## WEDGE-TAILED SHEARWATER *Ardenna pacifica*

Other: *'Ua'u kani* monotypic

**breeding visitor, indigenous**

Wedge-tailed Shearwaters are found abundantly throughout the tropical Pacific and Indian oceans (Harrison 1983, AOU 1998, Wiles 2005, Whittow 1997) and are the most ubiquitous Procellariiform in the Hawaiian Islands. They breed commonly on almost every island in the archipelago and on many small offshore islets, adults arriving at the colonies in Mar, departing primarily during Sep-Nov, and remaining away from colonies and being scarce in Hawaiian waters for a short time in Jan-Feb (Richardson and Fisher 1950, King 1974, Byrd et al. 1983, Whittow 1997); young fledge primarily in Nov and are found in Hawaiian waters through Dec. Populations in the N Pacific, including Hawaii and Wake Atoll (Rauzon et al. 2008), are primarily of the light morph, with whitish underparts. Those in the equatorial and S Pacific, generally south of 10° N latitude, are primarily of the dark morph, with uniform sooty brown underparts and upperparts. Low proportions (< 3%) of dark-morph and intermediate-morph birds are found in Hawaiian waters (e.g., King 1974; HRBP 5624, 5799-5800), in particular at-sea S and W of Hawai'i I during mid-summer (cf. Force and Ballance 2009), but rarely among breeding colonies in Hawaii (*cf.* Stejneger 1889, Rothschild 1900). Leucistic individuals (e.g., HRBP 1334-1337) are occasionally encountered, and an unidentified albino shearwater photographed off Hawai'i I in May 1990 (HRBP 0924-0927) was most likely a Wedge-tailed. Wedge-tailed Shearwater was placed in genus *Puffinus* (*pacificus*) until moved to *Ardenna* (*pacifica*) by the AOU (2016).

An estimated 230,000 pairs of Wedge-tailed Shearwaters bred in the *Northwestern Hawaiian Islands* during the 2000-mid 2010s (Table); in descending order, the largest colonies were found on ***Laysan***, ***Nihoa***, ***Lisianski***, ***Kure*** and ***Pearl and Hermes***, ***Midway***, ***French Frigate***, ***Necker***, and ***Gardner Pinnacles***, where lack of suitable nesting habitat limits the population to at most 50 pairs (Table). On Midway, they were abundant on Eastern I in 1902 (Bryan 1906) and a population of 33,000 pairs was estimated in 1945 (Fisher and Baldwin 1946). The population size decreased to a low point of 1-3000 pairs during the 1960-1980s due to disturbance by rats and human activities (King 1974, Fefer et al. 1987), but has recently increased again since rats were removed in 1997, perhaps to about 5,000 pairs, but a systematic survey is needed. On Kure, burrow surveys in 2000 (VanderWerf and David 200) resulted in an extrapolated estimated 7,500 pairs on the island, up from an estimate of 1,000 in 1984, and likely representing an actual increase there due to removal of rats in 1994 and lessening of human disturbance since a LORAN station was closed there in 1992. On the other islands, populations of this species appear to have changed little from historical counts, the "scanty numbers" reported by Rothschild (1900) based on Palmer's expedition in June-July 1891 perhaps related to the species' nocturnal habits and burrowing tendencies. Information on the history of the species and data on breeding phenology for each Northwestern Island, compiled as part of the POBSP, can be found in the Atoll Research Bulletins for each breeding locality (see Seabird Page).

In the *Southeastern Hawaiian Islands,* Wedge-tailed Shearwaters probably bred in large numbers prior to human settlement. Many bones have been found at fossil sites on Kaua'i, O'ahu, Moloka'i, and Hawai'i (Olson and James 1982b). In historic times, human

disturbance and predation by dogs, cats, and other non-native mammals has severely restricted successful nesting on inhabited main islands. Larger colonies have fared better on small offshore islets relatively free from mammalian predators and human disturbance, although, even here, Hawaiian fishermen would visit these islands in the early 1900s to catch them in nets (Northwood 1940b), and visitation from fisherman and kayakers through the mid-2010s continued to cause some disturbance to colonies. During the 2000-mid 2010s breeding populations existed on all eight islands (and nearby islets) with a population estimate of about 87,000 breeding pairs, (Table).

No current population estimates are available for Wedge-tailed Shearwater breeding colonies on ***Ni'ihau***; Fisher (1951) could not find evidence of breeding in Aug 1947, although they likely breed on the island and are observed frequently in offshore waters. Fisher (1951) and Richardson (1963) did observe them breeding abundantly on Lehua Islet off the N end of Ni'ihau, and VanderWerf et al. (2007) estimated 23,000 pairs breeding there in 2002-2005, although high vegetation had reduced the population by about 50% in 2011. Harrison (1990) indicated that 1500-2500 pairs bred on Kaula Rock SW of Ni'ihau. On ***Kaua'i,*** a 1978 survey of 18 coastal sites found 3855 burrows of which about 2800 were in the Kilauea Pt. area (Byrd and Boynton 1979). Fledging success that year at Kilauea Pt. was ~50%, but was less at other sites where disturbances from dogs, humans, horses, and cattle were major threats to the colonies. With improving protection the colony at Kilauea Pt. had 1600 active burrows with eggs and chicks on 30 July 1999, most of which probably fledged successfully, and by 2004 nesting burrows had increased to several thousand with a hatching success rate of 73% (Zahn 2004). By the mid 2010s, the breeding population size at Kilauea was estimated at 8-15,000 breeding pairs (USFWS 2016). Another extensive colony flourishes in bluffs along the S shore of Kaua'i from Spouting Horn to Port Allen.

Apart from Lehua I, the largest colonies in the Southeastern Islands are found on islets off the ne. shore of ***O'ahu***, where DOFAW conducted population surveys during 1995-2007. Largest colonies occur on Manana, the two islets of Mokulua, Moku'auia, and Mokumanu islets, with smaller colonies present on several other islets (Table). On Manana, disturbance by humans (including the collection of birds and eggs for eating) and military activity resulted in extirpation of the shearwater colony during the early 1900s (Fefer et al. 1987; *E* 1[8]:1-4) but breeding had resumed there by the 1950s. On Mokoli'i Islet rats were removed in 2002, resulting in an increase in chick production from 1 in 1999-2001 to 185 in 2003. On the island of O'ahu, a thriving colony in Kaena Pt. Natural Area Reserve has grown, with adequate protection, to an estimate of about 1,500 burrows in 2007, increasing to about 4,500 burrows following the establishment of a predator-free fence protecting the colony in 2010 (Young et al. 2013). Smaller colonies with minimal but growing protection have been reported at Black Point in E Honolulu (*E* 67:1-2), at Mokapu Peninsula, and at Malaekahana N of Laie. At the last site 40 predated carcasses were found 16 Jun 2000.

Elsewhere in the Southeastern Islands (Table), 1,210 burrows were counted in 1981 on Moku-ho'oniki Islet and Kanaha Rock off ***Moloka'i*** (*E* 50:77), but no other information exists pertaining to this species on these islets. On Okala Islet, 40 were counted 20 Aug 1996 and at Mo'omomi Dunes, predator control measures initiated in 1999 allowed a small colony to grow through the 2000 and early 2010s, with 720 active nests counted on 1 Oct 2012 and 636 nests counted on 1 Oct 2013, although dogs may still be a threat there (60 adults were killed by a dog in Apr 2009 and at least 15 fledglings killed in Oct 2011). Hundreds have been observed off Papohaku Beach at the

W end of Moloka'i (e.g., during the first week of Aug 2011), perhaps heading for the Mo'omomi colonies or perhaps indicating other colonies nearby. Offshore of ***Maui***, visits in Apr 2005 to islets produced burrow counts of 1000s on Alau, 100s on Moke'ehia, about 100 on Moku Mana and Hulu, 75 on Keopuka, and 12 on Moku Pipi islets. Molokini islet also has an estimated 1000-1500 breeding pairs. On Maui itself small colonies have persisted at Hawea Point (estimated 1000 burrows in 2012, up from 16 burrows in 2001), Hakuhe'e Pt. and Waihe'e Pt. N of Wailuku, at Pauuwalu Pt. E of Keanae, and near Ho'okipa Beach Park E of Kahului. In 1999-2000 a study found that 65% of active burrows on Maui failed to fledge a chick successfully, while only 17% on Molokini Islet failed (Hurley 2002). The Ho'okipa colony was devastated during Aug 2002 when one or more feral cats killed >100 adults and destroyed 22 eggs, leaving only 15 of the original 73 burrows still active, most of which failed to fledge a chick. Wedge-tailed Shearwaters also breed sporadically in small numbers on ***Lana'i*** (Munro 2007), ***Kaho'olawe*** (e.g., Conant 1983a), and ***Hawai'i I*** (e.g. Honokohau 1998-2000), and small numbers are known to breed on one or more coastal islets off of the first two islands, at least (e.g., Hirai 1978b, Munro 2007). Over the years Wedge-tailed Shearwaters probably have attempted to nest at other sites in the Southeastern Islands and may have established other small colonies not as yet reported.

Chicks fledging from offshore islets during late fall often become stranded on O'ahu beaches. Citizens pick up many for rehabilitation at SLP in Waimanalo, O'ahu (Sea Life Park 1990-2003): during this time frame 100's of fledglings were turned in each year during Aug-Dec, and fewer than 30 adults were received each Jan-Jul. About 20% died and about 70% were released with bands. In 1994 a phenomenal 1,196 birds were turned in, probably reflecting high reproductive success that year; counts otherwise varied from a low of 117 in 1992 to 575 in 1999. Year-to-year differences in totals turned in reflect citizen effort to retrieve birds and food and wind conditions during fledging, as well as breeding success. Many specimens of recently fledged birds found throughout the Southeastern Islands are housed at BPBM. Similarly, over 600 Wedge-tailed Shearwaters, largely fledglings in Sep-Dec, were turned in as part of the SOS program on Kaua'i in 2008-2015, most of which were rehabilitated and released (SOS data).

Wedge-tailed Shearwaters are observed commonly from shore and from boats offshore (e.g., Winship et al. 2016, HICEAS data, CRC data; HRBP 5793, 6183), where they often feed in association with sub-surface schools of tuna (Hebshi et al. 2008). Occasionally much larger numbers are observed flying or rafting offshore; e.g. flocks of 700 or more reported off Kilauea Point, Kaua'i in Aug 2000 and Apr-May 2011 and off Poipu Kaua'i 21-23 Jun 2013; in Kaulakahi Channel W of Kaua'i 23 Apr 2000, 2 Apr 2002, and on several dates in May 2012; off Kaho'olawe 24 Jul 2003; off the ne. coast of O'ahu, particularly around Makapu'u Point and primarily in mid Apr-mid May and in Aug; off the W coast of Hawai'i I 6 May 1990, 20 Jun and 1 Jul 2014, and 1 Aug 2015. During 25 Mar-1 Apr 2000 nearly 30,000 birds were counted in the evenings from two locations on Kaua'i (*AB* 54:330). After chick fledging completes in Dec, Wedge-tailed Shearwaters are rarely observed offshore until breeding adults return in early March, although scattered records of 1-3 individuals exist off all islands in Dec-Feb (e.g., HRBP 5807).

Farther *at sea*, Wedge-tailed Shearwaters are recorded commonly from research vessels within 370 km (200 nmi) from the islands. During monthly surveys S and E of the Southeastern Island s in 1964-1965 King (1970) found Wedge-taileds in large numbers during Apr-Oct, fewer in Dec-Jan, and none in Feb. One flock of 700 birds was observed

a few miles from O'ahu on 20 Sep 1964. Dark-morphed birds occurred more commonly S of 15 N latitude and appeared farther N in larger proportions in June and July. Ten birds E of Hawai'i I. during July 1964 were the only dark-morphed birds recorded within 370 km of the Hawaiian Islands (King 1970). During survey cruises out to 370 km SE and S of Hawai'i I. in 1984-1991, Spear et al. (1999) reported high densities of Wedge-tailed Shearwaters in Apr-Jun. Densities were lower in Oct-Nov, and in both seasons they decreased consistently with distance away from Hawai'i. A few dark-morph birds were observed in both spring and fall. The HICEAS surveys in Aug-Nov 2002 recorded 40,066 Wedge-tailed Shearwaters and >14,000 were recorded in 2010 (Rowlett 2002; HICEAS data), in each case the most commonly recorded species of the survey. The 2002 survey included 1001 intermediate morph birds and 128 dark morph birds, most of the latter in August, and the species was missed on only 9 of 163 observing days, all at 240-370 km N of the central islands in late Sep-Oct.

We follow Clements (2007) in considering Wedge-tailed Shearwaters monotypic; populations breeding on islands off Mexico may warrant subspecies status, in which case Hawaiian breeding birds would be considered nominate ("*A.p. pacifica*"). Hawaiian breeding birds were referred to in the older literature as "*Puffinus cuneatus*" or "*P.p. cuneatus*".

Acronyms and Abbreviations

Literature cited

Citation: Pyle, R.L., and P. Pyle. 2009. The Birds of the Hawaiian Islands: Occurrence, History, Distribution, and Status. B.P. Bishop Museum, Honolulu, HI, U.S.A. Version 1 (31 December 2009) http://hbs.bishopmuseum.org/birds/rlp-monograph/