

Avifaunal inventory of Laysan Island, Hawaii, USA

Cameron L. Rutt

School of Renewable Natural Resources, Louisiana State University, Baton Rouge, Louisiana, 70803, USA
E-mail: crutt1@lsu.edu

Abstract: Here I present a 6-month bird inventory of Laysan (25.776° N, 171.733° W), a coral island in the North-western Hawaiian Islands. Forty-four species belonging to 17 families were recorded, including six globally threatened species. Three species new to Laysan were found: *Tringa brevipes*, *Tringa glareola*, and *Larus hyperboreus*. This study expands upon previous ornithological coverage of the island, the majority of which has been partial, transitory, or historical.

Key words: birds; Northwestern Hawaiian Islands

INTRODUCTION

In all, 317 species of birds have been recorded from the Hawaiian Islands, including 28 extant endemics (PRATT et al. 1987; PYLE & PYLE 2009). Of these, 181 species have been found within the Northwestern Hawaiian Islands, the continuation of the Hawaiian archipelago north and west of Kauai, which terminates at its farthest outpost in Kure (PYLE & PYLE 2009). Among these islands, Laysan's avifauna is unique, once harboring a remarkable five endemic species, of which two remain today (FISHER 1903b; PYLE & PYLE 2009). The bird life on Laysan has interested ornithologists for more than a century (ROTHSCHILD 1990; FISHER 1903a, 1903b), with 93 species recorded there to date (PYLE & PYLE 2009). Since 1967, access to Laysan has been restricted to authorized scientific and official activities (ELY & CLAPP 1973). In fact, until very recently, Midway Atoll was the only island within the Northwestern Hawaiian Islands that was open to public visitation; today, even Midway Atoll is closed to the public (TAYLOR 2003; MARAGOS et al. 2011). Thus, limited access has restricted ornithological coverage of Laysan and the Northwestern Hawaiian Islands and it has been unusual to have field ornithologists on Laysan for long durations (Peter Pyle, pers. comm.). Here, I present the first detailed bird inventory of Laysan in recent decades, adding new species to the island and updating the status of breeding residents, migrants, and vagrants.

MATERIALS AND METHODS

Study site

Located in the Central Pacific, Laysan (25.7755° N, 171.7333° W) is a coral island situated within the Papahānaumokuākea Marine National Monument. Among the Northwestern Hawaiian Islands, it is second in size to Midway Atoll's Sand Island, and encompasses approximately 3.7 km² (ELY & CLAPP 1973; TAYLOR 2003). The island is relatively flat with a maximum elevation of 12 m (ELY & CLAPP 1973). From an avian perspective, the island consists roughly of three major habitats:

- 1) Rocky coastlines and fringing white sand beaches, which, at places, rise to interior sand dunes.
- 2) A hypersaline lake and its associated bare saline mudflats in the center of the island. The lake comprises approximately a fifth of the island's area, and is among only five natural lakes in all of Hawaii (ELY & CLAPP 1973; TAYLOR 2003).
- 3) The remainder of the island's interior is well vegetated, dominated by ca. 1 m tall clumps of the bunchgrass *Eragrostis variabilis* (Gaud.). Within this region, the outer perimeter of vegetation is bordered by dense, ca. 0.5–1 m stands of the woody shrub *Scaveola taccada* (Gaertn.), which also occupies large areas at the northern end of the lake. The introduction of *Oryctolagus cuniculus* Linnaeus, 1758, to Laysan in the early 1900s had a devastating impact on the island's native flora, denuding the island of vegetation and causing the extinction of three bird species (ELY & CLAPP 1973). The vegetation eventually recovered, although non-native plants spread in the aftermath, and the United States Fish and Wildlife Service began control of these invasive species and native plant restoration in the 1980s and 1990s (MORIN 1992; MORIN & CONANT 2002).

Data collection

Although we did not inventory birds using any formal methods, Robby Kohley and CLR were resident on site and spent many hours in the field 10 September 2011–21 March

Table 1. Species list of birds of Laysan Island, Hawaii, USA, recorded during September 2011–March 2012. Status: R: Resident; B: Breeding visitor; W: Winter visitor/resident; M: Migrant; V: Vagrant; IUCN: IUCN Red List data for given species (IUCN 2014); LC: Least Concern; NT: Near Threatened; V: Vulnerable; CE: Critically Endangered; End: Species endemic to Hawaiian Islands.

Family/scientific name	English name	Status*	IUCN	End
Anatidae (4)				
<i>Anas americana</i> Gmelin, 1789	American Wigeon	W	LC	
<i>Anas laysanensis</i> Rothschild, 1892	Laysan Duck	R	CE	X
<i>Anas acuta</i> Linnaeus, 1758	Northern Pintail	W	LC	
<i>Anas crecca</i> Linnaeus, 1758	Green-winged Teal	W	LC	
Diomedeiidae (3)				
<i>Phoebastria immutabilis</i> (Rothschild, 1893)	Laysan Albatross	B	NT	
<i>Phoebastria nigripes</i> (Audubon, 1849)	Black-footed Albatross	B	NT	
<i>Phoebastria albatrus</i> (Pallas, 1769)	Short-tailed Albatross	W	V	
Procellariidae (3)				
<i>Pterodroma hypoleuca</i> (Salvin, 1888)	Bonin Petrel	B	LC	
<i>Ardenna pacifica</i> (Gmelin, 1789)	Wedge-tailed Shearwater	B	LC	
<i>Puffinus nativitatis</i> Streets, 1877	Christmas Shearwater	B	LC	
Hydrobatidae (1)				
<i>Oceanodroma tristrami</i> Salvin, 1896	Tristram's Storm-Petrel	B	NT	
Phaethontidae (1)				
<i>Phaethon rubricauda</i> Boddaert, 1783	Red-tailed Tropicbird	B	LC	
Fregatidae (2)				
<i>Fregata minor</i> (Gmelin, 1789)	Great Frigatebird	B	LC	
<i>Fregata ariel</i> (Gray, 1845)	Lesser Frigatebird	B	LC	
Sulidae (3)				
<i>Sula dactylatra</i> (Lesson, 1831)	Masked Booby	B	LC	
<i>Sula leucogaster</i> (Boddaert, 1783)	Brown Booby	B	LC	
<i>Sula sula</i> (Linnaeus, 1766)	Red-footed Booby	B	LC	
Ardeidae (1)				
<i>Bubulcus ibis</i> (Linnaeus, 1758)	Cattle Egret	W?	LC	
Accipitridae (1)				
<i>Circus hudsonius</i> (Linnaeus, 1766)	Northern Harrier	V	LC	
Rallidae (1)				
<i>Fulica alai</i> Peale, 1848	Hawaiian Coot	V	V	X
Charadriidae (2)				
<i>Pluvialis squatarola</i> (Linnaeus, 1758)	Black-bellied Plover	M	LC	
<i>Pluvialis fulva</i> (Gmelin, 1789)	Pacific Golden-Plover	W	LC	
Scolopaciidae (11)				
<i>Tringa brevipes</i> (Vieillot, 1816)	Gray-tailed Tattler	V	NT	
<i>Tringa incana</i> (Gmelin, 1789)	Wandering Tattler	W	LC	
<i>Tringa glareola</i> (Linnaeus, 1758)	Wood Sandpiper	V	LC	
<i>Numenius tahitiensis</i> (Gmelin, 1789)	Bristle-thighed Curlew	W	V	
<i>Limosa lapponica</i> (Linnaeus, 1758)	Bar-tailed Godwit	M	LC	
<i>Arenaria interpres</i> (Linnaeus, 1758)	Ruddy Turnstone	W	LC	
<i>Calidris pugnax</i> (Linnaeus, 1758)	Ruff	M, W	LC	
<i>Calidris acuminata</i> Horsfield, 1821	Sharp-tailed Sandpiper	M, W	LC	
<i>Calidris alba</i> (Pallas, 1764)	Sanderling	W	LC	
<i>Calidris alpina</i> (Linnaeus, 1758)	Dunlin	W	LC	
<i>Calidris melanotos</i> Vieillot, 1819	Pectoral Sandpiper	M	LC	
Stercorariidae (1)				
<i>Stercorarius</i> sp	Pomarine Jaeger or South Polar Skua	M	LC	
Laridae (7)				
<i>Larus hyperboreus</i> Gunnerus, 1767	Glaucous Gull	V	LC	
<i>Anous stolidus</i> (Linnaeus, 1758)	Brown Noddy	B	LC	
<i>Anous minutus</i> Boie, 1844	Black Noddy	B	LC	
<i>Gygis alba</i> (Sparrman, 1786)	White Tern	B	LC	
<i>Onychoprion fuscatus</i> (Linnaeus, 1766)	Sooty Tern	B	LC	
<i>Onychoprion lunatus</i> (Peale, 1848)	Gray-backed Tern	B	LC	
<i>Chlidonias niger</i> (Linnaeus, 1758)	Black Tern	V	LC	
Falconidae (1)				
<i>Falco peregrinus</i> Tunstall, 1771	Peregrine Falcon	M, W	LC	
Acrocephalidae (1)				
<i>Acrocephalus familiaris</i> (Rothschild, 1892)	Millerbird	R	CE	X
Fringillidae (1)				
<i>Telespiza cantans</i> (Wilson, 1890)	Laysan Finch	R	V	X

*Status follows PYLE & PYLE (2009) except where our observations expand their categorization.

2012, opportunistically searching for and monitoring all detected species. Minimally, weather permitting, we conducted fieldwork 5 d per week for approximately 5–6 h. With only one exception (*Circus cyaneus* Linnaeus, 1766, sensu stricto), the taxonomy and nomenclature of this inventory (Table 1) follows the American Ornithologist's Union Checklist (AOU 1998) as updated by the most recent supplement (CHESSER et al. 2016). Additionally, all observed species have been entered into eBird (2017).

RESULTS AND DISCUSSION

We recorded 44 species, of which four are endemic to the Hawaiian Islands (Table 1); photographic documentation of particularly noteworthy records is displayed in Figures 1 and 2. Seventeen families were recorded, with Scolopacidae ($n = 11$) and Laridae ($n = 7$) the most species rich. Altogether, the species list includes two Critically Endangered species, four Vulnerable species, and four Near-threatened species (IUCN 2014). Over the course of our stay, we recorded three species new to the island (PYLE & PYLE 2009). In addition to the two extant endemic species on Laysan, as well as the hundreds of thousands of breeding seabirds, our results demonstrate the importance of the island for migrating and wintering waterbirds and shorebirds.

Notable species are discussed in more detail below:

Anas laysanensis Rothschild, 1892. This is the only resident species of waterfowl on Laysan, although we did not note any signs of breeding during our survey. Our high counts for this species (174 on 8 October 2011 and 264 on 24 December 2011) were about equal to that of the recently translocated population on Midway (REYNOLDS & KLAVITTER 2006) during the same period (260 on 11 January 2012; eBIRD 2017).

Anas acuta Linnaeus, 1758. The numbers of wintering *A. acuta* increased during the fall and peaked at 18 individuals on 26 November 2011 (Figure 1A). These numbers persisted, undiminished until 21 January 2012, after which only two birds were seen (19 February 2012). This suggests that members of this flock either perished or departed the island between these two latter dates. After molting into basic plumage, it became apparent that the *A. acuta* flock consisted of seven males and eleven females.

Phoebastria albatrus (Pallas, 1769). A single banded adult arrived on 2 November 2011. The band number indicated that this 13-year-old individual (banded as a chick on Torishima Island, Japan, 24 April 1998) was returning to the island for its fourth winter (DONALDSON 2009). The bird remained throughout the duration of our residence, excepting three periods of absence (20, 18, and 18 days, respectively), presumably during which the bird was foraging at sea. The Laysan *P. albatrus* was part of a then record high count of 11 individuals throughout the Northwestern Hawaiian Islands during this period (DONALDSON 2012b).

Fregata ariel (Gray, 1845). The third island record of *F. ariel* remained on Laysan from 25 September 2011 to 27 January

2012 (Figure 1B). Due to the limited coverage on Laysan and the difficulty of field identification of frigatebird species, it is likely that this species occurs more frequently on Laysan than prior records indicate. As with the two previous records—9 August 1996 and two individuals on 28 February 1998—this bird was an adult male (PYLE & PYLE 2009).

Sula leucogaster (Boddaert, 1783). The expected subspecies for birds in the central Pacific is *S. l. plotus*, yet we observed at least three different males of the distinctive *S. l. brewsteri*, an eastern Pacific subspecies. Our sightings typically consisted of only a single bird, but from 22–26 December 2011, three birds were found roosting together at the south end of the island (Figure 1C); this record marks the first time that more than two birds were found together in Hawaiian waters and adds to the approximately 25 records of this taxon for the region (VANDERWERF et al. 2008; PYLE & PYLE 2009; DONALDSON 2012a). One *S. l. brewsteri* was seen attending a nest in late February; although no egg was present at the time, two males were later seen with active nests in June 2012: one with a large chick and another incubating eggs (John Vetter, pers. comm.). There are only two prior breeding attempts from the Hawaiian Islands (VANDERWERF et al. 2008; PYLE & PYLE 2009).

Bubulcus ibis (Linnaeus, 1758). Shortly after our arrival, we observed a flock of 12 individuals (12 September 2011), but this count inflated to 15 individuals on 16 October 2011, which probably indicates undetected birds, rather than continually arriving ones. However, after 11 December 2011, no more than six birds were recorded on any single day (Figure 1D), suggesting that through death or departure, the number of *B. ibis* on the island had been more than halved in approximately two months' time. It is important that this population or any future arriving flocks be closely monitored for breeding, which has already occurred on Midway, as this species is known to prey on the young of breeding seabirds (KLAVITTER & VEKASY 2008). The count of 15 *B. ibis* on Laysan more than doubles the previous island high count (7 in 1994) and, excluding Midway, is the highest count on record for the Northwestern Hawaiian Islands (PYLE & PYLE 2009).

Circus hudsonius (Linnaeus, 1766). A juvenile visited the island from 15–24 October 2011 (Figure 1E) representing the third record for the island, all of which have appeared during early- to mid-October (PYLE & PYLE 2009). Because most taxonomic authorities treat the North American *C. hudsonius* and its Old World counterpart—*C. cyaneus* (Linnaeus, 1766)—separately, we paid careful attention to distinguish between the two similar species. We identified the Laysan bird as *C. hudsonius* based upon the following characteristics: a rich orangey-rufous body; thin, limited streaking to the upper breast and flanks; an obviously dark hood; strong dark terminal tips to the secondaries contrasting with weakly tipped primaries; and more barring on the outermost primaries (six bars on p8 and four bars on p10; HOWELL et al. 2014). Although there were



Figure 1. Photographic records of some species from Laysan Island, Hawaii, USA. **A.** Eighteen Northern Pintails and a single American Wigeon (left). **B.** Adult male Lesser Frigatebird. **C.** Two male “Brewster’s” Brown Boobies (left and middle) with three probable *plotus* Brown Boobies. **D.** Cattle Egrets. **E.** Juvenile Northern Harrier. **F.** Hatch-year Hawaiian Coot. **G.** Adult Gray-tailed Tattler (center) amongst Wandering Tattlers. **H.** First-cycle Wood Sandpiper. All photographs by CLR.



Figure 2. Photographic records of some species from Laysan Island, Hawaii, USA. **A.** Juvenile Bar-tailed Godwit. **B.** Adult Ruff. **C.** Juvenile Sharp-tailed Sandpipers. **D.** First-cycle Glaucous Gull (photograph by Robby Kohley). **E.** First-cycle Black Tern. **F.** Probable first-cycle *japonensis* Peregrine Falcon, in nearly adult-like body plumage aspect. All other photographs by CLR.

only six *Circus* sp. records in the Northwestern Hawaiian Islands through 2009, harriers have shown up more regularly on the main Hawaiian Islands (PYLE & PYLE 2009). Despite *C. cyaneus* being a distinct possibility—perhaps even expected—for the Northwestern Hawaiian Islands, only one Hawaiian specimen has been critically identified to *C. hudsonius*; although, most other individuals showed characters consistent with that taxon (PYLE & PYLE 2009). All other Hawaii records have lacked sufficient detail for this difficult identification (PYLE & PYLE 2009).

Fulica alai Peale, 1848. We observed a first-cycle bird 16–21 September 2011 (Figure 1F) that proved difficult to

identify, because separation of this age class of the Hawaiian resident *F. alai* and the North American *F. americana* Gmelin, 1789 is currently unresolved (Peter Pyle, pers. comm.). The difficulty is partially inherent in the fact that it takes some time for immature birds to attain adult bill and frontal shield structure, despite having otherwise adult plumage (PRATT & BRISBIN 2002). The Eurasian counterpart, *F. atra* Linnaeus, 1758, however, can be eliminated by the presence of white undertail coverts (Pratt et al. 1987). As all prior *F. americana* reports from Hawaii are considered unsubstantiated and most vagrant coots from the Northwestern Hawaiian Islands have been critically identified as *F. alai* (PYLE & PYLE 2009), it follows

that this bird most likely pertains to that species, which is also supported by the date, as it would be too early for a juvenile *F. americana*. Thus, this bird represents the fifth record of *F. alai* for Laysan and approximately the 15th for the Northwestern Hawaiian Islands through 2009 (PYLE & PYLE 2009). The bird was reported by a United States Fish and Wildlife Service field crew prior to our arrival on the island, but the date of its arrival is uncertain.

Tringa brevipes (Vieillot, 1816). A molting adult transitioned into basic plumage during its 25 September 2011–17 March 2012 (Figure 1G) stay on Laysan. This Old World shorebird has been confirmed on nine previous occasions from the Hawaiian Islands, although this bird represents the first such record from Laysan (PYLE & PYLE 2009; DONALDSON 2011a, 2011b). Four of these 10 records have occurred between 2009 and 2011 indicating that it may be more regular than records indicate, which probably reflects increased observer awareness and refined identification criteria more than an increased trend of vagrancy to Hawaii.

Tringa glareola (Linnaeus, 1758). This first-cycle bird, the most unusual avian discovery of the winter season, was Laysan's first and Hawaii's sixth (through 2009); the only other observations are from Midway and Kure (PYLE & PYLE 2009). It lingered on the island from 16 September 2011–13 January 2012 (Figure 1H).

Numenius tahitiensis (Gmelin, 1789). A bird displaying a green leg flag with a white alpha code (EJ) was photographed on 27 January 2012. We later learned that this male was banded the previous summer (2 July 2011) at the Yukon Delta National Wildlife Refuge in southwestern Alaska (Kristine Sowl, pers. comm.). Although undoubtedly more birds wintered on the island, our high count for *N. tahitiensis* was only 31 (26 December 2011) and we seldom recorded more than 10 birds on any day. These counts are far lower than prior winter population estimates that put the number at approximately 300–450 individuals (PYLE & PYLE 2009). However, the 2011–2012 winter may not be an anomaly as the average number registered during the Laysan Christmas Bird Count (CBC) between 2000 and 2011 was only 25 birds (the CBC high count during this span was 55 on 24 December 2005). Although the reasons for this apparent decline are unclear, if these signs are indicative of a long-term, widespread trend, this is particularly alarming as Laysan and Lisianski historically have held the highest concentrations of wintering *N. tahitiensis*.

Limosa lapponica (Linnaeus, 1758). We observed a single juvenile on 27 October 2011 (Figure 2A). It presumably departed overnight, as it was not seen again the following morning.

Calidris pugnax (Linnaeus, 1758). We found two *C. pugnax* during our stay: a transient juvenile 12–19 September 2011 and an overwintering adult 13 October 2011–17 March 2012 (Figure 2B).

Calidris acuminata Horsfield, 1821. The fall migration of this species was exceptional on Laysan. After first appearing on 19 September 2011, numbers initially grew slowly before increasingly rapidly in mid- to late-October: 7 October 2011 ($n = 14$), 13 October 2011 ($n = 47$), and 27 October 2011 ($n = 93$). The peak count of 105 individuals on 30 October 2011 is among the largest concentrations ever recorded in Hawaii. Only two other counts on record have exceeded 100 individuals: > 100 on Laysan (6 October 1990) and 110 on Maui (13 October 1991; PYLE & PYLE 2009). Numbers quickly declined thereafter and had dwindled to two birds on 6 December 2011. It later became apparent that at least three individuals over-wintered (last recorded 17 March 2012). These observations confirm the first time that *C. acuminata* have been documented over-wintering anywhere in the Northwestern Hawaiian Islands outside of Midway. All birds critically identified to age were juveniles/first-cycle birds (Figure 2C).

Calidris alba (Pallas, 1764). Although considered to be primarily a migrant through the Northwestern Hawaiian Islands (PYLE & PYLE 2009), our experiences on Laysan instead show that relatively large numbers overwinter there. Our peak count ($n = 111$) on 3 January 2012 is the highest on record for the Northwestern Hawaiian Islands, more than three times larger than the previous high counts ($n = 30$ – 35 on Laysan in 1964 and 1991; PYLE & PYLE 2009).

Larus hyperboreus Gunnerus, 1767. A first-cycle bird made a one-day appearance on 8 February 2012 (Figure 2D). This marks the first record for Laysan and one of only 17 substantiated records for the Hawaiian Islands through 2009 (PYLE & PYLE 2009).

Chlidonias niger (Linnaeus, 1758). A first-cycle *C. niger* briefly visited the island 12–13 December 2011 (Figure 2E). This record is just the second ever on Laysan (the first appeared on 21 December 1994) and the fourth for the Northwestern Hawaiian Islands (PYLE & PYLE 2009). This *C. niger* appears to represent the New World subspecies, *C. n. surinamensis* (Gmelin, 1789), based upon the bird's lack of clean white underwing coverts, in combination with limited diffuse gray apparent on the upper flanks and some contrast between the darker ear spot and the paler crown (HALLAM & LEWINGTON 2009). Only one other *C. niger* from Hawaii (a specimen) has been identified to subspecies (also *C. n. surinamensis*; PYLE & PYLE 2009).

Falco peregrinus Tunstall, 1771. We recorded two juveniles/first-cycle birds on the island: 3–7 October 2011 and 4 November 2011–17 March 2012. The former bird, possibly *F. p. tundrius* C.M. White, 1968, would represent the expected subspecies during migration in Hawaii, while the latter bird appeared to be *F. p. japonensis* Gmelin, 1788 (Figure 2F). We believe that this overwintering bird was likely of the *japonensis* subspecies (from northeast Asia) as it underwent a substantial preformative body molt, the extent of which is unlike that of the other probable subspecies, such that it appeared much like an adult by late winter

(PYLE 2008). An apparently similar body molt occurred in an *F. p. japonensis* that wintered on Midway in 1999–2000 (PYLE & PYLE 2009). The wintering Laysan bird used a predictable location as a roost site, routinely dismembering a portion of its kills there. This allowed us to regularly scour the ground in the vicinity for identifiable leftovers, which primarily comprised wings cleanly severed from the rest of the bird. Throughout the course of its roost occupancy (27 November 2011–17 March 2012) we found the body parts of 68 prey items: 38 *Arenaria interpres* (Linnaeus, 1758); 27 *Pluvialis fulva* (Gmelin, 1789); two *Telespiza cantans* (Wilson, 1890); and one *Calidris alba*. Few other *F. peregrinus* in the Northwestern Hawaiian Islands have allowed this sort of detailed diet analysis and none have included a comprehensive summary of prey species and individuals. Eight dead *Anas laysanensis* on Midway over a period of 17 days were attributed to an *F. peregrinus*, and another bird depredated or otherwise dispersed a small colony of *Procelsterna cerulea* Bennett, 1840, at French Frigate Shoals (PYLE & PYLE 2009; McClung et al. 2011). The most detailed *F. peregrinus* roost survey also comes from Laysan (2009) when 58 *Telespiza cantans*; 6 *Pterodroma hypoleuca* (Salvin, 1888); 1 *Oceanodroma tristrami* Salvin, 1896; and an unrecorded number of *Anous minutus* Boie, 1844; and *A. stolidus* (Linnaeus, 1758); were tallied over the course of 50 days (McClung et al. 2011). Perhaps these *F. peregrinus* individuals specialize on certain prey items (shorebirds, ducks, terns, and finches, respectively) so as to increase their efficiency of prey capture, which could explain the apparently broad, but limited, focus of these various individuals.

Acrocephalus familiaris (Rothschild, 1892). Although the Laysan subspecies (*A. f. familiaris*) went extinct by at least 1923, the population on Nihoa (*A. f. kingi* (Wetmore, 1923)) was long considered for translocation to Laysan in order to produce a secondary, insurance population (USFWS 1984, PYLE & PYLE 2009). On 10 September 2011, 24 *A. f. kingi* (13 males, 11 females) were released on Laysan after being transported by boat from Nihoa (RUTT & KOHLEY 2012). At least 21 of these 24 (87.5%) individuals survived the winter and were resighted according to a unique combination of color bands during late February or March 2012 (RUTT & KOHLEY 2012). The released birds primarily remained within the nearly contiguous patch of *Scaveola taccada* towards the north and northeast of the island, although one individual traveled at least 8.72 km during a stretch of 37 days from the time of its release until mid-October (RUTT & KOHLEY 2012). Two periods of breeding were recorded during our survey; the first occurred from early October to early December 2011, outside of the published breeding season for this species (January–September; MORIN et al. 1997). During this period, females from three pairs laid eggs but, of these, only one clutch hatched and the nestling was eventually found dead in the nest (RUTT & KOHLEY 2012). We hypothesize that the other two nests with eggs were depredated by *Telespiza cantans* (RUTT & KOHLEY 2012). A second breeding period began in mid-February 2012 and we found three active nests through 21

March 2012 (RUTT & KOHLEY 2012). Two of these nests later fledged a total of three chicks (23–24 March 2012 and 10 April 2012; John Vetter, pers. comm.), the first successful fledging of *A. familiaris* on Laysan in nearly a century (RUTT & KOHLEY 2012).

Telespiza cantans (Wilson, 1890). We first observed evidence of breeding (two recently-fledged juveniles) for this species in late December. This early breeding event, however, seemed unusual for *T. cantans* as the onset of nest-building behavior did not really begin until late January, after which we found multiple nests with eggs (30–31 January 2011 and 2 February 2011), about a month prior to published initiation dates (late February; MORIN and CONANT 2002). Two of the earliest active nests in February were later found empty, presumably as a result of conspecific nest predation events. The first *T. cantans* nestlings were observed in multiple nests from 27 February 2012–1 March 2012, again predating published accounts (MORIN & CONANT 2002), and we found three fledglings on 12 March 2012. All of these observations suggest that the breeding phenology of this species begins earlier than was previously thought (MORIN & CONANT 2002; RUTT & KOHLEY 2012).

ACKNOWLEDGMENTS

I thank the American Bird Conservancy, U.S. Fish and Wildlife Service, and the Papahānaumokuākea Marine National Monument for funding and facilitating my time on Laysan. First and foremost, I am indebted to Robby Kohley for providing me with this unique opportunity, for his loyal company, and his invaluable help surveying the island's birds. Additionally, I thank Andrea Kristof, David Tafoya, Jack Toriello, and Rachael Herman for further assistance with bird surveys. I am grateful to Stephanie Wheeler, Eric VanderWerf, and Regina Rutt for providing materials while I was stranded on the island with little access to the outside world, and to Marshall Iliff who directed me to pertinent resources upon my return. Lastly, thanks to Peter Pyle for assistance in ageing multiple species that I was unfamiliar with.

LITERATURE CITED

- AOU (AMERICAN ORNITHOLOGISTS' UNION). 1998. Check-list of North American birds. 7th ed. Washington, DC: American Ornithologists' Union. 829 pp.
- CHESSER, R.T., K.J. BURNS, C. CICERO, J.L. DUNN, A.W. KRATTER, I.J. LOVETTE, P.C. RASMUSSEN, J.V. REMSEN, JR., J.D. RISING, D.F. STOTZ & K. WINKER. 2013. Fifty-seventh supplement to the American Ornithologists' Union check-list of North American birds. *The Auk* 133: 544–560.
- DONALDSON, P. 2009. Hawaiian Islands. *North American Birds* 63(1): 176.
- DONALDSON, P. 2011a. Hawaiian Islands. *North American Birds* 65(2): 360.
- DONALDSON, P. 2011b. Hawaiian Islands. *North American Birds* 65(3): 537.
- DONALDSON, P. 2012a. Hawaiian Islands. *North American Birds* 66(1): 192.

- DONALDSON, P. 2012b. Hawaiian Islands. *North American Birds* 66(2): 370.
- EBIRD. 2017. eBird: An online database of bird distribution and abundance. Accessed at <http://www.ebird.org>, 12 February 2017.
- ELY, C.A., & R.B. CLAPP. 1973. The natural history of Laysan Island, northwestern Hawaiian Islands. *Atoll Research Bulletin* 171: 361 pp.
- FISHER, W.K. 1903a. Birds of Laysan and the leeward islands, Hawaiian group. *United States Fish Commission Bulletin* 23(3): 767–807.
- FISHER, W.K. 1903b. Notes on the birds peculiar to Laysan Island, Hawaiian group. *The Auk* 20(4): 384–397. <http://www.jstor.org/stable/4069753>
- HALLAM, N. & I. LEWINGTON. 2009. Identification of American Black Tern. *Birding World* 22(9): 383–388.
- HOWELL, S.N.G, I. LEWINGTON, AND W. RUSSELL. 2014. Rare birds of North America. Princeton: Princeton University Press. 448 pp.
- IUCN (INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE). 2014. The IUCN Red List of threatened species. Version 2014.2. Accessed at <http://www.iucnredlist.org/>, 18 August 2014.
- KLAVITTER, J. & M. VEKASY. 2008. Summary of Cattle Egret eradication program at Midway Atoll NWR from October 2004 to October 2007. Honolulu: United States Fish & Wildlife Service.
- MARAGOS, J.E., D.C. POTTS, B. MAXFIELD, D. SICILIANO & E. FLINT. 2011. Midway Atoll (Hawaiian Archipelago); pp. 700–707, in: D. HOPLEY (ed.). *Encyclopedia of modern coral reefs: structure, form and process*. New York: Springer.
- MCCLUNG, A., M. REYNOLDS, M. VEKASY, J. KLAVITTER, M. MUDGE, M. HENSCHEN & A. BOYD. 2011, August 2–4. Peregrine Falcon predation on endangered Laysan Ducks and Laysan Finches at remote Hawaiian atolls. Poster presented at the 19th Hawai'i Conservation Conference: Island Ecosystems: The Year of the Forest, Honolulu, Hawaii.
- MORIN, M.P. 1992. Laysan Finch nest characteristics, nest spacing and reproductive success in two vegetation types. *The Condor* 94: 344–357.
- MORIN, M.P. & S. CONANT. 2002. Laysan Finch (*Telespiza cantans*), *The birds of North America* (P.G. RODEWALD, ed.). Ithaca: Cornell Lab of Ornithology. Accessed at <https://birdsna.org/Species-Account/bna/species/layfin>, 12 February 2017.
- MORIN, M.P., S. CONANT & P. CONANT. 1997. Millerbird (*Acrocephalus familiaris*), *The birds of North America* (P.G. RODEWALD, ed.). Ithaca: Cornell Lab of Ornithology. Accessed at <https://birdsna.org/Species-Account/bna/species/miller>, 12 February 2017.
- PRATT, H.D. & I.L. BRISBIN, JR. 2002. Hawaiian Coot (*Fulica alai*), *The birds of North America Online* (A. POOLE, ed.). Ithaca: Cornell Lab of Ornithology. Accessed at <http://bna.birds.cornell.edu/bna/species/697b>, 19 August 2014.
- PRATT, H.D., P.L. BRUNER & D.G. BERRETT. 1987. *a field guide to the birds of Hawaii and the Tropical Pacific*. Princeton: Princeton University Press. 409 pp.
- PYLE, P. 2008. Identification guide to North American Birds, part II: Anatidae to Alcidae. Point Reyes Station: Slate Creek Press. 835 pp.
- PYLE, R.L. & P. PYLE. 2009. *The birds of the Hawaiian Islands: occurrence, history, distribution, and status*. B.P. Bishop Museum, Honolulu. Version 1 (31 December 2009). Accessed at <http://hbs.bishopmuseum.org/birds/rlp-monograph/>, 21 August 2014.
- REYNOLDS, M. & J. KLAVITTER. 2006. Translocation of wild Laysan duck *Anas laysanensis* to establish a population at Midway Atoll National Wildlife Refuge, United States and US Pacific Possession. *Conservation Evidence* 3: 6–8.
- ROTHSCHILD, W. 1990. 1893–1900. The avifauna of Laysan and the neighboring islands, with a complete history to date of the birds of the Hawaiian possessions. London: RH Porter. 406 pp.
- RUTT, C. & R. KOHLEY. 2012. Monitoring translocated Millerbirds on Laysan, 10 September 2011 to 19 March 2012. Honolulu: United States Fish & Wildlife Service.
- TAYLOR, C. 2003. *Northwestern Hawaiian Islands: a resource guide*. Washington, DC: United States Department of Commerce. 41 pp.
- U.S. FISH AND WILDLIFE SERVICE. 1984. Recovery plan for the Northwestern Hawaiian Islands passerines. Portland, Oregon: United States Fish & Wildlife Service.
- VANDERWERF, E.A., B.L. BECKER, J. EIJZENGA & H. EIJZENGA. 2008. Nazca Booby *Sula granti* and Brewster's Brown Booby *Sula leucogaster brewsteri* in the Hawaiian Islands and Johnston and Palmyra atolls. *Marine Ornithology* 36: 67–71. http://www.pacificrimconservation.com/wp-content/uploads/2013/10/57%20VanderWerf_etal_2008_Nazca+Brewsters_Boobies_MarineOrn.pdf

Received: 22 August 2014

Accepted: 8 March 2017

Academic editor: Michael J. Andersen