# Hawaiian Dark-rumped Petrel
# (*Pterodroma phaeopygia sandwichensis*)

## 5-Year Review
## Summary and Evaluation

**U.S. Fish and Wildlife Service**
**Pacific Islands Fish and Wildlife Office**
**Honolulu, Hawaii**

# 5-YEAR REVIEW

**Species reviewed:**

Hawaiian Dark-rumped Petrel

(*Pterodroma phaeopygia sandwichensis*)

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# 5-YEAR REVIEW
# Hawaiian Dark-rumped Petrel / (*Pterodroma phaeopygia sandwichensis*)

## 1.0 GENERAL INFORMATION

### 1.1 Reviewers

**Lead Regional Office**:
Region 1, Endangered Species Program, Division of Recovery, Jesse D'Elia, (503) 231-2071

**Lead Field Office**:
Pacific Islands Fish and Wildlife Office, Loyal Mehrhoff, Field Supervisor, (808) 792-9400

**Cooperating Field Office(s)**:
N/A

**Cooperating Regional Office(s)**:
N/A

### 1.2 Methodology used to complete the review:

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office (PIFWO) of the U.S. Fish and Wildlife Service (USFWS) between March 2010 and July 2011. The Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater Recovery Plan (USFWS 1983), was one source of information for this five-year review of the Hawaiian dark-rumped petrel (*Pterodroma phaeopygia sandwichensis*); considerably more recent information about the status and biology of this species were obtained from additional sources, especially from Dr. Nick Holmes formerly of the State of Hawaii's Kaua`i Endangered Seabird Recovery Project. The document was then reviewed by the Recovery Program Lead and the Assistant Field Supervisor for Endangered Species before submission to the Field Supervisor for approval.

### 1.3 Background:

#### 1.3.1 FR Notice citation announcing initiation of this review:
U.S. Fish and Wildlife Service. 2009. Endangered and threatened wildlife and plants; initiation of 5-year reviews of 103 species in Hawaii. Federal Register 74(49):11130-11133.

### 1.3.2 Listing history

Original Listing
**FR notice:** U.S. Fish and Wildlife Service. FR notice: USFWS. 1967. Native Fish and Wildlife: Endangered Species; Federal Register 32(48): 4001.
Date listed: March 11, 1967
**Entity listed:** Species
**Classification:** Endangered

Revised Listing, if applicable
**FR notice:** N/A
**Date listed:** N/A
**Entity listed:** N/A
**Classification:** N/A

**1.3.3 Associated rulemakings**: None

**1.3.4 Review History:**
Species status review FY 2011 Recovery Data Call (August 2011): Uncertain

**Recovery achieved:**
1 (0-25%) [FY 2007 Recovery Data Call] (last year reported)

**1.3.5 Species' Recovery Priority Number at start of this 5-year review:** 2

**1.3.6 Current Recovery Plan or Outline**
**Name of plan or outline**: Hawaiian Dark-rumped Petrel and Newell's Manx Shearwater Recovery Plan.

**Date issued**: April 25, 1983

**Dates of previous revisions, if applicable**: N/A

## 2.0 REVIEW ANALYSIS

### 2.1 Application of the 1996 Distinct Population Segment (DPS) policy

**2.1.1 Is the species under review a vertebrate?**
__X__ ***Yes***
_____ ***No***

**2.1.2 Is the species under review listed as a DPS?**
____ ***Yes***
__X_ ***No***

**2.1.3 Was the DPS listed prior to 1996?**

____ ***Yes***
____ ***No***

**2.1.3.1 Prior to this 5-year review, was the DPS classification reviewed to ensure it meets the 1996 policy standards?**

____ ***Yes***
____ ***No***

**2.1.3.2 Does the DPS listing meet the discreteness and significance elements of the 1996 DPS policy?**

____ ***Yes***
____ ***No***

**2.1.4 Is there relevant new information for this species regarding the application of the DPS policy?**

____ ***Yes***
__X_ ***No***

## 2.2 Recovery Criteria

**2.2.1 Does the species have a final, approved recovery plan containing objective, measurable criteria?**

__X_ ***Yes***
____ ***No***

**2.2.2 Adequacy of recovery criteria.**

**2.2.2.1 Do the recovery criteria reflect the best available and most up-to date information on the biology of the species and its habitat?**

___ ***Yes***
_X__ ***No***

**2.2.2.2 Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria?**

_X__ ***Yes***
____ ***No***

**2.2.3 List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information:**

1. Reduce the annual fallout of Hawaiian dark-rumped petrels to near 0.

This criterion has not been met. The source of fallout (and injury or death) is attraction to and disorientation caused by artificial lights, which leads to birds (especially fledglings), flying in circles for hours and falling exhausted to the ground or colliding with powerlines, buildings, and other structures. Once grounded, the birds are often struck by vehicles, taken by predators, or die of starvation and dehydration. The number of Hawaiian petrel recoveries has been relatively low over the 3 decades the Save Our Shearwater (SOS) program has operated, with an average of approximately 10 birds found grounded per year (SOS 2010). Six or 7 grounded birds were documented in 2010: 2 adults and 5 hatch-year birds based on plumage (S0S 2010). Although generally low, the maximum number of groundings has been as high as 20 birds on Maui (Simons 1983; C. Hodges unpub. data) and up to 30 on Kaua`i (Ainley *et al*. 1995). Growing urbanization on Maui and Kaua`i islands may be expected to increase the number of Hawaiian petrel groundings and should be monitored closely (Simons and Hodges 1998). Programs to shield street lights, turn off nonessential lights during the fledging season, and install large balls on powerlines to reduce groundings are underway on Kaua`i (Appel 2006).

2. Provide long-term protection for the one known Hawaiian dark-rumped petrel nesting colony in Maui.

This criterion has not been entirely met. National Park Service biologists maintain a predator control program and monitor around 200 nests annually at Haleakalā (Simons and Hodges 1998). The Haleakalā population appears relatively stable or increasing (Hodges and Nagata 2001). However, the number of Hawaiian petrels on Maui is estimated at 1,800 birds, all of which are believed to be associated with colonies on Haleakalā (Hodges 1994; Simons 1984, 1985; Simons and Hodges 1998). Predation by feral cats and mongooses reduced hatching and fledging success of Hawaiian petrels studied at Haleakalā in 1979 and 1981 (Simons 1985). Simons (1985) found that an expanded trapping program can control predation on breeding petrels. More recent information suggests there are some Hawaiian petrels using west Maui as well, at sites that are currently unprotected.

Although the majority of Hawaiian petrels nest on Maui, since the recovery plan was published, more colonies have been located on Kaua`i, Hawai`i, and Lāna`i, but to date receive little to no protection. In 2009, the first fencing project on Kaua`i was completed to protect montane nesting habitat for this species. Predator control efforts on Hawai`i Island are limited due to the remote location of the remaining birds (Simons and Hodges 1998). A fencing project for nesting sites in Hawai`i Volcanoes National Park is planned but has not been completely funded to date. On Lāna`i, colony delineation is underway, as well as fencing, habitat restoration, and feral cat trapping (BirdLife International 2011).

3. Develop efficient predator control methods and techniques for use in and around isolated nesting sites.

This criterion has not been met. Although aerial broadcast of rodenticides for conservation purposes has been a legally available predator control tool for several years, its implementation in Hawai`i is fraught with regulatory and socio-political difficulties. Predator-proof fences are widely used in New Zealand and other countries, however these fences are expensive to build and the current technology and design specifications are incompatible with the topography and substrates of remote montane Hawai`i. Methods widely in use today in remote locations to control small carnivores such as cats and mongooses (the latter occurs on other islands but not Kaua`i) are the same as they have been for decades: baited cage traps and soft-jaw traps that must be checked frequently, and conibear traps that can only be used prior to the seabird breeding season to avoid risks to seabirds. The first pig-proof enclosure of a significant Newell's shearwater and Hawaiian petrel colony in montane Kaua`i was built in 2009, and the pigs have been eradicated from within the fence. In 1976, a perimeter fence was erected around the main Hawaiian petrel colony at Haleakalā National Park to exclude feral goats and pigs. This fence likely facilitated an increase in the number of birds in east Maui (BirdLife International 2011).

It is critical to ensure adequate between-island quarantine to prevent mongoose becoming established on Kaua`i.

## 2.3 Updated Information and Current Species Status

### 2.3.1 Biology and Habitat

#### 2.3.1.1 New information on the species' biology and life history:

Since the recovery plan was published, Simons and Hodges (1998) published a compilation of life history and ecological information about the Hawaiian dark-rumped petrel in a species account for the Birds of North America series. Although the account includes information on the Galapagos petrel, it is focused on the Hawaiian petrel. There is more recent information on the breeding phenology of Hawaiian petrels on Kaua`i from radar studies (Deringer 2009) showing significant inter-island difference in breeding phenology. Satellite tagged birds have been tracked travelling more than 6,000 miles on a single foraging trip to and from their breeding colonies (Adams 2007). They also make shorter trips,1-2 nights away, when the chicks are young (D. Ainley, *in litt*. 2011).

Numerous knowledge gaps remain for the Hawaiian petrel such as foraging and other at-sea behavior; annual and age-specific survival, especially for non-breeders; and the scope and severity of threats at sea.

#### 2.3.1.2 Abundance, population trends (e.g. increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family

**size, birth rate, age at mortality, mortality rate, etc.), or demographic trends**:

This species is monitored mainly on the island of Maui, where around 85 percent of the known population nests (Simons 1985, Simons and Hodges 1998). Pelagic surveys estimate the total Hawaiian petrel population at 19,000 (95% CI = 11,000-34,000), including a best estimate of 4,500-5,000 breeding pairs (Ainley *et al*. 1997, Spear *et al*. 1995). However, the discovery of previously unknown colonies may bring the total population estimate higher (BirdLife International 2011). Observation of Hawaiian petrel movements by radar suggests that the total number on Maui exceeds the current estimate of 1,800 individuals (Cooper and Day 2003). On Hawai`i, small numbers breed on Mauna Kea (Bartle *et al*. 1993) with numbers estimated at 150 pairs (Pyle and Pyle 2009). On Kaua`i, 1,600 pairs were estimated (Ainley *et al*. 1997). On Moloka`i, observations suggest small numbers breed there, but there has not been a concerted effort to estimate numbers on this island (BirdLife International 2011, Simons and Hodges 1998). Pyle and Pyle (2009) estimated around 50 pairs on Moloka`i. Surveys in 2006-2007 located a colony of Hawaiian petrels in the cloud forests of Lanaihale and it is thought that the Lāna`i population numbers around several thousand birds, based on the volume of calling during night time listening surveys in April and May (BirdLife international 2011). The current status of the Hawaiian petrel is uncertain due to the difficulty surveying this species. Recent at-sea surveys are currently being analyzed for Hawaiian petrel and Newells' shearwater.

**2.3.1.3 Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.)**:

Genetic diversity and divergence of populations of Hawaiian and Galapagos petrels was examined using allozyme electrophoresis, indicating the existence of a unique genetic variant discriminating between them (Browne *et al*. 1997). Based on this and additional information, the former subspecies were elevated to species level (see section 2.3.1.4).

**2.3.1.4 Taxonomic classification or changes in nomenclature**:

The Hawaiian and the Galapagos populations of the dark-rumped petrel (*Pterodroma phaeopygia*) were elevated to species rank by the American Ornithologists' Union in 2002 (Banks *et al*. 2002). The Hawaiian petrel (*Pterodroma sandwichensis*) and the Galapagos petrel (*Pterodroma phaeopygia*) are quite similar in size and appearance, but were separated on the basis of differences in vocalizations, morphology, and genetics (Banks *et al*. 2002, Browne *et al*. 1997, Tompkins and Milne 1991). Force *et al*. (2007) suggested several characters may be used to visually

distinguish the birds at sea, including plumage, size, shape and manner of flight, and distribution and habitat at sea.

**2.3.1.5 Spatial distribution, trends in spatial distribution (e.g. increasingly fragmented, increased numbers of corridors, etc.), or historic range (e.g. corrections to the historical range, change in distribution of the species' within its historic range, etc.)**:

Breeding colonies have been discovered on west Maui as well as Hawai`i, Kaua`i, Lāna`i, and possibly Moloka`i since the recovery plan was published (Simons and Hodges 1998).

A recent study of stable isotope values of flight feathers demonstrated that Hawaiian petrels nesting on different islands vary in their foraging locations during both the breeding and non-breeding seasons (Wiley *et al*. 2011). The authors (Wiley *et al*. 2011) speculate this may reduce competition between colonies and because a diversity of foraging strategies may provide stability in the face of future environmental change and that preservation of colonies on different islands should be a goal of conservation management of this species.

**2.3.1.6 Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem)**:

Since publication of the recovery plan (USFWS 1983), the amount, distribution, and suitability of nesting habitat for Hawaiian petrels has been diminished. Hurricane Iniki, which struck Kaua`i in September of 1992, was among the most powerful hurricanes ever to strike Hawai`i. The vegetation in montane areas utilized by Hawaii petrels was believed to be severely damaged in many areas. Hurricanes are part of the natural disturbance regime in the Hawaiian Islands, and in and of themselves do not pose a threat to the existence of native species or their habitat. Today, however, landscape-scale changes wrought by such storms facilitate the incursion of invasive plants and animals, especially feral goats, pigs, and sheep, as well as non-native predators into once pristine native habitats and alter their ability to support native biota.

**2.3.1.7 Other**:

As described above in section 2.2.3, criterion #1, a major threat to the Hawaiian petrel is attraction to artificial lights and collision with powerlines and other structures. Since the recovery plan was published, economic development has increased significantly on Kaua`i, with a concomitant increase in infrastructure and in this threat. Collisions with the boundary fence were shown to be a significant threat to Hawaiian petrels at Haleakalā until modification in areas adjacent to their nesting

sites reduced the problem (Simons and Hodges 1998). Fence collisions have been reported on Hawai`i Island as well (Kaegler 1988, cited in Simons and Hodges 1998).

Wind farms are a new threat to Hawaiian petrels. Section 7 consultation and Habitat Conservation Plans (HCPs) are approved or being planned and are likely to affect petrels on Oahu, Maui, Moloka`i, and Lāna`i. To date, at least two Hawaiian petrels have been killed at the west Maui wind farm site.

### 2.3.2 Five-Factor Analysis (threats, conservation measures, and regulatory mechanisms)

#### 2.3.2.1 Present or threatened destruction, modification or curtailment of its habitat or range:

Nesting habitat has been lost from lowland areas due to urbanization and degraded by feral goats and pigs. Nest burrows are trampled by feral goats, sheep, and potentially axis deer (BirdLife International 2011). In addition, suitable nesting habitat is threatened by invasion of non-native plant species, such as strawberry guava (*Psidium cattleianum*), that fundamentally alter the vegetation structure so that petrels cannot excavate burrows or even reach the ground. Habitat degradation by strawberry guava is a major threat to the Lānai Hawaiian petrel colony (BirdLife International 2011).

On Kaua`i, the breeding range appears centralized over the northwest region, which has the most intact remaining native forest and is furthest from human development (Ainley, *in litt*. 2011).

#### 2.3.2.2 Overutilization for commercial, recreational, scientific, or educational purposes:

Not considered a threat to this species.

#### 2.3.2.3 Disease or predation:

A key factor in range contraction of this ground- nesting species is predation by non-native predators. Nestlings are extremely vulnerable as they cannot fly for more than 15 weeks after hatching (BirdLife International 2011). Predation by non-native mammals (rats, cats, and pigs on Kaua`i; these and mongoose on other islands) and non-native barn owls (*Tyto alba*) remains a severe threat to this ground-nesting island seabird, which evolved in the absence of such predators. This threat affects nesting colonies even in the most remote habitats (Simons and Hodges 1998).

West Nile virus and avian flu may pose a risk to the Hawaiian petrel if these diseases reach Hawai`i. Warner (1968) found at least one of a number of Hawaiian petrels reported grounded had a case of avian malaria. This may be one reason this species is now known to nest only locally on the higher volcanic slopes of Maui, Hawai`i, and Kaua`i (Warner 1968).

#### 2.3.2.4 Inadequacy of existing regulatory mechanisms:

Not considered a threat to this species.

#### 2.3.2.5 Other natural or manmade factors affecting its continued existence:

As described above, a threat to Hawaiian petrels is disorientation and fall-out caused by light attraction and collision with structures (Simons and Hodges 1998). It is generally thought that fledglings on their first flight to the sea are particularly susceptible to this threat.

Climate change may also pose a threat to the Hawaiian petrel. However, current climate change models do not allow us to predict specifically what those effects, and their extent, may be for this species.

## 2.4 Synthesis

Threats to the Hawaiian dark-rumped petrel described in the recovery plan continue unabated. Although shielding of lights in recent years may have reduced the exposure of fledglings to this threat, the annual fallout continues. The SOS program on Kaua`i, with assistance from species experts and veterinarians, continually improves techniques for rehabilitating shearwaters and other seabirds that "fall out" because of light attraction or collision with structures and reducing light attraction. The effectiveness of rehabilitation activities in improving the survival of these birds is unknown; only a very small number of bands have been recovered from released birds.

Although predator control now occurs at several Hawaiian petrel breeding sites, the threat posed by introduced predators remains significant throughout the species' range. Progress has been made state-wide on increasing public awareness of fallout, refining survey techniques to yield better data for monitoring population trends, and on two Habitat Conservation Plans that ultimately will provide significant funds for mitigation of incidental take (light attraction, collision). However, none of these efforts has progressed sufficiently to substantially abate threats. In collaboration with the State of Hawai`i Division of Forestry and Wildlife, we have undertaken a statewide review of recovery implementation for Hawaiian petrels and Newell's shearwater with the goal of establishing, with the assistance of land managers and seabird biologists within and outside Hawai`i, a five-year action plan with new priorities for research, management, outreach, and other recovery actions.

Little progress has been made toward addressing the chief threats to or meeting the recovery criteria for Hawaiian petrels. Remnant breeding colonies thought to occur on west Maui, Hawai`i Island, Kaua`i, Lāna`i, and possibly Moloka`i are not mapped or managed. These colonies are certainly subject to predation by alien mammals, possibly are subject to the threat of light attraction and collision, and most are thought to be dwindling as well. Therefore, the Hawaiian dark-rumped petrel still meets the definition of endangered.

## 3.0 RESULTS

### 3.1 Recommended Classification:

**____ Downlist to Threatened**
**___ Uplist to Endangered**
**____ Delist**
____ *Extinction*
____ *Recovery*
____ *Original data for classification in error*
_*X*__ **No change is needed**

### 3.2 New Recovery Priority Number: N/A

**Brief Rationale:**

### 3.3 Listing and Reclassification Priority Number: N/A

**Reclassification (from Threatened to Endangered) Priority Number: ____**
**Reclassification (from Endangered to Threatened) Priority Number: ____**
**Delisting (regardless of current classification) Priority Number: ____**

**Brief Rationale:**

## 4.0 RECOMMENDATIONS FOR FUTURE ACTIONS

1. Obtain new estimates of total abundance from analysis of at-sea survey data (collected by NOAA). (Listing Factors A, C, and E)

2. Continue research to refine radar survey methods to monitor population trends and response to management. (Listing Factors A, C, and E)

3. Ensure compliance with Endangered Species Act sections 7 and 10 with respect to avoiding, minimizing, and mitigating take of listed seabird resulting from lighting, power lines, communications towers, wind turbines, and other structures. (Listing Factor E)

4. Rank potential sites for survey priority and conduct surveys using standard metrics and survey protocol developed to determine presence of breeding birds and delineate perimeter of breeding areas in different habitat types. (Listing Factors A and C)

5. Conduct site ranking for initial colony management for each species and for highest ranked colonies develop threat analyses and approximate budget to address threats. (Listing Factors A and C)

6. Undertake threat mitigation, including fencing, predator control/eradication, and habitat restoration, and monitor effects of threat mitigation. (Listing Factors A and C)

7. Develop and trial translocation methods to create safe, managed colonies. (Listing Factors A and C)

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**Signature Page**
**U.S. FISH AND WILDLIFE SERVICE**
5-YEAR REVIEW of **Hawaiian Dark-rumped Petrel**
**(*Pterodroma phaeopygia sandwichensis*)**

**Current Classification:** E

**Recommendation resulting from the 5-Year Review**:

____ Downlist to Threatened
____ Uplist to Endangered
____ Delist
_X_ No change needed

**Appropriate Listing/Reclassification Priority Number, if applicable:**_____

**Review Conducted By**:
Annie Marshall, Fish and Wildlife Biologist
Jess Newton, Recovery Program Leader
Assistant Field Supervisor for Endangered Species

Approved _____ Date 9/30/2011
**Field Supervisor, Pacific Islands Fish and Wildlife Office**