acacias is that, based on nest architecture alone, its nests may be more vulnerable to predation than are flycatcher or oriole nests. By placing nests in ant-protected acacias, the wren presumably gains additional security for its eggs and nestlings. This may explain why halo characteristics are more important to wrens than to the other two species. These data suggest that larger and more dense halos with high *Pseudomyrmex* activity are the most likely signals which wrens use to assess optimal nest location.

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LITERATURE CITED

COLLIAS, N. E. AND E. C. COLLIAS. 1964. The evolution of nest-building in the Weaverbirds (Ploceidae). Univ. Calif. Publ. Zool. 73:1–162.

GILARDI, J. D. AND K. VON KUGELGEN. 1991. Bird/ant/acacia symbiosis in a mature neotropical forest. Wilson Bull. 103:711–712.

JANZEN, D. H. 1966. Coevolution of mutualism between ants and acacias in Central America. Evolution 20:249–275.

———. 1969. Birds and the ants × acacias interaction in Central America, with notes on birds and other myrmecophytes. Condor 71:240–256.

———. 1983. Costa Rican natural history. University of Chicago Press, Chicago, Illinois.

SKUTCH, A. F. 1976. Parent birds and their young. Univ. of Texas Press, Austin, Texas.

STILES, F. G. AND A. SKUTCH. 1989. A guide to the birds of Costa Rica. Cornell University Press, Ithaca, New York.

YOUNG, B. E., M. KASPARI, AND T. E. MARTIN. 1990. Species-specific nest site selection by birds in Ant-Acacia trees. Biotropica 22:310–315.

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Notes on the ecology and population decline of the Rota Bridled White-eye.—The Bridled White-eye (*Zosterops conspicillata*) of the Mariana Islands is represented on Rota by the endemic subspecies *Z. c. rotensis,* which once was common and widespread (Baker 1951, E. Taisacan, pers. obs.), but by the 1960s had become uncommon (Engbring et al. 1986). In 1982 the total population, by then restricted to the Sabana plateau region, was estimated at 10,763 compared to 229,138 (*Z. c. saypani*) for the similarly sized island of Saipan (Engbring et al. 1986). J. Engbring (pers. comm.) estimated a further 26% decline on Rota by 1987, although he believed poor weather may have interfered with censuses. By 1991, qualitative but intensive distributional surveys by E. Taisacan and G. Witteman yielded

population estimates of <300–1500. Hence, from 1982 to 1991, populations appeared to decline by at least 87%. Furthermore, E. Taisacan (pers. obs.) found that from 1988 to 1991 maximum flock size dropped from 23 to ca ten. Craig (1989) has reviewed literature that links population declines in Bridled White-eyes to decreasing flock size.

Because the Rota Bridled White-eye is now rare, we gathered new data on its social behavior, foraging, and microhabitat use to document aspects of its ecological requirements. We also report results of monthly estimates of population density in the heart of its present range and offer insights into reasons for its population decline.

Methods.—From 1990–1992, we observed social behavior, foraging, and microhabitat use in the same manner employed by Craig (1990) for white-eyes on Saipan. Briefly, this entailed recording for each foraging attempt the (1) portion of the tree chosen, (2) surface used, (3) method employed, and (4) size of perch used. Qualitative observations were made on social behavior. In addition, E. Taisacan conducted monthly variable circular plot (Reynolds et al. 1980) censuses (33 total points separated by 150 m, 8 min counts/point) along J. Engbring's (pers. comm.) 1987 transects four and ten in the Sabana region. Censuses were made from June 1990–January 1991 and are compared with the identically performed censuses of January–August 1989. Pooled raw data from the two transects (made comparable by computing birds detected/10 census stations) are reported here.

Results and discussion.—Rota Bridled White-eyes were found as isolated flocks occurring solely on the Sabana plateau at ca 400–490 m elevation. All flocks occurred in native forest, although the character of the forest varied from stunted, open forest on the plateau summit to closed, mature forest on the upper Sabana slopes. Dominant trees within the range of the white-eyes included *Elaeocarpus joga, Ficus prolixa, Intsia bijuga, Guettarda speciosa, Pisonia umbellifera, Claoxylon marianum, Pandanus* spp., and *Hernandia labrynthica.*

Based on the frequent food begging observed, flocks appeared to be composed of related individuals. Incidental observations and census data (flock detected at adjacent points on different censuses) suggested that flocks used areas at least 150 m in diameter. We always found flock members in the same vicinity and found no birds in identical habitat between existing flocks. Flocks appeared to have a maximum of ten individuals, although small groups of two to three birds were seen often. These observations indicate that Rota Bridled White-eyes are relatively sedentary, inhabit a home range, and live in family groups or extended families.

Although sample size was small (24 observations), quantification of foraging activities showed that Rota Bridled White-eyes were generally similar to the Saipan population in their foraging behavior and microhabitat use (Table 1). Like Saipan birds (Craig 1989), those on Rota foraged mostly in the tree crown where they gleaned insects from leaves. Moreover, they predominantly chose perches <1.0 cm diameter for foraging, i.e., those small branchlets making up the majority of outer tree crowns.

Census data from 1989 and 1990–1991 showed a statistically non-significant ($r^2 = 0.07$) trend toward declining counts (Fig. 1). However, the trend is consistent with our qualitative impression that populations continue to decline. Moreover, Engbring et al.(1986) found 40.0 birds/10 stations at 66 Sabana census points, whereas during this study we averaged 8.6 birds/10 stations at 33 census points. The weak statistical relationship we found is likely attributable to the large inherent variation in census data. Taking into account those months in which no censuses were made, the equation for population decline is: census detections = 9.931 − 0.102 month, where month = the number of months after January 1989 (January 1989 = 1).

Several agents, particularly disease and introduced predators, have been implicated in causing population collapses of birds on Pacific islands (van Riper III et al. 1986, Savidge 1987). However, no evidence links disease to bird declines on Guam in the Mariana Islands

TABLE 1

COMPARISON OF FORAGING BEHAVIOR AND MICROHABITAT USE BY SAIPAN[a] AND ROTA BRIDLED WHITE-EYES

	Population			
	Saipan		Rota	
Behavior/microhabitat	Percent use	N	Percent use	N
Tree zone				
Top	72.0	103	83.3	20
Middle	25.9	37	16.7	4
Lower	2.1	3	0	0
Foraging surface				
Leaf/bud	84.4	119	79.2	19
Flower	6.4	9	0	0
Fruit	1.4	2	4.2	1
Branch/trunk	7.8	11	16.7	4
Foraging method				
Glean	89.0	130	100	24
Probe	6.2	9	0	0
Hover/sally	4.8	7	0	0
Perch size (cm)				
<1.0	75.5	37	87.0	20
1.0–<2.0	12.2	6	13.0	3
2.01–>4.0	12.2	6	0	0

[a] From Craig 1990.

(Savidge 1986). Predation by the introduced brown tree snake (*Boiga irregularis*), responsible for the extinction of forest birds on Guam (Savidge 1987), also appears unrelated to the Rota Bridled White-eye decline because the snakes are unknown on Rota. Instead, the predatory Black Drongo (*Dicrurus macrocercus*), introduced on Rota in 1935 (Baker 1951), is implicated in causing the population declines of several native bird species.

Black Drongos did not become abundant until the 1960s (E. Taisacan, pers. obs.), the time when the decline in Rota Bridled White-eye populations was first noted. Maben (1982) demonstrated that introduced Black Drongos on Guam preyed on small passerines, although she believed drongos had little effect on their populations. Despite this belief, the present distribution of Black Drongos on Rota shows a negative relationship with that of white-eyes, which are now found mostly in extensive stands of native Sabana forest. Engbring et al. (1986) found Drongos abundant in lowlands (40–42 bird/10 stations), and particularly in open habitat, but uncommon in the forest of the Sabana plateau (15 birds/10 stations). The Rota Bridled White-eye appears particularly susceptable to predation by Black Drongos because it is very small and feeds in exposed microhabitats. Like the Saipan subspecies, it is a flocking, vocal bird that forages in the forest canopy and flies above the forest (see Craig 1989, 1990).

Notably, all birds on Rota too large for drongo predation are abundant and widespread (Engbring et al. 1986). Only the small Rufous Fantail (*Rhipidura rufifrons*) is also uncommon.

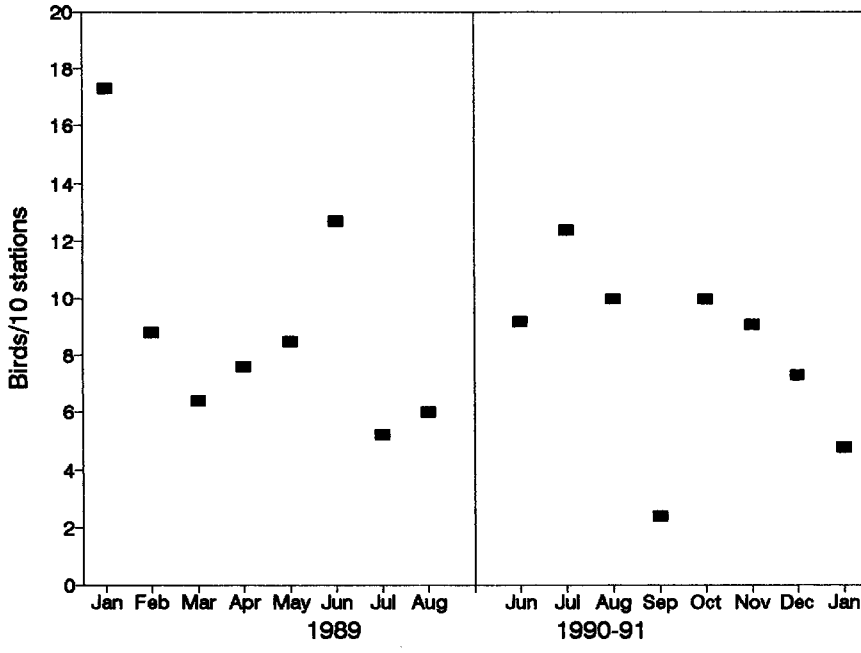

FIG. 1. Population densities of Rota Bridled White-eyes based on transect counts. Data are from January–August 1989 and June 1990–January 1991.

Baker (1951) reported Rufous Fantails as common on Rota, but by 1982 Engbring et al. (1986) found that they occurred less densely on Rota than on Saipan, Tinian, and Aquijan, where drongos are absent. Rufous Fantails are also preyed upon by Black Drongos (Maben 1982). However, they are likely less susceptable to avian predation than white-eyes because they are territorial (thus spread out) and forage in the forest understory.

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LITERATURE CITED

BAKER, R. H. 1951. The avifauna of Micronesia, its origin, evolution, and distribution. Univ. Kansas Mus. Nat. Hist. Publ. 3:1–359.

CRAIG, R. J. 1989. Observations on the foraging ecology and social behavior of the Bridled White-eye. Condor 91:187–192.

———. 1990. Foraging behavior and microhabitat use of two species of white-eyes (Zosteropidae) on Saipan, Micronesia. Auk 107:500–505.

ENGBRING, J., F. L. RAMSEY, AND V. J. WILDMAN. 1986. Micronesian forest bird survey, 1982: Saipan, Tinian, Aguijan, and Rota. U.S. Fish & Wildl. Serv. Report, Honolulu, Hawaii.

MABEN, A. F. 1982. The feeding ecology of the Black Drongo *Dicrurus macrocercus* on Guam. M.S. thesis, California State Univ., Long Beach, California.

REYNOLDS, R.T., J. M. SCOTT, AND R. A. NUSSBAUM. 1980. A variable circular plot method for estimating bird numbers. Condor 82:309–313.

SAVIDGE, J. A. 1986. The role of disease and predation in the decline of Guam's avifauna. Ph.D. diss., Univ. of Illinois, Champaign, Illinois.

———. 1987. Extinction of an island forest avifauna. Ecology 68:660–668.

VAN RIPER III, C., S. G. VAN RIPER, M. L. GOFF, AND M. LAIRD. 1986. The epizootiology and ecological significance of malaria in Hawaiian land birds. Ecol. Monogr. 56:327–344.

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Notes on the natural history of the Crescent-faced Antpitta.—The Neotropical antpittas (Formicariidae) are renowned for being secretive and poorly known, and the Crescent-faced Antpitta (*Grallaricula lineifrons*) remains the most enigmatic of its genus. Prior to our recent Ecuadorian avifaunal investigations, this boldly marked antpitta was known from only the type locality, Oyacachi, Prov. Napo, on the east slope of the Andes in Ecuador (Chapman 1924), and from two records from Puracé National Park, Depto. Cauca, on the west slope of the Central Andes in Colombia (Lehmann V. et al. 1977). Our observations substantially add to the knowledge of this species' natural history and dramatically increase its known range.

Distribution and status.—On 19 August 1991, Ridgely and Sornoza encountered a female (ANSP 184002) north of Taday, Prov. Cañar, in humid temperate forest at ca 3000 m elevation (02°34′S, 78°43′W; Fig. 1). In 1992, *G. lineifrons* was found at two additional localities along the eastern slope of the Ecuadorian Andes (Fig. 1). From 14–24 March, it was fairly common between 3225 and 3400 m in humid, temperate forest along the western slope of Cerro Mongus in extreme eastern Carchi (00°27′N, 77°52′W; Robbins et al., in press). During a brief period of fieldwork, 28 March–1 April, in the Cordillera de Cordoncillo, Prov. Loja (03°41′S, 79°13′W; Fig. 1), Robbins, Rosenberg, and Sornoza located three birds at 3100 m in disturbed montane forest connected to primary forest. At this latter locality, Krabbe heard birds singing on 2 September and 6 November 1992.

The fact that only four of eighteen individuals have been located without the aid of voice or the use of mist-nets attests to why this fairly common antpitta has been overlooked. It is now apparent that *G. lineifrons* is distributed widely between 3000 and 3400 m along much of the eastern Ecuadorian Andes from near the Colombian border (undoubtedly it occurs along the adjacent eastern slope in Colombia) south at least to northern Loja. Historically, the upper Río Zamora may have been a barrier to this species' dispersing farther south, as Parker et al. (1985) failed to find it in northern Peru. Despite "trolling" with prerecorded tapes Robbins, Ridgely, and Sornoza did not encounter it in the Cordillera Lagunillas (04°47′S, 79°24′W) in extreme southern Ecuador in 1992 (ANSP/MECN, unpubl. data). The Río Zamora appears to be a barrier to the dispersal of other montane avian taxa, e.g., *Oreotrochilus* complex, *Metallura odomae/M. baroni,* and *Anairetes agilis.*

At the Cerro Mongus locality, nine individuals (6 specimens; 5 study skins, 1 skeleton; ANSP, MECN) were recorded along ca 3 km of forest trails. Three birds (presumed pair,