

A comprehensive review of records shows eastern Kazakhstan has multiple opportunities to conserve the Great Bustard *Otis tarda tarda* year-round

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Summary: We summarise observations of the Great Bustard *Otis tarda tarda* since 1856 and review information from over 127 publications and contemporary observations by amateur birdwatchers obtained from a citizen science website. The study area encompasses the Almaty and East Kazakhstan provinces of Kazakhstan, where 772 records in over 40 locations are identified. Based on the available data, we estimate that approximately 60 Great Bustards may breed in the study area, though our confidence in that estimation is low and further censuses should be conducted. From 150 to 500 Great Bustards overwinter in this area. The seasonal and long-term dynamics indicate that the eastern Kazakhstan population is small, unstable and vulnerable. Key conservation measures include eradication of illegal hunting and environmental education campaigns for local people, with the involvement of a wide group of stakeholders and subsequent international monitoring of the population.

HISTORICAL BACKGROUND

The Great Bustard *Otis tarda tarda* has been mentioned in eastern Kazakhstan in published literature since 1856 (Semenov-Tyan-Shanskii 1946). During the 20th century there was a small but fairly stable population in East Kazakhstan province, and a similarly sized population in the Xinjiang province of China, across the international border.

METHODS AND STUDY AREA

Our study area included present-day Almaty and East Kazakhstan provinces of Kazakhstan and is bounded by the international border with China to the east. We compiled data on the abundance and seasonal distribution of the Great Bustard derived from 127 published sources since 1856 (see list of references). We also collected material from a website used by the Kazakhstan birdwatching community (birds.kz) to obtain more recent data to understand the current status of the species. Observations were also collected by the authors at the Markakol' nature reserve in Kurchum district of East Kazakhstan province from 1988–1990, and in the eastern Balkhash area of Alakol' and Sarkand districts of Almaty province in autumn 2021. All in all, 772 Great Bustard observations were collated from over 40 sites, of which 610 were made during a period of regular monitoring in East Kazakhstan province from 1999 onward. Sightings were recorded in natural landscapes such as steppe, mountain foothills, lake and river shores, and large lake valleys, as well as human-modified landscapes, specifically agricultural plots.

RESULTS AND DISCUSSION

To examine seasonal dynamics of Great Bustard abundance in the region, records of the species were classed into three periods: breeding season, period of formation of pre-migration flocks and migration, and wintering. The breeding season was defined as March–mid-August, covering the period from the first appearance of birds at breeding sites through fledging and the gathering of young in flocks. The period of formation of flocks for migration, and migration itself, was defined as mid-August–early October. The wintering period was defined as mid-October–February. A map of the seasonal distribution of Great Bustards is provided in Figure 1. Our evaluation of the number of individual birds appearing in the region in each season based on observations from 1999

to 1 March 2022 is provided in Table 1. A complete list of observations is included in Appendix 1.

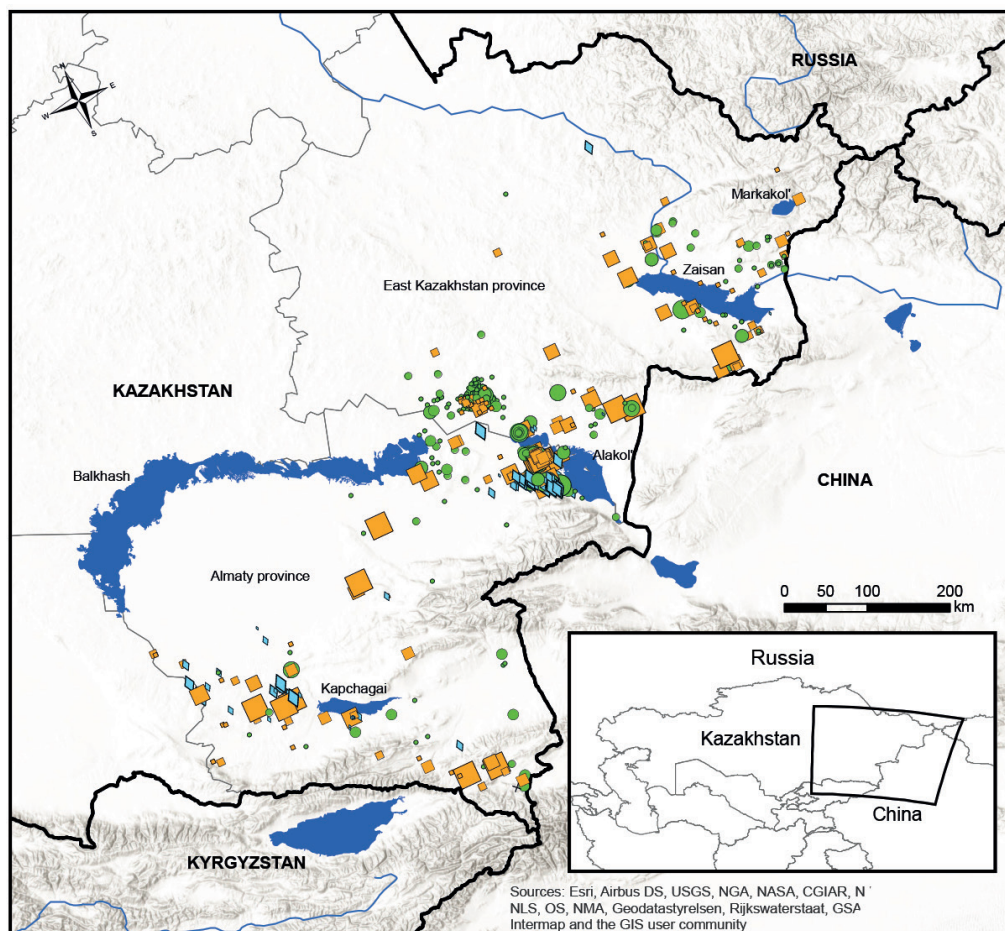


Figure 1. Seasonal distribution of Great Bustards in eastern Kazakhstan, defined as Almaty and East Kazakhstan provinces. Green circles indicate observations during the breeding season; orange squares indicate observations of pre-migratory flocks; blue diamonds indicate wintering; black x represents an observation for which the season is unclear. The magnitude of the symbol is proportional to the number of Great Bustards observed at a given point. Geographical relief is displayed with grey shading. Major rivers and water bodies are displayed in blue.

Breeding

Given the data we have collated, we find that in the 21st century the Great Bustard breeds in the Zaisan depression, on the foothills of the southern Altai ridge and in the Shilikti valley (Saur-Tarbagatai mountain system) in limited numbers. It may breed in the southern foothills of the Tarbagatai range, where small groups have been observed in the summer almost every year (Rustamov & Kovshar' 2007). Breeding has been confirmed to the north-east of Balkhash lake (Gubin 2015). The slight decline observed in number of breeding individuals recorded in recent years may be a result of decreasing attention paid by researchers as the species became somewhat more re-established in the region over the past decade.

Most observations from May through July are of post-breeding, moulting birds, mostly males, which use well-protected sites with good feeding conditions within the Alakol' nature reserve. During this time they are typically observed singly, or in groups of 2–3, or occasionally up to 6 individuals (Borisenko 1977).

Migration

Comparatively large migratory groupings of Great Bustard are observed in the western part of the Alakol' basin, particularly in the Tentek river delta. Berezovikov & Levinskii (2003, 2004, 2005, 2006, 2007, 2008, 2011) found that pre-migratory flocks typically consist of 15–30 individuals. However, there is some variation in the number of birds from year to year, and multiple reports of what are likely the same individuals in some years, particularly around 2002 as the species had recently reappeared in the province.

It is possible that the incidental autumn appearance of a Great Bustard on the southern Altai ridge in Katon-Karagai national park on 15 November 2014 (Chelyshev & Berezovikov 2014) represented use of a previously hypothesised migratory path of the Great Bustard. This path, used by other bird species, could have connected extirpated populations of the Eastern Great Bustard *O. t. dybowskii* on the Ukok plateau in Gornii Altai with wintering grounds of the Western Great Bustard in Kazakhstan (Berezovikov 1986). This hypothesis is supported by the presence of several stable Great Bustard wintering grounds in the western part of the Alakol' depression, in the Ili river valley and in the Karatau and Boraldai foothills in the south of Kazakhstan (Shakula 2019), where we estimate that more individuals winter than breed (Table 1).

Wintering

Great Bustard wintering grounds in the Alakol' nature reserve and vicinity on the border between East Kazakhstan and Almaty provinces have been regularly reported on in a series of 54 articles by N Berezovikov and collaborators (see Appendix and Literature Cited). Since 2004, Great Bustards have stayed to overwinter in the Alakol' basin. The core habitat consists of soybean fields in the foothills of the Bolshoi Saikan range, and also between Tentek and the western shore of Alakol' lake (Berezovikov & Levinskii 2005, Berezovikov 2011, Berezovikov & Filimonov 2015). The number of birds observed wintering increased in 2006–2008, when many fields in the region were converted from wheat and sunflower to soy (Berezovikov & Levinskii 2009). In subsequent years, as these larger groups of Great Bustards were heavily persecuted by poachers, the escape distance of the birds increased dramatically (Berezovikov & Levinskii 2012). This may have made censusing more difficult, such that surviving birds were undercounted.

Large fluctuations in the number of Great Bustards censused from winter to winter can be attributed in part to snow conditions, which affect both feeding conditions for Great Bustards and ability of observers to reach the site. In years with greater snow cover, Great Bustards gather in large flocks on the soybean fields and are more easily censused (Berezovikov & Filimonov 2016b). In contrast, during winters with less snow cover, overwintering Great Bustards tend to be scattered in smaller groups across the landscape, and are harder to locate and census.

Habitat

In spring (April–May) Great Bustards were observed on green sedge *Carex* sward in the lower reaches of rivers, on wormwood semi-desert, adjacent to lakes, in dry steppe with shrubby vegetation, and on patches of saltmarsh and sedge-mixed grass meadows in depressions (Sushkin 1938). During the breeding season (May–June) a female with two downy chicks was observed in semi-desert habitat (Gubin 2015).

The earliest autumn gathering (32 birds) was recorded on hay meadows in the Kokpekti tract in the lower reaches of the Tentek river (Berezovikov & Levinskii 2009b). The same authors record that in October, Great Bustards were seen feeding on dry grassy steppe, and among reeds on Shiryaev island in the Tentek river inside Alakol' nature reserve. From November through February, wintering flocks were recorded feeding on harvested fields of soybeans, sunflower and wheat (Berezovikov *et al* 2010–2021).

THREATS

Poaching of large winter flocks is the major threat to the Great Bustard in eastern Kazakhstan, where over a period of years one-third of wintering flocks were poached annually (Isakov & Flint 1987, Berezovikov & Levinskii 2012). Proposed protection measures should, first of all, be aimed at eradicating poaching, by improving effectiveness of anti-poaching efforts and conducting public awareness campaigns (Chan & Goroshko 1998, Berezovikov & Gubin 2010). Steep declines in populations of Great Bustards in eastern Kazakhstan were observed during a time of agricultural intensification in the 1950s, and it is likely that incompatible agricultural methods still lower reproductive success (Berezovikov 1986). The establishment of a local network of interested scientists and amateurs could provide information about the likely location of nests, as well as migratory or wintering flocks, and advocate for their protection. Concomitantly, standardised long-term monitoring such as that conducted for many years around Alakol' should continue, under the supervision of state organisations and international scientific institutions.

Table 1. Estimation of current Great Bustard population in eastern Kazakhstan, based on observations from 1999 to time of publication in early 2022. These numbers are an expert evaluation of the number of individual birds appearing in the region in each season.

Season	Number of Great Bustards	Number of sites	Quality of estimate, from 1 (low-quality) to 5 (high-quality)
Breeding	60	11	1–2
Gathering for migration	80–90	14	4
Wintering	180–500	15	5

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Appendix 1. All records of Great Bustard in eastern Kazakhstan from first record to 1 March 2022, by province, district and locality. Provinces are ordered west to east. Districts and localities are ordered alphabetically; Almaty city is listed as if a district. Provinces and districts of each observation are identified using current boundaries and names. The most specific locality relating to the particular record is given in bold. When dates were not provided, the position of the sighting in the timeline was interpolated from context available in the article. Citations commonly refer to 'pairs' and this is repeated here, although the species does not form pair-bonds. Comments in square brackets are editorial.

Almaty province

Aksu district

- 20 km from the left bank of lower **Aksu river**, 2 in sands, 07/05/1983 (Gubin 1986)
- **Ityk**, in the Dzhungarian Alatau foothills between Ak-Ichke and Aksu rivers, and south of road between Ak-Ichke and Karabulak stations, large numbers after September, year unspecified (Shnitnikov 1949)
- **Kopal**, chicken-sized juvenile caught, 16/06/1908 (Shnitnikov 1949)
- western **Syugaty valley**, 2 birds, 21/06/1955 (Kuz'mina 2008)
- near **Zhetysu**, 3 recently hatched chicks caught on bank of Aksu river, 19/05/1909 (Shnitnikov 1949)

Alakol' district

- **Alakol' lake** including Alakol' nature reserve (see also under Sasykkol' lake), well over 150 separately dated published records on land adjacent to the lake's western shores since 1965 to present, usually involving small groups but cumulatively often over 100 (see figures below under Enbekshi) and including single flocks of (eg) 24, 30, in fields (including soybeans and wheat), hay meadows, reeds, steppe, gravel plains and wormwood–saltbush (*Artemisia–Atriplex cana*) semi-desert at sublocalities Ai river, Akkuduk, Akshi, Aktubek, At Bashik, Ateken, Baibala lake, Batpakzhol, Besagach, Beskol', Chimkozha lake, Chuba-Tubek, Karabulak, Karamoiyn lake, Kokpekti, Korzhunkol' lake, Shiryayev island, Talapker farm, Tastyube hill, Tentek delta, Togyztubek, Tuyuksu watercourse, Usharal town and vicinity (including railway junction 8), Yntaly (see below under Enbekshi) including to the north (400 birds on soy fields in December 2016) and to the south on rocky foothill plain where Tentek river debouches from mountains (40 on 29/09/2004, with 2 shot by hunters), Zayachaya Guba gulf, Zhagatal, Zhaipak (see below under Enbekshi), Zhalanashkol' lake, Zhanama village and Zholdyagach, and including breeding records (female[s] with juveniles in June 2005, May 2008, May–June 2010 and 2011; 2 and 3 chicken-sized juveniles on Shiryayev island, 19/07/2003), and intensive migration at the Almaty/East Kazakhstan provincial border, 05–25/11/1953 and 20/10–17/11/1954, also 20/10–25/11/1962 (Gavrin *et al* 1962, Auezov & Grachev 1977, Annenkov 1986, Berezovikov *et al* 2002, 2007, 2016, Berezovikov 2003, Berezovikov & Filimonov 2017a, 2018, Berezovikov & Levinskii 2003, 2004, 2005a, 2006, 2007, 2008, 2009a,b, 2010, 2011, 2012, Kovalenko 2006, 2016, Gubin 2015, Filimonov & Berezovikov 2016, 2019b, 2021, Filimonov *et al* 2018, 2021)

- between **Arganaty** and Lepsy fortresses, many birds seen, 22/08/1856 (Semenov-Tyan-Shanskii 1946)
- near **Arkharly** village, 5 seen thrice on sands in lower Shilikti river, December 1988 (Berezovikov *et al* 2015); on road between Arkharly and Bala-Saikan mountain, 1 in sands, 08/12/2002 (Berezovikov *et al* 2004, 2015)
- lower reaches of Ayagoz and **Bakanas rivers** (to the north of the Kyskash, Arkharly and Arganata mountains), 7–8 birds moulting, late July 1982 and late July 1983 (Berezovikov *et al* 2015)
- **Bala-Saikan mountain**, repeatedly seen on plateau-like summit in strong winds, winter 1988/89 and 1989/90 (Berezovikov *et al* 2015); foot of mountain, 4 in soy field, 04/02/2007 (Berezovikov *et al* 2007)
- eastern end of **Balkhash lake**, 1 on yellow sand *takyr*, 28/10/1988 (Berezovikov *et al* 2015), 6 birds, 05–06/05/2017 (Shmygalev 2017), and a year-old male in Saryarka hunting estate, 06/06/2020 (Shmygalev 2020)
- near Il'ich village and at **Baybol**, valley of Shinzhily river (left tributary of Tentek), 8 birds, 27/12/2008, with birds present for at least 10 days (Berezovikov & Levinskii 2009b)
- northern foothills of **Bolshoi Saikan mountain**, 12 on soybean fields, 16/01/2005 (Berezovikov & Levinskii 2005a; flock of 35 in soy fields, October–November 2005 (Berezovikov & Levinskii 2005a); 20–30, winter 2007/08 (Berezovikov & Levinskii 2009a)
- between northern foot of Ulken Saikan mountain and **Enbekshi** village (roughly west of Usharal) on Shinzhily river, this area plus that between Yntaly and Zhaipak (see Alakol' lake above) being censused in January–February 2013, 2014 and 2015, yielding 276, 240 and 132 birds respectively (Berezovikov & Filimonov 2015); in equivalent censuses in 2016 numbers broke down as Zhaipak/Yntaly 180, Enbekshi 60 and Karabulak 23 (Berezovikov *et al* 2016), in 2017 Zhaipak/Yntaly 188, Enbekshi 80 and Karabulak 120 (Berezovikov & Filimonov 2017a), and in 2018 Zhaipak/Yntaly 32, Enbekshi 30 and Karabulak 24 (Filimonov *et al* 2018)
- **Gorkii Kluch**, near Alakol' lake, 1 bird, 11/07/1981 (Khrokov 1986)
- near **Kainar** village, 5 in soy fields, 30/10/2009 (Berezovikov & Levinskii 2010)
- **Karakum desert** between Sasykkol' and Balkhash lakes [presumably as traversed on road R-129], 4 on clay desert and sands, April 2010 (Berezovikov & Levinskii 2010)
- near **Koktuma**, south shore of Alakol' lake, 12/04/1981 (Annenkov 1986)
- **Kugurum**, Dzungarian Alatau foothills, 2 feeding in field, 06/12/2004 (Berezovikov & Levinskii 2004)
- between **Makanchi** village and Alakol' lake, next to Khatynsu river, 4 reported by hunter, May 1978 (Shcherbakov 1986)
- **Saikan Pass**, Kugurum mountain plateau, 3 birds, 01/03/2009 (Berezovikov & Levinskii 2009b); 14, 10/01/2010 (Berezovikov & Levinskii 2010); northern foot of pass at Akkuduk, 1 bird, 13/11/2010 (Berezovikov & Levinskii 2011)
- **Sarybel**, 12 birds, 03/02/2005, 16 birds, 15/02/2005 (Berezovikov & Levinskii 2005a)
- **Sasykkol' lake** (southern and western part in Alakol' district; see also under Urzhar district) near Zharsuat village, 3 birds, May 1981 (Annenkov 1986); 7, 17/05/1999, 2, 30/07/1999; between Zharsuat and the Zaisan–Semey (Semipalatinsk) highway, male, 06/06/2000 (Berezovikov *et al* 2002); 12 at an artesian well west of Zharsuat, 21/05/2001, with 2 there on 26th, and 1, 16/07/2002 (Berezovikov *et al* 2002); between Sasykkol' and Alakol' lakes, 45 birds in 6 encounters, 13–18/12/2006 (Berezovikov & Levinskii 2006); along 10 km of road bordering Sasykkol' lake, 15 birds in 4 groups, 08/07/2013 (Dyakin 2013)
- **Taskarakum**, lower Shilikti river, flock of 12 in sand-dunes, 09/12/2004 (Berezovikov & Levinskii 2004)
- near **Uch-Kul' lake**, nest, 28/04/1909 (Shnitnikov 1949)

- unspecified areas within more general landscape embracing northern foothills of Saikan, Tekeli, Kaikan and Zhabyk mountains, where groups of 12–18 wintered 2004/05 (Berezovikov & Levinskii 2005b)

Almaty city

- near Vernyi (modern-day **Almaty**), nest with fresh eggs, 07/05/1907 (Shnitnikov 1949)

Balkhash district

- **Akdala hunting estate**, lower Ile river, 1 bird, 01/02/2020 (Shmygalev 2020)
- **Bakanas**, Ile river, and on Ile at confluence of Kurty river [50 km south-east], small groups and singles on regular spring migration to north-east; passing through this area in the first half of October as single birds or pairs (Shnitnikov 1949)
- **Miyali** [southernmost part of district, on border], 1 bird, 24/03/2018 (Gubin 2018)

Enbekshikazakh district

- **Asy plateau**, flock seen in treeless alpine pastures at 2440 m, 18/09/1867 (Severtsov 1947)
- east of **Bezimyannoe lake** in lower Turgen river flowing into Kapshagai lake, 30 in October 2003 as reported by shepherd (Bevza 2003); 2, 03/12/2006 *fide* shepherd (Bevza 2006)
- **Karashengil'** on Karatal river, huge number feeding on harvested wheat fields, 20/10/1910 (Shnitnikov 1949); Karashengil' game reserve, poached male, late February 1974 (Belyalov 1986), 2 including large male, 08/12/2006 with 1 there, 14/12/2006 (Bevza 2006); west of this reserve, 2 km from Kapshagai lake, 3 birds, 21/08/2006 *fide* ranger (Bevza 2006)
- **Kush** village, 1 flying north-west, 24/12/2004 and 28/12/2004 (Bevza 2004)
- west of **Shebukty river** and east of Karashengil' game reserve, 6 birds, 11/02/2006, and 1 bird, early March 2006, *fide* local reports (Bevza 2006)
- 40 km north-east of **Shilik** village, 1 in sparse saxaul forest, 20/05/1979 (Grachev 1986)
- central part of **Sugaty valley**, 1 bird, 15/03/2015 (Berezovikov & Zhdanko 2015)

Eskeldi district

- near **Taldykurgan city**, 2 birds, 31/10/2015, and 6, 02/12/2017 (Belyaev 2015, 2017)

Ile district

- near **Druzhba** village on Shamalgan river, 1 bird, 12/11/2000, with shepherds reporting that a bird reared two young there that year (Belyalov 2002)
- **lower Ile river** across from Bakbakty (in Balkhash district), 7 birds 23/02/2016 (Shmygalev 2016)
- 50 km from **Iliiskii** village, 8 on virgin steppe, autumn 1976 (Kamyshnikov 1986)
- **Kanshengel'**, 6 birds, 26/11/2006, and 2, 22/03/2014 (Isabekov 2006, 2014)
- **Karaoi plateau** near Akshi village, 8 birds, 09/05/1982 (Mirkhashimov 1986); 1 bird, April 1983 (Stepanov 1986); along 70 km of Kurty–Kazakhstan–Kapshagai road, groups of 30, 60, 10, 10, 10 (total 120), 06/11/2000 (Zhuyko 2002); 20 km north-east of Akshi, 5 birds, 19/11/2000 (Belyalov 2002); 20 km north-west of Kapshagai town, 23 birds, and 1 bird at 30 km post on Kapshagai–Kazakhstan road, 07/12/2000 (Gubin & Belyalov 2002), and several hundred on plateau, winters 2000/01 and 2001/02, *fide* local hunters (Belyalov 2002); between Akshi and Kazakhstan villages, 1 flock of 16 in lower reaches of Kurty river, 10–11/01/2006, and 20 km south-east of Kazakhstan village, 2 groups of 11 and 16, 03/02/2006 (Grachev 2006); between Akshi and Kazakhstan, up to ten flocks of 40–60 birds each (*ie* 400–600) in lower reaches of Kurty river, mid-December 2006 (Berezovikov *et al* 2007); 80 km from Kapshagai on Kapshagai–Kurty highway, 4 groups (1, 3, 10, 10), 10/12/2007, and 4 birds, 17/12/2007 (Azarenko 2007); between Kapshagai and Akshi at Kostobe game reserve, 4 birds, December 2015, and 8–12, January 2016 (Berezovikov *et al* 2016)
- near **Kazakhstan** village, eastern outskirts of Taukum desert, 1 migrating male, 10/11/1996 (Berezovikov *et al* 1999)

- 20 km south-west of **Kurty**, 3 on wormwood plain, 25/11/2000 (Belyalov 2002); 20 km east of Kurty, flocks totalling 150–170 birds, 05/11/2001 (Zhuyko 2002); 30 km south-east of Kurty, 5 birds, 11/11/2001 (Karpov & Khrokov 2002); plain west of Kurty, flocks of 49, 19 and 14 birds several hundred metres apart (Karpov & Belyalov 2002); Kurty to Uzunagash village, 4, January–February 2016 (Berezovikov *et al* 2016); near Kurty, 4 flying on migration, 04/03/2018 (Isabekov 2018)
- lower **Kurty river**, 2 males and 1 female, 23/11/1996 (Berezovikov *et al* 1999)
- **Sarybulak**, large numbers, 06/04/1909 (Shnitnikov 1949)
- south-eastern spur of **Seriktes mountains**, species seen, 11/01/1995 and up to 10 reported by poachers in nearby Anrakhai foothills over winter 1994/95 (Levin & Belyalov 2002)
- **Sorbulak lake**, 2 birds, 26/10/2012 (Fedorenko 2012)

Karatal district

- between **Zhanatalap** and Engels stations, 10–12 on edge of Moiynkum sands, September 1998 (Berezovikov 2002b)

Kegen district

- lower **Temirlik valley**, Sharyn National Park, 15 birds, 05/02/2016 (Zhdanko & Berezovikov 2016)
- **Uch-Merke plateau** (near Zhalanash, between the northern and southern ridges of the Zailiiskii Alatau), birds at 1525 m in clay steppe with pebbles and sparse vegetation, 21–24/09/1867 (Severtsov 1947)

Kerbulak district

- upper reaches of **Bezhe river**, Dzhungarian Alatau, migrating birds (number unspecified), late September–early November 1962 (Gavrin *et al* 1962)

Panfilov district

- edge of **Taukum sands**, 20 km west of Aidarly village, 1 bird, 06/09/1982 (Lopatin 1986)
- foothill steppe near **Zharkent**, fairly frequent with small groups of males, and nest with 3 eggs, 09/05/1929, nest with 2 eggs, 13/05/1929, nest with 3 pipping eggs, 25/05/1929 (Shestoperov 1929)

Raiymbek district

- entire district with very large numbers, 20 October of unspecified year (Shnitnikov 1949)
- **Aybyrzhal mountains**, fresh feather, 09/04/1956 (Berezovikov *et al* 2005)
- **Bayankol' river** at 1800 m, species collected, 1902 (Lönnerberg 1905)
- meadows on right bank of **Karkara river** between the Zhelkarkara and Malaya Karkara rivers, 'bustards roam undisturbed', after 27/07/1904 (Sapozhnikov 1904); Karkara valley, adult male collected, 28/10/1910 (Polyakov 2013)
- between **Kegen river** and Chul-Adyr mountains, 1900 m, unspecified observation, 10/07/1912 (Shnitnikov 1949); lower Sheldude (Kegen) river, between Burado-bosun (Tuzkul') lake and Sardzhaz-Tute station, fairly large numbers, 29/07/1912 (Shnitnikov 1949)
- near **Kumurchi** village in Shalkudusu valley, flock of 18 adults, 15/07/1953 (Korelov 1956); between Kumurchi and Aktasty, 2 reported in *Artemisia* steppe, July–August 1993 (Berezovikov *et al* 2005)
- near **Narynkol** in the Bayankol' valley, male killed from flying group, 05/05/1949 (Stogov 2008)
- **Shirganak river** (tributary of Kegen river), birds seen and collected, 05/10/1867 (Severtsov 1947)
- steppe valley of the middle reaches of the **Tekes river**, between the mouths of the Muzart and Koksus rivers, pairs and flocks, second half of July 1893 (Kozlov 1899); groups feeding

in fields in Tekes valley, autumn 1947–1950 (Stogov 2008); occasional spring flocks, Tekes valley, 1955–1957 (Berezovikov *et al* 2005)

- valley of Burado-Bosun (**Tuzkul'**) mountain lake, brood found at 2000 m, 28/07/1912 (Shnitnikov 1949)
- **Zhalanash valley**, birds hunted at 1700 m, 03/10/1867 (Severtsov 1947)

Sarkand district

- near **Cherkasskoe** village (Dzhungarian Alatau foothills), two nests close to each other, eggs of one pipping, early May 1909 (Shnitnikov 1949)
- **Lepsy**, by Arganaty railway siding, 15 birds in 5 groups, 01/04/2010 (Gubin 2015)
- south-west of **Kokterek**, 2 birds, 02/05/2017 (Katuntsev 2017)
- no specified locality, 2 flocks of 7 and 16 in winter wheat, 05/10/2002, in an area where by local report numbers had significantly increased in recent years (Annenkov 2003)

Uigur district

- **Alabuga river valley** in foothills of Kul'dzha-Bash pass, 1800 m, unspecified observation, 12/07/1913 (Shnitnikov 1949)
- between Shonzy (Chundzha) and **Sharyn** (Charyn) village, groups of 5–10 in winter 2015/16, with the species probably occurring along the entire deserted left bank of the Ile and adjacent northern apron of the Ketmen ridge between Shonzy and Kolzhat village near Chinese border, birds reportedly first wintering there in 2011/12 (Berezovikov *et al* 2016)

Zhambyl district

- between marker points 215 km and 260 km [hence close to **Aksuek**] on Almaty–Karagandy highway, 1 male, 3 females, 12/08/1983, and 1 bird, 24/08/1983 (Kovalenko 1986); Zhusandala steppe between Kanshengel' and Aksuek villages, 3 birds, 04/10/2001 (Lapshin 2002); between Kanshengel' and Sarybulak in lowland desert Zhusandala near the Chu-Ili mountains and Anarkhai foothills, as many as 565 birds, with another 150 on an *Artemisia* plain with needlegrass and 70 more further away, 20/01/2007 (Berezovikov *et al* 2007); northern Anarkhai foothills, 5 flocks of 3, 4, 7, 11 and 14, 21–26/10/2007 (Kovalenko 2007); between Aksuek and Kanshengel', 17, and between Kanshengel' and Anarkhai foothills, in Zhusandala valley, 7, in winter 2015/16 (Berezovikov *et al* 2016); Anarkhai pass in Chu-Ili mountains, 15, 17/02/2016 (Shmygalev 2016); Zhusandala, 22 birds, 13/12/2018 (Kessler 2019)
- near **Aydarly** on Almaty–Karagandy highway, species seen, 12/10/2002, and reported to number 2000 birds in winter *fide* *Okhotzooptom* inspectorate, with 2 pairs nesting in 2002 (Levin 2002)
- near **Bakhabakhty** village, 2 on ricefields, 01/11/1980 (Pole 1986)
- **Bozoi**, 15 seen, 27/10/2006, 20 reported a few days later (Sklyarenko 2006)
- **Jolbarstau** in Saz railway station area (100 km north-west of Almaty), 1 in steppe, 06/04/2002 (Karpov & Belyalov 2002)
- 20 km from **Kopa** station in the Anarkhai foothills, 2 birds, 23/10/1981, and 1, 30/10/1983 (Rodionov & Usaty 1986)
- 109 km west of Almaty [seemingly therefore near **Otar Rgaytö**], 1 bird, October 1979, and 4 males, 28/11/1980 (Pfander 1986); also 120 km west of Almaty [*ie* border with Zhambyl province], bird flying towards mountains, 28/11/1979, and male (8 kg) killed, 12/11/1980 (Erokhov & Zhuiko 1986)

East Kazakhstan province

Ayagoz district

- near **Aktogai** station, 4 out of 5 birds shot by drill operators, 1982 (Khrokov 1986); nest with 3 eggs, 12/05/2010 (Gubin 2010)

- **Ayagoz**, first spring appearance 11/04/1884 (Shnitnikov 1949); 3 birds, 15/09/2013 (Barashkova 2013); Ayagoz river, along eastern Balkhash, 25/04/2016 (Shmygalev 2016)

Borodulikha district

- sandy areas 30 km north of **Rybach'e** village, 2 for several days, early August 1982 (Starikov 1986)

Katon-Karagai district

- **Katon-Karagai national park**, 1 feeding in hay meadow between highway and apiary on left bank of Bukhtarma, 1.5 km east of Zhanaul'ga (Zhana-Ulgo) village, *vide* E Zhumagulov, 15/11/2014 (Chelyshev & Berezovikov 2014)
- fields near **Sergeevka** on western spurs of Narymskii range, southern Altai, nesting, 1952–1955 (Berezovikov & Vorob'ev 2001); display and courtship seen west of Sergeevka at Zhenishke, where local people killed six birds 1975–1978 (Berezovikov 1986)

Kokpekti district

- near **Bukhtarma reservoir** (see also Kurchum district) in the steppe mountains between Novoslavyanka and Kuigan villages, several, summer 1982, and flock of 8 including juveniles, October 1982 (Vorob'ev 1986); opposite Palatsy village, 4 birds, 02–08/10/2006 (Shcherbakov 2007)
- in sands along **Bukon river**, 1 bird, 08/09/1985, 4 birds, 04/10/1985 (Berezovikov & Samusev 2003)
- **Kokpekti**, 7 in hayfields, 25/12/2006 (Berezovikov *et al* 2007)
- 2.5–3 km south-east of **Turanga lake**, adult and subadult, 05/08/1967 (Egorov & Berezovikov 2006)
- western end of **Zaisan lake**, 10–15 roosting (with one eaten by a fox), October 1949, fewer birds there (or south-west of the lake) at the onset of frost, 02/11/1949, and near outflow of Irtysh river two broods of 2 and 3 crow-sized downy chicks, 01/07/1950, and 2 full-grown young collected, 13/09/1950, stomachs full of grasshoppers and one lizard (Berezovikov & Samusev 2003)

Kurchum district

- south of **Ak-Mekteb** village, 20 birds, 25/08/1981 (Shcherbakov & Kochnev 1986)
- near **Akzhar** village, 1 pair, only birds found after 3000 km prospection of Zaisan lake, April–October 1975–1978 (Berezovikov 1986)
- middle reaches of **Ashaly river**, 6 in small hills, 25–26/08/1985 (Berezovikov 2002a)
- plateau-like steppe mountains adjoining **Bukhtarma reservoir** (see also Kokpekti district), between mouths of Kaiyndy and Kurchum rivers, nesting and with moulting groups of 6–8 males observed in summer, 1982–1983, and up to 10, 1996–1998 (Berezovikov & Vorob'ev 2001)
- steppe and on bare slopes along **Bukhtarma river**, quite common, 1912, 1914 (Sushkin 1938)
- near **Bukon estuary**, north of Zaisan, 1 reported by hunter, mid-May 1978 (Shcherbakov & Kochnev 1986)
- between **Chernyaevka** and Kalguty villages, 4 in semi-desert next to Kurchum range, 15/07/1977 (Prokopov 1986); at Baichuak between Chernyaevka and Takyr villages, reportedly regular till 1970, thereafter occasional including 1, 28/06/1983 (Berezovikov 2002a)
- **Irtysh river** left bank near bridge [P-164 road, east of south-east point of Zaisan lake], 1 bird, April 1997 (Berezovikov & Samusev 2003)
- fields near **Kara** village (Kurchum range), 2 birds by local report, May 1962 (Berezovikov 2002a)
- in grassland near **Karashilik**, 2, September 1998, 4, 30/08/1999, 1, 28/03/2000 (Berezovikov & Samusev 2003)

- near **Karoi** village in Batpakbulak, 1 in mountain steppe (Kurchum range), May 1966 (Berezovikov 1986); 2 birds, 14/05/1983 (Shcherbakov & Kochnev 1986)
- **Markakol' depression** on migration, 1900–1901 (Yablonskii 1914); granite foothills through desert steppe on way from Zaisan lake to Markakol' lake, quite common, 1912, 1914 (Sushkin 1938)
- along **Razdolnoe**–Karatogai (Kalguty) road, 4 in semi-desert, 10/05/1965 (Egorov & Berezovikov 2006)
- **Sarykuduk** (between Ardynka and Karashilik), female with 2 large downy chicks, early June 1978 (Berezovikov & Samusev 2003)
- **Shakpaktas**, Kurchum mountains, 2 on plowed field, May 1963, and family group of 3 there, late August 1963 (Berezovikov 2002a)
- near **Shingildy** village on northern shore of Zaisan lake, young bird, 12/08/1979 (Egorov & Berezovikov 2006); also in unspecified area of northern shore of Zaisan lake, only 2 seen in 60 km, 27/09/1963 (Berezovikov & Samusev 2003)
- **Shushkaly** near Burabai in Kurchum ravine, 5 birds, 05/04/1983 (Berezovikov & Vorob'ev 2001)
- **South Bakumbai** valley, bold female [suggesting nesting] in *Spirea*-dotted fescue–wormwood, 21/05/2000 (Berezovikov 2002a)
- steppe near **Terekhti** (formerly Alexeevka) in Kurchum mountains *fide* IA Dolgushin, species regularly encountered by local residents, 31/08–4/09/1946 (Berezovikov 2002a); desert plain along Buran–Karashilik–Terekhti road, often found singly and in groups of 2–5, 1952–1954, including female with egg in oviduct, April 1953 (Berezovikov & Samusev 2003); between Terekhti and Karatogai, breeding stronghold, 1970s–1980s, when species in decline elsewhere in region (Berezovikov 2002a); semi-desert plain of Alkabek between Terekhti and Buran, regular, 1998–2002 (Berezovikov & Samusev 2003)
- **Ust'-Bukon sands**, 2 birds, summer 1981, 12, autumn 1981, 2, summer 1982 (Shcherbakov & Kochnev 1986); 2, 29–30/08/1982 (Berezovikov & Samusev 2003)
- **Zelenyi ravine** in lower reaches of the Alkabek river, 4 birds, summer 1967 (Berezovikov & Samusev 2003)

Tarbagatai district

- near **Akshokka** station, flock of 12 (adult male killed by poachers), 18/07/1982 (Trutnikov 1986)
- near **Karabulak** village (currently Tugyl) on the Priozernoe–Zaisan road, 1 bird, 14/07/1966 (Egorov & Berezovikov 2006); also in northern Manrak foothills [south-west of Karabulak and south of south-east corner of Zaisan lake], 2 birds, August 1982 (Berezovikov & Samusev 2003)
- near **Priozernoe** and Baitugas villages, 1+1, April 1983, and south of Priozernoe, 2 seen all summer 1983 (Shcherbakov & Kochnev 1986)
- southern **Prizaisan'e** area [*ie* near Manrak ridge], 1 bird in snow-covered lowlands, 02/04/1950 (Berezovikov & Samusev 2003)
- **Shilikti valley** (see also under Zaisan district) in Manrak foothills, small numbers in 1970–1980s (Berezovikov 1986, 1992); near Komsomol' station, 4 birds, 30/08/1980 (Kovshar' & Shcherbakov 1986); near Akhmetbulak village, 2 flocks of 8 and 4 birds, August 1981 (Shcherbakov & Kochnev 1986); between Shilikti and Akhmetbulak villages, 17 birds composed of females with young in groups of 2–4, early July 2001 (Berezovikov & Levin 2002)

Ulan district

- between **Preobrazhenka** and Kokpekti villages, bird flying towards Kalbinskii ridge, 30/07/1963, *fide* IA Dolgushin (Berezovikov & Samusev 2003)
- 20 km south of **Ust'-Kamenogorsk**, 40 birds, winter 1948/49 (Gavrin *et al* 1962)

Urzhar district

- south-east corner of **Alakol' lake**, 3 birds, 08/05/2016 (Shmygalev 2016)
- at **Zhenishke**, 70 km north-east of Sagat, 40 birds, 04/05/2008 (Shcherbakov 2008)
- **Balatuba mountain**, 30 on fields, September 1983 (Starikov 2002)
- 7–8 km south-west of **Karabuta** village, northern foothills of Karabas range, along the lower Laika river, 7 in harvested fields and hayfields, 28/08/2002, 27, 14/09/2002, two flocks of 16 and 20, 28/09/2002, 135–148 in somewhat wider area involving lower Laika river and Ashaly (Atagai, Karabuta, Bugubai, Bakhty, Karabas), 02/10/2002, with 145 counted in same area (with addition of Kokterek village), 15/10/2002 (Berezovikov & Shmygalev 2008); near Karabuta in Tarbagatai range, 1 bird, 13/05/2016 (Shmygalev 2016)
- 8 km east of **Makanchi** village, 8 birds, spring 1981, and 8 km north, fledged chick, late June 1982 (Trutnikov 1986); 10 km south, several seen regularly, summer 1982, 10 km east, 2 birds, mid-January 1983, 10 km north-west, 4 birds, late April 1985 (Starikov 2002); 30 km north, 4 feeding in harvested grain fields, mid-August 1982 (Trutnikov 1986)
- lower **Makanchi river**, 1 on green sedge sward, 12/04/2005 (Berezovikov & Annenkov 2005)
- north side of **Sasykko' lake** (see also under Alakol' district) near Sagat, 2 birds, 19/05/2003, 3, 20/05/2003 (Belyalov & Gavrilov 2003); 58 birds, 14–30/03/2016 (Berezovikov *et al* 2016, Filimonov & Berezovikov 2016); 6, 27–28/03/2017 (Filimonov & Berezovikov 2017b); 7, 15/03/2018 (Berezovikov & Filimonov 2018); 24, 16–23/03/2019 (Filimonov & Berezovikov 2019b); between 3 and 8 on 4 different days, March 2020 (Filimonov & Berezovikov 2020b); 4, 25/03/2021 (Filimonov *et al* 2021); unspecified area of northern shore of lake, 31 feeding on locusts *Locusta migratoria*, 02–03/09/2013 (Berezovikov & Filimonov 2016a); 3, 10–12/01/2018 (Filimonov *et al* 2018); 5, 22–25/01/2019 (Filimonov & Berezovikov 2019a); 5 during 90 km drive, 18–21/01/2021 (Filimonov & Berezovikov 2021); 18 km north-east of Sagat, groups of 1, 2 and 8 in dry steppe with shrubby vegetation, patches of salty land and sedge/grass meadows in depressions, 17/05/2008 (Shcherbakov 2008); steppe north of lake at 46° 42' N, 81° 30' E, 3 birds, 14/07/2004 (Zinchenko & Bulgakova 2004); between Sagat and Saryzhol lake, 8 birds on 45 km transect, 12/01/2017 (Filimonov & Berezovikov 2017a)
- south of **Urzhar**, 1 bird, 11/09/2004 (Isabekov 2004)
- by **Ushkata river**, western foothills of Karabas, 25–30 drinking at artesian well in afternoon heat, fledged young in flock, 12/07/2004, and species seen there, 13/08/2004, when reportedly often in groups of 3–4 (Berezovikov & Shmygalev 2008)

Zaisan district

- **Aidapkel'** near Uiden reservoir, 3 birds including a juvenile, summer 1999 (Berezovikov & Levin 2021)
- between **Aktoubas** and Baitagas, pair, August 1982 (Berezovikov & Samusev 2003)
- between **Dau'al** and Karabulak villages, adult in wormwood steppe in eastern foothills of Manrak, 16–17/06/2004 (Berezovikov & Levinskii 2004)
- near **Kamyshzavod**, 1 bird, 20/09/1981 (Berezovikov & Samusev 2003)
- 3 km west of **Kara-Biruk mountain**, 2 wary birds (flight distance 500 m) in clay semi-desert with shrubby vegetation, 26/07/2008 (Shcherbakov 2008)
- near **Karatal**, 2 in fields after first snow, 05–10/11/1984 (Berezovikov & Samusev 2003)
- **Kusty river** valley, 2 birds, 11–15/09/1984 (Berezovikov & Samusev 2003)
- **Mukashi**, just south of Zaisan lake, 2 birds, early April 1997, and 1 bird between Polovinka and Mukashi, May 2000 (Berezovikov & Samusev 2003)
- near **Sarchii** village at eastern edge of Manrak ridge, flocks in vast steppe-like mid-mountain plateau at 1300–1400 m, 1960 (Shcherbakov & Berezovikov 2004)
- **Shilikti valley** (see also under Tarbagatai district), pre-migration flocks so large that 'at any hour of day riding through the valley you can find thousands of them', autumn 1855 (Plotnikov 1893); concentrations in valley and adjacent Manrak when moulting, and even on high plateaus, summer of year(s) unspecified (Berezovikov & Samusev 2003); moulting in

valley, May, in flocks of 10–20(–100), with fledged broods after 20 June moving from desert plain to alpine meadows in watersheds at 1700 m, 1910–1920 (Khakhlov 1928)

- meadows west of **Zaisan lake**, several small groups (2, 3, 3, 4, 7 and 8), with one young (3.8 kg) caught, 04/10/1950 (Berezovikov & Samusev 2003); young female killed at Baklanyi cape on the lake, stomach full of tenebrionid beetles, 28/08/1976 (Egorov & Berezovikov 2006); pair at Volchii cape, mid-May 1981 (Berezovikov & Samusev 2003)
- steppe adjacent to **Zaisan**, flocks of 3–7 birds on 52 km journey, c1950 (Samusev 1977); arable land near the city, 3 birds, 10–15/10/1985 (Berezovikov & Samusev 2003); 7 km from Zaisan at Zhanaturmys, female with chick, summer 1997, female with chick, summer 1998, 4–5, August–September 1999 (Berezovikov & Levin 2021)
- near **Zelenoe** village, south of Kurchum, 18 feeding in hay meadow, 22/09/1981 (Shcherbakov & Kochnev 1986)

Zharma district

- 20 km from **Charsk** station, 2 birds reported by hunter, late June 1981 (Shcherbakov 1986)
- north of **Karakultas mountain** [on Google Maps as Kara-ut-kul’], between Arshaly and Zharma, female with two juveniles in steppe, late August 2000 (Zinchenko 2002)