Bonin Petrel
Pterodroma hypoleuca
Family: Procellariidae

Identification
This small gadfly petrel has a dull blue-gray back and head with a white forehead, chin, and throat. Their underparts are white with a partial grey collar extending from the nape, while their underwings are white with dark margins and a diagonal bar extending from the carpal inward across the coverts. Bonin Petrels have a wedge-shaped tail and flesh colored legs and feet with black toes. Sexes and ages are alike.

Bonins can be easily distinguished from the only other gadfly petrel in Hawaii, the Dark-rumped Petrel (*P. phaeopygia*). Dark-rumped Petrels are much larger and especially long-winged compared to Bonin Petrels. Also, Dark-rumps are darker above and have a narrower black border to white underwing.

Survival and Lifespan
On Midway, the oldest recorded petrel is at least 19 years old. No information exists on survivorship.

Distribution
Breeding (Aug-Jun)
The Bonin Petrel breeds farther north than any other *Pterodroma*, or gadfly petrel, in the Pacific Ocean. The Hawaiian population of the Bonin Petrel currently breeds in the Northwestern Hawaiian Islands on French Frigate Shoals, Laysan, Lisianski, Pearl and Hermes Reef, Midway Atoll, and Kure Atoll. Outside of Hawaii a separate population breeds on the Volcano and Bonin Islands of Japan.

Marine
Outside the breeding season, Bonin Petrels in Hawaii disperse west and north towards Japan, ranging to about 35 - 40ºN from July through April. They feed in waters off Sanriku and east of Honshu and are widely distributed in this area until July and early August. By late August or September, they return to their breeding grounds.

Breeding Ecology
In Hawaii, Bonin Petrels nest on sandy, grassy areas on small, low coral atolls at sea level where they excavate burrows in sandy soils. Breeding is confined to these small islands because of predation elsewhere at otherwise appropriate sites. This species breeds in their natal colonies, forms long-term pair bonds, has high site fidelity, lays only one egg per season, and both parents participate in all aspects of raising the young. Bonin Petrels nest in winter with adults arriving in August and spending the fall months courting, establishing pair bonds, excavating burrows, and nest building. Chicks begin to hatch in early March and fledging occurs approximately 82 days thereafter. By the end of June, adults and chicks have departed the nesting colonies. Late fledglings may be forcibly removed from burrows or killed by arriving Wedge-tailed Shearwater adults. There is no data on age at first breeding. On Midway, 4 pairs bred every year.

Feeding and Prey
- Feeding guild – NOCTURNAL PETREL

- Food capture – Bonin Petrels feed mainly at night; their eyes possess high levels of rhodopsin, a visual pigment that enhances nocturnal vision. They sit on the water while seizing prey and by dipping while in flight

- Foraging Distribution – During the breeding months, adults feed close to their nesting islands.

- Microhabitat for foraging – Bonin Petrels forages offshore in surface waters usually alone but occasionally with Wedge-tailed Shearwaters, Sooty Terns, and Great Frigatebirds. They consume fish that inhabit deep waters by day and surface at night. They are not known to depend on upwellings.

- Diet – This is one of the few *Pterodroma* petrels that feed mainly on fish, although squid are also an important food and to a lesser degree, marine insects and crustaceans. Among food samples collected from breeding colonies in the Northwest Hawaiian Islands, the most important identifiable fish families were midwater lantern fishes (Myctophidae) and hatchetfishes (Sternoptychidae): 2 lantern fishes identified as *Hygophum* sp. and *Myctophum* sp., and 2 hatchetfish as *Argyropelecus* spp. and juvenile goatfishes (Mullidae). Another important component of their diet is squid (Ommastrephidae). Additionally, they may feed on crustaceans and the water strider insect (*Halobates sericeus*). Most prey possess photophores (tiny light emitting organs) and rise to the surface at night or twilight.

Threats and Status

Bonin Petrels once occupied the main Hawaiian Islands but are now extinct there, probably as a result of predation by humans, rats (*Rattus* spp.), dogs (*Canis familiaris*), or pigs (*Sus scrofa*) during prehistoric times. They suffered heavy losses due to rat predation on Midway and Kure Atolls in the Northwest Hawaiian Islands. The population of 500,000 birds on Midway was almost wiped out when rats were introduced during World War II. Additionally, habitat destruction by introduced rabbits (*Oryctolagus cuniculus*) on Laysan and Lisianski caused years of nest failure in the early 1900s. The removal of rats and rabbits on these islands has allowed a slow population recovery.

In the Hawaiian Archipelago, the population is estimated at 270,000 - 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). The worldwide population is unknown.

Main threats to the species include:

- Predators – Adults and nests of burrowing and ground-nesting species are extremely vulnerable to predation by introduced mammals (e.g., rats, cats, dogs). Rat invasion (*Rattus* spp.) on Midway and Kure resulted in declines of breeding populations. Over a 40 year period, the Midway population declined from 250,000 to 5,000 pairs. Currently, rats have been eradicated from all Northwest Hawaiian Islands, but great care needs to be taken to prevent reinvasion.

- Invasive species – Non-native plants, specifically golden crown-beard (*Verbesina encelioides*) and sandbur (*Cenchrus echinatus*), degrade nesting habitat by providing poor soil stabilization. Habitat restoration projects on Midway and Laysan are attempting to remove alien vegetation and to encourage native species. Larger areas of appropriate nesting habitat should decrease the amount of competition with other burrowing species, such as Wedge-tailed Shearwater, and increase breeding success. Introduced big-headed ants (*Pheidole megacephala*) at Kure and Midway may cause nestling mortality, but also facilitate the destruction of native vegetation by a nonnative scale insect.

- Collisions – Disorientation due to artificial lighting increases vulnerability to collisions with man-made structures.

Selected Readings

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