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USE OF AN EXOTIC TREE PLANTATION BY BORNEAN LOWLAND FOREST BIRDS

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ABSTRACT.—During May to July 1982, we surveyed birds in primary forest and in different-aged groves of the exotic tree *Albizia falcataria* at Sabah Softwoods, a lowland tree plantation in Sabah, East Malaysia (formerly British North Borneo). We found that the *Albizia* was in general attractive to many native birds. About 60% of primary-forest species used the plantation, and the frequency at which individuals were observed in the oldest groves was almost twice that of nearby primary forest. The *Albizia* attracted birds because, as an extremely fast-growing legume with thin leaves, it permitted the rapid development of a well-structured secondary forest. It also was heavily infested with pest insects, which provided an abundant food source. Despite its apparent richness, however, the *Albizia* lacked several important features of natural forest (e.g. canopy fruits and nest holes). As a result, some primary-forest bird groups were poorly represented (e.g. large canopy frugivores and flycatchers) and others could make only limited use of the plantation (e.g. woodpeckers). In addition, the *Albizia* is expected to lose its diversity as the plantation as a whole ages. Many of the plantation birds were transients from nearby forest that visited daily to feed, and some probably had been displaced by intense logging. The number of daily transients should decrease as primary forest recedes due to logging and development. Refugee species diversity should suffer from attrition as the plantation is cropped and predation and age take their toll. *Received 9 March 1992, accepted 20 November 1992.*

AS THE RESULT of development, many tropical rain forests throughout the world face rapid and generally destructive change. One form of tropical land development that has become increasingly popular in the last 20 years is the planting of exotic, fast-growing trees for chip and pulp production. Tracts of primary rain forest in Asia, Africa, and the Neotropics that have been exploited for timber subsequently have been cleared and replaced with plantations of trees such as *Eucalyptus deglupta, Gmelina arborea, Albizia falcataria, Acacia mangium, Pinus carabaea, P. oocarpa,* and *Anthocephalus chinensis.* Unlike agricultural crops, such plantations do not require good soils or intensive management (e.g. of understory growth). Thus, they offer an attractive alternative for sustained yield of revenues.

Although the prospect of sterile monocultures replacing diverse, rich forests has raised concerns (e.g. Andrews 1973, Wells 1985, Sheldon 1986), the ecological consequences of this type of land use have received little attention, and many basic questions remain to be answered. In particular, how will native plants and animals respond to plantations, and how will plantation communities influence adjacent forest communities (e.g. as a source of food or competitors)? Answers to such questions are needed because they not only bear on issues of tropical community ecology, but they relate directly to practical problems of plantation management and the conservation of organismal diversity. Although plantations are inevitable, they can be developed to preserve and exploit natural forests. For example, plantations that are intercalated with or surrounded by natural forest almost certainly benefit from biological control of infesting pests (e.g. insects and rodents) by forest-dwelling predators. The use of forest conservation in plantation management and the influence of plantations on forest communities will depend upon many potential factors, including the types, ages, and mixture of trees that are cultivated, crop rotation, proximity of primary forest, plantation physiognomy (e.g. presence of streams, cliffs, etc.), and timing and complexity of pest infestations.

To understand elements of the interaction between plantation and forest bird communities, we censused birds at Sabah Softwoods Plantation in Sabah, East Malaysia (formerly British North Borneo) during May to July 1982. Ours is one of only a few such studies that have been

TABLE 1. Dates and times of surveys.

Plot type (age)	Plot no.	No. surveys	Dates	Early/late[a]
Primary forest	1	2	10, 15 June	2/0
	2	1	10 June	0/1
Albizia				
1975 (7 years)	1	8	28 May–25 July	4/4
	2	3	29 May; 8, 14 June	1/2
	3	1	20 July	1/0
1977 (5 years)	1	2	30 May; 4 June	1/1
	2	3	2, 3, 12 June	2/1
	3	2	22 July	1/1
	4	4	24, 30 July	2/2
1979 (3 years)	1	6	3, 13 June; 17, 29 July	3/3
	2	4	7 June; 18 July	2/2
1981 (1 year)	1	5	6, 11 June; 23 July	3/2
	2	3	6, 9, 11 June	1/2
All surveys		44	28 May–30 July	23/21

[a] Early (0600-0900)/late (0930-1230).

conducted in Asia. Others include Davies (unpubl. manuscript), Davies and Payne (1982), Duff et al. (1984), and Stuebing and Gasis (1989), which were surveys mainly of mammals in Sabah Softwoods, and Wilson and Johns (1982), which examined a restricted set of mammal and bird species in a similar plantation in east Kalimantan (Indonesian Borneo). These investigations complement data collected in recent years on the effects of logging on Malayan and Bornean bird and mammal communities (e.g. Wilson and Wilson 1975, Johns 1983, 1986, 1989, Wong 1985, Lambert 1992). Beehler et al. (1987) also surveyed birds in several plantation and man-disturbed forest habitats in the Eastern Ghats of India. However, the age and configuration of the forests and plantations they studied (including coffee and teak groves) differed from the newer exotic-tree schemes of Malaysia and Indonesia.

Sabah Softwoods is located in the Kalabakan Forest Reserve in southeastern Sabah (4°37'N, 117°45'E, altitude < 300 m). The plantation was begun as a joint venture by the Sabah Foundation and North Borneo Timber Company in 1972. Prior to development, most of the region had been covered with primary forest, dominated by trees of the family Dipterocarpaceae (Wood and Meijer 1964, Whitmore 1984). This forest was heavily logged in the early and mid-1970s, and a large area was clear-felled and burned to establish the plantation. At the time of our survey, about 25,000 ha of a 61,000-ha concession had been replanted, principally with the exotic trees *Albizia falcataria, Acacia mangium, Gmelina arborea,* and *Eucalyptus deglupta.* Another 3,300 ha were planted with agricultural crops such as cocoa and coffee (Duff et al. 1984). Circumscribed stands of primary forest persisted about 1 to 2 km from the plantation in 1982, and logging was active at distances from 5 to 20 km.

We were interested in assessing (1) the extent to which primary-forest birds used the plantation, (2) how the bird community in the plantation developed through time, and (3) ecological factors that played a role in this development. To this end, we censused birds in different age groups of one species of plantation tree, *Albizia falcataria.* We selected this species because preliminary observations (e.g. A. G. Davies unpubl. manuscript) indicated that *Albizia* groves were more attractive to birds than were those of other plantation trees.

Locally called "Batai," *Albizia falcataria* is native to the Molucca Islands, New Guinea, New Britain, and the Solomon Islands, but has been introduced to most parts of Malaysia (Cockburn 1976). Synonyms are *A. falcata* and *A. moluccana;* sometimes the species is placed in the genus *Serianthes* (Mabberley 1987). *Albizia* is a popular plantation tree because it grows fast, gaining as much as 6 m in height and over 12.5 cm in girth per year in its first few years. It is also a legume that improves soil quality (Cockburn 1976, K.-C. Tan pers. comm.).

METHODS

Data were collected in each of the following five habitats or "plot types": one-, three-, five-, and seven-year-old *Albizia,* and primary forest (summarized in Table 1). To compare richness and diversity, we compiled accurate lists of the kinds and numbers of birds present in each plot type and converted these into frequency values. For each plot type we surveyed replicate "plots." To ensure consistency among plots, we selected areas with similar altitudes, terrains, and distances from streams and primary and logged forest. In each plot, a quadrat trail of 300 m on a side was cut; one of the four sides consisted of an access road. To census, we walked the trails, allowing 3 h for each quadrat. Surveys were conducted at two different times of day: 0600 to 0900 and 0930 to 1230 standard time. We considered all surveys of a given plot to be replicates, but endeavored to complete equal numbers of early- and late-morning surveys for each plot and plot type. Every bird that was seen or heard was noted.

TABLE 2. Feeding-guild classification with examples.

1	Raptors (r): Hawks and owls.
2	Terrestrial insectivores (ti): Pittas, some babblers, and thrushes.
3	Bark-gleaning insectivores (bgi): Woodpeckers, nuthatches, and some babblers.
4	Foliage-gleaning insectivores (fgi): Many babblers and warblers.
5	Sallying substrate-gleaning insectivores (ssgi): Trogons, some kingfishers, broadbills, and drongos.
6	Sallying insectivores (sai): Flycatchers.
7	Nectarivores (n): Sunbirds, spiderhunters, *Loriculus galgulus*, and *Dicaeum trigonostigma*.
8	Arboreal frugivores (af): Most pigeons, most barbets, *Calyptomena*, *Irena*, crows, mynas, and most bulbuls.
9	Arboreal frugivores/faunivores (aff): Hornbills and *Megalaima chrysopogon*.
10	Terrestrial frugivores (tf): Phasianids and *Chalcophaps*.
11	Aerial insectivores (ai): Swifts, swallows, and nightjars.
12	Miscellaneous (m): Some kingfishers, a honeyguide, predatory waterbirds, and rails.

The censusing took place from 28 May to 30 July 1982. During this period, no northern migratory species were present in the area. Table 1 shows the dates and times of all surveys. The Appendix lists the species and numbers of individuals recorded.

In addition to data recorded during formal surveys, we compiled many distributional records while collecting birds in primary forest and other *Albizia* groves during March and April 1977, and May to July 1982. These records have been separated from the survey data, but we have used them to obtain lists of the total number of species for the plot types. Nonsurvey species are marked with a "P" in the Appendix. To distinguish between survey data and the combination of survey and nonsurvey data, we use the terms "species surveyed" and "total species."

Species richness in each plot type is expressed simply as the number of species. Abundance or encounter frequency was computed by dividing the total number of individuals recorded on a survey or group of surveys by the number of survey hours. To portray the distribution of species across different environments, we counted the number of species restricted to each plot type (unique species) and the proportion of total individuals accounted for by the five commonest species in each plot type (dominant species). Diversity in each plot type is expressed by the Shannon-Wiener index (H'):

$$H' = -\sum_{i=1}^{n} p_i \log p_i, \qquad (1)$$

where p_i is the proportion of individuals in species i and n is the number of species surveyed.

To evaluate the more obvious ecological differences distinguishing habitats, we divided bird species and individuals into categories based on their feeding guilds and then compared relative frequencies of these groups in each plot type. The 12 feeding guilds were based on their main food type (Table 2), rather than a combination of foods, as is often done (Karr 1980, Johns 1986, Lambert 1992). Thus, we categorized sunbirds as nectarivores, even though they also eat insects. We used Horn's (1966) index of overlap (C) to make pairwise comparisons between plot types on the basis of their food-guild frequencies:

$$C = \left(2 \sum_{i=1}^{s} x_i y_i\right) \Big/ \left(\sum_{i=1}^{s} x_i^2 + \sum_{i=1}^{s} y_i^2\right), \qquad (2)$$

where x_i is the frequency of guild i in plot type x, y_i is the frequency of guild i in plot type y, and s is the number of guilds. This index varies from 0 for cases when sets share no common members to 1 when sets are identical.

To portray the tolerance of bird species to *Albizia*, we computed T, the inverse of Simpson's (1949) measure of concentration (Lovejoy 1974):

$$T = 1/\sum P_i^2 \qquad (3)$$

where P_i is the proportion of individuals of a species found in habitat i. P_i is calculated as the encounter frequency in habitat i divided by the sum of encounter frequencies in all five plot types. The T-values are listed for each surveyed species in the Appendix. They range upward from 1.00 for the least tolerant species.

RESULTS

Our 44 surveys yielded 4,889 records of 140 species and 6,741 individual birds. Most of the records were based on identification by song or call (65%). Only 27% were based on sightings, and 8% on both calls and sightings. Nonsurvey records yielded data on an additional 60 species. Of the 200 total species, 59 were found only in primary forest and 38 only in the *Albizia* groves. About 50% of the 38 species restricted to the *Albizia* were obligate secondary-forest or open-land species. Of the 162 species recorded in primary forest, 103 were also found in the *Albizia* groves (see Appendix).

In general, within the plantation, plot types varied predictably in respect to species richness, encounter frequency, uniqueness, dominance,

TABLE 3. Summary of data for *Albizia* groves and primary forest.

	Primary forest	*Albizia* grove[a]			
		1975 (7 years)	1977 (5 years)	1979 (3 years)	1981 (1 year)
Species surveyed	69	98	73	56	38
Total species[b]	162	122	92	63	45
Survey records	234	1,651	1,381	1,123	500
Individuals surveyed	338	2,200	1,792	1,591	820
Individuals/observation	1.44	1.33	1.30	1.42	1.64
Individuals/hour[c]	37.6	61.1	49.8	53.0	34.2
Unique species[d]	59	5	0	5	2
Dominant species[e]	26.6	30.4	43.7	61.0	75.0
Diversity (H')	3.823[f]	3.867	3.334	2.915	2.360

[a] Plot type (age).
[b] Includes species recorded outside formal surveys.
[c] Encounter frequency.
[d] Number of species restricted to given plot type (38 species restricted to *Albizia* groves as a whole).
[e] Proportion of total individuals accounted for by five commonest species in each plot type.
[f] Diversity for primary forest artifically depressed because of relatively small sample size.

and diversity (Table 3). The number of species and diversity increased with plot age. Encounter frequency increased between youngest and oldest plots, despite similar values for three- and five-year-old plots. There was no obvious pattern in individuals per observation, and no reason to expect any. Similarly, the number of unique species was not related to plot age. With the exception of a few open-country or wetland birds (e.g. *Gallirallus striatus, Rallina fasciata, Todirhamphus chloris,* and *Lonchura malacca*), the species unique to given plantation plot types were uncommon, patchily distributed, or difficult-to-identify forest birds that probably were overlooked in our primary forest work (e.g. *Spizaetus alboniger, Cacomantis minutillus, Indicator archipelagicus, Dinopium rafflesii, Dicaeum agile, D. concolor,* and *Arachnothera robusta*). Dominance by individual species decreased with plot age as the proportion of abundant early colonists and openland species decreased (e.g. *Macronous gularis, Prina flaviventris, Orthotomus sericeus,* and *Pycnonotus goiavier*). This pattern prevailed despite the increasing abundance of some dominant forest species in the older plots (e.g. *Dicaeum trigonostigma, Anthreptes simplex,* and particularly *Arachnothera longirostra*).

Trends noted across *Albizia* plot types seemed to hold for the primary forest in the cases of species richness (total species) and relative dominance of species. In contrast, trends in diversity and encounter frequency did not extend to the primary forest. We believe, however, that the numbers of species and individuals surveyed and diversity of species found in the primary forest were artificially depressed for two reasons: (1) detecting birds was more difficult in primary forest than in the plantation (this was a consequence of the higher canopy and greater structural complexity of natural forest) and (2) we surveyed the forest formally only three times. To achieve results comparable to the plantation data, we needed more primary-forest surveys. Nevertheless, the total number of species recorded in the primary forest (162), which was compiled over a much longer period than the plantation survey, is reasonably accurate. This number is only slightly less than that of nonmigratory, closed-canopy species found in the well-studied, nearby Ulu Segama region (e.g. Lambert 1992, A. D. Johns and F. H. Sheldon unpubl. manuscripts).

To check for bias in our sampling methods, we examined variation among plots within plot types. We found that plots varied significantly in numbers of species recorded per survey (ANOVA, $P < 0.025$). Such variation may indicate ecological heterogeneity among plots, but also it appears to be influenced by survey dates. Even though we tried to sample over similar dates for plot types, the average dates of surveys for individual plots within plot types typically were different (Table 1). The differences among plots over time indicate not only an increase in number of species surveyed, but also an increase in encounter frequencies. Possible explanations for these increases are growth in populations following nesting, or that a change in logging intensity caused greater dispersal of birds from forested areas. It seems more likely,

TABLE 4. Feeding guild frequencies (in percent). Percent species calculated as number of species representing each guild divided by total species (including nonsurvey species) in a given plot type. Percent individuals calculated as number of individuals representing each guild divided by total number of individuals surveyed in plot type.

			Albizia groves[a]							
	Primary forest		1975 (7 years)		1977 (5 years)		1979 (3 years)		1981 (1 year)	
Guild	Individuals	Species	Individuals	Species	Individuals	Species	Individuals	Species	Individuals	Species
1 r	0.3	6.8	0.5	5.7	0.1	4.3	0.2	4.8	0.0	0.0
2 ti	5.3	8.0	6.9	7.4	4.3	5.4	3.0	3.2	2.4	4.4
3 bgi	7.4	9.9	1.5	9.0	0.8	5.4	0.6	3.2	0.7	4.4
4 fgi	46.2	21.6	43.8	26.2	52.9	31.5	57.2	31.7	60.4	28.9
5 ssgi	7.1	12.3	3.4	9.0	0.8	6.5	0.1	1.6	0.0	0.0
6 sai	12.4	9.9	5.6	4.9	4.5	6.5	2.8	3.2	1.8	8.9
7 n	4.7	4.9	16.4	10.7	11.6	12.0	11.6	17.5	2.0	13.3
8 af	10.7	16.7	19.6	17.2	23.2	16.3	23.6	17.5	27.7	24.4
9 aff	5.3	3.1	0.6	1.6	0.2	1.1	0.0	0.0	0.0	0.0
10 tf	0.6	3.1	1.1	1.6	1.7	2.2	1.6	3.2	5.0	2.2
11 ai	0.0	3.7	0.7	5.7	0.0	7.6	0.1	9.5	0.0	11.1
12 m	0.0	0.0	0.1	1.6	0.0	1.1	0.2	6.3	0.0	2.2

[a] Plot type (age).

however, that our skill at detecting birds simply improved as we conducted more surveys.

Feeding-guild frequencies are listed in Table 4. The degree of domination by the two most prominent guilds (foliage-gleaning insectivores and arboreal frugivore-faunivores) showed an inverse relationship to plot age. Together, these guilds accounted for the following percentages of individuals and species: 57% and 38% for primary forest; 63% and 43% for seven-year-old plots; 76% and 48% for five-year-old plots; 81% and 49% for three-year-old plots; and 88% and 53% for one-year-old plots. The next-most-prominent plantation guild was nectarivores, which when added to the previous two guilds yielded: 62% and 43% for primary forest, 79% and 54% for seven-year-old plots, 88% and 60% for five-year-old plots, 93% and 67% for three-year-old plots, and 90% and 67% for one-year-old plots.

Horn's indexes of ecological overlap are listed in Table 5. This index provides a measure of the ecological similarity of plot types under the assumption that the degree of similarity between different bird communities (compared pairwise in terms of their feeding guild frequencies) reflects ecological similarity between the habitats in which the communities are found. In general, the index indicated that plot types of similar age are most similar in bird community structure.

Habitat tolerances are listed for all surveyed species in the Appendix. The most tolerant species in terms of quantity and evenness of dispersion in the five plot types were the small babbler *Stachyris rufifrons* ($T = 4.67$) and the large thrush *Copsychus malabaricus* (4.60). They were followed by *Cacomantis merulinus* (3.97), *Orthotomus sericeus* (3.94), *Chloropsis sonnerati* (3.85), *Stachyris erythroptera* (3.82), *Pellorneum capistratum* (3.78), and *Orthotomus ruficeps* (3.73). With the exception of the generalist feeder *C. sonnerati*, all of these species are insectivores. Most of the tolerant species are insectivores or generalists.

DISCUSSION

The impressive diversity of birds found in Sabah Softwoods' *Albizia*, especially the older

TABLE 5. Degree of feeding-guild overlap between bird communities of five plot types as indicated by Horn's (1966) index. Cells in upper-right based on individual counts, and those in lower-left based on species counts.

		Albizia grove[a]			
	Primary forest	1975 (7 years)	1977 (5 years)	1979 (3 years)	1981 (1 year)
Primary forest	—	0.935	0.931	0.915	0.892
1975 (7)	0.961	—	0.979	0.962	0.914
1977 (5)	0.914	0.979	—	0.997	0.976
1979 (3)	0.813	0.929	0.968	—	0.984
1981 (1)	0.841	0.921	0.955	0.958	—

[a] Plot type (age).

TABLE 6. Average canopy heights and basal areas of *Albizia* (K.-C. Tan pers. comm.).

Plot type (age)	Canopy height (m)	Basal area (m^2/ha)
1981 (1 year)	5.5	4
1979 (3 years)	17	18
1977 (5 years)	24	28
1975 (7 years)	28	32

groves, indicates that many native forest birds made at least some use of this artificial habitat. Four attributes appear to be responsible for the attractiveness of *Albizia*: (1) By virtue of its rapid growth and thin canopy, *Albizia* provided the space and light for the development of a substantial secondary forest replete with animal and plant food. (2) The *Albizia* themselves were infested with caterpillars, which attracted birds. (3) The plantation was adjacent to primary forest and near to areas of active logging and, thus, had a ready source of avian forest species. (4) The plantation as a whole (including non-*Albizia* groves) was young; thus, there may not have been enough time for birds displaced by logging to be depleted, and there was still microhabitat structure in the plantation (e.g. stumps and logs) left from clearing primary forest.

Secondary forest and prey community development.—The rapid successional development of *Albizia* groves accounted in large measure for the diversity of the plantation's bird community. In general, the youngest plots had a grassy understory, which became more herbaceous in three to five years. After five to seven years, the *Albizia* acquired an impressive undergrowth, which was dominated by woody plants, had a canopy of its own at about 5 m, and featured many plants in flower and fruit (see Tables 6 and 7).

Changes in the bird community from younger to older groves of *Albizia* appeared to mirror, in part, the reassemblage of the arthropod community. Arthropods would be expected to return as the temperature and humidity in the forest became buffered by canopy development (Wong 1985, D. R. Wells pers. comm.). Foliage gleaners in one- and three-year-old plots (e.g. *Cacomantis merulinus, Macronous gularis, Stachyris erythroptera, S. rufifrons, Prinia flaviventris,* tailorbirds, and some sunbirds and spiderhunters) probably subsisted largely on the lepidopteran larvae that form the first wave of insect invaders. In the later stages of *Albizia* growth, there was an influx of larger faunivores, such as malkohas, trogons, *Ceyx erithacus,* broadbills, and drongos. Other kinds of insectivores also increased in older growth, including bark-gleaning woodpeckers, terrestrial-feeding pittas, and foliage-gleaning campephagids (e.g. *Coracina*) and babblers.

Raptors (including owls) were relatively common in *Albizia,* probably in response to abundant prey. In addition to birds and insects, their potential prey included large numbers of mammals. Stuebing and Gasis (1989), for example, found that six- and seven-year-old *Al-*

TABLE 7. Description of changes in understory composition in *Albizia* groves (K.-C. Tan pers. comm.).

One-year-old plots

Grasses: *Paspalum conjugatum, Imperata cylindrica, Eleusine indica, Ottochloa nodosa,* etc.
Herbaceous: Mostly *Eupatorium odoratum.*
Ferns: *Nephrolepsis* spp.
Climbers: Mainly *Mikania* spp.

Three-year-old plots

Grasses and ferns: Less common than above.
Climbers: As above.
Herbaceous: Same as above, except *Eupatorium* more common.
Woody plants: *Solanum wrightii, Melastoma malabathrium.*

Five-year-old plots

Grasses: Less common than above.
Woody plants: More common than in three-year-old plots, including, *Credrela glaziorii, Trema tomentosa, Leea indica, Dillenia suffruticosa.*

Seven-year-old plots

Woody plants: Even more prominent, including *Macaranga gigantea, Macaranga hypoleuca, Mallotus paniculatus, Anthocephalus chinensis.*

bizia (the only ages they surveyed) contained unusually large numbers of the nocturnal rat *Maxomys whiteheadi*, as well as the treeshrews *Tupaia glis* and *T. tana*.

The successional changes described above were accompanied by a decrease in some early colonists. The grassland species *Centropus bengalensis*, for example, though common in the one- and three-year-old plots, declined and disappeared thereafter. *Pycnonotus goiavier*, *Prinia flaviventris*, and *Lonchura fuscans* were common throughout the *Albizia* plots, but decreased in frequency in the older plots. Some species that were abundant in young plot types (e.g. *Macronous gularis* and *Orthotomus sericeus*) were less numerous in older plots, apparently having been replaced by their congeners (e.g. *M. ptilosus* and *O. ruficeps*). It is possible that this pattern of congeneric replacement was in some cases an artifact of plantation development. It has been suggested, for example, that *M. gularis* may have retreated to the canopy in older groves where it would have been more difficult to observe. While this retreat may have occurred, we probably did not miss this species in older groves given that most of our records of it were based on calls, not sightings.

Pest insects.—Important attractants for many birds were the lepidopteran larvae that infested the *Albizia* leaves (e.g. the pierid butterfly *Eurema blanda*). The existence of this superabundant food supply requires that our food-guild data be interpreted with caution. Many birds, including flowerpeckers and sunbirds, that are normally characterized as frugivores and nectarivores, were feeding on caterpillars. We observed, for example, during nonsurvey periods flocks of 10 to 20 *Dicaeum agile* gleaning caterpillars in the seven-year-old *Albizia* canopy. Because birds assigned to different guilds actually may have had similar diets, trophic diversity in the plantation may not be as great as indicated in Tables 4 and 5.

Plantation location and age.—Even though the *Albizia* groves at Sabah Softwoods in 1982 showed a remarkable diversity of birds, such a finding should not be expected necessarily of *Albizia* plantations in other areas or even of Sabah Softwoods in 1993. The proximity of the plantation to primary forest and active logging of that forest certainly influenced the size and constitution of the plantation's bird community. In morning surveys, we regularly observed flocks of birds flying into the plantation from surrounding areas. Vagile and nomadic birds, such as hornbills, *Loriculus galgulus*, bulbuls, *Zosterops everetti*, flowerpeckers, sunbirds, *Gracula religiosa*, and *Corvus enca* would be expected to migrate daily from forested areas. Furthermore, a proportion of the plantation species probably had been displaced by logging of their home forest.

The age of the plantation as a whole also should influence the richness and diversity of its bird community. In 1982, when the survey was conducted, the plantation was young. As the surrounding primary forest recedes due to logging and development, visits by daily migrants and infusions of refugee species should decline. Moreover, at the time of the survey, the plantation groves were still littered with stumps and logs left from clearing of primary forest. These stumps could be used as nesting sites by such taxa as woodpeckers and *Gracula religiosa*, and feeding sites by bark gleaners, including woodpeckers, some babblers (e.g. *Stachyris maculata* and *Pomatorhinus montanus*), and *Sitta frontalis*. Through time, however, such lingering microhabitats and their dependent bird species likely will disappear. Finally, at the time of our study, the *Albizia* had not yet been cropped. Thus, the effects of harvesting on the bird community did not have time to take effect.

Bird groups not found in Albizia *groves.*—In the plantation, we failed to record species representing the bulk of several families, guilds, or subguilds. Some of these simply may have been overlooked. Cuckoos, for example, were difficult to record unless calling. Members of other groups were rare even in the surrounding forest (e.g. the trogons *Harpactes orrhophaeus* and *H. oreskios*). Other groups may have required special subhabitats (e.g. large rivers and cliffs) that were not found on the plantation. An obvious example would be the large piscivorous kingfishers, which were notably lacking. Regardless of such extenuating circumstances, several forest-dwelling groups were underrepresented in the plantation, apparently because of fundamental properties of the *Albizia* groves themselves.

In the absence of large canopy fruits (e.g. strangler figs), there was a dearth of large canopy frugivores, including hornbills, pigeons, and barbets. The only exceptions were smaller species (e.g. *Megalaima australis*) or species thought to consume a relatively large proportion of animal prey (e.g. *Anorrhinus galeritus* and

M. chrysopogon; Lambert 1992). Even these were not common and were recorded only in the oldest groves. Duff et al. (1984) and Stuebing and Gasis (1989) discovered a similar dearth of canopy mammals in the plantation.

Large terrestrial frugivores also were rare in the plantation, with the exception of the ubiquitous forest pigeon *Chalcophaps indica*. The only phasianids we recorded were *Arborophila charltonii* and the grassland specialist *Coturnix chinensis*. Phasianids, which are generalist feeders, appear to be fairly common in recently logged forest (F. Lambert unpubl. manuscript), and we may have missed them in the *Albizia* because, like cuckoos, they are difficult to find unless calling.

Large-sized and many medium-sized woodpeckers were missing from the plantation, as expected in a forest composed of thin, young trees. Seven smaller woodpecker species were recorded in the older *Albizia* stands, but few woodpeckers would be likely to survive exclusively in the plantation because the trees are cropped at about 10 years (i.e. before they develop nest holes). *Albizia* trees 20 or more years in age, however, are attractive to nesting woodpeckers (D. Wells pers. comm.), a fact that should be considered in managing plantation wildlife.

Flycatchers, with the exception of most monarchs (*Rhipidura, Philentoma, Hypothymis,* and *Terpsiphone*), were notably fewer in the *Albizia* than in the primary forest, despite the large number of mosquitoes and other flying insects. Studies of the effect of logging on primary forest bird communities in Malaysia and Borneo also have shown that flycatcher diversity is reduced (Johns 1986, 1989, Wong 1986, Lambert 1992). Why this occurs is not clear, but speculations include a reduction in foraging area for the birds (e.g. caused by overcrowding of scrubby vegetation), marked change in insect-community composition, subtle microhabitat differences affecting both birds and insects (e.g. warmer forest-floor temperatures), and extreme specialization on the part of the birds (Wong 1986, Lambert 1992). These factors also may have contributed to the absence of other insectivorous birds in the *Albizia* groves, notably the terrestrial species *Pitta baudii, P. guajana, Kenopia striata,* and *Napothera atrigularis.*

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APPENDIX. Species recorded in Sabah Softwoods *Albizia* groves and adjacent primary forest. List does not include migrants or species recorded in other habitats. Numbers indicate individuals surveyed in each plot type; "P" indicates nonsurvey records. List sequenced according to Smythies (1981), and names follow Sibley and Monroe (1990).

	Name	Primary forest	*Albizia* groves[a] 1975 (7)	1977 (5)	1979 (3)	1981 (1)	Habitat tolerance
1	Bat Kite (*Macheirhamphus alcinus*)	P	—	—	—	—	—
2	Jerdon's Baza (*Aviceda jerdoni*)	—	4	—	1	—	1.55
3	Brahminy Kite (*Haliastur indus*)	P	—	—	1	—	1.00
4	Crested Goshawk (*Accipiter trivirgatus*)	P	4	—	—	—	1.00
5	Blyth's Hawk-Eagle (*Spizaetus alboniger*)	—	2	—	—	—	1.00
6	Wallace's Hawk-Eagle (*S. nanus*)	P	P	1	—	—	1.00
7	Rufous-bellied Eagle (*Hieraaetus kienerii*)	P	—	—	—	—	—
8	Lesser Fish-Eagle (*Ichthyophaga humilis*)	P	—	—	—	—	—
9	Crested Serpent-Eagle (*Spilornis cheela*)	1	P	—	1	—	1.55
10	Blue-breasted Quail (*Coturnix chinensis*)	—	—	4	1	17	1.41
11	Chestnut-necklaced Partridge (*Arborophila charltonii*)	P	4	—	—	—	1.00
12	Crested Partridge (*Rollulus rouloul*)	P	—	—	—	—	—
13	Crested Fireback (*Lophura ignita*)	P	—	—	—	—	—
14	Great Argus (*Argusianus argus*)	2	—	—	—	—	1.00
15	Slaty-breasted Rail (*Gallirallus striatus*)	—	—	—	1	—	1.00
16	Red-legged Crake (*Rallina fasciata*)	—	1	—	—	—	1.00
17	White-breasted Waterhen (*Amaurornis phoenicurus*)	—	P	P	P	P	—
18	Large Green-Pigeon (*Treron capellei*)	P	—	—	—	—	—
19	Little Green-Pigeon (*T. olax*)	P	—	—	—	—	—
20	Green Imperial-Pigeon (*Ducula aenea*)	P	—	2	—	—	1.00
21	Common Emerald-Dove (*Chalcophaps indica*)	P	13	7	1	—	2.05
22	Blue-rumped Parrot (*Psittinus cyanurus*)	P	—	—	—	—	—
23	Blue-crowned Hanging-Parrot (*Loriculus galgulus*)	3	12	23	39	—	2.93
24	Moustached Hawk-Cuckoo (*Cuculus vagans*)	1	—	—	—	—	1.00
25	Indian Cuckoo (*C. micropterus*)	3	—	—	—	—	1.00
26	Banded Bay Cuckoo (*Cacomantis sonneratii*)	1	—	1	—	2	2.46
27	Plaintive Cuckoo (*C. merulinus*)	P	42	35	37	27	3.97
28	Rusty-breasted Cuckoo (*C. sepulcralis*)	1	—	—	—	—	1.00
29	Little Bronze-Cuckoo (*C. minutillus*)	—	—	—	P	—	—
30	Violet Cuckoo (*Chrysococcyx xanthorhynchus*)	—	1	5	—	—	1.38

APPENDIX. Continued.

Name	Primary forest	*Albizia* groves[a] 1975 (7)	1977 (5)	1979 (3)	1981 (1)	Habitat tolerance
31 Drongo Cuckoo (*Surniculus lugubris*)	7	16	1	—	—	1.95
32 Raffles's Malkoha (*Phaenicophaeus chlorophaeus*)	P	11	5	—	—	1.75
33 Black-bellied Malkoha (*P. diardi*)	P	—	—	—	—	—
34 Red-billed Malkoha (*P. javanicus*)	1	1	P	—	—	1.47
35 Chestnut-breasted Malkoha (*P. curvirostris*)	2	8	5	3	—	3.65
36 Greater Coucal (*Centropus sinensis*)	—	19	22	28	1	2.93
37 Lesser Coucal (*C. bengalensis*)	—	—	3	23	18	2.21
38 Collared Scops-Owl (*Otus lempiji*)	P	—	P	—	—	—
39 Buffy Fish-Owl (*Ketupa ketupu*)	P	P	—	—	—	—
40 Brown Hawk-Owl (*Ninox scutulata*)	P	—	P	—	—	—
41 Brown Wood-Owl (*Strix leptogrammica*)	P	P	P	—	—	—
42 Malaysian Eared-Nightjar (*Eurostopodus temminckii*)	P	P	P	—	—	—
43 Large-tailed Nightjar (*Caprimulgus macrurus*)	—	P	P	1	—	1.00
44 Black-nest Swiftlet (*Collocalia maximus*)	P	P	P	P	P	—
45 White-bellied Swiftlet (*C. esculenta*)	P	P	P	P	P	—
46 Brown-backed Needletail (*Hirundapus giganteus*)	P	P	P	P	P	—
47 Silver-rumped Swift (*Rhaphidura leucopygialis*)	P	P	P	P	P	—
48 Whiskered Treeswift (*Hemiprocne comata*)	11	—	—	—	—	1.00
49 Grey-rumped Treeswift (*H. longipennis*)	P	—	—	—	—	—
50 Diard's Trogon (*Harpactes diardii*)	P	7	2	—	—	1.53
51 Red-naped Trogon (*H. kasumba*)	1	2	—	—	—	1.80
52 Scarlet-rumped Trogon (*H. duvaucelii*)	5	4	—	—	—	1.38
53 Cinnamon-rumped Trogon (*H. orrhophaeus*)	P	—	—	—	—	—
54 Orange-breasted Trogon (*H. oreskios*)	P	—	—	—	—	—
55 Banded Kingfisher (*Lacedo pulchella*)	P	—	—	—	—	—
56 Rufous-collared Kingfisher (*Actenoides concretus*)	P	—	—	—	—	—
57 Collared Kingfisher (*Todirhamphus chloris*)	—	—	—	1	—	1.00
58 Blue-eared Kingfisher (*Alcedo meninting*)	P	—	—	—	—	—
59 Blue-banded Kingfisher (*A. euryzona*)	P	—	—	—	—	—
60 Oriental Kingfisher (*Ceyx erithacus*)	P	4	1	—	—	1.47
61 Red-bearded Bee-eater (*Nyctyornis amictus*)	P	—	—	—	—	—
62 Bushy-crested Hornbill (*Anorrhinus galeritus*)	2	10	4	—	—	2.69
63 Wreathed Hornbill (*Aceros undulatus*)	P	—	—	—	—	—
64 Rhinoceros Hornbill (*Buceros rhinoceros*)	5	—	—	—	—	1.00
65 Helmeted Hornbill (*B. vigil*)	10	—	—	—	—	1.00
66 Malaysian Honeyguide (*Indicator archipelagicus*)	—	—	—	1	—	1.00
67 Brown Barbet (*Calorhamphus fuliginosus*)	8	—	—	—	—	1.00
68 Gold-whiskered Barbet (*Megalaima chrysopogon*)	1	2	—	—	—	1.80
69 Red-throated Barbet (*M. mystacophanos*)	1	—	—	—	—	1.00
70 Yellow-crowned Barbet (*M. henricii*)	P	—	—	—	—	—
71 Blue-eared Barbet (*M. australis*)	3	2	—	—	—	1.32
72 Rufous Piculet (*Sasia abnormis*)	P	8	8	8	1	3.30
73 Crimson-winged Woodpecker (*Picus puniceus*)	4	—	—	—	—	1.00
74 Checker-throated Woodpecker (*P. mentalis*)	P	—	—	—	—	—
75 Banded Woodpecker (*P. miniaceus*)	P	—	—	—	—	—
76 Rufous Woodpecker (*Celeus brachyurus*)	3	2	—	—	—	1.32
77 Grey-capped Woodpecker (*Dendrocopos canicapillus*)	P	5	—	—	—	1.00
78 Buff-rumped Woodpecker (*Meiglyptes tristis*)	1	P	1	—	—	1.47
79 Buff-necked Woodpecker (*M. tukki*)	P	1	2	—	—	1.80
80 Grey-and-buff Woodpecker (*Hemicircus concretus*)	1	1	—	—	—	1.47
81 Olive-backed Woodpecker (*Dinopium rafflesii*)	—	P	—	—	—	—
82 White-bellied Woodpecker (*Dryocopus javensis*)	P	—	—	—	—	—
83 Great Slaty Woodpecker (*Mulleripicus pulverulentus*)	P	—	—	—	—	—
84 Maroon Woodpecker (*Blythipicus rubiginosus*)	6	—	—	—	—	1.00
85 Orange-backed Woodpecker (*Reinwardtipicus validus*)	4	—	—	—	—	1.00
86 Green Broadbill (*Calyptomena viridis*)	P	7	—	—	—	1.00
87 Black-and-yellow Broadbill (*Eurylaimus ochromalus*)	9	19	—	1	—	1.90
88 Banded Broadbill (*E. javanicus*)	2	6	2	—	—	2.46

APPENDIX. Continued.

Name	Primary forest	*Albizia* groves[a] 1975 (7)	1977 (5)	1979 (3)	1981 (1)	Habitat tolerance
89 Dusky Broadbill (*Corydon sumatranus*)	P	—	—	—	—	—
90 Garnet Pitta (*Pitta granatina*)	P	11	—	—	—	1.00
91 Blue-headed Pitta (*P. baudii*)	P	—	—	—	—	—
92 Banded Pitta (*P. guajana*)	2	—	—	—	—	1.00
93 Hooded Pitta (*P. sordida*)	—	17	7	—	—	1.70
94 Pacific Swallow (*Hirundo tahitica*)	—	P	P	P	P	—
95 Large Wood-shrike (*Tephrodornis virgatus*)	P	P	1	—	—	1.00
96 Lesser Cuckoo-shrike (*Coracina fimbriata*)	5	11	6	—	—	2.46
97 Black-winged Flycatcher-shrike (*Hemipus hirundinaceus*)	P	40	21	27	6	3.31
98 Bar-winged Flycatcher-shrike (*H. picatus*)	1	4	6	—	—	2.88
99 Fiery Minivet (*Pericrocotus igneus*)	7	—	4	—	—	1.28
100 Scarlet Minivet (*P. flammeus*)	8	3	P	1	—	1.27
101 Green Iora (*Aegithina viridissima*)	4	27	32	9	—	3.46
102 Common Iora (*A. tiphia*)	P	—	—	—	—	—
103 Lesser Green Leafbird (*Chloropsis cyanopogon*)	8	3	P	—	—	1.19
104 Greater Green Leafbird (*C. sonnerati*)	5	26	11	3	21	3.85
105 Asian Fairy-Bluebird (*Irena puella*)	15	21	5	—	—	1.82
106 Puff-backed Bulbul (*Pycnonotus eutilotus*)	P	P	P	—	—	—
107 Black-and-white Bulbul (*P. melanoleucos*)	P	—	2	—	—	1.00
108 Black-headed Bulbul (*P. atriceps*)	P	127	95	30	8	2.74
109 Scaly-breasted Bulbul (*P. squamatus*)	P	—	—	—	—	—
110 Grey-bellied Bulbul (*P. cyaniventris*)	P	—	—	—	—	—
111 Straw-headed Bulbul (*P. zeylanicus*)	—	20	—	—	—	1.00
112 Yellow-vented Bulbul (*P. goiavier*)	—	38	155	269	207	3.02
113 Red-eyed Bulbul (*P. brunneus*)	—	48	54	1	—	2.04
114 Cream-vented Bulbul (*P. simplex*)	—	5	3	1	1	3.04
115 Spectacled Bulbul (*P. erythropthalmos*)	6	84	86	18	7	3.28
116 Grey-cheeked Bulbul (*Alophoixus bres*)	5	2	—	—	—	1.20
117 Yellow-bellied Bulbul (*A. phaeocephalus*)	P	—	—	—	—	1.00
118 Finsch's Bulbul (*A. finschii*)	P	1	—	—	—	—
119 Hairy-backed Bulbul (*Tricholastes criniger*)	1	13	2	—	—	1.91
120 Buff-vented Bulbul (*Iole olivacea*)	P	P	—	—	—	—
121 Rufous-tailed Shama (*Trichixos pyrropygus*)	P	1	—	—	—	1.00
122 White-rumped Shama (*Copsychus malabaricus*)	9	43	39	27	10	4.60
123 White-crowned Forktail (*Enicurus leschenaulti*)	P	2	1	—	—	1.80
124 Chestnut-naped Forktail (*E. ruficapillus*)	P	—	—	—	—	—
125 Chestnut-capped Thrush (*Zoothera interpres*)	P	P	—	—	—	—
126 Black-capped Babbler (*Pellorneum capistratum*)	5	48	24	8	10	3.78
127 Short-tailed Babbler (*Malacocincla malaccense*)	2	24	7	4	1	2.87
128 White-chested Babbler (*Trichastoma rostratum*)	P	19	3	—	—	1.31
129 Ferruginous Babbler (*T. bicolor*)	P	29	6	—	—	1.40
130 Horsfield's Babbler (*Malacocincla sepiarium*)	P	15	4	2	—	1.86
131 Rufous-crowned Babbler (*Malacopteron magnum*)	3	27	7	—	—	2.30
132 Scaly-crowned Babbler (*M. cinereum*)	6	5	—	—	—	1.40
133 Moustached Babbler (*M. magnirostre*)	7	2	—	—	—	1.14
134 Sooty-capped Babbler (*M. affine*)	—	30	12	11	—	2.50
135 Chestnut-backed Scimitar-Babbler (*Pomatorhinus montanus*)	P	1	2	—	—	1.80
136 Bornean Ground-Babbler (*Ptilocichla leucogrammica*)	2	1	—	—	—	1.25
137 Striped Wren-Babbler (*Kenopia striata*)	P	—	—	—	—	—
138 Black-throated Wren-Babbler (*Napothera atrigularis*)	P	—	—	—	—	—
139 Striped Tit-Babbler (*Macronous gularis*)	—	149	168	224	59	3.48
140 Fluffy-backed Tit-Babbler (*M. ptilosus*)	4	33	28	6	3	3.57
141 Grey-headed Babbler (*Stachyris poliocephala*)	P	3	P	—	—	1.00
142 Black-throated Babbler (*S. nigricollis*)	—	2	P	1	—	1.88
143 White-necked Babbler (*S. leucotis*)	P	—	—	—	—	—
144 Chestnut-rumped Babbler (*S. maculata*)	3	6	—	—	—	1.80
145 Chestnut-winged Babbler (*S. erythroptera*)	40	114	99	52	8	3.82
146 Rufous-fronted Babbler (*S. rufifrons*)	9	21	39	27	13	4.67

APPENDIX. Continued.

Name	Primary forest	*Albizia* groves[a] 1975 (7)	1977 (5)	1979 (3)	1981 (1)	Habitat tolerance
147 Brown Fulvetta (*Alcippe brunneicauda*)	11	30	3	—	—	2.08
148 White-bellied Yuhina (*Yuhina zantholeuca*)	P	—	—	—	—	—
149 Yellow-bellied Prinia (*Prinia flaviventris*)	—	11	87	139	184	2.62
150 Dark-necked Tailorbird (*Orthotomus atrogularis*)	P	3	—	—	—	1.00
151 Rufous-tailed Tailorbird (*O. sericeus*)	3	157	214	235	138	3.94
152 Ashy Tailorbird (*O. ruficeps*)	6	107	147	107	20	3.73
153 Spotted Fantail (*Rhipidura perlata*)	4	—	—	—	—	1.00
154 Pied Fantail (*R. javanica*)	—	—	P	—	5	1.00
155 Grey-headed Canary-flycatcher (*Culicicapa ceylonensis*)	13	—	—	—	—	1.00
156 Verditer Flycatcher (*Eumyias thalassina*)	P	—	—	—	2	1.00
157 White-tailed Flycatcher (*Cyornis concretus*)	P	—	—	—	—	—
158 Pale-blue Flycatcher (*C. unicolor*)	P	—	—	—	—	—
159 Sunda Blue-Flycatcher (*C. caerulatus*)	1	—	—	—	—	1.00
160 Bornean Blue-Flycatcher (*C. superbus*)	P	—	—	—	—	—
161 Rufous-chested Flycatcher (*Ficedula dumetoria*)	P	—	—	—	—	—
162 Grey-chested Jungle-Flycatcher (*Rhinomyias umbratilis*)	4	—	—	—	—	1.00
163 Rufous-winged Philentoma (*Philentoma pyrhopterum*)	P	P	4	—	—	1.00
164 Maroon-breasted Philentoma (*P. velatum*)	P	2	—	—	—	1.00
165 Black-naped Monarch (*Hypothymis azurea*)	1	51	45	17	2	3.01
166 Asian Paradise-Flycatcher (*Terpsiphone paradisi*)	7	27	4	—	—	2.28
167 Velvet-fronted Nuthatch (*Sitta frontalis*)	3	8	2	1	5	3.49
168 Scarlet-breasted Flowerpecker (*Prionochilus thoracicus*)	P	—	—	—	—	—
169 Yellow-rumped Flowerpecker (*P. xanthopygius*)	P	23	3	1	1	1.52
170 Yellow-breasted Flowerpecker (*P. maculatus*)	P	3	—	—	—	1.00
171 Yellow-vented Flowerpecker (*Dicaeum chrysorrheum*)	—	P	—	—	P	—
172 Thick-billed Flowerpecker (*D. agile*)	—	41	—	—	—	1.00
173 Plain Flowerpecker (*D. concolor*)	—	1	—	—	—	1.00
174 Orange-bellied Flowerpecker (*D. trigonostigma*)	1	49	27	16	1	2.88
175 Plain Sunbird (*Anthreptes simplex*)	1	93	12	8	6	1.81
176 Brown-throated Sunbird (*A. malacensis*)	—	14	6	5	—	2.52
177 Red-throated Sunbird (*A. rhodolaema*)	—	4	—	—	4	1.92
178 Ruby-cheeked Sunbird (*A. singalensis*)	P	25	32	5	—	2.36
179 Purple-naped Sunbird (*Hypogramma hypogrammicum*)	P	16	8	—	1	2.02
180 Purple-throated Sunbird (*Nectarinia sperata*)	—	5	2	2	—	2.54
181 Crimson Sunbird (*Aethopyga siparaja*)	—	—	3	3	2	2.98
182 Scarlet Sunbird (*A. mystacalis*)	1	P	1	—	—	1.47
183 Little Spiderhunter (*Arachnothera longirostra*)	9	122	89	70	1	3.55
184 Thick-billed Spiderhunter (*A. crassirostris*)	—	8	3	5	—	2.65
185 Spectacled Spiderhunter (*A. flavigaster*)	P	P	—	1	—	1.00
186 Long-billed Spiderhunter (*A. robusta*)	—	P	—	—	1	1.00
187 Yellow-eared Spiderhunter (*A. chrysogenys*)	P	—	1	1	2	2.36
188 Grey-breasted Spiderhunter (*A. affinis*)	1	7	—	—	—	1.86
189 Everett's White-eye (*Zosterops everetti*)	—	21	—	30	—	1.87
190 Hill Myna (*Gracula religiosa*)	2	21	8	45	—	2.38
191 Bornean Bristlehead (*Pityriasis gymnocephala*)	P	—	—	—	—	—
192 Dusky Munia (*Lonchura fuscans*)	—	8	19	23	22	3.37
193 Chestnut Munia (*L. malacca*)	—	—	—	—	2	1.00
194 Bronzed Drongo (*Dicrurus aeneus*)	P	P	—	—	—	—
195 Greater Racket-tailed Drongo (*D. paradiseus*)	4	12	—	—	—	1.96
196 Black-hooded Oriole (*Oriolus xanthornus*)	—	—	—	1	—	1.00
197 Dark-throated Oriole (*O. xanthonotus*)	10	20	9	—	—	2.29
198 Crested Jay (*Platylophus galericulatus*)	P	—	—	—	—	—
199 Black Jay (*Platysmurus leucopterus*)	P	—	—	—	—	—
200 Slender-billed Crow (*Corvus enca*)	P	17	P	7	1	2.00
Total species	162	122	92	63	45	—
Total individuals	338	2,200	1,792	1,591	820	—

[a] Plot types (age in years).