Threatened Birds of Asia:
The BirdLife International Red Data Book

Editors

N. J. COLLAR (Editor-in-chief),
A. V. ANDREEV, S. CHAN, M. J. CROSBY, S. SUBRAMANYA and J. A. TOBIAS

Maps by

RUDYANTO and M. J. CROSBY

Principal compilers and data contributors

■ ***BANGLADESH*** P. Thompson ■ ***BHUTAN*** R. Pradhan; C. Inskipp, T. Inskipp ■ ***CAMBODIA*** Sun Hean; C. M. Poole ■ ***CHINA*** ■ *MAINLAND CHINA* Zheng Guangmei; Ding Changqing, Gao Wei, Gao Yuren, Li Fulai, Liu Naifa, Ma Zhijun, the late Tan Yaokuang, Wang Qishan, Xu Weishu, Yang Lan, Yu Zhiwei, Zhang Zhengwang. ■ *HONG KONG* Hong Kong Bird Watching Society (BirdLife Affiliate); H. F. Cheung; F. N. Y. Lock, C. K. W. Ma, Y. T. Yu. ■ *TAIWAN* Wild Bird Federation of Taiwan (BirdLife Partner); L. Liu Severinghaus; Chang Chin-lung, Chiang Ming-liang, Fang Woei-horng, Ho Yi-hsian, Hwang Kwang-yin, Lin Wei-yuan, Lin Wen-horn, Lo Hung-ren, Sha Chian-chung, Yau Cheng-teh. ■ ***INDIA*** Bombay Natural History Society (BirdLife Partner Designate) and Sálim Ali Centre for Ornithology and Natural History; L. Vijayan and V. S. Vijayan; S. Balachandran, R. Bhargava, P. C. Bhattacharjee, S. Bhupathy, A. Chaudhury, P. Gole, S. A. Hussain, R. Kaul, U. Lachungpa, R. Naroji, S. Pandey, A. Pittie, V. Prakash, A. Rahmani, P. Saikia, R. Sankaran, P. Singh, R. Sugathan, Zafar-ul Islam ■ ***INDONESIA*** BirdLife International Indonesia Country Programme; Ria Saryanthi; D. Agista, S. van Balen, Y. Cahyadin, R. F. A. Grimmett, F. R. Lambert, M. Poulsen, Rudyanto, I. Setiawan, C. Trainor ■ ***JAPAN*** Wild Bird Society of Japan (BirdLife Partner); Y. Fujimaki; Y. Kanai, H. Morioka, K. Ono, H. Uchida, M. Ueta, N. Yanagisawa ■ ***KOREA*** ■ *NORTH KOREA* Pak U-il; Chong Jong-ryol, Rim Chu-yon. ■ *SOUTH KOREA* Lee Woo-shin; Han Sang-hoon, Kim Jin-han, Lee Ki-sup, Park Jin-young ■ ***LAOS*** K. Khounboline; W. J. Duckworth ■ ***MALAYSIA*** Malaysian Nature Society (BirdLife Partner); K. Kumar; G. Noramly, M. J. Kohler ■ ***MONGOLIA*** D. Batdelger; A. Bräunlich, N. Tseveenmyadag ■ ***MYANMAR*** Khin Ma Ma Thwin ■ ***NEPAL*** Bird Conservation Nepal (BirdLife Affiliate); H. S. Baral; C. Inskipp, T. P. Inskipp ■ ***PAKISTAN*** Ornithological Society of Pakistan (BirdLife Affiliate) ■ ***PHILIPPINES*** Haribon Foundation for Conservation of Natural Resources (BirdLife Partner); N. A. D. Mallari, B. R. Tabaranza, Jr. ■ ***RUSSIA*** Russian Bird Conservation Union (BirdLife Partner Designate); A. V. Andreev; A. G. Degtyarev, V. G. Degtyarev, V. A. Dugintsov, N. N. Gerasimov, Yu. N. Gerasimov, N. I. Germogenov, O. A. Goroshko, A. V. Kondrat'ev, Yu. V. Labutin, N. M. Litvinenko, Yu. N. Nazarov, V. A. Nechaev, V. I. Perfil'ev, R. V. Ryabtsev, Yu. V. Shibaev, S. G. Surmach, E. E. Tkachenko, O. P. Val'chuk, B. A. Voronov. ■ ***SINGAPORE*** The Nature Society (Singapore) (BirdLife Partner); Lim Kim Seng ■ ***SRI LANKA*** Field Ornithology Group of Sri Lanka (BirdLife Affiliate); S. Kotagama; S. Aryaprema, S. Corea, J. P. G. Jones, U. Fernando, R. Perera, M. Siriwardhane, K. Weerakoon ■ ***THAILAND*** Bird Conservation Society of Thailand (BirdLife Partner); U. Treesucon; R. Jugmongkol, V. Kongthong, P. Poonswad, P. D. Round, S. Supparatvikorn ■ ***VIETNAM*** BirdLife International Vietnam Country Programme; Nguyen Cu; J. C. Eames, A. W. Tordoff, Le Trong Trai, Nguyen Duc Tu.

With contributions from: S. H. M. Butchart, D. S. Butler (maps), P. Davidson, J. C. Lowen, G. C. L. Dutson, N. B. Peet, T. Vetta (maps), J. M. Villasper (maps), M. G. Wilson

Recommended citation
BirdLife International (2001) *Threatened birds of Asia: the BirdLife International Red Data Book.* Cambridge, UK: BirdLife International.

Wellbrook Court, Girton Road, Cambridge, CB3 0NA, United Kingdom
Tel: +44 1223 277318 Fax: +44 1223 277200 Email: birdlife@birdlife.org.uk
Internet: www.birdlife.net

BirdLife International is a UK-registered charity

ISBN 0 946888 42 6 (Part A)
ISBN 0 946888 43 4 (Part B)
ISBN 0 946888 44 2 (Set)

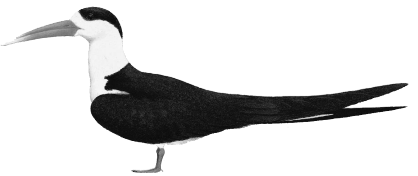
British Library-in-Publication Data
A catalogue record for this book is available from the British Library

First published 2001 by BirdLife International

Designed and produced by the **Nature**Bureau, 36 Kingfisher Court, Hambridge Road, Newbury, Berkshire RG14 5SJ, United Kingdom

Available from the Natural History Book Service Ltd, 2–3 Wills Road, Totnes, Devon TQ9 5XN, UK. Tel: +44 1803 865913 Fax: +44 1803 865280 Email nhbs@nhbs.co.uk
Internet: www.nhbs.com/services/birdlife.html

INDIAN SKIMMER
Rynchops albicollis



Critical □ —
Endangered □ —
Vulnerable ■ A1c,e; A2c,e; C1

This species has a small, rapidly declining population as a result of widespread degradation and disturbance of lowland rivers and lakes. It therefore qualifies as Vulnerable.

DISTRIBUTION The Indian Skimmer has a large extent of occurrence but a relatively narrow area of occupancy, being confined to the major river systems of Pakistan, northern India, Bangladesh, Myanmar and Indochina (Laos, Cambodia and Vietnam). Small numbers have been recorded in China (historically) and Nepal (currently). Ticehurst (1922–1924) mentioned that "according to Zarudny this species is found so far west as Persian Baluchistan" (presumably coastal Iran); although it may have strayed along this coast when its population was far higher than it is today, the record cannot be confirmed. As the map generated from the records below indicates, recent records show that India has was always the most important country for the species and has now become crucial in any strategy to preserve the species.

■ ***CHINA*** Although reported to occur sporadically on the coast of **southern China** in the nineteenth century (Swinhoe 1863a; also Cheng Tso-hsin 1987), no more information appears to be available.

■ ***PAKISTAN*** The species was originally recorded in Punjab and Sind provinces all along the Chenab, Sutlej, Jhelum and Indus rivers (Hume 1872–1873, Roberts 1991–1992). Although it has declined markedly, it is still relatively widespread on these rivers. Records are from: ■ ***North-West Frontier Province*** upstream of **Chashma barrage**, Dera Ismail Khan/Mianwali districts, 12, April 1970 (Roberts 1991–1992), summer visitor, 1990 (Kylänpää 1997); **Dhab Shumali**, two, May 1990 (D. A. Scott *in litt*. 2000); **Dera Ismail Khan district**, six records between March and August, 1989–1998 (Kylänpää 2000); ■ ***Sind*** **Hyderabad**, one, undated (Swinhoe 1887), nesting, undated (Barnes 1888–1891), undated (specimen in BNHS, Abdulali 1968–1996), small parties, July and September 1965 (Holmes and Wright 1968–1969); **Kotri**, Indus river, March 1881 (Barnes 1881); on islands near **Jherruck**, Indus river, colonies of 20–40 pairs, late April 1933 and 1936 (Roberts 1991–1992); **Haleji lake** (Haleji dandh), Thatta district, February and March, 1980–1983 (Roberts *et al*. 1986, Roberts 1991–1992); **Indus delta**, a flock of 18 "on the mouth of the Indus", March 1970 (Roberts 1991–1992); ■ ***Punjab*** opposite **Attock**, Indus river, "large numbers" apparently breeding, April 1923 (Briggs and Osmaston 1928); **Rawal lake**, near Islamabad, one, April 1975 (Roberts 1991–1992); near **Kalabagh**, Indus river, c.30 birds, April 1908 (Whitehead 1909, 1910–1911); **Jhelum district**, June–August 1913, March 1914 (Whistler 1913, ms, male in BMNH); nesting on an island upstream of **Marala barrage**, Chenab river, Sailkot district, May, pre-1969 (Roberts 1991–1992); between **Pind Dadan Khan** (Pindadhun Khan) and Jhelum, on Jhelum river, breeding, April 1870 (Hume and Oates 1889–1890), and a "pretty large party" nearby, November 1871 (male in BMNH); **Shadiwal**, Gujrat district, May 1940 (two males in BMNH); near **Chuha Mal** (Chuka Mal), Gujrat district, presumably breeding on islands of Chenab river, May 1939 (specimen in BMNH), May, 1940s (Roberts 1991–1992); **Wazirabad**, on the Chenab river, c.30 pairs breeding, April 1870 (Hume and Oates 1889–1890), and nearby at Palkhu Nallah, five, August 1915 (Whistler 1916c); Wahdat, outskirts of **Lahore**, one, December 1973 (Vittery 1999); **Jhang district**, 1917–1920 (Whistler 1922a); **Trimmu barrage**, 14, December 1983 (Roberts 1991–1992); near **Sidhnai barrage**, Ravi river, Multan district, three, April 1970 (Roberts 1991–1992); **Multan**,

pre-1881 (two specimens in BMNH); on islands near **Ali Wahan**, Indus river, colonies of 20–40 pairs, late April 1933 and 1936 (Roberts 1991–1992); near "Pruda Thaur" (illegible; untraced), Jhelum river, November 1871 (male in BMNH).

■ ***INDIA*** This species was once very common on all large river systems in central and northern India, not occurring south of c.16° N (Ali and Ripley 1968–1998). A decline in numbers has occurred, paralleled by a fragmentation of its range, and it now only breeds at scattered localities. Records are from:

■ *Punjab* **Harike Lake Wildlife Sanctuary**, a colony nearby, undated (Whistler ms), 1981–1982 (Ali *et al*. 1981), maximum of 43, October 1983–August 1994 (P. Undeland *in litt*. 1995), 51, March 1995 (*Oriental Bird Club Bull.* 21 [1995]: 68–73, P. Undeland *in litt*. 1995), 70, of which 34 were adults and 36 were juveniles, July 1995 (*Oriental Bird Club Bull.* 23 [1996]: 49–53), 54, October 1996 (P. Undeland *in litt*. 1997), up to 30 nearby, mostly on the Sutlej river and the canal near the dam, July 1999 (H. Hendriks *in litt*. 1999); **Phillaur**, several nests found, 1910 (Whistler 1919a); above **Rupar**, on the Sutlej river, "fairly common" and thought to breed, March 1916 (Whistler 1918); **Ludhiana**, singles encountered twice, June–July 1917 (Whistler 1919); **Fatehgarh** (Fategarh), Patiala district, April 1888 (one egg in NMS); **Firozpur district**, 1–2 on three occasions on the Sutlej river, February–March 1912 (Whistler ms);

■ *Haryana* unspecified locality, undated (Yadav and Maleyvar 1981);

■ *Delhi* near **Delhi**, on the Yamuna (=Jumna) river, undated (Basil-Edwardes 1926), 1931–1947 (Frome 1947–1948), undated (Hutson 1954), undated (Abdulali and Pandey 1978); also Bad Khal lake (untraced), south of Delhi (and possibly not in Delhi administrative area), c.10 birds, c.1973 (B. F. King verbally 1998); **Najafgarh lake**, a pair, July 1991 (Menon and Gandhi 1992), one, around 1996 (M. Aggarwal *in litt*. 1999); previously at **Okhla barrage**, undated, but no recent records (M. Aggarwal *in litt*. 1999);

■ *Rajasthan* Jod-Beed, **Bikaner**, one, March 1993 (Sangha 1998); **Keoladeo National Park**, Bharatpur, one, December 1994 (Sangha 1998); **Ban Baretta** (Bund Barata, Bandh Baretha), near Bharatpur, 30, February 1990 (Hough 1990), 10, January 1991 (Bradshaw 1991), 20, February 1992 (Drijvers 1995), up to 10, January 1993 (P. Holt *in litt*. 1999, P. Alström, U. Olsson and D. Zetterström *in litt.* 2000), up to eight, January–February 1994 (P. Holt *in litt*. 1999), 11, February 1995 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000), eight in February 1997 (P. Holt *in litt*. 1999), two in March 1997 (P. J. Hines *in litt*. 1999), six, possibly breeding, June 2000 (Sundar 2000); Kalakho, **Dausa**, one, December 1994 (Sangha 1998); Dangiwas, **Jodhpur district**, August 1966 (Majumdar and Roy 1993); **Chandlai**, Jaipur, one on monsoon flood-water, January 1987 (Sangha 1998), and Chandlai tank, undated (Scott 1989), possibly referring to the same record; in or near **Ranthambhore National Park**, on the Chambal river, 10, March 1990, six, February 1994 (D. Richardson *in litt*. 1999), a pair with nest "near Ranthambore", April 1991 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000), and at Lake Moesunare (untraced), "a one-hour drive from Ranthambore", three, February 1996 (C. Bell *in litt*. 1999); Soorwal reservoir, c.10 km from **Sawai Madhopur**, one, October 1996 (Sangha 1998), seven, January 1997 (P. Holt *in litt*. 1999), seven, "summer" 1998 (M. Kulshreshtha *in litt*. 1999), and nearby at Three River Junction, 36, January 1998 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000); **Kothari river**, at a dam, seven, July 1998 (Kaur 1999); **Alnia**, Kota, near the Chambal river, three, May 1989, followed by a single, July 1989 (Sangha 1998); Ranpur, **Kota**, near the Chambal river, five, March 1989, and two, December 1989 (Sangha 1998); **Abu lake**, four, c.1875 (Butler 1875–1877), and Nukhi Talao, near Abu, undated (Barnes 1888–1891); "Kunkrowlee", a lake near **Udaipur**, several parties, undated (Hume 1878b);

■ *Gujarat* **Banni**, as "Dhdko Banni", three, October 1990 (Tiwari 1997); Patadi, **Little Rann of Kutch**, a pair, February 1996 (O. Pfister *in litt*. 1999); **Chhari-Dhand**, one, May 1990

(Tiwari 1997); at **Mandvi**, Kutch, flock of c.9, August 1947 (G. M. B. Sparks *in litt*. 2000), and nearby at Laija creek, two, August 1947 (Lavkumar 1956b, G. M. B. Sparks *in litt*. 2000), and another, December 1966 (Himmatsinhji 1966); **Surendranagar reservoirs**, 11, January 1987 (Scott 1989); **Gulf of Kutch**, southern shore in Saurashtra, recorded in winter, undated (Scott 1989), also central and eastern Saurashtra, 18, January 1987 (Scott 1989); **Khajadia Sanctuary** (lakes), 190, undated (Scott 1989), 76, March 2000 (*Oriental Bird Club Bull.* 32 [2000]: 66–76); **Jamnagar**, several parties of 10–15, August 1963 (Abdulali 1964), 1983 (Gole 1985); **Jasdan lakes**, "a few", August 1948 (Dharmakumarsinhji 1955); **Gulf of Khambhat**, small numbers, undated (Scott 1989); mouth of the **Shatrunji river**, a tightly packed flock of c.250 on a mud bank, winter, year unspecified (Dharmakumarsinhji 1955); Jathavera (untraced), two, November 1990 (Tiwari 1997); Sardar Post (untraced), Rann of Kutch, two, February 1991 (Tiwari 1997); Modhva coast (untraced), two, March 1991 (Tiwari 1997);

■ ***Uttar Pradesh*** **Dehra Dun district**, "somewhat scarce" on the Ganges and Yamuna, undated (Osmaston 1935); **Garhmuktesar** (Garh Mukhteshwar), bridge over the Ganges river near Delhi, 50, February 1983 (A. Dean *in litt*. 1999), 30, January 1988 (Berlijn *et al*. 1988), seven, March 1997 (P. Holt *in litt*. 1999), two, December 1997 (A. Holcombe *in litt*. 1999), 21, January, 44, February 1999 (P. Holt *in litt*. 1999), and (presumably all at exactly the same site) on the Ganges river, "between Delhi and Moradabad", 28–30, January 1989 (H. Hendriks *in litt*. 1999), "between Bharatpur and Corbett National Park", 85, February 1996 (I. Lewis *in litt*. 1999) and near Moradabad, six, March 1984 (J. Fritzhand *in litt*. 1999); **Dasna jheel**, one, undated (Ganguly 1950); **Bulandshahr**, undated (Abdulali 1968–1996); **Chauka river** (as "Chowka"), the species was "common in the cold season", with large flocks often seen on sandbanks around 1857–1860 (Irby 1861; also Reid 1887); near **Shergarh** (Sheregurh), on the Yamuna river, breeding, March–April, year unspecified (Hume and Oates 1889–1890); **Fatehgarh**, c.1872 (specimen in BMNH), March–April 1873 (two specimens in BMNH), May 1876 (two males, five females in BMNH), and breeding downstream, April 1898–1899 (Jesse 1896–1899, 1899); Yamuna river, near **Agra**, common breeding bird, mid-April, c.1941, and distributed widely along the river (Lowther 1941); **Bahramghat** ("Byramghat"), on the "Ghaghara" (Gogra) river, pre-1881 (Reid 1887), and mentioned as common on this river by Irby (1861); in the **Lucknow** region, on the Gomati (Goomti) river, undated (Jesse 1902–1903); **Faizabad**, April 1901, April 1918 (NMS egg data); **Etawah**, December 1865 (specimen in BMNH), January 1867 (two specimens in BMNH), March 1867 (one egg in NMS), August 1867 (specimen in BMNH); **Bithur** (Bitoor), near Kanpur, on the Ganges, "a flock", 1986 (S. Sondhi *in litt*. 1999); **Allahabad district**, March 1880 (male in BMNH), and "several" seen between here and Rajmahal (Bihar), 1859 (Beavan 1865–1868); **Ghazipur district**, on the Ganges, "fairly numerous," around 1930–1931 (Briggs 1934); **Varanasi** (Benares), two, March 1983 (Nickel and Trost 1983);

■ ***Madhya Pradesh*** **Fort Ater**, on the Chambal river, common at breeding colony, 1990s (M. Aggarwal *in litt*. 1999); **National Chambal Sanctuary**, between Rameshwar and Bhare, 555 counted along 403 km of the Chambal river, January–February 1994 (Sharma *et al*. 1995); **Chambal river**, along a c.18 km stretch, 44, January 1987 (Scott 1989); **Morena district**, undated (Saxena 1998); **Jiran**, Mandsaur district, one, "just before the monsoon," undated (Barnes 1888–1891); **Sehore**, July, 1908–1910 (Whitehead 1911); **Hoshangabad**, on the Narmada river, "a few individuals" breeding "in the hot weather", undated (Hewetson 1956); **Indravati river**, breeding, undated (Ali 1933–1934);

■ ***Maharashtra*** **Dhule**, August 1883 (male in BMNH); **Salsette island**, on Chedda Salt Pans, up to three, August–September 1970 (Stairmand 1970); **Dharamtar creek**, Kolaba district, small flocks, November 1940, "some", November 1950 (Stairmand 1970); **Alibag**, Kolaba district, March 1890 (specimen in BNHS, Ali and Abdulali 1936–1939); **Mula-Mutha Sanctuary**, Pune, one, December 1986 (Bradbeer 1987);

■ *Goa* **Chapora estuary**, one, September 1996 (Lainer 1999); **Carambolim lake**, apparently regular, 1992 (F. R. Traynor *in litt*. 1992), but no other sightings despite regular visits (P. Holt *in litt*. 1999);

■ *Karnataka* **Bhima river**, one, undated (E. A. Butler 1881);

■ *Andhra Pradesh* unspecified localities, listed (Taher and Pittie 1989); **Pocharam reservoir**, on the Manjira river, nine, January 1987 (Scott 1989); **Bezwada**, breeding, undated (Whistler and Kinnear 1931–1937, Ali 1933–1934); **Nellore**, undated (four specimens in MCML); **Nelapattu tank**, 1979–1982 (Nagulu 1983);

■ *Tamil Nadu* **Madras** (Chennai), pre-1845 (specimen in BMNH); **Pondicherry** (Puduchcheri), July 1932 (specimen in IRSNB);

■ *Bihar* (see Remarks 1) **Jaynagar**, Jainagar, on the Kamla river, "a few," July and August, pre-1902 (Inglis 1901–1904); **Madhubani**, August 1899 (female in AMNH); **Savan** (Savanbehar, Siwan), April 1907 (NMS egg data); **Darbhanga**, undated (Dalgleish 1902), March 1908 (female in BMNH); **Patna district**, common on the Ganges, undated but presumably 1930s (D'Abreu in Whistler ms); on the Ganges near **Bhagalpur**, 140 individuals in January 1995 (A. Mishra *in litt*. 2000); **Sultanganj**, several in February 1999 and seven in May 1999 (A. Mishra *in litt*. 2000); **Rajmahal** (Rejmahal), on the Ganges, undated (Ball 1876, 1878);

■ *Orissa* **Bhitarkanika Wildlife Sanctuary**, listed (Kar 1991), but not by Pandav (1996) suggesting that the record was either overlooked or retracted; **Cuttack**, on the Mahanadi river, "a large flock consisting of skimmers and terns", undated (Ball 1876), recorded elsewhere on this river, undated (Ball 1878) and thought to be resident (D'Abreu 1935);

■ *West Bengal* **Jalpaiguri**, on the Tista river, 1860 (Beavan 1865–1868); **Sankosh** (Sankos) **river**, Jalpaiguri district, "often seen", 1915–1920 (Inglis *et al*. 1920);

■ *Assam* unspecified locality, breeding, undated (Baker 1922–1930); **Dhubri** (Dhuburi), pre-1881 (Hume 1888), and elsewhere in Dhubri district at Gadhadhar (Godadahr) river, March 1906 (two specimens in AMNH); **Surma valley**, Cachar, 1896 and 1897 (Baker 1894–1901).

■ ***NEPAL*** The species is an irregular and uncommon non-breeding visitor (Inskipp and Inskipp 1991, Baral *et al*. 1996). Records are from: **Karnali river**, close to the Indian border, March 1986 (Hurrell 1988) and on the same river on the western boundary of Royal Bardia National Park, on the river journey from Tiger Tops, unspecified numbers, 1999 (K. Daly *in litt*. 1999); along the **Narayani river** in Royal Chitwan National Park, near the crossing point of Temple Tiger and Tiger Tops, one, March 1994 (White and White 1994), and near Amaltarighat, one, undated (*Bird Conserv. Nepal Newsletter* 5, 2 [1996] 2–3); **Kosi barrage**, April 1975 (Fleming *et al.* 1984), up to 17, March 1976 (Gregory-Smith and Batson 1976), maximum of seven, February and March 1981 (del Nevo and Ewins 1981, Inskipp and Inskipp 1981a), one pair, May 1979 (Lister 1979), up to two seen irregularly through the 1990s (*Nepal Birdwatching Club Newsletter* 3, 2 [1994]: 2–3, T. R. Giri verbally 1998) and near Kusaha, on the Kosi river, May 1997 (*Danphe* 6, 4 [1997]: 2).

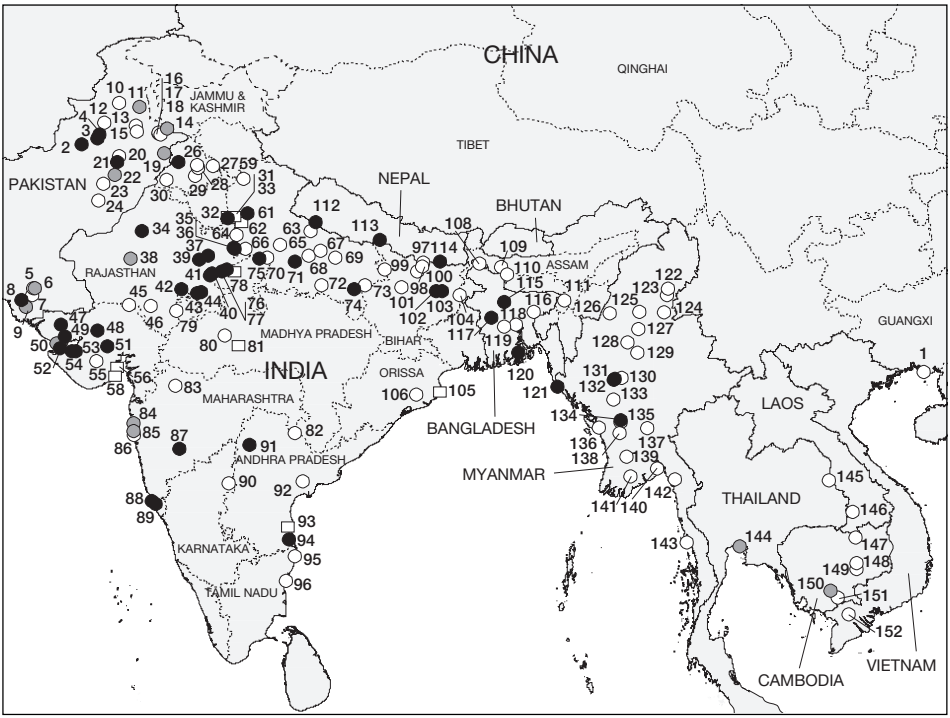
■ ***BANGLADESH*** Historically, the species was found seasonally on large rivers far from the coast, and it still occurs in these areas on migration (presumably annually in fairly substantial numbers, although records are scarce). Otherwise it is now known almost exclusively from the coastal region. Records are from: **Jamuna river** (Jamuna–Brahmaputra sandbanks), two records (four and a singleton), 1990s (Thompson and Johnson 1996, P. M. Thompson *in litt*. 1999); **Lakhai**, "south-west corner of Sylhet", pre-1881 (Hume 1888); **Pabna**, September or October 1990 (P. M. Thompson *in litt*. 1999); **Dhaka** (Dacca), pre-1891 (specimen in BMNH); **Faridpur** (Furreedpore), seasonally common on rivers, 1870s (Cripps 1878); **Padma–Meghna delta**, Hatiya island, a total of 3,200 in the vicinity, January 1989 (Anon. 1989), flocks of several hundred regularly wintering, 1990s (Thompson and Johnson 1996), including more than 600, January 1997 (J. N. Dymond *in litt*. 1999); **Teknaf peninsula**, rare, 1980s (Rashid and Khan 1987).

■ ***MYANMAR*** The species was formerly found on all major river systems (Hume and Davison 1878, Oates 1882, Harington 1909–1910, Smythies 1986). It appears to have declined dramatically and there have been very few recent sightings. Records are from: **Myitkyina**, undated (Smythies 1986); south of **Khaungpu**, March, undated (Stanford and Ticehurst 1938–1939); **Bhamo district**, undated (Oates 1888), on the Irrawaddy (Ayeyarwady), undated (Harington 1909a, 1909–1910); between **Seiktha** and Seikngu, Katha district, breeding, April 1916 (Smith 1942); **Upper Chindwin district**, undated (Harington 1909a); **Tagaung**, Katha district, breeding, April 1927 (63 eggs found of both this species and River Tern *Sterna aurantia* in unspecified proportions), and c.12 pairs, April 1929 (around 30 eggs of both species found, and many others already hatched) (Smith 1942); **Kabo**, Shwebo district, four, June 1933, and three, January 1934 (Roseveare 1949); **Yedaw**, Mandalay district, "small parties" noted on the Irrawaddy, in December 1929 (Smith 1942); **Myingyan district**, around 1905 (Macdonald 1906); between **Nyaungu** and Pakokku, four, January 1989 (Khin Ma Ma Thwin *in litt*. 1997), 24, February 1993 (U Thein Aung verbally 1993); **Pagan**, three, March 1995, in suitable breeding habitat on the Irrawaddy (Robson *et al.* 1998); one specimen apparently labelled "Minbu" (but illegible), July 1892 (female in BMNH), and sightings from **Minbu**, on the Irrawaddy, four, June 1936 (Roseveare 1952), also at an unspecified locality in Magwe state, April 1906 (two eggs in NMS); **Thayetmyo**, March 1866 (specimen in BMNH), December, year unspecified (specimen in MCML); **Boulay**, March 1873 (two males in BMNH); **Arakan**, 1909–1910 (Hopwood 1912b); **Toungoo**, April–May 1874 (two males in BMNH, male in NMS), April and May 1874 (male and two eggs in NMS) and an unspecified locality on the Sittang river, February 1876 (female in RMNH); **Padaung**, Pye (Prome) district, undated (Abdulali 1968–1996), also from unspecified locality in Pye district, on the Irrawaddy, March 1929 (Stanford and Ticehurst 1931); **Henzada**, Irrawaddy, around 1930 (Stanford and Ticehurst 1935a); **Sittang estuary** (or lower Sittang river), undated (Hume 1876a, Smythies 1986), and at Theinchaung mudflats, three shot in July 1940, when several parties of 2–5 were observed (Smith 1942); north **Maubin**, around 1930 (Stanford and Ticehurst 1935a); Salween (Thalwin) river, near **Kado**, February 1876 (two males in BMNH), and opposite Guay Beuzite, February 1876 (male in BMNH), these presumably being those reported in the lower reaches of the Salween, undated (Hume 1876a); **Tavoy river**, Tenasserim (Taninthayi), undated (Hume and Davison 1878).

■ ***THAILAND*** Although some early records from Laos were made along the Mekong river where it forms the border with Thailand, the sole Thai record is of an individual at **Bang Pu**, Samut Prakan "fishing with terns", May 1954 (W. W. Thomas *per* P. D. Round *in litt*. 1998).

■ ***LAOS*** The species was once regular along the Mekong river between the Cambodian border and Pakxe, ranging more rarely to the north along the same river (Oustalet 1898; see Remarks 2) and possibly breeding, although there is no direct evidence of this (Duckworth *et al*. 1999). There have been no recent sightings. Records are from: **Savannakhet**, "groups" on the Mekong river, 1877 (Harmand 1878–1879); **Pakxe**, undated (Engelbach 1929, 1932) and several small parties on sandbanks at unspecified localities along the Mekong river between Pakxe and the Cambodia border, May 1929 (Engelbach 1929; see Remarks 2 and 3); **Khone** (Khon falls), unspecified numbers nearby, March 1929 (Engelbach 1932).

■ ***CAMBODIA*** Records are from: **Sambor**, December 1875 (specimen in MNHN), several pairs nearby, January and February 1932 (Engelbach 1932); Mekong river, between **Khet Kracheh** (Kratie) and the Laos frontier, unspecified dates (Oustalet 1898, Delacour and Jabouille 1931; see Remarks 2); **Phnom Penh**, six at the confluence of the Mekong, Bassac and Tonle Sap rivers, between 1950 and 1964 (Thomas 1964); **Bassac river**, apparently common, 1897 (Oustalet 1898).



The distribution of Indian Skimmer *Rynchops albicollis*: (1) southern China; (2) Chashma barrage; (3) Dhab Shumali; (4) Dera Ismail Khan district; (5) Hyderabad; (6) Kotri; (7) Jherruck; (8) Haleji lake; (9) Indus delta; (10) Attock; (11) Rawal lake; (12) Kalabagh; (13) Jhelum district; (14) Marala barrage; (15) Pind Dadan Khan; (16) Shadiwal; (17) Chuha Mal; (18) Wazirabad; (19) Lahore; (20) Jhang district; (21) Trimmu barrage; (22) Sidhnai barrage; (23) Multan; (24) Ali Wahan; (25) Harike Lake Wildlife Sanctuary; (26) Phillaur; (27) Rupar; (28) Ludhiana; (29) Fatehgarh; (30) Firozpur district; (31) Delhi; (32) Najafgarh lake; (33) Okhla barrage; (34) Bikaner; (35) Keoladeo National Park; (36) Ban Baretta; (37) Dausa; (38) Jodhpur district; (39) Chandlai; (40) Ranthambhore National Park; (41) Sawai Madhopur; (42) Kothari river; (43) Alnia; (44) Kota; (45) Abu lake; (46) Udaipur; (47) Banni; (48) Little Rann of Kutch; (49) Chhari-Dhand; (50) Mandvi; (51) Surendranagar reservoirs; (52) Gulf of Kutch; (53) Khijadia Sanctuary; (54) Jamnagar; (55) Jasdan lakes; (56) Gulf of Khambhat; (57) unallocated; (58) Shatrunji river; (59) Dehra Dun district; (60) Garhmuktesar; (61) Dasna jheel; (62) Bulandshahr; (63) Chauka river; (64) Shergarh; (65) Fatehgarh; (66) Agra; (67) Bahramghat; (68) Lucknow; (69) Faizabad; (70) Etawah; (71) Bithur; (72) Allahabad district; (73) Ghazipur district; (74) Varanasi; (75) Fort Ater; (76) National Chambal Sanctuary; (77) Chambal river; (78) Morena district; (79) Jiran; (80) Sehore; (81) Hoshangabad; (82) Indravati river; (83) Dhule; (84) Salsette island; (85) Dharamtar creek; (86) Alibag; (87) Mula-Mutha Sanctuary; (88) Chapora estuary; (89) Carambolim lake; (90) Bhima river; (91) Pocharam reservoir; (92) Bezwada; (93) Nellore; (94) Nelapattu tank; (95) Madras; (96) Pondichery; (97) Jaynagar; (98) Madhubani; (99) Savan; (100) Darbhanga; (101) Patna district; (102) Bhagalpur; (103) Sultanganj; (104) Rajmahal; (105) Bhitarkanika Wildlife Sanctuary; (106) Cuttack; (107) unallocated; (108) Jalpaiguri; (109) Sankosh river; (110) Dhubri; (111) Surma valley; (112) Karnali river; (113) Narayani river; (114) Kosi barrage; (115) Jamuna river; (116) Lakhai; (117) Pabna; (118) Dhaka; (119) Faridpur; (120) Padma-Meghna delta; (121) Teknaf peninsula; (122) Myitkyina; (123) Khaungpu; (124) Bhamo district; (125) Seiktha; (126) Upper Chindwin district; (127) Tagaung; (128) Kabo; (129) Yedaw; (130) Myingyan district; (131) Nyaungu; (132) Pagan; (133) Minbu; (134) Thayetmyo; (135) Boulay; (136) Arakan; (137) Toungoo; (138) Padaung; (139) Henzada; (140) Sittang estuary; (141) Maubin; (142) Kado; (143) Tavoy river; (144) Bang Pu; (145) Savannakhet; (146) Pakxe; (147) Khone; (148) Sambor; (149) Khet Kracheh; (150) Phnom Penh; (151) Bassac river; (152) Mekong river.

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

■ ***VIETNAM*** There appears to be no precise locality record for this species in the country. It is nevertheless included in the works of Vo Quy (1975) and Wildash (1968) on the birds of Vietnam, and two specimens (in MNHN) were taken at unspecified localities in "Cochinchina", and therefore here presumed to be on the **Mekong river**, 1876.

POPULATION This unusual waterbird was once abundant in the major river systems of the Indian subcontinent and fairly common in South-East Asia. There have been declines in both range and numbers throughout its broad distribution. While this has resulted in much smaller populations in the Indus, Ganges (and other Indian rivers) and Irrawaddy catchments, the population of the Mekong catchment is almost certainly extinct. Its global population was recently judged to be 10,000 individuals (Rose and Scott 1997) but it may well have fallen below this level, and is certainly falling.

Pakistan At the turn of the century, Hume (1872–1873) described the species as "tolerably abundant" all along the Jhelum, Chenab, Sutlej and Indus rivers, although less common than on equivalent watercourses in India; he collected 100 eggs in one day from a single colony on the Chenab (Hume and Oates 1889–1890). Conversely, Barnes (1885) described it as "very common" on the Indus, but rarer in much of India (specifically: Gujarat, "the Deccan" and "Central India"). Despite this lack of consensus on which area held the most skimmers, the species was clearly common and well distributed in Pakistan, being "locally abundant" on the Indus (Inverarity 1886–1888). Early in the twentieth century, however, it was described as a summer visitor to the Jhelum river in only "small numbers" (Whistler 1913), and by the First World War Ticehurst (1922–1924) could not find the colonies that Barnes (1885) had described in Sind, in fact failing to see a "single bird", suggesting that numbers might by then have been starting to fall. Certainly its population appears to have declined markedly during the rest of the twentieth century (Roberts 1991–1992). By the 1960s, for example, it was "apparently rare" in areas previously visited by A. O. Hume (Holmes and Wright 1968–1969), and the paucity of recent records suggests that this applies to all regions of Pakistan; the population is now very small (Roberts 1991–1992). During the course of the 1990s in Dera Ismail Khan district, North-West Frontier Province, Kylänpää (2000) recorded the species six times, usually in groups of 1–3 in spring (March–June), and in groups of 5–7 in August, suggesting that a small breeding population survives upstream of this area.

India A perusal of early reports leaves little doubt that the species was once widespread and abundant in India. It was emphatically described as an "extremely common bird" in "upper India", nesting on river islands in "countless numbers" (Hume 1878b). In Uttar Pradesh it was also thought to be "very common" on the Chowka and Ghaghara rivers (Reid 1887), and a "permanent resident, common on the big rivers" by Jesse (1902–1903). In Darbhanga district of Bihar it was "not uncommon" (Dalgleish 1902), although Inglis (1901–1904) thought it "rather scarce" with "a few" observed each July and August near Jaynagar. In the vicinity of Delhi it was thought "not at all common" along the Yamuna, 1931–1945 (Frome 1947–1948), although Lowther (1941) described large annual nesting colonies on sandbars downriver in the Agra area. Barnes (1885) and Butler (1875–1877) agreed that it was "rare" in Gujarat. In Bihar, E. A. D'Abreu (in Whistler ms) described it as "common on the Ganges", usually in small flocks, although he "once saw an immense flock" (presumably on migration). While it was usually "very rare" in Cachar/North Cachar hills, Assam, it was "in 1897 very numerous and in 1896 almost equally so" (Baker 1894–1901). The only other record from Assam is one in the nineteenth century from Dhubri (Hume 1888) near the border with West Bengal, indicating that even then the species was surprisingly scarce along the Brahmaputra. These accounts serve to illustrate the wide distribution of the species throughout northern India in the nineteenth and early twentieth centuries, as well as its considerable if patchy local abundance.

More recently, large numbers have very infrequently been observed and breeding populations are certainly no longer "countless". The suggestion that the species might have

"established itself in Kutch," Gujarat (Tiwari 1997), was contested by Himmatsinhiji (1997), who maintained that the lack of perennial rivers in the region limited it to infrequent and irregular visits. In Maharashtra it is an uncommon and local migrant (Abdulali 1981). Recent counts from the Yamuna and Ganges have been rather small (see Distribution) although one flock of 140 was counted on the latter river in Bihar (A. Mishra *in litt*. 2000), quite possibly returning from the Padma–Meghna delta in Bangladesh. A 1994 count of 555 individuals along 403 km of the Chambal river in the National Chambal Sanctuary, Madhya Pradesh (Sharma *et al*. 1995), suggests that this river system is now one of the most important for the species anywhere in the world. Although India hosts the largest surviving population (containing several thousand individuals at least), evidence suggests that it is declining rapidly for a variety of reasons; indeed it has been declared "the most important species which needs special conservation action" in the Indo-Gangetic plains (Rahmani 1995a).

Nepal This waterbird occurs in low numbers and irregularly in the country, chiefly at Kosi barrage, usually between February and July (Inskipp and Inskipp 1991, *Nepal Birdwatrching Club Newsletter* 3, 2 [1994]: 2–3, Grimmett *et al*. 1999). Although breeding has never been recorded, Lister (1979) watched a pair repeatedly chasing conspecifics from a sandbank in the Kosi river in late May, and concluded that they were defending a territory (although this seems odd given their coloniality). The number of individuals in the country at any one time is normally fewer than 10 (H. S. Baral *in litt*. 1998), and this tiny population is possibly declining (C. Inskipp *in litt*. 1999).

Bangladesh Historically, the species was "common from April to the end of October", with "small parties" being observed on all larger rivers and even some larger lakes, although it probably did not breed at this time (Cripps 1878). The large numbers reported by Baker (1894–1901) in North Cachar must have ascended the Surma (=Kalni) river in Sylhet, where they were presumably commoner at that time. The species has declined markedly, however, and is currently very rare on inland rivers and wetlands in the country (P. M. Thompson *in litt*. 1999). A few large flocks are usually seen each winter on offshore islands, principally in the Padma–Meghna delta (Rashid 1993, Thompson and Johnson 1996). These flocks were thought to constitute about "a third of the world population" (Thompson and Johnson 1996); however, there appears to have been a steep decline, with counts falling from over 3,000 individuals in 1987 to around 600 individuals in 1997 (S. M. A. Rashid *in litt*. 1999).

Myanmar The species was once common and widespread in rivers and large wetlands (Smythies 1986). In the nineteenth century, it was "very abundant" on all the streams of Pegu state (Oates 1882), specifically "common" on the Irrawaddy, while elsewhere it was also "common" along the Meghna, the Salween (Thalwin), the Sittang, "and all the rivers of Pegu and Arakan" (Hume 1872–1873, 1875a, 1876a, 1888). The species remained "fairly common" in Arakan early in the twentieth century (Hopwood 1912b), and common along the Irrawaddy river at Bhamo district (Harington 1909–1910) and Myingyan district (Macdonald 1906). It was, however, "not common" in northern Myanmar (Stanford and Ticehurst 1938–1939). By 1920–1940 it was usually encountered only in small flocks of a few individuals throughout the country (Smythies 1986). There have been very few sightings subsequently and a major decline has undoubtedly occurred. Robson *et al*. (1998) observed three individuals near suitable nesting habitat in March 1995, but breeding was not confirmed. Given the apparent extinction of the Mekong river population, it should be assumed that the same fate will soon befall the Myanmar population until evidence emerges to suggest otherwise.

Thailand Although there is only one record, the species must once have occurred along the Mekong river in northern Thailand and also possibly along the Chao Phraya river which runs through the Central Plains (prior to the river trips of Schomburgk [1864] and Gyldenstolpe [1916]).

Laos The species was once fairly common along the Mekong river in the far south, and rarer north of Pakxe (Oustalet 1898, Harmand 1878–1879; see Remarks 2). Even in the 1920s

it was still regular in small groups between the Cambodian border and Pakxe, generally in the dry season (Engelbach 1929, 1932), when it possibly bred. There have been no recent records.

Cambodia The species was apparently very common in 1897 along the Mekong (Oustalet 1898). It had clearly declined substantially in Cambodia by the 1960s when only six were encountered during several river journeys (Thomas 1964), and it was absent from long sections of the Bassac and Mekong rivers in 1992 (Scott 1992). Although McNeely (1975) considered it an "uncommon resident" in the lower Mekong basin on the basis of published records, there has been no sighting since the 1960s. Given that a fair amount of survey effort was directed along the Mekong and its major tributaries in north-east Cambodia in 1998–2001, it seems increasingly likely that the species is extinct in the Mekong basin (J. W. Duckworth *in litt*. 2000, R. J. Timmins *in litt*. 2001). The chance of it surviving undetected in Cambodia is thought to be "negligible" (Goes 2000a).

Vietnam Although there are faint hopes that it may persist on unsurveyed stretches of river near the Cambodian border (A. W. Tordoff verbally 2000), there have been no records for well over a century and it is even less likely to survive in Vietnam than in Cambodia (R. J. Timmins *in litt*. 2001).

ECOLOGY ***Habitat*** It occurs on rivers (often sandy) and lakes of various sizes, and also on coasts and estuaries (Harington 1909a, Smythies 1986, del Hoyo *et al*. 1996). It is principally adapted to feeding along rivers and breeding on sandy spits or river islands (Barnes 1881, Ali and Ripley 1968–1998, Roberts 1991–1992), occurring much more infrequently in lacustrine habitats, and then normally during the non-breeding season and on passage (Hume 1878b, Roberts 1991–1992). It often feeds near the edges of river channels and lagoons, sometimes where the water depth is only 3–4 cm (Baker 1922–1930). In Pakistan it also occurs around lakes and swamps, and in estuaries (Roberts *et al*. 1986), and in Bangladesh densely packed flocks gather in coastal areas to rest on mudflats in winter, feeding along mudflat edges where water is shallow (P. M. Thompson *in litt*. 1999). This seasonal shift to estuarine and even marine environments lends some credence to early records from coastal China and Iran (see Distribution).

Food Skimmers employ a very specialised foraging technique, normally obtaining all their food from the water surface along which they skims with bill open and lower mandible cutting the water (Ali and Ripley 1968–1998, del Hoyo *et al*. 1996). The Asian species is apparently mainly piscivorous, scales and bones of small fish having been found in gizzards of specimens (Blyth 1866–1867, Wardlaw Ramsay 1877, BMNH label data), but the diet also apparently contains a high proportion of small surface-dwelling crustaceans and insect larvae (Baker 1922–1930, Lowther 1941, Roberts 1991–1992). The gizzards of some have been found to be packed with small fish "lying neatly parallel like sardines in a tin" (H. Whistler in Ali and Ripley 1968–1998), while several others contained nothing but a thick oily material (E. W. Oates in Hume 1875a, Baker 1922–1930). When winds are strong they cannot hunt successfully as their large wings gain too much lift; this perhaps explains their predilection for crepuscular or even nocturnal foraging when the summer winds subside and the air is relatively calm (Roberts 1991–1992); but equally, their feeding schedule might relate to the activity patterns of their prey.

Breeding Season The species is a monogamous colonial nester (Ali and Ripley 1968–1998); up to 40 pairs have been recorded nesting together on sandbanks of the Indus river (Roberts 1991–1992). The nesting season is highly dependent on riverine water levels and thus to rainfall patterns. Egg-laying in India rarely begins as early as February, tends to begin in March, peaks in April and tapers off in May (Reid 1887, Jesse 1899, Baker 1922–1930, Whistler and Kinnear 1931–1937, Ali 1933–1934, Briggs 1934, Lowther 1941). Hume and Oates (1889–1890) stated that along the Ganges and its tributaries the usual egg-laying month was March, whereas along the Indus and its tributaries it was April. In Myanmar

breeding records are from March and April, with the earliest eggs recorded on 21 March (Stanford and Ticehurst 1931, 1935a, 1938–1939, Smythies 1986). In the Mekong basin breeding is (or was) likely to be completed by May as the water level rises rapidly after that time (J. W. Duckworth *in litt*. 1999).

Site Colonies are often found in the company of other river-island nesters, with species composition varying geographically. The most commonly reported are River Tern, Little Tern *Sterna albifrons*, Black-bellied Tern *S. acuticauda*, Small Pratincole *Glareola lactea* and Great Thick-knee *Esacus recurvirostris*, all of which share the requirement for secluded sandbanks and river islands (Barnes 1881, Lowther 1941, Briggs 1934, Stanford and Ticehurst 1935a, Smythies 1986). These congregations of skimmers were often "of considerable size", with nests tightly packed but generally apart from other species nesting nearby (Baker 1922–1930); there are no recent reports of any large colonies. Adults do not allow a close approach in comparison with terns, nor are they as aggressive or vociferous when their nests are disturbed (Baker 1922–1930). The nest itself is a bare irregular hollow, unlined and in an exposed position, usually only 0.3–1.0 m above the water level on shelterless stretches of open sand, such that intruders are visible from long distances (Hume and Oates 1889–1890, Stanford and Ticehurst 1931, 1935a, 1938–1939, Smythies 1986, Roberts 1991–1992). These sandy island nesting sites disappear and are re-created year-by-year by the ever-changing courses of large rivers (Stanford 1954).

Clutch size and incubation The most frequent clutch has been given as four in India (Hume and Oates 1889–1890, Barnes 1888–1891), although both Stanford and Ticehurst (1931) and Lowther (1949) later stated that the normal clutch was three in Myanmar and Uttar Pradesh respectively; but up to five eggs have been observed in a clutch (Lowther 1941). Fish presentation sometimes occurs between presumed pair members well after incubation commences (Lowther 1949); provisioning of females by males throughout the breeding cycle is common in the closely related terns Sterninae, and generally results in higher reproductive success (e.g. Nisbet 1974). Both sexes take part in nest building (Roberts 1991–1992), the female apparently contributing the larger share of incubation (Dharmakumarsinhji and Lavakumar 1972). The incubation period has not been determined, but is around 21 days in the closely related African Skimmer *Rynchops flavirostris* (Urban *et al.* 1986). Adults have been observed to splash their eggs and nestlings with water carried in their breast feathers when the temperatures are very high (Lowther 1941, 1949).

Migration The Indian Skimmer has been described as largely resident in the Indian subcontinent, subject to local movements (Ripley 1982). In regions where it breeds, however, it is often otherwise absent, while large groups of non-breeding individuals gather (or are seen moving through) elsewhere (see Distribution); these facts imply that definite migrations occur. The pattern of movements remains poorly known, however, although flooding regimes are clearly critical as breeding can only occur when water levels are low.

In Pakistan the species evidently once occurred locally along the major rivers during winter, November–February (Hume 1872–1873), whereas it now occurs almost exclusively as a summer breeding visitor, February–August (Roberts 1991–1992); the first bird was noted in Jhelum district on 20 March and the last on 15 August (Whistler 1913); while extreme dates in Jhang district were 24 March and 6 October (Whistler 1922a). In lower Sind, spring migrants have been noted from mid-February to early April flying up the main channel of the Indus, presumably travelling to the main tributaries in the Punjab where the species arrives in April to breed (Roberts 1991–1992). They have also been recorded flying south at Hyderabad in small groups in July and September (Holmes and Wright 1968–1969), again suggesting a southward (seaward) post-breeding dispersal. Where these birds spend the non-breeding season is not clear, although winter records in coastal Gujarat, India, and flocks seen in spring in the Indus delta, suggest that their destination might be, at least in part, the coasts of the Arabian Sea in India and Pakistan (and perhaps historically in Iran: see

Distribution). Dharmakumarsinhji (1955), for example, often recorded only small numbers around Saurashtra, Gujarat, and usually between May and August in the hot weather; however, a flock of c.250 was encountered in the "winter months". Ticehurst (1922–1924) felt that breeding skimmers from Punjab and further north in Pakistan moved southward during winter and augmented the lower Indus population, producing the large numbers of birds observed by Hume (1872–1873). Perhaps these birds now move to the estuary or the coast in preference to the lower Indus, potentially as a result of pollution or disturbance.

The species was a "permanent resident" in Lucknow division, Uttar Pradesh (Reid 1887), and many recent non-breeding season records (November–February) show that this remains at least partly true in the Ganges catchment (see Distribution). In Nepal, it is mainly recorded from February to July (i.e. the breeding season), although there is at least one October record (*Bird Conserv. Nepal Newsletter* 4, 4 [1995]: 2–3). Its seasonal absence from Faridpur district, Bangladesh, convinced Cripps (1878) that it did not breed locally. Again, the appearance of large numbers of individuals in the Padma-Meghna delta during winter indicates that a fairly substantial movement away from the breeding areas must occur. Whether these areas are in India or Myanmar, or both, is unclear, but large flocks in Bihar (A. Mishra *in litt*. 2000) suggest that some birds might follow the Ganges down to its mouth.

The absence of birds in northern Myanmar after May when major rivers were in spate (see Stanford and Ticehurst 1938–1939) indicates that the population was subject to considerable local movements. Although its whereabouts at these times was not known (Smythies 1986), it seems plausible that skimmers may have migrated to coastal regions, perhaps making up a large portion of the flocks that form in coastal Bangladesh during winter. In Myanmar, Stanford and Ticehurst (1931) observed a flock apparently migrating south down the Irrawaddy river in November. Old coastal Chinese records of the species hint that the now apparently defunct Mekong population also once visited sea coasts during the non-breeding season.

THREATS In the past century of increased human usage of wetlands, many colonies have been plundered and the substrates mined, cultivated and settled; and many feeding areas have been over-exploited, polluted, flooded or drained (see Scott 1989, Rahmani 1995a, Duckworth *et al*. 1998a, 1999). The Indian Skimmer has consequently declined throughout and will continue to do so unless suitable wetland habitats, and particularly their colonies, are kept sufficiently free of disturbance and development. Its stronghold is India, but even here it is thought to be the species most urgently in need of conservation action (Rahmani 1995a).

Disturbance and persecution The main threat to the species is the disturbance of rivers. *Pakistan* The construction of irrigation barrages on the main river systems has reduced the hazard of seasonal flooding, which in turn has allowed the gradual encroachment of temporary cultivation on riverbeds and river islands (see Threats under Jerdon's Babbler *Chrysomma altirostre*); this, and the increased human traffic on and settlement of river systems, has resulted in a greater disturbance of breeding habitat, with undoubted detrimental effects on the species (Roberts 1991–1992). *India* Similarly, the requirements of this species overlap dangerously with those of India's people; crucially, most watercourses in the country are used intensively by people for fishing, transportation and domestic purposes (Rahmani 1995a). As a consequence of huge increases in the human population of India, pressures are mounting on wetlands throughout the country; in particular, human use of main river channels previously favoured by the species is now intensive in most areas (Scott 1989). As other specific examples, the rapid expansion of Ramnagar poses a threat to Khajidia lakes in Gujarat through concomitant rises in disturbance (Scott 1989), and mining of sand along the Chambal river causes disturbance to and reduction of skimmer nesting and roosting habitat (Chanda 2000). Harike Lake Wildlife Sanctuary is threatened by wildlife poachers (Singh 1992) and 24-hour fishing causes much disturbance (Scott 1989, Ladhar *et al*. 1994). At Bund Baretha,

Rajasthan, disturbance has increased, mainly from fisherman who have established semi-permanent camps on larger islands, and as a result the species now vacates the site in November–early February, and breeding has not been confirmed in recent years (P. Holt *in litt*. 1999). Predation might also be a threat: Lowther (1941) recorded golden jackal *Canis aureus*, Pallas's Fish-eagle *Haliaeetus leucoryphus* (but see Remarks 4) and House Crows *Corvus splendens* taking eggs of this species, and the spread of the latter in association with human populations might entail increased predation at skimmer colonies. *Nepal* Intense fishing activity within the Kosi barrage area presumably disturbs the birds (H. S. Baral *in litt*. 1997). *Myanmar* Human disturbance threatens the species along major rivers, especially in the lower Irrawaddy where 3.5 million people inhabit the delta area alone (Scott 1989). *Indochina* (*Laos*/*Cambodia*/*Vietnam*) Human settlement is particularly intensive in the Mekong basin (Duckworth *et al*. 1998a), with the result that attendant pressures are very high. All lowland Indochinese ethnic groups consume large quantities of fish and other aquatic products with the result that rivers are heavily exploited, food supplies are reduced and large waterways are almost constantly disturbed (Chape 1996, Duckworth *et al*. 1998a). In particular, rivers are frequently used as arteries of travel and few (if any) waterways with suitable sandbar habitat for nesting skimmers are unnavigable, leaving few, if any, stretches that could support unmolested populations (J. W. Duckworth *in litt*. 1999). This massive human exploitation of river systems and their sandbars presumably underlies the decline in most riverine bird species in Laos (Chape 1996). This disturbance derives from several sources, most especially buffalo grazing and trampling, overnight camps and dining stops by boat-borne fishermen, ubiquitous dogs in association with fishermen and active collection of animals, eggs etc. at most incidental opportunities, resulting in the virtual extirpation of this species and the once-abundant Black-bellied Tern (down to perhaps one pair in all Indochina) and the River Tern (now rare) (Duckworth *et al*. 1998a,b, 1999, J. W. Duckworth *in litt*. 1999, Goes 2000b). The vulnerability of river-nesting species to human development and disturbance is very clearly illustrated.

Habitat loss and modification *Pakistan* The development of barrages on main river channels has changed flow regimes drastically, allowing cultivation of riverbanks and islands and a consequent loss of breeding habitat for the species (Roberts 1991–1992); an account of the effects of changing flood regimes appears below. *India* Increased cultivation (e.g. of melons) on the islands and banks of large rivers is reducing the availability of breeding sites for the species (Rahmani 1995a). In Dehra Dun district, rivers are threatened by overfishing, while the mining of banks and beds for sand, gravel and stones—all of which causes disturbance—lowers food supply and reduces nesting habitat for riverine birds (Singh 2000). Around Delhi, the loss of sandbanks and suitable secure roosting and breeding islands through intensive dredging regimes is thought to have contributed to the decline of this species (Menon and Gandhi 1992). Away from fluvial habitats, Harike Lake Wildlife Sanctuary provides a well-studied example of the problems facing wetlands (even protected wetlands) in northern India. One such problem is weed infestation: in 1980, only 40% of the lake was covered with water hyacinth *Eichhornia crassipes*, the amount increasing to over 70% in 1989 (Scott 1989), and 75% in 1994 (Ladhar *et al*. 1994). The sanctuary also suffers from siltation such that there are fears that it is drying out and becoming unsuitable for wildlife (Ali *et al*. 1981, Scott 1989, Singh 1992). Deforestation and erosion of the watershed has accelerated this process dramatically, and at current rates of shrinkage it is estimated that the wetland will disappear in c.80 years (Ladhar *et al*. 1994). *Nepal* The species is threatened by loss of habitat, although the process is not specified (H. S. Baral *in litt*. 1997). *Bangladesh* The proposed Sandwip Cross-dam, which was likely to cause considerable alteration in coastal habitats of the Padma-Meghna delta (Rashid 1989), is now unlikely to be built, but reclamation at Hatiya-Nijumdip is likely to proceed, with unknown impacts on birds, partly because Indian Skimmers move according to erosion and deposition patterns and the mud and silt banks that they cause

(P. M. Thompson *in litt*. 1999). Another likely threat in the country is seasonal agriculture on river margins and islands (P. M. Thompson *in litt*. 1997).

Flooding regimes Flooding of rivers in the breeding season, for whatever reason, destroys nests in colonies on low sandbanks (Smith 1942, Smythies 1986). While this threat can result from natural phenomena such as early snow-melt or heavy rainfall, it is presumably exacerbated by comprehensive deforestation in the watersheds of major rivers and consequent rapid run-off. Dam projects might seem to provide a means of controlling this problem, but a complex suite of threats means that dam construction is disastrous for sandbar-nesting birds: (1) dams block sediment flow and cause intermittent sediment-poor flooding: the first starves sandbars of sediment while the second scours them with pulses of released water (thus they shrink) (J. W. Duckworth *in litt*. 2000); (2) most dams store water during the wet season and release it in the dry season, a factor that reduces the seasonal amplitude of water levels such that they never drop sufficiently low to expose much sand (J. W. Duckworth *in litt*. 2000); (3) the control of flooding regimes is often not beneficial as it allows agricultural development on banks and islands, further reducing the area of bare sand available (Roberts 1991–1992); (4) if the dam is used to generate electricity it tends to show circadian fluctuations in release that can flood sandbars on a daily basis during the dry (= skimmer breeding) season (J. W. Duckworth *in litt.* 2000). In India, water released from dams regularly washes away skimmer colonies (Rahmani 1995a), and flow regimes on the Chambal river (which supports one of the most important skimmer populations) have been altered by several new dams, greatly reducing water levels during periods of low rainfall (Scott 1989).

Pollution *India* Large rivers are increasingly polluted with agricultural and industrial chemicals (Rahmani 1995a). Heavy pollution around Delhi is thought to have had a major impact on populations of this species in the vicinity (Menon and Gandhi 1992). Rivers in Dehra Dun district, where the species once occurred, are now polluted by toxic discharges (Singh 2000). *Nepal* Pesticide pollution threatens wetland fauna in the country (Shakya 1995), presumably including this species. In addition, chemical fishing in tributaries of the Sapta-Kosi is likely to affect the Kosi barrage area as poison residues presumably enter the main river system and perhaps underlie the falling numbers of waterbirds in the area (*Oriental Bird Club Bull*. 21: 15–20).

MEASURES TAKEN Very few conservation activities currently target this species, a circumstance that needs urgent attention. The species is listed as totally protected in Myanmar (Wildlife Act 1984).

Protected areas *India* The National Chambal Sanctuary (5,400 km^2) was established to protect Gharial *Gavialis gangeticus*, but it also contains one of the healthiest skimmer populations in Asia. It is financed by the Indian government, through the state governments of Rajasthan, Madhya Pradesh and Uttar Pradesh (Scott 1989). The skimmer has also occurred in Harike Lake Wildlife Sanctuary, and in or near Ranthambore National Park. Khijadia lakes (c.6 km^2), Gujarat, have been declared a bird sanctuary in which all hunting is prohibited. Part of Pocharam reservoir is managed as a sanctuary. *Nepal* It has occurred in Royal Chitwan and Royal Bardia National Parks. *Bangladesh* Some of the islands in the Naf river have been declared game reserves, although no effective protection exists (Rashid and Khan 1987).

Habitat management *India* Manual clearance of water hyacinth at Harike Lake Wildlife Sanctuary has been organised after the failure of biological controls (Singh 1992); plantations were established at the margins of the lake to minimise siltation (Ladhar *et al*. 1994). *Bangladesh* Islands in Noakhali district, Bangladesh, have been planted with mangroves to stabilise them (Anon. 1989). Although this possibly helps provide roosting sites for the species by encouraging deposition of silt, skimmers do not roost where mangrove has been planted (P. M. Thompson *in litt*. 1999).

MEASURES PROPOSED ***Control of disturbance*** The key to conserving this species lies in the provision of secure nesting sites. In all areas, major changes in river use (e.g. prevention of access to entire stretches of river) are most unlikely to be either needed or feasible (see Duckworth *et al.* 1999). Nevertheless, a reduction of river disturbance is required in key areas to ensure suitable habitat remains to meet the breeding and foraging requirements of the species; important breeding colonies require strict protection from disturbance; this could be achieved by prohibition (perhaps in the form of fencing and guarding), or at least regulation, of access to individual sandbars found to support colonies or pairs (Duckworth *et al.* 1999; proposed for South-East Asia, but relevant throughout the range of the species). If a network of key colonies can be properly protected, the chances of saving the species would appear to be high at least in Pakistan and India. Similarly, effective protection of potential breeding sites (i.e. large relatively undisturbed river islands) might result in the return of the species to stretches of river that it has abandoned.

Habitat management A reduction of pollution is required in (and upstream of) key areas to ensure that the breeding and foraging requirements of this species are met. Management of the National Chambal Sanctuary, India, should focus on this species in tandem with the Gharial (the need for undisturbed stretches of river island and banks in both species would in any case appear to overlap; strict protection of islands supporting skimmer colonies should be instigated as this will doubtless have positive impacts on the populations of both animals). Water hyacinth infestation is a problem on many wetlands in northern India and some form of control, preferably mechanical rather than biological, needs to be exercised (Scott 1989). At Khijadia lakes, Gujarat, efforts are planned to manage the area as a nature reserve, minimising grazing and disturbance and dredging the lakes so that more water is retained after the monsoon (Scott 1989). Furthermore, extraction of water should be monitored during the dry season at important lakes for the species to ensure it is not excessive (Scott 1989). Flow regimes below dams should managed with very careful consideration for the conservation needs of this species (see below), as should development of the Padma-Meghna delta.

Research and education As the seasonal movements of this species are imperfectly understood, there is a need to investigate the breeding and non-breeding ranges of each sub-population. In particular, the non-breeding population in the Padma-Meghna delta of Bangladesh should be monitored regularly to track trends in population size and distribution, and the breeding range of these birds should be determined. Repeatable river surveys are required in Pakistan and India to map colonies and estimate population size and trends. These national censuses should be used to assess the threats it suffers and identify key colonies for protection.

The effect of dams on breeding success of sandbar-nesting birds is a neglected topic; there are an increasing number of head-ponds and hydroelectric schemes at which this work could be targeted. The most pertinent approach (upstream and downstream) would be to relate flood regimes and sediment deposition rates to in-flow and out-flow patterns, and in turn to identify the relationship between these factors and the success or siting of riverine bird colonies. For example, a head-pond might flood an important sandbar area, but the increased release of sediment at the entrance to the head-pond could reproduce ideal sandbar habitat, especially if induced to do so. It might transpire that minor adjustments to dam and reservoir management could allow for a greater compatibility between river development and Indian Skimmer populations, and this is a possibility that deserves close investigation.

Protected areas In Pakistan and India, protected areas do not tend to focus on rivers, and this is an oversight that needs to be addressed, especially in the case of large protectable colonies of this species. Similarly, the proposed system of wetland reserves in Myanmar (Lwin 1995) should, if possible, involve the establishment of riverine reserves wherever important breeding populations of this species are discovered. Legal protection of islands in the Naf river, Bangladesh, should be enforced and adjacent areas of the Teknaf Peninsula

should be included (Rashid and Khan 1987). Key portions of the Padma-Meghna estuary are important for both this species and Spoon-billed Sandpiper *Eurynorhynchus pygmeus* in winter and should be included within a protected area system if possible.

REMARKS (1) Pre-1845 specimens (in BMNH) of half-grown young labelled "Behar" were presumably collected in Bihar state. (2) Oustalet (1898) may have been referring to slightly different stretches (in both Laos and Cambodia) of the Mekong river than would be implied today, as the Laos–Cambodia border was once almost as far south as Stung Treng (J. W. Duckworth *in litt*. 1999). (3) Thewlis *et al*. (1998), however, stated that all Engelbach's (1929, 1932) Lao records came from between January and March. (4) A. R. Rahmani *in litt*. (1999) contradicted this statement by asserting that Pallas's Fish-eagle "cannot take eggs", and thus perhaps some other raptor species was involved.