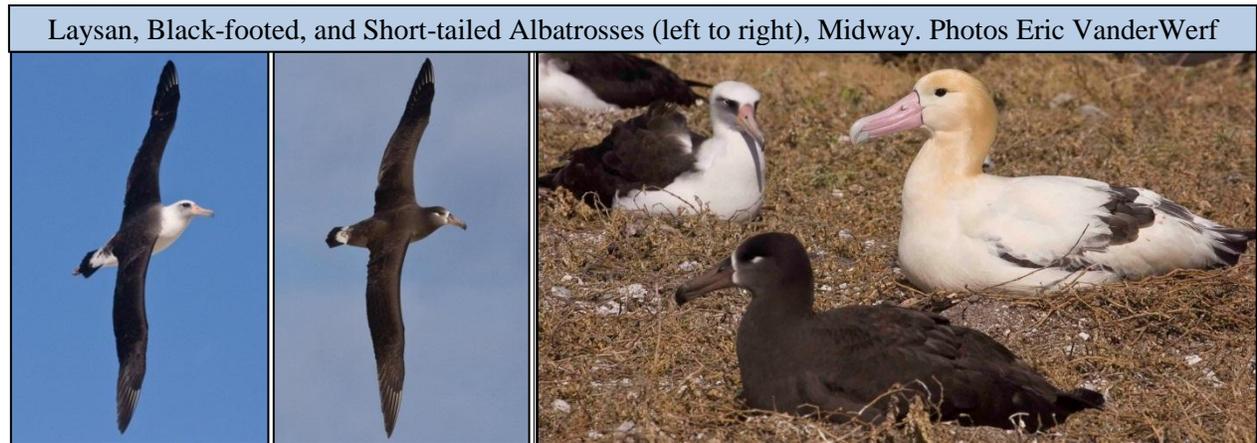


**Focal Species:** Laysan Albatross or Mōlī (*Phoebastria immutabilis*)  
 Black-footed Albatross or Ka’upu (*Phoebastria nigripes*)  
 Short-tailed Albatross (*Phoebastria albatrus*)

**Synopsis:** These three North Pacific albatrosses are demographically similar, share vast oceanic ranges, and face similar threats. Laysan and Black-footed Albatrosses nest primarily in the Northwestern Hawaiian Islands, while the Short-tailed Albatross nests mainly on islands near Japan but forages extensively in U.S. waters. The Short-tailed Albatross was once thought to be extinct but its population has been growing steadily since it was rediscovered in 1951 and now numbers over 3,000 birds. The Laysan is the most numerous albatross species in the world with a population over 1.5 million, but its trend has been hard to determine because of fluctuations in number of breeding pairs. The Black-footed Albatross is one-tenth as numerous as the Laysan and its trend also has been difficult to determine. Fisheries bycatch caused unsustainable mortality of adults in all three species but has been greatly reduced in the past 10-20 years. Climate change and sea level rise are perhaps the greatest long-term threat to Laysan and Black-footed Albatrosses because their largest colonies are on low-lying atolls. Protecting and creating colonies on higher islands and managing non-native predators and human conflicts may become keys to their survival.



Status	Laysan Albatross	Black-footed Albatross	Short-tailed Albatross
Federal	Species of Concern	Species of Concern	Endangered
State of Hawaii	Protected	Threatened	Endangered
IUCN	Near Threatened	Endangered	Vulnerable
Conservation score, rank	15/20, Vulnerable	17/20, At-risk	17/20, At-risk
Watch List 2007 Score	Red	Red	Red
Climate Change Vulnerability	High	High	High

**Population Sizes and Trends:**

Laysan Albatross – Annual breeding population estimated to be about 590,000 pairs, >99% of which nest in the Northwestern Hawaiian Islands (NWHI; USFWS 2005, Arata et al. 2009). Small numbers also nest in the main Hawaiian Islands (~500 pairs), on islands near Japan (~20 pairs), and off western Mexico (~400 pairs) (VanderWerf et al. 2007, Arata et al. 2009, Flint 2009, Young et al. 2009, Henry 2011). An estimated 15-20% of adults skip breeding each year and birds do not begin breeding until 7-8 years of age, so the total population is higher (VanderWerf and Young 2011). The population trend is thought to be stable overall, but is difficult to determine due to variability in breeding frequency and consequent fluctuations in

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number of breeders (Arata et al. 2009). Several recently established colonies in the main Hawaiian Islands (Young et al. 2009) and Mexico (Henry 2011) are growing.

**Black-footed Albatross** – Annual breeding population estimated to be about 60,000 pairs, >95% of which nest in the NWHI (USFWS 2005, Arata et al. 2009). Small numbers also nest in the main Hawaiian Islands (~30 pairs), on several islands near Japan (~2,500 pairs) and off western Mexico (1-2 pairs) (USFWS 2005, Arata et al. 2009). An estimated 15-20% of adults skip breeding each year and young birds do not begin breeding until 7-8 years of age, so the total population is higher (Whittow 1993b). The population trend is thought to be stable overall, but is difficult to determine due to variability in breeding frequency and consequent fluctuations in number of breeders (Arata et al. 2009).

**Short-tailed Albatross** – Once thought to be extinct, its population has been growing steadily since it was rediscovered in 1951 and now numbers over 3,000 birds. Almost all of the population nests on islands near Japan, including 512 pairs on Torishima in the Izu Islands and about 50 pairs on Minami-kojima in the Senkaku Islands. One pair fledged a chick on Midway in 2011 and 2012. Infertile eggs were laid on Midway starting in 1993 and on Kure in 2010 and 2011.

Island (west to east)	LAAL breeding pairs (year estimated)	BFAL breeding pairs (year estimated)
Kure <sup>a</sup>	20,255 (2011)	3,486 (2011)
Midway <sup>b</sup>	388,017 (2011)	25,510 (2011)
Pearl & Hermes <sup>b</sup>	6,912 (2003)	6,116 (2003)
Lisianski <sup>b</sup>	26,500 (1982)	2,126 (2006)
Laysan <sup>b</sup>	141,743 (2009)	19,088 (2009)
Gardner Pinnacles <sup>b</sup>	10-15	0
French Frigate Shoals <sup>b</sup>	2,988 (2009)	4,309 (2009)
Necker <sup>b</sup>	500 (1995)	112 (1995)
Nihoa <sup>b</sup>	0 (2007)	1 (2007)
Kaula <sup>b</sup>	55 (1993)	0? (1998)
Lehua <sup>c</sup>	89 (2011)	32 (2011)
Ni'ihau <sup>b</sup>	190 (2002)	?
Kaua'i <sup>b</sup>	271 (2008)	0
O'ahu <sup>d</sup>	91 (2011)	0
Total	587,393	60,773

<sup>a</sup>Vanderlip 2011; <sup>b</sup>Flint 2009; <sup>c</sup>VanderWerf et al. 2007, A. Raine pers. comm. 2011; <sup>d</sup>Young et al. 2009, unpubl. data.

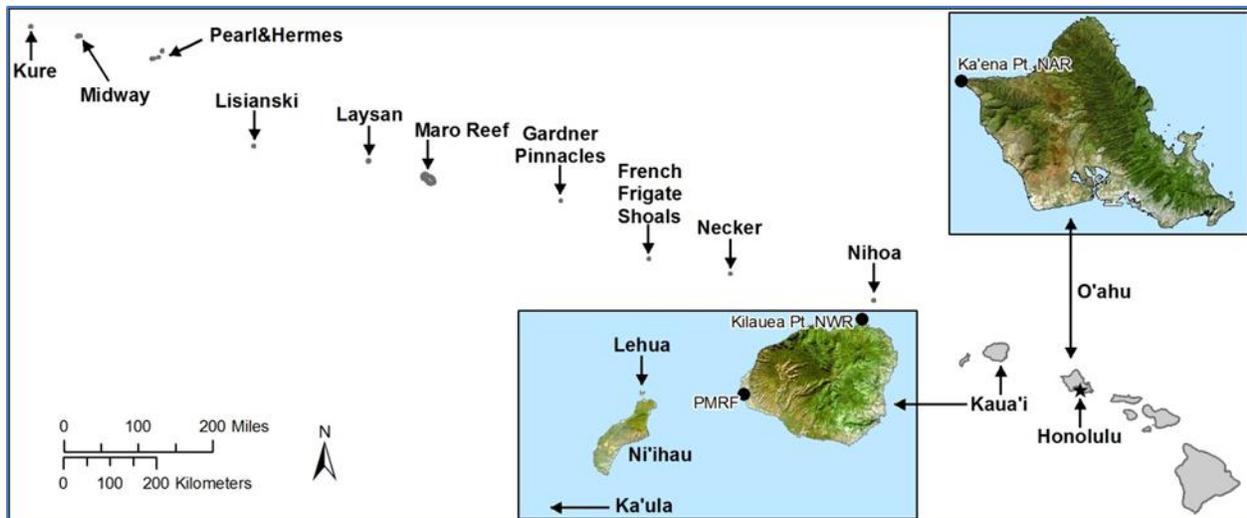
### Ranges:

**Laysan Albatross** – The largest breeding colonies are in the NWHI, with smaller colonies in the main Hawaiian Islands, the Ogasawara Islands or Bonin Islands southeast of Japan, and several islands off western Mexico (USFWS 2005). On Kauai, the largest concentrations are at Kilauea Point National Wildlife Refuge and the Pacific Missile Range Facility (PMRF). On Oahu, the largest colony is at Kaena Point Natural Area Reserve, with another at nearby Kuaokala Game Management Area, and a few pairs at Marine Corps Base Hawaii in Kaneohe. At sea, Laysan Albatrosses disperse widely over the northern Pacific Ocean, generally further west and north than Black-footed Albatrosses (Fischer et al. 2009, Young et al. 2009, Kappes et al. 2010, Block et al. 2011).

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**Black-footed Albatross** – The largest breeding colonies are in the NWHI, with smaller colonies in the main Hawaiian Islands and several islands off Japan and western Mexico (USFWS 2005). At sea, Black-footed Albatrosses disperse widely over the northern Pacific Ocean, generally further south and east than Laysan Albatrosses (Hyrenbach et al. 2002, Fischer et al. 2009, Kappes et al. 2010), regularly occurring in large numbers off western North America (Hyrenbach et al. 2006, Block et al. 2011).

**Short-tailed Albatross** – Most birds breed on islands near Japan, with the largest colony on Torishima in the Izu Islands, and a smaller colony on Minami-kojima in the Senkaku Islands. An effort to create another breeding colony was conducted from 2008-2012 by translocating 70 chicks from Torishima to Mukojima in the Ogasawara or Bonin Islands. In the U.S., one pair fledged a chick on Midway in 2011 and 2012, and infertile eggs were laid on Kure in 2010 and 2011. At sea, Short-tailed Albatrosses range widely across the Northern Pacific Ocean. In U.S. waters, most birds are concentrated along the edge of the continental shelf in the northern Gulf of Alaska, Bering Sea, and Aleutian Islands, but some reach the continental shelf off western North America (USFWS 2005, Suryan et al. 2006, 2007).



### **Essential Biology:**

Albatrosses are large seabirds that are adapted to nest on predator-free islands and forage over enormous areas of open ocean. They are classic examples of “K-selected” species, being characterized by long lifespan, low annual fecundity, delayed recruitment, and intermittent breeding. Annual adult survival of Laysan Albatross averages 93-96% (Fisher 1975, VanderWerf and Young 2011). Annual adult survival of Black-footed Albatrosses ranges from 92-96%, varying with amount of fisheries by-catch (Véran et al. 2007, LeBreton and Véran 2012). The oldest known Laysan Albatross, located on Midway and nick-named Wisdom, is at least 61 years old and is among the longest-lived birds ever documented. Because of their low annual fecundity, albatross populations are slow to recover from adult mortality caused by threats such as fisheries by-catch.

Albatrosses are colonial, with aggregations of birds nesting in a few locations. Each pair lays a single egg in November-December that hatches in January-February. They will not re-nest if the first attempt fails. Short-tails nest about one month earlier and Black-foots about two weeks earlier than Laysans (Whittow 1993a, 1993b, USFWS 2005). Fledglings depart nesting islands in June-July. Young albatross usually return to their natal colony to breed, but do not begin breeding until 5-8 years of age (Fisher 1975, VanderWerf and Young 2009). The annual recruitment

probability for Black-footed Albatross was 2% in 5-year olds, 29% for 6-year olds, and 59% for birds seven and older (Lebreton and Véran 2012). In these albatross species, 15-20% of adults skip breeding each year, causing fluctuations in the apparent size of the breeding population. Frequency of skipped breeding is higher in birds that raised a chick the year before and also appears to be related to oceanic conditions and food availability (VanderWerf and Young 2009).

All three species forage over enormous areas of the northern Pacific Ocean and feed primarily on squid, fish, and fish eggs. They catch live prey and scavenge by seizing food at or just below the water surface. Albatross often follow fishing vessels to scavenge bait and offal, when they can be caught on hooks or entangled in lines and injured or drowned (Fischer et al. 2009, Lebreton and Véran 2012). Albatross generally obtain all their food from the ocean, but chicks may pick at and ingest objects near their nests; this behavior has caused problems on Midway where chicks ingest lead paint from aging buildings.

### **Primary Threats:**

These species suffer from many of the same threats, but the nature and severity of these threats differ among species and among colonies depending on their location. Colonies in the NWHI are currently safe from disturbance and predators but are vulnerable to inundation from sea level rise and storm surge. Other threats occur at sea away from breeding colonies, such as adult mortality from fisheries by-catch. Some threats have been at least partly mitigated, but others have not been adequately addressed.

- Human Disturbance and Conflict. In the early 1900s, albatross populations on many islands were reduced or completely wiped out by feather hunters. Military activities during World War II also took a heavy toll. During the 1950s and 1960s, thousands of albatrosses were killed at Midway to reduce risk of collisions with aircraft. Today, human disturbance is a threat primarily on Oahu and Kauai. At the U. S. Navy Pacific Missile Range Facility on Kauai, Laysan Albatrosses are a collision hazard to aircraft and their eggs are removed each year. In a small colony at Kuaokala on Oahu, all chicks disappeared under suspicious circumstances in 2009, probably as a result of human disturbance.
- Fisheries By-catch. Accidental by-catch in commercial fisheries managed by Regional Fisheries Management Organizations is among the most serious threats to albatrosses. By-catch occurs in all commercial fisheries throughout the North Pacific, but low observer coverage rates in most fisheries can make calculating reliable estimates difficult. Although numbers of each species killed may be similar in some cases, by-catch may represent a greater threat to Black-footed Albatrosses because they tend to follow fishing vessels more often and their population size is smaller than that of Laysan Albatrosses. The baseline annual adult survival of Black-footed Albatross averaged 96%, but was only 90-92% from 1997-2002, a period of higher by-catch (Véran et al. 2007, Lebreton and Véran 2012). Lebreton and Véran (2012) also showed that by-catch of Black-footed Albatross probably is underestimated by at least 50%. From 1950 to 1977, by-catch of Laysan Albatross was estimated to be less than 6,000 per year, but during the period of driftnet fishing, 1978 to 1992, by-catch increased to an estimated 27,800 per year (Arata et al. 2009). For Black-footed Albatrosses, by-catch estimates showed a bimodal distribution with a peak of 15,290 birds in 1961 and a second peak of 16,215 birds in 1988 due to the combined effect of high-seas driftnet and long-line fisheries (Arata et al. 2009). Between 1990 and 1994, Cousins and Cooper (2000) estimated that >23,000 Black-footed Albatross were killed on long-line hooks set by the north Pacific swordfish fishery and that 1,800 were killed annually between 1994 and 1998 by the domestic Hawaii long-line fishery.

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- Marine Pollution. Ingestion of plastic debris by adult albatrosses at sea, who then feed it to their chicks, causes mortality of chicks. Adults are less susceptible because they are more capable of regurgitating plastic debris. Plastic may harm or kill chicks by obstructing or damaging the digestive tract, reducing the volume of the gut available for food, facilitating absorption of petroleum-soluble contaminants, and creating a false feeling of satiation so chicks literally starve while feeling full. Albatross chicks regurgitate a bolus of indigestible material before they fledge, and these can provide a means of measuring the amount of plastic ingested. Weaker chicks or those with too large a plastic load may be unable to regurgitate the bolus, resulting in death.
- Environmental Contaminants. On Midway, Laysan Albatross chicks nesting near aging buildings may ingest paint chips or soil that contain lead, causing neurological disorders, “droop wing syndrome,” and often death (Work and Smith 1996). Up to 7% of albatross chicks may die each year from lead poisoning (Finkelstein et al. 2010). Organochlorine and mercury contamination have been detected in Laysan and Black-footed Albatrosses in varying levels on Midway and in birds sampled at sea (Auman et al. 1997, Guruge et al. 2001, Finkelstein et al. 2006, Caccamise et al. 2012). Oil spills are also a threat.
- Alien Predators. Albatross are naïve to predators and are vulnerable to predation even by small mammals. Predators are not present in the NWHI, but in the main Hawaiian Islands predation has been documented on Laysan Albatross eggs, chicks, and adults by a variety of introduced mammals, including feral dogs (*Canis familiaris*), feral cats (*Felis catus*), small Indian mongooses (*Herpestes auropunctatus*), feral pigs (*Sus scrofa*), and possibly black rats (*Rattus rattus*) and Pacific rats (*Rattus exulans*). Predation limits the distribution and reproduction of albatrosses in the main islands.
- Invasive Alien Plants. The invasive alien golden crown-beard plant (*Verbesina encelioides*) threatens Laysan and, to a lesser degree, Black-footed Albatrosses on some islands, particularly Midway and Kure. This annual plant can grow into dense, tall stands that limit albatross nesting density, entangle chicks, prevent them from reaching open fledging areas, and reduce air flow and cause them to overheat. Klavitter et al. (2009) found that *Verbesina* reduced hatching and fledging success of Laysan Albatrosses, resulting in a reduction in reproductive success of over 50%. *Verbesina* is less of a threat to Black-footed Albatrosses because they often nest on sandier substrate near the shore where this plant is less invasive.
- Climate Change. Most colonies of Black-footed and Laysan Albatrosses are on low-lying atolls that are extremely vulnerable to sea level rise, storm surge, and high wave events associated with climate change. Black footed Albatrosses are particularly vulnerable because they often nest in open sandy areas closer to the shoreline. In 2011, high wave events and the Japan tsunami wiped out 56% of Black-footed Albatross nests and 41% of Laysan Albatross nests in the NWHI. Remarkably, the Short-tailed Albatross chick on Midway was twice swept from its nest, but survived.

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Albatross colonies on low atolls like Midway (left) are vulnerable to climate change and sea level rise; those on high islands like Lehua (center) and Oahu (right) may become more important. Photos Eric VanderWerf.

**Conservation Actions to Date:** The Short-tailed Albatross was listed as endangered under the U.S. Endangered Species Act (ESA) in 2000 (USFWS 2008). The USFWS was petitioned in October 2007 to list the Black-footed Albatross under the ESA, but the USFWS determined in October 2011 that listing was not warranted.

- **Habitat Protection and Management.** All of the albatross colonies in the NWHI are protected. Midway Atoll was designated a National Wildlife Refuge in 1988 while it was administered by the U.S. Navy. In 1996, Midway Naval Air Station was closed and administration was transferred to the USFWS. Kure Atoll was commissioned a LORAN Station in 1961 and was administered by the U.S. Coast Guard until 1992, when it was transferred to the State of Hawai'i to be managed by the Hawai'i Department of Land and Natural Resources as a State Seabird Sanctuary. All of the other NWHI are managed by the USFWS as National Wildlife Refuges. In 2006, approximately 139,793 square miles of emergent and submerged lands and waters of the NWHI, including the National Wildlife Refuges and State Seabird Sanctuary, were included in the Papahānaumokuākea Marine National Monument.
- **Predator Control.**
  - Pacific rats were eradicated from Kure in 1994 and from Midway in 1997. In the NWHI, only house mice (*Mus musculus*) now remain on Midway.
  - A predator-proof fence enclosing the Laysan Albatross colony at Kaena Point Natural Area Reserve on Oahu was built in 2011 and all predators were removed.
  - Other colonies on Kauai and at Kuaokala on Oahu have been protected from dogs and feral pigs by construction of small fences, but they are still vulnerable to other predators.
- **Invasive Species Control and Biosecurity.**
  - Efforts are underway to control the invasive golden crown-beard plant on Midway and Kure, but the work is labor intensive and additional effort and resources are needed.
  - Strict biosecurity programs, including restrictions on movement of food and equipment among islands and quarantine procedures, are in place to help prevent spread of invasive plants and animals among islands and prevent the introduction of additional pest species.



Predator fence, Kaena Pt., Oahu. Photo Lindsay Young.

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- **Environmental Contaminants.** Midway Atoll National Wildlife Refuge is in year 2 of a 6-year, \$21 million project to remediate lead paint from all structures and soil. Remediation of lead on Midway had been attempted previously, but those efforts were not completely effective. Previous methods included fencing to keep albatross away from buildings and ground cloth to prevent albatross from ingesting paint chips or contaminated soil. Current methods also include demolition of some buildings, remediation and excavation and removal of contaminated soil.
- **Fishery Management.** Regulations designed to reduce the incidental take of albatrosses and other seabirds in commercial fishing operations have been promulgated for several U.S. fisheries that operate out of Hawai'i and Alaska (Arata et al. 2009). In Hawaii, incidentally hooked or entangled albatrosses have been reduced by 92 to 99% annually compared to pre-regulation estimates (NMFS 2010). Seabird bycatch rates in the Alaska longline fisheries were reduced by 78% and albatross mortality has been reduced by 88% (Fitzgerald et al. 2008). Canada has required the use of seabird avoidance measures since 2002 in the long-line fisheries off British Columbia. Currently, the west coast groundfish fishery is the only U.S. managed fishery in the north Pacific that does not require mandatory seabird bycatch mitigation. Collaborative efforts with the fishing industry are currently underway to develop practical mitigation options to minimize by-catch in this fleet. Other nations, including Japan, China, and Taiwan, that operate pelagic long-line fisheries in the North Pacific typically do not require the use of mitigation measures to reduce the by-catch of seabirds and do not have trained and dedicated observers to monitor the magnitude and composition of the seabird by-catch. In 2003, mortality of Black-footed Albatrosses was estimated from available data to be at least 26,000 in Japanese and Taiwanese fleets (Birdlife International 2010). These fleets currently pose the greatest known fisheries threat.
- **Agreement on the Conservation of Albatrosses and Petrels (ACAP).** ACAP (<http://www.acap.aq/>) is a multilateral agreement which seeks to conserve albatrosses and petrels by coordinating international activity to mitigate known threats to their populations. ACAP came into force in February 2004. ACAP has produced a detailed assessment for each species, including the three North Pacific albatrosses, as well as fact sheets on fisheries by-catch and mitigation. The U.S. is not yet a party to ACAP but participates as an observer.

### **Planning/Research Needs:**

- Explore methods of reducing impacts of climate change on albatross colonies in the NWHI.
- Estimate annual mortality from U.S. and foreign fisheries by-catch and use demographic models to determine effect of this mortality on albatross populations (e.g., Lebreton and Véran 2012, Zydalis et al. 2012).
- Continue research and development of techniques and gear that will minimize fishing by-catch mortality and explore alternatives to mitigate mortality by fishing industry.
- Continue monitoring of albatross colonies on Midway, Laysan, Tern Island, Kure, Oahu, Kauai, and Lehua to collect demographic data and inform management decisions and measure efficacy of conservation actions.
- Perform another plastics study similar to Auman (1997) to understand current plastic loads in albatross chicks at Midway.
- Monitor rate of soil erosion and inundation at colonies in the NWHI and estimate numbers of albatrosses that may be forced to emigrate.

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- Continue to investigate the at-sea distribution of albatrosses and the environmental factors that influence them. Climate models predict significant changes in oceanic conditions, which could affect the quality and quantity of foraging habitat.

### 5-Year Conservation Goals:

- Establish new albatross colonies on high islands that are less vulnerable to climate change.
- Continue to reduce mortality of adult albatross from fisheries by-catch.
- Increase albatross productivity by continuing to protect and restore nesting habitat in the NWHI through biosecurity and removal of invasive alien plants.
- Protect albatross colonies in the main islands from predators and resolve or mitigate human conflicts.

### Conservation Actions Needed in Next 5 Years:

- Human Disturbance and Conflict.
  - Continue protection of national wildlife refuges in the NWHI and Kilauea Point on Kauai, and of state seabird sanctuaries on Kure and Lehua.
  - Continue Laysan Albatross egg swap project on Kauai, in which some of the eggs removed from the U.S. Navy Pacific Missile Range Facility as part of a Bird-Aircraft Strike Hazard reduction program are placed with foster parents whose eggs are not viable at Kilauea Point NWR and nearby private properties.
- Fisheries By-catch.
  - Continue, promote, and enhance observer programs in all long-line fishing fleets.
  - Compare the spatial and temporal overlap between fisheries and albatrosses throughout the North Pacific to prioritize conservation and management efforts.
  - Develop fishery-specific best-practice mitigation measures in long-line fisheries throughout the species ranges.
- Marine Pollution. Support public education programs aimed at increasing awareness of marine pollution, especially plastic, and its effects on seabirds, other organisms, and the oceans.
- Environmental Contaminants. Continue lead remediation on Midway by removing lead paint from buildings, and removing, treating, and/or stabilizing contaminated soil.
- Introduced Predators.
  - Eradicate alien Pacific rats from Lehua Islet to eliminate predation on eggs and chicks and allow growth of existing Black-footed and Laysan Albatross colonies.
  - Continue to maintain the predator-proof fence at Kaena Point and ungulate fence at Kuaokala, Oahu.
  - Control or eradicate predators at additional sites in the main Hawaiian Islands to allow establishment of new colonies.
- Introduced Plants.
  - Continue Hawaii DLNR winter camp on Kure Atoll to facilitate control of *Verbesina encelioides* and restoration of native habitat.
  - Continue USFWS efforts to control *Verbesina encelioides* and other non-native plants on Midway, Laysan, and other islands.
- Colony Protection and Creation.
  - Continue to maintain the predator-proof fence at Kaena Point, Oahu to provide a safe haven for albatross that immigrate from inundated colonies in the NWHI.

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- Establish a breeding colony of Laysan Albatrosses at James Campbell NWR, Oahu, and control predators, by translocating chicks hatched from excess eggs removed from PMRF, Kauai as part of a BASH reduction program.
- Establish a breeding colony of Black-footed Albatrosses within the predator-proof fence at Kaena Point, Oahu, through social attraction or, if necessary, translocation of chicks from the NWHI.
- Continue Short-tailed Albatross social attraction project at Midway Atoll NWR.

### Summary and Estimated Costs of Conservation Actions, 2013-2017:

Conservation Action	Year(s)	Annual cost	Total Cost
U.S. Navy PMRF egg swap program	2012-2016	\$15,000	\$75,000
Remove lead paint from buildings and soil on Midway	2012-2017	NA	\$21,000,000
Eradicate alien Pacific rats from Lehua Islet	2013	\$400,000	\$400,000
Maintain predator-proof fence at Kaena Point, Oahu	2012-2016	\$20,000	\$100,000
Eradicate alien <i>Verbesina</i> and restore native habitat on Sand Island, Midway Atoll	2012-2022	NA	\$6,000,000
Eradicate alien <i>Verbesina</i> and restore native habitat on Eastern Island, Midway Atoll	2012-2016	\$200,000	\$1,000,000
Establish Laysan Albatross colony at James Campbell NWR, Oahu using excess eggs from PMRF, Kauai	2014-2016	\$150,000	\$450,000
Establish Black-footed Albatross colony at Kaena Point, Oahu by social attraction (or by translocation if necessary)	2012-2016 (2014-2016)	\$3,000 (\$150,000)	\$15,000 (\$450,000)
Continue demographic monitoring of Laysan Albatross on Oahu	2012-2016	\$15,000	\$75,000
Continue demographic monitoring of Laysan and Black-footed Albatrosses on Midway	2012-2016	\$70,000	\$350,000

**Potential Partners:** U.S. Fish and Wildlife Service-Refuges, Hawaii Division of Forestry and Wildlife (Kure, Lehua, Kauai, and Oahu), Hawaii Natural Area Reserves System (Oahu), U.S. Navy (PMRF on Kauai), U.S. Coast Guard (Lehua), Pacific Rim Conservation.

**Ancillary Species:** Numerous other seabirds, migratory shorebirds, and several endemic land birds occur on many of the same islands that support albatross colonies, including: Bonin Petrel (*Pterodroma hypoleuca*), Hawaiian Petrel (*Pterodroma sandwichensis*), Bulwer's Petrel (*Bulweria bulwerii*), Wedge-tailed Shearwater (*Puffinus pacificus*), Christmas Shearwater (*Puffinus nativitatis*), Newell's Shearwater (*Puffinus auricularis newelli*), Band-rumped Storm-petrel (*Oceanodroma castro*), Tristram's Storm-petrel (*Oceanodroma tristrami*), White-tailed Tropicbird (*Phaethon lepturus*), Red-tailed Tropicbird (*Phaethon rubricada*), Masked Booby (*Sula dactylatra*), Brown Booby (*Sula leucogaster*), Red-footed Booby (*Sula sula*), Great Frigatebird (*Fregata minor*), Laysan Duck (*Anas laysanensis*), Gray-backed Tern (*Sterna lunata*), Sooty Tern (*Sterna fuscata*), Brown Noddy (*Anous stolidus*), Black Noddy (*Anous minutus*), Blue Noddy (*Procelsterna cerulea*), White Tern (*Gygis alba*), Pacific Golden Plover (*Pluvialis fulva*), Wandering Tattler (*Tringa incanus*), Bristle-thighed Curlew (*Numenius tahitiensis*), Ruddy Turnstone (*Arenaria*

*interpres*), Millerbird (*Acrocephalus familiaris*), Nihoa Finch (*Telespiza ultima*), and Laysan Finch (*Telespiza cantans*).

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