

**Band-rumped storm-petrel  
(*Oceanodroma castro*)  
Hawai'i Distinct Population Segment**

**5-Year Review  
Summary and Evaluation**

**U.S. Fish and Wildlife Service  
Pacific Islands Fish and Wildlife Office  
Honolulu, Hawai'i**

## 5-YEAR REVIEW

Species reviewed: Band-rumped storm-petrel (*Oceanodroma castro*) Hawai'i DPS

### TABLE OF CONTENTS

<b>1.0 GENERAL INFORMATION .....</b>	<b>2</b>
<b>1.1 Reviewers:.....</b>	<b>2</b>
<b>1.2 Methodology used to complete the review:.....</b>	<b>2</b>
<b>1.3 Background: .....</b>	<b>2</b>
<b>2.0 REVIEW ANALYSIS.....</b>	<b>3</b>
<b>2.1 Application of the 1996 Distinct Population Segment (DPS) policy .....</b>	<b>3</b>
<b>2.2 Recovery Criteria .....</b>	<b>4</b>
<b>2.3 Updated Information and Current Species Status .....</b>	<b>4</b>
<b>2.4 Synthesis .....</b>	<b>21</b>
<b>3.0 RESULTS .....</b>	<b>22</b>
<b>3.1 Recommended Classification:.....</b>	<b>22</b>
<b>3.2 New Recovery Priority Number:.....</b>	<b>22</b>
<b>3.3 Listing and Reclassification Priority Number: .....</b>	<b>22</b>
<b>4.0 RECOMMENDATIONS FOR FUTURE ACTIONS.....</b>	<b>22</b>
<b>5.0 REFERENCES.....</b>	<b>24</b>

**5-YEAR REVIEW**  
**Band-rumped storm-petrel / *Oceanodroma castro***

**1.0 GENERAL INFORMATION**

**1.1 Reviewers:**

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John Vetter, Animal Recovery Coordinator, PIFWO  
Megan Laut, Conservation and Restoration Team Manager, PIFWO

**Lead Regional or Headquarters Office:**

Region 1, Portland Regional Office, Portland, OR

**Lead Field Office:**

Region 12, Pacific Islands Fish and Wildlife Office, Honolulu, HI

**Cooperating Field Office:**

N/A

**Cooperating Regional Office:**

N/A

**1.2 Methodology used to complete the review:**

This review was conducted by staff of the Pacific Islands Fish and Wildlife Office of the U.S. Fish and Wildlife Service (Service), beginning in July 2021. The review was based on the final rule listing this species; peer-reviewed literature, gray literature (government, academic, business, and industry reports), and expert elicitation. The evaluation completed by James Breeden, Wildlife Biologist, was reviewed by John Vetter, Animal Recovery Coordinator, and Megan Laut, Conservation and Restoration Team Manager.

**1.3 Background:**

**1.3.1 FR Notice citation announcing initiation of this review:**

[USFWS] U.S. Fish and Wildlife Service. 2019. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Status Reviews for 91 Species in Oregon, Washington, Hawaii, and American Samoa. Federal Register 84(112): 27152–27154, June 11, 2019.

**1.3.2 Listing history**

Original Listing

**FR notice:** [USFWS] U.S. Fish and Wildlife Service. 2016. Endangered and Threatened Wildlife and Plants; Endangered Status for 49 Species From the Hawaiian Islands; final rule. Department of the Interior, Federal Register 81 (190): 67786–67860.

**Date listed:** October 31, 2016  
**Entity listed:** *Oceanodroma castro*  
**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:**

N/A

**1.3.4 Review History:**

This is the first 5-year review for the band-rumped storm-petrel.

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

6

**1.3.6 Current Recovery Plan or Outline**

**Name of plan or outline:** Recovery Outline for Hawaiian Multi-Island Species

**Date issued:** August 03, 2020

**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?**

Yes  
 No

**2.1.2 Is the species under review listed as a DPS?**

Yes  
 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  
 No

## **2.2 Recovery Criteria**

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

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  
 No

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

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:**

## **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:

The Hawai'i Distinct Population Segment (DPS) of the 'akē'akē (band-rumped storm-petrel, *Oceanodroma castro*) is an endangered seabird that is found throughout the Pacific Ocean basin, and nests in the Hawaiian Islands. Band-rumped storm-petrels are a small seabird measuring approximately eight inches (in) (20 centimeters [cm]) long with a wingspan of 19 in (47 cm), and weighing about 2 ounces (50 grams). The tail is only slightly notched and is almost square in appearance. Plumage is an overall blackish-brown with a white band across the "rump," just above the tail. This species typically flies with a relatively shallow wing-beat and glides on slightly bowed wings as a regular part of flight (Slotterback 2002, p. 2). Both sexes are alike in size and appearance. Vocalizations at breeding colonies can be used to further distinguish this species from other Procellariiformes seabirds (albatrosses and petrels) found throughout Hawai'i (Allan 1962, p. 279; James and Robertson 1985, pp. 391–392).

Band-rumped storm-petrels are ground nesting seabirds, which predominantly nest in cliffs or rocky lava fields (Raine et al. 2017, p. 79; Raine et al. 2020a, p. 94; Galase 2019, p. 27). The current known breeding range of this species in the Hawaiian Islands includes the islands of Hawai'i, Lāna'i, Kaua'i, and Lehua (USWFS 2015, p. 58822). Breeding is also suspected on Maui based on ground calling observations, but no known colonies exist. When breeding, band-rumped storm-petrels utilize dry cliff (dry grasslands and shrublands), wet cliff (wet forest), coastal cliff, and barren lava field habitat types (USFWS 2015, p. 58825; Clark et al. 2020, p. 6; Kim et al. 2020, p. 4; Pe'a et al. 2020, p. 4). Band-rumped storm-petrel calls have also been detected near cinder cones on the southeast slope of Mauna Loa above 6,562 feet (ft) (2,000 meters [m]) and on the slopes of Haleakalā on Maui, indicating potential breeding in these areas (Banko et al. 1991, p. 653; Raine et al. 2020a, p. 94). Due to the remote and often vertical nature of their nesting habitat, the only active nest that has been confirmed is in the Pōhakuloa Training Area (PTA) of the island of Hawai'i, on the slopes of Mauna Loa (Galase 2018). Three other inactive nests have been found in the Hawaiian Islands, one in a small lava tube at 8,500 ft (2,591 m) elevation on the southeastern slope of Mauna Loa volcano on the island of Hawai'i (Hu et al. 2001, p. 235), one on a sheer cliff in remote Pōhakuao Valley on the Nā Pali coast of Kaua'i (Wood et al. 2003, p. 8), and one in a small cave on Lehua Islet (VanderWerf et al. 2007, p. 47), which is located 0.6 miles (mi) (0.97 kilometers [km]) north of Ni'ihau. All inactive nests were located in small caves or crevices and were confirmed by skeletal remains found in the nest. Data suggest that band-rumped storm-petrels prefer deeper crevices, compared to those available within 328 ft (100 m) of nest sites, as they may provide protection from invasive predators (Antaky et al. 2019, p. 4). No other nests have been found to date (Slotterback 2002). Calling activity for band-rumped storm-petrels peaks from 60 to 120 minutes after sunset, as recorded by song meters on Lāna'i (Raine et al. 2020a, p. 94).

Band-rumped storm-petrels are long-lived (15 to 20 years) and likely do not breed until at least the third year (Harrison 1990, p. 148). When not at nesting sites, adults spend their time foraging on the open ocean for small fish, squid, and crustaceans. They are small, and therefore difficult to identify from similarly sized petrels. Band-rumped storm-petrels have been observed feeding during the day, but it is likely that they also feed at night (Harris 1969, p. 105). Little is known about the phenology of band-rumped storm-petrels in Hawai‘i. However, a review of available literature performed by Wood et al. (2003, p. 18) on birds from Kaua‘i indicates that the nesting cycle can last as long as 184 days from the arrival of adults to fledging of chicks. The study postulates that it is approximately 39 days from arrival to copulation, 33 days from copulation to egg laying, 42 days from egg laying to hatching, and 70 days from hatching to fledging (Wood et al. 2003, p. 18). This would mean that the arrival time for band-rumped storm-petrels in Hawai‘i would be mid-May, with egg laying in mid-June, incubation until early August, and fledging in October (Raine et al. 2017, p. 78). However, birds may arrive earlier in the year and go through a pre-laying period of reproduction where they head out to sea after prospecting for burrows or attempting to breed, as seen with other Hawaiian Procellariids (Martinez-Gomez and Jacobsen 2004, p. 36).

The at-sea distribution of band-rumped storm-petrels in the Pacific Ocean is largely unknown, but birds have been seen 600 mi (966 km) north of Hawai‘i, 1,000 mi (1,609 km) south of Hawai‘i, and between Japan and Hawai‘i. The Pacific populations of band-rumped storm-petrels are not known to range near the waters of the U.S. West Coast (Howell et al. 2010, p. 198). Band-rumped storm-petrels in the Atlantic are known to travel immense distances (Howell et al. 2010, p. 198), so it is possible that any of the Pacific records could include the Hawai‘i DPS of band-rumped storm-petrels (KESRP 2019, p. 1). Flock feeding is typical of this species, as is gregarious feeding. They’ve also been known to follow ships, and scavenge from these vessels (Bretagnolle 1993, pp. 141, 159–160).

Because of the small size of band-rumped storm-petrels, they are susceptible to predation from larger fish, such as sharks, while feeding out at sea (Garcia-Barcelona et al. 2019, p. 155). The dark plumage coloration of band-rumped storm-petrels likely acts as a cryptic color against the sea, reducing the likelihood of predation. Additionally, the dark coloration also provides protection against ultraviolet radiation (Bretagnolle 1993, p. 159).

Band-rumped storm-petrels, like several other seabirds in the order Procellariiformes, show a strong attraction to light sources, including artificial lights (Raine et al. 2017, p. 75). Fallout is a term used to describe the grounding of seabirds due to the disorientation or collision, often caused by exposure to anthropogenic sources such as artificial lights, structures, or utility wires. Low levels of fallout have been recorded on Kaua‘i since 1978, where

rehabilitation of band-rumped storm-petrels is performed by the Save our Shearwaters (SOS) Program (Telfer et al. 1987, p. 480). Because of their large range, fallout can occur anywhere where birds may interact with artificial lights. Fallout has been reported from the islands of O‘ahu, Kaua‘i, and Hawai‘i (USFWS 2020, unpublished data).

**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:**

Worldwide, band-rumped storm-petrels have sympatric but temporally isolated (allochronic) populations. Populations of band-rumped storm-petrels in Hawai‘i and Japan only breed during the hot season (hot breeders) (Friesen et al. 2007, p. 18593; Raine et al. 2017, p. 77). Conversely, in the Berlengas, Azores, and the Canary Islands of the Atlantic Ocean, populations breed only during the cool season (cold breeders). We interpret hot season to equate to summer seasons which are hot and drier in Hawai‘i, versus cool seasons that equate to winter months where rain is abundant in Hawai‘i. On Kaua‘i birds have been detected as early as May and as late as September (Raine et al. 2017, p. 76). Other populations breed twice a year, or show evidence of some level of reproduction throughout the year (Bolton et al. 2008, p. 725).

In Hawai‘i, band-rumped storm-petrels breed once per year, where a single egg is laid (Harrison 1990, p. 140). There is one single population that breeds within the Hawaiian Islands (Table 1) (USFWS unpublished data). Population estimates for Hawai‘i DPS of band-rumped storm-petrel are unknown (Table 1), but a study estimated between 171 and 221 nesting pairs on Kaua‘i in 2002 (Wood et al. 2003, p. 6). A total of four nests were located at PTA on the island of Hawai‘i, indicating the presence of at least eight birds in this area, with additional birds spread across other areas of Mauna Loa. No population estimates are available for Lehua or Lāna‘i. These estimated numbers are likely much lower than the actual population numbers, but the cryptic nature of this species makes accurate population estimates challenging. According to a genetics study by Antaky et al. (2020, p. 12) there is no evidence of inbreeding among Hawai‘i DPS band-rumped storm-petrel individuals analyzed and suggests some level of connectivity among subpopulations across the islands.

Table 1. Known populations of the band-rumped storm-petrel from listing to this 5-year review.

<b>Date</b>	<b>Populations</b>	<b>Individuals</b>	<b>Recovery Criteria<sup>1</sup></b>
2016 listing	1	unknown	N/A
2020 recovery outline	1	unknown	N/A
2021 5-year review	1	unknown	N/A

<sup>1</sup>N/A = not available; the recovery plan and species-specific recovery criteria is currently under development and is expected to publish in 2022.

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

Genomic analysis of band-rumped storm-petrels revealed up to seven unique clusters, and phylogenetic construction showed that they represent seven monophyletic groups (Taylor et al. 2019, p. 8). They found that populations from different archipelagos are genetically distinct, and that allochronic populations in different regions evolved independently (e.g., hot breeders versus cold breeders). They concluded that band-rumped storm-petrels encompass multiple cryptic species, with non-geographic isolating mechanisms that are potentially acting as barriers to gene flow. This has implications for conservation as it can overestimate population sizes and ranges (Taylor et al. 2019, entire). Band-rumped storm-petrel populations in Japan and Hawai‘i appear to be the most genetically similar, and have the lowest level of genetic differentiation compared to other populations (Taylor et al. 2019, p. 9).

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

In November of 2019, a proposed rule was published to revise the name *Oceanodroma castro* to *Hydrobates castro* on the list of migratory bird species as a result of recent taxonomic revisions (USFWS 2019a). However, the current listed entity remains *Oceanodroma castro*.

### **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.):**

This species was once found on all main Hawaiian Islands (Figure 1; Harrison 1990, pp. 139–140). Band-rumped storm-petrels currently occupy very limited breeding habitats on vertical cliff faces, as well as in barren lava fields, on four islands (Figure 1). This is thought to be a remnant of the original nesting range, which likely extended upwards from sea level, based on occurrences of bones found in midden sites along the shoreline on O‘ahu (Olsen and James 1982, p. 30). During pre-contact times, the absence of mammalian predators would have allowed ground-nesting seabird populations to extend far beyond their current range, but the true extent of their presence is unknown. According to Athens et al. (1999, pp. 171–172), the seabird population on the lower ‘Ewa Plain was extremely rich, and consisted of a number of ground-nesting species, including band-rumped storm-petrels. The evidence for this species in the region comes from sinkhole deposits. Radiocarbon dating of bones from the area puts their origin between 1573 and 1066 B.C, which lay underneath cultural midden deposits. Band-rumped storm-petrels were almost certainly present following Polynesian arrival in the islands, as their bones

have been found in cultural middens and were likely so abundant that they were sourced as food for early settlers.

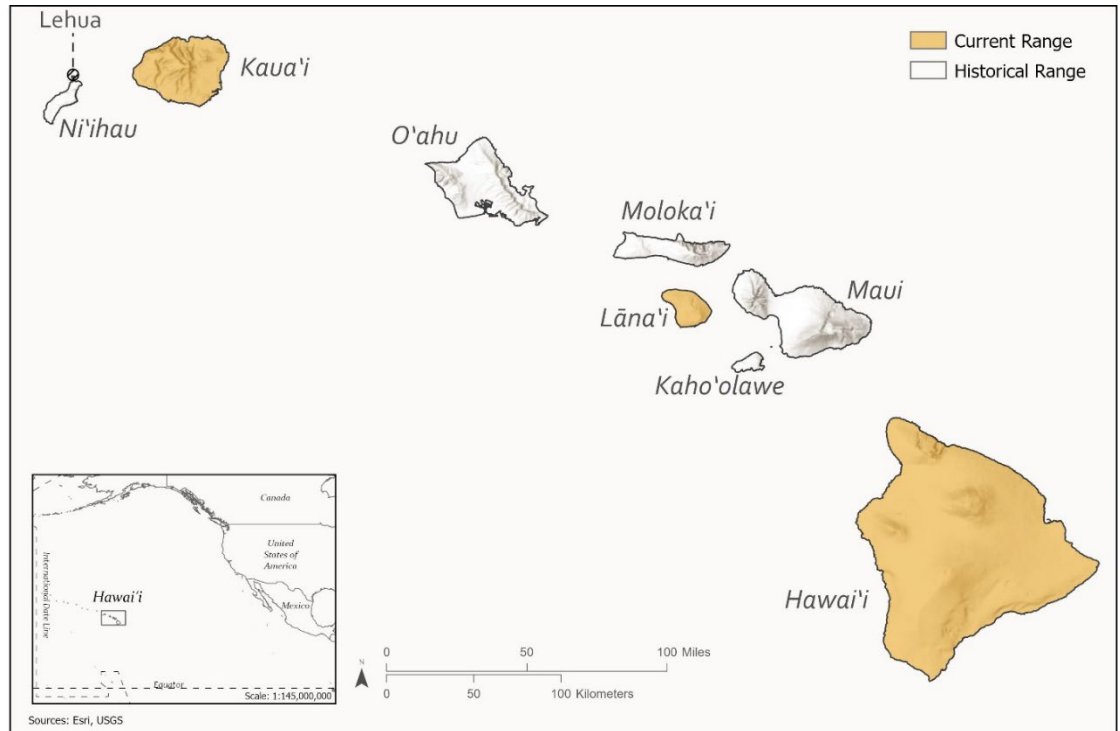


Figure 1. Historic range and current range of the Hawai‘i DPS of band-rumped storm-petrel (USFWS 2020, Unpublished data).

Historically, band-rumped storm-petrels were likely present on all of the main Hawaiian Islands from the island of Ni‘ihau to the island of Hawai‘i (Figure 1). Fossilized remains have been found on the islands of Kaua‘i, O‘ahu, Moloka‘i, and Kaho‘olawe. Bones were found in sea level middens on Kaua‘i (Wood et al. 2003, pp. 3–4). Olsen and James (1982, pp. 30, 33) describe band-rumped storm-petrel bones as very common when discovered in cultural midden sites in Barber’s Point on O‘ahu. Only a few bones were discovered at a single midden site on Moloka‘i, despite intensive screening for small birds. On Kaho‘olawe, two humeri were recovered from sand dunes in 1984, west of Honokanai‘a, and, in 1992, a small portion of a humerus bone was discovered in a small lava tube in Ahupu Gulch. Since no current population information is present, and a large number of feral cats (*Felis catus*) are present on the island, it is possible but unlikely that breeding populations persist on Kaho‘olawe (KIRC 2015, p. 19). No fossils or other prehistoric remains have been identified on the islands of Ni‘ihau, Lehua, Lāna‘i, Maui, or Hawai‘i.

Band-rumped storm-petrels were first observed flying in the Kaulakahi channel in 1893 by Palmer, near the island of Ni‘ihau. Specimens of band-rumped storm-petrels were collected on Ni‘ihau prior to 1900 by Francis Gay, but no description of the habitat is noted (Fisher 1951, p. 36). Ni‘ihau is a privately owned island, and there are no observed records since the initial

collections. Recent evidence of birds on the island of Kaua‘i are noted from collections at the Bishop Museum from Makaweli and Waimea collected in 1893–1894, and from Hanapēpē Valley in 1979 (Wood et al. 2003, p. 3). The presence of a colony was reported from Kaua‘i’s Hono O Nā Pali (HONP) Natural Area Reserve (NAR) in 2001 and songs detected on Lehua in 2002 (Wood et al. 2003, pp. 3, 17–18). Additional monitoring using song meters on Lehua have detected calls that are concentrated on southeastern slopes, and not detected on other areas of the islet (Raine et al. 2017, p. 79). Calls from band-rumped storm-petrels were detected on Maui at Haleakalā Crater in 1970, and again in 1983. Band-rumped storm-petrels were first detected on the island of Hawai‘i in 1949 when a dead juvenile was collected at the Kīlauea Military Camp and a subsequent collection of remains on Mauna Loa in 1968. A live fledgling was collected at the Kulani Correctional Facility in 1988 (Wood et al. 2003, p. 2). There are no historic records known for band-rumped storm-petrels from Lāna‘i, and they were first detected on that island in 2018 using song meters (Raine et al. 2020, p. 94).

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

Band-rumped storm-petrels are currently confirmed or likely breeding on Lehua Islet, Kaua‘i, Lāna‘i, and the island of Hawai‘i. These are areas where there have been visual observations of the birds, ground calls recorded on song meters, or recent remains that indicate they are present and not just transiting through the area. The species may potentially breed on Maui, where inconclusive evidence exists.

On Lehua, the remains of a band-rumped storm-petrel chick were found on the islet, indicating that the species likely nests there even though no active nests were confirmed (VanderWerf et al. 2007, p. 39). The area where nesting is suspected on Lehua is mainly concentrated on the southeastern coastal steep slopes, with little vegetation (Raine et al. 2017, p. 79).

On Kaua‘i, Raine et al. (2017, pp. 74–79) used mist nets and acoustic monitoring to confirm the presence of band-rumped storm-petrels from June through October, which coincides with their breeding season. Birds were captured across multiple years, and for birds captured during the months from June to September (n=36), brood patches were recorded on 94.6 percent of birds. They also recorded fledglings in the area, the majority of which were observed during October. On Kaua‘i, band-rumped storm-petrel breeding areas are found along the northwestern coast, with larger concentrations in the narrow valleys of the Na Pali coast, as well as the sheer walls of the Waimea Canyon in the southwest region. Small colonies were located on sparsely vegetated cliff faces in Lumahai and Wainiha valleys as well (Raine et al. 2017, p. 79). Wood et al. (2003, p. 6) located suspected band-rumped storm-petrel colonies in the Pōhakuao, Nu‘ulolo ‘Āina, Nu‘ulolo Kai, Kalalau,

Awa‘awapuhi vista, Honopū, and Waimea valleys using visual observations, acoustic monitoring, and surveys performed by rappelling down the cliff face and searching for nests. Population estimates for band-rumped storm-petrels are unknown, but a study estimated between 171 and 221 nesting pairs on Kaua‘i in 2002 (Wood et al. 2003, p. 6).

Song meters have been used on Lāna‘i and band-rumped storm-petrels have been detected along Maunalei Gulch, with peak activity occurring 60–120 minutes after sunset (Raine et al. 2020a, p. 94). Due to the high volume of calls in the area, it is almost certain that band-rumped storm-petrels are breeding in the gulch.

On the island of Hawai‘i, band-rumped storm-petrel breeding has been confirmed through the discovery of four active nests at the PTA on the slopes of Mauna Loa (Galase 2019, p. 27). The nests were located in lava tubes on barren lava flows, with the aid of a detector dog (*Canis familiaris*), acoustic monitoring, night vision surveys, and remote camera surveillance (Galase 2019, p. 26). In addition, an analysis of song meter data revealed the presence of band-rumped storm-petrels at 9 different sites on the northern slopes of Mauna Loa, with calls peaking 110 to 170 minutes after sunset (DOFAW 2019, p. 18), indicating the presence of a wide distribution within this area. An analysis of song meter data from the eastern slopes of Mauna Loa in Hawai‘i Volcanoes National Park (HAVO) revealed numerous band-rumped storm-petrel calls, indicative of in-burrow calling that indicates the high likelihood of breeding in the area (HAVO 2020, p. 15). Band-rumped storm-petrel calls have also been detected along the southwest rift of Mauna Loa at elevations up to 9,701 ft (2,957 m) at volcanic cones (Banko et al. 1991, p. 653).

On Maui auditory surveys have detected band-rumped storm-petrel calls at Haleakalā crater, as well as nearer to the ocean. Calls were first detected in 1970 within Haleakalā crater. Based on pre-listing surveys in 1992, three to five individuals were suspected from Maui and were detected over land during the presumed breeding season (Wood et al. 2003, p. 2). In addition, there have been reports of band-rumped storm-petrel calls being detected over the bogs of Haleakalā National Park, but to date no nesting colonies have been discovered in the area (Bailey 2009, pp. 2–3). In the West Maui mountains, two exclosures have been constructed at Makamaka‘ole, designed to attract nesting seabirds to the site. In 2020, a dead band-rumped storm-petrel was discovered in one of the artificial burrows, suggesting that the species may be attracted to the site (Bogardus 2020, pers. comm., entire). Band-rumped storm-petrels are also suspected to nest in cliff sites in the Kahikinui Forest Reserve, and auditory surveys are underway to confirm their presence, prior to the construction of an ungulate-proof fence (Conservation Metrics 2021, entire). Despite the presence of birds over the island, breeding sites of band-rumped storm-petrels have not been confirmed on Maui.

## 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:

*Habitat Destruction or Modification by Invasive Species* – Ground-nesting seabirds such as the band-rumped storm-petrel and their offspring are particularly vulnerable to threats while on their breeding grounds, as they are unable or unwilling to depart the burrow in the event of nest disturbance. Invasive ungulates, such as pigs (*Sus scrofa*), goats (*Capra hircus*), axis deer (*Axis axis*), mule deer (*Odocoileus hemionus*) and mouflon sheep (*Ovis musimon*), are a threat to band-rumped storm-petrels, as their activities lead to modification of the native habitat. These introduced ungulates are a threat to native ecosystems and have drastically altered native plant populations, most of which lack defensive mechanisms to deter herbivory (Chynoweth et al. 2010, p. 42). Their herbivory and trampling results in erosion, which washes away nesting habitat and makes the area susceptible to rockfalls. Rockfalls can directly injure or crush adults, as well as eggs and chicks. Additionally, ungulates facilitate the spread of nonnative plants, and severely degrade the landscape (Chynoweth et al. 2010, p. 44).

The invasion of seabird nests by ants is also an emerging threat to band-rumped storm-petrel burrows in Hawai‘i. Yellow crazy ants (*Anoplolepis gracilipes*) were observed invading nests of ‘ua‘u kani (wedge-tailed shearwaters, *Ardenna pacifica*), a burrowing seabird species in Hawai‘i (Plentovich et al. 2017, p. 77). The number of active burrows decreased following the invasion of ants, likely as nest sites were abandoned prior to egg laying. In the event that hatching did occur, chicks in areas invaded by the ants displayed developmental abnormalities (Plentovich et al. 2017, p. 77). Boieiro et al. (2018, p. 48) observed that invasive ants killed a Barolo shearwater in Cape Verde, a species of seabird that nests in the same area as band-rumped storm-petrels. Yellow crazy ants are an emerging threat in coastal lowland areas such as Lehua and some areas of Kaua‘i, but elevation could be a limiting factor that would prevent invasion of nests in montane areas. Yellow crazy ants are typically found in elevations below 3,937 ft (1,200 m) (Abbott 2005, p. 266).

While not known from observations of band-rumped storm-petrels, a potential threat is feral honeybees (*Apis mellifera*), which have been observed invading burrows of ‘ua‘u (Hawaiian petrel, *Pterodroma sandwichensis*) and ‘a‘o (Newell’s shearwaters, *Puffinus auricularis newelli*) that nest in the same habitat. Feral bees are recorded regularly in Kaua‘i’s HONP NAR and have caused both the abandonment of seabird burrows, as well as fatalities of seabird chicks and adults as a result of stings (Raine et al. 2020b, p. 48). In

2019, for example, there was a visit by bees at a monitored Newell's shearwater burrow at the Pīhea seabird monitoring site. Bees were observed entering a previously occupied burrow, which ultimately failed for unknown reasons (Raine et al. 2020c, p. 47). In 2020, a swarm of feral bees inhabited a Procellarid seabird burrow at the Upper Limahuli Preserve, making it unavailable for the season, and potentially endangering seabirds in surrounding burrows (Nagendra 2020, pers. comm., entire).

*Habitat Destruction or Modification by Stochastic Events* – Stochastic events such as hurricanes, drought, and landslides have the potential to negatively impact band-rumped storm-petrel breeding grounds. The size and intensity of large-scale storms are expected to increase in coming years, and recent data demonstrates category 4 and 5 hurricanes have increased at a rate of 25–30 percent per degrees Celsius (°C) (1.8 degrees Fahrenheit [°F]) increase in global warming (Holland and Bruyere 2014, p. 625). Specifically, Hawai'i is expected to see an increased probability of active hurricane seasons, particularly during those years which coincide with an El Niño event (Murakami et al. 2015, p. S118). Because of climate change, there is an increased frequency of extreme El Niño events, and a warming of sea surface temperatures (SST) in the eastern Pacific where most Hawai'i bound hurricanes originate (Cai et al. 2014, p. 115).

An increase in El Niño dry seasons, and subsequent La Niña wet seasons, is expected to alter rainfall levels in Hawai'i, potentially leading to periods of drought or flooding that could have an effect on vegetation and nesting seabirds. Already, the recorded rainfall in Hawai'i during La Niña years has undergone abnormal variability dating back to the early 1980s, with lower than normal levels of precipitation observed (O'Conner et al. 2015, p. 7814). The western Pacific warming pool has expanded to nearly double its previous size from 1980 to 2018 (Roxy et al. 2019, p. 648). Modeling data shows a correlation between increased SST in the western Pacific warming pool and negative rainfall anomalies in Hawai'i (O'Conner et al. 2015, p.7820). This is particularly pronounced on the southern and western sides of O'ahu and Kaua'i, which would receive most of their precipitation during this period. This could lead to the death of vegetation, which helps to stabilize cliff areas where band-rumped storm-petrels nest. Conversely, La Niña wet seasons can lead to increases in large-scale rain and flooding events and landslides which can directly affect nesting areas.

Variability in rainfall levels and increases in storm events could lead to landslides, which could directly impact band-rumped storm-petrel nesting sites, as well as access for seabird monitoring. After historic flooding on Kaua'i in early 2018, a number of landslides were reported in the Upper Limahuli Preserve (ULP) destroying seabird burrows and reducing access to the site (Raine et al. 2019b, p.16). The Upper Limahuli Preserve is a known montane breeding site for the Hawaiian Petrel and Newell's shearwater, but

no band-rumped storm-petrel burrows have yet been observed. The breeding habitats are similar, and likely have a similar susceptibility for landslides. Subsequent landslides at ULP in 2020 caused the destruction of a seabird burrow belonging to an endangered Procellariid (Raine et al. 2020d, p. 17). This site, as well as others in the area, continue to be at risk for landslides due to their steep terrain, making management of this area a challenge for biologists (Nagendra 2020, in litt., entire).

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

There is currently no evidence to suggest that overutilization for commercial, recreational, scientific, or educational purposes poses a threat to the Hawai‘i DPS of the band-rumped storm-petrel.

### **2.3.2.3 Disease or predation:**

*Disease* – The best available information does not indicate that disease is a threat to the Hawai‘i DPS band-rumped storm-petrel.

*Breeding Colony Predation* – Introduced predators, primarily barn owls (*Tyto alba*), rats (*Rattus* spp.), mongooses (*Herpestes javanicus*), and cats are believed to be the most serious terrestrial threat facing band-rumped storm-petrels in Hawai‘i. Band-rumped storm-petrels lack effective predator defenses and have a lengthy incubation and fledgling period, making adults, young, and eggs highly vulnerable to predation by introduced vertebrates. Due to the number of terrestrial predators that can impact birds at all life stages, they have an effect at the population level.

Wood et al. (2003, p. 4) observed introduced barn owls flying along basalt cliff faces where band-rumped storm-petrels likely nest in Pōhakuao, Kaua‘i. The closely related Newell’s shearwater and Hawaiian petrel both nest in remote, high-elevation sites on Kaua‘i close to band-rumped storm-petrels and barn owls are known predators of both species. From 2011 to 2018 they were confirmed to have killed 21 endangered seabirds (Raine et al. 2019a, p. 34). An additional two barn owl depredations were recorded at a single monitoring site during the 2019 seabird monitoring season (Raine et al. 2020b, p. 3). The loss of adult seabirds is of particular concern, as survivors of breeding age represent a loss of future breeding potential, as well as a decline in the population rate. Barn owls likely predate upon band-rumped storm-petrels as well, and a lack of direct evidence has been attributed to their small size and cryptic nature. According to a study by Raine et al. (2019a, p. 35), barn owls are regularly attracted to the calls of band-rumped storm-petrels at mist-netting sites, indicating a high likelihood that predation of the species occurs. In 2013, in the Nualolo ‘Āina area of Kaua‘i, the remains of a band-rumped

storm-petrel was found consistent with barn owl predation (Raine et al. 2017, p. 79). Barn owls predate upon birds in the chick and adult life stage.

Rats are among the greatest threats to band-rumped storm-petrels and other ground-nesting seabirds, and are able to predate upon the species any time that they are on land. The three rat species that have been documented seabird predators in Hawai‘i are black rats (*Rattus rattus*), Norway rats (*Rattus norvegicus*), and Polynesian rats (*Rattus exulans*). In Newell’s shearwater nesting colonies, rats have been observed predated upon all life stages of the bird on a near constant basis, but have the largest impact on eggs and chicks. Active seabird monitoring occurs in the montane colonies in, and nearby to, Kaua‘i’s HONP NAR. At one management site within the HONP NAR monitored by cameras, a total of 1,942 rat visits were recorded on camera during the 2019 season (March to November) (Raine et al. 2020c, p. 36). Band-rumped storm-petrel populations on Kaua‘i, Lehua, and Lāna‘i all nest on cliff habitats, where access to nests is difficult. However, it does not remove the risk of all mammalian predators. On Kaua‘i, while performing auditory surveys for band-rumped storm-petrels in the HONP NAR, Wood et al. (2003, p. 8) noted that two live rats were observed walking on tiny rock ledges along vertical cliffs. In the same study, a cave that was accessible to researchers contained the bones of a small bird (suspected to be a band-rumped storm-petrel) along with rat bones, indicating that the two likely interact.

Predation from cats is another serious threat to the continued existence of band-rumped storm-petrels. Feral cats that roam Newell’s shearwater and Hawaiian petrel nesting sites near the HONP NAR have been directly responsible for a large number of confirmed predation events since monitoring efforts began. Cat trapping takes place at three seabird breeding colonies within the HONP NAR. During the 2018 calendar year, a total of 30 cats were removed from baited traps within the three sites (Pias 2019, p. 17). Satellite/GPS tracking collars have been deployed on released cats to study their movement and habitat use within the HONP NAR area (Pias et al. 2017, p. 41). Preliminary results of the study indicated that cats travel over large distances within the HONP NAR, in one case covering 20,035 acres (8,108 hectares) over the course of 41 days (Dutcher 2020, in litt., entire). At the PTA nesting areas on the island of Hawai‘i, cat scat was found near a possible burrow location, which contained bones that were likely from band-rumped storm-petrels (Galase et al. 2016, p. 20). While there is no direct evidence of cats predated upon eggs, they do kill adults and chicks. Any eggs left unattended as a result of parental cat predation would indirectly fail as a result.

In addition to threats from introduced predators, there are several native species that also threaten the band-rumped storm-petrel. The endemic pueo (Hawaiian owl, *Asio flammeus sandwichensis*) has been seen circling seabird colonies during daylight hours on Kaua‘i, in areas where band-rumped storm-

petrels are likely nesting (Wood et al. 2003, p. 4). This native owl has not been observed predating upon other native seabird species, but due to the small size of band-rumped storm-petrels, it is possible that predation could occur. The Galapagos short-eared owl (*Asio flammeus galapagensis*), which is similar in size to the pueo, is a known predator of band-rumped storm-petrels on those islands, as indicated by remains discovered in owl pellets (Harris 1969, p. 102).

*Oceanic Predation* – The feeding behavior of band-rumped storm-petrels at the ocean’s surface puts adult and sub-adult birds at risk from predatory fish that may attack while they are feeding. When band-rumped storm-petrels were examined near the Galapagos Islands, 7 percent of them showed injury to their feet, presumably from predatory fish (Harris 1969, p. 106). Stomach contents of blue sharks (*Prionace glauca*) caught off a commercial longline boat off Cape Verde in the Central Atlantic ocean were examined, and band-rumped storm-petrel remains were found in the stomachs of two sharks, indicating predation by sharks does occur (Garcia-Barcelona et al. 2019, p. 155). Blue sharks are found in temperate and tropical oceans including in those surrounding Hawai‘i, along with at least 39 other shark species. This individual threat can cause direct mortality to birds, or may damage or injure birds and reduce reproductive fitness.

#### **2.3.2.4 Inadequacy of existing regulatory mechanisms:**

*Inadequate Regulatory Mechanism Inadequate Habitat Protection* – Nonnative feral ungulates pose a threat to band-rumped storm-petrels through destruction and degradation of the species’ habitat and herbivory but regulatory mechanisms are inadequate to address this threat (USFWS 2015, entire). The State of Hawai‘i provides game mammal (feral pigs and goats, deer, and mouflon sheep) hunting opportunities across the state (Table 2; HDLNR 2015, pp. 19–21 and 66–77). However, the State’s management objectives for game animals range from maximizing public hunting opportunities (e.g., “sustained yield”) in some areas to removal by State staff, or their designees, in other areas (HDLNR 2015, entire).

*Inadequate Regulatory Mechanism Introduction of Nonnative Plants and Insects* – Currently, four agencies are responsible for inspection of goods arriving in Hawai‘i (USFWS 2015, entire). The Hawai‘i Department of Agriculture inspects domestic cargo and vessels and focuses on pests of concern to Hawai‘i, especially insects or plant diseases. The U.S. Department of Homeland Security-Customs and Border Protection is responsible for inspecting commercial, private, and military vessels and aircraft and related cargo and passengers arriving from foreign locations (USFWS 2015, entire). The U.S. Department of Agriculture-Animal and Plant Health Inspection Service-Plant Protection and Quarantine inspects propagative plant material, provides identification services for arriving plants and pests, and conducts

pest risk assessments among other activities (HDOA 2009, p. 1). The Service inspects arriving wildlife products, enforces the injurious wildlife provisions of the Lacey Act (18 U.S.C. 42; 16 U.S.C. 3371 *et seq.*), and prosecutes violations of the Convention on International Trade in Wild Fauna and Flora. The State of Hawai‘i allows the importation of most plant taxa, with limited exceptions (USFWS 2015, entire). It is likely that the introduction of most nonnative invertebrate pests to the State has been and continues to be accidental and incidental to other intentional and permitted activities. Many invasive weeds established on Hawai‘i have currently limited but expanding ranges. Resources available to reduce the spread of these species and counter their negative ecological effects are limited. Control of established pests is largely focused on a few invasive species that cause significant economic or environmental damage to public and private lands, and comprehensive control of an array of invasive pests remains limited in scope (USFWS 2015, entire).

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

*Light Attraction and Fallout* – Band-rumped storm-petrels are particularly vulnerable to the effects of artificial lights, which act as an attractant, causing disorientation, confusion, and eventual grounding. The effects of artificial lights lead to a condition known as fallout, where fledgling young and adults are grounded and unable to regain flight, making them vulnerable to depredation or dehydration (Telfer et al. 1987, p. 410; Ainley et al. 2001, p. 109; Banko et al. 1991, p. 651). Newell’s shearwaters account for 95 percent of annual seabird fallout on the Kaua‘i, but small numbers of Hawaiian petrels and band-rumped storm-petrels are also recovered (Telfer et al. 1987, p. 407). This is thought to be an underestimate of actual fallout numbers for band-rumped storm-petrels due to their small size, and propensity for hiding once they fall to the ground. Though uncommon, fallout of band-rumped storm-petrels on O‘ahu has also been recorded (USFWS 2020, unpublished data).

Since 1979, a total of 40 band-rumped storm-petrels have fallen out and been processed by the Save Our Shearwaters (SOS) program on Kaua‘i, with an annual high of three birds in 2015 (Anderson 2015, p. 4–13). The majority of these birds landed on various cruise ships transiting off the coast of Kaua‘i. The ships subsequently docked at Nāwiliwili Harbor, Kaua‘i and submitted injured birds to SOS for care (Anderson 2015, p. 4–13).

A number of factors can influence the likelihood of fallout due to light attraction beyond just the presence of bright lights. These include factors such as moon phase, location of burrow in relation to human populations and the coastline, topography, cloud cover, bulb color and intensity, and light height (Troy et al. 2003, p. 226). Periods of diminished moonlight, such as seen during a new moon phase, increases the likelihood that fallout will occur in Procellariid seabird species that nest on Kaua‘i (Troy et al. 2003, p. 232).

*Low Numbers of Individuals and Populations* – Species with low numbers of individuals, restricted distributions, and small, isolated populations are often more susceptible to extinction as a result of natural catastrophes such as hurricanes or disease outbreaks, demographic fluctuations, or inbreeding depression (Shaffer 1981, p. 131). These problems associated with small population size are further magnified by interactions with each other and with other threats, such as habitat loss and predation (Lacy 2000, pp. 45–47). The band-rumped storm-petrel is represented in Hawai‘i by very small numbers of colonies, and perhaps not more than a few hundred individuals (Harrison 1990, p. 49). A single human-caused action such as establishment of mongooses on Kauai, or a hurricane during the breeding season, could cause reproductive failure and the mortality of a significant percentage of the remaining individuals. Threats to this species include habitat destruction and modification, landslides and erosion, hurricanes, predation, injury and mortality from lights and structures, and other human factors (such as commercial fisheries). The effects of these threats are compounded by the current low number of individuals and populations of band-rumped storm-petrel.

*Collisions* – When band-rumped storm-petrels were listed as endangered in 2016, collisions with structures was listed as a threat (USFWS 2016, p. 67,811). When birds become disoriented or blinded as a result of light attraction, they fly into unforeseen objects such as buildings or other structures (Telfer et al. 1987, p. 410). In addition to these light-caused instances, other stationary objects such as communications towers, poles, and power lines may pose a risk to transiting birds that might not see the objects on moonless nights. While not observed for band-rumped storm-petrels, Newell’s shearwaters and Hawaiian petrels do interact with power lines. Dead seabirds for these federally listed species have been observed or seabird power line collisions have been detected at all power line regions and wire constructions on Kaua‘i, as reported by the Underline Monitoring Program (UMP) (Travers et al. 2020, p. 20). The UMP program revealed that 27 percent of the observed seabird power line collisions resulted in immediate and negative post-collision outcomes, including death and loss of flight. Approximately 70 percent of seabirds were able to maintain or regain flight following collision, but it is unknown if any deleterious effects may develop as a result of collision (Travers et al. 2020, p.9).

*Wind Farms* – There is a lack of sound science that assess the effects of wind farms on seabirds (Green et al. 2016, p. 1635). Band-rumped storm-petrels have lower wing loading (due to their small size) and can increase their air speed more proportionately than birds with higher wing loading, which may contribute to their interactions with wind farms (Spear and Ainley 1997, p. 241). Wind farms are a new threat to band-rumped storm-petrels, after the first death of a Hawai‘i DPS band-rumped storm-petrel was recorded in June of 2020 at Auwahi Wind on Maui (Salbosa 2020, in litt., entire). Prior to the

incident, band-rumped storm-petrels had been excluded from incidental take permits issued to wind farm applicants, because they had not been previously recorded from the project areas and because of the overall rarity of the species in Hawai‘i (USFWS 2019b, p. 53).

*Fisheries Interactions* – Other factors that may negatively affect the band-rumped storm-petrel include commercial fisheries interactions and alteration of prey base upon which the band-rumped storm-petrel depends. Commercial fisheries are known to adversely affect certain species of seabirds (Furness 2003, pp. 33–35). Seabirds are caught in fishing gear and suffer mortality by drowning. Seabirds also come into contact with and consume deep-water fish to which they would not normally have access, and can become contaminated by high levels of heavy metals in these fish (Furness 2003, p. 34). Commercial fisheries also cause depletion of small pelagic schooling fish, a significant food source for seabirds (Furness 2003, p. 34). The potential effects of these activities have not been assessed for the band-rumped storm-petrel; however, storm-petrels have been observed to attend fishing vessels (e.g., Yorio and Caille 1999, p. 21; Yeh et al. 2013, p. 146), and the effects of fishery interactions on this species are likely to be similar to those documented for other seabird species in the order Procellariiformes. In addition, plastics and other debris in the open ocean can be ingested accidentally by band-rumped storm-petrels and pose a threat to this species (Ryan 1990, p. 629). Although a study by Moser and Lee (1992, p. 85) found no evidence of plastic ingestion by band-rumped storm-petrels, the sample size was very small (4 individuals) and inadequate to conclusively determine whether this species suffers from ingestion of plastics. Other species of storm-petrels have been documented to ingest plastics (Bond and Lavers 2013, p. 3; Ryan 2015, p. 20; Wilcox et al. 2015, p. 3), and band-rumped storm-petrels are likely to do so also. Many closely related seabirds do suffer ill effects from ingestion of plastics, including physical damage to the digestive tract, effects of toxins carried on the plastics, and resulting mortality (Ryan 1989, pp. 623–629; Tanaka et al. 2013, pp. 2–3).

*Effects of Climate Change* – Large scale anthropogenic impacts like climate change are expected to alter wind and sea currents, potentially affecting flight and foraging patterns of band-rumped storm-petrels. According to the Intergovernmental Panel on Climate Change, human activities have caused a 1°C (1.8 °F) increase in temperature above pre-industrial levels, and if the current rate of warming remains constant, we could reach an increase of 1.5°C (2.7 °F) by the year 2030 (IPCC 2018, A1, p. 6). A global warming of 1.5°C (2.7 °F) is expected to shift the range of many marine species to higher latitudes, and reduce the productivity of fisheries and aquaculture (IPCC 2018, B.4.3, p. 11). Ocean warming from climate change is expected to increase the thermal stratification in the upper ocean, reducing the upwelling of nutrients and decreasing productivity (Fabry et al. 2008, p. 426). Squid, a primary food source for band-rumped storm-petrels and many other seabird species, are

predicted to undergo shifts in their range and size as a result of warmer ocean temperatures. Individual squid will require more food per unit body size, require more oxygen due to faster metabolism, have a reduced capacity to cope without food, and reduced seawater power of hydrogen (or pH) could affect the ability for squid to uptake oxygen (Pecl and Jackson 2008, p. 382). This threat is expected to impact all life stages of the bird from chick to adult, at the population level.

Shifts in food availability may occur based on SST. One of the primary food sources of band-rumped storm-petrel is squid, a type of mollusk from the class cephalopoda. While there have been studies predicting that the number of cephalopods will increase in some systems with increasing SST, the likelihood of ecological mismatch with band-rumped storm-petrels remains a possibility, and population expansion is not applicable to all cephalopod species (van der Kooij et al. 2016, p. 2285; Sakurai et al. 2002, p. 229). Higher between-year variance will be observed in surface feeding birds, which are more constrained in the water column because they can only exploit prey near the surface. In a meta-analysis a steeper negative slope was observed in birds with smaller body size to avoid incurring fitness costs of thermoregulation at higher temperatures, as well as with surface feeding birds as they are predicted to be more sensitive to the timing at which lower trophic-level-prey are available, placing band-rumped storm-petrels at increased risk for climate-induced mismatch due to shifts in timing of their prey (Keogan et al. 2018, pp. 315–316). This lack of food availability is expected to affect all feeding birds across the population.

An increase in large scale storm events as a result of climate change is expected to increase the intensity and frequency of storm events, which could directly impact nesting sites and lead to rockfalls that could kill or injure birds at all life stages (NASEM 2016, p. 109).

Table 2. Status of threats to the Hawai‘i DPS band-rumped storm-petrel and ongoing conservation efforts.

<b>Threat</b>	<b>Listing Factor</b>	<b>Current Status</b>	<b>Conservation/Management Efforts</b>
Invasive Species and Habitat Modification	A	Ongoing	Ungulate fencing on Kaua‘i, cat proof fence within HAVO on the island of Hawai‘i
Stochastic Events	A	Ongoing	None
Breeding Colony Predation		Ongoing	Predator management and fencing at several colonies. Protection is limited to a small proportion of the population.

<b>Threat</b>	<b>Listing Factor</b>	<b>Current Status</b>	<b>Conservation/Management Efforts</b>
Oceanic Predation		Ongoing	None
Inadequacy of Existing Regulatory Mechanisms	D	Ongoing	The State of Hawai‘i manages game mammal (feral pigs, goats, deer, and mouflon sheep) populations to support hunting opportunities. The State of Hawai‘i allows the importation of most plant taxa, with limited exceptions (USFWS 2015, entire).
Light Attraction and Fallout	E	Ongoing	Minimization efforts, Habitat Conservation Plan (HCP) development
Low Number of Individuals and Populations	E	Ongoing	None
Collisions	E	Ongoing	Research to evaluate the influence of powerline collision on the population and research on methods to make powerlines more visible, some powerline arrays have been placed underground or modified to reduce their surface area
Windfarms	E	Ongoing	Minimization efforts, HCP development
Fisheries Interactions	E	Ongoing	None
Climate Change	E	Ongoing	None

## 2.4 Synthesis

The Hawai‘i DPS band-rumped storm-petrel is a small seabird that nests in the Hawaiian archipelago, and ranges throughout the Pacific Ocean basin while foraging. There is thought to be one single population that breeds within the Hawaiian Islands across several colonies. In Hawai‘i, band-rumped storm-petrel breeding is confirmed or likely

on Lehua, Kaua‘i, Lāna‘i, and the island of Hawai‘i. They may also breed on Maui, but no nesting sites have been confirmed. Due to its cryptic nature and remote nesting habitat, only four active nests have been confirmed in Hawai‘i, all on the northern slope of Mauna Loa. Breeding is suspected in other areas as indicated by ground calling and the presence of brood patches in captured birds.

There are a number of threats that the Hawai‘i DPS band-rumped storm-petrels face including climate change, invasive species and habitat modifications, predation, stochastic events, light attraction and fallout, collisions, wind farms, fisheries interactions, and inadequate regulatory mechanisms. Low numbers of individuals and populations in a contracted range, along with a low reproductive rate magnify the threats to viability. Given the extent of threats, declining numbers of individuals and populations, and lack of management of these threats, this species best fits the definition of endangered. A draft recovery plan is expected to be completed in 2022.

### 3.0 RESULTS

#### 3.1 Recommended Classification:

- Downlist to Threatened**
- Uplist to Endangered**
- Delist** (*Indicate reasons for delisting per 50 CFR 424.11*):
  - Extinction*
  - Recovery*
  - Original data for classification in error*
- No change is needed**

#### 3.2 New Recovery Priority Number:

No change

#### Brief Rationale:

#### 3.3 Listing and Reclassification Priority Number:

No change

**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

- Develop and finalize a Draft Recovery Plan that includes the Hawai‘i DPS of band-rumped storm-petrels.
- Determine the current distribution and status of the species and their habitats.

- Initiate control of species-specific threats, such as nonnative mammals and nonnative invertebrates within the highest priority management units.
- Assess or confirm the distribution, current status, and potential future distribution of existing habitats and determine the most intact sites for management. Make use of landscape modeling, spatial analysis, remote sensing technology, and existing survey data to better understand species distributions and priority areas for targeting future surveys.
- Conduct systematic, island-wide surveys for additional populations.
- Expand the distribution of existing wild populations and establish new populations.
- Protect all remaining extant populations by controlling species-specific threats.
- Prevent the influx of new invasive species into recovery areas.
- Prioritize research that will provide information and tools that will aid in ameliorating known threats and limiting factors of the species and habitats.
- Increase outreach efforts and coordination with federal and state agencies, and private landowners regarding habitat conservation.
- Promote opportunities to assist in the recovery of this species through habitat conservation plans, safe harbor agreements, Federal action agency Section 7(a)(1) and 7(a)(2) consultation obligations under the ESA, and through various conservation partnerships.

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***In Litteris***

Nagendra, U. 2020. Landslides in ULP during KIUC STHCP monthly update memo.

Dutcher, A. 2020. Cat range in the HONP as determined by tracking collar.

Salbosa, L. 2020. First death of *Oceanodroma castro* at a wind farm on Maui.

**Pers. Comm.**

Bogardus, M. 2020. dead bird at Makamaka‘ole site in West Maui.

Nagendra, U. 2020. pers. comm. Bees present at ULP seabird burrow.

**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW of the Band-rumped storm-petrel (*Oceanodroma castro*)**

**Current Classification:** Endangered

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

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change needed

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

**Review Conducted By:**

James Breeden, Wildlife Biologist, PIFWO  
John Vetter, Animal Recovery Coordinator, PIFWO  
Megan Laut, Conservation and Restoration Team Manager, PIFWO

**FIELD OFFICE APPROVAL:**

for \_\_\_\_\_ Date \_\_\_\_\_  
**Lead Field Supervisor, Fish and Wildlife Service**