

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 Huan; 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 Sálím 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 Chuyon. ■ **SOUTH KOREA** Lee Woo-shin; Han Sang-hoon, Kim Jin-han, Lee Ki-sup, Park Jin-young ■ **LAOS** K. Khounbolin; 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. Supparatvirkorn ■ **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.

© 2001 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

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, electrical, chemical, mechanical, optical, photocopying, recording or otherwise, without prior permission of the publisher.

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

The presentation of material in this book and the geographical designations employed do not imply the expression of any opinion whatsoever on the part of BirdLife International concerning the legal status of any country, territory or area, or concerning the delimitation of its frontiers or boundaries.

WHITE-NAPED CRANE

Grus vipio

Critical —
Endangered —
Vulnerable A2c,e; C1

This crane has a small, declining population. The rate of decline is predicted to increase in the near future as a result of the loss of wetlands to agriculture and economic development. These factors qualify the species as Vulnerable.



DISTRIBUTION The White-naped Crane breeds in south-east Russia, north-east Mongolia and north-east China, in “Dauria” (the bordering area of Mongolia, China and Russia), the Amur and Ussuri basins (near the Russia–China border) and the Songnen and Sanjiang plains (north-east China). It migrates through north-east China to wintering grounds in the lower Yangtze River basin (mostly at Poyang Hu and Dongting Hu lakes), or along the Korean Peninsula to wintering grounds in North Korea and South Korea (mostly near the Demilitarised Zone [DMZ]), and southern Japan (mostly at Izumi on Kyushu). There is a single record from Taiwan.

■ **RUSSIA** Most of the breeding range of this species is in north-east Mongolia and north-east China, but there are small extensions into Russia in the Onon river basin in Chita, the middle Amur plains in Khabarovsk, Amur and the Jewish Autonomous Region, plus the Ussuri river basin and the Lake Khanka lowlands in Primorye (see Meine and Archibald 1996). It is also a very rare migrant on Sakhalin island, but it has not been recorded on the Kuril islands (Nechaev 1991). There is a substantial breeding population in southern Chita north to the Hila river (including the Daurisky Nature Reserve) (Golovushkin and Goroshko 1995), but it is apparently not as common there as in the past (see Stegmann 1929). In the Amur region, it is found only near to the Amur and Bureya river floodplains, from Blagoveshchensk east to the borders of Khabarovsk and the Jewish Autonomous Region and north to the Uril river, mainly in two areas, the Bureya–Amur confluence (Arkhara lowlands, protected in Khinganskiy Nature Reserve) and the left bank of the Amur from Volkovo village to Poyarkovo; there have been repeated observations on the middle Zeya river and along the Urkan valley, where it probably also breeds (Dymin and Pan’kin 1975). In the southern Zeya–Bureya plain, much of its habitat has been ploughed and a dense network of roads has been developed, and it now only survives in small pockets of suitable habitat (Dugintsov and Pan’kin 1990, 1995). In the Khabarovsk and Jewish Autonomous Regions, it is apparently now restricted to a single area, in the latter region (B. A. Voronov *in litt.* 1997). In Primorye there are now just a few isolated pairs in the Ussuri river basin and the Lake Khanka lowlands (Yu. V. Shibaev *in litt.* 1997), and it has disappeared from former breeding sites on the western shore of Lake Khanka and the Ilistaya (Lefu) river valley (see Shul’pin 1936). Records (by province) are as follows:

■ **Chita** southern Chita province north to the **Hila river**, 96 breeding pairs (presumably including those in Daurisky Nature Reserve) in the early 1990s (Golovushkin and Goroshko 1995); Onon river near **Karakсар** village, pairs repeatedly seen on the shores of lakes and riverine sandspits, undated (Shchekin 1976); Khara–Tyrka settlement, **Olovyanninskiy district**, pair, June 1960 (Leont’ev 1976); near **Olovyannaya** settlement, pairs repeatedly seen on the shores of lakes and riverine sandspits, undated (Shchekin 1976); **Chikoy river** valley (Tchikoi river), northern Mongolia–Transbaykalia, one collected, April 1896 (Kozlova 1932–1933); **Daurisky Nature Reserve**, including Barun-Torey lake, occasionally seen in summer and during

migration (unspecified years) on the eastern shores of Barun-Torey lake (Osipova and Golovushkin 1988, Ozaka and Baba 1994), with an average of c.50 birds breeding each year although their numbers fluctuate with climate and in optimum years as many as 300 cranes breed in the area (O. Goroshko verbally 1998); **Zun-Torey lake**, Olovyaninskiy district, one, May 1966 (Leont'ev 1976); **Uldza river** delta, one nesting pair in 1985, two nesting pairs in 1986 (Osipova and Golovushkin 1988); **Agutsa river**, on the Russian–Mongolian border, single nesting pairs recorded (unspecified years) (Potapov and Flint 1987); lower **Bukukun river**, one nesting pair in May 1985, one adult with two chicks (two-thirds adult size), July 1986 (Osipova and Golovushkin 1988);

■ **Khabarovsk** near **Evoron lake**, four, June 1973 (Tagirova 1983); near **Amursk** town and **Ommi** village, Amurskiy district, two single birds in meadows of the Amur valley, May 1958 (Kistiyakovskiy 1976); near the former settlement of **Novaya Ussura** (Novoussuri), left bank of the Amur, Nanayskiy district, 110 km downstream from Khabarovsk, four, May 1981, on the border between a sphagnum-moss bog and a marshy *Carex*–*Calamagrostis* meadow (Voronov 1985); c.10 km north of **Khabarovsk**, eight birds on the western bank of the Amur river, July 1988 (M. Dornbusch *in litt.* 1999); Chirka river floodplain, **Bol'shekhekhstirskiy Nature Reserve**, rare on migration, one feeding in sedge meadows, undated (Voronov 1981); Zhuravliny Game Refuge (Zhuravlini) (not mapped), reportedly an important site for this species, undated (Chan 1999);

■ **Amur** (including a continuous breeding population along a 10–20 km wide stretch of the Amur river valley between the mouth of Bureya river to the foothills of the Bureinski range: Pan'kin and Neufeldt 1976c): 1.5 km from **Ogoron lake**, northern upper Amur region, “the main breeding area in the Bureya–Uril interfluve”, with “a small number” of nesting pairs on a floating island, undated (Kostin and Dymin 1977); **Podbiralikha river**, Zeya river basin, up to three feeding birds, May 1973 (Kislenko *et al.* 1990); **Dep river** basin, several breeding pairs, undated (Kostin and Dymin 1975, 1997, Smirenskiy 1980); **Klimovtsy** village, Amur–Zeya plateau, two, June 1975 (V. A. Dugintsov *in litt.* 1997); near of **Krasnoyarovo** village, lower Zeya river, pair reported to have nested by local villagers, 1968–1969 (Pan'kin and Neufeldt 1976c); **Novo-Andreyevka** (Novoalekseevka) village, lower Zeya river, six in a mixed flock with Red-crowned Cranes *Grus japonensis* and Oriental Storks *Ciconia boyciana*, August 1985 (Pan'kin and Dugintsov 1988); **Sergeyevka** village, north-west of Blagoveshchensk, migrating flocks of eight and 12 birds, May 1977 (Smirenskiy and Roslyakov 1982); **Markovo** village, lower Zeya river, seven flying south, August 1984 (Pan'kin and Dugintsov 1988); **Cherkasova** (Novocherkasovka) village, Mikhailovskiy district, pairs apparently nesting, July 1984 and July 1986 (Andronov 1988b); **Volkovo** village, near the Zeya river mouth, pair present but nest presumably failed, April–August 1986 (Andronov 1988b, Pan'kin and Dugintsov 1988); **Lazarevka** village, two at the lake, August 1978 (Pan'kin 1981); **Zavitinskiy Wildlife Refuge**, one pair reported in the mid-1990s (A. A. Gaidar *per* V. A. Dugintsov *in litt.* 1997); **Petropavlovskiy Game Reserve**, two pairs (one breeding) in the mid-1990s (V. A. Dugintsov *in litt.* 1997); **Muravevskiy Wildlife Refuge** (Muraviovka Park), three nesting pairs reported, 1982–1986 (Andronov 1988b), five pairs in the mid-1990s (V. A. Dugintsov *in litt.* 1997), 2–4 pairs near the villages of Gribskoe, Volkovo and Kanikurgan in the mid 1990s (V. A. Dugintsov *in litt.* 1997), up to 12 pairs nesting in good years (S. Smirenskiy verbally 1998); **Amurskiy Wildlife Refuge**, four, May 1977 (Smirenskiy and Roslyakov 1982), 1–2 territorial pairs, 1982–1985, a pair with a chick and a flock of 23 birds being reported in August 1982 (Andronov 1988b), breeding pair seen from a helicopter, May 1986 (Yu. I. Kirichenko *per* V. A. Dugintsov *in litt.* 1997); **Kazanovka** village, lower Bureya river, breeding, undated (Baranchev 1954); **Bureya-Uril interfluve**, Amursk region, four pairs breeding (in an area of c.300 km²) in 1970, one of them successfully (Dymin and Pan'kin 1975), nesting in 1978–1980, pair with two chicks in August 1980 (Smirenskiy and Roslyakov 1982); near the **Bureya river**, middle Amur river, one collected, undated (Stegmann 1930);

near **Ukraina** village, Arkhara–Bureya confluence, several pairs, May 1969 (Pan'kin and Neufeldt 1976c), the first proof of breeding being in 1970 when downy chicks were found in grassy marshes (Dymin and Pan'kin 1975); **Khinganskiy Nature Reserve**, seven nesting pairs in the mid-1980s (data *per* AVA), 10–12 nesting pairs annually in the mid-1990s (V. A. Dugintsov *in litt.* 1997); **Skobel'tsino**, **Krasnyy Luch**, **Innokent'evka** and **Zhuravlevka** villages, between the Arkhara and Bureya rivers, nesting sites found near each village, undated (Pan'kin and Neufeldt 1976c); **Kasatkino** village, Amur valley, several pairs, spring and summer 1956–1958 (Pan'kin and Neufeldt 1976c); **Ganukan Game Reserve** (Ganukanski Wildlife Refuge), near the Amur–Bureya confluence, three nesting pairs in the mid-1980s (data *per* AVA), c.60 birds breeding here and in Khinganskiy Nature Reserve, undated (V. Andronov *in litt.* 1997), with birds colour-banded here being seen in Japan and South Korea (Ozaki and Baba 1994); **Khingan** (Little Chingan), April (unspecified year) (Stegmann 1930); **Arkhara–Bureya confluence**, 4–5 pairs nesting annually in 1956–1971 but not since, although they occur in summer and on migration (Pan'kin 1981), nest with two eggs near Pashkovo village, April 1971 (Dymin and Pan'kin 1975), copulating pair, April 1975 (V. A. Dugintsov *in litt.* 1997), 9–10 nesting pairs from 1982 onwards (Andronov 1988b); **Sagibovo** village, Amur valley, several pairs, spring and summer 1956–1958 (Pan'kin and Neufeldt 1976c);

■ **Jewish Autonomous Region Glinyanskaya river**, 20 km north-east of Birobidzhan town, rare, breeding in marshy meadows, undated (Yakhontov 1976c); **Mitrofanovka river**, tributary of the In river, Tunguska Basin, pair on territory in marshy meadows, undated (Yakhontov 1976c); near **Babstovo** village, Leninskiy district, nest with one egg and one chick in damp meadows in July 1978, pair present in the same place in May–June 1979, pair seen with two young in August 1980 (Smirenskiy and Smirenskaya 1980);

■ **Primorye Verkhniy Krasnyy Pereval** (Verkhniy Pereval) settlement, Bikin river basin, nesting c.2 km from the village until 1969 in a wooded bog near lakes, nest found in 1963 (Shibnev 1976b); **Kanikheza** swamps, lower Alchan river, upper headwaters of the Bikin river, breeding, undated (Shibnev 1976b); **Gogolevka river**, lower Iman river, pair nesting on riverside bogs in 1958, seen on migration in 1964 (Leonovich and Nikolaevskiy 1976); **Khanka lake** plains, including Khanka Nature Reserve, the eastern side of the Lake Khanka lowlands (including Zumanacha lake) being the main breeding area of this species in Primorye, and a migratory staging area for many birds (in particular, in the paddyfields adjoining the marshes) (Przheval'skiy 1877–1878, Shul'pin 1936, Glushchenko 1981, Ozaka and Baba 1994), with records on migration near the Ilistaya river mouth (Lefu) near Iskra village in spring 1945, this (the Ilistaya mouth) being an irregular breeding site in the 1980s (Vorob'ev 1954, Glushchenko *et al.* 1995), specific records including c.10 birds on the plain with 1–2 nesting pairs, in 1986 (Shibaev and Glushchenko 1988, Glushchenko *et al.* 1995), 7–9 birds at Sosnovka village in spring 1986, one lone bird and a pair with a chick there in July 1986 and five adults in October 1988 (Shibaev and Glushchenko 1988), and up to 300 birds flocking on migration in Khanka Nature Reserve (Yu. Sushicky verbally 1998), migrating birds staying for about one month from late September to early November (Shibaev and Surmach 1994); **Erdmana peninsula** (De Friz peninsula), four on migration, March 1958 (Omel'ko 1976); **Kedrovaya Pad' Nature Reserve** and the adjoining coastal plain in Peter the Great bay, an important traditional and current passage and staging site for cranes (Shibaev 1975, Shibnev 1988, Shibaev and Surmach 1994); **Khasan plain**, coastal plain near Melkovodnaya bay, an important traditional and current migration stopover for this species (Shibaev and Surmach 1994); area around the **Tumen estuary** (Tumangan river), Peter the Great bay, a traditional and current staging area for migrants in spring and autumn (Shibaev 1975, Shibaev and Surmach 1994);

■ **Sakhalin Lososey bay** (Losos' inlet), Aniva bay, three, May 1979 (Nechaev 1991).

■ **MONGOLIA** It breeds in north-eastern Mongolia, mainly to the east of the Khentii mountains, from the northern border (at c.110°E) south to the Kerulen river and east to the

border with China (see Meine and Archibald 1996). Its range includes the entire Onon and Ulz river basins, and the Orshun river, Buir lake, Khalhyngol river, Tashgain Tavan lake and the Azarga river mouth. Another breeding site (probably just established) was recently found in the delta of the Khar Buh river (Tola's basin). Records (by province) are as follows: ■ **Khovd Buyant river**, undated (Fomin and Bold 1991); **Khar Us Nuur**, undated (Bold 1997); ■ **Khövsgöl Bakhtakhiin river**, **Darhadin depression** (Darkhad depression), undated (Fomin and Bold 1991); ■ **Arkhangai Ögiy Nuur** (Ogii lake), more than 20 birds, undated (Batdelger 1996), pair seen near a nest, June 2000 (A. Bräunlich *in litt.* 2000, *Oriental Bird Club Bull.* 32 [2000]: 66–76); ■ **Bulgan Aikhan lake at Egiyn Gol**, Selenga Basin, single birds, undated (Bold *et al.* 1995); **Kharabukha river** (Kharbuukh river), undated (Fomin and Bold 1991), the “Khar Buh” river delta (presumably the same river), Doro lake, being an important site for this species (N. Tseveenmyadag *in litt.* 1998); ■ **Övörkhangai Tatsain Tsagaan Nuur** (Tashgain Tavan Nuur) lake, an important site for this species, undated, proposed as a new nature reserve (N. Tseveenmyadag *in litt.* 1997); ■ **Töv Haraa Gol** (Khara river), northern Mongolia–Transbaykalia, several seen with a flock of Common Cranes *Grus grus* on autumn migration in 1924–1926 (Kozlova 1932–1933); ■ **Khentii Shuusii river** (Shuusii river) valley, an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); **Barkha river** (Barkh river) valley, an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Dund Nomgon, Nagoon Nuur, **Batshireet Sum**, one juvenile banded, August 1994 (N. Tseveenmyadag *in litt.* 1998); **Binder lake**, near Batscheret, one breeding pair found (unspecified year), local people reporting that a pair bred annually (Ostapenko and Tseveenmyadag 1983), and an important site for this species (N. Tseveenmyadag *in litt.* 1997); **Onon river** basin, found breeding, undated (Kozlova 1932–1933, Stepanyan 1975), tens of breeding pairs, June 1999 (O. A. Goroshko *in litt.* 1999); **Khurkhyn Gol** (Khurkh Gol) valley, Batshireet Sum, one juvenile banded, July 1994, an important site for this species (N. Tseveenmyadag *in litt.* 1997, 1998); **Bajan-Adraga** village, flock of 13 birds reported by local people at a steppe lake, July 1981 (Ostapenko and Tseveenmyadag 1983); **Saikhan-gol** (Saikhan Golyn Adag), Batshireet Sum, one juvenile banded, August 1994 (N. Tseveenmyadag *in litt.* 1998); Kholboo Shar Nuur, **Umun-delger Somon** (Umnudelger Sum), five juveniles banded, August 1994, an important site for this species (N. Tseveenmyadag *in litt.* 1997, 1998); Baljiin river, near **Öndörkhaan** (Underkhaan), undated (Fomin and Bold 1991), the Baljiin river valley being an important site for this species (N. Tseveenmyadag *in litt.* 1997), with three adults on a small unnamed steppe lake in the Kherlen valley, between Öndörkhaan and Bayan-Ovoo, June 1998 (A. Bräunlich *in litt.* 2000); Argun river (untraced), found breeding, undated (Kozlova 1932–1933); Bulangiin Nuur (untraced), one juvenile banded, July 1994 (N. Tseveenmyadag *in litt.* 1998), Bulan lake (presumably the same site) being an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Khukh Nur (Chuch-Nur) lake (untraced), flock of 14 birds on the west shore, July 1977 (Ostapenko and Tseveenmyadag 1983); Khulst Nuur lake (untraced), Khurkh Sangiin Aj Akhui, two juveniles banded, July 1994, an important site for this species (N. Tseveenmyadag *in litt.* 1997, 1998); Nagoon Nur lake (untraced), seven adults, July 1981 (Ostapenko and Tseveenmyadag 1983), an important site for this species (N. Tseveenmyadag *in litt.* 1997); Sain Eriin Khonkhoryn Ar Nuur (untraced), Khurkh Sangiin Aj Akhui, two juveniles banded, July 1994 (N. Tseveenmyadag *in litt.* 1998); Tsegaan lake (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); ■ **Dornod Galuutayn Nuur** (Galut Nuur), one adult, June 1998 (A. Bräunlich *in litt.* 2000); Angirt lake, **Chuluunhoroot** Sum, one juvenile banded, July 1994 (N. Tseveenmyadag *in litt.* 1998); **Mongol Daguur Strictly Protected Area**, part of the Dauria International Nature Reserve, a breeding ground for c.30 birds, unspecified years (N. Tseveenmyadag *in litt.* 1998); **Duchi river** (Duch river) valley, an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); **Khökh Nuur**, undated (Bold 1997); **Uldz river** valley, found breeding in the late 1960s (Bold *et al.* 1995), an important site for this species (N. Tseveenmyadag *in litt.* 1997); **Ugtam Nature Reserve**, an important

site for this species, undated (N. Tseveenmyadag *in litt.* 1997); near **Bajan Ula** (Bajan-UI) village, Uldz river, seven pairs along 5–6 km length and 3 km width of the river valley, July 1977 (Ostapenko and Tseveenmyadag 1983); Uldz river at **Gürwandzagal** (Gurbun-Dzagal-Sumu, Gurvanzagak Sum), one juvenile banded, July 1994 (N. Tseveenmyadag *in litt.* 1998); **Khaichiin Tsagaan Nuur**, an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); **Tsagaan Ovoo** Sum, undated (Bold 1997); **Khalkh gol** (Khalhyngol, Khalkh, Khalkhin Gol, Chalchin Gol) river, found breeding in the late 1960s (Bold *et al.* 1995; also Bold 1997), flock of six birds near this river, where the river Adsarga Gol flows into Daschgajn-Tawan-Nur lake, July (unspecified year) (Ostapenko and Tseveenmyadag 1983); **Kerulen river** (Kherlen river) valley, an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); **Ulaan Nuur** lake, an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); **Sumburiin Tsagan Nuur** (Sumiin Tsagaan Nuur) lake, an important site for this species, undated, proposed as a new strictly protected area (N. Tseveenmyadag *in litt.* 1997); **Numrug Strictly Protected Area** (Nömrög), rare breeding bird (unspecified years) (Tseveenmyadag 1998); **Eastern Mongolia Strictly Protected Area**, very rare summer visitor (unspecified years), breeding not confirmed (Tseveenmyadag 1998); Baga lake (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Eg river valley (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Ekhen lake (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Godigor lake (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Ich Taschgai Nuur (untraced), one adult, June 1999 (A. Bräunlich *in litt.* 2000); Ikh Uul (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Khavtgai Us (untraced), Khalkhyn Gol, one adult, June 1999 (A. Bräunlich *in litt.* 2000); Kholboo Nuur (untraced), Bayan-uul Sum, an important site for this species, one juvenile banded, July 1994 (N. Tseveenmyadag *in litt.* 1997, 1998); Khotol Nuur (untraced), one adult, June 1999 (A. Bräunlich *in litt.* 2000); Tsegeen lake (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Turgen Tsagaan lake (untraced), an important site for this species, undated (N. Tseveenmyadag *in litt.* 1997); Zagan Nur (untraced), Barchyn Gol river, pair with a chick, July 1981 (Ostapenko and Tseveenmyadag 1983).

■ **JAPAN** Blakiston and Pryer (1878 in Austin and Kuroda 1953) reported that this was “the most abundant crane in Japan, and found all over the islands” as a non-breeding visitor. It was, for example, reported to have been common on Hokkaido in the eighteenth century, and apparently was commoner than Red-crowned Crane until the late nineteenth century (Masatomi 1999). However, at present its only regular wintering site in Japan is at Izumi on Kyushu, although small numbers sometimes winter in Kochi prefecture on Shikoku, and it occurs at other locations on Kyushu on migration; moreover, it is a rare visitor to many other parts of Japan, especially in the west of the country. It no longer occurs regularly on Hokkaido, although, remarkably, a pair bred there in the 1980s (Masatomi 1999). Records (by island and prefecture) are as follows:

Hokkaido **Abashiri**, undated (Wildlife Information Center, Hokkaido 1985, Brazil 1991); Maizuru, **Naganuma-cho**, one pair bred in 1985 (Masatomi 1999); **Ishikari**, undated (Brazil 1991); **Kushiro**, undated (Brazil 1991); **Chitose**, 1871 (Austin and Kuroda 1953, Ogasawara and Nishide 1980), one collected, 1878 (Yamashina 1930a); **Hiyama**, undated (Wildlife Information Center, Hokkaido 1985, Brazil 1991);

Honshu ■ **Aomori** unspecified locality, 1984 (Brazil 1991; also OSJ 2000); ■ **Akita Hachirogata**, one, March 1978 (Ogasawara and Nishide 1980); ■ **Saitama** unspecified locality, undated (OSJ 2000); ■ **Chiba** unspecified locality, undated (OSJ 2000); ■ **Tokyo Tokyo**, 1887 (WBSJ 1975); unspecified localities, sight records and collected, undated (Austin and Kuroda 1953); ■ **Niigata Hamochi-machi**, Sado island, single birds in April 1981, April 1984 and February 1985 (Kazama and Shuri 1986); Kakumihama coast, **Maki-machi**, Nishikanbara-gun, one,

March 1986 (Kazama and Shuri 1986); **Joetsu-shi**, one, May 1988, one at Unoike pond, Joetsu area, September 1986 (Nakamura 1994); **Itoigawa-shi**, one, February 1987 (Nakamura 1994); ■ **Toyama** Kamiino, Nyuzen-machi, **Shimoniikawa-gun**, May 1945 (WBSJ Toyama Chapter database); ■ **Ishikawa** unspecified locality, one, February 1986 (Kazama and Shuri 1986); ■ **Fukui Mikuni-cho**, Sakai-gun, adult, February 1979 (Fukui Prefecture 1982); **Takefu-shi** and Sabae-shi, adult, December 1972 (Fukui Prefecture 1982); ■ **Nagano Akashina-machi**, Higashichikuma-kun, one, December 1995–February 1996 (Katoh 1997); ■ **Gifu** Nagara-gawa river, **Kaizu-cho** (Haizu-cho), Haizu-gun, one, January 1996 (Y. Sakai *in litt.* 1998); ■ **Shizuoka Yamanashi**, Fukuroi-shi, February 1979 (WBSJ Totomi Chapter database); ■ **Aichi Tatsuta** (Tatsuta Ohashi), upper Kiso-gawa river, Tatsutamura, Ama-gun, adult, January 1996 (*Birder* 96/3); ■ **Kyoto** unspecified locality, undated (OSJ 2000); ■ **Hyogo** unspecified localities, sight records, undated (Austin and Kuroda 1953); ■ **Wakayama Wada**, Mihama-cho, Hidaka-gun, one, November 1997 (WBSJ Wakayama Chapter database); ■ **Tottori** unspecified locality, undated (OSJ 2000); ■ **Shimane Matsue-shi**, at Katanouchi in November 1990–March 1991 (WBSJ Shimane Chapter database), one in Matsue-shi, April 1996 (Katoh 1997); unspecified localities, sight records, undated (Austin and Kuroda 1953); ■ **Okayama** unspecified locality, undated (OSJ 2000); ■ **Hiroshima** unspecified localities, sight records, undated (Austin and Kuroda 1953); ■ **Yamaguchi Fukamizo**, **Yamaguchi-shi**, January 1990 (WBSJ Yamaguchi Chapter database); **Yashiro**, “small numbers”, undated (Ogasawara and Nishide 1980);

Ogasawara islands unspecified island, 1893 (probably in January) (female in MCZ);

Shikoku ■ **Tokushima** Nakabayashi-cho, **Anan-shi**, November 1997 (WBSJ Tokushima Chapter database); Kushigatani, Okugawauchi, **Hiwasa-cho**, Kaifu-gun, March 1984 (WBSJ Tokushima Chapter database); ■ **Kagawa** unspecified locality, undated (Brazil 1991); ■ **Ehime** near **Habu**, Matsuyama-shi, one, October–November 1972 (Ishihara 1982); **Hojo**, Toyo-shi, two, February 1994 (WBSJ Ehime Chapter database); Ebisu, **Saijo-shi**, one, December 1975–January 1976 (Ishihara 1982), adult and juvenile, February 1994 (*Birder* 94/4, WBSJ Ehime Chapter database); Hibino, Futami-cho, **Iyo-gun**, one, March 1995 (WBSJ Ehime Chapter database); **Ozu-shi**, one, November 1997 (WBSJ Ehime Chapter database); **Hirajo**, Misho-cho, Minamiuwa-gun, one, December 1994 (WBSJ Ehime Chapter database); unspecified localities, sight records, undated (Austin and Kuroda 1953); ■ **Kochi Oogata-cho**, Hata-gun, three, February 1977 (Y. Sawada *in litt.* 1998); **Nakamura-shi**, mainly on the plains along the Nakasuji river, two, winter 1943, two, November 1972–February 1973, four, November 1973–February 1974, three adults and a juvenile, November 1976, single birds in February 1977 and November 1985 (Y. Sawada *in litt.* 1998), eight at Guju, January 1994 (*Birder* 95/3); **Sukumo-shi**, mainly on the lower reaches of Matsuda river, three at Sukumo-niita, winter 1969, four, February 1977, one, March 1984 (Y. Sawada *in litt.* 1998); unspecified localities, five, winter 1992, six, winter 1995, five seen but not wintering in 1996, one seen but not wintering 1997 (Y. Sawada *in litt.* 1998);

Kyushu ■ **Fukuoka Sone tidal flat**, Kokuraminami-ku, Kitakyushu-shi, nine, November 1995, one, November 1996 (WBSJ Kitakyushu Chapter database); **Shiida-machi**, Chikujogun, two, October 1997 (WBSJ Kitakyushu Chapter database); **Imazu**, Nishi-ku, Fukuoka-shi, 70 birds, February 1994 (*Birder* 94/4); unspecified localities, collected, March 1935, sight records, undated (Austin and Kuroda 1953); ■ **Saga Hizen-cho**, occasional visitor, undated (Wild Bird Society of Saga 1997); **Matsuura-gawa river mouth**, Karatsu-shi, 32 adults and seven juveniles, March 1995 (*Birder* 95/5), occasional visitor to Karatsu-shi, undated (Wild Bird Society of Saga 1997); **Tosu-shi**, occasional visitor, undated (Wild Bird Society of Saga 1997); Nagahama reclamation, **Imari-shi**, two adults and a juvenile, December 1997 (*Birder* 98/3), occasional visitor to Imari-shi, undated (Wild Bird Society of Saga 1997); **Kashima-shi**, occasional visitor, undated (Wild Bird Society of Saga 1997); Nishiyoka-cho (untraced), occasional visitor, undated (Wild Bird Society of Saga 1997); ■ **Nagasaki Tsushima** island,

birds wintering on Kyushu stopping off here on spring migration (Brazil 1991), for example a colour-marked bird seen in February 1989 (Ozaki and Baba 1994); Ishidake, **Sasebo-shi**, 10 birds, March 1997 (*Birder* 97/6); unspecified localities, sight records and collected, undated (Austin and Kuroda 1953); ■ **Kumamoto Amakusa**, occasional wintering site, 1985/1986–1988/1989 (Ohsako 1994); ■ **Oita** unspecified localities, undated (OSJ 2000); ■ **Miyazaki Futatsushima-machi, Nobeoka-shi**, one, December 1993 (*Birder* 94/3); ■ **Kagoshima Izumi** (also known as Arasaki or Izumi-Takaono Wildlife Protection Area, c.8.42 km²), Izumi city, wintering ground for c.2,000–3,000 White-naped Cranes, their numbers having increased from 20–40 birds in the 1950s to c.500 in the early 1970s, 1,000 since 1976, 2,000 since 1990, and 3,000 by the late 1990s (Izumi Crane Park database); Takae-cho, **Sendai-shi**, three, January 1996 (*Birder* 96/4); Korimoto, **Kagoshima-shi**, one, November 1994 (*Birder* 95/1);

Tanega-shima island, 1917 (Brazil 1991);

Amami-ooshima island, **Ogachi**, Tatsugo-cho, Oshima-gun, one, January 1997 (*Birder* 97/4);

Okinawa island, February 1968 (Brazil 1991; also Ikehara 1983);

Minami-daito-jima island, Daito islands, winter 1983–1984 (McWhirter *et al.* 1996).

■ **KOREA** ■ **NORTH KOREA** The White-naped Crane was a common winter visitor to Korea until the early twentieth century, but it then declined substantially (Austin 1948). It is now a passage and winter visitor, with the main wintering areas around the Han river estuary and the Demilitarised Zone (DMZ), and important migration stopover sites in the coastal wetlands of North and South Hamgyong and North and South Pyongan (Pak U-il *in litt.* 1998, Tomek 1999). Records (by province) are as follows: ■ **North Hamgyong Sonbong** area, Tuman river mouth, including Kulpo-ri, identified by satellite-tracking as an important stopover area, but birds usually staying only one day in late March, early 1990s (Chong *et al.* 1994, Pak U-il *in litt.* 1998); ■ **Orang** area, identified by satellite-tracking as an important stopover area, but again birds usually staying only one day in March–April (one stayed for 12 days in May 1993), early 1990s (Chong *et al.* 1994); ■ **South Hamgyong Sinpo** city wetlands, a migration stopover, unspecified years (Pak U-il *in litt.* 1998); ■ **Kumya Wetland Reserve**, where c.600 birds stop over on migration (Pak U-il *in litt.* 1998), including at Haejungri, March 1987 (Chung Jong-ryol 1988 in Tomek 1999), usually in mid- to late March, concentrating to roost in reedbeds on the Ryonghung river estuary and feeding in the paddyfields at Haejungri in western Kumya, along the Tokchi river in south-western Kumya and around Hapo lake, Wonpyong district, in northern Kumya, satellite-tracking showing that they stay for c.19 days, with 472 birds in March 1993 (Chong *et al.* 1994); ■ **North Pyongan Sindo county**, a migration stopover, unspecified years (Pak U-il *in litt.* 1998); Ansan-ri, ■ **Pakchon county**, a migration stopover, unspecified years (Pak U-il *in litt.* 1998); ■ **Chongchong-gang estuary**, including Pakchon plain and Mundok plain (parts of which are in South Pyongan), an important migration stopover, unspecified years (Chong and Morishita 1996), at the Chongchon river, March 1990 (J. Fiebig in Tomek 1999); ■ **South Pyongan Tongrimri**, February–March 1987 (Chung Jong-ryol 1988 in Tomek 1999); ■ **Mundok**, Sukchon area, identified by satellite-tracking as an important stopover area, with 512 counted in March 1993 (Chong *et al.* 1994), but normally c.230 occur on migration, including at Dongrim-ri (Pak U-il *in litt.* 1998); 3rd March Cooperative Farm, ■ **Onchon county**, a migration stopover, unspecified years (Pak U-il *in litt.* 1998); ■ **Kangwon Naemun-ni**, Cholwon county, 30 birds recorded in Cholwon and Tosan counties in 1991–1994 (Pak U-il *in litt.* 1998); ■ **North Hwanghae Bupo-ri, Tosan county**, 30 birds recorded in Cholwon and Tosan counties in 1991–1994 (Pak U-il *in litt.* 1998); Baekchon Wetlands Natural Monument (untraced), an important site, undated (Pak U-il *in litt.* 1998); ■ **South Hwanghae Sinchon**, collected, November 1955 (Tomek 1999); ■ **Suiya-ri**, c.100 km west of Kaesong, 600–700 White-naped and Red-crowned Cranes circling, and c.12 White-naped Cranes seen later, March 1929 (Kobayashi 1931);

Paechon, undated (Sonobe 1987); **Ongjin district**, flocks occurring in winter in the early twentieth century (Mori 1939 in Austin 1948), February 1957 and February 1958 (Won Hong-koo in Tomek 1999); **Sohae-ri**, Ongjin county, a migration stopover, unspecified years (Pak U-il *in litt.* 1998); **Namhae-ri**, undated (Sonobe 1987); Yonbaek district (untraced), flocks occurring in winter in the early twentieth century (Mori 1939 in Austin 1948); ■ **Hwanghae** unspecified localities, collected in December 1916 and March 1929, “great flocks” in late autumn in the early twentieth century (Austin 1948); ■ **Kaesong Kaesong**, February 1955, December 1956, March and November 1957 (Won Hong-koo in Tomek 1999); **Panmunjom** (Panmunchom), north of the DMZ, identified by satellite-tracking as an important stopover area, where birds stay for a few weeks (up to 54 days) usually in March–April, early 1990s (Chong *et al.* 1994); **Panmun** plain, an important wintering ground, unspecified years (Chong and Morishita 1996); **Sachon river** basin, Panmun county, 2–3 birds wintering, unspecified years (Pak U-il *in litt.* 1998); lower **Han river**, 17–24 birds occur annually, unspecified years (Pak U-il *in litt.* 1998).

■ **SOUTH KOREA** The species occurs on passage and in winter, mainly in and near the DMZ, with important wintering grounds in the Cholwon basin in Kangwon and migratory stopovers there and at Panmunjom in Kyonggi (see Pae *et al.* 1996). There are a few recent winter records further south at the Nakdong estuary and Chunam reservoir (Lee Woo-shin *in litt.* 1998), but the species is now much less widespread and abundant in South Korea than in the early twentieth century (see Austin 1948). Records (by province) are as follows:

■ **Kangwon Cheolweon** (Cholwon) basin, important wintering ground and migratory site, its numbers being highest during spring and autumn migrations when satellite-tracking has shown that wintering birds from Izumi (in Japan) stay for a few weeks (up to 45 days), early 1990s (Chong *et al.* 1994), with 350–676 birds, November 1995–January 1996, c.350 present in mid-winter (Pae *et al.* 1996), 261–754 birds, November 1997–March 1998 (Kim Jin-han *in litt.* 1998), 474 birds, February 1999 (MOE Korea 1999); **Hoengsong**, south-western Kangwon, flocks seen on migration in October–November (unspecified years) (Austin 1948); **Wonju**, south-western Kangwon, flocks seen on migration in October–November (unspecified years) (Austin 1948); ■ **Kyonggi and Seoul Panmunjom** (Panmunchom), south of the DMZ, including a 39 km stretch of the Imjin river, one of the most important stopover sites of the White-naped Cranes wintering at Izumi (in Japan), 60% of the area used by the cranes being inside the DMZ (Higuchi *et al.* 1996); lower **Imjin river**, wintering and occurring on migration, in winter 1995/1996, the maximum count here and on the Han river estuary being 155 birds in February, and c.70–100 birds present in December–January (Pae *et al.* 1995), 24 birds, February 1999 (MOE Korea 1999); **Han estuary**, c.1,200 birds on the saltmarshes on the east side of the estuary in November 1974, but only a few widely scattered families by mid-December, most of the saltmarshes having been destroyed during the construction of a highway between Seoul to Imjin Gak (G. Archibald *in litt.* 1999), with c.120 on the Han river estuary in Haseong-myon (Kimp'o-gun) and Gyoha-myon (Paju-gun) in winter 1991 (Lee Woo-shin *in litt.* 1998), up to 820 birds (on 16 March) on spring migration in 1993 (Won *et al.* 1993), 20–51 birds wintering in the late 1990s, and a maximum count of 660 birds on migration in March 1997 (Kim Jin-han *in litt.* 1998), plus 68 birds on the lower Han river, February 1999 (MOE Korea 1999); near **Uijongbu** (Giseifu) station, one collected in 1916 (N. Kuroda 1918); **Seoul**, March 1940 (two specimens in MCZ); **Yoju**, south-eastern Kyonggi, flocks seen on migration in late autumn (unspecified years) (Austin 1948); **Suwon**, seen in February–March (unspecified years), including a flock of well over 500 birds (Austin 1948); **Ichon-gun**, January 1919 (female in YIO); **Ansong-gun**, February 1933 (male in YIO); unspecified localities, collected in March 1888 (two), January (two) and March 1909, 1916, January and February 1919, March 1936 and March 1940 (Austin 1948); ■ **North Chungchong Chongju** (Chongju), flocks (sometimes totalling over 1,000) seen on migration in November–December (unspecified years), immediately after the rice harvesting (Austin 1948); **Chinchon**, north-west North Chungchong, flocks of several thousand not uncommon in winter

(unspecified years) (Austin 1948); unspecified localities, collected in December 1910, March 1914 and March 1935 (two) (Austin 1948); ■ **South Chungchong** unspecified localities, collected in January 1927 (five) (Austin 1948); ■ **North Kyongsang** Nakdong river, **Kumi** city, 37 birds killed by agrochemicals in farmland in March 1998, an event which first revealed this as a stopover site for the species (Chan 1998); ■ **South Kyongsang Chunam reservoir** (Junam), two collected, winter 1986 and December 1989 (Lee Woo-shin *in litt.* 1998), recorded in all five years of a survey in 1988–1992, maximum count of 16 birds in February 1991 (Yu and Hahm 1994), 30 birds, December 1991, three, February 1992 (Forestry Research Institute, Korea 1992), two, February 1999 (MOE Korea 1999); **Tongpan reservoir** (Dongpan reservoir), recorded here and/or at Chunam reservoir in eight out of nine years of a survey in 1988–1996, 11 birds in 1988, 17 in 1989, eight in 1990, 37 in 1991, three in 1992, 12 in 1994, 19 in 1995 and 42 in 1996 (Hahm 1997); **Nakdong estuary**, December 1981 (WBSJ Research Division 1982), 42 birds in December 1991, but none during surveys in January–February 1992 (Forestry Research Institute, Korea 1992), six at Taema-dung during censuses in 1992–1993 (Kim and Won 1997); unspecified localities, collected in December 1883 and June 1884 (Austin 1948); ■ **South Cholla Mokpo**, January 1930 (immature female in YIO; also Austin 1948); **Haenam** Kun, several hundred being killed each year in the early twentieth century, when they were “most numerous” every year (Mori 1939 in Austin 1948); unspecified localities, collected in January 1938 and undated (Austin 1948).

■ **CHINA** ■ **MAINLAND CHINA** The White-naped Crane breeds in Heilongjiang (including on the Sanjiang plains), Jilin (on the Songnen plain) and in north-eastern and eastern Inner Mongolia, and it migrates through Inner Mongolia, Hebei and the Yellow River delta in Shandong (with a few records from other provinces in eastern China) to the main wintering grounds at Poyang Hu and Dongting Hu lakes in the Yangtze basin (Wang Qishan *in litt.* 1997). The concentration of almost all wintering birds at two localities is probably because other former wintering sites are no longer suitable, and makes it likely that this species may decline in the future (Wang Qishan *in litt.* 1997). The record from Fujian in the late nineteenth century possibly indicates that some birds wintered south of the Yangtze valley in the past. Records (by province) are as follows:

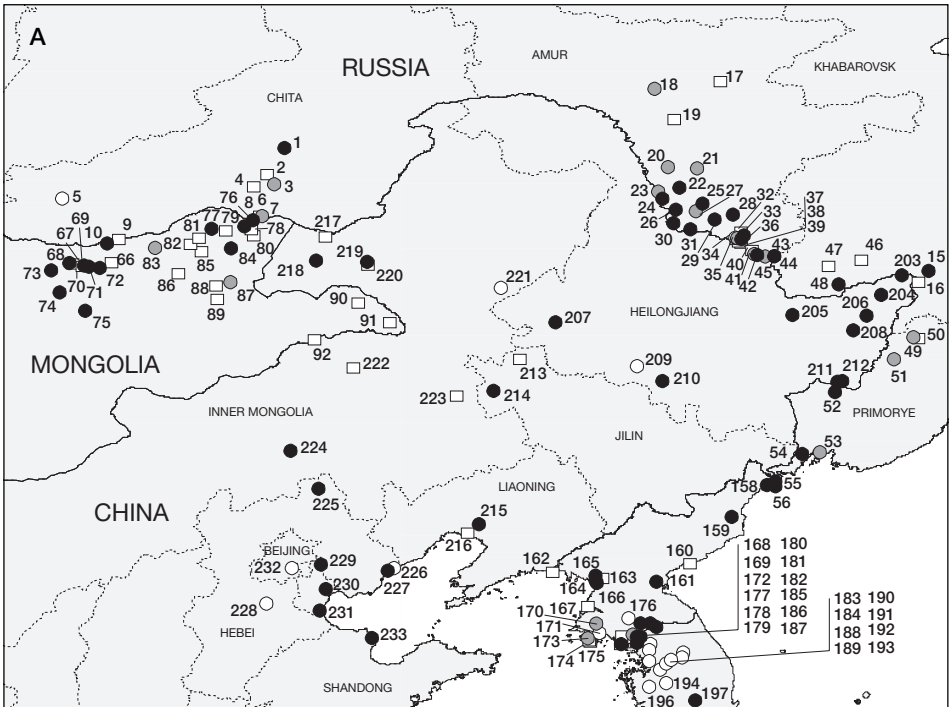
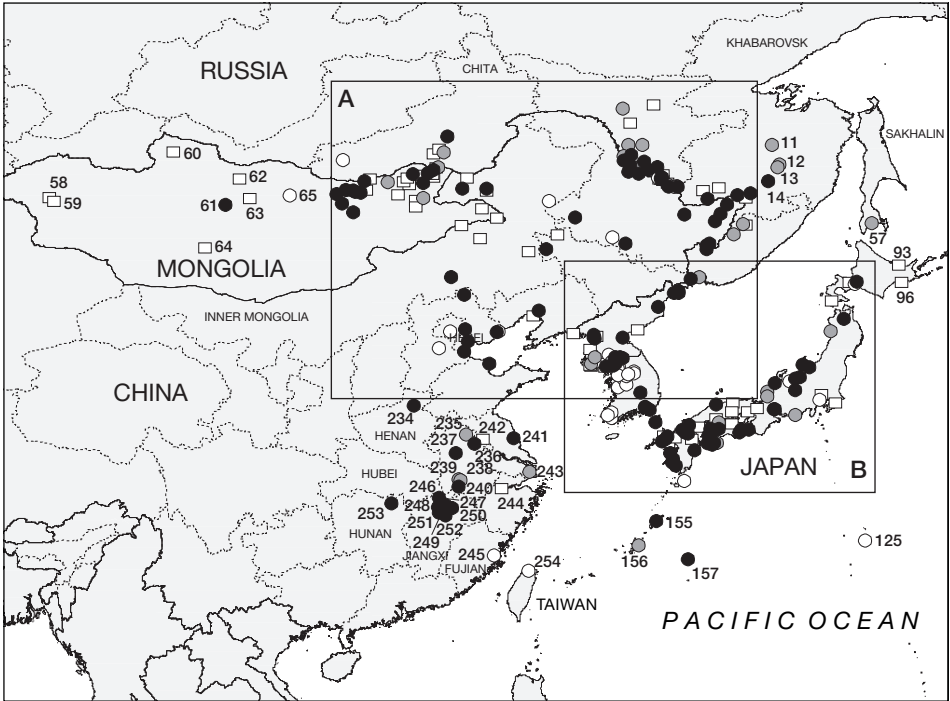
■ **Heilongjiang** Sanjiang Nature Reserve, **Fuyuan county**, rare summer visitor, undated (Liu Bowen *et al.* 1999), with 19 birds at Haiqing township, May 1999 (Xing Hailin *et al.* 1999, Zhang Xixiang *et al.* 1999), 198 birds, September 1999 (Piao Renzhu 1999); **Honghe Nature Reserve**, Tongjiang county, Sanjiang plains, an important breeding and migration site, undated (Wang Qishan *in litt.* 1997), two, June 1991 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000); **Dulu He** river, four counted during an aerial census, mid-May 1984 (Feng Kemin and Li Jinlu 1985); **Naoli He-Qixing He river basin** and Changlindao Nature Reserve, five counted during an aerial census, mid-May 1984 (Feng Kemin and Li Jinlu 1985), reported to breed (Wang Qishan *in litt.* 1997); **Zhalong National Nature Reserve**, Qiqihar city, including Lindian county, 34 birds, May 1975 (Ma Guo'en 1981), c.20 birds nesting from 1981–1986, and another 36–48 using Zhalong as a migratory staging ground (Feng Kemin and Li Jinlu 1985, Li Jinlu *et al.* 1987), with 17 birds counted during an aerial census near the Wuyur He river, mid-May 1984 (Feng Kemin and Li Jinlu 1985), and sightings of colour-banded birds showing that some White-naped Cranes nesting at Zhalong migrate through the Korean Peninsula to Izumi in Japan (Xu Jie *et al.* 1995), 44 birds, May 1996, 11 birds, June 1998 (Piao Renzhu 1999); **Yanwodao** Nature Reserve and Changlindao Nature Reserve, Baoqing county, 50 breeding birds estimated in these two adjacent reserves in 1999 and c.500 birds during autumn migration (Li Xiaomin and Chang Yunhong 1999), but another report suggesting only 25 birds were counted in the two reserves in May 1999 (Piao Renzhu 1999); **Harbin**, April 1940 (male in YPM); **Pingshan**, adult collected, January 1985 (Wang Qishan *in litt.* 1997); **Xiaoxingkai Hu** area, two counted during an aerial census, mid-May 1984 (Feng Kemin and Li Jinlu 1985);

Xingkai Hu National Nature Reserve (the Chinese part of Lake Khanka), at least 16–20 breeding birds and an important staging area on migration, with 48 birds seen in May 1993 (Li Wenfa *et al.* 1994), 14 birds and six nests, May 1999 (Piao Renzhu 1999);

■ **Jilin Melmeg Nature Reserve** (Momoge), a migratory staging ground, arriving in late March and 12–15 birds usually to be seen in mid-April, some birds staying until late May (Wu Zhigang and Han Xiaodong 1992); **Xianghai National Nature Reserve**, two counted during an aerial census, mid-May 1984 (Feng Kemin and Li Jinlu 1985), 12–14 breeding birds in the nature reserve and up to 100 summering non-breeding birds (Lu Jianjian 1990), breeds, e.g. 11 adults, May 1994 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000);

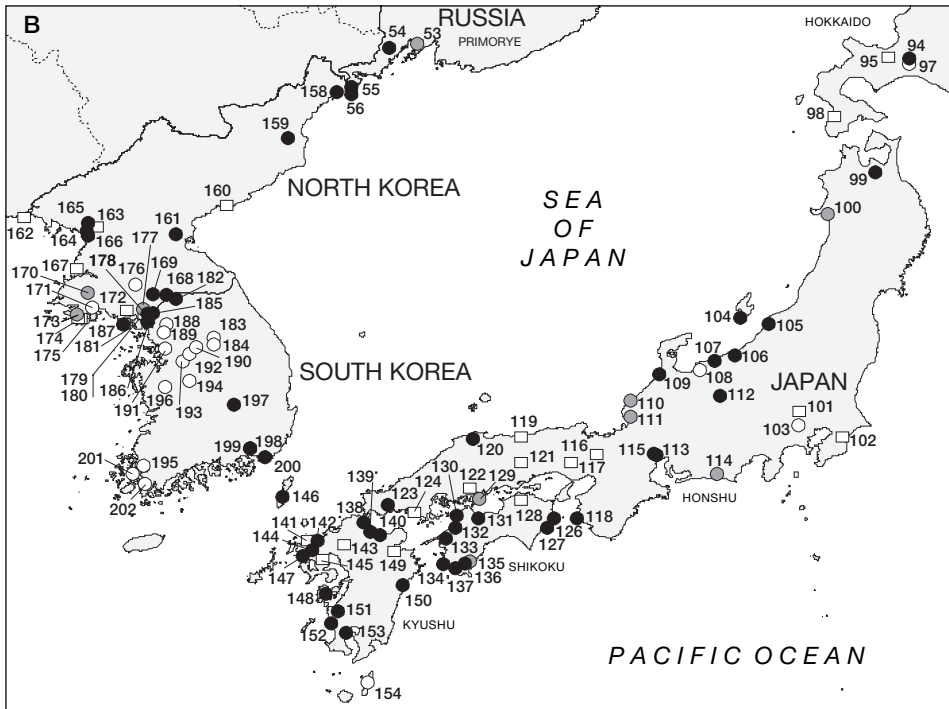
The distribution of White-naped Crane *Grus vipio* (maps opposite): (1) Hila river; (2) Karaksar; (3) Olovyanninskiy district; (4) Olovyannaya; (5) Chikoy river; (6) Daurisky Nature Reserve; (7) Zun-Torey lake; (8) Uldza river; (9) Agutsa river; (10) Bukukun river; (11) Evoron lake; (12) Amursk; (13) Ommi; (14) Novaya Ussura; (15) Khabarovsk; (16) Bol'shekhekhirsirskiy Nature Reserve; (17) Ogoron lake; (18) Podbiralikha river; (19) Dep river; (20) Klimovtsy; (21) Krasnoyaroovo; (22) Novo-Andreyevka; (23) Sergeyevka; (24) Markovo; (25) Cherkasova; (26) Volkovo; (27) Lazarevka; (28) Zavitinskiy Wildlife Refuge; (29) Petropavlovskiy Game Reserve; (30) Muravevsky Wildlife Refuge; (31) Amursky Wildlife Refuge; (32) Kazanovka; (33) Bureya-Uril interfluv; (34) Bureya river; (35) Ukraina; (36) Khinganskiy Nature Reserve; (37) Skobel'tsino; (38) Krasnyy Luch; (39) Innokent'evka; (40) Zhuravlevka; (41) Kasatkino; (42) Ganukan Game Reserve; (43) Khingan; (44) Arkhara-Bureya confluence; (45) Sagibovo; (46) Glinyanskaya river; (47) Mitrofanovka river; (48) Babstovo; (49) Verkhniy Krasnyy Pereval; (50) Kanikeza; (51) Gogolevka river; (52) Khanka lake; (53) Erdmana peninsula; (54) Kedrovaya Pad' Nature Reserve; (55) Khasan plain; (56) Tumen estuary; (57) Lososey bay; (58) Buyant river; (59) Khar Us Nuur; (60) Darhadin depression; (61) Ögiy Nuur; (62) Egiyn Gol; (63) Kharabukha river; (64) Tatsain Tsagaan Nuur; (65) Haraa Gol; (66) Shuusün river; (67) Barkha river; (68) Batshireet; (69) Binder lake; (70) Onon river; (71) Khurkhyn Gol; (72) Bajan-Adraga; (73) Saikhan-gol; (74) Umun-delger Somon; (75) Öndörkhaan; (76) Galuutayn Nuur; (77) Chuluunhoroot; (78) Mongol Daguur Strictly Protected Area; (79) Duchi river; (80) Khökh Nuur; (81) Uldz river; (82) Ugtam Nature Reserve; (83) Bayan Ula; (84) Gürwandzagal; (85) Khaichiin Tsagaan Nuur; (86) Tsagaan Ovoo; (87) Khalkhgol; (88) Kerulen river; (89) Ulaan Nuur; (90) Sumburiin Tsagan Nuur; (91) Numrug Strictly Protected Area; (92) Eastern Mongolia Strictly Protected Area; (93) Abashiri; (94) Naganuma-cho; (95) Ishikari; (96) Kushiro; (97) Chitose; (98) Hiyama; (99) Aomori; (100) Hachiro-gata; (101) Saitama; (102) Chiba; (103) Tokyo; (104) Hamochi-machi; (105) Makimachi; (106) Joetsu-shi; (107) Itoigawa-shi; (108) Shimonikawa-gun; (109) Ishikawa; (110) Mikuni-cho; (111) Takefu-shi; (112) Akashina-machi; (113) Kaizu-cho; (114) Yamanashi; (115) Tatsuta; (116) Kyoto; (117) Hyogo; (118) Wada; (119) Tottori; (120) Matsue-shi; (121) Okayama; (122) Hiroshima; (123) Yamaguchi-shi; (124) Yashiro; (125) Ogasawara islands; (126) Anan-shi; (127) Hiwasa-cho; (128) Kagawa; (129) Habu; (130) Hojo; (131) Saijo-shi; (132) Iyo-gun; (133) Ozu-shi; (134) Hirajo; (135) Oogata-cho; (136) Nakamura-shi; (137) Sukumo-shi; (138) Sone tidal flat; (139) Shiida-machi; (140) Imazu; (141) Hizen-cho; (142) Matsuura-gawa river mouth; (143) Tosu-shi; (144) Imari-shi; (145) Kashima-shi; (146) Tsushima; (147) Sasebo-shi; (148) Amakusa; (149) Oita; (150) Nobeoka-shi; (151) Izumi; (152) Sendai-shi; (153) Kagoshima-shi; (154) Tanega-shima; (155) Ogachi; (156) Okinawa island; (157) Minami-daito-jima; (158) Sonbong; (159) Orang; (160) Sinpo; (161) Kumya Wetland Reserve; (162) Sindo county; (163) Pakchon county; (164) Chongchon-gang estuary; (165) Tongrimri; (166) Mundok; (167) Onchon county; (168) Naemun-ni; (169) Tosan county; (170) Sinchon; (171) Suiya-ri; (172) Paechon; (173) Ongjin district; (174) Sohae-ri; (175) Namhae-ri; (176) Hwanghae; (177) Kaesong; (178) Panmunjom; (179) Panmun; (180) Sachon river; (181) Han river; (182) Cheolweon; (183) Hoengsong; (184) Wonju; (185) Panmunjom; (186) Imjin river; (187) Han estuary; (188) Uijongbu; (189) Seoul; (190) Yoju; (191) Suwon; (192) Icheon-gun; (193) Ansong-gun; (194) Chongju; (195) Chinchon; (196) South Chungchong; (197) Kumi; (198) Chunam reservoir; (199) Tongpan reservoir; (200) Nakdong estuary; (201) Mokpo; (202) Haenam; (203) Fuyuan county; (204) Honghe Nature Reserve; (205) Dulu He; (206) Naoli He-Qixing He river basin; (207) Zhalong National Nature Reserve; (208) Yanwoda; (209) Harbin; (210) Pingshan; (211) Xiaoxingkai Hu; (212) Xingkai Hu National Nature Reserve; (213) Melmeg Nature Reserve; (214) Xianghai National Nature Reserve; (215) Panjin; (216) Shuangtai Hekou National Nature Reserve; (217) Zhalan Nur; (218) Dalai Hu National Nature Reserve; (219) Medamuj; (220) Huihe Nature Reserve; (221) Buttha Qi; (222) Ulgai; (223) Horqin Nature Reserve; (224) Dalai Nur Nature Reserve; (225) Saihanmiao Shan; (226) Qinhuangdao; (227) Beidaihe; (228) Xin'an; (229) Yuqiao reservoir; (230) Dongqilhai; (231) Beidagang; (232) Tong Xian county; (233) Yellow River Delta Nature Reserve; (234) Pangzhai; (235) Lingbi county; (236) Nūshan Hu; (237) Wabu Hu; (238) Caizi Hu; (239) Zongyang county; (240) Shengjin Hu Nature Reserve; (241) Yancheng Nature Reserve; (242) Hongze Hu; (243) Shanghai; (244) Lin'an county; (245) Fuzhou; (246) Jiujiang county; (247) Duchang county; (248) Poyang Hu Nature Reserve; (249) Yongxiu county; (250) Boyang county; (251) Nanchang city; (252) Junshan Hu; (253) Dong Dongting Hu Nature Reserve; (254) Kuantu.

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



■ **Liaoning Panjin** wetlands, rare passage migrant, with only two records in the 1990s, two in spring 1995 and nine in spring 1997 (Yang Fulin *et al.* 1998); **Shuangtai Hekou National Nature Reserve**, part of Panjin wetlands, a migratory staging ground, undated (Wang Qishan *in litt.* 1997);

■ **Inner Mongolia Zhalan Nur**, adult collected, undated (Wang Qishan *in litt.* 1998); **Dalai Hu National Nature Reserve** (Hulun Nur Nature Reserve), c.10 birds present annually in May–August (Wuliji and Liu Songtao *in litt.* 1998); **Medamuji**, two, July 1991 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000); **Huihe Nature Reserve** (Huei He river basin),



The distribution of White-naped Crane *Grus vipio* (map B): (53) Erdmana peninsula; (54) Kedrovaya Pad' Nature Reserve; (55) Khasan plain; (56) Tumen estuary; (94) Naganuma-cho; (95) Ishikari; (97) Chitose; (98) Hiyama; (99) Aomori; (100) Hachiro-gata; (101) Saitama; (102) Chiba; (103) Tokyo; (104) Hamochi-machi; (105) Maki-machi; (106) Joetsu-shi; (107) Itoigawa-shi; (108) Shimoniikawa-gun; (109) Ishikawa; (110) Mikuni-cho; (111) Takefu-shi; (112) Akashina-machi; (113) Kaizu-cho; (114) Yamanashi; (115) Tatsuta; (116) Kyoto; (117) Hyogo; (118) Wada; (119) Tottori; (120) Matsue-shi; (121) Okayama; (122) Hiroshima; (123) Yamaguchi-shi; (124) Yashiro; (125) Ogasawara islands; (126) Anan-shi; (127) Hiwasa-cho; (128) Kagawa; (129) Habu; (130) Hojo; (131) Saijo-shi; (132) Iyo-gun; (133) Ozu-shi; (134) Hirajo; (135) Oogata-cho; (136) Nakamura-shi; (137) Sukumo-shi; (138) Sone tidal flat; (139) Shiida-machi; (140) Imazu; (141) Hizen-cho; (142) Matsuura-gawa river mouth; (143) Tosu-shi; (144) Imari-shi; (145) Kashima-shi; (146) Tsushima; (147) Sasebo-shi; (148) Amakusa; (149) Oita; (150) Nobeoka-shi; (151) Izumi; (152) Sendai-shi; (153) Kagoshima-shi; (154) Tanega-shima; (158) Sonbong; (159) Orang; (160) Sinpo; (161) Kumya Wetland Reserve; (162) Sindo county; (163) Pakchon county; (164) Chongchon-gang estuary; (165) Tongrimri; (166) Mundok; (167) Onchon county; (168) Naemun-ni; (169) Tosan county; (170) Sinchon; (171) Suiya-ri; (172) Paechon; (173) Ongjin district; (174) Sohae-ri; (175) Namhae-ri; (176) Hwanghae; (177) Kaesong; (178) Panmunjom; (179) Panmun; (180) Sachon river; (181) Han river; (182) Cheolweon; (183) Hoengsong; (184) Wonju; (185) Panmunjom; (186) Imjin river; (187) Han estuary; (188) Uijongbu; (189) Seoul; (190) Yaju; (191) Suwon; (192) Ichon-gun; (193) Ansong-gun; (194) Chongju; (195) Chinchon; (196) South Chungchong; (197) Kumi; (198) Chunam reservoir; (199) Tongpan reservoir; (200) Nakdong estuary; (201) Mokpo; (202) Haenam.

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

reported to breed, undated (Lu Jianjian 1990); **Butha Qi** (Zalantun, Dshalantun), 115 km north-west of Qiqihar (Tzitzikar), adult male collected, April 1927 or 1929, probably breeding there (Meise 1934); **Ulgai** (Wulagai) marshes, an important breeding site, undated (Wang Qishan *in litt.* 1997); **Horqin Nature Reserve** (Ke'erqin, Keerqin), an important breeding ground, c.20 breeding birds, undated (Zhang Zixue *et al.* 1989); **Dalai Nur Nature Reserve**, Hexigten Qi, a breeding ground, with up to c.100 birds occurring in autumn (Wang Qishan *in litt.* 1997), and c.100 present in March–October 1995 (Arongqiqige *in litt.* 1998);

■ **Hebei Saihanmiao Shan** (Saihanba), Weichang county, rare summer visitor, April–July 1992–1995 (Hou Jianhua *et al.* 1997); **Qinhuangdao** (Chinwangtao), October 1918 (La Touche 1920–1921, male in MCZ); **Beidaihe** (Peitaiho), flocks seen, April 1923, flocks of 20 to several hundred flying south, October 1924 (Wilder 1924a, Wilder and Hubbard 1924), birds probably of this species seen in November 1942 (two) and October–November 1945 (44) (Hemmingsen and Guildal 1968), totals of 152 birds in September–November 1986, 63 in October 1987, 48 in October–November 1988, 17 in October–November 1989 and 66 in October–November 1990 (Williams *et al.* 1992); **Xin'an** (Hsinan), July 1936 (Shaw 1936 in Hemmingsen and Guildal 1968, specimen in ASCN);

■ **Tianjin Yuqiao reservoir**, three, January 1992 (Waterbird Specialist Group 1994); **Dongqilihai** (Doqilihai), two, January 1991 (Waterbird Specialist Group 1994); **Beidagang** reservoir, two, January 1991 (Waterbird Specialist Group 1994);

■ **Beijing Tong Xian county** (Tung-hsien), 10 km east of Beijing, wounded bird with broken wings captured by a sandy river, April 1934 (Wilder 1934, Piechocki 1956);

■ **Shandong Yellow River Delta Nature Reserve** (Huang He Sanjiao Zhou), Dongying city, where c.50 occur on migration, mainly at Yiqian'er and some at Huanghekou (Yellow River mouth) (Zhao Yanmao and Song Chaoshu 1995, Lü Juanzhang *et al.* 1998), identified by satellite-tracking as an stopover area, early 1990s (Higuchi *et al.* 1994), and one with a flock of Common Cranes, December 1998 (SC);

■ **Henan Pangzhai** (Yu-bei Huanghe Gudao Nature Reserve), a migration staging ground, and some birds may winter (Xu Xinjie *et al.* 1996), with 21 birds, November 1991, three, January 1990 (Waterbird Specialist Group 1994);

■ **Anhui Lingbi county** (Lingbi Cao gou), adult male captured, 1970s or 1980s (Wang Qishan *in litt.* 1997); **Nüshan Hu** lake, Mingguang, adult male captured, 1980s (Wang Qishan *in litt.* 1997); **Wabu Hu** lake, probably a migratory stopover site, with one satellite-tracked bird in November 1991 (Higuchi *et al.* 1994); **Caizi Hu** lake, Zongyang county, wintering in the late 1970s (Ding Wenning and Zhou Fuzhang 1986); **Zongyang county**, adult female collected, November 1964 (Wang Qishan *in litt.* 1997); **Shengjin Hu Nature Reserve**, Guichi and Dongzhi counties, a migration staging ground (for the birds that winter at Poyang lake), and some wintering birds (Wang Qishan 1990), with 23 birds, January 1990, three, January 1991, 424, February 1993, 147, March 1994, 95, February 1998 (Wang Qishan *in litt.* 1997), 48 near the lake and 46 outside Bailianxu, February 1998 (Liu Zhengyuan and Xu Wenbin 1998);

■ **Jiangsu Yancheng Nature Reserve**, a small number wintering, including four in January 1990 (Wang Qishan *in litt.* 1997), 12 birds on the “Jiangsu coast” in January 1991 (Waterbird Specialist Group 1994), two young birds, December 1997–January 1998, one with a family group of Red-crowned Cranes (Su Hualong *et al.* 1998); **Hongze Hu** lake, 30–40 wintering birds at Chengtou, Xiangyang and Lihewa before 1990 (Zhang Guibao 1997), but no information in recent years (Wang Qishan *in litt.* 1997);

■ **Shanghai** near **Shanghai**, one collected in the lower Yangtze valley, January 1889 (Styan 1891), December 1972 (specimen in WUCN);

■ **Zhejiang Lin'an county**, one record, undated (Zhuge Yang 1990);

■ **Fujian Fuzhou** (Foochow) river mouth, February 1893 (Rickett 1894, female in BMNH);

■ **Jiangxi Poyang Hu Nature Reserve**, north-western section of Poyang lake, Yongxiu county, Poyang lake being the most important wintering ground of the species in China,

where their numbers increased from 700 in 1983 to 3,716 in 1994 (Wang Qishan *in litt.* 1997), at Dahu Chi, with at least 2,000 birds counted inside the reserve in December 1985, and another 36 birds at Bang Hu (Kennerley 1987), although only c.125 birds stayed in the reserve in winter 1998–1999 because their food plants were killed by the floods in summer 1998 (Zeng Nanjing *et al.* 1999), aerial surveys of the other small lakes in the Poyang Hu system in December 1998 producing 310 birds at Nanjishan and up to 61 birds at Saicheng Hu, **Jiujiang county**, 20 birds at Tangyin, **Duchang county**, 150–173 birds at Nan Hu, **Yongxiu county**, 30 birds at Dalianzi Hu, **Boyang county** and 92 birds at **Junshan Hu**, Jinxian county (Zeng Nanjing *et al.* 1999); Linchong Hu lake, **Nanchang city**, 177 birds in January 1999, probably present because the floods had killed most water plants at Poyang Hu (Liu Zhiyong *et al.* 1999); Jiangfang Hu lake (untraced), part of Poyang lake but outside the nature reserve, up to 620 birds in February 1993 (Harris *et al.* 1995);

■ **Hunan Dong Dongting Hu Nature Reserve** (East Dongting lake), Yueyang county, an important wintering ground with c.50–100 birds, 1985–1996 (Wang Qishan *in litt.* 1997).

■ **TAIWAN** There is a single record: **Kuantu**, Taipei, one collected, February c.1930 (“early Showa years”) (Lin Wen-horn 1997).

POPULATION Recent estimates of the global population of White-naped Cranes (all based on winter census results) have been (a) 4,900–5,300 birds, including 1,900–2,300 wintering on the Korean Peninsula and in Japan and 3,000 in the Yangtze valley in China (Meine and Archibald 1996, Rose and Scott 1997), and (b) 5,500–6,500 birds, including more than 2,200 wintering at Izumi in Japan, c.300 wintering in Korea, and 3,000–4,000 wintering in China (Chan 1999). In the late 1990s, the number wintering at Izumi increased to over 3,000 (see below), indicating either that the global population is higher than was previously thought, or that some birds have shifted their wintering ground to Izumi from elsewhere. Little information is available on historical changes to the range and numbers of the White-naped Crane (Meine and Archibald 1996), but there is some evidence that it was more abundant than at present in the nineteenth and early to mid-twentieth centuries. The contraction in breeding range and numbers is probably a better gauge of the plight of this species than changes in wintering or passage range and numbers, since the birds are clearly capable of changing their patterns of movement according to circumstance, so that increases or decreases may not reflect real-world changes, merely geographical shifts. In Russia, it was reported to be a common breeding species on the Onon and Argun rivers and the Torey lakes in Chita in the nineteenth century (Stegmann 1929), when it was also widespread on the Lake Khanka plain in Primorye (Shul’pin 1936), and it has since declined in both areas (see Distribution). There has probably been a further contraction in its breeding range in Russia in recent decades, but there is no hard evidence to document this (Potapov and Flint 1987). Blakiston and Pryer (1878 in Austin and Kuroda 1953) reported that this was “the most abundant crane in Japan, and found all over the islands”, whereas it is now mainly confined to a single wintering site. It has clearly declined in Korea, where Austin (1948) described it as a “common winter visitor, the most abundant of the wintering cranes”, despite the fact that it had suffered “considerable decimation” in the preceding few decades “with the encroachment of civilisation, particularly from firearms”: flocks of 2,000–3,000 were common in about 1925, but it then decreased each year and by the mid-1930s flocks of “only several hundred” were to be seen in restricted areas. In recent years there has been an increase in the numbers of wintering birds in Korea and Japan, but the status of the Chinese population is unclear (SC).

Russia In Chita, this species was reported to be a common breeding species on the Onon and Argun rivers and the Torey lakes in the nineteenth century (Stegmann 1929). It has presumably declined since then, as a total of 96 breeding pairs were recorded in the southern part of this province in the early 1990s (Golovushkin and Goroshko 1995). This figure included the population in Daursky Nature Reserve, where an average of c.50 birds nest each year,

but their numbers fluctuate according to the climate and in optimum years as many as 300 cranes breed in the area (O. A. Goroshko verbally 1998). They have also declined in Khabarovsk and the Jewish Autonomous Region, where there were probably no more than 4–5 pairs in the mid-1980s (data *per* AVA), and even fewer by the mid-1990s (B. A. Voronov *in litt.* 1997). In the Amur region, up to 20 pairs were estimated to breed in the mid-1980s in years when conditions were favourable (Andronov 1988b). In 1994, there were estimated to be 25 breeding pairs and, counting the juveniles of the year and non-breeding immature birds, the size of the regional population at the end of that year was c.100 birds (V. A. Dugintsov *in litt.* 1997). However, because of various limiting factors (fires, disturbance and the use of toxic chemicals on fields) only 10–15 pairs (out of 20–25) usually succeed in rearing juveniles (V. A. Dugintsov *in litt.* 1997) but, in general, the species is showing a slight tendency to increase in the Amur region (V. A. Andronov *in litt.* 1997). In Primorye, its breeding range has contracted on the Lake Khanka plain since the nineteenth century, and it no longer nests on the western shore of Lake Khanka (in the Komissarovka-Siyankhe and Mel'gunovka-Mo valleys), or the Ilistaya (Lefu) river valley (Shul'pin 1936). In 1976–1986 the population of the Russian section of the Lake Khanka was estimated at 3–6 breeding pairs (Glushchenko 1981, Shibaev and Glushchenko 1988), but in more recent years only 1–2 pairs were found (Glushchenko *et al.* 1995). The number migrating through the lower Tumen river (Tumangan) in spring is very approximately estimated to be from several tens to 150–200 birds (Shibaev 1975). On autumn migration in 1988, at least 305 individuals were estimated to have migrated along the east side of Lake Khanka (Shibaev and Surmach 1994).

Mongolia In 1994, totals of 246 adults and 26 immature birds were counted along the Onon and Uldz rivers, and 2,500–3,000 migrating birds were recorded in the Uldz basin; it was estimated that c.800 birds breed in Mongolia (Bold 1997).

Japan Blakiston and Pryer (1878 in Austin and Kuroda 1953) reported that this was “the most abundant crane in Japan, and found all over the islands”, whereas at present its only regular wintering site in Japan is at Izumi on Kyushu, although small numbers sometimes winter in Kochi prefecture on Shikoku, and it occurs elsewhere on migration (see Distribution). It is impossible to be certain whether a major decline has occurred or if the species has merely focused its numbers in one site, but on balance it seems highly probable that a very considerable decline has indeed occurred in the past 150 years. At Izumi, there were only 40 birds in 1927–1928, but they increased to 469 in 1939–1940, before declining during the Second World War to 25 birds in 1947–1948; their numbers did not change significantly until the early 1960s, when they increased to 121 birds in 1964–1965, and they remained at 100–300 until 1972, when 401 birds were counted; they increased to 1,021 in 1976–1977, and remained at 1,000–2,000 birds until 1990–1991, since when their numbers stabilised at c.2,000 birds (Izumi Crane Park database). The population at Izumi increased again to an all-time high of 3,232 birds in 1997–1998, with 2,535 in 1998–1999, and 3,093 in 1999–2000 (Izumi Crane Park database).

Korea Large numbers of White-naped Cranes occurred on passage and in winter on the Korean Peninsula in the early twentieth century: Y. Kuroda (1937) noted that up to three thousand wintering cranes (mostly this species) could be seen in North Chungchong in the early 1920s, but by the 1930s only several hundred were found wintering, following widespread hunting, including for “pest control” (Mori 1939). There are currently estimated to be c.300 wintering birds in Korea (Kim Jin-han *in litt.* 1998). In North Korea, as many as 2,300 birds wintered in the 1960s; in the 1980s they decreased to several tens, but in 1992–1993 they increased again to several hundred birds (Tomek 1999). The current wintering population is c.150–200, and 450–650 have been observed on migration (Pak U-il *in litt.* 1998). However, no birds were found during the census in January–February 1999 (Chong Jong-ryol *in litt.* 1999). In South Korea, c.200–350 birds can be found in midwinter in the Cholwon basin, the main wintering ground of this species, and almost 1,000 birds occur there on migration (Pae

et al. 1996; see Distribution). There is also a regular wintering population of c.100 birds at the Han river estuary and on the Imjin river, where up to 850 birds can be found on migration (especially in spring); however, while the numbers wintering in the Cholwon basin have definitely increased since the late 1970s, they appear to have declined in the Panmunjom valley and the adjacent Han and the Imjin river estuaries (G. Archibald *in litt.* 1999).

China The number and distribution of breeding White-naped Cranes in north-east China is still being investigated (Meine and Archibald 1996), and no population estimate is available. The wintering population is probably 3,000–4,000 birds, but this is difficult to judge because of large fluctuations in their numbers at the main wintering sites (SC; see Table 1). Wang Qishan (1998) compiled information on the wintering populations at Poyang Hu, Dongting Hu and Shengjin Hu lakes from 1988–1989 to 1994–1995, and found that in 1992–1993 and 1994–1995 the counts at these wetlands totalled more than 3,700 birds. The total wintering population in the Yangtze basin appears to be stable at present, although there has been a decline at Dong Dongting Hu (see Table 1), but given the threats to the wetlands there, including the effects of the Three Gorges Dam, it is likely that the species may decline there in the future. It appears to have become concentrated at a few sites where the conditions remain favourable, which means that it is much more likely to decline in the future than to increase (Wang Qishan *in litt.* 1997). It was probably more widespread and numerous in China in the past, as it was frequently mentioned in ancient Chinese literature and poetry, by the names “Cang Ji” (bluefowl) or “Chi-jia” (Red-cheek), indicating that the poets were very familiar with this species (SC).

Table 1. Counts of White-naped Cranes at the main wintering sites in China, Poyang Hu Nature Reserve in Jiangxi (1983–1997) and Dong Dongting Hu Nature Reserve in Hunan (1985–1996) (Wang Qishan *in litt.* 1997).

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Poyang	700	1,162	2,000	2,200	2,000	3,106	2,316	2,670	2,540	3,206	1,158	3,716	3,265	2,197	2,970
Dongting	–	–	146	164	156	36	72	32	24	103	89	72	48	2	–

ECOLOGY Habitat This species is characteristic of the wet, “monsoon-influenced”, forest-steppe belt of North-East Asia, where it inhabits grassy marshes, wet meadows and reedbeds in broad river valleys, lake depressions and boggy upland wetlands; in the Amur region it nests in large cotton grass–sedge tussock fens and sedge–*Calamagrostis* wet meadows alongside river terraces, interspersed with low ridges covered in oak–birch coppice (Dymin and Pan’kin 1975, Kucheruk 1977, Smirenskiy 1980, Smirenskiy and Roslyakov 1982). It appears to require a combination of sedge swamps and meadows or farmland, which explains its sporadic distribution throughout the breeding range (data *per* AVA). The nesting sites are usually on the edge of swamps near to farmland, and the nests are normally built near to water that is 20–40 cm deep and c.150–300 m from the forest edge; during the nesting period, it feeds on both sedge swamps and in oat and soya fields, while sedge–*Calamagrostis* marshes and sedge–grass–*Artemisia* meadows are secondary feeding habitats (data *per* AVA). In north-east Mongolia, it was found to breed in wet steppes, mainly near the water’s edge where there was relatively tall vegetation (Fujita *et al.* 1994). Some pairs in Mongolia have been found nesting in very small wetlands in the steppes: for example, one nest was in a small pond (only c.60 m in diameter) without any reeds and only c.200 m from a road (O. Goroshko *in litt.* 1999). On the breeding grounds in China, nesting habitat is similar to that of Red-crowned Cranes, in wetlands, wet grasslands, lake shores, lowland grasslands and wooded grasslands, although White-napes prefer to forage in drier reed–sedge and sedge marshes than Red-crowned Cranes (Meine and Archibald 1996, Wang Qishan *in litt.* 1997). At Zhalong and Lindian, they mainly stay in reedbeds and marshy grasslands dominated by *Phragmites*

communis, *Carex*, *Cyperus*, *Scirpus tabernaemontani* and *Typha angustifolia* (Wang Qishan *in litt.* 1997).

On the migratory staging grounds and the wintering grounds the species mainly utilises wetlands and farmland, and a typical migratory stopover is by the Huai He river in Anhui, in seasonally flooded farmland that is open and relatively undisturbed (Wang Qishan *in litt.* 1997). On the wintering grounds in China, it mainly utilises the shallow water of freshwater lakes (e.g. at Poyang Hu) and paddyfields (e.g. at Dong Dongting Hu lake) (Ding Wenning and Zhou Fuzhang 1982, Ding Tieming 1985). At Poyang Hu and Dong Dongting Hu lakes, it is somewhat less aquatic than the Siberian Cranes *Grus leucogeranus* but somewhat more so than the Hooded Crane *G. monacha* and Common Crane (Meine and Archibald 1996). In the Cholwon basin in Korea, the main feeding sites are on farmland, all within 5 km of the roost sites (on frozen reservoirs or near other waterbodies, or on ricefields), where the birds usually roost in flocks of 150–500 (Pae and Won 1994). At Izumi in Japan, they also winter on farmland, where they prefer newly cultivated fields (Ohsako 1994).

Food On their breeding grounds White-naped Cranes feed predominantly on insects, small vertebrates, seeds, roots and tubers of sedges and other wetland plants (Meine and Archibald 1996). They mainly eat the tubers of *Eleocharis*, which they excavate from wet mud, and they also feed on grasslands and paddies (G. Archibald *in litt.* 1999). When they have just arrived on the breeding grounds in China (at Zhalong) in the spring, they feed mainly on seeds, grass roots, wasted grain and some dead fish, and when it gets warmer after May they feed mainly on fish, shrimps and shellfish, and some plant material such as maize, wheat, young roots, stems, leaves and buds (Wang Qishan *in litt.* 1997). The stomach of a bird collected in Inner Mongolia contained small fish, tadpoles, grasshoppers, aquatic insects and young buds of *Triglochin palustre* and *Sparganium stoloniferum* (Yin Ruixue 1992). In Russia, newly arrived birds in spring feed in rice- and cornfields (in Primorye) (Yu. V. Shibaev *in litt.* 1997) and corn-, soya and wheatfields (in Amur) (V. A. Dugintsov *in litt.* 1997). On the wintering grounds at Poyang Hu, birds feed on the tubers of *Carex*, *Scirpus maritimus*, *Vallisneria spiralis*, *Suaeda japonica* and *Salsola komadori* (Chen Bin and Wang Zuoyi 1990). At Dong Dongting lake, they feed on the roots of *Vallisneria spiralis*, *Carex unisexualis*, the fruits and tubers of *Potamogeton malainus* and the roots of *Phalaris arundinacea*, and on wasted grains in paddyfields (Gui Xiaojie 1990).

Breeding White-naped Cranes attain sexual maturity in their third or fourth year, and are monogamous with long-lasting pair-bonds (V. A. Dugintsov *in litt.* 1997). However, captive birds in China were reported to reach sexual maturity at ages of c.2–5 years (Li Fangman and Li Peixun 1991). They arrive in flocks on the breeding grounds by early April, and move to the nesting sites after about two weeks, as soon as the swamps begin to thaw (V. A. Dugintsov *in litt.* 1997). The density of nesting pairs depends on the habitat type and quality: for example, in Mongolia three breeding pairs were counted on 5 km of floodplain near a lake surrounded by reedbeds, but one pair was found per 8 km where there were no lakes (Golovushkin and Goroshko 1995). The territories of this species at Zhalong in China may overlap with those of breeding Red-crowned Cranes, and occasionally the two species may fight where the territories overlap, but serious conflicts have not been observed (Li Fangman and Li Peixun 1991). Pairs defend their territories more frequently early in the breeding season, and become more tolerant of intruders during the incubation and chick-rearing periods (Li Fangman and Li Peixun 1991). The nests are mounds of dried sedges and grasses in open wetlands (Meine and Archibald 1996; see also Golovushkin and Goroshko 1995). The nests are usually built close to a stream or open water, near to tall, dense vegetation, and of 16 nests found at Zhalong, 11 were built on the ground (on top of cut reeds), three in open water and two on floating islands of sedge and reed; other nest-like structures were sometimes found inside the territories, perhaps representing nests that were abandoned because of disturbance during their construction (Li Fangman and Li Peixun 1991). However,

breeding pairs often construct several nests within their territories, although eggs are only laid in one, possibly to ensure that other nests will be available if the first attempt fails (G. Archibald *in litt.* 1999). The egg-laying period is from mid-April to mid-May, and clutches are of 1–2 eggs, although most pairs lay two eggs, and they will lay again if the first clutch is lost; incubation lasts 28–32 days, the chicks hatch in June or early July, and they fledge at 70–75 days (Su Liying *et al.* 1991, Golovushkin and Goroshko 1995, Meine and Archibald 1996, V. A. Dugintsov *in litt.* 1997).

Migration This species migrates from its breeding grounds in Russia, Mongolia and north-east China to wintering sites in Japan, Korea and eastern China, and satellite-tracking and colour-banding studies have helped to improve understanding of its migratory routes (as well as identifying key sites for its conservation): satellite-tracking in 1991 and 1992 showed that birds migrate from Daursky Nature Reserve in Russia to the Gulf of Bohai and then to the wintering grounds at Poyang Hu in China, whilst a bird from Khinganskiy Nature Reserve in Russia flew via the Sanjiang plain, Lake Khanka and the Korean Peninsula to Izumi in Japan (Higuchi *et al.* 1994). Field observations of colour-banded birds in 1984–1992 found that birds nesting in the Amur region in Russia also moved via Korea to Izumi in Japan, and that breeding birds from Zhalong National Nature Reserve in China took the same route, but none of the 50+ birds colour-banded at the Barun-Torei lakes (Daursky Nature Reserve) in Russia and the Uldz river in Mongolia were seen in Japan (Ozaki and Baba 1994). At least four colour-banded birds from Daursky Nature Reserve were seen at Poyang Hu in February–March 1993, and 11 colour-banded birds were seen there in January 1994, including nine banded at Daursky, one banded a short distance across the border from there in north-eastern Mongolia, and the other unknown (Harris *et al.* 1995).

This species moves over southern Primorye in late March–early April and arrives at the breeding grounds on the Zeya–Bureya plains in early April, and in autumn it passes over Primorye in mid-October to early November (Dymin and Pan'kin 1975). There are two major migrating stopovers in Primorye, Lake Khanka and the Khasan plain, where flocks may stay for up to one month (Shibaev and Surmach 1994). In Mongolia, it arrives in late March–early April, and departs in early October (Golovushkin and Goroshko 1995). In China, the species occurs in early November and late March at the Yellow River delta on migration (Zhao Yanmao and Song Chaoshu 1995), and it arrives on the wintering grounds at Poyang Hu in late October to late November and departs from early March to early April (Song Xiangjin *et al.* 1995). Migrating flocks move along the east and west coasts of the Korean Peninsula in October, with those migrating along the east coast all probably moving to the wintering ground in Japan, but some of the birds migrating along the western route wintering near the DMZ in Korea (Chong 1987). They arrive near the DMZ from late October (earlier than Red-crowned Crane), with the peak of autumn migration around 10 November in 1992, and northward migration seemed to start in mid-February and reach a peak in mid-March, and all birds seemed to have departed by 4 April in 1993 (Pae *et al.* 1996). Satellite-tracking has shown that the area around the DMZ is the most important stopover for the White-naped Cranes that winter at Izumi in Japan, and nine of the 15 cranes tracked from there stopped for more than 10 days at Panmunjom and/or Cholwon; the percentage of total migration days spent in the DMZ by the successfully tracked cranes that used these sites ranged from 32% to 87% (Higuchi *et al.* 1996). A satellite-tracking study found three migration routes along the Korean Peninsula, one to the north-west from the south coast, using the rest sites at Panmunjom, Kumya and Sonbong; the second using Cholwon, Kumya and Sonbong; and the third (used by birds heading for Zhalong in China) stopping over at Panmunjom and Tanton (at the mouth of the Amnok–Yalu river), or in the Sukchon area (Chong *et al.* 1994).

THREATS *Habitat loss and degradation* The most significant threat to this species is the loss of wetlands to agricultural expansion, especially on the breeding grounds in the Amur river

basin, the Sanjiang plain, and in other parts of northern China (Meine and Archibald 1996). *Russia* The main reason for the sharp decline in its numbers during the twentieth century was the destruction of its nesting habitats through the drainage of marshlands, and their subsequent ploughing and use for the cultivation of cereals and other agricultural crops (Potapov and Flint 1987). Twenty years ago, the situation of this species was continuing to worsen, mainly because of marshland drainage and fires (Smirenskiy and Roslyakov 1982), and it was then (and remains) a fear that wetlands throughout the entire Amur floodplain might ultimately be drained (Dymin and Pan'kin 1975). A proposed series of dams in the Amur river basin would have a devastating impact on the breeding grounds through flooding and increased agricultural development of natural areas (Meine and Archibald 1996). In the Amur region, the greatest threat to nests comes from agricultural fires (which are especially dangerous in spring because they destroy both the nests and the tall vegetation used to conceal nests), disturbance and spring floods; when dead vegetation is set alight, tens of thousands of hectares of the cranes' marshland habitat can be destroyed by fire over 1–3 days, and especially after night-time fires the cranes may abandon their nests completely (Smirenskiy 1988). In Khabarovsk and the Jewish Autonomous Region, the extinction of this species is a real possibility because of this practice of setting fire to meadows in spring and autumn, and the use of its habitats for agriculture, including stock-grazing (B. A. Voronov *in litt.* 1997). Clutches are sometimes destroyed by being trampled by cattle (Dymin and Pan'kin 1975). At Lake Khanka, the breeding population has probably been reduced by the reclamation of wetlands for ricefields (G. Archibald *in litt.* 1999), and again their nesting has been disturbed by the regular setting of fires in spring and autumn (Yu. V. Shibaev *in litt.* 1997). It has been suggested that interspecific competition with the Red-crowned Crane has increased because of human modification to their habitats in the Amur region, such that White-naped Cranes (which return to their breeding grounds later than Red-crowned Cranes) are forced to occupy peripheral parts of the breeding area, which are the first to be ploughed up and drained (Smirenskiy 1980). However, G. Archibald (*in litt.* 1999) has commented that the Red-crowned Cranes typically inhabit the wetter and more central portions of marshes, while the White-naped Cranes occupy the edges of the wetlands and the surrounding upland grasslands and/or agricultural fields; wetland reclamation therefore often affects the habitat of the White-naped Cranes more seriously, but there is no evidence that White-naped Cranes would occupy wetter areas of marsh if the Red-crowned Cranes were absent. *Mongolia* On the breeding grounds in Mongolia, steppe fires and floods (natural phenomena, although the fires may presumably sometimes be started by man) are the main causes of the loss of nests, clutches and chicks (Golovushkin and Goroshko 1995, Bold 1997, O. A. Goroshko *in litt.* 1999). *Japan* The numbers of wintering birds in Kochi prefecture declined in the late 1980s and 1990s, probably because the wet paddies on the wintering grounds were converted into dry farmland, meaning that less food was available, and the illumination of nearby houses was also a problem there (presumably because it disturbed roosting birds at night) (Y. Sawada *in litt.* 1998). *Mainland China* Economic development is reducing the area and quality of many of the wetlands in China, including those used by this species on migration and in winter (Wang Qishan *in litt.* 1997; see equivalent section under Siberian Crane for details of threats to wetlands in the Yangtze basin). Road-building is a problem at Zhalong National Nature Reserve in Heilongjiang, where National Highway 301 cuts through the wetlands, and reclamation for rice paddies and the development of tourist facilities are taking place even inside the core area of the reserve (Wu Changshen 1997); the water inflow to the marsh and the area of the wetlands have been reduced in recent years, as large areas of reedbeds are gradually being converted into wet grassland or even dry grassland (Wang Qishan *in litt.* 1997). Threats to the Sanjiang plain in Heilongjiang are described in the equivalent section under Swan Goose *Anser cygnoides*. At Xingkai Hu Nature Reserve in Jilin, fires set by farmers are a threat, and in April 1993 fire destroyed 60–70% of the vegetation in the reserve and the cranes were forced to congregated at a few sites (Li Wenfa *et al.* 1994).

The wintering populations at Poyang Hu and Dong Dongting Hu lakes in the Yangtze valley are threatened by the construction of the Three Gorges Dam, which will change the seasonal flow of water in the Yangtze river and could significantly affect the wetlands downstream (Iwabuchi *et al.* 1998, Wang Qishan *in litt.* 1997).

Hunting *Russia* Small numbers of cranes are still killed by poachers, but this may nevertheless have a serious impact on this species (Potapov and Flint 1987). At Lake Khanka, hunting is probably one of the reasons for the decline of its breeding population (G. Archibald *in litt.* 1999). *Korea* In March 1998, at Kumi in North Kyongsang, South Korea, 37 White-naped Cranes were killed by ingesting grains soaked with Dimecron, which were believed to have been placed by poachers for ducks (Chan 1998). *Mainland China* A study of hunting pressure in the middle and lower basins of the Yangtze in 1987–1992 estimated that c.50% of the total wintering waterfowl in this region were killed each year by local hunters, using netting, shooting and poisoning; the White-naped Crane was one of the quarry species found in hunters' bags during the study, but not one of the main targets of hunting (Lu Jianjian 1993a). At Poyang Hu, its most important wintering ground, illegal hunting is a major threat, including poisoning by the baits set for waterfowl and fish; law enforcement is weak there, and the local people do not have a good understanding of the need for wildlife conservation and environmental protection (Wang Qishan *in litt.* 1997). A total of eight birds of this species were found killed at Poyang Hu lake in the early 1990s, including five killed by poisoning (Song Xiangjin *et al.* 1995).

Disturbance *Russia* In Amur, frequent disturbance near the nest was found to increase the probability of clutches being lost through predation by crows (Andronov 1988b). At Lake Khanka, disturbance from stock-grazing and haymaking affects the crane population (Yu. V. Shibaev *in litt.* 1997), and target-shooting by the military was another source of disturbance there (G. Archibald *in litt.* 1999). *Mongolia* In the Onon river basin, disturbance by people and domestic animals was found to be one of the main threats to this species (O. A. Goroshko *in litt.* 1999). *Korea* Disturbance has recently increased along the southern boundary of the DMZ in the Cholwon basin, as human activities have been expanded in the "Civilian Control Zone", but surprisingly the crane population has not declined there, suggesting that they might be abandoning former wintering areas in North Korea and moving to the security of the DMZ (G. Archibald *in litt.* 1999). After construction of the Jayoo-ro (Freedom Highway), the east coast near the Han river estuary and Imjin river became more accessible, and human disturbance and hunting became a problem at the Imjingak rice paddies (where entry is not restricted), which are the main feeding site for the cranes in midwinter when the river is frozen (Pae *et al.* 1996). *Mainland China* Overfishing is a serious problem at many sites, for example at Zhalong (Wu Changshen 1997) and Poyang Hu (Wang Qishan *in litt.* 1997).

Pollution and pesticides The indiscriminate use of pesticides may affect its breeding success, and agricultural and industrial pollution present a serious threat at several breeding sites (Meine and Archibald 1996). It is possible that in Russia some cranes, especially chicks, may die from poisoning after consuming seeds dressed with pesticides (Andronov 1988b). Deaths of cranes in China also result from ingestion of grain soaked with pesticides, used by poachers to kill ducks and by farmers for rodent control, and at Zhalong the species is also threatened by pollution and eutrophication of the water (Wang Qishan *in litt.* 1997).

Over-concentration *Japan* The wintering grounds at Izumi support an unnaturally large concentration of wintering cranes because of artificial feeding, and they are therefore at elevated risk from the outbreak of disease (Ohsako 1994, Meine and Archibald 1996) or some other catastrophe.

MEASURES TAKEN *International cooperation* Since the 1980s, there has been international collaboration on projects for the conservation of this species within the Asia region, and the North East Asian Crane Site Network was established in 1997, to encourage international

cooperation on the conservation of cranes and wetlands and to ensure the long-term survival of all crane species and their habitats in their north-east Asian flyways; reserves important for White-naped Cranes, including Lake Khanka, Daursky, Mongol Daguur, Xingkai Hu, Yellow River delta, Poyang Hu, Kumya, Mundok, Han river estuary, Cholwon basin and Izumi-Takaono, are listed as key sites of the North East Asian Crane Site Network (SC; see equivalent section under Hooded Crane).

Legislation The species is included in the Russian Red Data Book (Kolosov 1983). It is listed as a “Very Rare Animal” under the Mongolian Law on Hunting (1995), which means that it may be hunted or trapped only for research and with permission from the government, and that it is prohibited to hunt, trap, or sell any parts for any other purposes. In the Mongolian Red Data Books, it is listed as Endangered (Bold 1987) and “Very Rare” (Bold 1997). It is on the Red List of Japan, which means that its conservation importance is recognised and it can be used as a reference species in environmental impact assessment for development projects (Environment Agency of Japan *in litt.* 1999). In South Korea it was designated as natural monument no. 203 on 30 May 1968 (Lee Woo-shin *in litt.* 1998). In China it is a Nationally Protected Species (Second Class) (Zheng Guangmei and Wang Qishan 1998). It is listed on Appendix I of CITES.

Protected areas *Russia* An important breeding population is protected in Daursky Nature Reserve (c.1,368 km²) in Chita, part of the Torey lakes Ramsar site and the Dauria International Nature Reserve (Golovushkin and Goroshko 1995, O. A. Goroshko verbally 1998). In Amur, nesting sites of this species are protected within Khinganskiy Nature Reserve and by several wildlife refuges (Ganukanskiy, Murav’evskiy and Amurskiy) (V. A. Dugintsov *in litt.* 1997). Some breeding sites are protected in the Khanka Nature Reserve (established in 1990), but unfortunately most of the suitable nesting habitat for this species was not included within the reserve boundaries (Yu. V. Shibaev *in litt.* 1997). Migratory staging grounds are protected in the “Khasanskiy” Nature Park on the lower Tumen river, established in 1997 (Yu. V. Shibaev *in litt.* 1997). *Mongolia* This species occurs in Mongol Daguur, Eastern Mongolia and Numrug Strictly Protected Areas in Dornod province (N. Tseveenmyadag *in litt.* 1998). *Japan* Its wintering grounds in Kagoshima were designated as a Special Natural Monument in March 1921 (Kato *et al.* 1995). Izumi-Takaono (8.42 km², including 0.54 km² of Special Protection Area), the key wintering site in the country, is a National Wildlife Protection Area for the conservation of cranes (Environment Agency of Japan *in litt.* 1999). *Korea* Protected areas and natural monuments have been established at several of the migratory staging sites in North Korea, including wetland reserves at Kumya and Mundok (see Chong and Morishita 1996). *Mainland China* Protected areas have been established at many of the sites used by White-naped Cranes in China, including: (*breeding sites*) Zhalong, Changlindao, Yanwodao, Xingkai Hu and Honghe nature reserves in Heilongjiang, Melmeg and Xianghai nature reserves in Jilin, and Horqin, Dalai Hu and Dalai Nur nature reserves in Inner Mongolia; (*migration sites*) Shuangtai Hekou Nature Reserve in Liaoning, Yellow River Delta Nature Reserve in Shandong, and Shengjin Hu Nature Reserve in Anhui; (*wintering sites*) Yancheng Nature Reserve in Jiangsu, Poyang Hu Nature Reserve in Jiangxi and Dong Dongting Hu Nature Reserve in Hunan (see Distribution, and MacKinnon *et al.* 1996 for conservation recommendations for these reserves).

Supplementary feeding At Izumi, Japan, natural habitats and food sources no longer exist, and the cranes depend completely on intensive habitat management and artificial feeding (supported by the Japanese government), and fresh water is pumped over the agricultural fields where the cranes are fed to aid in cleansing the area (Meine and Archibald 1996). The number of White-naped Cranes wintering at Izumi has been increasing since this artificial feeding (which is monitored by the Kagoshima Crane Conservation Committee) began in winter 1962–1963 (Ohsako 1994). It is possible that the harvesting of rice by machines rather than by hand in the Cholwon basin, South Korea, benefits this species by providing more

food, as 1.5% of grain is missed by the machines, whereas almost 100% was gathered when it was collected by hand (G. Archibald *in litt.* 1999).

Research The migratory movements of this species have been studied using satellite-tracking (Higuchi *et al.* 1994, 1996, Chong *et al.* 1994). Counts of the main wintering population at Izumi have been conducted annually since 1947, and some survey figures are available for earlier years (Eguchi *et al.* 1993).

Conservation education Along with other crane species, the White-naped Crane benefits from education campaigns conducted at protected areas in China and the feeding station in Japan, where thousands of visitors come to observe them (Meine and Archibald 1996).

Captive breeding A total of 409 White-naped Cranes were in captivity in 1993, an international studbook is maintained, and limited re-introduction (of birds released near research and education facilities) has already taken place at Khinganskiy Nature Reserve in Russia and Zhalong National Nature Reserve in China; at least one pair that was raised in captivity and released at Khinganskiy has successfully migrated and bred (Meine and Archibald 1996). Zhalong National Nature Reserve started its captive breeding programme in 1984, and 21 captive-bred White-naped Crane have been released into the wild (although information is not yet available on the results of this release) (Wu Changshen and Ma Jianhua 1999).

MEASURES PROPOSED Legislation Zheng Guangmei and Wang Qishan (1998) have proposed that this species should be upgraded to a first class nationally protected species in China.

Protected areas and habitat management There is a need for improved international coordination of the management of Lake Khanka and other protected areas on the borders between Russia, Mongolia and China, and improved management and professional training of reserve staff is necessary in many of the protected areas where this species occurs (Meine and Archibald 1996). **Russia** Many of the nesting pairs of White-naped Cranes in Amur are widely distributed at low densities, and their conservation cannot be fully addressed by the creation of one or even several large reserves, and in some places the nesting territories of individual pairs should be designated as local sanctuaries (zakazniks) (Smirenskiy and Roslyakov 1982). Several areas need to be designated as reserves in Khabarovsk and the Jewish Autonomous Region (Tarabarova and Bol'shoy Ussuriyskiy islands and the Zabelovskie and Petrovskie "mari") (B. A. Voronov *in litt.* 1997). In Primorye, the most important measure is to expand the boundaries of Khanka Nature Reserve to include all the surviving marshes and swamps on the Khanka plain, in particular on the eastern and southern sides of the lake (Glushchenko and Shibaev 1996). **Japan** To counter the risk of disease through the abnormal concentration of thousands of cranes at the artificial feeding station near Izumi, the artificial feeding should be gradually reduced, and the cranes encouraged to disperse over wider areas of southern Japan (G. Archibald *in litt.* 1999). Experiments should be conducted to attract cranes to other potential wintering sites (Ohsako 1994). **Mongolia** There are several wetlands (especially smaller wetlands) in the breeding range in north-east Mongolia that should be established as new protected areas (Meine and Archibald 1996). **Korea** The Imjingak area at the Han river estuary, South Korea, requires urgent protection, either through the extension of the wildlife reserve or the designation of the area as a national monument (Pae *et al.* 1996). The conservation of the DMZ and associated buffer zones is extremely important, and if reunification of the two Koreas occurs, proactive steps must be taken to protect critical habitats for cranes along the western and central portions (Meine and Archibald 1996, G. Archibald *in litt.* 1999). **Mainland China** There are several wetlands (especially smaller wetlands) in the breeding range on the Sanjiang plain that should be established as new protected areas (Meine and Archibald 1996). A general measure that would greatly benefit conservation would be to give the management offices of nature reserves more authority to control land use inside reserves (Wang Qishan *in litt.* 1998). In many

nature reserves the management of the land is decided by the local people, and it is crucial that land-use practices are developed that accommodate not only their needs but also those of the cranes (G. Archibald *in litt.* 1999). At Zhalong National Nature Reserve, the construction of roads in the wetlands and the damming of streams and rivers that provide water to the wetlands must be curtailed (Wang Qishan *in litt.* 1997, G. Archibald *in litt.* 1999), and the construction of recreation facilities should be stopped and existing facilities removed (Wang Qishan *in litt.* 1997). At Poyang Hu Nature Reserve it is necessary to maintain the water level at 17–18 m during the flooding period, and 14.5–15.5 m in winter (Wang Qishan *in litt.* 1997; see equivalent section under Siberian Crane). The construction of the Three Gorges Dam will change the seasonal flow of water in the Yangtze river and could negatively affect the wetlands downstream of the dam (Iwabuchi *et al.* 1998), so changes to the wetlands in the Yangtze valley and the threatened waterbirds that occur there should be carefully monitored once the dam is in operation, and appropriate efforts made to mitigate the problems that arise (see equivalent section under Siberian Crane).

Research Satellite-tracking studies should be continued to improve knowledge of its migration routes (Meine and Archibald 1996), and identify further key sites for its conservation. More surveys are necessary in Mongolia, including studies of the influence of human activities on known sites, and a crane monitoring system needs to be established (N. Tseveenmyadag *in litt.* 2000). Surveys are also required to improve understanding of its breeding range and population in China.

Conservation education Education campaigns on crane conservation (and the wise use of wetlands) targeted toward the local people in Russia and China are extremely important (G. Archibald *in litt.* 1999; see Meine and Archibald 1996). The raising of public awareness about cranes and their conservation is also important in Mongolia (N. Tseveenmyadag *in litt.* 2000).