

## Reptiles, Birds, and Mammals of Oroluk Atoll, Eastern Caroline Islands

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**Abstract**—Ten species of reptiles, 17 birds, and four introduced mammals are recorded from Oroluk Atoll, Federated States of Micronesia; none is endemic. The rock gecko (*Nactus pelagicus*), Micronesian gecko (*Perochirus ateles*), Pacific Reef-Heron (*Egretta sacra*), Black-bellied (=Gray) Plover (*Pluvialis squatarola*), and Sharp-tailed Sandpiper (*Calidris acuminata*) are reported from the atoll for the first time. The Micronesian Starling (*Aplonis opaca*) is the only indigenous resident land bird. Oroluk Island is an important nesting site for the green turtle (*Chelonia mydas*), and it hosts a large breeding colony of Black Noddies (*Anous minutus*) and lesser numbers of at least four other breeding seabirds. The atoll has been declared a Marine Sanctuary by Pohnpei State government and traditional leaders, but regulations regarding resource utilization and management are still being formulated.

### Introduction

Many of the far-flung islands of the tropical Pacific are poorly known biologically; published reports are scanty and widely scattered throughout the scientific literature. Terrestrial vertebrates have been recently surveyed on five of eight Pohnpei State atolls, Federated States of Micronesia, including Mokil and Pingelap (Buden 1995), Ant (Buden 1996a), Pakin (Buden 1996b), and Kapingamarangi (Buden 1998 and in prep). Of the three remaining atolls, Oroluk is the smallest in total land area but the most frequently visited by biologists, mainly to study nesting sea turtles.

*Biological Explorations of Oroluk.*—J. T. Marshall visited Oroluk during 5–6 June 1956 in connection with a Pacific Islands rat ecology project. Marshall's (1957) report includes a brief description of vegetation together with his observations on the fauna, and it represents the first biological survey of terrestrial vertebrates on Oroluk. Observations on sea turtles nesting in November 1964 by the District Administrator of Truk (= Chuuk) during a helicopter flyover, and additional observations on turtles by B. Sablan, Pohnpei Fisheries Department, in July 1975 were reported by Pritchard (1981). T. Herring, a Peace Corps Volunteer working for the Pohnpei Marine Resources Division visited Oroluk during 1 June–10 July 1985 accompanied by other Division personnel. Herring's (1986) report

includes turtle nesting data for 1985 (contributed in large measure by local residents) together with a census of coconut crabs (*Birgus latro*). Other Marine Resources personnel visited the atoll in May 1986 to continue monitoring turtle nesting activity, and Edson & Curren (1987) summarized tagging and census results for the months April-August. J. Vindum and S. Turpie collected 15 specimens among four species of lizards on Oroluk on 7 February 1986 while visiting several Pohnpei State atolls aboard the government supply ship; the specimens were deposited in the California Academy of Sciences (CAS 159732-745, 160108). An inventory of fish, marine turtles, algae, corals, giant clams, and sea cucumbers was conducted by a team of nine investigators on behalf of Pohnpei State and FSM governments during 29 November-3 December 1990. The report of the expedition (Holthus et al. 1991) included ancillary data on birds and

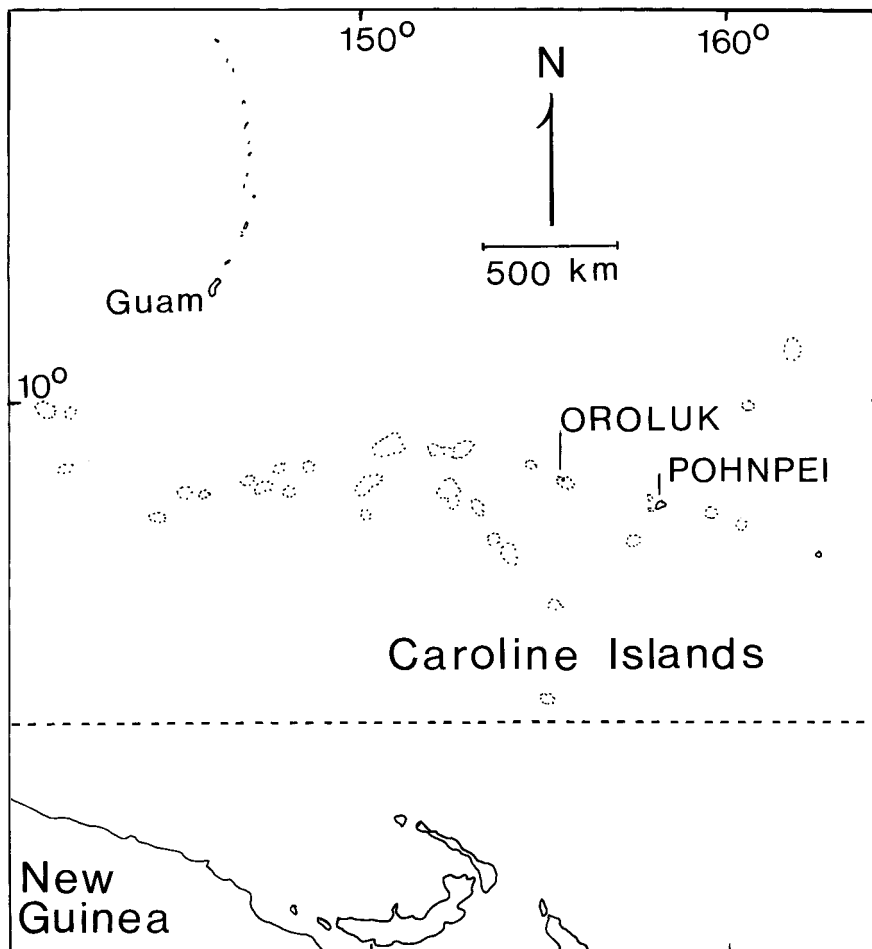


Figure 1. Oroluk map; broken line = equator.

vegetation; additional information on turtles was presented separately (Naughton 1991). Pohnpei Marine Resources personnel revisited the atoll during March/April and again in December 1996 to assist with the turtle tagging and surveillance program; results are on file at Pohnpei Marine Resources Division, Kolonia.

The present study brings together available information on the terrestrial vertebrates of Oroluk Atoll, and is based largely on my observations during an opportunistic visit via private sailing vessel from Pohnpei, 21-26 December 1997.

### Study Area

Oroluk Atoll (Pohnpei State, Federated States of Micronesia, Eastern Caroline Islands) is approximately 325 km west/northwest of Pohnpei at 7° 32' N, 155° 17' E (Fig. 1). It is about 31 km long (northwest to southeast) and 20 km wide; the lagoon covers 420 km<sup>2</sup>. Oroluk Island, which is located in the northwestern corner of the atoll has a land area of about 13 ha and is the only vegetated island. Numerous tiny sand cays and exposed rocks covering about 37 ha are scattered along the edge of the reef, which is transected by 16 channels or passes (Bryan 1971). Oroluk Island has been inhabited intermittently since at least the 1930s when as many as 42 people resided (Pritchard 1977). Since the 1960s, the population has ranged from 0–20 (Herring 1986; Pritchard 1977, 1981; Naughton 1991); the current population is 15.

The vegetation is mainly *Cocos* forest with a scattering of breadfruit (*Artocarpus*) in the center and *Tournefortia* trees along the forest edge. *Ficus* sp., *Hibiscus tiliaceus*, *Morinda citrifolia*, and *Pandanus* sp. are common understory trees, and several species of grasses, ferns, and other herbaceous plants contribute ground cover. Rocky beach predominates along the northern and western (ocean-side) shores and sandy beach occurs mainly along the southern and eastern (lagoon-side) shores. Numerous work houses, living quarters, water catchments, and pig pens have been constructed at the southeastern end of the island, and the local residents have excavated small taro and banana pits in the interior.

### Methods

Vernacular and scientific names of birds follow Pratt et al. (1987) except the Pacific Golden Plover (*Pluvialis fulva*) is treated as a species distinct from the American Golden Plover (*P. dominica*). The terms of abundance for 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 (fewer than 1/day). In view of scanty records and limited observations, I treat all winter visitors and passage migrants as “nonbreeding visitors” without assessing abundance. For lizards, the terms are: common (at least 30 sightings/day under optimum conditions), fairly common (10–30/day), and scarce (no more than 5/day, and unrecorded on some days).

Status of lizards and birds was assessed by transect counts along with incidental observations and information obtained from local residents and the literature. All records are from the main island (Oroluk) unless otherwise stated. The Micronesian Starling (*Aplonis opaca*), which is the only resident land bird, was censused using estimated 50-m fixed-width, strip transects. Waterbirds (seabirds, shorebirds, herons) were recorded as individuals encountered per kilometer on walks along beaches, and covering the area from the strand zone to the outer reef edge. Distances were estimated with the exception of three baseline measurements obtained with a topometric hipchain: island circumference (1,566 m), a 500-m transect from the settlement to the northern shore through the center of the island and roughly parallel to the long axis, and a 350-m transect across the island approximately perpendicular to the long axis.

The 73 specimens of lizards collected by hand were deposited in the B. P. Bishop Museum, Honolulu; the California Academy of Sciences, San Francisco; 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*.—Oroluk is the principle nesting area for the green turtle in Pohnpei State (Pritchard 1977). The nesting season extends from March to September (McCoy 1981) with possibly another peak in December and January (Pritchard 1977). Turtles have been reported nesting in November 1964 (Pritchard 1981), hatchlings were observed emerging from a nest on 20 December 1996 (P. Daams, pers. com.) and local residents reported three clutches deposited on 2, 21, and 27 December 1996 (Pohnpei Marine Resources Office, unpublished data). A "winter" nesting peak may be irregular as none was observed by the residents interviewed by Herring (1986).

Pritchard (1977, 1981) reported that "between 9 and 15 turtles nest on Oroluk on the average night with up to 20 on a very good night," but McCoy (1981) reported that resident islanders had complained of a decline in nesting activity during the 1970s and estimated about 40-100 females nesting per year. Herring (1986) recorded 50 clutches in 1985, and unpublished records in Pohnpei Marine Resources Office indicate 55 clutches recorded in 1996, and 54 in 1997, most of them in July, and the earliest being in April.

The harvesting of turtles and eggs and the construction of living quarters and pig pens on or immediately adjacent to nesting beaches probably has contributed to diminished numbers of turtles in recent decades. Marshall (1957) reported that 27 turtles "laying eggs in the beach sand" had been captured and taken to Pohnpei when he visited Oroluk in early June 1956, and McCoy (1981) indicated that turtles were kept in stone holding pens regularly to await transport to Pohnpei via the government field trip ship, about six times a year. Although overt commercial

exploitation has been discontinued, subsistence use of turtles on Oroluk continues to the present time. One of the islanders told Naughton (1991) that “residents take every turtle they encounter...[and that] only in peak summer nesting season are some turtles allowed to return to the sea.” One resident told me that just prior to our arrival, the crew of an FSM patrol boat was observed killing a turtle for food.

Naughton (1991) reported one adult and 14 juveniles (carapace length less than about 75 cm) foraging in the lagoon during 29 November–3 December 1990 and suggested that Oroluk Atoll “may be an important resident area for several life stages of green turtles.” During the present study (21–26 December 1997), two among our crew of recreational enthusiasts (T. Davis & E. Mecklenburg) spent considerable time exploring the shallow lagoon waters with mask and fins and reported seeing 10–12 turtles (maximum three together), all of them apparently *C. mydas* and juveniles. To what extent and in what directions the turtles of Oroluk travel is unknown as only two tagged specimens have been recovered after at least one breeding season—one tagged while nesting on 2 June 1986 was captured alive in Nanwan Bay, Taiwan on 18 April 1987 (Edson & Curren 1987), and another tagged on Oroluk on 6 June 1991 (carapace length 105 cm) was recaptured there on 10 July 1996 (Pohnpei State Marine Resources, unpublished data).

*Eretmochelys imbricata*.—The hawksbill turtle presently is uncommon at Oroluk but apparently was more numerous in the past. Resident islanders told Herring (1986) that “large numbers” once nested, but by the mid-1980s there was little or no nesting. No hawksbills were observed during the 1 June–10 July 1985 survey (Herring 1986), and only one was seen during underwater surveys in

Table 1. Relative abundance of lizards on Oroluk Atoll in December 1997.

Species	Specimens collected	Encounters		Status <sup>a</sup>
		per hour	per km	
Gekkonidae <sup>b</sup>				
<i>Gehyra oceanica</i>	6	1.1	1.6	FC-C
<i>Lepidodactylus lugubris</i>	12	2.1	3.0	FC-C
<i>Nactus pelagicus</i>	12	2.2	3.1	FC
<i>Perochirus ateles</i>	18	1.9	2.7	C
Scincidae <sup>c</sup>				
<i>Emoia boettgeri</i>	5	24.0	21.8	C
<i>Emoia impar</i>	6	44.0	40.0	C
<i>Eugongylus</i>				
<i>albofasciolatus</i>	3	0	0	S
<i>Lamprolepis smaragdina</i>	11	170.0	170.0	C

<sup>a</sup>Based on overview of specimens collected, transect counts, and general observations throughout the study; C = common, FC = fairly common, S = scarce.

<sup>b</sup>Counted during nighttime surveys in forest and forest edge habitats covering 7.0 km in 10.2 h.

<sup>c</sup>Counted during daytime surveys in forest and forest edge habitats covering 1.0 km in 60 min for *Lamprolepis smaragdina* (surveyed separately) and 1.1 km in 60 min for all other species.

November and December 1990 (Naughton 1991). Seven were tagged (but no clutches recorded) during 25 March–30 November 1996, and three were recorded in May, September, and October 1997, with three emerged clutches recorded on 1, 3, and 7 November (Pohnpei State Marine Resources, unpublished data).

*Gehyra oceanica*.—The oceanic gecko is fairly common in *Cocos* forest, with adults observed mainly on tree trunks at night and juveniles occurring mainly in low shrubs and herbs, especially in small patches of *Scaevola* and low *Tournefortia* along the beach (Table 1). It is most numerous in buildings throughout the settlement where it was the only gecko I recorded in one 20-minute survey, with an encounter rate of 60/h.

*Lepidodactylus lugubris*.—The mourning gecko is common in *Scaevola* shrubs along the beach and somewhat less numerous in the forest and settlement.

*Nactus pelagicus*.—The rock gecko was encountered regularly only on *Tournefortia* trunks at the forest edge on the windward side of the island, and occasionally on the ground in coral rubble on the upper beach. The greatest concentration was nine counted on *Tournefortia* trunks over a 90-minute period covering approximately 600 m of forest edge (6/h and 15/km). The lizards were no more than about 1.5 m high on the tree trunks.

*Perochirus ateles*.—The Micronesian gecko is common throughout the island, being most numerous on *Cocos* and *Tournefortia* trunks at the forest edge. Additionally, thirteen (72%) of the 18 lizards I observed in leaf axils of young *Cocos* were *P. ateles*. It is less common in edificarian habitats, where it is greatly outnumbered by the similarly-sized *Gehyra oceanica*.

*Emoia boettgeri*.—Boettger's skink is common in the *Cocos* forest, being most numerous on the forest floor in predominately shady, sun-dappled areas. It is less common on tree trunks and shrubs (only about 1-5% of initial sightings), but frequently climbs trees to avoid capture. I observed several individuals sleeping at night on the leaves of trees and herbs in the understory.

*Emoia impar*.—The blue-tailed copper-striped skink is common in broad patches of sunlight on the forest floor; approximately 15% of my sightings were on tree trunks and low in the vegetation. All the specimens from Oroluk listed under *E. cyanura* by Marshall (1957) probably are *E. impar*, as is the only one (USNM 139294) in Smithsonian collections (R. Crombie, in litt.).

*Eugongylus albofasciolatus*.—The reclusive litter skink is scarce on Oroluk. I saw no more than seven or eight in six days, and no more than three in one day. It is exclusively terrestrial and inhabits dense, weedy areas and piles of *Cocos* trash. The three I collected on 23 December are the first specimens, although Marshall (1957) observed it in June 1956.

*Lamprolepis smaragdina*.—The green tree skink is the most common lizard on the island, with encounter rates of 170/h and 170/km. It is largely arboreal, but at least 25% were on the ground, in contrast to less than about 10% on Pohnpei and other outlying atolls I have visited, including Ant, Mokil, Pakin, Pingelap, and Kapingamarangi. Extremes in dorsal coloration also are more marked on Oroluk than elsewhere in Pohnpei State, ranging from bright greenish yellow, to dull

green, to brown and occasionally solid black (with gray venter). Of the 170 for which I recorded dorsal coloration, 91 (54%) were green, greenish yellow, or yellowish green, 57 (34%) were brown or black, and 22 (13%) were intermediate. I observed several that were stretched out flat with limbs extended over broad leaf surfaces sleeping at night.

#### BIRDS

*Sula sula*.—The Red-footed Booby breeds in small numbers and mainly on a sand cay at North Pass (= Keltie Pass in Bryan 1971), about 20 km east of Oroluk Island. The islanders visit the cay occasionally (distance prohibits more frequent visits) to collect eggs and young. Two downy white young collected early in December were tethered on the beach at the Oroluk settlement while I was there, one of which was dead on 26 December. I saw none nesting or roosting on the main island, but I observed at least 6-7 black-and-white plumaged birds among a colony of about 50 boobies at North Pass Cay from a boat at considerable distance on 26 December. Marshall (1957) recorded boobies (“apparently both *S. sula* and *S. leucogaster*”) nesting in trees on the northern side of Oroluk

Table 2. Status and abundance of birds on Oroluk Atoll in December 1997, based on general observations, and transect counts; nc = observed on transect but not counted.

Species	Status <sup>a</sup>	Birds/km <sup>b</sup>
Red-footed Booby	B <sup>c</sup>	
Brown Booby	B <sup>c</sup>	
Great Frigatebird	B, FC	nc
Pacific Reef-Heron	?, S	0.2
Red Junglefowl (Chicken)	B, I, S	nc
Pacific Golden Plover	NBV	7.3
Black-bellied (=Gray) Plover	NBV	0.2
Tattler sp.	NBV	2.2
Whimbrel	NBV	0.8
Ruddy Turnstone	NBV	15.7
Sharp-tailed Sandpiper	NBV	0.3
Great Crested Tern	?, S	
Black-naped Tern	(B) <sup>c</sup>	
Brown Noddy	(B), C-VC	nc
Black Noddy	B, VC	[249.6/ha]
Common Fairy-Tern	(B), UC	1.3
Micronesian Starling	B, VC	52.5 [10.5/ha]

<sup>a</sup>B=resident year-round, breeding confirmed, (B)=resident year-round, breeding not confirmed but very probable, I=introduced, NBV=nonbreeding visitor, VC=very common, C=common, UC=uncommon, S=scarce, ?=resident status uncertain, possibly breeding.

<sup>b</sup>Distances covered include 2 km through *Cocos* forest for counts of Micronesian Starlings, 500 m through forest for the Black Noddy population density estimate, and 6 km along the shoreline for counts of all other species.

<sup>c</sup>Individuals observed mainly on rocks and sand cays and in flight along the reef, and rarely if at all on the main island.

Island in June 1956. "Masked Boobies recorded on Oroluk (1) and North Pass Cay (8) by Holthus et al. (1993) may have been *S. sula*. Three Red-footed Boobies banded as flightless young on Johnston Atoll early in 1994 (1347–11862, 1347–24726, 1347–24788) were captured by hand and in weakened condition early in 1996 (E. Timothy, pers. comm.). The original letter accompanying the bands was sent to U.S. Fish & Wildlife Service on 12 April 1996.

*Sula leucogaster*.—Local residents told me that the Brown Booby nests in trees on the northern side of Oroluk Island, and Marshall (1957) recorded *S. leucogaster* and *S. sula* as apparently nesting there in June 1956. Holthus et al. (1993) recorded more than 10 on Oroluk and 50 (some of which were breeding) on a sand cay at the southeastern end of the atoll during November/December 1990. I saw none on Oroluk but observed several in flight and several others perched on the rocks along the reef between Oroluk Island and North Pass (about 20 km east of Oroluk). Additionally, some of the approximately 50 boobies I saw at North Pass Cay on 26 December may have been *S. leucogaster*.

*Fregata minor*.—Resident islanders told me that Great Frigatebirds nest in the tops of mature coconut trees at the northern end of the island. I saw none nesting but observed up to 35 together soaring over the island nearly everyday during 21–26 December 1997, and Holthus et al. (1993) recorded "more than 10" during November/December 1990. One ringed at French Frigate Shoals, Hawaii in 1966 (0757–26855), and hatched in 1965 or earlier, was captured by hand in exhausted condition early in 1996 (E. Timothy, pers. comm.). The original letter returning the bands to the U.S. Fish and Wildlife Service was sent 12 April 1996.

*Egretta sacra*.—The only documented record of a Pacific Reef-Heron on Oroluk is one piebald bird I saw on several occasions during 23–26 December. Many of the resident islanders were aware of this species occurring in different color morphs but could not confirm breeding.

*Gallus gallus*.—Red Junglefowl (chickens) were introduced and range freely throughout the settlement, but none was encountered in the forest.

*Pluvialis fulva*.—One Pacific Golden Plover was recorded by Holthus et al. (1993) and I observed approximately 5–15 daily.

*Pluvialis squatarola*.—One Black-bellied (Gray) Plover in winter plumage that I saw on a sandy beach on 23 December 1997 is the only record.

*Heteroscelus brevipes* / *H. incanus*.—The Wandering Tattler (*H. brevipes*) and Gray-tailed Tattler (*H. incanus*) both occur in Micronesia as migrants (Pratt et al. 1987). As they are difficult to distinguish in the field, I have elected to include the few records of tattlers from Oroluk as a species pair. I observed up to 10 per day (usually on rocky beaches and reef flats) in December, and Holthus et al. (1993) recorded three [*H. brevipes*] during November/December 1990.

*Numenius phaeopus*.—I observed 1–4 Whimbrels almost daily. Those in flight showed a conspicuous white patch on the rump and lower back characteristic of Asiatic populations. There are no other records.

*Arenaria interpres*.—The Ruddy Turnstone was recorded by Holthus et al. (1993), and I observed small flocks of 5–10 daily, usually on rocky beaches.



*Calidris acuminata*.—The 1–3 Sharp-tailed Sandpipers that I saw daily during 21–26 December are the only records.

*Sterna bergii*.—Holthus et al. (1993) recorded 30 Great Crested Terns on a sand cay at the southeastern end of the atoll during November/December 1990. There are no other records.

*Sterna sumatrana*.—I observed flocks of 5–10 Black-naped Terns in the lagoon and along the reef between Oroluk Island and North Pass, but none immediately adjacent to Oroluk Island. There are no other confirmed records although Holthus et al. (1993) listed it with a question mark.

*Anous stolidus*.—The Brown Noddy nests unobtrusively in *Cocos* crowns on Oroluk, making the population difficult to assess. I roughly estimated about 100–200 pairs in December 1997. Holthus et al. (1993) recorded 50 (some of them breeding) on a sand cay at the southeastern end of the atoll in December 1990.

*Anous minutus*.—The Black Noddy is the most abundant bird on Oroluk. It nests in trees throughout the island, being especially numerous in breadfruit (*Artocarpus*). The nests usually are clustered in groups of about 50–75. Assuming all of the well-formed nests I saw were active (most of them were occupied by adults), I estimate about 3,000 breeding pairs. Many recently fledged young were on the ground and in low, dense vegetation. Holthus et al. (1993) recorded 30 (“all birds were nesting, no eggs seen”) on a sand cay about 4 km east of Oroluk.

*Gygis alba*.—I saw Common Fairy-Terns occasionally throughout my stay, usually paired or in small groups of 3–6, and mainly along the edge of the *Cocos* forest. *G. alba* was recorded also by Holthus et al. (1993). Breeding is unconfirmed but very probable.

*Aplonis opaca*.—The Micronesian Starling is the only native, resident breeding land bird on Oroluk. It is very common throughout, usually in small flocks of 5–10. I estimated 10.6/ha with a total population of about 137 and an encounter rate of 61/h. Marshall (1957) estimated 400 (about 95% adults) in June 1956.

#### MAMMALS

All four mammal species recorded on Oroluk are almost certainly deliberate or accidental introductions.

*Rattus rattus*.—Marshall (1957) stated that 11 roof (black) rats [12 reported in Marshall 1962] were trapped mostly in thatched buildings in June 1956; Johnson (1962) indicated only three were “obtained”. All were smaller and darker and had shorter tails than those collected elsewhere in Micronesia (Johnson 1962), and had a white spot on the chest (Marshall 1957, 1962). I often saw rats in the settlement after sunset when they foraged for food scraps in and among the living quarters. Others were seen in the *Cocos* forest, especially where islanders had recently discarded partially consumed coconut. Measurements (in mm) for one male that I examined and discarded were: head and body 165; tail 135, hind foot 36, ear 25; it weighed 120 g. A female measured 150, 130, 35, and 21 mm respectively, and it weighed 70 g. Neither had a white spot on the chest.

*Canis familiaris*.—One of the islanders told me that dogs were formerly present but have since been extirpated as a measure to protect nesting turtles.

*Felis catus*.—One of the islanders told me that cats were more numerous in the past, but most have since died and only one or two remain on island in a semi-feral state. I saw none.

*Sus scrofa*.—Pigs are common throughout the settlement. Some range freely but I never encountered any in the forest; most were tethered or penned along the beach. They frequently excavate turtle nests to eat the eggs (M. Abraham, pers. comm.).

### Discussion

The terrestrial vertebrates of Oroluk Atoll include 10 species of reptiles (2 turtles, 4 geckos, 4 skinks), 17 birds, and four introduced mammals. Among the birds, one (*Gallus gallus*) is introduced, six are nonbreeding, migrant shorebirds, and eight are confirmed or probable breeders, including two boobies, a frigate-bird, four terns, and the Micronesian Starling (*Aplonis opaca*), which is the only indigenous land bird. The Pacific Reef-Heron (*Egretta sacra*) and Great Crested Tern (*Sterna bergii*) possibly also breed but are known only from a few records and their status remains unknown. The number of recorded migrants doubtless will increase greatly with additional observations, but few additions to the list of breeders can be expected in view of small island size and low habitat diversity. I consider records of Masked Booby (*Sula dactylatra*), Bristle-thighed Curlew (*Numenius tahitiensis*), and Blue-gray Noddy (*Procelsterna cerulea*) in Holthus et al. (1993) in need of corroboration.

Holthus et al. (1993) recommended stringent restriction on subsistence level harvesting of turtles and eggs, enhancement of turtle habitat (including removal of pig pens from beach areas), the continued tagging and surveillance of turtles, and the establishment of specific commercial fishing zones and protected areas (marine reserves and seabird sanctuaries). The Pohnpei Office of Marine and Coastal Resources has supported a turtle tagging and monitoring program with the assistance of Oroluk residents, but funding for this project over the long term is not secure. Oroluk Atoll was declared a Marine Sanctuary in 1997 by the Pohnpei Governor's Office in cooperation with traditional community leaders, but regulations and enforcement measures regarding land and marine resource utilization have not yet been formalized. This remote and still relatively pristine area remains vulnerable especially to exploitation by foreign fishing vessels working in Micronesia.

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