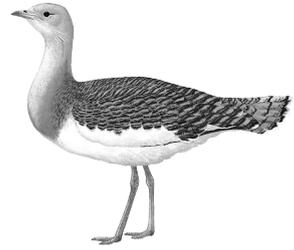


GREAT BUSTARD

Otis tarda

Critical —
Endangered —
Vulnerable A2c



Land privatisation and subsequent land-use change in eastern Europe, Russia and Central Asia could have a significant impact on the population and extent of remaining habitat of this species, such that it is likely to undergo a rapid population reduction, equivalent to more than 20%, in the next 10 years. It therefore qualifies as Vulnerable.

DISTRIBUTION The Great Bustard occupies a huge Palearctic range that stretches from Morocco and Portugal in the west to the Russian Far East and north-east China in the east (see Remarks 1). Formerly the birds within this long but relatively narrow belt would have been part of an effectively single, if occasionally disjointed, population, but in the past two hundred years, and in particular in the past 50 years, the disruption and destruction of steppe and grasslands have been so intense that the species survives in ever smaller and ever more isolated areas.

Outside the Asian region Outside “Asia” as defined here, breeding populations currently remain in Morocco, Portugal, Spain, Austria, Germany, Slovakia, Hungary, Bulgaria, Yugoslavia, Romania, Moldova, Turkey, Iran, Russia, Ukraine, Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan (Collar 1985, Kollar 1996). It was at least historically a regular winter visitor to the Danaghori plains of northern Afghanistan (Meinertzhagen 1938).

Asian region It breeds in the steppes of eastern Russia, Mongolia and northern and western China, and winters in very small numbers on the breeding grounds and in Japan (where it has always been rare), North Korea and South Korea (formerly numerous but now very rare), mainland China (now the main wintering grounds), Pakistan (always very rare and possibly now extinct), with a single old record from Myanmar.

■ **RUSSIA** In Eastern Russia, the Great Bustard was a locally common breeding species in the steppes and forest-steppes of Krasnoyarsk, Khakassia, Tuva, Buryatia, Chita, Amur and Primorye, but has declined dramatically during the twentieth century (see Population). It is now known to breed in only a handful of areas, where it is generally uncommon or rare. Most of the eastern Russian population migrates to China, but a few birds have been recorded in winter, and there are many records of birds on migration. Records are presented here by region:

■ **Krasnoyarsk** near **Kuragino**, on the Tuba river, Minusinsk depression, “rarely encountered”, nineteenth century (Sushkin 1914, Sushkin 1914 in Rogacheva 1992); near **Baraksan**, Minusinsk depression, “rarely encountered”, nineteenth century (Sushkin 1914, Sushkin 1914 in Rogacheva 1992), recorded annually at various localities in the Minusinsk depression, where it used to be a common breeder, but nowadays it probably only rarely nests (Prokof'ev 1988); near **Minusinsk**, Minusinsk depression, rarely seen, nineteenth century (Rogacheva 1992); **Abakan steppe**, Minusinsk depression, the main breeding area of this species (in Central Siberia) in the nineteenth century, some birds sometimes overwintering (Sushkin 1914 in Rogacheva 1992), three records (flocks of two, five and eight) between 1963 and 1983 (Prokof'ev 1988); **Khady**n village, on passage in spring in the 1960s and 1970s (Kelberg and Smirnov 1988);

■ **Khakassia Shira steppe**, Minusinsk depression, two records (flocks of four and five) between 1963 and 1983 (Prokof'ev 1988); near **Itkul' lake**, 12 km from Kyzlasovo village,

one seen, June 1963 (Kim 1988); **Yubat steppe** (Uibatovskaya steppe), reported by hunters to occur annually until recently (Prokofyev 1987 in Rogacheva 1992, Prokof'ev 1988); **Koibal steppe** (Koibatskaya steppe), Minusinsk depression, four birds (two of which were probably young birds) reported by hunters, August 1979, groups of four and five birds seen in 1980 (Prokofyev 1987 in Rogacheva 1992, Prokof'ev 1988); northern **Sagay steppe**, found in the nineteenth century (Sushkin 1914 in Rogacheva 1992);

■ **Tuva Turan** village, on passage in spring in the 1960s and 1970s (Kelberg and Smirnov 1988); lower reaches of the **Uyuk river**, nesting birds present in the 1960s (Kelberg and Smirnov 1988); lower reaches of the **Ust'-Begreda river** (Begredy river), nesting birds present in the 1960s (Kelberg and Smirnov 1988); Kemchik river and Begredy river, near the villages of **Iyi-Tal** and Ust-Elegest, single birds and flocks of 2–4 seen, 1970s (Kelberg and Smirnov 1988); south of Khadyn lake, south of the villages of **Bayan-kol** and Eerbeck, c.100, 1960s (Kelberg and Smirnov 1988); lower reaches of the **Elegest river**, nesting in the 1960s (Kelberg and Smirnov 1988); near **Shagonar**, breeding commonly in the 1950s (Isakov and Flint 1987, Kelberg and Smirnov 1988); **Cheder lake** and Beloe lake, flocks of c.30, 1947–1948 (Kelberg and Smirnov 1988); lower reaches of the **Mezhegey river**, nesting in the 1960s (Kelberg and Smirnov 1988); around **Chagatay lake**, breeding commonly in the 1950s (Isakov and Flint 1987, Kelberg and Smirnov 1988); southern foothills of the **Tannu-Ola mountains**, breeding commonly in the 1950s (Isakov and Flint 1987, Kelberg and Smirnov 1988); **Borshin-Gol** (Boroshin-Gol) valley, Ovyurski district, pair with two chicks, July 1976 (Baranov 1988); **Saglinskaya valley**, between the Torgalyk and Ust'u-Sailyt rivers, female, May–early June 1978 (Baranov 1988); south of **Tes-Hem river**, regularly encountered, early 1960s (Berman and Zlotin 1972); western and southern foothills of the **Agardag massif**, southern Tuva, 1–2 birds per 200 km of car journey, early 1960s (Berman and Zlotin 1972 in Rogacheva 1992), the steppes on the western and southern foothills being the only area where this species currently survives (Rogacheva 1992); **Tsagan-Tologoy**, west of Tere-khol' lake, Erzinski district, single males seen on two days, July 1979 (Baranov 1988);

■ **Buryatia Verkhnyaya Angara valley**, 1950s (Gusev 1962), numbers declining rapidly thereafter (E. N. Elaev verbally 1997); **Davsha**, near the Verkhnyaya Angara valley, 1950s (Gusev 1962), numbers declining rapidly thereafter (E. N. Elaev verbally 1997); **Vitim plateau**, common in the past (Stegmann 1929) but possibly now extinct (Izmailov 1967); **Barguzin valley**, 1950s (Gusev 1962), numbers declining rapidly thereafter although the Barguzin depression remains one of the two areas where it is still known to occur (E. N. Elaev verbally 1997); **Yeravinskiy district** (Yeravinski district.) in relatively large numbers, undated (Ponomareva 1986); near **Gunda** settlement, Yeravinskiy (Yeravinski) district, nest destroyed by a “herding dog”, 1983 (Ponomareva 1986); **Domna river** (Domka river) valley, Yeravinski district, a migration stopover but with some birds remaining to breed, unspecified years (Ponomareva 1986); **Khorinskiy district**, undated but apparently the 1980s (Ponomareva 1986); **Marekta steppe** (Marakhatskaya steppe), on the border between Eravinski and Khorinski districts, present in large numbers in 1982 but, following widespread poaching, absent in 1983 (Ponomareva 1986); **Mukhorshibirskiy district**, undated, with Tunguiski Wildlife Refuge designated to protect this species but most of the steppe now ploughed up (Ponomareva 1986); **Borgoy steppe** (Borgoiskaya steppe), on the border between Dzhidinskiy and Selenginskoye districts, present in large numbers, both regularly nesting and overwintering, unspecified years (Ponomareva 1986); **Dzhidinskiy district** (Dzhindzhinski district), including Dzhidinskiy Nature Reserve, undated but apparently the 1980s (Ponomareva 1986); **Selenginskoye plateau**, 1950s (Gusev 1962), numbers declining rapidly thereafter although this is one of the two areas where it is still known to occur (E. N. Elaev verbally 1997);

■ **Chita** above **Ivan lake** and Arachley lake, southern Vitim plateau, inhabiting the strips of meadows surrounded by forest, undated (Stegmann 1929); **Urulyunguy lowlands** (Urulunguy), “common”, undated (Stegmann 1929), currently one of the two major breeding

grounds in the province (Chan and Goroshko 1998); **Borzya** and the Adun-Tchalon plateau (untraced), “common”, undated (Stegmann 1929); near **Kulusutay** (Kulusutai), female collected, undated (Taczanowski 1885); **Torey lakes**, “common”, undated (Stegmann 1929), the Torey basin, at the Daursky Nature Reserve, currently one of the two major breeding grounds in the province (Chan and Goroshko 1998), with 60 displaying birds on the isthmus between Burun-Torey and Zun-Torey lakes, spring 1985, and six groups (each of 4–6) counted along a 30 km route there, September 1985 (data *per* AVA);

■ **Amur Romnenskiy district**, southern Upper Amur region, breeding, undated (Pan’kin 1985); **Blagoveshchenskiy district**, on migration, unspecified years (Barancheev 1953); near **Uspenovka** village, Ivanovskiy district, seven seen, April 1984 (V. A. Dugintsov *in litt.* 1997); near **Nekrasovka** village, upper Belaya river, one collected from a flock of three, September 1952 (V. A. Dugintsov *in litt.* 1997); near **Svyatorussovka** village, Romnenskiy district, upper Belaya river, seen once, undated (V. I. Potorochi *per* V. A. Dugintsov *in litt.* 1997); **Ivanovka** district, four, June 1997, no proof of breeding (Yu. A. Darman *in litt.* 1998); **Oktyabr’skiy district**, southern Upper Amur region, breeding in small numbers before the 1950s (Barancheev 1953); **Sadovoye** village, between the upper Gil’chin river and the Bol’shoi Alim river, recorded almost annually, unspecified years (V. A. Dugintsov *in litt.* 1997); lower Bol’shoi Alim river, between **Gribskoye** village, Tushki village and Udobnoe village, pair in spring and five birds in the autumn, 1963 (V. A. Dugintsov *in litt.* 1997); near **Bely Yar** village, middle reaches of the Zavitaya river, four seen, autumn 1965 (V. A. Dugintsov *in litt.* 1997); near **Lermontovka** village, between the upper Gil’chin river and the Bol’shoi Alim river, recorded almost annually, unspecified years (V. A. Dugintsov *in litt.* 1997); **Tambovskiy district**, southern Upper Amur region, bred in small numbers before the 1950s (Barancheev 1953); near **Razdol’noye** and **Slava** villages, between the Gil’chin and Dim rivers, family groups of three and five seen, 1972, seen in 1979 (Pan’kin 1983, V. A. Dugintsov *in litt.* 1997); **Dronovo** village, between the upper Gil’chin river and the Bol’shoi Alim river, Blagoveshchenskiy district, flock of 12, early September 1968, recorded almost annually, unspecified years (V. A. Dugintsov *in litt.* 1997); extensive meadowland between the upper **Bol’shoi Alim river**, upper **Gil’chin river** and the middle reaches of the Ivanovka river, summer, unspecified years (V. A. Dugintsov *in litt.* 1997); **Konstantinovskiy district**, pair seen, May 1996, no proof of breeding (Yu. A. Darman *in litt.* 1998); near **Nizhnepoltavka** and **Klyuchi** villages, between the Gil’chin and Dim rivers, family party of five seen, August 1969 (Pan’kin 1983, V. A. Dugintsov *in litt.* 1997); **Mikhailovskiy district**, southern Upper Amur region, breeding, undated (Pan’kin 1985); near **Beloberezovoe lake**, west of Voykovo village, Konstantinovskiy district, one shot, 1972 (V. A. Dugintsov *in litt.* 1997); near **Vinnikovo** village, middle reaches of the Raychikha river, spring and autumn, unspecified years (V. A. Dugintsov *in litt.* 1997); lower **Bureya river**, recorded a few times on migration, unspecified years (Pan’kin 1985); **Dolgoye lake** (Dolgoe lake), Arkharinskaya depression, one, June 1980 (data *per* AVA); near **Bely Svet lake**, Arkharinskaya depression, seen twice, summer 1985 (data *per* AVA); near **Krasnyy Luch** settlement, towards Innokent’evka village, Arkharinskaya depression, brood seen, autumn 1978 (Andronov 1987); **Boguchan mountain**, Arkhara Nature Reserve, Lebedinskoe department, regularly hunted in the 1960s (Andronov 1987); **Zeiskaya lowlands**, bred in the early twentieth century (Stegmann 1930); five “ostrich-like” birds at the Selemdzha river mouth (not mapped; record treated as unconfirmed) in late summer 1953, the northernmost locality on the Zeya-Bureya plain (P. K. Glebov *per* V. A. Dugintsov *in litt.* 1997);

■ **Primorye Khanka lake western shore**, brood seen near Turii Rog village, August 1867, and reported by local villagers to be a common breeding species there (Przheval’skiy 1877–1878); near **Platono-Aleksandrovskoye** settlement, Khanka lake, several flocks of c.10 seen annually on migration in the 1970s (Nazarov and Kurinny 1981); between **Terney bay** and Taivasa bay, eastern slopes of Sikhote-Alin’ range, three, October–December 1959, and near Terney settlement, February 1960 (Rakhilin 1965); **Khanka lake eastern shore**, two seen, spring

1977 (Nazarov and Kurinny 1981); near **Troitskoye**, Khanka lake, one collected, April 1909 (Chersky 1915), occasionally breeding in the 1930s and 1940s (Vorob'ev 1954), six seen near Troitskoye, summer 1977, and eight reported there "in previous years" (Nazarov and Kurinny 1981); **Ol'ga bay**, eastern slope of Sikhote-Alin' range, female shot, December 1956 (Sudilovskaya 1965); **Lazovskiy State Reserve**, eastern slopes of Sikhote-Alin' range, one or two regularly seen by the Kievka river and Chernaya river in the 1940s and 1950s, last seen in November 1962 (Belopol'ski 1955, Litvinenko and Shibaev 1971); **Sedimi river mouth** (Sidimi river), common summer visitor and rare in winter in the 1860s (Taczanowski 1885); lower **Tumen river** (Tumangan river), reported to breed on sandy dunes by the river in the 1920s (Shul'pin 1936); Taudimi village (untraced), Olginski district, one collected, March 1909 (Chersky 1915).

■ **MONGOLIA** The Great Bustard is widely distributed in Mongolia, in Arkhangai, Bulgan, Dornod, Dzavkhan, Gov'-Altai, Khentii, Khövsgöl, Khovd, Ömnögov', Övörkhongai, Selenge, Töv and Uvs provinces; its main range encompasses the forest steppes of northern and central Mongolia, and the steppes and desert steppes of western, central and eastern Mongolia, but it penetrates even into the desert zone (northern Gobi) of southern Mongolia (Vaurie 1964, Bold 1997, A. Bräunlich *in litt.* 1998, D. Batdelger *in litt.* 1998). The subspecies generally occurring in Mongolia is *Otis tarda dybowskii*, but *O. t. tarda* probably occurs in extreme western Mongolia (Chan and Goroshko 1998). Records (by province) are as follows: ■ **Uvs Tesin river**, undated (Bold 1997); **Uureg Nuur lake**, undated (Bold 1997); **Mongol Els**, undated (Bold 1997); ■ **Khovd Khovd river**, undated (Bold 1997); **Dariv** (Khovd Dariv), undated (Batdelger 1998); **Bulgan**, three females collected (all with brood-patches or eggs), May, unspecified year (Piechocki 1968); ■ **Dzavkhan Tes** (Zavkhan Tes), undated (Batdelger 1998); **Bor Har Els** (Bor Khar Els), undated (Bold 1997); ■ **Gov'-Altai Shargin Gov-** (Shargiin Gobi), undated (Piechocki *et al.* 1981); ■ **Khövsgöl Selenge river**, undated (Bold 1997); ■ **Arkhangai Ögij Nuur** (Ogij Nuur), two birds, June, unspecified year (Piechocki 1968); ■ **Bulgan Teshig** (Bulgan Teshig), undated (Batdelger 1998); ■ **Övörkhongai Khujirt**, two males, one in the Orchon valley c.20 km north-west of Khujirt (Chudshirt) and the other 41 km north of Khujirt, June 1980, the species being rarer than on earlier trips (Mauersberger *et al.* 1982); **Buruun bayan-Ulaan** (Baruun Baján Ulaan), undated (Piechocki *et al.* 1981); ■ **Selenge Zheltura** (Selenge Zelter), undated (Batdelger 1998); ■ **Töv Ulaanbaatar** (Urga), undated (female in AMNH); ■ **Ömnögov'** from the lowlands of the Gobi to the foothills of **Gurbun-saykhan** (Gurwan-sajchan) mountains, total of six birds, June–August 1979, one, June 1980 (Mauersberger *et al.* 1982); ■ **Khentii Barkha river** (Barkh river), undated (Bold 1997); **Norovlin river**, undated (Batdelger 1998); **Khentii Kurkhiin river**, undated (Batdelger 1998); **Khurkhyn Gol** (Khurkh river), undated (Bold 1997); ■ **Dornod Mongol Daguur Strictly Protected Area**, rare breeding bird, unspecified years (Tseveenmyadag 1998); **Uldz river**, undated (Bold 1997); **Onon river**, undated (Bold 1997); **Tsagaan Ovoo** (Dornod Tsagaan Ovoo), undated (Batdelger 1998); **Khalkhgol** (Khalkh river), Lake Buir, undated (Bold 1997); **Kerulen river** (Kherlen river), undated (Bold 1997); **Menengiyn Tal** (Menengiin Tal), undated (Batdelger 1998); **Numrug Strictly Protected Area** (Nömrög), rare breeding bird, unspecified years (Tseveenmyadag 1998); **Eastern Mongolia Strictly Protected Area**, rare breeding bird, unspecified years (Tseveenmyadag 1998).

■ **JAPAN** The Great Bustard has always been a rare winter visitor to Japan, and prior to 1975 there had only been 15 records (Yamashina Institute for Ornithology 1975), mostly of solitary birds. Records (by island and prefecture) are as follows:

Hokkaido Ishikari-gawa river, one collected, November before 1882 (Kuroda 1917, Austin and Kuroda 1953; also Wildlife Information Center, Hokkaido 1985); **Zenibako**, Shiribeshi, two collected, November 1881 (Yamashina 1930a, Austin and Kuroda 1953); **Iburi**, undated (Wildlife Information Center, Hokkaido 1985); **Muroran**, undated (Brazil 1991); **Hiyama**, undated (Wildlife Information Center, Hokkaido 1985);

Honshu ■ **Aomori** unspecified localities, two collected, 1922 and December 1966 (Aomori Prefecture 1978); ■ **Ishikawa** unspecified locality, April 1931 (Brazil 1991); ■ **Fukui** Koshino-mura, **Nyu-gun**, one collected, November 1955 (Fukui Prefecture 1982); ■ **Yamanashi** **Hanawa**, before 1942 (Austin and Kuroda 1953); ■ **Nagano** unspecified locality, undated (probably late nineteenth century) (Austin and Kuroda 1953); ■ **Gifu** “Kawashina”, near **Gifu**, January 1940 (Gifu Prefecture 1983, Austin and Kuroda 1953); ■ **Aichi** **Anjo-shi**, male, March 1994 (T. Kameya verbally 1998); ■ **Mie** Kuwana-cho, **Kuwana-shi** (Kuwana-gun), September 1903 (Austin and Kuroda 1953, specimen in YIO); ■ **Shiga** unspecified localities, 1907 and November 1939 (Brazil 1991); ■ **Hyogo** **Takasago**, one collected, November 1939 (Austin and Kuroda 1953); unspecified locality, collected, December 1876 (Kuroda 1917, Brazil 1991); ■ **Tottori** unspecified locality, undated (OSJ 2000);

Shikoku ■ **Tokushima** **Maiko-jima** island (Maiko), one collected, 1907 (Austin and Kuroda 1953);

Kyushu ■ **Nagasaki** **Isahaya**, one collected, undated (Kuroda 1917, Austin and Kuroda 1953); **Goto islands**, February 1917 and December 1918 (Austin and Kuroda 1953; also OSJ 2000); **Minamimatsuura-gun**, male collected, February 1917 (Kuroda 1917); unspecified localities, two collected, December 1916 and undated (probably late nineteenth century) (Austin and Kuroda 1953, female in AMNH);

Okinawa island, one at Hedo, Kunigami-son, December 1967 to January 1968 (Takara 1979, McWhirter *et al.* 1996);

Ishigaki-jima island, female photographed, March 1981 (Environment Agency of Japan 1991, McWhirter *et al.* 1996).

■ **KOREA** ■ **NORTH KOREA** The Great Bustard was formerly a common winter visitor, in flocks of up to 100 birds, but is now rare (Austin 1948, Tomek 1999). Records (by province) are as follows: ■ **North Hamgyong Hoeryong**, May 1897 (“Yankovskii 1898” in Tomek 1999); **Kil-ju** (Kilju-kun), several birds seen in the Toksan-myon wasteland, November 1917 (Y. Kuroda 1918); ■ **South Hamgyong Ryonghung estuary**, Kumya Wetland Reserve, four, December 1991 to March 1992 (Chong *et al.* 1994); unspecified locality, February 1887 (Austin 1948); ■ **North Pyongan Chongchon-gang estuary**, Mundok Wetland Reserve, on migration, undated (Chong and Morishita 1996); unspecified locality, April 1921 (Austin 1948); ■ **South Pyongan Kaechon**, January 1938 (Won in Tomek 1999); **Onchon** fields, on migration, undated (Chong and Morishita 1996); unspecified locality, two collected, March 1909 (Austin 1948); ■ **Pyongyang Pyongyang**, January 1935–1939 (Won 1956, 1964 in Tomek 1999); **Chunghwa**, February 1956 (Tomek 1999); ■ **Kangwon Yonghung**, October–November 1897 (“Yankovskii 1898” in Tomek 1999); **Wonsan** (Wonson), September 1897 (“Yankovskii 1898” in Tomek 1999); **Pyonggang** (Pyonggang-kun), c.40, December 1917 (Y. Kuroda 1918); unspecified locality, December 1926 (Austin 1948); ■ **South Hwanghae Jedo**, November 1959 (Won in Tomek 1999); **Suiya-ri**, c.100 km west of Kaesong, up to 30 seen, March 1929 (Kobayashi 1931); **Taejon**, two collected, December 1917 (Y. Kuroda 1918); **Ongjin**, March 1957 (Won in Tomek 1999); **Yonan**, January 1956 (Won in Tomek 1999); ■ **Hwanghae** unspecified localities, December 1916, January and March 1927 (Austin 1948).

■ **SOUTH KOREA** The species used to be a common winter visitor around Seoul, but rare further south, but it has become increasingly scarce everywhere (Austin 1948), with only a handful of recent records, as follows (by province): ■ **Kangwon Sokcho**, four, February 1968 (Won 1981); ■ **Kyonggi and Seoul Kanghwa island**, seven, November 1970 (Gore and Won 1971), male, January 1997 (Kim J. M. *per* Lee Woo-shin 1988); south of **Kimpo** airport, three, February 1948 (Wolfe 1950); **Yongpyong island** (Yeonpyong island), one captured, January 1974 (Lee Woo-shin *in litt.* 1998); valley north of **Susong**, c.15 km east of Seoul, one collected and others seen, January–February 1948 (Wolfe 1950); near **Seoul**, where “one can sometimes see bands of up to a hundred individuals”, c.1887 (Taczanowski 1888 in Austin

1948), several collected and flocks of 30–40 “quite common”, winters 1887–1889, immature male collected, January 1889 (Campbell 1892), January 1901 (two females in BMNH), three seen 12 km north-west of the city, February 1948 (Fennell 1952); **Hwasong-gun** (Hwaseng-gun), one, April 1977 (Won 1984 in Chan and Goroshko 1998); unspecified localities, January 1889, February 1910, January and May 1928, 1929 (Austin 1948); ■ **North Chungchong** unspecified localities, December 1911, January 1928 (Austin 1948); ■ **South Kyongsang Nakdong estuary**, December 1981 (WBSJ Research Division 1982), one at Kimhae, January 1982 (Won 1984 in Chan and Goroshko 1998); near **Pusan** (Fusan), “a good series” collected, 1880s (Austin 1948); unspecified localities, December 1883, January 1884, January 1922 (Austin 1948).

■ **CHINA** The Great Bustard breeds in Heilongjiang, Jilin, Inner Mongolia and Xinjiang, and it bred once in Hebei in the 1960s, but its breeding range is now much reduced and fragmented (see Population). It occurs on passage and in winter in many other provinces in eastern China, and important wintering sites have been located in Shandong, Henan, Anhui, Jiangsu and Jiangxi provinces. The wintering grounds of the Xinjiang population are unknown (Chan and Goroshko 1998). Around the start of the twentieth century, Sowerby (1914) found that “a particularly fine stretch of country for [wintering birds] lies to the north west of the chain of high mountains that runs from Ning-wu Fu in Shansi [Shanxi] down the western part of that province past Tai-yuan Fu and Fen-chow Fu”; even so, only two specific localities have been traced in Shanxi (see below). Records (by province) are as follows:

■ **Heilongjiang** between **Nejiang** (Mergen) and Qiqihar (Tzitzikar), undated (specimen in BMNH), “many birds” in May, unspecified years (Melzer 1929 in Meise 1934); **Qiqihar** (Tzitsihar, Tzitzikar), in or near to Zhalong reserve, one collected, and “prodigious numbers” seen on the “vast undulating plains, stretching before us as far as the eye could reach, and covered in succulent grass”, undated (Ingram 1909), male collected, April 1927–1929 (Meise 1934), June 1939 (female in YIO); Halahai wetland, **Longjiang county**, a few dozen birds reported to breed on the nearby grasslands and several hundred present on migration, e.g. c.50 birds in spring 1998 (Li Xiaomin 1999); “**Churchura**”, 23 km north-west of Qiqihar, wings and feathers collected, undated (Musilek in Meise 1934); **Wuyur He** area, in or near to Zhalong reserve, 24 counted in the grasslands during an aerial census, May 1984 (Feng Kemin and Li Jinlu 1985); between **Mingshui county** and Zhaodong city, east of the Nen Jiang river, breeding and on migration, late 1980s (Liu Bowen 1996); **Zhalong National Nature Reserve**, Qiqihar city, June 1987 (Goodwin 1987), “a fairly common visitor to the marsh edge and adjacent arable land”, undated (Scott 1989); steppes near **Yantongtun** (Jantuntun), east of the Hinggan Ling (Chingan mountains), “very common”, undated (Musilek in Meise 1934); **Dorbod county**, 1960s (specimen in NEFUCN); **Xingkai Hu** (Lake Changa), the Chinese section of Khanka lake, “a rare breeding bird nowadays” (Piechocki 1956) and not listed in more recent avifaunal lists of Xingkai Hu National Nature Reserve (Li Wenfa *et al.* 1994, Luan Xiaofeng *et al.* 1999); 33–40 km north of “Woroschilow” (untraced), reported by hunters to breed in small numbers, late 1940s (Piechocki 1956); “Mankeov” (untraced), northern Manchuria, one collected, May 1924 (Seys and Licent 1933);

■ **Jilin** (with breeding reported in the western parts of the province, in the districts of Baicheng, Siping and western Changchun: Tong Yongchang 1984) **Melmeg Nature Reserve** (Momoge), Zhenlai county, undated (MacKinnon *et al.* 1996); **Qagan Nur Nature Reserve**, Qian Gorlos county, undated (Liu Donglai *et al.* 1996); **Xianghai National Nature Reserve**, Tongyu county, c.100 birds reported to breed by hunters in the 1970s (Sun Xiangwu 2000), but only 30 birds bred in 1985 (Lu Jianjian 1990), declining to c.2 pairs in early 1990s and no breeding reported since 1997 (Sun Xiangwu 2000), albeit with counts of 14 birds during an aerial census, May 1984 (Feng Kemin and Li Jinlu 1985), c.50, April 1985 (Lu Jianjian 1990), seen on several recent visits, e.g. eight, April 1995 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000), and 30–40, winter 1998/1999 (Sun Xiangwu *per* K. Fukui *in litt.* 1999); **Yaojingzi**

Caoyuan Nature Reserve, Changling, Qian'an, Tongyu and Qian Gorlos counties, undated (Liu Donglai *et al.* 1996); **Darganghze steppes**, 15 birds and a nest with three eggs, May 1999 (A. Dean *in litt.* 1999);

■ **Liaoning** (mainly a passage migrant, with no breeding records) **Namusilai Nature Reserve**, **Zhangwu county**, undated (Liu Donglai *et al.* 1996); **Chaoyang county**, undated (Cheng Tso-hsin 1987); **Liaoyang city**, undated (Cheng Tso-hsin 1987); near **Niuzhuang** (Niutschwang, Newchwang), recorded on migration and in winter, undated (La Touche 1920–1921, Meise 1934); **Shuangtai Hekou National Nature Reserve**, Dawa and Panshan counties, single injured birds sent to the reserve (presumably from nearby areas), November 1992 and November 1997 (Li Yuxiang *in litt.* 1997); **Suizhong county**, November 1935 (two males in YIO); **Lüshun**, undated (Cheng Tso-hsin 1987);

■ **Inner Mongolia Barga** steppe, two males collected, August 1956 (Piechocki 1956); **Dalai Hu National Nature Reserve** (Hulun Hu, Dalai Nuur, Dalai lake), Hulun Buir league, breeding on the upper Hailar river, undated (Mizuno 1940), maximum recent count of eight, August 1997, with an estimate of 15–18 birds present annually in the entire reserve during May–October of recent years (Wuliji and Liu Songtao *in litt.* 1998); **Medamuji**, up to nine, and one at nearby Xia Mi, late 1980s and early 1990s (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000), up to three, May 1996, display observed (B. F. King verbally 1998); **Huihe Nature Reserve**, Hulun Buir league, c.60 at Hang Ula, August 1998, probably breeding (Liu Songtao *in litt.* 1998); between **Buir Nur** (Bouir-nor) and Sambeisse, “rather common”, 1928 (Tugarinow in Piechocki 1956); **Tumuji Nature Reserve**, **Jalaid Qi**, Hinggan league, eight breeding pairs, mid-1990s (Liu Bowen verbally 1996), four females, September 1999 (SC); **Ulgai** (Wulagai), reported to breed in nearby steppes, undated (Lu Jianjian 1990); **Horqin Nature Reserve** (Keerqin, Ke'erqin), Jirem league, c.50, summer from 1987 to 1996 (Arongqi qige *in litt.* 1997), breeding, 20 birds, March–October 1988 (Arongqi qige *in litt.* 1998); **Xilin Gol league** (Sjiling Gol), one collected, June 1924 (Seys and Licent 1933), flocks of several dozen commonly seen on the steppes in the 1970s (Arongqi qige *in litt.* 1997); **Ar Horqin Qi**, Chifeng city, undated (Fei Rongzhong *et al.* 1993); **Bayan Obo Nature Reserve** (Baiyin Aobao), Hexigten Qi, Chifeng city, undated (Liu Donglai *et al.* 1996); **Dalai Nur Nature Reserve**, Chifeng city, breeding, more than 40 birds estimated, summer, unspecified years (Arongqi qige *in litt.* 1997), 32 breeding birds, August 1995 (Arongqi qige *in litt.* 1998); **Hexigten Qi**, Chifeng city, one collected, July 1975 (Fei Rongzhong *et al.* 1993); **Ongniud Qi**, Chifeng city, undated (Fei Rongzhong *et al.* 1993); **Boxodoi** Sum, Zhengxiangbai Qi, Xilin Gol league, several collected, late 1950s (Zhou Haizhong *in litt.* 1997); **Chifeng**, before 1914 (male in BMNH); **Dolonnur county**, flocks of up to 1,000 birds, autumn, unspecified years (Xing Lianlian *in litt.* 1997); south of **Daqing Shan** mountains, flocks of 30–50 birds, winter, unspecified years (Xing Lianlian *in litt.* 1997); **Ulansuhai Nur** (Wuliangsuhai), Urad Qianqi, passage migrant and winter visitor, undated (Xing Lianlian 1996); southern suburbs of **Hohhot**, 30, November–December 1999, reported by local people to winter annually (Bi Junhuai *in litt.* 1999);

■ **Xinjiang** (see Remarks 2) **Jintasi Nature Reserve**, **Fuhai county** (Burultokay), undated (Liu Donglai *et al.* 1996); Tacheng basin, **Tacheng county**, bordering Kazakhstan, 38 flocks seen, the largest of which was of 35 birds, 1992 (Gao Xingyi in Chan and Goroshko 1998); **Kalamaili Nature Reserve**, Qitai, Jimsar, Fukang, Fuyun (Koktokay), Qinghe (Qinggil) and Fuhai (Burultokay) counties, undated (Liu Donglai *et al.* 1996); **Ili He** river valley, Qapqal county, reportedly resident, 550–1,300 m, November–December of an unspecified year (Hou Lanxin *et al.* 1999; also Gao Xingyi verbally 1997);

■ **Qinghai Datong county**, undated (Li Dehao 1989); **Xining city**, one collected, undated, seen migrating south in December of an unspecified year (Li Dehao 1989);

■ **Gansu Jiuquan county**, undated (Fu Jingwen 1994); **Zhangye county**, undated (Fu Jingwen 1994); **Wuwei county**, undated (Fu Jingwen 1994); **Lanzhou city**, large flocks seen in the Yellow River valley above Lanzhou (Hoang-ho valley, above Lan-tsichou), February

1879 (Kreitner 1881 in Stresemann *et al.* 1937–1938), November 1957 (specimen in LAUCN; also Fu Jingwen 1994); **Pingliang county**, undated (Fu Jingwen 1994);

■ **Ningxia** foothills of the **Helan Shan** mountains, undated (Wang Xiangting 1990); **Pingluo county**, undated (Wang Xiangting 1990); **Helan county**, undated (Wang Xiangting 1990); **Yinchuan city**, undated (Wang Xiangting 1990); **Huangyangtan**, Yongning county, one collected, undated (Wang Xiangting 1990); **Qingtongxia city**, undated (Wang Xiangting 1990); **Yunwu Shan Caoyuan Nature Reserve**, Guyuan county, undated (Liu Donglai *et al.* 1996);

■ **Sichuan** Meishan county (not mapped), 1992 (M. Rank *in litt.* 2000);

■ **Guizhou** **Cao Hai**, “a large flock”, winter 1987 (Li Lin 1989);

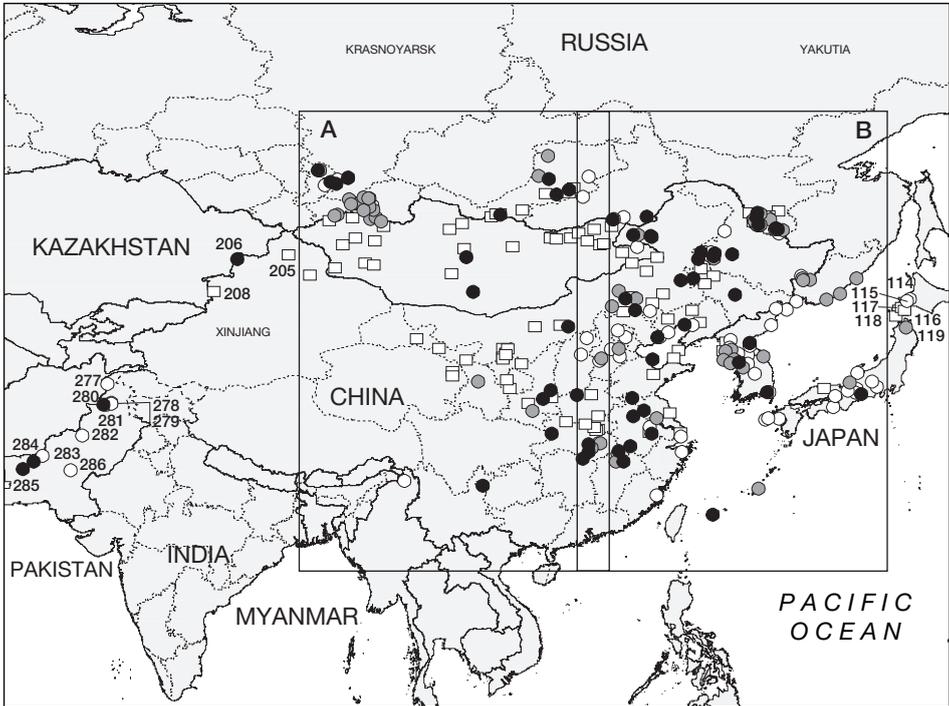
■ **Shaanxi** **Dingbian county**, wintering, unspecified years (Fu Jingwen 1994); Xinxingba, **Heyang county**, 25 seen by the Yellow River, March 1995, probably wintering (Wu Jiayan *et al.* 1998); **Sanmenxia Nature Reserve**, Dali and Tongguan counties, undated (Liu Donglai *et al.* 1996); Guanzhong area, **Weinan county**, c.80 km east of Xi’an, up to 240 in wheatfields near the Wei He river, December 1999–February 2000 (*Oriental Bird Club Bull.* 32 [2000]: 31); **Zhouzhi county**, wintering, unspecified years (Fu Jingwen 1994); plains on the northern and southern slopes of the **Qinling Shan** mountains, recorded in winter, unspecified years, seen, June–August 1965 (Cheng Tso-hsin *et al.* 1973);

■ **Shanxi** **Hun He** river (Hun river sands), flock of c.100, April 1924 (Wilder 1924c), regularly present in winter (Wilder and Hubbard 1924); **Xinzhou** (Hin-chóu basin), central Shanxi, “particularly large numbers” in the uncultivated river flats in 1904 (Blackwelder 1907); Taiyuan (not mapped), December 1920 (male in NRM), and some decades earlier (see the quotation from Sowerby [1914] at the start of this section);

■ **Hebei** **Saihanmiao Shan** (Saihanba), Weichang county, May 1992, July 1993 and June 1995 (Hou Jianhua *et al.* 1997); **Qinhuangdao** (Chinwangtao), “many flocks” of 10–20, occasionally 40–50, seen on migration at Qinhuangdao and Shanhaiguan between 1911 and 1919, in spring from early March to early May, and in autumn from October to about 10 November (and specimens also collected in December and January) (La Touche 1914, 1920–1921, 1925–1934, 17 specimens in AMNH, BMNH and MCZ); **Beidaihe**, late August 1919, April 1941 (G. D. Wilder and H. W. Hubbard in Hemmingsen and Guildal 1968), frequently recorded on migration in March–May and October–December in 1942–1945, usually in flocks of up to 30, but flocks of up to 500 seen on the ground at “grassy sands” in November (Hemmingsen and Guildal 1968), with a total of 132 flying north in March–April 1985 (largest flock 15 birds) (Williams 1986), total of 95, March–April 1986 (P. Alström, U. Olsson and D. Zetterström *in litt.* 2000), 452 birds seen flying south in October–November 1986 (largest flock 26 birds), 203 in October–November 1987, 62 in October–November 1988, 308 in October–November 1989, 154 in October–November 1990 (Williams *et al.* 1992), and a flock of 35, October 1993 (Qiao Zhenzhong *in litt.* 1998); **Baiyang Dian** lake, January 1957 (specimen in ASCN); foothills west of **Baoding** (Pau-ting-fu), “seen rarely”, 1904 (Blackwelder 1907); **Xian Xian county** (Sien Hien), male collected, 1918 (Seys and Licent 1933); near **Shijiazhuang city**, one breeding record, early 1960s (Zheng Guangmei *per* Liu Bowen verbally 1996); **Yincun** (Yinn T’ouen), one collected, February 1920 (Seys and Licent 1933);

■ **Tianjin** Fengzhuang (not mapped), 21 birds (three of which were killed by a hunter), November 1998 (Zhang Shuping *et al.* 1999);

■ **Beijing** northern **Yanqing county** (Yen Ch’ing Hsien), beyond Nankou (Nankow) pass, “quite common” on the sandflats and fields, c. 1924, and apparently “on the increase in Chihli [=Hebei and Beijing]” (Wilder 1924c), regularly present in winter (Wilder and Hubbard 1924), 1–2 birds, and sometimes 6–8, present most years at Guanting reservoir (Zhao Xinru *per* M. Rank *in litt.* 2000); **Tong Xian county** (Tunghsien), large flocks (including groups of 70 and 30), winter 1928/1929, with the comment that “the bustards that winter here have been increasing steadily for many years” (Wilder 1929); Beijing market, purchased in late winter 1921 (two specimens in MCZ);



■ **Shandong Nantuoji Shuidao** (Nantuozi Dao) island, Changshan islands, recorded annually on migration, and also in January (Fan Qiangdong and Xu Jianmin 1996); **Yellow River Delta Nature Reserve** (Huang He Sanjiaozhou), Dongying city, an important wintering area where numbers seem to have increased in the early 1990s, with an estimated 700–800 birds usually in flocks of tens of birds (Zhao Yanmao and Song Chaoshu 1995), more than 100, winter 1992 (Qian Fawen *in litt.* 1997), 324, December 1994 (Lü Juanzhang *in litt.* 1997); **Weifang city**, Laizhou bay, up to 150 birds (possibly part of the Yellow River delta population), undated (Lu Jianjian 1990); **Weishan Hu**, Weishan county, at Hulutou, east bank of Weishan Hu, November 1954 (two specimens in ASCN), 160, winter, unspecified years (Lu Jianjian 1990), with local people reporting that only small numbers (probably a few dozen birds in total) were present in winter 1998/1999 owing to significant human disturbance in the area (Wang Qishan *in litt.* 1999);

■ **Henan Huayuankou**, by the Yellow River, undated (Lu Jianjian 1990); **Mengjin Nature Reserve**, Luoyang city, on migration and sometimes in winter, with c.35 estimated to winter in the reserve (Yao Xiaozong and Ma Shuzhao 1996), up to 52, February–March 1998, but none seen, winter 1998/1999 (Ma Shuzhao *per* Wang Qishan *in litt.* 1999); **Xuya Hu** lake, undated (Lu Jianjian 1990); near **Danjiangkou reservoir**, undated (Lu Jianjian 1990); **Taibaiding Nature Reserve**, Tongbai county, undated (Liu Donglai *et al.* 1996); **Nanwan reservoir**, undated (Lu Jianjian 1990); **Dongzhai Nature Reserve**, Luoshan county, small numbers on passage (Qu Wenyuan and Song Chaoshu 1996a); **Jigong Shan National Nature Reserve**, Xinyang county, undated (Liu Donglai *et al.* 1996);

■ **Hubei Shennongjia Nature Reserve**, Fangxian, Xingshan and Badong counties, five at Guanfeng and Bancang, 1,182 m and 1,500 m, March 1995 (Hu Hongxing *in litt.* 1999), one collected and another seen, March 1998 (Hu Hongxing 1999); **Dong Hu** lake, five, December

The distribution of Great Bustard *Otis tarda* (map opposite): (1) Kuragino; (2) Baraksan; (3) Minusinsk; (4) Abakan steppe; (5) Khadyñ; (6) Shira steppe; (7) Itkul' lake; (8) Yubat steppe; (9) Koibal steppe; (10) Sagay steppe; (11) Turan; (12) Uyuk river; (13) Ust'-Begreda river; (14) Iyi-Tal; (15) Bayan-kol; (16) Elegest river; (17) Shagonar; (18) Cheder lake; (19) Mezhegy river; (20) Chagatay lake; (21) Tannu-Ola mountains; (22) Borshin-Gol; (23) Saglinskaya valley; (24) Tes-Hem river; (25) Agardag massif; (26) Tsagan-Tologoy; (27) Verkhnyaya Angara valley; (28) Davsha; (29) Vitim plateau; (30) Barguzin valley; (31) Yeravninskiy district; (32) Gunda; (33) Domna river; (34) Khorinskiy district; (35) Marekta steppe; (36) Mukhorshibirskiy district; (37) Borgoy steppe; (38) Dzhidinskiy district; (39) Selenginskoye plateau; (40) Ivan lake; (41) Uruleyunguy lowlands; (42) Borzya; (43) Kulusutay; (44) Torey lakes; (45) Romnenskiy district; (46) Blagoveshchenskiy district; (47) Uspenovka; (48) Nekrasovka; (49) Svyatorussovka; (50) Ivanovka; (51) Oktyabr'skiy district; (52) Sadovoye; (53) Gribskoye; (54) Belyy Yar; (55) Lermontovka; (56) Tambovskiy district; (57) Razdol'noye; (58) Bol'shoy Alim river; (59) Dronovo; (60) Gil'chin river; (61) Slava; (62) Konstantinovskiy district; (63) unallocated; (64) Mikhailovskiy district; (65) Nizhnepoltavka; (66) Beloberezovoe lake; (67) Vinnikovo; (68) Bureya river; (69) Dolgoye lake; (70) unallocated; (71) Bely Svet lake; (72) Krasnyy Luch; (73) Boguchan mountain; (74) Zeiskaya lowlands; (75) Khanka lake western shore; (76) Platono-Aleksandrovskoye; (77) Terney bay; (78) Khanka lake eastern shore; (79) Troitskoye; (80) Ol'ga bay; (81) Lazovskiy State Reserve; (82) Sedimi river mouth; (83) Tumen river; (84) Tesin river; (85) Uureg Nuur; (86) Mongol Els; (87) Khovd river; (88) Dariv; (89) Bulgan; (90) Tes; (91) Bor Har Els; (92) Shargin Gov-; (93) Selenge river; (94) Ögiy Nuur; (95) Teshig; (96) Khujirt; (97) Buruun bayan-Ulaan; (98) Zheltura; (99) Ulaanbaatar; (100) Gurbun-saykhan; (101) Barkha river; (102) Norovlin river; (103) Khentii Kurkhiin river; (104) Khurkhyn Gol; (105) Mongol Daguur Strictly Protected Area; (106) Uldz river; (107) Onon river; (108) Tsagaan Ovoo; (109) Khalkhhol; (110) Kerulen river; (111) Menengiyn Tal; (112) Numrug Strictly Protected Area; (113) Eastern Mongolia Strictly Protected Area; (114) Ishikari-gawa; (115) Zenibako; (116) Iburi; (117) Murooran; (118) Hiyama; (119) Aomori; (120) Ishikawa; (121) Nyu-gun; (122) Hanawa; (123) Nagano; (124) Gifu; (125) Anjo-shi; (126) Kuwana-shi; (127) Shiga; (128) Takasago; (129) Tottori; (130) Maiko-jima; (131) Isahaya; (132) Goto islands; (133) Minamimatsuura-gun; (134) Okinawa island; (135) Ishigaki-jima; (136) Hoeryong; (137) Kil-ju; (138) Ryonghung estuary; (139) Chongchon-gang estuary; (140) Kaechon; (141) Onchon; (142) Pyongyang; (143) Chunghwa; (144) Yonghung; (145) Wonsan; (146) Pyonggang; (147) Jedo; (148) Suiya-ri; (149) Taejon; (150) Ongjin; (151) Yonan; (152) Hwanghae; (153) Sokcho; (154) Kanghwa island; (155) Kimpo; (156) Yongpyong island; (157) Susong; (158) Seoul; (159) Hwasong-gun; (160) North Chungchong; (161) Nakdong estuary; (162) Pusan; (163) Nenjiang; (164) Qiqihar; (165) Longjiang county; (166) Churchura; (167) Wuyur He; (168) Mingshui county; (169) Zhalong National Nature Reserve; (170) Yantongtun; (171) Dorbod county; (172) Xingkai Hu; (173) Melmeg Nature Reserve; (174) Qagan Nur Nature Reserve; (175) Xianghai National Nature Reserve; (176) Yaojingzi Caoyuan Nature Reserve; (177) Darganghze steppes; (178) Zhangwu county; (179) Chaoyang county; (180) Liaoyang city; (181) Niuzhuang; (182) Shuangtai Hekou National Nature Reserve; (183) Suizhong county; (184) Lüshun; (185) Barga; (186) Dalai Hu National Nature Reserve; (187) Medamuji; (188) Huihe Nature Reserve; (189) Buir Nur; (190) Jalaid Qi; (191) Ulgai; (192) Horqin Nature Reserve; (193) Xilin Gol league; (194) Ar Horqin Qi; (195) Bayan Obo Nature Reserve; (196) Dalai Nur Nature Reserve; (197) Hexigten Qi; (198) Ongniud Qi; (199) Boxodoi; (200) Chifeng; (201) Dolonnur county; (202) Daqing Shan; (203) Ulansuhai Nur; (204) Hohhot; (205) Fuhai county; (206) Tacheng county; (207) Kalamaili Nature Reserve; (208) Ili He; (209) Datong county; (210) Xining city; (211) Jiuquan county; (212) Zhangye county; (213) Wuwei county; (214) Lanzhou city; (215) Pingliang county; (216) Helan Shan; (217) Pingluo county; (218) Helan county; (219) Yinchuan city; (220) Huangyangtan; (221) Qingtongxia city; (222) Yunwu Shan Caoyuan Nature Reserve; (223) Cao Hai; (224) Dingbian county; (225) Heyang county; (226) Sanmenxia Nature Reserve; (227) Weinan county; (228) Zhouzhi county; (229) Qinling Shan; (230) Hun He; (231) Xinzhou; (232) Saihanmiao Shan; (233) Qinhuangdao; (234) Beidaihe; (235) Baiyang Dian; (236) Baoding; (237) Xian Xian county; (238) Shijiazhuang city; (239) Yincun; (240) Yanqing county; (241) Tong Xian county; (242) Nantuoji Shuidao; (243) Yellow River Delta Nature Reserve; (244) Weifang city; (245) Weishan Hu; (246) Huayuankou; (247) Mengjin Nature Reserve; (248) Xuya Hu; (249) Danjiangkou reservoir; (250) Taibaiding Nature Reserve; (251) Nanwan reservoir; (252) Dongzhai Nature Reserve; (253) Jigong Shan National Nature Reserve; (254) Shennongjia Nature Reserve; (255) Dong Hu; (256) Hankou; (257) Chen Hu; (258) Shahu; (259) Longgan Hu; (260) Hong Hu; (261) Huai He; (262) Danyang Hu; (263) Shijiu Hu; (264) Shengjin Hu; (265) Sihong county; (266) Yancheng Nature Reserve; (267) Gaoyou Hu; (268) Pukou; (269) Chongming Dao; (270) Shanghai; (271) Ningbo; (272) Fuzhou; (273) Jiujiang; (274) Yongxiu county; (275) Poyang Hu; (276) Dong Dongting Hu Nature Reserve; (277) Chitral; (278) Mardan; (279) Risalpur; (280) Peshawar; (281) Jamrud; (282) Zhob; (283) Nushki; (284) Padag; (285) Kharan district; (286) Jacobabad; (287) Fort Hertz.

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



1936, “uncommon” winter visitor (December–February) in the 1950s (Hu Hongxing *in litt.* 1999); **Hankou** (Hankow) plains, Wuhan city, two females collected, 1880, with flocks of as many as 600 in winter (Slater 1882), 1881 (female in AMNH); **Chen Hu** lake, seven seen, spring 1989 and 1990 (Hu Hongxing *et al.* 1996), none seen, January–March 1999 (Hu Hongxing *in litt.* 1999); **Shahu** lake, “uncommon” winter visitor (December–February) in the 1950s (Hu Hongxing *in litt.* 1999); **Longgan Hu** lake, eight seen, late 1980s/early 1990s (Zhou Haizhong *in litt.* 1997), three seen, early 1990s (Hu Hongxing *et al.* 1996), none seen in December 1998–March 1999 (Hu Hongxing *in litt.* 1999); **Hong Hu** lake, “uncommon” winter visitor, early 1980s (Hu Hongxing *in litt.* 1999);

■ **Anhui Huai He** river, undated (Wang Qishan *in litt.* 1997); **Danyang Hu** lake, near Shijiu Hu, before 1980 (Wang Qishan *et al.* 1980); **Shijiu Hu** lake, wintering flocks of 10–20, sometimes even of 50–60 birds, before 1980 (Wang Qishan *et al.* 1980), 80, 1983 (Wang Qishan *in litt.* 1997); **Shengjin Hu** lake, population of “several dozen” estimated, 1989 (Wang Qishan *in litt.* 1997), c.100 wintering on nearby plains (Lu Jianjian 1990);

■ **Jiangsu Sihong county**, northern and western shores of Hongze Hu lake, 200–300 wintering in the 1980s, but numbers probably much lower now because of increased disturbance, with six killed and sold, 1997/1998 (Wang Qishan *in litt.* 1999); **Yancheng Nature Reserve**, “occasional visitor” (Wang Hui 1991); **Gaoyou Hu** lake, common at Wanggang and Daguantan prior to the 1980s, when flocks of 20–50 (and sometimes 200 or more) could be seen in this area, but none was found in January 1999 after the habitat at Wanggang had been destroyed by the construction of highway and bridges (and chemical factories in the area also threaten the ecosystems of Gaoyou Hu and Shaobo Hu) (Yan Anhou 1982, Wang Qishan *in litt.* 1999); north of **Pukou** (Pookow), three seen, February 1922 (Kolthoff 1932);

■ **Shanghai** east coast of **Chongming Dao** island, “rare” winter visitor (Huang Zhengyi *et al.* 1991); near **Shanghai**, including c.50 km to the north, March 1869, March 1875, January 1893 (Swinhoe 1871, three specimens in BMNH);

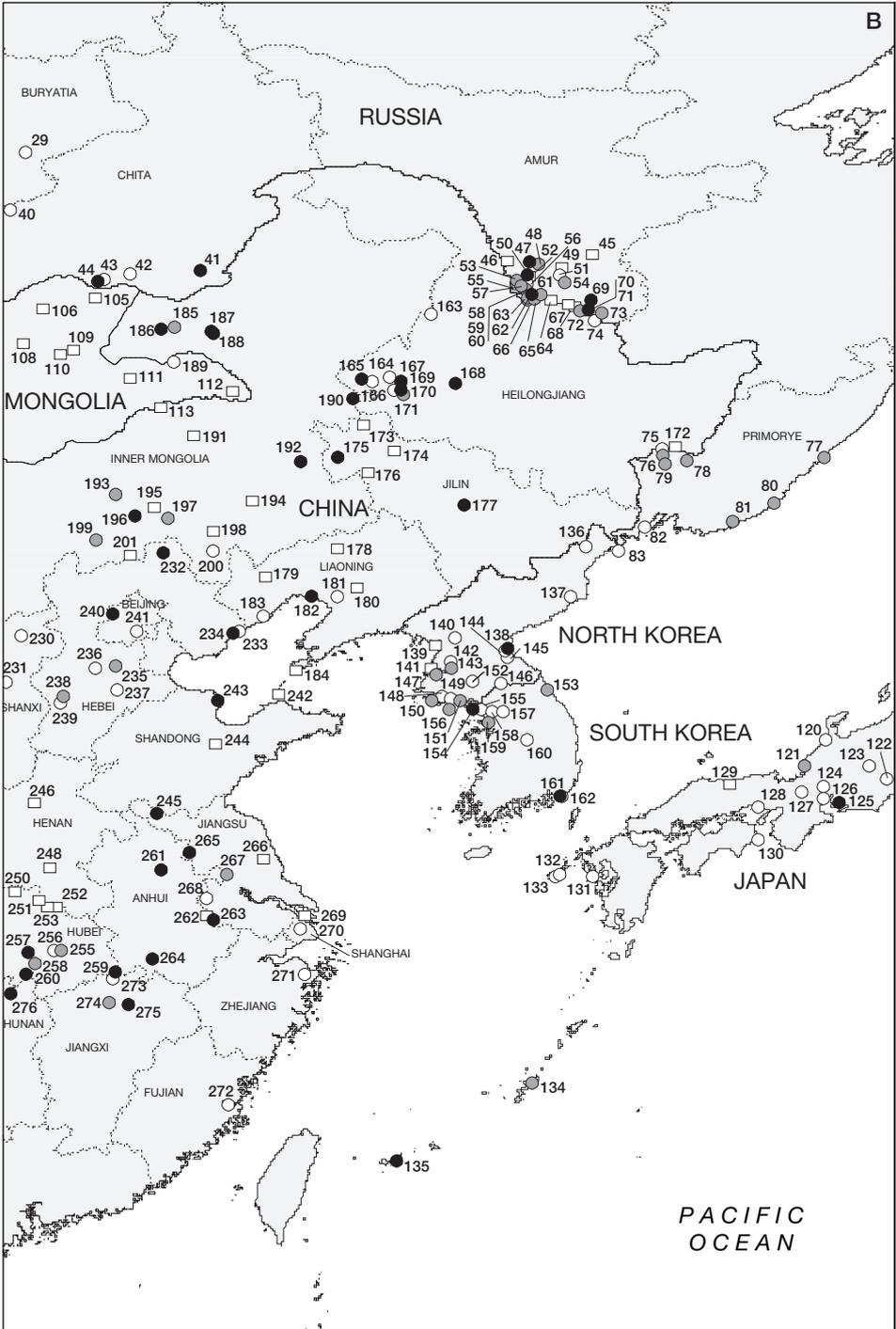
■ **Zhejiang Ningbo** (Ningpo), November 1872 (female in BMNH);

■ **Fujian Fuzhou** (Foochow), November 1889, December 1892, c.1894 (Rickett 1894, La Touche 1925–1934, two specimens in MCZ and BMNH);

■ **Jiangxi Jiujiang** (Kiujiang), December 1888 (female in BMNH); Nan Hu lake, **Yongxiu county**, “uncommon” winter visitor (December–February) in the 1950s (Hu Hongxing *in*

The distribution of Great Bustard *Otis tarda* (map A opposite): (1) Kuragino; (2) Baraksan; (3) Minusinsk; (4) Abakan steppe; (5) Khady; (6) Shira steppe; (7) Itkul' lake; (8) Yubat steppe; (9) Koibal steppe; (10) Sagay steppe; (11) Turan; (12) Uyuk river; (13) Ust'-Begdreda river; (14) Iyi-Tal; (15) Bayan-kol; (16) Elegest river; (17) Shagunar; (18) Cheder lake; (19) Mezhegey river; (20) Chagatay lake; (21) Tannu-Ola mountains; (22) Borshin-Gol; (23) Saglinskaya valley; (24) Tes-Hem river; (25) Agardag massif; (26) Tsagan-Tologoy; (27) Verkhnyaya Angara valley; (28) Davsha; (29) Vitim plateau; (30) Barguzin valley; (31) Yervavnskiy district; (32) Gunda; (33) Domna river; (34) Khorinskiy district; (35) Marekta steppe; (36) Mukhorshibirskiy district; (37) Borgoy steppe; (38) Dzhydinskiy district; (39) Selenginskoye plateau; (40) Ivan lake; (84) Tesin river; (85) Uureg Nuur; (86) Mongol Els; (87) Khovd river; (88) Dariv; (89) Bulgan; (90) Tes; (91) Bor Har Els; (92) Shargin Gov.; (93) Selenge river; (94) Ogiiy Nuur; (95) Teshig; (96) Khujirt; (97) Buruun bayan-Ulaan; (98) Zheltara; (99) Ulaanbaatar; (100) Gurbun-saykhan; (101) Barkha river; (102) Norovlin river; (103) Khentii Kurkhiin river; (104) Khurkhyin Gol; (106) Uldz river; (107) Onon river; (108) Tsagaan Ovoo; (110) Kerulen river; (202) Daqing Shan; (203) Ulanhuai Nur; (204) Hohhot; (207) Kalamaili Nature Reserve; (209) Datong county; (210) Xining city; (211) Jiuquan county; (212) Zhangye county; (213) Wuwei county; (214) Lanzhou city; (215) Pingliang county; (216) Helan Shan; (217) Pingluo county; (218) Helan county; (219) Yinchuan city; (220) Huangyangtan; (221) Qingtongxia city; (222) Yunwu Shan Caoyuan Nature Reserve; (223) Cao Hai; (224) Dingbian county; (225) Heyang county; (226) Sanmenxia Nature Reserve; (227) Weinan county; (228) Zhouzhi county; (229) Qinling Shan; (230) Hun He; (231) Xinzhou; (238) Shijiazhuang city; (239) Yincun; (246) Huayuankou; (247) Mengjin Nature Reserve; (248) Xuya Hu; (249) Danjiangkou reservoir; (250) Taibaiding Nature Reserve; (251) Nanwan reservoir; (252) Dongzhai Nature Reserve; (253) Jigong Shan National Nature Reserve; (254) Shennongjia Nature Reserve; (255) Dong Hu; (256) Hankou; (257) Chen Hu; (258) Shahu; (260) Hong Hu; (276) Dong Dongting Hu Nature Reserve; (287) Fort Hertz.

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



litt. 1999); **Poyang Hu** lake, an important wintering area, but numbers declining rapidly in recent years, with 64 at Kangshan, Yugan county, in the south-east part of the lake, spring 1982, c.100–300 wintering at Linggong Zhou island, near Wucheng, Yongxiu county (now in Poyang Hu Nature Reserve), in the early 1980s, a total of c.340–400 wintering in the mid-1980s (Ding Tieming 1988), up to 115 on Linggong Zhou in December 1985 to January 1986 (Kennerley 1987), 230 in 1988, the highest count in recent years (information from Poyang Hu Nature Reserve Management Office Education Centre), 13, November 1993 (I. Lewis *in litt.* 1999), up to 18, December 1997 (Yu Yat-tung *in litt.* 1998), maximum of 13 at Bang Hu, winter 1998/1999 (Wang Qishan *in litt.* 1999);

■ **Hunan Dong Dongting Hu Nature Reserve**, Yueyang county, seven seen at Jianban Waitan, 1991 (Lei Gang *in litt.* 1997), reported from Dongting Hu, 1994 (Liu Qide *per* Wang Qishan *in litt.* 1997), but none found during surveys, February 1999 (Hu Hongxing *in litt.* 1999).

■ **PAKISTAN** This species is a rare non-breeding visitor, with records as follows: ■ **North West Frontier Province Chitral**, immature female, March 1911 (Kinnear 1911); Hastnagur, near **Mardan**, a small party from which a young female was shot, December 1870 or 1873 (Hume and Marshall 1879–1881, Briggs and Osmaston 1928) and some miles south-east of Mardan, female, January 1932 (Cunningham 1933); between **Risalpur** and Mardan, seven,

The distribution of Great Bustard *Otis tarda* (map B opposite): (29) Vitim plateau; (40) Ivan lake; (41) Urulyunguy lowlands; (42) Borzya; (43) Kulusutay; (44) Torey lakes; (45) Romnenskiy district; (46) Blagoveshchenskiy district; (47) Uspenovka; (48) Nekrasovka; (49) Svyatorussovka; (50) Ivanovka; (51) Oktyabr'skiy district; (52) Sadovoye; (53) Gribskoye; (54) Bely Yar; (55) Lermontovka; (56) Tambovskiy district; (57) Razdol'noye; (58) Bol'shoy Alim river; (59) Dronovo; (60) Gil'chin river; (61) Slava; (62) Konstantinovskiy district; (63) unallocated; (64) Mikhailovskiy district; (65) Nizhnepoltavka; (66) Beloberezovoe lake; (67) Vinnikovo; (68) Bureya river; (69) Dolgoye lake; (70) unallocated; (71) Bely Svet lake; (72) Krasnyy Luch; (73) Boguchan mountain; (74) Zeiskaya lowlands; (75) Khanka lake western shore; (76) Platono-Aleksandrovskoye; (77) Terney bay; (78) Khanka lake eastern shore; (79) Troitskoye; (80) Ol'ga bay; (81) Lazovskiy State Reserve; (82) Sedimi river mouth; (83) Tumen river; (105) Mongol Daguur Strictly Protected Area; (106) Uldz river; (108) Tsagaan Ovoo; (109) Khalkhol; (110) Kerulen river; (111) Menengiyn Tal; (112) Numrug Strictly Protected Area; (113) Eastern Mongolia Strictly Protected Area; (120) Ishikawa; (121) Nyu-gun; (122) Hanawa; (123) Nagano; (124) Gifu; (125) Anjo-shi; (126) Kuwana-shi; (127) Shiga; (128) Takasago; (129) Tottori; (130) Maiko-jima; (131) Isahaya; (132) Goto islands; (133) Minamimatsuura-gun; (134) Okinawa island; (135) Ishigaki-jima; (136) Hoeryong; (137) Kil-ju; (138) Ryonghung estuary; (139) Chongchon-gang estuary; (140) Kaechon; (141) Onchon; (142) Pyongyang; (143) Chungghwa; (144) Yonghung; (145) Wonsan; (146) Pyonggang; (147) Jedo; (148) Suiya-ri; (149) Taejon; (150) Ongjin; (151) Yonan; (152) Hwanghae; (153) Sokcho; (154) Kanghwa island; (155) Kimpo; (156) Yongpyong island; (157) Susong; (158) Seoul; (159) Hwasong-gun; (160) North Chungchong; (161) Nakdong estuary; (162) Pusan; (163) Nenjiang; (164) Qiqihar; (165) Longjiang county; (166) Churchura; (167) Wuyur He; (168) Mingshui county; (169) Zhalong National Nature Reserve; (170) Yantongtun; (171) Dorbod county; (172) Xingkai Hu; (173) Melmegg Nature Reserve; (174) Qagan Nur Nature Reserve; (175) Xianghai National Nature Reserve; (176) Yaojingzi Caoyuan Nature Reserve; (177) Darganghze steppes; (178) Zhangwu county; (179) Chaoyang county; (180) Liaoyang city; (181) Niuzhuang; (182) Shuangtai Hekou National Nature Reserve; (183) Suizhong county; (184) Lushun; (185) Barga; (186) Dalai Hu National Nature Reserve; (187) Medamuji; (188) Huihe Nature Reserve; (189) Buir Nur; (190) Jalaid Qi; (191) Ulgai; (192) Horqin Nature Reserve; (193) Xilin Gol league; (194) Ar Horqin Qi; (195) Bayan Obo Nature Reserve; (196) Dalai Nur Nature Reserve; (197) Hexigten Qi; (198) Ongniud Qi; (199) Boxodoi; (200) Chifeng; (201) Dolonnur county; (230) Hun He; (231) Xinzhou; (232) Saihanmiao Shan; (233) Qinhuangdao; (234) Beidaihe; (235) Baiyang Dian; (236) Baoding; (237) Xian Xian county; (238) Shijiazhuang city; (239) Yincun; (240) Yanqing county; (241) Tong Xian county; (242) Nantuoji Shuidao; (243) Yellow River Delta Nature Reserve; (244) Weifang city; (245) Weishan Hu; (246) Huayuankou; (248) Xuya Hu; (250) Taibaiding Nature Reserve; (251) Nanwan reservoir; (252) Dongzhai Nature Reserve; (253) Jigong Shan National Nature Reserve; (255) Dong Hu; (256) Hankou; (257) Chen Hu; (258) Shahu; (259) Longgan Hu; (260) Hong Hu; (261) Huai He; (262) Danyang Hu; (263) Shijiu Hu; (264) Shengjin Hu; (265) Sihong county; (266) Yancheng Nature Reserve; (267) Gaoyou Hu; (268) Pukou; (269) Chongming Dao; (270) Shanghai; (271) Ningbo; (272) Fuzhou; (273) Jiujiang; (274) Yongxiu county; (275) Poyang Hu; (276) Dong Dongting Hu Nature Reserve.

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

of which two females were killed, January 1911 (Fooks 1911), although Baker (1922–1930) reported that (presumably the same) two females were shot from 25 birds seen; near **Peshawar**, one, November 1917 (Roos-Keppel 1918), female, December 1932 (Cunningham 1933); **Jamrud** plain, west of Peshawar, one collected, late 1970s (Roberts 1991–1992); ■ **Baluchistan Zhob**, one collected, April 1940 (Christison 1942; also Roberts 1991–1992); near **Nushki**, male and female captured, 1937 (Christison 1941; also Roberts 1991–1992); near **Padag** (Padak), two seen, October 1984 (Roberts 1991–1992); Bisemah, southern **Kharan district**, one seen, 1985 (Roberts 1991–1992); ■ **Sind** near **Jacobabad**, one female shot out of a party of four, December 1910 to January 1911 (Simonds 1911, Ticehurst 1922–1924).

■ **MYANMAR** There is a single record: **Fort Hertz**, Myitkyina, 370 m, two, one of which (a young female) was collected, December 1933 (Stanford and Ticehurst 1935b, 1938–1939, female in BMNH).

POPULATION In Europe, North Africa, the Middle East and Central Asia, the Great Bustard's breeding population includes 1,000 birds in Portugal, 17,000–19,000 birds in Spain, 1,100–1,300 birds in Hungary, 800–3,000 birds in Turkey and 8,000 birds in Russia (Tucker and Heath 1994, Alonso and Alonso 1996, Kollar 1996, A. Antonchikov *in litt.* 1999). The global population may number 31,000–37,000 individuals, of which 4,200–4,500 occur in east Asia (Kollar 1996). There have been rapid declines in populations throughout eastern and central Europe and in parts of Asia, particularly Kazakhstan and Mongolia (Collar 1985, Kollar 1996, Chan and Goroshko 1998). Most populations are resident or partially migratory, but 8,000–10,000 birds occur on passage or in winter in Ukraine (Y. Andryushenko *in litt.* 1999).

The Asian region supported a large population of Great Bustards until the early twentieth century, and eastern Russia alone is estimated to have held more than 50,000 individuals prior to the 1940s (Chan and Goroshko 1998). However, numbers have declined during the twentieth century, with a particularly rapid fall in the 1950s and 1960s (according to data from the wintering grounds) (Chan and Goroshko 1998). The wintering population of *O. t. dybowskii* was recently estimated at only 1,200–1,500 birds in China, with small numbers wintering in Russia and Mongolia; however, its breeding population was estimated at 800 birds in eastern Russia, 700–2,000 in Mongolia and 250–300 in China (Chan and Goroshko 1998; see below), indicating that it may total 1,750–3,100 individuals. The population of *O. t. tarda* in the Asian region was recently estimated at 2,000–3,000 in Xinjiang, China, although this may be an overestimate (Chan and Goroshko 1998; see below). Its numbers on the wintering grounds in China have declined during the 1990s, and it is feared that this will continue unless urgent conservation measures are taken (see Threats and Measures Proposed).

Eastern Russia The subspecies *O. t. dybowskii* was locally common in the steppes of eastern Russia, but it has suffered a huge decline there in recent decades. It bred on the steppes of Krasnoyarsk and Khakassia until the beginning of the twentieth century, but was only rarely encountered to the east of the Yenisey river (Rogacheva 1992). The main breeding locations were on the Abakan steppe, where it was “very common”, but it was also encountered further north, as far as the northern part of the Sagay steppe, where it was “not uncommon”, although its numbers in this region were “subject to great annual swings” (Dement’ev and Gladkov 1951–1954, Rogacheva 1992). However, it is now virtually extinct there, with only a handful of recent records from the Abakan and Shira steppes, and reports by local villagers from the Koibal steppe and Yubat steppe (Rogacheva 1992; see Distribution). In Tuva, up to start of the twentieth century it was common in *Artemisia* grassland and *Caragana* steppes in the Tuva, Khemcha and Ubsunur basins (Kelberg and Smirnov 1988), or even “abundant” (Dement’ev and Gladkov 1951–1954). It was regularly encountered south of the Tes-Hem

river until the early 1960s (Berman and Zlotin 1972), but it has since declined rapidly, from an estimated 600 birds in the Khakassia-Tuva regions in 1971 to only 50 birds in 1980 (Isakov and Flint 1987). The species generally only survived in areas rarely visited by people, such as the steppes in the western and southern foothills of the Agardag massif (Rogacheva 1992). It now survives only in the remote steppes on the western and southern foothills of the Agardag massif (Rogacheva 1992), where there are fewer than 50 birds (A. A. Baranov in Chan and Goroshko 1998).

The Great Bustard used to be common in the steppes and forest-steppes of south-east Buryatia, and it survived in almost all of these areas as recently as the 1960s, as far north as the Vitim plateau (see Stegmann 1929), but since then its numbers have rapidly declined (O. A. Goroshko verbally 1997). There are now only two known breeding grounds, in the Barguzin depression and on the Selenginskoye plateau (see Distribution). It is uncertain whether a population survives on the Vitim plateau (Izmailov 1967). The population in Buryatia was estimated at 500–600 individuals in 1971 (Isakov 1974), 300 in 1978 (Isakov 1982) and 180 in 1983 (Moskvitin and Atutov 1985, Ponomareva 1986), but it is thought that the current population is unlikely to exceed 90 birds (E. N. Elaev verbally 1997).

It used to be a very common bird over a large continuous area of southern Chita, from the border with Mongolia to Arakhley, north of Chita city (O. A. Goroshko verbally 1997). However, it is estimated that in the past 50 years its population in the region has declined to only 1% of its former size, with a particularly rapid decrease in the 1950s and 1960s, and now only two major breeding grounds remain, the Torey basin and the Urulyunguy lowlands (Chan and Goroshko 1998; also O. A. Goroshko verbally 1997; see Distribution). Its numbers in the Daurisky Nature Reserve in the Torey basin fluctuate annually. The population increased between 1982 and 1985, following a period of relatively wet weather which improved the quality of the breeding habitat (Osipova and Golovushkin 1986), and its numbers increased rapidly (by about five times) from 1985 to 1996, probably because of reduced agricultural activity and human disturbance (O. A. Goroshko verbally 1997). However, since 1996 the area has become drier again and both agriculture and hunting pressure have increased (O. A. Goroshko verbally 1997), which presumably could cause its numbers to decline. The current population in Chita is estimated at c.300–600 birds in the breeding season, with single birds regularly present in winter (O. A. Goroshko verbally 1997).

In Amur province, the Great Bustard population was estimated at 300 birds in 1971, but by the early 1980s this had declined to only about 50 (Isakov and Flint 1987), or even 20, because of the intensive reclamation of virgin steppe (Pan'kin 1985). On the plain between the lower Zeya and Bureya rivers, small numbers bred from the 1940s to the 1960s (Isakov and Flint 1987), but they subsequently declined, and the main breeding locality was in the south of the plain between the middle and lower reaches of the Gil'chin and Dim rivers (an area which is now partially inside the Amur Wildlife Refuge) (Pan'kin 1985). According to the regional authorities' hunting report, up to 50 birds were recorded in autumns of the late 1970s and early 1980s, in the southern part of the Zeya-Bureya plain; although this figure may be inaccurate owing to double-counting during the dispersal period (V. A. Dugintsov *in litt.* 1997), the decline to no more than three "pairs" by the mid-1980s, which did not breed annually (Pan'kin 1985), was a real one, and the species has now apparently disappeared from the area (V. A. Dugintsov *in litt.* 1997; but see Remarks 3). In Primorye, the Great Bustard used to breed on the plains around Khanka lake and in the extreme south of the province (Przheval'skiy 1877–1878, Shul'pin 1936). However, it is now a rare non-breeding visitor to the Khanka plains in summer, and to the coastal areas of the Sea of Japan in other seasons, and apparently has not been recorded since the late 1970s (Rakhilin 1965, Litvinenko and Shibaev 1971, Nazarov and Kurinny 1981; see Distribution).

Mongolia In the 1930s, the Great Bustard was regarded as a common breeding bird in the steppe and semi-deserts of northern Mongolia (Kozlova 1932–1933). However, by the

1960s the population had started to decline and the species is now considered “rare” (Chan and Goroshko 1998). Piechocki *et al.* (1981) noted a “shocking decline” in its numbers overall, Mey (1988) considered that a dramatic decline had taken place in the previous 50 years, and Mauersberger (1980) noted a decline there during the 1970s. Grummt (1961) cited an estimated breeding density in eastern Mongolia of one “pair” per 50 km², which accorded with the observations of Piechocki (1968). There are no numerical data available for the country, but recent tentative estimates of its breeding population have included 700–800 birds (D. Batdelger in Chan and Goroshko 1998) and no more than 2,000 (N. Tsevenmyadag in Chan and Goroshko 1998). Small numbers have been recorded in Mongolia in winter (Bold 1997).

Korea In the late nineteenth century, the Great Bustard was “common all winter from Seoul to the Manchurian border; around the capital one can sometimes see bands of up to a hundred individuals” (Taczanowski 1888 in Austin 1948), but it had already become a rare winter visitor by the middle of the twentieth century (Austin 1948). It used to be more plentiful in severe winters, and the timing of its arrival depended on the severity of the weather (Campbell 1892 in Austin 1948). It is now a very rare winter visitor to both North and South Korea, and only occurs in small numbers (Gore and Won 1971, Won 1993b, Tomek 1999; see Distribution).

China Early literature indicates this was once a common bird in the country. David (1867) noted that Great Bustards spent the winter in “very large flocks” on the plains of northern China. Sir Evan James observed “prodigious numbers of this fine bustard” on the steppes near Qiqihar (Tsitsihar) in Heilongjiang in the 1880s (Ingram 1909). Slater (1882) recorded flocks of as many as 600 near Wuhan (Hankow plains) in Hubei; he collected Great Bustards from September to November 1880 and found the birds were not difficult to approach. Styan (1891) reported it “common” all along the Yangtze River. Blackwelder (1907) found it still “very common” in the less densely populated portions of China, wherever there was sufficient open ground or plains, and he found particularly large numbers at Xinzhou in Shanxi. Sowerby (1914) encountered “large flocks, often numbering twenty or thirty head”, in the plains and broad valleys of Shanxi and Shaanxi, noting that “in a day’s ride one may see ten or a dozen flocks without straying far from the road”. Wilder (1924c, 1929) found it quite a common winter visitor near Beijing (flocks of 30 and 70 were found in Tong Xian county) and reported that its numbers seemed to be increasing; however, he also noted it as a “very common” bird in Beijing market (Wilder and Hubbard 1924). Loukashkin (1939) found it very common in Hailar region of Inner Mongolia, while Qiao Zhenzhong (*in litt.* 1998) interviewed old men living in Qinhuangdao in Hebei who said Great Bustards were common in the 1940s and 1950s. In the early 1940s, flocks of up to 500 were seen on migration at Beidaihe in Hebei (Hemmingsen and Guildal 1968; see Distribution).

Prior to the 1960s, the species was a widely distributed breeding bird in north-east China, with the main concentrations on the steppes of the Song-nen plain in Heilongjiang westward to the steppes of Hulun Buir, Horqin and Xilin Gol in Inner Mongolia, and eastward to the Wanda Shan mountains and Xingkai Hu (Khanka lake) (Chan and Goroshko 1998). In Xinjiang in western China, the species formerly bred in Kashi, the Tien Shan mountains and parts of the Turpan basin (Cheng Tso-hsin 1987). However, there has been a substantial decline in the range and numbers of the species during the twentieth century, and by the 1980s only three isolated breeding populations remained in north-east China: in the southern Hulun Buir steppes in Inner Mongolia, near to the border with Mongolia; on the Horqin steppes in Inner Mongolia and adjacent parts of Jilin; and in Heilongjiang province (Liu Bowen 1996; see Table 2). In Xinjiang, the species is now restricted to the northern and probably also eastern Junggar basin, northern Tacheng basin and Qapqal in the Ili valley (Gao Xingyi verbally 1997). The total breeding population in north-east China was recently tentatively estimated at 250–300 birds (Chan and Goroshko 1998). The population in Xinjiang was reported to be 2,000–3,000 birds by Gao Xingyi *et al.* (1994), although it is unclear how and when this estimate was made, and whether it referred to breeding or non-breeding birds.

Table 1. Numbers of breeding and wintering Great Bustards at Xianghai National Nature Reserve, Jilin, in the 1990s, according to data in Sun Xiangwu (2000).

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Number of nests	24	6	2	2	1	2	1	0	0
Number of wintering birds	270	160	188	231	132	173	120	80	50

The numbers recorded on passage and in winter reflect the declines that have been noted on the breeding grounds. The population estimates given by Lu Jianjian (1990) for wetlands throughout China suggest that there may have been several thousand Great Bustards wintering in the country at that time, although these figures may already have been out of date when they were published, and the numbers of wintering birds are known to have declined at several sites during the 1990s (SC; see Chan and Goroshko 1998). At Beidaihe in Hebei, significantly lower numbers were recorded on migration in the late 1980s than were seen in the early 1940s (Hemmingsen and Guildal 1968, Williams 1986, Williams and Dorner 1991, Williams *et al.* 1992; see Distribution). At Poyang Hu lake in Jiangxi, hundreds of bustards were present in winter until the 1980s (Kennerley 1987, Lu Jianjian 1990), but by the late 1990s fewer than 20 could be found (Yu Yat-tung *in litt.* 1998, Wang Qishan *in litt.* 1999; see Distribution). The number of wintering birds at Xianghai National Nature Reserve in Jilin also declined during the 1990s (Sun Xiangwu 2000; see Table 1). The total wintering population of *O. t. dybowskii* in China (which includes virtually the entire global population of this subspecies) was recently estimated at only 1,200–1,500 birds, including c.500 in the Yellow River delta area of Shandong, c.300 at Poyang Hu and nearby lakes in the Yangtze basin, c.300 in the border areas of Shandong, Jiangsu and Anhui, and a few hundred elsewhere (including those that remain on the breeding grounds in winter) (Chan and Goroshko 1998). It is likely that its numbers will continue to decline in China unless urgent conservation measures are taken (see Threats and Measures Proposed).

Pakistan Local people in Chitral had a name for this species and claimed that it occurred regularly but was “very rare” (Kinnear 1911). In the 1910–1911 winter “a good many” arrived in the North West Frontier Province of Pakistan (Roos-Keppel 1918), but generally the species is a rare vagrant (Roberts 1991–1992).

ECOLOGY In Europe, North Africa, the Middle East and Central Asia, the Great Bustard occurs in steppe, secondary and pasture grassland and open non-intensive agricultural land; areas with little or no disturbance are required if breeding is to be successful (Kollar 1996, Y. Andryushenko *in litt.* 1999). Its ecological requirements in the Asian parts of its range are discussed in detail below.

Habitat The habitats of *O. t. dybowskii* on the breeding grounds in Asia are somewhat different to those of the nominate subspecies, as it occurs on plains in upland areas at altitudes up to 2,000 m, and it is found mainly in natural grasslands and rarely nests on agricultural land (Dement’ev and Gladkov 1951–1954). For example, in northern Buryatia it prefers undisturbed grasslands, and tends to avoid ploughed land and pasture, although in southern Buryatia, where most virgin steppe areas have been developed, it prefers the remaining untouched sites but will also use farmland and pasture (Ponomareva 1986). In eastern Inner Mongolia and Heilongjiang, it does not breed on farmland (Liu Bowen verbally 1997), probably because of the intensity of human activity in this habitat (Chan and Goroshko 1998). However, in some parts of eastern Russia, Mongolia and Xinjiang the Great Bustard has recently been reported to occur in fallow land and farmland (Chan and Goroshko 1998). It is generally a bird of the open dry steppes (Piechocki 1968), but will also nest in semi-desert and forest-steppe (*O. A.* Goroshko verbally 1997). Both subspecies prefer to breed at sites with tall vegetation, often in dry feather-grass steppes, but *O. t. dybowskii* will also

breed in wet meadows in river valleys and lake depressions, as well as forest margins (Kozlova 1975, Flint *et al.* 1991). In the semi-desert regions near the Altai and Sajchan mountains, and at the south-eastern end of the Mongolian Altai, the range of this species meets that of the Houbara Bustard *Chlamydotis undulata*; here, Great Bustards inhabit the narrow foothill zone of genuine steppes while the Houbara lives in adjacent desert steppe (Tarasow 1962).

La Touche (1920–1921) found Great Bustards to winter on bare ground, inland and on the plains, and recent studies have confirmed that they prefer open areas, such as meadows and wheatfields near large lakes or rivers (Wang Qishan *in litt.* 1997). A few remain on agricultural land near the breeding grounds in winter (O. A. Goroshko verbally 1997), and have also been found on saline steppe in this season (N. Tseveenmyadag *per* O. A. Goroshko verbally 1998). Specimens were taken in Pakistan (N. Tseveenmyadag *per* O. A. Goroshko verbally 1998). Specimens were taken in Pakistan in winter from cultivated land, mainly fields of gram and mustard (Hume and Marshall 1879–1881, Simonds 1911).

Food The species is omnivorous (Cramp and Simmons 1980). On the breeding grounds in Russia, it mainly eats insects (beetles, locusts) and plants (flowers of Compositae, a variety of grasses and leaves of Cruciferae, wheat sprouts and seeds), along with some vertebrates (voles, chicks, lizards, frogs) (Kozlova 1975). The stomach of an adult female collected in Jilin, China, in June contained 75% plant material (*Hemerocallis flava*) and 25% grasshoppers (Yao Jing *et al.* 1997). When rearing chicks, it feeds mainly on Orthoptera and Coleoptera (Riabov 1949, Kelberg and Smirnov 1988, Gao Zhongxin 1990), and ants are an important food source for the chicks (Isakov and Flint 1987). On the wintering grounds, it feeds on the seedlings of pea and wheat (Chan and Goroshko 1998), and in the Yellow River delta birds fed on soybean, green peas, grass shoots and insects (Zhao Yanmao and Song Chaoshu 1995). The species has been observed to feed on seeds in winter and insects in spring and autumn (Chan and Goroshko 1998).

Breeding Male Great Bustards become sexually mature at 5–6 years, and females at 3–4 years (Isakov and Flint 1987; also Cramp and Simmons 1980). In Xinjiang, the species arrives on the breeding grounds in the middle of April (Gao Xingyi verbally 1997). The males display on more-or-less fixed leks, usually near to the nesting areas of the females (Isakov and Flint 1987). The nests are simple, consisting of shallow pits on dry, soft slopes with *Prunus armeniaca*, *Hemerocallis flava*, *Euphorbia fischeriana* and *Aneurolepidium chinense*; no nesting material is used, and the nests are c.30 cm in diameter and vary in depth from 2 to 20 cm (Yao Jing *et al.* 1997). In Xinjiang, they may nest close to each other, sometimes only 200 m apart (Gao Xingyi verbally 1997). In China, eggs are laid from early May (Yao Jing *et al.* 1997). In Xinjiang, 60% of nests contain two eggs and 40% three or four (Gao Xingyi verbally 1997). In Tuva, clutches usually contain two, and less often three eggs (Kelberg and Smirnov 1988), while second clutches contain only one (Isakov and Flint 1987). Only the females incubate the eggs, for 21–28 days (Isakov and Flint 1987), or 30–35 days (Yao Jing *et al.* 1997), and the males take no part in incubation or care of chicks (Yao Jing *et al.* 1997). The chicks can stand two days after hatching, forage independently after 10 days (Yao Jing *et al.* 1997), and fly at 30–35 days (Isakov and Flint 1987).

Migration Most *O. t. dybowskii* are migratory, although a few birds remain on the breeding grounds throughout the year (Chan and Goroshko 1998), including in Buryatia (Izmailov and Borovitskaya 1973, E. N. Elaev verbally 1997), Chita (O. A. Goroshko and V. Kiriliuk verbally 1997), Mongolia and Inner Mongolia, China (Chan and Goroshko 1998), including at Tumuji (Liu Bowen verbally 1997), and south of the Daqing Shan mountains near Hohhot (Xing Lianlian *in litt.* 1997). Spring migrants arrive on their breeding grounds on the steppes of Tuva in April, soon after the snow melts (Berezovikov 1986), and at Dalai Hu National Nature Reserve in Inner Mongolia they arrive on the breeding grounds in late April (Liu Songtao verbally 1997). However, in Mongolia the species was reported in the past to be the earliest spring migrant, appearing in flocks around Ulaanbaatar in February and March (Kozlova 1932–1933). After breeding, birds move to pre-migratory gathering sites, which

are usually located in large lake depressions; several thousand birds gathered at such sites in the past (Berezovikov 1986). The Torey basin in Chita is an important gathering site for *O. t. dybowskii*, with 100–300 seen in some years (O. A. Goroshko verbally 1997). Flocks left the Tola river area in Mongolia at about the end of September (Kozlova 1932–1933). On the breeding grounds in China, the species gathers in flocks of up to 1,000 birds (but presumably only in such large numbers in the past) from mid-October (Xing Lianlian *in litt.* 1997). Birds generally depart from late October, arriving on the wintering grounds in late November, where they remain until late February (Li Lin 1989). In the Yellow River delta, however, they arrive in early November and depart in late April (Zhao Yanmao and Song Chaoshu 1995), and in the past they were present on the plains around Beijing from October to April (Wilder 1925b). In China, the wintering flocks do not occupy the same sites every winter (Lü Juanzhang verbally 1998). *O. t. tarda* in Xinjiang is migratory (Gao Xingyi *et al.* 1994) but the wintering grounds are not yet known. Several records of the species in the Indian subcontinent appeared to coincide with periods of cold weather, for example the winter of 1910–1911 was one of the coldest on record in Pakistan (Fooks 1911), and an individual was obtained in Pakistan in December 1932 after a recent “fairly heavy fall of snow over all the higher hills to the north” (Cunningham 1933).

THREATS In Europe, North Africa, the Middle East and Central Asia, key threats include increased human disturbance and the potential for agricultural intensification following land privatisation in eastern Europe and the former Soviet Union (Kollar 1996, S. Nagy *in litt.* 1999). Habitat loss continues as a result of ploughing of grasslands, intensive grazing, afforestation and increasing development of irrigation schemes, roads, power-lines, fencing and ditches (Kollar 1996). Mechanisation, chemical fertilisers and pesticides, fire and predation all contribute to high mortality in eggs, chicks and juveniles (Kollar 1996). Hunting is a major threat in the Ukraine (Y. Andryushenko *in litt.* 1999).

In the Asian region, hunting and habitat loss on both the breeding and wintering grounds are the main reasons for the dramatic reduction in the numbers of Great Bustard during the twentieth century (Chan and Goroshko 1998). A particularly rapid decline appears to have taken place in the past four decades, apparently linked to more efficient methods of hunting, the large-scale conversion of steppe to agricultural land on its breeding grounds in Russia and China, and habitat loss on the wintering grounds in China (Chan and Goroshko 1998; see Population).

Habitat loss and degradation Eastern Russia The main reason for the decline of this species in Central Siberia (including Krasnoyarsk, Khakassia and Tuva) was the intensive development of the entire steppe zone for agriculture (Rogacheva 1992). Habitat loss and modification, including an increase in grazing pressure on steppe habitats, threatens the population in Buryatia, which is now so small that it may not be viable (Ponomareva 1986). Changes in agricultural practices are also a major threat to the species in Chita (O. A. Goroshko verbally 1997). In Amur, it has declined sharply in recent decades because of agricultural intensification, including the ploughing of virgin steppes, drainage and the degradation of its breeding habitats by cattle grazing; its population there is now very small and confined to patches of fragmented habitat that continue to be degraded (Pan'kin 1985, V. A. Dugintsov *in litt.* 1997). **Mongolia** The rate of development of the steppes for agriculture is much lower in Mongolia than in Russia and China, but there is growing pressure from an increasing human population (which has tripled since 1950) and an associated increase in the grazing of livestock; a reported 70% of steppe pastures are facing some degree of degradation (Ministry for Nature and the Environment of Mongolia *et al.* 1998). **China** On the breeding grounds in Inner Mongolia excessive livestock grazing has resulted in grassland degradation, and much of the species's former habitat is no longer suitable for nesting (Liu Bowen 1996), e.g. at Tumuji, where Great Bustards avoid agricultural land (Liu Bowen

verbally 1997); the expansion of agriculture is the greatest threat on the Horqin steppes (Arongqiige *in litt.* 1997). In Heilongjiang, the loss of breeding Great Bustards on the eastern Song-nen plains was caused by the development of oilfields at Daqing, and mass human migration from other provinces (especially Shandong) and the consequent conversion of the remaining steppes and grasslands into farmland (Liu Bowen 1996). A survey in the winters of 1998 and 1999 found that the species's habitats have been seriously degraded throughout most of its known wintering range in China (Wang Qishan *in litt.* 1999). Habitat loss has been severe in Hubei and Hunan; for example the reclamation of wetlands for cotton plantations and fishponds is a problem at Longgan Hu lake in Hubei (Hu Hongxing *in litt.* 1999). In northern Jiangsu, wintering habitat has been reclaimed, and local people reported that Great Bustards have become rare in recent years as a consequence (Wang Qishan and Hu Xiaolong 1998). Details of habitat loss in the Yangtze basin appear in the equivalent section under Siberian Crane *Grus leucogeranus*. *Pakistan* Fooks (1911) was under the impression that Great Bustards would never return to the Mardan region after the spread of cultivation brought about by the Malakand Canal.

Hunting Although it is protected in all countries in its range in the Asian region, the Great Bustard is still illegally hunted throughout (but particularly on the wintering grounds), and this is thought to be the main reason for its rapid decline there; given its relatively slow reproductive rate, the species is not able to recover from the high level of hunting pressure that it has suffered in recent decades (Chan and Goroshko 1998). It is wary of the presence of human beings, but less so of men on horseback or in cars, so some hunters now shoot birds from their vehicles; hunters also practise a "silent" method of killing birds, to avoid the attention of police and wardens, by placing grain soaked in pesticide in the fields where migrant birds regularly feed (Chan and Goroshko 1998). *Eastern Russia* On the breeding grounds in eastern Russia, hunting by poachers and shepherds is reported to be a serious problem, and is thought to have contributed to the decline in Great Bustard populations (Pan'kin 1985, V. A. Dugintsov *in litt.* 1997). Its population in Tuva started to decline rapidly in the late 1950s with the invention of "mobile hunting" (presumably using vehicles), which enabled hunters to take up to 70–80% of observed birds (Kelberg and Smirnov 1988; also Baranov 1991). Hunting, including "night-drive shooting" (Ponomareva 1986), is a major threat to the species in Buryatia (E. N. Elaev verbally 1997) and in Chita (Goroshko 1995). Despite being a "holy bird" of the Buryats, and hunting being officially prohibited for many years, the species is regularly shot by herdsmen (Ponomareva 1986). *Mongolia* Illegal hunting is reported to have had a considerable impact on the breeding population in Mongolia (Bold 1997). It has been suggested that declines in its numbers there were mainly caused by Russian troops stationed in the country, since Mongolians do not usually hunt them (N. Tseveenmyadag and O. A. Goroshko verbally 1997). However, in recent years local people are reported to have begun to poach the species (Ministry for Nature and the Environment of Mongolia *et al.* 1998), and Arab falconers also visit Mongolia increasingly frequently (Terrasse 1999). *China* In China, the Great Bustard has long been regarded as a delicacy and even its feathers have market value (for making fans) (Cheng Tso-hsin 1963). In northern China in the early twentieth century, local people hunted the species on both spring and autumn passage, by attracting them with decoys and either shooting them from hides or capturing them with nets (La Touche 1920–1921, 1925–1934). The game markets there were plentifully supplied with the species, e.g. at Qinhuangdao in Hebei, where birds were captured locally in spring and autumn and brought from inland in winter (La Touche 1920–1921, 1925–1934). However, the simple methods used could only kill one or two birds out of a flock (La Touche 1925–1934). In the latter half of the twentieth century, the efficiency of hunting was greatly increased by the availability of improved firearms and motorised vehicles (Chan and Goroshko 1998). Hunters often shoot bustards from their vehicles, and in Inner Mongolia many of the poachers are truck drivers (Liu Bowen 1996). In eastern Inner

Mongolia, Great Bustards eggs are sometimes collected by local people (Liu Bowen 1996). Poisoning is widely used to capture the species, including Inner Mongolia, where hunters have used poisoned grasshoppers (Xing Lianlian *in litt.* 1997), in Hebei, where four poisoned bustards were sent to the Qinhuangdao Bird Banding and Conservation Centre (but later died) in October 1996 (Qiao Zhenzhong *in litt.* 1998), and at Poyang Hu lake in Jiangxi in 1993 (O. A. Goroshko verbally 1997). Hunting pressure is reported to be severe at the recently discovered wintering site in Weinan county, Shaanxi (*Oriental Bird Club Bull.* 32 [2000]: 31). The species is still sold for food in markets, e.g. at Sihong county in Jiangsu, where at least six birds were for sale in the market in early 1998 (Wang Qishan and Hu Xiaolong 1998).

Disturbance and changes in agricultural practices Eastern Russia Disturbance linked to increased human population and changing agricultural practices is a serious threat to the species on its breeding grounds in eastern Russia. On average 20–30% of eggs are damaged if the nesting field is ploughed by tractor (O. A. Goroshko verbally 1997). Tractors also frighten the birds away from their nests, leaving the eggs vulnerable to predators (Rogacheva 1992). Female Great Bustards allow humans to approach closely when on the nest, but when flushed they may abandon the nest or the eggs may be predated by crows (O. A. Goroshko verbally 1997). The species tends to abandon heavily grazed steppes (O. A. Goroshko verbally 1997), and clutches have been damaged by livestock (Rogacheva 1992). In southern Buryatia, birds have been observed to tolerate farm machinery working close by, as well as livestock, but are sensitive to direct human disturbance; clutches are frequently abandoned if they are found by people (Ponomareva 1986; also E. N. Elaev verbally 1997). The use of mineral fertilisers, in combination with other factors, is also thought to have had a negative impact on Great Bustard populations (Pan'kin 1985, V. A. Dugintsov *in litt.* 1997). **China** The main threat on the breeding grounds in Xinjiang is water pumped onto agricultural land, which floods nests and drowns chicks, although some farmers build small dykes to protect nests (Gao Xingyi verbally 1997). Trampling by domestic animals is not a major threat there because most pairs nest on agricultural land, but a significant proportion of eggs may be damaged if the fields used for nesting are ploughed by tractors, and human activities in the fields also disturb the nesting birds (Gao Xingyi verbally 1997). In Inner Mongolia, where the species breeds on steppes, eggs are sometimes trampled by livestock; of eight nests studied at Tumuji in Inner Mongolia in 1996, two were trampled by cattle (Liu Bowen verbally 1997). Disturbance from domestic animals is a major threat to the species in Dalai Hu National Nature Reserve in Inner Mongolia (Liu Songtao verbally 1997). Disturbance is also caused on the breeding grounds in eastern Inner Mongolia by the collection of medicinal herbs and grass cutting (Liu Bowen 1996). In the Yellow River delta, one of the species's main wintering grounds, oil drilling and animal husbandry have caused disturbance to wildlife (Zhu Shuyu *et al.* 1999). Several hundred wintering bustards could be seen at Linggong Zhou in Poyang Hu Nature Reserve in the 1980s, but they no longer occur there owing to increased human activity in the nearby town of Wucheng (SC). Disturbance on the wintering grounds in Hubei and Hunan is now severe (Hu Hongxing *in litt.* 1999). At the recently discovered wintering site in Weinan county, Shaanxi, the Great Bustard is under strong pressure from intensive agriculture; the birds there depend on wheatfields in an area with a high human population density, and when they first arrive in November they have difficulty finding a field to land in (*Oriental Bird Club Bull.* 32 [2000]: 31).

Pollution and pesticides Eastern Russia The use of pesticides is thought to have had a negative impact on Great Bustard populations (Pan'kin 1985, V. A. Dugintsov *in litt.* 1997). In Tuva and Chita, Great Bustards have been reported killed after eating poisoned grain placed to kill rodents (Kelberg and Smirnov 1988, V. Kiriliuk verbally 1997). Even when the pesticide does not kill birds directly, the decrease in the availability of insect food may reduce their breeding success (Flint *et al.* 1986). **China** Pesticides are considered to be a major threat on the breeding grounds in Dalai Hu National Nature Reserve, Inner Mongolia (Liu Songtao verbally 1997). Pollution from domestic, agricultural and industrial effluent is likely to have a

significant effect on the species in its wintering grounds in China, which are in one of the most densely populated areas in the world (Chan and Goroshko 1998); for example, large quantities of pesticides are applied to control insect pests in and around the Yellow River Delta Nature Reserve in Shandong, with consequent effects on environmental health (Zhu Shuyu *et al.* 1999), and pollution is a problem in Longgan Hu lake in Hubei (Hu Hongxing *in litt.* 1999).

Fire Steppe fires, which are usually set by man in spring and early summer, are a major threat to breeding Great Bustards in Russia and Mongolia (Pan'kin 1985, V. A. Dugintsov *in litt.* 1997, Chan and Goroshko 1998). *Eastern Russia* In Chita, it is estimated that c.30% of steppe was burnt annually, with up to 70% in recent years, and these fires kill many young birds (O. A. Goroshko verbally 1997). *Mongolia* It is estimated that between 1971 and 1997, c.14 million hectares of land were affected by forest and steppe fires (Ministry for Nature and the Environment of Mongolia *et al.* 1998), which may have affected the species.

Predators On the breeding grounds, Great Bustard eggs and nestlings are preyed on by foxes, wolves, lynx, weasels, dogs, harriers, buzzards and crows; the adults have few natural enemies, but eagles sometimes prey on the females (Chan and Goroshko 1998). In areas with high levels of human disturbance, crows predate eggs and young nestlings when the females have been flushed from the nest; for example, crow predation is reported to be a major cause of breeding failure on agricultural land in Chita (O. A. Goroshko verbally 1997). Disturbance and predation by herding dogs, which are now numerous in some parts of the breeding range, are a threat to the species in some areas, for example in Buryatia and Mongolia (Ponomareva 1986, N. Tsevenmyadag verbally 1997).

Unfavourable climatic conditions Great Bustard populations appear to have been affected by adverse climatic conditions in the Asian region. There is a cycle of wet and dry periods (over 26–40 years) in the arid zone of Central Asia that probably affects its breeding success, especially of *O. t. dybowskii* which breeds in wet grasslands (Chan and Goroshko 1998). In the Torey basin in Chita, Great Bustards were rare when conditions were dry in the 1970s, but began to increase in 1983–1985 when the climate became wetter (Osipova and Golovushkin 1986). In Mongolia, the degradation of steppe pasture has recently been exacerbated by the increasing frequency of droughts (Ministry for Nature and the Environment of Mongolia *et al.* 1998). High mortality has been recorded on the wintering grounds during periods of extreme cold, for example in Kazakhstan (Gavrin *et al.* 1962), and amongst the few birds that winter in Mongolia (Isakov and Flint 1987). At Poyang Hu lake in Jiangxi in 1962, c.300 bustards were caught by fishermen after a severe winter rainstorm (Ding Tieming 1988).

MEASURES TAKEN In Europe, the Great Bustard is legally protected in Austria, Bulgaria, Czech Republic, Germany, Hungary, Portugal, Romania (females only), Russia, Slovakia, Spain and Ukraine (Kollar 1996). A European action plan was published in 1996 (Kollar 1996). Measure taken in the Asian region are described below.

Legislation The Great Bustard is included in the Russian Red Data Book (Kolosoov 1983), and its hunting is banned throughout the country (N. M. Litvinenko *in litt.* 1997). In Mongolia, hunting and trapping of the species has been prohibited since 1980 (Bold 1997), although it is permitted for “special purposes”. It is listed as “Rare” in the Mongolian Law on Hunting (1995). The hunting of the species in Japan is prohibited under an ordinance of 1918, and it is listed in a bilateral agreement between Japan and Russia (made in 1973) on the conservation of migratory birds (Chan and Goroshko 1998). In South Korea, it was designated as a Natural Monument (number 206) on 30 May 1968 (Won 1984). It is a nationally protected species (first class) in mainland China (Zheng Guangmei and Wang Qishan 1998). The Great Bustard is listed on Appendix II of CITES, and on Appendix I of the CMS (Bonn Convention, for which see Boere 1991).

Protected areas and habitat management The species has been recorded in many protected areas in its Asian range, although it is often difficult to judge how important these are for its

conservation, particularly given its rapid recent decline in the region (see Population). *Eastern Russia* It has been recorded in or near to the following protected areas: in Tuva, Ubsunur Depression and Altay Nature Reserves; in Buryatia, Dzhidinskiy Nature Reserve; in Chita, Daurisky Nature Reserve, which protects and important breeding population; in Amur, Arkhara Nature Reserve; and in Primorye, Lazovskiy State Reserve (where it is probably now extinct) (Chan and Goroshko 1998; see Distribution). *Mongolia* It has been recorded in or near to the following protected areas: Mongol Daguur, Numrug, Eastern Mongolia (Dornod Mongol), Uvs Lake and Khan Khentii Strictly Protected Areas; Khorgo-Terhin Tsagan Noor National Park; Ugtam Mountain and Lkhachinvandad Nature Reserves; and Yakh and Toson-Khoolastay Protected Areas (Chan and Goroshko 1998; see Distribution). *China* It has been recorded in or near to the following protected areas: in Heilongjiang, Zhalong and Xingkai Hu National Nature Reserves; in Jilin, Xianghai National Nature Reserve, and Melmeg, Qagan Nur and Yaojingzi Caoyuan Nature Reserves; in Liaoning, Shuangtai Hekou National Nature Reserve and Namusilai Nature Reserve; in Inner Mongolia, Dalai Hu National Nature Reserve, and Huihe, Tumuji, Horqin, Bayan Obo, Dalai Nur and Ulansuhai Nur Nature Reserves; in Xinjiang, Jintasi and Kalamaili Nature Reserves; in Ningxia, Yunwu Shan Caoyuan Nature Reserve; in Shaanxi, Sanmenxia Nature Reserve; in Hebei, Beidaihe Nature Reserve; in Shandong, Yellow River Delta and Nansi Hu Nature Reserves; in Henan, Jigong Shan National Nature Reserve, and Mengjin, Taibaiding and Dongzhai Nature Reserves; in Hubei, Shennongjia Nature Reserve; in Anhui, Shengjin Hu Nature Reserve; in Jiangsu, Yancheng and Sihong Chengtuo Nature Reserves; in Jiangxi, Poyang Hu Nature Reserve; and in Hunan, Dong Dongting Hu Nature Reserve (Chan and Goroshko 1998; see Distribution). In Inner Mongolia, the Wild Bird Society of Japan and the Northeast Forestry University (based in Harbin) have been conducting a project since 1996 which resulted in the designation of Tumuji Nature Reserve (500 km²) by the government of Inner Mongolia Autonomous Region in 1997, the first nature reserve in China established specifically to protect the breeding grounds of the Great Bustard (SC). The breeding grounds at Dalai Nuur Nature Reserve in Inner Mongolia are still well preserved, with more than 40 birds estimated to be present in summer (Arongqiqige *in litt.* 1997). The Yellow River Delta Nature Reserve in Shandong is an important wintering area, where its numbers increased in the early 1990s to an estimated 700–800 birds (Zhao Yanmao and Song Chaoshu 1995); the area is still well preserved and human disturbance is low (SC).

International cooperation In September 1997, a workshop was held at Daurisky Nature Reserve in Chita, with the aim of drafting an Action Plan for Great Bustards in Asia, which was published in 1998 (Chan and Goroshko 1998), and a leaflet and poster on Great Bustard conservation have been distributed in and around important sites in eastern Russia, Mongolia and China (SC). An international workshop on the conservation of the Great Bustard was held at Tumuji Nature Reserve in March 1999, followed by a training course on nature reserve management and conservation education in September 1999 (SC).

MEASURES PROPOSED *Enforcement of legislation* Chan and Goroshko (1998) (which is the source of the information in the following paragraph unless other references are cited) proposed several measures to try to control the illegal hunting of this species. Government agencies should ensure that park rangers are sufficiently well equipped to enforce wildlife protection laws, by providing them with vehicles, communication systems and (where necessary) the means to defend themselves. Government officers, including rangers and police, should be well informed about wildlife conservation laws, and trained in the identification of protected species. Educational materials on protected species (e.g. posters) should be placed in public to ensure that potential hunters are aware that killing Great Bustards is illegal, and the public should be encouraged to inform the police whenever they encounter wildlife poaching. Potential economic losses to farmers that result from measures taken for the

protection of Great Bustards or other species should be evaluated, and where necessary compensation paid. Traditional and professional hunters should be encouraged to form unions, and information provided to help ensure that all union members understand the regulations and avoid violations of the hunting laws. New laws are required to prohibit the practice of starting grassland fires in some parts of the species's range, and the enforcement of laws to prevent the illegal reclamation of land needs to be improved. Factories and known pollution sources should be regulated, and toxic emissions treated, and there should be government checks and punishment for violations. Ponomareva (1986) proposed that new legislation was required to reduce the numbers of dogs kept by herdsmen, which was found to be five dogs per family during a survey in Buryatia in 1986.

Protected areas and habitat management The establishment of new nature reserves in key areas, and improved management of existing reserves, is essential for the conservation of this species and its habitat; although this is the responsibility of government, there are many opportunities for NGOs to cooperate with government agencies in the establishment and management of reserves (Chan and Goroshko 1998). To improve protected areas management, their staff should be fully aware of all relevant laws and ordinances and have at least a basic knowledge of biology and natural science, which could be learnt through on-the-job training; government agencies and other conservation bodies should assist in such training and provide the necessary equipment (Chan and Goroshko 1998). The staff should be trained in the following subjects: wildlife survey and field study techniques; design and implementation of education programmes; environmental assessment and monitoring; habitat management; and fire prevention and control (Chan and Goroshko 1998). *Eastern Russia* In eastern Russia, several new reserves have been proposed to protect important breeding grounds, including: several small protected areas in the steppes of Khakassia, to attract birds wandering into this region from Tuva (Rogacheva 1992); a new wildlife refuge of c.150 km² in the Domna (Domka) valley, Yeravinski district, Buryatia (Ponomareva 1986); and Argunsky and Urulunguievkaia Pad in the Urulyunguy lowlands of Chita (Chan and Goroshko 1998). In Amur, a rigorous census and mapping of all breeding grounds has been proposed on the Zeya-Bureya plain, followed by the establishment of micro-reserves in areas where the birds are most frequently found to breed (Pan'kin 1985). *Mongolia* The Kherten-Menen area is known to be important for the conservation of the species, and requires official protection (Chan and Goroshko 1998). *China* The Tacheng basin in Xinjiang and Baicheng Pintai in Jilin are known to be important for the conservation of the species, and require official protection (Chan and Goroshko 1998).

Involvement of local people in habitat management Chan and Goroshko (1998) (the source of the information in the following paragraph) proposed that sustainable management of the steppes should be promoted outside protected areas. In areas where Great Bustard nest on farmland, studies could be conducted, in cooperation with local farmers, on the impacts of agricultural practices (including timing of ploughing and sowing, fertiliser use, crop types, time left fallow and levels of human disturbance in the fields) on breeding success, to help identify ways to modify agricultural practices and minimise their negative impact. Local people could be encouraged to take the initiative in Great Bustard conservation through a voluntary warden system. In Russia and Mongolia this type of system has proved successful, with farmers avoiding ploughing areas near Great Bustard nests, while in Xinjiang farmers have built dykes to prevent flooding of nests. Voluntary wardens should report to nearby protected-area and government agencies if they discover illegal activities, but they should not take action themselves. Conservation bodies (government agencies or NGOs) could consider paying farmers to plough and sow fallow lands and leave unharvested grain for Great Bustards and cranes, to reduce competition between birds and humans.

Prevention of steppe fires The practice of starting grassland fires needs to be more strictly controlled, and new laws to prohibit this are required in many regions (Chan and Goroshko

1998). Fire-fighting and alarm facilities should be installed in important breeding grounds (Chan and Goroshko 1998), and fire-breaks constructed in areas where the fire risk is high, although there is a danger that fire-breaks may further fragment the habitat for the species (Liu Naifa *in litt.* 1997). The involvement of local communities is essential in helping to prevent fires, so fire-fighting facilities should be provided along with regular training (Chan and Goroshko 1998).

Research Studies are required on the migration routes, distribution, population size, and habitat preferences of the Great Bustard in Asia (Chan and Goroshko 1998, which is the source of the information in the following section unless other references are cited). Migration routes should be assessed using satellite-tracking and possibly colour-banding using the national colour codes already established for cranes (with the proviso that the capture of birds needs to be undertaken with enormous care to avoid death and injury: NJC), although colour bands are not easily observed in the field and there may be insufficient observers to obtain useful results. The threatened population in Daursky Nature Reserve in Chita would be a suitable first target for satellite-tracking because most of the birds are migratory and their migration routes and wintering grounds are unknown. It would also be valuable to satellite-track breeding birds from Xinjiang, as this may be the most important population of *O. t. tarda* in Asia, and its migration routes and wintering grounds are unknown.

Knowledge of the range of the species in the region could be greatly improved by analysis of the distribution of suitable habitat on vegetation maps and the satellite-tracking studies outlined above, together with detailed ground surveys in selected areas and interviews with local people, who are often familiar with it. Aerial surveys of the breeding grounds are not appropriate, because the species occurs at low densities over a wide area and is well camouflaged. An appropriate target for field surveys would be the region between western Inner Mongolia and Mazong Shan mountain in Gansu, where there is thought to be suitable breeding habitat and the human population is low, but no surveys have been conducted (Liu Naifa *in litt.* 1998). As a result of the recent international initiatives for the conservation of the Great Bustard, the State Forest Administration of China now plans to carry out a national survey of the species, with the aim of developing measures for its conservation (Wang Wei verbally 1999). A full international census of the species is not practical because of its large range, but counts and density estimates in selected areas could be used to provide valuable baseline information. These surveys should record not only the number of individuals, but also age and sex ratios, to provide information on population dynamics. The monitoring of the population of the species through regular counts may be more practical on its main migration routes (for example at Beidaihe in Hebei) and on the most important wintering grounds (for example at the Yellow River delta in Shandong).

There have been many studies of the ecology of the Great Bustard in Europe, but relatively little such work has been carried out in Asia. There appear to be important differences in the habitat requirements of the species in Europe and Asia (see Ecology), so studies on habitat use in Asia are required. Other potential subjects for research include breeding and feeding biology, habitat use in breeding, migration and wintering areas, steppe ecology (e.g. seasonal changes in flora and fauna in relation to Great Bustard feeding behaviour), analysis of its food requirements, and the impact of steppe fires and agricultural practices.

Conservation education Education of the public about the importance of the species and its habitat is a vital element of efforts for its conservation (Chan and Goroshko 1998, which is the source of the information in the following paragraph), particularly given its wide range and vulnerability to hunting and human disturbance. A variety of materials (including posters and other printed matter, videos, postcards, badges, tee-shirts and other artwork) should be distributed at important sites for the species, to help inform local people of its importance as part of the steppe ecosystem and its status as an internationally and nationally protected species. The media should be used to promote the conservation of the species and improved

management of its habitat, and schools encouraged to include nature conservation on the curriculum. Meetings should be held with local people, and staff from the education units of protected areas could visit local communities to provide information on wildlife conservation in the area, including holding discussions on the introduction of bustard-compatible methods of land cultivation and the prevention of grass fires. Farmers should be better informed about the use of pesticides and agrochemicals, and regulations on their use should be clearly stated.

Re-introduction and restocking Chan and Goroshko (1998) proposed that re-introduction programmes could be used to rebuild populations in areas where the species has become extinct. However, it should be noted that no captive-breeding programme for the species has ever succeeded, and that this type of initiative probably has no immediate role in its conservation (NJC).

REMARKS (1) Two subspecies of Great Bustard are generally recognised: *Otis tarda tarda* is found in Europe and western Asia, and in the Asian region it breeds in Xinjiang in western China, and probably occurs in extreme western Mongolia; *Otis tarda dybowskii* is apparently only found in the Asian region (Chan and Goroshko 1998). (2) The subspecies *O. t. tarda* is recorded from western and central Xinjiang around Kashi, the Tianshan mountains and Turpan (Cheng Tso-hsin 1987), but it is now confined to a fragmented breeding range in the northern and probably also eastern Junggar basin, the northern Tacheng basin and Qapqal in the Ili river valley (Gao Xingyi verbally 1997). (3) V. A. Dugintsov carried out fieldwork in the southern part of the Zeya-Bureya plain in April and May in the period 1990 to 1996, but saw no Great Bustards there; however, agricultural workers reported 3–5 birds in the Tambovskiy, Ivanovskiy and Konstantinovskiy districts in the spring, although all reports possibly referred to the same group of birds (V. A. Dugintsov *in litt.* 1997).