'ELEPAIO *Chasiempis sandwichensis*

Other: *Apekepeke* (juvenile)

C.s. slateri (Kaua'i)
C.s. ibidis (O'ahu)
C.s. sandwichensis (w. Hawai'i)
C.s. ridgwayi (e. Hawai'i)
C.s. bryani (c.Hawai'i)

native resident, endemic
O'ahu subspecies endangered

The 'Elepaio is endemic to forests of the Hawaiian Islands (AOU 1998). It is most closely related to Old-World monarch flycatchers (Monarchidae) of SE Asia and the Pacific (Mayr 1943), which have colonized the sw. Pacific as far north as Pohnpei and Tinian (Pratt et al. 1987). The 'Elepaio resembles fantails (*Rhipidura*) in appearance and the genus *Pomarea* molecularly (Filardi and Moyle 2005, VanderWerf et al. 2009); Peale (1848) believed most Pacific fantails, including the 'Elepaio, to be conspecific. C. Clerke's description (*in* King 1779) of a "small bird of the flycatcher kind" appears to be the first post-contact mention of 'Elepaio. It was subsequently described three times based on three different specimens collected during Cook's last voyage (Medway 1981, Olson 1989b) and confusion about the nomenclature of 'Elepaio (see Synonymies) continued, primarily due to the further naming of different age-sex groups as separate taxa (Sclater 1881, 1885; Ridgway 1882; Stejneger 1887; Wilson 1891b; Newton 1892; Rothschild 1893c, 1900; Wilson and Evans 1899; Henshaw 1902e; MacCaughey 1919). Dole (1869, 1879) listed it under three separate genera (see Synonymies) and Newton (*in* Evenhuis 2007:75) stated that it was "as puzzling a question as I ever had to do with".

Currently the 'Elepaio is recognized as a single species (Bryan and Greenway 1944, AOU 1998), of five subspecies, residing on Kaua'i, O'ahu, and Hawai'i (Pratt 1979a, 1980b; Olson 1989c); however, VanderWerf et al. (2009) have shown that genetic distances support the recognition of three species (but no additional subspecies) and it is likely that the AOU and others (including us) will follow VanderWerf et al.'s recommendation. The absence of the species from the four islands of Maui Nui (reports in Bryan 1908 and *E* 21:26, 22:19, 22:21 are unsubstantiated), even in the subfossil record (Olson and James 1982b), has long puzzled ornithologists (VanderWerf 2007b), and molecular evidence suggests that they flew from Kaua'i (where they first colonized ~830,000 years ago) to O'ahu (~490,000 years ago) and then to Hawai'i (~440,000 years ago) by-passing Maui Nui somehow, or they were present on Mau Nui <10,000 years ago, when earliest fossil records from these islands are dated, and have since become extirpated (VanderWerf et al. 2007b, 2009). Banko (1979) listed the locations of nearly 800 specimens, Banko (1981a) summarized early accounts and natural history of the 'Elepaio, and Berger (1972, 1981) and VanderWerf (1998) summarized its biology, and conservation. It is a rather tame bird, perhaps because it was revered and protected by Hawaiian priests, who regarded it as a guide to the selection of sound trees to build canoes (Bryan 1937b). Bones have been found in fossil deposits of O'ahu that were ca. 200,000 yrs old (James 1987).

On ***Kaua'i***, the 'Elepaio was considered one of the most common landbirds from the late 1800s through the 1960s (e.g., Bryan and Seale 1901, *E* 4:12, Richardson and Bowles 1964, *E* 31:47), being found at elevations as low as 150 m. Populations at these lower elevations have decreased severely with the clearing of forest for agriculture and

urbanization (Banko 1981a) although, in general, 'Elepaios have adapted better to human changes (including the inhabiting of non-native forests) than other Hawaiian forest birds on Kaua'i (Munro 1944; Richardson and Bowles 1964; Conant 1977; Scott et al. 1986; VanderWerf 1993, 1994, 1998), perhaps because they had a greater resistance to avian diseases than the Drepaninae (Warner 1968, Scott and Kepler 1985, VanderWerf 2001; but see van Riper et al. 2002, VanderWerf et al. 2006a). The USFWS (1983c) found them from 500 m to the highest elevations of Mt Waialeale and estimated a population size of 40,000 individuals in 1973. Scott et al. (1986) found little change in densities (200-400/sq m through most of their study area in Alaka'i Swamp) during the HFBS, indicating a stable population at these elevations through 1981. Banko (1981a) documented declines at lower elevations and Walther (1995) found them no lower than 900 m in elevation in 1994, but further surveys through the 2000s indicate increasing densities and a total population size of about 150,000 individuals (Gorresen et al. 2009). Further surveys and incidental observations indicated little change in densities at high elevations (e.g., Kokee SP) through the early 2000s (*cf*. Foster et al. 2004).

The 'Elepaio on ***O'ahu*** was also regarded as common in the late 1800s and early 1900s, from sea level to the highest elevations (Seale 1900; Bryan 1905b; MacCaughey 1919; Munro *in* Gregory 1931, 1935; Northwood 1940), but populations here have decreased much more dramatically than on other islands (Conant 1977; Shallenberger 1977b; Shallenberger and Vaughn 1978; Banko 1981a; Williams 1987; VanderWerf et al. 1997, 2001, 2006a; *E* 55:17-18, 55:38, 58:49; Graph), being listed as Federally Endangered in 2000 (USFWS 2006). Unlike on the Honolulu Christmas Bird Count (Graph), no trend was detected on the Waipi'o count, but detection rates were low here (Graph). Distribution on O'ahu declined 75% between 1975 and 2000, primarily from wetter areas, implicating mosquito-born diseases such as malaria and avian pox as causes (VanderWerf et al. 2001, 2006a), as well as predation from rats (VanderWerf and Smith 2002, VanderWerf 2009). Nest predation by rats may be more severe on Oahu than on other islands because 'Elepaios on Oahu prefer riparian areas that are dominated by alien fruit-bearing trees, which attract rats into the forest canopy (VanderWerf 2009). During the 2000s control of rats resulted in a 26% increase in survival of breeding females and a doubling of reproduction. The elevational range of remaining populations (150-500 m in the Ko'olau Range and 550-850 m in the Wai'anae Range) are lower than are found for surviving populations on Kaua'i and Hawai'i I, perhaps helping to explain the more dramatic declines on O'ahu. By the mid 1990s, populations were estimated at 1,950-2,000 individuals residing primarily in 6 fragmented populations (VanderWerf et al. 2001, USFWS 2006), that in general were continuing to decline. In 1995 a captive propagation program was initiated with 'Elepaios from Hawai'i I to develop technologies for potential use with the O'ahu population (Lieberman and Kuehler 2009).

The 'Elepaio on ***Hawai'i I*** represents the only case of reported polytypy for an extant species on a single Hawaiian Island (Synonymies; see also Hawaiian Rail), but recent genetic evidence suggests that the three subspecies should be synonymized (VanderWerf et al. 2009). If considered polytypic, the nominate subspecies (*C.s. sandwichensis*) is restricted to Mt Hualalai and the drier w. slopes of Mauna Loa; *C.s. ridgwayi* ranges most extensively from the wetter se. slopes of Mauna Loa to the e. slopes of Mauna Kea and the Kohala Mts; and *C.s. bryani* has the most restricted range in

the center of the island, limited on the drier sw. slopes of Mauna Kea from 1,900-3,000 m elevation (Pratt 1980b, Banko 1981a, VanderWerf 1998).

The 'Elepaio was formerly abundant on Hawai'i I at lower elevations (e.g., Sclater 1881, Perkins 1893, 1903; Wilson and Evans 1899, Henshaw 1902a). During the first half of the 1900s, 'Elepaios declined on Hawai'i in both range and population size (Pratt 1980b, Banko 1981a, VanderWerf 2008), and further declines have been noted at upper elevations (*E* 66:55). The occurrence of pox in these populations may be a factor (VanderWerf 2001). During the HFBS, Scott et al. (1986) estimated population sizes of 63,000 individuals of *sandwichensis*, 124,000 individuals of *ridgwayi*, and 2,500 individuals of *bryani* in 1977-1979, and suggested that *bryani* populations be carefully monitored (see also Scott and Kepler 1985, Scott et al. 1985). More recent surveys through the 2000s indicate stable populations in some regions of e. Hawai'i I but decreasing population densities in w. and some e. sections of the island (Reynolds et al. 2003, Camp et al. 2009), with an overall population of about 200,000 individuals (Gorresen et al. 2009). During the 2000s the 'Elepaio remained fairly common in upper-elevation forests and as low as 300 m elevation, showing no significant trend (*ridgwayi*) in 1972-2007 according to Volcano Christmas Bird Count data (Graph).

Acronyms and Abbreviations

Literature cited

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