Recent status and distribution of the Great Bustard, *Otis tarda*, in Turkey

(Aves: Otidae)

Recep Karakaş, Ferdi Akarsu

Abstract. The records of the Great Bustard, *Otis tarda* (Linnaeus, 1758), in Turkey from the period 1989-2008 were compiled and analysed to update a previous assessment published in 1989. Despite a sharply increased birdwatching activity in Turkey, only 106 records could be found from published and unpublished sources for this 20-year period. 870 of the total of 1066 individuals were recorded during the breeding season and 196 in the non-breeding season. The population is split into two subpopulations; one focused in Inner Anatolia and the other in East and South-east Anatolia, with the latter exceeding the Inner Anatolian population in numbers. Both subpopulations have declined significantly since the 1989 assessment, although, in the absence of comprehensive field surveys, it is not possible to quantify the degree. As several breeding sites have been abandoned, the size of the distribution area has shrunk in recent decades. In particular, the species is no longer present at several sites situated at the edge of the distribution area. The species winters in south-eastern Anatolia and in small numbers also in the large river deltas on the Black Sea and Mediterranean coasts. However, the winter population is also sharply decreasing. The Turkish Great Bustard population is much smaller than predicted, and apparently comprises 200-300 breeding pairs at the most.

Key words: Great Bustard, Otidae, conservation, population decline, distribution, conservation management, habitat, Turkey.

Introduction

The Great Bustard (*Otis tarda* Linnaeus, 1758) is a globally-threatened species, classified as "vulnerable" by IUCN (IUCN 2008). The species has been showing population declines across most of its range, mostly owing to the loss and fragmentation of its habitat (CRAMP 1998, BIRDLIFE INTERNATIONAL 2008), except in Iberia, where populations are considered stabilised, and in Russia, where an increase has been reported (BIRDLIFE INTERNATIONAL 2004). Great Bustards are generally declining because of increasing use of steppe areas for arable farming, modernisation of agriculture and irrigation methods, changes in land-use, pesticides and intensive agricultural activities (CRAMP 1998). The current world population is estimated at about 45,000 individuals, while Turkey's population was estimated as 3000-4000 by GORIUP & PARR (1985), 800-3000 by KOLLAR (1996), 145-4000 by KASPAREK & BILGIN (1996), 764-1250 by KILIÇ & EKEN (2004) and about 800-3000 individuals by BIRDLIFE INTERNATIONAL (2008). The Turkish population is the third or fourth largest in Europe after Spain and Russia (KOLLAR 1996). The species occurs in Turkey in two discrete sub-populations, one in Inner Anatolia and the inner part of Southern Anatolia, the other in Eastern and South-eastern Anatolia (KASPAREK 1989, GÜRKAN et al. 2003).

KASPAREK (1989) compiled all the Turkish Great Bustard records from published and un-

Zoology in the Middle East 48, 2009: 25–34.
ISSN 0939-7140 © Kasparek Verlag, Heidelberg

published sources up to 1989, and analysed the breeding and winter distribution pattern. Based on this study, *Doğal Hayatı Koruma Derneği* (DHKD, Society for the Protection of Nature) and *Doğa Derneği* (DD, BirdLife partner in Turkey) conducted a few surveys to assess and update the status of the bird in Turkey, and to develop a national species action plan (DOĞA DERNEĞI 2004, 2005, GÜRKAN et al. 2003, HEUNKS et al. 2001). Nevertheless, reliable numbers on the breeding and wintering populations are still not available, and population trends are still unknown. Based on these studies, we have attempted to update information on the status, including numbers and distribution. The aim is to show changes in the population status since KASPAREK (1989) and to assess the current status. For this purpose, we compiled published and unpublished records for which locality, date and numbers are available for the period (1989)1990-2008. Factors influencing the level of the Turkish population are discussed.

Material and methods

All Turkish Great Bustard records from the period (1989) 1990-2008 were compiled to analyse the status of the species. Records were collected from all published studies about distribution of birds in Turkey, including the "Bird Reports" published by the Ornithological Society of the Middle East and unpublished material available at www.kusbank.org, a database run by *Doğa Derneği*. Our own unpublished records from the south-eastern Anatolia region were also included. All records were evaluated and mapped with the aid of a GIS (Geographical Information System) program (ArcMap 9.2), together with habitat data. Records from April to July were regarded as breeding season records and records from December to February as wintering records.

Results

Breeding distribution

Annex 1-2 list the Great Bustard records available for Turkey from the period 1990-2008. Out of the 1066 individuals reported, 870 were from the breeding season and 196 from the non-breeding season. Most breeding season records are from eastern Anatolia (66.8%), followed by Inner Anatolia (29.9%), Aegean region (2.2%) and south-eastern Anatolia (1.0%). The main breeding populations are found in the open rangelands and steppes of the East and Inner Anatolia regions, while the population in the Aegean region seems to be smaller than expected. Also, there is a small breeding population in the northern part of the south-eastern Anatolia region, where some steppe habitats are found similar to those that are characteristic for East and Inner Anatolia. The species was not reported during the breeding season from European Turkey (Thrace).

Marmara Region: Although not reported from the breeding season, a record at Manyas Lake on 31 March 1996 may indicate that the species was still breeding in the region until the 1990s. Breeding season records had been reported in former studies (KASPAREK 1989), but there are no recent records despite the fact that especially the area around Manyas Lake (Bird Paradise) is a very popular birdwatching area.

Black Sea Region: There is only one breeding season record from this region, and this is from a small river delta (Fırtına area) in the northeast that is apparently not suitable for breeding.

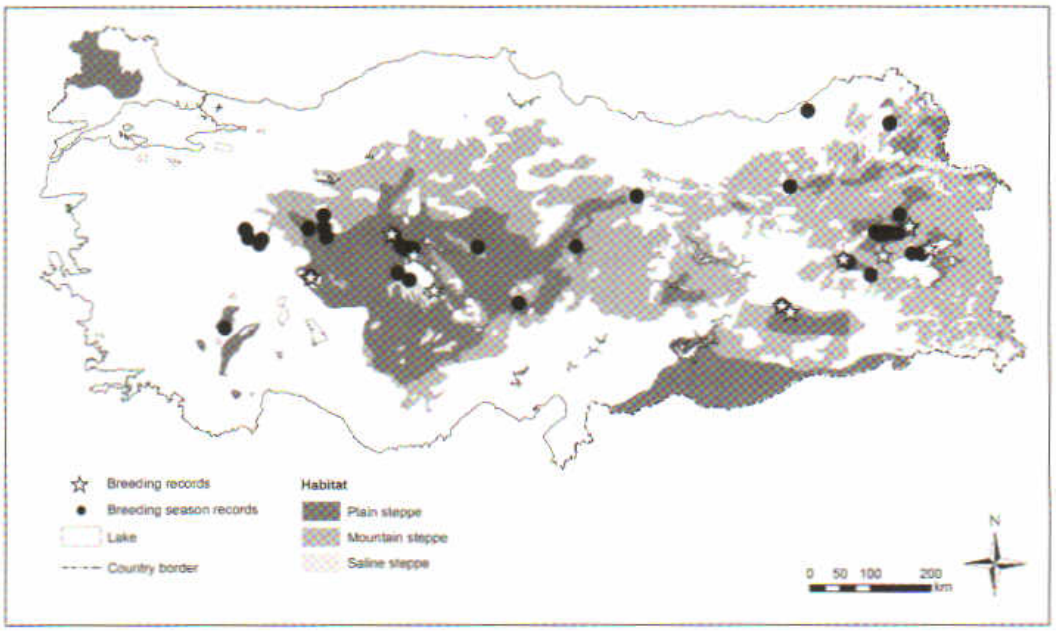

Fig. 1. Breeding distribution of the Great Bustard in Turkey. Dots indicate breeding season records, stars confirmed breeding.

Aegean Region: All six breeding season records are from the inner part of region close to the Central Anatolia region, mainly from the Kütahya province. In spite of a lack of clear evidence for breeding, the species may actually breed in Altıntaş Plain. Although the species was reported from Afyon Plain and Marmara Lake (Salihli) in earlier studies (KASPAREK 1989), it was not reported there during 1990-2008. Even at Acıgöl, a former stronghold of the species (KASPAREK 1989), the most recent record is from 1991, and the Great Bustard can be regarded as extinct there. The population in this region seems to be small and has apparently almost disappeared in the last two decades.

Inner Anatolia: Thirty-two breeding season records highlight the importance of this region as a reproduction area. The population is concentrated in the plains around Tuz Gölü where HEUNKS et al. (2001), in a survey conducted in 2000, found a total of 83 birds in four different areas, including three different display grounds (altogether 32 displaying males around Kulu Gölü and in the north-west and south-east of Tuz Gölü). Other scattered records throughout the reporting period confirm the presence there of the species. Further potential breeding areas in Inner Anatolia include the north side of Akşehir Gölü (Akşehir prov.), Aliken Plain (Kütahya prov.), Polatlı (Ankara prov.), Sultansazlığı (Kayseri prov.), Ballıhisar and Balıkdamı (Eskişehir prov.), Şarkışla and Tödürge Gölü (Sivas prov.) and around Seyfe Lake (Kırşehir prov.). No breeding season records are available for the southern part of Konya basin where the species was reported before the 1990s.

Mediterranean Region: Despite former breeding records (KASPAREK 1989), there are no breeding season records in this region from our study period.

East Anatolia Region: There are 34 breeding season records between 1990 and 2008 and this region seems to hold the most important breeding population in the country. The species

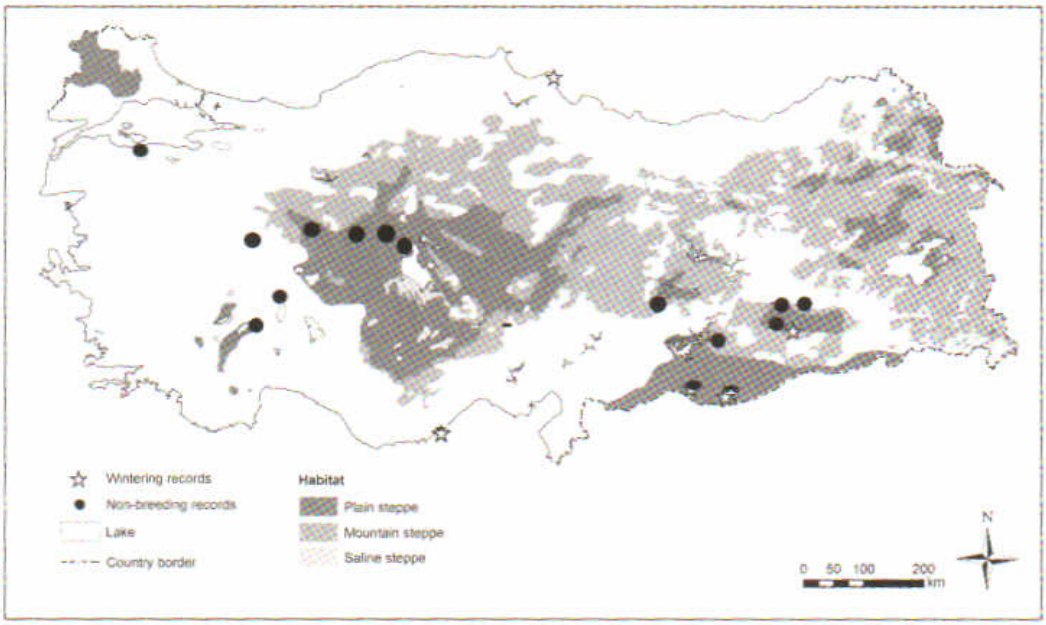

Fig. 2. Distribution of the Great Bustard in Turkey outside the breeding season. Stars indicate wintering records (December – February).

is concentrated in the eastern half of the region, mainly around Muş, Bitlis and the northern part of Van Lake. In a survey carried out by DHKD and DD in 2002, 252 individuals were counted, with the highest concentrations in the Bulanık Plain. Although this area holds a large portion of the breeding population in the region, there is widespread agricultural intensification in the plain together with many irrigation schemes and their effects (BALMER & KIRWAN 2003, GÜRKAN et al. 2003). Other breeding or potential breeding areas include the Muş Plain and Yarımada near Bitlis, where displaying males were observed.

South-eastern Anatolia: There are four breeding season records from the northern part of this region, mainly around Diyarbakır, where breeding was confirmed by KILIÇ & KARAKAŞ (2005). A recent breeding record comes from the area between Kağıtlı and Mermer on 20 June 2008, when N. KARAKAŞ observed one pair with two chicks. Although KASPAREK (1989) mentioned the species as breeding in the southern part of this region (between Akçakale and Nusaybin), there is no recent indication from these areas.

Winter distribution

Most winter records are from the south-east (84.7%), followed by the Mediterranean region (11.2%) and the Black Sea regions (4.1%) (Annex 2, Fig. 2). The Great Bustard thus spends the winter mainly in the south-eastern region, but occasionally also in the river deltas of the Black Sea and Mediterranean regions.

The winter records from the south-east come mainly from the Ceylanpınar and Viranşehir areas. This region supported a large wintering population of Great Bustards until the early

1980s, with up to about 1000 individuals. In a survey conducted by *Doğa Derneği* in this region in 2004 for determining the wintering population, only 83 individuals were recorded (DOĞA DERNEĞI 2004).

Discussion and conclusions

The Great Bustard is a globally threatened species and has suffered from large population declines throughout its range, including Turkey, mainly as a result of habitat loss, human disturbance and hunting (KOLLAR 1996). It is a flagship species for the conservation of steppe, grassland and open arable areas in Turkey (DOĞA DERNEĞI 2005). It has been classified as endangered in the Red Data Book of Birds of Turkey (KILIÇ & EKEN 2004). There are many threats to the species and to the main sites that it uses. There are also still large gaps in our knowledge of the distribution, habitat selection and movements of the species in Turkey.

The breeding population in Turkey is split into two subpopulations, the one being focused in East and the other in Inner Anatolia. The population in the east extends somewhat to the south-east (Diyarbakır area), while the Inner Anatolia population extends somewhat to the Aegean region (Altıntaş plain in Kütahya province and Acıgöl). This distribution pattern confirms in principal the findings by KASPAREK (1989), but the size of the distribution area has shrunk since then, particularly in Inner Anatolia. The results of this study also confirm an increasing isolation of the breeding populations in Inner, East and South-east Anatolia as already suggested by ÖZBAĞDATLI & TAVARES (2006).

KASPAREK (1989) identified a total of 83 major bustard sites that included many breeding sites. Most of these sites no longer harbour this species. There are, for example, no recent records which would indicate breeding in Thrace or elsewhere in the Marmara region. The species can be regarded as extinct in the wider surroundings of Manyas Gölü (Karacabey Ovası) and other places such as Balıkesir plain and the Meriç Delta. The species has apparently also disappeared from Afyon plain and Karamık Marshes in the Aegean region. In the nearby areas around Akşehir Lake, the species was last recorded in 1992. Even at Acıgöl, a former stronghold of the species, the most recent record is from 1991, and the Great Bustard can be regarded as extinct there. For south-eastern Anatolia, there is no longer evidence that the species breeds in the Ceylanpınar plains, where it was still breeding in the 1980s.

KASPAREK & BILGIN (1996) gave a population size of about 145-4000 pairs, while KILIÇ & EKEN (2004) estimated 764-1250 individuals as breeding in Turkey. The population estimate given by KILIÇ & EKEN (2004) for Turkey is smaller than the number given by KOLLAR (1996). According to the results of this study, the total population of the species in Turkey may be smaller than previously estimated, as a cumulative total of only 1066 individuals was recorded between 1990 and 2008, despite the sharp increase in birdwatching activity throughout the country and despite a few surveys in the main breeding areas. The present data do not allow us to make a reliable population estimation. Based on the fragmentary records and taking into account the absence of systematic surveys, we believe that the entire Turkish breeding population is in the range on 200-300 pairs at the most. The size of the east Anatolian subpopulation apparently exceeds that of the Inner Anatolian subpopulation. There are no figures available to substantiate this precisely, but the numbers of birds there are usually higher compared to Inner Anatolia.

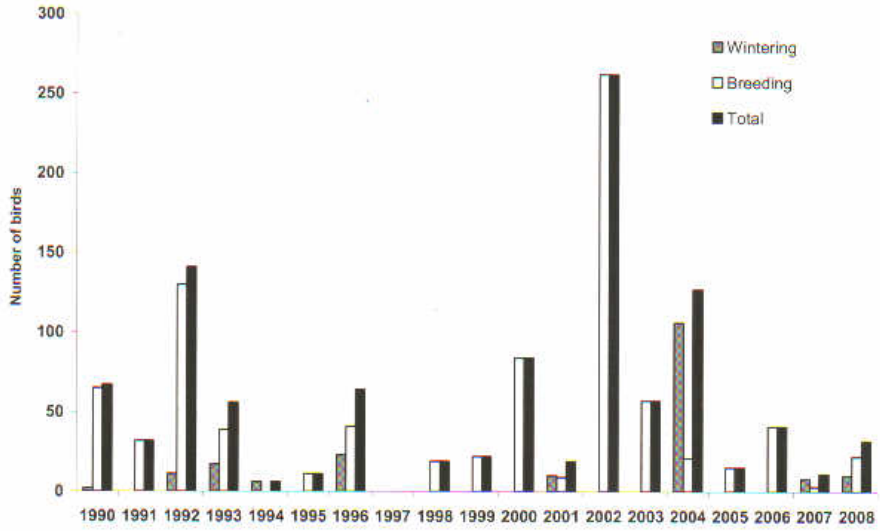

Fig. 3. Number of Great Bustard records per year in Turkey between 1990 and 2008.

The number of Great Bustards recorded in Turkey between 1990 and 2008 (Fig. 3) shows a high annual fluctuation, and because of the high fluctuation in observation activity this graph does not sufficiently reflect the population trend. The peak numbers in 2002 and 2004 are due to surveys of the breeding population in the east (2002) and the winter population in the south-east (2004).

The number of birdwatchers and local birdwatching clubs has increased considerably in Turkey during recent years, mainly since the late 1990s and early 2000s. Networks for the exchange of information have been established with the support of *Doğa Derneği* (DD) and *Doğal Hayatı Koruma Derneği* (DHKD), but relatively little information on the Great Bustard has become available. This can be taken as strong evidence that the species has actually become very rare and is not just due to a lack of information. 106 records of a birdwatchers' favourite species over 20 years is strong evidence for the rarity of the species today.

Winter records are available from south-east Anatolia and the Kızılırmak delta on the Black Sea coast and the Göksu delta on the Mediterranean coast. The Çukurova plain on the Mediterranean or the Yeşilırmak Delta on the Black Sea coast would provide suitable habitats for wintering, but actual records are absent. Considerable numbers still wintered in the border regions of South-east Anatolia in the early 1980s.

The major threat to the species in Turkey is habitat loss, mostly due to intensive agriculture (KIRWAN et al. 2008a). The farming of the steppes and intensive grazing are causing a reduction of available habitat and the isolation of suitable feeding and breeding patches. In addition, the pesticides and fertilisers used in the intensification of agriculture may be decreasing the breeding success. Overgrazing, illegal hunting and disturbance by humans are also significant problems. Collision with powerlines may be also a threat, but its impact is unknown (ÖZBAĞDATLI & TAVARES 2006). Conservation efforts should be focused on Key Biodiversity Areas (KBA) that hold the biggest breeding and wintering groups (see EKEN et al. 2006 for the KBA boundaries). 64 of 79 breeding and 18 of 24 wintering records in Turkey have been reported in KBAs. Moreover, out of the total of 106 Turkish bustard records, 82 or 80% have been reported in KBAs. The Great Bustard population of Turkey thus exists

mainly in KBAs and conservation efforts should be concentrated there. Although some of the KBAs where Great Bustards occur have legal protection status, there are no specific conservation efforts for this species.

Conservation measures needed for the species should focus on active habitat management for the species at key sites (the main breeding and wintering areas), and on maintaining certain farming systems. Local cooperation is required to preserve the species and its habitats, and local awareness should be ensured through education programmes. The Upper Murat river basin seems to be one of the most critical breeding sites, and should therefore receive special attention (see ÖZBAĞDATLI & TAVARES 2006). The area around Tuz Lake also holds important parts of the breeding population and needs special attention. Direct habitat management for the conservation of this species, and carried out in cooperation with the farmers, should be an immediate priority.

Further census work is needed to confirm and to elaborate further details on the status of the species in some areas. Countrywide surveys are needed. However, taking limited resources into account, we recommend that such surveys concentrate in the main breeding areas. Regular surveys should be made at least in Inner Anatolia (mainly around Tuz lake), the East Anatolia region (Bulanık Plain, Bitlis and northern part of Van lake, including Patnos) and the South-eastern Anatolia region (mainly Diyarbakır). Some locations in the South-eastern Anatolia region (Ceylanpınar, Akçakale and Bismil areas) should also be surveyed regularly for the wintering population. This should be possible with the help of local birdwatching clubs.

The Great Bustard lives in dry agricultural areas, and its status is highly dependent on agricultural practices although it previously lived in the steppes (KOLLAR 1996). In conclusion, to ensure growth or to maintain the population of the species in Turkey, the European experience on the conservation of the species now needs to be transferred to this country, and strict habitat conservation measures should be implemented, like those in the Iberian Peninsula which holds the greatest part of the world's breeding population and which is associated with the implementation of nature conservation measures and land use management practices.

Acknowledgements. We would like to thank Dr Max KASPAREK, Prof. Dr Murat BIRICIK and José TAVARES for their help and for comments on earlier drafts of the manuscript.

References

BALMER, D. & G. M. KIRWAN (2003): News and information. – Sandgrouse 25: 4-7.

BIRDLIFE INTERNATIONAL (2004): Birds in Europe: population estimates, trends and conservation status. – BirdLife Conservation Series No. 12, BirdLife International, Cambridge (U.K.).

BIRDLIFE INTERNATIONAL (2008): Species factsheet: *Otis tarda*. Downloaded from www.birdlife.org on 17/11/2008.

BRADSHAW, C. G. & G. M. KIRWAN (1994): The ornithological importance of the Aksehir Gölü wetlands, Central Plateau, Turkey. – Sandgrouse 16(2): 118-138.

CRAMP, S. (1998): The complete birds of the Western Palaearctic [CD-ROM version]. – Oxford.

DOĞA DERNEĞI (2004): Great Bustard wintering survey in south-eastern Turkey, 11–21 December 2004. – Unpublished Report, Doğa Derneği, Ankara.

DOĞA DERNEĞI (2005): The conservation of Great Bustard in Important Bird Areas of Turkey. – Unpublished Report, BirdLife International European Division & Doğa Derneği, Ankara.

EAMES, J. (1991): More selected bird observations from Turkey: spring and summer 1990. – Bulletin of the Ornithological Society of the Middle East 27: 29-31.

EKEN, G., M. BOZDOĞAN, S. İSFENDIYAROĞLU, D. T. KILIÇ & Y. LISE (Eds) (2006): Türkiye'nin Önemli Doğa Alanları [Turkey's Key Biodiversity Areas]. – Doğa Derneği, Ankara.

GORIUP, P. D. & D. F. PARR (1985) Results of the ICBP bustard survey of Turkey, 1981. – Bustard Studies 2: 77-97.

GÜRKAN, Z., S. BEKIR & N. ÖZBAĞDATLI (2003): Toy Koruma Projesi, Doğu Anadolu Bölgesi Araştırma Raporu [Great Bustard Conservation Project: East Anatolia Survey Report]. – Doğal Hayatı Koruma Derneği, İstanbul.

HEUNKS, C., E. HEUNKS, G. EKEN & B. KURT (2001): Distribution and current status of Great Bustard (*Otis tarda*) in the Konya Basin, Central Turkey. – Sandgrouse 23 (2): 106-111.

IUCN (2008): 2008 IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded 17/11/2008.

KASPAREK, M. (1989): Status and distribution of the Great Bustard and the Little Bustard in Turkey. – Bustard Studies 4: 80-113.

KASPAREK M. & C. C. BILGIN (1996): Kuşlar (Aves). In: A. KENCE & C. C. BILGIN (Eds), Türkiye Omurgalılar Tür Listesi [List of Turkish Vertebrates]. – Tübitak, Ankara, p. 27-87.

KILIÇ, D. T. & G. EKEN (2004): Türkiye'nin Önemli Kuş Alanları – 2004 Güncellemesi [Turkey's Important Bird Areas – 2004 Update]. – Doğa Derneği & BirdLife International, Ankara.

KILIÇ, A. & R. KARAKAŞ (2005): Recent observations on the Great Bustard, *Otis tarda*, in Southeastern Anatolia. – Zoology in the Middle East 35: 99-102.

KIRWAN, G. M., K. BOYLA, P. CASTELL, B. DEMIRCI, M. ÖZEN, H. WELCH & T. MARLOW (2008a): The birds of Turkey. – London, 512 pp.

KIRWAN, G. M. & R. P. MARTINS (1994): Turkey Bird Report 1987–91. – Sandgrouse 16: 76-117.

KIRWAN, G. M. & R. P. MARTINS (2000): Turkey Bird Report 1992–1996. – Sandgrouse 22: 13-35.

KIRWAN, G. M., M. ÖZEN & B. DEMIRCI (2008b): Turkey Bird Report 2002–2006. – Sandgrouse 30: 166-189.

KIRWAN, G. M., M. ÖZEN, B. KURT & R. P. MARTINS (2003): Turkey Bird Report 1997–2001. – Sandgrouse 25: 8-31.

KOLLAR, H. P. (1996): Action plan for the Great Bustard (*Otis tarda*) in Europe. p. 245-260. In: B. HEREDIA, L. ROSE & M. PAINTER (Eds), Globally threatened birds in Europe action plans. – Council of Europe Publishing, Strasbourg.

ÖZBAĞDATLI, N. & J. P. TAVARES (2006): The situation of Great and Little Bustard in Turkey. In: D. LEITAO, C. JOLIVET, M. RODRIGUEZ & J. P. TAVARES (Eds), Bustard conservation in Europe in the last 15 years: current trends, best practice and future priorities. – RSBP/Birdlife, UK, p. 45-49.

ÖZEN, M. & B. KURT (2001): Türkiye'nin Kuşları - 2000 Yılı Kuş Gözlem Raporu [Turkey's Birds: bird observation report for 2000]. – Türkiye Doğal Hayatı Koruma Derneği Yayını, İstanbul.

WELCH, H. J. (Ed.) (2004): GAP Biodiversity Research Project 2001-2003. Final Report. – DHKD (Doğal Hayatı Koruma Derneği), Istanbul.

Authors' addresses: Dr Recep Karakaş, Dicle University, Science and Art Faculty, Biology Department, 21280 Diyarbakır, Turkey. – Ferdi Akarsu, Doğa Derneği, Hürriyet Cad. No: 43/12, Dikmen, Ankara, Turkey. – E-mail: rkarakas@dicle.edu.tr.

Annex

Annex 1. Breeding season records (from April to July) of the Great Bustard, *Otis tarda*, in Turkey between 1990 and 2008. Anat. = Anatolia, R. = region.

Region	Location	Date	N	Source / Observer
Black Sea R.	Rize: Fırtına river mouth	20.04.1993	1	Kirwan & Martins (2000)
Aegean R.	Denizli: Gökçek (near Acıgöl)	03.06.1991	1	Kirwan & Martins (1994)
	Kütahya - Altıntaş Plain	06.04.1995	11	Kirwan & Martins (2000)
		07.04.2002	1	S. Bekir, B. Kurt, O. Can et al.
		07.04.2002	2	S. Bekir, B. Kurt, O. Can et al.
	Kütahya: Altıntaş Plain (Kuyucak)	06.04.2002	2	S. Bekir, B.Kurt, O.Can et al.
	Kütahya: Altıntaş Plain (Çayırbaşı)	06.04.2002	2	S. Bekir, B. Kurt, O. Can et al.
Inner Anat.	Ankara: Çöl Lake	02.06.1996	1	Kirwan & Martins (2000)
	Eskişehir: Balıkdamı	16.04.1996	1	Kirwan & Martins (2000)
	Eskişehir: Ballıhisar	27.06.2004	1	G. Güven
	Kayseri: Sultansazlığı	22.04.2005	4	Kirwan et al. (2008b), A. Bal
		22.06.2005	7	A. Bal
	Kırşehir: Seyfe Lake	30.04.1996	3	Kirwan & Martins (2000)
	Konya: north side of Akşehir Lake	21.04.1992	3	Bradshaw & Kirwan (1994)
		03.05.1992	2	Bradshaw & Kirwan (1994)
	Konya: Kulu Lake	18.04.1996	1	Kirwan & Martins (2000)
		27.04.1999	1	C. Mroczko
		28.04.1999	1	C. Mroczko
		08.04.2001	8	Kirwan et al. (2003)
		14.04.2001	1	Kirwan et al. (2003)
		28.04.2007	1	B. Kurt
	Konya: Konya Basin	09.05.1998	1	Kirwan et al. (2003)
		10.05.1998	3	Kirwan et al. (2003)
		08.06.1998	3	Kirwan et al. (2003)
		10.06.1998	1	Kirwan et al. (2003)
		21.06.1998	5	Kirwan et al. (2003)
		23.06.1998	1	Kirwan et al. (2003)
		25.06.1998	2	Kirwan et al. (2003)
		18.07.1998	3	Kirwan et al. (2003)
		16.06.1999	9	Kirwan et al. (2003)
		17.06.1999	11	Kirwan et al. (2003)
	Konya: NW Tuz Lake	8-29.4.2000	31	Heunks et al. (2001)
	Konya: SW Tuz Lake	8-29.4.2000	1	Heunks et al. (2001)
	Konya: SE Tuz Lake	8-29.4.2000	33	Heunks et al. (2001)
	Konya: Kulu Lake	8-29.4.2000	18	Heunks et al. (2001)
	Konya: E of Cihanbeyli	04.06.2002	1	Kirwan et al. (2008)
	Polatlı: betw. P. and Ankara	05.05.2004	15	Doğa Derneği (2005)
	Kütahya: Aliken Plateau	13.05.1993	31	Kirwan & Martins (2000)
		01.05.1996	35	Kirwan & Martins (2000)
		23.04.2006	19	Kirwan et al. (2008b)
	Sivas: Tödürge Lake	02.06.1993	1	Kirwan & Martins (2000)
	Sivas: Başören nr. Şarkışla	01.05.2002	1	S. Bekir, Ö. Cırık
SE Anatolia	Diyarbakır: university campus	26.04.2004	2	M. Biricik
	Diyarbakır: Alçık	01.06.2004	1	Kılıç & Karakaş (2005)
		09.04.2007	2	R. Karakaş
	Diyarbakır: Betw. Kağıtlı & Mermer	20.06.2008	4	N. Karakaş
E Anatolia	Ağrı: Patnos Plain	1-5.05.2002	20	Gürkan et al. (2003)
	Ağrı: Tutak	18.05.2002	2	Gürkan et al. (2003)
	Ardahan: SW of Ardahan	17.05.2002	1	Kirwan et al. (2008b)
	Bitlis: Korkut - Güroymak	29.05.1990	1	Kirwan & Martins (1994)
	Bitlis: Ahlat - Nazik / Ovakışla	30.05.1992	1	Kirwan & Martins (2000)
	Bitlis: Yarımada village	07.05.2002	16	Gürkan et al. (2003)
	Bulanık: Sultanlı village	01.05.2003	2	E. Per
	Bulanık - Malazgirt Plains	24.05.2008	1	Ş. Esin

Erzurum: Karasu Plain	23.05.2002	7	Gürkan et al. (2003)
Muş - Bulanık: Balatos	19.05.1990	8	Kirwan & Martins (1994)
	12.06.1990	1	Kirwan & Martins (1994)
Muş: Bulanık	13.05.1992	68	Kirwan & Martins (2000)
	30.05.1992	30	Kirwan & Martins (2000)
	26.05.1993	1	Kirwan et al. (2003)
	27.05.1993	4	Kirwan & Martins (2000)
	03.06.1993	1	Kirwan & Martins (2000)
	28.04.2002	145	Gürkan et al. (2003)
	03.05.2002	11	Gürkan et al. (2003)
	19.05.2008	2	Ş.Esin
Muş	23.05.2008	14	Ş. Esin
Muş: Bulanık: Kotanlı village	29.04.2003	4	E. Per
	30.04.2003	51	E. Per
Muş Plain	03.06.2006	5	Kirwan et al. (2008b)
Muş: TIGEM farm	02.05.2002	46	Gürkan et al. (2003)
	29.06.2006	5	Ö. Döndüren
Muş: betw. Muş and Rüstemgedik	17.06.2005	4	I. Richardson
Muş: Malazgirt Plain	24.07.2000	1	Kirwan et al. (2003)
Muş: Malazgirt: betw. M. and Bulanık	29.04.2002	5	Gürkan et al. (2003)
Van: Göldüzü (Arin Lake)	04.07.1990	23	Eames (1991)
	05.07.1990	32	Eames (1991)
	26.06.1991	31	Kirwan & Martins (1994)
	23.06.1992	14	Kirwan & Martins (2000)
	25.06.1992	12	Kirwan & Martins (2000)
	08.06.2006	12	Kirwan et al. (2008b)

Annex 2. Non-breeding records of the Great Bustard in Turkey between 1990 and 2008. Winter records between December and February are shown in **bold**.

Region	Location	Date	Total	Source / Observer
Marmara R.	Manyas Lake	31.03.1996	4	Kirwan et al. (2003)
Mediterranean	Göksu Delta	**12.01.1990**	2	Kirwan & Martins (1994)
		03.01.1992	9	Kirwan & Martins (2000)
		16.03.1992	2	Kirwan & Martins (2000)
	Eğirdir Lake	22.03.1993	5	Kirwan & Martins (2000)
	Burdur Lake	**08.02.1994**	6	Kirwan & Martins (2000)
Black Sea R.	Kızılırmak Delta	**26.12.1993**	4	Kirwan & Martins (2000)
Aegean R.	Kütahya - Altıntaş Plain	30.11.1993	8	Kirwan & Martins (2000)
Inner Anatolia	Eskişehir: Aliken Plateau	21.03.1996	19	Kirwan & Martins (2000)
	Konya: Kulu Lake	17.03.2001	8	Kirwan et al. (2003)
	Konya: Uyuz Lake	25.03.2001	2	Kirwan et al. (2003)
	Ankara: Betw. A. & Polatlı	Nov 2004	15	Doğa Derneği (2005)
SE Anatolia	Diyarbakır: Alçık	14.03.2004	5	Kılıç & Karakaş (2005)
		31.03.2004	2	Kılıç & Karakaş (2005)
	Diyarbakır: university campus	20.03.2004	1	M. Biricik
	Diyarbakır: Yenidoğan – Tavuklu	18.09.2004	2	Kılıç & Karakaş (2005)
	Diyarbakır: Bismil - Kazancı	**19.12.2004**	15	E. Per
	Diyarbakır: near Hazro	27.03.2007	5	M. Biricik
	Diyarbakır:Büyükkadı	31.08.2008	1	R. Karakaş
	Şanlıurfa: Akçakale	**13.12.2004**	39	K. Erciyas
	Şanlıurfa: Pekmezli - Guaybşehri	**18.12.2004**	2	K. Erciyas
	Şanlıurfa: Guaybşehri	**18.12.2004**	27	E. Per
	Şanlıurfa: SW of town	01.03.2008	2	A. Atahan
	Şanlıurfa - Akçakale	08.03.2008	8	B. Bilgen
	Şanlıurfa: Siverek – Hilvan	**07.02.2007**	1	R. Karakaş, H. Deniz et al.
E Anatolia	Malatya: Akçadağ – Sultansuyu Dam	30.03.2007	2	M. Erturhan