

## Abundance and Habitat Use of Reptiles on Rota, Mariana Islands

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**Abstract**—Fourteen species of reptiles are known from Rota, Mariana Islands and include two species of sea turtles, one anole, five geckos, four skinks, one monitor lizard, and one blind snake. At least four of these species are suspected introductions. *Anolis carolinensis* has been recently introduced and was found only around the island's two villages. Data are presented on the types of foraging substrates used by geckos and skinks. Four species of geckos, *Gehyra mutilata*, *G. oceanica*, *Lepidodactylus lugubris*, and *Nactus pelagicus*, were most common in forests, while a fifth species, *Hemidactylus frenatus*, occurred most frequently in urban areas. The skinks *Emoia atrocostata* and *Cryptoblepharus poecilopleurus* were uncommon and found only in coastal strand. *Emoia caeruleocauda* occurred in all habitats, but was particularly common in forests. *Ramphotyphlops braminus* is reported for the first time from Rota.

### Introduction

Basic information is lacking on the diversity, abundance, and biology of reptiles in the Mariana Islands. Several recent reports have briefly examined various aspects of lizard ecology on Guam and Tinian (Sabath 1981, Wiles *et al.* 1989), but the herpetofauna of Rota has not received systematic attention. It is particularly important to have a better understanding of the reptiles of the large southern Marianas, from Guam to Saipan, where increasing development and the possible introduction of the brown tree snake (*Boiga irregularis*) threaten existing wildlife populations. *B. irregularis* has become a serious predator on lizards and most native vertebrates on Guam since its introduction after World War II (Savidge 1987, Fritts 1988).

The main objectives of this study were to survey lizard abundance and habitat use on Rota. Information on the island's other reptiles was also gathered. The results of this survey provide the first baseline data against which future changes in the island's ecology can be viewed. Data on lizard densities will be useful for comparisons with similar informa-

tion from Guam and will help to assess the impact of predation by brown tree snakes on lizards on that island.

### Study Area

Rota (14°10'N, 145°12'S) is located in the southern Mariana Islands, approximately 60 km northeast of Guam and 90 km south of Tinian. It is the southernmost island in the Commonwealth of the Northern Mariana Islands. Rota has a land area of 85 km<sup>2</sup>. The western half of the island is dominated by a series of rugged uplifted terraces and steep hillsides that culminate in a large plateau that is about 4 km long and 2 km wide and has a maximum elevation of 491 m. A slightly larger plateau occupies the eastern part of the island. It is much lower in elevation (180 m) and is characterized by less severe terrain. The surface of the island is composed entirely of limestone except for two small outcrops of volcanic soil that protrude from the top and south side of the upper plateau.

Rota's climate is tropical and temperatures remain warm and relatively constant during the year, ranging from 22–33°C. Average annual rainfall at low elevations is estimated to range from 2,000–2,300 mm, most of which falls from July to November (T. Yoshida, pers. comm.). A dry season occurs between January and May when rain diminishes to 0–150 mm per month. Rota's upper plateau, which is frequently shrouded by heavy clouds or mist in the rainy season, receives considerably more rainfall than the rest of the island but the amount has never been measured.

Nine plant communities have been described for Rota (Engbring *et al.* 1986, Fosberg 1960). About 60% of the island is covered with native forest, nearly all of which grows on limestone-based soils. Limestone forest is characterized by moderate to dense undergrowth, a canopy 10–15 m high, and scattered taller emergent trees. The forest floor normally consists of sharp limestone rocks and boulders with little soil present. Common tree species include *Eleocharpus joga*, *Hernandia sonora*, *Ficus prolixa*, *F. tinctoria*, *Pandanus dubius*, *P. tectorius*, *Neisosperma oppositifolia*, *Macaranga thompsonii*, *Pisonia grandis*, *Artocarpus mariannensis*, *Psychotria* spp., *Guamia mariannae*, *Premna obtusifolia*, and *Aglaia mariannensis*. The liana *Freycinetia reineckeii* and epiphytic orchids, ferns, and mosses grow abundantly at higher elevations. Secondary limestone forest occurs at low to moderate elevations and has low plant diversity and an open understory. Beach strand forest grows on sandy soils along Rota's coastlines and is categorized with other types of native forest by Engbring *et al.* (1986). This forest is characterized by *Hernandia sonora*, *Cocos nucifera*, *Mammea odorata*, *Pisonia grandis*, *Pandanus dubius*, and *Casuarina litorea*.

Open fields occupy about 28% of Rota's land area (Engbring *et al.* 1986). The eastern plateau has a number of fields used for cattle grazing. Openings also occupy large areas on the upper plateau, which form an area known locally as the Sabana, and the southern slope of this plateau. Common plants of fields and savannas include *Miscanthus floridulus*, *Pennisetum* sp., *Panicum* sp., *Mimosa invisa*, *Mikania scandens*, and *Chromolaena odoratum*.

Secondary vegetation is composed of a mixture of trees, brushy areas, and grassy openings. The canopy is often relatively open and varies in height from 2–20 m. A dense understory is usually present. A mixture of introduced and native plant species occur in second growth and often include *Leucaena leucocephala*, *Guettarda speciosa*, *Artocar-*

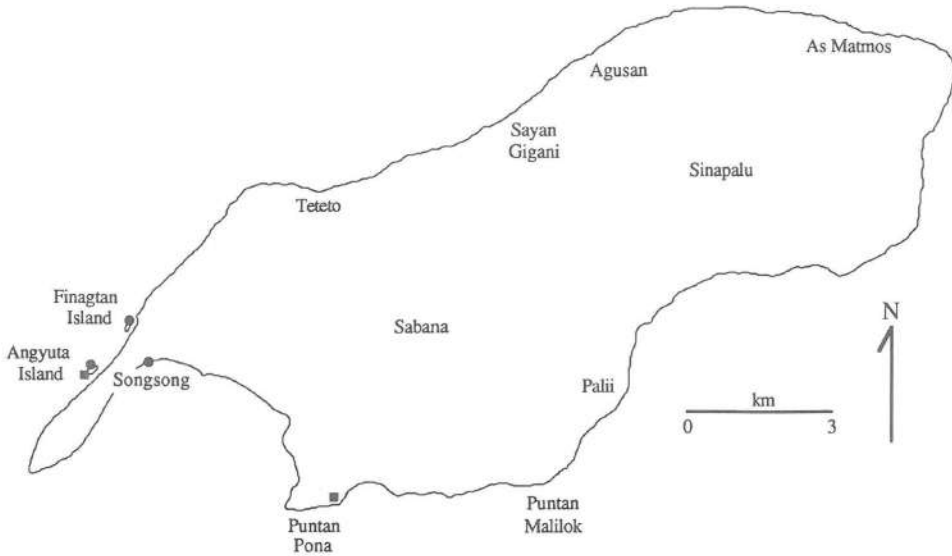


Figure 1. Map of Rota, Mariana Islands, with names of locations used in the text. Locations are marked where *Emoia atrocostata* and *Cryptoblepharus poecilopleurus* (closed squares) were collected or observed.

*pus altilis*, *Acacia confusa*, *Cocos nucifera*, and *Delonix regia*. Overgrown coconut groves are considered as part of this habitat category.

Other habitat types occupy a small portion of the island (Engbring *et al.* 1986). Strand vegetation is generally 0.5-3 m tall and commonly includes *Pemphis acidula*, *Tournefortia argentea*, *Scaevola taccada*, *Ipomoea* spp., *Paspalum* spp., and *Wollastonia biflora*. Rota has two urban areas, one of which is the main village of Songsong where most of the island's population resides, and the second being a smaller, recently constructed housing area at Sinapalu. Concrete and tin buildings, scattered trees, grassy lawns, and weedy patches typify the habitat in villages.

Rota was severely damaged by Typhoon Roy on 12 January 1988, about 6 weeks before our survey of the island. Large numbers of trees around the island were blown down or suffered major limb losses. Nearly all foliage was stripped from the forest canopy in many parts of the island. During our two visits, the forest floor in many areas was lit brightly with sunshine and littered with fallen leaves, branches, and trees. High surf during the storm also damaged large areas of shrubby coastal strand vegetation.

### Methods

Field work was conducted from 22–28 February 1988, with additional surveys completed from 3–6 February and 1–5 November 1988. Study sites were selected around the island to provide wide geographic coverage and to cover a variety of common or unique natural habitats. Two to three observers participated in surveys at each site. Observers censused lizards by walking slowly through each site and counting the number of animals seen on the ground and in trees. Every lizard observed was recorded by species, date, time, locality, microhabitat, and in the case of *Emoia caeruleocauda*, by the color of its

tail and posterior portion of its body. Lizards that were not positively identified by sight during censuses were classified as being either unknown skinks or geckos. Most censuses took place between 0900–1600 and 1930–2330. Lengths of censuses ranged from 15–120 min per site with most lasting 45–60 min. Animals were collected whenever possible to obtain accurate identifications. Skinks were caught by shooting them with a heavy rubber band; geckos were captured by hand.

The abundance of skinks was also measured with adhesive rat traps (Victor Holdfast Glueboards, Woodstream Corp., Lititz, Penn.) at six sites. Traps were 12 × 16 cm in size and were placed 10–15 m apart on the ground. Twelve traps were set at each site except in strand vegetation on Angyuta and Finagtan Islands, where 2–6 traps were used. Traps were placed out at 0900–1200 hr and were retrieved 3–10 hr later. The traps allowed the capture of lizards that were exceptionally wary and difficult to capture. They also allowed us to sample the relative activity of species in a less subjective manner than hand collecting.

Additional information about Rota's reptiles was gathered during incidental observations made outside census periods, or was provided by Taisacan, a long-time resident of the island. Specimens were deposited in the National Museum of Natural History (USNM) in Washington, D.C.

### Species Accounts

#### CHELONIIDAE

##### *Chelonia mydas* and *Eretmochelys imbricata*

Two kinds of sea turtles, the green turtle (*C. mydas*) and hawksbill turtle (*E. imbricata*), occur in Rota's offshore waters. Turtles were still fairly common around the island in the 1960s, but have become more scarce since then. At present, most sightings of sea turtles occur on the eastern half of Rota between Sayan Gigani and Puntan Malilok.

Table 1. Rates of observations of lizards in relation to habitat and time of day on Rota, Mariana Islands

Habitat	Search effort (hr)	Rates of Observation (animals/hour)						
		<i>Anolis carolinensis</i>	<i>Gehyra mutilata</i>	<i>Gehyra oceanica</i>	<i>Hemidactylus frenatus</i>	<i>Lepidodactylus lugubris</i>	<i>Nactus pelagicus</i>	Unknown geckos
Day								
Forest	22.3	0	0	<0.1	0	0.2	0	<0.1
Strand	9.0	0	0	0	0	0 <sup>a</sup>	0	0.1
Second growth	4.4	0	0 <sup>a</sup>	0	0	0	0 <sup>a</sup>	0.2
Open field	3.6	0	0.3	0	0	0	0	0.8
Urban	3.2	0.6	0.6	0	0.9	0.3	0	0.6
Night								
Forest	16.2	0	1.3	3.1	0.3	3.1	0.4	0.8
Second growth	3.9	0	0	1.5	0.3	1.8	0	0.3
Open field	2.8	0	0	0.4	1.4	0	0	0.7
Urban	2.0	0	0	0.5	42.0	2.0	0	0.5

<sup>a</sup> recorded in this habitat during incidental observations

Turtles are regularly seen at some locations in this area, such as at As Matmos. *Chelonia mydas* is encountered much more frequently than *E. imbricata*, which is considered rare. We are not aware of any recent nesting attempts by sea turtles on Rota. Villagers report that the beach on the west shore of Songsong village was commonly used as a nesting site many years ago. There is also a record of a single nest laid at Teteto in the 1970s. Turtles are still hunted on Rota, but much of this activity is believed to be done by fishermen arriving in boats from the neighboring islands of Guam, Tinian, and Saipan. Reports of local residents catching and eating turtles are rare.

## IGUANIDAE

### *Anolis carolinensis*

This diurnal lizard was first observed on Rota in the late 1970s (E. M. Taisacan, per. obs.), and almost certainly originated from populations that were previously introduced to Saipan and Guam. On Rota, established populations of *A. carolinensis* are known to exist only around the two villages. Within this limited distribution, animals are reportedly common at some localities, such as near the harbor, but are not known to have colonized forests yet.

## GEKKONIDAE

### *Gehyra mutilata*

This species was widely distributed on Rota and was present in most habitats (Tables 1 and 2). It was not recorded in large numbers at any location and was always outnumbered by one or two other species of geckos at each survey site. *Gehyra mutilata* was most common in native forest, where it occurred at moderate densities (Table 1). In this habitat, it

Table 1. *Continued*

Habitat	Rates of Observation (animals/hour)					Total
	<i>Emoia caeruleo-cauda</i>	<i>Emoia atrocostata</i>	<i>Cryptoblepharus poecilopleurus</i>	Unknown skinks	<i>Varanus indicus</i>	
Day						
Forest	17.1	0	0	0	0	17.5
Strand	0.3	0.4	1.1	0.3	0	2.3
Second growth	23.0	0	0	0	0.2	23.4
Open field	3.6	0	0	0	0	4.7
Urban	1.9	0	0	0	0	5.0
Night						
Forest	0.1	0	0	0	0	9.0
Second growth	0	0	0	0	0	3.8
Open field	0	0	0	0	0	2.5
Urban	0	0	0	0	0	45.0

Table 2. Number of sites visited where lizard species were recorded during surveys made at day and night on Rota, Mariana Islands

Time period	No. of sites visited	Number of sites recorded									
		<i>Anolis carolinensis</i>	<i>Gehyra mutilata</i>	<i>Gehyra oceanica</i>	<i>Hemidactylus frenatus</i>	<i>Lepidodactylus lugubris</i>	<i>Nactus pelagicus</i>	<i>Emoia caeruleo-cauda</i>	<i>Emoia atrocostata</i>	<i>Cryptoblepharus poecilopleurus</i>	<i>Varanus indicus</i>
day	23	2	5	3	4	9	1	21	3	2	5
night	17	0	11	11	12	14	6	2	0	0	0

Table 3. Use of foraging substrates by geckos at night on Rota, Mariana Islands

Species	No. of sightings	Substrate (% of total sightings per species)							
		<i>Pandanus</i> and banana leaves	Large tree trunks and limbs (>15 cm)	Small tree trunks and limbs (<15 cm)	Rock faces and boulders	Tree foliage	Low ground vegetation and grass	On ground	Man-made structures (buildings, fences, etc.)
<i>Gehyra mutilata</i>	23	17.4	26.1	43.5	13.0	0	0	0	0
<i>Gehyra oceanica</i>	51	33.3	25.5	13.7	13.7	0	3.9	0	9.8
<i>Hemidactylus frenatus</i>	104	1.9	4.8	9.6	1.9	1.0	1.9	0	78.8
<i>Lepidodactylus lugubris</i>	80	18.8	2.5	35.0	0	36.3	0	0	7.5
<i>Nactus pelagicus</i>	15	0	0	0	86.7	0	0	13.3 <sup>a</sup>	0

<sup>a</sup> all sightings were close to boulders

foraged mainly on tree limbs and trunks, especially those of small trees (Table 3). *Gehyra mutilata* was noted in open fields, secondary vegetation, and urban areas during the day, when individuals were found on the ground hiding under sheets of plywood and tin, or in crevices in rock piles, but was not recorded in these habitats at night.

#### *Gehyra oceanica*

This is the largest species of gecko in the Mariana Islands. *Gehyra oceanica* was recorded at a number of locations on Rota, but was most common in native forest where it and *L. lugubris* were the most abundant geckos present (Tables 1 and 2). Moderate numbers of *G. oceanica* occurred in second growth, especially on coconut trees, but this gecko was uncommon in other habitats with few *Pandanus* or few large trees (Table 1). In open fields, it was noted only on scattered large trees.

This species foraged mainly on large smooth surfaces that were clear of obstructing leaves and vines. Favored substrates included the leaves of *Pandanus* and bananas, and the trunks and limbs of large trees such as *Cocos nucifera* (Table 3). *Gehyra oceanica* also inhabited large rock faces and certain man-made structures, such as village buildings with dimly lit or unlit walls and abandoned World War II military structures. Daytime hiding sites for this lizard included the crowns of *Pandanus* and *Cocos* trees.

#### *Hemidactylus frenatus*

This introduced species is widely recognized as a commensal with man (Brown, 1956; Allison, 1982). *Hemidactylus frenatus* occurred at a number of survey sites, and was commonest in urban areas (Tables 1 and 2). Most sightings occurred on man-made structures such as buildings and fences (Table 3). This lizard was present in moderate numbers on tall grass and fences in some open fields, but was uncommon in forest and secondary vegetation (Table 1), where it may compete poorly with native species of geckos.

#### *Lepidodactylus lugubris*

*Lepidodactylus lugubris* is the smallest and probably most common species of gecko on Rota, and was encountered in a variety of habitats (Tables 1 and 2). Sightings were most frequent in native forest and secondary vegetation (Table 1). This gecko was also relatively common in urban areas but was much less abundant than *H. frenatus*. We did not record *L. lugubris* in open fields, although it probably occurs on isolated shrubs and trees in this habitat.

Although *L. lugubris* and *G. oceanica* generally inhabited the same plant communities, the two species often foraged on different substrates (Table 3). Preferred feeding sites of *L. lugubris* included foliage, the trunks and limbs of small trees, and *Pandanus* leaves, of which only *Pandanus* was commonly used by *G. oceanica*. Because of its much smaller body size, *L. lugubris* might be able to use smaller twigs and leaves than *G. oceanica*.

#### *Nactus pelagicus*

This species was found at several sites in native forest, but was encountered less frequently than other geckos (Tables 1 and 2). Most nighttime sightings were of animals on

rock outcrops, boulders, or karst formations, although several individuals were recorded on the ground foraging next to rocks (Table 3).

Several *N. pelagicus* were discovered during the day under sheets of plywood and other debris at a blown down shack near the Peace Memorial on the Sabana. The site was at the edge of an *Acacia* grove next to a large opening dominated by *Mimosa invisa*, with no rocks of any sort nearby. This observation suggests that *N. pelagicus* inhabits a wider range of habitats than indicated by our night surveys.

*Nactus pelagicus* proved to be somewhat difficult to census because of its vigilant behavior. These geckos often fled to protective crevices and openings in rocks before observers could make positive identifications. Animals sometimes jumped to the ground from perches one meter high on rocks and ran rapidly to nearby holes. Frequently, animals were not noted until they were heard scurrying across leaf litter on the ground. Because of these factors, the abundance of *N. pelagicus* at certain sites was probably somewhat greater than what was recorded in the survey.

In the Marianas, this species has been collected on Tinian and Guam, although there have been no recent sightings on either island (Sabath 1981, Wiles *et al.* 1989, Rodda & Fritts, unpubl.). The population on Rota may represent the only extant population of this species remaining in the island chain.

## SCINCIDAE

### *Emoia caeruleocauda*

This lizard was recorded at most daytime survey sites on Rota (Table 2) and was the only species of skink that was found away from ocean shorelines. *Emoia caeruleocauda* was common in secondary growth, native forest, and in some tall grassy fields (Tables 1 and 4). This species frequently entered short littoral vegetation but rarely ventured far into this habitat, preferring instead to remain along the edges near other habitats. In urban areas, it was present in weedy patches and compost piles, but avoided open lawns.

*Emoia caeruleocauda* normally foraged on the ground in leaf litter but occasionally climbed 1-2 m high in shrubs and trees (Table 5). The species appears to be more arboreal on Guam, where animals are sometimes seen feeding in the forest canopy (G. J. Wiles, pers. obs.). Collared kingfishers (*Halcyon chloris*) fed heavily on these skinks following Typhoon Roy, when much protective understory vegetation was destroyed (P. O. Glass, pers. comm.).

Juvenile *E. caeruleocauda* have bright blue tails and three distinct pale golden dorsal stripes. As animals mature, these features become less distinct in adult females and disappear completely in adult males, which become entirely brown. A faint mid-dorsal stripe may be retained by some males. In this study, sightings of individuals were tabulated according to color in an effort to determine the proportion of adult males to the rest of the population. Skinks with blue tails made up 81% of the individuals sighted and 57% of the animals captured on traps. The difference between the percent of individuals with blue tails that were seen versus those that were trapped was significant ( $G = 11.47$ ,  $p = 0.001$ ), and suggests that the plain brown form may be harder to see or less mobile.



*Emoia atrocostata*

This skink has not been previously reported from Rota. It was found only among low *Pemphis* shrubs in strand vegetation at each of three rocky shoreline sites visited near Songsong village. It seems likely that *E. atrocostata* occurs elsewhere on the island where scrubby littoral vegetation grows, although it was not recorded at Agusan or Puntan Pona. Based on its limited distribution, this species appears to be uncommon on Rota. The only other location that *E. atrocostata* is known from in the Marianas is Cocos Island, a small atoll-like islet off of southern Guam (Brown & Falanruw 1972, Rodda & Fritts, unpubl.).

*Emoia slevini*

This lizard is known from Rota on the basis of two specimens (USNM 122645, 122646) collected in October 1945 by W. L. Necker at "isthmus Sosan," which is the present day location of Songsong village. No information is available on the habitat where Necker's animals were collected. However, because of the narrow width of the isthmus, they presumably came from a location that was fairly close to the ocean. On Cocos Island, *E. slevini* inhabits strand forest (Brown & Falanruw 1972) and groves of *Casuarina* (R. Krizman, pers. comm.). This species was not recorded in our survey, suggesting that the present population on Rota is rare or has been extirpated.

*Cryptoblepharus poecilopleurus*

This lizard was recorded only at Angyuta Island and Puntan Pona, where it inhabited low shrubby *Pemphis* in strand vegetation. *Cryptoblepharus poecilopleurus* was seen in low numbers at both locations and was considered to be uncommon (Table 1). None was captured on a trap (Table 4). Animals were observed on limestone rocks, coarse sand, and up to 1 m high in *Pemphis* trees (Table 5). These skinks were absent from several other areas of similar strand habitat in Songsong village and at Agusan. Two unidentified small brownish skinks seen briefly in small *Pemphis* trees at Agusan may have been this species.

## VARANIDAE

*Varanus indicus*

Monitor lizards were judged to be common on Rota. Thirteen sightings were made during the study, all of which were in forest or secondary growth (Table 1). *Varanus indicus* reportedly occurs islandwide and is also known to forage in grassy fields and around the edges of villages.

Monitor lizards venture into farms to prey on chicken eggs and chicks, thus, they are often killed as pests by farmers. The species is enough of a nuisance that some farmers resort to building chicken coops on tall metal legs with strong wire screening to reduce depredations. Accidents with automobiles represent another source of mortality to *V. indicus* on Rota. Animals are occasionally struck by automobiles while sunning themselves or crossing the recently paved highway running between Songsong village and the airport.

Table 4. Capture rates of skinks caught on adhesive traps during the day in relation to habitat on Rota, Mariana Islands

Habitat	No. of trap sites	No. of trap hours	No. of animals captured/trap hour	Number of skinks captured/trap hour				
				<i>Emoia caeruleocauda</i>			<i>Emoia atrocostata</i>	<i>Cryptoblepharus poecilopleurus</i>
				blue	color phase brown	unknown		
Forest	4	365	0.107	0.066	0.033	0.008	0	0
Strand	4	263	0.030	0.004	0.019	0	0.008	0
Open field	2	140	0.036	0.014	0.021	0	0	0

Table 5. Use of foraging substrates by skinks during the daytime on Rota, Mariana Islands

Species	No. of sightings	Substrate (% of total sightings)		
		Ground and low rocks	Low vegetation (0–1 m high)	Low vegetation (1–2 m high)
<i>Emoia caeruleocauda</i>	324	80.2	13.9	5.9
<i>Emoia atrocostata</i>	4	100.0	0	0
<i>Cryptoblepharus poecilopleurus</i>	10	70.0	30.0 <sup>a</sup>	0

<sup>a</sup> observed only in *Pemphis acidula*

## TYPHLOPIDAE

*Ramphotyphlops braminus*

*Ramphotyphlops braminus* occurs on a number of Pacific islands, probably having been introduced (Fisher 1948, McCoy 1980), but has not been previously reported from Rota. Taisacan collected an individual (USNM 292496) in Songsong village in 1987 and remembers seeing additional animals in the 1960s in damp soil around septic tanks and shower stalls of homes in the village. No effort was made to find blind snakes during the present survey.

**Discussion**

Current lizard populations on Rota probably resemble the island's original lizard fauna more closely than do those for any other island in the southern Marianas. Several factors may account for this. Native plant communities on Rota, Guam, Tinian, and Saipan have undergone substantial alteration because of extensive agricultural activities, grazing by feral and domestic ungulates, warfare and military construction in the 1940s and 1950s, and modern development (Bowers 1950, Fosberg 1960). These practices have generally occurred to a lesser extent on Rota. Bowers (1950:354) reported that 25% of Rota remained forested at the end of World War II, in contrast to Saipan and Tinian, which were 5% and 2% forested, respectively. At present, a substantial portion, about 60%, of Rota is covered by primary and secondary forest (Engbring *et al.* 1986). Rota's shoreline has experienced little development and remains relatively pristine in most areas.

Rota is also free of several introduced vertebrates that are present on neighboring islands. The island does not yet have brown tree snakes, an abundant predator that feeds heavily on lizards on Guam (Savidge 1988). Predation by tree snakes has been implicated as the cause for severe reductions in the populations of several lizard species on that island (Engbring & Fritts 1988). Feral pigs (*Sus scrofa*), which are abundant on Guam but do not occur on Rota, disrupt natural habitats and thus may indirectly affect some species of terrestrial fauna (Singer *et al.* 1984, Conry 1989). Pigs also occasionally feed on terrestrial lizards (Conry 1989).

Two species of skinks, *Carlia fusca* and *Lamprolepis smaragdina*, do not occur on Rota, but have been introduced to neighboring islands, where they possibly compete with or occasionally feed on native lizards (Wiles *et al.* 1989). *Carlia fusca* occupies terrestrial habitats on Guam, Tinian, and Saipan, where it is abundant. *Lamprolepis smaragdina* is a large arboreal skink present on Saipan and Tinian.

*Habitat Use by Lizards*

All five species of geckos on Rota inhabited native forest and secondary vegetation, and each, except for *H. frenatus*, was recorded most frequently in native forest. Gecko diversity was also fairly high in strand, open fields, and urban areas, with each of these habitats having three or four species of geckos. *Nactus pelagicus* exhibited the greatest restriction in habitat use, being found only in native forest, secondary vegetation, and the edges of these habitats. For most species of geckos, abundance was substantially reduced

in habitats with few trees. In contrast, the highest numbers of *H. frenatus* occurred in urban areas and it was also the most common type of gecko in open fields. This introduced species has been highly successful at exploiting man-made structures (Sabath 1981) and certain habitats avoided by other geckos, such as grassy fields.

Coastal strand vegetation was the only plant community used by all of the island's skink species, although the abundance of each species was low, possibly because of recent typhoon damage to this habitat. Both *E. atrocistata* and *C. poecilopleurus* were recorded only in this vegetation type. *Emoia caeruleocauda* was the only skink that occurred inland on Rota; it preferred forested areas and other sites with thick vegetation and shading.

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