

A Revised List of Birds  
of Barro Colorado Island, Panama

EDWIN O. WILLIS  
and  
EUGENE EISENMANN

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## ABSTRACT

Willis, Edwin O., and Eugene Eisenmann. A Revised List of Birds of Barro Colorado Island, Panama. *Smithsonian Contributions to Zoology*, number 291, 31 pages, 1 figure, 1979.—Three hundred and sixty-six species of birds have been recorded on or near Barro Colorado Island, a 14.8 km<sup>2</sup> forested area in Gatun Lake in the Panama Canal Zone. Of these 366 species, 217 breed or formerly bred on the island; 11 of the 217 are birds of the edge of Gatun Lake rather than land birds. Migrants breeding in North or South America number 83 species, including 25 from the lake.

Nine of the 217 resident species immigrated to the island from nearby lowland areas since the early 1950s, but four of the nine have already disappeared. In addition to the four lost immigrants, 51 formerly resident species have disappeared from the island, leaving 162 species resident in 1977. Most of the extirpated former residents have been lost because of growth of forest and consequent loss of second-growth habitats. Some 16 of the 51 extirpated species seem to be birds of forest; their loss may be due to the small size of the island and to tendencies for small remnants of forest to retain few species.

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# A Revised List of Birds of Barro Colorado Island, Panama

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## Introduction

The birds of Barro Colorado Island, a reserve of about 1480 ha (3650 acres) of tropical forest in Gatun Lake in the Panama Canal Zone, have been studied at various times over the past fifty years (Chapman, 1929, 1938; Eisenmann, 1952). Recently, Willis (1974) found that some species of birds were disappearing from the island. Here we document this process of change, and bring a list of the birds for the island up to date as of April 1978, using published and unpublished records of many observers. We briefly outline the recent history of the island, lake, and vegetation, and we summarize ornithological studies. In the annotated list of species, we give present and former status of birds, breeding records, and comments on habitats as indicating possible reasons for status or changes in status. Comparisons are chiefly with the status and habitats reported by Eisenmann (1952) and Chapman (1938).

ACKNOWLEDGMENTS.—Barro Colorado Island has become internationally famous as a biological reserve and attracts visitors from throughout the world—often for their first experience with the American tropics. For records of birds, we are indebted to many such visitors, too numerous to list here by name. When we use a record for the annotated list, the name of the observer is given.

For sponsoring studies on Barro Colorado Island,

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## Recent Geographical and Ecological History

Barro Colorado Island is a forested hilltop that reaches 164 m (540 ft) elevation. It is centered just southwest of 9°10'N and 79°50'W, at about 26 km south of the Caribbean Sea and 32 km northwest of the Pacific Ocean, on the Atlantic slope of central Panama. It is irregular in shape, and ranges from about three to six km in diameter. Originally a part of the lowland forest, between 1912 and 1914 it was isolated when the large artificial Gatun Lake rose to about 26 m (85 ft) behind Gatun Dam on the central Chagres River to form the central part of the Panama Canal. At several places, mainland forest is less than one kilometer from the island.

The island became a biological reserve on 17 April 1923, and a few farmers who had cleared small areas were paid for their claims (Chapman, 1938). Presently it is managed by the Smithsonian Tropical Research Institute. Except for small clearings for a laboratory and for navigation lights and markers along shore, and for some 40 km of named trails marked (for the most part) every 100 m by signposts, the forest has been allowed to grow. This does not mean that the habitats and birdlife have

remained the same, as the following paragraphs show for the main habitats and the annotated list shows for the birds.

**LAKE AND LAKE SHORE.**—Gatun Lake and its borders have changed for two reasons: growth of extensive mats of introduced water weeds (*Hydrilla* species) since 1965; and spread of a cichlid fish known as "peacock bass" (*Cichla ocellaris*), efficient fish-eaters introduced about 1971 that have eliminated the prey of certain fish-eating birds (Zaret and Paine, 1973). As is detailed in the annotated list, the growth of *Hydrilla* added Common Gallinules and increased populations of some other birds, but the spread of peacock bass eliminated many herons, kingfishers, terns, and gulls.

Prior to declines in bird numbers due to competition with the peacock bass, the lake attracted many offshore birds in the rainy season (May–December). Flocks of Black Terns and Laughing Gulls joined tarpon (*Tarpon atlanticus*) in chasing small fish (*Melaniris chagresi*), and at times Parasitic Jaegers pursued the gulls. There may have been greater nutrient supplies and hence greater plankton and fish productivity in the rainy season. The absence of dry season chopiness (a result of northeast trade winds) may also have favored offshore birds in the wet season.

Along less exposed shores, there are submerged water weeds (formerly *Chara* species, now *Hydrilla*), and shore communities of floating grasses or emergents are gradually spreading as rainy season floods wash material into certain coves, such as opposite the ends of Shannon and Pearson trails. Shaded inlets lack aquatic vegetation, and are slowly filling with debris from the forest. The "esteros" referred to in Barro Colorado literature are long narrow inlets, actually drowned stream valleys. Exposed shores range from shelving cliffs to short rocky or muddy beaches, which attract only a few migrant sandpipers and waterthrushes.

**CLEARINGS AND FOREST BORDERS.**—Grassy or weedy clearing, near navigation lights off Miller Trail and around a house at the end of Drayton Trail are cleared regularly. Tiny clearings for navigation signs and bush-overgrown former house sites at the ends of Barbour, Harvard, and Zetek trails also attract occasional birds of open habitats. The 66-km shoreline (measured from a 1927 map) forms an edge that attracts certain flycatchers and other birds of forest edge or open areas. Wind and treefall dam-

age along exposed shores and on some ridges, such as near Wheeler Trail 8, keeps some forest fringes in a perpetually immature state. Within the forest, there are some large treefalls. The main area for open-country or forest-edge birds, and certainly the best-explored one, is the 2-ha (5-acre) laboratory clearing.

The laboratory clearing has become less open since a banana plantation north of the dock was allowed to revert to second growth in 1957, and canopy and forest-edge birds regularly cross it. Several birds of bushy and grassy areas, still common at Frijoles across the lake or on 4-ha (10-acre) Mona Grita Island near Burringa Point (sometimes called Harvard Point), have disappeared from the clearing in recent years. Bushy undergrowth near little-used animal cages at Allee Creek north of the laboratory, and a weir-tower complex for environmental surveillance (Windsor, 1975) by Lutz Creek south of the laboratory, appear to repel some forest birds but do not attract those of disturbed areas.

**FORESTS.**—The forests of the island may be divided into old forest and young forest. Some 705 ha (much of the southwestern half of the island, plus some small areas near the laboratory) are in old forest, according to planimetric analysis of a map (Figure 1) kindly furnished by a plant ecologist, Robin B. Foster. Bennett (1963) suggests that Indians must have cleared much of this region before the Spanish conquest, and Knight (1975) thinks that old forests may be only 130 years old and still changing in species composition. For earlier views of the successional ecology, see Kenoyer (1929). In general aspect, the old forests seem to be changing little except for local regrowth following treefalls. Huge espavé (*Anacardium excelsum*), almendro (*Dipteryx panamensis*), cativo (*Prioria copaifera*), and ceiba (*Ceiba pentandra*), or other trees, are scattered through a patchwork of treefalls of various ages. Dense patches of wild pineapple (*Ananas magdalenae*) clutter the undergrowth in places. A clump-forming palm (*Oenocarpus panamensis*) is often common in the understory.

Young forests, some 770 ha on the northeastern half of the island or on points, have been growing for 50–80 years (Knight, 1975). Although they have some of the same plants as old forest, they seem to vary less than do old forests, perhaps because they are even-aged rather than a patchwork of treefall



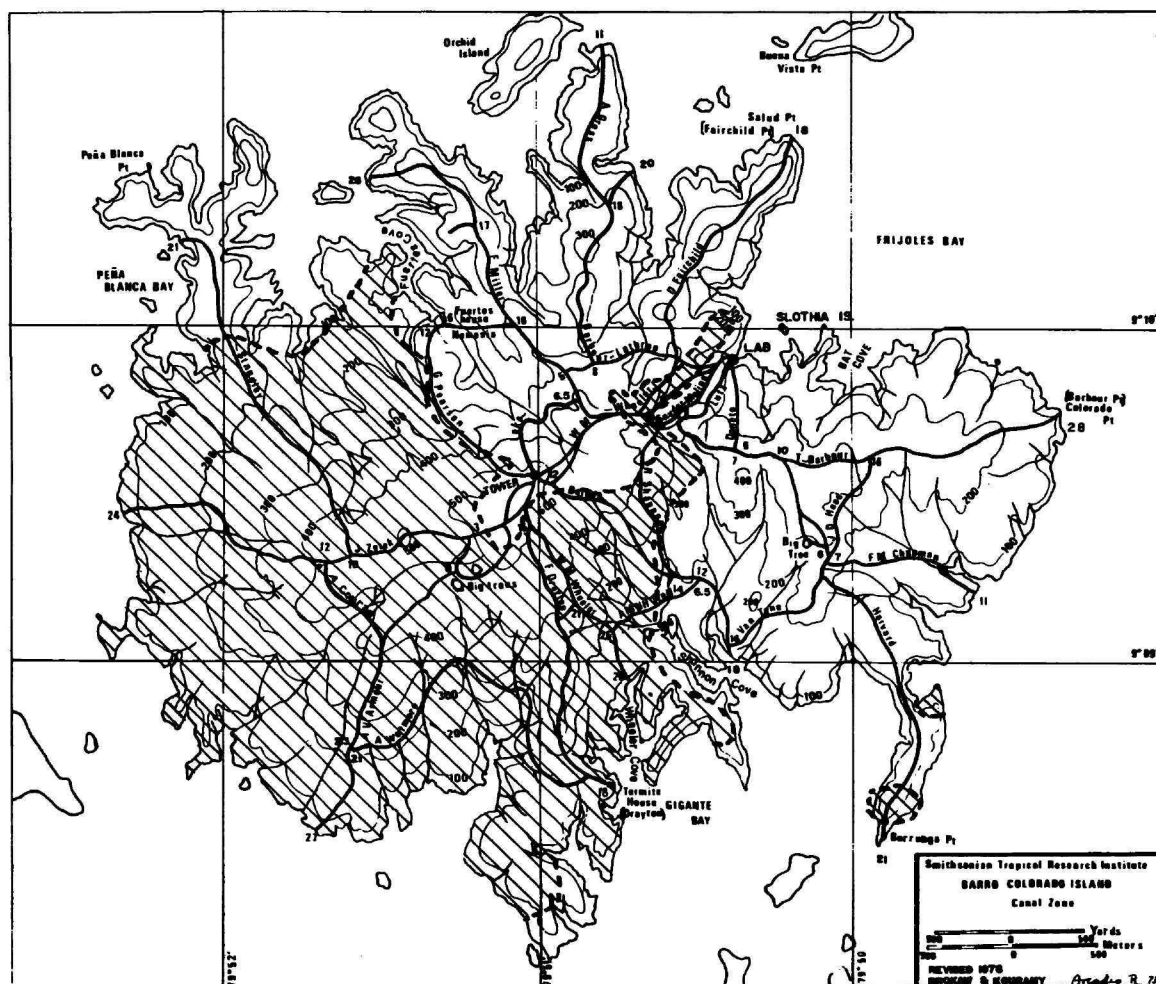


FIGURE 1.—Limits of old versus young forest on Barro Colorado Island. Striped areas indicate old forest, based on information furnished by Robin Foster.

zones. Generally they are uncluttered, except on windy ridges or edges where lianas loop through low vegetation. More trees are deciduous than in old forest, so that more light reaches the understory in the dry season. These forests have opened out underneath, increased in height, and changed in species over the years we have visited Panama.

The low stature of young forest is generally attributed to former agricultural use. Knight (pers. comm.) found one old resident who said that a windstorm felled much of the forest on Barbour Point in 1919, which could be an alternative explanation. Piles of bottles and evidence of houses

near Wheeler Trail 8 and Lake Trail 5 indicate, however, that previous human use is likely to be the main reason why the young forest is under 100 years old.

In some places, such as the escarpment west of Conrad Trail 2, landslides and treefalls create large clearings, soon growing up to scrub or young forest, within the borders of old or young forest. Several days of drizzling rain in November 1959 caused numerous landslides; the south edge of the laboratory clearing is the site of one such major slide. On 1 October 1961, a windstorm that came up from the south toppled scattered groups of trees

in old forest and created habitats that encouraged an increase in treefall birds (Willis and Oniki, 1972); a large treefall north of Zetek Trail 23 resulted from a 1973 storm. Normal northerly to easterly (rainy season) or northeasterly (dry season) winds have less effect.

Forest streams on the island dry up or become chains of pools in the dry season, as does a forest-shaded swamp of wild pineapple north of Armour Trail on the central and flat basalt cap of the island. The best streams, including small floodplains, are below American Museum Trail 3. A few herons, Pygmy Kingfishers, and wintering waterthrushes are nearly the only birds that use streams for feeding. Steep-walled canyons in the Bohio Conglomerate around the basalt cap provide humid forest zones favored by some birds (Willis, 1973b); the flat Caimito Formation of Barbour Point (Woodring, 1958) favors other species, such as Gray-headed Tanagers among the ant-following birds.

**CLIMATE, PLANTS, AND ANIMALS.**—The average annual rainfall (1925–1971) is about 2600 mm (106 in.); October and November are the rainiest months. The four warmer dry season months, January through April, supply only about 211 mm (8.5 in.) of this total. Fluctuations from year to year and away from the mean for a given month are to be expected, with some rainy seasons (1968, for example) only six months long (Willis, 1974). Occasional dry weather in the rainy season marks hurricane weather to the north, while occasional frontal drizzles or downpours in the dry season mark cold waves to the north. Heavy rains in the 1970 dry season caused early flowering of almendro trees, but fruit failed to set because pollinators were absent; mammals that normally would have eaten almendros the following December starved or tore up wild pineapples and tree bark (Robin B. Foster, pers. comm.). Chapman (1938) records a similar period of starvation that brought white-lipped peccaries (*Tayassu pecari*) to the clearing. Little is known about the effects of such climatic or mammalian fluctuations on birds.

Some mammal and reptile populations have changed since the island became a reserve, and may compete with or prey on birds. White-faced monkeys (*Cebus capucinus*) and reintroduced spider monkeys (*Ateles geoffroyi*) may rob nests of birds or compete with them for food. Such mammals as

white-lipped peccaries appear to have died out, but coatimundi (*Nasua narica*) and agouti (*Dasyprocta agouti*) are flourishing. Puma (*Felis concolor*) are gone, but ocelots and jaguarundis (*F. pardalis* and *F. yagouarundi*) or tayras (*Eira barbara*) are occasionally seen. Myers and Rand (1969) note that some frogs and lizards have disappeared, but some snakes are very numerous—especially the nest-robbing *Pseustes poecilonotus* and *Spilotes pullatus*. Barro Colorado has unusually high nest-predation rates (Y. Oniki, MS), and there may be many small nest-robbers because of losses of large predators like pumas.

Little is known of changes in insect or plant populations over the years. Since 1965, the hydrilla mats have greatly increased populations of a mosquito, *Anopheles albitarsus*, whose larvae puncture the water plants for air. Such mosquitoes may be vectors for avian disease.

#### Ornithological Studies

Eisenmann (1952) has reviewed the early ornithological history (with bibliography) of Barro Colorado Island, so it is not repeated here. He visited the island many times from 1937 to 1951 (when his paper was completed), almost annually from 1952 to 1967, and was present for a day and a half in 1974; Barro Colorado data are included in several of his later papers (e.g., 1955, 1961, 1970). Johnson (1953, 1954) visited in 1948 and worked chiefly on mixed insectivorous bird flocks. C. B. Koford had charge of the island during the year 1956–1957; he netted and banded a number of birds, some of which provided interesting recaptures many years later (Crebbs, 1955). Martin H. Moynihan took charge of Barro Colorado in 1957 and his supervision continued until the mid-1970's; most of his work with birds was done off the island, but Moynihan (1960, 1962) and helpers did important studies of mixed flocks of tanagers and honeycreepers about the clearing, and, with the assistance of T. C. Crebbs, Jr., did some netting and banding on and near the Island. Neal G. Smith, another Smithsonian Tropical Research Institute scientist, who arrived in 1963 and contributed observations to this paper, has done his ornithological work chiefly off the island, particularly in relation to brood parasites and their hosts (see 1968). Meanwhile, Willis worked on the island every year from 1960

to 1971, and in January–March 1977, chiefly studying the behavior and populations of birds that follow army ants; he has published many papers using Barro Colorado Island information (1963, 1966a, 1966b, 1967, 1972a, 1972b, 1972c, 1973a, 1973b, 1974; Willis and Oniki, 1972; Wilson and Willis, 1975).

Other recent workers have included Kilham (1972) on woodpeckers; Leck (1972, 1975) on fruit-eating birds and bird weights; Oniki (1972, 1975) on bird temperatures and on Slaty Antshrikes; Ricklefs (1969, 1971) on nesting mortality and Mangrove Swallows; Wiley (1971), and J.N.M. Smith later in the 1970's, on antwren flocks; W. John Smith (1966) and coworkers during the 1960's to 1978 on flycatchers and caciques; and Michael Perrone during 1972–1973 on peacock bass and lakeshore birds. E. S. Morton (1971, 1973, 1975, 1977) did some of his work on bird vocalizations, fruit-eating birds, food of migrants, and wren behavior on the islands. Wetmore's multi-volume Panama work (1965, 1968, 1972) contains numerous references to birds on Barro Colorado; and this is true of books and papers by many other authors. Skutch (1971 list) still publishes papers including material based on his early work on Barro Colorado, so that the bird publications from work done in the 1930s still outnumber publications from the second peak of research in recent years.

A Christmas census from Frijoles to Barro Colorado (Leck and Wilson, 1970) is useful but incomplete. Slud (1976) censused birds on the island briefly in 1966, but did not list species. Another census (MacArthur, Recher, and Cody, 1966) lacked comparability because of several misidentifications, including wrens for antwrens, and *Myiarchus panamensis* for *M. crinitus*. Even with a new Panama field guide (Ridgely, 1976; for some additional illustrations see Davis, 1972) the identification of tropical forest birds can be difficult. We have tried to be careful about accepting records of birds for the present list, but realize that occasional errors of identification may have been included. In questioning or rejecting the inclusion of a few species listed by Chapman (1937) or Eisenmann (1952), we have taken into consideration the previous experience in the neotropics of the observers who made the sight identifications, and the fact that at the time Panama bird distribution was very inadequately known and there was no guide for field identifica-

tion covering all the species likely to occur on Barro Colorado Island or indicating their usual habitat. Even today distinguishing certain species in the field is difficult, and much remains to be learned as to habitat niche and details of distribution of many Canal Zone birds.

#### Comments on the Annotated List

The following list gives 366 kinds of birds that have been recorded on Barro Colorado Island. Asterisks mark birds that have been collected on the island. In view of the long-existing policy not to collect animals, lack of a specimen has little significance. Existence of a specimen need not mean that the species still occurs, and should never justify casual identification. Nomenclature and sequence of names follow Ridgely (1976). The annotations give relative abundance or specific records with dates, habitats, common vocalizations syllabized by Willis (unless otherwise specified), and breeding records. Details of many early breeding records and a number of additional vocalizations or different syllabizations are given by Eisenmann (1952). Ridgely (1976) also gives many other vocalizations, usually drawn from information provided by Eisenmann. Symbols indicate if a species is a breeding resident (R), occasional vagrant (V) from the mainland or ocean, or a migrant breeding to the north (N) or south (S). Birds that stay on the water or grassy marshes are marked "w". If symbols are enclosed by parentheses the species no longer breeds on the island, although it may occur as a vagrant.

Birds that we assume or know to have bred on the island in the 1930s (Chapman, 1929, 1938) number 199 species, plus 9 species restricted to the lake or grassy marshes along the shores of the island. Seven other breeding species (Tiny Hawk, Long-tailed Tyrant, Great Kiskadee, etc.) immigrated from nearby areas of Panama to the island's land area and two others (Least Grebe, Common Gallinule) to its water edges, bringing the total of residents to 217 species.

Four of the nine immigrants (Green-and-rufous Kingfisher, Plain Wren, Buff-rumped Warbler, and Dusky-faced Tanager) apparently have failed to maintain populations and are again gone from the island. Fifty-one other residents no longer breed on the island, so that the breeding avifauna has

decreased from 208 in the early 1930s to 162 species (including five immigrants) in 1977. Small numbers of two extirpated species (White-breasted Wood-Wren, Song Wren) were reintroduced in 1976 by E. S. Morton, which, if they became re-established, would bring the total to 164. If a few recent White-necked Puffbirds and one Nightingale Wren are breeding rather than vagrant, the present total would be 164. One additional species, the Slate-colored Seedeater, is considered a vagrant but may breed in years of bamboo seed crops.

Some species seem to breed on the island but disappear from it in nonbreeding months: Piratic Flycatchers, Red-legged Honeycreepers, Giant Cowbirds, and (formerly) Yellow-green Vireos. They are listed as resident species. The flycatcher and vireo are known to be migratory in Panama, apparently going to South America after the breeding season (Morton, 1977).

Vagrant species (or local migrants) from elsewhere in central Panama number 66; 15 wander to the lake or its edges rather than to the island itself. Some may breed occasionally or, without breeding, use the island as part of their home ranges—White-collared Swifts, for instance. Others probably once bred on the island, and perhaps should be listed among the residents that have vanished from it. (Gray-cheeked Nunlet, White-fronted Nunbird, Spot-crowned Barbet, and Red-billed Scythebill may well have bred; others not even on the list probably occurred in the 1920s but were overlooked.) Most vagrants appear in the clearing or along the lake shore, and might breed if there were suitable semi-open habitat. A few, notably a male Lance-tailed Manakin that sang near Wheeler Trail 8 for several years, require second-growth or dry forests. Only eight vagrant species are forest birds, and several of these are vagrants from nearby hill areas (altitudinal or seasonal migrants?: Green Hermits, White-ringed Flycatchers, White-throated Robins, and Bay-headed Tanagers) rather than from lowland forests. Yellow-headed Parrots may have been seasonal migrants from savanna areas, as some Red-ored Parrots are local migrants today. Plumbeous and Swallow-tailed Kites may be chiefly migrants from further north in Middle America; but, as the Panamanian populations are also migratory, some may be local vagrants.

Undoubted migrants number 83 species, two

breeding south of Panama and 81 breeding north of Panama. Several other species presently listed as vagrants from elsewhere in Panama (Little Blue Herons, for instance) may also be migrants from the north. Of the northern migrants, 25 are lake birds and 56 are birds of the forest, clearing, or edges. The island seems good for migrants compared to similar forests on the mainland, perhaps because of declines in species of resident birds. Analyses (Willis, ms) suggest that one bird in seven on the island is a migrant during October, the peak month for migrants. Visitors often see migrants more easily than resident birds, since many migrants forage conspicuously around clearings rather than hide in the forest as do local birds.

Eisenmann believes that many vagrants (especially insectivores and seed-eaters) from cleared and semiopen mainland areas appear on the island during the dry season, when open areas become parched. Because of preservation of the forest, the island remains more humid than many nearby mainland areas at this season. Also, immature birds are likely to occur well after the breeding season (mainly March–August in Panama) when they have become independent and are searching for suitable habitats.

### Loss of Species

The rate of bird extirpations is of considerable interest; but, to be certain, one needs the last dates when species were recorded. We would appreciate corrections if the last dates given in the annotated list are not the last dates recorded by visitors. Apparently 5 species disappeared in the decade 1926 to 1935, 9 more by 1945, 11 by 1955, and 13 per decade since then. The low rate of loss in the early years may reflect failure to record some species that soon disappeared. Ornithologists visiting the island should keep lists of all species seen and send them to us and the Smithsonian Tropical Research Institute, for a list may include what might turn out to be the last record of some species.

Losses of resident birds from Barro Colorado have attracted attention because this is the best-documented case of an isolated reserve losing species in the way predicted by theories of island biogeography (MacArthur and Wilson, 1967). Some of the birds, however, have disappeared because of habitat

changes rather than because of increased extinction rates due to small area of habitats. Amazon Kingfishers and immigrant Green-and-rufous Kingfishers have apparently lost in competition with the peacock bass, and would have survived in a larger reserve only if the bass could not enter certain coves or if prey species adapted to it. Thirty-four species are birds of second growth and forest edge, and probably disappeared because forest growth removed their habitats. Several of these 34 extirpated species probably would still be nesting on a reserve the size of Barro Colorado were there a stream large enough to flood occasionally and maintain extensive zones of low growth like those on the Agua Salud River behind Frijoles. Sunbitterns, Gray-capped Flycatchers, and three unsuccessful immigrants (Plain Wrens, Buff-rumped Warblers, and Dusky-faced Tanagers) are examples of species that might have remained if there were such a stream. With such a stream occupying part of the forest area, however, more forest species might have been lost.

Sixteen of the lost species are woodland or forest birds, which would disappear from central Panama in the event that forests other than those on Barro Colorado Island were cut. They are as follows: Harpy Eagle, Barred Forest-Falcon, Red-throated Caracara, Great Curassow, Marbled Wood-Quail, Rufous-vented Ground-Cuckoo, Barred Woodcreeper, Buff-throated Foliage-gleaner, Black-faced Antthrush, Streak-chested Antpitta (lost since 1970), Sulphur-rumped Flycatcher, Northern Royal-Flycatcher, Black-chested Jay (lost since 1970), White-breasted Wood-Wren (reintroduced in 1976), Song Wren (reintroduced in 1976), Nightingale Wren. Ocellated Antbirds, down to two males at the 1977 census, will also soon be gone from the island. Although losses of these and further forest species are to be expected in such a small reserve (MacArthur and Wilson, 1967), the causes of losses are not clear. Willis (1974) studied declines of Barred Woodcreepers and Ocellated Antbirds, but found only that these birds were low in numbers and did not recover after fluctuations put their numbers close to zero.

It is possible that successional changes in the forest affect suitability even for forest and woodland birds, so that one cannot entirely eliminate the factor of forest maturation even for these 16 species. It seems doubtful, however, that one could pick or manage a forest area the size of Barro Colorado so

that it would not lose species at the same rate as Barro Colorado or even more rapidly. One would expect that survival of some species on the island depends on occasional restocking from forests near the island, so that it is likely to lose even more species when mainland forests are cut and there is no longer interchange of these species (Red-lore Parrots, for instance).

Several losses of forest species on Barro Colorado involve "ecological truncation" of guilds of similarly foraging birds, in which large or specialized species are low in densities and drop out first when area of habitat is reduced; similar cases on Hawaii are mentioned in Wilson and Willis (1975). Among ant-following birds, the very large Rufous-vented Ground-Cuckoo disappeared first, then the large Barred Woodcreeper, and finally the fairly large Ocellated Antbird. Systematic truncation of guilds (not the random extinctions implicit in "island biogeography theory," as suggested by Simberloff and Abele, 1976) means that multiple small refuges of a given habitat (such as tropical forest in the case of Barro Colorado) probably will retain fewer species than one large refuge of that habitat. We may expect further species to disappear from Barro Colorado by ecological truncation, for even larger and formerly connected islands off the coast of Panama have fewer species than does Barro Colorado.

Some birds, such as Slaty Antshrikes, have become very common on Barro Colorado and may be replacing lost species (Oniki, 1975). Mammals of several species are very common, and also may take the niches of missing birds to some extent. Some niches on Barro Colorado, however, are clearly less well occupied than in larger forest areas in the Canal Zone. For instance, loss of ant-following birds during the period of 1960 to 1977 was not made up by other birds. Swarms of army ants seem almost deserted by birds compared to similar swarms of ants in larger forests. Jon Greenlaw and J. R. Karr, who netted birds in the undergrowth, captured few birds per net-hour on Barro Colorado compared to forests on the nearby mainland.

Barro Colorado has thus become less interesting than larger forest tracts elsewhere in Panama for those who hope to study interactions in a fairly complete avifauna. Tropical forests are always difficult places in which to see birds, for they are usually good at keeping out of sight behind the dense foliage. Birds of tropical forests stand up and sing

their territorial claims less often than do migratory birds in the north. One would scarcely believe estimates of 2000 birds per square kilometer as he walks through the forest on Barro Colorado. One easily sees 50 or 60 species around the clearing and two dozen more in the forest, but finding other species is difficult. Investigation of every strange call helps; the ornithologist here must work with his ears. Forests larger and better suited for birds elsewhere in central Panama are less likely than Barro Colorado to survive expanding human use and changes in governmental policies. Moreover, one can readily see hunted species like Great Tinamous and Crested Guans, as well as many mammals, only on Barro Colorado. Forest reserves like the island will continue to play an important part in tropical ornithology, even though new measures may be needed to avoid losses due to the "island effect."

Willis (1974) suggests that, whenever possible, future reserves not be "islands" but parks connected to each other by "corridor zones." Such zones would allow movement to wet areas in dry years and vice versa, and might allow immigration by forest spe-

cies. Some tropical birds, especially forest ones, rarely cross open or water areas, and need corridor zones of natural vegetation to disperse.

The larger the areas left for natural ecosystems the better. Preserving large areas as natural zones would represent but a minor reduction of the area available for human exploitation. Willis believes that, for example, leaving half the world free for natural areas would cut only 35 years of human population growth at the present human doubling rate of 100 percent every 35 years. Since half the world was not even known to humans some few thousand years ago, geologically speaking, again removing from human exploitation part of the world is not unthinkable. Recently, there have been suggestions that even "nonresources" such as species and natural ecosystems should be granted some legal standing (Stone, 1974; Ehrenfeld, 1976). Extending such protection to a network of natural areas and to natural objects might help assure that potentially "lost worlds" like the Panamanian forest ecosystem and its birds would only be withdrawn from human exploitation, not lost forever.

### Annotated List

#### Family TINAMIDAE: Tinamous

##### \**Tinamus major*: Great Tinamou R

Uncommon on the forest floor. Breeding: 26 Feb (1934, D. E. Davis), 8 young just able to fly; 17 records of 2 to 8 blue-green eggs 28 Feb (1938, T. Gilliard) to 7 Oct (1961, Willis), on ground between tree buttresses. Nests tend to be deserted and unsuccessful if parent is flushed.

##### \**Crypturellus soui*: Little Tinamou (R)

Formerly regular near the laboratory. Prefers second growth and forest edges, but last bird heard whistling deep in forest near summit of island in 1963-1966 (last 8 Apr 1966, Slud). Breeding: 16 Mar 1926, 2 eggs (Van Tyne); 13 Jul 1927, 2 eggs that hatched 29 Jul 1927 (Gross and Van Tyne); 4 Aug 1925, 2 eggs (Gross).

#### Family PODICIPEDIDAE: Grebes

##### *Podiceps dominicus*: Least Grebe Iw

Fairly common in hydrilla mats since 1965; first noted 8 Feb 1960 (Eisenmann). Breeding: Pair with large young 21 Jan 1971 (Willis).

##### \**Podilymbus podiceps*: Pied-billed Grebe Rw

Fairly common in open water near or in hydrilla mats, mainly on Gigante Bay. Winter concentrations may be of northern subspecies, *P. p. podiceps*. Male in breeding condition collected 5 Aug 1927 (Van Tyne).

#### Family PELECANIDAE: Pelicans

##### \**Pelecanus occidentalis*: Brown Pelican Vw

Small groups often fly over the island and lake on their way across the isthmus.

#### Family SULIDAE: Boobies

##### *Sula leucogaster*: Brown Booby Vw

Flying north past the clearing, Jun 1964 (6 birds) and 11 May 1967 (2; N. G. Smith). Four Masked Boobies (*Sula dactylatra*), a more pelagic species, were reported by Mrs. G. G. Fry flying together over the lake on 14 Feb 1940.

#### Family PHALACROCORACIDAE: Cormorants

##### \**Phalacrocorax olivaceus*: Neotropic Cormorant Vw

Formerly common on the lake, especially on projecting tree

trunks; mainly immatures. Few in recent years, probably due to declines of fish prey with peacock bass predation.

Family ANHINGIDAE: Anhingas

\**Anhinga anhinga*: Anhinga Rw

Uncommon along shore, mainly in coves. Breeding: Nest with 2 eggs and 2 young in Wetmore Cove, 30 Oct 1976 (C. O. Handley).

Family FREGATIDAE: Frigatebirds

*Fregata magnificens*: Magnificent Frigatebird Vw

Individuals and small groups sometimes fly over on their way across the isthmus.

Family ARDEIDAE: Herons

*Ardea herodias*: Great Blue Heron Nw

Individuals, possibly all northern-breeding migrants, visit the lake shore at all seasons.

*Casmerodius albus*: Great Egret Vw

Occasional on low stumps offshore.

*Egretta thula*: Snowy Egret Vw

27 Feb 1940 (Mrs. A. Edey and Mrs. M. Edey).

*Egretta (Florida) caerulea*: Little Blue Heron Vw

Occasional along the lake shore in all months; most are immatures. Some, perhaps all, may be northern-breeding migrants. Walk on hydrilla mats, probably seeking small fish.

*Egretta (Hydranassa) tricolor*: Tricolored Heron Vw

No recent records; earlier noted occasionally (Chapman).

\**Butorides virescens*: Green Heron Nw

Rare along the lake shore, more common September to May, when northern-breeding birds arrive. Now considered conspecific with the following form, with which it apparently interbreeds. Breeding: 24 Mar, 3 eggs (T. Gilliard); 28 Apr, 2 eggs (Skutch). Slight identification of breeding birds as this form, rather than representing an intermediate or hybrid population, is uncertain. Van Tyne, who collected specimens, identified all breeding *Butorides* on the island as *B. striatus*.

\**Butorides striatus*: Striated Heron Rw

Formerly common along the lake shore, now almost extirpated apparently because of food competition with peacock bass. Breeding: 28 Jul 1925, nest and 2 eggs; 11 Aug, 2 half-grown young (Van Tyne). 9 Aug 1970, 3 eggs; one very large young in another nest, near Frijoles 20 Jun 1968 (Willis).

*Agamia agami*: Chestnut-bellied Heron R

Occasional along the lake shore or forest streams, generally in the shade of the forest; rarely seen.

*Bubulcus ibis*: Cattle Egret V

One immature at laboratory, 7 Dec 1968 (Leck). Adult there 30 Oct 1976 (C. O. Handley).

*Nycticorax nycticorax*: Black-crowned Night-Heron Vw

No recent records; earlier "not common" (Chapman).

*Tigrisoma lineatum*: Rufescent Tiger-Heron R

Occasional along coves or larger streams, sometimes well inland. Chapman reported *Tigrisoma cabanisi* (= *T. mexicanum*) but we and Wetmore think these observations were of *T. lineatum*.

*Ixobrychus exilis*: Least Bittern Rw

Occasionally flushed in marshes of Gigante Bay; very furtive. The northern *I. e. exilis* may winter. Notes: A low, drawling moan at brief intervals (Wetmore).

Family CICONIIDAE: Storks

*Mycteria americana*: Wood Stork Vw

Flying over 12 Feb 1940 (Mrs. Fry, Mrs. Francke, Mrs. Teague).

Family THRESKIORNITHIDAE: Ibises

*Mesembrinibis cayennensis*: Green Ibis Vw

Six flying over Gigante Bay, June 1971 (N. G. Smith). Mrs. G. G. Fry reported eight "all dark ibis" flying over 8 Feb 1940. The Glossy Ibis, *Plegadis falcinellus*, now a regular migrant to Panama, would be hard to separate from the Green Ibis and is more likely in the Canal Zone, at least during the northern winter.

Family ANATIDAE: Ducks

*Anas discors*: Blue-winged Teal Nw

Sometimes common migrant since 1966 (Slud), near the edges of hydrilla mats on the lake.

*Anas americana*: American Wigeon Nw

At Burrunga Point, 30 Oct 1976 (C. O. Handley).

*Aythya affinis*: Lesser Scaup Nw

Flock near dock 28 Nov 1956 (R. C. Murphy). Occasional on lake near island, especially near Burrunga Point, since hydrilla growth; fairly common in other parts of the lake.

*Aythya collaris*: Ring-necked Duck Nw

One male in Shannon Estero, 12 Feb 1977 (D. Glanz, Willis).

***Oxyura dominica*: Masked Duck Vw**

One female in grass of cove west of Chapman Trail, 12 Feb 1977 (D. Glanz, Willis). Breeds in other parts of Gatun Lake.

**Family CATHARTIDAE: American Vultures****\**Sarcoramphus papa*: King Vulture R**

Occasionally one to four soar over the clearing and forest or flush from dead animals on the forest floor. Breeding: Single young bird found 19 Feb 1954 (flying bird; Wetmore) and 23 Jan 1957 (downy; C. B. Koford).

**\**Coragyps atratus*: Black Vulture R**

Fairly common; occasionally flushed from dead animals on the forest floor. Formerly very common near the dump. Breeding: Two eggs in hollow stump in Gigante Bay, 11 Jan 1973 (M. Perrone). Two eggs laid on Pepper Island, just off Salud Point, between 28 Oct and 6 Nov 1976, were near site where two fledged young were present 9 Apr 1976 (L. McHargue).

**\**Cathartes aura*: Turkey Vulture R**

Common soaring over the forest or at carcasses within it. In addition to local *C. a. ruficollis*, large flocks of migrants, probably western *C. a. meridionalis* (see Wetmore, 1965) recorded 25 Feb to Apr (Chapman, G. W. Cottrell) and in Oct (30 Oct 1956, 2000 between 08:15 and 08:25; C. Koford). These northern birds, without yellow napes, also winter in fair numbers. Breeding: Young about 24 days old 8 Apr 1976 on Pepper Island probably came from egg laid in early Feb (L. McHargue).

**Family ACCIPITRIDAE: Hawks****\**Elanoides forficatus*: Swallow-tailed Kite V**

Groups or scattered birds occasionally soar over the forest, 3 Jan (Leck) to early Sep. This species breeds in Panama and northward, so that some birds are passage migrants. Twenty on 3 Jun 1949 (Eisenmann) were probably of the local population.

**\**Leptodon cayanensis*: Gray-headed Kite R**

Occasional in the upper levels of the young forest; collected 18 Aug 1927 (Van Tyne). Notes: A loud flicker-like *wick wick wick* . . . of 15-20 notes, also a loud cat-like *miaow*. Breeding: Nest near Gamboa in Aug, 1972 (N. G. Smith).

***Chondrohierax uncinatus*: Hook-billed Kite R**

Rare in the upper levels of the forest; soars regularly. Notes: A rapid, chuckling *wi-i-i-i-i-i-i-i-uh!*

**\**Harpagus bidentatus*: Double-toothed Kite R**

Fairly common in the forest midlevels and at the clearing; sometimes soars; follows troops of White-faced Monkeys (Greenlaw, 1967). Notes: A high, shrill *pee-yip* and a *pee-*

*riteét*, suggesting the two songs of the Eastern Phoebe (*Sayornis saya*). Breeding: Eggs in nest, 20m in *Ceiba pentandra* at clearing edge, 29 Jun 1951 (Laughlin, 1952).

**\**Ictinia plumbea*: Plumbeous Kite V**

Small groups to large flocks of migrants (breeding elsewhere in Latin America), as well as vagrants from nearby forests, occasionally soar west over the island from 5 Feb (1961; 150 birds, Willis) to 5 May (1953, Wetmore), and eastward from July to Sep.

***Accipiter superciliosus*: Tiny Hawk I**

Rare in treetops or forest interior in recent years; first seen 13 Aug 1970 (Willis). A treetop or forest-edge hawk, often attacking small birds in mixed flocks. Notes: High, faint peeping like a baby chicken.

***Buteo albonotatus*: Zone-tailed Hawk N**

Occasional in the dry season, 29 Dec (1970) to 5 Apr (1965, Willis), mainly along the lake shore east of the clearing; soars among Turkey Vultures on updrafts from trade winds.

***Buteo swainsoni*: Swainson's Hawk N**

Occasionally flocks soar over the island during migration: 275 on 7 Mar 1969 (Leck) to 6 May (1953, Wetmore); also in Oct.

***Buteo brachyurus*: Short-tailed Hawk V**

Occasionally soars high over the lake shore; normally soars over open country near woodland.

***Buteo nitidus*: Gray Hawk V**

Vagrant to clearing 6 May 1953 (two, Wetmore), 11 Feb 1960 (Eisenmann), and 27 Jan 1969 (Leck). A forest-edge bird.

***Buteo platypterus*: Broad-winged Hawk N**

Uncommon winter visitor in forest or about the clearings; huge flocks soar over in migration, circling up on thermals and coasting off in long strings to hills on the mainland. Over 7000 passed 10-11 Oct 1968 (Leck) and 5000 on 13 Oct 1972 (M. Perrone). Large flights in Mar and Apr, late date 20 Apr 1961 (Willis).

***Buteo magnirostris*: Roadside Hawk V**

Occasional vagrants at the laboratory clearing. The common open-country hawk of much of Panama.

***Leucopternis albicollis*: White Hawk R**

Uncommon in the forest or at clearing edges. Breeding: Building nest atop forest tree, 9 Mar 1929 (Chapman).

***Leucopternis semiplumbea*: Semiplumbeous Hawk R**

Uncommon in the forest, catching lizards and other prey. Notes: A long, high-pitched *kiteeeeeeeeeeah*. Breeding: Fledglings seen out of nest on island (Willis).



*Buteogallus anthracinus*: Common Black-Hawk V

Rare, mostly immatures; commonest in coastal Panama, particularly near mangroves.

*Buteogallus urubitinga*: Great Black-Hawk V

Occasional vagrants of race *ridgwayi*, both at clearing and along the lake shore.

*\*Morphnus guianensis*: Crested Eagle R

Specimen 30 Mar 1936 (R. J. Niedrach and A. C. Rogers); seen occasionally, including the rare banded phase (8 Feb 1950, Wetmore).

*Harpia harpyja*: Harpy Eagle (R)

No recent records. Seen 1924 (T. Barbour), 8 Jan 1947 (C. W. Quaintance) and 22 Jun 1950 (K. Stott); one was killed by a hunter 14 Sep 1951 in the nearby Bohio, Canal Zone, area (Wetmore, 1965).

*Spizaetus tyrannus*: Black Hawk-Eagle R

Regular in canopy; soars and calls persistently at midday. Notes: A mellow whistled *wheet, wheet, wheeteeeéa*, with variations (Eisenmann).

*\*Spizaetus ornatus*: Crested Hawk-Eagle R

Rare in forest midlevels; seldom soars and calls. Notes: A repeated set of a few brief whistles, the second note in each series emphasized—*whut WHEE whut whut*. Breeding: Two large stick nests high in cativo trees in tall forest near the end of Wheeler Trail; nest found 29 Dec 1960 had one large young 13 to 27 May 1961; nearly grown young in other nest 4 Oct 1965 gave series of 3–10 *whew* notes and parent answered the same (Willis).

*Circus cyaneus*: Northern Harrier (Marsh Hawk) N

No recent records; "winter visitant" (Chapman)

*Geranospiza caerulescens*: Crane Hawk R

Occasional at the clearing or in the forest; crossing from mainland, 8 Feb 1977 (S. Robinson).

## Family PANDIONIDAE: Ospreys

*Pandion haliaetus*: Osprey Nw

Regular Oct to Apr visitor along the lake shore; nonbreeders occasional in other months.

## Family FALCONIDAE: Falcons

*\*Micrastur semitorquatus*: Collared Forest-Falcon R

Occasional in the forest or calling in treetops; not seen 1960–1969, but noisily calling bird present 18 Aug 1970 to 9 Jan 1971 (Willis) and others seen since as if the species reinvaded successfully.

*\*Micrastur ruficollis*: Barred Forest-Falcon (R)

Formerly "not common" (Chapman); last seen 22 Mar 1966 (Slud). A bird of the lower layers of forest edge and secondary woodland, but also of forest.

*\*Daptrius americanus*: Red-throated Caracara (R)

Formerly fairly common in small and noisy groups in the forest canopy and edge; last seen 29 Aug 1963 (Willis). This species disappeared at about the same time from nearby Panamanian forests, so that loss from Barro Colorado may have been connected with general loss rather than with small size of the island.

*Falco peregrinus*: Peregrine Falcon Nw

Rare migrant to dead trees of the lake, from 9 Oct (1972, M. Perrone) to 5 May (1953, Wetmore).

*Falco ruficularis*: Bat Falcon (R)

Formerly regular in the treetops and along the lake shore. Last pair at hollow almindro near Armour Trail I in Feb to Nov, 1961; last stray 30 Sep 1965 (Willis). Notes: A rapid *kee kee kee kee*. Breeding: Defending tree cavities 23 Mar 1955 (Wetmore) and in 1961.

*Falco femoralis*: Aplomado Falcon V

Accidental wanderer, probably from savannas of western Panama, circled over Salud Point, 19 Feb 1954 (Wetmore).

*Falco sparverius*: American Kestrel N

One over clearing 9 Oct 1968 (Leck); a bird of open areas, where known as a migrant and winter visitor.

## Family CRACIDAE: Curassows, Guans, Chachalacas

*\*Crax rubra*: Great Curassow (R)

Noted only by Van Tyne, 1925 to 18 Apr 1927. Pair introduced in 1960 were killed by predators.

*\*Penelope purpurascens*: Crested Guan R

Uncommon in the forest and at the edge of the clearing. Usually in pairs, yelping noisily when disturbed. Drum before sunrise in Jan-Feb. Breeding: Young out of nest seen often (Willis). 2 young, 1/3 grown, 17 Oct 1976 (C. O. Handley).

*\*Ortalis cinereiceps*: Gray-headed Chachalaca R

A few groups remain near the lake shore, especially on Barbour and Burrunga Points; a bird of forest edge and second growth.

## Family PHASIANIDAE: Partridges

*Odontophorus gujanensis*: Marbled Wood-Quail (R)

Formerly in groups near the clearing; last heard 5 May 1953 (Wetmore).

## Family RALLIDAE: Rails

\**Aramides cajanea*: Gray-necked Wood-Rail R  
Uncommon in woodland along the lake and in the Armour 9 swamp.

\**Laterallus albigularis*: White-throated Crake Rw  
Common in grassy marshes of Gigante Bay and the south-western shores of the island.

*Gallinula chloropus*: Common Gallinule Iw

Increasingly common since 26 Mar 1966 (Slud) in mats of hydrilla. Breeding: Nest with 3 eggs, islet near end of Shannon Trail, 30 Jun 1967 (Karr, Willis); similar nest and 4 eggs nearby 12 Feb 1977 (D. Glanz, Willis). Chicks seen nearly all months of the year.

\**Porphyryla martinica*: Purple Gallinule Rw

Fairly common in bushes and small marshes along shore, especially on the south and west. Breeding: 14 Mar 1929, two young about a week old (Chapman); young in natal down near Frijoles (mainland), 5 Nov 1927 (Gross, Van Tyne). Nest and 5 eggs 15 May 1935 (Skutch); 4 eggs in nest near laboratory, 13 Jul 1925 (Gross, Van Tyne).

*Fulica americana*: American Coot Nw

Regular in winter on hydrilla mats; first recorded 26 Mar 1966 (Slud).

## Family HELIORNITHIDAE: Finfoots

\**Heliornis fulica*: Sungrebe Rw

Scattered along shore where trees overhang quiet waters, especially in narrow bays; rare recently. Notes: Hollow code barks, usually 3-4 per series, sometimes ending in *kwa* bark (Willis, M. Perrone). Breeding: Flightless fledgling with adult in Wheeler Estero, 8 Jan 1961 (Willis). Female with two half-grown chicks, mid-Jul 1973 (M. Perrone).

## Family EURYPYGIDAE: Sunbitterns

\**Eurypyga helias*: Sunbittern (R)

No recent records. Collected 15 Mar 1926, in creek bed on Shannon Trail (Van Tyne); seen on lake and streams in 1920's (Sturgis).

## Family JACANIDAE: Jacanas

\**Jacana jacana*: Wattled Jacana Rw

Common along the lake shore, especially since 1967 on hydrilla mats. Breeding: Small chicks out of nest, mid-Feb 1969 (Wiley). Nest and 4 eggs, 12 Feb 1977 on Burrunga Point (D. Glanz, Willis); 3 eggs in nest at Gigante Bay, 6 Apr 1969 (Leck). Nests recorded at Summit Gardens (mainland) 15 Feb 1942 (J. Abbott) and 17 May to 26 Nov 1941 (G. R. Meyer).

## Family SCOLOPACIDAE: Sandpipers

*Tringa flavipes*: Lesser Yellowlegs Nw  
Three 26 Mar 1966 (Slud).

\**Actitis macularia*: Spotted Sandpiper Nw

Uncommon winter visitor along lake shore, more frequent during migration, 9 Aug (1970, Willis) to 12 May (1926, collected, Van Tyne).

## Family STERCORARIIDAE: Skuas

*Stercorarius parasiticus*: Parasitic Jaeger Nw

Six immatures, probably of this species, harried Laughing Gulls (about same size) over lake 27 Dec 1960; one did so until 18 Jan 1961 (Willis). Normally marine birds, but occasional over lake Oct-Dec (N. G. Smith).

## Family LARIDAE: Gulls and Terns

*Larus delawarensis*: Ring-billed Gull Nw

Occasionally winters on lake (Moynihan, N. G. Smith).

*Larus argentatus*: Herring Gull Nw

Several over lake in winter of 1957-1958 (Moynihan). One 27 Dec 1968 (Leck), other 29 Jan 1977 (Willis).

*Larus atricilla*: Laughing Gull Nw

Formerly common migrant and winter resident on the lake; nonbreeding birds occasional May-Aug. Often flocked around groups of small fishes chased by larger ones. Less common since spread of peacock bass (Zaret and Paine, 1973).

*Larus pipixcan*: Franklin's Gull Nw

One on lake 3 Jul 1951, 21 Aug 1954 (Eisenmann); seven on 22 Jun 1952 (J. Bull, Eisenmann); two on 9 Apr 1973 (M. Perrone); nonbreeding birds occasional throughout year in Panama.

\**Chlidonias niger*: Black Tern Nw

Migrants and nonbreeders formerly common over the lake in the wet season, May-Dec, rare in the dry season. Sometimes common in recent years. Large numbers are offshore in the Gulf of Panama, Jan-Apr (Eisenmann).

*Gelochelidon nilotica*: Gull-billed Tern Nw

Once on lake, winter 1957-1958 (Moynihan).

*Sterna hirundo*: Common Tern Nw

Migrants and nonbreeders uncommon to rare over the lake in the wet season; once in Feb, 1969 (Leck).

*Sterna fuscata*: Sooty Tern Vw

One found unable to fly in laboratory clearing about 30

Nov 1970; Morton saw it still alive the first week of December. A pelagic species.

*Sterna albifrons*: Least Tern Nw

One over lake near Frijoles (mainland), 11 and 17 Aug 1961 (Willis).

\**Sterna maxima* (*Thalasseus maximus*): Royal Tern Nw

Migrants and nonbreeders (May-Aug) occasional over the lake; collected 28 May 1927 (Van Tyne). A banded bird from the Atlantic coast of the United States has been recovered on Gatun Lake (J. Weske).

*Sterna* (*Thalasseus*) *sandwicensis*: Sandwich Tern Nw

Migrants and nonbreeders (May-Jun) occasional over the lake, less often in dry season.

*Anous stolidus*: Brown Noddy Vw

One over ship channel in lake, mid-Jul 1973 (M. Perrone). Pelagic species.

Family COLUMBIDAE: Pigeons

*Columba cayennensis*: Pale-vented Pigeon R

Uncommon along the lake shore, flying mostly over water. Commoner at Frijoles (mainland). Breeding: Several nests, one containing one egg, over water of laboratory cove 6 Feb 1977. Five nests in tops of bushes over water by Buena Vista Point had young 21 May 1961 to 8 Jun 1962; in one nest the single egg hatched between 2 and 6 Jul 1962 (Willis). Notes: Usual call oo, kùk-tu-coóoo, kùk-tu-coóoo, kùk-tu-coóoo (Eisenmann).

\**Columba speciosa*: Scaled Pigeon R

Rare, mostly along shores of Gigante Bay; commoner at Frijoles (mainland). Notes: A groaning, low oooo, ook-coooo, ook-coooo, ook-cooo.

\**Columba nigrirostris*: Short-billed Pigeon R

Fairly common in canopy. Easily attracted by whistling the call, a melodious, melancholy ho, cu-cu-coóoo (Eisenmann).

*Columbina minuta*: Plain-breasted Ground-Dove V

One reported in the clearing, 24 Mar 1950 (G. W. Cottrell). A species of open country; confusion with female of next species is easy.

*Columbina talpacoti*: Ruddy Ground-Dove V

Formerly occasional in the clearing in the dry season (W. A. Weber, Skutch); Feb, 1962 (Mr. and Mrs. A. Schnitzer). Common in clearings and semi-open areas at Frijoles and elsewhere in Panama.

\**Claravis pretiosa*: Blue Ground-Dove (R)

Rare recently, probably nonbreeding stragglers from large populations in light woods at Frijoles (mainland); a few pairs present to 1965 in young woodland.

*Leptotila verreauxi*: White-tipped Dove R

A few pairs in the clearing and along shore in young or windswept woodland. Notes: A low woob, w-woooooh. Breeding: Mar (1947, Quaintance) to 8 Oct (1927, Gross); elsewhere in Panama eggs January to 19 Sep (1968, J. Karr).

\**Leptotila cassinii*: Gray-chested Dove R

Common in the forest, especially young forest, on the ground. Notes: A low-pitched cooooooooh, longer than the note of either species of quail-dove. Sings from 2-5 m up. Noisy flight. Breeding: Feb-Apr (1935, Skutch) and commonly to 25 Sep (1965, Willis); stick platforms 1-4m up hold 2 whitish eggs each.

\**Geotrygon violacea*: Violaceous Quail-Dove R

Uncommon on the ground in the young forest, mainly from Zetek 1 across to Barbour 15. Also on Bohio Peninsula (mainland). Possibly immigrant, but more probably overlooked prior to 1960. Silent flight. Notes: A short hollow coooo, repeated about 18 per minute from 3-15 m up; higher in pitch than song of Gray-chested Dove or Ruddy Quail-Dove. Breeding: Incubating two buff eggs in shallow stick nest 2.3 m on sapling limb at Balboa Trail 3.4, 11 to 17 Jul 1963; nest destroyed 19 Jul (Willis).

*Geotrygon montana*: Ruddy Quail-Dove R

Uncommon on the ground in the forest. Silent flight. Notes: A low humming mmmmmmmmm (Eisenmann), intermediate in length between the songs of the last two species, Sings on or near the ground. Breeding: Six slight leaf platforms, 1-2 m up, each with two buff eggs, Jun to Aug in 1961 to 1969 (Willis).

Family PSITTACIDAE: Parrots

\**Brotogeris jugularis*: Orange-chinned Parakeet R

Common in the treetops and forest edge, flocking after the breeding season. Breeding: Jan-May (Van Tyne). Digging nest in termitarium on tree in Gigante Bay, 22 Jun 1952 (J. Bull, Eisenmann).

\**Pionus menstruus*: Blue-headed Parrot R

Fairly common in the treetops; some fly over from the mainland. Breeding: At nest cavity, 22 Jan 1960 (Willis); young in nest 12 Apr 1937 (T. Gilliard); 6 Apr 1950, in stub in water (Wetmore). At Ft. Davis (mainland), fledgling at hole in topless royal palm, 5 May 1961 (J. Ambrose).

*Amazona autumnalis*: Red-lore Parrot R

Fairly common in the treetops. Large flocks flying from the mainland to Barbour Point before 07:00 each day in early

Feb, 1977 (N. Brokaw, J. Pickering, Willis); flocks departing northward across Salud Point each evening in Nov, 1976 (Brokaw). Breeding: Visiting nest hole in dead tree over water by laboratory, 5-7 Feb 1962 (Willis). Two nestlings in hollow dead tree on lake 8 Apr 1956 (C. Redemyer) taken from nest and kept in captivity (seen by Eisenmann).

*Amazona ochrocephala*: Yellow-headed Parrot V  
Until 1950, casual from dry Pacific woodlands.

\**Amazona farinosa*: Mealy Parrot R  
Fairly common in the treetops, especially in old forest.

#### Family CUCULIDAE: Cuckoos

*Coccyzus americanus*: Yellow-billed Cuckoo N  
Migrant 18 Apr (1961) to 11 May (1966) and 14 Aug (1965, Willis) to 19 Nov (1972, M. Perrone); uncommon to rare transient; some winter in Panama.

*Coccyzus erythrophthalmus*: Black-billed Cuckoo N  
Immature hit window, later released and stayed, 14-21 Oct 1976 (C. O. Handley). In Panama rare to uncommon fall transient; very rare in spring.

\**Piaya cayana*: Squirrel Cuckoo R  
Fairly common in liana-covered treetops and at forest edges; at times follows army ants in the forest interior. Notes: A loud *wreep-wurr* or *geep-kareer* much like call of Greater Kiskadee; in alarmed flight a loud *stit* or *stit-it*; song a series of 5-8 ringing *whweep* notes; an accented *wik-i-y'wer* in disputes. Breeding: Nest in mango tree by kitchen, May 1935 (Skutch). Nest being constructed on Escobal Road (mainland), 28 Jun 1955 (Eisenmann, F. O. Chapelle, J. Ambrose).

*Crotophaga major*: Greater Ani R  
Scattered small groups in dense vines along sheltered parts of the lake shore, favoring moist areas; in early 1971 often near summit of island with army ants. Breeding: Seven young left nest in Fuertes Estero 27 Sep 1972; nest used again 1 Aug 1973 (M. Perrone). Seven eggs in stick nest by Buena Vista Point, 23 Jul 1961; several young Jul 30 (Willis). Seven eggs in Bohio Peninsula (mainland) nest, 24 Jun 1972 (M. Perrone).

*Crotophaga ani*: Smooth-billed Ani R  
Formerly (to 1962) bands in the clearing; recently only in grassy marshes of Gigante Bay. Breeding: Jan, Feb (Chapman, T. Gilliard); Feb-May 1935, repeated nestings, all destroyed; Jun 1929 (Skutch).

*Tapera naevia*: Striped Cuckoo V  
Formerly occasional in the clearing; a bird of bushy savannas. Notes: Melancholy whistles, *sa-see* or *sa-seh-see*, *see-tah* (Wetmore). Breeding: Parasitic.

\**Dromococcyx phasianellus*: Pheasant Cuckoo R  
Rare; in young woodland, mainly near Shannon 13; collected 13 Mar 1926 (Van Tyne); last noted 23 Jan 1971 (Willis). Decoys to whistled imitation of voice. Notes: Melancholy whistles, *se-see-werrrrrrr*, the last note quavering. Also, *sa*, *seh*, *si-see*, four notes rising in pitch. Breeding: Parasitic.

\**Neomorphus geoffroyi*: Rufous-vented Ground-Cuckoo (R)  
Collected 7 Jan 1926 (Chapman, Potter); last seen 22 Mar 1935 (Skutch). Terrestrial bird of vine-crowded forest; follows army ants. Breeding: Not parasitic (H. Sick, Willis).

#### Family STRIGIDAE: Owls

\**Otus guatemalae vermiculatus*: Vermiculated Screech-Owl R  
Fairly common in the lower levels of the forest; probably overlooked before 1960. Specimen from one found dead 30 Mar 1969 (Leck). Notes: A short, quavering *ro-o-o-o-oh*, suggestive of but much shorter than call of *Otus asio* of North America and unlike call of *O. guatemalae* in British Honduras (Willis; see L. I. Davis 1972).

*Otus choliba*: Tropical Screech-Owl (R)  
Formerly about the clearing; a bird of clearings and second growth. Last reported Feb 1950 (Kilham). Seen on nearby Mona Grita Island 5 Feb 1977 (N. Brokaw, J. Pickering, Willis). Notes: a short series of bubbling or purring notes usually ending in a higher, catlike whine.

*Lophotrix cristata*: Crested Owl R  
Seen rarely, but often heard at night in treetops from summit of island westward, at least in the wet season; rests during day low in lianas or tangles. Notes: A grunty, frog-like *grrrroof* (P. Schwartz).

*Pulsatrix perspicillata*: Spectacled Owl R  
Fairly common in the forest, resting diurnally on limbs. Notes: A motmotlike pulsing very rapid series of low rattling hoots, *woob-woob-woob-woob-woob-woob-woob-woob-boo-boo*; young birds give a slightly hoarse loud whistle, *hweew* (Eisenmann). Breeding: Young calling out of nests 9 Sep and 30 Oct, 1961 (Willis).

\**Ciccaba virgata*: Mottled Owl R  
Uncommon in the forest, resting in vine tangles during the day. Notes: A loud, slow *lwoof*, *woof*, *woof* in western Mexico and in Panama (Willis); a catlike *keeeoweeyo* and a *gruff hrrr* (Eisenmann).

*Ciccaba nigrolineata*: Black-and-white Owl R  
Reported mainly since 1952 (Ingles) at the laboratory clearing, where it often takes bats (Mrs. H. Burkhardt) or

insects attracted by lights; presumably overlooked earlier. Notes: An abrupt *bu* at short intervals, often in groups of three; weaker than calls of Mottled Owl (Willis); a deep, resonant, very deliberate *whoof, whoof, whoof* (Eisenmann). A catlike *keeeeee* (Ingles).

*Rhinoptynx clamator*: Striped Owl V

Vagrant to dense cover on Slothia Island near the laboratory, 19 Aug 1970 (M. Sunquist, photograph). A bird of bushy, grassy areas.

Family NYCTIBIDAE: POTOOS

*Nyctibius grandis*: Great Potoo R

Occasionally seen in or at the edges of tall forest. Sits quietly on high open limbs during the day, rarely low. Notes: A harsh, growling *ahrrr* (Eisenmann); also *oorroo* (Haverschmidt).

*Nyctibius griseus*: Common Potoo (R)

No recent records; "not uncommon" (Chapman). Nocturnal, woodland edges, perching in vertical posture on bare limbs. Notes: A melancholy musical series of wailing notes, going downscale (Eisenmann).

Family CAPRIMULGIDAE: Nightjars

*Lurocalis semitorquatus*: Short-tailed Nighthawk R

7-17 Mar 1961, one zoomed batlike around the laboratory clearing for a few minutes about 06:15 am (J. Zimmerman, Willis). Dead at laboratory, May 1972 (N. G. Smith). Feb, 1977 (S. Robinson). A bird of forest crown and edges, perhaps overlooked earlier.

\**Chordeiles acutipennis*: Lesser Nighthawk N

Migrant. Specimen 30 Oct 1927; large flocks of silent night-hawks seen from mid Sep on (Gross, Eisenmann). Willis noted silent birds and groups 8 Sep 1961 and 2 Nov 1960. Some are probably northern transient Common Nighthawks (*Chordeiles minor*), which migrate through Panama.

\**Nyctidromus albicollis*: Pauraque R

Occasional on nearby Slothia Island, in the clearing, and at Wheeler Trail 7.5. Breeding: Mar 1935 in clearing, 30 Apr 1935 on Slothia (Skutch). Notes: A hoarse whistled *porweeeeer*; also a series of *hip's* on a single tone (Eisenmann).

\**Caprimulgus carolinensis*: Chuck-will's-widow N

Winter resident in the forest 7 Oct (1960) to 18 Apr (1961, Willis). One sitting on ground in forest Jul, 1967, may have been the similar Panamanian *C. rufus*, but seemed large (Karr, Willis).

Family APODIDAE: Swifts

*Streptoprocne zonaris*: White-collared Swift V

Six overhead 5 May 1953 (Wetmore). Three on 23 Sep 1972 (M. Perrone). Twice seen by Willis.

*Chaetura pelagica*: Chimney Swift N

A flock of 500 moving eastward on 22 Oct 1960 and some going westward on 17-25 Apr 1961 seemed this migrant species (Willis).

*Chaetura spinicauda*: Band-rumped Swift R

Common over coves and the island; other species may occur in their flocks. Flocks of large dark swifts, apparently some species of *Cypseloides*, occasionally soar with the *Chaetura* or separately.

*Chaetura brachyura*: Short-tailed Swift V

Several with Band-rumped Swifts over cove below Wetmore Trail, 3 Mar 1977 (Willis). Common in open areas, as Frinjoles (mainland).

*Panyptila cayennensis*: Lesser Swallow-tailed Swift R

A few often circle high in pairs or small groups in flocks of *Chaetura* swifts or alone.

Family TROCHILIDAE: Hummingbirds

*Glaucis hirsuta*: Rufous-breasted Hermit R

Few recent records; formerly uncommon. Usually at stream-side plants, *Heliconia* thickets, or treefall openings.

*Threnetes ruckeri*: Band-tailed Barbthroat (R)

No recent records; formerly occasional (Eisenmann). Humid forest bird.

*Phaethornis guy*: Green Hermit V

No recent records; formerly "not uncommon" (Chapman), perhaps as seasonal migrant from upland forests. Eisenmann now suspects misidentification.

\**Phaethornis superciliosus*: Long-tailed Hermit R

Fairly common in the lower levels of the forest and clearing. Males sing noisily one to five meters up at small leks near American Museum Trail 1, at Standley Trail 16, south of Armour Trail 8 some 350 m, and northwest of Fairchild 8; the first three sites were occupied at least 1961 to 1971. Notes: A *whees* as it darts through the forest; males sing monotonously, *wheeisk*, over and over. Breeding: Seven nests about eye level under tips of palm frondlets had two white eggs each 24 Jun (1951; L. J. Milne, Eisenmann) to 13 Sep (1965, Willis); one egg in the first nest hatched 26 Jun.

**\*Phaethornis longuemareus:** Little Hermit R

Rare in young forest and at the clearing; one or two males sang until 1971 at lek near ground at Wheeler Trail 7.6 (Willis).

**Florisuga mellivora:** White-necked Jacobin R

Common at flowering plants or hawking aerial insects at the clearing or other forest edges, less common deep in forest. Breeding: Seven nests with two eggs or young, yellow-felted, cup-shaped structures 0.3–2.1 m atop large leaves in deep forest, 10 Jan (1937, T. Gilliard) to 20 Jul (1964, Willis).

**Anthracothorax nigricollis:** Black-throated Mango R

Rare, formerly more common, at the clearing and along shore. Breeding: Dec to Mar (Chapman, Skutch, A. A. Allen).

**Lophornis delattrei:** Rufous-crested Coquette V

Rare around flowering plants at the clearing; 30 Jun 1948, 28 Jun–5 Jul 1949, and Jun 17–19, 1952 (Eisenmann); 19 Dec 1960 (Willis); 1968 (Leck); Mar 1977 (George Angehr).

**Chlorostilbon canivetii:** Fork-tailed Emerald V

A few records from the laboratory clearing; an open-country bird, chiefly of Pacific slope.

**Thalurania colombica:** Crowned Woodnymph R

Fairly common low in the forest and clearing. Breeding: Feb (1977, D. and A. Murowski, Willis); 2 and 25 Mar (1935, Skutch).

**\*Damophila julie:** Violet-bellied Hummingbird R

Common low in the forest and clearing. Notes: Males hiss an insectlike *vieiei*, *veii*, *veii*, *viii*, *viii* series from perches 1–10 m up during the breeding season. Alarm note, *see see zeeek*. Breeding: Four nests on branches 2.5–4.2 m up in forest, 15 Mar 1961 to 10 Jul 1967 (young; Willis). A nest at Summit Gardens (mainland) had two eggs 19 Jan 1941 (Meyer).

**Lépidopyga coeruleogularis:** Sapphire-throated Hummingbird V

Formerly occasional around the laboratory. Common in open areas; in Panama usually near the coast.

**Hylocharis eliciae:** Blue-throated Goldentail

Eisenmann now questions his original identifications; they were probably Rufous-tailed Hummingbirds with reddish bills.

**\*Amazilia amabilis:** Blue-chested Hummingbird R

Common in the laboratory clearing and at treefall clearings, but often mistaken for a female of the four preceding species. Males call singly or in small groups, centered 10–15 m up, especially at dawn and dusk in the dry season. Notes: A

monotonous *pseik* at 120 per minute, with some pauses or faint buzzes as of fluttering wings.

**Amazilia edward:** Snowy-breasted Hummingbird V

Males at laboratory 2–6 Jul 1948 and 4–6 Jul 1950 (Eisenmann), 20 Mar 1969 (Leck) and Dec 1977 (George Angehr). Generally in more open country.

**\*Amazilia tzacatl:** Rufous-tailed Hummingbird (R)

A few were at the laboratory clearing until 1971, where formerly considered commonest hummingbird (Eisenmann). A bird of semi-open habitats. Breeding: Dec (1930, Skutch) to 10 Jul (1950, collecting nest material, Eisenmann); on mainland, Canal Zone nests also recorded in Apr and May (Stone, 1918).

**\*Chalybura buffonii:** White-vented Plumeleteer (R)

Occasional around the laboratory; usually in *Heliconia* thickets at forest edges.

**\*Heliophryx barroti:** Purple-crowned Fairy R

Fairly common high in the forest or at forest edges. Breeding: Apr, 1924, nest attached to vertical hanging liana (Sturgis).

**Helimaster longirostris:** Long-billed Starthroat V

Male near laboratory 27 Jan 1951 (Collias) and 12 Apr 1961 (Eisenmann). Primarily a bird of partly open country and the edges of the lake. Breeding: Young flew near but returned to nest 9 m at tip of dead twig of tree by Gamboa railroad station (mainland), 30 Jan 1961; female sitting on same nest 12 and 24 Feb; two young overflowing nest 28 Apr (Willis).

## Family TROGONIDAE: Trogons

**\*Trogon massena:** Slaty-tailed Trogon R

Fairly common in the forest midlevels. Observed following *Cebus* monkeys (Stott and Selsor, 1961). Notes: A loud, long series of *cah* or *cow* notes, at the rate of about two per second. Breeding: In termite nests, Mar–Jun (Chapman, T. Gilliard); 13 Jul 1927, nest with young (Gross).

**Trogon melanurus:** Black-tailed Trogon R

Rare in the forest upper levels or midlevels; most regular near the middle 500 m of Shannon and Balboa Trails. Notes: A series of 10–20 resonant *kwo* notes, at 2–3 per second, higher in pitch than those of *T. massena* and increasing in volume like the calls of a Crested Guan. Breeding: Pair building 4 m in termite nest at head of Gigante Bay, 10 May 1961 (Willis). In other Canal Zone areas, pairs at holes in termite nests 23 Mar 1967 (Eisenmann, N. G. Smith), Apr–May 1970 (Morton).

**\*Trogon viridis:** White-tailed Trogon R

Fairly common in the midlevels of young forest, uncommon in old. Notes: In addition to accelerating song, starting as

slow *coo* notes and gradually becoming a roll (Eisenmann, 1952), a soft *cop* every second or two; alarm a rattling *kirrrrick* (Willis). Breeding: In termite nests, 11 Mar (1946, Wetmore) to 3 Jul (1968, young calling; Willis). Building 17 Jun 1952 (Eisenmann, J. Bull).

**\*Trogon rufus: Black-throated Trogon R**

Common in the forest understory. Notes: A *cow*, repeated three or four times, with pauses between notes, at rate of about one per second (Eisenmann). Breeding: One or two white eggs in eight nests in hollows in sides of low decaying stubs, Apr (1935, Skutch) to 25 Jul (1964, Willis); young in ninth nest 3 Jul (1973, M. Perrone). A nest with two eggs in a stump, 25 Feb 1950 (Kilham) and attributed to the next species (see Eisenmann, 1952) probably belonged to this species.

**Trogon violaceus: Violaceous Trogon R**

Fairly common in the treetops of young forest, coming lower at the forest edge. Notes: A rather soft *cow*, repeated at a steady pace, 10–15 times, at about 2 per second (Eisenmann). Breeding: Feeding young in a pendent wasp nest at clearing Jun 1952 (J. Bull, Eisenmann). Eisenmann now feels that nesting in termitaria reported by Chapman (1938), Wetmore (1968), and himself (1952) need confirmation. All recent nests he and Skutch have seen were in soft material, such as wasp nests and dense masses of ferns and other epiphytes, high in trees.

Family ALCEDINIDAE: Kingfishers

**\*Ceryle torquata: Ringed Kingfisher R**

Formerly fairly common along the lake shore, now rare. Breeding: Building tunnel in earth cliff at Barbour Point, 21 Jan 1971 (Willis); 29 Mar 1969 on island (Leck); food to young in nest across canal from Salud Point, 21 May 1961 (Willis).

**Ceryle alcyon: Belted Kingfisher N**

Rare migrant to the lake shore, until 28 Mar (1966, Slud).

**\*Chloroceryle amazona: Amazon Kingfisher (R)**

Once fairly common, now extirpated, along the lake shore.

**\*Chloroceryle americana: Green Kingfisher R**

Once common along the lake shore, now very rare. A recent decrease in all kingfishers on the lake is probably due to spread of introduced peacock bass.

**Chloroceryle inda: Green-and-rufous Kingfisher (I)**

One to two pairs formerly in narrow coves near end of Wheeler Trail, 22 Feb 1952 (Junea Kelly) to 28 Jun 1970 (Willis). Note: Short, buzzy *jjj* and *tih-git*; also a clicking *stik-stik-ik-ik* and a higher *see-ee-jee-jee*.

**Chloroceryle aenea: Pygmy Kingfisher R**

Uncommon in overhanging limbs along narrow, quiet coves;

occasional along forest streams up to the center of the island. Notes: A sharp *chick* or *cheet*; also a faint *tik*. Breeding: Two fledglings near nest in small hole 1 m up in earth of uprooted part of fallen tree, near end of Wheeler Trail on cove, 1 May 1961 (Willis).

Family MOMOTIDAE: Motmots

**\*Electron platyrinchum: Broad-billed Motmot R**

Fairly common in the forest midlevels near gulches. Notes: A nasal, resonant *kwong* every 2–3 seconds; at times there is a duet, one bird calling *kwong* slowly and the other *hong* at three notes per second; call especially at dawn and dusk.

**\*Baryphthengus martii: Rufous Motmot R**

Common in the low to middle levels of the forest, often following army ants. Notes: Commonly a mellow, rhythmic *hoo-too-too-too*; *ka* alarm notes at close range. Breeding: Seven nests in holes at sides of gullies; excavating 24 Apr (1961) to 21 Aug (1969), flushed from nests 9 May to 15 Sep (1961, Willis).

**Momotus momota: Blue-crowned Motmot (R)**

Casual 12 Apr 1961 near Allee Stream (Eisenmann); formerly "occasional; irregular" (Chapman). Favors woodland borders and second growth; collected at nearly Frijoles.

Family BUCCONIDAE: Puffbirds

**\*Notharchus macrorhynchus: White-necked Puffbird (R)**

Scattered recent records perhaps only vagrant birds; formerly "not uncommon" (Eisenmann). Breeding: Nesting in termite nests at Curundu (mainland), Feb–Jul 1967 and 28 Jun 1971 on Escobal Road (mainland) (Eisenmann). Borders of woodlands, second growth, and open woods.

**\*Notharchus pectoralis: Black-breasted Puffbird R**

Common in the treetops and forest midlevels; often follows army ants. Notes: A loud series of 10 or more *wheet* whistles followed by 3 or so *whew* notes at a lower pitch and ending with a few *wheet-whew* couplets that gradually fade away; in territorial fights, rasping *chah-chah-chah-chah*. Breeding: In termite nests, building 16 Mar (1961, Willis) to Apr (1935, Skutch); incubating or feeding young in five other nests to 24 Jul (1969, Willis).

**Notharchus tectus: Pied Puffbird R**

Fairly common in the canopy and at the forest edge.

**\*Malacoptila panamensis: White-whiskered Puffbird R**

Fairly common low in the young forest or in treefall zones of old forest. Notes: A high, faint *see* in alarm; in territorial fights, various high-pitched squeaks and a rapidly repeated high *see-it-hee-hee* or similar phrase. Breeding: Eleven nests

in holes in the ground, May to Aug; digging 1 Jan (1961) to 4 Oct (1965); loose earth is removed and the edges of entrances are concealed by sticks or leaves (Willis).

*Nonnula frontalis*: Gray-cheeked Nunlet V

Possibly a resident earlier; 7 Sep 1935 off Drayton Trail (D. W. Lamm); 23 Jun 1950 near the start of Wheeler Trail (K. Stott). Prefers riverine or vine-tangled woodlands.

*Monasa morphoeus*: White-fronted Nunbird V

At least two on Wheeler Trail, 6 Apr 1950 (Wetmore). Usually in humid hill-country forests.

#### Family CAPITONIDAE: Barbets

*Capito maculicoronatus*: Spot-crowned Barbet V

Seen once (Sturgis), perhaps resident formerly. Wet-forest bird.

#### Family RAMPHASTIDAE: Toucans

\**Pteroglossus torquatus*: Collared Araçari R

Common in forest and edge. Breeding: In high hollow of branch, incubating late Mar; 3 young, hatched about 11 Apr, emerged 24–27 May (1935, Skutch). Several feeding young in cavity at edge of clearing, Jul (1973, J.N.M. Smith).

\**Ramphastos sulphuratus*: Keel-billed Toucan R  
Common in forest and edge. Breeding: In natural cavities of large trees, eggs laid Mar and Apr (Van Tyne).

\**Ramphastos swainsonii*: Chestnut-mandibled Toucan R

Common in forest and edge. Breeding: Nest hole in jacaranda tree shown by E. Mayr to Eisenmann, 15–16 Mar 1974; said to have been used also in previous years.

#### Family PICIDAE: Woodpeckers

*Celeus loricatus*: Cinnamon Woodpecker (R)

Formerly occasional (Chapman, Skutch, K. Stott). One seen at Lathrop Trail 2, 8 Mar 1976 (C. O. Handley), perhaps vagrant. Canopy and forest edge in humid areas. Notes: A loud *ping-peeng-pit-wit*.

\**Dryocopus lineatus*: Lineated Woodpecker R

Fairly common in the forest. Notes: A loud *chiff-wurr* and a series of 5 to 15 *wick* notes, rather flicker-like. Breeding: Building 19 Dec 1960 and 5 Jan 1971; young in the Dec nest, at edge of clearing, 19 Mar 1961 (Willis). Pair building 10 Feb 1960 (Eisenmann). See Kilham, 1972.

\**Melanerpes rubricapillus*: Red-crowned Woodpecker (R)

To 4 Mar 1956 (Wetmore), occasional at the clearing. Common in more open areas.

\**Melanerpes pucherani*: Black-cheeked Woodpecker R

Common in the canopy and at forest edges. Breeding: Building 20 Dec (1960) to young 5 Aug (1961, Willis).

\**Campyphilus melanoleucos*: Crimson-crested Woodpecker R

Fairly common in the forest. Notes: Alarm a loud *stii-ik*; also a rasping *kiarhh*, often followed by a snarling *rai-ai-ai-ai*; double to quintuple raps on tree trunks. Breeding: December-February; young left one nest about 20 Feb 1925 (Chapman). Building, Jan 1971 and 1977 (Kilham, Willis).

#### Family DENDROCOLAPTIDAE: Woodcreepers

\**Dendrocincla fuliginosa*: Plain-brown Woodcreeper R

Fairly common in the forest, usually with army ants. Notes: A loud sharp *stieek*; faint rattling; and a rapid descending whinny of 20 to 30 notes. Breeding: On Pipeline Road (mainland), carrying nest material 10 May 1969 (J. Karr). In hollow of stub, 1966; breeding May to Sep (Willis, 1972).

\**Glyphorhynchus spirurus*: Wedge-billed Woodcreeper R

Common in the lower levels of the forest. Notes: Sharp, repeated sneezes, *chiff*. Rising trill or warble. Breeding: 16 nests, most with two eggs or young, 0–3.5 m up in natural tree cavities; young 25 May to 25 Oct 1961 (Gross, F. Loetscher, Willis).

\**Dendrocolaptes certhia*: Barred Woodcreeper (R)

No records since the last bird of two pairs banded in 1960–1961 was seen 24 Aug 1969 (Willis); usually follows army ants. Notes: A whistled *urit urit urit urit*; in fights a snarling *wi-kath*.

\**Xiphorhynchus guttatus*: Buff-throated Woodcreeper R

Common in the young forest, uncommon in the old. Notes: Besides song, given at three notes per second, has a slurred *pyewl* and a loud, slow *peer peer peer peert*. Breeding: 14 Apr 1936 in partly covered box (Chapman); May 1935 in hole in papaya tree (Skutch).

\**Xiphorhynchus lachrymosus*: Black-striped Woodcreeper R

Common in the forest, especially in the treetops. Notes: A soft, descending whinny of 10–30 *we* notes at about four per



second; a loud *choo-reeep*; a loud, descending *weeep-weeep-wup*. Breeding: Visiting narrow slit 1.5 m up, 10 Apr to 7 Jun 1961 (Willis).

*Campylorhynchus trochilirostris*: Red-billed  
Scythebill V

On Snyder-Molino Trail, 17 Aug 1935 (D. W. Lamm); possibly was resident. Usually in riverine forests and hill country.

Family FURNARIIDAE: Ovenbirds

\**Automolus ochrolaemus*: Buff-throated Foliage-  
gleaner (R)

No records since 2 Apr 1966 at Fuertes House (Slud); formerly uncommon resident. Usually in medium-height woodlands. Breeding: 23 Mar 1926, nest with two young in burrow in clay bank (Van Tyne).

\**Xenops minutus*: Plain Xenops R

Common in lighter woodland, creeping on rotten twigs of low trees and high shrubs. Notes: A sharp *pseek*; a stuttering *chip chip chip che-e-e-e-e-e-e-ep!* rising in pitch and speed; a *whit wheet wheet wheet* ending at times in *spit-spit*. Breeding: Two nests, 1.3 and 7.5 m in holes in slender rotten stubs, 9 Jun and 30 Sep 1961; noisy young in second nest (Willis).

\**Sclerurus guatemalensis*: Scaly-throated Leaf-tosser R

Uncommon on ground in forest. Notes: A piercing *weeek*. Song a descending series of accented whistles at about three per second: *whit whit whit peet peet peet peet pert pert*, often repeated over and over. Breeding: 30 Mar 1935, one nestling in burrow in stream bank (Skutch). 27 Sep 1961, adult fled burrow in Madden Forest Reserve (mainland) (Willis).

Family FORMICARIIDAE: Antbirds

\**Cymbilaimus lineatus*: Fasciated Antshrike (R)

No recent records; last 1961 along lake shore near end of Armour Trail (Willis); a bird of thick vines of woodland and borders.

*Thamnophilus doliatus*: Barred Antshrike (R)

Vagrants 4 Apr 1966 (Slud) and at tip Burrunga Point 5 Jan 1971 (Willis); formerly "occasional" in clearing (Eisenmann). A bird of semi-open areas, common at Frijoles (mainland).

\**Thamnophilus punctatus*: Slaty Antshrike R

Abundant in the forest understory and midlevels; one pair per hectare (Oniki, 1975). Notes: Ten to 30 rapid, low whistled *hu* notes end with a nasal *wenk*; a loud *ang-grrrr*; a nasal cawing, *cah* or *cah-cah*; a catlike meow; a brief stutter. Breeding: Occupied nests recorded every month except Oct and Nov, from 22 Dec (1930, Skutch) to Sep (Willis); mostly Apr to Sep.

\**Dysithamnus puncticeps*: Spot-crowned Antvireo R

Uncommon in the upper understory of forest. Notes: A soft *Otus*-like series of whistles accelerating to a roll, without a nasal ending: *hu-hu-h-h-h-h-h-h-h-h-u-u-u-u-u-u*; also a brief roll, *t-t-trrr*; faint chirps. Breeding: Nests with two eggs 9 and 11 Jul 1925, Jul 1949 (Gross), 6 Jul 1966 (Willis); food carried to nest 22 Apr 1951 (Collias).

*Myrmotherula brachyura*: Pygmy Antwren V

Reported seen 28 Jul 1934 (R. Arbib). A bird of dense vine tangles in the crowns and edges of forests.

*Myrmotherula surinamensis*: Streaked Antwren (R)

Formerly "not uncommon" (Chapman); a bird of streamside tangles.

\**Myrmotherula fulviventris*: Checker-throated Antwren R

Very common, probing into hanging dead leaves in the forest understory, often in mixed flocks. Notes: A sharp *peesk*; a high loud *tseek-seek-seek-seek*; territorial males often bow back and forth a meter apart, throats puffed out, as they repeat squeaky chirps (*syip-syip-syip*) for minutes on end. Song reported by Eisenmann (1952) for species is probably that of Dot-winged Antwren. Breeding: 58 oval-entrance pensile pouched nests low (0.4–2.0 m) at tips slender twigs, mainly in rainy season (no Dec, Feb, or Apr nests); two eggs or young, rarely one (1 A. A. Allen; 2 Skutch; 55 Willis).

\**Myrmotherula axillaris*: White-flanked Antwren R

Very common in mixed flocks in the lower midlevels, fluttering in green foliage. Notes: A loud, descending *cheep doo* or *cheep cheep doo*; faint chirps; alarm at nest a dry rattle, *trrrrrrrrr*; song at dawn or in disputes a measured series of six to ten descending whistles at two per second: *pyee, pee, piy, pey, peh, pu*. Breeding: 27 nests (3 Skutch, 24 Willis) 0.2–4.0 m suspended from twig forks, always with large overhanging leaf or leaves, 9 Mar (1961) to 16 Aug (1964), with two (rarely one) eggs or young.

\**Microrhophias quixensis*: Dot-winged Antwren R

Common near dense vine tangles and foliage, especially in young forest; often in mixed flocks. Notes: A rapid series of five to ten whistles going upscale, *pu-peh-pey-pih-pee-pyee*, often alternated in disputes with one to five rough *zhaiet* notes; alarm notes are a falsetto *peep* and *chew* and a tinny buzz like the chirr of a Spotted Antbird; also faint chirps and twitters. Breeding: Building 22 Feb 1935 (Skutch) and 24 Jul 1961 (Willis).

\**Cercomacra tyrannina*: Dusky Antbird R

Now uncommon on Burrunga Point; once "common" (Eisenmann) scattered in dense lower growth along lake shore and borders of clearings.

**\**Myrmeciza longipes*: White-bellied Antbird (R)**

Once "not uncommon" in young woodlands (Eisenmann); last heard in 1971 near end of Chapman Trail (Willis). Notes: A chatter, *di-i-i-i-i-i-i-i-i-i*; a fast loud rail-like series of 20-30 notes that descend in pitch and slow to three long notes on one pitch at the end: *see-ee-jee-jee-jee-* (etc.)-*jew-jew-jew-cherr cherr, cherrp*.

**\**Myrmeciza exsul*: Chestnut-backed Antbird R**

Common in the forest, low near thickets. Notes: A loud, emphatic *dee, dew, or dch, dee, dew*, the last note lower; a nasal, catlike *nyaah*; a clucking *quick-ick* alarm; a rattle; and soft chirps and warbles. Breeding: 15 nests (3 Gross, 12 Willis) low on debris, with one or two eggs or young 7 Jun to 12 Oct 1961; nearly independent young 4 Jun 1966 came from eggs laid in Apr; laying is thus at least Apr to Sep (Willis and Oniki, 1972).

**\**Gymnophithys bicolor*: Bicolored Antbird R**

Uncommon, formerly fairly common; keeps low with army ants. Notes: A low, whining *chirrrr* or sharp *chip-ip* of alarm; the song, a ringing series of loud whistles that rise and then fall in pitch, often ends with snarling *why* noises. Breeding: Nests through the rainy season, eggs 15 Apr (1927, Van Tyne) to early Dec (Willis, 1967).

**\**Hylophylax naevioides*: Spotted Antbird R**

Common low in the undergrowth; with army ants about half the time. Notes: A short chirr or rattle and a sharp *peep*, often repeated several times; a soft, wheezy song—*peety weety weety weety weety weety weety weety*; a sharp *chit* and whining *peeiieeh* in disputes. Breeding: Nests with eggs Apr to Oct (Willis, 1972a).

**\**Phaenostictus mcleannani*: Ocellated Antbird R**

Once uncommon (50 birds on island), now almost gone—two males at the 1977 census. Notes: A sharp chirr, *chee-e-e-e-yk*; a sharp *chip-ip-ip*; a soft upscale set of whistles, often with a low final note, *whee-hi-hih-chew*; a loud, thin series of whistles going upscale and then slowing to several long *cheer* notes. Breeding: Records of fledglings show eggs laid Apr to Dec but nest not definitely located; one cup nest, probably of this species, sunk in ground between tree butresses, with one egg 7 May 1961 (Willis, 1973b).

**\**Formicarius analis*: Black-faced Antthrush (R)**

No records since 28 Feb 1951 (Wetmore); formerly "common" (Eisenmann). In Panama, seems to favor young shady woodland, although also found in hill forests; still common on Buena Vista Point across from Salud Point. Notes: A sharp *tleet* alarm (Skutch), sometimes repeated several times; basic song is *peh, peu-peu*, the last notes lower in pitch than the first. Breeding: Nest with one egg in tree stump, 19 May 1929 (Cleaves).

***Hylopezus perspicillatus*: Streak-chested Antpitta (R)**

Once fairly common; probably extirpated, as last seen at 150 m south of Armour 6, 21 Jan 1971 (J. Strassenburg). Declined greatly in the 1960's, for it was common from Barbour 4 to Shannon 9 until 1965. Notes: One call a resonant *pew, you-you-you-you*; more often a series of clear, melancholy whistles, *deh dee-dee-dee-dee-dce-dee, dew, dew, dew*; usually three long and low final notes. Breeding: On Pipeline Road (mainland), two eggs 4 Jul 1969 on leafy platform low on vines (J. Karr).

## Family PIPRIDAE: Manakins

**\**Pipra mentalis*: Red-capped Manakin R**

Common in the lower levels of the forest. Breeding: 19 nests, 10 Mar with eggs (Skutch) to 22 Aug 1964 with young (Willis).

***Chiroxiphia lanceolata*: Lance-tailed Manakin V**

Occasional; 11 Mar 1946, female at Miller Trail 15 (Wetmore). Males sang near Balboa Trail 3 from 12 to 18 Oct 1961 and near Wheeler Trail 7.5 from 27 Jan 1965 to 11 Jul 1970 (Willis). A bird of scrub and thickets in second growth. Eisenmann now feels sure that one of the vocalizations credited (1952) to this species—the song starting with *whit* (not heard on Barro Colorado)—was actually uttered by the Rufous-and-white Wren (*Thryothorus rufalbus*).

**\**Manacus vitellinus*: Golden-collared Manakin R**

Uncommon in low woodland on the lake shore and in the clearing, keeping low. Leks along shore include one across the inlet north of dock, active at least since Chapman's time (1935). Breeding: Displays began in mid-Dec, 1968 (Leck). Nests with eggs 27 Feb-1 Aug (Skutch, Van Tyne, Gross).

***Schiffornis turdinus*: Thrushlike Manakin R**

Singing south of Wheeler Trail 7.5 to 9 Jun 1967 (Willis); across cove from end of Shannon Trail 23-24 Apr 1978 (Brokaw). A bird of dense growth in low or secondary woodland. Notes: A loud, plaintive whistled *see-right-by-key*.

## Family COTINGIDAE: Cotingas

***Cotinga nattererii*: Blue Cotinga R**

Fairly common in the treetops, but not often seen except at edge of clearing. Notes: A whirr, as of wings, from male. Breeding: Feb-Mar 1927-1928 (Chapman). Carrying nest material, 22 Mar 1969 (Leck). Incubating at Frijoles (mainland), 21 Mar 1961 (Willis).

**\**Attila spadiceus*: Bright-rumped Attila R**

Uncommon, mostly in vine-crowded areas of young forest; perches low to high. Notes: Alarm a sharp *di-di-dit*; songs whistled *we-we-two, we-we-two, we-we-two, we're, took!* or *weed weary weary weary weary two, weed-we-two!*, sometimes

alternated. Breeding: Building nest in tree hole 19 Jun 1971, Pipeline Road (mainland) (R. Sharp, Captain Palmgren).

**\*Laniocera rufescens:** Speckled Mourner R

Rarely seen. Males sang persistently 10–20 m up in vines of dark ravines above American Museum Trail 3.5 and west of Fuertes House at least to 1967, the Fuertes bird still in 1977. Notes: High-pitched, whining songs every minute or two for hours; two to eight *hee-pel* couplets, often introduced by a nasal whine.

**\*Rhytipterna holerythra:** Rufous Mourner R

Uncommon, a treetop bird of young forest.

**\*Lipaugus unirufus:** Rufous Piha R

Uncommon, a bird of the treetops and upper levels of old forest. Lek 150 m north of Wetmore Trail 10 occupied at least 1960 to 1977. Notes: An emphatic, loud *chu-weel-you*, sometimes doubled, often given at a loud noise. Also a rattling *trrt-trrt-trrt-trrt*.

**Pachyramphus cinnamomeus:** Cinnamon Becard (R)

Infrequent around the clearing as late as 24 Aug 1963. Notes: Loud musical trill, *teedeedeede* (Eisenmann), varying to whining trills like creaking branches. Breeding: Carrying nest material second week of Apr, 1962 (J. Zimmerman); nests on Pipeline Road (mainland) 19 Apr 1969 (Ridgely) and at Tocumen (mainland) 9 Jul 1952 (Eisenmann).

**Pachyramphus polycopterus:** White-winged Becard (R)

Few recent records; one at Van Tyne Trail 12 on 21 Jan 1977 (Willis) perhaps vagrant. Earlier "infrequent" (Chapman). Upper to midlevels of second growth and forest edges. Breeding: Feeding young in globular nest in orange tree behind kitchen, 12 Jul 1955 (J. Ambrose, Eisenmann).

**Tityra semifasciata:** Masked Tityra R

Fairly common in the treetops and at forest edges. Breeding: Building 9 Feb (1961) to feeding young 28 Jul (1963, Willis); nests in woodpecker holes or bare tree cavities (Skutch, Eisenmann, Willis).

**Tityra inquisitor:** Black-crowned Tityra R

Uncommon in the treetops. Breeding: Cerro Azul, Panama, 9 Apr 1969 and 30 Jun 1952 (Eisenmann).

**\*Querula purpurata:** Purple-throated Fruitcrow R

Common, noisy, arboreal in forest, in small bands. Breeding: Pair building nest by clearing 28 June 1951; incubation apparently started 14 Jul (Ellis, 1952; Eisenmann). Active at a nest 13 Feb 1957 (A. Fast, *vide* C. Koford).

Family TYRANNIDAE: Tyrant Flycatchers

**Colonia colonus:** Long-tailed Tyrant I

6 Jul 1962 (H. Holgersen); 6–14 Jan 1971 (Willis); several records 1975–1977. A bird of dead treetops of humid forests. Notes: A high *whееest*. Breeding: Feeding young 15 m up in hole of stub by Agua Salud River at Pipeline Road (mainland), 21 Jul 1964 (Willis); feeding young near Gatun (mainland), 1 Sep 1934 (Arbib).

**\*Tyrannus tyrannus:** Eastern Kingbird N

Common transient; occasionally in huge flocks, as over 500 on 10 Apr 1961 (J. Zimmerman, Willis). Usually in treetops, especially along the lake shore. Recorded 22 Mar (1927, Chapman) to 28 May (1961, Willis) and 14 Sep (1938, Eisenmann) to 1 Nov (1961, Willis). Flocks feeding on fruits of *Trichilia cipo* in fall (Mark Leighton). They are mainly frugivorous while in Panama, and seem more numerous in spring migration (Morton, 1971).

**Tyrannus melancholicus:** Tropical Kingbird R

Fairly common along the lake shore. Breeding: Nests Feb–Jun (Chapman, Skutch, *et al.*) and 1 Jul 1962 (G. Hunt, Willis); large young in nest 3 Sep 1961 on Buena Vista Point (Willis).

**Tyrannus dominicensis:** Gray Kingbird N

February, 1940 (D. E. Davis), 21–22 Feb 1952 (Mr. and Mrs. Schnitzer), 15 Mar 1966 (Slud). Winters mainly in more open areas.

**Legatus leucophaeus:** Piratic Flycatcher R

Now rare, formerly uncommon. Favors treetops in semi-open areas. Breeding: Seizes closed nests of others; using oropendola nests Feb–Apr (Chapman, Sturgis); appropriating *Myiozetetes* nests in late March (Chapman). The species is essentially frugivorous, and leaves Panama in the nonbreeding season (Morton, 1977).

**Myiodynastes luteiventris:** Sulphur-bellied Flycatcher N

Rare transient, recorded 27–30 Sep 1968 (Leck) and by Willis.

**Myiodynastes maculatus:** Streaked Flycatcher R

A few pairs in the laboratory clearing and along the lake shore; rare in the forest. Breeding: Several broods in tree holes, roof corners, window sills, from late Dec (1925, Chapman) to 7–10 Jul (1949, Gross); eggs of the last nest hatched 25 Jul.

**\*Megarhynchus pitangua:** Boat-billed Flycatcher R

A few pairs along the lake shore or in the canopy. Breeding: Building 18 May 1961 in soon-deserted nest (Willis). 27 Jun 1925, nest with large young (Van Tyne). Incubating 28 Jun–3 Jul (1951, Eisenmann) and during Jun, 1961 (Willis).

*Conopias parva*: White-ringed Flycatcher V

28 Feb 1951, along shore east of laboratory (Wetmore). 13-18 May 1961, one in crowns of high second growth by Gigante Bay across from end of Shannon Trail (Willis). Normally in humid or foothill forests.

*\*Myiozetetes similis*: Social Flycatcher R

Common, foraging high to low along the clearing and lake shore; also atop the canopy in some areas. Breeding: Egg dates Feb-Jun (Chapman, Eisenmann, Leck, Skutch, Van Tyne, Willis).

*\*Myiozetetes cayanensis*: Rusty-margined Flycatcher R

Scattered pairs low along the lake shore, mainly near grassy marshes; formerly more common. Breeding: Jan-May (Chapman, Skutch, Eisenmann). Fledgling fed at Summit Gardens (mainland) 23 Jul 1970 (Eisenmann). Pair repeatedly drove pair of *M. similis* from partly completed nest atop active wasp nest, 11-16 Feb 1960 (Eisenmann); according to N. G. Smith and W. J. Smith, *M. cayanensis* captures nests begun or built by *M. similis*.

*Myiozetetes granadensis*: Gray-capped Flycatcher (R)

To Sep, 1958, occasional along the lake shore (Eisenmann). Notes: A heavy *chip*. Breeding: Nest with young on stump opposite Fuertes House 3 Apr 1956 (Wetmore).

*Pitangus sulphuratus*: Great Kiskadee I

First 14 Apr 1961 (Eisenmann); 1973 (M. Perrone) to 1977 (Willis and others) increasing and nesting along the lake shore. This species has been steadily extending its range in Panama.

*\*Pitangus lictor*: Lesser Kiskadee R

Fairly common in coves and at marsh edges, low over water. Notes: Buzzy *dzee* and *dzee-ur*. Pairs greet with *wip-wip-wip-you* in flight. Breeding: Cup nests in bushes or on stumps over water; 2 eggs 4 Mar 1977 and 1 Jul 1962 (C. Hunt, Willis); two broods from one nest at Buena Vista Point left about 20 Jun and 10 Sep, 1961; see Willis, 1962.

*\*Myiarchus crinitus*: Great Crested Flycatcher N

Common winter visitor in treetops and borders, 20 Sep (1961) to 25 May (1961, Willis).

*\*Myiarchus panamensis*: Panama Flycatcher (R)

Until 1967, uncommon in the clearing and along the lake. A bird of second growth and scrub edges. Reported 21 Mar 1969 (R. Smart, G. S. Keith). Breeding: Carrying material to ridge of metal roof of Zetek House, 25 Mar 1952 (Wetmore). Formerly this species was usually treated as a race of *M. ferox*.

*\*Myiarchus tuberculifer*: Dusky-capped Flycatcher R

Common in the treetops. Notes: A long, soft *wheeer*; a rising *fear-rrrrriih*.

*Nuttallornis borealis*: Olive-sided Flycatcher N

Uncommon atop tall dead branches in fall, 13 Sep (1961, Willis) to 18 Nov (1962, Eisenmann).

*\*Contopus virens*: Eastern Wood Pewee N

Common transient at edges openings, 21 Aug (1970) to 14 Dec (1960) and 12 Mar to 21 May (1961, Willis). Also seen and heard at edges of clearing 9-10 Feb 1940 (Mrs. Fry and party). Notes: Calls often in migration, a *peewee* (rarely, *pee-urr*) unlike the *pe-e-e-e-e-e-e-eet* of the Tropical Pewee at Summit Gardens (mainland) or the silence of presumed Western Wood Pewees (*Contopus sordidulus*), migrant chiefly in the mountains of Panama.

*Contopus cinereus*: Tropical Pewee V

Reported at the laboratory clearing 2 Apr 1957 (Wetmore); normally in more open areas.

*\*Empidonax virescens*: Acadian Flycatcher N

Common in the forest understory from 6 Sep to 1 May (1961, Willis); collected 19 Feb 1927 (Chapman). Notes: A sharp *wreep* usually marks territorial wintering birds. The Yellow-bellied Flycatcher (*E. flaviventris*) was reported seen 17 Oct 1944 (A. A. Allen) and 23 Feb 1952 (Mr. and Mrs. A. Schnitzer), but as there are many Acadian Flycatchers with yellow bellies, we await collection or recording of the voice of *E. flaviventris* before listing it.

*Empidonax traillii*: Traill's Flycatcher N

Winter visitant in bushy marshes along shore; no specimens. Notes: a light *wit*. Currently this complex is divided into two species, not certainly separable in the field except by song. *E. traillii*, the Willow Flycatcher (which sings *fitzbeew*), winters in Panama; *E. alnorum*, Alder Flycatcher (which sings *feebeeo*) is a regular transient. We use "Traill's Flycatcher" to cover both or either species; in Panama, at least during the northern winter, the Willow Flycatcher is the likely bird (Eisenmann).

*\*Terenotriccus erythrurus*: Ruddy-tailed Flycatcher R

Fairly common in the forest lower layers. Notes: A thin *tseeé*, *peet* and a faint *pe-e-e-e-eet*. Breeding: 25 and 29 Mar 1935, two nests with eggs; 18 May, pendent domed nest with nestlings (Skutch).

*\*Myiobius sulphureipygius*: Sulphur-rumped Flycatcher (R)

Formerly "not uncommon" (Chapman). Breeding: Nests over stream at rear of clearing, Mar and Apr 1925 (Skutch).

**\*Myiobius atricaudus:** Black-tailed Flycatcher (R)

Formerly "fairly common" along streams and lake shore (Eisenmann). On the mainland, a bird of second growth. Breeding: Five pendent domed nests with eggs, low over water, 28 Jun-9 Aug 1935 (Gross).

**\*Onychorhynchus mexicanus:** Northern Royal-Flycatcher (R)

Formerly uncommon (Chapman); on the mainland, a forest-stream bird. Notes: A soft *peee-yuk*. Breeding: Nesting over stream Feb-Mar 1935 (Skutch). At Summit (mainland), one nestling and one addled egg 9 May 1966 (S. Olson).

**\*Platyrinchus coronatus:** Golden-crowned Spadebill R

Fairly common within forest in low trees and shrubs, especially near streams. Notes: A high, insectlike *ste-e-e-e-e-eeeet*, a quaver ending in an upslur. Breeding: Young left one lichen-dotted cup 22-24 Jul, and first of two eggs hatched in another 3 Aug (1970, Willis, S. Kistler).

**\*Cnipodectes subbrunneus:** Brownish Flycatcher (R)

Formerly occasional (Chapman). On the mainland, in low undergrowth of shady woodland along streams. Breeding: Building 28 March-17 Apr 1935 (Skutch in Wetmore 1928; 507-8).

**Tolmomyias assimilis:** Yellow-margined Flycatcher R

Fairly common in the upper levels of the forest and along shore, often with mixed flocks. Breeding: Building 6 Apr 1948 (Wetmore) and 11 Apr 1962 (Eisenmann). A reported sighting of *T. sulphurescens* Yellow-olive Flycatcher, on 23 May 1933 (G. Carleton) may refer to this species or to *Myiopagis gaimardii*.

**\*Rhynchocyclus olivaceus:** Olivaceous Flatbill R

Fairly common in vine-crowded forests and woodland. Breeding: 13 Apr 1937, young about four days old in nest (T. Gilliard).

**Todirostrum cinereum:** Common Tody-Flycatcher R

Rare on islets and in scrub along shore; in the clearing to 1961. Common in semi-open areas of Panama. Notes: A sharp *chip*; a *de-e-eet*. Breeding: 4 Apr 1937 (T. Gilliard); two eggs, 2 May 1935 (Skutch); two eggs hatched 10 Jul 1950 in orange orchard (Eisenmann).

**Todirostrum sylvia:** Slate-headed Tody-Flycatcher

Chapman reported it "not common", but the records are uncertain. A bird of low, dense shrubbery in drier areas. Notes: Distinctive *tuk, grrrrt*.

**\*Oncostoma olivaceum:** Southern Bentbill R

Fairly common low in thickets or around treefalls. Breeding: Nests Apr 1937 (Chapman); two eggs, 2 May 1935 (Skutch); young in nest 27 Jul 1970 (Willis). Nest with eggs 7 Aug 1933 in Canal Zone (Harrower).

**Myiornis atricapillus:** Black-capped Pygmy-Tyrant R

Common but rarely seen in the midlevels of tall forest; probably overlooked before 1960. Eisenmann had often heard it calling before 1952, but thought it a tree-frog. Notes: *Tseek*, repeated faster and faster 2-20 times, like a tree-frog. Call a sibilant *siesp*. Breeding: Ovoid nest with entrance in side being built by one bird, 3 m on *Desmoncus* (vine-palm) petiole, 29 Apr 1961 (Willis).

**Capsiempis flaveola:** Yellow Tyrannulet V

Pair in clearing, Nov 1935 (Skutch). Jan, 1969 (E. Tramer). A shrub bird of woodland edges and semi-open country.

**\*Elaenia flavogaster:** Yellow-bellied Elaenia V

Occasional in the laboratory clearing. Common in more open country and suburban habitats.

**Elaenia chiriquensis:** Lesser Elaenia V

Occasional in the clearing; an open-country bird. Breeding: Off two eggs at Frijoles (mainland), 21 Mar 1961 (Willis); 30 Jul, nest with young in the Canal Zone (T. Imhof).

**Sublegatus arenarum:** Scrub Flycatcher

"Not uncommon" (Chapman). Probably misidentified, for it is normally a bird of dry Pacific scrub.

**Myiopagis gaimardii:** Forest Elaenia R

Fairly common along the lake shore and at the clearing, high in the edges of the forest; easily mistaken for a *Tolmomyias*, and probably overlooked prior to 1960.

**Camptostoma obsoletum:** Southern Beardless Tyrannulet R

Fairly common along the lake shore and at the clearing. Notes: *pee, dree dree dree*; also a *peee* and *cheeyuk* and other faint notes. Breeding: 11 Feb 1962, building (Willis); feeding grown young 9 Mar 1949 (Wetmore); 16 May 1966, into nest in laboratory clearing (E. Morton, Willis).

**Tyranniscus vilissimus:** Paltry Tyrannulet R

Very common in the canopy, along the lake shore, and at the clearing. Notes: A heavy *chee-yip* (Eisenmann) or *vireo* (Willis); a fast *pier-he-he-he-he*. Breeding: Building on the Pipeline Road (mainland) in late Feb, 1977; feeding nestlings in domed nest there, 14 Jul 1969 (J. R. Karr).

**Tyrannulus elatus:** Yellow-crowned Tyrannulet R

Common in the clearing and along the lake shore, occasional

in the canopy. Breeding: 3 Jul 1950, feeding stub-tailed fledgling; incubating 22-24 Aug 1954 (Eisenmann).

*Ornithion brunneicapillum*: Brown-capped Tyrannulet R

Common in the upper levels of the forest and forest edge. Notes: A high, piping whistle, usually of four or five notes with a pause after the first, descending in pitch: *peeee, pih-pey-peh*. Breeding: Building on high palm frond on Pipeline Road (mainland), 1 Aug 1970 (Oniki, Willis).

\**Pipromorpha oleaginea*: Ochre-bellied Flycatcher R

Fairly common in the lower levels of woodland or clearings, mainly in young forest. Breeding: 2 Mar 1926, two pendent pear-shaped nests against one tree; 12 Jul 1925, two nests (Van Tyne). 23 Nov 1939 nest (Skutch). Three eggs at Lutz Creek, 21 May 1966 (Willis).

Family HIRUNDINIDAE: Swallows

*Riparia riparia*: Bank Swallow Nw

Transient, 25 May (1966, Slud) to 8 May (1973, M. Perrone). Common 8 Sep to 24 Oct (1960, Willis).

*Tachycineta bicolor*: Tree Swallow Nw

19-28 Mar 1966, several brownish-backed ones over Gigante Bay (Slud). 13 Mar 1971 (N. G. Smith).

\**Tachycineta albilinea*: Mangrove Swallow Rw

Fairly common, flying low over the lake. Breeding: Ricklefs (1971) found first egg laid 19 Jan 1968, one fledged; second brood fledged late Apr or May. Young in nest at Frijoles (mainland), 18 May 1966 (Willis).

*Hirundo rustica*: Barn Swallow Nw

Common transient, 15 Mar (Willis)-17 May (Van Tyne) and 9 Aug (M. Perrone)-12 Dec (Willis); 30 Dec 1934 (D. E. Davis).

*Petrochelidon pyrrhonota*: Cliff Swallow Nw

Uncommon transient, 21 Mar (1966, Slud) to 8 May (1973, M. Perrone) and 3 Sep-17 Oct (1961, Willis).

\**Progne chalybea*: Gray-breasted Martin R

Common over the lake and island. Breeding: In tin-can channel markers, 6 Apr 1950 and 6 Feb 1952 (Wetmore), 20 May 1935 (Skutch); nestling 2 Jul 1951 (R. Laughlin).

*Progne subis*: Purple Martin N

Male over laboratory clearing 30 Aug 1970 (Willis). A transient through Panama, especially on Caribbean slope.

*Phaeoprogne tapera*: Brown-chested Martin S

Migrant breeding in southern South America (*P. t. fusca*); three over laboratory 4 Jul 1949 (Eisenmann, Gross); common at Frijoles (mainland) 29 Apr to 6 Oct 1961 (Willis).

*Pygochelidon cyanoleuca*: Blue-and-white Swallow S

Four over clearing 20 Aug 1972 (N. G. Smith) probably were of the migratory race *P. c. patagonica* of southern South America.

*Stelgidopteryx rufipennis*: Rough-winged Swallow Vw

Fairly common, at least in the dry season, flying over the lake and clearing; the migratory dark-rumped and dull-throated northern migrant *serripennis* is seen as well as the pale-rumped bright-throated breeding race *uropygialis* (Eisenmann).

Family CORVIDAE: Jays

\**Cyanocorax affinis*: Black-chested Jay (R)

A single bird 19 Jan 1971 (D. Wechsler, S. Kistler, Willis) near Barbour 15 was last of flock present there in 1965; formerly several flocks resided on island. A bird of woodland and edges.

Family TROGLODYTIDAE: Wrens

*Campylorhynchus albobrunneus*: White-headed Wren V

6 May 1953 one chattered at edge of clearing (Wetmore). A species of very wet lowland or hill forest.

*Thryothorus leucotis*: Buff-breasted Wren (R)

Formerly "occasional in thickets around the clearings" (Eisenmann) and in the 1960's on Mona Grita Island. A bird of thickets, especially near water.

*Thryothorus modestus*: Plain Wren (I)

Formerly occasional pairs in clearing, on Slothia Island, and grassy islands of southwestern lake shore, 6 Sep 1958 to 1967; last heard 1971 on southwestern shore (Eisenmann, Willis). A bird of cleared, semi-open, and grassy areas with scattered bushes or thickets.

*Thryothorus fasciatoventris*: Black-bellied Wren (R)

Last recorded 22 Aug 1964 along Burrunga Point (Willis); formerly "occasional in thickets" (Eisenmann). Notes: A rough scold followed by loud whistles, *zaa-aaj, hoe-treak*; also rich whistles like *choop per cheér ho ho* repeated several times.

\**Troglodytes musculus*: Southern House Wren (R)

No records since 2 Jul 1966; formerly one or more pairs at the laboratory and sometimes at houses along shore. Breeding: Egg dates, early Jan through Aug (Chapman, Van Tyne, Skutch, Eisenmann).

\**Henicorhina leucosticta*: White-breasted Wood-  
Wren (R)

Collected by Van Tyne and Chapman. A bird of humid woodland undergrowth. A few individuals, of unknown sex, reintroduced 1976 by Morton.

\**Cyphorhinus phaeocephalus*: Song Wren (R)

Last noted near Fuertes House in 1961 (Willis); formerly fairly common. Two pairs reintroduced 1976 and both bred successfully (Morton). A bird of humid woodland thickets. Notes: A strange mixture of froglike grunts and musical whistles, often from one bird—*ong cutta cutta, whong cutta cutta glut, WHOO HEE*, etc.

\**Microcerculus marginatus*: Nightingale Wren (R)

Several reported singing 14–23 May 1933 (G. Carleton). One 23 Jan 1977 east of Wheeler Trail 20 (a vagrant? Willis). Walks on ground in humid woodlands.

Family MIMIDAE: Mockingbirds

*Dumetella carolinensis*: Gray Catbird N

A few migrants recorded in the dry season.

*Mimus gilvus*: Tropical Mockingbird V

Vagrants at laboratory, 11 Aug 1967 (Karr) and 6 Sep 1970 (Willis). Common around houses and lawns in the Canal Zone, where introduced from South America.

Family TURDIDAE: Thrushes

*Turdus assimilis*: White-throated Robin V

Rare vagrant from hill country; one followed army ants near the Tower 28 Oct 1960–14 Jan 1961; also near the Tower 16 Sep 1961 and 2 Jan 1971 (Willis).

\**Turdus grayi*: Clay-colored Robin (R)

Last noted 16 Mar 1966 (Slud); until 1961, usually a pair or two in the clearing. Common on lawns in Canal Zone.

*Hylocichla mustelina*: Wood Thrush N

Uncommon winter visitor on forest floor, 16 Oct to 20 Apr (1961, Willis). Often follows army ants.

\**Catharus ustulatus*: Swainson's Thrush N

Common transient, especially in fall; often with army ants. Recorded 19 Sep 1961–26 Dec 1970 and 16 Mar–15 May 1961 (Willis). A few individuals winter.

\**Catharus minimus*: Gray-checked Thrush N

Common fall transient, rare winter visitor and spring transient. 5 Oct–3 Dec 1960 and 25 Jan, 4 Feb, and 15 Apr 1961 (Willis). Often follows army ants.

*Catharus fuscescens*: Veery N

Uncommon fall transient, 20 Sep–13 Nov 1960 (Willis). Often follows army ants.

Family SYLVIIDAE: Gnatcatchers and allies

\**Polioptila plumbea*: Tropical Gnatcatcher R

Uncommon in the treetops and woodland borders, fairly common along shore.

\**Ramphocaenus rufiventris*: Long-billed Gnatwren R

Uncommon in vine tangles in lighter woods. Breeding: On nest 23 Apr and building 6 Jul 1961 on Buena Vista Point (Willis); newly hatched young in Panama City, 15 Jul 1950 (Eisenmann).

Family CYCLARHIDAE: Peppershrikes

*Cyclarhis gujanensis*: Rufous-browed Peppershrike V

Singing at laboratory 9–10 Mar 1949 (Wetmore). In Panama, mostly in trees of open country of Pacific slope.

Family VIREOLANIIDAE: Shrike-Vireos

\**Smaragdolanus pulchellus*: Green Shrike-Vireo R

Uncommon, singing recently mainly at tops trees near Wheeler Estero Dec to Sep. Formerly more widely distributed and fairly common in the forest. Breeding: Female building mossy vireo-like cup 14 m up as male sang and watched, 15 May 1966 in the Madden Forest Reserve (mainland) (Willis). Notes: A frequently repeated phrase of three whistles, *peeee, peeee, peeee* or *pee, pee pee*, suggestive of the call of the temperate North American Tufted Titmouse, *Parus bicolor*.

Family VIREONIDAE: Vireos

*Vireo flavifrons*: Yellow-throated Vireo N

Common fall transient and uncommon winter resident in the treetops, 11 Oct (1961, Willis) to 12 Mar (Skutch); sings persistently in the fall. Notes: Burry short phrases, *eeyeh, duree, earwit, vireo*, etc. Rasping *riiz jii jii jii jii jii jii*.

*Vireo olivaceus*: Red-eyed Vireo N

Common transient in treetops and forest edge 19 Aug (1970, Willis) to 5 May (1953, Wetmore); commonest Sep to Nov.

*Vireo flavoviridis*: Yellow-green Vireo (R)

Formerly rare breeder in the clearing; seen singing there 16 Mar 1974 (Eisenmann), possibly a vagrant; common in open woodland at Frijoles. Breeding: Feeding short-tailed fledgling in the clearing, 14 Jun 1952 (Eisenmann). Eggs late Jan to Jun in Canal Zone (Morton). Notes: Song is much like that

of northern Red-eyed Vireo, but phrases tend to be shorter (Eisenmann).

*Hylophilus flavipes*: Scrub Greenlet R

Singing in scrub of marshy islets at end Armour Trail, 7 Jul 1963 and 15 Jul 1967 (Willis). Common in low scattered trees and scrub at Frijoles (mainland).

\**Hylophilus decurtatus*: Lesser Greenlet R

Very common in the treetops, often the center of mixed flocks there or in groups of its own kind. Notes: A *cheetsa-cheet* or similar phrase, often repeated two or three times; uttered monotonously, and easily mistaken for a song of the Yellow-green Vireo.

Family COEREBIDAE: Honeycreepers

\**Coereba flaveola*: Bananaquit R

Fairly common, especially in forest edges and lighter forest. Breeding: Nests Nov to Apr (Skutch), 30 Aug 1947 (Eisenmann). Old nests often used for sleeping, and sleeping nests are built.

*Cyanerpes lucidus*: Shining Honeycreeper R

Uncommon at forest edges and in the canopy.

\**Cyanerpes cyaneus*: Red-legged Honeycreeper R

Common in the canopy and at forest edges; rarely seen or absent during post-breeding period, 8 Sep (1958, molting male) to 10 Nov (1962, full-plumaged male; Eisenmann). Breeding: Nest being built 27 Feb 1952 (Mr. and Mrs. Schnitzer). Two fluffy fledglings 21 Jun 1952 (Eisenmann).

\**Chlorophanes spiza*: Green Honeycreeper R

Fairly common in the treetops and at forest edges. Breeding: 7 Jul 1950, female gathering nest material (Eisenmann). Female feeding fledgling, 18 Jul 1972, and two fledglings begging from male, 11 Jun 1973 (M. Perrone).

\**Dacnis cayana*: Blue Dacnis R

Common in the treetops and forest edge. Breeding: Female feeding juvenile bird 11 Jun 1973, and adult feeding one 8 Oct 1972 (M. Perrone).

*Dacnis venusta*: Scarlet-thighed Dacnis R

Occasional at forest edges or in the treetops, first recorded 8 Feb 1951 (Collias) but probably overlooked earlier. Commoner in humid foothill forests. Breeding: Two males with female, she feeding grown fledgling at the laboratory, 18 Jul 1962 (G. Hunt, Willis).

Family PARULIDAE: Wood Warblers

*Mniotilta varia*: Black-and-white Warbler N

Uncommon winter resident; late date, 27 Mar (1966, Slud).

*Protonotaria citrea*: Prothonotary Warbler N

Fairly common 15 Sep (1972, M. Perrone) to 23 Mar (1955, Wetmore), low along the lake shore.

*Helmitheros vermivorus*: Worm-eating Warbler N

Rare winter visitor in forest, reported 21 Oct (1960, Willis) to 16 Mar (1966, Slud).

*Vermivora chrysoptera*: Golden-winged Warbler N

Rare transient, 19 Sep (1951, Bourlière) to 3 Oct (1960) and 16 Mar (1966, Slud) to 17 May (1961, Willis).

*Vermivora peregrina*: Tennessee Warbler N

Common fall migrant, fairly common winter and spring along the lake shore and in the clearing and canopy; recorded 8 Oct to 23 Apr (1961, Willis).

\**Dendroica petechia*: Yellow Warbler N

Fairly common winter visitor and transient, especially in the clearing and along the lake shore, 18 Aug (1965, Willis) to 4 May (1926, collected, Van Tyne). Birds are of the northern *aestiva* group.

*Dendroica magnolia*: Magnolia Warbler N

Rare in winter in tangles in the forest; 15 Jan (1961, Willis) to 12 Apr (1961, Eisenmann).

*Dendroica cerulea*: Cerulean Warbler N

Uncommon transient in mixed flocks high in forest, 14 Apr 1970 and 17 Sep 1961 (Willis); 18 to 28 Mar 1966 (Slud).

*Dendroica fusca*: Blackburnian Warbler N

Rare transient, 5 Sep (1958, Eisenmann) to 26 Oct (1972, M. Perrone) and 20 Mar (1950, Cottrell).

\**Dendroica pensylvanica*: Chestnut-sided Warbler N

Common winter visitor in the lower midlevels of the forest and edges, 7 Sep (1970, Willis) to 21 Apr (1958, F. Chapelle).

*Dendroica castanea*: Bay-breasted Warbler N

Common winter visitor in the midlevels of the forest and edges, 16 Oct (1960) to 21 Apr (1961, Willis).

*Dendroica striata*: Blackpoll Warbler N

Vagrant, reported 6 Nov 1944 (A. Allen) and 8-9 Feb 1940 (Mrs. G. G. Fry, Mrs. L. J. Francke). At most casual in continental Middle America.

*Seiurus aurocapillus*: Ovenbird N

Rare winter visitor on the ground in forest, 18 Oct to 31 Mar (1961, Willis).



*\*Seiurus noveboracensis*: Northern Waterthrush N  
Fairly common winter visitor along streams and the lake shore, 29 Sep (1968, Leck) to 6 May (1953, Wetmore).

*\*Seiurus motacilla*: Louisiana Waterthrush N  
Uncommon winter visitor along rocky forest streams, 18 Aug (1970, Willis) to 21 Mar (1966, Slud).

*Oporornis formosus*: Kentucky Warbler N  
Common winter visitor on or near the ground within lighter forest, less common in old forest; recorded 4 Sep-18 Apr (1961, Willis).

*Oporornis philadelphia*: Mourning Warbler N  
Uncommon winter visitor in bushes in and near grassy marshes.

*\*Geothlypis trichas*: Common Yellowthroat N  
Collected by Chapman, 28 Jan 1929.

*Wilsonia citrina*: Hooded Warbler N  
Males 24 Sep 1951 (Bourlière) and 5 Jan 1977 (N. Brokaw).

*Wilsonia canadensis*: Canada Warbler N  
Common fall, uncommon spring transient in mixed flocks of the lower layers of the forest; rare in winter. Recorded 3 Sep (1965) to 8 Nov (1961, Willis) and 25 Mar (1950, Cottrell) to 5 May (1961, Willis). Jan 1969 (E. J. Tramer) and 1977 (R. Greenberg); 8 Feb 1977 (N. Brokaw).

*Setophaga ruticilla*: American Redstart N  
Rare winter visitor, 17 Sep (1961 and 1965, Willis) to Feb (1940, Mrs. Fry).

*\*Basileuterus delatrii*: Chestnut-capped Warbler (R)

Formerly "not uncommon along clearing borders" (Chapman). A few persisted in 1961 on islands and shores north of Salud Point, in edges of second growth (Willis). Favors drier woodlands.

*Basileuterus fulvicauda*: Buff-rumped Warbler (I)  
1960 to 1962 one or two sang loudly along creeks near the clearing.

#### Family ICTERIDAE: Troupials

*\*Zarhynchus wagleri*: Chestnut-headed Oropendola R

Small bands occasional in the clearing and forest canopy from Dec through Jul; nest colonially in the clearing or along shore in some years. Breeding: Building in early Jan, egg laying late Jan to Apr, young gone by the end of Jun (Chapman). Nesting is later in some years.

*Psarocolius decumanus*: Crested Oropendola V  
Several around laboratory 5 May 1953 (Wetmore).

*\*Cacicus cela*: Yellow-rumped Cacique R  
Individuals or small groups sometimes forage in the canopy or along the lake shore, mainly Dec to May near Gigante Bay. Breeding: Colony of 16 nests over water Apr-May 1935, destroyed by snake (Skutch); colony of about 16 nests over Gigante Bay, 3 Apr 1969 (Leck).

*Amblycercus holosericeus*: Yellow-billed Cacique V  
19 Feb 1940 at clearing (Mrs. Fry). Thicket bird of more open and cleared areas of Panama. Notes: Mellow whistles, often doubled (*whew-whew*) from the male answered by a *wheeee, churrrr* from the female (Skutch, Willis).

*Scaphidura oryzivora*: Giant Cowbird R  
Occasional at colonies of oropendolas or caciques, in whose nests it lays its eggs. Feeds in more open parts of Panama.

*Cassidix mexicanus*: Great-tailed Grackle V  
Jan 1969 (E. J. Tramer). Female in clearing, 7 Apr 1969 (Leck). Common on lawns and in trees around towns and along coasts in Panama.

*Icterus spurius*: Orchard Oriole N  
Rare winter visitor around the laboratory and along the lake shore, 19 Feb (1937, Chapman) to 2 Apr (1961, Willis). Common during northern winter about Panama City and the Canal Zone.

*Icterus mesomelas*: Yellow-tailed Oriole V  
Near the laboratory 17 Apr 1942 (T. Imhof), 12 Mar 1946, 8 Mar and 3 May 1949 (Wetmore). Common in trees of thickets along marshy edges of streams elsewhere in much of Panama.

*Icterus chrysater*: Yellow-backed Oriole R  
Fairly common in young forest along the lake shore. Notes: A repeated loud *gai-eeek*; song a rambling series of loud, clear whistles, up and down scale but ending inconclusively. Breeding: In palm tree near dock, Feb 1972 (Schnitzers). Five birds at nest being built on Mona Grita Island, 5 Feb 1977 (N. Brokaw, J. Pickering, Willis).

*Icterus galbula*: Northern Oriole N  
Rare winter visitor in treetops and at the clearing, 24 Sep (1972, M. Perrone) to 19 May (1961, Willis). The race *galbula* (Baltimore Oriole) winters commonly in Panama. Female with characters of the western *bullocki* seen in lab clearing 13 Nov 1972 (M. Perrone).

*Dolichonyx oryzivorus*: Bobolink N  
Male alighted on a cage of Dickcissels, 16 Apr 1961 (Eisenmann, Willis, J. Zimmerman).

## Family THRAUPIDAE: Tanagers

*Euphonia minuta*: White-vented Euphonia V

Male or pair seen in clearing, 1 Feb 1969 (Leck) to 1971 or later (Ridgely, Willis). Foothill bird, perhaps post-breeding wanderer to island.

*Euphonia fulvicrissa*: Fulvous-vented Euphonia R

Common in the treetops and at the forest edge, usually in pairs.

\**Euphonia lanirostris*: Thick-billed Euphonia (R)

"Not common" (Chapman). In the clearing, Apr 1935 (Skutch); collected 31 Oct 1956 (C. Koford). On islets west of Peña Blanca Point, 6 Mar 1977 (Willis). A bird of second growth and semi-open woodland. Breeding: Building nests 21 Mar 1961 and 27 Jun 1966 near Frijoles (mainland) (Willis).

\**Tangara larvata*: Golden-hooded Tanager R

Pairs and small groups formerly occasional around the clearing and in the treetops. Not seen 1977. Breeding: Feb–May 1937 (Skutch) to (two eggs in old oropendola nest) 20 Aug 1954 (Eisenmann).

\**Tangara inornata*: Plain-colored Tanager R

Common in small groups around the clearing and along the lake, usually in the canopy. Breeding: Young left 23 Mar 1955 (Wetmore); carrying nest material 23 Aug 1954 (Eisenmann). Three banded by C. Koford in 1956 were recaptured by T. C. Crebbs, Jr., and S. Harty in 1963 when more than six and a half years old (Crebbs, 1965).

*Tangara gyrola*: Bay-headed Tanager V

Seen in 1964 (N. G. Smith). Common in humid forests, as on the Agua Salud River above Frijoles (mainland). A report of the similar *T. lavinia*, Rufous-winged Tanager (22 Jul 1933, R. Arbib) probably refers to *T. gyrola*.

\**Thraupis episcopus*: Blue-gray Tanager R

Fairly common in the clearing and along the lake shore, rare in the forest canopy. Breeding: Nests January (Chapman) to 10 May (1935, Skutch); building 4 Jul 1948 (P. Longenecker, Eisenmann).

\**Thraupis palmarum*: Palm Tanager R

Fairly common in the clearing, occasional along the lake shore or in the canopy. Breeding: In crannies, especially of palms and buildings, Jan (1926, Chapman) to 1 Jun (1935, Skutch).

\**Ramphocelus dimidiatus*: Crimson-backed Tanager (R)

Only vagrant young males to clearings and lake shore since 28 Mar 1966 (Slud); formerly a few pairs bred in the clearings. A bird of thickets and smaller trees in towns, clearings,

and semi-open areas, common at Frijoles (mainland). Breeding: Feb–May 1935 (Skutch). Notes: Song a monotonous but somewhat musical *chikeéo chikeéo*; dawn song *cheéawee* repeated ten or more times; call a sharp nasal *nyehk* or *yeenk*; also *chewk* and *keeya* (Eisenmann).

*Ramphocelus icteronotus*: Yellow-rumped Tanager (R)

Until 1962, irregular in the laboratory clearing; no recent record. A bird of marshy borders and thickets in humid zones; common at Frijoles (mainland). Notes: Much like those of Crimson-backed Tanager; common calls *psst*, also *nyeck* and *cheeick* (Eisenmann).

\**Piranga rubra*: Summer Tanager N

Uncommon winter visitor around the clearing and in the forest treetops, 11 Sep (1965, Eisenmann) to 20 Apr (1961, Willis).

\**Piranga olivacea*: Scarlet Tanager N

Uncommon fall migrant, 10 Oct (1961) 16 Nov (1960, Willis); rare spring, 28 Mar (1966, Slud) and 5 Apr (1936, collected, Niedrach) to 11 Apr (1961, Willis). Once in winter, 12 Feb 1970 (Ridgely).

\**Habia fuscicauda*: Red-throated Ant-Tanager R

Uncommon in the young woodland, mainly along the lake shore. A bird of secondary woodland and thickets; follows army ants at times. Breeding: In the Canal Zone, nests 14 May (Stone) to early Jul (Willis, 1972).

*Tachyphonus rufus*: White-lined Tanager (R)

To 1961, irregular in the clearing; a bird of thickets and semi-open areas at the edge of humid woodlands.

\**Tachyphonus luctuosus*: White-shouldered Tanager R

Fairly common in the canopy and occasional at the edge of the clearing, often in mixed flocks.

*Heterospingus rubrifrons*: Sulphur-rumped Tanager R

Fairly common in the canopy, in groups. Notes: A sharp *tseet*.

\**Eucometis penicillata*: Gray-headed Tanager R

Fairly common in the undergrowth, mainly with army ants. Notes: A sharp *chip* and high *stet*; a high *sweeyie tsweeyie*; song a musical sputter, *eat eat meat chop*, *'safurry chew*, *'sfurry chew* or the like. Breeding: Nest with eggs 1–2 Apr 1935 (Skutch); one egg hatched 11 Jul 1948 (P. Longenecker, Eisenmann); other records Apr to Sep (Willis).

*Mitrospingus cassini*: Dusky-faced Tanager (I)

Immigrants about edge of laboratory clearing from 2 Nov 1972 (M. Perrone); gone by 1977. Notes: A loud, rattling repeated *tsrrip-tsrip* varied to *tsreep-tsreep* (Eisenmann).

**\**Rhodinocichla rosea*: Rosy Thrush-Tanager V**

One at clearing 1936–1937, dead 17 Feb 1937 (Chapman, W. Weber). A bird of undergrowth of secondary woodland, common around Frijoles (mainland).

## Family FRINGILLIDAE: Finches

***Saltator atriceps*: Black-headed Saltator V**

15 Jul 1962 at southern tip of island (Willis). Local in damp second growth of western and central Panama. Notes: A loud *weehk* and rough *shaw* at intervals, also other loud calls.

**\**Saltator maximus*: Buff-throated Saltator (R)**

To 1 Sep 1964, occasional around the clearing; common in woodland edges and second growth, as at Frijoles (mainland). Notes: A sharp *seeeeeeep*; song short robinlike musical phrases.

***Saltator albicollis*: Streaked Saltator V**

Formerly occasional at the clearing; common in open areas, as Frijoles (mainland).

**\**Pitylus grossus*: Slate-colored Grosbeak R**

Fairly common in the upper midlevels of the forest. Notes: In addition to songs, a metallic cardinal-like *chip* and a jay-like *nyeah*.

***Pheucticus ludovicianus*: Rose-breasted Grosbeak**

N

Rare to uncommon in clearing or canopy in migration and winter, 14 Oct (1960) to 21 Apr (1961, Willis).

**\**Cyanocopsa cyanooides*: Blue-black Grosbeak R**

Fairly common in thickets in valleys and young forest. Notes: *pick*; also a rising and then descending clear series, *do- do, deh, dee, deh, do*, often ending with a soft twitter. Breeding: Eggs Jul 1947 (C. A. Moore).

***Passerina cyanea*: Indigo Bunting N**

Occasional in migration or winter: several winter 1957–1958 (Moynihan); 22 Mar (1955, Wetmore) to 14 Apr (1961, Eisenmann).

***Spiza americana*: Dickcissel N**

Occasional in winter (Chapman) and on migration; many records 13 Mar to 17 May 1961, when J. Zimmerman kept birds in outdoor cages. 5 Sep 1958, one at laboratory (Eisenmann).

**\**Volatinia jacarina*: Blue-black Grassquit V**

Adult male collected 27 Apr 1927 (Van Tyne). 25–28 Mar 1966 (Slud). Jul 1972 (M. Perrone). On the mainland, abundant in grassy areas.

***Sporophila schistacea*: Slate-colored Seedeater V**

An irruption of singing birds to clearings where trees were felled by windstorm of 1 Oct 1961 lasted from 16 Oct 1961 to 18 Feb 1962 at least (Willis). Male singing in planted bamboo thicket at clearing, 15–19 Mar 1975 (Eisenmann, Morton). Feb–Mar 1977 in bamboos near Armour Trail 1 (N. Brokaw, D. Schemske, Willis). Singing commonly in early 1978 (N. Brokaw). Evidently attracted by bamboo seed crops, and wanders widely to such areas. Notes: Song *tsee, tsitsitsitsi*, the last part very thin and high, sometimes varied by a thin rattle (Eisenmann).

**\**Sporophila aurita*: Variable Seedeater R**

Irregularly common in the clearing; occasional in shrubbery of grassy marshes along shore. Breeding: Juvenile at laboratory 25 Jun 1973 (M. Perrone). Nests as early as late May (Gross, 1952) and with fresh eggs as late as Sep (Gross, Eisenmann).

***Sporophila nigricollis*: Yellow-bellied Seedeater V**

Occasional in the clearing; a common bird in grassy semi-open country.

***Oryzoborus funereus*: Thick-billed Seed-Finch V**

Occasional in the clearings; a bird of bushy, semiopen areas, as at Frijoles (mainland).

***Arremonops conirostris*: Black-striped Sparrow (R)**

As late as 28 Mar 1966 (Slud), there was a pair or two in the clearing; and in 1961 one pair was at the Miller Trail outer lighthouse. A bird of bushy fields and cleared areas in Panama. Breeding: In central Panama, nests with eggs 18 Apr (Stone) to 7 Oct (Karr).

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**Legends** for illustrations must not be attached to the art nor included within the text but must be submitted at the end of the manuscript—with as many legends typed, double-spaced, to a page as convenient.

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**A few points of style:** (1) Do not use periods after such abbreviations as "mm, ft, yds, USNM, NNE, AM, BC." (2) Use hyphens in spelled-out fractions: "two-thirds." (3) Spell out numbers "one" through "nine" in expository text, but use numerals in all other cases if possible. (4) Use the metric system of measurement, where possible, instead of the English system. (5) Use the decimal system, where possible, in place of fractions. (6) Use day/month/year sequence for dates: "9 April 1976." (7) For months in tabular listings or data sections, use three-letter abbreviations with no periods: "Jan, Mar, Jun," etc.

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