

The Avifauna of Kosrae, Micronesia: History, Status, and Taxonomy¹

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Abstract: Kosrae, the easternmost high island of Micronesia, is a 110 km² volcanic island rising up to 630 m above sea level. It is seldom visited by birders and ornithologists because it is small, isolated, and lacks any previously recognized extant endemic bird species. We review the history of research on the island's avifauna and summarize the status of each species, including documentation for six new species: Northern Pintail (*Anas acuta*), Gray Plover (*Pluvialis squatarola*), Common Snipe (*Gallinago gallinago*), Bristle-thighed Curlew (*Numenius tahitiensis*), Red-necked Stint (*Calidris ruficollis*), and Whiskered Tern (*Chlidonias hybrida*). We discuss previously undescribed vocalizations of endemic taxa and provide online reference to recordings. We also present supporting evidence for the recognition of two taxa as full biological species: Kosrae Fruit Dove (*Ptilinopus hernsbeimi*; formerly part of the *P. porphyraceus* complex) and Kosrae White-eye (*Zosterops cinereus*, as a split from Gray-brown White-eye, *Z. ponapensis*). The avifauna of Kosrae includes 53 naturally occurring species of birds of which 13 breeding residents are extant (2 endemic species, 4 endemic subspecies) and 2 are extinct (both endemic species), 21 are boreal migrants from breeding populations in the temperate Northern Hemisphere (including 11 exclusively Palearctic migrants and 3 exclusively Nearctic migrants), 5 are austral migrants from breeding populations in the temperate Southern Hemisphere, and 12 are visitors from breeding populations on tropical islands elsewhere in the Pacific. Two additional species have been introduced; one has a self-sustaining feral population and the other is extirpated. Because of the island's low human population and relatively pristine environment, resident breeding birds are thriving with no serious threats to their survival at present, except for overhunting of the Micronesian Imperial Pigeon (*Ducula oceanica oceanica*).

KOSRAE, THE EASTERNMOST high island of the Caroline islands of Micronesia (5° 19' N, 162° 59' E) and one of four states that compose the Federated States of Micronesia, is a 110 km² volcanic island surrounded by fringing coral

reefs and a few small satellite islands (Figure 1). The mountainous interior is steep, rugged, and uninhabited, rising up to 630 m above sea level at Mount Finkel. Precipitation is high, averaging 4,842 mm/yr (Western Regional Climate Center 2004). The vegetation is dominated by tropical rainforest in the mountains and mangroves along the coast (e.g., Maxwell 1982, Cole et al. 1999). Because of its historically low human population (6,616 humans in 2010 with a density of 54.7/km²; Gorenflo 1993, Office of SBOC 2013), which is concentrated along the coast, the environment of Kosrae remains relatively pristine. Segal (1989) provided an excellent treatise on the island's history, culture, government, and economy, but some of his information on its natural history is inaccurate.

Kosrae is seldom visited by birders and ornithologists because it is small, isolated, and

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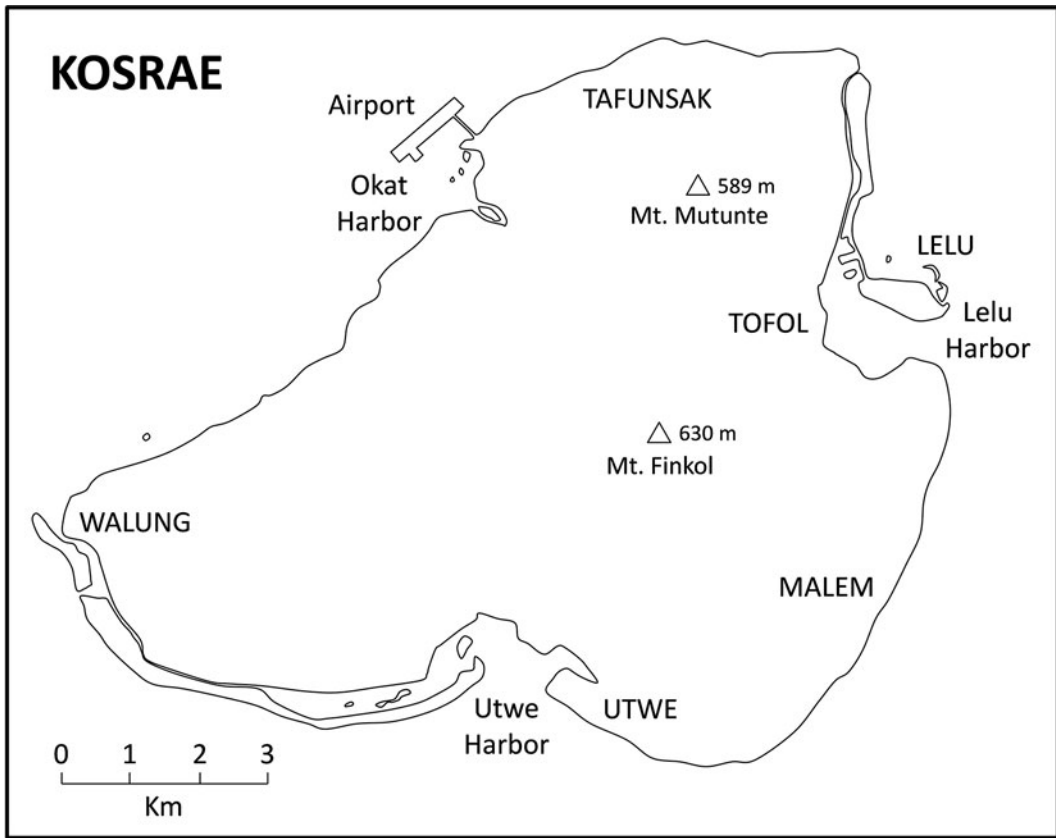


FIGURE 1. Map of Kosrae, Federated States of Micronesia.

until now lacked any previously recognized extant endemic bird species. The available information on the avifauna of Kosrae is widely scattered in the technical literature and has been dominated by reports of new or unusual species, which often neglected to report details of previously recorded species. The only summaries of the avifauna since Baker's (1951) comprehensive review of the birds of Micronesia include five checklists with a few symbols denoting the status or a literature source for the occurrence of each species on Kosrae (Owen 1977, Pyle and Engbring 1985, Pratt et al. 1987, Engbring et al. 1990, Wiles 2005). As a consequence, it is cumbersome for researchers to extract information on the status of the island's birds. The purpose of this paper is to provide a detailed summary of ornithological history and overview of what is

known of the avifauna of Kosrae, including documentation for six new species for the island. We also discuss previously undescribed vocalizations of endemic species and subspecies, and we present supporting evidence for the recognition of three taxa as full biological species.

METHODS

We reviewed the pertinent literature on the birds of Kosrae, gleaned data on collectors and observers, the ranges of dates in which they visited, their observations of birds, reports of specimens collected, the museums in which specimens were deposited, and the Kosraean names of birds. We also reviewed the available online catalogs of specimens of various museums, including those in the

ORNIS 2 database (ornis2.ornisnet.org); however, not all museums potentially hosting specimens from Kosrae have posted their catalogs online. We also searched for archived recordings of bird vocalizations from Kosrae in the Macaulay Library of the Cornell University Laboratory of Ornithology (macaulay-library.org) and the online source xeno-canto (www.xeno-canto.org), sponsored by the Xeno-canto Foundation with support from the Naturalis Biodiversity Center. Our online searches yielded previously unpublished data for both skin and acoustic specimens.

We compiled a list of bird species reported from Kosrae. We considered a species to be documented if its occurrence was based on verifiable physical evidence such as a specimen, photograph, or sound recording. Undocumented sight records were evaluated based on the information available to us. Each species was placed into one of three categories: (1) naturally occurring species, (2) introduced species, and (3) hypothetical species whose presence on Kosrae has been inadequately documented. Terms for current abundance include “common” (recorded daily), “uncommon” (recorded less than daily with five or more records), and “rare” (less than five records). Status terms include “extinct” (no longer living), “migrant” (annual migratory movements, nonbreeding), “resident” (breeding), and “visitor” (nonbreeding vagrant from islands in tropical Pacific). Migratory birds are defined by the biogeographical realm or region in which they breed (Hayes 1995): “austral migrant” (temperate Southern Hemisphere), “Australian migrant” (Australia or New Zealand), “boreal migrant” (temperate Northern Hemisphere), “Nearctic migrant” (temperate North America), and “Palearctic migrant” (temperate Eurasia). In the case of seabird records with published coordinates, distances from Kosrae were recalculated using Google Earth.

A summary of the avifauna, including English, scientific, and Kosraean names; abundance; status; and type of documentation, is provided in Table 1. Unless otherwise specified, taxonomy and English names follow Gill and Donsker (2015). Our taxonomic innovations are based on criteria for species limits

among insular populations proposed by Pratt (2010), with a focus on potential isolating mechanisms, geographic distance (i.e., degree of isolation), quasi-clinal variation, and comparisons with closely related species. Populations that have obvious potential isolating mechanisms in two or more qualitatively different categories are considered species unless proven otherwise. This view considers genetic data informative but not essential to taxonomic decisions and follows Gill’s (2014) recent proposal to shift the burden of proof in species-level taxonomy of birds. All taxonomic comments herein were contributed by H.D.P.

Acronyms for museums and sound archives are as follow: AMNH=American Museum of Natural History, New York, New York; BPBM=Bernice Pauahi Bishop Museum, Honolulu, Hawai‘i; DMNH=Delaware Museum of Natural History, Wilmington, Delaware; FMNH=Field Museum of Natural History, Chicago, Illinois; ML=Macaulay Library, Cornell Lab of Ornithology, Ithaca, New York; MCZ=Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; MNHN=Muséum National d’Histoire Naturelle Zoologie, Paris, France; MTD=Senckenberg Naturhistorische Sammlungen Dresden, Dresden, Germany; NSMT=National Museum of Nature and Science, Tokyo, Japan; RMNH=Nationaal Natuurhistorisch Museum, Leiden, Netherlands; SMF=Senckenberg Naturmuseum Frankfurt, Frankfurt, Germany; USNM=United States National Museum, Washington, DC; UWBM=Burke Museum, University of Washington, Seattle, Washington; XC=Xeno-canto Foundation (www.xenocanto.org); YIO=Yamashina Institute of Ornithology, Abiko, Japan; YPM=Peabody Museum of Natural History, Yale University, New Haven, Connecticut; ZIN=Zoological Museum of the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia.

RESULTS

Ornithological History

The first scientific studies of Kosrae’s avifauna were conducted by French biologists René

TABLE 1
Summary of the Naturally Occurring and Introduced Bird Species of Kosrae

English Name	Scientific Name	Kosraean Name	Abundance ^a	Status ^b	Documentation ^c
Northern Shoveler	<i>Anas dypeata</i>	Tuk, ^d Tuhk ^e	R	BM	Ph
Northern Pintail	<i>Anas acuta</i>		U	BM	Ph
Feral Chicken	<i>Gallus gallus</i> × <i>sonnerati</i>	Won in ima ^d	U	IR	Sp
Kermadec Petrel	<i>Pterodroma neglecta</i>		R	AM	Si
Wedge-tailed Shearwater	<i>Puffinus pacificus</i>	Kakowe ^d	C	V	Sp
Flesh-footed Shearwater	<i>Puffinus carneipes</i>		R	AM	Si
Christmas Shearwater	<i>Puffinus nativitatis</i>		R	V	Si
Tropical Shearwater	<i>Puffinus bailloni</i>		U	R	Sp
Bulwer's Petrel	<i>Bulweria bulwerii</i>	Lo, ^{i,g} Kakowe ^d	R	V	Si
Wilson's Storm Petrel	<i>Oceanites oceanicus</i>		R	AM	Si
Tristram's Storm Petrel	<i>Oceanodroma tristrami</i>		R	V	Si
Red-tailed Tropicbird	<i>Phaethon rubricauda</i>		R	V	Si
White-tailed Tropicbird	<i>Phaethon lepturus</i>		C	R	Sp
Asian Cattle Egret	<i>Bubulcus coromandus</i>		R	V	Si
Pacific Reef Heron	<i>Egretta sacra</i>	Shiek, ^f Sik ^{d,e,g}	R	R	Sp
Great Frigatebird	<i>Fregata minor</i>		C	V	Si
Lesser Frigatebird	<i>Fregata ariel</i>		C	R	Sp
Brown Booby	<i>Sula leucogaster</i>	Neg lap, ^f Nokleap, ^g Noklap ^d	R	V	Ph
Kosrae Crane	<i>Porzana monasa</i>	Won-palang ^d	R	V	Ph
Watercock	<i>Gallinix cinerea</i>		U	V	Sp
Pacific Golden Plover	<i>Pluvialis fulva</i>		X	R, E1	Sp
Gray Plover	<i>Pluvialis squatarola</i>	Nay tai mai not, ⁱ Kuluinut, ^d Naituma-Oa ^d	R	V	Ph
Lesser Sand Plover	<i>Charadrius mongolus</i>		C	BM	Sp
Common Snipe	<i>Gallinago gallinago</i>		R	BM	Ph
Black-tailed Godwit	<i>Limosa limosa</i>		R	PM	Sp
Bar-tailed Godwit	<i>Limosa lapponica</i>		R	PM	Ph
Whimbrel	<i>Numenius phaeopus</i>	Kaht kaht, ^f Katkat ^{d,e}	U	PM	Ph
Bristle-thighed Curlew	<i>Numenius tahitiensis</i>	Kulul ^d	C	NM	Sp
Gray-tailed Tattler	<i>Tringa brevipes</i>	Ku lul ^f	R	PM	Ph
Wandering Tattler	<i>Tringa incana</i>	Ku lul ^f	U	PM	Sp
			C	NM	Sp

Common Sandpiper	<i>Actitis hypoleucos</i>	Katkat ^d	Ph
Ruddy Turnstone	<i>Arenaria interpres</i>	Ku lul, ^f Katkat, ^g Kulul ^d	Sp
Sanderling	<i>Calidris alba</i>	R	Ph
Red-necked Stint	<i>Calidris ruficollis</i>	R	Ph
Sharp-tailed Sandpiper	<i>Calidris acuminata</i>	U	Ph
Brown Noddy	<i>Anous stolidus</i>	C	Sp
Black Noddy	<i>Anous minutus</i>	C	Sp
White Tern	<i>Gygis alba</i>	C	Sp
Laughing Gull	<i>Leucophaeus atricilla</i>	R	Ph
Greater Crested Tern	<i>Thalasseus bergii</i>	U	Si
Little Tern	<i>Sternula albifrons</i>	U	Si
Sooty Tern	<i>Onychoprion fuscatus</i>	R	Si
Whiskered Tern	<i>Chlidonias hybrida</i>	R	Ph
South Polar Skua	<i>Stercorarius macrorhynchos</i>	R	Si
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	R	Si
Rock Dove	<i>Columba livia</i>	X	Si
Kosrae Fruit Dove	<i>Phainopepla nitens</i>	C	Sp
Micronesian Imperial Pigeon	<i>Ducula oceanica</i>	U	Sp
Pacific Long-tailed Cuckoo	<i>Urodynamis taitensis</i>	U	Sp
Island Swiftlet	<i>Aerodramus inquietus</i>	C	Sp
Micronesian Myzomela	<i>Myzomela rubratra</i>	C	Sp
Kosrae White-eye	<i>Zosterops cinereus</i>	C	Sp
Micronesian Starling	<i>Aplonis opaca</i>	C	Sp
Kosrae Starling	<i>Aplonis corvina</i>	X	Sp
Blue-faced Parrotfinch	<i>Erythrura trichroa</i>	C	Sp
		Pfawn, ^f Fowne, ^g Fon, ^d Fohn ^e	
		Mouluk, ^f Ulwe, ^g Ule ^{de}	
		Nis eahr, ^f Suukperowst, ^g Won pangpang mos, ^d	
		Won pahngpahng mos ^e	
		Gal kief, ^f Kalkeci, ^g Kalkaf ^d Kalkac ^f	
		Schusch, ^f Sruust, ^g Srustr, ^d Srihsr ^e	
		Tar ahm, ^f Tuwram, ^g Truum, ^d Tuhrum ^e	
		U veh, ^f Wee, ^g We, ^d Wa ^{ce}	
		Kako-wee ^g	
		Schisch na weh, ^f Sruust peclang, ^g Sruust-en-eku, ^d	
		Srihsr in eku ^f	

^aAbundance: C=common, U=uncommon, R=rare, X=extinct.

^bStatus: AM = austral migrant, BM = boreal migrant, EI = endemic species, E2 = endemic subspecies, NM = Nearctic migrant, I = introduced, PM = Palearctic migrant, R = resident, V = visitor.

^cDocumentation: Ph = photograph, Si = sight, Sp = specimen.

^dSantos et al. (1970), Segal (1985, 1989), Engbring et al. (1990).

^eYi and Lee (1976).

^fCoultas (1931).

^gHill (1957).

Primevère Lesson and Prosper Garnot, who visited Kosrae during 5–15 June 1824 with a French expedition aboard the corvette *La Coquille*, recording at least 10 species (Lesson 1829–1830*a, b*, 1831). Lesson described two new species from Kosrae (Lesson and Garnot 1826, Lesson 1827). Oustalet (1895) suspected that none of Lesson's specimens from Kosrae were preserved, which was the case with one of the new species that he described, but three specimens of two species from Kosrae are listed online in the MNHN, and at least two specimens from Kosrae are in the RMNH (Hoek Ostende et al. 1997, Dekker and Quaiser 2006).

Freidrich Heinrich von Kittlitz, a Russian biologist, visited Kosrae from 8 December 1827 to 1 January 1828 with a Russian expedition aboard the *La Seniavine* (Kittlitz 1832–1833, 1835, 1836, 1858). Kittlitz recorded 19 species, of which 17 were collected and deposited in the ZIN. Some specimens were sold or traded to the SMF (Steinbacher 1954) and the RMNH (Mees 1964, Dekker and Quaiser 2006). Six new species were described from Kosrae, two of which were never collected again.

Friedrich Hermann Otto Finsch, a German biologist, collected birds on Kosrae from 20 to 29 February 1880 (Finsch 1880*a*, 1881). Finsch observed 18 species, of which 14 were collected and a new subspecies was described. Unfortunately, he did not state where his specimens were deposited, but none are listed online at the SMF and the MTD, and none of the other potential museums in Germany and Holland have an online catalog.

The online catalog of the FMNH lists four specimens from the Louis B. Bishop Collection that were obtained on Kosrae from 28 January to 7 February 1899. It is uncertain whether Bishop collected the specimens himself or obtained them from another collector.

Charles Haskins Townsend, an American biologist, collected birds on Kosrae during an expedition of the U.S. Fish Commission aboard the *Albatross* during 7–9 February 1900. The specimens were deposited in the USNM (Townsend and Wetmore 1919), but a few were traded or sold to the MCZ (online catalog).

Ernst Gotthilf Sarfert, a German ethnologist, visited Kosrae during February to May 1910 as a member of the South Sea Expedition sponsored by the Hamburg Scientific Foundation. Sarfert (1919) published anecdotal accounts about the island's most common bird species and wrote extensively about the methods used to hunt birds.

Japanese biologists collected birds on Kosrae in the early 1900s (Taka-Tsukasa and Kuroda 1915*a, b*; Momiyama 1920, 1922; Kuroda 1922; Hachisuka et al. 1932, 1942), but no information was published on the collectors and dates of collection. The online catalog of the YIO lists a specimen collected by (Keisuke?) Kobayashi on 4 April 1915, another specimen by Toji Mishima on 23 January 1929, and 69 specimens by Hyojiro Orii during 2–9 August 1931 (Orii's name appears on only one label, but the handwriting appears to be the same on all other labels). Two of Orii's specimens were obtained by the FMNH and one by the YPM (online catalogs). Six specimens at the NSMT were obtained by an unknown collector, possibly Hyojiro Orii, during 2–16 April 1931 and on 10 September 1931 (online catalog).

William Coultas, an American biologist, visited Kosrae as a member of the Whitney South Sea Expeditions of the AMNH from 15 January to 11 June 1931 (Coultas 1931). He collected 426 specimens of 22 species for the museum, a few of which were traded or sold to the DMNH. Coultas provided the first relatively complete list of Kosraean bird names. Some of his specimens from Kosrae were reported by others (Bogert 1937, Mayr and Amadon 1941, Ripley and Birckhead 1942, Stickney 1943).

After World War II, nearly all bird observations were made by Americans. Biologist Joseph T. Marshall Jr. visited Kosrae during 23–27 November 1955 while studying rats for the Pacific Islands Rat Ecology Project. He collected four species of birds for the USNM (Marshall 1957), but only two specimens of one species are in the online catalog.

Margaret Hill, a teacher, briefly reported her observations of birds and interviews with local informants from July 1956 to March 1957 (Hill 1957), although a few of the species she reported were almost certainly misidenti-

fied. She also included the Kosraean names of birds.

John H. Brandt collected two nests from Kosrae on 10 May 1959, which were deposited in the USNM (online catalog). Brandt (1962) published a detailed summary of nests and eggs collected on Chuuk, but never published anything on Kosrae.

Harvey Gordon Segal, another teacher and education coordinator, resided on Kosrae from 1964 to 1968 before moving permanently to Pohnpei. Segal authored two books on the birds of Micronesia (Santos et al. 1970, Segal 1985) and a compendium on Kosrae (Segal 1989) that included information, although sometimes inaccurate, on the island's ornithological history and birdlife, including Kosraean names and folklore.

C. John Ralph visited Kosrae in September 1979 (precise dates not given) and collected 22 specimens of six species of birds that were deposited at the USNM (online catalog).

Floyd E. Hayes, a teacher, resided in Tafunsak from 27 August 1981 to 1 January 1982 and from 15 January to 21 May 1982. He also traveled by ship from Kosrae to Pohnpei during 1–4 January 1982. Hayes published details for 11 new species of birds for Kosrae (Hayes 1985) and data on migratory shorebird populations (Hayes 1986).

During the summer of 1983, a U.S. Fish and Wildlife Service (USFWS) team, including Philip Ashman, John Engbring, David Jickling, James Moore, and Peter Pyle, conducted a survey of the native forest birds of Kosrae from 30 June to 29 July 1983 (Pyle 1983, Pyle and Engbring 1987, Engbring et al. 1990). Using the variable circular plot method for 8 minute counts, they estimated the densities and total population sizes of birds on Kosrae based on 313 stations for a total of 26.35 km². Their field work added two new species of birds for the island.

Michael Lauret, a physician, visited the island from 28 January to 8 March 1988 and reported three new species of birds (Lauret 1990). Ornithologists H. Douglas Pratt and Robert L. Pyle briefly visited Kosrae during 24–26 February 1988 and observed a few noteworthy birds (Lauret 1990, Wiles et al. 2000). Pratt recorded vocalizations of eight

species of birds, which were deposited at the ML.

During the First Joint U.S.–U.S.S.R. Central Pacific Expedition in 1988, Angela K. Kepler, Cameron B. Kepler, David H. Ellis, and Jeffrey S. Hatfield studied seabirds from a ship while cruising from Hawai'i to Singapore, passing south of Kosrae on 12 October 1988 (Kepler et al. 1992). In an extraordinary day, they added six new seabirds to the avifauna of Kosrae, showing how little is known about the movements of seabirds in Micronesia.

Visits by birders and ornithologists have increased in recent years. Between 8 February and 5 March 1989, three specimens of birds from Kosrae were collected by S. E. Shubel, Berlin Sigrah, and D. Tahlavan and were deposited in the UWBM (online catalog). Todd Mark visited during 7–10 October 2008 and recorded the vocalizations of five species of birds. Carlos Cianchini has resided on the island since 2008 and obtained photographs of six new species, one reported in Pratt et al. (2010) and the others reported herein. Glenn McKinlay, a New Zealand birder, visited Kosrae during 30 April to 3 May 2010 and photographed a new bird (Buden and McKinlay 2010). W. Ross Silcock led a group of birders including Al Reyer, Bill Scheible, and Ken Lowder to Kosrae during 6–10 June 2011 and conducted a pelagic trip approximately 6 km out from Utwe on 7 June 2011 (reported herein). Pablo Oleiro, a graduate student of Dylan Kesler at the University of Missouri, Columbia, coordinated a bird survey in early 2012, but the results have yet to be published. Floyd E. Hayes briefly returned to Kosrae during 18–28 June 2013 and 17–27 June 2014 and photographed two new birds for the island (reported herein). Grady L. Pettigrew taught at the College of Micronesia in Kosrae from 9 September 2013 until his untimely death on 17 August 2014 and found a new bird (reported herein).

In recent decades, the avifauna of Kosrae has been listed in several simple checklists (Owen 1977, Pyle and Engbring 1985, Pratt et al. 1987, Engbring et al. 1990, Wiles 2005) that usually cite only the first source for new records since Baker (1951). The following

species accounts document subsequent records for migratory visitors to reveal patterns of occurrence.

Species Accounts

Northern Shoveler (*Anas clypeata*)

Rare boreal migrant. Hayes (1985) found eight females or immatures at Okat Harbor on 13 October 1981. C.J.C. photographed five of six females or immatures flying over Lelu Harbor toward Tofol on 4 October 2014 and photographed three at Tofol on 11 October 2014 (Figure 2), providing the first documented record for Kosrae. This species is a regular visitor to most of the island groups of Micronesia (Wiles 2005).

Northern Pintail (*Anas acuta*)

Uncommon boreal migrant. Segal (1989: 220) listed this species among three duck species that are “occasional visitors” but provided no further details. In late December 2009 (exact date unknown), Maxson Nithan reported to C.J.C. that two ducks had been found in Utwe. One of them, a female, died but was photographed (Figure 3A) and the other disappeared the next day. On 13 January 2011, C.J.C. photographed two males (Figure 3B) on the grounds of the athletic complex in Lelu and was told by others that



FIGURE 2. First photo documented record of Northern Shoveler (*Anas clypeata*) for Kosrae at Tofol on 12 October 2014. Photo by C.J.C.



FIGURE 3. First documented records of Northern Pintail (*Anas acuta*) for Kosrae at: (A) Utwe in late December 2009; (B) Lelu on 15 January 2011; and (C) Lelu on 17 January. Photos by C.J.C.

five had been present the week before. He photographed three males nearby at Foko Lik, Lelu, on 18 January (Figure 3C) and 2 February 2011. On 26 November and 1 December 2011, C.J.C. photographed two female-plumaged individuals near Tofol. The date is early enough that these birds could have been eclipse-plumaged males rather than females. C.J.C. and Grady Pettigrew observed a female at Tofol on 14 March 2014. These records, in four successive winters, indicate that the Northern Pintail may be an annual visitor to Kosrae in very low numbers. It is the most frequent wintering duck throughout Micronesia (Wiles 2005).

Feral Chicken (*Gallus gallus* × *sonnerati*)

Introduced resident. Ornithologists have generally regarded the Red Junglefowl (*G. gallus*) as having established feral breeding populations on Kosrae and other island groups of Micronesia (Baker 1951, Owen 1977, Pyle and Engbring 1985, Pratt et al. 1987, Wiles 2005). Eriksson et al. (2008) recently confirmed the hybrid origin of the domestic chicken, which complicates the taxonomy of feral populations throughout the tropical Pacific. On Kosrae, Kittlitz (1836:284) stated that it “runs wild” (translated from German). Finsch (1881:114) stated that they were “the offspring of imported birds, which have run wild and have returned to the original plumage.” However, a half-century later, Coultas

(1931:241) reported that it was “interbred so badly with domestic strains” that he was unable to find a “good example” and that the “few that are found in a ‘wild state’ remain so close to human habitation that it is useless to consider [it] a pure strain.” He also “never once encountered this bird in the mountains or high mountain valleys.” Bequaert (1939, 1941) found the parasitic fly *Ornithopecton plicata* (Hippoboscidae) on one or more specimens collected by Coultas. During 1981–1982, F.E.H. never saw one >100 m from a human home, although he saw one shot by Oliod Moura in a mangrove swamp >100 m from the nearest house in Walung on 29 December 1981. Nevertheless, Engbring et al. (1990) found a few wild birds scattered relatively uniformly in mangroves and rainforest throughout the uninhabited interior of Kosrae with a density of 2/km², indicating that a self-sustaining feral population still existed in July 1983. Since 2008, C.J.C. and F.E.H. have heard individuals in uninhabited areas.

BREEDING: No data.

SPECIMENS: AMNH (Peterson and Brisbin 2005), NSMT (online), YIO (online), ZIN (Kittlitz 1836).

Kermadec Petrel (*Pterodroma neglecta*)

Rare austral migrant offshore. Kepler et al. (1992) observed two individuals (pale and dark morphs) approximately 147 km (originally reported as 157 km) south-southeast of Kosrae (04° 03' N, 163° 30' E) on 12 October 1988. On 7 June 2011, W. Ross Silcock et al. observed two all-dark, small tubenoses that might have been this species several kilometers offshore from Utwe. Elsewhere in Micronesia, it has been recorded as a visitor in Chuuk and the Marshall Islands (Wiles 2005).

Wedge-tailed Shearwater (*Puffinus pacificus*)

Common visitor offshore. First reported without details by Hachisuka et al. (1932), presumably based on a male dark-morph specimen obtained on 8 August 1931 (YIO 00708). F.E.H. observed 50 individuals from a fishing boat a few kilometers west of Tafunsak on 8

October 1981. All were dark-morph except for a single pale-morph individual. In the same area, F.E.H. saw a dozen, including a single pale-morph individual, on 12 October 1981. The shearwaters were feeding with large flocks of noddies (*Anous* spp.). On 2 January 1982, F.E.H. observed 63, including 15 pale-morph individuals, at sea between about 85 km west-northwest of Kosrae and 50 km south-southeast of Pingelap, mostly near the latter (Hayes 1985). Kepler et al. (1992) observed 29 dark-morph individuals at sea south of Kosrae on 12 October 1988. On 7 June 2011, W. Ross Silcock et al. observed one Wedge-tailed Shearwater and probably others too distant to identify several kilometers off Utwe. On 21 February 2012, a pale-morph Wedge-tailed Shearwater was found on land in Utwe and brought alive to C.J.C., who photographed it. This is the most common and widespread shearwater throughout Micronesia (Wiles 2005).

SPECIMEN: YIO (online).

Flesh-footed Shearwater (*Puffinus carneipes*)

Rare austral migrant offshore. Kepler et al. (1992) observed one individual about 167 km south-southeast of Kosrae (03° 59' N, 163° 46' E) on 12 October 1988. It has also been recorded in the Marshall Islands (Wiles 2005).

Christmas Shearwater (*Puffinus nativitatis*)

Rare visitor offshore. Pyle and Engbring (1987) observed a single individual about 12 km east of Lelu on 28 July 1982. On 7 June 2011, W. Ross Silcock et al. saw a small, all-dark shearwater that was probably this species. It also visits the Commonwealth of the Northern Marianas, Marshall Islands, and Wake (Wiles 2005).

Tropical Shearwater (*Puffinus bailloni dichrous*)

Uncommon resident. Lesson's (1829–1830a:432) “pétrel désolé” and Kittlitz's (1858:358) “Schwarzlicher Sturmvogel” presumably refer to this species. Coultas (1931) obtained a specimen that was trapped in a

chicken coop on 25 April 1931 (Baker 1951). F.E.H. observed five individuals from a fishing boat a few kilometers west of Tafunsak on 8 October 1981 and two more in the same area on 12 October 1981. The USFWS team heard one flying over the Yela River at night on 8 July 1983 (Pyle 1983, Engbring et al. 1990) and observed four to six at sea about 15 km southeast of Lelu on 28 July 1983 (Pyle and Engbring 1987, Engbring et al. 1990). Kepler et al. (1992) did not observe any during their cruise through Micronesia in October 1988.

BREEDING: Coultas (1931) estimated that two or three dozen nested on two steep cliffs in the center of the island, where natives used to tie ropes of grass and lower themselves over the edge to capture the birds for food, but he and his assistants were unable to capture any during an attempt with ropes. Pyle (1983) and Engbring et al. (1990) suggested that one calling above the Yela River at night on 8 July 1983 was returning to its nesting site in the mountains, but no nests were located. It is unknown whether any still nest on Kosrae. This species is recorded as a resident or visitor in most island groups of Micronesia (Wiles 2005).

SPECIMEN: AMNH (Baker 1951).

Bulwer's Petrel (*Bulweria bulwerii*)

Rare visitor offshore. Kepler et al. (1992) observed several individuals >100 km south of Kosrae on 12 October 1988. It has been recorded in most of the island groups of Micronesia (Wiles 2005).

Wilson's Storm Petrel (*Oceanites oceanicus*)

Rare austral migrant offshore. Kepler et al. (1992) observed one individual approximately 145 km (originally reported as 157 km) south-southeast of Kosrae (04° 03' N, 163° 31' E) and either a Wilson's Storm Petrel or a Band-rumped Storm Petrel (*Oceanodroma castro*) approximately 165 km south-southeast of Kosrae (03° 59' N, 163° 45' E) on 12 October 1988. Elsewhere in Micronesia, it has been recorded as a visitor only in the Marshall Islands (Wiles 2005).

Tristram's Storm Petrel (*Oceanodroma tristrami*)

Rare visitor offshore. Hayes (1985) observed two large, fork-tailed storm petrels at sea approximately 88 km (originally reported as 84 km) west-northwest of Kosrae (5° 36' N, 162° 10' E) on 2 January 1982 (and up to four during subsequent days in Pohnpei state). They were identified as "most likely" Tristram's Storm Petrel because no white was observed on the primary shafts, which is typical of Matsudaira's Storm Petrel. Subsequent authorities regarded them as Matsudaira's Storm Petrel because at the time Tristram's Storm Petrel was not known to follow ships and white in the primary shafts of Matsudaira's Storm Petrel was considered less conspicuous than the paler rump of Tristram's Storm Petrel (Pyle and Engbring 1985, Pratt et al. 1987, Wiles 2005). However, Tristram's Storm Petrel is now known to follow ships (Yoshiki Watabe, kantorilode.weebly.com/dark-rumped-storm-petrels.html) and a review of numerous online photos of both species reveals that the white primary shafts of Matsudaira's Storm Petrel are a distinctive field mark contrasting with the brown upper wing bar, whereas the slightly paler rump of Tristram's Storm Petrel is more easily overlooked as a field mark. Based on the observed field marks, we now believe these birds were Tristram's Storm Petrels. Matsudaira's Storm Petrel has been recorded as a visitor in Micronesia east to Pohnpei (Wiles 2005) whereas Tristram's Storm Petrel has been documented in the Marianas, including Guam (D. Vice pers. comm.; details to be published elsewhere), and by a female specimen found dead by Nancy Vander Velde on Majuro, Marshall Islands, on 7 April 2007 (BPBM 185080).

Red-tailed Tropicbird (*Phaethon rubricauda*)

Rare visitor. Finsch's (1880*a, b*, 1881) observations of Red-billed Tropicbird (*P. aethereus*) at Kosrae during February 1880 have been regarded by others as Red-tailed Tropicbirds

(Amerson 1969, Wiles 2005; more details provided in Red-billed Tropicbird account within Hypothetical Species section). Lauret (1990) observed single individuals on three occasions near Okat Harbor in February 1988 and reported that HDP and R. L. Pyle observed a flock of six in the same locality later that month; the birds appeared to be engaged in courtship flights and vocalized loudly, suggesting possible breeding, but none has been confirmed. This species has been recorded from most island groups in Micronesia (Baker 1951, Wiles 2005) and has been expanding its breeding range in recent decades (H.D.P., pers. obs.).

White-tailed Tropicbird (*Phaethon lepturus dorotheae*)

Common resident. It occurs in small groups throughout the island and at sea, often flying at great heights above the mountains. During 1981–1982, F.E.H. observed up to a dozen at a time at Okat and Utwe Harbors. On 2 January 1982, F.E.H. observed four far out at sea between Kosrae and Pingelap; the first was recorded about 91 km west-northwest of Kosrae. Engbring et al. (1990) reported a mean density of 18/km² with an estimated total population of 1,828; densities were highest in mangroves and negatively correlated with elevation, with none occurring above 400 m (Table 2), and were higher in Walung (34/km²) than in other regions. Engbring et al. (1990) observed 20–25 at a time soaring above Okat Valley in Tafunsak during July 1983. However, C.J.C. has not observed more than five at a time since 2008, suggesting that the population has declined.

BREEDING: Finsch (1880a, 1881) captured one on its nest in late February 1880. This species is resident in most island groups of Micronesia (Wiles 2005).

SPECIMENS: AMNH (Baker 1951), YIO (online).

Asian Cattle Egret (*Bubulcus coromandus*)

Rare visitor. Lauret (1990) saw a single individual fly overhead and land in a pasture

near two cows on 30 January 1988, but did not report the exact locality. The species has increased in numbers and range in Micronesia in recent decades and is now an annual visitor in large numbers in the western part of the region (Wiles 2005, H.D.P., pers. obs.). Micronesian cattle egrets belong to the Indo-Pacific species recently split (Rasmussen and Anderson 2005) from the Afro-American *B. ibis*, which is introduced in the Hawaiian Islands (Pyle and Pyle 2009). The two are easily distinguished in alternate (breeding) plumage because *B. coromandus* has the entire head and neck colored rufous-buff, but birds in basic plumage are probably not distinguishable in the field, even though *B. coromandus* has longer legs, so Lauret's sighting is identified on geographic likelihood rather than actual observed characters. See Pratt (2014) for a discussion of English names of cattle egrets.

Pacific Reef Heron (*Egretta sacra*)

Common resident. Micronesia is inhabited by the nominate subspecies *E. s. sacra* (Baker 1951). It forages along the coastal tidal flats, beaches, and mangroves, but it also wanders inland along streams and ditches. Coultas (1931) noted individuals at the deep end of a cave (100 m from the entrance) on the north side of the island. Bequaert (1939, 1941) found the parasitic fly *Ornithoxtona plicata* (Hippoboscidae) on one or more specimens collected by Coultas. During 1981–1982, F.E.H.'s maximum count was 23 at Okat Harbor on 18 April 1982. Mayr and Amadon (1941) studied plumage variation among specimens, including 49 from Micronesia (26 from Kosrae), and reported that 54% in Micronesia were dark-morph, 40% were white-morph, and 6% were pied-morph. However, they pointed out that white-morph juveniles often have dark feathers, rendering it difficult to identify genuine pied-morph individuals, and that white-morph individuals may have been preferentially collected. In Kosrae, Coultas (1931) reported that dark-morph and white-morph individuals were equally common with a few pied-morph individuals. Engbring et al. (1990) observed approximately equal numbers of

TABLE 2

Densities (Individuals / Km²) of Bird Species in Mangroves and at Different Elevations in Nonmangrove Areas (Mostly Tropical Rainforest) of Kosrae in July 1983

Species	Man-groves	Nonmangrove (Mostly Tropical Rainforest) Areas					Total
		0–100 m	100–200 m	200–400 m	400–600 m	0–630 m	
Feral Chicken	1	2	2	2	1	2	2
White-tailed Tropicbird	82	4	8	9	0	30	66
Brown Noddy	886	275	38	49	27	164	274
Black Noddy	129	72	10	10	0	42	55
White Tern	366	153	136	67	22	123	160
Purple-capped Fruit Dove	44	72	90	106	42	83	77
Micronesian Imperial-Pigeon	7	57	77	96	28	69	60
Island Swiftlet	118	332	344	276	381	322	290
Micronesian Myzomela	3,975	1,325	665	550	495	973	1,433
Kosrae White-eye	1,098	2,062	2,000	1,897	1,350	1,981	1,846
Micronesian Starling	637	946	1,247	958	513	989	935
Blue-faced Parrotfinch	0	180	84	50	244	131	111

Source: Engbring et al. (1990).

dark- and white-morph individuals and did not find any pied-morph individuals. F.E.H. recorded the plumage of each sighting during 1981–1982 ($n=325$) and 2013 ($n=64$) and found that most were dark-morph (64% vs. 67%) with smaller percentages of white-morph (29% vs. 19%) and pied-morph (7% vs. 14%, some probably were white-morph juveniles with scattered dark feathers), suggesting that the proportion of morphs remained relatively stable during three decades. One bilaterally asymmetrical individual in 1983–1982 was completely white on one side and dark on the other.

BREEDING: Segal (1989) stated that there were several rookeries around the island, but F.E.H. never saw any; although, in June 2013, he noted herons roosting overnight in the mangroves at Yen-Yen Island in Lelu. This species occurs throughout Micronesia except Wake (Wiles 2005).

SPECIMENS: AMNH (Mayr and Amadon 1941, Baker 1951), USNM (Townsend and Wetmore 1919, Baker 1951), YIO (online), ZIN (Kittlitz 1836).

Great Frigatebird (*Fregata minor*)

Rare visitor. Finsch (1880a, 1881) observed one in late February 1880. Hill (1957) reported that it occasionally flies overhead or chases noddies (*Anous* spp.), but did not state whether she actually saw one. F.E.H. observed single individuals, both females with a white head and chest, at Okat Harbor on 31 October 1981 and at Malem on 31 December 1981. This species is a resident or visitor in most island groups of Micronesia, including nearby Pohnpei (Wiles 2005).

Lesser Frigatebird (*Fregata ariel*)

Rare visitor. Philip Ashman (in Pyle 1983, Pyle and Engbring 1987) observed a male and a female near Malem on 12 July 1983. C.J.C. photographed a distant flock of nine frigatebirds at Lelu on 11 April 2015, but they were too distant to identify. Two weeks later, C.J.C. photographed a male and a female at Okat Harbor on 25 April 2015, providing the first documented record for Kosrae (Figure 4).



FIGURE 4. First photo documented record of Lesser Frigatebird (*Fregata ariel*) for Kosrae at Okat Harbor on 25 April 2015. Photo by C.J.C.

This species is a visitor in several island groups of Micronesia (Wiles 2005), with the nearest known breeding site at Helen Atoll, southwestern Palau (Pratt and Etpison 2008).

Brown Booby (*Sula leucogaster*)

Uncommon visitor. Coultas (1931:240) collected a specimen on 19 April 1931 (date from Baker 1951) and noted individuals roosting on a small islet at Walung, but reported that, “according to the natives, this species has never been known to nest.” During 1981–1982, F.E.H. recorded up to three individuals, including at least one immature, on seven occasions from 8 October 1981 to 16 May 1982. On 29 December 1981, F.E.H. found two adults sitting among nesting Brown Noddies (*Anous stolidus*) in mangroves between Okat Harbor and Walung, but they were not nesting. C.J.C. photographed an immature just south of Okat Harbor on 10 November 2010 and saw an individual of unknown age off Utwe on 28 December 2013. F.E.H. photographed an adult off Utwe on 18 June 2014. This species is a resident or visitor in all island groups of Micronesia (Wiles 2005).

SPECIMEN: AMNH (Baker 1951).

Kosrae Crane (*Porzana monasa*)

Extinct resident. Kittlitz (1836) collected two specimens in December 1827, which he

initially identified as the Spotless Crake (*P. tabuensis*; Kittlitz 1836) and later described, although with some uncertainty, as a new species (Kittlitz 1858). They were found “in the damp places in the middle of the forests” (translated from French; Kittlitz 1836:286) or “on the ground in those places in the forest that are always deeply shaded and damp” (translated from German; Kittlitz 1858:31). Finsch (1880a, 1881) searched for it unsuccessfully in 1880, suggesting it may have already been extinct by then; he examined the specimens and believed they represented *P. tabuensis*. Hartlaub (1893) redescribed the specimens, demonstrating that they represented a valid species. Coultas (1931) included a map of Kosrae that shows where he searched, revealing that he traveled extensively through lowland and montane forests. Coultas (1931:247) wrote that “it is a god of the bush and much revered by the people. Several oldsters seemed to remember their forefathers speaking of the bird, but none of them admitted having seen it, except an elderly deacon, a staunch pillar of the church, who claimed to have had the bird pointed out to him some 20 years before my visit.” Kittlitz (1836, 1858) reported that its native name is setamanot. Coultas (1931:247) stated that its native name, nay tai mai not, means “to land in the taro,” suggesting that it lived in the swamps in which taro was cultivated. According to Hill (1957), King John, an 80 yr old ex-king, remembered that a German scientist had collected one in a cave in the mountains about 50 yr earlier, but none had been found since; it may have been a fuzzy memory of Finsch’s unsuccessful search for it 77 yr earlier. Extensive fieldwork at all elevations by the USFWS team failed to find any in July 1983 (Engbring et al. 1990), yet Segal insisted that hunters have seen “a ‘chicken-like bird,’ reddish brown in color, that runs rather than flies [*sic*] when sighted” (Segal 1985:16), and later reiterated that “once in a while pig hunters report a running forest bird high up in the mountains” (Segal 1989:219–220). Steadman (1986) published X-rays of the two specimens, which revealed that it was probably flightless. Its extinction is usually attributed to predation by introduced rats, which Kittlitz (1836:284) reported as

abundant and causing “great damage” to banana and sugar cane; in the words of Coultas (1931:247), “in as much as the island is overrun with rats, one couldn’t expect to find many ground birds.”

BREEDING: No data.

SPECIMENS: ZIN (Kittlitz 1836, 1858; Steadman 1986).

Watercock (*Gallinula cinerea*)

Rare visitor. Glenn McKinlay photographed an individual, possibly a basic-plumaged male, at Utwe during 1–2 May 2010, providing the first documented record for Oceania (Buden and McKinlay 2010). A previous sight record from Palau was regarded as hypothetical by Pratt et al. (1987).

Pacific Golden Plover (*Pluvialis fulva*)

Common boreal migrant. This is the third most common shorebird on Kosrae (Hayes 1986), foraging at sandy beaches, mangrove swamps, grassy areas, and other open habitats. During 1981–1982, the maximum count was 35 birds on 9 March 1982, with slightly lower numbers during fall (up to 30) and winter (up to 30; Hayes 1986). A few linger during the summer. The USFWS team saw up to 12 at Okat Harbor on 1 July 1983 (J. Engbring in Hayes 1986) and F.E.H. saw up to 13 at Okat Harbor on 27 June 2014. This species occurs throughout Micronesia (Wiles 2005).

SPECIMENS: AMNH (Stickney 1943, Baker 1951), FMNH (online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online).

Gray Plover (*Pluvialis squatarola*)

Rare boreal migrant. C.J.C. photographed an adult molting into basic plumage at Kosrae Nautilus Resort, Lelu, on 1–3 November 2014 (Figure 5), providing the first record for Kosrae. It was distinguished from a Pacific Golden Plover by its larger size, grayer plumage, and white tail when seen in flight. This species occurs throughout Micronesia except Wake (Wiles 2005).

Lesser Sand Plover (*Charadrius mongolus*)



FIGURE 5. First documented record of Gray Plover (*Pluvialis squatarola*) for Kosrae at Kosrae Nautilus Resort, Lelu, on 1 November 2014. Photo by C.J.C.

Rare Palearctic migrant. First recorded without details by Hachisuka et al. (1932), presumably based on an adult female in prebasic molt collected on 2 August 1931 (YIO 00314). Hayes (1986) found two basic-plumaged birds at Okat Harbor on 3 October 1981 and an alternate-plumaged adult at Okat Harbor on 6 April 1982. F.E.H. photographed an alternate-plumaged adult male of the nominate race at Okat Harbor on 20 June 2013. This species occurs throughout Micronesia except Wake (Wiles 2005).

SPECIMEN: YIO (online).

Common Snipe (*Gallinago gallinago*)

Rare Palearctic migrant. Grady Pettigrew and C.J.C. encountered a group of three snipes at Tofol on 29 March and four on 4 April 2014, representing the first *Gallinago* reported on the island. On the latter occasion, C.J.C. obtained a blurry photo of one flying away (Figure 6) that revealed a prominent, sharply defined, white trailing edge to the secondaries, which is a diagnostic field character for Common Snipe (Hayman et al. 1986, Pratt et al. 1987, Message and Taylor 2005), providing the first record for Kosrae. On 4 November 2014, C.J.C. found three more snipe at Tofol and recorded the calls of one on a video; the calls, which sound somewhat like tearing cloth, resembled those of Common Snipe (XC215455). Although a rare vagrant in



FIGURE 6. First documented record of Common Snipe (*Gallinago gallinago*) for Kosrae at Tofol on 4 April 2014. Photo by C.J.C.

Micronesia, this species has been recorded in most island groups (Wiles 2005, VanderWerf 2006, Pratt et al. 2010).

Black-tailed Godwit (*Limosa limosa*)

Rare Palearctic migrant. Hayes (1985, 1986) found a basic-plumaged individual at Okat Harbor on 13 December 1981. The US-FWS team saw and photographed another at Okat Harbor during 1–17 July 1983 (Pyle 1983, J. Engbring in Hayes 1986, Pyle and Engbring 1987; photo published in the latter). This species occurs throughout Micronesia except Wake (Wiles 2005).

Bar-tailed Godwit (*Limosa lapponica*)

Uncommon Palearctic migrant. Hayes (1985, 1986) found two at Walung on 8 September 1981 and regularly saw a few throughout the winter of 1981–1982 between Okat Harbor and Walung, with up to 13 at Okat Harbor on 17 October 1981 and smaller numbers during winter (up to 6) and spring (up to 2). Pratt and Pyle observed one at Okat Harbor on 21 February 1988 (Wiles et al. 2000). A few linger during the summer. The US-FWS team observed three at Okat Harbor in July 1983 (Pyle 1983, J. Engbring in Hayes 1986, Pyle and Engbring 1987). F.E.H. photographed a basic-plumaged adult at Walung on 27 June 2013 (Figure 7), providing the first



FIGURE 7. First photo documented record of Bar-tailed Godwit (*Limosa lapponica*) for Kosrae at Walung on 27 June 2013. Photo by F.E.H.

documentation of the species for Kosrae. C.J.C. photographed one of unknown age near Treelodge Hotel, Putuk Te, Lelu, on 10 December 2014. This species occurs throughout Micronesia except Wake (Wiles 2005).

Whimbrel (*Numenius phaeopus*)

Common Palearctic migrant. Flocks of the East Asian subspecies *N. p. variegatus* (Baker 1951) forage among rocks and seagrasses on tidal flats during low tide. Coultas (1931) noted flocks of 20 or more roosting at night on tiny islets at Walung. During 1981–1982, Hayes (1986) observed a maximum of 100 (27 September 1981) roosting on the branches of Pandanus (*Pandanus* sp.) and Coconut Palms (*Cocos nucifera*) on tiny Kiul Island at Okat Harbor; smaller numbers occurred during winter (up to 35) and spring (up to 45). A few linger during the summer, with up to 11 observed during July 1983 (Pyle 1983, J. Engbring in Hayes 1986) and up to two seen by F.E.H. during June 2013 and June 2014. This species occurs throughout Micronesia except Wake (Wiles 2005).

SPECIMENS: FMNH (online), ZIN (Kittlitz 1836).

Bristle-thighed Curlew (*Numenius tabitensis*)

Rare Nearctic migrant. Hill (1957) reported that it was “commonly seen” during 1956–1957, but undoubtedly she misidentified the much more common Whimbrel, which she did not report. Segal (1985, 1989) listed it for Kosrae but no details were given. On 24 June 2014, F.E.H. photographed a solitary individual at the northwest tip of Utwe-Ma (Figure 8), providing the first record for Kosrae. It was distinguished from the similar Whimbrel by its buffy orange rump. It has been recorded in most of the island groups of Micronesia, including Pohnpei and the Marshall Islands (Wiles 2005), thus its occurrence on Kosrae was expected.

Gray-tailed Tattler (*Tringa brevipes*)

Uncommon Palearctic migrant. This species is difficult to distinguish from the more common Wandering Tattler (*T. incana*) by

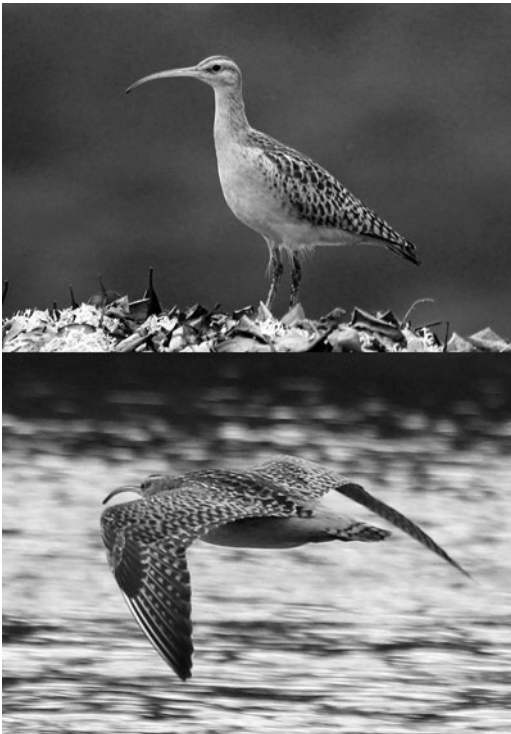


FIGURE 8. First documented record of Bristle-thighed Curlew (*Numenius tabitiensis*) for Kosrae at Utwe-Ma on 24 June 2014. Photo by F.E.H.

plumage, but is easier by voice. Hayes (1986) estimated that 5% of the tattlers on Kosrae were of this species. They preferred the tidal flats at low tide and often flocked together. During 1981–1982, it was more common in fall, with a high count of 35 at Tafunsak on 2 October 1981 (Hayes 1986), than during spring, with a high count of 5 at Okat Harbor on 13 May 1982. The USFWS team observed a single individual on the old runway at Lelu in July 1983 (J. Engbring in Hayes 1986). F.E.H. failed to find any during June 2013 and June 2014. This species occurs throughout Micronesia (Wiles 2005).

SPECIMENS: AMNH (Stickney 1943, Baker 1951), ZIN (Kittlitz 1836).

Wandering Tattler (*Tringa incana*)

Common Nearctic migrant. This is the most common shorebird on Kosrae (Hayes 1986), foraging among rocks and seagrasses on tidal flats, sandy beaches, mangroves, and occasionally inland along mountain streams. During 1981–1982, maximum counts were higher during fall (135 at Okat Harbor on 4 October 1981) than during winter (100) or spring (80; Hayes 1986), and large flocks roosted at night on the runway under construction at Okat Harbor. A few linger during the summer, with up to 10 per day seen by F.E.H. in June 2013 and smaller numbers during July 1983 (J. Engbring in Hayes 1986). Both tattler species are widespread throughout Micronesia, but the Gray-tailed Tattler is more common westward and Wandering Tattler is more common eastward.

SPECIMENS: AMNH (Stickney 1943, Baker 1951), FMNH (online), MNHN (online), USNM (Townsend and Wetmore 1919), YIO (online).

VOCALIZATIONS: ML (online).

Common Sandpiper (*Actitis hypoleucos*)

Rare Palearctic migrant. Separating this species from a basic plumaged Spotted Sandpiper (*A. macularius*), a Nearctic migrant, is difficult. Hayes (1985) saw single birds, possibly the same individual, on four occasions from 15 January to 1 April 1982 at Lelu and

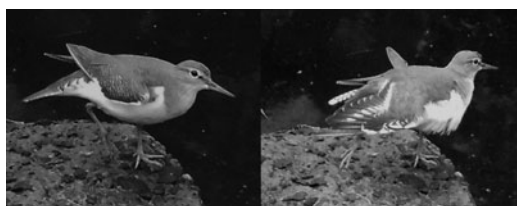


FIGURE 9. First documented record of Common Sandpiper (*Actitis hypoleucos*) at Okat Harbor on 21 February 2014. Photo by C.J.C.

Tofol, but did not positively identify the species; however, the lack of spotting by 1 April, at a time when it is often acquired by Spotted Sandpiper (especially adults; Pyle 2008), is suggestive of the Common Sandpiper. C.J.C. photographed an immature at Okat Harbor on 21 February 2014 (Figure 9), providing the first documented record for Kosrae. It was distinguished from a Spotted Sandpiper by its tail extending well beyond its relatively shorter wings, shorter wingstripe, and less barred wing coverts. This species has been recorded in most island groups of Micronesia (Wiles 2005), including recent confirmation in Pohnpei (Pratt et al. 2010). The Spotted Sandpiper has only been recorded from the Marshall Islands (Wiles 2005).

Ruddy Turnstone (*Arenaria interpres*)

Common boreal migrant. This is the second most common shorebird on Kosrae (Hayes 1986), foraging along the coasts and occasionally occurring on roads during high tide. During 1981–1982, the highest counts occurred during late winter (160 at Okat Harbor on 27 February 1982) and spring (120 at Okat Harbor on 9 March 1982), with smaller numbers during fall (up to 85; Hayes 1986). A few linger during summer. The USFWS team observed up to eight at Tafunsak and six at Okat Harbor on 17 July 1983 (J. Engbring in Hayes 1986), and F.E.H. saw six at Okat Harbor on 20 June 2013. This species occurs throughout Micronesia (Wiles 2005).

SPECIMENS: AMNH (Stickney 1943, Baker 1951), NSMT (online), YIO (online), ZIN (Kittlitz 1836).



FIGURE 10. First photo documented record of Sanderling (*Calidris alba*) for Kosrae at Okat Harbor on 13 November 2013. Photo by C.J.C.

Sanderling (*Calidris alba*)

Rare boreal migrant. Hayes (1985, 1986) observed basic-plumaged individuals at Okat Harbor on 14 November 1981 and at Tafunsak on 18 December 1981. The USFWS team observed an alternate-plumaged individual at Okat Harbor on 1 July 1983 (Pyle and Engbring 1987) and possibly the same individual at Tafunsak on 3 July 1983 (J. Engbring in Hayes 1986; Pyle 1983 reported the date of 5 July 1983). C.J.C. photographed an alternate-plumaged individual at Okat Harbor on 13 November 2013 (Figure 10), providing the first documentation of the species for Kosrae. This species occurs throughout Micronesia (Wiles 2005).

Red-necked Stint (*Calidris ruficollis*)

Rare Palearctic migrant. C.J.C. photographed a worn adult *Calidris* sp. molting into basic plumage (Figures 11A, 11B) at Tofol on 21 November 2011. Although the characters of the bird are consistent with this species, distinguishing it from other similar congeners is very difficult (e.g., Message and Taylor 2005, O'Brien et al. 2006, Chandler 2009). The bird appears too pale, especially on the head and neck, for either Semipalmated Sandpiper (*C. pusilla*) or Little Stint (*C. minuta*), but its identity could not be confirmed. C.J.C.

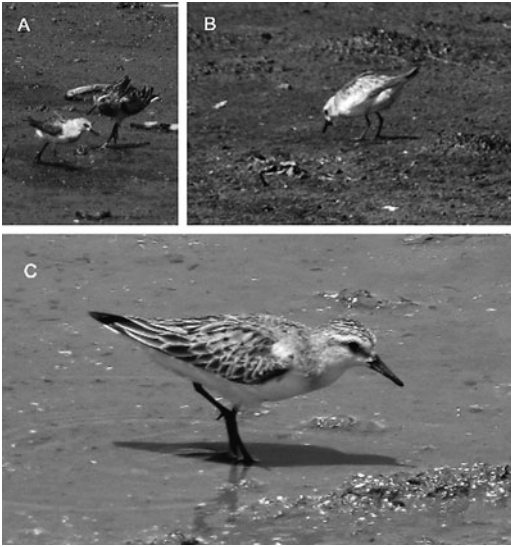


FIGURE 11. First documented records of Red-necked Stint (*Calidris ruficollis*) for Kosrae: (A, B) a presumed adult at Tofol on 21 November 2011 and (C) a juvenile at Okat Harbor on 30 October 2013. Photos by C.J.C.

photographed a more definitively identified juvenile at Okat Harbor on 30 October 2013 (Figure 11C), which lingered until 13 November 2013, providing the first documented record for Kosrae. It was distinguished from Semipalmated Sandpiper by its finer bill tip, less scaly back, whiter tertial edges, and longer wing projection, and from Little Stint by its thicker bill tip, lack of mantle lines, duller tertial edges, and shorter wing projection. The Red-necked Stint is a regular migrant in western Micronesia east to Chuuk and a vagrant in the Marshall Islands, Little Stint is a vagrant in the Commonwealth of the Northern Marianas and Marshall Islands (Wiles 2005), and Semipalmated Sandpiper is unrecorded in Micronesia but is a vagrant in the Hawaiian Islands (Pyle and Pyle 2009).

Sharp-tailed Sandpiper (*Calidris acuminata*)

Uncommon Palearctic migrant. Hayes (1985, 1986) saw up to two at Okat Harbor on five occasions from 27 September to 31 October 1981, and also single individuals at Malem on 12 November 1981 and at Tofol on 22 No-



FIGURE 12. First photo documented record of Sharp-tailed Sandpiper (*Calidris acuminata*) for Kosrae at Tofol on 23 November 2011. Photo by C.J.C.

vember 1981. C.J.C. photographed an immature among a flock of five at Tofol during 23–24 November 2011 (Figure 12), providing the first documentation of the species for Kosrae. C.J.C. photographed four more at Okat Harbor on 23 November 2013. This species occurs throughout Micronesia (Wiles 2005).

Brown Noddy (*Anous stolidus pileatus*)

Common resident. Coultas (1931:242) considered it common, especially in the south, and reported it occurring “high up on the ridges of the tallest mountains.” During 1981–1982, F.E.H. observed large flocks of >1,000 individuals, often visible from shore, following schools of fish at sea. Fisherman routinely followed such flocks to locate fish. Engbring et al. (1990) found Brown Noddies abundant in all terrestrial habitats, with an average density of 274/km² and an estimated total population of 27,243; densities were highest in mangroves and negatively correlated with elevation, but some occurred above 400 m (Table 2), and densities were higher at Walung (472/km²) than in other areas. During June 2013 and June 2014, F.E.H. never saw more than a few dozen flying to or from their roosts despite evening searches from the western, northeastern, and southeastern coasts, and never saw any large foraging flocks from shore, suggesting either a seasonal departure

of most noddies from the island or a dramatic decline in the population. This species occurs throughout Micronesia (Wiles 2005).

BREEDING: Finsch (1880a, 1881) observed nests among epiphytic ferns in tall trees. Coultas (1931) suspected that Brown Noddies nested year round. F.E.H. found approximately 50 nests in mangroves near Molsron Mwot, between Okat Harbor and Walung on 29 December 1981. When camping at higher elevations in July 1983, Engbring et al. (1990) often heard adults and their young calling at night. C.J.C. observed a mixed colony of noddies nesting annually since 2012 at Inya Mutunenea, a mangrove lagoon north of Lelu; nest construction begins in early November and the last chicks are fledged in May. C.J.C. also observed about 50 nests (3 photographed) at Molsron Mwot on 5 March 2011, and about 20 nesting in trees beside the Kosrae Island Resource Management Authority in Tofol in early 2011.

SPECIMENS: AMNH (Baker 1951), MCZ (online), USNM (Townsend and Wetmore 1919), YIO (online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online).

Black Noddy (*Anous minutus marcusii*)

Common resident. Coultas (1931:242–243) stated that it favored roosting on “low shrubs and trees of outlying reefs and isolated small islands.” Engbring et al. (1990) reported a mean density of 55/km² and an estimated total population of 5,461; densities were highest in mangroves and negatively correlated with elevation (Table 2). Engbring et al. (1990:80) observed “limited, scattered numbers” in the forested interior and recorded at least one pair “perched in a tree high in the interior,” but none were seen above 400 m (Table 2). This species has been recorded from all island groups in Micronesia (Wiles 2005).

BREEDING: Finsch (1880a, 1881) reported large colonies nesting in mangroves in late February 1880. Nehr Korn (1899) reported that eggs had been collected at Kosrae. F.E.H. located two nests on the branches of tall trees about 75 m above sea level along the Mutunte River in Tafunsak on 26 December 1982. In July 1983, Engbring et al. (1990) found a col-

ony of several hundred to a few thousand nests on a small islet at Walung, a second colony of a few hundred nests on a mangrove island near Utwe, and a third colony of a few hundred nests in mangroves at Lelu Harbor, but F.E.H. did not observe any evidence of nesting in June 2013. C.J.C. observed a mixed colony of noddies nesting annually at Inya Mutunenea, a mangrove lagoon north of Lelu, since 2012; nest construction begins in early November and the last chicks are fledged in May.

SPECIMENS: AMNH (Baker 1951), YIO (online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online).

White Tern (*Gygis alba pacifica*)

Common resident. F.E.H. regularly observed small numbers at lower elevations, along the shore, and foraging at sea, where they often accompanied fishing flocks of noddies, including 5 seen from a fishing boat a few kilometers west of Tafunsak on 8 October 1981 and 10 more in the same area on 12 October 1981. On 2 January 1982, F.E.H. observed six far out to sea between Kosrae and Pingelap, mostly near the latter. Engbring et al. (1990) reported a mean density of 160/km² with an estimated total population of 15,860; densities were highest in mangroves and negatively correlated with elevation, although some were observed above 400 m (Table 2). Engbring et al. (1990) noted 24 during an offshore fishing trip southeast of Lelu on 28 July. Kepler et al. (1992) observed an unspecified number of individuals >100 km south of Kosrae on 12 October 1988. This species occurs throughout Micronesia (Wiles 2005).

BREEDING: A fledgling was found on the ground and photographed by C.J.C. at Lelu Island on 20 February 2011.

SPECIMENS: AMNH (Baker 1948, 1951), NSMT (online), YIO (online), ZIN (Kittlitz 1836).

Laughing Gull (*Leucophaeus atricilla*)

Rare Nearctic migrant. C.J.C. photographed a basic-plumaged adult on a concrete platform beside the causeway connecting Lelu

Island with the main island on 4 January 2008; it lingered through February 2008 (last date unknown) and was seen twice at Okat Harbor (photo published; Pratt et al. 2010). C.J.C. photographed a first-cycle immature at Okat Harbor on 25 March 2011 and another first-cycle immature at Okat Harbor on 24 February 2014. This species has been recorded as a vagrant in Palau, Commonwealth of the Northern Marianas, Pohnpei, and Marshall Islands (Wiles 2005, Pratt et al. 2010).

Greater Crested Tern (*Thalasseus bergii*)

Uncommon visitor. Hayes (1985) observed two at Tafunsak and Okat Harbor from 31 August to 13 September 1981 and up to seven (six adults and an immature) along the west coast from 5 December 1981 to 5 May 1982. F.E.H. saw one at Walung on 26 June 2013, and C.J.C. saw two at Okat Harbor on 18 February 2014. This species has been recorded from all island groups in Micronesia except Wake (Wiles 2005).

Little Tern (*Sternula albifrons*)

Uncommon Palearctic migrant. Hayes (1985) observed up to five at Okat Harbor from 3 October 1981 to 5 May 1982. Pratt and Pyle observed five at Okat Harbor on 24 February 1988 (Wiles et al. 2000). This species occurs throughout Micronesia except Wake (Wiles 2005).

Sooty Tern (*Onychoprion fuscatus*)

Rare visitor. Hayes (1985) heard and saw three flying over Okat Harbor on 20 April 1982 and one over Okat Harbor on 13 May 1982. Kepler et al. (1992) observed a flock of about 200 foraging approximately 145 km (originally reported as 157 km) south-southeast of Kosrae (04° 03' N, 163° 31' E) on 12 October 1988. This species occurs throughout Micronesia (Wiles 2005).

Whiskered Tern (*Chlidonias hybrida*)

Rare Palearctic migrant. On 25 June 2013, F.E.H. observed an alternate-plumaged adult



FIGURE 13. First documented record of Whiskered Tern (*Chlidonias hybrida*) for Kosrae at Utwe on 26 June 2013. Photo by F.E.H.

circling Utwe-Ma, but did not see it well enough to verify its identity until the following day, 26 June 2013, when he observed and photographed it foraging in Utwe Harbor (Figure 13). It was distinguished from a Common Tern (*Sterna hirundo*) by its all-red bill, darker gray underparts, and shorter tail with white outer tail feathers. The Whiskered Tern was unknown in Micronesia until a specimen was taken on Yap in 1976 (Clapp and Laybourne 1983). Subsequently, it has been reported in Palau, the Marianas, Yap, and Pohnpei (Wiles 2005, Pratt et al. 2010), and it is now a regular visitor to western Micronesia in substantial numbers (Pratt and Etpison 2008). This record represents the first for Kosrae and the easternmost in Micronesia, suggesting an ongoing expansion of this species in the region.

South Polar Skua (*Stercorarius maccormicki*)

Rare austral migrant offshore. Kepler et al. (1992) observed two pale-morph adults approximately 145 km south-southeast of Kosrae (04° 03' N, 163° 31' E) on 12 October 1988. Elsewhere in Micronesia it has been reported at Palau and Pohnpei (Wiles 2005).

Parasitic Jaeger (*Stercorarius parasiticus*)

Rare boreal migrant offshore. On 12 October 1981, F.E.H. briefly observed two jaeger-like birds, probably of this species, from a fishing boat a few kilometers west of Kosrae, but did not report them among other new bird records because of uncertainty of identification (Hayes 1985). Kepler et al. (1992) observed two unidentified jaegers approximately 145 km south-southeast of Kosrae (04° 03' N, 163° 31' E), and a juvenile Parasitic Jaeger approximately 120 km south-southwest of Kosrae (04° 22' N, 162° 21' E) on 12 October 1988. Elsewhere in Micronesia this species has been reported only for Pohnpei (Wiles 2005).

Rock Dove (*Columba livia*)

Extirpated introduction. Santos et al. (1970:33) suggested that the Japanese may have introduced carrier pigeons to carry messages, "but we have no record of them now." Hayes (1985) found three individuals at Lelu on 16 December 1981, which were still present when he left the island in May 1982. They were obviously introduced, either from a visiting ship or as escaped pets. However, none were seen by the USFWS team in July 1983 (Engbring et al. 1990), indicating that they failed to establish a self-sustaining feral population. Elsewhere in Micronesia, this species failed to establish itself in Chuuk, Pohnpei, and the Marshall Islands, where birds have been detected in the past (Wiles 2005), but apparently a self-sustaining population occurs on Wake (Jones 1995).

Kosrae Fruit Dove (*Ptilinopus bernsheimi*)

Common resident. This endemic species was described from Kosrae by Finsch (1880a). A specimen taken in 1859 at Ebon in the Marshall Islands was originally described as a new species (Peters and Griscom 1928) but later synonymized with the Kosrae form by Ripley and Birkhead (1942), who suspected its locality was mislabeled. Later authors assumed the locality was correct; if so, the lack of subsequent records from the Marshall Islands indicates that any previous population is now extirpated (Baker 1951, Amerson 1969, Spennemann 2006). The calls of this species

are a constant sound in the rainforest, but the birds are hard to see except in flight. Engbring et al. (1990) reported a mean density of 77/km² with an estimated population of 8,672 on Kosrae; densities were higher in rainforest than in mangroves and increased with elevation up to 400 m, but tapered off at the highest elevations (Table 2). Because females do not vocalize and most individuals were detected by sound, the density and total population could be twice as high (Engbring et al. 1990). It remains common on Kosrae through 2015 (C.J.C. and F.E.H., pers. obs.). F.E.H. observed one at 589 m near the summit of Mt. Mutunte on 21 June 2013.

BREEDING: No data.

SPECIMENS: AMNH (Ripley and Birkhead 1942, Baker 1951), DMNH (online), FMNH (online), MCZ (online), NSMT (online); USNM (Townsend and Wetmore 1919, Baker 1951), YIO (online).

VOCALIZATIONS: ML (online), XC (online).

TAXONOMIC NOTES: The Kosrae Fruit Dove was long regarded as a component of a large polytypic Crimson-crowned Fruit Dove *P. porphyraceus* complex that included the Micronesian forms *bernsheimi* (Kosrae), *ponapensis* (Chuuk and Pohnpei), and *pelewensis* (Palau), along with three Polynesian subspecies (Mayr 1945, Baker 1951). Pratt et al. (1980), followed by all subsequent authors, began the breakup of this complex by splitting the Palau Fruit Dove (*P. pelewensis*) based on striking plumage and vocal differences. Pratt et al. (1987) suggested that the remaining Micronesian and Polynesian subspecies might best be considered two species, but a thorough analysis of the complex had to await the collection of adequate comparative vocal material. Vocal differences now suggest that the *P. porphyraceus* complex may comprise more than the two species previously hypothesized (Pratt et al. 1987). Unfortunately, past descriptions, such as that of Pratt et al. (1987), tended to conflate the songs of different regional groups and understated what was considered at the time to be intraspecific variation.

The Micronesian and Polynesian groups are widely separated geographically and differ in coloration and voice. Micronesian subspecies

have a bold yellow band at the tip of the tail, whereas *P. porphyraceus fasciatus* (Samoan Archipelago) has an inconspicuous yellowish-gray band, and the nominate subspecies (Fiji, most of Tonga, Niue) has a pale gray band, with *P. porphyraceus graeffei* (Wallis and Futuna and Niuafo'ou, Tonga) intermediate. Micronesian forms have a deep purple, almost black, belly patch that can be brownish-red in many individuals of *P. bernsheimi* (Baker 1951). The belly patch is paler in nominate *P. porphyraceus* and dull red in Samoan birds. The head and breast are strongly tinged yellow in Micronesian birds, but are greenish gray in Polynesian ones, and the frontal cap is more purple and less rosy than in Micronesian birds.

The typical song of all Polynesian forms has a halting or stumbling rhythm as if the bird stops and starts again: *hup-brrOOAH, a-hup-brrOOAH, hoo-HOO-hoo hoodoo, hoo-HOO-hoo hoo, hoo-HOO-hoo hoo, hoo-HOO-hoo hoop-hoop-hoop, hoo-HOO-hoop hoop* (from ML 139953). Very rarely, they utter a variant, as in the first song on ML 94984 from Vava'u, Tonga, with rhythm more evenly paced. Fruit doves on Chuuk and Pohnpei utter a hooting song that has an initial syncopated phrase followed by a long rhythmic series of 12–20 nearly identical single-note hoots that slow toward the end: *hooo, hup-hoo, whoop hoo hoo hoo hoo, etc.* Occasionally, the single hoots may be slightly two-syllabled as *tarwoo tarwoo tarwoo*, for example (several examples in ML 55697), but at a distance this structure is not apparent. The pace of the long series may vary from song to song, even when uttered by the same individual. As first noted by Engbring et al. (1990), the Kosrae Fruit Dove's higher-pitched song doubles the notes in the long series, with the second note emphasized and sharply clipped, like a hiccup: *hooo, hup-HOOO, a-HOOT a-HOOT a-HOOT a-HOOT*, etc. Among roughly 40 songs of Kosrae birds, we found one (ML 55624, second song) in which the first syllable of the "hiccup" was muted or deleted so that the song somewhat resembled that of *ponapensis*, but the overall rhythm and other *bernsheimi* characteristics remained the same. We found no double-note songs among 10 recorded examples from Chuuk and 40 from Pohnpei (totals are approximations be-

cause whether to count a particular recording, based on its quality, is an arbitrary decision of the researcher).

Given the wide geographic separation of the Polynesian subspecies and their potential isolating mechanisms of voice and coloration, they clearly warrant recognition as a separate species by Pratt's (2010) criteria, and can retain the English name Crimson-crowned Fruit Dove. Pratt and Mittermeier (2016) discuss geographic variation among the three nominal Polynesian subspecies of Crimson-crowned Fruit Dove, which may comprise only two valid subspecies and a hybrid population.

Molecular studies also support the separation of Polynesian *P. porphyraceus* at the species level. Cibois et al. (2014) found the broadly defined *P. porphyraceus* to be polyphyletic, with Micronesian *P. ponapensis* closer to the Melanesian Red-bellied Fruit Dove *P. greyi* than to Polynesian *P. porphyraceus*. Unfortunately, Cibois et al. (2014) included no samples from Kosrae, so for now, the status of *P. bernsheimi* must be based on morphological and behavioral criteria. We originally regarded the color differences between *P. bernsheimi* and *P. ponapensis* as matters of degree rather than kind, typical of differences among subspecies, but del Hoyo and Collar (2014), using a scoring system promoted by Tobias et al. (2010) for determining putative species limits, recognized *P. bernsheimi* as a full endemic species, based on coloration and measurements alone. Now that striking vocal differences between them have been well documented, we agree that *P. bernsheimi* and *P. ponapensis* are best regarded as separate biological species.

English names in this complex have led to some past confusion. Owen (1977, pers. comm.) coined the name "purple-capped" because he considered "crimson-crowned" to be inaccurate for Micronesian representatives. Pratt et al. (1987) used Purple-capped for the whole *porphyraceus* complex, but most other sources have used Crimson-crowned. With this revision, Purple-capped Fruit Dove can be used for *P. ponapensis* and Crimson-crowned Fruit Dove can be restricted to the Polynesian forms.

Micronesian Imperial Pigeon (*Ducula oceanica oceanica*)

Uncommon resident. The nominate subspecies, which occurs in Kosrae and in Jaluit and Elmore in the Marshall Islands (Baker 1951), was first described from Kosrae by Lesson and Garnot (1826). According to Sarfert (1919) its numbers had sharply declined by 1910 due to hunting with guns and it had become rare along the coast. Coultas (1931) stated that the pigeons congregated in tall trees along the coast in the evenings to roost and scattered at dawn to forage in the mountains. Coultas (1931) observed that the island residents had become proficient at imitating their calls and killing them with stones and clubs. He felt that there were not enough Japanese hunters to have reduced their numbers, but later, according to Segal (1989), the pigeons were nearly exterminated by Japanese hunters during World War II, when many humans were starving. Bequaert (1939, 1941) found the parasitic fly *Ornithoctona plicata* (Hippoboscidae) on one or more specimens collected by Coultas. During 1981–1982, F.E.H. seldom saw this bird, but often heard its deep low moan and coarse cooing, with most sightings occurring away from the coast. Native hunters seem to have little trouble finding this species; during 1981–1982, F.E.H. met hunters who had shot up to three birds within a few hours. Engbring et al. (1990) reported its mean density as 60/km² with an estimated total population of 7,474; densities were highest at intermediate elevations, lowest in mangroves (Table 2), and varied regionally, ranging from 46/km² in Tafunsak to 84/km² in Walung. During several long hikes in the mountains in 2013 and 2014, F.E.H. heard only a few individuals, suggesting the population has declined. The species is heavily hunted with an open season lacking a bag limit in January. However, poachers take many during other months and sell each for \$10 on the black market. This species exhibits an irregular, possibly relic-tual (Baker 1951), distribution on both high islands and atolls throughout the Caroline Islands (Wiles 2005). Todd Mark obtained the first recordings from Kosrae of both the

barking “song” (XC75516) and the low moaning call (XC75517).

BREEDING: Finsch (1880a, 1881) collected molting immatures and molting adults in late February and suggested that they breed year-round. C.J.C. photographed a recently fledged juvenile at Pukusrik Wan on 11 September 2008.

SPECIMENS: AMNH (Baker 1951), DMNH (online), FMNH (online), MCZ (online), MNHN (online), RMNH (Hoek Ostende et al. 1997), SMF (online), USNM (Townsend and Wetmore 1919, Baker 1951), YIO (online), ZIN (Kittlitz 1836).

VOCALIZATIONS: XC (online).

Pacific Long-tailed Cuckoo (*Urodynamis taitensis*)

Uncommon austral migrant. Kittlitz (1836) observed one but failed to collect it in December 1827. Coultas (1931) reported that the species arrived around 1 February and occurred everywhere on the island. He collected three specimens, on 15 March, 5 April, and 15 April 1931 (Bogert 1937). During 1981–1982, F.E.H. saw only one bird, flying over the main road at Tofol on 14 March 1982. The USFWS team observed an immature in rainforest near Tafunsak on 5 July, a second in mangroves at Walung on 12 July, and a third in rainforest near Okat Harbor on 23 July 1983 (Pyle 1983, Pyle and Engbring 1987, Engbring et al. 1990). C.J.C. has occasionally observed and heard up to three annually since 2007 at Pukusruk Wan, north of Lelu, and photographed one on 26 October 2009. This species, whose migratory pattern has been recently studied (Gill and Hauber 2012), occurs throughout Micronesia (Wiles 2005).

SPECIMENS: AMNH (Bogert 1937, Baker 1951).

Island Swiftlet (*Aerodramus inquietus inquietus*)

Common resident. This species was first described from Kosrae by Kittlitz (1836). The nominate subspecies *A. i. inquietus* is endemic to Kosrae (Baker 1951); elsewhere in Micronesia, this species occurs on Chuuk and Pohnpei

(Baker 1951, Wiles 2005). Large flocks forage above the forest canopy throughout Kosrae. Coultas (1931) considered it the most common bird on the island and reported it from the tops of the highest peaks. F.E.H. observed a few at 589 m near the summit of Mt. Mutunte on 21 April 2013. Engbring et al. (1990) reported a mean density of 290/km² with an estimated total population of 27,863; densities were highest at the highest elevations, lowest in mangroves (Table 2), and varied regionally with much higher densities at Tafunsak (549/km²) than in Malem (162/km²) or Walung (147/km²). As pointed out by Gary Wiles (pers. comm.), the variable circular plot method may be unsuitable for studying this species due to its swift and circling flight; the estimate of nearly 28,000 birds may be too high, requiring the equivalent of 28 colonies with 1,000 birds each, yet only a few colonies with none exceeding 1,000 birds are known. Nevertheless, the species is still abundant.

BREEDING: Coultas (1931) reported roosting and nesting in caves scattered throughout the island. Engbring et al. (1990) visited the Wiya Bird Cave at Tafunsak on 1 July 1983 and observed many birds on nests with begging offspring and an egg that fell to the ground. C.J.C. observed nests at a cave in Yela, south of Okat Harbor, on 15 January 2010. F.E.H. saw several hundred active nests at the Wiya Bird Cave, Tafunsak, on 20 June 2013 and 25 June 2014. On 19 June 2014, F.E.H. examined 11 nests, each made of moss (most of which was still green), in a small man-made Japanese cave beside the municipal water supply in Malem; four nests had one egg, one nest had a chick that had just hatched (eggshell still present), one nest had a quarter-grown chick, and five nests were empty.

SPECIMENS: AMNH (Baker 1951), USNM (Baker 1951), YIO (online), ZIN (Kittlitz 1836).

VOCALIZATIONS: XC (online). Todd Mark recorded the cacophony of swiftlets (XC75520) inside Wiya Bird Cave on 10 October 2008, providing the first recordings of this species' voice (other than clicks used for echolocation recorded at Chuuk). Because the cave is shallow enough for light to penetrate throughout, Kosrae swiftlets do not echolocate there. The

calls are high-pitched, fairly loud squeaky notes uttered in a patternless jumble, and apparently only within the confines of nesting caves, even though they may not be related to navigation. Mark recorded a similar vocalization (XC100258) in a cave on Pohnpei, but swiftlets foraging in the open are utterly silent (Pratt et al. 1987) on that island and at Chuuk. On the latter, the only sounds recorded have been echolocation clicks (ML 5509) and squeaks of nestlings (ML 5508). Possible interisland differences in the vocalizations of swiftlets should be studied.

Micronesian *Myzomela* (*Myzomela rubrata rubrata*)

Common resident. This species was first described from Kosrae by Lesson (1827). The nominate subspecies is endemic to Kosrae (Baker 1951). It is common in every terrestrial habitat, including mangroves. Coultas (1931) stated that it did not occur at higher elevations, but Engbring et al. (1990) often recorded it above 400 m, and F.E.H. observed several at 589 m near the summit of Mt. Mutunte on 21 April 2013. During 1981–1982, F.E.H. often observed children shooting them with homemade slingshots and once saw a bird killed by a thrown rock. Engbring et al. (1990) reported a mean density of 1,433/km² with an estimated total population of 136,358; densities were highest in mangroves (higher in *Sonneratia* than *Rhizophora* trees) and inversely correlated with elevation (Table 2). This species occurs in all island groups in Micronesia except the Marshall Islands and Wake (Wiles 2005).

ABNORMAL PLUMAGE: C.J.C. photographed a hypomelanic individual with gray replacing black plumage at Tafayet, Lelu, on 1 August 2014.

BREEDING: Finsch (1880a, 1881) found an unfinished nest in a mangrove in late February. Coultas (1931) noted females feeding young long after they could fly, and also noted adult males copulating with juvenile females. Baker (1951), based on an examination of molt in specimens, concluded that nesting activities occur from December to March and molt begins in January and peaks in March. In April

1982, F.E.H. observed a nest with chicks at Tafunsak.

SPECIMENS: AMNH (Baker 1951), NSMT (online), RMNH (Dekker and Quaisser 2006), USNM (Townsend and Wetmore 1919), YIO (Momiya 1922; online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online), XC (online). *Myzomela* taxa are noteworthy for singing impressively complex dawn songs quite distinct from their daytime utterances, and the Kosrae representative is an excellent example. By itself, it performs a dawn chorus that sounds like many species singing together. Singing begins before sunrise when it is still too dark to see the birds and continues for about 25 min until enough light is present for visibility. It then ceases quite suddenly, as if someone has thrown a switch (ML 55634, 55659). The dawn song is a continuous series of burry whistles and jerky back-and-forth phrases, many segments of which lend themselves to transliteration as *cheeky cheeky can't beat the beat; too sweet to eat*; or *she eats a pizza*. It is generally similar to the dawn song of *M. r. dichromata* on Pohnpei (ML 55674), or *M. r. kurodai* on Yap (ML 140151), to select two examples, but with a quicker pace and fewer slurred notes. Individual variation is great, and some dawn songs are more lilting and less jerky. In contrast, the daylight vocalizations of Micronesian *Myzomelas* are rather uninteresting, but highly varied, with short buzzy calls, sharp *tseep!* notes that may be repeated as a sequence, and raspy scolds. They also utter a rapid trill or whinny (ML 55614) whose function is unknown, but seems to be an alarm call. The daytime song is short and highly variable, usually including one emphatic note and two notes slurred together as *see-oo SEET* or *schweer cheap-beer*.

TAXONOMIC NOTES: The nominate and easternmost subspecies, which is endemic to Kosrae, differs from other subspecies in that adult sexual dimorphism is much reduced, and juvenile males are dark sooty gray with a triangular patch of red-tipped feathers in the center of the back. Other subspecies of *M. rubratra* occur in Pohnpei, Chuuk, Yap, Palau, and the Marianas (Baker 1951).

Populations of Mayr's (1945) original *M. cardinalis* complex are distributed among three

widely separated geographic centers: one in eastern Melanesia, one in Samoa, and one in Micronesia. On the basis of region-wide differences in coloration and vocalizations, Pratt et al. (1987) separated the *M. rubratra* group (Micronesia) from the *M. cardinalis* group (eastern Melanesia and Samoa). See Pratt and Mittermeier (2016) for further details of the latter and Higgins et al. (2008) for illustrations by H.D.P. of the entire *M. cardinalis* complex.

Kosrae White-eye (*Zosterops cinereus*)

Common resident. This endemic species was first described from Kosrae by Kittlitz (1832–1833). It is common, foraging in small flocks in virtually every terrestrial habitat, including mangroves. F.E.H. observed it at 589 m near the summit of Mt. Mutunte on 21 April 2013. Engbring et al. (1990) reported a mean density of 1,846/km² with an estimated total population of 203,375; densities were higher in the rainforest than in mangroves and were inversely correlated with elevation (Table 2). Engbring et al. (1990) noted that flocks typically included four to eight individuals and that early in the morning large numbers flew from the lowlands toward the interior, but they were uncertain whether it was a daily or seasonal pattern.

BREEDING: No data. F.E.H. photographed a juvenile on 22 June 2013 (Figure 14) with an enlarged rectus, pure yellow bill, green-tinged plumage (possibly an artifact of lighting), and mostly yellow legs with a few dark blotches. A presumably older immature photographed by C.J.C. on 6 November 2009 has a yellow bill with dark blotches and adult plumage color. No distinctive juvenile coloration has been previously described for the Kosrae White-eye. Distinct juvenile plumages are rarely, if ever, found among white-eyes (van Balen 2008).

SPECIMENS: NSMT (online), SMF (Steinbacher 1954, but not listed online), USNM (Townsend and Wetmore 1919), YIO (Taka-Tsukasa and Kuroda 1915a; online), YPM (online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online), XC (online). The vocal repertoire of the Kosrae White-eye

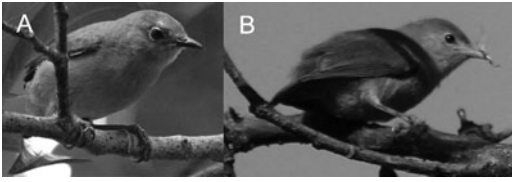


FIGURE 14. Adult (A) and juvenile (B) Kosrae White-eyes (*Zosterops cinereus*) at Malem on 19 June 2014 and at Tafunsak on 22 June 2013, respectively. The juvenile has a swollen rectis, pure yellow bill (black in adult), green-tinged plumage (gray in adult), and yellow legs with dark blotches (darker in adult). Photos by F.E.H.

is described here for the first time and compared to that of the Gray-brown White-eye (*Z. ponapensis*) of Pohnpei (ML numbers are currently listed under Gray-brown White-eye). Call notes are of two types. Isolated foraging birds or pairs utter a nasal, reedy *tschew* (ML 55625) that anyone familiar with the genus would recognize as that of a *Zosterops*, but distinctive in its own right. Similar calls of Gray-brown White-eyes are higher pitched and less reedy. Roaming flocks of five to seven Kosrae White-eyes often utter a different series of calls as they fly from perch to perch, but do not call in flight. These notes are contrastingly loud and sharp, with the sound quality of a child's squeak-toy (ML 55626, 55645). Observers in North America might compare them to calls of the Brown-headed Nuthatch (*Sitta pusilla*), but more vigorous. Kosrae White-eyes also utter isolated single notes that seem to be alarm calls, or short bursts that may represent a true song. Apparently the Kosrae White-eye has no dawn song. In two dawn recording sessions in places where the white-eye is common during the day (see Micronesian *Myzomela* account), H.D.P. could detect no input from the Kosrae White-eye. However, two days later on Pohnpei, he discovered that the Gray-brown White-eye has a distinctive complex dawn song (ML 55690).

TAXONOMIC NOTES: This species was long considered the nominate subspecies of the Dusky White-eye complex along with *Z. c. finschii* of Palau and *Z. c. ponapensis* of Pohnpei (Baker 1951) (see Figure 15). Pratt et al. (1980) split the Palau form, the Dusky White-

eye (*Z. finschii*), on the basis of striking differences in coloration, vocalizations, and behavior, leaving the Kosrae and Pohnpei birds as subspecies of the Gray-brown White-eye (Pratt et al. 1987, Wiles 2005), a default taxonomy that can be evaluated now that the vocal differences between the two forms have been documented. The two differ obviously in color, with the Kosrae bird lacking any brown in the otherwise gray plumage while Pohnpei birds are strongly tinged olive-brown dorsally and on the flanks (Figure 15). The white eye-ring of the Kosrae White-eye is but a single row of feathers and consequently is often not clearly visible in study skins, which may explain Baker's (1951) misstating that it lacks an eye-ring. Pohnpei birds also have smaller bills (Baker 1951), perhaps resulting from character displacement because Pohnpei has two other white-eye species. Clearly, the two forms have adapted to completely different avian communities and probably differ in their foraging ecology, which has not been studied.

Given all the differences in vocalizations, coloration, morphology, and very likely ecology, continuing to consider *Z. cinereus* conspecific with *Z. ponapensis* is clearly untenable; therefore, we treat the two forms as single island endemic species confined to Kosrae and Pohnpei, respectively.

Micronesian Starling (*Aplonis opaca opaca*)

Common resident. The nominate subspecies was described from Kosrae by Kittlitz (1832–1833) and is endemic to Kosrae (Baker 1951). Coultas (1931) noted that this bird was the second most common landbird species and that flocks occurred throughout the island at all elevations. F.E.H. observed it at 589 m near the summit of Mt. Mutunte on 21 April 2013. Coultas (1931) reported that immature-plumaged birds outnumbered adults by a ratio of 5:1, and that younger birds flock together. The high ratio of immatures to adults also occurs elsewhere (Engbring et al. 1990) and suggests either a high rate of reproduction or an unusually long retention of juvenal plumage (Jenkins 1983). Engbring et al. (1990) reported a mean density of 835/km² with an estimated

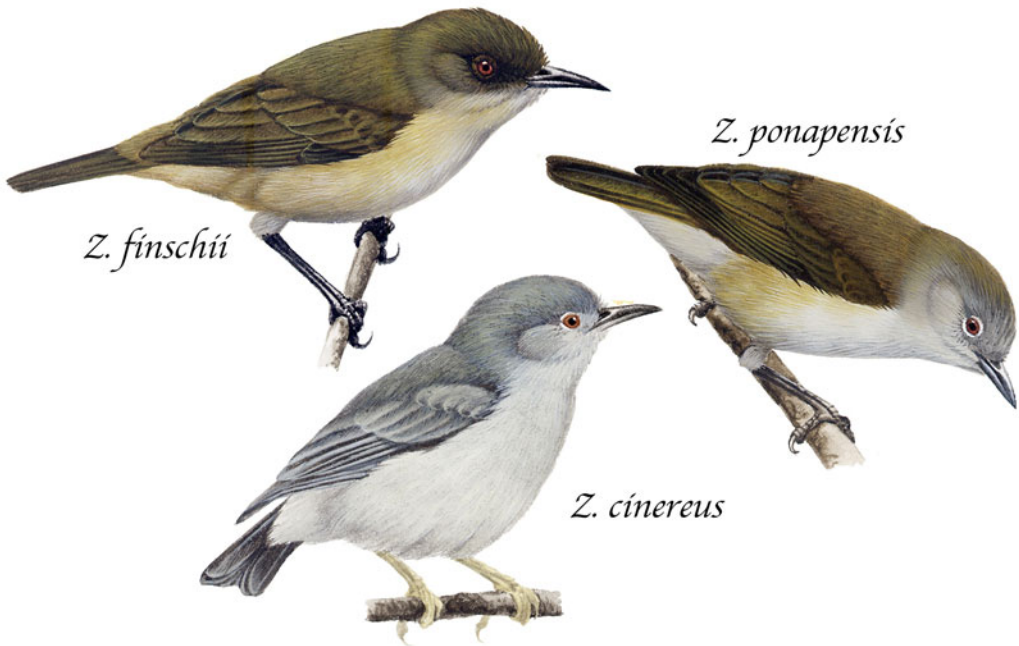


FIGURE 15. Three Micronesian species of *Zosterops* formerly considered conspecific: Dusky White-eye (*Z. finschii*) of Palau, Gray-brown White-eye (*Z. ponapensis*) of Pohnpei, and Kosrae White-eye (*Z. cinereus*) of Kosrae. Painting by H.D.P.

total population of 101,955; densities were higher in rainforest than in mangroves and were highest at low and intermediate elevations (Table 2). Seven additional subspecies are found in Micronesia west to Palau and north to Pagan in the Marianas; it is absent in the Marshall Islands and Wake (Baker 1951, Wiles 2005).

BREEDING: No data.

SPECIMENS: AMNH (Baker 1951), MCZ (online), RMNH (Dekker and Quaisser 2006), USNM (Townsend and Wetmore 1919, Baker 1951), YIO (Momiyama 1920, 1922; Taka-Tsukasa and Yamashina 1931; online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online).

Kosrae Starling (*Aplonis corvina*)

Extinct resident. Kittlitz (1832–1833, 1835) described this endemic species on Kosrae based on an unknown number of specimens. Hume and Peterson (2003) pointed out that

the correct publication date of the description is 1833. Kittlitz (1858) mentioned only three specimens deposited in the Zoological Museum of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg, which were collected on 15, 21, and 29 December 1827 (Hume 2002). However, two additional specimens, collected by Kittlitz and subsequently traded or sold, were later discovered in the Nationaal Natuurhistorisch Museum in Leiden (Mees 1964). A sixth specimen in the Senckenberg Naturmuseum Frankfurt in Frankfurt (Hartert 1891) was destroyed during World War II (Steinbacher 1954, Hume 2002). The existing specimens include two juveniles, a subadult, and two adults. According to Kittlitz (1835:7), this species was solitary, lived “deep in the wooded region in the centre of the island and is just about the only bird occasionally to be seen here.” Kittlitz (1835) also noted that it foraged on large insects, small lizards, and fruit. Subsequent collectors, especially Coultas (1931),

searched extensively for this species without success. Hill (1957) claimed that an informant and two others in Utwe were “familiar with it” and had recently seen one in the “Finkol Mountains” above Utwe during 1955 or 1956. The USFWS team failed to find it in July 1983 despite extensive searches.

Hume (2002) reviewed four hypotheses for its extinction: (1) competitive exclusion by the Micronesian Starling, which arrived later and outcompeted it at lower elevations, forcing it to higher elevations in the interior; (2) predation by introduced rats, which Kittlitz (1836:284) reported as abundant and causing “great damage” to banana and sugar cane; (3) an introduced avian disease, as in the Hawaiian Islands; and (4) human disturbance and hunting. Hume (2002:153) suggested that “a combination of events was to blame,” and we concur. There is strong evidence that early avian colonists on islands are forced to specialize and become vulnerable to extinction by interspecific competition from later colonists, which tend to be highly competitive generalists (Ricklefs and Bermingham 1999, 2002). We suspect that the apparently distinctive habitat, dietary, and morphological specializations of the Kosrae Starling (Hume 2002) were a direct outcome of competition with a later arriving congener, the Micronesian Starling, thus greatly reducing its population and range, and rendering it vulnerable to extinction by one or more of the other factors.

BREEDING: The two juvenile specimens were recently fledged, apparently by late November (Hume 2002).

SPECIMENS: RMNH (Mees 1964), ZIN (Kittlitz 1836).

Blue-faced Parrotfinch (*Erythrura trichroa trichroa*)

Common resident. The nominate subspecies was first described from Kosrae by Kittlitz (1835) and is endemic to Kosrae (Baker 1951). Coultas (1931:246) regarded it as common, occurring in flocks throughout the island and even at “quite high elevations.” F.E.H. observed it only in open areas at lower elevations at Okat Harbor, Tafunsak, and Tofol in 1981–1982 and 2013–2014. Engbring

et al. (1990) reported a mean density of 111/km² with an estimated total population of 10,893; densities were highest at the highest elevations, none were in mangroves (Table 2), and regional variation occurred with the highest densities in Malem (177/km²) and the lowest in Walung (62/km²). Engbring et al. (1990) seldom saw flocks larger than four individuals. It is much more common on Kosrae than Pohnpei (Engbring et al. 1990). Other Micronesian subspecies inhabit Chuuk and Pohnpei (*E. t. clara*) and Palau (*E. t. pelewensis*; Baker 1951, Wiles 2005).

BREEDING: No data.

SPECIMENS: SMF (Steinbacher 1954, but not listed online), YIO (Taka-Tsukasa and Yamashina 1931; online), ZIN (Kittlitz 1836).

VOCALIZATIONS: ML (online). The metallic or insect-like call notes of this species are well known, but the full song is not, nor has it been previously reported in Micronesia. H.D.P. recorded it in a mangrove forest at the Pacific Tree Lodge on the northeastern coast of Kosrae on 23 February 1988 (ML 55637 0:44ff). It matches descriptions given by Goodwin (1982) and Clement et al. (1993) as comprising three distinct elements uttered repeatedly in sequence. One element is the three-note variant of the metallic call *tee-dee-deet*, another is a shrill drawn-out descending note *tseeeooo*, and the other a series of upslurred whistles *seet-seet-seet*, etc. The entire song would be: *tseeeooo tee-dee-deet tee-dee-deet tseeeooo seet-seet-seet-seet-seet-seet-seet-seet tseeeooo tee-dee-deet tseeeooo tee-dee-deet seet-seet-seet-seet-seet-seet tseeeooo tee-dee-deet tseeeooo*.

Hypothetical Species

Eastern Spot-billed Duck (*Anas zonorhyncha*)

Possibly a rare visitor. Santos et al. (1970) listed this species for Kosrae but provided no further details. In Micronesia, it has been recorded only in the Marianas (Wiles 2005).

Pacific Black Duck (*Anas superciliosa*)

Possibly a rare visitor. Segal (1989:220) listed this species among three duck species that are “occasional visitors” but provided no

further details. It breeds at Chuuk and Palau, but these populations are apparently sedentary, as are other populations found across the tropical Pacific and south to New Zealand (Pratt et al. 1987).

Red-billed Tropicbird (*Phaethon aethereus*)

Possibly a rare visitor. Finsch (1880*a, b*, 1881) reported observing both the White-tailed Tropicbird and Red-billed Tropicbird in the Marshall Islands and in Kosrae during February 1880. His description of the latter from Kosrae is unequivocal: “observed several distinctive (red beak, white tail!) in sight of island at sea” (translated from German; Finsch 1880*a*:310). Baker (1951) accepted Finsch’s records, but Amerson (1969) regarded his observations of Red-billed Tropicbirds from the Marshall Islands (Finsch 1880*b*) as mistaken identifications of Red-tailed Tropicbirds. Finsch was well aware of the existence of the Red-tailed Tropicbird, which he observed at Pohnpei only a few days after leaving Kosrae (Finsch 1880*a*). However, Wiles (2005) pointed out that Finsch (1880*c*) saw more Red-billed Tropicbirds than White-tailed Tropicbirds and did not see any Red-tailed Tropicbirds during his voyage from Hawai‘i to the Marshall Islands. Although the Red-billed Tropicbird is much less common than the Red-tailed Tropicbird in Hawai‘i, it has been recorded at least 19 times as far west as Johnston Atoll (VanderWerf and Young 2007), which is >5,000 km west of their nearest colonies in Mexico. Kosrae is an additional 3,250 km west of Johnston Atoll. Given the uncertainty of Finsch’s observations and absence of subsequent records in Micronesia, it has been regarded as hypothetical (or even deleted) for Micronesia by subsequent authorities (Owen 1977, Pyle and Engbring 1985, Pratt et al. 1987, Wiles 2005).

Masked Booby (*Sula dactylatra*)

Possibly a rare visitor. Hill (1957) reported that a booby, “apparently” this species, was “not common” during 1956–1957. It has been recorded in all of the island groups of Micronesia except Pohnpei and Kosrae (Wiles

2005), so its occurrence on Kosrae is plausible but requires further documentation.

Greater Sand Plover (*Charadrius leschenaultii*)

Possibly a rare Palearctic migrant. We have been unable to find a specimen or detailed published record from Kosrae. Lesson mentioned “Oulan” in his brief description of the species from India (Lesson 1826) and in a subsequent treatise of ornithology (Lesson 1831), resulting in subsequent authorities listing it for Kosrae up through Wiles (2005). However, Oustalet (1895:48–49) pointed out that “Oulan,” which was italicized unlike other locality names in Lesson (1826, 1831), represented a vulgar name for the species in India rather than a locality, and was misinterpreted for similarly spelled “Oualan,” the name for Kosrae used elsewhere by Lesson (1827, 1829–1830*a, b*, 1831) and Lesson and Garrot (1826). Unfortunately the misinterpretation was perpetuated for more than a century. Because this species has been recorded from all major island groups west of Kosrae (Wiles 2005), its eventual documentation in Kosrae is expected.

Swinhoe’s Snipe (*Gallinago megala*)

Possibly a rare Palearctic migrant. Identification of snipes to species is notoriously difficult (Message and Taylor 2005). Among a group of four snipes at Tofol on 4 April 2014, C.J.C. obtained a blurry photo of one flying away (Figure 16) that clearly lacked the white trailing edge of the Common Snipe (*G. gallinago*). It appeared too dark for Latham’s Snipe (*G. hardwickii*), which has been documented by a specimen from the Marshall Islands (Amerson 1969) with unconfirmed sight records from Yap and Rota (Pratt et al. 2010) and an unpublished photographic record from Guam (D. Vice, pers. comm.). It resembled a Swinhoe’s Snipe, which is a fairly common winter visitor in Palau, Yap, and the Marianas, and a rare visitor to Chuuk (Wiles 2005), but it also could have been a Pin-tailed Snipe (*G. stenura*), only recently confirmed for the Marianas (D. Vice, pers. comm.; details to be



FIGURE 16. First possible record of Swinhoe's Snipe (*Gallinago megala*) for Kosrae at Tofol on 4 November 2014. Photo by C.J.C.

published elsewhere), although the legs appear to be too short, barely protruding beyond the tail (Figure 16). We regard this identification as hypothetical until better documentation is available.

Greater/Lesser Yellowlegs (*Tringa melano-leuca/flavipes*)

Possibly a rare Nearctic migrant. Santos et al. (1970) listed the Greater Yellowlegs and Segal (1989:220) included the “Yellow Legs” among several shorebird species that are “less common but yearly visitors,” but no further details were provided. The Greater Yellowlegs has been recorded as a vagrant in the Commonwealth of the Northern Marianas, Marshall Islands, and Wake, and the Lesser Yellowlegs has reached the Marshall Islands (Wiles 2005).

Red-necked Phalarope (*Phalaropus lobatus*)

Possibly a rare boreal migrant. Hill (1957) reported it from Kosrae but did not state whether she had actually seen any. She stated that an informant “seems to be certain” of its identity based on a picture (confusion with the Sanderling is possible) and a description of its habits. In Micronesia, it is known only from the northern Mariana Islands (Wiles 2005) and Palau (Pratt et al. 2010).

Cuckoo sp. (*Cuculus optatus*)

Possibly a rare Palearctic migrant. C.J.C. very briefly observed a gray, cuckoo-like bird with a long, barred tail, but was unable to obtain any photos, at Okat Harbor on 13 October 2014. In Micronesia, two species of this genus have been recorded from Palau and Yap, with unconfirmed reports from the Commonwealth of the Northern Marianas and Pohnpei (Wiles 2005).

Short-eared Owl (*Asio flammeus*)

Possibly a rare visitor. Ridgway (1881) briefly described an unsexed adult specimen (USNM 66235) collected at “Strong’s Island,” which he believed was in the West Indies. Kelso (1938) pointed out that Strong’s Island was an old name for Kosrae and subsequent authorities up through Wiles (2005) considered the specimen to be a valid record from Kosrae. According to the label, the undated specimen was collected by “Gulick” of “Wesleyan University.” Presumably it was collected by either Luther H. Gulick, John T. Gulick, or Theodore W. Gulick, all brothers who were American missionaries (John later became an accomplished biologist, specializing in mollusks and evolutionary theory). Luther and John briefly visited Kosrae during 22–30 August 1852, and John returned during 6–15 October 1852 (Jewett 1895, Gulick 1932). Kelso (1938) and R. B. Clapp (in Engbring et al. 1990) measured the specimen’s wings, which were 20–40 mm shorter than those of continental populations and typical of shorter-winged insular forms. Baker (1951) included it within the endemic subspecies *A. f. ponapensis* of nearby Pohnpei but did not discuss its origin. R. B. Clapp (in Engbring et al. 1990) and H.D.P. found that the alleged color distinctions of *A. f. ponapensis* in Mayr’s (1933) description could be matched by specimens of nominate *A. f. flammeus* of Asia, thus its smaller size is its only morphological distinction as an endemic subspecies. Engbring et al. (1990) suggested that the Kosrae specimen may have arrived on Kosrae as a vagrant from Pohnpei or that it was actually collected on Pohnpei but

mis-labeled as originating from Kosrae. Alternatively, the specimen may have represented a resident population on Kosrae that was subsequently extirpated, but the island probably lacked sufficient grassland habitat to support a resident population. Luther resided on Pohnpei from 1852–1859, but visited Kosrae only briefly with John in 1852 (Jewett 1895). After his first visit to Kosrae, John wrote, “I was surprised not to see more wild birds in my rambles on Kusaie. We heard the cooing of pigeons and the songs of two or three other kinds of small birds” (Gulick 1932:79). Had an owl been encountered during either of John’s visits, he probably would have written about it. Theodore collected birds on Pohnpei (and possibly Kosrae as well) and may have collected the owl specimen. He wrote, “My recreation has been gardening, paddling canoes, shooting birds, and the like. I have made a collection of Ponape [Pohnpei] birds, most of which are quite different from ours at the Sandwich [Hawaiian] Islands” (Chamberlain 1860:9). We do not know the fate of his bird collection from Pohnpei, but we suggest it was eventually deposited at Wesleyan University and included the owl specimen, which was mislabeled as originating from Kosrae. Occasional records of Short-eared Owl from the Mariana Islands (Wiles 2005), Yap (Pratt et al. 2010), Marshall Islands (Spennemann 2004), and Wake (Jones 1995) are probably migrants of the longer-winged nominate race from Asia.

SPECIMEN: USNM (Ridgway 1881, Kelso 1938, Engbring et al. 1990).

Sacred Kingfisher (*Todiramphus sanctus*)

Possibly a rare Australian migrant. Lauret (1990) briefly observed a kingfisher at Malem on 7 February 1988, but was unable to view its underparts. It was most likely this highly migratory species, which has also been tentatively reported from Kapingamarangi Atoll in southern Pohnpei State (Buden 1998) and Nauru (Buden 2008), and confirmed on Kwajalein Atoll in the Marshall Islands (Schipper 1985).

Carolinian Reed Warbler (*Acrocephalus syrinx*)

This species was considered by many authors to be an extirpated resident until Engbring et al. (1990) first questioned the veracity of historical reports. Hartlaub (1852:131) listed “*Tatare syrinx*” for “Ualan” (Kosrae) and “Lugunor,” which he attributed to Kittlitz without citing a reference. Kittlitz (1835:6) described the species from the islands of “Ulcei” and “Lugunor”; the former refers to Woleai in Yap and the latter is an atoll in Chuuk. Hartlaub evidently confused “Ulcei” with “Ualan,” which led to confusion in the subsequent literature. Kittlitz (1858) discussed “*Sylvia syrinx*” (a synonym of this species) and then “*Lamprothornis*” (a synonym of the Micronesian Starling) on p. 92, but did not mention “Ualan” until p. 93 as a locality for the latter species. Finsch (1881:108) stated, “I suspect *Calamoberpe syrinx* [another synonym] may still be found in Kushai, although it is not mentioned by Kittlitz and escaped my notice.” Despite Finsch’s statement that neither he nor Kittlitz had found it on Kosrae, Baker (1951) cited Hartlaub (1852), Kittlitz (1858), and Finsch (1880a, 1881) among other authors for its occurrence on Kosrae, even though none had ever reported observing or collecting it on Kosrae. Elsewhere it occurs in Yap, Chuuk, and Pohnpei (Wiles 2005).

DISCUSSION

Thus far, 53 naturally occurring species of birds have been reliably reported from Kosrae. Of these, 39 have been properly documented by either a specimen deposited in a permanent museum collection (24 species) or a published photograph (15 species), and 14 are based on one or more sight records (Table 1). Twelve potentially naturally occurring species have been reported on the basis of insufficiently substantiated sight records or erroneous interpretation of the literature and are therefore considered hypothetical. Two additional species have been introduced (one represented by specimens, the other by sight records), of which one has a self-sustaining feral population and the other is extirpated.

Of the 15 naturally occurring breeding residents, 13 species are extant (including two endemic species and four endemic subspecies)

and two species (both endemic) are extinct. Of the 38 nonbreeding residents, 21 are boreal migrants (including 11 exclusively Palearctic migrants and 3 exclusively Nearctic migrants), 5 are austral migrants from breeding populations in the temperate Southern Hemisphere, and 12 are visitors that breed on tropical islands elsewhere in the Pacific (Table 1).

Further fieldwork will undoubtedly add new species to the island's avifauna and additional records of the rarer species. All records of new species and those of species represented only by sight records should be properly documented by a published photograph or sound recording, or a specimen deposited in a permanent museum collection.

Although data on the populations of migratory shorebirds and resident landbirds have been published (Hayes 1986, Engbring et al. 1990), additional monitoring of these populations and those of other species is needed to detect any future changes in population levels. Much more information is needed on the breeding season, breeding biology, foraging behavior, and habitat requirements of Kosrae's resident species. Because of the island's historically low human population density (Gorenflo 1993) and relatively pristine habitats (Wortel 2010), most of the breeding birds appear to be thriving with no serious threats. The Micronesian Imperial Pigeon, which is still heavily hunted, is the only exception. Vigilance is warranted and steps should be taken to mitigate any future threats to the island's avifauna, such as habitat destruction and introduced species.

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