Threatened Birds of Asia:
The BirdLife International Red Data Book

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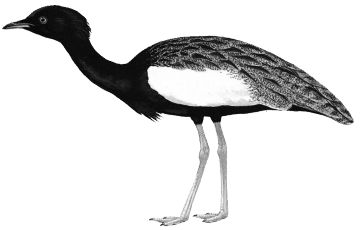
BENGAL FLORICAN
Houbaropsis bengalensis



Critical □ —
Endangered ■ C1
Vulnerable □ A1c,d; A2c,d; C2a; D1

This bustard has a very small, rapidly declining population largely as a result of widespread loss of its grassland habitat. It therefore qualifies as Endangered.

DISTRIBUTION The Bengal Florican occurs in India (from the Kumaon terai of Uttar Pradesh through Bihar and West Bengal to the foothills and plains of Arunachal Pradesh, Assam and Meghalaya), Nepal (in the terai) and historically in Bangladesh with an outlying (but now believed substantial) population (subspecies *blandini*: Delacour 1929a) in Cambodia and southern Vietnam (Ripley 1982, del Hoyo *et al*. 1996). While it is possible that the species has occurred in Bhutan (see Remarks 1), Myanmar (see Remarks 1 under Lesser Florican *Sypheotides indica*) and Thailand (see Remarks 2), there are no extant populations and no confirmed records in these countries. Detailed compilation and discussion of the species's distribution in the Indian subcontinent is given elsewhere (Anon. 1990, Narayan 1992).

■ ***INDIA*** The species has been recorded in Uttar Pradesh, Assam, West Bengal, Bihar, Assam, Arunachal Pradesh and Meghalaya (Ali and Ripley 1968–1998, Ripley 1982). A breeding-plumaged male (in BMNH), allegedly from Satapur, Kathiawar, Gujarat, 1865, comes from so far out of the usual range of the species that the record is discounted here (especially as the specimen was initially mislabelled as "*indicus*", suggesting some error in tag allocation, as the Lesser Florican is regular in Kathiawar). There is also one unconfirmed report from Madhya Pradesh, where the species was seen for sale at Jabalpur (Jubbulpore), undated, and reported from nearby hills (E. A. Butler 1881). In Assam it is still "widely but patchily distributed throughout the Brahmaputra valley", although it appears to have disappeared from Cachar (Choudhury 1996d,e, 2000c). Records are from:

■ ***Uttar Pradesh*** Bussee (perhaps Busti or Basi), **Saharanpur district**, one sighting, undated, and another in the same district at **Deoband** (Deobund), undated (E. A. Butler 1881); **Muzaffarnagar district**, at Sikri jheel, eight, undated (E. A. Butler 1881); "Doodla swamp", on the east bank of the Ganges, **Bijnur district**, undated (E. A. Butler 1881); **Naini Tal**, 400 m, February 1923 (male and female in AMNH); **Hastinapur**, undated (Hume and Marshall 1879–1881), presumably around present-day Hastinapur Wildlife Sanctuary; below **Garhmuktesar**, undated (Hume and Marshall 1879–1881); **Lagga Bagga**, undated (Rahmani 1989, Rahmani and Qurieshi 1991); **Dudwa National Park**, one male, May 1983 (Inskipp and Inskipp 1983), five males in the Sathiana and Sonaripur areas, April 1985 (Ali *et al*. 1986), at least 14 males, 1987–1989 (Sankaran 1996), 1990s (Javed and Rahmani 1999); **Kishanpur Wildlife Sanctuary** (Kishanpur Pashu Vihar Sanctuary), 1–3 displaying males, 1992–1993 (Javed and Rahmani 1998); **Katerniaghat Wildlife Sanctuary**, undated (Rahmani and Qurieshi 1991), but no longer thought to occur (S. Javed *in litt*. 1999); **Kheri district** (Lakhimpur–Kheri), February 1874 (one female in BMNH), a pair, January 1905 (Wall 1905), also a specimen labelled "No. Kheri forest" (presumably North Kheri forest) probably from this area, April 1923 (male in BMNH); **Nanpara**, Bahraich district, two males, 1980 (Ali *et al*. 1986); **Lucknow**, and unspecified localities in Avadh ("Oudh"), 1857–1860 (Irby 1861), January and December 1874 (two males in BMNH); Makhdumpur, Faizabad district, here presumed to be **Makhdumnagar**, undated (Hume and Marshall 1879–1881); Mahewa, near the Yamuna (=Jumna) river in **Allahabad district**, one female, February, unspecified year (*Stray Feathers*

9 [1880]: 198–209); **Mirzapur district**, pre-1870s (Baker 1921–1930); Patli Dun (untraced), on the banks of the Ramganga, one female, May 1871 (*Stray Feathers* 9 [1880]: 198–209); Corbett National Park (unconfirmed), undated (Lamba 1987), possibly based on historical records from nearby (the species apparently no longer occurs in the park: S. Javed *in litt*. 1999);

■ *Bihar* **Champaran district**, one seen in 1980 (Mukherjee 1986); **Darbhanga district**, at Baghownie, two sightings, April 1901, May 1902, and at Hatauri (not far from Darbhanga town), one, May–June, unspecified year (Inglis 1901–1904); **Purnea**, undated (two specimens in BMNH), and at Zilla, Purnea, breeding, June, unspecified year (*Stray Feathers* 9 [1880]: 198–209, BMNH egg data), rare by 1910 (Baker 1921–1930); Kalegary (untraced), June 1906 (BMNH egg data);

■ *West Bengal* **Darjeeling district**, at Sahabad-Sayedabad tea-estate, 1984–1985 (Narayan 1992), and Balasan river in 1988 (Sanyal 1988 in Narayan 1992); **Hasimara**, Jalpaiguri district, March 1912 (egg in BNHS; also Narayan 1992), March 1926 (male in BMNH); **Ramshai**, Jalpaiguri district, one, December 1918 (Inglis *et al*. 1920); **Jaldapara Wildlife Sanctuary**, Torsa block, "found till a few years ago" (Ali *et al*. 1986), and still present with several sightings, 1988–1989 (Narayan and Rosalind 1990a), "10 floricans estimated" (Narayan 1992), and unspecified numbers in 1995 (Kumar 1998); **Jalpaiguri**, 1859 (Beavan 1865–1868), and along the Raidak river in Jalpaiguri district, 1955 (Mukherjee 1986); **Koch Bihar**, February 1912 (Gauripur Raj in Narayan 1992); **West Dinajpur district**, one male seen at Debijhora tea-estate (Sonapur ghat) near Chapra in 1990 (Narayan 1992); **Maldah**, common around 1885, but rare by 1910 (Baker 1921–1930), "a few" seen in 1970s at Bhaluka, but no suitable habitat left by the late 1980s (Narayan 1992); **Nadia** (Nuddea), "by no means uncommon" near the Hugli (Hoogly) river as far down as Chakdaha, pre-1880 (Baker 1887 in Narayan 1992), undated (Hume and Marshall 1879–1881), one female, January 1884 (Baker 1921–1930);

■ *Arunachal Pradesh* **Bomjir**, three, March 1993 (Choudhury 1996e, 1998b); **Dibang Reserve Forest**, specifically near Anpun, four males, August–September 1993 (Choudhury 1996e, 1998b); **foot of the Mishmi hills**, recorded (Hume and Marshall 1879–1881); **Dibang chapori**, "not uncommon", May 1993 (Choudhury 1996e); near **Dotung river**, "not uncommon", May 1993 (Choudhury 1996e, 1998b); **D'Ering Memorial Wildlife Sanctuary**, three sightings of single birds, 1990, November 1991, March 1993 (Narayan 1992, Singh 1994, Choudhury 1996e), January 1996 (Barman 1996); **Paglam**, "not uncommon", May 1993 (Choudhury 1996e; **Mingmung**, right bank of the Dotung river, one adult, June–July 1993, one male, December 1993 (Choudhury 1996e); **Lohit river**, thinly distributed on chapories (seasonally flooded riverine grasslands) along the river, February 1994 (Choudhury 1996e), principally those in and around Dibru-Saikhowa National Park (Assam) but also on the north side of the river in Arunachal Pradesh;

■ *Assam* **Deopani river**, Sadiya, "not uncommon", 1993 (Choudhury 1996e); **Bholuka**, Amarpur, one adult, 1992 (Choudhury 1996e); **Sadiya**, nearby or between here and Brahmakund, undated (Godwin-Austen 1878), fair numbers in around the 1870s (Hume and Marshall 1879–1881), a nest, undated (Baker 1907a), and particularly abundant in grasslands in this area (including Lali chapori), 1901–1911 (Stevens 1914–1915; also Narayan 1992); between **Sunpura** and Tezu, undated (Choudhury 1996e); **Sibia chapori**, Tinsukia district, one male, December 1993 (Choudhury 1996e); Dibang river, **Amarpur**, "not uncommon", 1993 (Choudhury 1996e), including two at Laimekuri, February 1993, and one male at **Siling Lalbeel** (as Lalbeel), December 1993 (Choudhury 1996e); **Bhim chapori**, Lohit river, Tinsukia, one male, c.1988 (Choudhury 1996e); Kobo chapori, presumably near **Kobo**, Dhemaji district, 1979 (Mukherjee 1986), undated (Choudhury 1996e; see Table 1); between **Paglamghat** and Mingmung (Arunachal Pradesh, one adult, October 1993 (Choudhury 1996e); **Dibru-Saikhowa National Park**, one at Rungagora in February 1905 (Stevens 1914–1915), at Rangdoi chapori, two males, 1987, at Sisso chapori, one male, April 1991, one male in Churke chapori (Churche), c.1989, and "common" north-west of Churke by local report, April 1994

(Choudhury 1995b, 1996e), but generally "very rare" in the park (Choudhury 1998a; see Table 1); **Dhopabor–Miajan** area, c.5 km north of Hatiali, "not uncommon", 1973–1974 (Choudhury 1996e); **Panitola**, occasional, 1901–1911 (Stevens 1914–1915); **Nameri National Park**, recent records (Choudhury 2000c); **Majuli island**, Jorhat, two shot in April 1938 (Gauripur Raj in Narayan 1992), one male reliably reported 1987 (Narayan and Rosalind 1990a; also Choudhury 2000c; see Table 1); **Sonai-Rupai Wildlife Sanctuary**, two in 1997–1998 (Choudhury 2000c); see Table 1); **Batabari** (Battabarie), May 1871 (Pollok 1879), May 1947 (Narayan 1992); Bhutan duars, unspecified localities, "very common" with up to 20 seen in a morning, undated (Hume and Marshall 1879–1881), nests subsequently found by Stevens, thus probably 1900–1920 (BMNH egg data), and in this area at **Manas National Park**, seven at Bansbari and Kapurpura, May 1985 (Ali *et al*. 1986), around 30 territories at Kisamdaha, Mahout Camp, Palsiguri, Uchila-Katajhar, Kuribeel, Bura Buri Jhar and Sidhajhar–Kapurpura, 1986–1989 (Narayan and Rosalind 1990b; see Table 1); **Bishnath plain**, below the Dafla hills, 1874–1875 (Godwin-Austen 1876b; also Hume and Marshall 1879–1881); **Tezpur**, "several", February 1910 (Stevens 1914–1915); Kalugoun, "many", April 1869 or 1870 (Pollok 1879), this site being in **Sibsagar district** (A. Choudhury *in litt*. 2000), where generally scarce in around the 1870s (Hume and Marshall 1879–1881); **Orang National Park**, Nichlabari, Rohumari and Pashnoi areas, seven, May 1985 (Ali *et al*. 1986), 22 sightings in March–May 1989 (Narayan and Rosalind 1990a, Narayan 1992; see Table 1); **Kaziranga National Park**, undated (Thom 1965), April 1971 (Aarestrup *et al*. 1971), one, December 1975 (D. A. Scott *in litt*. 2000), two, January 1983 (G. Ouweneel *in litt*. 1999), three, Arimora, Mithunmari and Mihimukh, May 1985 (Ali *et al*. 1986), five males, March 1989 (Narayan and Rosalind 1990a), at least three, February 1994 (Alström *et al*. 1994c), two males, March 1994 (Bishop 1994), up to four males, March 1998 (Hornbuckle 1998a, H. Hendriks *in litt*. 1999), with birds occurring at Lahorani chapori, Yunikati chapori, Bhawani, Borbeel, Mihimukh, Arimora and Debeswari chapori (Barua and Sharma 1999; see Table 1); Nagaon (Nowgong) district, c.1870s (Hume and Marshall 1879–1881), c.1900–1910 (Baker 1921–1930), and in this district at Burachapori Wildlife Sanctuary, and the adjacent **Laokhowa Wildlife Sanctuary**, where 2–3 males reported, 1982–1983 (Ali *et al*. 1986), then thought to be extinct in the late 1980s (Narayan and Rosalind 1989), but an injured individual seen in 1994 (Goswami *et al*. 1999), and a pair probably breeding, May 1995 (Talukdar 1995); Kochmora Reserve Forest (not mapped), Sonitpur district, two in 1989 and one caught in 1993, and also in Sonitpur district in the Hugrajuli area of Charduar Reserve Forest, undated (Choudhury 2000c; see Table 1); **Bongaigaon district**, recent records (Choudhury 2000c); Darrang district (previously including present-day Sonitpur district), very common in the 1870s (Hume and Marshall 1879–1881), and north of **Mangaldai**, Darrang district, 12 shot in a day, c.1870s (Hume and Marshall 1879–1881; also Baker 1921–1930), more recently several shot in Darrang district (specifically at Bagharkhatani, Rowta and Dhansiri), 1938–1939 (Gauripur Raj in Narayan 1992), and still fairly common north of Mangaldai in 1960s (Narayan 1992); **Kokrajhar district**, plentiful pre-1912 (Baker 1921–1930), with shooting records from 1928–1967 (specifically at Lawgaon, south of Amteka, Bijnee, Ranikhata, Balagaon, Angrong, Bordangi, Deosiri, Kungring and Kashiabari) (Gauripur Raj in Narayan 1992), observations at Nikasi (Bhutan foothills), 1964–1965 (Narayan 1992), also seen at Deosiri and Amteka, 1969–1970, and c.12 individuals in the Choraibil area, 1976–1981 (Ali *et al*. 1986, Choudhury 2000c), c.30 at Makhtaigaon (Makhtargaon) block, 1977–1978 (Narayan 1992), 15 there in 1981 (Inskipp and Inskipp 1985), but could not be found in the mid-to late 1980s (Ali *et al*. 1986, Narayan 1992); **Barpeta**, several, February 1867, and nearby at "Bornugger", more than one, January 1868 (Pollok 1879), 1870s, in Kamrup district which then included Barpeta district (Hume and Marshall 1879–1881), and many shot in Barpeta district (specifically at Kanamakra, Gobardanga, Dangaigaon, Longalbhanga, Daba beel, Chirang–Badla–Batabari, Elangmari, Bhabanipur, Dotra, Hilapokri, Patlagaon, Kanthalmuri, Bhowanipur and Charcharia), 1917–1954

(Gauripur Raj in Narayan 1992); c.8 km from **Gauhati**, along the "Beltolah road", a few, 1867 (Pollok 1879); **Goalpara** (see Remarks 3), at "Sonthal colony", April–May 1905, April and August 1906 (Abdulali 1968–1996, six specimens in BNHS), also from Goalpara (and probably the same locality), April 1906 (two eggs in NMS), February–May, 1906–1907 (BMNH egg data), thus deemed plentiful in the area pre-1912 (Baker 1921–1930), and a few shot in 1929 (at Lakhipur and Dhonapeta: Gauripur Raj in Narayan 1992) but disappearing by the mid-twentieth century (Narayan 1992); Myung, 1867 (Pollok 1879), this probably Mayong near **Pobitora** (Pabitora) **Wildlife Sanctuary** (A. Choudhury *in litt*. 2000), where one male was reliably reported, 1984 (Ali *et al*. 1986), and three males and one female were seen in the Tuplung–Kukari area, 1988 (Narayan and Rosalind 1990a; see Table 1); **Soalkuchi** (=Sialkuchi, Loo-al-choochi), c.20 km downriver from Gauhati, May 1871 (Pollok 1979); **Mornai**, Goalpara, August 1906 (male in BMNH), May 1908 (BMNH egg data); **Khopili river**, on the border of North Cachar Hills district and Nagaon (Nowgong) district, undated (Baker 1894–1901), but with no suitable habitat remaining in 1980s (Narayan 1992); **Dhubri district**, plentiful pre-1912 (Baker 1921–1930), many shot 1916–1940 (with specific sites as follows: Sapotgram, Kususm beel, Chowtara, Mokra beel, Chitla, Bathuatali, Chinabari, Naobhangi, Changlandha, Borigao and Dipli) (Gauripur Raj in Narayan 1992), thought to have disappeared by the mid-twentieth century (Narayan 1992), but recent record(s) mentioned by Choudhury (2000c); **Cachar district**, undated (Hume and Marshall 1879–1881), "rare", undated (Baker 1922–1930), and now apparently extinct in this area ("Barak valley districts") (Choudhury 2000c); **Silchar**, North Cachar Hills district, one female, undated (Baker 1894–1901); Demoo Nuddie (untraced), three, April 1872 (Pollok 1879); Hazoo (untraced), many, April 1869 or 1870 (Pollok 1879); Jargoan (untraced), and across the Maji Koochie, "lots", April 1869 or 1870 (Pollok 1879); Kharjan (untraced), occasional, 1901–1911 (Stevens 1914–1915); Kilahari block (untraced), February 1959 (male in BNHS, Abdulali 1968–1996), possibly from around Kokilabari in Manas National Park; Mina Muttee (untraced), January 1868 (Pollok 1879); Nokhroy (untraced), occasional, 1901–1911 (Stevens 1914–1915); Paka Marah (untraced), close to Kumblepur, April 1869 or 1870 (Pollok 1879);

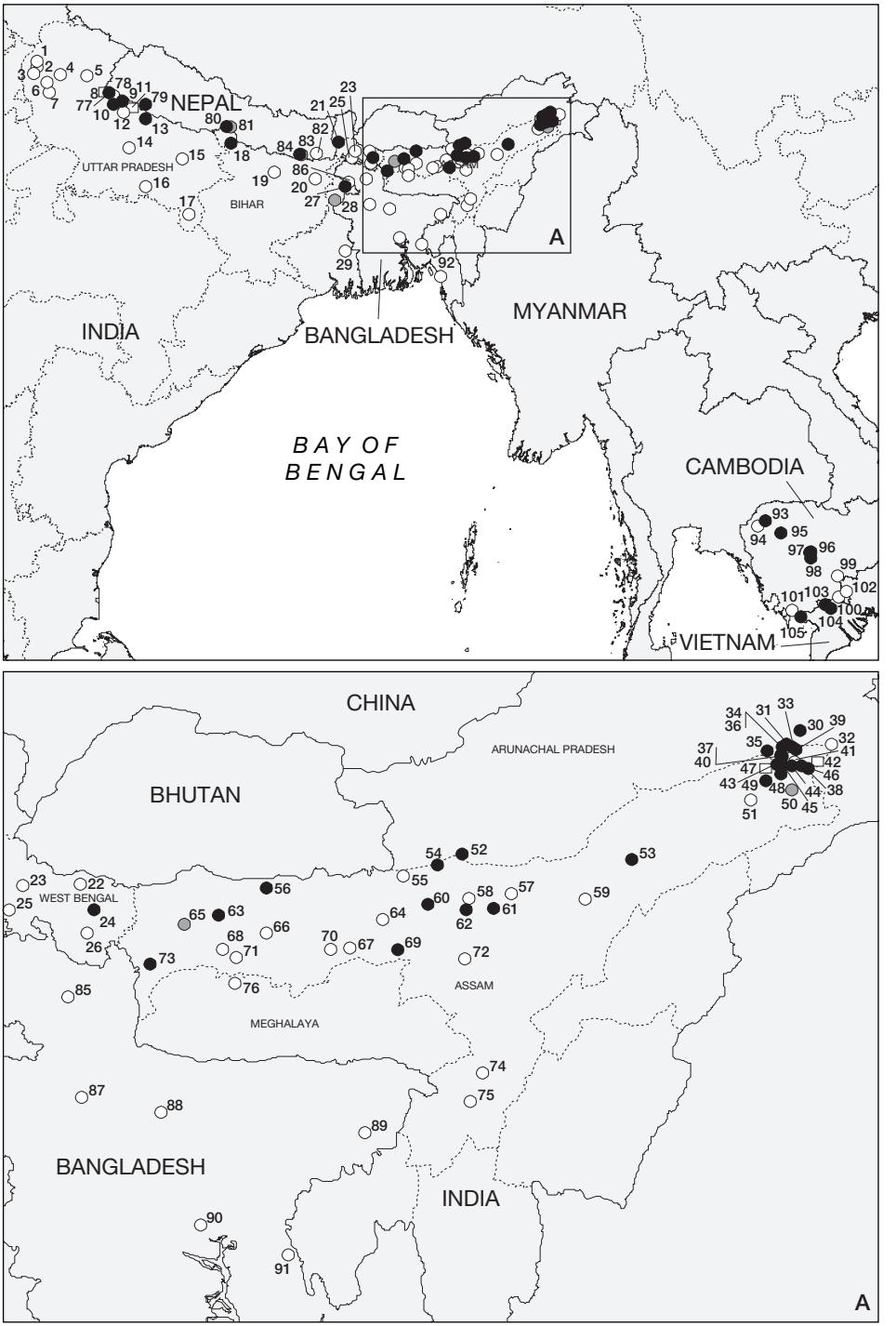
■ ***Meghalaya*** **foot of the Garo hills**, unspecified locality, common (8–10 shot in a morning), c.1870s (Hume and Marshall 1879–1881, Baker 1921–1930).

■ ***NEPAL*** The species is now almost exclusively restricted to Royal Sukla Phanta Wildlife Sanctuary, Royal Bardia National Park and Royal Chitwan National Park (Inskipp and Inskipp 1983, 1984, 1991, Inskipp and Collar 1984). Records are from: **Royal Sukla Phanta Wildlife Reserve**, Mahakali Zone, Kanchanpur district, 250 m, one male in April, one to seven males and two females in May 1982 (Inskipp and Inskipp 1983), and in the proposed reserve extension, one male, April 1982 (Inskipp and Inskipp 1983), more than one male, March 1985 (Ali *et al*. 1986); **Bilauri**, February 1937 (female in BMNH); **Royal Bardia National Park**, undated (Lama 1991), on Baghaura phanta, north of Thakurdwara, 200 m, up to seven males and one female, May 1982 (Inskipp and Inskipp 1983), five males throughout in 1991 (Weaver 1991), recorded in 1995 (Anon. 1995), two males and a female, March 1996 (Davidson and Heywood 1996), one female, March 1997 (Giri 1997), and at Lamkauli and Baghaura, five in May 2000 (Baral *et al*. 2000); **Royal Chitwan National Park**, many records, including "Ghatgain Kasara", January 1926 (two males in FMNH), and later in this area at Ghatgain, March–April 1982 (Inskipp and Inskipp 1983), one male and a female, undated (T. R. Giri verbally 1998), unknown locality, February 1957 (two specimens in FMNH), at Sukebhar, up to seven males and one female, April 1982 (Inskipp and Inskipp 1983), on grasslands between Bhimle and Sukebhar, west of Kasara, one female, March 1994 (Weiss and Wettstein 1994), one male, mid-February 1996 (H. S. Baral *in litt.* 1997), at Jarneli, one male, March 1982 (Inskipp and Inskipp 1983), 1985 or 1986 (T. R. Giri verbally 1998), one male, April 1997 (Baral 1997b), west of Chitwan Jungle Lodge, one male, March 1995 (T. R. Giri verbally 1998), at Meghauli, 1–3, March–May,

1994–1997 (Drijvers 1994, 1995, Davidson and Heywood 1996, P. Hines *in litt*. 1999), at Bhawanipur, Padampur village, one male and a female, undated (T. R. Giri verbally 1998), at Bhimle, up to three males, April 1982 (Inskipp and Inskipp 1983), one male, March 1984 (T. R. Giri verbally 1998), and one male in March/April 1996 (Baral 1996), at Dumaria, February–May, 1982–1997, with a maximum of four (Inskipp and Inskipp 1983, Baral 1991, T. R. Giri verbally 1998), at Kachuwani (Kachuwani), Narayani, up to three males, March–April 1982 (Inskipp and Inskipp 1983), at least a pair, March–May, 1985–1997 (Baral 1991d, 1997b, T. R. Giri verbally 1998), and at Khoria Mohan, one male, April 1982 (Inskipp and Inskipp 1983); **Rapti Dun**, not uncommon in winter between the Rapti and Narayani rivers, just outside Royal Chitwan National Park, undated (Proud 1961); **Morang district** at Sundar Gundar, February 1938 (male and female in BMNH, Bailey 1938) and Baklore, Morang district, March 1936 (female in BMNH, Bailey 1938); **Kosi Tappu Wildlife Reserve**, occasionally in 1976 (Dahmer 1976), and 1989 (Cox 1989), but very few subsequent sightings (Inskipp and Inskipp 1991, H. S. Baral *in litt*. 1998); **Kosi barrage**, up to four, March–May 1982, January 1983 (Inskipp and Inskipp 1983), 10 males, including at least one displaying, 6 km south of the barrage April 1983 (Inskipp and Inskipp 1983), and one displaying male, March 1986 (J. N. Dymond *in litt*. 1999), but none reported subsequently (Inskipp and Inskipp 1991).

■ ***BANGLADESH*** The species once occurred in the grassland areas of Mymensingh, Sylhet and Comilla districts, apparently straggling as far south as Chittagong (Hume and Marshall 1879–1881, Baker 1921–1930, 1922–1930). There have been no recent records and it is probably extinct (Husain 1985, P. M. Thompson *in litt*. 1997), although it "could occur in very small numbers in the extreme north-west" (Grimmett *et al*. 1998). Records are from: around **Rangpur** (Rungpore), undated (Jerdon 1862–1864), c.1880 (Simson 1882, Baker 1887 in Narayan 1992); south of **Dinajpur**, c.1870s, and near Dinajpur, at Punorbhada valley, late 1880s (Baker 1887 in Narayan 1992); **Bogra**, Rajshahi district, scarce, undated (Baker 1887 in Narayan 1992); **Madhupur** (Mudhopore jungle), Mymensingh, undated (*Stray Feathers* 9 [1880]: 198–209, Baker 1922–1930); **Sylhet**, "rare", undated (Baker 1921–1930); **Dhaka** (Dacca), undated (Jerdon 1862–1864), also a common seasonal visitor north of Bunser river (untraced), itself north-west of Dhaka, but "hardly known" to the south, c.1880 (Simson 1882); **Comilla** ("Tippera"), undated (Anon. 1850; and thereafter Jerdon 1862–1864, Baker 1902, 1922–1930); **Chittagong**, undated (Baker 1921–1930, 1922–1930; but see Remarks 2 under Grey-crowned Prinia *Prinia cinereocapilla*).

■ ***CAMBODIA*** The species was previously thought to be confined to Prey Veng, Svey (Soai) Rieng and the provinces north of Tonle Sap lake (Thomas 1964). Its current distribution in Cambodia is not fully known owing to survey difficulties during protracted military unrest (Eames 1995b), a situation that has only recently ameliorated. It was once thought that the species might breed in uninhabited regions between the Mekong river and the Annamite mountains (Delacour 1929c); recent evidence tends to support this view, although the breeding range probably extends well to the west of the Mekong. Records are from: **Ang Trapeang Thmor Reserve**, Banteay Meanchay, one, April 1999, and later five, June/July 1999 (C. M. Poole *in litt*. 1999, Goes and Veasna 1999); **Sisophon**, Battambang, one male, January 1939 (Engelbach 1940a, 1940b), 1960 (Thomas 1964); **Siem Reap**, one bird in captivity reportedly trapped locally, apparently c.60 km to the north-east where small areas of natural grassland remain, undated (probably January 1994) (E. Briggs verbally 1999) and Stoung district, on the border of Kompong Thom and Siem Reap provinces, four males and a female, February 2000 (Goes 2000c); **Kompong Thom**, one collected, May 1959 (Thomas 1964), and Boeung Prabel, Kompong Thom, two males, May 1999 (Veasna 1999, Goes and Veasna 1999); near **Kruos Kraoum**, Stung Sen district, 30–60 shot annually according to a reliable local report, March–April, 1990s (Veasna 1999), with c.200 birds shot in two months, April–May 1999, "several pairs" observed, March 2000 (Goes 2000c); Trapeang Rompeak, **Baray district**,


NEPAL
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Kompong Thom, one male and two females, May 1999 (Veasna 1999); **Su Vu**, 80 km north of Svey Rieng, eight specimens collected within a few days, June 1928 (eight specimens in BMNH and MNHN, Delacour 1929a); **Soai Rieng** (Svey Rieng; see Remarks 4) unspecified locality, specimen presented in January 1927, probably collected some months previously (female in BMNH, Delacour 1929a), three, August 1938 (Eames and Ericson 1996); **Kampot**, unspecified localities and dates, several recorded (Engelbach 1940a, 1940b).

There are also unconfirmed reports from: Boeng Kho Nhay, where the species was reported present until at least 1995, although no suitable grassland was found in 1996 (Eames 1997); Choeng Phleung, where it was reported present until at least 1995 (Eames 1997).

■ ***VIETNAM*** The species has only been reliably reported from the south of the country (see Remarks 5). Records are from: **Tay Ninh**, 1928 (Delacour 1929a); **Hong Ngu** district, Dong Thap, January–March 1992, and February–April 1993 (Anon. 1993c); **Tram Chim Nature Reserve** and an adjacent site in Tam Nong district (the latter was destroyed in the 1990s: S. T. Buckton verbally 2000), Dong Thap, up to 20 in the dry season by local report, sometimes nesting (Archibald 1990; see Population), at least four (three males, one female) in February–March 1990 (Archibald 1990, Eames 1995b), also January–March 1992, February–April 1992 (Anon. 1993c), two males, February 1993 (Huong Norton-Payson verbally 1995), one male, April 1997 (J. C. Eames *in litt*. 1997), one male, March 1988 (R. J. Safford *in litt*. 1999), one male, May 1999 (Buckton *et al*. 1999); **Ha Tien** (Ha Tien plain), Kien Giang, reliably reported in 1990s (Tran Triet *et al*. in press; see Remarks 6).

POPULATION In the early 1980s the Bengal Florican was considered the rarest and possibly the most threatened of all bustard species (Inskipp and Collar 1984; but see under Lesser Florican). Its current world population has been estimated at 350–400 individuals (Rahmani *et al*. 1991, Narayan 1995), having undergone a considerable decline in recent years (Mukherjee 1981, Inskipp and Inskipp 1983, Eames 1997). However, recent population estimates from Assam, and, in particular, new evidence from Cambodia (see above and below) suggest this estimate should be revised upwards.

India Early reports indicate that the species was once common, and locally very common, in many parts of northern India (Hume and Marshall 1879–1881). In Uttar Pradesh, it was "very common in the Kadir of the Ganges (right bank)" in the Muzaffarnagar and Saharunpur districts, especially the former (*Stray Feathers* 9 [1880]: 198–209). However, E. A. Butler (1881)

The distribution of Bengal Florican *Houbaropsis bengalensis* (maps opposite): (1) Saharanpur district; (2) Deoband; (3) Muzaffarnagar district; (4) Bijnur district; (5) Naini Tal; (6) Hastinapur; (7) Garhmuktesar; (8) Lagga Bagga; (9) Dudwa National Park; (10) Kishanpur Wildlife Sanctuary; (11) Katerniaghat Wildlife Sanctuary; (12) Kheri district; (13) Nanpara; (14) Lucknow; (15) Makhdumnagar; (16) Allahabad district; (17) Mirzapur district; (18) Champaran district; (19) Darbhanga district; (20) Purnea; (21) Darjeeling district; (22) Hasimara; (23) Ramshai; (24) Jaldapara Wildlife Sanctuary; (25) Jalpaiguri; (26) Koch Bihar; (27) West Dinajpur district; (28) Maldah; (29) Nadia; (30) Bomjir; (31) Dibang Reserve Forest; (32) Mishmi hills (foot of); (33) Dibang chapori; (34) Dotung river; (35) D'Ering Memorial Wildlife Sanctuary; (36) Paglam; (37) Mingmung; (38) Lohit river; (39) Deopani river; (40) Bholuka; (41) Sadiya; (42) Sunpura; (43) Sibia chapori; (44) Amarpur; (45) Siling Lalbeel; (46) Bhim chapori; (47) Kobo; (48) Paglamghat; (49) Dibru-Saikhowa National Park; (50) Dhopabor-Miajan; (51) Panitola; (52) Nameri National Park; (53) Majuli island; (54) Sonai-Rupai Wildlife Sanctuary; (55) Batabari; (56) Manas National Park; (57) Bishnath plain; (58) Tezpur; (59) Sibsagar district; (60) Orang National Park; (61) Kaziranga National Park; (62) Laokhowa Wildlife Sanctuary; (63) Bongaigaon district; (64) Mangaldai; (65) Kokrajhar district; (66) Barpeta; (67) Gauhati; (68) Goalpara; (69) Pobitora Wildlife Sanctuary; (70) Soalkuchi; (71) Mornai; (72) Khopili river; (73) Dhubri district; (74) Cachar district; (75) Silchar; (76) Garo hills (foot of); (77) Royal Sukla Phanta Wildlife Reserve; (78) Bilauri; (79) Royal Bardia National Park; (80) Royal Chitwan National Park; (81) Rapti Dun; (82) Morang district; (83) Kosi Tappu Wildlife Reserve; (84) Kosi barrage; (85) Rangpur; (86) Dinajpur; (87) Bogra; (88) Madhupur; (89) Sylhet; (90) Dhaka; (91) Comilla; (92) Chittagong; (93) Ang Trapeang Thmor Reserve; (94) Sisophon; (95) Siem Reap; (96) Kompong Thom; (97) Kruos Kraoum; (98) Baray district; (99) Su Vu; (100) Soai Rieng; (101) Kampot; (102) Tay Ninh; (103) Hong Ngu; (104) Tram Chim Nature Reserve; (105) Ha Tien.
○ Historical (pre-1950) ◍ Fairly recent (1950–1979) ● Recent (1980–present) □ Undated

later contested that the bird was only "occasionally met with" in the former and "very rare" in the latter. In Avadh (=Oudh) it was considered "exceedingly local, and then not numerous"; however, up to eight were sometimes shot in a day (Irby 1861), suggesting that the species was then far commoner in that region of Uttar Pradesh than it is today. More recently there have been substantial declines in populations in Uttar Pradesh. In Ramnagar division, for example, flocks of up to 5–10 individuals were encountered during winter shoots in the 1960s, but there have been no recent reports, suggesting that a wholesale decline has occurred in tandem with the virtual elimination of suitable grassland habitat (Ali *et al.* 1986). In Purnea (Bihar) and Maldah (West Bengal) the species was apparently "common" around 1885, becoming "much less so" around 1910 due to habitat loss through the spread of cultivation (Baker 1921–1930). Historical accounts suggest, however, that the species was always relatively scarce in Bihar and common only locally in northern West Bengal (Narayan 1992). Local reports suggested that it was "not uncommon" near Jabalpur (Madhya Pradesh) where birds were seen for sale (E. A. Butler 1881), although this record is somewhat extralimital cannot now be confirmed.

The grasslands of the Brahmaputra valley in Assam have always been the stronghold for the species in India. In western Assam it was sufficiently common in the 1860s for Pollok (1879) to shoot "lots of florican", especially around Barpeta and Gauhati, and it was reported to breed in "vast numbers" in old Goalpara district (see Remarks 3); moreover, although it was stated that "twenty or thirty men" covering a "huge extent of country" only found 24 eggs, possibly because the season was too far advanced (Baker 1907a), it should be noted that this figure still implies a fairly dense population of the species. The largest number shot in one day was 64 birds in Assam on a patch of raised grassland surrounded by large areas of inundated habitat (Baker 1921–1930); again this figure suggests an abundance very far beyond current levels. On the Bishnath plain, Arunachal Pradesh, it was found in "numbers" by (Godwin-Austen 1876b) while Graham saw "from 30 to 40…in a day" (Baker 1921–1930). In 1912 the species was "still plentiful in the Goalpara district on the North bank [of the Brahmaputra], breeding in great numbers in the sun grass lands at the foot of the Bhutan hills" (Baker 1921–1930). It was also "common in parts of Nowgong" (Nagaon) (Baker 1921–1930). In North Cachar, however, it was only "a straggler" being seen on very few occasions (Baker 1894–1901).

Data gathered during several intensive surveys for the species in the 1980s and 1990s (e.g. Ali *et al.* 1986, Anon 1990a, Narayan 1992, Choudhury 1996e), have revealed a population much reduced from nineteenth-century levels. Assuming an equal sex ratio, Ali *et al.* (1986) estimated that there might be fewer than 20 birds in Uttar Pradesh and between 100 and 120 in Assam (34 in Manas National Park, 30 in Orang National Park, 16 in Kaziranga National Park, seven in Kuklung, three in Deosiri and 15 in Makhtaigaon). In the 1990s this alarming population estimate for India was raised slightly to "less than 300" (Narayan 1992), or 220–280 individuals (Narayan 1995). Revised estimates for Dudwa National Park and nearby Kishanpur Wildlife Sanctuary, Uttar Pradesh, suggested that 40–60 birds might remain (Narayan and Rosalind 1990a, Javed and Rahmani 1998), although Corbett National Park and Katerniaghat Wildlife Sanctuary were no longer thought to support the species (S. Javed *in litt.* 1999). Small numbers at the Sahabad-Sayedebad tea-estates in Darjeeling district, West Bengal, have apparently disappeared (Narayan and Rosalind 1990a), and the only surviving population (perhaps 10 birds) in West Bengal is at Jaldapara Wildlife Sanctuary (Narayan and Rosalind 1990a). Specific estimates for Assam have included 25–40 birds surviving in Kaziranga National Park (Narayan and Rosalind 1990a, Rahmani *et al.* 1991, Bhattacharjee *et al.* 1996), and at least 80 in Manas National Park (Narayan and Rosalind 1990a). In the Tinsukia, Dibrugarh and Dhemaji areas of Assam 36–47 were estimated to occur with 54–68 in the East Siang, Dibang valley and Lohit area of Arunachal Pradesh (Choudhury 1996e). At some sites, such as Amarpur and Dibang Valley Reserve Forest, the species was considered "common" in the small amount of available habitat (Choudhury

Table 1. Recent population estimates for Bengal Florican at key sites in Assam (following Choudhury 2000c).

Sanctuary/Area	Population	Period
Manas National Park	80–100	1994–1998
Kaziranga National Park	50–80	1994–1998
Orang National Park	35–45	1994–1998
Laokhowa–Burachapori–Kochmora complex	20–34	1994–1998
Kobo chapori	10–20	1996–1998
Dibru-Saikhowa National Park	9–12	1992–1996
Amarpur	8–12	1992–1994
Sonai-Rupai Wildlife Sanctuary	4–8	1994–1998
Majuli island	3–8	1990–1995
Pobitora Wildlife Sanctuary	2–6	1990–1998

1996e). Increased fieldwork in Assam has led to its total population of Bengal Floricans being revised upwards to 250–380 individuals (Choudhury 2000c; see Table 1), a total that, combined with the best estimates for Uttar Pradesh (c.60), West Bengal (c.10) and Arunachal Pradesh (c.50), suggests that 400–500 individuals persist in India, although this estimate must be considered a very rough approximation.

Nepal The population in Nepal was estimated to be 56–82 birds in 1982 (Inskipp and Inskipp 1983, Inskipp and Collar 1984), and a total of 100 probably survive at four sites in the country (Narayan 1995), although there have been no recent records at one of these (H. S. Baral *in litt*. 1998). The largest population is in Royal Sukla Phanta Wildlife Reserve, where the species is patchily distributed but locally common (Inskipp and Inskipp 1983, Baral 2000b). Smaller populations remain in Royal Bardia National Park and Royal Chitwan National Park (see Distribution). In Kosi Tappu Wildlife Reserve the species was once fairly common (Dahmer 1976) but it appears to have disappeared from this site (Dodman and Guinan 1989, H. S. Baral *in litt*. 1998) and from nearby Kosi barrage. In Bardia, fewer males were recorded in 2000 (three) (Baral *et al*. 2000) and 1990 (five) (Weaver 1991) than in 1982 (8–9) (Inskipp and Inskipp 1983), suggesting a possible decline. Speculation that the bird's numbers appear to be falling throughout Nepal (H. S. Baral *in litt*. 1998, Baral *et al*. 2000) remains unconfirmed.

Bangladesh Between 1860 and 1880 the species was "always found" around a large jheel north-west of Dhaka "in the warmer season", and north of here "towards Rungpore and Assam" it was "common" Simson (1882). Baker (1921–1930), presumably on the strength of this report, stated that it was "common in parts of the Rangpur district to the North of the river". It also apparently occurred seasonally in "quite good numbers… immediately before partition of India in 1947" (Karim 1983b), although the source of this information is not clear. Additionally, it occurred "not infrequently" on the borders of the Madhupur jungle in Mymensingh (*Stray Feathers* 9 [1880]: 198–209). However, its current listing as "endangered" in the country (Husain 1985) is, if anything, optimistic. There have been no recent records and it is almost certainly extinct (Khan 1982, Husain 1989), the date of its disappearance probably being around 1953–1954 (Karim 1983b, 1985). A survey of its previous haunts (Dinajpur, Rangpur, Sylhet and Chittagong) between 1977 and 1983 failed to locate the species (Karim 1985).

Cambodia In the 1960s the species was described as rare and shy in Cambodia (Thomas 1964), and until recently surveys had unearthed reports by local people but produced no sightings (Eames 1997). The lack of suitable habitat remaining in much of its previous Cambodian range suggested that it was extremely rare and possibly nearing extinction in the country (Eames 1997). However, in 1999, it was rediscovered at Ang Trapeang Thmor Reserve in the north-west, and further brief surveys carried out in Kompong Thom and Siem Reap,

in grasslands north of Tonle Sap lake, resulted in several sightings (Veasna 1999, P. Davidson *in litt.* 1999). Evidence from a number of local people, who were familiar with the species and provided accurate details of its plumage and habits (along with identifiable remains), suggested that considerable numbers remained in this area. For example, it was estimated that between 300 and 600 individuals were traded in only one market annually (Veasna 1999, Goes 2000c). One hunter claimed to have killed between 100 and 200 Bengal Floricans in 1999 alone (P. Davidson *in litt*. 2000). If these estimates are even remotely accurate, and given the fact that the area of suitable habitat is "absolutely vast" (P. Davidson *in litt*. 2000), the Cambodian population possibly far exceeds that found in the Indian subcontinent.

Vietnam It is likely that only a few birds survive in Vietnam, where numbers have certainly declined because of hunting and habitat loss throughout the 1900s (J. C. Eames *in litt*. 1998). The population at Tram Chim Nature Reserve (apparently the stronghold in the country) is probably only in single figures (Buckton *et al*. 1999). Nests have been accurately described by local peope at Tram Chim and on the Ha Tien plain (Archibald 1990, Buckton *et al*. 1999, Tran Triet *et al*. in press), but none has been confirmed and the possibility remains that the species is a non-breeding visitor from grasslands in Cambodia (Eames 1995b). No sightings were made in the Ha Tien plain during surveys carried out in 1999, but local people are familiar with the species and it may well survive, or occur sporadically in the area (Buckton *et al*. 1999). Overall numbers are clearly very low.

ECOLOGY ***Habitat*** The Bengal Florican appears to favour relatively open short grasslands (0.5–1 m tall) sometimes with patches of tall grass and scattered bushes and trees (Ali and Ripley 1968–1998, Inskipp and Inskipp 1983, Mukherjee 1981, Narayan and Rosalind 1990a), usually in lowlands below 300 m (Choudhury 1996e, Baral *et al*. 1996). Shorter grassland appears to be favoured whilst foraging or displaying (Sankaran 1996, C. and T. P. Inskipp *in litt*. 1998), and males have been recorded displaying in recently burned experimental plots (N. B. Peet *in litt.* 2001). However, birds seek shelter in longer grass during the heat of the day, and females, which are difficult to see, probably spend much of their time in longer grass, together with males outside the breeding season (Ali *et al*. 1986). It has thus been suggested that the best locations contain areas of shorter grassland dominated by *Imperata cylindrica*, interspersed with patches of taller grassland (Baral *et al*. 1996, Peet 1997). The species may avoid large, dense stands of tall grassland (Narayan and Rosalind 1990a), although there are historical accounts of birds in "dense grass and ekra [*Erianthus ravaneae*]" up to 4.5 m high, usually when no other habitat was available or when pursued by hunters (Baker 1922–1930).

The grasslands frequented by this species in the Amarpur section adjacent to Dibru-Saikhowa National Park are dominated by *Imperata cylindrica*, but also contain tall grass species such as *Arundo donax* (nal) and *Phragmites karka* (khagori), as well as *Erianthus ravaneae* (ekra) and *Saccharum* (Choudhury 1994, 1996e). At Manas and Kaziranga National Parks, floricans occur in grasslands around 1 m high containing *Andropogon*, *Chrysopogon*, *Imperata cylindrica* and *Saccharum* (Mukherjee 1981). In D'Ering Memorial Wildlife Sanctuary, grassland habitat most commonly consists of *Saccharum spontanium, S. arundinaceum*, *Neyraudia* "*reynaudiana*", *Thysanolaena maxima* and various sedges (Barman 1996) and is surrounded by sal *Shorea robusta* forests (Ali *et al*. 1986). In Nepal, it frequents grassland with *Imperata cylindrica, Saccharum bengalense* (=*munja*), *Phragmites karka*, *Vetiveria zizanioides* and *Desmostachya bippinata* with or without scattered small trees (Inskipp and Inskipp 1983, Baral 2000a, N. B. Peet *in litt*. 2001). Such grassland survives in large tracts in Royal Sukla Phanta Wildlife Sanctuary, and in small patches at Baghaura phanta, Lamkhauli phanta, Royal Bardia National Park and Dumariya and Kachuwani grasslands, Royal Chitwan National Park (Baral *et al*. 1996, N. B. Peet *in litt.* 2001).

In Cambodia and Vietnam, it is confined to natural or semi-natural grasslands, sometimes seasonally flooded or with scattered scrub and open forest (Nguyen Cu *in litt*. 1997, Sun

Hean *in litt*. 1997). At Su Vu (Cambodia), the species was found in seasonally inundated grassland about 1 m tall (Jabouille 1929). In the 1920s, when there were records from Svey Rieng province, the area contained large open plains, dry from autumn to spring (Delacour 1929a). In north-west Cambodia, the species was found in the vast uncultivated plains which extended from Sisophon to the Thai border (Engelbach 1940a, 1940b). More recently, it has been found on mounds emerging from flooded areas and covered in *Gmelina asiatica* and grasses (Veasna 1999). In Dong Thap province, Vietnam, it occurred in a small fragment (4 km^2) of riparian grassland vegetation largely composed of *Cynodon dactylon, Oryza rufipogon* and (probably) *Saccharum* and the sedges *Cyperus halpan*, *Eleocharis dulcis*, *Fuirena umbellata*; vegetation height varied from about 0.3 m in drier areas to 2 m in wet areas; the area frequented by floricans was mostly dry although waterbodies of up to 50 m^2 were scattered locally (Eames 1995b). Habitat at the nearby Tram Chim Nature Reserve consists of lowland seasonally inundated grasslands, dominated by the sedge *Eleocharis*, and low forest of *Melaleuca cajuputi* (Buckton *et al*. 1999).

The species has also been recorded in cultivation, including ricefields (Baker 1922–1930, Choudhury 1996e), mustard fields (Pollok 1879, Baker 1894–1901, D. A. Showler verbally 2001), indigo fields and sugarcane (Inglis 1901–1904). However, these are likely to be suboptimal habitats.

The structure and height of grass swards appears to be important to the species, early in the breeding season (Weaver 1991). In the early morning, males are found in open, tussocky, *Imperata* grassland up to c.60 cm tall, these being approximately the full height of a standing bird; such areas are not too dense, allowing mobility and good visibility for foraging, display and territorial activities (Weaver 1991). It has been suggested that a burning, clearing or grazing regime to "open up" the grassland creates suitable habitat, and if this does not occur the grassland grows too rank and dense and is apparently vacated by territorial males (Narayan and Rosalind 1990a). The population in Dudwa National Park appeared to increase after controlled burning of grasslands (Rahmani 1998). The species is usually encountered singly (Baker 1921–1930, Delacour 1929b), although it can occur in small groups of up to eight birds (Ali and Ripley 1968–1998).

Food The species is omnivorous, eating grain, seeds, flowers, berries and small invertebrates such as slugs, grasshoppers, ants and beetles (Baker 1922–1930, Baral *et al*. 1996), and even frogs (Baker 1922–1930) and "small reptiles" (Choudhury 2000c). In Nepal, it has been seen feeding on new grass shoots (Baral 1991). The stomachs of specimens collected at Su Vu (Cambodia) contained only grass and seeds (Delacour 1929b). In burned areas, it eats burned seeds and insects driven out of the grasslands (Mukherjee 1981).

Breeding The florican is generally polygamous (Baker 1907a, Ali and Ripley 1968–1998) and has a dispersed lek mating system (Sankaran 1991). Of 27 birds observed during a 1985 survey, only three were female (Ali *et al*. 1986), while Inskipp and Inskipp (1983) counted 5–6 females amongst a total of 35 to 50 birds. Given that the species is polygamous, the observed highly skewed sex ratio is probably a result of differences in the behaviour and plumage of the sexes, and in reality females probably equal or outnumber males (Narayan 1992). During the breeding season, males fiercely defend small territories (18–28 ha) while females disperse, only associating very briefly with males (Sankaran 1996). In grassland occupied by three males, intra-male distances were between 350 and 400 m (Sankaran 1996).

Display Male display is generally confined to a core area of 2.1–8.4 ha within their territories (Sankaran 1996). Display sites are located in arenas of short grass where males are conspicuous when present; they tend to visit these arenas 3–3.5 hours before sunset, roosting at them overnight, and leaving them 3–3.5 hours after sunrise (Sankaran 1996). Displays tend to occur around dawn and dusk, 70% of morning displays occurring within 85 minutes of sunrise and 70% of evening displays within 50 minutes of sunset (Sankaran 1996).

Season In Assam, the breeding season has been said to last from March to June, with the majority of eggs laid in the last week of March or the first half of April, with a few eggs found at the end of February and in the first week of July (Baker 1921–1930). In Dudwa National Park, the breeding season commences in the first week of March, and ends at the beginning of June when the monsoon rains generally arrive (Sankaran 1996). Males in Nepal have been observed displaying in April at Kosi barrage, and in March, April and May at Royal Chitwan and Royal Bardia National Parks (Inskipp and Inskipp 1983). Local people in Kompong Thom province, Cambodia, have reported breeding in the dry season (March–April) (Veasna 1999, Goes and Veasna 1999). Indeed, the first confirmed nest records in Cambodia were of eggs and nests seen on 19/20 March 2000 (Goes 2000c).

Nest site and structure In western Assam, 46 nests were found in "small bare patches in the centre of fields of sungrass [possibly *Imperata* sp.], or *uloo* grass", these being generally of considerable extent, seldom near any village or habitation, and most often surrounded by "dense forests or cane jungle" (Baker 1907a, 1921–1930). The grass in which the nest is sited may be rather thin to very dense, and nests have been found in dense "elephant grass" (a loose term for tall grassland 1–5 m high) (Baker 1922–1930). A nest near Sadiya, Assam, was in an "extensive patch of sun grass which had been considerably fed over by buffaloes, and was consequently neither very high nor very dense, and was intersected in every direction by buffalo paths" (Baker 1907a, 1921–1930). Historically, birds were reported to nest regularly in tea plantations with the eggs being destroyed during cultivation (Inglis *et al.* 1920). Nests are sometimes found in close proximity to each other (Baker 1921–1930). No nest is constructed, eggs being laid in a natural depression under the shelter of a tuft of grass (Baker 1921–1930). Where no such depression exists the female either scrapes one herself or lays the eggs directly onto level ground (Baker 1921–1930).

Clutch and incubation Clutches frequently contains two eggs, although some contain only one (Hume and Oates 1889–1890, Baker 1921–1930). The incubation period lasts 25–30 days, and the chicks are nidifugous (Hume and Oates 1889–1890, Baker 1921–1930). Development is generally more advanced in one egg than the other, suggesting that laying and hatching are asynchronous (Baker 1921–1930), a factor that presumably delays the departure of the first offspring from the nest. Circumstantial evidence indicates that parental care is provided by the female (Sankaran 1996).

Migration The species has been described as a resident in the Indian subcontinent by Ripley (1982). It may well be resident in Nepal, but the possibility of local or even long-distance movements should not be ruled out (Inskipp and Inskipp 1983). It appears to be absent from areas of grassland where it breeds in Royal Bardia National Park, at least between November and February (N. B. Peet *in litt.* 2001). Movements certainly occur in the Brahmaputra valley, as much breeding habitat is seasonally flooded, but it is not known where floricans from these areas then move to (Narayan 1992, Choudhury 2000c). In Bangladesh, the species was "always to be found" at a jheel north-west of Dhaka "in the warmer season, just before the earliest rains set in" (Simson 1882). This suggests that perhaps local movements in response to rainfall occurred.

Evidence also suggests that the species is at least partially migratory in South-East Asia. Movements appear to be linked to the south-west monsoon and the consequent seasonal inundation of grassland areas; during wet periods, it might be expected that the species moves northward to higher and drier regions (Eames 1995b). Current knowledge of movements fits with this pattern. Passage around Svey Rieng and Su Vu, Cambodia, apparently began at the end of June when birds supposedly moved north to breed at an unknown locality at the onset of the rains, returning in December (Delacour 1929a,c, Jabouille 1929). The recently discovered population in Kompong Thom province, however, is believed to be largely resident, with local movements to dry "islands" in the wet season (Veasna 1999). In Vietnam, the species is thought to be a seasonal visitor to Hong Ngu district and breeding has not been confirmed there (J. C.

Eames *in litt*. 1997). At Tram Chim Nature Reserve, it is unlikely to be a year-round resident owing to the regular deep inundation of its habitat in the wet season (Buckton *et al*. 1999). Clearly much remains to be learnt about movements in the species; investigations making use of radio-telemetry have been proposed to address this issue (Choudhury 2000c).

THREATS The key threats to the species are habitat loss and modification throughout its range, coupled with hunting, which affects all populations but appears to be a particularly serious threat in Cambodia.

Habitat loss and modification There have been huge declines in the area and quality of grasslands across South and South-East Asia (Bell and Oliver 1992, Peet *et al.* 1999a, Eames 1997). Virtually all remaining grasslands within the species's range are subject to intense pressures which threaten their future (detailed by country below) (Rahmani 1988, 1992c, Javed and Rahmani 1991, Bell and Oliver 1992, Eames 1997, Peet *et al.* 1999a). In many areas grasslands of conservation value are restricted to protected areas but continue to suffer degradation (Bell and Oliver 1992, Peet 1997), and grasslands are generally poorly represented in protected-area systems (Rahmani 1988, 1992c, Eames 1997, Baral 1998, Buckton *et al.* 1999). Furthermore, most grassland patches are now small and isolated, and populations of this species are thus susceptible to local extinction; moreover, many regions within its range are prone to political instability so that long-term protection of several sites cannot be guaranteed (Narayan 1992, 1995). As so little is known of the whereabouts of the species during the non-breeding season, protected-area coverage may be insufficient at that time (Narayan 1995).

India The Bengal Florican appears to have been almost completely eliminated from unprotected areas in its former Indian range (Narayan and Rosalind 1990a, Choudhury 2000c). Huge areas of grassland have been lost as a result of conversion to agriculture and forestry plantations, edaphic grasslands have been altered as flooding regimes have been changed by dam and irrigation schemes, and many remaining grasslands are subject to high grazing pressure from domestic stock and intensive harvesting by local communities, often associated with grassland burning (Javed and Rahmani 1991, Bell and Oliver 1992, Bhargava 2000). This loss and degradation has resulted in huge declines in the population of this species (Narayan and Rosalind 1990a) and a contraction of its range, particularly in Uttar Pradesh (see Distribution). In the 1950s, the habitat of Ramnagar division (Uttar Pradesh) was typical of undeveloped terai habitat, with extensive stands of *Imperata cylindrica* and *Saccharum munja* (=*bengalense*) dotted with isolated trees (Ali and Crook 1959), whereas by 1985 most of this habitat had disappeared and no floricans could be located (Ali *et al*. 1986). Small grasslands in Uttar Pradesh which previously held Bengal Floricans have been rapidly replaced by sugarcane plantations (Ali *et al*. 1986). Much Forest Department land throughout the species's Indian range has been converted to agriculture, either legally or by encroachment (Ali *et al*. 1986). Even by 1920 the species was thought to be "steadily decreasing [partly] owing to… the increasing acreage under tea" (Inglis *et al*. 1920). Although the largest population of the species in India survives in Assam, the vast majority are restricted to protected areas while suitable habitat outside protected areas is predicted to vanish in the first decade of the twenty-first century (Choudhury 2000c).

Neither are grasslands inside protected areas particularly secure; on the contrary, they are generally seriously at risk. In the Amarpur area of Dibru-Saikhowa National Park, for example, grassland continues to be converted to rice and mustard fields (Choudhury 1995b, 1996e). New settlements are being established within the reserve, further reducing the extent of habitat and increasing levels of disturbance in remaining grasslands (Choudhury 1995b, 1996e), especially as there are already 110 cattle camps and more than 9,000 cattle and buffalo grazing there (Choudhury 1997, *Oriental Bird Club Bull.* 25 [1997]: 61–69). Burachapori Wildlife Sanctuary is heavily encroached by immigrant farmers who disturb grasslands and convert them to ricefields; although the habitat is otherwise ideal, the species was very rare

in the 1980s (Narayan and Rosalind 1989). Jaldapara Wildlife Sanctuary is heavily overgrazed (Samant *et. al.* 1995) and grasslands have been degraded by grazing of domestic stock in Manas National Park, where park regulations are difficult to enforce because of an adverse security situation (Rosalind 1989, N. B. Peet *in litt.* 2001). Dudwa National Park was threatened by rising anti-tiger sentiments apparently stirred by local politicians keen to exploit the potential gains should the park area be reduced; serious encroachments have taken place, increasing the conflict between people and tigers with the result that the buffer zone and park borders are in jeopardy of official contraction (Scott 1989). The Lagga Bagga Sanctuary contained high-quality grasslands until recently, but by promising land to encroachers local politicians have generated an influx into the area with the result that deforestation and grazing is increasing rapidly (Rahmani and Qurieshi 1991). Several other potentially suitable protected areas (e.g. Laokhowa Wildlife Sanctuary in Assam) are overrun by "thousands" of grazing cattle, and heavily used by fishermen and farmers, such that high-quality grasslands are highly disturbed and rapidly becoming degraded (Ali *et al*. 1986, Narayan and Rosalind 1990a). In Katerniaghat Wildlife Sanctuary, Uttar Pradesh, five enclave villages threaten habitat and nearly 10 times more cattle than the 2,500 stipulated by the management plan are present in the reserve (Rahmani and Qurieshi 1991). The Bengal Florican has disappeared from these supposedly protected areas and is unlikely to return without drastic conservation action.

Grasslands in Dibru-Saikhowa National Park are further threatened by the unusually large annual floods of recent years, presumably because of greater run-off from the denuded Brahmaputra catchment (Choudhury 1995b, 1997, *Oriental Bird Club Bull.* 25 [1997]: 61–69). Erosion caused by these floods has already reduced the extent of grassland in the reserve, and terrestrial birds are particularly affected as most of the grassland area is flooded and previous refuge habitat away from the main river has been destroyed (Choudhury 1995b, 1997, *Oriental Bird Club Bull.* 25 [1997]: 61–69). A similar problem is reported from Pobitora Wildlife Sanctuary, where floods in 1988 forced local people to increase their use of protected grasslands for thatch collection and grazing, apparently forcing the Bengal Florican population out of the reserve (Narayan and Rosalind 1990a). Floods in Kaziranga National Park have also washed away islands and waterlogged other areas, resulting in much suitable habitat overgrowing with tall grasses or becoming too sandy, and probably resulting in the small Bengal Florican population in the park (Narayan and Rosalind 1990a). Massive floods in 1998 again destroyed large areas of grassland (*Oriental Bird Club Bull.* 29 [1999]: 16–21).

Nepal Grassland in the terai of Nepal has declined in area and quality, particularly since the virtual eradication of malaria in the terai in the 1950s (Peet 1997). Since this period there has been rapid human population growth and large areas of grassland have been lost to settlement, conversion to agriculture, forestry and flood control (Bell and Oliver 1992, Peet 1997). Outside protected areas virtually no grasslands capable of supporting threatened birds remain, as most are heavily grazed by domestick livestock, harvested for cane or thatch, and subject to overwhelming levels of human disturbance (Peet 1997). Tall grasslands (up to 5 m tall), dominated by the genera *Erianthus*, *Narenga*, *Saccharum*, *Phragmites* and *Themeda*, and shorter grasslands, dominated by *Imperata cylindrica*, remain in the four protected areas of Royal Chitwan and Royal Bardia National Parks, Royal Sukla Phanta and Kosi Tappu Wildlife Reserves (Lehmkuhl 1994, Peet *et al.* 1999a, Baral 2000b). Within these protected areas grasslands are threatened by several problems.

Tall grasslands are maintained either as edaphic climaxes by seasonal inundation during the monsoon or by disturbance from the combined effects of fire, cutting and grazing, which slow succession to forest (Lehmkuhl 1994, Peet 1997). Any change in these factors threatens the stability of grassland ecosystems. For example, alteration of the flooding regime by dam projects, such as that proposed for the Karnali river above Royal Bardia National Park, would have catastrophic consequences for tall grasslands and their fauna (Peet *et al.* 1999a). In some cases protection is reducing the area of ideal habitat: in Royal Chitwan National

Park areas of shorter grassland favoured by the species are succeeding to taller *Narenga*- and *Saccharum*-dominated grassland and in Bardia to scrub grassland and forest (Inskipp and Inskipp 1983, 1991, Peet 1997). In addition, grasslands inside protected areas are a vital human resource for local people who depend on grasses for building and thatching materials (Brown 1994, 1997, Peet 1999b, Baral 2000b). People are allowed into protected areas for 7–10 days annually to cut grass, at which time the grasslands are also burned; in the case of Chitwan this involves an influx of 70,000 people (Brown 1994, Peet *et al.* 1999b). This harvesting is vital in maintaining grassland and possibly in generating sward height and stem densities suitable to the Bengal Florican (Peet 1997), but disturbance is a problem and there is sometimes no refuge for grassland fauna (see Disturbance). In particular, the timing and method of burning regimes can be inappropriate and then become major conservation issues (see Measures Proposed).

Despite being inside protected areas, some grasslands continue to suffer degradation and disturbance from grazing livestock. Kosi Tappu Wildlife Reserve is overrun by approximately 5,000 cattle and 3,000 domestic buffalo (*Oriental Bird Club Bull.* 21 [1995]: 15–20), leading to severe habitat degradation in parts of the reserve. The problem is complicated by land right claims inside the protected area (N. B. Peet *in litt* 2001). An extension to Royal Sukla Phanta Wildlife Reserve containing potentially important areas of grassland has been illegally settled by people, rendering it useless to wildlife conservation; their cattle are freely grazed near Radhapur and Jhilmila, areas that could otherwise be an important site for Bengal Florican (Baral 2000b). Outside protected areas, there has been a tendency to encourage forestry plantations on degraded grasslands rather than to encourage grassland regeneration (Baral 2000b).

Bangladesh Very few, if any, extensive patches of grassland remain in Bangladesh, and habitat destruction and hunting are the key reasons for the species's probable extinction. An account of grassland habitat loss in the country is in the equivalent section under Swamp Francolin *Francolinus gularis* and Black-breasted Parrotbill *Paradoxornis flavirostris*.

Thailand All grassland in the Chao Praya floodplain, the only area of potentially suitable habitat for the species, was long ago converted to wet rice and human settlement (Eames 1997).

Cambodia Between 1973 and 1993 there was a catastrophic 81% reduction in the area of all grassland habitats (Mekong Secretariat 1994, Eames 1997). This was caused by a massive intensification of agriculture and expansion of rice cultivation and was thought to have been responsible for the apparent crash in the Cambodian population (Eames 1997, Sun Hean *in litt*. 1997). The areas in which the species was first discovered and was apparently once common (namely Svey Rieng and Kampong Cham provinces) have lost almost all their natural grasslands over the last few decades (Eames 1997). However, the species has since been discovered in Komphong Thom and Banteay Meanchay provinces where the area of suitable habitat is still "vast" (P. Davidson *in litt*. 2000). Suitable habitat at the Ang Trapeang Thmor Reserve is threatened by plans to develop a village at the site (C. M. Poole *in litt*. 1999).

Vietnam A huge contraction of range and decline in population has presumably occurred due to the massive conversion of natural grasslands to rice cultivation (Nguyen Cu *in litt*. 1997); high human population densities in flat areas of Vietnam, suitable for this type of agriculture, exert high pressure on natural grassland habitat (Eames 1995b). The Ha Tien plain contains the only substantial area of seasonally inundated grassland remaining in the Mekong delta, but is imminently threatened by conversion to rice agriculture and *Melaleuca* plantations (Buckton *et al*. 1999).

Persecution *India* During British colonial rule, sports hunting was rampant and the relentless florican shooting described by Pollok (1879) may well have helped to reduce populations of the species. Birds were easily shot and were "among the best of table-birds" (Baker 1922–1930). Even by 1920 the species was thought to be "steadily decreasing [partly]

owing to the indiscriminate shooting of hens" (Inglis *et al*. 1920). In the 1980s hunting remained rampant in many areas (Narayan and Rosalind 1990a), and indeed, during a survey of sites in Assam and Arunachal Pradesh in 1992–1995, several instances of birds being shot, snared or killed with long sticks were reported (Choudhury 1996e; also Choudhury 2000c). The Sahabad-Sayedabad tea estates in Darjeeling district, West Bengal, supported a small population of the species until recently, but they were increasingly disturbed by people who "openly admitted killing florican or robbing its nest", and the species apparently no longer occurs (Narayan and Rosalind 1990a).

Nepal Hunting remains a threat in Nepal and the Bengal Florican is a favoured "game bird" (Baral 1995, H. S. Baral verbally 1998). An injured bird seen at Dumaria (Royal Chitwan National Park) around 1990 appeared to have been recently shot (Baral 1991). Shakya (1995) listed several pressures on birds in Nepal, including the capture of galliforms for cock-fighting, trading of cagebirds, selling of bird meat for food (especially to traders from Bihar, India) and body parts for medicinal purposes.

Bangladesh Hunting, together with habitat loss, is thought to have been the major reason for the species's disappearance from the country (Karim 1985). Hunting pressure was particularly high after the partition of India when arms and ammunition were very cheap and hunting/conservation legislation ineffective or non-existent (Karim 1983b).

Cambodia The recently discovered population in Kompong Thom province is severely threatened by an alarming scale of hunting and capture. Reports from local people suggest that between 300 and 600 birds are sold each year, either alive or fried, in one local market (15 stalls) at Srayov commune, the species being considered "the most tasty" bird in the area (Veasna 1999, Goes and Veasna 1999). Eggs are also eaten (Veasna 1999). The commonest trapping technique is apparently to dazzle roosting birds at night and trap them with a net on a long stick, a method to which floricans are particularly vulnerable in the wet season when they are concentrated in the remaining dry areas (Veasna 1999). Large-scale trapping probably only began in the 1990s and current harvesting rates will perhaps eradicate the population in only a few years unless protective measures are taken (Veasna 1999). On and around a 3 km^2 farm in Kompong Thom, c.200 birds were reportedly shot in April–May 1999 (remains of birds were conclusively identified on a return visit in March 2000) (Goes 2000c). Although these figures seem astonishingly high, there is as yet no reason to refute them and a steadily growing body of evidence to suggest that they might be correct, in which case current levels of hunting in the area are clearly unsustainable. The owner of the farm is a director of the provincial Forestry and Wildlife Department, another indication of the challenging conservation situation in Cambodia (Goes 2000c).

Vietnam People living around Tram Chim Nature Reserve report that they have collected eggs and captured young, but breeding there has not yet been confirmed (S. T. Buckton verbally 2000). Given the generally high levels of hunting in Vietnam (see Threats under Pale-capped Pigeon *Columba punicea*) it is likely that persecution has played a part in reducing populations of this species.

Disturbance Throughout the range of the species disturbance causes problems in the breeding season, and in many areas the chances of eggs or chicks being trodden on by cattle or people has greatly increased in recent years (see, e.g., Narayan 1992, Choudhury 1996e). While birds might adapt to breed in certain cropfields, the chances of nest destruction during the weeding or harvesting periods is very high (Ali *et al*. 1986). In Nepal the species is threatened by disturbance even in protected areas (H. S. Baral verbally 1998); for example, over 70,000 people enter Royal Chitwan National Park during the annual harvest (Peet 1997), and some floricans are apparently forced out of this park to nearby mustard fields (*Bird Cons. Nepal Newsletter* 4, 2 [1995]: 2–3). Disturbance from people and domestic stock is much higher in Kosi Tappu Wildlife Reserve and around Kosi barrage, sites which previously held the species (N. B. Peet *in litt*. 2000), and is also caused by off-road driving in protected areas (Rai 1996). *Bangladesh*

A high human population means that there is intense disturbance of what little grassland remains (Sarker 1986a). *Cambodia* The grassland area in Kompong Thom and Siem Reap provinces north of Tonle Sap lake are apparently most heavily disturbed by extensive burning and ploughing for rice cultivation at the time when the species is most likely to be breeding (P. Davidson *in litt.* 2000). *Vietnam* Encroachment by villagers into Tram Chim Nature Reserve, including immigrants from Cambodia, is an increasing problem (Eames 1995b, J. C. Eames *in litt*. 1997, Buckton *et al*. 1999). The site is now surrounded by rice agriculture, and is heavily disturbed by drainage, paddy construction and fishermen such that it is unlikely that floricans will survive beyond the near future (Eames 1995b, Buckton *et al*. 1999).

Management of protected areas While several populations of the species survive in protected areas (in India and Nepal at least), this is no guarantee of security. Conservation measures are difficult to implement in Indian reserves given the "meagre strength of Forest Department staff" and their poor infrastructural facilities (Choudhury 1995b). This lack of funding, training and infrastructure probably affects protected areas throughout the species's range. Moreover, management practices commonly fail to consider the ecological requirements of the species, an oversight that will probably lead to local extinctions in several cases (S. Javed *in litt*. 1999).

MEASURES TAKEN ***Legislation*** The Bengal Florican appears on Appendix I of the Indian Wildlife Act (1974).

Protected areas *India* It occurs in D'Ering Memorial Wildlife Sanctuary (c.190 km^2, of which about 50% is grassland), Dibru-Saikhowa National Park, Dudwa National Park (815 km^2), Jaldapara Wildlife Sanctuary (216.5 km^2), Kaziranga National Park (430 km^2, with new areas of grassland recently added: Choudhury 2000c), Kishanpur Wildlife Sanctuary (227 km^2), Manas National Park (391 km^2), Orang Wildlife Sanctuary (70 km^2) and Pobitora Wildlife Sanctuary (16 km^2). It also occurs in Burachapori Wildlife Sanctuary, in which roughly 65% of its 44 km^2 is grassland (Talukdar 1995a; corrected in *Newsletter for Birdwatchers* 36, 2 [1996]), and at least some of this area is now Burachapori Wildlife Sanctuary. Nameri National Park is receiving improved protection and, although the species appears not to be present currently, it was predicted to recolonise the area (Narayan and Rosalind 1990a), and indeed there have apparently been recent records (Choudhury 2000c). *Nepal* It receives protection in Royal Bardia National Park (968 km^2, of which only 200–300 ha is probably suitable habitat for floricans: N. B. Peet *in litt*. 2001), Royal Chitwan National Park (932 km^2, although only c.20% of this area is covered by grassland: N. B. Peet *in litt*. 2001), Kosi Tappu Wildlife Reserve (175 km^2) and Royal Sukla Phanta Wildlife Reserve (155 km^2). *Vietnam* It occurs in Tram Chim Nature Reserve (76 km^2) (Nguyen Cu *in litt*. 1997); for conservation measures at this site see equivalent section under Sarus Crane *Grus antigone*.

Grassland management There is some evidence that cutting areas of *Imperata*-dominated grassland more than once a year has helped to maintain patches of shorter Imperata dominated grassland in Royal Chitwan National Park (Inskipp and Inskipp 1983). A grassland classification has been produced for protected areas in the terai (Lehmkuhl 1994, Peet *et al.* 1999a), and rotational management of *Imperata cylindrica* grassland in relation to the provision of refugia and thatch production has been investigated in Royal Bardia National Park (Peet *et al.* 1999b). The relationships between grassland assemblages, management and bird communities have recently been studied (Baral 2000b).

Control of persecution Forestry officials have visited food stalls at Srayov commune, Kompong Thom, Cambodia, to monitor bird trade and confiscate endangered species (Veasna 1999).

Research and education In India a public plea for information on the distribution of Bengal Florican and Lesser Florican, together with publicity regarding their threatened status, was made in India (Ali 1981) twenty years ago. Subsequently, several research projects have

focused on the species (see, e.g., Narayan and Rosalind 1990a, Narayan 1992, Choudhury 1996e, Sankaran 1996). In Nepal a survey for the species was undertaken in 1982 by the ICBP Bustard Group (Inskipp and Inskipp 1983, Inskipp and Collar 1984). Ornithological surveys in the Mekong delta of Vietnam in 1999 included the currently known sites for the species in the area (Buckton *et al.* 1999). Also in Vietnam a project is currently underway to assess the status and habitat preferences of the population at Tram Chim Nature Reserve (S. T. Buckton verbally 2000). In Cambodia surveys of suitable habitat have been undertaken in Kompong Thom and Banteay Meanchay provinces (C. M. Poole *in litt.* 1999, Veasna 1999).

MEASURES PROPOSED The most important populations of the Bengal Florican occur in India, Nepal and Cambodia, and its survival hinges on conservation action in these countries. The conservation requirements of the species should be viewed in combination with the needs of a variety of other threatened grassland birds within its range, so that a programme of habitat management and research can be implemented with benefits to each of these species (see Remarks 7). An appraisal of relevant measures arranged by country appears in the following sections; a certain degree of overlap between general proposals in different countries has been unavoidable.

Grassland management *India* Grass is a vital resource for people in the Indian terai who use it for fodder, thatch and material for rope, mats and other items (Rahmani and Qurieshi 1991). Proper management of terai grasslands needs to be a compromise that benefits the Bengal Florican and several other threatened grassland species, but also provides local people with resources (Rahmani 1997c). In effect, "to protect grasslands and benefit people, India needs a clear-cut policy on grassland management" (Rahmani and Qurieshi 1991). The most important methods to be considered in such a policy are rotational grazing, controlled burning, control of free-ranging livestock and protection of grassland plots to conserve seed banks (Rahmani 1997c). In most reserves an ample grassland buffer zone will also be required to absorb the requirements of local people (Rahmani and Qurieshi 1991).

Research has shown that practices such as rotational grazing and burning can increase herbage production and thus the carrying capacity of grasslands while allowing grassland birds to breed; as grass productivity can thus be vastly increased while grassland ecosystems are conserved this is at least a partial remedy to the fundamental problem of India's outsize and rapidly increasing livestock population on a rapidly decreasing area of grazing land (see Narayan *et al.* 1992, Rahmani 1997c). As this approach ensures patches of cover are left as refugia, it benefits not only the Bengal Florican but also other threatened cover-dependent species (see Remarks 7; also Grassland management: Nepal).

Timely burning or harvesting of the terai grasslands would also help to protect several endangered species (Rahmani 1997c); clearance regimes (controlled burning, thatch collection or grazing, either by wild ungulates or domestic cattle) in florican habitat should be completed before males establish display territories (Narayan and Rosalind 1990a). While late clearance disrupts breeding, lack of clearance can be equally disastrous: grassland areas in Dudwa National Park that were not burnt before the breeding season tended to catch fire in the summer, destroying all breeding attempts by Bengal Floricans (Narayan and Rosalind 1990a). It has been suggested that all suitable areas be burned in the third week of February (Narayan and Rosalind 1990a), although birds are often on display sites by the second week of February, and all burning in florican territories should thus be completed earlier than this if possible (S. Javed *in litt.* 1999).

The florican population at Manas National Park apparently thrived because rotational burning was practised (Ali *et al.* 1986). Moreover, one of the reasons that certain grasslands in the park were especially good for the species was that grass burning, thatch collection and grazing by cattle and hog deer *Axis porcinus* were not unduly intensive and thus maintained optimal grass height and density (Narayan and Rosalind 1990b). This type of balanced

management needs to be imposed where possible within protected areas. Protecting grasslands outside protected areas is an even more difficult challenge, but one that might be assisted by the allocation of tree and grass rights to communities rather than individuals, a measure that might act as an incentive to resist poachers, fight forest fires and harvest the environment sustainably (Rahmani and Qurieshi 1991). The most important fact to publicise and to follow is that it is possible to regenerate high-quality grassland habitat rapidly from overgrazed or disturbed areas given appropriate management (Narayan 1995). If suitable sites in the florican's range can be reclaimed from agricultural uses and developed into protected areas, the re-emergence of suitable habitat in a few years would almost certainly result in the species's return (Narayan 1995), particularly if sites are selected close to surviving populations.

Nepal Maintenance of monsoonal flooding regimes is vital for the persistence of the riverine grasslands utilised by the Bengal Florican and other threatened birds (Lehmkuhl 1994, Peet *et al.* 1999a). Dam and irrigation schemes which threaten rivers feeding important grasslands should be vigorously opposed.

As in India, the management of grasslands in Nepal's protected areas is beset by the complex issue of balancing wildlife conservation with the sustainable utilisation of grasslands by local communities (Peet 1997, Baral 2000b; see Richard 2000). Current cutting and burning regimes lead to extensive (if temporary) loss of habitat and cover. Whilst cutting and burning may create open areas beneficial to Bengal Florican and species such as Swamp Francolin (Baral 1998), other species require intact areas of grassland (see, e.g., Habitat and Measures Proposed under Jerdon's Babbler *Chrysomma altirostre*), and most will require refugia during and immediately after the cutting and burning period; in addition some threatened grassland mammals require unburnt refugia (Peet 1997). Management should thus aim to maintain areas of intact grassland that are not cut or burnt, on a rotational basis, whilst allowing other areas to be harvested by local people (Peet 1997, Peet *et al.* 1999b, Baral 2000b). Whilst rotational management will be difficult to achieve, given the resources available to protected-area authorities and the huge number of people involved, it is vital to bring the cutting and burning regime under greater control. Experimental work in *Imperata* grassland in Royal Bardia National Park has indicated that rotational cutting and burning is possible without the loss of thatch grasses from the sward (Peet *et al.* 1999b). The exact role(s) of fire and cutting in succession between different grassland species assemblages is unclear and further research is required. In order to reduce pressure on grasslands inside protected areas, alternatives to grass harvesting should be promoted in communities currently dependent on grassland resources (Peet 1997).

Grassland management should seek to maintain the existing diversity of grassland assemblages in protected areas (Peet *et. al.* 1999a) in order to maintain the existing diversity of threatened taxa dependent on this habitat. Consideration should therefore be given to maintaining areas of shorter grassland (usually dominated by *I. cylindrica*) which are currently succeeding to tall grassland or forest, particularly where these are used by the Bengal Florican: in Royal Bardia National Park, saplings and bushes encroaching on the grasslands, particularly in Baghoura and Lamkauli phantas should be removed (N. B. Peet *in litt*. 2001). Preventing succession to tall grassland is more complex and further research is probably necessary to discover a suitable methodology; current cutting and burning regimes do not appear to halt succession from *Imperata* grassland to tall grassland in Royal Chitwan National Park (N. B. Peet *in litt.* 2001), although in India annual cutting and burning would appear to maintain shorter grasslands (Narayan and Rosalind 1990a). Cutting patches more than once annually may be a solution but it is expensive and must not be allowed to interfere with breeding birds; the large, open *Imperata* grasslands in Royal Sukla Phanta Wildlife Reserve should be monitored to see if tall grassland is encroaching the area (N. B. Peet *in litt.* 2001). Ploughing would appear to be counterproductive and should be avoided (Peet 1997, Baral 2000b). Management of grasslands has tended to concentrate on large threatened mammals

such as tiger *Panthera tigris* and greater one-horned rhinoceros *Rhinoceros unicornis* but needs to take account of other threatened taxa including birds (Baral 2000b).

There is an urgent need to reduce grazing pressure from domestic livestock in Kosi Tappu Wildlife Reserve (Baral 2000b). This may require the resolution of land right issues first (N. B. Peet *in litt.* 2001). In Royal Sukla Phanta Wildlife Reserve, there is a need to try and reverse the process of illegal settlement and stock grazing in the extension area to the reserve, and grazing of stock in grassland near Radhapur and Jhilmila (Baral 2000b).

Grassland currently degraded by overgrazing will regenerate into fairly high-quality *Saccharum-Imperata* grassland within two years (Baral 1998, 2000b), depending on the existing composition of grass species (N. B. Peet *in litt*. 2001). Threatened bird species including Bengal Florican, Swamp Francolin, Bristled Grass-warbler *Chaetornis striatus* and White-throated Bushchat *Saxicola insignis* will quickly utilise these regenerating areas (Baral 2000b).

Bangladesh Khan (1988) recommended that controlled burning regimes should be implemented where necessary to assist grassland conservation, that grazing be controlled within sustainable limits, and that corridors be maintained between habitat patches. If any localities are found still supporting Bengal Floricans in Bangladesh, these should immediately be considered for elevation to protected-area status. Given that grassland can rapidly regenerate, a suitable area should be established for this purpose with a view to promoting potential recolonisation by the species.

Cambodia The Trapeang Rompeak area is probably too large to designate as a strictly protected zone of the Tonle Sap Biosphere Reserve because of manpower and funding constraints (Veasna 1999). It should therefore be made a multiple-use area wherein natural resources are harvested sustainably and habitat quality is monitored (Veasna 1999).

Protected areas *India* Adequate protection of remaining habitat is clearly an important step. In north-east India, one of the most important sites is Dibang Reserve Forest, and consequently this has been proposed, along with sections of Kerim Reserve Forest and Sirkee proposed reserve forest, as a 202 km^2 national park (Choudhury 1996e), towards which immediate conservation action should be directed. In addition, Choudhury (1996e) recommended the establishment of Kobo-Pobo Wildlife Sanctuary (196 km^2) to protect Kobo chapori (Choudhury 2000c). D'Ering Memorial Wildlife Sanctuary should be extended to include the grassland between the Sibia and Sesseri rivers, and Garampi Wildlife Sanctuary requires expansion to encompass the entire Nambor Reserve Forest (Choudhury 1996e). Protective measures at each reserve in which floricans breed, or even occur sporadically, should be improved. In particular, this necessitates provision of improved infrastructural facilities (Choudhury 1996e). Lagga Bagga is contiguous with Royal Sukla Phanta Wildlife Sanctuary in Nepal and would be better protected through a cooperative agreement between the two countries (Rahmani 1989). Visits to the area a decade ago revealed it to be deteriorating rapidly and urgently in need of conservation intervention (Rahmani and Qurieshi 1991). Choudhury (1995b, 1996e, 1999) made several recommendations for protection of Dibru-Saikhowa National Park. These included the designation of a 190 km^2 core area where no human disturbance would be allowed, translocation of enclave villages "on a priority basis", increased patrolling and manning of camps throughout the reserve by Forest Department guards, whose number should be increased to at least 100 (Choudhury 1995b). In addition, ecotourism should be encouraged and an awareness campaign conducted in fringe villages (Choudhury 1995b). In the Amarpur section of Dibru-Saikhowa, the species is mostly confined to relatively undisturbed fenced portions of grassland used for research by the Soil Conservation Department and this should be designated as a satellite core area with no human disturbance (Choudhury 1995b, 1996e). It has also been suggested that similar fenced areas enclosing 100–200 ha of grassland should be established in habitat such as Sibia chapori, Miri chapori and Bhim chapori (unprotected in Sadiya district) so that floricans might be able to forage and breed without disturbance (Choudhury 1995b, 1996e). Steps should be

taken to prevent further encroachment to reserve forests and grasslands, especially by the eviction of recent immigrants to their areas (Choudhury 1996e). Boundaries of forest villages should be re-marked as they have mostly expanded well beyond their previous intended limits and are seriously encroaching on protected habitats (Choudhury 1996e). Examples of such villages are Laika and Dadhia in Dibru-Saikhowa Wildlife Sanctuary, Lakhipathar, Choraipung, Borjan and Dimoruhola in Upper Dihing (West Block) Reserve Forest, and Kherjan, Bhimporapathar and Dhekiajan in Upper Dihing (East Block) Reserve Forest. A strict policy disallowing the establishment of new settlements should be enforced in all reserve forests and protected areas (Choudhury 1996e). *Nepal* As suitable grasslands are so restricted in area and distribution, further research must be coupled with direct action to strengthen the measures that ensure their protection (Peet *et al*. 1999). Specific management recommendations in protected areas are made under Grassland management.

Cambodia The wetlands and grasslands at Ang Trapeang Thmor deserve immediate protection as they provide important habitat for Sarus Crane, White-shouldered Ibis *Pseudibis davisoni* and several other scarce species (C. M. Poole *in litt*. 1999; see Remarks 7). The Trapeang Rompeak area qualifies as Cambodia's fifteenth Important Bird Area, as it holds not only Bengal Florican but also Greater Adjutant *Leptoptilos dubius,* Lesser Adjutant *L. javanicus*, and White-shouldered Ibis (Veasna 1999; see Remarks 7). As such it requires conservation action along with other areas in Kompong Thom province found to hold populations of the species (see under White-shouldered Ibis). *Vietnam* Buckton *et al*. (1999) recommended the establishment of two protected areas in the Ha Tien plain where suitable habitat remains and the species has been recorded.

Control of persecution *India* Even in the early twentieth century, hunting management was proposed by Baker (1907a), who suggested that a year-round ban on hunting females and a hunting season for males between 1 October and 1 March was necessary "for some years to come": this was based on a closed season while the birds were breeding and on the higher value of females to the population given the polygamous mating system. Current legislation prevents hunting and this necessitates the employment and empowerment of guards or wardens in protected areas to ensure that legal protective measures are adhered to and that heavy penalties accrue to violators. *Cambodia* Control and monitoring of hunting in Kompong Thom province is essential to the species's future in the country (Veasna 1999). Prohibition of capture and trade is necessary in local communities around Beoung Prabel, Trapeang Rompeak, Viel Anh Chanh and Kruos Kraom, with strict penalties enforced for offenders (Veasna 1999). This could be achieved alongside other management goals in a multiple-use annex to the Tonle Sap Biosphere Reserve (Veasna 1999).

Education *India* Local people, especially those settled on or near protected areas and reserve forests, should be informed of the importance and legal status of the Bengal Florican; attempts are needed to generate interest and pride in the species, and to motivate villagers and visitors to refrain from hunting, stealing or otherwise causing disturbance or damage to either the birds, their nests or their young (Choudhury 1996e). This proposal is relevant throughout the range of the species. *Nepal* Education programmes have been proposed to inform people of the importance of grasslands for both people and wildlife and to provide them with the technical and practical knowledge necessary to harvest sustainably (Baral 2000). *Bangladesh* Awareness campaigns were designed and proposed by Sarker (1989) to reduce hunting and habitat destruction. *Cambodia* An environmental education campaign should be pursued in the Boeng Prabel, Trapeang Rompeak, Viel Anh Chanh and Kruos Krom districts of Kompong Thom province (Veasna 1999). A research and training centre for wildlife conservation in northern Cambodia is needed in order to increase the capacity of local officials and coordinate wildlife research, conservation, and environmental education (Veasna 1999).

Research The species is only easily detectable in the breeding season and little is known about its movements outside this time; non-breeding grounds may therefore constitute

additional sites requiring protection if and when they are discovered, and searches should be mounted in appropriate areas (Narayan 1995). *India* All potential sites should be surveyed at the earliest opportunity and populations at known sites frequently monitored (Rahmani 1988, Choudhury 1996e). *Nepal* Further study of its behaviour and ecology are required, but perhaps most important are radio-telemetry studies to clarify its movements and distribution in the non-breeding season (Baral 2000). *Bangladesh* Khan (1988) proposed an immediate survey of grasslands and an assessment of the status of grassland fauna. *Cambodia* Wet-season field surveys have been proposed in south-east Cambodia, and also in the provinces of Battambang and Takeo (Eames 1997). The most likely areas to contain unknown populations of the species were thought to be grasslands north of Tonle Sap in Siem Reap and Preah Vihear provinces, and the south-eastern provinces adjacent to Vietnam: Kampot and Takeo (C. M. Poole *in litt*. 1999). Since these recommendations were forwarded an apparently large but unquantified population has been discovered in Kompong Thom and Banteay Meanchay provinces and the most urgent research requirement in Cambodia is now to assess its distribution, status and threats so that measures can be taken to protect it. In particular, critical areas need to be identified for protection and studies undertaken to monitor population trends (Veasna 1999). Moreover, an understanding of seasonal movements and breeding requirements in the region is necessary before any conservation strategy for the Bengal Florican can be designed (Eames 1995b). Dry-season surveys should also be carried out (Veasna 1999). To address the need for further study, a regional wildlife research and conservation team has been proposed, along with a centre to coordinate research, conservation and education in northern Cambodia (Veasna 1999). *Vietnam* As undiscovered small populations were thought possibly to exist elsewhere in Tay Ninh province further surveys in suitable grassland habitat were proposed (Eames 1995b), although the likelihood of populations surviving should be re-assessed before these are undertaken. Given the fact that all suitable habitat surrounding Tram Chim Nature Reserve has now been converted to agricultural use, an assessment of the status and viability of the population at the site is required (S. T. Buckton verbally 2000).

REMARKS (1) One specimen in BMNH is marked: "Bootan"; given the paucity of suitable habitat for the species in Bhutan, this bird was probably shot in the grasslands of the Bhutan duars in adjacent West Bengal and Assam. (2) Birds of unknown origin were observed in the Bangkok Bird Market in 1978 (Inskipp and Inskipp 1983); while it is perhaps likely that these were captured in Cambodia it is possible that the species once occurred in the grasslands of the Chao Praya floodplain (Eames 1995b). However, all suitable habitat has been destroyed in this area and there is no further evidence that the species ever occurred in the country. (3) Goalpara district once included present-day Dhubri and Kokrajhar districts (Narayan 1992), so there is no guarantee that records listed here are not from these adjacent areas. (4) One specimen in BMNH from Svay (Soai) Rieng, Cambodia, is labelled as collected on 1 December 1928, but this seems unlikely given knowledge of the species's movements and those of both J. Delacour and W. Lowe (Eames 1995b). (5) Two mounted specimens in MNHN are dated 1880 and labelled "M. Pierre, Tonkin" (i.e. north Vietnam). However, it is thought likely that the birds were sent from Soai Rieng, Cambodia, to the Saigon Botanical Gardens where Pierre was director (Delacour and Jabouille 1931, Eames 1995b). (6) At Ha Tien (Ha Tien plain), Kien Giang, in 1997 a hunter produced feathers of a male killed there within the previous three years, and local people accurately described the nest and eggs (Tran Triet *et al*. in press). (7) A considerable assemblage of threatened species depends, in whole or in part, on the grasslands of northern India, the Himalayan states, Bangladesh and Myanmar for their survival. To varying degrees the preservation of the Bengal Florican runs hand-in-hand with that of the Swamp Francolin *Francolinus gularis*, Manipur Bush-quail *Perdicula manipurensis*, Marsh Babbler *Pellorneum palustris*, Jerdon's Babbler *Chrysomma altirostre*,

Slender-billed Babbler *Turdoides longirostris*, Black-breasted Parrotbill *Paradoxornis flavirostris*, Hodgson's Bushchat *Saxicola insignis*, Grey-crowned Prinia *Prinia cinereocapilla*, Bristled Grass-warbler *Chaetornis striatus* and Finn's Weaver *Ploceus megarhynchus*, and conservation action should be targeted towards sites that provide protection to the broadest selection of these species. Similarly, in South-East Asia the Bengal Florican is found in several areas that support large waterbirds such as White-shouldered Ibis *Pseudibis davisoni*, Lesser Adjutant *Leptoptilos javanicus,* Lesser Adjutant *L. dubius*, Greater Adjutant and Sarus Crane *Grus antigone*. It is clearly vital to view grassland conservation as a broad programme aimed at preserving an entire suite of species, with research proposals and management recommendations modified accordingly.