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NOTES ON THE TAXONOMY, NATURAL HISTORY, AND STATUS OF THE RESIDENT BIRDS OF PALAU

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ABSTRACT.—This paper reports observations made from 1976 to 1979 of the resident birds of the Palau Islands in western Micronesia. Comments on population status, distribution, and habitat are made for all species. Song descriptions and food habits are reported for many species. Nests are described for *Megapodius laperouse*, *Ptilinopus pelewensis*, *Cettia* (= *Psamathia*) *annae*, *Myiagra erythrops*, *Rhipidura lepida*, *Zosterops cinerea*, *Myzomela cardinalis*, *Aplonis opaca*, and *Artamus leucorhynchus*. Taxonomic comments are made on *Ptilinopus*, *Coracina*, *Psamathia*, *Myiagra*, *Colluricincla*, and *Megazosterops*. The recommendation is made that *Pyrrhoga podargina*, *Rhipidura lepida*, and possibly *Megapodius laperouse* be declassified as Endangered Species, but that Palau populations of *Rallina eurizonoides*, *Gallinula chloropus*, *Porphyrio porphyrio*, and *Caprimulgus indicus* be considered for such listing.

The Palau Islands lie at the western extreme of Micronesia about equidistant from Mindanao, the Moluccas, and New Guinea (Fig. 1). The islands are part of the U.S. Trust Territory of the Pacific Islands (TTPI), but that status will change in the near future when the trusteeship expires. Although possessing the richest avifauna in Micronesia, Palau has been sadly neglected by ornithologists until recently. Only a few brief notes on the birds have appeared in the almost three decades since Marshall (1949) and Baker (1951) published their observations. In recent years the work of Robert P. Owen (1977a, b, and c), TTPI Chief Conservationist, at the Trust Territory Biology Laboratory at Koror in Palau has begun to focus attention on Palauan birds once again. A proposal to build an oil tanker superport at Palau has made environmentalists aware of the islands (Gosnell 1976) and has at last brought some Federal attention. A survey of bird populations at Palau has recently been completed by John Engbring under Owen's direction. Also the

U.S. Forest Service has begun surveys of birdlife in Micronesia, including Palau (Ralph and Sakai 1979). Because of the awakening interest in Palauan birds, we have prepared this summary of our recent observations in order to provide information and show where information is lacking. As most of our notes on migrants will be published elsewhere (Pratt and Bruner, in press), this paper deals only with the resident breeding birds. Our comments on status are preliminary assessments pending publication of Engbring's quantitative data. For the most part, the nests reported herein are the first for the species. Our knowledge of Palauan birds has been greatly increased by conversations with Owen, and we include many of his observations as well as some of the information contained in three unpublished government reports (Owen 1977a, Engbring 1977, 1978).

Berrett, Bruner, and Pratt first visited Palau in June 1976 and studied on Koror, Malakal, Arakabesan, southern Babelthuap, Peleliu, and the Seventy Islands Preserve

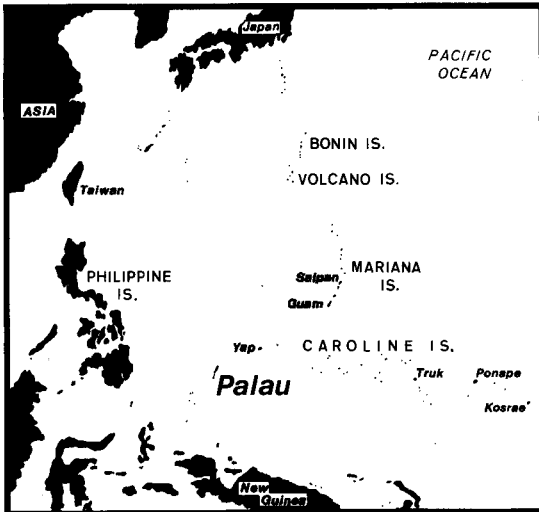


FIGURE 1. The Southwest Pacific showing the location of Palau and other islands mentioned in the text.

(Fig. 2). Pratt returned to Palau 16–23 January 1978 and conducted investigations on southern Babelthuap, in additional areas on Peleliu, and to a lesser extent on Koror, Malakal, and Arakabesan. Bruner and Pratt revisited the islands from 24 June to 4 July 1978, observing (with Engbring) additional areas, particularly the central islands south of Koror. Engbring arrived in Palau 1 July 1977 and began fieldwork in September of that year. He visited all areas of Palau during his service through June 1979.

Pratt has recorded numerous bird vocalizations, the first ever of Palauan birds. These tapes are deposited in the Library of Natural Sounds, Cornell Laboratory of Ornithology. Our efforts to obtain permits to take specimens of birds were unsuccessful. Palau District Code, Section 202, protects (on paper at least) most birds of the islands and makes no provision for scientific collecting. This situation is unfortunate in that little anatomical material and no tissue samples of Palauan birds exist, and many taxonomic questions may require such specimens for satisfactory resolution. Efforts are now under way to persuade local legislators to amend their well-intentioned statute so as to allow collecting under permit (Owen, pers. comm.).

THE ISLANDS

The main Palau Islands (Fig. 2) range in size from Babelthuap (397 sq. km) to tiny rock islets. All except the southernmost island of Angaur and two outlying atolls to the north are enclosed within a single reef system. An excellent account of the geology

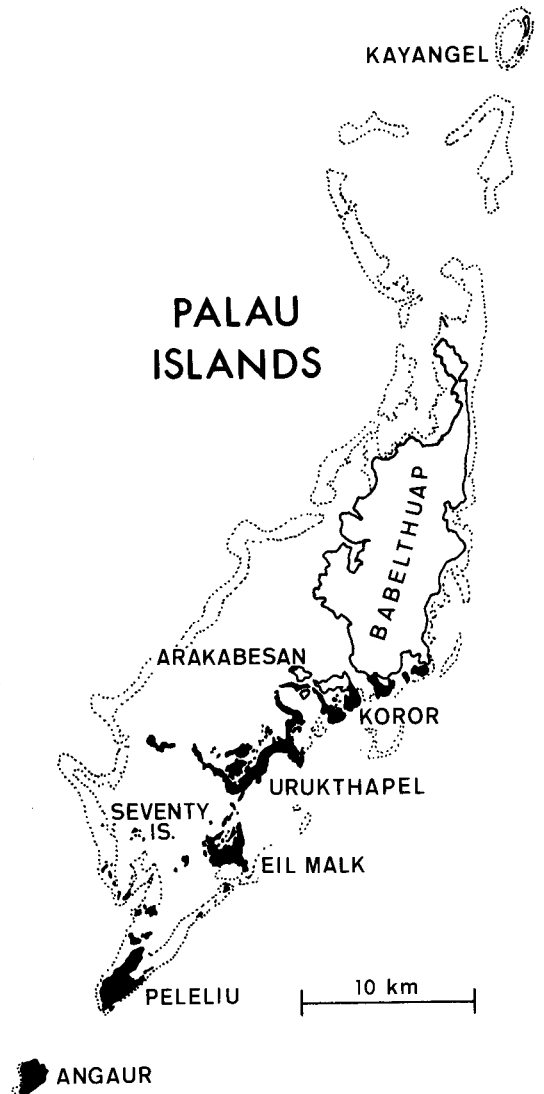


FIGURE 2. Map of Palau showing the major islands mentioned in the text. Islands of coralline limestone (rock islands) are indicated in solid black. Dotted lines indicate coral reefs.

and habitats of Palau is that of Gressitt (1954). In general, the southern islands are of raised coral limestone and the northern ones are of ancient volcanic soil. Some islands, such as Koror, have some volcanic and some coralline areas (Fig. 2). The limestone islands between Koror and Peleliu are largely uninhabitable. They are covered with a dense growth of forest over jagged coralline rubble on precipitous slopes. These "rock islands" are characteristically undercut at the waterline by water solution and the action of marine organisms such as chitons, with only a few sheltered beaches. Peleliu lies on the barrier reef at the southern end and is a relatively flat coralline is-

TABLE 1. Summary of distribution and status of Palauan land and freshwater birds. Status abbreviations: A, abundant; C, common; U, uncommon; R, rare; X, extirpated; ?, status uncertain.

| | Babelthuap | Arakabesan | Koror | Urukthapel | Eil Malk | Peleliu | Angaur |
|---------------------------------|------------|------------|-------|------------|----------|---------|--------|
| <i>Ixobrychus sinensis</i> | C | U | U | U | U | U | C |
| <i>Anas superciliosa</i> | R | | X | | | R | R |
| <i>Megapodius laperouse</i> | R | R | U | C | C | C | C |
| <i>Gallus gallus</i> | C | U | U | | | A | A |
| <i>Rallina eurizonoides</i> | U | U | U | U | U | U | U |
| <i>Rallus philippensis</i> | C | C | C | | | A | A |
| <i>Poliolimnas cinereus</i> | R | | R | | | R | R |
| <i>Gallinula chloropus</i> | X | | X | | | R | R |
| <i>Porphyrio porphyrio</i> | U | | R | | | U | U |
| <i>Caloenas nicobarica</i> | R | R | R | U | U | U | |
| <i>Gallicolumba canifrons</i> | R | R | R | U | U | U | R |
| <i>Ptilinopus pelewensis</i> | A | A | A | A | A | A | A |
| <i>Ducula oceanica</i> | A | U | C | A | A | R | |
| <i>Pyrrhoxylus podargina</i> | C | C | C | C | C | C | R |
| <i>Caprimulgus indicus</i> | U | U | U | R | R | U | |
| <i>Cacatua galerita</i> | R | R | R | U | U | | |
| <i>Eclectus roratus</i> | R | R | R | U | U | | |
| <i>Aerodramus vanikorensis</i> | C | C | C | A | A | C | |
| <i>Halcyon cinnamomina</i> | C | U | U | C | C | U | |
| <i>Halcyon chloris</i> | C | C | C | C | C | C | C |
| <i>Coracina tenuirostris</i> | U | U | U | U | U | U | |
| <i>Cettia annae</i> | A | C | C | A | A | A | |
| <i>Myiagra erythrops</i> | C | C | C | C | C | C | |
| <i>Rhipidura lepida</i> | C | C | U | C | C | A | |
| <i>Colluricincla tenebrosa</i> | C | C | C | C | C | C | |
| <i>Zosterops cinerea</i> | C | A | A | C | C | C | |
| <i>Zosterops conspicillata</i> | C | C | C | C | C | U | |
| <i>Megazosterops palauensis</i> | ? | | | C | | A | |
| <i>Myzomela cardinalis</i> | C | C | C | C | C | C | C |
| <i>Erythrura trichroa</i> | R | U | U | U | U | | |
| <i>Lonchura malacca</i> | A | C | A | | | | |
| <i>Aplonis opaca</i> | A | A | A | A | A | A | A |
| <i>Artamus leucorhynchus</i> | U | | R | | | | |

land with extensive beaches; it supports a small human population. Angaur, separated from Peleliu by 10.5 km of open ocean, is a low, flat island which also has a small human population. Both Peleliu and Angaur were devastated by World War II (Baker 1946) and their vegetation is entirely second growth. Nevertheless, at least on Peleliu some areas of tropical forest have recovered impressively. The main population center of Palau is on the volcanic western part of Koror, with satellite communities on neighboring Arakabesan and Malakal. These three islands are joined by causeways and are collectively known as the Koror complex. They are devoted largely to agriculture and residential areas, but forests remain on the western end of Arakabesan and on the limestone eastern portion of Koror. Babelthuap's population is mainly confined to the coastal periphery of the island, with very little disturbance of the vast and, prior to Engbring's work, ornithologically little known interior forests. With fewer than 15,000 people, Palau cannot be said to be overcrowded.

THE AVIFAUNA

The Palauan avifauna comprises representatives of 38 families, either as breeding residents or migrant visitors. A high level of endemism at the species or subspecies level characterizes the terrestrial avifauna, but the breeding seabirds are species that are widespread in tropical waters (Baker 1951). The migrants include winter visitors from the Asiatic mainland and Japan. Shorebirds predominate among such visitors but the list also includes herons, raptors, and passerines. A few species visit Palau during the southern winter.

Several Palauan birds are listed as Endangered Species by Federal (Federal Register, 26 September 1975) or local (Title 17, Code of the Trust Territory) statutes. The inclusion of these birds in the Federal list was apparently based on published accounts shortly after the cessation of World War II (Marshall 1949, Baker 1951), when avian habitats had been severely disturbed by battle (Baker 1946). As we will indicate, several of these species seem to have re-

covered completely and may eventually be removed from the lists (Owen, pers. comm.). Several others not now listed may warrant inclusion, however. Table 1 shows the distributions among the major islands (Fig. 2) of Palauan land and freshwater birds. Most species are found on all main islands except Angaur, but a few present enigmatic distributional anomalies discussed in the following species accounts.

Puffinus lherminieri dichrous. Audubon's Shearwater. This is apparently the only shearwater that breeds at Palau. It is probably common, if not abundant, but its habits make accurate population estimates difficult. The birds are rarely seen among the main islands during the day, but begin to appear at dusk as they fly in from the open sea. On 4 July 1978, Bruner, Pratt, and Engbring observed such a flight of these shearwaters in a sheltered bay at the western end of Urukthapel. The birds were roosting or nesting in the forest atop a sheer cliff-sided rock island. The few shearwaters that appeared early were silent and circled the island without landing. When the light had faded so that the birds were barely visible against the sky, shearwaters began calling and flying into the forest on the island. As darkness deepened, their eerie squeals created a cacophony. From the amount of noise we estimated that the colony consisted of at least several hundred birds.

Phalacrocorax melanoleucos melanoleucos. Little Pied Cormorant. Micronesia's only cormorant is an uncommon bird at Palau. It occurs anywhere in lagoon waters, but is most numerous in the shallow bays and along the boat channels at the north end of Peleliu. Cormorants also occur on freshwater ponds and reservoirs on Koror and Babelthuap and on marine lakes on Angaur.

Ixobrychus sinensis. Yellow Bittern. This small bittern is much less numerous at Palau than in the Marianas (Pratt et al. 1979) or at Yap but is by no means rare. Its favored habitat, dry grassy fields and edges, occurs only sparingly in the archipelago. We have noted Yellow Bitterns on southern Babelthuap, Koror, Malakal, Angaur, and rarely in the larger rock islands. At Palau, this species utters a harsh *krek-krek* when in the presence of other individuals, but is usually solitary and silent. The nest is built near the ground in thick vegetation. We have no data to indicate what proportion of Yellow Bitterns seen at Palau may be migrants from eastern Asia.

Nycticorax caledonicus pelewensis. Rufous Night-Heron. As many as 50 of these

herons congregate at times at the garbage dump/landfill site at Koror, particularly at high tide. When tides are low, Rufous Night-Herons disperse to mudflats in the surrounding bays. The birds also can be seen on sandspits, shallow shorelines, and in trees on the rock islands. We have rarely noted this species in freshwater habitats at Palau.

Egretta sacra sacra. Pacific Reef Heron. These dichromatic herons are fairly common shoreline birds at Palau, with the white and gray color phases occurring in about equal numbers. We can discern no segregation of the two types based on habitat as has been postulated elsewhere (Bruner 1972) and the phases seem to associate randomly. Pacific Reef Herons are infrequently found among the flocks of herons and egrets that gather in winter at the Koror garbage dump.

Anas superciliosa pelewensis. Australian Gray Duck. The Palau population of this species is apparently quite small. Marshall (1949) and Baker (1951) found none, and we have not found any in the main islands. Engbring saw five individuals (one male, two females, and two ducklings 6–8 weeks old) between 12 and 15 October 1977 on a large freshwater pond at the southeast side of the landing strip on Angaur. Palau is the type locality of this widespread Southwest Pacific subspecies, and the small Australian Gray Duck population there deserves to be considered an Endangered Species.

Megapodius laperouse senex. Micronesian Megapode. The Palau subspecies of the Micronesian Megapode has been generally believed to be rare (Baker 1951, Greenway 1967) but Marshall (1949) considered it to be abundant. Owen (1977a) considered the megapode "exterminated on Koror, Arakabesan, and Malakal." Our observations reveal that these birds are probably not in serious trouble at Palau. They are present and apparently numerous on virtually every coralline island we have visited from Urukthapel to Peleliu, and local residents report the birds in low numbers on Angaur. In 1978 Engbring found megapodes on the uninhabited portion of Koror and, suprisingly, on Malakal and received reliable reports of an active nest mound on Arakabesan. Micronesian Megapodes are rare on Babelthuap, and local residents consider the population there to be declining. The highest density of megapodes, however, occurs on a small, flat, sandy, uninhabited island in the atoll of Kayangel. Here Engbring found nest mounds every 50 m.

Despite legal protection, megapodes are still hunted and their eggs collected for food. Nevertheless, we find the birds' status encouraging. The species seems highly resilient, and probably easily recolonizes islands it formerly inhabited when hunting pressure is reduced. The birds can occasionally be seen flying several kilometers between islands, and the Mariana Islands subspecies (*M. l. laperouse*) has apparently recently recolonized Saipan (Pratt and Bruner 1978).

Favored sites for incubation mounds are sandy beaches surrounded by steep forested slopes. At these locations mounds are constructed mainly of sand, with moist vegetation placed inside with the eggs. The mounds are not placed in direct sun, but rather are shaded by trees. Often small plants grow on the surface of the mound itself. In areas without sand, such as parts of eastern Peleliu, megapode mounds may be constructed of rough coralline rubble. Owen (pers. comm.) has noted that in the forested upper reaches of the rock islands, mounds may be mostly vegetable matter. Adult megapodes return to their mounds from time to time, particularly in the early morning, apparently for maintenance. Recent scratch marks near the apex of many mounds may result from upkeep of the mound or serve a display function. Most of the mounds we saw ranged in diameter from 2 to 6 m and from 1 to 2 m in height.

We found active mounds on two beaches that were frequently used by picnickers. Apparently, mere proximity of human activity is not inimical to megapodes. The megapode deserves legal protection, but its special status as an Endangered Species probably should be reassessed.

Micronesian Megapodes feed on seeds, other vegetable matter, insects, and crabs. We have found that the calls of this subspecies differ from those of *M. l. laperouse* of the Marianas (Pratt and Bruner 1978). One call often heard at Palau is a single loud *keek*, apparently a contact note used by a foraging pair. This note may be elaborated into a loud "crow": *keek-keer-kew!* with the notes dropping in pitch. The homologous call of the Mariana bird does not drop at the end. A low *cuk-cuk-cuk* etc. call given by both subspecies is somewhat lower in pitch at Palau.

Gallus gallus. Red Junglefowl. The feral fowl of Palau are quite wary. They are most common on the smooth stony soils of Peleliu and Angaur. Baker (1951) reported them from several low flat islands of coral rubble

north of Peleliu, but junglefowl are apparently absent from the true high rock islands. Perhaps the ground there is too steep and rough for them. They are also present deep in the interior forests of Babelthuap but are relatively rare there. Engbring believes that considerable intermingling of wild and domestic stocks occurs near residential areas.

Poliolimnas cinereus micronesiae. White-browed Rail. This species is apparently more wary and less vocal at Palau than at Yap where it is, for a rail, conspicuous (Pratt et al. 1977 and observations by Pratt in 1978). Owen (pers. comm.) considers it uncommon. Engbring found it common on Angaur in October 1977, but the bird is far from common elsewhere. The grassy habitat on Babelthuap, where these rails are rare, appears identical to areas on Yap where they are abundant. However, Banded Rails (*Rallus philippensis*) share this habitat on Babelthuap, but are absent from Yap. White-browed Rails have also been seen recently at two localities on Peleliu.

Rallus philippensis pelewensis. Banded Rail. This rail is abundant along roadsides on Peleliu and Angaur. In the savannah-grassland habitat of southern Babelthuap, the rails are not uncommon, but we do not consider them abundant as did Marshall (1949). He reported hearing dozens of Banded Rails in the evening, but we have heard their calls infrequently on Babelthuap. The population there may have declined since 1945.

Rallina eurizonoides eurizonoides. Banded Crake. This species is apparently both secretive and uncommon. Owen (pers. comm.) has seen adults with young on Koror, and Engbring saw one on Angaur in 1977 and another on Malakal in 1978. In 1976, we recorded a monotonous *ow-ow-ow* nocturnal call emanating from a cane thicket on Arakabesan. The vocalist did not respond to playback, but flushed from above the ground when Bruner entered the thicket. We heard this call during daylight from cane thickets near the previous site in 1978 but still could not see the bird. Some of Owen's co-workers identified the call as that of the Banded Crake in 1976, and Engbring has since confirmed the identification. The call may also be uttered in nocturnal flight.

Porphyrio porphyrio pelewensis. Purple Swamp Hen. This distinctive local subspecies may be quite rare. Baker (1951) reported it only from Koror and Angaur, and Marshall (1949) did not see any but received reports of the birds' presence on Peleliu.

Pratt, Berrett, and Bruner noted one individual in a taro patch on Peleliu in July 1976. The swamp hen was "uncommon" on Angaur in October 1977 (Engbring 1977) and only two individuals were seen on Peleliu during a week of observation in May 1978 (Engbring 1978). However, in 1979 Engbring found five individuals at a small pond there. We have noted single individuals on southern Babelthuap in July 1976 (HDP, DGB, PLB) and January 1978 (HDP). These limited observations probably indicate that only a very small population exists and that the subspecies may be endangered. Nevertheless, this species is one of the few birds not protected by local statute at Palau (apparently because swamp hens are reputed to eat young taro) and it is included in neither the Federal nor the TTPI list of Endangered Species. Owen (1977a) reported that the bird is not persecuted because of a local taboo.

Gallinula chloropus subsp.? Common Gallinule. The gallinule is apparently even rarer at Palau than in the Marianas (Pratt et al. 1979) and may be restricted to the southernmost islands. Marshall (1949) and Baker (1951) reported it only from Peleliu and Angaur, and Engbring has found it only on the latter. Gallinules are absent from apparently suitable freshwater habitats on Koror and Babelthuap. This population is definitely endangered.

Caloenas nicobarica pelewensis. Nicobar Pigeon. This large pigeon is listed as endangered by the TTPI. Marshall (1949) saw only two during a month at Palau in 1945. Baker (1951) reported only five in a similar period that year, and considered the subspecies "on the road to extinction." Apparently the Nicobar Pigeon has recovered somewhat since 1945, but it still cannot be considered common. Berrett and Pratt saw two individuals on the forest floor of eastern Peleliu in 1976. The birds circled each other, flapping their wings and erecting their long neck feathers but uttering no sounds. When approached, they ran away into the forest but did not fly. Later during that visit other Nicobar Pigeons were seen in the area, some on the ground and others in trees. In 1978 Engbring (May) and Bruner and Pratt (July) again noted low numbers of these pigeons on Peleliu. The bird is probably uncommon but not rare there. In January 1978 Pratt noted a daily late afternoon flight of two or three of these pigeons from an island in Iwayama Bay, enclosed by the island of Koror, toward the forested ridge of the limestone eastern part of the main is-

land. This flight line was still in use in June. In early July 1978 Bruner, Engbring, and Pratt saw several small tight flocks of these birds in strong direct flight among the rock islands. Other individuals were flushed from the forests on these islands. As many as 18 Nicobar Pigeons were seen in a single day.

These pigeons have a rather duck-like flight, owing to their deep rapid wing-beats and very short tails that seem even shorter because of the white color. We noted several immatures with black tails. We have never seen the birds soar in the manner described by Baker (1951). We have heard no vocalizations from this species. Nicobar Pigeons are so secretive in the forest and so silent that they are easily overlooked. Thus we believe they may be more common at Palau than has been supposed. The Nicobar Pigeon at Palau is largely terrestrial, feeding on seeds and fruit both on the ground and in trees.

Gallicolumba canifrons. Palau Ground-Dove. Published accounts of this Endangered Species are enigmatic. Whether its scarcity is real or only apparent cannot be stated at present. Certainly we found the ground-dove to be one of Palau's most elusive species, but the bird's habits are such that many individuals could remain undetected even in well-explored places. Marshall's (1949) description of the Palau Ground-Dove's terrestrial foraging habits is apt. The seemingly contradictory descriptions by Marshall (1949) and Baker (1951) of the ground-dove's vocalizations are both accurate. The bird utters both a series of coos as described by Marshall (1949) and a low moan as discussed by Baker (1951). The distinctive series of short notes is most often heard at dawn or dusk. The moan is so similar to one of the calls of the Micronesian Pigeon (*Ducula oceanica*, discussed below) that only considerable field experience will enable an observer to distinguish them. Thus even the ground dove's vocalizations exacerbate the problems of making accurate population estimates. Both Baker (1951) and Marshall (1949) believed the ground dove to be found only on rocky coralline ground and most of our observations bear out their contention. We have observed these birds on all the major limestone islands from Koror to Angaur. Pratt tape recorded the coo-coo-coo call of the Palau Ground-Dove on volcanic Arakabesan in June 1978; notably the bird was calling from a small area of coralline soil at the western end of the island. However, both Owen (pers. comm.) and

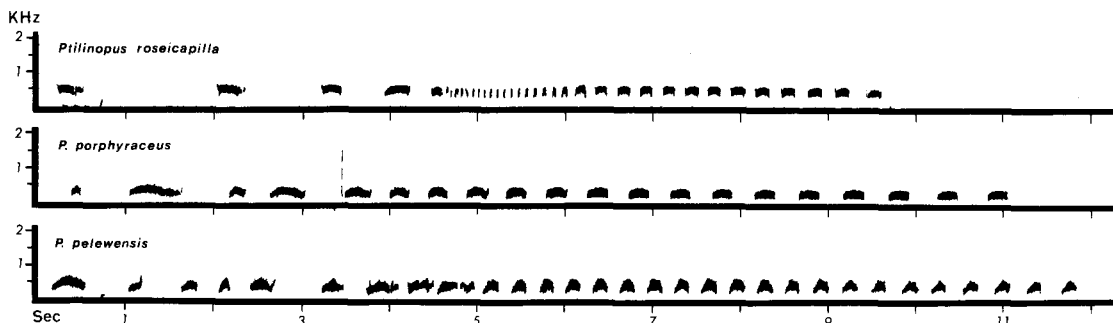


FIGURE 3. Sonograms of the three Micronesian fruit dove species. Produced on a Kay Sonagraph with wide band setting by R. M. Beck at the Laboratory of Ornithology, Cornell University.

Engbring have found this species on Babelthuap and believe it to be present in very low numbers on volcanic soils. The Palau Ground-Dove feeds on seeds picked up from the ground.

Ptilinopus pelewensis. Palau Fruit Dove. This dove has been variously treated as a separate species (Goodwin 1977) and as a subspecies of *P. porphyraceus* (Mayr 1945, Baker 1951). We believe the former treatment most closely reflects the bird's evolutionary position. In addition to the striking plumage differences between *P. pelewensis* and the various subspecies of *P. porphyraceus*, the birds differ in vocalizations. Marshall (1949) compared the call of *P. pelewensis* with that of *P. roseicapilla* of the Marianas. The Palau bird's song shows less divergence from that of *P. porphyraceus* in the eastern Carolines than from that of the Mariana bird, as might be expected from plumage characters. Songs of the three Micronesian *Ptilinopus* are shown in Figure 3. The most prominent distinction of the song of *P. pelewensis* is the halting or hesitating rhythm of the initial notes: *Whooo, whup-whooo, whoo-who-who-who-who-who*. The song of *P. porphyraceus* at Truk and Ponape consists of *whos* given at more or less regular intervals. The Palau Fruit Dove also utters a low, quiet moan while feeding. This call is similar to certain calls of the Palau Ground-Dove and the Micronesian Pigeon, but is much quieter than either.

Palau Fruit Doves are found in virtually all forested habitats in the islands. The songs are among the characteristic environmental sounds of Palau, noticed even by persons not usually aware of birds. The owl-like quality of the song was noted by Marshall (1949), who felt that nocturnal singing by the fruit dove was stimulated by the voice of the Palau Owl (*Pyrhroglaux podargina*). We have heard the fruit dove call at night without such a stimulus, however. On

24 May 1978, Engbring found a Palau Fruit Dove nest in mangroves about 2 m above the water. The flimsy stick structure held a single white egg. Fruit doves feed on fleshy seeds and small fruits gleaned in the upper forest canopy. Baker (1951) reported Palau Fruit Doves in "small numbers" in 1945, apparently the result of persistent hunting during the previous Japanese mandate. Fortunately, the population has recovered dramatically and these colorful doves might well be considered abundant today.

Ducula oceanica monacha. Micronesian Pigeon. Despite considerable hunting pressure, this large pigeon is still common at Palau. A legal shooting season has been established in November and December, but poaching occurs throughout the year (Owen 1977a). Although Owen (1977a) believes such activities are depleting the species, we doubt that the bird is in any serious trouble except perhaps on the heavily populated islands. The exception to this optimistic assessment is the island of Peleliu, where the Micronesian Pigeon is rare. Residents of Angaur have reported this species in recent years, but Engbring found none there in October 1977.

We can add little to Marshall's (1949) account of the ecology of *Ducula* at Palau. The bird's vocalizations have been only incompletely described, however. The deep-throated barking call described by Marshall (1949) is the most noticeable vocalization, but the pigeons have a wide repertoire of quieter sounds given during feeding or at rest. A frequently heard moan is so similar to one call of the Palau Ground-Dove as to make use of the two calls in censusing very difficult. Other vocalizations include a series of *coos*, deeper and slower than the songs of *Gallicolumba* or *Ptilinopus*, and a variety of other growling or cooing notes.

Cacatua galerita. Sulphur-crested Cockatoo. Marshall (1949) first reported intro-

duced cockatoos at Palau, but the specific identity of the birds was not determined until later (Ripley 1951). These parrots have thrived at Palau, and are now widespread in the forests of nearly all the rock islands. Because of the depredations of the cockatoo, which eats the hearts of palms, the rock island palm (*Gulubia palauensis*) and the Palau palm (*Ptychosperma palauensis*) have been placed on the TTPI list of Endangered Species (Owen, pers. comm.).

Eclectus roratus. Eclectus Parrot. Ripley (1951) first reported this exotic parrot at Palau and Forshaw (1973) considered it as probably established. Our observations indicate that Eclectus Parrots, which have been implicated along with the Sulphur-crested Cockatoo in the destruction of native palms, are now fairly common in the central rock islands, and are almost as numerous as the cockatoos. The two exotic parrots often flock together at Palau.

Pyrhroglaux podargina. Palau Owl. When Marshall (1949) and Baker (1951) visited Palau in 1945, the endemic owl was scarce, even though Coultas (in Baker 1951) had reported it fairly common in 1931. On this basis the bird was included in the U.S. and TTPI Endangered Species lists. Fortunately, the outlook for the species is greatly improved. We have found the birds abundant throughout the archipelago. Owen (pers. comm.) believes the Palau Owl's population history may be related to that of the beetle *Oryctes rhinoceros*, a serious introduced pest in coconut plantations. A campaign to control this insect in the Pacific was waged in the 1950's (for a popular account see Brower 1974). Owen was directly involved in the project in Palau, and reported that a combination of biological control methods had brought a measure of success by the late 1960's. During this same period, the Palau Owl had continued to decline. However, since the 1960's, Owen (pers. comm.) reported a steady increase in the owl to its present abundant state. The population trends of the owl and the beetle might seem unrelated except for some anecdotal evidence. Owen had received reports from Palauans in the early 1960's that the owls were being killed by beetles they had eaten! Certainly, *Oryctes* is capable of such an act (Brower 1974 claimed that this beetle can tear through hardboards and brass screening), but direct evidence was lacking until Owen received a dead owl that had been eviscerated, apparently from within. No direct study of the owl-beetle interaction was ever made, and we offer this somewhat

apocryphal account in the hope of stimulating such investigation. J. M. Diamond (pers. comm.) reports similar stories elsewhere in the Southwest Pacific of large toads being killed by ingested beetles.

Marshall's (1949) account of the behavior and vocalizations of the Palau Owl is excellent, and to it we can add little. We have infrequently heard the owl call by day. Also, we believe territory size may now be somewhat truncated under population pressure. We have on several occasions heard as many as five birds calling simultaneously. Clearly the density of *Pyrhroglaux* is much greater than that of any mainland owl species with which we are familiar.

Caprimulgus indicus phalaena. Jungle Nightjar. The Jungle Nightjar is apparently declining at Palau. Marshall (1949) considered it common, but we have encountered it only infrequently. In 1976 we heard several individuals on Arakabesan, but found none there in 1978. We did not find the bird in seemingly ideal habitat on Peleliu in 1976, and heard only one in the rock islands in 1978. Pratt heard the odd knocking vocalizations on eastern Koror in January 1978, but could not find any nightjars there later in the year. He and Engbring found at least two individuals in the forests of southern Babelthuap in January. One bird responded to playback of the recorded song by flying directly at the speaker, pulling up at the last instant, and dropping to the ground for a few seconds, after which it flew deeper into the forest and began calling once again. Engbring heard six Jungle Nightjars on Peleliu in May 1978. The preferred habitat at Palau is the mangrove/lowland forest ecotone. We have never witnessed the evening foraging flights or singing choruses described by Marshall (1949). This species may deserve to be placed on the list of Endangered Species, as it is almost certainly less numerous than several of the species so listed at present.

Aerodramus vanikorensis pelewensis. Vanikoro Swiftlet. We follow Brooke (1972) and Medway and Pye (1977) in using the generic name, and Medway (1975) in considering this form a subspecies of *A. vanikorensis*. Among the Micronesian races of this species, *A. v. pelewensis* is the most distinctive in possessing a very noticeable pale rump patch and somewhat darker body plumage than the others. The squeaky chattering vocalizations of the Palau bird are infrequently uttered and resemble those of the other Micronesian swiftlets. We do not know whether *A. v. pelewensis* is capable

of echolocation, but caves are frequent enough in the rock islands that such an ability would probably be adaptive. The Vanikoro Swiftlet is abundant throughout most of Palau but is enigmatically absent from Angaur.

Halcyon cinnamomina pelewensis. Micronesian Kingfisher. The two kingfishers at Palau appear to segregate themselves primarily by habitat, the present species being a denizen of deep forests, rarely seen near the water. The fact that no so-called "character displacement" has occurred may indicate that the two species do not compete directly. *Halcyon c. pelewensis* and *H. chloris teraokai* are closer in bill measurements (Marshall 1949) than are the allopatric *H. chloris albicilla* and *H. c. cinnamomina* in the Marianas. Vocally, the two forms at Palau both have rolling *creee* calls that, to our ears, are identical and thus may be evidence of interspecific territoriality. Other calls, as described by Marshall (1949) are distinctive. The Micronesian Kingfisher is much less common than its larger relative at Palau, but this apparent scarcity may result partly from the retiring habits of the smaller bird. In the summer of 1978 we noted individuals or pairs on Koror, Urukthapel, Peleliu, and in the smaller southern rock islands. Engbring has found Micronesian Kingfishers throughout the upland forests of Babelthuap. *Halcyon cinnamomina* feeds mainly on insects.

Halcyon chloris teraokai. Collared, or Mangrove Kingfisher. This larger kingfisher is common throughout Palau, keeping mainly to coastal areas. However, Pratt and Engbring have found it in the savannahs and forested uplands of southern Babelthuap, where the Micronesian Kingfisher is apparently absent. In some areas, such as eastern Koror, the two species co-exist locally. The Collared Kingfisher is bold and conspicuous in contrast to its smaller relative. It often feeds over water or tidal flats where prey includes insects, small fish, and crustaceans. This kingfisher also harasses and occasionally kills small birds including chicks of domestic fowl. Marshall (1949) discussed geographic variation among western Micronesian *Halcyon*. A behavioral quirk of *H. c. teraokai* that distinguishes it from the races of *H. chloris* in the Mariana Islands is an upward flip of the tail that accompanies the *clip-clip* call note. Much remains to be learned about the systematics of the *H. chloris* complex. Vocalizations may well prove to be of great value in sorting out this problem, but too little is known about the be-

havioral contexts of the various calls for meaningful conclusions to be drawn now.

Coracina tenuirostris monacha. Cicada-bird. Micronesian Cicadabirds present a number of evolutionary problems as has been noted elsewhere (Pratt et al. 1977). The three forms do not differ in plumage characters any more than can be expected among allopatric subspecies, but the Yap bird *C. t. nesiotis* is larger than the other two. Apparently none of the Micronesian forms possesses the cicada-like call produced by this species in Australia (Slater 1974) and from which the English name is derived. The only call of the Palau bird we have heard is a short, quiet, upslurred whistle easily overlooked among other forest sounds. Marshall (1949) reported also a downslurred note with a "twanging quality." At least the first of these notes is absent from the repertoire of the Ponape subspecies *C. t. insperata* and probably also from that of *C. t. nesiotis*, the voice of which is similar to that of *insperata* according to observations made on Yap by Pratt in August 1978.

Cicadabirds are uncommon but widely distributed at Palau. Essentially birds of dense forest, particularly mangroves, they can be seen sometimes at edges and in low scrubby vegetation such as is found in the hills of southern Babelthuap. Baker (1951) did not record this species from the rock islands, but we have found them on Urukthapel and nearby islands.

Cettia annae. Palau Bush-Warbler. This bird is abundant at Palau but rarely seen. Its song is one of the characteristic sounds of the forest throughout the archipelago during at least part of the year. The song may be only a single long, flutelike, melancholy whistle. The whistle is repeated at different pitches, often at minor-third intervals, producing eerie harmonies in chorus. Often so many bush-warblers are singing that the sound is almost continuous with one note modulating into another. Sometimes the whistle is slurred upward or downward, and sometimes the bird stutters a bit at the outset. To this whistle is usually appended an excited jumble of high-pitched chirps. Another song is totally different, with no initial whistle; it resembles somewhat the dawn song of *Myzomela cardinalis* in Micronesia. The call is a dry unmusical chatter. Palau Bush-Warblers may exhibit some seasonality in vocalizations for Pratt heard only two songs during January 1978. This seasonality may account for the fact that

Marshall (1949), present in November, considered the bird "very abundant" in 1945 while Baker (1951), who visited in September, found it "not common" the same year. We heard the greatest amount of vocalization in June and July. On 20 April 1978 Engbring found a nest of this species on Urukthapel. The nest was 2.5 m off the ground in a small tree and was domed with an entrance in the side. The exterior was composed of coarse grasses and leaves, with the interior lined with feathers and fine shredded material. The nest held one purplish brown egg. The nest and egg agree closely with those of the Japanese Bush-Warbler (*Cettia diphone*) as described by Austin and Kuroda (1952).

Baker (1951) outlined the taxonomic history of the Palau Bush-Warbler, long classified in the endemic monotypic genus *Psamathia*. He concluded, citing numerous morphological similarities, that the genus was quite close to *Cettia*. When we first visited Palau we were immediately struck by the vocal similarity of *Psamathia* to *Cettia diphone*, introduced to Oahu in Hawaii. Both species have a long penetrating whistle followed by several quicker notes, a second more complex song, and marked seasonality in song frequency. Long introductory whistles appear to be characteristic of many *Cettia* species (King and Dickinson 1975). This vocal similarity, together with the morphological resemblances and similarities of nests and eggs, argues against maintenance of *Psamathia* as a genus distinct from *Cettia*.

Myiagra erythroptus. Mangrove Flycatcher. This bird has long been considered a component subspecies of the Micronesian Broadbill (*M. oceanica*; Baker 1951, Owen 1977c) even though Mayr (1945), who first proposed such an arrangement, stated that the four forms could be treated either as species or subspecies. Morony et al. (1975) considered them species. Our investigations have led us to conclude that the four *Myiagra* in Micronesia represent more than one colonization. Marshall (1949) documented the differences between the Palau form and *freycineti* of Guam, and demonstrated that the two did not overlap or approach each other in several characters. The forms *oceanica* of Truk and *pluto* of Ponape are even more divergent. To these morphological differences we can add striking vocal, ecological and behavioral distinctions.

No English names are available for these four species, so we have coined our own. *Myiagra erythroptus* may be the most con-

spicuous bird of the mangrove community at Palau. Although common in all types of forest, this flycatcher is abundant in mangroves. Members of this monarchine genus have traditionally been called "broadbills" in Micronesia (Baker 1951, Owen 1977c). This epithet is unfortunate, not only because of confusion with the Eurylaimidae, but also because it cannot be applied to all members of the genus (the Australian *M. ruficollis* would become the Broad-billed Broadbill!). Rand and Gilliard (1967) used the unwieldy "myiagra flycatcher" for the group, and Edwards (1974) used the generic name as the vernacular. We believe the Australian practice of using the simple non-committal term "flycatcher" (Slater 1974) is best.

The Mangrove Flycatcher has two songs. One is a series of four pure whistles on a level pitch: *pee-pee-pee-peat*. The second is similar in quality but faster so that the notes run together. It descends in pitch and consists of six to eight, usually seven, notes: *peeppeeppeeppeeppeep*. At a distance this song sounds like a single quavering whistle. In one experiment, playback of the slower song elicited a fast song response of some minutes duration. A second bird, possibly paired with the first, joined in about midway in the performance. After about eight minutes the first individual resumed the slow song and the other departed. The call or scold of the Mangrove Flycatcher is a low-pitched unmusical *zhrick*. One nest of this species on Arakabesan was placed on a horizontal branch and was constructed of stems and shredded material held together with spider web and decorated with lichens and mosses.

Rhipidura lepida. Palau Fantail. This bird, listed as endangered, was apparently uncommon in the 1930's and 1940's (Baker 1951). The population appears now to have increased, and we agree with Owen (1977a) that the Palau Fantail has no place among the Endangered Species. It is one of the more common birds in forests throughout the islands. We did not find it commonly in mangroves, however. On southern Babelthuap, where isolated pockets of forest remain in ravines in the fire-maintained savannah, each such grove harbored at least one pair of fantails in January 1978. Occasionally these birds moved into the surrounding scrub to forage. Fantails are now abundant on Peleliu where once they were scarce (Baker 1951). One nest on that island was essentially identical in construction to nests of the Rufous-fronted Fantail (*R. ruf-*

ifrons) we have seen elsewhere (Pratt et al. 1977). It was a tightly woven cup placed in a fork, like a teacup on a saucer, with a "tail" of nest material trailing below for several centimeters. The nest held a single young bird.

Vocalizations of the Palau Fantail differ from those of the Rufous-fronted Fantail. Single call notes are loud and squeaky with a downward inflection: *keee-up!* and *queeer*. Adults also utter a rhythmic *kee-keer-kew* (accented as the word "cockatoo"). The song is an excited jumble of chirps and squeaks like the sound of a heavy piece of furniture being rolled on wooden casters. It is similar to, but louder and lower pitched than the song of the Winter Wren (*Troglodytes troglodytes*).

Colluricincla tenebrosa. Morningbird. This drab bird takes its name from its elaborate pre-dawn song, probably the most pleasing of all Palau bird songs. The song is given in abbreviated form throughout the day. It has no striking pattern, but rather is an almost random series of liquid chirps and whistles. The call notes are decidedly unmusical, harsh, and raspy. Morningbirds forage slowly and deliberately in the forest understory, and often approach and silently follow a human intruder. They are solitary skulkers, apparently taking food from trunks and branches of trees. We have not seen them gleaning leaves. Presumably these birds take both plant and animal food, but we have no hard data on food preferences. The courtship display includes a peculiar exaggerated teetering by both members of a pair.

The Palau Morningbird has been placed in various genera and the matter is presently unresolved. We follow Baker (1951) and Diamond (pers. comm.) in placing it in *Colluricincla* rather than *Pitohui*. Unfortunately, we have no first-hand knowledge of these New Guinea genera on which to base comparisons. Behaviorally, the Morningbird resembles *C. megarhyncha* (= *Myiolestes megarhynchus* of Rand and Gilliard 1967) as described by Diamond (1972) but its vocalizations seem more like those he described for several species of *Pitohui* (Diamond 1972). Obviously, more data will be needed before the affinities of the Palau Morningbird can be accurately discerned.

Zosterops conspicillatus semperi. Bridled White-eye. This species is the smallest of the three white-eyes of Palau, and the least aberrant. Despite the recent study by Mees (1969) we remain dissatisfied with the taxonomy of the *Z. conspicillatus* complex (Pratt et al. 1977). We have found even

greater geographic variation in behavior and vocalizations within the complex than Mees (1969) documented for morphology. We therefore use the present classification advisedly, pending a more thorough analysis of our data.

Bridled White-eyes at Palau are typical *Zosterops* in their movements through the trees in small flocks gleaning food items from foliage and branches. Contact notes are high-pitched and squeaky, and apparently this bird has no true song. Lack (1971:208–212) considered that size differences alone are sufficient for ecological isolation of this and the following species. The birds differ strikingly in bill length. We noted no differences in distribution or foraging behavior between the two and, indeed, often found them feeding together in the same trees. The two white-eyes may not form true mixed flocks, however. Marshall (1949) described the movements of two flocks, one of each species, that used the same foraging route, but did not interact and occasionally occurred together fortuitously. Palau Bridled White-eyes are found in forest, scrub, and forest edge and occasionally in low bushes in grasslands. They are common but not as abundant as *Z. cinereus*, and are found throughout the archipelago except for Angaur.

Zosterops cinereus finschii. Dusky White-eye. This ubiquitous species may be the most abundant bird at Palau, and is found in virtually every terrestrial habitat on all islands except Angaur. Flocks of Dusky White-eyes are noisy, constantly uttering a nasal *cheee*, similar to the call of the Bridled White-eye but louder and lower in pitch. In flight, and occasionally while perched, the birds utter a rollicking series of three or four notes descending in pitch: *chee-che-chee* with the first and last accented. This vocalization is reminiscent of, but louder and harsher than, the flight call of the American Goldfinch (*Carduelis tristis*). Engbring located a Dusky White-eye nest in low dense roadside vegetation on Peleliu 11 May 1978. Woven into the branching stem of a morning glory (*Operculina* sp.), the incomplete nest was 1 m off the ground. Both members of the pair participated in nest construction. The nest was built almost entirely of fine strands of moss. As with the previous species, the taxonomy of *Z. cinereus* has been based entirely on morphology (Mayr 1944) and may need to be reexamined. This form is presently considered conspecific with similarly colored birds at Ponape (*ponapensis*) and Kosrae (*cinerea*),

despite wide divergence in bill length (Lack 1971) and a hiatus of 2,600 km between Palau and Ponape. We believe closer attention to ecology and behavior will help to clarify the evolutionary history of this complex.

Megazosterops palauensis. Giant White-eye. On what basis this singular species is placed in the Zosteropidae we cannot say. Mees (1969) stated that Stresemann "found its true affinities" but Stresemann (1930) cited only the small size of the outermost primary as a reason for transferring this species from *Cleptornis* of the Meliphagidae to the Zosteropidae. We agree with Marshall's (1949) statement that *Megazosterops* "does not even suggest, let alone resemble, the other species of white-eyes on these islands." Probably only biochemical or anatomical studies will reveal this species' "true affinities." We believe a close relationship between *Megazosterops* and *Rukia*, in which genus the former was placed by Mayr (1967), is unlikely.

Reports of *Megazosterops* have conflicted on several points. For many years the species was known only from Peleliu (Mayr 1945, Marshall 1949, Baker 1951) although Babelthuap was the type locality (Reichenow 1915). However specimens were taken on Urukthapel in 1950 (Mees 1969) and we have seen it there, but not on other rock islands between Urukthapel and Peleliu. Its absence from Eil Malk is particularly enigmatic. Yamashina (1940) considered the bird very rare, but Marshall (1949) said it was "abundant" and Baker (1951) found it "fairly common" on Peleliu in 1945.

In light of the bird's present distribution and numbers, we cannot account for its scarcity earlier in this century on islands largely untouched by hostilities or agriculture. Giant White-eyes are noisy, curious, conspicuous birds not likely to be overlooked if present. They are today abundant on Peleliu, and are fairly common on Urukthapel. Whereas Marshall (1949) and Baker (1951) found the birds only in remaining pockets of forest, we have seen them in a wide variety of habitats including thickets of the scrubby exotic *Leucaena* growing over abandoned World War II airfields. Furthermore, we have frequently met with flocks of up to eight Giant White-eyes despite reports by Marshall (1949) and Baker (1951) that the species does not form flocks. In dense forests *Megazosterops* is mainly a canopy bird, but it can also be found in the understory.

Marshall's (1949) description of the bizarre song of *Megazosterops* is excellent. Mees (1969), in trying to downplay the distinctiveness of this bird among the Zosteropidae, overemphasized Marshall's (1949) comparison of the song to that of two canaries singing together. The canary-like quality extends only to the fact that the song comprises whistles and trills. We would liken it to two canary songs recorded at 33½ being played at 78 rpm, with an underlying rattling sound like that of several marbles being massaged in the hand. The song has a rather mechanical quality enhanced by abrupt starts and stops. Call notes include a rasping *scheee* and a dry rattle, the two often combined by flocks of Giant White-eyes into a harsh scolding chorus. When scolding, these birds hold the bill constantly open revealing the orange lining of the mouth. They feed on caterpillars, other insects, and fruits.

Myzomela cardinalis kobayashii. Cardinal Honeyeater. This species is common and conspicuous in edges and forest openings, as well as flower gardens and other man-associated habitats. Marshall (1949) apparently missed this bird's true song, which is sung only before dawn. The song is a complex and pleasing series of whistles, very different from the burry or wheezy chirps and whistles uttered during the day. We noted a rather striking difference between the dawn songs of Cardinal Honeyeaters at Palau and Samoa (*M. c. nigriventris*), which may mean that species limits in the *M. cardinalis* complex should be reexamined.

Engbring found a Cardinal Honeyeater nest on 2 April 1978 about 2 m off the ground in a lateral branch extending over a sand beach. The nest's structure was similar to that described for the species at Truk (Brandt 1962) but the three nestlings exceeded the usual brood size (two) reported there.

Erythrura trichroa pelewensis. Blue-faced Parrotfinch. Until 1976 this endemic subspecies had not been seen since the single type specimen was collected on Babelthuap (Owen 1977a) and had been thought possibly extinct (Owen, pers. comm.). On 26 June 1976 Pratt, Bruner, and Berrett saw a flock of six Blue-faced Parrotfinches feeding quietly among the foliage of tall trees on eastern Arakabesan. The birds' blue, green, and red coloration and finch bills were clearly evident. In January 1978 Pratt saw a single individual in flight over a forested

ridge on southern Babelthuap and noted the green body plumage and red rump and tail. On 3 July 1978 Pratt, Bruner, and Engbring found a total of six individuals south of Urukthapel on three small rock islands with extensive sandy beaches. Subsequently, Engbring found them on most of the rock islands as well as Babelthuap, but in low numbers.

Despite its bright colors, the Blue-faced Parrotfinch is an elusive and inconspicuous bird. These tiny finches move slowly and deliberately when foraging in the tops of tall trees, and their voice is only a high-pitched metallic chirp, like the sound of coins clicked together, and uttered most often as the birds fly away. This sound is easily missed at Palau where several insects make similar noises. Nevertheless, the calls were the main cue to the birds' presence in the most recent sightings. The bird is rare but widely distributed. It may also be nomadic at Palau, to compound the difficulties of census-takers. Its place on the TTPI list of Endangered Species appears well justified.

Lonchura malacca. Chestnut Mannikin. This exotic finch was apparently introduced to Palau in the late 1940's. Neither Marshall (1949) nor Baker (1951) reported it in 1945, and specimens were first taken in the islands in 1950 (Ripley 1951). These birds are now abundant in the artificial grasslands of southern Babelthuap where they move through the fields in great hordes. They are also numerous in grassy places in urban and suburban parts of the Koror complex. Mannikins do not appear to compete in any way with native birds, and indeed are totally absent from undisturbed habitats. Apparently, this species has completely displaced the Nutmeg Mannikin (*L. punctulata*), once established at Palau (Marshall 1949, Baker 1951). Both species were taken on Koror in 1950 (Ripley 1951) but *L. punctulata* has not been reported since (Owen, pers. comm.).

Aplonis opaca orii. Micronesian Starling. Baker (1951) considered this bird the most abundant at Palau. Starlings are still very common today, but we have not noted them in such large flocks (12–50 birds) as recorded by Marshall (1949). Micronesian Starlings occur in virtually all land habitats. They are gregarious at times but also move about singly or in pairs. Many small flocks in June and July appeared to be family groups. Vocalizations of these starlings are highly varied, consisting of loud slurred

whistles and gurgling notes. The song is merely an elaboration of these call notes with no constant pattern. Micronesian Starlings nest in tree cavities. A small amount of nest material (grasses, leaves, bits of fern) is placed in the cavity. Two or three eggs, bluish speckled with purple and brown about the larger end, comprise the clutch. Engbring has found nests from May to late September.

Artamus leucorhynchus pelewensis. White-breasted Woodswallow. This Endangered Species has a peculiarly restricted distribution at Palau, being confined to the upper savannahs of Babelthuap. These areas are characterized by poor, highly eroded, red soils. Vegetation consists of grasses, pitcher plants (*Nepenthes mirabilis*), false staghorn fern (*Dicranopteris* sp.) and scattered *Pandanus* trees. Ravines in the savannahs are heavily forested. Frequent fires produce many dead trees in the edges of these forests and such snags are favored perching, nesting, and roosting sites for the woodswallows. The birds occur only in the more remote savannahs in the interior of the island and are inexplicably absent from seemingly identical habitat in the southern part of the island. Engbring estimates that only a few hundred individuals exist.

White-breasted Woodswallows occur at Palau in small groups of two to five birds. They are highly social and exhibit no "individual distance;" they nestle tightly against each other when perched. They feed aerially on large insects, either in continuous flight or by sallying from a perch. The birds are not wary and allow close approach.

Engbring found a woodswallow nest on 15 June 1978. It was a bowl of fine grasses exposed on a lateral dead branch about 6 m up in a large spreading tree (*Callophyllum inophyllum*) growing along the edge of a savannah. Two fledglings, with only a trace of down remaining, perched in or near the nest. They were sometimes shielded from the sun by the parents. Several adults in addition to the parents perched nearby in the tree, but whether they participated in feeding the young could not be determined.

SEABIRDS

Several widespread tropical seabirds in addition to Audubon's Shearwater previously discussed are common to abundant at Palau. Brown Noddies (*Anous stolidus*) and Fairy Terns (*Gygis alba*) nest in forest trees

throughout the archipelago, often quite far inland. White-tailed Tropicbirds (*Phaethon lepturus*) also nest in or beneath trees, sometimes far inland. Huge concentrations of Black Noddies (*A. minutus*) occur among the rock islands where the birds nest in trees overhanging lagoons. Rocky cliffs at Palau are used extensively for nesting and resting by Bridled (*Sterna anaethetus*) and Black-naped (*S. sumatrana*) terns, while Great Crested Terns (*Thalasseus bergii*) are most likely to be seen on sandbars or channel markers. The latter species nests at Palau only on one islet of Kayangel Atoll.

CONSERVATION

The avifauna of Palau appears to have mostly recovered from the disturbance of World War II. Of the eight species listed as endangered, at least two (*Pyrhroglaux podargina*, and *Rhipidura lepida*) probably should be deleted from the lists, and perhaps also *Megapodius laperouse senex*. On the other hand, four unlisted species (*Rallina eurizonoides*, *Gallinula chloropus*, *Porphyrio porphyrio pelewensis*, and possibly *Caprimulgus indicus*) may qualify for such designation. The outlook for most land birds is encouraging because of the extent of the rock islands which form a de facto wildlife sanctuary. These islands are highly scenic and in their present state are one of Palau's most important long-term assets. The potential for nondestructive uses, such as tourism, is great.

Palau's legislators have shown considerable enlightenment in passing laws for the protection of birds, but enforcement is generally limited. We hope that legislation to allow the taking of controlled numbers of scientific specimens under permit will be enacted, and that enforcement of existing laws at the local level will improve.

We are optimistic that as Palau enters an era of political change, environmental concerns will not be disregarded in favor of short-term economic gain.

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RECENT PUBLICATIONS

Birds of Colorado's Gunnison Country.—A. Sidney Hyde. 1979. The Western State College Foundation. 140 p. Paper cover. \$6.95. Source: W.S.C.F., 120 North Boulevard, Gunnison, Colorado 81230. Gunnison Country (essentially the same as the county of the same name) lies in the Rocky Mountains in southwestern Colorado. This book is a review of its birds, combining aspects of an annotated checklist and a field guide. The species accounts report the status, unusual records, and places where the bird can be found. They also give field marks and brief remarks about the voice and habits. Identification keys are provided for fringillids and warblers in spring plumage. The book is illustrated with eight color plates and many pen-and-ink drawings by Donald Radovich. A fold-out sketch map shows the nesting areas of many species. List of references; index.

Combination List and Checklist for Birds of North America.—James A. Tucker. 1979. River City Publishing Co. At least 32 p. Loose-leaf binder. \$15.00 plus \$1.50 postage. Source: River City Publishing Co., P.O. Box 4471, Austin, TX 78765. This is a notebook in which to keep personal records of species of birds seen in North America. All the species that have occurred here are listed on the left side of a series of pages. Blanks to the right and on interleaved half-pages are

provided for several kinds of data: life list, seasonal status, year lists, geographic lists, etc. The system appears to be comprehensive, versatile, and workable. It certainly seems more useful than that designed by Drennan (1979. Noted in *Condor* 81:375). The seven-ring vinyl binder is sturdy and additional blank pages are available. Even birders who have not hitherto kept track of their records will be tempted to fill in the blanks. Index.

The Birds of Ecuador and the Galapagos Archipelago.—Thomas Y. Butler. 1979. The Ramphastos Agency, P.O. Box 1091, Portsmouth, N.H. 80 p. Paper cover. \$6.25. Most of this booklet is devoted to a checklist of the birds of mainland Ecuador. It is based on Meyer de Schauensee's *A Guide to the Birds of South America* (1970. Livingston), augmented with recent records by many observers. Symbols on the list show for every species its status in several habitat zones and a reference to a published illustration or sound recording. The introduction gives brief instructions for finding good birding places. A checklist for the birds of the Galapagos shows their status on each of the major islands. This booklet may be useful to birders in mainland Ecuador, for which no field guide exists. It will be of little use, however, for birders in the Galapagos who have Harris's (1974. Collins) guide.