GENERAL NOTES

Local distribution of mixed flocks in Puerto Rico.—Moynihan (1962) and Willis (1972) suggest that mixed or interspecific bird flocks primarily protect birds against predation, but Morse (1970) and Cody (1971) suggest that mixed flocks mainly increase foraging efficiency. A recent visit to Puerto Rico shows that mixed flocks there are localized, a situation like that reported by Diamond (1972) for New Guinea but much more accessible. Intensive study of such situations can perhaps help determine whether flocking is due to a single factor or combination of factors.

From 17 to 28 January 1972, I looked in vain for cohesive mixed flocks in several of the major forest types of Puerto Rico. (Mixed flocks of grassquits, swallows, blackbirds, or introduced weaver finches occur in open country, and flocks of shorebirds on shorelines, but these flocks were not studied.) I visited very wet forests on seven days in the Luquillo Mountains: shrubby, mossy "elfin forest" at El Yunque and Pico del Oeste; palm and other forests of moderate height around La Mina; tall forests on the central Rio Mameyes and at the El Verde Experimental Station. Dry, scrubby thorn and cactus woodland much like that in the foothills of Sinaloa, Mexico was scoured for flocks for three days at the Guanica State Forest. Five hours on one day were in patchy and fairly dry woodland of moderate height in a canyon northwest of La Parguera.

On 30 January, 11:00–13:00, I found in two cohesive mixed flocks nearly all the observed small woodland birds (Table 1; bird names from Bond, 1971) at a fourth area: Maricao State Forest, moderately wet and tall (about 15 m) dense woodland on the westernmost ridge of the Central Range. Unfortunately, I was leaving Puerto Rico and could not investigate further, However, Robert MacArthur (pers. comm.) found mixed flocks at Maricao and in the nearby savannahs of the Lajas Valley but not at Guanica when he censused the three areas in March–April, 1964. He found that flocks made his censusing difficult, but did not investigate further. The localized flocking is thus not a new or accidental phenomenon, but regular.

The Luquillo Forest did produce a few cases of loose association of Black-throated Blue Warblers with pairs of Bananaquits, and one instance where several other species flocked to a flowering bush. The Rechers (1966) found Cape May Warblers associating with Black-throated Blue Warblers and Puerto Rican Tanagers, occasionally joined by Pearly-eyed Thrashers, Bananaquits, and Stripe-headed Tanagers in December censuses. I saw no Cape May Warblers in Puerto Rico in January. Possibly these birds were at fruits or flowers that do not persist into January.

At Guanica, Adelaide's Warblers twice had Puerto Rican Vireos loosely associated with them. In both cases I found other birds about, but the birds seemed to be concentrating in areas of thick foliage during the hot hours of the day rather than associating with each other. Once a Parula Warbler followed two Puerto Rican Bullfinches. Otherwise, the birds wandered singly or in pairs; the family groups sometimes noted in Puerto Rican Tanagers and Elfin Woods Warblers at Luquillo were absent in Guanica.

The first Maricao flock circled slowly from 11:00 to 11:25 through woodland along bulldozed trails at picnic tables north of the new Forest Service Recreation Area. Only the Mango strayed from the group. At 12:45, however, only part of the flock was near the road just south. The second flock moved slowly 11:45 to 12:25 in continuous woodland along a trail north of there some 300 m. In both flocks, the noisy Puerto Rican Tanagers seemed the central species, even though they supplanted several smaller birds. Close to them were immature or female migrant warblers; the only adult male seen was a Black-throated Blue 75 m north of the second flock and not with it. Pairs of the re-

TABLE 1
BIRDS IN AND OUTSIDE OF FLOCKS IN PUERTO RICO

Species	Maricao			Luquillo[a]	Guanica[b]	La Parguera[c]
	Flock 1	Flock 2	Outside			
Green Mango	1	–	1	–	–	–
Puerto Rican Tody	1+	1	–	61	10	6
Puerto Rican Vireo	1+	1+	–	–	17	5
Black-and-White Warbler	1	1	–	6	3	–
Black-throated Blue Warbler	1	1	1	18	–	–
Elfin Woods Warbler	2	2	–	4	–	–
Parula Warbler	2	1	–	7	7	5
American Redstart	1	1	–	11	4	1
Bananaquit	1	–	–	320	26	10
Puerto Rican Tanager	2+	3+	–	50	–	–
Stripe-headed Tanager	2	–	2	17	3	–
Puerto Rican Bullfinch	2+	1+	–	21	21	3

[a] 13 other forest species seen. [b] 14 others. [c] 12 others.

cently described Elfin Woods Warblers, previously recorded only from elfin woodland in the Luquillo Forest, followed closely, as did Puerto Rican Vireos. Other native species wandered more widely around the flocks, especially the loosely associated Bananaquit and Stripe-headed Tanagers.

The most likely reason for flocking at Maricao is that it is the only forest in which Sharp-shinned Hawks are regular (Leopold, 1963; Biaggi, 1970). The Keplers (1970) report Sharp-shins locally in the Luquillo Forest, however; possibly some flocks observed by the Rechers were in such areas. I saw no Sharp-shins, but Sparrow Hawks are common at La Parguera and Guanica while Red-tailed Hawks fly over all four areas surveyed. Probably these last two hawks seldom chase birds. Diamond (1972) thought there were forest-dwelling accipiters in regions with no mixed flocks in New Guinea. However, the lack of bird flocks on Hawaii seems a result of the absence of effective predators (Willis, in press). Perhaps the flocking at Maricao will prove to be a way of using an otherwise unsafe habitat in the presence of a bird predator. However, Maricao is on serpentine soil and probably has low productivity. It could thus be that bird territories are larger there than in other areas, which would facilitate flocking. Certainly there is a relatively low number of Bananaquits there compared to other forests in Puerto Rico.

I gratefully acknowledge the support of the Ford Foundation to the "Tropical Ecology" course of Robert MacArthur and John Terborgh.

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The wing molt of the Florida Duck.—There does not appear to be any documentation of the Florida Duck (*Anas fulvigula fulvigula*) undergoing a wing molt, rendering it flightless, in the wild. Beckwith and Hosford (Am. Midl. Nat. 57:461–473, 1957) reported circumstantial evidence that the Florida Duck undergoes such a molt in the wild. They reported that three one-year-old captive Florida Ducks underwent a molt and became flightless during the month of July 1954.

Between 1 August and 1 September 1967 nightlighting operations were conducted on the Merritt Island National Wildlife Refuge, Titusville, Florida. These operations were designed primarily to capture broods of Florida Ducks utilizing a modification of the method described by Cummings and Hewitt (J. Wildl. Mgmt. 28:120–126, 1964).

These nightlighting operations yielded a total of 13 flightless adult Florida Ducks, six males and seven females, in varying stages of a wing molt that had rendered them flightless. The primary wing feathers are lost first (Fig. 1), followed by secondaries and tertials. The tertial feathers are not entirely molted until after the new primary and secondary feathers begin to appear. The molting succession of axillars and coverts was not determined. A wild Florida Duck retained after capture was found to remain flightless for approximately 4 weeks. All flightless females were found alone. In one instance, four flightless adults were encountered, two of which were captured, and proved to be males.

All molting Florida Ducks were found in impoundments of 515 to 555 acres in size. Water salinities in these two areas varied from 7,910.4 to 14,184.0 ppm. Vegetation utilized for escape by molting Florida Ducks consisted of saltgrass (*Distichlis spicata*) and mangrove (*Rhizophore mangle* and *Avicannia nitida*). At no time were molting birds found very far from such cover.

I thank the following employees of the Bureau of Sport Fisheries and Wildlife for