

Threatened Birds of Asia:

The BirdLife International Red Data Book

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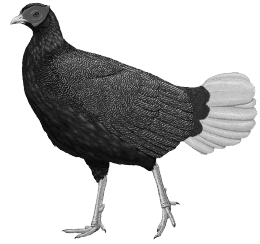
CRESTLESS FIREBACK

Lophura erythrophthalma

Critical —

Endangered —

Vulnerable A1c,d; A2c,d



The continuing rapid reduction in extent and quality of this pheasant's lowland rainforest habitat, across most of its known range, infers a rapid population reduction and justifies its classification as Vulnerable.

DISTRIBUTION The Crestless Fireback (see Remarks 1) has a Sundaic range encompassing Peninsular Malaysia and Sumatra (nominate *erythrophthalma*) and Borneo (race *pyronota*). Beebe (1918–1922) mapped it as ranging along the south coast of Peninsular Malaysia (explicitly stating that he could find no trace of it on the east coast), north coast of Sumatra (east of 100°E) and west coast of Sarawak, but eighty years later a much fuller picture has emerged, and its range is (or was) clearly very much broader than Beebe thought (see map). However, it is everywhere sparsely distributed (McGowan and Garson 1995). In the Peninsula it is known from southern Johor to southern Kelantan (Lebir drainage) and Kedah (Wells 1999). There is one specimen from Singapore collected in February 1837 (in BMNH) and two collected there before 1845 (in IRSNB), which possibly indicate an extinct population, although such specimens have been considered probably erroneous and/or indicative of trade captives (Beebe 1918–1922, Robinson and Chasen 1936, Wells 1999). In Borneo the species has been thought confined to the south and west as far north as Brunei and Gunung Mulu National Park (Smythies 1981, MacKinnon and Phillipps 1993, SvB), but it is present in Sabah. On Sumatra its range remains enigmatic; records from Way Kambas National Park—presumably based on Santiapillai and Suprahman (1985) and van Balen and Holmes (1993), and repeated in McGowan and Garson (1995)—have been withdrawn (Holmes 1996, Parrott and Andrew 1996). Records are as follows:

■ **MALAYSIA** ■ *Peninsular Malaysia* Penang, before 1880 (male in BMNH), an island locality doubted by Beebe (1918–1922) and Robinson and Chasen (1936), but a place to which captive live birds were brought for sale (Rickett ms a); **Kedah** (Keddah), before 1880 (three specimens in BMNH); **Pagar**, Melaka, before 1880 (two specimens in BMNH); **Sungai Petuang**, Terengganu, 150 m, around 1980 (Davison and Scriven undated); lower slopes of **Gunong Rabong**, Kelantan, 200 m, around 1980 (Davison and Scriven undated, Siti Hawa Yatim 1993); **Taman Negara National Park**, here including the lowlands of Pahang, winter 1901 (specimen in AMNH; also Hartert 1902b) and north Pahang, 1901 (two specimens in AMNH; also Hartert 1902b), then in September 1976 (Wells 1983), very small numbers recorded in the 1980s and 1990s (T. Carlberg, P. Hines, D. Rogers separately *in litt.* 1999), including at the Kumpang Hide, February 1989 (*Enggang* 2,4: 8), on the Jenut Muda trail, October 1989 (*Enggang* 2,11: 4) and at Kuala Jeram, February 1997 (*Enggang* February/March 1997: 21), with an earlier but undated record from Gunong Tahan (Wells 1999); **Sungkai Wildlife Reserve**, Perak, 200 m, around 1980 (Davison and Scriven undated), February 1993 (K. H. Phon *in litt.* 1999); **Sungai Klah Forest Reserve**, 1980s (Siti Hawa Yatim 1993); **Besout Forest Reserve**, 1980s (Siti Hawa Yatim 1993); **Gunung Benom**, at Benom Dong, Pahang, 200 m, around 1980 (Davison and Scriven undated) and Benom Cheka, Pahang, 200 m, around 1980 (Davison and Scriven undated); **Kuala Lompat**, Pahang, 50 m, around 1980 (Davison and Scriven undated); **Kerau Wildlife Reserve**, currently (McGowan and Garson 1995); **Lepar Hilir**, 1980s (Siti Hawa Yatim 1993); **Selangor**, May/June 1900 (three specimens in AMNH,

SNMB); **Templer Park**, Selangor, recently (McGowan and Garson 1995); **Sungai Buloh** (Buluh), Selangor, 40 m, around 1980 (Davison and Scriven undated), but see Threats; **Ampang** (I, II and III), Selangor, 70–200 m, around 1980 (Davison and Scriven undated); **Subang Forest Reserve**, 1962, eight ringed (Medway and Wells 1963; see Population, Threats); **Tasek Bera**, July 1991 (A. C. Sebastian *in litt.* 1999), and, as “Fort Iskander”, December 1962 (Medway and Wells 1963); **Cheras**, Ulu Langat, Selangor, August 1908 (female in NRM); Pasuh or **Pasoh Forest Reserve** (I, II and III), Negeri Sembilan, 50–200 m, around 1980 (Davison and Scriven undated), occasionally seen (B. F. King verbally 1998) including early 1986 (Harrap 1986), March 1987 (Wells 1990c), April 1998 (D. Cooper and F. Cooper *in litt.* 1999); **Air Hitam**, Selangor, 25 m, around 1980 (Davison and Scriven undated); Endau district presumably in what has been since 1989 **Endau-Rompin Park**, Johor, breeding, March 1979 (Davison 1980, Wells 1984), and including Sungai Rompin, June–July 1902 (Riley 1938); **Sungai Dusun**, Selangor, 1980s (Siti Hawa Yatim 1993); **Melaka** (Malacca; presumably in the vicinity, although this was a major trade centre), nineteenth century (specimens in AMNH, BMNH, NRM, etc.; Ogilvie Grant 1893); **Labis** (one label also qualifying as Segamat), Johor, July and November 1910 (five specimens in AMNH); Sungai Lebir (untraced, but in southern Kelantan: G. W. H. Davison *in litt.* 2000), May 1901 (female in AMNH; also Hartert 1902b);

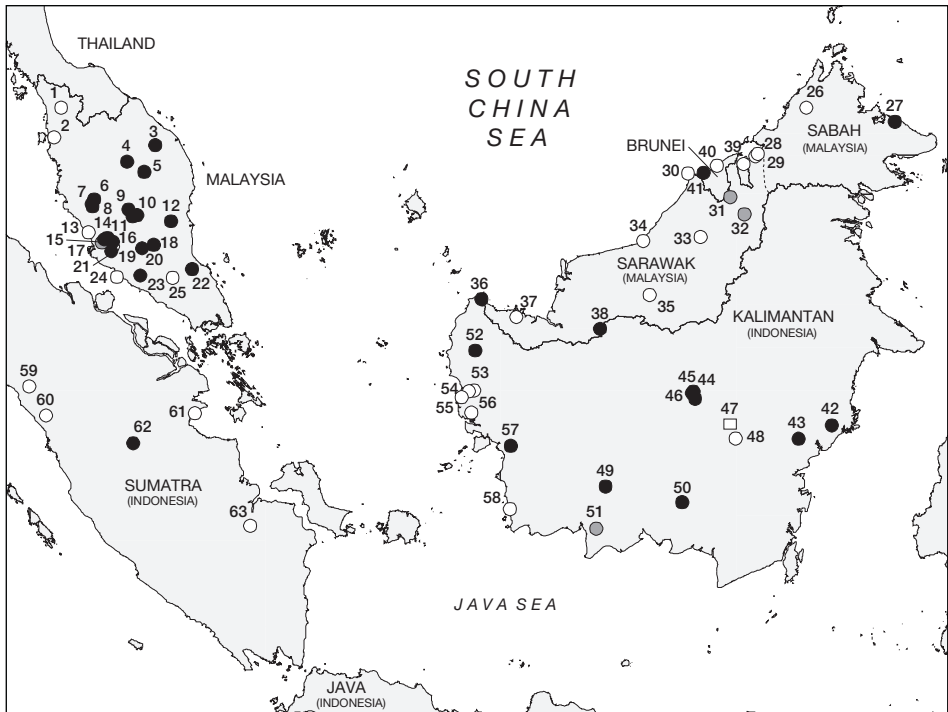
■ **Sabah** Kinabalu, in what is presumably today **Kinabalu Park**, June/July 1903 (specimen in AMNH; see Remarks 2); Sungai Deramakot, tributary of **Kinabatangan river**, November 1999 (A. C. Sebastian *in litt.* 1999); Uncle Tan’s Wildlife Camp, one probable bird, September/October 1991 (Verbelen 1991); unconfirmed sighting from Labuk, August 1949 (Mann *in prep.*, Sheldon *et al.* *in press*); Danum Valley, mid-1990s (E. J. F. Gasis-Campbell *per* R. Sözer *in litt.* 2000; see Remarks 3); Kabili-Sepilok Forest Reserve, three females reportedly observed once in the period 1974–1975 (de Silva 1981; see Remarks 4);

■ **Sarawak** **Mengaloh river**, undated (Sharpe 1876–1879); **Lawas river**, undated (Sharpe 1876–1879); **Baram river**, 1891 and undated (two specimens in NRM, RMNH; also Ogilvie Grant 1893, Smythies 1957); Gunung Mulu in what is now **Gunung Mulu National Park**, 300 m, September–December 1893 (Sharpe 1893–1894), April–May 1978 (Wells *et al.* 1978; also Davison 1979); **Kubaan river**, Tutoh, 400–600 m, February 1965 (Fogden 1976); **Gunung Dulit**, December 1897 and October 1898 (three males in BMNH, FMNH); **Bintulu**, undated (Sharpe 1876–1879); **Mujong river**, July 1910 (female in AMNH); **Samunsam Wildlife Sanctuary**, May and November 1986 (A. C. Sebastian *in litt.* 1999); **Kuching** (“10th mile”), July 1910 (male in AMNH); **Batang Ai National Park**, 1992 (Meredit 1995); Entoyut river (untraced), September 1894 (two specimens in AMNH); Similajau National Park, September 1995, possibly (Duckworth *et al.* 1996).

■ **BRUNEI** Labu, presumably in **Labu Forest Reserve**, Temburong, 1949 (Gore 1968); **Tutong river**, December 1897 and March–April 1898 (four specimens in AMNH, RMNH); **Seria** “a female seen walking up and down in plain view at the edge of intertidal mud”, May 1982 (Vowles and Vowles 1997); Ulu Belait, undated (Smythies and Davison 1999; see Remarks 5);

■ **INDONESIA** **Kalimantan** ■ **East Kalimantan** Muara Jawaq area, north of Mahakam, as reported by the owner of a captive bird in Melak, Sungai Mahakam, 1995 (R. Sözer *in litt.* 1999); feather from Bukit Suharto, undated (R. Sözer *in litt.* 1999); **Sungai Wain**, between Balikpapan and Samarinda, early 1990s (G. Fredriksson and H. Peters *per* R. Sözer *in litt.* 2000); **Gunung Beratus** at Bongan logging camp south of Balikpapan, an egg collected by a local, 1998 (R. Sözer verbally 2000); ■ **Central Kalimantan** above **Muara Joloi** at the confluence of the Busang and Murung rivers, 150–200 m, Barito Ulu (Barito river headwaters), July–September 1989 (Wilkinson *et al.* 1991a,b; also Holmes 1989); **Sungai Busang**, 15 km above Muara Joloi, 300–500 m, July to September 1989 (Wilkinson *et al.* 1991a,b); **Sungai Murung**, 10 km above Muara Joloi, 300–400 m, July to September 1989 (Wilkinson *et al.* 1991a,b); **Tumbang Maruwei**, September/November 1915 (Voous 1961); **Lihong Bahaija**, January 1882

(Grabowsky 1885, Blasius 1896); **Sukamandang**, captive bird, mid-1980s (Holmes and Burton 1987, D. A. Holmes *in litt.* 1999); upper catchment of the **Sungai Sebangau**, 20 km south-west of Palangkaraya, 1993–1995 (Page *et al.* 1997); **Tanjung Puting National Park**, in the period since c.1970 (bin Jalan and Galdikas 1987, B. F. King verbally 1998; see Remarks 6); ■ **West Kalimantan Bengkayang**, Singkawang, captive bird, 1997 (R. Sözer verbally 2000); **Sungai Landak**, Kapuas, March 1907 (Parrot 1908; see Remarks 6); **Pontianak**, December 1892, January 1893, October 1893 and in 1894 (Blasius 1896), March/April 1931 (Chasen and Kloss 1932a); **Ngara**, Ipoh Peniti, 1931 (van Balen and Holmes 1993); **Gunung Ambawang**, Pontianak, including Telok Pakedai, nest with three eggs, January 1930, and nest with one egg, March 1930 (Coomans de Ruiter 1946b); **Gunung Palung National Park** at Cabang Panti, 1986–1995 (Laman *et al.* 1996), and, adjacent to the park in the community forest area, June 1998 (E. Pollard *in litt.* 2000); **Sungai Kendawangan**, August–September 1908 (Smythies 1957; specimen in USNM);



The distribution of Crestless Fireback *Lophura erythrophthalma*: (1) Kedah; (2) Pagar; (3) Sungai Petuang; (4) Gunung Rabong; (5) Taman Negara National Park; (6) Sungai Wildlife Reserve; (7) Sungai Klah Forest Reserve; (8) Besout Forest Reserve; (9) Gunung Benom; (10) Kuala Lompat; (11) Kerau Wildlife Reserve; (12) Lepar Hilir; (13) Selangor; (14) Templer Park; (15) Sungai Buloh; (16) Ampang; (17) Subang Forest Reserve; (18) Tasek Bera; (19) Cheras; (20) Pasoh Forest Reserve; (21) Air Hitam; (22) Endau-Rompin Conservation Area; (23) Sungai Dusun; (24) Melaka; (25) Labis; (26) Kinabalu Park; (27) Kinabalu river; (28) Mengalong river; (29) Lawas river; (30) Baram river; (31) Gunung Mulu National Park; (32) Kubaan river; (33) Gunung Dulit; (34) Bintulu; (35) Mujong river; (36) Samunsam Wildlife Sanctuary; (37) Kuching; (38) Batang Ai National Park; (39) Labu Forest Reserve; (40) Tutong river; (41) Seria; (42) Sungai Wain; (43) Gunung Beratus; (44) Muara Joloi; (45) Sungai Busang; (46) Sungai Murung; (47) Tumbang Maruwei; (48) Lihong Bahaija; (49) Sukamandang; (50) Sungai Sebangau; (51) Tanjung Puting National Park; (52) Bengkayang; (53) Gunung Landak; (54) Pontianak; (55) Ngara; (56) Gunung Ambawang; (57) Gunung Palung National Park; (58) Sungai Kendawangan; (59) Ophir District; (60) Kayutanam; (61) Indragiri; (62) Gelumpang; (63) Talangbetutu.

○ Historical (pre-1950) ● Fairly recent (1950–1979) ● Recent (1980–present) □ Undated

Sumatra ■ *West Sumatra Ophir District* at Pasirdela, 1931 (van Balen and Holmes 1993); *Kayutanam, Pariaman*, 1931 (van Balen and Holmes 1993); ■ *Riau Indragiri*, December 1898 (male in AMNH; also van Marle and Voous 1988); *Gelumpang* at Bukit Tigapuluh, August 1991, and at Sungai Alar, September 1991 (Danielsen and Heegaard 1995a); ■ *South Sumatra Talangbetutu, Palembang*, undated (Kloss 1931).

POPULATION Although widespread on Borneo this pheasant is very scarce and local (Mann in prep.). Over a decade ago it was feared that lowland forest loss might cause it to be placed in the “Endangered” (then the highest risk) category (Holmes 1989). McGowan and Garson (1995) suggested a population of between 1,000 and 10,000 for subspecies *erythrophthalma* but did not clarify if this was for Peninsular Malaysia only or for Sumatra as well; they suggested the same numerical ranges for race *pyronota* in East Malaysia (Sabah and Sarawak), whilst in Kalimantan *pyronota* is described as occurring at low densities. Quantification of decline in this species has been attempted, but this exercise was greatly hampered by paucity of data: 40 localities were traced, 21 before and 21 after 1970, two being shared (McGowan *et al.* 1998a), while in this review 63 localities have been traced, 33 before 1980, 33 after (including a large number from Peninsular Malaysia from “around 1980”), three being shared (see Distribution). Despite these balances in recent *versus* former times, there is no question that numbers will have declined steeply in recent decades owing to habitat loss (see Threats).

Peninsular Malaysia On the mainland adjacent to Penang the species was judged apparently common in the 1880s owing to the fact that “numbers (mostly female) are brought round for sale” (Rickett ms a). In the early twentieth century it was judged commonest in the more southerly regions of the Peninsula, but “by no means a common bird” in the central ones (Robinson and Chasen 1936). Although as many as eight birds were ringed in Subang Forest Reserve in 1962, the area was then extremely small (“one-half square mile of forest”) and a third of it was cleared during that year (Medway and Wells 1963); it is now non-existent (see Threats). The statement that this is “the commonest *Lophura* pheasant (found at densities up to six birds per km²), occurring in both logged and unlogged forest (Davison and Scriven 1983 [=undated])” (Holmes 1989; quotation from Collar *et al.* 1994) is slightly misleading, because (a) there are only two members of the genus to compare, and (b) although it was found to be much more *widespread*, its densities (see under Habitat below) were always lower than the maximum densities of Crested Fireback *Lophura ignita* (see Davison and Scriven undated). It was recently described as “uncommon to more or less common” in the Peninsula (Wells 1999). Sungai Buloh, a site for the species in 1980, has now been destroyed (*Suara Enggang* 5, September–October 2000: 10).

Borneo It has been asserted that the Crestless Fireback is only present in the south and west of Borneo (Smythies 1981, Holmes 1989, MacKinnon and Phillipps 1993), but as the map indicates this is an oversimplification of a trend: there is a cluster of records in the far west and another in the southern half, but there is a third in and around Brunei in the north-west, and there are records from northern and eastern Borneo, leaving a huge area of East Kalimantan and interior West Kalimantan devoid of records. In Sarawak it was judged “decidedly rare” in the Baram district in the nineteenth century (Hose 1893), Fogden (1976) reported it uncommon (defined as “seen only a few times”) in the Tutoh headwaters in early 1965, and Banks (1935a) stated that it was as common as Crested Fireback based on numbers taken in snares, but much less easy to find in the wild, probably because “more wary, less aggressive and less noisy, thus attracting less attention”. In Kalimantan it appears to be very scarce (Holmes 1989, van Balen and Holmes 1993, B. F. King verbally 1998); Grabowsky (1885) found it at only one place (Lihong Bahaija) during his explorations in the south-east, but repeatedly caught it there in snares, suggesting that it was and may still be patchy in its abundance; and it is considered “rare” in Gunung Palung National Park (Laman *et al.* 1996).

Sumatra Status on the island is difficult to assess. It is highly secretive in one area (Danielsen and Heegaard 1995a), and this attribute may well mask its true status. On the other hand, one observer who has found it easy to locate in Peninsular Malaysia has never seen it in Sumatra (F. Verbelen *in litt.* 1999), and it may be genuinely less common there.

ECOLOGY Habitat The Crestless Fireback is essentially a bird of level lowland primary and lightly disturbed rainforest (but see last paragraph in this section). In Peninsular Malaysia it is known from mature and well-generated closed-canopy lowland and hill dipterocarp forest over level, gently sloping and steep country from sea-level to 200 m, possibly higher, but not to the upper limits of hill dipterocarp forest (Davison and Scriven undated, Wells 1999), being “often encountered near forest edge, in cultivation, and along streams in lowland dipterocarp forest” (Siti Hawa Yatim 1993; see Remarks 7). In Borneo it is found on the floor of lowland dipterocarp and alluvial forests (Hose 1893, Beebe 1918–1922, Mann *in prep.*; also Davison 1979, van Balen and Holmes 1993).

There is evidence of some tolerance of degraded habitat, but this is mostly in Peninsular Malaysia. There, densities were highest (6/km²) in logged forest on hilly ground with a dense palm undergrowth, lower (3/km²) in level lowland forest with mixed dry and swampy terrain, and lowest (0.6/km²) in level lowland forest in mixed alluvial terrace, dry and swampy land (Davison and Scriven undated; see also Holmes 1989). In Riau, Sumatra, birds were encountered in both primary and lightly logged forest (Danielsen and Heegaard 1995a). In Borneo there is less evidence of use of disturbed forest, and indeed Beebe (1918–1922) thought the species on Borneo was less tolerant of human presence (in the form of settlements) than it was in the Peninsula. Reference by Beebe (1918–1922) to “grassy runways” leading to a roost-tree (see Threats: Human exploitation) suggests that in the Malay Peninsula such trees are in secondary habitat, since grassy runways are never a feature of primary forest (F. R. Lambert *in litt.* 2000).

It has been speculated to be a valley-bottom specialist, so that its status might be particularly precarious (McGowan and Garson 1995). Beebe (1918–1922) certainly found that the species was commoner along small creeks in the lowlands, and that in the early morning birds visit waterholes of water buffalo. However, it has only been recorded in lowland (not swamp) forest in Gunung Palung (Laman *et al.* 1996), and where sympatric with Crested Fireback it avoids the latter’s preferred valley-bottom habitat (Davison 1981). Indeed there appears to be competitive exclusion between the two species such that their home ranges may or do not overlap (at least in Peninsular Malaysia), with Crested chiefly occupying riverine forest and Crestless using both riverine and hilly forest, but only if Crested is absent (Davison 1981, Davison and Scriven undated).

It has also been speculated to be a poor-quality forest specialist. Robinson and Chasen (1936) thought its habitat selection similar to that of Black Partridge *Melanoperdix nigra* (i.e. peat swamp forest among other things; see relevant account), but sometimes penetrating (and not uncommon in) second-growth jungle near small villages. In Kalimantan records in Barito Ulu were in poor-quality mixed dipterocarp forest with a high canopy and little undergrowth (Wilkinson *et al.* 1991b), and R. Sözer (verbally 1999) speculates that it might yet be found in montane heath forest, pointing out that the local name “ayam prengēt” means “heath chicken”.

Food Birds seem to feed throughout the day, in a fowl-like manner with much noisy scratching of the forest floor, albeit with silent pauses to check for danger; they often feed along animal (notably buffalo) trails, and visit waterbodies to drink early in the morning (Beebe 1918–1922). Roughly equal quantities of plant and animal material have been found in the crops of birds, with termites frequently taken, ticks and grubs less often; small hard berries were in two males (Beebe 1918–1922). In captivity birds feed readily on rice, peas and wild ants (Robinson and Chasen 1936). Group-living may in part be a response to

concentrations of invertebrates in the leaf-litter, so that groups can profit from surpluses uncovered by any one member of it (Davison 1981); this in turn implies that the species is at least part-specialised on colonial invertebrates.

Breeding The Crestless Fireback is often encountered in parties (in one case as many as 22, possibly representing several families united after breeding) with an equal distribution of sexes (Beebe 1918–1922) or usually with one adult male (Robinson and Chasen 1936), and on the latter evidence it seems likely to be polygynous (indeed, the existence of equal-sex parties does not preclude polygyny as the main sexual system), a view held also by Robinson and Chasen (1936) and Wells (1999). On the evidence below, clutch-size might be thought to range from one egg to four, but the single egg may have been the first of an incomplete clutch; Wells (1999) reported incubated clutches of 4–5 eggs, with one in captivity of six eggs.

In Peninsular Malaysia, a prolonged, possibly territorial fight between two males was witnessed in February (Wells 1999), a female was flushed off two eggs, Johor, in March, and another had four eggs, Pasoh, March, with eggs otherwise recorded in April and June (Wells 1984, 1990c). The April nest was on a strip of rising ground in swampy jungle, and consisted of an area about 0.75 m across that had been picked clean on a low anthill, under a bertam palm, with a shallow central depression holding four eggs on a few dried leaves (Chasen 1939a); three other nests were depressions in dry leaf- or twig-litter between the buttresses of forest trees or stumps (Wells 1999). A female with one young was seen in Taman Negara, September (Wells 1983).

In Borneo, two nests with two and three eggs were found in January and one with one egg in March in West Kalimantan (Coomans de Ruiter 1946b). There appears to be no record of breeding from Sumatra. In captivity a female bred at three years of age (Johnsgard 1999, Wells 1999).

THREATS *Habitat loss* *General* Level lowland non-swampy (or “dryland”) evergreen dipterocarp rainforest in the Sundaic region (Peninsular Malaysia, Borneo and Sumatra; to a lesser extent southernmost Thailand and Myanmar, and Java) is widely acknowledged to be amongst the richest, if not *the* richest, in terms of biodiversity, on the planet (Whitmore 1984, Collins *et al.* 1991 Mittermeier *et al.* 1999, Lambert and Collar in prep.), but it appears to be seriously overlooked that it is such forest *in the extreme lowlands* (below 150–200 m)—not simply below 500 m or even 1,000 m (which are sometimes used as gauges of “lowlands”)—that is the richest and most species-saturated, not just for birds but also for (at least) plants and fish (Wells 1985, 1999). Even though they may penetrate slopes above c.200 m, some species fail to breed successfully away from the flat lowlands, so that hill slopes are effectively “sinks” for them, and their presence at any elevation above 200 m is not a guide to the value of the habitat (D. R. Wells verbally 2000).

Habitat loss in this level lowland non-swampy (“peneplain”) forest proceeds in several ways. More rarely, it results from clear-cutting for timber and pulpwood, when it is commonly linked to planned clearance for food-crop production (notably rice), plantations (notably oil-palm and rubber), settlements or hydroelectric schemes (R. F. A. Grimmett *in litt.* 2000). More usually, it results from modification (disturbance) by selective logging within “production forests” (although for many of the ecologically more sensitive species this is no different from clear-cutting, since a number of niches available in pristine forest simply disappear); level lowland forest is much the most attractive to logging companies because it provides the best returns, (a) being the most accessible, hence requiring the lowest operating costs, and (b) producing the best-quality and hence most profitable timber (D. A. Holmes *in litt.* 1999). Certain technical requirements intended to mitigate the impact of selective logging are commonly ignored and, once cut over, “production forest” is highly vulnerable to (a) illegal logging, using access provided by legal enterprises, (b) illegal clearance by subsistence farmers and small investors, (c) illegal logging and illegal clearance in combination, or (d)

conversion by large investors for plantations following revised land-use planning based on economic considerations (R. F. A. Grimmett *in litt.* 2000). Indeed, such is the indifference of companies to the prospect of sustainability in this industry that, in Kalimantan, there is not a single instance where a logged forest has survived for a second cycle of timber harvesting (D. A. Holmes *in litt.* 1999). Moreover, “selective logging”, although targeting a mere 3% of trees, may in the process destroy 50% of them (Johns 1988); worse, there are reports that some logging companies in Indonesia have, at least in the past, deliberately set fire to logged areas as a far cheaper alternative to replanting them under the terms of their concession licence (F. R. Lambert *in litt.* 2000). Throughout the Sundaic region, lowland forest protected areas are threatened by both large-scale and small-scale logging interests, and by efforts to claim the land by both, particularly subsistence farmers (R. F. A. Grimmett *in litt.* 2000).

Thus the species loss over the past 20 years wrought by the intense and continuing assault on this forest by commercial and political forces, compounded by fire (see below), must now be regarded as incalculable, particularly as it has focused so strongly on extreme lowland (i.e. most accessible) areas. As many as 13 bird species—Storm’s Stork *Ciconia stormi* (Sundaic region minus Java), Wallace’s Hawk-eagle *Spizaetus nanus* (Sundaic region minus Java), Black Partridge *Melanoperdix nigra* (Sundaic region minus Java), Malaysian Peacock-pheasant *Polyplectron malacense* (Peninsular Malaysia), Bornean Peacock-pheasant *P. schleiermacheri* (Borneo only), Crestless Fireback (Sundaic region minus Java), Large Green-pigeon *Treron capellei* (Sundaic region), Short-toed Coucal *Centropus rectunguis* (Sundaic region minus Java), Sunda Nightjar *Caprimulgus concretus* (Borneo and Sumatra), Blue-banded Kingfisher *Alcedo euryzona* (Sundaic region), Blue-headed Pitta *Pitta baudi* (Borneo only), Large-billed Blue-flycatcher *Cyornis caerulatus* (Borneo only), Rueck’s Blue-flycatcher *Cyornis ruecki* (Sumatra only) and Bornean Wren-babbler *Ptilocichla leucogrammica* (Borneo only)—are confined to lowland Sundaic forest and judged to be suffering sufficiently rapid declines as a consequence of habitat loss to qualify as threatened, while three further species—Wattled Pheasant *Lobiophasis bulweri* (Borneo only), Straw-headed Bulbul *Pycnonotus zeylanicus* (Sundaic region) and Hook-billed Bulbul *Setornis criniger* (Borneo and Sumatra)—mainly occupy adjacent or associated habitats and are subject to many of the same pressures; moreover, there are as many as 82 Near Threatened lowland Sundaic forest species (see Remarks 8).

Fires In Borneo (mainly the south-east) and Sumatra, periods of drought related to ENSO cycles cause widespread evergreen leaf-fall which, when combined with high levels of dried-out detritus from timber-extraction operations, renders logged-over areas intensely vulnerable to fire, and in 1982–1983 there was a horrific conflagration that engulfed 32,000–36,000 km² of forest (Johnson 1984, Beaman *et al.* 1985, Leighton and Wirawan 1986, MacKinnon *et al.* 1996). The major fires of 1997–1998, fuelled by the uncontrolled and mismanaged expansion of palm oil and rubber plantations, and fanned both by a largely illegal logging industry bloated with over-capacity (apparently sometimes deliberately igniting areas to cover up their non-compliance over replanting: see above) and by cadres of land-hungry transmigrants and shifting cultivators (apparently sometimes deliberately igniting areas as a vendetta against protected areas, timber concessions and plantation owners), are reported to have affected 50,000 km² (*the size of Sri Lanka*) of forest on Sumatra and Borneo, damaged at least 17 of Indonesia’s parks and reserves and, following the earlier fires of 1972 and 1982–1983, accelerated the desiccation of the forest environment that renders regrowth and unburnt adjacent areas ever more vulnerable to fire and ever poorer in biodiversity (Kinnaird and O’Brien 1998, Taylor *et al.* 1999; also D. A. Holmes *in litt.* 1999, R. F. A. Grimmett *in litt.* 2000; see Remarks 9). As a consequence, half of lowland Kalimantan now lies within “hot spots” (a punning term coined to define areas of highest-intensity deforestation and highest risk of renewed conflagration) (Achard *et al.* 1998). The effects of fire on species abundance are evidently pronounced but still being evaluated; in one instance, declines of 28–63% have

been shown in three species of hornbill, a cornerstone family for forest health and regeneration (Anggraini *et al.* 2000).

Peninsular Thailand Lowland forest has almost completely disappeared, having been logged and converted to food crops, rubber and oil-palm; commercial logging has ceased, but localised small-scale illegal logging and clearance continues, and some serious fires were deliberately started in 1997–1998, primarily for land clearance (R. F. A. Grimmett *in litt.* 2000; see also next paragraph, and Threats under Gurney's Pitta *Pitta gurneyi*). (It needs to be noted that many “Sundaic” forest species, including Crestless Fireback, do not reach across the Malaysian border.)

Peninsular Malaysia In the “Thai-Malay Peninsula” (i.e. including southernmost Thailand) there is a single conservation priority, lowland rainforests, “from which must already have been lost globally important amounts of biological diversity, and upon whose fate hangs the survival of close on one half of the Peninsula's bird species” (Wells 1999); Map 5 in Wells (1999) depicts two images of the Peninsula which indicate that the great majority of remaining “dryland” forest below 150 m (in which species richness is greatest) was removed in the period 1970–1990; this is reflected in the fact that the total forest cover of Peninsular Malaysia fell from 63% in 1970 to around 43% in 1990 (Collins *et al.* 1991). Deforestation proceeded at the rate of 2,500 km² per year in the 1970s, dropping (presumably owing to depletion of accessible lowland stands) to 1,000 km² per year in the late 1980s (Collins *et al.* 1991). Most remaining lowland forest has been logged, although some important areas, particularly along the Thai border, retain substantial uncut areas; the “permanent forest estate” is relatively stable, but pressure for conversion for plantations and other activities remains (R. F. A. Grimmett *in litt.* 2000). Subang Forest Reserve must now have totally disappeared under buildings (G. W. H. Davison *in litt.* 2000).

Sabah Natural forest cover fell from 86% of the land area in 1953 to 45% in 1985 (Collins *et al.* 1991), and inevitably the vast majority of the forest lost in this 32-year period would have been in the lowlands. By 1980, all the state's productive forests had either been logged or licensed for logging (Collins *et al.* 1991). The two major lowland reserve areas in Sabah, in neither of which the Crestless Fireback has (yet) been recorded, are by no means secure: the Danum Valley Conservation Area (for which see Showler 1992), 438 km², established in 1982 to protect a population of Sumatran rhinoceros *Dicerorhinus sumatranus* within the Danum Valley, remains a long-term timber concession to the Sabah Foundation, while the Tabin Wildlife Reserve was commercially logged from the 1960s through to the early 1990s (despite being gazetted in 1984), and is consequently far from primary (Rabinowitz 1995). In the Danum area, lowland tropical rainforest totalling 2,414 km², including two forest reserves (one of them Ulu Segama, which embraces the Danum Valley Conservation Area) and about eight “virgin jungle reserves” and representing a major biological corridor between the Danum valley and the Maliau basin, has recently been approved “in a hasty and covert manner without the proper environmental impact assessments” for conversion to an *Acacia mangium* plantation with a pulp and paper mill, with co-funding from China (J. R. MacKinnon *in litt.* 2000, Malaysian Nature Society 2000; also M. Renganathan *in litt.* 2000; see Remarks 10).

Sarawak In Sarawak, dry level lowland forest is acknowledged to be the state's most threatened ecosystem (Sebastian *ms*), with 92% of the land already, or in the process of converting to, logged, secondary or non-forest condition: 48% of the land is designated (36% current, 12% proposed) as “permanent forest estate” (timber production land), 26% is “state land forest” (convertible to agriculture), 12% is “native customary rights land” (also convertible to non-forest use), 6% is urban and farmland, 2% is totally protected areas (TPA) and 6% is proposed TPA (Bennett *et al.* 1997). However, it appears that little of the 2% and less of the 6% includes lowland dipterocarp forest below the hill-foot boundary—certainly the amounts of such forest in Bako, Niah, Similajau, Gunung Gading, Kubah, Tanjung Dato, Batang Ai and Bukit Tiban National Parks are very small (Sebastian *ms*, E. L. Bennett

in litt. 2000; see Measures Proposed). “Conservatively, the total area of pristine dry lowland forest remaining in Sarawak may not exceed 200 km²... it is of particular concern that no new areas of lowland forest will be included in the proposed increase in the state’s protected areas” (Sebastian ms).

Sundaic Indonesia in general In the Indonesian sector of the Sundaic region, the process of lowland forest clearance has reached unprecedented levels (Grimmett and Sumarauw 2000, Whitten *et al.* 2001), attributable to a clutch of interrelated factors (see Remarks 11). (1) Transmigration programmes, which received major financial backing from international development assistance agencies such as the World Bank, have caused much clearance and led to high population pressure in once pristine areas, giving opportunities for poor people to establish land holdings (R. F. A. Grimmett *in litt.* 2000). (2) The breakdown in law and order throughout Indonesia following the economic and political crisis of 1997–1998 has resulted in an escalation of illegal but corruptly promoted logging and land conversion, with deliberate targeting of all remaining stands of valuable timber including those inside protected areas (D. A. Holmes *in litt.* 1999; see, e.g., Newman *et al.* 1999, 2000, McCarthy 2000). (3) A new legal framework granting greater regional autonomy within Indonesia has weakened official centralised controls over the planning and conservation of natural resources, and created opportunities for the deliberate flouting of such controls: although this new regionalisation was only due to come into force on 1 January 2001, many enterprises with no incentives to invest in environmental sustainability were behaving as if it was already in place throughout the preceding year (F. R. Lambert *in litt.* 2000). (4) Production forest has become increasingly uneconomic owing to over-exploitation, poor management and illegal logging, whereas there are high returns and investment opportunities in the pulp, oil-palm and rubber industry, with huge over-capacity in the pulp industry (R. F. A. Grimmett *in litt.* 2000; see also Lohmann 1996). As a consequence of these factors, in spite of the huge resources that have been invested in these forests over the past half-century, partly to establish the scientific basis for “sustainable” logging, partly to identify marketable non-timber forest products, but largely simply to conserve large mammals such as orang-utan *Pongo pygmaeus*, tiger *Panthera tigris*, Sumatran rhinoceros, Javan rhinoceros *Rhinoceros sondaicus* and Asiatic elephant *Elephas maximus*, Indonesia is currently subject to what has been called “a chain-saw massacre driven by poverty, lawlessness, corruption and... regional autonomy” (F. R. Lambert *in litt.* 2000) and an “illegal logging epidemic” which to date the government has been wholly ineffective in controlling (Newman *et al.* 2000).

Kalimantan Indonesian Borneo as a whole lost 90,000 km² of forest in the period 1985–1997, representing just under 25% of its 1985 total forest cover, and resulting in the prediction that, in the absence of changes in forest resource policy and management, all non-swampy or “dryland” lowland (“peneplain”) forest in the entire area of Kalimantan could be removed by the year 2010 (D. A. Holmes *in litt.* 1999, Grimmett and Sumarauw 2000, *Down to Earth* 44 [2000]: 1–5; see also Achard *et al.* 1998). Kutai National Park (from which the Crestless Fireback—unlike the majority of other threatened lowland Sundaic birds—has not been recorded) has enlisted private sector interests for ongoing management purposes so as to counteract illegal encroachment (MacKinnon *et al.* 1994, Blouch *et al.* 1998) but was badly damaged by fire in 1982–1983 (Leighton and Wirawan 1986) and almost terminally destroyed by fire, with some 711 km² lost, in 1997–1998 (Smythies and Davison 1999, T. R. Soehartono verbally 1999). Industrial-scale illegal logging within Tanjung Puting National Park was so intense in 1999 that the park chief judged the forest would be “gone” in five years (Newman *et al.* 1999, 2000). Gunung Palung National Park has been 80% hand-logged in recent years (M. J. Lammertink verbally 1999), and the effects of this and adjacent logging, combined with ENSO drought events, appear to have disrupted seed predator dispersal patterns such that no dipterocarp recruitment has occurred since 1991, boding ill for the long-term sustainability of the climax ecosystem the park is intended to preserve (Curran *et al.* 1999).

Sumatra Sumatra's richest lowland forests are wet alluvial formations, of which it originally held 15,000 km² but by 1980 held only 2,800 km² (20%), of which only 330 km² (2%) were in reserves (Whitten *et al.* 1987b); the island lost 67,000 km² of forest in the period 1985–1997, representing almost 30% of its 1985 total forest cover, resulting in the prediction that, again without policy and management changes, most peneplain forest will have disappeared by 2005 (D. A. Holmes *in litt.* 1999, Grimmett and Sumarauw 2000, *Down to Earth* 44 [2000]: 1–5; see also Achard *et al.* 1998). In Indonesia the law allows clear-cutting forest in concessions only if replanting with oil-palms is then intended, and Sumatra's forests have in particular been subject to the widespread abuse whereby companies clear-cut, bank the profit and fail to re-plant the area: only some 30% of land cleared under this law has subsequently been replanted (F. R. Lambert *in litt.* 2000). Although the Crestless Fireback remains unrecorded in the following four major Sumatran protected areas, they are important to other threatened Sundaic birds in the above list and their steady loss is a major blow to the biodiversity of the region: Gunung Leuser National Park has been subject since mid-1998 to illegal industrial-scale logging (“on a dramatic scale”: R. Buij *in litt.* 2000; “under siege”: *Down to Earth* 47: 4) of the lowland swamps in the Kluet and Singkil areas (Newman *et al.* 1999, 2000; see also Threats under Aceh Pheasant *Lophura hoogerwerfi*), Bukit Barisan Selatan National Park recently “hosted” a new settlement, apparently set up with support of local government and with plans to increase its size (M. F. Kinnaird and T. G. O'Brien *per* F. R. Lambert *in litt.* 2000), Way Kambas National Park is rapidly degenerating, with much recent clearance of trees and an invasion of people claiming the land (B. F. King verbally 1998, F. R. Lambert verbally 2000), and Berbak Wildlife Reserve burnt so badly in 1997 (Legg and Laumonier 1999) that a large hole now shows in the centre of the reserve on satellite images (F. R. Lambert *in litt.* 2000).

The transformation of continuous lowland Sundaic forests into a scattered archipelago of relatively small blocks of habitat greatly increases the vulnerability of the true primary forest species, since they have greatly reduced or entirely denied opportunities for dispersal to other areas, leaving their populations exposed to heightened risks from predictable events such as fires, local climate change, edge effects, inbreeding and, in the case of some frugivores, lean periods when non-fruiting occasionally synchronises.

Human exploitation Presumably this species suffers from hunting pressure as much as any other galliform in the Greater Sundas. On the Malay Peninsula, Beebe (1918–1922), apparently referring to group site-fidelity, observed that “even continued trapping will not drive these birds away, and a pot-hunter or trapper could easily destroy every member of a flock”; indeed, on discovering a regular roost-tree, “a native... will set scores of nooses in all the grassy runways leading to the tree”. Moreover, in Sarawak Beebe (1918–1922) reported that “the natives trap these birds whenever possible”, although this appeared to be infrequent and the species seemed relatively little known to dayak communities. There is a regular trade in live specimens out of Kuching (R. Sözer verbally 1999).

MEASURES TAKEN In 1995 this species was on CITES Appendix III for Malaysia, and enjoyed protected status in Sarawak (McGowan and Garson 1995). The only real conservation it has experienced is, however, through protected areas (in which category “forest reserves” do not fall). It was recently determined as present in 16 protected areas (albeit some of them forest reserves), of which three—Gunung Mulu National Park, Kerau Wildlife Reserve and Taman Negara National Park—are considered irreplaceably important to the long-term security of eastern Asian galliforms, and one site—Pasoh Forest Reserve (“10 km² of suitable habitat”: McGowan and Garson 1995)—is considered important for the security of this particular species (McGowan *et al.* 1999). In the account above it has also been recorded from (*Peninsular Malaysia*) Sungkai Wildlife Reserve, the tiny Templer Park (“1–2 km² of habitat”: McGowan and Garson 1995) and Endau Rompin Park (which surely may be of

huge importance to the species); (*Sarawak*) Samunsam Wildlife Sanctuary and Batang Ai National Park, and (*Kalimantan*) Tanjung Puting and Gunung Palung National Parks; somewhat curiously, it has not been recorded in Kutai National Park (Pearson 1975) and indeed is considered absent there (Smythies 1981).

The statement in Johnsgard (1999) that the species is listed for Kerinci-Seblat National Park in McGowan and Garson (1995) is in error (but see Measures Proposed); the only Sumatran protected area mentioned in the latter is Way Kambas, although the record in question has been withdrawn (see Distribution).

MEASURES PROPOSED Lowland dipterocarp forest in the Sundaic region has always been recognised as possessing a paramount biodiversity value (see Remarks 12), but it now needs the strongest possible publicity and advocacy if it is to survive with that biodiversity intact. There has perhaps been an understandable assumption by the global conservation community that this apparently massive biome would be safe for many decades, and that therefore efforts to prevent environmental degradation should be focused in other quarters, or, if action was needed within that biome, that this should target certain key Sundaic large mammals (none of which is confined below the hill-foot boundary, and all of which were believed to be at risk more from poaching than from habitat loss). However, to assume that there is no time or space to rectify the situation would be mistaken.

Identification and documentation of remaining forest areas Following the recommendations of Wells (1999) for Peninsular Malaysia, very urgent concerted effort is now needed throughout the extreme Sundaic lowlands to pinpoint all significant (perhaps >100 km²) remnants of pristine non-swampy (“dryland”) forest. Several major institutions such as CIFOR and CRISP appear to possess datasets directly relevant to such an initiative, and international, national and local NGOs are encouraged to participate in the rapid assembly of the necessary information in map form. Moreover, an inventory and map are needed of current permits for forest clearance, at least in Indonesia.

National commitment to a permanent forest estate It is vital to preserve as much and as many as possible of the remaining tracts of forest in perpetuity. Such an imperative should carry the shared endorsement and support of a broad coalition of conservation organisations, in order to bring home to the governments involved the entirely exceptional importance of this very late extension of their national and state conservation plans. The permanent forest estate should be clearly defined and mapped in both sectoral and spatial plans of district, provincial and national governments (BirdLife International in prep.). There are still many existing conservation areas in Malaysia (e.g. Endau Rompin, Belum, Danum) whose future remains unsecured, while the threats to lowland forest inside protected areas in Kalimantan and Sumatra are on a scale beyond either government or NGO capacity to counter with their present resources (R. F. A. Grimmett *in litt.* 2000): however, unequivocal commitment to their preservation is likely to improve significantly the level of participation in conservation and resource management by major external supporters.

Clear policy and firm enforcement Until the permanent forest estate has been established through incorporation into relevant plans, Indonesia should suspend the granting of any further permits to clear primary and logged forest (BirdLife International in prep.). Greater clarity in and understanding of government policies relating to forest conversion and plantations is required. Stronger, clearer and proportionately appropriate penalties (including the revocation of licences) must be imposed on corporations which fail to meet the legal requirements of their concession terms, and licence holders should be made legally responsible for the policing of their own concessions (BirdLife International in prep.).

Rigorous habitat management It should go without saying that the protected areas of the Sundaic region ought to be managed in such a way that sensitive forest species such as the Crestless Fireback (and others listed under Threats: Habitat loss: general) find permanent

sanctuary within them; this basically means that substantial core areas of forest need to be left intact to ensure that they retain the maximum levels of species richness universally attributed to climax pristine rainforest. Meanwhile, timber-producing forest in the Greater Sundas is in urgent need of management under an entirely new regime which recognises the paramount importance of, and fully allows for, truly sustainable usage (see, by way of convergent commentary, Jepson 2001). The concept of forest management units—involving very large areas under very long concessions (99 years) and carefully zoned regimes—needs broad promotion and practical support (G. W. H. Davison *in litt.* 1998); the conservation community must devote much more time and energy to ensuring sustainability in this sector than hitherto, particularly given its failure to recognise the diminishing profitability (especially in Indonesia) of production forests, and must also address other sectors of the regional economy that are driving alternative uses of forested land, notably the oil-palm and rubber but also pulp and paper industries (R. F. A. Grimmett *in litt.* 2000).

Species-specific research Extensive surveys were called for in 1995 to determine the present range of both subspecies of Crestless Fireback, with particular regard to defining the elevational limits and hence the amount of suitable habitat available in existing reserves; “any new sites found should be considered for protection” (McGowan and Garson 1995). In Sarawak virtually all the 69 km² of Lambir National Park, and 25% of the 60 km² Samunsam Wildlife Sanctuary, are composed of lowland “dryland” dipterocarp forest (E. L. Bennett *in litt.* 2000) and both should be surveyed for this species and, indeed, the other threatened and Near Threatened Bornean species mentioned in this account; new work to quantify the status and needs of the species in Gunung Mulu National Park is also important. In Sumatra research is needed in the east and in lowland areas within Kerinci-Seblat National Park, as there are local reports of a pheasant there which might be this species (F. Verbelen *in litt.* 1999). The ecology of the Crestless Fireback needs to be clarified through studies of population density, breeding success, feeding patterns, dispersal and survival in a number of carefully evaluated primary and secondary habitats, with particular emphasis on its separation from congeners (building on the work in Davison 1981). The results of this work will allow for improved reserve design and habitat management in all future efforts to secure viable populations of the species. A call for a dedicated programme of research into galliform resource partitioning on Borneo is made under Bornean Peacock-pheasant.

REMARKS (1) The subspecies on Borneo, named *pyronota*, is sufficiently distinctive in plumage to merit full species status. The male of this form raises its breast feathers in display, a feature absent from the displays of the mainland and Sumatran form (R. Olsen *per* R. Sözer verbally 1999). Splitting the species would, of course, result in two species each with a higher overall probability of extinction.

(2) Gore (1968) judged that this species would probably prove to be resident in Sabah “though as yet there is no confirmed record”, unaware of this AMNH specimen.

(3) This record is treated as provisional as there appear to be no others from this very well-watched area.

(4) This record has been omitted from recent reviews (Smythies and Davison 1999, Sheldon *et al.* *in press*); given that the paper in question also contains a record of Silvery Wood-pigeon *Columba argentina* (see relevant account) in the same reserve, which must reflect an error in identification, this caution appears judicious. Moreover, G. W. H. Davison (*in litt.* 2000) adds that this reserve was used by the Game Branch of the Sabah Forestry Department for the release of confiscated wildlife in the 1960s and 1970s, which means that the identification may have been correct but that the provenance of the bird was unnatural.

(5) It appeared that this record might have been based on a mistaken record by Holmes (1969), which was corrected by Mann (1991). However, G. W. H. Davison (*in litt.* 2000) has

clarified that it is based on a juvenile specimen in the Brunei Museum whose identity has been uncertain, but which is apparently Crestless Fireback.

(6) RMNH possesses two undated specimens from “Sungai Kapuas”. There are two major rivers of this name, however, one in Central Kalimantan west of Palangkaraya, and one in West Kalimantan south of Pontianak. Given that there are other records from around Pontianak, and that this is much the bigger river, the West Kalimantan Sungai Kapuas seems likely to be the site involved in these records. This consideration extends to records of several other threatened species.

(7) The comment about the birds occurring “in cultivation” appears unsupported, but was presumably intended to qualify the description of “forest edge”, i.e. birds may stray short distances out of forest into plantations.

(8) Accepting that some species reach elevations of up to 1,000 m and that some occur on West Sumatran islands (in one case, also the Andaman Islands), the Near Threatened bird species of the Sundaic forest lowlands are: White-fronted Falconet *Microhierax latifrons*, Long-billed Partridge *Rhizothera longirostris*, Ferruginous Partridge *Caloperdix oclea*, Crested Partridge *Rollulus rouloul*, Crested Fireback *Lophura ignita*, Crested Argus *Argusianus argus*, Cinnamon-headed Green-pigeon *Treron fulvicollis*, Jambu Fruit-dove *Ptilinopus jambu*, Yellow-throated Hanging-parrot *Loriculus pusillus*, Long-tailed Parakeet *Psittacula longicauda*, Moustached Hawk-cuckoo *Cuculus vagans*, Black-bellied Malkoha *Phaenicophaeus diardi*, Chestnut-bellied Malkoha *P. sumatranus*, Bornean Ground-cuckoo *Carpococcyx radiatus*, Enggano Scops-owl *Otus enganensis*, Reddish Scops-owl *O. rufescens*, Simeulue Scops-owl *O. umbra*, Mentawai Scops-owl *O. mentawi*, Large Frogmouth *Batrachostomus auritus*, Gould’s Frogmouth *B. stellatus*, Red-naped Trogon *Harpactes kasumba*, Diard’s Trogon *H. diardii*, Cinnamon-rumped Trogon *H. orrhophaeus*, Scarlet-rumped Trogon *H. duvaucelii*, Rufous-collared Kingfisher *Actenoides concretus*, Black Hornbill *Anthracoceros malayanus*, Rhinoceros Hornbill *Buceros rhinoceros*, Helmeted Hornbill *Rhinoplax vigil*, White-crowned Hornbill *Aceros comatus*, Sunda Wrinkled Hornbill *A. corrugatus*, Red-crowned Barbet *Megalaima rafflesii*, Red-throated Barbet *M. mystacophanos*, Black-banded Barbet *M. javensis*, Yellow-crowned Barbet *M. henricii*, Malaysian Honeyguide *Indicator archipelagicus*, Olive-backed Woodpecker *Dinopium rafflesii*, Buff-necked Woodpecker *Meiglyptes tukki*, Black-and-yellow Broadbill *Eurylaimus ochromalus*, Green Broadbill *Calptomena viridis*, Hose’s Broadbill *C. hosii*, Giant Pitta *Pitta caerulea*, Garnet Pitta *P. granatina*, Fiery Minivet *Pericrocotus igneus*, Black-and-white Bulbul *Pycnonotus melanoleucus*, Scaly-breasted Bulbul *P. squamatus*, Grey-bellied Bulbul *P. cyaniventris*, Puff-backed Bulbul *P. eutilotus*, Finsch’s Bulbul *Alophoixus finschii*, Buff-vented Bulbul *Iole olivacea*, Streaked Bulbul *Ixos malaccensis*, Lesser Green Leafbird *Chloropsis cyanopogon*, Green Iora *Aegithina viridissima*, Bornean Bristlehead *Pityriasis gymnocephala*, Rufous-tailed Shama *Trichixos pyrropyga*, Chestnut-naped Forktail *Enicurus ruficapillus*, Rail-babbler *Eupetes macrocerus*, White-chested Babbler *Trichastoma rostratum*, Short-tailed Babbler *Malacocincla malaccensis*, Sooty-capped Babbler *Malacopteron affine*, Rufous-crowned Babbler *M. magnum*, Grey-breasted Babbler *M. albogulare*, Striped Wren-babbler *Kenopia striata*, Large Wren-babbler *Napothera macrodactyla*, Black-throated Wren-babbler *N. atrigularis*, White-breasted Babbler *Stachyris grammiceps*, White-necked Babbler *S. leucotis*, Black-throated Babbler *S. nigricollis*, Chestnut-rumped Babbler *S. maculata*, Fluffy-backed Tit-babbler *Macronous pilosus*, Brown Fulvetta *Alcippe brunneicauda*, Maroon-breasted Philentoma *Philentoma velatum*, Grey-chested Jungle-flycatcher *Rhinomyias umbratilis*, Rufous-chested Flycatcher *Ficedula dumetoria*, Malaysian Blue-flycatcher *Cyornis turcosus*, Scarlet-breasted Flowerpecker *Prionochilus thoracicus*, Brown-backed Flowerpecker *Dicaeum everetti*, Red-throated Sunbird *Antheptes rhodolaema*, Javan White-eye *Zosterops flavus*, Dark-throated Oriole *Oriolus xanthonotus*, Sumatran Drongo *Dicrurus sumatranus*, Crested Jay *Platylophus galericulatus* and Black Magpie *Platysmurus leucopterus*.

(9) Although Indonesia's Ministry of Environment estimated a total forest loss of 3,812 km² in these fires, CRISP, based in Singapore, put the figure at 45,600 km² (BirdLife International in prep.), and this latter statistic has been generally rounded up to 50,000 km².

(10) Failure of this project is predicted for three reasons: (i) fire, (ii) elephants, and (iii) inappropriate topography. (i) The only previous large-scale plantation of *Acacia mangium* in Sabah was destroyed by fire, and the new plantation will prove no less highly flammable, such that a future ENSO-related drought will lead to the damage and destruction by fire of the remaining forest area (F. R. Lambert *in litt.* 2000, J. R. MacKinnon *in litt.* 2000). (ii) There are 600 Asian elephants *Elephas maximus* in the area slated for conversion, and this species is known to eat the bark of *Acacia mangium*, so that huge damage to the plantations will be caused (and shooting the elephants would produce an international outcry) (J. R. MacKinnon *in litt.* 2000). (iii) Although mean gradients appear moderate, the entire area is crenillated with streambeds and ridges so that many slopes are too steep for safe or legal plantation forestry (J. R. MacKinnon *in litt.* 2000). However, in any case, the real case for cancelling this initiative and preserving the area as primary forest is that it represents biologically the richest area in all Borneo, and as such one of two or three of the richest areas on the entire planet (J. R. MacKinnon *in litt.* 2000).

(11) The underlying causes of forest loss in Indonesia have been grouped under the following headings: (a) government policy and plans for conversion of forest to plantations, (b) government policies and procedures in relation to logging of natural forest, (c) lack of clear land tenure laws, (d) extension of agriculture into forest areas, (e) droughts and extreme weather phenomena, and (f) illegal logging (BirdLife International in prep.).

(12) It is, moreover, important to recognise that although the Sundaic or West Malaysian region is clearly identifiable by the species it holds in common, the Thai-Malay Peninsula, Borneo and Sumatra each have distinct faunal and floral components, so that each of these three main entities of the region needs to be surveyed, prescribed and treated semi-independently.