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CHAPTER 2

ORNITHOLOGICAL EXPLORATION IN THE SOUTHEASTERN SUB-HIMALAYAN REGION OF MYANMAR

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ABSTRACT.—We initiated ornithological exploration of the sub-Himalayan region of Myanmar in 1997. The work had five main goals: to conduct a basic inventory of the avifauna, to identify special conservation needs, to investigate ornithogeographic affinities, to build knowledge of the ecology and seasonal movement patterns of the large number of poorly known birds, to clarify pathogen patterns, and to create a distributional database for understanding how climate change is affecting local and regional distribution over time. After five expeditions to northern Myanmar, we have recorded 413 species, expanded the known range for several species, and described a new subspecies for *Tesia olivea* and a new species of scimitar-babbler, *Jabouilleia naungmungensis*. We have also examined the forms of avian malaria and obtained information on the ecology and seasonal movements of several species.

Key words: bird surveys, Kachin State, northern Myanmar.

Exploración Ornitológica en el Sudeste de la Región Sub-Himalaya de Birmania

RESUMEN.—Iniciamos la exploración ornitológica de la región sub-himalaya de Birmania (Myanmar) en 1997. El trabajo tuvo seis metas principales: hacer un inventario básico de la avifauna, identificar las necesidades de conservación especiales, investigar las afinidades ornitogeográficas, obtener información sobre la ecología y los patrones de movimiento estacional del gran número de aves poco conocidas, aclarar los patrones de patógenos, y crear una base de datos de distribución para entender cómo el cambio climático está afectando la distribución local y regional a lo largo del tiempo. Luego de cinco expediciones al norte de Birmania, hemos registrado 413 especies, expandido la distribución conocida para varias especies y descrito una nueva subespecie de *Tesia olivea* y una nueva especie, *Jabouilleia naungmungensis*. También hemos examinado las formas de malaria aviar y obtenido información sobre la ecología y los movimientos estacionales de varias especies.

THE HIMALAYAN AND sub-Himalayan portion of Myanmar (the former Burma), hereafter referred to as the “Hkakabo Razi region,” is located in the northernmost part of the country. Bordered on the north by Tibet, on the east by the Chinese

province of Yunnan, and on the west by the Indian state of Arunachal Pradesh, the area is extremely remote, with nothing but foot paths connecting the few villages located north of the town of Naung Mung (Khin and Aung 1999, Win 1999).

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Our introduction and subsequent investigation of the Hkakabo Razi region came as a result of efforts led by the Nature and Wildlife Conservation Division (NWCD) of the Myanmar Forestry Ministry to understand the biodiversity of their newest national park. Named for the highest peak in Myanmar, Hkakabo Razi (5,881 m), the park was established on 12 November 1998 by the Union of Myanmar and covers 3,800 km² (Fig. 1).

The principal goal of our work was to conduct a basic inventory of the birds of the Hkakabo Razi region. Historical information on ornithological exploration in the region was reviewed by B. E. Smythies in *The Birds of Burma* (1953) and can be summarized in brief as follows. (1) Extensive explorations were made throughout the region by Frank Kingdon-Ward in the early 1900s (Kingdon-Ward 1921, 1930, 1938, 1944, 1945, 1949, 1960). The purpose of his journeys was mainly botanical, although he made notes on the birds he observed and did some ornithological collecting (Kinnear 1934). (2) George Forrest made several trips through the area between 1904 and 1931. Most of his work was also botanical in nature, and done in neighboring Yunnan, but he made some bird collections in the Hkakabo Razi region (Rothschild 1926, 1927). (3) Colonel J. K. Stanford was stationed at Myitkyina from 1932 to 1936, during which time he made many trips into the southern portions of the Hkakabo Razi region, collecting extensively (Stanford and Ticehurst 1938a, b, c, d; Ticehurst 1939; Stanford 1946). He also participated in the Vernay-Cutting ornithological expedition in 1938 to 1939 (Stanford and Ticehurst 1938a, b, c, d; Stanford and Mayr 1940, 1941a, b, c, d; Stanford 1946). (4) Ronald Kaulback collected birds near Pangnamdim in 1938 and 1939 (Ticehurst 1939). Finally, (5) Smythies made trips to the region of several months' duration in 1944, 1945, and 1948 (Smythies 1949, 1953).

Despite the quantity and quality of work done in northern Myanmar by some of the world's most outstanding field biologists (e.g., visits by King et al. [2001] to the Hpongkan Razi area northwest of Putao), the birds of the Hkakabo Razi region were still relatively poorly known when the NWCD launched exploratory expeditions in 1997 and 1998 (ornithological results of which are reported by Aung and Oo [1999]) and remained so in 2010. The remoteness and difficulty of the climate and terrain are not adequate explanations for this incomplete understanding, which we attribute in large part to the region's

exceptional topographical, geological, and biological diversity and complexity.

In addition to the primary goal of an ornithological inventory, we had several additional objectives that were either in mind before we began the field work or developed as the project evolved, including the following: (1) investigation of ornithogeographic affinities, (2) collection of information on life history and seasonal movements of birds, (3) creation of a landcover map, (4) clarification of selected pathogen distribution and movement patterns, (5) creation of a database for understanding avian range change that may be related to global warming, and (6) identification of special conservation needs.

STUDY AREA

We define the Hkakabo Razi region of Myanmar as the area from Putao north to the Tibet border and east to the Yunnan border (Fig. 1), an area covering ~10,000 km². As shown in the figure, Hkakabo Razi National Park covers the northeastern third of the area. Elevations range from ~400 m at Putao to ~6,000 m at Hkakabo Razi. Two major watersheds dominate the area: the Mali Hka, which is part of the Irrawaddy drainage, and the Namei Hka, which feeds into the Salween. The ridgeline separating these watersheds runs roughly from northwest to southeast, cutting the region roughly in half, with the Namei Hka drainage forming the northeastern half and the Mali Hka drainage the southwestern half.

The general climate of the area is similar to that of other parts of Myanmar: a rainy season from May to October; a cool, dry season from November to February; and a hot, dry season from March to May. The area around Putao follows this regime fairly closely, but, as described by Smythies (1953:xiv), the higher in latitude or elevation, the stronger the continental influences:

In the mountains of northern Burma wet and dry spells alternate during the "dry" season; snow falls down to 6,000 feet [1,800 m], but does not lie for more than a day or two much below 8,000 feet [2,400 m]; the heaviest falls of snow occur in February and March, and above 10,000 feet [3,000 m] the snow lies from January to May; from June to mid-October the mountains are exposed to the full force of the south-west monsoon and the climate is appalling, as the few botanist-explorers who have spent a rainy season in these mountains unanimously testify, with perpetual rain

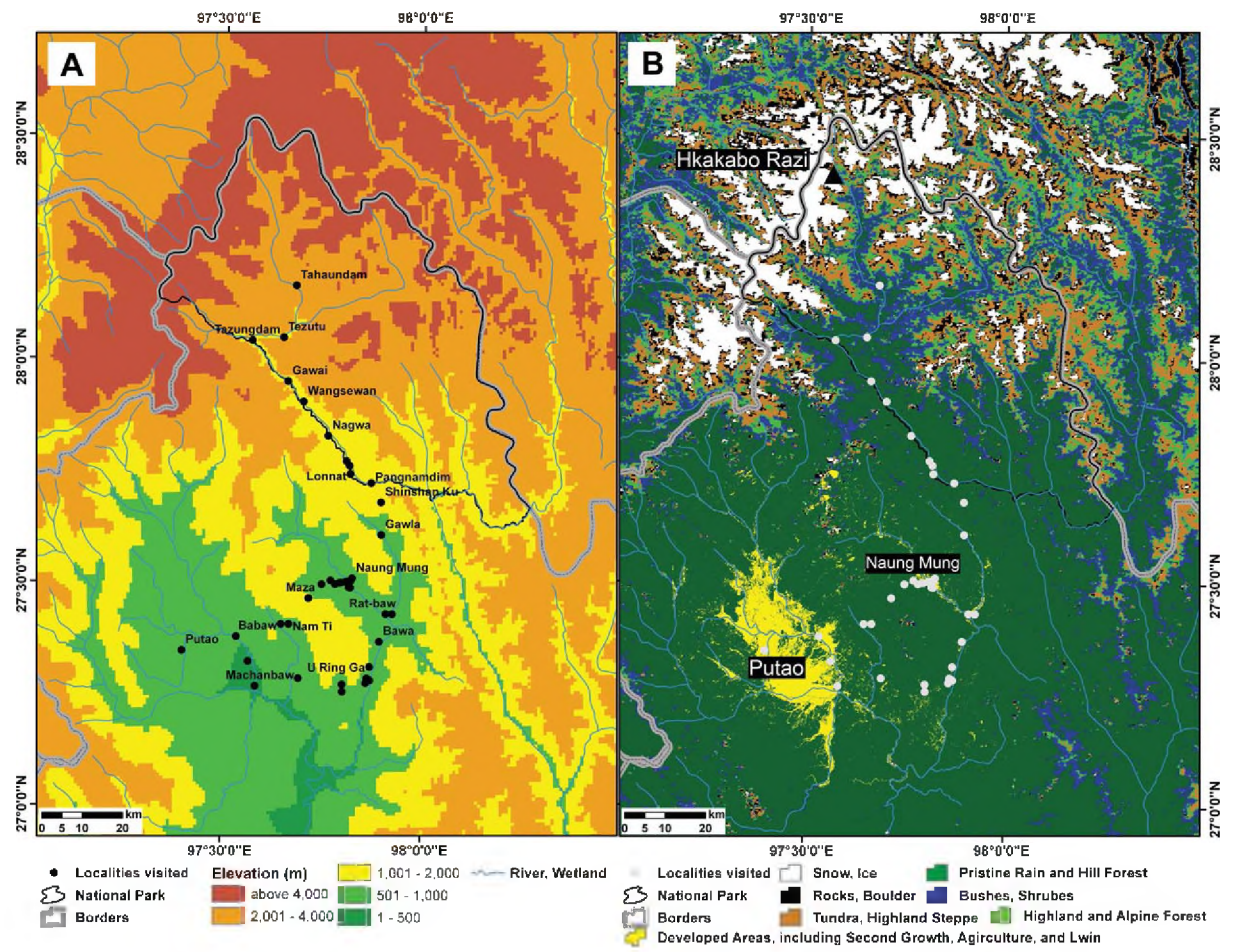


FIG. 1. Map of the Hkakabo Razi region showing (A) the localities, altitude, rivers, park boundaries, and (B) habitats and national boundaries.

TABLE 1. Major habitats of the Hkakabo Razi region.

Habitat	Description	Illustrated in Figure 1 as
Rainforest	Subtropical, broadleaf, evergreen, 400–1,000 m	Pristine Rainforest and Hill Forest
Hill forest	Temperate, semi-deciduous, broadleaf rainforest dominated by oak (<i>Quercus</i>), laurel, and chestnut (<i>Castanea</i>), 1,000–2,000 m	Pristine Rainforest and Hill Forest
Highland forest	Mixtures of broadleaf (e.g., <i>Rhododendron</i> , <i>Quercus</i> , <i>Acer</i>) and coniferous (e.g., <i>Pinus</i>) forest, 2,000–3,000 m	Highland and Alpine Forest
Alpine forest	Spruce (<i>Picea</i>)–Fir (<i>Abies</i>) forest, 3,000–3,700 m	Highland and Alpine Forest
Tundra	Highland grassland, moss, and lichens, >3,700 m	Tundra, Highland Steppe
Wetlands	Open water of rivers, streams, pools, and ponds; marshes, swamps, flooded areas	Wetlands, River
Second growth	Shrubs, hedgerows, thickets bordering rivers and streams, old farm fields	Developed Areas, including Second Growth, Agriculture, and Lwin
Agriculture	Upland rice farming predominates in the lowland areas (<1,000 m); wheat and corn are grown at higher elevations	Developed Areas, including Second Growth, Agriculture, and Lwin
Developed areas	Settlements, roads, paths	Developed Areas, including Second Growth, Agriculture, and Lwin
Lwin	Natural savanna and grassland, most of which is found on the open flatlands surrounding the town of Putao	Developed Areas, including Second Growth, Agriculture, and Lwin
Aerial	The air column above a variety of habitats	Not illustrated

and mist for weeks on end, and infinite torment of leeches and ticks and all manner of biting flies [an understatement, as T.A., P.C.R., and S.C.R. can attest].

On the open Putao Plain, the average annual rainfall is 396 cm, the mean maximum temperature is 35.8°C, and the mean minimum temperature is 3.7°C. These figures are likely quite different in most of the heavily forested portions of the region that lie north and east of the Putao Plain. Unfortunately, no weather station yet exists to provide data from those mountainous areas.

The habitats of the area are listed in Table 1. We have surveyed all of the major habitat types, but most of our field work has been focused on subtropical rainforest, hill forest, and their associated seral stages.

METHODS

T.A. and colleagues from the NWCD began collecting and recording observations on the birds of the Hkakabo Razi region in 1997 (Aung 2002). Because of the region's remoteness and near complete isolation, an expedition was required for the initial visit by Smithsonian scientists. Although there is one seasonal road that runs east

from Putao (the nearest town with an airport) to the main village of the region, Naung Mung, it is open only about 3 months of the year during the dry season from February to April. Naung Mung is located south of the park boundary, which is actually at Pangnamdim (Fig. 1). To reach and enter the park, one must travel on foot, carrying all necessary equipment and supplies. Steep slopes and numerous crude bamboo-lash-suspension bridges make travel into the region by pack animals (e.g., elephants or mules) impossible. Although there are villages of 5 to 10 households located roughly a day's march apart along the route from Naung Mung to the park boundary at Pangnamdim, and from there to the northernmost village in Myanmar at Tahaundam, the people essentially have no economy. There is no surplus of the meager crops of corn, rice, and wheat produced, and hence no trade in these commodities, and certainly nothing left over for travelers beyond what the villagers need themselves. To accommodate our supply and equipment needs for a 5-week journey to the Myanmar-Tibet frontier and back, we organized an expedition that included 60 porters and a cook, along with two foreign scientists (J.H.R. and S.C.R.), three NWCD biologists (Nay Myo Shwe, team leader; Kyaw Lin; and Kyi Aung), and the assistant park warden, A Jo. Tay Za,

an engineer by training, was our trail boss, handling most of the logistics of hiring the porters and determining where the catches would be located. Local guides were hired as needed.

To begin this initial expedition, the scientists and NWCD biologists flew from Yangon to Putao on 7 February 2001. From there, we loaded all of the equipment and supplies needed for the journey on a 2.5-ton, four-wheel-drive truck to travel the 50 km from Putao to Naung Mung. The 3-day drive began on 8 February 2001. U Tay Za brought some porters from Putao and hired the remainder at Naung Mung, where the expedition was launched on 13 February.

Observations, mist netting, and selective collection and preservation of specimens were the main procedures used for obtaining information on the avifauna during this first trip as well as all subsequent ones. During this first expedition, whose main goal was to sample the birds across as wide an area as possible, our mist-netting regime involved half of our research team leaving with the porters at 0700 hours each morning—usually arriving at the day's destination in 5 to 6 hours of walking. This crew then set up 10 nets in whatever primary habitat they could find in the vicinity. We ran the nets the rest of the day, and half the team stayed behind the next day to take them down and then catch up with the main group. Specimens were preserved as study skins along with tissue samples. We also used a global positioning system (GPS) and vegetation observation points along the route so that we would be able to create a supervised classification of the habitat types from remote-sensing images once we were back at the Smithsonian Conservation Biology Institute GIS lab in Front Royal, Virginia. Photographs were made of all birds captured and all habitats sampled, copies of which were donated to the National Geographic Society as part of our final report.

As of September 2009, five field trips had been made to the Hkakabo Razi region by one or more members of our field team along with NWCD personnel and others necessary for logistical purposes. Field work in 2001 began on the date that we arrived in Putao, 7 February, and continued until our return to that town on 12 March. Subsequent field work in the region did not require major expeditions because we focused most of our efforts on the area between Putao and Naung Mung and were never more than a 3-day walk from places where we could purchase supplies.

The dates of these subsequent visits were 2–20 February 2004, September 2005, 4–20 March 2006, and 21 June to 10 July 2006.

In addition to these episodic field efforts, T.A., who was chief warden of Hkakabo Razi National Park from 1999 to 2007, conducted bird surveys, including some mist netting, from 2 March to 13 April 1997 and 24 April to 17 May 1998 across a major part of the park and its vicinity (Aung and Oo 1999). He and his staff also conducted long-term surveys nearly throughout his tenure as chief warden (Aung 2002).

RESULTS

During our first trip in 2001, we traveled 353 km from Putao to Tahaundam, 20 km southwest of the Tibet border, mist netting, taking GPS readings and notes on habitat, and recording visual observations of the avifauna at elevations ranging from 500 m to 3,000 m, in a variety of habitats from subtropical rainforest to alpine. The most diverse area that we encountered during this extensive sampling was in the vicinity of Naung Mung, which is located ~30 km south of the southern boundary of Hkakabo Razi National Park. Therefore, most subsequent field work was focused on this area, in which the predominant primary vegetation type is subtropical rainforest that contains a remarkable flora and fauna—for example, Leopards (*Panthera pardus*), Gaur (*Bos gaurus*), and by far the largest diversity of birds of all the areas sampled during our investigations.

Ornithological data gathered during our trips are summarized in Table 2. A new species of bird was discovered during our 2004 field work, the Naung Mung Scimitar-Babbler (*Jabouilleia naungmungensis*; Rappole et al. 2005). We were able to gather ecological and life-history data on the bird during a subsequent visit in 2006 (Rappole et al. 2008). A new subspecies of *Tesia* was discovered based on our field work (Renner et al. 2008), but most of the taxonomic material has yet to be analyzed. Nevertheless, the work to date has provided significant insight into major ornithological questions concerning the region, which we discuss below. A more complete summary of ornithological information will be included in detailed species accounts in a monograph on the birds of the southeastern Himalayas (Rappole and Renner, "Avifauna of the southeastern sub-Himalayan Mountains and neighboring Myanmar hill country," in preparation).

TABLE 2. Birds of the Hkakabo Razi region observed (O) and/or saved as specimens (S) by Smithsonian researchers and Nature and Wildlife Conservation Division colleagues, 1997 to 2006. Nomenclature and taxonomic order follow Gill and Wright (2006). R = resident (i.e., present throughout the year so far as is known) and M = migratory (i.e., not present throughout the year, including passage migrants [transients], altitudinal migrants, summer residents, and winter residents).

English name	Scientific name	Record type	Habitat	Status
Tibetan Snowcock	<i>Tetraogallus tibetanus</i>	O	Tundra	R
King Quail	<i>Coturnix chinensis</i>	O	Lwin	R
Hill Partridge	<i>Arborophila torqueola</i>	O	Hill forest	R
Rufous-throated Partridge	<i>Arborophila rufogularis</i>	O	Hill forest	R
White-cheeked Partridge	<i>Arborophila atrogularis</i>	O, S	Subtropical rainforest	R
Blood Pheasant	<i>Ithaginis cruentus</i>	O	Hill forest, second growth	R
Blyth's Tragopan	<i>Tragopan blythii</i>	O	Highland forest, alpine forest	R
Temminck's Tragopan	<i>Tragopan temminckii</i>	O	Highland forest, alpine forest	R
Himalayan Monal	<i>Lophophorus impejanus</i>	O, S	Alpine forest	R
Slater's Monal	<i>Lophophorus slateri</i>	S	Alpine forest, tundra	R
Red Junglefowl	<i>Gallus gallus</i>	O	Rainforest, second growth, agriculture	R
Kalij Pheasant	<i>Lophura leucomelanos</i>	O	Rainforest	R
Common Pheasant	<i>Phasianus colchicus</i>	O	Lwin, agriculture, second growth	R
Gray Peacock-Pheasant	<i>Polyplectron bicalcaratum</i>	O	Rainforest	R
Lesser Whistling Duck	<i>Dendrocygna javanica</i>	O	Wetlands	R
Ruddy Shelduck	<i>Tadorna ferruginea</i>	O	Wetlands	M
Mallard	<i>Anas platyrhynchos</i>	O	Wetlands	M
Indian Spot-billed Duck	<i>Anas poecilorhyncha</i>	O	Wetlands	M?
Tufted Duck	<i>Aythya fuligula</i>	O	Wetlands	M
Common Merganser	<i>Mergus merganser</i>	O	Wetlands	M
Little Grebe	<i>Tachybaptus ruficollis</i>	O	Wetlands	M?
Black Stork	<i>Ciconia nigra</i>	O	Wetlands	M
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	O	Wetlands	M
Lesser Adjutant	<i>Leptoptilos javanicus</i>	O	Wetlands	M?
Striated Heron	<i>Butorides striatus</i>	O	Wetlands	R?
Indian Pond Heron	<i>Ardeola grayii</i>	O	Wetlands	R
Cattle Egret	<i>Bubulcus ibis</i>	O	Lwin, agriculture	R
White-bellied Heron	<i>Ardea insignis</i>	O	Wetlands	R
Little Egret	<i>Egretta garzetta</i>	O	Wetlands	R
Spot-billed Pelican	<i>Pelecanus philippensis</i>	O	Wetlands	R
Little Cormorant	<i>Phalacrocorax niger</i>	O	Wetlands	R
Great Cormorant	<i>Phalacrocorax carbo</i>	O	Wetlands	R
Amur Falcon	<i>Falco amurensis</i>	O	Lwin, agriculture	M
Eurasian Hobby	<i>Falco subbuteo</i>	O	Lwin, second growth	M?
Oriental Hobby	<i>Falco severus</i>	O	Hill forest	R?
Peregrine Falcon	<i>Falco peregrinus</i>	O	Lwin, agriculture	M?
Osprey	<i>Pandion haliaetus</i>	O	Wetlands	M
European Honey Buzzard	<i>Pernis apivorus</i>	O	Lwin, agriculture	M?
Black-winged Kite	<i>Elanus caeruleus</i>	O	Lwin, agriculture	R?
Crested Serpent-Eagle	<i>Spilornis cheela</i>	O	Rainforest	R
Northern Harrier	<i>Circus cyaneus</i>	O	Lwin, agriculture	M
Pied Harrier	<i>Circus melanoleucos</i>	O	Lwin, agriculture	R
Crested Goshawk	<i>Accipiter trivirgatus</i>	S, O	Hill forest	R
Shikra	<i>Accipiter badius</i>	O	Lwin, agriculture	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Besra	<i>Accipiter virgatus</i>	S, O	Hill forest	M?
Eurasian Sparrowhawk	<i>Accipiter nisus</i>	O	Lwin, agriculture	M
Northern Goshawk	<i>Accipiter gentilis</i>	O	Lwin, agriculture, second growth, rainforest	M
Gray-faced Buzzard	<i>Butastur indicus</i>	O	Rainforest	M
Common Buzzard	<i>Buteo buteo</i>	O	Lwin, agriculture	M
Black Eagle	<i>Ictinaetus malayensis</i>	O	Rainforest	R
Steppe Eagle	<i>Aquila nipalensis</i>	O	Lwin, agriculture	M
Rufous-bellied Eagle	<i>Hieraetus kienerii</i>	O	Rainforest	R
Changeable Hawk-Eagle	<i>Spizaetus limnaetus</i>	O	Rainforest, second growth	R
Mountain Hawk-Eagle	<i>Spizaetus nipalensis</i>	O	Hill forest	R
Black-tailed Crane	<i>Porzana bicolor</i>	O	Wetlands	R
Common Moorhen	<i>Gallinula chloropus</i>	O	Wetlands	R
Common Crane	<i>Grus grus</i>	O	Wetlands	M
Ibisbill	<i>Ibidorhyncha struthersii</i>	O	Wetlands	M
River Lapwing	<i>Vanellus duvaucelii</i>	O	Wetlands	R
Red-wattled Lapwing	<i>Vanellus indicus</i>	O	Wetlands, lwin, agriculture	R
Marsh Sandpiper	<i>Tringa stagnatilis</i>	O	Wetlands	M
Green Sandpiper	<i>Tringa ochropus</i>	O	Wetlands	M
Common Sandpiper	<i>Actitis hypoleucos</i>	O	Wetlands	M
Common Pigeon	<i>Columba livia</i>	O	Agriculture, developed areas	R
Speckled Wood Pigeon	<i>Columba hodgsonii</i>	O	Hill forest	R
Ashy Wood Pigeon	<i>Columba pulchricollis</i>	O	Hill forest	R
Pale-capped Pigeon	<i>Columba punicea</i>	O	Rainforest, second growth	R
Oriental Turtle Dove	<i>Streptopelia orientalis</i>	O	Lwin, agriculture	R
Eurasian Collared Dove	<i>Streptopelia decaocto</i>	O	Lwin, Agriculture	R
Spotted Dove	<i>Streptopelia chinensis</i>	O	Lwin, agriculture	R
Barred Cuckoo-Dove	<i>Macropygia unchall</i>	O	Rainforest, second growth	R
Common Emerald Dove	<i>Chalcophaps indica</i>	S, O	Hill forest	R
Thick-billed Green Pigeon	<i>Treron curvirostra</i>	O	Rainforest, second growth	R
Pin-tailed Green Pigeon	<i>Treron apicauda</i>	O	Rainforest, hill forest, second growth	R
Wedge-tailed Green Pigeon	<i>Treron sphenurus</i>	O	Rainforest, hill forest	R
Green Imperial Pigeon	<i>Ducula aenea</i>	O	Rainforest	R
Mountain Imperial Pigeon	<i>Ducula badia</i>	O	Hill forest	R
Gray-headed Parakeet	<i>Psittacula finschii</i>	O	Rainforest	R
Blossom-headed Parakeet	<i>Psittacula roseata</i>	O	Rainforest, second growth	R
Red-breasted Parakeet	<i>Psittacula alexandri</i>	O	Rainforest, second growth	R
Greater Coucal	<i>Centropus sinensis</i>	O	Lwin, agriculture, second growth	R
Lesser Coucal	<i>Centropus bengalensis</i>	O	Lwin, agriculture, second growth	R
Chestnut-winged Cuckoo	<i>Clamator coromandus</i>	O	Rainforest, second growth	R/M?
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	O	Lwin, agriculture, second growth	R
Asian Drongo-Cuckoo	<i>Surniculus lugubris</i>	S, O	Rainforest, second growth	R/M?
Large Hawk-Cuckoo	<i>Hierococcyx sparveriioides</i>	O	Rainforest, second growth	R/M?
Indian Cuckoo	<i>Cuculus micropterus</i>	O	Rainforest, second growth	R/M?
Mountain Scops Owl	<i>Otus spilocephalus</i>	O	Hill forest, second growth	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Collared Scops Owl	<i>Otus bakkamoena</i>	S	Rainforest, hill forest, second growth, developed areas	R
Eurasian Scops Owl	<i>Otus scops</i>	O, S	Rainforest, second growth	R/M?
Brown Wood Owl	<i>Strix leptogrammica</i>	O	Rainforest, hill forest	R/M?
Tawny Owl	<i>Strix aluco</i>	O	Hill forest, highland forest	R
Collared Owlet	<i>Glaucidium brodei</i>	S	Rainforest, hill forest	R
Asian Barred Owlet	<i>Glaucidium cuculoides</i>	S, O	Rainforest, second growth	R
Hodgson's Frogmouth	<i>Batrachostomus hodgsoni</i>	O	Rainforest	R
Great Eared Nightjar	<i>Eurostopodus macrotis</i>	O	Rainforest, second growth	R
Himalayan Swiftlet	<i>Aerodramus brevirostris</i>	O	Aerial	R
Silver-backed Needletail	<i>Hirundapus</i> <i>cochinchinensis</i>	O	Aerial	M
Brown-backed Needletail	<i>Hirundapus giganteus</i>	O	Aerial	R
Asian Palm Swift	<i>Cypsiurus balasiensis</i>	S, O	Developed areas (palm- roofed huts), aerial	R
Fork-tailed Swift	<i>Apus pacificus</i>	O	Aerial	M
House Swift	<i>Apus affinis</i>	O	Developed areas, lwin, agriculture, aerial	R
Red-headed Trogon	<i>Harpactes erythrocephalus</i>	S, O	Rainforest	R
Indian Roller	<i>Coracias benghalensis</i>	O	Lwin, second growth, agriculture	R
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	O	Wetlands	R
Black-capped Kingfisher	<i>Halcyon pileata</i>	O	Wetlands	R
Blue-eared Kingfisher	<i>Alcedo meninting</i>	S, O	Wetlands	R
Common Kingfisher	<i>Alcedo atthis</i>	O	Wetlands	R
Blyth's Kingfisher	<i>Alcedo hercules</i>	S, O	Wetlands	R
Crested Kingfisher	<i>Megaceryle lugubris</i>	S, O	Wetlands	R
Pied Kingfisher	<i>Ceryle rudis</i>	O	Wetlands	R
Blue-bearded Bee-eater	<i>Nyctyornis athertoni</i>	O	Rainforest	R
Green Bee-eater	<i>Merops orientalis</i>	O	Lwin, second growth, agriculture	R
Blue-tailed Bee-eater	<i>Merops philippinus</i>	O	Lwin, second growth, agriculture	R/M?
Chestnut-headed Bee-eater	<i>Merops leschenaulti</i>	O	Lwin, second growth, agriculture	R
Eurasian Hoopoe	<i>Upupa epops</i>	O	Lwin, second growth, agriculture	R
Oriental Pied Hornbill	<i>Anthracoceros albirostris</i>	O	Rainforest, second growth	R
Great Hornbill	<i>Buceros bicornis</i>	O	Rainforest	R
Rufous-necked Hornbill	<i>Aceros nipalensis</i>	O	Rainforest, hill forest	R
Wreathed Hornbill	<i>Aceros leucocephalus</i>	O	Rainforest	R
Great Barbet	<i>Megalaima virens</i>	S, O	Rainforest, hill forest	R
Lineated Barbet	<i>Megalaima lineata</i>	O	Rainforest, second growth, developed areas	R
Green-eared Barbet	<i>Megalaima faiostriata</i>	O	Rainforest	R
Golden-throated Barbet	<i>Megalaima franklinii</i>	O	Hill forest	R
Blue-throated Barbet	<i>Megalaima asiatica</i>	S, O	Rainforest, hill forest	R
Eurasian Wryneck	<i>Jynx torquilla</i>	O	Lwin, second growth, agriculture	M
Speckled Piculet	<i>Picumnus innominatus</i>	S	Rainforest, hill forest	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Rufous Piculet	<i>Sasia abnormis</i>	S	Rainforest	R
White-browed Piculet	<i>Sasia ochracea</i>	S	Rainforest, hill forest	R
Rufous-bellied Woodpecker	<i>Dendrocopos hypertythrus</i>	O	Rain Forest, hill forest	R
Gray-capped Pygmy Woodpecker	<i>Dendrocopos canicapillus</i>	O	Rainforest, hill forest	R
Fulvous-breasted Woodpecker	<i>Dendrocopos macei</i>	O	Developed areas, second growth, lwin	R
Crimson-breasted Woodpecker	<i>Dendrocopos cathpharius</i>	O	Hill forest	R
Darjeeling Woodpecker	<i>Dendrocopos darjellensis</i>	O	Hill forest	R
Rufous Woodpecker	<i>Celeus brachyurus</i>	O	Second growth, developed areas, lwin	R
Lesser Yellownape	<i>Picus chlorolophus</i>	S,O	Rainforest, hill forest	R
Greater Yellownape	<i>Picus flavinucha</i>	O	Hill forest, highland forest	R
Gray-headed Woodpecker	<i>Picus canus</i>	S	Hill forest	R
Himalayan Goldenback	<i>Dinopium shortii</i>	O	Rainforest	R
Common Goldenback	<i>Dinopium javanense</i>	O	Lwin, second growth, developed areas	R
Greater Goldenback	<i>Chrysocolaptes lucidus</i>	O	Rainforest, second growth	R
Pale-headed Woodpecker	<i>Geocinulus grantia</i>	O	Rainforest	R
Bay Woodpecker	<i>Blythipicus pyrrhotis</i>	S, O	Rainforest, hill forest	R
Long-tailed Broadbill	<i>Psarisomus dalholusiae</i>	O	Rainforest, hill forest	R
Silver-breasted Broadbill	<i>Serilophus lunatus</i>	S, O	Rainforest, hill forest	R
Rusty-naped Pitta	<i>Pitta oatesi</i>	O	Rainforest	R
Blue-winged Pitta	<i>Pitta moluccensis</i>	O	Rainforest	R/M?
Large Woodshrike	<i>Tephrodornis virgatus</i>	O	Rainforest	R
Ashy Woodswallow	<i>Artamus fuscus</i>	O	Lwin, second growth, developed areas	R
Common Iora	<i>Aegithina tiphia</i>	O	Second growth, developed areas, lwin	R
Black-winged Cuckooshrike	<i>Coracina melaschistos</i>	S, O	Rainforest	R
Pied Triller	<i>Lalage nigra</i>	O	Lwin, second growth, developed areas	R
Rosy Minivet	<i>Pericrocotus roseus</i>	S, O	Rainforest	R
Ashy Minivet	<i>Pericrocotus divaricatus</i>	O	Rainforest, second growth	M?
Small Minivet	<i>Pericrocotus cinnamomeus</i>	O	Second growth	R?
Gray-chinned Minivet	<i>Pericrocotus solaris</i>	O	Rainforest, hill forest	R
Long-tailed Minivet	<i>Pericrocotus ethologus</i>	O	Hill forest	R
Short-billed Minivet	<i>Pericrocotus miniatus</i>	O	Hill forest, second growth	R
Scarlet Minivet	<i>Pericrocotus flammeus</i>	S, O	Rainforest, hill forest	R
Bar-winged Flycatcher-shrike	<i>Hemipus picatus</i>	S, O	Rainforest, hill forest, second growth	R
Brown Shrike	<i>Lanius cristatus</i>	O	Lwin, agriculture, second growth, developed areas	M
Burmese Shrike	<i>Lanius colluriooides</i>	O	Lwin, agriculture, second growth, developed areas	R/M?
Long-tailed Shrike	<i>Lanius schlach</i>	O	Lwin, agriculture, second growth, developed areas	R
Gray-backed Shrike	<i>Lanius tephronotus</i>	O	Lwin, agriculture, second growth, developed areas	M
Black-hooded Oriole	<i>Oriolus xanthornus</i>	O	Rainforest	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Maroon Oriole	<i>Oriolus traillii</i>	O	Rainforest, hill forest, second growth	R
Black Drongo	<i>Dicrurus macrocercus</i>	O	Lwin, agriculture, second growth, developed areas	R/M?
Ashy Drongo	<i>Dicrurus leucophaeus</i>	O	Lwin, agriculture, second growth, developed areas	R/M?
Crow-billed Drongo	<i>Dicrurus annectans</i>	S, O	Lwin, agriculture, second growth, developed areas	R/M?
Bronzed Drongo	<i>Dicrurus aeneus</i>	S, O	Rainforest, hill forest, second growth	R
Lesser Racket-tailed Drongo	<i>Dicrurus remifer</i>	S, O	Rainforest, hill forest, second growth	R
Hair-crested Drongo	<i>Dicrurus hottentottus</i>	S, O	Rainforest, hill forest, second growth	R/M?
Greater Racket-tailed Drongo	<i>Dicrurus paradiseus</i>	O	Lwin, agriculture, second growth, developed areas	R
Yellow-bellied Fantail	<i>Rhipidura hypoxantha</i>	O	Hill forest	R
White-throated Fantail	<i>Rhipidura albicollis</i>	S	Rainforest, hill forest	R
Black-naped Monarch	<i>Hypothymis azurea</i>	S, O	Second growth	R
Asian Paradise Flycatcher	<i>Terpsiphone paradisi</i>	S, O	Rainforest, second growth	R
Eurasian Jay	<i>Garrulus glandarius</i>	O	Lwin, agriculture, second growth, developed areas	R
Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>	O	Rainforest, hill forest	R
Red-billed Blue Magpie	<i>Urocissa erythrorhyncha</i>	S	Rainforest, second growth	R
Common Green Magpie	<i>Cissa chinensis</i>	S, O	Rainforest, hill forest, second growth	R
Rufous Treepie	<i>Dendrocitta vagabunda</i>	O	Second growth	R
Gray Treepie	<i>Dendrocitta formosae</i>	S, O	Rainforest, second growth	R
Collared Treepie	<i>Dendrocitta frontalis</i>	S, O	Rainforest	R
Racket-tailed Treepie	<i>Crypsirina temia</i>	O	Lwin, agriculture, second growth, developed areas	R
Spotted Nutcracker	<i>Nucifraga caryocatactes</i>	O	Highland forest, alpine forest	R
House Crow	<i>Corvus splendens</i>	O	Developed areas	R
Collared Crow	<i>Corvus pectoralis</i>	O	Lwin, agriculture, second growth, developed areas	R
Large-billed Crow	<i>Corvus macrorhynchos</i>	O	Lwin, agriculture, second growth, developed areas	R
Rufous-vented Tit	<i>Periparus rubidiventris</i>	O	Highland forest, alpine forest	R
Coal Tit	<i>Periparus ater</i>	O	Highland forest, alpine forest	R
Great Tit	<i>Parus major</i>	S, O	Rainforest, hill forest	R
Black-bibbed Tit	<i>Parus hypermelanus</i>	O	Highland forest, alpine forest	R
Green-backed Tit	<i>Parus monticolus</i>	S	Hill forest	R/M?
Yellow-cheeked Tit	<i>Parus spilonotus</i>	O	Hill forest	R/M?
Yellow-browed Tit	<i>Sylviparus modestus</i>	O	Hill forest, highland forest	R/M?
Sultan Tit	<i>Melanochlora sultanea</i>	O	Hill forest	R
Brown-throated Martin	<i>Riparia paludicola</i>	O	Wetlands, aerial	R?
Barn Swallow	<i>Hirundo rustica</i>	O	Wetlands, aerial	M
Asian House Martin	<i>Delichon dasypus</i>	O	Aerial	M

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Red-rumped Swallow	<i>Cecropis daurica</i>	O	Lwin, agriculture, aerial, developed areas	M
Black-throated Bushtit	<i>Aegithalos concinnus</i>	O	Hill forest	R
Bengal Bush Lark	<i>Mirafa assamica</i>	O	Lwin, agriculture, second growth, developed areas	R
Oriental Skylark	<i>Alauda gulgula</i>	O	Lwin, agriculture, second growth, developed areas	R
Hill Prinia	<i>Prinia atrogularis</i>	O	Lwin, second growth	R
Gray-breasted Prinia	<i>Prinia hodgsonii</i>	O	Second growth	R
Mountain Tailorbird	<i>Orthotomus cucullatus</i>	S	Hill forest, second growth	R
Common Tailorbird	<i>Orthotomus sutorius</i>	S	Second growth	R
Dark-necked Tailorbird	<i>Orthotomus atrogularis</i>	O	Second growth	R
Striated Bulbul	<i>Pycnonotus striatus</i>	O	Hill forest	R
Black-headed Bulbul	<i>Pycnonotus atriceps</i>	O	Second growth	R
Black-crested Bulbul	<i>Pycnonotus melanicterus</i>	O	Second growth	R
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	S, O	Lwin, agriculture, second growth, developed areas	R
Red-vented Bulbul	<i>Pycnonotus cafer</i>	O	Lwin, agriculture, second growth, developed areas	R
Stripe-throated Bulbul	<i>Pycnonotus finlaysoni</i>	O	Lwin, second growth, developed areas	R
Flavescent Bulbul	<i>Pycnonotus flavescens</i>	O	Lwin, agriculture, second growth, developed areas	R
White-throated Bulbul	<i>Criniger flaveolus</i>	S, O	Rainforest, second growth	R
Mountain Bulbul	<i>Ixos mccllellandii</i>	S, O	Hill forest, second growth	R
Ashy Bulbul	<i>Hemixos flava</i>	S, O	Hill forest, second growth	R
Black Bulbul	<i>Hypsipetes leucocephalus</i>	O	Second growth	R/M?
Striated Grassbird	<i>Megalurus palustris</i>	O	Lwin, second growth	R
Chestnut-headed Tesia	<i>Oligura castaneocoronata</i>	O	Hill forest	R
Slaty-bellied Tesia	<i>Tesia olivea</i>	S	Rainforest, hill forest, second growth	R
Gray-bellied Tesia	<i>Tesia cyaniventer</i>	O	Hill forest	R
Brown-flanked Bush Warbler	<i>Cettia fortipes</i>	O	Hill forest, second growth	R
Hume's Bush Warbler	<i>Cettia brunnescens</i>	S	Hill forest, highland forest, second growth	R/M?
Gray-sided Bush Warbler	<i>Cettia brunnifrons</i>	O	Alpine forest	M?
Chinese Bush Warbler	<i>Bradypterus tacsanowskii</i>	O	Second growth	M?
Dusky Warbler	<i>Phylloscopus fuscatus</i>	O	Second growth	M
Tickell's Leaf Warbler	<i>Phylloscopus affinis</i>	O	Second growth	M
Buff-throated Warbler	<i>Phylloscopus subaffinis</i>	O	Second growth	M
Ashy-throated Warbler	<i>Phylloscopus maculipennis</i>	O	Hill forest, highland forest	M
Lemon-rumped Warbler	<i>Phylloscopus chloronotus</i>	S, O	Hill forest, highland forest	M
Greenish Warbler	<i>Phylloscopus trochiloides</i>	O	Rainforest	M
Blyth's Leaf Warbler	<i>Phylloscopus reguloides</i>	O	Hill forest	M
Yellow-vented Warbler	<i>Phylloscopus cantator</i>	S, O	Rainforest, hill forest, second growth	R
Mountain Leaf Warbler	<i>Phylloscopus trivirgatus</i>	S	Rainforest	R
White-spectacled Warbler	<i>Seicercus affinis</i>	S	Rainforest, hill forest	R
Green-crowned Warbler	<i>Seicercus burkii</i>	S, O	Rainforest, hill forest, highland forest	R/M?
Gray-crowned Warbler	<i>Seicercus tephrocephalus</i>	S	Hill forest	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Whistler's Warbler	<i>Seicercus whistleri</i>	S	Hill forest	R
Gray-cheeked Warbler	<i>Seicercus polio-genys</i>	S	Rainforest, hill forest	R
Chestnut-crowned Warbler	<i>Seicercus castaniceps</i>	O	Rainforest, hill forest	R
Broad-billed Warbler	<i>Tickellia hodgsoni</i>	S	Hill forest, second growth	R
Rufous-faced Warbler	<i>Abroscopus albogularis</i>	S	Rainforest, hill forest	R/M?
Black-faced Warbler	<i>Abroscopus schisticeps</i>	O	Hill forest	R
Spot-throated Babbler	<i>Pellorneum albiventre</i>	S, O	Second growth	R
Puff-throated Babbler	<i>Pellorneum ruficeps</i>	S, O	Rainforest, second growth	R
Buff-breasted Babbler	<i>Pellorneum tickelli</i>	S, O	Hill forest, second growth	R
Abbott's Babbler	<i>Malacocincla abbotti</i>	S	Rainforest	R
Red-billed Scimitar-Babbler	<i>Pomatorhinus ochraceiceps</i>	S, O	Rainforest	R
Coral-billed Scimitar-Babbler	<i>Pomatorhinus ferruginosus</i>	S, O	Rainforest	R
Slender-billed Scimitar-Babbler	<i>Xiphirhynchus superciliaris</i>	O	Rainforest	R
Naung Mung Scimitar-Babbler	<i>Jabouilleia naungmungensis</i>	S, O	Rainforest	R
Long-billed Wren-Babbler	<i>Rimator malacoptilus</i>	S	Rainforest	R
Streaked Wren-Babbler	<i>Napothera brevicaudata</i>	S, O	Rainforest	R
Eyebrowed Wren-Babbler	<i>Napothera epilepidota</i>	S, O	Rainforest	R
Pygmy Wren-Babbler	<i>Pnoepyga pusilla</i>	S	Rainforest	R
Long-tailed Wren-Babbler	<i>Spelaornis chocolatinus</i>	S	Rainforest	R
Wedge-billed Wren-Babbler	<i>Sphenocichla humei</i>	S	Rainforest	R
Rufous-fronted Babbler	<i>Stachyris rufifrons</i>	S	Rainforest	R
Rufous-capped Babbler	<i>Stachyris ruficeps</i>	S, O	Rainforest, hill forest, second growth	R
Golden Babbler	<i>Stachyris chrysaea</i>	S, O	Rainforest	R
Gray-throated Babbler	<i>Stachyris nigriceps</i>	S, O	Rainforest	R
Spot-necked Babbler	<i>Stachyris striolata</i>	S	Rainforest	R
Snowy-throated Babbler	<i>Stachyris oglei</i>	S	Rainforest	R
White-crested Laughingthrush	<i>Garrulax leucolophus</i>	S, O	Rainforest, second growth	R
Lesser Necklaced Laughingthrush	<i>Garrulax monileger</i>	S, O	Rainforest, second growth	R
Greater Necklaced Laughingthrush	<i>Garrulax pectoralis</i>	S, O	Rainforest, second growth	R
Striated Laughingthrush	<i>Garrulax striatus</i>	O	Rainforest	R
Chestnut-backed Laughingthrush	<i>Garrula nuchalis</i>	S, O	Rainforest, second growth	R
Rufous-vented Laughingthrush	<i>Garrulax gularis</i>	S	Rainforest, second growth	R
Spot-breasted Laughingthrush	<i>Garrulax merulinus</i>	S	Rainforest, hill forest	R
Blue-winged Laughingthrush	<i>Garrulax squamatus</i>	S, O	Rainforest	R
Rufous-chinned Laughingthrush	<i>Garrulax rufogularis</i>	S	Rainforest	R
Scaly Laughingthrush	<i>Garrulax subunicolor</i>	S	Hill forest	R
Black-faced Laughingthrush	<i>Garrulax affinis</i>	S	Hill forest	R
Chestnut-crowned Laughingthrush	<i>Garrulax erythrocephalus</i>	S	Hill forest	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Red-tailed Laughingthrush	<i>Garrulax milnei</i>	O	Second growth	R
Red-faced Liocichla	<i>Liocichla phoenicea</i>	S	Hill forest	R
Silver-eared Leiothrix	<i>Leiothrix argenteauris</i>	S, O	Rainforest, hill forest, second growth	R
Red-billed Leiothrix	<i>Leiothrix lutea</i>	S, O	Rainforest, second growth	R
Cutia	<i>Sutia nipalensis</i>	O	Rainforest, hill forest	R
Black-headed Shrike-Babbler	<i>Pteruthius rufiventer</i>	O	Hill forest	R
White-browed Shrike-Babbler	<i>Pteruthius flaviscapis</i>	O	Rainforest, Hill forest	R
Green Shrike-Babbler	<i>Pteruthius xanthochlorus</i>	O	Hill forest	R
Black-eared Shrike-Babbler	<i>Pteruthius melanotis</i>	O	Rainforest, hill forest	R
White-hooded Babbler	<i>Gampsorhynchus rufulus</i>	O	Second growth	R
Rusty-fronted Barwing	<i>Actinodura egertoni</i>	O	Rainforest, hill forest	R
Streak-throated Barwing	<i>Actinodura waldeni</i>	O	Hill forest, second growth	R
Blue-winged Minla	<i>Minla cyanouroptera</i>	S, O	Rainforest, hill forest	R
Chestnut-tailed Minla	<i>Minla strigula</i>	O	Hill forest	R
Red-tailed Minla	<i>Minla ignotincta</i>	S	Rainforest, hill forest	R
Yellow-throated Fulvetta	<i>Alcippe cinerea</i>	S	Rainforest, hill forest, second growth	R
Rufous-winged Fulvetta	<i>Alcippe castaneiceps</i>	O	Rainforest, hill forest	R
White-browed Fulvetta	<i>Alcippe vinipectus</i>	O	Hill forest	R
Streak-throated Fulvetta	<i>Alcippe cinereiceps</i>	O	Hill forest	R
Rufous-throated Fulvetta	<i>Alcippe rufogularis</i>	S, O	Rainforest	R
Brown-cheeked Fulvetta	<i>Alcippe poioicephala</i>	S	Rainforest, second growth	R
Gray-cheeked Fulvetta	<i>Alcippe morrisonia</i>	S, O	Rainforest, hill forest	R
Nepal Fulvetta	<i>Alcippe nipalensis</i>	S	Hill forest, second growth	R
Rufous-backed Sibia	<i>Heterophasia amnectans</i>	S, O	Rainforest, hill forest	R
Beautiful Sibia	<i>Heterophasia pulchella</i>	S	Hill forest, highland forest	R
Long-tailed Sibia	<i>Heterophasia picaoides</i>	S	Hill forest, highland forest	R
Striated Yuhina	<i>Yuhina castaneiceps</i>	S, O	Second growth	R
White-naped Yuhina	<i>Yuhina bakeri</i>	O	Hill forest, second growth	R
Whiskered Yuhina	<i>Yuhina flavicollis</i>	O	Hill forest, second growth	R
Stripe-throated Yuhina	<i>Yuhina gularis</i>	O	Hill forest, second growth	R
Rufous-vented Yuhina	<i>Yuhina occipitalis</i>	O	Hill forest	R
Black-chinned Yuhina	<i>Yuhina nigrimenta</i>	S, O	Rainforest, hill forest, second growth	R
White-bellied Yuhina	<i>Erpornis zantholeuca</i>	S, O	Rainforest, second growth	R
Black-throated Parrotbill	<i>Paradoxornis nipalensis</i>	S	Rainforest, hill forest, second growth	R
Lesser Rufous-headed Parrotbill	<i>Paradoxornis atrosuperciliaris</i>	S	Second growth	R
Greater Rufous-headed Parrotbill	<i>Paradoxornis ruficeps</i>	O	Second growth	R
Gray-headed Parrotbill	<i>Paradoxornis gularis</i>	O	Hill forest, second growth	R
Fire-tailed Myzornis	<i>Myzornis pyrrhoura</i>	O	Hill forest	R
Oriental White-eye	<i>Zosterops palpebrosus</i>	O	Second growth	R
Asian Fairy-bluebird	<i>Irena puella</i>	O	Rain forest	R
Goldcrest	<i>Regulus regulus</i>	O	Alpine forest, highland forest	M?
Chestnut-bellied Nuthatch	<i>Sitta castanea</i>	O	Rainforest	R
White-tailed Nuthatch	<i>Sitta himalayensis</i>	O	Hill forest, highland forest	R

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	O	Hill forest	R
Beautiful Nuthatch	<i>Sitta formosa</i>	S	Rainforest, hill forest	R/M?
Rusty-flanked Treecreeper	<i>Certhia nipalensis</i>	O	Highland forest, alpine forest	M?
Common Hill Myna	<i>Gracula religiosa</i>	O	Lwin, agriculture, second growth, developed areas	R
White-vented Myna	<i>Acridotheres javanicus</i>	O	Lwin, agriculture, second growth, developed areas	R
Collared Myna	<i>Acridotheres albocinctus</i>	O	Lwin, agriculture, second growth, developed areas	R
Common Myna	<i>Acridotheres tristis</i>	O	Lwin, agriculture, second growth, developed areas	R
Chestnut-tailed Starling	<i>Sturnus malabaricus</i>	O	Lwin, agriculture, second growth, developed areas	R
Blue Whistling Thrush	<i>Myophonus caeruleus</i>	S	Rainforest, hill forest	R/M?
Orange-headed Thrush	<i>Zoothera citrina</i>	S, O	Rainforest	R/M?
Long-tailed Thrush	<i>Zoothera dixonii</i>	S	Hill forest, highland forest	R/M?
Scaly Thrush	<i>Zoothera dauma</i>	O	Hill forest, highland forest	R/M?
Black-breasted Thrush	<i>Turdus dissimilis</i>	O	Hill forest	R/M?
Gray-winged Blackbird	<i>Turdus boulboul</i>	S	Hill forest	R/M?
Common Blackbird	<i>Turdus merula</i>	O	Second growth	M
Chestnut Thrush	<i>Turdus rubrocanus</i>	O	Highland forest, alpine forest	M
Red-throated Thrush	<i>Turdus ruficollis</i>	O	Highland forest, second growth	M
Naumann's Thrush	<i>Turdus naumanni</i>	O	Hill forest, highland forest, second growth	M
Rusty-bellied Shortwing	<i>Brachypteryx hyperythra</i>	S	Rainforest	R/M?
Lesser Shortwing	<i>Brachypteryx leucophrys</i>	S	Rainforest, hill forest	R/M?
White-browed Shortwing	<i>Brachypteryx montana</i>	O	Hill forest, highland forest	R/M?
Siberian Blue Robin	<i>Luscinia cyane</i>	O	Hill forest, second growth	M
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>	S, O	Hill forest	M
Oriental Magpie-Robin	<i>Copsychus saularis</i>	O	Lwin, agriculture, second growth, developed areas	R
White-rumped Shama	<i>Copsychus malabaricus</i>	O	Lwin, agriculture, second growth, developed areas	R
Daurian Redstart	<i>Phoenicurus aureus</i>	O	Second growth	M
Plumbeous Water Redstart	<i>Rhyacornis fuliginosa</i>	S, O	Wetlands	R
White-capped Redstart	<i>Chaimarrornis leucocephalus</i>	O	Wetlands	R
White-tailed Robin	<i>Myiomela leucura</i>	S, O	Rainforest, hill forest	R
Little Forktail	<i>Enicurus scouleri</i>	S, O	Wetlands	R
Black-backed Forktail	<i>Enicurus immaculatus</i>	O	Wetlands	R
Slaty-backed Forktail	<i>Enicurus schistaceus</i>	S, O	Wetlands	R
White-crowned Forktail	<i>Enicurus leschenaulti</i>	S, O	Wetlands	R
Spotted Forktail	<i>Enicurus maculatus</i>	O	Wetlands	R
Eurasian Stone Chat	<i>Saxicola torquatus</i>	O	Lwin, agriculture, second growth, developed areas	M
Pied Bush Chat	<i>Saxicola caprata</i>	O	Lwin, agriculture, second growth, developed areas	M
Gray Bush Chat	<i>Saxicola ferreus</i>	O	Lwin, agriculture, second growth, developed areas	R
Blue Rock Thrush	<i>Monticola solitarius</i>	O	Rainforest	R/M?

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Chestnut-bellied Rock Thrush	<i>Monticola rufiventris</i>	O	Hill forest	R
Asian Brown Flycatcher	<i>Muscicapa dauurica</i>	O	Second growth	M
Rufous-gorgeted Flycatcher	<i>Ficedula strophiiata</i>	S	Hill forest, second growth	R/M?
Red-breasted Flycatcher	<i>Ficedula parva</i>	O	Second growth, developed areas	M
White-gorgeted Flycatcher	<i>Ficedula monileger</i>	S	Rainforest, hill forest	R
Snowy-browed Flycatcher	<i>Ficedula hyperythra</i>	S, O	Rainforest	R
Little Pied Flycatcher	<i>Ficedula westermanni</i>	O	Rainforest	R
Slaty-blue Flycatcher	<i>Ficedula tricolor</i>	O	Second growth	R
Sapphire Flycatcher	<i>Ficedula sapphira</i>	S	Hill forest	R
Verditer Flycatcher	<i>Eumyias thalassinus</i>	O	Rainforest	R/M?
Pale Blue Flycatcher	<i>Cyornis unicolor</i>	S	Rainforest	R
Hill Blue Flycatcher	<i>Cyornis banyumas</i>	S, O	Rainforest, hill forest, second growth	R
Tickell's Blue Flycatcher	<i>Cyornis tickelliae</i>	O	Second growth	R
Blue-throated Blue Flycatcher	<i>Cyornis rubeculoides</i>	S	Rainforest	R
Rufous-bellied Niltava	<i>Niltava sundara</i>	S	Rainforest	R
Large Niltava	<i>Niltava grandis</i>	S	Rainforest	R
Small Niltava	<i>Niltava macgrigoriae</i>	S	Rainforest	R
Gray-headed Canary-Flycatcher	<i>Culicapa ceylonensis</i>	S, O	Rainforest	R
Brown Dipper	<i>Cinclus pallasii</i>	S, O	Wetlands	R
Orange-bellied Leafbird	<i>Chloropsis hardwickii</i>	S, O	Rainforest, hill forest	R
Yellow-vented Flowerpecker	<i>Dicaeum chrysorrheum</i>	O	Second growth	R
Orange-bellied Flowerpecker	<i>Dicaeum trigonostigma</i>	O	Second growth	R
Plain Flowerpecker	<i>Dicaeum concolor</i>	O	Second growth	R
Fire-breasted Flowerpecker	<i>Dicaeum ignipectus</i>	O	Second growth	R
Purple Sunbird	<i>Cinnyris asiaticus</i>	O	Rainforest, Second growth	R
Olive-backed Sunbird	<i>Cinnyris jugularis</i>	O	Second growth	R
Green-tailed Sunbird	<i>Aethopyga nipalensis</i>	S	Rainforest	R
Black-throated Sunbird	<i>Aethopyga saturata</i>	S, O	Second growth	R
Crimson Sunbird	<i>Aethopyga siparaja</i>	S, O	Second growth	R
Little Spiderhunter	<i>Arachnothera longirostra</i>	S	Rainforest	R
Streaked Spiderhunter	<i>Arachnothera magna</i>	S, O	Rainforest	R
House Sparrow	<i>Passer domesticus</i>	O	Developed areas	R
Eurasian Tree Sparrow	<i>Passer montanus</i>	O	Developed areas	R
White-rumped Munia	<i>Lonchura striata</i>	O	Lwin, agriculture, second growth, developed areas	R
Scaly-breasted Munia	<i>Lonchura punctulata</i>	O	Lwin, agriculture, second growth, developed areas	R
Rufous-breasted Accentor	<i>Prunella strophiiata</i>	O	Hill forest, agriculture, second growth	M
Maroon-backed Accentor	<i>Prunella immaculata</i>	S	Hill forest	M
Forest Wagtail	<i>Dendronanthus indicus</i>	O	Lwin, agriculture, second growth, developed areas	M
Western Yellow Wagtail	<i>Motacilla flava</i>	O	Lwin, agriculture, wetlands, developed areas	M

(continued)

TABLE 2. Continued.

English name	Scientific name	Record type	Habitat	Status
Citrine Wagtail	<i>Motacilla citreola</i>	O	Lwin, agriculture, wetlands, developed areas	M
Gray Wagtail	<i>Motacilla cinerea</i>	O	Lwin, agriculture, wetlands, developed areas	M
White Wagtail	<i>Motacilla alba</i>	O	Lwin, agriculture, wetlands, developed areas	M
Richard's Pipit	<i>Anthus richardi</i>	O	Lwin, agriculture, developed areas	M
Olive-backed Pipit	<i>Anthus hodgsoni</i>	O	Second growth	M
Dark-breasted Rosefinch	<i>Carpodacus nipalensis</i>	O	Lwin, agriculture, second growth, developed areas	M
Common Rosefinch	<i>Carpodacus erythrinus</i>	O	Lwin, agriculture, second growth, developed areas	M
Dark-rumped Rosefinch	<i>Carpodacus edwardsii</i>	O	Second growth	R
Red Crossbill	<i>Loxia curvirostra</i>	O	Alpine forest	M
Brown Bullfinch	<i>Pyrrhula nipalensis</i>	O	Hill forest, second growth	R
Gray-headed Bullfinch	<i>Pyrrhula erythrocephala</i>	O	Hill forest, second growth	R
Golden-naped Finch	<i>Pyrrhoplectes epauletta</i>	O	Hill forest, second growth	R
Crested Bunting	<i>Melophus lathami</i>	O	Lwin, agriculture, second growth, developed areas	R
Little Bunting	<i>Emberiza pusilla</i>	O	Lwin, agriculture, second growth, developed areas	M
Chestnut Bunting	<i>Emberiza rutila</i>	O	Lwin, agriculture, second growth, developed areas	M

Using GPS and observational data gathered during three trips to the region along with a LANDSAT remotely sensed image, we produced a land-classification map for all of northern Myanmar (Renner et al. 2007). A modified version of this classification is shown in Figure 1, depicting the major habitats in the Hkakabo Razi region as defined in Table 1. There is no sharp boundary between the subtropical evergreen forest that we have called "rainforest" and the more temperate, semi-deciduous forest that we have called "hill forest." We have rather arbitrarily set the dividing line at 1,000 m, although several bird species found in rainforest can be found above that line and some from hill forest can be found below it, especially during Palearctic winter. Nevertheless, the bird communities of these two habitat types are quite distinct. Indeed, the argument can be made that the transitional zone (800–1,500 m) between the major habitats could warrant its own designation—something like "Myanmar cloud forest"—a cool, wet forest dominated by evergreen versions of several tree species typical of more temperate forests (e.g., *Quercus*). Further study in the region should clarify this relationship.

DISCUSSION

The list of birds for the Hkakabo Razi region provided in Table 2 is a work in progress. As is true for any distributional listing, those records based solely on observation should be considered hypothetical until confirmed by collection of a specimen. Also, there are obvious gaps in the list because of biased sampling. In particular, canopy species, passage migrants, and Himalayan highland species are likely underrepresented. On the basis of our experience in the area, the available literature, and published estimates of avian community richness from other regions of comparable complexity, we estimate that the 413 species presented in Table 2 represent at least 80% of the bird species found regularly (i.e., every year) in the region. Despite the fact that it is incomplete and probably includes some species incorrectly, the list gives evidence of an extraordinary level of diversity. In addition, the data in Table 2 provide enough information for at least some preliminary analyses on a number of important questions.

Ornithogeography.—As Ernst Mayr stated in 1940, "Our knowledge of the birds of Upper

Myanmar is still too incomplete to justify an exhaustive zoogeographical analysis." However, some of the principles of distribution in this area are already quite evident. The most important is that two distinct faunas meet at about 900–1,500 m on the western slope of the mountains that form the Irrawaddy-Salween watershed. Below this line there is the fauna of northern Myanmar and Assam, and above is the fauna of the highlands of Szechuan, Yunnan, and the Himalayas (Stanford and Mayr 1940, 1941a, b, c, d).

On the basis of our work in the region, we now believe Mayr's analysis to be at least partially correct. The area located north and east of the Namei Hka-Mali Hka divide, most of which is included within the boundaries of Hkakabo Razi National Park, is largely Himalayan in terms of its ornithogeography. The bird species that occur there are similar to those found in similar habitats (hill forest, highland forest, alpine forest, tundra) elsewhere throughout the Himalayas. However, the area south and west of the divide is much more complex. For example, the closest known relative to the new bird species that we discovered, the Naung Mung Scimitar-Babbler, is the Short-tailed Scimitar-Babbler (*J. danjoui*), whose range encompasses eastern Laos and northern Vietnam (Rappole et al. 2005). No occurrences of anything like any of these taxa have been discovered in the 800 km that separates Naung Mung from northwestern Vietnam, despite recent sampling by Jack Dumbacher, Yang Xiaojun, and their colleagues in Yunnan (see Chapter 3 of the present volume; although J. Hornskov reported an observation of *J. naungmungensis* on 8 December 2008 at a site on the Myanmar-Yunnan border ~300 km south of Naung Mung; J. Hornskov pers. comm.).

Despite this apparent tie to eastern Southeast Asian avifauna, individuals of several of the species that we have examined that were collected in the Hkakabo Razi region (e.g., *Liocichla phoenicea* and *Pellorneum albiventris*) are most similar to subspecies from the sub-Himalayan region of Arunachal Pradesh located 100 km to the west. Clearly, the subtropical rainforest and cloud forest found in the vicinity of Naung Mung warrants significant additional investigation to determine the origin and history of its bird communities.

Migration.—Knowledge and understanding of migration is rudimentary nearly throughout Asia. Except for McClure's (1974) pioneering efforts in Southeast Asia and the work of a few others, almost all information on bird movements

is derived from seasonal records of appearance and disappearance (Smythies 1953, Rappole et al. 2011). These kinds of data provide an incomplete, and often distorted, concept of migratory status, especially when some portions of a population are migratory and others are resident, as is the case for a significant portion of the Myanmar avifauna. The information on status in Table 2 should be considered preliminary. It is derived from our observations of seasonal presence or absence, as well as from the regional literature (Smythies 1953, King et al. 1995, Rasmussen and Anderton 2005).

So far as actual documentation of seasonal movement in the Hkakabo Razi region is concerned, even less presence-absence information is available than elsewhere in Asia. Very little ornithological work has been done during the Palearctic summer (May to August). A notable exception is the trip made by P.C.R. to Naung Mung, 21 June to 10 July 2006. Although she did not sample at higher elevations, she found species in her net samples that had not previously been recorded (e.g., *Cyornis magnirostris* and *Dicrurus annectans*). The presence of these species may represent seasonal movement into the region from the south for breeding.

Seasonal shifts in distribution associated with altitudinal migration—upslope in association with Palearctic spring and downslope in fall—are likely a major aspect of migration in the Hkakabo Razi region. Such movements occur elsewhere in the Himalayas (King et al. 1995, Rasmussen and Anderton 2005); presumably they occur in northern Myanmar as well. It is also likely that migratory movements occur in relation to monsoon weather patterns, as has been found elsewhere in Myanmar (Rappole et al. 2011).

Clarification of pathogen patterns.—We did not actually have this objective in mind when we began our work, but the tissue samples we collected allowed us to contribute to a study of the distribution of avian malaria (Ishtiaq et al. 2007), and it seems likely that they could be used for other such studies in the future.

Avian range change as related to global warming.—As in the case of the previous objective, we did not have this goal in mind when we began the study. The thorough review by Parmesan (2006), as well as our own work on rapid range change in subtropical species in south Texas, has awakened us to the possibility not only of latitudinal range change (Rappole et al. 2007, Faridani et al.

2009), but of altitudinal range change as well. Indeed, Round and Gale (2008) reported on evident range change in pheasants (*Lophura*) in Thailand. Unfortunately, historical data needed for comparison are mostly lacking, but we must at least try to obtain data on current distribution, understanding that these are not likely to be the same as historical ranges, and with the idea of making comparisons with data on ranges to be gathered in the future.

Identification of special conservation needs.—Unlike some of our objectives, we had this goal in mind from the beginning, and indeed, it was a major reason that U Uga suggested the exploration in the first place. Hkakabo Razi National Park was established in 1998. It was a goal toward which many academic and wildlife professionals in Myanmar had worked extremely hard to achieve because they, like many others in the conservation and scientific communities, recognized the extraordinary value of the southeastern Himalayan and sub-Himalayan region. However, the boundaries of the park were somewhat arbitrary—they had to be, given that very little information was available—and were based, in part at least, on recommendations from the Wildlife Conservation Society, according to Rabinowitz (2001:196).

After our five trips, two trips led by NWCD and the Wildlife Conservation Society, several trips by NWCD and California Academy of Sciences herpetologists, and several years of bird surveys in and around the park by NWCD personnel, we now know that a major error was committed in boundary location for the national park. The most diverse and unique portion of the region, namely that located in the subtropical rainforest and cloud forest located between Putao and Naung Mung, is outside the park and therefore not protected. This portion includes the entire known range of the endemic Naung Mung Scimitar-Babbler, a new species of deer (Leaf Deer [*Muntiacus putaoensis*]; Rabinowitz et al. 1999), and several new species of reptiles and amphibians discovered by Myanmar NWCD and California Academy of Sciences personnel. U Uga, a former chief of NWCD, was working with colleagues to try to get some protection for this extraordinary region, up until his death earlier this year, but the Myanmar government has given signs of rethinking the entire park concept because of security concerns along its border with China. Lack of protection exposes the region to two major threats: removal of primary

forest from steep slopes via slash-and-burn agricultural methods as a result of increasing population pressure, and unregulated harvest and sale of forest products.

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