

Ornithological Monographs

No. 52



Ornithology of Sabah:
History, Gazetteer, Annotated Checklist,
and Bibliography

by

Frederick H. Sheldon, Robert G. Moyle,
and Jody Kennard

**ORNITHOLOGY OF SABAH:
HISTORY, GAZETTEER, ANNOTATED
CHECKLIST, AND BIBLIOGRAPHY**

ORNITHOLOGICAL MONOGRAPHS

Edited by

DAVID A. WIEDENFELD
Sutton Avian Research Center
P.O. Box 2007
Bartlesville, OK 74005

Ornithological Monographs, published by the American Ornithologists' Union, has been established for major papers too long for inclusion in the Union's journal, *The Auk*. Publication has been made possible through the generosity of the late Mrs. Carll Tucker and the Marcia Brady Tucker Foundation, Inc.

Copies of *Ornithological Monographs* may be ordered from Buteo Books, 3130 Laurel Road, Shipman, VA 22971. Price of *Ornithological Monographs 52*: \$25.00 (\$22.50 for AOU members). Add \$4.00 for handling and shipping charge in U.S., and \$5.00 for all other countries. Make checks payable to Buteo Books.

Authors of this issue, Frederick H. Sheldon, Robert G. Moyle, and Jody Kennard.

Library of Congress Control Number 2001 130335

Printed by Allen Press, Inc., Lawrence, Kansas 66044

Issued June 29, 2001

Ornithological Monographs, No. 52 vi + 285 pp.

Copyright © by the American Ornithologists' Union, 2001

ISBN: 1-891276-24-7

Cover: Whitehead's Broadbill (*Calyptomena whiteheadi*) and Mt. Kinabalu. Drawing by Dan Lane.

ORNITHOLOGY OF SABAH:
HISTORY, GAZETTEER, ANNOTATED
CHECKLIST, AND BIBLIOGRAPHY

By:

FREDERICK H. SHELDON, ROBERT G. MOYLE,
AND JODY KENNARD

Museum of Natural Science
Louisiana State University
Baton Rouge, Louisiana 70803-3216 USA
E-mail: fsheld@lsu.edu

ORNITHOLOGICAL MONOGRAPHS NO. 52

PUBLISHED BY
THE AMERICAN ORNITHOLOGISTS' UNION
WASHINGTON, D.C.

2001

TABLE OF CONTENTS

ABSTRACT	1
INTRODUCTION	1
PHYSICAL AND ENVIRONMENTAL NATURE OF SABAH	3
Physiographic Regions	6
Geology	6
Climate	6
Habitats	10
Parks and Preserves	13
DIVERSITY OF SABAH'S BIRDS: THE STATE OF OUR KNOWLEDGE	13
Evolution	16
Ecology and Behavior	18
Conservation	20
HISTORY	22
OVERVIEW OF THE ORNITHOLOGICAL HISTORY OF SABAH	22
CHRONOLOGICAL REVIEW OF INDIVIDUALS, EXPEDITIONS, AND INSTITUTIONS THAT HAVE CONTRIBUTED SUBSTANTIALLY TO THE ORNITHOLOGY OF SABAH	25
GAZETTEER: ANNOTATED LIST OF ORNITHOLOGICAL STUDY SITES	35
ABBREVIATIONS	37
LOCALITIES	38
ANNOTATED CHECKLIST OF THE BIRDS OF SABAH	88
PODICIPEDIFORMES	89
Podicipedidae (Grebes)	89
PROCELLARIIFORMES	89
Hydrobatidae (Storm-Petrels)	89
Procellariidae (Shearwaters)	90
PELECANIFORMES	90
Pelecanidae (Pelicans)	90
Sulidae (Gannets and Boobies)	90
Fregatidae (Frigatebirds)	91
Phalacrocoracidae (Cormorants)	92
Anhingidae (Darters)	92
CICONIIFORMES	93
Ardeidae (Herons, Egrets, and Bitterns)	93
Ciconiidae (Storks)	99
Threskiornithidae (Ibises and Spoonbills)	100
ANSERIFORMES	101
Anatidae (Ducks and Geese)	101
FALCONIFORMES	102
Accipitridae (Hawks and Eagles)	102
Pandionidae (Osprey)	107
Falconidae (Falcons)	108
GALLIFORMES	109
Megapodiidae (Megapodes)	109
Phasianidae (Quail, Partridges, and Pheasants)	110

RALLIFORMES	113
Rallidae (Rails, Moorhens, Gallinules, and Coots)	113
Jacanidae (Jacanas)	115
CHARADRIIFORMES	116
Rostratulidae (Painted-snipe)	116
Charadriidae (Plovers)	116
Scolopacidae (Sandpipers and Snipe)	118
Recurvirostridae (Stilts and Avocets)	124
Phalaropodidae (Phalaropes)	125
Burhinidae (Thick-knees)	125
Glareolidae (Pratincoles)	125
Stercorariidae (Skuas and Jaegers)	126
Laridae (Gulls)	126
Sternidae (Terns)	127
COLUMBIFORMES	129
Columbidae (Pigeons and Doves)	129
PSITTACIFORMES	134
Psittacidae (Parrots)	134
CUCULIFORMES	136
Cuculidae (Cuckoos, Malkohas, and Coucals)	136
STRIGIFORMES	142
Tytonidae (Barn Owls)	142
Strigidae (Owls)	142
CAPRIMULGIFORMES	144
Batrachostomidae (Frogmouths)	144
Caprimulgidae (Nightjars)	145
APODIFORMES	146
Apodidae (Swifts)	146
Hemiprocnidae (Treeswifts)	150
TROGONIFORMES	151
Trogonidae (Trogons)	151
CORACIIFORMES	153
Alcedinidae (Kingfishers)	153
Meropidae (Bee-eaters)	157
Coraciidae (Rollers)	158
Upupidae (Hoopoe)	158
Bucerotidae (Hornbills)	158
PICIFORMES	161
Megalaimidae (Barbets)	161
Picidae (Woodpeckers)	164
Indicatoridae (Honeyguides)	169
PASSERIFORMES	169
Eurylaimidae (Broadbills)	169
Pittidae (Pittas)	173
Alaudidae (Larks)	176
Hirundinidae (Swallows)	177
Motacillidae (Wagtails and Pipits)	178
Campephagidae (Cuckooshrikes, Trillers, and Minivets)	182

Laniidae (Shrikes)	186
Artamidae (Woodswallows)	187
Aegithinidae (Ioras, Leafbirds, and Fairy Bluebird)	187
Pycnonotidae (Bulbuls)	190
Turdidae (Robins, Forktails, Chats, and Thrushes)	200
Timaliidae (Babblers)	207
Pardalotidae (Gerygones)	220
Sylviidae (Warblers)	221
Muscicapidae (Flycatchers)	227
Pachycephalidae (Whistlers)	240
Paridae (Tits)	241
Sittidae (Nuthatches)	242
Dicaeidae (Flowerpeckers)	242
Nectariniidae (Sunbirds and Spiderhunters)	246
Zosteropidae (White-eyes)	255
Fringillidae (Finches)	257
Sturnidae (Starlings and Mynas)	257
Cracticidae (Butcherbirds, Bell-magpies, and Relatives)	259
Passeridae (Old World Sparrows)	260
Estrildidae (Munias)	260
Dicruridae (Drongos)	263
Oriolidae (Orioles)	265
Corvidae (Jays, Magpies, Treepies, and Crows)	267
ACKNOWLEDGMENTS	269
BIBLIOGRAPHY	270

ORNITHOLOGY OF SABAH: HISTORY, GAZETTEER, ANNOTATED CHECKLIST, AND BIBLIOGRAPHY

FREDERICK H. SHELDON, ROBERT G. MOYLE, AND JODY KENNARD
*Museum of Natural Science, Louisiana State University,
Baton Rouge, Louisiana 70803-3216, USA*

ABSTRACT.—Sabah is the Malaysian state representing former British North Borneo. It is well known for its rich forests, impressive mountains (including Mt. Kinabalu), and diverse avifauna. Ornithologists have explored and published on the birds of Sabah since the 1850s. This monograph reviews the work of these ornithologists by providing an historical overview of their explorations and studies; a gazetteer describing the sites at which they worked; an annotated checklist summarizing what they learned about birds, particularly in regard to distribution, habitat preferences, and breeding; and a bibliography of ornithological and related publications. The purpose of this report is to set the stage for future research on the birds of Sabah. This goal is accomplished in two ways. First, by reviewing what has been done, the history and gazetteer serve as a guide for expedition planners, wildlife managers, conservationists, and other scientists as they seek information on study sites. Certain parts of Sabah have been well studied (e.g., the East and West coasts), but other areas are poorly explored (e.g., the north-central mountains and the south-central uplands). Second, by summarizing what is known about the birds of Sabah, the annotated checklist and bibliography provide a guide to research needs. Although a great deal is known about the distribution of birds in Sabah, remarkably little work has been done on bird ecology and evolution. Only a handful of modern, quantitative studies have been conducted on the population genetics, phylogeny, biogeography, migration, community ecology, or autecology of Sabah's birds. This dearth of ornithological information is a burden for conservationists, as they struggle to preserve the last bits of forest in Sabah, but it presents a great opportunity for bird researchers.

INTRODUCTION

Sabah is a Malaysian state consisting of the northernmost part of the island of Borneo. It is the site of Mt. Kinabalu (4,095 m), the highest mountain in southeast Asia, and it features some of the most diverse and spectacular forests in the world (Whitmore 1984a). As a result, Sabah has an unusually rich avifauna, which has been attracting ornithologists and bird watchers since the state's first natural history was published in 1855 by Motley and Dillwyn. Much of Sabah's ornithological history, and many facts about its birds, were captured in Smythies' *The Birds of Borneo* (1960, 1968, 1981), but in the last 25 years ornithological exploration and bird watching in Sabah have exploded, and the written record has lagged far behind our growth in knowledge. Moreover, during this recent period,

¹ E-mail: fsheld@lsu.edu.

development and extensive logging have dramatically changed the face of Sabah. The forest is now a mere shadow of what it was 25 years ago. This transformation has strongly influenced Sabah's avifauna and, thus, the needs and direction of future ornithological research.

In this monograph, we review the 140-year history of ornithological exploration and discovery in Sabah and summarize much of what is known about its birds. Our original intention was to report on a single expedition, that of the Western Foundation of Vertebrate Zoology, 1981–1983. That expedition collected the most extensive set of specimens and data on the birds of Sabah to date. However, while preparing the report, we reviewed specimens in many collections and the notes and publications of the principal ornithologists who have studied Sabah's birds. In the process, we realized that a great deal of information is not readily available to the public. Even Smythies' monumental *The Birds of Borneo*, having depended mainly on collections and records from Sarawak and Mt. Kinabalu, was not complete in its information on Sabah's birds. Therefore, we expanded the manuscript to include as much information as we could about the ornithology of Sabah.

The monograph is divided into five sections. The Introduction summarizes the physical and environmental nature of Sabah, including its physiographic features, geology, climate, habitats, and parks and preserves, as well as the state of our knowledge about Sabah's birds, including their evolution, ecology, behavior, and conservation. The next section is History. It consists of an overview of Sabah's ornithological history and a chronological review of the people, expeditions, and institutions that have contributed substantially to our knowledge of Sabah's birds. The history section is modeled after similar reviews in *Flora Malesiana* (van Steenis-Kruseman 1950), *The Birds of Borneo* (Smythies 1960), and *Mammals of Borneo* (Medway 1977). Following the historical review is the Gazetteer, an annotated list of ornithological study sites. It describes the location, habitat, elevation, and other features of collecting, research, and major bird-watching sites in Sabah. Many of these sites are familiar to the ornithological community (Mt. Kinabalu, Sepilok, and Danum Valley), but others are relatively unknown (e.g., Brumas) and sometimes even mysterious (Lumbidan) or misunderstood (Mt. Ensuang). Next comes the Annotated Checklist of the Birds of Sabah. It describes mostly new or uncompiled information about each bird species, including its distribution, habitat, food, nesting, and other features of natural history. The final section is an extensive Bibliography. It includes most of the literature on Sabah's birds, as well as other pertinent references.

The purpose of the monograph is to help set the stage for future research on the birds of Sabah. This goal is approached in two ways. By reviewing research that has been conducted in the state, the history and gazetteer provide a guide for expedition planners, wildlife managers, conservationists, and other researchers as they seek information on study sites in the state. By summarizing what is known about the birds of Sabah, the annotated checklist and bibliography provide a guide to research needs. In general, a great deal is known about the distribution of birds in Sabah, but remarkably little is known about bird evolution and ecology. Practically no studies have been conducted on the phylogeny, population genetics, autecology, and community ecology of Sabah's land birds, other than investigations into the effects of logging and plantation development. Knowledge in all

these areas is critical to understanding the forces that built and maintain the diverse avifauna of Sabah.

PHYSICAL AND ENVIRONMENTAL NATURE OF SABAH

Sabah has a land area of 73,371 km², roughly the size of Ireland, and represents about 10% of the island of Borneo. It lies close to the equator, between about 4°10'N and 7°30'N (Fig. 1), and thus possesses a classic tropical climate. Much of the forest is dominated by trees in a single family, the Dipterocarpaceae (Whitmore 1984a), but the habitat structure of Sabah is rich and varied because of the state's complex topography and geology. Sabah has several mountain ranges, plateaus, plains, and large deltas, as well as many isolated peaks and valleys. Depending upon alluvial sources, areas with similar topography can possess different soils, altering forest composition and structure (Thomas et al. 1976). As a result, not only are numerous types of dipterocarp forest present (Wood and Meijer 1964; Fox 1972), but many other forest habitats as well, including mangrove, nipah, heath (kerangas), peat swamp, forest on limestone, forest on ultrabasic soils, forest on serpentine soils, and forest varying according to elevation and relief.

Most of the forest of Sabah was relatively undisturbed until 40 years ago. At that time, the population of Sabah was about 0.5 million, and human settlement and influence were concentrated in just a few areas—the West Coast, the east side of the Crocker Range from Tenom to Ranau, along major rivers such as the Kinabatangan, and near the large towns of the East Coast. Only 1.5% of the land was permanently cultivated (Chatfield 1972). Twenty-five years ago, when the population was about 0.75 million, one could fly over the interior of Sabah and see not a single road between Tambunan and the outskirts of Tawau. At that time, Thomas et al. (1976 [Vol. 1]:5) stated: "The forest resources of the State are very extensive, almost 60% of the land containing undisturbed commercial forest." However, since then, the population has grown to about 2.5 million, and the amount of potentially forested land has shrunk from about 85% to less than 60%, and the amount of undisturbed forest (commercial and noncommercial) has shrunk from about 70% to less than 15%, of State land (Table 1). About 4.5% of Sabah's land is preserved in parks and special conservation areas. Nowadays, when flying over Sabah, one sees logging roads everywhere, and closed canopy forest occurs only sparsely on mountains and in parks and reservations. With the exception of these specially protected areas, virtually all accessible forest has been logged. Most of the flat land of the East Coast is covered with plantations, and substantial portions of potentially forested land have been burned in El Niño fires and converted permanently to grassland (Beaman et al. 1985; Woods 1989).

We emphasize the changes that have overcome Sabah's forests during the last 25 years because they affect what is said in the gazetteer about bird habitats and in the checklist about bird distributions. Most of the information presented in the gazetteer and checklist was collected before 1990. Whether this information still applies depends, in part, upon changes to the forest. Because we do not know the current habitat condition of many localities listed in the gazetteer, we have simply described a site's habitat as it was at the time of study. It can be assumed that forest habitats that are described as "primary" in the gazetteer are no longer primary if the site is not in a park, reservation, or the mountains.

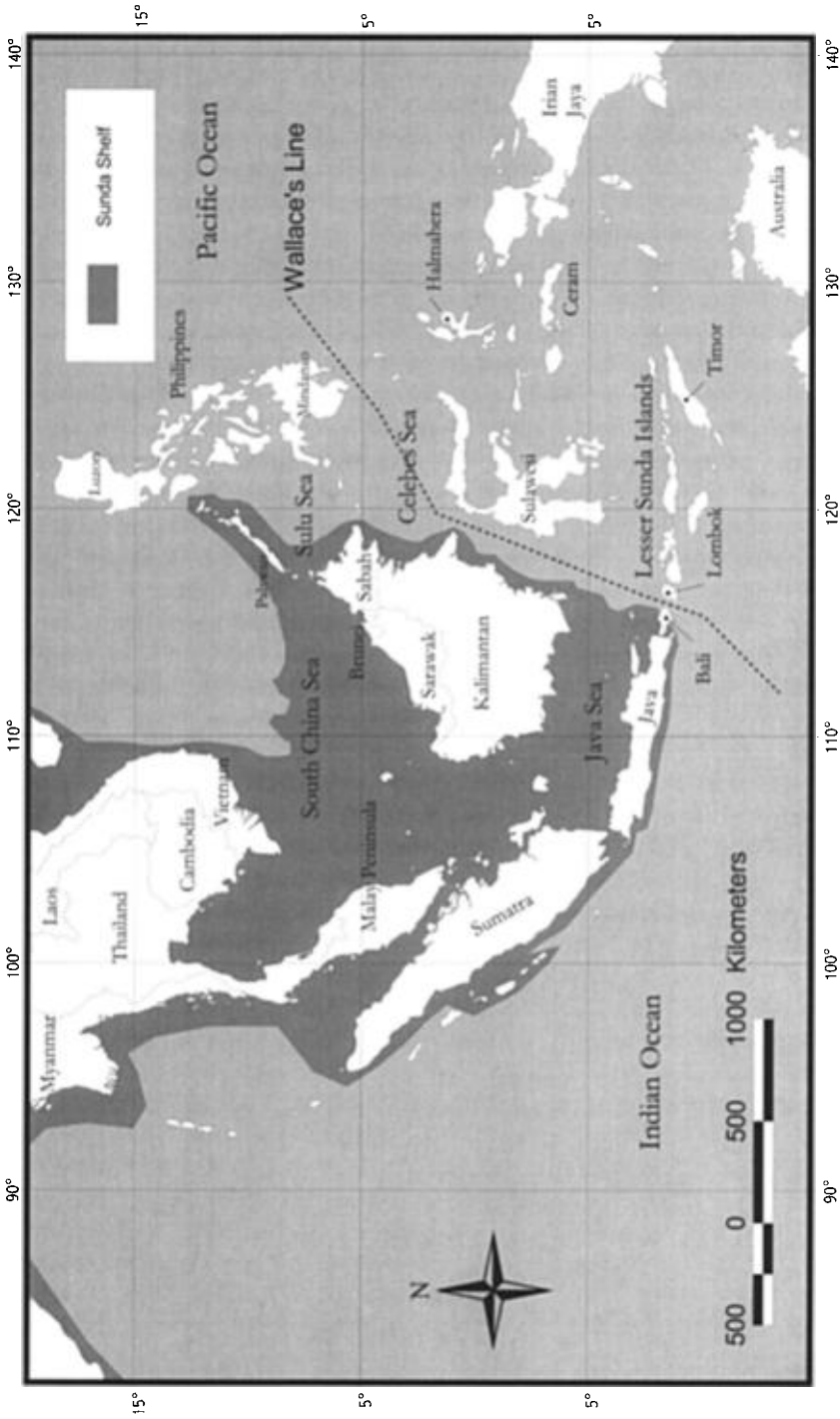


FIG. 1. The Malay Archipelago, with depictions of the Sunda Shelf and Wallace's Line. The map derives from data included with ArcView GIS 3.2 (© Environmental Systems Research Institute, Inc., Redlands, California).

TABLE 1. Human population growth and forest-cover change in Sabah since the 1960s.

Year	Population*	Forest cover in km ² (percentage of total land area of 73,371 km ²)						Total potential forest
		Mangrove	Swamp and transitional	Lowland and upland	Montane	Disturbed [§]	Plantation† forests	
1960	454,000							
1970‡	665,000	2,155 (3.0%)	5,230 (7.0%)	32,228 (44%)	11,323 (15%)	11,611 (16%)		62,547 (85%)
1980	1,003,000			20,000 (27%)	9,540 (13%)			45,800 (65.2%)
1990¶	1,494,000	3,160 (4.3%)	1,930 (2.6%)	5,000 (6.8%)	7,250 (9.8%)	27,080 (36.7%)		44,420 (60.2%)
1997#		3,174 (4.3%)	1,930 (2.6%)	4,000 (5.5%)*	5,000 (6.8%)**	28,875 (39.4%)	1,450 (2.0%)	44,488 (60.3%)††
2000	2,584,000							

* Population values for 1960–1980 are from Sullivan and Regis (1981). Values for 1990 are projected from 1987 population and growth figures (Marsh and Greer 1992). Values for 2000 are projected from 1996 population and growth figures (Government of Malaysia 1996).

† Plantation forests are areas that have been cleared of native trees and planted with exotic trees for pulpwood production. An example is described by Mira and Sheldon (1993).

‡ Forest cover for 1970 has been reconstructed from the text of Thomas et al. (1976). Although this reference provided much information on land use, it emphasized commercial use of forests and, thus, the areas of noncommercial forest had to be estimated. The authors stated specifically (Vol. 1, p. 5): "The forest resources of the State are very extensive, almost 60% of the land containing undisturbed commercial forest." Thus, the amount of montane and undisturbed lowland forest indicated in the table is conservative.

§ Disturbed forest includes immature, logged, and regenerating forest. Some of this area was severely damaged by the 1983 and 1998 El Niño fires, and much of this "disturbed forest" is, in fact, land covered with lalang grass and shrubs and no longer qualifies as forest.

|| The 1980 values for lowland and montane forest cover are based on Davies and Payne's (1982) statement that 27,671 km² of commercial forest reserve was primary forest and, of that, 9,540 km² of this represented timber that could not be extracted (presumably mostly montane forest). The total potential forest value for 1980 was extrapolated from the 1986 area (60.1%), which resulted from a 1.37% rate of forest area decline during 1975–1985 (FAO 1987; Marsh and Greer 1992). At that rate, the total potential forest area for 1975 would have been 69.8% or about 51,200 km².

The 1990 values for forested areas are from Marsh and Greer (1992).

** Of this forest, 2,450 km² is in parks (3.3% of state land), and most of this park property is montane (Kinabalu, Crocker Range, and Tawau Hills Parks). The largest blocks of lowland–highland forest are in Danum Valley (438 km²) and Maliau Basin (390 km²). A total of 2,295 km² is designated as permanent virgin forest reserve (Sabah Forestry Department 1989).

†† Undoubtedly the amount of potentially forested land is less than 60%. Repeated burning of logged forest has turned some areas into permanent grasslands (Woods 1989), and about 4,000 km² of land that is still considered forest was converted to oil-palm plantations between 1980 and 1997 (G. Davison, pers. comm.). About 48% of the state land is gazetted as permanent forest reserve and parks, and this number is probably closer to the actual amount of potentially forested land. Also see Whitmore (1984b) and Collins et al. (1991).

PHYSIOGRAPHIC REGIONS

The topology and river systems of Sabah are depicted in Figures 2 and 3. These features were fundamental to Collenette's (1963) physiographic classification, which divided Sabah into ca. 25 regions (Fig. 4). Using Collenette's regions, Davies and Payne (1982) identified seven similar terrains based on geology, soil, habitat, relief, and elevation. We have used the terrain classification of Davies and Payne (1982) and related elevational designations (Table 2) in our gazetteer and species accounts. Their classification is as follows.

Coastal swamps.—All the East Coast deltas and part of the Klias Peninsula. Habitats: nipah and mangrove, with freshwater or peat swamp hinterlands.

Extensive dry or seasonally swampy flatlands.—The Kinabatangan and Labian lowlands. Elevation: 0–150 m. Substrate: alluvium, sandstone, and mudstone.

Alluvial plains.—Fairly flat, usually fertile, plains at various elevations in the western part of Sabah (e.g., Bandau, Crocker, Keningau, Pinosuk, Ranau, and Tenom plains).

Lowlands with mixed relief.—Land on sedimentary and volcanic rock, containing fertile flat areas and hills up to 300 m in elevation, sometimes higher. Includes the Lokan Penepain, Sandakan Peninsula, Mananam Plain/Milian Valley, Segama Valley, Semporna Lowlands, Kalabakan Valley, and Bengkoka Lowlands.

Uplands.—Mainly rather steep areas of 150–450 m in elevation on sandstone, with flatter areas along the larger rivers. Includes the Bongaya Hills, Kaindangan Penepain, Dent Hills (Bagahak Range and part of the Labian Lowlands), Crocker Foothills, and Talangkai Valley.

Central highlands.—Mainly 450–950 m in elevation, with some lower areas and some peaks to 1,500 m. Geology: sedimentary, ultrabasic, igneous, and basaltic rock. Includes the Labuk, Kuamut, Segama, and Tawau highlands.

Western hill ranges.—Mainly sedimentary formations at 300–1,500 m in elevation, with higher peaks (including Mt. Kinabalu at 4,095 m). Inhabited in some places to 1,200 m by shifting cultivators. Includes the Crocker, Witt, Maligan, and Trus Madi ranges.

GEOLOGY

Sabah's bedrock consists mainly of young sandstones and mudstones (Reinhard and Wenk 1951). Bending, breakage, and erosion of these beds have yielded much of the hilly and broken terrain of the interior of the state. A few pockets of metamorphic rock may be found in outcrops, for example, in the upper reaches of the Bambangan and Penataran rivers (Choi 1996). Mt. Kinabalu is part of an arc of intrusive igneous (granitic) rock that spans from northern to southwestern Sabah (Jacobson 1978). Related igneous outcrops include ultrabasic (ultramafic) formations east and south of Kinabalu (e.g., near Telupid) and on the upper Segama River. Such formations form the basis of ultrabasic soils on which distinct forest types grow in eastern Sabah (Payne 1988a; Proctor et al. 1988, 1989).

CLIMATE

Sabah lies just above the equator and has a relatively constant tropical climate. The average lowland shade temperature is 27°C, and the high, unshaded temperature in Kota Kinabalu is ca. 33°C. Annual rainfall ranges from ca. 200 cm to more than 400 cm per year. The wettest areas are the higher mountains, Brunei

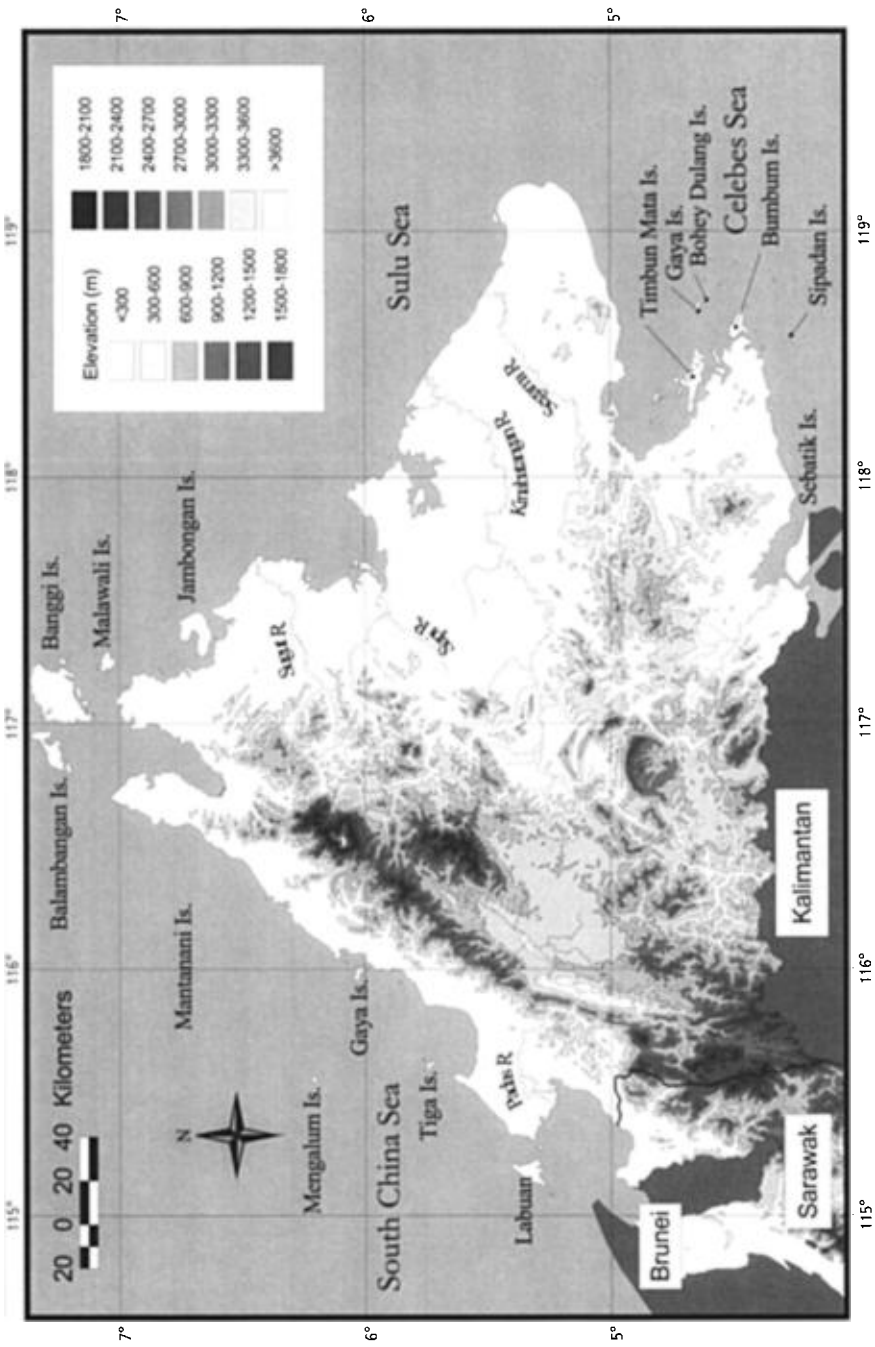


FIG. 2. Topography of Sabah. This and other maps of Sabah derive from data provided by Pennsylvania State University's Digital Chart of the World Server (<http://www.maproom.psu.edu/dcw/>).

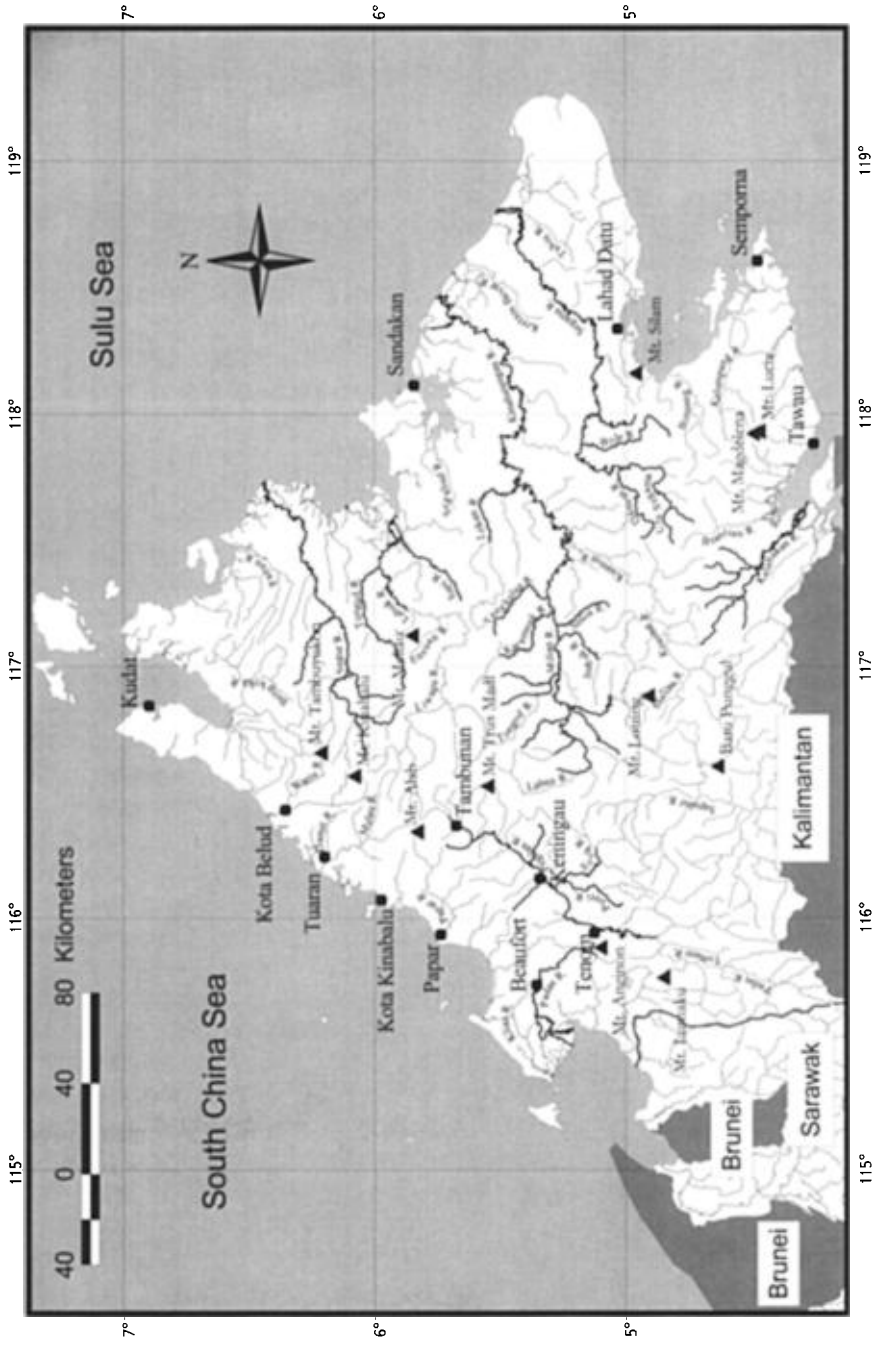


FIG. 3. The rivers of Sabah.

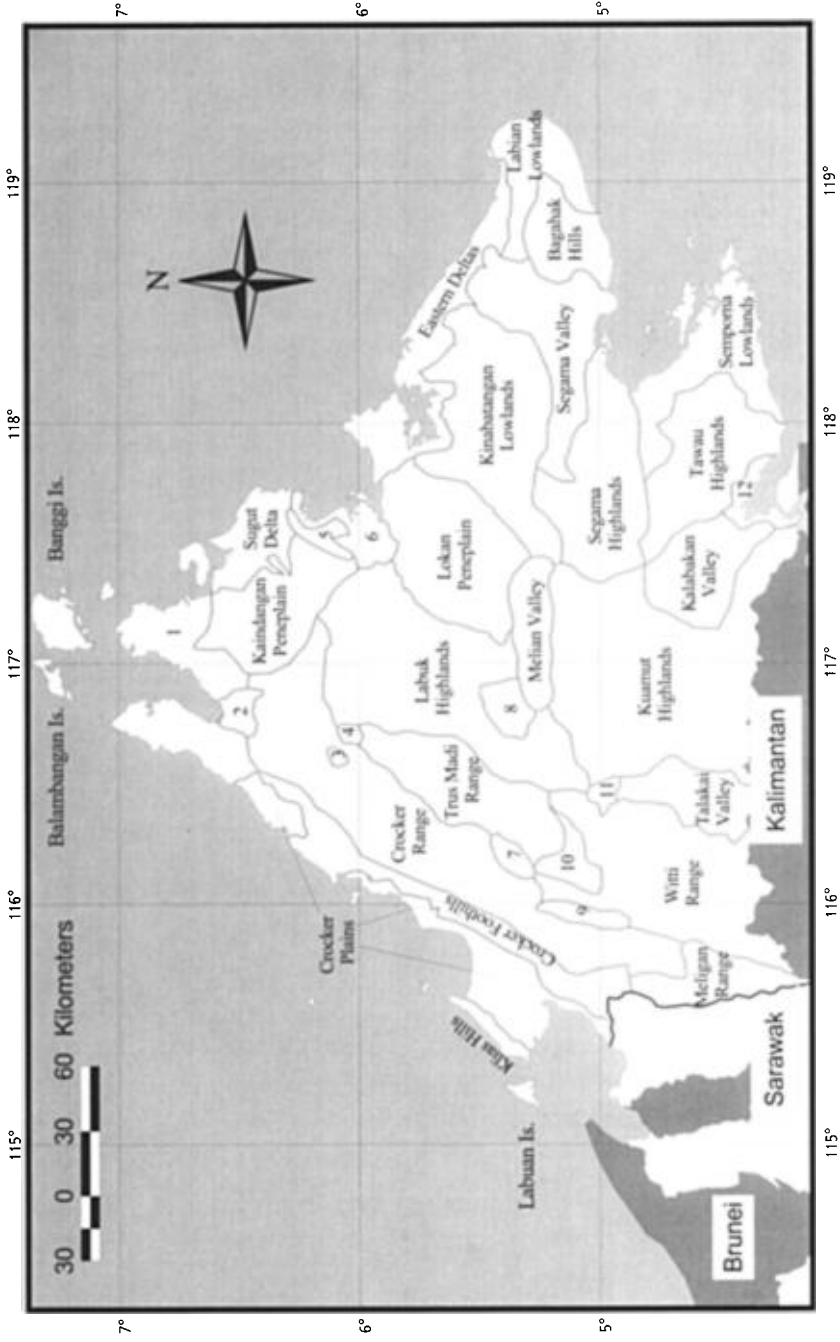


FIG. 4. Physiographic regions of Sabah (from Collette [1963]). (1) Bengkoka Lowlands, (2) Bandau Plain, (3) Pinosuk Plain, (4) Ranau Plain, (5) Bongaya Hills, (6) Labuk Delta, (7) Keningau Plain, (8) Mananam Plain, (9) Tenom Plain, (10) Sook-Dalit Plain, (11) Penawan Plain, (12) Cowie Delta.

TABLE 2. Major elevational subdivisions.*

Name	Range (m)
Lowland forest	0–150
Upland forest	150–450
Highland forest	450–950
Lower montane forest	950–1,400
Upper montane forest	Above 1,400

* From Davies and Payne (1982).

Bay, and the northeastern coast. Mt. Kinabalu, for example, receives ca. 425 cm of rain per year. The driest regions are the Keningau plateau (Crocker rain shadow) and a broad region inland from Lahad Datu Bay to Wallace Bay. Although rain is regular and frequent in most parts of Sabah, rainfall patterns are influenced by the Indo-Australian monsoon system, which provides northerly winds from December to March and southwesterly winds from May to October. The northern winds tend to soak the East Coast, but have less effect on the West Coast because of the Crocker Range rain shadow. The southwest monsoon has the opposite, though generally weaker, effect (Chatfield 1972; MacKinnon et al. 1996; Walsh 1996).

During 1983 and again in 1997–1998, Sabah experienced severe El Niño droughts. Fires were widespread in the lowlands, and montane forests were remarkably dry (Beaman et al. 1985). The droughts seemed to have a substantial short-term effect on the distribution of some bird species (e.g., some lowland species occurred at unusually high elevations, and some deep-forest species were found in nonforested areas). We have noted these anomalies in the checklist. Studies of drought frequency in Sabah (Walsh 1996; Walsh and Newbery 1999) indicate that droughts have occurred regularly since records were first kept in 1879. Thus, it seems that droughts have played a role not only in short-term bird distribution but also in shaping Sabah's bird diversity over the long run. However, in the past, Bornean rain forests recovered easily from droughts because of the protection afforded by primary forest canopy to the understory. However, since the advent of large-scale logging, droughts have had a more devastating effect because of the susceptibility of logged forest to fire. In 1983, 66–85% of the area that burned was logged forest (Beaman et al. 1985). Such burning seriously hampers forest regeneration by exposing soil to sunlight, promoting erosion, destroying seed sources, and encouraging vigorous grasses (Woods 1989). Repeated burning of logged areas converts forestland permanently into grassland, with consequent, serious effects on bird diversity.

HABITATS

Many classifications have been proposed for Sabah's habitats. Most have been designed by botanists or forest ecologists and are often specific to certain regions or forest types in the state (e.g., Gibbs 1914; Fox 1972). We use the classification of Davies and Payne (1982), which roughly follows that of Whitmore (1984a), because it seems most appropriate for the study of vertebrates. This classification distinguishes major forest types—mangrove, nipah, riparian, dipterocarp, montane, freshwater swamp, peatswamp, kerangas (heath), ultrabasic, and limestone—and overlays these types with a consideration of elevation and human disturbance.

The elevational divisions of Davies and Payne (1982) are lowland, upland, highland, lower montane, and upper montane (Table 2). These guidelines are approximate, because many factors can influence elevational ranges of plant and animal communities (Frahm and Gradstein 1991; Pendry and Proctor 1997). These factors include the *Massenerhebung* effect, in which elevational ranges are larger on large mountains than small mountains; the degree to which a mountain is isolated and, thus, subject to colonization and extinction; the mountain's drainage patterns, which affect plant distributions by directing seed dispersal; the proximity of mountains to coastal areas, which influences humidity; and the variation in montane soil types (Whitmore 1984a; Bruijnzeel et al. 1993). For example, Marai Parai (1,550 m) on Mt. Kinabalu is in the "upper montane" zone, but its flora is strongly influenced by soil formed from disintegrating serpentinite (Phillips 1985b). Another example is Mt. Silam on the East Coast. Mt. Silam is low in elevation (884 m), isolated, adjacent to the sea, and has ultrabasic soil (Proctor et al. 1988, 1989; Bruijnzeel et al. 1993). Consequently, its montane forest extends to an unusually low level (600–800 m) and features a distinct plant community.

Davies and Payne (1982) referred to areas exhibiting little or no human disturbance as "pristine" or "primary" (1°). "Secondary" (2°) habitats are those in which large trees have been removed and the resulting forest gaps are beginning to fill through regeneration. Logged forest refers to recently logged areas, without substantial regeneration of trees. Absent from Davies and Payne's classification are agricultural communities or forests, such as rubber, oil-palm, and pulp-wood plantations (e.g., *Albizia falcataria*, *Eucalyptus deglupta*, *Acacia mangium*, *Pinus carabaea*, and *Gmelina arborea*). These man-made habitats affect bird distribution, and we refer to them extensively in the gazetteer and checklist. In general, overgrown rubber and some pulp-wood plantations are much more hospitable to birds than oil-palm or other plantations that inhibit undergrowth.

Habitat types referred to in the gazetteer and checklist are as follows. Additional information on habitats of Borneo can be found in MacKinnon et al. (1996).

Beach strand.—A narrow stand of herbaceous and woody growth on or behind sea beaches, typically over calcareous sand and sometimes intermixed with mangroves. Characteristic vegetation includes casuarinas, pandans, and coconut palms.

Dipterocarp forest.—Common lowland to highland tall forest of Sabah dominated by trees of the Dipterocarpaceae, which are characterized by a single-seed fruit with two or more dispersal wings (Wood and Meijer 1964). Dipterocarp forest typically has a high canopy broken by spectacular emergent trees that can exceed 70 m. Various subdivisions of dipterocarp forests are based on structure and component species (Ashton and Hall 1995). River valley terrace forest, for example, is wetter and has more underbrush than ridge forest. Because most of Sabah's interior forest is dominated by dipterocarps, we generally do not repeat the term "dipterocarp" in describing forest habitats in the gazetteer and checklist. Instead, the assumption can be made that we are referring to dipterocarp forest unless otherwise specified.

Several early bird collections were made in lowland dipterocarp forest, for example, on the Sandakan peninsula and along the Kinabatangan River. However, except for Sepilok Orangutan Reserve and small stands in the Tabin Wildlife Reserve on the Dent Peninsula, extreme lowland dipterocarp forest has been

logged and replaced with plantations or grasslands. Most of the remaining dipterocarp forest is in upland and highland areas away from the coast.

Forest on limestone and limestone caves.—Localized vegetation at limestone outcrops, consisting mainly of shrubs and small trees. On islands, where soils are often of poor quality, limestone forests tend to be richer and better developed than surrounding vegetation. Fig trees tend to grow well on limestone soils and are an important source of food for frugivorous birds (e.g., pigeons on islands). Limestone caves serve as nesting sites for edible-nest swiftlets (*Collocalia* species). References on swiftlet caves include Harrisson and Harrisson (1971) and Francis (1987).

Forests on soils derived from ultrabasic rock.—These forests are often structurally simpler and the trees are shorter than in other dipterocarp forests at the same elevation. The presence of toxic substances in soil discourages some plants and animals. One of Sabah's rarer birds, Gray-breasted Babbler (for scientific names please refer to the annotated checklist), seems to prefer forests on such soils (Sheldon 1987). See Ulu Rukuruku, Tawai, Mt. Silam, and Meliau.

Freshwater swamp.—Forest on fertile, claylike soils (as opposed to peat-swamp), found most often behind mangroves and nipah on the East Coast.

Kerangas or heath forest.—Forest on podsolized, sandy soils (Brunig 1974). Growth tends to be stunted, and leaves are small and leathery. Tall trees and climbers are rare, and in areas where the kerangas is burned and grazed (fire-padang kerangas), the vegetation is especially stunted and scrubby. In certain coastal and island localities, burned or well-grazed sandy heath often takes on the look of savanna grassland, broken only by occasional islands of shrubs.

Birds have been well surveyed in coastal kerangas. Wells et al. (1975) and Wells (1976) described an example of fire-padang kerangas in the Merintaman–Manggalong Forest Reserve, and Sheldon (1985) described one at Binsulok. At these sites, birds are particularly abundant during the *Eugenia* (jambu) fruiting season from February to May, and much nesting is in evidence. Upland heath forest also has been surveyed for birds, most comprehensively at Maliau Basin and Labau River.

Mangrove.—Swamp consisting primarily of mangrove trees (e.g., *Rhizophora*, *Bruguiera*, *Avicennia*, and *Sonneratia*) growing in brackish water. Upstream, where the mangrove attenuates to riparian forest, carapa (*Xylocarpus*) and dungun (*Heritiera*) dominate (Wells et al. 1975).

Lower montane forest.—Forest on steep slopes, characterized by trees in the families Fagaceae, Myrtaceae, Lauraceae, and to a lesser extent Dipterocarpaceae. This forest is generally wet, with substantial moss on trees. (However, the description "mossy forest" can apply equally well to upper montane stands.) The canopy is lower and fewer climbing plants occur than in dipterocarp forests at lower elevation.

Upper montane forest.—Forest found only on Mt. Kinabalu, Mt. Trus Madi, and a few other isolated peaks. Upper montane forest is characterized by trees of the families Fagaceae, Magnoliaceae, Rosaceae, Myrsinaceae, and Myrtaceae, and tends to be wet, stunted, and shrubby. Ericaceous and *Dacrydium* forests are types of high-elevation upper montane forest (Fox 1972). Bird life is scant in upper montane forest, but includes the endemic Friendly Bush Warbler and Mountain Black-eye.

Nipah.—Swamp forest dominated by nipah palms (*Nipa fructicans*), usually upriver or inland of mangroves.

Peatswamp forest.—Forest on saturated peat, having extensive permanent surface water. Sections of the forest may be tall, with dense middle and lower strata and spaced emergents. A good example is in the Merintaman–Menggalong Forest Reserve, which contains a ramin–jangkang (*Gonystylus–Dillenia*) forest, and is rich in swamp kapur (*Dryobalanops*) and lotung (*Dyera*) (W. Meijer, pers. comm.). Sealing-wax palms (*Cyrtostachys*) and pitcher plants (*Nepenthes*) are important features. Another area for peatswamp is Selagon near Membakut. Two species of birds that are rare in other parts of Sabah, Hook-billed Bulbul and Gray-breasted Babbler, occur commonly in peatswamp (Sheldon 1987; Holmes and Wall 1989).

Riparian forest.—Primary or 2° forest located along water-courses. Mature riparian forest is common in Sabah, because river-edge trees are often left by loggers, and growth of riparian forest tends to be fast because of the availability of light and water.

PARKS AND PRESERVES

Sabah has six parks managed by Sabah Parks under the Ministry of Tourism Development, Environment, Science & Technology (Fig. 5): Kinabalu Park, Tungku Abdul Rahman Park, Pulau Tiga Park, Tawau Hills Park, Crocker Range Park, and Turtle Islands Marine Park (Pulau Penyu). These parks cover 245,172 ha of land (ca. 3.3% of Sabah's land area), plus 20,622 ha of marine waters (Payne 1988a). Sabah also has five bird sanctuaries: Kota Belud (Tempasuk) and Kota Kinabalu (Likas) on the mainland, and Mantanani, Bohey Dulang, and Sipadan islands (Davies and Payne 1982). With the exception of Kota Kinabalu, these sanctuaries were formed under weak legislation before Sabah's independence, and are not maintained (although interest recently has been expressed in developing Kota Belud as a site for ecotourism [Payne and Parish 1985]). Forest along the Lower Kinabatangan River is being gazetted as a sanctuary (Sharma 1992; G. Davison, pers. comm.), and two wildlife reserves, under the Sabah Forest Department, are present at Kulamba and Tabin. Apart from parks, the only other truly protected and as yet largely undamaged areas of lowland and upland forest are Sepilok Forest Reserve (ca. 4,500 ha), Danum Valley (ca. 43,000 ha), and the Mt. Lotung/Maliau Basin (ca. 39,000 ha) (Payne 1988a; Marsh 1989).

DIVERSITY OF SABAH'S BIRDS: THE STATE OF OUR KNOWLEDGE

Borneo has about 622 species of birds, of which 434 are known or thought to breed, and 39 are endemic (Smythies 2000). Of these, Sabah has about 526 well-documented species, of which about 395 are residents, 35 are Bornean endemics, and 4 are Sabah endemics (Table 3). Another 51 species have been recorded in Sabah, but are unconfirmed.

The derivation and maintenance of this remarkable diversity may be viewed as a function of two forces. The first of these is evolution, the historical events that shaped diversity (Ricklefs 1987), including dispersal (colonization), vicariance (splitting of populations), speciation, and extinction. These events were spurred by the geological and paleontological turmoil of the developing Bornean region (Whitmore 1981, 1987; Hall and Holloway 1998; Metcalfe 1988). The second

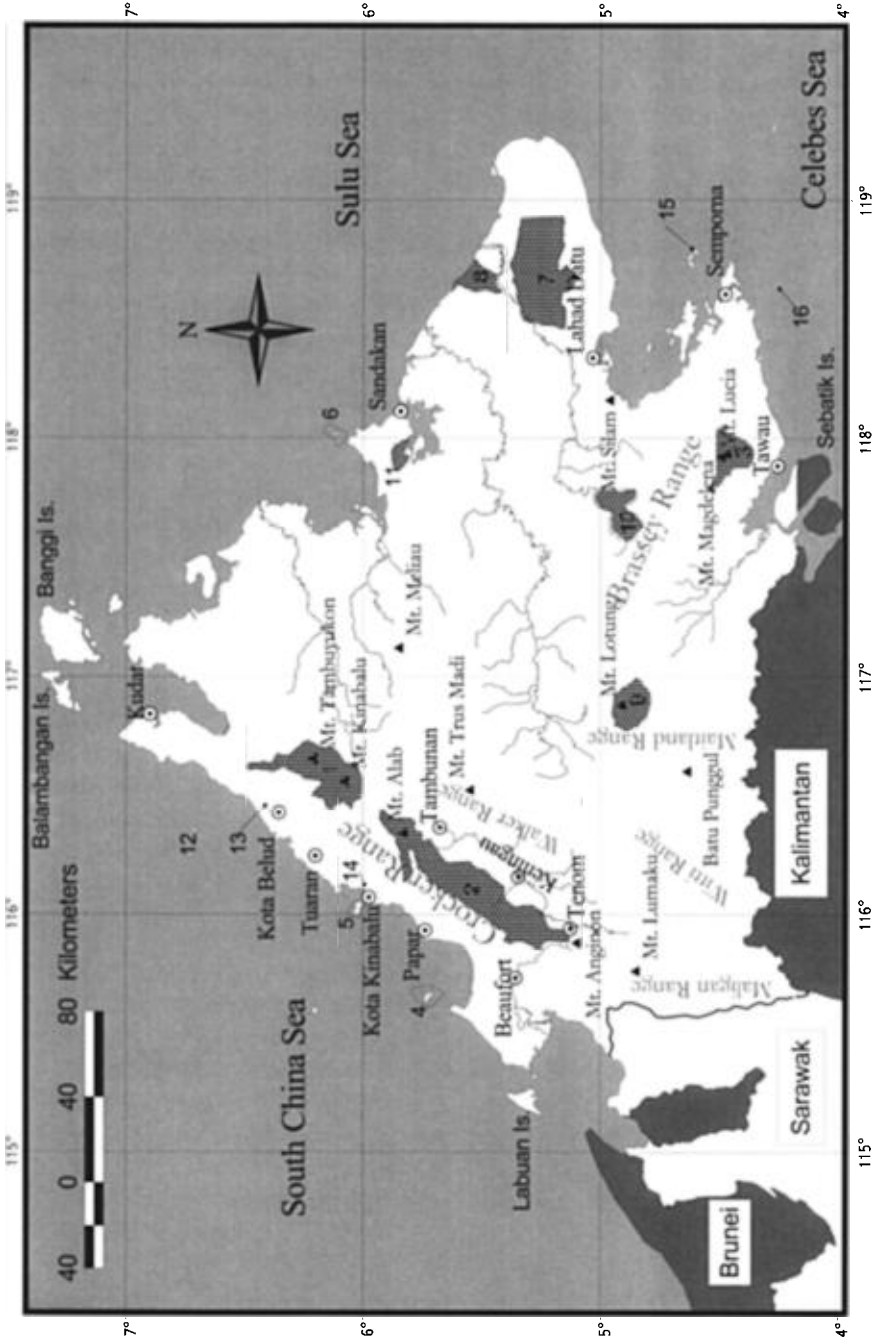


FIG. 5. The major cities, mountain ranges, peaks, and protected areas of Sabah. (1) Kinabalu Park, (2) Crocker Range Park, (3) Tawau Hills Park, (4) Pulau Tiga Park, (5) Tungku Abdul Rahman Park, (6) Turtle Islands Park, (7) Tabin Wildlife Reserve, (8) Kulamba Wildlife Reserve, (9) Maliau Basin Conservation Area, (10) Danum Valley Conservation Area, (11) Kabil-Septlok Forest Reserve, (12) Mantanani Islands Bird Sanctuary, (13) Kota Belud Bird Sanctuary (Tempasuk), (14) Kota Kinabalu Bird Sanctuary (Likas), (15) Bohey Dulang Island Bird Sanctuary, (16) Sipadan Island Bird Sanctuary.

TABLE 3. The endemic bird species of Borneo.

Species	Elevational distribution
Mountain Serpent Eagle (<i>Spilornis kinabaluensis</i>)	Montane
White-fronted Falconet (<i>Microhierax latifrons</i>)*	Lowland–lower montane
Dulit Partridge (<i>Rhizothera dulitensis</i>)†	Lower montane
Red-breasted Partridge (<i>Arborophila hyperythra</i>)	Montane
Crimson-headed Partridge (<i>Haematoryx sanguiniceps</i>)	Montane
Bulwer's Pheasant (<i>Lophura bulweri</i>)	Lowland–lower montane
Bornean Peacock Pheasant (<i>Polyplectron schleiermacheri</i>)	Lowland (upland?)
Bornean Ground Cuckoo (<i>Carpococcyx radiatus</i>)	Lowland
Dulit Frogmouth (<i>Batrachostomus harterti</i>)†	Lower montane
Whitehead's Trogon (<i>Harpactes whiteheadi</i>)	Montane
Golden-naped Barbet (<i>Megalaima pulcherrima</i>)	Montane
Mountain Barbet (<i>Megalaima monticola</i>)	Montane
Bornean Barbet (<i>Megalaima eximia</i>)	Lower montane
Hose's Broadbill (<i>Calyptomena hosii</i>)	Upland–lower montane
Whitehead's Broadbill (<i>Calyptomena whiteheadi</i>)	Montane
Blue-banded Pitta (<i>Pitta arquata</i>)	Upland–lower montane
Black-and-crimson Pitta (<i>Pitta ussheri</i>)*	Lowland–upland
Blue-headed Pitta (<i>Pitta baudii</i>)	Lowland–upland
White-crowned Shama (<i>Copsychus stricklandii</i>)*	Lowland–lower montane
Everett's Thrush (<i>Zoothera everetti</i>)	Montane
Fruithunter (<i>Chlamydochaera jefferyi</i>)	Montane
Black-browed Babbler (<i>Malacocincla perspicillatum</i>)†	?
Bornean Wren Babbler (<i>Ptilocichla leucogrammica</i>)	Lowland–highland
Black-throated Wren Babbler (<i>Napothera atrigularis</i>)	Lowland–highland
Mountain Wren Babbler (<i>Napothera crassa</i>)	Montane
Chestnut-crested Yuhina (<i>Yuhina everetti</i>)	Montane
Bornean Stubtail (<i>Urosphena whiteheadi</i>)	Montane
Friendly Bush Warbler (<i>Bradypterus accentor</i>)*	Montane
Bornean Blue Flycatcher (<i>Cyornis superbus</i>)	Lowland–lower montane
Bornean Whistler (<i>Pachycephala hypoxantha</i>)	Montane
Yellow-rumped Flowerpecker (<i>Prionochilus xanthopygius</i>)	Lowland–lower montane
Black-sided Flowerpecker (<i>Dicaeum monticulum</i>)	Montane
Whitehead's Spiderhunter (<i>Arachnothera juliae</i>)	Montane
Pygmy White-eye (<i>Oculocincta squamifrons</i>)	Upland–lower montane
Mountain Black-eye (<i>Chlorocharis emiliae</i>)	Montane
Bornean Bristlehead (<i>Pityriasis gymnocephala</i>)	Lowland–highland
Dusky Munia (<i>Lonchura fuscans</i>)	Lowland–lower montane
Black Oriole (<i>Oriolus hosii</i>)†	Lower montane
Bornean Treepie (<i>Dendrocitta cinerascens</i>)	Montane

* Endemic to Sabah.

† Not found in Sabah.

force is ecology, the physical and organismal interactions that support diversity, including climate, physical geography, plant community composition, predation, competition, parasitism, and many others. Conservation, the future of diversity, relates directly to these two forces. The conservation of Sabah's birds hinges on our understanding of evolutionary causes and ecological maintenance of diversity.

Unfortunately, our understanding of the evolution and ecology of Sabah's birds is hampered by a lack of quantitative studies. To date, modern studies of Sabah's forest birds consist only of one on evolution (Rahman's [2000] examination of Little Spiderhunter population genetics) and a few on ecology (e.g., Stuebing and Zazul 1986; Johns 1992, 1996; Lambert 1992; Mitra and Sheldon 1993; Zakaria 1994; Zakaria and Nordin 1998; Ahmad 1999). The findings of ecological studies in other parts of Borneo and in Malaya may apply to Sabah's birds, but such

TABLE 4. The number of taxa of breeding Bornean land birds that occur in other areas.

Island or area	No. of species	No. of genera
Sumatra	315	179
Malaya	292	169
Java	192	149
Philippines* (not including Palawan)	101	114
Palawan	91	89
Sulawesi*	65	89

* Not part of Sundaland.

studies are also few (e.g., Fogden 1972; McCormick 1979; Davison 1981; Leighton 1982; Leighton and Leighton 1983; Wong 1985, 1986; Johns 1987, 1989a, b; Lambert and Marshall 1991; Curran and Leighton 2000).

To help set the stage for much-needed research, we review the current state of our understanding of the evolution, ecology, and conservation of Sabah's birds, and suggest areas in particular need of study.

EVOLUTION

The geographic position of Borneo is the key to its bird diversity. Borneo lies on the Sunda continental shelf, or Sundaland, with Malaya (peninsular Malaysia), Sumatra, Java, and many smaller islands (Fig. 1). As a result, the island's bird diversity has been strongly influenced by the avifauna of mainland Asia and is most similar to that of the other Sunda islands (Table 4). Borneo is particularly rich in representatives of pheasants and partridges (Phasianidae), pigeons and doves (Columbidae), cuckoos and relatives (Cuculidae), trogons (Trogonidae), barbets (Megalaimidae), woodpeckers (Picidae), broadbills (Eurylaimidae), pittas (Pittidae), bulbuls (Pycnonotidae), babblers (Timaliidae), thrushes (Turdidae), muscicapine flycatchers (Muscicapidae), warblers (Sylviidae), flowerpeckers (Dicaeidae), and sunbirds (Nectariniidae). Lying as it does on the eastern edge of the Sunda shelf near the Sahul (Australian) continental plate, Borneo also has been exposed to invasion from the Philippines and Sulawesi. Although such invasion has been hampered by Wallace's Line—the permanent separation of Borneo from most eastern islands by a deep oceanic trench (Fig. 1)—Australo-Papuan birds have nevertheless reached Borneo and enriched its avifauna. Among Australo-Papuan taxa in Borneo are the Bornean Bristlehead (a highly derived butcherbird, Cracticidae [Ahlquist et al. 1984]); White-breasted Woodswallow (Artamidae); several species of cuckooshrikes, trillers, and minivets (Campephagidae); three species of whistlers (Pachycephalidae); and the Golden-bellied Gerygone (Pardalotidae). Finally, lying on the equator between Asia and Australia, Borneo is perfectly situated for wintering northern and austral migrants. These include many species of herons and egrets (Ardeidae), ducks (Anatidae), hawks (Falconiformes), shorebirds (Charadriiformes), kingfishers (Alcedinidae), and passerines (Passeriformes).

Because most Bornean species are Asian in affinity, biogeographic events involving the Sunda islands and the Asian mainland are viewed as the most important in shaping Borneo's avifauna. These events centered around eustatic sea level changes in the late Tertiary and Quaternary, which led to periodic connection

and disconnection of the Sunda islands and repeated opportunities for colonization and isolation of populations (Heaney 1986; Whitmore 1987; Hall and Holloway 1998). The general view of Sundaic biogeography is that this movement of populations to and from islands acted as a speciation pump, increasing diversity. When isolated, populations are thought to have diverged as a result of natural selection and random genetic drift. When connected, populations intermingled and sometimes interbred. The tendency for them to intermingle was presumably influenced by a variety of stochastic factors, including habitat distribution, elevation, plant and animal communities, and other features of the connected areas. The tendency for the populations to interbreed required not only intermingling but also compatible mating systems. If reconnected populations failed to interbreed and introgress genetically, they had become distinct biological species (Mayr 1963). Haphazard mixing of populations, and ultimately species, via serendipitous circumstances is presumed to have produced unique bird communities on each island and much of the bird diversity of Sundaland.

Apart from promoting the spread and diversification of Asian colonists, sea level changes are also thought to have played a particularly important role in the evolution of endemic species (Inger 1966; Heaney 1985; Han et al. 2000). Many endemic vertebrates in Borneo have montane distributions (Table 3). These include such birds as Red-breasted Partridge, Whitehead's Trogon, Golden-naped Barbet, Whitehead's Broadbill, Everett's Thrush, Fruithunter, and Whitehead's Spiderhunter. This montane pattern reaches a pinnacle in Sabah, where Borneo's highest mountains are located: Kinabalu (4,095 m), Trus Madi (2,649 m), and Tambuyukon (2,579 m). On these mountains are species or subspecies of birds endemic to Sabah: the Friendly Bush Warbler, a blue-throated subspecies of Bornean Barbet, and a pale subspecies of Mountain Leaf Warbler (the latter two possibly occurring only on Kinabalu). The common explanation for montane endemism is that, during periods of elevated sea level, mountains offered refuge for otherwise lowland populations. These populations diverged genetically while isolated on peaks and, when seas subsided, were displaced from the lowlands by invading congeneric competitors (Han et al. 2000). A similar explanation applies to lowland species endemic to Sabah: White-fronted Falconet, Black-and-crimson Pitta, and White-crowned Shama. These species are replaced by close congeners, with broader Sundaic distributions, in western and southern Borneo (viz., Black-thighed Falconet [*Microhierax fringillarius*], Garnet Pitta [*Pitta granatina*], and White-rumped Shama [*Copsychus malabaricus*]). Sabah's endemics presumably differentiated on Borneo and were displaced or swamped genetically in the rest of Borneo by congeners invading more recently from the west and south.

However, it is worth reiterating that no one has studied the evolution of bird diversity in Borneo using modern methods. For example, Bornean montane endemics possibly have simply dispersed from mountains on other Sunda islands. Once isolated, some of these dispersers diverged into endemic species and some did not (e.g., Island Thrush and Sunda Bush Warbler). Similarly, lowland endemics in Sabah, such as the White-rumped Shama, might simply be isolated in north Borneo by mountain ranges or river drainage systems, which have cut gene flow and promoted differentiation. To determine the events responsible for speciation requires the reconstruction of phylogenetic trees of species or phylogeographic trees of populations. Once constructed, these trees can be examined for common

patterns (Brooks 1990; da Silva and Patton 1998). These patterns can indicate the timing and direction of vicariance or colonization events, and the likelihood of extinction, especially when considered in view of geologic, paleoclimatologic, and paleobotanic data, which are extensive for southeast Asia (Hall and Holloway 1998). But we do not have phylogenetic or population genetic data on any group of Bornean birds other than the Little Spiderhunter. With few exceptions (Cracraft 1988), the biogeographic history of birds on Borneo and neighboring islands has been reconstructed only anecdotally by observing current distributions and extrapolating likely dispersal events (Banks 1933, 1937; Cranbrook 1981a; Keast 1983; Michaux 1995; MacKinnon et al. 1996).

Fortunately, we can expect our understanding of Sabah bird evolution to improve considerably in the near future. Molecular studies of the phylogeny and population genetics of southeast Asian vertebrates are becoming common (Schmitt et al. 1995; Ruedi 1996; Ruedi and Fumagalli 1996; Zhi et al. 1996; Rosenblum et al. 1997; Harcourt 1999; Honda et al. 1999; Emerson et al. 2000; Han et al. 2000). For birds, in addition to Rahman's (2000) study of spiderhunters, we can expect population genetic comparisons of several montane endemics and babbler groups in the near future (R. G. Moyle, in prep.). Several comprehensive phylogenetic studies of bird families are also in progress (e.g., Cibois et al., submitted). Once completed, these should provide perspective and context for ecological studies of Sabah's birds (Brooks 1990; Richman and Price 1992; da Silva and Patton 1998).

ECOLOGY AND BEHAVIOR

Comprehensive studies of southeast Asian bird ecology and behavior are remarkably few, especially in comparison to similarly sized areas in other tropical regions (e.g., in the Neotropics: Martin and Finch 1995; Rappole 1995; Stotz et al. 1996; Remsen 1997). For Bornean birds, many small papers and notes have been written describing incidental discoveries concerning nesting, feeding, habitat preferences, and behaviors, but very few quantitative studies have been conducted on bird ecology and behavior. A substantial proportion of these has focused on the effects of human disturbance on forest bird communities (Johns 1992, 1996; Lambert 1992; Mitra and Sheldon 1993; Zakaria and Nordin 1998). Others have concentrated on the feeding ecology of specific groups, most notably hornbills (Leighton 1982) and herons (Lansdown 1987c), or the distribution and general ecology of species of concern, such as Philippine Scrubfowl (Stuebing and Zazul 1986; Ahmad 1999), Argus Pheasant (Nijman 1998), and edible-nest swiftlets (Francis 1987). Few quantitative data can be found relating to such key ecological issues as niche partitioning, elevational zonation, seasonal abundance, habitat requirements of migratory species, flocking behavior, breeding displays, vocalizations, and so on.

The only aspect of Sabah bird ecology that is reasonably well understood is distribution. From records of many expeditions and surveys (summarized in this monograph), we know the general habitat requirements and distribution of most species in Sabah. This includes many of the rarer species, such as Bornean Barbet (lower montane forest), Hooked-billed Bulbul (peatswamp forest), Gray-breasted Babbler (ultrabasic and peat swamp forests), Hill Blue Flycatcher and Rufous-tailed Jungle Flycatcher (lower montane forest), and Brown-backed Flowerpecker

(coastal kerangas). Nevertheless, the distribution and habitat requirements of some forest bird groups remain a mystery. Most notable are the night birds, such as Rajah's Scops Owl, all species of frogmouths, and some of the nightjars (Savanna and Bonaparte's nightjars). Their nocturnal habits, inconspicuous behavior, and cryptic plumage make them difficult to find, identify (except perhaps by voice), and characterize. Similarly, some of the cuckoos, particularly the hawk cuckoos and Little Bronze and Gould's Bronze cuckoos, have proven difficult to identify and characterize, a problem exacerbated by their nest parasitism. Even when identification is not difficult, some species continue to defy our understanding in respect to habitat requirements and distribution (e.g., Long-billed and Black partridges, Bornean Peacock Pheasant, Bornean Ground Cuckoo, Speckled Piculet, Greater Flameback, Blue-banded Pitta, Abbott's and White-necked babblers, Crimson-breasted Flowerpecker, Pin-tailed and Tawny-breasted parrotfinches, and White-bellied Munia).

Among the best distributional studies are quantitative analyses of the extent to which birds use logged forest and exotic tree plantations. For example, Johns (1992, 1996), Lambert (1992), and Zakaria and Nordin (1998), studied the effect of logging on bird communities in the Ulu Segama Forest Reserve, and Mitra and Sheldon (1993) examined bird use of different age groups of an exotic tree, *Albizia falcataria*, at the Sabah Softwoods plantation. These studies indicated that logged forest and some plantations can be relatively hospitable habitats to forest birds. Lambert (1992) found that 85% of primary forest birds occurred in older logged forest. Mitra and Sheldon (1993) found that 63% of primary forest birds were using older *Albizia* groves. Zakaria and Nordin (1998) found that most frugivorous birds used disturbed forest, but in reduced numbers. Of course, such findings must be treated with caution for several reasons. Some types of birds, including species of trogons, woodpeckers, wren babblers, and flycatchers, seem to avoid disturbed forests (Wong 1985; Johns 1992, 1996; Lambert 1992), and disturbance could have a profound effect on the fecundity and social behavior of those species that remain (Johns 1997). Moreover, the attractiveness of logged forests and plantations is a function of many factors. These include geographic variation in bird community structure and species tolerance, the extent of logging damage, the amount of regeneration in logged areas, the extent of undergrowth in plantations, the proximity of disturbed areas to active logging (which produces potential refugee colonists), and the proximity of disturbed to undisturbed forest (which provides potential commuters and colonists). Finally, some types of disturbed forest and, especially, agricultural plantations are almost completely inhospitable to forest birds. This is particularly true of oil-palm and other plantations that inhibit the growth of understory vegetation.

Despite the current dearth of data on the ecology of Sabah's birds, the future of ecological and behavioral study is bright. Sabah has developed an excellent infrastructure for bird research. Field sites with accommodations include Crocker Range Park Headquarters, Danum Valley, Mt. Kinabalu Park, Sepilok Orangutan Reserve, Sayap, and Tawau Hills Park. Also, as background to bird studies, a great deal of baseline data on Bornean forest ecology is available from long-term studies at Danum Valley (Newbery et al. 1999; Walsh and Newbery 1999; Willot 1999), Mt. Kinabalu (Wong and Phillipps 1996), Sepilok (Fox 1972, 1973; Gönner 1990), Mt. Silam (Proctor et al. 1988, 1989; Bruijnzeel et al. 1993), and

Gunung Palung National Park in western Kalimantan (Curran et al. 1999; Curran and Webb 2000).

Among the many areas of Bornean bird ecology and behavior that need work, a few seem particularly promising. With the advent of DNA fingerprinting, the study of parental roles in breeding has become a prominent research area (Ketterson and Nolan 1994), and some Sabahan species seem to have especially interesting breeding systems. For example, the Bornean Bristlehead and some species in the babbler genus *Stachyris* may be cooperative breeders (R. Stuebing and J. Schmitt, pers. comm.). In ecology, one of the great questions facing tropical biologists is how so many similar species coexist in the face of limited resources and expected competition (Hutchinson 1978). How do congeneric barbets, trogons, bulbuls, babblers, flycatchers, and warblers divide up the Bornean forest? McCormick (1979) did some preliminary work on this problem in Sarawak, but much more remains to be done. One potentially interesting line of investigation is the idea that congeners partition habitats through time by a process of succession, instead of spatially. Analysis of census data from Sabah Softwoods (Mitra and Sheldon 1993) suggests that this may be the case for the three species of lowland tailorbirds. The proportion of Rufous-tailed to Ashy tailorbirds decreases with increasing age of *Albizia* groves. Thus, the species may be replacing one another as substantial forest develops from grassland. The third species, Dark-necked Tailorbird, seems likely to replace the others in yet older growth and primary forest. Similar questions concern how habitats are partitioned elevationally. What are the morphological and ecological factors allowing very similar congeners (e.g., Ochraceous and Gray-cheeked bulbuls, Black-capped and Temminck's babblers, and Gray-chested and Rufous-tailed jungle flycatchers) to replace one another at specific elevations on mountains (Price 1991; Richman and Price 1992)? Answers to these questions on partitioning may yield insight into perplexing issues of bird distribution. For example, we have noticed that bird community composition can differ substantially among lower montane sites, despite similar elevations. At Sayap on Mt. Kinabalu (900 m) the bird community is almost entirely montane, whereas at Crocker Range Park Headquarters (900 m), the avifauna is rich in both lowland and montane species. One possible explanation is that lowland birds find it more difficult to disperse on the northern side of Mt. Kinabalu, where shifting agriculture has disturbed forests for decades (if not centuries). Alternatively, a *Massenerhebung* effect might occur because of the relative size difference between Mt. Kinabalu and the Crocker Range mountains. Finally, studies are needed on migrating land birds, especially to explain how these birds use habitats in Sabah. The future of northern migrants, whose breeding habitats are eroding quickly, will depend in part upon the availability of appropriate wintering habitat in Borneo (Keast and Morton 1980; Hagan and Johnston 1992).

CONSERVATION

The conservation of Sabah's birds encompasses two distinct pursuits: understanding the evolutionary and ecological forces that created and maintain diversity, and saving and managing habitat. The first is a scientific pursuit. The second comprises both scientific and political elements. These two endeavors are intertwined in that decisions by conservationists and wildlife managers depend upon

information provided by ecologists and evolutionary biologists and, conversely, the study of ecology and evolution depends upon conserved habitats. To some extent, the interdependence between scientists and conservationists might seem to be diminished in Sabah, at least as far as political action is concerned, because the fate of the forests has already been determined; they have all been disturbed, destroyed, or protected. However, political conservationists, acting with the information provided by ecologists and evolutionary biologists, will always be needed in Sabah, for three main reasons. First, vigilance by conservationists is needed to protect existing parks and conservation sites from changes in government policy. Too many times in recent history sections of parks and reservations have been "degazetted" to permit development (see below). Second, conservationists are needed to promote the protection of areas that have been disturbed but may regenerate into forest if given a chance. The planned Kinabatangan bird sanctuary is just such a place. It will provide an opportunity for one of Sabah's most endangered habitats—flat, low-elevation forest—to regenerate. Finally, conservationists are needed to help plan agricultural and suburban development. If unplanned, development unnecessarily wastes natural habitat. If planned, agricultural and suburban development can coexist with forest to maximize benefits to both areas. Examples of such mutual benefit have been described many times (e.g., MacKinnon et al. 1996). For Sabah, two benefits in particular are worth emphasizing. First, if plantations are organized so that they are surrounded by (or interspersed in) natural forest, they will benefit from biological control of pests by forest animals. This was the case for Sabah Softwoods, where forest birds feasted on caterpillars infesting the *Albizia* trees (Mittra and Sheldon 1993). Second, if undisturbed forest is maintained close to cities, it will attract ecotourists to the benefit of those cities. This certainly is true for Sandakan, which is close to Sepilok Orangutan Reserve, and Lahad Datu, which is close to Danum Valley.

The most pressing conservation issues for birds concern the destruction of restricted habitat types and the long-term erosion of forests in general. The bird habitats that are most in need of protection are coastal, extreme lowland, and lower montane forests. Coastal and extreme lowland dipterocarp forest is particularly endangered because it has suffered human exploitation for the longest time, and its once large area has been reduced to minuscule remnants. Much of the area previously covered by coastal dipterocarp forest has been converted to agricultural plantations and grasslands. For example, about 4,000 km² of lowland forest was replaced with oil palm between 1980 and 1997 (G. Davison, pers. comm.). The only remaining examples of relatively undisturbed, lowland dipterocarp forest are in small reserves on Sabah's East Coast, for example, Kabili-Sepilok Forest Reserve (43 km²) and sections of Tabin Wildlife Reserve. Extreme lowland dipterocarp forest may have been the principal habitat of some of Sabah's rarest bird species, such as Bornean Peacock Pheasant and Bornean Ground Cuckoo. However, without large tracts of this forest for study, we can only extrapolate its original avifauna from observations of birds in Sepilok and Tabin and from data on old, poorly documented, museum specimens.

In addition to lowland dipterocarp forest, localized coastal forest types such as peat swamp and kerangas also need special conservation attention. This is particularly true of the peat swamp forests from Membakut to Sipitang on Sabah's West Coast. These forests, which have been devastated in the last 20 years, are the

only places on Sabah's West Coast (and perhaps all of Sabah) where the Hook-billed Bulbul, Gray-breasted Babbler, and Scarlet-breasted Flowerpecker may be found regularly. Coastal kerangas may be the only habitat in Borneo to contain Brown-backed Flowerpeckers. The fate of one of these forests—the Merintaman–Menggalong peatswamp forest—illustrates the need for vigilance and political activism on the part of conservationists. The Merintaman–Menggalong forest, near Sipitang, represented the last good stand of coastal Ramin swamp in the state (W. Meijer, pers. comm.) and, as a result, was part of a national park gazetted in 1978 (Wells 1976). However, this park was degazetted in the early 1980s and, after a substantial portion of the Merintaman–Menggalong section was removed to make room for a pulp mill, some of the area was regazetted as a Virgin Jungle Reserve in 1984 (Scott 1989).

The final habitat of special concern is lower montane forest. This forest is a transitional zone, which varies in elevation depending on the height and location of the mountain. Because of moderate climate, lower montane areas are popular for human activities, such as shifting agriculture, temperate vegetable farming, and residential development. However, these activities substantially degrade lower montane forest, and in some cases have destroyed extremely important habitat. The most disturbing example is the fate of the southeastern part of Kinabalu Park during the 1970s. This section of the park was established largely to protect the only remaining major stand of lower montane forest in Sabah and purposely included the world's richest oak forest on the Pinosuk Plateau, the habitat of rare species of *Rafflesia*, and the floristically unique ultrabasic forest of Bukit Hampuan. These areas were degazetted from the park and replaced by a copper mine, dairy farm, golf course, luxury suburban homes, tea and passion flower plantations, and permanent temperate vegetable plots (Sheldon 1986). In the rest of Sabah, undisturbed lower montane forests can be found only in parks and on isolated peaks in the interior. For birds, the fate of lower montane forests seems particularly important because of the preponderance of rare or uncommon species that depend upon these forests. These species include the Cinnamon-rumped Trogon, Bornean Barbet, Long-tailed Broadbill, Hose's Broadbill, Blue-banded Pitta, Hill Blue Flycatcher, and Rufous-tailed Jungle Flycatcher.

Humans have also influenced the avifauna of Sabah by introducing exotic birds or promoting the success of invading bird species by creating habitats favorable to them. Several species have been introduced, apparently as escapees or stowaways. These include Peaceful Dove, Rose-ringed Parakeet, Common Myna, Eurasian Tree Sparrow, Java Sparrow, Red Avadavat, and House Crow. Natural colonizations also occurred, apparently facilitated by deforestation of coastal areas. For example, the Striated Warbler was first found in Borneo in 1982 at Lahad Datu airport (Francis 1985a). These birds seem to have come from the Philippines and now have gained a foothold not only in Lahad Datu, but also in several coastal areas between Kota Belud and Kudat.

HISTORY

OVERVIEW OF THE ORNITHOLOGICAL HISTORY OF SABAH

Birds have always featured importantly in Sabah's culture, as food, religious objects, and omens. Near the beginning of the 15th century, they assumed in-

creasing economic status with the arrival of Chinese and Muslim merchants and the growth of the swiftlet edible-nest trade (Harrisson and Harrisson 1971). Scientific study of birds began in earnest with European colonial expansion and the development of specimen collections and natural history museums in the 18th and 19th centuries (Stresemann 1975). For Sabah, this colonial and scientific period began formally when the Sultan of Brunei ceded the island of Labuan to the British in 1846. However, scientific knowledge of Sabah's birds did not grow substantially until the North Borneo Company was chartered in 1881, and administrative stations were founded around the state, opening it to exploration.

The first publication on Sabah's birds was a list of Labuan species by Motley and Dillwyn (1855). The first notable collections were those in the 1870s of the colonial administrators H. Low, H. T. Ussher, W. H. Treacher, and W. B. Pryer. These men collected on Labuan, the Klias Peninsula, and in the vicinity of Kota Belud and Sandakan. In the 1880s, these earliest investigations were supplemented by more substantial collections of visiting naturalist-adventurers, and published lists and species descriptions abounded from 1880 to 1900, particularly by R. B. Sharpe of the British Museum.

By far, Sabah's most important ornithologist was John Whitehead, who visited the state several times as a private collector from 1885 to 1888. His life has been chronicled by Mearns and Mearns (1988), and his explorations in Sabah are documented in his book *Exploration of Mount Kina Balu, North Borneo* (1893). Whitehead collected in various locations around Sabah's coast, but is best known as the first scientific explorer of Mt. Kinabalu. In addition to discovering seven new Bornean species and adding 59 species to the Bornean list, Whitehead contributed an irreplaceable body of life-history information on Bornean birds. His notes appear in clear, readable style as addenda to the taxonomic reports of R. B. Sharpe (1887a, b, 1889a–d, 1890a–c) and in an appendix to his book (Whitehead 1893). Such thoroughly written observations were unusual in the 19th century, when collectors often failed even to note the specific collecting locality of a specimen. As a result, Whitehead's work formed the foundation for subsequent writings on Bornean and Sabahan birds, such as those of T. Harrisson, M. E. J. Gore, D. V. Jenkins and G. S. de Silva, and, most importantly, B. E. Smythies (1957, 1960). Unfortunately, many of these writers, lacking information other than Whitehead's, often accepted his opinions uncritically and inadvertently perpetuated some misconceptions about Sabah's birds. Most of Whitehead's experience in Sabah was in coastal forest, scrub, and on Mt. Kinabalu. From his notes, he clearly had an imperfect knowledge of at least some lowland dipterocarp forest birds. For example, he wrote that the Spotted Fantail is rare. Several cases of misconceptions perpetuated from Whitehead's writing are noted in our species accounts. We mention this not to impugn Whitehead or his followers, but to explain the source of some common misconceptions about Sabah's birds.

After Whitehead, birds were collected along the coast of Sabah, up the Kinabatangan River, and particularly on Mt. Kinabalu. However, few papers were published and little work of consequence occurred until 1927–1928, when F. N. Chasen and C. B. Kloss collected for the Raffles Museum on the northern islands (Mengalum, Mantanani, Balambangan, and Banggi), northern coast (Kudat), Padas River (Rayoh), and on Mt. Kinabalu. From these collections, they described 19 new races of birds (summarized in Chasen 1935).

The tendency to concentrate on Mt. Kinabalu and coastal areas of Sabah changed in the mid-1950s. In 1956, two major collecting expeditions were launched to the interior. Cambridge University sent a group to Mt. Trus Madi, Borneo's second highest mountain (2,649 m), where they collected ca. 250 specimens of 50 species, and the British Museum explored Mt. Meliau and Mt. Magdalena, collecting 560 specimens of 191 species. In 1962, M. C. Thompson of the Bishop Museum (Hawaii) and A. D. Garcia of the Sabah Agriculture Department collected ca. 1,300 specimens of 240 species, mostly in the interior of Sabah and wrote an unusually clear and thorough report (Thompson 1966). Thompson and Garcia were the first ornithologists to use mist nets in Sabah, and this collecting technique increased general knowledge of Sabah bird distribution substantially. Species previously thought to be rare (Chestnut-capped Thrush and Bornean Wren Babbler) were discovered simply to be secretive. The advent of mist nets also brought bird banding to Sabah under the auspices of the United States Army Research Development Group: Migratory Animal Pathological Survey (MAPS; McClure and Leelavit 1972; McClure 1974). Among the MAPS participants in Sabah were the University of Malaya and the Sabah Museum. During this period, enthusiastic amateurs also contributed to the ornithology of Sabah, especially in regard to bird distribution, migration, and nesting. Most notable were D. M. Batchelor and K. V. Thompson, both of whom kindly provided us with copious notes for our species accounts.

In the 1960s came the most important development in the history of Bornean ornithology: publication of B. E. Smythies' book, *The Birds of Borneo* (Smythies 1960). Smythies simplified the task of Bornean bird study for ornithologists and bird watchers who followed him by organizing facts and citations on all species into a single, remarkable reference. He first came to grips with the arcane taxonomy of the island's birds in *An Annotated Checklist of the Birds of Borneo* (Smythies 1957), and parlayed this preliminary work into a great handbook by reviewing the natural history of Bornean birds clearly and precisely.

Since the 1960s, knowledge of Sabah bird biology has grown largely through the efforts of independent birders, two major collecting expeditions (Yale University 1976–1977 and Western Foundation of Vertebrate Zoology 1981–1983), and a series of collections, surveys, and studies by conservation and research organizations in cooperation with the Sabah government (e.g., Worldwide Fund for Nature Malaysia, Asian Wetland Bureau [Wetlands International], and the British Royal Society). Government and educational agencies in Sabah (Sabah Parks, Sabah Wildlife Department, Sabah Museum, Sabah Foundation, and Universiti Malaysia Sabah [formerly Universiti Kebangsaan Malaysia, Sabah Campus]) have played an especially important role in the study and management of wildlife. They have inherited this role from the Sabah Agriculture and Forest departments, which until the 1970s were active in collecting and surveying birds.

Certainly the driving force behind much of the recent natural history study in Sabah has been the need to compile data for conservation planning in the face of forest and wetland destruction. Of particular importance to conservation have been studies that gathered information about the distribution of native animals before habitats were altered or destroyed (e.g., Davies and Payne 1982; Lansdown 1989); assessed the impact of logging and development on animal communities (e.g., for birds: Johns 1988, 1992, 1996; Lambert 1990c; Mitra and Sheldon 1993; Zakaria

and Nordin 1998); and designated appropriate sites for protection from logging and development (e.g., Wells et al. 1975; Kiew 1977; Davies and Payne 1982; Payne 1985; Marsh 1989).

CHRONOLOGICAL REVIEW OF INDIVIDUALS, EXPEDITIONS, AND INSTITUTIONS THAT HAVE CONTRIBUTED SUBSTANTIALLY TO THE ORNITHOLOGY OF SABAH

Hugh Low, 1848–1877.—After 3 years as an administrator in Sarawak, Low was transferred to Labuan in 1848 as colonial secretary. He remained there until 1877, holding several posts including acting governor (Sadka 1954). He was a botanist, but was interested in all aspects of natural history (Reece 1990). While at Labuan (as treasurer of Labuan [Rutter 1922]), he made the first scientific bird collection in Sabah, including birds of Labuan (Sharpe 1875) and the adjacent mainland (Sharpe 1879b, c). He was also the first westerner to climb Mt. Kinabalu in 1851 (Low 1852). In 1858, he repeated the feat twice with Spenser St. John, British consul general in Borneo (St. John 1862; Rutter 1922; Sadka 1954; Reece 1990).

J. Motley, ca. 1851–1852.—A civil engineer who worked on Labuan's coal mines in ca. 1851 and 1852, Motley published the first list of Sabah birds in collaboration with his (apparent) benefactor, L. L. Dillwyn, in 1855 (Smythies 1960; Medway 1977). Several early compilers depended heavily on Motley's records (e.g., Sclater 1863; Salvadori 1874).

H. T. Ussher and William Hood Treacher, 1870s.—Ussher was governor of Labuan ca. 1876–1877. Treacher was colonial secretary, acting consul general to Brunei, acting governor in the 1870s, and the first governor of British North Borneo from 1881 to 1887. The collections of these two men, from Labuan and Lumbidan, were described together by Sharpe (1879b, c). Ussher employed a Kadayan named Buak, who collected mainly near Labuan. Treacher also obtained birds from the "lower slopes" of Kinabalu (Sharpe 1879a) and published on the occurrence of Bulwer's Pheasant in North Borneo (Treacher 1888). Bulwer's Pheasant was named after Sir Henry Bulwer, Ussher's predecessor as governor. Treacher was also among the first to translate Malay names of birds for publication (Sharpe 1879b). See Treacher (1889, 1890)

F. W. Burbidge, 1877–1878.—Burbidge was a botanist, but also collected a small number of birds on expeditions to Mt. Kinabalu in December 1877 and August 1878 (Sharpe 1879a; Burbidge 1880).

Alfred Hart Everett, 1877–1893.—After Whitehead, Everett is Sabah's most important 19th century ornithologist. Unfortunately, his activities are difficult to trace because he moved back and forth from Sarawak to North Borneo, alternating as an administrator and a professional collector, and left few published records (Smythies 1960). The dates given here are from specimen labels and one major paper (Everett 1889). His collecting sites included Labuan, Pulau Tiga, Lumbidan, Kimanis, Papar, Mantanani Island, and the Kudat area. When the Chartered Company was founded, he was employed at their Kudat office (Chasen and Kloss 1930b). From there, he made several trips to Balambangan and Banggi islands. While collecting professionally, he worked for benefactors and his collections, like those of Whitehead, are now widely scattered among museums. A short obituary appears in *The Ibis* (Anonymous 1898:627).

Sarawak Museum, 1878–1965.—The Sarawak Museum was founded in 1878,

when specimens were first collected, and officially opened 1891. Four of its curators, C. D. Haviland, J. C. Moulton, E. Banks, and T. Harrisson, contributed substantially to the ornithology of Sabah. Haviland, the first curator of the Sarawak Museum (1893–1895), collected at Tuaran in March 1892 and on Mt. Kinabalu in March and April 1892 (Stapf 1894; Moulton 1915). He collected at Tuaran again in October 1913. Moulton, the fifth curator, collected on Kinabalu for 6 weeks in August and September 1913 (Moulton 1913, 1915) and on Mantanani Island in June 1921. He also wrote a useful summary of expeditions to Mt. Kinabalu (Moulton 1915) and a list of the birds of Borneo (Moulton 1914b). Banks, curator from 1925 until the Second World War, wrote several analyses of Bornean bird distribution (Banks 1933, 1937) and participated in the British Museum North Borneo Expedition of 1956 (see under British Museum). Harrisson, curator from 1947 to 1966, was interested in many aspects of zoology and anthropology. He visited Sabah only for short periods, which are not clearly documented (Harrisson and Harrisson 1971). In January and February 1952, he reached the summit of Mt. Kinabalu via the Keningau–Ranau route, after having flown from Sandakan to Keningau. On the same trip he visited Labuan, Tempasuk plain, and collected in Sandakan. Several papers derive from this first trip (Harrisson 1955a, b, 1957, 1962, 1964). Subsequent trips are more difficult to document. From papers by Smythies (1957, 1963), Gore (1968), Fogden (1965), and himself (Harrisson 1966), we know Harrisson visited the following localities: Labuan, November 1955 and May–June 1960; Kota Kinabalu, December 1960; Gomantong Caves, July 1964 and April 1965; Labuk River, July 1964; Mt. Kinabalu, December 1964; Mt. Danum, 21–22 February 1965; and the Turtle Islands, July 1965. Two members of the Sarawak Museum staff, Gaun anak Sureng and R. Nyandoh anak Kadir, also played key roles in North Bornean ornithology. For more information on their contributions see sections for the Field Museum of Natural History and Cambridge University, respectively.

William B. Pryer, 1878–1898.—In February 1878, as an agent of Baron von Overbeck and Alfred Dent, founders of the Chartered Company, Pryer was given the job of securing what is now Sandakan Harbor. As “Resident of the East Coast” for the Company and “Consular Agent” for the British Colonial Office, he succeeded. He established the town of Elopura, later called Sandakan, explored much of the East Coast of Sabah, and established several agricultural stations in the ensuing 20 years (Tregonning 1954, 1965). He was an avid collector, particularly of butterflies. One of his early bird collections was described by Sharpe (1881). Pryer (1881) also published anonymously on mammals (see Anonymous [1886] in Medway [1977]), and someone named H. Pryer (1884) vividly described a trip to Gomantong Caves.

E. G. Lempriere, early 1880s.—Nicholson (1883) reported on a collection made by Lempriere on Labuan, Segaliud River, and at “Silam” (the name for the Lahad Datu area in the early years of the Chartered Company). Few details are provided about the collection other than the site names, not even dates. At least part of Lempriere’s collection is in the Liverpool Museum (Smythies 1960).

Marchesa Expedition, 1883.—F. H. H. Guillemard (1885, 1889) described the visit of this yacht to the coast of North Borneo during April–June 1883. The yacht reached Sandakan on 3 April and from there made short trips to adjacent areas, including the Segaliud River at the head of Sandakan Harbor and Libaran Island.

On 22 May, the yacht left Sandakan for Kudat, where it stayed briefly and from which Guillemard made a day trip to Bongon. On 30 May, the yacht left Kudat and stopped at Tanjung Sempang Mangayau, Banggi Island, Abai, Gaya Bay, Papar, Benoni, and Kimanis, before reaching Labuan on 7 June.

John Whitehead, 1885–1888.—Whitehead's work in Sabah is summarized in his book, *Exploration of Mount Kina Balu, North Borneo* (Whitehead 1893). He collected on Labuan Island, the Padas River, Pulau Tiga, Gaya Island, Tempasuk plain, Bengkoka River, and at Sandakan, but is best known for his extended exploration of Mt. Kinabalu. Whitehead collected ca. 300 species in Sabah, but estimation of the number of specimens is difficult because they are scattered. He may have collected about 1,500–2,500 specimens. He traveled twice to the mountain via the Kuala Abai-Kabayau route. In 1887 on the advice of his guide, he went from Kabayau along the Penataran River to Malangkap, but from there he could not reach elevations higher than ca. 1,500 m. Nevertheless, he worked the area around Malangkap from February to May with much success. (Nowadays, researchers can explore the same general area by driving to Sayap from Kota Belud.) On his second trip in 1888, Whitehead reached Mt. Kinabalu's summit via Kiau and the Kadamaian River, and he collected extensively at high elevations from January to March. On Kinabalu, he discovered Whitehead's Trogon, Golden-naped Barbet, Whitehead's Broadbill, Fruithunter, Friendly Bush Warbler, Bornean Stubtail, and Whitehead's Spiderhunter, and in total added 59 species to the Borneo list. He also contributed a large body of life-history information on Bornean birds. His notes appear in clear, readable style as addenda to the taxonomic reports of R. B. Sharpe (1887a, b, 1888a–c, 1889a–e, 1890a–c) and in an appendix to his book (Whitehead 1893). A short notice of his death appears in *The Ibis* (Anonymous 1899:642).

D. D. Daly, ca. 1887.—Daly was an assistant resident in North Borneo who wrote a description of his investigations of swiftlet nesting caves in Sabah (Daly 1888).

Smithsonian Institution and U.S. government, 1887–1960s.—In addition to occasional skins obtained through trade or purchase, the U.S. National Museum has several collections made by U.S. government agents. C. F. Adams collected in the Sandakan area and lower Kinabatangan between May 1887 and February 1888 (Elliot 1890, 1891). Dean Conant Worcester and Frank Swift Bourns collected on Kinabalu in March and April 1893. George A. Goss and H. D. Dodge collected on Kinabalu during April–May 1904 (Richmond 1905; Moulton 1915). Paul Bartsch, traveling on the U.S. Bureau of Fisheries steamer *Albatross*, collected in the vicinity of Sandakan from 1 to 3 March 1908 (Mearns 1909). David Horn Johnson, representing the U.S. Army Medical Service Graduate School, collected mainly mammals and a few birds on Mt. Kinabalu and at Menggatal during June–August 1951. The Smithsonian's largest collection is from a U.S. Naval Medical Research Unit expedition led by Robert E. Kuntz from 24 August to 4 October 1960 (Kuntz 1969). This expedition collected common species near Kota Kinabalu, Keningau, and Ranau to study bird parasites. The Migratory Animal Pathological Survey (MAPS), part of the U.S. Army Research Development Group, banded birds in Sabah (McClure and Leelavit 1972; McClure 1974). D. M. Batchelor, Q. Phillipps, the Sabah Museum, the University of Malaya (on the Royal Society Expedition, 1964), and others, took part in this program.

J. Waterstraat, 1897–1909.—Waterstraat was a professional insect collector who collected birds on Labuan and in the Padas River district during 1897 (Smythies 1960). He also collected birds along the Menggalong River and on Mt. Kinabalu in 1899 and 1900 (Blasius 1901). Specimens in the American Museum, British Museum, and Field Museum indicate he collected on Kinabalu in 1903 and 1909 as well.

P. N. Graydon, 1901–1902.—Graydon was the first to collect deep in the interior lowlands of Sabah. He worked at Lamag Estate on the Kinabatangan River from September 1901 to May 1902 (Sharpe and Chubb 1909). His specimens are in the British Museum.

American Museum of Natural History, 1910.—The American Museum possesses relatively few specimens from Sabah. Many of these are Whitehead's and Waterstraat's specimens, purchased as part of the Rothchild collection. Roy Chapman Andrews, Assistant Curator of Mammals, collected in the vicinity of Tawau and on Sebatik Island in November 1909 and January 1910 while traveling on the U.S. Bureau of Fisheries steamer *Albatross* (Allen 1911; Amadon 1943b; also see under Smithsonian Institution). He collected two of the three existing Bornean specimens of the Greater Flameback.

S. Tanaka, 1920s–1930s.—Tanaka collected at Tawau in 1923 and 1931 (Kuroda 1925, 1933). His specimen of Black-hooded Oriole was the first from Borneo.

Raffles Museum, 1925–1941.—The Raffles Museum sponsored a series of collecting trips to North Borneo in the late 1920s. These expeditions were led by Frederick Nutter Chasen, Curator of the Raffles Museum, and C. Boden Kloss, Director of Museums, Straits Settlements and Federated Malay States. Kloss collected on Mantanani Island in June 1924 and Mengalum Island in July 1928 (Kloss 1930a, 1931a). He and museum staff member Mengga made a large collection at Rayoh on the Padas River in June 1928 (Chasen and Kloss 1930a). During the 1928 trip, Kloss and J. L. Humphreys, governor of British North Borneo, scouted Mt. Kinabalu for an expedition to be led the following year by Chasen and H. M. Pendlebury, an entomologist from the Federated Malay States Museums (Kloss 1931b, c; Smith 1931; Pendlebury and Chasen 1932). Chasen and Kloss also collected extensively on Balambangan, Banggi, and Malawali islands, and on the mainland at Kudat and Bettotan in 1929 (Chasen and Kloss 1929, 1930a–c). Their discoveries are included in Chasen's (1935) list of Malaysian birds, which is an especially useful guide to bird name synonymy. In 1925, Chasen and Kloss sent Mengga to accompany C. M. Enriquez, a butterfly collector, on a trip to North Borneo (Enriquez 1927). During that trip, Mengga collected a series of birds on Kinabalu and at Benoni. The most recent Sabah collection in the Raffles Museum is that of L. A. Charles in 1941. Charles was evidently a planter and collected in the Padas–Pegalan River drainage, specifically at Weston, Saliwangan, and Melalap. Also see V. W. Ryves, Sabah Forest Department, and C. A. Gibson-Hill. The Raffles Museum zoological collection is now at the National University of Singapore.

Field Museum of Natural History, 1929–1980s.—The Field Museum's first expedition to Sabah was part of the Crane Pacific Expedition of 1929. Frank C. Wonder and Walter A. Weber collected for the Museum, mainly near Sandakan but also in Kota Kinabalu (Mayr and Camras 1938). In 1950, D. D. Davis, R. F.

Inger, and Gaun anak Sureng collected mammals, reptiles, amphibians, and birds in the Sapagaya and Kretam forest reserves. Their specimens and those of the Crane Expedition are at the Field Museum. Inger and Gaun returned and collected at Deramakot on the Kinabatangan River in 1956. Many specimens from that trip are at the Sarawak Museum. S. M. Goodman, a research ornithologist at the Field Museum, visited Mt. Kinabalu in April 1988 (Goodman 1989).

Sabah Forest and Wildlife departments, 1930–1990s.—The Forest Department originally oversaw wildlife management in Sabah. With respect to birds, its main responsibility was the management of edible-nest swiftlets and to a lesser extent the management of game and protected species. In 1964, a formal Game Branch was established within the Department. Subsequently, the Game Branch was renamed the Wildlife Section and eventually assumed wider responsibilities, becoming the Division of Wildlife and Forest Recreation. In 1988, the Wildlife Department separated from the Forest Department in Sandakan and moved to Kota Kinabalu. The remainder of the old Wildlife Division within the Forest Department became the Division of Forest Recreation and Urban Forestry (Payne 1988a). Among Forest Department officials known for bird studies are P. F. Burgess, deputy conservator during the 1960s (Burgess 1961a, b, 1964; Harrisson 1966; Gore 1968), and G. S. de Silva, a long-time Forest Department and Park wildlife officer (de Silva 1966, 1981; de Silva and Chong 1974; Jenkins and de Silva 1978).

As part of the Forest Department mandate to manage edible-nest swiftlets, Pastor Orolfo investigated caves around the state and collected specimens for identification in 1930 and 1931 (Orolfo 1964). Most of his specimens went to the Raffles Museum, but many are scattered elsewhere. From 1981 to 1984, Charles M. Francis, a Canadian volunteer, surveyed Sabah's swiftlet caves and studied swiftlet biology (Francis 1987). While working for the Forest Department, Francis contributed several other publications on birds and mammals and discovered Borneo's first known population of Striated Grassbird at Lahad Datu airport in October 1982 (see references under Francis in the Bibliography; also Sheldon et al. 1983; Payne et al. 1985; Sheldon and Francis 1985).

The Wildlife Section developed a synoptic collection of birds starting in 1981 at the Sepilok Nature Education Center. The Western Foundation of Vertebrate Zoology Expedition (1981–1983) contributed the bulk of this collection, but many specimens were added subsequently by Forest Department staff. Among those who collected or prepared additional birds for the collection were Simon Ambi, Jibius Dausip, Steven Sira, and P. L. Wong. This collection is now at the Wildlife Office in Tawau.

Harvard University Asiatic Primate Expedition, 1937.—During the spring and summer of 1937, J. A. Griswold collected on Kinabalu and H. G. Deignan collected at Sandakan, Abai, and in the Kalabakan area for Harvard University (Griswold 1939; Coolidge 1940; Peters 1940). Near Sandakan, Deignan collected one of only three Greater Flameback specimens existing from Borneo.

V. W. Ryves, 1938–1939.—Ryves contributed substantially to our understanding of Bornean bird life-histories by collecting eggs and birds in Sandakan, the Kota Belud area, on the lower slopes of Mt. Kinabalu, and on the Mantanani Islands. Ryves kept careful field notes, although many of these may be lost. We obtained copies of his notes on collections made in Sandakan from the Raffles

Museum, where his collection is housed. Much of Ryves work was summarized by Gibson-Hill (1949b), but unfortunately some of the locations cited by Gibson-Hill are imprecise and not always the same as on specimens.

K. V. Thompson, 1947–1970.—Tommy Thompson was a chartered accountant in Sabah for 18 years and traveled frequently and widely in his work, often to remote agricultural estates (e.g., up the Labuk and Segama rivers). While in retirement between 1966 and 1970, he recorded several first sightings of migratory bird species in Borneo.

C. A. Gibson-Hill, 1949–1950.—Gibson-Hill made one trip to Sabah, in July 1949, when he sailed from Labuan to Darvel Bay (Gibson-Hill 1950). He contributed to the ornithology of Sabah mainly by publishing a description of V. W. Ryves' egg collection (Gibson-Hill 1949b).

Cambridge University, 1956.—The Cambridge University Explorers' and Travellers' Club sent a group of students to Mt. Trus Madi in August and September 1956 and collected ca. 250 skins. The group was led by J. Bryant, a Clare College engineering student. Other Cambridge participants were geographers D. P. J. Wood and B. J. Moser, zoologist and photographer J. P. Woodall, and ornithologist John V. Boys. Tom Harrisson, curator of the Sarawak Museum, made local arrangements and sent R. Nyandoh anak Kadir, a preparator, to accompany the students. Despite their inexperience, the Cambridge group made several discoveries. Among these were range extensions of Friendly Bush Warbler, Island Thrush, Orange-headed Thrush, and Mountain Black-eye, three of which species were previously thought to be restricted to Mt. Kinabalu. Most of this collection resides at the Sarawak Museum. Unfortunately, a summary of the expedition was never published. All that exist are an unpublished report to the Explorers' Club (Bryant et al. 1956), a handwritten manuscript on the birds by J. V. Boys, which was held from publication by Harrisson (J. V. Boys, pers. comm.), and Boys' notebooks.

E. J. H. Berwick, 1950s–1960s.—As director of the Agriculture Department, a founder and first curator of the Sabah Museum, and subsequently director general of the International Union for the Conservation of Nature (Harrison 1967), Berwick was a productive amateur who contributed substantially to Sabah ornithology. His records from Tempasuk plain and the Labuk River are especially noteworthy. Also see Sabah Agriculture Department.

Bertram E. Smythies, 1950s–1970s.—Smythies checklist (1957) and handbook, *The Birds of Borneo* (1960), opened the way for bird study in Borneo. During his tenure in the Sarawak Forest Department from February 1949 to May 1964, he visited Sabah several times, most notably during the Royal Society Expedition to Mt. Kinabalu in 1961. His final contribution on Sabah's ornithology was a chapter in the book *Kinabalu, Summit of Borneo* (Luping et al. 1978; reprinted in Wong and Phillipps 1996). The fourth edition of *The Birds of Borneo* (Smythies 2000:707–710) contains a biography of Smythies (1912–1999).

British Museum (Natural History) North Borneo Expedition, 1956.—The British Museum sent Reginald Sims and E. Banks, former Curator of the Sarawak Museum, on a bird collecting expedition to the East Coast of Sabah during the spring and summer of 1956. Their primary goal was to explore interior mountains. To this end, they selected Mt. Ensuan (= Mt. Meliau) in the Labuk River drainage and Mt. Magdalena north of Tawau. They also collected some birds at Sandakan,

Gomantong, Beluran, and Tawau; on Bohayen, Bohey Dulang, Karindingan, Sangkat, and Sipadan islands near Semporna; and along the Labuk, Meliau, and Merutai rivers. Their results are largely unpublished, although Banks (1982) wrote a nostalgic (and apparently not very accurate) overview. Sims published papers on edible swiftlet nests (1959a) and dwarf kingfishers (1959b). He also prepared an extensive report (R. Sims, unpubl.), but was discouraged from publishing it (R. Sims, pers. comm.). The British Museum North Borneo Expedition collection is housed at the British and Sabah museums and consists of 560 specimens of 191 species.

Dennis M. Batchelor, 1958–1964, 1984–1990s.—While serving as relief manager on rubber estates in the Kimanis Bay area and on the Klias Peninsula 40 years ago, Batchelor collected copious notes on Sabah's birds. Since the mid-1980s, he has led birding tours to Sabah. His careful records have been an invaluable source for our species accounts.

The Phillipps Family, 1960s–1980s.—Centered at their Tanjung Aru home, Anthea, Karen, Charles, Quentin, and their mother Susan Phillipps contributed substantially to our knowledge of Sabah's wildlife. As park ecologist during the 1980s, Anthea compiled many bird records (Phillipps 1986) and also helped edit the second edition of *Kinabalu, Summit of Borneo* (Wong and Phillipps 1996), which contains an updated bird checklist (Jenkins et al. 1996). Karen participated in Western Foundation surveys of Tempasuk and Trus Madi (S. Phillipps 1982; Sheldon and Francis 1985), and is best known for her illustrations (Payne et al. 1985; MacKinnon and Phillipps 1993). Quentin recorded bird notes and participated in the MAPS banding program (Phillipps and Phillipps 1970). With Anthony Lamb, he also surveyed birds on Mt. Tambuyukon (Phillipps 1982), discovering Friendly Bush Warbler, Island Thrush, and Mountain Black-eye for the first time outside of Mt. Kinabalu and Mt. Trus Madi.

University of Malaya, 1960s–1990s.—Two ornithologists from the University have contributed extensively to Bornean ornithology: Lord Medway (now the Earl of Cranbrook) and David R. Wells. While a Ph.D. student at the University, Cranbrook studied edible-nest swiftlets, mainly in Sarawak (citations provided in Francis 1987). He also participated in the 1964 Royal Society Expedition to Mt. Kinabalu, where he banded and collected birds. After leaving Malaysia, he edited the third edition of *The Birds of Borneo* (Smythies 1981), which updated many Sabah species accounts. David Wells has served as ornithological advisor to the Worldwide Fund for Nature (Malaysia), the Asian Wetland Bureau (Wetlands International), and various Sabah government agencies (Sabah Parks and Sabah Museum). His formal expeditions in Sabah include those to Balambangan Island, Gaya Island, Danum Valley, Klias Peninsula, Merintaman–Menggalong Forest Reserve, and Sabahat. See citations under Wells in the Bibliography.

Mary M. Norman, 1961–1962.—Norman visited Sabah from June 1961 to February 1962. She wrote a paper summarizing sightings near her home on Sebatik Island and during visits to timber camps with her husband, who was a medical officer (Norman 1964). Some of her records are controversial (e.g., Brown Cuckoo Dove at Sebatik Island and Black-and-white Bulbuls as the commonest species in mangroves), but others are intriguing (Bornean Barbet at Mt. Tukok).

Royal Society, 1961, 1964, 1985–1990s.—The British Royal Society sponsored two expeditions to Mt. Kinabalu, one in 1961 and another in 1964. The principal

ornithologists of these expeditions were B. E. Smythies in 1961 and Lord Medway (= Earl of Cranbrook) in 1964. The first expedition was well documented (Corner 1964; Smythies 1964b), but only incidental reports exist for the second (Gore 1964a; Fogden 1965). During the second expedition, birds were collected and banded by the University of Malaya (Cranbrook, pers. comm.). Since the mid-1980s, the Royal Society has funded long-term forest research in the Danum Valley Conservation Area through an alliance with the Danum Valley Management Committee (Marshall 1992). This project has included two major studies of the effects of logging on bird populations, one by Andrew D. Johns (1987–1988) and another by Frank Lambert (1989–1990). See references under Danum Valley Conservation Area and Bole River in the Gazetteer.

Bernice P. Bishop Museum Expedition, 1962–1963.—Max C. Thompson of the Bishop Museum and Antonio Garcia of the Sabah Agriculture Department led a major collecting expedition from 24 June 1962 to 14 January 1963. About 1,300 specimens representing 224 species were collected from locations including Quoin Hill, Tawau, Kalabakan Forest Reserve, Karindingen Island, Si Amil Island, Lahad Datu, Kuala Samawang, Gum Gum Agricultural Station, Lamag, Pintasan, Kuamut, Malua, Ka-Karis, Tongod, Tuaran, Telipok, Mt. Rumas, Tenom, Kampung Banjar, and Garinono Oil-Palm Research Station (Ulu Dusun). This expedition is notable for its thorough documentation (Thompson 1966) and many contributions to our knowledge of Sabah bird distribution. Specimens from the Bishop Expedition are located at the Bishop, Sabah, Field, University of Kansas, University of Malaya, and Smithsonian museum collections. Also see Sabah Agriculture Department.

Sabah Agriculture Department, 1962–1965.—The Agriculture Department, under the leadership of E. J. H. Berwick, developed a bird collection in the early 1960s. Among its collectors were Berwick, S. F. W. Chong, A. D. Garcia, and N. F. Wong. The Department collected mainly in the vicinity of its research stations at Tuaran, Tawau Hills, and Garinono Forest Reserve (Ulu Dusun). Many of the Agriculture Department's specimens were also collected by the Bishop Museum Expedition of 1962–1963 (see above). The Agriculture Department no longer plays a role in bird studies, and most of its collection has been transferred to the Sabah Museum.

M. E. J. Gore, 1963–1966.—Gore lived in Kota Kinabalu from August 1963 to March 1966. He wrote a checklist of the birds of Sabah (Gore 1968) and some papers on bird observations (Gore 1964a, b; Harrisson 1967).

Sabah Museum, 1965–present.—Sabah museum has a tradition of ornithology left by its founder and first curator, E. J. H. Berwick. The museum's bird collection is built upon the old Agriculture Department collection (see above), and has benefited particularly from the efforts of staff members Henry Tsen, Raymond Goh, Jaffit Majuakim, Rob Stuebing, and Anna Wong. With funding from the MacArthur Foundation, the museum undertook several collecting expeditions to poorly studied regions of Sabah in the 1990s (e.g., Muruk Miau and Imbak Valley). As a result of these trips and other efforts, the Museum possesses specimens of three of Sabah's rarest and least known bird species: Bornean Peacock Pheasant, Bornean Ground Cuckoo, and Hill Blue Flycatcher. A review of the Sabah Museum's bird collection in 1993 listed 1,254 specimens from 277 species (Majuakim 1993), but the collection has grown substantially since then.

Sabah Parks, Sabah Wildlife Department, and Sabah Foundation, 1970s–1990s.—In recent years, these institutions and the Sabah Museum have been the primary agencies for cooperative wildlife study in Sabah. They have often co-sponsored expeditions with conservation organizations or research institutions (e.g., Louisiana State University, the Royal Society, Academy of Natural Sciences of Philadelphia, Universiti Malaysia Sabah, and WWFM [see below]). Sabah Parks, under the leadership of Datuk Lamri Ali and Francis Liew, has been active in bird banding, collecting, censusing hornbills, and surveying birds at Crocker Range, Kinabalu, Pulau Tiga, and Tawau Hills parks. These programs have benefited especially from the activities of Maklarin Lakim and Alim Biun. Particularly noteworthy is the Zoological Collection established at Kinabalu Park. Among many projects, the Sabah Foundation has sponsored expeditions (e.g., to Maliau [Marsh 1989]) and promoted conservation and long-term research productivity at Danum Valley (Marsh and Greer 1992; Marshall 1992). The Sabah Wildlife Department, under the leadership of Patrick Andau, has overseen all these operations and strongly supported wildlife research in the state.

Worldwide Fund for Nature (Malaysia) (WWFM), 1970s–1990s.—Starting in the 1970s, WWFM has supported many conservation surveys and projects in Sabah. These include collaborations with the Park and Forest departments to scout potential parks or protected areas, such as Balambangan Island, Danum Valley, the Semporna Islands, Klias Peninsula, and the Menggalong–Merintaman Forest Reserve. Much of the bird work for these reports was conducted by David Wells (University of Malaya). With the Sabah Forest Department, WWFM also sponsored the comprehensive survey by Glyn Davies and Junaidi (John) Payne of large mammals and birds in Sabah during 1979–1981 (Davies and Payne 1982). More recently, Payne completed a series of surveys and reports on behalf of WWFM (e.g., of the Kota Belud Bird Sanctuary and Kulamba Wildlife Reserve). In April and May 1988, WWFM and the Sabah Foundation funded a major expedition to Maliau Basin, one of the last undisturbed areas in Sabah's interior (Marsh 1989; Yong et al. 1989). Currently, WWFM is supporting the establishment of a bird sanctuary in the lower Kinabatangan valley (Sharma 1992; G. Davison, pers. comm.).

Yale University Expedition, 1976–1977.—To obtain genetic samples for a molecular phylogenetic study of birds of the world, Yale University Professor Charles G. Sibley sent a group to collect birds and tissues in Sabah. F. H. Sheldon organized the expedition in September 1976. Milan G. Bull, of the Connecticut Audubon Society, and Richard Semba, a Yale undergraduate, joined in December 1976. Local participants were Taising bin Matanggal, Philip Hee, and David Jenkins (Assistant Director of Sabah Parks). The expedition collected briefly at Poring, Membakut, Mandahan, Papar, Wallace Bay, and on Gaya Island, and extensively at Keningau, Saliwangan, Sinsuran Road, and Brumas Timber Camp. Collecting ended in April 1977. Among its discoveries was the first record of Orange-headed Thrush outside of Mt. Kinabalu and Mt. Trus Madi. The tissues collected on the expedition served as the main source of Asian bird DNA for the DNA-hybridization studies of Sibley (Sibley and Ahlquist 1990; Sibley and Monroe 1990). Specimens are housed at the Delaware State Museum of Natural History. No report of the Yale Expedition was published. Its records are summarized in

our species accounts. Some data were cited by Jenkins and de Silva (1978), Mitra and Sheldon (1993), and Jenkins et al. (1996).

INTERWADER (Asian Wetland Bureau and Wetlands International), 1980s–1990s.—Under the leadership of D. Parish, INTERWADER and its more recent incarnations, Asian Wetland Bureau and Asia-Pacific wing of Wetlands International, has conducted several surveys of wading bird sites in Sabah. These include Benoni, Bongawan, Gaya Bay, Kuala Penyu, Kulamba, Lok Kawi, Mempakul, Mumiang, Padas Damit, Papar, Sepilok, Tambisan, Tempasuk, and Weston. Related surveys were conducted by D. Beadle and A. Whittaker, who provided us with their thorough report (Beadle and Whittaker 1985), and R. V. Lansdown, who studied heron ecology and distribution (see Bibliography). The *INTERWADER Annual Reports* and the *Asian Wetland News* are useful sources of information on wader conservation in Sabah, e.g., Parish and Wells 1984; Parish et al. 1986, 1987.

D. M. Simpson, 1981.—Capt. Simpson commanded the *Pacific Teak*, a support boat for the Tembungo oil platform. Although only on site from 15 June to 31 October 1981, he obtained a valuable set of observations of sea birds and northern migrants occurring at the platform (Simpson 1982a, b). He also obtained specimens for the Sabah Museum.

Western Foundation of Vertebrate Zoology (WFVZ), 1981–1983.—The WFVZ compiled the most extensive collection of Sabah's birds to date (ca. 4,500 specimens of 400 species). F. H. Sheldon and J. Kennard led this expedition, arriving in Sabah on 31 March 1981 and leaving at the end of August 1983. Twenty naturalists participated in the field work: S. Ambi, S. Bond, G. Davies, G. Falxa, D. Foote, C. Francis, D. Gardiner, T. Howell, L. Kiff, B. King, A. Mack, M. Marin, C. Marsh, N. Palavan, J. Payne, K. Phillipps, J. Schmitt, L. Sussman, D. Yong, and J. Zoeger. Major collecting sites were Bole River, Brumas Camp, Imbak River, Labau River, Maang, Megatai, Rinangisan, Sabah Softwoods, Saliwangan, Sinsuran Road, and Trus Madi. Minor sites were Binsulok, Gaya Bay, Gomantong, Kota Kinabalu suburbs, Labuk Road, Lahad Datu, Mantanani Island, Membakut area, Mengalum Island, Menggalong, Kinabatangan River, Papar, Segama River, Semporna Islands, and Wallace Bay. In addition to collecting, the expedition surveyed birds in Kinabalu Park, Poring, Sabah Softwoods, Sepilok, Tempasuk plain, and Pulau Tiga. Among WFVZ discoveries were Sabah's first Thick-billed and Brown-backed flowerpeckers (Sheldon 1985). The WFVZ publications may be found in the Bibliography mainly under Sheldon; they also include Ahlquist et al. (1984), Marin and Sheldon (1987), and Mitra and Sheldon (1993). Numerous reports filed by the expedition may be found at the Sabah Parks and Wildlife Department offices, the Socio-Economic Unit of the Malaysian Prime Minister's Department, and in the WFVZ archives.

Universiti Kebangsaan Malaysia (UKM; Sabah campus), 1983–1992.—In 1983 under the guidance of Professors Ghazally Ismail and Rob Stuebing, the Sabah campus of UKM (UKMS) established a collection of vertebrates. Since then, the University has collected and surveyed many sites throughout the state (e.g., Danum, Lawa Mandau, Kauran River, Pangas [Rompon] River, Mt. Lumaku, Mak-aniton, Sayap, Selagon, Tawau Hills, and Tabin). The University also has surveyed several islands (Balambangan, Banggi, Gaya, and Tiga) and coastal sites (Klias Peninsula, Binsulok, Kudat, and Lahad Datu). In 1994, UKMS became the Univ-

ersiti Malaysia Sabah (UMS). UKMS and UMS publications on birds include Ahmad bin Darus and Stuebing (1986), Stuebing and Zazul (1986), Stuebing and Nor (1995), and Ahmad (1999).

Universiti Kebangsaan Malaysia (Sabah campus) and The Academy of Natural Sciences of Philadelphia (ANSP) Expedition, 1989.—From 27 May to 4 July 1989, UKMS and the ANSP obtained specimens for molecular genetic studies and photographed birds for the ANSP's VIREO photograph collection. Study sites included Klias, Lumaku, Makaniton, Sinsuran Road, and Mt. Danum. Participants from the Academy were F. H. Sheldon and D. Wechsler. Participants from UKMS and Sabah Parks were P. Anggot, K.-H. Han, L. Kimsui, B.-H. Lee, S. Mohd. Nor, R. Stuebing, P. Sungkit, and P. Yambun. The trip to Mt. Danum was part of a larger UKMS expedition to survey flora and fauna in that region, and F. Lambert (Royal Society) served as principal ornithologist.

Robert G. Moyle, 1998–2000.—Moyle is a Ph.D. student at Louisiana State University who is studying several problems in Sabah bird evolution using molecular genetic comparisons. Among his projects are a study of endemism in montane species, *Stachyris*-babbler and barbet phylogenies, and White-crowned Forktail population genetics. He has visited Sabah three times: in 1998 to set up his research program; in 1999 to collect at Tawau Hills, Mt. Kinabalu, Crocker Range Park Headquarters, and Mt. Trus Madi; and in 2000 to collect at Tawau Hills, Imbak Valley, and Sayap. In the course of his work, he has contributed many specimens to the Sabah Museum, Sabah Parks Zoological Collection, and LSU Museum of Natural Science.

GAZETTEER: ANNOTATED LIST OF ORNITHOLOGICAL STUDY SITES

Localities in Sabah where birds have been collected or recorded are described in this section. Under each locality heading is a description of the site, names and dates of individuals or expeditions that visited it, and references. The list of collections at each site is virtually complete, but bird-watching records are not exhaustive. Sites for which specimens or substantial observational data exist are plotted in Figure 6. As indicated by this figure, certain areas (e.g., northwestern and southeastern Sabah) have been well surveyed, but others are poorly known (e.g., northeastern and south-central Sabah).

In listing localities, we have tried to circumvent language problems by translating Malay descriptors to English. These translated words include *bukit* (hill), *danau* (lake), *gunung* (mountain), *kampung* (village, sometimes abbreviated as “Kg.”), *padang* (field or open area), *pulau* (island), *sungai* (river), *tanjung* (promontory, sometimes abbreviated “Tg.”), and *teluk* (bay). Sungai Bole is thus called Bole River, and Kampung Maang is simply Maang or Kg. Maang. However, certain Malay descriptors are simpler or more useful than their English counterparts, especially *kuala*, river mouth or confluence of rivers, and *ulu*, the headwaters of a river or river system. Kuala Papar is the mouth of the Papar River; Ulu Papar is the Papar River watershed in the Crocker Range. We retain these useful terms. We also retain the name Pulau Tiga, because that name is more widely recognized than Tiga Island.

Because variations in site spellings are common, we have cross-referenced many alternatives. However, some synonyms are inevitably lacking, and it may

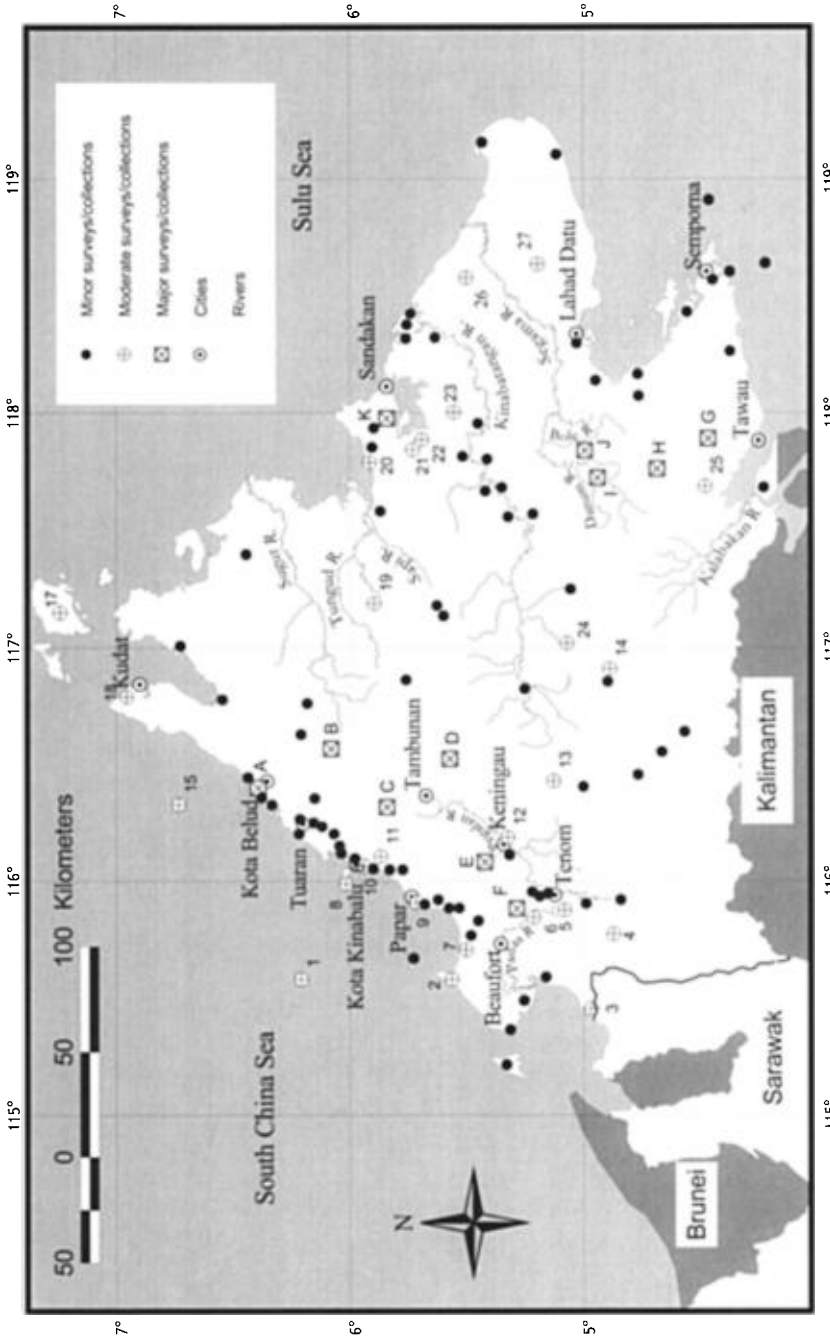


FIG. 6. Bird collecting and survey sites in Sabah. (A) Tempasuk, (B) Mt. Kinabalu, (C) Sinsuran Road, (D) Mt. Trus Madi, (E) Rinangisan, (F) Saliwangan, (G) Tawau Hills, (H) Brumas, (I) Danum Valley, (J) Bole River, (K) Septiok, (1) Tembungo, (2) Binsulok, (3) Merintaman-Menggalong, (4) Mt. Lumaku, (5) Angimon, (6) Rayoh, (7) Membakut, (8) Gaya Island, (9) Papar, (10) Kota Kinabalu, (11) Maang, (12) Keningau, (13) Labau River, (14) Maliau, (15) Mantanani Island, (16) Balambangan Island, (17) Banggi Island, (18) Kudat, (19) Mt. Meliau, (20) Labuk Road (Gum Gum), (21) Garinono, (22) Bettotan, (23) Gomantong, (24) Imbak River, (25) Kalabakan, (26) Kretam, (27) Tabin.

be necessary for readers to search all names starting with a particular letter to find a desired locality. Sites on Mt. Kinabalu, whose names originated in the Dusun language, are usually provided with two spellings. Those in parentheses are Dusun spellings from Beaman et al. (1996).

Most locality coordinates have been read from Gazetteer No. 10 of the United States Board on Geographic Names (1955, 1970), Tactical Pilotage Chart (TPC L-11BG, scale 1:500,000, Ministry of Defense, London, UK, 1976), and from a Sabah map (Rampaian 37 Jenis C, Cetakan 2-PPNM, Director of National Mapping, Malaysia, 1981). Other coordinates are from Tangah and Wong (1995) and gazetteers appended to papers (Davis 1962; Davies and Payne 1982; Stuebing 1991; Mat-Salleh 1993; Beaman et al. 1996). Because access to fine-scale maps of Sabah is limited by the government, and many site names describe wide areas, some coordinate values are approximations. Localities that lack coordinates could not be found in gazetteers or on maps.

ABBREVIATIONS

Because some persons provided substantial information in the form of personal communications and notes, we acknowledge their contribution with their initials to save space. Similarly, we acknowledge some collectors, collections, and authors of major papers with their initials. The abbreviations are as follows.

ADG	Antonio D. Garcia, Sabah Agriculture Department
AMNH	American Museum of Natural History
ANSP	Academy of Natural Sciences of Philadelphia
BMNBE	British Museum North Borneo Expedition, 1956
BMNH	British Museum (Natural History)
B&W	D. Beadle and A. Whittaker (1985)
CMF	Charles M. Francis
DMB	Dennis M. Batchelor
DMS	D. M. Simpson (1982a, b)
FHS	Frederick H. Sheldon
FMNH	Field Museum of Natural History (Chicago Natural History Museum)
GD	Geoffrey Davison
KVT	K. V. Thompson
LSUMNS	Louisiana State University Museum of Natural Science
MAPS	Migratory Animal Pathological Survey (United States Army Research and Development Group, Far East)
MCT	Max C. Thompson (1966), Bishop Museum Expedition, 1962–1963
MCZ	Harvard University's Museum of Comparative Zoology (Asiatic Primate Expedition, 1937)
NAMRU	United States Naval Medical Research Unit
RGM	Robert G. Moyle
RMC	Raffles Museum Collection (formerly the National University of Singapore Collection)
SAD	Sabah Agriculture Department (collections housed at Sabah Museum)
SMC	Sarawak Museum Collection

SWD	Sabah Wildlife Department and its predecessors, the Game Branch and the Wildlife Section of the Forest Department
UKMS-ANSP	University Kebangsaan Malaysia (Sabah Campus)—Academy of Natural Sciences of Philadelphia Expedition
USNM	United States National Museum (Smithsonian)
WFVZ	Western Foundation of Vertebrate Zoology
WWFM	World Wildlife Fund Malaysia (= Worldwide Fund for Nature, Malaysia)
YUE	Yale University Expedition, 1976–1977

LOCALITIES

Abai.—5°47'N, 118°25'E. See under Kinabatangan River.

Abai.—A village on the coast W of Kota Belud (6°23'N, 116°21'E). Also see Kota Belud Bird Sanctuary. *Elevation*: Sea level. *Habitats*: Currently consists of mangroves, strand, coastal scrub, and grasslands (pastures). *Sources*: F. Witt, no date (Everett 1889); Marchesa Expedition, first week in June 1883 (Guillemard 1889); J. Whitehead, Feb.–Mar. 1886, Dec. 1887 (Sharpe 1889a; Whitehead 1893; Gibson-Hill 1952); V. W. Ryves, Jan. 1939 (Gibson-Hill 1952; RMC specimen data). *Remarks*: Abai was the main starting point for early trips to Mt. Kinabalu (Moulton 1915), and many birds were collected in the area. It still serves as launching site to the Mantanani Islands.

Alab.—5°51'N, 116°22'E. See Sinsuran Road.

Ambong and Ambong Bay.—A bay on the W coast near Kota Belud (6°19'N, 116°18'E) and a village (6°18'N, 116°20'E). Also see Lamas Mountain and Tuaran. *Elevation*: Sea level. *Habitats*: 2° scrub, rice fields, and mangroves. *Sources*: Sabah Museum, mainly Jan. and Apr. 1970, some banding in 1971 (McClure and Leelavit 1972; specimen data); D. R. Wells, 2 Nov. 1980 (Wells 1981, pers. comm.). *Remarks*: H. Tsen of Sabah Museum banded birds for MAPS here.

Anginon.—A peak 8 km SW of Tenom on the SW side of the Padas Gorge (5°06'N, 115°52'E). *Elevation*: 1,198 m. *Habitats*: 1° oak and “moss forest,” with considerable amounts of climbing bamboo and some 2° scrub. *Sources*: MCT, Dec. 1962 (Thompson 1966, pers. comm.).

Apas-Balung Area.—12–15 km NE of Tawau between the Apas (ca. 4°15'N, 118°04'E) and Balung (ca. 4°18'N, 118°10'E) rivers. Also see Quoin Hill. *Elevation*: Unspecified, but probably 50–150 m. *Habitats*: 1° and 2° lowland forest during Norman's time; nowadays, the area has been completely converted to agricultural plantations. *Sources*: M. Norman, June 1961–Feb. 1962 (Norman 1964). *Remarks*: Norman visited a timber concession called “Apas-Balung.”

Aru, Tanjung.—See Tanjung Aru.

Ayer Simpul.—See Balambangan Island.

Bai Island.—In Sandakan Bay (5°46'N, 118°06'E). *Elevation*: Sea level. *Habitats*: Closed forest, beach strand, coconut plantations, and scrub. *Sources*: W. B. Pryer, ca. 1883–1898 (Tregonning 1954); Bartsch, 1–3 Mar. 1908 (Mearns 1909); V. W. Ryves, 5 June 1938 (Gibson-Hill 1949b, 1952; RMC specimen data). *Remarks*: Pryer owned the island, on which he planted coconut, coffee, and areca nut palms, and ran cattle.

Bakapit.—In the southern coastal region of the Dent Peninsula (4°59'30"N,

118°41'E). *Elevation*: Ca. 200 m. *Habitat*: Logged upland forest. *Sources*: WWFM, 9–17 Sept. 1981 (Davies and Payne 1982).

Bakungan (Bakkungaan) Kecil Island.—6°10'N, 118°07'E. See Turtle Islands.

Baladut.—5°26'N, 118°11'E. See under Kinabatangan River.

Balak Island.—7°08'N, 117°08'E. See Banggi Island.

Balambangan Island.—Off northernmost Sabah (7°17'N, 116°55'E). The island includes the sites Tanjung Periuk, Teluk Lung (beach), Tanjung Panbatu (beach), Sekrumit River (mangrove), Ayer Simpul (Wells 1978, 1982c). *Elevation*: Sea level to 150 m. *Habitats*: Open shore, beach strand, reed marshes, swamp-thickets, mangroves, heathland, and inland closed-canopy forest. Heathland has apparently increased since 1927 at the expense of closed forest and also possibly reed marshes. Limestone caves occur at 7°12'N, 116°51'E and 7°13'N, 116°53'E and are inhabited by Edible-nest and mossy-nest swiftlets (Francis 1987). *Sources*: F. N. Chasen and C. B. Kloss, 9–14 Sept. 1927 (Chasen and Kloss 1930a, b; RMC specimen data); Sabah Park Survey, 7–13 Apr. 1977 (Wells 1978, 1982c); UKMS and SWD, 4–7 Apr. 1984 (UKMS and SWD catalog data). *Remarks*: Chasen and Kloss collected on Tanjung Periuk. Wells (1978) described habitats and speculated about changes since Chasen and Kloss's 1927 expedition. Wells (1982c:10) provided a map with site names.

Bal Estates.—In the Merutai River area NW of Tawau (4°21'N, 117°48'E). Also see Quoin Hill and Tawau Hills Park. *Elevation*: 50–400 m. *Habitats*: Cocoa and oil-palm plantations. *Sources*: WWFM, 11–16 and 20 July 1980 (Davies and Payne 1982).

Balung Estate.—4°22'N, 118°08'E. See Quoin Hill.

Balung River.—4°18'N, 118°10'E. See Apas-Balung Area.

Bambangan River.—6°10'N, 116°24'E. See Pinosuk Plateau under Kinabalu Mountain.

Bandau.—At the foot of Marudu Bay on the Bandau River (ca. 6°31'N, 116°45'E), which lies between the Bongon and Langkon rivers (maps in Rutter 1922; Gore 1968). Also see Bongon, Madalon Mountain, Marudu Bay, Sungai River, and the homonymous site under Membakut. The name "Bandau" does not appear on modern maps and may be synonymous with Kota Marudu. When cited as a bird locality, Bandau probably refers to a wide area. *Sources*: E. J. H. Berwick, Feb. 1958 (Smythies 1963); Sabah Museum, Nov. 1970 (Sabah Museum specimen data).

Bandau.—See under Membakut.

Banggi Island.—Off northernmost Sabah (7°17'N, 117°12'E). Includes also Balak Island (7°08'N, 117°08'E) visited by Gore in July 1965. *Elevation*: Sea level to 533 m. *Habitats*: Undescribed by ornithologists, but A. Lamb (pers. comm.) noted that the interior is mostly logged forest and that much of the area was destroyed by fire during the El Niño drought in 1983. *Sources*: Marchesa Expedition, a few days in late May and early June 1883 (Guillemard 1885, 1889; Chasen and Kloss 1930b); A. H. Everett, June 1886, Feb. 1887, Jan. 1893 (Everett 1886, 1889; Sharpe 1894b; Chasen and Kloss 1930b); F. N. Chasen and C. B. Kloss, 31 Aug.–8 Sept. (Chasen and Kloss 1930a, b; RMC specimen data); M. E. J. Gore, June–July 1965 (Gore 1968); UKMS and SWD, 7–8 Apr. 1984 (UKMS and SWD catalog data). *Remarks*: Everett held a Chartered Company

post at Kudat and probably visited Banggi several times (Chasen and Kloss 1930b). The UKMS-SWD group collected terns off the coast of Banggi.

Banjar.—"Kampung Banjar, Mile 29, Keningau," (Thompson 1966:382). Exact location, elevation and habitat unknown. *Sources*: ADG, Nov. 1963 (Thompson 1966).

Baru Jumpa.—"18 Miles [29 km] S of Tenom" (exact locality unknown). Also see Tomani. *Elevation*: 275 m. *Sources*: ADG, Jan.–Feb. 1963 (University of Malaya specimen data).

Batang Ipil.—See Segaliud–Lokan Forest Reserve.

Batang River.—5°55'N, 118°02'E. See Sandakan.

Batangan.—5°30'N, 117°54'E. See under Kinabatangan River.

Battleship Island.—4°38'N, 118°39'E. See Sibuan Island under Semporna Islands.

Batu Mandi.—Two large sandstone rocks off the W coast of the Kudat peninsula at Tanjung Tambuluran (6°53'N, 116°37'E). *Sources*: CMF, 23 Feb. 1984 (Francis 1987). *Remarks*: A site where Edible-nest and Black-nest swiftlets nest.

Batu Pang.—4°27'N, 118°11'E. See Kalumpang.

Batu Punggul.—On the Sepulut River (4°38'N, 116°36'E). *Elevation*: 300 m. *Habitats*: Limestone outcrop that was surrounded by 1° riparian and dipterocarp forest in 1988. Most of this forest has since been logged. *Sources*: CMF and K. Phillipps, 24–26 May 1984 (Francis 1987, pers. comm.); Sabah Museum, Mar. 1988 (R. Goh, pers. comm.). *Remarks*: Batu Punggul has caves that apparently contained nests of Edible-nest Swiftlets at one time, but not when visited by Francis and Phillipps in 1984. The only swiftlets they observed were Mossy-nest Swiftlets. A virgin forest reserve has been established around the limestone pinnacle. This 2,000-ha reserve is bisected by the Sapulut River and its avifauna has not been thoroughly surveyed.

Batu Putih.—5°25'N, 117°55'E. See under Kinabatangan River.

Baturong Caves.—Limestone caves in Madai Forest Reserve (4°43'N, 117°59'E) along the Binuang River (4°44'N, 118°02'E). *Elevation*: 10–315 m. *Habitats*: Sabah Museum specimen labels indicate "1° forest." Francis (1987) described the caves as surrounded by a small island of lowland dipterocarp forest no more than a few kilometers in diameter, which may extend N and W and has been selectively logged. Limestone vegetation, 2° growth, and oil-palm plantations also occur in the area. *Sources*: P. Orolfo, Oct.–Nov. 1930 (RMC specimen data, USNM catalog data); Sabah Museum, July 1978, Aug. 1980, Mar. 1982 (specimen data); CMF, periodically 1982–1984 (Francis 1987). *Remarks*: An important swiftlet nest site with more than 36 caves. Baturong is also one of only two sites in Sabah where Bornean Ground Cuckoo has been collected. *References*: Daly (1888).

Batu Timbang.—Caves on a 777-m hill in the Gunung Rara Forest Reserve (4°58'N, 117°05'E). *Elevation*: 200–750 m. *Habitats*: 1° forest (as of 1984) and forest on limestone. *Sources*: YUE, Apr. 1977; CMF, 1984 (Francis 1987). *Remarks*: A cave site with all four swiftlet species nesting. *References*: Daly (1888), Bernard and Diun (1999).

Bauto (Boto).—On the Labuk River, 5°40'N, 117°12'E. *Elevation*: Ca. 200 m. *Sources*: E. J. H. Berwick, 8 Feb. 1959 (Smythies 1963).

Beatrice River.—4°52'N, 117°40'E. See Danum Valley.

Beaufort Hill.—3 km NW of Beaufort town (5°22'N, 115°45'E). *Elevation*: 150 m. *Habitats*: Until the 1980s, most of the hills around Beaufort were covered in 1° dipterocarp forest. This forest was some of Sabah's richest in terms of tree species. It was logged and subsequently damaged by the El Niño fire in the early 1980s (Beaman et al. 1985; J. Beaman and A. Lamb, pers. comm.). *Sources*: L. A. Charles, Mar. 1941 (RMC specimen data).

Bekuku.—4°41'N, 115°53'E. See Tomani.

Beluran.—At the mouth of the Labuk River (5°54'N, 117°33'E). Birds were also collected at Kolapis, ca. 7 km E of Beluran on the S shore of Kuala Labuk (5°53'N, 117°36'E). *Elevation*: Sea level. *Habitats*: Grassy fields, gardens, 2° growth, mangroves, mudflats, and estuary. Some specimen labels say "edge of 1° forest." *Sources*: BMNBE, May 1956 (Banks 1982, pers. comm.; R. Sims, unpubl.; BMNH and Sabah Museum specimen data).

Bengkoka River.—SE of Kudat across Marudu Bay (6°50'N, 117°03'E). Pitas Estate is located at 6°43'N, 117°04'E. *Elevation*: Sea level. *Habitats*: Undescribed, but probably mangroves and 1° and 2° swamp and coastal forest. Whitehead's notes suggest that he did not find many bird species normally expected in lowland dipterocarp forest (e.g., Spotted Fantail). KVT noted that mangrove in that area ends abruptly and suggested that the region was probably cleared shortly after Whitehead's visit. Tobacco was planted in ca. 1900 and then rubber. *Sources*: J. Whitehead, Sept.–Nov. 1885 (Sharpe 1889a; Whitehead 1893); F. N. Chasen and C. B. Kloss, Sept. 1927 (Chasen and Kloss 1930a); KVT, intermittently 1950s–1960s.

Benoni.—A small village on the Benoni River ca. 4 km S of Papar (5°41'N, 115°55'E). Also see Papar. *Elevation*: Sea level to 5 m. *Habitats*: Padi, fields, marsh, ponds, mud flats, heath forest, mangroves, estuary, and beach strand. *Sources*: Marchesa Expedition, first week in June 1883 (Guillemard 1885, 1889); C. M. Enriquez and Mengga, 29 June–6 July 1925 (Enriquez 1927; RMC specimen data); WFWZ, intermittently 1981–1983; B&W, Sept., Nov., and Dec. 1984; R. V. Lansdown, Sept. (year unspecified, Lansdown 1989). *Remarks*: Early in the 20th century, Benoni was a resort. Membakut and Sapong Rubber Estates rented beachside bungalows to visitors (Rutter 1922), and Enriquez's group collected from one of these. More recently, surveys and collections have been made inland and closer to the village along the Kota Kinabalu–Beaufort highway, where there are mudflats, marsh, and swamp.

Benunuk.—"Ulu Padas, Beaufort" (exact locality unspecified). *Habitat*: "1° forest." *Sources*: Sabah Museum, Dec. 1981 (specimen data).

Berhala Island.—At the mouth of Sandakan Bay (5°52'N, 118°08'E). *Elevation*: Sea level to 180 m. *Habitats*: Sandstone hills with caves, heavy forest on the western side, sandy beaches, and coconut plantations. *Sources*: W. B. Pryer, Feb. 1878 (Tregonning 1954); C. F. Adams, May 1887–Feb. 1888 (Elliot 1890, 1891); F. N. Chasen and C. B. Kloss, July 1929 (RMC specimen data); BMNBE, May 1956 (R. Sims, unpubl.); J. C. and M. G. Pearson, 6 Apr. 1981 (pers. comm.). *Remarks*: Edible-nest and Glossy swiftlets nest in the sandstone caves (Daly 1888; Francis 1987). The Pearsons collected terns offshore.

Bettotan (Betotan).—Ca. 30 km from Sandakan at the western end of Sandakan Bay (5°47'N, 117°52'E). Also see Segaliud–Lokan Forest Reserve. *Elevation*: Sea level. *Habitats*: Undescribed, but KVT believed that it was 1° forest at the time

of Chasen and Kloss, and logged between 1935 and 1940 by Sabah Timber Co. *Sources:* F. N. Chasen and C. B. Kloss, July–Aug. 1927 (Chasen and Kloss 1930a; RMC specimen data).

Binsulok Forest Reserve and Environs.—On the coast near Membakut (5°31'N, 115°41'E). *Elevation:* Sea level. *Habitats:* Peatswamp, fire-padang kerangas, and riverine forest; beach strand; and interface between mangroves and beach scrub. Peatswamp portions have been heavily logged in recent years. *Sources:* DMB, intermittently 1958–1962, Dec. 1984, Jan. 1985, Jan. and Mar. 1986; WFVZ, intermittently 1982–1983; SWD (CMF), Apr. 1984 (specimen data); B. King and D. Yong, 6 Sept. 1986 (B. King, pers. comm.); UKMS, Aug. 1987, periodically 1992 (R. Stuebing, pers. comm.; UKMS catalog data). *Remarks:* Under this heading, we include shore areas not necessarily in the reserve. The WFVZ collected Sabah's only Brown-backed Flowerpecker at this site (Sheldon 1985). UKMS found Hooked-billed Bulbul and Gray-breasted Babbler to be common in the swamp forest in 1992.

Binuang River.—4°44'N, 118°02'E. See Baturong Caves.

Bodgaya Island.—4°27'N, 118°33'E. See under Semporna Islands.

Bod Narkiw.—Site of a swiftlet nest cave along the Kinabatangan River (Daly 1888). No further information.

Bod Tai.—A low limestone hill along the Menanggul River ca. 10 km (as the river winds) from Sukau (5°31'N, 118°13'E). *Remarks:* The site of several caves where Edible-nest Swiftlets nest. *Reference:* Francis (1987).

Bohayen Island.—4°28'N, 118°55'E. See under Semporna Islands.

Bohey Dulang Island.—4°35'N, 118°47'E. See under Semporna Islands.

Bole Kecil (Little Bole) River.—West of Bole River (5°10'N, 117°52'E). *Elevation:* 100–150 m. *Habitats:* 1° lowland forest, logged in 1981. *Sources:* WWFM, 16 Feb.–14 Apr. 1980 (Davies and Payne 1982).

Bole River.—In the Ulu Segama Forest Reserve, ca. 50 km W of Lahad Datu (5°11'N, 117°53'E). With the exception of MacKinnon's site near Kuala Bole (5°10'N, 117°53'E; see Segama River), the sites listed here lie near the main road from Silam to Danum Valley. Also see Danum Valley and Segama and Kawag rivers. *Elevation:* 150–300 m. *Habitats:* 1° and logged upland forest. *Sources:* J. MacKinnon, between Sept. 1969 and Sept. 1970 (MacKinnon 1974, pers. comm.); WFVZ, 16 Feb.–14 Apr. 1982; A. D. Johns, intermittently from 18 June 1987 to 17 Nov. 1988 (Johns 1988, 1989b, 1992, 1996); F. R. Lambert, May 1989–Oct. 1990 (Lambert 1990c, 1992, pers. comm.). *Remarks:* Johns and Lambert studied the effects of logging on 1° forest bird communities by comparing 1° forest populations with those in segments of logged forest of varying age and isolation. WFVZ collected many specimens at Bole River.

Bongawan.—A small town on the Bongawan River between Membakut and Kimanis (5°33'N, 115°49'E). The site of a Sabah Land Development Board Plantation. *Elevation:* Ca. 30 m. *Habitats:* Padi W of the village along the Bongawan River; rubber, and, in the 1980s, a new oil-palm plantation E of the village. *Sources:* DMB, intermittently 1958–1962, Jan. 1985, Jan.–Mar. 1985; KVT, half-yearly 1952–1964; Sabah Museum, Sept. 1970, May 1983 (specimen data); WFVZ, intermittently during 1983; B&W, Sept., Nov., and Dec. 1984. *Remarks:* B&W banded shorebirds at this locality.

Bongon and Bongon River.—At the foot of Marudu Bay (ca. 6°34'N,

116°48'E). Also see Bandau and Marudu Bay. *Sources*: Marchesa Expedition, late May 1883 (Guillemard 1889); A. H. Everett, Jan. 1893 (Sharpe 1893, 1894b; ANSP catalog data). *Remarks*: No other information, except that Bongon was a well-established town and visited briefly by Guillemard.

Boto.—See Bauto.

Brantian River.—4°25'N, 117°35'E. See Kalabakan.

Brumas.—North Borneo Timber Co. camp (4°37'N, 117°45'E) in the Kalabakan district along the Umas Umas (4°22'N, 117°44'E) and Gumpal (4°40'N, 117°36'E) rivers. Also see Sabah Softwoods and Kalabakan Forest Reserve. *Elevation*: 150–200 m. *Habitats*: 1°, 2°, and recently logged upland forest and exotic-tree plantation. *Sources*: YUE, 5 Mar.–14 Apr. 1977; WWFM, June–July 1981 (Davies 1981; Davies and Payne 1982); WFVZ, 4 May–14 June 1982; UKMS, Sept. 1984 and Nov. 1985 (catalog data). *Remarks*: YUE and WFVZ collected many birds at Brumas.

Brunei Village.—Near Membakut (5°30'N, 115°48'E). *Sources*: DMB, Dec. 1984.

Bukau River.—5°16'N, 115°36'E. See Lumbidan.

Bukit Garam.—5°29'N, 117°50'E. See under Kinabatangan River.

Bukit Goram.—4°30'N, 117°57'E. See Magdalena Mountain.

Bukit Ibul.—4°50'N, 115°42'E. See Ibul, Bukit.

Bukit Tupai.—See under Kinabalu Mountain.

Bulat River and Bulat, Tanjung.—See Bukit Garam under Kinabatangan River.

Buloh River.—4°38'N, 116°25'E. *Sources*: L. A. Charles, 13 May 1941 (RMC specimen data).

Bum Bum (Bumbun) Island.—4°27'N, 118°40'E. See under Semporna Islands.

Bundu.—A small rubber holding on Klias Peninsula (5°32'N, 115°33'E). Also see Klias Peninsula and Sitompok Lake. *Elevation*: Sea level. *Habitats*: Rubber, sago in swamp jungle, and scrub. *Sources*: DMB, intermittently 1958–1962, 1984. *Remarks*: DMB mentioned a site called Sitompok Lake, which may be near Bundu or Kuala Penyu.

Bundu Tuhan.—Village NE of Kota Kinabalu (5°59'N, 116°32'E). See Kinabalu Mountain.

Bungoliu.—Ca. 6°28'N, 116°32'E. See Pandasan.

Burong Island.—5°14'N, 115°11'E. See Labuan.

Bunsit.—5°26'N, 116°10'E. See Keningau.

Butong Caves.—A swiftlet nesting site (Daly 1888). This may refer to Supu (see under Kinabatangan).

Butong River and Lake.—See Bukit Garam under Kinabatangan River.

Carson's Camp.—See Kinabalu Mountain.

Cowie Bay or Harbor.—Tawau Bay (4°18'N, 117°45'E). See Wallace Bay and Sebatik Island.

Crocker Range.—The chain of mountains running SW from Kinabalu (maximum elevation 2,085 m). Most of this range is contained in the Crocker Range Park. See Anginon, Crocker Range Park Headquarters, Kauran River, Lumaku, Makaniton, Megatai, Rinangisan, Sinsuran Road, Tambunan, and Ulu Losan.

Crocker Range Park Headquarters.—15 km NW of Keningau (5°23'59"N, 116°06'08"E). *Elevation*: ca. 1,000 m. *Habitat*: 2° forest. *Sources*: RGM, 4–16

June 1999. *Remarks:* RGM collected a few birds from this locality. The specimens are stored at the Sabah Park's collection and LSUMNS.

Dallas.—See Kinabalu Mountain.

Danum Valley Conservation Area.—438 km² within the Ulu Segama Forest Reserve. It is located ca. 75 km W of Lahad Datu, with approximate boundaries of 4°49'–5°04'N and 117°28'–117°49'E. The headquarters (including rest house and research facilities) are along the Segama River (4°58'N, 117°48'E). The Park Survey took place at three camps: one at the confluence of the Beatrice and Segama rivers (4°52'16"N, 117°40'27"E) and at two sites on the Danum River (4°54'30"N, 117°34'20"E and 5°1'35"N, 117°45'50"E). WWFM surveyed what they called "Ulu Danum" (4°54'N, 117°34'E). UKMS-ANSP visited Mt. Danum, with a base camp at the confluence of the Danum and "Sabran" rivers (ca. 4°47'N, 117°41'50E). Lambert (1990c) worked at ca. 5°00'N, 117°30'E (plot P) and along the Sapat Kalisun River in logged forest (plot L89, ca. 1 km from plot P). *Elevation:* The elevation of most surveys is ca. 150–400 m. The highest point, Mt. Danum, is 1,093 m. *Habitats:* 1° upland to lower montane, riparian, logged, and 2° forest. *Sources:* T. Harrisson, 21–22 Feb. 1965 (Fogden 1965); Sabah Park survey, 5 Aug.–5 Sept. 1976 (Kiew 1977; Sabah Museum and University of Malaya specimen data); WWFM, 5–8 Aug. 1979 (Davies and Payne 1982); B. King and D. Yong, July–Aug. 1986, July and Aug. 1988, July 1989 (B. King, pers. comm.); A. D. Johns (Royal Society), 18 June 1987–17 Nov. 1988 (Johns 1988, 1989b, 1992, 1996); F. Lambert (Royal Society), May 1989–Sept. 1990 (Lambert 1990c, 1992; Danum Valley Annual Report 1989, 1990; pers. comm.); Mohd. Zakaria Hussin (University Pertanian Malaysia), Aug. 1990–Feb. 1992 (Danum Valley Annual Report 1990; Zakaria 1994; Mohd. Nordin and Mohd. Zakaria 1997; Zakaria and Nordin 1998); UKMS-ANSP, 9–14 June 1989. *Remarks:* Johns and Lambert conducted extensive research on the effects of logging on 1° forest bird community structure. Most 1° forest bird records are directly across the Segama River from the headquarters. *References:* The first phase of research at Danum was summarized in papers from a Royal Society discussion meeting, 18–19 Sept. 1991 (e.g., Johns 1992; Lambert 1992; Marsh and Greer 1992; Marshall 1992). Research at Danum is also summarized in Annual Reports of Danum Valley Field Centre, Sabah Foundation, Kota Kinabalu (Anonymous 1989, 1990, 1991). One checklist of vertebrates covers records from 1985 to 1992 (Mobilik and Marsh 1992). Showler (1992) described the conservation area and its notable birds briefly.

Darau River.—6°03'N, 116°08'E. See Gaya Bay.

Darvel (Lahad Datu) Bay.—The large bay S of Lahad Datu (4°50'N, 118°30'E). See Lahad Datu, Segarong, Silam, and Semporna Islands. *Sources:* C. A. Gibson-Hill, July 1949 (Gibson-Hill 1950).

Dent Peninsula.—The large promontory forming the easternmost part of Sabah—the area N and E of Lahad Datu. Also see See Bakapit, Kulamba, Sabahat, Segama River, Tabin, and Tambisan.

Deramakot.—5°17'N, 117°33'E. See under Kinabatangan River.

Dewhurst Bay.—Estuary of the Kinabatangan and Kretam rivers (5°35'N, 118°35'E). Also see Kretam Forest Reserve and Tanjung Linsang. *Sources:* KVT, July 1963 and Mar. 1965.

Dinawan Island.—Off Kinarut, between Kota Kinabalu and Papar (5°51'N, 115°59'E). *Sources*: E. Banks, no details (pers. comm.).

Dumpil.—A promontory (Tg. Dumpil) ca. 12 km SW of Kota Kinabalu (5°54'N, 116°02'E). *Sources*: Phillipps family, 14 July 1968 (Phillipps 1970). *Habitat*: Mangroves.

Dusun River.—5°50'N, 117°45'E. See Garinono Forest Reserve.

Elopura.—An old name for Sandakan (Guillemard 1889; Tregonning 1965).

Elopura Mangrove Forest Reserve.—See Sandakan and Sepilok Forest Reserve.

Eno Island.—Near Labuan (5°15'N, 115°14'E). *Sources*: J. Whitehead, 29 Dec. 1885 (Sharpe 1890b).

Ensuan Mountain (Mt. Meliau).—5°51'N, 117°07'E, between the Meliau and Ensuan rivers, ca. 23 km N of Telupid. The name "Mt. Ensuan" does not appear on modern maps and its absence has led to confusion as to which mountain the British Museum group explored. Specimen data with coordinates 5°51'N, 117°08'30"E indicate that Mt. Ensuan is Mt. Meliau. R. Sims' (unpubl.) description of the route taken by BMNBE corroborates this. The expedition traveled up the Labuk and Meliau rivers and then overland to Mt. Ensuan. The only discrepancy in this account is that Sims noted a summit elevation of "4,700 feet" (1,433 m), and Meliau is 4,383 feet (1,336 m). Banks (1982:120) further confused the issue by stating that Ensuan is posted on maps as Mt. Mentapok, and this mountain is ca. 20 km (12 miles) SW of Mt. Meliau and 5,188 feet (1,581 m) high. Smythies (1960) stated that Ensuan "(= Tonsuan on some maps)" is ca. 4,500–4,900 feet high (1,372–1,494 m) and 6 miles (9.7 km) SW of Mt. Meliau. *Elevation*: 1,336 m. *Habitats*: 1° highland to lower montane forest growing largely on soils derived from ultrabasic rock. Sims noted that above ca. 900 m the forest on Ensuan was ericaceous, stunted, and full of bryophytes. *Sources*: BMNBE, Apr.–May 1956 (Banks 1982; R. Sims, unpubl.; BMNH specimen data). *Remarks*: Banks (1982, pers. comm.) observed that no montane birds were found on Mt. Ensuan, even above 1,250 m. A similar observation by Banks regarding Mt. Magdalena is not true.

Gana.—See Membakut.

Garam, Bukit.—See under Kinabatangan River.

Garinono Forest Reserve.—38 km WSW of Sandakan (5°47'N, 117°52'E). Garcia headquartered at the Oil Palm Research Station, mile 32 on the main Sandakan Road. Sabah Museum collected at "Ulu Dusun," which is the locality name of the Agricultural Research Station (A. Lamb, pers. comm.). *Elevation*: 10 m. *Habitats*: 1° lowland forest, freshwater swamp forest, mixed mangrove–nipah, and oil-palm plantations. Logging in the area started in the 1930s and continued through the 1960s (J. Payne, pers. comm.). The Reserve itself was not disturbed until the late 1970s (A. Lamb, pers. comm.). *Sources*: ADG, Aug. 1963, (Thompson 1966; Sabah Museum specimen data); Sabah Museum, Oct. 1977 (specimen data; R. Goh, pers. comm.).

Gaya Bay.—The bay surrounding Kota Kinabalu (5°59'N, 116°06'E), including the coastal section of Likas (Likas Bay), Kuala Bakut (Lansdown 1989), Kuala Darau (near the Sabah Foundation), and small islands such as Udor (6°05'N, 116°05'E). Also see Gaya Island, Kota Kinabalu, and Likas Swamp. *Elevation*: Sea level. *Habitats*: Bay, beaches, tidal flats and ponds, mangroves, grasslands,

casuarinas, and coastal scrub. At Kuala Darau there was also a shrimp-pond project in the 1980s. *Sources*: WFVZ, intermittently 1981–1983; DMB, 1984–1990; UKMS-ANSP, May–July 1989; B&W, intermittently Aug.–Dec. 1984 (Beadle and Whittaker 1985); R. V. Lansdown, Sept. (year unspecified; Lansdown 1989). *Remarks*: Sheldon and Marin (1985) reported a night heron roost along the Darau River, and Lansdown found an egret roost at Kuala Bakut. The shore of Likas Bay, immediately NE of Kota Kinabalu, is a convenient locality for watching shorebirds and waders, and it is now a bird sanctuary. However, the area in general has suffered substantial suburban development since the 1980s.

Gaya Island (Tungku Abdul Rahman Park).—Gaya is the large island adjacent to Kota Kinabalu (6°01'N, 116°02'E). Tungku Abdul Rahman Park encompasses most of Gaya Island and also includes the small islands W of Gaya: Sapi (6°03'N, 116°00'E), Mamutik (5°58'N, 116°00'E), Manukan (5°58'N, 116°00'E), and Sulug (5°57'N, 115°59'E). Also see Bodgaya Island under Semporna Islands. *Elevation*: Sea level to 300 m. *Habitats*: Sandy and rocky beaches, beach strand, mangroves, nipah, and dipterocarp forest (Wells 1976). *Sources*: Marchesa Expedition, early June 1883 (Guillemard 1889); J. Whitehead, 28 Apr.–8 May 1885 (Whitehead 1893); Sabah Museum (H. Tsen), Feb. 1965 (Gore 1968); M. E. J. Gore, Jan. 1966 (Gore 1968); D. Yong, May ca. 1975 (Wells 1976); Sabah Park Survey, 13–15 Mar. 1975 (Wells and Lowry 1975; Wells 1976); YUE 16–20 Nov. 1976; Phillipps family, Oct. 1981 (A. P. Lamb, pers. comm.); B. King and D. Yong, 17–19 July 1983, 16 Aug. and 9 Sept. 1986 (B. King, pers. comm.); DMB, 1 Jan. 1985, 20–22 Feb. 1986, 14 and 19 Nov. 1990; F. H. Sheldon and R. Stuebing, 1 Aug. 1990. *Remarks*: The park was founded in 1974.

Gaya Island.—4°37'N, 118°45'E. See Bodgaya under Semporna Islands.

Gomantong Forest Reserve.—The area of Gomantong caves, ca. 35 km S of Sandakan (5°33'N, 118°05'E). *Elevation*: Sea level to 200 m. *Habitats*: An extensive series of limestone caves, lowland forest, old selectively logged and recently cleared forest, and old and new oil palms. The area within ca. 2.5 km of the caves is a virgin jungle reserve and has not been logged; the remaining area was selectively logged in ca. 1970, extensively burned during the El Niño drought in 1983, and subsequently overgrown with scrub. Much of the forest beyond 5 km from the caves has been replaced with oil palm and cocoa (Francis 1987). The BMNBE found undisturbed forest during their visit in 1956 (R. Sims, unpubl.; Banks, pers. comm.). *Sources*: "H." Pryer, 19–22 Mar. 1884 (Pryer 1884); F. N. Chasen and C. B. Kloss, July 1929 (Chasen and Kloss 1930a); P. Orolfo, 24–27 July 1930 (FMNH catalog data); BMNBE, Apr. 1956 (Sims 1959a, unpubl.; Banks 1982, pers. comm.); T. Harrisson, 14 July 1964, 27 Apr. 1965 (Fogden 1965); WWFM, 21 Oct.–2 Nov. 1979 (Davies and Payne 1982); WFVZ, Dec. 1982, 2–5 Aug. 1983; CMF (Forest Dept.), 1982–1984 (Francis 1987, pers. comm.); J.-M. Thiollay, F. Thiollay, S. Charpentier, C. Hermides, July 1982 (Thiollay 1983); DMB, 15 Dec. 1984. *Remarks*: Francis (1987) studied swiftlets at Gomantong. All four swiftlet species nest in the caves. The WFVZ group collected along the Sukau Road, which travels E-W between the Sandakan–Lahad Datu highway and Sukau, passing close to the caves. In 1983, much of the forest along the road had been burned in preparation for oil-palm planting, but there were still good stands of ca. 20- to 30-yr-old selectively logged lowland forest. *References*: Daly (1888), Chasen (1931), and Burder (1961).

Goram, Bukit.—See Magdalena Mountain.

Gramma River.—5°23'N, 115°33'E. See Klias Peninsula.

Gulisaan Island.—6°09'N, 118°03'E. See the Turtle Islands.

Gum Gum Forest Reserve.—30 km NW of Sandakan (5°58'N, 117°55'E). Also see Labuk Road and Sepilok Forest Reserves. *Elevation:* 10 m. *Habitats:* Undescribed, but probably 1° and 2° lowland dipterocarp forest and scrub. *Sources:* ADG, Sept. 1963 (Thompson 1966); SWD, intermittently 1983–1985 (SWD specimen data). *Remarks:* Garcia's collecting headquarters were the Agricultural Research Station at mile 17 on the Sandakan Road. SWD collected birds at various locations along Labuk Road after the establishment of a reference collection at Sepilok in 1982–1983.

Gumpal River.—4°40'N, 117°36'E. See Brumas and Sabah Softwoods.

Gunung Rara Forest Reserve.—See Batu Timbang.

Ibul, Bukit.—Meligan mountain range (4°50'N, 115°42'E). *Elevation:* 1,050–1,200 m. *Habitat:* Lower montane forest. *Sources:* WWFM, 2–7 May 1981 (J. Payne, pers. comm.; Davies and Payne 1982).

Imbak River.—North Borneo Timber Co. concession on the Luasong River, ca. 100 km NW of Tawau (4°33'N, 117°22'E). *Elevation:* ca. 200 m. *Habitat:* 1° upland forest. *Sources:* WFVZ, 11–26 July 1982.

Imbak Valley.—South of Telupid (5°6'N, 117°01'E). *Elevation:* ca. 250 m. *Habitats:* 1° forest surrounded by a huge area of 2° forest. *Sources:* RGM, June 2000. *Remarks:* This area is one of the last unprotected upland 1° forest sites in Sabah. It is due to be logged in 2001.

Inanam.—5°59'N, 116°08'E. See Kota Kinabalu.

Jesselton.—The colonial name for Kota Kinabalu.

Kabayau or Kabaiau.—6°12'N, 116°28'E. See under Kinabalu Mountain.

Kabili–Sepilok Forest Reserve.—See Sepilok Forest Reserve.

Kadamaian River.—6°22'N, 116°26'E. See Kedamaian and Kebayau under Kinabalu Mountain.

Kaingaran.—5°39'N, 116°27'E. See under Trus Madi Mountain.

Ka-Karis or Kariskaris.—See Melian River.

Kalabakan Forest Reserve and Environs.—NW of Tawau (ca. 4°25'N, 117°29'E); Kalabakan River 4°21'N, 117°32'E. MCZ collected at the “mouth of the Kalabakan River” (Coolidge 1940:124). FMNH worked on the Marikut River (4°27'N, 117°26'E) and at the mouth of the Tibas River, a small tributary of the Kalabakan (Davis 1962). Thompson, Garcia, and Norman visited a variety of Kalabakan areas. One of Thompson's more important sites was in 1° forest “2 miles” (19.3 km) N of the village of Kalabakan. He and Garcia also collected along the Brantian River (4°25'N, 117°35'E) and at Tiger Estate (probably near Tiger Hill, 4°25'N, 117°49'E). See also Brumas, Imbak River, Sabah Softwoods, and Tukok. *Elevation:* Sea level to 300 m. *Habitats:* 1° and 2° lowland and upland forest, and rubber and oil-palm plantations. Until the 1970s, much of the upland 1° forest remained, although Inger and Gaun collected in some “logged dipterocarp forest.” Nowadays, all of the lowland 1° forest is gone, as is most of the loggable highland forest. *Sources:* H. G. Deignan (MCZ), June–Aug. 1937 (Coolidge 1940; Davis 1962); FMNH (R. F. Inger and Gaun anak Sureng), 2–28 June 1956 (Davis 1962; SMC specimen data); M. Norman, June 1961–Feb. 1962 (Norman 1964); MCT, Oct.–Nov. 1962 (Thompson 1966).

Kalampunian Islands.—Kecil (Damit), 5°46'N, 115°41'E; Besar, 5°45'N, 115°40'E. See Pulau Tiga.

Kallang (Kalliang) River.—Tenom district (5°20'N, 115°24'E) (Stuebing 1991).

Kalumpang.—At the headwaters of the Pang Burong tributary of the Kalumpang River, 3 km N of the Tawau–Semporna road junction (4°33'N, 118°15'E). The WWFM surveyed an area called Ulu Kalumpang (4°36'N, 117°56'E). *Sources*: WWFM, Feb. 1982 (Davies and Payne 1982); CMF, Oct. 1984 (Francis 1987). *Remarks*: A swiftlet nesting site, with Edible-nest, Mossy-nest, and Glossy swiftlets, is found at Kalumpang.

Kamborangoh.—See Kinabalu Mountain.

Kapayan.—5°56'N, 116°04'E. See Kota Kinabalu.

Karamuak River.—5°17'N, 117°13'E. Also see Kunatong. *Sources*: E. J. H. Berwick (Gore 1968).

Karamunting, Bukit.—See Melobang.

Karindingan Island.—4°23'N, 118°39'E. See under Semporna Islands.

Kariskaris.—See Melian River.

Karudan.—See Sugut River.

Kasigui.—5°55'N, 116°07'E. See Kota Kinabalu.

Kaung.—See Kinabalu Mountain.

Kauran River.—Near Keningau; ca. 5 km toward Tenom on the main road, then W to the base of the Crocker Range (5°19'N, 116°08'E). *Elevation*: 850 m. *Habitats*: 2° forest adjacent to 1° forest. *Sources*: UKMS, Jan. 1991 (R. Stuebing, pers. comm.). *Remarks*: A road was built into a quarry at this site, permitting access, but the area was never heavily logged. UKMS has a small collection from here.

Kawag River.—In the Ulu Segama Forest Reserve at 5°05'N, 117°59'E. *Elevation*: Ca. 350 m. *Habitat*: 1° upland forest. *Sources*: WWFM, 27 Mar.–7 Apr. 1980 (Davies and Payne 1982).

Kedamaian and Kedamaian River.—Kota Belud district (6°22'N, 116°26'E; Stuebing 1991). See also under Kinabalu Mountain.

Kelangaan River.—See Pinosuk Plateau under Kinabalu Mountain.

Kenakok.—See Kinabalu Mountain.

Keningau.—A large town on the E side of the Crocker Range (5°20'N, 116°10'E). YUE collected around the SAD catfish farm, ca. 3 km NE of town on the main road. DMB visited the nearby village of Bunsit (5°26'N, 116°10'E), located on the Keningau–Tambunan road. Also see Lime Cave. *Elevation*: 350–450 m. *Habitats*: Upland and highland heath, woodland, grassy fields, cattle range, plantations, and scrub left by shifting agriculture. *Sources*: T. Harrison, Feb. 1952 (SMC specimen data); Cambridge University Expedition, 2–3 Aug. 1956 (J. Boys notes); YUE, 11–19 Dec. 1976; DMB (no details).

Keningau Caves.—The swiftlet caves in the Keningau–Sepulut area that produce commercial nests are loosely referred to as “Keningau Caves” because their produce is often sold in Keningau (Francis 1987). See Lime Cave, Pun Batu, Batu Punggul, and Sinuron Cave.

Kerah (Krah or Kra) River and Swamp.—6°27'N, 116°27'E. See Kota Belud Bird Sanctuary.

Keraman (Kuraman) Island.—5°14'N, 115°08'E. See Labuan.

Keruak.—5°32'N, 118°17'E. See under Kinabatangan River.

Kiabau Agricultural Station.—Along the Labuk River NE of Telupid (5°49'N, 117°13'E). *Sources*: E. J. H. Berwick (SAD), Dec. 1961 (Gore 1968).

Kiau.—See Kinabalu Mountain.

Kiberibib, Ulu.—See Ulu Kiberibib.

Kidukarok River.—5°36'N, 116°31'E. See Trus Madi Mountain.

Kimanis and Kimanis Bay and River.—A town near the mouth of the Kimanis River on the coast SW of Kota Kinabalu between Membakut and Papar (5°37'N, 115°53'E). Kimanis is often used loosely to refer to a wide area around the actual town, reaching from the Kimanis Bay (5°44'N, 115°45'E) to Kampung Ulu Kimanis (5°34'N, 115°57'E). *Elevation*: Sea level to 200 m. *Habitats*: Mangroves, mudflats, small islands, coastal scrub, freshwater swamp, swamp forest, and old rubber plantations. *Sources*: Marchesa Expedition, first week in June 1883 (Guillemard 1885, 1889); DMB, intermittently 1958–1962, Dec. 1984, 1–11 Jan. 1985, 20 Jan.–9 Mar. 1986 (Batchelor 1959, pers. comm.); KVT, intermittently 1950–1960s (Smythies 1981, pers. comm.); WFVZ, intermittently 1981–1983; C. Byers and C. Robson, 17 Feb. 1992 (Robson and Byers 1992). *Remarks*: DMB managed a rubber estate, “Kimanis Estate,” S of the town. On this estate is the site of the first and only American colony in Borneo. It was established in 1865 by C. Lee Moses and abandoned after the death of the American entrepreneur Thomas Bradley Harris in 1866. Harris’s grave marks the site, and DMB used to watch migrating birds from the grave.

Kinabalu Mountain.—Kinabalu (6°05'N, 116°33'E) is SE Asia’s highest mountain (4,095 m), the most important biogeographic feature of Borneo, and the centerpiece of the 766-km² Kinabalu Park (Fig. 7). Ornithologically, Mt. Kinabalu is interesting because of its high-elevation species—Friendly Bush-Warbler, Island Thrush, and Mountain Blackeye—which are known to occur elsewhere in Borneo only on Mt. Trus Madi and Mt. Tambuyukon. Also see Tambuyukon, Templer, and Madalon Mountains, which are part of Kinabalu Park but listed separately.

Most studies of Mt. Kinabalu’s birds have been conducted on the E, S, and W slopes. Little work has been done on the N face, which is less accessible (except for Sayap). Collecting has been concentrated largely at sites along the main access routes to the mountain (described by Moulton 1915). The most important of these routes was the northern approach via the Kadamaian River from Kota Belud to Kiau and then up the mountain (essentially) by the current path from park headquarters. An alternative route to Mt. Kinabalu was by train from Beaufort to Tenom, overland (e.g., via horseback) to Kundasang via Keningau, Tambunan, and Ranau. Few expeditions have taken this southern route, but part of it was used by T. Harrisson (SMC) in 1952.

Habitats: Descriptions of Kinabalu’s habitats are difficult because of the diversity and complexity of the mountain’s flora (e.g., Fox 1972; Beaman and Beaman 1990; Beaman 1996; Corner 1996). In general, we follow the simple classification scheme of Gibbs (1914), which has been used several times by others (e.g., Smith 1931; Pendlebury and Chasen 1932): 2° forest resulting from shifting agriculture, ca. 750–1,250 m; tall lower montane forest, ca. 1,000–1,850 m; “mossy forest,” which is noncontinuous, ca. 1,550–2,750 m; “serpentine scrub” ultrabasic forest (e.g., at Marai Parai, 1,550 m); “low sheltered forest” ca. 2,700–3,250; and “subsummit dwarf” and “granite core” above ca. 3,200 m.

In the 19th century, shifting agriculture removed 1° forest along the traditional

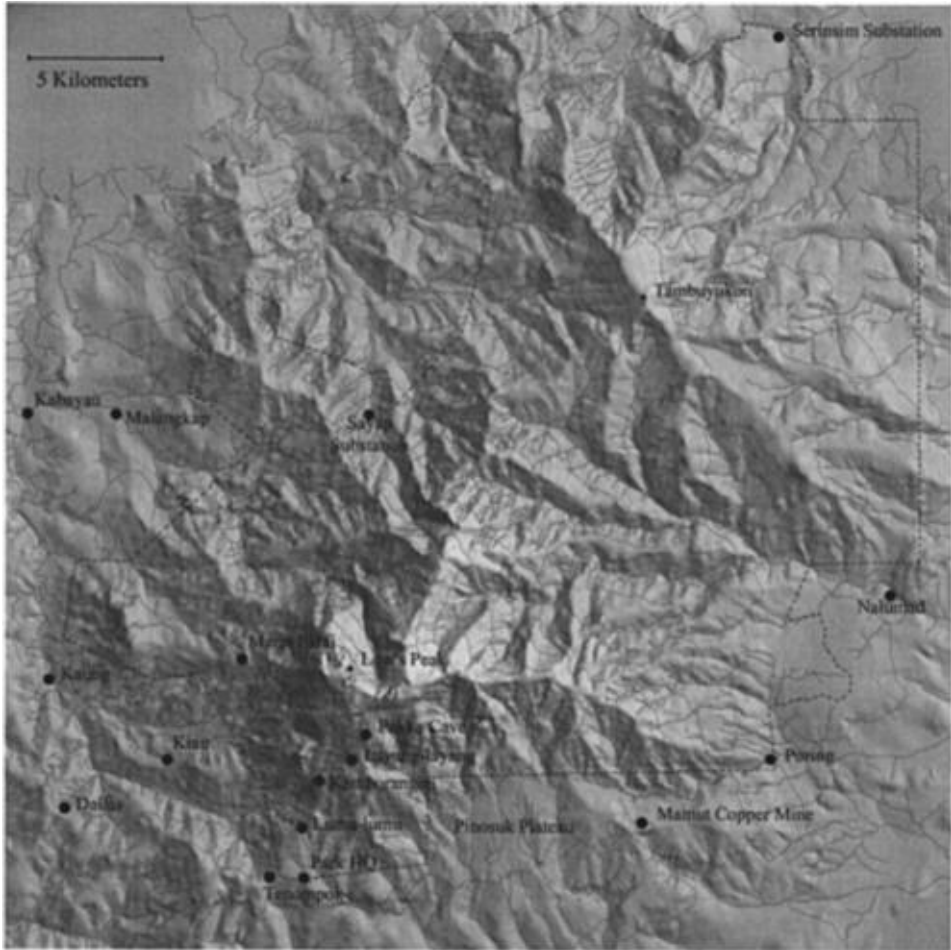


FIG. 7. Collecting and survey sites on Mt. Kinabalu. Map source: <http://nabalu.flas.uft.edu/kinal/LocationMap.html> (©Reed S. Beaman and John R. Beaman).

access routes up to ca. 1,000 m (Moulton 1915). Until at least the 1930s, 1° forest persisted at Tenompok and in general above ca. 1,200–1,300 m (Gibbs 1914; Smith 1931; Fox 1972). Since then, and particularly in the last 20 years, the lower montane forest has been degraded or destroyed at higher elevations in many areas (to ca. 1,700 m on some of the W, S, and E slopes, but only to 900–1,000 m on some parts of the N slope). Among lower montane habitats that have been destroyed in the last 20 years is the rich oak forest on the Pinosuk Plateau. Because of its relatively gentle slope and position, this area was excised (degazetted) from the park and developed, mainly in the 1970s and 1980s. As a result of deforestation, some historical, lower elevation, 1° forest bird records from Kinabalu no longer apply.

General sources: These sources provided general records of birds on Kinabalu. W. N. Treacher, late 1870s (Sharpe 1879a); F. W. Burbidge, Dec. 1877, Aug. 1878 (Burbidge 1880; Sharpe 1879a); C. D. Haviland, Mar.–Apr. 1892 (Stapf 1894; BMNH specimen data); A. H. Everett, Nov. 1892, Feb. 1893, Jan. 1894 (Sharpe

1893, 1894a; BMNH specimen data; ANSP and FMNH catalog data); F. S. Bourns and D. C. Worcester, 15 Mar.–7 Apr. 1893 (USNM catalog data; Smythies 1960; Jenkins 1978); J. B. Bell, Sept.–Oct. 1896 (ANSP and FMNH catalog data); R. Hanitsch, 18–25 Mar. 1899 (Hanitsch 1900); J. Waterstraat, Nov. 1899–Jan. 1900, July 1903, June 1909 (Blasius 1901; Jenkins 1978; AMNH specimen data; BMNH specimen data; FMNH catalog data); G. H. Goss and H. D. Dodge, Apr.–May 1904 (Richmond 1905; USNM catalog data); J. C. Moulton, Aug.–Sept. 1913 (Moulton 1913, 1915; SMC specimen data); Sabah Museum, Feb. 1970, Sept. 1978 (specimen data); University of Aberdeen Expedition, July–Sept. 1981 (Prentice and Eddie 1981; A. Phillipps, pers. comm.); J.-M. Thiollay, F. Thiollay, S. Charpentier, C. Hermides, July 1982 (Thiollay 1983); UKMS, June 1986 (catalog data); C. Byers and C. Robson, Jan. 1992 (Robson and Byers 1992).

General references: Sharpe (1879a), Kloss (1931b, c), Smith (1931), Berwick (1961), Corner (1964), Harrisson (1964), Smythies (1964a, 1978), McClure and Leelavit (1972), Jenkins (1978, 1996), Jenkins and de Silva (1978), Davison (1992), Jenkins et al. (1996) and Biun (1999). More specific references are cited under each locality heading below. Jenkins and de Silva (1978) wrote the first comprehensive checklist of Kinabalu's birds. As park employees, they had access to much unpublished information when compiling their list (e.g., reports provided by ornithologists working in the park and personal communications of bird watchers). The same is true of the unpublished list of A. Phillipps (1986), who was park ecologist in the early 1980s, and the updated list of Jenkins et al. (1996), which was compiled by D. R. Wells and A. Phillipps in the second edition of *Kinabalu, Summit of Borneo* (Wong and Phillipps 1996).

Specific localities: These are record or principal sites on Mt. Kinabalu. Some map coordinates are from Beaman et al. (1996). Dusun spellings of site names from Beaman et al. (1996) are noted in parentheses. See map in Figure 7.

Bukit Tupai.—6°00'N, 116°32'E. See Lumu-lumu.

Bundu Tuhan.—Ca. 2 km S of Park headquarters (5°59'N, 116°32'E). *Elevation:* Ca. 1,250 m. *Sources:* Mengga, June 1925 (Enriquez 1927; RMC specimen data); J. A. Griswold (MCZ), June 1937 (Griswold 1939; Coolidge 1940; Peters 1940); D. H. Johnson, June–July 1951 (USNM catalog data); T. Harrisson, Jan. 1952 (SMC specimen data).

Carson's Camp.—On the summit trail (6°03'N, 116°33'E). *Elevation:* 2,750 m. *Sources:* Q. and J. Phillipps, Feb.–Mar. 1979 (Phillipps and Phillipps 1970); DMB, Nov. 1980. *Remarks:* The Phillipps' were banding for the MAPS program during their visit.

Dallas.—On the ridge between Tenompok Pass and Kaung (6°02'N, 116°28'E). *Elevation:* Ca. 950 m. *Sources:* Mengga, June 1925 (Enriquez 1927; RMC specimen data); T. Harrisson, Jan. 1952 (SMC specimen data).

East Ridge.—The summit approach from Poring (6°03'–6°05'N, 116°36'–116°42'E). *Elevation:* 1,000–3,250 m. *Sources:* B. E. Smythies (Royal Society), 4–24 July 1961 (Smythies 1964b). *Remarks:* This site is arbitrarily separated from Poring at ca. 1,000 m. *Reference:* Corner (1964).

Kabayau (Kebayau).—On the Kedamaian River near Kuala Penataran (Pangataran), ca. 12–14 km S of Kota Belud (6°12'N, 116°28'E). *Elevation:* Ca. 200 m. *Habitats:* Mainly 2° upland forest and scrub. Smith (1931) and Pendlebury and Chasen (1932) described the area as 2° forest with some patches of 1° forest left on isolated peaks. *Sources:* F. N. Chasen, May 1929 (Pendlebury and Chasen 1932;

RMC specimen data); V. W. Ryves, 5 Feb. 1939 (Gibson-Hill 1949b). *Remarks:* Kabayau was a rest stop on the Kota Belud route to Mt. Kinabalu (Moulton 1915).

Kamborangoh (Kemburongoh).—On the main route up the mountain from park headquarters (6°02'N, 116°33'E). *Elevation:* Ca. 2,220 m. *Habitat:* "Mossy forest" similar to the next lower site, Lumu-lumu, but shorter and scrubbier (Smith 1931). *Sources:* J. Whitehead, 31 Jan.–3 Mar. 1888 (Sharpe 1889a–d, 1890a–c; Whitehead 1893); F. N. Chasen, Apr. 1929 (Pendlebury and Chasen 1932; RMC specimen data); D. H. Johnson, July 1951 (USNM catalog data); B. E. Smythies, 5–10 Mar. 1959 (Smythies 1959); J. and Q. Phillipps, Feb.–Mar. 1970 (Phillipps and Phillipps 1970). *Remarks:* Whitehead collected his first Golden-naped Barbet, Friendly Bush Warbler, Bornean Stubtail, and Mountain Black-eye at this site. The Phillipps banded birds for MAPS on their visit.

Kaung.—Ca. 5 km downstream from the confluence of the Kinataki and Kadamaian rivers (6°05'N, 116°28'E). *Elevation:* Ca. 400 m. *Habitats:* Some 1° upland and highland forest in gullies and ridges, but mainly 2° growth (Smith 1931). *Sources:* F. N. Chasen, Apr. 1929 (Pendlebury and Chasen 1932; RMC specimen data); V. W. Ryves, Feb. 1939 (Gibson-Hill 1949b, 1952; RMC specimen data); D. H. Johnson, June 1951 (USNM catalog data); T. Harrisson, Jan. 1952 (SMC specimen data).

Kenakok.—A valley leading to Marai Parai on the NW slope of Kinabalu at the headwaters of the Kinataki River (ca. 6°04'N, 116°30'E). *Elevation:* 1,000–1,100 m. *Habitat:* 1° lower montane forest. *Sources:* J. Whitehead, 12 Mar.–9 Apr. 1888 (Sharpe 1889a–d, 1890a–c; Whitehead 1893); A. H. Everett, Nov. 1892 (Sharpe 1893; ANSP catalog data); F. N. Chasen, Apr. 1929 (Pendlebury and Chasen 1932; RMC specimen data); J. A. Griswold (MCZ), June 1937 (Griswold 1939; Coolidge 1940; Peters 1940). *Remarks:* Approached from Kiau by following the Kinataki rather than Kadamaian River. Whitehead collected his first Whitehead's Trogon at this site.

Kiau.—SW of Kinabalu peak (6°02'N, 116°30'E). *Elevation:* Ca. 925 m. *Habitats:* Mainly 2° lower montane forest (even in the early days), but with 1° forest on ridges (Smith 1931; Pendlebury and Chasen 1932). *Sources:* J. Whitehead, 22–25 Jan., 4–5 and 10–12 Mar., 9–10 Apr. 1888 (Sharpe 1889a–d, 1890a–c; Whitehead 1893); F. N. Chasen, Mar.–Apr. 1929 (Pendlebury and Chasen 1932; RMC specimen data); V. W. Ryves, 17 Jan.–7 Apr. 1939 (Gibson-Hill 1949b, 1952; RMC specimen data).

Kundasang.—Ca. 4 km SW from park headquarters on the road to Ranau (5°59'N, 116°34'E). *Elevation:* Ca. 1,300–1,600 m. *Habitats:* Much of the country around 1,200–1,550 m was 1° forest during the 1950s and 1960s (KVT). Now it is mostly cleared. *Sources:* B. E. Smythies, 24 Feb.–2 Mar., 10–13 Mar. 1959 (Smythies 1959); KVT, intermittently 1955–1965; Q. Phillipps, Mar. 1969 (Phillipps 1970); T. Miyamoto, 14–16 Aug. 1969 (Miyamoto 1971); WFVZ, intermittently 1981–1983; DMB, 9–12 Dec. 1984, 15–18 Nov. 1990. *Remarks:* Kundasang is on the south route to the mountain. Virtually all Kundasang records derive from the last 50 years.

Layang-layang.—6°03'N, 116°33'E.

Liwagu River.—The main river flowing from E of park headquarters through Ranau (6°02'N, 116°32'E). *Elevation:* Harrisson's martin record (see below) was at ca. 1,000 m above Ranau. *Sources:* T. Harrisson, 9 Dec. 1964 (Fogden 1965). *Remarks:* At this site, Harrisson recorded Sabah's first Asian House Martin.

Lobang (Lubang).—A large overhanging rock on the left bank of the Kadamaian River upstream from Kiau (6°02'N, 116°32'E). *Elevation:* 1,200–1,450 m. *Habitat:* "Heavy jungle" (Smith 1931). *Sources:* J. Whitehead, 25–31 Jan. 1888 (Sharpe 1889a–d, 1890a–c; Whitehead 1893); C. D. Haviland, Mar. 1892 (Stapf 1894; Moulton 1915); F. N. Chasen, Apr. 1929 (Pendlebury and Chasen 1932; RMC specimen data).

Lumu-lumu (park headquarters).—Formerly an important camp on the main mountain spur below Kamborangoh. It is presumed to be near the park headquarters (6°00'N, 116°32'E). Beaman et al. (1996) placed it at the power station (6°02'N, 116°33'E). *Elevation:* 1,400–1,700 m. *Habitats:* “Tall 1° mossy forest” (Pendlebury and Chasen 1932; Smith 1931). The area is still 1° forest with scrub along roads and in developed sections. *Sources:* F. N. Chasen, Apr. 1929 (Pendlebury and Chasen 1932; RMC specimen data); J. A. Griswold (MCZ), June–Aug. 1937 (Griswold 1939; Coolidge 1940; Peters 1940); D. H. Johnson, July 1951 (USNM catalog data); T. Harrisson, Dec. 1964 (Fogden 1965); Q. Phillipps, Aug. 1970, and Q. and J. Phillipps, Feb. and Mar. 1970 (Phillipps and Phillipps 1970); B. King, 1–4 Mar. 1977, 2 and 4–7 Mar. 1982 (pers. comm.); WFVZ, intermittently 1981–1983; J. C. and M.G. Pearson, 18–22 Mar. 1981 (pers. comm.); B. King and D. Yong, July 1983, Aug. and Sept. 1986, July and Aug. 1988, and July 1989 (pers. comm.); DMB, intermittently 1984–1990; A. Whittaker, Nov. 1984 (pers. comm.); S. Goodman, Apr. 1988 (Goodman 1989); RGM, 18–29 May 1999. *Remarks:* Bukit Tupai is located near the headquarters. *Reference:* Phillipps (1986).

Malangkap (Melangkap).—In the northwestern foothills of Mt. Kinabalu along the Penataran River (6°09'N, 116°30'E). Also see Sayap. *Elevation:* The village is at ca. 400 m. *Habitats:* 1° and 2° highland and lower montane forest, including coniferous and serpentine scrub forest. *Sources:* J. Whitehead, 9 Feb.–7 Apr. 1887; 6–20 Jan., 10 Apr.–23 May 1888 (Sharpe 1887a, b, 1889a–d, 1890a–c; Whitehead 1893); A. H. Everett, during 1893 (Sharpe 1893). *Remarks:* Whitehead used this site as a base of operations for his two trips to Kinabalu. From mid-Feb. to mid-Mar. 1887, Whitehead camped above Malangkap at ca. 1,000 m and surveyed up to ca. 1,500 m. From the camp at 1,000 m he collected the first Whitehead's Broadbill, Fruithunter, and Whitehead's Spiderhunter.

Mamut River.—6°03'N, 116°28'E (Stuebing 1991).

Marai-Parai.—At the headwaters of the Kinataki River above Kenokok on the western side of the mountain (6°05'N, 116°31'E). It is accessed via the Kenokok Valley. *Elevation:* 1,550 m. *Habitats:* Forest on ultrabasic soil from disintegrating serpentine, as well as more typical 1° montane forest. *Sources:* F. N. Chasen, May 1929 (Pendlebury and Chasen 1932; RMC specimen data); A. Phillipps, 13 Feb. 1985 (Phillipps 1985b).

Mesilau River.—5°58'N, 116°37'E. See Pinosuk Plateau.

Mokodou River (Mekedou).—A river in the eastern foothills of Mt. Kinabalu and N of Poring (ca. 6°07'N, 116°40'E). *Habitat:* 2° forest. *Sources:* Sabah Museum, Nov. 1976 (specimen data).

Nalumad.—On the eastern side of Mt. Kinabalu NW of Poring. The village is located at 6°06'N, 116°44'E, the river at ca. 6°07'N, 116°42'E (Beaman et al. 1996). *Elevation:* 750 m. *Sources:* D. Jenkins, 1975 (Jenkins and de Silva 1978). *Remarks:* Cited by Jenkins and de Silva (1978) as a location where a small collection was made in 1975.

Pakka Cave (Paka-paka Cave).—Slightly to the W of the main modern route up the mountain, where a large rock overhangs on the left bank of the Kadamaian River (6°03'N, 116°34'E). Also see Panar Laban. *Elevation:* Ca. 3,150 m. *Habitat:* Largely leptospermum scrub. *Sources:* J. Whitehead, 10 Feb. 1888 (Whitehead 1893; Moulton 1915); A. H. Everett, Nov. 1892 (BMNH specimen data); J. A. Griswold (MCZ), 4 Aug. 1937 (Griswold 1939); D. H. Johnson, July 1951 (USNM catalog data); T. Harrisson, Feb. 1952 (Harrisson 1964; SMC specimen data); B. E. Smythies, 5–10 Mar. 1959 (Smythies 1959); W. Corris, 22 Aug. 1964 (Fogden 1965).

Panar Laban.—Site of the main summit rest houses at the base of the rock face (6°04'N, 116°34'E). *Elevation:* 3,350–3,700 m. *Sources:* J. Whitehead, 11 Feb. 1888

(Whitehead 1893). *Remarks:* On 11 Feb., Whitehead climbed from Pakka Cave to the peak and then returned to Kamborangoh. The only birds he found on the summit rock face were Sunda Bush Warblers and Mountain Black-eyes.

Park Headquarters.—See Lumu-lumu.

Pinosuk Plateau.—At the headwaters of the Bambang and Mesilau rivers above Kundasang and E of park headquarters (6°01'N, 116°36'E). *Elevation:* Ca. 1,500 m. *Habitats:* The Pinosuk Plateau was well known among botanists for its extremely rich oak forest, which was cleared in the 1970s and early 1980s. *Sources:* Medway (Cranbrook) (University of Malaya and Royal Society), Feb.–May 1964 (Gore 1964a; Fogden 1965; Cranbrook, pers. comm.; University of Malaya specimen data). *Remarks:* The 1964 Royal Society Expedition began in Jan. 1964, and Medway collected and banded birds at a camp between the main forks of the Mesilau River (5°58'N, 116°37'E) on 5 Feb. Other Royal Society collections were made along the “Kelangkaan” (site unknown) and at Poring. Banding data are reported in McClure and Leelavit (1972).

Poring Hot Springs.—On the SE slopes of Mt. Kinabalu, 15 km N of Ranau (6°03'N, 116°42'E). *Elevation:* 500–1,000 m. *Habitats:* 1° highland and lower montane forest, 2° highland forest and scrub. *Sources:* B. E. Smythies (Royal Society), July 1961 (Smythies 1964b); Medway (Cranbrook) (University of Malaya, Royal Society), Apr.–May 1964 (Cranbrook, pers. comm.); Q. Phillipps, Aug. 1970 (Phillipps 1970); J. and Q. Phillipps, Sept. 1969, Feb.–Mar. 1970 (Phillipps and Phillipps 1970); Sabah Museum, Feb. 1970, Sept. 1978 (specimen data); YUE, 25 Feb.–2 Mar. 1977 (Jenkins and de Silva 1978); WFVZ, intermittently 1981–1983; B. King and D. Yong, Feb.–Mar. 1982, July 1983, Aug.–Sept. 1986 (B. King, pers. comm.); J. Wall and D. Yong, 21–22 July 1985 (J. Wall, pers. comm.); DMB, intermittently 1986–1990; UKMS, Nov. 1987. *Remarks:* Poring is arbitrarily separated from the “East Ridge” (see above) approach to the summit of Kinabalu at ca. 1,000 m. *References:* Corner (1964) and Jenkins and de Silva (1978).

Power Station.—At the end of the park headquarter's road (6°02'N, 116°33'E). Also see Lumu-lumu. *Elevation:* 1,675 m.

Sayap or Saiap.—On the northwestern slopes of Kinabalu along the Penataran River (6°9'51"N, 116°33'55"E). Also see Malangkap. *Elevation:* ca. 1,000 m. *Habitats:* 1° lower montane forest (in the park), bordering on heavily disturbed shifting agriculture. *Sources:* UKMS, Feb. 1991 (R. Stuebing, pers. comm.); RGM, July 2000. *Remarks:* This site is close to Malangkap, where Whitehead collected type specimens of Fruithunter and Whitehead's Spiderhunter (see above). It has not been well studied by ornithologists. It features a rich lower montane avifauna (including good numbers of Whitehead's Broadbills and Long-tailed Broadbills), but is remarkably lacking in lowland species (probably because of long-term shifting agriculture below the park). The park is developing the area for the public, and it is an excellent site for research. *Reference:* Stuebing (1991).

Sayat-sayat.—Site of the rock face rest huts (6°04'N, 116°34'E). *Elevation:* 3,750 m. *Sources:* J. Griswold (MCZ), Aug. 1937 (Griswold 1939).

Templer Extension.—The area of Kinabalu Park jutting N past Mt. Templer (6°25'N, 116°37'E). Also see See Madalon Mountain and Langui Langui.

Tenompok and Tenompok Pass.—Ca. 2 km W of park headquarters on the main road (5°52'N, 116°31'E). *Elevation:* 1,475 m. *Habitats:* “A patch of 1° forest” in 1929 (Smith 1931), which is now cut. *Sources:* Mengga, June 1925 (Enriquez 1927; RMC specimen data); D. H. Johnson, July 1951 (USNM catalog data); T. Harrisson, Feb. 1952 (Harrisson 1955a); B. E. Smythies, 24 Feb.–2 Mar., 10–13 Mar. 1959 (Smythies 1959); KVT, intermittently 1960s. *Remarks:* This has been a good site to find night-flying migrants (Jenkins and de Silva 1978).

Kinabatangan River.—5°42'N, 118°23'E. Kinabatangan applies specifically to the section of river running from Kuamut (5°13'N, 117°30'E) to Kuala Kinabatangan Besar (5°38'N, 118°36'E) and Kuala Kinabatangan Kecil (5°41'N, 118°34'E). At Kuamut, the Kinabatangan is formed by the confluence of the Kuamut and Melian rivers. Also see Gomantong Forest Reserve, Karamuak River, Kretam Forest Reserve, Kuamut River, Langut River, Melian (Milian) River, and Segaliud–Lokan Forest Reserve.

General observations: The Kinabatangan River played a key role in the natural history exploration of Sabah by providing access to deep interior forest before the development of roads. Because little information is available on specific collecting sites along the river, and much collecting occurred during boat trips, we simply summarize the general characteristics of the Kinabatangan in this section. *Elevation:* Sea level to ca. 150 m, depending upon adjacent terrain. *Habitats:* Previously, 1° dipterocarp and freshwater swamp forests extending indefinitely from the river edges. Nowadays, most adjacent forest has been logged or cleared. At the lower end of the river, extensive mangroves, freshwater swamp forests, reed swamps, and oxbow lakes still exist. The swiftlet cave sites have forest growing on limestone (e.g., Keruak and Panggi). *References:* Scott (1989) describes the habitat at the lower end of the river. Also see Jomitin (1996) and Nihayah and Abdullah (1996).

General sources and collection sites: C. F. Adams collected at the lower end of the River between May 1887 and Feb. 1888 (Elliot 1890, 1891). A. H. Everett visited the “lower Kinabatangan” in Jan. 1892 (Sharpe 1893). J. B. Bell collected along the “lower Kinabatangan” in June 1895 (ANSP specimen data). “Tubb” recorded birds along the lower Kinabatangan (in the 1950s?) during a trip up to Lamag (Smythies 1960; Fogden 1965). Barbara Harrisson (wife of the Sarawak Museum curator, Tom Harrisson) recorded birds while travelling from Abai to Pindasan, 17 May–3 June 1965 (Fogden 1965). The WFVZ recorded birds on a trip from Bukit Garam to Kuala Malubuk, 9–10 Aug. 1983. Among the important Kinabatangan sites are edible-nest swiftlet caves (Francis 1987). The anthropology of these caves (including nest collection) was described by Harrisson and Harrisson (1971). During the 1990s, the development of ecotourist camps (e.g., Uncle Tan’s) along the river increased Kinabatangan bird sightings, but those records are not included in our species accounts because most are not published or otherwise available.

Specific collecting sites: Below are sites where birds have been collected.

Abai.—Near the mouth of the Kinabatangan River (5°47'N, 118°25'E). *Habitat:* Mangroves. *Sources:* H. G. Deignan (MCZ), summer 1937 (Coolidge 1940; Peters 1940; MCZ specimen data); DMB, 21 Mar. 1990.

Baladut.—A solitary hill ca. 10 km upstream from Bilit, not far from the Baladut River (5°26'N, 118°11'E). *Remarks:* A poorly known cave site where edible nests were at one time harvested (Francis 1987).

Batangan.—A long, low hill ca. 17 km upriver of Bilit (5°30'N, 117°54'E). *Remarks:* A cave site where nesting swiftlets have been reported, but for which no records are available (Francis 1987).

Batu Putih.—At the Kinabatangan bridge crossing (5°25'N, 117°55'E). *Sources:* WFVZ, 3–7 Feb. 1982.

Bukit Garam and Environs.—A town at 5°29'N, 117°50'E. *Habitats:* Logged low-

land dipterocarp, swamps, and fire-damaged forests. *Sources*: J. C. and M. G. Pearson, 30 Mar.–3 Apr. 1981 (pers. comm.); R. V. Lansdown, Sept. (year unspecified; Lansdown 1989). *Remarks*: Lansdown surveyed the surrounding area, including Kuala Butong to Kuala Lokan on the western side of Bukit Garam. He found egret roosts at the following sites: Danau Butong, one of a series of small peaty lakes at the head of the Butong River; Tg. Bulat, a large oxbow lake adjacent to and joined by the Bulat River across the Kinabatangan from Bukit Garam; and at Danau Labaung, a lake at the head of the Labaung River (5°29'N, 117°48'E) W of the town.

Deramakot.—5°17'N, 117°33'E. *Elevation*: 30–50 m. *Habitat*: Mainly 1° forest when visited by FMNH. *Sources*: FMNH, 22 Apr.–18 May 1956 (Inger 1956; Davis 1962; SMC specimen data). *Remarks*: This was an ichthyological and herpetological expedition, but birds were also collected by Gaun anak Sureng of the Sarawak Museum (Smythies 1960; R. F. Inger, pers. comm.).

Ka-Karis or Kariskaris.—See Melian River.

Keruak.—A low hill on the N bank of the Kinabatangan River (5°32'N, 118°17'E). *Remarks*: The site of three swiftlet caves, with nesting Edible-nest and Glossy swiftlets (Francis 1987).

Kuala Kinabatangan.—5°35'N, 118°35'E.

Kuamut.—5°13'N, 117°30'E. *Sources*: ADG, 20 Oct. 1963 (Thompson 1966; Sabah Museum specimen data); CMF, 3 Aug. 1984 (SWD specimen data).

Lamag.—5°29'N, 117°49'E. *Elevation*: Up to 150 m. *Habitats*: Graydon was stationed at Lamag Estate, and he described the area as “dense impenetrable jungle, some few thousand acres of which have been felled for planting purposes” (Sharpe and Chubb 1909:137). *Sources*: P. N. Graydon, Sept. 1901–May 1902 (Sharpe and Chubb 1909; BMNH specimen data); ADG, Oct. 1963 (Thompson 1966; Sabah Museum specimen data); M. E. J. Gore, June 1965 (Gore 1968).

Malua River.—5°18'N, 117°37'E. *Sources*: ADG, date undetermined (Thompson 1966).

Melikop and Melikop River.—Upper reaches of the Kinabatangan River (5°05'N, 116°48'E) between the Melikop and Pinangah tributaries (5°12'N, 116°50'E). *Sources*: Daly, 1884 (Daly 1888). *Remarks*: A cave site with Edible-nest Swiftlets. Known locally as Obang-obang. *Reference*: Francis (1987).

Panggi.—An irregular low limestone hill on the S bank of the Kinabatangan River (5°32'N, 118°18'E). *Remarks*: A site with many swiftlet caves, with all four swiftlet species nesting (Francis 1987).

Pinangah.—5°12'N, 116°50'E. See Langut River and Melikop.

Pintasan Agricultural Station.—5°26'N, 117°42'E. *Elevation*: 10 m. Also see Segaliud-Lokan Forest Reserve. *Sources*: ADG, 11 and 17 Oct. 1963 (Thompson 1966).

Sukau.—A village on the lower Kinabatangan (5°32'N, 118°17'E). Also see Sepagaya Forest Reserve and Gomantong. *Habitats*: Freshwater swamp and riparian forests. *Sources*: DMB, Mar. 1989.

Supu.—On the N bank between the Kinabatangan River bridge and Bukit Garam (5°27'N, 117°56'E). *Remarks*: A site with several caves and all four swiftlet species nesting (Francis 1987). This may be the site that Daly (1888) referred to as Butong Caves.

Tongod.—5°16'N, 116°58'E. See Melian River.

Kinarom River.—6°26'N, 116°50'E. See Waleigh-waleigh and Bongon River.

Kinarut.—12 km SSW of Kota Kinabalu on the coast (5°49'N, 116°03'E). Also see Dinawan Island. UKMS, Oct. 1986 (catalog data); UKMS-ANSP May–July 1989. *Elevation*: Sea level. *Habitats*: Beaches, mangroves, and coastal scrub.

Sources: WFVZ, intermittently 1981–1983; Sabah Museum, June 1983 (specimen data).

Kinataki River.—6°04'N, 116°28'E. See Kaung, Kenokok, and Marai Parai, under Kinabalu Mountain.

Kiulu.—6°04'N, 116°17'E (Stuebing 1991). *Elevation:* 300–500 m. *Habitats:* 2° forest and old rubber plantations.

Klias Estate.—At Kampung Sungei Klias (5°23'N, 115°45'E). *Elevation:* Ca. sea level. *Habitats:* Formerly rubber and 2° forest; oil palms since ca. 1978. *Sources:* DMB, intermittently 1958–1962, Dec. 1984, Jan. 1985 and 1986.

Klias Peninsula.—The large promontory in SW Sabah, which forms the NE shore of Brunei Bay and SW shore of Kimanis Bay (5°23'N, 115°45'E). Wells surveyed an area from Menumbuk up the Klias River to the Gramma River (5°25'N, 115°33'E), along the SW coast to the Padas River, and up the Padas River. Also see Binsulok, Bundu, Padas Damit, Klias Estate, Klias River, Kuala Penyu, Kota Klias, Mempakul, Menumbok, and Sitompok Lake (5°32'N, 115°35'E). *Elevation:* Sea level. *Habitats:* Mangroves, nipah, swamp forest, peat-swamp, heath scrub, oil palm, rubber, grassy fields. *Sources:* DMB, intermittently 1958–1962 (Smythies 1981); G. Mikil, late Aug. 1974 (Wells 1976); Sabah Park Survey, 23–25 Mar. 1975 (Wells et al. 1975; D. R. Wells, pers. comm.); WWFM, 17–20 Aug. 1979 (Davies and Payne 1982); WFVZ, intermittently 1981–1983. *Remarks:* In 1978, 30,900 ha of the coastal parts of Klias were gazetted as a National Park, but the area was degazetted in 1980. G. Mikil observed birds in the “south Klias swamp” (Wells 1976). *Reference:* The physiographic features of Klias are described in Scott (1989).

Klias River.—On the Klias Peninsula near Kota Klias (5°18'N, 115°22'E). *Elevation:* Sea level. *Habitats:* Mangroves, nipah, gallery forest, swamp forest, and old rubber plantation. *Sources:* Sabah Park Survey, 23–25 Mar. 1975 (Wells et al. 1975; D. R. Wells, pers. comm.); UKMS-ANSP, 6–7 June 1989, 3–4 July 1989.

Kolapis.—5°53'N, 117°36'E. See Beluran.

Kota Belud.—A large town ca. 55 km NE of Kota Kinabalu (6°21'N, 116°26'E). *Remarks:* The town lies on the original northern route to Mt. Kinabalu (Moulton 1915). It is also the namesake of an important bird-watching site: the Kota Belud Bird Sanctuary (see below). Sometimes the term Kota Belud is used by bird watchers to mean Tempasuk Plain, and Tempasuk is used to mean Kota Belud Bird Sanctuary.

Kota Belud Bird Sanctuary.—Ca. 13,000 ha stretching from Kota Belud in the S to Rampayan village in the N. Outlining coordinates are: 6°23'–6°32'N and 116°21'–116°31'E (Payne and Parish 1985; Scott 1989). The Sanctuary is bordered by the Tempasuk (Kadamaian) River in the S and the Kuang-kuang (Pandan) River (6°29'N, 116°30'E) in the N. Although commonly called “Tempasuk Plain,” after Kampung Tempasuk (6°21'N, 116°27'E), the sanctuary actually comprises four main parts, as summarized by Lansdown (1987c): Kerah (“Kra” or “Krah”) swamps in the NE (6°27'N, 116°27'E), Tempasuk Plain grassland in the NW, rice fields in the SE, and settlements in the SW. The North and South Kerah swamps lie on the E side of the Kota Belud–Kudat highway, and the Kerah River, a small tidal river, parallels the beach in the center of the plain (Lansdown 1986b). Also see Abai, Ambong, and Pandasan. *Elevation:* Sea level. *Habitats:* Grassy

plain (grazed and often wet), freshwater marshes and mudflats, rice fields, ponds, freshwater swamp and swamp forest, coastal and inland river, mangrove–nipah, estuary, and beach strand. *Sources*: J. Whitehead, Feb. 1886 (Sharpe 1889a; Whitehead 1893; Gibson-Hill 1952); V. W. Ryves, Jan. and Apr. 1939 (RMC specimen data); E. J. H. Berwick, Oct. and Nov. 1956, 17 July 1965 (Smythies 1963; Fogden 1965; Gore 1968); P. F. Burgess, Jan. and Nov. 1959 (Smythies 1963; Gore 1968); KVT, intermittently 1960s; T. Harrisson, 17 July 1965 (Fogden 1965); Phillipps family, intermittently 1960s–1980s (S. Phillipps 1982; Q. Phillipps, pers. comm.); D. R. Wells, 2–3 Nov. 1980 (Wells 1981, pers. comm.); WWFM, 1 Dec. 1981 (Davies and Payne 1982); WFVZ, intermittently 1981–1983; B. King and D. Yong, 17 July 1983, 5 Aug. and 8 Sept. 1986 (B. King, pers. comm.); DMB, intermittently 1984–1989; SWD (CMF and S. Ambi), 9–11 Apr. 1984; B&W, 9–13 Sept., 22–25 Nov., 11–12 Dec. 1984 (B&W 1985; A. Whittaker, pers. comm.); D. Parish, 7–19 Feb. 1985 (Payne and Parish 1985); R. V. Lansdown, 27 Feb.–12 Mar. 1986, Sept.–Dec. 1986 (Lansdown 1986a, b, 1987a, c, 1989). *Remarks*: The sanctuary, originally 12,200 ha of marsh and grassland, was constituted in 1960 (Burgess 1964). Its birds have been well surveyed, for example, by WFVZ, SWD, INTERWADER, and WWFM, which funded a tourist feasibility study (Axell 1985; Payne and Parish 1985). Lansdown located an egret roost in the South Kerah swamp near Sangkir village (opposite the secondary school). He also found a Black-crowned Night Heron roost on an oxbow lake of the Tempasuk River at Kampung Merabau. *References*: de Silva (1966), Phillipps (1982), and Parish et al. (1986).

Kota Kinabalu (Jesselton).—The capital city of Sabah (5°59'N, 116°04'E). Included under this heading are the following suburban areas: Bukit Padang (5°57'N, 116°03'E), Dah Yeh Villa, Kapayan (5°56'N, 116°04'E), Kasigui (5°55'N, 116°07'E), Kiansom (5°59'N, 116°12'E), Luyang, Inanam (5°59'N, 116°08'E), Penampang (5°55'N, 116°07'E), and Petagas (5°55'N, 116°03'E). Also see Dumpil, Gaya Bay, Gaya Island, Likas Swamp, and Tanjung Aru, which are bird-watching areas close to the city, and Maang, a major WFVZ site. *Elevation*: Sea level to 50 m. *Habitats*: 2° growth, grassy fields, sea coast, mangroves, mud and sand flats, rubber, and gardens. *Sources*: Crane Pacific Expedition (R. E. Wheeler and F. C. Wonder), July–Aug. 1929 (Mayr and Camras 1938; FMNH catalog data); MCZ, May 1937 (Griswold 1939; Coolidge 1940); KVT intermittently 1950–1960s; DMB, intermittently 1958–1962, 1984–1990; NAMRU, 24 Aug.–4 Oct. 1960 (Kuntz 1969; USNM catalog data); T. Harrisson, Dec. 1960 (Gore 1968); Sabah Museum (H. Tsen), mainly during 1967 (McClure and Lee-lavit 1972); WFVZ intermittently 1981–1983; UKMS, intermittently 1984–1989 (catalog data). *Remarks*: Formerly called Jesselton.

Kota Klias.—5°26'N, 115°38'E. See Klias River.

Kota Marudu. See Bandau.

Krah (Kra or Kerah) River and Swamp.—6°27'N, 116°27'E. See Kota Belud Bird Sanctuary.

Kretam Forest Reserve.—Area surrounding the Big and Little Kretam rivers (5°32'N, 118°33'E), which run into the SW end of Dewhurst Bay. Davis (1962: 11) collected along the Little Kretam River, working from a logging camp at Kretam Hill (5°29'N, 118°34'E) near the river mouth. The WWFM surveyed the large Kretam River system from 5°18'N, 118°26'E to 5°37'N, 118°35'E. *Eleva-*

tion: Sea level to 200 m. *Habitats*: In Davis's day, a mixture of lowland to upland 1° and logged forest. In 1981, mainly logged forest, mangroves, and nipah. *Sources*: FMNH (D. Davis and R. Inger), May–June 1950 (Davis 1962; FMNH catalog data); WWFM, Aug.–Sept., Nov. 1980, Mar. 1981 (Davies and Payne 1982).

Kuala Abai.—6°23'N, 116°21'E. See Abai.

Kuala Bakut.—See Gaya Bay.

Kuala Bole.—5°10'N, 117°53'E. See Bole River and Segama River.

Kuala Papar.—See Papar.

Kuala Penyu.—A town on the N tip of the Klias Peninsula (5°34'N, 115°36'E). The promontory N of Kuala Penyu is Tanjung Nosong (5°38'N, 115°36'E). Nukohan (5°27'N, 115°37'E) is a village ca. 2 km E of the hill before Kuala Penyu center. *Elevation*: Sea level. *Habitats*: Sandy-mud beaches and flats, mangroves, padi, grassy fields, freshwater marshes, sandy soil scrub, and estuary. *Sources*: DMB, intermittently 1958–1962, Dec. 1984, Jan. 1986 (Smythies 1963); KVT, intermittently 1960s; Sabah Museum, 9 Sept. 1970 (specimen data); Sabah Park Survey, 26 Mar. 1975, 7 Nov. 1980 (Wells et al. 1975; Wells 1976, 1981); WFVZ intermittently 1981–1983; B&W, 1–4 Sept. 1984. *Remarks*: Offshore of Tg. Nosong are “rock stacks,” noted by DMB as the nesting site for such birds as Pacific Reef Egret and Black-naped Tern.

Kuala Segama.—The mouth of the Segama River (5°26'N, 118°48'E). Also see Kulamba Wildlife Reserve and Segama River. *Sources*: KVT, intermittently 1953–1969. *Elevation*: Sea level. *Habitats*: 1° dipterocarp and freshwater swamp forest (inside the delta) and mangroves. The delta was all mangrove and uninhabited from 1952–1956 (KVT).

Kuamut, Kuamut River and Forest Reserve.—5°13'N, 117°30'E. See Kuamut and Batu Timbang, under Kinabatangan River, and Malubuk.

Kuang-Kuang River.—6°29'N, 116°30'E. See Kota Belud Bird Sanctuary and Pandasan.

Kubonatok Cave.—Cited as “Dallas, Lahad Datu” by Orolfo, but exact locality unknown to us and not listed by Francis (1987). *Sources*: P. Orolfo, 24 Sept. 1930 (specimen data).

Kudat.—A large town in northernmost Sabah (6°53'N, 116°50'E). Included under this heading are Tg. Tajau (6°58'N, 116°49'E) ca. 7 km N of Kudat, and Kampung Nangka (6°46'N, 116°47'E) ca. 8 km S of Kudat on the Milau River. Also see Sempang Mangayau Cape and Teuton. *Elevation*: Sea level. *Habitats*: Beach strand, coastal scrub, and mangroves. *Sources*: Marchesa Expedition, 22–30 May 1883 (Guillemard 1885, 1889; Chasen and Kloss 1930b); A. H. Everett, Jan. 1893 (FMNH catalog data); J. B. Bell, June 1895 (ANSP and BMNH specimen data); F. N. Chasen and C. B. Kloss, Sept. 1927 (Chasen and Kloss 1930a); B. E. Smythies, 23 Dec. 1954 (Smythies 1957); E. J. H. Berwick, Feb. 1958 (Smythies 1963); Sabah Museum, Jan. 1970 (specimen data); WFVZ 1–2 Oct. 1981; UKMS and SWD, 8 Apr. 1984 (SWD specimen data). *Remarks*: Everett was posted as a government officer in Kudat (Chasen and Kloss 1930b), from which he visited Balambangan and Banggi islands.

Kulamba Wildlife Reserve.—A 20,682-ha reserve between Kuala Kinabatangan and Kuala Segama on the Dent Peninsula (5°36'N, 118°36'E). Payne's survey and the INTERWADER survey included Tg. Tundunbuangin (5°36'N, 118°36'E). *Elevation*: Sea level. *Habitats*: Mixed forest on freshwater swamp and dry land,

open freshwater swamp forest, forest dominated by aru trees (*Casuarina equisetifolia*), forest dominated by butabuta trees (*Excoecaria agallocha*), beach strand, muddy sand flats, nipah, riparian forest, 1° dipterocarp forest (Payne 1985). *Sources*: J. Payne (WWFM), Aug. 1980, May 1983, 2–12 Apr. 1984 (Payne 1985, pers. comm.); B&W, 25 Oct. 1984 (B&W 1985; Payne 1985); DMB, Oct. 1984, Dec. 1984; GD, 25–27 May 1999. *Remarks*: Payne listed the birds by habitat. *References*: Payne (1988b) and Scott (1989).

Kunatong River.—A small river off the Karamuak River in the vicinity of Telupid and Tawai Hills, not far from Entelebon (5°30'N, 117°03'E). Also see Tawai. *Habitats*: 1° and 2° forest. *Sources*: Sabah Museum, Oct.–Nov. 1977 (specimen data).

Kundasang (Kundassan).—5°59'N, 116°34'E. See under Kinabalu Mountain.

Kunkun River.—In the Tangkulap Forest Reserve (5°28'N, 117°13'E). *Elevation*: 200 m. *Habitat*: 1° upland forest. *Sources*: WWFM, 28 Apr.–9 May 1980 (Davies and Payne 1982, pers. comm.).

Kuraman (Keraman) Island.—5°14'N, 115°08'E. See Labuan.

Labaung (Labaong) River and Lake.—5°29'N, 117°48'E. See Bukit Garam under Kinabatangan River.

Labau River.—Site of the Bornion Timber Co. concession, 40 km ESE of Keningau (5°07'N, 116°35'E). *Elevation*: Ca. 400 m. *Habitats*: 1° upland dipterocarp, 1° tall kerangas, and recently logged forest. *Sources*: CMF (SWD), 15–20 Feb. 1982 (Forest Department report); WFVZ, 19–30 Oct. 1982. *Remarks*: The WFVZ recorded many forest-dwelling migrant individuals, for example, of Siberian Blue Robin and Crow-billed Drongo, in Oct. 1982. These species seem far less concentrated in forests during the winter and spring months.

Labuan.—The large island off the southwestern end of the Klias Peninsula in Brunei Bay (5°19'N, 115°13'E). Also included under this heading are the surrounding islets: Keraman (5°14'N, 115°08'E), Papan (5°15'N, 115°16'E), and Burong (5°14'N, 115°11'E). *Habitats*: Ussher in the 1870s noted that Labuan was “finely timbered” although areas had been burned for padi (Sharpe 1879b). Whitehead (1893) lamented the lack of natural habitat on the island, and Pendlebury and Chasen (1932) found that all forest had been removed by the time of their visit in the 1920s. Burong Island had some forest during Harrison's 1960 visit, but limestone on the island had been quarried to build Labuan airport and much of the natural vegetation was destroyed (Smythies 1963). *Sources*: J. Motley, ca. 1851 (Motley and Dillwyn 1855; Sclater 1863; Salvadori 1874; Smythies 1960); H. Low, 1848–1877 (Sharpe 1879b; Smythies 1960); “Frank,” intermittently 1873–1886 (SMC archives); F. W. Burbidge, 1877 (Burbidge 1880; Sharpe 1879b); H. T. Ussher and a Kadyan named “Buak,” May 1876–Mar. 1877 (Sharpe 1879b, c); W. N. Treacher, 1870s (Sharpe 1879b, c); E. G. Lempriere, early 1880s (Nicholson 1883); Marchesa Expedition, early June 1883 (Guillemard 1889); J. Whitehead, June–Aug. 1885, Nov. 1885–Jan. 1886, intermittently Mar.–July 1886, Jan. 1887, Apr. 1887, Dec. 1887, and May 1888 (Sharpe 1889b, c; Whitehead 1893; Gibson-Hill 1952); A. H. Everett, intermittently 1877–1893 (Everett 1889, 1890a, b; Whitehead 1893; Sharpe 1893, 1894b; ANSP and FMNH catalog data); J. Waterstraat, Dec. 1897 (Smythies 1960); “Local collector,” June 1924 (RMC specimen data); T. Harrison, 3 Dec. 1952, 23 Nov. 1955, May–June 1960 (Smythies 1957, 1963; SMC specimen data); KVT, Nov. 1960; DMB, 26–27 Feb. 1962;

J. Collman, 11 Oct. 1970 (Vowles and Vowles 1985). *Remarks*: Guillemard (1889) reported megapodes on Keraman Island. Everett collected a Peregrine Falcon in Feb. 1892 on Papan Island. T. Harrisson visited Burong Island. *References*: The earliest reference is Motley and Dillwyn (1855). Sharpe (1875) compiled a list of birds based on the Motley–Dillwyn collection and some specimens sent by H. Low. Subsequently, Sharpe realized that some of the birds he had listed for Labuan actually came from the adjacent mainland. To correct mistakes, he wrote an updated list (Sharpe 1879b), which benefited from the relatively well-documented collection of H. T. Ussher. This second list nevertheless contained mistakes (e.g., the inclusion of the lower montane Common Green Magpie).

Labuk Bay.—6°10'N, 117°50'E. See Labuk River.

Labuk River.—A major NE river of Sabah (5°54'N, 117°30'E), with its mouth at Labuk Bay. See Bauto, Beluran, Ensuan Mountain, Meliau, Rumidi, and Telupid. *Sources*: E. J. H. Berwick, intermittently 1950–1960s (Smythies 1963; Gore 1968); KVT, intermittently 1950–1960s; BMNBE, Apr. and May 1956 (Banks 1982, pers. comm.; R. Sims, unpubl.; BMNH catalog data); T. Harrisson, 12 July 1964 (Fogden 1965). *Remarks*: Officers and businessmen on SAD business often traveled this river to visit plantations. With the exception of the BMNBE, relatively little bird collecting or study has taken place in this part of Sabah.

Labuk Road Forest Reserve.—Ca. 30 km W of Sandakan (5°53'N, 117°55'E). Also see Gum Gum Forest Reserve. *Elevation*: Ca. 50 m. *Habitats*: Old logged forest, oil palm, and a small stand of 1° forest. *Sources*: WFVZ, 31 July–4 Aug. 1983; SWD, intermittently 1983–1985 (SWD specimen data). *Remarks*: Labuk Road is the name of the main Sandakan–Telupid Road in the vicinity of Kebili–Sepilok Forest Reserve. SAD collected extensively along this road after the establishment of a bird collection at Sepilok in 1982–1983.

Lahad Datu.—A major town in eastern Sabah (5°02'N, 118°19'E). Also see Silam and Segama River. *Elevation*: Sea level. *Habitats*: 2° scrub, grassy fields, gardens, and sea coast. Formerly, the area immediately around the town in the Segama River flood plain was largely tobacco plantation (KVT). *Sources*: ADG, early 1960s (Thompson 1966); WFVZ, intermittently during 1981–1983; CMF (SWD), Oct. 1982 (Francis 1985a); D. R. Wells, J. Payne, and C. Wells, 28–31 July, 11–19 Sept. 1987 (D. R. Wells, pers. comm.); UKMS-ANSP, June 1989. *Remarks*: In colonial days the name Silam may have been a synonym for modern-day Lahad Datu (William 1981). A small colony of Striated Grassbirds occurs at the Lahad Datu airport (Francis 1985a).

Lahad Datu (Darvel) Bay.—The large bay S of Lahad Datu (4°50'N, 118°30'E). See Lahad Datu, Segarong, Silam, Sibuan Island, and Semporna Islands.

Lakutan River.—A small river ca. 7 km N of Sipitang (5°08'N, 115°33'E). *Sources*: J. Waterstraat, Apr.–Aug. 1899 (Blasius 1901).

Lamag.—5°29'N, 117°49'E. See under Kinabatangan River.

Lamas Mountain.—A coastal hill ca. 10 km N of Tuaran (6°17'N, 116°15'E). Also see Ambong and Tuaran. *Elevation*: Sea level to 417 m. *Habitats*: Unspecified, but likely to include mangroves and coastal scrub. *Sources*: ADG, Mar. 1963 (Thompson 1966; Sabah Museum specimen data).

Langkon River.—6°34'N, 116°45'E. See Bandau and Sungai River.

Langui Langui.—A peak in the Mt. Templer extension of Kinabalu Park (6°22'N, 116°36'E). *Elevation*: 1,198 m; mammals and birds surveyed at 762 m.

Habitat: 1° highland forest. *Sources*: WWFM, 20–27 Nov. 1979 (Davies and Payne 1982).

Langut River.—In the ulu Kinabatangan (ulu Melian) near the village of Pinangah (5°50'N, 116°37'E). Also see Melian River. *Elevation*: Ca. 50–125 m. *Habitats*: 1° lowland forest and shifting cultivation. *Sources*: G. Hewett, 1880s (Treacher 1888); WWFM, 31 May–4 June 1980 (Davies and Payne 1982). *Remarks*: Hewett was a Chartered Company representative in the Kinabatangan district and resided at Pinangah. He provided Treacher with information on the first record of Bulwer's Pheasant.

Lankayan Island.—6°32'N, 117°55'E. See Turtle Islands.

Larai-Larai.—6°02'N, 118°03'E. Also see Pulau Tiga Park.

Lawa Mandau.—Behind the former UKMS campus, 7 km NE of Menggatal (6°03'N, 116°12'E). This site is reached by a road from Telipok. *Elevation*: The peak is 851 m; birds were collected at ca. 600 m. *Sources*: UKMS, Mar. 1991 (R. Stuebing, pers comm.). *Remarks*: A potentially good site for lower montane species close to Kota Kinabalu.

Layang Island.—Off Papar (5°46'N, 115°53'E) (Stuebing 1991).

Layang-Layang.—6°03'N, 116°33'E. See Kinabalu Mountain.

Layang-Layang Island.—An oceanic island far to the NW of Sabah. *Sources*: GD, 25–26 Sept. 1998.

Lebakan Island.—See Turtle Islands.

Lelingan Island.—See Turtle Islands.

Libaran Island.—6°07'N, 118°01'E. See Turtle Islands.

Likas Bay.—5°59'N, 116°06'E. See Gaya Bay.

Likas Swamp.—3 km NE of Kota Kinabalu (5°59'N, 116°06'E). Also see Gaya Bay. *Elevation*: Sea level. *Habitats*: Disturbed mangroves surrounded by suburbs. *Sources*: WFVZ, May and June 1983 (Sheldon and Marin 1985); UKMS, Feb. 1986; DMB, 20–21 Dec. 1984, Feb. and Mar. 1986. *Remarks*: Formerly, a good birding site close to Kota Kinabalu, with roosting and nesting herons. May now have succumbed somewhat to suburban development, although GD counted more than 600 Black-crowned Night Herons and 30 Rufous Night Herons there in Aug. 1998 (Smythies 2000).

Limbahau.—5°43'N, 115°57'E. See Papar.

Limbawan.—In the Padas River district (5°19'N, 116°08'E) (Stuebing 1991).

Lime Cave.—A small cave ca. 10 km N of Keningau. *Sources*: CMF, May 1984 (Francis 1987). *Remarks*: Purported to have nesting swiftlets, but none was found by Francis.

Linsang, Tanjung.—5°38'N, 118°38'E. See Tanjung Linsang.

Liwagu River.—6°02'N, 116°32'E. See under Kinabalu Mountain.

Lobang.—6°02'N, 116°32'E. See Kinabalu Mountain.

Lokan River.—5°26'N, 117°44'E. See Bukit Garam under Kinabatangan River and Segaliud-Lokan Forest Reserve.

Lokapas.—6°53'N, 117°14'E. See Melobang.

Lok Kawi.—The shoreline 10 km SW of Kota Kinabalu (5°51'N, 116°03'E) opposite the military camp. *Elevation*: Sea level. *Habitats*: Beach and tidal flats. *Sources*: WFVZ, intermittently 1981–1983; B&W, 18 Oct. 1984. *Remarks*: A good shorebird site with sand and mud flats.

Long Pasia.—A town in extreme SW Sabah (4°24'N, 115°43'E). Also see

Muruk Miau. *Elevation*: Ca. 900 m. *Habitats*: 1° highland and lower montane forest, logged forest, and shifting cultivation. *Sources*: GD, Apr. 1996 (Smythies 2000). *Remarks*: This is an area that needs bird study.

Losan.—5°14'N, 115°59'E. See Ulu Losan.

Lotung (Lutung) Mountain.—Ca. 4°50'N, 116°53'E. See Maliau Basin Conservation Area.

Luasong River.—4°33'N, 117°22'E. See Imbak River.

Lucia Mountain.—4°28'N, 117°56'E. See Tawau Hills Park.

Lumadan River and Estate.—5°16'N, 115°40'E. See Lumbidan.

Lumahat or Lumat.—Between Membakut and Beaufort (5°24'N, 115°45'E). *Elevation*: Ca. sea level. *Habitats*: Old rubber and peatswamp and logged dipterocarp forest. *Sources*: DMB, 1958–1962.

Lumako.—See Lumaku Mountain.

Lumaku Mountain.—Between Tenom and Sipitang (4°52'N, 115°38'E). *Elevation*: 1,966 m; birds surveyed at 1,200–1,500 m. *Habitats*: In the 1980s, 1°, recently logged, and 2° montane forest. *Acacia mangium* was planted by Sabah Forest Industries up to ca. 1,300 m in 1989. The plantation was not maintained, or it burned, and is now extensivealang grass (R. Stuebing, pers. comm.). *Sources*: UKMS-ANSP, 22–27 June 1989.

Lumat.—See Lumahat.

Lumbidan and Lumadan.—Lumbidan is not shown on maps, and its exact location is unknown. The name may refer to several localities or a large area on the Klias Peninsula. Ussher described it as a “. . . little Kadyan settlement . . . on the northwest coast, and about thirty miles [48 km] above the mouth of the Brunei River” (Sharpe 1879b). He also noted that the Klias River is W of Lumbidan. Davis (1962) cited the coordinates in his gazetteer as 5°23'N, 115°22'E without references. This places Lumbidan on the northwestern coast of the Klias Peninsula. However, DMB visited Lumadan Estate (5°16'N, 115°40'E) on the Lumadan River near the Bukau River (5°16'N, 115°36'E), on the road between Beaufort and Weston. *Elevation*: Sea level. *Habitats*: Lumadan: mature rubber, new plantations, swamp, and dipterocarp forest. Lumbidan: circumstantial evidence, in particular the presence of the habitat-specific species Hooked-billed Bulbul and Gray-breasted Babbler (Sharpe 1879c), suggests peatswamp forest. *Sources*: H. Low, 1848–1877 (Sharpe 1879c); H. T. Ussher, ca. May 1876–Mar. 1877 (Sharpe 1879b, c; BMNH specimen data); W. H. Treacher, ca. 1879 (Sharpe 1879b, c); A. H. Everett, Nov. 1889, Mar. and Apr. 1892 (ANSP catalog data); DMB, intermittently 1958–1962 (Smythies 1981).

Lumerau River.—5°19'N, 118°53'E. See Tabin Wildlife Reserve.

Lumpongan River.—In Tabin Wildlife Reserve (5°19'N, 118°53'E).

Lumu-lumu.—6°00'N, 116°32'E. See Kinabalu Mountain.

Lungisan Island.—6°42'N, 116°20'E. See Mantanani Islands.

Lungmanis Virgin Jungle Reserve.—Ca. 50 km W of Sandakan (5°44'N, 117°40'E). *Elevation*: <100 m. *Habitat*: Lowland forest. *Sources*: WWFM, 5–10 Oct. 1979 (Davies and Payne 1982).

Lutung Mountain.—Ca. 4°50'N, 116°53'E. See Maliau Basin Conservation Area.

Maang.—A suburb of Penampang ca. 12 km S of Kota Kinabalu (5°05'N, 116°05'E). *Elevation*: 20 m. *Habitats*: Padi, scrub, and overgrown rubber. *Sources*:

es: WFVZ, regularly 1981–1983. *Remarks*: The WFVZ was headquartered in Kampung Maang and collected many birds in the vicinity. *Reference*: Marin and Sheldon (1987).

Madai Caves.—A limestone outcrop just N of Kunak along the Lahad Datu–Tawau highway (4°43'N, 118°08'E). *Elevation*: Sea level to 600 m. *Habitats*: Limestone forest and 2° growth. Much of the area has been cleared and planted with oil palm. Some parts were extensively burned during the 1983 El Niño (Francis 1987). *Sources*: P. Orolfo, Oct.–Nov. 1930 (RMC specimen data; USNM catalog data); Sabah Museum, Oct. 1978, Jan. 1980 (specimen data). *Remarks*: An important swiftlet nest site with 25 caves. *Reference*: Daly (1888).

Madai Forest Reserve.—4°44'N, 118°03'E. See Madai and Baturong Caves.

Madalon Mountain.—In the Mt. Templer extension of Kinabalu Park (6°27'N, 116°37'E). Also see Sungai River. *Elevation*: 650–900 m. *Habitat*: 1° highland forest. *Sources*: WWFM, 20–27 Nov. 1979 (Davies and Payne 1982, pers. comm.).

Magdalena Mountain.—Ca. 30 km N of Tawau (4°30'N, 117°57'E). The BMNBE approached Magdalena from the right branch of the Merutai River and, thus, surveyed mainly the western slope. Banks (1982) referred to Magdalena as Bukit Goram. The southern slopes of Magdalena are in the Tawau Hills Park. Also see Tawau Hills Park. *Elevation*: 1,311 m, collections from 600 to 1,300 m. *Habitat*: 1° lower montane forest. *Sources*: BMNBE, June 1956 (Banks 1982, pers. comm.; R. Sims, unpubl.; Sabah Museum specimen data). *Remarks*: Banks (1982, pers. comm.) remarked on the absence of montane birds on Magdalena, but there are examples in the BMNBE collection of at least lower-montane species (e.g., Pygmy White-eye).

Maiga Island.—4°36'N, 118°41'E. See under Semporna Islands.

Malangkap.—6°09'N, 116°30'E. See Kinabalu Mountain.

Makaniton.—Ca. 15 km NE of Tenom behind Melalap Estate on the Purulon River (5°11'N, 115°58'E). Also see Melalap and Ulu Losan. *Elevation*: 300 m. *Habitats*: 1° upland forest and forest edge, cocoa plantations, and 2° scrub. *Sources*: UKMS-ANSP, 27 May–4 June 1989. *Reference*: Stuebing (1991).

Malawali Island.—Northernmost Sabah (7°03'N, 117°18'E). *Elevation*: Sea level. *Sources*: F. N. Chasen and C. B. Kloss, 8–9 Sept. 1927 (Chasen and Kloss 1930a, b).

Maliau Basin Conservation Area.—This area (390 km²) in south-central Sabah (ca. 4°50'N, 116°53'E) includes Mt. Lotung and the southerly basin that drains into the Maliau River. *Elevation*: 450–1,684 m. Also see Simatuoh and Ulu Samuran. *Habitats*: 1° upland to upper montane, upland riparian, highland or lower montane kerangas (1,000–1,100 m), lower montane coniferous (950–1,000 m), and upper montane ericaceous (above ca. 1,200 m) forests. The coniferous forest on the Maliau side forms a narrow band. *Sources*: Sabah Museum, May 1981 (specimen data; R. Goh, pers. comm.); Sabah Foundation/WWFM Expedition, Apr.–May 1988 (Yong et al. 1989). *Remarks*: The Sabah Museum Expedition approached Mt. Lotung from Sepulut via the Sepulut and Sabutan Rivers. The participants walked to Ulu Samuran and up the western ridge to ca. 1200 m. The Sabah Foundation/WWFM group flew into the Basin by helicopter and established a base camp along the Maliau River at 490 m. Yong et al. (1989) listed birds according to habitat. *References*: Marsh (1989) and Marsh and Gasis (1990).

Maliau River.—4°45'N, 116°59'E. See Maliau Basin Conservation Area.

Malingai, Bukit.—The site of a swiftlet nesting cave (Daly 1888). No other information.

Malua River.—5°18'N, 117°37'E. See under Kinabatangan River.

Malubang.—6°58'N, 117°03'E. See Melobang.

Malubuk.—In the Kuamut Forest Reserve (5°08'30"N, 117°33'E). *Elevation*: 150–200 m. *Habitat*: Logged upland forest. *Sources*: WWFM, 28 July–6 Aug. 1981 (Davies and Payne 1982).

Malubuk River.—5°14'N 117°33'E.

Malutut River.—Tenom district, 5°15'N, 115°58'E (Stuebing 1991).

Mamut River.—6°03'N, 116°28'E. See under Kinabalu Mountain.

Mamutik Island.—5°58'N, 116°00'E. See Gaya Island.

Manampilik (Manampili) Island.—4°20'N, 118°34'E. See under Semporna Islands.

Mananam Plain.—5°21'N, 116°53'E. See Melian River.

Mandahan.—Ca. 50 km SW of Kota Kinabalu between Kimanis and Bongawan (5°32'N, 115°54'E). *Elevation*: Sea level. *Habitats*: Beach strand, mangroves, coastal swamps (inland), and heath scrub. Until 1970, a small rubber estate was present that was surrounded by 1° forest. *Sources*: YUE, 27 Feb.–2 Mar. 1977.

Mandangin.—A village just NW of Membakut (ca. 5°29'N, 115°47'E). *Elevation*: Sea level. *Habitats*: Padi and 1° swamp forest. *Sources*: WFVZ, intermittently in 1983. *References*: Marin and Sheldon (1987).

Mangalum Island.—6°12'N, 115°35'E. See Mengalum Island.

Manggis.—Two villages, one near Papar (5°42'N, 116°00'E) and another near Mt. Tambuyukon (6°12'N, 116°45'E).

Mangsi (Mangsee) Islands.—Two small islands N of Banggi Island (7°31'N, 117°18'E). *Remarks*: Mentioned by Smythies (1957) as one of several north Bornean record localities for Gray Imperial Pigeon. He did not specify who worked at this site.

Manila.—See Sandakan.

Mantabuan Island.—4°37'N, 118°47'E. See under Semporna Islands.

Mantanani Islands.—Two main islands, Mantanani Besar (6°42'N, 116°22'E) and Mantanani Kecil (6°43'N, 116°18'E), and a small rocky islet, Lungisan (6°42'N, 116°20'E), ca. 40 km NNE of Kota Belud. *Elevation*: Sea level. *Habitats*: Mantanani Besar: beach strand, coconut groves, heath grasslands, enclosed forest, forest on limestone soil, and limestone bluffs. Mantanani Kecil: limestone hill, and rocky and sandy shores. Lungisan is a small rocky islet consisting of a steep limestone hill ca. 40 m. high. *Sources*: A. H. Everett, Dec. 1887, Dec. 1891, Apr. 1892 (Everett 1889; Sharpe 1893; Kloss 1930a); C. Hose, 1891 (SMC specimen data); J. C. Moulton, 18 June 1921 (Kloss 1930a); C. B. Kloss, 15–16 June 1924 (Kloss 1930a); P. Orolfo, June 1931 (RMC specimen data; USNM catalog data); V. W. Ryves, 25–26 Jan. 1939 (Gibson-Hill 1949b); Sabah Museum, 13 July 1970, 18–21 Apr. 1971 (specimen data); J. T. Marshall, 12 Nov. 1974 (Marshall 1978); WFVZ (FHS, B. King, D. Yong, and CMF), 9–11 Mar. 1982 (Sheldon et al. 1983); J. Wall and D. Yong, 29–31 July 1985 (pers. comm.). *Remarks*: The Mantanani islands are home to the endemic Mantanani Scops Owl, as well as nesting Blue-naped Parrots, Black-nest and Edible-nest swiftlets, and several insular pigeons. *References*: Daly (1888) and Francis (1987).

Manukan Island.—5°58'N, 116°00'E. See Gaya Island.

Marai-Parai.—6°05'N, 116°31'E. See Kinabalu Mountain.

Marak-Parak.—Kota Marudu district (6°14'N, 117°48'E) (Stuebing 1991).

Marantongan River.—See Merintaman–Menggalong Forest Reserve.

Marikut River.—4°27'N, 117°26'E. See Kalabakan Forest Reserve.

Marudu River and Bay.—Northernmost Sabah (6°45'N, 116°55'E). Also see Bandau, Bengkoka, and Kudat. *Elevation*: Sea level. *Habitats*: Sandy beaches, 2° scrub, mangroves, intertidal mudflats, estuary, and open water. *Sources*: A. H. Everett, Jan. 1893 (Sharpe 1893, 1894b); C. A. Gibson-Hill, July 1949 (Gibson-Hill 1950); KVT, intermittently 1960s. *Reference*: Scott (1989).

Materis Hill.—6 km SW of Gomantong (5°31'N, 118°02'E). *Remarks*: A site with caves from which swiftlet nests have been collected, but about which little is known (Francis 1987).

Mawau or Mawao Estate.—Immediately S of Membakut town on a line with the left bank of the Membakut River (ca. 5°26'N, 115°42'E). *Elevation*: Sea level. *Habitats*: Oil palm, old and new rubber, swamp forest, and scrub. *Sources*: DMB, intermittently 1958–1962, Dec. 1984, Jan.–Mar. 1986.

Megatai.—Ca. 5 km N of Tambunan (5°39'N, 116°19'E). *Elevation*: Ca. 550 m. *Habitats*: 2° forest, bamboo and sapling thickets, and shifting agriculture. *Sources*: WWFV, 18–29 Nov. 1981, 20–22 June 1983.

Mekedeu.—Ca. 6°07'N, 116°40'E. See Mokodau under Kinabalu Mountain.

Melalap.—Site of a large plantation ca. 15 km NNE of Tenom (5°14'N, 116°00'E). Also see Makaniton and Ulu Losan. *Elevation*: 100 m. *Habitats*: 1° and 2° upland forest and scrub, oil palm, rubber, and gardens. *Sources*: L. A. Charles, Apr. 1941 (RMC specimen data); KVT, intermittently 1950–1960s.

Melian River and Valley.—The main northern tributary of the Kinabatangan running from the Maitland Range to Kuamut (5°13'N, 117°25'E). The Melian Valley refers to the physiographic region separating the Kuamut and the Labuk highlands, and includes Mananam Plain (5°21'N, 116°53'E), a flat and partially alluvial area E of the Tongod River (Collenette 1963). Garcia worked two sites: Ka-Karis, the location of which is uncertain, but may be Kariskaris (5°16'N, 117°27'E); and Tongod (5°16'N, 116°58'E). WWFM surveyed on Mananam Plain and in the Melian Valley (exact site unspecified). Also see Kinabatangan, Labau, and Langut rivers, and Ulu Tiulon. *Elevation*: Ca. 50–150 m. *Habitats*: In Garcia's day probably some 1° lowland forest. WWFM found logged lowland forest and shifting cultivation. *Sources*: ADG, 20–21 Oct. 1963 (Thompson 1966; Sabah Museum specimen data); WWFM, 29 Apr.–1 May, 22–24 Nov. 1980 (Davies and Payne 1982).

Meliau.—A village (ca. 5°51'N, 117°8'30"E) and river (5°52'N, 117°13'E). Meliau also describes the general area from the Meliau–Labuk river junction to ca. 2 km up the Meliau River, the route traveled by the BMNBE on their way to Mt. Meliau (Ensuan). *Elevation*: Ca. 60 m. *Habitats*: 1° lowland to upland forest, 1° and 2° riparian forest, 2° growth in the vicinity of Meliau village, and possibly forest on ultrabasic soil. *Sources*: BMNBE, Apr.–May 1956 (Banks 1982, pers. comm.; R. Sims, unpubl.; BMNH specimen data). *Remarks*: Ultrabasic-soil forest is suggested by Sim's description of stunted forest in the Mt. Ensuan area and by the presence of Gray-breasted Babbler (Sheldon 1987).

Meliau Mountain.—5°51'N, 117°07'E. See Ensuan Mountain.

Melikop River.—5°12'N, 116°50'E. See under Kinabatangan River.

Melobang.—6°57'N, 117°05'E. *Remarks*: Swiftlet caves of this name are thought to be in the Marudu Bay area, but their exact locality is unknown (Francis 1987). Caves have been reported from the W side of the Bengkoka peninsula (near Kampung Malubang, 6°58'N, 117°03'E) and on the E side (on Bukit Kar-amunting at Lokapas, 6°53'N, 117°14'E). *Remarks*: These may be sea caves. One of these sites may be "Pigton," which was mentioned by Daly (1888) as a limestone hill where swiftlets nest.

Membakut.—A large town 65 km SW of Kota Kinabalu (5°28'N, 115°47'E) and the surrounding area from the coast to the Crocker Range foothills (Ulu Membakut). Under this heading we include Kampung Pimping (5°29'N, 115°46'E), and several areas whose exact locality we do not know: Bandau (YUE), Kampung Gana (DMB), and Kampung Sungai Damit (DMB). The nearby locality of Mawau is listed separately because DMB recorded so many birds there. Mandangin and Selagon are listed separately because they are interesting sites. See also Mawau, Mandangin, and Selagon. *Elevation*: Sea level. *Habitats*: Heath, beach strand, mangrove, swamp and peatswamp forest, padi, fallow padi, rubber, and 1° dipterocarp forest (in Ulu Membakut). *Sources*: DMB, intermittently 1958–1962, Dec. 1985, Jan. 1985, Jan.–Mar. 1986; Sabah Museum, June 1971 (specimen data); YUE, 21–26 Feb. 1977; WfVZ, intermittently during 1983.

Mempakul.—On the SW tip of the Klias Peninsula at the end of the road to the Labuan ferry (5°18'N, 115°20'E). The town of Menumbok (5°18'N, 115°22'E) is adjacent to Mempakul. *Elevation*: Sea level. *Habitats*: Sandy-mud beaches, beach strand, coconut plantation, scrub, and village. *Sources*: Sabah Museum, 11 Jan. 1981 (specimen data); B&W, 5 Sept. 1984; DMB, 22 Dec. 1984.

Menampilik (Manampilik) Island.—4°20'N, 118°34'E. See under Semporna Islands.

Menanggul River.—See Bod Tai.

Mendolong.—The Sabah Forest Industries' plantation between Sipitang and Tenom on the Mendolong River (4°57'N, 115°40'E). Also see Lumaku Mountain. *Elevation*: Ca. 200–1,300 m. *Habitats*: An exotic tree plantation consisting primarily of *Acacia mangium*; also 2° scrub, logged and unlogged 1° upland to lower montane forest. Much of the area has burned and is now lalang grass (R. Stuebing, pers. comm.). *Sources*: UKMS, May 1987, Dec. 1987 (catalog data); UKMS-ANSP, 22–27 June 1989. *Remarks*: UKMS students conducted bird and small mammal surveys in the plantation in the 1980s.

Mengalum Island.—55 km NW of Kota Kinabalu (6°12'N, 115°35'E). *Elevation*: Sea level. *Habitats*: Beach strand, swamp (with sago), heath grasslands, enclosed heath forest, and enclosed good-soil forest. *Sources*: C. B. Kloss, 10–15 July 1928 (Kloss 1930a, 1931a); WfVZ, 2–3 June 1983.

Menggalong River.—5°01'N, 115°28'E. See Merintaman–Menggalong Forest Reserve.

Mengatal.—A town ca. 13 km NE of Kota Kinabalu (6°01'N, 116°09'E). *Sources*: D. H. Johnson, Aug. 1951 (USNM catalog data); Sabah Museum, Nov. 1970 (specimen data); J. C. and M. G. Pearson, 10 Apr. 1981 (pers. comm.); UKMS, Mar. 1988 (catalog data). *Remarks*: Johnson collected at "Mengatal Rubber Estate." Locally this is called Labao Estate and lies on the main road

between Menggatal and Telipok (KVT). The Pearsons collected on the Menggatal River, presumably in mangrove.

Mengkabong.—A fishing village ca. 2 km SW of Tuaran (6°08'N, 116°12'E). *Elevation*: Sea level. *Habitats*: Mangroves, estuary. *Sources*: D. R. Wells, 1 Nov. 1980 (Wells 1981); DMB, 18 Nov. 1990.

Mengkaladom.—5°58'N, 116°18'E. See Sinsuran Road.

Mentapok River.—5°44'N, 116°55'E.

Menumbok.—5°18'N, 115°22'E. See Mempakul.

Menunuk.—Location uncertain; listed on specimen tags as "Ulu Padas." *Habitat*: "1° forest." *Sources*: Sabah Museum, 30 Dec. 1981 (specimen data).

Merabai.—6°22'N, 116°20'E. See Merabali and Merabau.

Merabali.—Unknown, possibly Merabai (6°22'N, 116°20'E) or Merabau. All in the vicinity of Kota Belud. *Sources*: A. H. Everett, Dec. 1892 (ANSP catalog data).

Merabau.—Possibly Merabai or Merabali. See Kota Belud Bird Sanctuary.

Meridi.—6°06'N, 116°58'E. See Sugut River.

Merintaman–Menggalong Forest Reserve.—A forest reserve on the SW coast near Sipitang, so named for its two bordering rivers: Menggalong (5°01'N, 115°28'E) in the S and Merintaman (5°02'N, 115°32'E) in the N. Two rivers within the reserve are the Marantongan and Sebuboh. *Elevation*: Sea level. *Habitats*: 1° peat swamp forest, fire-padang kerangas, scrub. Fruiting *Eugenia* (jambu) trees in the kerangas attract large numbers of birds during Feb.–Apr. See Binsulok, Membakut, and Selagon for similar habitats. *Sources*: H. Low, ca. 1870s (Sharpe 1879c); H. T. Ussher's collectors, during May 1876–Mar. 1877 (Sharpe 1879b, c); A. H. Everett, no date (Everett 1889); J. Waterstraat, Apr.–Aug. 1899 (Blasius 1901); Sabah Park Survey, 18–22 Mar. 1975 (Wells et al. 1975; Wells 1976); WFVZ, 14–16 June 1983 (Sheldon 1987). *Remarks*: Waterstraat collected on the Menggalong River during the spring and summer of 1899. Low obtained a few birds along the Menggalong River as well. This reserve is the last good stand of coastal Ramin swamp forest in Sabah (W. Meijer, pers. comm.) and is home to two of the most habitat-specific bird species in the state, Hook-billed Bulbul and Gray-breasted Babbler (Holmes and Wall 1989; Sheldon 1987). Another site with similar forest and birds is Selagon, near Membakut. The Merintaman–Menggalong peat swamp forest was protected as a national park in 1978, degazetted in the early 1980s, and then regazetted (minus the Merintaman forest) as a virgin jungle reserve in 1984. *Reference*: Scott (1989).

Merintaman River.—5°02'N, 115°32'E. See Merintaman–Menggalong Forest Reserve.

Merutai (or Merotai or Morutai) Besar.—A village (4°26'N, 117°46'E) and an estate (4°24'N, 117°49'E) on the Merutai River NW of Tawau. Also see Bal Estates and Ulu Merutai. *Habitats*: Unspecified, but likely to be 2° growth and gardens with some adjacent 1° forest. *Sources*: H. G. Deignan (MCZ), June–July 1937 (Coolidge 1940); BMNBE, June 1956 (R. Sims, unpubl.).

Mesilau River.—5°58'N, 116°37'E. See Pinosuk Plateau under Kinabalu Mountain.

Miaga Island.—4°36'N, 118°41'E. See Miaga Island under Semporna Islands.

Milau River.—See Kudat.

Milian River and Valley.—5°13'N, 117°25'E. See Melian River.

Mokodau River.—Ca. 6°07'N, 116°40'E. See under Kinabalu Mountain.

Morutai Besar.—4°26'N, 117°46'E. See Merutai Besar.

Mount Kinabalu.—6°05'N, 116°33'E. See Kinabalu Mountain.

Moyog.—5°53'N, 116°15'E. See Sinsuran Road.

Mumiang.—At the mouth of the Mumiang and Kinabatangan rivers ca. 15 km E of Sandakan (5°49'N, 118°19'E). *Elevation*: Sea level. *Habitats*: Tidal flats, estuary, and mangroves; includes an island where shorebirds roost. *Sources*: SWD, 4–11 July 1984 (specimen data); B&W, intermittently 27 Sept.–23 Oct. 1984; DMB, 15–17 Dec. 1984, Mar. 1986, 1989, 1990. *Remarks*: B&W surveyed and banded shorebirds at this site for INTERWADER.

Muruk.—A village ca. 10 km E of Ranau on the Ranau–Telupid road (5°58'N, 116°45'E). *Elevation*: 300–450 m. *Habitats*: 1° and 2° forest. *Sources*: H. Tsen (Sabah Museum), May–June 1970 (specimen data).

Muruk Miau.—In southwesternmost Sabah near Long Pasia (4°22'N, 115°50'E). *Elevation*: 1,100–1,600 m. *Habitats*: 1° oak forest, with a 30-m canopy, disturbed in late 1998 or early 1999 by logging. *Sources*: Sabah Museum, 16–25 Apr. 1999. *Remarks*: The museum collected 57 birds (23 species), as well as mammals and frogs. Among the birds was Whitehead's Broadbill.

Nalumad.—6°06'N, 116°44'E. See under Kinabalu Mountain.

Nangka.—6°46'N, 116°47'E. See Kudat.

Nilau River.—Cited by Gore (1968) as a site for Palm Swifts. No data or references.

Northern Boundary.—The boundary between Sabah and Kalimantan. *Sources*: Dutch Boundary Commission, 1912 (Kloss 1930b). *Remarks*: Many of the birds collected by the commission are in the Bogor Museum.

Nosong (Nusong) Peninsula.—5°38'N, 115°36'E. See Kuala Penyu.

Nukohan.—5°27'N, 115°37'E. See Kuala Penyu.

Obang-Obang.—See Melikop under Kinabatangan River.

Paal River.—A tributary of the Padas ca. 13 km S of Tenom (5°01'N, 115°55'E). *Elevation*: Ca. 300 m. *Habitats*: Unspecified, but likely to have been 1° forest or shifting cultivation. *Sources*: J. Comber, Jan. 1966 (Gore 1968).

Padang, Bukit.—See Kota Kinabalu.

Padas Damit.—A village and river on the Klias Peninsula ca. 40 km WSW of Beaufort (5°20'N, 115°33'E). *Elevation*: Sea level. *Habitats*: Freshwater marsh, sago, swamp forest, mangrove, and nipah. *Sources*: Sabah Park Survey, 23–25 Mar. 1975 (Wells et al. 1975; D. R. Wells, pers. comm.); WFVZ, intermittently 26 May–5 June 1983; B&W, 28 Aug., 7–9 Dec. 1984 (Beadle and Whittaker 1985; A. Whittaker, pers. comm.); DMB, 23–24 Dec. 1984, 19–20 Jan., 16–17 Feb. 1986; D. Parish, 21 Feb. 1985 (unpublished WWFM report); R. V. Lansdown, Sept. (year not specified; Lansdown 1989). *Remarks*: An important feature of Padas Damit is Padang Teratak, which lies just SW of the village and attracts wintering waders and ducks. This area is now protected as a wildlife sanctuary by the Sabah Wildlife Department. Teratak is a large, open, buffalo-grazed marsh, with swamp forest growing on islandlike outcrops of high ground. An egret roost was found by Lansdown on the Padas Damit River ca. 4 km SW of the village (Lansdown 1989). *Reference*: Scott (1989).

Padas River.—The main river draining the interior of SW Sabah into Brunei Bay via Tenom and Beaufort (5°12'N, 115°34'E). Also see Beaufort, Klias Pen-

insula, Padas Damit, Pegalan River, Rayoh, Saliwangan, Sapong, Tatalahan Caves, Tenom, and Tomani. *Sources*: J. Whitehead, 2–17 June 1885 (Whitehead 1893); A. H. Everett, May 1893, Oct. 1893 (ANSP catalog data); J. Waterstraat, Sept.–Dec. 1897 (Smythies 1960); Sabah Park Survey, 23–25 Mar. 1975 (Wells et al. 1975; D. R. Wells, pers. comm.). *Remarks*: Whitehead collected briefly along the “upper Padas” before exploring Mt. Kinabalu (Sharpe 1889a; Whitehead 1893). He seems to have reached Padas Gorge, just below Tenom.

Paitan.—A village on the Paitan River in NE Sabah (6°23'N, 117°22'E). *Elevation*: Ca. 50 m. *Habitat*: Undescribed, but certainly 1° forest in Everett's day. *Sources*: A. H. Everett, July 1892 (Smythies 1957; AMNH and ANSP specimen data); W. Frost, 1938–1939 (Smythies 1957); KVT, intermittently 1950s–1960s. *Remarks*: The site where Everett collected Bornean Peacock Pheasant and Long-billed Partridge.

Pakka Cave.—6°03'N, 116°34'E. See under Kinabalu Mountain.

Panan.—Unknown, but likely to be in the vicinity of Mt. Kinabalu, as Harrison was in the Kinabalu area at the time. *Sources*: T. Harrison, 11 Feb. 1952 (SMC specimen data).

Panar Laban.—6°04'N, 116°34'E. See under Kinabalu Mountain.

Panbatu, Tanjung.—See Balambangan Island.

Pandanan Island.—4°35'N, 118°55'E. See under Semporna Islands.

Pandasan or Pindusan.—A village on the Pandasan River at the N end of the Kota Belud Bird Sanctuary (6°28'N, 116°32'E). It is located at mile 61 on the Kudat Road near Rampayan Beach (Phillipps 1970; A. Lamb, pers. comm.). Tapinatan appears on maps at the same locality. Sabah Museum collected at a site called “Kampung Bungliu, Pandasan.” The Pandasan River mouth is 6°28'N, 116°30'E. Upstream, as it crosses Kota Belud–Kudat highway, the Pandasan River is called the Kuang-kuang River (6°29'N, 116°30'E). Also see Kota Belud Bird Sanctuary. *Elevation*: Sea level. *Habitats*: 1° riverine forest (probably now destroyed), 2° forest, fruit trees, gardens, coconut, and riparian growth. *Sources*: Q. Phillipps, May and July 1970 (Phillipps 1970); T. Miyamoto, 8–13 Aug. 1969 (Miyamoto 1971; Sabah Museum specimen data); Sabah Museum, Mar. 1969, Apr.–May 1970, Oct.–Nov. 1971 (specimen data). *Remarks*: Miyamoto (1971) described the Pandasan area as “lovely woods and streams” and KVT as “charming.”

Pandasan River.—See Pandasan and Kota Belud Bird Sanctuary.

Pangakayan.—Just S of Papar along the coast (5°42'N, 115°54'E). *Habitats*: Swampy land flanked by dying trees. *Sources*: DMB, intermittently 1958–1962 (Smythies 1963). *Remarks*: DMB found a roost at this site with breeding Purple Herons.

Pangas River.—At the base of a ridge NE of Mt. Trus Madi (6°32'N, 116°34'E). *Sources*: UKMS, 8–24 May 1991 (Stuebing 1991, pers. comm.).

Pangataran or Penataran.—6°11'N, 116°27'E. See Malangkap under Kinabalu Mountain.

Pang Burung River.—4°25'N, 118°16'E. See Kalumpang.

Panggi.—5°32'N, 118°18'E. See under Kinabatangan River.

Pantai Manis.—See Papar.

Papan Island.—5°15'N, 115°16'E. See Labuan.

Papar.—33 km SW of Kota Kinabalu (5°44'N, 115°56'E). We include under

this heading Manggis, 6 km inland (5°42'N, 116°00'E), Limbahau (5°43'N, 115°57'E), and Papar beach (Pantai Manis). Also see Benoni River, Pangakayan, Layang-Layang Island. *Elevation*: Sea level to ca. 50 m. *Habitats*: Padi, fields, ponds, mud and sand flats, mangrove, estuary, and beach strand. Ulu Papar includes rubber and some forest. *Sources*: A. H. Everett, no date (Everett 1889); DMB, intermittently 1958–1962, 1984–1990 (Batchelor 1959; Smythies 1981); KVT, intermittently 1960s, particularly at Limbahau during 1966–1967 (Smythies 1981); Sabah Museum, intermittently 1964–1981 (McClure and Leelavit 1972; specimen data); T. Miyamoto, 17–23 Aug. 1969 (Miyamoto 1971; Sabah Museum specimen data); YUE, 24 Apr. 1977; Sabah Park Survey, 26 Mar. 1975 (Wells 1976); D. R. Wells, 2, 4 Nov. 1980 (Wells 1981); WFVZ, intermittently 1981–1983; B&W, Sept., Nov., Dec. 1984; R. V. Lansdown, Sept. (year unspecified; Lansdown 1989). *Remarks*: Sabah Museum banded birds for MAPS in Papar during 1964–1967 (McClure and Leelavit 1972). Lansdown located a communal egret roost ca. 1 km NW of Papar center in nipah swamp along a tributary of the Papar River.

Parang Besar.—Uncertain, but probably near Melalap or along the Padas River. *Sources*: L. A. Charles, Mar. 1941 (RMC specimen data).

Pegalan River.—The main river draining the eastern side of the Crocker Range through Sinsuran, Tambunan, and Keningau to Tenom, where it joins the Padas River (5°07'N, 115°57'E). See Tambunan, Keningau, Melalap, and Tenom.

Penampang.—5°55'N, 116°07'E. See Maang and Kota Kinabalu.

Penataran or Pangataran River.—6°11'N, 116°27'E. See Malangkap under Kinabalu Mountain.

Penyu Islands (Pulau Penyu).—See Turtle Islands.

Periuk, Tanjung.—See Balambangan Island.

Petagas.—5°55'N, 116°03'E. See Kota Kinabalu.

Pigton.—See Melobang.

Pimping.—5°29'N, 115°46'E. See Membakut.

Pinangah.—5°12'N, 116°50'E. See Langut River and Melikop.

Pinawantai.—6°07'N, 116°42'E. See Tambuyukon.

Pindusan.—6°28'N, 116°32'E. See Pandasan.

Pinosuk Plateau.—6°01'N, 116°36'E. See under Kinabalu Mountain.

Pintasan.—5°26'N, 117°42'E. See under Kinabatangan River and Segaliud-Lokan Forest Reserve. A similar sounding site name is Pandasan; see Pandasan and Kota Belud Bird Sanctuary.

Pitas Estate.—6°43'N, 117°04'E. See Bengkoka River.

Poch.—Unknown. Cited as “Poch, Kinabalu.” *Sources*: A. H. Everett, Aug. 1892 (ANSP catalog data).

Poring Hot Springs.—6°03'N, 116°42'E. See under Kinabalu Mountain.

Pulau Tiga Park and the Kalampunian Islands.—Pulau Tiga lies 55 km SW of Kota Kinabalu. It consisting of two islands: Tiga (5°43'N, 115°39'E) and Kalampunian Damit or Kalampunian Kecil (5°46'N, 115°41'E). A third island, Kalampunian Besar (5°45'N, 115°40'E), was present until the mid-1980s, but has subsequently disappeared. Larai-Larai is a beach on Pulau Tiga. *Elevation*: Sea level. *Habitats*: Beach strand, mangrove, and closed-canopy forest. Kalampunian Besar was beach and strand. Kalampunian Damit is almost entirely covered with Pisona trees. *Sources*: J. Whitehead, 21–28 Apr. 1886 (Sharpe 1889d; Whitehead

1893); A. H. Everett, Apr. 1887, Apr. 1892 (Everett 1887, 1889; ANSP catalog data); DMB, intermittently 1958–1962, 1984–1986; Sabah Museum, 24 Mar. 1971 (specimen data); WFVZ, 10–15 Jan. 1982, 11–13 May 1983; UKMS, June 1982 and in 1986 (Stuebing and Zazuli 1986; Stuebing et al. 1990); Q. and K. Phillipps and J. Schmitt, 16–19 Apr. 1985 (A. Phillipps 1985a); A.-H. Ahmad, Aug. and Sept. 1998 (Ahmad 1999). *Remarks:* The park was founded in 1978. Kalampanian Damit is also called Snake Island for its abundant sea snakes.

Pun Batu or Pohon Batu.—On the upper reaches of the Talankai River, which flows to Sepulut (4°47'N, 116°11'E). *Remarks:* A cave site with nesting Edible-nest Swiftlets. *Reference:* Francis (1987).

Purulon River.—See Makaniton.

Putatan.—8 km SW along the coast from Kota Kinabalu (5°53'N, 116°03'E). *Elevation:* Sea level. *Habitats:* Heath, scrub, and freshwater marsh consisting mostly of *Eleocharis variegata* in deep water and *Scleria* spp. in shallow water (J. Beaman, pers. comm). *Sources:* WFVZ, intermittently 1981–1983 (Marin and Sheldon 1987).

Quoin Hill Cocoa Estate and Research Station.—Ca. 25 km NE of Tawau (4°25'N, 118°01'E). We include under this heading Ulu Balung Cocoa Estate (4°22'N, 118°08'E) and the SAD Cocoa Research Station where MCT and ADG collected. Also see Bal Estate and Apas-Balung Area. *Elevation:* Maximum elevation 533 m, but most records come from ca. 250 m. *Habitats:* During the 1960s, 1° and 2° upland forest and scrub, abaca, and cocoa shaded by *Trema orientalis*. *Sources:* M. Norman, June 1961–Feb. 1962 (Norman 1964); MCT, July–Dec. 1962 (Thompson 1966); ADG, Apr.–July 1963 (Thompson 1966); KVT, Aug. 1966. *Remarks:* MCT and ADG were based at two cocoa plantations, Quoin Hill Cocoa Research Station and Ulu Balung Cocoa Estate. Most of their work centered at the Cocoa Research Station, where they collected in cocoa and adjacent forest. They also collected in areas specifically designated as Ulu Balung and Ulu Apas. KVT visited Quoin Cocoa Estate, which was owned by the Bombay-Burma Co.

Rampayan.—A village and beach at the N end of Tempasuk Plain (6°32'N, 116°31'E). See Pandasan.

Ranau.—A town ca. 15 km SW of Kinabalu Park headquarters (5°58'N, 116°41'E). Also see Bundu Tuhan, Mt. Kinabalu, Kundasang, Mokudau, Muruk, Poring, and Pinosuk Plateau. *Sources:* T. Harrisson, Feb. 1952, 9 Dec. 1964 (SMC specimen data); NAMRU, Sept. 1960 (Kuntz 1969; USNM catalog data). *Remarks:* Ranau is occasionally cited as the locality for work done in the surrounding hills.

Rankam River.—In the Tambunan district (5°50'N, 116°25'E) (Stuebing 1991).

Rayoh.—Between Beaufort and Tenom, just below the Padas River gorge (ca. 5°13'N, 115°53'E). *Elevation:* Less than 300 m. *Habitats:* Unspecified, but likely to be 1° upland forest in the 1920s. *Sources:* C. B. Kloss and Mengga, June 1928 (Chasen and Kloss 1930a). *Remarks:* The Raffles Museum has many specimens from this site.

Resang, Ulu.—See Ulu Resang.

Rinangisan.—In the Crocker Range 60 km S of Kota Kinabalu at the highest point on the Kimanis–Keningau road (5°29'N, 116°03'E). *Elevation:* 1,050–1,325 m. *Habitats:* 1° and 2° montane forest, moss forest, and a helicopter pad. *Sources:* WWFM, 26 Sept.–6 Oct. 1981 (Davies and Payne 1982); WFVZ 18 Mar.–17 Apr.

1983, 25–28 June 1983; CMF (SWD), 17–18 May 1984 (SWD specimen data). *Remarks:* Davies and Payne refer to this area as “Ulu Kimanis.” The WFVZ group made several interesting elevational, behavioral, and migrational observations here during the height of the 1983 El Niño drought.

Rompon River.—A river near Mt. Trus Madi (5°30'N, 116°19'E).

Rukuruku, Ulu.—See Ulu Rukuruku.

Rumidi.—On the Labuk River (5°56'N, 117°17'E). *Elevation:* Ca. sea level. *Habitats:* A cocoa estate near 1° lowland forest, some of which may be growing on ultrabasic soils. *Sources:* KVT, 7 Mar. 1966. *Remarks:* Thompson observed Hook-billed Bulbul at this site.

Rusukan Besar Island.—A small island SW of Labuan (5°11'N, 115°08'E).

Sabahat.—Ca. 80 km E of Lahad Datu on the coast (5°04'N, 119°03'E). *Elevation:* Sea level. *Habitats:* Heavily logged lowland forest and agricultural plantation. *Sources:* D. R. Wells, J. Payne, and C. Wells, 28–31 July, 11–19 Sept. 1987 (D. R. Wells, pers. comm.; Wells and Francis 1988).

Sabah Softwoods Plantation.—At the Brumas Timber Camp ca. 75 km NW of Tawau (4°37'N, 117°45'E) along the Umas Umas (4°22'N, 117°44'E) and Gumpal (4°40'N, 117°36'E) rivers. Also see Brumas. *Elevation:* 150–200 m. *Habitats:* At the time of the WFVZ visit, Sabah Softwoods was ca. 30,000 ha of exotic tree plantation, comprising mainly *Albizia falcataria*, *Eucalyptus deglupta*, *Acacia mangium*, and *Gmelina arborea*. The oldest stands were ca. 7 yr. Some cocoa shaded by *Eucalyptus* and *Albizia* also was present. The plantation was adjacent to a large area of recently logged and some unlogged 1° upland forest. *Sources:* WWFM, 26 June–6 July 1981 (Davies 1981; Davies and Payne 1982); WFVZ, 26 May–27 July 1982 (Sheldon and Kennard 1982; Sheldon et al. 1992; Mitra and Sheldon 1993); UKMS, Sept. 1984 (catalog data). *Remarks:* Davies (Davies 1981; Davies and Payne 1982) surveyed large mammals and birds (including by netting) in *Albizia*, *Eucalyptus*, and *Gmelina* stands. WFVZ spent several weeks censusing birds in different age groups of *Albizia* in an effort to determine the extent of use by forest species (Mitra and Sheldon 1993). WFVZ also collected specimens in the *Albizia* for about 1 month. *References:* Duff et al. (1984), Gasis (1984), Stuebing (1985), and Stuebing and Gasis (1989).

Sabangkat Island.—4°33'N, 118°39'30"E. See under Semporna Islands.

Sabran River.—See Danum Valley Conservation Area.

Sabutan, Ulu.—See Ulu Sabutan, Maliau Basin Conservation Area, and Simatuoh.

Saiap.—6°14'N, 116°32'E. See under Kinabalu Mountain.

Saint Lucia (Sibuko) Bay.—The body of water outside Tawau harbor and SW of Semporna (4°00'N, 118°26'E).

Saliwangan.—Along the Padas River below Padas Gorge (5°18'N, 115°48'E). *Elevation:* 165 m. *Habitats:* 1° and 2° forest and scrub, riparian forest, and overgrown rubber. *Sources:* L. A. Charles, Mar. 1941 (RMC specimen data); YUE, Dec. 1976–Jan. 1977; WFVZ, 26 Aug.–3 Sept. 1981, 10 Feb.–16 Apr. 1983. *Remarks:* During the YUE, substantial stands of 1° upland forest existed on both sides of the river. A notable feature of this forest was the presence of Helmeted and Rhinoceros hornbills. The forest was severely logged in ca. 1979–1980, and no 1° forest (or large hornbills) was left.

Salyawak.—5°07'N, 118°03'E. See Segama River.

Samantolang.—In the Ulu Serudong (ca. 4°23'N, 117°02'E). *Elevation*: Ca. 500 m. *Habitat*: 1° upland forest. *Sources*: WWFM, 10–19 July 1980 (Davies and Payne 1982).

Samawang and Samawang River.—40 km NW of Sandakan (5°55'N, 117°46'E). *Habitats*: Although Chasen and Kloss did not specify habitat, from their collections it appears that they worked in 1° lowland forest. ADG collected primarily at Kuala Samawang, that is, in mangrove and open areas. *Sources*: F. N. Chasen and C. B. Kloss, July 1927 (Chasen and Kloss 1930a); ADG, Sept. 1963 (Thompson 1966; Sabah Museum specimen data).

Sampangmangio.—7°02'N, 116°45'E. See Sempang Mangayau.

Samuran.—See Ulu Sabutan, Simatuoh, and Lotung Mountain.

Sandakan (Elopura).—A large town on the east coast at 5°50'N, 118°07'E. Precise locations of old collecting sites are often unclear. Ryves collected eggs and birds at three localities (Gibson-Hill 1949b): Bai Island (5°46'N, 118°06'E); Batang River (5°55'N, 118°02'E) on Sandakan Estate, which was 11 miles (18 km) from Sandakan town and had a “bit of forest” in the its vicinity (KVT); and Tanjung Teluk. The Crane Pacific Expedition collected at the 8-mile marker (Davis 1962). Harrisson and the BMNBE collected at Sandakan airport, ca. 14 km W of Sandakan town. SWD collected a few specimens at Kampung Manila at mile 12 on the main Sandakan road and at Bukit Sino-sino. Also see Bai Island, Berhala Island, Bettotan, Garinono Forest Reserve, Gum Gum Forest Reserve, Labuk Road Forest Reserve, Samawang River, and Kabili–Sepilok Forest Reserve. *Elevation*: Ca. sea level to 100 m. *Habitats*: Usually unspecified. Certainly many of the 19th and early 20th century records were from 1° lowland dipterocarp and riparian forest, which was extensive in the vicinity of Sandakan before the Second World War. Until 1955, 1° forest began at mile 15 on the main road to Telupid (KVT). Deforestation continued into the 1960s (J. Payne, pers. comm.). The only substantial 1° lowland forest left is at Kabili–Sepilok Forest Reserve. The region around Sandakan airport in the 1950s (and today) is grassy fields, rubber, and 2° growth. Sandakan harbor is lined with the mangroves of the Elopura Mangrove Forest Reserve. *Sources*: W. B. Pryer, 1878—ca. 1899 (Sharpe 1881; Tregonning 1954); Marchesa Expedition, Apr.–May 1883 (Guillemard 1885, 1889; Chasen and Kloss 1930b); J. Whitehead, 10–28 Apr. 1885 (Sharpe 1889a–d; Whitehead 1893); C. F. Adams, May 1887–Feb. 1888 (Elliot 1890, 1891; USNM catalog data); J. C. Prakke, ca. 1890 (G. F. Mees, pers. comm.); P. Bartsch, 1–3 Mar. 1908 (Mearns 1909); Crane Pacific Expedition (W. A. Weber and F. C. Wonder), 3–7 July, 17–26 Aug. 1929 (Mayr and Camras 1938; Davis 1962; FMNH catalog data); H. G. Deignan (MCZ), June 1937 (Coolidge 1940; Smythies 1957; MCZ specimen data); V. W. Ryves, 27 Mar.–24 Aug. 1938 (Gibson-Hill 1949b, 1952, pers. notes; RMC specimen data); D. D. Davis (FMNH), Aug. 1951 (FMNH catalog data); T. Harrisson, Jan. and Feb. 1952, July 1964 (Harrisson 1955a; Fogden 1965; specimen data); BMNBE, Apr.–May 1956 (R. Sims, unpubl.); WFVZ, intermittently 1981–1983; SWD, intermittently 1983–1985 (SWD specimen data); DMB, intermittently 1984–1990. *Remarks*: An old name for Sandakan was Elopura. Ryves recorded Philippine Scrubfowl nesting on the mainland at Tg. Teluk. *Reference*: Pryer (1881).

Sangkir.—See Kota Belud Bird Sanctuary.

Sapagaya.—5°35'N, 118°04'E. See Sepagaya Forest Reserve.

Sapanmangio Cape.—7°02'N, 116°45'E. See Simpangmengiao Cape.

Sapat Kalisun River.—5°00'N, 117°30'E. See Danum Valley Conservation Area.

Sapi Island.—See Gaya Island.

Sapong Estate.—Ca. 5 km S of Tenom (5°04'N, 115°56'E). Also see Benoni River. *Habitats*: No details on habitat are available, but KVT sighted a Hook-billed Bulbul here, suggesting swamp or other poor-soil forest forest. *Sources*: J. Comber, 1960s (Gore 1968; Comber 1971); KVT, Mar. 1966. *Remarks*: Comber was manager of the estate in the 1960s.

Sapulut (Sapulut) and Sapulut River.—4°42'N, 116°29'E. See Sepulut.

Sayap.—6°9'51"N, 116°33'55"E. See under Kinabalu Mountain.

Sayat-Sayat.—6°04'N, 116°34'E. See under Kinabalu Mountain.

Sebangkat Island.—4°33'N, 118°39'30"E. See Semporna Islands.

Sebatik Island.—The large island forming the southern shore of Tawau Bay (4°10'N, 117°45'E). *Elevation*: Sea level. *Habitats*: Andrews said it was "... heavy jungle similar to that of the adjacent mainland" (Amadon 1943b:331). Now it consists of 2° growth, largely impenetrable "prickly cane" (Norman 1964), gardens, and mangrove. *Sources*: R. C. Andrews, 3 Nov. 1909, 10 Jan. 1910 (Allen 1911; Amadon 1943b); M. Norman, June 1961–Feb. 1962 (Norman 1964); KVT, intermittently 1960s. *Remarks*: Norman (1964) described local bird seasonality on the island. From June to Aug., a great influx of birds and evidence of nesting occurs, apparently corresponding with fruit abundance. From Sept. to Dec. bird activity diminished, but picked up again in Jan. and Feb. Sebatik Island is one of two locations where Greater Flameback has been collected in Sabah. The other is near Sandakan.

Sebuboh River.—5°03'N, 115°31'E. See Merintaman–Manggalong Forest Reserve.

Segaliud–Lokan Forest Reserve.—The drainage area of the Segaliud and Lokan rivers, centered at ca. 5°38'N, 117°40'E. The Lokan River (5°26'N, 117°44'E) flows into the Kinabatangan River near Pintasan, and the Segaliud River (5°45'N, 117°52'E) enters Sandakan Harbor. The Marchesa group explored the lower section of the Segaliud River up to Batang Ipil. Also see Bettotan. *Elevation*: Sea level to ca. 120 m. *Habitats*: Previously 1° lowland forest. The Segaliud River area is now almost entirely oil palm. The Lokan area is now all logged lowland forest and oil palm (Davies and Payne 1982; J. Payne, pers. comm.). *Sources*: E. G. Lempriere, early 1880s (Nicholson 1883); Marchesa Expedition, 11–14 Apr. 1883 (Guillemard 1885, 1889); WWFM, Dec. 1979, Feb. and Apr. 1980 (Davies and Payne 1982, pers. comm.). *Remarks*: Whether Lempriere's collection and the Marchesa Expedition involved separate trips is unclear.

Segama River.—Ca. 5°00'–5°35'N, 117°30'–118°50'E. KVT regularly visited plantations on the lower Segama. J. MacKinnon worked primarily at Kuala Bole (5°10'N, 117°53'E), but also camped further up the Bole. WFWZ surveyed from Kampung Segama (Segama bridge, ca. 5°06'N, 118°14'E) to Kuala Bole (May 1983); and between Kampung Segama and Kampung Salyawak, ca. 20 km NW of Lahad Datu (5°07'N, 118°03'E), in Aug. 1983. Also see Bole River, Danum Valley Conservation Area, and Kuala Segama. *Elevation*: Sea level to ca. 100 m. *Habitats*: Mainly riparian forest, 1° lowland and upland forest, logged forest, 2° growth, and limestone cliffs. *Sources*: KVT, intermittently 1950–1960s; B. Har-

risson, early Sept. 1964 (Fogden 1965); J. MacKinnon, July–Sept. 1968, Sept. 1969–Sept. 1970, briefly in 1982 (MacKinnon 1974, pers. comm.; unpubl. Wildlife Dept. report); D. Foote (WVZ), C. Marsh (Sabah Foundation), J. Payne (WWFM), and R. Whitaker (WWFM), 28–31 May 1983 (Whitaker 1984); WVZ, 18–20 Aug. 1983; A. D. Johns (Royal Society), intermittently 18 June 1987–17 Nov. 1988 (Johns 1988, 1989b, 1992, 1996, pers. comm.). *Remarks:* MacKinnon informally surveyed birds during his Ph.D. research on orangutans at Kuala Bole (1969–1970). In 1982, he returned briefly and compiled a list of birds. In an unpublished report to the Wildlife Department, he compared this list to his recollections of the birds that were present in 1968–1970.

Segarong Caves.—See Segarong Forest Reserve.

Segarong Forest Reserve.—22 km NW of Semporna on the coast (4°34'N, 118°26'E). *Elevation:* Sea level, with limestone hills reaching 300 m. *Habitats:* Limestone, 2° scrub, mangrove, and nipah. *Sources:* CMF, 13–18 Jan. 1983 (Francis 1987, unpubl. Forest Dept. report). *Remarks:* An important nesting site for Edible-nest and Black-nest swiftlets. *Reference:* Daly (1888).

Seguntor (Siguntor) River.—A river flowing into the “north bay” of Sandakan Harbor (5°49'N, 118°00'E). *Elevation:* Sea level. *Habitat:* Mangrove. *Sources:* WVZ and SWD, 8 Dec. 1982; SWD, 7 Sept. 1983 (SWD specimen data).

Sekrumit River.—See Balambangan Island.

Selagon.—An area just SW of Membakut on the way to Beaufort. The pertinent forest is adjacent to the highway on the W side (or was before clearing). *Elevation:* Sea level. *Habitat:* Peatswamp forest. *Sources:* UKMS, Jan. 1992 (R. Stuebing, pers. comm.). *Remarks:* UKMS collected Hook-billed Bulbul and Gray-breasted Babbler at this site in 1992.

Selakan Island.—Ca. 5°34'N, 118°42'E. See under Semporna Islands.

Selimpopon River.—A river flowing into the Wallace Bay–Cowie Harbor area (4°15'N, 117°31'E) (Gore 1968). *Sources:* M. Norman, Feb. 1962 (Gore 1968).

Selingaan or Selinggian Island.—6°11'N, 118°04'E. See Turtle Islands.

Sembakong River.—4°15'N, 116°27'E. The Ulu Sembakong Caves is a swiftlet site reported by Daly (1888). It is in East Kalimantan, Indonesia.

Sempang Mangayau Cape.—The large promontory NW of Kudat forming the northernmost point on mainland Borneo (7°02'N, 116°45'E). Also see Kudat. *Sources:* Marchesa Expedition, 30 May 1883 (Guillemard 1885, 1889); A. H. Everett, June 1886 (Everett 1886, 1889).

Semporna.—A town in SE Sabah (4°28'N, 118°36'E). *Elevation:* Sea level. *Habitat:* Coastal scrub. *Sources:* BMNBE, 7 July 1956 (BMNH catalog data); MCT, 16 Aug. 1962 (Thompson 1966).

Semporna Islands.—The islands off the coast of Semporna (see the individual islands listed below). These islands have been visited for short periods by several groups. Also see Sipadan Island. *Habitats:* Beach strand, thin fringes of mangrove, heath forest and scrub, and enclosed forest. *Remarks:* The high volcanic islands (Bohey Dulang, Bodgaya, and Tatagan) and associated smaller islands (Mantabuan, Sibuan, Maiga, Selakan, and Sebangkat) were surveyed for inclusion in a marine park during 26 Aug.–6 Sept. and 9–15 Sept. 1980 (Yong 1980; Wood 1981).

Bodgaya (Gaya).—The largest of the high volcanic island group (4°37'N,

118°45'E). *Elevation*: Highest point 455 m. *Habitats*: Tall forest (Wood 1981), agricultural clearings, and beach strand. *Sources*: Marine Park Survey, Aug.–Sept. 1980 (Yong 1980; Wood 1981); WfVZ, 16 Aug. 1983. *Remarks*: Sometimes called Gaya Island. Edible-nest Swiftlets nest in caves on the island (Francis 1987).

Bohayen.—Ca. 37 km E of Semporna (4°28'N, 118°55'E). *Sources*: BMNBE, 10 July 1956 (R. Sims, unpubl.).

Bohey Dulang.—Furthest E of the three high volcanic islands (4°35'N, 118°47'E). *Habitat*: Some tall forest stands (Wood 1981). *Sources*: BMNBE, 9 July 1956 (R. Sims, unpubl.); Marine Park Survey, Aug. and Sept. 1980 (Yong 1980; Wood 1981). *Remarks*: Bohey Dulang was designated as a bird sanctuary intended to protect nesting Philippine Scrubfowl (Burgess 1961a).

Bum Bum (Bumbun).—A large island just offshore from Semporna (4°27'N, 118°40'E). *Sources*: C. A. Gibson-Hill, July 1949 (Gibson-Hill 1950); BMNBE, 7 July 1956 (R. Sims, unpubl.).

Karindingan.—A small island S of Semporna point (4°23'N, 118°39'E). *Habitats*: Thompson (1966:385) and Banks (1982, pers. comm.) described the principal vegetation as mangroves. A 2-km-wide coral sand beach that attracts shorebirds also is present. *Sources*: BMNBE, 7 July 1956 (Banks 1982, pers. comm.; R. Sims, unpubl.); MCT, 17 Aug., 24 Nov. 1962 (Thompson 1966, pers. comm.).

Maiga.—A small island due W of the Bodgaya Group (4°36'N, 118°41'E). *Sources*: Marine Park Survey, Aug.–Sept. 1980 (Yong 1980; Wood 1981); WfVZ, 16 Aug. 1983.

Manampilik.—A small island S of Semporna point (4°20'N, 118°34'E). *Sources*: E. J. H. Berwick, Aug. 1959 (Smythies 1963).

Mantabuan.—4°37'N, 118°47'E. *Sources*: Marine Park Survey, Aug.–Sept. 1980 (Yong 1980; Wood 1981).

Pandanau.—A small island ca. 15 km E of the Bodgaya group (4°35'N, 118°55'E). *Sources*: Kok (1998) cited in Smythies (2000).

Sabangkat.—A small island SW of Bodgaya (4°33'N, 118°39'30"E). *Sources*: BMNBE, 9 July 1956 (R. Sims, unpubl.); Marine Park Survey, Aug.–Sept. 1980 (Yong 1980; Wood 1981).

Selakan.—Between Sabangkat and Bodgaya (5°34'N, 118°42'E). *Sources*: Marine Park Survey, Aug.–Sept. 1980 (Yong 1980; Wood 1981).

Si Amil.—4°19'N, 118°52'E. *Elevation*: Ca. 100 m. *Habitats*: Includes a steep, partially forested hill with thick rattan; otherwise mostly coconut and pandan. A small area of closed forest was being cut and replaced with coconut during Thompson's visit. *Sources*: BMNBE, no details (E. Banks, pers. comm.); MCT, 19–20 Sept. 1962 (Thompson 1966, pers. comm.). *Remarks*: Edible-nest Swiftlet nests have been collected from this island (Francis 1987). Banks visited the caves, but found "no birds."

Sibuan (Battleship) Island.—Ca. 9 km NW of Bodgaya (4°38'N, 118°39'E). *Sources*: E. J. H. Berwick, 23 Aug. 1959 (Smythies 1963); Marine Park Survey, Aug. and Sept. 1980 (Yong 1980; Wood 1981). *Remarks*: Gore (1968) and E. Banks (pers. comm.) called it "Battleship Island."

Tatagan.—A small island attached to the SW tip of Bodgaya Island (4°35'N, 118°43'E). *Sources*: Marine Park Survey, Aug.–Sept. 1980 (Yong 1980; Wood 1981); WfVZ, 16 Aug. 1983.

Semporna Marine Park.—See Semporna Islands.

Senobang.—Caves on the Senobang River, a small stream flowing into the upper Pinangah tributary of the Kinabatangan River (4°54'N, 116°40'E). *Remarks*:

This site has a cave with nesting Edible-nest Swiftlets. *References:* Daly (1888) and Francis (1987).

Sepagaya or Sapagaya River and Forest Reserve.—Inland from the S shore of Sandakan harbor (5°35'N, 118°04'E). The FMNH collected in an area ca. 16 km above the mouth of the Sapagaya River. Adams collected along the Suanlamba and Sapagaya Rivers. Also see Gomantong Forest Reserve. *Elevation:* Sea level. *Habitats:* At the time of the FMNH expedition, 1° lowland and new and 15-yr-old selectively logged forest. Now the area is largely oil palms. *Sources:* C. F. Adams, intermittently May 1887–Feb. 1888 (Elliot 1890, 1891; FMNH catalog data); FMNH, 13 July–12 Aug. 1950 (Davis 1962; FMNH catalog data).

Sepilok (Kabili–Sepilok) Forest Reserve.—4,294 ha located ca. 24 km W of Sandakan (5°47'–5°52'N, 117°55'–118°03'E). Also see Gum Gum and Labuk Road forest reserves. *Elevation:* Sea level to 170 m. *Habitats:* 1° and 2° lowland dipterocarp forest, mangrove, kerangas, freshwater marsh, 2° forest and scrub, and in adjacent areas overgrown rubber and oil palm. *Sources:* Because of its accessibility and popularity, Sepilok and its birds have been surveyed formally and informally by many individuals and groups, for example, B. J. Smith, 1974–1975 (de Silva 1981); B. King, 27 Feb.–1 Mar. 1977 (pers. comm.); WFWZ, intermittently 1981–1983; DMB, Dec. 1984, Mar. 1986, 1989, and 1990; B. King and D. Yong, July 1983, Aug.–Sept. 1986 (B. King, pers. comm.); B&W, 21–28 Sept., 25 Oct.–11 Nov. 1984 (pers. comm.); J. Wall and D. Yong, 24–27 July 1985 (pers. comm.). Formal surveys include: University of Malaya banding project, Feb. 1981–Aug. 1983 (CMF and J. Spenser, pers. comm.); WWFM survey, July 1979–Nov. 1981 (Davies and Payne 1982, pers. comm.); J.-M. Thiollay, F. Thiollay, S. Charpentier, C. Hermides, July 1982 (Thiollay 1983); C. Gönner, during 1990 (Gönner 1990); K. Ickes, during 2000 (K. Ickes, pers. comm.). *Remarks:* The proper name of the reserve is Kabili–Sepilok Forest Reserve, after its principal rivers. The mangrove surrounding Sepilok is technically part of the Sepilok Mangrove Virgin Jungle Reserve and is contiguous with the Elopura Mangrove Forest Reserve, which extends around Sandakan Bay and includes mangrove areas of some islands (Payne 1988a). An important feature of Sepilok is the Orangutan Rehabilitation Center, established on the northern border of the Reserve in 1964. The Sepilok Nature Education Center building, constructed at the Rehabilitation Center headquarters in 1980–1981, used to house a small but fairly complete collection of Sabah's birds (which is now at the Tawau Forest Department headquarters). *References:* Francis (1984a) compiled a checklist of Sepilok's birds, and Payne (1988a) reviewed its history and wildlife. Also see Fox (1973) and deSilva (1981).

Sepulut (Sapulut, Sapulut, Sepulut).—A village in south-central Sabah (4°43'N, 116°29'E). The name commonly refers to the entire Sepulut River drainage. Ambi collected at “km 108 on the Keningau–Sepulut road.” Also see Batu Punggul, Labau River, Maliau Basin Conservation Area, Simatuoh, Ulu Sabutan, Ulu Samuran, Ulu Sepulut, and Ulu Tiulon. *Elevation:* Ca. 200–400 m. *Habitats:* In 1984, considerable 1° forest still existed; since then the area has been completely logged. *Sources:* S. Ambi (SWD), 10–12 Dec. 1984 (SWD specimen data).

Serudong River.—4°14'N, 117°36'E. See Samantolong.

Serudong, Ulu.—4°23'N, 117°02'E. See Samantolang.

Si Amil Island.—4°19'N, 118°52'E. See under Semporna Islands.

Sibatik Island.—See Sebatik Island.

Sibuan Island.—4°38'N, 118°39'E. See under Semporna Islands.

Sibuko (St. Lucia) Bay.—The body of water outside Tawau Harbor and SW of Semporna (4°00'N, 118°26'E).

Siguntor River.—5°49'N, 118°00'E. See Seguntor River.

Silabukan River and Forest Reserve.—4°59'N, 118°28'E. See Tabin Wildlife Reserve.

Silam and Mt. Silam.—The site of the Kennedy Bay timber camp and plantation headquarters, 35–50 km WSW of Lahad Datu (4°58'N, 118°13'E), adjacent to Mt. Silam (4°58'N, 118°10'E). Also see Lahad Datu. *Elevation*: Sea level to 884 m. *Habitats*: 1° upland forest, including 1° ultrabasic forest on Mt. Silam, 2° forest and scrub, and *Albizia*, *Eucalyptus*, and *Albizia* over cocoa plantations. *Sources*: E. G. Lempriere, early 1880s (Nicholson 1883); Marchesa Expedition, 1883 (Guillemard 1885; Chasen and Kloss 1930b); KVT, intermittently 1960s; WFVZ 16 Feb.–14 Apr. 1982, 19 Aug. 1983. *Remarks*: During colonial times, the name Silam may have been synonymous with modern-day Lahad Datu (William 1981). Whether Lempriere's collection and the Marchesa Expedition involved separate trips is unclear. *References*: Several studies of forest ecology have been conducted on Mt. Silam (e.g., Proctor et al. 1988, 1989; Bruijnzeel et al. 1993).

Silikap.—Uncertain, but likely to be on the lower slopes of Kinabalu between Kiau and Kota Belud. *Sources*: V. W. Ryves, 4 Apr. 1939 (RMC specimen data).

Silingan or Silingaan Island.—6°11'N, 118°04'E. See Selinggan Island under Turtle Islands.

Simatuoh.—Ca. 10 km up the Sepulut River from Sepulut (4°41'N, 116°32'). Also see Maliau Basin Conservation Area, Ulu Sabutan, and Ulu Sepulut. *Elevation*: Ca. 400 m. *Habitats*: 1° forest in 1981, but now logged (J. Payne, pers. comm.). *Sources*: Sabah Museum, May 1981 (R. Goh, pers. comm.; specimen data). *Remarks*: The Sabah Museum group traveled via Simatuoh on their way to Mt. Lotung (Maliau). Simatuoh is an interesting site for mammals because of the presence of a salt lick (J. Payne, pers. comm.).

Simpang Mangayau (Simpangmengiau).—7°02'N, 116°45'E. See Sempang Mangayau Cape.

Sino-Sino, Bukit.—See Sandakan.

Sinsuran Road.—The road between Kota Kinabalu and Sinsuran (5°44'N, 116°22'E) over the Crocker Range (e.g., 5°51'N, 116°19'E), includes Alab Peak (5°51'N, 116°22'E) and Mengkaladom (5°58'N, 116°18'E), Moyog (5°53'N, 116°15'E), and Tagodon. *Elevation*: Ca. 1,000–1,800 m. The elevations of individual work sites are given below. The highest point accessible from Sinsuran Road is 2,085 m on the ridge past Alab. *Habitats*: 1° and 2° montane forest. *Sources*: KVT, intermittently 1960s; Q. Phillipps, Apr. 1968, May 1969 (Phillipps 1970); Sabah Museum, Aug. 1969, July 1974, June 1975 (specimen data); YUE, 30 Jan.–21 Feb. 1977; D. R. Wells, Nov. 1980 (pers. comm.); WFVZ at Moyog, 1–20 Dec. 1981, 11–19 Nov. 1982, intermittently during 1983; UKMS, Aug. 1984, Apr. 1986 (catalog data); DMB, 8–12 Feb. 1986, 19 Mar. 1990; B. King and D. Yong, 17 Aug. 1986 (B. King, pers. comm.); UKMS-ANSP, 29 June–2 July 1989. *Remarks*: YUE collected in the area adjacent to the Forest Department rest house at mile 28 (ca. 1,200–1,500 m). 1° forest in this area was cleared in ca. 1980 and replaced with a (now defunct) temperate vegetable project. WFVZ

stayed at the SAFODA rest house at Moyog, which subsequently belonged to Outward Bound, at mile 30 (ca. 1,400–1,700 m) for two long visits. The surrounding area was surveyed and collected extensively, and day trips were made to the following locations: mile 32 (ca. 1,700 m), located ca. 300 m down the road from the Gunung Emas complex; mile 34 (ca. 1,800 m), Sinsuran Road's highest point; and mile 39 (ca. 1,100–1,200 m), an excellent section of lower montane forest on the E side of the Crocker ridge. UKMS-ANSP camped at mile 32 and also spent 1 day on the highest ridge. Sabah Museum collected principally at mile 29 and Alab. Philipps (1970) reported nests at miles 16, 20, and 25. Much of the higher-elevation area along Sinsuran Road is now part of the Crocker Range Park.

Sinuron Cave.—Ca. 1- to 2-hr walk from Kampung Samuran (= Kampung Sinuron) along the upper Sepulut River (ca. 4°41'N, 116°36'E). Also see Ulu Sabutan. *Remarks*: Site of a small cave purported to have Edible-nest Swiftlets (Francis 1987).

Sipadan Island.—Off the SE coast (4°07'N, 118°37'E). *Habitats*: Forest on sandy organic soil, coconut groves, beach scrub. *Sources*: BMNBE, 10 July 1956 (E. Banks, pers. comm.; R. Sims, unpubl.); S. Cope, May–June (1960?) (Smythies 1963); WWFM National Park Survey, 6–9 Sept. 1980 (Yong 1980; Wood 1981); DMB, 27–29 Mar. 1989; F. Lambert, 22–23 Oct. 1989, Apr. 1990 (Lambert 1990b, pers. comm.); CMF, during 1995 (Francis and Andau 1997). *Remarks*: Sabah's only oceanic island. Sipadan was designated as a bird sanctuary to protect Lesser Frigatebirds, which were thought to nest there (Burgess 1961a). S. Cope (in Smythies 1963) briefly described the island and made special reference to its large pigeon population. However, DMB felt that Sipadan's attractiveness to birds (particularly pigeons) may be overrated; it is a relatively small island and consists largely of coconut groves. The WWFM survey proposed that the island and associated reef be protected as the Sipadan Marine Reserve (Wood 1981).

Sipitang.—On the SW coast (5°05'N, 115°33'E). See Merintaman and Mengalong. *Source*: M. E. J. Gore, May 1965 (Gore 1968).

Sitompok Lake.—5°32'N, 115°35'E. See Bundu, Kuala Penyu, and Klias Peninsula.

Snake Island.—Another name for Kalampunian Damit island (5°46'N, 115°41'E). See Pulau Tiga Park.

Sook.—SSE of Keningau (5°09'N, 116°20'E). *Elevation*: 200 m. *Habitats*: Upland 1° and 2° dipterocarp and heath forest and scrub. *Source*: KVT, intermittently 1960s.

Suanlamba River.—5°39'N, 118°07'E. See Sapagaya Forest Reserve and Gomantong.

Sugut Forest Reserve.—See Sugut River and Ulu Telidusan.

Sugut River.—The main river between the Paitan and Labuk rivers running NE from ca. Meridi to the Sulu Sea (6°26'N, 117°43'E). WWFM surveyed 6°12'N, 117°18'E to 6°40'N, 117°43'E. *Elevation*: Sea level to 30 m. *Habitats*: Beach vegetation, shifting cultivation, mangrove, nipah, and riparian logged lowland dipterocarp and freshwater swamp forest. *Sources*: Sabah Museum, Nov. 1973 (specimen data); M. E. J. Gore, intermittently Aug. 1963–Mar. 1966 (Gore 1968); WWFM, 14–22 Oct. 1981 (Davies and Payne 1982); R. Whitaker, May 1983 (Whitaker 1984, pers. comm.). *Remarks*: Whitaker found a colony of Darters

roosting in mangrove trees in an oxbow lake near Kampung Karudan. *Reference:* Stuebing (1991).

Sukau.—5°32'N, 118°17'E. See Sukau under Kinabatangan River. Also see Sepagaya Forest Reserve and Gomantong.

Sulaman Bay or Lake.—Ca. 7 km N of Tuaran (6°15'N, 116°15'E). *Elevation:* Sea level. *Habitats:* Mangrove and mud and sand flats. *Sources:* D. R. Wells, 1 Nov. 1980 (Wells 1981, pers. comm.).

Sulug Island.—5°57'N, 115°59'E. See Gaya Island.

Sungai River.—A tributary of the Langkon River draining N from Mt. Madalon into Marudu Bay (ca. 6°30'N, 116°39'E). Also see Bandau and Madalon Mountain. *Source:* M. E. J. Gore, Sept. 1964 (Gore 1968).

Supu.—5°27'N, 117°56'E. See under Kinabatangan River.

Tabin Salt Spring.—See Tabin Wildlife Reserve.

Tabin-Tagas.—See Tabin Wildlife Reserve.

Tabin Wildlife Reserve.—Formerly the Silabukan and Lumerau forest reserves, Tabin is now 1,205 km² lying ca. 50 km NE of Lahad Datu (5°10'–5°15'N, 118°30'–118°45'E). The area includes the Tabin Salt Spring (5°12'N, 118°40'E) and Tabin-Tagas (5°02'N, 118°29'E) surveyed by WWFM. *Elevation:* Ca. 0–500 m. *Habitats:* 1° and logged lowland and upland forest. *Sources:* Sabah Museum, Nov. 1979, Mar. 1982 (specimen data); WWFM, Mar.–Apr. 1980, Nov.–Dec. 1980, Apr. and Sept. 1981, 1983 (Davies and Payne 1982; J. Payne, pers. comm.; WWFM 1984); CMF, 15–25 Oct. 1982, Feb. 1983 (Francis, unpubl. Forest Dept. report, banding data, pers. comm.); A. D. Johns (Royal Society), 13 May–15 June 1988 (Johns 1989b, 1992, pers. comm.; Lambert 1990c); Sabah Museum and UKMS, 26 Sept.–3 Oct. 1988 (Goh et al. 1989); DMB, Mar. 1989. *Remarks:* CMF banded birds for the University of Malaya during his visits to this site. As part of a study on the effects of logging on bird populations, Johns (Johns 1988, 1989b, 1996; Lambert 1990c) compared a 3-km unlogged tract with a twice-logged section in Tabin. *References:* Wells and Francis (1988), Ghazally (1989), and Payne (1989).

Tagodon, Tagodan, or Tagudan.—See Sinsuran Road.

Tajau, Tanjung.—6°58'N, 116°49'E. See Kudat.

Talankai River.—4°30'N, 116°25'E. See Pun Batu.

Tambisan.—At the NE tip of the Dent peninsula (5°27'N, 119°08'E). *Elevation:* Sea level. *Habitat:* Unspecified, except as “coral.” *Sources:* B&W, 19–20 Oct. 1984 (B&W 1985, unpubl. list; A. Whittaker, pers. comm.). *Remarks:* B&W mention this site in reference to Gray-tailed Tattler.

Tambuluran.—See Batu Mandi.

Tambunan.—A town SE of Kota Kinabalu on the E side of the Crocker Range in the Pegalan River valley (5°40'N, 116°22'E). WWFM surveyed nearby in the Crocker foothills (5°38'–5°41'N, 116°14'–116°17'E). Also see Megatai and Trus Madi Mountain. *Elevation:* At the town 500–600 m; in the Crocker foothills 600–1,350 m. *Habitats:* Largely 2° forest and shifting cultivation, with some 1° highland and lower montane forest on ridges and along rivers. Grassy fields and padi on the plain. *Sources:* T. Harrisson, Feb. 1952 (Harrisson 1955a; SMC specimen data); Cambridge University Expedition, 13–16 Aug., 19–24 Sept. 1956 (J. Boys, pers. comm.; SMC specimen data); WWFM, 16–21 Oct. 1980 (Davies and Payne 1982); WFFVZ, intermittently 1981–1983; UKMS, Apr. 1986 (catalog data).

Tambuyukon (Tamboyukon) Mountain.—Mt. Tambuyukon lies in Kinabalu Park, ca. 20 km NE of Mt. Kinabalu (6°13'N, 116°39'E). Phillipps and Lamb approached via the villages of Manggis (6°12'N, 116°45'E) and Pinawantai (6°07'N, 116°42'E) on the E boarder of the park. Also see Waleigh-waleigh. *Elevation:* The third highest peak in Borneo at 2,579 m. Phillipps and Lamb surveyed from the "lowlands" to the summit. They camped at ca. 550 m and 1,200 m. *Habitat:* 2° forest and open country in the vicinity of Manggis and Pinawantai; a combination of 1° and 2° forest between the villages and 550 m; 1° montane forest above 550 m; and ultrabasic forest at the summit. *Sources:* Q. Phillipps and A. Lamb, 20–26 Jan. 1982 (Q. Phillipps 1982). *Remarks:* Q. Phillipps (1982) wrote: "The birdlife of Mt. Tambuyukon is characteristic of rich and relatively undisturbed submontane and montane forest. The 5 different species of hornbill encountered is indicative of low hunting pressure. All birds above 5000 ft [1,524 m] were extremely tame and unafraid—a reminder of what Kinabalu's higher level bird life must have been like once. . . . The Friendly Warbler is one of Borneo's rarest birds and has only been found before on Kinabalu and Trus Madi. The zonation of higher level vegetation on Tambuyukon would appear to correspond with that on Kinabalu but becoming operative at lower level. This would also appear to apply to the birds. Thus Blackeyes and Friendly Warblers seen at 6000 ft [1,829 m] on Tambuyukon would not normally be seen until 8000 ft [2,438 m] on Kinabalu. Similarly, the characteristic birds of 11,000 ft [3,353 m] on Kinabalu are characteristic of Tambuyukon at 8000 ft. . . ." Above ca. 2,100 m, Phillipps and Lamb observed only Mountain Black-eyes and the Island Thrushes.

Tamparuli.—A small town on the Tuaran river upstream from Tuaran town (6°08'N, 116°16'E). *Remarks:* Until the new Kota Kinabalu–Mt. Kinabalu highway was built in the early 1980s, Tamparuli was an important stopping point on the way to Kinabalu Park and Sabah's E coast. *Reference:* Stuebing (1991).

ampias.—Between Ranau and Telupid on the main road (5°48'N, 116°34'E). *Elevation:* Ca. 150 m. *Habitat:* 2° forest. *Source:* Sabah Museum, Dec. 1972 (specimen data).

Tangkulap Forest Reserve.—5°28'N, 117°13'E. See Kunkun River.

Tanjung Aru.—Beach and suburban area immediately W of Kota Kinabalu (5°57'N, 116°03'E). *Elevation:* Sea level. *Habitats:* Beach strand, grassy fields, and gardens. *Sources:* E. J. H. Berwick, intermittently during the 1950s and early 1960s (Smythies 1963); DMB, intermittently 1958–1962, 1984–1990 (Smythies 1981, pers. comm.); NAMRU, 24 Aug.–4 Oct. 1960 (Kuntz 1969; USNM catalog data); the Phillipps family from the 1960s to 1990s (Smythies 1981; Phillipps 1987, pers. comm.); Sabah Museum, intermittently (specimen data); WFVZ, intermittently 1981–1983; B. King and D. Yong, 16 July 1983 (B. King, pers. comm.); UKMS-ANSP May–July 1989. *Remarks:* Tanjung Aru is a good site to see introduced species, such as Peaceful Dove, Blue-naped Parrot, and Crested Myna.

Tanjung Bulat.—See Bukit Garam under Kinabatangan River.

Tanjung Dumpil.—5°54'N, 116°02'E. See Dumpil.

Tanjung Linsang.—The S promontory at Kuala Kinabatangan (5°38'N, 118°38'E). Also see Kulamba Wildlife Reserve. *Elevation:* Sea level. *Habitats:*

Beach, mangrove, and nipah. *Sources*: WWFM, 29 and 31 Aug., 8 Sept. 1980 (Davies and Payne 1982).

Tanjung Panbatu.—See Balambangan Island.

Tanjung Tajau.—6°58'N, 116°49'E. See Kudat.

Tanjung Telok.—See Sandakan.

Tanjung Tundunbuangin.—5°36'N, 118°36'E. See Kulamba Wildlife Reserve.

Tapinatan.—See Pandasan.

Tatagan Island.—4°35'N, 118°43'E. See under Semporna Islands.

Tatalahan Caves.—Swiftlet nesting caves purportedly on the Padas River (Daly 1888), but no specific details.

Tawai Hill and Massif.—Ca. 11 km S of Telupid (5°32'N, 117°07'E). Also see Karamuak River, Ulu Rukuruku, and Meliau. *Elevation*: 500 m. *Habitats*: "Tall forest." The Tawai highlands are ultrabasic rock and much of the surrounding forest, which grows on ultrabasic soils, is stunted (Davies and Payne 1982). *Source*: Sabah Museum, Oct. 1977 (specimen data). *Remarks*: The exact locality of the museum collection is unspecified, but likely to be on the W slopes because the museum collected along the Karamuak River at nearly the same time.

Tawau.—A large town in southeastern Sabah (4°15'N, 117°54'E). Sabah Museum collected at the Tawau Agricultural Research Station. *Habitats*: 2° growth, grassy fields, rubber and coconut plantations, mangroves, mudflats, and gardens. Also see Kalabakan Forest Reserve, Sebatik Island, Tawau Hills Park, Ulu Merutai, and Wallace Bay. *Sources*: R. C. Andrews, 2 Jan. 1910 (Allen 1911); S. Tanaka, Sept.–Oct. 1923, Feb.–Oct. 1931 (Kuroda 1925, 1933); H. G. Deignan (MCZ), summer 1937 (Coolidge 1940; Smythies 1960); BMNBE, June 1956, (Banks 1982, pers. comm.; R. Sims, unpubl.); M. Norman, June 1961–Feb. 1962 (Norman 1964); MCT, intermittently July–Dec. 1962 (Thompson 1966); Sabah Museum, Nov. 1964 (specimen data). *Remarks*: Norman (1964) noted that Tintagat Point ("near Tawau"), with its stretches of sand and reef, is an excellent shorebird site during the winter months.

Tawau Bay or Harbor.—4°18'N, 117°45'E. See Tawau, Wallace Bay, and Sebatik Island.

Tawau Hills Park.—This park encompasses the highlands ca. 15–30 km N of Tawau (ca. 4°22'–4°31'N, 117°47'–118°04'E), including Mt. Lucia (4°28'N, 117°56'E), the southern slopes of Mt. Magdalena (4°30'N, 117°57'E), and parts of the Tawau Hills, Bald Hill, and Quoin Hill forest reserves. Also see Bal Estates, Magdalena Mountain, Quoin Hill, and Ulu Merutai. *Elevation*: 100–1,300 m; Mt. Lucia 1,201 m, Mt. Magdalena 1,311 m. *Habitats*: 1° upland to lower montane forest and logged lowland to highland forest. *Sources*: WWFM, 26 June–7 July 1980 (Davies and Payne 1982; J. Payne, pers. comm.); J.-M. Thiollay, F. Thiollay, S. Charpentier, C. Hermides, July 1982 (Thiollay 1983); UKMS, 22–29 Nov. 1989 (Stuebing and Mohd. Nor 1995); RGM, 24 June–9 July 1999, 18 May–2 June 2000. *Remarks*: UKMS and RGM surveyed the area around the Park headquarters and the hot springs. Other surveyed areas are the western slopes of Mt. Magdalena (BMNBE) and Quoin Hill (MCT and ADG). RGM collected from 350 to 750 m near Mt. Lucia. His specimens are stored at the Sabah Park collection and LSUMNS.

Telidusan, Ulu.—6°16'N 117°09'E. See Ulu Telidusun.

Telipok.—15 km NE of Kota Kinabalu near the coast (6°05'N, 116°11'E). *Ele-*

vation: Sea level to ca. 25 m from the coast to town, and to 850 m in the nearby hills. *Habitats*: 2° scrub, padi, and forested highland. *Sources*: ADG, Feb.–Mar. 1963 (Thompson 1966; Sabah Museum specimen data); N. F. Wong and G. R. Conway (SAD), Mar. 1965 (Sabah Museum specimen data).

Telok or Teluk.—See Sandakan.

Teluk Lung.—See Balambangan Island.

Telupid.—On the road between Ranau and Sandakan (5°39'N, 117°07'E). Also see Kunatong, Meliau, Tawai, and Ulu Rukuruku. *Elevation*: Ca. 100–150 m. *Habitats*: 1° and 2° forest. *Source*: KVT, intermittently 1960s.

Tembungo Oil Rig. Esso oil platform ca. 56 km NNW of Kota Kinabalu (6°37'N, 115°47'E). *Elevation*: Sea level. *Habitat*: Open sea. *Sources*: D. M. Simpson intermittently 1979–1981, 15 June–31 Oct. 1981 (Casement 1979; Simpson 1982a, b); WFVZ 7–8 Oct. 1982. *Remarks*: On foggy or stormy nights birds often settle on the platform. Simpson (1982b) recorded the demise of many passerine migrants on the night of 19 Sept. 1981, when stormy conditions and the light of the oil platform's gas flare apparently disoriented night-flying individuals. The birds either burned up in the flare or fell exhausted into the sea. WFVZ observed migrating birds circle the platform (apparently attracted to the lights and gas-flare) all during a clear night in Oct. 1982 before disappearing towards the Bornean mainland at dawn.

Tepadong.—Ca. 5°08'N, 118°08'E. See Tepadong.

Temasuk Plain and River.—6°21'N, 116°27'E. See Kota Belud Bird Sanctuary.

Templer Extension of Kinabalu Park.—The area of Kinabalu Park jutting N past Mt. Templer (6°25'N, 116°36'E). See Madalan Mountain, Langui Langui, Sungai River, and Tambuyukon Mountain.

Tenom.—A major town at the Pegalan–Padas River confluence (5°08'N, 115°57'E). Also see Anginon, Melalap, Rayoh, Sapong Estate, and Tomani. *Elevation*: 200 m. *Habitats*: 2° growth, fields, marshes, oxbow lakes, plantations, and gardens. *Sources*: MCT, Dec. 1962–Jan. 1963 (Thompson 1966); A. Lamb, 1970s–1990s (S. Phillipps 1982, pers. comm.); YUE, Sept. 1976.

Tenompok.—5°52'N, 116°31'E. See under Kinabalu Mountain.

Tepadong or Tepadong.—On the N bank of the Segama River, ca. 21 km upstream from the Segama bridge crossing (ca. 5°08'N, 118°08'E). Davis (1962) cited the coordinates as 5°02'N, 118°20'E. *Elevation*: Ca. 10–150 m. *Sources*: P. Orolfo, Jan. 1931 (RMC specimen data). *Remarks*: An important swiftlet nesting site for all four swiftlet species (Francis 1987).

Teratak Marsh.—See Padas Damit.

Teuton.—Locality unknown, but J. B. Bell in 1895 collected important specimens of Black Partridge (ANSP) and Bornean Ground Cuckoo (Royal Ontario Museum) at this site. It may be near Kudat, because Bell apparently collected in the vicinity of Kudat that year.

Tibas River.—Listed in gazetteers as 5°42'N, 116°01'E, but see under Kalabakan Forest Reserve for a much different location.

Tiga Island.—5°43'N, 115°39'E. See Pulau Tiga.

Tiger Estate.—35 km NW of Tawau, probably near Tiger Hill (4°25'N, 117°49'E). Also see Kalabakan Forest Reserve. *Elevation*: Ca. 200 m. *Habitat*: Oil-palm plantation. *Sources*: MCT, Nov.–Dec. 1962 (Thompson 1966, pers.

comm.; Sabah Museum specimen data); ADG, Apr.–July 1963 (Thompson 1966; Sabah Museum specimen data).

Tintagat Point.—See Tawau.

Tiulan River.—4°26'N, 117°30'E.

Tiulon, Ulu.—5°12'N, 116°28'E. See Ulu Tiulon.

Tobobon or Toboban.—Kampung Tobobon and Tobobon River are listed as 6°03'N, 116°10'E in gazetteers. See under Trus Madi for an important (and apparently different) bird collecting site.

Tomani.—Includes a village, Kuala Tomani, ca. 30 km S of Tenom (4°50'N, 115°55'E) and the surrounding Padas River watershed (Ulu Tomani). Also see Baru Jumpa. *Habitats*: 1° and 2° forest, shifting agriculture, and logged forest. *Source*: Sabah Museum, Dec. 1977 (specimen data). *Remarks*: Ornithologically, this area is largely unexplored. Sabah Museum worked at “Kampung Bekuku, Ulu Tomani” (4°41'N, 115°53'E).

Tongod.—5°16'N, 116°58'E. See Melian River and Ulu Kiberibi.

Trus Madi Mountain.—SE of Tambunan (5°33'N, 116°31'E). *Elevation*: Trus Madi (2,649 m) is Borneo's second highest mountain after Mt. Kinabalu. Bird records derive from elevations between 700 m near Kaingaran (5°39'N, 116°27'E) and 2,450 m (the highest collecting locality of the Cambridge Expedition). *Habitats*: 2° highland and lower montane forest in the vicinity of Kaingaran, 1° montane forest from ca. 1,000 to 1,800 m, and stunted myrtaceous–ericaceous forest and scrub above 2,000 m. Logging has reached over 1,800 m in some areas. *Sources*: Cambridge University Explorer's and Traveller's Club–Sarawak Museum Expedition, 13 Aug.–19 Sept. 1956 (J. Boys notes, pers. comm.; Boys and Harrison, unpubl.; Bryant et al., unpubl. report; SMC specimen data); A. Phillipps, 20 Mar. 1984 (Phillipps 1984); WFVZ, 30 June–10 July 1983 (Sheldon and Francis 1985); RGM and Sabah Museum, 2–12 Aug. 1999. *Remarks*: Trus Madi is one of only three mountains in Sabah where Friendly Bush Warbler, Island Thrush, and Mountain Black-eye occur (the others are Kinabalu and Tambuyukon). The Cambridge Expedition had two ornithologists, John Boys (a Cambridge undergraduate) and R. Nyandoh (a collector from the Sarawak Museum). Nyandoh made an early foray from Tambunan to Kaingaran (a village on the Kaingaran River at 750 m) and collected in that area from 13 to 16 Aug. He was joined by Boys on 16 Aug., and by 19 Aug. they had established a main camp on the Kidukarok River (5°36'N, 116°31'E; 1,500 m), a tributary of the Kaingaran River. They collected at this camp during 19–24 Aug., 31 Aug.–6 Sept., and 9–17 Sept. Boys and Nyandoh collected near the summit from 24 to 31 Aug. and 6 to 9 Sept. Specimens were also collected at Tobobon on the Kaingaran River (ca. 1,100 m). This is apparently a different site than Kampung Tobobon, 6°03'N, 116°10'E. The Cambridge group returned to Tambunan on 19 Sept. The WFVZ collected at three sites: Kaingaran, and at 1,600 m and 2,100 m above Kaingaran (Sheldon and Francis 1985). RGM and the Sabah Museum collected at 1,500–1,600 m on the north slope (5°34'51"N, 116°29'30"E). RGM's specimens are stored at the Sabah Museum and LSUMNS. *Reference*: Acres (1972).

Tuaran and Tuaran River.—30 km NE of Kota Kinabalu along the coast (6°11'N, 116°14'E). The Sabah Museum banded birds for MAPS at 6°12'N, 116°12'E during 1964–1965 and at 6°10'N, 116°10'E during 1967–1970 (McClure and Leelavit 1972). Also see Mengkabong and Sulaman. *Elevation*: Sea level to

400 m. *Habitats*: 2° scrub, rice fields, grassy fields, beach strand, and heath scrub. *Sources*: C. D. Haviland, 17 Mar. 1892, 5 Oct. 1913 (SMC specimen data); NAMRU, Sept. 1960 (Kuntz 1969; USNM catalog data); MCT, Dec. 1962 and Jan. 1963, ADG, Mar. and Dec. 1963, S. F. W. Chong (SAD), Nov. 1962, E. J. H. Berwick (SAD), Dec. 1963 (Thompson 1966; Sabah Museum specimen data); N. F. Wong (SAD), Mar. 1965 (Sabah Museum specimen data); Phillipps family, intermittently 1960s–1980s; Sabah Museum, intermittently 1964–1970, Mar. 1975 (specimen data); WFVZ, intermittently 1981–1983; CMF (SWD), 14 Apr. 1984 (SWD specimen data). *Remarks*: The SAD research station at Tuaran had a small bird collection. Most of the specimens from that collection are now in the Sabah Museum. *Reference*: Stuebing (1991).

Tukok Mountain.—A ridge in the Kalabakan Forest Reserve, but the exact location unknown to us. *Elevation*: Ca. 425 m. *Source*: M. Norman, between June 1961 and Feb. 1962 (Norman 1964). *Remarks*: Norman recorded Bornean Barbet at this site. In Sabah, records of this species are rare, and this is the only record on so small a mountain.

Tundunbuangin.—5°36'N, 118°36'E. See Kulamba Wildlife Reserve.

Tungku Abdul Rahman Park.—6°01'N, 116°02'E. See Gaya Island.

Tungud and Ulu Tungud Forest Reserve.—Tungud is a river and site of an estate (5°59'N, 117°23'E). For Ulu Tungud see Ulu Kiberibi (5°51'N, 116°58'E).

Tupai, Bukit.—6°00'N, 116°32'E. See Lumu-lumu under Kinabalu Mountain.

Turtle Islands and Turtle Island Park.—The Turtle Island (Pulau Penyu) Park consists of Selingaan (6°11'N, 118°04'E), Gulisaan (6°09'N, 118°03'E), and Bakungan Kecil (6°10'N, 118°07'E) islands, ca. 45 km N of Sandakan. For practical purposes, Selingaan is *the* Turtle Island. Libaran is the largest island in the area, ca. 30 km N of Sandakan (6°07'N, 118°01'E). Lankayan is ca. 80 km N of Sandakan (6°32'N, 117°55'E). *Elevation*: Sea level. *Habitats*: Beach strand, coconut, coral outcrop, and mangrove. *Sources*: The Marchesa Expedition visited Libaran in Apr. or May 1883 (Guillemard 1885, 1889). P. Burgess and T. Harrison surveyed “Selinggan” (Selingaan, Silingan), Gulisaan, Bakungan Kecil, Lankayan, Lebakan, and Lelingan during 13–17 July 1965 (Harrisson 1966). G. S. de Silva and C. Chong recorded birds on Selingaan intermittently during 1973 (de Silva and Chong 1974). C. Phillipps surveyed Selingaan in Apr. 1981 and 1982 (S. Phillipps 1982). DMB visited Selingaan 22–24 Mar. 1990. *Remarks*: Harrisson (1966) recorded birds on two small islands, Lebakan and Lelingan, which presumably lie nearby. Selingaan was constituted as a game and bird sanctuary on 12 Aug. 1971 (de Silva and Chong 1974) and a park in 1977.

Udin River.—See Wallace Bay.

Udor Island.—6°05'N, 116°05'E. See Gaya Bay.

Ulu Balung Estate.—4°22'N, 118°08'E. See Quoin Hill.

Ulu Bekuku.—4°41'N, 115°53'E. See Tomani.

Ulu Danum.—4°54'N, 117°34'E. See Danum Valley Conservation Area.

Ulu Dusun.—See Garinono Forest Reserve.

Ulu Kalumpang.—See Kalumpang.

Ulu Kiberibi.—In the Ulu Tungud Forest Reserve (5°51'N, 116°58'E). *Elevation*: 450 m. *Habitat*: 1° upland forests. *Sources*: WWFM, 2–10 June 1981 (Davies and Payne 1982). *Remarks*: A Bornean Peacock Pheasant was collected in

1996 in the Ulu Tungud Forest Reserve, but no specific details are available (Sabah Museum specimen).

Ulu Kimanis.—5°34'N, 115°57'E. See Kimanis and Rinangisan.

Ulu Losan.—On the SE slopes of the Crocker Range above Melalap (5°14'N, 115°59'E). Also see Mekaniton and Melalap. *Elevation:* 500–850 m. *Habitat:* 1° highland forest. *Sources:* WWFM, 28 Sept.–4 Oct. 1980 (Davies and Payne 1982).

Ulu Lumpongan.—In Tabin Wildlife Reserve (5°19'N, 118°53'E).

Ulu Mawau.—Area inland of Mawau. See Mawau.

Ulu Melian Forest Reserve.—See Ulu Tiulon.

Ulu Membakut.—Area inland of Membakut. See Membakut.

Ulu Merutai or Merotai.—The right branch of the Merutai River in the western foothills of Mt. Magdalena and Mt. Lucia (ca. 4°29'N, 117°52'E). Also see Tawau Hills Park. *Elevation:* 150–500 m. *Habitats:* At the time of the BMNBE, 1° upland to highland forest. It was logged by 1980. *Sources:* BMNBE, June 1956 (R. Sims, unpubl.); WWFM, June–July 1980 (Davies and Payne 1982; J. Payne, pers. comm.). *Remarks:* The BMNBE approached Mt. Magdalena via the Merutai River. Much of this area is not part of Tawau Hills Park.

Ulu Resang.—At the edge of the same limestone hills as Panggi (ca. 5°32'N, 118°18'E). See Panggi under Kinabatangan River. *Remarks:* A small cave with nesting Edible-nest Swiftlets (Francis 1987).

Ulu Rukuruku.—Ca. 15 km ESE of Telupid (5°36'N, 117°14'E). *Elevation:* 50–100 m. *Habitats:* Kerangas and forest growing on soils derived from ultrabasic rock of the Tawai highlands. *Sources:* WWFM, 5–9 May 1980 (Davies and Payne 1982, pers. comm.). *Remarks:* Ulu Rukuruku is only one of a few areas in Sabah where Gray-breasted Babbler has been found (Sheldon 1987; R. Stuebing, pers. comm.).

Ulu Sabutan or Samuran.—The village of Samuran lies on the Sepulut River, ca. 18 km SE of Sepulut (4°40'N 116°36'E). Ulu Sabutan is the SW watershed of Mt. Lotung (ca. 4°43'N, 116°45'E). Also see Maliau Basin Conservation Area, Simatuoh, Sinuron Cave, and Ulu Sepulut. *Habitats:* 1° forest in 1981, now mainly logged. *Sources:* Sabah Museum, May 1981 (R. Goh, pers. comm.; specimen data). *Remarks:* The Sabah Museum Expedition to Mt. Lotung approached the mountain from Sepulut via the Sepulut and Sabutan rivers. On their specimen labels they seem to have used Samuran and Ulu Samuran (= Ulu Sabutan) interchangeably.

Ulu Segama Forest Reserve.—See Bole Kecil, Bole River, Danum Valley Conservation Area, Kawag, and Segama River.

Ulu Sepulut.—E of Sepulut at 4°37'N, 116°36'E. Also see Simatuoh and Ulu Sabutan. *Elevation:* Ca. 450 m. *Habitat:* 1° upland forest. *Sources:* WWFM, 29 Apr.–7 May 1981 (Davies and Payne 1982).

Ulu Serudong.—4°23'N, 117°02'E. See Samantolang.

Ulu Telidusan.—In the Sugut Forest Reserve (6°16'N, 117°09'E). *Elevation:* 150–275 m. *Habitat:* 1° upland forest. *Sources:* WWFM, 6–11 June 1981 (Davies and Payne 1982).

Ulu Tiulon.—In the Ulu Melian Forest Reserve ca. 30 km SW of Keningau (5°12'N, 116°28'E). Note that gazetteers list the “Tiulan River” as 4°26'N, 117°30'E. *Elevation:* 450–600 m. *Habitats:* 1°, 2°, and recently logged upland

and highland forest. *Sources*: G. Davies (WWFM), J. Kennard, F. Sheldon (WFVZ), CMF (SWD), 8–11 Oct. 1981 (Davies and Payne 1982); WFVZ, 24–25 Oct. 1981; C. Phillipps, during 1981 (CMF).

Ulu Tungud Forest Reserve.—See Ulu Kiberibi.

Umas Umas River.—4°22'N, 117°44'E. See Brumas and Sabah Softwoods.

Usukan Bay and Island.—Bay at the mouth of the Abai River, 12 km W of Kota Belud (6°22'N, 116°19'E) and site of Usakan Island (6°24'N, 116°19'E), which was visited by Harrisson. Also see Abai. *Sources*: Marchesa Expedition, early June 1883 (Guillemard 1885, 1889; Everett 1889); T. Harrisson, Dec. 1960 (Smythies 1963).

Waleigh-waleigh.—The exact locality is unclear, but said to be on the Kinarom River (6°26'N, 116°50'E), a tributary of the Bongon River on the N side of Mt. Tambuyukon (ca. 6°18'N, 116°43'E). *Remarks*: The site of purported swiftlet caves (Daly 1888).

Wallace Bay.—A sawmill town on the NW coast of Sebatik Island (4°25'N, 117°40'E). The name is sometimes used to describe Cowie Harbor (= Tawau Bay) in general. Also see Tawau and Sebatik Island. *Elevation*: Sea level. *Habitats*: Scrub, gardens, mangroves, and estuary. *Sources*: BMNBE, 7 July 1956 (BMNH catalog data); M. Norman, June 1961–Feb. 1962 (1964); WFVZ, 6–9 July 1982. *Remarks*: The WFVZ group approached Wallace Bay from the North Borneo Timber loading area on the Udin River. *Reference*: Scott (1989).

Weston.—A town near the SE corner of the Klias Peninsula (5°13'N, 115°36'E). *Habitats*: Mainly mangroves, but also 2° growth, fields, gardens, and other coastal habitats. *Sources*: L. A. Charles, Mar. 1941 (RMC specimen data); DMB, late 1950s and early 1960s; Sabah Park Survey, Mar. 1975 (Wells et al. 1975; Wells 1976, pers. comm.); B&W, early Sept. 1984.

ANNOTATED CHECKLIST OF THE BIRDS OF SABAH

This checklist includes information on the birds of Sabah gathered from all major ornithological expeditions, as well as from many informal excursions in the state. Sources of locality information are summarized in the preceding history and gazetteer. Information on breeding, food, habits, and so forth is referenced in the species accounts, except when this information is from our own observations (i.e., from the YUE, WFVZ, UKMS-ANSP, or RGM expeditions). Most of the information in the species accounts is based upon specimen or netting records. However, we also include sight records if these are particularly noteworthy or uncontroversial. We have omitted records that are both controversial and unsubstantiated (e.g., some records in Norman [1964], Gore [1968], de Silva [1981], and Goh et al. [1989]). Species that have been reported but are unconfirmed for Sabah are marked with brackets.

To facilitate cross-referencing, we retain the same taxonomic order and higher-level names as *The Birds of Borneo* (Smythies 1981, 2000), but have updated common and scientific names of species to agree with *An Annotated Checklist of the Birds of the Oriental Region* (Inskipp et al. 1996). Some of the information in the checklist is the same as in *The Birds of Borneo* (Smythies 1981, 2000), largely because we used the same references and because we made our text available to Geoffrey Davison (GD) as he prepared the fourth edition. We cite Smythies (1981, 2000) mainly when his information is not published or available elsewhere.

Each species account is divided into the following sections: Status, Localities, Elevation, and Habitats. Species accounts may also include information on Breeding, Migration dates, Voice, Food, and Identification. Additional information, such as taxonomic status and general references, may be included under Remarks and References. We do not dwell on issues of synonymy, because these have been covered by Inskipp et al. (1996).

Status.—This section consists of five subjective categories: abundant, common, uncommon, scarce, and rare. These categories may be amended to meet specific cases. For example, if a species is rarely recorded, but is common in a specific habitat, it will be listed as common in that habitat. In all cases, our designations refer to the current status of species. However, in each species account, we list all locations at which the species has been recorded historically. In some cases, a species may no longer occur at a site because the habitat at that site has been altered substantially since the site was surveyed.

Localities.—All sites at which a species has been *reliably* recorded are listed. We do this for three main reasons: to provide an historical record of bird distribution; to permit cross checking with the gazetteer, so readers can see who discovered what and when; and to facilitate the compilation of species lists for specific sites. However, in a few cases of widely distributed, common species, we have dropped the localities section and describe their general distribution under Status.

Elevation.—The maximum elevational range is designated from specimen records and some sightings. For many montane species, we have tried to indicate the elevational distribution on Kinabalu, Trus Madi, and other peaks of special interest. When a single sight record is out of normal elevational range, we indicate it.

Habitats.—These are defined in the introduction. 1° and 2° forest refer to dipterocarp forest or “typical” montane forest unless otherwise specified.

Breeding.—When available, we provide information on nesting records, nests and eggs, and gonadal activity. Sex organ development is not necessarily an accurate guide to breeding, except for females with obvious egg and oviduct development.

Identification.—We do not describe the physical appearance of species, except when we have some insight into identification (or misidentification).

Order PODICIPEDIFORMES

Family PODICIPEDIDAE

GREBES

Little Grebe *Tachybaptus ruficollis*

Status: A rare vagrant to Sabah. *Remarks:* One specimen (in the British Museum) is known for Sabah. It was collected from Labuan in Dec. (year not specified, probably 1890 or earlier; Smythies 1960, 2000). A tour led by K. D. Bishop observed one in a small pond near Gomantong on 2 Mar. 2000 (Robson 2000).

Order PROCELLARIIFORMES

Family HYDROBATIDAE

STORM-PETRELS

Swinhoe's Storm-Petrel *Oceanodroma monorhis*

Status: An occasional migrant or vagrant. *Remarks:* One undated specimen in

the Sabah Museum was purported to be from Banggi Island, but may have been purchased from a collection or collector from the Philippines (D. Wells, pers. comm.). A specimen collected in Kota Kinabalu on 21 Jan. 1953 and sent to the Sarawak Museum was probably storm swept (Harrisson 1955a). DMB observed three individuals flying off the tip of Kalampunian Island on 7 Jan. 1962.

Family PROCELLARIIDAE

SHEARWATERS

Streaked Shearwater *Calonectris leucomelas*

Status: An uncommon migrant. *Remarks:* Pryer observed them at Sandakan (year not specified; Sharpe 1881). T. Harrisson heard many birds calling with a "harsh double cry" after dusk on 24 Apr. 1965 between Usukan Island and Mantanani Island. He inferred the possible presence of a colony on one of the many small rocky islets (Fogden 1965). Near Mantanani Island (ca. 20 km NE of Kuala Abai) at 10:00 a.m. on 11 Mar. 1982, WFVZ observed ca. 20 shearwaters, most of which were sitting in extremely calm seas (Sheldon et al. 1983). They were identified by B. King and D. Yong as Streaked Shearwaters based on their white foreheads and strongly patterned backs.

Order PELECANIFORMES

Family PELECANIDAE

PELICANS

[Pelicans

Status: The only record of pelicans in Sabah was Spenser St. John's (1862) reference to monstrous pelicans on Balambangan Island. Three species could possibly occur in Sabah (Smythies 2000): Great White Pelican (*Pelecanus onocrotalus*), Spot-billed Pelican (*P. philippensis*), and Australian Pelican (*P. conspicillatus*).]

Family SULIDAE

GANNETS AND BOOBIES

Red-footed Booby *Sula sula*

Status: A scarce vagrant. *Localities:* Treacher collected one ("*S. piscatorix*") at Labuan (Sharpe 1879b). One was caught by a police launch off Si Amil Island in May 1962 (Gore 1968). De Silva and Chong (1974) identified 12 circling Selingaan Island. GD observed four individuals off Semporna in Feb. 2000. A. Phillipps has a photograph of one on Gaya Island, off Kota Kinabalu (no date; Smythies 2000). *Breeding:* Smythies (1957) indicated that this species breeds on Bankoran Island and Usong Island, 100 and 200 miles (160 and 320 km) NE of Banggi Island, respectively. *Remarks:* This species has been confused with Brown Booby, and even some specimens have been mislabeled (Sharpe 1881; Smythies 1957). Caution is required in accepting sight records, for example, the 12 reported from Selingaan Island.

Brown Booby *Sula leucogaster*

Status: A regularly recorded visitor. *Localities:* Between Gaya and Mengalum Island, Kimanis Bay, Kuala Penyu, Mumiang, Pulau Tiga, Putatan, between Ta-

wau and Sipadan Island, Tembungo, Tempasuk, and Tuaran. *Food*: They are not keen divers and prefer to catch flying fish and other small fish that break the surface (DMS). *Breeding*: They breed on Bankoran Island ca. 100 miles (160 km) east of Banggi (Smythies 1957). *Remarks*: A frequent visitor to the Kimanis Bay and Pulau Tiga fish traps. DMB observed particularly large numbers during Oct. 1961 and 1981, but also singles in every month of the year and small parties of 5–12 between Dec. and May. His more recent records include groups of two to eight off Pulau Tiga or between Pulau Tiga and Kuala Penyu on 2 and 5 Dec. 1984 and during 21 Jan. to 1 Feb. 1986; and one to three between Tawau and Sipadan Island on 27–29 Mar. 1989. DMS observed them regularly at the Tembungo oil rig between 15 June and 31 Oct. 1981. They were usually adults, alone or in pairs, or sometimes small groups of up to seven individuals. WFVZ received a live oil-covered bird captured on the Tembungo oil rig on 20 Jan. 1983. On 3 June 1983, while enroute to Mengalum Island, WFVZ observed four individuals in a mixed flock with frigatebirds working a school of large fish, then groups of eight and two later during the trip.

Family FREGATIDAE

FRIGATEBIRDS

Christmas Island Frigatebird *Fregata andrewsi*

Status: A regular visitor. The most common frigatebird after Lesser Frigatebird. *Localities*: Bongawan, Kimanis Bay, Kota Kinabalu, Kuala Sugut, Labuan, Mantanani Island, Mengalum Island, Mumiang, Pulau Tiga, Tembungo, and Tempasuk (all sightings). *Remarks*: DMB's records include two circling among Lesser Frigatebirds on 2–3 Dec. 1984 and single birds off Pulau Tiga on 21, 22, and 29 Jan. 1986. Parish (1985) and B&W recorded them off of Tempasuk on 10–11 Sept. and 23 Nov. 1984. Gore (1968) saw ca. 20 off of Kota Kinabalu in Feb. 1964 and singles with Lesser Frigatebirds off Mengalum on 1 June 1965. WFVZ recorded males and females in small numbers near Pulau Tiga on 9 Jan. 1982. WFVZ observed 20 or more each day during 9–10 Mar. 1982 near Mantanani Island, and found them to be far more common than Great Frigatebirds, but much less common than Lesser Frigatebirds (Sheldon et al. 1983).

Lesser Frigatebird *Fregata ariel*

Status: An abundant visitor. The commonest frigatebird, far outnumbering Christmas Island and Great frigatebirds. *Localities*: Balambangan Island, Cowie Harbor, Darvel Bay, Gaya Bay, Kalampunian Island, Kimanis Bay, Kuala Penyu, Kudat Beach, Kulamba, Malawali Island, Mantanani Island, Membakut Beach, Mengalum Island, Miagra Island, Mumiang, Nosong, Pulau Tiga, St. Lucia Bay, Sandakan, Selingan Island, Semporna Islands, Sipadan Island, Tanjung Aru, Tawau, Tembungo, Tempasuk Beach, and other coastal localities. *Migration dates*: They are abundant on both coasts in the early months of the year, but largely disappear from late Apr. until mid-July (Smythies 1957; DMB). WFVZ records are consistent with this pattern. In June 1983, during a trip to Mengalum Island, WFVZ saw only 10 birds, and these all appeared to be immatures. *Remarks*: Roosting islands include Pulau Tiga, where Phillipps (1985a) noted ca. 200 in the late afternoons of 16–19 Apr. 1985; Kalampunian Damit Island, where hundreds roost and Suluk people have been known to trap them for food (DMB; Phillipps

1985a); Mantanani Kecil Island, where WFVZ observed perhaps 2,000 congregating at dusk on 9–10 Mar. 1982; and Miagra Island, where WFVZ found abundant scatalogical evidence of roosting on 16 Aug. 1983.

Great Frigatebird *Fregata minor*

Status: A regularly recorded visitor. The least common frigatebird. *Localities:* Berhala Island, Kalampunian Island, Kota Belud, between Kulamba and Sandakan, Labuan (specimen), Maiga Island, Mantanani Island, Mumiang, Nosong, Pulau Tiga, Sandakan (specimen), Semporna Harbor, Sipadan Island, and Tembungo. *Remarks:* The first East Coast record seems to be from Maiga Island on 27 Aug. 1980 by D. Yong. DMS regularly observed them from the Tembungo oil platform from 15 June to 31 Oct. 1981. DMB reported a single bird feeding among Lesser Frigatebirds off Pulau Tiga on 2 Dec. 1984. Some older records exist from Labuan (Sharpe 1879b, 1890b). They have also been recorded at Nosong, Mumiang, and between Kulamba and Sandakan (B&W). During a trip to Mantanani Island in Mar. 1982, WFVZ observed hundreds to thousands of Lesser Frigatebirds, tens of Christmas Island Frigatebirds, and less than 10 Great Frigatebirds (Sheldon et al. 1983). However, Great Frigatebirds are regularly recorded on both coasts and are not rare.

Family PHALACROCORACIDAE

CORMORANTS

Great Cormorant *Phalacrocorax carbo*

Status: An uncommon resident and vagrant. *Localities:* Dewhurst Bay, Gaya Island, Kalampunian Island, Kuala Papar, Kuala Penyu, Labuan, Menumbok, Sandakan Harbor, Selinggaan Island, Sipadan Island, Tawau Bay, and Tempasuk. *Habitats:* Freshwater ponds, mudflats, mangroves, and estuaries. *Remarks:* DMB recorded single birds at Kuala Penyu on 18 Dec. 1959, on Kalampunian Besar (no other information), in Sandakan Harbor on 19 Dec. 1984, and two flying over the channel between Menumbok and Labuan on 22 Dec. 1984. A party was observed on the west side of Labuan during 19–22 Mar. 1949 (Smythies 2000). KVT recorded single birds on the eastern side of Dewhurst Bay in July 1963 and Mar. 1965 and at Tempasuk on 28 July 1968. The Tempasuk bird sat beside a freshwater pond drying its wings. KVT recorded several off Labuan in July 1966.

Family ANHINGIDAE

DARTERS

Darter *Anhinga melanogaster*

Status: A widespread but uncommon resident. B&W considered them to be much rarer on the West Coast. *Localities:* Abai, Balambangan Island, Batu Putih, Bengkoka River, Binsulok, Bole River, Bongawan, Bulat, Brumas, Danum, Dewhurst Bay, Gomantong, Karudan, Keningau, Kinabatangan River, Kota Belud, Kulamba, Labuan, Labaung, Labuk River, Madai Caves, Maliau, Melalap, Membakut, Menumbok, Padas Damit, Padas Gorge, Segama River, Sepilok, Sugut River, Sukau, Tabin, and Tempasuk. *Habitats:* Oxbow lakes and swamps, rivers, freshwater ponds, stagnant pools, and mangroves. *Breeding:* Whitehead (1893) reported a breeding colony with ca. 50 nests on the Padas River with eggs in mid-Nov. The nests were firm structures of sticks lined with leaves, and contained

four or five eggs that become brown during incubation (Whitehead 1888). Single pairs were observed in small dead-end channels at Klias (Wells et al. 1975). *Remarks:* R. Whitaker (pers. comm.) found a colony with nests (but not breeding) in a mangrove oxbow lake near Kampung Karudan on the Sugut River in May 1983. Lansdown (1989) found more than 30 Darters feeding on Tanjung Bulat Lake. At Labaung, ca. 100 pairs of Darters were reported by local people (Lansdown 1989). Both of Lansdown's records were in Sept. (year unspecified, but mid-1980s). DMB observed more than 20 gathering to roost in the mangroves at Abai (East Coast) on 21 Mar. 1990.

Order CICONIIFORMES

Family ARDEIDAE

HERONS, EGRETS, AND BITTERNES

Much of information on herons derives from the work of Richard V. Lansdown (1986a, b, 1987a, b, c, 1988, 1989, 1990), who surveyed for WWFM and the Asian Wetland Bureau during the 1980s. While at Tempasuk, Lansdown observed several pond herons (*Ardeola*) not identifiable to species.

Great-billed Heron *Ardea sumatrana*

Status: An uncommon resident. Widespread but sparsely distributed, possibly due to large territories (Lansdown 1986b). *Localities:* Abai, Balambangan Island, Bandau, Banggi Island, Binsulok, Bole River, Bongawan, Bum-Bum Island, Danum, Imbak River, Karindingan Island, Kawag River, Kinabatangan River, Kuala Papar, Kuala Penyu, Kudat, Kulamba, Lamag, Likas Bay, Maliau, Menumbok, Mumiang, Padas Damit, Paitan River, Sandakan, Segama River, Segarong, Selinggaan Island, Semporna, Sepilok, Tabin, Tambisan, Tempasuk, and Wallace Bay. *Habitats:* Rivers, including large and small rivers in the deep interior forest, rivers in logged areas, and mangroves. *Food:* Fish, crabs, and molluscs (Lansdown 1986b). *Remarks:* This species seems to be seasonal, occurring on the West Coast mainly from Jan. to Mar. (Smythies 1963); possibly more common on the East Coast from June to Oct. (Norman 1964).

Gray Heron *Ardea cinerea*

Status: An uncommon migrant. *Localities:* Benoni, Binsulok, Bongawan, Kuala Membakut, Kalabakan River, Klias Peninsula, Kuala Penyu, Likas, Padas Damit, Papar, and Tempasuk (all sightings). *Habitats:* Grassy wet fields, freshwater ponds, and freshwater swamp. *Food:* Fish (Lansdown 1986b). *Migration dates:* WFVZ recorded one at Tempasuk on 14 Sept. 1982 and another at Tempasuk on 19 Apr. 1983. DMB observed one at Benoni on 16 May 1960. *Remarks:* Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 10. DMB observed 11 at Padas Damit on 16 Feb. 1986. B&W noted six on 23 Nov. and seven on 11 Dec. 1984 at Tempasuk.

Purple Heron *Ardea purpurea*

Status: A locally common resident. *Localities:* Beaufort, Bengkoka, Binsulok, Bongawan, Danum, Klias Peninsula, Kuala Penyu, Labuan, Likas Swamp, Membakut, Padas Damit, Pangakayan, Papar, Pulau Tiga, Putatan, Tembungo, and Tempasuk. *Habitats:* Grassy wet fields, freshwater swamp, *Spartina* marsh, rice

padi, rivers, and mangroves. *Breeding*: A specimen collected at Padas Damit on 25 May 1983 had large active testes. Breeds at Binsulok and Pangakayan (DMB). *Voice*: An alarm in flight is a kind of croaking moo: *moaaa*. *Food*: Mainly large fish, also frogs, tadpoles, and invertebrates (Lansdown 1986b, 1987c). *Remarks*: Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 200. He observed birds flying to roosts singly and in small groups.

Great Egret *Casmerodius albus*

Status: A common migrant and possibly a resident in low numbers. *Localities*: Abai, Batu Putih, Bengkoka, Benoni, Bundu, Karindingan Island, Kinabatangan River, Kolapis, Kota Belud, Kuala Bakut, Kulamba, Labuk River, Lamag, Likas Swamp, Mumiang, Padas Damit, Pandasan, Papar, Quoin Hill, Sepilok, Tanjung Aru, Tempasuk, and Tuaran. *Habitats*: Grassy wet fields, forest, freshwater swamp, open freshwater, rice padi, rivers, and mangroves. *Food*: Mainly large fish, also invertebrates (Lansdown 1986b, 1987c). *Breeding*: The breeding status of this species is uncertain (Lansdown 1989). Ca. 20 individuals frequented Likas Swamp at the height of night-heron breeding in May 1983, and a clutch of eggs was collected on 18 May that is likely (although not absolutely confirmed) to be of this species (WFVZ). KVT reported breeding colonies at Kuala Kinabatangan in June and July (no further details). GD observed several individuals in breeding plumage and colors at Kulamba during 25–27 May 1999 (Smythies 2000). *Migration dates*: Distinguishing resident and summering birds from visitors is difficult. WFVZ recorded ca. 20 individuals at Tempasuk on 8 Aug. 1981 and 4 along the Kinabatangan River on 10 Aug. 1983. J. Payne found many in Aug. 1982 on the Kinabatangan. Ca. 100 individuals were observed at Padas Damit on 25 May 1983 (WFVZ). *Remarks*: Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 600. During subsequent study in the postbreeding season (autumn), Lansdown (1989) found 1,215 roosting at southern Kerah swamp (Tempasuk), 75 at Padas Damit, 154 at Kuala Papar, and an unestimated number at Kuala Bakut.

Intermediate Egret *Mesophoyx intermedia*

Status: A common migrant. *Localities*: Bandau, Beluran, Bongawan, Bundu, Karindingan Island, Kimanis, Kinabatangan River, Klias Peninsula, Kota Belud, Kuala Bakut, Kuala Penyu, Kudat, Likas Swamp, Membakut, Mengkabong, Padas Damit, Papar, Sembulan, Tanjung Aru, Tawau, Tembungo, and Tempasuk. *Habitats*: Grassy wet fields, freshwater swamp, swamp forest, and rice padi. *Food*: Feeds equally on a large variety of prey items: invertebrates, including mole crickets and leeches, fish, frogs, and tadpoles (Lansdown 1986b, 1987c). A specimen collected at Papar on 3 Mar. 1983 contained grasshoppers, mole crickets, and dragonfly larvae (WFVZ). *Breeding*: This species seems not to breed in Sabah. At Likas Swamp during May 1983, the height of the heron breeding season, WFVZ found that these egrets came to roost in large numbers at dusk, but were not evident during the day. *Migration dates*: As with the previous species, the presence of summering birds confounds attempts to date migration. Early Aug. 1982 and 1983 records exist from the Kinabatangan River (WFVZ, J. Payne). KVT recorded a bird on 13 Aug. 1966 (no locality). DMS recorded migrants at Tembungo oil platform on 4, 13, and 22 Sept. 1981. For late records,

WFVZ observed many individuals roosting at Likas Swamp on 23 May 1983 and ca. 100 at Padas Damit on 25 May 1983. *Remarks:* Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 600. During subsequent study in the postbreeding season (autumn), Lansdown (1989) found from 500 to 1,000 of this species and Little Egret roosting at each of Padas Damit, Kuala Papar, and Kuala Bakut.

Little Egret *Egretta garzetta*

Status: A common to abundant migrant and possibly a resident in small numbers. More common than Great or Intermediate egrets. *Localities:* Batu Putih, Brantian River, Karindingan Island, Kimanis, Kota Belud, Labuan, Labuk River, Likas and Likas Swamp, Membakut, Mumiang, Padas Damit, Papar, Pimping, Sandakan, Tamparuli, Tembungo, Tempasuk, Tuaran, and Wallace Bay. *Habitats:* Grassy wet fields, freshwater swamp, rice padi, cultivated fields, open freshwater, rivers, and lagoons. *Breeding:* Not confirmed as breeding in Sabah. *Migration dates:* Summer records are few. KVT observed birds at Papar on 2 Aug. 1966 and 16 July 1969 (possible residents). Substantial numbers of migrants do not appear until Oct. By the end of May, virtually all have left. For example, at Padas Damit on 25 May 1983 WFVZ recorded ca. 100 each of Great and Intermediate egrets, but only two Little Egrets. *Food:* Mainly small fish, also frogs, tadpoles, crabs, and other invertebrates (Lansdown 1986b, 1987c). *Remarks:* During winter months, Little Egret is the most abundant egret. Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 1,400. Two subspecies were recorded by Lansdown (1986b) and DMB in Sabah, *E. g. garzetta* and *E. g. nigripes*. The nominate subspecies has yellow toes, whereas feet of *E. g. nigripes* are all black. *E. g. nigripes* is a common winter visitor around Kimanis, but less frequent than *E. g. garzetta* (DMB). In the Tawau area, *E. g. nigripes* may be more common near the shore and *E. g. garzetta* more common inland (Norman 1964).

Chinese Egret *Egretta eulophotes*

Status: An uncommon migrant. *Localities:* Binsulok River, Bongawan, Kinabatangan River, Kuala Papar, Kuala Penyu, Labuan, Lahad Datu, Likas Bay, Lok Kawi, Mengkabong, Menumbok, Mumiang, Padas Damit, Sandakan, and Tanjung Aru. *Habitats:* Coastal mudflats, mangroves, river mouth sandbars. All records except for the Kinabatangan River (20 Oct. 1963; MCT) are coastal. *Migration dates:* KVT recorded a bird on 10 Oct. 1968 at Papar. WFVZ observed a single bird in breeding plumage at the mouth of the Binsulok River on 26 Apr. 1983. Birds have been recorded in breeding plumage on 25 Mar. 1975 (Wells et al. 1975) and 19 Jan. 1952 (SMC). The late record is 9 May 1993 at Lahad Datu (Heath in Smythies 2000). *Remarks:* DMB observed 14 and 11 at Likas Bay on 8 and 20 Dec. 1984, respectively, and 16 at Mumiang on 16 Dec. 1984. He found them regularly at Likas Bay in winter months from 1984 to 1990. When not in breeding plumage, they are similar to Pacific Reef Egret. *Reference:* See Lansdown (1990) for a discussion of identification, distribution, and conservation status.

Pacific Reef Egret *Egretta sacra*

Status: A common resident. *Localities:* Balambangan Island (dark phase),

Banggi Island (dark phase), Gaya Island, Kulamba, Labuan (dark phase), Likas Bay (light phase), Mantanani Island, Nosong, Pandanan, Pulau Tiga (dark phase), Sandakan Bay (light phase), Sapi Island (dark phase), Selingan Island (dark phase), Sipadan Island (both phases), Tanjung Aru (dark phase), Tawau (dark phase), Wallace Bay (both phases), and sightings from other coastal localities. *Habitats*: Beach and coastal rocks. May also occur in freshwater swamps (e.g., on Labuan; Smythies 1957). *Breeding*: DMB observed breeding at Nosong in 1959 and 1960. On 23 June 1959 at Nosong, he found five nonbreeding pairs of dark-phase birds, three dark-phase pairs with nests (two with two eggs, one with one egg), and one nonbreeding mixed pair. Dark-phase individuals outnumbered light-phase birds by at least two to one. Eggs (usually two) averaged 43.0×33.0 mm. *Food*: Crabs. Food is sometimes captured by lunging from the air (Wells 1978). *Remarks*: KVT estimated that there are four light-phase to every one dark-phase individual on the West Coast. Wells (1978) reported equal numbers of dark and light forms on Balambangan.

Cattle Egret *Bubulcus ibis*

Status: A common to abundant migrant. *Localities*: Bengkoka, Bongawan, Bundu, Kimanis, Kinarut, Klias Peninsula, Kota Belud, Kuala Penyu, Likas Bay, Membakut, Mengkabong, Mumiang, Padas Damit, Papar, Sandakan, Sepilok, Tamparuli, Tawau, Tembungo, Tempasuk, Tenom, Tongod, and Tuaran. *Habitats*: Grassy wet fields, freshwater swamp, rice padi, cultivated fields, open freshwater, and rivers. *Breeding*: Cattle Egrets occur in large numbers outside the breeding season; breeding is not yet confirmed (Lansdown 1989). *Migration dates*: In general, they arrive in numbers in Oct. KVT recorded a possible summering individual at Papar on 2 Aug. 1966. In 1982, WFVZ saw no birds at Papar on 9 Sept., but several on 17 Sept. WFVZ found a single bird at Kinarut on 5 Sept. 1982. B&W reported more than 100 birds on 10 Sept. 1984 at Tempasuk. DMS recorded one at the Tembungo oil platform on 25 Sept. 1981, and WFVZ saw hundreds flying around the platform on 7 Oct. 1982. WFVZ's late date is 30 Apr. 1983 at Tempasuk. Small flocks occur as late as 15 June at Papar (Smythies 1963). *Food*: Small vertebrates and invertebrates flushed by cattle. *Remarks*: Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 1,000. During subsequent study in the postbreeding season (autumn), Lansdown (1989) found 1,215 roosting at southern Kerah swamp (Tempasuk), 194 at Padas Damit, 308 at Kuala Papar, and 1,460 at Kuala Bakut.

Javan Pond Heron *Ardeola speciosa*

Status: A rare visitor, more common in southern Borneo. *Localities*: Sharpe (1890b) noted a specimen from Bengkoka on 13 Oct. 1885. Two were seen at Tempasuk on 13 July 1997 (S. Harrap via C. Mann, pers. comm.).

Chinese Pond Heron *Ardeola bacchus*

Status: A rare migrant. *Localities*: MCT collected a specimen in a village stream 12 mi. (19 km) N of Kalabakan on 26 Oct. 1962 (Thompson 1966). KVT observed a party of six to eight individuals in a rice field near the center of Labuan in Nov. 1960. The Phillipps family observed several at Tempasuk in Jan. 1979. DMS recorded one by spotlight at Tembungo oil platform on 21 Sept. 1981 and one in daylight on 3 Oct. 1981.

Little Heron Butorides striatus

Status: A common resident and winter migrant. *Localities:* Abai, Benoni, Binsulok River, Bodgaya Island, Bole River, Bongawan, Brunei, Gana, Gaya Island, Kuala Penyu, Likas Swamp, Lok Kawi, Maang, Membakut, Mengkabong, Pandanan, Papar, Sandakan, Selintaan Island, Segarong, Sepilok, Sukau, Tabin, Tanjung Aru, Tembungo, Tempasuk, Tuaran, Turtle Islands, Wallace Bay, and other areas. *Habitats:* Freshwater ponds, roadside ditches, cultivated and uncultivated fields, fast-flowing forest rivers (uncommon), beaches, beach strand, tidal mudflats, mangroves, and swamps. *Breeding:* At Likas Swamp on 18 May 1983, WFVZ found nests with fledged young, almost fledged young, eggs and chicks, and well-incubated eggs (usually two or three eggs per clutch). The nests were soccer ball-sized masses of sticks with no lining, built ca. 8 m high in isolated open mangrove trees. J. Payne observed nest building on 10 Apr. 1984 at the edge of Kulamba Reserve. DMB found nests in Mar. and from May to Aug. In early Mar. 1962, he found six nests in low mangroves downstream from Kampung Pimping (Smythies 2000). Nesting was also reported near Tanjung Aru in Aug. 1958 (Smythies 1963). Eggs are pale blue, 37.0×29.25 mm (DMB). *Migration dates:* Because of the confusion between resident and visiting individuals, it is difficult to date migration. DMS observed ca. 20 at Tembungo between 20 Sept. and 20 Oct. 1981. WFVZ observed ca. 12 at Tembungo during the night of 7 Oct. 1982. Sharpe (1894b) reported migrants on Labuan on 20 Oct. 1892. *Food:* Invertebrates (Lansdown 1986b) and fish. *Remarks:* Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 10.

Black-crowned Night Heron Nycticorax nycticorax

Status: A common resident and migrant. *Localities:* Bengkoka, Benoni, Binsulok, Bongawan, Darau River, Kalabakan River, Kimanis, Klias River, Labuan, Lamag, Likas Bay and Swamp, Membakut, Padas Damit, and Tempasuk. *Habitats:* Freshwater swamp, padi, tidal mudflats, nipah, and mangroves. *Breeding:* WFVZ visited the Likas Swamp rookery several times between 18 May and 15 June 1983, observed ca. 100 individuals, and located 25 nests (Sheldon and Marin 1985). As of 18 May the nests contained newly hatched chicks, chicks and eggs, or well-incubated eggs. Nests were concentrated in inland and taller mangrove trees, ca. 8–10 m high. *Migration dates:* Little information is available on migration because of the confusion between residents and visitors. However, WFVZ collected two individuals at Benoni on 7 May 1983 that were extremely fat and probably migrants. *Voice:* A harsh *kwak* in flight, a subdued *kwik-kwik* call, and a harsh croak upon disturbance (DMB). *Remarks:* A large roost was located along the Darau River near the Sabah Foundation in 1983 (WFVZ). Based on crepuscular movements, Lansdown (1986b) estimated that ca. 50 night herons wintered in the Tempasuk area. In autumn 1986, he discovered a roost with more than 600 birds on an oxbow lake of the Tempasuk River near Kampung Merabau (Lansdown 1987c).

Rufous Night Heron Nycticorax caledonicus

Status: An uncommon resident. Most records are of single birds or a few individuals. *Localities:* Binsulok, Bongawan, Gana, Klias Estate, Kuala Kimanis, Likas Swamp, Menggatal, Padas Damit, Papar, Tanjung Aru, and Tempasuk. *Hab-*

itats: Swamp forest, nipah, casuarinas, and mangroves. *Breeding*: Q. Phillipps discovered that this species nested at Likas Swamp in the early 1970s. Although it was thought that the species had abandoned the swamp by 1978 (Smythies 1981), WFVZ observed ca. 20 individuals and found three active nests there on 20 May 1983 (Sheldon and Marin 1985), and GD observed 30 birds of all ages there in Aug. 1998 (Smythies 2000). The nests found by the WFVZ contained, respectively: two eggs, one egg and a chick, and two chicks. The nests were not intermingled with nests of Black-crowned Night Herons, but instead were grouped together on the fringe of the swamp. *Remarks*: KVT noticed this species at Likas in 1956 and thought they were visitors from the Philippines.

Malayan Night Heron *Gorsachius melanolophus*

Status: A rare migrant. *Localities*: Sharpe (1890b) reported a specimen collected at Bengkoka on 29 Oct. 1885. The Sabah Museum has one specimen, an adult female, collected at Bungoliu on 24 Nov. 1971. An individual shot by hunters at Kuala Kimanis on 25 Apr. 1960 was sent to the Sarawak Museum (DMB). (We could not locate this specimen.) DMB observed two individuals flushed from a nipah thicket near Kuala Papar in Mar. 1964; one was observed on Sipadan Island on 27 Feb. (year not specified; Smythies 2000); and one was observed in early Apr. 1993 in mixed dipterocarp forest at Danum (Smythies 2000).

Yellow Bittern *Ixobrychus sinensis*

Status: A common migrant, probably also a resident. *Localities*: Abai, Beaufort, Bundu, Kalabakan, Kimanis, Kuala Penyu, Likas, Lok Kawi, Membakut, Putatan, Papar, Sandakan, Tembungo, Tempasuk, and Tuaran. *Habitats*: Grassy wet fields, freshwater swamp, and padi. *Breeding*: Evidence of breeding is strong. KVT reported a bird from Tempasuk in July, and Q. Phillipps saw one at Lok Kawi on 11 July 1978 (Smythies 1981). WFVZ observed ca. 20 individuals on Tempasuk Plain on 8 Aug. 1981. Lansdown (1987b) observed a flightless juvenile begging from an adult at Tempasuk. *Migration dates*: The existence of a resident population makes it difficult to determine migration dates. DMS observed a bird on the Tembungo oil platform on 11 Sept. 1981. *Food*: Fish, frogs, and invertebrates (Lansdown 1986b). *Remarks*: Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 250.

Cinnamon Bittern *Ixobrychus cinnamomeus*

Status: A common resident and winter visitor found in appropriate habitat in all coastal and inland areas. *Habitats*: Grassy wet fields, freshwater swamps, cultivated and uncultivated fields, and drainage ditches. *Breeding*: Two nests with eggs were found on 30 Aug. 1982 at Kampung Maang and three nests with eggs at Putatan on 7 June 1983 (Marin and Sheldon 1987). The nests were built in tall (ca. 80 cm) grass tussocks that grow in fallow padi or in tall (ca. 120 cm) marsh grasses. They were constructed of grass blades from the inner part of the tussock that had been folded and weaved into a sturdy platform ca. 23 × 23 cm across and 15–20 cm high. A makeshift cover was sometimes formed of a few grasses pulled over the top of the platform. Lining was of dry rice plant material. Some nests were only 1.5 m apart. One or both parents were flushed upon approach. Four of the nests had three eggs; one had two. The eggs were dull white and

varied in shape from elliptical to subelliptical to short subelliptical. Average dimensions were 34.2×26.5 mm ($n = 11$). Although the eggs were fresh or slightly incubated, flightless, feathered chicks occurred simultaneously in a nearby field. A female collected at Mandangin on 5 June 1983 had an egg in its oviduct. DMB observed possible courtship display at Papar consisting of a pair flying in a slow rising spiral before planing quickly downwards. *Migration dates*: The presence of resident birds makes it difficult to determine migration times. WFVZ observed 20 individuals flying around the Tembungo oil rig during the night of 7 Oct. 1982. *Voice*: Three froglike croaks when flushed. *Food*: Fish and frogs (Lansdown 1986b), grasshoppers and crustaceans (DMB). *Remarks*: Based on surveys in Feb. and Mar. 1986, Lansdown (1986b) estimated a wintering population at Tempasuk of 300.

Von Schrenck's Bittern *Ixobrychus eurhythmus*

Status: A scarce migrant. *Localities*: Danum, Labuan, Lamag, Papar, Pulau Tiga, and Tempasuk. *Remarks*: Lansdown (1986b) saw three individuals of this species, one adult and two apparent subadults, on Tempasuk Plain during Feb.–Mar. 1986. Lambert (1990c) listed them as present in 1° forest at Danum, and Buckton (1992) saw a male in a lily pond by the Segama River at Danum in late Mar. 1992. It was also observed at Papar on 24 Apr. 1967 (Gore 1968), and P. Heath (in Smythies 2000) recorded it on Pulau Tiga on 16 Apr. 1983.

Black Bittern *Dupetor flavicollis*

Status: A scarce migrant. *Localities*: Bongawan, Bundu, Labuan, Mawau, Membakut, Papar, Selingaan Island, Sepilok, Tawau, and Tempasuk. *Habitats*: Swamp. *Remarks*: Little is known about this bird in Sabah. J. Payne observed an adult in swampy dipterocarp forest at Sepilok on 8 Feb. 1980. DMB recorded two at Tempasuk on 28 Dec. 1984, one at Kilatuan Lama (Papar) on 5 Jan. 1985, and singles at Bongawan, Membakut, and Bundu on 24 Jan. and 5 and 18 Feb. 1986. Lansdown (1986b), based on surveys in Feb. and Mar. 1986, estimated a wintering population at Tempasuk of five. Elsewhere in Borneo records of Black Bittern exist for nearly every month, and breeding is possible (Smythies 2000).

[Great Bittern *Botaurus stellaris*

Status: Possibly a rare migrant or vagrant. A sighting by KVT at Papar on 10–11 Nov. 1966 (Gore 1968) was withdrawn (Cranbrook 1982). The Sabah Museum has a mounted specimen collected on 27 Feb. 1985, but with no locality (GD).]

Family CICONIIDAE

STORKS

Storm's Stork *Ciconia stormi*

Status: An uncommon and local resident. *Localities*: Batu Putih, Danum, Gomanong, Kimanis, Kinabalu, Kinabatangan River, Kulamba, Lahad Datu, Lamag, Membakut, Mt. Silam, Padas Damit, Sepilok, Sukau, Tuaran, Ulu Segama, and Wallace Bay. *Elevation*: Generally sea level, although one was reported circling at ca. 1,600 m at Kinabalu Park on 4 May 1998 (Robson 1998b). *Habitats*: 1° dipterocarp and logged forest, freshwater swamp, mangrove, and plantation clearings. *Voice*: They utter a cowlike *krauu* when taking off (DMB). *Food*: Dragonfly larvae from pools of stagnant water, grasshoppers, and possibly crabs. *Remarks*:

WFVZ observed one 3 km north of Gomantong Caves in Apr. 1981, two flying over the Kinabatangan ferry at Batu Putih in Feb. 1982, one ca. 5 km west of Lahad Datu in Apr. 1982, three along the Sukau Road in Aug. 1983, and about 10 soaring in groups of two and three along the Kinabatangan River between Bukit Garam and Kuala Kuamut in Aug. 1983. The Sukau Road birds were feeding in an area recently logged and burned for a plantation. CMF observed several in and about Sepilok Forest Reserve in Dec. 1982. DMB recorded one at Kulamba in Dec. 1984, two south of Membakut in Jan. 1985, two at Padas Damit in Feb. 1985, and one (perhaps two) at Sukau in Mar. 1989. Lambert (1990a) observed one individual in the vicinity of Mt. Silam in Jan. 1990.

Lesser Adjutant *Leptoptilos javanicus*

Status: An uncommon resident. *Localities:* Abai, Balambangan Island, Bundu, Gomantong, Karindingan Island, Kimanis, Kinabatangan River, Klias Peninsula, Kuala Penyu, Kulamba, Lumahat, Mawau, Membakut, Mumiang, Nukohan, Padas Damit, Semporna, and Tempasuk. *Habitats:* Wet grasslands, freshwater marsh, swamp forest, and mangrove. *Breeding:* A breeding colony was located near Semporna (Gore 1968). Burgess (1964) reported that they probably nested in woodlands near the mouth of the Kerah River (Tempasuk). *Voice:* Like the deep growl of a dog (MCT). *Food:* Frogs and other small vertebrates (Smythies 1963). One was observed feeding near fish traps at low tide on Karindingan Island (Banks 1982). *Remarks:* This species was frequently recorded in the 1950s, but is relatively rare nowadays (DMB). It was common along the Kota Kinabalu to Beaufort railway during the Japanese occupation, when hunting was disallowed (KVT). DMB reported 200–300 at Brunei Village in Jan. 1960. (The villagers welcomed the storks because they ate rodents that ate rice.) MCT reported approximately 100 birds on the reefs and coral sands of Karindingan Island on 17 Aug. 1962. (These may be the breeding birds noted by Gore [1968].) More recent sightings are of smaller numbers of individuals. WFVZ observed singles at Tempasuk in Aug. 1981, at Padas Damit in May and June 1983, and flying over Semporna in Aug. 1983. DMB recorded one near Kuala Penyu, two over Mawau, and four at Kampung Bundu in Dec. 1984.

Family THRESKIORNITHIDAE

IBISES AND SPOONBILLS

Black-headed Ibis *Threskiornis melanocephalus*

Status: A rare migrant or vagrant. *Remarks:* DMB observed singles at Papar in Feb. 1962. Gore (1968) observed one at Kota Belud (probably Tempasuk) on 8 Jan. 1966. The Phillipps family observed one on Papar Beach in Oct. 1975.

Glossy Ibis *Plegadis falcinellus*

Status: A rare vagrant. *Remarks:* One was found on 31 Mar. 1998 at Likas lagoon by A. Phillipps, and two were there in Apr. 1998. Individual birds were sighted at Likas until at least July 1999 (Smythies 2000; RGM).

[Spoonbills

Status: Uncertain. KVT reported spoonbills at Papar on 22 Feb. 1967 and 11 Sept. 1968, and at Tempasuk on 12 Jan. 1968 (Smythies 1981). However, we do

not know which species. It could be either Eurasian Spoonbill (*Platalea leucorodia*) or Black-faced Spoonbill (*Platalea minor*.)]

Order ANSERIFORMES

Family ANATIDAE

DUCKS AND GEESE

Lesser Whistling-Duck *Dendrocygna javanica*

Status: An uncommon migrant. *Localities:* Papar and Tempasuk. *Remarks:* B&W recorded five at Papar on 31 Aug. 1984. DMB recorded three at Tempasuk on 7 February 1986. GD recorded 42 at Tempasuk in Mar. 1999 (Smythies 2000).

[Common Teal *Anas crecca*

Status: A rare migrant. Apparently the only record for Sabah was on 8 Dec. 1984 at Padas Damit (B&W). MacKinnon and Phillips (1993) listed this species as a regular winter visitor to the coast of north Borneo, but Smythies (1981) did not include it in his book. It has been recorded three times in Brunei (Mann 1989).]

[Mallard *Anas platyrhynchos*

Status: Possibly a rare migrant. The only record is five seen (one drake) by E. J. H. Berwick on a lake at Kerah Swamp, Tempasuk, on 31 Oct. 1956 (Smythies 1963).]

Eurasian Wigeon *Anas penelope*

Status: An uncommon migrant. *Localities:* Beaufort, Padas Damit, Papar, and Tempasuk. *Remarks:* Sharpe (1890b) noted a Whitehead specimen collected at Tempasuk (no date). Sabah Museum has a specimen taken at Kuala Papar on 1 Nov. 1966. DMB has several records: seven near Padas Damit on 23 Dec. 1984, five at Kuala Papar on 20 Feb. 1962, and up to seven outside Beaufort in Dec. 1960 and Jan. 1961. He noted a musical whistling call when feeding at night over fallow padi.

Northern Pintail *Anas acuta*

Status: An uncommon migrant. *Localities:* Labuan, Mumiang, Padas Damit, and Papar (all sightings). *Remarks:* J. Collman recorded one on Labuan, 11 Oct. 1970 (Vowles and Vowles 1985). B&W recorded one at Padas Damit on 8 Dec. 1984 and had three sightings totaling six individuals at Mumiang on 2 Oct. 1984. DMB observed four on flooded grazing land near Papar on 5 Jan. 1985.

Garganey *Anas querquedula*

Status: A common migrant. *Localities:* Banjar, Bengkoka, Binsulok, Bundu, Gana, Keningau, Kimanis, Kuala Padas, Labuan, Likas, Mandangin, Marudu Bay, Mumiang, Padas Damit, Papar, Sandakan, Tawau airport, and Tempasuk. *Habitats:* Freshwater marshes, flooded fields, padi, and ponds. *Migration dates:* The earliest date is 4 Oct. 1984 at Mumiang (B&W); the latest is 23 individuals on 30 Apr. 1983 at Tempasuk (WFVZ). *Remarks:* Thousands of migrants frequent the large marsh at Padas Damit during winter months and on spring migration. B&W recorded more than 2,000, and DMB had several thousand there on 8 and 23 Dec. 1984.

Northern Shoveler *Anas clypeata*

Status: An uncommon migrant. *Localities:* Padas Damit and Tempasuk. *Remarks:* WFVZ observed seven (three males, four females) at the main Tempasuk lake on 8 Mar. 1982. B&W reported this species at Padas Damit on 8 Dec. 1984, and Parish (1985) reported it at Tempasuk in Feb. 1985.

Tufted Duck *Aythya fuligula*

Status: An uncommon migrant. *Localities:* Labuan, Likas, Sandakan, and Tempasuk. *Remarks:* KVT saw one at Tempasuk on 2 Jan. 1968. C. Francis and K. Scriven observed one on the Sandakan golf course lake, in company with three Garganey, on 30 Nov. 1982. Smythies (1963) reported a large influx in Nov. 1959 at Kerah Swamp. GD observed a pair at Likas Lagoon in Jan. 1996.

Cotton Pygmy-Goose *Nettapus coromandelianus*

Status: A rare vagrant or migrant. *Localities:* DMB reported a flock of eight in a flooded padi at Kabang, Papar, on 19 Mar. 1960. He saw four at Kuala Papar on 4 Dec. 1960 and again on 18 Dec. 1960. He heard reports of birds in the Papar area from Nov. 1961 to Feb. 1962, but only saw two birds at Benoni on 4 Jan. 1962 feeding in flooded padi.

Order FALCONIFORMES

Family ACCIPITRIDAE

HAWKS AND EAGLES

Populations of large birds of prey may be in serious jeopardy from hunting in Sabah. During WFVZ expedition in the early 1980s, we found large hawks to be relatively common (depending upon species) along rivers and roads with limited access, but rare along public roads. We also found them to be much more common on the East Coast than on the more populated West Coast.

Black-shouldered Kite *Elanus caeruleus*

Status: An uncommon and local resident and vagrant. *Localities:* Kinarut, Kota Kinabalu, Kudat Peninsula, Labuk River, Membakut, Papar, Semporna, Tawau, Tempasuk, and Tuaran. *Habitats:* Flat open areas including marshy grasslands, plantation clearings, and suburbs. *Elevation:* Sea level. *Breeding:* Breeding reported at Kota Belud in Mar. 1986 (C. Mann). Two adults and a fledged young were perched together on wires at Papar in Jan. 1996 (GD). *Voice:* A thin *keer* (DMB). *Food:* Skinks, quail. *Remarks:* This species seems to be extending its range and becoming more common in Sabah (GD).

Bat Hawk *Macheiramphus alcinus*

Status: An uncommon and local resident. *Localities:* Bole River, Brumas, Danum, Gomantong, Kalabakan, Merintaman, Papar, Segarong, Sepulut, Tabin, Tuaran, and Ulu Segama. *Habitats:* Limestone caves for feeding, and 1° and logged lowland forest for roosting and nesting. *Elevation:* Sea level to 200 m. A record of 1,550 m on Kinabalu may have been of a Peregrine Falcon (Jenkins et al. 1996; Smythies 2000). *Breeding:* CMF reported a nest 20 m high in a tree top with two eggs at Segarong (Jan. 1983). WFVZ observed a pair on Sukau Road near Gomantong on 2–3 Aug. 1983 roosting at a nest. The nest was placed high in a large mengaris tree (*Koompassia excelsa*) that had been left by loggers. *Voice:*

A high-pitched single note repeated in a long string. They often call after dark. *Food:* At Gomantong caves the birds feed on swiftlets and bats by swooping down on prey that are exiting from the caves at dawn and dusk. They catch prey with one foot and usually swallow it whole in flight. Occasionally they land to eat. They are also known to enter caves to catch prey (KVT). *Tadarida plicata* is a common prey species (Francis 1985b). Thiollay (1983) reported a capture rate of 5–10 bats per hour, with up to 10 individual hawks hunting together. Norman (1964) reported three individuals making dives at a mixed group of broadbills, bee-eaters, and hornbills. *Remarks:* This species' apparent preference for nesting and roosting in mangaris trees is fortunate, because these large trees are usually left by loggers.

Jerdon's Baza *Aviceda jerdoni*

Status: An uncommon resident. *Localities:* Batu Punggul, Bole River, Brumas, Danum, Kaingaran, Kota Belud (specimen), Menangkul River, Paitan, Pandasan (specimen), Sabah Softwoods, Sebatik Island, Sepilok, Sukau, Tawau Hills, and Ulu Segama. *Habitats:* This raptor is often found in logged forest. *Food:* Insects. *Voice:* A call of *pit-wee*.

Oriental Honey-Buzzard *Pernis ptilorhyncus*

Status: A common resident and winter migrant. *Localities:* Batu Punggul, Danum, Kaingaran, Kalabakan River, Kiau, Kimanis, Kinabalu, Labuan, Mumiang, Muruk, Papar, Pulau Tiga, Quoin Hill, Ranau, Sandakan, Sebatik Island, Sepilok, and Sukau. *Habitats:* 1° and logged forest, especially hill and lower montane forest. *Elevation:* Sea level to 1,000 m. *Breeding:* WFVZ observed a pair flying back and forth between two tall trees near Sukau on 3 Aug. 1983. A large nest was present in one tree, but it was uncertain if the pair was using it. *Food:* As its name implies, this species often feeds on bees, wasps, their larvae, and even honey and wax; also snakes and fruits (Smythies 1963). *Remarks:* Thiollay (1983) reported this species as the most common raptor at Gomantong and Kinabalu.

Black Kite *Milvus migrans*

Status: A rare migrant. *Localities:* Everett (1890a) collected one during the NE "monsoon" at Labuan. Gore (1968) reported one from Papar, 20–24 Mar. 1967.

Brahminy Kite *Haliastur indus*

Status: A resident and perhaps the commonest raptor, found throughout open, lower elevational areas of Sabah. *Elevation:* Sea level to 1,000 m. *Habitats:* Coast, beaches, harbors, mangroves, river edges, agricultural plantations, and logged forest. *Breeding:* Sharpe (1879b) reported a dull white egg measuring 1.95×1.4 inches (49.5×35.6 mm) found high in a tree near Labuan in Dec. 1873. Although they often feed on the coast, Brahminy Kites generally roost and nest inland in tall trees (Wells 1978). In Jan. 1962, DMB observed a nest 15 m high in a jungle tree near the mouth of the Bongawan River. It was a bulky nest of twigs with one white egg speckled with rust. However, DMB believed that the breeding season is actually earlier than indicated by the Jan. nest record because of the molting pattern he had observed. *Food:* Snakes, lizards, insects, birds, crabs, and fish. They also catch swarming ants and termites on the wing (DMB) and have been observed eating sea turtle hatchlings (de Silva and Chong 1974).

Chinese Sparrowhawk *Accipiter soloensis*

Status: An uncommon winter migrant. *Localities:* Kimanis, Kinabalu, Labau River, Lumbidan, Malangkap, Menggatal, Mumiang, Padas Damit, Tembungo, and Turtle Islands. *Elevation:* Sea level to 500 m. *Migration dates:* Earliest records are 8 Oct. 1981 (Tembungo) and 23 Oct. 1982 (Labau River). *Food:* Lizards and insects. *Remarks:* In general, little is known about accipters in Sabah, largely because they are difficult to identify (see Mees 1980). All records should be treated with caution, for example, a Chinese Sparrowhawk specimen from Menggatal in the Sabah Museum was mislabeled as Japanese Sparrowhawk.

Crested Goshawk *Accipiter trivirgatus*

Status: A common resident. *Localities:* Batu Punggul, Bole River, Brumas, Danum, Kimanis, Kinabalu, Membakut, Pandasan, Penampang, Pintasan, Madai, Quoin Hill, Sandakan, Sepilok, Tambunan, and Trus Madi. *Elevation:* Sea level to 2,000 m. *Habitats:* 1° and logged forest, and river valleys. *Breeding:* V. W. Ryves found a nest with one egg at Kaung on 11 Feb. 1939, two nests with one egg each at Dallas on 27 Mar. 1939, and one nest with two eggs in an advanced state of incubation at Silikap on 4 Apr. 1939 (RMC). *Food:* Small birds, rodents, and reptiles. One WFVZ specimen had day-old nestlings in its stomach, and another had just caught a Black-and-yellow Broadbill.

Japanese Sparrowhawk *Accipiter gularis*

Status: A common passage migrant and winter visitor. *Localities:* Balambangan Island, Bekuku, Bole River, Mumiang, Papar, Poring, Putatan, Sinsuran Road, Sipadan Island, Tambunan, Tawau, Tembungo, and Tempasuk. *Elevation:* Sea level to 700 m. *Habitats:* Beach strand, sandy heath, logged forest, and forest clearings. *Migration dates:* The earliest record is 25 Sept. 1981 at Tembungo with 40 individuals sighted the following day (Simpson 1982a). Simpson's late fall record at Tembungo was 29 Oct. 1981. B&W observed passage migrants frequently in Sept. and Oct. 1984. The late spring date is early Apr. 1977 (Wells 1978). *Voice:* A shrill *kee-bick* and a mewing *kew-kew* (DMB). *Food:* Small birds. Simpson (1982a) observed migrants feeding on passerines at the Tembungo oil platform, often hunting at night by flare light.

Besra *Accipiter virgatus*

Status: An uncommon resident. *Localities:* Kaingaran, Kinabalu, Lumu-lumu, Malangkap, Silam, Sinsuran Road, and Tambunan. *Elevation:* 300 to 1,900 m. *Habitats:* Clearings, roadsides, and montane forest. *Breeding:* Phillipps (1986) reports nesting in Kinabalu Park on the Silau trail in May 1982. Sharpe (1889a) tentatively identified eggs collected at a Dusun clearing, 30 Mar. 1888, as those of *A. virgatus*. *Food:* Rodents, small birds. WFVZ observed one catch a Dusky Munia at Kaingaran (9 July 1983).

Gray-faced Buzzard *Butastur indicus*

Status: A common migrant and winter visitor. *Localities:* Bengkoka, Binsulok, Bole River, Bundu Tuhan, Kalabakan, Kimanis, Kinabalu, Labuan, Lamag, Lumbidan, Mantanani Island, Membakut, Mumiang, Papar, Quoin Hill, Segaliud River, Selingaan Island, Sepilok, and Tempasuk. *Elevation:* Sea level to 1,500 m. *Habitats:* Hill forest and clearings. This raptor is especially common around new clearings, where DMB saw as many as eight (Smythies 1963). *Migration dates:*

Everett (1889) and Sharpe (1879b) noted arrivals in Sept. However, most fall sightings do not occur until Oct. Birds stay in Sabah until the end of Mar. (Sharpe 1889a) or early Apr. (DMB). Heath (in Smythies 2000) had a record from Selin-gaan Island on 16 Apr. 1994. *Voice*: A high-pitched *ker-kreer* call, rising sharply at the first part of the second note. Also a *tit-kwee*. *Food*: Lizards, insects, rodents, and occasionally birds. DMB noted locusts as their primary prey (Smythies 1963).

Changeable Hawk Eagle *Spizaetus cirrhatus*

Status: An uncommon resident. *Localities*: Balambangan Island, Bohey Dulang Island, Bole River, Kiau, Kimanis, Labuan, Lamag, Mawau, Megatai, Melalap, Membakut, Mumiang, Papar, Pulau Tiga, Segama River, Sepilok, Sukau, Tempasuk, and Tiger Estate. *Elevation*: Sea level to 1,400 m. *Habitats*: 1° and occasionally logged forest. *Breeding*: Sharpe (1879b) reported an egg taken at Labuan in Jan. 1875 that was 2.8 × 2.2 inches (71.1 × 55.9 mm) and white with ochre stains. Another nest of a light-phase female and dark-phase male at Labuan on 15 Dec. 1885 had one large white egg (Sharpe 1889a). J. Whitehead found a nest and eggs at Tempasuk on 17–19 Feb. 1886. V. W. Ryves found a nest at Tempasuk on 17 Jan. 1939 with one fully incubated egg, and a nest at Kiau on 24 Mar. 1939 with one nestling (RMC). *Food*: Mostly birds, some reptiles (including small monitor lizards) and rodents. *Remarks*: This species has two color morphs. The dark morph, often confused with Black Eagle, may be more common in Borneo than the light phase.

Blyth's Hawk Eagle *Spizaetus alboniger*

Status: An uncommon resident. *Localities*: Bole River, Danum, Gomantong, Kaingaran, Kalabakan, Kiau, Kinabalu, Kinabatangan River, Labau River, Lamag, Magdalena, Mawau, Poring, Sabah Softwoods, Saliwangan, Sandakan, Spong Estate, Sepilok, Sinsuran Road, Sukau Road, Tabin, Telupid, and Trus Madi. *Elevation*: Sea level to 2,000 m. *Habitats*: 1° and logged forest, hill forest, and montane forest. *Voice*: In flight, *speoo-oo* descending at the end. When perched, short high-pitched squeaks. *Remarks*: This species has often been confused with Wallace's Hawk Eagle, especially in immature plumage. Thiollay (1983) believed this to be the most common *Spizaetus* in Sabah.

Wallace's Hawk Eagle *Spizaetus nanus*

Status: An uncommon resident. *Localities*: Bole River, Danum, Dusun River, Gomantong, Kinabatangan River, Labuk River, Lumerau, Meliau River, Quoin Hill, Sabah Softwoods, Sepilok, Sepulut, Sukau Road, Tabin, and Ulu Tiulon. *Elevation*: Sea level to 1,000 m. *Habitats*: 1°, logged, and riverine forest. *Voice*: A variable number (one to four) of short *pips* followed by a longer *peeee*. *Food*: Birds, bats, and lizards.

Rufous-bellied Eagle *Hieraetus kienerii*

Status: An uncommon resident. *Localities*: Batu Punggi, Beluran, Bole River, Brumas, Danum, Bukit Garam, Gomantong, Keningau, Kinabatangan River, Malangkap, Poring, Quoin Hill, Sabah Softwoods, Segama River, Sepilok, Sook, Sukau Road, Tabin, Tawau, Tiger Estate, and Tuaran. *Elevation*: Sea level to 1,000 m. *Habitats*: 1°, logged, and riverine forest; and *Albizia*. Often found at edges and clearings. *Food*: Thiollay (1983) observed one at Gomantong attacking minivets, swallows, and swiftlets.

Black Eagle *Ictinaetus malayensis*

Status: An uncommon resident. *Localities:* Keningau, Kimanis, Kinabalu, Labuan, Padas, Papar, Sabah Softwoods, Silabukan, Tabin, Tawau Hills, Tempasuk, Trus Madi, and Ulu Segama (all sightings). *Elevation:* Sea level to 1,500 m. *Habitats:* 1° lowland and hill forest; and *Albizia*. Possibly rarer over logged areas. *Voice:* A single high-pitched descending whistle. Also, a loud, plaintive *klee-kee* (DMB). *Food:* Birds, bats, eggs, rodents, and lizards. *Remarks:* This species is most often seen soaring high over the canopy of hill forest.

White-bellied Sea Eagle *Haliaeetus leucogaster*

Status: A common resident. *Localities:* Abai, Balambangan Island, Banggi Island, Bukit Garam, Cowie Bay, Gaya Island, Kulamba, Labuan, Lahad Datu, Likas Bay, Mantanani Island, Membakut, Mengalum Island, Merintaman, Mumiang, Padas Damit, Pulau Tiga, Sandakan Harbor, Segarong, Selinga Island, Semporna Islands, Sepilok, Si Amil Island, Sipadan Island, Tawau, Tempasuk, and Wallace Bay. *Elevation:* Sea level to 200 m. *Habitats:* Lakes, bays, open coast, mangroves, fire-padang kerangas, and offshore islands. *Breeding:* White-head found a nest in a dead tree in burned forest on Labuan with nearly fledged young on 12 Apr. (year not specified; Sharpe 1879b). *Voice:* A loud and far carrying *ung-ung* or *ungang* (DMB). *Food:* Fish, sea snakes, squid, and sea turtle hatchlings. *Remarks:* A successional replacement of eagles seems to occur as one progresses up rivers from the coast: White-bellied Sea Eagle on the coast, then Gray-headed Fish Eagle, and finally Lesser Fish Eagle (KVT).

Gray-headed Fish Eagle *Ichthyophaga ichthyaetus*

Status: An uncommon resident. *Localities:* Beluran, Bengkoka, Bole River, Danum, Gaya Island, Kalabakan, Kinabatangan River, Klias Peninsula, Mawau, Padas River, Sepilok, Sibuan Island, Tawau, and Wallace Bay. *Elevation:* Sea level to 600 m. *Habitats:* Rivers, lakes, swamp, mangrove, and some islands and coastal areas. *Food:* Fish.

Lesser Fish Eagle *Ichthyophaga humilis*

Status: An uncommon resident. *Localities:* Bole River, Brumas, Danum, Klias Peninsula, Labau River, Melian River, Meliau River, and Sukau Road. *Elevation:* Sea level to 1,000 m. *Habitats:* Rivers, swamp, mangrove, logged forest, and oil palm. This species generally inhabits forest-lined rivers of the interior. It seems to be quite sensitive to human disturbance (Thiollay 1983). However, WFVZ saw it in heavily logged and burned areas near Sukau. *Food:* Fish.

Crested Serpent Eagle *Spilornis cheela*

Status: A common resident. *Localities:* Ambong, Batu Punggul, Bengkoka, Binsulok, Bole River, Brumas, Danum, Gomantong, Kabayau, Kiau, Kimanis, Klias Peninsula, Kuala Penyu, Lamag, Lumerau, Maliau, Mawau, Menggalong River, Mumiang, Padas Damit, Pandasan, Quoin Hill, Ranau, Rinangisan, Sabah Softwoods, Sandakan, Segarong, Sepilok, Silabukan River, Sinsuran Road, Sukau Road, Tabin, Tawau Hills, Tempasuk, Tuaran, Ulu Segama, and Ulu Tiulon. *Elevation:* Sea level to 1,200 m. Confusion with Mountain Serpent Eagle is possible at higher elevations. *Habitats:* 1°, logged, and swamp forest; clearings and tree plantations. *Breeding:* DMB observed two individuals in a tree at Kimanis apparently in courtship display. They pushed at each other with their breasts and

called *kee-ar-kyar*. *Voice*: The call is a disyllabic *kwee-kwee*. *Food*: Reptiles, rodents, large insects, crabs.

Mountain Serpent Eagle *Spilornis kinabaluensis*

Status: An uncommon Bornean endemic. *Localities*: Kaingaran, Kenakok, Kinabalu, Rinangisan, Sinsuran Road, Tenompok, and Trus Madi. *Elevation*: 800–2,900 m. Confusion with Crested Serpent Eagle is possible at lower elevations. *Habitats*: Montane forest. *Breeding*: Two adults were observed flying with two noticeably smaller young along Sinsuran Road in the Crocker Range (ca. 900 m in elevation) on 9 Nov. 1968 (Phillipps 1970). *Voice*: A loud *dit-dit-eeeeoo*, less sharp and more drawn out than Crested Serpent Eagle. *Food*: Snakes and lizards. *Remarks*: Also known as the Kinabalu Serpent Eagle.

[Hen Harrier *Circus cyaneus*

Status: Possibly a rare winter migrant. Harrisson (1955a), who believed he knew this species well, recorded it at Tambunan on 15 Feb. 1952 and Tempasuk on 18 Dec. 1960 (Smythies 1981). It was also reported at Tempasuk by E. J. H. Berwick in Nov. 1959 (Gore 1968).]

Eurasian Marsh Harrier *Circus aeruginosus*

Status: A locally common migrant. *Localities*: Abai, Kundasang, Labuan, Papar, Sandakan, Tempasuk, and Tuaran (all except Labuan are sightings). *Elevation*: Sea level to 1,300 m. *Habitats*: Marsh, plains, and padi. *Migration dates*: The earliest date is 9 Aug. 1959 at Papar (DMB). There is also a specimen from Labuan in Sept. 1876 (Sharpe 1879b). Among late dates: 8 Mar. 1982 at Tempasuk (CMF), 3 Apr. 1960 at Benoni (DMB), and 19 Apr. (KVT, no year). *Food*: Birds, small mammals, insects, and fish. *Remarks*: B&W observed a roost of up to 13 individuals at Tempasuk in Nov. and Dec. 1984.

Pied Harrier *Circus melanoleucos*

Status: A scarce migrant. *Localities*: Kota Belud, Labuk River, Tanjung Aru, and Tempasuk (all sightings). *Elevation*: Sea level to 400 m. *Habitats*: Marshes, plains, and padi fields. *Migration dates*: The earliest record is 7 Aug. 1966 over the Labuk River (KVT). *Food*: Birds and small mammals. *Remarks*: Although listed as common by Gore (1968), few records exist.

Family PANDIONIDAE

OSPREY

Osprey *Pandion haliaetus*

Status: A migrant and winter visitor, regularly recorded. *Localities*: Abai, Klias Peninsula, Kota Belud, Kota Kinabalu, Labuan, Labuk River, Membakut, Padas Damit, Papar, Sandakan, Ulu Segama, Wallace Bay, and Weston. *Elevation*: Sea level to 700 m. *Habitats*: Lakes, rivers, and coastal areas. *Migration dates*: The earliest record is 28 Aug. 1984 at Padas Damit (B&W). The latest record of northern migrants is 15 Apr. 1967 on the Segama River (KVT). DMB observed one on 24 June 1959 at Kuala Membakut. From facial markings, he believed it might be the Australian race. *Food*: Fish.

Family FALCONIDAE

FALCONS

White-fronted Falconet *Microhierax latifrons*

Status: An uncommon north Bornean endemic. *Localities:* Bengkoka, Bettotan, Bole River, Brumas, Danum, Gomantong, Kalabakan, Keningau–Kimanis Road, Lamag, Kinabatangan River, Lumbidan, Lumerau, Manggis (Papar), Menggalong, Poring, Quoin Hill, Ranau, Rinangisan, Sabah Softwoods, Sandakan, Segaliud River, Segama River, Sepilok, Silam, Sinsuran Road, Tabin, and Tiger Estate. *Elevation:* Sea level to 1,200 m. *Habitats:* 1° and 2° forest, *Albizia*, and peat-swamp. *Breeding:* Phillipps (1970) reported two two-chick broods raised by a pair nesting at Sinsuran Road, mile 16. The first two fledglings were observed in a hole in a fork of a small tree ca. 3 m from the ground in early Nov. 1968. The second pair of fledglings emerged from an old (barbet?) hole ca. 10 m high in a dead tree in mid-June 1969. The Sabah Museum has records of a nest with three nestlings from a tree hole 6 m above the ground at Kampung Manggis on 14 June 1978. DMB observed mating at Papar on 22 Mar. 1960. The pair occupied an old woodpecker hole. A female collected at Tiger Estate on 1 Dec. 1962 had a regressing oviduct and an old brood patch (MCT). *Food:* Insects and small birds. Thiollay (1983) observed one hunting large flying insects (butterflies, beetles, and so on) from high in a dead tree. WFVZ observed several congregating in the morning at Silam rest house to catch sphinx moths that had been attracted to a light. They were competing with Dollarbirds and White-breasted Woodswallows. *Remarks:* Black-thighed Falconet (*M. fringillarius*) may occur in Sabah along the Brunei border (Blasius 1901). However, the type specimen of White-fronted Falconet (Sharpe 1879c) was described from a specimen collected in extreme western Sabah, on the Lawas River.

Peregrine Falcon *Falco peregrinus*

Status: An uncommon resident and migrant. *Localities:* Batu Punggul, Gomantong, Kaingaran, Kimanis, Kinabalu, Kota Kinabalu, Kuamut, Labuan, Lumbidan, Maliau, Mumiang, Pulau Tiga, Rinangisan, Sandakan, Segarong, Tanjung Aru, Tembungo, Tempasuk, and Tepadong. *Elevation:* Sea level to 2,440 m (on Kinabalu; Everett 1889). *Habitats:* Forests, limestone cliffs, marshes, plains, and coastal regions. They often perch on cliffs, buildings, or bridges. *Breeding:* A pair of birds was copulating on Segarong Hill on 13–18 Jan. 1983 (CMF). At Batu Punggul, they were presumed to nest on the limestone cliffs (CMF). *Migration dates:* These dates are difficult to determine because of confusion between migrants and residents. DMS observed one at the Tembungo oil platform that was hunting small birds for several hours on 28 Apr. 1979 (Casement 1979). *Food:* Mostly birds. Thiollay (1983) observed one at Gomantong catching swiftlets and bats. WFVZ observed them hunting swiftlets at Gomantong and Tepadong. DMB recorded Yellow-vented Bulbul, Pink-necked Green Pigeon, and Redshank as prey items. *Remarks:* The resident race (*F. p. ernesti*) can be distinguished from the migrant race (*F. p. calidus*, listed as *F. p. japonensis* in Smythies 1981) by its smaller size and darker face and underparts.

Oriental Hobby *Falco severus*

Status: A rare vagrant. *Localities:* Kinabalu, Poring, and Pulau Tiga. Everett

collected it on "Mt. Kinabalu" (Sharpe 1893), and D. Yong observed it at Poring (Jenkins and de Silva 1978). The record from Pulau Tiga (Robson 1998a) lacks supporting details (Smythies 2000). *Elevation*: Unknown. *Habitats*: This species normally occupies forests, fields, and open woods. *Food*: Insects and small birds. *Remarks*: Although very few records exist from Borneo, this species ranges from India through SE Asia and into New Guinea and the Solomon Islands and, thus, it should occur in Sabah. Misidentification is unlikely, because this hobby is the only falcon in Borneo with rufous underparts.

Common Kestrel *Falco tinnunculus*

Status: A scarce winter vagrant. *Localities*: Abai, Kimanis, Kinabalu, Kota Kinabalu, Labuan, Likas Bay, Papar, Ranau, Tembungo, and Tempasuk. *Elevation*: Sea level to 1,200 m. *Habitats*: Fields, marshes, farms, newly planted plantations, and any other open areas. *Migration dates*: The earliest record is 13 Oct. 1981 at Tembungo oil platform (Simpson 1982a). *Voice*: A shrill *ke-ke-ke-ke* (DMB). *Food*: Insects and small rodents, generally caught by hovering and then a short dive. *Remarks*: One was observed on 23 Feb. 2000 at 1,220 m on Kinabalu by a bird tour led by K. D. Bishop (Robson 2000).

Order GALLIFORMES
Family MEGAPODIIDAE

MEGAPODES

Philippine Scrubfowl *Megapodius cumingii*

Status: A resident, common on some islands. *Localities*: Abai (West Coast), Balambangan Island, Banggi Island, Bodgaya Island, Bohey Dulang Island, Keraman Island, Kulamba, Labuan, Malawali Island, Mantanani Island (large and small islands), Mengalum Island, Mumiang, Pandasan, Pulau Tiga, Sandakan, Selingaan Island, Sipadan Island, and Tanjung Teluk (Sandakan). *Elevation*: Sea level. *Habitats*: Aru tree, casuarina beaches, and coastal forests; and forest on limestone soil. Whitehead observed that they occur usually within a few hundred yards of the shore, preferring the sandy soil near the beach (Smythies 1981). *Breeding*: V. W. Ryves collected a total of nine eggs at five localities: Tanjung Teluk on 1 Aug. 1938, Sandakan on 5 Aug. 1938, Kuala Abai in Jan. 1939, Manatanani Island on 25 Jan. 1939, and Mantanani Kecil on 26 Jan. 1939 (Ryves 1955). The eggs were an elongated, regular oval with a rough surface. They were fundamentally white, but usually stained uniformly to some shade of light brown. Average dimensions: 78.1 × 47 mm. E. J. H. Berwick found a nest with fresh scrapings at Tanjung Tajau (Smythies 1963). On Mantanani Island on 9 Mar. 1982, WFVZ found a nest that had recently been raided by humans (Sheldon et al. 1983). The eggs apparently had been laid in shafts that started on the edge of the nest and angled inward to about 1.5 m. *Voice*: A long sad mew, rising and then falling again. *Food*: Berries, worms, grubs, and snails (Smythies 1981). *Remarks*: This species was fairly common along the coast of Sabah, but egg collecting and development have taken a substantial toll on mainland populations. It is still common on some islands (e.g., Pulau Tiga), but is heavily depredated by humans on other islands. For example, it seems to be extirpated from Keraman Island (C. Mann). Some modern status reports are as follows: Appell (1965) reported breeding on the Kudat Peninsula; Phillipps (1985a) reported two active nests on Pulau

Tiga; Yong (1980) reported two active nests on Sipadan (however, in 1991, no signs of megapodes were found on Sipadan [DMB]); WFVZ found one abandoned nest mound on Pulau Tiga and encountered 10 individuals in one and a half hours of searching; WFVZ also found them to be common on Mengalum Island in 1983, even though pressure from egg collecting and hunting was obvious. *References:* Scrubfowl populations on Pulau Tiga were surveyed in the 1980s (Stuebing and Zazuli 1986) and again in the 1990s, when Ahmad (1999) found an increase in population size (particularly on the leeward side of the island) and estimated 118–206 breeding pairs.

Family PHASIANIDAE

QUAIL, PARTRIDGES, AND PHEASANTS

Blue-breasted Quail *Coturnix chinensis*

Status: A common resident. *Localities:* Benoni, Brantian River, Brumas, Kinabalu, Labuan, Membakut, Mendolong, Mumiang, Paitan, Quoin Hill, Ranau, Sabah Softwoods, Sandakan, Tabin, Tawau, Tempasuk, and Tuaran. *Elevation:* Sea level to 1,200 m (Smythies 1957). *Habitats:* Grasslands, padi, logged forest, and agricultural areas. *Breeding:* Phillipps (1970) reported a hen leading five downy young at the end of Apr. 1970 (no locality). Low found many eggs at Labuan in Jan. 1873 that averaged 1.0×0.75 inches (25.4×19.1 mm) (Sharpe 1879b). They ranged from dark olive-brown with a few dark spots to pale olive with many dark spots. Sharpe (1890b) described eggs from Kinabalu as 1×0.85 inches (25.4×21.6 mm) and dark olive-green speckled throughout with black and dark brown spots. DMB observed a pair with three or four tiny young at Mawau on 5 Feb. 1959, and a nest with six eggs in a field at Mawau on 6 Mar. 1964. The nest was a slight hollow in the soil lined with dry grass. The eggs were green and heavily speckled with blackish brown. MCT collected a specimen from Quoin on 6 Sept. 1962 with testes that measured 8×5 mm. *Voice:* A call of *tok-ta-dau* (much like Malaysian Eared Nightjar) or just *ta-dau*. Also an unmelodious alarm call of *hew-hew-hew-hew* when flushed. *Food:* Rice, seeds, and insects.

Long-billed Partridge *Rhizothera longirostris*

Status: A rare resident, for which there are only two records: a specimen of a male collected in July 1892 by A. H. Everett at Paitan (AMNH) and a sighting in Danum valley in Mar. of 1992 (Buckton 1992; Showler 1992). A reference also exists to a *Rhizothera* partridge near Tenom (Comber 1971). *Remarks:* This species is not common anywhere in Borneo. GD (in Smythies 2000) recognized two Bornean species of *Rhizothera*: the lowland *R. longirostris* and the montane *R. dulitensis*. So far, no records exist of *R. dulitensis* from Sabah.

[Ferruginous Partridge *Caloperdix ocella*

Status: This is one of the few montane species that has not been found on Mt. Kinabalu. It may be a middle slope specialist, rather than truly montane (GD). The only records from Sabah are tenuous: a sighting from the Mt. Magdalena area by R. Young (Norman 1964) and one or more adults heard calling in a logged area of Ulu Kalumpang by WWFM on 13 Feb. 1982.]

Red-breasted Partridge *Arborophila hyperythra*

Status: A Bornean endemic, common at high elevation. *Localities:* Kaingaran,

Kinabalu, Lumu-lumu, Rinangisan, Sinsuran Road, Tambunan, and Trus Madi. *Elevation:* 600–3,050 m. *Habitats:* Montane forest, particularly bamboo thickets. *Breeding:* WFVZ collected a male (testis 11 mm) at 1,450 m on Sinsuran Road on 9 Dec. 1981. *Voice:* Boys described the male's call as a whistle and the female's as a low-pitched chattering rattle. Smythies (1959) described a pair calling as a "mad cuckoo clock" with one bird calling *cock-coo*, while the other simultaneously repeats one note. Smythies (1964b) also reported a ringing call repeated three times and then a loud double-noted call uttered once per second that dropped in pitch like that of a cuckoo. WFVZ noted dueting on Sinsuran Road, in which one bird repeated a single chime note and another answered with the cuckoo-clock call rising in pitch and volume. *Food:* Seeds, acorns, fruits, and insects. *Remarks:* Often found in coveys. Davison (1982b) discussed the plumage and voice differences in *Arborophila* partridges, placing this species in a "brown-breasted group." He noted a superficial resemblance to Ferruginous Partridge, but difference in call.

Scaly-breasted Partridge *Arborophila charltonii*

Status: A locally common resident, perhaps restricted on Borneo to Sabah. *Localities:* Baru Jumpa, Bengkoka, Bettotan, Bole River, Brumas, Danum, Kinabatangan River, Kota Belud, Lamag, Lumerau, Magdalena, Mokodou River, Pandasan, Sandakan, Segaliud River, Sepagaya, Sepilok, Silabukan, and Tabin. *Elevation:* Sea level to 800 m. *Habitats:* 1° and 2° lowland forest. Most records are from 1° forest, and Lambert (1990c) believed that they avoid even lightly degraded forest. However, Johns (1996) found this species in twice logged areas in Tabin. *Voice:* A duet call similar to that of Red-breasted Partridge (CMF). Kiew (1977) described the call of a single bird as *ray, mee, do*. *Remarks:* Although not often seen, Scaly-breasted Partridge is commonly trapped by hunters (Norman 1964; DMB).

Black Partridge *Melanoperdix nigra*

Status: A rare resident. *Remarks:* Two old, poorly documented, specimen records exist. ANSP has a specimen from "Teuton" or "Tenton" (possibly near Kudat) collected by J. B. Bell in June 1895. The AMNH has a specimen from "Kina Balu, June July 03, J. Waterstradt coll." In addition, DMB saw one on exhibit at the Papar market in 1961. It apparently had been collected at Ulu Papar. WFVZ observed a small dark partridge uttering a two-note call incessantly near the first waterfall at Poring Hot Springs on 30 Dec. 1981. Although the bird was not seen well enough for a positive identification, the call matched the description in MacKinnon and Phillipps (1993), and no other all-black partridges occur in Sabah.

Crested Partridge *Rollulus rouloul*

Status: A common resident. *Localities:* Bengkoka, Bettotan, Bole River, Brumas, Bundu Tuhan, Danum, Kimanis, Lumbidan, Lumerau, Mawau, Melalap, Menggalong, Merutai Besar, Parang Besar, Quoin Hill, Ranau, Samawang River, Sandakan, Sepilok, Silam, Tabin, and Tawau. *Elevation:* Sea level to 800 m. *Habitats:* 1°, logged, peat swamp, riverine, and swamp forest. Although this species may prefer pristine areas, Lambert (1990c) observed an adult with recently fledged young in logged forest. *Breeding:* Sharpe (1879c) described an egg from

Lumbidan as dull yellowish-white and 1.25×1.55 inches (31.8×39.4 mm). WFVZ collected a male (testis 11×4 mm) near the Bole River on 27 Mar. 1982. DMB observed adults with chicks in Dec. 1958 at Kimanis and in June 1959 at Ulu Mawau. *Voice*: A plaintive *seeeoool*, often heard at dawn and dusk, easily imitated by hunters (DMB).

Crimson-headed Partridge *Haematortyx sanguiniceps*

Status: An uncommon to common Bornean montane endemic. *Localities*: Kamborangoh, Kinabalu, Lumu-lumu, Maliau, Mesilau Caves, Quoin Hill, Rinangisan, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation*: 1,000–3,050 m, occasionally to 500 m. *Habitats*: Montane forest, sometimes on poor soils. *Breeding*: WFVZ collected a male (testis 9×5 mm) at Rinangisan on 19 Mar. 1983. *Voice*: Described variously as *coo-where* or *took-tree*, *took-teree*, or *pom-prang*. *Food*: Insects and berries.

[Crestless Fireback *Lophura erythrophthalma*

Status: A rare resident, known from one Sabah specimen. More common in southern and western Borneo. *Remarks*: There is one old, poorly documented specimen record: "Kina Balu, June July 03, J. Waterstradt coll." (AMNH specimen 543272). KVT observed a pair in 1° forest at Brunei, Labuk, on 24 Aug. 1949.]

Crested Fireback *Lophura ignita*

Status: An uncommon resident. *Localities*: Baru Jumpa, Baturong, Bettotan, Bole River, Brumas, Danum, Kalabakan, Klias Peninsula, Lamag, Madai Caves, Melalap, Membakut, Menggalong River, Pandasan, Quoin Hill, Samawang, Sandakan, Silabukan, Silam, and Tawau Hills. *Elevation*: Sea level to 600 m. *Habitats*: 1°, 2°, and logged forest. *Breeding*: Eggs collected by Low near the Menggalong River were uniformly creamy-buff and 51×39 mm (Sharpe 1879c). On 21 July 1986, two nests were found in Danum Valley (Still et al. 1988). Both were in the angle formed by buttress roots of large dipterocarp trees. The nests were constructed of leaves and feathers, and contained seven eggs. The eggs were cream colored with faint brown spots. A female was observed sitting on one of the nests. WFVZ collected a male (testis 19×10 mm) near Bole River on 22 Mar. 1982. Four chicks barely out of the egg were found on 31 July 1959 (DMB). The chicks and hen were heavily parasitized by lice, fleas, and hippoboscids. *Voice*: A chirping call of *chirrik*, also a soft *sleeeep* and a croaking noise (DMB). *Food*: Berries, leaves, and insects.

Bulwer's Pheasant *Lophura bulweri*

Status: A rare Bornean endemic. *Localities*: Danum, Kalabakan, Kinabatangan River, Maliau, Menggalong River, Pinangah River, Sipitang, Tawau Hills, and Ulu Segama. *Elevation*: Sea level to 1,000 m. *Habitats*: 1°, coniferous, and logged forests. *Food*: Insects and fruit. *Remarks*: Until the 1990s, all records were very old (e.g., Treacher 1888) or anecdotal.

Bornean Peacock Pheasant *Polyplectron schleiermacheri*

Status: A rare Bornean endemic. *Localities*: Paitan and Ulu Tungud. *Elevation*: Sea level to 400 m (?). *Habitats*: 1° forest. *Remarks*: Until recently, the only records from Sabah were three specimens taken by A. H. Everett at "Paitan" in

July 1892 (Smythies 1957). An expedition to Paitan by W. Frost in 1938–1939 to collect more specimens failed to find any (Smythies 1957). However, the Sabah Museum obtained a specimen of an adult male that was trapped in Ulu Tongud Forest Reserve on 18 Jan. 1996 (Smythies 2000). The Bornean Peacock Pheasant is sometimes considered a subspecies of the Malaysian Peacock Pheasant (*P. malacense*). The behavior and plumage displays of *P. malacense* are described in detail by Davison (1983a, b).

Great Argus *Argusianus argus*

Status: A common resident. *Localities:* Anginon, Baru Jumpa, Batu Punggul, Bengkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Kalabakan, Labau River, Lamag, Lumerau, Magdalena, Makaniton, Maliau, Melalap, Membakut, Menggalong River, Merutai Besar, Muruk, Poring, Ranau, Rinangisan, Saliwangan, Segarong, Sepilok, Tambuyukon, Tawau Hills, and Ulu Segama. *Elevation:* Sea level to 1,800 m (Phillipps 1982). *Habitats:* 1° and logged forest. Although this species favors dense forest, it has been recorded in logged forest and even crossing wide logging roads (Lambert 1990c). *Breeding:* Eggs found near the Menggalong River by Low were creamy or yellowish white and covered with minute dots (Sharpe 1879c). WFVZ estimated that Feb. was the last month of displaying along the Bole River because of a dramatic decrease in calling and heavy molt of individuals caught in Mar. DMB observed a nest of dead grass between tree buttresses at Ulu Mawau on 31 July. It contained three eggs, pale white and speckled with brown, chiefly at the wider end. The spectacular displays performed by males during courtship are described by Davison (1982a). *Voice:* Kiew (1977) described its primary call as *kwa-wau*. This can be produced at an extraordinary volume. *Food:* Fruit and insects. *Remarks:* As with many pheasant species, habitat destruction and hunting are believed to be reducing the range and density of the Great Argus.

Order RALLIFORMES

Family RALLIDAE

RAILS, MOORHENS, GALLINULES, AND COOTS

Slaty-breasted Rail *Gallirallus striatus*

Status: A common resident. *Localities:* Benoni, Bongawan, Kimanis, Kota Kinabalu airport, Labuan, Labuk Road, Membakut, Papar, Putatan, Ranau, Sabah Softwoods, Tawau Hills, Tempasuk, and Ulu Segama. *Elevation:* Sea level to 500 m. *Habitats:* Swamp, padi, grasslands, and mangrove. *Breeding:* Eggs collected near Labuan were creamy-buff in color with red spots and purplish blotches (Sharpe 1879b). The density and location of the spots and blotches varied from egg to egg. All eggs measured 1.3–1.4 × 1.0–1.1 inches (33.0–35.6 × 25.4–27.9 mm). DMB found a nest consisting of a small pad of grass blades hidden among marsh plants at Kampung Gana, Membakut, on 18 Jan. 1962. It contained four pinkish-white eggs, marked with dark reddish-brown flecks and spots, and a few blotches of lilac. *Voice:* A sharp *terrik* call, also a rapidly repeated *ketch* that builds in volume. *Food:* Insects, seeds, and grasses.

Red-legged Crake *Rallina fasciata*

Status: An uncommon resident and migrant. *Localities:* Bakungan Kecil Island, Benoni, Kinabalu, Labuan, Padas Damit, Papar, Rinangisan, Sabah Softwoods,

and Tiger Estate. *Elevation*: Sea level to 1,300 m. *Habitats*: Swamp and scrubby fields. *Migration dates*: The presence of resident populations in Sabah makes it difficult to estimate migration dates. However, a specimen found dead on Bakungan Kecil Island on 14 Aug. 1985 was probably a migrant (D. Wells). Spring migrants were seen at Papar on 13 Apr. 1966 (Smythies 1981). WFVZ collected a specimen on 12 Apr. 1983 at Rinangisan (1,300 m). This bird was a night migrant, attracted to a light as it flew over the Crocker Range. *Voice*: A descending series of croaks. *Food*: The stomach of the WFVZ specimen was full of beetles. *Remarks*: Little is known about the range, habits, or breeding of this secretive bird.

Baillon's Crake *Porzana pusilla*

Status: A rare resident or winter visitor. *Localities*: Papar and Putatan (all sightings). *Elevation*: Sea level. *Habitats*: Swamps and marshes. *Remarks*: Only five records of this species exist from Sabah: three at Papar, 9 Jan. 1962, 28 Apr. 1966 (Gore 1968), and 5 May 1966 (KVT); one at Putatan, 11 May 1983 (WFVZ); and one on the Kimanis-Papar railway line, 9 Jan. 1962 (DMB).

Ruddy-breasted Crake *Porzana fusca*

Status: A rare resident or winter visitor. *Localities*: Beaufort, Klias Peninsula, Kota Kinabalu, Papar, and Tempasuk. *Elevation*: Sea level. *Habitats*: Swamps, reed beds, and rice fields. *Remarks*: KVT reported one caught in a house in Papar during a rainstorm on 11 Sept. 1966. DMB observed two in a roadside marsh near Beaufort on 31 Oct. 1960 and another at the same place on 4 Nov. 1960. He also saw one at Klias on 16 Nov. 1960 and in Kota Kinabalu on 13 Feb. 1962 (Gore 1968).

White-browed Crake *Porzana cinerea*

Status: A common resident. *Localities*: Inanam, Labuan, Likas, Papar, Putatan, and Tempasuk. *Elevation*: Sea level. *Habitats*: Marshes, padi, grasslands, and lake edges. *Breeding*: WFVZ found two nests on 24 May 1983 at Putatan, one with three eggs and the other with four (Marin and Sheldon 1987). The eggs were buff colored and completely covered with fine dots and splotches of rufous brown (all ca. 30 × 23 mm). The nests were neat structures of marsh grass wrapped into a bowl shape. They lay on hummocks of dry grass in the flooded marsh. *Voice*: A soft *ee-ah* contact call, with an abrupt last note. *Remarks*: WFVZ found substantial populations of this species at Papar and Putatan during the 1982–1983 El Niño drought. They appeared to have been concentrated by dwindling habitat.

White-breasted Waterhen *Amaurornis phoenicurus*

Status: A very common resident throughout Sabah in suitable habitat. *Elevation*: Sea level to 1,500 m on Kinabalu (Jenkins and de Silva 1978; Robson 1996). *Habitats*: Marshes, grasslands, padi, drainage ditches, and plantations (Davies 1981). *Breeding*: V. W. Ryves collected a clutch of four eggs at Sandakan estate on 15 July 1938 (40 × 29.5, 38 × 29.5, 40 × 29, 39.5 × 30 mm) and two eggs at Kuala Abai on 21 Jan. 1939 (37 × 29 mm, 40 × 28 mm). He also collected three other clutches of four eggs on the West Coast in Jan. without providing exact localities. The ground color of the eggs ranged from off-white to light buff, and they were speckled or blotched, usually fairly thickly, with pale violet gray and reddish brown. The eggs were blunt egg-shape, sometimes almost a regular

oval, and smooth surfaced (Gibson-Hill 1949b). Low collected eggs on Labuan (Sharpe 1879b) that were buff colored with reddish brown spots and small blotches distributed over most of the surface (15.0–16.0 × 10.5–11.5 mm). DMB found nests at Membakut on 30 July, Benoni on 2 Oct., Kimanis and Papar in Dec., and Klias Peninsula in Feb (years not specified). *Voice*: DMB described an extremely varied repertoire of croaks, squeaks, clucks, and screams, and mainly an explosive *whack-a-whack* call, with many variations. *Food*: Rice, oil-palm fruit.

Watercock *Gallicrex cinerea*

Status: A scarce winter visitor and possible resident. *Localities*: Beaufort, Kimanis Estate, Mandangin, Marudu, Papar, Tempasuk, and Tiger Estate. *Elevation*: Sea level to 200 m. Outside of Sabah, this species has been found up to 1,000 m. *Habitats*: Marshes, padi, and dry grasslands. *Breeding*: Chicks were observed with adults in July (no year or locality specified; S. Harrap in Taylor and van Perlo 1998). *Food*: Insects and rice (stomach contents of a WFVZ specimen from Mandangin), and grass seeds (Smythies 1960). *Remarks*: Specimens from Kimanis Estate, 2 May 1960 (SMC), and from Mandangin, 2 May 1983 (WFVZ), might be migrants or from small resident populations.

Common Moorhen *Gallinula chloropus*

Status: An uncommon resident. *Localities*: Inanam, Papar, Penampang, Putatan, Tempasuk, and Tenom. *Elevation*: Sea level to 100 m in Sabah, although found up to 1,200 m outside of Sabah. *Habitats*: Marshes, lake edges, and padi. *Breeding*: A. Lamb (pers. comm.) found pairs with fluffy brown fledglings in an old oxbow lake (containing thick reed beds) near Tenom in Jan. 1982. WFVZ found a nest with five eggs in a freshwater marsh at Putatan on 7 June 1983. Grasses were bent down and woven together to make a base. The surrounding grass was folded over the top making a roof. The eggs averaged 45.2 × 29.3 mm (Marin and Sheldon 1987).

Purple Swamphen *Porphyrio porphyrio*

Status: A scarce vagrant or resident. *Localities*: Putatan (specimen), Likas, and Tempasuk. *Elevation*: Sea level. *Habitats*: Marshes, lake edges, reed beds, and padi. *Remarks*: A pair of possible residents was observed on 7 Aug. 1982 in a swamp lagoon at Tempasuk by the Phillipps family. Breeding is further suggested by observations of two individuals chasing a third away from tussock sedges at Likas Lagoon on 21 June 1998 and of a half-grown bird at Jelatik swamp, Kota Kinabalu, in Sept. 1998 (GD).

Common Coot *Fulica atra*

Status: A rare vagrant. *Localities*: Likas Bay, Penampang, and Tempasuk. *Elevation*: Sea level. *Habitats*: Lakes, ponds, and reed beds. *Remarks*: R. Burgess collected one of eight individuals seen at Tempasuk in Jan. 1959 (Smythies 1981), and Sabah Museum has a specimen from Penampang, collected on 5 Feb. 1968. This species was also sighted at Likas Bay between 20 Jan. and 1 Feb. (year unspecified, C. Mann).

Family JACANIDAE

JACANAS

[Pheasant-tailed Jacana *Hydrophasianus chirurgus*

Status: A rare vagrant. The only record is a winter-plumage bird seen near Kota Belud in Feb. 1986 (Lansdown 1986a).]

Order CHARADRIIFORMES

Family ROSTRATULIDAE

PAINTED-SNIPE

Greater Painted-snipe *Rostratula benghalensis*

Status: An uncommon resident. *Localities:* Limbahau, Mandangin, Papar, Tempasuk, and Tuaran. *Elevation:* Sea level. *Habitats:* Padi, grasslands, and marshes. *Breeding:* WFVZ observed a pair with two young chicks in a wet padi near Tuaran on 1 May 1983. A male (testis 18×9 mm) and female (ova 13×11 mm, 8×8 mm, and 5×5 mm) were collected at Mandangin on 3 May 1983. WFVZ observed a male sitting on a nest near Mandangin on 4 June 1983 (Marin and Sheldon 1987). The nest was constructed of rotting grasses pushed up to form a cup. There were four eggs of varying incubation, one almost hatched. They were buffy brown with black streaks and blotches. *Remarks:* Although few formal records of this species exist for Sabah, Q. Phillipps has observed them on several occasions between 1971 and 1978 at Papar, Tempasuk, and Tuaran in padi (Smythies 1981). WFVZ observed many at Papar, Tuaran, and Mandangin.

Family CHARADRIIDAE

PLOVERS

Gray Plover *Pluvialis squatarola*

Status: A common migrant and winter visitor. *Localities:* Balambangan Island, Klias Peninsula, Kuala Papar, Kuala Penyu, Labuan, Likas Bay, Mempakul, Mumiang, Nosong, Pulau Tiga, Sandakan, and Tawau. *Elevation:* Sea level. *Habitats:* Mud flats, sandy beaches, estuaries, and mangroves. *Migration dates:* The earliest record is 1 Sept. 1984 at Nosong (B&W). The late record is 19 Apr. 1985 on Pulau Tiga (Phillipps 1985a). *Voice:* A whistled *tee-loo-ee* (DMB). *Remarks:* This species is often seen on mudflats at low tide mixed with other waders. At high tide they may roost in trees near the water (Wells et al. 1975).

Pacific Golden Plover *Pluvialis fulva*

Status: A common migrant and winter visitor. *Localities:* Balambangan Island, Bengkoka, Bongawan, Kota Kinabalu, Labuan, Likas Bay, Maiga Island, Mantanani Island, Membakut, Mempakul, Merutai, Nosong, Padas Damit, Papar, Pulau Tiga, Ranau, Sinsuran, Tempasuk, and Tuaran. *Elevation:* Sea level. *Habitats:* Mud flats, grasslands, padi, and river banks. *Migration dates:* Some first-year birds may summer in Borneo (Smythies 1960), but large numbers begin to build in early Sept. *Remarks:* This species is usually seen in small groups of up to a dozen individuals. However, at times thousands may gather in suitable habitats in the winter (Smythies 1960).

Little Ringed Plover *Charadrius dubius*

Status: A common migrant and winter visitor. *Localities:* Benoni, Bongawan, Klias Peninsula, Labuan, Likas Bay, Mumiang, Papar, Pulau Tiga, Tambunan, Tawau, Tembungo, and Tempasuk. *Elevation:* Sea level to 650 m. *Habitats:* Marshes, grasslands, padi, and river banks. *Migration dates:* The earliest record is 24 Aug. 1984 at Papar (B&W). The latest record is 24 Apr. 1886 on Pulau Tiga (Sharpe 1890b). Simpson (1982a) found a dead bird on the Tembungo oil rig on 5 Aug. 1981. Although Aug. records exist, large numbers of migrants are

not seen until Nov. or Dec. *Voice*: *Pi-pi-pi-pi-pi* as they take off, followed by a subdued *teeoo* in flight (DMB).

Kentish Plover *Charadrius alexandrinus*

Status: An uncommon migrant and winter visitor. *Localities*: Balambangan Island, Binsulok, Bongawan, Klias Peninsula, Kudat, Labuan, Likas Bay, Lok Kawi, Membakut, Mumiang, Nosong, Padas Damit, Papar, Tembungo, and Tempasuk. *Elevation*: Sea level. *Habitats*: Mud flats, coastal marshes, and open shore. *Migration dates*: Although possible Aug. records, the earliest substantiated observation is 4 Sept. 1984 at Nosong (B&W). Simpson (1982a) observed an individual on the Tembungo oil platform on 17 Oct. 1981 and again on 22 Oct. 1981. This species becomes increasingly common in Nov. and Dec. The latest record is a specimen on 13 Apr. 1984 from Binsulok (SWD). *Remarks*: Kentish Plover often occurs in mixed flocks with other plovers, especially Little Ringed and Greater Sand plovers.

Malaysian Plover *Charadrius peronii*

Status: A common resident. *Localities*: Bakungan Kecil Island, Balambangan Island, Berhala Island, Brantian Estate, Gulisaan Island, Kuala Penyu, Kudat, Labuan, Lok Kawi, Mantanani Island, Membakut, Mempakul, Mengalum Island, Mumiang, Nosong, Papar, Pulau Tiga, Rusukan Besar Island, Sandakan, Selingaan Island, Tawau, and Tempasuk. *Elevation*: Sea level. *Habitats*: Sandy beaches, grasslands, and wet fields. *Breeding*: A nest with eggs was found on Rusukan Besar Island in Mar. 1985 (C. Mann). Wells (1978, 1982c) observed a clutch of downy young on the open shore of Balambangan Island on 6 Apr. 1977. Two eggs (1.25 inches, 1.3 × 0.85 inches [31.8 mm, 33.0 × 21.6 mm]) collected by Low on Labuan (Sharpe 1879b) were creamy buff, thickly scribbled over and blotched with dark brown and black, mainly at the larger end. Underlying the dark blotches were purplish gray markings. Three eggs collected on Pulau Tiga in sea drift were buff colored and thickly blotched with sepia at the large end, and speckled and streaked to a lesser extent all over with the same sepia color (Sharpe 1890a). B&W reported a family group at Kuala Penyu during the first week in Sept. 1984, and juveniles at Mumiang in Sept. and Oct. 1984. Gore (1968) mentioned nests at Kudat, but gave no details. *Voice*: The call, especially in flight, is *chedrr-chedrr*.

[Long-billed Plover *Charadrius placidus*

Status: A possible vagrant. There is one sight record at Kimanis on 25 Nov. 1959 of a bird uttering a loud *tootloo* in flight, consistent with this species (DMB). Any Bornean records would be vagrants from the wintering grounds in SE Asia.]

Lesser Sand Plover *Charadrius mongolus*

Status: A common winter visitor. *Localities*: Balambangan Island, Banggi Island, Kudat, Labuan, Likas Bay, Lok Kawi, Mempakul, Mumiang, Nosong, Padas Damit, Papar, Petagas, Pulau Tiga, and Tempasuk. *Elevation*: Sea level. *Habitats*: Sandy beaches, mud flats, and mangroves. Prefers muddier beaches than Greater Sand Plover (B&W). *Migration dates*: The earliest record is a specimen from 6 Sept. 1927 on Banggi Island (RMC). The latest record is 19 Apr. 1985 on Pulau Tiga (Phillipps 1985a). *Remarks*: Although no published records exist for summer

months in Sabah, Smythies (1960) noted that nonbreeding individuals may remain through the summer.

Greater Sand Plover *Charadrius leschenaultii*

Status: A very common migrant and winter visitor found in all coastal areas and islands around Sabah. More common than Lesser Sand Plover. *Elevation:* Sea level. *Habitats:* Sandy beaches, grasslands, and river banks. Prefers sandy beaches to muddy ones (B&W). *Migration dates:* Nonbreeding birds remain in Sabah throughout the summer, as evidenced by records from late May and July. The arrival of early migrants is difficult to detect because of these holdovers, but numbers of birds clearly increase in early Sept.

Oriental Plover *Charadrius veredus*

Status: A scarce migrant. *Localities:* Labuan, Manukan Island, Papar, and Tempasuk. *Elevation:* Sea level. *Habitats:* Rivers, marshes, and mud flats. *Remarks:* The only specimen is from Labuan (Everett 1889). Several sightings exist from Tempasuk and Papar in Sept., Oct., Nov., Apr., and May (KVT, WFVZ). This species seems to be mainly a passage migrant, but there is one midwinter sighting on Manukan Island, 2 Jan. 1983 (Phillipps family).

Family SCOLOPACIDAE

SANDPIPERS AND SNIPE

[Little Curlew *Numenius minutus*

Status: A rare migrant or vagrant known from sightings at Papar, Tanjung Aru, and Tembungo. Possibly the most reliable record from Sabah is a single bird seen at close range on 26 Apr. 1966 at Papar by KVT.]

Whimbrel *Numenius phaeopus*

Status: A common winter visitor. *Localities:* Balambangan Island, Bongawan, Karindingan Island, Klias Peninsula, Labuan, Likas Bay, Lok Kawi, Membakut, Mumiang, Nosong, Papar, Pulau Tiga, Ranau, Sandakan, Segarong, Tempasuk, and Wallace Bay. *Elevation:* Sea level to 600 m. *Habitats:* Sand beaches, mud flats, buffalo fields, and mangroves (roosting at high tide). Mostly restricted to the coast, but occasionally found feeding inland. *Migration dates:* Nonbreeding individuals remain in Sabah through the summer (Gore 1968), and therefore the migration dates are uncertain. Large numbers begin arriving by late Sept. Peak numbers are generally recorded later in the winter than for other species of curlew (B&W). *Remarks:* This is the commonest long-billed wader in Sabah (B&W).

Eurasian Curlew *Numenius arquata*

Status: An uncommon migrant and winter visitor. *Localities:* Bandau, Karindingan Island, Kuala Penyu, Kuala Segama, Lok Kawi, Mumiang, Papar, Pulau Tiga, and Selingaan Island. *Elevation:* Sea level. *Habitats:* Beaches, estuaries, and mud flats. *Migration dates:* The earliest record is 6 Sept. 1984 at Kuala Penyu (B&W). The latest record is 19 Apr. 1985 on Pulau Tiga (Phillipps 1985a). B&W remarked that the males (with smaller bills) seemed to migrate earlier than the females.

Eastern Curlew *Numenius madagascariensis*

Status: An uncommon or locally common winter visitor. *Localities:* Karindingan Island, Kuala Penyu, Labuan, Membakut, Mumiang, Papar, Sandakan, Selin-

gaan Island, Semporna, Tanjung Aru, and Tawau. *Elevation*: Sea level. *Habitats*: Mudflats, marshes, and mangrove. *Migration dates*: The earliest record is 17 Aug. 1962 on Karindingan Island (Thompson 1966). The latest record is 23 Mar. 1964 near Tawau (Gore 1968). *Remarks*: B&W found it to be the most abundant shore-bird on Karindingan Island in Aug. 1984.

Bar-tailed Godwit *Limosa lapponica*

Status: An uncommon winter migrant. *Localities*: Bandau, Karindingan Island, Kimanis, Kuala Papar (specimen), Kuala Penyu, Mempakul, Mumiang, Tempasuk, and Wallace Bay. *Elevation*: Sea level. *Habitats*: Mudflats, marshes, and estuaries. *Remarks*: Most Sabah records are from Sept. through Nov. and seem to reflect birds that are passing through the state (B&W). Few birds winter in Sabah. However, DMB observed one on buffalo grounds at Bandau on 15 Jan. 1962.

Black-tailed Godwit *Limosa limosa*

Status: A scarce migrant. *Localities*: Kota Belud and Mumiang (specimen). *Elevation*: Sea level. *Habitats*: Tidal flats, estuaries, and mangroves. *Remarks*: B&W observed four individuals at Mumiang: one on 30 Sept. 1984, two on 13 Oct. 1984, and one on 15 Oct. 1984. Two were sighted at Kota Belud (probably Tempasuk) on 8 Apr. 1996 (Robson 1996). SWD collected a specimen at Mumiang on 7 Nov. 1984.

[Spotted Redshank *Tringa erythropus*

Status: A rare migrant. All records are sightings in Papar by KVT in Mar. and Apr. 1966 and 1967 (Gore 1968).]

Common Redshank *Tringa totanus*

Status: A common migrant and winter visitor. *Localities*: Balambangan Island, Bandau, Bongawan, Karindingan Island, Labuan, Lok Kawi, Mempakul, Mumiang, Nosong, Padas Damit, Papar, Segarong, Sipadan Island, Tempasuk, and Wallace Bay. *Elevation*: Sea level to 100 m. *Habitats*: Marshes, mangroves, beaches, fallow padi, buffalo fields, and river banks (sometimes far inland). *Migration dates*: The earliest record is 10 Aug. 1984 at Padas Damit (B&W). The late records are 4 June 1983 at Padas Damit (WFVZ), and 13 July 1959 at Binsulok (DMB). The largest numbers of individuals have been recorded in autumn; spring records are few. This disparity may reflect a difference in seasonal migration routes or a lack of published spring surveys. *Voice*: A musical *teu-loo-loo* with the second note at lower pitch than the first (DMB).

Marsh Sandpiper *Tringa stagnatilis*

Status: A common winter visitor. *Localities*: Mandangin, Mumiang, Padas Damit, Papar, and Tempasuk. *Elevation*: Sea level. *Habitats*: Marshes and mudflats. *Migration dates*: The earliest record is 28 Sept. 1984 at Mumiang (B&W). The latest record is 3 May 1983 at Mandangin (WFVZ). *Voice*: A weak *pew-pew*. *Remarks*: B&W searched for this species in Aug. and Sept. on the coast and inland, but could not find it until 28 Sept. 1984 at Mumiang. By Nov., they found it to be widespread and common in wetlands in groups of up to 20 individuals.

Common Greenshank *Tringa nebularia*

Status: A locally common winter visitor. *Localities*: Balambangan Island, Bon-

gawan, Kimanis, Kuala Papar, Kuala Penyu, Likas Bay, Membakut, Mumiang, Nukohan, Nosong, Padas Damit, Papar, Pulau Tiga, and Tempasuk. *Elevation*: Sea level. *Habitats*: Marshes, beaches, ponds, and buffalo fields. *Migration dates*: The earliest record is 7 Sept. 1984 at Papar (B&W). The latest record is at Padas Damit on 4 June 1983, where flocks of 3–10 birds were common (WFVZ). *Food*: A specimen collected by WFVZ contained a small (30-mm) fish. *Remarks*: B&W found that numbers peaked in Dec., with flocks of up to 30 in flooded grasslands near Papar, often in association with Marsh Sandpipers.

[Nordmann's Greenshank *Tringa guttifer*

Status: A rare vagrant. The only records from Sabah are a few sightings at Papar: 1 June 1966, 31 Aug. 1966, and 25 Apr. 1967 (KVT). These dates differ from the KVT records in Smythies (2000) of 8 Jan. and 22 Sept. 1968, and 8 Oct. 1969, and may be additional ones. An additional KVT Papar sighting was 21 Feb. 1967 (Gore 1968). Howes and Lambert (1987) reviewed the status, behavior, and identification of this species, but they listed no Bornean wintering sites.]

Green Sandpiper *Tringa ochropus*

Status: An uncommon winter visitor. *Localities*: Bandau, Bongawan, Brantian Estate, Kimanis, Kota Kinabalu, Maang, Membakut Beach, Papar, Sandakan, and Tempasuk. *Elevation*: Sea level. *Habitats*: Mudflats, buffalo fields, plantation clearings, mangroves, and shrimp ponds. Generally found near the coast, but prefers fresh to brackish water (KVT). *Migration dates*: Autumn records are from Nov. and Dec. DMB observed two individuals on buffalo grounds at Kimanis on 14 June 1960 and one near Bandau on 15 Feb. 1962. *Voice*: A high, sharp *pip-pip*. A prolonged, bubbling *toop-loop-loop-loo* when landing (DMB).

Wood Sandpiper *Tringa glareola*

Status: An abundant migrant and winter visitor. *Localities*: Bengkoka, Benoni, Bongawan, Kasigui, Keningau, Klias Peninsula, Kuala Papar, Labuan, Lok Kawi, Lumbidan, Maang, Membakut, Mumiang, Padas Damit, Papar, Ranau, Tembungo, Tambunan, and Tempasuk. *Elevation*: Sea level to 600 m. *Habitats*: Mudflats, padi, and freshwater swamps, often well inland. *Migration dates*: The earliest land record is 8 Aug. 1982 at Maang (WFVZ). However, Simpson (1982) observed one from the Tembungo oil platform on 29 July 1981. On 24 Aug. 1984 B&W observed 250 at Bongawan. Numbers dwindle substantially by midwinter. The latest spring record is 25 Apr. 1983 at Papar (WFVZ). A summering population may be present, because ca. 20 were observed in padi at Penampang on 21 July 1983 (WFVZ). *Voice*: Two or three sharp pips in flight; also, *terseeu* (DMB). *Remarks*: Probably the most common winter wader inland. B&W recorded hundreds at several localities and more than 1,000 at Papar in 1984. This species occasionally associates with Common Redshank and Marsh Sandpiper during migration.

Common Sandpiper *Actitis hypoleucos*

Status: A common migrant and winter visitor in all appropriate habitats from islands to the deep interior. *Elevation*: Sea level to 1,000 m. *Habitats*: Beaches, estuaries, mangroves, flooded roads, logged forest, lawns, padi, rivers, and streams. *Migration dates*: The earliest record is 7 Aug. 1983 at Sepilok (WFVZ).

The latest record is 10 May 1983 at Putatan (WFVZ). Large numbers of passage migrants are seen in late Sept. and Oct. A small number of nonbreeding individuals may remain year-round, as evidenced by sightings at Tempasuk on 19 July 1966 (KVT) and 28 July 1985 (J. Wall). *Remarks:* Along riverbanks, they seem to be territorial, occurring approximately every 100 m (B&W).

Terek Sandpiper *Xenus cinereus*

Status: An uncommon migrant and winter visitor. *Localities:* Kalabakan River, Klias Peninsula, Kuala Papar, Kuala Segama, Lok Kawi, Membakut Beach, Mumiang, Pulau Tiga, Tanjung Aru, and Weston. *Elevation:* Sea level. *Habitats:* Open shore and mudflats. *Migration dates:* Early dates: B&W reported small numbers at Weston in early Sept. 1984, and the Sabah Museum has a specimen from Kuala Papar on 28 Sept. 1972. Late dates: three on Membakut Beach on 22 Apr. 1983 (WFVZ).

Gray-tailed Tattler *Heteroscelus brevipes*

Status: A common migrant and winter visitor. *Localities:* Balambangan Island, Binsulok, Klias Peninsula, Labuan, Likas Bay, Lok Kawi, Mempakul, Mumiang, Papar, Pulau Tiga, Si Amil Island, Tambisan, Tembungo, Usakan, and Wallace Bay. *Elevation:* Sea level. *Habitats:* Sand beaches, mud flats, mangroves, and estuaries. *Migration dates:* The latest spring record of adults in breeding plumage is 25 Apr. 1982 at Binsulok (WFVZ). A small number of nonbreeding individuals summer in the region. Everett (1889) reported a Guillemard specimen from Usakan Bay on 3 June 1883. WFVZ recorded individuals on 13 May 1983 on Pulau Tiga, 7 July 1982 at Wallace Bay, and 13 Aug. 1982 on Pulau Tiga. *Voice:* A distinctive, metallic *cre-eeek*.

Ruddy Turnstone *Arenaria interpres*

Status: An uncommon migrant and winter visitor. *Localities:* Balambangan Island, Kalumpunian Besar Island, Kolapis, Lumbidan, Membakut Beach, Mempakul, Mumiang, Nosong, Papar, Pulau Tiga, Selingaan Island, Tanjung Aru, and Tempasuk. *Elevation:* Sea level. *Habitats:* Sandy beaches, mud flats, and estuaries. *Migration dates:* The earliest record is a sighting at Tempasuk on 12 Sept. 1984 (B&W). BMNBE collected a specimen at Kolapis on 24 May 1956.

Asian Dowitcher *Limnodromus semipalmatus*

Status: An uncommon migrant. *Localities:* Mumiang, Papar, Tanjung Aru, and Tawau (all sightings). *Elevation:* Sea level. *Habitats:* Mudflats. *Migration dates:* Two individuals were observed at Mumiang on 28 Sept. 1984 (B&W). A flock of 30 was observed on the mudflats at Tawau in Feb. 1962 (Smythies 1963; Norman 1964). *Remarks:* B&W suggested that a few birds may winter in Sabah. This possibility is supported by their observation of a molting individual at Mumiang in Oct. 1984.

[Long-billed Dowitcher *Limnodromus scolopaceus*

Status: A sighting of two individuals in a Kota Belud marsh (probably Tempasuk) on 8 Apr. 1996 is the first record for Sabah and only the second for Borneo (Robson 1996).]

Pintail Snipe *Gallinago stenura*

Status: A common migrant and winter visitor. *Localities:* Benoni, Bongawan,

Labuan, Lamag, Membakut, Padas Damit, Papar, Poring, Ranau, Tambunan, and Tempasuk. *Elevation*: Sea level to 800 m. *Habitats*: Grasslands, padi, swamps, and occasionally thicker vegetation. *Migration dates*: The earliest record is a sighting on 28 Aug. 1984 at Padas Damit. Numbers increase substantially in Dec. (B&W). Late records include a bird collected at Benoni on 25 Apr. 1983 and several birds observed at Tempasuk on 30 Apr. 1983 (WVZ). *Voice*: *Skeek*. *Food*: Worms and insects. *Remarks*: Field identification of the three snipes is difficult and opinions conflict on which species is the commonest in Sabah. B&W found Pintail Snipe to be the commonest. They describe its flight as more woodcocklike, its call more nasal, and its legs yellowest of the snipe species. Banks' 4-yr (1926, 1927, 1928, 1932) snipe hunting totals in Sarawak were 191 Pintail, 8 Common, and 5 Swinhoe's (Gibson-Hill 1949c). See under Swinhoe's Snipe for other opinions on the relative abundance of snipe species in Sabah.

Swinhoe's Snipe *Gallinago megala*

Status: A common migrant and winter visitor. *Localities*: Abai, Bongawan, Kinabatangan River, Membakut Beach, Padas Damit, Pintas, Ranau, Tempasuk, and Tiger Estate. *Elevation*: Sea level to 500 m. *Habitats*: Padi, marshes, and other muddy areas. *Migration dates*: The earliest records are a sighting on 28 Aug. 1984 at Padas Damit (B&W), and a specimen from Ranau on 17 Sept. 1960 (USNM). The latest published record is 25 Dec. 1887 at Abai (Sharpe 1890b). *Remarks*: Sharpe (1890b) listed this species as the commonest snipe at Abai. MCT believed Swinhoe's Snipe to be the most common snipe in Sabah. Smythies (1960) stated that Pintail Snipe is more common in western Borneo, but Swinhoe's Snipe outnumbers it in north and east Borneo. However, Norman (1964) believed that in the Tawau area, Swinhoe's Snipe is outnumbered four to one by Pintail Snipe. B&W only positively identified this species by trapping it at Bongawan. Some of the confusion about relative abundance may be due to identification problems and different habitat preferences for the two species. Swinhoe's Snipe is generally found in wetter areas than Pintail Snipe.

Common Snipe *Gallinago gallinago*

Status: An uncommon migrant and winter visitor. *Localities*: Bongawan, Labuan, Lamag, Padas Damit, Papar, Tempasuk, and Tuaran. *Elevation*: Sea level to 100 m. *Habitats*: Marshes, grasslands, and padi. *Migration dates*: The earliest records are a netted bird at Papar on 16 Nov. 1981 (WVZ) and a sighting at Bongawan on 17 Nov. 1984 (B&W). The latest record is from Tempasuk on 8 Mar. 1982 (CMF). *Voice*: *Squaak*. *Remarks*: The best identifying feature of this species is the white trailing edge of the secondaries (B&W).

[Eurasian Woodcock *Scolopax rusticola*

Status: One flew over the Danum Valley lodge at dusk on 24 Apr. 1999 (GD). Other records exist from Brunei, although 24 Apr. is a late date for SE Asia (GD).]

Red Knot *Calidris canutus*

Status: A rare migrant or winter vagrant. *Localities*: Karindingan Island, Mumiang, and Tempasuk (all sightings). *Elevation*: Sea level. *Habitats*: Sand beaches and mudflats. *Migration dates*: MCT observed a flock of 20 feeding on a coral sand beach on Karindingan Island on 17 Aug. 1962. B&W observed small flocks at Mumiang from 28 Sept. to 3 Oct. 1984.

Great Knot Calidris tenuirostris

Status: A scarce migrant. *Localities:* Kolapis (specimen), Kota Kinabalu, Kuala Segama, Labuan (specimen), Mumiang, Papar, and Pulau Tiga. *Elevation:* Sea level. *Habitats:* Mudflats, sand beaches, and mangroves. *Migration dates:* B&W observed small numbers at Mumiang from 28 Sept. to 19 Oct. 1984. BMNBE collected a specimen on 24 May 1956 at Kolapis.

Sanderling Calidris alba

Status: A common migrant and winter visitor. *Localities:* Kimanis, Labuan, Membakut Beach, Mumiang, Papar, Tembungo, Tempasuk, and Tuaran Beach. *Elevation:* Sea level. *Habitats:* Sandy beaches and mudflats. *Migration dates:* B&W observed small numbers on 28 Sept. 1984 at Mumiang, but by early Oct., hundreds of individuals were present on the beaches. WFVZ observed a dozen at Tuaran Beach on 1 May 1983. DMS observed this species on the Tembungo oil platform from 20 Apr. to 5 May 1979 (Casement 1979). *Remarks:* The active foraging behavior of this species, in which it runs back and forth along the surf line, and its missing hind toe are distinctive characteristics.

[*Little Stint Calidris minuta*

Status: The first well-documented sighting of this species in Sabah was of three juvenile birds at Mumiang on 6 Oct. 1984 (B&W). They were feeding in a loose flock of Red-necked Stints, whose call was noticeably different.]

Red-necked Stint Calidris ruficollis

Status: A common passage migrant and winter visitor. *Localities:* Balambangan Island, Benoni, Bongawan, Karindingan Island, Kolapis, Kuala Papar, Kudat, Labuan, Membakut Beach, Mumiang, Nosong, Padas Damit, Petagas, Pulau Tiga, Sandakan, and Tempasuk. *Elevation:* Sea level. *Habitats:* Mudflats, sandy beaches, and occasionally grasslands. *Migration dates:* Earliest migrants were seen on 29 Aug. 1984 at Bongawan (B&W). An 11 Sept. 1927 specimen exists from Balambangan (RMC). The latest date is from Kolapis on 24 May 1956 (BMNBE). *Remarks:* A specimen collected at Membakut Beach on 25 Apr. 1983 had been banded in Victoria, Australia, on 4 Dec. 1982 (WFVZ).

Long-toed Stint Calidris subminuta

Status: An abundant migrant and winter visitor. *Localities:* Abai, Benoni, Bongawan, Klias Peninsula, Labuan, Membakut Beach, Mumiang, Nangka, Padas Damit, Papar, Ranau, Sandakan, Tambunan, and Tempasuk. *Elevation:* Sea level to 600 m. *Habitats:* Marshes, padi, grasslands, buffalo fields, and occasionally coastal mudflats. *Migration dates:* The earliest record is a specimen from Sandakan on 11 Aug. 1929 (FMNH). The latest record is a sighting of approximately 15 birds on 8 Mar. 1982 at Tempasuk (CMF). *Remarks:* Long-toed Stint and Wood Sandpiper are the most abundant overwintering inland waders. B&W estimated that they comprise 70–80% of padi waders.

[*Temminck's Stint Calidris temminckii*

Status: A scarce migrant. *Localities:* Papar, Selimponon Estuary, and Tempasuk (all sightings). *Elevation:* Sea level. *Habitats:* Mudflats and estuaries. *Remarks:* Few records exist of this species: Selimponon Estuary in Feb. 1962 (Norman 1964), and Papar on 14 Nov. 1966, 28 Feb. 1966, 1 Mar. 1966, and 3 Apr. 1967

(KVT; Gore 1968). Smythies (2000) noted extreme dates, 15 Sept. (KVT) and 12 Apr. (Q. Phillipps). Norman (1964) stated that her identifications were uncertain. Payne and Parish (1985) listed it for Tempasuk.]

Curlew Sandpiper *Calidris ferruginea*

Status: An uncommon migrant. *Localities:* Bongawan, Kuala Penyu, Membakut Beach, Mumiang, Padas Damit, Papar, and Tempasuk. *Elevation:* Sea level. *Habitats:* Mudflats and padi. *Migration dates:* The earliest record is 28 Sept. 1984 at Mumiang (B&W). The latest spring record is 22 Apr. 1983 at Membakut Beach (WFVZ). *Remarks:* This species is found in relatively small numbers in Sabah in contrast to peninsular Malaysia, where it is one of the most common waders (B&W).

Sharp-tailed Sandpiper *Calidris acuminata*

Status: A scarce migrant. *Localities:* Mumiang and Papar (all sightings). *Elevation:* Sea level. *Habitats:* Mudflats and marshes. *Migration dates:* B&W observed an adult molting out of summer plumage at Mumiang on 7 Oct. 1984. The late date is 23 Apr. 1967 at Papar (KVT). *Remarks:* This species may be more common than indicated in Smythies (1981), because it has been regularly observed as a passage migrant at buffalo pools in the Papar area (KVT).

Broad-billed Sandpiper *Limicola falcinellus*

Status: An uncommon migrant. *Localities:* Mumiang, Papar (specimen), Pulau Tiga, Nosong, and Tempasuk. *Elevation:* Sea level. *Habitats:* Mudflats and marshes. *Migration dates:* The earliest record is at Papar on 14 Sept. 1966 (KVT). Late records occur in Feb. and Mar. (KVT; DMB; Gore 1968). *Remarks:* B&W observed up to 20 individuals feeding with Red-necked Stints and roosting with Common Sandpipers at Mumiang from 28 Sept. to 18 Oct. 1984. Fluctuating numbers suggest a high turnover of migrating individuals.

Ruff *Philomachus pugnax*

Status: An uncommon winter visitor. *Localities:* Kinarut, Labuan (specimen), Padas Damit, Papar, and Tuaran. *Elevation:* Sea level. *Habitats:* Marshes, mudflats, and wet grasslands. *Migration dates:* The early record is Oct. 1963 (no day) at Kinarut by KVT (Gore 1968). WFVZ observed several in fallow padi at Papar from 23 Oct. to 13 Nov. 1981, and B&W reported two females and three males wintering on grazing land at Papar in Nov. and Dec. 1984.

[Spoon-billed Sandpiper *Eurynorhynchus pygmaeus*

Status: Smythies (1981) described a sighting of this species at Papar on 14 Jan. 1967 by KVT as "convincingly suggesting this species," but KVT said in an interview in 1983 that he only "thinks it was a spoonbill." The information given (grayer plumage and more white on the forehead than Red-necked Stint) is merely consistent with this species. Bill shape was not mentioned.]

Family RECURVIROSTRIDAE

STILTS AND AVOCETS

Black-winged Stilt *Himantopus himantopus*

Status: An uncommon vagrant. *Localities:* Labuan (specimen), Likas, Papar, and Tempasuk. *Elevation:* Sea level. *Habitats:* Coastal marshes, lagoons, and

fallow padi. *Remarks:* Q. Phillipps observed them at Papar from 13 July 1971 to 12 Mar. (year not specified; Smythies 2000). Three individuals were observed together in a flooded padi at Papar on 23 Oct. 1981 (WFVZ). Two were young birds (browner wings and some brown around the eyes). A flock of 63 individuals was observed at Tempasuk on 8 Apr. 1996 (Robson 1996). In recent years, this species has been recorded annually at Likas lagoon. GD observed them at Likas from 26 May to 21 June 1998, with a peak of 15 individuals on 7 June. He identified them as the subspecies *leucocephalus*, wintering from a southern locality.

Family PHALAROPODIDAE

PHALAROPES

Red-necked Phalarope *Phalaropus lobatus*

Status: An uncommon migrant and winter visitor, although large concentrations are occasionally encountered. *Localities:* Beaufort, Danum, Darvel Bay, Kota Kinabalu, Labuan, Maliau, Mumiang, Papar, Sipadan Island, Tembungo, and Ulu Tiulon (all sightings). *Elevation:* Sea level to 500 m. *Habitats:* Estuaries, bays, padi, and riparian forest. *Migration dates:* The earliest record is one individual from the Tembungo oil platform on 13 Aug. 1981 (Simpson 1982a). Between 19 and 28 Sept. 1981, Simpson observed flocks of more than 1,000 individuals around the oil platform flare at night. After this mass migration, only a few individuals were seen in Oct. Spring records include sightings on 11 Mar. 1982 between Kuala Abai and Mantanani Island (Sheldon et al. 1983), and at Maliau in Apr. or early May of 1988 (Yong et al. 1989).

Family BURHINIDAE

THICK-KNEES

Beach Thick-knee *Esacus neglectus*

Status: A rare resident or vagrant. *Localities:* Abai, Balambangan Island, Kalamumpunan Besar Island, Selingaan Island, Simpangmengiao, and Tanjung Aru. *Elevation:* Sea level. *Habitats:* Sandy beaches and coral reefs. *Voice:* A low plaintive note uttered while feeding (S. Phillipps 1982). Also a loud but thin, metallic *twink*. *Food:* Crabs. *Remarks:* Most records are old, for example, Abai (Sharpe 1890b), Balambangan (Chasen and Kloss 1930b), and Simpangmengiao (Everett 1889). Among more recent records are Kalamumpunan Besar on 14 Jan. 1982 (WFVZ) and Selingaan Island in Apr. 1981 and 1982 (S. Phillipps 1982). The Selingaan bird frequented the extensive coral reef at the N end of the island.

Family GLAREOLIDAE

PRATINCOLES

Oriental Pratincole *Glareola maldivarum*

Status: A locally common migrant, winter visitor, and scarce resident. *Localities:* Balambangan Island, Klias Peninsula, Kota Kinabalu, Kulamba, Labuan, Merintaman–Menggalong, Papar, Rampayan, Tawau, Tempasuk, and Tiger Estate. *Elevation:* Sea level to 100 m. *Habitats:* Airports, padi, grasslands, buffalo fields, and heathland. *Breeding:* S. Phillipps (1982) reported nests at Tempasuk on 17 Apr. 1981 hidden in tufts of thick grass. The nests usually contained one brown-

blotched egg and one downy chick. No nests were found in the same area the following year. *Migration dates*: Migration dates are difficult to determine because of the presence of some resident birds. Few individuals can be found at Tempasuk in early Aug., but B&W observed more than 40 individuals there on 12 Sept. 1984. On 9 Mar. 1983, thousands of pratincoles were observed on Tempasuk Plain (WFVZ). *Food*: Hunts insects on the wing.

[Australian Pratincole *Stiltia isabella*

Status: The only record for Sabah is a sighting of three individuals at Kota Belud (presumably Tempasuk) on 1 Aug. 1987 (Robson 1988).]

Family STERCORARIIDAE

SKUAS AND JAEGERS

[Parasitic Jaeger *Stercorarius parasiticus*

Status: B&W saw one near Kota Kinabalu on 11 Dec. 1984 (CMF).]

Pomarine Jaeger *Stercorarius pomarinus*

Status: A scarce winter visitor. *Localities*: Brunei Bay, Mantanani Island, and Tanjung Aru. *Remarks*: Only a few sightings have been made of this species. D. R. Wells observed two individuals near Mantanani Island on 14 Apr. and one in Brunei Bay on 31 Oct. 1975 (Smythies 1981). The Phillipps family observed one off Tanjung Aru on 1 Jan. 1983. F. Lambert observed one from a boat traveling between Sipadan Island and Semporna on 31 Oct. 1989. About 15 were sighted between Kota Kinabalu and Pulau Tiga on 17 Feb. 1992 (Robson and Byers 1992).

[Skuas *Catharacta* species

Status: Uncommon vagrants. *Remarks*: Skuas have been observed several times off the NW coast of Sabah. D. R. Well observed one between the mainland and Mantanani Island in 1976 (Smythies 2000). The WFVZ observed one between Gaya and Mengalum Islands on 3 June 1983. Three or four were seen on a trip between Kota Kinabalu and Pulau Tiga on 17 Feb. 1992 (Robson and Byers 1992). These could be either South-Polar Skuas (*Catharacta maccormicki*) or Brown Skuas (*C. antarctica*).]

Family LARIDAE

GULLS

Black-headed Gull *Larus ridibundus*

Status: An uncommon winter visitor. *Localities*: Bandau, Kuala Penyu, Kudat, Labuan, Likas Bay, Papar, Pulau Tiga, Sandakan Harbor, and Tawau (all sightings). *Elevation*: Sea level. *Habitats*: Beaches, coastal lakes, estuaries, and harbors. *Migration dates*: DMB observed an individual on Pulau Tiga on 6 Jan. 1962 and three at Sitompok Lake on 8 Jan. 1962. Norman (1964) observed one at Tawau in Feb. A few appear in Sandakan Harbor every winter, and KVT has seen them at Papar on 14 Jan. 1967 and in Brunei Bay in Feb. GD observed seven in Likas Bay in Dec. 1996, and a bird tour let by K. D. Bishop observed 27 there on 23 Feb. 2000 (Robson 2000).

Family STERNIDAE

TERNs

White-winged Tern *Chlidonias leucopterus*

Status: A common migrant. *Localities:* Berhala Island, Kimanis, Mandangin, Mumiang, Padas Damit, Papar (specimen), Tembungo, and Tempasuk. *Elevation:* Sea level. *Habitats:* Beaches, offshore, padi, and inland rivers. *Migration dates:* The earliest date is a sighting of eight on 10 Sept. 1984 off Tempasuk (B&W). One late record is 6 Apr. 1981 on Berhala Island (J. Pearson). WFVZ saw several birds at Mandangin and Padas Damit during 4–8 June 1983. The greatest numbers appear in late Sept. and Oct. B&W observed up to 650 at that time near Mumiang in 1984.

Whiskered Tern *Chlidonias hybridus*

Status: An uncommon migrant and winter visitor. *Localities:* Benoni, Kolapis (specimen), Mantabuan Island, Mumiang, Papar (specimen), Samawang, Tawau Bay, and Tempasuk. *Elevation:* Sea level. *Habitats:* Beaches, marshes, and flooded padi. *Migration dates:* B&W observed 15 individuals off Tempasuk on 11 Sept. 1984. Yong (1980) reported one off Mantabuan Island on 13 Sept. 1979. The latest record is a specimen from Kolapis on 24 May 1956 (BMNBE).

Gull-billed Tern *Gelochelidon nilotica*

Status: A common migrant and winter visitor. *Localities:* Kolapis, Kuala Papar, Mumiang, Sitompok Lake, Tawau, and Tempasuk. *Elevation:* Sea level. *Habitats:* Beaches, coastal pools and lakes, and estuaries. *Migration dates:* This species is a common migrant throughout Sept. and Oct. (B&W). The earliest confirmed record is a specimen from Kuala Papar on 21 Sept. 1972 (Sabah Museum). The latest record is two specimens from Kolapis on 24 May 1956 (BMNBE). *Food:* Small fish and occasionally crabs caught on the beach (Smythies 1960).

Common Tern *Sterna hirundo*

Status: An irregular migrant and winter visitor, common at times. *Localities:* Bandau, Kudat, Labuk Bay, Mantanani Island, Mumiang, Papar, Pulau Tiga, Sandakan, and Tanjung Aru. *Elevation:* Sea level. *Habitats:* Beaches, estuaries, and offshore. *Migration dates:* A specimen was collected at Papar on 26 Sept. 1972 (Sabah Museum). WFVZ observed three on the return trip from Mantanani Island on 11 Mar. 1982 (Sheldon et al. 1983). *Remarks:* B&W described it as abundant at Mumiang, seeing as many as 4,000 individuals during Oct. 1984.

Roseate Tern *Sterna dougallii*

Status: An uncommon visitor and possible resident on offshore islands. *Localities:* Kota Kinabalu, Labuan, Mumiang, Tanjung Aru, Tempasuk, and Turtle Islands (all sightings). *Elevation:* Sea level. *Habitats:* Beaches, rocky islets, and offshore. *Breeding:* No breeding records for Sabah. However, breeding colonies occur off Brunei and Palawan (Smythies 1960), and T. Harrisson (1966) observed ca. 50 off Pulau Burong, Labuan, on 9 June 1960 (Smythies 1963) and ca. 10 individuals between Gulisaan and Langkayan islands on 13–17 July 1965. *Remarks:* Other records include Tanjung Aru on 7 Sept. 1969 (KVT) and Tempasuk on 9 Sept. 1984 (B&W).

Black-naped Tern *Sterna sumatrana*

Status: A common resident. *Localities:* Banggi Island, Bodgaya Island, Labuan, Layangan Island, Lebakan Island, Mantanani Island, Mumiang, Nosong, Pilar Island, Pulau Tiga, Sandakan, Selinga Island, Sipadan Island, Tembungo, and Tempasuk. *Elevation:* Sea level. *Habitats:* Beaches, rocky islets, and offshore. *Breeding:* DMB found nests with two eggs at Nosong and Kalampunian Damit Island on 23 June 1959 (also see Phillipps 1985a). He noted that eggs are usually laid on bare rock or occasionally a small tuft of grass. They are pale olive-buff heavily spotted with brown. Gore (1968) observed fledglings that had been collected by locals off Banggi Island on 7 Jul. 1965. Breeding is suspected on Lebakan Island (Harrison 1966) and Layang-Layang Island (KVT).

Bridled Tern *Sterna anaethetus*

Status: An uncommon resident. *Localities:* Banggi Island, Kalampunian Island, Klias Peninsula, Kota Kinabalu, Labuan, Lahad Datu, Membakut, Mempakul, Papar, Pulau Tiga, Sipadan Island, Nosong, and Tembungo. *Elevation:* Sea level. *Habitats:* Offshore, breeds on small islets. *Breeding:* Not documented in Sabah, but suspected on Kalampunians (Phillipps 1985a) and at Nosong. DMB observed this species around the Nosong stacks and off Pulau Tiga in June 1959, and a local man told him that they bred at Nosong in July 1961. *Remarks:* Few records exist for this species from Sabah, probably because it spends most of the year offshore. Gore (1968) found it common offshore, and Lambert (1990b) observed "many" between Semporna and Sipadan on 31 Oct. 1989. A band that had been placed on a nestling on North Fisherman Island, Western Australia, on 31 Dec. 1979 was recovered in Lahad Datu on 18 Aug. 1980.

Little Tern *Sterna albifrons*

Status: An uncommon winter visitor and possible resident. *Localities:* Kuala Bandau, Menampilik Island, Mumiang, Papar, Sandakan, Tanjung Aru, and Tempasuk. *Elevation:* Sea level. *Habitats:* Sandy beaches and estuaries. *Migration dates:* The earliest record is 2 Aug. 1959 from Menampilik Island (Smythies 1963). The latest record is 19 June 1966 from Papar (Gore 1968). *Remarks:* With records from Mar., June, and early Aug., some birds seem to oversummer, or breed on one of the small islets off of Sabah. The latter seems likely, because breeding is reported in Brunei (Mann 1989) and Kalimantan (GD).

Sooty Tern *Sterna fuscata*

Status: An uncommon vagrant. *Localities:* De Silva and Chong (1974) observed several near Gulisaan Island. Harrison (1966) observed it approximately 5 miles (8 km) west of Lelingan Island on 15 July 1965 and believed it to be common in Sabah's waters. The Phillipps' collected one that was blown ashore at Sandakan by a storm on 27 Dec. 1973. One was recorded off Bodgaya Island in Sept. 1998 (GD). *Remarks:* This species is oceanic, only venturing to shore to breed on sandy island beaches.

[Caspian Tern *Sterna caspia*

Status: Recorded at Labuan on 6 Jan. 1991 (C. Mann).]

Great Crested Tern *Sterna bergii*

Status: A common migrant and possible resident. *Localities:* Ambong, Banggi

Island, Darvel Bay, Gaya Bay, Kalamunian Island, Kimanis Bay, Klias Peninsula, Kolapis, Kuala Papar, Labuan, Lok Kawi, Mantanani Island, Mengalum Island, Merintaman–Menggalong, Mumiang, Pulau Tiga, Samawang, Tawau, Tembungo, and Turtle Islands. *Elevation*: Sea level. *Habitats*: Beaches, bays, estuaries, and small islets. *Breeding*: No records exist of breeding colonies in Sabah. WFVZ collected a male (testis 7×10 mm) and a female (three ova 4×4 mm) at Lok Kawi on 15 Mar. 1983. *Migration dates*: It occurs all year in Sabah, but large influxes are seen in Sept. and Oct. B&W saw up to 6,000 in Sept. and Oct. 1984 near Mumiang. All specimens we checked were collected in Sept., Mar., Apr., and May. Simpson (1982a) found it to be common at Tembungo in the summer months of 1981, with numbers tapering off until no birds were present offshore by the end of Oct.

Lesser Crested Tern *Sterna bengalensis*

Status: An uncommon visitor. *Localities*: Berhala Island, Kimanis, Kota Belud, Kuala Bandau, Kuala Penyu, Kuala Segama, Labuk Bay, Mantanani Island, Mumiang, Pulau Tiga, Sandakan, Tempasuk, Turtle Islands, and Wallace Bay (all sightings). *Elevation*: Sea level. *Habitats*: Beaches, bays, fish traps, and offshore. *Migration dates*: It may be observed offshore at all times of the year (Gore 1968). Most records near shore are from Nov. to Apr., but B&W observed five off Tempasuk on 12 Sept. 1984, and Harrisson (1966) saw 10 near the Turtle Islands in July 1965.

Brown Noddy *Anous stolidus*

Status: An uncommon vagrant. *Localities*: Sightings have been made off the coast in most seasons (Gore 1968). Records include: Sandakan Harbor in Apr. 1961 (KVT); one at the Tembungo oil platform on 6 Oct. 1981 (Simpson 1982a); off Tanjung Aru in Dec. 1979 and 3 Dec. 1982 (Phillipps family); at Sipadan Island on 17 July 1998 (C. Mann); and about 30 off Bodgaya Island in Sept. 1998 (GD).

Black Noddy *Anous minutus*

Status: A rare vagrant. *Remarks*: The only records for this species are from the 19th century: an undated specimen collected by Treacher at “Labuan” (Sharpe 1879b) and a specimen from “Padas” on 2 June 1886 (Sharpe 1890b).

Order COLUMBIFORMES

Family COLUMBIDAE

PIGEONS AND DOVES

Large Green Pigeon *Treron capellei*

Status: An uncommon resident. *Localities*: Bengkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Kinabatangan River, Klias Peninsula, Labuk, Lumerau, Magdalena, Melian River, Meliau River, Menggalong, Ranau, Saliwangan, Segama River, Sepilok, Silam, Tabin, Tampias, Ulu Mawau, and Ulu Melian. The AMNH has a specimen labeled: “Kina Balu, June July 03, J. Waterstradt coll.” *Elevation*: Sea level to 1,000 m. *Habitats*: 1°, logged, and riverine forest. Much less abundant in logged compared to pristine forest (Lambert 1990c). This may be because of their reliance on large figs for food. *Food*: Large figs (Lambert

1990c). *Breeding*: A female near Silam Plantation on 12 Mar. 1982 had an unshelled, membrane-covered egg (32×25 mm) in its oviduct (WVZ).

Thick-billed Green Pigeon *Treron curvirostra*

Status: A common resident. *Localities*: Balambangan Island, Banggi Island, Baru Jumpa, Batu Punggul, Bettotan, Bole River, Danum, Kaingaran, Kimanis, Labuan, Melalap, Poring, Quoin Hill, Ranau, Rinangisan, Samawang, Sandakan, Sepilok, Tabin, Tambunan, and Ulu Segama. *Elevation*: Sea level to 750 m, occasionally to 1,300 m. *Habitats*: 1° and 2° forest and old rubber. *Breeding*: Nests were located in 1° forest in early Aug., some overlooking cultivated land (Phillipps 1970). A fallen chick found on 12 Aug. was nearly fledged. Birds collected by MCT on 1 and 2 Aug. 1962 at Quoin Hill had testes measuring 9×5 mm, 5×4 mm, 13×6 mm, and 9×5 mm. *Food*: Figs and berries. *Remarks*: Several males were attracted at night to a light at Rinangisan (1,300 m) on 12–14 Apr. 1983 (WVZ).

Cinnamon-headed Green Pigeon *Treron fulvicollis*

Status: A locally common resident. *Localities*: Abai, Balambangan Island, Bandau, Banggi Island, Benoni, Binsulok, Klias Peninsula, Kudat, Labuan, Lumbidan, Mawau, Merintaman–Manggalong, Padas Damit, Sandakan, and Sepilok. *Elevation*: Sea level to 150 m. *Habitats*: 1° forest, mangroves, swamp forest, peatswamp forest, and kerangas. *Breeding*: DMB observed nest building at the edge of a Kimanis rubber garden on 8 Feb. 1961. The male collected all of the nest material, and the female built the nest. DMB also found a nest with two eggs at Kimanis in late Feb. 1964. A male with testis 12×5 mm was collected at Binsulok on 19 Feb. 1983 (WVZ).

Little Green Pigeon *Treron olax*

Status: A common resident. *Localities*: Beluran, Bettotan, Binsulok, Bole River, Bukit Padang, Kapayan, Kasigui, Kuala Penyu, Labuan, Lamag, Lumbidan, Manggis (Tambuyukon), Megatai, Manggalong, Mumiang, Muruk, Padas Damit, Pandasan, Penampang, Petagas, Pintasan, Poring, Pulau Tiga, Quoin Hill, Ranau, Saliwangan, Sandakan, Sebatik Island, Sepilok, Silam, Sinsuran Road, Tabin, Telupid, Tembungo, Tuaran, and Ulu Tiulon. *Elevation*: Sea level to 1,040 m. *Habitats*: 1°, logged, and peatswamp forest. *Breeding*: DMB observed a nest at Mawau in late Mar. 1959, nest building at Kimanis and Klias Peninsula in June, and downy young at Klias Peninsula on 7 July. Phillipps (1970) observed a cock feeding the inhabitants of a nest in 2° forest on the Kota Kinabalu–Papar Road on 28 May 1970. MCT collected a bird at Quoin Hill with testes measuring 11×5 mm on 1 Sept. 1962. *Voice*: Its call resembles that of a crying child (MCT). *Food*: Berries, figs, and small flower buds.

Pink-necked Green Pigeon *Treron vernans*

Status: A very common resident in all coastal areas, open inland habitats, and on islands. *Elevation*: Sea level to 750 m. *Habitats*: 1° and 2° forest, swamp forest, kerangas, riverine forest, mangroves, fire-padang kerangas, and strand forest. *Breeding*: The breeding season occurs mainly from Feb. to July, although nests may be found in Nov. and Dec. as well (DMB). A frail nest was found on Labuan in mid-May that held two eggs (1.1×0.85 inches [27.9×21.6 mm]) (Sharpe 1890a). Wells (1976) found a nest with two eggs on 21 Mar. 1975 in

fire-padang kerangas at Merintaman–Menggalong. *Food*: Seeds and *Melastoma* berries. Hundreds were seen in *Melastoma malabathricum* at Binsulok in Jan. and Feb 1983 (WFVZ). *Voice*: Similar to that of Cinnamon-headed Green Pigeon. It starts like a siren winding up and then breaks off suddenly into chortles.

Jambu Fruit Dove *Ptilinopus jambu*

Status: An uncommon resident. *Localities*: Bettotan, Bole River, Danum, Kinabalu, Labuan, Lamag, Likas, Maang, Sapi Island, Sebatik Island, Ranau, Rinangisan, Saliwangan, Sandakan, and Sepilok. *Elevation*: Sea level to 1,300 m. *Habitats*: 1° and 2° forest and old rubber. *Breeding*: Phillipps (1986) observed a nest with one egg in Kinabalu Park on the Kiau Trail (no date). *Food*: Figs and other fruits. *Remarks*: WFVZ caught one attracted at night to a light at Rinangisan (1,300 m) during the El Niño drought (Apr. 1983).

Black-naped Fruit Dove *Ptilinopus melanospila*

Status: An uncommon resident of islands. *Localities*: Balak Island, Balambangan Island, Banggi Island, Bodgaya Island, Bohey Dulang Island, Labuan, Pulau Tiga, Sibuan Island, and Sipadan Island. *Elevation*: Sea level. *Habitats*: Closed forest, mangroves, and fringe forest. *Breeding*: F. Lambert found three nests in the understory on Sipadan in late Oct. 1989. Two nests were found on Bohey Dulang Island, one on 28 Feb. and another on 1 Mar. 1999 (GD). *Food*: Figs.

Green Imperial Pigeon *Ducula aenea*

Status: A very common resident in all habitats. *Elevation*: Sea level to 1,050 m. *Habitats*: 1° and 2° forest, logged forest, mangroves, nipah, and riverine forest. This species feeds mainly in the canopy and emergent trees, and its numbers decline in logged forest (Lambert 1990c). *Breeding*: V. W. Ryves collected two single-egg clutches at “Kota Belud” on 22 and 24 Jan. 1939. They were white and regularly oval, with a smooth and slightly glossy surface. Dimensions: 49 × 33.5 mm, 47 × 33.5 mm (Gibson-Hill 1949b). H. Low (no date) collected an egg at Labuan that was white and measured 1.7 × 1.25 inches (43.2 × 31.8 mm) (Sharpe 1879b). DMB observed a pair displaying: they flew up together, hung briefly while facing each other, then fluttered down in a tight spiral. *Voice*: Sharpe (1890a) described their call as a loud, booming *coo*. *Food*: Figs and oil-palm fruit.

[**Pink-headed Imperial Pigeon** *Ducula rosacea*

Status: The only record for Borneo is a sighting on Sipadan Island on 27 Feb. 1996 (Robson 1997). This species is generally restricted to Sulawesi, the Moluccas, and the Lesser Sundas.]

Gray Imperial Pigeon *Ducula pickeringii*

Status: A locally common resident on islands. *Localities*: Mantanani Island, Mengalum Island, Mumiang, Pulau Tiga, Semporna Islands, Sibuan Island, Sipadan Island, and Tanjung Aru. *Elevation*: Sea level. *Habitats*: 1° and 2° forest, and beach strand. *Voice*: A loud, deep *wa-roo* or *ow-roo*.

Pied Imperial Pigeon *Ducula bicolor*

Status: A common resident of offshore islands, sometimes in coastal areas. *Localities*: Abai, Bodgaya Island, Darvel Bay, Eno Island, Gaya Island, Kalamunian Island, Labuan, Mantanani Island, Mengalum Island, Mumiang, Nosong,

Pandanan Island, Pulau Tiga, Sandakan, Sebangkat Island, Semporna Islands, Si Amil Island, Sibuan Island, Sipadan Island, and Weston. *Elevation*: Sea level. *Habitats*: Forested areas on islands and coast. *Breeding*: Low found eggs of this species on Labuan that were pure white and measured 1.9×1.4 inches (48.3×35.6 mm) (Sharpe 1879b). *Voice*: A subdued *waroo*, not as loud or distinctive as that of Gray Imperial Pigeon. *Food*: Fruits, mainly nutmeg. Birds collected by WFVZ on 16 Aug. 1983 on Gaya Island (Semporna) had two types of purple berries in their stomachs measuring 3×3 mm and 10×10 mm, possibly from *Eugenia*s. They also feed on mangrove buds (DMB). *Remarks*: Flocks travel between islands frequently in search of fruiting trees, resulting in open ocean sightings (Sharpe 1890a; Harrison 1966).

Mountain Imperial Pigeon *Ducula badia*

Status: A locally common resident. *Localities*: Ibul, Kalabakan River, Kiau, Kimanis Bay, Kinabalu, Labau River, Maang, Maliau, Mantanani Island, Ranau, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Sea level to 2,500 m. *Habitats*: 1° and 2° forest; also old rubber, mangroves, and conifers. *Breeding*: V. W. Ryves collected four single-egg clutches between 13 Feb. and 30 Mar. 1939 at Kiau and (apparently) between Kota Belud and Kiau. The eggs were white, regularly oval, smooth, and slightly glossy; average dimensions 42.9×32 mm (Gibson-Hill 1949b). Sharpe (1890a) described a nest in overgrown rice that contained two bright white eggs. A nest found by WFVZ on 21 Mar. 1983 at Rinangisan was a simple stick platform approximately 30 cm in diameter located in a small tree 5 m above the road. It contained a single egg. A male collected at Rinangisan on the same day had a left testis measuring 9×5 mm. *Food*: A specimen from Rinangisan on 12 Apr. 1983 contained a yellow arilate fruit (24 mm in diameter). *Voice*: *Whroom-whroom* or *whroom-whroom-whroom*. *Remarks*: Flocks undertake large daily and seasonal movements (DMB). Although fundamentally montane, this species ranges to coastal areas. Flocks are more commonly found in mangroves from Oct. through Feb., and in the montane areas from Mar. to Sept. (DMB; Gore 1968). WFVZ found them in fruit trees in overgrown rubber at Maang in June.

Metallic Pigeon *Columba vitiensis*

Status: An uncommon island resident. *Localities*: Manukan Island, Mantanani Island, Pulau Tiga, and Sipadan Island. *Elevation*: Sea level. *Habitats*: Cliffs and forested areas of offshore islands. *Breeding*: Yong (1980) observed courting behavior on Sipadan during 6–9 Sept. 1979.

[Silvery Pigeon *Columba argentina*

Status: An unlikely vagrant. One record for Sabah, at Sepilok (de Silva 1981), is unreliable.]

Rock Pigeon *Columba livia*

Status: An introduced species, common around some towns. *Localities*: Bukit Padang, Kota Kinabalu, and Likas Bay.

Ruddy Cuckoo Dove *Macropygia amboinensis*

Status: An uncommon resident. *Localities*: Kaingaran, Kinabalu, Kundasang, Megatai, and Sinsuran Road. *Elevation*: 500–1,000 m, sightings up to 1,550 m.

Habitats: Mainly lower montane forest, 2° forest resulting from shifting agriculture. *Breeding:* Sharpe (1890a) described a nest consisting of a few dead twigs found on 13 Jan. only a few feet off the ground in ferns. It contained one nearly hatched egg. *Voice:* A loud *wa-oo*. It is noticeably less disyllabic and repeated less often than the call of Little Cuckoo Dove. *Food:* Berries. *Remarks:* Sometimes encountered with Little Cuckoo Dove and bulbuls in fruiting trees. Norman (1964, also see Gore 1968) reported it from Sebatik Island based on vocalizations and one sighting. However, Sebatik seems an unlikely location for this species.

Little Cuckoo Dove *Macropygia ruficeps*

Status: A common resident. *Localities:* Kaingaran, Kiau, Kimanis, Kinabalu, Mawau, Poring, Ranau, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* 750–1,500, occasionally to 3,000 m. *Habitats:* Montane forest and clearings. *Breeding:* V. W. Ryves collected 11 single-egg clutches at Kiau between 18 Feb. and 25 Mar. 1939. The eggs were white (three were light yellow), regularly oval, smooth, and very slightly glossy. Average dimensions were 28 × 20.1 mm (Gibson-Hill 1949b). Sharpe (1890a) reported nesting from Jan. to May and described a nest with one creamy white egg (1.1 × 0.8 inches [27.9 × 20.3 mm]) on 13 Jan. on Kinabalu. Smythies (1964b) found a bird on 9 July 1961 at 2,950 m on the East Ridge (Kinabalu) incubating two recently hatched nestlings in a nest 4.5 m above the ground in rattan. A male with a 14-mm testis was collected by WFVZ at mile 30 of Sinsuran Road on 10 Dec. 1981. *Voice:* An often repeated *woop*. Smythies (1960) described it perfectly as *croo-wuck* with the *croo* being much softer than the *wuck*. *Food:* Small berries. *Remarks:* This species generally replaces the lower montane Ruddy Cuckoo Dove at higher elevations, although the two species are sympatric at intermediate elevations.

Peaceful Dove *Geopelia striata*

Status: Locally common. *Localities:* Tanjung Aru and Papar. *Remarks:* A resident population at Tanjung Aru is apparently derived from two pairs released there in 1965 (Gore 1968). Peaceful Dove is now common in the suburbs around the airport. DMB observed two individuals in Papar in July 1960. He assumed that they were escaped cage birds.

Island Collared Dove *Streptopelia bitorquata*

Status: A rare vagrant. *Localities:* Sandakan and Si Amil Island. *Elevation:* Sea level. *Remarks:* Listed in Smythies (1981) as Javanese Turtle Dove. One was collected by Pryer in Sandakan in the 19th century, and one was seen by Thompson (1966) among Spotted Doves on Si Amil Island in Sept. 1962 (Smythies 1981).

Spotted Dove *Streptopelia chinensis*

Status: A common resident. *Localities:* Balambangan Island, Banggi Island, Kapayan, Kiau, Kota Kinabalu, Kuala Merutai, Kudat, Labuan, Lamag, Meliau River, Mumiang, Padas Damit, Pandasan, Petagas, Ranau, Sandakan, Sepilok, Si Amil Island, Sinsuran Road, Tambunan, Tanjung Aru, Tawau, Tembungo, Tempasuk, Tiger Estate, and Tuaran. *Elevation:* Sea level to 1,000 m. *Habitats:* Any disturbed habitat, especially agricultural areas. *Breeding:* Breeding occurs year-round, but reaches its peak at Kimanis from Dec. to Mar. (DMB). Eggs measured by DMB averaged 27 × 21 mm and were pure white with a slight gloss. Low

collected pure white eggs (1.05×1.15 inches [26.7×29.2 mm]) in Jan. 1873 on Labuan. Two nests were found on Tempasuk Plain on 30 Apr. 1983 (WFVZ). These were flimsy structures constructed with bent twigs in the tops of pandan trees ca. 200 m from the beach. Each contained two white eggs. *Food*: Seeds; however, a specimen collected by WFVZ at Padas Damit on 26 May 1983 had a crop full of caterpillars.

Emerald Dove *Chalcophaps indica*

Status: A common resident. *Localities*: Banggi Island, Batu Punggul, Bettotan, Bole River, Danum, Gaya Island, Gomantong, Kabayau, Kaingaran, Kasigui, Kinabalu, Labuan, Lamag, Lumerau, Maang, Megatai, Mendolong, Mengalum Island, Menggalong, Muruk, Pandasan, Poring, Pulau Tiga, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Samawang River, Sepilok, Silabukan, Tambunan, Tawau, Tempasuk, Ulu Dusun, and Ulu Tiulon. *Elevation*: Sea level to 1,450 m. *Habitats*: 1° and 2° forest, peat swamp forest, oil-palm plantations. *Breeding*: WFVZ records include a male with an 11-mm testis on 29 Nov. 1981 at Tambunan; a female at Bole River on 17 Feb. 1982 with one ruptured follicle and an enlarged oviduct; a male on the same day with testis 12×8 mm; a male on 19 June 1982 from Sabah Softwoods with testis 9.5×4.5 mm and trace body molt; two males at Maang on 20 June 1983 with enlarged testes (12×7 mm). *Voice*: The call is a hollow *gneet*. *Food*: A terrestrial frugivore that eats mainly macaranga fruits (Lambert 1990c). *Remarks*: This species is generally found on the ground and is the most commonly netted columbiform. Flocks arrive on Labuan in Apr. with the change in the monsoon (Sharpe 1879b). Lambert (1990c) noticed a dramatic increase in numbers after logging of an area. Norman (1964) found them to be common around Kalabakan from June to Nov., but scarce at other times. DMB found them to be common on Pulau Tiga from Apr. to July.

Nicobar Pigeon *Caloenas nicobarica*

Status: A scarce island resident. *Localities*: Gaya Island, Labuan, Mantanani Island, Pulau Tiga, and Sipadan Island. *Elevation*: Sea level. *Habitats*: Feeds in the open, but roosts in trees on small islands. *Voice*: Sharpe (1890a) described the call as a powerful *coo*. Smythies (1960) described it as a deep croak. *Remarks*: This species travels long distances over open water in search of food on islands.

Order PSITTACIFORMES

Family PSITTACIDAE

PARROTS

Blue-naped Parrot *Tanygnathus lucionensis*

Status: A locally common resident. *Localities*: Kota Kinabalu, Mantanani Island, Si Amil Island, and Tanjung Aru. *Elevation*: Sea level. *Habitats*: Forested habitat and strand on offshore islands, also suburbs and strand forest around Kota Kinabalu. *Voice*: A noisy species, which makes a loud screeching when congregating or flying. *Breeding*: Nesting was observed at Tanjung Aru in Apr. 1985 and during the first four months of 1986 (Phillipps 1987). *Food*: Phillipps (1987) observed these parrots in Tanjung Aru probing the rough bark of casuarinas and other trees. They were also feeding on the young leaves of *Parkia* and sea almond (*Terminalia*), new leaves of flame and rain trees, fleshy leaves of a hoyo plant and mangos, green nuts of sea almond and penaga (*Callophyllum*), fruits of large-

and small-leaved fig trees, and flowers and buds. *Remarks:* The Kota Kinabalu population is likely the result of escaped cage birds (Jenkins 1976; Phillipps 1987). Phillipps observed some flocking individuals with leg leashes. Natural populations are restricted to Mantanani and Si Amil islands, where they are fairly common.

[Rose-ringed Parakeet *Psittacula krameri*

Status: Ahmad bin Darus and Stuebing (1986) and Phillipps (1987) observed this species flocking with Blue-naped Parrots at Tanjung Aru. Presumably, they were escaped cage birds.]

Long-tailed Parakeet *Psittacula longicauda*

Status: A common resident. *Localities:* Beaufort, Bengkoka, Benoni, Binsulok, Bole River, Bongawan, Danum, Klias Peninsula, Kulamba, Labuan, Lamag, Melalap, Membakut, Menggalong River, Merutai, Mumiang, Padas Damit, Sepilok, Silabukan, and Tawau. *Elevation:* Sea level to 200 m. *Habitats:* 1°, 2°, swamp, peatswamp, and riparian forests; old rubber; and fire-padang kerangas. *Breeding:* DMB recorded breeding near Membakut, Klias Peninsula, and Beaufort. The nests were in dead rubber trees or old woodpecker and barbet holes. Eggs and young were seen in June and July. *Voice:* A raucous *mew*, and loud screeching in flight. *Food:* The buds and young fruit of rubber and small fruits of *Areca* and other palms (DMB), and fruit of *Dillemia speciosa* (Norman 1964). Flocks of this species are major dipterocarp seed predators during mast fruiting (Curran and Leighton 2000). *Remarks:* Found in large flocks in certain localities (Bengkoka, Membakut, Menggalong, and Mumiang), where they roost and forage on fruits.

Blue-rumped Parrot *Psittinus cyanurus*

Status: A common resident. *Localities:* Batu Punggul, Bole River, Brumas, Danum, Gomantong, Kalabakan River, Klias Peninsula, Labau River, Lumerau, Maliau, Mawau, Menggalong River, Merutai, Papar, Ranau, Saliwangan, Sandakan, Sebatik Island, Sepilok, Silabukan, Tabin, Tawau, Tenom, Tiger Estate, Ulu Segama, Ulu Tiulon, and Wallace Bay. *Elevation:* Sea level to 500 m. *Habitats:* 1° and 2° forest and old rubber. *Breeding:* DMB found three nests in broken off branches of rubber trees near Klias in May 1961. *Voice:* A sharp *chi-chi-chi* or *chewee* (Norman 1964). *Food:* Small fruits, dipterocarp seeds, flower heads from rubber trees, small palm nuts, and berries of Loranthaceae (DMB).

Blue-crowned Hanging Parrot *Loriculus galgulus*

Status: A common resident. *Localities:* Banggi Island, Beluran, Binsulok, Bole River, Brumas, Danum, Kabayau, Kalabakan, Kinabalu, Labuan, Labau River, Lamag, Lumerau, Maang, Maliau, Membakut, Merintaman–Menggalong, Mumiang, Padas Damit, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Sandakan, Segaliud River, Segarong, Selingan Island, Sepilok, Silabukan, Silam, Tabin, Tambuyukon, Tawau, and Ulu Tiulon. *Elevation:* Common from sea level to 500 m, sightings to 1,600 m. *Habitats:* 1° and 2° forest, kerangas, peatswamp, old rubber, *Albizia*, and beach strand. *Breeding:* DMB recorded breeding at Kimanis from Jan. until May, whereas the peak of breeding at Klias Peninsula was Aug.–Sept. Low found eggs (no date) that were dull white stained with brown measuring 0.7 × 0.6, 0.6 × 0.65, and 0.7 × 0.55 inches (17.8 × 15.2, 15.2 × 16.5, and 17.8 × 14.0 mm) (Sharpe 1879b). WFVZ found a nest hole near Sal-

ingawan in a 15-cm-diameter tree on 21 Apr. 1981. Two newly hatched chicks were inside. WFVZ found another nest on 4 Mar. 1982 near the Bole River that contained two well-incubated eggs. The large size of the hole indicated that it had been excavated by a larger bird. *Voice*: A soft *tze-tze* contact call given in flight. *Food*: Lambert (1990c) described this species as a specialized nectarivore and classified it as a member of the nectarivore–frugivore guild. It feeds on the nectar of plants invading logged forest, such as *Mezoneuron sumatranus*.

Order CUCULIFORMES

Family CUCULIDAE

CUCKOOS, MALKOHAS, AND COUCALS

Large Hawk Cuckoo *Hierococcyx sparverioides*

Status: An uncommon montane resident and lowland vagrant. *Localities*: Kainangan, Kiau, Kinabalu, Labuan, Poring, Sinsuran Road, and Trus Madi. *Elevation*: Sea level to 1,550 m; resident birds generally found above 800 m. *Habitats*: Montane forest, occasionally lowland forest. *Breeding*: Phillipps (1970) observed “a large and grossly fat” young black-and-white speckled cuckoo being fed by a Mountain Leaf Warbler near Kinabalu Park Headquarters on 15 Aug. 1970. Although he acknowledged that the chick might be a Hodgson’s Hawk Cuckoo, he felt that it was probably a Large Hawk Cuckoo. *Remarks*: The nominate subspecies is the occasional winter vagrant. The resident montane subspecies is *H. s. bocki*.

Hodgson’s Hawk Cuckoo *Hierococcyx fugax*

Status: An uncommon resident and winter visitor. *Localities*: Batu Punggul, Danum, Gaya Island, Kinabalu, Klias Peninsula, Lumbidan, Lumerau, Maliau, Membakut, Poring, Quoin Hill, Rinangisan, Sepilok, and Silabukan. *Elevation*: Sea level to 1,300 m. *Habitats*: 1° and 2° forest and cocoa. *Breeding*: See Large Hawk-Cuckoo. *Voice*: There are several calls. One is a short *ki-wi*. The other is a slightly buzzy ascending, then descending, series of short notes, similar to the call of Drongo Cuckoo (Smythies 1981). DMB described the call as *pi-kwik*. *Remarks*: Two were collected at night when they were attracted to a light at Rinangisan (1,300 m) on 14 Apr. 1983. These might have been migrants, but had little fat. *H. f. fugax* is the resident race; *H. f. hyperythrus* and *H. f. nasicolor* are occasional winter visitors.

Moustached Hawk Cuckoo *Hierococcyx vagans*

Status: An uncommon resident. *Localities*: Batu Punggul, Bengkoka, Bettotan, Bole River, Brumas, Danum, Kalabakan, Lumerau, Mawau, Poring, Sepilok, and Sukau. *Elevation*: Sea level to 550 m. *Habitats*: 1° and riverine forest. *Breeding*: A nestling was observed being fed by a female Rufous-winged Philentoma at Danum (UKMS-ANSP). *Food*: Large insects. *Voice*: An ascending series of single notes and then an accelerating series of paired notes (Smythies 1981).

Indian Cuckoo *Cuculus micropterus*

Status: A common resident and occasional migrant. *Localities*: Batu Punggul, Bole River, Brumas, Danum, Gomantong, Kaingaran, Kiau, Kinabalu, Klias Peninsula, Labau River, Lumbidan, Lumerau, Maliau, Megatai, Menggalong, Penampang, Saliwangan, Samawang, Sepilok, Sinsuran Road, Sipadan Island, Tabin,

Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m. *Habitats*: 1° and logged forest, peatswamp, and swamp forest. *Voice*: This species is heard more than seen, especially from Oct. to Apr. when calling frequency increases dramatically. Although many calls have been described, the most common is a four-note phrase reminiscent of the beginning of Beethoven's 5th symphony. *Remarks*: The rare migrant subspecies *C. m. micropterus*, seen on Sipadan in late Oct. 1989 (Lambert 1990b), is larger than the resident subspecies *C. m. concretus*.

[Eurasian Cuckoo *Cuculus canorus*

Status: The only record of this species is a sighting on Labuan (Everett 1889). Smythies (1957) did not accept this.]

Oriental Cuckoo *Cuculus saturatus*

Status: A common resident and winter visitor. *Localities*: Balambangan Island, Kaingaran, Kiau, Kimanis, Kinabalu, Labuan, Lamag, Papar, Pulau Tiga, Ranau, Rinangisan, Tambuyukon, and Trus Madi. *Elevation*: Sea level to 2,750 m; residents generally above 1,000 m. *Habitats*: 1° and 2° forest, and heavily disturbed forest near development. Migrants may be found in beach strand forest. *Breeding*: Both Yellow-breasted Warbler and Mountain Leaf Warbler were observed caring for juvenile cuckoos at Kinabalu Park during May 1999 (Moyle et al. 2001). *Voice*: The call is a triple *hoop*, with a slight pause after the first *hoop*. It can be imitated, but generally does not lure birds. Sharpe (1890a) noted that it sounded like Golden-naped Barbet. In fact, it sounds more like a Bornean Barbet. The calls of the migrant races on their breeding grounds are disyllabic *du-du*, *du-du* (Wells and Becking 1975). *Remarks*: The resident subspecies, *C. s. insulindae*, generally inhabits montane and lower montane zones. The two migrant subspecies, *C. s. saturatus* and *C. s. horsfieldi*, are more common in lowland habitats from Oct. to Apr. WFVZ collected three specimens attracted to a night light at Rinangisan (1,300 m) from 12 to 14 Apr. 1983. One was small and clearly the resident race (wing 145 mm). The other two were larger (wings > 190 mm) and lighter in color. Relevant racial taxonomy was reviewed by Wells (1982a). Payne (1997) elevated *horsfieldi* to species level.

Horsefield's Cuckoo *Cuculus horsfieldi*

Status: A rare migrant. *Localities*: Balambangan Island (a possible sighting) and Labuan (specimens). *Remarks*: Taxonomic confusion has muddled the allocation of some *Cuculus* specimens to species (Smythies 1981, 2000). However, these problems have been sorted out by Payne (1997). Several 19th century specimens of Horsefield's Cuckoo exist from Labuan. However, the migrant sighted by D. R. Wells on Balambangan on 12 Apr. 1977 cannot be confirmed to species (Smythies 2000).

Banded Bay Cuckoo *Cacomantis sonneratii*

Status: A common resident. *Localities*: Batu Punggul, Beaufort, Bengkoka, Bole River, Brumas, Danum, Ensuan, Kimanis, Lumbidan, Lumerau, Maliau, Pandasan, Poring, Quoin Hill, Sepilok, Silabukan, Tabin, and Ulu Segama. *Elevation*: Sea level to 500 m. *Habitats*: 1° and logged forest, casuarinas, gardens, and cocoa. *Breeding*: A female collected on 10 Mar. 1982 at Bole River had two ruptured follicles, a 10-mm yolk, and two smaller yolks (WFVZ). Another female collected on 19 Mar. 1982 at the same locality had a 10-mm oviduct egg with a thin shell.

The bird's skull was only 75% ossified. *Voice*: The song starts with four even-pitched notes, then climbs up the scale, sounding similar to that of the Plaintive Cuckoo. DMB described a rising double noted *too-breeeet* followed by *tu-tu-tu, toodleytoo*. *Food*: Caterpillars, locusts, and crickets (DMB).

Plaintive Cuckoo *Cacomantis merulinus*

Status: A ubiquitous lowland resident. *Elevation*: Sea level to 1,000 m. *Habitats*: 1° and 2° forest, peatswamp, kerangas, *Albizia* plantations, and agricultural areas. *Breeding*: A female collected on 21 Mar. 1982 near Gomantong contained an oviduct egg (CMF). Common Iora, Streaky-breasted Spiderhunter, and Yellow-bellied Prinia nests are parasitized (DMB). *Voice*: Two calls are frequently heard. The first is *tay-ta-tay* rising in pitch each time it is repeated. The second is four slow notes then an accelerating and descending run down the scale that peters out at the bottom. The call is similar to a Scarlet-rumped Trogon's, but louder and more persistent.

Rusty-breasted Cuckoo *Cacomantis sepulchralis*

Status: An uncommon resident. *Localities*: Batu Punggul, Bole River, Bongawan, Gaya Island, Imbak Valley, Kalabakan, Kimanis, Maang, Poring, Quoin Hill, Ranau, Rayoh, Tabin, and Tawau Hills. *Elevation*: Sea level to 750 m. *Habitats*: 1° and 2° forest, logged forest, and old rubber. *Voice*: In addition to the common three-noted, ascending, repeated call, they give a well-spaced, descending series of short whistles (CMF). *Remarks*: This species is difficult to identify by sight, and few specimens exist. Smythies (1981) listed it as Brush Cuckoo (*C. variolosus sepulchralis*), but Inskipp et al. (1996) split that into two species, *C. sepulchralis* and *C. variolosus* (Brush Cuckoo).

Violet Cuckoo *Chrysococcyx xanthorhynchus*

Status: A common resident. *Localities*: Abai, Banggi Island, Binsulok, Bole River, Danum, Gomantong, Labuan, Lumat, Lumbidan, Lumerau, Pulau Tiga, Quoin Hill, Rinangisan, Sabah Softwoods, Sandakan, Sepilok, Silabukan, Silam. *Elevation*: Sea level to 1,300 m. *Habitats*: 1° and 2° forest, cocoa, *Albizia*, rubber, *Trema orientalis* groves, and scrub. *Breeding*: A female collected near Bole River on 8 Apr. 1982 had a shelled oviduct egg (WFVZ). The base color was off white with a violet tint, and small (1- to 2-mm) black and white splotches were distributed evenly about the surface. *Migration dates*: A female collected at night on 13 Apr. 1983 at Rinangisan at 1,300 m was attracted to a light (WFVZ). It was small for a migrant (wing 94 mm). *Voice*: The flight call is a repeated *chew-eet* that rises on the *eet*. Sharpe (1890a) described the call as *kievik, kievik*. While perched, it also chatters like a woodpecker. Its courtship call is a multiple *seer-sees* ending in a descending trill (DMB). *Food*: Caterpillars. *Remarks*: The subspecies found in most of Sabah is *C. x. xanthorhynchus*. A second subspecies, *C. x. banguyenssis*, described by Chasen and Kloss (1929), is restricted to Banggi Island.

Little Bronze Cuckoo *Chrysococcyx minutillus*

Status: A scarce species, possibly a resident. The status of this species is difficult to determine, given confusion with the next species, Gould's Bronze Cuckoo. Until recently, the two species were lumped together as *C. 'malayanus'* (Parker 1981). *Localities*: Confirmed localities for *C. minutillus* are Merutai Besar (two

specimens, MCZ) and Kinabalu (1 specimen, British Museum, collected by A. H. Everett). *Elevation*: Specimens have been collected at ca. 100 m and at an unknown elevation on Kinabalu. Jenkins et al. (1996) mistakenly attributed an elevation of 950 m on Kinabalu to this species. *Habitats*: 1° forest. *Remarks*: Both this species and Gould's Bronze Cuckoo have been collected in Sabah, but it is uncertain whether they are residents or migrants (Payne 1997). The two species are sympatric at Merutai Besar and possibly on Kinabalu. However, Everett provided no elevation for his Kinabalu specimen, and it is possible that it was collected nearer to Kota Belud than to Mt. Kinabalu proper.

Gould's Bronze Cuckoo *Chrysococcyx russatus*

Status: An uncommon resident (see Little Bronze Cuckoo). *Localities*: Confirmed records are Abai (East Coast, two specimens, MCZ), Kinabalu (one specimen, MCZ), Lumbidan (one specimen), Merutai Besar (three specimens, MCZ), Quoin Hill (four specimens, MCT), and Silam plantation (five specimens, Feb. and Mar. 1982, WFVZ). MCT collected a *C. 'malayanus'* at Tiger Estate; this specimen has not been reexamined. The WFVZ also had sightings at Sabah Softwoods (June 1982) and on Sibuan Island (16 Aug. 1983). *Elevation*: Sea level to 945 m (Peters 1940; Parker 1981). *Habitats*: 2° forest, cocoa, and *Albizia*. *Breeding*: A female collected at Quoin Hill on 4 July 1962 had a brood patch (MCT). Two males collected from the same locality on 8 Aug. 1962 had testes 4 × 4 mm and 4 × 3 mm. The *C. 'malayanus'* collected by MCT at Tiger Estate on 25 Nov. 1962 had a brood patch and enlarged oviduct.

Drongo Cuckoo *Surniculus lugubris*

Status: A common resident. *Localities*: Batu Punggul, Bole River, Brumas, Danum, Kabayau, Kaingaran, Kinabalu, Labuan, Labau River, Lumerau, Megatai, Menggalong, Padas Damit, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Sandakan, Sepilok, Silabukan, and Tabin. *Elevation*: Sea level to 1,200 m. *Habitats*: 1° and logged forest, swamp forest, and *Albizia* plantations. *Breeding*: An oviduct egg from a specimen in Sarawak (23 May, year not specified) was white with small purple splotches (Smythies 1957, 1960). WFVZ observed a Drongo Cuckoo being chased by a Red-eyed Bulbul in Mar. 1982 near the Bole River, and collected a female there with a 19 × 14-mm unshelled oviduct egg on 10 Apr. 1982. Chestnut-winged Babbler also may be a host for this species (Cranbrook and Wells 1981). *Voice*: An ascending series of clear whistles. An alternative call is a series of broken ascending notes instead of the usual clear whistles. Yet another call starts as the first, but then continues with a descending series of whistles (CMF). Birds often sing from the same perch and occasionally sing at night. *Food*: A specimen at Quoin Hill had 50 caterpillars in its stomach (MCT). *Remarks*: DMB had numerous records, all in Dec. through Mar. Either this species moves seasonally or it is silent the rest of the year.

Asian Koel *Eudynamys scolopacea*

Status: An uncommon winter visitor and possible resident. *Localities*: Kalamunian Besar Island, Kundasang, Labuan, Labuk River, Mantanani Island, Mengalum Island, Pulau Tiga, Ranau, Sapong, Selingaan Island, Si Amil Island, Tawau, and Tembungo. *Elevation*: Mainly sea level, rarely to 1,200 m. *Habitats*: Lowland forest, oil palm, cocoa, mangroves, and heath forest; mostly in coastal

areas. *Food*: The stomach of a male collected on Mengalum on 3 June 1983 contained red fruits with 3-mm seeds (WFVZ). *Voice*: An often repeated *ke-woo*. DMB described a very loud, rich, ascending three-note call. *Food*: Mantids, stick insects, and caterpillars (DMB).

Chestnut-winged Cuckoo *Clamator coromandus*

Status: A scarce winter visitor. *Localities*: Keningau, Kinabatangan River, Labuan, Poring, Telipok, and Ulu Segama. *Elevation*: Sea level to 500 m. *Habitats*: 1° and 2° forest, woodlands, buffalo fields, and oil palm. *Migration dates*: The earliest record is a specimen from the Kinabatangan on 5 Oct. 1956 (Sabah Museum). The latest record is from Telipok on 8 Mar. 1965 (Sabah Museum). *Voice*: DMB described it as a harsh *chee-ke-kek* similar to the scolding note of a Brown Shrike.

Raffles's Malkoha *Phaenicophaeus chlorophaeus*

Status: A common resident, ubiquitous in forested lowland and upland areas. *Elevation*: Sea level to 1,100 m. *Habitats*: 1° and 2° forest, peatswamp, riverine forest, old rubber, cocoa, *Albizia*, and *Eucalyptus*. *Breeding*: DMB found a nest 8 m up in a tree at Klias on 7 Feb. 1961. It contained one glossy white egg. *Voice*: Four descending, slightly slurred whistles: *wee-wee-wee-wee*. Also, a string of separated notes, slightly descending at first: *ha-ha-ha-ha-ha-ha-ha*. *Remarks*: Lambert (1990c) recorded a mean foraging height of 20 m in 1° forest and 15 m in logged forest.

Black-bellied Malkoha *Phaenicophaeus diardi*

Status: An uncommon resident. *Localities*: Bettotan, Binsulok, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Kinabatangan River, Kudat, Lumerau, Maang, Maliau, Meliau River, Membakut, Mendolong, Menggalong, Poring, Quoin Hill, Sabah Softwoods, Sandakan, Sepilok, and Tabin. *Elevation*: Sea level to 1,000 m. Robson 1998b reported a sighting in Kinabalu Park at 1,700 m. *Habitats*: 1° and 2° forest, peatswamp, cocoa, and *Albizia*. *Voice*: *pwew-pwew* (Norman 1964).

Chestnut-bellied Malkoha *Phaenicophaeus sumatranus*

Status: An uncommon resident. *Localities*: Abai, Benoni, Binsulok, Bole River, Danum, Lumbidan, Membakut, Menggalong, Quoin Hill, Sabah Softwoods, Segarong, Sepilok, Tanjung Aru, and Telipok. *Elevation*: Sea level to 500 m. *Habitats*: 1° and logged forest, mangrove, peatswamp, cocoa, and *Albizia*. This is a distinctly coastal species. The only inland records are Bole River and Danum by Lambert (1990c) and Sabah Softwoods (WFVZ; Mitra and Sheldon 1993). *Voice*: A soft *chok-chok* (DMB). *Food*: Lepidoptera larvae and orthopterans.

Red-billed Malkoha *Phaenicophaeus javanicus*

Status: An uncommon resident. *Localities*: Beaufort, Bettotan, Bole River, Brumas, Danum, Gomantong, Kinabalu, Kudat, Labau River, Lamag, Lumbidan, Lumerau, Menggalong, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Sandakan, Segaliud River, Sepilok, Silabukan, Silam, and Tabin. *Elevation*: Sea level to 1,300 m; most records below 500 m. The WFVZ collected one at 1,300 m at Rinangisan, but this may have been an unusually high record caused by the El Niño drought. *Habitats*: 1° and logged forest, cocoa, *Eucalyptus*, and *Albizia*.

Voice: A clear whistled *who-oo* repeated every 10 s; also a variety of rattles and clicks. *Food:* Cockroaches, caterpillars (up to 7.8 cm, and a 5-g hornworm), walking sticks, and katydids (WFVZ).

Chestnut-breasted Malkoha *Phaenicophaeus curvirostris*

Status: A common resident, ubiquitous in forested lowland and upland areas. *Elevation:* Sea level to 1,100 m, most often below 800 m. *Habitats:* 1° and 2° forest, *Albizia*, cocoa, citrus, rubber, and gardens. *Breeding:* A male collected near Bole River on 14 Mar. 1982 had a 9 × 5-mm testis (WFVZ). A nest found at Saliwangan on 20 Feb. 1983 (WFVZ) was loosely constructed of rambutan twigs, lined with rambutan leaves, and placed at the top of a mangosteen tree (ca. 7 m). The outside dimensions were 35 cm in diameter and 13 cm deep. The egg cup was 11 cm across and 5 cm deep. The nest contained two fresh white eggs (34 × 27.5 mm and 34 × 29 mm). *Voice:* A loud *wee-oo*, lower on the second note. *Food:* Stick insects (up to 150 mm), beetles, orthopterans, and mantises (WFVZ). *Remarks:* Often participates in mixed species flocks, with drongos, woodshrikes, other malkohas, and magpies.

Bornean Ground Cuckoo *Carpococcyx radiatus*

Status: A rare and secretive endemic. *Localities:* The Royal Ontario Museum has a specimen collected by J. Bell at "Teuton" in 1895. Two specimens in the Sabah Museum were snared near Baturong Caves (1978 and 1980). Another specimen was snared 20 km north of Kalabakan in 1962 (Thompson 1966). *Elevation:* Sea level to 50 m. *Habitats:* 1° forest; possibly also forest growing on limestone soils. *Remarks:* We suspect that this species inhabits extremely low-elevation, flat, 1° forest, most of which is extirpated in Sabah.

Greater Coucal *Centropus sinensis*

Status: A common resident, generally in open and scrubby areas throughout the state. *Elevation:* Sea level to 750 m. *Habitats:* 1° and 2° forest, cocoa, swamp, riverine forest, *Albizia*, and scrub. *Breeding:* V. W. Ryves collected single-egg clutches at Kiau on 23 Mar. 1939 (27.5 × 23 mm) and Sandakan Estate on 24 Aug. 1938 (31 × 25 mm). The eggs were white, regularly oval, smooth, and slightly glossy (Gibson-Hill 1949b). WFVZ found a nest at Sabah Softwoods on 18 July 1982 that was 6 m up in a 3-yr-old *Albizia* tree. It was a large ball of grass and twigs (30 × 30 cm). It had a narrow entrance, was 20 cm deep, and was lined with dried leaves. The nest contained one white egg (14 g, 33.2 × 28.2 mm) and two chicks. One chick was much larger than the other (32.3 g vs. 10.9 g). DMB found nests with eggs in Sept. and Mar. and young in nests in Nov., Dec., Feb., and Mar. *Voice:* Pairs will duet with one repeating *boo-boo-boo* and the other singing *boo-up*, rising on the second part of the call. *Food:* Large insects, grubs, and trapped birds (Sharpe 1890a).

Short-toed Coucal *Centropus rectunguis*

Status: A scarce or rare resident, not nearly as common as in Malaya. *Localities:* Bole River, Danum, Klias Peninsula, Kulamba, Menggalong, and Sepilok. All are sightings or vocal records, and many are tentative. One by KVT (Gore 1968) in Papar padi fields is doubtful. *Elevation:* Sea level to 300 m. *Habitats:* 1°, old logged, swamp, and riverine forests. *Voice:* The call is a *boop* followed by a pause and then a series of descending *boops* that taper off. *Identification:*

This is a forest species, unlike Greater Coucal. It is similar in appearance to Greater Coucal, but its voice is distinctive.

Lesser Coucal *Centropus bengalensis*

Status: A common resident. *Localities:* Balambangan Island, Binsulok, Bodgaya Island, Bohey Dulang Island, Bongawan, Kaingaran, Kimanis, Kinabalu, Labuan, Lamag, Lumbidan, Maang, Manggis (Tambuyukon), Megatai, Membakut, Mendolong, Mumiang, Padas Damit, Poring, Sabah Softwoods, Sepilok, Tambunan, Tempasuk, and Tuaran. *Elevation:* Sea level to 1,500 m; most records below 700 m, one specimen at 1,500 m. *Habitats:* Swamp, logged forest, cultivated fields, *Acacia*, and *Albizia*. *Breeding:* Low collected one dull white egg (1.25 × 0.95 inches [31.8 × 24.1 mm]) on Labuan (Sharpe 1879b). A female collected near Binsulok on 9 Feb. 1983 had a fully formed oviduct egg with shell, a second full-sized oviduct egg, and three developed ova (WFVZ). DMB found nests from Dec. to May. The nests are large domed platforms of dead grasses and sedges, located in low tangled vegetation. *Voice:* There are two calls. One is *whoop-whoop-whoop* with three or four notes. The other is a repeated double note that is best described as *torup* or *chuk-duke*. The two calls are sometimes dueted.

Order STRIGIFORMES

Family TYTONIDAE

BARN OWLS

Barn Owl *Tyto alba*

Status: An introduced species, possibly locally common. *Localities:* Beaufort. *Remarks:* Smythies (2000) described the introduction of six pairs by Sabah Land Development Corporation at Beaufort on 31 Jan. 1991. By mid-1996, about 50 birds were estimated to breed locally. Subsequent introductions seem to have failed. A report of Barn Owls occurring in Sabah oil palm before the introduction lacked confirmation (Duckett 1987).

Oriental Bay Owl *Phodilus badius*

Status: An uncommon resident. *Localities:* Ambong, Bettotan, Danum, Gomantong, Kaingaran, Kota Kinabalu, Kulamba, Labuan, Maang, Mawau, Papar, Quoin Hill, Rampayan, Sepilok, Tawau Hills, and Wallace Bay. *Elevation:* Sea level to 750 m. *Habitats:* 1° and 2° forest, old rubber, and bamboo. *Voice:* A soft *kek-kek-kek* in flight (DMB).

Family STRIGIDAE

OWLS

Reddish Scops Owl *Otus rufescens*

Status: An uncommon resident. *Localities:* Bengkoka, Bole River, Danum, Kaingaran, Kinabalu, Lumerau, Saliwangan, and Sepilok. *Elevation:* Sea level to 1,500 m. *Habitats:* 1°, 2°, and logged forest. *Remarks:* Most records are from mist nets set at night. WFVZ found one roosting in a banana tree at Kaingaran.

Mountain Scops Owl *Otus spilocephalus*

Status: A locally common resident. *Localities:* Kaingaran, Kinabalu, Rinangisan, and Trus Madi. *Elevation:* 750–2,750 m. *Habitats:* Montane forest. *Voice:* A simple double note *hoo-hoo* or *poo-poo*.

Mantanani Scops Owl *Otus mantananensis*

Status: A common but very local resident. *Localities:* Mantanani Island. *Elevation:* Sea level. *Habitats:* Forest. *Breeding:* A female collected on 9 Mar. 1982 had a 3-mm ovary, but an enlarged oviduct that looked as though it recently carried an egg (WFVZ). *Voice:* A simple *waa* followed by a descending series of short *wa*'s. Pairs often duet. In a survey of Asian night birds, Marshall (1978) found that the female of this species has a lower, harsher voice than the male. *Remarks:* The population on Mantanani Island is surprisingly dense, judging by the number of calling birds.

Collared Scops Owl *Otus bakkamoena*

Status: A common resident. *Localities:* Abai, Garinono, Gum Gum, Kaingaran, Kasigui, Kiau, Kinabalu, Kulamba, Megatai, Melangkap, Mengalong, Poring, Sabah Softwoods, Sandakan, Sepilok, Tambunan, Tenom, Tiger Estate, and Tuaran. *Elevation:* Sea level to 800 m. *Habitats:* 2° forest, peatswamp, villages, grasslands, scrublands, and *Balsa* plantations. *Breeding:* V. W. Ryves collected five clutches of two eggs each in the region between Kota Belud and Kiau on 28 Jan. and 6, 9, 16, and 21 Mar. 1939. The eggs were white, regularly oval (almost spherical), smooth, and slightly glossy. Average dimensions were 33 × 28.6 mm (Gibson-Hill 1949b). Sharpe (1889a) described an egg found on 20 Mar. 1888 on Kinabalu (1.45 × 1.2 inches [36.8 × 30.5 mm]). DMB observed a nest in the hollow base of a *Jambu* tree. It contained two dozen empty snake eggs and two spherical white eggs, 31.0 × 28.0 mm. *Voice:* A single note *wok* reminiscent of dripping water. *Food:* The stomach of a specimen collected at Sabah Softwoods contained the remains of an unidentified small rodent and a large orthopteran (WFVZ).

Rajah's Scops Owl *Otus brookii*

Status: A rare resident known in Sabah from a specimen found dead at 1,900 m on the summit trail of Kinabalu in 1986 (Jenkins et al. 1996). Unfortunately, this specimen has disappeared, but there may be a 1999 specimen from the park mounted in the park's collection (RGM; P. Rasmussen, pers. comm.).

Barred Eagle Owl *Bubo sumatranus*

Status: An uncommon resident. *Localities:* Apas-Balung, Danum, Kiau, Kimanis, Klias Peninsula, Malangkap, Melalap, Padas Damit, Poring, Sandakan, Segarong, Sepilok, and Tawau. *Elevation:* Sea level to 1,000 m. *Habitats:* 1° and 2° forest, cultivated areas, and tree plantations. *Voice:* An occasional low pitched *who-who*.

Buffy Fish Owl *Ketupa ketupu*

Status: A common resident. *Localities:* Bengkoka, Binsulok, Bole River, Danum, Gomantong, Inanam, Kimanis, Klias Peninsula, Labuan, Lamag, Madai, Melalap, Meliau, Pandasan, Papar, Sabah Softwoods, Saliwangan, Sandakan, Tawau Hills, and Tempasuk. *Elevation:* Sea level to 400 m. *Habitats:* 1° and logged forest, swamp, estuaries, and river edges. *Breeding:* DMB found nests between Nov. and Apr. around Papar. Two eggs, averaging 58.0 × 46.0 mm, were always present. *Voice:* *Whoo-oo*. *Food:* Fish, frogs, crabs, and insects. A bird collected at Sabah Softwoods on 23 June 1982 contained a large scorpion (WFVZ). One

observed at the mouth of Gomantong caves took injured or weakly flying swiftlets as they emerged in the morning (WFVZ).

Collared Owlet *Glaucidium brodiei*

Status: A common resident. *Localities:* Kaingaran, Kalabakan, Kenakok Valley, Kinabalu, Rinangisan, Sinsuran Road, Trus Madi, and Ulu Balung. *Elevation:* 750–2,100 m, occasionally lower. *Habitats:* Montane forest. *Voice:* Two monotone phrases separated by a pause. The first is *poop-te-poop-poop*, followed by *poop-te-poop*. *Food:* One at Kaingaran that had just caught an Ashy Drongo and had grasshoppers and insect parts in its stomach (J. Boys). One was caught at Moyog while attempting to eat a large beetle caught in a mist net (WFVZ).

Brown Hawk Owl *Ninox scutulata*

Status: A common resident, whose population numbers are augmented by winter visitors. *Localities:* Bengkoka, Bole River, Kalabakan, Kaingaran, Kaung, Kinabalu (lower slopes), Labuan, Lamag, Lumerau, Mantanani Island, Megatai, Menggalong River, Pandasan, Ranau, Saliwangan, Sandakan, Segarong, Sepilok, Sipadan Island, Tembungo, Tenom, and Ulu Segama. *Elevation:* Sea level to 1,500 m. *Habitats:* 1° and 2° forest, grasslands, and scrublands. *Breeding:* V. W. Ryves collected a single egg at Kaung on 9 Feb. 1939. It was white, smooth, slightly glossy, and regularly oval (almost spherical), 35.5 × 32 mm (Gibson-Hill 1949b). Low collected a single white egg (0.95 × 0.8 inches [24.1 × 20.3 mm]) on Labuan (Sharpe 1879b). *Voice:* A two-note call repeated a variable number of times. The second note is louder and on a higher pitch. *Food:* Insects, especially moths, beetles, and dragonflies. *Remarks:* The resident subspecies, *N. s. borneensis*, is joined in the winter by a few *N. s. burmanica* from mainland Asia.

Brown Wood Owl *Strix leptogrammica*

Status: An uncommon resident. *Localities:* Apas River, Bengkoka, Bole River, Brumas, Danum, Kenakok, Klias Peninsula, Lumbidan, Lumerau, Maliau, Penampang, Quoin Hill, Rayoh, Sabah Softwoods, Sandakan, Segarong, Sepilok, Tabin, and Ulu Tiulon. *Elevation:* Sea level to 1,000 m. *Habitats:* 1° and logged forest, *Albizia*, and old rubber. *Voice:* A hoarse *whoh-whoh* with both notes on the same pitch. They also make a bark-like noise, *ack-ack-ack-ack*. DMB attributed a deep *hua-hoo-oo-oo* to this species. *Food:* Insects.

Order CAPRIMULGIFORMES
Family BATRACHOSTOMIDAE

FROGMOUTHS

Because frogmouths are nocturnal and unobtrusive, little is known about their status, distribution, or ecology in Sabah. We list all species as scarce or rare. However, some may more common than we realize.

Large Frogmouth *Batrachostomus auritus*

Status: A rare resident. *Localities:* Danum (sighting; Lambert 1990a; Yong 1997) and Merutai Besar (specimen, BMNBE). *Elevation:* Lowland (the only specimen is from 150 m). *Habitats:* 1° forest. *Remarks:* R. Sims (unpubl.) noted that the specimen collected at Merutai Besar was darker than specimens from Sarawak, nearly as dark as the smaller Dulit Frogmouth. The status of Large and Dulit frogmouths is discussed by Harrisson and Smythies (1959).

[Dulit Frogmouth *Batrachostomus harterti*

Status: No verified Sabah records exist. However, it is a Bornean endemic that frequents lower montane forests and is expected to occur in Sabah. The few Bornean records are from upland areas in Sarawak and northern Kalimantan. Sightings exist from above Poring (Smythies 2000), but confusion with Large Frogmouth is possible (see above).]

Gould's Frogmouth *Batrachostomus stellatus*

Status: A scarce resident. *Localities:* Bettotan, Gum Gum, Kulamba, Lumerau, Sandakan, and Silabukan. *Elevation:* Sea level to 100 m. *Habitats:* 2° forest, presumably also 1° forest. *Remarks:* The Lumerau and Silabukan records were voice identifications (CMF), the Kulamba record is a photograph (Smythies 2000), the others were based on specimens. The only modern specimen is a bird collected at Gum Gum on 4 Sept. 1985 (SWD).

Short-tailed Frogmouth *Batrachostomus poliolophus*

Status: A rare resident. *Localities:* Kinabalu and Trus Madi (unconfirmed). *Elevation:* Confirmed at ca. 1,500 m; vocalizations reported from 1,500 to 2,540 m (Jenkins et al. 1996; Yong 1997). *Breeding:* The only confirmed record for Sabah is based on published color photographs of a bird sitting on a nest near Kinabalu Park Headquarters (ca. 1,500 m) in late Apr. 1982 (S. Phillipps 1982). The nest was placed at the edge of a clearing about 1 m above the ground on a thin sapling branch. It was a small, whitish pad, ca. 7 cm across, finely woven from cobwebs or similar soft material. The single nestling was incubated by the male during the day (Smythies 2000).

Sunda Frogmouth *Batrachostomus cornutus*

Status: A scarce resident. *Localities:* Kudat (RMC specimen, Chasen and Kloss, 18 Sept. 1927), Maang (specimen, WFVZ, 12 July 1983), Mawau (sighting, DMB), and Segaliud River (specimen; Nicholson 1883). *Elevation:* Sea level. *Habitats:* 2° forest and overgrown rubber. *Voice:* A whistle that rapidly ascends and then descends, with the greatest emphasis on the highest note; also some gruff grunts. Responds well to imitations of its call. *Remarks:* Smythies (1957) reported the specimen of Chasen and Kloss as coming from Banggi Island, but the specimen label says Kudat.

Javan Frogmouth *Batrachostomus javensis*

Status: A rare resident. *Localities:* Banggi Island (RMC specimen, Chasen and Kloss, 2 Sept. 1927), Bole River and Danum (Lambert 1990a), and Poring (photograph; Hitoshi et al. 1996 in Smythies 2000). *Habitats:* 1° and logged forest (Lambert 1990a). *Breeding:* Smythies (2000) described a nest photographed at Poring (Hitoshi et al. 1996), but provided no date. The nest was a whitish soft pad built on a slender horizontal branch, with nest materials trailing downward. This description is similar to that for Short-tailed Frogmouth.

Family CAPRIMULGIDAE

NIGHTJARS

Malaysian Eared Nightjar *Eurostopodus temminckii*

Status: A common resident. *Localities:* Batu Putih, Bole River, Brumas, Dan-

um, Kimanis, Klias Peninsula, Kulamba, Maliau, Megatai, Membakut, Merutai, Papar, Poring, Sabah Softwoods, Sepilok, Tambunan, Tawau Hills, Tenom, and Tenompok. *Elevation*: Sea level to 500 m; single voice record at 1,100 m (Smythies 1964b). *Habitats*: 1°, 2°, logged, and riverine forest; padi and *Albizia*. *Voice*: A three-note call described as *what-to-do* or *tok-tadow*, heard at dawn and dusk.

Large-tailed Nightjar *Caprimulgus macrurus*

Status: A common resident of lowland areas and islands. *Elevation*: Sea level to 400 m; one specimen from Bundu Tuhan, ca. 1,200 m (SMC). *Habitats*: Open areas; scrub, grasslands, heath forest, mangrove, and villages. *Breeding*: Lays two eggs on the ground. Low reported that eggs are variable in shape and markings. They generally have faint purplish lines and blotches over a creamy buff background (Sharpe 1879b). Sharpe (1890a) described eggs (1.25 × 0.9 inches [31.8 × 22.9 mm]) collected on 2 Apr. as pale creamy yellow with pale gray and brown markings. Nesting records include two eggs on the ground on 9 Apr. 1984 at Kulamba (J. Payne); four nests on Pulau Tiga from 16 to 19 Apr. 1985 (Phillipps 1985a), one with two eggs, another with two nearly fledged young, the third with one nearly fledged young, and the fourth with a single fresh egg; and a nest consisting of two eggs about 25 m from the ocean at Mempakul, 3 May 1983 (WFVZ). *Voice*: A *tok* or *chok* repeated several times. It sounds like wood-chopping or a stone thrown on thick ice. Also, a low *kurruk* (DMB).

Gray Nightjar *Caprimulgus indicus*

Status: An uncommon winter visitor. *Localities*: Kamborangoh, Kiau, Kimanis, Kinabalu, Lamag, Megatai, Selinagan Island, Tambunan, and Ulu Segama. *Elevation*: Sea level to 2,000 m, most common above 750 m. *Habitats*: 2° and logged forest. *Voice*: A rapidly repeated *cruck* (Phillipps 1986). *Remarks*: DMB netted an individual at Kimanis on 30 Dec. 1961 that had been identified in flight as Large-tailed Nightjar. De Silva and Chong (1974) observed this species on Selinagan Island in Sept. 1973. There are several sightings at Kinabalu Park of birds hawking insects, including in Dec. and Mar. (year not specified; Phillipps 1986; Jenkins et al. 1996).

[Savanna Nightjar *Caprimulgus affinis*

Status: All Sabah records are questionable. An individual was apparently banded at Tuaran in Oct. 1964 by Sabah Museum (Gore 1968). KVT observed birds near Papar Beach in the summer of 1966, but was unable to confirm the identification.]

Bonaparte's Nightjar *Caprimulgus concretus*

Status: A rare resident, known only from old or unconfirmed records. Ussher collected this species at Lumbidan (Sharpe 1879c), and T. Harrison apparently saw one in the Mt. Danum area during 21–22 Feb. 1965 (Fogden 1965). No other records exist from Sabah.

Order APODIFORMES

Family APODIDAE

SWIFTS

Swiftlets (genus *Collocalia*).—The biology of Sabah's four species of swiftlets was studied by Charles Francis (CMF) from 1981 to 1984. He summarized his

findings on identification, taxonomy, ecology, and distribution in a report to the Forest Department (Francis 1987). Much of our information on *Collocalia* species derives from his report. Another study of swiftlets, based largely on observations and specimen collected in Sabah, is by Lee et al. (1996). They examined the link between swiftlet phylogeny, nesting, and other behaviors. Also see Chasen (1931).

The two commercially valuable species of swiftlet are the Edible-nest Swiftlet and Black-nest Swiftlet. These species nest and roost colonially in caves. Their nests are composed of a sticky, salivary-gland secretion (nest-cement) and are prized as food and medicine. Black-nest Swiftlet nests are so-called because they consist partly of feathers, and the presence of these feathers reduces their commercial value. The two other species of swiftlet, Mossy-nest and White-bellied, are also colonial cave-nesters, but their nests are not commercially valuable.

Swiftlet caves are located at the following sites: Baladut, Balambangan Island, Batangan, Batu Mandi, Batu Pang, Batu Punggul, Baturong, Batu Timbang, Berhala Island, Bodgaya Island, Bod Tai, Gomantong, Keruak, Lime Cave, Madai, Mantanani Island, Materis, Melikop (Obang-obang), Melobang, Panggi, Pun Batu, Segarong, Senobang, Si Amil Island, Supu, Tepadong, and Ulu Resang. The caves at these sites are limestone-based, except for those on Berhala Island, which are sandstone. In the species accounts below, we list specimen localities only.

Black-nest Swiftlet *Collocalia maxima*

Status: A common resident. *Localities:* Batu Timbang, Bettotan, Bole River, Brumas, Danum, Gomantong, Labuan, Mantanani Island, Segarong, Sinsuran Road, and Tabin. *Elevation:* Specimens from sea level to 1,200 m. *Breeding:* This species requires at least one month to build its nest, ca. 28 days to hatch its one egg, and up to eight weeks to fledge the young. Egg-laying begins at Gomantong in late Mar. and Apr. and may continue to June when nests are collected. The eggs are white and samples from Gomantong were $22.4\text{--}24.3 \times 15.1\text{--}15.7$ mm ($n = 4$). If the nest is destroyed early in the breeding season, the birds usually build and lay again. The nests are composed of white nest-cement and the birds' own feathers. Nests are stiff and self-supporting and often built close together. In some cases nests are attached to one another. *Voice:* Twittering flight calls. DMB noted a distinct *cree-ar-crure* call. *Identification:* This species is larger than other Bornean *Collocalia* species. It is uniformly dark blackish brown above (although the rump is slightly paler in some races) and paler brownish gray with dark shaft streaks below. The downy bases of the rump feathers are usually dark, sometimes having small white tips. The tarsus is heavily feathered, with a row of six or seven small feathers on the outer side and about four feathers on the inner side. The species looks much like an Asian Palm Swift, but has the fluttery flight of a swiftlet.

Mossy-nest Swiftlet *Collocalia salangana*

Status: A common resident. *Localities:* Batu Punggul, Baturong, Bettotan, Bongawan, Dallas, Gomantong, Imbak River, Kubonatok, Lahad Datu, Lumu-lumu, Madai, Mantanani, Segarong, and Wallace Bay. *Elevation:* Specimens from sea level 1,400 m. *Breeding:* Nests are composed of mosses, liverworts, and filmy ferns glued with salivary nest-cement. Because the cement is not hard, the nests are not self-supporting and are always attached to an irregularity or shelf on the cave wall. Its breeding season at Gomantong is similar to that of Black-nest

Swiftlet, starting in late Mar. and Apr., but lasting somewhat longer. Two eggs are laid about 3 days apart. Incubation starts soon after the first egg is laid and takes ca. 23 days for each egg; hatching is asynchronous. Egg sizes from Gomantong are in the range $19.2\text{--}22.2 \times 13.1\text{--}14.9$ mm ($n = 25$). *Identification*: Except for their mossy nests, Mossy-nest Swiftlets are virtually indistinguishable from Edible-nest Swiftlets. They are uniformly dark blackish brown above, and paler and grayish below. The downy bases to rump feathers usually are dark, with little or no white (but see Taxonomy). The tarsi are bare or have at most four feathers on the outer side. *Taxonomy*: Also known as Uniform Swiftlet. Bornean birds were originally placed in the species *C. salangana*, until it was realized that their nest is the same type as *C. vanikorensis* in other parts of SE Asia. They were then placed in the subspecies *salanganus*. Based on Salomonsen's (1983) revision of the genus, Inskipp et al. (1996) removed *salangana* from *vanikorensis*.

Edible-nest Swiftlet *Collocalia fuciphaga*

Status: A common resident. *Localities*: Anginon, Baturong, Berhala Island, Gomantong, Madai, Mantanani, Membakut, Menggalong, Quoin Hill, and Segarong. *Elevation*: Specimens from sea level to 1,200 m. *Breeding*: This species requires at least one month to build its nest, 23 days to hatch its (usually) two eggs, and about six weeks to fledge the young. At Gomantong, most individuals lay in late Feb. and Mar. and continue through Apr. and May, if their nests are collected. (MCT collected a female 30 June 1962 at Quoin Hill with an enlarged oviduct and a 7-mm ovum.) If the nest is lost early in the nesting season, the birds will rebuild, but may not lay two eggs. Initially, eggs are laid about 3 days apart, with incubation starting soon after the first egg is laid. Egg size is similar to that of Mossy-nest Swiftlet. The nest is composed entirely of nest-cement. Although it is stiff and may be attached to a vertical or sloping wall, the nest is sometimes built on a shelf. Unlike those of Black-nest Swiftlets, these nests are usually dispersed instead of clustered. *Identification*: Brownish black above, sometimes with a slight gloss; paler below. The inland form has a uniform rump and back, whereas island species have a paler whitish rump. The tarsus is lightly feathered, and the downy barbs at the bases of the rump feathers have white tips. The Black-nest Swiftlet is distinctly larger. The Mossy-nest Swiftlet is much like the inland form, but (usually) has uniformly blackish brown bases to the rump feathers. *Taxonomy*: Also called the White-nest Swiftlet. It is sometimes split into two species, the Gray-rumped Swiftlet, *C. fuciphagus* (including the subspecies *germani* and *perplexus*), and the Brown-rumped Swiftlet, *C. vestita*. Subspecies are distributed as follows. The subspecies *vestita* occurs in inland caves such as Gomantong, *germani* occurs on islands on the West Coast, including Mantanani and possibly Balambangan, and *perplexa* occurs on Berhala Island

Glossy Swiftlet *Collocalia esculenta*

Status: An abundant resident in open areas. *Elevation*: Sea level to 3,900 m. *Breeding*: V. W. Ryves collected 66 eggs at Kabayau on 5 Feb. 1939. The eggs were white, egg-shaped, and smooth with average dimensions 18.2×11.8 mm (Gibson-Hill 1949b). WFVZ found nests with nestlings in a culvert under Sinsuran Road (1,450 m) on 2 May 1982. RGM observed nesting at 1,500 m on Sinsuran Road in July 1998. DMB observed breeding in tunnels, crevices, and buildings around Kimanis. Nests with eggs were found Jan.–Apr., Oct., and Nov.

Nests with young were found in May and June. Burgess (1961b) observed a colony of 2,000–3,000 individuals in a small sandstone cave at Kampong Gelam, Sandakan. Although a few eggs were present at all times, he noted two distinct laying seasons, one at the end of Mar. and the other in early June. The chicks fledged five weeks after egg-laying. Francis (1987) described the nests as vegetable matter (including mosses, liverworts, ferns, casuarina needles, and seeds) glued together with varying amounts of white nest-cement and attached to a cave wall. Typically two eggs are laid; samples from Gomantong measured 16.7–19.1 × 10.6–11.8 mm ($n = 14$). *Identification*: Smaller than the other swiftlets and the only *Collocalia* with a white belly. *Remarks*: The name “*esculenta*” means edible in Latin, but although this species produces white nest-cement, there is never enough to make the nests commercially valuable (Francis 1987).

[Waterfall Swift *Hydrochrous gigas*

Status: A migrant known in Sabah only from a few sightings, none of which is substantiated. *Localities*: Gulisaan Island (17 July 1965; Harrison 1966), Kalabakan (Norman 1964), Kinabalu (Hornskov 1989), Klias (10 Sept. 1960, DMB), and Nosong (19 Jul. 1960, DMB). *Taxonomy*: Although formerly considered a swiftlet (*Collocalia*), the size and solitary nesting habits of this species distinguish it from typical swiftlets (Francis 1987).]

Brown-backed Needletail *Hirundapus giganteus*

Status: An uncommon resident and winter visitor. *Localities*: Bole River, Brumas, Danum, Imbak River, Kinabalu, Labuan, Lumerau, Membakut, Mendolong, Poring, Pulau Tiga, Ranau, Rinangisan, Sabah Softwoods, Sepilok, Silabukan, Silam, Sinsuran Road, Tabin, Tempasuk, Ulu Segama, and Wallace Bay. *Elevation*: Sea level to 1,700 m. *Habitats*: Any habitat with flying insects, especially over water, fields, roads, and marshes. *Migration dates*: These are difficult to determine because of confusion between migrants and residents. Records occur in all months of the year. B&W observed eight individuals at Tempasuk that they believed to be migrants flying inland from the sea on 10 Sept. 1984. *Remarks*: Some daily movements of these birds are remarkably predictable. For example, flocks going to roost will often travel along a road or river at exactly the same time each evening (WFVZ).

White-throated Needletail *Hirundapus caudacutus*

Status: A rare migrant. *Localities*: Balambangan Island (Wells 1978), Mawau (DMB), Papar (DMB), and Tembungo (DMS). *Elevation*: Sea level. *Habitats*: Coastal areas, hills, and ridgelines; often hunts over water. *Remarks*: An individual from Tembungo on 4 Oct. 1981 was well described (Simpson 1982a). It had a white throat and a buffy center of the back, which contrasted with a dark tail and wings. DMB observed three groups on 8 Oct. 1959 moving northeast over Mawau. He also saw groups at Papar on 3 Apr. 1960 and 11 Apr. 1960.

Silver-rumped Needletail *Rhaphidura leucopygialis*

Status: A common resident, locally abundant at times. *Localities*: Balambangan Island, Banggi Island, Batu Punggul, Bettotan, Bole River, Brumas, Danum, Gaya Island, Klias Peninsula, Labau River, Labuan, Lumerau, Maliau, Mantanani Island, Meliau River, Membakut, Mendolong, Merintaman, Poring, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Sebatik Island, Sepilok, Sepulut, Sila-

bukan, Silam, Sinsuran Road, Tabin, and Tawau. *Elevation*: Sea level to 1,300 m. *Habitats*: 1° and 2° forest, peatswamp, streams, *Albizia*, and clearings. *Breeding*: Of three birds collected near the Bole River on 4 Mar. 1982, a male had enlarged testes (5 mm) but the two females were not in breeding condition (WFVZ). A female collected at Quoin on 28 June 1962 by MCT had a well-developed brood patch.

Fork-tailed Swift *Apus pacificus*

Status: An uncommon migrant. *Localities*: Balambangan Island, Bukit Garam, Mumiang, Pulau Tiga, Sipidan Island, Tanjung Aru, Tembungo, Tempasuk, and Ulu Segama (all sightings). *Elevation*: Sea level to 300 m, but probably occurs higher. *Habitats*: This species often feeds in flocks over open areas, but may be encountered in any habitat during migration. *Migration dates*: The earliest record is a single individual circling the Tembungo oil rig on 22 Sept. 1981 (DMS). Wells (1978) reported them at Balambangan Island in Apr. 1977, and Heath (in Smythies 2000) observed them in Apr. 1993 at Tanjung Aru and Pulau Tiga.

House Swift *Apus affinis*

Status: A common resident. *Localities*: Berhala Island, Bohey Dulang, Kainangan, Kasigui, Kimanis, Klias Peninsula, Kota Kinabalu, Kuala Penyu, Labuan, Membakut, Padas Damit, Papar, Parang Besar, Rinangisan, Selingaan Island, Tawau, and Tempasuk. *Elevation*: Sea level to 1,450 m. *Habitats*: Towns, agricultural areas, coastal regions, and any open habitat. *Breeding*: Nests can be found in colonies under house eaves, in caves, on cliffs, and under bridges. Breeding colonies have been reported from Bohey Dulang, Kimanis, Membakut, and Tawau. A colony examined on 26 Apr. 1983 under a highway bridge near Membakut had about 20 multichambered nests with one to six chambers each (WFVZ). Some chambers were empty, others contained up to three eggs or two chicks. A few had a combination of eggs and chicks. If a chick was near fledging, it was always alone in the nest. Although three eggs occurred in nests, three chicks were never present.

Asian Palm Swift *Cypsiurus balasiensis*

Status: A common resident. *Localities*: Bongawan, Kaingaran, Keningau, Kimanis, Kinabalu, Kuala Penyu, Kudat, Labuan, Likas, Lok Kawi, Manggis (Tambuyukon), Mumiang, Padas Damit, Papar, Sepilok, Sibuan, Tawau, and Tempasuk. *Elevation*: Sea level to 750 m. *Habitats*: Any open habitat with appropriate palms. Because most palms occur in coastal regions and as ornamentals in towns, these are the principal habitats of this species. *Breeding*: Smythies (1957, 1960) reported that they breed in palms with broad-edged leaves (*Borassus*, *Livistona*, and *Areca*), but not those with pinnate leaves. Palm Swifts may roost in other palms, and DMB has found them breeding in coconut palms. The nest is attached to the underside of the palm frond. *Identification*: Noticably elongate body and wings compared to swiftlets. *Voice*: A very sharp, high-pitched *tew-tew-tew-tew-tew*.

Family HEMIPROCNIIDAE

TREESWIFTS

Whiskered Treeswift *Hemiprocne comata*

Status: A common resident. *Localities*: Batu Punggul, Bettotan, Bole River,

Brumas, Danum, Ensuan, Kimanis, Kulamba, Labuan, Lumbidan, Lumerau, Maliau, Menggalong, Poring, Quoin Hill, Rayoh, Saliwangan, Sandakan, Sebatik Island, Sepilok, Silam, Tabin, Tawau Hills, Ulu Segama, and Wallace Bay. *Elevation*: Sea level to 500 m. *Habitats*: Logged forest, kerangas, clearings, mangrove, roadsides, and other open habitats. *Breeding*: Low collected one white egg (1.25 inches [31.8 mm] in diameter) from a nest in Feb. 1876 (Sharpe 1879b). WFVZ collected a female near the Bole River on 28 Feb. 1982 that had one large oviduct egg and another that was 4×4 mm. *Voice*: Their squeaky calls can be heard along roadsides, even at midday when most other species are quiet. *Identification*: Tree swifts are easily differentiated from true swifts by their longer wings and tails. Also, they commonly hawk insects from exposed perches and make short sallying flights instead of always hunting on the wing as do true swifts.

Gray-rumped Treeswift *Hemiprocne longipennis*

Status: A common resident. *Localities*: Balambangan Island, Banggi Island, Batu Punggul, Bengkoka, Bettotan, Binsulok, Bole River, Brumas, Danum, Kainangan, Kota Kinabalu, Labau River, Labuan, Lamag, Lumaku, Lumbidan, Lumerau, Maang, Makaniton, Maliau, Manggis (Tambuyokon), Megatai, Menggalong, Mumiang, Pandasan, Papar, Petagas, Poring, Pulau Tiga, Quoin, Rinangisan, Saliwangan, Sandakan, Segarong, Sepilok, Silabukan, Sinsuran Road, Tabin, Trus Madi, Ulu Tiulon, and Wallace Bay. *Elevation*: Sea level to 1,050 m. *Habitats*: 1° and logged forest (often on emergent trees), peat swamp, kerangas, mangrove, mature rubber, beach strand, and road sides. *Breeding*: WFVZ observed a pair copulating on 10 Oct. 1981 at Ulu Tiulon. DMB observed nests from Dec. to Feb. A chick that hatched on 1 Jan. fledged on 8 Feb. *Identification*: Larger size and longer tail distinguish Gray-rumped Treeswift from Whiskered Treeswift when facial pattern is not visible. This species tends to perch higher up in taller trees than Whiskered Treeswifts. They have a gliding, wheeling flight, with their wings held below horizontal.

Order TROGONIFORMES

Family TROGONIDAE

TROGONS

Diard's Trogon *Harpactes diardii*

Status: A common resident. *Localities*: Batu Punggul, Beluran, Bengkoka, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Ensuan, Kalabakan, Kulamba, Labau River, Lamag, Lumbidan, Lumerau, Magdalena, Makaniton, Mendolong, Poring, Quoin Hill, Ranau, Sabah Softwoods, Samawang, Sandakan, Sepilok, Silam, Tabin, and Tawau Hills. *Elevation*: Sea level to 1,000 m. *Habitats*: 1° and logged forest, riverine forest, cocoa, and *Albizia*. Generally less common in logged forest than in 1° forest. However, Diard's is the only trogon still found in significant numbers after logging (Lambert 1990c). *Breeding*: A nest was found by park staff at Tawau Hills, 23 May 2000, consisting of a hole in a stump about 1 m off the ground. It contained one white egg and one naked chick. A male from Quoin Hill had testes 6×3 mm on 5 Sept. 1962 (MCT). Pertinent WFVZ records include one male from Bole River with testes 7×4 mm on 20 Feb. 1982, another from Brumas with testis 8.5×5.5 mm on 8 May 1982, and a female from Silam Plantation with ova 3 mm on 9 Apr. 1982. *Voice*: A series

of 8–10 notes that descends on the first two notes and then remains constant for the rest: *peoo-peoo-pew-pew-pew . . .* *Food:* Stick insects, caterpillars, beetles, and orthopterans (WFVZ).

Red-naped Trogon *Harpactes kasumba*

Status: A common resident. *Localities:* Batu Punggul, Bengkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Lamag, Lumerau, Maliau, Magdalena, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang River, Sandakan, Sebatik Island, Sepilok, Silabukan, Tambuyukon, and Tawau Hills. *Elevation:* Sea level to 1,200 m. *Habitats:* 1° and 2° forest (rarely), old *Albizia*, and bamboo. Although occasionally found in logged forest, this species apparently avoids highly degraded habitat and relies on islands of 1° forest within logged tracts (Lambert 1990c; WFVZ). *Voice:* One note followed by several on a slightly higher pitch, softly and slowly: *pew, pew-pew-pew . . .* The call does not descend, in contrast to those of Diard's and Scarlet-rumped trogons. *Food:* Stick insects (WFVZ).

Whitehead's Trogon *Harpactes whiteheadi*

Status: An uncommon Bornean endemic. *Localities:* Kaingaran, Kinabalu, Mt. Ibul, Poring, Rinangisan, Sayap, Sinsuran Road (Menkaladom), and Trus Madi. *Elevation:* 900–2,000 m. *Habitats:* Montane forest. *Breeding:* A female collected on 23 Mar. 1983 at Rinangisan had a ruptured ovarian follicle and a 6-mm ovum (WFVZ). *Voice:* One vocalization is one to four, easily copied, hoarse, upward-slurred whistles, all on the same note. A variation of this has the cadence *poop-poop, poop-poop-poop*. A second vocalization is a heavy churring sound. *Identification:* The only Bornean trogon with a red crown and nape (males). In juveniles, cinnamon feathers are mixed in with the red on the head.

Scarlet-rumped Trogon *Harpactes duvaucelii*

Status: A common resident. *Localities:* Beluran, Bengkoka, Bettotan, Bole River, Brumas, Danum, Gomantong, Kabayau, Kalabakan, Kimanis, Kinabalu, Klias Peninsula, Kulamba, Kunatong, Labau River, Labuk Road (mile 17), Lamag, Lumbidan, Lumerau, Madai, Maliau, Megatai, Meliau River, Menggalong, Pintasan, Poring, Quoin Hill, Ranau, Sabah Softwoods, Saliwangan, Samawang River, Sandakan, Segaliud River, Sepilok, Silabukan, Simatuoh, Tabin, Tawau Hills, Ulu Balung, and Ulu Tiulon. *Elevation:* Generally sea level to 500 m. However, D. Yong had a sighting at 1,500 m in Kinabalu Park (Phillipps 1986). *Habitats:* 1°, logged, and 2° forest; peatswamp, old rubber, and *Albizia*. In lowland 1° forest, this and Diard's Trogon are the commonest species. *Voice:* A descending scale starting with a slow sequence of notes, then quickly turning into a downward trill. This species is highly ventriloquial and difficult to find by voice. *Food:* Caterpillars (DMB; Norman 1964).

Cinnamon-rumped Trogon *Harpactes orrhophaeus*

Status: An uncommon resident. *Localities:* Bettotan, Bole River, Brumas, Danum, Kalabakan, Megatai, Poring, Quoin Hill, Sayap, Sepilok, Silabukan, Tabin, and Ulu Dusun. *Elevation:* Sea level to 1,000 m; sightings at 1,100 m at Poring and 1,550 on Kinabalu (Jenkins et al. 1996). *Habitats:* 1° and 2° forest. *Breeding:* WFVZ collected a male (testis 5 mm) and a female (two large yolks) on 2 Mar. 1982 near the Bole River, and RGM collected a female with ovary 10 × 8 mm,

largest ovum 4 mm, and oviduct enlarged on 2 July 2000 at Sayap. *Food*: Stick and leaf insects (WFVZ). *Remarks*: This species is a mystery. In Malaya it is found only in extreme, flat lowlands (D. Wells; Gibson-Hill 1949a). In Sabah it occurs from lowland to lower montane forest, and definitely in 2° forest, but it never is common.

Orange-breasted Trogon *Harpactes oreskios*

Status: An uncommon resident. *Localities*: Bole River, Brumas, Danum, Kainangan, Keningau, Kiau, Kinabalu (lower slopes), Labau River, Lumaku, Magdalena, Maliau, Megatai, Mengkaladom, Poring, Ranau, Tambunan, and Tawau Hills. *Elevation*: 200–1,200 m, occasionally to 1,500 m. This species occurs in highland and lower montane areas. *Habitats*: 1° and old 2° forest. *Breeding*: V. W. Ryves collected a single egg at Kiau on 8 Mar. 1939. The egg was uniform ivory yellow, smooth, and glossy, with dimensions 29 × 21 mm (Gibson-Hill 1949b). *Voice*: A repeated whistle on the same note: *pew-pew-pew* Sometimes the call descends a bit at the end. Also a series of harsh grunts. It is extremely ventriloquial, but not shy.

Order CORACIIFORMES

Family ALCEDINIDAE

KINGFISHERS

Banded Kingfisher *Lacedo pulchella*

Status: An uncommon resident. *Localities*: Batu Punggul, Beaufort, Bengkoka, Bole River, Brumas, Danum, Kalabakan, Kinabalu, Labau River, Lumaku, Lumbidan, Maang, Magdalena, Maliau, Menggalong, Saliwangan, Sandakan, Sinsuran Road, and Sepilok. *Elevation*: Sea level to 1,500 m. *Habitats*: 1°, 2°, and swamp forest; peatswamp and old rubber. *Voice*: A soft call, all on one pitch, starting with a long introductory note and speeding up with long and short notes interspersed. *Food*: Beetles, locusts, and a large satyrid butterfly (DMB).

Rufous-collared Kingfisher *Actenoides concretus*

Status: A common resident. *Localities*: Anginon, Bengkoka, Bettotan, Bole River, Brumas, Danum, Gomantong, Kabayau, Kaingaran, Kalabakan, Kiau, Kinabalu (lower slopes), Kudat, Labuan, Lumerau, Maang, Maliau, Mokodau, Poring, Saliwangan, Sandakan, Segaliud River, Sepilok, Silabukan, Simatuoh, Sinsuran Road, Tawau, Tawau Hills, Ulu Dusun, and Ulu Kimanis. *Elevation*: Sea level to 1,200 m, but listed to 1,650 m by Gore (1968). *Habitats*: 1°, logged, and riverine forest; and old rubber. *Breeding*: V. W. Ryves collected a clutch of two eggs at Kiau on 21 Feb. 1939. The eggs were white, regularly oval, smooth, and very slightly glossy, 38 × 31 mm and 36.5 × 30.5 mm (Gibson-Hill 1949b). WFVZ found a nest near the Bole River on 21 Feb. 1982 consisting of a hole (4 inches [10.2 cm] in diameter) that extended almost 1 m horizontally into a mud embankment (no water nearby). A female sat on the two eggs (32 × 29 mm and 34 × 30 mm). A female collected on 11 Apr. 1981 near Sepilok had a brood patch (WFVZ). A male calling on 30 Jan. 1983 had a 7 × 5 mm testis. *Voice*: The call is an often repeated *wee-it* rising on the second note, frequently given just before dawn.

Collared Kingfisher *Todiramphus chloris*

Status: A common resident, the most abundant kingfisher in populated areas and islands. *Elevation:* Sea level to 300 m. There is a sight record at the entrance to Kinabalu Park at ca. 1,500 m (Robson 1996). *Habitats:* Roadsides, beach strand, mangrove, plantations, grasslands, open shores, and estuaries. *Breeding:* V. W. Ryves collected a clutch of three eggs at Sandakan Estate on 26 June 1938. The eggs were white, regularly oval, smooth, and slightly glossy; dimensions: 29 × 24 mm, 29 × 24 mm, and 28.5 × 23.5 mm (Gibson-Hill 1949b). De Silva and Chong (1974) reported breeding on Selinga Island from Apr. to Oct. Nesting occurred in a hole in a coconut stump 0.6 m off of the ground, and produced two broods of three eggs each, with both parents attending the young. Breeding was observed by WFVZ at Papar (three eggs, 2 May 1983), Kimanis (excavation of a hole, 7 May 1983), and Palau Sarankai in Gaya Bay (two nests, three eggs each in short tunnels into muddy banks, 18 May 1983). DMB found nests in termite mounds and dead tree trunks, generally with two or three eggs averaging 28.8 × 24.1 mm. Analysis of banding data suggests that birds breed inland and then move to the coast (DMB). *Voice:* A harsh *chew-chew-chew-chew* with three to six notes (Smythies 1960; WFVZ). *Food:* Fish, hermit crabs, skinks, cicadas, grasshoppers, and squid.

Sacred Kingfisher *Todiramphus sanctus*

Status: A scarce summer visitor from Australia. *Localities:* Apas River, Bauto, Quoin Hill, Tawau, and Wallace Bay. Specimens of this species have been collected only at Apas River on 17 June 1963 (Thompson 1966) and Wallace Bay on 7 July 1982 (WFVZ). *Elevation:* Sea level. *Habitats:* Mangrove, scrublands, and riverine forest. *Identification:* This species can be distinguished from the similar Collared Kingfisher by its smaller size and buffier color.

Ruddy Kingfisher *Halcyon coromanda*

Status: An uncommon coastal resident, and winter visitor. *Localities:* Balam-bangan Island, Benoni, Binsulok, Gramma River, Kalabakan, Kinabatangan River, Kota Kinabalu suburbs, Kudat, Labuan, Lamag, Little Kretam River, Membakut Beach, Nangka, Padas Damit, Padas Gorge, Pulau Tiga, Sandakan, Sebatik Island, and Sepilok. *Elevation:* Sea level. *Habitats:* Island and riverine forest, mangrove, beach strand, and old rubber. *Breeding:* Phillipps (1970) observed an adult feeding two young in the mangrove on Tanjung Dumpil on 14 July 1968. The young appeared recently fledged. *Voice:* Three descending whistles, *whew-whew-whew*, fairly rapid in succession. A loud and unmistakable call. *Food:* Locusts, fish, and crabs (DMB). Small red crabs were fed to fledglings (Phillipps 1970). *Identification:* This beautiful bird is unmistakable, with a violet back, rufous underparts, white rump, orange bill, and orange feet. *Remarks:* Two subspecies occur in Sabah. *Halcyon coromanda minor* is the more common resident race, *H. c. major* is an occasional winter visitor from Asia.

Black-capped Kingfisher *Halcyon pileata*

Status: A common winter visitor along coastal rivers, scarce elsewhere. *Localities:* Bodgaya Island, Bongawan, Klias Peninsula, Kunatong, Labuan, Lamag, Menggalong, Papar, Pintasan, Pulau Tiga, Tawau, Tembungo, and Tenom. *Elevation:* Sea level to 200 m. *Habitats:* Riverine forest, and streams in grasslands

and young plantations. *Migration dates:* They generally arrive by late Sept. and depart in Apr. The earliest record is a sighting on Bodgaya Island in mangroves on 30 Aug. 1979 (Yong 1980). Simpson (1982a) observed migrants on the Tembungo oil platform on 5 Sept., 27 Sept., and 13–14 Oct. 1981. There is one apparent summer record, a specimen at Menggalong in July 1899 (Blasius 1901). *Food:* Locusts, mantids, beetles, butterflies, and dragonflies.

Stork-billed Kingfisher *Halcyon capensis*

Status: A common resident. *Localities:* Ambong, Balambangan Island, Banggi Island, Batu Putih, Bengkoka, Benoni, Bole River, Brantian River, Danum, Gaya Island, Gomantong, Kalabakan River, Kinabatangan River, Klias Peninsula, Kota Kinabalu suburbs, Kulamba, Labuan, Lamag, Lumbidan, Meliau River, Membakut, Menggatal River, Mumiang, Nangka, Pandasan, Papar, Pulau Tiga, Sandakan, Segama River, Segarong, Sepilok, Silabukan, Tawau Hills, Telipok, Tempasuk, Tuaran, Ulu Segama, Wallace Bay, and Weston. *Elevation:* Sea level to 400 m. *Habitats:* Riverine forest, mangrove, beach strand, logged forest, and buffalo fields. *Breeding:* Apparently the only breeding record is large white eggs (1.5×1.25 inches [38.1×31.8 mm]) collected on Labuan (no date; Sharpe 1879b). *Voice:* A hawk-like series of three or four descending screams, also a “laughing” call. *Food:* Fish, frogs, crabs, lizards, and insects.

Common Kingfisher *Alcedo atthis*

Status: A common winter visitor. *Localities:* Bengkoka, Klias Peninsula, Kudat, Labuan, Lamag, Maang, Membakut Beach, Menggalong, Mumiang, Padas Damit, Papar, Pintasan, Pulau Tiga, Segarong, Sepilok, Sipadan Island, Tempasuk, and Wallace Bay. *Elevation:* Sea level to 200 m. *Habitats:* Mangrove, water-courses, padi, and open shore. *Migration dates:* Sabah’s early date is 11 Sept. 1984 at Tempasuk (B&W), and its late dates are 16–19 Apr. 1985 on Pulau Tiga (Phillipps 1985a), although dates from 3 Aug. to 1 May are attributed to DMB (Smythies 2000). *Identification:* Distinguished from Blue-eared Kingfisher by orange ear coverts and greenish, as opposed to deep blue, upper parts. *Voice:* A shrill, piping *peee-keee* (DMB). *Food:* Fish.

Blue-eared Kingfisher *Alcedo meninting*

Status: A common resident. *Localities:* Ambong, Batu Putih, Bengkoka, Betotan, Bole River, Brumas, Bukit Garam, Danum, Gomantong, Gramma River, Kaingaran, Kasigui, Kimanis, Kinabatangan River, Kuala Papar, Kulamba, Labuan, Lamag, Lumerau, Madai, Makaniton, Membakut, Menggalong, Menggatal River, Mumiang, Pandasan, Papar, Petagas, Saliwangan, Sandakan, Sayap, Sebatik Island, Segarong, Sepilok, Silabukan, Silam, Tawau Hills, and Ulu Segama. *Elevation:* Sea level to 1,000 m. *Habitats:* 1°, logged, and 2° forest near rivers; swampy scrub, mangrove, *Albizia*, rubber, marshes, and open areas. *Breeding:* Low collected rounded white eggs (0.8×0.65 inches [20.3×16.5 mm]) on Labuan (Sharpe 1879b). WFVZ found a nest with three eggs built in fresh clay left by a small landslide on a logging road near the Bole River on 22 Mar. 1982. The hole was 7.5 cm in diameter but tapered to 5.1 cm inside and extended approximately 20 cm into the bank. The egg cavity was unlined and the eggs were pure white (18.9×16.1 mm, 19.3×16.7 mm, 18.9×16.6 mm). WFVZ also found nest holes at Gomantong (7 Aug. 1983) and Sandakan (1 Aug. 1983),

both built into banks left by bulldozer tracks. DMB found five nests along the Klias River on 14 Jan. 1961. One contained eggs, and another contained nestlings.
Food: Fish.

Blue-banded Kingfisher *Alcedo euryzona*

Status: An uncommon resident. *Localities:* Bole River, Brumas, Danum, Gomantong, Kabayau, Kaingaran, Kalabakan, Keningau, Kidukarok River, Kinabalu, Labau River, Lumerau, Madai, Magdalena, Maliau, Mokodau River, Muruk, Por-ing, Quoin Hill, Rinangisan, Saliwangan, Sepilok, Silabukan, Simatuoh, Tabin, Tawau Hills, and Ulu Tiulon. *Elevation:* Sea level to 1,400 m. *Habitats:* Mostly along streams and rivers in 1° forest; less common in logged forest. *Breeding:* Little breeding information exists for this species. WFVZ collected a male (4-mm testis) and female (enlarged oviduct, granular ovary) on 15 Mar. 1982 at Brumas. *Remarks:* More commonly netted than seen. By netting records, this species is fairly common along rivers in 1° forest. It tends to be replaced by Blue-eared Kingfishers in more open areas.

Oriental Dwarf Kingfisher *Ceyx erithacus*

Status: A common resident. *Elevation:* Sea level to 1,200 m. *Habitats:* 1° and logged forest, peat swamp, riverine forest, mangrove, and *Albizia*. *Remarks:* The taxonomic issues concerning *Ceyx erithacus* are not resolved. Ripley (1942), Voous (1951), and Ripley and Beehler (1987) treated Black-backed (*C. erithacus*) and Rufous-backed (*C. rufidorsa*) kingfishers as separate species based on evidence of assortative mating over parts of their ranges. Inskipp et al. (1996) followed Sims (1959b) and Fry et al. (1992) in treating them as two forms of the same species, because of extensive (apparent) hybridization in some areas. We found them side by side in some localities (Brumas, Menggalong, Sabah Softwoods, and Tawau Hills). RGM, for example, netted six *erithacus* and one *rufidorsa* at Tawau Hills. However, at Sabah Softwoods many of the birds seemed to be hybrids (or intermediates). Clearly, the molecular genetics of this group need to be examined. In the following accounts, we list localities of individuals that were clearly of one or the other form.

Black-backed Kingfisher *erithacus* group

Localities: Banggi Island, Beluran, Bettotan, Bole River, Brumas, Danum, Gomantong, Kabayau, Labuan, Labau River, Lumbidan, Makaniton, Meliau, Menggalong, Merutai, Mokodou, Sabah Softwoods, Saliwangan, Samatuoh, Tabin, Tawau Hills, Ulu Dusun, and Ulu Samuran. *Breeding:* WFVZ found a nest hole in a mud bank 1 m above a road near Bole River on 15 Apr. 1982. The hole was 5 cm in diameter and extended 60 cm into the bank. The nest cup was 13 cm in diameter and lined with a few leaves and sticks. The nest contained two white eggs (20 × 17.5 mm, 3.4 g; 20.1 × 18 mm, 3.7 g).

Rufous-backed Kingfisher *rufidorsa* group

Localities: Brumas, Danum, Gaya Island, Kinarut, Klias Peninsula, Labuan, Lamag, Maang, Makaniton, Maliau, Menggalong, Muruk, Padas Damit, Penampang, Sabah Softwoods, Saliwangan, Sandakan, Silam, and Tawau Hills. *Breeding:* Sharpe (1890a) described a nest hole in a bank at 900 m on Kinabalu that contained two white eggs (0.9 × 0.75 inches [22.9 × 19.1 mm]). WFVZ netted a female at Penampang on 21 Jan. 1982 that had a 4-mm yellow ovum. *Remarks:* Wells (1976) found the *rufidorsa* type to be predominant on Gaya Island, and birds he netted at

Menggalong seemed to be pure *rufidorsa*. However, WfVZ found the two forms side-by-side at Menggalong in 1983.

Family MEROPIDAE

BEE-EATERS

Blue-throated Bee-eater *Merops viridis*

Status: A common resident. *Localities:* Abai, Ambong, Batu Putih, Bengkoka, Benoni, Binsulok, Bukit Padang, Danum, Gaya Island, Keningau, Kinabatangan River, Klias Peninsula, Kota Kinabalu suburbs, Kuala Penyu, Kulamba, Labau River, Labuan, Lamag, Lumbidan, Lumerau, Maang, Mandahan, Membakut, Menggalong, Papar, Pintasan, Poring, Rumas, Samawang, Sandakan, Segama River, Sepilok, Tambunan, Telipok, Tempasuk, Tanjung Aru, and Ulu Segama. *Elevation:* Sea level to 500 m. *Habitats:* 2° forest, scrublands, kerangas, mangrove, rivers, and open shores. *Breeding:* This species congregates in large numbers to breed on the sandy waste at the end of the Kota Kinabalu airport runway in Mar., Apr., and May (Phillipps 1970). A few birds remain all year. At Membakut beach, no birds were found in Nov. 1982, but hundreds had congregated in Jan. 1983 (WfVZ). On Feb. 26, WfVZ found more than 25 nests in sandy soil near the mouth of the Binsulok River. The entrance tunnels extended for about 1.5 m into the ground and ended in a chamber 10 cm in diameter and 40 cm deep. Of 28 holes examined, 17 were empty, 8 contained three eggs, and 1 each contained one, two, and four eggs. The eggs were pure white, almost round (21.5–25.5 × 19.0–24.5 mm), and varied in their stage of incubation. In nests with three eggs, one was fresh, one had a small embryo, and one had a large embryo. Nesting continued into May, with fresh eggs in evidence on 3 May. DMB recorded breeding colonies at Putatan and Papar. The nest tunnels that he measured were from 2.5 to 4.5 m long, but shallow. Three eggs in one nest averaged 23.5 × 20.0 mm. GD recorded nesting beginning at Kuala Penyu in mid-Jan. and ending at Kota Kinabatangan by 28 May (Smythies 2000). *Voice:* A trilling *kurau-kurau* (DMB). *Food:* Flying insects.

Blue-tailed Bee-eater *Merops philippinus*

Status: A rare winter visitor. *Localities:* The only specimens are one by Treacher at Lumbidan (Sharpe 1879c) and one collected by L. A. Charles at Weston on 8 Mar. 1941 (RMC). DMB had sightings in Kimanis (2 Nov. 1959) and Membakut (13 Jan. 1962). *Remarks:* This species is apparently more common in southern than northern Borneo (Smythies 1957). It breeds in southern Asia, the Philippines, and New Guinea.

Red-bearded Bee-eater *Nyctyornis amictus*

Status: A common resident. *Localities:* Batu Punggul, Bengkoka, Benoni, Betotan, Bole River, Brumas, Gomantong, Danum, Kaingaran, Kasigui, Kudat, Kunatong, Labau River, Lamag, Lumerau, Magdalena, Maliau, Megatai, Menggalong, Nangka, Parang Besar, Poring, Quoin Hill, Ranau, Sabah Softwoods, Saliwangan, Sandakan, Segaliud River, Sepilok, Silabukan, Sinsuran Road, Tabin, and Ulu Tiulon. *Elevation:* Sea level to 1,000 m. *Habitats:* 1°, old 2°, and logged forest; peat swamp, *Albizia*, and old rubber. *Breeding:* It nests in 1-m burrows in roadside banks on Klias Peninsula as early as Oct., but most breeding occurs from Jan. to Apr. (DMB). Phillipps (1970) observed a pair with two young on Sinsuran

Road on 25 May 1969. The young had gray fronts. *Voice*: A loud, raucous, descending *a-wak-wak-wak*. Also a nonmusical *chwak*. DMB described the song as alternating repetitive phrases of *priow-priow-priow* and *krow-krow*. *Food*: Insects. WFVZ collected a male near Brumas on 11 May 1982 packed with 12- to 25-mm beetles. *Remarks*: This bee-eater is a forest species, whereas Blue-throated Bee-eater is most often encountered in open areas.

Family CORACIIDAE

ROLLERS

Dollarbird *Eurystomus orientalis*

Status: A common resident and winter visitor. *Localities*: Balambangan Island, Banggi Island, Baru Jumpa, Batu Putih, Benoni, Bettotan, Binsulok, Bole River, Brumas, Danum, Kalabakan, Kinabalu, Kudat, Kulamba, Labuan, Lamag, Lok Kawi, Lumbidan, Lumerau, Mantanani Island, Meliau, Mengalum Island, Mengatal, Merutai, Mumiang, Nangka, Pulau Tiga, Quoin Hill, Sandakan, Segarong, Sepilok, Silabukan, Silam, Sook, Tabin, Tampias, Tawau, Tempasuk, Ulu Segama, Ulu Tiulon, and Wallace Bay. *Elevation*: Sea level to 1,000 m, but mostly low elevation. *Habitats*: 1°, 2°, and riverine forest; cocoa and mangrove. *Breeding*: DMB observed three nests near Papar in Dec. 1958 and nests at Klias in Nov. and Feb. *Voice*: A loud *chack*. *Food*: Insects. The stomach of an individual collected near Binsulok on 18 Jan. 1983 contained iridescent green beetles (WFVZ). *Remarks*: The resident subspecies is *orientalis*. There are probably two migrant subspecies, *orientalis* from mainland SE Asia and *abundus* from more northern parts of the east Asian mainland (Wells 1999).

Family UPUPIDAE

HOOPOE

Common Hoopoe *Upupa epops*

Status: A rare vagrant. *Localities*: Labuan and Tempasuk. *Voice*: A soft whooping. *Remarks*: One specimen was collected by Treacher on Labuan (no date; Sharpe 1879b) and occasional sightings have been made. The Phillipps family recorded a pair north of Rampayan Beach (Tempasuk) on 28 Sept. 1981 (S. Phillipps 1982). When encountered it is unmistakable. The rufous color, crest, and black and white striped wings distinguish it from any other Bornean bird.

Family BUCEROTIDAE

HORNBILLS

White-crowned Hornbill *Aceros comatus*

Status: An uncommon resident. *Localities*: Bengkoka, Bole River, Danum, Gaya Island, Kalabakan, Kota Belud, Lumerau, Magdalena, Maliau, Poring, Quoin Hill, Sepilok, Tambuyukon, Tawau Hills, and Trus Madi. *Elevation*: Sea level to 1,600 m, generally above 500 m. *Habitats*: 1° and 2° forest. *Food*: Mostly a carnivore (snakes, lizards, small birds, and insects), but it also consumes many fruits (Johns 1987). WFVZ observed them trying to eat small birds and a frog caught in a mist net. *Voice*: A clear *who-who* or *kuk-kuk*. Relatively soft compared to the calls of other hornbills. *Remarks*: Unlike most other Bornean hornbills, this species regularly comes to the ground.

Bushy-crested Hornbill *Anorrhinus galeritus*

Status: A common resident. *Localities:* Batu Punggul, Bengkoka, Bole River, Brumas, Danum, Ensuan, Gomantong, Kaingaran, Kinabalu, Labau River, Lum-bidan, Lumerau, Maliau, Melalap, Menggalong, Mokodou, Poring, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Sandakan, Segarong, Sepilok, Silabukan, Silam, Tabin, Tambuyukon, Tawau Hills, Ulu Segama, and Ulu Tiulon. *Elevation:* Sea level to 1,300 m. *Habitats:* 1° and 2° forest and *Albizia*. *Breeding:* Sharpe (1890a) reported on well-feathered young at Bengkoka on 11 Oct. 1885. Norman (1964) observed an adult feeding fledged young at Quoin Hill. Kemp (1995) estimated the laying time in Sabah to be June. *Voice:* A loud series of shrill yelping sounds. Also a quiet *wah-wah-wohawaha* increasing and decreasing in volume (Kemp 1995). *Food:* Figs, mantids, lepidopteran larvae, and unidentified orange fruit. Near Rinangisan one was observed eating a large (20- to 25-cm) millipede. It cleaned its bill meticulously when finished (WFVZ). *Remarks:* Flocks of 10–12 birds are not uncommon.

Wrinkled Hornbill *Aceros corrugatus*

Status: An uncommon resident, scarce on the West Coast. *Localities:* Bole River, Brumas, Danum, Kalabakan, Kinabatangan River, Klias Peninsula, Kulamba, Lamag, Menggalong, Papar, Quoin Hill, Sebatik Island, Sepilok, Tabin, and Ulu Segama. *Elevation:* Sea level to 400 m. *Habitats:* 1°, 2°, riverine, and swamp forest. *Voice:* Loud clear barking *cow* or *cawow*. *Remarks:* This species is scarce on the West Coast, although WFVZ found it regularly in Klias Peninsula swamp forest in the early 1980s.

Wreathed Hornbill *Aceros undulatus*

Status: A locally common resident. *Localities:* Bole River, Brumas, Crocker Range Park Headquarters, Danum, Kuala Penyu, Labau River, Lumaku, Lumerau, Maliau, Menggalong, Muruk, Kinabalu, Quoin Hill, Rinangisan, Sabah Softwoods, Sepilok, Sibatik Island, Silabukan, Tabin, Tambuyukon, Tawau Hills, Trus Madi, Ulu Mawau, Ulu Segama, Ulu Tiulon, and Wallace Bay. *Elevation:* Sea level to 3,000 m. Primarily in hill and lower montane forest. *Habitats:* 1° and 2° forest and kerangas. *Breeding:* MCT collected a male (testis 10 × 11 mm) and a female (largest ovum 5 mm) near Quoin Hill on 2 Oct. 1962. *Voice:* A barking or growling call, hoarser and gruffer than that of Wrinkled Hornbill. Kemp (1995) described the call as *oek-uk-uk*. Contact calls *ah-ah-a*, lower on the second note. *Food:* Large-seeded fruits and any small animals it can catch. Occasionally, it feeds on the ground. *Identification:* Molting birds may have chestnut crowns.

Black Hornbill *Anthracoceros malayanus*

Status: A common resident, less common on the West Coast. *Localities:* Batu Punggul, Baturong, Bole River, Brumas, Danum, Kimanis (foothills), Kinabalu (lower slopes), Kinabatangan River, Kulamba, Kunatong, Labau River, Lamag, Little Kretam River, Meliau, Menggalong, Poring, Ruku-Ruku, Sandakan, Sepilok, Tabin, Tawau Hills, Ulu Membakut, and Ulu Segama. *Elevation:* Sea level to 500 m; one sighting at 1,000 m. *Habitats:* 1°, mixed 1° and 2°, logged, and riverine forest; and oil palm. *Breeding:* V. W. Ryves collected a clutch of three eggs at Kaung on 6 Feb. 1939. The eggs were white, egg-shaped, smooth, and fairly glossy; dimensions: 49.5 × 32 mm, 46 × 32.5 mm, and 46 × 33 mm

(Gibson-Hill 1949b). *Voice*: A retching gaglike *squaak* (J. Payne). *Food*: Black Hornbills feed on oil-palm fruit. One was even caught in a rat trap at Sepilok baited with oil palm. *Remarks*: The Bornean subspecies (*A. m. deminutus*) is smaller than birds from Sumatra and the Malay peninsula (Kemp 1995).

Oriental Pied Hornbill *Anthracoceros albirostris*

Status: A common resident of coastal areas and islands. *Localities*: Abai, Bin-sulok, Bodgaya Island, Bohey Dulang Island, Bole River, Gaya Island, Kinabalu, Kinabatangan River, Klias Peninsula, Kulamba, Labuan, Labuk River, Lamag, Meliau River, Menggalong, Padas Damit, Pandasan, Pulau Tiga, Segarong, Sepilok, Tabin, Tuaran, and Ulu Segama. *Elevation*: Sea level to 200 m. *Habitats*: Swamp, riverine, and 2° forest; peatswamp, padi, and Aru tree forest. It is a bird of the forest edge and disturbed areas rather than interior forest, and distinctly coastal in distribution. Along the Kinabatangan River there are many more Black than Pied Hornbills, and the Pied Hornbills do not seem to reach Kuamut. *Breeding*: Sharpe (1879b) reported that they lay two white, coarse-textured, eggs (1.95 × 2.1 inches, 1.25 × 1.4 inches [49.5 × 53.3 cm, 31.8 × 35.6 mm], no date). A pair nested in a large beluno tree in the manager's garden at Tuaran Estate in June during the late 1930s (Phillipps 1970). *Voice*: A loud yelping and cackling, *kek-kek-kek-kek*. *Food*: *Tarap* fruits and small durians, also lizards (DMB). *Remarks*: Once considered conspecific with Malabar Pied Hornbill (*A. coronatus*), the Oriental Pied Hornbill has since been separated based on morphological differences (Kemp 1979; Frith and Frith 1983).

Rhinoceros Hornbill *Buceros rhinoceros*

Status: A commonly recorded resident. *Localities*: Baturong, Bengkoka, Bet-totan, Bole River, Brumas, Danum, Kinabalu, Kinabatangan River, Kulamba, Labau River, Lumaku, Lumerau, Maliau, Meliau River, Menggalong, Poring, Quoin Hill, Rinangisan, Sabah Softwoods, Sapagaya, Segarong, Sepilok, Silabukan, Suanlamba, Tabin, Tambuyukon, Tawau Hills, Ulu Segama, and Ulu Tiulon. *Elevation*: Sea level to 1,750 m. Usually below 1,200 m. *Habitats*: 1°, 2°, and riverine forest; *Albizia*. *Breeding*: Fogden (1965) reported fledglings near the Segama River in early Sept. 1964. *Voice*: A loud *hok*, *krook*, or *kook-krawk*. *Food*: A variety of large fruits and small animals. *Remarks*: The Bornean subspecies (*B. r. borneoensis*) is smaller than the other subspecies (Kemp 1995).

Helmeted Hornbill *Buceros vigil*

Status: A conspicuous resident, but not necessarily common. *Localities*: Batu Punggul, Bengkoka, Bole River, Brumas, Danum, Kaingaran, Kalabakan, Kinabalu, Kinabatangan River, Labau River, Labuk River, Lamag, Lumerau, Magdalena, Makaniton, Maliau, Menggalong, Poring, Rinangisan, Samuran, Sapagaya, Segarong, Sepilok, Silabukan, Tabin, Tambuyukon, Tawau Hills, Tenom, Trus Madi, Ulu Segama, and Ulu Tiulon. *Elevation*: Sea level to 1,000 m. *Habitats*: 1° and 2° forest. *Breeding*: Fogden (1965) reported fledglings on the Labuk River on 12 July 1964. *Food*: Fruit (especially figs) and a variety of animal prey. *Voice*: One of the most memorable noises of the Bornean forest: a long series of *garooks*, starting very slowly and accelerating excitedly to a point at which they break off into a peal of demonic laughter, *ka-ka-ka-ka . . .*, which descends and fades away. The song was analyzed by Haimoff (1987).

Order PICIFORMES
Family MEGALAIMIDAE

BARBETS

Brown Barbet *Calorhamphus fuliginosus*

Status: A common resident. *Localities:* Batu Punggul, Batu Putih, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Kabayau, Kaingaran, Kalabakan, Kinabalu, Labau River, Lumbidan, Lumerau, Maang, Magdalena, Makaniton, Maliau, Megatai, Menggalong, Nangka, Padas Damit, Poring, Quoin Hill, Ranau, Rayoh, Saliwangan, Sandakan, Sebatik Island, Sepilok, Silam, Sinsuran Road, Tabin, Trus Madi, and Ulu Tiulon. *Elevation:* Sea level to 1,500 m. *Habitats:* 1° and 2° forest, cocoa, and peatswamp. *Breeding:* Norman (1964) observed a nest in the Tawau area from June to Oct. 1961. A nest was observed in Mar. near Sepilok (year not specified; Smythies 2000). Phillipps (1970) observed a bird with a grasshopper entering a nest hole constructed in the bottom of a bee's nest in a wayside tree at mile 14 on the Kota Kinabalu–Ranau Road in early Aug. 1970. Along Sinsuran Road, he also observed a pair occupying a nest hole at mile 24 in July and Aug. and recorded young birds in Sept. and Oct. MCT collected a male (testis 5 × 3 mm, 25 Sept. 1962) and a female (largest ovum 2 mm, brood patch, 7 July 1962) near Quoin Hill. *Voice:* A thin, lispy whistle. *Remarks:* The Sabah subspecies (*C. f. tertius*) differs from *C. f. fuliginosus* that occurs in southern Borneo by possessing a reddish throat. RGM observed at least six individuals using holes in a termite nest on a tree in mid June 1999.

Gold-whiskered Barbet *Megalaima chrysopogon*

Status: A common resident. *Localities:* Ambong, Batu Punggul, Bengkoka, Bettotan, Bole River, Brumas, Danum, Kaingaran, Kasigui, Kiau, Labau River, Lamag, Lumerau, Maang, Magdalena, Makaniton, Maliau, Meliau, Mendolong, Menggalong, Pandasan, Poring, Quoin Hill, Ranau, Rinangisan, Sabah Softwoods, Saliwangan, Segaliud River, Sepilok, Silabukan, Tambunan, Tawau Hills, Tiger Estate, Trus Madi, Tuaran, and Ulu Tiulon. *Elevation:* Sea level to 1,150 m. *Habitats:* 1° and 2° forest, cocoa, and *Albizia*. Lambert (1990c) noted a substantial decline in numbers after logging. It was scarce in the *Albizia* plantation of Sabah Softwoods in 1982. *Breeding:* MCT collected a male on 1 Aug. with testis 6 × 3 mm and another male on 8 Aug. 1962 with testis 10 × 8 mm near Quoin Hill. WFVZ collected a male with testis 6 × 3 mm on 20 June 1983 near Maang. *Voice:* A series of shorter and shorter trills, *drrrrrr—drrrrr—drrr* Also, a monotonous repetition of *ta-hoop*. This is often the only bird species “singing” in the middle of the day. *Food:* Fruit. As the largest barbet in Sabah, this species is purported to be a specialist on large figs. *Remarks:* MCT described it as the commonest barbet at Quoin Hill next to Brown Barbet.

Red-crowned Barbet *Megalaima rafflesii*

Status: An uncommon resident. *Localities:* Batu Punggul, Binsulok, Kimanis, Klias Peninsula, Labuan, Lumbidan, Maang, Makaniton, Melalap, Merintaman–Menggalong, Padas Damit, Saliwangan, Tabin, and Weston. *Elevation:* Sea level to 300 m. *Habitats:* 2°, old logged, peatswamp, and swamp forest; heath scrub and old rubber. This species seems to be restricted to coastal 2° and swamp forests.

The only interior forest records are sightings from Makaniton, Tabin, and Batu Punggul. There are no 1° dipterocarp forest records. *Breeding*: DMB reported fledged young at Kimanis on 16 June and Klias on 1 July (no year). *Voice*: *Poop-poop* pause *poop-poop* and then a series of many (20 or so) *poops*. *Food*: Figs, berries, and grubs (DMB).

Red-throated Barbet *Megalaima mystacophanos*

Status: A common resident. *Localities*: Ambong, Anginon, Batu Putih, Beaufort Hill, Bengkoka, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Ensuan, Kabayau, Kalabakan, Kinabalu, Labau River, Lamag, Lumbidan, Lumerau, Magdalena, Makaniton, Megatai, Menggalong, Pandasan, Poring, Quoin Hill, Rayoh, Saliwangan, Segaliud River, Segarong, Sepilok, Silabukan, Silam, Tabin, Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,000 m. *Habitats*: 1° and 2° forest and rubber. *Breeding*: Phillips (1970) recorded a pair inhabiting a nest hole at Pandasan from May (when they were apparently excavating the hole) through July 1970. The hole was ca. 3 m up in a decayed tree stump located near a small stream in 2° forest. In July, the parents brought food to the nest, even after one of the young had fledged. WFVZ collected a female with an ovary 12 × 7 mm near the Bole River on 20 Feb. 1982. MCT collected a male on 9 Aug. 1962 with testis 8 × 5 mm and another on 1 Sept. 1962 with testis 9 × 5 mm at Quoin. RGM collected a male with testis 9 × 5 mm on 12 June 1999 and a female with an ovary 11 × 7 mm on 14 June 1999 at Crocker Range Park Headquarters. *Voice*: *took-took—took—took* all on the same note. *Food*: Fruit, berries, and fat white grubs (Phillips 1970).

Yellow-crowned Barbet *Megalaima henricii*

Status: An uncommon resident. *Localities*: Batu Punggul, Bettotan, Bole River, Brumas, Danum, Kalabakan, Labau River, Magdalena, Maliau, Megatai, Poring, Quoin Hill, Saliwangan, Silabukan, Tabin, Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m, most common below 700 m. *Habitats*: 1°, logged, and riverine forest. Lambert (1990c) observed a decline in this species in logged forest. *Voice*: A short trill *trrrrook*, and then four (or six) *tooks*. Occasionally ending with another trill identical to the first. *Remarks*: It feeds mainly in the upper strata and emergents (Lambert 1990c).

Golden-naped Barbet *Megalaima pulcherrima*

Status: A common Bornean endemic. *Localities*: Kaingaran, Kamborangoh, Kenakok, Kinabalu, Lumaku, Lumu-lumu, Marai Parai, Poring, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Generally 1,100 m to 2,450 m. Most common between 1,400 m and 2,000 m. Smythies (1964b) reported it as high as 3,200 m. WFVZ heard it as low as 600 m near Poring. *Habitats*: 1° and 2° forest. *Breeding*: Gore (1964a) found a nest hole at the Royal Society camp on the Mesilau River on 23 Apr. 1964. The hole was 8.5 m up in a dying *Helicia* tree, ca. 0.75 m beneath the point where the trunk had broken off. As of 6 May, the male was feeding the presumably incubating hen. WFVZ netted a male with an 8-mm testis and a female with a 25-mm ovum on 19 Dec. 1981 at Sinsuran Road Mi. 30. *Voice*: *Took-took-trrook* and also a rolling trill. *Food*: Fruit and insects. An individual at Rinangisan was eating crickets out of a mist net (WFVZ).

Mountain Barbet *Megalaima monticola*

Status: A common Bornean endemic. *Localities:* Bundu Tuhan, Kaingaran, Kenakok, Kiau, Kidukarok, Kinabalu, Lobang, Lumaku, Maliau, Rinangisan, Sinsuran Road, Tenompok, and Trus Madi. *Elevation:* 750–1,800 m. *Habitats:* 1° and 2° forest, kerangas (Maliau), and planted fruit groves. *Breeding:* Phillipps (1970) observed a pair occupying a hole on the top of a dead tree trunk at Sinsuran Road mile 24 in Aug. 1970. RGM collected a specimen with an ovary 10 × 6 mm on Trus Madi (1,500 m) on 9 Aug. 1999. *Voice:* A series of rapid *took*s (several per second) interspersed with slower *tukuks*.

Bornean Barbet *Megalaima eximia*

Status: A scarce Bornean endemic. Of the three endemic barbets in Sabah, this is by far the rarest. *Localities:* Bornean Barbet used to occur on the Pinosuk Plateau (e.g., Gore 1964a), at Kiau, and in other lower montane areas on the southern side of Mt. Kinabalu, but these forests are now gone. All modern records are sightings: Maliau (Yong et al. 1989); Lumaku (UKMS); Poring, 900 m (D. Yong in Jenkins et al. 1996); Sayap, 1,000 m (RGM); Trus Madi, 1,500 m (RGM); and Tukok, 427 m (Norman 1964). *Elevation:* 900–2,100 m, possibly as low as 400 m. *Habitats:* Principally, 1° lower montane forest; hill and coniferous forest at Maliau. *Breeding:* Gore (1964a) observed a bird at the Royal Society Mesilau camp on 23 Apr. 1964 leaving its nest-hole on several occasions with brownish material, which he thought to be excavated wood. The nest hole was 19 m above the ground in an oak, situated on the underside of the stump of a dead and broken branch. It was 3.8 cm in diameter and descended 23 cm down the axis of the rotten branch. When checked on 6 May, the hole was abandoned. *Voice:* MacKinnon and Phillipps (1993) incorrectly described the call as a hollow repeated *took—took—took*, and also a trill. Actually, the call is the other way around: *took-took—took* (RGM). *Remarks:* The subspecies that is found on Kinabalu (*M. e. cyanea*) has a blue forehead and throat. Like Hill Blue and Rufous-tailed Jungle flycatchers, scarcity of this species may result from the destruction of accessible 1° lower montane forests by shifting agriculture, logging, and development.

Blue-eared Barbet *Megalaima australis*

Status: A common resident. *Localities:* Batu Punggul, Bole River, Brumas, Danum, Kaingaran, Klias Peninsula, Kulamba, Labau River, Lamag, Lumbidan, Maang, Magdalena, Maliau, Megatai, Membakut, Merintaman–Menggalong, Padas Damit, Poring, Quoin Hill, Saliwangan, Samawang, Sandakan, Sepilok, Tabin, Tambunan, and Tawau Hills. *Elevation:* Sea level to 1,000 m. *Habitats:* 1°, 2°, swamp, and buta buta forest; mangrove and peatswamp. *Breeding:* DMB reported breeding in Dec.–Jan. and May–June. The nest is a small (ca. 2.5-cm) hole, usually on the underside of a branch, sometimes in vertical branches or in coconut palm fronds. The clutch is two or three white eggs. MCT collected two males with enlarged testes (7 × 5 mm and 9 × 5 mm) on 1 Aug. 1962 at Quoin Hill. *Voice:* There are three calls. One is a monotonous *dedook-dedook-dedook* The second is a nonresonant *terek-terek-terek* The third is a winding-up call *trrrr-trrr-trr* . . . , sounding like a pea whistle.

Family PICIDAE

WOODPECKERS

Rufous Piculet *Sasia abnormis*

Status: A common resident. *Localities:* Ubiquitous in appropriate habitat. *Elevation:* Sea level to 1,200 m. *Habitats:* 1°, 2°, swamp, and peat swamp forest; *Eucalyptus*, *Albizia*, and old rubber. *Breeding:* A female collected on 17 June 1982 at Sabah Softwoods was in breeding condition (largest ovum 5.5 × 5.5 mm; WFVZ). DMB observed a chick on 14 Feb. and found a nest 3 m high in a dead rubber tree at Mawau in Apr. 1960. A bird molting out of juvenal plumage (skull unossified) was collected on 17 Mar. 1982 near the Bole River (WFVZ). RGM collected a juvenile with skull 10% ossified on 6 July 1999 in Tawau Hills. *Voice:* A loud burst of single or double notes *tseet*. *Identification:* Juvenile birds are almost entirely dark green, with only a trace of rufous around the face.

Speckled Piculet *Picumnus innominatus*

Status: A scarce resident. *Localities:* Batu Timbang, Bole River, Danum, Gomantong, Lumerau, Magdalena, Maliau, Marudu Bay, Sepilok, Silabukan, and Tabin. The only specimens are two from Mt. Magdalena by the BMNBE and one at Bongon by Everett ("Timbang Batu, Bongon River"; Sharpe 1893). *Elevation:* Sea level to 1,200 m. *Habitats:* 1° forest. Lambert (1990c) reported this species as absent from logged forest, and only at low densities in 1° forest. *Remarks:* Most often seen in mixed-species flocks. The WFVZ never encountered it.

Crimson-winged Woodpecker *Picus puniceus*

Status: A common resident. *Localities:* Bengkoka, Bettotan, Bole River, Brumas, Kabayau, Kaingaran, Keningau, Kenakok, Kiau, Kinabalu, Kudat, Lamag, Lumbidan, Lumerau, Magdalena, Maliau, Megatai, Pulau Tiga, Quoin Hill, Ranau, Rinangisan, Sabah Softwoods, Saliwangan, Sandakan, Sebatik Island, Segaliud River, Sepilok, Silabukan, Silam, Tabin, Tawau Hills, Ulu Tiulon, and Weston. *Elevation:* Sea level to 1,675 m (on Kinabalu). *Habitats:* 1° and 2° forest. Less common in 2° forest. Some evidence suggests that it does not respond well to logging (Lambert 1990c). *Breeding:* WFVZ found a nest hole on 26 July 1981 at Sepilok. It was approximately 8 m up in a 40-cm-diameter tree that was broken off 2 m above the hole. A pair of birds took turns occupying the hole. A Gray-and-buff Woodpecker examined the hole, but was repelled and ended up excavating a preexisting hole about 2 m below the Crimson-winged Woodpecker's hole. DMB found a nest 12 m above the ground in a dead tree at Kimanis in May 1959, and chicks in a nest in a dead oil palm in Feb. 1961. *Voice:* A two-note call, with emphasis on the first note, which is at a slightly higher pitch than the second.

Checker-throated Woodpecker *Picus mentalis*

Status: A common resident. *Localities:* Bengkoka, Bettotan, Bole River, Brumas, Danum, Kaingaran, Kinabalu, Labau River, Lamag, Lumbidan, Lumerau, Magdalena, Maliau, Megatai, Petagas, Poring, Quoin Hill, Ranau, Rinangisan, Saliwangan, Samawang River, Sebatik Island, Segaliud River, Segarong, Sepilok, Silam, Tabin, and Trus Madi. *Elevation:* Sea level to 1,700 m; many records are above 600 m. The Cambridge University expedition found it at 1,700 m on Trus Madi. *Habitats:* 1° and logged forest. Often found around vine tangles.

Banded Woodpecker *Picus miniaceus*

Status: A common resident. *Localities:* Banggi Island, Bengkoka, Benoni, Bettotan, Bole River, Brumas, Danum, Kaingaran, Kenakok, Kiau, Kinabalu, Labuan, Lamag, Lumbidan, Makaniton, Megatai, Melalap, Meliau River, Membakut River, Menggalong, Muruk, Padas Damit, Pandasan, Poring, Quoin Hill, Saliwangan, Sandakan, Sebatik Island, Segaliud River, Semporna, Sepilok, Silam, Sinsuran Road, Tanjung Aru, Tawau, and Ulu Segama. *Elevation:* Sea level to 1,500 m. *Habitats:* 1°, 2°, and logged forest; mangrove, peatswamp, and cocoa. Rarely recorded in logged forest by Lambert (1990c). *Breeding:* Phillipps (1970) observed a male excavating a hole at Sinsuran Road mile 24 in Aug. 1970. DMB observed an adult with two grown young at Bandau on 8 May 1960. MCT collected a male with testis 8×5 mm at Quoin Hill on 4 Aug. 1962. *Voice:* A single *kiew* or *kwee*, or occasionally four *kwees* in a row. *Food:* Ants, termites, and their eggs (WFVZ). This species often feeds on the ground.

Rufous Woodpecker *Celeus brachyurus*

Status: A common resident. *Localities:* Bengkoka, Bettotan, Bole River, Danum, Kiau, Labau River, Lamag, Lumbidan, Maang, Magdalena, Menggalong, Pandasan, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Sandakan, Sepilok, Silam, Tambunan, and Tiger Estate. *Elevation:* Sea level to 1,100 m. *Habitats:* 1° and 2° forest, rubber, *Albizia*, and cocoa. Lambert (1990c) recorded this species only once in logged forest. However, this species may not be overly sensitive to human activity, because many records derive from disturbed habitats. *Breeding:* DMB found a nest with three almost-fledged young 1 m above the ground in a rotting rubber tree at Kimanis on 3 May. He observed a nest at Bandau in February 1962 that had a sitting bird and presumably eggs. This nest was in an old termite encrustation on the side of a fruit tree, 3.5 m above the ground. A female collected on 3 July 1962 at Quoin Hill had an old brood patch and five collapsed follicles (MCT). WFVZ collected a male with testis 7×4 mm at Bole River on 20 Feb. 1982 and a female with ovary 2.5×2 mm at Sabah Softwoods on 21 June 1982. *Voice:* Three to five typical woodpecker shrieks, all on the same pitch: *kee-kee-kee-kee-kiu-kiu* (DMB). *Food:* Ants and termites.

Gray-capped Pygmy Woodpecker *Dendrocopos canicapillus*

Status: A common resident. *Localities:* Bole River, Danum, Kinabalu, Klias Peninsula, Labau River, Lumbidan, Menggalong River, Merintaman River, Quoin Hill, Sabah Softwoods, Sandakan, Sepilok, Silabukan, Silam, Tabin, Tawau, and Tempasuk. *Elevation:* Sea level to 400 m. *Habitats:* 1° and 2° forest, peatswamp, kerangas, mangrove, cocoa, and *Albizia*. *Breeding:* WFVZ collected a male with testis 4×2 mm at Silam Plantation on 8 Apr. 1982. *Voice:* A high, rapid staccato. Also drumming, rattling calls, and a softer *cheep-cheep* call (MCT). *Remarks:* This species is more a bird of the interior forest than the Sunda Pygmy Woodpecker, which is a coastal resident.

Sunda Pygmy Woodpecker *Dendrocopos moluccensis*

Status: A common resident in coastal areas. *Localities:* Balambangan Island, Benoni, Kimanis, Labuan, Likas, Lumbidan, Membakut, Padas Damit, Papar, Selinggaan Island, Tempasuk, and Wallace Bay. *Elevation:* Sea level. *Habitats:* Strand forest, mangrove, gardens, and open areas. *Breeding:* WFVZ observed a hole

being excavated in a dead *Casuarina* by this species on 26 Apr. 1983 near Membakut. The tree was isolated on a sand spit at the mouth of a river. The hole was 10 m off the ground and 5 cm across. *Voice*: A very rapid, high-pitched, woodpecker-like trill.

Buff-rumped Woodpecker *Meiglyptes tristis*

Status: A common resident. *Localities*: Banggi Island, Benoni, Berhala Island, Bettotan, Bole River, Crocker Range Park Headquarters, Danum, Gaya Island, Gomantong, Labau River, Lamag, Lumbidan, Magdalena, Maliau, Menggalong, Nalumad, Padas River, Quoin Hill, Ranau, Rayoh, Sabah Softwoods, Samawang River, Sandakan, Sebatik Island, Segaliud River, Sepilok, Silam, Tabin, and Ulu Segama. *Elevation*: Sea level to 1,100 m. *Habitats*: 1° and 2° forest, peatswamp, *Albizia*, and cocoa. *Breeding*: WFVZ observed a pair using a hole 6 m up in a dead *Albizia* tree at Silam Plantation on 6 Apr. 1982. *Identification*: This species has a crest that is visible at all times in the field. This feature is not stressed in field guides. *Voice*: *Chit-chit-chit-tee* (Norman 1964). *Food*: Ants, termites, and grubs. *Remarks*: Buff-rumped Woodpecker is often found in mixed flocks. Lambert (1990c) found this species in logged and 1° forest, but the average foraging height was much lower in logged forest (9 m vs. 19 m in 1° forest).

Buff-necked Woodpecker *Meiglyptes tukki*

Status: A common resident. *Localities*: Banggi Island, Berhala Island, Bettotan, Bole River, Brumas, Buloh River, Danum, Garinono, Gomantong, Kalabakan, Kinabalu, Labau River, Likas Bay, Lumbidan, Lumerau, Magdalena, Makaniton, Maliau, Menggalong River, Menunuk, Muruk, Pandasan, Petagas, Pintasan, Poring, Quoin Hill, Ranau, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sandakan, Sapagaya, Segarong, Silabukan, Silam, Tabin, Tambunan, Telipok, Ulu Dusun, and Ulu Tiulon. *Elevation*: Sea level to 800 m. *Habitats*: 1°, 2°, and logged forest; peatswamp, *Albizia*, and cocoa. *Breeding*: DMB observed nesting in May and June. WFVZ collected a male at Bole River on 16 Mar. 1982 with testis 8 × 4 mm. *Voice*: Loud drumming, high-pitched churring, and chittering (DMB; Norman 1964). *Remarks*: Lambert (1990c) found this species to be the only bark-gleaning insectivore that increased in numbers in logged forest. It often occurs in mixed-species flocks.

Gray-and-buff Woodpecker *Hemicircus concretus*

Status: A common resident. *Localities*: Beluran, Bengkoka, Bettotan, Bole River, Brumas, Danum, Labau River, Labuk Road, Lumbidan, Lumerau, Maliau, Menggalong River, Poring, Sabah Softwoods, Saliwangan, Segaliud River, Sepilok, Silabukan, Sinsuran Road, Sipitang, and Tabin. *Elevation*: Sea level to 500 m. *Habitats*: 1° and 2° forest, clearings, gardens, and *Eucalyptus*. *Breeding*: WFVZ observed a pair excavating a hole on a broken tree at Sepilok on 26 July 1981. An occupied nest hole was found in Feb. 1961 by DMB at Kimanis about 3.5 m up a dying tree. *Voice*: A trill and *skree*, both not very shrill. *Food*: In addition to typical woodpecker bark searching, this species gleans fruit and leaf surfaces as well as eating overripe *Eugenia* fruit (DMB). *Remarks*: Gray-and-buff Woodpecker is small, unbarred, and does not have a stiffened tail. It also feeds more like a nuthatch or babbler than a woodpecker.

Common Flameback *Dinopium javanense*

Status: A common resident in coastal areas. *Localities:* Benoni, Berhali Island, Kimanis, Kinarut, Kuala Penyu, Labuan, Lumbidan, Membakut, Mempakul, Menggalong, Menggatal, Mumiang, Padas Damit, Papar, Petagas, Sandakan, Segarong, Sepilok, Tuaran, Ulu Segama, and Wallace Bay. *Elevation:* Sea level. *Habitats:* 1° and 2° forest, peatswamp, mangrove, and beach strand. *Breeding:* Phillipps (1970) noted that the nest hole is almost always in a dead coconut palm. He observed a female excavating in Apr. (year unspecified). DMB observed a nest with two young in a coconut palm at Kimanis in May 1960 and another nest with young on 22 June at Kuala Penyu. *Voice:* A trill, softer and less staccato than other woodpeckers.

Olive-backed Woodpecker *Dinopium rafflesii*

Status: An uncommon resident. *Localities:* Bettotan, Bole River, Danum, Garinono, Kalabakan, Kinabalu (lower slopes), Lamag, Lumbidan, Magdalena, Padas Damit, Quoin Hill, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silabukan, Simatuoh, Tabin, and Ulu Dusun. *Elevation:* Sea level to 400 m; a specimen from Mt. Magdalena was collected at 900–1,200 m. *Habitats:* 1°, 2°, and logged forest; *Albizia* and rubber. Lambert (1990c) never found this species in logged forest near Danum, although records exist from logged areas. *Breeding:* MCT collected a male at Quoin Hill with testis 11 × 7 mm on 12 July 1962. WFVZ collected a male with testis 13 × 5 mm near Bole River on 26 Feb. 1982 and another with testis 7 × 3 mm at Sabah Softwoods on 2 July 1982. *Food:* A male collected by WFVZ at Sabah Softwoods on 2 July 1982 had more than 100 ants and ant larvae in its stomach.

White-bellied Woodpecker *Dryocopus javensis*

Status: A common resident. *Localities:* Balambangan Island, Banggi Island, Beaufort, Bengkoka, Binsulok, Bole River, Brumas, Danum, Kimanis, Klias Peninsula, Labau River, Labuan, Lamag, Lumbidan, Lumerau, Magdalena, Maliau, Menggalong, Padas Damit, Pulau Tiga, Quoin Hill, Sandakan, Segarong, Sepilok, Sebatik Island, Silam, Tabin, Tawau, Tuaran, and Ulu Tiulon. *Elevation:* Sea level to 600 m. *Habitats:* 1°, 2°, peatswamp, and swamp forest; kerangas, cocoa, and old rubber. Lambert (1990c) found this species to be much more common in 1° forest than in logged forest. *Breeding:* Phillipps (1970) observed two adults and three young leave a nest hole placed low in a decaying rubber tree at Tuaran Estate (no date). DMB observed a nest with two young at Kimanis on 17 Apr. 1959. A female collected at Quoin on 6 July 1962 had an old brood patch (MCT). *Voice:* A sharp *yip, keow*, or a long low staccato. *Remarks:* It is often seen flying great distances at high altitude and, thus, seems to have substantial dispersal ability.

Great Slaty Woodpecker *Mulleripicus pulverulentus*

Status: An uncommon resident. *Localities:* Batu Punggul, Bengkoka, Bole River, Brumas, Danum, Klias Peninsula, Labuan, Lamag, Lumbidan, Lumerau, Magdalena, Maliau, Menggalong, Padas River, Quoin Hill, Sandakan, Sepilok, Tabin, Tiger Estate, and Ulu Segama. *Elevation:* Sea level to 500 m. *Habitats:* 1° and 2°, swamp, and peatswamp forest. Lambert (1990c) found this to be a wide-ranging species, occurring in logged forest as frequently as in 1° forest. *Breeding:*

WFVZ collected one with a testis of 10×5 mm on 13 Mar. 1981 at Bole River. *Voice*: A loud double call note, also a loud bubbling scream. DMB described a loud, laughing call: *rout-a-rout-a-rout-rout-rout*. *Remarks*: It often occurs in flocks of three to seven individuals, which are not particularly shy. They move from tree to tree by plummeting with their wings folded and then flaring them out at the last minute to slow down and land.

Maroon Woodpecker *Blythipicus rubiginosus*

Status: A common resident. *Localities*: Baturong, Beluran, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Kaingaran, Kenakok, Kimanis, Kinabalu, Kota Belud, Labau River, Labuk Road (mile 18), Lumerau, Magdalena, Maliau, Marai Parai, Megatai, Poring, Quoin Hill, Ranau, Rinangisan, Sabah Softwoods, Saliwangan, Sebatik Island, Sepilok, Silabukan, Sinsuran Road, Tabin, Tawau Hills, Trus Madi, Ulu Dusun, Ulu Samuran, and Ulu Segama. *Elevation*: Sea level to 1,800 m. *Habitats*: 1° and 2° forest, *Albizia*, rubber, and gardens. Lambert (1990c) reported this species as rarer in logged than in 1° forest. *Breeding*: WFVZ collected a recent fledgling and an adult undergoing complete body molt near the Bole River on 22 Feb. 1982. WFVZ also collected a male with testis 9×4 mm near Brumas on 15 May 1982. RGM collected a specimen with testis 9×6 mm at Tawau Hills on 28 June 1999. *Voice*: A loud, sharp, metallic cry. Also a distinctive machine-gun-like chatter when it flies. *Food*: Beetle larvae (WFVZ) and ants (RGM).

Greater Flameback *Chrysocolaptes lucidus*

Status: A rare resident. *Localities*: Sandakan and Sebatik Island. The first two Bornean specimens were collected by R. C. Andrews on Sebatik Island in 1910 (AMNH). The only other specimen was collected near Sandakan by the MCZ expedition in 1937. There is also a sighting in the Sepilok Forest Reserve by J. Payne on 7 Feb. 1980. *Elevation*: Sea level. *Habitats*: Unknown in Sabah, but probably mangrove or 1° coastal dipterocarp forest. In other areas it is a mangrove species. It is apparently common in the mangroves on the Mahakam delta, East Kalimantan (Eve and Guige 1989). *Remarks*: This species has an odd disjunct distribution: southern Asia, the Philippines, Sumatra, Java, and eastern Borneo. Amadon (1943b) described the Bornean form as a separate subspecies *C. lucidus andrewsi*, nearest in appearance to *C. l. chersonesus* of Malaya. This diagnosis is important; otherwise the birds might be immigrants from the Philippines (*C. l. lucidus*).

Orange-backed Woodpecker *Reinwardtipicus validus*

Status: A common resident. *Localities*: Baru Jumpa, Batang River, Bengkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Kaingaran, Kinabalu, Labuan, Labuk Road, Lamag, Lumaku, Lumbidan, Lumu-lumu, Magdalena, Maliau, Meliau River, Menggalong, Menkaladom, Padas Damit, Quoin Hill, Rinangisan, Samawang, Sandakan Estate, Segaliud River, Segarong, Sepilok, Sepulut, Silabukan, Silam, Tabin, Ulu Segama, and Ulu Tiulon. *Elevation*: Sea level to 1,900 m. *Habitats*: 1° , river terrace, peatswamp, and 2° forest; also cocoa. Lambert (1990c) recorded this species only once in logged forest. *Breeding*: V. W. Ryves collected a single egg at Batang River (Sandakan Estate) on 25 June 1938. The egg was white, egg-shaped, smooth, glossy, and 29.5×23 mm (Gibson-Hill 1949b). A.

Phillipps found a nest at Kinabalu Park Headquarters (Prentice and Eddie 1981). The nest hole was 10 m up in a large dead tree beside the Kamborangoh road. On 6 Aug. a nestling could be seen in the hole. On 17 Aug. a male was observed visiting the nest and the nestling was seen sitting on the lip of the hole. The female approached the hole calling *kee-weet-wit-wit-wit-wit* at 07:00 hr on 18 Aug. and the nestling made its first flight. That day it made ca. 20-m flights. MCT collected a male with testis 5×3 mm on 23 July 1962 at Quoin Hill. WFVZ collected a male with testis 8×4 mm near the Bole River on 22 Feb. 1982 and observed a female excavating a hole nearby on 15 Mar. 1982. *Voice*: Described as variations on a series of *ke-weets*.

Family INDICATORIDAE

HONEYGUIDES

Malaysian Honeyguide *Indicator archipelagicus*

Status: An uncommon resident. *Localities*: Bengkoka, Bole River, Danum, Lumbidan, Menggalong, Poring, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Sepilok, and Sipitang. *Elevation*: Sea level to 1,300 m. *Habitats*: 1° and 2° forest, rubber, and *Albizia*. Lambert (1990c) never recorded them in logged forest, and only infrequently in 1° forest. However, they occurred in 3-yr-old *Albizia* at Sabah Softwoods in a mixed flock with nuthatches, sunbirds, and Green Ioras (WFVZ). One was also collected in 2° scrub adjacent to the helicopter platform at Rinangisan (1,300 m) during the 1983 El Niño drought, and they have been found at the edge of rubber plantations (DMB, YUE). *Voice*: Exactly as described by Smythies (1981), it sounds like a domestic cat. Also described as woodpecker-like, with a harsh initial note followed by a rattling series of notes (DMB).

Order PASSERIFORMES

Family EURYLAIMIDAE

BROADBILLS

Green Broadbill *Calyptomena viridis*

Status: A common resident, frequently heard and netted, less frequently seen. *Localities*: Bettotan, Bole River, Brumas, Bundu Tuhan, Danum, Ensuan, Garinono, Imbak River, Kaingaran, Kalabakan, Kinabalu (lower slopes), Kulamba, Labau River, Lamag, Maang, Magdalena, Makaniton, Malangkap, Maliau, Megatai, Melalap, Membakut, Menggalong, Muruk, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Samawang River, Sebatik Island, Sepilok, Sinsuran Road, Tabin, Tawau Hills, and Ulu Tiulon. *Elevation*: Generally, sea level to 700 m, but recorded by Whitehead (Sharpe 1889d; Whitehead 1893) at 1,200 m on Mt. Kinabalu and specimens have been collected at 1,250 m at Rinangisan and on Mt. Magdalena. *Habitats*: 1° and 2° lowland to lower montane, old logged, peatswamp, and heath forest; also overgrown rubber, cocoa under *Trema orientalis*, and *Albizia* groves. Lambert (1990c) found it less common in logged than in 1° forest. *Breeding*: WFVZ collected specimens with enlarged testes at Saliwangan on 12 Feb. 1983 (10×5.5 mm), Bole River on 14 and 18 Feb. 1982 (15×7 mm), Brumas on 9 and 11 May 1982 (11×7 mm and 11×5 mm), Rinangisan on 26 June 1983 (11.5×7.5 mm), and Maang on 27 June

1983 (13 × 6 mm and 18 × 8 mm). Although several females were collected at the same time as these males, none showed signs of breeding. *Voice*: One call is reminiscent of the sound of a wooden marble dropped on a table; it starts slowly and increases in speed and rises in pitch. Also, a low whistle that drops slightly in pitch. *Food*: Fruit. *Remarks*: Sympatric with Whitehead's Broadbill at Poring. Lambert (1990c) noted that this is not a far-ranging species for a frugivore, which may account for its lowered occurrence in logged forest.

Hose's Broadbill *Calyptomena hosii*

Status: A scarce Bornean endemic, which may be absent from East Coast forest. All records in Sabah are from upland to lower montane areas in central and western parts of the state. *Localities*: Batu Punggul, Bukit Ibul, Long Pasia, Poring, Sepulut, and Ulu Tiulon (all sightings). *Elevation*: 300–1,000 m. *Habitats*: 1° forest. *Breeding*: GD found a nest at Long Pasia on 3 Apr. 1996 that was slung on a low drooping branch of an understory tree about 1.5 m up. The nest was a bulk of about 25 × 15 cm, made of dead leaves of broadleaf plants, rattans, and bamboos, and it was covered with green moss and lichens and featured a hanging tail of rattan leaves. Two creamy-white eggs about 28 mm long were present (Smythies 2000). *Remarks*: CMF observed a flock of four birds at the base of the limestone pinnacle at Batu Punggul and two more, during the same trip, between Batu Punggul and Sepulut. Francis had another sighting during a WFFVZ trip to Ulu Tiulon. These localities are upland and highland areas in south-central Sabah.

Whitehead's Broadbill *Calyptomena whiteheadi*

Status: In general, an uncommon Bornean endemic, but at certain localities they are common, especially when fruit is available (e.g., Sayap). *Localities*: Kinabalu, Muruk Miau, Poring, Rinangisan, Sayap, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation*: Kinabalu 600–1,700 m, Trus Madi 1,500–1,850 m, Tambuyukon 900–1,200 m, and Crocker Range 1,200 m. *Habitats*: 1° montane forest. Whitehead described it as a species of the deep tall forest and not of stunted mountain forests. This has been our experience as well. We have also recorded it in the early morning at the Kinabalu Park headquarter's street lights in company with other birds feeding on moths. *Breeding*: Whitehead (Sharpe 1889d; Whitehead 1893) found a nest with two nestlings on 17 Mar. 1888 on Kinabalu. The nest was hanging from a slender bough ca. 15 m above the ground. The outside was fresh green moss bound over the bough and had a long camouflage streamer dangling over the side. Inside, the nest was lined with dry bamboo leaves. Whitehead also found a nest with two eggs (no further information). V. W. Ryves collected a clutch of one egg at Kiau on 23 Mar. 1939. The egg was pyriform, with a fine matte surface of uniform white, 33 × 26 mm (Gibson-Hill 1949b). WFFVZ collected females with enlarged sexual organs at Rinangisan on 1 and 2 Apr. 1983 (enlarged oviduct, largest ovum 18 × 9 mm). Sexually active males were collected at Rinangisan on 4 and 13 Apr. 1983 (testes 11 × 6.5 mm, 17 × 13 mm, 5 × 8 mm). *Voice*: A variety of calls are given. The first is a loud, high-pitched, woodpecker-like staccato, *eek-eek-eek . . .*, uttered as an alarm (WFFVZ). The second is a contact call consisting of a squeak followed by hissing that sounds like a combination of a catlike spit and a human clearing his throat, *skeek! hkhkhkhkhkhk*. This has been described as a loud, harsh *kee-eerrrr* (WFFVZ). The third is a hissing alarm call, *ee-ooo*. The fourth is a search call that is hollow,

deep, and trogonlike, *go-up*. The fifth is five or six loud whistles, each note rising slightly. *Food*: Berries and insects. RGM observed six individuals in a lindos tree (Lauraceae: *Litsea cubica*) and found that the stomachs of specimens smelled strongly of lindos fruits. *Remarks*: The behavior of this broadbill is quite different from that of the similar-looking Green Broadbill. Whitehead's Broadbill can be loud and obtrusive. It can be woodpeckerlike in behavior and (some) vocalizations. It convenes in small groups, and screeches and flaps loudly as it moves from perch to perch (often trunk to trunk).

Long-tailed Broadbill *Psarisomus dalhousiae*

Status: A scarce resident. *Localities*: Bukit Ibul, Kaingaran, Kinabalu, Mengkaladom, Rinangisan, Sayap, and Sinsuran Road. *Elevation*: Kinabalu 900–1,650 m, Trus Madi 900 m, Crocker Range 1,100–1,400 m, and Bukit Ibul 1,150. *Habitats*: Principally 1° lower montane forest, forest-edge scrub, and emergent trees. *Breeding*: Whitehead collected a female with a brood patch and speculated that the species breeds in the middle of March on Kinabalu. Phillipps (1970) watched a family of five on Sinsuran Road (mile 43, 1,100 m, 25 Apr. 1968) flying to and from their nest, which was a large soccer ball-sized structure composed of dead leaves and rootlets. It was placed in the lower branches of a forest tree and opened directly over the steeply falling forested slope below. J. Payne observed one carrying apparent nesting material (an epiphytic creeper) at Bukit Ibul on 3 May 1981. RGM observed an adult feeding a loudly begging juvenile at Kinabalu Park (1,500 m) on 22 May 1999, and a flock of 8–12 with juveniles at Sayap in early July 2000.

Black-and-red Broadbill *Cymbirhynchus macrorhynchos*

Status: A common resident. *Localities*: Batu Punggul, Beluran, Benkoka, Binsulok River, Bole River, Bukit Garam, Bundu, Danum, Kaingaran, Kalabakan, Kimanis, Kinabatangan River, Klias, Kota Belud, Kota Kinabalu suburbs, Kuala Penyu, Kulamba, Labuan, Labuk Road, Lamag, Lumbidan, Maang, Melalap, Membakut River, Menggalong, Merutai, Muruk, Papar, Penampang, Poring, Saliwangan, Segarong, Sepilok, Silam Plantation, Tanjung Aru, Tawau, Tempasuk, and Tiger Estate. *Elevation*: Sea level to 750 m. *Habitats*: 1°, 2°, and logged forest; scrub, river-edge growth, peat swamp, mangrove, nipah, overgrown rubber, and padi edges. *Breeding*: DMB found nests at Klias in Jan. and July, Kimanis in Feb. and May, Membakut in Feb., Mar., and Apr., and Papar in Aug. and Dec. (years not specified). He described them as (usually) an untidy mass of twigs, leaves, and other vegetation suspended from a branch and generally overhanging water. There is often a long, bedraggled “tail” suspended below. Nests occur quite commonly along rivers, but also over pools in coastal slacks and drainage ditches on estates. On one occasion he found a nest 8 m up in a rubber tree well away from water. Two eggs are laid, and they are pale pink, closely speckled, and otherwise marked with reddish-brown, chiefly at the larger end. J. Payne observed ca. 12 nests along a river at Kulamba and collected a nest with three eggs in Apr. 1984. WFVZ collected a specimen with a partially shelled oviduct egg at Binsulok on 5 Feb. 1982. *Voice*: DMB described one vocalization as a monotonous and repetitive *tyook*, and another as *ka-ka-kraar-kraar*, which is hoarse, grumbling and descending in pitch. WFVZ described one call as *kraa-kraa . . .*, and a husky *shack-shack-shack . . .* in slow cadence. It also utters a

series of high-pitched *weeet* sounds. *Food*: Snails were found in mangrove specimens, also hemipterans (WFVZ).

Black-and-yellow Broadbill *Eurylaimus ochromalus*

Status: A common resident. *Localities*: Batu Punggul, Batu Putih, Beaufort Hill, Bettotan, Bole River, Bongawan, Brumas, Bundu, Danum, Ensuan, Gomantong, Gum Gum, Imbak River, Kabayau, Kaingaran, Kimanis, Klias Estate, Kota Kinabalu suburbs, Kuala Penyu, Labau River, Lamag, Lumaku, Lumbidan, Maang, Maliau, Manggis, Mawau, Megatai, Meliau, Membakut, Menggalong, Quoin Hill, Padas Damit, Pintasan, Poring, Rayoh, Sabahat, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Sebatik Island, Silam Plantation, Sukau Road, Tabin, Tawau Hills Park, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m (Mt. Lumaku) and 1,800 m (Manggis). *Habitats*: 1° and 2°, upland heath, riparian, logged, and coastal peatswamp forest; also overgrown rubber, cocoa, and *Albizia*. Lambert (1990c) found that this species survived well in logged forest. *Breeding*: Norman (1964) observed an occupied (later abandoned) nest on Sebatik Island in late May and early June 1961. It was an untidy pear-shaped structure composed of looped grasses suspended from the branch of a tree ca. 5 m above the ground. A bee's nest was located close by. At Quoin Hill in mid-June 1961, she observed a family with two recently fledged young, whose nest again was placed near a beehive. RGM observed a similar family group in the Crocker Range in June 1999. Phillipps (1970) observed a pair flying about an apparent nest along Sinsuran Road (mile 20, ca. 600 m) in May 1969. WFVZ observed a nest under construction at Bole River on 14 Mar. 1982. The nest was a large ball of twigs among dense branches in a 6-m, 2°-growth sapling. Specimens collected at that time had active, but not especially enlarged, gonads. WFVZ observed a nest at Menggalong on 14–16 July 1983. It was suspended 15–18 m high from the lateral branch of a tall tree at the edge of peatswamp forest and seemed like a shapeless conglomerate of grasslike material. A bird was singing from a perch above and adjacent to the nest. WFVZ collected specimens with enlarged sexual organs at Sabah Softwoods on 1 July 1982 (testes 5 × 3 mm) and at Silam on 19 Aug. 1983 (largest ovum 4 × 4 mm, ruptured ovarian follicles). *Voice*: Rising, cicadalike; well described in King et al. (1975). *Food*: Caterpillars, mantises, orthopterans, beetles.

Banded Broadbill *Eurylaimus javanicus*

Status: A common resident. *Localities*: Benkoka, Bole River, Brumas, Danum, Ensuan, Imbak River, Kaingaran, Labau River, Lamag, Lumbidan, Maang, Magdalena, Maliau, Mawau, Megatai, Meliau, Membakut, Menggalong, Padas Damit, Poring, Pulau Tiga, Quoin Hill, Rinangisan, Sabahat, Sabah Softwoods, Saliwangan, Sebatik Island, Sepilok, Silam, Simatuoh, Sinsuran Road, Tabin, Tawau Hills, Ulu Dusun, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m. *Habitats*: 1° and 2°, logged, upland heath, and peatswamp forest; overgrown rubber and *Albizia* groves. Lambert (1990c) found this species to survive fairly well in logged forest. *Breeding*: Specimens with enlarged sexual organs were collected at Bole River 16 Mar. 1982 (testes 7 mm; largest ovum 5 mm, enlarged oviduct); Brumas on 6 June 1982 (testes 7 × 2 mm); Maang on 15 and 18 June 1983 (largest ovum 2 × 2 mm, enlarged oviduct; testes 7 × 6 mm), and Quoin Hill on 25 July 1962 (testes 7 × 6 mm). A dependent juvenile was observed in Aug. by C. Mann.

Voice: Exactly as described in King et al. (1975), *wheoo* or *pee-u* then a low accelerating whistle, ending in two or three harsher trailing-off notes. *Food:* Small snails, insects, hemiptera.

Dusky Broadbill *Corydon sumatranus*

Status: An uncommon resident. *Localities:* Beaufort area, Benkoka, Bole River, Brumas, Danum, Gomantong, Kalabakan, Kinabalu (lower slopes), Lamag, Magdalena, Malangkap, Maliau, Poring, Sabahat, Sabah Softwoods, Sebatik Island, Sepilok, Silam, Tabin, Ulu Kimanis, Ulu Membakut, and Ulu Tiulon. *Elevation:* Sea level to ca. 1,200 m; for example, Poring 1,050, Mt. Danum 1,100 m, and Mt. Magdalena 1,200 m. There are sightings on Kinabalu to 1,800 m (Gore 1968; Robson 1998b). *Habitats:* 1°, river terrace, and 6-yr-old logged forest adjacent to 1° forest (A. Johns, unpubl.). Whitehead regarded it as a bird of “old forest,” and DMB observed single individuals in “thin jungle” in the Kimanis–Beaufort area. Lambert (1990c) noted an apparent decline of this species in logged forest, but that a nest was found in recently logged forest near Bole River. *Breeding:* J. Spenser watched a pair build a nest in 2 hr in Sepilok on 12 Apr. 1981. It was a large (ca. 30-cm-diameter) domed ball suspended ca. 15 m above the 1° forest floor from a long drooping branch. *Voice:* A clear ringing *pee-u* (Norman 1964). *Remarks:* WFVZ collected no specimens of this species. However, at Brumas on 6 May 1982 our group watched a group of eight birds, which included at least one begging juvenile. Norman (1964) and Kiew (1977) also reported flocking.

Family PITTIDAE

PITTAS

Giant Pitta *Pitta caerulea*

Status: A scarce resident. *Localities:* Bettotan, Bole, Danum, Luasong (Smythies 2000), Magdalena, Maliau, Segaliud River, Sepilok, and “Upak” (Sandakan). *Habitats:* 1°, 2°, and logged forest, and overgrown rubber adjacent to 1° forest. *Elevation:* Sea level to 500 m; A. D. Johns had a sighting at 1,200 m at Maliau (Lambert and Woodcock 1996). *Food:* Spiders and trilobite beetles. *Remarks:* The BMNBE collected a specimen in “light undergrowth” on the lower slopes of Mt. Magdalena (R. Sims, unpubl.). At Danum, F. Lambert found them difficult to observe and net, but on some occasions he heard as many as three or four calling simultaneously. WFVZ had only two records, both in the vicinity of Sepilok Forest Reserve, but not in 1° forest. One bird was hit by a car not far from where the Sepilok access road meets the main highway. This is an area of scrub and rubber. The second record was a bird netted in a thicket between the Sepilok laborers’ quarters compound and an oil-palm plantation. S. Ambi observed this species twice in nearby old rubber estates. B. King, D. Yong, and J. Wall observed it on several occasions in 1° forest at Sepilok, and K. Ickes attracted them there using tape-recorded playback. It seems likely that the Sepilok birds found in plantation areas derived from the nearby 1° forest.

Blue-banded Pitta *Pitta arquata*

Status: A scarce Bornean endemic. *Localities:* Bole River, Danum, Ensuan, Kinabalu, Malangkap, Maliau, Meliau, Poring, Rayoh, Saliwangan, Togudon, and Ulu Samuran. *Elevation:* 150–1,250 m. A distinctly upland and lower montane species. *Habitats:* 1° and 2° forest. *Voice:* A whistle virtually indistinguishable

from that of Rail-Babbler and similar to Garnet Pitta (D. R. Wells; Lambert and Woodcock 1996). See Black-and-crimson Pitta. *Food*: Insects. *Remarks*: Buckton (1992) found this species to be regular at Poring, but much rarer at Danum Valley.

Black-and-crimson Pitta *Pitta ussheri*

Status: A common north Bornean endemic. *Localities*: Benkoka, Berhala River, Bettotan, Bole River, Brumas, Danum, Gomantong, Gum Gum, Imbak River, Kalabakan, Labuk Road, Lumbidan, Magdalena, Meliau River, Sabahat, Sabah Softwoods, Saliwangan, Samawang, Samuran, Sepilok, Tabin, Tambuyukon (lower slopes), and Ulu Dusun. *Elevation*: Sea level to 200 m. *Habitats*: 1°, 2°, and logged forest; overgrown rubber and *Albizia*. It is often in dense undergrowth. *Breeding*: V. W. Ryves (notes) collected a nest with two well-incubated eggs at “Batang” River on Sandakan Estate on 28 Apr. 1938. The nest was in an area of “low-lying jungle” adjacent to a track. The nest was domed, ca. 23 cm in diameter, and sequestered among some twisted roots on the ground and buried in thick debris of rotting vegetation and dead leaves. An inner layer consisted of strips of palm leaves and fiber, and was surrounded by dead and decaying leaves. The female sat tight until Ryves almost touched the nest. She then flushed, but only a short distance. Gibson-Hill (1949b) described the eggs collected by Ryves as smooth and glossy, white in color with a few fine spots and coarse blotches of gull-gray and fuscous, mostly at the broader end, 29.5 × 20.5 mm and 29 × 20 mm. The BMNBE collected a female accompanied by a “chick” along the Meliau River in Apr.–May 1956 (R. Sims, unpubl.). J. Payne flushed a bird from a nest with two eggs on 17 May 1982 at the headwaters of the Lumpongan River, near Silabukan (Tabin Wildlife Reserve). The nest was built on gently sloping ground in 1° forest and was attached to the base of a clump of saplings and herbs. The one intact egg was 26.7 × 20.0 mm and colored off-white tending towards pinkish-beige. It had reddish blotches that were especially concentrated at the large end. Specimens with enlarged sexual organs were collected at Bole River on 22 Mar. (enlarged oviduct, ruptured ovarian follicles) and 6 Apr. 1982 (testes 5 × 3 mm); Sabah Softwoods on 30 June (testes 6.5 × 4 mm) and 5 July 1982 (largest ova 3 × 3 mm, two ruptured follicles); Imbak River on 19 July 1982 (testes 6 × 3.5 mm); and Labuk Road on 1 Aug. 1983 (testes 5 × 3 mm). *Voice*: As described in Whitehead (1893) and Lambert and Woodcock (1996): a prolonged whistle, gradually rising in power and suddenly ceasing when it reaches its highest pitch; ventriloquial. Sabah’s birds sound very much like the Rail-babbler, with a more prolonged whistle than the red-headed Garnet Pitta (F. Lambert). *Food*: Cockroaches, spiders, beetles, ants, and snails. *Remarks*: Also known as Black-headed Pitta. Initially, this species was lumped with Graceful Pitta (*P. venusta*) in Garnet Pitta (*P. granatina*), but Inskipp et al. (1996) followed Lambert and Woodcock (1996) in treating them as allospecies.

Blue-headed Pitta *Pitta baudii*

Status: An uncommon Bornean endemic, although it may be more frequent at some localities, such as Danum Valley (Buckton 1992). *Localities*: Batu Punggul, Baturong, Benkoka, Bettotan, Bole River, Bongon, Brumas, Danum, Gomantong, Kalabakan, Kinabatangan River, Magdalena, Maliau, Quoin Hill, Pandasan, Saliwangan, Sepilok, Sukau, Tabin, Tawau Hills, Ulu Merutai, Ulu Samuran, and Ulu Tiulon. *Elevation*: Sea level to 500 m. *Habitats*: 1° (especially river terrace),

riparian, and logged forest. Usually in 1° forest, but Lambert (1990c) and Johns (unpubl.) recorded it in logged areas. *Breeding*: Specimens with enlarged testes were collected at Bole River on 5 Mar. 1982 (5 × 3 mm) and at Brumas on 26 May (5 × 3 mm) and 2 June 1982 (6 × 3 mm). *Voice*: A soft, descending whistle: *whoo-oo* or *wee-oo*. *Food*: Caterpillars (50 mm long) and orthopterans.

Banded Pitta *Pitta guajana*

Status: An uncommon resident. *Localities*: Bole River, Brumas, Crocker Range Park Headquarters, Danum, Dent Hills, Ensuan, Kaingaran, Madalon, Magdalena, Maliau, Muruk, Poring, Quoin Hill, Rayoh, Sabahat, Sepilok, Tabin, Trus Madi, and Ulu Tiulon. *Elevation*: 50–1,000 m. Most records are from upland or highland areas, but Sabahat and Tabin are below 100 m. Whitehead (Sharpe 1889d; Whitehead 1893) obtained a specimen from a local collector with a dubious elevation of 5,000 feet (1,524 m). *Habitats*: 1° and old 2° forest. Lambert observed them on wide logging roads, suggesting good dispersal powers, but he had no records in logged forest at Bole or Danum. Johns (unpubl.) recorded it in twice-logged forest at Tabin. *Breeding*: Specimens with enlarged sexual organs were collected at Bole River on 15 Mar. (testes 5 mm; largest ovum 8 mm) and 23 Mar. 1982 (testes 6 × 3.5 mm), Brumas on 21 May 1982 (enlarged oviduct), and Quoin Hill on 4 Aug. 1962 (testes 6 × 3 mm). *Voice*: The call is a hoarse (or raspy) descending diphthong. Also a loud, explosive *poww* (F. Lambert). *Food*: Insects, platyhelminths, and snails.

Blue-winged Pitta *Pitta moluccensis*

Status: A migrant that is infrequently encountered except in coastal areas or while migrating at night (e.g., over the Crocker Range). Breeding populations may also be present (see Breeding). *Localities*: Beaufort, Brumas, Gaya Island, Gomantong, Kimanis, Kota Kinabalu suburbs, Kuala Penyu, Lamag, Lumbidan, Melalap, Papar, Pulau Tiga, Rinangisan, Saliwangan, Sebatik Island, Sinsuran Road, Tanjung Aru, Tembungo, and Tenom. *Elevation*: Generally, sea level to 200 m, but migrants have been recorded at 1,800 m on Sinsuran Road (D. R. Wells), 1,450 m at Tenompok Pass (Q. Phillipps in Jenkins and de Silva 1978), 1,300 m at Rinangisan (WFVZ), and 1,600 m in Kinabalu Park (Robson 1998b). *Habitats*: 1° and 2° forest and scrub, mangroves, and coastal gardens. In coastal areas they seem to prefer damp gullies and edges of water-courses (DMB). *Breeding*: MCT (Thompson 1966) collected a specimen at Tenom on 31 Dec. 1962 with a slightly enlarged oviduct and an edematized brood patch. Although no nests have been found in Sabah, breeding is strongly suspected (Lambert and Woodcock 1996). *Migration dates*: Early: DMS (Simpson 1982a) recorded the following numbers of birds at the Tembungo oil platform in 1981: 27 Sept. (five in 2 hr), 28 Sept. (35 in 1.5 hr), 1 Oct. (one dead), and 5 Oct. (one dead). He collected a specimen at Tembungo on 14 Dec. 1981. DMB (Batchelor 1961) encountered a large flock while at sea off Labuan at ca. 21:00 hr on 13 Oct. 1958. He (Batchelor 1959) later found them to be common on the West Coast until the end of Nov. Five to six birds appeared on his boat outside Pulau Tiga at night on 13 Oct. 1961; several flew into his bungalow at Kimanis on 31 Oct. 1958 and a year later on 1 Nov. Other planters experienced the same phenomenon on the same nights as far as Beaufort and Putatan. D. R. Wells netted five at a night-light at the Sinsuran Road summit on 3 Nov. 1980. Late: From 12 to 14 Apr.

1983 WFVZ saw many individuals flying over Rinangisan at night. On 12 May 1983, WFVZ netted one bird on Pulau Tiga that had heavy fat deposits and was clearly a migrant. Whitehead (1893) reported large numbers in Apr. 1886 on Pulau Tiga, and DMB found birds there as late as 5 June. *Voice*: A short whistle uttered three times (Whitehead 1893). A melodious whistling *ter-wheoo*, with the accent on the middle syllable, or a low *churr* audible only in close proximity (DMB). *Food*: Insects, insect larvae; one specimen had a crab claw in its stomach. *Remarks*: The two that WFVZ recorded at 1,300 m were attracted to a light at night. They are easily identified at night by their large white underwing patches and red bellies.

Fairy Pitta *Pitta nympha*

Status: A migrant for which there are few records. *Localities*: Bole River, Lumbidan, and Mawau. *Remarks*: DMB collected a bird at Mawau on 15 Nov. 1959 that he later suspected of being this species. The specimen, which was sent to the Sarawak Museum, showed a prominent whitish supercilium extending from the bill to the nape, as well as rich buffy underparts. Johns (1989b) sighted one in riparian forest at Bole River. Mees (1977) tracked down several specimens of Fairy Pitta (one from south Borneo, one from Lumbidan in the British Museum, and seven from Sarawak) and concluded that NW Borneo was an important wintering area for the species.

Hooded Pitta *Pitta sordida*

Status: An uncommon resident. *Localities*: Bole River, Danum, Gana, Gomantong, Kimanis, Kinabatangan River, Kota Kinabalu, Kunatong, Labuan, Lamag, Lumbidan, Mawau, Melalap, Meliau, Membakut, Quoin Hill, Sabahat, Sabah Softwoods, Samawang, Segarong, Sepilok, Silam, Tabin, and Ulu Dusun. Whitehead noted that A. H. Everett's collectors found it on Pulau Tiga, but Whitehead and others did not. *Elevation*: Sea level to 400 m. *Habitats*: 1°, 2°, logged, and peat swamp forest; mangrove, *Albizia*, *Gmelina*, old rubber, and overgrown gardens. This species may favor 2° growth. *Breeding*: DMB found an empty nest at Mawau on 12 Apr. 1960. It was a soccer ball-sized domed mass of dead leaves, grass stems, and pieces of thin bark and root fibers, placed just off the ground in a thick clump of spiny palm. Superficially, it looked just like a mass of rubbish left by flood waters. The nest was deserted a few days later. WFVZ collected specimens at Bole River with enlarged sexual organs on 3 Mar. (testes 8 × 5 mm), 23 Mar. (largest ovum 4 mm), and 31 Mar. 1982 (ova granular, enlarged oviduct). *Voice*: A loud, abrupt *whew-whew*, with the distinctive hoarse pitta quality (see Banded Pitta). Also an alternative call that sounds somewhat like that of a woodpecker. DMB described the call as a double whistle, *wheep-wheep*, repeated every 10 s or so. *Food*: Beetles, beetle larvae, and snails. *Remarks*: Individuals have been recorded at Danum and along the Kinabatangan roosting, singly or on pairs, in looping lianas (UKMS-ANS, RGM).

Family ALAUDIDAE

LARKS

[Eurasian Skylark *Alauda arvensis* or Oriental Skylark (*Alauda gulgula*)

Status: A migrant with no confirmed records in Sabah. This species appeared in Gore's (1968) checklist based on sightings by Norman along the Tawau coast-

line on 14 Feb. 1962 (Smythies 1963; Norman 1964) and KVT along Sinsuran Road (1,400 m) on 22 Feb. 1966. KVT has since withdrawn his record (Cranbrook 1981b).]

Family HIRUNDINIDAE

SWALLOWS

Sand Martin *Riparia riparia*

Status: An uncommon migrant. *Localities:* Gaya Island, Kuala Penyu, Membakut, Papar, Tempasuk, and Tamparuli (all sightings). *Elevation:* Sea level. *Habitats:* Coast and coastal grasslands. *Migration dates:* In Sabah the earliest record is one individual at Tempasuk on 23 Nov. 1984 (B&W). However, in Brunei they have been recorded in Aug. (Smythies 1981). Several sightings have been made in Apr., the latest on 27 Apr. 1981 at Tempasuk (WFVZ). *Remarks:* DMB had many records in 1986.

Asian House Martin *Delichon dasypus*

Status: A migrant for which there are a few sight records. *Remarks:* This species has been reported by T. Harrisson at Liwagu Valley above Ranau (Fogden 1965; Jenkins and de Silva 1978; Smythies 1981); DMB at Mawau on 19 Sept. 1959 and at Kundasan Hotel on 12 Dec. 1984; and KVT at "Labuk" on 16 Nov. 1969. DMB saw three birds circling over bare hills of newly planted rubber.

Pacific Swallow *Hirundo tahitica*

Status: A common resident. *Localities:* Balambangan Island, Batu Punggul, Bodgaya Island, Bohey Dulong Island, Bole River, Danum, Gaya Island, Gomanong, Kimanis, Kinabalu, Kinabatangan River, Klias, Kota Kinabalu and suburbs, Kudat, Mahang, Makaniton, Maliau, Membakut, Mendolong, Mumiang, Padas Damit, Papar, Pulau Tiga, Quoin Hill, Saliwangan, Sandakan, Segama River, Semporna, Sepilok, Sebatik Island, Tabin, Tambunan, Tawau Hills, Tempasuk, Tetagan Island, and Wallace Bay. *Elevation:* Sea level to 1,550 m. *Habitats:* 1° and logged forest, rivers, ponds, swamp, rice padi, estuaries, beaches, and mangrove. *Breeding:* DMB found nests in every month of the year on the West Coast, although there seemed to be fewer in Apr.–May and Aug.–Nov. By banding birds, he determined that pairs attempt to rear two to three broods each year and that the same birds return to the same sites (although not necessarily the same nests) to breed. Nests are often built in buildings, are constructed of mud and grass, and are lined with soft materials (e.g. cloth, feathers, and so on). Two to four eggs are laid, and these are white or faintly pinkish in color with brown spotting, which is denser at the thick end. WFVZ observed a pair of swallows at Maang lay three eggs (17.8 × 13.5 mm, 19 × 13.5 mm, 17.8 × 13.5 mm) on consecutive days from 15 to 17 Mar. 1983. Eggs have been collected in May on Labuan (Sharpe 1879b, 1889d) and in Apr. in the Kinabalu foothills (Gibson-Hill 1949b). *Habits:* This species often mixes in flight with Barn Swallows, but unlike Barn Swallows, it alights on low perches in the water, such as stumps and floating branches. In upland areas, it concentrates on water-courses more than do Barn Swallows, which are more commonly found along roads. Pacific Swallows sometimes roost in numbers in eaves. *Voice:* A call like a squeaky door is given when they are perched. *Food:* Flying ants and dipterans.

Barn Swallow *Hirundo rustica*

Status: An abundant migrant. *Localities:* Balambangan Island, Banggi Island, Beaufort, Bodgaya Island, Bohey Dulong Island, Bole River, Brumas, Danum, Imbak River, Kalabakan, Kinabalu, Kinabatangan, Klias, Kota Kinabalu and suburbs, Kuala Penyu, Labau River, Labuan, Lahad Datu, Lok Kawi, Maang, Mantanani, Megatai, Membakut Beach, Mumiang, Pulau Tiga, Ranau, Rinangisan, Sabah Softwoods, Saliwangan, Segarong, Selinga Island, Semporna Island, Sepilok, Sinsuran Road, Sipadan Island, Tabin, Tambunan, Tembungo, Tempasuk, Tenom, Trus Madi, and Ulu Tiulon. *Elevation:* Sea level to 2,400 m on Kinabalu and at the summit of Trus Madi (J. Boys). *Habitats:* Open areas in all parts of the country. *Migration dates:* Early: The earliest published record is that of E. J. H. Berwick, 18 July 1956 (Smythies 1963). Individuals appeared on Sabah Softwoods access roads as early as 22 July 1983 and were at Sabahat on 28 July 1987 (D. R. Wells). DMS (Simpson 1982a) observed that the southward movement commenced in earnest in mid-July and that the maximum rate was reached during the last week in Aug. 1981. Early arrivers tend to be young, whereas those in Sept. and Oct. are largely adults (DMS, DMB). Thousands of migrants may congregate in Sept. on the West Coast and upland areas (e.g., Tenom). DMB noted that they also mass in the thousands on the West Coast in Jan. and Feb. for their return flight, and he observed steady streams of birds leaving in Mar. and smaller numbers in Apr. The latest record by WFVZ was 16 Apr. 1983. Phillipps (1985a) observed them on Pulau Tiga during 16–19 Apr. 1985. DMS observed an individual at Tembungo on 28 Apr. 1979 (Casement 1979). *Remarks:* An albino Barn Swallow was recorded at Lahad Datu airport on 21 Aug. 1983 (WFVZ).

Striated Swallow *Hirundo striolata*

Status: An apparently regular migrant, known from numerous sightings and one net record in Sabah. Some sightings may be of Red-rumped Swallow (*H. daurica*). *Localities:* Gana, Kalabakan, Kimanis, Klias, Lumahat, Mawau, Membakut, Papar, Tambunan, Tembungo, and Tuaran. DMB netted one individual on 10 Jan. 1962 at Kampung Gana, Membakut. He also had many records from the Kimanis–Klias area, including Kimanis on 13 Nov. 1959 and 4 Mar. 1964; Klias on 23 Nov. and 1 Dec. 1960; Kampung Gana on 11 Jan. 1962, 4–26 Dec. 1984, and 3 Feb. 1986; and Lumahat on 14 Mar. 1964. The Phillipps family observed this species at Tuaran on 31 Oct. 1981. DMS (Simpson 1982a) recorded one individual in a flock of Barn Swallows at Tembungo on 24 Oct. 1981. *Elevation:* Sea level to 600 m. *Habitats:* DMB recorded this species from Nov. to Feb. on barren hills that had been cleared for rubber planting and in recent plantings (Smythies 1963). *Identification:* This species has a conspicuous reddish rump, streaked underparts, and is obviously larger than Barn Swallow (DMS). *Remarks:* There is speculation about a resident population, but this is unlikely because all records are in the winter (DMB).

Family MOTACILLIDAE

WAGTAILS AND PIPITS

White Wagtail *Motacilla alba*

Status: An uncommon migrant. *Localities:* Banggi Island, Kimanis, Kota Belud, Mawau, Membakut, Papar, Tambunan, Tanjung Aru, Tawau, Tembungo, Tem-

pasuk, and Wallace Bay. All of the records are sightings, except for one specimen collected by A. H. Everett on Banggi in Jan. 1893 (Sharpe 1894b). *Elevation*: Sea level to 600 m. *Habitats*: Sea coast and upland plains. Usually found on roadsides, but also on hillsides cleared for rubber planting, rice fields, buffalo pastures, and soccer fields (Batchelor 1959). *Migration dates*: They occur in Sabah during all the winter months (Smythies 1981). DMB (Batchelor 1959, notes) had an "exceptionally early" record on 18 Sept. 1958 (no specific locality), but noted that birds generally arrive at the beginning of Oct. Numbers decrease until the third week of the month, although they may be seen throughout Nov. and Dec. DMS (Simpson 1982a) had two land on his ship at Tembungo on 26 Oct. 1981. DMB noted that they increase in numbers during Mar. and Apr., but are scarcer in the spring than autumn. The late date is 18 Apr. (Smythies 1981). *Habits*: "Very active on the ground, they run rapidly across the grass after insects, often jumping into the air or to one side to snap at a passing fly. Whenever they stop, the tail is immediately commenced wagging up and down" (DMB). *Voice*: *Chiz-zit* (Smythies 1981, DMB).

Gray Wagtail *Motacilla cinerea*

Status: A common migrant. *Localities*: Bole River, Busit, Danum, Kaingaran, Kimanis, Kinabalu, Klias, Labau River, Labuan, Malangkap, Mawau, Megatai, Papar, Poring, Quoin Hill, Rinangisan, Sinsuran Road, Sandakan, Tambunan, Tembungo, Tempasuk, Tambuyukon (lower slopes), Trus Madi, and Ulu Tiulon. *Elevation*: Sea level to 1,500 m. Most records are in upland and montane areas. *Habitats*: Coastal to montane streams (1°, 2°, and logged forest), roads, and fields. *Migration dates*: DMS (Simpson 1982a) reported many at Tembungo from 7 Aug. to 1 Sept. 1981, before the arrival of Yellow Wagtails, and also in late Oct., after the departure of Yellow Wagtails. J. Boys collected a specimen at Kaingaran on 15 Aug. 1956. DMB observed them at Klias and Membakut on 26 and 27 Aug. 1960. They have also been found at Quoin Hill in Aug. (Thompson 1966). WFVZ's earliest record was on Sinsuran Road at 950 m on 17 Aug. 1982. In Oct. 1982, they were common along logging roads and tracks at Labau River (WFVZ). WFVZ's late date was 2 May 1982, Sinsuran Road (900 m). *Voice*: A loud *tzizzik* or *tzik-zee*, louder and more rattling than that of White Wagtail (DMB). *Food*: Insects and ants.

Yellow Wagtail *Motacilla flava*

Status: A common migrant. *Localities*: Balambangan Island, Bongawan, Gana, Kalabakan, Klias, Kota Belud, Kuala Penyu, Labuan, Lamag, Lumbidan, Maang, Membakut, Mengalum Island, Mengkabong, Mumiang, Padas Damit, Papar, Pulau Tiga, Selingan Island, Semporna, Sipadan Island, Tambunan, Tamparuli, Tembungo, and Tempasuk. *Elevation*: Sea level to 50 m. *Habitats*: Fields, clearings, mangrove flats, padi, and roads, especially abundant in coastal areas. *Migration dates*: Early: DMB's earliest record was at Kuala Penyu on 29 Aug. 1959. Both MCT (Thompson 1966) and DMS (Simpson 1982a) list 1 Sept. as the early date. On 14 Sept. 1982, WFVZ found hundreds on Tempasuk Plain. DMS also noted that at the Tembungo oil rig the last birds occurred on 18 Oct. 1981. However, DMB found that literally thousands were to be found on the coast in late Oct. and early Nov. The numbers in late Nov. remained constant throughout the winter. Late: DMS observed four at Tembungo on 28 Apr. 1979 (Casement 1979). DMB

noted that by mid-Mar. the winter visitors leave, but passage birds continue to pass through until mid-May. His latest record was on Pulau Tiga on 26 May 1959. WFVZ's late dates were 1 May 1983 at Tempasuk, where they were still plentiful, and 7 May 1983, when only three or four were recorded on the Klias peninsula. *Habits*: DMB noted that unlike the previous two species, Yellow Wagtail is gregarious, and may occur in large flocks. He found that they roost in seedling nurseries on rubber estates, as well as bamboo clumps, patches of marsh vegetation, and sometimes with swallows on clods of earth in new rubber plantings. Morning and evening flights from roosts can be impressive. B&W observed ca. 25,000 flying to roost at Tempasuk on 11 Dec. 1984. *Voice*: A musical, prolonged, shrill *tsweep* (DMB). *Food*: Whitehead (1893) observed thousands on Tempasuk Plain eating grasshoppers driven by grass fires in Feb. 1886. *Remarks*: Both races, *simillima* and *taivana*, were collected by WFVZ and seen on the Tembungo oil rig by DMS. DMB identified both races and found the highest proportion of wintering birds to be *simillima*.

Forest Wagtail *Dendronanthus indicus*

Status: An uncommon migrant. *Localities*: Kinabalu, Mawau, Membakut, Pandasan, Papar, Pulau Tiga, and Tuaran. *Elevation*: Sea level to ca. 1,000 m. *Habitats*: Rocky streams, mangrove edges, mature rubber, and mountain tracks. *Voice*: A loud *sapink* when flushed (DMB). *Remarks*: Sabah's first record was a bird seen at Tenompok Pass on 6 Feb. 1952 (Harrison 1955a). DMB and Gore (1968) observed individuals at Mawau on 6 Feb. 1962, Papar on 20 Feb. 1964, and Membakut on 9 Jan. 1985. The Sabah Museum banded two individuals near Tuaran in 1970 (McClure and Leelavit 1972). Q. Phillipps saw it on two occasions at Pandasan (Feb. 1969 and Mar. 1971) on rocks in a dry stream bed (Smythies 1981). WFVZ had only one record, on Pulau Tiga, where a single bird was netted on 12 May 1983 at the edge of mangrove.

Olive-backed Pipit *Anthus hodgsoni*

Status: A scarce migrant. *Localities*: Gana, Kimanis, Membakut, and Rinangisan. *Elevation*: Sea level to 1,250 m. *Habitats*: Roads, tracks, and clearings, newly planted and mature rubber, casuarinas, and *Aru* trees. *Migration dates*: Most records are those of DMB and are in winter. WFVZ's only records were from Rinangisan on 20 Mar. and 13 Apr. 1983. *Habits*: When flushed, they often fly into trees. We observed as many as five birds in a single 25-m tree at Rinangisan. DMB observed them strutting on horizontal branches of casuarinas at Kimanis, slowly wagging their tails. *Voice*: Their call is an unmelodious series of buzzes. DMB described it as a plaintive *tzee*, or when flying a long distance it gives a sharper, louder *zeeet* (Smythies 1981). *Identification*: These are large and chunky birds, and have an odd, upright posture as they are about to alight. They have markedly forked tails, plain (not obviously streaked) olive-colored backs, streaked heads and wings, darkly streaked breasts (the streaks ending abruptly on the lower breast), and pink legs. In many respects, they are like Red-throated Pipits, but lack the dark streaking on the back.

Pechora Pipit *Anthus gustavi*

Status: An uncommon migrant. *Localities*: Abai, Gana, Kimanis, Klias, Labuan, Lumbidan, Membakut, Papar, Pulau Tiga, Sipadan Island, Tembung, Tem-

pasuk. The Abai, Labuan, and the first Pulau Tiga records are Whitehead's (Sharpe 1889d; Whitehead 1893). One was found dead on the Tembungo oil rig in Apr. 1979 (Casement 1979; DMS). *Elevation*: Sea level. *Habitats*: Coastal forest and scrub. A forest species, often in thick understory or forest edge. *Migration dates*: The earliest dates are in Nov., for example, 17 Nov. in the Kimanis Bay area (DMB) and 23 Nov. 1984 at Tempasuk (B&W). They are most frequent from early Dec. through the winter months (DMB). DMB's late date was 17 Apr., and Whitehead (1893) recorded it on Pulau Tiga on 22 Apr. 1886. *Habits*: They tend to run rather than fly (F. Lambert). *Voice*: A high-pitched thin *seeee* or a louder harder and more abrupt *prrrt*, quite distinct from the calls of other pipits (Batchelor 1959). In flight, *pip pip pip* (A. Whittaker). *Food*: Insects, spiders, mosquitos, and casuarina seeds. *Identification*: Similar to Red-throated Pipit, but smaller, more compact, and much duller, with heavier streaking and more distinctive broad white braces on the back (F. Lambert).

Red-throated Pipit *Anthus cervinus*

Status: An uncommon migrant. *Localities*: Bongawan, Keningau, Kimanis, Labuan, Membakut, Merintaman, Papar, Sandakan, Tembungo, Tempasuk, and Tuaran. T. Harrisson collected four specimens at Keningau racecourse and airstrip on 21 Feb. 1952 (SMC; Smythies 1981). He collected another at Sandakan airport on the same day. B&W observed large numbers "80 and 150+" on Tempasuk Plain on 11 Dec. 1984. *Elevation*: Sea level to ca. 400 m. *Habitats*: Coastal and upland grasslands, airstrips, playing fields, racetracks, and plantation clearings. *Migration dates*: The earliest record is three individuals sighted at Tembungo oil rig on 18 Oct. 1981 (Simpson 1982a). The latest record is on 26 Apr. (DMB), but parties of more than 30 birds were seen regularly around Papar in mid-Apr. Other spring records include an individual collected at Tuaran on 4 Mar. 1975 (Sabah Museum specimen) and a sighting at Merintaman during the Park survey, 17–25 Mar. 1975 (Wells et al. 1975). *Voice*: A full, abrupt *teup* as they take flight and a thin *seeez* contact call given in flight or when the birds are feeding on the ground (DMB). *Food*: Flies, a blue lycaenid butterfly, and *Ypthima* butterflies (DMB). *Identification*: See Pechora Pipit.

Richard's Pipit *Anthus richardi*

Status: A common migrant. *Localities*: Previously this and the next species, Paddyfield Pipit (*A. rufulus*), were lumped with *A. novaeseelandiae* (Smythies 1981; Inskipp et al. 1996), causing confusion of records. Localities at which one or the other of these species have been recorded are Batu Punggul, Bongawan, Kimanis, Labuan, Lahad Datu airport, Mantanani Island, Membakut Beach, Mengalum Island, Padas Damit, Papar, Sandakan, Sebatik Island, Tanjung Aru, Tawau, and Tempasuk. *Elevation*: Sea level. *Habitats*: Grassy fields, new plantations, and roadsides. *Migration dates*: Uncertain because of confusion with residents. *Voice*: The call note is a loud, rasping *chrrruup*, and it also gives a wagtail-like *sreeep* as it flies overhead or lands (DMB). *Food*: Insects. *Identification*: Most easily recognized by their large size and upright stance.

Paddyfield Pipit *Anthus rufulus*

Status: A common resident. *Localities*: See Richard's Pipit. *Elevation*: Sea level. *Habitats*: Grassy fields, new plantations, and roadsides. *Breeding*: Courting

pairs were observed at Membakut Beach on 26 Feb. 1983 (WFVZ). The female darted to a grass tussock and squatted in a hollow, with her tail cocked and head up (just as though she were sitting on a nest). The male approached, held his head straight up, then vigorously dropped and shivered his wings. After a few seconds, the female moved away sporadically, and the male, still shivering, pursued. DMB found breeding individuals at the Papar racecourse in 1962 (no date). On Tempasuk plain, 9 Mar. 1983, WFVZ observed hundreds of recent fledglings. A fledgling was collected at Padas Damit on 26 May 1983. WFVZ collected specimens with enlarged sexual organs along the Membakut River on 16 Jan. 1983 (testes 6×6 mm), at Bongawan on 19 Jan. 1983 (testes 8×4 mm), and on Mengalum Island on 3 June 1983 (testes 11×7 mm).

Family CAMPEPHAGIDAE

CUCKOOSHRIKES, TRILLERS, AND MINIVETS

Large Woodshrike *Tephrodornis gularis*

Status: A common resident, somewhat less so than Lesser Cuckooshrike. *Localities:* Bettotan, Bole River, Brumas, Danum, Imbak River, Kalabakan, Kinabalu (lower slopes), Klias, Kulamba, Labau River, Lumbidan, Malangkap, Maliau, Mawau, Megatai, Membakut, Quoin Hill, Poring, Sabahat, Sabah Softwoods, Saliwangan, Sepilok, Sinsuran Road, and Tabin. *Elevation:* Sea level to 1,150 m. *Habitats:* 1°, 2°, logged, and butabuta tree forest; and *Albizia*. *Breeding:* Sharpe (1879c) reported on eggs collected by Low at Lumbidan (no date). Normal clutch size is three. The eggs were creamy buff, with large blotches of rufous brown and underlying spots of purplish gray. Most spots are at the larger end, although some eggs have spots throughout. Their size range is $24\text{--}25 \times 18\text{--}19$ mm. Specimens with active sexual organs were collected at Saliwangan on 21 Feb. 1983 (testes 10×4 mm; enlarged oviduct and ruptured ovarian follicles); at Brumas on 16 May 1982 (enlarged oviduct); and Sabah Softwoods on 20 June and 1 July 1982 (both with testes 7×5 mm) and 5 July 1982 (testes 8×4 mm). *Food:* Lepidopteran larvae, homopterans, orthopterans, and spiders. *Remarks:* Often found in 2° forest and in mixed flocks.

Bar-bellied Cuckooshrike *Coracina striata*

Status: An uncommon resident. *Localities:* Banggi Island, Bengkoka River, Bole River, Bongawan, Keningau, Kimanis, Kinabatangan, Lamag, Lumbidan, Maliau, Membakut, Menggalong, Poring, Quoin Hill, Tabin, Tenompok, and Tiger Estate. *Elevation:* Generally sea level to ca. 600 m. Smythies (1959) observed one at Tenompok at 1,250 m. *Habitats:* 1°, 2°, recently logged, riparian, and coastal peat swamp forest; cocoa and old rubber. Maliau and Danum are the only 1° dipterocarp forest records. *Breeding:* A female with an enlarged ovary and a male with testes 7×4 mm were collected at Menggalong on 16 July 1983. *Voice:* Sharp whistles and calls when flocking. A loud *cree-ack* (DMB). *Remarks:* In Malaya, this is a bird of flat lowlands (D. R. Wells), and its distribution in Sabah is much the same. The only higher-elevation records are sightings at Bole River, Danum, Maliau, and Tenompok. In the Menggalong peat swamp forest it was fairly common, occurring in noisy flocks of about six birds. Whitehead (Sharpe 1889b; Whitehead 1893) noted that it stays high, both in trees and in flight, a habit also recorded by WFVZ, DMB, and F. Lambert.

Sunda Cuckooshrike *Coracina larvata*

Status: An uncommon resident. *Localities:* Kaingaran, Kinabalu Park, Lumaku, Malangkap, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 750–2,100 m and Trus Madi 750–2,550 m. *Habitats:* 1° and 2° forest, including the summit scrub on Trus Madi. *Breeding:* A family group with recently fledged young was observed along Sinsuran Road on 17 June 1983 (WFVZ). *Voice:* A low-pitched, whistled *pit-teeoh*, descending on the *oh*. They also shriek like raptors and make loud squeaking noises. *Food:* Geckos, grasshoppers, stick insects, beetles, and lepidopteran larvae. *Remarks:* The young of this species is strongly barred underneath and gray above.

Lesser Cuckooshrike *Coracina fimbriata*

Status: A common resident. *Localities:* Beaufort, Bettotan, Bole River, Brumas, Bundu, Danum, Imbak River, Kabayau, Kalabakan, Klias, Lumaku, Lumbidan, Magdalena, Malangkap, Maliau, Mawau, Megatai, Membakut, Menggalong, Quoin Hill, Rayoh, Sabahat, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silam Plantation, Tiger Estate, and Ulu Tiulon. *Elevation:* Sea level to 1,000 m. *Habitats:* 1°, 2°, logged, peatswamp, and riverine forest; abandoned rubber, *Albizia*, and cocoa under *Albizia* and *Trema orientalis*. *Breeding:* DMB found a nest containing two young at Klias in Sept. 1960. The nest was located at the top of an old rubber tree. It was small for the size of the bird, a compact structure of vegetable fibers and scraps of bark and rootlets molded together with cobwebs. He observed another nest being constructed in the rubber canopy at Mawau in Jan. 1961. Specimens with enlarged gonads were collected at Bole River on 25 Mar. 1982 (testes 5 × 3 mm; oviduct enlarged and ovum 4 mm). *Voice:* A fairly rapid *sweet-sweet-sweet-sweet . . .* all on the same pitch. *Food:* Mantises, orthopterans, lepidopteran larvae, large grubs, caterpillars, spiders, and jambu (*Eugenia*) fruit. Specimens from Sabah Softwoods were gorged with caterpillars.

Black-winged Flycatcher-shrike *Hemipus hirundinaceus*

Status: A common resident. *Localities:* Banggi Island, Benoni, Bettotan, Binsulok, Bole River, Bongawan, Brumas, Bundu, Busit, Danum, Ensuan, Gana, Kabayau, Kalabakan, Kasigui, Kiau, Kinabalu (lower slopes), Klias, Labau River, Labuk Road, Lumbidan, Maang, Magdalena, Malangkap, Maliau, Mawau, Megatai, Membakut, Menggalong, Padas Damit, Papar Beach, Pulau Tiga, Quoin Hill, Sabahat, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silam Plantation, and Tabin. *Elevation:* Generally, sea level to 950 m, but DMB observed them at Tenompok at ca. 1,200 m. *Habitats:* 1°, 2°, logged, and upland heath forest; fire-padang kerangas, coastal peatswamp, freshwater swamp, mangrove, overgrown rubber, casuarinas, and *Albizia*. This species is most common in 2° growth. *Breeding:* DMB found a nest at Mawau on 29 May 1959. About 8 m up in an old rubber tree, it was a deep felted cup of mosses and lichens swathed in cobwebs and placed in full view on the surface of a horizontal branch (although it looked like a broken branch stump). A bird was sitting in the nest when it was found. DMB also observed recently fledged, brown-winged, young birds at Mawau on 15 Aug. 1959 and at Klias on 7 Oct. 1959. We observed a nest with young at Bole River on 11 Apr. 1982, built in a large tree along a skidder track in recently logged forest. The nest was placed in a snag ca. 11 m above ground, and both parents were feeding the chicks. Specimens with enlarged gonads were collected

at Saliwangan on 26 Feb. 1983 (testes 5×3 mm); Bole River on 2 Mar. 1982 (enlarged ova and oviduct, testes 7×4 mm); and Sabah Softwoods on 30 June 1982 (testes 5×3 mm). *Voice*: A variety of distinct calls. One is a three-syllable, buzzing *dee-dit-doo*, lower pitched on the *doo*. Another is a high-pitched, undulating buzz, which seems to consist of three rapidly descending notes repeated over and over. The other is a flight call, *zee-zit-zit*, with the last two notes ascending. *Food*: Spiders, lepidopterans (larva and adult), and beetles. This species feeds mainly by sallying from a perch to catch prey in flight. This habit was noted by MCT (Thompson 1966) and F. Lambert, contra Whitehead (1893). *Remarks*: In general, Black-winged Flycatcher-shrike is distributed at lower elevation than Bar-winged Flycatcher-shrike, but they are sympatric in upland forest.

Bar-winged Flycatcher-shrike *Hemipus picatus*

Status: A common resident. *Localities*: Bole River, Brumas, Busit, Danum, Kaingaran, Kalabakan, Kinabalu (headquarters and below), Lumaku, Magdalena, Malangkap, Maliau, Megatai, Poring, Quoin Hill, Sabahat, Sabah Softwoods, Silam, Sinsuran Road, Telupid, Trus Madi, and Ulu Tiulon. *Elevation*: Generally 150–1,500 m, although D. R. Wells recorded it at ca. 50 m at Sabahat (Wells and Francis 1988). *Habitats*: 1°, 2°, and logged forest (uncommon); highland kerangas, *Albizia*, and cocoa under *Trema orientalis*. It is rarely recorded in 1° forest, perhaps because it favors the high canopy and is difficult to see. *Breeding*: Specimens with enlarged testes were collected at Silam on 26 Feb. 1982 (5×2 mm); Bole River on 4 Mar. 1982 (6×4 mm); and Sabah Softwoods on 3 July 1982 (5×3 mm). *Food*: Insects. Specimens from Sabah Softwoods' *Albizia* did not have caterpillars in their stomachs, even though caterpillars were abundant and eaten by many insectivores.

Pied Triller *Lalage nigra*

Status: A common resident. *Localities*: Bai Island, Balambangan Island, Banggi Island, Benoni, Gulisaan Island, Gaya Island, Kalampunian Besar Island, Keningau, Kimanis area, Kota Belud, Kota Kinabalu and suburbs, Kudat, Labuan, Maang, Mantanani Island, Membakut Beach, Mengkabong, Merintaman, Mumiang, Papar Beach, Pulau Tiga, Sandakan, Sebatik Island, Selingaan Island, Semporna, Si Amil Island, Tambunan, Tanjung Aru, Tawau, Tempasuk, Tuaran, Wallace Bay, and Weston. *Elevation*: Sea level to 450 m. *Habitats*: 2° coastal scrub, buffalo fields, mangroves, coastal kerangas, casuarinas, and gardens. *Breeding*: V. W. Ryves (notes) collected a clutch of two eggs on Bai Island on 5 June 1938. The nest was in the fork of an isolated and stunted mangrove tree growing somewhat away from the shore. At high tide, the nest would have been only ca. 1.5 m from the water. It was a shallow saucer compactly and strongly woven of fine dried grass stems, with the outside felted together with cobwebs. Gibson-Hill (1949b) described the eggs as "egg shaped" with a smooth surface, sizes 23.5×16.5 mm, 22.5×17 mm, and color yellowish-glaucous, with a few spots of dull gray and flecks of olive brown. DMB found nests in the Kimanis area from Apr. to July. They were well constructed cups of vegetable fibers and a little moss and tree bark held together with cobwebs and anchored into a branch fork 5–8 m above the ground. Two eggs seemed to be the rule. DMB also found a nest at Sandakan on 23 Mar. 1990. This nest was a very small cup placed 2 m up in an ornamental tree. The female was sitting and the male was in attendance. *Voice*:

DMB described the call as a not unmusical *per-whek*, repeated twice, or sometimes just a shorter *wherk* note rising in pitch and uttered several times in swift succession. He also described a less frequent call uttered by the male on nest guard as a sighing *khoover* sound, soft and aspirated. *Food*: Caterpillars and grubs. *Remarks*: Ryves (notes) found this species in 1938 only on Bai Island and not in Sandakan or the cultivated village land surrounding it.

Ashy Minivet *Pericrocotus divaricatus*

Status: A scarce migrant. *Localities*: Klias, Kuala Segama, Labuan, Lamag, Lumbidan, Silam, and Tanjung Aru. All records are sightings except for 19th and early 20th century specimens taken at Lamag, Labuan, and Lumbidan. DMB observed one flycatching at Klias on 8 Feb. 1969. KVT had two sightings: at the mouth of the Segama River on 22 Feb. 1969 and on the coast near Silam in tall trees on 17 Apr. (year not given). The Tanjung Aru records are garden birds recorded on 18 Oct. 1968, 9 Oct. 1970, and 6 Nov. 1970 (Q. Phillipps in Smythies 1981). *Elevation*: Sea level. *Habitats*: Coastal gardens and scrub, "wet forest," and mangroves.

Gray-chinned Minivet *Pericrocotus solaris*

Status: A common resident. *Localities*: Kinabalu Park, Malangkap, Poring, Rinangisan, Sayap, Sinsuran Road, and Trus Madi. *Elevation*: Sinsuran Road 1,100–1,800 m, Trus Madi 1,500–2,200 m, and Kinabalu 650–2,450 m (Robson 1996; Jenkins et al. 1996). *Habitats*: 1° and 2° forest. *Breeding*: A specimen collected on Sinsuran Road, 13 Feb. 1977, had 8-mm testes. *Voice*: An often repeated *zee* while flying. *Food*: Lepidopteran larvae. *Remarks*: Often found in mixed flocks.

Fiery Minivet *Pericrocotus igneus*

Status: A common resident. *Localities*: Binsulok, Bole River, Bundu, Danum, Kimanis Beach, Kuala Penyu, Lumbidan, Maliau, Mandahan, Marudu Bay, Membakut Beach, Pulau Tiga, Quoin Hill, Sabah Softwoods, Saliwangan, Sandakan, Sepilok, Silam Plantation, Tabin, Telupid, Tuaran, and Ulu Membakut. *Elevation*: Sea level to 600 m. *Habitats*: 1°, 2°, logged, and coniferous forest; casuarinas, cocoa under *Trema orientalis*, and *Albizia*. *Breeding*: A specimen with 8-mm ova, an enlarged oviduct, and a brood patch was collected at Bole River on 17 Mar. 1982. Males with enlarged testes were collected at Membakut beach on 17 and 28 Sept. 1982 (8 × 5 mm, 8 × 4 mm) and 10 Oct. 1982 (7 × 4 mm). *Food*: Insects and caterpillars. *Remarks*: Most commonly recorded in 2° growth or trees in open areas.

Scarlet Minivet *Pericrocotus flammeus*

Status: A common resident. *Localities*: Bettotan, Bole River, Brumas, Busit, Danum, Kabayau, Kaingaran, Kalabakan, Klias, Kundasang, Labau River, Malangkap, Maliau, Megatai, Padas Gorge, Poring, Quoin Hill, Sabah Softwoods, Sayap, Segarong, Sepilok, Silam Mountain, Silam Plantation, Sinsuran Road, Sukau, Tabin, Tambunan, Tiger Estate, and Ulu Tiulon. *Elevation*: Generally, sea level to 1,000 m (Sinsuran Road), although Whitehead (Sharpe 1889d; Whitehead 1893) found them at ca. 900–1,200 m near Malangkap. *Habitats*: 1°, 2°, and logged forest; cocoa under *Trema orientalis* and *Albizia*. *Breeding*: Specimens with enlarged testes were collected at Mt. Silam on 24 Feb. 1982 (9 × 6 mm); Silam Plantation on 27 Feb. 1982 (10 × 6 mm); Brumas on 2 June 1982 (11 ×

7 mm); Megatai on 22 June 1983 (14 × 7 mm); Sabah Softwoods on 1 July 1982 (10 × 6 mm); and Sinsuran Road on 22 Nov. 1982 (9 × 6 mm). *Voice*: Call similar to Black-winged Flycatcher-shrike: a high thin *dee-doo-dee-doo* . . . , and a display call of three rapid descending notes repeated many times. *Food*: Green caterpillars and spiders. *Remarks*: Whitehead (Sharpe 1889d; Whitehead 1893) found them in company with Gray-chinned Minivets in the vicinity of Malangkap.

Family LANIIDAE

SHRIKES

Long-tailed Shrike *Lanius schach*

Status: A rare migrant. *Localities*: A sighting by T. Harrison on 3 Feb. 1957 on Labuan, a sighting by DMB on 14 Feb. 1962 at Damit River between Membakut and Bongawan, and two specimens at Sandakan, at least one of which was taken by W. B. Pryer in 1878 (Sharpe 1881; Gore 1968; Smythies 1981).

Brown Shrike *Lanius cristatus*

Status: A common migrant. *Localities*: Balambangan Island, Bengkoka River, Bole River, Gana, Kimanis, Kinabalu (lower slopes), Labuan, Lamag, Lumbidan, Maang, Manggis, Mawau, Membakut, Membakut Beach, Mengkabong, Mumiang, Padas Damit, Papar, Petergas, Pinawantai, Pulau Tiga, Selingaan Island, Sepilok, Silam, Sinsuran Road, Tambunan, Tanjung Aru, Tembungo, Tempasuk, and Tuaran. *Elevation*: Sea level to 1,700 m. *Habitats*: 2° coastal to montane forest and scrub, field edges, island heath, and mangroves. *Migration dates*: The first and last sightings of autumn migrants by DMS (Simpson 1982a) at Tembungo oil rig in 1981 were 10 Sept. and 24 Oct. DMS also observed an individual at Tembungo on 28 Apr. 1979. DMB found that most birds depart towards the end of Mar., with some lingering to the end of Apr. His latest record was 31 May (no year). Phillipps (1985a) noted most birds departing Pulau Tiga between 16 and 19 Apr. 1985. *Voice*: A raucous scold. *Food*: Grasshoppers, locustids, mantids, butterflies, horseflies, 'cockchafer-type' beetles, and rodents (DMB). *Identification*: Breeding plumage appears in Feb. The species may show enormous variation in the extent of white on the forehead and over the eyes, and in the amount of gray or grayish brown on the crown and back (DMB). *Remarks*: Most often recorded along the West Coast, less so inland. DMB found that most winter residents hold territories and scold intruders.

Tiger Shrike *Lanius tigrinus*

Status: A common migrant; less frequently recorded than the Brown Shrike. *Localities*: Bole, Keningau, Kudat Beach, Quoin Hill, Ranau, Rinangisan, Saliwangan, Sipadan, Tembungo, and Tiger Estate. *Elevation*: Sea level to 1,300 m. *Habitats*: 2° forest and scrub woodlands, clearings, and coastal scrub. This species seems to prefer overgrown areas more than Brown Shrike (DMB). *Migration dates*: DMS (Simpson 1982a) recorded five birds on board his ship at Tembungo oil rig from 30 Sept. to 23 Oct. 1981. DMB noted that this species seems more numerous in Feb.–Apr., presumably as a result of the return of passage migrants. It is also more common in May than Brown Shrike, and DMB's latest record was 2 June 1959. *Identification*: Distinguished from Brown Shrike by the black crescents (subterminal bands) on its back coverts.

Family ARTAMIDAE

WOODSWALLOWS

White-breasted Woodswallow *Artamus leucorhynchus*

Status: A common resident. *Localities:* Balambangan Island, Banggi Island, Batu Punggul, Beaufort, Beluran, Bodgaya Island, Bohey Dulang Island, Bongawan, Brumas, Gaya Island, Kaingaran, Kalampunian Besar Island, Keningau, Kimanis, Kota Kinabalu, Kudat Beach, Labuan, Maang, Mandangin, Mantanani Island, Megatai, Membakut Beach, Miagra Island, Mumiang, Padas Damit, Papar, Pulau Tiga, Ranau, Sandakan, Sarankai Island, Sebatik Island, Selinggaan Island, Sepilok, Silam, Sinsuran Road, Tambunan, Tamparuli, Tanjung Aru, Tawau, Tempasuk, Tetagan Island, Tuaran, and Wallace Bay. *Elevation:* Sea level to 1,000 m. Gore (1968) stated that it ascends to 5,000 ft. (1,524 m), but provided no further information. *Habitats:* Open areas with good, often high, perches, including telephone wires, coconut palms, oil palms, dead trees, mangrove edges, fence posts, and goal posts. *Breeding:* Whitehead (Sharpe 1889d; Whitehead 1893) found a nest with three eggs in June (no locality or year). V. W. Ryves (notes) collected two nests at Sandakan Estate in 1938, one with three eggs on 8 Apr. and one with four eggs on 26 Apr. (Gibson-Hill [1949b] placed one of these clutches at the wrong locality). Both nests were in rubber trees, and were rather untidy, loosely constructed affairs of soft dead stems of creeping plants and dead grass. The lining was of the same material but more compact. The cup was ca. 7.5 cm across and 4.5 cm deep. The outside was ca. 13 × 8 cm. The birds whose eggs were taken on 26 Apr. started another nest on 13 May at the very top of a rubber tree. Gibson-Hill (1949b) described the eggs as smooth surfaced and white with purplish gray, antique brown, and fine raw umber spots. Most markings are concentrated at the broader end. DMB found a nest at Kuala Kimanis on 4 Jan. 1961. It was a loose cup of vegetable fibers, rootlets, bark, lichens, and feathers, placed in the crotch of a broken dead branch, some 10 m from the ground. On 13 Jan. it contained four eggs, pale yellowish-buff, with a zone of purplish-brown about the larger end, and a few other sparse speckles of brown and gray (average size 23.5 × 17.5 mm). He found other nests at Kuala Kimanis in Dec. and Apr., at Bongawan in Apr., and at Kuala Membakut in Dec. and May. Newly fledged young were observed by DMB in June. WFVZ found a nest with two nestlings at Beaufort on 16 May 1983. It was placed 8 m above the ground in the broken end of a rotten tree, which was also the home of several Asian Glossy Starling nests. A specimen with a shelled oviduct egg (23 × 16 mm) was collected at Papar on 23 Apr. 1983. Enlarged testes were found in specimens from Padas Damit on 26 May 1983 (9 × 6 mm); Papar on 8 June 1983 (10 × 5 mm, 13 × 6 mm); and Wallace Bay on 7 July 1982 (18 × 4 mm). *Food:* Sphinx moths, grasshoppers, beetles, bivalves, and snails. *Remarks:* This is an unusual passerine in that it can catch insects (e.g., sphinx moths) with its feet and eat them in flight (T. Howell, pers. comm.).

Family AEGITHINIDAE

IORAS, LEAFBIRDS, AND FAIRY BLUEBIRD

Green Iora *Aegithina viridissima*

Status: A common resident. *Localities:* Anginon, Banggi Island, Bengkoka Riv-

er, Benoni, Binsulok, Bole River, Bongawan, Brumas, Danum, Kabayau, Klias, Kudat, Labau River, Labuan, Labuk Road, Lumbidan, Makaniton, Maliau, Megatai, Menggalong, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silam Plantation, Sukau, Tabin, Tawau Hills, Ulu Membakut, and Ulu Tiulon. *Elevation*: Generally from sea level to 600 m; one record at Anginon at 1,200 m (Thompson 1966). *Habitats*: 1°, 2°, logged, and peat swamp forest; fire-padang kerangas, overgrown rubber, cocoa under *Trema orientalis*, and *Albizia*. *Breeding*: Specimens with enlarged testes were collected at Silam Plantation on 20 Feb. (7 × 4 mm) and 26 Feb. 1982 (6 × 4 mm); Sabah Softwoods on 19 June (6.5 × 4 mm) and 2, 3, 5 July 1982 (5 × 3 mm); and Megatai on 22 June 1983 (5 × 4 mm). *Voice*: Several versions of a song in which the first note is slurred upward and the next notes (staccato or lengthy) are all on the same pitch, *wit-dit-dit . . .* or *wit-dit-dit-dit-dee* or *wit-dit-dit-dit-dee-dee*. Also, an indistinct, high-pitched, two-note call, *zee-zee*. *Food*: Lepidopteran larvae. *Remarks*: MCT (Thompson 1966) found them to be abundant in cocoa at Quoin Hill, where he observed flocks of 5–10 individuals in the *Trema orientalis* shade trees. We have seen them often flying across open areas alone or in groups.

Common Iora *Aegithina tiphia*

Status: A common resident. *Localities*: Bai Island, Balambangan Island, Banggi Island, Binsulok, Brumas, Crocker Range Park Headquarters, Gaya Island, Keningau, Kinarut, Kota Kinabalu and suburbs, Kudat, Kulamba, Labuan, Lamag, Likas Swamp, Maang, Mandahan, Meliau, Membakut Beach, Merutai, Mumiang, Padas Damit, Papar, Poring, Pulau Tiga, Rayoh, Saliwangan, Sandakan, Sebatik Island, Segarong, Sepilok, Serankai Island, Tambunan, Tanjung Aru, Tempasuk, Tenom, Wallace Bay, and Ulu Tiulon. *Elevation*: Sea level to 1,000 m. *Habitats*: 1° forest edge, 2° forest and scrub, mangroves, swamp forest, fire-padang kerangas, casuarinas, and gardens. Found only in logged forest at Danum (Lambert 1990c). *Breeding*: DMB observed nesting in Feb. and May–June in the Kimanis Bay area and a family of newly fledged young at Klias on 7 July 1960. The nest is a small cup of rootlets and grass secured with cobwebs, located in branch forks of small trees from 3 to 8 m above the ground. DMB never found more than two eggs or observed more than two fledglings. WFVZ found two nests at Likas. One contained two chicks on 20 May 1983, and the other contained a fresh egg on 1 June 1983. The latter was 4.5 m up in a fork of a dead mangrove. These nests were tight cups ca. 10 cm in outside diameter, woven from and lined with fine grasses, other delicate vegetable material, and cobwebs. Eggs are creamy white, with spots of reddish-brown and a few scattered flecks of gray confined to a zone around the larger end (Sharpe 1889c; DMB). DMB measured a clutch that averaged 19 × 14.5 mm. On 18 Apr. 1981 at Saliwangan, WFVZ watched a pair construct a nest in a dying rubber tree and, on 12 May 1982, watched a pair build in a tall tree at the edge of 1° forest. Specimens with enlarged testes were collected at Membakut Beach on 25 Jan. 1983 (7 × 4 mm); Binsulok on 12 Mar. 1983 (8 × 4 mm, 7 × 4 mm); Padas Damit on 29 May 1983 (6 × 4 mm, 6 × 4 mm); and Keningau on 18 Dec. 1976 (7 mm). *Voice*: Many calls. A series of harsh *chih* sounds followed by a single, high, sweetly whistled note. A tailorbird-like *wee-oo*, dropping on the *oo* and followed by a harsh *churr*. A series of ca. seven rather staccato *doo* sounds, all on the same pitch and ending with a longer note.

A rapid series of *swee* whistles that becomes very loud and ends abruptly. DMB described the call as *sweetie-pie*, alternating with harsh churrs. *Food*: Insects.

Lesser Green Leafbird *Chloropsis cyanopogon*

Status: A common resident, somewhat more abundant than the next species. *Localities*: Banggi Island, Batu Punggul, Beluran, Bengkoka River, Benunuk, Bettotan, Bole River, Brumas, Bundu, Danum, Imbak River, Kabayau, Kuala Penyu, Kudat, Labau River, Lamag, Lumbidan, Magdalena, Makaniton, Maliau, Megatai, Meliau, Membakut, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Sebatik, Segarong, Sepilok, Silam, Silam Plantation, Tabin, Tawau Hills, Tempasuk, Ulu Samuran, and Ulu Tiulon. *Elevation*: Sea level to 600 m. *Habitats*: 1°, 2°, and logged forest; *Albizia*, *Eucalyptus*, old rubber, cocoa under *Trema orientalis*, and beach strand (unusual). *Breeding*: DMB found a nest at Beaufort in June 1960 built on the bough of a large forest tree ca. 10–12 m above the ground. Specimens with enlarged testes were collected at Bole River on 26 Feb. (10 × 6 mm), 14 Mar. (11 mm), and 8 Apr. 1982 (9 × 6 mm); Brumas on 12 May (8.5 × 5 mm), 15 May (11 × 7 mm), and 5 June 1982 (9 × 6 mm); Sabah Softwoods on 21 June (9 × 6 mm) and 1–4 July 1982 (9 × 6 mm, 7 × 5 mm, 9 × 4 mm); and Quoin Hill on 27 Aug. 1962 (8 × 5 mm). Females in breeding condition were collected at Bole River on 15 Mar. (enlarged oviduct) and 29 Mar. 1982 (oviduct egg, 10-mm ovum); and Brumas on 15 May 1982 (enlarged oviduct). RGM observed a fledgling being fed by adults at Tawau Hills on 23 May 2000. *Voice*: A whistled *pew* or *pit-weet* on a single pitch. *Food*: Lepidopteran larvae, beetles, flies, Ichoranthacean fruits, and figs (DMB). Lambert described it as a nectarivore (Lambert 1990c), but also observed it eating fruits of *Poikilospermum suaveolens* (Lambert 1991). *Remarks*: It often congregates at fruiting trees with bulbuls and other frugivores.

Greater Green Leafbird *Chloropsis sonnerati*

Status: A common resident, but seemingly less so than Lesser Green Leafbird. *Localities*: Bengkoka River, Bettotan, Bole River, Brumas, Busit, Danum, Imbak River, Labau River, Labuan, Labuk Road, Lamag, Lumbidan, Magdalena, Makaniton, Malangkap, Maliau, Megatai, Membakut, Mendolong, Menggalong, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sebatik Island, Sepilok, Silam Plantation, Sinsuran Road, Tabin, Tambunan, Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m. *Habitats*: 1°, 2°, logged, and peat-swamp forest; upland kerangas, cocoa under *Trema orientalis*, and *Albizia*. *Breeding*: Specimens with enlarged testes were collected at Saliwangan on 19 Jan. 1977 (10 mm); Silam Plantation on 6 Mar. 1982 (11 × 6 mm); Brumas on 10 June 1982 (13 × 8 mm); and Menggalong on 15 July 1983 (12 × 7 mm). Females showing signs of breeding were collected at Brumas on 3 June 1982 (collapsed ovarian follicles); and Labau River on 19 Oct. 1982 (enlarged oviduct). *Voice*: A wide variety of calls: *wit-chew*, rising on *wit* and descending on *chew*; *chew-prrt-prrt-chew*; a single whistled *weet* or *weet-weet*; a *wank-wank* reminiscent of Asian Fairy Bluebird; *wee-wu*, lower pitched on *wu*; and *wee-twit-twit* all on one pitch. *Food*: Berries and figs, stick insects, mantises, lepidopteran larvae, and nectar (Lambert 1990c). *Remarks*: Average foraging height 30 m in 1° forest, 11 m in logged forest (Lambert 1990c).

Blue-winged Leafbird *Chloropsis cochinchinensis*

Status: A common resident, whose numbers and distribution depend heavily upon local fruit abundance. *Localities:* Bukit Ibul, Kaingaran, Kinabalu, Lumaku, Malangkap, Maliau, Poring, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 550–1,550 m, Trus Madi 750–2,200 m, and Sinsuran Road 1,000–1,600 m. Gore (1968) stated that they ascend to 7,000 ft. (2,134 m) on Kinabalu, but provided no further information. *Habitats:* 1° and 2° forest. *Breeding:* A bird carrying nesting material was observed along Sinsuran Road, 15 Nov. 1982. *Food:* Berries and dragonflies. *Remarks:* The only race of this species recorded in Sabah is the montane *flavocincta*, in which the female has a black throat rimmed with bluish-green. The male has a black throat with a yellow border. No lowland Blue-winged Leafbird has been recorded in Sabah, although such birds might occur in the southwesternmost part of the state.

Asian Fairy Bluebird *Irena puella*

Status: A common resident. *Localities:* Batu Punggul, Bengkoka, Bettotan, Bole River, Brumas, Danum, Imbak River, Kaingaran, Kebayau, Kinabalu (lower slopes), Klias, Labau River, Labuan, Labuk Road, Lamag, Lumbidan, Maang, Makaniton, Mawau, Megatai, Melalap, Membakut, Menggalong, Menggatal, Pandasan, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Sinsuran Road, Tambunan, Tawau Hills, Tiger Estate, and Ulu Tiulon. *Elevation:* Sea level to 1,300 m. A specimen was collected at Rinangisan (1,250 m) and a sighting made at Kundasang (Jenkins and de Silva 1978). *Habitats:* 1°, 2°, and upland-heath forest; old rubber, cocoa, *Albizia*, and oil palm. *Breeding:* DMB found a nest on 19 Dec. (no site or year) that was a large but shallow cup of vegetable fibers, rootlets, and a few twigs, well padded with moss and cleverly built into the fork of a moss- and saprophyte-draped tree, ca. 6 m from the ground. The nest contained one egg (30 × 19.75 mm), pale blue-green in color and blotched and spotted with brown and lilac gray. Specimens with enlarged gonads were collected at Saliwangan on 19–26 Feb. 1983 (testes 7 × 11 to 14 × 9 mm, enlarged oviduct and ruptured ovarian follicles); Bole River on 2 Mar. (testes 13 × 7 mm), 9 Mar. (ovum 4 mm), and 15 Mar. 1982 (testes 12 × 8 mm); Rinangisan on 3 Apr. 1983 (testes 9 × 6 mm); Brumas on 11 June (testes 11 × 7.5 mm) and 21 June 1982 (testes 9 × 4 mm); Maang on 20 June 1983 (testes 10 × 7 mm); Labuk Road on 31 July 1983 (testes 16 × 9 mm); and Quoin Hill on 2 Aug. 1962 (testes 13 × 10 mm). *Voice:* Seven or eight *wank* sounds, which descend slightly and become broader and more profound towards the end of the series. *Food:* Oil-palm fruit, ants, termites, and small beetles. *Remarks:* Commonly travel in large (often single-sex) flocks, flying over open areas, presumably in search of fruiting trees.

Family PYCNONOTIDAE

BULBULS

Puff-backed Bulbul *Pycnonotus eutilotus*

Status: An uncommon resident. *Localities:* Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Gomantong, Imbak River, Labuk, Makaniton, Maliau, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Tabin, and Telipok. *Elevation:* Generally from sea level

to ca. 600 m; one specimen at 1,300 m. *Habitats*: 1°, logged, and river-terrace forest; older *Albizia*. *Breeding*: Specimens with enlarged testes were collected at Bole River on 23 Feb. (7 × 4 mm), 27 Feb. (8 × 5 mm), and 1 Mar. 1982; Brumas on 16 May 1982 (7 × 5 mm); and Sabah Softwoods on 2 July 1982 (8 × 5 mm). RGM obtained a specimen with testis 9 × 5 mm at Crocker Range Park Headquarters on 7 June 1999. *Remarks*: The Rinangisan (montane) net record may have been an aberration caused by the El Niño drought.

[Blue-wattled Bulbul *Pycnonotus nieuwenhuisii*

Status: A rare resident known from one specimen from Kalimantan. The record from Tabin (Goh et al. 1989) is likely to be a mistake.]

Black-and-white Bulbul *Pycnonotus melanoleucos*

Status: An uncommon resident. *Localities*: Batu Putih, Baturong, Bole River, Brumas, Bundu, Danum, Kalabakan, Kinabalu, Klias, Labau River, Lumadan, Lumaku, Makaniton, Maliau, Rinangisan, Sabah Softwoods, Saliwangan, Sinsuran Road, and Wallace Bay. *Elevation*: Sea level to 3,050 m. Most records are from upland or highland areas, with montane records restricted to two specimens from Rinangisan at 1,250 m and one specimen (found dead) at 3,050 m on the east ridge of Kinabalu (Smythies 1964b). *Habitats*: 1°, 2°, logged, and upland-river-terrace forest; overgrown rubber and plantation edge. Norman (Smythies 1963; Norman 1964) found it to be “abundant” in the mangrove at Wallace Bay, but she may have been seeing Magpie Robbins (GD). Only found in logged forest at Danum and Bole River (Lambert 1990c). *Breeding*: DMB found a nest at Klias in Jan. 1962 in an old rubber tree. It was ca. 6 m above the ground in the fork of one of the outer branches and appeared to be composed of fibers (not sticks). A sitting bird was fed a caterpillar by its mate. *Voice*: A constantly repeated *ee-o-lay*, the first note is highest, the second is lowest and slides into the third. When it flies it utters a high, wheezy call. *Food*: Fruit of Loranthaceae, *Lantana*, and Straits rhododendron, as well as figs and caterpillars (DMB). *Remarks*: WFVZ always found the birds as individuals or in pairs. Note that the Sabah birds have white in the tail (Thompson 1966), which is not shown in Smythies (1981, 2000) or King et al. (1975).

Black-headed Bulbul *Pycnonotus atriceps*

Status: A common to abundant resident. With Yellow-vented and Olive-winged, this is one of the most common bulbuls in Sabah. It is a nomadic species, with large fluctuations in abundance. *Localities*: Bettotan, Binsulok, Bole River, Brumas, Bundu, Danum, Keningau, Kinabalu, Kuala Penyu, Kundasang, Labau River, Labuan, Lamag, Maang, Makaniton, Malangkap, Membakut, Merintaman, Padas Damit, Poring, Pulau Tiga, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Sepilok, Sinsuran Road, Tabin, Tambunan, Tambuyukon, and Ulu Tiulon. *Elevation*: Sea level to 1,600 m. Phillipps (1986) found one dead at summit of Tambuyukon (2,579 m). *Habitats*: 1°, 2°, and logged forest; coastal kerangas, *Eucalyptus*, and *Albizia*. *Breeding*: DMB found a nest at Mawau in early June 1959. It was a cup of dead grass and other fibers, including a few strips of fine bark placed ca 1.2 m above the ground in a pitcher plant-draped *Melastoma* bush. WFVZ found a nest with two eggs in 7-yr-old *Albizia* growing in a shaded ravine on 3 July 1982 at Sabah Softwoods. The nest was a small (6 × 8-cm), tightly

woven cup of coarse grass and stringy plant material fixed to slender twigs and a vine 1.5 m off the ground. The eggs were long and narrow (24×15 mm, 23×14.5 mm) with a light buff base at the narrow end and a dark buff base at the wide end. Birds with enlarged sexual organs were collected at Binsulok on 19 Feb. 1983 (testes 8×7 mm); Bole River on 8 (enlarged oviduct) and 16 Mar. 1982 (testes 8×7 mm); Maang on 22 and 27 June 1983 (testes 7×5 mm, 8×6 mm); Sabah Softwoods on 17 June (testes 8×4 mm), 28 June (testes 7.5×7 mm), and 29 June 1982 (enlarged ova and oviduct); and Saliwangan on 28 Aug. 1981 (testes 8×7 mm) and 15 Jan. 1977 (testes 10 mm). RGM collected a specimen with testis 7×4 mm at Crocker Range Park Headquarters on 7 June 1999. *Voice*: WFVZ noted two songs. The first, heard everywhere in July in 7-yr-old *Albizia* (Sabah Softwoods) is five staccato notes *doo-da-dit-dit-doo*, followed by a series of *chuk* sounds. The *doo* notes are on a lower pitch, the *dit* notes are higher and faster. The second song has three phrases, each higher than the other, *doodoo-deedee-deedee*, followed by staccato, less musical notes. In addition to these songs, this species utters a ubiquitous single sharp contact note. DMB described the call as "chinky," like two pebbles knocked together, and uttered repeatedly. *Food*: Berries, fruit, and flying ants.

Black-crested Bulbul *Pycnonotus melanicterus*

Status: An uncommon resident. *Localities*: Kaingaran, Kinabalu, Lumaku, Malangkap, Sinsuran Road, Tambunan, Telipok, and Trus Madi. *Elevation*: 600–1,550 m; Trus Madi 750–1,550 m. Generally found above 800 m, but KVT observed them at 600 m in the Crocker foothills south of Telipok. *Habitats*: 2° forest. *Voice*: A whistled *grrrt-grrrt*. *Food*: Fruits. *Remarks*: Whitehead (1893, in Sharpe 1889c) described them as scarce, and there are remarkably few specimens from Mt. Kinabalu. They occur regularly along mountain roads, especially when small berries are available.

Scaly-breasted Bulbul *Pycnonotus squamatus*

Status: An uncommon resident. *Localities*: Batu Punggul, Bole River, Brumas, Danum, Ensuan, Kaingaran, Makaniton, Poring, Quoin Hill, Rayoh, Silam, Sinsuran, Tambunan, and Ulu Tiulon. *Elevation*: 300–1,200 m. *Habitats*: 1° and 2° forest, and cocoa under *Trema orientalis*. *Voice*: An abrupt, metallic, descending *prrrt-prrrt*. *Food*: Fruit, berries, figs (8-mm diameter), and *Trema orientalis* berries (Thompson 1966). *Remarks*: Not a rare species, but patchily distributed. WFVZ found them in large numbers at Kaingaran in mixed flocks feeding on small green berries, along with Pygmy White-eyes, Ashy Bulbuls, and Chestnut-crested Yuhinas. They are often found feeding on small figs.

Gray-bellied Bulbul *Pycnonotus cyaniventris*

Status: An uncommon resident. *Localities*: Beaufort, Bettotan, Bole River, Brumas, Bundu, Danum, Kalabakan, Kimanis, Klias, Labau River, Magdalena, Maliau, Quoin Hill, Saliwangan, Samawang, Sepilok, Silam Mountain, Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,100 m. *Habitats*: 1°, 2°, and logged forest; overgrown rubber and cocoa under *Trema orientalis*. *Breeding*: DMB found nests at Klias in Aug., Dec., and Jan., and at Kimanis in Jan. to Mar. The nest is composed of grass, rootlets, weed stems, and often a little moss. The two eggs measure ca. 25×19.3 mm. They are whitish or pinkish-white, heavily

speckled with purplish brown and maroon, and underlying marks of gray. Specimens with active sex organs were collected at Quoin Hill on 13 Sept. 1962 (testes 7×4 mm); and Bole River on 28 Feb. (testes 6×4 mm), 4 Mar. (largest ovum 15×10 mm, testes 5×4 mm), and 13 Mar. 1982 (testes 5.5×4 mm). *Voice*: Similar to that of a Gray-headed Canary Flycatcher, its song is a high-pitched series of five notes, the last four of which climb a scale. Also described as a distinctive *clewk* by DMB. *Food*: Green berries and *Trema orientalis* berries (Thompson 1966). DMB observed them hawking rising ants or termites. *Remarks*: Usually seen in mixed flocks at fruiting trees with barbets, bulbuls, leafbirds, and pigeons.

Straw-headed Bulbul *Pycnonotus zeylanicus*

Status: A common resident in the 1980s, perhaps less so now with increased pressure from the cage-bird market. *Localities*: Batu Punggul, Batu Putih, Bole River, Danum, Kaingaran, Keningau, Kinabalu, Kinabatangan, Kota Kinabalu suburbs, Maang, Makaniton, Megatai, Membakut, Padas Damit, Papar, Poring, Sabah Softwoods, Saliwangan, Segama River, Sinsuran, Sukau, Tambunan, Tempasuk, and Tuaran. *Elevation*: Sea level to 1,500 m (at Kundasang and Tenompok). *Habitats*: Principally in scrub along rivers and streams, also edges of rice fields, gardens, beach scrub with freshwater nearby, 1° and logged forest at Danum and Bole River (Lambert 1990c), and overgrown hill padi. *Breeding*: V. W. Ryves collected a single egg on 10 Mar. 1939 at Kiau. The egg is egg-shaped, smooth, and slightly glossy (size: 25.5×19 mm). It is white with light violet-gray and mahogany-red markings concentrated at the thicker end (Gibson-Hill 1949b). Specimens with enlarged sex organs were collected at Saliwangan on 3 Mar. 1983 (testes 6×3 mm); Maang on 5 Feb. (testes 6×5 mm) and 13 Mar. 1983 (enlarged oviduct, ruptured ovarian follicles, largest ovum 15×12 mm); and along the Segama River on 20 Aug. 1983 (largest ovum 13×11 mm, testes 8×3 mm). *Voice*: A loud, pleasant, warble. An off-key rendition of *In the Mood* (DMB). *Food*: Green berries, bananas.

Flavescent Bulbul *Pycnonotus flavescens*

Status: A scarce to uncommon resident. *Localities*: Kinabalu, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 1,400–3,400 m, Trus Madi 2,100–2,400 m, and Sinsuran Road 1,500 m. *Habitats*: 1° and 2° forest and scrub, also summit bamboo thickets and myrtaceous–ericaceous scrub on Trus Madi (Phillipps 1984). *Food*: Fruit. Also commonly hawks insects (K. Ickes). *Remarks*: This species is spotty in its distribution and usually occurs in small groups. Despite much work in the mountains, WFVZ only recorded it once in the Crocker Range.

Yellow-vented Bulbul *Pycnonotus goiavier*

Status: An abundant resident, found in all 2° forest areas. *Elevation*: Sea level to 1,400 m. D. Jenkins (Jenkins and de Silva 1978) had a sight record at Kinabalu Park Headquarters (1,600 m). *Habitats*: Virtually all wooded habitats, except the interior of 1° forest, including coastal heath, *Gmelina*, *Eucalyptus*, *Albizia* (older stands), and recently logged interior forest. *Breeding*: DMB recorded nesting throughout the year in the Kimanis Bay area, but with two main peaks: Jan.–Mar. and Aug. Nests were found 1 m up in lantana bushes on Selingaan Island on 22 Mar. 1990. He found that nests are usually placed in branch forks in low bushes,

but sometimes as high as 8 m. The nests are composed of vegetable fibers, dead leaves and grass, and lined with finer fibers. Eggs are invariably two in number, pinkish white, and heavily speckled and spotted with maroon and purplish brown with underlying marks of pale gray, and measure ca. 23.5×16 mm. V. W. Ryves collected a clutch of one at "Kota Belud" on 24 Mar. 1939 and a clutch of two at "Sandakan" on 28 Apr. 1938 (Gibson-Hill 1949b). WFVZ collected a nest with two eggs at Papar on 8 June 1983. Another nest was observed in Sabah Softwoods from 10 to 24 July 1982, from the final stages of construction to the hatching of the two eggs. The nest was much like that of the Black-headed Bulbul. It was cup-shaped (outer dimensions 10 cm across, 8 cm high), suspended from four bent-over ferns 1.5 m off the ground, and made of tightly woven grasses and lacy leaves. The cup was 7 cm across and 6 cm deep. The eggs were smooth, slightly glossy, and whitish in color (or off-white) with rufous spots becoming denser at the large end. In early June 1999, RGM found a nest at Crocker Range Headquarters, 0.5 m off the ground in tall grass. It contained two naked chicks. Specimens with enlarged sex organs were collected at Membakut Beach in Feb. 1983 (testes 10×5 mm); Sabah Softwoods on 23 and 26 June 1982 (testes 7×5 mm, 8×5 mm); Kota Belud on 15 Sept. 1982 (testes 10×7 mm); and Tenom on 31 Dec. 1962 (testes 9×6 mm, enlarged oviduct and old brood patch) and 1 Jan. 1963 (testes 9×7 mm) (Thompson 1966). *Voice*: DMB described the usual flight call as a distinctive double *purrut* or *purru*, and the alarm note as a softer *prrrk*. *Food*: Many types of fruits and berries, including figs, *Lantana*, and *Melastoma* berries. They also eat annelid worms, flies, and lepidopteran larvae (DMB). *Remarks*: Although one of the commonest scrubland birds, Yellow-vented Bulbul does not occur on most islands. Wells (1978) noted that it is only recently established on Balambangan Island; it was absent there in 1927 (Chasen and Kloss 1930a,b). However, flocks apparently reach islands in search of food. DMB observed 19 birds on 19 Sept. 1959 flying over Kimanis Bay at 18:45 hr, apparently returning from Pulau Tiga.

Olive-winged Bulbul *Pycnonotus plumosus*

Status: A common resident. *Localities*: Balambangan Island, Banggi Island, Batu Putih, Beaufort Hill, Binsulok, Bodgaya Island, Bohey Dulang Island, Bole River, Busit, Gaya Island, Gomantong, Keningau, Kinarut, Kota Kinabalu suburbs, Kota Klias, Kudat, Labuan, Labuk Road, Maang, Makaniton, Malawali Island, Manggis, Mantabuan Island, Membakut Beach, Merintaman, Mumiang, Padas Damit, Pandasan, Pinawantai, Poring, Pulau Tiga, Rayoh, Rinangisan, Rumas, Saliwangan, Samawang, Selakan Island, Sepilok, Serankai Island, Silam Plantation, Tambunon, Tanjung Aru, Tatagan Island, Tempasuk, Tenom. *Elevation*: Sea level to 1,200 m. The 1,200-m record is a Rinangisan specimen taken during the El Niño drought. More commonly, these birds occur up to ca. 600 m (e.g., Poring). *Habitats*: Principally 2° (occasionally in 1°), logged, and closed-island forest; scrub, woodlands, and mangroves. *Breeding*: DMB located a nest in scrub next to padi fields at Gana on 15 Feb. 1986 and found a nest at Klias on 18 Jan. The latter was located in a tangle of *Lantana* over a tree stump and composed of grasses and rootlets lined with fibers. There were two eggs, pale pink, heavily marked with dark purplish red (23.2×16.2 mm). Specimens with enlarged sexual organs were collected at Bole River on 8 Mar. 1982 (largest ovum 13×10 mm);

Padas Damit on 29 May 1983 (unshelled oviduct egg, testes 8×5 mm); Labuk Road on 4 Aug. 1983 (testes 9×6 mm); and Membakut Beach on 8 Sept. 1983 (enlarged oviduct, testes 5×3 mm). *Food*: Fruits, dipterans, lepidopterans, caterpillars, ants, termites, and spiders (DMB). *Remarks*: The most common bulbul on near-shore islands, and in numbers second only to Yellow-vented Bulbul along the coast. The only bulbul on the Semporna islands (Yong 1980).

Red-eyed Bulbul *Pycnonotus brunneus*

Status: A common resident. *Localities*: Banggi Island, Bettotan, Binsulok, Bole River, Brumas, Danum, Garinono, Gaya Island, Kabayau, Keningau, Kota Kinabalu suburbs, Labuk Road, Maang, Makaniton, Maliau, Megatai, Menggalong, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Sepilok, Silam Plantation, Tabin, and Tawau Hills. *Elevation*: Sea level to 1,200 m. *Habitats*: Principally 2° (occasionally 1°) and logged forest; scrub, peatswamp, *Albizia*, *Trema orientalis*, and oil palm. *Breeding*: Specimens with enlarged sexual organs were collected at Quoin Hill on 4 Sept. (testes 6×4 mm) and 10 Sept. 1962 (oviduct egg; Thompson 1966). RGM collected a specimen with ovary 8×4 mm on 10 June 1999 at Crocker Range Park Headquarters. *Voice*: The call is a simple *prrrrt-prrrrt* on one pitch, not nearly as melodious as the Spectacled Bulbul or as distinct as the Yellow-vented Bulbul. *Food*: Figs, oil-palm fruit, and caterpillars. MCT (Thompson 1966) observed them feeding on *Capsicum* red peppers at Quoin Hill. *Identification*: This species is often confused with Cream-vented Bulbul. We believe the Red-eyed Bulbul is larger and has an orange iris, which is often two-toned (red outer ring, yellow-orange inner ring). However, Phillipps and Phillipps (1970) came to the opposite conclusion, that is, that Cream-vented Bulbul has the orange iris and Red-eyed Bulbul has the red iris. One additional source of confusion is that immature birds have brownish or grayish irides (Chasen and Kloss 1930a; M. Fogden letter to T. Harrison, 7 July 1966). The Red-eyed Bulbul is a larger bird and has underparts that are a more uniform brown (throat perhaps somewhat darker and vent darker) than the Cream-vented Bulbul, which appears generally lighter underneath. *Remarks*: Red-eyed and Cream-vented bulbuls are sympatric. Chasen and Kloss (1930a) collected both species at Kabayau and Rayoh. WFVZ collected both at Bole River, Sabah Softwoods (with Red-eyed Bulbul being the more common in *Albizia* groves), Labuk Road, Megatai, Menggalong, Saliwangan, and Silam Plantation. MCT (Thompson 1966) found Red-eyed Bulbul to be the most common "brown bulbul" at the Quoin Research Station. Cream-vented Bulbuls seem to prefer closed forest (Wells 1976). In upland areas of the East Coast, WFVZ found that Red-eyed Bulbuls were less common than Cream-vented Bulbuls. M. Fogden (letter to T. Harrison, 7 July 1966) suggested that the numbers of Red-eyed Bulbuls have increased (in Sarawak) relative to Cream-vented Bulbul as the result of deforestation. As evidence he cited the dearth of Red-eyed Bulbul specimens in the SMC until recent times. The same phenomenon may be true in Sabah, where no Red-eyed Bulbul specimens were taken until the 1920s. We suspect that the relationships among populations of brown bulbuls may be complicated by interspecific hybridization. For example, a YUE specimen from Gaya Island had "orange" eyes and was intermediate in weight (ca. 25 g) between Red-eyed and Cream-vented bulbuls. In any event, the

situation seems complicated, and its resolution may require a careful examination of specimens, vocalizations, and molecular genetic patterns.

Cream-vented Bulbul *Pycnonotus simplex*

Status: A common resident. *Localities:* Anginon, Balambangan Island, Bole River, Busit, Danum, Ensuan, Gaya Island, Gomantong, Kabayau, Kiau, Labau River, Labuk Road, Maliau, Meliau, Megatai, Membakut, Menggalong, Perang Besar, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Tabin, and Tambunan. *Elevation:* Sea level to 1,200 m (Anginon). *Habitats:* 1°, 2°, logged, closed island (Wells 1976), and peatswamp forest; also upland (Labau River) and highland (Maliau) kerangas, *Albizia*, and oil palm. *Breeding:* V. W. Ryves collected an egg at Kiau on 28 Feb. 1939. The egg was smooth, egg-shaped (18 × 14 mm), fairly glossy, and white with flecks of mouse gray and mahogany red (Gibson-Hill 1949b). Ryves collected one of the adults as well (RMC). *Identification:* Cream-vented Bulbuls are smaller than Red-eyed Bulbuls and their irides are red or (less often) pale yellow. They have creamy bellies and undertail coverts, faintly dusky breasts, and creamy-white throats. Overall, their underparts are washed with creamy off-white rather than the strong yellow-buff of Red-eyed Bulbuls (CMF). *Food:* Insects, purple berries, and oil-palm fruit. *Remarks:* Wells (1976) found this species to be the most common bird of the inland forest on Gaya Island. However, he did not find them on Balambangan Island, even though Chasen and Kloss (1930a) had collected them there 50 yr earlier (Wells 1978). They may have been replaced recently by Yellow-vented Bulbuls.

Spectacled Bulbul *Pycnonotus erythrophthalmos*

Status: A common resident. *Localities:* Bettotan, Bole River, Brumas, Danum, Gomantong, Imbak River, Kabayau, Kaingaran, Klias, Labukan River, Makaniton, Maliau, Megatai, Membakut, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Silam Plantation, Tabin, Tambunan, and Ulu Tiulon. *Elevation:* Generally, sea level to 1,000 m; one bird was collected at 1,300 m at Rinangisan during the El Niño drought. *Habitats:* 1° and older stands of 2° forest, logged forest, mangroves, *Trema orientalis*, and *Albizia*. *Breeding:* DMB found nests in various parts of the Kimanis Bay area in Jan. and from June to Aug. The nest is a deep cup of dead leaves, rootlets, and plant fibers, lined with fine grasses, and is placed 1.5–9 m up in a branch fork of a bush or small tree. The two eggs are off-white speckled with purplish brown and gray, chiefly at the larger end. The eggs are similar to but smaller than those of the Yellow-vented Bulbul. A specimen at Imbak River on 18 July 1983 had a 4-mm ovum, and one at Quoin Hill on 25 Sept. 1962 had testes 7 × 5 mm (Thompson 1966). RGM collected a specimen with testis 5 × 3 mm at Crocker Range Park Headquarters on 11 June 1999. *Voice:* A sweet, prolonged, light *tweedle tweedle tweet tweet dit dit dit*. The *tweedle* notes are longish, the *tweets* are shorter, sharper, and higher; the *dits* go down the scale. An abbreviated song is an upward roll or trill of five or six notes with the same sweet quality as the full song. *Food:* Fruit. *Remarks:* The commonest *Pycnonotus* species in the lower stories of 1° dipterocarp forest. Mean foraging height is 10 m in 1° forest and 8 m in logged forest (Lambert 1990c).

Gray-cheeked Bulbul *Alophoixus bres*

Status: A common resident. Probably the most common lower-elevation 1° forest bulbul. *Localities:* Batu Punggul, Baturong, Bole River, Brumas, Danum, Ensuan, Garinono, Gomantong, Imbak River, Kabayau, Kalabakan, Kulamba, Labau River, Labuk Road, Maang, Madai, Magdalena, Makaniton, Maliau, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Tabin, Tawau Hills, Ulu Dusun, Ulu Merutai, and Ulu Tiulon. *Elevation:* Sea level to 700 m. *Habitats:* 1°, old 2°, and logged forest; overgrown rubber, 7-yr-old *Albizia*, cocoa, and oil palm. *Breeding:* Birds with enlarged testes were collected at Bole River on 26 Feb. (12 × 9 mm) and 6 Apr. 1982 (15 × 8 mm), Sabah Softwoods on 26 June 1982 (10 × 6 mm), and Maang on 30 June 1983 (10 × 6 mm). *Voice:* The main feature of the song is a throaty rasping upward slur, followed by sweeter, clear, descending notes. This song is often preceded by some introductory notes. When flushed it calls *chipple, chipple . . . zeet!* *Food:* Oil-palm fruit, figs, and berries (6 × 12 mm).

Ochraceous Bulbul *Alophoixus ochraceus*

Status: A common resident. It and Ashy Bulbul are the most common montane bulbuls. *Localities:* Anginon, Kaingaran, Kinabalu, Lumaku, Lotung, Malangkap, Megatai, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 950–1,850 m, Crocker Range 600–1,700 m, Trus Madi 750–1,700 m. D. Jenkins had a sight record on Kinabalu at 2,650 m (Jenkins and de Silva 1978). *Habitats:* 1°, 2°, and coniferous forest and scrub. *Breeding:* V. W. Ryves collected a clutch of two eggs on the lower slopes of Kinabalu on 30 Mar. 1939. The eggs (25.5 × 16 mm, 20 × 16.5 mm) were rather elongated, smooth, slightly glossy, and white, spotted sparsely at the broad end with light violet-gray and mahogany red (Gibson-Hill 1949b). Specimens with enlarged testes were collected along Sinsuran Road on 9 Dec. 1982 (10 mm) and 7 Feb. 1977 (9 mm), at Rinangisan on 22 Mar. 1983 (9 × 5 mm), at Crocker Range Park Headquarters on 6 and 9 June 1999 (both 8 × 6 mm), and on Trus Madi on 5 Aug. 1999 (10 × 6 mm). *Voice:* A metallic *creek* followed by a series of quick musical *pew* notes. *Food:* Fruit and berries (10 mm). *Remarks:* This species seems to replace Gray-cheeked Bulbul in montane areas. It is often found feeding with other species at fruiting trees and bushes.

Yellow-bellied Bulbul *Alophoixus phaeocephalus*

Status: A common resident. *Localities:* Anginon, Batu Punggul, Baturong, Benkoka, Bettotan, Bole River, Brumas, Danum, Garinono, Gomantong, Gum Gum, Imbak River, Kabayau, Kulamba, Labuk Road, Lamag, Madai, Magdalena, Makaniton, Maliau, Megatai, Muruk, Pandasan, Poring, Quoin Hill, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Silam Plantation, Sukau, Tabin, Telupid, Ulu Dusun, Ulu Kimanis, Ulu Mawau, Ulu Samuran, and Ulu Tiulon. *Elevation:* Generally sea level to 600 m; one specimen by RGM at 1,000 m near the Crocker Range Park Headquarters and one record by MCT (Thompson 1966) at 1,200 m at Anginon. *Habitats:* 1°, 2°, and logged forest; old *Albizia* and oil palm. *Breeding:* Specimens with enlarged sexual organs were collected at Bole River on 26 Feb. 1982 (testes 8 × 4 mm); Sabah Softwoods on 5 July 1982 (testes 7 × 5 mm); and Imbak River on 17 July 1982 (enlarged oviduct, ruptured

ovarian follicles). *Food*: Oil-palm fruit. *Remarks*: Average foraging height 4 m in 1° forest and 5 m in logged forest (Lambert 1990c).

Finsch's Bulbul *Alophoixus finschii*

Status: A scarce resident. *Localities*: Bole River, Brumas, Danum, Kalabakan, Labau River, Quoin Hill, Saliwangan, Tabin, and Ulu Kimanis. *Elevation*: 150–400 m. *Habitats*: 1°, 2°, and logged forest; upland kerangas, *Trema orientalis*, and cocoa. WFVZ recorded this bird rarely in 1° forest, and more commonly in roadside scrub trees. *Breeding*: Specimens taken at Bole River on 6 and 8 Mar. 1982 had enlarged testes. *Voice*: Norman (1964) described a small party calling *choi-choi-chong-choi*, *choi-choi*. A couple flying back and forth between two trees called *pek-pek-pek-pek* and *bierchef-bierchef*. *Identification*: Important field characters are its yellow throat and large size relative to the similar Hairy-backed Bulbul.

Hook-billed Bulbul *Setornis criniger*

Status: A rarely recorded resident, but locally common in appropriate habitat. *Localities*: The only confirmed (net or specimen) records from Sabah are from Lumbidan, Membakut, Menggalong, and Selagon. Sight localities are: Binsulok, Bole River, Danum, Klias, Quoin Hill, Rumdi, and Sapong Estate (Norman 1964; DMB; KVT; A. Johns, unpubl.). *Elevation*: Sea level (200 m for sight records). *Habitats*: 1° coastal-Ramin swamp forest, coastal kerangas, and Quoin cocoa. Net and specimen records apparently are all from peatswamp forest. This species may be confined essentially to poor-soil forests (Wells et al. 1975, 1978; Wells 1976; Sheldon 1987; Holmes and Wall 1989; Dutson et al. 1991). The plantations where it has been sighted are (or were) near 1° forest, and all except perhaps Sapong and Quoin are in areas of poor soils (e.g., ultrabasic soils). *Voice*: This species travels in noisy flocks and utters a harsh *currrrk* among other noises (DMB). *Food*: Insects. *Remarks*: WFVZ observed it only twice, once when a noisy flock of three flew over a logging road in the Menggalong reserve and again on the edge of coastal kerangas (near peatswamp) at Binsulok. Their large size and conspicuous white tail spots make them easy to identify.

Hairy-backed Bulbul *Tricholestes criniger*

Status: A common resident. *Localities*: Apas Balung, Batu Punggul, Baturong, Benkoka, Bettotan, Bole River, Bongawan, Brumas, Danum, Ensuan, Gomantong, Gum Gum, Imbak River, Imbak Valley, Kaingaran, Kulamba, Kunatong, Labau River, Lumbidan, Magdalena, Makaniton, Maliau, Megatai, Meliau, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sandakan, Sebatik Island, Segarong, Sepilok, Tabin, Tawau Hills, Ulu Dusun, Ulu Membakut, and Ulu Pappar. *Elevation*: Sea level to 850 m. *Habitats*: 1°, 2°, and upland-heath forest; old rubber and older stands of *Albizia*. *Breeding*: Specimens with enlarged sexual organs were collected at Brumas on 7 and 9 May (testes 8 × 5 mm) and 3 June 1982 (testes 7 × 4 mm); and Imbak River on 25 July 1982 (enlarged oviduct, testes 7 × 3 mm). RGM collected a specimen with a ruptured ovarian follicle, an egg with yolk (8 mm), and a shelled oviduct egg (19 × 13 mm) on 9 June 2000 at Imbak Valley. *Voice*: Vocalizations include a prolonged churring and a *chit-chuee* (upward slur on the second note) or *chit-cheeoo* (downward slur on the second note). They can utter these calls for hours. *Food*: Fruit with pits 8 ×

5 mm, small berries, caterpillars, and insects. MCT (Thompson 1966) observed them flycatching as well as eating *Trema orientalis* fruit. *Remarks:* Average foraging height 8 m in 1° forest and 6 m in logged forest (Lambert 1990c).

Streaked Bulbul *Ixos malaccensis*

Status: An uncommon resident. *Localities:* Anginon, Beaufort Hill, Bole River, Danum, Ensuan, Kaingaran, Kalabakan, Klias, Lumbidan, Magdalena, Makaniton, Maliau, Mawau, Poring, Quoin Hill, Rinangisan, Rayoh, Saliwangan, Samawang, Sepilok, Silam, Sukau, Tabin, Tambuyukon, Ulu Kimanis, and Ulu Tiulon. *Elevation:* Sea level to 1,300 m. *Habitats:* 1°, 2°, logged, and coniferous forest. *Breeding:* Specimens with enlarged testes were collected at Saliwangan on 11 and 12 Feb. 1983 (8 × 4 mm, 8 × 5 mm; WFVZ) and Quoin Hill on 20 Aug. 1962 (8 × 5 mm; MCT). Sharpe (1879c) described two eggs (no date or locality) as variable in color, pinkish white, with variable sized maroon or chestnut spots or blotches. *Voice:* A “creaking gate” contact call, which does not sound particularly like a bulbul. *Identification:* Long bill and wings, which are especially noticeable in its flight silhouette, distinguish it from other bulbuls. *Food:* Berries and figs. *Remarks:* Patchily distributed, Streaked Bulbuls can occur in large numbers in fruiting trees, but may be scarce elsewhere.

Buff-vented Bulbul *Iole olivacea*

Status: An uncommon resident. *Localities:* Banggi Island, Bettotan, Bole River, Brumas, Danum, Kabayau, Klias, Labau River, Lumadan, Makaniton, Maliau, Menggalong, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sebatik Island, Segarong, Sepilok, Silam Plantation, and Ulu Kimanis. *Elevation:* 50–400 m. *Habitats:* 1° and, more often, 2° forest, logged forest, 7-yr-old *Albizia*, and peatswamp. *Breeding:* Specimens with enlarged sexual organs were collected at Saliwangan on 12 Feb. 1983 (largest ovum 10 mm) and 27 Aug. 1981 (testes 9 mm), Bole River on 9 Apr. 1982 (testes 8 × 5 mm), and Labau River on 23 Oct. 1982 (enlarged oviduct). *Food:* Fruit, berries (8 mm), locustids, and fly larvae. MCT (Thompson 1966) observed them feeding on *Trema orientalis* berries. *Identification:* Most easily recognized by its cream-colored iris.

Ashy Bulbul *Hemixos flavala*

Status: A common resident. *Localities:* Alab, Anginon, Carsons Camp, Kaingaran, Kinabalu, Lumaku, Lotung, Malangkap, Poring, Rinangisan, Sayap, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 700–2,750 m, Trus Madi 750–2,400 m, Crocker Range 1,000–1,800 m. *Habitats:* 1°, 2°, and coniferous forest; bamboo, kerangas (Maliau), and summit scrub (Trus Madi). *Breeding:* Specimens with enlarged testes were collected on Sinsuran Road on 14 Feb. 1977 (10 mm); Kaingaran on 6 July 1983 (6 × 4 mm); and Anginon on 20 Dec. 1962 (6 × 6 mm, 5 × 4 mm). *Voice:* They utter a double, nasal *beep* or *meoo* reminiscent of nuthatches. MCT (Thompson 1966) described it as a catlike “mew.” *Food:* Berries and spiders. *Identification:* This species is not at all like the pictures in King et al. (1975) or Smythies (1981). It has bright olive wings and tail, a puffed white throat, and a yellow vent. Although vaguely like the Ochraceous Bulbul, it is smaller, less boisterous, and tends more to the canopy. Many individuals can be seen when fruit is abundant.

Family TURDIDAE

ROBINS, FORKTAILS, CHATS, AND THRUSHES

[Japanese Robin *Erithacus akahige*

Status: A single individual was found dead on board a ship off the coast of Sabah, 6°57'N, 115°34'E (Casement 1980). Because it is not possible to tell where it joined the ship, this species is not confirmed for Sabah (Smythies 2000).]

[Siberian Rubythroat *Luscinia calliope*

Status: Breeds in northern Asia; winters in India and southern China. The only Sabah record is of a singing male from Mt. Kinabalu on 27 Jan. 1992 (Robson 1992).]

Siberian Blue Robin *Luscinia cyane*

Status: A common migrant. *Localities:* Bole River, Bongawan, Brumas, Danum, Gaya Island, Gomantong, Kalabakan, Klias, Kimanis, Kinabalu (lower slopes), Labau River, Maang, Malangkap, Poring, Rinangisan, Saliwangan, Sepilok, Silam, Tabin, Tanjung Aru, Tawai Plateau, Tembungo, and Ulu Tiulon. *Elevation:* Generally from sea level to 550 m; but during migration flies over the Crocker Range and has been recorded at 1,300 m at Rinangisan and 1,450 m at Kundasang. *Habitats:* 1°, 2°, and logged forest; overgrown rubber. *Migration dates:* The earliest record is Tanjung Aru on 12 Sept. 1978 (Sabah Museum specimen). Other early dates are "Ranau" on 26 Sept. 1960 (USNM specimen), Ulu Tiulon on 9 Oct. 1981 (WFVZ), and Tembungo oil rig on 12 Oct. 1981 (Simpson 1982a). The WFVZ's latest date was 14 Apr. 1983 at Rinangisan (flying migrants attracted to a lamp at night). *Remarks:* Often netted in 1° forest, where we found it especially common in Oct. It also occurs in the forest in winter and spring months, but is less commonly encountered at these times.

White-browed Shortwing *Brachypteryx montana*

Status: A resident that is frequently heard but difficult to see. *Localities:* Kinabalu, Lotung, Rinangisan, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation:* Kinabalu 1,050–3,600 m, Trus Madi 900–2,100 m, Crocker Range 1,250–1,800 m. *Habitats:* 1°, 2°, and ultrabasic (Phillipps 1986) forest, with a preference for ravines and areas of thick undergrowth. *Breeding:* Specimens with enlarged testes were collected along Sinsuran Road on 5, 7, and 13 Feb. 1977 (e.g., 7 mm and 13 mm). Harrisson (1962) described a bird that he collected at Pakka Cave (Mt. Kinabalu) on 6 Feb. 1952 as a female in full breeding condition, with many enlarged ova and heavy body fat. *Voice:* One of the most beautiful sounds of the Bornean mountains, a long drawn-out fluting song, with an eerie or melancholy quality. It is often uttered in ravines for (apparent) maximum acoustic effect. *Food:* Insects, snails, and tiny, round black beetles (Harrisson 1962).

Rufous-tailed Shama *Trichixos pyrropyga*

Status: An uncommon resident. *Localities:* Benkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Garinono, Labau River, Magdalena, Maliau, Menggalong, Quoin Hill, Samawang, Samuran, Sepilok, Tabin, Tawai, Tawau Hills, and Ulu Dusun. *Elevation:* 50–600 m. *Habitats:* 1°, coastal peat swamp, upland heath, and ultrabasic forest. Less common in logged forest (Lambert 1990c). *Breeding:* Specimens with enlarged sexual organs were collected at Bole River on 19 Feb. (testes

8 × 6 mm), and 2 Mar. 1982 (testes 9 mm); and Brumas on 23 and 24 Mar. (testes 9 mm and 12 mm) and 1 Apr. 1977 (testes 11 mm), 7 May (testes 10 × 5 mm), 15 May (ruptured ovarian follicles), and 11 June 1982 (testes 9 × 5 mm). *Food*: Insects. *Remarks*: This shama has a habit of cocking its tail in marked stages from horizontal to 45° to fully up.

Oriental Magpie Robin *Copsychus saularis*

Status: A common resident on the West Coast, less common on the East Coast. *Localities*: Balambangan Island, Banggi Island, Batu Putih, Benoni, Bettotan, Bodgaya Island, Bohey Dulang Island, Bole River, Gomantong, Kaingaran, Keningau, Kinabalu (lower slopes), Kota Kinabalu suburbs, Kudat, Kulamba, Labau River, Labuan, Lahad Datu, Lamag, Lumbidan, Maang, Makaniton, Malangkap, Malawali, Manggis, Mawau, Megatai, Meliau (village), Membakut Beach, Mendolong, Padas Damit, Pandasan, Papar, Pinawantai, Poring, Pulau Tiga, Sabah Softwoods, Saliwangan, Sebatik Island, Segarong, Sepilok, Silam Plantation, Sinsuran Road, Sukau, Tabin, Tambunan, Tampusuk, Tawau Hills, Telipok, Tuaran, Ulu Segama, and Ulu Tiulon. *Elevation*: Generally sea level to 1,000 m, but D. Jenkins had a sighting near Bundu Tuhan at ca. 1,450 m (Jenkins and de Silva 1978). *Habitats*: Mainly open (cultivated) areas and scrub; logging roads, hill-padi clearings, beach strand, casuarinas, cocoa under *Albizia*, swamp forest, mangroves, and gardens. *Breeding*: H. Low collected a nest in Jan. 1874 (Sharpe 1879b). Whitehead collected nests with clutches of three to four eggs in the beginning of May. He described the nests as entirely of fine roots, hidden among overhanging roots of a tree or in branches. V. W. Ryves collected a clutch of three fresh eggs at Kiau on 3 Mar. 1939 (RMC). DMB found nests in the Kimanis Bay area between Jan. and May and from Oct. to Dec. These were located in a hole or crevice in a tree or broken bamboo. The two to four eggs were pale greenish, heavily spotted with reddish brown, and measured 24 × 17 mm. Whitehead (1893) and Gibson-Hill (1949b) described the eggs as rather elongated (27.5 × 17.5 mm, 27 × 17.5 mm, 26 × 17.5 mm), with a smooth, glossy surface and a bluish-green color flecked or blotched with pale purplish gray and reddish brown. A specimen with enlarged testes was collected at Maang on 15 Jan. 1982 (12 × 5 mm). *Voice*: Extremely variable. They often sing antiphonally and also mimic the sounds of such birds as Pied Fantail, Yellow-bellied Prinia, and Plaintive and Indian cuckoos (DMB). At Megatai (eastern side of the Crocker Range) their song starts with a ventriloquial note and then two phrases: *doo-dit-dit-dit, deet-dit-dee*. The first phrase starts with on a lower pitch (*doo*) followed by three higher and descending *dits*. The second phrase descends on the same three *dit* notes but the first (*deet*) and third (*dee*) notes are longer. Sometimes this second phrase is repeated by itself. Near Kota Kinabalu (western side of the Crocker Range) the song starts with a longer first note, descends from the same pitch in three notes (*doo-doot-ta-doot*) and then goes to two higher-pitched, accented, descending notes. *Food*: Lepidopteran larvae, earth worms, orthopterans, dipterans, isopterans, spiders, fallen fruit (DMB), ants, and beetles. *Remarks*: Norman (1964) and Banks (1982) noted the apparent rarity of Magpie Robins in the Tawau area. Magpie Robins from Tawau are subspecies *C. s. niger*, which lack white in the tail (Kuroda 1933). WFVZ's only East Coast records are from the cocoa plantations at Silam and Sabah Softwoods and the mangrove at Sepilok. However,

East Coast records have increased in recent years with the spread of oil palm (GD).

White-crowned Shama *Copsychus stricklandii*

Status: A common north Bornean endemic. *Localities:* Anginon, Balambangan Island, Banggi Island, Batu Punggul, Baturong, Benoni, Bettotan, Binsulok, Bodgaya Island, Bohey Dulang Island, Bole River, Brumas, Danum, Ensuan, Gana, Garinono, Gaya Island, Gomantong, Gum Gum, Imbak River, Kabayau, Kalabakan, Keningau, Klias, Kulamba, Kunatong, Labau River, Labuan, Lamag, Lumbidan, Maang, Magdalena, Makaniton, Maliau, Megatai, Meliau, Menggalong, Muruk, Padas Damit, Pandasan, Papar, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silam Plantation, Simatuoh, Sukau, Tabin, Tambuyukon, Tatagan Island, Tawau Hills, Ulu Dusun, Ulu Kimanis, Ulu Tiulon, and Weston. *Elevation:* Sea level to 1,200 m. *Habitats:* 1°, 2°, heath, freshwater swamp, and logged forest, including forest left by shifting agriculture; scrub adjacent to mangroves, overgrown rubber, tall closed island forest, *Albizia*, and cocoa. *Breeding:* DMB found nests in the Klias area in Sept., Oct., and Jan. to Mar. The nests were built in holes in trees at heights of 2.5–4 m above the ground. They were built of fibers, rootlets, and dead leaves. The two or three eggs were pale greenish, heavily flecked with light brown and a few spots of lilac and purple, and measured 22.5 × 16.5 mm. Specimens with enlarged testes were collected at Bole River on 18 Feb. 1982 (10 × 6 mm); Brumas on 12 June 1982 (9 × 4 mm); Megatai on 20 June 1983 (9 × 6 mm); Imbak River 15 July 1982 (7 × 4 mm); and Quoin Hill on 28 Aug. (8 × 5 mm) and 5 Sept. 1962 (11 × 6 mm). A female with an enlarged oviduct and brood patch was collected at Kalabakan on 17 Oct. 1962 (Thompson 1966). Fledglings were noted at Sabah Softwoods on 25 July 1982 and Labau River on 19 Oct. 1982. *Food:* Large ants, worms, spiders, centipedes, and berries (DMB). *Remarks:* Sabah birds have prominent white crowns (not depicted in Smythies 2000), and for this reason they are split from the black-crowned White-rumped Shama, *C. malabaricus*, and placed in their own species (Inskipp et al. 1996). D. Wells (in Kiew 1977) noted that a few specimens from Danum Valley have crown feathers tipped in black, suggesting hybridization with the more southern *C. malabaricus*. WFVZ specimens from Bole River (near Danum) and Brumas and Sabah Softwoods (south of Danum) have pure white crowns and, thus, show no signs of hybrid introgression.

White-crowned Forktail *Enicurus leschenaulti*

Status: A common resident. *Localities:* Apus Balung, Benkoka, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Gomantang, Gum Gum, Imbak River, Kaingaran, Kalabakan, Kinabalu, Kundasan, Labau River, Lamag, Lumaku, Magdalena, Malangkap, Maliau, Poring, Sabah Softwoods, Sepilok, Simatuoh, Sinsuran Road, Tabin, Tawau Hills, Trus Madi, Ulu Mawau, and Ulu Tiulon. *Elevation:* Sea level to 1,950 m (Mt. Kinabalu east ridge). *Habitats:* 1°, logged, and upland heath forest; *Albizia*. Although usually found along streams, this species commonly occurs on ridges away from water. *Breeding:* Specimens with enlarged sexual organs were obtained at Brumas on 6 May 1982 (largest ovum 9 × 9 mm) and Imbak River on 15 July 1982 (largest ovum 2 mm, ruptured ovarian follicles). A fledgling with a parent bird was observed at Bole River on 17 Feb. 1982. *Voice:* Loud pewing notes. *Food:* Insects. *Remarks:* Sym-

patric with Chestnut-naped Forktail in upland areas of 1° forest. GD (in Smythies 2000) recognized two races of White-crowned Forktail, the lowland *frontalis* and upland *borneensis*, based on tail length and shape of white tips to the inner secondaries. See Harrisson (1949).

Chestnut-naped Forktail *Enicurus ruficapillus*

Status: A common resident. *Localities:* Batu Punggul, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Ensuan, Gomantong, Imbak River, Kalabakan, Labau River, Magdalena, Makaniton, Maliau, Poring, Quoin Hill, Rinangisan, Saliwangan, Silam Mountain, Silam Plantation, Tabin, Tawau Hills, Ulu Merutai, and Ulu Tiulon. *Elevation:* Sea level to 1,250 m. Not common in flat lowland forest, where the only records are old specimens from Bettotan and Gomantong. It is more common in upland and highland areas. *Habitats:* 1° and logged forest, and occasionally in 2° scrub and along logging roads. *Breeding:* Females showing signs of sexual activity were collected at Bole River on 20 Feb. (largest ovum 9 × 8 mm) and 2 Mar. 1982 (enlarged oviduct, largest ovum 2 mm), and at Brumas on 14 May 1982 (enlarged oviduct, full body molt). *Voice:* Call is a loud three notes, higher pitched on the second note. *Food:* Insects. *Remarks:* Like White-crowned Forktail, this species is generally found along rivers, where it is commonly seen on rocks. Occasionally it is found on dry ridges.

[Northern Wheatear *Oenanthe oenanthe*

Status: A rare migrant. The only record for Sabah seems to be a pair of birds seen by DMS (Simpson 1982a) on the Tembungo oil platform on 18 Oct. 1981. One bird had a strong black face mark (like a shrike), was gray above with darker wings, and showed a white rump in flight. Underparts were pale rusty buff. The other had much fainter face markings and was generally paler and sandier, suggesting that it was immature.]

[Pied Bushchat *Saxicola caprata*

Status: A rare migrant. One was seen on 2 May 1998 at Kinabalu Park Headquarters (Robson 1998b).]

Common Stonechat *Saxicola torquata*

Status: A rare migrant. *Remarks:* DMB recorded a bird at Tanjung Aru on 4 Feb. 1960. D. R. Wells (1976) saw a female in a buffalo field at Kampung Nukohan near Kuala Penyu on 26 Mar. 1975 (Wells 1976; Smythies 1981). B&W observed an immature male on Tempasuk Plain on 11–12 Dec. 1984.

[Orange-flanked Bush Robin *Tarsiger cyanurus*

Status: A rare migrant known in Borneo only from two sightings. DMB (Smythies 1981) saw one in overgrown rubber at Klias on 19 Dec. 1960. Smythies (2000) noted a sighting (without supporting data) at Danum during the first week of Jan. 1991.]

Blue Rock Thrush *Monticola solitarius*

Status: An uncommon migrant. *Localities:* Bongawan, Gana, Kinabalu, Kuala Penyu, Kundasan, Labuan, Membakut, Papar, Papar Beach, Pulau Tiga, Rinangisan, Sinsuran, and Tembungo. *Elevation:* Sea level to 2,100 m (on Kinabalu). *Habitats:* Open areas, including new clearings, watercourses, and coast; especially areas with low perches (e.g., rocks and stumps). *Migration dates:* Early dates are

11 and 27 Sept. 1981 at Tembungo (Simpson 1982a) and 18 Sept. (no year) in the Kimanis Bay area (DMB). DMS had additional birds on 16–18 Oct. 1981. Late dates are 29 Mar. (DMB), 16–17 Apr. 1985 (Phillipps 1985a), and night migrants at Rinangisan on 13 Apr. 1983 (WFVZ). *Voice*: The callnote is a grating *tchak*, which is sometimes repeated to form a double call; also a thin *see* note (DMB). *Food*: “Whole gecko” (SMC specimen label), worms, insect larvae, snails, crustaceans, and berries (DMB in Smythies 1981). *Remarks*: T. Harrisson (SMC specimen) wrote: “80' [24 m] up in tall bare tree. Runs rather like rat up branch.” This bird has a horizontal posture with its short tail carried in line with the body and wings; it often flits its tail and droops its wings (DMB).

Island Thrush *Turdus poliocephalus*

Status: A locally common resident, whose range in Borneo is restricted to Sabah. *Localities*: Kinabalu, Tambuyukon (Q. Phillipps 1982), and Trus Madi. *Elevation*: Kinabalu generally 2,100–3,650 m, but occasionally down to 1,500 m; Trus Madi 2,100–2,450 m; Tambuyukon >2,100 m. *Habitats*: Stunted, higher montane scrub, “Leptospermum” forest. *Breeding*: V. W. Ryves (1957) found a nest at Pakka Cave on Mt. Kinabalu on 19 Feb. 1939. The nest contained a single chick a few days old. He also obtained single-egg clutches in the vicinity of Pakka Cave on 26 Feb. and 23 Mar. 1939. T. Harrisson (in Ryves 1957) collected specimens with enlarged sexual organs on Kinabalu between 1 and 7 Feb. 1952 (largest testes 30 mm, 16 mm, and 24 mm; one specimen with an oviduct egg and several with enlarged ovaries). *Voice*: A metallic, repeated *chack-chack-chack* (Phillipps 1986). *Food*: Fruit, insects, and beetles. The presence of insect parts in specimens indicates that this species eats more than just fruit, contra Harrisson (1955a). *Remarks*: On Kinabalu, Island Thrush seems to be semi-nomadic. It often is abundant in areas where a few weeks earlier it had been absent, suggesting that it moves according to fruit availability. Whitehead (1893) observed it to be most common at ca. 2,800 m on Kinabalu. A few have been recorded at lower elevations: Kinabalu at 1,550 m and Tenompok pass at 1,475 m feeding on berries in July 1983 (Phillipps 1986). This low 1983 elevational record may have been influenced by the El Niño drought, because RGM recorded this species at 1,600 m on Kinabalu in July 1998, another El Niño year.

Eyebrowed Thrush *Turdus obscurus*

Status: An uncommon migrant. *Localities*: Gaya Island, Kimanis, Kinabalu, Klias, Labuan, Muruk Miau, Papar, Rinangisan, Sinsuran Road, Tambunan, and Tenom. *Elevation*: Sea level to 3,100 m on Kinabalu (Jenkins et al. 1996). *Habitats*: 1° and 2° forest. WFVZ recorded flocks of 12–15 birds in the tops of 1° forest trees along Sinsuran Road (1,350 m), and individual birds were netted deep in interior forest (1,200 m). *Migration dates*: Small parties were observed at Klias by DMB on 17 and 24 Oct. 1961. Most records are from Dec. to Apr. WFVZ's early and late dates are 21 Dec. 1981 (Sinsuran Road) and 1 Apr. 1983 (Rinangisan). *Voice*: The contact calls are thin *tsee* notes, and birds in flocks tend to “chatter” (DMB). *Food*: Fruit with seeds 7 × 5 mm.

Scaly Thrush *Zoothera dauma*

Status: A rare migrant. The only Bornean records are a single specimen col-

lected on Mantanani Island on 12 Aug. 1969 (Miyamoto 1971) and a bird found dead on Sabah Museum grounds on 23 Nov. 1992 (A. Wong, J. Majuakim, GD).

[Siberian Thrush *Zoothera sibirica*

Status: A rare migrant. The only Sabah record is an individual bird that stopped on Seligaan Island from Aug. to Dec. 1973 and took shelter in the public toilets (de Silva and Chong 1974).]

Orange-headed Thrush *Zoothera citrina*

Status: An uncommon resident, recorded in Borneo only in Sabah and west Kalimantan. *Localities:* Kaingaran, Kinabalu, Malangkap, Rinangisan, Sayap, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 950–1,800 m, Trus Madi 750–1,600 m, Crocker Range 1,200–1,400 m. *Habitats:* 1° and 2° forest. *Breeding:* Whitehead (Sharpe 1889c; Whitehead 1893) found fully fledged young by the beginning of May on the lower slopes of Kinabalu. A specimen with an enlarged oviduct, but granular ova, was collected along Sinsuran Road on 18 Nov. 1982 (WFVZ). *Food:* Insects. *Remarks:* The first record of this species at a site other than Kinabalu or Trus Madi was a specimen collected at 1,500 m on Sinsuran Road by YUE in Feb. 1977. WFVZ had only a few sightings or net records of this species in the Crocker Range (i.e., along Sinsuran Road and at Rinangisan). However, on Trus Madi, WFVZ netted and observed it frequently in the heavily disturbed forest around Kaingaran, as well as higher mountain slopes (Sheldon and Francis 1985). WFVZ also observed an individual foraging on a small patch of lawn behind the orchid display at Kinabalu Park Headquarters. RGM collected a specimen at Sayap in early July 2000 (not in breeding condition). Outside of Sabah, this species has only been found at Gunung Palung National Park (Laman et al. 1996).

Everett's Thrush *Zoothera everetti*

Status: A scarce Bornean endemic. *Localities:* Kinabalu, Rinangisan, and Trus Madi. There are no Kinabalu specimens in the Sarawak or Singapore collections. The British Museum has five Kinabalu specimens with no other data. The only specimen with elevation data from Mt. Kinabalu was obtained by WFVZ after it hit a window at Park Headquarters and was killed. However, one was banded in Kinabalu Park at ca. 1,850 m during the 1964 Royal Society expedition (McClure and Leelavit 1972; Jenkins and de Silva 1978), and there are several sight records from trails near park headquarters. *Elevation:* Kinabalu 1,500–2,000, Rinangisan 1,200 m, and Trus Madi 1,400–1,550 m. *Habitats:* Mossy and dry montane forest. The Cambridge University Expedition recorded three individuals on Trus Madi foraging together among damp leaves on the floor of the “jungle dense with creepers” (SMC specimen). WFVZ observed it on trails in stunted dense growth. *Food:* Beetle larvae and termites. *Remarks:* WFVZ observed Everett's Thrush two times at Rinangisan. Like other Bornean thrushes, it is unobtrusive. When encountered on a path, it flies ahead furtively or sits or hops quietly. In flight it makes a quiet clicking or muttering noise, and its underwing is distinctive for its wide white stripe.

Chestnut-capped Thrush *Zoothera interpres*

Status: An uncommon resident. Before the advent of mist-netting and tape recording, this species was considered rare (Smythies 1960). *Localities:* Bettotan,

Bole River, Brumas, Crocker Range Park Headquarters, Danum, Garinono, Gomantong, Gum Gum, Imbak River, Kalabakan, Kuala Segama, Kunatong, Makaniton, Poring, Pulau Tiga, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Tabin, Telupid, and Ulu Dusun. *Elevation*: Generally, sea level to ca. 400 m. Four were collected at 1,000 m near Crocker Range Park Headquarters (RGM), and one night migrant was collected at 1,300 m at Rinangisan (WFVZ). *Habitats*: 1°, old 2°, island heath, and recently logged forest; *Albizia*. Johns (unpubl.) listed it as present in twice-logged upland forest at Tabin. *Breeding*: Phillipps and Phillipps (1970) located a nest at Poring in Sept. 1969 (no details provided). Specimens with enlarged sexual organs were collected at Brumas on 15 May 1982 (testes 5×3 mm, enlarged oviduct and ruptured ovarian follicles) and Crocker Range Park Headquarters on 14–20 June 1999 (ovary 6×9 mm). *Food*: Snails, insects, and seeds. *Remarks*: WFVZ captured a young bird (skull 50% ossified) at Rinangisan, 1,300 m, on 14 Apr. 1983 that was attracted to a lantern at night, and WFVZ netted another bird (and observed several others) on Pulau Tiga in May 1983. These birds may have been local wanderers searching for food during the harsh conditions of the El Niño. The ability of this species to disperse over water was most dramatically demonstrated by their recent colonization of Krakatau (GD).

Fruithunter *Chlamydochaera jefferyi*

Status: A scarce Bornean endemic that can be locally common when fruit is abundant. *Localities*: Kaingaran, Kinabalu, Malangkap, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 950–3,200 m, Crocker Range 1,100–1,600 m, and Trus Madi 700–2,100 m. *Habitats*: 1° and 2° forest. *Breeding*: Specimens with enlarged sexual organs were collected at Rinangisan on 21 Mar. (ruptured ovarian follicles, enlarged oviduct, brood patch) and 28 Mar. 1983 (enlarged oviduct and ova). *Voice*: A soft, hardly noticeable *seep*, sometimes rising in inflection. It is sounded every 5–10 s while the bird perches unobtrusively in the midstory (WFVZ). *Food*: Lindos (*Litsea cubica*) berries (RGM), and other berries with 15×11 -mm seeds (WFVZ). *Identification*: When sitting, their posture is pigeon-like, but when they congregate at berry trees, they act much like bulbuls. They also resemble laughingthrushes in some behaviors and often occur in pairs. Their flight is like that of a campephagid, in that they dip their pointed wings in and out rather than flap. *Remarks*: WFVZ observed dozens, along with many bulbuls, in Mar. 1983 at Rinangisan, when many scrub trees were producing berries. Using WFVZ specimen material in DNA-hybridization comparisons, Ahlquist et al. (1984) found that the Fruithunter is a thrush. Using skeletons collected by the WFVZ, Olson (1987) suggested it is probably the Bornean representative of the genus *Cochoa*.

Sunda Whistling Thrush *Myophonus glaucinus*

Status: An uncommon resident. *Localities*: Kinabalu, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 650–2,750 m (Whitehead [1893] reported this range; most specimens we examined come from 1,000–2,200 m); Trus Madi 1,200–2,200 m. *Habitats*: 1° forest, especially dark ravines and water-courses. *Breeding*: At Malangkap on 23 Apr. 1888, Whitehead (Sharpe 1889c; Whitehead 1893) found a nest containing young that was built in a crevice over a stream. V. W. Ryves found a nest with two eggs at Kenakok on 15 Feb. 1939.

The eggs were cream colored and speckled with reddish (Smythies 1981; RMC). A specimen with testes 11×7 mm was collected along Sinsuran Road on 14 Nov. 1982. *Voice*: A high-pitched screech, much like that of a fork-tail but harsher and longer in duration (CMF). When flushed it gives a high-pitched ringing whistle, almost like a coin dropping on a hard surface. *Food*: Insects, snails, and seeds (fruit?). *Identification*: This species appears all black when viewed in understory shadows, but its tail movements are diagnostic. It bobs its tail frequently and, when perched, raises its tail into alignment with its body axis, fans it, then presses it down again (WFVZ).

Family TIMALIIDAE

BABLERS

[Rail-babbler *Eupetes macrocerus*

Status: A rare resident for which there are no confirmed Sabah records. *Localities*: Two sightings in 1° forest at Brumas during June 1982 (WFVZ), two sightings from Kalabakan (Norman 1964), a sighting at Poring (ca. 1,100 m; J. Wall and D. Yong), and a sighting in twice-logged forest at Tabin (Johns, unpubl.). *Voice*: One whistled call is virtually indistinguishable from that of the Blue-banded Pitta (D. R. Wells); see Black-and-crimson Pitta. Another call is a soft clucking or plopping sound (GD).]

Black-capped Babbler *Pellorneum capistratum*

Status: A common resident. *Localities*: Banggi Island, Benkoka, Bettotan, Bin-sulok, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Goman-tong, Imbak River, Kaingaran, Kudat, Kulamba, Labau River, Labuk Road, Maang, Madai, Magdalena, Makaniton, Maliau, Megatai, Membakut, Mengga-long, Padas Damit, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Sepulut, Silam, Tabin, Telupid, Ulu Dusun, Ulu Merutai, and Ulu Tiulon. *Elevation*: Sea level to 1,000 m. *Habitats*: 1°, 2°, and logged forest; upland kerangas, peat-swamp, overgrown rubber, bamboo-sapling thickets, *Albizia*, cocoa, and sandy-soil scrub adjacent to beaches and mangroves. *Breeding*: Specimens with enlarged sexual organs were collected at Bole River on 3 Mar. 1982 (testes 6×3 mm); Brumas on 4 June 1983 (ruptured follicles, slightly enlarged ova); Maang on 27 June 1983 (testes 5×2 mm); and Labuk Road on 1 Aug. 1983 (testes 5×2 mm). *Voice*: Two different calls. On the West Coast a three-note call is common: long-short-short (the last two notes slurred and rising). East of the Crocker Range the call is usually two notes, the first rising, the second falling. Sometimes a third quick note is placed in the middle. DMB described the call as a liquid, disyllabic *pooeet*, rising in tone. *Food*: Termites, locusts, spiders (DMB).

Temminck's Babbler *Pellorneum pyrrogenys*

Status: An uncommon resident. *Localities*: Anginon, Danum, Kaingaran, Kin-abalu, Lumaku, Malangkap, Poring, Rinangisan, Sayap, Sinsuran Road, and Trus Madi. *Elevation*: Crocker Range 1,000–1,500 m, Danum 500 m, Kinabalu 700–1,500 m, and Trus Madi 750 m. *Habitats*: 1° and 2° forest. This is distinctly a species of lower montane forest. MCT (Thompson 1966) reported it as common in "moss" forest at Anginon. *Breeding*: V. W. Ryves collected three clutches of two eggs and a single egg at Kiau on 4 Mar. (19.5×15 mm), 11 Mar. ($20.5 \times$

14.5 mm, 19.5 × 15 mm), 27 Mar. (21 × 15.5 mm, 21 × 15 mm), 30 Mar. 1939 (19.5 × 15 mm, 19.5 m × 15 mm). The eggs were dull bluish-green, thickly spotted with light purplish gray and brown (Gibson-Hill 1949b). Specimens with enlarged sexual organs were collected at Sinsuran Road on 30 Jan. (testes 5 mm) and 8 Feb. 1977 (testes 6 mm); Rinangisan on 25 Mar. (enlarged oviduct) and 28 Mar. 1983 (testes 7 × 4 mm); Sinsuran Road on 6 Dec. 1981 (testes 5 mm); and Anginon on 18 Dec. (collapsed ovarian follicles, brood patch), 19 Dec. (testes 6 × 3 mm), and 25 Dec. 1962 (testes 5 × 3 mm). *Remarks:* There are no specimens from Sabah in the Sarawak or Singapore Museums, but the Sabah Park Zoological Collection has one from Sayap (RGM). Trus Madi records are based on sightings only (RGM).

White-chested Babbler *Trichastoma rostratum*

Status: A common resident. *Localities:* Banggi Island, Batu Punggul, Benkoka, Benoni, Bettotan, Binsulok, Bole River, Brumas, Bundu, Danum, Gaya Island, Gomantong, Kabayau, Kota Klias, Kunatong, Labau River, Labuk Road, Likas Swamp, Maang, Maliau, Mawao, Membakut Beach, Menggalong, Padas Damit, Pandasan, Papar, Sabah Softwoods, Saliwangan, Sepilok, Silam Plantation, Simatuh, Sukau, and Tabin. *Elevation:* Sea level to 500 m. *Habitats:* 1°, 2° forest (mainly along rivers and streams), upland heath, logged, and swamp forest; beach strand scrub, mangroves, old rubber, and *Albizia*. *Breeding:* A specimen with enlarged testes (5 × 3 mm) was collected at Sabah Softwoods on 29 June 1982. *Voice:* Smythies description of *minta duit* is accurate; also *tew-tew-teweeet* (DMB) and *duit-duit-duit*.

Ferruginous Babbler *Trichastoma bicolor*

Status: A common resident. *Localities:* Baturong, Benkoka, Bettotan, Bole River, Brumas, Danum, Garinono, Gomantong, Imbak River, Kalabakan, Labau River, Labuk Road, Lumbidan, Maang, Makaniton, Maliau, Megatai, Poring, Pulau Tiga, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Sepulut, Tabin, Telupid, Tawau Hills, Ulu Tiulon, and Weston. *Elevation:* Sea level to 550 m. *Habitats:* 1°, 2°, logged, and upland heath forest; scrub left by shifting agriculture, older *Albizia* groves, and overgrown rubber. *Breeding:* DMB found a nest inland from Weston in Mar. 1959. It was a small and untidy cup of thin twigs and strips of palm leaf placed less than 1 m off the ground among a mass of dead leaves in the middle of a clump of spiny ground palm. It contained one half-grown chick and an addled egg (21.5 × 17 mm), which was stained, but appeared to be pale pink-buff flecked with spots of rusty red and gray mainly at the larger end. Specimens with enlarged testes were collected at Bole River on 20 Feb. 1982 (7 × 4 mm), Brumas on 1 Apr. 1977 (7 mm), and Labuk Road on 31 July (8 × 5 mm) and 1 Aug. 1983 (7 × 5 mm). Prentice and Eddie (1981) reported an adult with three fledglings in dense bushes at Poring on 4 Sept. 1981. A nest found within 100 m of this sighting on 3 Sept. may have belonged to these birds. A very young fledgling was collected at Brumas on 5 June 1982 (WVZ). *Voice:* *Wee-eet*, higher pitched and sharper on the second syllable. Sometimes described as a descending *plint-a-tue* or occasionally *plink-a-tue*, *plink*. *Remarks:* Lambert (1990c) reported average foraging heights of 3 m in 1° forest and 2 m in logged forest.

Short-tailed Babbler *Malacocincla malaccensis*

Status: A common resident. *Localities:* Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Ensuan, Garinono, Imbak River, Kabayau, Kalabakan, Kulamba, Labau River, Labuk Road, Lumbidan, Maang, Magdalena, Makaniton, Maliau, Megatai, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Sepulut, Silam Plantation, Tabin, Tawau Hills, Telupid, Ulu Dusun, Ulu Mawau, and Ulu Tiulon. *Elevation:* Sea level to 1,000 m. *Habitats:* 1°, 2° (both dry ridges and stream edges), logged, and upland podsol forest; 10-yr-old sapling-bamboo thickets, *Albizia*, and overgrown rubber. *Breeding:* Specimens with enlarged sexual organs were collected at Saliwangan on 12 Feb. 1983 (testes 5 × 2 mm); Bole River on 19 and 20 Feb. 1982 (enlarged oviduct, ruptured ovarian follicles; testes 6 × 4 mm); Brumas on 11, 28, 29 Mar. and 2 Apr. 1977 (testes 5 mm) and 8 May 1982 (testes 5 × 3 mm); Maang 16 June 1983 (testes 5 × 3 mm); Sabah Softwoods on 3 July 1982 (testes 5 × 3 mm); and Quoin on 31 July 1962 (testes 7 × 4 mm). *Voice:* *Fit-zweet* or *fit-fit-zweet*. Also a rapidly repeated *pew*. *Remarks:* D. Wells identified the subspecies from Danum as *poliogenys* (Kiew 1977).

Horsfield's Babbler *Malacocincla sepiarium*

Status: A common resident. *Localities:* Batu Punggul, Bettotan, Bole River, Brumas, Danum, Gana, Garinono, Gomantong, Imbak River, Kalabakan, Magdalena, Makaniton, Maliau, Quoin Hill, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Sepulut, Silam Plantation, Sukau, Tabin, and Ulu Dusun. *Elevation:* Sea level to 500 m. Robson (1998b) reported it from 1,700 m in Kinabalu Park on 3 May 1998. *Habitats:* Principally 1° forest; also logged and old 2° forest, *Albizia*, and *Gmelina*. This species is sympatric with Short-tailed Babbler in 1° dipterocarp forest, but seems not to inhabit heath forest. MCT (Thompson 1966) believed that it is more common than Short-tailed Babbler in 2° forest. *Breeding:* Specimens with enlarged sexual organs were collected at Bole River on 17 Feb. (testes 7 × 5 mm), 8 Mar. (largest ovum 8 mm), 1 Apr. (enlarged oviduct), and 6 Apr. 1982 (testes 10 × 6 mm); Brumas on 10 Mar. 1977 (testes 10 mm), 1 Apr. 1977 (testes 8 mm), 9 May 1982 (enlarged oviduct, ruptured ovarian follicles; testes 8 × 6 mm), and 4 June 1982 (testes 7 × 5 mm); Sabah Softwoods on 29 June (enlarged oviduct) and 1 July 1982 (testes 7 × 4 mm); Imbak River on 17 July 1982 (testes 8 × 6 mm); Quoin Hill on 24–31 July 1962 (testes 8 × 5 mm and 8 × 7 mm); and Kalabakan on 8 Nov. 1962 (testes 8 × 5 mm). *Voice:* Call is as described by Smythies, but often lacks the first note, thus becoming *chup chiu* (DMB).

Abbott's Babbler *Malacocincla abbotti*

Status: A rare resident. *Localities:* Known in Sabah from only two specimens, a male collected on the Benkoka River (Chasen and Kloss 1930a) and a male collected in *primary forest* on the Little Kretam River on 17 July 1950 (FMNH specimen). There have been a few recent sightings. J. Payne reported it from Bukit Ibul (1,150 m) and Quoin Hill. WFVZ saw it once at Sabah Softwoods in 7-yr-old *Albizia*. There also are two dubious banding records cited by McClure and Leelavit (1972), one for Kampung Ambang (Kota Belud) and another for the Tuaran area, both in 1970. Johns (unpubl.) sighted it in twice-logged forest at Tabin. Goh et al. (1989) also recorded it from Tabin. Norman (1964) reported it

as "occasional" in undergrowth of thick forest. *Habitats*: Low elevation, riverine and coastal plain, coastal scrub, and poor soil forests. *Remarks*: Witt and Sheldon (1994a) reviewed the status of Abbott's Babbler in Sabah.

Rufous-crowned Babbler *Malacopteron magnum*

Status: A common resident. *Localities*: Baturong, Bettotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Imbak River, Imbak Valley, Kabayau, Kalabakan, Kulamba, Labau River, Lumbidan, Makaniton, Maliau, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sebatik Island, Segarong, Sepilok, Sepulut, Tabin, Tawau Hills, Ulu Membakut, and Ulu Tiulon. *Elevation*: Sea level to 700 m. *Habitats*: 1°, upland heath, and logged forest; cocoa (rarely [Thompson 1966]), old rubber, and older *Albizia*. The only records in 2° forest are from areas adjacent to 1° forest. *Breeding*: Specimens with enlarged sexual organs were taken at Bole River on 3 and 6 Mar. 1982 (7 × 5 mm, 9 × 5 mm); Brumas on 7 May (testes 11 × 7 mm, largest ovum 3 mm) and 14 May 1982 (testes 12 × 7.5 mm); Sabah Softwoods on 20 and 24 June 1982 (testes 9 × 4 mm, 9 × 6 mm); Imbak River 16 and 18 July 1982 (testes 8 × 5 mm, 8 × 5 mm); and Quoin on 4 Oct. 1962 (testes 9 × 5 mm). RGM collected a specimen with enlarged ova and oviduct, and a male with testes 9 × 6 mm on 8 June 2000 at Imbak Valley. *Voice*: Its song is a cheerful, descending scale of rapidly repeated notes. The descending notes are preceded by two or three rising notes of longer duration. It also has a wandering song like that of Sooty-capped Babbler, but less melancholy. Another call is *doo-dee-doo-dee-duit*, in which the *dee* notes are higher in pitch than the *doo* notes, and the *duit* is a sharp uprising whistle. *Food*: Beetles and orthopterans. *Remarks*: MCT (Thompson 1966) lumped Sabah specimens in the widely distributed subspecies *magnum*, whereas D. Wells (Kiew 1977) preferred the subspecies *saba* (Chasen and Kloss 1930a) based on the marked reduction of black on the nape of Sabah birds. In Danum, Wells found this to be the least common species of the genus, but nevertheless distributed in all of the habitats that were surveyed. Its average foraging heights are 9 m in 1° forest and 5 m in logged forest (Lambert 1990c).

Scaly-crowned Babbler *Malacopteron cinereum*

Status: A common resident. *Localities*: Batu Punggul, Beluran, Benkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Garinono, Gomantong, Imbak River, Kabayau, Kalabakan, Labau River, Labuk Road, Madai, Makaniton, Maliau, Menggalong, Pandasan, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Sepulut, Silam, Tabin, Tawau Hills, Telupid, Ulu Dusun, Ulu Membakut, and Ulu Tiulon. *Elevation*: Sea level to 550 m. *Habitats*: 1° and logged forest, coastal swamp and upland kerangas, and *Albizia* (rarely). This species is largely an old forest inhabitant. It is the only arboreal, foliage-gleaning babbler that is noticeably rarer in logged forest than in 1° forest (Lambert 1990c). *Breeding*: Specimens with enlarged sexual organs were collected at Brumas on 7 and 14 May (testes 10 × 7 mm, 10 × 7 mm) and 6 June 1982 (testes 8 × 5 mm), Sabah Softwoods on 26 June 1982 (largest ovum 3 mm), and Labuk Road on 31 July 1983 (enlarged oviduct, largest ovum 11 × 11 mm). RGM collected a specimen with testes 10 × 6 mm on 25 May 2000 at Tawau Hills. *Voice*: Two main songs: One consists of five wheezy notes, the first four rising

on a scale and the last dropping down to the beginning note. The second is a melancholy continuation of the four-note scales, each starting on a different pitch.

Moustached Babbler *Malacopteron magnirostre*

Status: A common resident. *Localities:* Anginon, Benkoka, Bettotan, Bole River, Brumas, Danum, Imbak River, Kalabakan, Labau River, Labuk Road, Magdalena, Maliau, Megatai, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Tabin, Tawau Hills, and Ulu Membakut. *Elevation:* Generally sea level to 600 m, one banded at 1,050 on Kinabalu (Jenkins and de Silva 1978) and one record from Anginon at 1,200 m (Thompson 1966). *Habitats:* 1°, logged, and old stands of 2° forest resulting from shifting agriculture; upland heath, old rubber, and *Albizia* (rarely). This bird seems to be a 1° forest counterpart of Sooty-capped Babbler, which is very similar and found mainly in 2° growth. For example, at Sabah Softwoods, many Sooty-capped Babblers were observed and netted in *Albizia* groves, but only one Moustached Babbler was recorded. This individual had a deformed bill. *Breeding:* Specimens with especially enlarged sexual organs were collected at Brumas on 9 May (enlarged oviduct, ruptured ovarian follicles) and 16 May 1982 (testes 9 × 6 mm), and by RGM at Tawau Hills on 19 May 2000 (shelled oviduct egg 20 × 14 mm and yolked ovum 9 mm). *Voice:* One song is a two-phrase melody, *doo-da-doo* (on one pitch) followed by a four-note descending scale. As in other *Malacopteron* species, the mate chimes in with counterpoint notes. *Food:* Insects. *Identification:* Grayer, less distinctive crown than Sooty-capped Babbler. *Remarks:* Average foraging height is 6 m in 1° forest and 4 m in logged forest (Lambert 1990c).

Sooty-capped Babbler *Malacopteron affine*

Status: A common resident. *Localities:* Batu Putih, Bettotan, Bole River, Danum, Gomantong, Kabayau, Labuan, Labuk Road, Lamag, Lumbidan, Maliau, Mawau, Poring, Rayoh, Sabah Softwoods, Saliwangan, Sepilok, Silam Plantation, Sukau, Tabin, Tawau Hills, Ulu Tiulon, and Weston. *Elevation:* Sea level to 550 m. *Habitats:* 1°, 2°, and logged forest; *Albizia*, overgrown edge of rubber, and oil palm. This is principally a 2° growth species. Records of this species in 1° forest are unusual. When it does occur there, it is most often found in vine tangles and along river edges, where the forest shows signs of natural disturbance (Wells in Kiew [1977]). *Breeding:* Specimens with enlarged sexual organs were collected at Sabah Softwoods on 29 June (enlarged oviduct, ova 2 × 2 mm, ruptured ovarian follicles) and 5 July 1982 (testes 7 × 4 mm), and Labuk Road on 4 Aug. 1983 (testes 8 × 5 mm). *Voice:* Two songs. One is a slow, plaintive, song consisting of two descending notes followed by two phrases of three descending notes. The second song follows the same theme, but is clearer and more cheerful. It is simply two phrases of three descending notes sung rapidly and with an accent on the first (and highest) note in each trio. *Food:* Caterpillars, ants, and beetles. *Identification:* Slightly smaller and browner, with a hint of chestnut on the crown, than Moustached Babbler.

Gray-breasted Babbler *Malacopteron albogulare*

Status: A rare resident, except in certain poor-soil habitats where it is more common. *Localities:* Ensuan, Lumbidan, Menggalong, Sabah Softwoods, and Ulu Rukuruku. *Elevation:* Sea level to 300 m. *Habitats:* Poor soil 1° forests such as

peatswamp forest and forests growing on podsols and ultrabasic soils (Sheldon 1987; Holmes and Wall 1989). *Identification:* This species is easily identified by its bright white superciliary line and yellow lores. These features are not obvious in bird skins. It also has a marked gray hood and a vivid breast band. *Remarks:* In other parts of Borneo this species occurs in areas of low soil fertility and thick undergrowth (Dutson et al. 1991) and is common in peatswamp forest (Gaither 1994). In Sabah, the WFVZ found it to be common only in the Merintaman–Menggalong swamp forest.

Chestnut-backed Scimitar Babbler *Pomatorhinus montanus*

Status: An uncommon resident. *Localities:* Anginon, Batu Punggul, Bettotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Imbak River, Kabayau, Kaingaran, Kalabakan, Kiau, Kinabalu, Maang, Magdalena, Maliau, Megatai, Melalap, Poring, Quoin Hill, Rinangisan, Sabah Softwoods, Samawang, Sepilok, Tabin, Tambunan, Tambuyukon, Tawau Hills, Telupid, Trus Madi, Ulu Merutai, and Ulu Tiulon. *Elevation:* Sea level to 1,700 m (Kinabalu) and 2,200 m (Trus Madi). *Habitats:* 1°, 2°, and logged forest; pure bamboo stands, shifting agriculture scrub, and 5-yr-old *Albizia*. Uncommon in recently logged forest, but becomes more common in older logged forest (Lambert 1990c). *Breeding:* Whitehead (Sharpe 1889d; Whitehead 1893) found a nest at Malangkap on 20 Jan. 1888. He described it as a large ball, composed of coarse grasses and lined with finer leaves. Eggs were glossy white. V. W. Ryves obtained two clutches at Kiau, one of three eggs on 13 Feb. and one of two eggs on 19 Feb. 1939. Specimens with enlarged sexual organs were collected at Bole River on 18 Feb. 1982 (enlarged oviduct), and Sabah Softwoods on 30 June 1982 (testes 6 × 3 mm). *Voice:* The call is a subdued oriole-like two-note phrase, with a short first note and longer second note that starts on the same pitch and slurs up. Smythies (1959) described a triple hoot. *Food:* Grasshoppers, caterpillars. *Remarks:* Often in mixed flocks in the lower midstory of tall forest.

Bornean Wren Babbler *Ptilocichla leucogrammica*

Status: An uncommon Bornean endemic. Before the advent of mist-netting and tape recording, this species was considered rare (Smythies 1960). *Localities:* Bettotan, Bole River, Brumas, Danum, Garinono, Labau River, Magdalena, Quoin Hill, Sabah Softwoods, Sepilok, Silam Plantation, Simatuoh, Sukau, Tabin, and Ulu Tiulon. *Elevation:* Sea level to 500 m. *Habitats:* 1°, 2°, upland heath, and recently logged forest; 7-yr-old *Albizia*. Although recorded in logged forest, it is much rarer there than in 1° forests (Lambert 1990c). *Breeding:* Specimens with enlarged sexual organs were collected at Quoin Hill on 19 July 1963 (oviduct egg), Garinono on 13 Aug. 1963 (oviduct egg), and Labau River in Oct. 1982 (testes 5 × 3 mm). *Voice:* A two- or three-note whistle, *doo-dee* or *doo-doo-dee*, in which the last note is higher than the first. If two *doo* notes are sounded, they are on the same pitch.

Striped Wren Babbler *Kenopia striata*

Status: An uncommon resident. *Localities:* Benkoka, Bettotan, Bole River, Brumas, Danum, Garinono, Imbak River, Kalabakan, Kun Kun, Labau River, Lumbidan, Magdalena, Maliau, Meliau, Quoin Hill, Rayoh, Samawang, Samuran, Sepilok, Tabin, Tawau Hills, Telupid and Ulu Merutai. *Elevation:* Generally sea level

to 500 m, but there is one specimen in the Sabah Museum from Maliau at 3,500 ft. (1,050 m) and one from Mt. Magdalena at 4,000 ft. (1,220 m). *Habitats*: 1°, 2° (adjacent to 1°), and upland heath forest. Occurs in logged areas, but less frequently than in 1° forest (Lambert 1990c). *Breeding*: A specimen with an enlarged oviduct and ova (largest 9 × 9 mm) was collected at Bole River on 27 Feb. 1982. A fledgling begging food was observed at Kuala Kun Kun on 4 May 1980 (G. Davies). *Voice*: *Kittle jank*, the first note trilled a bit higher in pitch than the last, which is short and chopped-off (Thompson 1966). Norman (1964) described their noise as *pee-pee-pee* and a call of *chrrh-churrrh-churra*, like the soft croaking of a frog. *Remarks*: Often seen in small parties.

Black-throated Wren Babbler *Napothera atrigularis*

Status: An uncommon Bornean endemic. *Localities*: Batu Punggul, Benkoka, Bettotan, Bole River, Brumas, Bukit Ibul, Danum, Ensuan, Kalabakan, Magdalena, Madai, Mumiang, Samawang, Segarong, Sepilok, Tabin, and Ulu Tiulon. *Elevation*: Generally sea level to 500; one sighting at 1,150 m on Bukit Ibul (J. Payne). *Habitats*: 1° (especially river terrace) and logged forest. Much rarer in logged forest. *Breeding*: A female with an enlarged oviduct was collected on 8 Mar. 1982 at Bole River. A bird banded at Lumerau (Tabin Wildlife Reserve) on 5 Feb. 1983 laid an egg, which was white stained with rufous splotches, ca. 26 × 17 mm (C. Francis). *Voice*: Highly reminiscent of Black-and-crimson Pitta and Blue-banded Pitta. Norman (1964) described these long, plaintive whistles, as well as a call: *we-ah, we-ah, we-ah*, which was deep and gruff and resembled that of Striped Wren Babbler, although much louder. *Remarks*: When its call is mimicked, it tends to circle the caller, flying (rather than running) from cover to cover. Based on behavior (including leaf-flicking feeding) and other characteristics, D. Wells thought this species to be conspecific (or allospecific) with *N. macrodactyla* in peninsular Thailand and Malaya (Kiew 1977).

Mountain Wren Babbler *Napothera crassa*

Status: An uncommon Bornean endemic. *Localities*: Kinabalu, Muruk Miau, Rinangisan, and Trus Madi. *Elevation*: Kinabalu 1,000–2,900 m, Trus Madi 1,400–2,400 m, Crocker Range 1,200 m; mainly a higher-elevation bird. *Habitats*: 1° forest and forest edge. Whitehead (Sharpe 1889d; Whitehead 1983) saw them in groups of four to five in low bamboo growth. *Breeding*: Specimens with enlarged sexual organs were collected at Rinangisan on 24 Mar. (testes 6 × 4 mm), 31 Mar. (ovary 7 × 3 mm), and 4 Apr. 1983 (testes 4 × 2 mm). A fledgling retaining some downy plumage was netted in a family group at Rinangisan on Mar. 19 and other young fledglings were captured on 31 Mar. 1983. Phillipps (1986) reported a nest on 12 July in a mossy bank near Silam trail (Kinabalu) containing one reddish-beige egg with brown blotches. *Voice*: A churring note uttered at infrequent intervals (WFVZ). Up and down whistling calls (DMB). *Food*: Caterpillars. *Remarks*: Occurs in family groups during the breeding season (WFVZ).

Eyebrowed Wren Babbler *Napothera epilepidota*

Status: A scarce resident. *Localities*: Bukit Ibul, Danum, Kinabalu, Magdalena, Malangkap, Maliau, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kin-

abalu 950–1,500 m, Trus Madi 1,600 m, Crocker Range 1,200–1,500 m, Danum and Maliau ca. 700 m. *Habitats*: 1°, coniferous, and damp gallery forest.

Striped Tit Babbler *Macronous gularis*

Status: An abundant resident; one of the commonest birds in Borneo. *Localities*: Banggi Island, Batu Punggul, Batu Putih, Benkoka, Benoni, Binsulok, Bole River, Danum, Gomantong, Kabayau, Kaingaran, Keningau, Kinabalu (lower slopes), Kinarut, Klias River, Kota Kinabalu and suburbs, Kudat, Kulamba, Labuan, Lumaku, Lumbidan, Makaniton, Malangkap, Malawali Island, Maliau, Mandahan, Membakut Beach, Menggalong, Merintaman, Padas Damit, Papar, Poring, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Silam Plantation, Sinsuran Road, Tabin, Tawau Hills, and Tempasuk. *Elevation*: Sea level to 1,200 m. *Habitats*: Riparian, swamp, logged dipterocarp, and coastal heath forest; mangroves and virtually all varieties of 2° scrub including forest edge, roadside, garden, freshwater marsh edge, river edge, and beach strand. Recorded at Danum and Bole River in logged forest only (Lambert 1990c). *Breeding*: Whitehead (Sharpe 1889d; Whitehead 1893) found nests from Jan. to Mar. on the lower slopes of Kinabalu. V. W. Ryves collected seven clutches of two eggs and one of three: Kaung on 11 February 1939; Kiau on 23 Feb., and 7, 25, 27, 28, and 31 Mar. 1939; and Sandakan Estate on 15 June 1938. The eggs were white with reddish speckles, and their average size was 18 × 14 mm (Gibson-Hill 1949b). DMB found nests at Mawau in Aug. and Nov. with eggs and in Nov.–Jan. with young. WFVZ found nests on 3 May 1982 in 5-yr-old *Albizia* at Sabah Softwoods and on 10 May in logged forest scrub at Brumas. The nests were rough tangles of lalang grass and dried leaves and were placed either in thick grass or scrubby vegetation ca. 1 m off the ground. They were domed, ca. 12–15 cm in diameter, with an oval entrance 3 × 7 cm, and were lined with a few sprigs of thin grass. Each nest had two eggs, and these were colored white with rufous spots, which became more concentrated at the thick end. They measured 17.9 × 13.2 mm, 17.9 × 13.4 mm; and 18.3 × 14.3 mm, 18.0 × 14.3 mm. A female with a hard oviduct egg was collected at Kinarut on 30 Jan. 1983. Specimens with enlarged testes were collected at Kinarut on 30 Jan. 1983 (5 × 3 mm), Saliwangan on 23 Feb. (7 × 6 mm) and 2 Mar. 1983 (7 × 4.5 mm), Bole River on 22 Mar. 1983 (6 × 4 mm); Padas Damit on 29 May 1983 (6 × 5 mm), and Sabah Softwoods on 17 June 1982 (6 × 5 mm). *Voice*: Whitehead (Sharpe 1889d; Whitehead 1893) described the song as *chou chou bickier buckier*. The common call is *chunk, chunk, chunk . . .*, and the song is three-note whistle with a short, lower-pitched, second note (WFVZ). *Food*: Ants, termites, and spiders (DMB). *Identification*: This bird is browner and more streaked than depicted in King et al. (1975).

Fluffy-backed Tit Babbler *Macronous ptilosus*

Status: A common resident. *Localities*: Benkoka, Bettotan, Bole River, Brumas, Busit, Danum, Ensuan, Garinono, Kabayau, Kalabakan, Klias, Kulamba, Labau River, Labuk Road, Lamag, Lumbidan, Maang, Maliau, Megatai, Meliau, Membakut, Menggalong, Padas Damit, Poring, Rayoh, Sabah Softwoods, Saliwangan, Sepilok, Sepulut, Silam Plantation, Tabin, Tawau Hills, Telupid, Tempasuk, and Ulu Tiulon. *Elevation*: Sea level to 550 m. *Habitats*: 1°, 2°, logged, and swamp forest; overgrown rubber, *Albizia*, *Eucalyptus*, and bamboo-sapling thickets. Main-

ly an inhabitant of 2° growth. *Breeding*: Whitehead (Sharpe 1889d; Whitehead 1893) found a nest on 17 Jan. (site and year unspecified, but somewhere between the coast and Malangkap). He described it as a small, loosely constructed, ball of dead leaves, lined with fine roots. The entrance is "somewhat hidden with fresh green moss stuck in the nest." It contained three glossy white eggs. DMB found nests at Kimanis between Nov. and May and elsewhere in the Kimanis bay area in Dec., Jan., and Apr. The nests were loose balls of grasses and bamboo leaves, lined with finer material, and placed ca. 1 m up in a tangle of vegetation. Two eggs (averaging 18 × 14.2 mm) were laid, and these varied from off-white to pinkish or grayish, speckled and blotched with rusty red or brown, chiefly at the larger end. Specimens with enlarged sexual organs were collected at Bole River on 9 Apr. 1982 (ruptured ovarian follicles), and Sabah Softwoods on 21 June (ruptured ovarian follicles) and 21 July 1982 (largest ovum 15 × 11 mm). *Voice*: Call *gertcha*. The song is long and liquid, preceded by *geeyok*, *khoo khoo khoo* (DMB); *craa-dit*, *craa-dit* and *cazz-a-cazz*, *cazz*, *chit-a-wok*, *cazz-cazz-cazz* (Norman 1964). The alarm note is a harsh *ker*. In some instances it calls with a typically *Stachyris*-sounding *poop-poop* (pause) *poop-poop* (WFVZ). *Food*: Beetles. *Remarks*: Average foraging height 4 m in 1° forest, 2 m in logged forest (Lambert 1990c).

Gray-throated Babbler *Stachyris nigriceps*

Status: A common resident. *Localities*: Anginon, Danum, Kaingaran, Kinabalu, Lumaku, Lotung, Malangkap, Poring, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu, generally 950–2,200 m, but birds banded at 3,300 m in 1964 (McClure and Leelavit 1972); Crocker Range 1,000–1,700 m; Trus Madi 750–2,200 m; Mt. Danum and Mt. Lotung above ca. 1,000 m. *Habitats*: 1° and 2° forest. *Breeding*: V. W. Ryves collected two clutches of two eggs, six of three, and one of five at Kiau from 6 to 29 Mar. 1939. The eggs were smooth, slightly glossy, and white in color, with an average size of 19.8 × 14.9 mm. WFVZ found a nest on 3 Apr. 1983 at Rinangisan on a ca. 45° NW-facing slope 50 m above a small stream in particularly wet forest. The nest was domed and attached to roots and small plant stems. Live ferns were drawn in and attached to provide additional support and camouflage. The outermost construction material was dried leaves, whereas the interior tunnel was woven from rootlets and grasses. This tunnel was 7.5 cm high, 5.5 cm wide, 7 cm deep, and ended with an egg cup 4 cm deep. It held three white eggs containing small embryos. Goodman (1989) observed a gray leaf monkey (*Presbytis hosei*) depredate a nest near Kinabalu Park Headquarters on 8 Apr. 1988. The nest contained at least two eggs and perhaps one small hatchling. Specimens with enlarged sexual organs were collected at Anginon on 18–20 Dec. 1962 (testes 7 × 5 mm, 6 × 3 mm, 9 × 5 mm, 6.4 mm, 7 × 5 mm, female with an old brood patch); Rinangisan on 19 Mar. 1983 (testes 5 × 8 mm, 7 × 4 mm); Kaingaran on 6 and 7 July 1983 (testes 7 × 4 mm, oviduct egg 18 × 13 mm); Sinsuran Road on 2 Dec. 1981 (testes 8 mm), and 30 Jan. (testes 8 mm) and 14 Feb. 1977 (testes 7 mm); and Trus Madi 3–8 Aug. 1999 (testes 8 × 5 mm, 9 × 5 mm). *Voice*: The most common song is a descending trill. It also gives a *zee-zee-zee-zee* contact call, and also a high-pitched rapid trill starting with some introductory notes: *tsut-trrrrrr* This call sounds like a high thin whistle from a distance (WFVZ). *Remarks*: MCT (Thompson 1966)

identified the subspecies from Anginon as *hartleyi*, not previously known in Sabah.

Gray-headed Babbler *Stachyris poliocephala*

Status: A resident that is commonly netted, but less commonly observed. *Localities:* Batu Punggul, Baturong, Bettotan, Bole River, Brumas, Danum, Garinono, Gomantong, Imbak River, Kabayau, Kalabakan, Labau River, Maang, Magdalena, Makaniton, Malangkap, Maliau, Megatai, Poring, Quoin Hill, Sabah Softwoods, Saliwangan, Sepilok, Silam Plantation, Simatuoh, Tabin, Tambuyukon, Tawau Hills, Ulu Membakut, and Ulu Tiulon. *Elevation:* Sea level to 1,200 m. It may be more frequent in upland than in very low elevation forest. *Habitats:* 1°, 2°, logged, and upland heath forest; bamboo-sapling thickets, overgrown rubber, and older *Albizia*. *Breeding:* Specimens with enlarged sexual organs were collected at Brumas on 17 June 1982 (oviduct egg, ruptured ovarian follicles), and Megatai on 22 June 1983 (largest ovum 6 × 6 mm).

Black-throated Babbler *Stachyris nigricollis*

Status: A locally common resident. *Localities:* Baturong, Bettotan, Binsulok, Bole River, Garinono, Lumbidan, Maliau, Melalap, Menggalong, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Silam Plantation, Simatuoh, Tabin, Ulu Dusun, and Ulu Samuran. *Elevation:* Sea level to 600 m. *Habitats:* 1° forest edge, 2° and logged forest, peatswamp, mangrove edges, oil-palm plantation scrub, and *Albizia*. This is not a 1° forest species, but prefers edges and transitional habitats, particularly of wet areas and streams. *Breeding:* Specimens with enlarged sexual organs were collected at Bole River on 9 Apr. 1982 (oviduct egg 15 × 15 mm, brood patch), Sabah Softwoods on 20 June 1982 (testes 7 × 5 mm), and Sepilok on 29 July 1983 (testes 8 × 5 mm). A fledgling was captured at Sabah Softwoods on 2 June 1983. *Voice:* *poop-poop-poop* . . . repeated many times, occasionally preceded by an upward slurred note. *Food:* Beetles.

White-necked Babbler *Stachyris leucotis*

Status: A scarce resident. *Localities:* Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Garinono, Imbak River, Magdalena, Sepilok, Sook, and Ulu Tiulon. *Elevation:* Sea level to 1,000 m. *Habitats:* 1° forest. It is found both along streams and on dry ridges. Johns (unpubl.) found it present in 6-yr-old logged forest that was not adjacent to 1° forest. *Breeding:* A specimen with enlarged testes (4 × 2 mm) was collected at Brumas on 20 May 1983 and another with testes 4 × 2 mm was collected at Crocker Range Park Headquarters on 9 June 1999. *Remarks:* A rather mysterious species that occurs at very low density. WFVZ never observed it, but netted it at very low frequency. RGM found it to be sympatric with Gray-throated Babbler on ridges at 1,000 m near the Crocker Range Park Headquarters.

Chestnut-rumped Babbler *Stachyris maculata*

Status: A common resident. *Localities:* Benkoka, Bettotan, Bole River, Brumas, Danum, Garinono, Imbak River, Kabayau, Kalabakan, Labau River, Lumbidan, Magdalena, Makaniton, Maliau, Menggalong, Mokudan, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sebatik Island, Sepilok, Tabin, Tawau Hills, Telupid, Ulu Dusun, Ulu Membakut, and Ulu Tiulon. *Elevation:* Sea

level to 550 m. *Habitats*: 1°, 2° (both wet and dry subhabitats), logged, upland heath, and coastal peat swamp forest; older *Albizia* stands. Common in 1° dipterocarp forest, but less so in upland heath, 2° growth, and *Albizia*. *Breeding*: Specimens with enlarged testes were collected at Bole River 20 and 22 Feb. 1982 (9 × 6 mm), 18 May (10 × 5 mm) and 7 June 1982 (9 × 6 mm), and Sabah Softwoods on 3 July 1982 (8.5 × 5.5 mm). MCT collected a female with an enlarged brood patch at Quoin Hill on 10 July 1962. *Voice*: Repeats a *who-up* call in which the second note rises in pitch, then stops abruptly. Norman (1964) described it as a mellow *whop, whop, whop-a-whop, whop-a-whop* and *walop, walop, walop*. *Food*: Spiders, beetles. *Remarks*: This species often congregates in loud groups. It forages by probing bark, attracting other species that seem to benefit from the insects it flushes, especially from tree trunks. When calling, it puffs out its throat, exposing blue skin patches.

Chestnut-winged Babbler *Stachyris erythroptera*

Status: A common resident. *Localities*: Anginon, Banggi Island, Batu Punggul, Benkoka, Bettotan, Binsulok, Bole River, Brumas, Danum, Ensuan, Gomantong, Imbak River, Kabayau, Kalabakan, Kudat, Labau River, Lumbidan, Maang, Maliau, Megatai, Menggalong, Poring, Quoin Hill, Sabah Softwoods, Saliwangan, Samawang, Sebatik Island, Segarong, Sepilok, Sepulut, Silam, Tabin, Tawau Hills, Telupid, Ulu Dusun, and Ulu Tiulon. *Elevation*: Sea level to 1,000 m (on Mt. Danum). *Habitats*: 1°, 2°, upland heath (uncommon), logged, and coastal-peat-swamp forest (common); mangrove edges, bamboo thickets, field edges, *Eucalyptus*, *Gmelina*, and *Albizia*. *Breeding*: Nest building was observed twice by WFVZ, once in two small, adjacent trees about 2 m from the ground in 1° forest at Ulu Tiulon on 9 Oct. 1981, and again ca. 4 m up in a *Macaranga* tree in Sabah Softwoods' 5-yr-old *Albizia* on 2 June 1982. In both instances, more than two birds were involved in nest building and the nest was not completed. R. Stuebing (pers. comm.) also noticed communal nesting behavior. The Ulu Tiulon nest was comprised of lacy dead leaves woven with leaf stems and caulked with moss. It was domed, ca. 18 cm high, with a side entrance. *Voice*: They give a variety of *poop* sounds, sometimes described as *hoo* (DMB) or *huh* or *ho* (Norman 1964), which are similar to Rufous-fronted Babbler, but lower in pitch and easily mimicked. *Food*: Plant bugs, small locustids, and many other insects (DMB). *Remarks*: We observed courting birds at Saliwangan on 21 Apr. 1981. The birds sat ca. 0.5 m apart on branches ca. 3 m off the ground; they pointed their bills upwards, displayed bright blue throat patches, and uttered a long series of soft *Stachyris* *poops*.

Rufous-fronted Babbler *Stachyris rufifrons*

Status: An uncommon resident. It is not rare or submontane in distribution in Sabah, as indicated in Smythies (1981). He may have been led to that conclusion because there were so few specimens in his day (none in the Sarawak or Raffles Museum collections). *Localities*: Bole River, Brumas, Gomantong, Imbak River, Kalabakan, Labau River, Maliau, Megatai, Poring, Quoin Hill, Sabah Softwoods, Sepilok, Silam Plantation, Sinsuran Road, and Trus Madi. *Elevation*: Sea level to 1,500 m. *Habitats*: 1°, 2°, and logged forest; bamboo-sapling thickets left by shifting agriculture, *Albizia*, upland heath, and stunted growth on limestone soil (e.g., Gomantong). *Breeding*: WFVZ observed a pair building a nest in a *Ma-*

caranga tree in old scrub surrounding Silam Plantation on 6–7 Apr. 1982. The nest was placed ca. 4 m above the ground in a sapling at the end of a branch where a trifurcation provided support, and it was composed of broad leaves lashed with ca. 20-cm strands of lalang grass. Its dimensions were large for such a small bird, approximately 20 × 15 cm. The entrance was on the side. Unfortunately, when we returned later to check for eggs, the tree had been cut down. Specimens with enlarged testes were collected at Silam Plantation on 22 Feb. 1982 (6 × 4 mm), Bole River on 1 and 9 Mar. 1982 (5 × 3 mm, 8 × 6 mm), Brumas on 9 May 1982 (8 × 5 mm), Sabah Softwoods on 20 and 22 June 1982 (6 × 4 mm, 6 × 5 mm, 7 × 5 mm), Megatai on 21 June 1983 (7 × 4 mm), Imbak River on 16 July 1982 (6 × 5 mm), and Trus Madi on 5 Aug. 1999 (testes 6 × 4 mm). *Voice*: The voice is similar to that of Chestnut-winged Babbler, but higher. The typical cadence is a long *poop* followed by a rapid succession of short *poops* on the same pitch. *Remarks*: This is a warbler-like babbler that flits from leaf to leaf and stays higher in trees than other *Stachyris* species. It is often found in mixed flocks.

Black Laughingthrush *Garrulax lugubris*

Status: An uncommon resident. This species is much less common than the other two laughingthrushes, but like the others it is often in loud, mixed flocks. *Localities*: Kaingaran, Kinabalu, Lumaku, Maliau, Rinangisan, Sayap, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 1,000–1,600 m, Trus Madi 800–1,600 m, Crocker Range 1,100–1,400 m. *Habitats*: 1° and 2° forest. *Voice*: One call is a hoot followed by two notes, the first higher in pitch than the second, or hoots and ringing whistles. The variety of hoot-whistle combinations is well described in Smythies (1959, 1981). They also have nasal contact calls. *Food*: Cicadas and “insects.” *Remarks*: Immature birds have feathered crowns.

Sunda Laughingthrush *Garrulax palliatus*

Status: A common resident. This species seems to be more common than the Black Laughingthrush, but less so than the Chestnut-capped Laughingthrush. *Localities*: Kaingaran, Kalabakan, Kinabalu, Lumaku, Malangkap, Maliau, Rinangisan, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation*: Kinabalu 1,000–1,900 m, Trus Madi 800–1,500 m, Crocker Range 1,100–1,500 m. Norman (1964) observed one on a 300-m ridge in the Kalabakan Forest Reserve. *Habitats*: 1° and 2° forest. *Breeding*: Specimens with enlarged testes were collected along Sinsuran Road on 21 Dec. 1981 (12 mm) and at Rinangisan on 25 Mar. 1983 (10 × 6 mm). *Voice*: Flocking birds call to one another with a single, clear, easily copied, descending whistle. After doing so, they usually join together in a raucous bubbling, tumbling, chorus. *Food*: It often joins other species in the morning to hunt moths attracted to lights at Kinabalu Park. It generally forages lower than Chestnut-capped Laughingthrushes, often on the ground, rarely in the canopy.

Chestnut-capped Laughingthrush *Garrulax mitratus*

Status: A common resident. *Localities*: Kaingaran, Kinabalu, Lotung, Lumaku, Malangkap, Muruk Miau, Rinangisan, Sayap, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation*: Kinabalu 800–3,500 m, Trus Madi 600–2,250 m, Crocker Range 1,000–1,800 m. Whitehead (Sharpe 1889d; Whitehead 1893) remarked that this bird is most common in overgrown hill-rice clearings at 700–1,000 ft. (200–

300 m), but this seems a bit low. *Habitats*: 1° and 2° forest. *Breeding*: Whitehead (Sharpe 1889d; Whitehead 1893) found a nest on 17 Mar. (year and locality unspecified). It was built in a long tangled mass of creepers ca. 10 m above the ground and was composed of dead leaves and roots. It contained one bright greenish-blue egg. V. W. Ryves collected four clutches of two eggs and a single egg at Kiau on 16 and 18 Feb. and 2, 20, and 28 Mar. 1939 (average size 26.6 × 19.8 mm). The eggs were smooth, glossy, and pale blue (Gibson-Hill 1949b). A specimen with enlarged testes was collected along Sinsuran Road on 11 Feb. 1977 (12 mm) and at Rinangisan on 7 Mar. 1983 (11 × 6 mm). *Voice*: It often calls *ri'-ri'-ri'* . . . or *to-we-oh, to-we-oh, ri'-ri'-ri'* *Food*: Fruit. *Remarks*: Although pairs of this species were observed during the breeding season (Mar. at Rinangisan), pairs of the other two laughingthrush species were never observed. The other laughingthrushes always occurred in groups. Moreover, Black and Sunda laughingthrushes responded as groups to recordings, but Chestnut-capped Laughingthrushes always responded singly or in pairs. This pattern suggests the possibility of group territories for the other two laughingthrush species and pair territories for Chestnut-capped Laughingthrush.

White-browed Shrike Babbler *Pteruthius flaviscapris*

Status: An uncommon resident. *Localities*: Kinabalu, Lumaku, Lotung, Malangkap, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 1,200–3,100 m, Trus Madi 750–2,200 m, Crocker Range 1,150 m. *Habitats*: 1° and 2° forest. On Mt. Lumaku, this species was found in large mixed flocks in 2° growth left by logging. Whitehead (1893) observed it in low weather-beaten trees in small parties. *Breeding*: Specimens with enlarged testes were collected at Rinangisan on 20, 25, 28, and 29 Mar. 1983 (8 × 5 mm, 7 × 5 mm, 8 × 4 mm, 7 × 5 mm). *Voice*: *Doo-du-dit-du-dit* or *doo-dit-du-dit-du*, with a long first note, shorter *du* notes, and very short and higher-pitched *dit* notes. The *dit-du* sequence might be interpreted as *teacher*. The song is repeated over and over. *Food*: Insects and beetles.

Brown Fulvetta *Alcippe brunneicauda*

Status: A common resident. *Localities*: Anginon, Batu Punggul, Benkoka, Betotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Imbak River, Kaingaran, Kalabakan, Kinabalu (lower slopes), Labau River, Magdalena, Makaniton, Maliau, Megatai, Meliau, Poring, Quoin Hill, Sabah Softwoods, Saliwangan, Sepilok, Silam Plantation, Sinsuran Road, Tabin, Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m. *Habitats*: 1° and logged forest (less common in logged forest), older stands of 2° growth, overgrown rubber, and *Albizia*. *Breeding*: Specimens with enlarged sexual organs were collected at Brumas on 15 May (testes 7 × 5 mm, 8 × 4 mm) and 11 June 1982 (largest ovum 8 mm, brood patch), Sabah Softwoods on 30 June 1982 (testes 7 × 3 mm), and Imbak River on 21 July 1982 (testes 7 × 4 mm). *Voice*: Its song is one of the commonest sounds of Sabah's forests. It is an up-and-down series of notes, *do-di-do-di-do-dee-do*, with a hard accent on the penultimate (high) note.

Chestnut-crested Yuhina *Yuhina everetti*

Status: A common Bornean endemic. *Localities*: Anginon, Danum, Kaingaran, Kinabalu, Lotung, Lumaku, Malangkap, Megatai, Muruk Miao, Poring, Rinangisan,

Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation*: Kinabalu 550–2,600 m, Tambuyukon 550–1,675 m, Trus Madi 750–2,100 m, Crocker Range 550–1,800 m. *Habitats*: 1° 2°, and heath (Lotung) forest. *Breeding*: V. W. Ryves collected six clutches of two eggs, three of three, one of four, three of five, two of six, and four of one at Kiau between 17 Feb. and 31 Mar. 1939. The eggs (average size 18.2×14 mm) were smooth, slightly glossy, and white in color, with light purplish gray, brown, or reddish brown spotting, usually denser at the wide end. Whitehead (Sharpe 1889c; Whitehead 1893) described the nest as occurring in small holes in river banks and at similar sites. The nest is composed of moss and lined with fine roots. Phillipps (1970:143) reported “. . . nests with clutches of two and three found in late Feb. and early Jan. 5500 feet [1,676 m].” WFFVZ found a nest with three chicks less than a week old near Kinabalu Park Headquarters on 25 May 1981. It consisted of a mossy hole formed by some roots exposed on a trail embankment. The hole was ca. 12 cm in diameter and 20 cm deep. It led to a 7×7 -cm nest cup, tightly woven from lichens. WFFVZ observed a fledgling being fed by its parents at Poring on 12 Jan. 1983 and birds carrying nesting material along Sinsuran Road on 23 Nov. 1982. RGM observed copulation at Kinabalu Park (1,700 m) on 22 July 1998. Specimens with enlarged testes were collected at Rinangisan on 26 June 1983 (6×3 mm); and along Sinsuran Road on 31 Jan. (6 mm, 5 mm), 8, 9, and 13 Feb. 1977 (5 mm, 6 mm, 5 mm), and 12 Nov. 1982 (8×4 mm). *Remarks*: Groups of 10–20 birds are often seen sweeping through the canopy, and also on roadsides apparently eating grass seeds (or glean-ing insects). Often they attract warblers, white-eyes, fantails, whistlers, and others, which feed on the insects they flush.

White-bellied Yuhina *Yuhina zantholeuca*

Status: A common resident. *Localities*: Anginon, Bole River, Brumas, Danum, Imbak River, Kabayau, Kaingaran, Kalabakan, Kinabalu, Labau River, Lumbidan, Maang, Magdalena, Malankap, Maliau, Megatai, Poring, Quoin Hill, Rinangisan, Samawang, Sepilok, Tabin, Tambuyukon, Trus Madi, and Ulu Tiulon. *Elevation*: Sea level to 1,700 m (Kinabalu and Trus Madi). *Habitats*: 1°, 2°, upland heath, and logged forest; overgrown rubber. *Breeding*: Specimens with enlarged sexual organs were collected at Maang on 18 Jan. 1983 (testes 7×5 mm), Bole River on 18 Feb. (enlarged oviduct) and 6 Mar. 1982 (testes 6×5 mm, 6×3 mm), Rinangisan on 1 Apr. 1983 (testes 8×5 mm), Brumas on 15 May 1982 (testes 8×5 mm), Labau River on 29 Oct. 1982 (testes 8×5 mm), and Anginon on 23 Dec. 1962 (testes 7×4 mm). *Voice*: A variety of calls and songs have been described. These include a soft rapid series of four rising notes, *che-che-che-che*, and nasal buzzing, churring, and beeping calls. *Food*: Caterpillars.

Family PARDALOTIDAE

GERYGONES

Golden-bellied Gerygone *Gerygone sulphurea*

Status: A common resident, inconspicuous but regularly encountered once its song is learned. *Localities*: Bole River, Danum, Kaingaran, Kimanis, Kinabalu (lower slopes), Lumaku, Maiga Island, Maliau, Megatai, Pandanan Island, Saliwangan, Segarong, Selakan Island, Sepilok, Sibuan Island, Sinsuran Road, Sipadan Island, Sungai Labau, Tabin, Ulu Segama, and Ulu Tiulon. WFFVZ would

have recorded it in more localities had we learned its song earlier. The same may be true of other collectors, because there are few specimens from Sabah in any museums. *Elevation*: Sea level to 1,450 m (Sinsuran Road). *Habitats*: 1°, 2°, highland kerangas, and coniferous forest; mangrove, old rubber, and beach strand. *Breeding*: A specimen collected on Miaga Island on 16 Aug. 1983 had testes 4 × 4 mm. *Voice*: The song is reminiscent of *Malacopteron* babblers, but somewhat off key and with a buzzy quality.

Family SYLVIIDAE

WARBLERS

Bornean Stubtail *Urosphena whiteheadi*

Status: An uncommon Bornean endemic. *Localities*: Anginon, Kinabalu, Lumaku, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Crocker Range 1,200–1,700 m, Kinabalu 1,000–3,150 m, Trus Madi 750–1,700. *Habitats*: 1° and 2° forest. It occurs in 2° roadside and shifting-agricultural vegetation, as well as darker ravines in 1° forest. *Breeding*: Phillipps (Phillipps 1986; Jenkins et al. 1996) described a nest found in April 1982 to be of reddish fibers, 5 cm across and 6 cm off of the ground, in a mossy bank along a trail. The two eggs were pink with darker spots. *Voice*: A soft insectlike *tsit-tsit-tsee*, uttered on one very high-pitched note every few seconds (F. Rosendaal, CMF). King (1989) provided a sonogram of the song. *Remarks*: Whitehead (1893) stated that it creeps in the undergrowth “like a mouse.”

Sunda Bush Warbler *Cettia vulcania*

Status: A common resident. *Localities*: Kinabalu, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 1,450–3,700 m, Trus Madi 1,500–2,300, Crocker Range 1,450–1,800. *Habitats*: Principally scrubby 1° and 2° higher montane forest, including thick bamboo tangles and myrtaceous–ericaceous scrub on the summit of Trus Madi. *Breeding*: RGM found a nest (without eggs) at 1,650 m on Kinabalu on 20 July 1998. It consisted of dead grasses woven into live ones. WFVZ observed copulating birds on 26 May 1981 at Mt. Kinabalu. Specimens with enlarged sexual organs were collected on Kinabalu by T. Harrison (SMC specimens) on 6 Feb. 1952 (egg-sized ovum, testes 10 × 4 mm), and by WFVZ on Trus Madi on 6 July 1983 (testes 5 × 3 mm). *Voice*: Two versions of the same slow, slurred, weezy, ventriloquial call. The first simply rises and falls, one time. The second is the version described by Smythies (1981) as *witch-a-wee-cheee-wee*. This rises and falls two times, starting with the up and down wheeze of the first call, but quickly rising again to a higher, sharper pitch (*cheee*) before fading down again. Wells (1982d) used the voice to unite the Bornean *Cettia* subspecies (*banksi* and *oreophila*) with *C. vulcania* of Java and Bali in a single species, *C. vulcania*. *Remarks*: As scrub-dwelling birds, Sunda Bush Warblers seem to have become more common recently at lower elevation as a result of road development (Q. Phillipps).

Friendly Bush Warbler *Bradypterus accentor*

Status: An uncommon Sabah endemic, occurring only on the highest mountains. *Localities*: Kinabalu, Tambuyukon (Q. Phillipps 1982), and Trus Madi. *Elevation*: Kinabalu 1,800 m (a sighting by T. Harrison in Fogden 1965) to 3,800 m, Trus Madi 2,200–2,350 m, Tambuyukon 1,825–2,250 m. *Habitats*: High mon-

tane forest and scrub. On Trus Madi they are found in dense climbing bamboos. On Kinabalu they occur in a variety of habitats including leptospermum forest, scrub along the "new road" just below the power station (Fogden 1965), and crevices in the bare summit rockface (T. Harrisson, SMC specimen label). On Tambuyukon they were encountered in ultrabasic forest (Q. Phillipps 1982). *Voice*: A high-pitched call of four notes, three short and one longer. Trus Madi birds gave a variety of calls, some of which were nearly identical to those of Kinabalu birds (CMF). Harrap (1994) described the vocalizations as "... a high pitched phrase, reeling or buzzing, and on one pitch, comprised of two short units and a longer and harsher, buzzing terminal unit." *Remarks*: Because WFVZ spent only 1 day at 2,200 m on Trus Madi, our observations were limited. Many individuals were calling, but were difficult to see because of the thick vegetation, and they did not respond to tape recording playback (Sheldon and Francis 1985).

Yellow-bellied Prinia *Prinia flaviventris*

Status: A common resident. *Localities*: Batu Putih, Benoni, Bettotan, Binsulok, Bole River, Kabayau, Kaingaran, Keningau, Kinabalu, Kinarut, Kota Kinabalu, Kulamba, Labuan, Lahad Datu, Lumbidan, Maliau, Megatai, Mendolong, Merutai, Padas Damit, Poring, Rayoh, Sabah Softwoods, Saliwangan, Sebatik Island, Segarong, Sepilok, Sinsuran Road, Tabin, Tambunan, Tawau Hills, Tempasuk, and others. *Elevation*: Sea level to 1,550 m. *Habitats*: Grassy fields and road edges, low scrub, freshwater marshes, plantation scrub, and gardens. As quick colonizers, prinias are found deep in the interior of Sabah along roads and rivers. *Breeding*: Whitehead (Sharpe 1889c; Whitehead 1893) found a nest on Labuan in mid-May containing "three bright terracotta red" eggs, which were somewhat deeper in color at the large end. DMB found nests in the Kimanis Bay area in Jan., Apr.–May, July, and Aug. The nest is normally a domed structure composed entirely of grasses placed in ground vegetation, bracken, creeper covered tree stumps, and so on. A nest found in bracken at Klias had a lining of fibrous roots and was "decorated" on the outside with cobwebs and the empty, bright yellow cocoons of ermine-type moths. Usually there are two, sometimes three, brick-red eggs, ca. 16.5×13.2 mm. WFVZ found a nest with three eggs at Sabah Softwoods on 20 June 1982. It was oval (12 cm high, 8 cm wide, and with a 4-cm side opening) and attached to twigs and grasses at ca. 0.5 m above the ground in roadside scrub. The eggs were brownish red in color, 16×12.5 mm. *Voice*: A ubiquitous mewing call. DMB describe it as *cheeyup*, and the song as variations on *chee-syup cheep*, *chee-syup*, *cheeaddle cheeaddle* . . . Its short flights are often punctuated with a distinct *brrrt brrrt*. This species often sings from exposed perches (e.g., electric wires). Its peculiar wing-snapping noise helps in identification when it is skulking.

Rusty-rumped Warbler *Locustella certhiola*

Status: An uncommon migrant. *Localities*: Ambang, Kimanis, Lumbidan, Papar, Rinangisan, Selangan Island, and Tempasuk. DMB (Batchelor 1960) banded at least one individual at Kimanis Estate in Nov. 1958. The Sabah Museum banded 22 birds at Papar in 1970 (McClure and Leelavit 1972), but no dates are given. They also banded two birds at Kampung Ambang in 1970. *Elevation*: Generally sea level, but collected on migration at 1,300 m (Rinangisan). *Habitats*: Freshwater marsh reeds, fallow padi, drainage ditches, and (on migration) over montane forest. *Migration dates*: WFVZ recorded this species as early as 2 Oct. 1981

(Tempasuk) and as late as 2 May 1983 (Papar). *Remarks:* The Rinangisan specimen was attracted to a light at midnight as it flew on migration. It and the bird collected on 2 May 1983 were heavy with fat.

Middendorff's Warbler *Locustella ochotensis*

Status: A rare migrant. *Localities:* Lumbidan (Sharpe 1879c), Malangkap (Sharpe 1889c), Papar, and Sepilok. WFVZ's only record was a bird netted in a marshy area along the entrance road to Sepilok on 19 Dec. 1982. DMB caught several in the padi fields at Benoni, Papar. *Elevation:* Sea level to 300 m. *Migration dates:* DMB reported birds from 6 Oct. to 2 Apr. *Identification:* Relative to the other two *Locustella* warblers, Middendorff's Warbler is larger, has narrow white tips to the inner webs of its outer four or five tail feathers, is unstreaked below, and is almost unstreaked on its upperparts (CMF).

Lanceolated Warbler *Locustella lanceolata*

Status: A rarely recorded migrant. *Localities:* Kimanis, Labuan (Everett 1890a), Mandahan, Membakut Beach, and Papar. WFVZ's only record is a bird collected in a thicket on a grassy (not marshy) plain adjacent to Membakut Beach on 26 Jan. 1983. DMB caught and banded two, one near Papar Beach and one near Membakut (Smythies 1981). He also observed them at Mandahan (near Membakut) and Kimanis in March. *Habitats:* Open coastal grasslands, fallow padi, swampy margins of the railway line, and wet areas in immature rubber. *Identification:* The Lanceolated Warbler is much smaller than the other two *Locustella* warblers, heavily streaked above, finely streaked below, and has no obvious white in the tail (CMF).

Oriental Reed Warbler *Acrocephalus orientalis*

Status: A common migrant. *Localities:* Kota Kinabalu and suburbs, Labuan, Lahad Datu, Lumbidan, Papar, Padas Damit, Putatan, Sipadan Island, Tembungo, Tempasuk, and Tenom. *Elevation:* Sea level to 200 m. *Habitats:* Fallow fields, freshwater marshes, and stream and padi edges. *Migration dates:* DMS (Simpson 1982a) observed them at the Tembungo oil platform from 29 Sept. to 30 Oct. 1981. DMB recorded them in the Kimanis Bay area from 6 Oct. to 14 Apr. WFVZ's latest date was 24 May 1983 at Putatan. *Voice:* The call is a loud *chik* or *tchak*, uttered as a scolding note from thickets (DMB). *Food:* Caterpillars, small locustids, neuropterans, and small dragonflies (DMB).

Striated Grassbird *Megalurus palustris*

Status: An uncommon resident, local but increasing in distribution. *Localities:* Beaufort, Kota Kinabalu, 5 km S of Kudat, Lahad Datu airport, and Tempasuk. *Elevation:* Sea level. *Habitats:* Grassy areas and associated electric wires and fences. In all areas with reeds and tall grasses on Tempasuk Plain (B&W). *Breeding:* Specimens with enlarged testes were collected at Lahad Datu on 19 Aug. (5 × 4 mm) and 21 Aug. 1983 (7 × 3 mm). *Voice:* A harsh *cha. . .cha. . .cha.cha.ch.ch.ch . . .* (Francis 1985a). *Identification:* A large warbler with thick black streaks on the back, a long tapered brownish-gray tail, faint light brown primaries and crown, and plain white underparts with a grayish band across the upper chest. *Remarks:* First discovered in Borneo by CMF at the Lahad Datu airport in Oct. 1982 (Francis 1985a), it has since been recorded at the other sites noted above. It is also known from Sarawak

and Brunei (C. Mann). The Sabah birds seem to be the race *forbesi* from the Philippines (Deignan 1946; Francis 1985a).

Arctic Warbler *Phylloscopus borealis*

Status: A common migrant. *Localities:* Anginon, Banggi Island, Bole River, Bongon, Danum, Kabayau, Keningau, Kimanis, Kinabalu (lower slopes), Labuan, Malangkap, Mawau, Megatai, Membakut Beach, Mumiang, Pulau Tiga, Rinangisan, Saliwangan, Segarong, Selintaan Island, Sepilok, Sinsuran Road, Sipadan Island, Tabin, Tanjung Aru, Tembungo, and Tempasuk. *Elevation:* Sea level to 1,700 m. *Habitats:* 1° and 2° forest and scrub, beach strand, heath forest, peat-swamp, older rubber, and dry upland scrub (Keningau). *Migration dates:* Early dates: DMS (Simpson 1982a) recorded ca. 1,200 individuals at the Tembungo oil platform from 1 Sept. to 19 Oct. 1981, including ca. 300 on the evening of 19 Sept. B&W found one in coastal scrub on Tempasuk Plain on 11 Sept. 1984. Lambert recorded them on Sipadan Island during 22–31 Oct. 1990. At Membakut beach WFVZ found none on 28 Sept. 1982, but 20–50 on 10 Oct. The Phillipps family recorded them in their garden at Tanjung Aru on 20 Sept. 1981. Late dates: On 13 Apr. 1983, WFVZ collected one at Rinangisan (1,300 m) that was attracted during migration to a night light at 23:00 hr. WFVZ's latest dates were 18–22 Apr. 1981 at Saliwangan. DMB found them in the Kimanis Bay region until 26 Apr. *Voice:* Calls include a hard *tzik* and a softer *tsi-ip* (DMB). Norman (1964) described their usual call as *dz-zit, dz-zit*. *Identification:* A large, slow-moving, streamlined warbler, which often poses like a nuthatch. It is plainer than other Bornean species, has a white superciliary line that is usually obvious, and wing bars that may or may not be conspicuous. Two WFVZ specimens have underparts that are quite yellow. *Remarks:* Arctic Warblers are the most common migrant in the interior of Sabah. They are often in mixed flocks with other warblers, flycatchers, and sunbirds.

Mountain Leaf Warbler *Phylloscopus trivirgatus*

Status: A common resident. *Localities:* Kinabalu, Lotung, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 1,500–3,350 m, Trus Madi 1,500–2,400 m, Crocker Range 1,150–1,800 m. *Habitats:* 1° and 2° forest and scrub. *Breeding:* Specimens with enlarged testes were collected at Rinangisan on 28 June 1983 (4 × 3 mm) and along Sinsuran Road on 17 Aug. 1982 (6 × 5 mm) and 12–14 Nov. 1982 (4 × 5 mm, 4 × 5 mm, 6 × 6 mm). DMB observed newly fledged young being fed small green caterpillars on 15 Nov. 1990. This species appears to be a brood host for Oriental Cuckoo (Moyle et al., 2001). *Voice:* The most melodious of the Bornean warblers, with a high-pitched thrushlike quality. Fogden (1965) described it as a low unmusical *tisiwi-tsuwiri-swit* and two longish *peet* notes followed by a short, sharp *pit-peet-peet-pit*. Smythies (1964a) described it as a *twit* note and a thin, high-pitched song. *Food:* Small caterpillars. *Remarks:* Commonly in mixed flocks with other warblers, fantails, whistlers, babblers, and sunbirds. Phillipps (1986) reported two races at Kinabalu Park Headquarters. The pale-headed race (*kinabaluensis*) is most common on Mt. Kinabalu.

Yellow-breasted Warbler *Seicercus montis*

Status: A common resident, the commonest warbler in most montane localities. *Localities:* Kinabalu, Lumaku, Malangkap, Rinangisan, Sinsuran Road, and Trus

Madi. *Elevation*: Kinabalu 1,050–2,450 m, Trus Madi 1,400–2,200 m, Crocker Range 1,150–1,800 m. Whitehead (Sharpe 1889b; Whitehead 1893) found it to be more plentiful at higher elevation. *Habitats*: 1° and 2° forest and scrub. *Breeding*: Specimens with enlarged sexual organs were collected at Rinangisan on 31 Mar. 1983 (testes 5 × 4 mm); Sinsuran Road on 6 Feb. 1977 (testes 4 mm), 16 Nov. 1982 (enlarged oviduct), and 1, 6, and 17 Dec. 1981 (testes 4 mm, 4 mm, 6 mm); and Trus Madi on 4 Aug. 1999 (testes 4 × 3 mm). *Voice*: A high-pitched seesawing buzz, *di-da-di-da-di-da*, given in about 1 s; it also commonly calls *gee*. *Remarks*: This species seems to be a brood host for Oriental Cuckoo (Moyle et al., 2001).

Yellow-bellied Warbler *Abroscopus superciliaris*

Status: A common resident. *Localities*: Anginan, Bole River, Crocker Range Park Headquarters, Danum, Ensuan, Kaingaran, Kinabalu, Lumaku, Lotung, Malangkap, Megatai, Papar, Poring, Rinangisan, Sinsuran Road, Tabin, Tambunan, Tambuyukon, and Trus Madi. *Elevation*: 200–1,800 m. The lowest records seem to be “in jungle” at Papar (Miyamoto 1971) and at Tabin and Bole River. *Habitats*: 1° and 2° forest and scrub, and logged forest. In the mountains it is often in bamboo. *Breeding*: V. W. Ryves collected a clutch of three eggs at Kiau on 29 Mar. 1939. The eggs (16.5 × 12 mm, two broken) were smooth, slightly glossy, and white with thin flecks of red, more dense at the thick end (Gibson-Hill 1949b). Phillipps (1970) reported a family group with two or three immatures at Poring. Specimens with enlarged testes were collected at Bole River on 6 and 8 Mar. 1982 (5 × 3.5 mm, 6 × 4 mm), Rinangisan on 2 Apr. 1983 (6 × 4 mm); Megatai on 20 and 22 June 1983 (4 × 7 mm, 6 × 5 mm), and Kaingaran on 6 July 1983 (6 × 6 mm). *Voice*: A descending series of ca. eight short notes, not rapid but not slow either.

Mountain Tailorbird *Orthotomus cuculatus*

Status: A common resident. *Localities*: Malangkap, Kinabalu, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: On Kinabalu generally about 1,200–2,000 m, but Jenkins (Jenkins and de Silva 1978) had a sight record at 2,650 m; Trus Madi 1,600–2,100 m; Crocker Range 1,150–1,700 m. *Habitats*: 1° and 2° forest and scrub. Common in roadside scrub at Kinabalu Park Headquarters. However, where undisturbed 1° lower montane forest was bordered by scrub along Sinsuran Rd (mile 39, 1,150 m), Mountain Tailorbirds inhabited the forest and Ashy Tailorbirds occurred in the scrub (WFVZ). *Breeding*: Specimens with enlarged testes were collected along Sinsuran Road on 5 Feb. 1977 (5 mm), 2 May 1982 (5 × 4 mm), 16, 17, and 20 Nov. 1982 (7 × 6 mm, 5 × 4 mm, 6 × 4 mm), and 7 Dec. 1981 (5 mm). *Voice*: A variety of songs based on the same theme, for example, *doo-dah-dah-dah-dee-doo*, in which the *dee* note either rises well above or falls well below the other notes, and *doo-dee-doo-dee-doo-doo* followed by two nonmusical chips. *Identification*: Young birds have a yellow throat. *Remarks*: The RMC collection has only three specimens, suggesting that this species may be more common now than in the first half of this century.

Dark-necked Tailorbird *Orthotomus atrogularis*

Status: A common resident. *Localities*: Apas Balung, Bettotan, Bole River, Brumas, Danum, Deramakot, Kimanis, Klias, Labau River, Makaniton, Maliau,

Menggalong, Quoin Hill, Sabah Softwoods, Sepilok, Silam Plantation, Tabin, Ulu Tiulon, and Wallace Bay. *Elevation*: Sea level to 600 m. *Habitats*: 1°, 2°, riparian, logged, peatswamp, freshwater swamp, and upland heath forest; abandoned rubber, mangrove edges, and *Albizia*. This tailorbird seems to prefer areas of disturbed 1° forest, including thickets resulting from tree falls, 1° forest edge, and new 2° scrub caused by logging. *Breeding*: Specimens with enlarged sexual organs were collected at Bole River on 4 Mar. (brood patch, ruptured ovarian follicles) and 9 Mar. 1982 (testes 5 × 3 mm), Sabah Softwoods on 19 June and 2 July 1982 (testes 5 × 2 mm, 4 × 2 mm), Menggalong on 15 July 1983 (testes 5 × 3 mm), and Quoin Hill on 28 Aug. 1962 (enlarged oviduct, brood patch). Courting pairs and territorial battles were observed throughout Mar. 1982 at Bole River. GD found nestlings at Danum on 26 Aug. (no year; Smythies 2000). *Voice*: Songs are distinctly different from those of Rufous-tailed and Ashy tailorbirds. One song is a low but sweet quality *twitch*, *twee-we-we-we-we*, repeated constantly. One call is a high-pitched *peeo*. DMB described the song as *chereeeechereee-chee*, which may be the same as that described by Smythies (1981) as *kri-ri-ri*. *Remarks*: In the early 1980s this species was much less common than the other tailorbirds. However, its numbers may be increasing with habitat changes in Sabah. It is now the commonest tailorbird at Sepilok (K. Ickes, pers. comm.).

Rufous-tailed Tailorbird *Orthotomus sericeus*

Status: A common resident. *Localities*: Ambang, Balambangan Island, Banggi Island, Bettotan, Bodgaya Island, Bohey Dulong Island, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Gaya Island, Gomantong, Keningau, Kota Kinabalu suburbs, Kudat, Kulamba, Labuan, Lumaku, Lumbidan, Maang, Makaniton, Maliau, Megatai, Membakut Beach, Menggalong, Pandasan, Papar, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Sepilok, Serankai Island, Silam Plantation, Sinsuran Road, Tabin, Tempasuk, Tatagan Island, Tawau Hills, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m (Mt. Lumaku). *Habitats*: 1° forest edge, 2° forest and scrub; logged, butabuta tree (Kulamba), riparian, and island heath-forest; *Gmelina*, *Eucalyptus*, *Albizia*, *Albizia* over cocoa, *Trema orientalis* over cocoa, mature rubber, beach strand, buffalo fields, woodlands, and gardens. It occurs along rivers and in other disturbed areas adjacent to inland forests. Wells (1978) found it in closed forest on Balambangan and remarked that it does not occur in similar habitat on the mainland. (See habitat discussion for Ashy Tailorbird.) *Breeding*: DMB found nests in Nov., Jan., and May–June in the Kimanis Bay area. The nests are felted cups of plant fibers and down, lalang-grass heads, and so on, between the folded edges of a large leaf sewn together with silky fibers. The three or four eggs (ca. 16 × 11 mm) are of a translucent pale pink, sometimes greenish in ground color, heavily marked with plumbeous, purplish red and brown. Specimens with enlarged testes were collected at Maang on 24 Jan. 1983 (4 mm), Bole River on 4 Mar. and 2 Apr. 1982 (7 × 4 mm, 4 × 3 mm), and Sabah Softwoods on 17 June 1982 (5 × 3 mm). Young fledglings and adults with brood patches were banded at Tempasuk on 27 Apr. 1981. *Voice*: Often starts its song with a loud chuck sound (much like the Striped Tit Babbler). One long song is *dee-doo-doo*, *deet-dit-deee*, *dee-doo-doo*. *Dee-doo-doo* consists of one higher note followed by two lower notes, and *deet-dit-deee* is a rising series of notes with a strong accent on the *deee*.

Ashy Tailorbird *Orthotomus ruficeps*

Status: A common resident. *Localities:* Anginon, Balambangan Island, Banggi Island, Bole River, Benoni, Bettotan, Binsulok, Brumas, Ensuan, Gomantong, Kabayau, Kaingaran, Kalabakan, Keningau, Kota Kinabalu suburbs, Kota Klias, Kudat, Kulamba, Labau River, Labuan, Lumbidan, Maang, Megatai, Membakut Beach, Mendolong, Menggalong, Mumiang, Padas Damit, Pandasan, Papar, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Sinsuran Road, Tabin, Tambunan, Tanjung Aru, Tawau Hills, Tempasuk, Tiger Estate, Trus Madi, and Ulu Tiulon. *Elevation:* Sea level to 1,150 m (Sinsuran Road), 1,200 m (Anginon), 1,300 m (Kinabalu), and 1,500 m (Trus Madi). *Habitats:* 1° forest edge; 2°, logged, butabuta tree (Kulamba), riverine, and freshwater swamp forest; mangrove, beach strand (including casuarinas), and gardens. Although sympatric in many localities with Rufous-tailed Tailorbird, differences in habitat preference and usage are evident. WFVZ found Rufous-tailed Tailorbirds on small islands, but not Ashy Tailorbirds. Ashy Tailorbirds occur in mangrove and freshwater swamp forest, whereas Rufous-tailed Tailorbirds do not. Ashy Tailorbirds also occur deeper in 1° forest and are more common in beach-side casuarinas and lower montane localities. In *Albizia*, Rufous-tailed Tailorbirds are more common in the grassy early stages of plantation growth, but the two species become about equally common in older plantations, suggesting that Ashy Tailorbirds replace Rufous-tailed Tailorbirds successionaly (Mitra and Sheldon 1993). *Breeding:* DMB found nests with young in the Kimanis Bay area in Feb., Mar., and July. The nests are placed in a tunnel formed by sewing together the rolled up edges of long leaves such as bananas and ginger. They are quite large for the size of the bird, are composed of fine grasses and plant fibers sewn into the leaf. Typically, two to three young were found in each nest. Specimens with enlarged testes were collected at Membakut Beach on 2 Feb. 1983 (4 × 3 mm) and 8 Sept. 1982 (4 × 2 mm), Sabah Softwoods on 20 June (4 × 2 mm, 6 × 4 mm) and 8 July 1982 (4 × 3 mm), Gomantong on 7 Aug. 1983 (5 × 3 mm), and Quoin Hill on 22 Aug. 1962 (5 × 3 mm). *Voice:* One call is *wee-chit*. Others are *doo-dit-dit* (*dits* are higher pitched than *doo* and staccato) and *doo-dee, doo-dee* (*dee* is higher than *doo* and slightly shorter).

Family MUSCICAPIDAE

FLYCATCHERS

White-throated Fantail *Rhipidura albicollis*

Status: A common resident. *Localities:* Kaingaran, Kinabalu, Lotung, Lumaku, Malangkap, Poring, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 900–2,750 m, Trus Madi 700–2,400 m, Crocker Range >1,000 m. *Habitats:* 1° and 2° forest and scrub. *Breeding:* Specimens with enlarged testes were collected at Rinangisan on 24 Mar. 1983 (8 × 5 mm); and Sinsuran Road on 24 Nov. 1982 (5 × 6 mm), 18 Dec. 1981 (6 mm), and 2, 3, and 4 Feb. 1977 (5 mm, 9 mm, 5 mm). A recent fledgling was caught at Rinangisan on 21 Mar. 1983. *Voice:* *Dee-dee-dit-dit-doo*. The first three notes descend the scale, the fourth note rises and (like the third) is short, and the last note descends again and is drawn out. This is a ubiquitous noise of montane forest. *Remarks:* White-throated and Spotted fantails occur together at 1,140 m in 1° lower montane forest on the

Sinsuran Road (eastern side of the Crocker Range) and from 700 to 1,500 m on Trus Madi.

Spotted Fantail *Rhipidura perlata*

Status: A common resident. *Localities:* Bole River, Brumas, Danum, Garinono, Gomantong, Imbak River, Imbak Valley, Kaingaran, Kalabakan, Kun Kun, Labau, Lumaku, Lumbidan, Makaniton, Maliau, Megatai, Poring, Quoin Hill, Rinangisan, Saliwangan, Sepilok, Sepulut, Sinsuran Road, Tabin, Tambuyukon, Tawau Hills, Trus Madi, Ulu Dusun, and Ulu Tiulon. *Elevation:* Sea level to 1,600 m. Specimens have been collected up to 1,500 m on Trus Madi and 1,200 m on Lumaku and at Rinangisan. *Habitats:* 1°, old 2°, and logged forest. *Breeding:* A bird was observed building a nest on 5 May 1980 at Kun Kun (G. Davies). Specimens with enlarged sexual organs were collected at Bole River from 18 to 22 Feb. 1982 (testes 8×6 mm, 7×3 mm), Brumas on 11 May (testes 7×4 mm) and 11 June 1982 (testes 7×4 mm), Sinsuran Road on 11 June 1983 (testes 7×3 mm), and Imbak River on 14 July 1982 (testes 9×4 mm, ruptured ovarian follicles). RGM collected a male with testes 7×5 mm on 9 June 2000 at Imbak Valley. *Voice:* Similar to the tune *Whistle while you work*. *Remarks:* Mainly a bird of old forest. It is sympatric with White-throated Fantail in 1° lower montane forest and with Pied Fantail in old second growth resulting from shifting agriculture (e.g., at Megatai).

Pied Fantail *Rhipidura javanica*

Status: A common resident. *Localities:* Balambangan Island, Banggi Island, Batu Punggul, Batu Putih, Benoni, Binsulok, Bole River, Darau River, Kaingaran, Keningau, Kota Kinabalu and suburbs, Kota Klias, Kudat, Kulamba, Labuan, Labuk Road, Lamag, Malawali Island, Mandahan, Megatai, Membakut, Mendolong, Menggalong, Merintaman, Miagra Island, Mumiang, Padas Damit, Papar, Poring, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sebatik Island, Segarong, Selakan Island, Sepilok, Sibuan Island, Tabin, Tawau, Telipok, Tempasuk, Tuaran, and Ulu Dusun. *Elevation:* Generally sea level to 750 m (Kaingaran), but one banded at 1,500 m on the Pinosuk Plateau (McClure and Leelavit 1972; Jenkins and de Silva 1978). *Habitats:* 2° forest, logged, freshwater swamp, 1° peat swamp, and butabuta tree forest (Kulamba); mangroves, nipah, coastal kerangas, rubber, young *Albizia*, *Gmelina*, beach scrub, casuarinas, and gardens. A species of 2° forest and scrub, or coastal forests. *Breeding:* H. Low found a nest on Labuan on 23 Mar. 1873 (Sharpe 1875, no description). V. W. Ryves (unpubl. notes) found a nest with two eggs along the Batang River, Sandakan, on 8 July 1938. The eggs were pyriform (17×13.5 mm, 17×13 mm), smooth, and off-white, with speckling of light gray and a few spots of pale umber that nearly formed a ring at the thick end. DMB has found nests during May–Aug. and Nov.–Feb. The nest is a small, but deep, finely woven cup of plant fibers, cobwebs, and sometimes animal hair. It is typically attached between the forks of “weeping” branches of rubber or other trees, 2.5–4.5 m above the ground. The two eggs (ca. 17.5×12.7 mm) are creamy-white to grayish-white, spotted and flecked with darker gray, with the markings forming a ring or zone around the larger end. A young bird that could not fly and its parents were observed on 18 Apr. 1981 at Saliwangan (WFVZ). Two nests, one with an egg and the other empty, were found along the Darau River on 18 May 1983 (WFVZ). Both were built on

mangrove branch ends less than 0.5 m from high water. The nests were unlined cups, 5 cm high and 3 cm across, of finely woven grasses glazed with cobwebs and "glued" to the branch stem (rather than fixed in a fork). The eggs were white and had reddish-brown spots circling the thickest part. Specimens with enlarged sexual organs were collected at Saliwangan on 2 Mar. 1983 (testes 5×8 mm), Padas Damit on 29 May 1983 (testes 12×6 mm; 20 mm oviduct egg), outside Sepilok on 30 July 1983 (testes 8×5 mm), and on Labuk Road on 4 Aug. 1983 (testes 8×5 mm). *Voice*: *Swit-sweet* or *swit-swit-sweet*, the *sweet* note slurring upwards. Whitehead (Sharpe 1889b; Whitehead 1893) described it as *kip-kip-pa-wheek*, with the accent on the last syllable.

Gray-headed Canary Flycatcher *Culicicapa ceylonensis*

Status: A common resident. *Localities*: Anginon, Bole River, Brumas, Danum, Ensuan, Imbak River, Imbak Valley, Kaingaran, Kalabakan, Kinabalu, Labau River, Lumaku, Magdalena, Maliau, Padas Gorge, Poring, Quoin Hill, Rinangisan, Sebatik Island, Sepilok, Sinsuran Road, Tabin, Tawau Hills, Trus Madi, and Ulu Tiulon. *Elevation*: Sea level to 1,600 m. *Habitats*: Principally 1° forest, occasionally old 2° forest and recently logged 1° forest; *Eucalyptus*. MCT (Thompson 1966) found many at the 1°–2° forest ecotone. Notably absent from *Albizia* plantations (Mitra and Sheldon 1993). *Breeding*: Whitehead (Sharpe 1889b; Whitehead 1893) found a nest at Malangkap on 29 Apr. 1888 (ca. 900 m). The nest was a pocket constructed in a long dangling piece of moss. The eggs (number not given) were glossy white, spotted primarily at the larger end with brown underlain with gray mottling. The nest also held an egg of Hodgson's Hawk Cuckoo. Specimens with enlarged sexual organs were collected at Bole River on 4 and 10 Apr. 1982 (4 mm, 5×4 mm), Brumas on 14 June 1982 (largest ovum 8 mm), and Kalabakan on 28 Oct. 1962 (testes 4×4 mm). *Voice*: Five-note *saw-see-saw-see-saw*, in which the *see* notes are higher pitched. *Remarks*: Most commonly found in 1° forest understory, where it perches alone or in pairs, hawks insects, and calls for long periods time.

Dark-sided Flycatcher *Muscicapa sibirica*

Status: An uncommon migrant. *Localities*: Bole River, Bongawan, Kimanis, Kinabalu, Klias, Maliau, Megatai, Papar, Rinangisan, Saliwangan, Sepilok, Silam, Sinsuran Road, Tabin, Tanjung Aru, Tembungo, and Tenom. All records except Bole River, Papar, Rinangisan, Saliwangan, and Sinsuran Road are sightings. *Elevation*: Sea level to 1,600 m. *Habitats*: 1° forest edge, 2° forest and logged forest, roadsides, fence posts, and oil platform. Recorded only in logged forest at Bole River and Danum (Lambert 1990c). *Migration dates*: DMS saw fair numbers between 19 Aug. and 30 Oct. 1981 at Tembungo. WFVZ's late date is 7 Apr. 1982 at Silam Plantation. DMB noted "mid-Apr." for their last departure from the Kimanis Bay area. *Remarks*: All specimens collected by WFVZ were identified as subspecies *sibirica* by D. R. Wells. Wells (1982b) found that a specimen from Quoin Hill identified as a Dark-sided Flycatcher by MCT (Thompson 1966) was actually an Asian Brown Flycatcher (see below). Two other specimens collected at Quoin Hill were similarly identified (Thompson 1966), but apparently these were not examined by Wells (1982b).

Ferruginous Flycatcher *Muscicapa ferruginea*

Status: A scarce migrant. *Localities:* Bole River, Kalabakan, Kimanis, Kinabalu, Labuan, Malangkap, Sinsuran Road, and Sipadan Island. *Elevation:* Sea level to 1,550 m. *Habitats:* 2° and logged forest. *Migration dates:* All records are from late Oct. to Feb. (Sharpe 1889b; Whitehead 1893; Everett in Sharpe 1894b; Norman 1964; Lambert 1990b; DMB, YUE, WFVZ). *Remarks:* A bird was banded on Kinabalu in 1964 by the MAPS/University of Malaya group (McClure and Leelavit 1972).

[Gray-streaked Flycatcher *Muscicapa griseisticta*

Status: A scarce migrant. There are no Sabah specimens. Sightings include Sepilok (Gönnér 1990), Sinsuran Road (ca. 1,524 m) on 28 Sept. 1969 (KVT), Sipadan Island in late Oct. 1990 (Lambert 1990b), and Tanjung Aru in Dec. 1976 (Q. Phillipps in Smythies 1981). A sighting for Gaya Island in Mar. 1975 (Smythies 1981) is not confirmed (D. R. Wells, pers. comm.). All sightings must be treated with caution, because this bird is difficult to identify. See van Balen and Aspinall (1996).]

Asian Brown Flycatcher *Muscicapa dauurica*

Status: An uncommon species with both resident and migrant races. *Localities:* Bole River, Kalampunian Besar, Kimanis Bay area, Quoin Hill, Pulau Tiga, Rinangisan, Sepilok, Silam Plantation, and Tabin. *Elevation:* Sea level to 1,300 m. *Habitats:* Mainly in open areas (e.g., plantation clearings, recently logged forest, and roadside scrub); however, residents have been netted in 1° lowland forest. DMB observed them in the gardens of rubber estates, mature rubber, and in casuarinas. *Breeding:* CMF collected a pair of adults with enlarged testes (7 × 4 mm) and a brood patch, respectively, on 27 July 1983 near Sepilok. He also collected a pair tending a fully grown juvenile on 8 July 1984 near Sepilok. *Migration dates:* DMS (Simpson 1982a) noted a fair number of brown flycatchers from 10 Aug. to 30 Oct. 1981, with one dead bird on 1 Sept. 1981 identified as an Asian Brown Flycatcher. DMB saw birds in the Kimanis Bay area as early as 22 Sept., and they remained until the end of Apr. Migrants were collected by WFVZ at Silam Plantation on 22 Mar. 1982 and at Rinangisan on 14 Apr. 1983. The latter was attracted to a light at night. *Remarks:* Smythies (1960) referred to this species as *M. latirostris*, a winter migrant. Wells (1982b) and Wells and Francis (1984) identified two subspecies from specimens collected in Sabah: *umbrosa*, a breeding resident (specimens from Bole River, Quoin Hill, and Sepilok), and *cinereoalba*, a migrant (specimens from Silam Plantation and Rinangisan). MCT (Thompson 1966) identified a specimen he collected (MCT2965) on 26 Sept. 1962 at Quoin Hill as *latirostris*. This specimen was not examined by Wells (1982b).

Verditer Flycatcher *Eumyias thalassina*

Status: An uncommon resident. *Localities:* Bettotan, Bole River, Brumas, Danum, Gomantong, Kalabakan (Mt. Tukok), Malangkap, Maliau, Sabah Softwoods, Sayap, Silam Plantation, Sinsuran Road, Tabin, and Tawau Hills. *Elevation:* Specimens are mainly from 150 to 400 m, with the exception of Bettotan and Gomantong, which are nearer to sea level. Whitehead (Sharpe 1889b; Whitehead 1893) never found them above ca. 300 m, but we observed a pair in a tree along Sinsuran

Road at 1,150 m (19 Nov. 1982) and a male at ca. 1,000 m (25 May 1989). *Habitats*: 1°, 2°, recently logged, and riparian forest and scrub; younger stands of *Albizia*. They often perch in emergent or isolated trees. CMF found them to be fairly common in the garden trees around the ranger station at Gomantong. *Breeding*: Specimens with enlarged sexual organs were collected at Silam Plantation on 23 Feb. 1982 (testes 6×3 mm); Bole River on 4 (testes 6×4 mm, largest ovum 10 mm), 17, 22, and 25 Mar. 1982 (testes 7×5 mm, 9×5 mm, 8×4 mm); Brumas on 7 Mar. 1977 (testes 4 mm), 20 May (testes 6×3 mm), and 5 June 1982 (testes 6×4 mm). *Voice*: A high-pitched, random warble lasting 5–6 s and repeated fairly frequently. *Food*: Insects and beetles.

Indigo Flycatcher *Eumyias indigo*

Status: A common resident. *Localities*: Batu Punggul, Kinabalu, Lotung, Lumaku, Malangkap, Muruk Miau, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 900–2,450, Trus Madi 1,350–1,600 m, Crocker Range 1,200–1,700 m, Lotung ca. 1,100 m. CMF netted one at 300 m at Batu Punggul. *Habitats*: 1° and 2° forest and scrub, including coniferous forest (Lotung). Whitehead (Sharpe 1889d; Whitehead 1893) described it as a forest bird not found in the open. *Breeding*: Phillipps (1970) found a nest under an overhang on a rocky face along the Kundasan track at 1,600 m on 1 Mar. 1969. The nest was small, cup-shaped, composed of rootlets and dead grasses, lined with down, and resting on top of a mass of rootlets. It contained two nestlings covered with slaty blue down. RGM found a nest at Kinabalu Park at 1,500 m on 23 May 1999. Adults were feeding nestlings. The nest was a covered cup of woven twigs ca. 6 m above the ground in a tree. WFVZ collected specimens with enlarged testes at Rinangisan on 24 and 25 Mar. 1983 (6×4 mm, 6×3 mm). We also netted fledglings at Rinangisan on 19 Mar. and 5 Apr. 1983, and observed a pair with two young fledglings on the Kinabalu summit trail on 12 June 1983. *Voice*: A high-pitched series of softly uttered wandering whistles. *Food*: Insects and small berries. *Remarks*: The bird that CMF netted at Batu Punggul (300 m) was apparently this species, but had no white in the tail.

Blue-and-white Flycatcher *Cyanoptila cyanomelana*

Status: An uncommon migrant. *Localities*: Bole River, Danum, Kinabalu, Klias, Kota Kinabalu suburbs, Labuan, Lumbidan, Malangkap, Megatai, Poring, Quoin Hill, Rinangisan, Sebatik Island, Sinsuran Road, Sipadan Island, and Ulu Kimanis. *Elevation*: Sea level to 1,550 m (on Kinabalu). *Habitats*: 1°, 2°, and old logged forest; abandoned rubber and cocoa. *Migration dates*: The earliest record is from Sipadan Island on 22–31 Oct. 1990 (F. Lambert). A bird was sighted on 5 Nov. 1958 at Klias in abandoned rubber (DMB). WFVZ had a sighting on 19 Nov. 1982 at Megatai. Late dates are 13 and 14 Apr. 1983 at Rinangisan, where WFVZ recorded two night migrants attracted to a light. *Food*: Insects and fruit.

White-tailed Flycatcher *Cyornis concretus*

Status: An uncommon resident. *Localities*: Anginon, Batu Punggul, Bole River, Brumas, Danum, Kalabakan, Kinabalu, Kuala Segama, Labau River, Lotung, Magdalena, Muruk Miau, Sebatik Island (sighting by Norman 1964), Simatuoh, Sinsuran Road, and Tambunan. *Elevation*: Confirmed records from 150 to 1,500 m. *Habitats*: 1° forest. D. R. Wells (in Kiew 1977) described it as a bird of lower-

and middle-story forest on hill slopes. Not recorded from logged forest at Danum (Lambert 1990c). *Breeding*: Specimens with enlarged sexual organs were collected at Bole River on 17 Feb. 1982 (testes 4 mm, enlarged oviduct); and Brumas on 19 May (testes 5×3 mm), 21 May (ova enlarged to 2 mm), and 5 June 1982 (testes 5×3 mm). *Remarks*: Apparently this species occurs regularly but in low density in 1° forest. WFVZ's only records were from Bole River and Brumas (dry upland forest at ca. 300 m). However, MCT (Thompson 1966) said it was common at Anginon (ca. 1,100 m) and Kalabakan (ca. 200 m) hawking insects in the understory. Specimens from Sabah have been collected only in the last 40 years.

Pale Blue Flycatcher *Cyornis unicolor*

Status: A scarce resident. *Localities*: Batu Punggul, Bole River, Brumas, Danum, Kalabakan, Kinabatangan River, Quoin Hill, Sepilok, and Sinsuran Road. *Elevation*: Mainly, sea level to ca. 400 m, although twice sighted on Sinsuran Road at ca. 1,300–1,400 m (KVT, 7 Oct. 1968; WFVZ, 3 Dec. 1981). *Habitats*: 1° forest and cocoa at the edge of 1° forest. Specimens have been obtained only from the interior of upland 1° forest, and Lambert (1990c) only found it in 1° forest at Danum. D. R. Wells (in Kiew 1977) described it as a canopy species. *Breeding*: Specimens with enlarged testes were collected at Bole River on 19 Feb. 1982 (4 mm) and Brumas 29 May 1982 (5×4 mm). *Remarks*: Its canopy feeding habit and reliance on 1° forest may explain its apparent rarity.

Malaysian Blue Flycatcher *Cyornis turcosus*

Status: A common resident. *Localities*: Bengkoka River, Bole River, Bongawan, Danum, Kabayau, Kalabakan, Kasigui, Kimanis, Kinabatangan River, Klias, Kunatong, Lamag, Lumbidan, Malangkap, Mawau, Megatai, Melalap, Meliau, Membakut, Muruk, Pandasan, Poring, Rayoh, Saliwangan, Simatuoh, Tabin, Tiger Estate, and Ulu Kimanis. *Elevation*: Sea level to 900 m. *Habitats*: 1° , 2° , and riparian forest and scrub; old rubber. D. R. Wells (in Kiew 1977) described it as a river bank thicket species that hardly penetrates inland. *Breeding*: DMB found nests at Kimanis, Bongawan, Membakut, Mawau, and Klias between early May and the end of Aug. He watched a pair collect moss from the bole of an old tree at Mawau on 9 July 1959. Spotted fledglings were seen being fed at Klias on 1 July 1960. DMB described the nest as a well constructed and camouflaged cup of mosses and fibers, felted with cobwebs, usually built among saprophytic plants growing in the branches of old rubber or other trees. One nest at Kimanis was fixed to the underside of an overhanging, large, moss-covered boulder at a height of ca. 2.5 m. Although usually simple cups, a Kimanis nest found at the end of a moss-draped dead treefern stump was a well-concealed shallow mossy cup with a kind of half-hood of moss over it. Phillipps (1970) found a nest with two eggs at Pandasan on 19 July (year unspecified). It was built of moss and rootlets 0.5 m above the ground in a small hollow in the trunk of a streamside tree. The eggs were bluish-gray, heavily blotched with rufous brown. Specimens with enlarged testes were collected at Saliwangan on 16 Jan. 1977 (6 mm) and Megatai on 21 June 1983 (6×4 mm). *Voice*: DMB described the song as a sweet, but very weak ditty *diddle diddle dee diddle dee*, which is barely audible at times; and the calls as a grating *chrrk* alarm note, a hard *tik-tk-tk*, and (by fledged chicks) a plaintive *seer* call. *Remarks*: See Bornean Blue Flycatcher.

Mangrove Blue Flycatcher *Cyornis rufigastra*

Status: A common resident. *Localities:* Balambangan Island, Banggi Island, Bengkoka River, Benoni, Binsulok, Gaya Island, Kimanis, Kota Kinabalu suburbs, Kota Klias, Kudat, Labuan, Labuk Road, Lumbidan, Maang, Malawali Island, Marudu Bay, Mawau, Membakut, Membakut Beach, Padas Damit, Papar, Pulau Tiga, Samawang, Sandakan, Sepilok, Segarong, Tuaran, and Weston. *Elevation:* Sea level. *Habitats:* 1°, 2°, riverine, peat swamp, and closed island forest; mangroves and overgrown rubber. *Breeding:* DMB found nests at Mawau in Apr. and Aug. They were placed in the crotch of dead palm stalks where they joined the main stem and blended in well with the decaying mass of fibrous palm stalk mingled with fern roots. The nest was a shallow cup placed 2–2.5 m above the ground. It was constructed of plant fibers and rootlets mixed with a few dead leaves. The Apr. nest had a tightly sitting bird and the Aug. nest contained two half-fledged young. Specimens with enlarged testes were collected at Membakut Beach on 2 Feb. 1982 (4 × 3 mm), Membakut (inland) on 22 Feb. 1977 (7 mm), and Padas Damit on 29 May 1983 (8 × 6 mm, 5 × 3 mm). A recent fledgling was also netted at Padas Damit on 29 May 1983. *Voice:* Four descending notes, followed by a slurred, abruptly ending, rising note, *do-do-do-do-deet*. *Food:* Winged ants, termites, tiny bees, aphids, and insects (DMB).

Large-billed Blue Flycatcher *Cyornis caerulatus*

Status: A common resident. *Localities:* Bettotan, Bole River, Brumas, Danum, Garinono, Gomantong, Imbak River, Kalabakan, Madai, Makaniton, Maliau, Quoin Hill, Rayoh, Sebatik Island, Sepilok, Sepulut, Tabin, Tawau Hills, Ulu Dusun, Ulu Mawau, and Ulu Tiulon. *Elevation:* Sea level to 500 m. *Habitats:* 1° forest; much rarer in logged forest. *Breeding:* Specimens with enlarged sexual organs were collected at Bole River on 16 and 27 Feb. 1982 (testes 10 × 4 mm and 6 × 5 mm); Brumas from 31 Mar. to 2 Apr. 1977 (testes 5 mm, 6 mm, and 7 mm), 6–9 May (testes 9 × 5 mm, 9 × 5 mm, 6 × 4 mm, and 12 × 6 mm), and 3 June 1982 (testes 9 × 5 mm, largest ovum 6 mm); and Imbak River on 14 July 1982 (testes 7 × 4 mm). *Voice:* A soft, hissing buzz followed by a higher, clear, descending slurred note. *Remarks:* See Bornean Blue Flycatcher.

Hill Blue Flycatcher *Cyornis banyumas*

Status: A rarely recorded resident. *Localities:* Kinabalu and Lotung. B&W sighted a male in a remnant of forest on the lower slopes of Kinabalu (CMF). Norman (1964) reported sightings from Kalabakan. RGM had a sighting at Sayap. *Elevation:* Kinabalu 900 m, Lotung 1,050 m. Norman's (1964) sighting was at ca. 300 m. *Habitats:* 1° lower montane forest. *Breeding:* V. W. Ryves collected voucher specimens and two clutches of two eggs at Kiau on 11 and 23 Mar. 1939. The eggs were egg-shaped, smooth, glossy, and pale olive buff, almost completely covered by a soft flecking of brown, 22 × 15.5 mm and 20.5 × 15.5 mm, 22.5 × 15.5 mm and 21 × 15.5 mm (Gibson-Hill 1949b). *Remarks:* WFVZ never recorded this species. The only specimens we located were one in the Sabah Museum (Mt. Lotung), two in the RMC (collected in Kiau by Ryves), and one in the BMNH (collected on "Kinabalu" by A. H. Everett). Banks (1982) listed it for Ensuan, but the specimen is not in the Sabah Museum or British Museum collection, and it is not mentioned by R. Sims (unpubl.). This species may be

rarely recorded in Sabah because it inhabits 1° lower montane forest, which has been depleted in accessible areas by shifting agriculture and development.

Bornean Blue Flycatcher *Cyornis superbus*

Status: An uncommon Bornean endemic. *Localities:* Baturong, Bettotan, Bole River, Brumas, Danum, Ensuan, Garinono, Imbak River, Imbak Valley, Kalabakan, Kinabalu, Kunatong, Labau River, Lamag, Magdalena, Makaniton, Maliau, Poring, Quoin Hill, Saliwangan, Samawang, Sepilok, Sepulut, Silam, Tabin, and Tomani. *Elevation:* Sea level to 1,000 m. *Habitats:* 1° and logged forest. Less common in logged than 1° forest (Lambert 1990c). *Breeding:* Specimens with enlarged sexual organs were collected at Silam and Bole River on 16, 20, and 27 Feb. and 10 Mar. 1982 (testes 5 × 3 mm, 8 × 5 mm, 5 × 3 mm, and 6 mm); and Brumas on 7, 9, and 19 May and 2 and 3 June 1982 (testes 9 × 6 mm, enlarged oviduct, testes 9 × 5 mm, testes 8 × 5 mm, testes 10 × 5 mm). RGM collected a male with testes 7 × 5 mm on 9 June 2000 at Imback Valley. *Voice:* A quick series of five notes. *Remarks:* This species is sympatric with the Large-billed Blue Flycatcher in 1° forest, but is somewhat less common, except perhaps at very low elevation. It replaces the Malaysian Blue Flycatcher in tall forest inland of riverine forest and scrub (D. R. Wells in Kiew 1977).

Red-throated Flycatcher *Ficedula parva*

Status: A scarce vagrant. *Localities:* DMB observed one at Kuala Kimanis on 17 Oct. 1960 and netted one there in early Nov. He also observed one at Penampang on 1 Mar. 1960, two at Tanjung Aru on 25 Nov. 1959, and one at Kuala Papar in early Mar. 1964. The only other record is of two individuals seen at Tanjung Aru on 18–25 Oct. 1970 by Q. Phillipps (Smythies 1981). *Elevation:* Sea level. *Habitats:* Beach strand and coastal scrub. *Habits:* An active species that flits about branches after insects in a warbler-like fashion; they also flycatch. Their tail is often flicked open and upwards to display the prominent white basal patches (DMB). *Identification:* The red breast is not seen in winter birds, but in March a bird in Papar possessed one (DMB).

Snowy-browed Flycatcher *Ficedula hyperythra*

Status: A common resident. *Localities:* Kinabalu, Malangkap, Rinangisan, Silam, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation:* Kinabalu 1,200–3,700 m, Trus Madi 1,350–2,400 m, Mount Silam 1,000 m, Tambuyukon 1,675 m. *Habitats:* 1° and 2° forest and scrub. *Breeding:* Whitehead (Sharpe 1889b; Whitehead 1893) found a nest with two white eggs on 22 Mar. 1888 at Kenakok. The nest was a moss-lined cup concealed in loose moss on a tree. Specimens with enlarged testes were collected at Rinangisan on 22 and 25 Mar. 1983 (testes 5 × 4 mm and 6 × 4 mm). Several recent fledglings were found at Rinangisan in late Mar. and early Apr. 1983 and on Kinabalu and Trus Madi in early and mid-July 1983. *Voice:* A high-pitched squeaking song, given while the bird sits still, *zu-zee-zu-zu*, with the *zee* note being higher in pitch.

Mugimaki Flycatcher *Ficedula mugimaki*

Status: An uncommon migrant. *Localities:* Bole River, Bongawan, Kinabalu, Labuan, Malangkap, Papar, Rinangisan, Saliwangan, Sepilok, Sinsuran Road, Sipidan Island, and Tanjung Aru. *Elevation:* Sea level to 1,750 m. *Habitats:* 1° and 2° forest and scrub. *Migration dates:* Early and late dates are 22 Oct. 1990 and

22 Apr. 1981. RGM also had a sighting on 19 May 1999. The late date of 5 June 1999 (Smythies 2000) is incorrect; it was based on a misidentified specimen (RGM). *Food*: It eats berries as well as insects. Feeds like a warbler in tall, often fruiting or flowering, trees. *Remarks*: WFVZ netted several in scrub along Sinsuran Road.

Rufous-chested Flycatcher *Ficedula dumetoria*

Status: A common resident. *Localities*: Anginon, Batu Punggul, Bettotan, Bole River, Brumas, Crocker Range Park Headquarters, Danum, Gomantong, Imbak River, Kalabakan, Kinabalu (lower slopes), Magdalena, Makaniton, Maliau, Poring, Quoin Hill, Samawang, Sayap, Sepilok, Sepulut, Tabin, Ulu Dusun, Ulu Merutai, and Ulu Tiulon. *Elevation*: Sea level to 1,050 m. There is an undocumented record at 1,600 m on Kinabalu (Jenkins and de Silva 1978). *Habitats*: 1° forest and recently logged areas adjacent to 1° forest. Lambert (1990c) did not find it in logged forest at Danum and Bole River. *Breeding*: Specimens with enlarged sexual organs were collected at Bole River on 25 Mar. 1982 (testes 4 mm); Brumas on 6, 8, and 18 May 1982 (testes 5 × 3 mm and 5 × 3 mm; ruptured follicles, enlarged oviduct, and brood patch); and Quoin Hill on 22 Nov. 1962 (testes 5 × 4 mm). *Food*: Sallies for insects in the understory (Thompson 1966) and gleans in the canopy like a *Phylloscopus* warbler (A. Whittaker).

[Yellow-rumped Flycatcher *Ficedula zanthopygia*

Status: A rare migrant. S. Schwarz reported this bird at Tawau Hills Park on 2 Mar. 1998 (Robson 1998b), and another was seen on Layang-Layang Island on 25–26 Sept. 1998 (GD). Other records exist from Brunei and central Kalimantan.]

Narcissus Flycatcher *Ficedula narcissina*

Status: An uncommon migrant. *Localities*: Anginon, Bole River, Danum, Kinabalu (lower slopes), Kudat, Labau River, Labuan (Nicholson 1883), Lumahat, Membakut, Quoin Hill, Rinangisan, Sepilok, Sinsuran Road, and Sipadan Island. *Elevation*: Sea level to 1,300 m. *Habitats*: 1° and recently logged forest, including upland heath. *Migration dates*: Early dates: 1 Sept. 1959, no locality (DMB), 19 Sept. at Kudat (KVT, year and habitat unspecified). Lambert (1990b) recorded it at Sipadan Island during 22–31 Oct. 1990. The earliest specimen record is from Labau River on 27 Oct. 1982. DMB recorded it in Feb. at Membakut and Lumahat. Late dates: During 12–14 Apr. 1983 at Rinangisan, WFVZ attracted dozens of night-migrating individuals of this species to a light set on a helicopter platform at 1,300 m. Whitehead (Sharpe 1889b; Whitehead 1893) found them near Malangkap (300 m) in Apr. 1887. *Food*: Observed hawking insects from perches at Sepilok (A. Whittaker).

Little Pied Flycatcher *Ficedula westermanni*

Status: A common resident. *Localities*: Kinabalu, Lotung, Malangkap, Megatai, Muruk Miau, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 850–3,100 m, Trus Madi 1,500–2,400 m. *Habitats*: 1° and 2° forest and scrub. *Breeding*: Whitehead (Sharpe 1889b; Whitehead 1893) found a nest near Malangkap on 25 Mar. 1887 built in a creeper ca. 12 m above the ground. It looked like a small pile of moss and was deep and lined with fine white roots. It contained one fawn-colored egg. WFVZ collected specimens with enlarged testes at Rinangisan on 20 Mar. and 3 Apr. 1983 (4 × 3 mm, 4 × 4 mm). A very young

fledgling was also caught at Rinangisan on 20 Mar. 1983. RGM observed adults with drab, mottled gray nestlings on Trus Madi during 2–12 Aug. 1999. *Voice*: During the apparent breeding season (Mar. and Apr. in the Crocker Range), their song is ubiquitous. The complete version consists of three phrases: *pink-pink dee-dee-dee-dee buzz buzz*. The *pink* notes are on a lower pitch and are sometimes not heard. The *dee* notes are higher and sometimes rise in pitch. The two final *buzzes* are the most distinctive aspect of the song. *Food*: Insects. During the 1983 El Niño drought, WFVZ observed many of these birds feeding in roadside grasses at Rinangisan.

Pygmy Blue Flycatcher Muscicapella hodgsoni

Status: A scarce resident. *Localities*: Malangkap, Kinabalu, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 1,200–2,000 m, Trus Madi 1,800–2,200 m, Crocker Range 1,100–1,300 m. *Habitats*: 1° forest. At lower elevation it frequents the forest midstory and also sometimes is found in tangled vegetation in tree-fall gaps. At higher elevation on Trus Madi, where the forest is stunted, it was largely in tree tops and not uncommon (WFVZ). *Breeding*: A specimen with testes 4×3 mm was collected along Sinsuran Road on 17 June 1983. *Voice*: A high-pitched *tsee-oo*, with an accompanying staccato churred trill. Also a high-pitched *pink*. Snowy-browed Flycatchers have similar calls, but their trill is of different quality (CMF). *Remarks*: It behaves like a flowerpecker and flicks its wings and tail constantly (A. Whittaker).

Fulvous-chested Jungle Flycatcher Rhinomyias olivacea

Status: An infrequently recorded resident. However, it is not uncommon in its coastal and island habitats, but these are not often visited by birders. *Localities*: Balambangan Island, Banggi Island, Bengkoka River, Bongon, Kinabalu (lower slopes), Kota Belud (Miyamoto 1971), Lumbidan, Maang, Sepilok, and Tabin. *Elevation*: Sea level to 900 m. Mostly coastal or lowland. The high elevation (900 m) is indicated by a specimen labeled Kiau, “3000 feet” (914 m, RMC). *Habitats*: 2° forest, mangrove edge, island strand and closed forest, and overgrown rubber. *Breeding*: Whitehead (Sharpe 1889b; Whitehead 1893) found a nest at ca. 300 m on “Kinabalu” during Feb. 1888. The nest was a neat, cup-shaped structure of moss and small sticks. The eggs were brownish-white, thickly clouded over with faint spots of reddish brown. V. W. Ryves collected three clutches of two eggs on 25, 28, and 31 Mar. 1939 and one of three eggs on 23 Mar. 1939 between Kota Belud and Kiau. The eggs (average size = 19.7×14.8 mm) were olive buff, thickly flecked with fawn or wood brown at the broad end (Gibson-Hill 1949b). WFVZ collected specimens with enlarged sexual organs at Maang on 15, 19, and 20 June 1983 (testes 9×6 mm, 8×5 mm, 11×6 mm; oviduct egg 18×12 mm). *Identification*: Compared to the Gray-chested Jungle Flycatcher, this species has a buffier (less gray) breast, but its throat may be nearly as white. *Remarks*: It does not occur on Gaya Island or in most 1° coastal swamp forest (e.g., Menggalong), where it is replaced by the Gray-chested Jungle Flycatcher (Wells 1976).

Gray-chested Jungle Flycatcher Rhinomyias umbratilis

Status: A common resident. *Localities*: Bettotan, Bole River, Brumas, Danum, Ensuan, Gaya Island, Imbak River, Kalabakan, Kimanis, Kinabalu (lower slopes),

Klias, Kunkun, Labau River, Lumbidan, Madai, Magdalena, Makaniton, Maliau, Megatai, Menggalong, Poring, Quoin Hill, Rayoh, Saliwangan, Sepilok, Sepulut, Tabin, Tawau Hills, Telupid, Ulu Dusun, and Ulu Tiulon. *Elevation*: Sea level to 750 m. *Habitats*: 1°, logged, peatswamp, and bamboo-sapling hill forest. Lambert (1990c) concluded that this species is unable to adapt to highly degraded forest. *Breeding*: V. W. Ryves collected a clutch of two eggs between Kota Belud and Kiau on 22 Mar. 1939. The eggs (23.5 × 15 mm, 23.5 × 15.5 mm) were smooth, glossy, and pale olive buff, almost completely obscured by a soft flecking of fawn (Gibson-Hill 1949b). DMB found a nest at Kimanis on 12 Apr. (no year). The nest was a thin cup of moss and rootlets decorated with pieces of rattan and a few cobwebs. It was placed in a cleft in a decaying tree stump just within the jungle edge and ca. 0.75 m above the ground. The two chicks were covered in gray down. Ten days later they were large and very spotted. DMB found a second nest at Klias (no date) in a similar situation, but placed ca. 1.75 m off the ground. It contained one egg (21 mm), which was pale stony gray and very heavily speckled with reddish brown, mostly concentrated at the larger end. A nest with two eggs was discovered on 6 May 1980 by G. Davies at Kunkun River. It was located in a hollow ca. 5 cm from the top of a 2-m mud-covered stump. Specimens with enlarged sexual organs were collected at Brumas on 7–9 May 1982 (enlarged oviduct and ruptured follicles, testes 8 × 5 mm, 9 × 6 mm, and 11.5 mm), Megatai on 20 June 1983 (testes 8 × 4 mm), and Quoin Hill on 25 July 1962 (testes 6 × 5 mm; Thompson 1966). *Voice*: Its five-note song is like a squeaky door. The first note is lowest (although very high pitched) and is followed by four higher, descending notes. MCT (Thompson 1966) described it as several notes on a descending scale. *Food*: Although a sallying aerial insectivore, it also gleans.

Rufous-tailed Jungle Flycatcher *Rhinomyias ruficauda*

Status: A scarce resident. *Localities*: Specimens: Kinabalu, Malangkap, Sayap, and Upper Padas River. Sightings: Sinsuran Road (1,500 m, KVT), Quoin Hill (350 m, KVT), and Maliau (Yong et al. 1989). *Elevation*: Kinabalu 950–1,250 m, Maliau ca. 1,000 m. *Habitats*: 1° lower montane forest, including coniferous forest. *Remarks*: The status of this bird in Sabah is a mystery. WFVZ never recorded it, and there are very few specimens. The only modern specimens are two individuals collected by RGM at Sayap (1,000 m) in July 2000 (one specimen is now at LSUMNS, the other in the Sabah Park Zoological Collection). The BMNH has five specimens with data, four from Kinabalu and one from the “Upper Padas” (collected by A. H. Everett). The AMNH has three, all from Kinabalu, collected by Whitehead and Everett at 3,000 and 4,000 ft. (914 and 1,219 m). SMC has none, and the RMC has one from Kenakok 3,300 ft. (1,006 m). Leiden Museum has a female collected by Whitehead on Kinabalu, 17 Apr. 1884. Whitehead (Sharpe 1889b; Whitehead 1893) found it in only one place (at “3000 feet” [914 m]), where it frequented the lower branches of high trees. Yong et al. (1989) observed it in coniferous forest at Maliau. Like Hill Blue Flycatcher, this species’ scarcity may be caused by the destruction of accessible 1° lower montane forests by shifting agriculture and development.

Eyebrowed Jungle Flycatcher *Rhinomyias gularis*

Status: A common resident. *Localities*: Kinabalu, Lumaku, Rinangisan, Sin-

suran Road, and Trus Madi. *Elevation*: Kinabalu 1,100–3,300 m, Trus Madi 1,400–2,100 m, Crocker Range >1,300 m. *Habitats*: 1° and 2° forest and scrub. *Breeding*: Whitehead (Sharpe 1889b; Whitehead 1893) found a nest on 11 Mar. (no year specified). It was mainly composed of moss, with a few sticks and dead leaves outside and a lining of roots and red fiber. The eggs were pale olive-greenish, clouded with reddish spots that became more densely spaced at the thick end. Specimens with enlarged testes were collected at along Sinsuran Road on 31 Jan. (6 mm) and 1 Feb. 1977 (6 mm) and at Rinangisan on 19 Mar. (6 × 3 mm and 8 × 4 mm) and 7 Apr. 1983 (6 × 4 mm). Fledglings were also caught at Rinangisan on 19 and 23 Mar. 1983. *Habits*: This species moves on the ground and through the undergrowth much like a thrush. *Identification*: The fledglings were much like the adults, but had buffy spots on their backs and tips of the greater wing coverts, and buffy streaks on their heads.

Rufous-winged Philentoma *Philentoma pyrhopterum*

Status: A common resident. *Localities*: Batu Punggul, Beaufort Hill, Bettotan, Bole River, Brumas, Danum, Ensuan, Imbak River, Kalabakan, Klias, Labau River, Lumbidan, Magdalena, Makaniton, Maliau, Megatai, Quoin Hill, Poring, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Sebatik Island, Sepilok, Tabin, Tawau Hills, and Ulu Dusun. *Elevation*: Sea level to 1,000 m. *Habitats*: 1°, 2°, and logged forest; older *Albizia*. *Breeding*: BMNBE collected a fledgling with an adult at Mt. Ensuan on 11 May 1956. The young bird was bright rufous above and below, and only the dusky black inner vanes of the primaries and the outer secondaries differed in color (R. Sims, unpubl.). Specimens with enlarged sexual organs were collected at Bole River on 18 Feb. 1982 (testes 8 × 3 mm); Brumas on 29 Mar.–7 Apr. 1977 (testes all 5 mm), 9 May (largest ovum 10 × 10 mm), and 5–6 June 1982 (testes 8 × 5 mm, largest ovum 2 × 2 mm); Sabah Softwoods on 2 July 1982 (testes 6 × 4 mm); and Imbak River on 17 July 1982 (testes 7 × 7 mm). *Voice*: Two softly whistled notes, the first higher than the second. *Remarks*: A female was observed feeding a Moustached Hawk Cuckoo chick at the base of Mt. Danum in July 1989 (UKMS-ANSP). Blue phase males have been collected at Brumas (1977), Bole River, and Sabah Softwoods. Average foraging height is 4 m in logged and 1° forest (Lambert 1990c).

Maroon-breasted Philentoma *Philentoma velatum*

Status: An uncommon resident. *Localities*: Anginon, Batu Punggul, Bole River, Brumas, Crocker Range Park Headquarters, Ensuan, Danum, Gomantong, Kalabakan, Lamag, Magdalena, Maliau, Melalap, Poring, Quoin Hill, Saliwangan, Sepilok, Tabin, and Tawau Hills. *Elevation*: Sea level to 1,200 m. *Habitats*: 1° and logged forest. *Breeding*: Specimens with enlarged testes were collected at Bole River on 22 Feb. 1982 (8 × 4 mm), and Brumas on 22 May (6 × 4 mm) and 7 June 1982 (7 × 4 mm). *Voice*: Norman (1964) described it as a noisy bird, crying *chazz, chazz, chazz* as it flies, and a sharp *chup, chup* followed by *chazz, chazz* with the head turning side to side when perched. *Remarks*: MCT (Thompson 1966) found it to be common in the “moss forest” at Anginon.

Black-naped Monarch *Hypothymis azurea*

Status: A common resident. *Localities*: Anginon, Balambangan Island, Banggi Island, Batu Punggul, Bengkoka River, Bettotan, Bole River, Brumas, Danum,

Ensuan, Garinono, Gaya Island, Gomantong, Imbak Valley, Kabayau, Kaingaran, Kimanis, Kota Kinabalu suburbs, Labuan, Lumbidan, Maang, Madai, Magdalena, Makaniton, Malangkap, Maliau, Mawau, Megatai, Membakut, Padas River, Poring, Pulau Tiga, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sandakan (mile 11), Segarong, Sepilok, Sepulut, Silam Plantation, Sukau Road, Tabin, Tawau Hills, Ulu Dusun, and Ulu Tiulon. *Elevation*: Sea level to 1,200 m. *Habitats*: 1°, 2°, logged, and closed island forest; rubber, cocoa, *Gmelina*, *Eucalyptus*, and *Albizia*. *Breeding*: Whitehead (Sharpe 1889b; Whitehead 1893) found a nest by the Padas River on 12 June 1885. The nest was 1.5 m above the ground and consisted of a cup of twigs lined with fine roots. It was placed in a large undergrowth plant. The eggs were creamy white, blotched, and spotted with brown and underlying spots of gray, chiefly at the larger end. V. W. Ryves collected a clutch of two eggs on 6 May 1938 at Sandakan Estate. The eggs (19 × 13.5 mm, 18.5 × 13 mm) were smooth, slightly glossy, and off-white, with fine specks (mostly in a ring at the broad end) with brown and light violet gray (Gibson-Hill 1949b). DMB found a nest containing two eggs at Membakut on 4 Mar. The nest was ca 1.75 m above the ground in a creeper-draped jungle tree and was composed of moss and fibers, with some dry grass mixed in and a scraggy “tail” drooping below. The eggs (17.7 × 13.3 mm) were pinkish-white, speckled and otherwise cloudily marked with reddish brown and underlying purplish gray. He found other nests at Kimanis and Mawau in June and July and observed new fledglings at Mawau in July and at Klias in mid-Oct. WFVZ observed a pair sharing nest-building duties in Sabah Softwoods’ *Albizia* on 14 June 1982. The nest, nearly completed, was a cup ca. 8.5 cm across and 7.5 cm deep, hanging in a tangle of vines and ca. 5 m above the ground. Specimens with enlarged testes were collected at Brumas on 3 and 7 May 1982 (8 × 5 mm and 6 × 3 mm), Sabah Softwoods on 17 and 27 June 1982 (7.5 × 4.5 mm and 8 × 4.5 mm), Megatai on 20 June 1983 (7 × 5 mm), and Quoin Hill on 6 Sept. 1962 (6 × 4 mm). *Voice*: A series of notes on the same pitch (*sweet-sweet-sweet . . .*), similar to that of the Asian Paradise-flycatcher and Lesser Cuckooshrike. On Pulau Tiga, the birds called *chi-choy-choy-choy . . .*, with the *chi* note on a higher pitch than the *choy*. *Food*: Grasshoppers, stick insects, coleopterans, and dipterans (DMB).

Asian Paradise-flycatcher *Terpsiphone paradisi*

Status: A common resident. *Localities*: Batu Punggul, Baturong, Beluran, Bengkoka River, Bettotan, Bole River, Brumas, Danum, Ensuan, Garinono, Gomantong, Imbak River, Kimanis, Kinabalu (lower slopes), Kulamba, Labau River, Labuk Road, Lamag, Lumbidan, Magdalena, Makaniton, Maliau, Megatai, Melalap, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Segaliud, Sepilok, Sepulut, Sukau Road, Tabin, Tambuyukon (lower slopes), Tawau Hills, and Ulu Merutai. *Elevation*: Sea level to 1,200 m. *Habitats*: 1°, 2°, and logged forest; open swamp (Kulamba), old rubber, and older stands of *Albizia*. *Breeding*: V. W. Ryves (unpubl. notes) collected two clutches of two eggs at Batang River, Sandakan, on 13 May 1938, and another clutch of two at the same location on 8 June 1938. The nests were in a “low-lying area of big forest” and were “exactly similar.” They appeared as inverted cones, ca. 3 m from the ground, one in the fork of a sapling, another on a piece of bamboolike creeper. The inside

of the nest was cup-shaped with an inner foundation-lining of strips of dead leaves and bark smoothed over with a layer of fine black horse-hair-like fibers. The outside was thickly covered with green lichens, a few pieces of which hung from the bottom. The eggs of one clutch were a pale cream color, with reddish spots, chiefly at the large end. The eggs of the other clutches had varying amounts of salmon pink as ground color. This was unevenly distributed within and between eggs. Gibson-Hill (1949b) described Ryves' eggs as smooth, glossy, and coffee-colored, spotted with light purplish gray and reddish brown, mostly at the broad end. The dimensions of the clutches collected on 13 May were 23.5×15.5 mm and 23×15.5 mm, and 22.5×16 mm and 22×16 mm. DMB found a nest at Kimanis in Mar. It was a deep cup of mosses and little shreds of bark, rootlets, and leaves matted with cobwebs and placed ca. 2.75 m above the ground in a sapling fork. It contained one egg, which was pale pink, heavily marked with bright reddish brown and having undertones of gray. Both birds took turns incubating. V. W. Ryves (unpubl. notes) also noted that males incubate the eggs. WFVZ observed nest building in 7-yr-old *Albizia* ca. 15 m from a stream on 21 July 1982. The nest was placed at ca. 4 m above the ground in a trifurcation in a thin sapling. Both the male and female participated in nest building. Each parent spent about 2 min at the nearly completed nest, apparently using their bellies to shape the cup. Specimens with enlarged sexual organs were collected at Saliwangan on 10 Feb. 1983 (enlarged oviduct, ova active); Bole River on 23 Feb. 1982 (testes 12×6 mm); Brumas on 5 and 9 Mar. 1977 (testes 9 mm, 7 mm), 7 May (testes 11×6 mm), and 9 June 1982 (testes 10×6 mm); Sabah Softwoods on 25 June 1982 (7.5×3.5 mm); Megatai on 20 June 1983 (testes 12×6 mm); Quoin Hill on 11 July 1962 (testes 9×5 mm); Imbak River on 20 and 21 June 1982 (testes 10×6 mm, largest ova 9 mm); and Sukau Road on 7 Aug. 1983 (testes 9×5 mm). *Voice*: Males give a series of rapid, melodious, high-pitched *twits*. Another call is a loud disyllabic note (DMB). *Food*: Ladybird and similar beetles, small bees, dipterans, and neuropterans (DMB). *Remarks*: By far, the most common form of this species is a long-tailed white male and a dark female. However, the WFVZ observed a dark-phase (apparent) male at Brumas, MCT (Thompson 1966) collected a rust-colored male at Quoin Hill, J. Payne observed a dark-phase pair at Segaliud, and YUE collected a long-tailed white female at Brumas.

[Japanese Paradise-flycatcher *Terpsiphone atrocaudata*

Status: The only record of this migrant is a sighting on Mt. Kinabalu, 23 Jan. 1992 (Robson 1992).]

Family PACHYCEPHALIDAE

WHISTLERS

Mangrove Whistler *Pachycephala grisola*

Status: A common resident. *Localities*: Balambangan Island, Banggi Island, Benoni, Binsulok, Bongawan, Bongon, Gaya Island, Kalampunian Besar Island, Kota Kinabalu suburbs, Kudat, Labuan, Libaran Island, Maang, Malawali Island, Manukan Island, Menggalong, Mumiang, Padas Damit, Pandasan, Pulau Tiga, Sabah Softwoods, Saliwangan, Sepilok, Si Amil Island, and Sipadan Island. *Elevation*: Sea level to 200 m. *Habitats*: Coastal and island heath forest and scrub,

peatswamp, overgrown rubber, mangroves, and 7-yr-old *Albizia*. *Breeding*: DMB observed a pair building a nest at Bongawan in Mar. 1964. The nest was a deep cup of fibrous roots and mosses placed ca. 1 m from the ground in a creeper-covered rotting tree stump in flooded peatland. WFVZ found a nest with young at Maang on 21 June 1983 in an area of overgrown rubber filled largely with bamboo. The nest was a small, top-shaped cup of thin woven plant material (9 cm across) placed at the end of an isolated bamboo branch ca. 3–4 m high. Both parents were in attendance. Specimens with enlarged sex organs were collected at Maang on 16, 19, and 24 Jan. (testes 8×4 mm, 7×4 mm, 11 mm) and 15 June 1983 (testes 7×5 mm); and at Padas Damit on 21 June 1983 (unshelled oviduct egg). *Voice*: Several loud, easily copied whistles, including *oo-oo-oo-oo chew-it*, the last note of which is slurred up to a higher pitch; *dit-dit-dit-do see-o*, with the first two *dits* on the same pitch, the third higher, the *do* is lower, and the *see-o* slurred down in pitch. There are numerous variations on these themes, and often a final, nonmelodious *chunk-chunk* (sounding much like a Striped Tit Babbler) is added by the mate. *Food*: Caterpillars. *Remarks*: On islands such as Tiga, this species seems to occupy a broad niche. It perches and flies sorties like a flycatcher, and it roams trunks and branches searching for insects like some species of babbler.

White-vented Whistler *Pachycephala homeyeri*

Status: Known in Sabah from Si Amil Island, where MCT collected two specimens in Sept. 1962, Pandanan Island (Kok in Smythies 2000), and Sipadan Island (Francis and Andau 1997). MCT and Francis and Andau found this species to be abundant in the relict forest.

Bornean Whistler *Pachycephala hypoxantha*

Status: A common Bornean endemic. *Localities*: Kaingaran, Kinabalu, Malangkap, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Kinabalu 650–2,950 m, Trus Madi 700–2,200 m, Crocker Range 1,150–1,800 m. *Habitats*: 1° and 2° forest and scrub. *Breeding*: Specimens with enlarged testes were collected along Sinsuran Road on 1, 6, and 10 Feb. 1977 (9 mm, 6 mm, 10 mm), 20 Nov. (9 × 6 mm), and 6 Dec. 1982 (6 mm, 7 mm). Fledglings were observed at Rinangisan on 26 Mar. 1983. *Voice*: Songs consist of variations on an easily whistled series of notes: *dee-dee-dee-dee-dit* (last note higher pitched), *dit-dit-dit-dit-dee-doo* (*dee* note higher than *dits*, *doo* note lower); sometimes a series of seesaw notes; and sometimes a song ending with a loud *tee-ow chirp*. *Food*: Caterpillar (Smythies 1964b), insects, ants, beetles, crickets, and rarely seeds (J. Boys). *Identification*: Adults have no rufous brown on the head or neck as shown in Smythies (1981). Fledglings are almost entirely rufous brown, with some yellow feathers emerging (depending upon age). *Remarks*: Often occurs in flocks of the same or mixed species, hawking insects acrobatically.

Family PARIDAE

TITS

[Great Tit *Parus major*

Status: A rare migrant or resident. The only records are two sightings by DMB in Jan. and Feb. 1962 at Binsulok and Kuala Penyu in mangrove and “riverside jungle.” A call of *zink-zink* was given a few times (Smythies 1981).]

Family SITTIDAE

NUTHATCHES

Velvet-fronted Nuthatch *Sitta frontalis*

Status: A common resident. *Localities:* Beluran, Benoni, Bole River, Brumas, Danum, Ensuan, Kalabakan, Kinabalu, Labau River, Labuk Road, Lumaku, Lum-bidan, Magdalena, Malangkap, Maliau, Mawau, Megatai, Meliau, Membakut Beach, Menggalong, Padas River, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Sebatik Island, Segarong, Sepilok, Silam Plantation, Sinsuran Road, Tabin, Trus Madi, Tuaran, Ulu Tiulon, and Weston. *Elevation:* Sea level to 2,200 m. *Habitats:* Virtually all forest habitats, including 1°, 2°, and logged, and swamp forest; casuarinas, mangroves, all ages of *Albizia*, young and old rubber, and cocoa under *Albizia*. Numbers decline after logging (Lambert 1990c). *Breeding:* DMB found a pair breeding at Mawau in Feb. 1962. Their nest was located in a very small woodpecker or barbet hole in a dead rubber tree in newly replanted rubber grove. The hole was about 2 cm across and was located only 1.75 m above the ground. It contained three whitish eggs speckled with rusty brown and measuring 17 × 13.5 mm. Gore (1964a) reported on a nest with young on 23 Apr. 1964 on the Pinosuk Plateau along the Mesilau River. The nest was in a hole about 1 m beneath the top of a broken, dead *Helicia* tree, and about 8 m above the ground. The hole was old and worn and may have been excavated by a barbet. It had not been patched with mud. The parents fed the young (number undetermined) throughout the day at 8-min intervals, and removed fecal sacs every second or third visit. When the nest was checked again on 6 May, it was no longer occupied. Specimens with enlarged sexual organs were collected at Saliwangan on 11 and 13 Feb. 1983 (testes 5 mm, enlarged oviduct); Silam Plantation on 6 Mar. 1982 (testes 5 × 4 mm); Brumas on 16 May 1982 (testes 7 × 6 mm); and Sabah Softwoods on 18 June 1982 (testes 7 × 4 mm). *Voice:* Tinkling noises and a rapid series of loud, high-pitched *seeps*. One distinctive call is *swik-swik* (DMB). *Food:* It is a bark-surface gleaner that eats insects, including beetles.

Family DICAEDAE

FLOWERPECKERS

Scarlet-breasted Flowerpecker *Prionochilus thoracicus*

Status: An uncommon resident. *Localities:* Binsulok, Ensuan, Maliau, Meliau, Merintaman, Menggalong, Sepilok, and Ulu Rukuruku. *Elevation:* Sea level to 1,000 m (Ensuan and Maliau). *Habitats:* 1°, 2°, ultrabasic, and peatswamp forest; fire-padang kerangas, coastal casuarinas, and abandoned rubber. This species seems to prefer poor soil habitats. WFVZ encountered it only in peatswamp forest and fire-padang kerangas (Smythies 1981). Davies and Payne (1982) recorded it in upland forest growing on ultrabasic soil at Ulu Rukuruku, and it was collected in similar forest by the BMNBE at Mt. Ensuan and Meliau. This would explain its absence from well-studied areas such as Danum and Bole River. *Breeding:* A specimen with enlarged testes (5 × 3 mm) was collected at Binsulok on 3 Mar. 1983. *Voice:* A harsh *chink* (DMB). *Food:* Loranthaceae and *Eugenia* berries; also small insects and spiders taken from webs and from tree trunks (DMB).

Yellow-rumped Flowerpecker *Prionochilus xanthopygius*

Status: A common Bornean endemic. *Localities:* Binsulok, Bole River, Brumas, Danum, Gomantong, Imbak River, Kabayau, Kaingaran, Lumbidan, Maang, Magdalena, Makaniton, Maliau, Mawau, Megatai, Menggalong, Quoin Hill, Penampang, Poring, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Silam Plantation, Tabin, Tambunan, Tawau Hills, and Ulu Tiulon. *Elevation:* Sea level to 1,100 m (Mt. Danum). *Habitats:* 1°, 2°, logged, and peatswamp forest; *Albizia* and *Albizia* over cocoa, fire-padang kerangas, and overgrown rubber. Lambert (1990c) listed it as more common in logged forest than 1° forest. *Breeding:* Phillipps (1970) observed a family in Penampang in mid-Aug. 1969 that included two fledglings being fed by parents. Specimens with enlarged sex organs were collected at Saliwangan on 8 Feb. 1983 (testes 4 × 3 mm), Silam Plantation on 23 Feb. 1982 (testes 4 × 2 mm), Bole River on 1 Mar. (testes 6 × 3 mm) and 6 Apr. 1982 (testes 4 × 3 mm), Maang on 15 June 1983 (testes 5 × 4 mm), Megatai on 22 June 1983 (testes 4 × 3 mm), Sabah Softwoods on 20 and 23 June 1982 (testes 6 × 4 mm, 5 × 4 mm), Imbak River on 16 July 1982 (testes 5 × 3 mm), and Quoin Hill on 13 and 26 Sept. 1962 (enlarged oviduct, testes 6 × 4 mm). *Voice:* The voice is reminiscent of trogons or Plaintive Cuckoo, but at higher pitch. It is a rapid, descending series of notes. Alternatively, the birds repeat seven to nine staccato notes on the same pitch, *zee-zit-zit-zit . . .* *Food:* MCT (Thompson 1966) observed them feeding on *Trema orientalis* at Quoin Hill, and DMB observed them feeding on overripe *Eugenia* fruit and berries and buds of *Lantana*. Lambert (1990c) listed it as a generalist insectivore–nectarivore–frugivore.

Crimson-breasted Flowerpecker *Prionochilus percussus*

Status: A rare resident. *Localities:* Specimens have been collected at Magdalena and Silam Plantation (but see Remarks). Sightings include Danum, Sinsuran Road, Poring, and Wallace Bay area. *Elevation:* Specimens from sea level to ca. 150 m. Sightings from sea level to 1,000 m. *Habitats:* 2° upland and lower montane scrub. *Remarks:* The only confirmed record is a male collected at Mt. Magdalena by the BMNBE (Sims, unpubl.). WFVZ collected a female in the 2° scrub surrounding Silam Plantation that may be this species, but also resembles Scarlet-breasted Flowerpecker. WFVZ also sighted this species along Sinsuran Road in June 1989 at ca. 1,000 m, and Q. Phillipps (Smythies 1981) recorded a pair at approximately the same elevation in the “Crocker Range” (probably also Sinsuran Road). Norman (1964) reported several sightings in the Tawau and Wallace Bay area and even described a possible nest.

Yellow-breasted Flowerpecker *Prionochilus maculatus*

Status: A common resident. The commonest flowerpecker in lowland and upland 1° forest. *Localities:* Bettotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Imbak River, Kalabakan, Klias, Labau River, Madai, Magdalena, Makaniton, Meliau, Membakut, Menggalong, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silam Plantation, Simatuoh, Tabin, Tawau Hills, Ulu Samuran, and Ulu Tiulon. *Elevation:* Sea level to 1,250 m. *Habitats:* 1°, logged, and swamp forest; old rubber and *Albizia*. *Breeding:* Specimens with enlarged sexual organs were collected at Saliwangan on 26 Feb. 1983 (testes 6 × 4 mm), Bole River on 17 Feb. 1982 (testes 8 × 4 mm, largest ovum 8 mm), Silam Plantation on 7 Apr. 1982 (testes 6 × 4 mm), Sabah Soft-

woods on 28 June 1982 (testes 8×4 mm), Imbak River on 16 July 1982 (testes 6×4 mm), and Sepilok on 29 July 1983 (testes 8×4 mm). *Food*: Berries.

Yellow-vented Flowerpecker *Dicaeum chrysorrheum*

Status: An uncommon resident. *Localities*: Anginon, Bole River, Danum, Kabayau, Kaingaran, Kinabatangan River, Klias, Lumadan, Malangkap, Maliau, Poring, Sabah Softwoods, Segaliud-Loken, Sepilok, Sinsuran Road, Tambunan, and Ulu Segama. *Elevation*: Sea level to 1,100 m. *Habitats*: 1°, 2°, and logged forest; highland kerangas, *Albizia*, and abandoned rubber. *Voice*: Its loud, hoarse contact calls are typical of flowerpeckers, but deeper and more profound. DMB described the call as a soft squeak and the song as *chip-a-chip treeeee*. *Food*: Small figs, and berries with seeds ca. 3×3 mm. *Remarks*: This species is sporadic and not at all common. WFVZ found it mostly in lower-montane 2° forest, but DMB found it to be fairly common around Klias and Lumadan.

Thick-billed Flowerpecker *Dicaeum agile*

Status: A scarce resident. *Localities*: Bole River, Danum, Sabah Softwoods, Sukau, and Tabin. *Elevation*: 50–200 m. *Habitats*: 1° forest and older *Albizia* groves. *Identification*: A large flowerpecker, often in flocks, with moderately streaked underparts, olive upperparts, and faint tail spots. It is easily identified by its habit of fanning and wagging its tail. *Food*: Insects. *Remarks*: WFVZ first observed and obtained specimens of this species in Sabah Softwoods and discovered that it had been confused with Brown-backed Flowerpeckers in taxonomic treatments (Sheldon 1985). Both species are present in Sabah, but seem not to frequent the same habitats. CMF observed this species at Tabin Wildlife Reserve in 1982.

Brown-backed Flowerpecker *Dicaeum everetti*

Status: A rare resident. *Localities*: Specimens from Binsulok and Labuan, and several sightings at Mawao, Klias, Bongawan, and Lumahat by DMB (Smythies 1981) and a recent sighting from Sukau (Smythies 2000). *Elevation*: Sea level. *Habitats*: The only modern specimen (from Binsulok) was collected in fire-padang kerangas. It may be restricted to coastal kerangas or related poor-soil forests (Sheldon 1985). *Breeding*: DMB watched a pair at Lumahat in Feb. 1962 adding material to a nest some 5–6 m up a tree: “The nest appeared to be a felty pouch, was built of lalang seed heads or perhaps kapok down; it was suspended from the end of one of the outer branches and was quite inaccessible.” A specimen collected at Binsulok on 3 Mar. 1983 had testes 5×3 mm (WFVZ). *Identification*: A moderate-sized flowerpecker with olive-brown upperparts, primaries tinged with olive, grayish underpart with no streaking, and no spots in the tail.

Plain Flowerpecker *Dicaeum concolor*

Status: An uncommon resident. *Localities*: Bole River, Kaingaran, Keningau, Kinabalu (lower slopes), Magdalena, Megatai, Poring, Saliwangan, Sinsuran Road, and Tambunan. *Elevation*: 200–1,100 m. There is a record from sea level near Wallace Bay (Norman 1964), but such a low elevation is unusual, and this record should be treated with caution. *Habitats*: 2° and logged forest. *Breeding*: V. W. Ryves collected a clutch of two eggs at Kiau on 23 Mar. 1939. The eggs (14×11 mm and 13.5×11 mm) were smooth, pale orange-pink, thickly flecked towards the broader end with reddish brown (Gibson-Hill 1949b). Specimens with

enlarged testes were collected at Megatai on 22 June 1983 (3 × 3 mm) and Kaingaran on 1 July 1983 (3 × 3 mm, 3 × 3 mm). *Food*: Green berries.

Black-sided Flowerpecker *Dicaeum monticulum*

Status: A common Bornean endemic. *Localities*: Anginon, Kaingaran, Kinabalu, Lumaku, Malangkap, Maliau, Muruk Miau, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation*: Crocker Range 1,000–1,500 m, Kinabalu 700–2,250 m, Trus Madi 750–2,500 m. *Habitats*: 1° and 2° forest and scrub, and kerangas at Maliau. *Breeding*: A specimen with enlarged testes was collected at Anginon on 17 Dec. 1962 (5 × 3 mm). *Identification*: The female may be confused with a Plain Flowerpecker, but is larger and whiter on the throat. *Food*: Parasitic tree plants with small fruits (Whitehead in Sharpe 1889d; Whitehead 1893). RGM observed them eating *Melastoma* berries at Kinabalu Park Headquarters.

Scarlet-backed Flowerpecker *Dicaeum cruentatum*

Status: A common resident. *Localities*: Balambangan Island, Banggi Island, Binsulok, Gaya Island, Kabayau, Kinabalu (lower slopes), Kota Kinabalu suburbs, Kudat, Labuan, Lamag, Maang, Malangkap, Maliau, Megatai, Membakut, Membakut Beach, Menggalong, Merutai, Papar, Padas Damit, Saliwangan, Sepilok, and Tawau. It was found on Balambangan Island by Chasen and Kloss (1930a, b) in 1927, but not by Wells (1978) in 1977. *Elevation*: Sea level to 700 m. *Habitats*: 2° scrub, mangrove edges, peat swamp forest edges, fire-padang kerangas, highland kerangas (Maliau), overgrown rubber, and gardens. *Breeding*: DMB found nests between Nov. and Jan. and again in Apr. and May. They were small pouches suspended from the outer branches of trees at heights of 5–9 m and composed ofalang seed heads, kapok, or similar down and often decorated with fragments of leaf or pieces of bark. The only nest he examined contained one whitish egg, covered by a few faint brownish flecks at the large end. Specimens with enlarged testes were collected at Binsulok on 16 Jan. (5 × 4 mm, 4 × 3 mm) and 12 Mar. 1983 (4 × 3 mm), Membakut on 21 Feb. 1977 (6 mm), and Maang on 16 June 1983 (5 × 4 mm). *Voice*: Buzzy seesaw and a single, long, high-pitched *seep* or *seep-seep*. DMB described it as a high-pitched, disyllabic *chizee*. *Food*: Small hard fruit, Loranthaceae fruits, limes, figs (DMB). *Remarks*: A highly vagile species, occasionally seen flying over open areas. Lambert (1990a) saw one on the coast near Tawau with a red crown and rump, but a black back.

[Scarlet-headed Flowerpecker *Dicaeum trochilium*

Status: Known only from southern Borneo, Java, and some Lesser Sunda islands. A record from Tabin (Mitchell 1994) is presumed to be erroneous (Smythies 2000).]

Orange-bellied Flowerpecker *Dicaeum trigonostigma*

Status: A common resident. *Localities*: Anginon, Balambangan Island, Banggi Island, Batu Punggul, Binsulok, Bole River, Brumas, Danum, Ensuan, Goman-tong, Kabayau, Kaingaran, Keningau, Kinabalu (lower slopes), Kinarut, Kota Kinabalu suburbs, Labuan, Labuk Road, Lumbidan, Maang, Makaniton, Maliau, Malangkap, Megatai, Membakut Beach, Menggalong, Merintaman, Merutai, Padas Damit, Papar, Poring, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Se-garong, Sepilok, Silam Plantation, Sinsuran Road, Tambunan, and Ulu Tiulon.

Elevation: Sea level to 1,300 m. *Habitats:* 2°, logged, and peatswamp forest; mangrove edges, highland kerangas, *Albizia*, *Eucalyptus*, overgrown rubber, and gardens. The most common flowerpecker occurring in 2° growth. *Breeding:* DMB found a nest from which a bird had just fledged at Klias in Sept. It was a small domed, pouch-shaped, structure composed of a feltlike mass of bright red plant fibers and down, and it was suspended from the end of a jackfruit branch ca. 2.5 m above the ground. The oval entrance hole was immediately below the twig from which the nest was suspended. Other nests, noted in July and Sept. to Dec., were typically 6–9 m above the ground in rubber trees and usually suspended from outer twigs just below the terminal leaf cluster. One nest at Bandau (Membakut) was found ca. 5 m up in a jacaranda. Specimens with enlarged sexual organs were collected at Membakut Beach on 2 Feb. 1983 (testes 6 × 4 mm), Maang on 10 Feb. 1982 (testes 5 × 4 mm) and 20 June 1983 (testes 6 × 3 mm), Bole River on 9 Mar. (testes 7 × 6 mm) and 7 Apr. 1982 (testes 6 × 4 mm), Megatai on 21 June 1983 (testes 6 × 4 mm), Sabah Softwoods on 25 June 1982 (10 mm oviduct egg), and Labuk Road on 1 Aug. 1983 (testes 5 × 4 mm). *Voice:* Includes a loud, shrill chirp and an excited *tzit*, often repeated (DMB). *Food:* Bananas, *Eugenia* fruit, Loranthaceae berries; the flowers and new fruits of rubber, coffee, and mangrove; and small insects, pollen, and nectar (DMB). A nectarivore–insectivore–frugivore, with nectar constituting an important dietary component (Lambert 1990c).

Family NECTARINIIDAE

SUNBIRDS AND SPIDERHUNTERS

Plain Sunbird *Anthreptes simplex*

Status: A common resident. *Localities:* Bettotan, Bole River, Brumas, Danum, Gomantong, Imbak River, Kabayau, Labau River, Labuk Road, Lumbidan, Maang, Makaniton, Megatai, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Sebatik Island, Segarong, Selinga Island, Sepilok, Silam Plantation, Tabin, and Ulu Tiulon. *Elevation:* Sea level to 400 m. *Habitats:* 1°, 2°, and logged forest; *Albizia*, abandoned rubber, and *Albizia* and *Trema orientalis* over cocoa. *Breeding:* Specimens with enlarged sexual organs were collected at Silam Plantation on 23 Feb. 1982 (testes 5 × 4 mm), Bole River on 15 Mar. (testes 6 × 5 mm) and 3 Apr. 1982 (testes 7 × 5 mm), Brumas on 8 (enlarged oviduct) and 11 May 1982 (testes 6 × 3 mm), Sabah Softwoods on 30 June 1982 (testes 6 × 4 mm), and Labuk Road on 1 Aug. 1983 (testes 6 × 4 mm). *Food:* MCT (Thompson 1966) observed them at cassava flowers, and DMB often saw them feeding at *Bauhinia* and fig flowers. Specimens from Sabah Softwoods *Albizia* had their stomachs filled with caterpillars. Lambert classified it as a generalist insectivore–nectarivore–frugivore (Lambert 1990c) and also observed it eating fruits of *Poikilospermum suaveolens* (Lambert 1991). *Remarks:* Extremely warblerlike in their leaf-gleaning behavior (especially in the *Albizia* canopy).

Brown-throated Sunbird *Anthreptes malacensis*

Status: A common resident. *Localities:* Bai Island, Balambangan Island, Banggi Island, Benkoka River, Benoni, Berhala Island, Binsulok, Bodgaya Island, Bohey Dulang Island, Bongawan, Gaya Island, Kabayau, Keningau, Kinabalu (lower slopes), Kota Kinabalu and suburbs, Kudat, Kulamba, Labuan, Labuk Road, La-

mag, Libaran Island, Maang, Malawali, Mantanani Island, Megatai, Membakut Beach, Mengalum Island, Merintaman, Mumiang, Padas Damit, Pandanan Island, Papar, Pulau Tiga, Rayoh, Sabah Softwoods, Saliwangan, Sebatik Island, Sepilok, Segarong, Si Amil Island, Sipitang, Tambunan, Tempasuk, and Tenom. *Elevation:* Generally from sea level to ca. 500 m. The highest record is a specimen collected at 950 m on Kinabalu (Peters 1940). *Habitats:* 2° forest and scrub, closed island forest, open swamp (Kulamba), mangroves, beach strand, casuarinas, *Albizia*, coconut palms, and gardens. *Breeding:* DMB found nests in the Kimanis Bay area between Jan. and Mar. and in July, and family parties from Apr. to July and in Nov. The nest is a typical sunbird packet, suspended from the terminal twigs of branches, although generally placed higher than those of other species. It is composed of plant fibers and dry grasses felted together with cobwebs and lined with vegetable down. The two eggs are pale pink, heavily marked with lines, squiggles, and blotches of purplish black and russet. WFVZ found a nest on 5 June 1983 at Kampung Padas Damit in a tree growing through the porch of an abandoned house. It was a pendulous, long-oval nest, hanging ca. 1.5 m above the ground, with a 3.6-cm opening near the top. It had a "roof" over the opening and was finely woven from dry grass, dry leaves, and other vegetable matter. It was camouflaged with larger leaves fastened by cobwebs. The cup lining was fine grass and other soft materials. It contained two moderately incubated eggs. Specimens with enlarged sexual organs were collected at Tenom on 4 Jan. 1963 (testes 5×4 mm), Saliwangan on 2 Feb. 1983 (testes 5×6 mm) and 23 Dec. 1976, Membakut on 22 Feb. 1977 (testes 5 mm), Bongawan on 11 Mar. 1983 (testes 7×6 mm), Likas on 1 June 1983 (testes 8×3 mm, 6×4 mm), Mengalum Island on 3 June 1983 (testes 6×5 mm), Maang on 15 June 1983 (testes 5×4 mm, largest ovum 17×11 mm), Sipitang on 17 July 1983 (testes 7×4 mm), and Bodgaya Island on 16 Aug. 1983 (testes 6×5 mm). *Identification:* See Red-throated Sunbird. *Voice:* An incessant two-note song: *wee-chew* or *witch-it*. *Food:* DMB observed them piercing the corollas of trumpet-shaped flowers (e.g., *Loranthus*) near their bases and feeding on the nectar. He also saw them feed at flowers of tulip trees, plantains, and coconut, as well as eating a variety of small insects, spiders, caterpillars, and overripe fruit. *Remarks:* On islands, this species is abundant and ubiquitous, and it seems to fill several niches, including berry-eater and leaf-gleaner. With Olive-backed Sunbird, it is the commonest sunbird outside the 1° forest.

Red-throated Sunbird *Anthreptes rhodolaema*

Status: An uncommon resident. *Localities:* Bole River, Danum, Kimanis, Kota Kinabalu, Kuala Segama, Membakut, Papar, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Sebatik Island, Sepilok, Silam Plantation, Tambunan, Telupid, and Ulu Mawau. *Elevation:* Sea level to 500 m. *Habitats:* 2° forest, logged forest, scrub, cocoa, and *Albizia*. Sabah Museum has a specimen collected in "tall forest" near Telupid. *Breeding:* Specimens with enlarged sexual organs were collected at Sabah Softwoods on 21 (testes 7×5 mm) and 25 June (testes 7×6 mm) and 1 July 1982 (testes 6×4 mm, 5×3 mm), and Quoin Hill on 9 Aug. (testes 5×3 mm) and 12 Sept. 1962 (enlarged oviduct). *Food:* Caterpillars, spiders, orthopterans, and fruit. DMB observed it feeding at ginger flowers. *Identification:* Distinguished from the male Brown-throated Sunbird by a greenish belly, reddish

cheeks, and more red on the wing coverts. *Remarks:* MCT (Thompson 1966) wondered whether this species is allopatric with respect to Brown-throated Sunbird, because the two species did not co-occur at Quoin Hill plantation. All of WFVZ's Red-throated Sunbird specimens came from Sabah Softwoods' *Albizia*, suggesting that this species may be common only in plantations (or perhaps only in the southeastern part of the state). In support of MCT's observation, we found Brown-throated Sunbirds to be scarcer than Red-Throated Sunbirds in the plantation.

Ruby-cheeked Sunbird *Anthreptes singalensis*

Status: A common resident. *Localities:* Banggi Island, Beluran, Bettotan, Bole River, Brumas, Danum, Gomantong, Kabayau, Kinabalu (lower slopes), Klias, Labau River, Labuan, Labuk Road, Lumaku, Lumbidan, Magdalena, Megatai, Membakut Beach, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Silam Plantation, Lumaku, Tanjung Aru, Ulu Kimanis, Ulu Tiulon and Weston. *Elevation:* Generally sea level to ca. 500 m; one specimen was taken on Mt. Lumaku at 1,200 m. *Habitats:* Principally 2° and logged forest and scrub; *Albizia*, *Gmelina*, cocoa, beach strand, and gardens. Also found in 1° forest. *Breeding:* DMB found nests from Jan. to Mar., all built behind thick vegetation under the lip of steep roadside banks in mature rubber. They were never in the open, like other sunbird nests. The nests were similar in appearance to those of the Brown-throated Sunbird, being a cradle of vegetable fibers, mosses, or dry grasses, held together with cobwebs and fixed by cottony fibers to rootlets. The two eggs are pale lilac or puce and bear fine lines and specks of dark reddish brown. Specimens with enlarged sexual organs were collected at Bole River on 6 and 9 Mar. 1982 (5 mm and 6 × 5 mm), Silam Plantation on 6 Mar. 1982 (testes 5 × 4 mm), Brumas on 13 June 1982 (testes 5 × 3 mm), Sabah Softwoods on 30 June (unshelled oviduct egg) and 5 July 1982 (5 × 4 mm), and Labuk Road on 30 July 1983 (testes 6 × 4 mm). *Voice:* A succession of notes on a descending scale (DMB). *Identification:* This is a much smaller bird than Brown-throated or Red-throated sunbirds.

Purple-naped Sunbird *Hypogramma hypogrammicum*

Status: A common resident. The commonest sunbird in the lower story of the forest, often netted. *Localities:* Batu Punggul, Beluran, Bettotan, Bole River, Brumas, Danum, Garinono, Gomantong, Imbak River, Kabayau, Kaingaran, Kalabakan, Klias, Kulamba, Labau River, Labuk Road, Lumbidan, Maang, Madai, Magdalena, Mekaniton, Maliau, Megatai, Merutai, Pandasan, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Sepilok, Sepulut, Silam Plantation, Tabin, Tambuyukon, Tawau Hills, Telupid, Ulu Dusun, and Ulu Tiulon. *Elevation:* Sea level to 1,000 m (Mt. Danum). *Habitats:* 1°, 2°, logged, and riparian forest; open swamp (Kulamba), *Albizia*, and overgrown rubber. The only generalist (insectivore–nectarivore–frugivore) that is not more common in logged areas (Lambert 1990c). *Breeding:* DMB found a nest under construction at Klias on 17 Jan. 1961. It was suspended from the underside of a plantain leaf. It was a typical pear-shaped structure made of grasses and rootlets, with pieces of hair and bark woven in. Specimens with enlarged sexual organs were collected at Maang on 24 Jan. 1982 (testes 6 mm) and 27 June 1983 (testes 5 × 4 mm), Saliwangan on 20 Feb. 1983 (testes 4 × 2 mm) and 27 Dec. 1976 (testes 5 mm),

Brumas on 8 Mar. 1977 (testes 5 mm) and 9 May 1982 (testes 5×3 mm), Sabah Softwoods on 25 June (testes 5×4 mm) and 5 July 1982 (testes 5×3 mm), Imbak River on 16 July 1982 (ovary with three ruptured follicles), Sepilok on 29 July 1983 (testes 5×4 mm), Labuk Road on 1 Aug. 1983 (testes 5×3 mm), and Megatai on 25 Nov. 1981. *Voice*: A high strong *sweet-sweet-sweet*, pause, *sweet*, pause, *sweet*. Also a sharp *tsit-tsit* call (DMB). *Food*: Commonly feed at plantain flowers (DMB). Fruits of *Poikilospermum* are an important dietary component (Lambert 1991). *Remarks*: Average foraging height 5 m in 1° forest and 4 m in logged forest.

Purple-throated Sunbird *Nectarinia sperata*

Status: An uncommon resident. *Localities*: Beaufort, Beluran, Bettotan, Binsulok, Bole River, Gaya Island, Danum, Kimanis, Klias, Labau River, Labuan, Labuk Road, Maang, Membakut Beach, Merintaman, Padas Damit, Poring, Quoin Hill, Sabah Softwoods, Saliwangan, Sepilok, and Tabin. *Elevation*: Sea level to 1,000 m (Mt. Danum). *Habitats*: 1°, 2°, logged, and swamp forest; coastal scrub, fire-padang kerangas, mangrove edges, *Albizia*, overgrown rubber, and gardens. Almost all WFVZ records are from logged forest, 2° forest, and scrub, but this may be because these very small birds inhabit the canopy and are difficult to see in 1° forest. *Breeding*: GD found a nest at Bole River on 29 Sept. (no year). It was a purse made of plant fibers slung over a horizontal twig, with a side entrance, 15 m up in the lower part of a tree crown (Smythies 2000). Specimens with enlarged testes were collected at Saliwangan on 6 Jan. 1977 (7 mm), Membakut Beach on 25 Jan. 1983 (6×5 mm), Binsulok on 19 Feb. 1983 (7×5 mm), Bole River on 8 and 10 Apr. 1982 (7×4 mm, 6×5 mm), and Maang on 15 June 1982 (8×5 mm). *Voice*: In flight this species gives a *chitchitchitchit* sound. *Food*: Nectar; it was also observed picking insects from a spider web (WFVZ).

Copper-throated Sunbird *Nectarinia calcostetha*

Status: A resident that is common in mangroves. *Localities*: Binsulok, Gaya Island, Kimanis, Klias, Kuala Penyu, Kudat, Labuan, Libaran Island, Likas Swamp, Lumbidan, Manukan Island, Membakut River, Merutai, Papar, Pulau Tiga, Sebatik Island, Segarong, Sepilok, Si Amil Island, and Tuaran. There are also many old records from mangroves formerly in the area surrounding Kota Kinabalu. *Elevation*: Sea level. *Habitats*: Mangroves and scrub adjacent to mangroves. *Breeding*: DMB found nests in the Kimanis Bay area in May. The nests were typically a pear-shaped bag suspended from twigs of mangroves and casuarinas and composed of grasses, mosses, and vegetable fibers held together with cobwebs and decorated with bits of bark and cocoons. They usually had a small roof over the entrance hole. DMB did not examine any eggs, but the brood size seemed to be two. At Likas Swamp on 18 May 1983, WFVZ found three nests, two in construction and a third completed but without eggs. The birds were extremely noisy as they built their nests, and it is possible that the incompleting nests were decoys. The finished nest was located in a short, bushy, ant-infested mangrove tree ca. 2 m above the water. It was pensile, like that of Olive-backed Sunbird, but not quite as long or camouflaged. It opened on the side and the opening was covered with a small roof. Egret feathers lined the interior. Specimens collected at Likas Swamp on 1 June 1983 had testes 4×3 mm and 3×2 mm. *Voice*: A prinia-like trill, but more melodious and less descending. *Identi-*

fication: This is a large species. The males are all dark from a distance and reminiscent of starlings. Females are remarkably similar to Little Spiderhunter with a short bill. *Food*: It often feeds at red mangrove flowers.

Olive-backed Sunbird *Nectarinia jugularis*

Status: A common resident. *Localities*: Ambang, Balambangan Island, Banggi Island, Berhala Island, Binsulok, Bohey Dulang Island, Gaya Island, Kaingaran, Kalampunian Besar, Keningau, Kinabalu (lower slopes), Kota Kinabalu and suburbs, Kudat, Labuan, Lumbidan, Manatanani Island, Membakut Beach, Mengalong, Mengalum Island, Merintaman, Miagra Island, Mumiang, Padas Damit, Papar, Pandasan, Pulau Tiga, Saliwangan, Sandakan, Selakan Island, Selingaan Island, Sepilok, Serankai Island, Si Amil Island, Sibuan Island, Sinsuran Road, Sipadan Island, Tambunan, Tawau, Tempasuk. *Elevation*: Sea level to 1,500 m (Kinabalu and Sinsuran Road). *Habitats*: 2° forest and scrub, closed forest on islands, fire-padang kerangas, beach strand, casuarinas, coconuts, heath forest, mangroves, rubber, and gardens. *Breeding*: Near Sandakan, V. W. Ryves (notes) collected a clutch of two on 27 Mar. 1938 and observed fledging of two young from other nests on 26 Apr. and 2 May 1938. After the third nest was empty, it was reoccupied (presumably by the same parents) on about 13 May and Ryves collected two eggs from it on 28 May 1938. Gibson-Hill (1949b) described the eggs (both 16 × 11 mm) as having a fine matte surface and white ground color. They were almost completely obscured with fine speckling of light olive gray and some light brown. DMB found nests in the Kimanis Bay area throughout the year, with a particularly large number occurring from Jan. to May. The nests were pear-shaped, usually with a little hood over the round entrance hole and a straggly "tail" hanging below. They were constructed of plant fibers, grasses, hair, and moss, and decorated with pieces of bark, dead leaves, lichens, cobweb, cocoons, larval frass, and a variety of other materials. The insides were lined with a thick layer of kapok or lalang down. The favored location for nests was the lip of roadside banks, landslips, and so on, where the nest was suspended from exposed rootlets from 1–8 m off the ground. Sometimes the nests were suspended from clumps of pigeon orchids on rubber trees, outer branches of rubber trees, creepers, radio and TV aerials, telephone wires, and cables. WFVZ found the following active nests: on Pulau Tiga, 12 Jan. 1982, containing two well-incubated eggs; Mantanani Island, 9 and 10 Mar. 1982, containing two well-incubated and two fresh eggs, respectively; and Mengalum Island, 2 June 1983, containing two naked chicks. Specimens with enlarged testes were collected at Membakut Beach on 25 Jan. 1983 (5 × 4 mm), Mengalum Island on 3 June 1983 (5 × 4 mm, 5 × 3 mm), and Sinsuran Road on 15 Nov. 1982 (5 × 3 mm). *Food*: DMB observed this species picking spiders from webs and piercing the corollas of *Loranthus* and other flowers for nectar. *Remarks*: On islands, Olive-backed and Brown-throated sunbirds are the prevalent sunbirds. We found Olive-backed Sunbirds occupying islands as small as 2.5 ha.

Crimson Sunbird *Aethopyga siparaja*

Status: A common resident. *Localities*: Balambangan Island, Banggi Island, Beluran, Benkoka, Benoni, Binsulok, Bongawan, Garinono, Gaya Island, Kabayau, Kalabakan, Kinabalu (lower slopes), Kudat, Labuan, Lamag, Lumbidan, Maang, Malangkap, Maliau, Megatai, Melalap, Membakut Beach, Mengalong,

Padas Damit, Pulau Tiga, Saliwangan, Segarong, Sepilok, Sinsuran Road, Tawau, and Tiger Estate. *Elevation*: Sea level to 1,000 m. WFVZ observed this species in the same tree with Temminck's Sunbirds at 975 m. *Habitats*: 2° forest and scrub, closed island forest, beach strand, coastal and highland kerangas, mangroves, swamp forest, bamboo, rubber, newly planted oil palm, *Albizia*, and gardens. *Breeding*: Whitehead (Sharpe 1889d; Whitehead 1893) found a nest at the end of Apr. (year and locality not given; likely to be Malangkap) underneath an overhanging embankment among loose tree roots. The nest was a long pocket, consisting of dead grass and lined with fine roots. There were two eggs, pale salmon-pink, blotched with darker pink tints at the large end and spotted and marked with dark "lake" red. DMB found nests in the Kimanis Bay area in all months except Oct. and Nov., and the most nests in Apr. ($n = 14$) and May ($n = 10$) and again in Aug. ($n = 11$). The nests were usually built fairly low to the ground, along roadsides or other banks, suspended from rootlets or other vegetation, and usually shielded by tall plants. They were large structures for such small birds, with a large openings, but otherwise typical of sunbirds except for the lack of a hood over the opening (see Brown-throated and Olive-backed sunbirds). Two eggs were usually laid, and these were pale pink, heavily speckled and blotched with purplish red. Specimens with enlarged testes were collected at Saliwangan on 16 Feb. 1983 (6×4 mm), Binsulok on 7 May 1983 (5×3 mm), Tawau on 2 Sept. 1962 (5×5 mm), Sinsuran Road on 23 Nov. 1982 (5×4 mm), and Megatai on 27 Nov. 1982 (5 mm). *Voice*: A short, soft, four-note song *dih-dih-dih-dee*, higher pitched on the *dee*. DMB described it as a soft *si-si-si*.

Temminck's Sunbird *Aethopyga temminckii*

Status: A common resident. *Localities*: Anginon, Brumas, Bole River, Danum, Ensuan, Imbak River, Kaingaran, Kinabalu, Lumaku, Magdalena, Malangkap, Megatai, Quoin Hill, Rinangisan, Sabah Softwoods, Silam, Sinsuran Road, Tabin, Tambunan, Trus Madi, and Ulu Tiulon. *Elevation*: A sighting at 50 m; specimens from 150 to 1,850 m; Kinabalu to 1,850 m; and Trus Madi to 1,700 m. *Habitats*: 1°, 2°, and logged forest; and older *Albizia* groves. *Breeding*: Specimens with enlarged testes were collected at Sinsuran Road on 5 Feb. 1977 and 3 Dec. 1981 (7 mm), and Sabah Softwoods on 23 June 1982 (5×4 mm). *Voice*: One song is a constantly repeated, barbetlike (but higher pitched), *chih-tik*, which can go on for 5 min or more and is often a feature of the morning chorus. *Food*: Commonly feeds among epiphytes. RGM observed them piercing corollas of trumpet-shaped *Loranthus* flowers at Kinabalu Park. *Remarks*: The predominant sunbird of the mountains. Previously lumped with Scarlet Sunbird (*A. mystacalis*) of Java (Inskipp et al. 1996), hence the name used by Smythies (1981).

Little Spiderhunter *Arachnothera longirostra*

Status: An abundant resident. *Localities*: Anginon, Batu Punggul, Baturong, Bettotan, Binsulok, Bole River, Brumas, Danum, Ensuan, Gomantong, Gum Gum, Imbak River, Kaingaran, Kalabakan, Keningau, Kota Klias, Kudat, Labau River, Labuk Road, Lumaku, Lumbidan, Maang, Makaniton, Malangkap, Maliau, Mawau, Megatai, Melalap, Membakut, Menggalong, Poring, Rayoh, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Sepulut, Sinsuran Road, Tabin, Tawau Hills, Trus Madi, and Ulu Tiulon. *Elevation*: Sea level to 1,500 m. *Habitats*: 1°, 2°, peat swamp, and logged forest and scrub; man-

grove edges, *Albizia*, rubber, and gardens. *Breeding*: DMB found nests at Mawau and Klias in July and observed adults carrying food in May and Nov. The nests were made of rootlets and dead leaves held together with plant fibers and cobwebs and placed in a tunnel formed by sewing together the undersides of a plantain or ginger leaf. The two eggs (ca. 17×13 mm) were white with no gloss, and featured a zone or ring of reddish brown spots about the larger end. Specimens with enlarged sexual organs were collected at Bole River on 18 Feb. 1982 (oviduct ovum, testes 8×5 mm); Rinangisan on 21 Mar. 1983 (testes 6×5 mm); Brumas on 4 Apr. 1977 (testes 5 mm); Sepilok on 29 July 1983 (testes 6×5 mm); Quoin Hill on 13 Sept. 1962 testes 6×4 mm); Kalabakan on 19 (testes 7×5 mm) and 26 Oct. (testes 7×5 mm), and 4 (testes 5×4 mm), 15 (two oviduct eggs, one oviduct egg, testes 7×6 mm), and 17 Nov. 1962 (testes 5×5 mm); Labau River on 19 Oct. 1982 (testes 7×5 mm); Megatai on 20 Nov. 1981 (testes 6 mm); and Saliwangan on 24 (testes 5 mm, 6 mm, 7 mm) and 25 Dec. 1976 (6 mm) and 15 Jan. 1977 (8 mm). *Voice*: The territorial song is an incessant whistle-like squeak: *chew-chew-chew-chew* *Food*: DMB observed it piercing corollas of flowers such as cannas to obtain nectar, taking spiders and prey from webs, and obtaining insects from pools of water in epiphytes and ferns. *Remarks*: Perhaps the commonest bird in 1° forest, certainly the most commonly netted species in virtually any type of forest.

Thick-billed Spiderhunter *Arachnothera crassirostris*

Status: An uncommon resident. *Localities*: Bettotan, Danum, Imbak River, Labau River, Lamag, Magdalena, Maliau, Poring, Rayoh, Quoin Hill, Sabah Softwoods, Saliwangan, Sepilok, Silam, and Tabin. *Elevation*: Sea level to 1,200 m. *Habitats*: 1°, 2°, and logged forest; *Eucalyptus* and *Albizia*. *Breeding*: A specimen with enlarged testes was collected at Saliwangan on 4 Jan. 1977 (6 mm, YUE). *Voice*: A distinct contact call: *tch-tch* (WFVZ; King et al. 1975). *Identification*: A small species, very much like a little spiderhunter in appearance, except that it has a yellow rather than gray throat. *Remarks*: Its movements are direct, like those of Little Spiderhunter; it does not flutter like Yellow-eared Spiderhunter. In the *Albizia*, we often saw pairs fly into the plantation from the direction of 1° forest in much the same manner as parrots.

Long-billed Spiderhunter *Arachnothera robusta*

Status: An uncommon resident. *Localities*: Bole River, Gomantong, Kimanis, Klias, Kota Kinabalu suburbs, Lotung, Mawau, Membakut, Poring, Sabah Softwoods, Samawang River, Saliwangan, Sebatik Island, Sepilok, Silam Plantation, Sinsuran Road, and Trus Madi. *Elevation*: Sea level to 1,500 m. *Habitats*: 1°, 2°, logged, and coniferous forest; *Albizia*, *Eucalyptus*, tobacco plantation, rubber edges, and gardens. It may be the only spiderhunter that is more commonly found in 1° forest than logged forest (Lambert 1990c). *Breeding*: DMB found a nest on Mawau Estate at the end of Mar. 1959. It was a large and bulky mass of rootlets, leaves, moss, plant fibers, and so on, packed into the tube formed by sewing up the curled underside of a banana leaf. The nest was anchored to the leaf by kapok or similar fibers passed through the leaf and fluffed out on the upperside to hold it in place. There were two chicks. Specimens with enlarged sexual organs were collected along Sinsuran Road on 11 June 1983 (enlarged oviduct and two ruptured follicles, testes 9×4 mm) and at Trus Madi on 10 Aug. 1999 (testes $8 \times$

4 mm). *Food*: Caterpillars and large spiders. It takes advantage of the small flowers and fruit of invasive creepers (Lambert 1990c). *Identification*: Much like a Streaky-breasted Spiderhunter, only with yellow underparts. *Remarks*: Like the other large spiderhunters, this bird stays mainly in the canopy, and thus is difficult to observe in 1° forest.

Spectacled Spiderhunter *Arachnothera flavigaster*

Status: An uncommon resident. *Localities*: Batu Punggul, Bettotan, Bole River, Brumas, Danum, Deramakot, Gomantong, Kaingaran, Kinabalu, Labau River, Labuk Road, Maliau, Quoin Hill, Rinangisan, Sabah Softwoods, Saliwangan, Sepilok, Silam, Tawau Hills, and Ulu Kimanis. *Elevation*: Sea level to 1,300 m. *Habitats*: 1°, 2°, and logged forest; *Albizia*, abaca, wild bananas, edge of oil palm, coconut groves, overgrown rubber, and gardens. *Breeding*: DMB found a nest near Weston on 8 Apr. The nest was 12–13 m up a palm tree and, from the ground, seemed to be fixed to the underside of the midrib and contained young. Specimens with enlarged testes were collected at Kaingaran on 3 July 1983 (8 × 6 mm) and Labuk Road on 4 Aug. 1983 (8 × 6 mm). *Food*: Pollen, nectar, spiders, oil-palm fruit, and figs. DMB observed it feeding at plantain/banana, coconut, and other flowering trees on nectar, as well as on spiders and insects. *Identification*: In comparison to the Yellow-eared Spiderhunter it has a shorter and stouter bill, smaller cheek patch without modified feathers, and a paler gray-yellow mixture of breast feathering.

Yellow-eared Spiderhunter *Arachnothera chrysogenys*

Status: An uncommon resident. *Localities*: Batu Punggul, Bettotan, Bole River, Brumas, Danum, Imbak River, Kimanis, Labuk Road, Lamag, Magdalena, Maliau, Mawau, Poring, Quoin Hill, Sabah Softwoods, Sepilok, and Tabin. *Elevation*: Sea level to ca. 1,200 m. *Habitats*: 1°, 2°, and logged forest; abaca, *Eucalyptus*, and *Albizia*; often found in fruiting trees. *Breeding*: Specimens with enlarged sexual organs were collected at Brumas on 25 May 1982 (testes 9 × 6 mm), Imbak River on 26 July 1982 (testes 7 × 4 mm), and Labuk road on 4 Aug. 1983 (testes 9 × 6 mm, testes 9 × 6 mm, oviduct egg). *Food*: Insects, spiders, nectar, pollen, and fruit. *Identification*: Medium-length bill, large earpatch with modified feathers (filoplumes), an exaggerated admixture of gray and yellow on the breast giving the impression of streaking, and a yellow belly. *Remarks*: Instead of flying straight and chipping (as would a Little Spiderhunter), this species flutters, dips, hovers, and hangs upside down. In *Albizia*, it spends much of its time creeping and probing the holes formed by broken branches.

[Gray-breasted Spiderhunter *Arachnothera modesta*

Status: Widespread in the lowlands of Borneo, and often recorded in Sabah by bird watchers. However, we cannot confirm the existence of this species in the state. All the specimens we have examined from Sabah ($n = 92$), whether collected in the highlands or lowlands, seem to be Streaky-breasted Spiderhunters.]

Streaky-breasted Spiderhunter *Arachnothera affinis*

Status: A common resident. *Localities*: Bettotan, Bole River, Brumas, Danum, Gomantong, Imbak River, Kaingaran, Kalabakan, Kinabalu (lower slopes), Magdalena, Makaniton, Maliau, Poring, Quoin Hill, Rayoh, Rinangisan, Sabah Softwoods, Saliwangan, Sepilok, Sinsuran Road, Tabin, Tawau Hills, and Ulu Dusun.

Elevation: Sea level to 1,500 m (Sinsuran Road and Mt. Kinabalu). *Habitats:* 1°, 2°, and logged forest; rubber, abaca, *Albizia*, and gardens. *Breeding:* Whitehead (Sharpe 1889d; Whitehead 1893) collected several nests on the lower slopes of Kinabalu in mid-Mar. (no specific dates or localities). He described the nests as cuplike, suspended from the underside of a large leaf by cobweb that is actually sewn through. The nest is composed of a bright silky substance that is found on the young fronds of ferns, and seed down. The outside is covered with small flower and plant stems attached with cobweb. A typical clutch is two. The eggs are deep olive-brown, mottled and clouded all over with specks of gray and sometimes a well-marked zone of black spots and blotches. V. W. Ryves collected a clutch of two eggs on 28 Feb. 1929 at Kiau. The eggs (21 × 15.5 mm, 21.5 × 15 mm) were smooth, glossy, and unevenly colored with olive-brown becoming clove-brown in a ring at the broad end (Gibson-Hill 1949b). Specimens with enlarged sexual organs were collected at Sinsuran Road on 2 (testes 6 mm) and 6 Feb. 1977 (testes 6 mm), Bole River on 20 Feb. (testes 5 × 4 mm) and 1 Mar. (shelled oviduct egg) and 2 Mar. 1982 (largest ovum 12 × 11 mm), Brumas on 19 May 1982 (testes 6 × 4 mm), Sabah Softwoods on 5 July 1982 (testes 7 × 6 mm), Sinsuran Road on 11 June 1983 (testes 5 × 4 mm) and 17 (testes 7 × 6 mm) and 21 Nov. 1982 (testes 5 × 4 mm), and Saliwangan on 27 Dec. 1976 (testes 6 mm) and 11 Jan. 1977 (testes 9 mm). *Voice:* One call that is highly reminiscent of Little Spiderhunter: *chee-chee chitchitchit*. Other calls include two long *chitgees* followed by two short ones, and a short explosive *tchack*. *Food:* Insects, spiders, and seeds. *Remarks:* GD in (Smythies 2000) revised the taxonomy of this species complex. Formerly, there were thought to be two species, the Bornean Spiderhunter (*A. everetti*), a Bornean endemic notable for its large size, streaky breast, and montane distribution, and the Gray-breasted Spiderhunter (*A. affinis*), widespread in Sundaland in lowlands and mountains, but restricted to lowlands in Borneo. However, GD noted that *A. everetti* also occurs in Java and Bali and, thus, is properly called Streaky-breasted Spiderhunter (*A. affinis*). The former *A. affinis* occurs in the lowlands of Borneo, Sumatra, and southern Asia and, thus, is properly called *A. modesta*. However, *A. affinis* does not seem to occur in Sabah. All specimens we have examined from Sabah, whose elevations range between 200 and 1,700 m ($n = 92$), are heavily streaked and overlap in size.

Whitehead's Spiderhunter *Arachnothera juliae*

Status: An uncommon Bornean endemic. *Localities:* Kinabalu, Lumaku, Malangkap, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 1,400–1,700 m, Trus Madi 1,500–2,100 m, Crocker Range >1,150 m. *Habitats:* 1°, 2°, and recently logged forest. At Rinangisan, it was commonly heard in the drier montane forest and scrub, but not in mossy forest. *Breeding:* Specimens with enlarged testes were collected at Rinangisan on 27 June 1983 (6 × 4 mm) and Sinsuran Road on 12 Nov. 1982 (10 × 6 mm). *Voice:* A nasal *oo-ee*, descending slightly on the *oo* and rising on the *ee*. Sometimes only the *ee* is given. An alternative description is *wheee-eeerr*. *Remarks:* Apart from its distinctive call, this spiderhunter is often easy to observe because it perches for relatively long periods on exposed branches, and its movements are sedate.

Family ZOSTEROPIDAE

WHITE-EYES

Oriental White-eye *Zosterops palpebrosus*

Status: A scarce resident. *Localities:* Kinabalu ("lower spurs"; Whitehead 1893), Klias, Mawau, and Padas Damit. *Elevation:* All except Whitehead's records are at sea level. Whitehead was probably referring to an area fairly close to Kota Belud and the coast. *Habitats:* Swamp forest, edges of wet fields, and scrub along river banks. *Breeding:* Two specimens from Padas Damit (26 May 1983) had enlarged testes (5×4 mm and 4×3 mm). *Voice:* Constantly uttered, soft, tinkling contact notes. DMB described a mixture of twitters and soft *see-see-see* calls. *Identification:* Distinguished from Everett's White-eye by grayish-white, not pearly-gray underparts, and more yellow color on the throat and head (especially forehead and lores). Despite the yellow on the head, there is still a dusky line around the lower half of the eye (CMF). *Remarks:* Records at Padas Damit include four specimens collected on 26 May 1983 (WFVZ), and observations by B&W in Dec. 1984. WFVZ specimens came from a flock of 10–20 birds that was feeding and moving rapidly along the edge of a forest island in freshwater marsh. The birds were gleaning caterpillars in much the same way as warblers. When the flock flushed, it flew hundreds of meters over the open marsh before settling on another island of swamp forest. DMB sighted noisy active flocks of these birds on numerous occasions in the Mawau and Klias areas. He found that the birds usually kept to the canopy, frequenting jungle edges and overgrown scrub along riverbanks and gullies.

Black-capped White-eye *Zosterops atricapilla*

Status: A common montane resident. *Localities:* Kinabalu, Lotung, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* 950–1,800 m. There are many Kinabalu records and specimens from 1,400 to 1,700 m. Fogden (1965) mentioned a Kinabalu record from 2,900 ft. (885 m). On Trus Madi, WFVZ and RGM found them at 1,500–1,800 m. *Habitats:* 1° and 2° forest and scrub. *Breeding:* Whitehead (1893) referred to a nest built of fine roots on the underside of a moss-covered bough, but provided no data other than elevation, 5,000 ft. (1,524 m). C. Robson found a nest with young on 9 Apr. (no year) on Kinabalu (Smythies 2000). Specimens with enlarged testes were collected on Sinsuran Road on 21 Sept. (7×4 mm) and 24 Nov. 1982 (6×4 mm), and at Rinangisan on 24 Mar. (5×4 mm) and 4 Apr. 1983 (6×4 mm). *Food:* Grubs, berries, nectar, and insects. Often seen in mixed flocks at flowering trees, where they feed on nectar with their brush-tipped tongues. Specimens were also found with grass seeds in their stomachs during the 1983 El Niño drought. *Identification:* Underparts are darker gray than those of Oriental or Everett's white-eyes. The throat is dull green, the belly greenish-yellow, and the undertail coverts greenish. Upperparts are similar to Everett's White-eye and slightly less yellow than Oriental White-eye. The lores and forehead are dusky or black (with considerable individual variation). The throat is slightly paler than the top of the head, but blends through the cheek without notable contrast (CMF).

Everett's White-eye *Zosterops everetti*

Status: An uncommon resident. *Localities:* Bole River, Kinabalu, Poring, Quoin

Hill, Sabah Softwoods, and Tabin. *Elevation*: 200–1,700 m. Smythies (1959) found them to be common from 1,450 to 1,700 m on Kinabalu. *Habitats*: 1°, 2°, and logged forest adjacent to 1° forest; *Albizia* and cocoa. *Breeding*: The only specimen of this species collected by WFVZ was at Sabah Softwoods on 20 July 1982 (testes 6×4 mm). *Food*: The birds in Sabah Softwoods were apparently feeding on the caterpillars that infest *Albizia*. *Identification*: Distinguished from Black-capped White-eye by a bright yellow belly, yellower throat, and only a touch of greenish on the undertail coverts. The two species have similar gray on breasts and flanks. Everett's White-eye has no yellow on the top of its head, but has dark lores and a semicircle under the eye. The illustration in Smythies (1981) may be of the incorrect species (CMF). *Remarks*: Our Kinabalu and Sabah Softwoods sightings were of flocks from 4 to 10 birds. MCT (Thompson 1966) recorded flocks of 20–40 daily in cocoa and adjacent 2° forest at Quoin Hill.

Pygmy White-eye *Oculocincta squamifrons*

Status: An uncommon Bornean endemic. *Localities*: Dallas, Danum, Kabayau, Kaingaran, Kundasan, Lucia, Magdalena, Maliau, Megatai, and Sinsuran Road. *Elevation*: Generally 550–1,000 m, but with notable exceptions. A specimen was collected by Chasen at 600 ft. (185 m) at Kabayau. Several were seen at the Danum research station at about 150 m elevation (GD). D. Jenkins sighted a bird at 2,100 m on Kinabalu (Jenkins and de Silva 1978). *Habitats*: 1° and 2° forest, scrub, and kerangas. *Breeding*: Specimens with enlarged testes were collected at Megatai on 22 June 1983 (5×4 mm) and Kaingaran on 7 July 1983 (5×4 mm, 6×3 mm). No females were collected. *Voice*: A high-pitched *tsee-tsee* . . . (CMF). *Food*: This species seems to be a nomadic frugivore and is often found in mixed flocks in fruiting trees. On the lower slopes of Trus Madi, we observed dozens of them feeding on small green berries in company with yuhinas, other white-eyes, and cuckoo doves. *Identification*: The extreme small size, warbler-like movements, generally gray back, head and throat, and fairly bright yellow belly are useful keys to identification. Yellow-bellied Warbler seems large in comparison, and Golden-bellied Gerygone is much yellower.

Mountain Black-eye *Chlorocharis emiliae*

Status: A Bornean endemic that occurs only at high elevation, where it is common. Whitehead (1893) and Smythies (1964a) described the Mountain Black-eye as the commonest species at high elevation (above ca. 1,700 m) on Mt. Kinabalu. Similarly, on Trus Madi, it is the commonest vertebrate of the summit scrub (J. Boys, pers. comm.). *Localities*: Kinabalu, Tambuyukon, and Trus Madi. *Elevation*: Kinabalu 1,500–4,000 m, Tambuyukon 1,825–2,550 m, Trus Madi 1,550–2,600 m. Phillipps (1986) recorded it at Kinabalu Park Headquarters (ca. 1,500 m) during the 1983 drought. *Habitats*: 1° forest, summit scrub, and gully vegetation on Kinabalu's summit rock face. *Breeding*: Whitehead (1893) recorded a recent fledgling on 12 Feb. 1888. Allen and Berwick (1958) found three nests on Mt. Kinabalu. One was in the vicinity of Pakka Cave on 11 Feb. 1958 and contained an almost fledged chick, which was olive-green and much like the adult but lacked the black eye patch. Its bill was yellow-orange. The nest was a shallow cup ca. 7.5 cm across externally and 5 cm internally, located in the green-leaved form of *Leptospermum recurvum* (placement in the tree was not specified; one of the other nests was ca. 2 m above ground). The nest was constructed of brown

rootlets and lined at the bottom with golden-red sporogonium stalks or setae of some species of moss. *Voice*: Harrisson (1955b) described one song as a melodious thrushlike *werwit-kukewtoweio* and another as a rather melodic *titiweeio*. Three perching calls were described: *iwi-u*, *siwi-u*, and *ie-wio*, and a flight call as *gujuguju* (*u*-sound is short). *Food*: Insects, caterpillars, beetles, and berries (Harrisson 1955b). Steinheimer (1999) described visits of Mountain Black-eyes to *Rhododendron* flowers on Kinabalu. He noted that black-eyes have tubular, brush-tipped tongues for nectar and pollen feeding (Moreau et al. 1969) and that they probably play a role in *Rhododendron* pollination (Argent 1985).

Family FRINGILLIDAE

FINCHES

[Little Bunting *Emberiza pusilla*

Status: A rare migrant. The only record is a sighting by B&W on 22 Nov. 1984 on Tempasuk Plain.]

Black-headed Bunting *Emberiza melanocephala*

Status: A rare migrant. *Localities*: Pulau Tiga. *Remarks*: The only records are birds seen and photographed on the lawn behind the staff quarters on Pulau Tiga by Dymond (1999), one first-winter individual on 16 Oct. 1996 and three first-winter individuals on 21–22 Oct. 1997. These records have been accepted by the Malaysian Nature Society's bird records committee.

Yellow-breasted Bunting *Emberiza aureola*

Status: A rare migrant. *Localities*: Papar. *Remarks*: The only Sabah record is a specimen collected by WFVZ on 23 Apr. 1983 in a dry padi field at Papar. The bird was a male and loosely associated with a flock of wagtails. Its white wing bars were prominent in flight. It had stored a great deal of fat and was probably on its northern migration.

Family STURNIDAE

STARLINGS AND MYNAS

Asian Glossy Starling *Aplonis panayensis*

Status: An abundant resident in coastal areas, on islands, and in all cities and towns. *Elevation*: Sea level to 200 m. *Habitats*: Coastal and island 1° and 2° forest, scrub, and heath; also mangroves, gardens, cities, and towns (coastal and upland). *Breeding*: Breeding seems to occur throughout the year, but in the Kimanis Bay area there is a peak period from June to Oct. (DMB). By Oct., many birds congregate into flocks for communal roosting. Norman (1964) noticed a large flock of juveniles from July to Nov. in the Wallace Bay area. A nest with eggs was recorded in June 1873 by Low (Sharpe 1879b). The eggs were blue with brown splotches. The nests were found among the leaves or in vegetation growing on coconut palms and were constructed of dry grass and bamboo leaves and lined with fine grass and dry green leaves. WFVZ collected two clutches (three well-incubated eggs each) on 5 June 1983 at Padas Damit and two clutches (two fresh eggs each) on 8 June 1983 at Mandangin. A female with enlarged ova (largest 4 mm) was collected on Labuk Road, 4 Aug. 1983. *Food*: Fruit and berries, including figs and oil-palm fruit, grubs of a cockchafer-like beetle, mole

crickets, locustids, and various soft-bodied insects and larvae (DMB). Norman (1964) found them in *Erythrina parcellis* when it was in flower. *Remarks:* Whitehead (1893) noted large flocks roosting in coconut trees on Labuan in the 1880s.

[Common Starling *Sturnus vulgaris*

Status: R. Lansdown observed this species at Kota Belud in Nov. 1986, but gave no details (Robson 1987).]

[Rosy Starling *Sturnus roseus*

Status: A wild vagrant or escaped cage bird was observed at Tanjung Aru on 2 and 3 Dec. 1999 (GD) and intermittently until Apr. 2000. It was in winter plumage and feeding on insects on the bark, branches, and foliage of the casuarina trees in Prince Philip Park and along the shoreline. The bird was carefully observed and a report submitted to the records committee of the Malaysian Nature Society.]

Chestnut-cheeked Starling *Sturnus philippensis*

Status: A scarce migrant. *Localities:* Ambong, Kota Kinabalu, Labuan, Mumiang, Sandakan, Sebatik Island, Tawau, and Tembungo. *Remarks:* Whitehead observed a flock picking berries from a 2° growth bush at Sandakan (24 Apr. 1885) and on Labuan (Sharpe 1889d). Amadon (1943b) reported a bird collected on Sebatik Island in 1910, but gave no details. Berwick saw a flock of 20–30 at Tawau in 2° growth near the aerodrome on 30 Mar. and 1 Apr. 1959 (Smythies 1963). Norman (1964) observed this species on her lawn at Wallace Bay (Sebatik Island) in Oct. 1961. The Sabah Museum has two specimens from Kampung Ambang near Kota Belud, 15 and 17 Jan. 1970. DMS sighted three birds at the Tembungo oil platform in Apr. 1979. B&W observed a group of three individuals at Mumiang in Sept. or Oct. 1984.

[Common Myna *Acridotheres tristis*

Status: A scarce species, probably introduced. WFVZ observed two Common Mynas once, on 25 May 1983, in a school yard at Bongawan.]

Crested Myna *Acridotheres cristatellus*

Status: An introduced species that is now locally common. *Localities:* Kota Kinabalu, Likas Lagoon, Papar, Tamparuli, Tanjung Aru, and Sandakan (Ahmad bin Darus and Stuebing 1986; Smythies 2000). *Habitats:* Gardens, dry padi, and fern swamp.

Hill Myna *Gracula religiosa*

Status: A common resident. *Localities:* Batu Putih, Beaufort Hill, Bettotan, Bole River, Danum, Gaya Island, Gum Gum, Kimanis, Kota Klias, Kulamba, Labuan, Labuk Road, Lamag, Lumbidan, Maang, Maliau, Mandangin, Mawau, Membakut, Menggalong, Padas Damit, Pinawantai/Manggis, Poring, Quoin Hill, Sabah Softwoods, Saliwangan, Sebatik Island, Segarong, Sepilok, Tabin, and Tawau Hills. *Elevation:* Generally sea level to 600 m, but one reported from Maliau at 1,000–1,200 m (Yong et al. 1989). *Habitats:* 1°, 2°, coniferous (Maliau), and swamp forest; mangroves, *Albizia*, oil palm, overgrown rubber, and clearings where dead trees are left standing. *Breeding:* Low collected “pure white” eggs (1.3 × 1.15 in. [33.0 × 29.2 mm]) in May 1874 on Labuan (Sharpe 1879b). DMB found that they breed in holes in trees and also crevices where branches have

fallen off. The base of the hole contains a few grass blades, feathers, and wood chips on which the two eggs are laid. Eggs are pale greenish or blue, flecked and spotted rather sparsely with rusty red and chocolate. From 3 to 6 Feb. 1982 WFVZ watched a pair carry twigs to build a nest in a dead tree hollow at Batu Putih. The hole was ca. 5–6 m above the ground and 15–20 cm in diameter. Specimens with enlarged sexual organs were collected at Bole River on 24 Mar. 1982 (testes 11×5 mm; ova 2 mm, enlarged oviduct), Sabah Softwoods on 3 July 1982 (ova 2 mm, three ruptured follicles), and Menggalong on 15 July 1983 (testes 13×4 mm). *Voice*: The Malay name for this species, *Tiong*, describes its loud, slurred whistle. The *tee* is a high-pitched note and the *ong* descends abruptly. *Food*: Fruit. WFVZ found them feeding on figs in the undergrowth and collected specimens stuffed with oil-palm fruit. *Remarks*: Pairs or small groups of birds are often seen flying high over forest or cleared areas or in tall dead trees. In Sabah Softwoods, WFVZ encountered 10–15 individuals moving up the trunks of *Albizia* trees. DMB remarked on the large flocks (up to 60 individuals in June 1959) that occur periodically in the Kimanis Bay area.

[*Coleto Sarcops calvus*

Status: Four individuals in the Sabah Museum purported to be from Banggai Island are apparently cage birds (Smythies 2000).]

Family CRACTICIDAE

BUTCHERBIRDS, BELL-MAGPIES, AND RELATIVES

Bornean Bristlehead *Pityriasis gymnocephala*

Status: An uncommon Bornean endemic. *Localities*: Batu Punggul, Bole River, Brumas, Danum, Imbak River, Kalabakan, Labau River, Magdalena, Maliau, Quoin Hill, Sapagaya, Sepilok, Tabin, and Ulu Segama. *Elevation*: Generally, sea level to 600 m, but one reporting from Maliau at 1,000–1,200 m (Yong et al. 1989). *Habitats*: 1° and disturbed 1° , upland kerangas, coniferous, and ca. 20-yr-old selectively logged forest. Although principally a bird of 1° forest, Bornean Bristleheads were observed by WFVZ near Gomantong caves in old logged forest that had been severely burned during the El Niño drought and that was not near substantial stands of 1° forest. They have also been seen in *Acacia* groves adjacent to 1° forest at Sepilok (K. Ickes, pers. comm.). *Breeding*: Specimens with enlarged sexual organs were collected at Brumas on 18 May 1982 (ova enlarged, ruptured follicles), Sapagaya on 5 Aug. 1983 (largest ovum 14×14 mm), and Quoin Hill on 4 Oct. 1962 (testes 8×4 mm; largest ovum 15 mm, enlarged oviduct, well-developed brood patch). *Voice*: A variety of noises, the most prevalent of which are a nasal, whining contact call and a constantly uttered *pit-pit-peeoo*. Flocking birds occasionally whistle to each other, each bird giving a single loud whistle, all within the space of 2–3 s (much like some mountain partridges). *Food*: Lepidopteran larvae, orthopterans, beetles, and insects. *Identification*: In juvenile plumage, red feathers are located on the breast, throat, and collar, and the head “bristles” are undeveloped. *Remarks*: Bristleheads are virtually always found in flocks, possibly even when they are nesting. Often they are accompanied by other large forest species, such as Black Magpie, malkohas, trogons, and woodpeckers. The close phylogenetic relationship of this enigmatic species to the Australian cracticids (magpies and butcherbirds) was supported in a genetic study by Ahlqu-

ist et al. (1984) using tissues collected by WFVZ. Also see Witt and Sheldon (1994b).

Family PASSERIDAE

OLD WORLD SPARROWS

Eurasian Tree Sparrow *Passer montanus*

Status: An abundant introduced species in appropriate habitat on mainland and islands. *Elevation:* Sea level to 700 m. *Habitats:* Cities, villages, camps, roads, and other cleared or developed areas. *Breeding:* Five specimens collected at Maang on 21 Jan. 1982 had enlarged sexual organs (testes 7–8 mm, largest ova 6–8 mm); two specimens taken at Brumas on 26 July 1982 had enlarged testes (6 × 3 mm, 8 × 4 mm). *Remarks:* Gore (1964b) first reported this species in Borneo. He noticed 8–12 birds that seemed to be nesting in the roof of the customs' warehouse in Sandakan on 25 Sept. 1964. Two or three of the birds were reported by customs officials to have arrived in about Jan. 1964. Fogden (1965) described the history of this species in Sabah, including the first sightings at Sandakan. The Royal Airforce Ornithologists' Club found a small colony on Labuan in 1966 (Gore 1968). By 1973 they were recorded in Kota Belud and Kota Kinabalu (Harrisson 1974), and by 1975 in Beaufort, Kuala Penyu, and Sipitang (Wells 1976; Smythies 2000). The ability of this species to expand its range is remarkable. The UKM-ANSP expedition, for example, found Eurasian Tree Sparrows at a helicopter clearing in 1° forest at Mt. Danum 15 km from the nearest road.

Family ESTRILDIDAE

MUNIAS

Pin-tailed Parrotfinch *Erythrura prasina*

Status: A scarce resident. *Localities:* Bodgaya Island, Bohey Dulang Island, Kinabalu (lower slopes), Kuamut, Ranau, and Sepilok. *Elevation:* Sea level to ca. 1,500 m. *Remarks:* The only specimens from Sabah seem to be those of Whitehead, taken in Jan. 1888 during his second trip to Kinabalu (Sharpe 1889d; Whitehead 1893). He found them to be common in hill-rice fields, but only during Jan. By Feb. they were gone. E. J. H. Berwick observed them in the forest near Ranau, 2 Mar. 1962 (Gore 1968). At Sepilok, G. S. de Silva and C. Chong sighted a small flock (no date) at the forest edges near the headquarters (de Silva 1981). Yong (1980) recorded flocks of up to 60 birds descending on rice fields from the surrounding forest on Bodgaya Island and Bohey Dulang Island in late Aug. to early Sept. 1980.

Tawny-breasted Parrotfinch *Erythrura hyperythra*

Status: A rare resident. *Localities:* Kinabalu, Malangkap, and possibly Sapong. *Elevation:* Probably 1,200–3,300 m. Smythies (2000) noted that this species was recorded by Comber (1971) at Sapong Estate at 600 m, but Comber's paper does not mention this explicitly. *Habitats:* 1° forest and hill-rice fields. *Voice:* A call note uttered on the wing is *tzit-tzit* (Whitehead 1893). *Remarks:* Whitehead collected two specimens in hill-rice fields on his first trip to Kinabalu, 5 Apr. 1887. However, he believed that this low elevation was unusual and that their preferred habitat was the "bamboo-jungle" found at 9,000 ft. (2,750 m). The Royal Society

expedition of 1964 banded five birds and collected specimens at 1,800 m on the Pinosuk Plateau and at 3,300 m on the mountain (Fogden 1965; McClure and Leelavit 1972; Jenkins and de Silva 1978). A flock of four or five was observed on 22 Aug. 1964 at 2,925 m near Pakka Cave, and two individuals were seen at 2,000 m on 10 Dec. 1964 (Fogden 1965).

Java Sparrow *Lonchura oryzivora*

Status: An uncommon introduced species, except perhaps on Labuan. *Localities:* Labuan and Tanjung Aru. *Remarks:* WFVZ found it only in one location, suburban gardens at Tanjung Aru. On Labuan, it was very common in the 19th century, after its apparent introduction by H. Low (Ussher in Sharpe 1879b). Whitehead said it was plentiful enough to harm the rice crop, and that it was supplanting Dusky Munias (Sharpe 1889d). We are unaware of its present status on Labuan.

Dusky Munia *Lonchura fuscans*

Status: An abundant Bornean endemic in appropriate habitat. *Elevation:* Sea level to 1,500 m. *Habitats:* Principally open scrub and fields, both coastal and upland; also 1° forest edge, 2° and logged forest, grassy bars and banks along larger interior rivers, younger *Albizia*, and gardens. MCT (Thompson 1966) remarked that, unlike the Black-headed Munia, Dusky Munia occurs in 2° forest well away from cultivated fields. *Breeding:* DMB found that they nest throughout the year, with the largest number of nestings, at least in the Kimanis Bay area, occurring in Nov.–Feb. He described the nests as typical munia balls of grasses with a hole in the side. The usual nesting site was a hollow below the overhanging lip of roadside banks, landslips, and so on, or in the roots of fallen trees. Often the nests were in loose colonies and situated 1–2 m above the ground. Other nests have been found in holes in dead trees, under the eaves of houses, or in low bushes in gardens. Exceptionally, they have been found in the terminal leaf clusters of mango and sena trees, where they may be as high up as 5–8 m. Nests are also used for roosting. Eggs may be laid daily or on alternate days. Once eggs are laid, the pair occupies the nest at all times, presumably to deter usurpers. DMB found that clutch size varied from four to seven eggs, but was usually five. Eggs were pure white. V. W. Ryves collected clutches of one, four, and five eggs at Sandakan Estate between 27 Mar. and 6 Apr. 1939. The eggs were egg-shaped with a fine matte surface and were white in color. Average size ($n = 10$) was 14.5×10.7 mm; maximum 15.5×11 mm; minimum 13.5×10 mm (Gibson-Hill 1949b). MCT (Thompson 1966) observed nest building at Kalabakan on 18 July 1962, and collected a male with testes 7×6 mm at Kalabakan on 1 Sept. 1962 and a female with an old brood patch and collapsed follicles at Tenom at the end of Dec. 1962. WFVZ collected two nests with four fresh eggs each on 25 Nov. 1981 at Megatai. These nests were built in the eaves of a house and consisted of ca. 25-cm woven-grass domes with ca. 7-cm front openings. A nest with four eggs was collected on 26 Apr. 1982 at Gomantong Caves. This nest was built on a limestone cliff and was an open cup with an overhanging rock as a roof (CMF). A nest with three eggs was collected on 13 Apr. 1982 at Bole River. A specimen with an oviduct egg (unshelled, 15×10 mm) was collected on 24 May 1983 at Putatan. *Remarks:* Wells (1978) found this species on Balamabangan, whereas Chasen and Kloss (1930a), who collected in 1927, did not.

However, it was present on Banggi in 1927. Whitehead (Sharpe 1889d; Whitehead 1893) believed that Dusky Munias were being displaced on Labuan by Black-headed Munias and Java Sparrows.

White-bellied Munia *Lonchura leucogastra*

Status: A scarce resident. *Localities:* Beluran, Kiabau, Kimanis, Maang, Meliau village, Saliwangan, Sandakan, Sepilok, Sipitang, Tabin, and Tuaran. *Elevation:* Sea level to 200 m. *Habitats:* Grassy fields, grass along railroad tracks and near rural houses, overgrown rubber, and about four month old logged 1° forest. *Remarks:* WFVZ only collected one specimen, at Maang in overgrown rubber. It had rice in its stomach and white streaking on its back coverts. The two times we observed this species it was in company with Dusky Munias. DMB observed a pair gathering dead bamboo leaves from a riverside clearing at Kimanis on 15 Dec. 1959. Berwick reported flocks of up to 16 at Kiabau (Gore 1968), and R. Sims (unpubl.) found flocks of ca. 20 birds to be common at Beluran. Pryer collected specimens at Sandakan (Sharpe 1881), and it has been kept as a cage bird in the Sipitang area (Gore 1968). The Sabah Museum banded an individual near Tuaran in 1970 (McClure and Leelavit 1972).

Black-headed Munia *Lonchura malacca*

Status: An abundant resident in appropriate habitat. However, it seems to be less abundant than Dusky Munia. *Elevation:* Sea level to 1,700 m. *Habitats:* Principally grassy areas, rice fields, 2° scrub, and plantations. At Sabah Softwoods, it was common in the timber camp, but not in the tree plantation. *Breeding:* Breeding occurs throughout the year, but mainly from Apr. to Oct. (DMB). This is well outside the rice-growing season, so the rice harvest cannot be paramount to breeding. The nest is similar to that of the Dusky Munia, a tight ball of grasses situated in low bushes, clumps of creepers, or grasses, or in pandans, palms, casuarinas, bamboo, and lower branches of trees. The placement height is generally 0–3 m. The eggs are pure white with no gloss, and they tend to be rather more conical in shape than Dusky Munia's. Eggs measure ca. 15 × 11 mm and number from three to six per clutch, with a usual number of five (DMB). V. W. Ryves collected a clutch of six eggs at Kota Belud on 17 Jan. 1939. They were egg-shaped, with a fine matte surface and white color. One egg was 16 × 11.5 mm, two were 16 × 11 mm, and three were 15.5 × 11.5 mm (Gibson-Hill 1949b). MCT (Thompson 1966) observed nest building at Tuaran on 19 July 1962, as did Wells (1978) at Merintaman on 21 Mar. 1977. WFVZ found nests with eggs on 6 Jan. 1982 at Maang (six eggs, five fresh), 30 Mar. 1982 at Silam (five well-incubated eggs), 27 Apr. 1981 at Tempasuk (four nests with five or six eggs each), 24–28 May 1983 at Maang and Padas Damit (four nests with two, three, three, and five eggs, respectively, all fresh), 5 June 1983 at Padas Damit (two nests, one with seven eggs, of which six were fresh, and one with five eggs, only one of which was fresh), and 25 Aug. 1982 at Maang (three eggs, all fresh). Specimens in breeding condition were collected at Megatai on 29 Nov. 1981 (e.g., a female with a 14 mm ovum), and at Likas on 1 June 1983 (oviduct yolk 16 × 11 mm). A bird with nesting material was observed at 1,000 m on Sinsuran Road on 24 Nov. 1982. *Remarks:* Although found on Balambangan in 1977, it was not there in 1927 (Chasen and Kloss 1930a; Wells 1978). In regard to roosting, DMB made some interesting discoveries by color banding this species. Like Dusky Munias,

they use their nests to roost as well as breed, and as many as nine individuals may be in a nest at one time. The same birds do not necessarily use the same nest every night. Rather, occupancy seemed to be on a first-come, first-served basis. Black-headed and Dusky munias occasionally switched nests, even after egg-laying commenced.

Scaly-breasted Munia *Lonchura punctulata*

Status: A recent invader of parts of northern and eastern Sabah (GD). *Localities:* Klias Peninsula, Kota Kinabalu, Likas, Menggatal, Padas Damit, Penampang, Tempasuk, and Tuaran. *Elevation:* Sea level. *Habitats:* Rice fields. *Remarks:* Sabah birds are apparently the Philippine race *cabanisi*. They were first recorded at Likas in 1993 by P. Heath and then subsequently in 1996 by GD (Smythies 2000). There are skins in the Brunei Museum from the Wasan rice fields, and records from west and south Kalimantan. The Kalimantan birds represent a different race, indicating separate colonization or release (GD).

[White-headed Munia *Lonchura maja*

Status: A rare introduced species. DMB observed a pair frequenting an open area near Papar railway station during the first few months of 1962. They were presumably escaped cage birds.]

[Red Avadavat *Amandava amandava*

Status: A rare introduced species. The first records were those of Q. Phillipps in Kota Kinabalu starting in June 1969 (Smythies 1981). Subsequently, one was seen at Likas Lagoon by GD on 13 Dec. 1996, and another reported from the Kinabatangan River in Mar. 1995 (no further details; Smythies 2000).]

Family DICRURIDAE

DRONGOS

Crow-billed Drongo *Dicrurus annectans*

Status: An uncommon migrant. *Localities:* Kunatong, Labau River, Labuan, Lumbidan, Membakut, Menggalong, Saliwangan, Sandakan, Tawau Hills, Tembungo, and Tempasuk. *Elevation:* Sea level to 400 m. *Habitats:* 1° peat swamp, logged, upland-heath, and ultrabasic-soil forest. *Migration dates:* DMS (Simpson 1982a) recorded 14 individuals from 24 Aug. to 11 Oct. 1981 at Tembungo. DMB observed a bird at Membakut on 5 Oct. 1959. WFVZ collected two specimens at Labau River (23 and 28 Oct. 1982). The Sabah Museum has a specimen from Kunatong "1° forest" on 25 Oct. 1977. Specimens were collected on Labuan during Jan. 1877 (Sharpe 1879b), and they were observed at Menggalong during Mar. 1975 (Wells et al. 1975). The latest date is four birds sighted at Tembungo on 4 Apr. 1979 by DMS (Casement 1979). *Food:* Dragonflies and moths at Tembungo (Simpson 1982a). *Identification:* This species has a deeply notched tail. The outer tail feathers curve slightly upwards. Feathering on the bill is slightly shorter and less well developed than in the Greater Racket-tailed Drongo, and the tail feathers are narrower (ca. 17 mm vs. 21 mm, 10 mm from the tip [CMF]). Similar to Black Drongo, and open-country sight-records of Crow-billed Drongos may in fact be misidentified Black Drongos (GD).

[Black Drongo *Dicrurus macrocercus*

Status: Perhaps an annual migrant in low numbers. One bird was observed on 7 Jan. 1999, and five were seen on 14 Jan. 1999, at Tempasuk in the rice fields and on isolated trees along fence lines by GD (Smythies 2000). He identified them by their long, deeply forked tails, with a barely visible upturn of the feather tips. Their plumage was not very glossy, and the bill was slim and not as heavy as Crow-billed Drongo. They commonly perched on buffaloes, hawking disturbed insects. The combination of habitat, morphology, and buffalo-perching are distinguishing characteristics. The occurrence of this species in Sabah calls into question open-country sight-records of Crow-billed Drongos (GD).]

Ashy Drongo *Dicrurus leucophaeus*

Status: A common resident. *Localities:* Alab, Kaingaran, Kinabalu, Lumaku, Malangkap, Megatai, Poring, Rinangisan, Saliwangan, Sinsuran, Sinsuran Road, Tambunan, and Trus Madi. *Elevation:* Crocker Range, generally >500 m, Kinabalu 550–2,000 m, Trus Madi 550–2,400 m. WFVZ observed one at 150 m at Saliwangan. *Habitats:* 1° and 2° forest and scrub. *Breeding:* Whitehead found a nest with two eggs at Malangkap on 4 Apr. 1887. The nest was located on a bough in a tree high over a steep river bank. V. W. Ryves collected two clutches of two eggs at Kiau on 27 and 29 Mar. 1939. The eggs were egg-shaped, with a fine matte surface. Color was ochraceous-buff, with a few spots of pale purplish gray, auburn, and raw umber, in some cases mainly at the broader end. The eggs measured 26 × 18.5 mm, 25.5 × 17.5 mm, 22.5 × 17 mm, and 24 × 18 mm (Gibson-Hill 1949b). D. Jenkins observed nesting at Kinabalu Park Headquarters in Mar. (Jenkins and de Silva 1978). WFVZ observed birds carrying nesting material at Rinangisan (20 Mar. 1983) and collected specimens with markedly enlarged testes during Mar. and Apr. 1983 at Rinangisan (range 11 × 6 mm to 16 × 9 mm). RGM collected juvenile birds in early July, 2000, at Sayap (bursa large, skull 10% ossified). *Voice:* Various noises, including a loud whistled *wee-chew*, rising in pitch on *wee* and descending on *chew*; also a series of whistles on the same note in groups of three: *sweet-sweet-sweet*. *Food:* Insects. *Remarks:* A conspicuous bird of mountain forests, often perching in the open, calling, and performing aerial acrobatics.

Bronzed Drongo *Dicrurus aeneus*

Status: A common resident. *Localities:* Batu Punggul, Bettotan, Bole River, Brumas, Danum, Kalabakan, Makaniton, Maliau, Poring, Sabah Softwoods, Sebatik Island, Sepilok, Silam Plantation, Tabin, Ulu Mawau, and Ulu Tiulon. *Elevation:* Sea level to 500 m. *Habitats:* 1° and logged forest. They seem little affected by logging (Lambert 1990c). *Breeding:* Norman (1964) observed a pair making a nest in June 1961 (no locality, but probably in the Kalabakan or Quoin region). They used bits of lichen, bark, and long hairlike threads, which both parents wove into a minute well-cupped nest. Specimens with enlarged testes were taken at Bole River on 4 Mar. (10 × 5 mm) and 3 Apr. 1982 (8.5 × 4 mm), and at Brumas on 9 June 1982 (11 × 6 mm). *Food:* Wasps, insects, and ants. *Remarks:* This species is common in forest understory, in emergent trees, or in isolated trees left by loggers. It often congregates in small groups that noisily hawk insects.

Spangled Drongo *Dicrurus hottentottus*

Status: A common resident. *Localities:* Kabayau, Kaingaran, Kaung, Kinabalu, Lumaku, Lotung, Malangkap, Megatai, Rinangisan, Saliwangan, Sinsuran Road, Tambunan, Tambuyukon (lower slopes), and Trus Madi. Sightings have been reported from Membakut and Klias (DMB), Quoin and Kalabakan (Norman 1964), and Banggi Island (Gore 1968). *Elevation:* Generally 500–1,700 m; Kinabalu 500–1,700 m, Trus Madi 550–1,600 m. There is one specimen from ca. 200 m at Kabayau (RMC). The DMB and Norman records would be near sea level. *Habitats:* 1°, 2°, and coniferous forest (e.g., on Lotung). *Breeding:* Whitehead found several nests with two eggs, for example, in Mar. and 20 May 1888 at Malangkap. The nests were placed at the end of a bough, not far from the ground. They were shallow structures, consisting of roots around a slender branch fork. The eggs were pale salmon-pink, dotted with red spots chiefly near the larger end. They measured 1.1–1.15 × 0.8–0.85 in. (27.9–29.2 × 20.3–21.6 mm). V. W. Ryves found a clutch of two eggs on 11 Feb. 1939 at Kaung. The eggs were egg-shaped, rough-surfaced, white, and blotched coarsely with pallid neutral gray, pale purplish gray, and mahogany red, with the markings occurring mainly at the broader end, 28.5 × 20 mm, 29 × 20 mm (Gibson-Hill 1949b). RGM observed a fledgling in late May 1999, and the WFVZ observed a pair feeding a fledgling at Kaingaran in early July 1983. A specimen with enlarged testes was collected at Rinangisan on 31 Mar. 1983 (12 × 5 mm). *Voice:* Clear chirps and warbles interspersed with electronic synthesizer sounds. *Food:* WFVZ observed them eating sphinx moths attracted to the lights at Kinabalu Park Headquarters.

Greater Racket-tailed Drongo *Dicrurus paradiseus*

Status: A common resident. *Localities:* Balambangan Island, Banggi Island, Beluran, Benkoka, Bettotan, Binsulok, Bole River, Brumas, Danum, Imbak River, Kalabakan, Kota Belud, Kota Klias, Kudat, Labau River, Labuk Road, Lamag, Lumbidan, Maang, Magdalena, Makaniton, Maliau, Megatai, Melalap, Membakut Beach, Menggalong, Padas Damit, Padas River, Pandasan, Pinawantai/Manggis, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Samawang, Segarong, Sepilok, Tabin, Tawau Hills, and Ulu Tiulon. *Elevation:* Sea level to 650 m. *Habitats:* 1°, 2°, logged, and peat swamp forest; mangroves, fire-padang kegangas, coastal strand, rubber, and *Albizia*. A ubiquitous forest bird, found from deep in 1° forest to sparse coastal woodlands. *Breeding:* A bird with nesting material was observed at Saliwangan on 8 May 1981. Specimens with enlarged sexual organs were collected at Membakut Beach on 25 Jan. 1983 (testes 17 × 6 mm), Binsulok on 5 Feb. 1982 (testes 14 × 7 mm), Saliwangan on 20 Feb. 1982 (testes 11 × 6 mm), Bole River on 22 Feb. (testes 12 × 8 mm) and 3 Apr. 1983 (ruptured follicles, brood patch), Brumas on 12 June 1982 (testes 13 × 7 mm), Sabah Softwoods on 23 June 1982 (testes 13 × 6 mm), Imbak River on 16 July 1982 (testes 10 × 7 mm), and Labuk Road on 1 Aug. 1983 (testes 10 × 7 mm). *Food:* Cicadas and winged termites.

Family ORIOLIDAE

ORIOLES

Black-naped Oriole *Oriolus chinensis*

Status: A rare introduced species. Both Black-naped Oriole individuals record-

ed in Sabah are likely to have been escaped cage birds. *Localities*: A specimen was collected at Malangkap by A. H. Everett in either Nov. 1892 or Jan. 1893 (Sharpe 1893). E. J. H. Berwick observed one in Sandakan in 1961 (Gore 1968). *Remarks*: There has been some confusion as to whether the Malangkap specimen was in fact collected by Hugh Low in Sarawak (or somewhere else) in 1846 (Smythies 1957, 2000). The confusion stems from the fact that Everett (1889) and Sharpe (1893) discussed doubts concerning the collecting locality of Low's specimen. However, there is no doubt that Everett collected a specimen at Malangkap in 1892 or 1893.

Black-hooded Oriole *Oriolus xanthornus*

Status: A scarce resident. *Localities*: Kinabatangan River (lower), Lahad Datu, Merutai, Mumiang, Sabah Softwoods, and Tawau. The first record was a specimen collected at Tawau in 1923 (Kuroda 1925). Another was taken in a garden at Kampung Merutai (BMNBE). KVT observed this species several times in the 1950s and 1960s between Lahad Datu and Silam. WFVZ observed it once, moving casually among 3-yr-old *Albizia* trees along a Sabah Softwoods access road. B&W observed up to six males in 2° growth around Mumiang. *Voice*: An often repeated, unmelodious *aaack*.

Dark-throated Oriole *Oriolus xanthonotus*

Status: A common resident. *Localities*: Banggi Island, Batu Punggul, Beluran, Benkoka, Bettotan, Bole River, Brumas, Danum, Ensuan, Gomantong, Imbak River, Klias, Kudat, Labau River, Labuk Road, Lamag, Lumbidan, Maang, Magdalena, Makaniton, Malangkap, Malawali, Maliau, Mawau, Megatai, Meliau, Menggalong, Poring, Quoin Hill, Rayoh, Sabah Softwoods, Saliwangan, Segarong, Sepilok, Silam Plantation, Tabin, Tambuyukon, Ulu Dusun, Ulu Merutai, and Ulu Tiulon. *Elevation*: Sea level to 600 m, Tambuyukon 550–750 m. *Habitats*: 1°, 2°, logged, peat swamp, and upland-heath forest; *Albizia*, overgrown rubber, and cocoa. *Breeding*: DMB found a nest at Klias in Apr. ca. 6 m above the ground in a Flame-of-the-Forest tree. It was slung between the forks of an outer branch and composed of fine pliable twigs, strips of paperlike bark, and other vegetable fibers. It was lined with finer materials. The outside was decorated with pieces of lichens and spider cocoons or egg sacs. The nest contained two eggs, which were a very pale translucent pink, finely glossed, and marked with sparse spots of dark purplish brown, chiefly at the larger end. Specimens with enlarged sexual organs were collected at Silam Plantation on 20 Feb. 1982 (testes 10 × 6 mm), Bole River on 10 Apr. 1982 (ova active, enlarged oviduct), Brumas on 13 May 1982 (testes 9 × 6 mm), Megatai on 21 June 1983 (testes 13 × 8 mm), Maang on 21 June 1983 (testes 10 × 8 mm), Sabah Softwoods on 27 June (testes 13 mm) and 2 July 1982 (testes 10 × 5 mm), and Labuk Road on 5 Aug. 1983 (testes 11 × 8 mm). *Voice*: A loud, mournful, *see-saw* whistle, higher pitched on the first note. DMB described a loud and clear *tooyoo* or *toolyoo*, as well as a soft *wee-pooorr*, the second syllable sighing away faintly. The call is a harsh *chaarr*. *Food*: Caterpillars, sawflies, and jambu fruit (DMB).

[Black Oriole *Oriolus hosii*

Status: This Bornean endemic is a lower montane species (Wells 1994), for which there are no Sabah records. It occurs in many localities in Sarawak.]

Black-and-crimson Oriole *Oriolus cruentus*

Status: A common resident. *Localities:* Kaingaran, Kinabalu, Lumaku, Malangkap, Poring, Rinangisan, Sayap, Sinsuran Road, and Trus Madi. *Elevation:* Generally 1,000–1,600 m; Kinabalu 800–1,500 m, Trus Madi 600–2,300 m. *Habitats:* 1° and 2° forest. *Breeding:* Whitehead collected a specimen with well-developed ovaries in Feb. and a full-grown fledgling in early Mar. WFVZ collected a male with enlarged testes (7 × 4 mm) at Kaingaran on 4 July 1983. *Voice:* A loud *ee-oo*, descending in pitch on the *oo*. *Food:* Insects, caterpillars, moths, and fruit. It feeds on moths at Kinabalu Park lights in the morning. *Remarks:* Most commonly seen in roadside emergent trees or in mixed flocks.

Family CORVIDAE

JAYS, MAGPIES, TREEPIES, AND CROWS

Crested Jay *Platylophus galericulatus*

Status: An uncommon resident. *Localities:* Anginon, Batu Punggul, Baturong, Benkoka, Bettotan, Bole River, Bongon, Brumas, Danum, Imbak River, Kaingaran, Kalabakan, Kiau, Kinabalu, Kulamba, Labau River, Lamag, Magdalena, Malangkap, Maliau, Megatai, Poring, Sabah Softwoods, Samawang, Sayap, Sepilok, Tabin, Tambunan, Tambuyukon (lower slopes), Ulu Samuran, and Ulu Tiulon. *Elevation:* Sea level to 1,300 m. RGM netted a specimen at 1,000 m (Sayap). MCT (Thompson 1966) sighted it at 1,230 m (Anginon). And Jenkins and de Silva (1978) reported a sighting at 1,300 m. *Habitats:* 1°, old 2°, logged, upland kerangas, and open-swamp forest; *Albizia*. During the 1983 El Niño drought, this species was common in the scrubby forest left by shifting agriculture at Kaingaran (750 m). *Voice:* MCT (Thompson 1966) noted a metallic chittering noise. *Food:* A bird captured at Imbak was attempting to eat small birds caught in a mist net.

Common Green Magpie *Cissa chinensis*

Status: An uncommon resident. *Localities:* Bukit Ibul, Dallas, Kaingaran, Kinabalu, Kundasan, Megatai, and Tambunan. *Elevation:* 550–1,000 m. Whitehead (Sharpe 1889a; Whitehead 1893) said they frequented the same “country” as treepies, but only between 1,000 and 3,000 ft. (300 and 900 m), and that they were rare at 3,000 ft. (1,000 m). *Habitats:* 2° forest and scrub. Often in the scrub left by shifting agriculture. Whitehead (1893) described this as a species of open cultivated country, as opposed to Short-tailed Green Magpie, which is more of a forest bird. *Breeding:* Whitehead (1893) found nestings to be common in Mar. The nests he encountered were set in thick undergrowth, and usually held two young (three on one occasion). V. W. Ryves collected a clutch of three eggs at Kiau on 14 Feb. 1939 and a single egg there on 10 Mar. 1939. The eggs (30 × 24 mm, 30 × 23 mm, and 31 × 23 mm; 32 × 22 mm) were “smooth but coarsely pitted,” white, with fine flecks of pale gray and medal bronze (Gibson-Hill 1949b). *Voice:* A variety of noises, but rather consistently a loud, shrill *nee-new*, in which the *nee* is higher pitched. This is usually repeated twice. *Remarks:* These birds are particularly vocal at dawn and dusk. Like many corvid species, they are very difficult to approach.

Short-tailed Green Magpie *Cissa thalassina*

Status: A common resident. *Localities:* Kinabalu, Rinangisan, Sinsuran Road, and Trus Madi. *Elevation:* Kinabalu 900–2,450 m, Trus Madi 2,100 m, Crocker

Range >1,100 m. *Habitats*: 1° and 2° forest and scrub. More of a forest bird than Common Green Magpie (Whitehead 1893). *Breeding*: Whitehead (1893) noticed family groups with two fledglings each in April. *Voice*: A variety of calls, including: *sweet-sweet*, *pew-pew*, the *pews* rapid; and three whistles on the same note followed by a fourth note on a lower pitch and of different quality. Whitehead (1893) found the voice similar to that of Common Green Magpie, but less clear. *Food*: A. Whittaker observed them eating a ca. 10-cm caterpillar, beetles, stick insects, and a small lizard. Whitehead listed snails and "possibly frogs." Phillipps (1986) reported one eating a green snake. WfVZ collected one with ants in its throat. *Remarks*: This is the species commonly observed at Kinabalu Park Headquarters, often in the morning around lamp posts searching for insects.

Bornean Treepie Dendrocitta cinerascens

Status: A common Bornean endemic. *Localities*: Kaingaran, Kinabalu, Lumaku, Poring, Rinangisan, Sinsuran Road, Tambuyukon, and Trus Madi. *Elevation*: Kinabalu 600–2,900 m, Tambuyukon 550–1,525, and Trus Madi 600–2,100 m. *Habitats*: 1° and 2° forest and scrub. *Breeding*: Whitehead found a nest with two eggs on 13 Mar. 1888. He described the eggs as greenish white, dotted with brown, which increases in intensity toward the broad end to form a virtual ring (1.2 × 0.9 in. [30.5 × 22.9 mm]). At Rinangisan on 31 Mar. 1983, WfVZ discovered a nest with two naked, equally developed, nestlings. The nest was placed just under the crown in a thin, 8-m, moss-covered sapling located in a small ravine. It was a simple affair, 25–30 cm across, made of thin twigs and lined with grasses and roots that were woven into a 3-cm-deep cup. Specimens with enlarged testes were collected at Rinangisan on 30 Mar. (testes 6 × 2 mm) and 6 Apr. 1983 (6 × 3 mm) and along Sinsuran Road on 14 Nov. 1982 (6 × 2 mm) and 1 and 10 Dec. 1981 (both 6 mm). *Food*: Moths, figs, and other fruits.

Black Magpie Platysmurus leucopterus

Status: An uncommon resident. *Localities*: Beluran, Benkoka, Bettotan, Bole River, Bongawan, Brumas, Danum, Gomantong, Kalabakan, Klias, Kulamba, Labau River, Lumadan, Malangkap, Megatai, Meliau, Membakut Beach, Membakut River, Menggalong, Pintasan, Poring, Quoin Hill, Saliwangan, Segarong, Sepilok, Tabin, Ulu Mawau, and Ulu Tiulon. *Elevation*: Sea level to 550 m. *Habitats*: 1°, 2°, logged, coastal peat swamp, open swamp, and upland-heath forest; cocoa under *Trema orientalis* (near 1° forest). *Breeding*: Davies and Payne (1982) found a nest at Tabin Wildlife Reserve on 17 Sept. 1981. It was in a small shrub in a gap in 1° forest. The nest was 8 m above the ground, measured ca. 20 × 20 cm, and was coarsely constructed of thick twigs. Specimens with enlarged sexual organs were collected at Bole River on 25 Mar. 1982 (testes 8 × 3 mm), Brumas on 14 May 1983 (testes 11 × 6 mm), Menggalong on 15 July 1983 (testes 10 × 5 mm), and Quoin Hill on 21 July 1962 (brood patch). *Voice*: The typical song is four notes, the first and last on the same pitch, the middle two higher and faster in beat. They also have a mewing contact call, a three- (sometimes two-) note whistle with the last two notes lower and on the same pitch, as well as a large variety of other noises. DMB noted that their wings make a distinctive, loud, *whooomph*. *Food*: Fruit, small lizards, leaf and stick insects, beetles, and cicadas (DMB). *Remarks*: Very often in pairs and in mixed flocks with other large forest species,

for example, drongos and Bornean Bristleheads. MCT (Thompson 1966) saw a flock of 10–20 feeding in the canopy of Kalabakan Forest Reserve.

[House Crow *Corvus splendens*

Status: A rare introduced or “assisted passage” species. WFVZ observed one individual in 1983 at an abattoir in Papar.]

[Large-billed Crow *Corvus macrorhynchos*

Status: Uncertain. Apparently there are old specimens from Kinabalu and Labuan (e.g., mentioned by Gore [1968] and Jenkins et al. [1996]), but we have not been able to confirm them because the authors provided no citations. Sight records include a group of three on electric wires at mile 32 on Labuk Road in oil palm (GD), and a solitary crow (Slender-billed Crows are usually in groups) in 1-yr-old *Albizia* at Sabah Softwoods that had a markedly deeper, more American Crow-like, call than Slender-billed Crow (WFVZ).]

Slender-billed Crow *Corvus enca*

Status: A common resident. *Localities:* Batu Punggul, Batu Putih, Beluran, Benkoka, Bole River, Brumas, Danum, Imbak River, Kabayau, Kiau, Kinabalu (lower slopes), Kinabatangan River, Kulamba, Labuan, Labuk Road, Lamag, Lumbidan, Lotung, Merutai, Mokudan, Pinawantai/Manggis, Pintasan, Poring, Quoin Hill, Sabah Softwoods, Sebatik Island, Segarong, Sepilok, Tabin, Tawau Hills, and Ulu Kimanis. *Elevation:* Sea level to 1,000 m. The highest records are from Kiau and Mt. Lotung. *Habitats:* 1°, 2°, logged, coniferous, and peatswamp forest; *Albizia* and oil-palm plantations. *Breeding:* A fledgling from Ulu Kimanis was brought to DMB in Oct. 1958. Specimens with enlarged testes were collected at Imbak on 16 July 1982 (12 × 6 mm) and Labuk Road on 1 Aug. 1983 (14 × 11 mm). *Voice:* DMB described a number of noises, including a crowish *kraaark*, a repetitive *ca-ca-ca-ca-ca*, which may sometimes be uttered so fast as to sound like a woodpecker drumming, and the banjo call of Smythies (1981), *engggannngg-ennnggaannnggg*. This latter is a particularly glottal sound, reminiscent of a jew’s-harp, and is uttered with the neck feathers fluffed out, possibly in connection with courtship. *Food:* Caterpillars, a shrewlike mammal, beetles, and oil-palm fruit. Birds collected near the Labuk Road oil-palm plantations had stomachs filled with oil-palm fruit (WFVZ). *Remarks:* In flight they hold their wings below horizontal and shiver them. This habit is useful in identification.

ACKNOWLEDGMENTS

The success of our expeditions and research stemmed largely from the help of many colleagues and officials. For this help, we offer our thanks. Those who contributed notes and information on birds or the history of ornithology of Sabah include D. Bishop, A. Biun, J. Boys, P. Coe, the Earl of Cranbrook, L. Curran, G. Davies, R. Goh, K. Ickes, A. Johns, B. King, A. Lamb, F. Lambert, C. Mann, C. Marsh, G. Mees, W. Meijer, J. Payne, J. Pearson, the Phillipps family, M. A. Rahman, P. Rasmussen, F. Rozendaal, K. Scriven, D. Simpson, G. Sinit, J. Spencer, A. Styring, A. Sullivan, K. Voous, J. Wall, R. Whittaker, D. Yong, and M. Zakaria. We owe special thanks to Dennis Batchelor, Geoffrey Davison, Charles Francis, Rob Stuebing, Tommy Thompson, and David Wells for providing particularly large amounts of unpublished information on the birds of Sabah. Others

who provided aid and advice were P. Angle, J. and R. Beaman, P. Cassels, T. Chesser, L. Chin, S. de Silva, A. Ganning, M. Hee, P. Hee, E. Hess, R. Ibbotson, G. Ismail, C. Leh, F. Liew, P. Malim, D. McCredie, M. McMyn, R. Paynter, S. Scriven, R. Sidek, E. Tangon, R. Voss, C. M. Yang, and the participants in the Yale University, Western Foundation, and Academy of Natural Sciences of Philadelphia–University Kebangsaan Sabah expeditions (listed in the gazetteer). In many ways, we drew heavily from the pioneering work of Glyn Davies and Junaidi Payne, and we thank them for their generous help. Institutions that helped us in Sabah include Kennedy Bay Timber Co., North Borneo Timber Co., Sabah Forest Department, Sabah Forest Industries, Sabah Foundation, Sabah Museum, Sabah Parks, Sabah Softwoods, Sabah Wildlife Department, and Universiti Kebangsaan Malaysia (Sabah Campus). Museums that provided access to specimens and data were Academy of Natural Sciences of Philadelphia, American Museum of Natural History, British Museum of Natural History, Delaware State Museum, Field Museum of Natural History, Sabah Museum, Museum of Comparative Zoology (Harvard), Peabody Museum of Natural History (Yale), Raffles Museum, Sabah Park Zoological Collection, Sarawak Museum, U.S. National Museum (Smithsonian), Universiti Kebangsaan Malaysia (Sabah Campus) Collection, and University of Malaya Collection. D. Batchelor, N. Collar, G. Davison, C. Francis, J. Hagan, F. Lambert, C. Mann, J. Payne, R. Paynter, J. V. Remsen, R. Stuebing, and D. Wells reviewed parts of the manuscript and provided many helpful comments. John and Reed Beaman kindly gave permission for us to reproduce their topographic map of Mt. Kinabalu. Finally, we thank Patrick Andau and Peter Malim of Sabah Wildlife Department; Datuk Lamri Ali, Francis Liew, and Maklarin Lakim of Sabah Parks; and Anna Wong and Jaffit Majuakim of Sabah Museum for logistic support and advice; Ed Harrison, Lloyd Kiff, and Julie Kiff for inspiration; and the Chief Minister's Department of Sabah and the Prime Minister's Department of Malaysia for permission to undertake research in Sabah. Financial support was provided by the Western Foundation of Vertebrate Zoology, Academy of Natural Sciences of Philadelphia, Louisiana State University Museum of Natural Science, National Geographic Society, American Ornithologists' Union, and the Frank Chapman Fund of the American Museum of Natural History. This is paper 16 of WFVZ Sabah Project.

BIBLIOGRAPHY

- ACRES, B. D. 1972. The ascent of Trusmadi. *Sabah Soc. J.* 5:365–370.
- AHLQUIST, J. E., F. H. SHELDON, AND C. G. SIBLEY. 1984. The relationships of the Bornean Bristlehead (*Pityriasis gymnocephala*) and the Black-collared Thrush (*Chlamydochaera jefferyi*). *J. Ornithol.* 125:129–140.
- AHMAD, A.-H. 1999. The population status of megapodes in Pulau Tiga, Sabah, Malaysia. *Sabah Parks Nat. J.* 2:75–84.
- AHMAD BIN DARUS, AND R. STUEBING. 1986. Vertebrate exotics in Sabah. *Sabah Soc. J.* 8:296–306.
- ALLEN, E. F., AND E. J. H. BERWICK. 1958. Nesting of the Mountain Black-eye. *Sarawak Mus. J.* 8: 462–463.
- ALLEN, J. A. 1911. Mammals collected in the Dutch East Indies by Mr. Roy C. Andrews on the cruise of the 'Albatross' in 1909. *Bull. Am. Mus. Nat. Hist.* 30:335–339.
- AMADON, D. 1943a. Two interesting pipits from Labuan Island, Borneo. *Ibis* 85:215.
- AMADON, D. 1943b. Notes on a collection of birds from Sebatik Island, Borneo. *Ibis* 85:331–333.
- ANONYMOUS. 1898. [An obituary for A. H. Everett.] *Ibis* 1898:627.
- ANONYMOUS. 1899. [An obituary for John Whitehead.] *Ibis* 1899:642.

- ANONYMOUS. 1989. Annual Report, Danum Valley Field Centre. Sabah Foundation, Kota Kinabalu, Sabah.
- ANONYMOUS. 1990. Annual Report, Danum Valley Field Centre. Sabah Foundation, Kota Kinabalu, Sabah.
- ANONYMOUS. 1991. Annual Report, Danum Valley Field Centre. Sabah Foundation, Kota Kinabalu, Sabah.
- APPELL, G. N. 1965. Distribution of the Megapode—as reported by the Rungus Dusun. *Sarawak Mus. J.* 12:393–394.
- ARGENT, G. C. G. 1985. *Vireya* rhododendrons in Borneo. *Notes R. Bot. Gard. Edinb.* 43:53–61.
- ASHTON, P. S., AND P. HALL. 1995. Comparisons of structure among mixed dipterocarp forests of north-western Borneo. *J. Ecol.* 80:459–481.
- AXELL, H. 1985. Kota Belud Bird Sanctuary, Sabah, Malaysia: A Development Plan for Wildlife and Tourism. Project No. MAL 73 (MYS 73/85). World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- BANKS, E. 1933. The distribution of mammals and birds in Sarawak and adjacent parts of Borneo. *Proc. Zool. Soc. Lond.* 1933(2):273–282.
- BANKS, E. 1937. The distribution of Bornean birds. *Sarawak Mus. J.* 4:453–496.
- BANKS, E. 1950. Breeding seasons of birds in Sarawak and North Borneo. *Ibis* 92:642.
- BANKS, E. 1982. A short account of an expedition to Sabah (Borneo). *Brunei Mus. J.* 1982:119–122.
- BATCHELOR, D. M. 1959. North Borneo bird notes. *Sarawak Mus. J.* 9:263–266.
- BATCHELOR, D. M. 1960. Bird banding. *Malay. Nat. Hist. J.* 14:230–231.
- BATCHELOR, D. M. 1961. Migrating birds off Borneo. *Malay. Nat. J.* 15:74.
- BEADLE, D., AND A. WHITTAKER. 1985. Sabah survey report. Pp. 79–118, 155–162 in *Interwader Annual Report 1984* (D. Parish and D. R. Wells, Eds.). Asian Wetland Bureau, Kuala Lumpur, Malaysia.
- BEAMAN, J. H. 1996. Evolution and phylogeography of the Kinabalu flora. Pp. 95–99 in *Kinabalu, Summit of Borneo*. 2nd ed. (K. M. Wong and A. Phillipps, Eds.). Sabah Society and Sabah Parks, Kota Kinabalu, Sabah.
- BEAMAN, J. H., R. H. AMAN, J. NAIS, G. SINIT, AND A. BIUN. 1996. Mount Kinabalu place names in Dusun and their meaning. Pp. 489–510 in *Kinabalu, Summit of Borneo*. 2nd ed. (K. M. Wong and A. Phillipps, Eds.). Sabah Society and Sabah Parks, Kota Kinabalu, Sabah.
- BEAMAN, J. H., AND R. S. BEAMAN. 1990. Diversity and distribution patterns in the flora of Mount Kinabalu. Pp. 147–160 in *The Plant Diversity of Malesia* (P. Baas, Ed.). Kluwer Academic Publishers, Netherlands.
- BEAMAN, R. S., J. H. BEAMAN, C. W. MARSH, AND P. V. WOODS. 1985. Drought and forest fires in Sabah in 1983. *Sabah Soc. J.* 8:10–30.
- BERNARD, H., AND P. DIUN. 1999. A checklist of the avifauna of Gunung Rara Forest Reserve, Tawau, Sabah, Malaysia. *Sabah Parks Nat. J.* 2:45–58.
- BERWICK, E. J. H. 1961. Mount Kinabalu, North Borneo. Pp. 125–127 in *Nature Conservation in Western Malaysia, 1961* (J. Wyatt-Smith and P. R. Wycherley, Eds.). Malayan Nature Society, Kuala Lumpur, Malaysia.
- BERWICK, E. J. H. 1970. Some vernacular bird names from Sabah. *Sabah Soc. J.* 5:127–132.
- BIUN, A. 1999. An altitudinal survey of the birds of Mt. Kinabalu, Sabah, Malaysia. *Sabah Parks Nat. J.* 2:59–74.
- BLASIUS, W. 1901. Bem erkungen uber neue Sendungen malayischer Vogel. *J. Ornithol.* 49:60–73.
- BRANSBURY, J. 1993. A birdwatcher's guide to Malaysia. Waymark Publishing, Australia.
- BROOKS, D. R. 1990. Parsimony analysis in historical biogeography and coevolution: methodological and theoretical update. *Syst. Zool.* 39:14–30.
- BRUIJNZEEL, L. A., M. J. WATERLOO, J. PROCTOR, A. T. KUITERS, AND B. KOTTERINK. 1993. Hydrological observations in montane rain forests on Gunung Silam, Sabah, Malaysia, with special reference to the *Massenerhebung* effect. *J. Ecol.* 81:145–168.
- BRUNIG, E. F. 1974. Ecological Studies in the Kerangas Forests of Sarawak and Brunei. Borneo Literature Bureau, Kuching, Sarawak.
- BRYANT, P. W., D. P. J. WOOD, B. J. MOSER, J. V. BOYS, AND J. P. WOODALL. 1956. [A Report on the 1956 Cambridge University Expedition to Mt. Trus Madi.] Cambridge University Explorers and Travellers Club, Cambridge, UK. Unpublished.
- BUCKTON, S. E. B. 1992. Sabah, A Birder's Guide. Oriental Bird Club Trip Report. Unpublished.

- BURBIDGE, F. W. 1880. Gardens of the Sun. London. [Reprinted in 1989 by Oxford University Press, Singapore.]
- BURDER, J. R. N. 1961. The birds' nest caves at Gomantong, North Borneo. Pp. 172–177 in *Nature Conservation in Western Malaysia, 1961* (J. Wyatt-Smith and P. R. Wycherley, Eds.). Malayan Nature Society, Kuala Lumpur, Malaysia.
- BURGESS, P. F. 1961a. Wild life conservation in North Borneo. Pp. 143–151 in *Nature Conservation in Western Malaysia, 1961* (J. Wyatt-Smith and P. R. Wycherley, Eds.). Malayan Nature Society, Kuala Lumpur, Malaysia.
- BURGESS, P. F. 1961b. Breeding of the White-bellied Swiftlet (*Collocalia esculenta*) in North Borneo. *Sarawak Mus. J.* 10:264–268.
- BURGESS, P. F. 1964. The Kota Belud bird sanctuary, Sabah. *Malay. Nat. J.* 18:177–178.
- CASEMENT, M. B. 1979. Sea report sheets. *Sea Swallow* 29:21–42.
- CASEMENT, M. B. 1980. Sea report sheets. *Sea Swallow* 30:19–35.
- CHASEN, F. N. 1931. Report on the "Birds' Nest" Caves and Industry of British North Borneo (with Special Reference to the Gomantong Caves). Government Printer, Jesselton, Sabah.
- CHASEN, F. N. 1935. A handlist of Malaysian birds. *Bull. Raffles Mus.* 11:1–389.
- CHASEN, F. N., AND C. B. KLOSS. 1929. Some new birds from North Borneo. *J. Ornithol.* 2:106–121.
- CHASEN, F. N., AND C. B. KLOSS. 1930a. On a collection of birds from the lowlands and islands of North Borneo. *Bull. Raffles Mus.* 4:1–112.
- CHASEN, F. N., AND C. B. KLOSS. 1930b. A list of the birds of Banguay, Balambangan and Mallewalle islands, British North Borneo. *Bull. Raffles Mus.* 4:113–116.
- CHASEN, F. N., AND C. B. KLOSS. 1930c. Additions to the list of Bornean birds. *Bull. Raffles Mus.* 4:124.
- CHATFIELD, G. A. 1972. Sabah, A General Geography. University of London Press, Singapore.
- CHOI, D. L.-T. 1996. Geology of Kinabalu. Pp. 19–29 in *Kinabalu, Summit of Borneo*. 2nd ed. (K. M. Wong and A. Phillipps, Eds.). Sabah Society and Sabah Parks, Kota Kinabalu, Sabah.
- CIBOIS, A., M. V. KALYAKIN, L.-X. HAN, AND E. PASQUET. Submitted. Molecular phylogenetics of babblers (Timaliidae): re-evaluation of the genera *Yuhina* and *Stachyris*. *J. Avian Biol.*
- COLLENETTE, P. 1963. A physiographic classification for North Borneo. *Sabah Soc. J.* 4:28–38.
- COLLINS, N. M., J. A. SAYER, AND T. C. WHITMORE, EDs. 1991. *The Conservation Atlas of Tropical Forests: Asia and the Pacific*. Macmillan, London.
- COMBER, J. 1971. Murut and Lun Dayah bird names. *Sabah Soc. J.* 5:172–176.
- COOLIDGE, H. J. 1940. Mammal and bird collections of the Asiatic primate expedition. Introduction. *Bull. Mus. Comp. Zool.* 87:121–130.
- CORNER, E. J. H. 1964. Royal Society expedition to North Borneo 1961: reports. General Report. *Proc. Linn. Soc. Lond.* 175:9–32.
- CORNER, E. J. H. 1996. The plant life of Kinabalu—an introduction. Pp. 101–149 in *Kinabalu, Summit of Borneo*. 2nd ed. (K. M. Wong and A. Phillipps, Eds.). Sabah Society and Sabah Parks, Kota Kinabalu, Sabah.
- CRACRAFT, J. 1988. From Malaysia to New Guinea: evolutionary biogeography within a complex continent–island arc contact zone. *Acta Congr. Int. Ornithol.* 19:2581–2593.
- CRANBROOK, EARL OF. 1981a. The vertebrate faunas. Pp. 57–69 in *Wallace's Line and Plate Tectonics* (T. C. Whitmore, Ed.). Clarendon Press, Oxford, UK.
- CRANBROOK, EARL OF. 1981b. *Birds of Borneo* by B.E. Smythies: editorial notes on the third edition. *Sarawak Mus. J.* 29:167–169.
- CRANBROOK, EARL OF. 1982. *Birds of Borneo* by B.E. Smythies: editorial notes on the third edition. *Sabah Soc. J.* 7:148–150.
- CRANBROOK, EARL OF, AND D. R. WELLS. 1981. Observations of fledgling cuckoos and their fosterers in Gunung Mulu National Park. *Sarawak Mus. J.* 29:147–149.
- CURRAN, L. M., I. CANIAGO, G. D. PAOLI, D. ASTIANI, M. KUSNETI, M. LEIGHTON, C. E. NIRARITA, AND H. HAERUMAN. 1999. Impact of El Niño and logging on canopy tree recruitment in Borneo. *Science* 286:2184–2188.
- CURRAN, L. M., AND M. LEIGHTON. 2000. Vertebrate responses to spatiotemporal variation in seed production of mast-fruiting Dipterocarpaceae. *Ecol. Monogr.* 70:101–128.
- CURRAN, L. M., AND C. O. WEBB. 2000. Experimental tests of the spatiotemporal scale of seed predation in mast-fruiting Dipterocarpaceae. *Ecol. Monogr.* 70:129–148.

- DALY, D. D. 1888. On the caves containing edible birds'-nests in British North Borneo. Proc. Zool. Soc. Lond. 1888:108–116.
- DA SILVA, M. N. F., AND J. L. PATTON. 1998. Molecular phylogeography and the evolution and conservation of Amazonian mammals. Mol. Ecol. 7:475–486.
- DAVIES, A. G. 1981. A Wildlife Survey Conducted in the Sabah Softwoods Sdn. Bhd. Plantation. Report submitted to Sabah Softwoods Sdn. Bhd., Brumas, Tawau, Sabah. Unpublished.
- DAVIES, G., AND J. PAYNE. 1982. A Faunal Survey of Sabah. IUCN/WWF Project No. 1692. World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia.
- DAVIS, D. D. 1962. Mammals of the lowland rain-forest of North Borneo. Bull. Natl. Mus. Singapore 31:1–129.
- DAVISON, G. W. H. 1981. Diet and dispersion of the Great Argus (*Argusianus argus*). Ibis 123:484–494.
- DAVISON, G. W. H. 1982a. Sexual displays of the Great Argus Pheasant *Argusianus argus*. Z. Tierpsychol. 58:185–202.
- DAVISON, G. W. H. 1982b. Systematics within the genus *Arborophila* Hodgson. Fed. Mus. J. 27:125–134.
- DAVISON, G. W. H. 1983a. Behaviour of Malay Peacock-Pheasant *Polyplectron malacense* (Aves: Phasianidae). J. Zool. Lond. 201:57–65.
- DAVISON, G. W. H. 1983b. The eyes have it: ocelli in a rainforest pheasant. Anim. Behav. 31:1037–1042.
- DAVISON, G. W. H. 1992. Birds of Mount Kinabalu, Borneo. Natural History Publications (Borneo), Kota Kinabalu, Sabah.
- DAVISON, G. W. H., AND Y. F. CHEW. 1996. A Photographic Guide to Birds of Borneo. New Holland Ltd., London.
- DEIGNAN, H. G. 1946. Races of the Striated Marsh Warbler (*Megalurus palustris* Horsfield). Auk 63:381–383.
- DE SILVA, G. S. 1966. Wild life conservation in Sabah. Sabah Soc. J. 1966(3):77–84.
- DE SILVA, G. S. 1981. Some birds of the Kabili–Sepilok forest reserve. Sarawak Mus. J. 29:151–166.
- DE SILVA, G. S., AND C. CHONG. 1974. Bird notes—Pulau Selingaan. Malay. Nat. J. 28:22–25.
- DUCKETT, J. E. 1987. A second set of general bird notes from the Fourth Division of Sarawak. Sarawak Mus. J. 37(58):123–138.
- DUFF, A. B., R. A. HALL, AND C. W. MARSH. 1984. A survey of wildlife in and around a commercial tree plantation in Sabah. Malay. For. 47:197–213.
- DUTSON, G., R. WILKINSON, AND B. SHELDON. 1991. Hook-billed Bulbul *Setornis criniger* and Grey-breasted Babbler *Malacopteron albogulare* at Barito Ulu, Kalimantan. Forktail 6:78–82.
- DYMOND, N. 1999. Two records of Black-headed Bunting *Emberiza melanocephala* in Sabah—the first definite occurrences in Malaysia and Borneo. Forktail 15:102–103.
- ELLIOT, D. G. 1890. A list of birds from northeast Borneo, with field notes by Mr. C. F. Adams. Auk 7:346–359.
- ELLIOT, D. G. 1891. A list of birds from northeast Borneo, with field notes by Mr. C. F. Adams. Auk 8:7–16.
- EMERSON, S. B., R. F. INGER, AND D. ISKANDAR. 2000. Molecular systematics and biogeography of the fanged frogs of southeast Asia. Mol. Phylogenet. Evol. 16:131–142.
- ENRIQUEZ, C. M. 1927. Kinabalu, the Haunted Mountain of Borneo. H. F. & G. Witherby, London.
- EVE, R., AND A. M. GUIGE. 1989. Survey of the Mahakam River delta, East Kalimantan, with special reference to its waterbirds. Publ. No. 45. Asian Wetland Bureau, Kuala Lumpur, Malaysia.
- EVERETT, A. H. 1886. Letter. Ibis 1886:524–525.
- EVERETT, A. H. 1887. Letter. Ibis 1887:362–363.
- EVERETT, A. H. 1889. A list of the birds of the Bornean group of islands. Straits Br. R. Asiatic Soc. J. 20:91–212.
- EVERETT, A. H. 1890a. Letter. Ibis 2:465.
- EVERETT, A. H. 1890b. Letter. Ibis 2:263.
- FAO. 1987. Development of forest sector planning, Malaysia. Technical report no. 1, DP/MAL/85/004. United Nations Food and Agricultural Organization, Rome.
- FOGDEN, M. P. L. 1965. Borneo bird notes, 1963–65 (from various hands). Sarawak Mus. J. 12:395–414.

- FOGDEN, M. P. L. 1972. The seasonality and population dynamics of equatorial forest birds in Sarawak. *Ibis* 114:307–343.
- FOX, J. E. D. 1972. The natural vegetation of Sabah and natural regeneration of the dipterocarp forests. Ph.D. thesis, University College of North Wales, Bangor.
- FOX, J. E. D. 1973. A Handbook to Kabili–Sepilok Forest Reserve. Sabah Forest Record No. 9. Borneo Literature Bureau, Kuching, Sarawak.
- FRAHM, J.-P., AND S. R. GRADSTEIN. 1991. An altitudinal zonation of tropical rain forests using bryophytes. *J. Biogeogr.* 18:669–678.
- FRANCIS, C. M. 1984a. A Checklist of the Birds of Sepilok. Sabah Forest Department, Sandakan, Sabah.
- FRANCIS, C. M. 1984b. Pocket Guide to the Birds of Borneo. Sabah Society and World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- FRANCIS, C. M. 1985a. Recent immigration of the Striated Warbler *Megalurus palustris* to Borneo. *Bull. Br. Ornithol. Club* 105:22–23.
- FRANCIS, C. M. 1985b. Predation on flocking *Tadarida plicata* in Sabah. *Bat Res. News* 26:59.
- FRANCIS, C. M. 1986. Checklist of the Birds of Sabah. Western Foundation of Vertebrate Zoology, Los Angeles, California.
- FRANCIS, C. M. 1987. The Management of Edible Bird's Nest Caves in Sabah. Sabah Forest Department, Sandakan, Sabah.
- FRANCIS, C. M., AND M. ANDAU. 1997. White-vented Whistler of Sipadan Island, Sabah. *J. Wildl. Manage. Res. Sabah* 1:31–39.
- FRITH, C. B., AND D. W. FRITH. 1983. A systematic review of the hornbill genus *Anthracoceros* (Aves, Bucerotidae). *Zool. J. Linn. Soc.* 78:29–71.
- FRY, C. H., K. FRY, AND A. HARRIS. 1992. Kingfishers, Bee-eaters, and Rollers. Christopher Helm, London.
- GAITHER, J. C. 1994. Understorey avifauna of a Bornean peat swamp forest: is it depauperate? *Wilson Bull.* 106:381–390.
- GASIS, J. 1984. A survey of the small mammals of the Sabah Softwoods, Pte. Ltd., tree plantation, Brumas, Tawau. Honours Thesis, Universiti Kegangsaan Malaysia, Sabah Campus, Kota Kinabalu, Sabah.
- GHAZALLY, I., ED. 1989. Tabin Wildlife Reserve. *Sabah Mus. Monogr.* 3:1–122.
- GIBBS, L. S. 1914. A contribution to the flora and plant formations of Mount Kinabalu and the highlands of British North Borneo. *J. Linn. Soc. (Bot.)* 42:1–240.
- GIBSON-HILL, C. A. 1949a. An annotated checklist of the birds of Malaya. *Bull. Raffles Mus.* 20:3–299.
- GIBSON-HILL, C. A. 1949b. Ornithological notes from the Raffles Museum, 5–8. No. 5. A collection of birds' eggs from North Borneo. *Bull. Raffles Mus.* 21:106–115.
- GIBSON-HILL, C. A. 1949c. Ornithological notes from the Raffles Museum, 1–4. No. 4. A note on the distribution of the immigrant snipe of the genus "*Capella*" wintering in the Malay peninsula and surrounding areas. *Bull. Raffles Mus.* 19:105–119.
- GIBSON-HILL, C. A. 1950. Notes on the sea birds breeding in Malayan waters. *Bull. Raffles Mus.* 23:5–64.
- GIBSON-HILL, C. A. 1952. The apparent breeding seasons of land birds in North Borneo and Malaya. *Bull. Raffles Mus.* 24:270–294.
- GOH, R., J. MAJUAKIM, A. LOH, G. JONIS, M. D. SHARIF, AND R. SININ. 1989. A bird survey of two sites in the Tabin Wildlife Reserve, Sabah. *Sabah Mus. Monogr.* 3:82–86.
- GÖNNER, C. 1990. Avigaunistische Artendiversität im Sepilok Virgin Jungle Reserve: Ein Methodenvergleich. M.S. thesis, University of Konstanz, Federal Republic of Germany.
- GOODMAN, S. M. 1989. Predation by the Grey Leaf Monkey (*Presbytis hosei*) on the contents of a bird's nest at Mt. Kinabalu Park, Sabah. *Primates* 30:127–128.
- GORE, M. E. J. 1964a. Notes on the nests of the Golden-Naped Barbet, Black-Throated Barbet and Velvet-Fronted Nuthatch. *Sabah Soc. J.* 2:138–139.
- GORE, M. E. J. 1964b. A new Borneo bird. *Sabah Soc. J.* 2:109.
- GORE, M. E. J. 1968. A check-list of the birds of Sabah, Borneo. *Ibis* 110:165–196.
- GOVERNMENT OF MALAYSIA. 1996. Seventh Malaysia Plan 1996–2000. Government Printers, Kuala Lumpur, Malaysia.
- GRISWOLD, J. A. 1939. Up Mount Kinabalu. *Sci. Month.* 48:401–414, 504–518.

- GUILLEMARD, F. H. H. 1885. Report on the collection of birds made during the voyage of the yacht 'Marchesa.' Part II. Borneo and the Island of Cagayan Sulu. Proc. Zool. Soc. Lond. 1885:404–420.
- GUILLEMARD, F. H. H. 1889. The Cruise of the Marchesa to Kamschatka & New Guinea. Scribner and Welford, New York.
- HAGAN, J. M., AND D. W. JOHNSTON, EDs. 1992. Ecology and Conservation of Neotropical Migrant Landbirds. Smithsonian Institution Press, Washington, D.C.
- HAIMOFF, E. H. 1987. A spectrographic analysis of the loud calls of Helmeted Hornbills *Rhinoplax vigil*. Ibis 129:319–326.
- HALL, R., AND J. D. HOLLOWAY, EDs. 1998. Biogeography and Geological Evolution of SE Asia. Backhuys, Leiden, The Netherlands.
- HAN, K. H., F. H. SHELDON, AND R. STUEBING. 2000. Interspecific relationships and biogeography of some Bornean tree shrews (Tupaiaidae: *Tupaia*), based on DNA-hybridization and morphometric comparisons. Biol. J. Linn. Soc. 70:1–14.
- HANITSCH, R. 1900. An expedition to Mount Kina Balu, British North Borneo. Straits Br. R. Asiatic Soc. J. 34:49–88.
- HARCOURT, A. H. 1999. Biogeographic relationships of primates on Southeast Asian islands. Global Ecol. Biogeogr. 8:55–61.
- HARRAP, S. 1994. Little known oriental bird: Kinabalu Friendly Warbler *Bradypterus accentor*. Orient. Bird Club Bull. 20:24–27.
- HARRISSON, T. 1949. A note on *Enicurus leschenaulti*. Sarawak Mus. J. 5:149–152.
- HARRISSON, T. 1955a. Four additions to the North Borneo bird list. Sarawak Mus. J. 6:318–320.
- HARRISSON, T. 1955b. The Mountain Black-eye (*Chlorocharis*). Ecology and natural history. Sarawak Mus. J. 6:660–687.
- HARRISSON, T. 1957. Nesting of the Kinabalu Mountain Blackbird. II. Sarawak Mus. J. 8:250–251.
- HARRISSON, T. 1962. Downward zonation of the Blue Shortwing (and other Malaysian high montane birds). Sarawak Mus. J. 10:605–609.
- HARRISSON, T. 1964. Remarks on the birds of Mt Kinabalu. Proc. R. Soc. Lond. Ser. B 161:80–82.
- HARRISSON, T. 1966. Sabah's Turtle Islands: vertebrate notes. Sabah Soc. J. 3:61–68.
- HARRISSON, T. 1967. Borneo bird notes, 1966–7 from various hands. Sarawak Mus. J. 15:414–423.
- HARRISSON, T. 1974. The Tree Sparrow in Borneo (East Malaysia and Brunei). A population explosion? Malay. Nat. J. 27:171.
- HARRISSON, T., AND B. HARRISSON. 1971. The prehistory of Sabah. Sabah Soc. J. 4:1–272.
- HARRISSON, T., AND B. E. SMYTHIES. 1959. Some Bornean rarities. Ibis 101:244–245.
- HEANEY, L. R. 1985. Systematics of oriental pygmy squirrels of the genera *Exilisciurus* and *Nannosciurus* (Mammalia: Sciuridae). Misc. Publ. Mus. Zool. Univ. Mich. 170:1–58.
- HEANEY, L. R. 1986. Biogeography of mammals in SE Asia: estimates of rates of colonization, extinction and speciation. Biol. J. Linn. Soc. 28:127–165.
- HITOSHI, N., S. ASAMA, AND A. BIUN. 1996. A Photographic Guide to the Birds of Mt. Kinabalu, Borneo. Bun-ichi Sogoshuppan, Tokyo.
- HOLMES, D. A., AND J. R. D. WALL. 1989. Letter: *Setornis criniger*, *Malacopteron albogulare* and conservation in Indonesia. Forktail 4:123–125.
- HONDA, M., H. OTA, M. KOBAYASHI, J. NABHITABHATA, H.-S. YONG, AND T. HIKIDA. 1999. Phylogenetic relationships of the flying lizards, genus *Draco* (Reptilia, Agamidae). Zool. Sci. 16:535–549.
- HORNsKOV, J. 1989. Threatened birds on Asian islands. World Birdwatch 11(2):4.
- HOWES, J., AND F. LAMBERT. 1987. Some notes on the status, field identification, and foraging characteristics of Nordmann's Greenshank *Tringa guttifer*. Wader Study Group Bull. 49:14–17.
- HUTCHINSON, G. E. 1978. An Introduction to Population Ecology. Yale University Press, New Haven, Connecticut.
- INGER, R. F. 1956. Some amphibians from the lowlands of North Borneo. Fieldiana Zool. 34:389–424.
- INGER, R. R. 1966. The systematics and zoogeography of the Amphibia of Borneo. Fieldiana Zool. 52:1–402.
- INSKIPP, T., N. LINDSEY, AND W. DUCKWORTH. 1996. An Annotated Checklist of the Birds of the Oriental Region. Oriental Bird Club, Sandy, United Kingdom.
- JACOBSON, G. 1978. Geology. Pp. 101–110 in Kinabalu, Summit of Borneo (M. Luping, W. Chin, and E. R. Dingley, Eds.). Sabah Society, Kota Kinabalu, Sabah.

- JENKINS, D. V. 1976. A brief note on the Blue-naped Parrot in Kota Kinabalu, Sabah. *Malay. Nat. J.* 29:158.
- JENKINS, D. V. 1978. The first hundred years: a short account of the expeditions to Mount Kinabalu 1851–1950. Pp. 45–74 in *Kinabalu, Summit of Borneo* (M. Luping, W. Chin, and E. R. Dingley, Eds.). Sabah Society, Kota Kinabalu, Sabah.
- JENKINS, D. V. 1996. The first hundred years: a short account of the expeditions to Mt. Kinabalu 1851–1950. Pp. 41–67 in *Kinabalu, Summit of Borneo*. 2nd ed. (K. M. Wong and A. Phillipps, Eds.). Sabah Society and Sabah Parks, Kota Kinabalu, Sabah.
- JENKINS, D. V., AND G. S. DE SILVA. 1978. An annotated check list of the birds of the Mount Kinabalu National Park, Sabah Malaysia. Pp. 347–402 in *Kinabalu, Summit of Borneo* (M. Luping, W. Chin, and E. R. Dingley, Eds.). Sabah Society, Kota Kinabalu, Sabah.
- JENKINS, D. V., G. S. DE SILVA, D. R. WELLS, AND A. PHILLIPPS. 1996. An annotated checklist of the birds of Kinabalu Park. Pp. 397–437 in *Kinabalu, Summit of Borneo*. 2nd ed. (K. M. Wong and A. Phillipps, Eds.). Sabah Society and Sabah Parks, Kota Kinabalu, Sabah.
- JOHNS, A. D. 1987. The use of primary and selectively logged rainforest by Malaysian hornbills (*Bucerotidae*) and implications for their conservation. *Biol. Conserv.* 40:179–190.
- JOHNS, A. D. 1988. Long-term Effects of Selective Logging Operations on Malaysian Wildlife. II. Case Studies in the Ulu Segama Forest Reserve, Danum Valley and Tabin Conservation Areas, Sabah, East Malaysia. Final Report to the Danum Valley Management Committee, Sabah Foundation, and the Socioeconomic Research Unit of the Prime Minister's Department, Kuala Lumpur, Malaysia. Unpublished.
- JOHNS, A. D. 1989a. Recovery of a peninsular Malaysian rainforest avifauna following selective timber logging: the first twelve years. *Forktail* 4:89–105.
- JOHNS, A. D. 1989b. Timber, the Environment and Wildlife in Malaysian Rain Forests. Final Report to the Institute of South-east Asian Biology, University of Aberdeen, United Kingdom. Unpublished.
- JOHNS, A. D. 1992. Vertebrate responses to selective logging: implications for the design of logging systems. *Philos. Trans. R. Soc. Lond. B* 335:437–442.
- JOHNS, A. D. 1996. Bird population persistence in Sabahan logging concessions. *Biol. Conserv.* 75: 3–10.
- JOHNS, A. D. 1997. Timber Production and Biodiversity Conservation in Tropical Rain Forests. Cambridge University Press, Cambridge, UK.
- JOMITIN, C. 1996. Results of bird and mammal surveys in the proposed Kinabatangan Wildlife Sanctuary. *Sabah Mus. J.* 1(3):7–23.
- KEAST, A., AND E. S. MORTON, EDs. 1980. *Migrant Birds in the Neotropics: Ecology, Behavior, Distribution, and Conservation*. Smithsonian Institution Press, Washington, D.C.
- KEAST, J. A. 1983. In the steps of Alfred Russell Wallace: biogeography of the Asian–Australian interchange zone. Pp. 367–407 in *Evolution, Time and Space: The Emergence of the Biosphere* (R. W. Sims, J. H. Price, and P. E. S. Walley, Eds.). Academic Press, London.
- KEMP, A. C. 1979. A review of the hornbills: biology and radiation. *Living Bird* 17:105–136.
- KEMP, A. C. 1995. *The Hornbills*. Oxford University Press, Oxford, UK.
- KETTERSON, E. D., AND V. NOLAN, JR. 1994. Male parental behavior in birds. *Annu. Rev. Ecol. Syst.* 25:601–628.
- KIEW, B. H. 1977. A Survey of the Proposed Sungai Danum National Park, Sabah. Project 1347. World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia.
- KING, B. 1989. The avian genera *Tesia* and *Urosphena*. *Bull. Br. Ornithol. Club* 109:162–166.
- KING, B. F., E. C. DICKINSON, AND M. W. WOODCOCK. 1975. *A Field Guide to the Birds of South-east Asia*. Collins, London.
- KLOSS, C. B. 1930a. The birds of Mangalum and Mantanani islands off the west coast of British North Borneo. *Bull. Raffles Mus.* 4:117–123.
- KLOSS, C. B. 1930b. An account of the Bornean birds in the zoological museum, Buitenzorg, with the description on a new race. *Treubia* 12:395–424.
- KLOSS, C. B. 1931a. A contribution to the zoology of Mangalum Island, north-west Borneo. *Bull. Raffles Mus.* 5:87–107.
- KLOSS, C. B. 1931b. Mount Kinabalu: a note. *Bull. Raffles Mus.* 5:1–2.
- KLOSS, C. B. 1931c. Mount Kinabalu: a note. *J. Fed. Malay States Mus.* 16:286.
- KNOX, A. G. 1987. Taxonomic status of 'Lesser Golden Plovers'. *Br. Birds* 80:482–487.

- KOK, M. L. 1998. Birding on the Pandanan Islands off Semporna, Sabah. *Suara Enggang* Sept.–Oct. 1998:34.
- KUNTZ, R. E. 1969. Vertebrates taken for parasitological studies by U.S. Naval Medical Research Unit No. 2 expedition to North Borneo (Malaysia). *Q. J. Taiwan Mus.* 22:191–206.
- KURODA, N. 1925. On a small collection of birds from British North Borneo. *Tori* 4(19):1–11.
- KURODA, N. 1933. On some specimens of birds from British [sic] North Borneo. *Tori* 8(36):2–9.
- LAMAN, T. G., J. C. GAITHER, AND D. E. LUKAS. 1996. Rain forest bird diversity in Gunung Palung National Park, West Kalimantan, Indonesia. *Trop. Biodiver.* 3:281–296.
- LAMBERT, F. 1990a. Recent reports: Malaysia, Sabah. *Bull. Orient. Bird Club* 11:45.
- LAMBERT, F. 1990b. Birds observed on P. Sipadan 22–31 Oct 1989. Unpublished list.
- LAMBERT, F. R. 1990c. Avifaunal Changes Following Selective Logging of a North Bornean Rain Forest. Final Report to The Royal Society South-east Asian Rain Forest Research Committee. Institute of South-east Asian Biology, Department of Zoology, University of Aberdeen, Aberdeen, UK.
- LAMBERT, F. R. 1991. Fruit-eating by Purple-naped Sunbirds *Hypogramma hypogrammicum* in Borneo. *Ibis* 133:425–426.
- LAMBERT, F. R. 1992. The consequences of selective logging for Borneo lowland forest birds. *Philos. Trans. R. Soc. Lond. B* 335:443–457.
- LAMBERT, F. R., AND A. G. MARSHALL. 1991. Keystone characteristics of bird-dispersed *Ficus* in a Malaysian lowland rain forest. *J. Ecol.* 79:793–809.
- LAMBERT, F., AND M. WOODCOCK. 1996. Pittas, broadbills, and asities. Pica Press, Sussex, UK.
- LANSDOWN, R. 1986a. Kota Belud, Sabah. *INTERWADER Newsl.* 7:6.
- LANSDOWN, R. V. 1986b. Observations on the wintering herons in the Kota Belud Bird Sanctuary, Sabah, 27 February 1986–12 March 1986. (WWFM Project 89/86). *INTERWADER Publication No. 7.* World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- LANSDOWN, R. 1987a. Sabah egret studies. *INTERWADER Newsl.* 8:16.
- LANSDOWN, R. V. 1987b. Recent extensions in breeding range of the Yellow Bittern *Ixobrychus sinensis*. *Forktail* 3:61–63.
- LANSDOWN, R. V. 1987c. The Feeding Ecology of the Larger Herons in the Kota Belud Bird Sanctuary. Project No. MAL/94 (MYS 94/86). World Wide Fund for Nature (Malaysia), Kuala Lumpur, Malaysia.
- LANSDOWN, R. V. 1988. Some calls, displays and associated morphology of the Cinnamon Bittern (*Ixobrychus cinnamomeus*) and their possible functions. *Colon. Waterbirds* 11:308–310.
- LANSDOWN, R. V. 1989. A Preliminary Survey of the Status of the White Egrets Occurring in Sabah, East Malaysia. Project No. MAL/94. World Wide Fund for Nature, Kuala Lumpur, Malaysia.
- LANSDOWN, R. 1990. Little-known oriental bird: Chinese Egret. *Bull. Orient. Bird Club* 11:27–30.
- LEE, P. L. M., D. H. CLAYTON, R. GRIFFITHS, AND R. D. M. PAGE. 1996. Does behavior reflect phylogeny in swiftlets (Aves: Apodidae)? A test using cytochrome *b* mitochondrial DNA sequences. *Proc. Natl. Acad. Sci. USA* 93:7091–7096.
- LEIGHTON, M. 1982. Fruit sources and patterns of feeding, spacing, and grouping among sympatric Bornean hornbills. Ph.D. thesis, University of California, Davis.
- LEIGHTON, M., AND D. LEIGHTON. 1983. Vertebrate responses to fruiting seasonality within a Bornean rain forest. Pp. 181–196 in *Tropical Rain Forest Ecology and Management* (S. L. Sutton, T. C. Whitmore, and A. C. Chadwick, Eds.). Blackwell Scientific, Oxford, UK.
- LOW, H. 1852. Notes of an ascent of the mountain Kina-Balow. *J. Indian Archipelago* 6:1–17.
- LUPING, M., W. CHIN, AND E. R. DINGLEY, EDs. 1978. Kinabalu, Summit of Borneo. Sabah Society, Kota Kinabalu, Sabah.
- MACKINNON, J. 1974. *In Search of the Red Ape*. Collins, London.
- MACKINNON, J., AND K. PHILLIPPS. 1993. *A Field Guide to the Birds of Borneo, Sumatra, Java, and Bali*. Oxford University Press, Oxford, UK.
- MACKINNON, K., G. HATTA, H. HALIM, AND A. MANGALIK. 1996. *The Ecology of Kalimantan*. Periplus Editions, Singapore.
- MAJUAKIM, J. 1993. The bird collection of the Sabah Museum. *Sabah Mus. J.* 1:57–71.
- MANN, C. F. 1989. More notable bird observations from Brunei, Borneo. *Forktail* 5:17–22.
- MARIN, M., AND F. H. SHELDON. 1987. Some new nesting records of padi-dwelling birds in Sabah, East Malaysia (North Borneo). *Bull. Br. Ornithol. Club* 107:23–25.
- MARSH, C. W., ED. 1989. Expedition to Maliau Basin, Sabah, April–May 1988, Final Report. Yayasan

- Sabah Information Paper No. 30. Project No. MYS 126/88. World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia.
- MARSH, C., AND J. GASIS. 1990. Conservation in Malaysia. An expedition to Sabah's lost world: the Maliau Basin. *Malay. Nat.* 43:346–348.
- MARSH, C. W., AND A. G. GREER. 1992. Forest land-use in Sabah, Malaysia: an introduction to Danum Valley. *Philos. Trans. R. Soc. Lond. B* 335:331–339.
- MARSHALL, A. G. 1992. The Royal Society's South-east Asia Rain Forest Research Programm: an introduction. *Philos. Trans. R. Soc. Lond. B* 335:327–330.
- MARSHALL, J. T. 1978. Systematics of smaller Asian night birds based on voice. *Ornithol. Monogr.* 25:1–58.
- MARTIN, T. E., AND D. M. FINCH. 1995. *Ecology and Management of Neotropical Birds*. Oxford University Press, New York.
- MAT-SALLEH, K. 1993. Revision of the genus *Goniothalamus* (Annonaceae) of Borneo. Ph.D. dissertation, Michigan State University, East Lansing.
- MAYR, E. 1963. *Animal Species and Evolution*. Belknap Press, Cambridge, Massachusetts.
- MAYR, E., AND S. CAMRAS. 1938. Birds of the Crane Pacific Expedition. *Zool. Ser. Field Mus. Nat. Hist.* 20:453–473.
- MAYR, E., AND G. W. COTTRELL. 1986. Check-list of Birds of the World. Vol. 11. Museum of Comparative Zoology, Cambridge, Massachusetts.
- MCCLURE, H. E. 1974. Migration and Survival of the Birds of Asia. U.S. Army Medical Component, SEATO Medical Project, Bangkok, Thailand.
- MCCLURE, H. E., AND P. LEELAVIT. 1972. Birds banded in Asia during the MAPS program, by locality, from 1963 through 1971. Report No. FE-315-7. U.S. Army Research and Development Group, Far East, Bangkok, Thailand.
- MCCORMICK, K. J. 1979. Resource division within a tropical rainforest avian community. M.S. thesis, University of Aberdeen, Aberdeen, UK.
- MEARNS, B., AND R. MEARNS. 1988. *Biographies for Birdwatchers*. Academic Press, London.
- MEARNS, E. A. 1909. A list of birds collected by Dr. Paul Bartsch in the Philippine Islands, Borneo, Guam, and Midway Island, with descriptions of three new forms. *Proc. U.S. Natl. Mus.* 36: 463–478.
- MEDWAY, LORD. 1977. Mammals of Borneo. *Monogr. Malay. Br. R. Asiatic Soc.* 7:1–172.
- MEES, G. F. 1977. Additional records of birds from Formosa (Taiwan). *Zool. Meded. Leiden* 51:243–264.
- MEES, G. F. 1980. The sparrow hawks (Accipiter) of the Andaman Islands. *J. Bombay Nat. Hist. Soc.* 77(3):371–412.
- MEIJER, W. 1961. Nature protection in North Borneo. Pp. 60–62 *in* Nature Conservation in Western Malaysia, 1961 (J. Wyatt-Smith and P. R. Wycherley, Eds.). Malayan Nature Society, Kuala Lumpur, Malaysia.
- METCALFE, I. 1988. Origin and assembly of south-east Asian continental terranes. Pp. 101–118 *in* Gondwana and Tethys (M. G. Audley-Charles and A. Hallam, Eds.). Oxford University Press, Oxford, UK.
- MICHAUX, B. 1995. Distributional patterns in west Wallacea and their relationship to regional tectonic structures. *Sarawak Mus. J.* 48:163–179.
- MITCHELL, A. H. 1994. Ecology of Hose's Langur, *Prebytis hosei*, in mixed logged and unlogged dipterocarp forest of northeast Borneo. Ph.D. thesis, Yale University, New Haven, Connecticut.
- MITRA, S., AND F. H. SHELDON. 1993. Use of an exotic tree plantation by Bornean lowland forest birds. *Auk* 110:529–540.
- MIYAMOTO, T. 1971. About birds near Mt. Kinabalu in Borneo. *Tori* 20:229–238.
- MOBILIK, P., AND C. MARSH. 1992. Danum Valley Conservation Area: A Checklist of Vertebrates. Innoprise Corp., Kota Kinabalu, Sabah.
- MOHD. NORDIN HJ. HASAN, AND MOHD. ZAKARIA HUSSIN. 1997. Some effects of logging in mixed lowland dipterocarp forests on birds. Pp. 161–166 *in* State of Malaysian Environment (B. G. Ong, Ed.). Consumer Association of Penang Press, Penang, Malaysia.
- MOREAU, R. E., M. PERRINS, AND J. T. HUGHES. 1969. Tongues of the Zosteropidae (white-eyes). *Ardea* 57:29–47.
- MORRIS, P. G. 1975. A note on a problematical kingfisher sighting in eastern Sabah. *Sarawak Mus. J.* 23:269–270.

- MOTLEY, J., AND L. L. DILLWYN. 1855. Contributions to the natural history of Labuan, and the adjacent coasts of Borneo. Part I ("Aves" pp. 8–38, 53–62). John Van Voorst, London.
- MOULTON, J. C. 1913. A collecting expedition on Mt. Kinabalu. *Sarawak Gaz.* 43:248–250, 262–264.
- MOULTON, J. C. 1914a. Guide to the collection of Bornean birds in the Sarawak Museum. Sarawak Government Printing Office, Kuching, Sarawak.
- MOULTON, J. C. 1914b. Hand-list of the birds of Borneo. *Straits Br. R. Asiatic Soc. J.* 67:125–191.
- MOULTON, J. C. 1915. An account of the various expeditions to Mt. Kinabalu. *Sarawak Mus. J.* 2: 137–176.
- MOYLE, R. G., A. BIUN, B. BUTT, AND D. SUMPONGOL. 2001. Brood hosts of Oriental Cuckoo (*Cuculus saturatus*) in Sabah, Malaysia. *Bull. Br. Ornithol. Club.*
- NEWBERRY, D. M., D. N. KENNEDY, G. H. PETOL, L. MADANI, AND C. E. RIDSDALE. 1999. Primary forest dynamics in lowland dipterocarp forest at Danum Valley, Sabah, Malaysia, and the role of the understorey. *Philos. Trans. R. Soc. Lond. B* 354:1763–1782.
- NICHOLSON, F. 1883. On a collection of birds from Borneo. *Ibis* 1883:85–90.
- NIHAYAH, M., AND A. ABDULLAH. 1996. Notes on a small collection of mammals and birds from three sites in the proposed Lower Kinabatangan Wildlife Sanctuary. *Sabah Mus. J.* 1(3):25–29.
- NILMAN, V. 1998. Habitat preference of Great Argus Pheasant (*Argusianus argus*) in Kayan Mentarang National Park, East Kalimantan, Indonesia. *J. Ornithol.* 139:313–323.
- NORMAN, M. M. 1964. Bird notes from the Tawau area. *Sabah Soc. J.* 2:43–76.
- OLSON, S. L. 1987. More on the affinities of the Black-collared Thrush of Borneo (*Chlamydochaera jefferyi*). *J. Ornithol.* 128:246–248.
- OROLFO, P. 1964. Discovery of bird's nest caves in North Borneo. *Sabah Soc. J.* 2:106–108.
- PARISH, D. 1985. Kota Belud Bird Sanctuary, Sabah. Preliminary Report on Potential for Tourist Development. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PARISH, D., R. C. PRENTICE, AND C. E. TAYLOR. 1986. INTERWADER—East Asia/Pacific Shorebird Study Programme—Annual Report 1985. Publ. No. 16. INTERWADER, Kuala Lumpur, Malaysia.
- PARISH, D., R. C. PRENTICE, AND C. E. TAYLOR. 1987. INTERWADER—East Asia/Pacific Shorebird Study Programme—Annual Report 1986. Publ. No. 19. INTERWADER, Kuala Lumpur, Malaysia.
- PARISH, D., AND D. R. WELLS. 1984. Interwader Annual Report 1984 (WWFM Project MYS 57/83). INTERWADER, Kuala Lumpur, Malaysia.
- PARKER, S. A. 1981. Prolegomenon to further studies in the *Chrysococcyx 'malayanus'* group (Aves, Cuculidae). *Zool. Verh.* 187:1–56.
- PAYNE, J. 1985. Kulamba Wildlife Reserve Survey Report and Management Recommendations. Project No. MAL 62 (MYS 62/84). World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PAYNE, J. 1986. Development of Conservation Areas for Sabah: Final Report. Project No. MYS 61/83. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PAYNE, J. 1988a. Sepilok Forest Reserve: Its History, Resources and Functions. Project No. MYS 111/87. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PAYNE, J. 1988b. Report on an Aerial Survey to Assess Fire Damage in Kulamba Wildlife Reserve, Sabah. Project MYS 115/87. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PAYNE, J. 1989. Tabin Wildlife Reserve, Sabah: A Preliminary Management Plan. Project No. MYS 61/83. World Wildlife Fund Malaysia Report, Kuala Lumpur, Malaysia.
- PAYNE, J. 1990. Transfrontier Protected Areas in Borneo: (1) Conservation in the Sabah Border Regions. Project No. MYS 166/89. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PAYNE, J., C. M. FRANCIS, AND K. PHILLIPPS. 1985. A Field Guide to the Mammals of Borneo. Sabah Society, Kota Kinabalu, Sabah; and World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- PAYNE, J., AND D. PARISH. 1985. Kota Belud Bird Sanctuary, Sabah. A Site of International Importance for Bird Conservation. Preliminary Report on Potential for Tourist Development. Project No. 73 (MYS 73/85). World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia.
- PAYNE, R. M. 1997. Family Cuculidae (cuckoos). Pp. 508–610 in *Handbook of the Birds of the World*, Vol. 4, Sandgrouse to Cuckoos (J. del Hoyo, A. Elliot, and J. Sargatal, Eds.). Lynx Edicions, Barcelona, Spain.
- PENDLEBURY, H. M., AND F. N. CHASEN. 1932. A zoological expedition to Mt. Kinabalu, British North Borneo (1929). *J. Fed. Malay States Mus.* 17:1–38.

- PENDRY, C. A., AND J. PROCTOR. 1997. Altitudinal zonation of rain forest on Bukit Belalong, Brunei: soils, forest structure and floristics. *J. Trop. Ecol.* 13:221–241.
- PETERS, J. L. 1940. Birds from Mt. Kina Balu, North Borneo. *Bull. Mus. Comp. Zool.* 87:195–211.
- PHILLIPPS, A. 1984. Report on the Gunung Trus Madi expedition 1984. Sabah Parks, Kota Kinabalu, Sabah. Unpublished.
- PHILLIPPS, A. 1985a. Diary Report on Pulau Tiga Park 1985. Sabah Parks, Kota Kinabalu, Sabah. Unpublished.
- PHILLIPPS, A. 1985b. Diary Report on the Marai–Parai Spur Expedition, Kinabalu Park, 11–15 February 1985. Sabah Parks, Kota Kinabalu, Sabah. Unpublished.
- PHILLIPPS, A. 1986. Selected Bird Notes from Kinabalu Park, 1980–1986. Sabah Parks, Kota Kinabalu, Sabah. Unpublished.
- PHILLIPPS, Q. 1970. Some important nesting notes from Sabah. *Sabah Soc. J.* 5:141–144.
- PHILLIPPS, Q. 1982. Notes on the birds and mammals of Mt. Tamboyukon. *In* Diary Report on the Mt. Tamboyukon Expedition, 20–26 January 1982 (A. Phillipps, Ed.). Sabah Parks, Kota Kinabalu Sabah. Unpublished.
- PHILLIPPS, Q., AND J. PHILLIPPS. 1970. Bird banding in the Kinabalu National Park. Annual Report to the Sabah National Park Trustees 1970:29–32.
- PHILLIPPS, S. 1982. Bird notes from Sabah 1981–82. *Sabah Soc. J.* 7:153–154.
- PHILLIPPS, S. 1987. Blue-naped Parrots have found a new home in Borneo. *Sabah Soc. J.* 8:314–319.
- PING, K.-K., ED. 1990. Forest Biology and Conservation in Borneo: A Bibliography. Yayasan Sabah and University Kebangsaan Malaysia (Sabah), Kota Kinabalu, Sabah.
- PRENTICE, R. C., AND W. M. M. EDDIE. 1981. An annotated list of birds recorded in Sabah and Brunei (July–Sept. 1981). Pp. 109–148 *in* Report of the University of Aberdeen Expedition to Mount Kinabalu (Sabah) 1981 (W. M. M. Eddie, Ed.). University of Aberdeen, Aberdeen, UK. Unpublished.
- PRICE, T. D. 1991. Morphology and ecology of breeding warblers in Kashmir, India. *J. Anim. Ecol.* 60:643–664.
- PROCTOR, J., Y. F. LEE, A. M. LANGLEY, W. R. C. MUNRO, AND T. N. NELSON. 1988. Ecological studies on Gunung Silam, a small ultrabasic mountain in Sabah I. Environment, forest structure and floristics. *J. Ecol.* 71:261–283.
- PROCTOR, J., C. PHILLIPPS, G. K. DUFF, A. HEANEY, AND F. M. ROBERTSON. 1989. Ecological studies on Gunung Silam, a small ultrabasic mountain in Sabah, Malaysia. II. Some forest processes. *J. Ecol.* 77:317–331.
- PRYER, H. 1884. An account of a visit to the birds'–nest caves of British North Borneo. *Proc. Zool. Soc. Lond.* 1884:532–538.
- PRYER, W. B. 1881. Animal life in Borneo. *The Zoologist* 5:393–398.
- RAHMAN, M. A. 2000. Biogeography of avifauna and patterns of variation in little spiderhunter (*Archnothera longirostra*) in Southeast Asia. Ph.D. thesis, Department of Zoology and Entomology, University of Queensland, St. Lucia, Queensland, Australia.
- RAPPOLE, J. H. 1995. The Ecology of Migrant Birds. Smithsonian Institution Press, Washington, D.C.
- REECE, R. H. W. 1990. Introduction to: *Sarawak: Notes During a Residence in that Country with H. H. the Rajah Brooke by Hugh Low*. Borneo Res. Bull. 22:3–26.
- REINHARD, M., AND E. WENK. 1951. The geology of the colony of North Borneo. *Br. Borneo Geol. Surv. Bull.* 1.
- REMSEN, J. V., ED. 1997. Studies in Neotropical ornithology honoring Ted Parker. *Ornithol. Monogr.* 48:1–918.
- RICHMAN, A. D., AND T. D. PRICE. 1992. Evolution of ecological differences in the Old World leaf warblers. *Nature* 355:817–820.
- RICHMOND, C. W. 1905. Description of a new swiftlet from Mount Kina Balu, Borneo. *Smithson. Misc. Collect.* 47(2):431–432.
- RICKLEFS, R. E. 1987. Community diversity: relative roles of local and regional processes. *Science* 235:167–171.
- RIPLEY, S. D. 1942. A revision of the kingfishers *Ceyx erithacus* and *rufidorsus*. *Zoologica* 27:55–59.
- RIPLEY, S. D., AND B. M. BEEHLER. 1987. Species status of the Malaysian three-toed kingfishers (*Ceyx*)—a reassessment. *Bull. Br. Ornithol. Club* 107:145–147.
- ROBSON, C., ED. 1987. Recent reports. *Bull. Orient. Bird Club* 5:33–36.
- ROBSON, C., ED. 1988. Recent reports. *Bull. Orient. Bird Club* 7:34–40.

- ROBSON, C., ED. 1992. From the field. *Bull. Orient. Bird Club* 15:45.
- ROBSON, C., ED. 1996. From the field. *Bull. Orient. Bird Club* 24:59–65.
- ROBSON, C., ED. 1997. From the field. *Bull. Orient. Bird Club* 25:61–69.
- ROBSON, C., ED. 1998a. From the field. *Bull. Orient. Bird Club* 27:61–66.
- ROBSON, C., ED. 1998b. From the field. *Bull. Orient. Bird Club* 28:44–48.
- ROBSON, C., ED. 2000. From the field. *Bull. Orient. Bird Club* 32:66–76.
- ROBSON, C., AND C. BYERS, EDs. 1992. Malaysia, Sabah. *Bull. Orient. Bird Club* 15:45.
- ROSENBLUM, L. L., J. SUPRIATNA, AND D. J. MELNICK. 1997. Phylogeographic analysis of pigtail macaque populations (*Macaca nemestrina*) inferred from mitochondrial DNA. *Am. J. Phys. Anthropol.* 104:35–45.
- RUEDI, M. 1996. Phylogenetic evolution and biogeography of southeast Asian shrews (genus *Crocidura*: Soricidae). *Biol. J. Linn. Soc.* 58:197–219.
- RUEDI, M., AND L. FUMAGALLI. 1996. Genetic structure of *Gymnures* (genus *Hylomys*; Erinaceidae) on continental islands of Southeast Asia: historical effects of fragmentation. *J. Zool. Syst. Evol. Res.* 34:153–162.
- RUTTER, O. 1922. *British North Borneo. An Account of Its History, Resources and Native Tribes.* Constable and Co., London.
- RYVES, V. W. 1955. The nesting of the Megapode in North Borneo. *Sarawak Mus. J.* 5:316–317.
- RYVES, V. W. 1957. Nesting of the Kinabalu mountain blackbird. I. *Sarawak Mus. J.* 8:250–251.
- SABAH FORESTRY DEPARTMENT. 1989. *Forestry in Sabah.* Sabah Forestry Department, Sandakan, Sabah.
- SABAH FORESTRY DEPARTMENT. 1999. *Annual Report 1997.* Sandakan, Sabah.
- SADKA, E., ED. 1954. Hugh Low, Perak, 1877. *Malay. Br. R. Asiatic Soc. J.* 27(4):1–108.
- SALOMONSEN, F. 1983. Revision of the Melanesian swiftlets (Apodes, Aves) and their conspecific forms in the Indo-Australian and Polynesian region. *Biol. Skr. Dan. Vid. Selsk.* 23(5):1–112.
- SALVADORI, T. 1874. *Catalogo sistematico degli uccelli di Borneo.* *Ann. Mus. Civ. Genova* 5:1–429.
- SCHMITT, J. 1992. The journals of John Schmitt. *WildBird* 6(5):64–65.
- SCHMITT, L. H., D. J. KITCHENER, AND R. A. HOW. 1995. A genetic perspective of mammalian variation and evolution in the Indonesian archipelago: biogeographic correlates in the fruit bat genus *Cynopterus*. *Evolution* 49:399–409.
- SCLATER, P. L. 1863. Observations on the birds of south-eastern Borneo by the late James Motley Esq. of Banjermassing. *Proc. Zool. Soc. Lond.* 1863:206–244.
- SCOTT, D. A. 1989. *A Directory of Asian Wetlands.* IUCN, The World Conservation Union, Gland, Switzerland.
- SHARMA, D. 1992. *A Wildlife Survey of the Proposed Kinabatangan Park, Sabah.* Project No. MYS 196/91. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- SHARPE, R. B. 1875. On a collection of birds from Labuan. *Proc. Zool. Soc. Lond.* 1875:99–111.
- SHARPE, R. B. 1879a. On collections of birds from Kina Balu Mountain, in north-western Borneo. *Proc. Zool. Soc. Lond.* March 4, 1879:245–249.
- SHARPE, R. B. 1879b. A list of the birds of Labuan Island and its dependencies. *Proc. Zool. Soc. Lond.* 1879(21):317–355.
- SHARPE, R. B. 1879c. Contributions to the ornithology of Borneo—part IV. On the birds of the province of Lumbidan, north-western Borneo. *Ibis* 1879:233–272.
- SHARPE, R. B. 1881. On the birds of Sandakan, north-east Borneo. *Proc. Zool. Soc. Lond.* 1881:790–800.
- SHARPE, R. B. 1887a. Notes on a collection of birds made by Mr. John Whitehead on the mountain of Kina Balu, in northern Borneo, with descriptions of new species. *Ibis* 1887:435–454.
- SHARPE, R. B. 1887b. On a new species of *Calyptomena*. *Proc. Zool. Soc. Lond.* 1887:558.
- SHARPE, R. B. 1888a. Further notes on *Calyptomena whiteheadi*. *Ibis* 6:231.
- SHARPE, R. B. 1888b. Further descriptions of new species of birds discovered by Mr. John Whitehead on the mountain of Kina Balu, northern Borneo. *Ibis* 6:383–396.
- SHARPE, R. B. 1888c. Diagnoses of some new species of birds obtained on the mountain of Kina Balu by Mr. John Whitehead. *Ibis* 6:478–479.
- SHARPE, R. B. 1889a. On the ornithology of northern Borneo, with notes by John Whitehead. *Ibis* 1889:63–85.
- SHARPE, R. B. 1889b. On the ornithology of northern Borneo, with notes by John Whitehead.—Part II. *Ibis* 1889:185–205.

- SHARPE, R. B. 1889c. On the ornithology of northern Borneo, with notes by John Whitehead.—Part III. *Ibis* 1889:265–283.
- SHARPE, R. B. 1889d. On the ornithology of northern Borneo, with notes by John Whitehead.—Part IV. *Ibis* 1889:409–443.
- SHARPE, R. B. 1889e. On two new species of birds from Kina Balu mountain. *Ann. Mag. Nat. Hist.* 3:423–424.
- SHARPE, R. B. 1890a. On the ornithology of northern Borneo, with notes by John Whitehead.—Part V. *Ibis* 1890:1–24.
- SHARPE, R. B. 1890b. On the ornithology of northern Borneo, with notes by John Whitehead.—Part VI. *Ibis* 1890:133–149.
- SHARPE, R. B. 1890c. On the ornithology of northern Borneo, with notes by John Whitehead.—Part VII. *Ibis* 1890:273–292.
- SHARPE, R. B. 1893. Bornean notes. No. 1. I. First list of birds from Mt. Kalulong, in Sarawak. II. A list of the birds collected by Mr. A. H. Everett on Mt. Penrisen and Mt. Poeh, in Sarawak. III. Description of a new *Spilornis* from Borneo. VI. A note on the *Baza* of Borneo. V. Notes on Mr. A. H. Everett's collections of birds from northern Borneo and Sarawak. VI. Additions to the avifauna of Mount Kina Balu. VII. Description of the nest and eggs of *Staphidia everetti*. *Ibis* 1893:546–563.
- SHARPE, R. B. 1894a. Bornean notes. No. III. X. Further additions to the avifauna of Mt. Kina Balu. *Ibis* 1894:538–540.
- SHARPE, R. B. 1894b. Bornean notes. No. XI. Notes on birds collected in northern Borneo by Mr. A.H. Everett. *Ibis* 1894:540–542.
- SHARPE, R. B., AND C. CHUBB. 1909. Notes on a collection of birds from Sandakan, N.E. Borneo. *Ornis* 13:137–161.
- SHELDON, F. H. 1985. The taxonomy and biogeography of the thick-billed flowerpecker complex in Borneo. *Auk* 102:606–612.
- SHELDON, F. H. 1986. Habitat changes potentially affecting birdlife in Sabah East Malaysia. *Ibis* 128:174–175.
- SHELDON, F. H. 1987. Habitat preferences of the Hook-billed Bulbul *Setornis criniger* and the White-throated Babbler *Malacopteron albobulare* in Borneo. *Forktail* 3:17–25.
- SHELDON, F. H., AND C. M. FRANCIS. 1985. The birds and mammals of Mount Trus Madi, Sabah. *Sabah Soc. J.* 8:77–88.
- SHELDON, F. H., AND J. KENNARD. 1982. Bird Colonization and Species Richness in Sabah Softwoods Tree Plantations's *Albizia falcataria*. Eighth Malaysian Forestry Conference, Sandakan, Sabah, Malaysia.
- SHELDON, F. H., B. F. KING, D. YONG, AND C. M. FRANCIS. 1983. The birds of the Mantanani Islands. *Sabah Soc. J.* 7:165–174.
- SHELDON, F. H., AND M. MARIN A. 1985. The sympatry of night herons in Borneo. *Bull. Br. Ornithol. Club* 105:76–78.
- SHELDON, F. H., S. MITRA, AND J. KENNARD. 1992. The birds of Sabah Softwoods exotic tree plantation. Pp. 498–499 in *Forest Biology and Conservation in Borneo* (G. Ismail, M. Mohamed, and S. Omar, Eds.). Publ. No. 2. Centre for Borneo Studies, Kota Kinabalu, Malaysia.
- SHOWLER, D. A. 1992. Birdwatching areas: Danum Valley Conservation Area, Sabah, Malaysia. *Orient. Bird Club Bull.* 16:26–31.
- SHOWLER, D. A. 1993. Long-billed Partridge *Rhizothera longirostris*: a new species for Sabah. *Forktail* 8:156.
- SIBLEY, C. G., AND J. E. AHLQUIST. 1990. *Phylogeny and Classification of Birds*. Yale University, New Haven, Connecticut.
- SIBLEY, C. G., AND B. MONROE. 1990. *Distribution and Taxonomy of Birds of the World*. Yale University, New Haven, Connecticut.
- SIMPSON, D. M. 1982a. Autumn migration of landbirds off north Borneo in 1981. *Sea Swallow* 32:48–53.
- SIMPSON, D. M. 1982b. Birds seen at the Tembungo gas flare, north Borneo during the development of typhoon 'Clara'. *Sea Swallow* 32:82–83.
- SIMS, R. W. 1959a. Edible birds' nests. Pp. 47–58 in *New Biology* 30 (M. L. Johnson, M. Abercrombie, and G. E. Fogg, Eds.). Penguin Books Ltd., Harmondsworth, Middlesex, UK.

- SIMS, R. W. 1959b. The *Ceyx erithacus* and *rufidorsus* species problem. *J. Linn. Soc. Lond. Zool.* 44: 212–221.
- SIMS, R. W. Unpublished. The Origin and Affinities of the Avifauna of eastern North Borneo. [Based on the British Museum (Natural History) North Borneo Expedition collection.] 117 pp, plus appendices.
- SMITH, M. A. 1931. The herpetology of Mt. Kinabalu, North Borneo. *Bull. Raffles Mus.* 5:3–32.
- SMYTHIES, B. E. 1957. An annotated checklist of the birds of Borneo. *Sarawak Mus. J.* 7:523–818.
- SMYTHIES, B. E. 1959. Bird notes from Mt. Kinabalu. *Sarawak Mus. J.* 9:257–262.
- SMYTHIES, B. E. 1960. The Birds of Borneo. Oliver and Boyd, London.
- SMYTHIES, B. E. 1963. Borneo bird notes from various hands. *Sarawak Mus. J.* 11:268–290.
- SMYTHIES, B. E. 1964a. The birds of Mt. Kinabalu and their zoogeographical relationships. *Proc. R. Soc. Lond. Ser. B* 161:75–80.
- SMYTHIES, B. E. 1964b. Royal Society expedition to North Borneo 1961: reports. Special Reports. 10. *Birds. Proc. Linn. Soc. Lond.* 175:50–54.
- SMYTHIES, B. E. 1968. The Birds of Borneo. 2nd ed. Oliver and Boyd, London.
- SMYTHIES, B. E. 1978. Some interesting birds of Kinabalu National Park. Pp. 321–346 in *Kinabalu, Summit of Borneo* (M. Luping, W. Chin, and E. R. Dingley, Eds.). Sabah Society, Kota Kinabalu, Sabah.
- SMYTHIES, B. E. 1981. The Birds of Borneo. 3rd ed. (revised by the Earl of Cranbrook). Sabah Society and Malayan Nature Society, Kuala Lumpur, Malaysia.
- SMYTHIES, B. E. 2000. The Birds of Borneo. 4th ed. (revised by G. W. H. Davison). Natural History Publications, Kota Kinabalu, Sabah.
- STAFF, O. 1894. On the flora of Mt. Kinabalu in North Borneo. *Trans. Linn. Soc. Lond. (Bot.)* 2nd Ser. 4:69–263.
- STEINHEIMER, F. D. 1999. The Mountain Black-eye *Chlorocharis emiliae* (Zosteropidae) as a rhododendron flower visitor on Mt. Kinabalu, Sabah, Malaysia. *Forktail* 15:100–101.
- STILL, M., D. YONG, AND B. KING. 1988. Two nests of Crested Fireback Pheasant *Lophura ignita* in Sabah, Malaysia. *Malay. Nat.* 41(3–4):17.
- ST. JOHN, S. 1862. *Life in the Forests of the Far East*. Smith, Elder, and Co., London.
- STOTZ, D. F., J. W. FITZPATRICK, T. A. PARKER III, AND D. K. MOSKOVITS. 1996. *Neotropical Birds: Ecology and conservation*. University of Chicago Press, Chicago.
- STRANGE, M. 1998. *Birds of South–East Asia: A Photographic Guide to the Birds of Thailand, Malaysia, Singapore, the Philippines and Indonesia*. New Holland, London.
- STRESEMANN, E. 1975. *Ornithology from Aristotle to the Present*. Harvard University Press, Cambridge, Massachusetts.
- STUEBING, R. 1985. A Small Mammal Survey in the Sabah Softwoods Sdn. Bhd. Oil Palm Area. Technical Report to Sabah Softwoods Sdn. Bhd., Brumas Tawau, Sabah.
- STUEBING, R. B. 1991. A checklist of the snakes of Borneo. *Raffles Mus. Bull.* 39:323–362.
- STUEBING, R. B., AND J. GASIS. 1989. A survey of small mammals within a Sabah tree plantation in Malaysia. *J. Trop. Ecol.* 5:203–214.
- STUEBING, R. B., E. LADING, AND F. S. P. LIEW. 1990. Snake Island of Pulau Tiga Park. Publ. No. 11. Sabah Parks, Kota Kinabalu, Sabah.
- STUEBING, R., AND S. MOHD. NOR. 1995. Notes on the terrestrial vertebrates of Tawau Hills Park. *In Sabah: A Scientific Journey Through Borneo, Tawau Hills Park* (G. Ismail, S. Omar and L. bin Din, Eds.). Pelanduk Publications, Kuala Lumpur, Malaysia.
- STUEBING, R., AND J. ZAZULLI. 1986. The megapodes of Pulau Tiga. *Sabah Mus. Arch. J.* 1:16–49.
- SULLIVAN, A. G., AND P. REGIS. 1981. Demography. Pp. 545–579 in *Commemorative History of Sabah 1881–1981* (A. G. Sullivan and C. Leong, Eds.). Sabah State Government Centenary Publications Committee, Kota Kinabalu, Sabah.
- TANGAH, J., AND K. M. WONG. 1995. *A Sabah Gazetteer*. Sabah Forestry Department and Forest Research Institute, Sarawak, Sabah.
- TAYLOR, B., AND B. VAN PERLO. 1998. *Rails: A Guide to the Rails, Crakes, Gallinules and Coots of the World*. Yale University Press, New Haven, Connecticut.
- THIOLLAY, J.-M. 1983. Evolution actuelle du peuplement de rapaces diurnes dans le nord de Borneo. *Alauda* 51:109–123.
- THOMAS, P., F. K. C. LO, AND A. J. HEPBURN. 1976. The Land Capability Classification of Sabah. Vols.

- 1–4. Land Resource Study 25. Land Resources Division, Ministry of Overseas Development, Surbiton, Surrey, UK.
- THOMPSON, M. C. 1966. Birds from North Borneo. Univ. Kans. Publ. Mus. Nat. Hist. 17:377–433.
- TREACHER, W. H. 1888. On the habits and range of Bulwer's Pheasant. *Ibis* 6:413–415.
- TREACHER, W. H. 1889. British Borneo: sketches of Brunai, Sarawak, Labuan, and North Borneo. *Straits Br. R. Asiatic Soc. J.* 1889:13–74.
- TREACHER, W. H. 1890. British Borneo: sketches of Brunai, Sarawak, Labuan, and North Borneo. *Straits Br. R. Asiatic Soc. J.* 21:19–121.
- TREGONNING, K. G. 1954. William Pryer, the founder of Sandakan. *J. Malay. Br. R. Asiatic Soc.* 27(1): 35–50.
- TREGONNING, K. G. 1965. *A History of Modern Sabah (North Borneo 1881–1963)*. University of Malaya Press, Singapore.
- UNITED STATES BOARD ON GEOGRAPHIC NAMES. 1955. *Gazetteer No. 10, British Borneo, Singapore, and Malaya*. U.S. Government Printing Office, Washington, D.C.
- UNITED STATES BOARD ON GEOGRAPHIC NAMES. 1970. *Gazetteer No. 10, Malaysia, Singapore, and Brunei*. Department of Interior, Washington, D.C.
- VAN BALEN, S., AND S. ASPINALL. 1996. First record of Grey-streaked Flycatcher for Kalimantan. *Kukila* 8:142–143.
- VAN STEENIS-KRUSEMAN, M. J. 1950. *Flora Malesiana*. Vol. 1. Malaysian Plant Collectors and Collections. Noordhoff-Kolff N.V., Djakarta, Indonesia.
- VOOUS, K. H. 1951. Distribution and evolutionary history of the kingfisher genus *Ceyx* in Malaysia. *Ardea* 39:182–195.
- VOWLES, R. S., AND G. A. VOWLES. 1985. Some notes on the birds of Borneo. *Bull. Br. Ornithol. Club* 105:71–73.
- WALSH, R. P. D. 1996. Drought frequency changes in Sabah and adjacent parts of northern Borneo since the late nineteenth century and possible implications for tropical rain forest dynamics. *J. Trop. Ecol.* 12:385–407.
- WALSH, R. P. D., AND D. M. NEWBERY. 1999. The ecoclimatology of Danum, Sabah, in the context of the world's rainforest regions, with particular reference to dry periods and their impact. *Philos. Trans. R. Soc. Lond. B* 354:1869–1883.
- WELLS, D. R. 1976. Some bird communities in western Sabah, with distributional records, March 1975. *Sarawak Mus. J.* 24:277–286.
- WELLS, D. R. 1978. A survey of the Proposed Pulau Balambangan National Park, Sabah. Project 1423. Report to World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia. Unpublished.
- WELLS, D. R. 1982a. A confirmation of the specific relations of *Cuculus saturatus insulindae* Hartert. *Bull. Br. Ornithol. Club* 102(2):62–63.
- WELLS, D. R. 1982b. Notes on some representatives of the Brown Flycatcher *Muscicapa latirostris* Raffles in southeast Asia. *Bull. Br. Ornithol. Club* 102:148–153.
- WELLS, D. R. 1982c. The physical features, flora and fauna of Balambangan. *Sabah Soc. J.* 7:9–27.
- WELLS, D. R. 1982d. Biological species limits in the *Cettia fortipes* complex. *Bull. Br. Ornithol. Club* 102:57–62.
- WELLS, D. R. 1994. Review of "Davison, G. W. H. 1992. *Birds of Mount Kinabalu, Borneo*." *Ibis* 136:380–381.
- WELLS, D. R. 1999. *The Birds of the Thai-Malay Peninsula*. Vol. 1. Non-passerines. Academic Press, New York.
- WELLS, D. R., AND J. H. BECKING. 1975. Vocalizations and status of Little and Himalayan cuckoos, *Cuculus poliocephalus* and *C. saturatus*, in Southeast Asia. *Ibis* 117:366–371.
- WELLS, D. R., AND C. M. FRANCIS. 1984. Further evidence of a resident Brown Flycatcher *Muscicapa latirostris* in Borneo. *Bull. Br. Ornithol. Club* 104:125–127.
- WELLS, D. R., AND C. M. FRANCIS. 1988. *Detailed Environmental Impact Assessment, Sabah Land Development Scheme, Sahabat, Dent Peninsula, Sabah*. Vol. 2. Miniconsult Sdn. Bhd., Petaling Jaya, Malaysia.
- WELLS, D. R., C. J. HAILS, AND A. J. HAILS. 1978. *A Study of the Birds of Gunung Mulu National Park, Sarawak, with Special Emphasis on Those of Lowland Forests*. Report to the Royal Geographical Society, London. Unpublished.
- WELLS, D. R., AND J. B. LOWRY. 1975. *Wildlife Notes from Pulau Gaya (Tungku Abdul Rahman*

- National Park), Sabah. Report to the Sabah National Parks Board, Kota Kinabalu, Sabah. Unpublished.
- WELLS, D. R., A. G. MARSHALL, AND J. B. LOWRY. 1975. A Survey of the Proposed Klias National Park, Southwest Sabah. Report to World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia. Unpublished.
- WHITAKER, R. 1984. Preliminary Survey of Crocodiles in Sabah, East Malaysia (WWFM Project 3127). Report to the World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia. Unpublished.
- WHITE, C. M. N., AND M. D. BRUCE. 1986. *The Birds of Wallacea*. British Ornithologists' Union, London.
- WHITEHEAD, J. 1888. Notes on some oriental birds. *Ibis* 1888:409–413.
- WHITEHEAD, J. 1893. Exploration of Mount Kina Balu, North Borneo. Gurney and Jackson, London.
- WHITMORE, T. C. 1981. Wallace's Line and Plate Tectonics. Clarendon Press, Oxford, UK.
- WHITMORE, T. C. 1984a. Tropical Rain Forests of the Far East. Clarendon, Oxford, UK.
- WHITMORE, T. C. 1984b. A vegetation map of Malesia. *J. Biogeogr.* 11:461–471.
- WHITMORE, T. C., ED. 1987. *Biogeographic Evolution of the Malay Archipelago*. Clarendon Press, Oxford, UK.
- WILLIAM, V. G. 1981. The general state administration of Sabah 1881–1981. Pp. 3–80 in *Commemorative History of Sabah 1881–1981* (A. G. Sullivan and C. Leong, Eds.). Sabah State Government Centenary Publications Committee, Kota Kinabalu, Sabah.
- WILLOT, S. J. 1999. The effect of selective logging on the distribution of moths in a Bornean rainforest. *Philos. Trans. R. Soc. Lond. B* 354:783–790.
- WITT, C. C., AND F. H. SHELDON. 1994a. The status of Abbott's Babbler in Borneo. *Kukila* 7:47–53.
- WITT, C. C., AND F. H. SHELDON. 1994b. A review of the status and distribution of the Bornean Bristlehead. *Kukila* 7:54–67.
- WONG, K. M., AND A. PHILLIPPS, Eds. 1996. *Kinabalu, Summit of Borneo*. 2nd ed. Sabah Society and Sabah Parks, Kota Kinabalu.
- WONG, M. 1985. Understorey birds as indicators of regeneration in a patch of selectively logged west Malaysian rainforest. *Int. Coun. Bird Preserv. Tech. Publ.* 4:249–263.
- WONG, M. 1986. Trophic organization of understory birds in a Malaysian dipterocarp forest. *Auk* 103:100–116.
- WOOD, E. 1981. Semporna Marine Park Survey. Expedition Report and Recommendations. Project No. MAL/34 (MYS 34/80). World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia.
- WOOD, G. H. S., AND W. MEIJER. 1964. Dipterocarps of Sabah. Sabah Forest Record No. 5. Sabah Forest Department, Sandakan, Sabah.
- WOODS, P. 1989. Effects of logging, drought and fire on structure and composition of tropical forests in Sabah, Malaysia. *Biotropica* 21:290–298.
- WWF MALAYSIA. 1984. Tabin Wildlife Reserve, Sabah: A Preliminary Management Plan. IUCN/WWF Project No. 3050 and Project MAL 61/83. World Wildlife Fund Malaysia, Kuala Lumpur, Malaysia.
- YONG, D. 1997. A report on the night birds listed for Malaysia in the Asian Bird Red Data Book. *Suara Enggang* September–October 1997:25–33.
- YONG, D. 1980. A Report on the Terrestrial Vertebrates of the Bodgaya Group of Islands and P. Sipadan. Sabah Parks, Kota Kinabalu, Sabah. Unpublished.
- YONG, D., K. W. SCRIVEN, AND A. JOHNS. 1989. Birds. Pp. 145–154 in *Expedition to Maliau Basin, Sabah, April–May 1988* (C. W. Marsh, Ed.). Sabah Information Paper No. 30. Project No. MYS 126/88. Sabah Foundation and World Wildlife Fund (Malaysia), Kuala Lumpur, Malaysia.
- ZAKARIA, MOHD. BIN HUSSIN. 1994. Ecological effects of selective logging in a lowland dipterocarp forest on avifauna, with special reference to frugivorous birds. Ph.D. thesis, University Kebangsaan Malaysia, Bangi, Malaysia.
- ZAKARIA, M., AND M. NORDIN. 1998. Comparison of frugivory by birds in primary and logged lowland dipterocarp forests in Sabah, Malaysia. *Trop. Biodivers.* 5:1–9.
- ZHI, L., W. B. KARESH, D. N. JANCZEWSKI, H. FRAZIER TAYLOR, D. SAJUTHI, F. GOMBEC, M. ANDAU, J. S. MARTENSON, AND S. J. O'BRIEN. 1996. Genomic differentiation among natural populations of organ-utan (*Pongo pygmaeus*). *Curr. Biol.* 6:1326–1336.

ORNITHOLOGICAL MONOGRAPHS

- No. 3. *The Birds of Kentucky*. R. M. Mengel. 1965. \$25.00.
- No. 6. *Adaptations for Locomotion and Feeding in the Anhinga and the Double-crested Cormorant*. O. T. Owre. 1967. \$10.00.
- No. 7. *A Distributional Survey of the Birds of Honduras*. B. L. Monroe, Jr. 1968. \$25.00.
- No. 10. *The Behavior of Spotted Antbirds*. E. O. Willis. 1972. \$10.00.
- No. 11. *Behavior, Mimetic Songs and Song Dialects, and Relationships of the Parasitic Indigobirds (Vidua) of Africa*. R. B. Payne. 1973. \$10.00.
- No. 12. *Intra-island Variation in the Mascarene White-eye Zosterops borbonica*. F. B. Gill. 1973. \$10.00.
- No. 13. *Evolutionary Trends in the Neotropical Ovenbirds and Woodhewers*. A. Feduccia. 1973. \$10.00.
- No. 14. *A Symposium on the House Sparrow (Passer domesticus) and European Tree Sparrow (P. montanus) in North America*. S. C. Kendeigh, Ed. 1973. \$10.00.
- No. 15. *Functional Anatomy and Adaptive Evolution of the Feeding Apparatus in the Hawaiian Honeycreeper Genus Loxops (Drepanididae)*. L. P. Richards and W. J. Bock. 1973. \$10.00.
- No. 16. *The Red-tailed Tropicbird on Kure Atoll*. R. R. Fleet. 1974. \$6.00.
- No. 17. *Comparative Behavior of the American Avocet and the Black-necked Stilt (Recurvirostridae)*. R. B. Hamilton. 1975. \$10.00.
- No. 18. *Breeding Biology and Behavior of the Oldsquaw (Clangula hyemalis L.)*. R. M. Alison. 1975. \$6.00.
- No. 19. *Bird Populations of Aspen Forests in Western North America*. J. A. D. Flack. 1976. \$10.00.
- No. 21. *Social Organization and Behavior of the Acorn Woodpecker in Central Coastal California*. M. H. MacRoberts and B. R. MacRoberts. 1976. \$10.00.
- No. 22. *Maintenance Behavior and Communication in the Brown Pelican*. R. W. Schreiber. 1977. \$6.00.
- No. 23. *Species Relationships in the Avian Genus Aimophila*. L. L. Wolf. 1977. \$12.00.
- No. 24. *Land Bird Communities of Grand Bahama Island: The Structure and Dynamics of an Avifauna*. J. T. Emlen. 1977. \$10.00.
- No. 25. *Systematics of Smaller Asian Night Birds Based on Voice*. J. T. Marshall. 1978. \$10.00.
- No. 26. *Ecology and Behavior of the Prairie Warbler Dendroica discolor*. V. Nolan, Jr. 1978. \$45.00.
- No. 27. *Ecology and Evolution of Lek Mating Behavior in the Long-tailed Hermit Hummingbird*. F. G. Stiles and L. L. Wolf. 1979. \$10.00.
- No. 28. *The Foraging Behavior of Mountain Bluebirds with Emphasis on Sexual Foraging Differences*. H. W. Power. 1980. \$10.00.
- No. 29. *The Molt of Scrub Jays and Blue Jays in Florida*. G. T. Bancroft and G. E. Woolfenden. 1982. \$10.00.
- No. 30. *Avian Incubation: Egg Temperature, Nest Humidity, and Behavioral Thermoregulation in a Hot Environment*. G. S. Grant. 1982. \$10.00.
- No. 31. *The Native Forest Birds of Guam*. J. M. Jenkins. 1983. \$15.00.
- No. 32. *The Marine Ecology of Birds in the Ross Sea, Antarctica*. D. G. Ainley, E. F. O'Connor, and R. J. Boekelheide. x + 97 pp. 1984. \$15.00.
- No. 33. *Sexual Selection, Lek and Arena Behavior, and Sexual Size Dimorphism in Birds*. R. B. Payne. viii + 52 pp. 1984. \$15.00.
- No. 34. *Pattern, Mechanism, and Adaptive Significance of Territoriality in Herring Gulls (Larus argentatus)*. J. Burger. xii + 92 pp. 1984. \$12.50.
- No. 35. *Ecogeographical Variation in Size and Proportions of Song Sparrows (Melospiza melodia)*. J. W. Aldrich. x + 134 pp. 1984. \$15.00 (\$12.00).
- No. 37. *Avian Monogamy*. P. A. Gowaty and D. W. Mock, Eds. vi + 121 pp. 1985. \$15.00 (\$12.00).
- No. 38. *An Analysis of Physical, Physiological, and Optical Aspects of Avian Coloration with Emphasis on Wood-Warblers*. E. H. Burt, Jr. x + 122 pp. 1986. \$15.00 (\$12.50).
- No. 39. *The Lingual Apparatus of the African Grey Parrot, Psittacus erithacus Linné (Aves: Psittacidae): Description and Theoretical Mechanical Analysis*. D. G. Homberger. xii + 236 pp. 1986. \$30.00.
- No. 40. *Patterns and Evolutionary Significance of Geographic Variation in the Schistacea Group of the Fox Sparrow (Passerella iliaca)*. R. M. Zink. viii + 119 pp. 1986. \$15.00.
- No. 41. *Hindlimb Myology and Evolution of the Old World Suboscine Passerine Birds (Acanthisittidae, Pittidae, Philepittidae, Eurylaimidae)*. R. J. Raikow. viii + 81 pp. 1987. \$15.00.
- No. 42. *Speciation and Geographic Variation in Black-tailed Gnatcatchers*. J. L. Atwood. vii + 74 pp. 1988. \$10.00.
- No. 43. *A Distributional Survey of the Birds of the Mexican State of Oaxaca*. L. C. Binford. viii + 418 pp. 1989. \$20.00.
- No. 44. *Recent Advances in the Study of Neogene Fossil Birds. I. The Birds of the Late Miocene-Early Pliocene Big Sandy Formation, Mohave County, Arizona* (K. J. Bickart); *II. Fossil Birds of the San Diego Formation, Late Pliocene, Blacan, San Diego County, California* (R. M. Chandler). vi + 161 pp. 1990. \$20.00.
- Nos. 45 & 46. *Descriptions of Thirty-two New Species of Birds from the Hawaiian Islands: Part I. Non-Passeriformes* (S. L. Olson and H. F. James). 88 pp.; *Part II. Passeriformes* (H. F. James and S. L. Olson). 88 pp. 1991. Bound together (not available separately). \$25.00 (\$22.50).
- No. 47. *Parent-Offspring Conflict and its Resolution in the European Starling*. E. Litovich and H. W. Power. 71 pp. 1992. \$15.00 (\$12.00).
- No. 48. *Studies in Neotropical Ornithology Honoring Ted Parker*. J. V. Remsen, Jr. xiv + 918 pp. 1997. \$49.95 (\$39.95).
- No. 49. *Avian Reproductive Tactics: Female and Male Perspectives*. P. G. Parker and N. T. Burley. v + 195 pp. 1998. \$20.00 (\$16.00).
- No. 50. *Avian Community, Climate, and Sea-Level Changes in the Plio-Pleistocene of the Florida Peninsula*. S. D. Emslie. iii + 113 pp. 1998. \$20.00 (\$16.00).
- No. 51. *A Descriptive and Phylogenetic Analysis of Plumulaceous Feather Characters in Charadriiformes*. C. J. Dove. iii + 163 pp. 2000. \$19.95 (\$15.96).
- No. 52. *Ornithology of Sabah: History, Gazetteer, Annotated Checklist, and Bibliography*. F. H. Sheldon, R. G. Moyle, and J. Kennard. vi + 285 pp. 2001. \$25.00 (\$22.50).

Order from: Buteo Books, 3130 Laurel Road, Shipman, VA 22971, 1-800-722-2460, or www.buteobooks.com. Prices in parentheses are for A.O.U. members.