DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2007–0004; MO 92210–0–0008]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Black-footed Albatross as Endangered or Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the black-footed albatross (*Phoebastria nigripes*) as endangered or threatened under the Endangered Species Act of 1973, as amended (Act). The petitioners provided three listing options for consideration by the Service: Listing the black-footed albatross throughout its range; listing the Hawaiian Islands breeding population of the black-footed albatross as a Distinct Population Segment (DPS); or listing the Japanese Islands breeding population of the black-footed albatross as a DPS. After a review of the best available scientific and commercial information, we find that listing the black-footed albatross rangewide is not warranted at this time. We find that the Hawaiian Islands breeding population and the Japanese Islands breeding population are separate DPSs, as defined by DPS policy. However, we further find that neither the Hawaiian Islands DPS nor the Japanese Islands DPS of the black-footed albatross warrants listing at this time. We ask the public to submit to us any new information that becomes available concerning the threats to the black-footed albatross or its habitat at any time.

DATES: The finding announced in this document was made on October 7, 2011.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R1–ES–2007–0004, and *http://www.fws.gov/pacificislands/.* Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Pacific Islands Fish and Wildlife Office, 300 Ala Moana Boulevard, Box 50088, Honolulu, Hawaii 96850. Please submit any new information or materials concerning this finding to the above address.

FOR FURTHER INFORMATION CONTACT: Dr. Loyal Mehrhoff, Field Supervisor, Pacific Islands Fish and Wildlife Office (see **ADDRESSES**); by telephone at 808–792–9400; or by facsimile at 808–792–9581. If you use a telecommunications device for the deaf (TDD), call the Federal Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Act (16 U.S.C. 1532 *et seq.*) requires us to make a finding within 12 months of the date of receipt of any petition to revise the Lists of Endangered and Threatened Wildlife and Plants, provided the petition contains substantial scientific and commercial information that listing may be warranted. In this finding, we will determine that the petitioned action is: (a) Not warranted, (b) warranted, or (c) warranted, but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are threatened or endangered, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, requiring that a subsequent finding be made within 12 months. We must publish these 12-month findings in the **Federal Register.**

Previous Federal Actions

On October 1, 2004, we received a petition dated September 28, 2004, from Earthjustice on behalf of the Turtle Island Restoration Network and the Center for Biological Diversity, requesting that we list the black-footed albatross as a threatened or endangered species throughout its range, with critical habitat, or that we list either or both the Hawaiian breeding population and/or the Japanese breeding population as a DPS, and that we designate critical habitat concurrently with listing. Because the determination of critical habitat is not a petitionable action under the Act, we did not consider the designation of critical habitat in this finding. The petition included supporting information regarding the species' taxonomy and ecology, historical and current distribution, present status, potential causes of decline, and active imminent threats. In our December 3, 2004, letter to the petitioner we acknowledged the petition and provided our determination that emergency listing was not warranted. We also explained that, due to a significant number of listing rules due in 2005 under court-approved settlement agreements, we had insufficient resources to initiate a 90-day finding at that time.

In 2007 we received funding and initiated the 90-day finding. On October 9, 2007, we published a 90-day petition-finding (72 FR 57278), in which we concluded the petition presented substantial scientific or commercial information indicating listing of the black-footed albatross may be warranted, and we initiated a status review. In that notice, we announced the opening of a 60-day information collection period and invited the public to submit to us any pertinent information concerning the status of or threats to this species. We received information from 14 parties in response to this notice. We also consulted with recognized species experts and other Federal and State agencies. On August 26, 2009, we announced the reopening of the information collection period (74 FR 43092) in response to the U.S. Geological Survey-Biological Resources Discipline (USGS–BRD) publication of the *Status Assessment of the Laysan and Black-Footed Albatrosses, North Pacific Ocean, 1923–2005* (Arata *et al.* 2009, entire). One additional party provided comments during the second information collection period. This notice constitutes the 12-month finding on the petition to list the black-footed albatross as endangered or threatened with critical habitat.

Outline of This Notice

In this notice, we first provide background information on the biology of the black-footed albatross. Next we analyze the threat factors facing the black-footed albatross throughout its range to determine if listing under the Act is warranted. This analysis is called a ''Five Factor Analysis'' because it addresses the five factors listed in section 4(a)(1) of the Act that are used in determining whether a species meets the definition of an endangered or a threatened species under the Act. For each factor, we first determine whether any stressors, or risk factors, appear to be negatively affecting black-footed albatrosses anywhere within the species' range. If we determine they are, then we evaluate whether each of these risk factors, either singly or in combination, is resulting in population-level effects. Defining a stressor to be a threat to the species does not necessarily mean the species meets the definition of endangered or threatened. Virtually all species face some degree of threat from either natural or anthropogenic sources. Rather, for the purposes of the Act, we must consider each of the stressors and identified threats, both individually and cumulatively, and make a determination with respect to whether the species is endangered or threatened according to the statutory standard. That is, we must make a determination as to whether the threats are impacting the species to such a degree that the species is currently in danger of extinction (endangered), or likely to become so within the foreseeable future (threatened), throughout all or a significant portion of its range. Further details on this evaluation are provided below in the section *Summary of Factors Affecting the Species.*

Species Information

The black-footed albatross is a migratory, open-ocean species whose current range encompasses the seas from north of the Hawaiian Islands to the Bering Sea (15° N to 60° N), eastward to the western coast of North America, and west to the northeastern coast of Japan (118° E to 112° W) (Figure 1) (Awkerman *et al.* 2008, p. 4; Fischer *et al.* 2009, p. 757).

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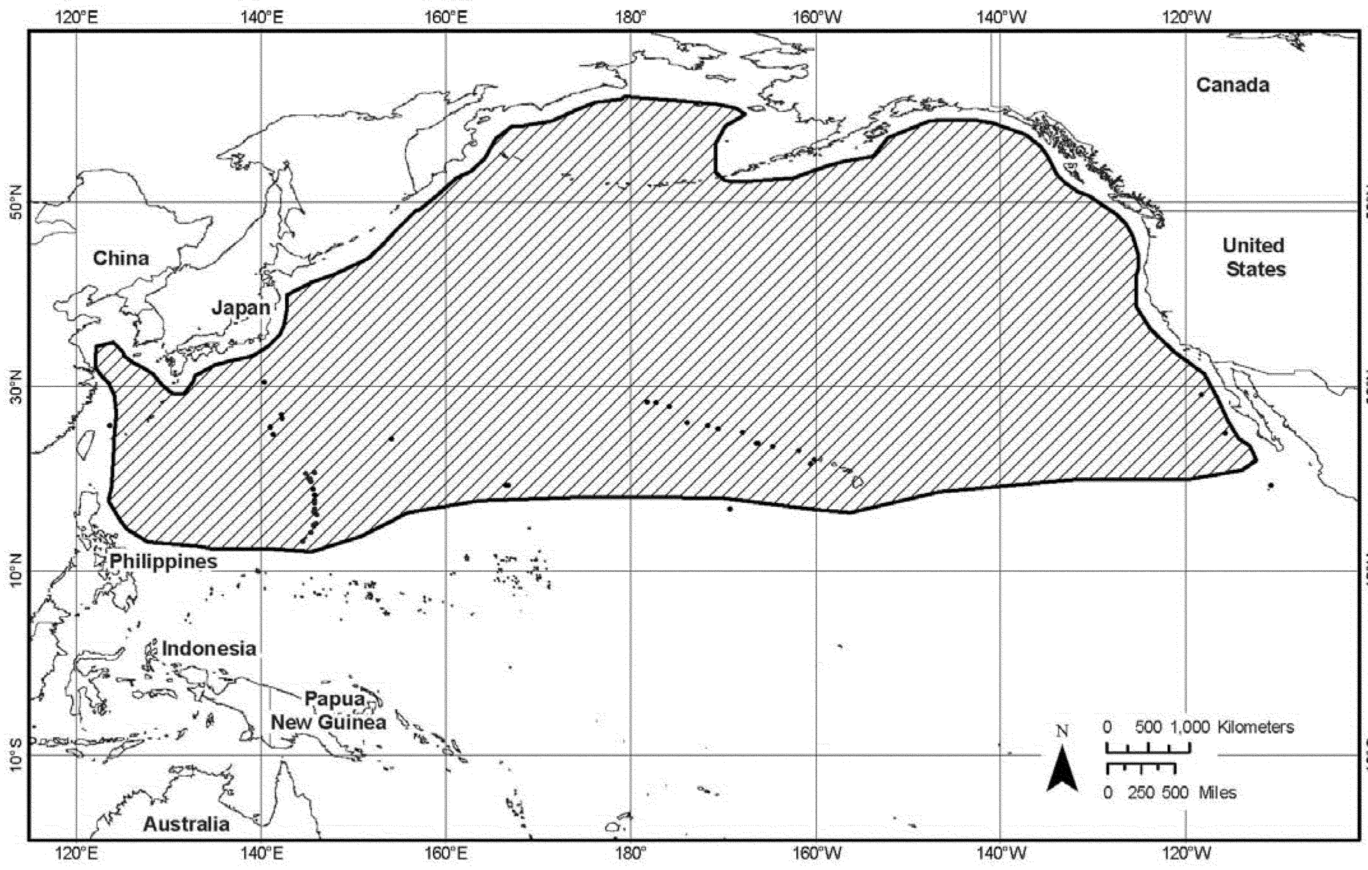
Figure 1. Current Range of Black-Footed Albatross



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Approximately 95 percent of the breeding population nests in the Hawaiian Islands archipelago in the central Pacific; other breeding colonies are found on the Japanese Islands in the western Pacific in the Izu-Torishima Islands, the Ogasawara Islands (also known as the Bonin Islands), and the Senkaku Islands (Figure 2).

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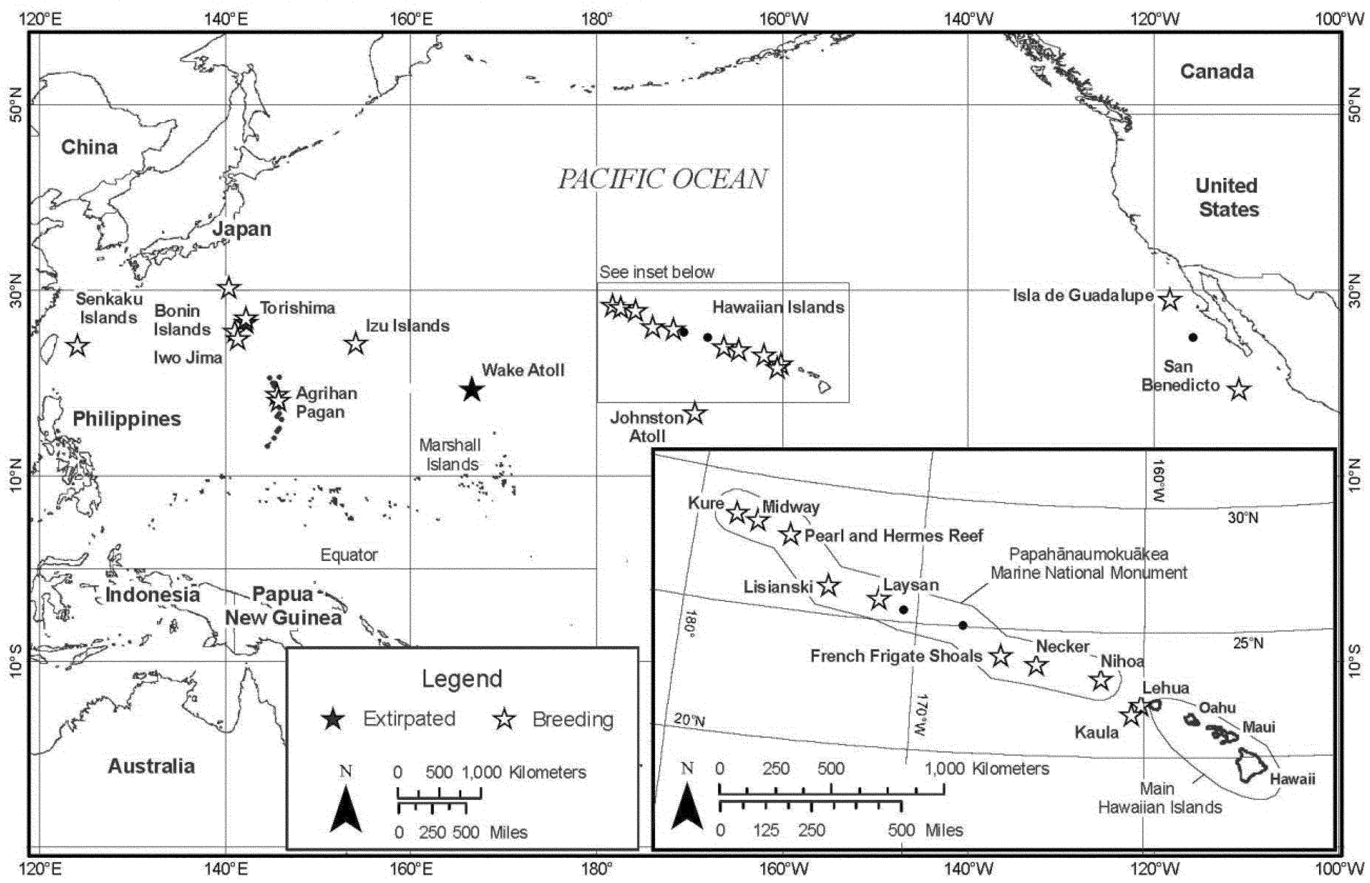
Figure 2. Breeding Distribution of Black-Footed Albatross



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Taxonomy and Description

The black-footed albatross is one of three north Pacific species in the seabird family Diomedeidae (albatrosses). Adults are uniformly sooty brown with a whitish ring at the base of the bill, a white patch behind the eye, and white feathers over the base of the tail and undertail coverts. Birds of all ages have a blackish bill, legs, and feet. Fledglings are uniformly dark brown and acquire a white ring at the base of the bill and around the tail as they age (Hyrenbach 2002, p. 87). The wingspan is 76 to 85 inches (in) (193 to 216 centimeters (cm)), and the average weight is 6.17 pounds (lb) (2.30 kilograms (kg)) (Cousins and Cooper 2000, p. 3). No subspecies are recognized, though significant genetic differentiation between the Hawaiian and Japanese populations has been identified (Walsh and Edwards 2005, pp. 292–294; Eda *et al.* 2008, pp. 112–115), and further research may possibly indicate that taxonomic revision is warranted (Eda *et al.* 2008, p. 115). At present the black-footed albatross continues to be classified by taxonomic authorities as a single species (American Ornithologists' Union 1998 and supplements; Integrated Taxonomic Information System 2011), and there does not appear to be a broad scientific consensus that this classification is incorrect; therefore, we consider it a single species in this finding.

Life History

Black-footed albatrosses range throughout the north Pacific (Cousins and Cooper 2000, p. 12). Reports of banded birds, casual observation, and studies using satellite transmitters have revealed patterns in the use of oceanic habitats by black-footed albatrosses that vary with age and breeding status, and oscillate with the breeding cycle (Cousins and Cooper 2000, p. 12). Adult birds concentrate around the colonies during egg-laying, incubation, and chick brooding. As chicks get older, breeding adults range much farther from the colony to reach productive foraging waters. Post-breeding adults forage near the western coast of North America, and south of Alaska as far west as the Aleutian Islands. Black-footed albatrosses use areas of coastal upwelling or convergence for foraging throughout the north Pacific; these highly productive areas are also used by numerous fisheries (Fernandez *et al.* 2001; Hyrenbach *et al.* 2002; Hyrenbach and Dotson 2003; Fischer 2007; Fischer *et al.* 2009).

Black-footed albatrosses live for 40 to 50 years, and represent a classic example of a ''K-selected'' species (*i.e.,* the species is long-lived, has delayed reproductive maturity, produces relatively few young, and is dependent upon high annual adult survivorship). The earliest known age for first breeding by black-footed albatrosses is 4 years of age, but on average the age of first breeding is 7 years (Cousins and Cooper 2000, p. 51). Pairs mate for life, and mate loss in black-footed albatrosses can cause adults to skip up to five breeding seasons prior to forming a new pair (Committee on the Status of Endangered Wildlife in Canada (COSEWIC) 2007, p. 33). Only one egg is laid per year, and pairs do not attempt to renest if nesting failure occurs (Cousins and Cooper 2000, p. 2). Sometimes pairs will skip a breeding year. It is estimated that 75 percent of black-footed albatrosses that fledged a chick one year will go on to breed the next year, while 83 percent of pairs that experience nest failure will breed the next year (Viggiano 2001, p. 59).

Female black-footed albatrosses have a high level of affinity to the nest site. Long-term studies have shown that over 99 percent of females return to breed on the island or atoll where they hatched and fledged (known as their natal site) and establish their own nesting site nearby (Rice and Kenyon 1962a, pp. 532–533). Most have been found to return within less than 20 feet (ft) (6 meters (m)) of the same nest site season to season (Rice and Kenyon 1962a, p. 533). Such is their nest site fidelity that birds banded at a particular site in 1938 were found still nesting at that site 20 years later (Rice and Kenyon 1962a, p. 533). Since the vast majority of females nest on the island where they themselves hatched (Rice and Kenyon 1962a, pp. 532–533), recolonization of formerly occupied islands or atolls (that were abandoned or where black-footed albatrosses were extirpated due to cataclysmic or stochastic events) and colonization of new islands or atolls by dispersing breeders is relatively rare. Such events are not unknown, however. For example, black-footed albatrosses banded as nestlings on Midway Atoll were later observed breeding on Kure Atoll, and other individuals are known to have moved from their natal sites to breed between the islands of Pearl and Hermes Reef, French Frigate Shoals, and Kure Atoll as well (Woodworth 1972, p. 96). Black-footed albatrosses recolonized Torishima Island, the Ogasawara Islands, and the Senkaku Islands followed cessation of World War II military activities in the western Pacific (see *Volcanic Activity,* below), and pioneering attempts by black-footed albatrosses to breed on Mexico's Guadalupe and San Benedicto islands in the eastern Pacific have been reported recently.

Birds arrive at their nesting colonies in the central and western Pacific islands in mid- to late October (Rice and Kenyon 1962a, p. 552; Woodward 1972, p. 92). Eggs are laid between mid-November and mid-December (Rice and Kenyon 1962a, p. 540; Woodward 1972, p. 92; Awkerman *et al.* 2008; Agreement on the Conservation of Albatrosses and Petrels [ACAP 2010], p. 2). Incubation lasts approximately 66 days, and most eggs hatch by early February (Rice and Kenyon 1962a, p. 546). Both adults take turns brooding the chick and attend it for approximately 1 month, after which the adults spend most of their time at sea, returning only to feed the chick (Rice and Kenyon 1962a, pp. 548–549). The chick-rearing stage lasts approximately 140 days, with fledging occurring in mid-June to mid-July (Rice and Kenyon 1962a, p. 562). Once fledged, the young birds remain at sea and do not return to land for 2 to 5 years (Rice and Kenyon 1962a, p. 520; Viggiano 2001, p. 15).

Diet and Feeding Habitats

Black-footed albatrosses are surface feeders and scavengers, generally seizing food within 3 ft (0.9 m) of the ocean's surface (Brooke 2004, p. 191). The birds take prey at the surface of the water, and occasionally partially submerge below the surface (Awkerman *et al.* 2008, p. 14). Fernandez and Anderson (2000, entire) used an immersion monitor and satellite telemetry to evaluate feeding activity patterns during the chick-brooding period, when shorter foraging trips would be expected (Fernandez *et al.* 2001, p. 4). The majority of time at sea was spent flying (90.8 percent), with most immersions less than 100 seconds long, indicating birds were engaged in surface foraging rather than resting (Fernandez and Anderson 2001, p. 580). Immersions (presumed feeding activity) during this study occurred primarily during the daytime, though some presumed feeding activity did occur during the night.

The diet of adult black-footed albatrosses is composed primarily of flying fish eggs, but also includes squid, fish, offal, and human refuse (Brooke 2004, p. 191). Black-footed albatrosses are known to follow fishing boats and are more aggressive than Laysan albatrosses (*Phoebastria immutabilis*) in scavenging fish discards (Fischer *et al.* 2009, p. 758). Harrison *et al.* (1983, entire) and Gould *et al.* (1997, entire) studied the food habits of the black-footed albatross. Harrison *et al.* (1983, pp. 15–18) collected regurgitation samples from adult birds primarily from Laysan Island and Midway Atoll, but also collected samples during the chick-rearing stage from Kure Atoll and French Frigate Shoals, and found the contents were primarily flying fish eggs, squid, and crustaceans. Gould *et al.* (1997, p. 550) sampled birds collected from drift nets in the north Pacific during the nonbreeding season. They found the greatest percentage of stomach contents was squid species typically targeted by the squid and driftnet fisheries. In their analysis of both Laysan and black-footed albatross stomach contents, Sileo *et al.* (1990a, p. 674) found that chicks consume a variety of plastic objects. Black-footed albatrosses are especially prone to inadvertently ingesting plastic because plastic particles floating on or below the water's surface resemble flying fish eggs, a major component of their diet. In addition, flying fish eggs are often laid in floating items, including plastic refuse, thereby increasing the chances of inadvertent plastic ingestion (Cousins and Cooper 2000, p. 5).

Nesting Sites

Black-footed albatross nests are most often a depression scooped out in a sandy substrate, surrounded by a rim of sand (Arata *et al.* 2009, p. 10). They are usually located on exposed sandy beaches at the beginning of the vegetation line (Cousins and Cooper 2000, p. 5; Awkerman *et al.* 2008, p. 20; Arata *et al.* 2009, p. 10). At Midway Atoll and Tern Island (French Frigate Shoals) in the Hawaiian Islands, nests are also located in areas with low-growing vegetation (Arata *et al.* 2009, p. 10). On the volcanic islands of Torishima Island and the Ogasawara Islands, nests are not found on beaches, but are located at high elevations on sparsely to highly vegetated exposed volcanic slopes (Cousins and Cooper 2000, p. 5).

Breeding Distribution

Historically, the breeding range of the black-footed albatross likely extended from Lehua Island (offshore of Niihau Island) in the Hawaiian Islands west to the Senkaku Islands in the western Pacific. In the late nineteenth and early twentieth centuries, this range was reduced due to extirpation of the black-footed albatross from entire breeding islands by egg and feather hunters, and later by military activities on some of the nesting islands in the central and western Pacific from World War II-related military occupation and activities (Rice and Kenyon 1962b, pp. 366–367; Naughton *et al.* 2007, p. 6). The likely historical breeding range of the black-footed albatross prior to these extirpation events is detailed in table 1.

TABLE 1—SUMMARY OF THE HISTORICAL DISTRIBUTION OF BLACK-FOOTED ALBATROSS BREEDING COLONIES AND THEIR CURRENT STATUS AS EXTANT E; EXTINCT X; OR PROSPECTING P (OCCASIONAL BREEDERS SCOUTING OUT NEW NEST SITES; CONSIDERED A POSSIBLE EARLY SIGN OF RANGE EXPANSION)

Breeding colony	Year cited	First known reference	Status
Central Pacific Islands			
Northwestern Hawaiian Islands:			
Nihoa Island	1923	Wetmore [1]	E
Necker Island	1923	Wetmore [1]	E
French Frigate Shoals	1923	Wetmore [1]	E
Laysan Island	1923	Wetmore [1]	E
Lisianski Island	1923	Wetmore [1]	E
Pearl and Hermes Reef	1923	Wetmore [1]	E
Midway Atoll	1923	Wetmore [1]	E
Kure Atoll	1923	Wetmore [1]	E
Main Hawaiian Islands:			
Kaula (Kauai)	1923	Wetmore [1]	E
Lehua (Kauai)	1923	Wetmore [1]	E
Other:			
Taongi Atoll (Marshall Islands)	1874	Dall [1]	X
Wake Atoll or Wake Island	1841	Peale [1]	P
Minami-Torishima (Marcus Island)	1902	Bryon [1]	X
Johnston Atoll	1923	Wetmore [1]	X
Western Pacific Islands			
Iwo Jima (Volcano Islands)	1891	Seebohm [1]	X
Izu Shoto (Torishima Island)	1889	Hattori [1]	E
Ogasawara Gunto (Bonin Islands)	1890	Seebohm [1]	E
Senkaku Retto (Ryukyu Shoto)	unknown	unknown	E
Eastern Pacific Islands			
Isla Guadalupe	1998	Pitman & Ballance [2]	P
San Benedicto	2000	Pitman & Ballance [2]	P

[1] Referenced in Rice & Kenyon, 1962a, p.21

[2] Referenced in Pitman & Ballance, 2002, p. 13.

Wake Island or Wake Atoll was first reported as a breeding colony for black-footed albatross in December 1841 by Titian R. Peale while on a U.S. Exploring Expedition. During this expedition, an egg and a black-footed albatross skin were collected; however, the egg was later judged, by size and shape, to be that of a Laysan and not a black-footed albatross (Rice and Kenyon 1962b, p. 379). Thus, because a single collected skin of a black-footed albatross does not denote nesting or breeding, we cannot conclude that these birds historically nested or bred on Wake Atoll.

Present breeding populations of black-footed albatross occur as follows (table 2): (1) Hawaiian Islands (central Pacific, Hawaii archipelago) (1a) Northwestern Hawaiian Islands—Nihoa Island, Necker Island, French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll; (1b) Main Hawaiian Islands—Lehua Island, Kaula Island; (2) Japanese Islands (western Pacific) (2a) Izu Islands—Torishima Island; (2b) Ogasawara Islands (also known as the Bonin Islands)—nine islets; (2c) Senkaku Islands — three islets (Kawakami *et al.* 2006, p. 187; Chiba *et al.* 2007, p. 5; Eda *et al.* 2008, p. 109).

TABLE 2—BLACK-FOOTED ALBATROSS POPULATION COUNTS OR ESTIMATES OF BREEDING PAIRS FROM ALL KNOWN BREEDING SITES 1993–2010 (UNITED STATES, JAPAN) (ACAP 2010, TABLE 3, P. 4; FLINT 2011A, PERS. COMM.)

Breeding site	Jurisdiction	Last year surveyed	Number of breeding pairs
Hawaiian Islands (Central Pacific)			
Northwestern Hawaiian Islands:			
Nihoa Island	United States	2007	1
Necker Island	United States	1995	112
French Frigate Shoals	United States	2009	4,309
Laysan Island	United States	2010	22,272
Lisianski Island	United States	2006	2,126
Pearl and Hermes Reef	United States	2003	6,116
Midway Atoll	United States	2010	25,581
Kure Atoll	United States	2010	3,486
Main Hawaiian Islands:			
Kaula Island (Kauai)	United States	1993	3 [1]

TABLE 2—BLACK-FOOTED ALBATROSS POPULATION COUNTS OR ESTIMATES OF BREEDING PAIRS FROM ALL KNOWN BREEDING SITES 1993–2010 (UNITED STATES, JAPAN) (ACAP 2010, TABLE 3, P. 4; FLINT 2011A, PERS. COMM.)—Continued

Breeding site	Jurisdiction	Last year surveyed	Number of breeding pairs
Lehua Island	United States	2007	25
Total Central Pacific			64,031
Japanese Islands (Western Pacific)			
Torishima Island (Izu Islands)	Japan	2003	2,150
Ogasawara (Bonin) Islands (Muko-jima Island)	Japan	2006	967
Ogasawara (Bonin) Islands (Haha-jima Island)	Japan	2006	11
Senkaku Islands	Japan	2002	56
Total Western Pacific			3,184
Total Rangewide			67,215

[1] Survey at Kaula was done 16–17 November, 1998, which is early for nesting. Nine birds were present on the island.

As of 2010, there are no established breeding colonies in the Marshall Islands or on Wake Atoll. While black-footed albatrosses have attempted to breed at Wake Atoll on occasion, most nests, both with and without eggs, were subsequently abandoned, and none have ever successfully fledged young. Birds are likely prospecting the atoll for potential nesting sites (Rauzon *et al.* 2008, pp. 14–15) (see Marshall Islands in ‘‘Current Population Status’’ below). Isolated attempts by black-footed albatrosses to breed on the Revillagigedo Islands of Mexico have been reported on Guadalupe and San Benedicto islands (Pitman and Ballance 2002, p. 13), but there is no record of a breeding population ever being established (Henry 2007, pers. comm.; Hebshi 2010, pers. comm.). Other than one unsubstantiated report of a ‘‘fully-feathered chick’’ on Guadalupe Island in 1998, there is no evidence that any young have been fledged (see Mexican Islands in ‘‘Current Population Status’’ below).

Foraging Distribution During the Breeding Season

Satellite telemetry data collected in 1988 and 1989 indicate black-footed albatrosses forage north and northeast of breeding colonies in the Hawaiian Islands. They tend to forage in pelagic (open ocean) oligotrophic (low in dissolved nutrients and high in oxygen) waters within the vicinity of the nest (maximum range 188 miles (mi) (303 kilometers) (km)) during the nest-guard phase (when chicks are less than 18 days old) (Fernandez *et al.* 2001, pp. 4–5; Hyrenbach *et al.* 2002, p. 288). When feeding older nestlings, black-footed albatrosses breeding on Tern Island mixed short trips near nest sites with long trips to the highly productive waters along the continental shelf of North America (Fernandez *et al.* 2001, pp. 4–7; Hyrenbach *et al.* 2002, pp. 288–294). They foraged along the North Pacific Transition Zone, which separates the Subarctic Domain (defined as a water mass with temperature less than 50 °F (10 °C)) from the North Pacific Subtropical Gyre (a large-scale circular feature made up of ocean currents that spiral around a central point; it is made up of four large, clockwise-rotating currents—North Pacific, California, North Equatorial, and Kuroshio)), and is characterized by convergence fronts and high productivity (Hyrenbach *et al.* 2002, p. 296). Overall, the adults ranged from 18° N to 48° N latitude in the north Pacific and over a large area in the eastern Pacific (121° W to 172° W longitude) (Fernandez *et al.* 2001, p. 4). Similar results have been reported using Geographic Positioning Systems (GPS) tracking of breeding birds in the Bonin Islands (Kawakami *et al.* 2006, p. 189). Adults incubating eggs or brooding young chicks foraged within 252 mi (405 km) of the breeding site; over 90 percent of the observations were within 124 mi (200 km) of the colony.

Foraging Distribution During the Nonbreeding Season

During summer months (postbreeding), female black-footed albatrosses captured off the coast of California foraged largely along the transition zone between the California Current (a cold current originating in the northern part of the Pacific Ocean, flowing southeast along the coast of western North America) and the North Pacific Gyre, and spent 39, 43, and 18 percent of their time at sea in tropical waters, subtropical frontal zones, and subtropical waters, respectively (Hyrenbach and Dotson 2003, p. 397). Likewise, they spent 25, 24, and 51 percent of their time foraging in the exclusive economic zones (EEZ) of the United States, Mexico, and the high seas, respectively (Hyrenbach and Dotson 2003, p. 397).

Postbreeding black-footed albatrosses captured off the coast of Alaska ranged from 60° N to 36° N, and 125° W to 180° W (Fischer *et al.* 2009, p. 757). Within this range, they spent more time in continental margin waters versus oceanic waters; within the continental margin waters they spent equal time in the continental shelf, shelf break, and slope waters (Fischer *et al.* 2009, pp. 755–756).

Demography and Population Resiliency

Certain intrinsic aspects of black-footed albatross ecology and demography are relevant to the species' status. Stable populations of K-selected species, such as the black-footed albatross, generally live in relatively constant (*i.e.,* not highly variable) environments and are characterized by low annual productivity rates balanced with high annual survival rates, meaning that individuals must live many years to replace themselves with offspring that survive to recruit into the breeding population. (The letter ‘‘K’’ represents the carrying capacity of a given environment, and is also used to represent a species whose reproductive strategy is to keep a stable population close to the carrying capacity.) Cousins and Cooper (2000, pp. 53–54) found that black-footed albatross population trends were more sensitive to changes in survival than to changes in fecundity.

Although factors that compromise productivity can cause populations to decline, adult survival is often the more important determinant of population size and persistence for a K-selected species (Cousins and Cooper 2000, p. 53). Annual adult death rates for the black-footed albatross are normally very low, on the order of 3 to 8 percent (in other words, annual adult survivorship is about 92 to 97 percent (Cousins and Cooper 2000, p. 50; Veran *et al.* 2007, p. 7; Arata *et al.* 2009, p. 47)). If a sufficient number of adults are removed from the population prior to replacing themselves (*i.e.,* adult survival is decreased beyond a certain threshold), the population will decline. Additionally, reduced juvenile survivorship will also affect the population; Cousins and Cooper (2000, p. 53) estimated that juvenile survival of black-footed albatrosses has to be 86 percent or higher to prevent a population decrease. Estimates of juvenile survivorship for the black-footed albatross have been more varied over the years; Arata *et al.* (2009, p. 47) report a rate as low as 0.688 for the period 1963–1982, but estimate juvenile survivorship of 0.993 over the period 1994–2002. For French Frigate Shoals, juvenile survivorship was estimated at 0.79 for the years 1994–2000 (ACAP 2010, Table 5, p. 8). All of the characteristics of the black-footed albatross—its longevity, low reproductive rates, delayed sexual maturity, irregularity in annual breeding, and life-long pair bonding (with consequent delays in subsequent breeding if a mate is lost)—make it difficult to detect changes in population structure, particularly the recruitment of juveniles into the population. Species with such characteristics are slow to exhibit population declines and are inherently more vulnerable to extinction (Primack 1993, p. 102; Meffe and Carroll 1994, p. 128). These intrinsic aspects of black-footed albatross ecology and demography signal the continuing need to monitor their populations, despite the fact that numbers are presently stable and the species continues to be widely distributed across its range (Arata *et al.* 2009 p. 2; see ‘‘Current Population Status’’ below).

Current Population Status

Rangewide

Feather and egg hunters decimated black-footed albatross populations until the 1920s, and an estimate of population size prior to this period is not known. In 1923, the estimated breeding population was 17,800 pairs in Hawaii, and 200 in Japan (Arata *et al.* 2009, p. 35). The current black-footed albatross worldwide population estimate, with most recent counts from the 2010 nesting season, is approximately 67,215 breeding pairs (ACAP 2010, p. 4; Flint 2011a, pers. comm.). Based on a Leslie matrix model, roughly 60,000 breeding pairs were estimated to represent a total world population of approximately 300,000 black-footed albatrosses, including both breeding and nonbreeding individuals (Cousins and Cooper 2000, p. 19; Niel and Lebreton 2005, p. 833); the most recent counts of more than 67,000 nesting pairs therefore puts the estimated world population of black-footed albatrosses at well over 300,000 individuals.

Cousins and Cooper (2000) present data on the number of breeding black-footed albatrosses from Midway Atoll, Laysan Island, and French Frigate Shoals as well as the available information for all other sites throughout the world. An examination of their data indicates a stable or increasing global trend in the number of breeding black-footed albatross in the years 1992 through 1999 (Cousins and Cooper 2000, p. 19 and Figure 19). More recently, data presented by Arata *et al.* (2009, Figure 22) indicate an increasing world population of the black-footed albatross between 1923 and 2005. In addition, survey data indicate populations in the Japanese Islands have been steadily increasing (Cousins and Cooper 2000, p. 23; Hasegawa 2010, pers. comm.; see Figure 4 of this document). All of these population data are based on counts of active nests at breeding sites. It should be noted that because only the breeding component of the species' population is counted, changes in population demographics that could affect the population in the long term cannot be detected with this method (Viggiano 2001, p. 5). For example, any significant increase in juvenile mortality would not be detected until years later, when these birds would normally be entering the breeding population that is counted. In the absence of more precise data, however, these counts are generally used as a rough index of population numbers, and represent the best scientific information available to us.

Hawaiian Islands

Roughly 95 percent of the world population of black-footed albatrosses breed in the Hawaiian Islands. Black-footed albatrosses currently nest on Lehua Island and Kaula Island off of Kauai in the main Hawaiian Islands, and in the Northwestern Hawaiian Islands on Nihoa Island, Necker Island, French Frigate Shoals, Laysan Island, Lisianski Island, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll. Many of the smaller breeding populations of black-footed albatross are not regularly monitored, but standardized counts and estimates of active nests have been conducted in the Northwestern Hawaiian Islands since 1980 at French Frigate Shoals and since 1991 at Midway Atoll and Laysan Island (Naughton *et al.* 2007, p. 6). These three colonies collectively comprise 77 percent of the global breeding population of the black-footed albatross as of 2010 (ACAP 2010, p. 4).

Based on the latest nest count data as of 2010, the largest colony of black-footed albatrosses at 25,581 breeding pairs is on Midway Atoll, representing approximately 40 percent of the world's breeding population. Laysan Island has the second largest colony with 22,272 breeding pairs (approximately 35 percent of the global breeding population), and French Frigate Shoals is the smallest of the three with 4,309 breeding pairs, or roughly 7 percent of the world's breeding pairs (Flint 2011a, pers. comm.). Prior to 1997, instead of direct nest counts on Laysan Island, nesting estimates were derived from counts on plots from a portion of the island that were then extrapolated to represent total nesting area. Beginning in 1997, the direct count method (counts of all nests) used at French Frigate Shoals and Midway Atoll was adopted on Laysan Island as well. An analysis of the nest count data from these three regularly monitored colonies at Laysan Island, French Frigate Shoals, and Midway Atoll for the years 1998 to 2009 demonstrates an increasing trend on the order of 0.93 percent per year for the three islands combined (ACAP 2010, p. 5, Fig. 2A). Individually, the breeding population at Midway increased at an average annual rate of 1.3 percent between the years 1992 and 2009 (ACAP 2010, p. 7, Table 4). At French Frigate Shoals, the colony for which the longest time series of data is available, the number of breeding pairs has fluctuated between the years 1980 and 2009, but overall is increasing at an average rate of 0.43 percent annually (ACAP 2010, p. 7, Table 4). Laysan Island, however, has shown a negative trend over the years 1998 to 2009, decreasing at an average annual rate of 1.1 percent (ACAP 2010, p. 7, Table 4). Laysan Island formerly supported the largest breeding population of black-footed albatrosses, until it was surpassed by Midway Atoll in 2004 (ACAP 2010, p. 6). Figure 3 shows the linear trend between 1998 and 2009 for the number of pairs nesting at French Frigate Shoals, Laysan Island and Midway Atoll, individually and combined (taken from ACAP 2010, p. 6, Figure 2).

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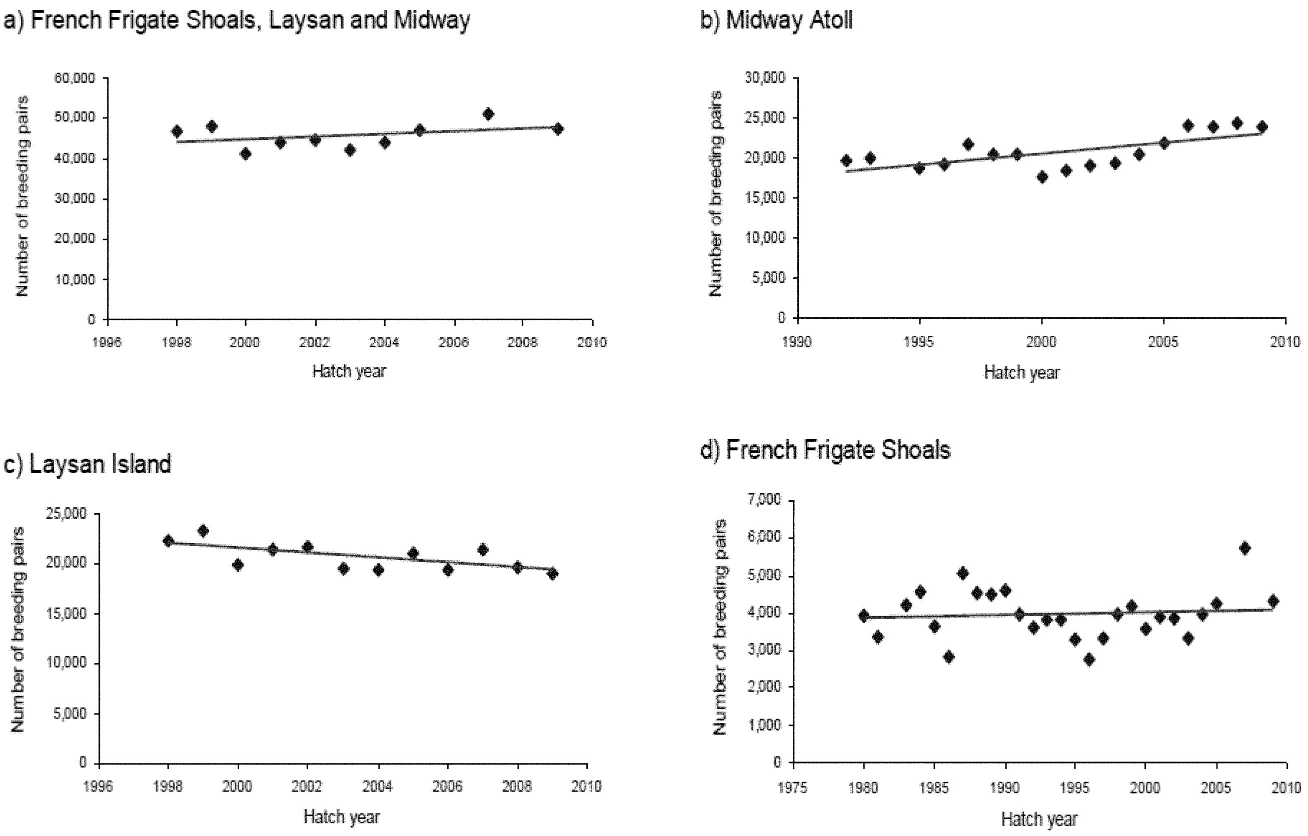

Figure 3. Number of breeding pairs between 1998 and 2009 at a) French Frigate Shoals, Laysan, and Midway collectively; b) Midway Atoll only; c) Laysan Island only; and d) FrenchFrigate Shoals (from ACAP 2010, p. 6).

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These trends are consistent with those reported in a recent status assessment of the black-footed albatross conducted by the U.S. Geological Survey (Arata *et al.* 2009, entire). The linear regression analysis in that report indicates a significant increasing trend between the years 1923 and 2005 for black-footed albatrosses at Midway Atoll, Laysan Island, and French Frigate Shoals combined, and no trend (stable population) for the more recent time periods examined, from 1957 to 2005 and 1998 to 2005 (Arata *et al.* 2009, p. 29, Table 6). The divisions in time steps represent the earliest thorough surveys of the population in 1923 and 1957, and the beginning of standardized surveys at Midway Atoll and Laysan Island in 1998. The authors attribute the positive growth in the black-footed albatross population, since 1923, to the cessation of poaching at nesting colonies. In addition, they state that only the time-series data from French Frigate Shoals are long enough to show a potential change over time, and note that this population shows positive annual population growth rates with a median trend for growth over the next 60 years. However, they also point out that French Frigate Shoals represents only a small fraction of the global population and advise caution in extrapolating these numbers (Arata *et al.* 2009, p. 50), and we note further that the projected growth trend is based on an implicit assumption of no changes in conditions.

Arata *et al.* (2009) also used matrix models to examine population data for the black-footed albatross over the time period 1955 through 2003. These results, summed across all three colonies at Midway Atoll, Laysan Island, and French Frigate Shoals in the Northwestern Hawaiian Islands, suggest the black-footed albatross population overall was stable or slightly increasing during that time period, with an annual population growth rate of 0.3 percent a year (Arata *et al.* 2009, p. 46). Although positive, the authors note the observed growth rate of 1.003 is less than the natural annual growth rate estimate of 1.035 for the species. They attribute this difference of 3.2 percent in potential population growth to fishery mortality (Arata *et al.* 2009, p. 46). In other words, the data indicate that the black-footed albatross population was stable or slightly increasing between 1955 and 2003, but that it was increasing at less than its potential annual growth rate. Wiese and Smith (2003, pp. 34–35) similarly concluded that the world population of black-footed albatross was stable, with an observed annual growth rate of 1.005 (based on demographic rates as published in Cousins and Cooper 2000 and Lewison and Crowder 2003), but also noted the population was growing at less than its estimated potential annual growth rate of 1.04 (Wiese and Smith 2003, p. 33). The authors cautioned that, although the black-footed albatross population appeared to be stable, this reduced annual growth rate renders the population vulnerable to changes in their environment, especially in conjunction with sustained anthropogenic impacts (Wiese and Smith 2003, p. 35).

Japanese Islands

Breeding populations of black-footed albatross currently occur on Izu-Torishima (Torishima) Island in the Izu Islands, on nine islets in the Ogasawara islands within the Bonin Island complex, and on three islets in the Senkaku Islands (Kawakami *et al.* 2006, p. 187; Chiba *et al.* 2007, p. 5; Eda *et al.* 2008, p. 109). Few data are available specific to the breeding population of the black-footed albatross in Japan. The Western Pacific Regional Fishery Management Council (Council) provided us with fledging success estimates for the Ogasawara Islands for 2009. The Council reported 801 chicks fledged, which is not directly comparable to the 967 nesting pairs in 2006 shown in table 2. They extrapolated these fledgling count data to estimate the number of nesting pairs, and concluded approximately 1,070 black-footed albatross nesting pairs were present on the Ogasawara Islands in 2009, which they interpreted as representative of an increase in the population. Because of the documented annual variability in nesting activity in black-footed albatross breeding colonies and lack of other supporting information, we believe extrapolation from a single year of fledging success data to an increase in the black-footed albatross population trend is inappropriate. However, Dr. Hiroshi Hasegawa of Toho University in Japan has additionally reported that the number of black-footed albatross chicks reared on Torishima Island has increased steadily between 1957 and 2010 (Figure 4) and that the populations on the Ogasawara and Senkaku Islands have also increased (Hasegawa 2010, pers. comm.).

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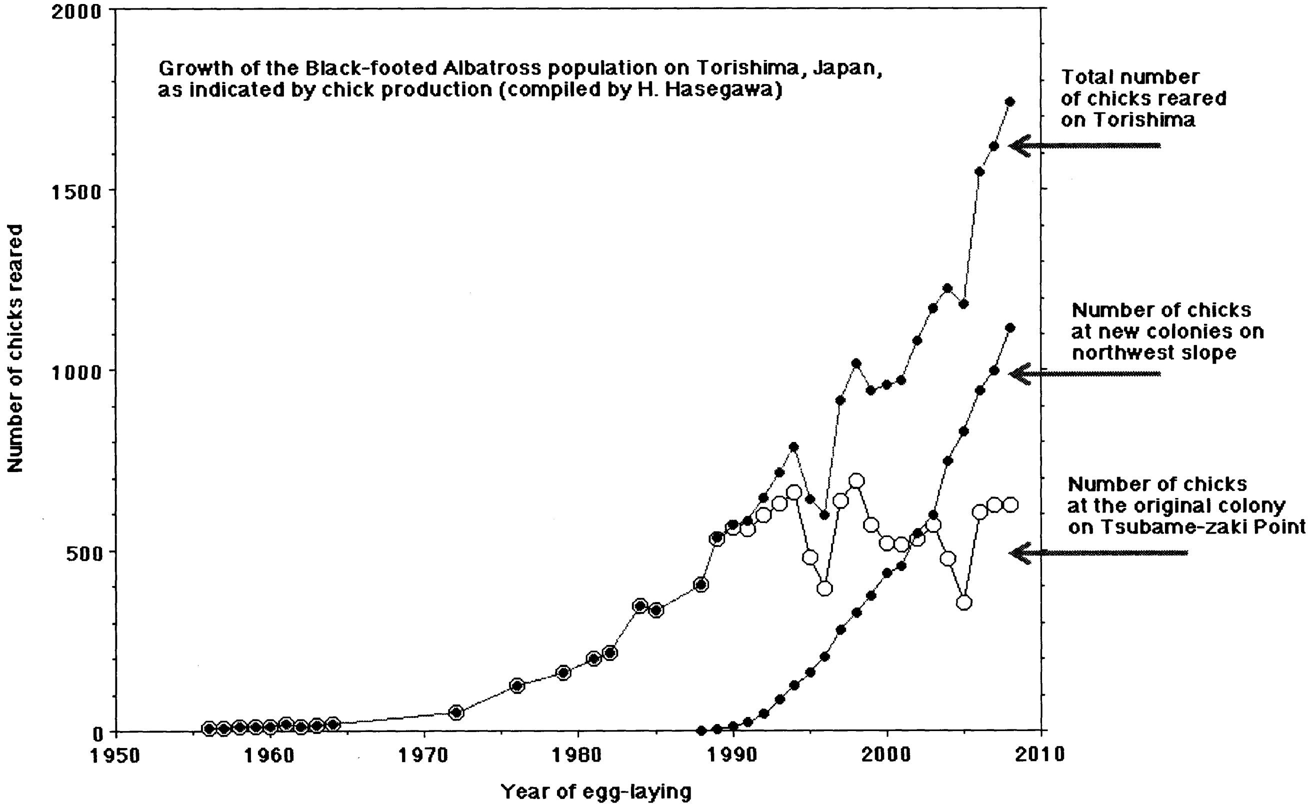

Figure 4. Growth of the black-footed albatross population on Torishima Island, Japan, as indicated by chick production (Hasegawa 2010, pers. comm.).

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Marshall Islands and Wake Atoll

Black-footed albatrosses have infrequently been reported on Wake Island, a U.S. territory in the Marshall Islands archipelago in the central Pacific, an area from which they had been extirpated by feather hunters prior to World War II (Rice and Kenyon, 1962a, pp. 379–380; Rauzon *et al.* 2008, pp. 15–16). Although a few birds have occasionally been observed nesting on Wake Island, any eggs laid were subsequently abandoned, and there have been no reports of black-footed albatross fledging here (Rauzon *et al.* 2008, p. 15). These birds are attempting to breed and may be prospecting for future nesting sites on this island, but based on the available information, we conclude that at present there is no established breeding population of black-footed albatrosses on Wake Island or on any island, atoll, or reef in the nearby Marshall Islands (see Tables 2 and 3).

Mexican Islands

There have been a handful of reports recording intermittent nesting activity by black-footed albatrosses on Guadalupe and San Benedicto islands in the Revillagigedo Island archipelago off the tip of Baja California, Mexico (Pitman and Ballance 2002, p. 13). In 1999, Pitman and Ballance (2002, p. 13) recorded a single black-footed albatross standing among a group of Laysan albatrosses on Albatross Beach on San Benedicto Island. In 2000, they recorded an adult black-footed albatross sitting on an egg on the rim of Herrera Crater on San Benedicto Island (Pitman and Ballance 2002, p. 13). Also in 2000, but on Guadalupe Island, military personnel identified a black-footed albatross nesting area that was set apart from the Laysan albatross nesting area. They also reported seeing a ''fully-feathered chick'' at this same site in 1998, no breeding in 1999, and no breeding in 2000, although one pair of birds was reported ''visiting'' the site every afternoon in 2000 (Pitman and Ballance 2002, p. 13). Apart from these reports, no black-footed albatross have been recorded nesting on either San Benedicto or Guadalupe islands in the last 10 years, although they have been recorded visiting and possibly prospecting for nesting sites on both islands during breeding seasons (Henry 2007, pers. comm.; Hebshi 2010, pers. comm.). The International Union for Conservation of Nature (IUCN) Red List reports a population of 400 black-footed albatross exists on Guadalupe Island (IUCN Red List, *http://www.iucnredlist.org*). We note this report appears to be in error, as there is a known population of approximately 400 Laysan albatross on Guadalupe Island, but there are no black-footed albatross. In conclusion, at this time, there is no established breeding population of black-footed albatross on either San Benedicto Island or Guadalupe Island in Mexico, but birds may sporadically nest there and appear to be prospecting the islands for potential nesting sites (Naughton 2010, pers. comm.).

Population Trends and Projections

Noticeable declines in nesting activity during the 1990s generated concern for the health of the black-footed albatross population, and several population modeling efforts were undertaken to evaluate the cause of the decline and to estimate the worldwide status of the black-footed albatross. Cousins and Cooper (2000, entire), Lewison and Crowder (2003, entire), Wiese and Smith (2003, entire), Niel and LeBreton (2005, entire), Veran *et al.* (2007, entire), and Arata *et al.* (2009, entire) used the nest count data collected by the Service on French Frigate Shoals, Midway Atoll, and Laysan Island, estimates of bycatch rates from the domestic and international fisheries, estimates of adult survival, and other population parameters to analyze and project black-footed albatross population trends. Population projections specific to the Japanese breeding colonies of black-footed albatross are not available.

The conclusions regarding future black-footed albatross population trends based on these different modeling efforts are not easily comparable because of limited or nonexistent empirical data. The various researchers consequently had to rely on various assumptions, and these assumptions often varied between models, as did the methods. In part due to these differences in assumptions, the conclusions reached by the various models are not consistent, making it difficult to project the future population condition of the black-footed albatross with certainty. Here we briefly summarize and evaluate each of these efforts.

Cousins and Cooper (2000, entire) investigated the population parameter values available at the time of their analysis, evaluated changes in demographic rates such as adult and juvenile survival, and modeled effects of longline fishing activity on the black-footed albatross. They reported a mean adult survivorship rate of 0.923 (range 0.81–0.994) over the years 1961 to 1966, based on data from Midway Atoll, and stated that this estimate of adult survival was based on data collected when the Hawaii-based longline fishing fleet represented only a small fraction of the north Pacific fishing effort (Cousins and Cooper 2000, p. iv). They also noted that this adult survivorship rate may be an underestimate (Cousins and Cooper 2000, p. 50). They estimated more recent adult survivorship, based on the years 1991–1997, as in the range of 0.90–0.94 (Cousins and Cooper 2000, p. 50).

According to a predictive model that estimated the annual population growth rate based upon varying levels of mortality and adult and juvenile survival rates, Cousins and Cooper (p. 53) found black-footed albatross population trends were more sensitive to changes in survival than fecundity, and reported juvenile survival has to be 86 percent or higher to prevent a population decrease, assuming adult survivorship of 0.93 and fecundity of 0.25 fledglings per adult (note that this model utilized a combination of experimental rates from black-footed albatrosses and Laysan albatrosses, since data for black-footed albatrosses were limited at the time). However, the most recent values for black-footed albatross survivorship (adult survivorship 0.967 and juvenile survivorship 0.993; Arata *et al.* 2009, p. 47) are higher than those for Laysan albatrosses, which were used in their models (adult survivorship 0.947 and juvenile survivorship 0.57; Cousins and Cooper 2000, p. 49).

Their models indicated the potential annual growth rate of the black-footed albatross population, without any bycatch loss, is in the range of 0 to 4 percent (annual growth rate, or lambda (λ) of 1.0 to 1.04) (Cousins and Cooper 2000, p. 56). In addition, they developed an estimate of potential biological removal—the maximum mortality that can be sustained before declines are observed—as 10,000 birds per year (Cousins and Cooper 2000, p. 57). Based on anecdotal evidence, they report the interactions of Japanese fisheries with black-footed albatross as insignificant (H. Hasegawa, Toho Univ., pers. comm., as cited in Cousins and Cooper 2000, p. 67). The demographic parameters and modeling efforts presented by Cousins and Cooper (2000, entire)) serve as the basis for some of the predictive models developed by several later researchers.

Lewison and Crowder (2003, entire) developed an age-structured matrix model. They based their longline fishing bycatch rates on published rates for the Hawaii and Alaska fisheries, and estimated annual fishing effort by international longline fleets (Lewison and Crowder 2003, pp. 774–746). Since their baseline population model was based on the demographic parameters reported by Cousins and Cooper (2000), the authors state that ''double-dipping'' (adding estimated fisheries bycatch to a demographic rate that already reflects mortality from fisheries) was not likely, based on their stated assumption that significant fisheries mortality was not occurring during the time period when the data used by Cousins and Cooper were collected (mid-1970s; Lewison and Crowder 2003, p. 747). The authors assigned three levels of mortality and age-based survival probabilities to evaluate the effect of longline fishing on the black-footed albatross. Population trajectories under all mortality levels resulted in projected declines over a 20-year period (Lewison and Crowder 2003, p. 748). According to these models, mortality from longline fishing exceeded the potential biological removal value developed by Cousins and Cooper (2000) (Lewison and Crowder 2003, p. 748).

The authors stated their estimates are likely conservative, since the reported bycatch estimates do not include the estimated 30 percent of birds caught in fishery operations that are scavenged or dislodged from the hooks prior to observation, and are, therefore, not counted as bycatch (Lewison and Crowder 2003, p. 751). In addition, they pointed out that due to the life-history characteristics of the black-footed albatross—longevity, delayed maturity, low fecundity—there is a lag in population response, and the impact of threats that may cause declines in adult survival may not be detectable for many years (Lewison and Crowder 2003, p. 751). The authors concluded that although declines had not been observed, the bycatch rates for black-footed albatross suggested population-level effects were likely (Lewison and Crowder 2003, p. 751).

Wiese and Smith (2003, pp. 29–31) also estimated black-footed albatross annual growth rates using an age-structured matrix model based on the published demographic parameters of Cousins and Cooper (2000) and Lewison and Crowder (2003, Table 1). However, unlike Lewison and Crowder (2003), they assumed incidental fishing mortality was already incorporated in the adult survival rate, based on their observation that longline fishing has occurred in the north Pacific since the mid-1900s, and thus would have been in place when the data serving as the basis for calculating that adult survival rate were collected (Wiese and Smith 2003, p. 30). Wiese and Smith's estimate of a potential annual growth rate of 1.04 in the absence of fisheries mortality is identical to the estimate presented by Cousins and Cooper (2000, p. 56). Wiese and Smith's results showed the population was stable with a stochastic annual intrinsic growth rate of 1.005 (range 0.990–1.018), and projected annual population growth rates of 0.98–1.04 percent over a period of 20 years based on known demographic values at the time of their analysis (Wiese and Smith 2003, p. 33 and Figure 4), indicating a stable population.

In addition, the authors found their model successfully fit real data (COSEWIC 2007, p. 29). Wiese and Smith (2003, p. 35) pointed out data collected during breeding bird censuses since 1992 and subsequent population projections do not support the projected decline that served as the basis for the IUCN designation of black-footed albatross as a vulnerable species (upgraded to ''endangered'' by the IUCN in 2003). However, they also emphasized the decreased annual population growth rate of the black-footed albatross, reduced below its maximum potential, renders the species vulnerable to additional stressors, even if the species is currently abundant, and they stressed the need for careful monitoring of colonies and the use of bycatch reduction measures in Canadian and international longline fisheries.

Niel and Lebreton (2005, entire) developed a model to estimate the annual maximal growth rate of a species from incomplete demographic data and used the black-footed albatross as a case study. They applied the population parameters developed by Cousins and Cooper (2000, entire) in their model and calculated a maximal annual growth rate of 1.059 (Niel and Lebreton 2005, p. 833). Additionally, they calculated the potential excess growth (used as an estimate of the maximum additional mortality the population could sustain on an annual basis without declining) of the population as 8,850 individuals. (It should be noted that Niel and Lebreton (2005) utilized the population parameters for the Laysan albatross presented in Cousins and Cooper (2003, p. 49; breeding age of 8.6 years and adult survivorship of 0.947) rather than those specific to the black-footed albatross, since Cousins and Cooper used the parameters for the Laysan albatross in their initial modeling efforts in the absence of data for the black-footed albatross (Cousins and Cooper 2000, p. 49)). It is not clear why they did so, since Cousins and Cooper (2000, p. 47) did provide an adult survivorship estimate specific to black-footed albatross, but it may be because Cousins and Cooper (2000, p. 50) believed their data likely underestimated adult survivorship of black-footed albatross. More recent estimates of black-footed albatross adult survivorship are 0.967 for the time period 1994–2002 (Arata *et al.* 2009, p. 47), slightly greater than the estimate of 0.947 for Laysan albatross used by Niel and LeBreton (2005)). Based on their calculations, Niel and LeBreton (2005, p. 833) concluded the additional mortality associated with the longline fishery, based on an estimated mortality of 12,000 individuals a year during the 1990s, has a biologically significant impact on the growth potential of the black-footed albatross population.

Lacking reliable estimates of bycatch rates, Veran *et al.* (2007, entire) developed a model to quantify the relationship between albatross populations and longline fishing by using capture-recapture data to develop survival estimates, and investigated the relationship between fishing effort and black-footed albatross adult survival using principal components analysis. One of the key assumptions of their model was that the level of bycatch is proportional to fishing pressure; thus, they assumed mitigation measures were not in place to reduce incidental mortality from fisheries (Veran *et al.* 2007, p. 4). Their adult survivorship estimates were based on capture-recapture data gathered between the years 1992–2003 on Tern Island in the Northwestern Hawaiian Islands (Veran *et al.* 2007, p. 3). Their results suggested a significant negative relationship between adult survival and fishing effort (Veran *et al.* 2007, p. 1). When fishing effort was high, adult survival was estimated to be 92 percent, which the authors described as low compared to other albatross species, and adult survival was related to fishing effort in a nonlinear fashion (Veran *et al.* 2007, pp. 5–7). Inspection of the adult survivorship data presented for 17 albatross species shows that Veran *et al.'s* estimated 0.92 survivorship of the black-footed albatross is on the borderline between those albatross species that were categorized as being impacted by fisheries (range 0.84 to 0.91) and those not impacted by fisheries (range 0.926 to 0.98) (Veran *et al.* 2007, Appendix S2). The authors estimated annual adult survival of black-footed albatross would be approximately 95 percent in the absence of fishing mortality (Veran *et al.* 2007, p. 8).

Veran *et al.* (2007, p. 9) concluded the low adult survival probability during the study period, combined with the significant correlation with longline fishing, suggests an anthropogenically induced decline for the black-footed albatross population. However, their only reference to evidence of any decline in the breeding population is a citation to unpublished data from the Service for the years 1992 to 2004 (Veran *et al.* 2007, p. 2); we note that more recent Service data for 1998 to 2009 indicate the black-footed albatross population is not in decline, but is stable or increasing at a rate of 0.93 percent a year (95 percent confidence interval (CI) 0.85 to 1.00; ACAP 2010, p. 5). (The Service used data from 1998 through 2009 because it reflects direct counts of breeding black-footed albatross on Laysan; we considered data from 1992 through 1998 less reliable as it reflects only estimates of breeding numbers, with resulting wide margins of error). In conclusion, Veran *et al.* (2007, p. 9) stressed the importance of efficient mitigation measures to reduce incidental mortality and maintain a sustainable survival probability for the black-footed albatross.

Arata *et al.* (2009) conducted a status assessment of the black-footed albatross, evaluated current population trends using linear regression and matrix models (both discussed above under ''Current Population Status''), and projected future trends using population viability analyses (PVA), assuming current conditions but incorporating environmental and demographic stochasticity. The authors based their analyses on counts of nesting birds from Midway Atoll, Laysan Island, and French Frigate Shoals in the Northwestern Hawaiian Islands; counts were available for 11 years: 1923, 1957, 1992, and 1998–2005 (Arata *et al.* 2009, p. 77). The survivorship rates presented and utilized by Arata *et al.* (2009, p. 47) were higher than those reported in earlier studies; for the years 1994 to 2002, they calculated an adult survivorship rate of 0.967 (compared to 0.926 for the years 1963 to 1982, and 0.892 for the years 1983 to 1993) and a juvenile survivorship rate of 0.993 (compared to 0.688 for 1963 to 1982 and 0.668 for 1983 to 1993). These rates suggest that both adult and juvenile survivorship may have increased from the mid-1990s to 2002, the last year covered in the survivorship estimates.

Arata *et al.* (2009, p. 46) estimated total fishery bycatch, including international fisheries, at 5,228 birds per year in 2005 and found this was within the mortality level that can be sustained by the black-footed albatross population without causing a decrease (Arata *et al.* 2009, p. 46). Their calculated maximum potential biological removal rate was 11,980 birds per year (range 10,579–12,796) (Arata *et al.* 2009, p. 47). All of their model scenarios indicated that when both the pelagic longline and pelagic driftnet fisheries were active during the 1980s the incidental mortality of black-footed albatross exceeded the potential growth capacity for the species (Arata *et al.* 2009, Figure 4, p. 15), and they concluded that the closure of the high seas pelagic driftnet fishery in 1992 was critical to preventing further population declines for the black-footed albatross (Arata *et al.* 2009, p. 46). In terms of the current conditions, the authors advised caution in interpreting results because there is such great uncertainty in the bycatch estimates and suggested that if the estimated bycatch level is doubled as a conservative safeguard for potentially underestimating bycatch, the resulting value approaches the potential biological removal maximum, and the upper 95-percent confidence limit exceeds that value (Arata *et al.* 2009, pp. 46, 51).

Although Arata *et al.* (2009, p. 51) stated that fishery bycatch ''may be causing a decrease in black-footed albatross populations,'' it is not clear how they arrived at that conclusion since they offer no evidence of a population decrease, and their conclusions point to rangewide populations being stable or increasing for their period of analysis. We assume the authors meant that, given the uncertainty in bycatch estimates, a population decline might be expected if the worst-case scenario were realized and bycatch was actually twice as much as the estimate they used (see, for example, the discussion regarding the uncertainty of bycatch estimates, particularly with regard to international longline fisheries, on p. 67 of Arata *et al.* 2009). Individual PVAs showed breeding colonies on Midway Atoll and French Frigate Shoals are stable or increasing, with projected annual population growth rates of 1.5 percent (95 percent CI 1.1 to 1.9) and 1 percent (CI 0.8 to 1.2) a year, respectively (Arata *et al.* 2009, pp. 39, 41). In contrast, the population on Laysan Island is declining, with a negative annual growth rate of 1.3 percent (CI -1.7 to -0.9) per year (Arata *et al.* 2009, p. 41).

Projections of future trends for all three colonies showed a high degree of uncertainty, with high probabilities of colonies both increasing and decreasing in the future, although in most cases the probability of future increases is greater than the probability of future decreases (Arata *et al.* pp. 39–45, 51). The authors concluded that, under conditions present in 2005, the black-footed albatross population is not at risk of a substantial decrease over the next 60 years (Arata *et al.* 2009, p. 50). Overall, the decreases at Laysan Island appear to be offset by the positive growth observed at Midway Atoll and French Frigate Shoals, resulting in the overall stable or positive trend.

Arata *et al.* (2009, p. 50) reported that the assumption of zero bycatch prior to 1970, as assumed by the previous analyses of Cousins and Cooper (2000) and Lewison and Crowder (2003), is not supported by their model (Arata *et al.* 2009, p. 46). They questioned the key assumption in the Lewison and Crowder (2003) model that led to the prediction of a rapid population decline for the black-footed albatross over the 60 years following their analysis, namely the assumption that there was no effect of fishery bycatch on adult survivorship at the time the data were gathered that served as the basis for demographic parameter estimates, in the 1960s and 1970s. Arata *et al.* (2009, p. 50) report that fishery effort data from the Ocean Fisheries Program indicate that fishery bycatch was in fact most likely significant during this time period (see Arata *et al.* 2009, Figure 4, p. 15). If so, this would result in analyses such as those of Cousins and Cooper (2000) and Lewison and Crowder (2003) having inadvertently doubled the impact of fisheries bycatch, since bycatch effects would already be reflected in the survivorship rates used, but mortality from bycatch was then additionally imposed on the population in the models. This inadvertent doubling of bycatch effects would account for the prediction of particularly rapid population decreases. Arata *et al.* (2009, p. 79) point out the nonindependence between survival estimates and fishery bycatch levels since the pelagic fishery started in 1952, and caution that survival estimates affected by fishery mortality used in previous population assessments may have significantly influenced results.

We additionally received comments during the information solicitation period indicating this possible double-counting of fisheries mortality in the Lewison and Crowder (2003) model, and pointing out that it would have resulted in erroneous predictions of sharp population decline (*e.g.,* Harrison 2008, pers. comm., p. 9). More importantly, perhaps, we received a communication from the senior author of the Lewison and Crowder (2003) analysis, in which Dr. Rebecca Lewison points out that their paper had illustrated population-level trajectories for the black-footed albatross *if bycatch levels remained constant and bycatch was unmitigated,* and assuming the bycatch levels observed in the Hawaii fishery from 1994 to 2000 would continue over the 60 year time period of the projection. ''This assumption has already been shown to be false,'' Dr. Lewison stated, ''There have been several NOAA regulations from 2001–2004 which have included initial and revised mitigation device requirements, improved performance specifications of mitigation devices, and spatial/temporal fishing closures. It is clear that mortality levels have dropped dramatically as a result'' (Lewison 2007, pers. comm., p. 2). An accurate understanding of the Lewison and Crowder (2003) model has important consequences, as the severe population declines projected by that particular model led, at least in part, to the IUCN changing the status of the black-footed albatross from ''vulnerable'' to ''endangered'' in 2003 (IUCN 2011), a change which further played a key role in spurring the original petition to list the species under the Act (EarthJustice 2004, p 2). The IUCN change in classification also apparently served as the basis for NatureServe to change the ranking of the black-footed albatross from G5 (globally secure) to G3/G4 (vulnerable) (NatureServe 2011).

Subsequent modeling efforts have produced different results. The modeling by Arata *et al.* (2009, pp. 50–51), which accounted for bycatch impacts in the observed demographic rates utilized in the models (Arata *et al.* 2009, p. 79), did not project future declines in the black-footed albatross population. Wiese and Smith (2003, p. 30) likewise considered that the black-footed albatross had sustained mortality in the northeastern Pacific fisheries since the 1970s, and, therefore, considered the survival rate data collected during that time to represent a population already affected by incidental mortality due to fisheries; their model also did not support projections of a population decline (Wiese and Smith 2003, p. 35). We consider these models to provide more accurate projections of future population trends in the black-footed albatross since they avoid the issue of double-counting mortality from fisheries bycatch. However, it appears the conservation status of the black-footed albatross has not yet been updated in light of this new information by either NatureServe (2011; population trend information cites to IUCN 2000) or the IUCN, although the IUCN does note that its current categorization of the black-footed albatross is likely to be revisited pending the outcome of a review of the species' population status (IUCN 2011).

Population-level estimation of demographic parameters in black-footed albatrosses has proved difficult because of multiple factors, including band loss and variation in capture-recapture efforts (Doherty *et al.* 2006, pp. 175–176). Until recently, the population monitoring program in the Hawaiian Islands consisted only of annual counts of breeding birds in three colonies at French Frigate Shoals, Midway Atoll, and Laysan Island. The program did not account for the proportion of nonbreeding birds in a year. A change in the count data from year to year could, therefore, reflect either a change in the total breeding population size or a change in the proportion of birds returning to breed in a given year (Naughton *et al.* 2007, p. 15).

The Service has contracted with USGS's Patuxent Wildlife Research Center to review the black-footed albatross monitoring program implemented by the Service in the Northwestern Hawaiian Islands. A pilot study has been undertaken that is expected to provide information on adult survival, probability of a breeder skipping a year, and reproductive success (Arata *et al.* 2009, p. 21; Naughton 2009, pers. comm.). These parameters are important for refining demographic models and determining population trends.

Summary Evaluation of Population Status and Trend Data

Following the end of feather hunting at nesting colonies, the world population of the black-footed albatross recovered from an estimated low of 17,800 breeding pairs in Hawaii and 200 breeding pairs in Japan in the early 1920s (Arata *et al.* 2009, p. 35) to an estimate of 64,031 breeding pairs in Hawaii and 3,184 breeding pairs in Japan as of 2010 (ACAP 2010, Table 3, p. 4; Flint 2011a, pers. comm.). Our evaluation of the best available scientific data indicates the world population of the black-footed albatross is currently stable or slightly increasing, although population growth is below its potential maximum, likely due to the impact of incidental bycatch in fishery operations (Wiese and Smith 2003, p. 35; Niel and Lebreton 2005, p. 833; Arata *et al.* 2009, p. 46). In the Hawaiian Islands, home to an estimated 95 percent of the breeding population of the black-footed albatross, a decrease in the number of breeding pairs on Laysan Island appears to be offset by increases at Midway Atoll and French Frigate Shoals, resulting in an overall positive trend and an increase of 0.93 percent annually for these three areas combined for the years 1998 through 2009 (ACAP 2010, p. 5). The nearly 40 percent reduction in the size of the colony on Laysan Island since the late 1950s (ACAP 2010, p. 7), however, does indicate cause for concern, as well as the need for further research to determine the underlying cause of this decline. In Japan, indications are that the number of breeding pairs has steadily increased over time (Cousins and Cooper 2000, p. 23; Arata *et al.* 2009, p. 39; Hasegawa 2010, pers. comm.).

There is little doubt that incidental mortality from fisheries had a significant negative impact on black-footed albatross populations in the past (Niel and Lebreton 2005, p. 833; Arata *et al.* 2009, p. 46), and recent analyses demonstrate a significant negative relationship between black-footed albatross survivorship and fisheries effort (Veran *et al.* 2007, p. 1). Examination of estimated bycatch data over the past 50 years shows high numbers of black-footed albatrosses killed in the pelagic driftnet and longline fisheries, peaking with 15,290 birds in 1961 and again with 16,215 birds in 1988 (Arata *et al.* 2009, p. 14). Past bycatch estimates ranged generally between approximately 6,000 and 10,000 birds a year, often exceeding the maximum potential biological removal value estimated for the black-footed albatross (Arata *et al.* 2009, Figure 4, p. 15; p. 46). However, mortality of black-footed albatrosses was greatly reduced following the closure of the high seas driftnet fishery by a United Nations resolution in 1992 (ACAP 2010, p. 12) and implementation of regulatory bycatch measures in U.S. longline fleets in 1997 and 2002 (Arata *et al.* 2009, p. 14, Figure 4; Moore *et al.* 2009, p. 444, Figs. 3A and 3B). Bycatch of black-footed albatrosses in the Hawaii-based pelagic longline fishery has decreased from over 1,300 birds taken annually in 1999 and 2000 to less than 100 in 2007 (annual report on seabird interactions and mitigation efforts in the Hawaii longline fishery for 2007, Administrative Report, U.S. Dept. of Commerce, NOAA, NMFS, PIRO, April 2008). The increased survivorship probabilities observed for both adult (0.967) and juvenile (0.993) black-footed albatross since these measures have been in place, for the years 1994–2002, may reflect this significant reduction in mortality (Arata *et al.* 2009, p. 47).

Attempts to project the future condition of the black-footed albatross population have produced inconsistent results. However, some of the past models that suggested incidental mortality from fisheries bycatch may exceed the level that can be sustained by the black-footed albatross population were based on demographic data gathered prior to both the high-seas driftnet moratorium (1992) and to regulatory bycatch reduction measures implemented in U.S. fisheries (1997, 2002) (*e.g.,* Cousins and Cooper 2000). It is not known what these models might project under current conditions, as these bycatch reduction measures have resulted in a significant decrease in incidental mortality of albatrosses (American Bird Conservancy 2008, pp. 7–9; Awkerman *et al.* 2008; Arata *et al.* 2009, pp. 14, 46; Moore *et al.* 2009, p. 444; ACAP 2010, p. 12).

The model of Lewison and Crowder (2003) assumed bycatch mortality was constant, and the model of Veran *et al.* (2007) assumed no bycatch mitigation measures were in place; neither of these assumptions are met under present conditions since effective bycatch reduction measures have been put in place in the U.S. fleets (acknowledging the level of bycatch in international fleets remains unknown and knowledge of bycatch in the U.S. North Pacific fleets is imperfect). That these assumptions are now known to be false has been acknowledged (Lewison 2007, pers. comm., p. 2). In addition, the studies of Cousins and Cooper (2000) and Lewison and Crowder (2003) appear to have used demographic parameters based on a potentially erroneous assumption of zero bycatch at the time the data on survivorship values were collected, resulting in likely exaggerated predictions of rapid population declines when mortality from bycatch was added to demographic rates that already reflected ongoing bycatch at the time the data were collected (Arata *et al.* 2009, p. 46). When bycatch mortality is considered to be already reflected in the survivorship parameters utilized, models project stable or slightly increasing populations of the black-footed albatross (Wiese and Smith 2003, p. 24; Arata *et al.* 2009, pp. 50–51).

We have evaluated the various predictive models for the black-footed albatross, and agree with Arata *et al.* (2009, p. 50) that the model of Lewison and Crowder (2003, entire) most likely overestimated bycatch impacts by adding mortality from fisheries bycatch on demographic parameters that already reflected bycatch impacts. This inadvertent doubling of the mortality rate from bycatch would have resulted in the projection of precipitous population declines for the species. We base our conclusion on the data from the Ocean Fisheries Program presented in Figure 4 of the report of Arata *et al.* (2009, p. 15), which shows significant levels of bycatch mortality of black-footed albatrosses from commercial fisheries occurring from the mid-1950s through the early 1990s. It follows that demographic parameters based on data collected during the mid-1970s, used by Lewison and Crowder (2003, p. 747) in their efforts, would have reflected ongoing levels of bycatch at that time.

Other models based on the assumption that bycatch mortality is already reflected in demographic data collected during this time period (and, therefore, did not incorporate further bycatch effects into simulations) project future black-footed albatross populations to be relatively stable or even slightly increasing in size under conditions present at the time of the analyses (Arata *et al.* 2009, pp. 46, 50–51; Wiese and Smith 2003, p. 35). Although stable, the results of these models also show that black-footed albatross populations are growing at less than their potential growth rate, most likely due to bycatch mortality (Arata *et al.* 2009, pp. 46, 50–51; Wiese and Smith 2003, p. 35). Because the models of Wiese and Smith (2003, entire) and Arata *et al.* (2009, entire) avoid double-counting mortality from fisheries bycatch, we consider them to provide the most reliable projections of population trends for the black-footed albatross.

All studies we examined acknowledged the vulnerability of the black-footed albatross to bycatch mortality, and all indicated that declines may occur in the future if bycatch levels are greater than estimated (*e.g.,* Arata *et al.* 2009, p. 47). At this point in time, however, we do not see any evidence that the black-footed albatross population is in decline, and current data suggest recent bycatch reduction measures have been effective in increasing survivorship (Arata *et al.* 2009, p. 65). Advances in avoiding seabird bycatch include methods such as the use of streamer lines, which are found to reduce incidental mortality of albatrosses by nearly 100 percent (Melvin *et al.* 2006, p. 4). Other seabird avoidance measures under evaluation include, but are not limited to, side setting, night setting, underwater setting, towing buoys, using heavier branch line weights, and dying bait (*e.g.,* Gilman *et al.* 2005, Table 1, pp. 40–41; Gilman *et al.* 2008, p. 12). Such measures are now required in most U.S. fisheries (some smaller vessels are exempted; for details, see the discussion under Factor D ‘‘The Inadequacy of Existing Regulatory Mechanisms,’’ below).

Although the conservation measures implemented thus far have been highly effective in reducing the incidental mortality of black-footed albatrosses (Arata *et al.* 2009, pp. 14, 46; Moore *et al.* 2009, p. 444; ACAP 2010, p. 12), great uncertainty surrounds the actual level of bycatch from international longline fisheries, and the true impact of those fisheries is currently unknown (Arata *et al.* 2009, p. 47). On the whole, however, the demonstrated effectiveness of current bycatch mitigation measures, where mandated, in conjunction with: (1) Indications that past models predicting severe declines may have inadvertently overestimated the impacts of fishery bycatch or operated under assumptions that are now known to be false; (2) analyses that show populations are collectively stable or increasing; and (3) recent modeling that projects no substantial decreases over the next 60 years if current mitigation measures remain in place (and assuming continuation of other conditions present in recent years), all lead us to the conclusion that black-footed albatross numbers are stable at present rangewide, in the Hawaiian Islands and in the Japanese Islands.

Summary of Factors Affecting the Species Throughout Its Range

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations (50 CFR part 424) set forth procedures for adding species to the Federal Lists of Endangered and Threatened Wildlife and Plants. A species may be determined to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

Listing actions may be warranted based on any of the above threat factors, singly or in combination.

In considering those factors that might constitute threats, we must look beyond mere exposure of the species to the factor to determine whether the species responds in a way that causes actual impacts to the species. If there is exposure to the factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat, and we then attempt to determine how significant that threat may be. All species face some degree or source of threat. We consider a threat to be ‘‘significant’’ if that threat may drive or contribute to the risk of extinction of the species such that the species warrants listing as threatened or endangered as those terms are defined by the Act. The mere identification of factors that could impact a species negatively is not sufficient to compel a finding that listing is appropriate. We require evidence that these factors are operative threats that act on the species to the point that the species meets the definition of endangered or threatened under the Act; that is, the species is presently in danger of extinction throughout all or a significant portion of its range (endangered), or is likely to become endangered within the foreseeable future (threatened).

In making this finding, we have considered and evaluated the best available scientific and commercial information, including information received in response to our 90-day finding (72 FR 57278, October 9, 2007) and received or acquired in response to our August 26, 2009, notice (74 FR 43092) reopening the information collection period. Below we summarize the information regarding the status and threats to the black-footed albatross across the range of the species in relation to the five factors in section 4(a)(1) of the Act.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

As with other members of the family Diomedeidae, black-footed albatrosses feed offshore or pelagically, and return to land only to breed. In this section, we describe and evaluate various conditions in relation to the present or threatened destruction, modification, or curtailment of the marine and terrestrial habitats and range of the black-footed albatross, including: Military activities; volcanic activity; natural gas development; invasive plant species; and conditions related to climate change, including sea level rise and coastal inundation, tropical storm frequency and intensity, impacts to marine productivity, and ambient temperature. Each of these topics is discussed in relation to the two breeding populations (Hawaiian Islands and Japanese Islands) that collectively constitute the entire breeding range of the species.

Military Activities

Historical occupation by armed forces on islands important to black-footed albatross breeding populations occurred during much of the twentieth century, mostly associated with World War II. Activities associated with warfare and development of military infrastructure throughout black-footed albatross breeding habitat, including the intentional modification of breeding habitat to reduce albatross nesting activity, negatively impacted albatross colony size in the past (Rice and Kenyon 1962b, p. 384). However, little information exists with which to deduce the original size of the black-footed albatross colonies on these islands because there were very few early quantitative studies.

Northwestern Hawaiian Islands. French Frigate Shoals and Midway, Kure and Johnston atolls all supported armed forces stations or sustained military activities during World War II (Rice and Kenyon 1962b, pp. 366–378). In addition to the obvious disruptive impact of active warfare during that time, black-footed albatross populations were severely diminished by the development of military bases that led to loss and degradation of nesting habitat and large-scale albatross eradication programs intended to reduce interference of the birds with aircraft operations (Arata *et al.* 2009, p. 17; ACAP 2010, p. 6). By 1996, management of nearly all of the Northwestern Hawaiian Islands was transferred to the jurisdiction of the Service, and active military impacts had ceased. The black-footed albatross' breeding sites on Midway Atoll National Wildlife Refuge (NWR), as well as Pearl and Hermes Reef; Lisianski, Laysan, Necker, and Nihoa islands; and French Frigate Shoals, which are part of the Hawaiian Islands NWR, are now all protected from human-related habitat modification or destruction because these islands are under the jurisdiction of the Service's NWR system.

The mission of the NWR System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration, of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans (U.S. Fish and Wildlife Service (USFWS) 2009b). Management of Kure Atoll was transferred from the U.S. Coast Guard to the State of Hawaii in 1993. Breeding sites for the black-footed albatross on Kure Atoll are protected from human-related habitat modification or destruction because this atoll now is a State wildlife sanctuary and is managed by the Hawaii Department of Land and Natural Resources (HDLNR) for the conservation and protection of indigenous wildlife, including seabirds (Hawaii Administrative Rules Title 13, Subtitle 5, Part 2, Chapter 125, sections 1–7). Further military impacts to black-footed albatross breeding habitat are unlikely in light of the transfer of the military lands to the Service and State, as described above.

Future military activity on these lands is further constrained by the 2006 establishment of the Northwestern Hawaiian Islands Marine National Monument (renamed Papahanaumokuakea Marine National Monument (PMNM) in 2007), which encompasses all of the islands, atolls, reefs, shoals, banks, and seamounts from 50 mi (80 km) east of Nihoa Island to 50 mi (80 km) west of Kure Atoll, and waters 50 mi (80 km) on either side of the lands. The co-trustees of the area are the Department of the Interior through the Service; the Department of Commerce through the National Oceanic and Atmospheric Administration (NOAA); and the State of Hawaii through the HDLNR. PMNM management is also accomplished in coordination with the State Office of Hawaiian Affairs. Within the boundary of the PMNM are two National Wildlife Refuges: Hawaiian Islands NWR and Midway Atoll NWR; the State Seabird Sanctuary at Kure Atoll; the State Marine Refuge; and the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve. Current uses are limited primarily to management activities by jurisdictional agencies, research, education, Native Hawaiian practices, a small-scale commercial bottomfishing and pelagic trolling operation, and a small number of recreational trips and visits to historical sites at Midway Atoll. Although military activities are not expressly prohibited within PMNM, the management regulations do require that all activities and exercises of the Armed Forces shall be carried out in a manner that avoids adverse impacts on monument resources and qualities, to the extent practicable and consistent with operational requirements (71 FR 51138; August 29, 2006). We have no reason to anticipate any active military operations within the PMNM.

Kaula Island and Lehua Island. Kaula Island has been under U.S. Navy control since 1965 and is still used for munitions training. In 1977, Kaula Island was designated a State Seabird Sanctuary by the State of Hawaii (U.S. Navy 2009, unpubl.). Currently the Navy uses the southeastern portion of the Kaula Island for inert ordnance and gunnery activities, and it was previously used as a practice range for air-to-surface and surface-to-surface weapons delivery. Black-footed albatrosses have been observed on Kaula Island as recently as 1998 (USFWS 2009a; U.S. Navy 2009, unpubl.), but the last breeding data collected from a 1993 survey reported a breeding population of only three pairs (ACAP 2010, p. 4). Because of concerns regarding bird-aircraft hazards and unexploded ordnance, access to the island for bird surveys or management has been denied (U.S. Navy 2009, unpubl.). Lehua Island is administered by the U.S. Coast Guard and managed by the State of Hawaii as a State Seabird Sanctuary. No current military activities occur on this island, and none are anticipated.

Japanese Islands. Torishima Island has been a protected national natural monument since 1965, when it was still under U.S. authority, and can be visited only by research scientists with special permission. In the Ogasawara Islands, Muko-jima is known to have been occupied during World War II by a Japanese garrison that presumably ‘‘wiped out’’ whole bird colonies for use as a food source (Austin 1949, pp. 290–291). The Senkaku Islands were used by the U.S. Navy as maneuver areas.

Following World War II, all of the western Pacific islands were controlled by the United States. However, in 1972, all of the islands were returned to Japan, although Taiwan and the People's Republic of China (China) both claimed sovereignty to the Senkaku Islands, and this is still under dispute (Senkaku Islands 2009).

Natural reoccupation or recolonization by black-footed albatrosses since World War II has occurred on Torishima Island, the Ogasawara Islands (Muko-jima Island and Haha-jima Island), and the Senkaku Islands (Arata *et al.* 2009, p. 39). The Ogasawara Islands are now part of Japan's Ogasawara National Park, and current protective management of the islands likely precludes future military activities.

In summary, significant military activity is not currently taking place anywhere within the range of the black-footed albatross, and we have no reason to anticipate any increase in future military activity. Therefore, military activity does not pose a threat to the black-footed albatross in relation to the present or threatened destruction, modification, or curtailment of its habitat or range rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Volcanic Activity

Within the nesting range of the black-footed albatross, volcanic activity in historical times is recorded only from Torishima Island, where a 1903 volcanic eruption occurred during the nonbreeding season for several species of albatrosses, so that the only apparent effect was to destroy part of their nesting habitat. By 1930, it was apparent that many birds had returned and were breeding on the island, as human harvesting of all the albatross species was resumed by settlers. The volcano erupted again in 1939, burying most of the former breeding grounds and making them uninhabitable for the birds. The main crater overflowed once more in 1941, closing the natural anchorage that had allowed free access to human hunters in the past. When visited in 1949, the island was described as ''birdless'' (Austin 1949, p. 289). The island was again naturally reoccupied by black-footed albatrosses subsequent to this eruption, growing from a count of 6 chicks in 1957 to 914 chicks by 1998 (H. Hasegawa, unpublished data, as cited in Cousins and Cooper 2000, p. 23). Volcanic activity on Torishima Island was last recorded in 2002, with volcanic ash and rock blanketing the central portion of the island. The following year, surveys resulted in an estimate of 2,150 breeding pairs of black-footed albatross on Torishima (ACAP 2010, p. 4), demonstrating that the breeding population was largely unaffected by this most recent event.

Given this history, it is likely that Torishima Island will continue to experience volcanic activity. The evidence from past events suggests that black-footed albatrosses may survive such an event, as they have in the past, since at any given time approximately 75 percent of the birds are at sea and, therefore, are likely to be absent at the time of a volcanic eruption or other catastrophic event (Finkelstein *et al.* 2010, p. 328). Past reoccupation of Japanese islands by black-footed albatrosses has occurred subsequent to volcanic events as well as recolonization following extirpation of colonies due to military activities during World War II. Therefore, if the nesting population should be eliminated from the island due to volcanic activity impacts on nesting habitat, as has apparently occurred in the past, the historical evidence suggests that natural reoccupation of the island is probable assuming no other substantial changes in present conditions. In addition, Torishima might also be recolonized by birds from the nearby Ogasawara Islands.

Some researchers have suggested this scenario to be unlikely as movement of black-footed albatrosses between colonies is typically low (*e.g.,* Finkelstein *et al.* 2010, p. 323). However, we believe natural reoccupation is likely, based on past evidence of several separate reoccupation events, although we acknowledge the population would likely suffer reduced productivity for several years following a catastrophic volcanic event. Torishima provides nesting habitat for 3.5 percent of the rangewide population and is the only nesting island for black-footed albatrosses with an active volcano. Most birds nesting on Torishima likely would be at sea if there were an eruption, and based on past history it is reasonable to assume the island would be reoccupied over time following any such event. Therefore, we conclude that volcanic activity does not pose a threat to the black-footed albatross in relation to the present or threatened destruction, modification, or curtailment of its habitat or range in the Hawaiian Islands, the Japanese Islands, or rangewide.

Natural Gas Exploration

Exploration for natural gas has recently become a potential issue for birds on the Senkaku Islands. A dispute, primarily between Japan and China but also including Taiwan, over the territorial jurisdiction of the Senkaku Islands has been ongoing since the summer of 1970 (Cheng 1973–1974, p. 221; Downs and Saunders 1999, p. 124). Although this dispute originated in 1945 following World War II, it escalated in the 1970s when potential undersea natural gas reserves off the continental shelf near the Senkaku Islands became an economic issue. However, there is no firm evidence that commercially exploitable petroleum reserves exist in the area (Downs and Saunders 1999, p. 124). Furthermore, it has been suggested that multinational petroleum companies have little interest in drilling near the Senkaku Islands because of difficult terrain, political uncertainty, existence of unexploded ordnance from use of the islands as a target range, and doubts about whether any reserves that might exist can be commercially exploited in viable terms (Downs and Saunders 1999, p. 124). Regardless of the outcome of the territorial dispute and the unlikely progress of gas exploration, we have no information to indicate that such development of natural gas resources in the area of the Senkaku Islands would potentially modify or destroy black-footed albatross nesting or foraging habitat. The black-footed albatross population of the Senkaku Islands comprises less than 0.1 percent of the rangewide population, and less than 2 percent of the breeding population of black-footed albatross in the Japanese Islands (56 breeding pairs; ACAP 2010, p. 4). Thus, even if such development were to occur and impact habitat on the Senkaku Islands, it would likely not pose a significant threat to the Japanese Islands population. It appears unlikely that gas exploration will occur in the Japanese Islands because: (1) There is no strong evidence that such resources exist; (2) commercial interest to develop these resources is weak, even if they were found to exist; and (3) sovereignty of the Senkaku Islands continues to be in dispute. Therefore, we conclude that natural gas exploration off the Senkaku Islands does not pose a threat to the black-tailed albatross in relation to the present or threatened destruction, modification, or curtailment of its habitat or range, including across its entire range, in the Hawaiian Islands, or in the Japanese Islands.

Invasive Plant Species

Many plant species have been introduced to the Hawaiian Islands, and of these *Verbesina encelioides* (golden crown-beard) has been identified as the greatest threat to black-footed albatross nesting habitat (Naughton *et al.* 2007, p. 12). *Verbesina encelioides* is well established on Kure Atoll, Midway Atoll, and Pearl and Hermes Reef, where it inhibits native plant growth (Shluker 1999, p. 4; Naughton *et al.* 2007, p. 17). It is a woody herb that forms tall, dense stands, which can reduce access to nesting habitat of ground-nesting birds, including the black-footed albatross. Dense growth of *V. encelioides* can entangle black-footed albatross chicks or prevent parents from locating and feeding chicks (Shluker 1999, p. 4; Flint 2010, pers. comm.). It also restricts windspeed at the nest sites, potentially reducing the ability of adult and juvenile birds to thermoregulate using convective cooling (Flint 2010, pers. comm.). The Service and the HDLNR have implemented programs to control and eradicate *V. encelioides* on Midway Atoll and Kure Atoll (Shluker 1999, pp. 4–7; Flint 2010, pers. comm.), where approximately 43 percent of the rangewide black-footed albatross population breeds (see Table 2). In 2003, the Service and the HDLNR increased efforts to reduce the extent and spread of this invasive plant on Midway Atoll, including hand-pulling, mowing, and herbicide application.

In addition to *Verbesina encelioides,* other nonnative plant species occur in the Northwestern Hawaiian Islands, including *Casuarina equisetifolia* (common ironwood), a nonnative tree that has been identified as a threat to ground-nesting seabirds on Midway Atoll (Naughton *et al.* 2007, p. 12). Like *V. encelioides,* the dense growth of *C. equisetifolia* around black-footed albatross nest sites can block the wind and thereby reduce the potential for convective cooling. Growing as they do in an area normally devoid of tall vegetation, these trees can potentially interfere with the flight of long-winged birds such as albatrosses. The trees also may break off or fall onto ground-nesting birds during wind storms; nesting Laysan albatrosses and chicks were killed on Midway in January 2011 by falling ironwood trees and flooding (ACAP 2011). *Casuarina equisetifolia* is also subject to a control program (Flint 2010, pers. comm.). Furthermore, the Papahanaumokuakea Marine National Monument Plan (PMNM Plan) has incorporated a nonnative species action plan to identify, control, eradicate, and avoid the introduction of new nonnative species to the PMNM (NOAA *et al.* 2008, pp. 201–214).

The number of birds nesting on Midway Atoll has been relatively constant since 1992 (USFWS, unpubl. data) and has increased each year between 1999 and 2005 (Arata *et al.* 2009, p. 36), so *V. encelioides* and *C. equisetifolia* as currently controlled do not appear to have significant negative impacts on the availability of black-footed albatross nesting habitat. Also, while standardized annual nest counts are not conducted on Kure Atoll and Pearl and Hermes Reef, a program to control *Verbesina* has been initiated on Kure Atoll (Flint 2010, pers. comm.). While uncontrolled growth of *V. encelioides* and *C. equisetifolia* would likely have negative impacts on habitat and thus possibly on the black-footed albatross population, based on the evidence from current control efforts, we anticipate these and expected future levels of control will continue to reduce and limit these impacts to the extent that these nonnative plants do not pose a significant threat to the black-footed albatross.

We found no information regarding nonnative plants within the nesting range of the black-footed albatross on the Japanese Islands, and have no evidence indicating that nonnative plants pose any threat to the black-footed albatross or its breeding habitat on the Japanese Islands.

Therefore, based on our evaluation of the best available scientific and commercial data, we conclude that invasive plants do not pose a significant threat to the black-footed albatross in relation to the destruction, modification, or curtailment of habitat or range of the species in the Hawaiian Islands, the Japanese Islands, or rangewide. In the section below, we further consider the potential spread of invasive plants in relation to conditions related to climate change.

Effects Related to Climate Change

The anticipated impact of climate change on black-footed albatross habitat, ecology, and life history in tropical and subtropical terrestrial and marine ecosystems is complex. In this section we begin with a general overview of climate change projections, followed by our evaluation of the potential response of the black-footed albatross to possible changes in their nesting and foraging habitat related to climate-related changes in sea level, coastal inundation, and storm events. We then consider changes in foraging habitat related to altered marine productivity that could occur in relation to climate change, and possible physical effects to the black-footed albatross related to changes in ambient temperatures.

Climate Change Overview

Consideration of the effects of climate change is a component of our analyses of species under the Act. Here we provide a brief overview of the general topic of climate change as a way of providing a broad context for the more detailed consideration that follows with respect to the black-footed albatross.

Described in general terms, ''climate'' refers to average weather conditions, as well as associated variability, over a long period of time (*e.g.* decades, centuries, or thousands of years). Climate variables most often described are temperature and precipitation, and the typical period for calculating the mean of these properties is 20 or 30 years. The term ''climate change'' thus refers to a change in the state of the climate (whether due to natural variability, human activity, or both) that can be identified by changes in the mean or variability of its properties and that persists for an extended period—typically decades or longer. (See Intergovernmental Panel on Climate Change (IPCC), 2007, pp. 30, 78, for technical definitions that are the basis for our description of these terms.)

Analyses of observed trends in climate demonstrate that climate change is occurring, as illustrated by examples such as an increase in the global mean surface air temperature (SAT) (''global warming''), substantial increases in precipitation in some regions of the world and decreases in other regions, and increases in tropical cyclone activity in some oceanic areas (IPCC 2007, p. 30). Because relatively small but sustained changes in temperature can have substantial direct and indirect effects on natural processes and human populations, temperature is one of the most widely used indicators of climate change. Based on extensive analyses, the IPCC concluded that warming of the global climate system over the past several decades is ''unequivocal'' (IPCC 2007, p. 2). These changes in global climate are affecting many natural systems (see IPCC 2007, pp. 2–4, 30–33 for global and regional examples, and Global Climate Change Impacts in the United States (GCCUS) 2009, pp. 27, 79–88, for examples in the United States).

Analyses of natural variability in climate conditions and the effects of human activities led the IPCC to conclude that most of the increase in global mean surface air temperature that has been observed since the mid-20th century is very likely due to the observed increase in greenhouse gas (GHG) concentrations related to human activities, particularly emissions of CO_2 from fossil fuel use (IPCC 2007, p. 5 and Figure SPM.3). Extensive analyses point to continued changes in climate and considerable efforts are occurring to make projections of the magnitude, rate, and variability of future changes and to understand the mechanisms underlying them, including the role of greenhouse gases.

Projections by the IPCC in 2007 for climate change for the earth as a whole and for broad regions were based on simulations from more than 20 Atmospheric-Ocean General Circulation Models used in conjunction with various scenarios of different levels and timing of greenhouse gas emissions (Christensen *et al.* 2007, pp. 847–917; Meehl *et al.* 2007, pp. 753–796; Randall *et al.* 2007, pp. 596–599). The emissions scenarios were developed in the late 1990s and described in the Special Report on Emissions Scenarios (SRES) published in 2000 (Carter *et al.* 2007, p. 160, and references therein). The scenarios span a broad range of potential GHG emissions over the coming decades based on a wide spectrum of economic, technological, and human demographic possibilities for the planet; the SRES made no judgment as to which of the scenarios are more likely to occur, and although they cover a very broad range it is possible that emissions could be higher or lower than the range covered by the scenarios.

The IPCC's projections of change in global mean warming (global annual mean surface air temperature (SAT)) and how they differ over time across emissions scenarios as compared to the observed SAT from1980–1999, are described by Meehl *et al.* (2007, pp. 760–764). Several key points emerge from their projections. First, the projected changes in magnitude of warming are similar under all emissions scenarios to about 2030 and to some degree even to about mid-Century although more divergence is evident then, and the divergence continues to increase over time, *i.e.,* in the near-term the projections differ by only 0.05 °C (0.09 °F), but by the last decade of the century the difference across scenarios is 1.6° C (0.9 ° F); as noted by Cox and Stephenson (2007, p. 208), total uncertainty in projected decadal mean temperature is lowest 30 to 50 years in the future. Second, the magnitude of projected warming increases across each scenario, including the lowest emission scenario. Under the lowest emission scenario, annual man SAT change is 1.19 ° F (0.66 °C) for 2011–2030 and 2.32 ° F (1.29 ° C) for 2046–2065 (See Meehl *et al.* 2007, p. 763, Table 10.5). Third, the pattern of projected increases is relatively consistent whether considering the average across all models for a given scenario or the projections from the individual models, including consideration of ± one standard deviation around the mean projection for each scenario (see Meehl *et al.* 2007, pp. 762–763, Figures 10.4 and 10.5, and Table 10.5). Thus although differences in projections reflect some uncertainty about the precise magnitude of warming, we conclude there is little uncertainty that warming will continue through the end of century, even under the lower emissions scenario. We note also that more recent analyses using additional global models and comparing other emissions scenarios have resulted in projections of global temperature change that are similar to those reported in 2007 by the IPCC (Prinn *et al.* 2011, pp. 527, 529).

While projections from global climate model simulations are informative, their resolution is coarse and it is helpful to have higher-resolution projections that are more relevant to the spatial scales used for various assessments involving climate change. Various methods to ''downscale'' climate information have been developed to generate projections that are more specific to regional or relatively local areas (see Glick *et al.* 2011, pp. 58–61 for a summary description of downscaling). In conducting status assessments of species, the Service uses downscaled projections when they are the best scientific information available regarding future climate change.

In the case of marine areas, however, adequate procedures for downscaling are still under development, thus global projections for various conditions related to climate change (*e.g.,* sea and land surface temperatures, precipitation, storm frequency and intensity, marine productivity, and ocean acidification) are used for marine areas and small islands within them, including the Northwest Pacific Islands. Efforts are currently underway by the Pacific Islands Climate Change Cooperative and climate modelers at the University of Hawaii to develop regional models that will increase our understanding of climate change effects specific to the Pacific Islands. However, this information is not yet available to us. In most cases, therefore, global projections of future climate conditions constitute the best available scientific information available for purposes of our analyses for this finding.

Projections of Sea Level Rise

On a global (eustatic) scale, the main factors currently contributing to sea level rise are thermal expansion of warming ocean water, water input to oceans from the melting of ice sheets, glaciers, and ice caps, and the addition of water from terrestrial systems (United Nations (UN) 2009a, p. 26). The IPCC's model-based projections of global average sea level rise for the last decade of this century, as compared to the average for 1980–1999, ranged from 0.59 ft to 1.94 ft (0.18 m to 0.59 m) across various emissions scenarios (Meehl *et al.* 2007, p. 812). This projection includes contributions from ocean thermal expansion, melting of glaciers and ice caps, and limited contributions from ice sheets; however, it did not include the possible contribution from relatively rapid melting of the Greenland and West Antarctic Ice Sheets. Several recent scientific publications have addressed problems that the IPCC's approach had in accounting for the observed level of sea level rise in the late 20th and early 21st centuries, and yielded new projections which reflect the possibility of rapid contributions from ice sheet dynamics beyond surface melting (see summaries by Church *et al.* 2010, Rahmstorf 2010, and Nicholls *et al.* 2011). Table 3 gives the ranges from these recent projections, along with the range given by the IPCC for purposes of comparison.

TABLE 3—PROJECTED RANGES OF GLOBAL AVERAGE SEA LEVEL RISE FOR THE 21ST CENTURY, INCLUDING THE IPCC PROJECTION (MEEHL *et al.* 2007) FOR COMPARISON

Projected range of global mean sea level rise feet (meters)	Source
0.59–1.94 ft, (0.18–0.59 m)	Meehl *et al.,* 2007 (IPCC), pp. 820–822,Table 10.7.
2.6–6.6 ft, (0.8–2.0 m)	Pfeffer *et al.,* 2008, p. 1340.
2.46–6.23 ft, (0.75–1.90 m)	Vermeer & Rahmstorf 2009, p. 21530.
2.36–5.25 ft, (0.72–1.60 m)	Grinsted *et al.,* 2010, pp. 469–470.
2.0–5.3 ft, (0.6–1.6 m)	Jevrejeva *et al.,* 2010, L07703, p. 4.
3–4 ft (0.9–1.2 m)	(GCCUS) 2009, p. 25.

As shown in Table 3, the ranges of recent projections of sea level rise all indicate substantially higher levels than the projection by the IPCC in 2007. They also show a much larger difference (approximately 3 to 4 ft (0.9 to 1.2 m)) from the low to the high ends of the ranges, which indicates the magnitude of global mean sea level rise at the end of this century is still quite uncertain.

In their review of sea level rise projections, Nicholls *et al.* noted that the earlier acceleration of some of the southeast Greenland glaciers had reversed by 2006, adding to uncertainty about whether the recent rates of mass loss are temporary and the extent to which they should be extrapolated into the future; they concluded that the upper part of the projected ranges of global sea level rise are possible but not likely to occur (Nicholls *et al.* 2011, pp. 165, 168). Lowe and Gregory (2010, p. 4) similarly concluded that global mean sea level rise by the end of the century is ''almost certain to be below two metres and that there is currently very little evidence to suggest that increases at the top of this range are likely.'' Church *et al.* (2010, p. 411) reported that new information from satellite-based data for 2002–2009 indicates an accelerating contribution to sea level rise from both the Greenland and Antarctic ice sheets, but that ''improved understanding of the processes responsible for ice-sheet changes are urgently required to improve estimates of the rate and timing of 21st-century and longer-term sea-level projections.'' Similarly, Nicholls and Cazenave (2010, p. 1519) state ''The extent of future SLR [sea level rise] remains highly uncertain—more so than in 2007, when the IPCC AR4 was published'' and they call for additional analyses to focus on understanding ice sheet instabilities and other processes drive sea level rise.

Viewed from broad regional and particularly more local perspectives, the picture is further complicated by the fact that sea level rise is not uniform around the world and deviations from the observed global mean of sea level rise have been substantial in some areas. The fact that future sea level change will not be the same everywhere has been characterized by Milne *et al.* (2009, p. 471) as ''one of the few statements that can be made with certainty.''

The considerable uncertainty about the magnitude of global average sea level rise by the end of the century is additionally complicated by the variability in sea level change observed in different parts of the world. This includes differences in open oceans, such as non-uniform changes in temperature and salinity and differences in ocean circulation patterns; the contributions of various factors to relative sea level change at regional scales are not fully understood and different contributions may dominate depending on the geographic location (Bindoff *et al.* 2007, p. 409). A recent analysis aimed at providing a better understanding of sea level change at regional scales indicates that the entire range of the black-footed albatross is within a very broad ocean region where sea level rise by the end of this century is projected (under each of three emissions scenarios) to be higher than the global mean, and Hawaii is expected to have slightly higher rise than the global average (Slangen *et al.* 2011, pp. 9–15). This analysis included numerous assumptions (including assumptions about changes in ice mass dynamics) and the authors made the point that the absolute values presented in their study required careful interpretation (Slangen *et al.* 2011, p. 16).

Different rates of sea level rise observed locally add further complexity to the evaluation of this factor. Specifically, Honolulu, on the island of Oahu, and Hilo, on the island of Hawaii, have had different observed trends in sea level rise since the mid-1940s, although the relative differences in the rate of sea level rise between these Hawaiian islands have been more limited since the mid-1970s; these differences may be related to variations in both space and time in land motion (subsidence, uplift), and it may be related to interdecadal variations in upper ocean temperatures (Caccamise *et al.* 2005, L03607, entire). Regardless of the cause(s) of the difference, this information adds to our caution in interpreting global sea level rise projections in our analysis of potential effects on the black-footed albatross and its habitat at a more localized scale.

In addition to reporting a projected range of sea level rise for the end of the century, Jevrejeva *et al.* (2010) also reported projections for the mid-century. In contrast to the relatively divergent range projected for 2100 (2.0–5.3 ft (0.6–1.6 m)), they found relatively close agreement in projected sea level rise across various emissions scenarios until about 2050 using the six emissions scenarios used by the IPCC, with projections ranging from a low of approximately 0.98 ft (0.3 m) to a high of 1.8 ft (0.55 m) (Jevrejeva *et al.* 2010, p. 3, Figure 2).

As discussed above, results for models projecting sea level rise further than mid-century become increasingly divergent, and this is particularly true with regard to the maximum bounds of projected sea level rise. Furthermore, with regard to evaluating the possible upper bounds of projected sea level rise over the next century, we considered the statements of both Nicholls *et al.* (2010, p. 168) and Lowe and Gregory (2010, p. 43) that the probability of rises at the high end of the spectrum are very low. Nicholls *et al.* (2010, p. 174) concluded that, although a sea level rise between 1.6 and 6.6 ft (0.5 and 2.0 m) is not an implausible range, ''owing to our poor understanding of the underlying processes driving climate-induced sea-level rise, we cannot associate any likelihood with this range, and we conclude that rises above 0.5 m and especially 1 m by 2100 are possible, rather than inevitable.''

As there is so much uncertainty surrounding global sea level projections, particularly at the upper bounds at the end of the century, and this is further complicated by uncertainty about regional and local divergences from the global mean, we believe it is more appropriate to focus our analysis on less variable projections over a somewhat shorter timeframe. Therefore, we evaluated what we consider to be reasonable approximate projected levels of sea level rise for the habitat of the black-footed albatross, based on consideration of the global estimates described above, over three time intervals: For the next 10–20 years we use an estimate of 0.5–1.0 ft (0.1–0.3 m); for 30–40 years we use 1.4–1.9 ft (0.4–0.6 m); and for 50 years we use 2.4 ft (0.7 m) (see USFWS 2011b, unpubl., for additional details). While we recognize that several models project an accelerated rate of sea level increase later in the century (*e.g.,* Vermeer and Rahmstorf 2009, Figure 6, p. 21531), we determined that, in light of the significant variability in projections following mid-century, for the purposes of this status evaluation using a linear projection of sea level rise (see Baker *et al.* 2006, pp. 5–6) and time-intervals up to mid-century is a reasonable approach. Note also that the level we use for 50 years from now, 2.4 ft (0.7 m), is conservative in that it is higher than the mid-century projection by Jevrejeva *et al.* (see above), and in fact is very close to the end of century level (0.8 m) described as ''plausible'' by Pfeffer *et al.* (2008, p. 1342), and even closer to the low ends of the ranges projected at 2100 by Vermeer and Rahmstorf (2009, p. 21530) and Grinsted *et al.* 2010, pp. 469–470. We believe this approach is reasonable and provides a reliable basis for our analysis.

Sea Level Rise and Coastal Inundation

There is very little existing information in the scientific literature on how projected sea level rise will affect the islands currently used by black-footed albatross for nesting, as topographical information for these islands in most cases is extremely limited and, as noted above, regionally specific models of sea level rise for the area are still under development (*e.g.,* Klavitter 2010, pers. comm.). A rigorous geomorphological coastal analysis is needed to fill this information gap. In a limited study of several of the Northwestern Hawaiian Islands, Baker *et al.* (2006, p. 2) noted this lack of spatial data, and developed models that can be used to estimate the proportional rate at which land area may disappear in the Northwestern Hawaiian Islands, based on cumulative elevation data (Baker *et al.* 2006, p. 6, Figure 3).

As only maximum elevation data are available for most of these islands, these researchers collected elevation data from three locations: Lisianski Island, Pearl and Hermes Reef (the islets of Southeast, Seal-Kittery, Grass, North, and Little North), and French Frigate Shoals (including the islands of East, Gin, Little Gin, and Trig). We did not use the projections of surface area lost presented by Baker *et al.* (2006) in their Table 1 since those estimates were developed using the older IPCC 2001 projections of sea level rise. However, based on their cumulative elevation models (Baker *et al.* 2006, Figure 3), we estimated the effects of the projected sea level rise on each of the islands over the three time intervals (Table 4).

Note that detailed topographical information is not available for the island of Midway Atoll or Laysan Island, which support the two largest colonies of black-footed albatrosses in the world, and these islands were not included in the analysis of Baker *et al.* (2006). However, results for Laysan Island are likely to be similar to those for Lisianski Island, as detailed below.

TABLE 4—PROJECTED EFFECTS OF SEA LEVEL RISE ON THE LAND AREA OF ISLANDS SUPPORTING NESTING BLACK-FOOTED ALBATROSS AT 10–20, 30–40, AND 50 YEARS IN THE FUTURE, BASED ON PASSIVE FLOODING AND THE CUMULATIVE ELEVATION MODELS OF BAKER *et al.* 2006

[We assumed islands greater than 165 ft (50 m) in maximum elevation would retain at least 95% of their land area above sea level]

Island	Maximum elevation	Island area	Number of breeding pairs of black-footed albatross (survey year)	Percent of northwestern Hawaiian islands breeding population	Percent of Japanese islands breeding population	Percent of world breeding population	10–20 years—proportion of land area remaining above 0.5–1.0 ft (0.1–0.3 m); range for individual islets is in parentheses	30–40 years—proportion of land area remaining above 1.4–1.9 ft (0.4–0.6 m); range for individual islets is in parentheses	50 years—proportion of land area remaining above 2.4 ft (0.7 m); range for individual islets is in parentheses
Northwestern Hawaiian Islands									
Kure Atoll	8–20 ft (2.4–6.1 m)	213 ac (87 ha)	3,486 (2010)	5.4	NA	5.2	Data not available.	Data not available.	Data not available.
Midway Atoll	12 ft (3.6 m)	1,532 ac (624 ha)	25,581 (2010)	40.0	NA	38.1	Data not available.	Data not available.	Data not available.
Pearl and Hermes Reef.	≈ 9.8 ft (≈ 3 m)	88 ac (36 ha)	6,116 (2003)	9.6	NA	9.1	99–88% (range 99–55%).	82–72% (range 82–30%).	67% (range 79–25%).
Lisianski	≈ 40 ft (≈ 12.9 m)	391 ac (159 ha)	2,126 (2006)	3.3	NA	3.2	99%	98–99%	97–98%.
Laysan [1]	≈ 40 ft (≈ 12.9 m)	1,000 ac (407 ha)	22,272 (2010)	34.8	NA	33.1	99%	98–99%	97–98%.
French Frigate Shoals.	8–12 ft (2.4–3.6 m)	67 ac (27 ha)	4,309 (2009)	6.7	NA	6.4	98–86% (range 98–75%).	82–74% (range 87–50%).	69% (range 80–40%).
Necker	276 ft (84 m)	45 ac (18 ha)	112 (1995)	0.2	NA	0.2	> 95%	> 95%	> 95%.
Nihoa	903 ft (275 m)	171 ac (70 ha)	1 (2007)	0.0	NA	0.0	> 95%	> 95%	> 95%.
Offshore Main Hawaiian Islands									
Kaula	165 m	64 ha (158 ac)	3 (1993)	0.0	NA	0.0	> 95%	> 95%	> 95%.
Lehua	214 m	116 ha (284 ac)	25 (2007)	0.0	NA	0.0	> 95%	> 95%	> 95%.
Japanese Islands									
Torishima Island	1,293 ft (394 m)	1,184 ac (479 ha)	2,150 (2003)	NA	67.5	3.2	> 95%	> 95%	> 95%.
Senkaku Islands	1,257 ft (383 m)	1,446 ac (633 m)	56 (2002)	NA	1.8	0.1	> 95%	> 95%	> 95%.
Ogasawara									
Muko-jima Retto	Not available	1,631 ac (664 ac)	967 (2006)	NA	30.4	1.4	> 95%	> 95%	> 95%.
Haha-jima Retto	1,525 ft (462 m)	6,805 ac (2,770 ha)	11 (2006)	NA	0.3	0	> 95%	> 95%	> 95%.

[1] Land area estimates assume similar conditions to Lisianski, based on similar elevation and topography.

Tern Island was estimated to comprise about 66 percent (57 ac (23 ha)) of the terrestrial area of French Frigate Shoals (Arata *et al.* 2009, p. 76). Originally the island was only about 10 ac (4 ha) in size but was expanded in 1942 to 57 ac (23 ha) (Amerson 1971, p. 12). Sand and Eastern islands, the two main islands at Midway Atoll, have also undergone extensive human modifications, and are approximately 12 ft (3.6 m) above sea level. All three islands (Tern, Sand, and Eastern) transition from sea level to maximum elevation over a few meters and are relatively flat across their full expanse to accommodate aircraft runways on each island. How much projected levels of sea level rise over the next 10 to 20 years (0.5–1.0 ft (0.1–0.3 m)), 30 to 40 years (1.4–1.9 ft (0.4–0.6m)), and 50 years (2.4 ft (0.7 m)) will impact black-footed albatross nesting habitat on these islands is unknown in the absence of more detailed geomorphological information, but given their relatively low elevation, sea level rise may result in some loss of nesting habitat for black-footed albatrosses.

It is also possible, however, that there will be no net loss of land area depending on relative rates of beach erosion in some (seaward) areas and beach deposition in other (lagoon-side) areas that may occur, as has been observed in other Pacific atoll islands in response to rising sea level (Webb and Kench 2010, p. 234). Webb and Kench (2010, entire) studied 27 Central Pacific islands using a combination of historical aerial photography and remote sensing imagery from years spanning from 1943 through 2006 (the timeframe of analysis for each island differed, depending on the availability of imagery, but ranged from 19 to 61 years). Despite the expectation that such islands would diminish in size due to ongoing and future sea-level rise, they found that with a historical sea level rise of 0.08 in (2 mm) per year over the period studied (roughly 4.8 in (12 cm) maximum), the terrestrial area of 43 percent of the 27 atoll islands studied remained stable while another 43 percent actually increased in size by 3 to 30 percent (Webb and Kench 2010, p. 241). Only 14 percent of the atoll islands showed a loss of 3 to 10 percent of area. The observed adjustment for 65 percent of these atoll islands was a net lagoon-ward migration, but also included island migration along the atoll reef. Overall, these atoll adjustments added 156 ac (63 ha) of coastal land area to these islands.

In the Northwestern Hawaiian Islands, sediment transport has resulted in the submersion of Whale-Skate Island in French Frigate Shoals and has accreted island area at Spit Island (Midway Atoll), Seal-Kittery Island (previously 2 islets), and North Island at Pearl and Hermes Reef (Amerson *et al.* 1974, pp. 8 and 11, comparing reported islet area to current estimates). These data, and taking into consideration the results reported by Webb and Kench (2010, see above) for atoll islands elsewhere, indicate projected sea level rise will likely change the physical shape and position of Tern, Sand, and Eastern islands and may reduce or possibly increase the size of these atoll islands. However, it is also important to note that we do not have information to indicate how these processes may work under potentially accelerated rates of sea level rise. Any such changes, however, whether positive or negative in terms of total land area, are likely to occur gradually over many years, giving black-footed albatrosses a long period of time to potentially adjust their breeding locations. Tern and East Islands each support just under half of the black-footed albatross breeding pairs at French Frigate Shoals (Arata *et al.* 2009, p. 38, Figure 14).

Based on the cumulative elevation model developed by Baker *et al.* (2006, p. 6, Figure 3) East Island will lose about 2 to 10 percent of its land area to 0.5–1.0 ft (0.1–0.3 m) sea level rise in 10 to 20 years, 12 to 19 percent of its land area to 1.4–1.9 ft (0.4–0.6 m) sea level rise in 30 to 40 years, and roughly 20 percent of its current land area to a 2.4 ft (0.7 m) rise in sea level in 50 years. Potential losses of land area at the smaller islets of French Frigate Shoals are projected to be greater (Table 4, this document), but no estimates were available for Tern Island, where relatively large numbers of black-footed albatrosses breed. We estimated that, collectively, the islets of French Frigate Shoals will have roughly 86 to 98 percent of terrestrial area remaining after 10 to 20 years, 74 to 82 percent remaining after 30 to 40 years, and 69 percent after 50 years (Table 4, this document).

We note Baker *et al.* (2006) do not take into account geomorphological features that can alter sea level rise impacts, as shown by Webb and Kench (2010, p. 241). All of these islands may change shape, size and position through erosion and accretion, such that future land areas may be larger or smaller than projected due to sea level rise alone. The islets of Pearl and Hermes Reef support 10 percent of the world black-footed albatross breeding pairs and comprise some of the lowest elevation areas used for nesting by the species. Collectively, we estimate that these islets will retain roughly 88 to 99 percent of their land area in 10 to 20 years, 72 to 82 percent of their land area over 30 to 40 years, and 67 percent of their land area in 50 years (Table 4, this document). This does not take into account potential changes in shape, size, or position that may occur due to erosion and accretion, as demonstrated by Webb and Kench (2010, p. 241) for island atolls elsewhere, but due to their small size and low elevation we consider these islets to be some of the most vulnerable to sea level rise and may be a potential loss of nesting habitat for the black-footed albatross.

Lisianski Island (currently supporting 3.2 percent of world black-footed albatross breeding pairs) is one of the larger Northwestern Hawaiian islands at 391 acres (159 ha) in size. We estimated that Lisianski would still have 99 percent of its terrestrial area over the next 10 to 20 years, 98 to 99 percent over 30 to 40 years, and about 97 percent of its terrestrial area in the face of a 2.4-ft (0.7 m) rise in sea level in 50 years (based on Baker *et al.* 2006, p. 6, Figure 3; see Table 4, this document). Laysan Island (currently supporting 35 percent of world black-footed albatross breeding pairs) has a maximum elevation that is the same as Lisianski Island (about 40 ft (13 m)) and, like Lisianski, has a large central depression (a lake on Laysan but not on Lisianski) surrounded by higher elevation sandy ridges (Macdonald *et al.* 1990, pp. 480–481). In addition, at approximately 1,000 ac (407 ha) in size, Laysan is substantially larger than Lisianski (391 ac; 159 ha). Presuming a similar island atoll geomorphology, sea level rise will affect a limited area of Laysan Island, most likely similar to the projections for Lisianski. As discussed above, this analysis does not consider geomorphological features that can alter early sea level rise impacts, as shown by Webb and Kench (2010, p. 241). Their information indicates that levels of sea level rise expected over the next 50 years will likely change the shape and position of Lisianski and Laysan Islands, and that processes of erosion and accretion may either reduce or even increase the size of these islands. All of these changes are likely to occur gradually over many years.

Kure Atoll (which supports 5.2 percent of world black-footed albatross breeding pairs) was not included in Baker *et al.*'s projections of sea level rise impacts on the Northwestern Hawaiian Islands. Kure Atoll has a maximum elevation of approximately 24 ft (7.5 m; Arata *et al.* 2009, p. 75). Impacts from sea level rise at Kure Atoll are likely to be similar to those discussed for these other atoll areas, although Kure Atoll has greater land area and maximum elevation than the islets of Pearl and Hermes Reef.

While black-footed albatrosses are typically characterized as nesting on the sandy beaches of low atoll islands, there are several colonies that currently nest upslope on high-elevation islands and do not utilize shoreline nesting sites: Toroshima (2,150 breeding pairs), Senkaku (56 breeding pairs), Ogasawara (Hahajima Island) (11 breeding pairs), Necker (112 breeding pairs), Nihoa (1 breeding pair), Kaula (3 breeding pairs) and Lehua (25 breeding pairs) (Arata *et al.* 2009, p. 3, Figure 1). Nesting on these islands occurs well above sea level in volcanic substrates or on the top of hill and upland slopes (Clapp and Kridler 1977, p. 36; Clapp *et al.* 1977, p. 44; Cousins and Cooper 2000, p. 5; Pitman and Ballance 2002, p. 13). Due to their topography and elevation, we do not expect these islands and their breeding populations of black-footed albatross to be affected by anticipated levels of sea level rise.

As noted earlier, detailed, spatially-explicit data specific to the breeding islands of the black-footed albatross are limited or nonexistent. Although the USGS is currently studying the potential impacts of sea level rise on the Northwestern Hawaiian Islands, the results of this research was not available in time for our status assessment. Based on the best scientific information available to us, we can make rough approximations of the land area that may remain under various sea level rise scenarios on these islands, but we do not have detailed spatial information that would enable us to determine how much of the land area that would be lost currently serves as nesting habitat for the black-footed albatross. However, given that black-footed albatrosses on the low-lying islands and atolls of the Northwestern Hawaiian Islands select sites in sandy habitats generally close to the shoreline for nesting, it is reasonable to assume that much of the initial losses of land area would constitute potential or current nesting habitat. This assumption does not apply to black-footed albatrosses that nest upslope on steep, high islands, such as Necker, Nihoa, or the Japanese Islands. Therefore, we must consider the potential effects of the loss of an unknown amount of current shoreline nesting habitat on the black-footed albatross, based on estimated losses of land area and related considerations.

For those black-footed albatrosses that do nest near the shoreline, inundation by high surf currently destroys some nests, and high winds bury nests and kill eggs or chicks and sometimes incubating adults, although the proportion of nests affected each year has not been quantified (Flint 2009a, pers. comm.). Winter storms and the associated high tides and high winds were identified as a major cause of black-footed albatross nest failure on Kure Atoll in the 1960s (Woodward 1972, p. 93). Recently on French Frigate Shoals, the smaller islands of Little Gin and Trig were washed over while adult black-footed albatrosses were incubating eggs (Flint 2009a, pers. comm.). Also on the larger islands of Tern and Eastern, black-footed albatross nests on the islands' northern sides that were exposed to the larger winter swells were often inundated or washed away (Flint 2009a, pers. comm.). During the 2008 breeding season, all of the nests, eggs, and chicks on Tern Island were washed away by high surf (Flint 2009a, pers. comm.). In addition, severe events may happen on occasion, as in the estimated loss of more than 20,000 black-footed albatross chicks from the Northwestern Hawaiian Islands in the aftermath of the March 2011 tsunami generated off the coast of Japan (Flint 2011b, pers. comm.). Such events, although random and unpredictable in occurrence, are not unexpected, and have presumably occurred throughout the history of the species (*e.g.,* see Cousins and Cooper 2000, pp. 115–117). Whether such events may potentially increase in frequency as a potential effect of climate change is an important consideration; however, at this point in time we do not have sufficient information to quantify the probability of such occurrences for this region (see ''Storm Frequency and Intensity,'' below). That most adults survive such events, and population viability in this species is more dependent on adult than juvenile survivorship, enables the species to persist despite occasional severe impacts to productivity or recruitment.

Reproductive success may also be affected in the event birds are forced to relocate their nesting sites due to high surf or winds. For example, black-footed albatrosses whose nest sites were lost on Midway Atoll because of habitat modification related to military activity, both during and immediately following World War II, were found in later years breeding at a different location on the atoll, though it is likely that they lost at least 1 year of breeding due to the displacement (Cousins and Cooper 2000, p. 44). More recently, black-footed albatrosses forced to relocate due to construction activities on Midway were later found nesting elsewhere in the atoll, although they similarly likely lost a year of breeding as a consequence (Flint 2009a, pers. comm.) If a nest site is destroyed, the birds may have difficulty in pairing up with the same mate. In general, mate loss in black-footed albatrosses can cause adults to miss up to 5 years of breeding before forming a new pair (COSEWIC 2007, p. 33). Increased storm surges or other events due to anticipated climate change may therefore result in some decreased productivity for black-footed albatrosses, especially those nesting on very low-lying islands; however, the actual potential extent of this impact would be purely speculative at this time.

A key uncertainty in our evaluation of the effects of sea level rise is the behavioral response of breeding black-footed albatrosses to the possible future inundation of their current nesting sites. The strong nest site fidelity of black-footed albatrosses is an important consideration in this regard. As described in the *Life History* section, above, more than 99 percent of black-footed albatrosses breed on the island where they hatched (Rice and Kenyon 1962a, p. 532), and they construct their nests every year on almost the same site. On Tern Island, black-footed albatrosses were found to nest within 16 ft (5 m) of the previous year's nest (Cousins and Cooper 2000, p. 44). Data from a 2-year study of the closely related Laysan albatross on Midway Atoll showed nests to be within 20 ft (6 m) of the previous year's nest site, and over 50 percent of nests were within 4 ft (1.3 m) (Rice and Kenyon 1962a, p. 533).

In an experimental study, adults of the closely-related Laysan albatross generally responded to displacement of their chick from the nest site by not feeding their chick unless it was within 7 ft (2 m) of the nest site (Rice and Kenyon 1962a, pp. 534–536). That is, adults are oriented on the location of the nest, not on the location or identity of the chick. Based upon this information, an unknown number of black-footed albatross nest sites may be lost each breeding season due to increasing high tides or storm surge from sea level rise, and chicks that get displaced from their nest site may die because their parents do not feed them. Offsetting this potential impact, however, is the availability of additional nesting habitat for black-footed albatrosses and the possibility that birds will relocate their nest sites to more suitable (higher-elevation, inland) habitat over time.

Although black-footed albatrosses do predominantly nest on sandy beaches near the shoreline, there is apparently some behavioral flexibility in nest site selection by the species, as they are found nesting further inland in vegetated areas on Midway and French Frigate Shoals, including amongst bushes, in clearings among introduced ironwood trees, and in grassy areas (Awkerman *et al.* 2008). On steep, volcanic high-elevation islands, such as Necker, Nihoa, and Japanese Islands such as Torishima, black-footed albatrosses nest high upslope in grassy or rocky areas (Cousins and Cooper 2000, p. 32; see, for example, *http://www.mnc.toho-u.ac.jp/v-lab/ahoudori/Photo/photo03/68.html*).

Although in some cases black-footed albatrosses have exhibited a reluctance to move, despite repeated nest failures, there are other examples of breeding pairs relocating, as for example cited above at Midway Atoll in response to displacement from military activities or construction (Arata *et al.* 2009, p. 39; Flint 2009a, pers. comm.). On Torishima Island, black-footed albatrosses established new breeding colonies following volcanic eruptions in 1903, 1941, and 2002 (see ''Volcanic Activity,'' above). In addition, anecdotal evidence suggests that black-footed albatrosses have moved to other islands as smaller islands have disappeared or become overwashed, as suggested at Tern Island by Cousins and Cooper (2000, p. 32) and at French Frigate Shoals (ACAP 2010, p. 7). The recent increase in breeding birds at French Frigate Shoals may be due to the redistribution of black-footed albatrosses that once nested on the island of Whale-Skate, which was lost entirely to erosion from winter storms and sea level rise in 1997 (ACAP 2010, p. 7); however, this supposition is apparently based on the circumstantial timing of the increase on French Frigate Shoals following the disappearance of Whale-Skate, and is not supported by observations of banded birds.

Whether established breeders would move to new nest sites is a major source of uncertainty in our evaluation. The question of whether birds just coming into breeding age would establish new colonies, assuming their natal sites may be lost, is less uncertain. Despite their normally high degree of philopatry, we do have evidence that some black-footed albatrosses banded as nestlings have become breeders on other than their natal islands (Woodworth 1972, p. 96). For example, of 124 banded nestlings, mostly from Midway Atoll, 22 were later observed breeding on Kure Atoll (Woodworth 1972, p. 96). Other movements of smaller numbers of black-footed albatrosses between their natal and breeding sites were observed between Pearl and Hermes Reef, French Frigate Shoals, and Kure Atoll as well (Woodworth 1972, p. 96). Although most movements of black-footed albatrosses between breeding colonies have been over a relatively small range (Woodworth 1972, pp. 96, 109), there is evidence of quite long-range movements from the recent observations of black-footed albatrosses prospecting for nesting sites on the islands of Guadalupe and San Benedicto off the coast of Mexico (Awkerman *et al.* 2008). Colonization of new islands and range expansion, including the establishment of breeding colonies in the eastern Pacific on the islands of Guadalupe and San Benedicto, has also been observed in the related Laysan albatross (Young *et al.* 2009, p. 722), a bird that exhibits a similarly high degree of natal philopatry, suggesting it is not unreasonable to anticipate that black-footed albatrosses are capable of colonizing new areas if their current nesting habitat is lost.

In general, gradual shifts from the loss of old habitat to the availability of new habitat, as would occur under a scenario of gradual sea level rise, are considered most conducive to the establishment of new colonies (as opposed to the abrupt loss of all breeding sites) (Schippers *et al.* 2009, p. 469). The availability of nest sites is only rarely limiting for seabirds (Kildaw *et al.* 2005, p. 55), and we have no evidence to suggest that suitable nest sites are a limited resource for black-footed albatrosses in the Hawaiian Islands (COSEWIC 2007, p. 20). There are, however, some new challenges that black-footed albatrosses may face as a result of relocating their nest sites. For one, if the birds attempt to relocate to some of the higher-elevation Hawaiian islands in response to sea level rise, they will encounter predators that are currently not a threat to the species (*e.g.,* mongooses, cats, dogs, pigs, rats) (Naughton *et al.* 2007, p. 10). Whether such an option may be feasible for black-footed albatrosses in the future may rely on the implementation and success of current management efforts to restore habitat and eradicate nonnative predators on other nearby, higher elevation islands (Naughton *et al.* 2007, p. 19). There are no introduced predators on the islands of San Benedicto or the small islets off of Isla Guadalupe in the eastern Pacific (Naughton *et al.* 2007, p. 12). In addition, reduced habitat area will in turn mean increased competition with other nesting seabirds, such as the Laysan albatross, which often nests in the same habitat as the black-footed albatross. However, the evidence from historical photographs indicates that great numbers of seabirds can successfully nest at very high densities on these islands, suggesting that the same number of black-footed albatrosses may be able to continue nesting into the future on islands that have diminished in size, despite the presence of other potential competitors. The maximum density of nesting seabirds on these islands is unknown, and although available habitat does not presently appear to be restricted, it is unknown at what point in time it may potentially become a limiting factor.

There will undoubtedly be some short-term impacts to productivity of nesting black-footed albatrosses due to displacement from sea level rise; based on the elevation and topography of the islands, we anticipate such impacts would be concentrated in the Northwestern Hawaiian Islands and would not affect the Japanese Islands populations (see Table 4). In the Northwestern Hawaiian Islands, our assessment of the projected levels of terrestrial area lost over the next 10 to 20, 30 to 40, and up to 50 years suggests that the loss of terrestrial area on islands used for nesting by black-footed albatrosses will be relatively gradual. Moreover, the remaining land area for some of the larger colonies at Laysan Island, Pearl and Hermes Reef, and French Frigate Shoals will still be relatively substantial at the end of that time period (estimated as 97 percent terrestrial area remaining at Laysan with 34.8 percent of the Northwestern Hawaiian Islands breeding population, 67 percent terrestrial area remaining at Pearl and Hermes Reef with 9.6 percent of the breeding population, and 69 percent terrestrial area remaining at French Frigate Shoals with 6.7 percent of the breeding population).

We note that information was not available for the largest breeding colony of black-footed albatrosses at Midway Atoll. Lost land area may disproportionately affect black-footed albatross nesting habitat, since many individuals select nesting sites on beaches near the shoreline, which will in many cases represent the first land area lost. In addition, diminished land area will not be the only effect of sea level rise, as the remaining land will consequently become increasingly vulnerable to overwash events. However, based on the relatively gradual nature of sea level rise over time, the amount of land area projected to remain, the ability of black-footed albatrosses to nest in habitats other than sandy beaches, the apparent capacity of these islands to support high densities of nesting seabirds, and the evidence suggesting that black-footed albatrosses will breed on other than their natal islands and colonize new sites, albeit in low numbers, we believe it is reasonable to conclude that the black-footed albatross may shift to new nest sites over time in response to sea level rise in the Northwestern Hawaiian Islands.

In summary, many uncertainties remain with regard to the potential impacts of future sea level rise on the black-footed albatross. As mentioned previously, at present we have no regional models of sea level rise specific to the islands used for nesting by black-footed albatross, but must instead rely primarily on global projections of sea level rise. Yet we know that sea level rise is likely to vary considerably in different locations across the globe, as described above. As also noted above, although we have some rough projections of how much terrestrial area may be lost on a limited number of the islands used for breeding, at present we do not have the data to inform us as to how much of the land area that may be lost currently serves as nesting habitat. In addition, projected losses of land area above sea level using a simple passive inundation or ''bathtub'' model do not account for other potential consequences of climate change that may impact the suitability of remaining terrestrial areas for nesting, such as storm surge.

The greatest uncertainty in evaluating the threat of sea level rise and potential loss of nesting habitat is the behavioral response of the birds over time. The biggest question in this regard is whether established adult breeders would eventually shift their nesting locations in response to habitat loss as a consequence of inundation; there is some evidence that supports such a potential shift, and some evidence that suggests such a shift would more likely require waiting for birds hatched on the islands to attain reproductive age and establish new nest sites elsewhere. Whether suitable, predator-free habitat would be available for these birds in the future is another uncertainty. In any case, we anticipate some unknown level of reduced productivity and likely diminished population sizes will be realized as a consequence of smaller habitat area. However, based on the land area projected to remain and the relatively large breeding population of black-footed albatrosses (Table 4), we do not anticipate that these interim losses will be so great as to pose a significant threat to the black-footed albatross.

We conclude, based on this assessment, that there will likely be some short-term impacts to black-footed albatross nesting success due to sea level rise and coastal inundation, and that future population sizes in the Hawaiian Islands may be smaller due to a reduced area of available nesting habitat. However, we do not have evidence to suggest the projected changes will be so great as to pose a significant threat to the breeding populations of the species rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Climate Change and Wave Inundation

The central Pacific location of the Northwestern Hawaiian Islands exposes the atoll islands to wind and ocean swells from all directions but mostly from the northeast and northwest (Vitousek and Fletcher 2008, p. 541). The northeastern trade winds predominate during three quarters of the year, and generate average wave heights of 6.6 ft (2 m) (Fletcher and Feirstein 2009, pp. 3–4). During winter, when black-footed albatrosses are nesting on the Northwestern Hawaiian Islands, northwestern Pacific storms generate much larger waves with an average height of 25.3 ft (7.7 m) (Fletcher and Feirstein 2009, p. 3). Wave inundation of coastal atoll island areas or overwash of entire atoll islands is known to occur, but information specific to this issue in the Northwestern Hawaiian Islands is limited. Two major features will affect future wave inundation: sea level rise and storm frequency and intensity. These are discussed below, based on the best scientific information available.

Winter (November through April) mid-latitude (30 to 60° N latitude) storms (extra-tropical cyclones) can produce waves that may impact black-footed albatross breeding. The southern cold fronts of these winter storms bring rain to the Northwestern Hawaiian Islands (Juvic *et al.* 1998, p. 54). The low-pressure centers of these mid-latitude storms generate ocean waves that can propagate to the Hawaiian Islands. Approximately 20 strong mid-latitude storms occur each year in the north Pacific (Graham and Diaz 2001, p. 1,874). Large waves generated by these storms are known to periodically overwash small islets (*e.g.,* Sand and Bird islets at Pearl and Hermes Reef; Gin and Little Gin islets at French Frigate Shoals) and inundate coastal sites in the Northwestern Hawaiian Islands and destroy near-shore black-footed albatross nests (Arata *et al.* 2009, p. 11). Most recently, a large wave event destroyed approximately 40 percent of black-footed albatross nests on Laysan Island in February 2011, resulting in the loss of an estimated 9,000 chicks, and more than 20,000 black-footed albatross chicks are estimated to have been lost when the Northwestern Hawaiian Islands were overwashed by a tsunami following the March 11, 2011, earthquake off Sendai, Japan (Flint 2011b, pers. comm.). The reported mortality of chicks from the tsunami is likely an underestimate, as counts were not available for all islands affected. There are no estimates as to the number of adults that may have been lost, but in general it is expected that chicks make up the vast majority of mortalities in such events.

Current climate models indicate that mid- and high- (60° to 90° N latitude; too far north to generate Pacific waves) latitude Pacific storms will shift to the north with a decrease in storm frequency in the mid-latitudes, an increase in frequency in the north latitudes (USCCSP 2008, p. 64), and an increase in the intensity of mid- and high-latitude storms (USCCSP 2008, p. 115). These model results are supported by observations from 1959 through 1997 that show similar trends (USCCSP 2008, pp. 64, 115). Winter (November through March) wave heights generated from climate models show significant increases in the northwestern and northeastern Pacific, but in the vicinity of the major black-footed albatross breeding areas (Northwestern Hawaiian Islands, Torishima Island, and the Ogasawara Islands), winter wave heights are predicted to remain relatively unchanged for the period 1990–2080 (Wang and Swail 2006, p. 116). Reduced future storm frequency in the mid-latitudes combined with no significant change in wave heights suggests that black-footed albatross may likely not be negatively affected to a degree beyond historical and current impacts, if these predictions generally hold. As in the past, wave surge and occasional overwash events will occasionally impact black-footed albatrosses breeding at localized areas. Although such events may have a large short-term impact on productivity in a single year, as with the significant wave events and tsunami observed in early 2011, most adult breeders generally survive these events, and the long-term impact on the species is limited. Therefore, based on the best available data, we have no information to indicate that the impact of wave or storm events will be so great as to pose a significant threat to the breeding populations of the species rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Climate Change and Tropical Cyclone Storm Frequency and Intensity

The Pacific tropical cyclone (*e.g.,* typhoon and hurricane) storm season conservatively starts in May or June, with the core storm season running from July through November in the eastern and central Pacific, and through December in the western Pacific. Black-footed albatrosses arrive at their nesting sites in mid- to late October and do not begin to lay eggs until mid-November. Thus, the overlap between adult birds arriving at nesting sites and the end of the tropical cyclone storm season is likely only a few weeks. There are no climate model predictions for a change in the duration of Pacific tropical cyclone storm season.

Climate modeling has projected changes in tropical cyclone frequency and intensity due to global warming over the next 100 to 200 years (Vecchi and Soden 2007, pp. 1068–1069, Figures 2 and 3; Emanuel *et al.* 2008, p. 360, Figure 8; Yu *et al.* 2010, p. 1,371, Figure 14). The frequency of hurricanes generated by these tropical cyclones is projected to decrease in the central and eastern Pacific (*e.g.,* the main and Northwest Hawaiian Islands and the islands off Mexico where black-footed albatrosses have recently attempted to breed) while storm intensity (strength) is projected to increase by a few percent over this period (Vecchi and Soden 2007, pp. 1,068–1,069, Figures 2 and 3; Emanuel *et al.* 2008, p. 360, Figure 8; Yu *et al.* 2010, p. 1,371, Figure 14). In the western Pacific (*e.g.,* the Mariana Islands and the Japanese Islands that currently, or in the past, supported black-footed albatross populations), the frequency and intensity of typhoons are projected to increase by a few percent over the next 100 to 200 years (Vecchi and Soden 2007, pp. 1,068–1,069, Figures 2 and 3; Emanuel *et al.* 2008, p. 360, Figure 8; Yu *et al.* 2010, p. 1,371, Figure 14). Although there is some indication that the impacts of tropical cyclones are expected to increase in general as a result of projected sea level rise (Knutson *et al.* 2010, p. 157), we do not have any modeling available specific to the regions used by nesting black-footed albatross, and we do not have sufficient data to quantify or evaluate the potential impacts of such events on the species or to assess the possible population-level response over the extended timeframes of the projections, except to note that the timing of such events does not usually coincide with the nesting season of the black-footed albatross, when potential impacts from such events would be expected.

In summary, based on the limited information available to us and the climate model analyses described above, the anticipated increases in cyclone intensity or frequency are minimal. This is especially true toward the end of the storm season when albatross begin to arrive at the breeding grounds and cyclone intensity and frequency is normally decreasing. Furthermore, we believe it is highly unlikely that multiple nesting sites would be impacted in a single storm season, given the wide geographic spread of the nesting sites used by black-footed albatrosses. We further note that the frequency of hurricanes in the Northwestern Hawaiian Islands, where the majority of black-footed albatrosses nest, is currently low and is predicted to decrease with climate change.

We conclude, based on this assessment, that while there may be some short-term impacts to black-footed albatross nesting success due to the potential overlap between the arrival of birds at nesting sites and the end of the tropical storm season, we do not have evidence to suggest that projected changes in storm frequency or intensity will be so great as to pose a significant threat to the breeding populations of the species rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Climate Change and Marine Productivity

The link between marine productivity and climate is not well understood (McGowan *et al.* 1998, p. 210; Polovina 2005, p. 233). The potential impacts of climate change on the food supply of the black-footed albatross (mainly flying fish eggs and squid (Arata *et al.* 2009, p. 11)), and thus survival and reproduction, has not been well studied. There are, however, two major natural climate oscillations associated with major changes in marine ecosystems in the Pacific: El Niño-Southern Oscillation (ENSO; (McPhaden *et al.* 2006, p. 1,741) and the Pacific Decadal Oscillation (PDO) (Miller *et al.* 2004, p. 163).

The ENSO can influence productivity in the tropical Pacific (Fiedler 2002, p. 270; McPhaden *et al.* 2006, p. 1,741) and the west coast of Central and North America (McGowan *et al.* 1998, p. 214). El Niño-Southern Oscillation is a 2- to 7-year fluctuation of unusually warm (El Niño) and cool (La Niña) conditions in the tropical Pacific associated with an unstable interaction between sea surface temperature and atmospheric pressure. It results in variations in wind, rainfall, ocean thermocline depth, circulation, and ultimately oceanic biological productivity (McGowan *et al.* 1998, p. 214; Fiedler 2002, p. 267). At present, the relationship between the future frequency and intensity of ENSO events related to global climate change is not yet determined and may be unchanged, increasing or decreasing (Guilyardi *et al.* 2010, p. 325; Vecchi and Wittenberg 2010, p. 260). ENSO affects areas used by the black-footed albatross mainly along the west coast of the United States and Canada (McGowan *et al.* 1998, p. 214; McPhaden *et al.* 2006, p. 1,741; Arata *et al.* 2009, p. 6). In this area, ENSO can affect plankton biomass, the distribution of fishes and invertebrates, and the breeding success of seabirds, sea lions, and seals (McGowan *et al.* 1998, p. 214).

A qualitative analysis of black-footed albatross reproductive success (1980 through 2008 on Tern Island, French Frigate Shoals) and number of breeding birds (Laysan Island, Midway Atoll, and French Frigate Shoals) showed no relationship with El Niño or La Niña events (USFWS 2009a, unpubl.). Although there have been references to ‘‘dramatic breeding failures’’ of black-footed albatrosses in years following El Niño events, inspection of the underlying data suggest this may be nothing more than natural variability, since the same data also show normal productivity following other El Niño years, and no statistical analyses were completed to support the claim (Kappes *et al.* 2010, p. 257, and references therein). Based on this information, we conclude that changes in ENSO due to climate change are unlikely to affect black-footed albatross in the foreseeable future.

The PDO is a recurring pattern of interdecadal climate variability that is widespread and detectable as regime shifts in Pacific Ocean ecosystem structure (Mantua *et al.* 1997, p. 1,070). Climate, sea surface temperatures, and ecosystems affected by the PDO cover the tropical and central north Pacific, the Bering Sea, the Gulf of Alaska, the California Current, and the Kuroshio-Oyashio Extension (Miller *et al.* 2004, p. 163). These are areas used by the black-footed albatross for foraging. The components of the marine ecosystem that are affected include significant changes in primary productivity and in abundance of salmon, sardines, anchovy, rockfish, yellowfin tuna, seabirds, zooplankton, and nutrients (Chavez *et al.* 2003, p. 220). While the PDO is a well-documented climatic and ecological cycle, the underlying causes of PDO are not well understood (Miller *et al.* 2004, p. 163) and reliable climate modeling of future PDO responses are currently lacking (Wang *et al.* 2010, p. 258). An examination of data on black-footed albatross reproductive success or the number of breeding birds showed no sustained changes before and after the 1999 PDO shift from a warm phase to a cool phase PDO (USFWS 2009a, unpubl.). Based on this information, we conclude that regime shifts driven by the PDO-associated climate change are unlikely to pose a significant threat to the black-footed albatross.

A recent study by Kappes *et al.* (2010, p. 254 and Table 4) indicated that the time spent in area-restricted searching (*i.e.,* foraging behavior) of black-footed albatrosses decreases with increasing sea surface temperature and increases with increasing primary productivity. Black-footed albatrosses foraged most intensively in areas with sea surface temperatures of 61.3 ± 6.8 °F (16.3 ± 3.82 °C) (Kappes *et al.* 2010, pp. 253, 255). Although black-footed albatrosses demonstrated flexibility in foraging strategies and shifted search efforts in response to environmental cues, the researchers noted that the distribution of sea surface temperatures in the North Pacific will likely be altered in response to climate change, and reliable associations between water temperature and prey availability may no longer persist under such conditions (Kappes *et al.* 2010, p. 256).

Polovina *et al.* 2011 (p. 1) modeled the effects of climate change on temperate, subtropical, and tropical North Pacific upwelling biomes. Their results project that by 2100 the subtropical biome will expand to the north and south, increasing its area by about 30 percent, with a slight decrease in primary productivity per unit area and a northward shift in warmer sea surface temperatures (Polovina *et al.* 2008, p. 3, Table 1; Polovina *et al.* 2011 (Figures 2, 6, and 7, respectively). The temperate biome to the north of the subtropical biome is predicted to decrease in area and also show a slight decrease in primary productivity per unit area and warmer sea surface temperatures. The core foraging area for breeding black-footed albatrosses spans the transition zone between these two biomes (Arata *et al.* 2009, p. 6; Kappes *et al.* 2010, p. 253; Polovina *et al.* 2011, Figures 2 and 7).

As discussed above, sea surface temperature and primary productivity are closely associated with the foraging and searching behavior of black-footed albatrosses, and these climate change effects may eventually impact the breeding success of these birds. Reduction in phytoplankton may eventually affect trophic structure, and the impact is expected to move up the food web (bottom-up control) through copepods that feed on phytoplankton to zooplankton carnivores and on to larger top predators such as squid and fish that comprise the diet of seabirds (Richardson and Schoeman 2004, p. 1609). These changes in productivity may also alter the spatial distribution of primary and secondary pelagic production. However, negative impacts to the black-footed albatross due to changes in ocean productivity have not been observed to date, and based on the best information currently available, any predicted impacts of shifts in sea surface temperature, primary productivity, or other factors such as food type or food distribution, on black-footed albatross survival remain speculative. We have no information at this time to suggest that possible predicted decreases in marine productivity or shifts in marine biomes pose a significant threat to the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands.

Climate Change and Ambient Temperature

Ambient temperature is one of many variables that affects the ability of a seabird to thermoregulate (maintain its internal body temperature)—wind speed, solar radiation, and humidity, as well as metabolic heat production, thermal conductance, evaporative cooling, and behavior also affect the rate of heat transfer (Bakken *et al.* 1985, p. 934; Bakken 1992, entire). During the hatching and early nestling stages, air temperatures at black-footed albatross nest sites can reach daily maxima of 76 °F (24.5 °C) in January and February and 86.9 and 87.8 °F (30.5 and 31.0 °C) in June and July; soil temperatures may be as high as 104 °F (40 °C) (Howell and Bartholomew 1961, pp. 185–186). In general, avian embryos do not tolerate temperatures higher than 96.8 to 102.2 °F (36 to 39 °C), although several species can tolerate temperatures as high as 105.8 °F (41 °C) for several hours (Webb 1987, p. 893). The vigilant brooding behavior of black-footed albatross parents, however, protects their young from environmental extremes and maintains dry, shaded conditions for eggs and chicks kept at approximately 96.8 °F (36 °C) (Howell and Bartholomew 1961, p. 195).

The thermal tolerances of black-footed albatross adults, chicks, and eggs are not known. Incubation and brooding occurs in a dry environment often in open areas among bushes and trees (Howell and Bartholomew 1961, p. 192; Rice and Kenyon 1962a, pp. 558–562). Adult and large juvenile black-footed albatrosses respond to high ambient temperatures by panting, moving into shade, elevating their highly vascularized feet to increase convective cooling, shading their elevated feet by keeping their backs to the sun, and by lowering their heads (Howell and Bartholomew 1961, p. 189). Young chicks are brooded and sheltered by their parents until they are able to thermoregulate at about 18 to 20 days of age. Unbrooded, dry chicks can thermoregulate at air and substratum temperatures of 78.8 to 81.5 °F (26 to 27.5 °C) (Howell and Bartholomew 1961, p. 194, Figure 8). When nonbrooded chicks become hot, they often move away from the natal nest and build themselves a new, temporary nest in the shade of some nearby vegetation, returning to the natal nest when the adult returns to the nest with food (Rice and Kenyon 1962a, pp. 558–562).

Observations from other seabird species suggest that black-footed albatross are likely well adapted to tolerate the high temperatures that may be encountered during the breeding season. Other seabird species with dark plumage, such as the brown noddy (*Anous stolidus*) and sooty tern (*Sterna fuscata*), are known to nest under similar conditions in the Hawaiian Islands and have numerous adaptive mechanisms that enable them to deal with heat stress (Mathiu *et al.* 1991, entire; Ellis *et al.* 1995, entire; Mathiu *et al.* 1994, entire). Research suggests these seabirds have relatively low basal metabolic rates that may help offset heat gain from absorption of radiant heat by their dark plumage (Ellis *et al.* 1995, p. 311). These birds also exhibit a relatively wide thermoneutral zone (the range of ambient temperatures where energy spent on thermoregulation is minimized) between 77 and 95 °F (25 to 35 °C) for the sooty tern (Mathiu *et al.* 1991, p. 322, and references therein) and 72.1 to 98.8 °F (22.3 to 37.1 °C) for the brown noddy (Ellis *et al.* 1995, p. 309). Brown noddies can also allow body temperature to increase slightly in response to high ambient temperatures, which allows them to avoid evaporative water loss (Mathiu *et al.* 1991, p. 323; Ellis *et al.* 1995, p. 310). Sooty terns and brown noddies can use evaporative cooling at air temperatures up to 109 °F (43 °C) (Mathiu *et al.* 1991, p. 323; Mathiu *et al.* 1994, p. 286; Ellis *et al.* 1995, p. 312). Both species demonstrated greater effectiveness responding to high air temperatures as opposed to low air temperatures, and even hatchlings successfully thermoregulated under conditions of heat stress (Mathiu *et al.* 1991, p. 323; Mathiu *et al.* 1994, p. 292; Ellis *et al.* 1995, pp. 311–312). Chicks of the western gull (*Larus occidentalis*) can survive ambient air temperatures that are 14.4 to 25.2 °F (8 to 14 °C) higher than the daily maximum normally experienced (Salzman 1982, p. 743). Although we do not have studies specific to the black-footed albatross, we believe it is reasonable to assume this species has likely developed physiological adaptations to its environment similar to those exhibited by other seabirds nesting under similar environmental conditions.

The global average temperature has risen by approximately 0.319 °F (0.177 °C) per decade since 1981 (Trenberth *et al.* 2007, p. 253). According to modeling projections, global average temperature is expected to continue to rise, even if carbon emissions remain at current levels (IPCC 2007, p. 13). In the main Hawaiian Islands at low elevation, the increase in surface temperature is about half of the global average, at approximately 0.157 °F (0.087 °C) per decade (1975–2005) (Giambelluca *et al.* 2008, p. 2). Under the various emissions scenarios considered by the IPCC, the range of increase in annual mean SAT change is projected to be 1.15 to 1.24 °F (0.64 to 0.69 °C) between 2011 and 2030 and 2.32 to 3.15 °F (1.29 to 1.75 °C) for the years 2046–2065 (Meehl *et al.* 2007, p. 763, Table 10.5). If the Hawaiian Islands continue to lag behind the global average in that same manner described above (Giambelluca *et al.* 2008, p. 2), then we expect average low-elevation temperatures will increase approximately half of the global average level, and thus for 2046–2065 would increase 1.16 to 1.57 °F (0.65 to 0.88 °C). Thus, June and July average air temperatures in the Northwestern Hawaiian Islands are likely to stay below 90 °F (33.3 °C) over the next several decades. While modeling has provided us with a range of increases in average regional and global temperatures, we note that we do not have such projections for the magnitude of likely future temperature extremes.

In summary, although we cannot predict future operative environmental temperatures that will be experienced by the black-footed albatross, our evaluation of the best scientific and commercial data available at this time indicates this species exhibits a variety of adaptations to nesting in a hot environment with intense solar radiation, and is likely capable of adapting to the projected average increases in air temperature expected over the next several decades. Therefore, based on our evaluation, we conclude the projected increase in average ambient temperature does not pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Summary of Factor A

Although historically military activities impacted nesting populations of black-footed albatrosses as well as their nesting habitat in the central and western Pacific prior to, during, and after World War II, black-footed albatross nesting habitat rangewide is currently protected on islands that are managed for the conservation of native wildlife and their habitat, and a future military presence with negative impacts to habitat is unlikely. Loss of breeding habitat from active volcanism is a potential threat on Torishima Island in Japan, though less than 5 percent of the rangewide breeding population nests on this island. In addition, we have evidence that black-footed albatrosses have survived past eruptions or successfully recolonized following volcanic events on Torishima (see ‘‘Volcanic Activity,’’ above). Volcanic activity is not known on any of the nesting islands for black-footed albatross in the Hawaiian Islands. We do not consider the potential exploration of undersea natural gas resources to be a threat to black-footed nesting habitat on the Senkaku Islands, where less than 0.1 percent of the rangewide breeding population nests, since the sovereignty of those islands is in dispute, the existence of such reserves is questionable, and it appears unlikely that any such exploration will occur. Even should such development occur, we have no evidence to suggest that it would result in substantial enough impacts to nesting habitat to pose a threat to the black-footed albatross. Natural gas development is not anticipated on any of the nesting islands for black-footed albatross in the Hawaiian Islands. For the reasons described above, we conclude military activities, volcanic activity, and natural gas development do not pose a threat to the black-footed albatross in relation to the present or threatened destruction, modification, or curtailment of habitat or range of the species in the Hawaiian Islands, the Japanese Islands, or rangewide.

Verbesina encelioides is an invasive, nonnative plant that is established on Kure Atoll, Midway Atoll, and Pearl and Hermes Reef that poses a threat to the black-footed albatross. The Service and HDLNR are implementing control measures to reduce the distribution of *V. encelioides* on Midway and Kure atolls. *Casuarina equisetifolia* is a nonnative tree that has been identified as a threat to ground-nesting seabirds on Midway Atoll. *Casuarina equisetifolia* is also subject to a control program. The black-footed albatross populations on Midway Atoll and Kure Atoll are increasing, in spite of the presence of *V. encelioides* on both of these islands and the presence of *C. equisetifolia* on Midway Atoll. Therefore, we conclude that current control measures are sufficient to offset this threat, and we expect such measures to continue. We have no information to indicate the likely effects of climate change on these nonnative plants. In addition, we have no information to indicate nonnative plants pose a threat to black-footed albatrosses in the Japanese Islands. Therefore, we conclude that, as currently managed, *V. encelioides* and *C. equisetifolia,* or other nonnative plants, are not a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Our analysis indicates that projected sea level rise over the next 10 to 20 years (0.5–1.0 ft (0.1–0.3 m)), 30 to 40 years 1.4–1.9 ft (0.4–0.6m), and 50 years (2.4 ft (0.7 m)), may result in beach erosion in some (seaward) areas and beach deposition in other (lagoon-side) areas on Tern, Sand, and Eastern islands, and Kure Atoll (which together support approximately 48 percent of black-footed albatross breeding pairs), as has been observed in other Pacific atoll islands in response to rising sea level. Sea level rise is likely to affect only a very limited area of the geomorphologically similar islands of Lisianski and Laysan (which together support approximately 35 percent of black-footed albatross breeding pairs). Approximately 12 percent of black-footed albatrosses nest on high islands, which we defined as islands with maximum elevation greater than 165 ft (50 m) (*e.g.,* Kaula, Lehua, Necker, and Nihoa in the Hawaiian Islands and the Japanese islands of Torishima, Senkaku, and Ogasawara). Breeding birds on these islands will not be affected by projected sea level rise. Although sea level rise is expected to result in the loss of land area in the Hawaiian Islands, and we acknowledge that this loss of land may disproportionately affect black-footed albatross nesting habitat, the best available information indicates that sufficient land area will likely remain to support large numbers of black-footed albatross, albeit at reduced numbers.

Based on the anticipated relatively gradual nature of sea level rise over time, the amount of land area projected to remain, the ability of black-footed albatrosses to nest in habitats other than sandy beaches, the apparent capacity of these islands to support high densities of nesting seabirds, and the evidence suggesting that black-footed albatrosses may have the behavioral flexibility to seek out new nesting sites, we believe the black-footed albatross may shift to new nest sites over time in response to sea level rise in the Hawaiian Islands. Based on this assessment, we do not believe sea level rise and coastal inundation pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Current climate models indicate that winter wave heights in the black-footed albatross breeding areas in the Northwestern Hawaiian Islands and the

Japanese Islands will remain unchanged. Wave surge and overwash events are expected occurrences and will continue to happen occasionally and impact breeding black-footed albatrosses in localized areas. We have no evidence that such events will have greater impacts on the population than are observed under current conditions. Based on this assessment, we do not believe winter wave inundation poses a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

While tropical storm intensity is projected to increase slightly (*i.e.,* by a few percent) in the central Pacific (*e.g.,* Hawaiian Islands) in response to climate change, the frequency of tropical storms is projected to decrease. Over the next 100 to 200 years, slight increases (*i.e.,* a few percent) in both the frequency and intensity of tropical storms are projected in the western Pacific (*e.g.,* Japanese Islands). These projected increases are not expected to significantly affect black-footed albatrosses, which arrive at their nesting sites in mid- to late October and begin laying eggs in early to mid-December. Tropical storm season in the central and western Pacific ends in November or December; therefore, the period of overlap between birds arriving at nesting sites and the end of the tropical storm season is likely only a few weeks, which reduces the probability of tropical storms impacting nesting black-footed albatrosses. While there may be some short-term impacts to black-footed albatross nesting success due to the potential overlap of bird arrivals at nesting sites at the end of the tropical storm season, we do not anticipate these impacts to significantly affect the breeding population of the species. Therefore, based on our assessment of the best available information, we do not believe projected changes in storm frequency and intensity pose significant threats to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands. We are unable to assess the effects of climate-induced changes in the duration of tropical storm seasons on the black-footed albatross due to the lack of studies and available information.

Negative impacts to black-footed albatrosses due to changes in marine productivity as a result of climate change have not been observed. Interannual changes in marine productivity from ENSO fluctuations have not impacted breeding success for the black-footed albatross on Tern Island over 28 years of observations, nor have changes in marine productivity had an effect on the number of pairs attempting to nest on Laysan Island, Midway Atoll, or French Frigate Shoals. The PDO is a well-documented climatic and ecological cycle though its underlying causes are not well understood, and climate models of future PDO responses are not available. The large foraging range of the black-footed albatross may buffer it from the impacts of variable or reduced marine productivity. Based on our assessment of the best available information with regard to ENSO, PDO, and reduced marine productivity, we do not believe that possible predicted decreases in marine productivity pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Periodic fluctuations in ambient temperature have been withstood and have shown no significant influence on the rangewide population of the black-footed albatross, which is currently stable or increasing. Increases in ambient temperature on the Hawaiian Islands have been about half of the global average (Giambelluca *et al.* 2008, p. 2), therefore the anticipated range of increase by the year 2065 is about 1.16 to 1.57 °F (0.65 to 0.88°C), based on IPCC global projections of increase in annual mean SAT of 2.32–3.15°F (1.29–1.75 °C) between 2046 and 2065 (Meehl *et al.* 2007, p. 763, Table 10.5). Black-footed albatrosses are adapted to nesting in a hot environment with high solar radiation, and brooding adults normally provide a stable thermal environment for eggs and chicks. Studies of other seabirds have indicated significant levels of chick mortality when air temperatures increased by a measure of 14.4 to 25.2 °F (8 to 14 °C) above the normal daily maximum temperatures, suggesting that the predicted average increase of 1.16 to 1.57 °F (0.65 to 0.88°C) is unlikely to affect black-footed albatross chicks. However, because we have no information to suggest the magnitude of future temperature extremes, we cannot make any informed assessment as to how such extreme temperatures may potentially impact the species. In assessing the best available information, we find no compelling evidence that the black-footed albatross will experience population-level effects from projected increases in global ambient temperature rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Therefore, based on our assessment of the best scientific and commercial data available, concerning present threats to black-footed albatross habitat and their likely continuation in the future, we conclude the black-footed albatross is not threatened by the present or threatened destruction, modification, or curtailment of its habitat or range rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The exploitation of the black-footed albatross for feathers and eggs at the turn of the twentieth century reduced its population to its lowest known size and distribution (Lewison and Crowder 2003, p. 744; Arata *et al.* 2009, p. 35). In 1923, the breeding population was estimated to be 18,000 pairs (Arata *et al.* 2009, p. 2). Little information exists to estimate the former size of the extirpated colonies. The threat from poaching no longer exists because nesting islands are now managed for the conservation and protection of native wildlife and their habitat, and there is no longer a demand for black-footed albatross feathers and eggs.

We are not aware of any information indicating that overutilization of black-footed albatrosses for commercial, scientific, or educational purposes threatens this species anywhere within its range, or is likely to do so within the foreseeable future. Therefore, based on a review of the best scientific and commercial information available, we conclude that overutilization for commercial, recreational, scientific, or for educational purposes is not a significant threat to the black-footed albatross across its range, in the Hawaiian Islands, or in the Japanese Islands.

Factor C. Disease or Predation

Because the range of the black-footed albatross overlaps with that of the endangered short-tailed albatross (*Phoebastria albatrus*) (final listing rule 65 FR 46643; July 31, 2000), it has been suggested that disease and predation factors affecting the short-tailed albatross are likely the same for black-footed albatrosses. Here we consider whether diseases such as avian pox, avian cholera, or West Nile virus are a potential risk to black-footed albatrosses, and whether predation poses a significant risk to the species.

Disease

Avian pox is a disease that has been reported in Laysan albatrosses on Midway Atoll and on the main Hawaiian Islands (Sileo *et al.* 1990b, p. 335; Young and VanderWerf 2008, pp. 93–97; Arata *et al.* 2009, pp. 20–21). The principal form of transmission in wild birds is through the introduced mosquito, *Culex quinquefasciatus,* rather than through direct contact with a contaminated surface or aerosol (Warner 1968, p. 104; Arata *et al.* 2009, p. 20). In the breeding range of the black-footed albatross in the Hawaiian Islands, the mosquito has been documented only on Midway Atoll and Lehua Island. Epizootics (an epidemic disease outbreak in animals) of pox in Laysan albatrosses have occurred on Midway Atoll in the past, but we do not have information documenting the occurrence of pox in black-footed albatrosses on Midway Atoll (Arata *et al.* 2009, p. 20). It has been suggested that pox rarely affects chicks of the black-footed albatross because they nest in more open areas, where mosquitoes are not as abundant (Arata *et al.* 2009, p. 20). A 4-year study of the effect of avian pox on the fledging success of Laysan albatrosses on Oahu (Young and VanderWerf 2008, entire) found infection rate was significantly correlated with rainfall; however, differences were not detected in fledging rate in years with high pox infections (wet years) and years with low pox infections (dry years), nor with the overall fledging rate on Midway Atoll.

Although it was once thought that high chick mortality would result from infection with avian pox in Laysan albatrosses, even chicks with severe infections survived, and some resightings of formerly infected chicks as healthy adults confirmed survivorship (Young and VanderWerf 2008, p. 96). The high recovery rate, fledging success, and post-fledging survival of albatross chicks with avian pox infections suggests strong immunity to the disease (Young and VanderWerf 2008, p. 93). However, it is not known whether infection may impact long-term survivorship or reproduction (Young and VanderWerf 2008, p. 96). On Lehua Island, 2 of 16 black-footed albatross chicks were observed with pox lesions in 2005, but appeared to be in good condition otherwise, and were presumed to have developed and fledged normally (VanderWerf 2011, pers. comm.). In summary, the prevalence of avian pox in black-footed albatrosses in the Hawaiian Islands is low, and based on limited information, it appears that infected individuals recover from the disease (Young and VanderWerf 2008, p. 93. Therefore, we conclude that avian pox does not pose a significant threat to the black-footed albatross in the Hawaiian Islands.

We are unable to determine the extent and impact of avian pox on the black-footed albatross in the Japanese Islands due to the lack of study and available information. We have no information to suggest that avian pox is present on any of the Japanese Islands used for nesting by black-footed albatrosses. Based on the limited information available regarding this disease, it is reasonable to assume that the prevalence of this disease in black-footed albatrosses in the Japanese Islands, if present, is low (since it has never been reported from the birds on these islands) and as we have no information to suggest that the situation in the Japanese Islands is different from that in the Hawaiian Islands. We assume that if any birds were infected, individuals would recover from the disease, as has been observed in the Hawaiian Islands. Therefore, the effect of avian pox on black-footed albatrosses in the Japanese Islands is expected to be minimal, and we have no evidence to suggest that avian pox poses a significant threat to the black-footed albatross in the Japanese Islands.

Diseases such as West Nile virus, avian cholera, and avian influenza have not been documented in north Pacific albatrosses. West Nile virus is a mosquito-borne disease that has had dramatic effects on birds in North America, though it has not been detected in the Hawaiian Islands. It has been found in more than 60 species of dead wild birds, and an additional 20 species of dead birds in zoos (Steele *et al.* 2000, pp. 208–224; Vetmed 2009). A thorough search of the literature indicated that the virulence of West Nile virus to black-footed albatrosses, or albatrosses of any species, has not been tested. As stated above, within the breeding range of black-footed albatrosses, mosquitoes currently occur on Midway Atoll and Lehua Island. For transmission to occur, either an infected bird has to reach a breeding island with mosquito populations, or a mosquito carrying the virus has to reach a breeding island. There is some question as to whether a bird with an active virus could survive the attempt to fly to the Hawaiian Islands (Burgett 2009, pers. comm.). A mosquito already infected with West Nile virus could arrive on Midway Atoll as a stowaway on an airplane (only Midway Atoll and Tern Island have active runways), but most flights to these locations originate in Honolulu (where screening protocols are in place, see below), although Midway's runway is available to all aircraft as an emergency landing strip (Flint 2009b, pers. comm.).

Between 2000 and 2009, the State of Hawaii's Departments of Agriculture and Health and the U.S. Department of Transportation implemented a West Nile virus monitoring program at major airports in the main Hawaiian Islands (State of Hawaii 2009). Currently this program is funded by the Service to monitor wild birds at Honolulu International Airport, Kalaeloa Regional Airport, and Dillingham Airfield, all on Oahu. Over the past 10 years of monitoring, West Nile virus has not been detected in the Hawaiian Islands. Therefore, the risk of transmission of West Nile virus to the Northwestern Hawaiian Islands is considered to be very low. West Nile virus has not been documented in north Pacific albatrosses nor has it been documented in wild or domestic birds in the Hawaiian Islands. Midway Atoll and Lehua Island do harbor mosquito populations, but the chance of these mosquitoes becoming infected with West Nile virus is unlikely. Therefore, we believe that West Nile virus does not pose a threat to the black-footed albatross in the Hawaiian Islands.

West Nile virus has not been documented in Japan (Shirafuji *et al.* 2011, entire), and we have no information to suggest that West Nile virus occurs within the breeding range of the black-footed albatross on any of the Japanese Islands. Due to the lack of study and available information we are unable to determine the potential extent and impact, if any, of West Nile virus on the black-footed albatross in the Japanese Islands, should the disease ever occur there. However, we presently have no evidence that it is likely to occur on the remote breeding islands of the species, or to suggest that it may pose a significant threat to the Japanese Islands population.

Avian cholera is a result of an infection by the bacterium *Patruella multocida,* and usually occurs in large-scale outbreaks, most commonly in migratory waterfowl at staging areas when populations are concentrated (Botzler 1991, pp. 367–395; USGS 1999, p. 75). Transmission can occur through inhalation of aerosol containing the bacteria or through the skin or mucous membranes by contact with contaminated surfaces (USGS 1999, p. 75). Avian cholera was first documented in the large yellow-nosed albatross (*Diomedea chlororhynchos*) as a probable cause of a significant decline in an albatross population. This species breeds on Amsterdam Island in the Indian Ocean and avian cholera is suspected to have spread to breeding colonies of the sooty albatross (*Phoebastria fusca*) and the very rare Amsterdam albatross (*D. amsterdamensis*) that also nest there (Weimerskirch 2004, pp. 374–379). The source of avian cholera on Amsterdam Island has not been confirmed but is suspected to have originated from domestic poultry or by increases in temperature in the Indian Ocean, which increase the persistence of the bacteria in the environment (Weimerskirch 2004, p. 378). However, avian cholera has not been detected in birds in the Hawaiian Islands, and reports of die-offs of wild birds in countries other than the United States and Canada are uncommon (USGS 1999, pp. 80–82). Therefore, we conclude that avian cholera is not a threat to the black-footed albatross in the Hawaiian Islands.

We have little information with which to determine the potential extent and impact of avian cholera on black-footed albatrosses in the western Pacific islands due to the lack of study and available information; although avian cholera has been documented in Japan, mostly in domestic birds (Sawada *et al.* 1999, p. 21), we have no information indicating that avian cholera has been found on the Japanese islands used for nesting by the black-footed albatross. Furthermore, these islands are remote, and, should cholera ever spread to Torishima, the Ogasawara Islands, or the Senkaku Islands, the geographic distance between them makes it unlikely that all colonies would be affected simultaneously. Based on the limited information available, there is no evidence to suggest that avian cholera may pose a significant threat to the Japanese Islands population.

Wild birds have been affected by the H5N1 highly pathogenic avian influenza since 2002 (Uchida *et al.* 2008, p. 1). Avian influenza is primarily spread by direct contact between infected birds and healthy birds, and through indirect contact with contaminated equipment and materials. The virus is excreted through the feces of infected birds and through secretions from the nose, mouth, and eyes (USDA 2007). International surveillance for H5N1 avian influenza in wild birds was initiated in 2005. To date, H5N1 avian influenza has not been detected in wild birds in the mainland United States, the Hawaiian Islands, nor in Canada (Wildlife Disease 2009). As of September 2009, almost 4,000 samples had been collected from birds in the Hawaiian Islands, with no samples testing positive for the virus (Wildlife Disease 2009). For logistical reasons, surveillance in the Pacific region is implemented in locations where people are stationed. In remote areas such as the Northwestern Hawaiian Islands, sampling is passive and consists of testing dead birds; mortalities that are of concern or are questionable are sent to the USGS Honolulu Field Station for necropsy and testing for avian influenza (Fisher 2009, pers. comm.). In the course of 3 years, seven Laysan albatrosses from Midway Atoll have been sampled for avian influenza, but no black-footed albatrosses have been sampled, through either a live or mortality sample (Fisher 2009, pers. comm.). None of the seven Laysan albatrosses tested positive for the H5N1 virus (Fisher 2009, pers. comm.).

The Northwestern Hawaiian Islands are part of the Mid-Pacific flyway, which overlaps with the East Asian-Australasian flyway. Migratory shorebirds and waterfowl from sites in the Pacific with documented cases of H5N1 in wild and domestic birds, and also birds from the North American west coast and Alaska, are likely to use the Hawaiian Islands as a stopover or as wintering grounds. If an infected bird arrives in the Hawaiian Islands, it could come in contact with uninfected birds and transmit the virus to other wild birds, including the black-footed albatross. Additionally, because black-footed albatrosses range widely, they could come into contact with infected birds in waters adjacent to nations that have H5N1 infection in wild and domestic birds. However, the H5 subtypes of avian influenza do not survive well under saline conditions, which would reduce their survival in the saline conditions surrounding black-footed albatross nesting islands (Brown *et al.* 2007, p. 285). The H5N1 avian influenza has been detected in wild birds (primarily waterfowl) on the main islands of Japan (Uchida *et al.* 2008, p. 2); however, H5N1 avian influenza has not been detected in wild birds on the Japanese Islands (Torishima Island, Ogasawara Islands, Senkaku Islands). The possibility of infection of black-footed albatrosses with the H5N1 virus appears to be low, and we have no evidence to suggest that it poses a significant threat to the species anywhere within its range. Therefore, we conclude that H5N1 avian influenza is not a significant threat to the black-footed albatross across its range, in the Hawaiian Islands, or in the Japanese Islands. Furthermore, at this time the limited information available does not suggest that the effects of climate change are likely to increase the threat of avian disease to the black-footed albatross.

In summary, based on our assessment of the best scientific and commercial data available, we conclude that the black-footed albatross is not threatened by disease across its range, in the Hawaiian Islands, or in the Japanese Islands.

Predation

All of the islands in the Northwestern Hawaiian Islands are free of rats (*Rattus* spp.), which are known to prey on eggs and chicks of the black-footed albatross. To prevent the introduction of rats to the Northwestern Hawaiian Islands, which are part of the PMNM, every vessel that enters the PMNM is required by access permit to be inspected for rats (White 2009, pers. comm.). In 2009, rat eradication efforts were initiated on Lehua Island, where less than 0.011 percent of the rangewide breeding population of black-footed albatrosses occurs. Although these efforts were not entirely successful, the eradication strategy is continuing to undergo review and improvement (Parkes and Fisher 2011, entire). Lehua Island is the only island currently used by nesting black-footed albatrosses in the Hawaiian Islands that has rats, and because such a small proportion of the population nests there, we conclude that predation by rats does not pose a significant threat to black-footed albatrosses in the Hawaiian Islands.

In the Japanese Islands, rats are documented from Torishima Island and the Ogasawara Islands (Okochi *et al.* 2004, p. 1,466) and could occur on the Senkaku Islands, though recent survey information is not available. The Ogasawara Islands and Torishima Island together are home to approximately 5 percent of the rangewide breeding population and 98 percent of the Japanese Islands population, which has been documented to be increasing despite the presence of rats (Cousins and Cooper 2000, p. 23; ACAP 2010, p. 4; Hasegawa 2010 pers. comm.). Even though there has been no documented effect of rat predation on the population, it is likely that rat predation is limiting the growth potential of the population, and an effort should be made to eradicate the rats from Torishima. Nonetheless, the continued positive growth of the populations in Japan (see Figure 4) indicates that predation by rats is likely not a limiting factor for these populations; therefore, we conclude that predation by rats does not pose a significant threat to black-footed albatrosses in the Japanese Islands.

Predation by sharks has been suggested as a possible threat to the black-footed albatross. Sharks are present offshore of all breeding islands and prey upon fledglings on their first flight out to sea; this likely occurs throughout the range of the black-footed albatross, but is best documented in the Northwestern Hawaiian Islands (Naughton *et al.* 2007, p. 10). On Tern Island, it is estimated that approximately 10 percent of black-footed albatross fledglings are depredated by sharks (Wake Forest University 1999, p. 1). Predation of fledging black-footed albatrosses by sharks is a natural source of mortality, and modeling efforts by numerous authors (Cousins and Cooper 2000, entire; Lewison and Crowder 2003, entire; Wiese and Smith 2003, entire; Niel and LeBreton 2005, entire; Veran *et al.* 2007, entire; and Arata *et al.* 2009, entire) have incorporated estimates of juvenile survivorship into their population projections that account for sources of mortality, such as shark predation, that may be present but cannot be quantified. Since measures of juvenile survivorship reflect all sources of mortality, including shark predation, and these models report mostly stable and increasing populations of black-footed albatrosses in both the Hawaiian Islands and the Japanese Islands (Wiese and Smith 2003, p. 35; Arata *et al.* 2009, p. 51; ACAP 2010, p. 5; Figure 4, this document), we cannot conclude that shark predation is having a population-level effect on the black-footed albatross. We, therefore, have no evidence to suggest that shark predation may pose a significant threat to the black-footed albatross population rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Summary of Factor C

The prevalence of avian pox is low for black-footed albatrosses in the Hawaiian Islands. Although mortality from avian pox was once thought to be relatively high, more recent information indicates that infected individuals recover and most likely survive. Because of a lack of study and available information, we are unable to determine the extent, if any, and impact of avian pox on black-footed albatrosses in the western Pacific islands, but we have no evidence to suggest that it may pose a significant threat to the Japanese Islands population. Based on this information, we conclude that avian pox does not pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Other avian diseases, such as H5N1 avian influenza, West Nile virus, and avian cholera, have not been documented in the Hawaiian Islands or in the black-footed albatross breeding islands in the western Pacific. The H5N1 avian influenza has been reported only on the main islands of Japan and has been associated primarily with domestic birds and migratory waterfowl (Uchida *et al.* 2008, pp. 1–8). It has not been reported from albatrosses on these islands or from black-footed albatrosses on Torishima Island, the Ogasawara Islands, or the Senkaku Islands, but this may be because of a lack of study. No other data are available with which to assess the susceptibility of black-footed albatrosses to these diseases (H5N1 avian influenza, West Nile virus, and avian cholera). If any of these diseases becomes established in the breeding islands of the black-footed albatross in the future, this species may be impacted, but the remoteness of its Pacific islands breeding habitat decreases the likelihood of transmission of these diseases to these areas. Therefore, we conclude that H5N1 avian influenza, West Nile virus, and avian cholera do not pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Predation by nonnative rats is not a threat to black-footed albatrosses in the Northwestern Hawaiian Islands, where 95 percent of the species breeds, because: (1) There are no rats on these islands; and (2) protocols are in place to prevent the inadvertent introduction of rats to these islands or to eradicate them if they are accidentally introduced (White 2009, pers. comm.). Rat eradication efforts are ongoing on Lehua Island in the main Hawaiian Islands, where less than 0.01 percent of the rangewide black-footed albatross population breeds. Rats are reported on Torishima Island and the Ogasawara Islands, where almost 5 percent of the black-footed albatross population breeds rangewide; however, the breeding colonies on these islands appear to be increasing, despite the presence of rats (Hasegawa 2010, pers. comm.). It is unknown if rats are present on the Senkaku Islands, where less than 0.1 percent of the black-footed albatross breeding population nests. Based on the lack of evidence that rats are having any limiting effect on black-footed albatross populations, we do not consider rat predation to be a significant threat to the black-footed albatross in the Japanese Islands. Therefore, we conclude that predation by rats does not pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Shark predation is a natural source of mortality for the black-footed albatross. However, population models that have taken this natural source of mortality into account report stable and increasing populations of black-footed albatross (Arata *et al.* 2009, p. 51). Therefore, we conclude that predation by sharks does not pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Based on our assessment of the best scientific and commercial data available, we conclude that the black-footed albatross is not threatened by either disease or predation rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

To determine whether existing regulatory mechanisms protect the black-footed albatross, we reviewed existing international and U.S. conventions, agreements, and laws for the specific protection of black-footed albatrosses or their marine and terrestrial habitats in the countries where they forage, migrate, and breed. The black-footed albatross ranges throughout the north Pacific and forages and breeds within multiple national jurisdictions and international waters. First, we discuss the protection status of the black-footed albatross and its marine and terrestrial habitat at international, national, and regional levels, followed by a discussion of international and national fisheries regulations that are designed to reduce and monitor seabird bycatch from fisheries operations.

International Protection

Because the black-footed albatross ranges across the jurisdictions of multiple nations (*e.g.,* United States, Canada, Japan, Russia), international agreements may provide some protection for the species (Table 5). Most of the agreements and conventions listed in Table 5 stem from bilateral implementation of the Migratory Bird Treaty Act (see description below), or have provisions similar to the Migratory Bird Treaty Act such that the circumstances under which migratory species, including the black-footed albatross, can be ''taken'' are restricted. In general, these agreements and conventions prohibit the hunting, selling, or purchase of migratory bird species, unless the actions are otherwise permitted (Harrison *et al.* 1992, pp. 266–267).

TABLE 5—CONSERVATION LEGISLATION, CONVENTIONS, AGREEMENTS, AND LISTINGS FOR THE BLACK-FOOTED ALBATROSS

International
United Nations Convention on Migratory Species.
IUCN Red List of Threatened Species.
Agreement on the Conservation of Albatrosses and Petrels.
North American Agreement on Environmental Cooperation.
USA—Canada Convention for the Protection of Migratory Birds.
USA—Mexico Convention for the Protection of Migratory Birds and Game Mammals.

TABLE 5—CONSERVATION LEGISLATION, CONVENTIONS, AGREEMENTS, AND LISTINGS FOR THE BLACK-FOOTED ALBATROSS—Continued

USA—Japan Convention for the Protection of Migratory Birds and Birds in Danger of Extinction, and Their Environment.
USA—Russia Convention Concerning the Conservation of Migratory Birds and Their Environment.
Japan—China Agreement Protecting Migratory Birds and their Habitats.
National
United States of America:
Migratory Bird Treaty Act.
National Wildlife Refuge System Improvement Act.
Birds of Conservation Concern.
Magnuson—Stevens Fishery Conservation and Management Act.
National Marine Sanctuaries Act.
Canada:
Migratory Birds Convention Act.
Species at Risk Act of 2002.
China:
Wildlife Protection Law of 1988.
Japan:
Wildlife Protection and Hunting Law.
Nature Conservation Law.
Mexico:
Norma Oficial Mexicana NOM–059–ECOL–2001 0 (List of Species at Risk).
Regional
British Columbia (Canada):
British Columbia Wildlife Act.

Much of the marine foraging range of the black-footed albatross is the high seas, outside of national jurisdictions. Although some protections may technically be provided in some of these areas through various agreements, such as regional fisheries management organizations, the enforcement and monitoring of such agreements is difficult and as a consequence a large percentage of the black-footed albatross's foraging range has little protection (Gilman *et al.* 2008, p. 13). Some protections may be afforded in marine protected areas (MPAs), which now cover an estimated 4.32% of continental shelf areas and 2.86% of waters within 20 nautical miles of coastlines across the globe (Toropova *et al.* 2010, p. 28), but the marine foraging range of the black-footed albatross is in one of the lowest areas of MPA coverage (Toropova *et al.* 2010, pp. 30–31). On the other hand, most of the terrestrial habitat used for nesting by the black-footed albatross is protected, and a number of marine areas where they are known to forage are protected by refuge or monument designations.

The black-footed albatross is listed in Appendix II of the United Nations Convention on Migratory Species; otherwise known as the Bonn Convention. Species listed in Appendix II have been identified as needing or benefiting from international cooperation (Convention on Migratory Species 2009). The black-footed albatross is included in the IUCN Red List Category as an ''Endangered'' species; this designation was based on projected or suspected population size reduction of greater than 50 percent, to be met within the next 10 years or 3 generations, whichever is the longer (IUCN 2001, pp. 18–19). However, as described above, the results of the models that in part prompted this status change (Cousins and Cooper 2000, entire; Lewison and Crowder 2003, entire) appear to have inadvertently double-counted the effects of mortality from fisheries and have not been supported by others (Niel and Lebreton, 2005, 9 pp.; Arata *et al.* 2009, pp. 48–49). In addition, the lead author of the Lewison and Crowder (2003) paper has pointed out that some of the key assumptions in that paper are now known to be inaccurate, consequently the population trajectories that were projected are not reliable (Lewsion 2007, pers. comm.). We do not consider the IUCN Red List to be an ''existing regulatory mechanism,'' because the IUCN is a non-governmental organization and a listing on the Red List has no legal effect.

The black-footed albatross is not currently listed under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), but trade of the black-footed albatross is not known to occur. The black-footed albatross is not a species listed under the United Nations Convention on the Conservation of Migratory Species of Wild Animals (UNEP–CMS), and the United States and Canada are not signatories of this agreement (Convention on Migratory Species 2009); therefore, the black-footed albatross receives no protection under this agreement.

The Agreement on the Conservation of Albatrosses and Petrels (ACAP) is a multilateral agreement that seeks to conserve albatrosses and petrels by coordinating international activity to mitigate known threats to albatross and petrel species (Convention on Migratory Species 2009). It is a legally binding treaty that requires signatory governments to take action to reduce albatross and petrel bycatch in fisheries and to protect breeding colonies. Currently, none of the nations in the marine or terrestrial range of the black-footed albatross (*i.e.,* United States, Japan, Canada, Mexico, Russia) are members of this agreement. Therefore, ACAP does not currently offer any protections to the black-footed albatross.

The North American Agreement on Environmental Cooperation (NAAEC), an agreement between the United States, Mexico, and Canada, may provide some protection for the species since the black-footed albatross ranges into Mexico and Canada. The NAAEC was negotiated and is being implemented in parallel with the North American Free Trade Agreement. The NAAEC requires that each party ensure that its laws provide for high levels of environmental protection. Each party agreed to effectively enforce its environmental laws through appropriate means, such as the appointment and training of inspectors, monitoring compliance, and pursuing the necessary legal means to seek appropriate remedies for violations. The Commission for Environmental Cooperation was created under the NAAEC and is authorized to develop joint recommendations on approaches to environmental compliance and enforcement. However, we are unaware of any protection measures specific to the black-footed albatross, or to albatrosses in general, currently in place under NAAEC.

The USA—Canada Convention for the Protection of Migratory Birds establishes a legal framework for protecting migratory birds and establishes regulations for their cross-boundary protection (Treaties 2009). The USA—Mexico Convention for the Protection of Migratory Birds and Game Mammals adopts a system for the protection of certain migratory birds in the United States and Mexico. It provides for enactment of laws and regulations to protect birds by establishing closed seasons and refuge zones (Treaties 2009). The USA—Japan Convention for the Protection of Migratory Birds and Birds in Danger of Extinction and Their Environment prohibits the taking of migratory birds or their eggs, unless there are permitted exceptions for subsistence. The USA—Japan Convention also specifies that each party shall seek means to prevent damage to such birds and their environment, including damage resulting from pollution of the seas (Treaties 2009). The USA—Russia Convention Concerning the Conservation of Migratory Birds and Their Environment (Treaties 2009) specifies each party shall prohibit the taking of migratory birds, the collection of their nests and eggs, and the disturbance of nesting colonies. The treaty also mandates that, to the extent possible, the parties shall undertake measures necessary to protect and enhance the environment of migratory birds and to prevent and abate pollution or detrimental alteration of that environment. The Japan—China Agreement Protecting Migratory Birds and their Habitats prohibits the hunting of migratory birds and the collection of their eggs, encourages the exchange of data relating to migratory birds, and encourages protection and management of migratory bird habitat (UN 1983, pp. 229–230).

The black-footed albatross is not covered specifically under any of these conventions. Although many of these international agreements or conventions have good intentions and may serve to draw attention to the conservation needs of the black-footed albatross, relatively few extend any real protection to the species. The Agreement on the Conservation of Albatrosses and Petrels has perhaps the greatest potential to provide protection from fisheries bycatch for the black-footed albatross, but since the key nations within the foraging and breeding range of the species are not signatories to the agreement, it can only be considered advisory in effect.

National Protections

National protections, particularly when regulated and enforced in the countries where the black-footed albatross nest, such as the United States and Japan, or where they forage offshore in national waters (United States, Canada, Mexico, Japan, China, Russia, Taiwan, Republic of Korea), have the potential to be beneficial to the species.

United States—The Migratory Bird Treaty Act of 1918 (MBTA) states that it is unlawful ''to pursue, hunt, take, capture or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or eggs of any such bird, or any product, whether or not manufactured.'' It provides penalties for anyone in violation of its provisions. It also implements the commitment of the United States to international conventions with Canada, Japan, Russia, and Mexico (see above) for the protection of a shared migratory bird resource. Each of the conventions protects selected species of birds that are common to both countries. The black-footed albatross is included in the list of migratory birds protected by the MBTA.

The National Wildlife Refuge System is managed by the Service under the National Wildlife Refuge System Improvement Act of 1997 primarily for the benefit of fish, wildlife, and plant resources and their habitats (USFWS 2009b). The National Wildlife Refuge System Improvement Act requires, among other things, that a comprehensive management plan be in place for each refuge. The plan describes the desired future conditions of a refuge or planning unit and provides long-range guidance and management direction to achieve the purposes of the refuge; helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wildlife Preservation System; and meets other mandates. As stated earlier, the black-footed albatross nests on the following islands within the National Wildlife Refuge System: Midway Atoll (Midway Atoll NWR), and Pearl and Hermes Reef, Lisianski Island, Laysan Island, French Frigate Shoals, Necker Island, and Nihoa Island (Hawaiian Islands NWR). Midway Atoll NWR, established in 1988, provides nesting habitat for 39 percent of the black-footed albatross population. Approximately 52 percent of black-footed albatrosses nest in the Hawaiian Islands NWR. Therefore, a total of approximately 91 percent of the global black-footed albatross population nests on islands within the National Wildlife Refuge system.

In 2006, the Northwestern Hawaiian Islands (renamed Papahanaumokuakea in 2007) Marine National Monument was designated by Presidential Proclamation 8031; it is described earlier in this document. A management plan for the monument was completed in December 2008. The plan includes strategies to: (1) Restore migratory bird habitat by eradicating invasive species and restore native plant communities; (2) minimize the impact of threats to migratory birds such as habitat destruction by invasive species, disease, contaminants, and fisheries interactions; (3) monitor populations and habitats of migratory birds to ascertain natural variation and to detect changes in that variation that might be attributed to human activities, including anthropogenically caused climate change; and (4) as threats are removed, restore seabird species at sites where they have been extirpated (NOAA *et al.* 2008, pp. 173–179). Human activity is highly regulated, and entry into the monument is prohibited without a permit.

Kaula Island is not part of the National Wildlife Refuge System. Although the island has been used by the U.S. Navy for bombing practice since the early 1950s, the State of Hawaii named Kaula Island a State Seabird Sanctuary in 1972. Permission from the U.S. Navy is required to land on Kaula Island.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) guides management of U.S. fisheries within its EEZ, and specifies that bycatch-related mortality of non-target fish should be minimized. It does not include seabirds in its definition of bycatch, so does not directly mandate seabird bycatch reduction. However, it promotes the development of bycatch reduction technology and authorizes incentives and cooperative bycatch reduction programs between Federal agencies and the industry. The National Marine Fisheries Service (NMFS) has invoked the MSA to reduce seabird bycatch under its mandate to conserve and manage the marine environment (69 FR 1930; January 13, 2004). As described below (Fishery Regulations) NMFS has enacted seabird bycatch minimization measures in multiple fisheries that operate within the range of the black-footed albatross.

The National Marine Sanctuaries Act of 1972 (NMSA) (16 U.S.C. 1431 *et seq.*) authorizes the Secretary of Commerce, and specifically NOAA, to designate and protect areas of the marine environment with special national significance due to their conservation, recreational, ecological, historical, scientific, cultural, or esthetic qualities, as National Marine Sanctuaries. Within the range of the black-footed albatross along the western coast of North America, five National Marine Sanctuaries (NMS) have been designated. Four sanctuaries occur off the coast of California: Cordell Bank NMS; Gulf of Farallones NMS; Monterey Bay NMS; and Channel Islands NMS. One sanctuary occurs off the coast of central Washington, the Olympic Coast NMS. In 1989, Congress passed a law that prohibits the exploration for, or the development or production of, oil, gas, or mineral resources in any area of the Cordell Bank NMS (Pub. L. 101–74). The Marine Protection, Research, and Sanctuaries Act of 1972 (Pub. L. 92–532,) prohibits leasing, exploration of, producing, or developing oil and gas in the Monterey Bay NMS, and includes a requirement for Federal agencies to consult on activities that are likely to injure sanctuary resources. The ''no-take'' marine reserves and one of the limited-take marine conservation areas in the Channel Islands NMS includes Federal waters 6 nautical mi (11 km) from land, which prohibits or limits removal of and injury to any Channel Islands NMS resource (74 FR 3216; January 16, 2009).

All of the existing U.S. Federal protections described above assist in the conservation of the black-footed albatross and its habitat in the United States, where 95 percent of the species breeds and nests. These protections have no effect on international waters where the species forages.

Canada—The Migratory Birds Convention Act (1994) (MBCA) is a statute that implements the 1916 MBCA between Canada and the United States (Canada Minister of Justice 1991, entire) and protects the black-footed albatross in Canada. Under the MBCA, the Governor in Council regulates migratory nongame bird species, such as the black-footed albatross, by prohibiting the killing, capturing, injuring, taking, or disturbing of migratory birds or the damaging, destroying, removing, or disturbing of nests; prescribing protection areas for migratory birds and nests; and requiring the control and management of those areas (Canada Minister of Justice 1991, entire). The MBCA does allow for take of migratory birds by aboriginal people, but the black-footed albatross is not known to be hunted by First Nation people (COSEWIC 2007, pp. 38–39). In June 2005, Bill C–15 amended the MBCA to more effectively protect migratory birds and the marine environment from the discharge of harmful substances into marine waters (Fisheries and Oceans Canada (FOC) 2007, p. 4). Bill C–15 clarifies that migratory birds are protected as both individuals and populations, and addresses matters related to birds oiled at sea (FOC 2007, p. 4).

The black-footed albatross was designated a species of ‘‘special concern’’ in 2007 under Canada's Species at Risk Act of 2002 (Species at Risk Act, or SARA), legislation similar to the U.S. Endangered Species Act. A species of special concern under SARA is a species of wildlife that may become a threatened or endangered species because of a combination of biological characteristics and identified threats, but this classification in and of itself does not provide any specific regulatory protections to the species. In its assessment and status report on the black-footed albatross, COSEWIC determined that the black-footed albatross was of ‘‘special concern’’ based on modeled population declines due to mortality from fishing operations and ingestion of plastic and pollutants (COSEWIC 2007, p. iii).

We consider existing protections in Canada adequate for black-footed albatross conservation, but note that these protections are limited to birds on land and in the generally protected marine environment, and provide no protection to the species on international waters where the majority of black-footed albatrosses forage.

Japan—The Wildlife Protection and Hunting Law was created to protect birds and mammals, to increase populations of birds and mammals, and to control pests through the implementation of wildlife protection projects and hunting controls (Wildlife Protection System 2009). This law restricts hunting to game species. The black-footed albatross is not hunted in Japan and is not otherwise protected under this law. While Japan's Nature Conservation Law enables the establishment of marine areas and nature conservation areas, no marine reserves to protect the black-footed albatross have been created (Harrison *et al.* 1992, p. 269). Torishima Island, where 3.5 percent of the rangewide population of the black-footed albatross nests (67 percent of the Japanese Islands breeding population), has been a protected national natural monument since 1965 and can be visited only with special permission (USFWS 2008a, p. 33). Landing on the island is very difficult due to heavy seas and lack of suitable landing beaches or facilities, and, therefore, it is unlikely that the black-footed albatross is threatened by human activity on the island. The Ogasawara Islands, used for nesting by 1.5 percent of the rangewide black-footed albatross breeding population (30 percent of the breeding population in the Japanese Islands), are included in the Ogasawara National Park. In 2001, Japan's Ministry of the Environment and Ministry of Agriculture, Forestry, and Fisheries submitted the Ogasawara Islands as a candidate for designation as a World Heritage Site. World Heritage is a program of the United Nations Educational, Scientific, and Cultural Organization (UNESCO) to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity (World Heritage 2009). Recognition of the Ogasawara Islands as a World Heritage site could lead to additional protections in the future, but does not presently afford any additional regulatory protections. We are unaware of any protections afforded the black-footed albatross or its nesting sites on the Senkaku Islands, where less than 0.1 percent of the rangewide population and 2 percent of the Japanese Islands population nests.

The existing protections afforded the black-footed albatross on the majority of Japanese Islands where it breeds and nests provide for its conservation, but have no effect in marine environments or in international waters where the species forages.

Mexico—The black-footed albatross is listed as a Threatened Species in Mexico (List of Species at Risk, Annex 2 of the Norma Oficial (the official body of regulations of the Mexican Government) Mexicana NOM–059–ECOL–2001). Threatened species are defined as species in danger of disappearance in the short- to medium-term, if factors that adversely affect their viability, such as causing damage or modification of habitat or directly reducing the size of their populations, continue to operate. Because there currently is no established breeding population of the black-footed albatross in Mexico (see Species Biology, Breeding Distribution), this provides minimal protection to the species. However, if black-footed albatrosses begin nesting and otherwise utilizing the islands of Guadalupe or San Benedicto where they have been sporadically reported on a more consistent basis, then protection while on land will be afforded them.

The protections for black-footed albatross in Mexico are helpful in terms of raising awareness regarding the conservation of the species, and will afford the species protection should it become established there, but at this time protection is limited, since there is not an established breeding population of black-footed albatrosses in Mexico.

Regional Protection

Hawaiian Islands (United States)—Lehua Island and Kure Atoll are managed by HDLNR as State Seabird Sanctuaries. The HDLNR manages State seabird sanctuaries for the conservation and protection of indigenous wildlife, including seabirds (Hawaii Administrative Rules Title 13, Subtitle 5, Part 2, Chapter 125, section 107). Kaula Island has also been designated a State Seabird Sanctuary, although the Navy uses Kaula Island for inert ordnance and gunnery activities, and access to the island is prohibited. Thus, we cannot determine the level of protection this State designation affords to the black-footed albatross or its nesting habitat on Kaula Island.

Alaska (United States)—Alaska has a State endangered species law, but the black-footed albatross is not State-listed as endangered or as a species of concern

(Alaska Department of Fish and Game 2009). The Alaska Department of Fish and Game, Division of Subsistence, has not conducted a survey to assess customary and traditional uses of albatrosses, and comprehensive household surveys have not specifically inquired about uses of albatrosses. However, throughout more than 20 years of comprehensive research on customary and traditional uses of wild animals and plants by Alaska's native peoples, the Division of Subsistence has not recorded harvest of black-footed albatrosses (State of Alaska (SOA), pp. 3–4).

California (United States)—In 1999, the California Legislature approved, and the governor signed, the Marine Life Protection Act (MLPA; Stats. 1999, Chapter 1015). While the black-footed albatross is not expected to benefit directly from this program, the MLPA requires California Fish and Game to prepare and present to the Fish and Game Commission a master plan that will guide the adoption and implementation of a Marine Life Protection Program, which includes a statewide network of marine protected areas. Four of five regional marine protected area planning processes have been developed thus far under the MLPA (California Department of Fish and Game 2011).

Oregon (United States)—Oregon is currently planning a series of marine reserves that would protect waters within 3 mi (4.8 km) of the coast. The first reserve was designated in June 2009 (Oregon Marine Reserves 2009). The level of protection given to black-footed albatrosses in this reserve system is unknown.

Washington (United States)—The State of Washington has developed State Aquatic Reserves to preserve and protect the State's living resources. To date, all of the designated reserve areas are inland, and likely do not afford additional protection of black-footed albatrosses or their foraging habitat.

British Columbia (Canada)—The black-footed albatross is considered to be a species of special concern in British Columbia (B.C.). Species of special concern are particularly sensitive or vulnerable to human activities or natural events. They are considered at risk but are not endangered or threatened (British Columbia Conservation Data Center 2009). The B.C. Wildlife Act is the provincial equivalent of Canada's Migratory Birds Convention Act, and offers the same protections.

Fishery Regulations

In the north Pacific, seven commercial longline fisheries overlap with the black-footed albatross foraging range: the pelagic tuna (*Thunnus* spp.) and swordfish (*Xiphias gladius*) fisheries, the demersal (on or near the seabed) groundfish fishery in the Bering Sea and Gulf of Alaska; the demersal Pacific halibut (*Hippoglossus stenolepis*) fishery in Alaska; the demersal fishery off the west coast of the United States, and the demersal rockfish (*Sebastes* spp.) and halibut fisheries in B.C., Canada (Smith and Morgan 2005, pp. 4–12). Approximately 3,000 pelagic longline vessels from Japan, China, Korea, Taiwan, Mexico, and the United States operate in the north Pacific. In addition, Canada, Japan, Russia, and the United States operate approximately 17,000 demersal longline vessels in the north Pacific (Gilman *et al.* 2005, p. 36). In a satellite telemetry study of black-footed albatrosses captured in Alaskan waters, black-footed albatrosses overlapped with the sablefish (*Anoplopoma stenolepsis*) and Pacific halibut longline fisheries, and also the pot cod (*Gadus macrocephalus*) fishery within the Alaskan EEZ (Fischer *et al.* 2009, pp. 755–756). Black-footed albatrosses that entered international waters spent almost 30 percent of their time there, and may have encountered the albacore tuna (*Thunnus alalunga*) fishery (Fischer *et al.* 2009, p. 757). Of the birds that entered the Canadian EEZ, black-footed albatrosses overlapped with the Pacific halibut longline fishery (Fischer *et al.* 2009, p. 757). Overall, this study demonstrated that post-breeding black-footed albatrosses favor highly productive waters and are likely to encounter fishery activity in their entire preferred foraging habitat, putting foraging birds at risk of incidental mortality.

Reliable population analyses provide evidence that conservation measures implemented thus far have been highly effective in reducing the incidental mortality of black-footed albatrosses (Awkerman *et al.* 2008; Arata *et al.* 2009, pp. 14, 46; Moore *et al.* 2009, p. 444; ACAP 2010, p. 12). In this section we review international conventions and guidance, national plans and fishing regulations, and regional fishery actions enacted to address impacts to seabirds, such as the black-footed albatross, from mortality incidental to fishing operations.

International

The United Nations Convention on the Law of the Sea of 1982 (UNCLOS) is a legally binding international agreement to conserve and manage targeted and associated species within EEZ waters, and to promote cooperation with other states in the conservation and management of living resources in the high seas (Harrison *et al.* 1992, p. 269). It requires nation states to take conservation measures to protect the living resources of the high seas; to cooperate and enter into negotiations with states whose nationals exploit identical living resources, or different living resources in the same area; and to maintain or restore populations of harvested species at levels that can produce the maximum sustainable yields. Canada, China, Japan, Mexico, the Republic of Korea, and Russia are signatories of UNCLOS; however, the United States has not signed it. In addition, the United States, Canada, Japan, and Russia ratified the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (U.N. Fish Stocks Agreement), which entered into force in 2001 (U.N. 2009b). The U.N. Fish Stocks Agreement sets forth conservation and management principles for straddling and highly migratory fish stocks.

Black-footed albatrosses experienced high rates of mortality (an estimated 50,000 birds between 1978 and 1992) in the squid and large-mesh driftnet fisheries, which were operational from the early 1970s until 1992 (Arata *et al.* 2009, pp. 14, 62). These fisheries used large nets, 9 to 37 mi (15 to 60 km) long, vertically suspended in the water, from the surface to 20 to 26 ft (6 to 8 m) deep (Arata *et al.* 2009, p. 13). Due to the high rate of incidental mortality to seabirds, sea turtles, marine mammals, and nontarget fish, the 1992 U.N. General Assembly agreed to a nonbinding resolution, *United Nations Resolution 46–215* (United Nations 1991), to ensure a global moratorium on all large-scale pelagic driftnet fishing on the high seas of the world's oceans and seas. Because the U.N. moratorium applied only to high seas fisheries, driftnet fisheries still exist in the EEZs of some countries. Laysan albatross bycatch has been documented in the Japanese salmon driftnet fishery in the Russian EEZ, and in the United States, large mesh gillnets are used within the EEZ off the coasts of California and Oregon (Arata *et al.* 2009, p. 13). However, by establishing a moratorium on high seas driftnet fisheries, the implementation of Resolution 46–215 in 1992 has removed a significant source of black-footed albatross mortality from driftnet fisheries throughout its range (Cousins and Cooper 2000, p. iii; Arata *et al.* 2009, p. 62; Moore *et al.* 2009, Figures 3a and 3b, p. 444). At this time we do not consider pelagic driftnet fisheries, as currently managed, to be a threat to the black-footed albatross throughout its range, but as long as driftnets are used within black-footed albatross foraging habitat, some mortality will continue even if not recorded.

The Pacific halibut fishery is managed by the *International Pacific Halibut Commission* (IPHC), a public international organization established by a convention between the governments of Canada and the United States. The fishery operates in Oregon, Washington, Alaska, and British Columbia, Canada. In December 2001, the North Pacific Fishery Management Council required all Pacific halibut vessels greater than 17 m (55 ft) to implement seabird avoidance measures, including the use of streamer lines, which have been shown to be almost 100 percent effective in reducing mortality in species such as albatrosses (Melvin *et al.* 2006, p. 4). Currently, observers are not required on Pacific halibut vessels and bycatch in this fishery is not well understood because no systematic observer program has been in place (Fischer *et al.* 2009, p. 758; ACAP 2010, p. 13). However, although the rangewide impact of the Pacific halibut fishery on the black-footed albatross is not specifically known, estimates obtained from fishing effort data suggest that the number of black-footed albatross killed by U.S. and Canadian halibut fisheries remains relatively low (Arata *et al.* Fig. A4, p. 64; p. 65). Management for the conservation of the black-footed albatross and other seabirds would be improved by more accurate knowledge of the bycatch from the Pacific halibut fishery.

The Food and Agriculture Organization of the U.N. (FAO) recognized the bycatch of seabirds in longline fisheries as a worldwide issue. In March 1997, FAO developed guidelines leading to an International Plan of Action to Reduce the Incidental Catch of Seabirds in Longline Fisheries (IPOA), in which participation is voluntary. The IPOA recommended that States with longline fisheries conduct an assessment of these fisheries to determine if a problem exists with respect to incidental catch of seabirds. If a problem exists, the IPOA states that States should adopt a National Plan of Action (NPOA) for reducing the incidental catch of seabirds in longline fisheries. The NPOA is a plan that a State designs, implements, and monitors to reduce the incidental catch of seabirds in longline fisheries and should: (1) Prescribe appropriate mitigation methods with proven efficiency; (2) contain plans for research and development of the most practical and effective seabird deterrent devices, improve other technologies and practices that reduce the incidental capture of seabirds, and undertake research to evaluate the effectiveness of mitigation measures; (3) prescribe means to raise awareness among fishermen, fishing associations, and other groups about the need to reduce incidental catch of seabirds in longline fisheries; (4) provide information about technical or financial assistance for reducing incidental catch of seabirds; (5) describe and implement outreach programs to improve the understanding of the problem; and (6) prescribe data collection programs to determine incidental catch of seabirds and the effectiveness of mitigation measures, including the use of onboard observers (Food and Agriculture Organization 2009).

Within the range of the black-footed albatross, the United States, Canada, and Japan have each developed NPOAs. The U.S. NPOA was developed in 2001 through a collaborative effort by NMFS, the Service, and the Department of State and is organized around three themes: Action items, interagency cooperation, and international cooperation. Action items include fishery assessments, data collection, prescription of avoidance measures, outreach, education, and reporting (NOAA 2001, pp. 12–14). The Interagency Seabird Working Group, comprising staff from NMFS, the Service, and the Department of State, was formed to continue to address seabird bycatch issues and help coordinate implementation of the NPOA and IPOA.

Canada's NPOA was developed in 2007 and provides an assessment of bycatch levels of seabirds within Canada's longline fisheries, identifies priorities for the NPOA, highlights Canada's legislative framework and international commitments, reviews Canada's integrated fisheries management framework, and presents a series of actions for better identifying bycatch levels and further enhancing efforts to reduce the incidental capture of seabirds (FOC 2007, p. 1). Actions include reviewing and enhancing scientific observer programs, promoting the use of mitigation measures to reduce seabird bycatch, outreach and education about seabird bycatch and the NPOA, and reassessing incidental take at the national level (FOC 2007, pp. 12–16).

Japan developed an NPOA in 2001 and revised the plan in 2009. The plan focuses on four fisheries for which measures for incidental catch are required: (1) Distant-water tuna longline fishing, for vessels over 109,000 kilograms (kg) (120 tons (T)) that fish within the Pacific Ocean; (2) near-shore longline tuna fishing for vessels 9,100 kg to 109,000 kg (10 to 120 T) that operate in near-shore waters and the central and western Pacific; (3) coastal longline tuna fishery for vessels of 9,100 kg to 18,100 kg (10 to 20 T) that operate in Japan's EEZ; and (4) other longline fisheries that operate in Japan's coastal and offshore areas. The plan notes that incidental catch of the black-footed albatross may occur in near-shore areas of Japan during the breeding season (Fisheries Agency Japan (FAJ) 2009, p. 3). The policy for mitigation of bycatch includes the implementation of mitigation measures under the jurisdiction of Regional Fishery Management Organizations, pursuant to their resolutions, and voluntary implementation of mitigation measures outside the jurisdiction of Regional Fishery Management Organizations.

Taiwan is not a member State of the FAO but still developed an NPOA in 2006. The Taiwanese plan includes efforts to reduce the incidental catch of seabirds in longline tuna fisheries, such as providing assistance for the installation of bird avoidance equipment, financial assistance to vessels for bird avoidance equipment, public outreach about bird conservation to the fishing community, and enhancement of international cooperation and scientific research (Fisheries Information Services 2009). We are not aware if Mexico, Korea, China, or Russia have developed NPOAs.

National

Currently, Japan, Canada, and the United States have adopted regulations to reduce seabird mortality in the demersal and pelagic longline fisheries. Below we describe regulations implemented by these nations to minimize bycatch of seabirds in longline fisheries. We also describe the extent of observer coverage in the fisheries, as this relates to the ability to quantify bycatch and evaluate the efficacy of minimization measures.

Japan—The Japanese government requests the collection of information when seabird bycatch occurs, but does not require it (Rivera 2001, p. 2). For a number of years, the Service has attempted to obtain bycatch data from the Japanese Ministry of Environment, but has not received the information

(Balogh 2009, pers. comm.). Due to the lack of data and available information on enforcement and monitoring measures implemented on Japanese longline fishing vessels since the inception of the NPOA, we are unable to determine the impact of Japanese longline fishing on the black-footed albatross. As stated earlier, many plans and agreements have good intentions and, if implemented, stand to have positive effects on the problem of bycatch. Because many of these are voluntary programs and agreements, there is no required management or mitigation; therefore, there is no enforcement of management activities or monitoring or data collection.

Canada—The black-footed albatross foraging range overlaps with the rockfish and halibut fisheries in Canada's EEZ. An estimated 55 to 253 black-footed albatrosses were taken in the B.C. halibut and rockfish fisheries between the years 2000 and 2002 (Wiese and Smith 2003, pp. 46–48). The B.C. commercial halibut fishery is managed internationally by the IPHC (described above). While the IPHC has not implemented mandatory observer programs for the halibut fishery, Fisheries and Oceans Canada (a Canadian Federal Government program) started an observer program in 1999 to more accurately estimate total catch (Wiese and Smith 2003, p. 26). Since 2002, mandatory seabird bycatch minimization measures have been implemented for the halibut and rockfish fisheries in B.C. (COSEWIC 2007, p. 32; Arata *et al.* 2009, p. 65). However, to date there have been no studies to evaluate the effectiveness of this regulation (COSEWIC 2007, p. 32).

In 2006, Canada implemented an Integrated Pacific Groundfish Pilot (Pilot), which provides a comprehensive model for the management of over 50 groundfish species. Under the Pilot, all seabird bycatch must be accounted for in these fisheries (FOC 2007, p. 8). An electronic seabird bycatch monitoring system was started in 2006 that uses logbooks audited using at-sea camera footage. Estimates of bycatch derived from vessel observations and the electronic monitoring system were within 2 percent of each other (FOC 2007, p. 9). Bycatch estimates from the electronic monitoring system may prove to be a cost-effective, efficient technology for monitoring a higher percentage of Canadian vessels. Monitoring and evaluation of seabird bycatch in Canadian rockfish and halibut fisheries was only recently implemented, so the evaluation of its effectiveness has not been fully evaluated; we are thus unable to determine the impact of the Canadian fisheries on the black-footed albatross throughout its range.

United States—NMFS has invoked the Magnuson-Stevens Fishery Conservation and Management Act to reduce seabird bycatch under its mandate to conserve and manage the marine environment (69 FR 1930; January 13, 2004). Observer coverage is established by NMFS on a fishery-specific basis through regulations under the authority of the Marine Mammal Protection Act, the Endangered Species Act, or the Magnuson-Stevens Fishery Conservation and Management Act (Moore *et al.* 2009, p. 438).

Hawaii-based longline fishing is divided into two segments, the tuna (*Thunnus* spp.) and swordfish (*Xiphias gladius*) fisheries, which operate between 0° N and 40° N latitude. Swordfish (shallow-set) fishing effort is generally concentrated between 30° N and 35° N latitude (NMFS 2008, pp. 33–34). The deep-set (tuna) fishery is traditionally considered to operate between 140° W and 180° W longitude and from 0° to 30° N latitude with the majority of deep-set fishing effort taking place south of the Hawaiian archipelago. However, in 2008 and 2009, the majority of fishing effort in the deep-set fishery was north of Hawaii during the first two quarters of the year (NMFS 2009, unpubl.).

Results from the Hawaiian scientific observer program reported in Lewison and Crowder (2003, p. 746), indicated that shallow-set (swordfish) and deep-set (tuna) fisheries differ significantly in seabird bycatch rates, with shallow swordfish sets catching more albatrosses. This is likely a function of shallow sets taking longer to sink, making baited hooks available to scavenging birds for a longer period of time. In the Hawaii-based longline fleet, bycatch of black-footed albatrosses was estimated by Lewison and Crowder (2003, p. 748) to be approximately 2,000 birds per year from 1994 through 2000 for both segments of the longline fishery combined. In March 2001, the U.S. District Court for Hawaii issued an Order suspending all shallow-set longline operations targeting swordfish to address the take of sea turtles in this segment of the fishery (USFWS 2002, p. 3). On May 14, 2002, NMFS published a final rule implementing a series of seabird bycatch minimization measures for Hawaii-based vessels operating north of 23° N, including requiring annual protected species training for vessel owners and operators and a scientific observer coverage rate of 20 percent (67 FR 34408). The measures described in this rule applied only to deep-set (tuna) operations, as the shallow-set segment was still closed as a result of the U.S. District Court ruling.

The shallow-set segment of the longline fishery remained closed throughout 2002 and 2003 and reopened April 2, 2004 under a new management program, which limited fishing effort (69 FR 17329). A revised rule incorporating seabird minimization measures for the shallow-set fishery was issued December 19, 2005 (70 FR 75075). The revised rule required 100 percent coverage of the shallow-set fishery by scientific observers, primarily to ensure compliance with sea turtle bycatch regulations, but also to detect and record seabird bycatch. Since 2005, the estimate of the number of black-footed albatrosses observed caught in the Hawaii-based longline fishery has remained below 300 birds per year, which is significantly lower than rates observed prior to the implementation of seabird bycatch minimization measures (NMFS, unpubl. data).

On March 18, 2009, NMFS proposed Amendment 18 to the Fishery Management Plan for Pelagic Fisheries of the Western Pacific Region (74 FR 11518). The amendment proposes to modify the Hawaii-based shallow-set segment of the longline fishery by removing the annual limit on fishing effort, currently limited to 2,100 sets per year, and to increase the number of allowable loggerhead turtle (*Caretta caretta*) interactions. Seabird avoidance measures implemented in 2004 would remain unchanged, and 100 percent of the fishing effort would be observed for bycatch. On December 10, 2009, NMFS published the final rule removing the limit on fishing effort for the shallow-set fishery (74 FR 65460). The increase in fishing effort may result in a modest increase in black-footed albatross bycatch (USFWS 2008b, unpubl.).

Based upon the limited information available regarding the impact of Hawaii's longline fishery on black-footed albatrosses, we do not consider this fishery to currently be a significant threat to the black-footed albatross. Since implementation of seabird bycatch minimization measures in 2002 and revisions to those measures in 2002 and 2004, the number of black-footed albatrosses observed caught in the Hawaii-based longline fishery has been significantly reduced. The shallow-set fishery regulations were changed in 2009 by NMFS so that while there is no annual limit on the number of sets per year, all required seabird avoidance measures and observer coverage were implemented as part of the new rule, which went into effect in January 2010. Even with an increase in the number of shallow sets per year, black-footed albatross bycatch should continue to be minimized by the implementation of effective bycatch minimization measures. Therefore, we conclude that Hawaii-based longline fishing is not a significant threat to the black-footed albatross.

In Alaska, the demersal longline fishery targets groundfish and halibut. Observer coverage is not required in the halibut fishery (see above), so we are unable to determine the extent and impact of the Alaska-based demersal longline halibut fishery on the black-footed albatross throughout its range. Seabird avoidance measures were implemented in the groundfish fishery beginning in 1997 and mandatory use of seabird avoidance measures went into effect in 2004 (NMFS 2006, p. 2). Observer coverage for the groundfish fishery ranges from 30 to 100 percent, depending on the size of vessel used, type of fish targeted, and type of gear used (50 CFR 679.50). Estimates of black-footed albatross bycatch in the Alaska-based groundfish fishery are derived from two sources of information: (1) The North Pacific Groundfish Observer Program and (2) the NMFS Alaska Regional Office catch accounting system, which reports annual total catch (NMFS 2006, p. 1). Following implementation of seabird avoidance measures on this fleet in 2004, black-footed albatross bycatch decreased approximately 75 percent from an estimated 683 black-footed albatrosses in 1996 to an estimated 167 birds in 2003 (Arata *et al.* 2009, p. 65). Therefore, based on the limited information available regarding the impact of Alaska's demersal longline groundfish fishery on estimated annual bycatch of black-footed albatrosses, we conclude the Alaska-based demersal longline groundfish fishery is not a significant threat to the black-footed albatross.

The Pacific Fisheries Management Council (Council) is responsible for managing the commercial fisheries off the western coast of the United States (California, Oregon, and Washington), so that management of fish stocks will be coordinated throughout the range of the target species. In May 2001, NMFS instituted an observer program to provide total catch monitoring of the west coast groundfish fisheries and required that all vessels, other than Pacific hake (*Merluccius productus*) vessels, carry an observer when notified to do so by NMFS (66 FR 20609; April 24, 2001). In the groundfish fishery, 0 to 30 percent of the landings are sampled (Northwest Fisheries Science Center (NWFSC) 2008, p. 3), and observers opportunistically sample seabird bycatch. Subsequent regulations that published June 7, 2004 provided for mandatory observer coverage for at-sea processing vessels in the Pacific hake fishery (69 FR 31751). In this fishery, approximately 100 percent of all tows are sampled. While no seabird bycatch reduction measures are required for either of these fisheries, the groundfish fishery estimated between 3 and 57 black-footed albatrosses were caught between 2002 and 2005, and an estimated 7 birds were caught in the Pacific hake fishery (NWFSC 2008, pp. 21–37).

In 2007, NMFS published a Fishery Management Plan (Plan) for U.S. West Coast Fisheries for Highly Migratory Species (NMFS 2007). No seabird bycatch minimization measures are required in any of the fisheries covered by the Plan (drift gillnet, coastal purse seine, troll, and California-based longline fisheries), although it recommended that NMFS develop an observer sampling plan (NMFS 2007, p. 59). Only the drift gillnet fishery has had observer coverage, at an average rate of 20 percent, for the past 10 years. No black-footed albatrosses have been observed to be incidentally caught in this fishery. U.S. west coast vessels fishing in the far offshore longline fishery were required to submit logbooks of fishing catch, fishing effort, and bycatch to the California Department of Fish and Game and the Oregon Department of Fish and Wildlife until 2000. Thereafter, logbooks for longline vessels fishing off the west coast were required by NMFS (NMFS 2007, p. D–18). Data from these logbooks showed that 58 black-footed albatrosses were reported as bycatch from the west coast pelagic longline fishery between 1995 and 1999 (NMFS 2007, pp. D–18–19). The Plan proposed that west coast pelagic longline fisheries implement the same seabird avoidance measures used in the Hawaii-based longline fishery, but provided no timeline for undertaking these actions (NMFS 2007, p. D–23). We are unaware of any available information indicating that California, Oregon, and Washington offshore longline fisheries have implemented these seabird avoidance measures.

We conclude, based on the limited information available, that the California, Oregon, and Washington groundfish and Pacific hake fisheries do not significantly impact the black-footed albatross throughout its range. While no seabird bycatch reduction measures are required for either of these fisheries, the groundfish fishery estimated between 3 and 57 black-footed albatrosses were caught between 2002 and 2005, and an estimated 7 birds were caught in the Pacific hake fishery. We do not consider these losses to be significant at the population level. In addition, no black-footed albatrosses have been caught in the drift gillnet fishery in the past 10 years, and we conclude that at this time this fishery is not a threat to the black-footed albatross throughout its range. We also conclude that the California, Oregon, and Washington-based pelagic longline fisheries are not a significant threat to the black-footed albatross throughout its range. While only 58 black-footed albatrosses were reported as bycatch from these fisheries between 1995 and 1999, the Plan (2007) recommended that these fisheries implement the same seabird avoidance measures used in the Hawaii-based longline fishery. Finally, due to the lack of data and available information on seabird bycatch from coastal purse seine, troll, and California, Oregon, or Washington based nonpelagic longline fisheries, we are unable to determine the impact of these fisheries on the black-footed albatross throughout its range, but we are mindful of the potential threat and the need for increased and diligent monitoring of the industry. Although we do not have information specific to the levels of bycatch for these fisheries, based on the observed stable or increasing populations of the black-footed albatross throughout its range, bycatch from these fisheries is apparently not manifested in any negative population-level effects. We, therefore, conclude seabird bycatch from coastal purse seine, troll, and California, Oregon, or Washington-based nonpelagic longline fisheries does not pose a significant threat to the black-footed albatross, but acknowledge the need for more specific bycatch data from these fisheries.

Summary of Factor D

Breeding Range Protections

We have assessed a diverse network of international, national, and regional laws, regulations, and agreements that are meant to provide protection to the black-footed albatross and its habitat (breeding and foraging) and are designed to ameliorate threats rangewide. Based on our analysis of the existing regulatory mechanisms, we conclude that, when implemented and enforced, bilateral migratory species agreements between nations with black-footed albatross populations prevent hunting, harassment, and harm to the species. The Convention on Migratory Species, the Agreement on the Conservation of Albatrosses and Petrels, and the North American Agreement on Environmental Cooperation provide some benefit to the black-footed albatross and its habitat by way of increased awareness of potential threats, and implementation of environmental protections. The U.S. Migratory Bird Treaty Act and Canada's Migratory Birds Convention Act protect the black-footed albatross as they ban hunting, killing, injuring, or disturbing migratory birds, their nests, or eggs. Canada's Species at Risk Act of 2002 and Mexico's List of Species at Risk recognize the black-footed albatross as requiring special attention, but to the best of our knowledge, these listings do not provide additional protection to the species or its habitat.

With 95 percent of the black-footed albatross population nesting in the protected areas of the Northwestern Hawaiian Islands, we conclude that existing regulatory mechanisms protect and conserve the species within its nesting and breeding habitat in the Hawaiian Islands. In addition, most of the nesting and breeding habitat of the black-footed albatross in the Japanese Islands is protected as either a national park or national monument; existing regulatory mechanisms protect and conserve the species within its nesting and breeding habitat there as well. Based on the above assessment, we do not consider the inadequacy of existing regulatory mechanisms to pose a significant threat to the black-footed albatross in its nesting habitat rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Foraging Range Protections

Many international agreements and national regulatory mechanisms are designed to protect seabirds, including the black-footed albatross, against impacts from some fisheries within their foraging ranges. The U.N. Convention on the Law of the Sea provides guidelines for protecting living resources of the high seas and serves as a medium for international cooperation in management of the resources of the high seas. The U.N. implemented a moratorium (Resolution 46–215) on pelagic drift-net fishing on the high seas in 1992, which successfully eliminated a significant source of mortality for black-footed albatrosses. In 1997 the FAO developed an International Plan of Action to Reduce the Catch of Seabirds in Longline Fisheries, which recommended the development of a National Plan of Action (NPOA) for each nation with longline fisheries. The United States, Canada, Japan, and Taiwan have developed such national action plans. These NPOAs aim to reduce the bycatch of seabirds, such as the black-footed albatross, and to develop better monitoring and data collection methodologies.

Japan, Canada, and the United States have further developed regulations for reducing the bycatch of black-footed albatrosses and other seabirds in their respective fishery operations. The regulations reflect similar techniques as described in their NPOA. In addition, while much of the range of the black-footed albatross is outside of national jurisdictions, some marine areas where the species is known to forage are designated as either national or State marine sanctuaries or reserves. The National Marine Sanctuaries Act of 1972 authorized five sanctuaries within the black-footed albatross' range on the western coast of North America. While the States of California, Oregon, and Washington are each developing marine protected areas, which may offer further protection to the black-footed albatross' marine range, we do not rely on the States' possible designation of such areas.

The vulnerability of the black-footed albatross and other long-lived seabirds to mortality from fisheries bycatch is widely recognized; we acknowledge the need to actively develop and implement agreements for bycatch avoidance measures on an international scale to continue the effective conservation of the species (*e.g.,* Lewison and Crowder 2003, p. 751; ACAP 2010, pp. 13–14), and recognize that all agreements and protective measures may not be fully functioning as intended. Although mortality from bycatch is apparently currently within levels that can be sustained by the species without causing a decline (Arata *et al.* 2009, p. 46), current levels of bycatch may be such that the black-footed albatross cannot realize its full growth potential (*e.g.,* Wiese and Smith 2003, p. 35; Niel and LeBreton 2005, p. 833; Arata *et al.* 2009, p. 46). Nonetheless, although many of the existing agreements could be strengthened or more forcefully implemented, based on the evidence from population counts that demonstrate black-footed albatross populations are currently relatively stable or even slightly increasing across the range of the species, we cannot conclude that the existing regulatory mechanisms are so inadequate as to pose a significant threat to the species.

Based on our review of the best available information, we conclude that the black-footed albatross is not significantly threatened by the inadequacy of regulatory mechanisms related to the Hawaii-based shallow-set longline fishery; the Alaska-based demersal longline groundfish fishery; and the California, Oregon, and Washington groundfish, Pacific hake, and pelagic longline fisheries throughout its range. Due to the lack of information, we cannot definitively determine the extent and quantify the impact of other Alaska-based demersal longline fisheries; other (nonpelagic) longline fisheries based in California, Oregon, and Washington; coastal purse seine and troll fisheries based in the United States; Canadian-based longline fisheries; and longline fisheries based in Japan, Taiwan, China, Korea, Russia, and Mexico.

We are mindful of the potential impacts these fisheries could have on the black-footed albatross. There is no evidence at present that fishery bycatch is causing a decline in the rangewide, Hawaiian, or Japanese populations of black-footed albatross, which are reported to be stable or increasing under current conditions, which includes current levels of fishery bycatch (Cousins and Cooper 2000, p. 23; Arata *et al.* 2009, pp. 37, 51; ACAP 2010, p. 5; Figure 4, this document). However, we also acknowledge that many of the current protective agreements are voluntary in nature, and that bycatch mitigation measures may be lacking in international fleets (Gilman *et al.* 2008, p. 13). The results of models used to estimate demographic parameters and the annual population growth rate of black-footed albatross suggest fishery bycatch, among other factors, may be influencing the somewhat lower than expected annual population growth rate. In fact, Arata *et al.* (2009, p. 46) caution that, while the 2005 fishery bycatch was within the mortality level that can be sustained by the species without causing a decrease, there is much uncertainty of current bycatch estimates for the international pelagic longline fishery, which the authors identify as the largest threat to albatross species worldwide (Arata *et al.* 2009, p. 47). However, the evidence that the population status of the black-footed albatross is currently stable or increasing (Arata *et al.* 2009, pp. 50–51; ACAP 2010, p. 5; Figure 4, this document) leads us to conclude that the threat of incidental bycatch from some fisheries, while very real, is not so severe that it is resulting in population-level impacts such that it poses a significant threat to the species across its range, in the Hawaiian Islands, or in the Japanese Islands.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

Here we discuss potential impacts to the black-footed albatross due to contamination from organochlorines (*e.g.,* polychlorinated biphenyls (PCBs), dichloro-diphenyl trichloroethane (DDT)), and ingestion of plastic. In addition, we discuss collisions with airplanes and contamination from oil pollution as potential threats to the species.

Contaminants

Ecological characteristics can be used to estimate the relative risk of contaminants to a species. These characteristics include trophic status (species higher in a food chain are more likely to accumulate persistent pollutants), pollution point sources, location, and lifespan (long-lived individuals have more time to accumulate persistent compounds) (Elliott 2005, p. 89). The black-footed albatross is a long-lived bird and a top predator, and is, therefore, at high risk for the accumulation of contaminants.

Organochlorides (which include organochlorines) and heavy metals have been introduced into the environment through a number of anthropogenic activities. Even though the use of DDT and many pesticides have been banned in the United States and Europe, they continue to persist in the environment for long periods of time (Finkelstein *et al.* 2006, p. 679). Black-footed albatrosses forage throughout the north Pacific, but spend most of their time along continental shelves and convergence zones off the western coast of North America. This area has a documented history of emission of contaminants from agriculture and industry (Finkelstein *et al.* 2006, p. 680).

Numerous studies have documented high levels of anthropogenic contaminants in black-footed albatrosses. In most of these studies, black-footed albatrosses consistently had the highest levels of contaminants and heavy metals in comparison to Laysan albatrosses and other north Pacific seabirds (Jones *et al.* 1996, pp. 1,793–1,800; Auman *et al.* 1997a, pp. 498–504; Ludwig *et al.* 1998, pp. 258–238; Burger and Gochfeld 2000, pp. 37–52; Guruge *et al.* 2001, pp. 389–398; Muir *et al.* 2002, pp. 413–423; Fujihara *et al.* 2003, pp. 287–296; Elliott 2005, pp. 89–96; Ikemoto *et al.* 2005, pp. 889–895; Finkelstein *et al.* 2006, pp. 678–686). Most of these studies attributed the high contaminant levels to the black-footed albatross' trophic position as a top predator; others ascribed the black-footed albatross' geographic foraging area as the reason for high levels of contamination. Plastics at the sea surface layer may also be a source of PCBs, although apparently it is a relatively small source (Ludwig *et al.* 1998, p. 231; Arata *et al.* 2009, p. 20).

In an analysis of PCB levels and stable isotopes of nitrogen in eight species of north Pacific seabirds, black-footed albatrosses had the highest levels for all of the 11 PCB compounds evaluated (Elliott 2005, p. 92). In this study, the analysis of nitrogen isotopes, an indicator of trophic level, related the high levels of contaminants in black-footed albatrosses to its position as a top marine predator (Elliott 2005, pp. 92–93).

When compared to Laysan albatrosses, black-footed albatross eggs have been found to have higher levels of dioxin and furan congeners and PCBs (Jones *et al.* 1996, p. 1,795). Higher levels of PCBs, DDT, and dichloro-2,2′-bis-*p*-chlorophenyl-ethylene (DDE) have been reported in black-footed albatross adults, chicks, and eggs in comparison to Laysan albatrosses; PCB and DDE levels in black-footed albatrosses have been found to be more than twice as high as in Laysan albatrosses (Auman *et al.* 1997a, p. 499). Organochlorides have been documented to reduce reproductive success in birds through embryo mortality and eggshell thinning. However, in a 1996 study, rates of egg-crushing in black-footed albatrosses were found to be similar between 1910 and 1969, and were also similar to rates observed in Laysan albatrosses (Auman *et al.* 1997a, p. 502).

Ludwig *et al.* (1998, entire) found that black-footed albatross eggs had higher levels of PCBs, polychlorinated dibenzo-*p*-dioxins, polychlorinated dibenzofurans, and DDT-group chemicals than Laysan albatross eggs at Midway Atoll between 1993 and 1995. These researchers found that 5.9 percent of black-footed albatross eggs were crushed or cracked (sample size of 153), compared to 4.1 percent of Laysan albatross eggs (sample size of 71) (Ludwig *et al.* 1998, Table 2, p. 227). They also found eggshells of black-footed albatrosses collected in 1994 and 1995 were 3 to 4 percent thinner than eggshells that had been collected prior to World War II, which they characterized as ''modest'' eggshell thinning, likely as a result of organochloride contamination (Ludwig *et al.* 1998, p. 230).

The authors suggested that a few females, perhaps 2 to 3 percent of the black-footed albatross population, had levels of contamination that were high enough to cause direct eggshell thinning effects. Contaminant concentrations in black-footed albatross eggs were considered a ''slight hazard,'' with the possibility of dioxin-like effects that could possibly contribute to increased embryo mortality or endocrine disruption (Ludwig *et al.* 1998, pp. 229–230). Hatch success of black-footed albatross eggs was 78.5 percent (sample size of 2,047), slightly less than the 80.8 percent hatch success observed in Laysan albatrosses (sample size of 1,415) (Ludwig *et al.* 1998, Table 2, p. 227).

Levels of 8 different metals were also compared in 12 species of seabirds nesting on Midway Atoll, and black-footed albatrosses were found to have levels of mercury that could result in adverse effects (Burger and Gochfeld 2000, p. 50); they were below the adverse effects threshold for all other metals examined. Although baseline levels for determining deleterious impacts of various heavy metals specific to the black-footed albatross have not been established, there are some generic threshold levels for adverse effects based on observations from other bird species. In the study of Burger and Gochfeld (2000, p. 49), both adult and young black-footed albatrosses examined exceeded the threshold for mercury known to cause sublethal and reproductive effects in other species, leading the authors to conclude there was some potential for adverse effects, although they note that interspecific variation in effect thresholds is not well understood. The authors further noted the possibility that black-footed albatrosses may be able to convert methylmercury into inorganic mercury in their tissues, citing a suggestion made by Kim *et al.* (1996, as referenced in Burger and Gochfeld 2000), and that in such a case the levels observed in their study may not be cause for concern (Burger and Gochfeld 2000, p. 50). Such a hypothesis, however, remains to be tested. Overall, the high concentrations of organochlorine contaminants and heavy metals observed in black-footed albatrosses are a cause for concern (*e.g.,* Arata *et al.* 2009, pp. 18–20), although to date the evidence for negative impacts on individual birds is limited and no population-level effects have been observed.

In the Japanese Islands, levels of mercury in black-footed albatross eggs from Torishima Island were higher than mercury levels documented for other seabirds and were higher than documented threshold levels for adverse effects in other bird species (Ikemoto *et al.* 2005, p. 892). Lead levels in black-footed albatross chicks on Torishima

Island were below levels of lead-poisoned Laysan albatross chicks from Midway Atoll, and no symptoms of lead poisoning, such as droop-wing syndrome, were observed (Ikemoto *et al.* 2005, p. 893). Kunisue *et al.* (2006, entire) studied dioxins and related compounds in black-footed and short-tailed albatrosses from Torishima Island. They found concentrations of dioxins were greater in black-footed albatrosses than in short-tailed albatrosses, and that toxic equivalents of the eggs of both albatross species exceeded the thresholds observed in some other species of wild birds (Kunisue *et al.* 2006, pp. 6920, 6925). Although they note that sensitivity for biochemical effects varies widely between species and the sensitivity of albatross for dioxin-like effects is not known, they also found some evidence of what they characterize as ''potential dioxin-like alterations'' in the black-footed albatross (Kunisue *et al.* 2006, p. 6925).

In addition to the contribution of trophic level in determining contamination level, high levels of organochlorides have also been attributed to the foraging locations of black-footed albatross. High levels of toxaphene, an organochloride pesticide used in the 1970s, PCBs, and DDT in black-footed albatrosses were recorded in 1994 and 1995 from Midway Atoll, the site of a major military base (Muir *et al.* 2002, p. 415). Also, toxaphene, DDT, and other organochloride pesticides were widely used in California from the 1970s until the mid-1980s. Black-footed albatrosses use the coastal waters of western North America as a primary foraging area, and it was concluded by some (Muir *et al.* 2002, entire; Finkelstein *et al.* 2006, entire) that this was a likely cause for the higher relative levels of these compounds when compared to Laysan albatrosses, which forage mainly in the northwest Pacific ocean (Muir *et al.* 2002, p. 419). As documented in other studies, black-footed albatrosses had higher concentrations of PCBs, DDT, and mercury than Laysan albatrosses (Finkelstein *et al.* 2006, p. 681). Contaminant levels, carbon and nitrogen stable isotope ratios, and satellite telemetry data were analyzed, and it was found that organochloride and mercury contaminant levels are higher in the California Current, where black-footed albatrosses forage, than in high-latitude north Pacific waters where Laysan albatrosses forage (Finkelstein *et al.* 2006, pp. 681–685).

The PCB and DDT levels documented in this study were higher than levels measured by others (Auman *et al.* 1997a, pp. 498–504). Finkelstein *et al.* (2006, p. 684) found levels of dichloro-diphenyl-dichloroethylene (DDE) in black-footed albatross and Laysan albatross that were 160–360 percent higher in samples from 2000 and 2001 than in samples from 1992 and 1993, and the proportional increase found in black-footed albatross over this time period was twice that observed in the Laysan albatross. Based on the information available to the Service regarding organochlorides and heavy metal contamination of black-footed albatrosses, black-footed albatrosses have been exposed to organochlorides and heavy metal contaminants through their food resources or their nonbreeding season foraging areas along the western coast of North America. We conclude that high levels of organochloride and heavy metal contaminants are present in black-footed albatrosses and may have contributed to the low levels of eggshell thinning observed in the Hawaiian Islands in the mid-1990s; however, the limited evidence does not suggest any population-level impact on the black-footed albatross.

Between 1994 and 1995, Ludwig *et al.* (1998, p. 232) estimated 90 percent of the human-caused mortality in black-footed albatrosses on Midway Atoll was likely from fisheries bycatch, and 10 percent was due to contaminants. Despite observations of high levels of contaminants in black-footed albatrosses at Midway, however, counts of breeding birds there demonstrate that the population on Midway Atoll has been increasing at an average annual rate of 1.3 percent, and has steadily increased since 2000 (ACAP 2010, p. 6 and Figure 2B). The steady increase in this population, particularly in recent years when chicks born during the study period in the mid-1990s would be entering the breeding population, indicates that these contaminants are not acting as a limiting factor. In the Japanese Islands, populations of the black-footed albatross have also been steadily increasing (see Figure 4) despite the high levels of lead, mercury, and dioxins and related compounds detected in eggs and chicks there. Therefore, we cannot conclude that these contaminants pose a significant threat to the species across its range, in the Hawaiian Islands, or in the Japanese Islands, as we have no evidence that they are causing a decrease in any of the populations.

Plastic Ingestion

In the north Pacific gyre, a massive accumulation of plastic has been named the ''great Pacific garbage patch'' or ''Pacific trash vortex'' in the popular press. It is a floating mass of largely plastic debris approximately the size of the state of Texas, roughly located between 20° N and 40° N and divided into eastern and western halves connected by the subtropical convergence zone. The eastern patch is located between the Hawaiian Islands and the coast of California; the western patch occurs off the coast of Japan (Young *et al.* 2009, p. e7623).

Ingestion of plastics by seabirds is well-documented, especially in surface-feeding seabirds that are likely to confuse plastic particles with their prey (Spear *et al.* 1995, pp. 123–146; Nevins *et al.* 2005, p. 4). Several studies have documented plastic consumption by black-footed albatrosses (Sileo *et al.* 1990a, pp. 665–681; Sievert and Sileo 1993, pp. 212–217; Auman *et al.* 1997b, pp. 239–244; Blight and Burger 1997, pp. 323–325). As plastic particles float on the surface where adults forage for food, chicks are accidentally fed plastic by adults, and it accumulates in the proventriculus (upper stomach and gizzard). Likely due to their surface feeding behavior, Laysan and black-footed albatrosses are known to ingest the widest variety and largest volumes of plastics of most seabirds studied (Sileo *et al.* 1990a, p. 666). Plastic is usually regurgitated by Laysan albatross chicks in the two months prior to fledging, but black-footed albatross chicks continue to accumulate plastic in the proventriculus during this period; it is not known if they fledge carrying their plastic load or if they regurgitate it between leaving the nest and departing the island (Sievert and Sileo, 1993, pp. 215–216).

In a study conducted in 1986 and 1987, 67 to 100 percent of Laysan and black-footed albatross chicks (combined) had plastic in their proventriculi (Sileo *et al.* 1990a, p. 674). Although the percentage of black-footed albatrosses with large volumes of plastic increased through the chick-rearing period, large volumes of plastic were not found to have an effect on weight gain or wing growth (Sievert and Sileo 1993, pp. 214–215), and the authors concluded there was no correlation between the volume of ingested plastic and survival or growth of black-footed albatross chicks (Sievert and Sileo 1993, p. 216). The results of this study suggested that ingested plastic was not a significant direct cause of death in albatross chicks (Sievert and Sileo 1993, p. 216), consistent with the results of an earlier study of Laysan albatross chicks on Midway Atoll (Sileo *et al.* 1990b, entire). In discussing their results that none of the deaths of the Laysan chicks studied were attributable to ingested plastic, the authors concluded ''the absence of plastic-related mortality was unexpected'' but supported by other research (Sileo *et al.* 1990b, p. 336, and references therein).

Other research has also suggested that ingested plastic does not cause significant direct mortality in albatross chicks, and Auman *et al.* (1997, p. 243) concluded that ''plastics may add considerable stress to individuals, but probably have little or no direct impact at the population level.'' Although there are relatively few studies that definitively attribute seabird mortality to ingestion of plastic (*e.g.,* Fry *et al.* 1987, p. 339; Pierce *et al.* 2004, p. 187), other research suggests numerous potential indirect impacts of plastics, including possible starvation due to a false sense of satiation, impaction of the intestines, ulceration of the stomach, reduced growth and body mass, increased PCB and organochlorine assimilation, and dehydration (summarized in Auman *et al.* 1997b, pp. 242–243; Pierce *et al.* 2004, p. 187; Rios *et al.* 2007, p. 1230). However, in a study of 38 species of seabirds in the West North Atlantic over a 14-year period, Moser and Lee (1992, p. 93), reported no evidence of such detrimental effects on the health of these species, despite increasing levels of plastic ingestion over the study period.

Dehydration was the most common cause of death for both black-footed albatross and Laysan albatross chicks studied at Midway Atoll in 1986 and 1987 (Sileo *et al.* 1990b, p. 329; Sievert and Sileo 1993, p. 212). Plastic ingestion was implicated directly in the death of only 1 out of 174 chicks examined (Sievert and Sileo 1993, p. 214). However, the decreased survivorship of Laysan albatross chicks that ingested high volumes of plastic in 1986 (there was no difference in chick survival for either species in 1987) led the authors to suggest that dehydration may be a possible indirect effect of plastic ingestion. The researchers suggested a high volume of plastic in the proventriculus may reduce the amount of food, and hence water, that a chick can accept during feeding (Sievert and Sileo 1993, p. 216). However, they also note the negative correlation between volume of ingested plastic and survival in this single year of observation may be coincidental, and controlled experiments are needed to test their hypothesis.

Plastics contain a variety of additives, and at sea, the surface of plastic particles absorbs organochloride compounds, particularly PCBs (Ryan 1990, p. 628; Rios *et al.* 2007, p. 1230; Teuten *et al.* 2009, p. 2027). Plastic ingestion may also increase the absorption of toxic compounds, but a correlation between polychlorinated biphenyls and plastic load in the great shearwater (*Puffinus gravis*) has been only suggestive (Ryan 1990, p. 623). Studies directly evaluating this relationship have not been conducted and are needed for the black-footed albatross because the foraging behavior of this species makes it particularly vulnerable to plastic ingestion.

In summary, although studies suggest numerous potential indirect effects of plastic ingestion, we did not find evidence that plastic ingestion by black-footed albatrosses is a significant source of mortality or reduces body condition in the species. Studies of the potential health impacts of plastic ingestion on other procellarids (seabirds in the same order as the black-footed albatross) have suggested that, although individual birds may suffer adverse consequences, population-level effects have not been observed (Moser and Lee 1992, p. 93; Auman *et al.* 1997b, p. 243). Research specific to the black-footed albatross concluded that there was no correlation between the volume of ingested plastic and survival or growth of black-footed albatross chicks (Sievert and Sileo 1993, p. 216). As we have no evidence that plastics are acting to limit the population of black-footed albatrosses, we conclude that plastic ingestion is not a significant threat to the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands.

Oil Pollution

Because there is much overlap between the range of the black-footed albatross and the short-tailed albatross, the potential threat reported for the short-tailed albatross from oil contamination might be applicable to the black-footed albatross. In the final rule to list the short-tailed albatross as an endangered species (65 FR 46643; July 31, 2000), we describe potential risks to the species in the form of oil spills and future oil development. The final rule also discusses petroleum toxicity and short-tailed albatross thermoregulatory problems that could result from oil contamination. Petroleum exposure may: (1) Compromise seabird thermoregulation through the fouling of feathers; (2) cause direct toxicity through ingestion; (3) contaminate the birds' food resources; (4) reduce prey availability from toxic effects on prey species; and (5) cause embryotoxic effects (USFWS 2008a, p. 26).

The impact of an oil spill depends on many factors, including the type, rate, location, and volume of oil spilled, weather and oceanographic conditions, time of year of the spill, distribution of birds near a spill, and the behavior of birds in reaction to oil (Ford *et al.* 1987, p. 549; McCrary *et al.* 2003, p. 46). Sources of potential oil spills in the range of the black-footed albatross could include transport ships, small oil slicks, and current and future offshore drilling off the western coast of North America. In California, 23 oil platforms operate in Federal waters, and 10 platforms operate in State waters, distributed over an area of approximately 12,400 mi^2 (20,000 km^2) (McCrary *et al.* 2003, p. 43). All oil and gas produced offshore is transported to shore by pipeline.

The Department of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Offshore Energy and Minerals Management, (BOEMRE) regulates oil platforms in Federal waters. Since 1969, BOEMRE has implemented a facility and pipeline inspection program, developed and updated oil spill response, and developed an oil spill response network of corporations and volunteers (McCrary *et al.* 2003, pp. 46–47). No new oil leases have been issued in California since 1984, and the Pacific outer continental shelf waters of California, Oregon, and Washington are under a moratorium from new leases until June 30, 2012 (McCrary *et al.* 2003, p. 45).

In Alaska waters, the Department of Environmental Conservation, Division of Spill Prevention and Response is responsible for protecting the land, waters, and air from oil and hazardous substance spills. It regulates spill prevention through spill prevention plans, and reviews and approves response plans (SOA 2009, p. 2). Alaska requires oil spill contingency plans for offshore oil and gas exploration facilities, crude oil transmission pipelines, and oil flow lines and gathering lines. The Industry Preparedness Program requires facilities and vessels to develop State-approved oil spill response and contingency plans, to establish a facility-wide spill prevention program, and to ensure that personnel, equipment, and financial resources are available to respond to the spills (SOA 2009, p. 2). No oil drilling takes place near the black-footed albatross' nesting islands in Hawaii, and the State of Hawaii has extensive oil spill prevention and response measures in place.

Nevertheless, in the unlikely event of an oil spill, it is possible that black-footed albatrosses could be affected while foraging at sea. The wide foraging range of the black-footed albatross and consequent dispersion of the global population makes it unlikely, however, that any large portion of the population would be simultaneously affected by an oil spill. In contrast, the short-tailed albatross would be vulnerable to the potential impacts of an oil spill due to its very small population numbers and extremely limited range. In addition, there is little evidence that oil pollution has been responsible for lasting population declines of seabirds. While considered to be catastrophic and dramatic events, oil spills likely account for only a small proportion of the total annual seabird mortality (Thompson and Hamer 2000, p. 97) and do not have the chronic mortality population effect of other threats, such as bycatch and marine pollutants (Finkelstein *et al.* 2010, p. 329).

Based on our evaluation of the best available scientific and commercial data, we conclude that oil spills do not pose a significant threat to the black-footed albatross across its range, in the Hawaiian Islands, or in the Japanese Islands.

Collisions With Aircraft

Collisions with airplanes were considered a potential threat to the endangered short-tailed albatross (65 FR 46643; July 31, 2000), thus it has been suggested that collisions with aircraft at Midway Atoll could impact black-footed albatrosses, especially if regular commercial air service were to be resumed on Midway. However, resumption of commercial air service on Midway is not anticipated (Klavitter 2009, pers. comm.). Since the closure of Midway Phoenix Corporation's activities at Midway Atoll in 2002, air traffic consists of 36 flights a year under contract with the U.S. Fish and Wildlife Service, or roughly 3 flights per month, with occasional additional visitor flights as well (Schulmeister 2011, pers. comm.). Aloha Airlines discontinued charter service to Midway in 2004, further reducing air traffic to the atoll. Currently, only Asheviille Jet Charter and Management is under contract with the Service to provide flights to Midway Atoll on any regular basis (Schulmeister 2011, pers. comm.).

To minimize the risk of bird–aircraft collisions, the Service implements protocols to reduce and document seabird collisions. During the Laysan and black-footed albatross breeding season (November through July), flights to and from Midway Atoll occur after dark, and staff sweep the runway and remove any birds that are present (Klavitter 2009, pers. comm.). Transient aircraft (primarily U.S. military or U.S. Coast Guard C–130s) are required to obtain prior permission from the Refuge Manager before landing at Midway Atoll. Black-footed albatrosses do not nest on the runway or its buffer as these areas are paved and unvegetated and are not suitable for nesting by this species. Few collisions with black-footed albatrosses occur, and when they do occur it is primarily with young fledglings that move onto the runway after it has been swept. The black-footed albatross' preference for nesting near the shoreline also decreases the likelihood of being struck by aircraft. Nonetheless, the incidence of seabird–airplane collisions (between 3 and 35 black-footed and Laysan albatrosses combined annually) on Midway has not significantly impacted the black-footed albatross population (USFWS 2004, p. 8).

The Service operates a very limited air service to Tern Island to support ongoing conservation and research activities on the island. Prelanding and takeoff sweeps are conducted to remove birds from the active runway (USFWS 2004, p. 33). Air service to Tern Island from Honolulu occurs approximately once every 2 to 6 weeks. However, the runway at Tern Island is unlit, so flights must occur during the daytime. Rates of bird–aircraft interactions are higher than on Midway Atoll, but most strikes are with sooty terns (*Sterna fuscata*) (USFWS 2004, pp. 7–8). We do not have specific information regarding the number of black-footed albatrosses involved in strikes. Altogether, the number of airline flights in the Northwestern Hawaiian Islands is limited, collisions with black-footed albatrosses are infrequent and measures are in place to avoid them, and mortality of black-footed albatross from airplane strikes has been limited. There is no evidence that collisions with aircraft poses any significant threat to black-footed albatrosses in the Hawaiian Islands, nor do we expect any change in this situation. We have no information to indicate that collisions with aircraft pose any threat to black-footed albatrosses nesting in the Japanese Islands. Based on our evaluation of the best available scientific and commercial information, we conclude that collisions with aircraft do not pose a significant threat to the black-footed albatross across its range, in the Hawaiian Islands, or in the Japanese Islands.

Summary of Factor E

Regarding other natural or manmade factors affecting the continued existence of the species, we conclude that organochloride and heavy metal contaminants are present at relatively high levels in black-footed albatrosses, based on studies that measured the levels of these contaminants in black-footed albatross adults, chicks, and eggs. Some black-footed albatross egg mortality due to egg crushing is likely caused by organochloride contamination, and toxic equivalents of some contaminants (*e.g.,* dioxins) exceed the toxicity thresholds for some other wild birds, but the sensitivity of black-footed albatrosses is not known. Despite the high levels of contaminants in black-footed albatrosses, deleterious effects on individuals have not been reported, nor have any population-level effects been observed. We, therefore, conclude that the available evidence does not support a conclusion that organochlorine and heavy metal contamination poses a significant threat to the species rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Like other surface-foraging seabirds, black-footed albatrosses accidentally ingest plastics while foraging, and feed ingested plastic to their chicks. Although we recognize the possible indirect effects of dehydration or exposure to PCBs resulting from plastic ingestion may be cause for concern, we found no information indicating that plastic ingestion is a significant source of black-footed albatross mortality or reduces body condition in chicks or adults, nor did we find evidence that plastic ingestion is having any population-level effects on the species. Therefore, we conclude that plastic ingestion is not a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Potential impacts from contamination from oil spills and future oil development are not likely to be a threat to the species' nesting habitat in the Hawaiian Islands because no oil drilling takes place there, and extensive oil spill prevention and response measures are in place in the Hawaiian Islands. We have no information to indicate that oil spills pose a threat to the nesting habitat of black-footed albatrosses in the Japanese Islands. However, because black-footed albatrosses disperse and forage rangewide over vast areas of the ocean and could possibly encounter oil anywhere, they are vulnerable to oil spills, both individually and in small foraging groups, but not at a scale that is likely to have population-level effects. We, therefore, do not consider oil spill contamination to be a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Hazards to black-footed albatrosses from collisions with aircraft at Midway Atoll and Tern Island where there is air traffic are not a threat because flights are limited, prelanding and takeoff protocols are in place to remove birds from active runways, and the incidence of collisions is low. We have no information to suggest that collisions with aircraft pose a significant threat to the Japanese Islands population of the black-footed albatross. We, therefore, do not consider collisions with aircraft to pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

Synergistic Interactions Between Threat Factors

We have evaluated individual threats to the black-footed albatross throughout its range. The black-footed albatross faces myriad potential stressors, including the effects of climate change, impacts to nesting habitat from nonnative plants, avian disease, the ingestion of plastics, and heavy metal contamination. In considering whether the threats to a species may be so great as to warrant listing under the Act, we must look beyond the possible impacts of these stressors in isolation, and consider the potential cumulative impacts of all of the threats facing a species.

In making this finding, we considered whether there may be cumulative effects to the species from the combined impacts of existing stressors such as contamination by organochlorines and heavy metals, plastic ingestion, and fisheries bycatch, such that even if each stressor individually does not result in population-level impacts, perhaps cumulatively they would be considered to do so. Population data for the black-footed albatross demonstrates a stable or increasing trend in the global population, based on data from 1955 through 2003 (Arata *et al.* 2009, p. 46), as well as in the Hawaiian Islands breeding population (data from 1998 through 2009; ACAP 2010, pp. 5–6) and the Japanese Islands breeding population (data from 1957 through 2010; Hasegawa 2010, pers. comm.). This stable or increasing trend suggests that the possible synergistic interactions between the aforementioned stressors do not significantly limit the population of the black-footed albatross across its range, in the Hawaiian Islands, or in the Japanese Islands. If the existing stressors cumulatively acted as a limiting factor on the black-footed albatross global population, we would expect a population decline during the time periods examined. Therefore, we conclude that synergistic interactions between existing stressors do not pose a significant threat to the black-footed albatross, across its range, in the Hawaiian Islands DPS, or the Japanese Islands DPS.

In the case of the black-footed albatross, additional potential sources of synergistic interactions between stressors are posed by the effects of climate change. For example, it has been suggested that, although plastic ingestion has not been demonstrated as a direct cause of mortality, it may be that ingestion of plastics may contribute to dehydration (Sievert and Sileo 1993, p. 216). If this were the case, then increased ambient temperatures anticipated as an effect of future climate change could exacerbate this stressor, as the increased need for evaporative cooling under higher ambient temperatures would also lead to an increased vulnerability to dehydration. However, the possible linkage between plastic ingestion and dehydration has only been suggested (Sievert and Sileo 1993, p. 216); more research is needed to understand the possible synergistic effects of increased ambient temperatures on black-footed albatrosses that ingest plastics.

In addition, it has been suggested that the invasive nonnative plant *Verbesina encelioides* may potentially reduce the capacity for convective cooling for the black-footed albatross by interfering with wind flow, an impact that would also be exacerbated by higher ambient temperatures. Currently there is no evidence that increased ambient temperatures and *V. encelioides* will synergistically negatively impact the ability of black-footed albatrosses to regulate, and this effect remains only suggested at this point in time. Additionally, as noted above, there are effective control programs in place for *V. encelioides* and other nonnative plants, such that we do not anticipate they will have a significant impact on the black-footed albatross in the future, even in the face of increased ambient temperatures. Any possible future impacts of climate change on these putative threats would therefore be speculative in the absence of more conclusive data supporting such associations.

There are many questions about how the effects associated with climate change may impact the black-footed albatross, and the answers are unclear at this point in time. Data in this regard are extremely limited, and all projections of future conditions have varying degrees of confidence associated with them. This in turn leads to even greater uncertainty when the potential synergistic interactions between projected variable future conditions are considered. For example, as discussed above, we anticipate that the area of nesting habitat available to black-footed albatrosses will gradually decrease as sea level rises; the extent of future sea level rise and land area loss is uncertain, and the extent of available nesting habitat that may be lost is also unknown. Although we anticipate that black-footed albatrosses may shift nesting locations over time in response to such events, we do not have any data to indicate the time scale over which such shifts may occur, what proportion of the population may find suitable new nesting sites, or the potential maximum density of nesting seabirds that may serve as a limiting factor on the islands utilized by the species. If greater numbers of black-footed albatrosses move inland to nest, on those islands where nonnative *Casuarina equisetifolia* trees occur, they could pose an increased threat to nesting black-footed albatrosses if storm frequency or intensity increases, due to falling limbs. Other potential changes associated with possible increases in storm frequency or intensity and sea level rise are increased overwash events.

All of these potential threats may interact to affect the black-footed albatross to varying degrees. However, as discussed above, all of these potential future threats have varying degrees of confidence and uncertainty. Interactions between multiple projected threats, each with its own degree of uncertainty, further compounds that lack of confidence, resulting in even greater uncertainty. When we additionally consider uncertainties as to whether such events will affect black-footed albatrosses (for example, as discussed above, there is little overlap in timing between nesting and tropical storm events) or how black-footed albatrosses will respond to such events, we conclude that we do not have sufficient information available to us to reliably assess the impacts of possible synergistic interactions of threats related to the effects of climate change on the black-footed albatross. The time scale and extremity at which the potential impacts of future effects of climate change will be realized are too uncertain, as is the potential behavioral response of the species. At this point in time, given the complex and uncertain nature of the effects associated with climate change, we can only conclude that continued research and monitoring is important in the detection of potential future effects of synergistic interactions between the effects of climate change and other potential threats to the black-footed albatross.

Finding

As required by the Act, we considered the five factors in assessing whether the black-footed albatross is endangered or threatened throughout all or a significant portion of its range. We have assessed the best available scientific and commercial data regarding the threats facing the black-footed albatross. We reviewed numerous information sources including literature cited in the petition, information in our files, and information submitted to us following our 90-day petition finding (72 FR 57278; October 9, 2007), and a second information solicitation period (74 FR 43092; August 26, 2009), and we consulted with recognized experts and other Federal and State agencies on potential threats to the black-footed albatross and its marine and terrestrial habitat. Such potential threats include: Historical habitat modification; invasive species; effects from climate change including sea level rise, changes in tropical storm frequency and intensity, changes in marine productivity, and increases in ambient temperature; overutilization; disease and predation; bycatch in fisheries; contamination by PCBs and other pollutants; plastic ingestion; oil spills; and collisions with aircraft. To determine whether these risk factors individually or collectively cause the species to be in danger of extinction throughout its range, or will likely do so within the foreseeable future, we first considered whether the factors, either singly or in combination, were causing a population decline, or were likely to do so within the foreseeable future.

Under Factor A (''Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range''), we evaluated the effects of: Military activities, volcanic activity; natural gas development; invasive plant species; and climate change in the forms of sea level rise and inundation, changes in tropical storm frequency and intensity, decreased marine productivity, and increased ambient temperature.

We found that the black-footed albatross historically experienced range reduction and habitat modification by armed forces during their occupation of black-footed albatross breeding islands in the western and central Pacific, up to and following World War II. Currently, however, at least 96 percent of black-footed albatross nesting habitat rangewide and including both the Hawaiian and Japanese Islands is protected, now and into the future, on islands that are managed for the conservation of native wildlife and their habitat, and it is unlikely that a military presence will be necessary on these islands in the foreseeable future.

Loss of breeding habitat from volcanic activity is a potential threat only on Torishima Island in the western Pacific. However, because the black-footed albatross population on Torishima Island comprises only 3.5 percent of the rangewide breeding population of the species, we do not consider volcanism to be a significant threat to black-footed albatrosses rangewide. Furthermore, evidence from past volcanic events on Torishima demonstrates black-footed albatrosses are either likely to survive such events, probably because a large portion of the population is at sea when they occur, or are likely to eventually recolonize from nearby islands; therefore, we do not consider volcanic activity to be a significant threat to black-footed albatrosses in the Japanese Islands.

We have no evidence to suggest that the potential exploration of undersea natural gas resources is a threat to black-footed albatrosses on the Senkaku Islands, which comprise less than 0.1 percent of the population of black-footed albatross nesting rangewide. It is considered unlikely that these resources exist in the area and, due to weak economic interest and the disputed sovereignty of the islands, such exploration is not likely to occur within the foreseeable future. Even if such development were to occur in this area, we have no evidence to suggest that undersea gas development near these islands would pose a significant threat to the species rangewide or in the Japanese Islands.

Verbesina encelioides is an invasive nonnative plant that forms dense thickets and reduces black-footed albatross nesting habitat on Kure Atoll, Midway Atoll, and Pearl and Hermes Reef in the Hawaiian Islands, but is not known from the islands in the western Pacific. *Casuarina equisetifolia* is a nonnative tree that has been identified as a threat to ground-nesting seabirds on Midway Atoll, as it degrades nesting habitat and potentially interferes with flight. We found that the Service, NOAA, and HDLNR are implementing control measures to reduce infestations of these nonnative plants in the Hawaiian Islands, and they are developing protocols to prevent the accidental introduction of new, nonnative plants on all of the black-footed albatross nesting islands within the PMNM. We have no evidence that either of these nonnative plants is currently causing any significant impact on the nesting populations of black-footed albatrosses on these islands, and we expect the active management of these invasive species to continue. We have no information indicating that invasive nonnative plants pose any threat to black-footed albatrosses nesting in the Japanese Islands. For these reasons, we conclude that, as currently managed, *V. encelioides, C. equisetifolia,* and other nonnative plants are not a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands.

The majority of models of future climate change available use a 100-year timescale to predict changes through the year 2100. However, projections over the next 30 to 50 years are more reliable than projections for the second half of the twenty-first century, which become increasingly uncertain and variable after 50 years into the future (Cox and Stephenson 2007, pp. 207–208). We, therefore, conclude that 50 years is the maximum timeframe over which to assess the effects of threats to the black-footed albatross associated with climate change. In particular due to great uncertainty surrounding the possible behavioral response of the black-footed albatross to changes in habitat suitability and availability associated with sea level rise, we assessed the threat associated with sea level rise over several time intervals, from 10 to 20 years into the future, 30 to 40 years into the future, and 50 years into the future. We considered 50 years to be the limit of our ability to reasonably project the future conservation status of the species, based on considerations of projected environmental conditions and uncertainties in the response of the species.

Because of the lack of study and high degree of uncertainty in the available information on the impacts of sea level rise on black-footed albatross nesting habitat in the Hawaiian or Japanese islands, it is challenging to draw any firm conclusions regarding the immediacy and significance of sea level rise on black-footed albatross nesting success on these islands. Our analysis indicates that over the maximum timeframe of 50 years, a 2.4-ft (0.7-m) sea level rise will likely result in beach erosion in some (seaward) areas and beach deposition in other (lagoon-side) areas on Tern, Sand, and Eastern Islands, and Kure Atoll (which together support approximately 48 percent of black-footed albatross breeding pairs) or may affect only a limited area of geomorphically similar islands (*e.g.,* Lisianski and Laysan), which support approximately 35 percent of black-footed albatross breeding pairs), as has been observed in other Pacific atoll islands in response to rising sea level. Approximately 12 percent of black-footed albatrosses nest on high islands (*e.g.,* Kaula, Lehua, Necker, and Nihoa in the Hawaiian Islands, and the Japanese Islands of Torishima, Senkaku, and Ogasawara), and breeding birds on these islands will not be affected by sea level rise in the foreseeable future.

Although sea level rise is expected to result in the loss of land area in the Hawaiian Islands, and we acknowledge that this loss of land may disproportionately affect black-footed albatross nesting habitat, the best available information indicates that sufficient land area will likely remain to support large numbers of black-footed albatross, albeit at likely reduced numbers. Based on the anticipated relatively gradual nature of sea level rise over time, the amount of land area projected to remain, the ability of black-footed albatrosses to nest in habitats other than sandy beaches, the apparent capacity of these islands to support high densities of nesting seabirds, and the evidence suggesting that black-footed albatrosses may have the behavioral flexibility to seek out new nesting sites, we believe the black-footed albatross may shift to new nest sites over time in response to sea level rise in the Hawaiian Islands. Therefore, based on our assessment of the best available information, we do not believe sea level rise and coastal inundation pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands, now or within the foreseeable future.

Climate models indicate that winter wave heights in black-footed albatross breeding areas in the Northwestern Hawaiian Islands and the Japanese Islands will remain unchanged in the foreseeable future. Wave surge and overwash events are not unusual and are expected to continue to occur occasionally and impact breeding black-footed albatrosses in localized areas. We have no evidence to suggest, however, that future impacts will be any different than those currently experienced by the species. Based on our assessment of the best available information, we do not believe winter wave inundation poses a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands, now or within the foreseeable future.

While tropical storm intensity (strength) is projected to increase slightly (*i.e.,* by a few percent) in the central Pacific (*e.g.,* Hawaiian Islands), the frequency of tropical storms is projected to decrease. Slight increases (*i.e.,* a few percent) over the next 100 to 200 years in both the frequency and intensity of tropical storms are projected in the western Pacific (*e.g.,* Japanese Islands). These projected increases are not expected to significantly affect black-footed albatrosses within the foreseeable future, as the birds arrive at their nesting sites in mid- to late-October and begin laying eggs in mid-November. Since the tropical storm season in the central and western Pacific ends in November or early December, the period of overlap between bird arrivals at nesting sites and the end of the tropical storm season is likely only a few weeks. While there may be some short-term impacts to black-footed albatross nesting success due to the potential short-term overlap of the arrival of birds at nesting sites at the end of the tropical storm season, we do not anticipate these impacts to significantly affect the breeding population of the species. Therefore, based on our assessment of the best available information, we do not believe storm frequency and intensity pose significant threats to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands, now or within the foreseeable future. We are unable to assess the effects of potential climate-induced changes in the duration of tropical storm seasons on the black-footed albatross due to the lack of studies and available information.

We found no direct evidence that changes in ocean productivity due to climate change have affected the black-footed albatross, or are likely to do so within the foreseeable future. Based on the limited available information, it appears that black-footed albatross breeding success (*i.e.,* the number of breeding pairs and fledging success) has not reflected any response to past El Niño and PDO events (seasons of low marine productivity). This is likely because, unlike many other albatrosses and seabirds, the black-footed albatross forages across a wide range of ocean temperatures and is found aggregating where sea surface temperatures are relatively warm, thereby buffering the impacts of reduced marine productivity on this species compared to other seabirds. However, there are documented instances of decreased reproductive success and even reproductive failure associated with El Niño for other seabird species, especially in years of severe ENSO events. Therefore, we cannot discount the possibility that a severe ENSO event, or a series of severe ENSO events associated with climate change, will not affect the reproduction of black-footed albatrosses in the future. However, based on the best available scientific evidence before us at this time, we have no information to suggest that such events are likely to pose a significant threat to the black-footed albatross within the foreseeable future.

Similarly, we found no evidence to suggest the projected 2.32 to 3.15 °F (1.29 to 1.75 °C) increase in annual mean SAT associated with climate change by the year 2065 (Meehl *et al.* 2007, p. 763, Table 10.5) will have a significant adverse effect on black-footed albatrosses. The black-footed albatross is adapted to nesting in a hot environment with intense solar radiation, and the evidence suggests they are capable of responding to the projected average increases in air temperature within the foreseeable future. Whether future extreme high temperatures may exceed the thermal tolerance of the black-footed albatross cannot be determined at this time, and based on the lack of critical information to inform any such evaluation, any conclusion with regard to this question would be highly speculative.

Therefore, based on the best available scientific information, we conclude that potential sea level rise and coastal inundation, winter wave heights, changes in tropical storm frequency and intensity, potential decreased marine productivity, or increased ambient temperature associated with climate change do not pose a significant threat to the black-footed albatross rangewide, in the Hawaiian Islands, or in the Japanese Islands, now or within the foreseeable future.

Based on our evaluation of Factor A, using the best available scientific and commercial data as summarized above, we conclude that the present or threatened destruction, modification, or curtailment of its habitat or range does not pose a significant threat to the black-footed albatross across its range, in the Hawaiian Islands, or in the Japanese Islands, now or in the foreseeable future, to the extent that the species is presently in danger of extinction, or likely to become so within the foreseeable future. Although climate change will undoubtedly impact the black-footed albatross to some degree, the immediacy, severity, and magnitude of any such impacts at a population level are uncertain at this time.

Under Factor B (''Overutilization for Commercial, recreational, scientific, or educational purposes''), we determined that historically the black-footed albatross was exploited for its feathers and eggs. Because there is no demand for or exploitation of black-footed albatross feathers and eggs, and there are protections in place for its nesting habitat, we find that overutilization is not a significant threat to the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands, to the extent that the species is presently in danger of extinction, or likely to become so within the foreseeable future.

Under Factor C (''Disease or Predation''), we found that while avian pox was once thought to be a significant source of mortality, recent information suggests that most infected individuals recover from the disease. Avian pox is transmitted by mosquitoes, which are known only from the islands of Lehua, where only 25 breeding pairs of black-footed albatrosses were last reported, and Midway Atoll. We have no evidence to suggest that avian pox poses a significant threat to the black-footed albatross in the Japanese Islands. Other diseases such as H5N1 avian influenza, West Nile virus, and avian cholera have not been documented in the Hawaiian Islands or the breeding range of the black-footed albatross in the Japanese Islands of the western Pacific. The remoteness of the island breeding habitat of the black-footed albatross decreases the likelihood of transmission of these diseases to these areas. Therefore, we concluded that avian pox, H5N1 avian influenza, West Nile virus, and avian cholera do not threaten the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands, now or in the foreseeable future, to the extent that the species is currently in danger of extinction, or likely to become so within the foreseeable future.

Predation by nonnative rats is not a significant threat to black-footed albatrosses in the Northwestern Hawaiian Islands, where 95 percent of the rangewide population nest, because: (1) There are no rats on these islands; and (2) protocols are in place to prevent the inadvertent introduction of rats to these islands or to eradicate them if they are accidentally introduced. Additionally, rat eradication efforts have been initiated and are continuing on Lehua Island, where less than 0.01 percent of the black-footed albatross population breeds. Rats have been reported on Torishima Island and the Ogasawara Islands, where 5 percent of the black-footed albatross population breeds. However, the breeding colonies on these islands are reported to be increasing despite the presence of rats; therefore, we do not consider rats to be a significant threat. Depredation by sharks is a known and natural source of seabird mortality, but we found no evidence that predation by sharks on black-footed albatross fledglings is a significant threat to the species in the Northwestern Hawaiian Islands, where 95 percent of the breeding population occurs. We are unable to determine the extent and impact of shark predation on black-footed albatrosses in the western Pacific islands due to the lack of study and available information, but we have no evidence to suggest that it may pose a significant threat to the Japanese Islands population. We conclude, therefore, that predation by either rats or sharks is not a significant threat to the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands, now or in the foreseeable future, to the extent that the species is currently in danger of extinction, or likely to become so within the foreseeable future.

Under Factor D (''Inadequacy of Existing Regulatory Mechanisms''), we looked at the diverse network of international, national, and regional laws, regulations, and agreements that may provide protection to the black-footed albatross and its habitat and effectively ameliorate threats rangewide. National and international agreements and laws provide some protection for the black-footed albatross from hunting, killing, harassment, and harm. Ninety-five percent of the black-footed albatross breeding population is protected by the PMNM, the National Wildlife Refuge System, and the State of Hawaii Seabird Sanctuary system. The Japanese breeding colonies on Torishima Island and the Ogasawara Islands are protected within a national natural monument and a national park, respectively. While much of the marine foraging range of the black-footed albatross is outside of national jurisdictions, some areas are protected within national or State marine sanctuaries or reserves, including five sanctuaries within the species' range off the western coast of North America.

International agreements and national regulatory mechanisms protect the black-footed albatross against impacts from some fisheries in its foraging range. The U.N. Convention on the Law of the Sea provides guidelines for protecting living resources of the high seas and serves as a medium for international cooperation in management of the resources of the high seas. U.N. Resolution 46–215 eliminated a significant source of mortality for black-footed albatrosses from pelagic drift-net fishing. The United States, Canada, Japan, and Taiwan have developed plans to reduce the bycatch of seabirds such as the black-footed albatross, and to develop better monitoring and data collection methodologies. The United States, Canada, and Japan have developed regulations for reducing the bycatch of black-footed albatrosses and other seabirds in their respective fishery operations. However, we note that many of the existing agreements are nonbinding, or key nations are not signatory to relevant international agreements; therefore, some of these agreements provide little protection to the black-footed albatross and other seabirds.

Based on our review of the best available information and for the reasons described in *Fishery Regulations* (above), we find that the black-footed albatross is not significantly threatened by the Hawaii-based longline fishery; the Alaska-based demersal longline groundfish fishery; or the California, Oregon, and Washington longline or groundfish and Pacific hake fisheries throughout the species' range now or in the foreseeable future. We cannot definitively determine the extent or quantify the impact of international demersal longline fisheries, but recent studies caution that there is much uncertainty in the bycatch estimates of the international pelagic longline fishery, which is considered the greatest threat to all albatross species throughout their ranges. Despite the shortcomings of many of the existing regulatory mechanisms, the present population status of the black-footed albatross, with rangewide populations stable or increasing, does not indicate that these mechanisms are inadequate such that they may be resulting in population-level effects on the species.

We are mindful of the potential impacts that these fisheries could have on the black-footed albatross, but conclude there is no evidence at present that fishery bycatch is causing a decline in the rangewide population of black-footed albatross, which is reported to be stable or increasing in both the Hawaiian Islands and the Japanese Islands breeding populations (Arata *et al.* 2009, p. 51; ACAP 2010, p. 5; Figure 4, this document). Therefore, based on our evaluation of the best available scientific and commercial data, we conclude the inadequacy of existing regulatory mechanisms does not threaten the black-footed albatross throughout its foraging range, now or in the foreseeable future, to the extent that the species is currently in danger of extinction or likely to become so within the foreseeable future.

Under Factor E (''Other Natural or Manmade Factors Affecting Its Continued Existence''), we found that organochlorine and heavy metal contaminants are present in high levels in black-footed albatrosses. Some egg mortality in black-footed albatrosses due to egg crushing is likely caused by organochloride contamination, and contaminant levels observed exceed toxicity thresholds known for other avian species. The sensitivity of black-footed albatrosses to these contaminants is not known, however, and deleterious effects have not been reported in adult birds or chicks, or reflected at the population level. Therefore, we conclude that organochlorine and heavy metal contaminants have not been shown to be a significant threat to the black-footed albatross.

We also found that, like other seabirds, black-footed albatrosses ingest plastics while foraging and accidentally feed ingested plastics to their chicks. Investigations on the effects of plastic ingestion in black-footed albatross showed plastics are not a direct cause of mortality, nor was plastic ingestion correlated with body condition or survivorship of chicks. The primary cause of chick mortality was dehydration, but it has also been suggested that plastic ingestion may prevent chicks from feeding properly, which may result in dehydration. This hypothesis remains to be tested. The ingestion of plastics and consequent potential for dehydration is of concern, however, particularly when considered in conjunction with predicted increased ambient temperatures. However, at present there is no information indicating plastic ingestion is a significant source of black-footed albatross mortality, or that it reduces body condition in chicks or adults. Furthermore, it has not been demonstrated to have any population-level effects. We, therefore, conclude that plastic ingestion is not a threat to the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands, now or in the foreseeable future, to the extent that the species is currently in danger of extinction or likely to become so within the foreseeable future.

Black-footed albatrosses forage singly or in small groups, and potential impacts from contamination from oil spills and future oil development are not a significant threat to the species because: (1) Few individuals would be exposed at any one time and oil spill prevention measures are in place; (2) we have no evidence of active oil drilling in the proximity of black-footed albatross nesting islands; and (3) response measures are in place in the species' foraging range in the Hawaiian Islands and the western coast of North America. Hazards to black-footed albatrosses from collisions with aircraft at Midway Atoll and Tern Island are not significant as a result of limited flights and prelanding and takeoff protocols to remove birds from active runways on these islands. We have no information to suggest that either oil spills or aircraft collisions pose significant threats to black-footed albatross breeding in the Japanese Islands. Therefore, based on the best available scientific and commercial data, we find that other natural or manmade factors do not threaten the black-footed albatross throughout its range, in the Hawaiian Islands, or in the Japanese Islands, now or in the foreseeable future, to the extent that the species is currently in danger of extinction, or likely to become so within the foreseeable future.

On the basis of our status review, we conclude that listing the black-footed albatross rangewide is not warranted at this time. Our standard for determining whether listing is warranted is whether a species is presently in danger of extinction throughout all or a significant portion of its range (endangered) or is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (threatened). We acknowledge the black-footed albatross faces a variety of threats, and that some of these threats have had significant impacts on the species in the past. However, our evaluation of the best available scientific and commercial data does not suggest that these threats, either singly or in combination, are currently of such severity or magnitude as to place the species in danger of extinction at the present time, or within the foreseeable future. We reviewed the petition, information available in our files, other published and unpublished information submitted to us during the public comment periods following our 90-day petition finding, and consulted with recognized albatross experts and other Federal, State, and local resource agencies within the historical range of the black-footed albatross, both in the Hawaiian Islands and in the western Pacific (Japanese Islands). Following this exhaustive review, we find that listing the black-footed albatross as endangered or threatened across its range is not warranted at this time.

In making this finding, we recognize there have been historical declines in black-footed albatross populations, and that the more recent declines observed from roughly the late 1950s through 1980s were primarily attributed to driftnet and longline fishery bycatch. Although the environmental effects from climate change will undoubtedly impact the species, we conclude that significant impacts to the black-footed albatross within the foreseeable future are not likely.

At this time, we conclude the best available scientific and commercial data suggests the population of black-footed albatross is large and robust enough to withstand the threats facing the species, as evidenced by the primarily stable or even slightly increasing populations across its range, and we have no evidence to suggest the species is in danger of extinction or is likely to become in danger of extinction within the foreseeable future.

Evaluation of the Black-Footed Albatross as Two Potential Distinct Population Segments

After assessing whether the species is endangered or threatened throughout its range, we next consider whether a distinct vertebrate population segment (DPS) meets the definition of endangered or threatened.

To interpret and implement the distinct vertebrate population segment (DPS) provisions of the Act and Congressional guidance, we, in conjunction with the National Marine Fisheries Service, published the Policy Regarding the Recognition of Distinct Vertebrate Population Segments (DPS Policy) in the **Federal Register** on February 7, 1996 (61 FR 4722). Under the DPS policy, two basic elements are considered in the decision regarding the establishment of a population of a vertebrate species as a possible DPS. We must first determine whether the population qualifies as a DPS; this requires a finding that the population is both: (1) Discrete in relation to the remainder of the species to which it belongs; and (2) biologically and ecologically significant to the species to which it belongs. If the population meets the first two criteria under the DPS policy, we then proceed to the third element in the process, which is to evaluate the population segment's conservation status in relation to the Act's standards for listing as an endangered or threatened species. These three elements are applied similarly for additions to or removals from the Federal Lists of Endangered and Threatened Wildlife and Plants.

In accordance with our DPS Policy, we detail our analysis of whether a vertebrate population segment under consideration for listing may qualify as a DPS. As described above, we first evaluate the population segment's discreteness from the remainder of the species to which it belongs. Under the DPS policy, a population segment of a vertebrate taxon may be considered discrete if it satisfies either one of the following conditions:

(1) It is markedly separated from other populations of the same taxon as a

consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

(2) It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

If a vertebrate population segment does not meet either of the DPS's criteria for discreteness, then no further analysis is necessary. However, if we determine that a vertebrate population segment is discrete under one or more of the conditions described in the Service's DPS policy, then we consider its biological and ecological significance to the larger taxon to which it belongs, in light of Congressional guidance (see Senate Report 151, 96th Congress, 1st Session) that the authority to list DPSs be used ''sparingly'' while encouraging the conservation of genetic diversity. In making this determination, we consider available scientific evidence of the discrete population segment's importance to the taxon to which it belongs. Because precise circumstances are likely to vary considerably from case to case, the DPS policy does not describe all the classes of information that might be used in determining the biological and ecological importance of a discrete population. However, the DPS policy describes four possible classes of information that provide evidence of a population segment's biological and ecological importance to the taxon to which it belongs. As specified in the DPS policy (61 FR 4722), this consideration of the population segment's significance may include, but is not limited to, the following:

(1) Persistence of the discrete population segment in an ecological setting unusual or unique to the taxon;

(2) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon;

(3) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; or

(4) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

A population segment needs to satisfy only one of these conditions to be considered significant. Furthermore, other information may be used as appropriate to provide evidence for significance.

The petition asked us to: (1) List the black-footed albatross as endangered or threatened throughout its range; or (2) list the ''Hawaiian breeding population'' of the black-footed albatross as a DPS, and (3) list the ''Japanese breeding population'' of the black-footed albatross as a DPS. We have already addressed the entity identified in the first petition request (black-footed albatross throughout its range), above (see Finding). To address the second and third petition requests regarding DPSs, we first need to clearly define the geographic boundaries of the breeding populations, both the Hawaiian and the Japanese; this involves looking at the range-wide breeding population. Through this process we additionally considered whether the islands of San Benedicto and San Guadalupe in the eastern Pacific (Mexico) and Wake Island in the central Pacific (Marshall Islands) might be considered DPSs, since black-footed albatross have on occasion attempted to nest there. We determined that even though they would likely be considered geographically separate from both the Hawaiian and Japanese islands, neither Wake Atoll nor the islands in Mexico would be included in our DPS analysis because although infrequent attempts at breeding have been documented (Rice and Kenyon 1962b, p. 379; Pitman and Ballance 2002, p. 13; Rauzon *et al.* 2008, pp. 14–15; Henry 2007, pers. comm.; Arata *et al.* 2009, p. 39; Hebshi 2010, pers. comm.), there is no evidence that these islands support established populations of black-footed albatrosses and, therefore, they cannot be defined as a ''breeding population'' (see Species Biology, Breeding Populations) that might serve as the subject of a DPS evaluation.

With the Hawaiian Islands and the Japanese Islands defined as two breeding population segments of black-footed albatross, we analyzed them separately to determine if they were ''discrete.'' If one or both of these population segments met any of the DPS policy criteria for discreteness, we next analyzed the population segment(s) to determine its significance to the taxon as a whole.

Definition of the Hawaiian Islands Population Segment of the Black-Footed Albatross

The Hawaiian Islands population segment encompasses the breeding range of the black-footed albatross within the Northwestern Hawaiian Islands (also known as the Leeward Islands), which are a group of small islands, atolls, and reefs in the northwest portion of the Hawaiian Islands archipelago, and the islands of Kaula (southwest of Niihau) and Lehua (north of Niihau) just off Kauai in the main Hawaiian Islands. The Northwestern Hawaiian Islands include Kure Atoll, Midway Atoll, Pearl and Hermes Reef, Lisianski Island, Laysan Island, French Frigate Shoals, Necker Island, Nihoa Island, Maro Reef, and the Gardner Pinnacles (Conant *et al.* 1984, pp. 378–379). Currently black-footed albatrosses breed on all of the Northwestern Hawaiian Islands (Naughton *et al.* 2007, p. 5), except the Gardner Pinnacles and Maro Reef. Less than 1 percent of the Hawaiian Islands population segment breeds on Kaula and Lehua islands. The best available information indicates the known historical breeding range (see Breeding Distribution) of black-footed albatrosses in the Hawaiian Islands archipelago includes the same locations where they are currently found. Other islands where they were historically reported but may not have bred are Wake Atoll (Marshall Islands archipelago) and Johnston Atoll (Rice and Kenyon 1962b, pp. 378–380; Naughton *et al.* 2007, p. 5).

Definition of the Japanese Islands Population Segment of the Black-Footed Albatross

The Japanese Islands population segment encompasses the breeding range of the black-footed albatross in the western Pacific, off the coast of Japan, and includes approximately 13 islands: Izu-Torishima Island (also known as Torishima, in the Izu Shoto Islands group); 9 islands within the Ogasawara Islands group, and 3 islands within the Senkaku Islands group (Eda *et al.* 2008, p. 109) (see Breeding Distribution above). The best available information indicates the known historical breeding range of black-footed albatrosses in the western Pacific also included Agrihan and Pagan islands in the Commonwealth of the Northern Marianas Islands, 2 of the Kazan-retto islands (also known as the Volcano Islands), including Iwo Jima; the isolated Minami Torishima Island (Marcus Island); at least 11 islands within the Mukojima islands; 2 of the Hajajima Islands; Minamitori-shima Island; Nishino-shima Island within the Bonin Island group; and several islands within the Senkaku Island group (Chiba *et al.* 2007, p. 5; Kawakami *et al.* 2006, p. 187). We considered for our analysis the entire western Pacific island groups of Izu, Ogasawara, and Senkaku, which encompass the current known breeding range of black-footed albatrosses in the western Pacific.

Discreteness of the Hawaiian Islands Population Segment of the Black-Footed Albatross

The breeding population is markedly separated from other breeding populations as a consequence of either physical, physiological, ecological, or behavioral factors; quantitative measures of genetic or morphological discontinuity may provide evidence of this separation—The Hawaiian breeding population of black-footed albatross is separated from the remainder of the species in the Japanese Islands by the approximately 2,500 mi (4,000 km) of ocean between Kure Atoll in the Northwestern Hawaiian Islands and the Hahajima Island cluster in the Ogasawara Islands in Japan. While this distance is well within the species' maximum estimated dispersal distance, the nesting site fidelity of the female albatross has effectively delimited the breeding range of the two populations. As previously described above (see Species Biology, Life History), female black-footed albatrosses have a high level of affinity to the nest site; over 99 percent of black-footed albatross females breed on the island where they hatched and fledged (natal site) and establish their own nesting site nearby where they return annually (Rice and Kenyon 1962a, pp. 532–533). Furthermore, this behaviorally dictated reproductive isolation is strongly supported by genetic assessments of the population structure among black-footed albatrosses from three islands in the Hawaiian Islands and from the Japanese islands of Izu-Torishima (Walsh and Edwards 2005, p. 292; Eda *et al.* 2008, p.110) and two of the Ogasawara Islands (Eda *et al.* 2008, p. 110). In these combined assessments it was found that the Hawaiian population is widely divergent from the Japanese population, representing four unique haplotypes out of nine known haplotypes, which is an indicator of long isolation (Eda *et al.* 2008, pp. 112–115; Chambers 2010, pers. comm.). Furthermore, these results are indicative that the species has been undergoing this divergence for several hundred millennia (Eda *et al.* 2008, p. 114–115). Thus, not only is the Hawaiian population spatially separated from the remainder of the taxon in Japan, it also has been temporally separated as indicated through unique haplotypes.

Discreteness Summary for the Hawaiian Islands Population of the Black-Footed Albatross

Our DPS policy states that a population segment of a vertebrate species may be considered discrete if it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. We find that the Hawaiian Islands population segment of the black-footed albatross is reproductively isolated from the remainder of the taxon in Japan as a result of: (1) The strong behavioral tendencies of black-footed albatross adult females to return to breed near their natal site and to return to an established nesting site in subsequent years; (2) the physical separation of approximately 2,500 mi (4,000 km) of ocean separating the two breeding populations, which further enforces the behavioral separation, and thus ensures that they breed within a localized geographic area of the Hawaiian Islands; and (3) the genetic uniqueness of the Hawaiian Islands population, which underscores both the spatial and temporal separation of this population from the remainder of the taxon in Japan.

We did not examine the second discreteness criterion, ''Delimitation by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant with regard to conservation of the taxon,'' because although the species is delimited by international governmental boundaries, it was not necessary to further pursue this line of analysis, as discreteness of the Hawaiian Islands breeding population of the black-footed albatross is already determined through a ''marked separation'' of the population from the remainder of the taxon.

Significance of the Hawaiian Islands Population Segment of the Black-footed Albatross

Having determined that the Hawaiian Islands population of the black-footed albatross meets the discreteness criterion for a DPS, our DPS policy directs us to consider scientific evidence of the biological and ecological importance of this discrete population to the remainder of the taxon to which it belongs. In this case, we evaluate the biological and ecological significance of the Hawaiian Islands population segment of black-footed albatrosses relative to the taxon as a whole, which includes the breeding population of the taxon in Japan. A discrete population is considered significant under the DPS policy if it meets one of the four elements identified in the policy under significance, or can otherwise be reasonably justified as being significant. Here we evaluate the four potential factors suggested by our DPS policy in evaluating significance.

(1) Persistence of the Discrete Population Segment in an Ecological Setting That Is Unusual or Unique for the Taxon

In considering whether the population occupies an ecological setting that is unusual or unique for the taxon, we evaluate whether the habitat includes unique features not used by the taxon elsewhere in its range and whether the habitat shares many features common to the habitats of other populations within the range of the taxon.

The small islands, atolls, and reefs of the Northwestern Hawaiian Islands, and Lehua and Kaula islands, where the Hawaii population of the black-footed albatross breeds, can be characterized as primarily low-elevation volcanic islands, reefs and atolls, some having sheer-faced cliffs and others sloping to the ocean (Rice and Kenyon 1962b, pp. 369–377). All support only sparse coastal scrub or grassy vegetation on a sandy or volcanic soil substrate (Cousins and Cooper 2000, p. 5; Awkerman *et al.* 2008, p. 20; Arata *et al.* 2009, p. 10). The remainder of the taxon in Japan breeds on volcanic islands (Torishima Island and the Ogasawara Islands) (Naughton *et al.* 2007, p. 5) and on nonvolcanic islands (the Senkaku Islands) (Naughton *et al.* 2007, p. 5), but not on atolls or reefs as these land forms are likely nonexistent in the western Pacific. Most of the best available information describes the nesting characteristics of the taxon in the Hawaiian Islands; very little information is available detailing the nesting characteristics for the remainder of the taxon in Japan. However, based on the best available scientific information, we have determined that the habitat for the Hawaiian Islands population does not represent an ecological setting that is unusual or unique relative to the habitat available throughout the entire taxon's range. We have no evidence to suggest that black-footed albatrosses nesting in the Hawaiian Islands utilize habitat with distinctly different physical characteristics from that used by black-footed albatrosses in Japan, aside from a difference in elevation. Black-footed albatrosses nesting in the Japanese Islands appear to utilize habitat with similar physical structure as black-footed albatrosses in the Hawaiian Islands. In general, nests are a depression in a sandy or volcanic ash substrate, surrounded by a rim of sand or volcanic soil (Arata *et al.* 2009, p. 10); in the Japanese Islands where there are no sandy beaches the nests are high upslope, whereas in the Hawaiian Islands nests are most often located on exposed beaches at the beginning of the vegetation line (Cousins and Cooper 2000, p. 5; Awkerman *et al.* 2008, p. 20; Arata *et al.* 2009, p. 10).

Based upon limited information to differentiate the foraging habits of the Hawaiian Islands population (Fernandez *et al.* 2001, p. 4; Awkerman *et al.* 2008, p. 14) from the remainder of the taxon in Japan (Kawakami *et al.* 2006, pp. 189–190), it appears that the foraging habits of breeding black-footed albatrosses in the Hawaiian Islands are similar to the taxon as a whole. Breeding birds tend to forage close to breeding islands while chicks are young and require continuous feeding and then take longer foraging trips as chicks get older (Hyrenbach *et al.* 2002, pp. 289–294; Kawakami *et al.* 2006, pp. 189–190). During the nonbreeding season, birds from both geographic areas forage throughout the north Pacific (Hyrenbach *et al.* 2002, p. 298). Given the available information on the diversity and extent of ecological settings of the black-footed albatross in the remainder of its range in Japan, we conclude that the discrete population of black-footed albatross in the Hawaiian Islands is not ''significant'' within the meaning of the DPS policy as a result of persistence in a unique or unusual ecological setting.

(2) Loss of the Population Segment Would Result in a Significant Gap in the Range of the Taxon

Loss of the Hawaiian Islands population segment of the black-footed albatross, when considered in relation to the taxon as a whole, would mean the loss of the great majority of the entire breeding range of the taxon. The Hawaiian Islands' black-footed albatross population comprises approximately 95 percent of the current breeding population of the species as a whole. In addition, assessments of genetic divergence between the birds from Hawaii and birds from Japan provide evidence of four haplotypes, out of nine haplotypes known, which are unique to the Hawaiian Islands population (Eda *et al.* 2008, p. 112–114). Such divergence in a species of bird suggests reproductive isolation over several hundred millennia with only rare movements of females between the Hawaiian and Japanese islands (Eda *et al.* 2008, p. 114; Chambers 2010, pers. comm.). It follows that, should a catastrophe decimate the Hawaiian population segment, the likelihood that repopulation of the Hawaiian islands would be aided (*i.e.,* ''rescued'') by birds from the remainder of the taxon in Japan would be remote due to the combined deterrents of the 2,500 mi (4,000 km) distance between the two population segments and the inherent site fidelity of the entire taxon, which together limit the occurrence of successful colonization events.

Nonetheless, there is biological value in maintaining the redundancy provided by two geographically discrete population segments in the event that either is catastrophically decimated, as the remaining population would represent the sole possible source for recolonization. The loss of the Hawaiian Islands population of black-footed albatross would: (1) Reduce the genetic diversity of the remainder of the taxon by almost 50 percent (see details under (4), below); (2) reduce the breeding population of the entire species by 95 percent; (3) reduce the breeding range of the taxon geographically to the islands off the coast of Japan; and (4) eliminate any taxonomic redundancy that could be imperative to the maintenance of the species in the event of a catastrophe. Therefore, we find that the gap in the range resulting from the loss of the black-footed albatross breeding population in the Hawaiian Islands would be significant to the taxon as a whole.

(3) Evidence That the Discrete Population Segment Represents the Only Surviving Natural Occurrence of a Taxon That May Be More Abundant Elsewhere as an Introduced Population Outside Its Historical Range

The Hawaiian Islands population does not represent the only surviving natural occurrence of the black-footed albatross throughout the range of the taxon; therefore, we conclude that the discrete population of the black-footed albatross in the Hawaiian Islands does not meet the significance criterion of the DPS policy based on this factor.

(4) Evidence That the Discrete Population Segment Differs Markedly from Other Populations of the Species in Its Genetic Characteristics

The genetic structure of the black-footed albatross was assessed in two separate analyses (Walsh and Edwards 2005, pp. 289–295; Eda *et al.* 2008, 109–116). Through these analyses it was determined that the Hawaiian Islands breeding population is genetically differentiated from the remainder of the taxon in Japan (Walsh and Edwards 2005, pp. 291–292; Eda *et al.* 2008, 112–115; Chambers 2010, pers. comm.). Of the nine known haplotypes described, four were found to be unique to the Hawaiian Islands population (H2, H3, H4, H5), and a fifth (H1) was nearly unique (Eda *et al.* 2008, 112–115). Although these haplotypes occur at low frequencies, they are nonetheless indicators of long isolation between the Hawaiian Islands population and the remainder of the taxon in Japan, and their loss would mean a significant reduction of almost 50 percent of the total known genetic diversity of the taxon as a whole (Chambers 2010, pers. comm.). We find, therefore, that the Hawaiian Islands breeding population differs markedly from the rest of the taxon because there are genetic characteristics present in this population that are not observed in the remainder of the taxon in Japan.

Significance Summary

We find the discrete population segment of black-footed albatross that occurs in the Hawaiian Islands is significant to the species as a whole. The significance of this population segment is based on a positive finding for two of the factors described in our DPS policy for determining significance. In our analysis of the significance criterion, ''Evidence that the loss of the population segment would result in a significant gap in the range of the taxon,'' we determined that, as a consequence of breeding site fidelity combined with the 2,500 mi (4,000 km) separation between the Hawaiian Islands and the Japanese Islands, the discrete population of the black-footed albatross in the Hawaiian Islands was reproductively isolated from the remainder of the taxon in Japan. The significance of this reproductive isolation was supported by evidence that unique haplotypes represented in the Hawaiian Islands population are a consequence of a long-term separation from the remainder of the taxon in Japan. Furthermore, the discrete population segment of the Hawaiian Islands represents 95 percent of the current breeding population. Thus, loss of the Hawaiian Islands discrete population segment would represent a loss of a reproductively isolated population representing a significant majority of the rangewide breeding population and would, therefore, result in a significant gap in the range of taxon.

We also found a positive determination for the significance factor, ''Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics,'' based on the results of two analyses that assessed the genetic divergence of the Hawaiian and Japanese islands populations. Together these analyses determined that the Hawaiian Islands discrete population of the black-footed albatross was genetically divergent from the remainder of the taxon in Japan through unique haplotypes representing almost 50 percent of the genetic diversity of the species. Because we have determined that extirpation of the Hawaiian Islands population segment would result in the loss of unique genetic characteristics within the taxon, we conclude that the Hawaiian Islands population segment differs markedly from other populations of the species in its genetic characteristics.

DPS Conclusion for the Hawaiian Islands Population Segment of the Black-footed Albatross

Our DPS policy directs us to evaluate the significance of a discrete population in the context of its biological and ecological significance to the remainder of the species to which it belongs. Based on an analysis of the best available scientific and commercial data, we conclude that the Hawaiian Islands population segment of the black-footed albatross is discrete due to reproductive isolation as a result of spatial and temporal separation from the remainder of the taxon. Furthermore, we conclude that the Hawaiian Islands discrete population segment of the black-footed albatross is significant because it meets the following criteria to establish significance in the DPS policy: (1) The loss of this breeding population would mean the loss of a large portion of the geographic range and reproductive proportion of the entire breeding range of the taxon, resulting in a significant gap in the range of the species; and (2) this population differs markedly from the rest of the species because there are genetic characteristics present in this population that are not observed in the remainder of the taxon. Therefore, we conclude that the Hawaiian Islands population of the black-footed albatross is both discrete and significant under our DPS policy and is, therefore, a listable entity under the Act.

Discreteness of the Japanese Islands Population Segment of the Black-footed Albatross

The breeding population is markedly separated from other breeding populations as a consequence of either physical, physiological, ecological, or behavioral factors; quantitative measures of genetic or morphological discontinuity may provide evidence of this separation—The Japanese breeding population of black-footed albatross is separated from the remainder of the species in the Hawaiian Islands by the approximately 2,500 mi (4,000 km) of ocean between the Hahajima Island cluster in the Ogasawara Islands in Japan and Kure Atoll in the Northwestern Hawaiian Islands. While this distance is well within the species' maximum estimated dispersal distance, the nesting site fidelity of the female albatross has effectively delimited the breeding range of the two populations. As previously described above (see Species Biology, Life History), female black-footed albatrosses have a high level of affinity to the nest site; over 99 percent of black-footed albatross females breed on the island where they hatched and fledged (natal site) and establish their own nesting site nearby where they return annually (Rice and Kenyon 1962a, pp. 532–533). Furthermore, this behaviorally dictated reproductive isolation is strongly supported by genetic assessments of the population structure among black-footed albatrosses from three islands in the Hawaiian Islands and from the Japanese Islands of Torishima (Walsh and Edwards 2005, p. 292; Eda *et al.* 2008, p.110) and two of the Ogasawara Islands (Eda *et al.* 2008, p. 110). In these combined assessments it was found that the Japanese population is widely divergent from the Hawaiian population, representing three unique haplotypes out of nine known haplotypes, which is an indicator of long reproductive isolation (Eda *et al.* 2008, pp. 112–115; Chambers 2010, pers. comm.). Furthermore, these results are indicative that the species has been undergoing this divergence for several hundred millennia (Eda *et al.* 2008, pp. 114–115). Thus, not only is the Japanese population spatially separated from the remainder of the taxon, it also has been temporally separated as indicated through unique haplotypes.

Discreteness Summary for the Japanese Population of the Black-footed Albatross

Our DPS policy states that a population segment of a vertebrate species may be considered discrete if it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. We find that the Japanese Islands population segment of the black-footed albatross is reproductively isolated from the remainder of the taxon in the Hawaiian Islands as a result of: (1) The strong behavioral tendencies of black-footed albatross adult females to return to breed near their natal site and to return to an established nesting site in subsequent years; (2) the physical separation of approximately 2,500 miles (4,000 km) of ocean separating the two breeding populations which further enforces the behavioral separation and thus ensures that they breed within a localized geographic area of the Hawaiian Islands; and (3) the genetic uniqueness of the Japanese population, which underscores both the spatial and temporal separation of this population from the remainder of the taxon in the Hawaiian Islands.

We did not examine the second discreteness criterion, ''Delimitation by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant with regard to conservation of the taxon,'' because, although the species is delimited by international governmental boundaries, it was not necessary to further pursue this line of analysis as discreteness of the Japanese breeding population of the black-footed albatross was already determined through a ''marked separation'' of the population from the remainder of the taxon.

Significance of the Japanese Population Segment of the Black-footed Albatross

Having determined that the Japanese population segment of the black-footed albatross meets the discreteness criterion for a DPS, our DPS policy directs us to consider scientific evidence of the biological and ecological importance of this discrete population to the remainder of the taxon to which it belongs. In this case, we evaluate the biological and ecological significance of the Japanese population segment of black-footed albatrosses relative to the taxon as a whole, which includes the breeding population of the taxon in the Hawaiian Islands. A discrete population is considered significant under the DPS policy if it meets one of the four elements identified in the policy under significance, or can otherwise be reasonably justified as being significant. Here we evaluate the four potential factors suggested by our DPS policy in evaluating significance.

(1) Persistence of the Discrete Population Segment in an Ecological Setting That Is Unusual or Unique for the Taxon

In considering whether the population occupies an ecological setting that is unusual or unique for the taxon, we evaluate whether the habitat includes unique features not used by the taxon elsewhere in its range and whether the habitat shares many features common to the habitats of other populations within the range of the taxon.

The island groupings in the western Pacific where the Japanese population of the black-footed albatross breeds can be characterized as volcanic (Torishima

Island and the Ogasawara Islands) (Naughton *et al.* 2007, p. 5) and nonvolcanic (Senkaku Islands) (Naughton *et al.* 2007, p. 5). The Northwestern Hawaiian Islands where the remainder of the taxon breeds is predominantly characterized by reefs and atolls, some having sheer-faced cliffs and others sloping to the ocean (Rice and Kenyon 1962b, pp. 369–377). Most of the best available information describes the nesting characteristics of the taxon in the Hawaiian population; we acknowledge that very little information is available detailing the nesting characteristics in the Japan population. However, based on the best available scientific information, we have determined that the habitat for the Japanese population segment does not represent an ecological setting that is unusual or unique relative to the habitat available throughout the entire taxon's range. Black-footed albatrosses nesting in the Japanese Islands appear to utilize habitat with similar physical structure as black-footed albatrosses in the Hawaiian Islands. In general, nests are a depression in a sandy or volcanic ash substrate, surrounded by a rim of sand or volcanic soil (Rice and Kenyon 1962a, 536–537; Arata *et al.* 2009, p. 10). Although black-footed albatrosses nest on high open slopes on the steep, rocky Japanese Islands where sandy beaches are not available, we have no evidence to suggest that this difference in physical location of nests on high elevation slopes is ecologically significant to the taxon as whole.

Based upon limited information to differentiate the foraging habits of the Japanese population (Kawakami *et al.* 2006, pp. 189–190) from the remainder of the taxon in the Hawaiian Islands (Fernandez *et al.* 2001, p. 4; Awkerman *et al.* 2008, p. 14), it appears that the foraging habits of breeding black-footed albatrosses in Japan are similar to the taxon as a whole. Breeding birds tend to forage close to breeding islands while chicks are young and require continuous feeding and then take longer foraging trips as chicks get older (Kawakami *et al.* 2006, pp. 189–190; Hyrenbach *et al.* 2002, pp. 289–294). During the nonbreeding season, birds from both population localities forage throughout the north Pacific (Hyrenbach *et al.* 2002, p. 298). Given the available information on the diversity and extent of ecological settings of black-footed albatrosses in the remainder of its range in the Hawaiian Islands, we conclude that the discrete population of black-footed albatross in Japan is not ''significant'' within the meaning of the DPS policy as a result of persistence in a unique or unusual ecological setting.

(2) Loss of the Population Segment Would Result in a Significant Gap in the Range of the Taxon

Loss of the black-footed albatross breeding population in the Japanese Islands, when considered in relation to black-footed albatrosses breeding in the Hawaiian Islands, would mean the loss of a proportionally small geographic area that holds approximately 5 percent of the entire breeding population of the taxon. Regardless of the proportional size of such a loss, the Japanese Islands population represents an important segment of the representative historical range of the taxon; loss of the breeding population in the Japanese Islands would mean the loss of the entire western Pacific breeding range of the species. The Japanese Islands population additionally provides an important measure of redundancy for the taxon as a whole. Loss of the Japanese Islands breeding population of black-footed albatross would reduce the remainder of the taxon to a single concentration of nesting islands in the central Pacific. Since only two breeding populations comprise the entire range of the species, each could be critical as a source of potential recolonization should the other population be lost (for example, to a severe epizootic).

Assessments of genetic divergence between the birds from Japan and birds from the Hawaiian Islands provide evidence of three haplotypes out of nine known haplotypes that are unique to the Japanese population and another haplotype that is nearly unique to Japan (Eda *et al.* 2008, pp. 112–114). Such genetic divergence in a species of bird suggests reproductive isolation over several hundred millennia with only rare movements of females between the Japanese and Hawaiian islands (Eda *et al.* 2008, p. 114; Chambers 2010, pers. comm.). Even though the Japanese Islands population does not contain the full genetic representation of the taxon rangewide, it is the only other population of the taxon that wildlife managers could use to repopulate the Hawaiian Islands population should that population be imperiled by a catastrophic event.

In summary, the loss of the Japanese population of black-footed albatross, therefore, would: (1) Reduce the genetic diversity of the remainder of the taxon by almost 45 percent (see (4), below; (2) reduce the breeding range of the taxon geographically to only the Hawaiian Islands, and eliminate the only other population representative of the historical range of the species; and (3) eliminate any biological redundancy that could be imperative to the maintenance of the species in the event of a catastrophe. Therefore, we find that the gap in the range resulting from the loss of the black-footed albatross breeding population in Japan would be significant to the taxon as a whole.

(3) Evidence That the Discrete Population Segment Represents the Only Surviving Natural Occurrence of a Taxon That May Be More Abundant Elsewhere as an Introduced Population Outside Its Historical Range

Because the population in Japan does not represent the only surviving natural occurrence of the black-footed albatross throughout the range of the taxon, we conclude that the discrete population of the black-footed albatross in Japan does not meet the significance criterion of the DPS policy based on this factor.

(4) Evidence That the Discrete Population Segment Differs Markedly from Other Populations of the Species in Its Genetic Characteristics

The genetic structure of the black-footed albatross was assessed in two separate analyses (Walsh and Edwards 2005, pp. 289–295; Eda *et al.* 2008, 109–116). Through these analyses it was determined that the Japanese breeding population is genetically differentiated from the taxon in the Hawaiian Islands (Walsh and Edwards 2005, pp. 291–292; Eda *et al.* 2008, 112–115; Chambers 2010, pers. comm.). Of the nine known haplotypes described, three were found to be unique to the Japanese Islands population (J2, J3, J4), and a fourth (J1) was nearly unique (Eda *et al.* 2008, 112–115). Although these haplotypes occur at low frequencies, they are nonetheless indicators of long isolation between the population in Japan and the remainder of the taxon in the Hawaiian Islands, and the loss of the Japanese population would mean a significant reduction of almost 45 percent of the total genetic diversity of the taxon as a whole (Chambers 2010, pers. comm.). We find, therefore, that the breeding population in Japan differs markedly from the rest of the taxon because there are genetic characteristics present in this population that are not observed in the remainder of the taxon in the Hawaiian Islands.

Significance Summary

We find that the discrete population segment of black-footed albatross that occurs in Japan is significant to the species as a whole. The significance of this population segment is based on a positive finding for two of the factors described in our DPS policy for determining significance. In our analysis of the significance criterion, ''Evidence that the loss of the population segment would result in a significant gap in the range of the taxon,'' we determined that loss of the Japanese breeding population would result in a significant gap in the range of the taxon because it would: (1) Reduce the genetic diversity of the remainder of the taxon by almost 45 percent; (2) reduce the breeding range of the taxon geographically to only the Hawaiian Islands, and eliminate the only other population representative of the historical range of the species; and (3) eliminate any biological redundancy that could be imperative to the maintenance of the species in the event of a catastrophe. We also made a positive determination for the significance factor ''Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics'' based on the results of two analyses that assessed the genetic divergence of the Japanese and Hawaiian islands populations. Together these analyses determined that the Japanese Islands population of the black-footed albatross was genetically divergent from the remainder of the taxon in the Hawaiian Islands through unique haplotypes representing almost 45 percent of the genetic diversity of the species. We have determined that extirpation of the Japanese Islands population segment would result in the loss of unique genetic characteristics within the taxon; therefore, we conclude that the Japanese Islands population segment differs markedly from other populations of the species in its genetic characteristics.

DPS Conclusion for the Japanese Population Segment of the Black-footed Albatross

Our DPS policy directs us to evaluate the significance of a discrete population in the context of its biological and ecological significance to the remainder of the species to which it belongs. Based on an analysis of the best available scientific and commercial data, we conclude that the Japanese Islands population segment of the black-footed albatross is discrete due to reproductive isolation as a result of spatial and temporal separation from the remainder of the taxon. Furthermore, we conclude that the Japanese Islands discrete population segment of the black-footed albatross is significant because it meets the following criteria established in the DPS policy: (1) The loss of this breeding population would mean the loss of the only other population representative of the historical breeding range of the taxon, nearly half the known genetic diversity of the species, and potentially important biological redundancy for the taxon, resulting in a significant gap in the range of the species; and (2) this population differs markedly from the rest of the species because there are genetic characteristics present in this population that are not observed in the remainder of the taxon. Therefore, we conclude that the Japanese Islands population is both discrete and significant under our DPS policy and is, therefore, a listable entity under the Act.

Summary of DPS Analyses

Based on our DPS policy (61 FR 4722; February 7, 1996), if a population segment of a vertebrate species is both discrete and significant relative to the taxon as a whole (*i.e.,* it is a distinct population segment), its evaluation for endangered or threatened status will be based on the Act's definition of those terms and a review of the factors enumerated in section 4(a) of the Act. Having found that the Hawaiian Islands and Japanese Islands breeding populations of the black-footed albatross each meet the definition of a distinct population segment, we now evaluate the status of each of these populations separately to determine whether either meets the definition of endangered or threatened under the Act.

Summary of Factors Affecting the Hawaiian Islands DPS

The Act establishes five categories of threat that, either singly or in combination, indicate a DPS may be threatened or endangered. The five listing factors that must be considered are: (A) Present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; or (E) other natural or manmade factors affecting its continued existence.

We have already completed a comprehensive status review of the black-footed albatross across the range of the species. In this case, the entire range of the species is composed of two breeding populations, that in the Hawaiian Islands and that in the Japanese Islands. In our rangewide assessment of the status of the black-footed albatross, wherever possible we differentiated between threats acting on the breeding populations in the Hawaiian Islands and threats acting on the breeding populations in the Japanese Islands, and reached separate conclusions as to the significance of those threats for each of these populations. To avoid repetition, here we incorporate by reference the threats analysis specific to the Hawaiian Islands breeding population of the black-footed albatross conducted earlier in this document, and specifically note if any circumstances specific to the breeding population in the Hawaiian Islands differs from the earlier analysis. Otherwise, we present only our conclusion for each of the threat factors considered, and refer the reader to the rangewide status assessment, above, for the detailed analysis supporting each conclusion (see Summary of Factors Affecting the Species Throughout Its Range).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

In our rangewide evaluation of threats facing the black-footed albatross, we evaluated the following potential factors as they affect the habitat or range of the Hawaiian Islands breeding population (now DPS) of the black-footed albatross: military activities; volcanic activity; natural gas exploration; invasive plant species; and effects related to climate change, including sea level rise, coastal and wave inundation events, changes in tropical storm frequency or intensity, changes in ENSO and PDO events resulting in reduced marine productivity, and increased ambient temperatures. We have no additional information unique to the Hawaiian Islands DPS of the black-footed albatross. Therefore, based on our assessment of the best scientific and commercial data available, as detailed in our rangewide assessment of Factor A, above (Summary of Factors Affecting the Species Throughout Its Range), we conclude that the Hawaiian Islands DPS of the black-footed albatross is not threatened by the present or threatened destruction, or modification, or curtailment of its habitat or range.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of any information indicating that overutilization of black-footed albatrosses for commercial, scientific, or educational purposes threatens this species, and have no additional information unique to the Hawaiian Islands DPS of the black-footed albatross. Therefore, based on our assessment of the best scientific and commercial data available, as detailed in our rangewide assessment of Factor B, above (Summary of Factors Affecting the Species Throughout Its Range), we conclude that overutilization for commercial, recreational, scientific, or educational purposes is not a significant threat to Hawaiian Islands DPS of the black-footed albatross.

Factor C. Disease or Predation

Our analysis of the potential threat posed by avian pox, avian cholera, west Nile Virus, and H5N1 is detailed under the section titled *Disease* in our rangewide assessment of Factor C, above. Our analysis of the potential threat posed by predation by rats and sharks is detailed under the section titled *Predation* in our rangewide assessment of Factor C, above. The rangewide assessment specifically addresses the Hawaiian Islands breeding population, and we have no additional information unique to the Hawaiian Islands DPS of the black-footed albatross. Therefore, based on our assessment of the best scientific and commercial data available, as summarized here and detailed in our rangewide assessment of Factor C, above (Summary of Factors Affecting the Species Throughout Its Range), we conclude the Hawaiian Islands DPS of the black-footed albatross is not threatened by disease or predation.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

To determine whether the DPS may be threatened as a result of the inadequacy of existing regulatory mechanisms, we reviewed existing international and U.S. conventions, agreements, and laws for the specific protection of black-footed albatrosses or their marine and terrestrial habitats in the countries where they forage, migrate, and breed. In our comprehensive evaluation of Factor D under the rangewide threats assessment for the black-footed albatross, above (Summary of Factors Affecting the Species Throughout Its Range), we discuss the protection status of the black-footed albatross and its marine and terrestrial habitat at international, national, and regional levels, followed by a discussion of international and national fisheries regulations that are designed to reduce and monitor seabird bycatch from fisheries operations, and specifically evaluate the threat posed to the Hawaiian Island breeding population of the species.

We conclude that the Hawaiian Islands DPS of the black-footed albatross is not significantly threatened by the Hawaii-based shallow-set longline fishery, the Alaska-based demersal longline groundfish fishery, or the California, Oregon, and Washington groundfish, Pacific hake, and pelagic longline fisheries. We cannot definitively determine the extent and quantify the impact of other Alaska-based demersal longline fisheries; other (nonpelagic) longline fisheries based in California, Oregon, and Washington; coastal purse seine and troll fisheries based in the United States; Canadian-based longline fisheries; and longline fisheries based in Japan, Taiwan, China, Korea, Russia, and Mexico. We have no additional information unique to the Hawaiian Islands DPS of the black-footed albatross. Therefore, based on our assessment of the best scientific and commercial data available, as detailed in our rangewide assessment of Factor D, above (Summary of Factors Affecting the Species Throughout Its Range), we conclude that the Hawaiian Islands DPS of the black-footed albatross is not threatened by the inadequacy of existing regulatory mechanisms.

We are mindful of the potential impacts that these fisheries could have on the Hawaiian Islands DPS of the black-footed albatross. Furthermore, we acknowledge that many of the current protective agreements are voluntary in nature, and that bycatch mitigation measures may be lacking in international fleets. Although regulatory mechanisms are thus not as strong or comprehensive as they potentially might be, the present status of the black-footed albatross, with populations collectively stable in the Hawaiian Islands and expected to remain so or even increase into the future (Arata *et al.* 2009, p. 51; ACAP 2010, p. 4), indicates that the DPS is not at risk at a population level as a result of any inadequacy in regulatory mechanisms in place respecting fisheries bycatch.

Factor E. Other Natural or Manmade Factors Affecting its Continued Existence

In our discussion of Factor E under the rangewide threats assessment for the black-footed albatross, above (Summary of Factors Affecting the Species Throughout Its Range), we detail our evaluation of the potential threat to the Hawaiian Islands breeding population posed by several sources of contamination, including organochlorines (*e.g.,* polychlorinated biphenyls (PCBs), dichloro-diphenyl trichloroethane (DDT)), ingestion of plastics, and oil spills. We additionally evaluated the potential threat posed to the black-footed albatross by collisions with airplanes. We have no additional information unique to the Hawaiian Islands DPS of the black-footed albatross. Therefore, based on the best available scientific and commercial data, and as detailed in our rangewide assessment of Factor E, above (see Summary of Threats Affecting the Species Throughout Its Range), we find that other natural or manmade factors do not significantly threaten the black-footed albatross in the Hawaiian Islands DPS. However, we further conclude that continued research and monitoring is important in the detection of potential future effects.

Finding for the Hawaiian Islands DPS

We assessed the best available scientific and commercial data regarding the threats facing the Hawaiian Islands DPS of the black-footed albatross. We reviewed numerous information sources including literature cited in the petition, information in our files, information submitted to us following our 90-day petition finding (72 FR 57278; October 9, 2007) and the second information solicitation period (74 FR 43092; August 26, 2009), and consulted with recognized albatross experts and other Federal, State, and local resource agencies related to potential threats to the black-footed albatross and its marine and terrestrial habitat. Such potential threats include: historical habitat modification; invasive species; effects from climate change including sea level rise, coastal and wave inundation events, changes in tropical storm frequency and intensity, changes in food availability, and increases in ambient temperature; overutilization; disease and predation; bycatch in fisheries; contamination by PCBs and other pollutants; plastic ingestion; oil spills; and collisions with aircraft. To determine whether these risk factors individually or collectively put the DPS in danger of extinction throughout its range, or are likely to do so within the foreseeable future, we first considered whether the factors were causing a population decline, or were likely to do so within the foreseeable future.

We subjected all potential threats to the black-footed albatross to a comprehensive assessment under our rangewide evaluation of the species, above, in the section titled *Summary of Threats Affecting the Species Throughout its Range.* Since the species throughout its range is composed collectively of only two breeding populations, that in the Hawaiian Islands and that in the Japanese Islands, our rangewide assessment included a full evaluation of the threats to each of these two breeding populations as well. To avoid repetition in our assessment of the Hawaiian Islands DPS, we incorporated by reference the detailed threats assessments conducted under the rangewide analysis, above, and present here only our conclusions for each of those threats specific to the Hawaiian Islands DPS of the black-footed albatross.

On the basis of our status review, we conclude that the listing of the Hawaiian Islands DPS of the black-footed albatross is not warranted at this time. Our standard for determining whether listing is warranted is whether a species (including a DPS) is presently in danger of extinction throughout all or a significant portion of its range (endangered) or is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (threatened). We acknowledge that the black-footed albatross faces a variety of threats, and that some of these threats have had significant impacts on the species in the past. However, our status review indicates that the black-footed albatross population in the Hawaiian Islands is presently stable and under current conditions may even increase in size over the next 60 years (Arata *et al.* 2009, pp. 50–51; ACAP 2010, p. 5), suggesting that these past threats are no longer significantly affecting the species. At this time our evaluation of the best available scientific and commercial data does not suggest that the threats acting on the species, either singly or in combination, are currently of such severity or magnitude as to place the DPS in danger of extinction at the present time or within the foreseeable future.

Summary of Factors Affecting the Japanese Islands DPS

The Act establishes five categories of threat that, either singly or in combination, indicate a DPS may be threatened or endangered. The five listing factors that must be considered are: (A) Present or threatened destruction, modification, or curtailment of its habitat or range; (B) overutilization for commercial, recreational, scientific, or educational purposes; (C) disease or predation; (D) the inadequacy of existing regulatory mechanisms; and (E) other natural or manmade factors affecting its continued existence.

We have already completed a comprehensive status review of the black-footed albatross across the range of the species. In this case, the entire range of the species is composed of two breeding populations, that in the Hawaiian Islands and that in the Japanese Islands. In our rangewide assessment of the status of the black-footed albatross, wherever possible we differentiated between threats acting on the breeding population in the Hawaiian Islands and threats acting on the breeding population in the Japanese Islands, and reached separate conclusions as to the significance of those threats for each of these populations. To avoid repetition, here we incorporate by reference the threats analysis specific to the Japanese Islands breeding population of the black-footed albatross conducted earlier in this document, and specifically note if any circumstances specific to the breeding population in the Japanese Islands differ from the earlier analysis. Otherwise, we present only our conclusion for each of the threat factors considered, and refer the reader to the rangewide status assessment, above, for the detailed analysis supporting each conclusion (see *Summary of Factors Affecting the Species Throughout its Range*).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

In our rangewide evaluation of threats facing the black-footed albatross, we evaluated the following potential factors as they affect the habitat or range of the Japanese Islands breeding population (now DPS) of the black-footed albatross: military activities; volcanic activity; natural gas exploration; invasive plant species; and the environmental effects of climate change, including sea level rise, coastal and wave inundation events, changes in tropical storm frequency or intensity, changes in ENSO and PDO events resulting in reduced marine productivity, and increased ambient temperatures. Here we evaluate each factor further only if we have additional information unique to the Japanese Islands DPS of the black-footed albatross.

Military Activities

In our rangewide evaluation of threats facing the black-footed albatross, we evaluated military activities as they affect the habitat or range of the Japanese Islands breeding population (now DPS) of the black-footed albatross. We have no additional information unique to the Japanese Islands DPS of the black-footed albatross. Therefore, based on our assessment of the best scientific and commercial data available, as detailed in our rangewide assessment of Factor A, above (*Summary of Factors Affecting the Species Throughout its Range*), we conclude the Japanese Islands DPS of the black-footed albatross is not threatened by military activities.

Volcanic Activity

On Torishima Island, a 1903 volcanic eruption occurred during the nonbreeding season for several species of albatrosses, so that the only apparent effect was to destroy part of their nesting habitats. By 1930, it was apparent that many birds had returned and were breeding on the island as human harvesting of all the albatross species was resumed by settlers. The volcano erupted again in 1939, burying most of the former breeding grounds and making them uninhabitable by the birds. The main crater overflowed once more in 1941, closing the natural anchorage that had allowed free access to human hunters in the past. When visited in 1949, the island was described as ‘‘birdless’’ (Austin 1949, p. 289). Black-footed albatrosses reoccupied the island, however, and have been steadily increasing in numbers since systematic counts began in 1957 (Cousins and Cooper 2000, p. 23). Volcanic activity on Torishima Island was last recorded in 2002, with volcanic ash and rock blanketing the central portion of the island.

Given this history, it is likely Torishima Island will continue to experience volcanic activity. We consider it likely that seabirds such as the black-footed albatross will survive such an event, as they have in the past; being pelagic, approximately 75 percent of the population is at sea during any given time, which likely buffers them against such a catastrophic event at their nesting site (Finkelstein *et al.* 2010, p. 328). Additionally, using a matrix model that incorporated catastrophic mortality (*i.e.,* volcanic eruptions) and chronic mortality (*i.e.,* annual fisheries bycatch), chronic mortality was found to have a greater effect on predicted annual population growth rate in short-tailed albatrosses than did catastrophic mortality (Finkelstein *et al.* 2010, p. 328), thus we expect catastrophic mortality would likely have relatively little effect on the population growth of the black-footed albatross population.

Following a volcanic eruption Torishima Island could eventually be reoccupied, and recolonized by birds from the nearby Ogasawara Islands, similar to the observed recolonization of these islands following military activities during World War II. Some authors, however, (Finkelstein *et al.* 2010, p. 323) suggest that this scenario is unlikely as the movement of breeding birds between colonies is extremely low; birds are more likely to skip breeding until such time as they can return to their island; and, dispersing and colonizing birds are more likely to be nonbreeding juveniles. Because Torishima Island provides nesting habitat for approximately 2,150 of the approximately 3,184 nesting pairs in the Japanese Islands (ACAP 2010, p. 4), the population could be impacted by a volcanic eruption either through mortality of some portion of the nesting population, destruction of nesting habitat for 67 percent of the population in the western Pacific, or through lack of recruitment as a result of several years of skipped breeding.

However, as we anticipate most of the adult birds would be at sea during an eruption, we expect that any negative effects from such an event would not be of such great magnitude that the Japanese Islands DPS would become in danger of extinction throughout all or a significant portion of its range, and based on historical observations, we believe it is reasonable to assume that the breeding population of black-footed albatross on Torishima Island would eventually recover as it has following past eruptions. In addition, it is possible that Torishima Island could eventually be recolonized by birds from the nearby Ogasawara Islands, similar to recolonization of these islands following military activities during World War II. We, therefore, conclude that volcanic activity does not pose a significant threat to the Japanese Islands DPS of the black-footed albatross.

Natural Gas Exploration

In our rangewide evaluation of threats facing the black-footed albatross, we evaluated the potential for natural gas exploration as it may affect the habitat or range of the Japanese Islands breeding population of the black-footed albatross. We have no additional information unique to the Japanese Islands DPS of the black-footed albatross. Therefore, based on our assessment of the best scientific and commercial data available, as detailed in our rangewide assessment of Factor A, above (*Summary of Factors Affecting the Species Throughout its Range*), we have no information at this time to suggest that activities associated with natural gas exploration pose a significant threat to the Japanese Islands DPS of the black-footed albatross.

Effects Related to Climate Change

While climate change impacts to some specific environmental features (*e.g.,* sea ice) can be reliably assessed to some degree into the future, assessment of potential climate-induced changes to black-footed albatross habitat in the tropical and temperate terrestrial and marine systems is complex, with highly variable predictions of effects. Here we evaluate the best available scientific and commercial data on possible climate change effects in these systems that could negatively affect the Japanese Islands DPS of the black-footed albatross now and in the foreseeable future. However, the majority of climate change data that were available to us were not for the far western Pacific, but for the central Pacific. Therefore, much of the information available to us did not apply specifically to the Japanese Islands DPS; however, it constitutes the best scientific and commercial data available to us for our evaluation.

Sea Level Rise and Coastal Inundation

Efforts to project and model the potential effects of climate change and sea level rise on the black-footed albatross have focused primarily on habitat in the central Pacific, not on the western Pacific where the Japanese Islands DPS is located (Vitousek *et al.* 2008, pp 1–11; Fletcher 2009, pp. 1–9; Fletcher and Feirstein 2009, pp. 1–8).

The Japanese Islands supporting nesting populations of black-footed albatross are relatively high islands with some elevation above sea level, not low-lying atolls or reefs as in many of the Northwestern Hawaiian Islands. Therefore, these islands are not likely to be affected by rising sea levels. For example, Torishima is a large island (1,184 ac (479 ha)) with relatively steep topography, with a peak elevation of 1,293 ft (394 m). The Senkaku Islands are also high in elevation, reaching a maximum height of 1,257 ft (383 m) (Japan Meteorological Society, *http://watchizu.gsi.go,* accessed July 21, 2010). Nesting by black-footed albatrosses on these islands occurs well above sea level in volcanic substrates or on the top of hill and upland slopes. These populations of black-footed albatross will not be affected by loss of nesting habitat due to sea level rise (see Summary of Factors Affecting the Species Throughout its Range). Based on this assessment, and as detailed in our rangewide assessment of *Sea Level Rise and Coastal Inundation* under Factor A, above (see *Summary of Factors Affecting the Species Throughout its Range*), we do not believe sea level rise and coastal inundation pose a significant threat to the Japanese Islands DPS.

Climate Change and Wave Inundation

Winter wave heights generated from climate models show significant increases in the northwestern and northeastern Pacific, but in the vicinity of the major black-footed albatross breeding areas in the Japanese Islands (Torishima Island and the Ogasawara Islands), winter wave heights are predicted to remain unchanged (Wang and Swail 2006, p. 116). In addition, as described above, black-footed albatrosses in the Japanese Islands do not nest on beaches, but instead nest upslope on steep high-elevation islands, and would not be impacted by waves or overwash events. Based on this assessment, and as detailed in our rangewide assessment of *Climate Change and Wave Inundation* under Factor A, above (see *Summary of Factors Affecting the Species Throughout its Range*), we do not believe climate change and wave inundation pose a significant threat to the Japanese Islands DPS.

Climate Change and Tropical Cyclone Storm Frequency

As described in our assessment of tropical storm frequency under the rangewide evaluation of Factor A (see *Summary of Factors Affecting the Species Throughout its Range*), above, slight increases (*i.e.,* a few percent), over the next 100–200 years, in both the frequency and intensity of tropical storms are projected in the western Pacific (*e.g.,* Japanese Islands) (Vecchi and Soden 2007, pp. 1068–1069, Figures 2 and 3; Emanuel *et al.* 2008, p. 360, Figure 8; Yu *et al.* 2010, p. 1371, Figure 14). These projected increases are not expected to significantly affect black-footed albatrosses, which arrive at their nesting sites in mid- to late October and begin laying eggs in mid-November to mid-December. Tropical storm season in the western Pacific ends in early November, and the period of overlap between birds arriving at nesting sites and the end of the tropical storm season is likely only a few weeks. These adult birds can fly away to avoid tropical storms that may arrive after they return to the nesting areas, and although the population of black-footed albatrosses nesting in the Japanese Islands is relatively small, it is unlikely that multiple nesting sites would be impacted in a single storm season, given the geographic spread of the nesting sites on different islands used by the species. Furthermore, as the scale of increase in intensity or frequency of storms is relatively small over the timeframe of 100 to 200 years considered in these models, we anticipate the increase within the next 30 to 50 years to be relatively minimal. Therefore, while there may be some short-term impacts to black-footed albatross nesting success due to the potential overlap of bird arrivals at nesting sites at the end of the tropical storm season, as detailed in our rangewide assessment of *Climate Change and Storm Frequency* under Factor A, above (see *Summary of Factors Affecting the Species Throughout its Range*), we do not anticipate these impacts to significantly affect the Japanese Islands DPS.

Climate Change and Marine Productivity

We have evaluated the best available scientific and commercial information with regard to climate change and decreased marine productivity in response to climate change, and as detailed in our rangewide assessment of *Climate Change and Marine Productivity* under Factor A, above (see *Summary of Factors Affecting the Species Throughout its Range*), and we have no additional information specific to the Japanese Islands DPS of the black-footed albatross. Based on our assessment, we have no information at this time to suggest that possible predicted decreases in marine productivity pose a significant threat to the Japanese Islands DPS of the black-footed albatross.

Climate Change and Ambient Temperature

As detailed in our rangewide assessment of *Climate Change and Ambient Temperature* under Factor A, above (see *Summary of Factors Affecting the Species Throughout its Range*), our evaluation of the best scientific and commercial data available at this time does not suggest projected average ambient temperature increases pose a significant threat to the breeding population of black-footed albatrosses in the Japanese Islands, and we have no additional information unique to the Japanese Islands DPS. Therefore, based on our assessment, we have no information at this time to suggest that possible predicted increases in ambient temperature pose a significant threat to the Japanese Islands DPS of the black-footed albatross.

Summary of Factor A

Based on our assessment of the best scientific and commercial data available, as summarized here and detailed in our rangewide assessment of Factor A, above (*Summary of Factors Affecting the Species Throughout its Range*), we conclude that the Japanese Islands DPS of the black-footed albatross is not threatened by the present or threatened destruction, or modification, or curtailment of its habitat or range.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

We are not aware of any information indicating that overutilization of black-footed albatrosses for commercial, recreational, scientific, or educational purposes threaten the Japanese Islands DPS. Therefore, we conclude that overutilization for commercial, recreational, scientific, or for educational purposes is not a significant threat to the Japanese Islands DPS of the black-footed albatross.

Factor C. Disease or Predation

Disease

Our analysis of the potential threat posed by avian pox, avian cholera, west Nile Virus, and H5N1 is detailed under the section titled *Disease* in our rangewide assessment of Factor C, above. The principal form of avian pox transmission in wild birds is through the introduced mosquito, *Culex quinquefasciatus,* rather than through direct contact with a contaminated surface or aerosol (Warner 1968, p. 104; Arata *et al.* 2009, p. 20). We are unable to determine the extent and impact of avian pox on the black-footed albatross in the Japanese Islands DPS due to the lack of study and available information. However, based on the limited information available regarding this disease in black-footed albatrosses in the Hawaiian Islands, it is reasonable to assume that the prevalence of this disease in black-footed albatrosses in the Japanese Islands, if present, is low (since it has never been reported from these birds on these islands) and that infected individuals recover from the disease. Therefore, if avian pox is present in black-footed albatrosses in the Japanese Islands, the effect of the pox is expected to be minimal.

Diseases such as West Nile virus, avian cholera, and avian influenza have not been documented in north Pacific albatrosses. West Nile virus is a mosquito-borne disease that has had dramatic effects on birds in North America, though it has not been detected in the central Pacific. A thorough search of the literature indicated that the virulence of West Nile virus to black-footed albatrosses, or albatrosses of any species, has not been tested. As stated above, within the breeding range of black-footed albatrosses, mosquitoes currently are documented only on Midway Atoll and Lehua Island. For transmission to occur, either an infected bird has to reach a breeding island with mosquito populations, or a mosquito carrying the virus has to reach a breeding island. It is highly unlikely, however, that an infected bird or a mosquito from the Hawaiian Islands would travel to the Japanese Islands. We are unable to determine the extent and impact of West Nile virus on the black-footed albatross in the Japanese Islands due to the lack of study and available information, but there are no reports of west Nile virus in the northern Pacific albatrosses.

Avian cholera is a result of an infection by the bacterium *Patruella multocida* and usually occurs in large-scale outbreaks, most commonly in migratory waterfowl at staging areas when populations are concentrated (Botzler 1991, pp. 367–395; USGS 1999, p. 75). Avian cholera has not been detected in birds in the Hawaiian Islands, and reports of die-offs of wild birds in countries other than the United States and Canada are uncommon (USGS 1999, pp. 80–82). However, we are unable to determine the extent and impact of avian cholera on black-footed albatrosses in the Japanese Islands DPS due to the lack of study and available information, but reports of die-offs are not known.

Wild birds have been affected by the H5N1 highly pathogenic avian influenza since 2002 (Uchida *et al.* 2008, p. 1). The H5N1 avian influenza has been detected in wild birds (primarily waterfowl) on the main islands of Japan (Uchida *et al.* 2008, p. 2); however, H5N1 avian influenza has not been detected in wild birds on Torishima Island, the Ogasawara Islands, or the Senkaku Islands.

In summary, we have no evidence to suggest that diseases such as avian pox, west Nile virus, avian cholera, or H5N1 avian influenza pose a significant threat to the Japanese Islands DPS of the black-footed albatross. Therefore, based on our evaluation of the best scientific and commercial data available, we conclude that disease is not a significant threat to the black-footed albatross in the Japanese Islands DPS.

Predation

In the Japanese Islands DPS, rats are documented from Torishima Island and the Ogasawara Islands (Okochi *et al.* 2004, p. 1,466) and could occur on the Senkaku Islands, although recent survey information is not available. The Ogasawara Islands and Torishima Island together are home to approximately 5 percent of the rangewide breeding population and 98 percent of the Japanese Islands population, which has been documented to be increasing despite the presence of rats (Cousins and Cooper 2000, p. 23; Hasegawa 2010, pers. comm.). This suggests that rat predation is not a significant threat to black-footed albatrosses breeding on these islands.

Our analysis of the potential threat posed by shark predation is detailed under the section titled *Predation* in our rangewide assessment of Factor C, above. We have no additional information unique to the Japanese

Islands DPS of the black-footed albatross. Based on our evaluation, at present we have no evidence to suggest that shark predation poses a significant threat to the Japanese Islands DPS of the black-footed albatross.

In summary, based on our assessment of the best scientific and commercial data available, as summarized here and detailed in our rangewide assessment of Factor C, above (*Summary of Factors Affecting the Species Throughout its Range*), we conclude the Japanese Islands DPS of the black-footed albatross is not threatened by disease or predation.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

To determine if the DPS is threatened as a result of the inadequacy of existing regulatory mechanisms, we reviewed existing international and U.S. conventions, agreements, and laws for the specific protection of black-footed albatrosses or their marine and terrestrial habitats in the countries where they forage, migrate, and breed. In our comprehensive evaluation of Factor D under the rangewide threats assessment for the black-footed albatross, above (*Summary of Factors Affecting the Species Throughout its Range*), we discuss the protection status of the black-footed albatross and its marine and terrestrial habitat at international, national, and regional levels, followed by a discussion of international and national fisheries regulations that are designed to reduce and monitor seabird bycatch from fisheries operations, and specifically evaluate the threat posed to the Japanese Islands breeding population of the species.

Based on our review of the best available information, as detailed above under Factor D in the section *Summary of Factors Affecting the Species Throughout its Range,* we conclude that the Japanese Islands DPS of the black-footed albatross is not significantly threatened by the Hawaii-based shallow-set longline fishery, the Alaska-based demersal longline groundfish fishery, or the California, Oregon, and Washington groundfish, Pacific hake, and pelagic longline fisheries at this time or within the foreseeable future. We cannot definitively determine the extent and quantify the impact of other Alaska-based demersal longline fisheries; other (nonpelagic) longline fisheries based in California, Oregon, and Washington; coastal purse seine and troll fisheries based in the United States; Canadian-based longline fisheries; and longline fisheries based in Japan, Taiwan, China, Korea, Russia, and Mexico. We have no additional information unique to the Japanese Islands DPS of the black-footed albatross.

We are mindful of the potential impacts that these fisheries could have on the Japanese Islands DPS of the black-footed albatross. Furthermore, we acknowledge that many of the current protective agreements are voluntary in nature, and that bycatch mitigation measures may be lacking in international fleets. Although existing regulatory mechanisms could be strengthened and broadened in scope, at this time the present status of the black-footed albatross, with populations steadily increasing in the Japanese Islands (Figure 4, this document), indicates that the DPS is not endangered or threatened as a result of any inadequacy in regulatory mechanisms respecting fisheries bycatch.

Summary of Factor D

Based on our assessment of the best scientific and commercial data available, as summarized here and detailed in our rangewide assessment of Factor D, above (*Summary of Factors Affecting the Species Throughout its Range*), we conclude that the Japanese Islands DPS of the black-footed albatross is not threatened by the inadequacy of existing regulatory mechanisms to the extent that it is currently in danger of extinction.

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

In our discussion of Factor E under the rangewide threats assessment for the black-footed albatross, above (*Summary of Factors Affecting the Species Throughout its Range*), we detail our evaluation of the potential threat posed by several sources of contamination, including organochlorines (*e.g.,* polychlorinated biphenyls (PCBs), dichloro-diphenyl trichloroethane (DDT)), ingestion of plastics, and oil spills. We additionally evaluated the potential threat posed to the black-footed albatross by collisions with airplanes. Here we present only a brief summary of that evaluation and our conclusions as they pertain to the Japanese Islands DPS of the black-footed albatross, and incorporate by reference the underlying analysis of each of these threats.

Contaminants

As detailed under our evaluation of Factor E in the section *Summary of Factors Affecting the Species Throughout its Range,* above, we found studies indicating that organochlorine and heavy metal contaminants are present in high levels in black-footed albatrosses. In the Japanese Islands, levels of mercury in black-footed albatross eggs from Torishima Island were found to be higher than mercury levels documented for other seabirds and were higher than documented threshold levels for adverse effects in other bird species (Ikemoto *et al.* 2005, p. 892). However, no negative impacts on the birds at Torishima were observed. Lead levels in black-footed albatross chicks on Torishima Island were found to be below levels of lead-poisoned Laysan albatross chicks from Midway Atoll in the central Pacific, and no symptoms of lead poisoning, such as droop-wing syndrome, were observed in black-footed albatrosses (Ikemoto *et al.* 2005, p. 893).

Kunisue *et al.* (2006, entire) studied dioxins and related compounds in black-footed and short-tailed albatrosses from Torishima Island and the Senkaku Islands. They found concentrations of dioxins were greater in black-footed albatrosses than in short-tailed albatrosses, and toxic equivalents of the eggs of both albatross species exceeded the thresholds observed in some other species of wild birds (Kunisue *et al.* 2006, pp. 6920, 6925). Although they note that sensitivity for biochemical effects varies widely between species and the sensitivity of albatross for dioxin-like effects is not known, they also found some evidence of what they characterize as ‘‘potential dioxin-like alterations’’ in the black-footed albatross (Kunisue *et al.* 2006, p. 6925). Kunisue *et al.* (2006, p. 6925) suggested that toxic equivalents in black-footed albatross eggs on Torishima exceed the toxicity thresholds for some other avian embryos, but the sensitivity of black-footed albatrosses for dioxin-like toxic effects is not known, and embryo viability was not evaluated in this study.

In the Japanese Islands, populations of the black-footed albatross have been steadily increasing (Figure 4, this document) despite the high levels of lead, mercury, and dioxins and related compounds detected in eggs and chicks there, and no adverse effects have been observed. Therefore, we cannot conclude that these contaminants pose a significant threat to the species in the Japanese Islands, as we have no evidence that they are causing a decrease in the population.

Based on our evaluation of the best available scientific and commercial data, we conclude that organochlorides and heavy metals do not pose a significant threat to the Japanese Islands DPS.

Plastic Ingestion

Our evaluation of the threat posed by plastic ingestion is detailed in our rangewide assessment of Factor E, above (*Summary of Factors Affecting the Species Throughout its Range*). We have no data on plastic ingestion specific to black-footed albatrosses in the Japanese Islands DPS, but we have no reason to assume that the effects in Japan would be any different from those observed in other geographic areas; therefore, we based our evaluation on the best available information. Because we did not find evidence that plastic ingestion by black-footed albatrosses is a significant source of mortality or reduces body condition in the species, we cannot conclude that plastic ingestion is a significant threat to the Japanese Islands DPS of the black-footed albatross.

Oil Pollution

As detailed in our rangewide analysis of the black-footed albatross under Factor E, above (*Summary of Factors Affecting the Species Throughout its Range*), we do not consider oil spills to pose a significant threat to the Japanese Islands DPS, now or within the foreseeable future. We have no information indicating that oil drilling takes place near the breeding grounds of the Japanese Islands DPS of the black-footed albatross. Based on our assessment, we conclude that oil spills do not pose a significant threat to the Japanese Islands DPS of the black-footed albatross.

Collisions with Aircraft

We have no information to suggest that there are any runways or other air traffic close to any of the breeding sites utilized by black-footed albatross in the Japanese Islands DPS. Thus, we conclude that collisions with aircraft are not a significant threat to the Japanese Islands DPS of the black-footed albatross.

Summary of Factor E

We found studies indicating that organochlorine and heavy metal contaminants are present in high levels in black-footed albatrosses, but there is little research investigating the effects of these compounds on black-footed albatrosses. In the Japanese Islands, black-footed albatrosses on Torishima Island and in the Ogasawara Islands have been found to have levels of mercury and other contaminants that exceed the threshold for adverse effects in some other bird species, but the sensitivity level for black-footed albatrosses is not known, and no negative impacts were observed. The population of black-footed albatrosses has been steadily increasing in the Japanese Islands, thus contaminants do not appear to act as a limiting factor on this population. Therefore, we conclude that organochlorines and heavy metal contaminants are not significant threats to the Japanese Islands DPS of the black-footed albatross.

Like other seabirds, black-footed albatrosses ingest plastics while foraging and accidentally feed ingested plastics to their chicks. Investigations on the effects of plastic ingestion in black-footed albatrosses and Laysan albatrosses indicated that ingestion of plastics does not reduce body condition or survivorship in black-footed albatross chicks, nor is there any evidence that it is a direct source of mortality in black-footed albatrosses. Therefore, we conclude that plastic ingestion is not a significant threat to the Japanese Islands DPS of the black-footed albatross.

Potential impacts from contamination from oil spills and future oil development are not likely to be a threat to the species' nesting habitat in the Japanese Islands because we have no information to suggest that oil drilling or development is occurring or is likely to occur in this area. However, black-footed albatrosses forage over vast areas of the ocean and could possibly encounter oil anywhere and, therefore, are vulnerable, both individually and in small foraging groups, but likely not population-wide. Accordingly, we do not consider oil spill contamination to be a significant threat to the Japanese Islands DPS of the black-footed albatross.

As there is no air traffic in the areas used by black-footed albatrosses for nesting in the Japanese Islands DPS and we do not anticipate any in the future, we do not consider collisions with aircraft to pose a significant threat to this DPS.

Based on our assessment of the best scientific and commercial data available, as summarized here and detailed in our rangewide assessment of Factor E, above (*Summary of Factors Affecting the Species Throughout its Range*), we find that other natural or manmade factors do not significantly threaten the black-footed albatross in the Japanese Islands DPS.

Finding for the Japanese Islands DPS

We assessed the best available scientific and commercial information regarding the threats facing the Japanese Islands DPS of the black-footed albatross. We reviewed numerous information sources including literature cited in the petition, information in our files, and information submitted to us following our 90-day petition finding (72 FR 57278; October 9, 2007), and the second information solicitation period (74 FR 43092; August 26, 2009), and we consulted with recognized albatross experts and other Federal, State, and local resource agencies related to potential threats to the black-footed albatross and its marine and terrestrial habitat. Such potential threats include: historical habitat modification; effects from climate change, including sea level rise, changes in tropical storm frequency and intensity, changes in marine productivity, and increases in ambient temperature; overutilization; disease and predation; bycatch in fisheries; contamination by PCBs and other pollutants; plastic ingestion; oil spills; and collisions with aircraft. To determine whether these risk factors individually or collectively put the Japanese Islands DPS in danger of extinction throughout its range, or are likely to do so within the foreseeable future, we first considered whether the factors were causing a population decline, or were likely to do so in the future.

We subjected all potential threats to the black-footed albatross to a comprehensive assessment under our rangewide evaluation of the species, above, in the section titled *Summary of Threats Affecting the Species Throughout its Range.* Since the species throughout its range is composed collectively of only two breeding populations, that in the Hawaiian Islands and that in the Japanese Islands, our rangewide assessment included a full evaluation of the threats to each of these two breeding populations as well. To avoid repetition in our assessment of the Japanese Islands DPS, we incorporate by reference the detailed threats assessments conducted under the rangewide analysis, above, and we present here only our conclusions for each of those threats specific to the Japanese Islands DPS of the black-footed albatross.

On the basis of our status review, and as summarized above under our evaluation of each listing factor, we conclude that the listing of the Japanese Islands DPS of the black-footed albatross is not warranted at this time. Our standard for determining whether listing is warranted is whether a species (including a DPS) is presently in danger of extinction throughout all or a significant portion of its range (endangered) or is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (threatened). We acknowledge that the black-footed albatross faces a variety of threats, and that some of these threats have had significant impacts on the species in the past. However, our status review indicates that the black-footed albatross population in the Japanese Islands has been steadily increasing over time and shows no sign of a decline (Cousins and Cooper 2000, p. 23; Figure 4, this document). Therefore, at this time our evaluation of the best available scientific and commercial data does not suggest that the threats acting on the species, either singly or in combination, are currently of such severity or magnitude as to place the Japanese Islands DPS in danger of extinction at the present time or within the foreseeable future.

Significant Portion of the Range

Having determined that the black-footed albatross is not in danger of extinction or likely to become so within the foreseeable future throughout all of its range, in the Hawaiian Islands DPS, or in the Japanese Islands DPS, we next consider whether there are any significant portions of the range where the black-footed albatross is in danger of extinction or is likely to become endangered in the foreseeable future.

In determining whether a species is threatened or endangered in a significant portion of its range, we first identify any portions of the range of the species that warrant further consideration. The range of a species can theoretically be divided into portions in an infinite number of ways. However, there is no purpose to analyzing portions of the range that are not reasonably likely to be significant and threatened or endangered. To identify only those portions that warrant further consideration, we determine whether there is substantial information indicating that: (1) The portions may be significant, and (2) the species may be in danger of extinction there or likely to become so within the foreseeable future. In practice, a key part of this analysis is whether the threats are geographically concentrated in some way. If the threats to the species are essentially uniform throughout its range, no portion is likely to warrant further consideration. Moreover, if any concentration of threats applies only to portions of the species' range that clearly would not meet a biologically based definition of significant, such portions will not warrant further consideration.

If we identify portions that warrant further consideration, we then determine their status (*i.e.,* whether in fact the species is endangered or threatened in a significant portion of its range). Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address either the ''significant'' question first, or the status question first. Thus, if we determine that a portion of the range is not ''significant,'' we do not need to determine whether the species is endangered or threatened there; if we determine that the species is not endangered or threatened in a portion of its range, we do not need to determine if that portion is ''significant.''

Applying the process described above for determining whether a species is threatened in a significant portion of its range, we considered the status question first to determine if any threats or potential threats acting individually or collectively threaten or endanger the species in a portion of its range. In analyzing the status of the black-footed albatross across its range, the only area we identified where threats may be concentrated is the breeding colony on Laysan Island. Of all of the larger breeding colonies (the 2010 count on Laysan indicated 22,272 breeding pairs of black-footed albatross), only the colony on Laysan currently exhibits a negative population trend, although the specific factors contributing to this observed negative trend have not been identified. We therefore considered whether the threats to the breeding colony on Laysan are such that the species may be in danger of extinction there, now or within the foreseeable future, such that Laysan Island may warrant further consideration as a potential significant portion of the range.

Although projections are that the global population is relatively secure under current conditions, the decline in the breeding colony at Laysan Island is of potential concern. We therefore, considered the likely future condition of the colony on Laysan Island under the presently observed rates of population decrease. The trend on Laysan is reported as decreasing by 1.1 percent a year by ACAP (2010, p. 7), and at an average rate of 1.3 percent a year by Arata *et al.* (2009, p. 41; CI–0.017 to –0.0009). There is some variation around this trend, however; for example, between 2009 and 2010 the number of nesting black-footed albatrosses on Laysan actually increased by over 3,000 pairs, from 19,088 to 22,272 (Flint 2011a, pers. comm.). Using a simple deterministic population model, we determined that, under the worst-case scenario of decline at a rate of 1.7 percent a year (the outer bound of the confidence limits yielded by the models of Arata *et al.* (2009, p. 41), in 50 years, nearly 9,500 breeding pairs of black-footed albatross would remain on Laysan Island, and in 100 years there would still be an estimated 3,850 pairs (USFWS 2011, unpublished data), assuming no changes in other conditions. We recognize that a more sophisticated population model capable of incorporating stochasticity and changes in potential future conditions would be preferable, however, such a model is not available to us at this time. Therefore, we consider this to be the best information available to us for the purposes of the present determination. Furthermore, we acknowledge that such a continued decline is by no means a desired condition for conservation; however, for the purposes of the Act, it does indicate that the population on Laysan Island is not likely to become in danger of extinction within the foreseeable future. In addition, we considered that Laysan Island is one of the breeding colonies that is least vulnerable to the effects of climate change. According to the study of Baker *et al.* 2006 (p. 7), the projected rise in sea levels by the year 2100 will likely result in a loss of only 5 percent of the terrestrial area of Lisianki, which is considered similar in size and elevation to Laysan. Baker *et al.* (2006, p. 7) suggest that Laysan Island may persist largely intact well into the next century, and that seabirds using this island for nesting will likely suffer relatively marginal losses due to sea level rise during this time. As the best available information indicates that the breeding colony of black-footed albatross on Laysan Island is not likely to become in danger of extinction within the foreseeable future, we conclude that Laysan Island does not warrant further consideration as a potential significant portion of the range at this point in time. We did not identify any other potential significant portions of the range of the black-footed albatross that may be threatened or endangered.

In *Defenders of Wildlife* v. *Norton,* 258 F.3d 1136, 1145 (9th Cir. 2001), the court ruled that a species may be endangered in a significant portion of its range ''if there are major geographical areas in which it is no longer viable but once was.'' Where the area in which the species is expected to survive is ''much smaller than its historical range,'' the determination of whether the species warrants listing turns on whether the lost portion of the range would be significant. The best available information indicates that the black-footed albatross was extirpated from four small islands or atolls where it historically nested near the turn of the 20th century (Table 1), that it continues to persist in viable nesting populations throughout the vast majority of its known historical range, and that the species even appears to be in the process of actively expanding its current nesting range to islands in the eastern Pacific. We conclude that the portion of the range in which the species remains and is expected to persist is comparable to the extent of its historical range and has not been significantly diminished. Therefore, we have determined that the black-footed albatross is not endangered or threatened in a significant portion of its range rangewide, in the Hawaiian Islands DPS, or in the Japanese Islands DPS.

Conclusion of 12-Month Finding

Our review of the information pertaining to the five factors does not support the assertion that there are significant threats acting on the species or its habitat that rise to the level of causing the black-footed albatross to be in danger of extinction or likely to become so in the foreseeable future, throughout all or a significant portion of its range. Although the black-footed albatross faced significant threats in the past, today all indications are that the black-footed albatross population is stable or even slightly increasing rangewide, in the Hawaiian Islands, and in the Japanese Islands, and we have no information indicating this status is likely to change within the foreseeable future. Therefore, listing the black-footed albatross as threatened or endangered under the Act is not warranted at this time.

We request that the public submit any new information concerning the status of, or threats to, the black-footed albatross to our Pacific Islands Fish and Wildlife Office (see **ADDRESSES**) whenever it becomes available. New information will help us monitor the black-footed albatross and encourage its conservation. If an emergency situation develops for the black-footed albatross, or any other species, we will act to provide immediate protection.

References Cited

A complete list of all references cited herein is available on the Internet at *http://www.regulations.gov* and upon request from the Pacific Islands Fish and Wildlife Office (see **ADDRESSES**).

Authors

The primary authors of this notice are staff members of the Pacific Islands Fish and Wildlife Office (see **FOR FURTHER INFORMATION CONTACT**).

Authority

The authority for this section is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: September 23, 2011.

Gregory E. Siekaniec,

Acting Director, Fish and Wildlife Service.

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