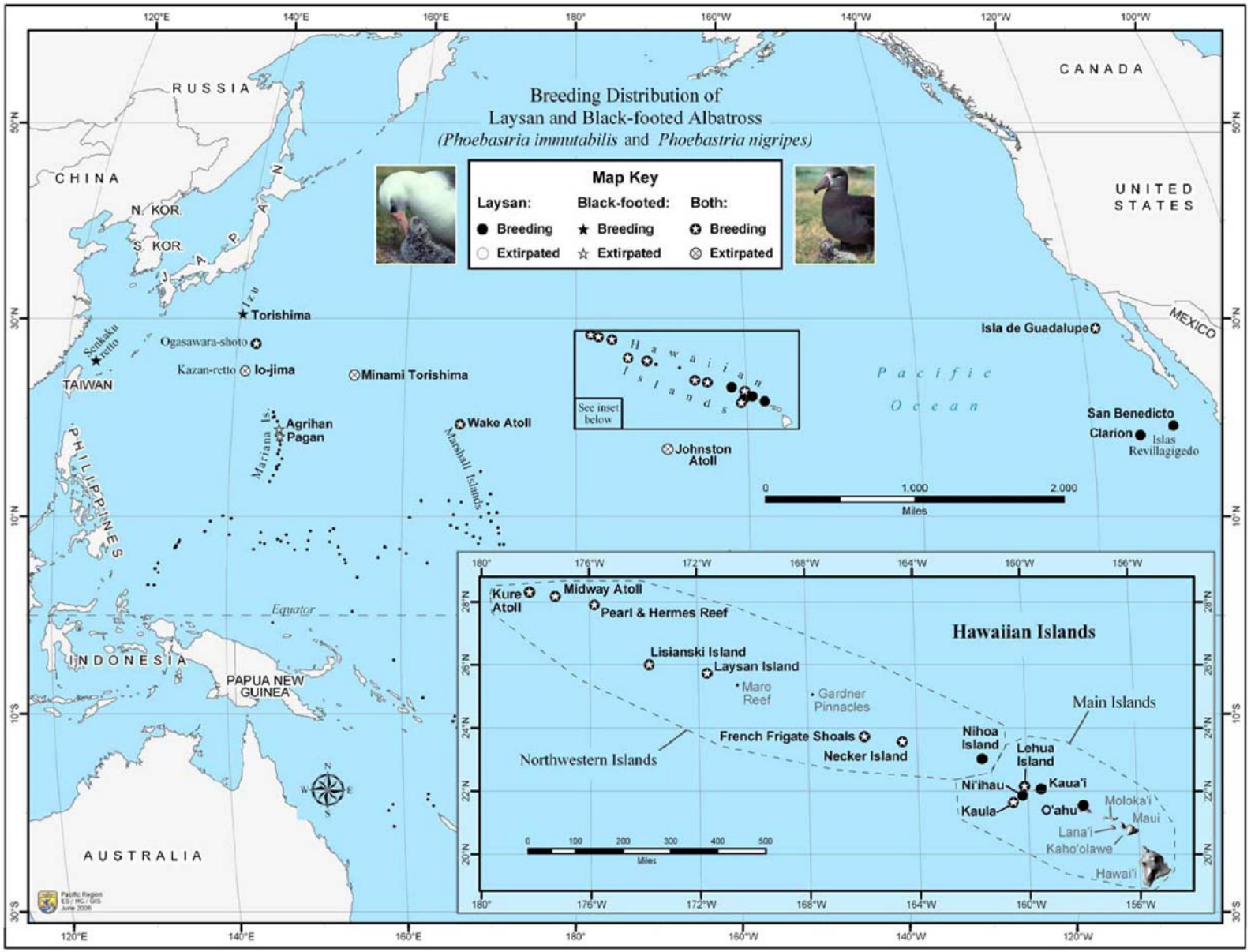

Figure 1. Current and historical breeding distribution of Laysan and Black-footed Albatrosses.

Plan is intended to cover all marine and terrestrial habitats used by the two species, the initial focus is the jurisdictional areas of the United States. Collaborative international efforts currently underway are also included, as well as potential opportunities for synergies with other regional and global conservation actions. The successful implementation of this Plan requires a coordinated, partnership approach among conservation partners both within the United States and internationally. Thus an essential next step will be to engage all nations, management bodies, and industries that have jurisdiction or an interest in conserving albatrosses throughout their international North Pacific range.

In implementing this Plan, all responsible parties and their partners should consider a precautionary approach. In particular, when addressing threats that have the potential for serious adverse impacts or damage to the species, the lack of full scientific certainty should be balanced with the consequences of postponing measures that may enhance the conservation status of the species.

This Plan is a working blueprint for conservation action. It takes advantage of information gathered from thousands of hours of field work by many individuals and represents our collective understanding of current albatross conservation needs. Management agencies and organizations will require the help of independent researchers, non-profit organizations, educators, industry groups and concerned individuals to realize the goals of the Plan. This is a living document that will be updated as new information is acquired and as new opportunities for conservation actions are identified and implemented. The diverse group that has produced the Plan will provide a cooperative forum for achieving the goals of this Plan, and for future Plan updates, in response to new information and emerging management opportunities.

II. DESCRIPTION OF TARGET POPULATION

Natural History Overview

Albatrosses are long-lived birds with deferred maturity, low annual fecundity and high rates of adult survival. The oldest known Laysan albatross is still breeding at 55 years (USFWS unpubl. data) and the longevity record for black-footed albatross is 41 years (USGS 2007). When chicks fledge they remain at sea for two to five years before returning to the colony (Fisher and Fisher 1969, Viggiano 2001). Birds can breed as early as five years of age (Fisher and Fisher 1969, Viggiano 2001) but most do not breed for the first time until they are eight or nine years old (Fisher 1976, Kendall et al. 2005) and some black-footed albatrosses are 13 or 14 years old when they breed for the first time (Kendall et al. 2005).

Albatrosses are monogamous with pair bonds usually lasting until the disappearance or death of one of the partners (Whittow 1993a, 1993b). If females nest in a given season, they lay one egg and do not relay if that egg is lost. Although physiologically capable of breeding every year, most birds periodically skip a breeding season (Fisher 1976). Laysan albatrosses that lose a mate take an average of 1.4 (males) – 1.9 (females) breeding seasons before resuming breeding with a new partner (Fisher 1976).

Both species initiate nesting in the winter and have a well defined breeding cycle with little annual or inter-island variation in nesting chronology. Eggs are laid in November and December

and are incubated by both parents for approximately two months. Newly hatched chicks are brooded for several days, after which they are usually attended by an adult for another month. After this "guard stage" the adults spend most of their time at sea returning to the island only to feed the chick. Both parents feed the chick for approximately five more months, until the chick fledges in June or July.

Reproductive performance data for albatrosses in the Northwestern Hawaiian Islands indicate inter-annual and inter-island variation (USFWS in prep.). The longest time series of data are from French Frigate Shoals where Laysan albatross reproductive success ranged from 0.09 – 0.89 fledglings/egg (mean = 0.64, SD = 0.19) for the 25 year period from 1980 – 2004. Reproductive success rates for black-footed albatross, ranged from 0.38 – 0.78 (mean = 0.69, SD = 0.10) over the same time period. Rates at Midway Atoll from 1992 – 2001 were lower, with means of 0.50 (SD = 0.20) and 0.55 (SD = 0.16) for Laysan and black-footed albatross, respectively. Data from Laysan Island are very limited (three years 1992 – 1995) but indicate lower reproductive rates for both species compared to French Frigate Shoals and Midway.

The primary cause of nest failure is desertion by a parent, which could be caused by a variety of factors including food shortages, the death of a member of the pair, or inexperience of the breeders. Flooding, strong storms, egg loss due to eggshell thinning, predation by introduced mammals, and oceanographic anomalies that result in food shortages, are also factors (Fisher 1971b, 1975a, Woodward 1972, Arata et al. in prep., USFWS unpubl. data).

Range and Distribution

At sea, black-footed and Laysan albatrosses range over most of the North Pacific Ocean, from the northern edge of the North Equatorial Current to the Bering Sea. Satellite telemetry has documented long-range movements even when albatrosses are tied to the islands during the breeding season. During incubation, Laysan albatrosses forage along the north edge of the North Pacific Current whereas black-footed albatrosses remain in warmer waters on the southern edge of the current (Kappes et al. unpubl.). Birds travel to Alaskan waters or to the California Current when provisioning their young (Fernandez et al. 2001, Hyrenbach et al. 2002). The post-breeding period emancipates adults from returning to the colonies and both species range widely through international waters and within the Exclusive Economic Zones (EEZs) of many nations, including Mexico, the United States, Canada, Russia, Japan, China, North and South Korea, the Federated States of Micronesia, and the Republic of the Marshall Islands. Less information on the distribution of juvenile birds exists but some preliminary tracking data for fledgling black-footed albatrosses suggests that juveniles share similar ranges as adults (Shaffer et al. unpubl. data).

Black-footed and Laysan albatrosses breed on oceanic islands spread across the tropical and subtropical North Pacific, from Mexico to Japan, between 16° and 31° N latitude (Figure 1). Black-footed albatrosses consistently nest at 13 sites and Laysan albatrosses at 16 sites, worldwide (Table 1). The core of the breeding distribution for both species is the Hawaiian Islands, in the Central Pacific, where greater than 96% and 99% of the world's black-footed and Laysan albatrosses breed, respectively. About one-third of all breeding colonies for these two species (5 black-footed colonies; 8 Laysan colonies) support less than 100 pairs and four sites are only intermittently attended and support ten or fewer pairs.

Table 1. Recent estimates of Laysan and Black-footed Albatross nesting pairs at all known breeding sites.

		Black-footed Albatross		Laysan Albatross	
Breeding site	Country	Pairs	Hatch Year	Pairs	Hatch Year
Central Pacific					
Hawaii					
Kure Atoll	USA	2,020 [1]	2000	3,900 [1]	2000
Midway Atoll	USA	21,830	2005	408,133	2005
Pearl and Hermes Reef	USA	6,116 [1]	2003	6,912 [1]	2003
Lisianski Island	USA	3,737 [1]	2002	26,500	1982
Laysan Island	USA	21,000	2005	140,860 [2]	2005
French Frigate Shoals	USA	4,259	2005	3,226	2005
Necker Island	USA	112 [1]	1995	500 [1]	1995
Nihoa Island	USA	31 [1]	1994	0	1995
Kaula	USA	0	1998	63	
Lehua	USA	10 [1]	2002	12 [1]	2002
Niihau	USA	?		175	
Kauai	USA	0	2004	159	2004
Oahu	USA	0	2005	56 [1]	2005
Marshall Islands					
Wake Atoll	USA	1	2003	1	2004
Isolated Islands					
Johnston Atoll	USA	0		0	
Minami Torishima[4]	Japan	0		0	
Western Pacific					
Izu Shoto					
Torishima[3]	Japan	1,560 [1]	2003	0	2003
Ogasawara Gunto [4]					
Mukojima Group	Japan	967 [1]	2006	23	2006
Hahajima Group	Japan	11 [1]	2006	0	2006
Ryukyu Shoto					
Senkaku Retto[5]	Japan/PRC/ROC	56 [1]	2002	0	2002
Mariana Islands					
Agrihan	CNMI	0		0	
Pagan	CNMI	0		0	
Eastern Pacific					
Isla Guadalupe	Mexico	0 [6]	2004	337	2005
Islas Revillagigedos					
San Benedicto	Mexico	0 [6]	2004	49	2003
Clarion	Mexico			17	2003
Alijos Rocks	Mexico			3	2003
Total		**61,710**		**590,926**	

All estimates from USFWS and State of Hawaii (DLNR) unpublished data except as noted below.

[1] indicates an extrapolation to total nests from a count of chicks late in the season (0.75 reproductive success)

[2] Laysan Albatross at Laysan Island were sampled using transects; 95% C.I.=107,000-144,000

[3] Estimates for Torishima Island from H. Hasegawa pers. comm.; Estimates for Mexican colonies from R.W. Henry pers. comm.

[4] Ogasawara Gunto also known as Bonin Islands; Kazan Retto - Volcano Islands; Minami Torishima - Marcus Island
Estimates for the Ogasawara Gunto from T. Deguchi pers. comm.

[5] The Senkaku Islands, or Diaoyutai Islands, are disputed territory claimed by Japan and China.

[6] A single pair of Black-footed Albatrosses nested on Isla Guadalupe and San Benedicto in 2000.

The breeding ranges of both species were greatly reduced during the late 1800s and early 1900s, when feather hunters extirpated birds from most of the colonies in the Western Pacific. Currently in the Western Pacific, black-footed albatrosses nest in the Izu, Ogasawara, and Senkaku island chains; and, Laysan albatrosses nest at only one colony in the Ogasawara islands (Table 1). These colonies are relatively small and only Torishima supports a colony with greater than 1,000 pairs (black-footed albatross). It is likely that albatrosses historically nested on other islands in the western Pacific but were not recorded prior to extirpation. Documented historical colonies that have not been reoccupied include Johnston Atoll, Minami Torishima (Marcus Island), Agrihan and Pagan in the Mariana Islands, and Iō Tō (Iwo Jima) in the Kazan Retto or Volcano Islands.

Over the past 25 years, Laysan albatrosses have established new colonies in the Eastern Pacific on islands off Mexico and currently about 400 pairs nest on four islands (Table 1). Individual pairs of black-footed albatrosses have sporadically nested on two of these islands.

Population Status and Trends

Historical Perspective - There are few reliable estimates of colony sizes prior to the devastation of feather hunting; therefore, it is difficult to compare the current population size with the pre-feather hunting population. The Laysan albatross colony at Laysan Island may have numbered close to half a million pairs prior to feather hunting (Nutting 1904). If this estimate is accurate then the colony has been significantly reduced (141,000 pairs estimated in 2005). Conversely, the Laysan albatross colony at Midway Atoll far exceeds historical levels (estimated to be in the low thousands; Munro 1942 *in* Rice and Kenyon 1962) due in large part to the significant increases in land area and widespread habitat alteration between 1903–1970 by the Pacific Cable Company and the U.S. Navy (Rice and Kenyon 1962). Historical estimates of black-footed albatrosses prior to feather hunting are too poor to allow any quantitative assessments. The best estimates for black-footed and Laysan albatross populations in the Hawaiian Islands following the devastation of feather hunting (1922–1923) were approximately 18,000 breeding pairs for each species (Table 2).

Black-footed Albatross – The world breeding population of black-footed albatrosses was estimated to be 61,700 pairs in 2005 (Table 1). The current black-footed albatross breeding population in Hawaii (approximately 59,000 pairs) is comparable to the 1956/57 estimates of 55,000 pairs (Table 2). However, the colony at Sand Island, Midway Atoll had declined from "nearly 20,000 pairs" in the early 1940s to 6,300 pairs in 1956/57 (Rice and Kenyon 1962). The entire Midway Atoll colony (including both Sand Island and Eastern Island) increased 150% between 1956 (8,700 pairs) and 2005 (21,800 pairs). The number of breeding pairs at Laysan Island, historically the largest colony, declined by 38%, from approximately 34,000 pairs in 1956 to 21,000 pairs in 2005. Together, Laysan and Midway Atoll account for >70% of the breeding pairs in Hawaii. The smaller colonies at Kure Atoll, Lisianski Island and French Frigate Shoals increased in size over the past half century while the colonies at Pearl and Hermes Reef, Necker Island and Kaula Rock declined (Table 2).

Standardized counts and estimates of active nests have been conducted since 1980 at French Frigate Shoals and since 1991 at Midway Atoll and Laysan Island. These three colonies represent more than 75% of the world's breeding black-footed albatrosses. Arata et al. (in prep.)

Table 2. Comparison of the most recent estimates (1982-2005) of Black-footed and Laysan albatrosses nesting pairs with estimates from 1956-1957 and 1922-1923, at Hawaiian breeding sites.

	Black-footed Albatross Pairs			Laysan Albatross Pairs		
Breeding site	1922-1923[1]	1956-1957[2]	1995-2005[3]	1922-1923[1]	1956-1957[2]	1995-2005[3]
Kure Atoll	365	70	2,020	75	350	3,900
Midway Atoll	2,430	8,700 [4]	21,829	3,800	100,055	408,133
Pearl and Hermes Reef	3,650	7,103	6,116	830	17,750	6,912
Lisianski Island	1,810	2,700	3,737	1,270	30,000	26,500
Laysan Island	8,510	34,000	21,006	10,800	130,000	140,861
French Frigate Shoals	730	1,499	4,259	200	584	3,226
Necker Island	180	370	112	950	2,500	500
Nihoa Island	110	50	31	3	500	0
Kaula		100	0	0		63
Lehua			10			12
Niihau					500	175
Kauai			0			159
Oahu			0			56
Total	**17,785**	**54,592**	**59,120**	**17,928**	**282,239**	**590,497**

[1]Wetmore in Rice and Kenyon 1962; Wetmore's spring/summer estimates were adjusted for nest loss

[2]Rice and Kenyon 1962

[3]USFWS unpublished data

[4]An estimated 20,000 pairs of Black-footed Albatross nested on Sand Is. alone in early 1940s, prior to WWII.

conducted a trend analysis of the combined colony count data from Midway, Laysan and French Frigate Shoals over three time periods: 1922–2005, 1957–2005, and 1992–2005. Linear regressions of log-transformed counts indicated an increasing trend in breeding birds over the long time period (1922–2005), a relatively stable breeding population, over the past half century, and a declining trend over the past 15 years (Table 3).

In an analysis of capture-recapture data of black-footed albatrosses, Veran et al. (2007) estimated the average annual survival of breeding adults at Tern Island, French Frigate Shoals from 1997 – 2002 to be 92%. This value is low when compared to the estimates available for other albatross species (Veran et al. 2007).

Laysan Albatross – The worldwide breeding population of Laysan albatrosses was estimated to be 590,000 pairs in 2005, the vast majority of which (>99%) breed in Hawaii (Table 1). Following the cessation of feather hunting in the early 20th Century, the number of Laysan albatrosses increased at all of the Hawaiian colonies and breeding populations approximately doubled from 1956/57 to 2005 (Table 2). The most significant increase occurred at Midway Atoll, which increased four-fold, from approximately 100,000 to 408,000 pairs. Substantial increases were also documented at Kure Atoll and French Frigate Shoals. These three islands all supported military bases, which have all now been decommissioned. Estimates of colony size at Laysan Island from 2005 and Lisianski Island from 1982 are comparable to estimates from 1956/57, and the colony at Pearl and Hermes Reef is the only one in the Northwestern Hawaiian Islands to exhibit a declining trend between 1957 and 2003 (17,750 and 6,900 pairs, respectively).

Table 3. Results of linear regression of log-transformed Black-footed Albatross nest count data from Midway, Laysan and French Frigate Shoals over three time periods.

Time Period	Slope	P	R^2
1922-2005	Positive	0.0001	0.7201
1957-2005	No Slope	0.996	0.000002
1992-2005	Negative	0.0333	0.3497

Table 4. Results of linear regression of log-transformed Laysan Albatross nest count data from Midway, Laysan and French Frigate Shoals, over three time periods.

Time Period	Slope	P	R^2
1922-2005	Positive	0.001	0.8549
1957-2005	Positive	0.0316	0.6363
1992-2005	No Slope	0.5964	0.0762

Standardized counts and estimates of active nests have been conducted since 1980 at French Frigate Shoals and since 1991 at Midway Atoll and Laysan Island. These three colonies represent more than 90% of the worlds breeding Laysan albatrosses. Arata et al. (in prep.) fit linear regressions to log-transformed nest counts, from Midway Atoll, Laysan Island, and French Frigate Shoals, combined, in order to detect trends in the breeding population. Over long (1922 – 2005) and medium (1957 – 2005) time scales, the combined breeding population at these three colonies increased, yet over the shortest time period (1992 – 2005) no increase was detected. All three colonies experienced declines in the number of breeding birds present in the late 1990s and early 2000s. The number of breeding pairs at Midway Atoll decreased from 429,300 pairs in 1992 to 284,600 pairs in 2001. At Laysan Island the breeding population declined from ca. 200,000 pairs in 1997 to 44,000 pairs in 2001. However, the breeding population at most colonies rebounded by 2005 (e.g. Midway: 408,100 pairs and Laysan: 140,900 pairs), suggesting that these changes in the breeding populations were reflective of large scale environmental conditions that affected the number of birds that returned to the colonies to nest rather than actual declines in the population. However, research is needed to investigate the cause and effects of these fluctuations.

III. LEGAL STATUS

In the United States, Canada, Japan, Russia, and China, migratory birds including albatrosses are protected by domestic legislation which implements migratory bird treaties (Harrison et al. 1992), including: United States: *Migratory Bird Treaty Act*, Canada: *Migratory Bird Convention Act*, Japan: *Wildlife Protection and Hunting Law*, Russia: *On the Protection and Use of Wild Animals*, and China: *Wildlife Protection Law*.

Additional protective designations include:
United States: A petition to list black-footed albatrosses under the Endangered Species Act (*Act*)

was submitted by Earth Justice in 2004. The USFWS determined that emergency listing was not warranted, and a 90-day finding to evaluate the petition was initiated but delayed due to higher priority listing actions. The implementation of conservation actions outlined in this Plan may be considered in any future listing determinations under the *Act*. However, it is important to note that the implementation and efficacy of such conservation actions is only one of many factors evaluated when assessing the status of a species under consideration for listing, and may not necessarily preclude listing under the *Act.*

The black-footed albatross is listed as a Bird of Conservation Concern at the national, regional, and Bird Conservation Region levels and the Laysan albatross is listed in Bird Conservation Regions 5, 67, and 68 (USFWS 2002). The black-footed albatross is listed as threatened by the State of Hawaii.

Mexico: Both species are listed as 'Amenazada' (Threatened) under the List of Species at Risk, Annex 2 of the Norma Oficial Mexicana NOM–059–ECOL–2001 (6 March 2002 www.ine.gob.mx/ueajei/norma59.html).

Canada: The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assessed the black-footed albatross as a Species of Special Concern on April 27, 2007 (COSEWIC 2007), and the federal government is currently evaluating whether the species should receive legal listing under the *Species at Risk Act*.

International: The World Conservation Union (IUCN) listed the black-footed albatross as Endangered (A3bd) in 2003 (IUCN 2007) based on a projected future decline of >60% over the next three generations (56 years). The Laysan albatross was listed as Vulnerable (A4bd) (IUCN 2007) based on an expected decline >30% over three generations (84 years). For both species the primary reason for the expected decline was the potential effect of longline fishing (IUCN 2007).

IV. THREATS AND LIMITING FACTORS

Fisheries Bycatch

Mortality due to incidental capture in commercial fisheries (i.e., bycatch) is the most significant source of mortality for black-footed and Laysan albatrosses (IUCN 2007). To assess the impact of fisheries on both species, a detailed analysis of albatross bycatch in commercial fisheries was conducted as part of the USFWS sponsored Status Assessment for black-footed and Laysan albatrosses (Arata et al. in prep.). The information below is largely excerpted from that assessment.

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. Albatross bycatch data were only available for a small subset of the North Pacific fisheries: high seas driftnet (international), pelagic longline (USA-based), and demersal longline (Canadian- and USA-based). Even for these fisheries the data were limited. 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.

The high-seas driftnet fishery for squid and salmon, active mainly from 1978 to 1992, killed significantly more Laysan albatrosses (Figure 2), than black-footed albatrosses (Figure 3). However, in proportion to the total population size, the impact was greater for black-footed than Laysan albatrosses. Closure of the high-seas squid and salmon driftnet fishery in December 1992 by a United Nations Resolution (INPFC 1993) significantly reduced the total number of albatrosses killed each year. Legal driftnet fisheries still occur within some EEZs, as do illegal driftnet fisheries on the high seas.

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 black-footed and Laysan albatrosses (Lewison and Crowder 2003, IUCN 2007, Arata et al. in prep.). Fleets from the United States, Japan, Korea, and Taiwan operate in the North Pacific (Kinan 2003) and Arata et al. (in prep.) estimate that albatrosses have been incidentally killed in this fishery since at least 1951. The total impact of the pelagic longline fisheries on either albatross species will only be known with certainty once seabird bycatch data becomes available for all fisheries incurring bycatch mortality (currently observer data is only available for the U.S. based pelagic longline fleet). Comparable observer data were not available from other international pelagic longline fisheries for the analyses and bycatch levels were estimated (Arata et al. in prep.).

During the period from 1951 – 2005, the estimated rate of bycatch of Laysan albatrosses was typically less than 6,000 albatrosses/year, but during the period of high seas driftnet fishing, 1978 to 1992, the rate increased to a maximum of 27,800 albatrosses/year (Figure 2). The estimated bycatch rates of black-footed albatrosses has fluctuated over the past 50 years, generally ranging between 6,000 – 10,000 birds per annum (Figure 3). The estimated number of black-footed albatrosses killed 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. In recent years, U.S. North Pacific longline fleets have implemented seabird deterrence measures that have reduced seabird bycatch in longline gear. The estimated bycatch due to bottom fisheries (trawl and longline) off Alaska represents a relatively small fraction of today's total bycatch (Figures 2 and 3).

Predators

The only known native predator of black-footed and Laysan albatrosses in Hawaii is the tiger shark (*Galeocerdo cuvieri*) which preys upon fledglings during their first incursions to sea. The endemic Clarion raven (*Corvus corax clarionensis)* and the Clarion racer (*Masticophis anthonyi*) may be significant predators on Clarion Island, Mexico (Bill Henry pers. comm.).

Invasive Species - Predators

Non-native mammalian predators (dogs, cats, pigs, mongooses, and rats) limit the size and productivity of several breeding colonies and may restrict the reoccupation of some historical sites. On the main Hawaiian Islands, feral and domestic cats and dogs kill albatrosses, and few if any of these colonies would be viable without predator control programs such as fencing and trapping (USFWS 2005). Feral cats are known to kill adult Laysan albatrosses at main island colonies of Isla Guadalupe, Mexico (Keitt et al. 2006). There are no introduced predators on the

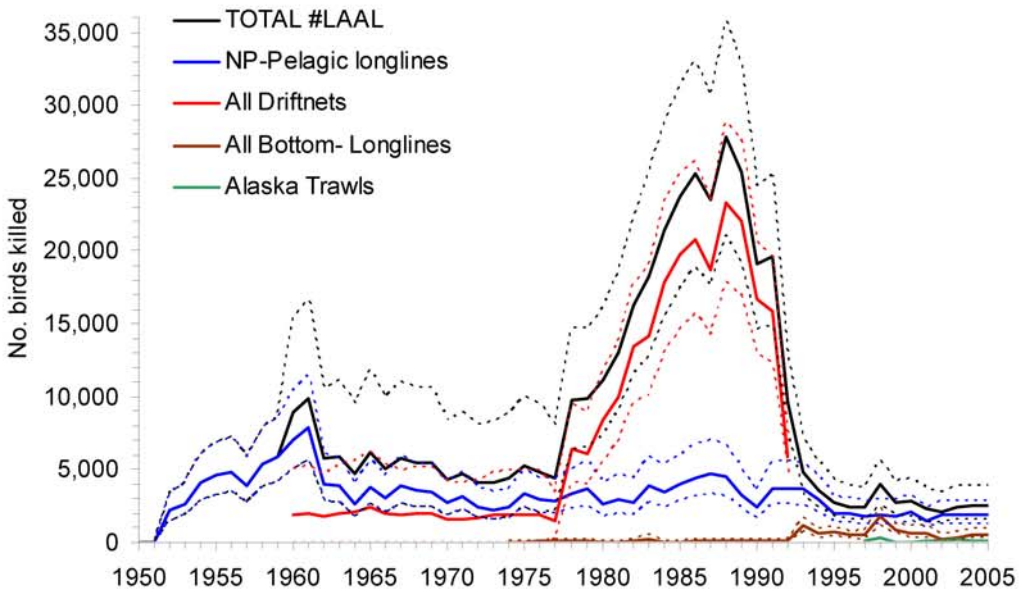

Figure 2. Estimated number of Laysan Albatrosses killed by longline and pelagic driftnet fisheries in the North Pacific Ocean, 1950 - 2005 (solid lines: mean estimates; dotted lines: 95%CI). (From Draft Laysan and Black-footed Albatross Status Assessment, Arata et al. in prep. Figure 12).

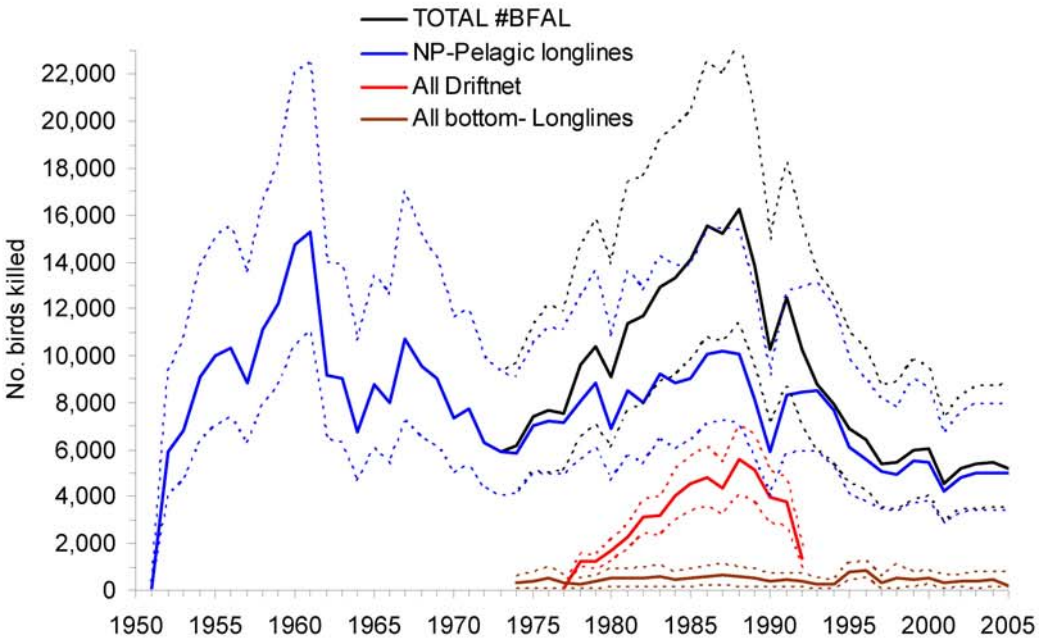

Figure 3. Estimated number of Black-footed Albatrosses killed by longline and pelagic driftnet fisheries in the North Pacific Ocean, 1950 - 2005 (solid lines: mean estimates; dotted lines: 95%CI). (From Draft Laysan and Black-footed Albatross Status Assessment, Arata et al. in prep. Figure 12)

small islets off Isla Guadalupe or on San Benedicto Island (Pitman et al. 2004, Keitt et al. 2006). Black rats (*Rattus rattus*) and Polynesian rats (*R. exulans*), were introduced to the Northwestern Hawaiian Islands during World War II but they were eradicated from Kure in 1995 and Midway in 1996 (Vanderlip and Morie 2004). The Northwestern Hawaiian Islands are free of all introduced mammalian predators, except house mice (*Mus musculus*) at Midway Atoll. Mice currently do not pose a threat to albatrosses on Midway, however, house mice prey on Tristan albatross (*Diomedea dabbenena*) chicks on Gough Island, in the South Atlantic Ocean and could potentially pose a threat in the future (Angel and Cooper 2006, Wanless et al. 2007).

Invasive Species – Plants and Invertebrates

Many plant species were introduced to the Northwestern Hawaiian Islands during the past century. Of these, ironwood trees (*Casuarina equisetifolia*) and golden crown-beard (*Verbesina encelioides*) have had the greatest potential for negative impact on albatross populations. At Midway Atoll there is a well established ironwood forest on Sand Island, and while Laysan albatrosses nest in this habitat, nest density is lower than in more open habitats. Management programs restrict expansion of the ironwood forest on Sand Island and ironwood trees on Eastern Island were cut down over the past decade. On the main Hawaiian Islands Laysan albatrosses nest among ironwood trees with no detectable negative impacts.

Golden crown-beard is an aggressive, woody herb that forms tall, dense stands that can reduce access for surface nesting species, such as albatrosses. This weed is well established at Kure Atoll, Midway Atoll, and Pearl and Hermes Reef. In a study that examined the abundance and distribution of nesting seabirds in seven vegetation types at Midway Atoll, shrubland dominated by golden crown-beard was found to have the lowest species richness and total abundance of seabird nests (Freifeld 1993). Although this study took place too late in the breeding season to include albatrosses, three of the six species that were included are obligate ground- or burrow-nesters. Golden crown-beard is also thought to reduce chick survival via entanglement (E. Flint pers. comm.) and the dense stands provide habitat for introduced mosquitoes that spread avian pox.

The southern house mosquito (*Culex quinquefasciatus*) was introduced to Hawaii in 1826 (Warner 1968), and sometime later reached Midway Atoll. It is believed to be the principal vector for avian pox (van Riper et al. 1986, Atkinson et al. 1995). It is also a potential vector for other diseases which could affect albatrosses in the future.

Disease

Avian pox is a viral disease, transmitted by mosquitoes, that affects Laysan albatross chicks at Midway Atoll and the main Hawaiian Islands. Pox was once thought to be a serious threat to the population at Midway Atoll, and epizootics with extensive mortality to chicks have occurred irregularly in the past (Sileo et al. 1990), but it is now known that most of the pox infected chicks survive (Young and VanderWerf 2007 in review, USFWS unpubl. data). Pox does affect black-footed albatross chicks, but it is rare, possibly because they nest in more open areas where mosquito numbers are lower. The vulnerability of albatrosses to West Nile Virus, avian influenza, and other emerging avian diseases is unknown.

The runways on Eastern Island, Midway Atoll were closed after World War II and although they are badly degraded, they are still a major feature of the island. Thousands of albatrosses nest on these old runways and some are plagued with swollen feet and leg joints that may be related to landing and nesting on this hard surface or puncture wounds caused by *Tribulus cistoides*, a native plant with a thorny seed. It is not known if this condition affects albatross survival or productivity.

Contaminants

Organochlorines - Both black-footed and Laysan albatrosses exhibit high concentrations of organochlorine contaminants (Jones et al. 1996, Auman et al. 1997, Guruge et al. 2001a) and concentrations of PCBs and DDE in both species have increased (by as much as 360% for black-footed albatrosses) over the last decade (Finkelstein et al. 2006). The primary route of organochlorines exposure for both species is believed to be diet (Finkelstein et al. 2006). The mean PCB levels in these North Pacific albatrosses are one or two orders of magnitude higher than those from southern oceanic albatrosses (Guruge et al. 2001b). Organochlorine compounds, such as PCBs and DDE, are known to reduce avian fecundity, through embryo mortality, teratogenic development, and eggshell thinning. Contaminant levels in the eggs of Laysan albatrosses are lower than threshold levels expected for eggshell thinning (Jones et al. 1996, Auman et al. 1997). Black-footed albatross eggs contained levels of PCB, DDE, and TCDD known to cause eggshell thinning and embryo mortality in piscivorous bird species (Auman et al. 1997, Guruge et al. 2001b). Eggshells of black-footed albatrosses collected in 1995 were 34% thinner than eggs collected before World War II. An estimated 2–3% of the female population contain concentrations of DDE great enough to produce eggshell thinning, and potential egg loss by crushing (Ludwig et al. 1998).

Heavy Metals - Many of the former military and historic cable company buildings at Midway Atoll contain multiple layers of lead-based paint. Deterioration over time has resulted in the deposition and accumulation of lead paint chips in the areas surrounding these buildings. Laysan albatross chicks, from nests near these buildings, are exposed to substantially elevated levels of lead through ingestion of paint chips (Finkelstein et al. 2003). Black-footed albatrosses rarely nest near buildings and lead poisoning at Midway Atoll is rare in this species. Adults of either species do not appear to be affected by lead poisoning at Midway Atoll. There are no published estimates of the number of chicks that die each year due to lead poisoning, however, as many as 6000–7000 chicks (~2% of the atoll's chicks) may die from lead poisoning each year (J. Klavitter, USFWS, pers. comm.). Birds exposed to lead that do not exhibit overt symptoms of lead poisoning could still experience sublethal toxic effects that decrease fitness and survival.

Concentrations of mercury are higher in black-footed than Laysan albatrosses (Finkelstein et al. 2006), and high mercury concentrations may be associated with altered immune function in black-footed albatrosses (Finkelstein et al. 2007).

Plastic Pollution

Albatrosses ingest a wide variety of plastics including small broken pieces, bottle caps, plastic toys, cigarette lighters and fishery light sticks. Kenyon and Kridler (1969) found that Laysan albatrosses at Midway had a higher prevalence, diversity and volume of plastic in their stomachs

than other Hawaiian seabirds. Albatross ingest plastic while feeding at sea, either mistaking it for food or incidentally ingesting it with other food items. Adult albatrosses feed this plastic to their chicks. Chicks will pick up some plastic themselves at the colonies, but the majority is fed to them by their parents. Just prior to fledging, albatross chicks regurgitate boluses of indigestible matter, including squid beaks and plastics.

There have been several studies investigating the effects of plastic ingestion on Laysan albatross chick survival (Sileo and Sievert 1993, Fry et al. 1987, Auman et al. 1997). Ingested plastics can cause death of a bird by perforating the digestive tract, but most of these studies have not been able to show conclusively that plastic ingestion is a significant source of direct mortality (Sileo et al. 1990, Sievert and Sileo 1993, Auman et al. 1997). However, they do note that ingested plastics may be a contributing factor to other causes of mortality. Auman et al. (1997), summarizing the work of many researchers, listed starvation, suppressed appetite and reduced growth, decreased fat accumulation, lower fledging weight gut obstruction, and increased susceptibility to dehydration and lead poisoning as possible effects of ingested plastic. Plastic compounds in the ocean are also believed to be transport mediums for lipophilic compounds such as organochlorines (Mato et al. 2001). Finally, Auman et al. (1997) reported that the incidence and mass of plastic in Laysan albatross appears to be increasing. Black-footed albatross chicks have a lower incidence and abundance of plastic than Laysan albatross chicks, and contain higher amounts of plastic fiber that is suspected to be derived from fishing gear (Sievert and Sileo 1993, Gould et al. 1997).

Oil Pollution

Oil spills and seabirds have long been associated. Over the past 30 years, there have been several oil spills in the vicinity of the large albatross colonies in the Northwestern Hawaiian Islands including the tanker Irenes Challenge that spilled more that ten million gallons of crude oil 50 miles north of Lisianski Island in January 1977 and the Hawaiian Patriot that spilled over 31 gallons of fuel approximately 125 miles south of French Frigate Shoals in February 1977 (NOAA 1992). These spills occurred in remote areas and there were no investigations of bird mortality.

Oiled albatrosses have been recorded at the colonies but the actual source of this oil is unknown (Fefer et al. 1983, USFWS unpubl. data). Given the vast at-sea distribution of both species, they could be encountering oil anywhere in the North Pacific. King and Sanger (1979) ranked both species of albatrosses as "average" on the Oil Vulnerability Index.

Military Activities

There is a long history of military occupation and conflicts with albatrosses on several of the remote islands that support breeding colonies and, over the long-term, the impacts of military activities have been both negative and positive. All of the military bases in the Northwestern Hawaiian Islands have now been decommissioned and these islands are all protected as part of the Papahānaumokuākea Marine National Monument.

On the main Hawaiian Islands, the U.S. military has determined that Laysan albatrosses nesting at the Pacific Missile Range Facility, Kaua'i and Marine Corps Base Hawaii, O'ahu pose a potential threat to aircraft operations. Consequently, Laysan albatross eggs are collected and

adults are translocated (under permit) from these military bases to secure sites where they do not pose a hazard to aircraft activities. These colonies on the main island military bases are small, but in view of the threat posed to low islands by sea level rise, all of the active colony sites on high islands are important. Kaula Rock was a military target for live bombing exercises in the past and a section of the island is still used by the military for inert bombing practice.

Climate Change and Sea Level Rise
Most global climate change models predict a net increase in sea level over the next century. Many of the low coral islands and atolls of the Northwestern Hawaiian Islands (the core breeding area for both species) are vulnerable to even a modest rise in sea level (Baker et al. 2006). Large waves associated with winter and spring storms cause a disproportionately greater loss in nests for birds nesting along the outer, more exposed sandy beaches of islands. Black-footed albatrosses generally nest in higher densities along these outer sandy beaches and thus may be more vulnerable than Laysan albatrosses to the negative impacts of storm events.

V. ADEQUACY OF EXISTING MONITORING PROGRAMS

Previous monitoring programs were inadequate to assess the status and trends of these two long-lived seabird species with the necessary precision, over a reasonable period of time. The population monitoring program was based largely on counts of annual breeding populations at key colonies. However, black-footed and Laysan albatrosses do not breed every year and until recently the program did not include protocols to determine this proportion. Consequently, increasing or decreasing trends in the number of breeding birds could reflect changes in the total breeding population size or they could reflect changes in the proportion of birds returning to breed in a given year. These methods were especially deficient when attempting to correlate inter-annual declines with specific threats such as fisheries bycatch. Finally, mortality factors that affect juveniles may not be reflected in the breeding population for 10 to 15 years, and this complicates interpretation.

In 2003, USFWS contracted with the USGS to compile and analyze existing albatross banding and recapture data (to assess adult survival rates over time), and review the albatross monitoring program and recommend changes. Survival rates were calculated from a few discrete data sets, but overall the data were not collected consistently or documented well enough to support rigorous analyses or comparisons. Adult survival rates are a key demographic parameter needed to assess and manage threats to albatrosses (e.g. bycatch; Kendall et al. 2005, Veran et al. 2007). The USGS recommended and helped design a demographic monitoring program based on the mark and recapture of banded adult birds (Kendall et al. 2005). This demographic monitoring program was designed to estimate a variety of key demographic parameters including, adult survival, reproductive success, proportion of adults breeding each year, and age at first breeding. In 2005, USFWS implemented a pilot monitoring program at Midway Atoll, French Frigate Shoals, and Laysan Island, which will be evaluated over a three year period. Once the protocols are vetted, they will be institutionalized by USFWS as the new long-term monitoring program for these two species at the colonies. Regular counts of breeding pairs from Midway, Laysan and French Frigate Shoals will be continued as part of the long-term monitoring program, although counts will not be conducted as frequently as they have been in the past.

The existing bycatch monitoring in the North Pacific is also inadequate. Currently, fisheries bycatch is the greatest known source of mortality for these birds, yet only a small fraction of the commercial fleets monitor and record seabird bycatch. Fleets that are monitored generally employ bird mitigation measures to minimize the bycatch of seabirds in accordance with Federal Regulations and National Plans of Action. To our knowledge, unmonitored fleets do not employ mitigation measures, so it is extremely difficult to estimate their impact. Bycatch data were available for the Hawaiian pelagic longline fisheries and for most of the Alaskan and Canadian demersal longline fisheries (with the exception of the halibut fishery and small inshore groundfish vessels in state and federal waters). Bycatch data are not available for demersal longline fisheries off the coasts of Washington, Oregon and California. Bycatch data were not available for the pelagic longline fisheries based out of Japan, Korea, Russia, and China (Arata et al. in prep.) and thus had to be estimated. Although bycatch was monitored for the Alaskan trawl fishery, due to the nature of albatross interactions with trawl vessels it was difficult to obtain good estimates of albatross bycatch. NOAA Fisheries is addressing this problem and new monitoring protocols should provide more accurate data.

Given the lack of adequate long-term data for colony counts, adult survival, and fisheries bycatch, researchers and managers relied upon various modeling exercises to estimate the status and trends of these albatross populations, and the population-level effects of fisheries. Unfortunately, because these investigations were forced to rely on limited and 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 enable managers to make informed decisions.

Photograph by Marc D. Romano, USFWS

VI. POPULATION GOALS AND OBJECTIVES

BLACK-FOOTED ALBATROSS

POPULATION GOAL – Increase the worldwide population of black-footed albatross ($\lambda > 1.0$)

POPULATION OBJECTIVES

B1 Increase the black-footed albatross breeding population at the core breeding islands in Hawaii to >60,000 pairs and at the Japanese colonies to >2,600 pairs.

Strategy: Minimize or eliminate threats that reduce productivity, such as habitat degradation, invasive species, and contaminants.

B2 Maintain mean adult survival rates at levels adequate to maintain a stable or increasing population. (Currently, 0.96 is the best estimate of the annual adult survival necessary to maintain a stable population.)

Strategy: Minimize or eliminate known sources of adult and juvenile mortality including bycatch in fisheries and introduced predators.

DISTRIBUTION GOAL – Reestablish breeding populations throughout the historical range, while maintaining and protecting the current distribution of black-footed albatross breeding colonies.

DISTRIBUTION OBJECTIVES

B3 Maintain the current number and distribution of colonies within the Northwestern Hawaiian Islands, and expand the number and distribution of colonies in the main Hawaiian Islands.

B4 Re-establish viable breeding populations on islands within the historical range where colonies have been extirpated (e.g., Wake Atoll, Johnston Atoll, Minami Torishima).

B5 Encourage the establishment of new colonies in Mexico.

LAYSAN ALBATROSS

POPULATION GOAL – Maintain a worldwide population of Laysan albatross at or above the current level ($\lambda \geq 1.0$).

POPULATION OBJECTIVES

L1 Maintain the Laysan albatross breeding population at the core breeding islands in Hawaii at ≥600,000 pairs.

Strategy: Minimize or eliminate threats that reduce productivity, such as habitat degradation, invasive species, and contaminants.

L2 Maintain mean adult survival rates at levels adequate to maintain a stable or increasing population. (Currently, 0.96 is the best estimate of the annual adult survival necessary to maintain a stable population.)

Strategy: Minimize or eliminate known sources of adult and juvenile mortality including bycatch in fisheries and introduced predators.

DISTRIBUTION GOAL – Reestablish breeding populations throughout the historical range, while maintaining and protecting the current distribution of Laysan albatross breeding colonies.

DISTRIBUTION OBJECTIVES

L3 Maintain the current number and distribution of colonies within the Northwestern

Hawaiian Islands, and expand the number and distribution of colonies at secure locations in the main Hawaiian Islands.

L4 Maintain the number and distribution of viable colonies in Mexico and Japan.

L5 Re-establish viable breeding populations on islands within the historical range where colonies have been extirpated (e.g., Wake Atoll, Johnston Atoll, Minami Torishima).

VII. RECOMMENDED CONSERVATION ACTIONS

Two workshops were convened, one in Honolulu, Hawaii (November 24, 2006) and one in Seattle, Washington (April 4–5, 2007) with representatives from partnering agencies, organizations and individuals to discuss albatross conservation and help formulate conservation actions. Participants at these meetings developed population goals and objectives, identified information gaps and priority needs, and identified recommendations for specific action items necessary to achieve the conservation goals and objectives.

Recommended action items are presented in Table 5. Each action item is presented with a lead party or parties and potential partners. The lead parties are typically the agency or organization with management authority or direct involvement that is needed to complete the action. Potential partners include parties whose direct participation and support in implementing an action would greatly increase the chances for success. Identification of lead parties and potential partners does not constitute a commitment by any agency or organization listed but rather, serves to highlight where agency or organizational leadership and participation would most effectively advance albatross conservation.

Costs have been estimated for some of the action items, and while these estimates represent our best estimate, they may significantly under- or over-estimate the actual cost. In some cases, the true scope of an action will only be known once initial information is collected and analyzed. For some actions there was not enough information available to generate an estimate of cost at this time.

The Conservation Action Items included in this Plan can be grouped into six main categories: 1) Albatross Population Monitoring and Management, 2) Fisheries Bycatch Mitigation and Monitoring, 3) Habitat Restoration and Invasive Species Control, 4) Contaminant and Disease Monitoring and Abatement, 5) At-sea Habitat Utilization, and 6) Education and Outreach. The direct objective of many of the specific Actions listed in Table 5 is information development. The ultimate goal of this information is to enable effective decision making or to structure direct management actions that will further the conservation of these two species. A brief description of the 5 categories of Conservation Action Items is provided below.

Albatross Population Monitoring and Management

The demographic monitoring program initiated by USFWS in 2005 will provide the data necessary to track the status and trends of albatross populations and should be implemented fully. Population monitoring at colonies in Mexico and Japan should be continued and partnerships and communication among all parties monitoring albatross populations needs to be strengthened in order to foster coordinated conservation and monitoring efforts. Standardized monitoring of Laysan and black-footed albatrosses throughout their range would greatly

facilitate rangewide assessments and comparisons between sites. Albatross monitoring data should be incorporated with other multi-species and environmental databases, to investigate the functional relationships of albatrosses in the ocean ecosystem and the effects of local and large-scale change in the marine environment on albatross population dynamics.

Fisheries Bycatch Mitigation and Monitoring

A comprehensive bycatch analysis is needed to accurately assess the effects of specific fisheries on albatross population dynamics and help focus conservation activities. The scope of albatross bycatch can not be fully determined until the North Pacific fisheries are characterized (*e.g.,* vessel size, configuration, gear, spatial distribution of effort, season, target species, offal discard, etc.) and more complete data on bycatch rates are collected, both for U.S. fisheries and those operated by other nations in the North Pacific. At the same time, mitigation measures for each of the high risk fisheries need to be developed, implemented and evaluated for their effectiveness.

Habitat Restoration and Invasive Species Control

The eradication of non-native vertebrate predators from albatross colonies could have a large impact on the growth of many small yet potentially important albatross colonies. Many of the islands where invasive predators occur are high elevation islands that may prove important in the event of sea level rise. Golden crown-beard and other invasive plant species that degrade nesting habitat should be eradicated or controlled to increase the quality of available habitat.

Contaminant and Disease Monitoring and Abatement

The full extent of the lethal and sub-lethal impacts of contaminants on albatross adults and chicks is not well known. Identification of contaminant sources and a comprehensive program to monitor contaminant exposure and assess contaminant-induced effects is recommended. The levels of organochlorines present in albatrosses are high and increasing, especially in the black-footed albatross. Levels and impacts of these contaminants need to be regularly assessed. Lead paint should be removed from old buildings at Midway Atoll. The vulnerability of albatross to West Nile Virus, avian influenza, and other emerging avian diseases is unknown so it is recommended that colonies be regularly monitored and that managers be ready to respond to disease outbreaks.

At-sea Habitat Utilization

Albatross spend most of their life at sea and it is important to understand how they function in the marine environment and how ecosystem changes affect their demography. In order to determine the potential exposure of albatrosses to risks and threats, the spatial and temporal distribution of the birds, and the threats, needs to be defined. Ship-based surveys and tagging of individual birds with tracking devices are the two most widely used techniques to delineate seabird use of at-sea habitats. The marine environment (*e.g.*, SST, chl) and at-sea risks (*e.g.,* fisheries, marine debris, contaminants) need to be characterized spatially and temporally and overlaid with information on albatross distribution and abundance to highlight areas of greatest concern. It is important to define and/or characterize the geospatial regions on the high seas that are regularly visited by albatrosses. National/international boundaries and management jurisdictions will help identify responsible parties and potential partners for conservation.

Education and Outreach
Education and outreach were recurring themes in every category of the Recommended Conservation Actions (Table 5). Public support of albatross conservation will provide benefits for all of the actions that are conducted as part of this Plan. The breeding colonies in the main Hawaiian Islands (e.g. Kilauea Point NWR, Kaena Point NAR) have the potential to serve as demonstration sites where the public can view albatrosses first hand in their natural habitat. Webcams and other interpretive tools can bring the remote colonies of the Northwestern Hawaiian Islands into homes and classrooms.

VIII. EVALUATING ACCOMPLISHMENTS

Assessing progress toward the desired goals for black-footed and Laysan albatrosses, as described above, will be accomplished primarily by tracking demographics (e.g. breeding population trends and adult survival) at the colonies in Hawaii. Demographic data will be provided by the new demographic monitoring program that was initiated in 2005. Annual reports will be generated by the USFWS at the end of each breeding season and the USGS, Patuxent Wildlife Research Center will provide the analyses of survival data. Data collected with compatible monitoring programs at other colonies in Hawaii and other nations will strengthen our ability to assess progress towards the Plan's goals.

International participation in this Plan is an important step in the conservation of these species. Formalizing the participation of Japan, Mexico, Canada and other Pacific Rim nations will result in updated editions of the Action Plan. Communication will be vital to the success of this Plan and organizations such as the North Pacific Albatross Working Group can provide a forum for partners to discuss ongoing activities and track the progress towards refining and achieving the goals in this Plan.

Table 5. Recommended Conservation Actions. This list of action items serves several functions including the ability to identify priority Conservation Action Items, provide cost estimate for items and track accomplishments. The highest priority items are identified with asterisks **. Although a "Lead Party" is identified, it does not obligate any party to provide funding or implement the action.

Priority	Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
	1	**Albatross Population Monitoring and Management**					
**	1.1	Evaluate and refine the demographic monitoring program (pilot study) recommended by USGS. Prepare manuals with detailed SOPs for the continued long-term monitoring of albatrosses in Hawaii.	FWS-MBHP	USGS, FWS-NWR	90	270	3yr
**	1.2	Implement a standardized long-term demographic monitoring program, based on the SOPs resulting from the pilot monitoring program (Action 1.1), to assess status and trends of albatross populations in Hawaii. Compile and disseminate demographic data at the conclusion of each breeding season. Prepare annual reports to summarize the results of monitoring efforts.	FWS-NWR, USGS	DLNR, UH	40	--	ongoing annual
**	1.3	Incorporate values for albatross life history parameters into population models to refine accuracy (e.g., age at first breeding, frequency of breeding, effects of widowing)	USGS	FWS, DLNR, Researchers	10	--	ongoing periodic
**	1.4	Reassess the status and trends of albatross populations at 5 and 10 year intervals using all demographic data.	USGS, FWS	DLNR	35	--	ongoing periodic
**	1.5	Continue counts of nests at the major Laysan Albatross colonies at 5-10 year intervals and Black-footed Albatross at annual intervals. Reevaluate the frequency of nest counts based on results of 5 yr reassessment (Action 1.4)	FWS-NWR	DLNR, UH	50 (LAAL) 10 (BFAL)	--	ongoing periodic
**	1.6	Develop a new sampling design to generate more precise estimates of the number of Laysan Albatross nests at Laysan Island.	FWS	USGS	7	14	2yr
**	1.7	Determine juvenile and sub-adult survival rates.	FWS, USGS	DLNR, Researchers	TBD	TBD	
**	1.8	Strengthen partnerships and communication with Mexico and Japan to foster coordinated conservation and continue colony monitoring efforts. Formalize the exchange of albatross monitoring data and management techniques with government, research, and conservation entities working at colonies throughout the range.	FWS	Japan, Mexico, GECI	30	30	ongoing periodic

** = high priority, TBD = to be determined, NAC = no additional cost

Priority	Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
**	1.9	Identify suitable relocation sites for albatrosses removed from the Pacific Missile Range Facility (PMRF) Kauai. Relocation sites must be secure from introduced predators and not pose a threat to aircraft operations.	DoD-PMRF	FWS, DLNR, APHIS	36	36	1yr
**	1.1	Investigate the cause of Black-footed Albatross declines at Laysan Island.	FWS	USGS	25	125	5
**	1.11	Develop and institutionalize standardized protocols for collection of albatross carcasses and collection of samples from live and dead birds (at-sea and in the colonies). Establish priorities for sample collection and analysis (contaminants, genetics, stable isotope, etc.). Conduct regular training for field-based personnel to insure consistency of methods.	Researchers, USGS	FWS, NOAA	20	20	1 -2 yr
**	1.12	Establish a centralized clearinghouse for processing of albatross carcasses and archiving tissue samples.	FWS, NOAA	USGS, UCSC, Oikonos	TBD	TBD	
	1.13	Develop criteria and assess the suitability for reintroduction of albatrosses to new or historical colony sites. Prioritize sites for reintroduction based on: current threats, historical breeding status, ease of removing threats, and sociological/political/economic ease.	FWS-MBHP	Japan, Mexico, CNMI, RMI, IC	40	40	1-2yr
	1.14	Investigate social attraction and translocation as tools to establish new colony or reestablish extirpated colonies.	FWS	USGS, DLNR	20	100	5
	1.15	Combine tracking, survey and colony databases into a "Decision Support Tool" for management agencies, fisheries and others. Use this to identify thresholds for conservation action.	Researchers, USGS	NOAA, FWS	TBD	TBD	
	1.16	Integrate albatross monitoring data with other multi-species and environmental databases, to further coordinated ecosystem monitoring and to assess the potential of albatross as indicators of local and large-scale change in the marine environment.	FWS	USGS, NOAA, PSG	TBD	TBD	ongoing annual
	2	**Fisheries Bycatch Mitigation and Monitoring**					
**	2.1	Characterize North Pacific fisheries, including: nationality, gear employed, vessel size/configuration, target species, spatial and temporal distribution of effort, offal discard, type of bycatch monitoring, % observer coverage, mitigation required/used, and management authority.	NOAA	RFMOs, FMCs, Canada, Russia, Korea, Taiwan, Mexico, Japan, BirdLife, GLoBal (Duke)	100	100	1-2 yr

** = high priority, TBD = to be determined, NAC = no additional cost

Priority	Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
**	2.2	Overlay spatio-temporal distribution data for fisheries (Action 2.1) and albatross (Action 5.3) to identify high risk areas and high risk fisheries.	NOAA, FWS	BirdLife, WWF, Researchers	50	50	1 yr
**	2.3	Quantify the magnitude of seabird bycatch by fishery and conduct a analysis to determine gaps in fishery bycatch data.	NOAA	RFMOs, FMCs, Canada, Russia, Korea, Taiwan, Mexico, Japan, BirdLife, GLoBal (Duke)	100	100	1-2 yr
**	2.4	Develop seabird bycatch mitigation appropriate to individual fisheries/fleets and identify best practices. Facilitate this process with scientist exchange, workshops, etc.	NOAA	WSG, Blue Oceans, BirdLife, RFMOs, ACAP, FAO, FWS	200	1,000 (minimum)	5 yrs (minimum)
**	2.5	Coordinate/synergize international and national efforts to implement best seabird bycatch mitigation practices in applicable fisheries.	NOAA	RFMOs, FMCs, Canada, Russia, Korea, Taiwan, Mexico, Japan, BirdLife, OPRT	NAC	NAC	ongoing periodic
**	2.6	Evaluate the effectiveness of best seabird bycatch mitigation practices and develop performance criteria for their use.	FWS, NOAA	RFMOs, FMCs, Canada, Russia, Korea, Taiwan, Mexico, Japan, BirdLife, OPRT,WSG	150	150	2 yrs (minimum) then every 5 years
**	2.7	Revaluate the location of the current boundary (23º N) for required use of seabird mitigation measures in the U.S. pelagic longline fisheries.	NOAA, FWS	Researchers, BirdLife	NAC	NAC	1yr
**	2.8	Model and compare the relative impact of bycatch to other albatross mortality factors, as new data become available.	FWS, NOAA	USGS, PFRP, RFMOs	100	100	1-2 yr
**	2.9	Develop data sharing and reporting agreements for seabird bycatch (or observations) to ensure consistency in data collection and reporting.	NOAA	RFMOs, FMCs, Canada, Russia, Korea, Taiwan, Mexico, Japan, BirdLife, OPRT, FWS	TBD	TBD	2-5 yr
**	2.10	Determine the demographics of bycatch birds and integrate carcass collection and analysis into monitoring and assessment programs.	NOAA, FWS	NGOs, Researchers	15	TBD	ongoing annual
	2.11	Overlay EEZ and RFMO boundaries with albatross at-sea distribution data to identify national and management jurisdictions. Disseminate results to nations, resource management agencies, and NGOs.	NOAA	RFMOs, FMCs, Researchers	5	5	1 yr

** = high priority, TBD = to be determined, NAC = no additional cost

Priority	Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
	2.12	Conduct an agency strategic planning exercise/workshop to prioritize critical actions that consider ecosystem approaches, conservation status and assessment of albatrosses, and both domestic and international fishery aspects.	NOAA, FWS	USGS	50	50	1yr
	2.13	Explore the efficacy of compensatory mitigation as both an incentive for bycatch reduction and a funding source to increase albatross productivity (e.g., habitat improvement).	NOAA, FWS, Researchers	Industry, NGO	50	50	1yr
	2.14	Establish independent monitoring (e.g. observers, video) of albatross bycatch rates/magnitude for all fisheries where albatrosses are at risk, using best practice metrics and data collection protocols.	NOAA, fisheries managers	RFMOs, FMCs, Canada, Russia, Korea, Taiwan, Mexico, Japan, BirdLife, OPRT	2000	--	ongoing annual
	2.15	Support research, development and testing of new tools to monitor seabird bycatch and compliance with mitigation requirements (e.g., video).	NOAA	Researchers, NGOs, Industry, observer service provider	500	--	ongoing periodic
	2.16	Determine level of monitoring required to get reliable estimates of albatross bycatch (rate/magnitude) for each fishery/monitoring program.	NOAA	Researchers, USGS	50	50	1-2 yr
	3	**Habitat Restoration and Invasive Species Control**					
**	3.1	Continue introduced predator control at Kilauea Pt. NWR, Kaena Pt. NAR, Kuaokala GMA, and other main Hawaiian Island colonies.	DLNR, FWS	APHIS	Kilauea Pt 48 Kaena Pt 32 Kuaokala 41	--	ongoing annual
**	3.2	Install predator control fences around Kaena Point NAR and Kilauea Point NWR and eradicate predators inside fence (year 1). Low level annual control ongoing.	DLNR, FWS	IC, NZ	Kaena NAR 260 (fence) 10 (control); Kilauea TBD	Kaena yr 1 260; Kilauea TBD	fence 1yr; annual control
**	3.3	Eradicate rats from Wake Atoll (includes post-eradication monitoring to ensure eradication and "release" effects from other invasives).	DoD	FWS-ES, APHIS, IC	--	475	5 yr
**	3.4	Eradicate rats and rabbits from Lehua Island (includes post-eradication monitoring to ensure eradication and "release" effects from other invasives).	DLNR	FWS, USCG, IC, TWS	--	500	TBD
**	3.5	Eradicate cats from Isla Guadalupe (includes post-eradication monitoring to ensure eradication).	CONABIO, CONANP	SEMARNAT, IC, FWS	--	1100	4 yr
**	3.6	Initiate regular monitoring for rodent introductions at all islands with breeding populations of albatrosses.	FWS, DLNR	NOAA	TBD	TBD	ongoing

** = high priority, TBD = to be determined, NAC = no additional cost

Priority		Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
**	#	3.7	Develop and implement techniques for the eradication of Verbesina at Midway Atoll, Kure Atoll and Pearl and Hermes Reef.	FWS, DLNR	USGS, FOM, APHIS	Midway only: 250 (1st 10 yr) 100 (2nd 10 yr)	3500	20 yr
**		3.8	Establish a year-round camp on Kure Atoll to eradicate Verbesina	DLNR	TBD	TBD	TBD	TBD
**		3.9	Document the effects of Verbesina on albatross nesting habitat and population dynamics.	FWS	USGS, UH	15	45	3yr
**		3.10	Continue control of Casuarina at Midway Atoll	FWS	FOM	5	--	ongoing
**		3.11	Implement standardized biosecurity protocols, such as those in Northwestern Hawaiian Islands, to prevent new introductions of invasive species at islands supporting albatross colonies.	FWS, DLNR	Mexico, Japan	NAC	NAC	ongoing
		3.12	Eradicate or control pigs and rabbits on Clarion (includes post-eradication monitoring to ensure eradication).	CONABIO, CONANP	FWS-MBHP, GECI	TBD	TBD	TBD
		3.13	Eradicate house mice from Midway and Johnston atolls (includes post-eradication monitoring to ensure eradication).	FWS-NWR	APHIS, IC	--	1,000 Midway 1,200 Johnston	TBD
		3.14	Eradicate cats, rats and goats from Kahoolawe Island (includes post-eradication monitoring to ensure eradication).	KIRC	APHIS, IC	TBD	TBD	TBD
		3.15	Eradicate mosquitoes from Midway Atoll.	FWS-NWR	USGS	TBD	TBD	TBD
		4	**Contaminant and Disease Monitoring and Abatement**					
**		4.1	Develop and implement a standardized program to monitor contaminant exposure and contaminant effects in albatross.	FWS, USGS	PMNM, DLNR, USN, USAF, USCG, NOAA	Plan only 15	Plan only 15	Plan: 1yr
**		4.2	Develop database of albatross contaminant data. Catalog/inventory albatross tissue specimens in existing collections, then review and prioritize needs and uses.	FWS	PSG, Researchers, PMNM, ABC, WWF	20	20	1 yr
**		4.3	Remove lead-based paint from existing buildings and soil at Midway Atoll NWR.	FWS	ABC, Private donors	1100	5520	5 yr
**		4.4	Quantify the effects of organochlorine contamination on adult and chick survival and incorporate the results into a population model to determine if there are population level effects.	FWS	Researchers, NOAA, PMNM	50	50	Start-up 1-2 yr

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Priority	Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
#	4.5	Investigate uptake of contamination (e.g., organochlorines, heavy metals) from soil by albatross. Determine the biodegradative capabilities of Pacific island soils.	FWS	Researchers, USN	250	750	3yr
	4.6	Quantify the effects of plastic ingestion on adult and chick survival and incorporate the results into a population model to determine population level effects. Incorporate investigations into the NOAA Marine Debris Program.	FWS, USGS	Researchers, NOAA, PMNM	40	40	Start-up 1 yr
	4.7	Quantify and compare plastic ingestion among colonies and species, and investigate temporal trends. Synthesize with albatross at-sea distribution data to identify correlations.			50	250	5yr
	4.8	Characterize and map contaminants left behind by military activities at Pearl and Hermes Reef and Wake Island.	FWS, DoD	USN, USAF, USCG, EPA, PMNM	TBD	TBD	TBD
	4.9	Document adverse effects of the destabilization of the old Bulky Waste landfill at Midway Atoll on albatrosses.	DoD	FWS, EPA, PMNM	TBD	TBD	TBD
	4.10	Recap the old Coast Guard landfill at the west runway, Kure Atoll	DLNR	DoD	TBD	TBD	TBD
	4.11	Determine albatross risk to oiling: overlap spatial and temporal distribution of albatrosses with vessel traffic and oil tanker routes throughout at-sea ranges.	TBD		30	30	1yr
	4.13	Monitor and respond to any new or emerging disease outbreaks.	FWS	USGS-NWHC	NAC	NAC	ongoing
	4.14	Determine the cause and quantify the population level effects of "bumble foot" on Eastern Island, Midway.	FWS, USGS	USGS-NWHC	TBD	TBD	4yr
	5	**At-Sea Habitat Utilization**					
**	5.1	Use existing empirical data to investigate how to combine tracking and at-sea data to delineate overall range, core range and key habitat/hotspots for each of the relevant stages of breeding and life cycle.	Researchers	BirdLife, FWS, NOAA	TBD	TBD	1-2 yrs
**	5.2	Create an albatross distribution database, containing metadata from tracking and shipboard surveys (extracted from literature search and solicited from the research community). Conduct a gap analysis to determine spatio-temporal gaps in the datasets (e.g., colonies, age/sex, season).	Researchers	USGS, FWS, NOAA	TBD	TBD	1yr

** = high priority, TBD = to be determined, NAC = no additional cost

Priority	Action #	Action Item	Lead Party	Potential Partners	Cost ($1000) per Year	Cost ($1000) Total	Duration
**	5.3	Compile and interpolate at specified time scales all tracking data for North Pacific Albatrosses. Identify albatross hotspots/foraging areas specific to colonies or meta-populations.	BirdLife	Researchers	TBD	TBD	1yr
**	5.4	Create a long-term monitoring program investigating albatross at-sea habitat utilization: identify 3-4 sites and deploy electronic tracking devices (based on foraging distributions, population trends, and proportion of population at each site).	Researchers, FWS			TBD	Once every 5yr
**	5.5	Monitor food habits of albatrosses to detect changes in prey species composition through time and its relationship to other measures of reproductive performance or survival.	FWS, NOAA	Researchers TBD	TBD	TBD	ongoing; periodic
	5.6	After ~10 years of tracking, assess albatross distribution for long-term trends related to climate variables (e.g., wind, SST, chl).	Researchers		80	80	1 yr
	5.7	Model functional relationships between colony-based responses and ocean conditions in albatross "high use" areas for focal colonies and model numerical relationships between ocean conditions and albatross numbers at-sea.	FWS, NOAA	Researchers	TBD	TBD	1 yr
	5.8	Develop a framework for identifying important bird areas worthy of protection in marine waters. Assess albatross use and risks within existing management zones (EEZ, RFMO, IBA etc).	Researchers	BirdLife, NOAA	TBD	TBD	1yr
	5.9	Develop predictive models to forecast bird distribution and population trends, incorporating ecological and environmental variables that affect albatross distribution by species/age/sex/season.	Researchers		80	80	1 yr
	5.10	Deploy observers on vessels of opportunity to conduct at-sea surveys for albatrosses.	FWS, NOAA	Researchers	TBD	TBD	ongoing; periodic
	6	**Education and Outreach**					
**	6.1	Design and launch an interactive web site (in multiple languages) that contains information about albatross natural history, major threats, exciting science (e.g. albatross tracks), and current conservation efforts.	FWS, NOAA, Researchers		TBD	TBD	1yr
**	6.2	Develop outreach/education materials (geospatial presentation with regional perspectives) targeted at policy makers, fishery managers (domestic, international), fishers, and funding sources.	NOAA, FWS	Researchers	35	35	1yr

** = high priority, TBD = to be determined, NAC = no additional cost

Priority	Action _	Action Item	Lead Party	Potential _____	Cost ($1000) per Year	Cost ($1000) Total	Duration
#	6.3	Produce printed material (in multiple languages) targeting K-12 or general public that can be distributed as modules to teachers, museums, environmental organizations, industry partners, and textbook publishers	FWS, NOAA **Partners**	DLNR, Researchers	50	50	1-2 yr
	6.4	Install a Webcam at one or more albatross colonies and link it to an interactive website for public and school education.	FWS, DLNR		TBD	TBD	ongoing; periodic
	6.5	Develop an albatross section for the Navigating Change program.	FWS		TBD	TBD	1yr
	6.6	Assist local schools to "adopt" Kaena Pt. NAR and Kilauea Pt. NWR	DLNR	FWS	NAC	NAC	ongoing; periodic

Abbreviations: ABC = American Bird Conservancy; ACAP = Agreement on the Conservation of Albatrosses and Petrels; APHIS = Animal and Plant Health Inspection Service; BFAL = Black-footed Albatross; chl = chlorophyll; CONABIO = Comisión Nacional para el Conocimiento y Uso de la Biodiversidad; CONANP = La Comisión Nacional de Áreas Naturales Protegidas; CNMI = Commonwealth of the Northern Marianas; DLNR = Hawaii Department of Land and Natural Resources; DoD = Department of Defense; DOFAW = Hawaii Division of Forestry and Wildlife; EEZ = Exclusive Economic Zone; EPA = Environmental Protection Agency; ES = Ecological Services, USFWS; FAO = Food and Agriculture Organization; United Nations; FMC = Fishery Management Council; FOM = Friends of Midway; FWS = U.S. Fish and Wildlife Service; GECI = Grupo de Ecología y Conservación de Islas; GloBAL = Global Bycatch Assessment of Long-lived Species, Duke University; GMA = Hawaii Game Management Area; IC = Island Conservation; KIRC = Kahoolawe Island Reserve Commission; LAAL = Laysan Albatross; MBHP = Migratory Birds and Habitat Programs; NAR = Hawaii Natural Area Reserve; NGO = Non-governmental Organization; NOAA = National Oceanic and Atmospheric Administration; NWHC = National Wildlife Health Center; USGS; NWHI = Northwestern Hawaiian Islands; NWR = National Wildlife Refuge; NZ = New Zealand; OIRC = Offshore Islet Restoration Committee; OPRT = Organization for the Promotion of Responsible Tuna Fisheries; PFRP = Pelagic Fisheries Research Program; PMNM = Papahānaumokuākea Marine National Monument; PMRF = Pacific Missile Range Facility; PSG = Pacific Seabird Group; Pt. = Point; RFMO = Regional Fisheries Management Organization; RMI = Republic of the Marshall Islands; SEMARNAT = Secretary of Secretaría de Medio Ambiente y Recursos Naturales; SOP = standard operating procedures; SST = sea surface temperature; TWS = The Wildlife Society - Hawaii Chapter; UCSC = University of California, Santa Cruz; UH = University of Hawaii; USAF = U.S. Air Force; USCG = U.S. Coast Guard; USGS = U.S. Geological Survey; USN = U.S. Navy; WSG = Washington Sea Grant; WWF = World Wildlife Fund.

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X. APPENDICES

Appendix A. Contributors to the Conservation Action Plan for Black-footed Albatross and Laysan Albatross, including participants of the workshops in Honolulu, Hawaii and Seattle Washington, and additional reviewers.

Honolulu, Hawaii	**November 24, 2006**
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Appendix B. List of abbreviations used in the Conservation Action Plan for Black-footed and Laysan Albatross.

ABC	American Bird Conservancy
ACAP	Agreement on the Conservation of Albatrosses and Petrels
APHIS	Animal and Plant Health Inspection Service
BFAL	Black-footed Albatross
chl	chlorophyll
CNMI	Commonwealth of the Northern Marianas
CONABIO	Comisión Nacional para el Conocimiento y Uso de la Biodiversidad
CONANP	La Comisión Nacional de Áreas Naturales Protegidas
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DDE	dichlorodiphenyldichloroethylene
DFO	Canada Department of Fisheries and Oceans
DLNR	Hawaii Department of Land and Natural Resources
DoD	Department of Defense
DOFAW	Hawaii Division of Forestry and Wildlife
EEZ	Exclusive Economic Zone
EPA	Environmental Protection Agency
ES	Ecological Services, USFWS
FAO	Food and Agriculture Organization, United Nations
FMC	Fishery Management Council: Pacific, North Pacific, and Western Pacific Regional
FOM	Friends of Midway
FWS	U.S. Fish and Wildlife Service
GECI	Grupo de Ecología y Conservación de Islas
GloBAL	Global Bycatch Assessment of Long-lived Species, Duke University
GMA	Hawaii Game Management Area
IATTC	Inter-American Tropical Tuna Commission
IC	Island Conservation, University of California at Santa Cruz
IFF	International Fishers Forum
INPFC	International North Pacific Fisheries Commission
IPHC	International Pacific Halibut Commission
IUCN	World Conservation Union
KIRC	Kahoolawe Island Reserve Commission
LAAL	Laysan Albatross
MBHP	Migratory Birds and Habitat Programs, USFWS
NAC	no additional cost
NAR	Hawaii Natural Area Reserve
NGO	Non-governmental Organization

NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPFMC	North Pacific Fishery Management Council
NWHC	National Wildlife Health Center, USGS
NWHI	Northwestern Hawaiian Islands
NWR	National Wildlife Refuge
NZ	New Zealand
OIRC	Offshore Islet Restoration Committee
OPRT	Organization for the Promotion of Responsible Tuna Fisheries
PCB	polychlorinated biphenyls
PFMC	Pacific Fishery Management Council
PFRP	Pelagic Fisheries Research Program
PMNM	Papahānaumokuākea Marine National Monument
PMRF	Pacific Missile Range Facility
PSG	Pacific Seabird Group
Pt.	Point
RFMO	Regional Fisheries Management Organization
RMI	Republic of the Marshall Islands
SEMARNAT	Secretary of Secretaría de Medio Ambiente y Recursos Naturales
SOP	standard operating procedures
SST	sea surface temperature
TBD	to be determined
TCDD	tetrachlorodibenzo-p-dioxin
TWS	The Wildlife Society - Hawaii Chapter
UCSC	University of California, Santa Cruz
UH	University of Hawaii
USAF	U.S. Air Force
USCG	U.S. Coast Guard
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USN	U.S. Navy
WCPFC	Western and Central Pacific Fishery Commission
WPRFMC	Western Pacific Regional Fishery Management Council
WSG	Washington Sea Grant
WWF	World Wildlife Fund
WWII	World War II