Micronesica 29(1): 21–36, 1996

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

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Abstract—Thirteen species of reptiles, 25 birds, and seven mammals are recorded from Ant Atoll, five of the reptiles, nine birds, and two mammals for the first time. None is endemic to the atoll. All occur on Pohnpei, the nearest high island, and most are widely distributed in Oceania. Established introductions include the Red Junglefowl (*Gallus gallus*) and at least four mammals (*Rattus rattus, R. exulans, Felis catus, Sus scrofa*). The Micronesian Starling (*Aplonis opaca*) is the most numerous land bird, followed closely by the Micronesian Honeyeater (*Myzomela rubratra*). Wolouna Island is an important seabird nesting area, hosting about 6,000 pairs of Black Noddies (*Anous minutus*) and smaller numbers of at least five other species. Subsistance hunting may have minimal impact on these seabird populations, but an increasing number of recreational visitors and exploitive hunters may present a future threat to populations.

Introduction

Ant Atoll is one of many small Pacific island groups that have not had thorough biological inventories. Its vertebrate fauna has never been reviewed systematically, and previous distribution records are scanty and cover only a few of the islands. J. Marshall and several assistants surveyed vertebrate populations on Nikalap Aru and Pamuk during 9–12 December 1955, and Nikalap Aru and Wolouna during 14–16 May 1956. Their observations were summarized by Marshall (1957), and additional information is included in Marshall's field notes on file in the Smithsonian Institution archives. Engbring et al. (1990) observed birds on Nikalap Aru, Imwinyap, and Wolouna in June 1982 and 1983; all their records cited as to date are 11 June 1982, and 12 and 25 June 1983. They censused land birds on Nikalap Aru on 26 June 1983 (Engbring, pers. comm.). The present study is based largely on my observations on all of the islands during 15–21 July, 1–5 August, and 25–27 November 1994, and 21 January 1995. This study includes previous records from the literature, unpublished information from correspondents, and the results of personal interviews with resident Pohnpeians who have lived on the atoll or have visited it regularly over many years.

Study Area

Ant Atoll is located in the eastern Caroline Islands, 18.5 km southwest of Pohnpei, the nearest large, high island (Fig. 1). It is privately owned by the Nanpei family on Pohnpei. The atoll is about 12.5 km long and 7–11 km wide, with a reef shelf ranging about 300 to 1100 m wide and a lagoon covering 74 km^2 (Bryan 1971, Pohnpei State Land Commission 1985). The 12 islands (11 of them strung along the southeastern perimeter) cover 1.86 km^2. With the exception of Wolouna (the only island in the northwestern quadrant), and excluding the deep water passage between Imwinyap and Nikalap Aru, the islands are separated by shallow, easily wadeable gaps up to several hundred meters wide, some able to be crossed dry shod or nearly so during the lowest tides. The two largest islands, Pamuk (0.6 km^2) and Nikalap Aru (0.5 km^2) account for over half the total land area (Bryan 1971).

Glassman (1953) recorded 58 species of vascular plants on Ant Atoll. *Cocos* forest is the predominant vegetation; only the smallest islets, Wolouna and Tolonmurui, are covered mainly with broadleaf woodland and coastal scrub. The coconut trees are 20–30 m tall and irregularly spaced 5–15 m apart. Marshall (1957) stated that on Nikalap Aru "coconut trees are throughout planted in rows." But these plantations have fallen into disuse in recent decades and the present regeneration of forest is natural rather than by human design. Other common forest trees include *Allophylus ternatus, Artocarpus altilis, Barringtonia asiatica, Cordia subcordata, Ficus* spp., *Guettarda speciosa, Hernandia sonora, Morinda citrifolia, Neisosperma oppositifolia,* and *Pisonia grandis.* The largest in girth occur mainly at the forest edge, along sandy lagoon-side beaches. They include *Barringtonia, Calophyllum inophyllum, Cordia,* and *Hernandia* about 10–15 m tall and 1–3 m in diameter at breast height. *Terminalia littoralis* also is a common shoreline tree, but not as large. Mosses and ferns are common ground cover and epiphytes.

The forest extends to sandy or rocky beaches or is bordered by scrub or thickets consisting largely of *Scaevola* and *Tournefortia* up to several meters wide. *Pemphis acidula* is locally common on windswept rocky beaches and on sandy and more sheltered lagoon shores. Grasses, sedges, vines, and small, scattered shrubs comprise irregularly spaced patches of strand vegetation. In many areas, the shoreline vegetation is shrouded in vines, mainly *Canavalia, Cassytha, Ipomoea,* and *Vigna.* Mangroves are scarce, but I found small patches of *Rhizophora* along some of the interisland passes, and one fairly extensive stand of *Bruguiera* covering about a hectare on the eastern side of Panshanki.

Ant Atoll is currently uninhabited but is visited from Pohnpei by hunters, fishermen, recreational divers, and weekend picnicers. Ant was managed for copra production at least from the late 1800s throughout most of this century under direction of Henry Nanpei and his heirs. Up to 500 people lived in settlements on the larger islands up until the early 1970s when the copra industry became unprofitable (W. Hauley, pers. comm.). Except for a few isolated and meagre shelters used by visitors, I saw no standing evidence of widespread human occupation. The framework of a small, short-lived (1989–1991), island-style hotel is still pres-

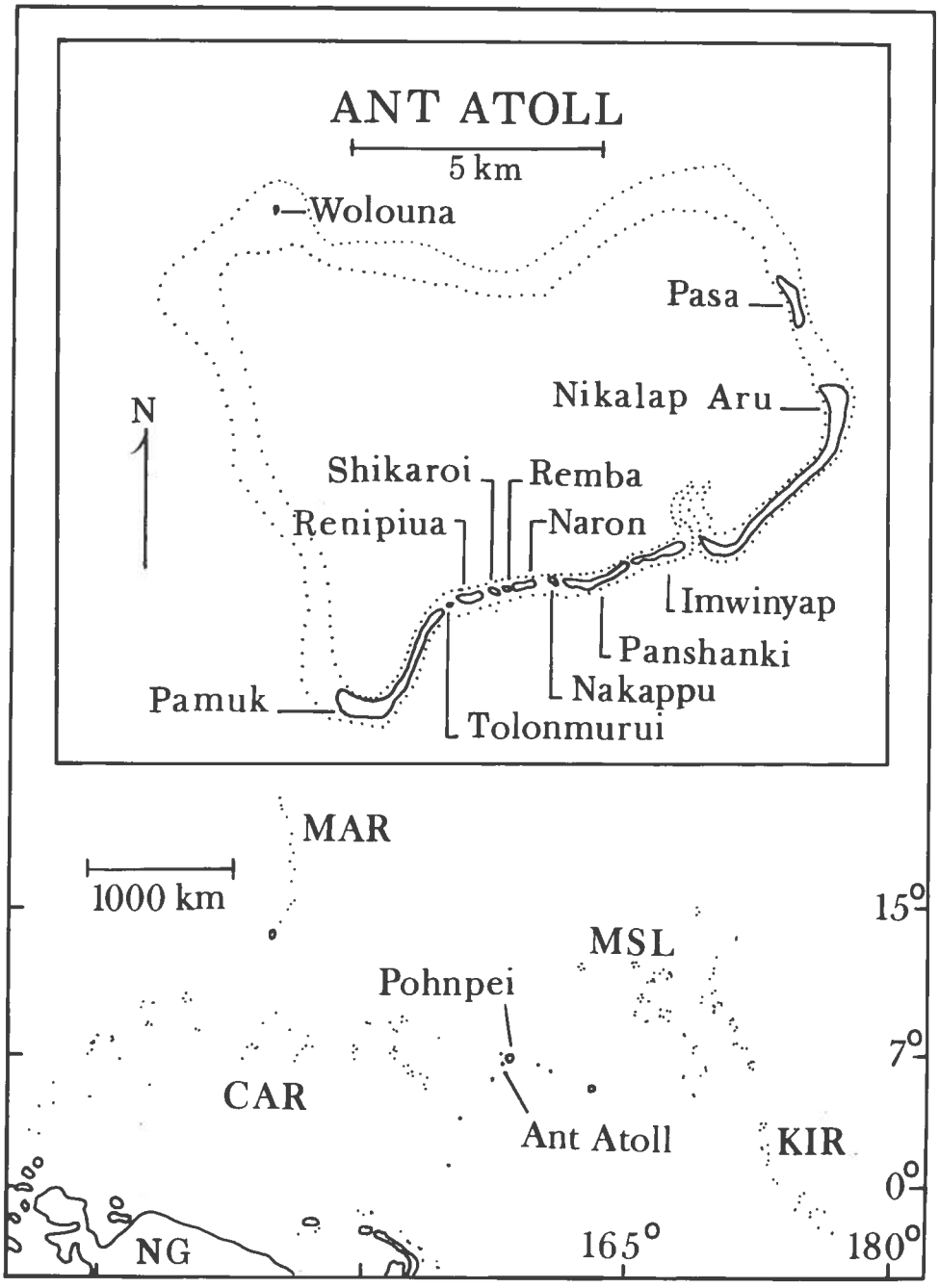

Figure 1. Location map for Ant Atoll. CAR = Caroline Islands, KIR = Kiribati (formerly Gilbert Islands), MAR = Mariana Islands, MSL = Marshall Islands, NG = New Guinea.

ent on Nikalap Aru. The dates of the original occupation of Ant Atoll are unknown, but Ayres et al. (1979) reported a date of AD 800 ± 100 for a charcoal sample from Imwinyap, and stated that "site distributions on Ant appear to reflect intensive occupation over a substantial period of time."

Methods

Bird names are from Pratt et al. (1987) except that the Pacific Golden-Plover (*Pluvialis fulva*) is treated as a species distinct from the American Golden-Plover (*Pluvialis dominica*) following Connors (1983). 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 (no more than five individuals or small flocks recorded during this study, and no evidence of greater abundance presented in previous studies). For lizards, the terms are common (at least 30 sightings/day in suitable habitat and under optimum time of day and weather conditions), fairly common (10–30/day), uncommon (up to 10/day on most days), and scarce (up to 5/day, but possibly unrecorded on more than half the days).

Status of lizards and birds was assessed by transect counts and by general observations throughout the study period. Forest transects were roughly straight lines across the breadth of the island or parallel to the long axis near mid-island, and coastal transects paralleled the strand line. No transect was repeated and distances were estimated using a 1:15,000 scale map (Pohnpei State Land Commission 1985). Land birds were censused using 50-m fixed-width, strip transects. Counts of waterbirds on reef flats and beaches, and all lizard species are given as numbers of individuals per kilometer, indicating relative abundance without estimating population size.

Place names and map (Fig. 1) are from Bryan (1971) with some modifications. The two islands identified as Imwinyap and Wachikichiki in Bryan (1971) are merged to match the size and configuration of Imwinyap in a more recent aerial survey mosaic (Pohnpei State Land Commission 1985). Also, Pasa = Pataya, Tolonmurui = Toronmurui, and Pamuk = Panmuk (also known as Pamuk Imwintiati). Nikalap Aru = Pukennge in Marshall (1957).

The 189 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 (USNM), Smithsonian Institution, Washington, D.C.; and the Museum of Comparative Zoology (MCZ), Harvard University.

Species Accounts

REPTILES

Chelonia mydas (green turtle) and *Eretmochelys imbricata* (hawksbill turtle).—I did not encounter any live turtles on Ant Atoll, but saw the scutes and bones of a small *C. mydas*—carapace length probably less than 30 cm—at a camp-

site on the western end of Pamuk in July 1994. Pritchard (1981) reported unconfirmed sightings and rumors of turtles nesting on the atoll. Additionally, several Pohnpeians I queried indicated that both green (mainly) and hawksbill turtles are occasionally seen in the lagoon and on the reef, and they reported nests of both species were regularly found on Pasa, Nikalap Aru, and Pamuk until about the 1970s.

Gehyra mutilata.—The only record of a mutilating gecko is one specimen (USNM 139055) collected on Nikalap Aru by J. Marshall during 10–11 Dec. 1955.

Gehyra oceanica.—The oceanic gecko is common on *Cocos* trunks and walls of buildings at night. During the day, I collected many beneath exfoliating bark on dead broadleaf trees and saw numerous others within the interstices of aerial roots of strangler figs (*Ficus prolixa*). It has been recorded on nearly all the islands (Table 1) and is the most abundant gecko on the atoll (Table 2). Marshall (1957) collected *G. oceanica* on Nikalap Aru in Dec. 1955.

Lepidodactylus lugubris.—The mourning gecko is uncommon to fairly common throughout the atoll, and is the only lizard recorded on Wolouna Island. It was most numerous at night on the walls and windows of several abandoned buildings on Nikalap Aru. During the day, most of the specimens were found beneath boards and other debris at the high tide line, and beneath dead bark on shoreline trees. I did not encounter *L. lugubris* in the interior parts of the forest. Marshall (1957) collected it on Wolouna in May 1956 and saw it also on Nikalap Aru in Dec. 1955.

Nactus pelagicus.—The rock gecko is fairly common throughout the atoll. I found it chiefly in coastal habitats at night, mainly low on tree trunks and on the

Table 1. Distribution records of lizards on Ant Atoll. Numbers are specimens collected during this study, plus signs indicate sight records only, and asterisks indicate records from other sources given in species accounts.

	Island[a]											
Species	Ps	Ni	Im	Pn	Np	Na	Rm	Sh	Rn	To	Pm	Wo
Gekkonidae												
Gehydra mutilata		*										
G. oceanica	15	12	2	3		1	11	2	2		1	
Lepidodactylus lugubris	1	10	1			1	2		1		1	7
Nactus pelagicus	7	1	1			1	5	3				
Perochirus ateles	6	*	3	3	1	1	1		5		1	
Scincidae												
Emoia boettgeri	5	6	1	1		+	2		+		1	
E. caeruleocauda		1										
E. impar	7	11	4	2	1	7	2		1	1	1	
E. jakati	2	3	1								*	
Eugongylus albofasciolatus	+	2	+				1					
Lamprolepis smaragdina	1	5	2	1	2	+	+		2	+	1	

[a] Localities are listed clockwise: Ps = Pasa, Ni = Nikalap Aru, Im = Imwinyap, Pn = Panshanki, Np = Nakappu, Na = Naron, Rm = Remba, Sh = Shikaroi, Rn = Renipiua, To = Tolonmurui, Wo = Wolouna.

Table 2. Relative abundance of lizards on Ant Atoll.

Species	Individuals observed per km		Status[c]
	Forest[a]	Strand[b]	
Gekkonidae[d]			
Gehyra mutilata	0		?[e]
G. oceanica	8.8		C
Lepidodactylus lugubris	0.6		UC-FC
Nactus pelagicus	5.6		FC
Perochirus ateles	0.9		UC-FC
Scincidae[e]			
Emoia boettgeri	22.3	10.4	C
E. caeruleocauda	0	0	S
E. impar	57.5	22.0	C
E. jakati	0.8	2.0	S-UC
Eugongylus albofasciolatus	0	0	S-UC
Lamprolepis smaragdina	2.5	9.6[f]	C

[a] The distances (km) covered during transect counts on each island are: Pasa 0.8 day/1.0 night, Nikalap Aru 1.7/0.8, Imwinyap 0.8/0, Panshanki 0.2/0, Nakappu 0.2/0, Naron 0.5/0.5, Remba 0.2/0.5, Shikaroi 0/0.6, Pamuk 0.9/0 (total = 5.3 km/3.4 km).

[b] The distances (km) covered during daytime transect counts on each island are: Pasa 2.2, Nikalap Aru 1.6, Nakappu 0.4, Naron 0.5, Remba 0.2 (total = 4.9 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 in trees at the forest/strand edge.

ground. It was the only gecko I observed foraging in coral rubble at the strand line. The specimens I collected are the first records for Ant Atoll.

Perochirus ateles.—The Micronesian gecko is common to fairly common in forest and has been recorded on nearly all the islands. Most of the specimens were taken from beneath dead bark on tree trunks during the day, syntopically with *Gehyra oceanica.* A clutch of about 15–20 hatched eggs that I found in a rotted *Cocos* stump on Nikalap Aru in Aug. probably belonged to *P. ateles.* In their size and placement, the eggs closely resembled those of *P. ateles* I collected on Pakin Atoll earlier in the year. I did not encounter the Micronesian gecko on Nikalap Aru, but Marshall (1957) collected it there in Dec. 1955.

Emoia boettgeri.—Boettger's skink is common in forest and shaded coastal strand, but less numerous in more open, sun-exposed areas. I usually saw it on the ground and less frequently on the trunks of large trees, especially breadfruit (*Artocarpus*). Marshall (1957) collected *E. boettgeri* on Nikalap Aru in Dec. 1955.

Emoia caeruleocauda.—A Pacific blue-tailed skink that I collected on the side of a trail through forest and near the site of the old hotel on Nikalap Aru on 3 August 1994 is the only record.

Emoia impar.—The blue-tailed copper-striped skink is the most common lizard on the atoll and has been recorded on all but Shikaroi (probably an artifact of sampling) and Wolouna. I observed *E. impar* mainly in forest on the ground and in low vegetation, although it readily climbed trees to avoid capture. It was also common in strand vegetation, where *E. cyanura* is the predominant lizard on the other Pohnpei state atolls I have surveyed—Mokil, Pingelap, and Pakin. Marshall's (1957) sight records (no specimens collected) of small, dorsally striped skinks with bluish tails on Ant Atoll, which he reported under *E. cyanura,* probably pertain to *E. impar.* The specimens I collected are the first confirmed records.

Emoia jakati.—The Jakati skink is scarce to uncommon and usually found in open, sunlit areas of forest and coastal strand with ground cover of weeds and grasses. I saw it occasionally on Pasa and Nikalap Aru during Aug. The only records west of the main channel into the lagoon are one I collected on Imwinyap on 18 July and one collected by Marshall (USNM 139062) on Pamuk during 10–11 Dec. 1955. The "striped bronze skink" mentioned by Marshall (1957) doubtless is *E. jakati,* but the Pamuk specimen was apparently inadvertently listed under Pukennge (= Nikalap Aru). There are no USNM records of *E. jakati* from Nikalap Aru (Crombie, unpubl. check-list) and Marshall's field notes summarizing records for 9–12 Dec. 1955 state "all the lizards came from Pukennge . . . except for the striped bronze skink, which was from Imuntiati," a village at the eastern end of Pamuk.

Eugongylus albofasciolatus.—I saw no more than eight *E. albofasciolatus* on three islands (Nikalap Aru, Imwinyap, Remba) over a period of 16 days during July, Aug., and Nov., and G. Suhm saw one on Pasa on 21 Jan. 1995. Marshall (1957) recorded it on Nikalap Aru in Dec. 1955. All those I saw were on the ground, mainly in grassy, weedy areas or on the forest floor where there was an accumulation of plant debris, including heaps of discarded *Cocos* husks. They were active throughout the day, from about 0900 to late dusk. The population may be larger than the scanty sightings suggest as their furtive movements, cryptic coloration, and tendency to hide when disturbed make detection difficult.

Lamprolepis smaragdina.—The green tree skink is common and widely distributed. It is the most arboreal of the skinks on the atoll and is usually seen on tree trunks (especially *Cocos*) and limbs, as well as on shrubs and vines, and only occasionally on the ground. Of the 79 for which I recorded dorsal coloration, 32 (41%) were distinctly green, 19 (24%) were brown, and the remaining 28 (35%) were intermediate (brownish green, greenish brown, yellowish brown). Marshall (1957) collected *L. smaragdina* on Nikalap Aru in Dec. 1955.

BIRDS

White-tailed Tropicbird (*Phaethon lepturus*).—Scarce visitor. Marshall (unpubl. field notes) listed *P. lepturus* among the birds he observed at Wolouna in May 1956. There are no other records. I observed small numbers of *P. lepturus* regularly between Pohnpei (where it is common in mangroves and montane forest—Engbring et al. 1990) and Ant Atoll, but none during my stay on the atoll.

Red-footed Booby (*Sula sula*).—Common to very common resident on Wolouna but unrecorded elsewhere. I saw three adults and five young each on a nest, four other young perched in trees, and about six other young (all presumably *S. sula*) being taken away by visiting Pohnpeians, all on 15 July 1994. I also saw about 100 *S. sula* on 21 Jan. 1995, including five adults on nests, along with ten other nests each with one downy white young. All the nests were 3–8 m high and mainly in *Tournefortia* along the northeastern shore. Marshall (1957) reported hundreds of frigatebirds and "boobies" gathering over Wolouna in the late afternoon and roosting overnight during 14–16 May 1956. His unpublished field notes indicate about 40 *S. sula* were seen, and one female (USNM 461663, original number 5120) was collected from its roost at dusk on 14 May (label reads 15 May) 1956. Additionally, a live immature booby captured on Wolouna and brought to Marshall on Pamuk on 11 Dec. 1955 probably was *S. sula* based on Marshall's field notes—" orange feet, bluish throat, brown above, white below." It was not saved.

Brown Booby (*Sula leucogaster*).—Uncommon resident on Wolouna, but unrecorded elsewhere. I saw one immature with distinctly bicolored underparts (dark anteriorly, pale posteriorly) perched in a tree on 15 July, and about ten adults and several nests (two each with two eggs, one with one hatchling, and three each with one downy white young), all on the ground beneath *Tournefortia* on the northeastern shore on 21 Jan. 1995. Whether *S. leucogaster* was among hundreds of frigatebirds and boobies observed by Marshall (1957) in May 1956 is unknown.

Great Frigatebird (*Fregata minor*).—Probably an uncommon to common resident breeding on Wolouna Island. Pohnpeians have told me it is occasionally among young seabirds collected for food and is selected above others to be raised as pets, often being trained to take food from the hand. I observed one downy white young (presumably *F. minor*) being carried away by a "hunter" from Pohnpei on 15 July, but I found no other indication of nesting then, and the only adult I saw in July and Aug. was in flight over the lagoon. At Wolouna on 21 Jan. 1995, I saw 50–100 adults and subadults in flight and at least five nests each with a downy young. Marshall (1957) recorded *F. minor* gathering over Wolouna in the afternoon and roosting at night in May 1956.

Pacific Reef-Heron (*Egretta sacra*).—Uncommon to fairly common and presumed resident. The Pacific Reef-Heron occurs regularly on beaches and reef flats throughout the atoll; breeding is undocumented but very probable. Marshall (1957) observed *E. sacra* on Nikalap Aru in Dec. 1955. Engbring et al. (1990) recorded it on Nikalap Aru and Imwinyap in June, and they counted ten on Wolouna on 12 June 1983. Of the 12 they recorded as to color, seven were dark phase and five were white. Of the 25 I recorded throughout the atoll during my visits, 13 were dark, and six each were white or piebald. During July and Aug., I counted an average of 1.2/km while walking along beaches and interisland flats between Pasa and Pamuk (Table 3).

Red Junglefowl (*Gallus gallus*).—Introduced and feral. Marshall (1957) reported chickens in the settlements he visited on Ant Atoll, but none "feral in the

Table 3. Status and abundance of birds on Ant Atoll based on general observations and transect counts. Asterisks indicate new atoll records; nc = observed on transect but not counted.

Species	Status[a]	Density	
		Birds/km[b]	Birds/ha[c]
White-tailed Tropicbird	NBV S		
Red-footed Booby	B C-VC[d]		nc
Brown Booby	B UC[d]		nc
Great Frigatebird	B UC-C[d]		
Pacific Reef-Heron	(B) UC-FC	1.2	
Red Junglefowl	(B) S/I		0.1
Pacific Golden-Plover*	NBV S[e]		
Tattler spp.**	NBV UC[e]	0.5	
Whimbrel*	NBV UC[e]		
Bristle-thighed Curlew*	NBV S[e]		
Bar-tailed Godwit*	NBV S[e]		
Ruddy Turnstone*	NBV UC[e]	0.7	
Great Crested Tern	B UC		
Black-naped Tern*	(B) S-UC	0.3	
Sooty Tern	B FC-VC[d]		
Brown Noddy	B C-VC	nc	nc
Black Noddy	B VC	nc	nc
Common Fairy-Tern	B UC-FC	nc	nc
Micronesian Pigeon	(B) UC		0.2
Pohnpei Lory	(B) UC		0.3
Micronesian Kingfisher	(B) FC		0.9
Caroline Islands Reed-Warbler	B C		1.0
Micronesian Starling	B VC		4.5
Micronesian Honeyeater	B VC		2.7

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

[b] Based on coastal surveys only and from upper beach to reef edge (total distance = 13.6 km).

[c] Based on forest surveys only: Pasa 0.8 km, Nikalap Aru 2.3, Imwinyap 0.8, Panshanki 1.0, Nakappu 0.2, Naron 0.5, Remba 0.2, Shikaroi 0.3, Renipiua 0.7, Tolonmurui 0.1, Pamuk 1.1, Wolouna 0.1 (total = 8.1 km).

[d] Recorded on Wolouna Island and adjacent reef and lagoon area only.

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

jungle," and none was recorded by Engbring et al. (1990). I heard at least two *G. gallus* calling near the old hotel grounds on Nikalap Aru during Aug., and another on Imwinyap on 25 Nov. The lack of permanent human habitation on Ant for the past two decades suggests these birds are part of a feral population.

Pacific Golden-Plover (*Pluvialis fulva*).—Nonbreeding visitor. I saw one *P. fulva* on Panshanki on 21 July, and another on Nikalap Aru on 4–5 Aug. Marshall (unpubl. field notes) recorded *P. dominica* (= *P. fulva*) on Wolouna in May 1956

and "*Pluvialis*" (presumably *P. fulva*) during visits to Nikalap Aru and Pamuk in Dec. 1955.

Wandering Tattler (*Heteroscelus brevipes*) and Gray-tailed Tattler (*H. incanus*).—Nonbreeding visitors. I observed one to several tattlers daily throughout Ant Atoll during July, Aug., and Nov. 1994. The darkest birds were *H. brevipes* and one conspicuously pale gray bird with much white on the underparts seen on Panshanki on 18 July doubtless was *H. incanus.* However, I report all the records as a species pair because most were seen under poor viewing conditions when identification was uncertain. Both *H. incanus* and *H. brevipes* occur throughout Micronesia in migration (Pratt et al. 1987). Marshall (unpubl. field notes) included "*Heteroscelus*" in his observations at Ant Atoll during Dec. 1955 and May 1956.

Whimbrel (*Numenius phaeopus*).—Nonbreeding visitor. I saw one on Renipiua on 16 July, and three or four others on beaches between Imwinyap and Pamuk on 25 and 26 Nov. These are the first records. All the birds had moderately long curlew-type bills, striped crowns, and brown-colored rumps that were evident in flight, and they were clearly seen at 10–50 m with 10 × 40 binoculars.

Bristle-thighed Curlew (*Numenius tahitiensis*).—Nonbreeding visitor. I saw one on a sandspit at the western end of Nikalap Aru on 4 and 5 Aug. 1994, and another on Wolouna on 21 Jan. 1995. The rufous rump and base of tail were evident when the birds flew. Marshall (unpubl. field notes) recorded *N. tahitiensis* on Wolouna in May 1956.

Bar-tailed Godwit (*Limosa lapponica*).—Nonbreeding visitor. The one I saw on a sandspit at the western end of Nikalap Aru on 4 and 5 Aug. 1994 is the only record. The white rump and barred tail were seen clearly with 10 × 40 binoculars when the bird flushed at distances of 20–50 m.

Ruddy Turnstone (*Arenaria interpres*).—Nonbreeding visitor. I saw *A. interpres* occasionally, usually in small flocks of 5–10, throughout the atoll in July, Aug., and Nov. 1994 (max. 20 together on Wolouna on 15 July), and saw about 100–200 in flocks of up to 40 on Wolouna on 21 Jan. 1995. Marshall (unpubl. field notes) recorded *A. interpres* on Wolouna in May 1956 and considered it the most common waterbird on Ant Atoll (at least on Nikalap Aru, and Pamuk) in Dec. 1955.

Great Crested Tern (*Sterna bergii*).—Uncommon resident. Marshall (1957) recorded a large colony (with eggs) on Wolouna during 14–16 May 1956. I observed 10–15 adults along with several recently fledged young on Wolouna on 15 July, and other adults in flight over the lagoon and reef flats occasionally during July, Aug., and Nov. 1994.

Black-naped Tern (*Sterna sumatrana*).—Probably a scarce to uncommon resident. I observed eight recently fledged young and three territorial adults at Tolonmurui on 16 July, 4 adults at Remba on 17 July, three adults circling agitatedly over a large, sparsely vegetated rock on the reef flat between Pasa and Nikalap Aru on 2 Aug., and 3–4 adults along the channel into the lagoon on 4 Aug. and 25 Nov. 1994. Marshall (unpubl. field notes) recorded *S. sumatrana* at unspecified localities at Ant in Dec. 1955, and on Wolouna in May 1956.

Sooty Tern (*Sterna fuscata*).—Fairly common to very common resident on Wolouna, but unrecorded elsewhere. I saw 15 flightless young scurrying beneath

Tournefortia shrubs on 15 July. The dark backs with pale flecks and the pale venters distinguished them from young of other tern species. I also saw a colony of about 150 adults, at least 20 ambulatory but flightless young, and many eggs within a 30 m span of strand at the same site on the eastern shore on 21 Jan. 1995. Engbring et al. (1990:230) included the Sooty Tern in an unannotated list of seabirds known to breed on Wolouna.

Brown Noddy (*Anous stolidus*).—Common to very common resident. The Brown Noddy is abundant throughout the atoll, excluding Wolouna, where it is unrecorded and which is occupied by a large colony of *A. minutus.* Engbring et al. (1990) reported *A. stolidus* as "abundant" on Nikalap (514/km^2) and Imwinyap and heard young calling in June 1983. I observed *A. stolidus* on all islands from Pasa to Pamuk during summer 1994. Most of the birds were observed in flight over *Cocos* forest, and others (including young) were heard calling while concealed presumably in nests or roosts in the tops of coconut trees. Marshall (unpubl. field notes) considered it the second most abundant waterbird (after *Arenaria interpres*) on Nikalap and Pamuk in Dec. 1955.

Black Noddy (*Anous minutus*).—Very common resident. Marshall (1957) recorded *A. minutus* nesting in trees on Wolouna during 14–16 May 1956. Engbring et al. (1990) observed breeding on Wolouna in June 1982 and again in June 1983 when they estimated 6,000 active nests and "15,000 or more" birds. They did not encounter the Black Noddy on Nikalap Aru and Imwinyap. I saw *A. minutus* regularly throughout the atoll, including small breeding colonies of about 5–50 pairs each on Panshanki (3 separate colonies), Renipiua (1), and Pamuk (1) in July 1994. The nests were high in the crowns of broadleaf trees, including *Cordia, Guettarda, Hernandia, Neisosperma,* and *Pisonia.* I observed a large colony with many eggs and young on Wolouna on 15 July 1994 and counted an average of about 50 active nests per 100 m^2, roughly estimating a total of about 6,000 nests on the island. There was a similar number of nesting birds on 21 Jan. 1995 and many nests contained eggs or (less frequently) downy young.

Common Fairy-Tern (*Gygis alba*).—Uncommon to fairly common resident in forest throughout. Marshall (1957) recorded *G. alba* nesting in trees on Wolouna in May 1956, and Engbring et al. (1990) observed "about a dozen birds" each on two visits in June 1982 and 1983. I saw 5–10 adults on 21 Jan. 1995 and small numbers (in pairs or groups of 3–6) regularly on most of the other islands during July, Aug., and Nov. 1994.

Micronesian Pigeon (*Ducula oceanica*).—Probably an uncommon resident, but breeding is undocumented. Marshall (1957) recorded the Micronesian Pigeon on Nikalap Aru in May 1956, and Engbring et al. (1990) considered it "abundant on the larger islets," recording 27/km^2 on Nikalap Aru in June 1983. I saw and heard *D. oceanica* in small numbers (2–3 together maximum) in forest and coastal scrub on all islands with the exception of Nakappu, Tolonmurui, and Wolouna in July and Aug. 1994. I recorded 14.9/km^2 for the entire atoll making it the least common of the land birds.

Pohnpei Lory (*Trichoglossus rubiginosus*).—Uncommon and presumed resident. I saw Lories on Imwinyap, Panshanki, Naron, Remba, and Pamuk in July,

Aug., and Nov. 1994. H. Segal (pers. comm.) saw *T. rubiginosus* on Pasa on 21 Jan. 1995, and Engbring et al. (1990) recorded it on Nikalap Aru in June 1983. Marshall (1957) saw Lories on Nikalap Aru and observed trees "with holes in which Lories were evidently nesting" on Pamuk in Dec. 1955.

Micronesian Kingfisher (*Halcyon cinnamomina*).—Fairly common and presumed resident; breeding is undocumented but very probable. The Micronesian Kingfisher is widespread in forest throughout, being unrecorded only on Wolouna and Pasa. In July and Aug., many birds were paired and aggressively territorial, swooping down from moderately high perches and scolding vociferously as I passed by. Kingfishers were also recorded on Ant by Marshall (1957) and Engbring et al. (1990). The Micronesian Kingfisher ranked 6th (last) in relative abundance among land birds in 1956 (Marshall, unpubl. field notes), 5th in 1983 (Engbring et al. 1990), and 4th in 1994 (this study). Whether these rankings reflect an increase in the Kingfisher population, a decrease in other species, or possibly differences in methods and observers is unknown.

Caroline Islands Reed-Warbler (*Acrocephalus syrinx*).—Common resident in forest and coastal scrub. *A. syrinx* is most numerous in thickets and dense understory, and less frequent in the forest canopy. I observed it on all islands with the exception of Tolonmurui, and it is the only land bird recorded on Wolouna, which supports several presumed breeding pairs (this study and Marshall 1957). *A. syrinx* was recorded on Nikalap Aru by Marshall (1957) and Engbring et al. (1990). I found one nest about 1.5 m high in an *Allophylus* sapling at the forest edge on Pamuk on 16 July, and another about 4 m high in a *Guettarda* sapling on Naron on 20 July. Both nests were cup-shaped and comprised largely of grasses and delicate plant fibers woven around the junction of three or more diverging branches. No eggs or young were present, but an adult entered the nest at Pamuk and a pair of adults was observed within 1–2 m of the nest on Naron.

Micronesian Starling (*Aplonis opaca*).—Very common resident. Marshall (1957 and unpubl. notes) recorded *A. opaca* on Nikalap Aru, and Engbring et al. (1990) observed it on Nikalap Aru and Imwinyap. I saw Micronesian Starlings (often in small groups of 3–6) on all the islands with the exception of Wolouna, where it has never been recorded. It was the most abundant land bird on the atoll in July and Aug. 1994, although my estimate of 450/km^2 atoll-wide is well below that of 1,841/km^2 recorded by Engbring et al. (1990) for Nikalap Aru in June 1983. Marshall (unpublished field notes) considered it the second most common land bird (after *Myzomela rubratra*) in Dec. 1956. No eggs or flightless young have been observed, but breeding is almost certain. Engbring et al. (1990) reported seeing an adult with nesting material on 12 June 1982. I observed many immatures with streaked breasts during July and Aug., and at least one adult made several visits to the crown of a *Cocos* tree where nestlings were calling during 1–4 Aug. 1994. Marshall (unpubl. field notes) collected a juvenile female (USNM, original number 5025) that was soliciting food from adults on Nikalap Aru on 11 Dec. 1955.

Micronesian Honeyeater (*Myzomela rubratra*).—Very common and presumed resident. The Micronesian Honeyeater currently is the second most nu-

merous land bird on Ant Atoll, after the Micronesian Starling (this study and Engbring et al. 1990); Marshall (unpubl. field notes) considered it the most numerous in 1955. I observed it frequently in all habitats, from coastal scrub to forest understory and canopy, and on all islands with the exception of Wolouna. Breeding is undocumented, but I observed several recently fledged young soliciting food from adults during summer 1994.

MAMMALS

Pteropus molossinus.—The Pohnpei fruit bat is fairly common in forest, averaging 0.4 per hectare on survey counts throughout the atoll during July and Aug. 1994. I recorded it on Pasa, Nikalap Aru, Imwinyap, Panshanki, Naron, Remba, Renipiua, and Pamuk. It was usually observed during the day and in flight at the level of the forest canopy. One pair was copulating while hanging high from a *Cocos* frond on Nikalap Aru on 4 Aug. Marshall's (1957) sight records of *Pteropus* on Nikalap Aru in Dec. 1955 probably pertain to *P. molossinus*

Emballonura sulcata.—The only record of a sheath-tailed bat or of any microchiropteran on a Pohnpei state atoll is one that I observed in flight along the beach on Remba on 18 July 1994. Presumably, it was a stray from Pohnpei, where *E. sulcata* is common (pers. obs.).

Rattus spp..—Johnson (1962) listed two male *Rattus rattus* and one female *R. exulans* as collected on Nikalap Aru by J. Marshall on 10 Dec. 1955. Marshall (1957) considered both species abundant on Nikalap Aru, but did not see any rats on Wolouna in May 1956. Ayres et al. (1979) recorded *R. rattus* and *R. exulans* among undated skeletal remains at an archaeological site on Imwinyap in 1978. I saw rats frequently (up to six in view together on Imwinyap during midday on 18 July 1994), and on nearly every island from Nikalap Aru westward to Pamuk, but none on Wolouna and Pasa, which apparently are the only rodent-free islands (pers. obs. and information from regular visitors). The 12 I collected in July and Aug. 1994 on Nikalap Aru (5 males, 3 females), Naron (1 m.), Remba (1 m., 1 f.), and Shikaroi (1 m.) all were *Rattus rattus.* In head/body length, the males ranged from 170–210 mm ($\bar{x}$ = 186.0) and females measured 188–211 mm ($\bar{x}$ = 199.8). The males weighed 140–249 g ($\bar{x}$ = 182.4) and females were 160–265 g ($\bar{x}$ = 220.0).

Canis familiaris.—Marshall (1957) recorded domesticated dogs during visits to Nikalap Aru and Pamuk in Dec. 1955. Ayres et al. (1979) excavated dog bones from an undated archeological site on Imwinyap and suggested that the animals were consumed during "the ritual feasting of high status people on Ant." I saw one dog on Nikalap Aru that probably belonged to the caretaker who occasionally visits the island.

Felis catus.—Marshal (1957) recorded domesticated cats during his visits to Nikalap Aru and Pamuk. I did not see any on Ant Atoll, but S. Santos, whose uncle is the local caretaker, indicated cats were feral on Pasa and probably on other islands.

Sus scrofa.—Marshal (1957) recorded domesticated pigs during visits to Nikalap Aru and Pamuk, but none feral. H. Segal (pers. comm.) reported pigs were

common on Pasa at least into the 1980s. I observed about 30 semiferal pigs on Nikalap Aru in July and Aug. 1994, but none elsewhere.

Discussion

Thirteen species of reptiles, 25 birds, and seven mammals are recorded from Ant Atoll. Introduced species include *Gallus gallus* among birds, and five mammals (*Rattus rattus, R. exulans, Canis familiaris, Felis catus, Sus scrofa,*). *Pteropus molossinus* is the only indigenous resident mammal, whereas *Emballonura sulcata* is recorded as a probable vagrant. The herpetofauna consists of two sea turtles, five geckos, and six skinks. Crombie and Steadman (1987) suggested that nearly all lizard species on remote Pacific islands may be considered introduced, but in the absence of any direct evidence of human transport, I have treated all the reptiles as indigenous. Both turtles (*Chelonia mydas, Eretmochelys imbricata*) and three lizards (*Nactus pelagicus, Emoia caeruleocauda, E. impar*) are first records for Ant Atoll.

The indigenous avifauna is comprised of eight nonbreeding visitors and 16 documented or presumed resident breeders, including six land birds, six species of terns, two boobies, a frigatebird, and a heron. Additional observations during winter doubtless will add to the number of migrants, but additional breeders are unlikely to be found, especially among the land birds. Both Marshall (1957) and Engbring et al. (1990) recorded only the same six species of land birds that I report here. The three most common species in decreasing order of abundance, and in roughly the same proportion in the Engbring et al. survey and in mine are Micronesian Starling, Micronesian Honeyeater, and Caroline Islands Reed-Warbler. The disparity in absolute counts for the three, with the Engbring et al. (1990) estimates of birds/km^2 much higher than mine (1,841 vs. 450 for starling, 1,548 vs. 271 for honeyeater, and 369 vs. 97 for reed-warbler), may be attributed to any one or a combination of factors, including 1) real differences in population size, 2) method—morning point counts (Engbring et al. 1990), vs. strip transects throughout the day (this study), and 3) sample area—Nikalap Aru only (Engbring et al. 1990) vs. all 12 islands (this study). Marshall (1955, unpubl. field notes) also reported the starling, honeyeater, and reed-warbler as being the three most common land birds, although he ranked the honeyeater ahead of the starling. He did not estimate population size.

Land bird species are widely distributed throughout the forest and appear to be most numerous overall at the forest edge. Lizards showed more obvious partitioning of habitat space. Among the skinks, *Eugongylus albofasciolatus* and *Emoia jakati* were completely terrestrial, with the larger and more robust *Eugongylus* being more frequent in shady, densely vegetated areas near cover, and the smaller and more gracile *E. jakati* being more numerous in sand strand, especially among vines and grasses. *Emoia impar* and *E. boettgeri* were common on the ground and low in the vegetation, but frequently evaded capture by climbing large trees, especially breadfruit (*Artocarpus*). *Lamprolepis smaragdina* was the most arboreal among skinks, occurring mainly on trees, vines, and shrubs, and only

occasionally encountered on the ground. With the exception of *Lepidodactylus lugubris,* all the gecko species were observed throughout the forest on tree trunks and branches at night. All *L. lugubris* were found in sand strand, forest edge, and in little-used or abandoned buildings. *Nactus pelagicus* was the only gecko observed foraging on the ground in coral rubble at night, but it also occurred in forest.

Wolouna Island has the fewest land birds (only *Acrocephalus syrinx*) and reptiles (only *Lepidodactylus lugubris*) of any island on the atoll, but it is one of the most important breeding sites for seabirds in the Pohnpei area. It supports roughly about 6,000 pairs of Black Noddy and much smaller numbers of Red-footed Booby, Brown Booby, Great Frigatebird, Great Crested Tern, and Sooty Tern. According to many Pohnpeians, visitors to Wolouna frequently take young birds as food, and young frigatebirds are popular as "pets." These "traditional" depredations, however, seem to be on a small scale and may not be especially deleterious to the populations—*A. minutus* was no less common during my study than it was in the early 1980s (Engbring et al. 1990). Many Pohnpeians indicate also that the terns and perhaps other seabird species breed throughout the year. I found just as many active nests of *A. minutus* in Jan. 1995 as in July 1994.

The number of visitors to Wolouna and the harvesting of seabirds probably were much greater in the past when people resided on Ant and subsisted largely on local foods rather than on imported goods. Nevertheless, seabirds, particularly the pelicaniforms cannot tolerate any but very slight exploitation due to their very low reproductive rate. Wolouna should be established as a protected area and the exploitation of nesting seabirds discouraged because the island is ecologically very vulnerable. An increasing number of visitors will probably have a negative impact, and W. Hawley, a member of the Nanpei family, reported one incident to me of a "hunter" who was shooting indescriminantly into nesting colonies, with hundreds of dead and dying birds on the ground.

Acknowledgments

For providing historical information about Ant Atoll, I thank G. Ashby, A. Edward, K. Elanzo, E. Eperiam, T. Liwy, R. Mauricio, J. Nanpei, S. Santos, and H. Segal. I am grateful to A. Edward for assistance in arranging transport to Ant Atoll and to R. Nakasone for his enthusiastic help in the field. I also thank T. Hartsell and R. Crombie for information on herpetological specimens in the USNM collection, J. Marshall for copies of selected pages from his field notes, G. Zug for identification of several atypical examples of *Emoia impar,* and D. Herbst for confirming identification of *Ficus prolixa.* Field expenses were defrayed in part by grants from the South Pacific Regional Environment Programme (SPREP) and the Pacific Island Network (PIN).

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Received 9 Mar. 1995, revised 11 Dec.

Addendum.—The inadvertent omission of records from USFWS biologists in June 1981/82/83, and reported by Pyle and Engbring (1987: 'Elepaio 47:11–15) was discovered as this paper was going to press. Approximately 2,000 Red-footed Boobies, some actively nesting, were observed on Wolouna in 1982 and again in 1983, two Mongolian Plovers (*Charadrius mongolus*) were seen on Panshanki in 1983, two Bristle-thighed Curlews were seen on Wolouna in 1982, and three others and two Sanderlings (*Calidris alba*) were recorded in 1983. The Mongolian Plovers and Sanderlings, both being nonbreeding visitors and first records for Ant Atoll, bring the total number of bird species recorded to 27.