

# The birds of Kapingamarangi Atoll, including first record of the Shining Cuckoo (*Chrysococcyx lucidus*) from Micronesia

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## ABSTRACT

Twenty species of birds are recorded from Kapingamarangi Atoll, southern Micronesia, 14 sea- and shorebirds and six land birds. Eleven are documented or probable breeders or former breeders. The Micronesian Starling (*Aplonis opaca*) is the only native, resident land bird, and it is common and widespread, averaging 5.7 birds ha<sup>-1</sup> atoll-wide among the 31 islands. A kingfisher is reported from Kapingamarangi for the first time, and a recently collected specimen of Shining Cuckoo (*Chrysococcyx lucidus*) is the first record for Micronesia and first report of the nominate (New Zealand) subspecies north of the Bismark Archipelago.

**KEYWORDS:** avifauna, distribution, *Chrysococcyx*, Kapingamarangi, Micronesia

## INTRODUCTION

The avifauna of Kapingamarangi Atoll has never been reviewed systematically. Niering's (1963) ecological study (results of the joint Pacific Science Board, National Academy of Science/Office of Naval Research Expedition during 22 June-31 August 1954) focused largely on vegetation. Niering (1963) discussed the effects of breeding seabirds on local soils and vegetation at length, but other birds are mentioned only in passing. Additional ornithological notes were presented adjunct to a sociology field study during 15 July-16 October 1947 and 17 June -26 November 1950 (Emory 1965), and an archaeological survey done over a period of about a month between November 1979 and February 1980 (Leach & Ward 1981). Emory (1965) also reported on birds observed by a German expedition on Kapingamarangi during 18-23 January 1910 (Eilers 1934). The present study brings together information on the occurrence, distribution, and relative abundance of birds on Kapingamarangi, and it is based largely on my observations during 19 June-13 August 1996, along with information gleaned from the literature and from local residents.

## STUDY AREA

Kapingamarangi Atoll (1°04' N, 154°05' E) is a Polynesian outlier in southern Micronesia, about 716 km southwest of Pohnpei, the administrative seat and nearest high island (Fig. 1). It is about 11.2 km long (east to west) and nearly 9 km wide, and with 31 islands all on the eastern side in total covering about 1.13 km<sup>2</sup> land

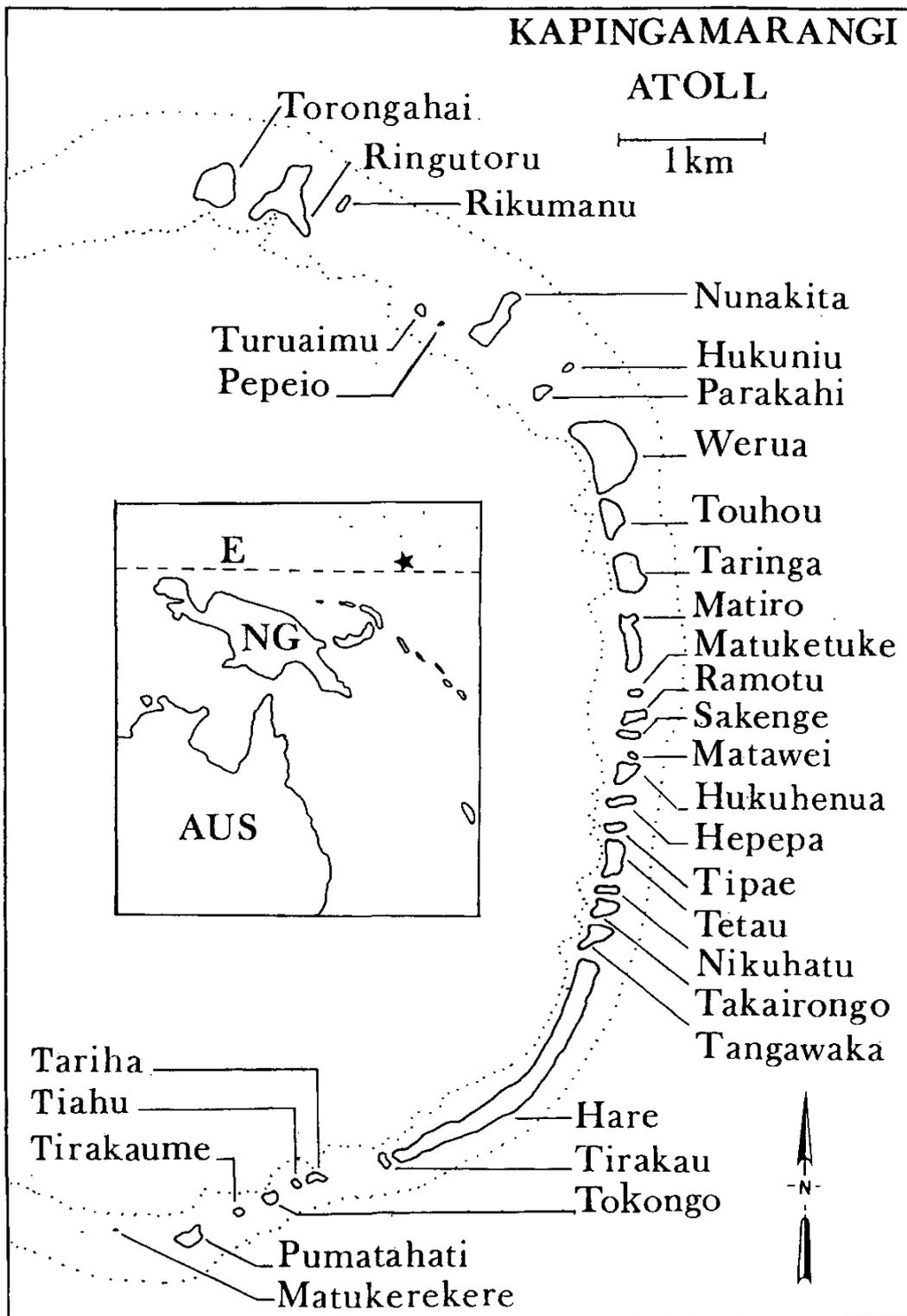


FIGURE 1 – The map and location of Kapingamarangi Atoll.

area; the largest island, Hare, covers about 34.5 ha. The highest elevation is about 4-5 m, and no land is more than about 200 m from the sea. The only pass or channel allowing boat passage into the lagoon is on the south side, just west of Matukerekere Island. Interisland channels range from about 43 m to 1.0 km wide and all can be easily waded at low tide, some of the islands being reached dry-shod during the lowest tides. The vegetation is mainly *Cocos* (coconut) or *Cocos/Artocarpus* (breadfruit) forest with an understorey of small trees and shrubs and ground cover of herbs and ferns. The forest extends directly to rocky (mainly oceanside) or sandy (mainly lagoonside) beaches or abuts a narrow, discontinuous zone of coastal scrub or thicket several metres wide and consisting largely of *Scaevola* and *Tournefortia*.

The 473 people counted during the 1994 census (Office of Planning and Statistics 1996) were distributed among 78 families (unpublished 1994 census data), nearly all of them on Touhou and Wera. I encountered only one family on Torongahai, two on Taringa, and another on Hukuhenua. Temporary residences consisting of opensided thatch or sheet-wood shelters are on many of the larger islands, which are visited to cultivate *Cyrtosperma* taro (a dietary staple) and to collect coconuts for local use and small-scale export of copra. The time of original colonization by aboriginals is unknown, but Emory (1965) estimated habitation by as early as 1200 AD. The local vegetation appears to have been greatly modified by a long history of human occupation and activity (Niering 1963). Detailed analyses of the vegetation and other facets of terrestrial ecology have been presented by Niering (1956, 1963) and Wiens (1956). Statistical summaries including island areas and duration of visits during the present study, along with examples of recent changes in island physiognomy (including the merging of adjacent islands) have been reported elsewhere (Buden, 1998).

## METHODS

Vernacular and scientific names follow Pratt *et al.* (1987) and Turbott (1990) except the Pacific Golden Plover (*Pluvialis fulva*) is treated as a species distinct from the American Golden Plover (*P. dominica*). The terms used to describe abundance are: very common (at least 30 sightings per day, and often more than 100), common (15-30/day), fairly common (5-15/day), and uncommon (1-5 on most days, but not necessarily observed on all days).

Status was assessed via a combination of census counts and general observations throughout the study period, along with information extracted from the literature. In view of the paucity of seasonal data, the status of migrants and probable off-season visitors is reported under the broad and all inclusive heading "nonbreeding visitor." Census counts were obtained during slow walks along beaches and inland through forest on all 31 islands, recording the number of individuals observed. No route was covered more than once, and all the islands were completely circled during the beach surveys, with the observation zone extending from the upper beach to the outer edge of the reef flat. The population density of *Aplonis opaca*

was estimated using a 50-m wide fixed-width transect. All distances were estimated by eye and by using an aerial survey photomosaic map (Pohnpei State Land Commission 1986). Place names are from Bryan (1971) based on Wiens (1956).

Students in the Pohnpei Teacher Education Centre programme for 1970 (PONTEC 1970) prepared a bird guide covering Pohnpei and its outlying atolls as an exercise to develop writing and organization skills. It included many unverified records based on hearsay evidence and observations by people unskilled or untrained in bird observation and was never intended for widespread distribution (H. Segal, project director, pers. comm.). However, copies were distributed to local schools and libraries. F. Leach examined a copy during his visit to Pohnpei (Leach, pers. comm.) and used it as a primary source for the list of Kapingamarangi birds in Leach & Ward (1981). I have treated all unconfirmed records in the PONTEC report as hypothetical.

### SPECIES ACCOUNTS

White-tailed Tropicbird (*Phaethon lepturus*).—This species is included on somewhat tenuous grounds. Emory (1965) saw two or three “tropicbirds” (unidentified as to species) and Leach & Ward (1981) listed *P. lepturus* among species known from Kapingamarangi, probably based on the PONTEC report, where it was reported as a “visitor” to the atoll.

Brown Booby (*Sula leucogaster*).—Emory (1965) recorded one “booby” seen on 14 October and Niering (1963) recorded *S. leucogaster* as “transients” on Kapingamarangi, adding that the islanders reported that up to 1920 it nested on Pumatahati when that island was covered with a *Pisonia* forest (Wiens 1962).

Red-footed Booby (*Sula sula*).—The only record is skeletal remains from a minimum of three birds excavated from an archaeological site on Touhou carbon-dated 300-700 years BP; specimens were sent to the University of Otago (New Zealand) and identified by R. Scarlett (Leach & Ward 1981).

Great Frigatebird (*Fregata minor*).—I observed 15-20 *F. minor* in flight regularly during July and August, usually soaring northward at sunrise and southward toward the southernmost islands at dusk. I did not observe any roosting. Leach & Ward (1981) excavated bones of at least seven *F. minor* from archaeological sites on Touhou carbon-dated 300-700 y BP. They also reported “large flocks...on several of the islands,” and that the “meat...was prized” by the islanders, contrary to Emory’s (1965) observation that neither the birds “nor their eggs were sought after as food by the people.” Niering (1963) reported flocks of frigatebirds (probably this species) roosting in coconut trees on Tirakaume. He also reported several immature birds being kept as pets and presumed they were brought in from elsewhere, as the islanders indicated the birds did not then nest on Kapingamarangi, but did so in the past, at least on Pumatahati. Emory (1965) also recorded frigatebirds rising “in great flocks from Pumatahati, Tirakaume, and neighboring islets.”

Pacific Reef Heron (*Egretta sacra*).—The Pacific Reef Heron is an uncommon resident usually seen on beaches and reef flats. Niering (1963) observed “white” and “mottled grey” (= pied?) morphs, and Emory (1965) saw “white herons” and dark herons.” Of the 36 sightings for which I recorded colouration, 26 birds (72%) were dark (greyish blue), and 10 were piebald; none was entirely white. As I often saw *E. sacra* in flight between islands, some birds may have been recorded more than once. Based on census counts and an overall impression of abundance during two months in the field, I roughly estimated 30-40 on the atoll. I saw mainly singles and no more than three birds together, including three pied birds on Touhou and three dark individuals on Hare. Niering (1963) reported that reef herons nest in *Cocos* and *Pandanus* trees. Eilers (1934 in Emory 1965) indicated that herons (and frigatebirds) were often observed as pets when a German expedition visited the atoll in the early 1900s. I observed no evidence of nesting during summer 1996.

Red Junglefowl/Chicken (*Gallus gallus*).—Domesticated chickens are free-ranging in the settled areas and small feral populations are widespread throughout the atoll. I recorded *G. gallus* on Torongahai, Ringutoru, Hukuniu, Werua, Touhou, Taringa, Hukuhenua, Tangawaka, and Hare. Chicken bones excavated on Touhou at an archaeological site of undetermined age were reported as possibly prehistoric based on the presence of a strongly developed tarsometatarsal spur (Leach & Ward 1981).

Pacific Golden Plover (*Pluvialis fulva*).—Niering (1963) observed *P. fulva* commonly along beaches during June-August 1954. I recorded it in small numbers (no more than two together) throughout the summer, and more frequently in July than June, probably as southwardbound migrants from northern breeding grounds.

Wandering Tattler (*H. brevipes*)/Grey-tailed Tattler (*H. incanus*).—I recorded tattlers occasionally on at least nine different islands during 21 June-9 August, mainly on rocky beaches and reef flats. But as I was unable to distinguish between *H. brevipes* and *H. incanus* confidently in these cases, and as both species occur regularly in this area of the Pacific (Pratt *et al.* 1987), I have elected to include all records as a species pair. Emory (1965) recorded Wandering Tattlers as being few in number, but this record requires confirmation at least at the species level.

Whimbrel (*Numenius phaeopus*).—I observed Whimbrels regularly in small numbers (mainly singles, occasionally two together) on beaches throughout the atoll, and estimated about 15-20 to be present at any one time during June, July, and early August 1996.

Ruddy Turnstone (*Arenaria interpres*).—Niering (1963) considered *A. interpres* common on beaches in summer 1954, and I found it to be uncommon to fairly common in summer 1996, with a maximum of 14 together on Touhou on 6 August.

Crested Tern (*Sterna bergii*).—Niering (1963) considered *S. bergii* “transient” on Kapingamarangi Atoll. There are no other documented records although it is listed in the PONTEC report under a local Kapingamarangi name, Sorbit.

Black-naped Tern (*Sterna sumatrana*).—Niering (1956) recorded *S. sumatrana* on Kapingamarangi but apparently inadvertently omitted it from his later work (Niering 1963), wherein he mentions 14 species being recorded but annotates only 13. The three “Gray-backed Terns” reported by Emory (1965) as seen perched on a rock at the pass (= channel entrance to the lagoon) probably were *S. sumatrana*. I saw Black-naped Terns occasionally (up to five together) on at least eight different islands and usually in flight along the beach or perched on sandbars.

Brown Noddy (*Anous stolidus*) and Black Noddy (*A. tenuirostris*).—The Brown Noddy is one of the more numerous resident seabirds on Kapingamarangi, being outnumbered only by the Black Noddy (this study and Niering 1963). It is usually seen in flight directly over the *Cocos* forest, lagoon, and reef-flat, and is frequently flushed from the tops of *Cocos* crowns. The population is difficult to assess as roosting and nesting birds are well hidden in dense vegetation. The largest concentrations of Brown Noddy I observed included about 50 in trees at the northern end of Werua, about 100 in *Cocos* and *Pandanus* trees on Ringutoru, and about 200 in flight over the reef-flat at Hare, returning from sea at dusk. Leach & Ward (1981) excavated bones of the Brown Noddy from an archaeological site on Touhou carbon-dated at about 300-700 years ago.

I observed the Black Noddy in somewhat greater numbers, the largest concentrations being about 100 at the channel entrance to the lagoon, about 150 in the lagoon off Hare, and about 300 in small groups of 10-75 in *Artocarpus* and *Pisonia* trees bordering taro pits on Ringutoru, where I also saw about 50 nests, some apparently disused and in disrepair. I also saw six *A. tenuirostris* in a *Guettarda* tree on Tariha, along with one nest occupied by an adult. According to Eske Joseph, a resident islander, both *Anous* species nest on Werua and Touhou, the Brown Noddy in *Cocos* and *Pandanus*, and the Black Noddy in *Artocarpus*. These habitat preferences were observed also by Niering (1963) and by me during the present study.

White Tern (*Gygis alba*).—I encountered *G. alba* frequently in flight at the forest edge or flushed from the canopy, and usually in pairs or small groups of 3-6. I counted an average of approximately 1 pair/100 m on 14 July, while walking the length of Hare along a trail several metres inland from the shore, and general observations indicated comparable densities among the larger islands throughout the atoll. Leach & Ward (1981) considered it “moderately common” in winter 1979-80, whereas Niering (1963) recorded it as “rarely seen” during summer 1954.

Micronesian Pigeon (*Ducula oceanica*).—Emory (1965) stated...“prior to the famine of 1916-1918, the fruit pigeon, *koko*, was extant on the atoll. It still exists at Nukuoru [the nearest land, about 300 km north of Kapingamarangi] where it is called *manu kono*.” Emory’s use of local names and reference to an extant population on Nukuoro Atoll leave no doubt that he is referring to the Micronesian Pigeon and not a *Ptilinopus* or other columbid species. The famine he mentioned was associated with a severe drought during which 80-90 people starved to death (Wiens 1956).

Shining Cuckoo (*Chrysococcyx lucidus*).—I observed a Shining Cuckoo in coastal thicket on Torongahai on 3 July 1996 and several times saw two together in *Tournefortia* trees along the northeastern shore of Ringutoru on 4 July. Two (presumably the same birds) were observed again in *Tournefortia* trees on Ringutoru on 5 July, at which time a male with unenlarged testes and weighing 25 g was collected and prepared as a study skin (MCZ 333071). Its stomach was filled with insect remains, chiefly small caterpillars. Measurements (in mm) of the completely dried skin are: wing length 101.0, tail length 64.0, bill length 13.6, bill width 5.2, and bill depth 4.2. The birds were silent throughout observation. No others were seen and local islanders who examined the specimen were unfamiliar with the species, thus suggesting it is of unusual occurrence on Kapingamarangi.

In colouration, pattern, and body measurements, the Kapingamarangi specimen matches well with examples of the nominate subspecies in the MCZ collection, although the barring on the throat and upper breast is more diffuse (also more grey and less green), and the base of the mandible is pale, which are characteristics of immatures (Mayr 1932). *C. l. lucidus* breeds in New Zealand, including many satellite islands and spends the off-season in the Solomon Islands and Bismarck Archipelago (Gill 1983, 1989; Heather & Robertson 1997). The specimen from Kapingamarangi is the first record for Micronesia and extends the range of the species approximately 600 km northeast of the Bismarck Archipelago.

Long-tailed Cuckoo (*Eudynamis taitensis*).—The Long-tailed Cuckoo breeds in New Zealand and migrates north and northeastward to spend the northern summer in Micronesia and Polynesia (Pratt *et al.* 1987, Heather & Robertson 1997). It is a regular but uncommon visitor to Kapingamarangi. Niering (1963) saw several during summer 1954, and Emory (1965) recorded one on Touhou and another at Nunakita, both on unspecified dates. I recorded singles on Ringutoru (4 July), Hare (8 July), and Touhou (3 August).

Kingfisher (*Halcyon* sp.).—I observed a kingfisher high in the crown of a *Morinda* tree on Tariha Island on 24 June, and glimpsed another (possibly the same bird) on Nunakita on 29 July. The bird(s) did not vocalize then, nor did I hear any kingfishers calling during approximately two months on the atoll, and none has previously been recorded there. A combination of dark postocular streak, white underparts with faint barring on the sides, rufous colouration above the eye (the crown was not visible), and frequent tail flicking, all noted during the 24 June sighting are suggestive of the Sacred Kingfisher (*H. sancta*). But as viewing conditions were poor, I consider this identification tentative and in need of corroboration. The Sacred Kingfisher breeds widely in Australia, New Zealand, and on southern Pacific Islands; Australian birds are migratory and they winter along the northern coast as well as in the Indo-Australian and Bismarck archipelagos, and the Solomon Islands (Fry & Fry 1992). There are also several confirmed and unconfirmed records of *H. sancta* from Micronesia: Pyle & Engbring (1985) suggest that two kingfishers observed on Ulithi and Helen Island, Palau, and originally recorded as *H. cinnamomina* probably were *H. sancta*, Schipper (1985) photographed *H. sancta* on Kwajalein, Marshall Islands, Pratt *et al.* (1987) indicate that Collared Kingfishers

TABLE 1—Status and records of birds on Kapingamarangi Atoll.

| Species                  | Status <sup>a</sup> | Records                 |                             |                           |                                |
|--------------------------|---------------------|-------------------------|-----------------------------|---------------------------|--------------------------------|
|                          |                     | This study <sup>b</sup> | Niering (1963) <sup>c</sup> | Emory (1965) <sup>d</sup> | Leach & Ward 981) <sup>e</sup> |
| White-tailed Tropicbird  | NBV                 |                         |                             | + <sup>f</sup>            | [+]                            |
| Brown Booby              | FB/(B)?             |                         | +                           | + <sup>f</sup>            | [+]                            |
| Red-footed Booby         | FB?/(B)?            |                         |                             |                           | +                              |
| Great Frigatebird        | FB/(B)?             | +                       | + <sup>f</sup>              | + <sup>f</sup>            | +                              |
| Pacific Reef Heron       | B UC                | +                       | +                           | +                         | [+]                            |
| Red Junglefowl (chicken) | I UC                | +                       | +                           | +                         | +                              |
| Pacific Golden Plover    | NBV                 | +                       | +                           | + <sup>f</sup>            | [+]                            |
| Tattler spp.             | NBV                 | +                       |                             | +                         |                                |
| Whimbrel                 | NBV                 | +                       | + <sup>f</sup>              |                           | [+]                            |
| Ruddy Turnstone          | NBV                 | +                       | +                           |                           | [+]                            |
| Crested Tern             | NBV                 |                         | +                           |                           | [+]                            |
| Black-naped Tern         | (B)? UC             | +                       | + <sup>g</sup>              | + <sup>h</sup>            |                                |
| Brown Noddy              | B VC                | +                       | +                           | +                         | +                              |
| Black Noddy              | B VC                | +                       | +                           | +                         | [+]                            |
| White Tern               | B C-VC              | +                       | +                           | +                         | [+]                            |
| Micronesian Pigeon       | FB Ex               |                         |                             | + <sup>h</sup>            |                                |
| Shining Cuckoo           | NBV                 | +                       |                             |                           |                                |
| Long-tailed Cuckoo       | NBV                 | +                       | +                           | + <sup>f</sup>            | [+]                            |
| Kingfisher sp.           | NBV                 | +                       |                             |                           |                                |
| Micronesian Starling     | B VC                | +                       | +                           | +                         | [+]                            |

<sup>a</sup> B = resident year-round, breeding confirmed, (B) = resident year-round, breeding not confirmed but very probable, FB = former breeder, I = introduced and feral, NBV = nonbreeding visitor, VC = very common, C = common, UC = uncommon, Ex = extirpated.

<sup>b</sup> observations during 19 June-13 August 1996.

<sup>c</sup> observations during 22 June-31 August 1954.

<sup>d</sup> observations during 15 July-16 October 1947 and 17 June-26 November 1950.

<sup>e</sup> observations over approximately a one-month period during November 1979-February 1980; square brackets indicate unverified records extracted from PONTEC report—see Methods for additional explanation.

<sup>f</sup> identified only as to species group in source text (e.g. tropicbird, booby, frigatebird, etc.), but almost certainly referring to the species indicated in the current listing.

<sup>g</sup> apparently inadvertently omitted from Niering (1963) but included in Niering (1956).

<sup>h</sup> reported under a different species name; see species account for explanation.

(*H. chloris*) reported from Nauru probably were misidentified *H. sancta*, and Lauret (1990) indicated a kingfisher he observed on Kosrae probably was *H. sancta*.

Micronesian Starling (*Aplonis opaca*).—The Micronesian Starling is the only native land bird breeding on Kapingamarangi Atoll. I saw *A. opaca* on all 31 islands, and with encounter rates averaging 28.5 birds km<sup>-1</sup> (covering 7.0 km atoll-wide), and 28.0 birds h<sup>-1</sup> (during 7.25 survey hours); the greatest concentration was on Ringutoru (33 counted in 22 minutes = 90.0 h<sup>-1</sup>). The average estimated population density is 5.7 birds ha<sup>-1</sup>. It occupies all habitats ranging from coastal scrub to dense *Cocos* forest in both understorey and canopy, and in settlements as well as in the most remote and least visited islands. I observed two in a *Cocos* crown on

TABLE 2—Encounter rates of shorebird, seabirds, and waders on beaches and reef flats on Kapingamarangi Atoll during June and July 1996.

| Species               | Encounters | Birds km <sup>-1</sup> | Birds hr <sup>-1</sup> |
|-----------------------|------------|------------------------|------------------------|
| Pacific Reef Heron    | 10         | 0.6                    | 1.1                    |
| Pacific Golden Plover | 3          | 0.2                    | 0.3                    |
| Tattler sp.           | 17         | 1.0                    | 1.9                    |
| Whimbrel              | 5          | 0.3                    | 0.6                    |
| Ruddy Turnstone       | 5          | 0.3                    | 0.6                    |
| Black-naped Tern      | 13         | 0.8                    | 1.5                    |
| White Tern            | 22         | 1.3                    | 2.5                    |

<sup>a</sup> based on surveys covering 16.7 km during 8.97 h, atoll-wide; Brown Noddy and Black Noddy were observed regularly but not counted at these times.

Matukerekere, which has a land area of only about 0.001 ha.

Miller (1956) stated that a starling “was reputedly introduced by the Germans,” but I have found no substantive evidence to support any claim to its having been introduced, at least in historical times. Whether it may have been brought by aboriginal settlers is unknown. Measurements (in mm) of seasoned skins of six males I collected on Hare in July 1996 (MCZ 333072-075, plus uncatalogued specimens with field numbers 4 and 8) are: wing length 130.0-135.0 ( $\bar{x}$  = 132.0), bill length 21.1-22.0 ( $\bar{x}$  = 21.5), bill depth 8.3-9.9 ( $\bar{x}$  = 8.8), and bill width 7.5-8.0 ( $\bar{x}$  = 7.8); body mass at time of capture measured 75-95 g ( $\bar{x}$  = 81.3). A female with unenlarged follicles also collected on Hare in July had the following measurements (mm): wing 125.0, tail 82.3, bill length 22.0, bill depth 8.0, bill width 7.7, body mass 70 g. As the wing length measurements in my sample of six males matches well with Baker’s (1951) measurements for 17 *A. o. ponapensis* from Pohnpei (130-138,  $x$  = 133) and exceeds the means of *A. o. opaca* (124), *A. o. angus* (129), *A. o. orii* (128), *A. o. guami* (128), and *A. o. kurodai* (range 119.5-130.0, Momiyama 1922, fide Baker 1951), I tentatively include Kapingamarangi within the range of *A. o. ponapensis*. In other measurements, the Kapingamarangi specimens generally agree with Baker’s (1951) measurements, but there is considerable overlap between named forms. According to Baker (1951) there also are subtle differences in colouration (gloss) between subspecies, but I have not examined sufficient material to comment further on this character. Olson (in litt.) indicated that an unsexed *A. opaca* from Kapingamarangi (USNM 458333) collected by Niering on Rikumanu on 19 July 1954 also resembles other examples of *A. o. ponapensis* in the USNM collection.

## DISCUSSION

Twenty species of birds are recorded from Kapingamarangi Atoll, 21 if both species of tattler occur. Seven of these are documented or presumed resident breeders and four others are considered former breeders (Table 1). Eight of the 11 current or former breeding residents are sea and shorebirds, including two boobies, a frigatebird, one heron, and four terns. The Micronesian Starling is the only native resident breeding land bird, although the Micronesian Pigeon apparently was present

until about 1920, and chickens are introduced and feral. Of the nine or ten nonbreeding visitors, three are land birds, including two presumed vagrants (a kingfisher and Shining Cuckoo) and one regular but uncommon visitor (Long-tailed Cuckoo); both migratory cuckoo species breed in New Zealand. The other visitors include wide-ranging seabirds (tropicbird, crested tern) and at least four holarctic migrants (plover, tattler, whimbrel, turnstone). Additional observations during the northern autumn through spring seasons doubtless will add many other migrant charadriiforms that have been recorded widely in the tropical Pacific, but in view of the very limited land area, remote location, and low habitat diversity, few additions to the list of breeding species is expected.

Additionally, six other species have been recorded but without adequate confirmation, and they require further corroboration. Several are from a "bird guide" produced by students in the Pohnpei Teacher Education Center (PONTEC report for 1970) discussed under Methods.

The Dusky (= Audubon's) Shearwater (*Puffinus lherminieri*) is listed as occurring on Kapingamarangi in the PONTEC report and by Leach & Ward (1981). Both records possibly are based on Emory's (1965) mention of "a bird not seen but heard only at night...its cry as described is that of a shearwater." Emory (1965) also reported that a duck "comes to the island once in a great while," and both the PONTEC report and Leach & Ward (1981) include the Sanderling (*Calidris alba*) among species recorded on Kapingamarangi.

The Sooty Tern (*Sterna fuscata*) and Bridled Tern (*S. anaethetus*) are both recorded by Emory (1965), but Emory's use of the local name manu tahongo for the Sooty Tern and his alluding to its being common about the village clearly indicate he is referring to the Brown Noddy, which he does not mention by name anywhere in the report. On the other hand, his use of the name Bridled Tern may be in reference to the very similar-looking Sooty Tern, which is more likely to occur in this area of the Pacific.

A resident islander told me of a bird known locally as the romiromi that is seen rarely on Kapingamarangi. He described it as being small in size and tending to fly low, fast, and erratically in circles around the island. The PONTEC report for 1970 gives romiromi as the Kapingamarangi name for the Carolines (= Island) Swiftlet (*Callocalia inquieta* = *Aerodramus vanikorensis*), and Leach & Ward (1981) included this species in their list. In all probability, the romiromi is the Barn Swallow (*Hirundo rustica*), which "is a winter migrant to western Micronesia from Asia" (Pratt *et al.* 1987). The swiftlet populations in the southern and central Pacific islands are nonmigratory.

To what extent human activities on Kapingamarangi have impacted on the avifauna is uncertain. The Micronesian Starling does not appear to be adversely affected, being common throughout the atoll in settled and unsettled areas. But the extirpation of the Micronesian Pigeon around 1920 probably is the combined result of excessive hunting pressure coincident with drought-induced stress. Also, seabird populations probably were larger in the past as evidenced from the marked

impact they have had on local soils and vegetation (Niering 1963), and from anecdotal information provided by local islanders.

Potential predators of birds on Kapingamarangi include cats (*Felis catus*) and the Polynesian rat (*Rattus exulans*). Pigs (*Sus scrofa*) are kept on many of the islands but are tethered or penned, and local residents told me that dogs (*Canis familiaris*) occurred from time to time but have not been allowed on the atoll in recent years. Leach & Ward (1981) saw one dog during their 1979/1980 visit, but found no canid bones in archaeological excavations. I saw no dogs during my visit but recorded one cat each on Torongahai, Ringutoru, Hukuhenua, and Hare; many others were kept as pets in the settlements on Touhou and Werua and I found one dead on Pumatahati. The feral cat population almost certainly is greater than the scanty records indicate, but census is difficult as the animals are furtive and barely afford even brief glimpses before disappearing into cover.

*R. exulans* is the only rodent recorded on Kapingamarangi (Niering 1963, Leach & Ward 1981). It is widespread and common; I observed rats on 17 of the 31 islands, with the greatest concentration being on Ramotu—18 counted during an approximately 2 h nighttime survey of lizards along the forest edge, and six together foraging among opened coconuts on the beach during mid-day. The seven rats (from four different islands) that I collected, measured, and discarded all were *R. exulans*, the largest weighing 96 g. Leach & Ward (1981) reported that “all remains of rat [in archaeological excavations during 1979/1980] were certainly *Rattus exulans*,” and that none was found in any site carbon-dated earlier than about 600 y BP. To what extent rats prey on the birds of Kapingamarangi is unknown. *R. exulans* may not be as devastating to birds as are its larger congeners *R. rattus* and *R. norvegicus* (Garnett 1984), but it impacts negatively on some bird populations by predation and possibly by depleting food resources (Seitre & Seitre 1992, Milberg & Tyrberg 1993).

Information on utilization of birds as food by islanders is scanty and somewhat contradictory, possibly reflecting dietary changes over time. Leach & Ward (1981) stated the “meat of the frigatebird, and others, was prized,” whereas Emory (1965) indicated that none of the most common birds on the atoll, including “Sooty Terns” (= Brown Noddy?), frigatebird, and starling or their eggs are sought for food. Buck (1950) indicated that the Brown Noddy and Black Noddy are “said to have been eaten, but birds generally were tapu.” Birds were not hunted frequently during my stay, but on two occasions I saw boys with pellet guns hunting noddies, and another had several starlings that he had recently shot. The Brown Noddy, Black Noddy, frigatebird, and reef heron also have been reported as being kept as pets (Buck 1950, Emory 1965, Niering 1963), but I saw none in captivity during my visit.

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