Micronesica 29(1): 37–48, 1996

Reptiles, Birds, and Mammals of Pakin Atoll, Eastern Caroline Islands

DONALD W. BUDEN

Division of Mathematics and Science, College of Micronesia, P.O. Box 159 Kolonia, Pohnpei, Federated States of Micronesia 96941.

Abstract—Fifteen species of reptiles, 18 birds, and five mammals are recorded from Pakin Atoll. None is endemic to Pakin and all of the residents tend to be widely distributed throughout Micronesia. Introduced species include four mammals (*Rattus exulans, Canis familiaris, Felis catus, Sus scrofa*), the Red Junglefowl (*Gallus gallus*) among birds, and at least one lizard (*Varanus indicus*). Of the 17 indigenous birds, ten are presumed or documented breeding residents, including four land birds, a heron, and five terns. The Micronesian Honeyeater (*Myzomela rubratra*) is the most common land bird, followed closely by the Micronesian Starling (*Aplonis opaca*). The vegetation is mainly *Cocos* forest, considerably modified by periodic cutting of the undergrowth, deliberately set fires, and the rooting of pigs. Most of the present vertebrate species do not appear to be seriously endangered by present levels of human activity. But the Micronesian Pigeon (*Ducula oceanica*) is less numerous on the settled islands, probably reflecting increased hunting pressure, and sea turtles (especially *Chelonia mydas*) and their eggs are harvested indiscriminately.

Introduction

Terrestrial vertebrates have been poorly studied on many of the remote atolls of Micronesia, and distributional records are lacking or scanty for many islands. The present study documents the occurrence and relative abundance of reptiles, birds, and mammals on Pakin Atoll for the first time. It is based largely on my observations and collections made during 26 March–3 April and 24 June-8 July 1994, and is part of a larger study to inventory natural resources of Pohnpei state atolls.

Study Area

Pakin Atoll (about 9.0 km long and 3.5 km wide) is in the eastern Caroline Islands, about 33 km west of Pohnpei, which is the administrative seat and nearest high island. The 21 islands (Fig 1) cover 1.09 km^2, the largest being Nikalap, about 1.5 km long, 0.5 km wide, and 0.585 km^2 (Bryan 1971). Approximately 60

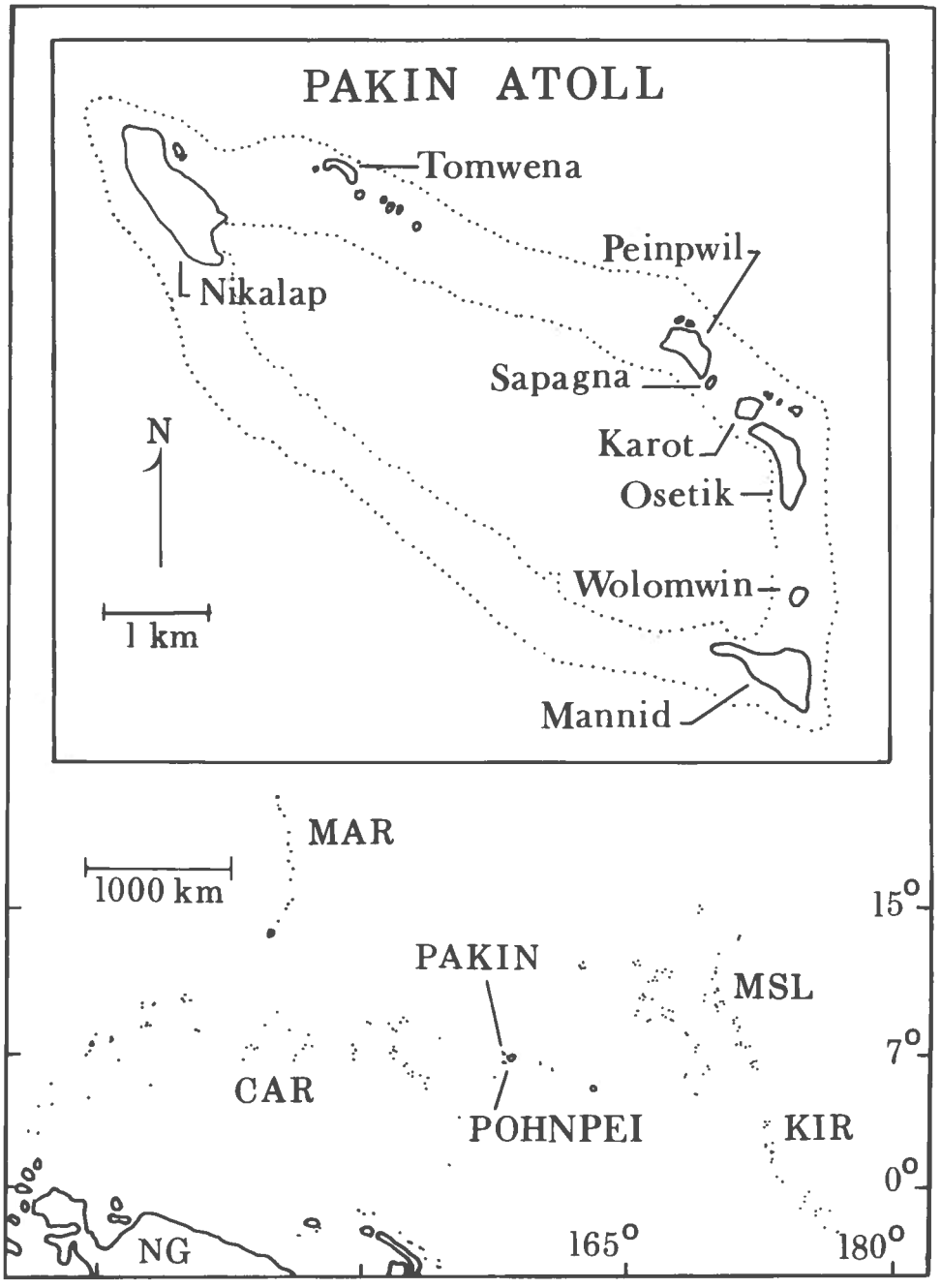

Figure 1. Location map for Pakin Atoll. CAR = Caroline Islands, KIR = Kiribati (formerly Gilbert Islands), MAR = Mariana Islands, MSL = Marshall Islands, NG = New Guinea.

people were living on Nikalap in 1994, and about 20 others were distributed among Mannid, Wolomwin, Osetik, and Peinpwil islands. The islands were settled since the 1940s mainly by people from the Mortlock (Chuuk state) community on Pohnpei, with prior occupation being discontinuous (J. Zaggreb, pers. comm.). The time of initial colonization is unknown. The islanders subsist largely on fish, rice, and local produce. Breadfruit (*Artocarpus*), taro (*Cyrtosperma*), banana (*Musa*), and coconut (*Cocos*) are grown locally, and copra is processed on a small scale. Rice and other locally unavailable provisions are brought from Pohnpei via small boat, usually once or twice weekly.

Cocos forest is the predominant vegetation on most of the islands. The coconut trees on Nikalap are about 20–25 m tall and 4–5 m apart. Other common forest trees throughout the atoll include *Allophylus* sp., *Artocarpus altilis, Barringtonia asiatica, Calophyllum inophyllum, Cordia subcordata, Ficus* spp., *Guettarda speciosa, Hernandia sonora, Morinda citrifolia, Pisonia grandis, Premna obtusifolia,* and *Terminalia littoralis.* The understory consists largely of ferns and small trees. *Scaevola* and *Tournefortia* often form dense thickets between the forest and the sand and coral rubble beaches. Small patches of mangroves (*Rhizophora, Sonneratia*) occur on sheltered shores throughout, and vines (especially *Vigna marina*) and grasses are common along the strand line. The smallest islets typically have dense growths of *Pemphis* scrub, with *Cordia, Pisonia,* and *Terminalia* being the most common trees, some *Pisonia* being at least 1 m in diameter at breast height and about 10–15 m tall.

Footpaths provide access to most parts of the larger islands, and much of the understory is periodically cleared, especially near the settlements. On Wolomwin, a nearly circular island about 200–250 m in diameter, the ground cover has been destroyed by pigs and cutting, and one can view the opposite shoreline from nearly any side of the island.

Methods

Vernacular and scientific names of birds follow Pratt et al. (1987) except for the Pacific Golden Plover (*Pluvialis fulva*), which is treated as a species distinct from the American Golden Plover (*P. dominica*) following Connors (1983). Names of other taxa are from a variety of different sources.

The terms used to describe abundance of birds are: very common (30 or more sightings/day), common (15–30/day), fairly common (5–15/day), uncommon (1–5 on most days), and scarce (one to five records only). For lizards, the terms are: common (at least 30 sightings/day under optimum conditions), fairly common (10–30/day), uncommon (up to 10/day on most days), and scarce (up to 5/day, but possibly being unrecorded on more than half the days).

Status of lizards and birds was assessed by transect counts and by general observations during March-July 1994. Land birds were censused using estimated 50-m fixed width transects and recorded as birds seen and heard per hectare. Waterbirds were recorded as individuals encountered per kilometer on walks along beaches, and covering the area from the upper beach to the outer reef edge.

Lizards also were recorded as encounters per kilometer for an index of relative abundance without attempt to estimate population size. The zone of detectability averaged about 3–4 m wide for most of the diurnal species of lizards, but *Lamprolepis smaragdina* was readily seen on tree trunks over greater distances and its relative abundance may be overestimated. Distances along transects were estimated from a 1:10,000 scale map (Pohnpei State Land Commission 1985), and place names are those in use by local residents. The name Tomwena refers to a group of islands as well as to the largest island within the group (Fig. 1), and the easternmost is sometimes referred to by locals as Home Run.

Turtle carapaces were measured as the straight line distance from the center of the anterior edge of the nuchal scute to the distal edge of the posteriormost marginal. The 234 specimens of lizards collected by hand have been deposited in the B. P. Bishop Museum, Honolulu; the College of Micronesia Reference Collection, Pohnpei; the National Museum of Natural History, Smithsonian Institution, Washington, D. C.; and the Museum of Comparative Zoology, Harvard University.

Species Accounts

REPTILES

Chelonia mydas (green turtle).—Resident islanders told me that turtles (mainly *C. mydas*) are seen in the lagoon regularly throughout the year. I saw only one turtle (unidentified as to species) in the lagoon, but I examined one live *C. mydas* and the remains of four others, all collected by local fishermen. The weathered and deteriorating carapaces of three killed in December 1993 measured 64, 66, and 74 cm long in April 1994. Two females collected on 7 July 1994 measured 43 and 78 cm long. The larger was butchered when captured and was said to have contained undeveloped follicles. Several islanders also reported that a gravid female weighing about 70 kg was caught near Mannid in March 1994, and that a nest of *C. mydas* was found on Nikalap and another on Wolomwin in May 1994.

Eretmochelys imbricata (hawksbill turtle).—Local residents told me that hawksbill turtles occur in the lagoon, but much less frequently than *C. mydas.* I saw none during my visits to the atoll.

Gehyra oceanica.—The oceanic gecko is fairly common on most of the islands, but it is uncommon on Nikalap and apparently absent on the Tomwena group, where it was unobserved during four days of camping among the islands. The lack of records from Karot may be an artifact of sampling. *G. oceanica* is usually seen at night on the trunks of *Cocos* trees and walls of buildings.

Lepidodactylus lugubris.—The mourning gecko is common on Nikalap, at least in the settlement, but uncommon on Mannid and unrecorded elsewhere. Most of the specimens were collected at night on walls and windows of buildings, and others were on tree trunks and limbs along the strand line.

Lepidodactylus moestus.—A specimen of *L. moestus* (USNM 343816) collected in a building on Nikalap on 26 June 1994 is the only record.

Table 1. Distribution records of lizards on Pakin Atoll. Numbers indicate specimens collected and plus signs indicate sight records only.

Species	Island[a]						
	Ni	To	Pe	Ka	Os	Wo	Ma
Gekkonidae							
Gehyra oceanica	8		6		4	5	3
Lepidodactylus lugubris	15						2
L. moestus	1						
Nactus pelagicus	4		3	3		3	8
Perochirus ateles			7		2		1
Scincidae							
Emoia boettgeri	3		3	2	1	2	3
E. cyanura	21		4	2	1	8	1
E. impar	16		7	4	5	8	7
E. jakati	12				1		2
Eugongylus albofasciolatus	2						2
Lamprolepis smaragdina	15	15	1	+	1	2	2
Lipinia noctua						2	1
Varanidae							
Varanus indicus	3						

[a] Localities are listed clockwise: Ni = Nikalap (including an unnamed islet connected to the northern shore at low tide, and where eight *Emoia cyanura*, three *E. impar*, four *E. jakati*, and one *Lepidodactylus lugubris* were collected), To = Tomwena (large, main island plus five smaller satellites), Pe = Peinpwil (including Sapagna, where two *Gehyra oceanica* and six *Perochirus ateles* were collected), Ka = Karot, Os = Osetik (including an unnamed islet connected to the northeastern shore at low tide, and where two *Gehyra oceanica* and two *Perochirus ateles* were collected), Wo = Wolomwin, Ma = Mannid.

Nactus pelagicus.—The rock gecko is uncommon to fairly common and recorded on most of the islands. It is usually seen at night on the lower parts of tree trunks along the upper beach and in coral rubble at the strand line. I collected three and saw three others while overturning rocks on Karot for approximately 30 minutes at midday on 2 July 1994; no other lizards were found beneath the rocks.

Perochirus ateles.—The Micronesian gecko is uncommon and known only from Mannid, Sapagna, and a small unnamed islet off the northeastern shore of Osetik. Specimens were collected on tree trunks at night, and in the interstices of the aerial roots of strangler figs (*Ficus prolixa*) and beneath exfoliating bark on dead broad leaf trees during the day. I found a communal nest containing approximately 15–20 eggs and one recently hatched young in a rotted *Cocos* stump on Sapagna on 2 July 1994. Four of the eggs measured 7.0–10.0 mm in diameter and hatched in the lab during the week of 15–22 July.

Emoia boettgeri.—Boettger's skink is common and recorded on nearly all of the islands (Table 1), being absent only from the Tomwena group. It is the most numerous species of lizard in forest habitats (Table 2), especially where under-

Table 2. Relative abundance of lizards on Pakin Atoll.

Species	Individuals observed per km		Status[c]
	Forest[a]	Strand[b]	
Gekkonidae[d]			
Gehyra oceanica	2.1		UC-FC
Lepidodactylus lugubris	0.1		UC-FC
L. moestus	0		S
Nactus pelagicus	2.6		UC-FC
Perochirus ateles	0.1		UC
Scincidae[e]			
Emoia boettgeri	31.5	5.8	C
E. cyanura	13.0	24.6	C
E. impar	19.4	3.8	C
E. jakati	2.6	8.9	UC-C
Eugongylus albofasciolatus	0	0	UC
Lamprolepis smaragdina	7.0	2.1[f]	C
Lipinia noctua	0.2	0	S
Varanidae			
Varanus indicus	0.2	0.6	UC-FC[g]

[a] The distances (km) covered during transect counts on each island are: Nikalap 5.3 day/3.5 night, Tomwena 0.3/0.3, Peinpwil 0.6/0.8, Karot 0.3/0.7, Osetik 0.9/1.5, Wolomwin 0.2/1.0, Mannid 1.2/2.8 (total = 5.3 km/10.6 km).

[b] The distances (km) covered during daytime transect counts on each island are: Nikalap 2.4, Peinpwil 0.3, Karot 0.7, Osetik 0.5, Wolomwin 0.3, Mannid 1.0 (total = 5.2 km).

[c] Overall status based on specimens collected, transect counts, and general observations throughout the study: C = common, FC = fairly common, UC = uncommon, S = scarce.

[d] Counted during nighttime surveys only, and mainly forest edge.

[e] Counted during daytime surveys only.

[f] Mainly on trees and shrubs at edge of forest along strand line.

[g] Nikalap only, unrecorded elsewhere except in captivity.

growth is sparse. *E. boettgeri* usually is seen on the ground, but it frequently climbs trees to avoid capture.

Emoia cyanura.—The brown-tailed copper-striped skink is common on most islands throughout the atoll, and is especially numerous in coastal strand. It is apparently absent in the Tomwena group. *E. cyanura* occurs mainly on the ground, and occasionally low in the vegetation.

Emoia impar.—The blue-tailed copper-striped skink is common in forest habitats nearly throughout, but is unknown in the Tomwena group. It is usually seen on the ground but often climbs tree trunks and low vegetation, especially when pursued.

Emoia jakati.—The Jakati skink is locally common on Nikalap and uncommon to fairly common on Mannid and Osetik, but is unrecorded elsewhere. It is most numerous in low, dense, weedy vegetation, especially among vines, grasses, and other herbaceous cover, and usually in coastal strand.

Eugongylus albofasciolatus.—This robust, ground-dwelling skink is scarce to uncommon in forest and settled areas, and recorded only on Nikalap and Mannid. I saw only five during three weeks on the atoll. But its skulking habits and predilection for dense cover make an assessment of status difficult. Most sightings were in late afternoon or early evening, and one of the two specimens from Mannid was collected between 1800 and 2200 hrs in a rat trap baited with peanut butter and set in a copra shed. Others were observed in or near piles of *Cocos* trash, dense weedy areas, or among roots of toppled trees.

Lamprolepis smaragdina.—The green tree skink is common on most of the islands throughout the atoll, and it is the only lizard recorded in the Tomwena group. It is usually seen on tree trunks and limbs, less frequently in shrubs and vines, and only occasionally on the ground. I found it most numerous in a patch of *Pisonia/Terminalia* forest on Tomwena (22 counted over a distance of 300 m) and in the *Cocos* grove in the settlement on Nikalap (33/800 m). *L. smaragdina* is unexpectedly scarce on Peinpwil where the only one I saw in three days was an immature (snout-vent length 37.0 mm) regurgitated by an *Emoia boettgeri* (snout-vent length 65.7 mm) on 2 July 1994. Of the 110 individuals atoll-wide for which I recorded dorsal coloration, 69 (63%) were distinctly green dorsally, 18 (16%) were brown, and 23 (21%) were intermediate (greenish brown, brownish green, or yellowish brown).

Lipinia noctua.—The moth skink is one of the least common lizards on Pakin Atoll. It is known only from one specimen taken on Mannid and two on Wolomwin during midday on 30 March 1994, and one seen among rocks piled at the base of a coconut tree on Wolomwin at noon on 27 June 1994. The Mannid specimen was collected on the outside wall of a wood and sheet metal shed, and the two from Wolomwin were about 1–2 m high on the trunks of large breadfruit trees. Its scarcity and apparent confinement to two closely adjacent islands (Mannid and Wolomwin) suggests it may be a recent introduction that has not yet reached other parts of the atoll. Alternatively, it may be widespread, but in such small numbers as to have avoided detection, or less likely, it may have been more widespread on the atoll in the past and has since been reduced to relict status.

Varanus indicus.—Monitor lizards are uncommon to fairly common on Nikalap (5–15 sightings daily), but do not occur elsewhere on the atoll except for those occasionally brought from Nikalap as "pets"—one was tethered to a tree at the settlement on Osetik in March 1994. All those I saw had chins and throats suffused with rusty coloration, unlike those seen on Mokil, another atoll in Pohnpei state. Monitor lizards presumably were introduced to Nikalap in the early 1900s during the Japanese occupation, as they were on other Caroline Islands, either for food (Weckler 1949) or for rat control (Marshall 1975, Uchida 1967).

BIRDS

White-tailed Tropicbird (*Phaethon lepturus*).—Nonbreeding visitor. The only records are the one I saw at Tomwena Islands on 2 April, another off Osetik on 30 June, another at Nikalap on 8 July, and the decomposed remains of one on

the beach at Mannid on 29 June 1994. Presumably, they are from breeding colonies on Pohnpei, where *P. lepturus* is common (Engbring et al. 1990).

Great Frigatebird (*Fregata minor*).—Nonbreeding visitor. Great Frigatebirds are common on Tomwena, with about 40–50 observed together during March-April and June-July 1994. Pakin islanders say they occur there regularly, but breeding is unknown.

Pacific Reef-Heron (*Egretta sacra*).—Uncommon to fairly common resident. Of the 13 recorded on reef flats and beaches on my first trip, eight were the dark morph and five were piebald. The maximum number I saw together was eight on the reef at Tomwena on 4 July 1994; six were white, one was dark, and the other was piebald. A nest 2–3 m high in *Pemphis* scrub in the Tomwena group contained two pinfeathered young being attended by a piebald adult on 4 July 1994.

Table 3. Status and abundance of birds on Pakin Atoll based on general observations and transect counts; nc = observed on transect but not counted.

Species	Status[a]	Density	
		Birds/km[b]	Birds/ha[c]
White-tailed Tropicbird	NBV S		
Great Frigatebird	NBV C[d]		
Pacific Reef-Heron	(B) UC	1.1	
Red Junglefowl	I		nc
Pacific Golden Plover	NBV S[e]	0.2	
Tattler sp.	NBV UC[e]	0.3	
Whimbrel	NBV S[e]	0.2	
Bristle-thighed Curlew	NBV S[e]		
Ruddy Turnstone	NBV UC-FC[e]	1.3	
Great Crested Tern	(B) UC-FC	1.3	
Black-naped Tern	(B)? UC		
Brown Noddy	B VC	nc	nc
Black Noddy	B VC	nc	nc
Common Fairy-Tern	(B) UC	nc	nc
Micronesian Pigeon	B UC		0.7
Caroline Islands Reed-Warbler	(B) FC		1.3
Micronesian Starling	(B) C-VC		3.0
Micronesian Honeyeater	(B) VC		3.8

[a] B = resident year-round, breeding confirmed, (B) = resident year-round, breeding not confirmed but very probable, I = introduced, possibly feral, NBV = nonbreeding visitor, VC = very common, C = common, FC = fairly common, UC = uncommon, S = scarce.

[b] Birds per kilometer on coastal surveys only, from upper beach to outer reef edge. Distances (km) covered on each island are: Nikalap 6.2, Tomwena 1.5, Peinpwil 0.8, Karot 0.8, Osetik 1.5, Wolomwin 1.5, Mannid 2.5 (total = 14.8 km).

[c] Birds per hectare on forest surveys only. Distances (km) covered on each island are: Nikalap 2.6, Tomwena 0.3, Peinpwil 0.7, Karot 0.5, Osetik 0.9, Wolomwin 0.2, Mannid 1.9 (total = 7.0 km).

[d] Status on Tomwena only, recorded elsewhere only occasionally and in flight.

[e] Status based on spring and summer records only; probably more numerous in winter.

Red Junglefowl (*Gallus gallus*).—Introduced. *G. gallus* is fairly common around human habitation, but I did not record any far from the settlements.

Pacific Golden Plover (*Pluvialis fulva*).—Nonbreeding visitor. The only records are the four I saw during 28 March-3 April 1994.

Wandering Tattler (*Heteroscelus brevipes*)/Gray-tailed Tattler (*H. incanus*).—Nonbreeding visitor(s). The only records of tattlers on Pakin are four seen during 29 March-1 April, and 12 others during 26 June-8 July 1994. Both *H. brevipes* and *H. incanus* occur as migrants throughout Micronesia (Pratt et al. 1987). I was unable to identify birds to either species with confidence and therefore recorded them only as *Heteroscelus* sp.

Whimbrel (*Numenius phaeopus*).—Nonbreeding visitor. I saw one at Nikalap on 1 April, three at Tomwena Islands on 2 April, and one at Peinpwil on 1 July 1994.

Bristle-thighed Curlew (*Numenius tahitiensis*).—Nonbreeding visitor. My only records are three seen at Tomwena Islands on 3 April and two others observed there daily during late afternoon and early evening, 3–5 July 1994. In flight, all showed a distinctly rufescent rump and base of tail, which distinguished them from the otherwise very similar *N. phaeopus*.

Ruddy Turnstone (*Arenaria interpres*).—Nonbreeding visitor. I found *A. interpres* fairly common in March and April and uncommon in June and July 1994; all were on reef flats and beaches. It is probably more numerous in winter.

Great Crested Tern (*Sterna bergii*).—Probably an uncommon to fairly common resident. Breeding was not confirmed, but Pakin islanders reported *S. bergii* nests on sandy beaches in the Tomwena group. I saw flocks of six and 10 at Tomwena Islands on 31 March, and observed singles and groups of 2–4 throughout the atoll during 24 June-8 July 1994.

Black-naped Tern (*Sterna sumatrana*).—Status uncertain, possibly breeding. I saw three groups of three, six, and eight at Tomwena Islands on 2 April, and 2–3 there regularly during the first week of July 1994.

Brown Noddy (*Anous stolidus*).—Very common resident. The Brown Noddy has a predilection for roosting and apparently nesting in *Cocos* crowns and its presence may often be undetected, making assessment of status difficult. I estimated roughly about 5,000 individuals more or less evenly distributed throughout the atoll based on sightings and vocalizations of birds in the forest canopy. I estimated 500–600 in the Tomwena Islands during March-April and June-July 1994; adults were on nests with eggs and young in various stages of development both times. Additionally, three nests on 31 March and one nest on 3 July 1994, each with single eggs, were observed on rocks extending 1–2 m above the waterline between Peinpwil and Tomwena.

Black Noddy (*Anous minutus*).—Very common resident. I estimated roughly about 5,000 *A. minutus* occurring mainly in small colonies widely distributed among hardwood forest trees throughout the atoll during March-July 1994. The largest concentrations included about 200 birds and 100 nests (several observed containing unfledged young) 10–15 m high in the tops of trees (mainly *Pisonia*) on Karot on 30 March, and about 1,000 birds at Tomwena Islands on 31 March

and 2 April 1994, with many nests high in *Pisonia* and others 3–5 m high in *Pemphis* scrub.

Common Fairy-Tern (*Gygas alba*).—Probably an uncommon resident. I observed *G. alba* in small numbers of up to five or six together throughout the atoll, and mainly in forest or forest edge. Breeding is undocumented but very probable. Most birds were paired.

Micronesian Pigeon (*Ducula oceanica*).—Uncommon resident in forest on most islands, but scarce on Nikalap. I heard and saw *D. oceanica* in small numbers regularly on nearly all islands, including the tiny, unnamed, predominately scrub-covered islets. But I recorded only one on Nikalap in approximately two weeks. A nest about 2 m high in *Pemphis* scrub on one of the Tomwena Islands contained one egg on 31 March and a nearly fledged young on 4 July 1994. The Micronesian Pigeon probably is more numerous throughout the atoll than the records indicate (Table 3), but the birds tend to be very shy and elusive, probably due to hunting pressure; I never saw more than three together.

Caroline Islands Reed-Warbler (*Acrocephalus syrinx*).—Fairly common and presumed resident. *A. syrinx* is widespread in forest throughout the atoll, occurring regularly even on the smallest scrub-covered islets. Breeding is undocumented but very probable.

Micronesian Starling (*Aplonis opaca*).—Common to very common and presumed resident. *A. opaca* is most numerous in the forest canopy, but also occurs in scrub and all other terrestrial habitats atoll-wide.

Micronesian Honeyeater (*Myzomela rubratra*).—Very common and presumed resident. *M. rubratra* occurs widely in *Cocos* forest and *Pemphis* scrub and is the most numerous land bird on the atoll.

MAMMALS

Pohnpei fruit bat (*Pteropus molossinus*).—The Pohnpei fruit bat is widespread but generally uncommon in forest throughout the atoll; I estimate a total population of about 100. All those I saw were singles or in pairs. One live young (total length 90.0 mm, forearm 58.3 mm) was brought to me on Nikalap on 1 April 1994 by a boy who found it hanging from the branch of a large *Hernandia* tree at the edge of the settlement.

Polynesian rat (*Rattus exulans*).—Rats are fairly common throughout, being most numerous in the settled areas. All those I saw were small in size and presumably *R. exulans,* two of which were collected but not saved. A mature male collected on Mannid on 29 June 1994 had enlarged testes (20 mm excluding epididymides), measured 260 mm in total length, 140 mm in tail length, and weighed 70 g. Another male collected at the same time measured 225 mm in total length, 117 mm in tail length, and weighed 30 g.

Dog (*Canis familiaris*).—Dogs are common in areas of human habitation, but seldom seen outside the settlements. I saw none on the uninhabited islands.

Cat (*Felis catus*).—Domesticated cats are kept as pets in the settlements. The islanders say feral cats are widespread, but the only two I saw were on Karot.

Pig (*Sus scrofa*).—Pigs are kept by the islanders and are common on the larger islands, being absent only from the Tomwena group and the tiny scrub-covered islets on the eastern end of the atoll. They are allowed to roam free over the islands, and I saw two swimming across the channel between Karot (an uninhabited island) and Osetik.

Discussion

Fifteen species of reptiles, 18 birds, and five mammals were recorded on Pakin Atoll. None is endemic to the atoll and all of the resident breeders generally are widespread throughout Micronesia. Introduced species include four of the five mammals (*Rattus exulans, Canis familiaris, Felis catus, Sus scrofa*), one bird (Red Junglefowl), and at least one reptile (monitor lizard). Other reptiles may have been brought to the atoll inadvertently by people, but in the absence of direct evidence in support of human assisted transport I consider them indigenous. Crombie and Steadman (1987) suggest that anthropochory probably accounts for nearly all lizards on remote Pacific islands. The only native mammal is the Pohnpei fruit bat.

The herpetofauna consists of two sea turtles (*Chelonia mydas* and *Eretmochelys imbricata*) and 13 lizards, most of which are widely distributed on the atoll (Table 1) and fairly common to common (Table 2). The native avifauna consists of at least seven nonbreeding visitors and ten documented or presumed resident breeders (Table 3). Each of the four resident land birds (Micronesian Pigeon, Caroline Islands Reed-Warbler, Micronesian Starling, and Micronesian Honeyeater) has been recorded on all the major (named) islands (Fig. 1) and on one or more of the small, predominately scrub-covered islets. Additional observations during fall to spring doubtless will add to the list of winter visitors and passage migrants.

Nearly all lizard species were observed in forest, the principle habitat on the atoll, but *Emoia cyanura* and *E. jakati* were more numerous in open areas, especially among grasses, prostrate vines, and other weedy plants in coastal strand, and the only specimen of *Lepidodactylus moestus* was collected in a building. Skinks were diurnal and usually seen on the ground or less than one meter high in the vegetation, although *Lamprolepis smaragdina* was mainly arboreal in trees, vines, and shrubs, and rarely on the ground. Geckos were observed mainly at night and in trees. But *Lepidodactylus lugubris* was found chiefly in human habitation and *Gehyra oceanica* also was common there.

With the exceptions of the introduced monitor lizard, which is confined to Nikalap, and the gecko *Lepidodactylus moestus,* which is known only from one specimen collected on Nikalap, the moth skink has the most limited distribution among the reptiles on Pakin Atoll.

Although Pakin Atoll is inhabited by fewer than 100 people, and is seldom visited by outsiders, it shows considerable modification by human activity. The effects of fires, periodic clearing of the undergrowth, and the rooting of domesticated and semiferal pigs are evident on all of the larger islands. The present

reptile fauna seems well-adapted to these conditions, and some such as *E. boettgeri* and *E. impar* are more numerous in the cleared and uprooted areas of the forest than in more natural habitats. Fruit bats and pigeons, however, are less numerous in the vicinity of settlements, doubtless reflecting hunting pressure. The small, predominately scrub-covered islets on the eastern and northern parts of the atoll host a surprisingly large number of land birds for their size, and the Tomwena Islands in particular are an important seabird nesting site, especially for Brown Noddy and Black Noddy. The eggs and young of seabirds are occasionally taken by local islanders for food.

The present degree of human activity seems no imminent threat to the vertebrate fauna with the exception perhaps of the indiscriminant harvesting of sea turtles and their eggs. On Pakin, as well as on many other remote Micronesian island groups, the people are becoming increasingly dependent on imported goods to the detriment of some aspects of local culture, but often releasing pressure on limited local natural resources.

Acknowledgments

I am grateful to A. Edward for arranging transportation between Pohnpei and Pakin, and I appreciate all the courtesies extended by the people of Pakin during my visits. I also thank R. Nakasone and S. Tachepliyang (student assistants from the College of Micronesia) for their help in the field. Funding was provided by a grant from the Pacific Island Network (PIN).

References

Bryan, E. H., Jr. 1971. Guide to place names in the Trust Territory of the Pacific Islands. Pacific Science Information Center, B. P. Bishop Museum, Honolulu. unpaged.

Crombie, R. I. & D. W. Steadman. 1987. The lizards of Rarotonga and Mangaia, Cook Island group, Oceania. Pacific Science 40: 44–57.

Engbring, J., F. L. Ramsey & V. J. Wildman. 1990. Micronesian forest bird surveys, the Federated States: Pohnpei, Kosrae, Chuuk, and Yap. United States Fish and Wildlife Service, Honolulu. 312 p.

Marshall, M. 1975. The Natural history of Namoluk Atoll, Eastern Caroline Islands. Atoll Research Bulletin 189: 1–53.

Pohnpei State Land Commission. 1985. Pakin Atoll. Scale 1: 10,000. Pohnpei State Land Commission, Federated States of Micronesia, Kolonia, Pohnpei.

Uchida, T. 1967. Observations on the monitor lizard *Varanus indicus* (Daudin) as a rat control agent on Ifaluk, western Caroline Islands. Micronesica 3: 17–18.

Weckler, J. E. 1949. Land and livelihood on Mokil, part 1. Coordinated Investigations in Micronesian Anthropology CIMA Report No. 11, Pacific Science Board, National Research Council, Washington, D.C. 147 p.

Received 18 April 1995, revised 11 Dec.