GREEN PEAFOWL

Pavo muticus

Critical □ —
Endangered □ —
Vulnerable ■ A1c,d; A2c,d; C1; C2a

This majestic species has a small, rapidly declining and severely fragmented population, primarily owing to high hunting levels, although more locally it has suffered a reduction in the extent and quality of its habitat. Rapid decline and further fragmentation are projected to continue. These factors qualify it as Vulnerable.

DISTRIBUTION Historically the Green Peafowl (see Remarks 1) was distributed widely from north-east India to southern China, Myanmar, Thailand, Laos, Vietnam and Cambodia, with further populations in Peninsular Malaysia and Indonesia (Java). It persists in all these countries except Malaysia and Bangladesh, but has certainly declined rapidly and now only occurs in fragmented, greatly reduced populations.

■ ***CHINA*** The Green Peafowl is currently found in Yunnan province, where it occurs in a total of 31 counties, and there are recent reports from two counties in south-eastern Tibet (Xu Yangong *et al.* 1998, but see Remarks 2). It used to be more widely distributed in southern China, and there are historical records from Zhejiang, Hubei, Sichuan, Yunnan, Guanxi and Guangdong provinces, and from the south-east Qinling mountains (presumably in Shaanxi province), and it was frequently mentioned in Chinese historical literature (He Yeheng 1994). Records are from:

■ ***Tibet*** **Dingba Qu** river valley, Medog county, "very rare", undated, in river valleys below 2,000 m (Yin Binggao and Liu Wulin 1993); **Kamen He** river valley, Cona county, "very rare", undated, in open areas in river valley below 2,000 m (Yin Binggao and Liu Wulin 1993) (a bird kept at the Rumtek Monastery in Sikkim, India, until the 1990s had apparently been trapped in Tibet: McGowan *et al.* 1999);

■ ***Yunnan*** (records arranged by county, with individual localities emboldened) Duosong village, Xiaruo township, Zhiba river, **Deqen county**, one collected, 2,200 m, March 1986, although local people reported never having seen the species before (Yang Xiaojun *et al.* 1997); Yongren county, seven seen at **Zhonghe** township and "a few" at **Zhiju**, winter 1988 (Wen Xianji *et al.* 1995), but the natural habitats in this area are in poor condition and it may only be marginal for Green Peafowl (Yang Lan verbally 1997); Lushui county, two immatures collected at **Liuku** in 1959 (Cheng Tso-hsin *et al.* 1962), several seen at lower altitudes by the Nu Jiang river in February 1974, in farmland (Ornithological Division, Kunming Institute of Zoology 1980), none in 1991 (Yang Lan *in litt.* 1997; see Threats); **Yao'an county**, "a small number" at Qianchang and Dahekou townships (both untraced), 1988–1991 (Wen Xianji *et al.* 1995, Xu Congde 1995); **Weishan county**, c.30 estimated in Qinghua (Beiyinqing Green Peafowl) Nature Reserve (established for this species in 1988) (untraced) (Wang Weimin *per* Yang Lan *in litt.* 1997, also Liu Donglai *et al.* 1996, MacKinnon *et al.* 1996, Wang Zijiang *per* Yang Lan *in litt.* 1997); **Nanhua county**, two captured at Xuying township (untraced) in 1992, "rare" at Dazhongshan, Majie and Tujie, recently (Wen Xianji *et al.* 1995); **Lufeng county**, four seen in Luochuan district, Luoping township (untraced), December 1988 (Wei Tianhao 1990), "a small number" occurring in the forests on Panglong Shan (untraced) in recent years (Wen Xianji *et al.* 1995); **Tengchong county**, undated (Cheng Tso-hsin 1987), but there is no evidence that it still occurs there (Yang Lan verbally 1996);

Changning county, 10–20 seen in seven or eight flocks at Xigui (untraced), near Wandian and Gengga townships, in 1990, the estimated population in the area being 30–40 (Wen Xianji *et al.* 1995); Chuxiong city, eggs collected by farmers at **Zhongyishe** in 1986, and forestry officials reporting that local people had collected at least 10 poisoned Green Peafowl at Xicha village, Xincun township in March 1991, five at Qianjin township, September 1992, three at Zixishan, Qianjin township, 1993, with small numbers reported from Donghua township and a forest at Zhangmuqing (untraced), both in Cangling town (undated), tail feathers found in farmers' houses at Zixishan Forestry Station, recently (Wen Xianji *et al.* 1995), and the population in the area being estimated at 50–80 (Yang Lan *in litt.* 1997); **Yingjiang county**, calls reportedly heard at Bangba Forestry Station (untraced) in 1989, but no subsequent records (Wen Xianji *et al.* 1995, Yang Lan *in litt.* 1997; see Threats); Shuangbai county, one captured at Taihejiang Forestry Station (untraced) in 1986, four seen at **Ejia** township in 1987 and five in 1989, with calls heard at Daizhuang township (untraced) prior to 1990 but seldom since, up to nine seen between 1990 and 1993 in **Ainishan** township (including the forest at Xiabazu village), 20–30 in 1992–1993 in **Tuodian** township and some at Dutian township (untraced), recently (Wen Xianji *et al.* 1995), the estimated population in this area being 150–250 birds, the largest in Yunnan (Yang Lan *in litt.* 1997); **Longling county**, one collected at Mengxing (untraced) in 1990, with calls still occasionally heard, the estimated population at Longjiang (untraced) being 10–20 birds (Wen Xianji *et al.* 1995); Jingdong county, four by the Xiaogan river, on the border of Wenlong (untraced) and **Jinping** townships, in 1990, present in the forest near Huiyao village in Jinping township in April 1993, 3–5 seen at the border of **Wenjing** and **Zhehou** townships, recently (Wen Xianji *et al.* 1995), c.20 in three groups on riverbanks at Lengwo (untraced) and Huiyao in Jinping township in March and April 1996 (Yang Xiaojun *per* Yang Lan *in litt.* 1997), present in **Wuliang Shan Nature Reserve** and at the edges of **Ailaoshan National Nature Reserve**, the estimated population in the area being 30–40 birds (Yang Lan *in litt.* 1997, also Liu Donglai *et al.* 1996, MacKinnon *et al.* 1996); Yunxian county, 2–3 at Lishu township (untraced) in 1988, attempted hunting at **Xingfu** township in 1990, one collected at **Maolan** township in 1991, calls recorded from Xiaojie township (untraced) in 1991, a "small number" occurring in Dashi township (untraced) recently and the estimated population in the area being 15–30 birds (Wen Xianji *et al.* 1995); **Mile county**, "occasionally found" recently in the mountains by the Nanpan river in Xunjiansi township (Yang Xiaojun *et al.* 1997); Longchuan county, 16 in the Longchuan river valley in early 1986, up to seven birds, 1989–1993, Chengguan township (untraced), 30–40 in January 1990 and evidence of presence in c.1993, **Qingping** township, three in January 1991 at **Tongbiguan Nature Reserve**, while 6–7 "can still be seen" at **Husa** township near the (China/Myanmar) border mark number 40, and "a small number" were found recently at **Nongba** township (Wen Xianji *et al.* 1995), the estimated population in the area being 70–90 birds (Yang Lan *in litt.* 1997); Fengqing county, one at **Yingpan** in 1984, with an injured bird captured at Jinji township (untraced) in May 1987, and the estimated population in the area being 5–10 birds (Wei Tianhao 1990); **Zhefang** farm, Luxi county, adult captured and two eggs collected, May 1989 (Wei Tianhao 1990), an important agricultural area where disturbance is high and peafowl numbers probably low (Yang Lan *in litt.* 1997); Xinping county, 5–6 at **Zhelong** in 1989, two pairs seen at **Shuitang** in 1990, one collected at Yani (untraced) in 1991, seven seen at **Laochang** in 1991, "small numbers" at Yaojie recently (Wen Xianji *et al.* 1995), calls heard by the Yuan Jiang river at Shuitang township in March 1993, and the estimated population in the area being 40–60 birds (Yang Lan *in litt.* 1997); Yongde county, c.20 seen in 1983–1984 and one in 1987 at **Yongkang** township, 3–4 in 1986–1991 in **Daxue Shan Nature Reserve**, five chicks in 1988 at Bangkong township (untraced), "small numbers" recently at Chonggang (untraced) and **Xiaomengtong**, the estimated population in the county being 30–50 birds (Wen Xianji *et al.* 1995); **Ruili county**, eggs collected in 1990 and evidence of persistence found c.1993 at Jiele (untraced), "a small number" still present in Tongbiguan Nature Reserve

at Duxiu and Nongdao townships, the estimated population in the area being 40–50 birds (Wen Xianji *et al.* 1995, also Liu Donglai *et al.* 1996); Zhenkang county, collected at Zhang Long (Chang Lung), Salwin river, 600 m, March 1917 (female in AMNH, Rothschild 1926), 20+ at **Mengsa** in 1975, "small numbers" recently at Junnong (untraced), Mengdui (untraced) and **Mengbang** (Wen Xianji *et al.* 1995); Shiping county, fewer than five recently at **Baoxiu** township, some possibly still occurring at **Longpeng** and **Longwu** townships (Yang Xiaojun *et al.* 1997); **Zhenyuan county**, 1950–1965, but no subsequent information (Yang Lan *in litt.* 1997); Lincang county, 15–20 recently estimated at Bangdong (untraced) and **Pingcun**, with records at **Matai**, Nazhao (untraced), **Quannei**, Zhangtuo (untraced) and **Mayidui** prior to 1987 but not since (Wen Xianji *et al.* 1995); **Jianshui county**, c.20 recently estimated at Guanting and Qinglong (at Laolidong) (both untraced), fewer than five recently at Potou (at Zhala) (untraced), c.10–15 recently at Panjiang (untraced), still present at Limin (untraced) but in unknown numbers (Yang Xiaojun *et al.* 1997); **Gengma county**, several near Nanding river, April–May 1964 (Yang Lan *in litt.* 1997), "small numbers" reported in 1991 at Hukeng village (untraced), Mengsa township (Wen Xianji *et al.* 1995); Mojiang county, one collected at **Tuantian** in 1988, one seen at **Longtan** (Longba) in 1992, present at **Tongguan** in October 1992, one captured at **Xinfu** in February 1993 (Wen Xianji *et al.* 1995); **Shuangjiang county**, "small numbers" recently by the Lancang river (upper Mekong river) at Dawei (untraced) (Wen Xianji *et al.* 1995); Jinggu county, 1–2 seen in 1989 at **Minle**, one collected in 1990 at **Mengban**, c.20 recently estimated along the **Weiyuan river** at Bi'an and Yizhi (both untraced), "small numbers" recently by the Weiyuan river at Fengshan (untraced) (Wen Xianji *et al.* 1995), reported recently from Weiyuan Jing Nature Reserve (Liu Donglai *et al.* 1996); **Mengzi county**, one obtained at Mengzi in 1956 but now extinct in south-eastern Yunnan, including this county (Yang Lan *in litt.* 1997); Cangyuan county, 3–4 in 1990 and two in March 1991 at Manhui (untraced), 3–4 in 1991 and one in March 1992 at Menglai (untraced), two in November 1991 at Nanla (untraced), five in 1992 in **Nangunhe Nature Reserve**, the estimated population in the county being 20–30 birds (Wen Xianji *et al.* 1995; also Liu Donglai *et al.* 1996); **Pu'er county**, 13–15 in February 1993 at Dehua (untraced) (Yang Lan *in litt.* 1997), with one at Cigutang, Huangtian village, Dehua, in April 1993 (Yang Xiaojun *per* Yang Lan *in litt.* 1997), two seen in 1988 at Mengxian (untraced), plus two and three in 1992 at Fengyang (untraced) (Wen Xianji *et al.* 1995); **Simao county**, 1959, but not since the mid-1980s (Yang Lan *in litt.* 1997), although reported from Laiyang He Nature Reserve (Liu Donglai *et al.* 1996); Jinghong county, one in May 1992 at **Zhengnuo**, some still present at **Mengyang** and Jinuo (Youleshan) (untraced) (Wen Xianji *et al.* 1995); Menghai county, 1959 by the Liusha river at Mengsong (untraced) and Nan'a river at **Meng'a** (but extinct there by 1974: see Threats), reported in Mangao Nature Reserve (untraced) in 1990 (Wen Xianji *et al.* 1995); **Mengla county**, recorded recently at Xiangming township (untraced), some still present in Xishuangbanna National Nature Reserve (Wen Xianji *et al.* 1995, also Liu Donglai *et al.* 1996).

■ ***INDIA*** The Green Peafowl is restricted to the far north-eastern states where its range is small and declining. The few records are from:

■ ***Manipur*** extreme north of the **Manipur valley**, a pair, January 1928 (Higgins 1933–1934); along the Myanmar border and in **Churachandpur district**, c.1990 (Choudhury 1992a).

Unconfirmed or unspecific records are from the Diana river, Jalpaiguri, West Bengal, one adult male, 1952, presumably an escape or a descendant of escapes (Daniel 1957), although records exist for south-east Tibet (see Remarks 2); North Cachar, eggs and adults recorded, 1888 (Baker 1894–1901, see Remarks 3).

■ ***BANGLADESH*** The species apparently occurs, or at least once occurred, only in the Chittagong Hill Tracts (McClelland 1842, Karim undated, Khan 1982) and perhaps also in the Chittagong lowlands (Rashid 1967). Indeed it possibly ranged as far north as Sylhet (Sarker 1986a). Recent evidence suggests, however, that it is extinct in the country (Husain

1985, 1989, P. M. Thompson *in litt*. 1997), although it apparently bred in Chittagong between 1968 and 1974 (Sarker 1987a, also Harvey 1990). The single confirmed record is from: **Garjania** (see Remarks 4), Chittagong Hill Tracts, undated (Baker 1921–1930).

■ ***MYANMAR*** It once occurred throughout Myanmar (Oates 1883), being found as far north as the Hukawng valley and up the N'Mai valley to Chipwi (Stanford and Ticehurst 1938–1939). Although there are few specific recent records, captive birds are apparently still taken regularly from Pegu (Bago) state and Yangon (Rangoon) state (see Remarks 5), and these areas might still harbour significant populations. Records are from: **Hukawng valley**, undated (Stanford and Ticehurst 1938–1939, Smythies 1986), and still present, 1990s (U Thein Aung verbally 2000); **Kachin hills**, undated (Couchman 1893); along the N'Mai valley, as far north as **Chipwi**, undated (Stanford and Ticehurst 1938–1939, also Smythies 1986); **Kaunghein**, west bank of Chindwin river, March 1935 (Mayr 1938, male in AMNH); **Pidaung Sanctuary**, over a dozen, December, year unpecified, and apparently tame and common in the reserve (Stanford and Ticehurst 1938–1939), undated (Tun Yin 1954), still present early 1980s (Salter 1983); **Talawgyi**, common along watercourses of the surrounding plain, c.1890 (Couchman 1893); above **Homalin**, Chindwin, undated (Hopwood 1908); **Bhamo**, frequently recorded, c.1908 (Harington 1909a, 1909–1910); **Upper Chindwin**, undated (Harington 1909a); north of **Thabyebin**, Katha district, "plentiful along the right bank of the we-in chaung", March 1927 (Smith 1942); **Yuwa**, undated (Hopwood 1908); also near **Mohlaing**, and Langu-sakan, near the Bhamo district boundary, "particularly plentiful", 1925 (Smith 1942); Kyauko, east of **Tagaung**, Katha district, noted, May 1927 (Smith 1942); below **Mabein**, and round Sipein, Singan and Sinpi, on the Shweli river, Mongmit state, "plentiful", 1925 (Smith 1942); **Ingade**, one male, 1936 (Smith 1942); **Bandi**, noted, 1935 (Smith 1942); **Maymyo**, 1,050 m, April 1910 (Harington 1911c), and at the Maymyo Reserve, a covey of six encountered near "Peacock ride", 1935 (Smith 1942); **Maubin**, "common", "where the track from Egangwe meets the Talaing chaung–Kokkoaing track", January 1936 and 1937 (Smith 1942); **Thabyegyin**, on the Nansein chaung, May 1927 (Smith 1942); unspecified localities in the **Southern Shan States**, locally common, 1898–1901 (Rippon 1901), and the Shan hills, undated (Wickham 1929–1930); **Kule**, noted, 1935 (Smith 1942); **Monnyin**, on the Mon river, Minbu district, two covies of about six each, January 1930 (Smith 1942); **Magwe**, April 1906 (NMS egg data); **Payadaung**, west of Tetshein, Yamethin district, heard calling, November 1938 (Smith 1942); **Nattaung**, noted, 1935 (Smith 1942); **Kayinlegyin**, Yomas, Toungoo district, coveys seen, November 1939 (Smith 1942); **Gwethi Reserve**, on the left bank of the Swedawya chaung, Karen foothills, Toungoo district, January 1941 (Smith 1942); **Kyundawzu**, Toungoo district, calls heard, December 1939 (Smith 1942); **North Nawin Reserved Forest** (North Nawing Nullah), c.16 km west of the main ridge of Pegu yoma, undated (Hume 1875); **Paukkaung** (Pank Kaung), Pye (=Prome) district, undated (Abdulali 1968–1996), and the road between Pye and Paukkaung, Pegu state, undated (U Aye Hlaing *per* Khin Ma Ma Thwin *in litt*. 1997); south-west of **Chaunggwa**, Pegu yoma, calling, February 1939 (Smith 1942); **Myohla**, undated (Hume 1875); **Padaung** township, Pegu state, undated (U Aye Hlaing *per* Khin Ma Ma Thwin *in litt*. 1997); Arakan, undated (Blyth 1875), including **Sandoway district**, undated (Hopwood 1912b); **Paungde** ("Poungday"), Tharawaddy, undated (Hume 1875); **Sabyin**, Tonkan Reserve, Toungoo district, calls heard, February 1941 (Smith 1942); **Papun** (Pahpoon), January 1874 (two females in BMNH); **Shwegyin**, Pegu state, "noted", 1935 (Smith 1942); **Henzada**, reportedly "very plentiful", around 1930 (Stanford and Ticehurst 1935a); **Taikkyi** township, Yangon state, undated (Stanford and Ticehurst 1935b), undated but presumably 1990s (U Aye Hlaing *per* Khin Ma Ma Thwin *in litt*. 1997); **Thaton district**, "many birds along the banks of the Donthami chaung", September 1927 (Smith 1942); **Insein**, April 1906 (single-egg clutch in NMS), rare around 1930 occurring as far south as Taikkyi (Stanford and Ticehurst 1935a); **Wimpong**, January 1877 (two specimens in BMNH); **Myawadi**

(on the Thaunggyun [=Thoungyeen] river), noted, 1935 (Smith 1942); **Kawkarieka**, December 1923 (male in AMNH); **Ataran valley**, 1879–1880 (Bingham 1880a); Salween district, January 1874 (three males in BMNH), presumably along the lower reaches of the Thalwin or **Salween river**, and at Chong Lung, along the Salween at 600 m, March 1917 (female in AMNH); **Hmawbi** township, Yangon state, undated (U Aye Hlaing *per* Khin Ma Ma Thwin *in litt*. 1997); **Tavoy** (=Dawe), Tenasserim (Taninthayi), three, undated (Hume and Davison 1878), February 1919 (single-egg clutch in NMS); **Yabu**, on the Tavoy river, "fairly common in dry forest", 1925 (Smith 1942); near **Mergui** (=Myeik), Tenasserim, undated (Hume and Davison 1878); near Bahonee, **Pakchan**, Tenasserim, undated (Hume and Davison 1878).

The following localities are untraced, sometimes because too many possible candidates exist: Duyindabo Police Thannah, undated (Hume 1875); Nonge, noted, 1935 (Smith 1942); Nyaungbintha, noted, 1935 (Smith 1942); Pya, one, 1936 (Smith 1942); Satpya-gyin, Katha district, May 1927 (Smith 1942); Sedaw, noted, 1935 (Smith 1942); Yeshin, noted, 1935 (Smith 1942). An unconfirmed record is from between Pauk and Tilin, Magwe state, one male reported, 1994 or 1995 (King *et al*. 1996).

■ ***THAILAND*** The race *imperator* occurs in lowland forests in the northern and eastern plateaus and the western and peninsular provinces south to Prachuap Khirikhan, while the race *muticus* is distributed in lowland forests of the peninsular provinces from the Isthmus of Kra to the extreme south (Deignan 1963). The species was evidently widespread in peninsular and lower Thailand in the 1920s (Robinson and Kloss 1921–1924) but it has almost certainly disappeared from these regions. Norapuck (1986) reported a female *P. m. muticus* with chick at Kien-za, Surattani Province, c.1983, but this has not been confirmed. Records are from: **Chiang Saen**, on the Mekong, 1914 (Gyldenstolpe 1916, Deignan 1945), February 1933 (Meyer de Schauensee 1934); **Doi Chiang Dao Wildlife Sanctuary** (Doi Luang Chiang Dao), common in the 1930s, with a specimen collected at 450 m, December 1931 or January 1932 (female in FMNH, Deignan 1945), and east of Doi Chiang Dao, on the Mae Ping, many in December 1931–January 1932 (Deignan 1945), Huai Hong Khrai Royal Development Study Centre, **Doi Saket district**, Chiang Mai province, about 80 birds, November 1999, a population increasing from near-vanishing point due to abandonment of farmland, regeneration of secondary forest, reduced hunting and improved protection (Kanjanavanit 2000; but see Population); Wiang Loh Wildlife Sanctuary (untraced), Jun district, and Doi Phu Nang National Park, both in Phayao province, and **Mae Yom National Park**, Phrae province, reported in March 1996 (*Oriental Bird Club Bull.* 24 [1996]: 59–65), up to 200 occurring in a more or less contiguous population among these three protected areas, December 1999 (Wina Meckvichai verbally to P. D. Round 2000); **Doi Inthanon National Park**, reliably reported to occur in dry forests (e.g. around present-day km 13–18), undated (Deignan 1945); **Khun Tan** (presumably in or around current day Khun Tan National Park), two males collected, 1915 (Deignan 1945); **Salawin Wildlife Sanctuary**, reported recently (B. Stewart-Cox verbally *per* P. D. Round *in litt*. 1998); **Chom Thong district**, Chiang Mai province, March 1999 (Wina Meckvichai *per* P. D. Round *in litt*. 2000); **Den Chai**, heard, c.1912 (Gyldenstolpe 1913; also Deignan 1945); and along the Ping river a flock near **Ban Mut Ka**, December 1935 (Deignan 1945), Sri Nan National Park, Mae Jarim National Park and Mae Jarim Wildlife Sanctuary (Nan and Uttaradit provinces), presumably around **Nam Jarim**, an estimated population of less than 100, December 1999 (Wina Meckvichai per P. D. Round *in litt*. 2000); **Li district**, Lamphun (Lampang) province, a few birds present, March 1999 (Wina Meckvichai per P. D. Round *in litt*. 2000); **Pak Pan**, heard, c.1912 (Gyldenstolpe 1913; also Deignan 1945); along the Ping river "quite common" at Wang Pra-thart, between **Kamphaeng Phet** and Nakhon Sawan, 1949, with a nest found in January (Madoc 1950, ms); **Ban Salak Phra** (Salak Phra Wildlife Sanctuary), one reported by rangers, 1975–1977 (Wiles 1980); 64 km east of **Umphang**, Mae Wong district, unspecified numbers, at least three individuals collected (specimens in AMNH), 300 m, February 1924

(Lowe 1933); **Huai Kha Khaeng Wildlife Sanctuary**, along the Huai Kha Khaeng river and its major tributaries Huai Ai Yo and Huai Mae Di in the heart of the sanctuary, south perhaps as far as the northern boundary of the Srinakaraind reservoir with post-1991 evidence of recolonisation of the Huai Thap Salao stream system on the eastern boundary of Huai Kha Khaeng as settlers have been relocated outside the sanctuary (Stewart-Cox 1996, 1997), plus several heard and three seen at Khao Bandai, April 1986, on the Huay Kha Kaeng river (D. Ogle *in litt*. 1986); **Thung Yai Naresuan Wildlife Sanctuary**, a few individuals reported, unspecified dates (Phumpakapun and Kutintara 1983); Chong Bat Lak, **Srisaket province**, close to the Cambodia border, droppings and tracks found, but thought to be uncommon, undated (Enderlein 1976); **Non Luam** (Non Luum), "some", c.1912 (Gyldenstolpe 1913); **Huey Sak**, February 1917 (two specimens in BMNH); **Ban Kok Klap**, 2–3 shot, June and July 1913 (Robinson 1915a); **Lawa cave**, unspecified numbers heard, February 1962 (Johnsen 1966); **Ban Nakloea** (Naklua), Trang, March 1899 (Riley 1938), and elsewhere in Trang province at Kok Sai, January 1899 (Riley 1938) with three collected at unspecified localities in interior Trang, 1910 (Robinson and Kloss 1910–1911), and (presumably the same) Ko Khau, January 1910 (specimens in ZRCNUS; also Morioka and Yang 1996); Jalor (archaic term for Yala), at Kuala Mabek, Pattani, this evidently being near **Ban Yaha**, July 1901 (two males in BMNH); Nong Kok (not mapped), Krabi (Ghirbi), three males shot in January 1918 (specimens in ZRCNUS, Robinson and Kloss 1918b; also Morioka and Yang 1996), mistakenly treated as "evidently a slip of the pen" by Riley (1938), on the grounds that Robinson and Kloss (1921–1924) did not mention the record. More recently an elderly villager reported that peafowl were present around 1945 around Bang Tieo, Khlong Thom district, Krabi province (P. D. Round *in litt*. 1998). The species has been reported since 1980 from Phu Khieo Wildlife Sanctuary and Sai Yok National Park but reliable details are lacking (P. D. Round *in litt*. 1998). A single bird at Bung Kroeng Non-Hunting Area in 1986–1987 (*Oriental Bird Club Bull.* 5 [1987]: 33–36) was a single individual thought to have been displaced by the construction and inundation of the Khao Laem dam in the mid- to late 1980s (P. D. Round *in litt*. 1998).

■ ***LAOS*** Originally common and widespread in the country (e.g. Delacour 1929b, Engelbach 1932), the species is now in a "precarious" situation with a few small populations left in the central and southern regions (McGowan *et al*. 1999). Records are from: **Ban Houayxai**, on the border with Myanmar, adult male collected nearby on banks of Mekong, December 1938 or January 1939 (Delacour and Greenway 1940b); **Xiang Khouang**, uncommon in the late 1930s and early 1940s at lower altitudes, including at Ban Ban, 600 m (David–Beaulieu 1944); **Nam Xan**, late 1930s and early 1940s (David–Beaulieu 1944); **Nam Ngiap** (Nghiep), uncommon, late 1930s and early 1940s (David–Beaulieu 1944); Phou Khao Khouay NBCA, at **Ban Nakhay**, six males calling, March 1994, two males calling, May 1995 (Evans and Timmins 1995, 1997, Duckworth *et al*. 1998); **Xe Banghiang**, Savannakhet, especially common (David–Beaulieu 1949); **Phou Xiang Thong NBCA**, reported along the eastern border, c.1994, suggesting that "significant populations may remain" (Evans and Timmins 1995), 13 calling males at five localities, March 1996 (Evans and Timmins 1997, Evans *et al*. 2000); **Tha Teng**, December 1931 (male in FMNH); **Bolaven plateau**, purchased locally around February 1932 (female in AMNH, Delacour 1949b, Dickinson 1970a); **Dong Hua Sao NBCA**, one female, 1993, commonly reported in 1993 and 1996, including a large communal roost at Quan Moor, although only one individual was seen there in 1993 and the roost is now the site of a village (Evans and Timmins 1995, 1997); **Dong Khanthung proposed NBCA**, one seen along the Nam Lepou and others reported (bordering Cambodia), April–May 1996 (Evans and Timmins 1997, Evans *et al*. 2000), uncommon in 1997, several records, February–April 1998 (Round 1998); Xe Pian NBCA, **Dong Kalo**, at least two heard, March 1993 (Evans and Timmins 1995), one feather found, 1995 (Evans and Timmins 1997); Ta Hoi (untraced), especially common in the area, late 1920s and early 1930s (Engelbach 1932).

Unconfirmed or unspecific localities (principally the result of village surveys; see Remarks 6) include: common throughout the southern provinces of Salavan, Champassak and Attapu in the late 1920s and early 1930s (Engelbach 1932); Savannakhet, extremely common throughout the province (David–Beaulieu 1949); Nakai Plateau, at the edge of Nakai-Nam Theun NBCA, locally reported but thought to be extirpated (Duckworth *et al*. 1998); Ban Sopkhao, southern border of Phou Louey NBCA, reported to have once occurred but disappeared around 1950 (Davidson 1998); Ban Dan, in Nam Xam NBCA, reported present around 50 years ago (Showler *et al*. 1998a); Ban Aluk, near Xe Sap NBCA, reported present in 1980s (Showler *et al.* 1998b); Dong Ampham NBCA, reported in the 1990s (Evans and Timmins 1997); Phou Theung proposed NBCA, reported in the 1990s (Evans and Timmins 1997); Phou Kathong proposed NBCA, reported in the 1990s (Evans and Timmins 1997); Nam Kong proposed protected area, reported in the 1990s (Evans and Timmins 1997); Xe Khampho proposed protected area, reported in the 1990s (Evans and Timmins 1997); Phou Theung proposed NBCA, locally reported in a small section of the reserve, c.1994 (Evans and Timmins 1995).

■ ***CAMBODIA*** The species apparently still occurs throughout the country (Sun Hean *in litt*. 1997). As it has been recorded along the Cambodian borders of Thailand and Laos, it presumably occurs in adjacent, but as yet unstudied areas of north and west Cambodia (Enderlein 1976, Evans *et al*. 2000), and the wide spread of villager reports also indicates that large numbers may survive in the country. The species was reported in the 1990s from the following provinces: Stung Treng, Preah Vihear, Pursat, Kampong Speu, Kratie, Battambang (C. M. Poole *in litt*. 1999). Records are as follows: Phum Chouay, **Taveng district**, Ratanakiri province, one male for sale in the town, mid-March 1996, and a population reported 10 km to the north along the Tabok stream (*Oriental Bird Club Bull.* 24 [1996]: 59–65); **Koh Ker** road, Preah Vihear province, around December 1999 (*Cambodia Bird News* 4 [2000]: 34–38); in the **Kaoh Nhek** region, several records at various sites (mostly to the east of Kaoh Nhek) in April 2000 (Long *et al*. 2000), and again (including chicks) in June 2000 (R. J. Timmins *in litt*. 2000, 2001); **Ratanakiri**, apparently widely distributed in 1996 with several sightings in scattered areas (Desai and Lic Vuthy 1996), with two captive individuals found in Lomphat (Duckworth and Hedges 1998), and although not recorded during survey work in 1998 the species was widely reported to persist (Timmins and Soriyun 1998); around **Phumi Yuon Dong**, in several in the Laoka hills, May 2000 (R. J. Timmins *in litt*. 2000); Mondulkiri, where the species is known by local report (C. M. Poole *in litt.* 1999), with two sets of tail feathers bound for Phnom Penh, April 1998, apparently taken there (F. Goes verbally 1999), and in this province at **Snuol Wildlife Sanctuary**, where up to 15 were seen along roads in the early morning, April 2000 (P. Davidson *in litt*. 2000); **Kirirom National Park**, 200 m, one bird heard, January 1998 (Goes *et al*. 1998a), with several for sale at Srey Khlong in December 1998 and February 1999 reported to come from the park (C. M. Poole *in litt*. 1999); **Bokor National Park**, one bird heard, February 1998, and two captive chicks, April 1998 (Goes *et al.* 1998a); Preah Vihear province (not mapped), up to five per day and widespread, December 2000 and January 2001 (P. Davidson *in litt*. 2001).

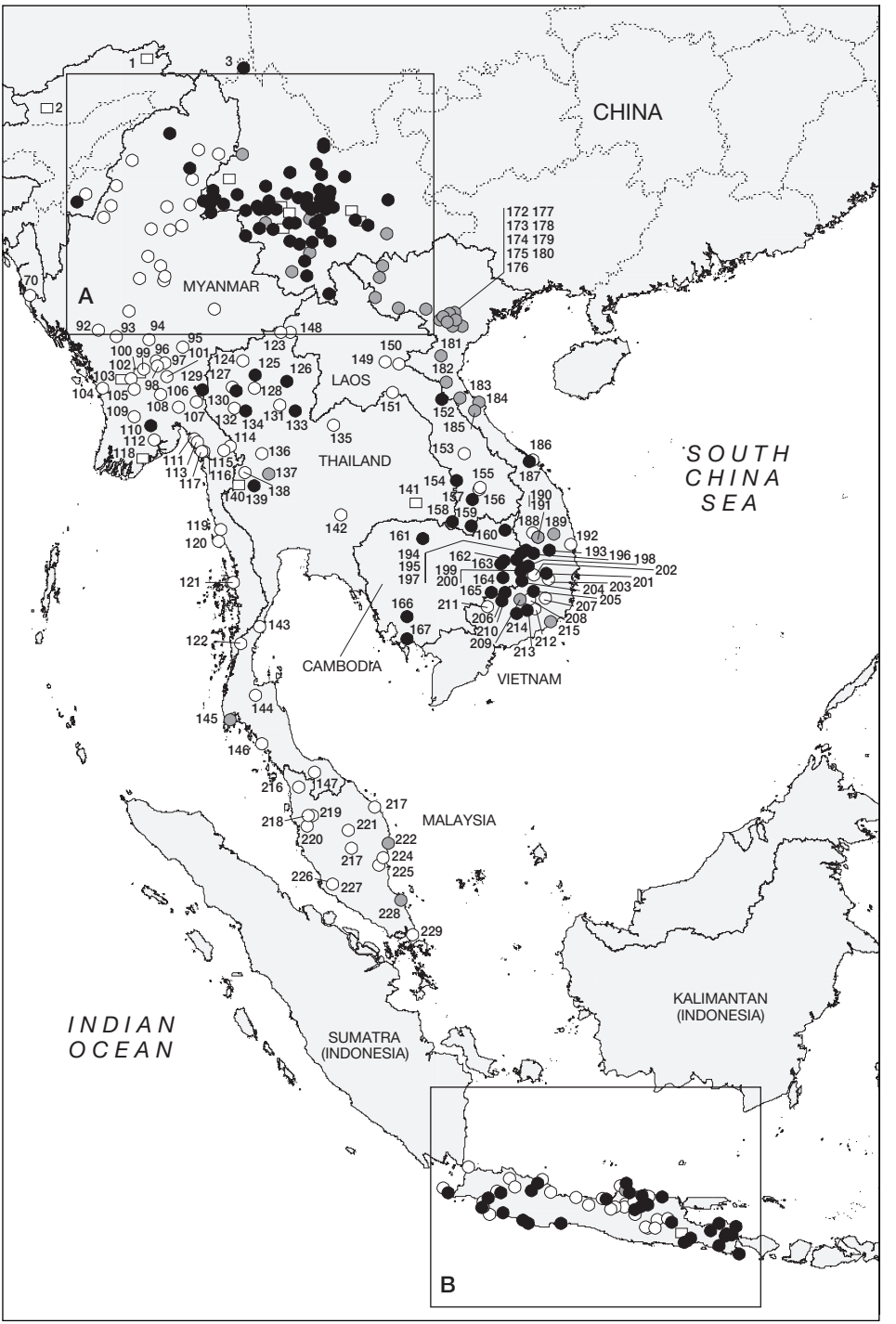
Unconfirmed or unspecific records include: Ream National Park, Koh Kong, previously present according to locals but now considered extinct (Goes *et al*. 1998a); Phnom Kulen National Park, Siem Reap, apparently present but no details provided (Sun Hean *in litt*. 1997), although two sets of tail feathers in Siem Reap market, April 1999, were reported to come from this park (C. M. Poole *in litt*. 1999); Taveng, Ratanakiri, by local report and tail feathers in villages (Baird *et al.* 1996); Phnom Nam Lyr Wildlife Sanctuary, Mondulkiri, locally reported, 1990s (McGowan *et al*. 1999).

■ ***VIETNAM*** Historically the species appears to have been distributed throughout the entire country except some parts of the south and north-east (Delacour 1977). However, there has

been no confirmed record in northern Vietnam since 1975 and the species might well be extinct there (Brickle *et al*. 1998). The majority of sites for it in Dac Lac come from the north-west of the province (Brickle *et al*. 1998). Records are from: **Sin Ho district**, Lai Chau, April 1963 (Dang Huy Huynh *et al*. 1974); **Muong Lay district**, Lai Chau, March and April 1963 (Dang Huy Huynh *et al*. 1974); **Dien Bien district**, Lai Chau, May 1963 (Dang Huy Huynh *et al*. 1974); **Song Ma district**, Son La, October and November 1963 (Dang Huy Huynh *et al*. 1974); **Moc Chau district**, Son La, November 1963 (Dang Huy Huynh *et al*. 1974); **Luong Son district**, Hoa Binh, May 1973 (Dang Huy Huynh *et al*. 1974); **Ky Son district**, Hoa Binh, June and May 1972 (Dang Huy Huynh *et al*. 1974); **Da Bac district**, Hoa Binh, February and December 1972 (Dang Huy Huynh *et al*. 1974); **Kim Boi district**, January, February and December 1972 (Dang Huy Huynh *et al*. 1974); **Mai Chau district**, Hoa Binh, October 1972 (Dang Huy Huynh *et al*. 1974); **Tan Lac district**, Hoa Binh, January 1974 (Dang Huy Huynh *et al*. 1974); **Lac Thuy district**, July 1973 (Dang Huy Huynh *et al*. 1974); **Lac Son** , March 1973 (Dang Huy Huynh *et al*. 1974); **Quy Chau district**, Nghe An, November and December 1965 (Dang Huy Huynh *et al*. 1974); **Tan Ky district**, Nghe An, December 1965 (Dang Huy Huynh *et al*. 1974); **Huong Khe district**, Ha Tinh, January and February 1964, April 1974 (Dang Huy Huynh *et al*. 1974); **Ky Anh district**, Ha Tinh, January and February 1964 (Dang Huy Huynh *et al*. 1974); **Tuyen Hoa district**, Quang Binh, October and November 1964 (Dang Huy Huynh *et al*. 1974); **Thua Luu**, Thua Thien Hue, three males, March 1938 (Eames and Ericson 1996); **Bach Ma National Park**, Thua Thien Hue, male near the park boundary, January 1990 (Robson *et al*. 1991, 1993b), no subsequent records and probably extinct in the area (Brickle *et al*. 1998, McGowan *et al*. 1999); **Pleiku**, Gia Lai, 1933–1936 (David-Beaulieu 1939), the report from Gia Lai by Stepanyan *et al*. (1983) presumably referring to this record; **An Khe district**, Gia Lai, along the Ba river, March and April 1978 (Truong Van La and Nguyen Cu 1982); **Mang Giang district**, Gia Lai, 5–6, 1970s (Truong Van La and Nguyen Cu 1982); **Dac Doa forest**, 1979 (Truong Van La and Nguyen Cu 1982); riverbanks between **Xomgom** and Daban, 1918 (Robinson and Kloss 1919a); **A Yun Pa district** (Azunba), Gia Lai, 20–30 in ricefields, March and April 1978, seven at Chu Se Pass, December 1978 and January 1979 (Truong Van La and Nguyen Cu 1982), three, April 2000 (A. W. Tordoff verbally 2000), the report from "A Du Pa, Tay Nguyen plateau" by Stepanyan *et al*. (1983) presumably referring to the records in the 1970s; **Chu M'lang**, June and July 1997 (Le Xuan Canh *et al*. 1997); **Ya Lop**, June 1997 (Le Xuan Canh *et al*. 1997); **Ea H'Leo district**, Dac Lac, recorded at three sites, spring 1998 (Brickle *et al*. 1998); **Ea Sup district**, Dac Lac, recorded at six sites, spring 1998 (Brickle *et al*. 1998) and Ea Sup, Tay Nguyen plateau, undated (Stepanyan *et al*. 1983); **Buon Don district**, Dac Lac, recorded at one site, spring 1998 (Brickle *et al*. 1998); **Yok Don National Park**, Dac Lac, two collected at Ban Don, Ea Sup district, November or December 1979 (Truong Van La and Nguyen Cu 1982), frequently heard, April 1989 (Laurie *et al*. 1989), undated (Nguyen Cu and Eames 1993), feathers found and one individual observed, May 1997 (Le Xuan Canh *et al.* 1997); **Cu Jut district**, Dac Lac, at one site, spring 1998 (Brickle *et al*. 1998); **Ea Kar district**, Dac Lac, recorded at one site, spring 1998 (Brickle *et al.* 1998); **Ban Me Thuot**, Dac Lac, 1937 (two in MCZ); **Eaktur**, Dac Lac, 40 km east of Ban Me Thuot, April 1937 (two in FMNH); **Dak Mil district**, Dac Lac, recorded at one site, spring 1998 (Brickle *et al*. 1998); **Killplanol district**, Lam Dong, April and May 1980 (Truong Van La and Nguyen Cu 1982); **Bu Gia Map Nature Reserve**, Binh Phuoc, listed as present (Anon. 1989c), and thought to occur currently (Nguyen Cu *in litt.* 1997); Lom Ba, near **Da Lat**, March 1938 (Eames and Ericson 1996); **B'sré**, May 1938 (Eames and Ericson 1996); **Dac Nong district**, between May and July 1979 (Truong Van La and Nguyen Cu 1982); **Dak R'Lap district**, recorded at one site, spring 1998 (Brickle *et al*. 1998); **Hon Quan**, Binh Phuoc, abundant between 1929 and 1931 (David-Beaulieu 1932); **Di Linh** (Djiring), Lam Dong, 900 m, April 1918 (female in BMNH; also Robinson and Kloss 1919a), February and March 1927 (two specimens in BMNH); **Bao Loc**

The distribution of Green Peafowl *Pavo muticus* (map opposite): (1) Dingba Qu; (2) Kamen He; (3) Deqen county; (4) Zhonghe; (5) Zhiju; (6) Liuku; (7) Yao'an county; (8) Weishan county; (9) Nanhua county; (10) Lufeng county; (11) Tengchong county; (12) Changning county; (13) Zhongyishe; (14) Yingjiang county; (15) Tuodian; (16) Maolan; (17) Longling county; (18) Ainishan; (19) Wuliang Shan Nature Reserve; (20) Jinping; (21) Husa; (22) Ejia; (23) Qingping; (24) Mile county; (25) Tongbiguan Nature Reserve; (26) Yingpan; (27) Zhelong; (28) Nongba; (29) Zhefang; (30) Wenjing; (31) Xiaomengtong; (32) Laochang; (33) Ailaoshan National Nature Reserve; (34) Mayidui; (35) Xingfu; (36) Zhehou; (37) Shuitang; (38) Yongkang; (39) Daxue Shan Nature Reserve; (40) Mengbang; (41) Ruili county; (42) Longwu; (43) Longpeng; (44) Zhenyuan county; (45) Matai; (46) Tuantian; (47) Baoxiu; (48) Mengsa; (49) Minle; (50) Xinfu; (51) Pingcun; (52) Jianshui county; (53) Quannei; (54) Gengma county; (55) Shuangjiang county; (56) Mengzi county; (57) Tongguan; (58) Nangunhe Nature Reserve; (59) Longtan; (60) Mengban; (61) Pu'er county; (62) Weiyuan river; (63) Simao county; (64) Zhengnuo; (65) Meng'a; (66) Mengyang; (67) Mengla county; (68) Manipur valley; (69) Churachandpur district; (70) Garjania; (71) Hukawng valley; (72) Kachin hills; (73) Chipwi; (74) Kaunghein; (75) Pidaung Sanctuary; (76) Talawgyi; (77) Homalin; (78) Bhamo; (79) Upper Chindwin; (80) Thabyebin; (81) Yuwa; (82) Mohlaing; (83) Tagaung; (84) Mabein; (85) Ingade; (86) Bandi; (87) Maymyo; (88) Maubin; (89) Thabyegyin; (90) Southern Shan States; (91) Kule; (92) Monnyin; (93) Magwe; (94) Payadaung; (95) Nattaung; (96) Kayinlegyin; (97) Gwethi Reserve; (98) Kyundawzu; (99) North Nawin Reserved Forest; (100) Paukkaung; (101) Chaunggwa; (102) Myohla; (103) Padaung; (104) Sandoway district; (105) Paungde; (106) Sabyin; (107) Papun; (108) Shwegyin; (109) Henzada; (110) Taikkyi; (111) Thaton district; (112) Insein; (113) Wimpong; (114) Myawadi; (115) Kawkarieka; (116) Ataran valley; (117) Salween river; (118) Hmawbi; (119) Tavoy; (120) Yabu; (121) Mergui; (122) Pakchan; (123) Chiang Saen; (124) Doi Chiang Dao Wildlife Sanctuary; (125) Doi Saket district; (126) Mae Yom National Park; (127) Doi Inthanon National Park; (128) Khun Tan; (129) Salawin Wildlife Sanctuary; (130) Chom Thong district; (131) Den Chai; (132) Ban Mut Ka; (133) Nam Jarim; (134) Li district; (135) Pak Pan; (136) Kamphaeng Phet; (137) Ban Salak Phra; (138) Umphang; (139) Huai Kha Khaeng Wildlife Sanctuary; (140) Thung Yai Naresuan Wildlife Sanctuary; (141) Srisaket province; (142) Non Luam; (143) Huey Sak; (144) Ban Kok Klap; (145) Lawa cave; (146) Ban Nakloea; (147) Ban Yaha; (148) Ban Houayxai; (149) Xiang Khouang; (150) Nam Xan; (151) Nam Ngiap; (152) Ban Nakhay; (153) Xe Banghiang; (154) Phou Xiang Thong NBCA; (155) Tha Teng; (156) Bolaven plateau; (157) Dong Hua Sao NBCA; (158) Dong Khanthung proposed NBCA; (159) Dong Kalo; (160) Taveng district; (161) Koh Ker; (162) Kaoh Nhek; (163) Ratanakiri; (164) Phumi Yuon Dong; (165) Snoul Wildlife Sanctuary; (166) Kirirom National Park; (167) Bokor National Park; (168) Sin Ho district; (169) Muong Lay district; (170) Dien Bien district; (171) Song Ma district; (172) Moc Chau district; (173) Luong Son district; (174) Ky Son district; (175) Da Bac district; (176) Kim Boi district; (177) Mai Chau district; (178) Tan Lac district; (179) Lac Thuy district; (180) Lac Son; (181) Quy Chau district; (182) Tan Ky district; (183) Huong Khe district; (184) Ky Anh district; (185) Tuyen Hoa district; (186) Thua Luu; (187) Bach Ma National Park; (188) Pleiku; (189) An Khe district; (190) Mang Giang district; (191) Dac Doa forest; (192) Xomgom; (193) A Yun Pa district; (194) Chu M'lang; (195) Ya Lop; (196) Ea H'Leo district; (197) Ea Sup district; (198) Buon Don district; (199) Yok Don National Park; (200) Cu Jut district; (201) Ea Kar district; (202) Ban Me Thuot; (203) Eaktur; (204) Dak Mil district; (205) Killplanol district; (206) Bu Gia Map Nature Reserve; (207) Da Lat; (208) B'sré; (209) Dac Nong district; (210) Dak R'Lap district; (211) Hon Quan; (212) Di Linh; (213) Bao Loc district; (214) Cat Tien National Park; (215) Bac Binh; (216) Kedah; (217) Bukit Jong; (218) Lenggong; (219) Ulu Sungai Soh; (220) Kuala Kangsar; (221) Ulu Pahang; (222) Kemaman river; (223) Kuala Tembeling; (224) Kempadang; (225) Pahang river; (226) Air Hitam Forest Reserve; (227) Bangi; (228) Mersing; (229) Cape Romania; (230) Pulau Panaitan; (231) Ujung Kulon National Park; (232) Merak; (233) Cikepuh; (234) Cilowa; (235) Pelabuhanratu; (236) Sampora; (237) Ciseureuh; (238) Tapos; (239) Gunung Gede-Pangrango National Park; (240) Ciogong; (241) Karawang; (242) Tanjung Sedari; (243) Purwakarta; (244) Cikelet; (245) Leuweung Sancang Wildlife Reserve; (246) Buahdua; (247) Cikawung; (248) Indramayu; (249) Cirebon; (250) Nusa Kambangan; (251) Pemalang; (252) Dieng plateau; (253) Kendal; (254) Alas Roban; (255) Gedangan; (256) Penawangan; (257) Banjaran; (258) Colo; (259) Gundih; (260) Purwodadi; (261) Clering; (262) Pati; (263) Wirosari; (264) Kradenan; (265) Ngaringan; (266) Randublatung; (267) Mantingan; (268) Cepu; (269) Alas Sengok; (270) Walikukun; (271) Paringan; (272) Padangan; (273) Pulung; (274) Jatirogo; (275) Besuki; (276) Nganjuk; (277) Tuban; (278) Jombang; (279) Wonosalem; (280) Kebonagung; (281) Lebakharjo; (282) Ranu Darungan; (283) Hyang plateau; (284) Gunung Ringgit; (285) Meru Betiri National Park; (286) Gunung Raung; (287) Krepekan; (288) Lijen; (289) Baluran National Park; (290) Alas Purwo National Park.

○ Historical (pre-1950) ◍ Fairly recent (1950–1979) ● Recent (1980–present) □ Undated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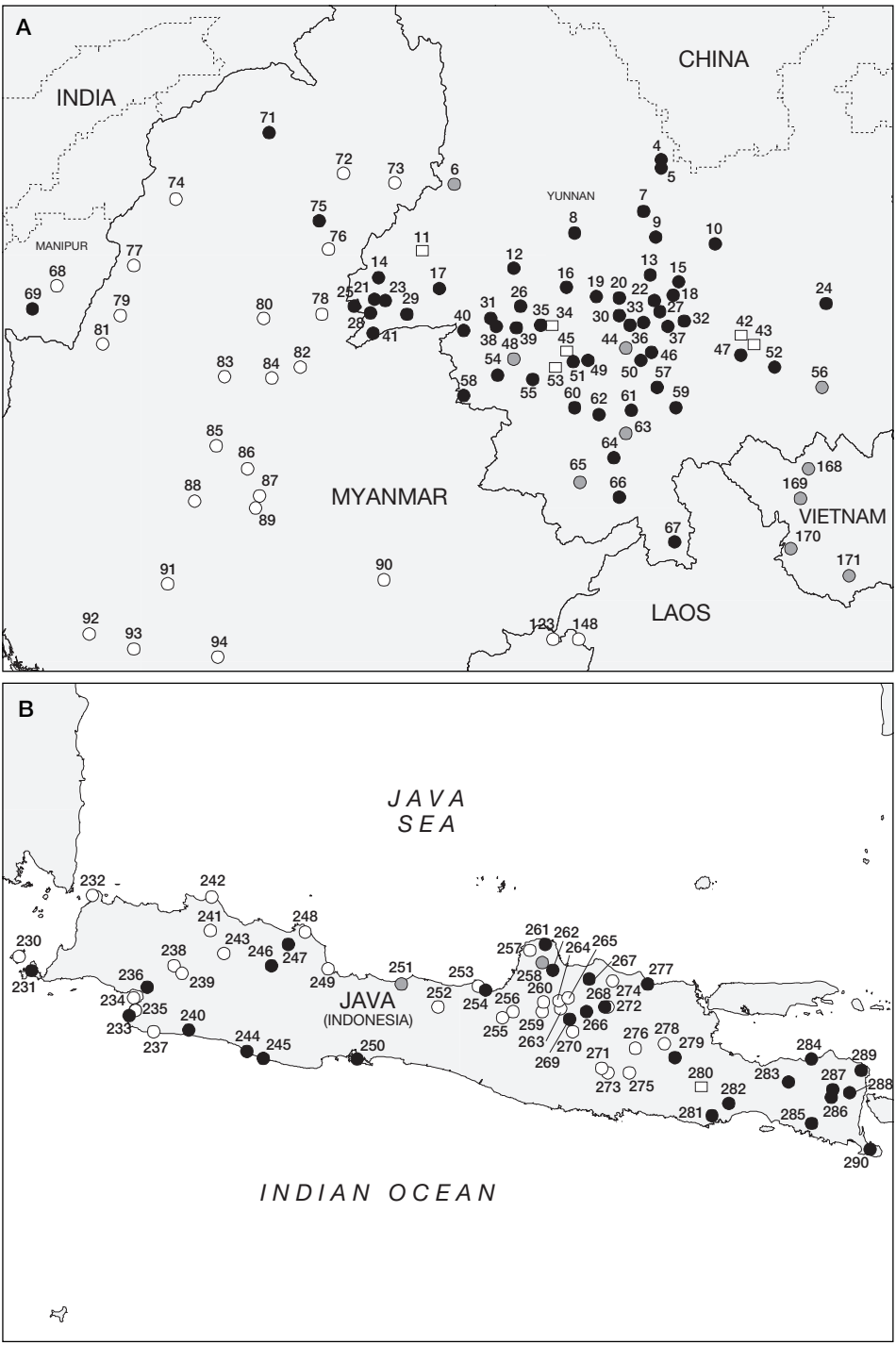
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district, Lam Dong, April and May 1980 (Truong Van La and Nguyen Cu 1982); **Cat Tien National Park**, Lam Dong, Dong Nai and Binh Phuoc, currently present (Nguyen Cu and Eames 1993, Treesucon 1994, Tentij and Atkins 1998b), estimated 40 birds (Morris 1988), maximum of 17 calling birds in 1990 (Robson *et al*. 1991), eight seen by Crocodile Lake and others heard nearby, February 1997 (Nguyen Cu *in litt*. 1997, Tentij and Atkins 1998b); **Bac Binh**, Thuan Hai, one male, June 1976 (Nguyen Cu and Eames 1993).

An untraced locality is Dac Min district, at Na Da, between May and July 1979 (Truong Van La and Nguyen Cu 1982). Unspecified or unconfirmed localities include: Muong Nhe Nature Reserve, Lai Chau, probably November–December 1991 (Cox *et al*. 1992) but insufficient detail given (McGowan *et al*. 1999); Cuc Phuong National Park, apparently present in the 1960s (Fischer 1974), although considered long extinct at this site (J. W. Duckworth *in litt*. 1999); Pu Mat Nature Reserve, Nghe An, plausible reports received from local hunters in the late 1990s (Round 1999); Quang Tri province, historically very common (Delacour and Jabouille 1925), April 1927 (three specimens in FMNH); Mom Ray Nature Reserve, Kon Tum, locally reported, 1994–1995 (Do Tuoc and Ngo Tu 1995). Additional unconfirmed local reports are mentioned for Chu Se, An Khe, Dien Binh, Dak Bang, Dak Doa and Bao Loc (Stepanyan *et al*. 1983, Eames *et al*. 1992).

■ ***MALAYSIA*** In the late nineteenth century this species occurred along both coastal plains to the extreme south in the east and to at least south Selangor in the west (Wells 1999). It is now almost certainly extinct in the country (see Population). Records area from: southern **Kedah**, undated (Robinson and Kloss 1910–1911); **Bukit Jong**, Terengganu, undated (Kloss 1911, Morioka and Yang 1996); Kuala Kangsar, 1870s (Kelham 1881–1882), and this or another record from **Lenggong**, north of Kuala Kangsar, undated (Robinson and Chasen 1936); Sungei Soh, a nest with four eggs destroyed in February 1938 (Madoc ms), and at **Ulu Sungai Soh** (Soh river headwaters), a nest found containing broken eggshells, March 1938

The distribution of Green Peafowl *Pavo muticus* (map A opposite): (4) Zhonghe; (5) Zhiju; (6) Liuku; (7) Yao'an county; (8) Weishan county; (9) Nanhua county; (10) Lufeng county; (11) Tengchong county; (12) Changning county; (13) Zhongyishe; (14) Yingjiang county; (15) Tuodian; (16) Maolan; (17) Longling county; (18) Ainishan; (19) Wuliang Shan Nature Reserve; (20) Jinping; (21) Husa; (22) Ejia; (23) Qingping; (24) Mile county; (25) Tongbiguan Nature Reserve; (26) Yingpan; (27) Zhelong; (28) Nongba; (29) Zhefang; (30) Wenjing; (31) Xiaomengtong; (32) Laochang; (33) Ailaoshan National Nature Reserve; (34) Mayidui; (35) Xingfu; (36) Zhehou; (37) Shuitang; (38) Yongkang; (39) Daxue Shan Nature Reserve; (40) Mengbang; (41) Ruili county; (42) Longwu; (43) Longpeng; (44) Zhenyuan county; (45) Matai; (46) Tuantian; (47) Baoxiu; (48) Mengsa; (49) Minle; (50) Xinfu; (51) Pingcun; (52) Jianshui county; (53) Quannei; (54) Gengma county; (55) Shuangjiang county; (56) Mengzi county; (57) Tongguan; (58) Nangunhe Nature Reserve; (59) Longtan; (60) Mengban; (61) Pu'er county; (62) Weiyuan river; (63) Simao county; (64) Zhengnuo; (65) Meng'a; (66) Mengyang; (67) Mengla county; (68) Manipur valley; (69) Churachandpur district; (71) Hukawng valley; (72) Kachin hills; (73) Chipwi; (74) Kaunghein; (75) Pidaung Sanctuary; (76) Talawgyi; (77) Homalin; (78) Bhamo; (79) Upper Chindwin; (80) Thabyebin; (81) Yuwa; (82) Mohlaing; (83) Tagaung; (84) Mabein; (85) Ingade; (86) Bandi; (87) Maymyo; (88) Maubin; (89) Thabyegyin; (90) Southern Shan States; (91) Kule; (92) Monnyin; (93) Magwe; (94) Payadaung; (123) Chiang Saen; (148) Ban Houayxai; (168) Sin Ho district; (169) Muong Lay district; (170) Dien Bien district; (171) Song Ma district;
(map B opposite): (230) Pulau Panaitan; (231) Ujung Kulon National Park; (232) Merak; (233) Cikepuh; (234) Cilowa; (235) Pelabuhanratu; (236) Sampora; (237) Ciseureuh; (238) Tapos; (239) Gunung Gede-Pangrango National Park; (240) Ciogong; (241) Karawang; (242) Tanjung Sedari; (243) Purwakarta; (244) Cikelet; (245) Leuweung Sancang Wildlife Reserve; (246) Buahdua; (247) Cikawung; (248) Indramayu; (249) Cirebon; (250) Nusa Kambangan; (251) Pemalang; (252) Dieng plateau; (253) Kendal; (254) Alas Roban; (255) Gedangan; (256) Penawangan; (257) Banjaran; (258) Colo; (259) Gundih; (260) Purwodadi; (261) Clering; (262) Pati; (263) Wirosari; (264) Kradenan; (265) Ngaringan; (266) Randublatung; (267) Mantingan; (268) Cepu; (269) Alas Sengok; (270) Walikukun; (271) Paringan; (272) Padangan; (273) Pulung; (274) Jatirogo; (275) Besuki; (276) Nganjuk; (277) Tuban; (278) Jombang; (279) Wonosalem; (280) Kebonagung; (281) Lebakharjo; (282) Ranu Darungan; (283) Hyang plateau; (284) Gunung Ringgit; (285) Meru Betiri National Park; (286) Gunung Raung; (287) Krepekan; (288) Lijen; (289) Baluran National Park; (290) Alas Purwo National Park.
○ Historical (pre-1950) ◍ Fairly recent (1950–1979) ● Recent (1980–present) □ Undated

(Madoc ms); along the Perak river up to **Kuala Kangsar**, undated (Beebe 1918–1922); **Ulu Pahang** or northern Pahang, in the upper Pahang catchment, January 1902 (specimens in AMNH, BMNH), a vague locality descriptor but likely to be in the general region of Gunung Tahan given J. Waterstradt's supposed itinerary (see Remarks 2 under Crested Argus *Rheinardia ocellata*); Terengganu, present until at least the 1950s (Wolfe 1951, Tweedie 1960) and specifically along the Kamamun or **Kemaman river**, October 1900 (Riley 1938) and in Kemaman district until the early 1960s (Medway and Wells 1976); **Kuala Tembeling**, in present day Taman Negara National Park, August 1905 (female in BMNH), and nearby at Kuala Tahan, March 1921 (Morioka and Yang 1996); **Kempadang**, an abandoned nest found in April 1938 (Madoc ms); **Pahang river**, undated (Robinson and Kloss 1910–1911), and in the Pahang lowlands in general, 1901 (three specimens in AMNH, Hartert 1902b); **Air Hitam Forest Reserve**, and adjacent rubber estates between the Kelang and Langat river valleys, 1930 and possibly early 1940s (Leyne 1941), but not since World War Two (Wells 1999); **Bangi**, south Selangor, undated (Wells 1999); **Mersing**, present until at least the 1950s (Wolfe 1951, Tweedie 1960); one shot, **Cape Romania**, opposite Singapore, 1870s, but probably a straggler there or an escape (Kelham 1881–1882); Kuala Rompin (not mapped), Pahang, August 1919 (Morioka and Yang 1996); Sungai Nerus (not mapped), September 1910 (Morioka and Yang 1996).

Rumours of the species's persistence in forest patches near Kerling, north Selangor, and reports from Besut, on the Pahang-Kelantan border, in the 1970s (Medway and Wells 1976) were never confirmed (Wells 1999).

■ ***INDONESIA*** From a review of the evidence, it appears that the species was very scattered in the western part of Java, with populations confined mainly to remote coastal areas, whereas in the centre and east of the island clusters of populations exist or existed in the extensive teak plantations and rugged hill areas of the interior (van Balen *et al.* 1995). For the sake of economy, the number of birds judged in van Balen *et al.* (1995) to be present at a site in the early 1990s is given immediately after the site name (but these figures are in some cases contradicted: see Population, also Remarks 7):

Java ■ *West Java* **Pulau Panaitan**, before 1910 but apparently now extirpated (van Balen *et al.* 1995); **Ujung Kulon National Park** (200–250), including the inshore island of Pulau Peucang, resident (Hoogerwerf 1948a, 1970, van Balen *et al.* 1995); **Merak** (city, whose name means Green Peafowl), September 1943 (two eggs in RMNH); **Cikepuh**, formerly "Zandbaai" (<10), where "not rare" a century ago (Bartels 1902, 1906) and recently present (van Balen *et al.* 1995), including Cilowa, 1901, current situation unknown (van Balen *et al.* 1995); **Pelabuhanratu** (=Wijnkoops Bay), nineteenth century (Hoogerwerf 1948a); **Ciletu** "vlakte", nineteenth century (Vorderman 1887), where although still regular at the outset of the twentieth century it disappeared totally 10–20 years later (Bartels 1915–1930); **Sampora** (23–29; see Remarks 8), mid-1980s (van Balen *et al.* 1995); **Ciseureuh** (Tjiseureuk), one female, May 1918 (Bartels 1915–1930), current situation unknown (van Balen *et al.* 1995); **Tapos**, August 1828 but now extirpated (van Balen *et al.* 1995); **Gunung Gede-Pangrango National Park**, previously "not uncommon", persisting until 1930s (Bartels 1915–1930) before disappearing, small numbers recently (<5), but these probably only stragglers from a free-ranging population in a local safari garden (van Balen *et al.* 1995); **Ciogong** (5–10), by reliable report in the late 1980s (van Balen *et al.* 1995); **Karawang**, 1896, current situation unknown (van Balen *et al.* 1995); **Tanjung Sedari** (Sedari delta), regular, undated (Bartels 1915–1930); **Purwakarta**, before 1865 (pullus in RMNH); **Cikelet** (population unknown), by reliable report in 1991 (van Balen *et al.* 1995), with many birds found captive there in August 1999 (YPAL *in litt*. 1999); **Leuweung Sancang Wildlife Reserve** (15–20; see Remarks 9), May 1991 (van Balen *et al.* 1995); **Buahdua** (25–30; see Remarks 10), by reliable report in 1993 (van Balen *et al.* 1995); **Cikawung** (8; see Remarks 11), November 1993 (van Balen *et al.* 1995); **Indramayu**, October 1927 (female in FMNH); **Cirebon**, at Sudramajoe, October 1927 (female in FMNH),

1940, current situation unknown (van Balen *et al.* 1995); fringes of the Sideru delta (untraced; possibly around Tanjung Sedari in the "Sedari delta"), regular, undated (Bartels 1915–1930); ■ ***Central Java*** by reliable local report **Nusa Kambangan**, currently (but island forests restricted owing to penal settlements: V. Nijman *in litt*. 1999); **Pemalang**, 1950s, but probably no longer relevant although "many" birds were present when last investigated (van Balen *et al.* 1995); **Dieng plateau** ("crater of death"), nineteenth century but no longer present (V. Nijman *in litt*. 1999); **Kendal**, pre-1940, current situation unknown (van Balen *et al.* 1995); **Alas Roban** (population unknown, but 180 birds were reported locally in the 1930s), 1991 (van Balen *et al.* 1995); **Gedangan**, pre-1940 and possibly no longer relevant (van Balen *et al.* 1995); **Penawangan**, 1880 and possibly no longer relevant (van Balen *et al.* 1995); **Banjaran**, 1936–1938, current situation unknown (van Balen *et al.* 1995); **Colo**, up to 1970 but apparently now extirpated (van Balen *et al.* 1995); **Gundih**, 1935–1938, current situation unknown (van Balen *et al.* 1995, also Hellebrekers and Hoogerwerf 1967, egg in RMNH); **Purwodadi**, 1936–1938, current situation unknown (van Balen *et al.* 1995); **Clering** (<10), June 1991 (van Balen *et al.* 1995); South **Pati** at three sites with local reports from two others (10–25), 1990–1991 (van Balen *et al.* 1995); **Wirosari**, 1880, current situation unknown (van Balen *et al.* 1995); **Kradenan**, 1880, current situation unknown (van Balen *et al.* 1995); **Ngaringan**, 1936–1938, current situation unknown (van Balen *et al.* 1995); **Randublatung** (70) at three sites, June 1991, with up to 190 in the northern and southern parts of the area in the 1930s (van Balen *et al.* 1995); **Mantingan** (15), early 1991 (van Balen *et al.* 1995); **Cepu** (104–167), 1990–1991, with up to 300 in the area in the 1930s (van Balen *et al.* 1995); ■ ***East Java*** **Alas Sengok** (5), June 1991, with up to 75 in the area in the 1930s (van Balen *et al.* 1995); **Walikukun**, 1936–1938, current situation unknown (van Balen *et al.* 1995); **Paringan**, 1936–1938, current situation unknown (van Balen *et al.* 1995); **Padangan**, pre-1940, current situation unknown (van Balen *et al.* 1995); **Pulung**, 1950s, current situation unknown (van Balen *et al.* 1995); **Jatirogo**, 1943–1945, current situation unknown (van Balen *et al.* 1995); **Besuki** (near Puger to the south and at Sumberwaru in the north), November 1910, current situation unknown (van Balen *et al.* 1995; two specimens in RMNH); **Nganjuk**, 1936–1938, current situation unknown (van Balen *et al.* 1995); **Tuban** (population unknown), by reliable report in 1992 (van Balen *et al.* 1995); **Jombang**, 1930s probably no longer relevant (van Balen *et al.* 1995); **Wonosalem** (population unknown), February 1993 (van Balen *et al.* 1995; also Wallace 1869, Vorderman 1899); **Kebonagung**, undated museum specimen (in ZMB) but probably no longer relevant (van Balen *et al.* 1995); **Lebakharjo** (<10; see Remarks 12), by local report in October 1989 (van Balen *et al.* 1995); **Ranu Darungan** (<10), at 800–900 m inside Bromo-Tengger-Semeru National Park, 1991 (van Balen *et al.* 1995); **Hyang plateau** (=Ijang, Hiang, Yang highlands) (25–50), as high as 2,300 m, July 1989, having been "very abundant" in the 1930s and still "very common" in the 1970s (van Balen *et al.* 1995; also Hoogerwerf 1948a); **Gunung Ringgit** (>75) including at Kembang Sambir/Pasir Putih village, 10–75 m, December 1991 to July 1992 (Setiadi and Setiawan 1992, van Balen *et al.* 1995); **Meru Betiri National Park** (25–50; see Remarks 12), October 1990 (van Balen *et al.* 1995); **Gunung Raung** (population unknown but "considerable numbers"), recently (van Balen *et al.* 1995); **Krepekan** (30; but see Population) on the west of the Ijen crater, 1990 and 1993–1994 (Indrawan and van Balen 1991, van Balen *et al.* 1995); **Lijen** (Licin) (10–20; but see Population) on the east of the Ijen crater, 1990 (van Balen *et al.* 1995); **Baluran National Park** (200; but see Population), January/February 1920 (Robinson and Kloss 1924b), 1993–1994 (Indrawan 1995), including Bajulmati, near the entrance to the park (also shot here in February 1920: Morioka and Yang 1996), and Maelang (just south of Baluran); **Alas Purwo National Park** (25–50; but see Population), May 1990 and 1993–1994, birds having been "very abundant" there in the 1930s (Indrawan 1995, van Balen *et al.* 1995).

POPULATION This spectacular galliform was once abundant from north-east India, through southern China, Myanmar, Thailand, Indochina and Peninsular Malaysia, Indonesia but

has largely disappeared from much of its previous range after a disastrous decline. The current world population of Green Peafowl in the wild is estimated at 5,000 to 10,000 individuals and declining (McGowan and Garson 1995). Captive populations are thought to be in the order of 100 nominate *muticus*, 10 *imperator* and 500 *spicifer* worldwide (McGowan and Garson 1995), although this is perhaps a considerable underestimate (see Remarks 7). Moreover, the predominance of *spicifer* in the equation is considered "simply not true", and a result of misidentified *imperator* forms from Myanmar (K. B. Woods *in litt*. 2000). A re-evaluation and reidentification of captive stock in the light of complex variation in Green Peafowl forms would be worthwhile. The range of the species is patchy, even when birds are unmolested: Rippon (1901) observed of birds in part of Myanmar that "wherever (parties or colonies) are found there seem to be a good number of individuals, but no more will be seen for some 20 or 30 miles, although the intervening ground may appear equally suitable". This circumstance makes population sizes difficult to assess without accurate data on local distribution, which is almost always lacking.

China The species is now restricted to Yunnan province (other than possibly Tibet: see Distribution and Remarks 2), and its population has recently been estimated at 800–1,100 individuals (see Remarks 13), based on estimates of the number of birds made by villagers in each area where the Green Peafowl is known to survive (Wen Xianji *et al.* 1995; also McGowan and Garson 1995). However, Xu Yangong *et al.* (1998) estimated the Chinese population to be fewer than 500 wild individuals. Before 1960, the species was common in western and southern Yunnan but habitat destruction and hunting have eliminated all but the remotest populations (Yang Lan *in litt.* 1998), and all remaining ones are thought to be fragmented and small (McGowan *et al.* 1999). The largest known surviving population is in Shuangbai county, where 150–250 were reported by local people in 1993; all other populations are thought to contain fewer than 100 birds (McGowan *et al.* 1999; see Distribution). Surveys in recent years have shown that the species is extinct in south-eastern Yunnan, including the counties of Mengzi, Jinping, Luchun, Hekou and Kaiyuan, and Wenshan Zhuang and Miao Autonomous Prefecture (Yang Lan *in litt.* 1997), and it may also have gone from Yingjiang and Lushui counties (see Distribution).

India The subspecies *spicifer* was believed to be confined to certain pockets of Mizoram, Manipur and Assam. Locals reported (in Baker 1894–1901) that earlier in the nineteenth century peafowl, many presumably Green, were common all over Cachar and Mizoram, but by the time he found the species in the North Cachar Hills it was far outnumbered there by Blue Peafowl *Pavo cristatus*, and he later (Baker 1922–1930) pronounced it "extremely rare" in its small Indian range. Soon afterwards it was declared "practically extinct" there (Higgins 1933–1934). It is now almost certainly extinct in Mizoram (Lalram Thanga verbally 1997). It may still occur in Manipur and Assam (Choudhury 1992a) but there have been no thorough surveys; there is only a single confirmed recent record from anywhere in India, Choudhury (1992a) reporting that it was "not uncommon" near the Myanmar border and in Manipur's Churachandpur district in 1990, with a dozen birds in a zoo in the latter. A small population possibly exists in the Bengal terai as a result of introduction (from Daniel 1957).

Bangladesh The subspecies *spicifer* was reportedly resident in south-east Bangladesh, where it was probably always "extremely rare" (Baker 1921–1930), but there have been no recent reports (Harvey 1990). In the Chittagong Hill Tracts long periods would pass between sightings, but it was known locally from a few scattered sites (Baker 1921–1930). If it survives in the country, it is either in decline (Karim undated) or more probably extinct (Khan 1982, McGowan and Garson 1995).

Myanmar The species was once evidently plentiful in suitable localities in the latter half of the nineteenth century (Oates 1883). In the nineteenth century and early twentieth century, for example, it was "very common" in Pegu state (generally; but see below) (Oates 1882), "very plentiful" in parts of Henzada yoma (Stanford and Ticehurst 1935b) and

"extremely common" (Hume 1875) or even "excessively abundant" in Tharrawaddy district in some years (Oates 1883). Harington (1909) came across it in many places in the lowland Bhamo district. Couchman (1893) found it abundant on the "banks of the larger streams" on the plain surrounding Talawgyi. In the Shan Hills it was "fairly plentiful", and commonest on plains below 900 m (Wickham 1929–1930). Stanford and Ticehurst (1938–1939) stated that it occurred in "considerable numbers" on the Irrawaddy plain. Even into the 1930s and 1940s, the detailed testimony of Smith (1942) implies that numbers in much of southern Myanmar were very high.

On the other hand, Bingham (1880a) described it as "very rare" in the Thoungyeen valley, Hopwood (1912b) found it "sparingly" in Arakan province, and Stanford and Ticehurst (1935a) considered it rare in and south of Insein Yoma Reserve; it was "uncommon" in upper Pegu, and only known at three sites (Hume 1875), present but very wary in the Attaran valley, Tenasserim (Bingham 1880a), and "very local" in Tenasserim (Hume 1874b). All Baker's (1921–1930) correspondents from the country considered it "a rare bird" and by the early 1930s it was thought comparatively rare in the country (Peacock 1933). Smith (1942) remarked that it was local, occurring in most districts, "but owing to constant persecution is rapidly becoming very scarce in all the more accessible localities", a judgement later repeated by Smythies (1986).

There is apparently no information on its current status (McGowan and Garson 1995), although it is clear that it is now scarce, local and very difficult to see. Captive birds in Mizoram were reportedly brought from north Myanmar, where populations near the Indian border are thought to survive (McGowan *et al*. 1999). It is reported to be still "common" in the Hukaung valley of Kachin and Sagaing provinces (U Thein Aung verbally 2000).

Thailand It was "not very common" in the east and "rarer" in the north by the time (c.1912) of Gyldenstolpe's (1913) visit, but was said by locals to be "very abundant" along the lower course of the Mae Ping (Gyldenstolpe 1916). Gyldenstolpe (1920) described it as "generally distributed throughout, but on account of its shyness it is seldom shot or met with by the traveller", adding that "its loud sonorous cry is, however, often heard at sunset". It was "abundant" in Ratburi and Petchaburi provinces around 1910 (Gairdner 1914). In February 1933, at Chiang Saen on the Mekong, birds came down to the river at sunset in order to drink, "sometimes in fairly large flocks" (Meyer de Schauensee 1934), and were reportedly quite common in the Ping valley between Kamphaengphet and Nakhon Sawan at that time (Madoc 1950). Deignan (1945) described the species as "well distributed in the northern lowlands" although extirpated around large towns. In the 1930s it was "common" around Doi Chang Dao and "common everywhere" in Nan province (being "seen by all who travel down the Mae Nan by boat"); "large bands" visited the Mae Ping to drink at dawn and dusk (Deignan 1945).

It may have been widespread and common into the 1960s in many parts of continental Thailand, but probably disappeared from the south more rapidly. In the peninsula it was "fairly common round the edges of the rice fields at Ban Kok Klap" in 1913 (Robinson 1915a) and several were collected in a few days in Krabi province (Robinson and Kloss 1918b). Glenister (1951) found it before World War Two and villagers in Khlong Thom district, Krabi, reported that it was still present until around 1945 (P. D. Round *in litt*. 1998). It was apparently "common" at Pattani and Trang (Robinson and Chasen 1936).

There are now perhaps four subpopulations of the species, comprising an estimated 500–700 birds (P. D. Round *in litt*. 1998, 2000). Numbers at Huai Kha Khaeng were first estimated at c.200 individuals (Round 1983b), then 225–270 in 1986–1987 on the basis of call-counts, footprints and sightings (Stewart-Cox and Quinnell 1990), and appear subsequently to have risen further with the removal of human settlements from the Thap Salao valley, allowing subadult birds to colonise the area (Stewart-Cox 1996, 1997). A population of up to 200 birds is shared between northern Mae Yom National Park, southern Doi Phu Nang National

Park and Wiang Loh Wildlife Sanctuary (P. D. Round *in litt*. 1998, 2000). Around 80 birds are thought to be currently thriving at Huai Hong Khrai Development Study Centre, a newly discovered site in Chiang Mai province (Kanjanavanit 2000, P. D. Round *in litt*. 2000). The apparent recent recolonisation of this site raises hopes that numbers in the north may be higher, and remnant populations more widespread than previously thought, especially in the hills where a large proportion of surface area is still covered by forest (P. D. Round *in litt*. 2000). The impetus for this increase or recolonisation possibly derived from birds released from Chiang Mai Zoo, although this suggestion is as yet unsubstantiated (Narit Sritasuwan verbally 2000).

Laos During exploration in central Laos in the 1920s the species was "found in abundance in all wooded parts" (Delacour *et al*. 1928), being variously described as "common everywhere" (Delacour 1929c), and, along with Red Junglefowl, "the commonest game-bird in Indochina" (Delacour and Jabouille 1925). It was common throughout the southern provinces of Salavan, Champassak and Attapu in the late 1920s and early 1930s, and "especially abundant" in certain valleys in the Ta Hoi region (Engelbach 1932). David-Beaulieu (1949–1950), having spent several years in Savannakhet province, reported the birds "extremely common throughout the province, but particularly along the Se Bang Hieng, where, morning or evening, and even during the day, one might encounter them at any moment". Reports are slightly conflicting in the north, as Delacour and Jabouille (1931) stated that the species "abounds everywhere" in that region, but it was apparently rare in the 1930s, with only one bird encountered during several months of travel (Delacour and Greenway 1940b). In Tranninh (now Xieng Khouang) it was "found only in lower areas, and even there is not very common" (David-Beaulieu 1944).

The Green Peafowl is now very scarce in the country, extinct in many regions where it was common 50–100 years ago (Evans and Timmins 1995), with a "severe decline" over the last 50 years (Evans and Timmins 1997). Populations at several sites were "reduced to vanishing point during 1992–1995" (Round 1998), and only six sites with known viable populations remain, although populations at a further ten sites have been locally reported (McGowan *et al*. 1998b). No individual population is thought to exceed 100–200 birds, and most are much smaller than this (Evans and Timmins 1995), suggesting that the national population is likely to be in the order of a few hundred birds. The population at Ban Nakhay in Phou Khao Khouay NBCA was estimated at around six calling males in 1994 (Evans and Timmins 1995), possibly 20–30 birds in total (McGowan *et al*. 1998b). A report of a communal display of around 70 individuals in Dong Hua Sao NBCA (Evans and Timmins 1995) is unlikely to be confirmed as the relevant area is now settled (J. W. Duckworth *in litt*. 1999). The population in Xe Pian NBCA appeared low as very few individuals were encountered in a two-week survey during the calling season; however, locals reported sizeable populations in remoter areas (Evans and Timmins 1995). There is a "general scarcity of Green Peafowl in Dong Khanthung" (Round 1998).

Cambodia During exploration through central and northern Cambodia in the 1920s the species was "found in abundance in all wooded parts" (Delacour *et al*. 1928), being variously described as "common everywhere" (Delacour 1929b), and, along with Red Junglefowl, "the commonest game-bird in Indochina" (Delacour and Jabouille 1925). In the 1960s, it still occurred "wherever the forest is thick and large enough" (Thomas 1964). There are no recent population estimates, but the country may support "the largest populations of all", especially given the large tracts of suitable habitat in the east which remain largely unsettled by man (Olivier and Woodford 1994, McGowan *et al*. 1998b). Evidence suggests that a healthy population might survive in Mondulkiri province close to the Vietnam border (P. Davidson *in litt*. 2000) and in Preah Vihear province in the north it was widespread and locally fairly common in 2000–2001 (P. Davidson *in litt*. 2001). It is nevertheless thought to have undergone major declines throughout the country (Sun Hean *in litt*. 1997).

Vietnam During exploration in the 1920s the species was "found in abundance in all wooded parts" of Indochina (Laos, Cambodia, Vietnam) (Delacour *et al.* 1928), being variously described as "common everywhere" (Delacour 1929b), and, along with Red Junglefowl *Gallus gallus*, "the commonest game-bird in Indochina" (Delacour and Jabouille 1925). Over 40 individuals were observed in three acres of agricultural fields near Mai Lanh in 1922 (Delacour and Jabouille 1925, 1927a), and it was observed that "when the crops are ripe, it is not unusual to see two dozen birds in a field" (Delacour and Jabouille 1925). The species was still "very common" in Gia Lai province between 1933 and 1936 (David-Beaulieu 1939).

In the twentieth century, the Green Peafowl suffered a major decline and is currently absent from many historical localities, being probably extinct in the north of the country and almost so in the central region (Nguyen Cu and Eames 1993, Nguyen Cu *in litt.* 1997, Brickle *et al.* 1998); it is now "under acute pressure in Indochina, with scattered populations persisting but under decline" (Le Xuan Canh *et al.* 1997). Between the late 1980s and late 1990s the species underwent a dramatic decline in Yok Don National Park (Laurie *et al.* 1989, Le Xuan Canh *et al.* 1997). In the early 1990s there were around 17 calling males in c.13 km^2 of Cat Tien National Park (Robson *et al.* 1993a,b) and this population still exists although it is now rather isolated as habitat has been seriously degraded or destroyed around the park (Brickle *et al.* 1998). The population in Dac Lac province has been judged probably the most important in Vietnam (Le Xuan Canh *et al.* 1997) and a survey there in 1998 confirmed this, but suggested that 40% of it is likely to be concentrated in 3% of the land area, where deciduous forest lies within 2 km of rivers and more than 2 km from human settlements (Brickle *et al.* 1998). Even in Dac Lac there has been a "major decline" as in 1978–1983 the species was apparently abundant throughout much of the province, regularly encountered in groups of up to eight individuals, even along roads (McGowan *et al.* 1998b).

Malaysia Early in the century, the Sundaic subspecies *muticus* appeared "to be common on both sides of the northern portion of the Malay peninsula as far south as Kedah", the birds being "not particularly shy, for they are hardly ever interfered with" and "often to be seen on the sand-banks of the Pahang river" (Robinson and Kloss 1910–1911). The species was reportedly "numerous in Trengganu" (Kloss 1911). Hartert (1902b) also reported that it was common in the lowlands of Pahang around 1900. It was apparently more abundant on the east coast (Beebe 1918–1922, Robinson and Chasen 1936), with little specific information from the west since the 1870s (Kelham 1881–1882), except in Selangor (Wells 1999). However, around 1900 it was not recorded on two expeditions up the Kelantan river, east of the main range (Waterstradt 1902, Gibson-Hill 1953). It was apparently numerous in the Pahang–Tembeling drainage around the same time (Wells 1999). In the mid-twentieth century Madoc (1956) reported that "seven feet of peacock flying up before one's car on the Pekan road is no uncommon sight". In the 1950s it was also still common enough to be regularly seen crossing the road in Terengganu and Mersing, Johor (Tweedie 1960). It was "common" in Setul, Perlis, portions of Kedah, the Perak river basin and the lower reaches of rivers in Kelantan and Terengganu (Robinson and Chasen 1936). Nevertheless, the last confirmed record was in the 1960s (Medway and Wells 1976) and the species is now apparently extinct in the country and unlikely to be rediscovered (Davison and Scriven 1987, McGowan and Garson 1995, McGowan and Gillman 1997, Yong 1997b, K. Kumar *in litt.* 1998, Wells 1999).

Indonesia The Green Peafowl was evidently once common on Java; it was, for example, common at Ciletu (Pelabuhanbatu bay) (Vorderman 1887), until disappearing around 1910–1920, a victim of "the war waged by development against nature" (Bartels 1915–1930). A similar situation befell it in the mountains where it was "not uncommon" around Gunung Gede but by 1930 "scarcely to be found any longer" (Bartels 1915–1930). Around 1930 it was noted that "the birds are becoming rarer in Java, and before many years, as the plantations increase, they will become extinct" (Beebe 1931); fortunately this judgement was mistaken. An evaluation of the species's status in the 1930s suggested that a "*minimum*" of 2,000–3,000

birds then occurred in Java's teak-growing areas, with reports from many other such areas being unquantifiable but positive ("very many") (Sody 1953). A new evaluation of records in the 1990s revealed totals from known sites of 915–1,149 birds, but again these are minimal values (van Balen *et al.* 1995). Nonetheless, the population is likely to be declining (McGowan and Garson 1995). In 1990–1991 van Balen *et al.* (1995) visited certain areas with recent local reports or records in the literature, but omitted some others (unfortunately not identified), so several significant small enclaves may await discovery. The danger of assuming the irrelevance of "historical" sites is shown by van Balen *et al.*'s (1995) discovery in February 1993 of birds at a site (Wonosalem) identified by Wallace (1869) in 1861 and only visited once subsequently by a biologist (in the nineteenth century).

In Ujung Kulon the species was common, with (e.g.) 15 birds seen in one palm in May 1941 (Hoogerwerf 1948a), and around 1970 the total population was "roughly guessed at from 200 to 250 individuals, certainly not more" (Hoogerwerf 1970). In Baluran, which was established as a game reserve in 1937 and as a national park in 1980, there were "very high numbers" in 1941 but disappointingly lower ones 30 years later (Hoogerwerf 1974). It was felt that the estimate of 200 birds for the site (in Johnsgard 1986) would still be valid in the early 1990s (van Balen *et al.* 1995). However, line transect estimates in a savanna/woodland mosaic yielded a density of 3.9±0.9 birds/km^2 and extrapolation of numbers of calling males, involving an assumption of one adult male to three further birds, yielded estimated totals of 408–616 birds in Baluran National Park, 168–268 birds in Alas Purwo, and 64–88 birds in Ijen (Krepekan and Lijen combined) (Indrawan 1995). These figures appear to have been generated too late to appear in van Balen *et al.* (1995), despite a common author, and were missed by McGowan *et al.* (1998b). In 1990 some 10–20 birds were estimated to be present at Lijen and c.30 at Krepekan (Indrawan and van Balen 1991).

ECOLOGY The Green Peafowl tends to live in small parties, resting and occasionally feeding in the undergrowth by day, and moving out into cultivation (if nearby) to forage more intensively in the morning and evening, or sometimes onto sand and shingle banks beside rivers (it swims very well: K. B. Woods verbally 2000), where it also sometimes roosts (Stanford and Ticehurst 1938–1939, Smythies 1986). In most areas it is shy and wary, running away swiftly when approached (Smythies 1986), but where it is (or was) less persecuted birds can be quite tame. For example, at the Pidaung Sanctuary, Myanmar, some individuals once showed little fear of man (Stanford and Ticehurst 1938–1939). It goes to roost early in the evening on large trees with little foliage, calling out loudly as it does so and again prior to descending in the morning (Peacock 1933). This behaviour renders it easy to locate and hunt (Evans and Timmins 1995, Yang Lan *in litt*. 1998, Xu Yangong *et al*. 1998); moreover, like many other galliforms, it gives an instantaneous involuntary calling response to loud noises such as gunshots and falling trees, making it easy to track down even after normal roosting calling is over (Lowe 1933). Research has shown a correlation between the minimum number of birds present and calling frequency of each bird; in other words calling is socially facilitated and more frequent in large populations (Brickle *et al*. 1998).

Habitat The species occurs from sea-level to 3,000 m, usually in lowlands or foothills but sometimes on montane grassland plateaus above 2,000 m (Delacour 1977). It generally requires open spaces on the edges of cover, such as open woodland, forest edge, savannas, farmland and riverbanks in forest, clearings and park-like country with long grass, patches of jungle and trees (Delacour 1977, McGowan and Garson 1995, Yang Lan *in litt*. 1998). It prefers areas with a good supply of water (Johnsgard 1986, Brickle *et al*. 1998) and is not shy of settlements if left unmolested, even sometimes joining domestic fowl in agricultural fields (Delacour and Jabouille 1925). The favoured vegetation type is open dry deciduous forest, often with patches of grassland, in Thailand (Round 1983b, Stewart-Cox and Quinnell 1990), Laos (Evans and Timmins 1995), Cambodia (Desai and Lic Vuthy 1996) and Vietnam (Brickle

et al. 1998). In China, it appears to be more of a forest species, occurring in monsoon and evergreen forest (K. B. Woods *in litt*. 2000). It is not known from steep slopes and avoids "deep unbroken forest and large open plains" (Delacour 1977, McGowan and Garson 1995). The habitat that has been ascribed to it in India and Bangladesh, "dense evergreen and moist deciduous forest" (Ripley 1982), may therefore be mistaken; in the Chittagong hills at Gurjunia it was found in "high reed jungle and elephant grass" in a wide valley "between forest hills" (Hume 1879–1880). In China optimum habitat appears to include forest at the edge of farmland or savanna below 1,500 m (Yang Lan *in litt*. 1998), although it is reported that since 1970 populations have moved higher, from monsoon evergreen or deciduous broadleaf forest at 500–1,500 m to deciduous broadleaf forest and secondary coniferous forest at 1,200–2,000 m, presumably as a result of hunting pressure (Xu Yangong *et al*. 1998). In Jingdong county, Yunnan, slightly more than 50% of birds were found to occupy coniferous and broadleaved forest, with the remainder in shrubland with scattered trees, grassland and farmland; most sites were less than 100 m from water, 1,300–1,400 m above sea level, with dry soil and less than 20% tree cover, and territories of three males were 0.380–0.557 km^2 (Yang Xiaojun *et al*. 1997, 1998). In Myanmar, the species is found in a variety of "jungles", from dense tall *Saccharum* grass swamps through light scrub-jungle to well-watered thick forest with elephant-grass undergrowth, but it prefers dry, open riverine forests or those near (shifting) cultivation (see, e.g., Hume and Davidson 1878, Oates 1882, 1883, Couchman 1893, Wickham 1929–1930, Peacock 1933, Stanford and Ticehurst 1938–1939, Ali and Ripley 1968–1998, Smythies 1986). It was said to be "capricious" in habitat choice, being "very abundant in some spots and entirely absent from others which seem equally well suited to it" (Porter 1883). In Thailand, it appears to be associated with the banks of streams, pools or reservoirs where dry deciduous, mixed deciduous woodland or plantations adjoin ricefields, riverine scrub, sandbars and grassy mineral licks, the birds apparently displaying in such open areas (Robinson and Kloss 1921–1924, P. D. Round *in litt*. 1998). In Malaysia, the species was recorded quite deep in closed forest, but more usually at forest edges, including flood damaged margins and sand-banks of large rivers through forest, margins of agriculture, and fire maintained scrub (Glenister 1951).

In Laos, the species is found in mixed deciduous forest below 300 m, gallery forest along rivers in areas of dry dipterocarp forest, large areas of bare rock with patches of dry dipterocarp forest on shallow sandy soil or along drainage lines (Evans and Timmins 1995), often (at least historically) coming out onto sandbanks, especially in early morning and late evening (David-Beaulieu 1949–1950). In Vietnam, it occurs in dry dipterocarp forest, especially along watercourses, swamp forest, damp open lake-fringe grasslands, bamboo, primary and secondary evergreen and semi-evergreen forests (Truong Van La and Nguyen Cu 1982, Nguyen Cu *in litt*. 1997, Tentij and Atkins 1998b). Recent research in the country attempted to clarify correlates with population density; it was found that the highest densities survived in deciduous forest with permanent water and no people within 2 km, followed by mixed forest with water but no people within 2 km (Brickle *et al*. 1998). In the absence of permanent water, density falls to a fifth of that when water is available, even when people are absent (Brickle *et al*. 1998). This clearly reveals the value of undisturbed areas, and also the critical importance of water in a dry environment. In contrast, the presence of bamboo, grass, burnt ground, scrub and cultivation were not found to have a significant relationship with peafowl population density (Brickle *et al*. 1998).

On Java the Green Peafowl is a bird of relatively dry, semi-deciduous forest and partially open habitats. It has long been noted for its acceptance of teak *Tectona grandis* plantations, and van Balen *et al.* (1995) cited nineteenth century comments that "few birds other than peafowl inhabited these forests", but that even so their abundance was greater where teak alternated with grass patches. Although described as sensitive to the cold (Johnsgard 1986) and in general being a bird confined to modest elevations, the species has been found as high

as 2,300 m and there are reports from as high as 3,000 m (van Balen *et al.* 1995). In Ujung Kulon it is observed in open ranges, light secondary bush, sometimes along the beach, and most usually in pastures and their borders; nests are usually between "lalang" (Hoogerwerf 1948a). It is attracted to pastures and their park-like surroundings (light or open forest and fringes), waste areas and second-growth patches, and therefore must be assumed to have profited in places from the loss of primary forest (Hoogerwerf 1970). Around Gunung Ringgit it inhabits forest dominated by teak and kamalina *Gmelina arborea*, plus open shrubby areas and plantations (Setiadi and Setiawan 1992). Features of peafowl habitat at Krepekan (near the Ijen Nature Reserve) are rugged terrain, a *Casuarina* grassplain, planted coffee and a tree- and shrub-lined creek; at Lijen there is extensive forest bordered by coffee (Indrawan and van Balen 1991). In a study in Baluran National Park, peafowl were found in a wide range of vegetation including open savanna, more closed woodland with fewer grasses, shrubby monsoon forest and parts of teak forest; but calling birds were rarely heard within unbroken tracts of forest (Indrawan 1995). Van Balen *et al.* (1995) described the park's savanna woodland and monsoon forest as "ideal peafowl habitat", although they noted that in the harsh dry season part of the population moves into evergreen kapok *Ceiba pentandra* plantations (outside, or at least in a small enclave of the park) where wells and a permanent watercourse exist. The number of peafowl using these plantations are, however, thought to be negligible (S. Hedges *in litt*. 2000). Birds were also recorded visiting coastal mangroves daily in the dry season, possibly for drinking and/or shade (Indrawan 1995). Males commonly use the main road in Baluran for display (Indrawan 1995), presumably because of its arena-like properties.

Roosting (Java) commonly occurs in trees which allow the birds to perch 10–15 m above ground, although females with chicks tend to stay lower, at 5–7 m (Setiadi and Setiawan 1992). The real roost tree is not the first one into which the bird ascends, but is usually the tallest in the vicinity, and among adult males they appear to be traditional (Indrawan *et al.* 1994). The roost-site within the tree is often exposed at an outer edge, frequently on slopes, presumably to allow a rapid gliding exit in emergencies (Indrawan *et al.* 1994). At Ringgit, roosting sites were 50–100 m apart (Setiadi and Setiawan 1992). In Ujung Kulon roost sites are sometimes on tall (15–20 m high) palms in the company of Woolly-necked Storks *Ciconia episcopus*, Milky Storks *Mycteria cinerea* or Lesser Adjutants *Leptoptilos javanicus* (Hoogerwerf 1970).

Food Like its close relative the Blue Peafowl, this species is omnivorous (Ali and Ripley 1968–1998), taking grains and seeds, insects, shoots, buds and young leaves of some trees and various fallen fruits (Peacock 1933, Lowe 1933). The stomach of a Chinese female contained 102 grammes of food, mostly mushrooms but also young leaves, grass, termites and beetles (Yang Lan *in litt*. 1998), and the species has been noted consuming fruits of *Pyrus pashia* and *Rubus obcordatus* (Cheng Tso-hsin *et al*. 1978). Other items recorded in the diet are rice grains and shoots, crickets, grasshoppers, moths, frogs and lizards, and local people have reported the species preying on snakes (Yang Lan *in litt*. 1998; see last paragraph of this section). In China, at the sowing and harvest seasons it may raid farmlands, showing a predilection for green pea and sweet potato (Yang Lan *in litt*. 1998); it eats peas until the harvest in mid-March, then wheat until the harvest in mid-April, then back into the forest for buds and fruit (Xu Yangong *et al*. 1998). In Huai Kha Khaeng, Thailand, it has been recorded foraging on small grass seeds from flowering heads of grasses in open dry dipterocarp woodland (P. D. Round *in litt*. 2000) and in Malaysia it was observed eating fallen fruit by the side of a road (Leyne 1941). Beebe (1936) mentioned ants, grass seeds, peppers, flower petals, crickets, grasshoppers, and small moths in the diet.

On Mount Ringgit and in Baluran National Park, Java, foraging generally takes place at 05h30–09h30 and at 15h00–17h00 (Setiadi and Setiawan 1992). Food is mainly sought on the ground, after scratching in an area typically 0.5 × 0.2 m, but occasionally in shrubs at 1–3 m, e.g. low-hanging fruits of shrubs (Hoogerwerf 1970, Setiadi and Setiawan 1992). Food

includes seeds of the pea *Phaseolus radiatus*, corn *Zea mays*, *Dactyloctenium annum*, *Lantana camara* and grasses such as *Panicum colonum* and *Digitaria sanguinalis*, leaves of *Euphatorium inulifolium* and *Leucaena glauca*, seeds and leaves of *Albizia procera* and *Sterculia campanulata*, fruits of chili *Capsicum frutescens*, and small insects such as termites *Macrotermes girvus* and *Cryptotermes cynocephalus* and their eggs, and grasshoppers (Setiadi and Setiawan 1992). H. J. V. Sody listed insects (including Orthoptera: Acridiidae [e.g. *Valanga nigricornis*], Gryllidae; Coleoptera: Scarabaeidae, also larval "cockchafers"; Isoptera; Lepidoptera; Gastropoda; worms; Amphibia [including frogs] and Reptilia [lizards and snakes]), seeds and fruits (including rice, *Paspalum conjugatum*, *Ziziphus rotundifolia*, *Capsicum* spp.) and flowers and leaves (including those of *Streblus asper*) (Becking 1989). Tender shoots and animals such as worms, snails, insect larvae, small reptiles and amphibians are probably significant components of the diet (Hoogerwerf 1970). Drinking at waterholes occurs, particularly in the dry season (Setiadi and Setiawan 1992), and the species seems particularly dependent on the availability of fresh water (Hoogerwerf 1970).

Despite the general absence of records, there is strong evidence that the Green Peafowl is highly adapted to prey on snakes; in semi-captivity it pursues, kills and eats wild snakes with intense purpose and skill (K. B. Woods verbally 2000).

Breeding *System and courtship* Although Robinson and Chasen (1936) described the common social grouping as a male accompanied by four or five hens, ageing and sexing of individuals in the field must then have been provisional (Wells 1999). Whereas females of the polygamous Common Peafowl are dull coloured, female Green Peafowls are almost as gaudy as males, suggesting that there might be considerable differences in social and sexual behaviour between the species (Wells 1999). In general the evidence is that no pair-bond is formed, and no "harem" of resident females is established; rather, territorial males court females in any group as it passes through the territory (Hoogerwerf 1970, Indrawan 1995). This conflicts with information from captivity, where pairs left to their own devices appear to be highly monogamous (second only to Congo Peafowl *Afropavo* in the galliforms); the suggestion is made that groups or "harems" seen in the field are assemblies of juvenile or otherwise non-breeding individuals and that breeding male Green Peafowl are not promiscuous (K. B. Woods *in litt*. 2000). This cleary requires further study.

Male courtship displays tend to take place in clearings, which are sometimes large open areas of up to 5–8 km^2 (Xu Yangong *et al*. 1998), or often very small openings in forest or scrub (P. D. Round *in litt*. 2000). Males hold territories and feed alone in the breeding season (the observed roosting distances of nearest-neighbour males at one site was 100–400 m), while females and immatures move about in small, apparently cohesive parties of 2–6 which may show some antagonism to other such groups but which sometimes unite in a roosting tree (Indrawan and van Balen 1991, Indrawan 1995). A "courting display" at which 12 birds proved to be present was noted in June/July at Krepekan (Indrawan and van Balen 1991). The home range of a female-led group was measured as at least 50 ha at Gunung Ringgit, Java (Setiadi and Setiawan 1992).

Season The breeding season is geographically variable. In India it apparently fell between January and April, although July–September was also recorded, while in Bangladesh birds reportedly bred in April–May (del Hoyo *et al*. 1994). In China, courtship calls and displays have been reported from late February to early May (Xu Yangong *et al*. 1998), with nests found in the Nanding river valley in April and May (Yang Lan *in litt*. 1998). In Myanmar, the season extends from March to September according to the monsoon, hence around March near Pegu but late June to September near Moulmein (Blanford 1895–1898, Stanford and Ticehurst 1938–1939, Smythies 1986, NMS egg data). In Thailand, the species was breeding in the Mae Wong district in February 1924 (Lowe 1933). In Laos, calling and displaying occurs at the end of the dry season, in February–April, with a peak in March (Evans and Timmins 1995). Eggs were found in Malaysia between March and May (Wells 1999), while

the breeding season in Pahang was thought to extend throughout the monsoon season from November to May (Robinson and Chasen 1936). In Ujung Kulon, West Java, long-trained and displaying males were mainly seen in July–September, and eggs and young were found mainly in August–October (eggs only in these months; hatching dates inferred to embrace July–December) (Hoogerwerf 1948a, 1970, Hellebrekers and Hoogerwerf 1967); two males, 10 females and 11 chicks were seen there in October 1997 (J. O. Gjershaug and N. Rov *in litt*. 1999). At Baluran, East Java, one annual cycle involved males growing their trains from March, displaying over the period from late July, and moulting their trains in December at the moment females began laying, coinciding with the onset of monsoon rains (Indrawan 1995; also Indrawan and van Balen 1991, Setiadi and Setiawan 1992).

Site and structure The nest, built by the female of reeds, grass and leaves in a shallow depression (Baker 1921–1930), is usually situated in grassland or under bushes, either in well-shaded areas (Peacock 1933, Yang Lan *in litt*. 1998), or in clearings in clumps of high grasses (Delacour and Jabouille 1927a). All nests (shallow scratched depressions, sparsely lined) in Ujung Kulon were in extensive stretches of open country with a 30–80 cm high cover of alang-alang, djarung *Stachytarpheta jamaicensis* or corresponding cover (Hoogerwerf 1970). Both grassland nests found in Malaysia were sited next to "small, isolated tree stems", and this was claimed by local people to be the norm (Madoc ms, Wells 1999). One nest in India was placed in "a hollow between the buttresses of an enormous Cotton Tree", underneath a dense thicket of thorny bushes, hence difficult to reach without lying down (Baker 1921–1930).

Clutch and incubation As with other polygynous species, the female undertakes all the incubation (Smythies 1986), a period which usually lasts 26–28 days (del Hoyo *et al*. 1994), possibly slightly longer, around 30 days, in China (Yang Lan *in litt*. 1998). Adult females usually produce one clutch annually (Yang Lan *in litt*. 1998) containing 3–8 eggs (occasionally as many as 12), although often one or two fail to hatch (Delacour and Jabouille 1927a), producing an average clutch-size of c.3–5 eggs (Smythies 1986). The largest clutch reported in Malaysia was of four eggs (Wells 1999). Clutch-size in Ujung Kulon, Java, is 2–5, mostly 3–4 (Hoogerwerf 1970). Young birds can fly at a very early age (Hoogerwerf 1970). Juveniles stay with the adults until the onset of the next breeding season, and at Gunung Ringgit, Java, it was noted that males in their second year become solitary and begin interacting aggressively with older, territory-holding males (Setiadi and Setiawan 1992).

Migration Individuals of this species wander locally but are essentially sedentary (del Hoyo *et al*. 1994).

THREATS Current threats to the Green Peafowl are considerable, as it now occupies a highly fragmented range throughout which it is heavily persecuted. Threats to the species are discussed at length by McGowan and Garson (1995) and McGowan *et al.* (1998b), and these studies should be referred to in the event of conservation strategies for the species being formulated. It is difficult to disassociate one threat from another, since hunting for meat, exploitation for trade and retributive persecution by farmers are not mutually exclusive; indeed, persecution by farmers often follows after habitat conversion to farmland. The species's preference for alluvial valleys and daily access to water overlaps with the requirements of human populations, a circumstance that is severely detrimental to the bird (Evans and Timmins 1995).

Hunting As peafowl draw attention to themselves by calling loudly at roosts they become easy targets for huge numbers of hunters throughout their range (Evans and Timmins 1995, Xu Yangong *et al*. 1998, Yang Lan *in litt*. 1998). They carry plentiful meat, provide ornamental feathers, and retail as pets. *China* At least eight birds are known to have been captured, six birds killed and five eggs collected between 1980 and 1993 in Yunnan (Yang Lan *in litt*. 1998). While this indicates that persecution certainly occurs, the true figures involved are

likely to be many times higher. The species is regarded as a pest in China by farmers who claim that, along with other pests, it causes a 10–20% crop loss (Xu Yangong *et al*. 1998), although there are no data to support this statement. Poisoned peafowl are found almost every year, and egg collection is a serious problem in Yunnan (Xu Yangong *et al*. 1998). In Chuxiang district, Yunnan, the local human population lacks awareness of wildlife conservation, and habitat destruction and hunting of the Green Peafowl still occur despite attempts to enforce existing laws (Wang Zijiang 1991b). *India* The Green Peafowl is at great risk and may even have disappeared from the country because of hunting and large-scale damage to its habitat. In the regions where it once ranged, peafowl are generally domesticated by locals who take eggs and young, and this is presumably another cause of the species's decline (Baker 1894–1901). The local tribespeople in the Manipur hills hunt and poach wildlife intensively, making the conservation of any large species problematical (Choudhury 1992a). *Bangladesh* Indiscriminate killing and trapping of birds, particularly since the partition of India in 1947, have depleted populations of galliforms (Karim undated). Legislation intended to control hunting remains ineffective (Sarker 1986a). Amongst other threats to human quarry in the country Sarker (1986a) listed the collection of eggs and chicks for food. *Myanmar* The species has been heavily hunted over the years, and owing to constant persecution it appears to have become scarce even in the most inaccessible localities (Smythies 1986). Security problems in the north have curtailed any attempts at survey work and provided a ready supply of firearms to the local population (Scott 1989). Little is known about current hunting practices in the country, but it is thought that levels of persecution and poaching are high (U Tun Yin 1954, Khin Ma Ma Thwin *in litt*. 1997), especially in many mountainous areas, owing to the hunting lifestyles of hill-tribesmen (B. F. King verbally 1998). This factor, and the 164 km of roads in the Pidaung Wildlife Sanctuary, probably results in widespread poaching in this protected area (Scott 1989). There is very little, if any, enforcement of protective legislation for either this species or its habitat in Myanmar. *Thailand* The species is still threatened by persecution and indiscriminate hunting where it survives close to settled areas (Ngampongsai 1986, P. D. Round *in litt*. 1998). *Vietnam* Hunting is a serious problem in Vietnam (Nguyen Cu *in litt*. 1998). The Ministry of Forestry (1991) noted that "levels of hunting in Vietnam are horrible… Most forests, even in nature reserves, are almost hunted out... The ground birds have been trapped and snared to very low densities." Brickle *et al*. (1998) detected a strong negative correlation between the presence of people and the population density of peafowl in Dac Lac province, presumably because of concomitant persecution as well as disturbance. *Laos* Habitat loss or fragmentation cannot alone account for the present scarcity or the speed of decline of the species, as large areas of suitable habitat remain in the country; hunting of the species with snares and guns appears to be the main factor underlying the decline (Evans and Timmins 1995). The spread of the human population into almost all regions of the country has resulted in ubiquitously unsustainable hunting levels, with disastrous effects on peafowl populations; in particular, peafowl are apparently shot whenever encountered because of the quality and quantity of meat they provide (Evans and Timmins 1995). The population at Ban Nakhay, Phou Khao Khouay NBCA, is (or at least was until recently) under severe pressure from local people: there are several nearby villages, and eggs are collected for incubation under domestic chickens and subsequent sale to traders in Vientiane (Dobias 1994, Evans and Timmins 1995). This type of pressure is likely to be widespread throughout the country (T. D. Evans verbally 1997). *Cambodia* By the 1960s, the species was apparently rare near habitations (Thomas 1964). Despite its protection under law from hunting, it is under severe threat through indiscriminate hunting for meat, tail-covert plumes and legs (Desai and Lic Vuthy 1996, C. M. Poole *in litt*. 1999), especially as "guns are plentiful" in the country (McGowan *et al*. 1998b). Although Green Peafowl parts are supposedly only used for decoration (Martin and Phipps 1996), their legs are used for medicinal purposes (Desai and Lic Vuthy 1996), as are Blue Peafowl legs in

southern India (McGowan *et al*. 1998b). *Malaysia* Although once afforded some protection through the Mohammedan belief that it is unclean, the species was eaten by many local people early in the twentieth century (Madoc ms), and fell "victim of locally changing attitudes to pot-hunting", having once been little persecuted in Malaysia but now being extinct as a result of shooting and trapping for food (Wells 1999), although habitat may perhaps always have been scarce (McGowan *et al.* 1998b); specifically, it is rumoured that in Pahang around the 1950s a local interdict on killing peafowl was lifted, with extirpation of the species ensuing rapidly (Wells 1999). *Indonesia* Persecution of peafowl was clearly rife early in the twentieth century. Bartels (1915–1930) was invited to hunt them in the mountains where few survived, but declined on account of their rarity. Hunting still occurs throughout the species's Javan range (Setiadi and Setiawan 1992); even where a taboo prevents local people from doing so (e.g. at Leuweung Sancang and Clering), this has no effect on hunters from elsewhere (van Balen *et al.* 1995). Hunting is notably heavy at Buahdua, Cikawung, Mantingan, Gunung Ringgit (for which see below) and Baluran, and birds were being sold locally at Alas Roban (van Balen *et al.* 1995). Heavy poaching is claimed to have reduced peafowl numbers in the Yang Highlands, despite their game reserve status (van Balen *et al.* 1995), although Hoogerwerf (1974) judged that the decline might have resulted from destruction of eggs and limitation of food resources by burning. At Baluran National Park some poaching of birds took place in the 1980s, and although by 1990 the efforts of local wardens and officials had brought this under control (Indrawan and van Balen 1991), it was later suggested that substantial poaching continued along the park boundaries (van Balen *et al.* 1995). However, it is thought that the species is now rarely hunted for food on Java, that snared birds are more often sold alive, and that eggs are collected for incubation before selling the chicks (McGowan *et al*. 1998b).

In Ujung Kulon, Java, natural enemies include the mongoose *Herpestes javanicus*, leopard cat *Felis bengalensis*, tigers, monitors and perhaps snakes (Hoogerwerf 1970). Depredation from these sources probably occurs at a low rate throughout the range of the species, although in most cases only the eggs or young are vulnerable. Natural predation should not, of course, contribute significantly to declines in peafowl populations.

Trade For decades, and probably centuries, the species is believed to have been traded throughout its range for meat, plumage and eggs (McGowan *et al*. 1998b). The spectacular tail-covert plumes are traded as ornaments or parts of elaborate artwork, which may have a serious impact on populations if birds are actively hunted as a consequence (Round 1988, Evans and Timmins 1995, Sun Hean *in litt*. 1997). Birds or their parts are regularly recorded in trade in Myanmar (Khin Ma Ma Thwin *in litt*. 1997), Laos (Evans and Timmins 1995, Duckworth *et al*. 1999), Vietnam (Nguyen Cu and Eames 1993) and Thailand (Round 1988a, 1990a); for example, 62 birds were counted in the Bangkok Market between 1967 and 1969 (McClure and Chaiyaphun 1971). Trade in wildlife parts in general is "exceptionally high" in Myanmar (Das 2000), a factor that is certain to be having a deleterious effect on this species. Trade in bundles of plume feathers is common along the Lao–Thai border at several markets (Srikosamatara *et al*. 1992, Srikosamatara and Sutethorn 1994, McGowan *et al*. 1998b). Thouless (1987) reported wild birds on sale between Cambodia and Thailand for c.US$25. In addition, seven birds (all but one dead) were seen for sale in the Srey Khlong wildlife market in Kompong Speu province, Cambodia, in December 1998 and February 1999, and tail-covert feathers are regularly seen in houses and markets throughout the country (McGowan *et al*. 1998b, C. M. Poole *in litt*. 1999). Wildlife traders in Ratanakiri spoke of exporting whole dead peafowl to Vietnam, and offered full sets of tail-covert plumes or stuffed peafowls for sale (the latter apparently retailing at US$100) (Martin and Phipps 1996), although it was not specified which species of peafowl were involved. In many places eggs and chicks are apparently collected for the purpose of breeding birds for their tail feathers (Nguyen Cu *in litt*. 1997, Sun Hean *in litt*. 1997). In China there is a large market for ornamental feathers, both in Yunnan and

around Beijing; in Yunnan train feathers are sold in bundles in Kunming and in towns close to the Laos and Myanmar borders (McGowan *et al.* 1998b).

Four general issues have been raised which need to be addressed before the effects of trade on peafowl populations can be assumed or assessed (McGowan *et al.* 1998b): first, feathers in markets need to be identified to species; second, whether feathers are from wild or captive birds, and whether birds are killed in the process of feather collection, need to be established; third, markets may receive and distribute products over a wide area, with traders often reluctant to provide details; fourth, current information relates to standing stock and there is no information about turnover of peafowl products.

The ornamental tail-covert feathers of Blue and Green Peafowl are surprisingly similar and criteria for distinguishing between them are not well known (see Evans and Duckworth in prep.). It is likely that feathers seen in the range of Green Peafowl are often merely assumed to derive from that species; examination of feathers traded on the Lao/Thai border, for example, revealed that they were from Blue not Green Peafowl (J. W. Duckworth *in litt.* 1999). It is much easier to collect or cut tail feathers from captive peafowl because wild birds are very difficult to find throughout most of their range; the abundance of supposed Green Peafowl feathers in Asian markets thus suggests that many come from farmed birds (J. W. Duckworth *in litt.* 1999). Most feathers in trade around Bangkok, where permits have been issued for private farms to breed the species for commercial purposes, probably derive from captive birds or collection in the field after the post-nuptial moult, and might therefore pose no threat to the wild population (Round 1988a, U. Treesucon verbally 1998). It is, however, feared that issuing commercial permits might lead to a spread in demand and abuse (P. D. Round *in litt.* 1998). In addition, large quantities of peafowl tail plumes seen at Kunming Airport (by SC) are perhaps not from wild birds because there are peafowl farms in the area (Wen Xianji verbally 1998). In general, the plumage trade is not confirmed as involving the killing of wild birds unless as a by-product of hunting for meat (J. W. Duckworth *in litt.* 1999). The price is generally not high for a single feather or even a full set, at least in Laos and Thailand (T. Hansel *per* J. W. Duckworth *in litt.* 1999). It is probably true, therefore, that peafowl are rarely, if ever, killed for their plumes (with the possible exception of Java); nevertheless, plumes presumably raise the overall value of a peafowl to a prospective hunter, and thus perhaps increase the likelihood that they will decide to pursue this quarry.

On Java, the trade in plumage is perhaps more a direct threat. At the start of the twentieth century the species was heavily hunted on the island for its train feathers, as part of the worldwide plumage trade, and this pressure is thought to have precipitated the population decline on the island (van Balen *et al.* 1995). In 1970 the hunting of peafowl under licence was still allowed in Java (Hoogerwerf 1970). At that time the poaching of small chicks for sale as aviary birds was regarded as the main threat, while the trade in train feathers was considered insignificant owing to the belief that such feathers brought bad luck (Hoogerwerf 1970). However, the males' trains are used in the traditional *reog* dance, with as many as 2,000–5,000 feathers being used in a single dancing outfit (Setiadi and Setiawan 1992, see also van Balen *et al.* 1995, McGowan *et al.* 1998b). Newspaper reports suggest that in East Java alone there are in excess of 1,000 active dance groups (McGowan *et al.* 1998b), and thus the pressure is believed to be intense. Furthermore, most existing sets of feathers were destroyed in the 1960s and are still being replaced (Soelastri 1995). It is not clear whether Blue Peafowl feathers are used, although it is worth noting that 2–3 million Blue Peafowl feathers were legally exported annually from Delhi airport alone in the four years before a trading ban was imposed in 1990 (Ahmed 1997), and that feathers are reportedly imported to meet the high demand (McGowan *et al.* 1998b). Gunung Ringgit became a major centre for peafowl feather trading on Java, with negative impacts on the wild population (Setiadi and Setiawan 1992). Edwin (1988) stated that Blue Peafowl feathers were seen as inferior and the wild Green Peafowl feathers most sought after (although the difficulty of identification between the feathers suggests

this might be in error). Feathers are also now popular as domestic ornaments, as well as earring artifacts, to the point where Blue Peafowl feathers are being imported, presumably illegally, to help meet the demand (van Balen *et al.* 1995, McGowan *et al*. 1998b).

Habitat loss In many areas, habitat loss is a major cause of the decline of this species. As an inhabitant of river valleys and adjacent flatlands, this species is always vulnerable to the first moves by people to clear and settle new areas (McGowan and Garson 1995). However, it is perhaps likely that, if hunting pressure is managed, man and peafowl could comfortably coexist (J. W. Duckworth *in litt*. 1999), particularly as the species is not reliant on tall forest and can thrive in degraded scrubland. *China* It appears to have been lost from Lushui county, Yunnan, since local people reported that since Liuku was established as the administrative centre of Nujiang prefecture there has been considerable urban development in lowland areas and Green Peafowl are no longer present (Yang Lan *in litt.* 1997). In Menghai county changes to habitat along the Liusha river at Mengsong and the Nan'a river at Meng'a apparently caused the species to disappear (Wen Xianji *et al.* 1995). Given the apparent close relationship between Green Peafowl and intact forest in Yunnan (Yang Xiaojun *et al.* 1997, 1998), the impact of forest loss or habitat degradation is possibly more severe. *Bangladesh* The human population explosion has caused widespread damage to natural habitats and a loss of indigenous wildlife (Karim undated). In particular, forests have suffered heavily at the hands of commercial and illegal logging operations, becoming fragmented and with remaining patches increasingly threatened by felling for plantations (P. M. Thompson *in litt*. 1997). *Myanmar* Although recent information regarding habitat loss and degradation in Myanmar is scarce, the species's habitat is reportedly being rapidly destroyed, particularly through clearance for shifting agriculture (Khin Ma Ma Thwin *in litt*. 1997). *Thailand* Apart from hunting, deforestation is the other major threat to the species in the country (Ngampongsai 1986). It has disappeared from most of its former range owing to forest clearance and settlement of lowland areas (P. D. Round *in litt*. 1998). *Laos* Forest loss and clearance of lightly wooded lowlands has exacerbated the massive population declines reported in this country and throughout Indochina (Evans and Timmins 1995). However, huge areas of suitable habitat remain wherein it could proliferate if hunting levels were controlled (J. W. Duckworth *in litt*. 1999). *Vietnam* Habitat has been lost and degraded because of wartime use of chemical defoliants, clearance of land for agriculture, and logging, and this is thought to be a major cause of the decline and contraction of range in Vietnam (Nguyen Cu and Eames 1993, McGowan and Garson 1995). The large areas of open dry deciduous forest that remain in Dac Lac province are likely to suffer from planned "massive industrial and agricultural development", and from the highest immigration rate of any province in the country (Brickle *et al*. 1998). *Cambodia* In early 1998, 80% of Bokor National Park was considered affected by logging activity, much of it clandestine (Poole 1999). At the current rate of extraction, which has been shown to be heaviest in the Cardomom range, Cambodia's forest resources may well be depleted to zero within the first decades of the twenty-first century (Poole 1999). Although Thai and Malaysian sawmills have closed down, local sawmills are still operating apace in the Bokor area, with considerable military involvement, and while this area remains under army control nothing can prevent the continuation of logging (Goes *et al.* 1998a). Areas within both Kirirom and Bokor National Parks are affected by a scheme which authorises Khmer Rouge defectors to conduct logging activities, at least until 2000 (Goes *et al*. 1998a). *Indonesia* Setiadi and Setiawan (1992) mentioned "large-scale forest clearance" as a threat on Java, although this presumably referred to the past as few "large-scale" forests presently remain to be cleared. Moreover, so long as forest was converted to fallow alang-alang or scrub jungle, and not to intensive cultivation, such alterations were actually deemed favourable to Green Peafowl (Hoogerwerf 1970). At Gunung Ringgit the conversion of habitat to crop production is a major threat (Setiadi and Setiawan 1992). In several areas (including Baluran National Park) the loss of natural grasslands and savanna woodland to invasive *Acacia nilotica* scrubland is a threat (S. Hedges *in litt*. 2000).

Disturbance The grazing of domestic cattle and the intense disturbance of almost all habitats by the dense human population in Bangladesh threatens all species of galliform (Sarker 1986a). Better protection in Huai Kha Khaeng, Thailand, resulted in an expansion of the peafowl population, but this may not last as there are plans to develop the sanctuary commercially with a consequent increase in human disturbance (Stewart-Cox 1996, 1997). Threats to Cat Tien National Park, Vietnam, are dealt with in the equivalent section under Orange-necked Partridge *Arborophila davidi*; upgrading of footpaths to driveable tracks in the park has increased human disturbance (Tentij and Atkins 1998b). At Yok Don National Park, no active conservation measures are undertaken and access is practically unrestricted, so that the hunting of wildlife is intense, with obvious likely consequences for the Green Peafowl (Nguyen Cu *in litt*. 1997, Le Xuan Canh *et al*. 1997).

Hydropower development In October 1996 the Thai government approved hydropower development on the Mae Yom river inside Mae Yom National Park, although to date construction has been delayed by local opposition (P. D. Round *in litt*. 1998); however, elsewhere in Thailand important riparian habitats have largely been cleared, settled or inundated by hydroelectric schemes following which the remaining populations of peafowl have been persecuted by loggers, farmers and hunters (Round 1988a).

Population fragmentation Populations of the species are now sufficiently fragmented that concerns have been raised regarding the potential problem of inbreeding (Yang Lan *in litt*. 1998). The fragmentation of range has presumably isolated many small populations of the species, causing each subpopulation to be more susceptible to local extinction; it has been suggested that the subspecies *imperator* "is highly fragmented throughout its range and thus... may be less secure than its substantial distribution suggests" (McGowan and Garson 1995).

Disease Local people in Yingjiang, Shuangbai and Chuxiong, China, recently reported in that in some areas Green Peafowl disappeared after major disease outbreaks in domestic poultry (Yang Lan *in litt*. 1998). It is thus possible that poultry disease affects peafowl populations, especially in areas where they feed in farmland alongside chickens. As many as 21 birds of unknown origin were released into Baluran National Park in 1991 (van Balen *et al*. 1995), which has been construed as a threat through hybridisation (McGowan and Garson 1995), although presumably disease transmission might be a greater danger in such situations since hybridisation with another race (if indeed another race was involved, which is apparently not the case; see Remarks 14) would not *per se* be likely to cause a decline (apart from in the genetic uniqueness of the naturally occurring race).

Pollution and poisoning The use of agrochemical fertilisers and pesticides in farmland poses an additional threat (Yang Lan *in litt*. 1998). There are reports in China of Green Peafowl killed by poisoned grains mixed with pesticides for rodent control (SC). At Gunung Ringgit, Java, peafowl are threatened by local farmers who poison them in retaliation for eating their crops; c.100 are believed thus to have been killed up to 1992 (Setiadi and Setiawan 1992; see Remarks 15).

MEASURES TAKEN ***Legal protection*** The species is listed on CITES Appendix II and receives full legal protection in India, China (nationally protected species, first class), Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia. The species has been protected under Indonesian law since 1973 (Inskipp 1986). In Chuxiang District, Yunnan, wildlife conservation laws are being implemented to help protect the Green Peafowl and other important species of conservation interest; unfortunately the laws have yet to be rigidly enforced (Wang Zijiang 1991b). In areas of Myanmar controlled by the Karen National Union, the killing of Green Peafowl is prohibited and the transport of all wild animals (except elephants) and their products out of the region is controlled; these laws are, however, often ineffective because of a lack of commitment (Martin 1997).

Protected areas It has recently been determined present in 25 protected areas, of which Cat Tien National Park and Bach Ma National Park, Vietnam, and Gunung Gede-Pangrango National Park, Java, are considered irreplaceably important for the long-term conservation of galliforms in East Asia (McGowan *et al.* 1998b). However, populations at the latter two sites are virtually non-existent (see Distribution). Three other sites are listed in a near-minimum network of protected areas for this species by McGowan *et al.* (1998b): Baluran National Park and Meru Betiri National Park, Java, and Nakai-Nam Theun Conservation Area, Laos, but there are no confirmed reports from the latter site (see Distribution) and if it survives there it must be in tiny and dwindling numbers. *China* The species has been recorded in or near to several protected areas: Qinghua (Beiyinqing Green Peafowl) Nature Reserve (2 km^2, condition of forest unknown but the area seems far too small for Green Peafowl, although established expressly for the species in 1988 according to sources in Distribution), Tongbiguan Nature Reserve (342 km^2, forest apparently in fairly good condition), Wuliang Shan Nature Reserve (234 km^2, forest apparently in very good condition), Ailaoshan National Nature Reserve (504 km^2, forest apparently in fairly good condition, but partly degraded in the lowlands), Daxueshan Nature Reserve (158 km^2, forests probably in good condition), Weiyuan Jing Nature Reserve (77 km^2, forest apparently in good condition), Nangunhe Nature Reserve (70 km^2, forest apparently in good condition), Laiyang He Nature Reserve, Mangao Nature Reserve, and Xishuangbanna National Nature Reserve (2,418 km^2, forest apparently rather disturbed and fragmented but still important) (see Distribution; protected areas size and condition from MacKinnon *et al.* 1996). *Myanmar* Certain protected areas, such as those at Maymyo, Shwesettaw and Tamanthi, and possibly also Pidaung and Shwe-U-Daung, possibly provide some protection for this species (Salter 1983). *Thailand* It is present in at least four protected area complexes: Huai Kha Khaeng (2,575 km^2)/Thung Yai; Wiang Loh/Doi Phu Nang/Mae Yom; Sri Nan/Mae Jarim and Mae Ping; and also Huai Hong Khrai, a *de facto* protected area (P. D. Round *in litt*. 2000). *Laos* This species has been recorded recently from Dong Hua Sao NBCA and Phou Khao Khouay NBCA; and a population near Ban Nakhay in Phou Khao Khouay NBCA is of high conservation value (J. W. K. Parr *in litt*. 1999; see Remarks 4 under Masked Finfoot *Heliopais personata*). A project at this site involved publicising the global importance of the species and consulting village leaders to explain that killing or capturing adults and stealing eggs is illegal (Evans and Timmins 1995). Subsequently, the species has been the focus of a two-year project financed by the Canada Fund, targeting conservation activities and agroforestry interventions among neighbouring communities (J. W. K. Parr *in litt*. 1999). Mapping of the habitat has been undertaken and villager reports documented in 1997 and 1998; population estimates are vague (20–30 birds) because social structure (group size and composition) is unclear, but the entire site has been earmarked as a Species Protection Zone, with special regulations to be applied; local support for the project, and the species, is high (J. W. K. Parr *in litt*. 1999). This peafowl conservation project cost US $20,000, and gave fruit trees in return for conservation agreements, with the result that birds are being observed by the local communities more regularly, and have extended their breeding range; it should be noted that the success was significantly enhanced by the collection of guns as part of a national programme (J. W. K. Parr *in litt*. 2000). However, the project is simple enough to be easily replicated elsewhere. *Vietnam* The species is still present in Cat Tien National Park (350 km^2) and its Cat Loc extension (235 km^2), where conservation management is being improved by an ongoing WWF project, and Yok Don National Park, which is the focus of a WWF/GTZ conservation project (A. W. Tordoff verbally 2000). *Indonesia* Ujung Kulon was declared a national park in 1980 (van Balen *et al.* 1995). At Cikepuh (near Sukabumi) there are two reserves with a total of 8.5 km^2 in which it is presumed the remnant population persists (van Balen *et al.* 1995). Leuweung Sancang includes a 22 km^2 nature reserve with plans (in the mid-1990s) to extend it to include a further 30 km^2 (van Balen *et al.* 1995). Gunung Clering possesses two reserves totalling 14 km^2 (van Balen *et al.* 1995). Mantingan has two tiny reserves

(van Balen *et al.* 1995). Ranu Darungan lies within Bromo-Sengger-Semeru National Park, established in 1982 (van Balen *et al.* 1995). The Yang Highlands were established as a game reserve in 1962, but this evidently had no effect in controlling hunting (van Balen *et al.* 1995); the area is reportedly 15 km^2 (McGowan and Garson 1995), but this presumably refers to the forest cover, not the reserve, since the latter embraces 150 km^2 *fide* V. Nijman (*in litt.* 1999). Meru Betiri has been protected since 1972 and is now a national park embracing lowland forest, plantations and pastures over an area of 580 km^2 (van Balen *et al.* 1995). Baluran National Park covers c.250 km^2 (Indrawan 1995) and, on the basis of data under Population, contains the largest population of Green Peafowl known in Java. Krepekan and Lijen fall within the 26 km^2 Kawah Ijen/Merapi/Ungup-Ungup area, which has been a nature reserve since 1920 (van Balen *et al.* 1995); on the basis of data under Population, this reserve appears to contain the highest density of Green Peafowl known in Java. Alas Purwo National Park (recently declared, having been a game reserve since 1939) covers c.434 km^2 (Indrawan 1995; MacKinnon *et al*. 1982 and Whitten *et al*. 1996 provide widely different figures), although it almost certainly contains smaller areas of suitable habitat than Baluran (largely being a limestone headland with little surface water: S. Hedges *in litt*. 2000) and hence probably a lower population. On Gunung Ringgit interviews with local bird-catchers led to their appreciation of the species as a threatened bird and they agreed voluntarily to cease catching birds (Setiadi and Setiawan 1992). The mention of Ciogong as a nature reserve in the Discussion in van Balen *et al.* (1995) is countered by their earlier statement that it is a proposed reserve; the area in question is given variously as 142 km^2 (McGowan and Garson 1995), 15 km^2 (MacKinnon *et al*. 1982, Whitten *et al*. 1996) and 10 km^2 (local PHPA reports: SvB).

Awareness campaigns Extensive public awareness campaigns have been carried out in China informing people of the threats faced by peafowl and the importance of conserving them (Yang Lan *in litt*. 1998). The Wildlife Conservation Society has produced and distributed a series of posters highlighting the importance of peafowl populations in Laos and urging local villagers to reduce hunting intensity on this species (W. G. Robichaud verbally 1997).

MEASURES PROPOSED The Green Peafowl has been considered one of the highest conservation action priorities amongst the galliforms (McGowan and Garson 1995, McGowan *et al*. 1998b). Although the formulation of a recovery plan is hampered by the severe fragmentation of remaining populations and the uneven quality of information from different range countries, a proposal is presented by McGowan *et al*. (1998b) containing four components: strategic review; assessing status and ecology; understanding the man–Green Peafowl relationship; considering the possibilities of re-introduction.

Research It should be noted that a great deal of survey work and monitoring has been completed in remote areas of Asia over recent years, and that the importance of this approach is waning. This is not to say that such research should be discontinued, but that the emphasis must now shift to rigorous protection of known populations. There is nonetheless a continuing need to census known populations, investigate their ecological requirements and identify further populations. Declines and extinctions should be documented, and their caused determined, so that the suitability of re-introduction can be forecast and extant populations more effectively safeguarded (McGowan *et al*. 1998b).

Searches for historical populations (or monitoring of known populations) are recommended in India (R. Kaul *in litt*. 1998), the Chittagong Hill Tracts in Bangladesh (Karim undated), Laos (Evans and Timmins 1997), Lai Chau and Son La provinces (Le Trong Trai 1996) and Gia Lai and Kon Tum provinces (Brickle *et al*. 1998) of Vietnam (in 2000, surveys were conducted in southern Gia Lai, where two sites were found: A. W. Tordoff verbally 2000), and the adjacent Mondulkiri and Ratanakiri provinces of Cambodia (Brickle *et al*. 1998). The two most important foci for future surveys are Cambodia and Myanmar (McGowan *et al*. 1998b). Other range countries are recommended to pursue regular censuses.

More importantly, detailed ecological research should be encouraged for all known populations, or perhaps two focused studies, one in Java and one in South-East Asia (McGowan *et al*. 1998b). In particular, the Kunming Institute of Zoology in China should be encouraged to conduct research into the conservation biology of the species in Yunnan. The effects of population fragmentation on demographic processes such as breeding success and recruitment would also repay study and facilitate the formulation of management plans for the species in protected areas; further work to identify habitat preferences more accurately, in order to investigate possible limiting factors such as water availability, are vital to the preparation of an appropriate conservation strategy (McGowan *et al*. 1998b). Knowledge of social structure and calling behaviour would help results from surveys to be interpreted into meaningful population estimates, and would also allow future surveys to be designed efficiently (McGowan *et al*. 1998b). In Dac Lac, Vietnam, recent surveys should be replicated at intervals and repeated in the wet season to clarify trends in seasonal habitat use, population and distribution (Brickle *et al*. 1998). In Indonesia, a detailed investigation of the ecology of the Green Peafowl at several different sites on Java is crucial for the provision of information for the long-term management of the species. The use of radio-telemetry would make this a relatively straightforward but extremely productive study. Studies of the role of small reserves (<0.5 km^2) as refuges is urged (van Balen *et al*. 1995). Investigation of the status of the species at many sites in Java is desirable: Buahdua, Randublatung, Cepu, Lebakharjo, Yang Highlands, Meru Betiri, Gunung Ringgit and Gunung Raung are perhaps the most pressing and obvious targets. However, given the strong links between Green Peafowl and teak forest (see Ecology), and the existence of very roughly 10,000 km^2 of teak plantations on Java (van Balen *et al.* 1995), there is a need to overlay known peafowl sites on a modern map of these plantations and, combined with other relevant mappable information such as local human population densities and waterbodies, determine the areas in which substantial numbers of peafowl (>100 birds) might have escaped detection. The "extensive teak plantations of Grobogan and Ponorogo in Central and East Java" have been identified as two major areas to survey (van Balen *et al.* 1995). However, the standard of living in teak-growing areas of the interior is very low, the birds and their eggs are a prized source of protein, and their feathers are a source of income, so that many currently undetected populations may be approaching extirpation (van Balen *et al.* 1995): a search for appropriate alternative sources of food and income in such areas would be worthwhile. Finally, an assessment of the effects on wild populations of trade in plumes is required (Duckworth *et al*. 1999), as is a quantitative description of the trade at specific locations and an investigation of the trade's importance to local economies (McGowan *et al*. 1998b).

Control of hunting and trade The most vital measure towards the conservation of this species is the minimisation of persecution. Hunting and trapping need to be controlled more effectively throughout the range of this species, at least partly through locally based education campaigns (McGowan and Garson 1995). Wherever possible, a complete ban on hunting of this species should be enforced; in particular a cessation of snaring in protected areas containing this species is required (Duckworth *et al*. 1999). The means by which hunting is controlled might involve site-based or community-based approaches to changing the attitudes of local people (see below under Management, education and ecotourism), or direct governmental intervention to control ubiquitous gun ownership, as has occurred lately in Vietnam and Laos (J. W. Duckworth *in litt*. 1999, J. W. K. Parr *in litt*. 2000). The success with which populations of Green Peafowl and gaur *Bos gaurus* have increased at single sites in northern Thailand prove to what extent these species can "respond when the threat of hunting is removed and when some regeneration of secondary forest is allowed to take place" (Kanjanavanit 2000).

International and internal trade should be monitored and controlled (Evans and Timmins 1995, Duckworth *et al*. 1999), and existing legislation should be enforced to prevent the sale

of feathers from hunted birds. Unfortunately, this proposition is fraught with difficulties. First, a considerable amount of trade is domestic; and second, it is almost impossible to distinguish between feathers of wild and farmed birds, and surprisingly difficult to distinguish Blue from Green Peafowl train feathers (Evans and Duckworth in prep.). To address these difficulties strong regulations on domestic trade are required, and documentation to prove that traded feathers are from farmed birds should be mandatory. While it might be suggested that farms should only keep Blue Peafowl, so that all Green Peafowl feathers in trade are known to be illegal, this might have the undesirable consequence that traders will promote Green Peafowl feathers as "better", more desirable and more costly because they are rare, and thus illegal poaching of the species might unwittingly be promoted. Also, as Blue and Green Peafowl can hybridise (Delacour 1977), escapes might infiltrate the wild populations. For this reason it is urged that no Blue Peafowl be farmed within the range of Green Peafowl, but that the possibility of farming Green Peafowl be investigated while attempts are made to meet demand by importing farmed Blue Peafowl feathers (McGowan *et al.* 1998b). The value of posters depicting and denouncing the trade in feathers should also be investigated (J. W. K. Parr *in litt*. 2000).

Management, education and ecotourism As remaining peafowl populations are highly localised, declining rapidly and targeted by hunters, there is an urgent requirement for specific protective measures to be implemented (Evans and Timmins 1995). The situation might be reversed by harnessing the widespread, charismatic appeal of the species, fostering a pride of ownership in local populations and alerting protection agencies to play a more pro-active role in its conservation (J. W. K. Parr *in litt*. 2000). To pursue this end, education and direct management should play a significant role in a conservation strategy; indeed, the Green Peafowl is one of few species for which a highly focused recovery programme is currently appropriate (Evans and Timmins 1995), alongside stronger legislation, stricter enforcement and monitoring of population trends (Duckworth *et al.* 1999). Effective management teams and education programmes should be initiated in key protected areas supporting peafowl populations; for example, the project at Phou Khaokhoay NBCA (see under Measures Taken) should be replicated (with appropriate modification) in Xe Pian and Phou Xiang Thong NBCAs and in Dong Khanthung proposed NBCA, Laos (Evans and Timmins 1995, Duckworth *et al.* 1999), as well as further afield where appropriate. The existing CPAWM/WCS poster campaign urging protection of Green Peafowl should be continued indefinitely (Duckworth *et al.* 1999).

In China, more regular patrolling of protected areas is required to control poaching pressure, farmers should be (where not already) compensated for loss of crops owing to pilfering by peafowl, and subsidised crops should be grown in appropriate areas as food supplements for the species (Xu Yangong *et al.* 1998). In addition, local people, and especially farmers, need to be educated as to the importance and endangerment of the species (Xu Yangong *et al.* 1998, Yang Lan *in litt*. 1998), and poison baits laid for rodents should be strictly forbidden (Xu Yangong *et al.* 1998). While an education programme in Vietnam seeking to improve local awareness of the importance of dry deciduous forest and its associated fauna (Brickle *et al.* 1998) might prove beneficial, a targeted approach roughly following or modifying the protocol adopted at Phou Khao Khouay, Laos, will probably prove more effective at selected key locations. Strategic plans should be made and implemented to control the spread of people and agricultural areas in Dac Lac province (Brickle *et al.* 1998). Given the avoidance of populated areas by the species, this is a vital step to ensuring its survival. Forestry concessions within dry deciduous forest in Dac Lac province should be effectively policed to prevent illegal use (e.g. grazing, firewood collection, illegal logging, hunting, fishing and settlement) outside logging periods (Brickle *et al.* 1998). Access should be restricted to border forests using existing border guards to enforce this (Brickle *et al.* 1998). In Indonesia, management of sites to create optimal peafowl conditions may be necessary. A general feature

of peafowl sites on Java is "parkland" landscape generated by banteng *Bos javanicus* grazing, active management and enclaves of plantations; when abandoned, these clearings revert to light secondary woodland and are less suitable for peafowl (van Balen *et al.* 1995). A study of habitat selection in Green Peafowl is, however, necessary to confirm this phenomenon. Awareness campaigns, perhaps linked to ecotourism, are also needed in Java (van Balen *et al*. 1995). The potential for ecotourism at peafowl sites in general should be considered (with reference to Blue Peafowl tourism in Chitwan National Park, Nepal) and linked to other tourism attractions where appropriate (J. W. K. Parr *in litt*. 2000).

Protected areas Given the current weakness of protected area management in most Asian countries, protected area designation is insufficient in the short or medium term; a suite of other approaches (some discussed above) should be considered, in particular those which provide incentives (usually directly or indirectly financial) to key village communities to inspire their confidence and compliance in protecting peafowl populations (J. W. K. Parr *in litt*. 2000). While the establishment or expansion of protected areas is often meaningless in itself, their existence provides leverage with which to initiate or improve such site-specific projects, and in some cases management is relatively secure (e.g. at Baluran National Park, Java, and Cat Tien National Park, Vietnam). Key protected areas should be given increased support, and in areas with few relevant reserves (e.g. China) new protected areas should be established (McGowan *et al*. 1998b).

China MacKinnon *et al.* (1996) made the following recommendations for the protected areas where this species has been recorded: at Qinghua (Beiyinqing Green Peafowl) Nature Reserve, re-evaluate and extend the area if possible; at Tongbiguan Nature Reserve, substantially extend the reserve northwards; at Wuliang Shan Nature Reserve, extend the area to link up with Ailaoshan reserve; at Ailaoshan National Nature Reserve, extend the area to link up with Wuliang Shan reserve; at Daxueshan Nature Reserve, strengthen protection; at Weiyuan Jing Nature Reserve, consider an extension to the reserve; at Nangunhe Nature Reserve, extend the reserve; at Xishuangbanna National Nature Reserve, reconstruct forest corridors and strengthen protection, particularly of the rare evergreen forest formations, and develop agroforestry systems in the buffer zones. However, many Green Peafowl live outside existing nature reserves in China and new protected areas need to be established for their conservation (Yang Lan *in litt*. 1998). Xu Yangong *et al*. (1998) suggested that all known sites for Green Peafowl in China should immediately be protected and eventually linked up as bigger reserves where possible. This approach is perhaps unlikely to succeed given human needs in the region, and it is perhaps best to focus on establishing two major protected areas where the largest populations of the species are thought to survive. The first should be sited where Shuangbai county, Chuxiong City and Lufeng county all meet; the second should be sited on the range including Lishejiang river, Malonghe river and Taihejiang river in Chuxiong City, Nanhua county, Shuangbai county and Xinping county (McGowan *et al*. 1998b). *Myanmar* Suitable habitat in the Pegu yoma region should be conserved by establishing one or more protected areas (Khin Ma Ma Thwin *in litt*. 1997). Key sites for protection urgently need to be identified (McGowan *et al*. 1998b). *Thailand* The protected area (and World Heritage Site) at Huai Kha Khaeng requires the most stringent protection (McGowan *et al*. 1998b). *Laos* The emphasis in Laos should be placed on a general reduction of hunting, disturbance and habitat destruction over a period of years in the large NBCAs, in parallel with sustainable patterns of resource use by local residents (Berkmüller *et al.* 1993). A viable population of the species is thought to survive in Dong Khanthung proposed NBCA, Laos, and this site should be granted full legal protection (Evans and Timmins 1997, Thewlis *et al.* 1998, Round 1998). The direct management project in Phou Khao Khouay NBCA should be continued (Evans and Timmins 1997), and high levels of protection should be applied to Xe Pian NBCA (McGowan *et al*. 1998b). *Vietnam* In Dac Lac province, where the majority of birds in the country persist, the districts of Ea Sup, Ea H'Leo, Buon Don, Cu

M'Gar, Cu Jut, Dak Mil and Ea Kar hold the most important tracts of habitat, and undisturbed waterbodies within these areas, notably the Ea H'Leo, Ea Khal, Ea Wy, Ya Lop, Dak Dam, Dak Rue, Ea Rok and Serepok, urgently require permanent conservation within large continuous reserve blocks, which will also be extremely valuable to several species of large mammal (Brickle *et al*. 1998). The expansion of Yok Don National Park (see Brickle *et al*. 1998) and establishment of other proposed protected areas, such as those in south-east Gia Lai province, Ea So in Dac Lac (220 km^2), Kalon Song Mao extension in Binh Thuan province (133 km^2) and Tan Phu in Dong Nai province (190 km^2) should be fully implemented at the earliest opportunity (Wege *et al*. 1999). The other site where protection should be maximised is Cat Tien National Park (McGowan *et al*. 1998b). *Cambodia* Suitable areas in Mondulkiri or Ratanakiri provinces should be established as protected areas to form a large cross-border reserve with Yok Don National Park in Vietnam (Brickle *et al*. 1998). Protection at Snuol Wildlife Sanctuary and surrounding areas should be maximised. *Indonesia* By 1995 reserves of 20 km^2 (Gunung Ringgit) and 40 km^2 (adjacent Gunung Beser), proposed in 1982, had still not been established (Setiadi and Setiawan 1992, van Balen *et al.* 1995), but if hunting can be controlled these areas remain important to gazette. The proposed extension of the reserve at Leuweung Sancang is highly desirable if it has not yet taken place (see Remarks 9). A 1990 proposal to create a reserve at Lebakharjo, given the presence there of 160 km^2 of largely pristine lowland rainforest (van Balen *et al.* 1995), seems eminently sound and possibly one of the most important general biodiversity conservation measures enactable today in Java. A reserve of 600 km^2 was proposed in 1982 for the mountain complex at Gunung Raung (SvB) and this, too, must be a major priority for biodiversity conservation in Java. The protected areas at Baluran and Ujong Kulon deserve strict management and protection for this species (McGowan *et al*. 1998b).

Re-introduction Given the comparatively large populations of birds in captivity, it has been deemed that "reintroduction into protected areas would be perfectly feasible" (Howman 1985; but see below). On Java, van Balen *et al*. (1995) proposed releasing confiscated birds into areas like Gunung Muriah (or Muryo), a proposed protected area where the species has died out, and even into apparently suitable sites such as Pangandaran nature reserve in West Java. Other management options, such as the translocation of individuals between populations (McGowan and Garson 1995), really only merit pursuit after efforts to protect various populations in protected areas have met with success. However, the possibility of using plantation estates for the re-introduction of *P. m. muticus* into the Malay peninsula needs investigation (McGowan and Garson 1995), although exposure to poison baits used to control pest rodent populations is a problem foreseen for any re-introduced peafowl population in Malaysia, particularly in the palm plantations which have been proposed for this project (Wells 1999). Management bodies wishing to re-introduce the species should follow the IUCN (1998) guidelines for re-introduction. In particular they must establish a studbook to monitor stock; birds of uncertain origin should not be used (see section below on taxonomy). A study is needed of the genetic makeup of wild populations and of the feasibility of translocating individuals between populations to avoid excessive inbreeding (Yang Lan *in litt*. 1998); such work might be particularly important in areas of China where isolated remnant populations are tiny.

With regard to the value of captive breeding, serious doubts have been expressed whether animals can survive in the wild after several generations of captivity, owing to physiological and behavioural degeneration during domestication (Assink 1993). With proper management, captive breeding can improve the survival prospects of species, but in the case of gallinaceous birds resort to this should only be seriously considered when wild populations have fallen below 2,000 individuals (Knoder 1988) and as a last possible strategy (Assink 1993). As avian diseases are a major difficulty with captive breeding, vaccination against relevant strains is vital (see, e.g., Pandey 1993a).

The conservation value of captive populations has been reduced by interbreeding of the supposed subspecies (McGowan and Garson 1995). Moreover, farms in China and Thailand are known to stock Green and Blue Peafowl together (Wen Xianji verbally 1998, U. Treesucon verbally 1998). Such management practices raise the issue that different subspecies of Green Peafowl have already been crossbred in captivity, and that some birds may be interspecific hybrids.

Taxonomy Taxonomic clarification is required to determine whether the three subspecies are valid and justify separate conservation action (McGowan and Garson 1995). This factor is also relevant to the management of captive populations. Pure subspecific populations must be established and managed separately, then carefully maintained as isolated stocks, for there to be any conservation value in captive breeding (McGowan and Garson 1995). No farming of Blue Peafowl should be allowed in the current range of Green Peafowl because of the likelihood of cross-breeding between escaped birds and wild stock; the same consideration means that great care should be taken in selecting farm founders for Green Peafowl, preferably targeting wild birds rather than captive birds of uncertain racial history (J. W. Duckworth *in litt*. 1999). It should be borne in mind, however, that although interbreeding between Green and Blue Peafowl has been recorded, this tends to occur after periods of inducement and confinement and is not likely to occur in the wild state (K. B. Woods *in litt*. 2000). Nevertheless, Irby (1861) and many other observers mentioned seeing hybrids between the two peafowl, and it is thus sensible to act on the precautionary principle that interbreeding is possible and therefore important to avoid.

REMARKS (1) Three subspecies are currently recognised: the nominate race (previously in the Thai-Malay peninsula, but currently confined to Java), *imperator* (originally distributed from Myanmar east of the Irrawaddy, south through Thailand to the Isthmus of Kra, west to southern China, Laos, Vietnam and Cambodia) and *spicifer* (north-east India, south-east Bangladesh, Myanmar west of the Irrawaddy and possibly south Tibet) (del Hoyo *et al*. 1994). The form in Yunnan is not separated taxonomically but it apparently differs in a few aspects from other forms, particularly in its forest-dwelling habits, an "odd, monal-like bill", a curiously long hind toe and longer, more slender wings (K. B. Woods *in litt*. 2000). Its taxonomic placement should perhaps be investigated further. (2) The species was reported from two counties in south-east Tibet by Yin Binggao and Liu Wulin (1993), but these reports were questioned by Li Zhu-mei (in McGowan and Garson 1995). Moreover, the records possibly fall within the boundaries of Arunachal Pradesh, India (as mapped in TAW 1999), a curious fact given that there are no records of the species in that state. (3) The North Cachar records are thought possibly to relate to "stock from tame birds, which had been imported generations previously" (Baker 1921–1930) and are thus treated as provisional. (4) The original localities for the Chittagong Hill Tracts were Gurunia and Ramoo, but the former was corrected to Garjania, and the latter excluded on the basis of being a petty "township" within the delimitation of Garjania (Inglis 1910). (5) Hlawga Park at Htauk Kyan, Yangon (Rangoon), has a captive stock of 17 birds, some of which have been raised in captivity. The origin of the original stock is not known (Khin Ma Ma Thwin *in litt*. 1997). About 11 individuals are maintained at Yangon Zoo, some of which were captured in the wild, and others donated to the zoo; most of these birds were captured from townships close to Pegu yoma and Yangon states (Khin Ma Ma Thwin *in litt*. 1997). (6) Interviews were considered an appropriate way of surveying for the species, as it is large, conspicuous and familiar to villagers (McGowan *et al*. 1998b). In almost all cases, therefore, villager reports are likely to be accurate, but some confusion has occurred between Crested Argus *Rheinardia ocellata* and Green Peafowl (Evans and Timmins 1995, T. D. Evans verbally 1997), suggesting that in some areas extra caution has to be applied. (7) As an example of how even a large and spectacular species with a far-carrying call can go so little detected or suspected on even so

populous an island as Java, it is worth recording that Holmes (1989) described this species as "almost confined to... Ujung Kulon... and Baluran... [and] elsewhere in Java extinct except for occasional reports from some teak forests... and mountain plateaux". (8) These numbers were the total seen at seven study plots (van Balen *et al.* 1995) but presumably are not intended to stand as the total for the site. (9) The figure of 15–20 given by van Balen *et al.* (1995) is puzzling given that in May 1991 they reported seeing 20 birds at four sites along one small area of Leuweung Sancang, and it seems likely that this area might (or, given its protected status, could be managed so as to) contain many more peafowl. (10) These numbers were apparently derived from a local report in 1993 that the species was "common" at the site (van Balen *et al.* 1995). (11) The birds recorded represent a minimum (van Balen *et al.* 1995). (12) van Balen *et al.* (1995) indicated that Lebakharjo contains 160 km^2 of lowland rainforest, and that Meru Betiri encompasses 580 km^2 of "good habitat for Green Peafowl", and it thus seems highly precautionary to indicate populations as low as these (<10 and 25–50 respectively) for such areas. However, the figures quoted relate to the total area under protection; the amount of suitable habitat is actually much more restricted and the population estimates are considered accurate (SvB). (13) McGowan *et al*. (1998b) give 800–1,000 for this figure. (14) PKA staff report that the birds came from Bali (presumably captives transported there from Java) and eastern Java; in any case, almost all individuals were very quickly predated because they roosted on the ground and lacked wariness, or were killed because they attacked people (S. Hedges *in litt*. 2000). (15) van Balen *et al.* (1995) did not mention this report, but relayed another in which "a large number of crop-raiding peafowl" were poisoned with DDT in the early 1980s, commenting that it "may not be an isolated incident".