



Photo: David Leonard, USFWS

Seabirds

Mōlī or Laysan albatross

Phoebastria immutabilis

SPECIES STATUS:

State Recognized as Indigenous, NatureServe
Heritage Rank G3 – Vulnerable, IUCN Red List
Ranking – Near Threatened, Regional Seabird
Conservation Plan – USFWS 2005, Bird of
Conservation Concern - USFWS 2021

SPECIES INFORMATION: The mōlī or Laysan albatross is a large, abundant seabird (Family: Diomedidae) whose breeding range is centered in Hawai‘i. Adults are mostly white except for black wings and tail; upperwings entirely dark, underwings mostly white with variable amounts of black especially along leading and trailing edges. Bill is pink with gray, hooked tip; legs and feet are light pink. Like all albatrosses, mōlī are accomplished fliers using dynamic soaring to cover great distances. They mainly feed at night and often far from breeding colony (e.g., 1,770 kilometers [1,100 miles]). Mōlī often feed with conspecifics, but rarely with other species, and similar to other albatross, seizes prey from the surface while sitting on the water. Scavenges from carrion and follows fishing boats, but not as frequently as ka‘upu or black-footed albatross (*P. nigripes*). In Hawai‘i, diet consists primarily of squid, as well as deep-water crustaceans, fish and flyingfish eggs. Like most seabirds, mōlī nest in colonies, have long-term pair bonds and high site fidelity, lay only one egg per season, and both parents participate in all aspects of raising young. Pairs engage in long, noisy, ritualized courtship dances. They typically select nest site closer to vegetation than ka‘upu, and nest varies from a scrape to a ring-like structure comprising sand, vegetation, and debris. In Hawai‘i, eggs are laid between November and December and chicks fledge in July, and no post-fledgling care is provided by parents. Young birds do not return to land until their third year after fledging. These birds do not breed, but dance, build nests, and prospect for mates. Birds first breed between five and eight years of age, and the oldest known individual was at least 71 years old.

DISTRIBUTION: Nests throughout the Northwestern Hawaiian Islands (NWHI) and on the Main Hawaiian Islands (MHI) of Kaua‘i and O‘ahu and Lehua Island off Ni‘ihau. Outside of Hawai‘i, they nest on islands off Japan and Mexico. At sea, mōlī occur widely throughout the north Pacific Ocean.

ABUNDANCE: The worldwide population is estimated at 590,000 breeding pairs, and more than 99 percent of them nest in the NWHI; most are on Midway Atoll (441,000 pairs) and Laysan Island (145,000 pairs). Small numbers nest in the MHI (500 pairs), on islands near Japan (20 pairs), and off western Mexico (400 pairs).

LOCATION AND CONDITION OF KEY HABITAT: Most nesting occurs in flat open areas on

low-lying coral and sand islands, but they also nest in steep rocky areas on high volcanic island such as Nihoa and Lehua. A majority of the world's mōlī nest within the North West Hawaiian Islands and Midway Atoll National Wildlife Refuge (NWR). Two of the largest breeding colonies on the MHI occur in the Kīlauea Point NWR on Kauaʻi and the Kaʻena Point Natural Area Reserve on Oʻahu. Predators are controlled at both these sites. Nesting attempts are discouraged (e.g., eggs are removed) at several military bases in the MHI to reduce collisions with aircraft. At-sea, they occur over the open ocean.

THREATS:

- Human disturbance and conflict: Historically, hunters decimated populations for the millinery trade. Populations extirpated from Johnston, Wake, and Marcus islands by Japanese feather hunters at the turn of the last century are only recently being re-colonized. Occupation of Pacific islands by military during World War II also took a heavy toll on this species. For example, during the 1950s and 1960s tens of thousands were killed at Midway to reduce collisions with aircraft. In 1909, 300,000 birds were killed on Laysan Island. Currently, human disturbance to breeding colonies on Oʻahu and Kauaʻi are a threat, and eggs are removed each year at the U.S. Navy Pacific Missile Range Facility to reduce the risk of aircraft collisions.
- Fisheries bycatch: One of the most serious threats to albatross, thousands were killed annually as bycatch in drift net fisheries prior to their ban in 1993. U.S. longline fisheries once killed thousands annually, but this form of bycatch has been greatly reduced in the last 10-20 years. However, bycatch from Japanese and Taiwanese fleets that operate in the north Pacific Ocean remains a significant threat to the albatross.
- Introduced predators: Like all seabirds, adults and nests on the MHI are susceptible to predation by introduced mammals including pigs (*Sus scrofa*), rats (*Rattus* spp.), dogs (*Canis familiaris*), feral cats (*Felis silvestris*), and the small Indian mongoose (*Herpestes auropunctatus*). At certain times mice have been documented predating incubating mōlī on Midway Atoll.
- Invasive species: Non-native plants, specifically golden crown-beard (*Verbesina encelioides*), degrades nesting habitat and may limit nesting density, reduce productivity, and provide habitat for mosquitoes that carry avian pox. Introduced big-headed ants (*Pheidole megacephala*) at Holaniku (Kure) may facilitate the destruction of native vegetation by a non-native scale insect.
- Contaminants: At Midway Island, lead contaminated paint chips and soil is ingested by chicks, which causes lead poisoning and mortality. Organochlorine and mercury contamination, and oil spills are also potential threats to this wide-ranging species.
- Marine pollution: Adults ingest plastic debris, then feed it to their chicks, resulting in harm or mortality of chicks.
- Collisions: At Midway, albatrosses collide with buildings, lights, antenna wires, and other human-made structures. In 1964 alone, 3,000 albatrosses were killed by colliding with communication antennas on Midway.
- Climate change: Nesting colonies on low-lying atolls are vulnerable to sea level rise, and increased storms and wave events associated with climate change.
- Disease: Diseases like avian influenza may impact albatross and other seabird species. Avian pox is also recorded in mōlī and has the potential to influence adult and chick

survival.

CONSERVATION ACTIONS: Actions specific to mōlī should include the following:

- Continue predator control and eradication at MHI colonies.
- Continue non-native vegetation control at Midway, Pearl and Hermes, and Kure Atoll.
- Continue lead remediation on contaminated soil and structures on Midway Island.
- Continue protection and management of wildlife sanctuaries and refuges.
- Continue egg swap project on Kaua‘i, in which eggs removed from the U.S. Navy Pacific Missile Range Facility are placed with foster parents (whose eggs are not viable) at other suitable locations. Continue efforts to reduce fisheries bycatch throughout the north Pacific Ocean.
- Conduct public education awareness programs about the hazards of plastics and other types of marine pollution, and their effects on seabirds and the ocean.
- Develop social attraction and potential translocation colonies on the higher MHI.
- Conduct outreach campaigns to increase the awareness of the general public on protecting the nesting albatrosses in residential areas from predation by cats, dogs, and other introduced species.

MONITORING: Continue annual censuses of breeding colonies and design and implement a population monitoring program that will allow the estimation of age-specific survival rates.

RESEARCH PRIORITIES:

- Continue monitoring all Hawaiian breeding colonies to collect demographic data, inform management decisions, and measure efficacy of conservation actions.
- Estimate annual mortality from albatross bycatch in U.S. and foreign fisheries and use demographic models to determine the effect of this mortality on population. Continue research and development of techniques and gear to minimize bycatch.
- Explore ways to reduce impacts of climate change and soil erosion on low-lying breeding colonies in the NWHI.
- Evaluate plastic loads in albatross chicks on Midway Island and other nesting locations. Understand the impacts of diseases such as avian pox and flu on the species

References:

- Hawai‘i Natural Heritage Program [Hawai‘i Biodiversity and Mapping Program]. 2004. Natural diversity database. University of Hawai‘i, Center for Conservation Research and Training. Honolulu, Hawai‘i.
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- U.S. Fish and Wildlife Service. 2005. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region. Portland Oregon.
- VanderWerf, EA. 2012. Hawaiian Bird Conservation Action Plan. Pacific Rim Conservation, Honolulu, Hawai‘i.
- Whittow GC. 1993. Laysan albatross (*Diomedea immutabilis*). In *The Birds of North America*, No. 66 (Poole A,

Gill F, editors.). Philadelphia: The Academy of Natural Sciences; Washington DC: The American Ornithologists' Union.



Seabirds

Ka'upu or Black-footed albatross

Phoebastria nigripes

SPECIES STATUS:

State Recognized as Indigenous,
NatureServe Heritage Rank G5 –
Apparently Secure, IUCN Red List Ranking
– Near Threatened, Regional Seabird
Conservation Plan – USFWS 200
Bird of Conservation Concern - USFWS
2021

SPECIES INFORMATION: The ka'upu or black-footed albatross is the smallest albatross (Family: Diomedidae) in Hawai'i. Adults are entirely black except for a narrow whitish area at the base of the bill and another under the eyes; 10 percent of the individuals also have a white rump and undertail coverts. Like all albatross, ka'upu use dynamic soaring to cover great distances. They feed from the surface by seizing prey while sitting on the water, and will "tip-up" like ducks, using their well-developed olfactory sense to locate food. Ka'upu form long-term pair bonds and exhibit high nest site fidelity, and do not breed every year. Nesting occurs in large colonies, and nests are placed in scooped out hollows on open, sandy beaches or dunes. Pairs engage in noisy, ritualized courtship dances. A single egg is laid in November and chicks fledge in June and July. Both male and female incubate egg, and brood and feed young. Young birds do not return to land until their third year after fledging. These birds do not breed, but dance, build nests, and prospect for mates. Age at first breeding is at least five years old. The oldest-known black-footed albatross was at least 43 years old.

DISTRIBUTION: Nests on all the Northwestern Hawaiian Islands (NWHI), and on Lehua Island off Ni'ihau in the Main Hawaiian Islands (MHI). Between 2017-2021, a translocation project brought albatross chicks from the NWHI to the James Campbell National Wildlife Refuge on Oahu to create new protected breeding colonies safe from climate change. Outside of Hawai'i, there are a few small nesting colonies off Japan and western Mexico. Historically, nesting occurred on several islands in the central and south Pacific, but no evidence of historical nesting on MHI. At sea, they occur widely throughout the north Pacific Ocean.

ABUNDANCE: The worldwide population is estimated at 60,000 pairs, more than 95 percent of which nest in the Hawaiian Islands. Majority of the Hawaiian population nests on Laysan (19,000 pairs) and Midway (25,000 pairs) Islands in the NWHI.

LOCATION AND CONDITION OF KEY HABITAT: Nesting colonies occur on low coral and sand islands. These birds use open sandy beaches or dunes for nest sites, or occasionally nest

among vegetation. At sea, they occur over the open ocean.

THREATS:

- Historical human disturbance: Hunters decimated populations for the millinery trade. Military activities at nesting islands also took a heavy toll on this species; for example, tens of thousands were killed at Midway Island during the 1950s and 1960s to reduce collisions with aircraft.
- Fishery bycatch: Bycatch is one of the most serious threats to albatross; thousands were killed annually as bycatch in drift net fisheries prior to their ban in 1993, and in U.S. longline fisheries: Bycatch has been greatly reduced in the last 10–20 years by U.S. fisheries; however, bycatch from Japanese and Taiwanese fleets in the north Pacific Ocean remains a significant threat.
- Invasive species: Non-native plants, specifically golden crown-beard, degrades nesting habitat and may limit nesting and reduce productivity.
- Marine pollution: Adults ingest plastic debris, then feed it to their chicks, resulting in harm or mortality of chicks.
- Contaminants: Organochlorine levels high enough to result in eggshell thinning and embryonic defects have been detected in ka‘upu. Oil spills are also a threat.
- Climate change: Nesting colonies on open sandy areas near the shoreline are vulnerable to sea level rise and increased storms and wave events associated with climate change.
- Disease: Diseases like avian influenza may impact albatross and other seabird species.

CONSERVATION ACTIONS: Actions specific to conservation of ka‘upu should include the following:

- Continue protection and management of nesting colonies.
- Control and eradicate non-native predators at nesting colonies.
- Reduce fisheries bycatch throughout the north Pacific Ocean.
- Conduct public education programs about the hazards of plastics and marine pollution for seabirds and the ocean.
- Establish new colonies on high islands that are less vulnerable to climate change.

MONITORING: Monitor all Hawaiian nesting colonies to collect demographic data, inform management decisions, and measure efficacy of conservation actions.

RESEARCH PRIORITIES:

- Estimate annual mortality from albatross bycatch in U.S. and foreign fisheries and model the effect of this mortality on population. Continue research and development of techniques and gear to minimize bycatch.
- Investigate methods to reduce impacts of climate change and soil erosion on low-lying colonies.
- Understand impacts of disease such as avian pox and flu on the species.

References:

IUCN Red List of Threatened Species. Version 2014.3. www.iucnredlist.org. (Accessed May 2015).

- NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, VI. Available at: <http://explorer.natureserve.org>. (Accessed May 2015).
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Seabirds



Photo: Eric VanderWerf

Koa'e kea or White-tailed Tropicbird

Phaethon lepturus

SPECIES STATUS:

State recognized as Indigenous, NatureServe Heritage
Ranking G5 – Secure, North American Waterbird
Conservation Plan – High concern, Regional Seabird
Conservation Plan - USFWS 2005

SPECIES INFORMATION: The koa'e kea or white-tailed tropicbird is a showy, white seabird (Family: Phaethontidae), related to boobies and frigatebirds. Six koa'e kea (white-tailed tropicbird) subspecies are recognized; only one (*P. l. dorothea*) breeds in Hawai'i. Adult male and females are mostly white, although sometimes with pale pinkish wash, except for a narrow black eye patch, black streak on upper wings, and black on the leading edge of the outer primaries; both sexes have long, narrow, white central tail feathers. Large yellow-green bill; legs and feet are very small. Flight is characterized by rapid wing beats, interspersed with brief periods of gliding. Koa'e kea (white-tailed tropicbird) usually forage alone, but occasional with conspecifics, most often far from land; often will follow ships. Koa'e kea (white-tailed tropicbird) captures prey by plunge diving from 15 to 20 meters (50 – 65 feet) above the water. Diet is poorly known, but includes flyingfish and is likely similar to koa'e ula or red-tailed tropicbird (*P. rubricauda*). Koa'e kea (white-tailed tropicbird) breed in colonies and pairs remain together for years. At the beginning of the breeding season, pairs engage in complex aerial displays. Nests are placed in hard to reach locations on cliffs as well as in caves and tree hollows; nests have little if any material. In Hawai'i, breeding occurs March through October and a single egg is laid per season. Both parents incubate the egg, and brood and fed the chick. No post-fledging care is provided. Based on few data, age at first breeding is likely after fourth year; no data on longevity.

DISTRIBUTION: Koa'e kea (white-tailed tropicbird) breed on Midway Atoll and in the MHI at the following locations: Waimea Canyon, Kīlauea Point National Wildlife Refuge, and the Nā Pali Coast on Kaua'i; Pelekunu Valley, Waikolu, and windward sea cliffs on Moloka'i; Kaholo Pali, Maunalei Gulch, Hauola Gulch on Lāna'i; Alau Islet, Moku Mana, & gulch walls windward and leeward on Maui; Kīlauea Crater, Manukā, Kainaliu and windward coast on the island of Hawai'i, and the offshore islet Mokoli'i. A few pairs nest on southeastern O'ahu. Outside of Hawai'i, koa'e kea (white-tailed tropicbird) breed on oceanic islands throughout the Atlantic, Indian, and Pacific oceans as well as the Caribbean. Outside the breeding season, adults are solitary and pelagic, and their range is poorly known.

ABUNDANCE: In Hawai'i, population is estimated at 1,800 breeding pairs with most occurring in the MHI. The worldwide population is estimated at less than 200,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Koa'e kea (white-tailed tropicbird) breeds mainly on oceanic islands. Frequently nests in inaccessible crevices or ledges on cliff walls, outside of Hawai'i the species is known to nest in a variety of sites including caves, tree hollows, and in closed-canopy rain forests. **Marine:** Pelagic and nearshore.

THREATS:

- Introduced predators: Like all seabirds, adults and nests susceptible to predation by rats (*Rattus* spp.), mongoose (*Herpestes auropunctatus*) and feral cats (*Felis silvestris*).

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of koa'e kea (white-tailed tropicbird) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Continued protection and management of existing wildlife sanctuaries and refuges.

MONITORING: Targeted surveys of population and distribution in known and likely habitats are needed.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to koa'e kea (white-tailed tropicbird) include the following:

- Conduct long-term demographic studies to determine population trends, philopatry to nest colonies and nest sites, survival rates, and reproductive success.
- Develop and implement survey protocols to assess population abundance, status and monitor trends.
- Understand foraging and at-sea behaviors through telemetry studies.

References:

- Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.
- Lee DS, Walsh-McGehee M. 1998. White-tailed tropicbird (*Phaeton lepturus*). In The Birds of North America, No. 353 (Poole A, Gill F, editors.). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.
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Photo: DOFAW

Seabirds

Koa'e 'ula or Red-tailed Tropicbird

Phaethon rubricauda

SPECIES STATUS:

State recognized as Indigenous,
NatureServe Heritage Ranking G4/G5
–Apparently secure/Secure, North
American Waterbird Conservation
Plan -Moderate concern, Regional
Seabird Conservation Plan - USFWS
2005 Bird of Conservation Concern -
USFWS 2021

SPECIES INFORMATION: The koa'e 'ula or red-tailed tropicbird is a showy, white seabird (Family: Phaethontidae) related to boobies and frigatebirds. Four koa'e 'ula (red-tailed tropicbird) subspecies are recognized, and one (*P. r. roseotincta*) breeds in Hawai'i. Adult males and females are mostly white, although sometimes with pale pinkish wash, except for partial black eye ring and short eye line, black flanks, and black shafts of outer primaries; both sexes have long, narrow, tail feathers with red shafts. Large reddish orange bill with black tip; legs and feet are very small. Flight is characterized by strong flapping interspersed with gliding; koa'e 'ula (red-tailed tropicbird) are capable of flying long distances. Koa'e 'ula (red-tailed tropicbird) usually forage alone, but occasional with other species, most often far from land; often will follow ships. Koa'e 'ula (red-tailed tropicbird) captures prey by plunge diving. In Hawai'i, diet is mainly comprised of flyingfish, but also takes squid, mackerel scads, dolphinfish, truncated sunfish, and ballonfish. Koa'e 'ula (red-tailed tropicbird) breed in colonies and pairs remain together for years. At the beginning of the breeding season, pairs engage in complex aerial displays. Nests are placed on the ground, and generally are a simple scrape lined with some vegetation. In Hawai'i, breeding can occur throughout the year, but most nests are active between February and June. A single egg is laid per season, and both parents incubate the egg, and brood and feed the chick. No post-fledgling care is provided. Age at first breeding is between two and four years, and the oldest known individual was 23 years old.

DISTRIBUTION: Koa'e 'ula (red-tailed tropicbird) breed throughout the NWHI and at a limited number of sites on MHI such as Molokai, Maui, Lāna'i, O'ahu and Hawai'i Island, mostly on coastal areas, offshore islets and sea cliffs, such as Lehua and Moku'ae'ae on Kaua'i and sea cliffs, but possibly on Ni'ihau, Ka'ula, and Kaho'olawe. Outside of Hawai'i, koa'e 'ula (red-tailed tropicbird) breed on oceanic islands in the Indian and Pacific oceans. Outside the breeding season, adults are solitary and pelagic, and their range is poorly known.

ABUNDANCE: In Hawai‘i, population is estimated at between 9,000 and 12,000 breeding pairs, with the largest populations occurring on Midway Atoll and Laysan. The worldwide population is estimated at 17,000 to 21,000 breeding pairs, with the majority residing in the Pacific Ocean.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Koa‘e ‘ula (red-tailed tropicbird) breed mainly on oceanic islands and coral atolls with shrubs, including beach magnolia (*Scaevola sericea*) and beach heliotrope (*Tournefortia argentea*). Koa‘e ‘ula (red-tailed tropicbird) nest on the ground, generally in inconspicuous places such as under vegetation or in cliff crevices. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests susceptible to predation by rats (*Rattus* spp.), mongoose (*Herpestes auropunctatus*) and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Breeding habitat loss: On Lehua, Koa‘e ‘ula mainly nests in shallow caves on rocky ledges, and the old known and currently unoccupied nest sites are apparently taken over by invasive grass species, forming thick cover in front of the nest. As the species is known to nest in vegetated islands, more research is needed to quantify the impact of introduced plants on nest occupancy and abundance.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of koa‘e ‘ula (red-tailed tropicbird) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Continued protection and management of existing wildlife sanctuaries and refuges.
- Eradication and control of introduced predators (and plants if impacting nesting sites) at current and potential breeding colonies.

MONITORING: Targeted surveys of population and distribution in known and likely habitats are needed.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to koa‘e ‘ula (red-tailed tropicbird) include the following:

- Conduct long-term demographic studies to determine population trends, survival rates, and reproductive success.
- Develop and implement survey protocols to assess population abundance, status and

monitor trends.

- Understand at-sea distribution and behavior through telemetry studies.

References:

- Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.
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Seabirds

‘Ou or Bulwer’s Petrel

Bulweria bulwerii

SPECIES STATUS:

State recognized as Indigenous, NatureServe
Heritage Rank G4 -Apparently secure, North
American Waterbird Conservation Plan -
Moderate concern. Regional Seabird
Conservation Plan - USFWS 2005, Bird of
Conservation Concern - USFWS 2021

SPECIES INFORMATION: The ‘ou or Bulwer’s petrel is a highly pelagic, nocturnal gadfly petrel (Family: Procellariidae) with a pantropical distribution. Individuals have long pointed wings, a long-pointed tail, a black bill and pale short legs. Adult males and females are overall sooty brown, with a pale bar across the proximal half of upper wings. Flight is buoyant and erratic; individuals fly low over the water using short wing beats followed by glides. ‘Ou (Bulwer’s petrel) forage alone. Foraging behavior is poorly known as is diet. Likely takes prey at surface by dipping on the wing or seizing while sitting on the water. Diet includes fish and squid, but also crustaceans and sea-striders. ‘Ou (Bulwer’s petrel) form long-term pair bonds and breed in large colonies. Limited data suggests they return to their natal colonies to breed and pairs return to the same nest site year after year. Nest is placed in a variety of hollows or crevices. Nests have a strong musky odor and may be nothing more than the cavity floor or may be lined with feathers, vegetation, or rubble. In Hawai‘i, eggs are laid from mid-May to mid-June and most nestlings fledge by early October. Both parents incubate the egg, and brood and feed the chick. Age at first breeding is six years, and the oldest known individual was 24 years old.

DISTRIBUTION: ‘Ou (Bulwer’s petrel) breed throughout the NWHI and on offshore islets of the MHI, including Hulu, Kaeoi, Kāohikaipu, Kapapa, Ka‘ula, Lehua, Mānana, Moke‘ehia, Mōkōlea Rock, Moku Lua, Moku Manu, Mokuho‘oniki, Molokini, Mokapu, Moku‘ae‘ae and Popoi‘a. ‘Ou have laid eggs in artificial burrows in the seabird exclosures at Makamaka‘ole on Maui, and ‘ou have been documented calling at ~2500 feet on windward Maui at Honomanu. Every fall fledging chicks are recovered in the water at the base of the sea cliffs of leeward Lāna‘i. Outside of Hawai‘i, ‘ou (Bulwer’s petrel) breed on a limited number of islands in the North Atlantic, North and South Pacific, and Indian Ocean. Non-breeding season range is poorly known, but have been observed dispersing to the southeast after breeding.

ABUNDANCE: In Hawai‘i, the population is estimated at between 75,000 and 103,000 breeding pairs on the NWHI and between 500 and 1,000 pairs on MHI. Largest colony on Nihoa (75,000 to 100,000 pairs); which supports the world’s largest known breeding colony. Smaller colonies are found on Laysan (1,000 - 2,000 pairs), French Frigate Shoals (200 - 500 pairs), and Necker (250 - 500 pairs). Prior to the introduction of rats (*Rattus* spp.) to Midway, ‘ou (Bulwer’s petrel)

were abundant. The worldwide population is unknown.

LOCATION AND CONDITION OF KEY HABITAT: **Terrestrial:** ‘Ou (Bulwer’s petrel) breed on rocky islets and atolls, nesting in rock crevices, rock or coral rubble, under vegetation, and man-made nest structures. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests susceptible to predation by rats, mongoose (*Herpestes auropunctatus*) and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats. Recent eradication of rats from Midway and Kure should allow re-establishment of breeding colonies. Barn Owls (*Tyto furcata*) are the main predator for the species on rat-free Lehua and Moku‘ae‘ae Islets. Although a native species, the Hawaiian Short-eared Owl (*Asio flammeus sandwichensis*) is also documented depredating ‘ou on Moku‘ae‘ae.
- Invasive species. Introduced big-headed ants (*Pheidole megacephala*) have been observed killing piping chicks.
- Catastrophic events: Given that a large portion of the world’s population breeds on Nihoa, a single catastrophic event (e.g., hurricane) could decimate the species.
- Collisions: Disorientation due to artificial lighting increases vulnerability to collisions with man-made structures.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of ‘ou (Bulwer’s petrel) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Facilitate the re-colonization of islands in MHI to reduce the species’ vulnerability to catastrophes.
- Continued protection and management of existing wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to ‘ou (Bulwer’s petrel) include the following:

- Baseline research on this species is needed as most aspects of its biology are poorly known.
- Determine effects of spectral content of night lighting on seabird distraction
- Design and implement survey protocols to understand the demography, trends,

and connectivity of ‘ou populations across the Hawaiian Islands

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Photo: Rachel Seabury, USFWS

Seabirds

Bonin Petrel

Pterodroma hypoleuca

SPECIES STATUS:

State recognized as Indigenous, North American
Waterbird Conservation Plan –Moderate concern,
Regional Seabird Conservation Plan - USFWS 2005
Bird of Conservation Concern - USFWS 2021

SPECIES INFORMATION: The Bonin petrel is a small, nocturnal gadfly petrel (Family: Procellariidae) which breeds further north than any of its Pacific relatives. Like many pelagic seabirds, Bonin petrels mostly have dark upper parts and light underparts and the sexes are similar in appearance. Flight is fast, and compared to other petrels, the species is very maneuverable. Bonin petrels generally forage far offshore, and feed by seizing prey while sitting on the water or while hovering. Usually forages alone, but may join mixed species flocks. Unlike most of its congeners, Bonin petrels feed mostly on fish, primarily lantern fishes (Myctophidae) and hatchetfishes (Sternoptychidae), although squid (Ommastrephidae) also are important. Bonin petrels are winter breeders, and interestingly, the only other gadfly petrel that breeds in Hawai‘i (i.e., ‘ua‘u or Hawaiian petrel [*P. phaeopygia*]) nests in the summer. Like most seabirds, Bonin petrels breed in their natal colonies, form long-term pair bonds, have high site fidelity, lay only one egg per season, and both parents participate in all aspects of raising young. Bonin petrels nest in burrows which they excavate in sandy soils. In Hawai‘i, eggs are laid in mid January and chicks fledge by June. Competes with larger ‘ua‘u kani (or wedge-tailed shearwater [*Puffinus pacificus*]) for burrows, and late fledging petrel chicks are sometimes killed by returning shearwaters. No information on age of first breeding. The oldest known Bonin petrel is 19 years old.

DISTRIBUTION: Bonin petrels breed on the NWHI from French Frigate Shoals to Kure. Historically bred on MHI. Between 2018-2021, a translocation project brought bonin chicks from the NWHI to the James Campbell National Wildlife Refuge on Oahu to create new protected breeding colonies safe from climate change. Outside of Hawai‘i, breeding populations are restricted to Bonin and Volcano islands off of Japan. Outside the breeding season a few individuals remain in the waters surrounding the Hawaiian Islands, but most disperse widely mainly between Hawai‘i and Japan.

ABUNDANCE: In the Hawaiian Archipelago, the population is estimated at between 270,000 and 395,000 breeding pairs, with the largest populations occurring on Lisianski (150,000 - 250,000 pairs), Laysan (50,000 - 75,000 pairs), and Midway Atoll (70,000 pairs). Prior to the introduction of rats (*Rattus* spp.) in the 1930s, an estimated 250,000 pairs nested on Midway. Worldwide population is unknown.

LOCATION AND CONDITION OF KEY HABITAT: **Terrestrial:** Bonin petrels breed on predator free islands. Sandy soils are necessary for nest burrow excavation. Currently all breeding colonies in Hawai‘i occur in the Hawaiian Islands National Wildlife Refuge or the Midway Atoll National Wildlife Refuge. **Marine:** Pelagic.

THREATS:

- Non-native mammals: Historically, mammalian introductions to islands supporting nesting colonies resulted in declines or extirpations. On Lisianski and Laysan, rabbits (*Oryctolagus cuniculus*) denuded the island resulting in erosion which destabilized burrows. On Midway and Kure, rats (*Rattus* spp.) resulted in declines of breeding populations. Over a 40 year period, the Midway population declined from 250,000 to 5,000 pairs. Rabbits and rats have been eradicated from all NWHI.
- Collisions: Disorientation due to artificial lighting increases vulnerability to collisions with man-made structures.
- Invasive species: Non-native plants, specifically golden crown-beard (*Vervesina encelioides*) and sandbur (*Cenchrus agrimonioides*), degrades nesting habitat by providing poor soil stabilization. Introduced big-headed ants (*Pheidole megacephala*) at Kure may cause nestling mortality, but also facilitate the destruction of native vegetation by a non-native scale insect.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protection, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of Bonin petrels should include the following:

- Eradicate golden crown-beard on Pearl and Hermes Reef and Midway, and prevent its establishment on other islands.
- Continue protection and management of wildlife sanctuaries and refuges.
- Expand translocations from the NWHI to MHI, above projected sea level rise in protected areas.

MONITORING: Continue surveys of population and distribution in known and likely habitats, and develop and implement a monitoring program to track recovering populations at Midway and Kure.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to the Bonin petrel include the following:

- Conduct long-term demographic studies to determine population trends, survival rates, and reproductive success.
- Determine the effect of non-native ants and scale insects on Bonin petrel populations

and develop methods to eradicate or control ants and scale.

- Determine effects of spectral content of night lighting on seabird distraction

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Photo: C. S. N. Bailey, NPS

Seabirds

Ua'u or Hawaiian petrel

Pterodroma sandwichensis

SPECIES STATUS:

Federally Listed as Endangered, State Listed as Endangered, State Recognized as Indigenous, NatureServe Heritage Ran G2/T2 – Species Globally Imperiled/Subspecies Locally Imperiled, IUCN Red List Ranking – Vulnerable, Regional Seabird Conservation Plan – USFWS 2005

SPECIES INFORMATION: The 'ua'u or Hawaiian petrel is a medium-sized, nocturnal gadfly petrel (Family: Procellariidae) endemic to Hawai'i. The name is derived from a commonly uttered call, heard at colonies. Adults are uniformly dark grayish black above forming a partial collar which contrasts with white throat, forehead, and cheeks; entirely white below except for black tail and leading and trailing edges of underwings. Owing to darkness of back color, the 'W-pattern' across back and upper surface of wings is not visible except in worm plumage. Bill black, and legs and feet mostly pink. Even during the breeding season, 'ua'u often feed thousands of kilometers from their breeding colonies, usually foraging within mixed-species feeding flocks over schools of predatory fishes. They feed by seizing prey while sitting on the water or by dipping prey while flapping just above the ocean surface. In Hawai'i, they feed primarily on squid, but also on fish, especially goatfish and lantern fish, and crustaceans. 'Ua'u nest in colonies, form long-term pair bonds, and return to the same nest site year after year.

Colonies are now typically in high-elevation, xeric habitats or wet, dense forests, although before the arrival of the Polynesians and their associated animals these birds nested in the lowlands, too. They nest in burrows, crevices, or cracks in lava tubes; nest chambers can be from 1 to 9 meters (3-30 feet) deep. Most eggs are laid in May and June and most birds fledge by December, although there are significant inter-island differences in breeding phenology; for example, the nesters that are earliest by more than a month reside at the summit of Haleakala Volcano. Both parents incubate the single egg, and brood and feed the chick. Birds first breed at five to six years of age.

DISTRIBUTION: Nests among the Main Hawaiian Islands (MHI) including Maui, Hawai'i, Kaua'i, Lāna'i, and possibly small numbers on Moloka'i and O'ahu. Subfossil evidence indicates that prior to the arrival of Polynesians, 'ua'u was common throughout the MHI. At sea, they occur throughout the central tropical and subtropical Pacific Ocean. Fledged juveniles have been tracked to Lagonoy Gulf in the Philippines, the South China Sea and the waters off Taiwan, and 1 bird flew up to Japan before returning to the waters off the Philippines.

ABUNDANCE: In the early 1990s the population was estimated at 19,000 individuals with a breeding population of 4,500 to 5,000 pairs, although inaccessible nesting locations make accurate counts difficult. Analysis of at-sea counts indicate broad consistency with the island-based estimates. More recently (1998-2011) the global population was estimated at 52,000 birds, although due to differences in sampling methods it is unknown whether these higher numbers reflect a population increase or a difference in the proportion of the total population sampled. More than 1,800 individuals occur at Haleakalā National Park on Maui (a few hundred more nest in West Maui), around 150 pairs occur on Mauna Kea, Hawai‘i; around 1,600 pairs occur on Kaua‘i; several thousand birds occur on Lāna‘i.

LOCATION AND CONDITION OF KEY HABITAT: Nests in a variety of remote, inland habitats. On the islands of Hawai‘i and Maui, colonies are located above 2,500 meters (8,200 feet) in xeric habitats with very sparse vegetation, with most nests in existing crevices in the lava. On Kaua‘i and Lāna‘i, windward east Maui and West Maui colonies occur in lower-elevation forests dominated by ‘ōhi‘a (*Metrosideros polymorpha*) often with a dense understory of uluhe fern (*Dicranopteris linearis*). At sea, they are pelagic and occur over the open ocean.

THREATS:

- Historical hunting: Nestlings were considered a delicacy by Polynesians, and were harvested from nest burrows, including artificial ones constructed by the Polynesians. Adults were netted as they returned to colonies, and smoky fires were sometimes lit along flight corridors to disorient and ground birds.
- Introduced predators: Adults and chicks are susceptible to depredation by dogs, pigs, rats, barn owls, feral cats, and the small Indian mongoose. The presence of these destructive introduced animals, the main force behind population decline, has relegated the species now to nest only in remote interior areas, at very high altitude, or on islands that are predator-free. An emerging new threat is introduced feral honey bees, documented to take over the burrows on Kaua‘i, as well as causing mortality by killing adult birds (Raine et al., 2023).
- Feral ungulates: Feral goats (*Capra hircus*), mouflon sheep (*Ovis musimon*), and potentially axis deer (*Axis axis*) trample burrows and degrade nesting habitat.
- Artificial lighting: Street and resort lights, especially in coastal areas, disorient fledglings, causing them to eventually fall to the ground exhausted or increasing their chance of colliding with artificial structures (i.e., fallout) such as powerlines. Once on the ground, fledglings are killed by cars, cats, and dogs, or die of starvation or dehydration.
- Collisions: Adults and fledglings are susceptible to mortality from collisions with obstacles such as communication towers, utility lines, fences, and wind farm structures while commuting between inland nest sites and the ocean at night.
- Colony locations: The remoteness of colonies, as well as the habitat in which they occur (e.g., steep terrain or dense forest), complicates predator and ungulate eradication or control.
- Breeding habitat loss. Habitat-modifying introduced plants such as Kahili Ginger and Australian Tree Fern are causing a reduction in available breeding habitat to the species on Kaua‘i.

CONSERVATION ACTIONS: Past actions directed at ‘a‘o (Newell’s shearwater [*Puffinus newelli*]) have often benefited ‘ua‘u populations. These actions include the rat and cat control in some of the large breeding colonies on Kaua‘i, rescue and rehabilitation of downed fledglings by the Save Our Shearwaters (SOS) program on Kaua‘i and Save Our Seabirds on Maui; and efforts to shade and curtail resort and event lighting and streetlights. Current and future conservation efforts should include efforts to reduce and shield lighting, control predators and invasive species at breeding colonies, conduct surveys to locate and characterize additional colonies, evaluate updated population estimates, and implement management actions appropriately. Actions being carried out in association with several Habitat Conservation Plans, along with State and federal recovery efforts are resulting in conservation benefits to ‘ua‘u on Maui, Lāna‘i, Hawaii and Kaua‘i; these include efforts to protect existing breeding populations and establish new colonies using predator-proof fencing, predator control, ungulate control, social attraction, and translocation work plans. In addition to these efforts, future management actions specific to ‘ua‘u populations should include the following:

- Continue predator and ungulate control at colonies on Hawai‘i, Maui, Lāna‘i, and Kaua‘i, and potentially at offshore islets that contain suitable nesting habitat.
- Locate additional breeding colonies on Hawai‘i, Maui, and Kaua‘i and perform surveys on Moloka‘i and Oahu, to assess ‘ua‘u presence.
- Continue to identify fallout areas and minimize effects of powerlines and artificial lights.
- Continue to support the SOS programs, particularly public outreach about light attraction and fallout, the rescue and rehabilitation program, and the establishment of similar programs on other islands where appropriate.
- Re-establish/expand breeding colonies by identifying suitable candidate locations for social attraction and/or translocation, and continue to refine translocation protocols.

MONITORING: Continue at-sea and terrestrial surveys in known and likely habitats to evaluate the population size and status, and to locate unidentified breeding colonies. Monitor breeding incidence, breeding density, reproductive success, causes of mortality, population trends, adult survivorship, return rates and effectiveness of management at breeding colonies. Assess the efficacy of predator control efforts.

RESEARCH PRIORITIES:

- Develop and implement standardized survey and monitoring protocols that can be used throughout Hawai‘i to better estimate population parameters and changes.
- Expand and refine radar studies to monitor population trends.
- Conduct long-term demographic studies to evaluate reproductive success, breeding incidence, breeding density, colony boundaries, population trends, and survival rates.
- Develop, refine, and monitor the outcome of conservation actions and measures that are employed to avoid and minimize impacts from flight collision and other causes, and broaden adaptive management approaches.
- Determine effects of spectral content of night lighting on seabird distraction

- Implement research to understand at-sea locations and behavior, and the impact of at-sea habitats and activities on population dynamics and life history traits.
- Investigate population genomic structure of the species across the Hawaiian Islands by using advanced sequencing technologies to evaluate genetic diversity, connectivity, and identify conservation management units.
- Develop research projects to evaluate the impact of current conservation and minimization actions on population viability.

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Photo: Steve McConnell

Seabirds

‘Akē’akē or Bandrumped Storm Petrel

Hydrobates castro cryptoleucura

SPECIES STATUS:

Hawaii Distinct Population Segment (DPS)
Federal Listed as Endangered, State Listed as
Endangered, State Recognized as Indigenous,
NatureServe Heritage Rank G4 - Apparently Secure,
Regional Seabird Conservation Plan - USFWS 2005

SPECIES INFORMATION: The ‘akē’akē or band-rumped storm-petrel is a medium sized, highly pelagic storm-petrel (Family: Hydrobatidae), and is the smallest and rarest seabird that breeds in Hawai‘i. Adults are primarily blackish-brown and have a sharply defined narrow white band across rump area. Flight is characterized by shallow wing beats and long glides just over the surface of the ocean. Foraging alone or with conspecifics, ‘akē’akē feed while sitting on the water or by dipping prey while flapping just above the ocean surface, often pattering water with feet. There is no diet information from Hawai‘i, but elsewhere diet primarily consists of small fish, squid, and some crustaceans. Breeding biology in Hawai‘i is poorly known, but these birds are known to nest in burrows or natural cavities in a variety of high-elevation, inland habitats. As with most seabirds, a single egg is laid per season. In Hawai‘i, eggs are laid between May and June, and nestlings fledge in October. ‘Akē’akē likely do not breed until they are three to seven years old, and likely live for 15 to 20 years.

DISTRIBUTION: Historically, was abundant and widespread throughout Main Hawaiian Islands (MHI). Nesting colonies occur on Kaua‘i at elevations around 600 meters (1,950 feet), on windward Lāna‘i around 610 meters (2000 feet), on Maui (in and around Haleakalā National Park) and, historically, in Ahihi-Kena‘u Natural Area Reserve, and the island of Hawai‘i (in Hawai‘i Volcanoes National Park at elevations greater than 1,200 meters (3,900 feet) and generally between 6,000 to 10,000 ft, and on Lehua. Outside of Hawai‘i, the species nests in Japan and on the Galapagos, and on several islands in the Atlantic. At sea, they occur in the Pacific and Atlantic oceans.

ABUNDANCE: In Hawai‘i, breeding population size is unknown, but likely very small. The breeding population on Kaua‘i was estimated at between 171 and 221 breeding pairs in 2002. Worldwide population is unknown, but likely less than 25,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Breeds in a variety of remote, high-elevation, inland habitats. On Kaua‘i, colonies are in steep valleys vegetated with shrubs and grasses. On Maui and the island of Hawai‘i, colonies occur on high, barren lava flows. Nesting in burrows or crevices in rock or lava has also been documented using artificial nest boxes.

THREATS: Due to its very small population size in the Hawaiian Islands, the ‘akē‘akē is susceptible to stochastic, genetic, environmental, and demographic events that could lead to extirpation. Important threats to the species include:

- Introduced predators: Adults and chicks are susceptible to predation by pigs (*Sus scrofa*), rats (*Rattus* spp.), feral cats (*Felis silvestris*), and the small Indian mongoose (*Herpestes auropunctatus*), barn owls and pueo.
- Feral ungulates: Pigs, goats (*Capra hircus*), and sheep degrade nesting habitat.
- Artificial lighting: Street and resort lights, especially in coastal areas, likely disorient fledglings, causing them to eventually fall to the ground exhausted or increasing their chance of colliding with artificial structures (i.e., fallout). Once on the ground, fledglings are unable to fly and are killed by cars, cats, and dogs (*Canis familiaris*) or die of starvation or dehydration.
- Collisions: Adults and fledglings are susceptible to mortality from collisions with obstacles such as communication towers and utility lines while commuting between inland nest sites and the ocean at night.
- Colony locations: The remoteness of colonies, as well as the habitat in which they occur (e.g., steep terrain or dense forest), complicates monitoring predator and ungulate eradication, or control.

CONSERVATION ACTIONS: Past actions directed at ‘a’o or Newell’s shearwater (*Puffinus auricularis*) that have benefited ‘akē‘akē include the rescue and rehabilitation of downed fledglings by the Save Our Shearwaters (SOS) program and efforts to shade resort lighting and streetlights. Current and future conservation efforts on Kaua‘i and Maui Nui to benefit the ‘akē‘akē, ‘a’o, and ‘ua‘u (Hawaiian petrel [*Pterodroma sandwichensis*]) include efforts to reduce and shield lighting, control predators and invasive species, conduct surveys to locate additional colonies, and develop revised population estimates using at-sea survey data. In addition to these efforts, future actions specific to Hawaiian populations of ‘akē‘akē should include the following:

- Locate existing colonies and protect and monitor them.
- Locate potential sites for the establishment of new breeding colonies.
- Continue efforts to eradicate and control predators and ungulates.
- Continue to identify fallout areas and minimize effects of powerlines and artificial lights.
- Continue to support the Kaua‘i and Maui SOS programs, particularly the public outreach about light fallout and its rescue and rehabilitation program. Consider establishing similar programs on other islands where appropriate.
- Social attraction in predator exclusion fencing and translocation when and if adequate source populations can be identified.
- Locate existing colonies, explore access using new technologies, and protect and monitor them.

MONITORING: Conduct at-sea and terrestrial surveys in known and likely habitats to evaluate the population size and status, and to locate unidentified breeding colonies.

RESEARCH PRIORITIES:

- Investigate new technologies or adapt existing technologies (e.g., radar, at-sea surveys, mark/recapture, automated acoustic monitoring, telemetry, genomics) to ascertain

population status and trends.

- Evaluate life history, habitat requirements, reproductive biology, and population status to assess management needs and conservation status of this poorly known species.
- Identify factors currently limiting populations.
- Evaluate mortality related to powerlines and coastal lighting.
- Evaluate if Hawaiian subspecies should be reclassified as its own species
- Determine effects of spectral content of night lighting on seabird distraction
- Locate existing colonies through auditory surveys and on-ground confirmation.
- Implement research at known nesting locations to understand at-sea locations and behavior, and the impact of at-sea habitats and activities on population dynamics and life history traits.
- Investigate population genomic structure of the species across the Hawaiian Islands by using advanced sequencing technologies to evaluate genetic diversity, connectivity, and identify conservation management units.

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Photo: Ian Jones, USFWS

Seabirds

Tristram's Storm-Petrel

Oceanodroma tristrami

SPECIES STATUS:

State recognized as Indigenous, NatureServe Heritage

Rank G3 – Vulnerable, North American Waterbird

Conservation Plan - High concern, IUCN Red List

Ranking - Near threatened, Regional Seabird Conservation

Plan - USFWS 2005 Bird of Conservation Concern -

USFWS 2021

SPECIES INFORMATION: Tristram's storm-petrel is a large storm-petrel (Family: Hydrobatidae) with long, pointed wings, and a notched tail. Adult males and females are entirely brownish-gray. Flight is typical of storm-petrels, gliding low over water searching for food. Forages alone or with conspecifics, and typically forages at night. Tristram's storm-petrel feeds by dipping prey from the ocean's surface on the wing, often pattering the water with feet. In Hawai'i, diet includes fish, squid, coelenterates, crustaceans, and insects. Tristram's storm-petrels are winter breeders, and are nocturnal at nesting colonies. Nests are placed in recesses in rocks, under piles of mined guano, or burrows that they excavate under vegetation. Eggs are laid between December through February and nestlings fledge by June. Little information on parental care of egg or young. Like most storm petrels, age at first breeding is likely three to five years and individuals likely live between 15 and 20 years.

DISTRIBUTION: Tristram's storm-petrels breed on Nihoa and on all NWHI except for Midway and Kure atolls, although they historically bred on both as well as on MHI. Outside of Hawai'i, breeding colonies only occur on three small Japanese islands. Outside the breeding season, Tristram's storm-petrels range across the subtropical central and western Pacific Ocean.

ABUNDANCE: In Hawai'i, breeding colonies are estimated at less than 10,000 pairs, with the largest populations occurring on Nihoa (2,000 - 3,000 pairs), Laysan (500 - 2,000 pairs), and Pearl and Hermes Reef (1,000 - 2,000 pairs). Between 2018-2022, a translocation project brought tristram's storm petrel chicks from the NWHI to the James Campbell National Wildlife Refuge on Oahu to create new protected breeding colonies safe from climate change. Worldwide population unknown.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Islands in Hawai'i and Japan, which include both low-lying coralline sand islands and high volcanic islands. For nesting, prefers recesses in rock scree, under mined guano piles, or burrows excavated under vegetation. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by

rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats. Extirpation from Midway and Kure atolls likely the result of the introduction of rats; since the eradication of rats from Midway in 1996, individuals have been mist-netted but nesting has not been documented.

- Invasive species: The continued expansion of golden crowned-beard (*Verbesina encelioides*) on Pearl and Hermes Reef and Kure likely will reduce nesting habitat. The effects of big-headed ants (*Pheidole megacephala*), and mice (*Mus musculus*) on Tristram's storm-petrels are unknown.
- Collisions: Disorientation due to artificial lighting increases vulnerability to collisions with man-made structures.
- Disease: Diseases like avian influenza may impact these and other seabird species.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of Tristram's storm-petrel should include the following:

- Eradicate golden crown-beard on Pearl and Hermes Reef, Midway, and Kure.
- Eradicate mice from Midway and facilitate recolonization using attraction programs.
- Determine population size, status, and trends in Hawai'i.
- Continue protection and management of existing wildlife sanctuaries and refuges.
- Translocate birds from the NWHI to the higher MHI within protected areas.

MONITORING: Continue surveys of population and distribution in known and likely habitats, particularly for re-colonization of Midway Atoll.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to Tristram's storm-petrel include the following:

- Design a reliable monitoring program.
- Determine the effects of ants on reproductive success.
- Research basic life history traits, demography, and factors limiting populations.
- Determine effects of spectral content of night lighting on seabird distraction

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Photo: Forest and Kim Starr, USFWS

Seabirds

Ua‘u kani or Wedge Tailed Shearwater

Ardena pacifica

SPECIES STATUS:

State Recognized as Indigenous, NatureServe
Heritage Ranking G4/G5 – Apparently
Secure/Secure, IUCN Red List Ranking -Least
Concern, Regional Seabird Conservation Plan –
USFWS 2005

SPECIES INFORMATION: The ‘ua‘u kani or wedge-tailed shearwater is a large, abundant seabird (Family: Procellariidae) that produces a variety of wails and moans that surely inspired the Hawaiian name of this bird which means “calling or moaning petrel.” Individuals have long thin wings, a wedge-shaped tail, and a hooked bill. ‘Ua‘u kani are polymorphic, having two color phases, dark or light, and sexes are similar in appearance. Light-phase adults are grayish brown above with white underparts except for dark trailing edges of wings and tail. Dark-phase adults are uniformly sooty brown. Most Hawaiian ‘ua‘u kani are light phase birds. Flight is similar to that of albatross but flaps wings with greater frequency. Often forages in large, mixed species flocks associated with schools of large predatory fishes which drive prey species to the surface. They use a variety of foraging techniques, most frequently plunges head into water while on the wing, also seizes prey while sitting on the water; often follows fishing vessels. In Hawai‘i, diet primarily consists of larval goatfish, flyingfish, squirrelfish, and flying squid. Like most seabirds ‘ua‘u kani breed in natal colonies, form long-term pair bonds, have high site fidelity, lay one egg per season, and both parents participate in all aspects of raising young. In Hawai‘i, nesting is synchronous, and most eggs are laid in June with most young fledging in November. Birds first breed at four years of age, and the oldest known individual was 29 years old.

DISTRIBUTION: Nests throughout the Northwestern Hawaiian Islands (NHWI) and on offshore islets of most of the Main Hawaiian Islands (MHI) and Kaua‘i, Oahu, Maui, Molokai, & Lāna‘i. Outside of Hawai‘i, nests on islands throughout the tropical and subtropical Indian and Pacific oceans. After the breeding season, they may migrate to the eastern Pacific Ocean.

ABUNDANCE: In Hawai‘i, population is estimated at 270,000 breeding pairs with the largest colonies on Laysan (125,000-175,000 pairs), Nihoa (30,000-40,000 pairs), and Lisianski (10,000- 30,000 pairs). The MHI population is estimated at 40,000-60,000 breeding pairs with the largest colonies on the offshore islands of Mānana (10,000-20,000 pairs), Moku Loa (10,000-20,000 pairs), Lehua (23,000 pairs), and Ka‘ula (1,500-2,500 pairs). Smaller populations occur on Moku Manu, Moku‘auia, Kāpapa, Molokini, Mōkapu Peninsula; Ka‘ena Point Natural Area Reserve, Black Point, James Campbell NWR and Kailua on O‘ahu; Mo‘omomi and Mokio on Molokai; Hawea, Pu‘u Keka‘a, Ho‘okipa, & Kama‘ole Beach Park III on Maui and Kīlauea Point National Wildlife Refuge on Kaua‘i. Worldwide population is

estimated at over 5 million birds.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Nests on low, flat islands and sand spits with little or no vegetation; sand dunes and coastal peninsulas on MHI, but also excavates burrows on the slopes of extinct volcanoes and in old volcanic craters. Burrows require firm soil or plant roots to stabilize loose soil; generally nesting habitat is devoid of tall woody plants. In locations where nest sites are scarce or the ground is too hard to excavate burrows, birds will nest in rock crevices or above ground. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like many seabirds, adults and nests are susceptible to mammalian predation by pigs (*Sus scrofa*), rats (*Rattus* spp.), feral cats (*Felis silvestris*), and the small Indian mongoose (*Herpestes auropunctatus*). Barn Owls predate adult and young 'ua'u kani on rat-free offshore islets and across the shore of Kaua'i. Although a native species, Black-crowned Night Heron (*Nycticorax nycticorax*) is documented to predate 'ua'u kani chicks on Lehua.
- Human disturbance. Laysan (*Telespiza cantans*) and Nihoa (*T. ultima*) finches will depredate eggs left unattended because of human disturbance. Trampling by humans can collapse burrows.
- Artificial lighting: Street and resort lights, especially in coastal areas, disorient fledglings, causing them to eventually fall to the ground exhausted or increasing their chance of collision with structures (i.e., fallout). Once on the ground, fledglings are unable to fly and are killed by cars, cats, and dogs or die of starvation or dehydration.
- Anthropogenic impacts: Powerline strikes, vehicle strikes and other man-made infrastructure like wind turbines can cause mortality.
- Overfishing: Because 'ua'u kani rely on predatory fish to drive prey to the surface, overfishing may be affecting Hawaiian populations.
- Contaminants. Mercury, lead, organochlorines and plastics have been detected in Hawaiian birds.
- Disease: Pox-like lesions have been observed on birds breeding on Maui and Moloka'i. Diseases like avian influenza may impact these and other seabird species.

CONSERVATION ACTIONS: Actions specific to 'ua'u kani should include the following:

- Continue eradication and control of introduced predators at current and potential nesting sites on MHI.
- Limit human access to colonies.
- Continue to support the Save Our Shearwater (SOS) and Save Our Seabirds (SOS) programs, particularly their public outreach about light fallout and its rescue and rehabilitation program. Consider establishing similar programs on other islands where appropriate.
- Continue to identify fallout areas and work to minimize effects of powerlines and lights.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES:

- Monitor contaminant levels and their effects, and investigate potential sources.
- Investigate the cause and effect of pox-like lesions in populations on Maui and Molokini.
- Model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on 'ua'u kani populations.
- Determine effects of spectral content of night lighting on seabird distraction
- Develop and implement population monitoring protocols to quantify demographic rates and connectivity between populations across the Hawaiian Islands, as well as the impact of different mortality sources on population viability.
- Investigate at-sea locations and behavior of the species through telemetry studies.
- Investigate population genomics using advanced sequencing technologies to understand genomic diversity and connectivity in the Hawaiian Islands.

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Photo: Brenda Zaun, USFWS

Seabirds

A'ō or Newell's Shearwater

Puffinus newelli

SPECIES STATUS:

Federally Listed as Threatened, State Listed as Threatened, State Recognized as Indigenous, NaturServe Heritage Rank G2/T2 – Imperiled Species/Imperiled Subspecies, IUCN Red List Ranking – Endangered, Regional Seabird Conservation Plan – USFWS 200

SPECIES INFORMATION: The 'a'ō or Newell's shearwater (Family: Procellariidae) is highly pelagic year-round, and is endemic to the Hawaiian Islands. Adult males and females are dark, sooty brown above, with white throat and underparts, and have a dark bill with a hooked tip. Flight is direct, fast and usually low over water, powered by rapid wing beats interspersed with glides; wing loading is higher than in more aerial shearwaters due to the species' foraging method (see below). Often forages in large, mixed species flocks associated with schools of large, predatory fishes, which drive prey to the surface. 'A'ō feed mainly by pursuit-plunging; individuals dive into water and swim using their partly folded wings for propulsion. Diet is not well known, but likely consists of fish and squid. 'A'ō are colonial and nest on steep mountain slopes, with variable amounts of vegetation, where they lay a single egg in cavities and burrows, often located at the base of a tree. Breeding is highly synchronous, and eggs are laid in early June, and most young fledge by November. Both parents incubate the egg, and brood and feed the nestling. Parents forage hundreds of kilometers offshore and return to colony at night to feed chick. No post-fledging care is provided. Age at first breeding is six to seven years.

DISTRIBUTION: 'A'ō nest on Kaua'i, Maui, Hawai'i, and may also nest on Moloka'i O'ahu, but not confirmed. At Makamaka'ole Seabird Exclosures on Maui social attraction, started in 2014, has drawn in some fifty adults, with a single chick being produced in 2021, 2022 and 2023. These are the only known and protected 'a'ō nesting sites in Maui Nui. Nesting colonies do not occur outside of Hawai'i. At-sea distribution includes the eastern and central subtropical Pacific Ocean.

ABUNDANCE: Apparently abundant prior to the arrival of Polynesians, hunting and predation by introduced species resulted in declines of 'a'ō, and the species was thought to be extinct by 1908. The species was rediscovered at sea in 1947 and breeding birds were found on Kaua'i in 1967. Abundance is difficult to estimate because of the remoteness and terrain of colonies. In the early 1990s, the population was estimated at 84,000 birds based on at-sea surveys (included adults and non-breeding birds); the population in the subsequent decade (1998-2011) was estimated at roughly 27,000 birds based on revised population estimates using at-sea survey data and are broadly validated by radar detections. Due to differences in sampling methods it is unknown whether these lower estimates reflect a population decline or a difference in the proportion of the total population sampled. The breeding population was estimated at 14,600 pairs, 75-90 percent of which nest on

Kaua‘i, based on demographic data. The population is in serious decline; radar detections on Kaua‘i declined significantly from 1993 to 2023, and three colonies reported as active between 1980 and 1994 were abandoned.

LOCATION AND CONDITION OF KEY HABITAT: On Kaua‘i, most colonies occur between 160 and 1,200 meters (525 - 3,936 feet) elevation on steep, densely vegetated mountains, however, birds also nest on the dry, sparsely vegetated cliffs of the Nā Pali coast and on Lehua. On the island of Hawai‘i, they nest within forested cinder cones. Colonies are usually located in areas of open native forest dominated by ‘ōhi‘a (*Metrosideros polymorpha*) with a dense understory of ‘uluhe fern (*Dicranopteris linearis*).

THREATS:

- Historical hunting: Subsistence hunting by Polynesians likely reduced populations, and the species was likely captured using methods described for ‘ua‘u or Hawaiian petrel (e.g., artificial nests, nets, and smoke from fires).
- Introduced predators: Adults, eggs, and chicks are taken by introduced predators, including dogs (*Canis familiaris*), pigs (*Sus scrofa*), and rats (*Rattus exulans*). Europeans added barn owls (*Tyto alba*), additional rat species, feral cats (*Felis silvestris*), and the small Indian mongoose (*Herpestes auropunctatus*), which is the main factor behind population decline. The largest colonies are on Kaua‘i, the only Main Hawaiian Island besides Lāna‘i where the small Indian mongoose is not established. An emerging new threat is introduced feral honey bees, documented to take over the burrows on Kaua‘i as well as causing mortality by killing adult birds (Raine et al., 2023).
- Habitat loss and degradation: Kaua‘i has lost about 75 percent of its forest in the last 150 years, and much of the remaining forest is being degraded by non-native plant species and feral ungulates
- Artificial lighting: Street and resort lights, especially in coastal areas, disorient fledglings, causing them to eventually fall to the ground exhausted or increasing their chance of colliding with artificial structures (i.e., fallout) such as powerlines. Once on the ground, thousands are killed annually by cars, cats, and dogs or die of starvation or dehydration. On Kaua‘i, approximately 350 fledglings were recovered annually from fallout in 1999 to 2010, far fewer than the thousands found per year in the late 1970s when the Save Our Shearwaters (SOS) program began; an unknown number are never found.
- Collisions: Adults and fledglings are susceptible to mortality from collisions with obstacles such as communication towers, overhead utility lines, and wind farm structures while commuting between inland nest sites and the ocean at night.
- Overfishing: Because ‘a‘o rely on predatory fish to drive prey to the surface, overfishing may be affecting the population.
- Colony locations: Remoteness of colonies, as well as the habitat they occur in (e.g., steep terrain or dense forest) complicates predator and ungulate eradication or control.
- Catastrophes: Given that a large proportion of the population breeds on Kaua‘i, catastrophic events like hurricanes could lead to extirpation.
- Breeding habitat loss: Habitat-modifying introduced plants such as Kahili Ginger and Australian Tree Fern are causing a reduction in available breeding habitat to the species on Kaua‘i.
- Improve Habitat: Improve colony locations, remoteness of colonies, as well as the habitat

they occur in (e.g., steep terrain or dense forest), complicates monitoring, predator and ungulate eradication or control.

CONSERVATION ACTIONS: Past and current actions include the SOS program which has recovered and released more than 31,000 downed fledgling shearwaters on Kaua‘i since 1978; presently all streetlights and some other types of lighting have been shielded on Kaua‘i; however, fallout still occurs and it is unknown whether these actions have improved survival. Fallout also occurs on Mau‘i. Current and future conservation efforts on Kaua‘i to benefit the ‘a‘o, ‘ua‘u (Hawaiian petrel), and ‘akē‘akē (band-rumped storm-petrel) include efforts to reduce and shield lighting, control predators and invasive species, and conduct surveys to locate additional colonies. In addition to these efforts, future actions specific to ‘a‘o should include the following:

- Continue predator and ungulate control at key colonies on Kaua‘i and the island of Hawai‘i, and initiate predator control at other known and potential colony sites.
- Continue to support the initiatives of the SOS program, particularly its public outreach about light fallout and rescue and rehabilitation program, and maintain and strengthen similar programs on other islands where needed.
- Continue to identify areas where high fallout occurs, accurately estimate flight collision risk, and develop improved methods to minimize and mitigate the effects of powerlines and artificial lights.
- Eradicate or control invasive plants from current and potential colony sites.
- Prioritize restoration projects at occupied and unoccupied nesting areas based on likelihood of success and existing threats at each site.
- Develop methods, test, and implement social attraction and translocation in order to create safe, managed colonies.
- Develop partnerships with private landowners to assist conservation measures.
- Continue to explore poorly surveyed areas to locate and manage breeding colonies on islands with known breeding colonies

MONITORING: Conduct at-sea and terrestrial surveys in known and likely habitats to evaluate the population size and status. Monitor breeding incidence, breeding density, reproductive success, causes of mortality, population trends, return rates and effectiveness of management at breeding colonies. Assess the efficacy of predator control efforts.

RESEARCH PRIORITIES:

- Develop and implement standard survey and monitoring protocols that allow changes in population size and structure to be evident.
- Expand and refine radar studies to monitor population trends, locate colonies, and evaluate the effectiveness of conservation measures.
- Evaluate diet and at-sea distribution to determine the potential effects of fishing and food web changes related to climate and oceanographic factors, and provide input on spatial planning for marine protected areas.
- Expand long-term demographic studies to determine reproductive success, survival rates, and factors affecting the population.
- Determine effects of spectral content of night lighting on seabird distraction.
- Implement research to understand at-sea locations and behavior, and the impact of at-sea habitats and activities on population dynamics and life history traits.

- Investigate population genomic structure of the species across the Hawaiian Islands by using advanced sequencing technologies to evaluate genetic diversity, connectivity, and identify conservation management units.
- Develop research projects to evaluate the impact of current conservation and minimization actions on population viability.

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Seabirds

Christmas Shearwater

Puffinus nativitatis

SPECIES STATUS:

State recognized as Indigenous, NatureServe Heritage
Ranking G3/G4 Vulnerable/Apparently secure, North
American Water Bird Conservation Plan - High concern,
Regional Seabird Conservation Plan - USFWS 2005,
Bird of Conservation Concern - USFWS 2021

SPECIES INFORMATION: The Christmas shearwater is a medium-sized, dark-brown shearwater (Family: Procellariidae), with a short, wedge-shaped tail and a shiny, black bill. Adult males and females are entirely dark brown, although underparts are lighter than upperparts. Flight is characterized by fast, stiff wing beats, followed by long glides. Often forages in large, mixed species flocks associated with schools of large predatory fishes which drive prey species to the surface. Christmas shearwaters feed from the surface by seizing prey while sitting on the water or by shallow pursuit plunges; also feeds by dipping or picking prey from the water while on the wing. Diet almost equally split between fish and squid (Ommastrephidae). Like most seabirds, Christmas shearwaters breed in their natal colonies, although colonies are often small, have high site fidelity, lay only one egg per season, and both parents participate in all aspects of raising young. In this species, divorce appears to occur at a higher frequency than in other seabirds. Christmas shearwaters nest in rock crevices or under dense vegetation. In Hawai‘i, eggs are laid beginning in February, and nestlings fledge in October or November. No post-fledging care is provided. Based on a small sample, age of first breeding is four years, and the oldest known individual was 17 years old.

DISTRIBUTION: Christmas shearwaters breed throughout NWHI, except for Necker Island and Gardner Pinnacles, and in MHI on offshore islets (e.g., Ka‘ula, Lehua, Moku Manu). Outside of Hawai‘i, Christmas shearwaters nest on islands throughout the central and eastern Pacific. Non-breeding distribution includes the eastern Pacific Ocean.

ABUNDANCE: In Hawai‘i, breeding colonies estimated at less than 3,000 pairs, with largest populations occurring on Laysan (1,500 - 2,000 pairs), Lisianski (400 - 600 pairs), Nihoa (200 - 250 pairs), and Midway Atoll (200 pairs). Worldwide population unknown but likely less than 10,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: The Christmas shearwater typically breeds on remote sandy islands in rock crevices or under dense vegetation, such as naupaka (*Scaevola sericea*), bunchgrass (*Eragrostis variabilis*), tree heliotrope (*Tournefortia argentea*), *Lepturus repens*, and beach morning glory (*Ipomea* spp.). Also has been known to nest in wooden debris, under buildings, or in abandoned burrows. Christmas shearwater eggs and young must be

shaded to protect them from lethal temperatures. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.) and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Invasive species: On Lisianski and Laysan, rabbits (*Oryctolagus cuniculus*) denuded the island reducing suitable nesting locations. Golden crown-beard (*Verbesina encelioides*) also degrades nesting habitat. Introduced big-headed ants (*Pheidole megacephala*) at Kure may cause nestling mortality, but also facilitate the destruction of native vegetation by a non-native scale insect.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of Christmas shearwaters should include the following:

- Eradication and control of introduced predators at current and potential nesting sites.
- Eradication and control of invasive species.
- Continued protection and management of existing wildlife sanctuaries and refuges.
- Translocations from the NWHI to the higher MHI sites above predicted sea level rise and within protected areas

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to the Christmas shearwater include the following:

- Conduct long-term demographic studies to determine population trends, survival rates, and reproductive success of this poorly known species.
- Updated population estimates.
- Locate foraging areas and determine non-breeding range and model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on Christmas shearwater populations.
- Determine effects of spectral content of night lighting on seabird distraction

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Photo: David Leonard, USFWS

Seabirds

Manu-o-Kū or White (Fairy) Tern

Gygis alba

SPECIES STATUS:

State listed as Threatened, State recognized as Indigenous, NatureServe Heritage Rank G4 - Apparently secure, North American Waterbird Conservation Plan – Moderate concern, Regional Seabird Conservation Plan - USFWS 2005

SPECIES INFORMATION: The manu-o-Kū or white tern is a small, entirely white tern (Family: Laridae) with a pantropical distribution. Individuals have dark eyes and a thick, sharply pointed black bill with an electric blue base. Adult males and females are identical and there are no seasonal changes in plumage. Flight is buoyant and characterized by erratic changes in direction and speed. Manu-o-Kū (white tern) feed by dipping the surface or surface diving. Often joins mixed species feeding flocks and usually preys on fish driven to the surface by large, predatory fish. In Hawai‘i, the diet of white terns consists mostly of juvenile goatfish and flying fish. Breeding adults remain close to nest sites and forage in inshore areas such as shoals and banks with occasional forays into offshore waters. Not as colonial or social as most other terns, preferring to nest in loosely associated groups or singly. Manu-o-Kū (white tern) remain paired for several seasons and often return to the same nest site year after year. No nest is constructed; a single egg is laid wherever a suitable depression is found. Most nests are on tree branches, buildings, or other man-made structures, rock ledges, or on the ground. In Hawai‘i, manu-o-Kū or (white tern) breeds year-round, but most eggs are laid between February and June. Pairs will replace an egg after initial nest failure, and some successfully raise two or three broods per year. Both parents incubate egg and brood and feed the chick. Fledglings are dependent on adults for up to two months. Birds first breed at five years of age, and the oldest known individual was 42 years old.

DISTRIBUTION: Manu-o-Kū (white tern) breed throughout the NWHI and on the island of O‘ahu. Outside of Hawai‘i, manu-o-Kū (white tern) breeds on islands throughout subtropical and tropical oceans, although breeding in the southern Atlantic Ocean is limited. Non-breeding distribution is unknown. Manu-o-Kū (white tern) typically remain near their breeding colonies year-round, seldom venturing far from shore.

ABUNDANCE: In the Hawaiian Archipelago, population is estimated at 15,000 breeding pairs, with largest populations occurring on Midway (7,500 pairs), Nihoa (5,000 pairs), and Laysan (1,000 pairs). On O‘ahu, the population continues to grow and is estimated to be 2,308 birds, including 1,408 breeders and ~900

nonbreeders, a dramatic increase from one bird in 1961 (Vanderwerf and Downs, 2018). Worldwide population unknown but likely exceeds 100,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Manu-o-Kū (white tern) breed on oceanic islands, both on low-lying coralline sand islands and high volcanic islands. Nests are not built, eggs are laid on whatever suitable depression is found. Nest sites include volcanic pinnacles, cliffs, rocky slopes, large bushes or trees, and man-made structures.
Marine: Nearshore waters.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), barn owl, raptors and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats. However, given the remote nature of nesting sites (e.g., cliffs), manu-o-Kū (white terns) are less vulnerable to predation than many other seabirds. Historically, rats likely preyed on eggs, young and adults on Midway.
- Introduced insects: On Midway, big-headed ants (*Pheidole megacephala*) have been observed attacking pipped eggs and incubating adults. On Kure, introduced scale insects are killing native vegetation, but the effects on manu-o-Kū (white tern) are unknown.
- Overfishing: Because manu-o-Kū (white tern) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.
- Tree trimming: Tree maintenance and trimming in the MHI can cause take of nests and chicks affecting populations in the MHI.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In Hawai‘i, currently there are no ongoing management actions specific to manu-o-Kū (white tern).

- Establish populations on other MHI
- Outreach and coordination with arborist communities regarding safe and beneficial practices for white terns

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to the manu-o-Kū (white tern) include the following:

- Determine the effect of introduced invertebrates on nesting habitat and their potential for limiting populations.
- Understand predator threats and their impacts to nesting success rate of the species to inform management actions
- Research white tern movements across the islands to understand breeding range,

- foraging range and inform management decisions.
- Understand post-fledgling behavior and survival of rehabbed and released birds to refine protocols of rescue and release of birds

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Seabirds

‘Ewa‘ewa or Sooty Tern

Sterna fuscata

SPECIES STATUS:

State recognized as Indigenous, NatureServe
Heritage Rank G5 – Secure, North American
Waterbird Conservation Plan – Moderate concern,
Regional Seabird Conservation Plan - USFWS
2005



Photo: Forest and Kim Starr, USFWS

SPECIES INFORMATION: The ‘ewa‘ewa or sooty tern is an abundant and gregarious tern (Family: Laridae) with a pantropical distribution, and is able to remain on the wing for years. Eight ‘ewa‘ewa (sooty tern) subspecies are recognized, and one (*S. f. oahuensis*) breeds in Hawai‘i. Individuals have long, slender wings and a deeply forked tail. Adult males and females are blackish above, except for white forehead and white on the edges of the outer most tail feathers, and entirely white below. The sharp bill, legs, and feet are black. Flight is characterized by powerful flapping, gliding and soaring, capable of long-distance migration and breeding adults remain aloft between breeding seasons. Generally forages in large mixed species feeding flocks, typically feeding over schools of predatory fishes, especially yellowfin tuna (*Neothunnus macropterus*) and skipjack tuna (*Katsuwonus pelamis*). ‘Ewa‘ewa (sooty tern) feed primarily by seizing prey from the water or air while on the wing, infrequently by shallow dives; species’ plumage has poor waterproofing and easily becomes waterlogged. In Hawai‘i, ‘ewa‘ewa (sooty tern) diet consists of squid, goatfish, flyingfish, and mackerel scad. Nests in large, dense colonies consisting of thousands to a million pairs of terns. Individuals return to natal colony to breed, some long-term pair bonds have been documented, and breeders prefer to return to previous nest locations. Nests are shallow scrapes often lined with bits of shell or vegetation. Timing of breeding varies among years and locations, even within Hawai‘i, but generally eggs are laid beginning of February and most birds fledge by July. Both parents incubate single egg and brood and feed chick. Parents continue feeding young for two weeks after fledging and young remain aloft until they return to breed. Birds first breed between four and ten years of age and the oldest known individual was 32 years old.

DISTRIBUTION: ‘Ewa‘ewa (sooty tern) breed throughout the NWHI and on Moku Manu off of the island of O‘ahu. Outside of Hawai‘i, ‘ewa‘ewa (sooty tern) breed on most islands throughout the world’s tropical oceans. Outside the breeding season, ‘ewa‘ewa (sooty tern) are highly pelagic.

ABUNDANCE: In Hawai‘i, population estimated at greater than one million breeding pairs with the largest populations occurring on Laysan (500,000 pairs) and Lisianski (500,000 pairs). Worldwide population is estimated at between 60 and 80 million breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: ‘Ewa‘ewa (sooty tern) breed on oceanic islands and atolls. Nest is usually on sandy substrates with sparse vegetation.
Marine: Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.) and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Native predators: ‘Iwa or great frigatebirds (*Fregata minor*), cattle egrets (*Bubulcus ibis*), ‘akekeke or ruddy turnstones, (*Arenaria interpres*) ‘auku‘u or black-crowned night herons (*Nycticorax nycticorax*), Laysan (*Telespiza cantans*) and Nihoa (*T. ultima*) finches will depredate eggs and chicks.
- Overfishing: Because ‘ewa‘ewa (sooty terns) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.
- Oil pollution: ‘Ewa‘ewa (sooty terns) populations are vulnerable to oil spills.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of ‘ewa ‘ewa (sooty terns) should include the following:

- Eradication and control of introduced predators at current and potential nesting sites.
- Continued protection and management of existing wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to ‘ewa‘ewa (sooty terns) include the following:

- Model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on ‘ewa‘ewa (sooty terns) populations.

References:

- NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (March 10, 2005).
- Schreiber EA, Feare DJ, Harrington BA, Murray BG, Robertson WB, Robertson MJ, Woolfenden GE. 2002. Sooty tern (*Sterna fuscata*). In The Birds of North America, No. 665 (Poole A, Gill F, editors.). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.
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Seabirds

Pākalakala or Gray-backed Tern

Sterna lunata

SPECIES STATUS:

State recognized as Indigenous NatureServe
Heritage Rank G3/G4 – Vulnerable/Apparently
secure North American Waterbird Conservation
Plan - Moderate concern Regional Seabird Conservation
Plan - USFWS 2005, Bird of Conservation Concern
- USFWS 2021

SPECIES INFORMATION: The pākalakala or gray-backed tern (Family: Laridae) is endemic to the central Pacific and breeds on small and remote islands and atolls, however, its historical and current distribution are poorly known. Adults are mostly slate gray above and white below with a black crown and nape. Forehead has a narrow white patch that is continuous with white eye-brow that extends above and past eye and is completely bordered with black. Flight is direct and graceful and body appears to move up and down with each wing beat. Outside the breeding season, may remain in flight continuously. Often forages with ‘ewa‘ewa or sooty terns (*S. fuscata*) and ‘ua‘u kani or wedge-tailed shearwaters (*Puffinus pacificus*). Pākalakala (gray-backed terns) feed mainly by plunge diving or by dipping the surface while hovering. Diet primarily consists of fish, especially five-horned cowfish, juvenile flyingfish, goatfish, herring, and dolphinfish, but also eats squid, crustaceans, mollusks, and marine and terrestrial insects. Pākalakala (gray-backed terns) nest in shallow depressions in sand or gravel, and like most seabirds lay a single egg per season. In Hawai‘i, nesting season varies from year to year, but most eggs are laid in February and March and most nestlings fledge by late July. Both males and females incubate egg, and brood and feed the chick. Oldest known bird was 25 years old.

DISTRIBUTION: Pākalakala (gray-backed terns) breed throughout NWHI, and a few pairs have been recorded breeding on Moku Manu off of the island of O‘ahu. Outside of Hawai‘i, pākalakala (gray-backed terns) nest on the Marianas, Howland and Baker, Johnston, Wake, Jarvis, Line Islands, American Samoa, the Marquesas, and Tuamotu. Non-breeding distribution includes the central Pacific Ocean.

ABUNDANCE: In Hawai‘i, population estimated at 44,000 breeding pairs, with largest populations occurring on Lisianski (20,000 pairs), Nihoa (12,000 pairs), and Laysan (10,000 pairs). Worldwide population unknown but likely on the order of 70,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Pākalakala (gray-backed terns) breed on remote islands and atolls. Nests are constructed in a variety of habitats (e.g., rocky ledges, open, sandy beaches) but usually at the base of shrubs or refuse. On Midway and Kure, individuals’ nest on runways. Nests are typically shallow depressions in sand or gravel and

in surf zones, making them vulnerable to storm tides. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Human disturbance: Pākalakala (gray-backed terns) are sensitive to nest disturbance, and flush from nests when humans approach. Exposed eggs and chicks are vulnerable to predation by ‘iwa or great frigatebirds (*Fregata minor*), ‘akekeke or ruddy turnstones (*Arenaria interpres*), kioea or bristle-thighed curlews (*Numenius tahitiensis*), and Laysan (*Telespiza cantans*) and Nihoa (*T. ultima*) finches.
- Manmade structures: On Kure, collisions with man-made structures have resulted in mortality.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of pākalakala (gray-backed terns) should include the following:

- Eradicate cats, mice (*Mus musculus*), and rats from islets off MHI.
- Protect colonies from human disturbance.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to the pākalakala (gray-backed tern) include the following:

- Long-term demographic studies are needed to determine population trends, survival rates, and reproductive success.

References:

- Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.
- Mostello CS, Palaia NA, Clapp RB. 2000. Gray-backed tern (*Sterna lunata*). In The Birds of North America, No. 525 (Poole A, Gill F, editors). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.
- NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (March 10, 2005).

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Seabirds

Noio or Black Noddy

Anous minutus



Photo: USFWS

SPECIES STATUS:

State recognized as Indigenous, NatureServe Heritage
Rank G5 – Secure, North American Waterbird
Conservation Plan –Moderate concern, Regional
Seabird Conservation Plan USFWS 2005, Bird of
Conservation Concern - 2021

SPECIES INFORMATION: The noio or black noddy is a medium-sized, abundant, and gregarious tern (Family: Laridae) with a pantropical distribution. Seven noio (black noddy) subspecies are generally recognized, and two are resident in Hawai‘i: *A. s. melanogenys* (MHI) and *A. s. marcusii* (NWHI). Individuals have slender wings, a wedge-shaped tail, and black bill which is slightly decurved. Adult males and females are sooty black with a white cap and have reddish brown to bright orange legs and feet; bill droops slightly. Flight is swift with rapid wing beats and usually direct and low over the ocean; this species almost never soars high. Often forages in large, mixed species flocks associated with schools of large predatory fishes which drive prey species to the surface. Noio (black noddy) generally forage in nearshore waters and feeds mainly by dipping the surface from the wing or by making shallow dives. Opportunistic, in Hawai‘i, noio (black noddy) primarily takes juvenile goatfish, lizardfish, herring, flyingfish, and gobies. Nests in large, dense colonies that include non-breeding juvenile birds. Established pairs return to the same nest site year after year. Breeding is highly variable and egg laying occurs year-round. Both parents incubate single egg, and brood and feed chick. Birds first breed at two to three years of age, and the oldest known individual was 25 years old.

DISTRIBUTION: Noio (black noddy) breed throughout the Hawaiian Archipelago, including all islands of NWHI and the coastal cliffs, sea caves and offshore islets of MHI. Outside of Hawai‘i, noio (black noddy) breed on islands throughout the world’s tropical oceans. Noio (black noddy) typically remain near (within 80 kilometers [50 miles]) their breeding colonies year-round.

ABUNDANCE: In Hawai‘i, population estimated at 12,000 breeding pairs with the largest populations occurring on Midway Atoll (6,000 pairs) and Nihoa (5,000 pairs). Worldwide population is estimated at 1,000,000 to 1,500,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Noio (black noddy) breed on oceanic and offshore islands, both on low-lying coralline sand islands and high volcanic islands. In Hawai‘i, noio (black noddy) place their nests on ledges and in crevices of coastal cliffs, in sea caves, and in ironwood (*Casuarina* spp.) trees. **Marine:** Nearshore waters.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats, however the MHI support large populations of non-native mammalian predators.
- Native predators: ‘Iwa or great frigatebirds (*Fregata minor*), Laysan Finches (*Telespiza cantans*), and shorebirds will depredate eggs and chicks. Barn Owls potentially predate on Noio/Noio Kōhā at the breeding locations.
- Habitat degradation. Non-native vegetation such as golden crown-beard (*Verbesina encelioides*) can alter potential nesting habitat and the removal of non-native ironwood trees from Midway could result in a reduction in nest sites.
- Human disturbance: Kayak and zodiac tours of sea caves used for nest sites can result in adults flushing from nests, resulting in predation by native birds.
- Nearshore pollution: Because noio (black noddy) forage close to shore, oil spills and dumping of waste may be more important to this species than those that forage far offshore. Oiled individuals are regularly seen in the NWHI.
- Overfishing: Because noio (black noddy) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of noio (black noddy) should include the following:

- Eradicate golden crown-beard and other exotic species on all islands used for breeding, especially those that can change the structure of the existing vegetation (e.g., scale insects).
- Eradication and control of introduced predators at current and potential breeding colonies.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to noio (black noddy) include the following:

- Conduct long-term banding and demographic studies to determine dispersal dynamics and demographic parameters.
- Determine the source of oil affecting birds in the NWHI.
- Determine the significance of recreational activities (e.g., kayaking), and if appropriate determine protocols to reduce disturbance.
- Model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on noio (black noddy) populations.

References:

- Gauger VH. 1999. Black noddy (*Anous minutus*). In The Birds of North America, No. 412 (Poole A, Gill F, editors.). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.
- Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.
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- U.S. Fish and Wildlife Service. 2005. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region. Portland, (OR): U.S. Fish and Wildlife Service.



Photo: Forest and Kim Starr, USFWS

Seabirds

Noio Kōhā or Brown Noddy

Anous stolidus

SPECIES STATUS:

State recognized as Indigenous, NatureServe
Heritage Rank G5 – Secure, North American
Waterbird Conservation Plan – Not currently at
risk, Regional Seabird Conservation Plan -
USFWS 2005

SPECIES INFORMATION: The noio kōhā or brown noddy is a medium-sized, abundant tern (Family: Laridae) with a pantropical distribution, and is very similar to noio (black noddy) in appearance and behavior. Five subspecies of noio kōhā (brown noddy) are recognized, and one (*A. s. pileatus*) is resident in Hawai‘i. Individuals have slender wings and a wedge-shaped tail. Adult males and females are dark brown with a white cap and have a black bill, legs, and feet; males are larger than females. Flight is swift with rapid wing beats and usually direct and low over the ocean, this species almost never soars high. Often forages in large, mixed species flocks associated with schools of large predatory fishes which drive prey species to the surface. Noio kōhā (brown noddy) generally forage in nearshore waters and mainly feed by dipping the surface from the wing or by making shallow dives. In Hawai‘i, diet is comprised mostly of fish, but squid are also taken. Breed in large, dense colonies and nest on the ground, on cliffs or in trees. In Hawai‘i, breeding is synchronous with peaks occurring in the spring and summer. Pairs stay together throughout the year, but there is little information on the length of pair bonds. Both parents incubate the single egg, and brood and feed chick. Birds first breed at three to seven years of age, and the oldest known individual was 25 years old.

DISTRIBUTION: Noio kōhā (brown noddy) breed throughout the Hawaiian Archipelago, including all islands of NWHI and the offshore islets of MHI. Outside of Hawai‘i, noio kōhā (brown noddy) breed on island in the tropical Atlantic and Pacific oceans. Noio kōhā (brown noddy) typically remain near (within 100 kilometers [62 miles]) their breeding colonies year-round.

ABUNDANCE: In Hawai‘i, population estimated at 112,000 breeding pairs with the largest populations occurring on Nihoa (35,000 pairs) and Ka‘ula (35,000 pairs). Worldwide population is estimated 500,000 to 1,000,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Noio kōhā (brown noddy) breed on small islands or islets, both on low-lying coralline sand islands and high volcanic islands and use a wide variety of nesting locations, including the ground, trees, shrubs, cliffs and human-made structures. In Hawai‘i, nests are predominantly located on open ground or under vegetation, or on human-made structures. **Marine:** Nearshore waters.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats. Barn Owls potentially predate on Noio/Noio Kōhā at the breeding locations.
- Native predators: ‘Iwa or great frigatebirds (*Fregata minor*), ‘auku‘u or black-crowned night herons (*Nycticorax nycticorax*), and Laysan (*Telespiza cantans*) and Nihoa (*T. ultima*) finches will depredate eggs and chicks, especially when adults are flushed from nests by human disturbance.
- Overfishing: Because noio kōhā (brown noddy) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of noio kōhā (brown noddy) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to noio kōhā (brown noddy) include the following:

- Conduct long-term banding and demographic studies to determine dispersal dynamics and demographic parameters.
- Model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on noio kōhā (brown noddy) populations.

References:

Chardine JW, Morris RD. 1996. Brown noddy (*Anous stolidus*). In *The Birds of North America*, No. 220 (Poole A, Gill F, editors.). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.

Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.

NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (March 10, 2005).

U.S. Fish and Wildlife Service. 2005. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife

Service, Migratory Birds and Habitat Programs, Pacific Region. Portland, (OR): U.S. Fish and Wildlife Service.



Seabirds

Blue-gray Noddy

Procelsterna cerulean

SPECIES STATUS:

State recognized as Indigenous,
NatureServe Heritage Rank G4 Apparently secure,
North American Waterbird Conservation Plan - High concern
Regional Seabird Conservation Plan - USFWS 2005 ,
Bird of Conservation Concern - USFWS 2021

SPECIES STATUS:

State recognized as Indigenous, NatureServe Heritage Rank G4 Apparently secure, North American Waterbird Conservation Plan - High concern Regional Seabird Conservation Plan - USFWS 2005, Bird of Conservation Concern - USFWS 2021

SPECIES INFORMATION: The blue-gray noddy or Necker Island tern is the world's smallest tern (Family: Laridae) and is widely distributed across the Pacific. Five subspecies are recognized, and one (*P. c. saxatilis*), is resident in Hawai'i. Adult males and females are entirely bluish gray and have a partial white eye-ring, a short, slender bill, and a shallow forked tail.

Flight is characterized by constant and rapid wing beats. The blue-gray noddy feeds nearshore, often with other species, by hover-dipping and surface-dipping. The species captures the smallest prey of any Hawaiian seabird, mainly larval lizardfishes, flounders, goatfishes, and flyingfish, as well as squid, crustaceans, and insects. Blue-gray noddies use a variety of substrates for nesting. In Hawai'i, they nest in aggregations among cavities or crevices in lava flows. In Hawai'i, nesting appear to occur throughout the year, and eggs have been found March through September. Little is known about the breeding behavior or biology of the blue- gray noddy. The oldest known bird was 11 years old, but blue-gray noddies likely live longer.

DISTRIBUTION: Blue-gray noddies breed mainly on Necker and Nihoa, but small colonies also are present on La Perouse Pinnacle, French Frigate Shoals, and Gardner Pinnacles.

Historically the species bred on Ka'ula Island off of Ni'ihau. Outside of Hawai'i, blue-gray noddies nest on islands throughout the Pacific Ocean. Blue-gray noddies typically remain near their breeding colonies year-round, and are rarely found far from land.

ABUNDANCE: In Hawai'i, population estimated at 3,600 breeding pairs with 3,500 pairs on Necker and Nihoa combined. Worldwide population estimated at 100,000 breeding pairs, but inaccessible nesting locations make accurate counts difficult.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: Blue-gray noddies breed on remote islands and atolls. They nest on a variety of substrates, but in NWHI mostly use crevices or cavities in ancient lava flows. Currently all breeding colonies in Hawai'i occur in the Hawaiian Islands National Wildlife Refuge or the Midway Atoll National Wildlife Refuge.

Marine: Nearshore waters.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Native predators: On Nihoa and Laysan, native finches (*Telespiza* spp.) are responsible for considerable egg mortality.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of blue-gray noddy should include the following:

- Continue protection and management of wildlife sanctuaries and refuges.
- Conduct social attraction to protected areas in the MHI.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to the blue gray-noddy include the following:

- Development and implementation of standardized survey protocols to determine current population size and status.

References:

Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.

NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (March 10, 2005).

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Photo: Holly Freifeld, USFWS

Seabirds

‘Ā or Masked Booby *Sula dactylatra*

SPECIES STATUS:

State recognized as Indigenous, NatureServe
Heritage Ranking G5 – Secure, North American
Waterbird Conservation Plan - Moderate concern,
Regional Seabird Conservation Plan - USFWS 2005

SPECIES INFORMATION: The ‘ā or masked booby is the largest booby (Family: Sulidae), and like its Hawaiian congeners, has a pantropical distribution. Four ‘ā (masked bobby) subspecies are recognized, and one (*S. d. personata*) is resident in Hawai‘i. Individuals have long, pointed wings and a short, wedge-shaped tail. Adult males and females are overall white, except for a brownish black tail, black trailing wing edges and black facial skin around the bill. Large bill varies in color from yellow to orange and is brighter in males; females are larger than males.

Flight is characterized by strong flapping interspersed with gliding, rhythmically ascending with flapping and descending while gliding. ‘Ā (masked booby) forage alone or in large, mixed species flocks associated with schools of large predatory fishes which drive prey species to the surface. Forages as far as 150 kilometers (90 miles) from shore, and ‘ā (masked booby) captures prey by plunge-diving from up to 30 meters (100 feet) over the water, often diving to a depth of three to four meters (10 – 13 feet). In Hawai‘i, diet is comprised almost entirely of fish, primarily flyingfish and jacks. ‘Ā (masked booby) breed in dense colonies and most return to their natal colony to breed, and at Kure at least 45 percent of pairs remained together through a second breeding season. Nest on open ground often near a cliff edge or on low sandy beaches; eggs are laid in a shallow scrape. Unlike most seabirds, ‘ā (masked boobies) typically lay two eggs per breeding season. The eggs hatch asynchronously, and the first chick to hatch usually pushes the other sibling out of the nest. In Hawai‘i, breeding season is synchronous, and eggs are laid between January and July and young fledge five months after eggs are laid. Both parents incubate eggs, and brood and feed chicks. Adults continue to feed young up to six months after fledging. Birds first breed at three to four years of age and the oldest known individual was 20 years old.

DISTRIBUTION: ‘Ā (masked booby) breeds mainly in NWHI, but also breeds in MHI on Ka‘ūla, Lehua, and Moku Manu. Outside of Hawai‘i, ‘ā (masked booby) breed on islands in the tropical waters of the Pacific and Atlantic oceans and the Red Sea. Outside the breeding season birds are most common near their breeding colonies, but individuals may wander thousands of kilometers from colonies.

ABUNDANCE: In Hawai‘i, population estimated at 2,500 breeding pairs with most occurring

on NWHI; approximately 450 pairs breed in the MHI. The worldwide population is estimated at several hundred thousand birds.

LOCATION AND CONDITION OF KEY HABITAT: **Terrestrial:** ‘Ā (masked boobies) breed on small islands or islets, both on low-lying coralline sand islands and high volcanic islands, nesting in the open on sandy beaches or on cliff ledges. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.) and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Non-native plants: Invasive plants, mainly golden crown-beard (*Verbesina encelioides*), has resulted in loss of nesting habitat.
- Human disturbance: Pairs often susceptible to human disturbance.
- Overfishing: Because ‘ā (masked booby) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of ‘ā (masked booby) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Eradication of golden crown-beard, especially from Midway Atoll, Kure, and Pearl and Hermes.
- Limit human disturbance to colonies.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to ‘ā (masked booby) include the following:

- Long-term banding and demographic studies are needed to determine dispersal patterns and demographic parameters.
- Model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on to ‘ā (masked booby) populations.

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- Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.
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Seabirds



Photo: USFWS

‘Ā or Brown Booby *Sula leucogaster*

SPECIES STATUS:

State recognized as Indigenous, State
NatureServe Heritage Rank G5 – Secure, North
American Waterbird Conservation Plan –
Moderate concern, Regional Seabird
Conservation Plan - USFWS 2005

SPECIES INFORMATION: The ‘ā or brown booby is a large, striking seabird (Family: Sulidae) with a pantropical distribution. Four ‘ā (brown booby) subspecies are recognized, and two (*S. l. plotus* & *S.l. brewsteri*) are resident in Hawai‘i. Individuals have long pointed wings and a relatively short, wedge-shaped tail. Adult males and females are overall dark brown, with white belly and underwings with a sharp demarcation across lower breast between the white of belly and brown of neck. Large bill and legs and feet are yellow in females and grayish-green in males; females are larger than males. Flight is characterized by strong flapping interspersed with gliding. Will forage alone, but most often forages in large, mixed species flocks associated with schools of large predatory fishes which drive prey species to the surface. ‘Ā (brown booby) generally forages in nearshore waters and captures prey by plunge-diving from one to 15 meters (3 – 50 feet) above the water, often remaining underwater for 25 to 40 seconds. In Hawai‘i, diet is comprised of flying fish, squid, mackerel scad, juvenile goatfish, and anchovy. Nest in small colonies of tens to hundreds of pairs and most return to natal colony to breed. ‘Ā (brown booby) is the only ground nesting booby that builds a nest, and its construction is an important part of courtship. Nests are constructed from whatever is available including branches, seabird bones, and human debris. Unlike most seabirds, ‘ā (brown booby) typically lays two eggs per breeding season. The eggs hatch asynchronously, and the first chick to hatch usually pushes the other sibling out of the nest. In Hawai‘i, peak egg laying occurs between March and May and chicks fledge by September. Both parents incubate eggs and brood and feed chicks. Adults continue to feed young up to 37 weeks after fledging. Birds first breed at four to five years of age and the oldest known individual was 26 years old.

DISTRIBUTION: ‘Ā (brown booby) breed throughout the NWHI and in MHI on offshore islets (e.g., Moku Manu, Lehua), on Moku Mana at Pauwalu Point Seabird Sanctuary on Maui, and possibly on the island of O‘ahu on the cliffs of Ulupa‘u Head at the Kāne‘ohe Bay Marine Corps Base. Outside of Hawai‘i, ‘ā (brown booby) breed on islands in the tropical waters of the Pacific, Indian, and Atlantic oceans, the Caribbean and Red seas, and seas north of Australia. Little is known about movements and distribution outside the breeding season.

ABUNDANCE: In Hawai‘i, population estimated at 1,400 breeding pairs with the largest population occurring on Lehua. Worldwide population estimate for *S. l. plotus* is 50,000 to 70,000 breeding pairs.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: ‘Ā (brown booby) breed on small islands or islets, both on low-lying coralline sand islands and high volcanic islands, nesting on open ground or on cliff ledges. **Marine:** Nearshore waters.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Human disturbance: Newly formed pairs are often very susceptible to human disturbance.
- Overfishing: Because ‘ā (brown booby) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of ‘ā (brown booby) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Limit human disturbance in colonies.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to ‘ā (brown booby) include the following:

- Long-term banding and demographic studies are needed to determine dispersal patterns and demographic parameters.
- Model interactions and importance of predatory fish, seabirds, and their prey to determine the long-term effects of overfishing on ‘ā (brown booby) populations.

References:

Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.

NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (March 10, 2005).

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Seabirds

‘Ā or Red-Footed Booby

Sula sula



Photo: Jack Jeffery

SPECIES STATUS:

State recognized as Indigenous, NatureServe
Heritage Rank G5 – Secure, North American
Waterbird Conservation Plan –Not at risk,
Regional Seabird Conservation Plan - USFWS
2005

SPECIES INFORMATION: The ‘ā or red-footed booby is the smallest booby (Family: Sulidae), and like its Hawaiian congeners has a pantropical distribution. Three ‘ā (red-footed booby) subspecies are recognized, and one (*S. s. rubripes*) is resident in Hawai‘i. Individuals have long pointed wings and a relatively long, wedge-shaped tail. Several color phases exist, ranging from all brown to all white; almost all Hawaiian birds are white. Adult male and females are overall white, except for brownish black primary and secondary wing feathers; females are larger than males. Feet and legs orange to red, bill bluish except for base of lower mandible which is pinkish, and facial skin around bill ranges from pink to red and blue. Flight is characterized by strong flapping interspersed with gliding; may glide for long distances. ‘Ā (red-footed booby) forage alone or in mixed species feeding flocks, generally feeding further from land than congeners. ‘Ā (red-footed booby) capture prey by plunge-diving generally from four to eight meters (13 – 26 feet) over the water. In Hawai‘i, diet is mainly comprised of flyingfish and squid, but also includes mackerel scads, saury, and anchovies. ‘Ā (red-footed booby) breed in colonies ranging from ten to ten thousand pairs and pairs generally retain mates throughout several breeding seasons. Unlike other boobies, ‘ā (red-footed booby) roost and build nests in shrubs or trees. In Hawai‘i, breeding season is synchronous, but can occur throughout the year. Egg laying peaks in February through April and most young have fledged by September. Both parents incubate egg, and brood and feed chick. Adults continue to feed young up to four months after fledging. Birds first breed at three to four years of age and the oldest known individual was 22 years old.

DISTRIBUTION: ‘Ā (red-footed booby) breed throughout the NWHI and at a limited number of sites on MHI including Kīlauea Point National Wildlife Refuge on Kaua‘i, the cliffs of Ulupa‘u Head at the Kāne‘ohe Bay Marine Corps Base on O‘ahu, and on offshore islets including Moku Manu and Lehua; on Maui about 1000 birds arrived in 2018 at Pauwahu Point Seabird Sanctuary and continue to breed there as well as some birds on Moku Mana. Outside of Hawai‘i, ‘ā (red-footed booby) breed on islands in the tropical waters of the Pacific, Indian, and Atlantic oceans, Caribbean Sea, and seas north of Australia. Little is known about the movements of the ‘ā (red-footed booby) outside nesting season, but birds in Hawai‘i appear to disperse eastward and move between islands.

ABUNDANCE: In Hawai‘i, population estimated at between 7,000 and 10,500 breeding pairs. The worldwide population is estimated at less than 300,000 breeding pairs, with the majority residing in the eastern Pacific.

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: ‘Ā (red-footed booby) breed on small islands or islets, both on low-lying coralline sand islands and high volcanic islands. Nest in bushes or trees, including beach magnolia (*Scaevola sericea*), ironwood (*Casurina equisetifolia*), strawberry guava (*Psidium cattleianum*), Hau (*Hibiscus tiliaceus*), and beach heliotrope (*Tournefortia argentea*). Will occasionally nest on deserted man-made structures, on bare ground, or on low piles of vegetation. Builds nest of twigs, grass, and other vegetation. **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests are susceptible to predation by rats (*Rattus* spp.), and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Invasive species: Introduced big-headed ants (*Pheidole megacephala*) at Kure may facilitate the destruction of native vegetation by a non-native scale insect, thus reducing nesting habitat.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of ‘ā (red-footed booby) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Eradication of invasive species that may alter ‘ā (red-footed boobies) nesting habitat (e.g., scale insects).
- Limit human disturbance in colonies.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to ‘ā (red-footed booby) include the following:

- Long-term banding and demographic studies are needed to determine dispersal patterns and demographic parameters.

References:

Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation

plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.

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Seabirds

Iwa or Great Frigatebird

Fregata minor

SPECIES STATUS:

State recognized as Indigenous,
NatureServe Heritage Rank G4 – Apparently secure,
North American Waterbird Conservation Plan – Moderate concern,
Regional Seabird Conservation Plan – USFWS 2005 ,
Bird of Conservation Concern - USFWS 2021

SPECIES INFORMATION: The ‘iwa or great frigatebird is a large, graceful seabird (Family: Fregatidae) related to boobies and tropicbirds, with a pantropical distribution. Five ‘iwa (great frigatebird) subspecies are recognized, and one (*F. m. palmerstoni*) breeds in Hawai‘i. Individuals have slim bodies, a long deeply forked tail, a long-hooked bill, and almost useless legs and feet. Adult males are almost entirely black, with varying amounts of a dark green sheen on head and neck; during courtship males inflate large, red gular pouch. Adult females are larger than males, and are black with a white breast patch and a gray throat; both sexes may have a buff bar on the upper surface of wings. Flight is characterized by long periods of soaring. An adept aerial flier, the species obtains some of its food by harassing other seabirds until they regurgitate their prey. Although ‘iwa (great frigatebird) captures most of its own prey, this behavior inspired both its Hawaiian and English names: ‘iwa means “thief” and “frigate” refers to the fast ships used by pirates. Often feeds far from land alone or in pairs, but will join mixed species feeding flocks, especially ‘ewa‘ewa or sooty terns (*Sterna fuscata*) and ‘ua‘u kani or wedge-tailed shearwaters (*Ardenna pacifica*), feeding over schools of predatory fishes. ‘Iwa (great frigatebird) take prey on the wing, seizing it by dipping bill into water or from the air. In Hawai‘i, diet primarily consists of flyingfish and squid. Nests in colonies, often with other species, ranging from ten to thousands of pairs, and constructs platform nests in low bushes. Unlike many seabirds, pairs usually switch partners every breeding season, likely because females often only nest every two to four years. Both parents incubate single egg, and brood and feed chick. Post-fledging feeding is provided by female for up to 18 months. Birds first breed at eight to ten years of age, and the oldest known individual was 37 years old.

DISTRIBUTION: ‘Iwa (great frigatebird) breed throughout the NWHI. Large numbers roost on offshore islets of the MHI, but breeding has not been documented. Outside of Hawai‘i, ‘iwa (great frigatebird) nest on islands mainly in the tropical Atlantic, Indian, and Pacific oceans. Outside the breeding season, adults remain relatively close to breeding colonies, but young and nonbreeders disperse throughout tropical oceans.

ABUNDANCE: In Hawai‘i, population is estimated at 10,000 breeding pairs with the largest breeding colonies occurring on Nihoa (3,500 – 4,500 pairs) and Laysan (2,000 - 2,500 pairs). Smaller colonies in NWHI include French Frigate Shoals (350 – 375 pairs), Necker (700 - 900 pairs), Lisianski (750 – 850 pairs), Pearl and Hermes Atoll (300 – 400 pairs), and Kure Atoll (200 -250 pairs). Worldwide population is estimated at 500,000 – 1,000,000 individuals. Numbers at roost locations in MHI include Moku Manu (0 - 1 pairs), Ka‘ula (250 – 350 pairs), and Lehua (5 - 10 pairs).

LOCATION AND CONDITION OF KEY HABITAT: Terrestrial: ‘Iwa (great frigatebird) breed and roost on small remote islands, typically within regions with tradewinds. Builds nests in the tops of various species of bushes and trees, including beach naupaka (*Scaevola sericea*), beach heliotrope (*Tournefortia argentea*), pisonia trees (*Pisonia grandis*), and mangrove trees (*Brugiera* spp., *Rhizophora* spp.) **Marine:** Pelagic.

THREATS:

- Introduced predators: Like all seabirds, adults and nests susceptible to predation by rats (*Rattus* spp.) and feral cats (*Felis silvestris*). All sites in NWHI are free of rats and cats.
- Habitat degradation: Introduced herbivores, insects, and plants can degrade native vegetation used for nesting. Rabbits (*Oryctolagus cuniculus*) denuded vegetation on Laysan, Lisianski, and Lehua islands greatly reducing nesting habitat; with the eradication of rabbits, Laysan and Lisianski have since recovered and support large colonies.
- Overfishing: Because ‘iwa (great frigatebird) rely on predatory fish to drive prey to the surface, overfishing may eventually affect Hawaiian populations.

CONSERVATION ACTIONS: The following management goals are important to Pacific seabird conservation: maintain, protect, and enhance habitat; eradicate or control non-natives; minimize bycatch and other negative effects of fishing; improve the effectiveness of oil spill response efforts; identify contaminants and hazardous substances; and minimize the effects of powerlines, towers, wind turbines and lights (USFWS 2005). The goal of these management actions is not only to protect seabird populations and their breeding colonies, but also to re-establish former breeding colonies thereby reducing the risk of extinction. In addition to these efforts, future management specific to Hawaiian populations of ‘iwa (great frigatebird) should include the following:

- Eradication and control of introduced predators at current and potential breeding colonies.
- Continue protection and management of wildlife sanctuaries and refuges.

MONITORING: Continue surveys of population and distribution in known and likely habitats.

RESEARCH PRIORITIES: Most research priorities for seabirds are related to determining the most appropriate methods for achieving the above goals. Research priorities specific to ‘iwa (great frigatebird) should include the following:

- Surveys of colonies to determine current population status.
- Model interactions and importance of predatory fish, seabirds, and their prey to determine the

long-term effects of overfishing on ‘iwa (great frigatebird) populations.

References:

- Metz VG, Schreiber EA. 2002. Great frigatebird (*Fregata minor*) In The Birds of North America, No. 681 (Poole A, Gill F, editors.). Philadelphia, (PA): The Academy of Natural Sciences; and Washington DC: The American Ornithologists' Union.
- Kushlan JA, et al. 2002. Waterbird Conservation for the Americas: The North American waterbird conservation plan, Version 1 Waterbird Conservation for the Americas, Washington, DC. 78pp. Available at: www.waterbirdconservation.org.
- NatureServe. 2003. Downloadable animal data sets. NatureServe Central Databases. Available at: <http://www.natureserve.org/getData/vertinvertdata.jsp> (March 10, 2005).
- U.S. Fish and Wildlife Service. 2005. Regional seabird conservation plan, Pacific Region. U.S. Fish and Wildlife Service, Migratory Birds and Habitat Programs, Pacific Region. Portland, (OR): U.S. Fish and Wildlife Service.



Photo: Forest and Kim Starr, USFWS

Seabirds

Short-tailed albatross

Phoebastria albatrus

SPECIES STATUS:

Federally Listed as Endangered, State Listed as Endangered, NatureServe Heritage Rank G1 – Critically Imperiled, IUCN Red List Ranking – Vulnera

SPECIES INFORMATION: The short-tailed albatross is the largest seabird (Family: Diomedidae) found in Hawai‘i. Adult males and females are mostly white, with varying amounts of black, mostly on the upper side of the wings, and a golden wash on the head. Huge pink bill has a bluish tip and legs and feet are pale pink. Like other albatrosses, they use air currents to glide and soar for long periods of time and feed by seizing prey from the surface while sitting on the water. They forage closer to land than other albatross species. Scavenges from carrion and follows fishing boats. In Japan, their diet consists primarily of shrimp, squid, and fish, including bonita, flyingfish, and sardines. As far back as the 1930s, individuals have occurred among nesting mōlī or Laysan (*P. immutabilis*) and ka‘upu or black-footed (*P. nigripes*) albatross at Midway Atoll. See fact sheets for mōlī or ka‘upu for details of breeding biology.

Like other albatrosses, the short-tailed albatross likely has a life span of at least 50 years.

DISTRIBUTION: Small numbers of birds nest on Midway Atoll and visit Kure Atoll in the Northwestern Hawaiian Islands. Outside of Hawai‘i, the species nests on several small islands offshore of Japan. At sea, the short-tailed albatross ranges widely across the north Pacific Ocean.

ABUNDANCE: The worldwide population is estimated at 4,350 individuals, with an increasing population trend. The population in the Hawaiian Islands is very small; one pair has nested at Midway Atoll since 2011, and another pair (suspected female-female pair) has attempted to breed at Kure Atoll since 2010.

LOCATION AND CONDITION OF KEY HABITAT: **Terrestrial:** Nests on islands and atolls. Nests are similar to other albatross species. **Marine:** Pelagic.

THREATS: The primary threat to this species is the limited breeding distribution, and a catastrophic event at one of the main colonies could have detrimental effect on the population. Other threats to the short-tailed albatross include the following:

- Human disturbance and conflict: Historically the most common albatross in the north

Pacific Ocean, the species' population numbered in the millions. By the 1930s the short-tailed albatross was thought to be extinct as a result of wanton killing for their feathers (millinery trade).

- Fishery bycatch: U.S. longline fisheries bycatch has been greatly reduced in the last 10-20 years and associated mortalities is thought to be infrequent and low. However, the amount of bycatch mortality from fisheries outside of U.S. waters is relatively unknown and remains a potential threat to the species.
- Marine pollution: As is true for other albatrosses, ingestion of plastic debris and toxic effects of oil, metals, mercury, and persistent organic pollutants are threats.
- Catastrophic events: Volcanic eruptions, earthquakes, landslides, and typhoons at breeding colonies have caused reproductive failures on nesting colonies in Japan.

CONSERVATION ACTIONS: Conservation actions for short-tailed albatross should include the following:

- Continue social attraction project (e.g., decoys and playing of vocalizations) to establish a breeding population on Midway and Kure Atoll.
- Continue efforts to reduce fisheries-related seabird bycatch.
- Continue protection and management of existing wildlife sanctuaries and refuges.

MONITORING: Continue satellite tracking of short-tailed albatross to determine at-sea distribution. Continue monitoring of nesting pairs on Midway Atoll and Kure Atoll.

RESEARCH PRIORITIES:

- Estimate annual mortality from U.S. and foreign fisheries bycatch and use demographic models to determine the effect of this mortality on population.
- Research and develop techniques and gear to minimize seabird bycatch.
- Evaluate molting behavior and assess potential vulnerability to oil spills or collisions with vessels during molt.
- Evaluate potential changes to prey availability as a result of climate change.
- Conduct contaminants analyses on addled eggs, feathers, and dead birds as they are available.

References:

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