

The Great Bustard *Otis tarda tarda* is faced with extinction in Iran

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Summary: The Great Bustard *Otis tarda tarda* is a globally threatened species, classified as Critically Endangered in Iran. Its population size has experienced a sharp decline in the last few decades, mainly due to habitat loss associated with agricultural intensification and changes. Recent surveys from 2016–2017 showed that its breeding and wintering populations are strictly confined to some pastures and agricultural lands in Boukan, north-western Iran. Areas supporting the remnant population include Sootav, Se Kanian, Qazlian and Yengija-Albolaq plains, with a rough estimate of 33–35 individuals in spring and 29–33 in winter. Observations over multiple years suggest a total population of around 35–40 individuals in Iran. Urgent conservation measures are warranted by environmental authorities, especially protecting breeding sites, to help prevent the extinction of the Great Bustard in Iran in the coming decades.

INTRODUCTION

The Great Bustard *Otis tarda* is distributed in grassland habitat from the Iberian Peninsula through eastern Asia, but most populations are declining so that today the species is considered Vulnerable by IUCN (BirdLife International 2021). A decade ago the world population was estimated to be around 44 100–57 000 individuals (Alonso & Palacín 2010). Although the Great Bustard was declared a protected species by the Department of the Environment of Iran (DoE 1967), its current status in the country is Critically Endangered (Barati *et al* 2015) and both wintering and breeding populations have sharply declined in number as a result of habitat changes and hunting (Amini Tareh 2000, Barati & Amerifar 2008).

In the past, Iran hosted migratory populations of the subspecies *O. t. tarda* that arrived to overwinter in the north-east of the country, where Razdan & Mansoori (1989) reported 124 birds in 1976. However, Amini Tareh (2000) found no birds in these areas in 1990–1994, and in the last two decades the species was not observed there despite regular monitoring. The only recorded sighting is of a wandering male in Miankaleh wildlife refuge, Mazandaran province, north-central Iran, on 21 January 2008 (Rabiee & Moghaddas 2008).

Breeding populations were previously distributed in north-west and western Iran, in the provinces of West and East Azerbaijan, Kurdistan, Kermanshah and Hamedan (Figure 1). Scott (1971) estimated that 40–100 breeding females remained in the west of the country, and Cornwallis (1983) judged that 40 females remained in 1977. In the mid-1980s this population was estimated at 100–200 individuals (Collar 1985). Based on regular surveys in 1990–1994, Amini Tareh (2000) estimated 60 breeding females and 200–300 wintering individuals in north-western Iran. However, the most recent published data indicated a sharp decline from the 1990s, with only 43–48 individuals remaining in Iran in 2011 (Barati *et al* 2015).

CURRENT RANGE AND POPULATION SIZE

According to our current surveys, data recorded by DoE and also Barati *et al* (2015), Great Bustards have now disappeared from most areas of Iran (Table 1). For example, the most recent observation of Great Bustard in Telesm (Kermanshah province) dates to 1974. In the Qareh Gheshlagh non-hunting area, the major site for Great Bustards in East Azerbaijan province, numbers decreased from 60 birds in 1990 to zero in 2008. In Asad Abad non-hunting area (Hamedan province), the birds counted in 1995 had disappeared by 2004. In recent decades Kurdistan province has been considered one of the most important areas for breeding and wintering populations of Great Bustard, but no records have been confirmed since 2005. Over the same period the species has also disappeared from several traditional areas in West Azerbaijan province.

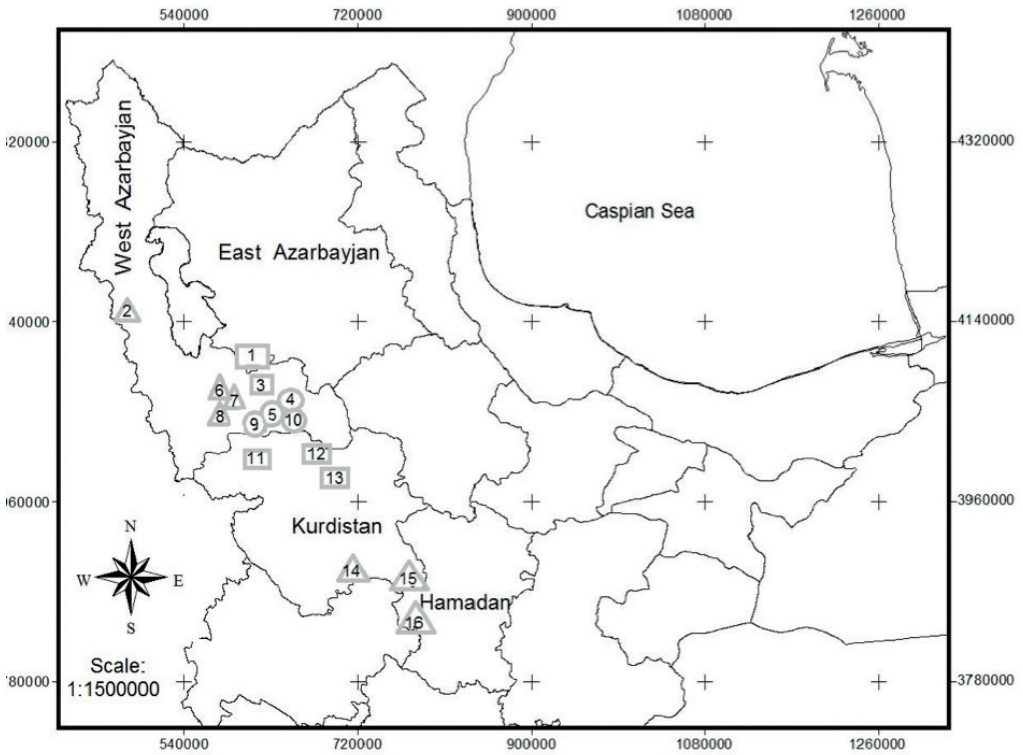


Figure 1. Map showing current and previous areas occupied by Great Bustards in north-west Iran. 1: Qareh Geshlagh, 2: Nazloo, 3: Azad and Bajvand, 4: Se Kanian, 5: Sootav, 6: Hassan Abad, 7: Misalm, 8: Kani Sib, 9: Qazlian, 10: Yengija-Albolaq, 11: Yazibolaghi, 12: Zarrineh Obatou, 13: Gaveshleh, 14: Dashte-Ghaz, 15: Chhar-doli Qorveh, 16: Asad Abad. Map originally published in Barati *et al* (2015); presented here with one minor correction.

- △ Areas where Great Bustards are assumed to be extinct (not observed for at least 10 years)
- Areas with unknown status (not observed for more than 10 years)
- Areas with extant populations (Boukan region)

According to the most recent data from 2016–2017, records in Iran are now restricted to the plains of Sootav, Yengija-Albolaq, Qazlian and Se Kanian, all located around Boukan city, in the Mokryan region in southern West Azerbaijan province, in the north-west of the country (Table 2). The climate is characterised by dry, hot summers and cold winters with moderate rainfall. According to the Meteorology Organisation of Iran, mean annual rainfall and temperature are 370.2 ml and 13.2 C respectively, with most rainfall occurring from November to May. The main crop in these areas is Wheat *Triticum aestivum*, but Chickpeas *Cicer arietinum*, Barley *Hordeum vulgare*, Lentils *Lens culinaris*, Alfalfa *Medicago sativa*, Corn *Zea mays* and Sunflower *Helianthus annuus* are grown as well.

The Sootav plain (Figure 1, site 5, 36° 33–37' N, 46° 08–12' E) is known as a wildlife refuge and is located 4 km north-west of Boukan city. The plain covers an area of about 44–50 km² and is 1410 m asl, adjacent to Shekhlar, Hammamiyan, Gerdi Ghabran, Dongoz and Akhtatar villages (Abdulkarimi *et al* 2010b). Breeding behaviour and nesting were confirmed here from March to June (Abdulkarimi *et al* 2010a). Traditional farming is widespread on the Sootav plain and the fact that it is a remote area with a low human population density makes it favourable as a breeding ground for Great Bustards. Human

Table 1. Last historical records and recent surveys of Great Bustards in western and north-west Iran

Area	Location	Last historical record ¹	2009-2011 ²	Current census (2016-2017) ³
West Azerbaijan				
Azad & Bajvand	20 km NE of Mohabad	3 birds in June 2003, 2 birds in July 2007 ⁷	0	0
Hassan Abad	25 km NE of Mohabad	not confirmed since late 1990s ⁴	0	0
Misalm	26 km W of Boukan	not confirmed since late 1990s ⁴	0	0
Kani Sib	35 km S of Mohabad	2 birds in June 2003 ⁷	0	0
Nazloo	15 km NW of Urmia	7 birds in winter 1994 ⁵	0	0
East Azerbaijan				
Qareh Gheshlagh	15 km SW of Bonab	25 birds in Nov-Dec 2007 ⁷	0	0
Kurdistan				
Chehar doli-Qorveh	15 km SE of Qorveh	not confirmed since 1995 ⁶	0	0
Zarrineh Obatou	15 km N of Divandareh	4 birds in 2004 and 2005 ⁶	0	0
Gaveshleh	17 km NE of Divandareh	8 birds in 2002, 4 birds in 2005 ⁶	0	0
Yazibolaghi	30 km E of Saqqez	3 birds in June 2002, 2 birds in September 2005 ⁶	0	0
Dashte-Ghaz	SW of Dehgolan	not confirmed since late 1995 ⁶	0	0
Hamedan				
Asad Abad	S of Asad Abad	1 bird in 2003 ⁷	0	0
Kermanshah				
Telesm	70 km W & SW of Kermanshah	2 birds in August 1974 ⁷		

¹Last records of Great Bustards in areas of Iran where the species is thought to be extinct, or nearly extinct at present; ²Barati *et al* 2015; ³Data from the authors' recent census, reports from DoE and local people; ⁴reported by local people; ⁵Amini Tareh (2000); ⁶Barati & Amerifar (2008); ⁷Department of Environment of Iran.

disturbance is very low in Sootav compared to other locations, and dry cereal farmlands are common.

Yengija-Albolaq plain (Figure 1, site 10, 36° 26–28' N, 46° 13–17' E) is located in E and SE Boukan region between Yengija, Albolaq and Kahriza villages. The area is about 22 km² and has a mean altitude of 1465 m asl (Abdulkarimi *et al* 2010b). Great Bustards are present on the plain in late summer and throughout the autumn, arriving from Sootav after breeding when juveniles are able to fly (Abdulkarimi & Ahmadi Sani 2012). Birds use the alfalfa and clover farms as a food source in autumn, but a decrease in human presence after the end of agricultural activities in autumn could also explain the higher bustard density during this time (Abdulkarimi *et al* 2010b). Unfortunately urban expansion, road construction and human population have increased in recent years, resulting in habitat loss.

Qazlian plain (Figure 1, site 9, 36° 28–30' N, 46° 08–10' E) is located 4 km south-west of Boukan city and covers an area of about 10 km², with a mean altitude of 1330 m asl. It is surrounded by Jambokha, Qazlian and Bogabasi villages, Bardeh Zard mountain and

Table 2. Breeding and wintering populations of Great Bustards on plains in Boukan, Mokryan region, West Azerbaijan province, Iran (2016-2017).

Season	Number of birds & Date of estimate	Number of sites	Quality of estimate, from 1 (low-quality) to 5 (high-quality)
Breeding			
Sootav	27 (8 ♂♂, 19 ♀♀), April 2017		5
Se Kanian	4 (2 ♂♂, 2 ♀♀), April 2017		5
Qazlian (Bogabasi village)	4 (unknown), March 2017		3
Yengija-Albolaq	2 ♀♀, April 2017		3
<i>Total breeding birds</i>	33–35	4	4
Wintering			
Qazlian	29, February 2017		5
Yengija-Albolaq	18, November 2016		4
<i>Total wintering population</i>	29–33	2	4
Estimated total	35–40 birds		

Simina river. Qazlian plain seems to be less important for bustard breeding now, but according to previous censuses this area hosted flocks during the post-breeding season. Earlier, when farming was traditional, Great Bustards were present in the spring but since the mechanisation of agriculture, introduction of modern irrigation and consequently rising human presence, Qazlian plain has lost its potential as a breeding site. Bustards now use this area from mid-autumn to early March. They feed on the leaves and roots of cultivated plants such as Canola *Brassica* spp. and Alfalfa. Observations suggest that Qazlian holds a significant population of Great Bustards in winter, probably owing to the lower altitude of this plain and accessible food sources (Abdulkarimi *et al* 2010a).

Se Kanian plain (Figure 1, site 4, 36° 39–45' N, 46° 1–17' E) is a non-hunting area located 24 km north of Boukan, covering an area of about 45 km², with a mean altitude of 1430 m asl. The plain is surrounded by Se Kanian, Qolar and Qormish villages. Although the area has some favorable characteristics such as vast expanses of dry lands, traditional agriculture, and low human population density, it is used only by a small number of Great Bustards as a breeding site. Hunting, grazing sheep and weak law enforcement by the Department of Environment could be resulting in disturbance to Great Bustards and habitat degradation there (Abdulkarimi & Ahmadi Sani 2012).

The breeding population of the Great Bustard in Boukan region has declined in recent decades (Abdulkarimi *et al* 2010a). In our most recent survey, conducted in April 2017, we observed only 4 adult bustards (2 males, 2 females) in Se Kanian and 27 adult breeding bustards (8 males, 19 females) in Sootav. Reports by farmers in April 2017 indicate that 2 adult bustards may exist at Yengija-Albolaq and 4 adult bustards at Bogabasi village (near Qazlian).

Previous studies indicated that breeding and wintering areas in Boukan overlap considerably (Abdulkarimi *et al* 2010b, Abdulkarimi & Ahmadi Sani 2012, Barati *et al* 2015). Current studies reveal that they are the same and that Great Bustards do not immigrate from other areas in winter (pers obs). The maximum number of birds observed during winter censuses was 18 at Yengija-Albolaq in November 2016, and 29 at Qazlian in February 2017.

During my regular monitoring surveys, when Great Bustards were observed in Sootav (for example in spring), the species was not recorded in other areas. Conversely, when

flocks (male and females) were observed in Qazlian in winter, Great Bustards were not found elsewhere. The flocks observed at Sootav may therefore have been the same birds present at Qazlian. The short distances between these sites (c12 km) make movements between them highly likely.

THREATS AND CONSERVATION RECOMMENDATIONS

Changes in the structure of farming practices have been shown to be the most important factor affecting the quality of breeding areas of the Great Bustard in Iran (Barati & Amerifar 2008, Abdulkarimi *et al* 2010b). It seems that advanced irrigated agroecosystems are the main cause of Great Bustard population loss, especially during the breeding season. Destruction of grasslands or pasture and their transformation to cultivated areas, industrial growth, and increasing human numbers are also among the main reasons for the rapid declines in Great Bustard populations in Iran. Other factors during the breeding season that may reduce habitat quality include human disturbance during agricultural activities, grazing sheep, hunting (targeting a variety of species), and the presence of domestic dogs, wolves, foxes and jackals.

Despite conservation measures implemented by the DoE (Boukan office), the population of Great Bustards at Sootav, Se Kanian and other sites has declined or, at best, not increased compared to the previous decade. This raises questions about the effectiveness of these conservation measures.

In conclusion Great Bustards currently only remain in the Boukan region. The maximum number of Great Bustards in 2017 is estimated to have been 35–40 individual birds. This represents a decline compared to 2011 numbers (Barati *et al* 2015). Based on these counts, the species is declining rapidly and is considered critically endangered. Urgent conservation measures are now needed by environmental authorities and breeding sites should be protected effectively, otherwise the species faces extinction in Iran in coming decades.

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