

Notes on petrels of the Dark-rumped Petrel complex (*Pterodroma phaeopygia/sandwichensis*) in Hawaiian waters

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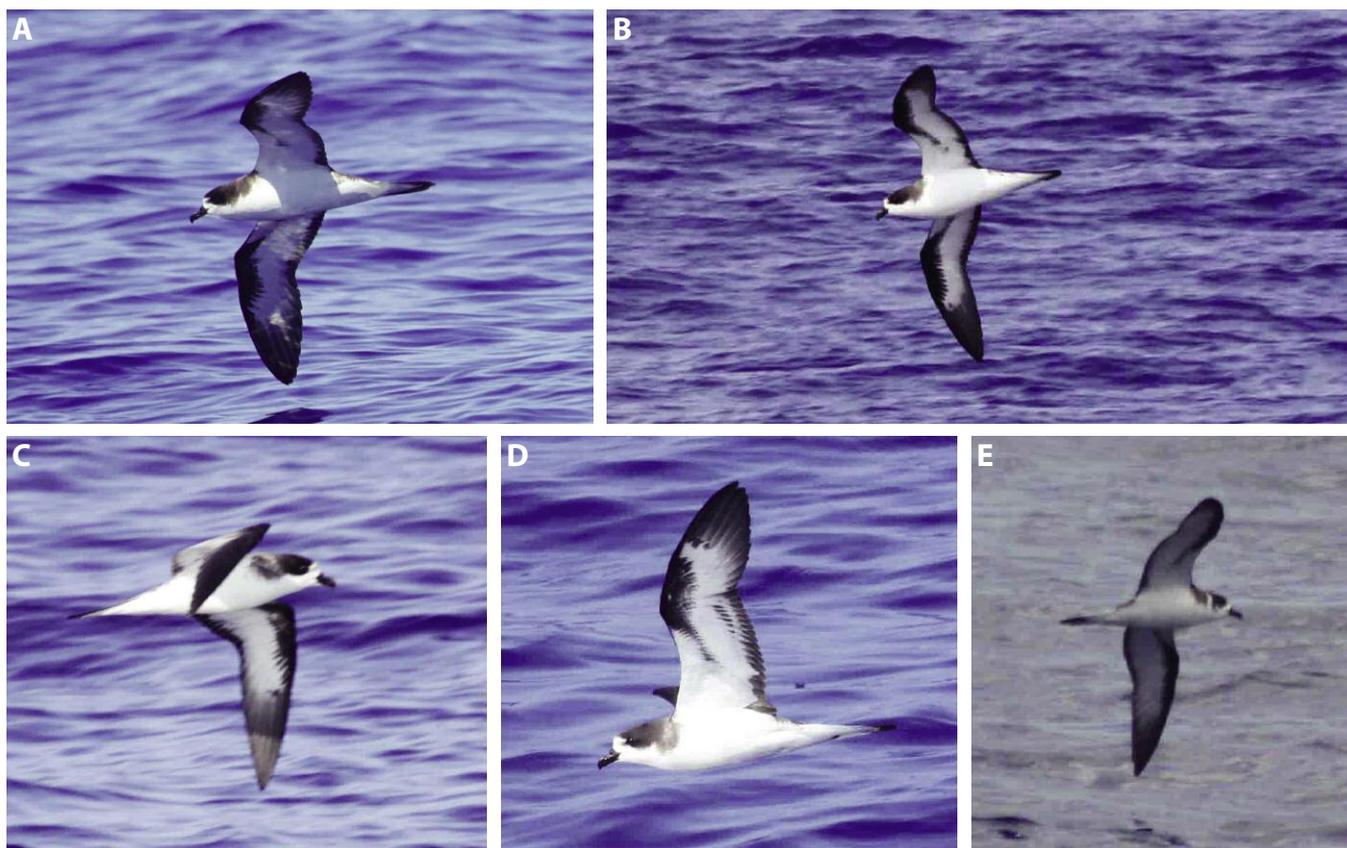


Figure 1. These images were selected to illustrate variation in the appearance of presumed Hawaiian Petrels in Hawaiian waters. All of these photographs show features associated with Hawaiian Petrel as opposed to Galapagos Petrel (Force et al. 2007): the birds have a capped appearance, with a notch of white behind the eye, rather than a strongly cowled appearance typical of Galapagos Petrel; narrow dark trailing edges of the underwing (typically broader in Galapagos Petrel); white flanks free of dark mottling, a mark shown by some Hawaiian Petrels but averaging heavier and more prevalent in Galapagos Petrels (see also Figures 2 and 4); and delicate structure and small bill typical of Hawaiian Petrel rather than the rangier, bulkier, larger-billed appearance associated with Galapagos Petrel (Force et al. 2007). These photographs (compare also Figure 2) demonstrate that the angle of the photograph relative to that of the bird and type of lighting can affect the appearance of *Pterodroma* petrels substantially. Dates and locations of photographs: A) 27 km southwest of Kaena Point, O'ahu, 14 October 2009; B) 16.5 km southwest of Kona, Hawai'i Island, 19 April 2009; C) 31.7 km west of the Kona Airport, Hawai'i Island, 27 April 2009; D) 14.6 km southwest of Kona, Hawai'i Island, 28 October 2009; E) 53 km northwest of the Kona Airport, Hawai'i Island, 15 July 2008. Photographs by Pacific Islands Fisheries Science Center (A), Daniel L. Webster (B, C, D), and Robin W. Baird (E).

Abstract

This paper documents petrels of the Dark-rumped Petrel complex (*Pterodroma phaeopygia/sandwichensis*) off the Hawaiian Islands in 2007–2011, including typical individuals of the endemic nesting species, Hawaiian Petrel (*P. sandwichensis*), and two individuals that could be variants of that species or perhaps Galapagos Petrels (*P. phaeopygia*). We summarize and discuss criteria for the at-sea identification of these two similar taxa.

Background

In 2002, the American Ornithologists' Union split Dark-rumped Petrel (*Pterodroma phaeopygia*) into two species: Hawaiian Petrel (*P. sandwichensis*), which nests in the Hawaiian Islands, and Galapagos Petrel (*P. phaeopygia*), nesting in the Galapagos Islands (A.O.U. 2002). Although the distinction of these petrels appears to be well supported by molecular evidence (Welch et al. 2011), their morphology is very similar, and at-sea identifica-

tion of these petrels (hereafter termed “Dark-rumped Petrels” when referring to the complex) has been considered problematic (Pyle 2006). Further field study has led to the proposal of new field criteria for separation of Galapagos and Hawaiian Petrels, primarily involving differences in head and neck plumage, the extent of the underwing's dark trailing edge, apparent bulk, bill size, and flight manner (Force et al. 2007; see also Loomis 1918, Tomkins and Milne 1991), and

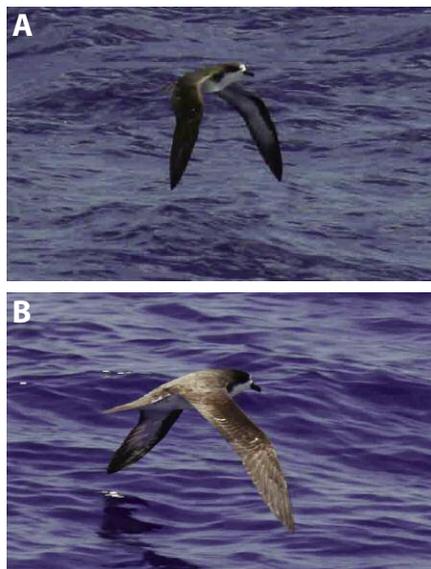


Figure 2. Hawaiian Petrel, 12.5 km south-southwest of Kona, Hawai'i Island, 13 August 2007. Dark-rumped Petrels can appear less hooded when viewed ventrally (A) and more cowl-like or hooded when viewed from behind and/or dorsally (B). This individual appears fairly heavily marked (including slight mottling to the flanks, as visible in other images of the bird) for Hawaiian Petrel, but it otherwise shows features consistent with this species (compare Figure 1). Photographs by Daniel L. Webster.

these criteria are currently being tested in the field by ornithologists and birders.

From September 2003 through May 2011, Cascadia Research Collective undertook 19 surveys (including 392 days) of marine mammals in Hawaiian waters, during which digital cameras were used to document individual whales and dolphins (Baird et al. 2008). Most surveys were conducted off the western (Kona) coast of Hawai'i Island, but surveys were also conducted off Kaua'i and O'ahu. As has been reported in the Hawaiian Islands regional report of *North American Birds*, Cascadia Research Collective personnel have also obtained many photographs of birds, currently over 11,500 in total, and provided them to Peter Donaldson and Pyle for review and assessment (e.g., Donaldson 2009a, 2009b, 2010, 2011). Here we present results of the examination of over 2000 images of approximately 92 Dark-rumped Petrels taken in Hawaiian waters, >75% of these obtained by Webster.

Analysis of images

These 2000+ images were taken on 68 dates spanning every month of the year except March (when there was little field effort). Data collected on these cruises indicate Dark-rumped Petrels are relatively common in Hawaiian waters during the months of April through September and uncommon to rare

during October through February, with records sparsely distributed throughout the winter period; this status accords with what is known of the breeding phenology of Hawaiian Petrel and with other at-sea observations of Dark-rumped Petrels off the Hawaiian Islands (King 1970, Pyle and Pyle 2009).

Of the 92 Dark-rumped Petrels photographed by the Cascadia Research Collective, 83 showed characteristics consistent with Hawaiian Petrel (Figures 1, 2), and seven were not clearly enough documented to identify to species. On 10 April and again 20 April 2010, off the west coast of Hawai'i Island, Webster obtained images of two birds that stood apart from all other individuals in showing characteristics associated more with Galapagos Petrel (Figures 3, 4).

Identification criteria for Galapagos and Hawaiian Petrels

In the captions for Figures 1-4, we discuss variation in the plumage of presumed Hawaiian Petrels and consider identification of the two individuals that may be Galapagos Petrels or may represent extreme or rare variations of Hawaiian Petrels (see Figure 3). If the two birds were indeed Hawaiian Petrels, these images suggest that at-sea identification of Hawaiian and Galapagos Petrels may be more challenging than indicated by Force et al. (2007). However, Pyle's examination of petrel photographs taken off of the Galapagos, along with field study of many Hawaiian Petrels, suggests that the identification criteria outlined by Force et al. (2007) are valid for most Hawaiian Petrels.

Differences in molt patterns may, in some cases, be helpful in distinguishing cryptic species of tubenoses at sea (cf. Howell et al. 2010). However, because colonies of Galapagos Petrels breed on different schedules, with breeding in the species occurring through most of the year (Tomkins and Milne 1991), molt patterns may not be helpful for identification of that species at sea. Hawaiian Petrels are more seasonal in their nesting, which peaks April–September (Simons and Hodges 1998); molting birds have been documented around the Hawaiian Islands in September–January (Cascadia Research Collective images), during the non-breeding season, as would be typical of

tropical seabirds (Pyle 2008). Thus, Hawaiian Petrels should appear fresh in January–May and worn in July–October, which accords with most of the birds photographed in these months in waters of the Hawaiian Islands.

At-sea distribution of Galapagos and Hawaiian Petrels

In 2010, Pyle evaluated records of Dark-rumped Petrel in California waters and concluded, based on criteria suggested by Force et al. (2007), that nine photographic records and two sight records (by Force) between 1997 and 2009 were referable to Hawaiian Petrel. The California Bird Records Committee subsequently accepted these and subsequent records, and the species was admitted to the California checklist (Pyle and Tietz, in press). Further evidence of Hawaiian Petrels in the eastern Pacific Ocean comes from individuals satellite-tagged at the Hawaiian breeding colonies, some of which have reached waters as near as 370 kilometers from the coasts of Oregon and California (J. Adams, D. Ainley, pers. comm.).

As of spring 2011, there were no reports of potential Galapagos Petrels from North American or Hawaiian waters. Data analysis by Spear et al. (1995) and Bartle et al. (unpublished ms.) suggest that there may be a gap in at-sea distributions of Dark-rumped Petrels in the eastern tropical Pacific, roughly between

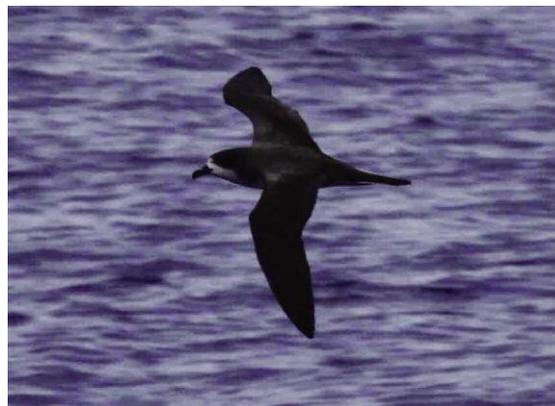


Figure 3. Dark-rumped Petrel, 3.9 km northwest of Milolii, Hawai'i Island, 10 April 2010. This individual shows some features of Galapagos Petrel according to Force et al. (2007), including a strongly dark-cowl-like appearance, lack of white notch behind the eye (visible from several angles), rather thick dark trailing edge to the underwing, slight dusky smudging to the flanks (see also Figures 2 and 4), heavy structure, and a very large bill. The bill in particular appeared to be well outside the range of bill sizes observed among the 83 presumed Hawaiian Petrels photographed by Cascadia Research Collective. This bird appears to be in worn plumage but is not in primary molt, suggesting a first-cycle individual. It may well have been a Galapagos Petrel, or it may have been a Hawaiian Petrel from the tiny and poorly known population breeding on Hawai'i Island. This population has recently been shown to be genetically distinct, to breed in more arid and volcanic habitats, and to forage more in equatorial waters than populations breeding on some other Hawaiian Islands (Welch et al., unpubl. ms.; Wiley et al., unpubl. ms.) DOI 10.1007/s00442-011-2085-y. Hopefully, more study will define the extent of variation in these petrels and elucidate identification of this individual and that of the bird depicted in Figure 4. Photograph by Daniel L. Webster.

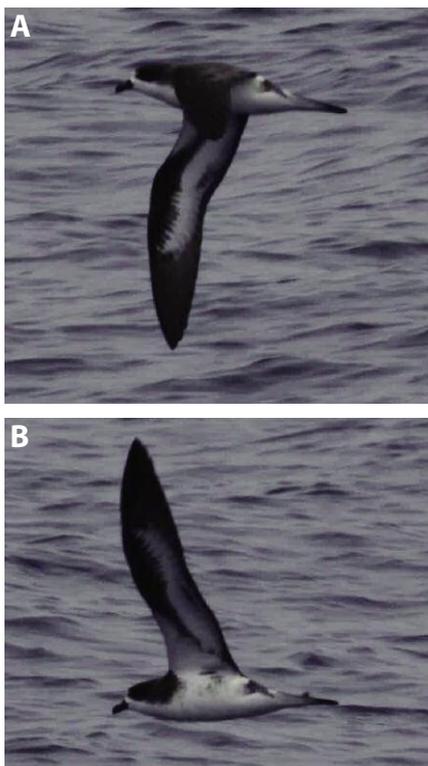


Figure 4. Dark-rumped Petrel, 10.2 km west-northwest of Milolii, Hawai'i Island, 20 April 2010. This individual is far more heavily marked ventrally than any of the 83 presumed Hawaiian Petrels photographed by Cascadia Research Collective personnel. Although at least 10 of these 83 petrels showed slight dusky mottling to the flanks, none had nearly the extent of mottling shown by this bird. Other features suggesting Galapagos Petrel include a hooded appearance, lack of white notch behind the eye, and broad dark trailing edge to the wing (Force et al. 2007), although the overall structure and bill do not appear particularly heavy. Although parsimony would favor identification as Hawaiian Petrel (perhaps an atypically dark bird from Hawai'i Island; see Figure 3), the plumage and relatively small bill could conceivably point to juvenile Galapagos Petrel. Photographs by Daniel L. Webster.

120° and 130° W longitude. However, other Pacific *Pterodroma* such as Juan Fernandez Petrel (*P. externa*) and White-necked Petrel (*P. cervicalis*) show very broad distributions at sea, there are several records of Dark-rumped Petrel in the supposed hiatal area (Pitman 1986), and given the possibility of sampling biases in this area, it is conceivable that Galapagos Petrels could occur in Hawaiian waters (see also Spear et al. 1995, Force et al. 2007). Furthermore, there are records of Dark-rumped Petrel off the Baja California peninsula, which could include the foraging range of either species, so observers should not assume that all Dark-rumped Petrels in North American waters are Hawaiian Petrels; indeed, Pyle considered the majority of sight records and one photographic record of Dark-rumped Petrels, from California waters to be unidentifiable to species. Additional study of structure



Figure 5. Mottled Petrel (*Pterodroma inexpectata*), 31.7 km west of the Kona Airport, Hawai'i Island, 8 April 2010. This individual shows an unusually extensive amount of dark body plumage, rather than just the dark belly patch that distinguishes this species at a glance from all other gadfly petrels. Although superficially similar to Magnificent Petrel (*P. [brevipes] magnificens*; Bretagnolle and Shirihai 2010), this bird is too large and has too much white in the underwing to be Magnificent. Several species of gadfly petrel have dark and light morphs, and aberrant darker and lighter individuals have been recorded in other tubenose species (e.g., Pink-footed Shearwater [*Puffinus creatopus*] and Black-vented Shearwater [*P. opisthomelas*]). Could Hawaiian Petrel also show occasional darker individuals (compare Figure 4), perhaps representing vestigial or adapting polymorphism? Photograph by Daniel L. Webster.

and plumage through digital imagery should help clarify questions about variation among these birds and help document the at-sea ranges of both species.

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