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SPECIMENS AND PROBABLE BREEDING ACTIVITY OF THE BAND-RUMPED STORM-PETREL ON HAWAII

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ABSTRACT.—Specimens (a downy fledgling and a hatch-year juvenile) and nocturnal calling of the Band-rumped Storm-Petrel (*Oceanodroma castro*) are evidence that this rare seabird breeds on the island of Hawaii. Nocturnal calling over land and sightings near the coast indicate that populations nest on the southwest rift and possibly the upper western slope of Mauna Loa. *Received 12 Feb. 1991, accepted 1 July 1991.*

The Band-rumped Storm-Petrel (*Oceanodroma castro*) breeds on widely separated islands in and around the margins of the tropical Atlantic and Pacific oceans (Palmer 1962). Nests of *O. castro* in the Pacific have been found on Hide Shima and Sangan Jima off the east coast of Japan and on several of the Galapagos islands (Cramp and Simmons 1977, Harris 1982, American Ornithologists' Union 1983, Harrison 1983). *Oceanodroma castro* is the rarest seabird thought to breed in the Hawaiian Islands, where its breeding distribution is poorly known (Harrison et al. 1990). It probably breeds on the island of Kauai, where fledglings have been collected, and possibly on Maui, but nests or eggs have not yet been found in the Hawaiian Islands (Richardson 1957, Munro 1960, Berger 1981, American Ornithologists' Union 1983, Pratt et al. 1987, Harrison 1990, Harrison et al. 1990).

Oceanodroma castro probably occurred on all main Hawaiian islands prior to Western contact (A. C. Ziegler, pers. comm.); its fossil remains were found on Oahu and Molokai by Olson and James (1982). Remains recovered from many Polynesian middens on the island of Hawaii indicate that the species was once common enough there to constitute a noticeable part of the early Hawaiians' diet (A. C. Ziegler, pers. comm.). There are no accounts of specimens or breeding on the island of Hawaii following Western contact in 1778 (Wilson and Evans 1890–1899, Perkins 1903, Rothschild 1893–1900), although Henshaw (1902) noted that native Hawaiians reported *O. castro,* known to them as 'Ake'ake, to be "common on the fishing grounds five or ten miles off the windward [northeast] coast

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of Hawaii." Berger (1981) noted that "immature birds were found on Hawaii and Kauai in the past," but he provided no further evidence of specimens or breeding on Hawaii. We report herein on the first specimens of this species from Hawaii Island and circumstantial evidence that the bird nests there.

SPECIMENS

In April 1967, W. E. Banko identified a small storm-petrel with natal down in the Hawaii Volcanoes National Park bird specimen collection as the first specimen of *O. castro* from the island of Hawaii. John W. Aldrich (pers. comm.) confirmed the identification and deposited the specimen in the National Museum of Natural History (USNM specimen #529770). The specimen label reads, "October 28, 1949. D. H. Hubbard 510, Motor Pool, Kilauea Military Camp, H.N.P." The bird was found near a woven wire fence at the Kilauea Military Camp motor pool near the rim of Kilauea Crater at 1219 m elevation (Fig. 1). It may have collided with the fence after having been attracted or confused by lights at the camp. *O. castro* is known to be attracted to lights at night (Harrison 1990). Another seabird, the Hawaiian (Dark-rumped) Petrel (*Pterodroma phaeopygia*), occasionally has crashed in the vicinity of lights around the summit area of Kilauea Crater (pers. obs.).

Because storms or unusual winds were not detected in the main Hawaiian Islands during October 1949 (Anonymous 1949), the specimen of *O. castro* probably was not blown to Hawaii from another island. Local weather at the time (National Park Service weather records) consisted of normal NE trade winds, partly cloudy skies, and light precipitation.

W. E. and P. C. Banko discovered most of a bird on the southwest rift of Mauna Loa near a line of volcanic vents about 1.6 km north of Puu O Keokeo (USGS quadrangle map: PUU O KEOKEO) at 2103 m elevation (Fig. 1) on 11 July 1968. The wing was that of *O. castro* (R. C. Laybourne, R. C. Banks, pers. comms.), but it was not saved as a voucher specimen. We also found two feathers from *O. castro* during 25–28 August 1973 in front of an apparent nest burrow entrance about 1.6 km from the wing specimen. These feathers were lost after they were sent to the U.S. National Museum, and their identity could not be confirmed.

On 3 November 1988, R. E. David examined and identified a live individual of *O. castro* that was discovered at Kulani Correctional Facility (1585 m elevation on the eastern slope of Mauna Loa about 14 km N of Kilauea Military Camp; see Fig. 1). This bird probably was confused by lights at the prison and crashed into the side of a building during the week of 20 October 1988. Unusual weather was not reported during this period (Anonymous 1988; National Weather Service, Honolulu Weather Service

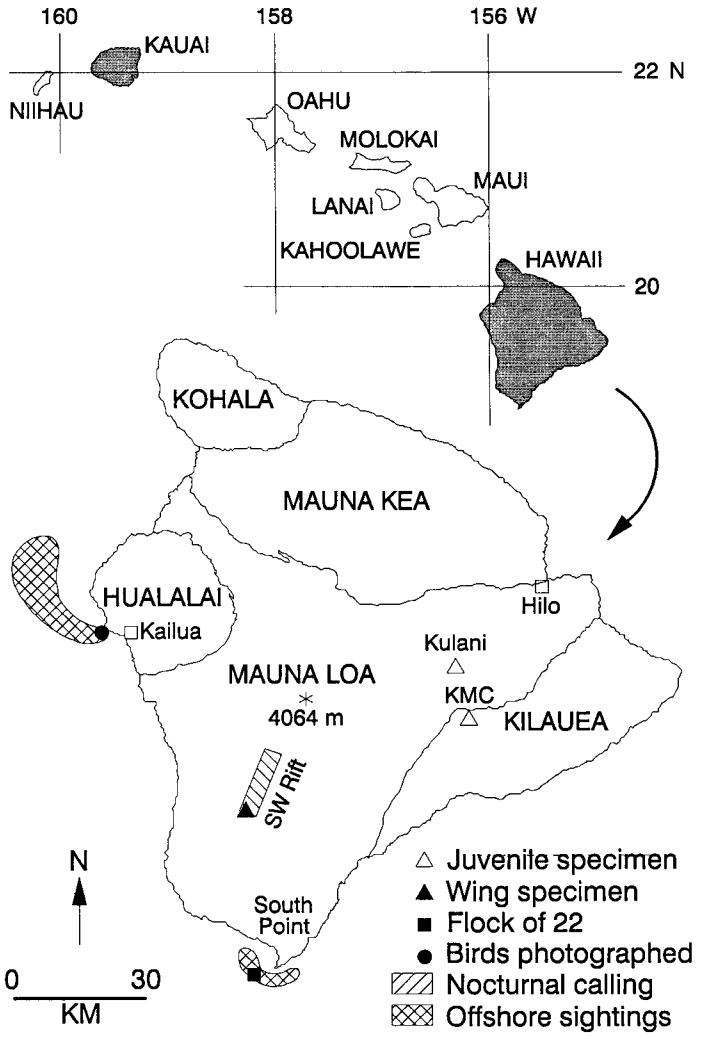

FIG. 1. Location of *Oceanodroma castro* records in the Hawaiian Islands. Breeding is believed to occur on Kauai and Hawaii (shaded).

Forecast Office, unpubl. data). State wildlife officials delivered the bird to the Panaewa Zoo in Hilo on 24 October and transferred it to Hilo Veterinary Clinic on 31 October, at which time it weighed 30 g (M. Lepes, pers. comm.). This weight is considerably below average for the species (42–44 g for adults and 49 g for fledglings; Cramp and Simmons 1977), indicating that the bird lost weight prior to its delivery to the veterinary

TABLE 1
TIMES AND ELEVATIONS OF *OCEANODROMA CASTRO* CALLS HEARD ON SOUTHWEST RIFT OF MAUNA LOA

Date	Time	Elevation (m)
25 June 68	20:05–22:30	2134
26 June 68	20:30–20:40	2377
10 July 68	20:35–22:30	2231
25 July 68	20:15	2530
25 August 73	>20:00	2957
26 August 73	>20:00	2469
27 August 73	>20:00	2246
28 August 73	>20:00	2096

clinic. It weighed only 21 g when it died in captivity on 18 November 1988; necropsy revealed no cause of death other than malnutrition (M. Lepes, pers. comm.).

The gonads of this specimen were inconspicuous, and the bird's sex could not be determined (M. Lepes, pers. comm.). Although the specimen lacked natal down, we believe it was a juvenile because the scapulars were edged with white (Palmer 1962, Cramp and Simmons 1977), the gonads were not well-developed, and it was recovered in October, when other Hawaiian fledglings of this species have been found (Richardson 1957, this paper). The specimen was preserved as a skin and partial skeleton at the Bernice Pauahi Bishop Museum (BPBM specimen #177920). Body measurements (R. L. Pyle, pers. comm.) were culmen 13.2 mm, tarsus 22.6 mm, and wing chord 140 mm (145 mm flattened).

OBSERVATIONS

W. E. and P. C. Banko heard calls of *O. castro* at 2096–2957 m elevation at volcanic cones along the southwest rift of Mauna Loa in 1968 and 1973 while conducting nocturnal surveys for the U.S. Fish and Wildlife Service (Table 1). These rapid, high-pitched, chattering calls, recorded as "kee-kee-kee" and resembling the sound of rubbing a wet finger over glass (Pratt et al. 1987), were easily distinguished from those of *P. phaeopygia,* which we also heard at night on the southwest rift below 2245 m elevation (Banko 1980).

Recently, R. E. David has regularly seen solitary Band-rumped Storm-Petrels from May through July within about 5 km of the west and southwest coast of Hawaii between Kailua and South Point (Fig. 1). He photographed two individuals flying southward, and these photographs are

maintained jointly by the Hawaii Audubon Society and Bishop Museum in the Hawaii Rare Bird Photographic File (HRBP #766–768 and #860–862). He photographed one bird on 7 May 1985 about 4.8 km west-northwest of Kailua, and the other was observed on 26 July 1986 about 4 km west of Kailua.

David has also seen flocks of *O. castro* at sea during September and October, including a flock of 22 birds 5.6 km west of South Point on 10 October 1988. Local fishermen report seeing this species regularly off South Point during the early fall.

DISCUSSION

The seemingly common and widespread population of *O. castro* inhabiting the island of Hawaii during the Polynesian era probably became restricted to very high elevation breeding grounds during the past two centuries of Western colonization. Our observations suggest that a breeding population persists on the upper slopes of Mauna Loa. Evidence includes specimens of two juvenile birds, nocturnal calling over inland habitat during the breeding season, and sightings of individuals and flocks close to shore. Because this species ranges close to its breeding grounds (Naveen 1982, American Ornithologists' Union 1983), recent sightings just off the west coast and southern tip of Hawaii suggest that the species continues to nest on the southwest rift and western slopes of Mauna Loa.

We recommend that the breeding areas and populations of this species be precisely determined, studied, and protected. We also suggest that surveys for breeding birds be concentrated high on Mauna Loa around volcanic cinder cones, where the substrate affords easy burrowing, and in lava tubes and highly fractured lava flows, where cavities exist for nesting.

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