naturalized, recently established non-breeding visitor, unknown status

B.i. ibis (naturalized, probable visitor)
B.i. coromandus (vagrant)

A worldwide species, Cattle Egrets now inhabit the contiguous United States southward to northern South America, and the other continents east to the Philippine Is and Australia (Cramp and Simmons 1977, Marchant and Higgins 1990, AOU 1998). The nominate subspecies spread naturally from Africa to the north coast of South America in the late 1870s, then north through middle America reaching the United States during the 1940s (Long 1981, Lever 1987). They have since wandered widely into Canada and se. Alaska but they initially reached the Hawaiian Islands by deliberate introduction (Breese 1959, AOU 1998). It is probable (but not possible to determine) that dispersing nominate birds also reached the Hawaiian Islands naturally from North America. A report of one near Kaneohe, O'ahu, 25 Apr 1951 pre-dated releases in Hawai'i, but the identification and provenance of this bird is not substantiated. Cattle Egrets were found during and following the dispersal period throughout Micronesia (Pyle and Engbring 1987, Schipper 1985, E 64:17,23, Wiles 2005), on Wake (Jones 1995, Rauzon et al. 2008) and Johnston (25+ birds between 1966 and 2000 and breeding recorded in 2012) atolls, in the Phoenix and Line Is (Clapp 1968a), Clipperton I (Howell et al. 1993; up to 100), Easter I (Jaramillo et al. 2008), and between North America and the Hawaiian Islands over 2000 km from the North American coast in the central Pacific (20-30 birds total; PP observations and L. Spear, pers. comm.). Single Cattle Egrets have also come aboard passenger vessels 2,150 km ESE of Hawai'i I (8 Nov 1964) and between Honolulu and the Line Is. (early Nov 1979). Recent records of the Asian subspecies in the Northwestern Hawaiian Islands (see below), however, are undoubtedly of natural occurrence

The Hawaii Board of Agriculture and Forestry, with the support of cattle ranchers and the Hui Manu Society, imported young Cattle Egrets (*B.i. ibis*) from southern Florida in Jul-Aug 1959 to assist "in the battle to control house flies, horn flies, and other flies that damage hides and cause lower weight gains in cattle" (Breese 1959; *E* 20:33-34). They released groups of a dozen or so at selected ranches (2 each on O'ahu and Hawai'i and one each on Kaua'i, Moloka'i, and Maui) totaling 105 birds released at 7 sites, while 16 egrets remained at the Honolulu Zoo and were released in 1961 (Breese 1959; Swedberg 1967a; Berger 1972, 1981; *E* 20:33-34, 22:14-15, 23:4-5). Most birds remained near the release sites initially but soon began dispersing. On O'ahu, for example, 4 Cattle Egrets were observed at the Kahuku mudflats 27 Sep 1959 (*E* 20:36), well north of the nearest release site at Kualoa Ranch, and by 1960 they were observed nesting there (*E* 22:14-15). They continued to disperse from propagation sites (*E* 20:48, 23:15) and eventually established breeding and roosting colonies on all of the release islands (e.g., Shallenberger 1977, Byrd et al. 1980, Walker 1983, Paton et al. 1986), and have been recorded breeding on or as visitors to on all non-release islands as well.

By the early 1970s colonies of up to 1,500-2,000 breeding birds were reported from *O'ahu* (HAS 1975-1984, Berger 1972, 1981) and *Kaua'i* (HAS 1981-1984; *E* 37:64), where populations reached peaks in the early 1970s and around 1980, respectively (see data from Christmas Bird Counts from Kapa'a, Lihue, Waipi'o, and Honolulu). Major breeding colonies persisted at Crater Hill near Kilauea NWR (*E* 41:25-

28) and along the Waimea River W of Hanapepe on Kaua'i; near Kahuku (E 21:39), near He'eia, and in Pearl Harbor near Waipahu (Berger 1981) on O'ahu; formerly near Umipa'a (E 43:91-92) but now in mangroves near Pala'au on *Moloka'i*; near Kanaha Pond on Maui; and at Loko Waka Pond on Hawai'i I (Paton et al. 1986, Ohashi and Kimizuka 1988). In 1981 the statewide population was estimated at 30,000 birds (E 43:20). Beyond the islands where released, Cattle Egrets had reached *Lana'i* by July 1976 (E 37:43) and were regarded as common during the 2000s (not known to breed) and were first reported on Ni'ihau 20 Jan 1979 (9 birds on an aerial DOFAW Waterbird Survey, and 59 birds on a survey a year later) and were breeding there in potentially large colonies through at least the 1990-2000s. A small colony also became established on Lehua Islet off Ni'ihau, where 2 nests were first observed in Jun 2002 and 21 nests in May-Jun 2003 (VanderWerf et al. 2007); 100 were observed there in Jun 2011. Attempts to eradicate this colony in 2007-2009 were initially unsuccessful, probably due to frequent infusion of birds from colonies on Ni'ihau. Although the first record for Kaho'olawe did not occur until the winter of 2003/2004 (2 birds), they surely visited this island in the 1970s during the period of dispersal throughout Hawaii. DOFAW Waterbird Surveys during 1980-2007 indicate cyclic statewide fluctuations, with peaks in 1986 (~1700 birds), 1997 (~2200), and 2004 (~1800), and low numbers in 1993 (~1000), 2002 (~ 1000) , and 2006 (~ 800) .

Although populations have shown declines in certain areas since initial population expansion (Table), Cattle Egrets were considered a pest through at least the 2010s, being a nest predator of Hawaiian Stilts and Hawaiian Coots, posing a hazard to aircraft, and taking prawns and shrimp from aquaculture farms (Kishinami 2001, Rauzon et al. 2004). Despite occasional eradication efforts near airports (*E* 43:19-20; Walker 1983, Paton et al. 1986, Ohashi and Kimizuka 1988), they have spread widely in the islands, becoming familiar sights at roadsides, open fields, marshes, and landfill dumps in daytime, and generally returning to colony sites to roost at night. By the 2000s-mid 2010s they were still considered common on Kaua'i, O'ahu, and Maui, and less so on the other Southeastern Islands (HAS 1989-2005), but may have been declining on Kaua'i and expanding on Hawai'i I in the late 2000s into the 2010s.

Wandering Cattle Egrets first appeared in the *Northwestern Hawaiian Islands* in 1967, and since the late 1970s have been recorded most frequently at Midway, Laysan, and French Frigate. At *Midway* single individuals appeared Oct 1978-May 1979 and Oct 1979-May 1980, then 5 together 3-21Oct 1983, then 1-2 birds nearly annually through Jan 2002 (e.g., HRBP 0057-0058, 0116, 1202, 1270-1271, 1397; published E 41:83 and AB 33:807; see also below). Later in 2002, 11-20 Cattle Egrets were observed 1 Sep (Klavitter and Vekasy 2008; NAB 57:134) and numbers thereafter increased steadily to 69 by Sep 2004. Breeding on Eastern I. was confirmed 27 Jul 2004 when 2 fledglings and 3 nests containing 3 chicks and an egg were found among nesting Great Frigatebirds and Red-footed Boobies, and up to 16 active nests were found at various times of the year through 2007 (Klavitter and Vekasy 2008). Due to their preying on the chicks of resident seabirds and the potential for aircraft strikes, eradication methods were employed between 2004 and 2007, resulting in five adults and no breeding by 31 Oct 2007 (Klavitter and Vekasy 2008), and one adult still present in Mar 2009. But numbers then increased again, with 17 counted in Dec 2010, breeding noted in 2011, 85 on the Midway Christmas Bird Count 25 Dec 2011, and at least 40 in May 2015; renewed eradication

efforts were being considered. Specimens collected during the eradication process during the 2000s were examined critically and determined to be of the nominate subspecies (see below), and thus likely originated from naturalized Southeastern Hawaiian Island populations (Klavitter and Vekasy 2008).

On *Laysan* 1-7 birds were reported for short periods in various years beginning in mid Jul 1977 (*E* 38:102) and through 2013, usually foraging around Laysan Lake and roosting in the island's only trees, a small group of palms; in Sep-Oct 2011 at least 15 birds arrived to Laysan during an incursion of this species to the Northwestern islands (HRBP 6705; Rutt in press). At *French Frigate* a specimen collected on Tern I 20 Jun 1967 provides the earliest record of Cattle Egret for the Northwest Islands (USNM 497550; Amerson 1971). Beginning May-Oct 1977 (HRBP 1446; *E* 38:102), single Cattle Egrets were reported on Tern I repeatedly in most years (e.g., HRBP 0341-0342, 0591, 0985), with an occasional report of 2 birds in later years, through at least 2011. Single Cattle Egrets have also been seen at least twice on *Kure* (30 Sep - 2 Oct 1997 and 9 arriving in the first week of Oct 2011), twice on *Lisianski* (Jul 2004 and 8 May 2005, HRBP 5547), and 4 times on *Nihoa* in Jun 1980 (Conant 1983b), Jun 1981, May 1986, and Sep 2011, islands less frequently visited by observers.

Whether or not Cattle Egrets that reached the Northwestern Islands are of Hawaiian or continental origin is a matter for conjecture. Photographs of the majority of individuals (HRBP Page) as well as specimens collected on Midway (see above) show small size and bill size and thus appear to be of the nominate subspecies, and it has been presumed that breeding vagrants to the Northwestern Islands originated from Southeastern Island colonies (Klavitter and Vekasy 2008). However, a bird observed and photographed (HRBP 1145-1147, 1265-1267) on Midway in Jun-Jul 1997 was larger and larger-billed than another Cattle Egret present at the same time (HRBP 1270-1271) and thought to have been an Intermediate Egret (Richardson 1999). It was later determined (AOU 2004) that this bird was of the Asian subspecies of Cattle Egret *B.i. coromandus*, in which case it can be considered a natural vagrant to the Hawaiian Islands. A Cattle Egret on Tern I, French Frigate 1-13 Nov 1980 (HRBP 0341-0342) also shows characters of *coromandus*.

Acronyms and Abbreviations

Literature cited

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