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# DISTRIBUTION, SIZE AND RECENT TRENDS OF THE GREAT BUSTARD *OTIS TARDA* POPULATION IN MADRID REGION, SPAIN

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SUMMARY.—*Distribution, size and recent trends of the Great Bustard* Otis tarda *population in Madrid region, Spain*. Between 1998 and 2002 we carried out five spring censuses of the Great Bustard population of Madrid region. The average count was 1148 individuals (337 males and 811 females) distributed in 13 leks. The species' distribution is highly fragmented, due to the presence of urban areas and infrastructures. Comparison with earlier censuses suggests that the cessation of hunting in 1980 could have favoured a recovery of the population and probably a concentration of birds at the habitat patches less disturbed by urban development. Throughout the last five years numbers have remained approximately stable, with slight oscillations that have affected much more the males than the females. Male mortality is high in Madrid as compared with populations with a more favourable conservation status. The Great Bustard population in Madrid is still highly vulnerable and some leks could be threatened with extinction in a near future, if strict conservation measures are not implemented urgently.

*Key words*: Distribution, Great Bustard, Madrid, *Otis tarda*, population size.

RESUMEN.—*Distribución, tamaño y tendencia de la población de Avutarda Común* Otis tarda *en la Comunidad de Madrid*. Entre los años 1998 y 2002 se llevaron a cabo cinco censos primaverales de las Avutardas Comunes en la Comunidad de Madrid, obteniéndose un promedio anual de 1148 individuos (337 machos y 811 hembras), repartidos en 13 grupos reproductivos o leks. La distribución actual de la especie es bastante fragmentada como consecuencia de la abundancia de áreas urbanizadas e infraestructuras. La comparación con censos anteriores sugiere que la prohibición de la caza en 1980 debió favorecer una cierta recuperación de la población madrileña de Avutardas Comunes, aunque también una concentración en las zonas con hábitats menos degradados. A lo largo de los últimos cinco años la población ha permanecido estable, con ligeras oscilaciones que han afectado más a los machos, los cuales sufren una mayor mortalidad en esta población que en otras con mejores condiciones de conservación. A pesar de las cifras, las Avutardas Comunes madrileñas son muy vulnerables frente al desarrollo urbanístico y de las infraestructuras asociadas, y varios de sus grupos reproductivos se pueden extinguir en un futuro cercano de no adoptarse urgentemente medidas de conservación adecuadas.

*Palabras clave*: Avutarda Común, distribución, Madrid, *Otis tarda*, población.

## INTRODUCTION

The Great Bustard, *Otis tarda*, is a globally threatened species with a wide distribution area ranging from eastern Asia westwards to Iberia and northern Morocco. Although widely distributed, most populations have suffered large declines and some went extinct in relatively short periods during the last century. Therefore, the species is categorised as vulnerable under current IUCN conservation criteria (Collar *et al*., 1994; BirdLife International, 2000).

Approximately half of the estimated world population is found at present in the Iberian Peninsula (*ca*. 24000 birds; Alonso *et al*., 2003). Despite these seemingly large numbers, the species is also considered vulnerable in Spain (Palacín *et al*., 2003). Its future status indeed remains uncertain in many Spanish regions, due to the current habitat fragmentation process caused by changes in agricultural land management and expansion of human infrastructures. This process of habitat degradation is particularly obvious in Madrid region. Madrid

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is the fourth Spanish region in number of Great Bustards, after Castilla y León, Castilla-La Mancha and Extremadura (Alonso *et al*., 2003). However, its Great Bustard population is highly vulnerable due to the rapid increase of infrastructures around the capital city in the last years.

In this paper we present an updated census of the Great Bustard population in Madrid province. We compare our results with earlier censuses, and discuss current demographic trends.

## STUDY AREA AND METHODS

Great Bustards occur east and south of the city of Madrid (Fig. 1), in flat to slightly undulated farmland habitat cultivated mainly with wheat and barley and minor crops of vetch *Vicia* spp., olives and grape vines. Most cereal is grown in a traditional two-year rotation system. In some instances fields may lay fallow for two or more years, while in others irrigation systems have been introduced allowing annual crops. The timing of these farming practices varies and the two-year cycle is not necessarily synchronised among or within farms. Consequently, a dynamic mosaic of ploughed, cereal and stubble habitats is created throughout the region. This farming system is complemented with sheep grazing in stubbles and fallows. The human population of the region amounts to 5.5 million, with ca. 90% concentrated in the city and its immediate surroundings.

We carried out five complete censuses of all known and potential Great Bustard areas in Madrid region in early spring from 1998 to 2002 (respectively, 13-18 March, 1-5 March, 27 March-6 April, 21-26 March, and 11-13 March). March is the best time to census Great Bustards, as both sexes gather at this time of the year at traditional display sites (leks), thus facilitating census work. We knew the lek sites in Madrid region from our own previous censuses carried out in 1987-88 (Alonso *et al*., 1990b) and 1995 through 1998 (Martín, 2001). Earlier studies have shown that previous knowledge of the study area and experience censusing Great Bustards are essential to avoid missing birds during later censuses (Alonso & Alonso, 1990; Alonso *et al*., 1990a). In addition to these lek sites and their immediate surroundings, during the first three years we also surveyed all other areas with habitat potentially suitable for Great Bustards, including those where the species had been cited in earlier times and later disappeared, just to confirm their absence (in total, some 800 km$^2$). To confirm spring census data we made some complementary counts at most lek sites between late March and early May. Finally, we also carried out additional censuses during other seasons of the year. These counts, together with long-term radiotracking data obtained from over 200 individually marked birds since 1995 (*pers. obs*.), helped us understand the dynamics of this metapopulation and confirm spring censuses.

Each census was conducted by two or three teams of two people operating from four-wheel drive vehicles with binoculars and telescopes (20-60x). In order to make results comparable between years, we used predetermined transects as far as possible throughout the study. Surveys began at dawn and ended at dusk, with a pause during midday (10:00-15:00 GMT) because Great Bustards often lie down during hot weather and become difficult to see. We distinguished the following sex and age classes: 1) non-juvenile males: all males older than one year, including immature and adult birds; 2) juvenile males: males hatched in the previous year; 3) females: all females, including young and old ones, as in March it is not possible to distinguish ages among females.

## RESULTS

Table 1 shows the census results of the last five years in Madrid. Interannual variation in the counts were small, with a minimum count of 1083 birds in March 2002 and a maximum of 1205 birds in March 2000. Numbers of males varied between 308 and 368, and numbers of females between 772 and 864. The mean sex-ratio of the five surveys was 2.42 females per male.

The Great Bustards were distributed in 13 leks (Fig. 1). Another two leks were close to the border between Madrid and Guadalajara provinces (Madrid region includes only one province with the same name). Although the Bustards of these two leks sometimes crossed the province boundaries, they were not included in the total numbers considered for Madrid. Seven of the 13 leks are located in an area

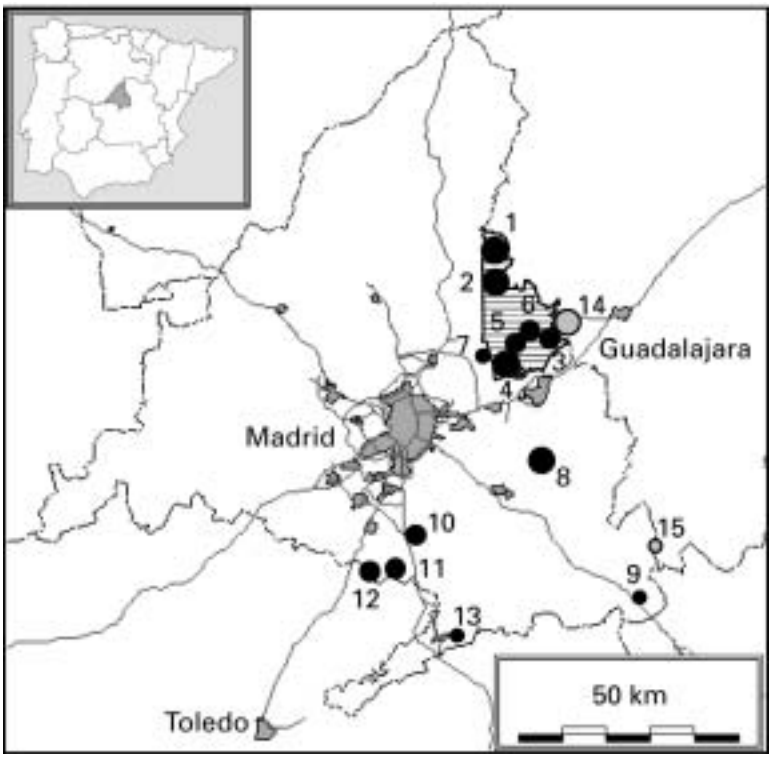


FIG. 1.—Map showing the location of Great Bustard leks in Madrid region (1-13; black dots) and two leks in Guadalajara province, close to the border with Madrid (14-15; grey dots). The large dots indicate leks with more than 100 birds, medium dots leks with 50-100 birds, and small dots leks with less than 50 birds. The limits of the SPA 139 «Estepas cerealistas de los ríos Jarama y Henares» are also shown as a striped area. Grey areas are main cities and lines highways. The leks are named by the municipalities where they occur: 1. Talamanca – Valdetorres; 2. Ribatejada – Valdetorres; 3. Meco; 4. Daganzo; 5. Camarma – Daganzo; 6. Camarma; 7. Cobeña; 8. Campo Real; 9. Estremera – Fuentidueña; 10. Pinto; 11. Torrejón de Velasco Este; 12. Torrejón de Velasco Oeste; 13. Aranjuez; 14. Villanueva de la Torre – Quer; 15. Driebes.
*[Localización de los 13 núcleos reproductivos de Avutardas Comunes Madrid (puntos negros), así como de los dos que se hallan en Guadalajara, próximos al límite provincial (14, 15; puntos grises). Se representan los límites de la ZEPA 139 «Estepas cerealistas de los ríos Jarama y Henares» como un área rayada. Las áreas grises son las principales ciudades y las líneas indican autovías. Los núcleos reproductivos se denominan de acuerdo a los términos municipales en los que se encuentran.]*

of ca. 350 km$^2$ with few habitat discontinuities northeast of the province. Six of these leks are included in the Special Protection Area called «Estepas cerealistas de los ríos Jarama y Henares» (SPA No. 139, Important Bird Area No. 074; Viada, 1998). The seventh lek, Cobeña, is outside the SPA 139, but also within the limits of the IBA 074. These seven leks hold the largest proportion of the Great Bustard population of Madrid (760 birds on average, 66% of the total). The remaining five leks are more dispersed in the south and southeast of the province. One of these (No. 13) is included in the Special Protection Area «Carrizales y Sotos de Aranjuez» (Important Bird Area No. 072; Viada, 1998).

The largest lek in the province was Talamanca-Valdetorres, with annual counts of 281-335 birds, and the smallest Aranjuez, with 12-14 birds. Daganzo was the one with highest densities, with up to *ca*. 8 Great Bustards per km$^2$.

Numbers of Great Bustards counted at each lek during the spring censuses 1998-2002. [1] areas not surveyed in this year; [2] areas where Great Bustards are sometimes observed in spring, with no established lek; [3] a number of females (50-70) had not yet arrived at this lek from their wintering areas, probably mostly Daganzo, Camarma, Campo Real, and a few females outside Madrid region (based on marked birds, own *unpub. data*); [4] These two leks were considered as a single one in Martín *et al*. (1999).

*[Cantidades de Avutardas Comunes censadas en cada uno de los diferentes núcleos reproductivos en las primaveras de 1998-2002. [1] zonas no censadas ese año;[2] áreas en las que se observan Avutardas Comunes ocasionalmente en primavera, aunque no existe un lek establecido;[3] unas 50-70 hembras no habían llegado a estos núcleos reproductivos desde sus áreas de invernada de Daganzo, Camarma, Campo Real y algunas otras áreas de fuera de Madrid, según datos de individuos marcados con emisores de radio (datos propios inéditos);[4] estos dos leks fueron considerados como uno solo en Martín* et al. *(1999).]*

| | 1998 | | | 1999 | | | 2000 | | | 2001 | | | 2002 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total | ♂♂ | ♂♂ >1 y | Total | ♂♂ | ♂♂ >1 y | Total | ♂♂ | ♂♂ >1 y | Total | ♂♂ | ♂♂ >1y | Total | ♂♂ | ♂♂ >1y |
| Talamanca-Valdetorres | 281 | 75 | 56 | 330 | 79 | 73 | 335 | 78 | 75 | 246 [3] | 68 | 68 | 297 | 68 | 67 |
| Ribatejada-Valdetorres | 53 | 14 | 12 | 52 | 15 | 12 | 55 | 16 | 14 | 40 [3] | 12 | 12 | 45 | 12 | 12 |
| Meco | 40 | 10 | 10 | 32 | 7 | 7 | 54 | 13 | 12 | 65 | 10 | 9 | 73 | 10 | 9 |
| Daganzo | 138 | 30 | 18 | 87 | 30 | 30 | 142 | 43 | 39 | 142 | 24 | 24 | 121 | 34 | 32 |
| Camarma-Daganzo | 127 | 48 | 36 | 107 | 43 | 41 | 99 | 29 | 27 | 86 | 40 | 40 | 81 | 38 | 38 |
| Camarma | 63 | 22 | 17 | 118 | 34 | 32 | 102 | 24 | 24 | 114 | 27 | 27 | 85 | 24 | 24 |
| Cobeña | 43 | 16 | 4 | 54 | 7 | 4 | 32 | 4 | 2 | 28 | 1 | 1 | 40 | 3 | 1 |
| Campo Real | 124 | 50 | 38 | 169 | 48 | 48 | 156 | 48 | 46 | 161 | 44 | 44 | 137 | 47 | 45 |
| Estremera-Fuentidueña | 44 | 20 | 17 | 28 | 17 | 17 | 32 | 14 | 13 | 21 | 15 | 15 | 24 | 6 | 6 |
| Pinto | 91 | 34 | 28 | 39 | 23 | 23 | 38 | 13 | 13 | 53 | 15 | 14 | 62 | 13 | 11 |
| Torrejón de Velasco E [4] | 91 | 37 | 33 | 59 | 31 | 30 | 102 | 41 | 41 | 106 | 35 | 35 | 82 | 39 | 39 |
| Torrejón de Velasco W [4] | 49 | 8 | 4 | 59 | 21 | 21 | 44 | 15 | 15 | 61 | 17 | 16 | 46 | 17 | 17 |
| Aranjuez | —[1] | —[1] | —[1] | —[1] | —[1] | —[1] | 14 | 3 | 3 | 12 | 0 | 0 | 0 | 0 | 0 |
| Other areas[2] | 24 | 4 | 2 | 14 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| TOTAL | 1.168 | 368 | 275 | 1.148 | 357 | 340 | 1.205 | 341 | 324 | 1.135 | 308 | 305 | 1.083 | 311 | 301 |

## DISCUSSION

### *Numbers and distribution*

The average number of Great Bustards counted in Madrid throughout the study period was 1148 birds. This represents a 5% of the Great Bustards estimated in Spain, and 2.5-3% of the estimated world population of this species (Alonso *et al*., 2003). Madrid is therefore the fourth Spanish region by number of Great Bustards, and holds a population large enough to deserve all conservation efforts.

The birds were distributed in 13 leks. Eight of these form three groups where leks are in close contact to each other (leks 1-2, leks 3-4-5-6, and leks 11-12), whereas the rest are more or less isolated from other breeding areas usually by unsuitable habitat (Fig. 1). The average location of the main display sites of the male flocks at these lek sites changed very little from year to year (< 0.8 km on average, own *unpub. data*). An ongoing radiotracking study started in 1995 has also shown very strong interannual fidelity of individual males and females to lek sites in spring, in spite of the long-distance movements of most males in summer and of many females in winter (Alonso *et al*., 2002, and own *unpub. data*).

The results of two habitat selection studies in the same area showed that the species' distribution was highly fragmented due to the presence of urban areas, main roads and patches of inappropriate habitat (Lane *et al*., 2001; Osborne *et al*., 2001). However, there were patches of suitable habitat that remained unoccupied during the study period, which indicated that Great Bustards showed fidelity to lek sites regardless of the availability of suitable habitat elsewhere. We observed no establishment of new lek sites. This strong philopatry has resulted in a genetic structuring of the female population, which is divided in three different groups of leks: 1-8, 9 and 10-13 (Martín *et al*., 2002).

### *Population trend*

The first complete census of the Great Bustard population in Madrid was carried out in 1998 (Martín *et al*., 1999). Earlier published censuses of this population gave much lower numbers than those obtained during the present study: 18 in 1977 (ICONA, 1982), 150 in 1980 (Domínguez & Vigal, 1982), 253 in 1982 (ICONA, 1982), 419 in 1986-87 (Martín & Ortas, 1987), 642 in 1988-89 (Alonso *et al*., 1990b) and 706 in 1994 (Gesnatura, 1994). The differences between these censuses and our current surveys were mostly due to the much lower coverage of the former, rather than to a real increase in bird numbers (see discussion in Alonso & Alonso, 1996). Although this prevents comparisons with our counts for the whole population, it is possible to establish trends at certain leks that have been surveyed with good coverage over one decade ago. Table 2 summarizes the results of all reliable counts available for these leks, which we comment below.

The Special Protection Area northeast of Madrid was surveyed with incomplete coverage in 1988 (Alonso *et al*., 1990b) and 1997 (own *unpub. data*). However, it was possible to make a comparison between these two counts, because the area surveyed was the same in both, 134 km$^2$, and included the main areas of leks 1 to 5. Within this area our counts showed an increase of *ca*. 50% from 1988 to 1997 (Table 2). In later years the surveys of the SPA 139 suggest that the population has stabilized around 700-780 birds, 180-195 being males older than one year (Table 1). The slight increase in numbers between 1998 and 2000 could probably be explained by the very high breeding success of the population in 1997 and 1998, the highest recorded since we started our long-term study of this population in 1995 (Martín, 2001; own *unpub. data*). Numbers decreased again in 2001 and 2002, after two years of very low productivity (2000 and 2001). In an earlier study, we have shown that numbers of Great Bustards at Madrid and Villafáfila, where we have longer series of annual counts and productivity values, were positively correlated with the breeding success, respectively, three and two years before (Alonso *et al*., 2003).

Throughout the last 10-15 years numbers of Great Bustards have increased by more than 100% at Torrejón de Velasco East and West (Tables 1 and 2). These increases were more marked during the first half of this period, with an apparent tendency to stabilize in recent years.

For Campo Real, we can only suggest a possible increase of *ca*. 10% between 1988 and

TABLE 2

Reliable counts of Great Bustard leks in Madrid prior to 1998. [1] Martín & Ortas (1987); [2] Alonso *et al*. (1990b) and own unpublished data; [3] Gesnatura (1994); [4] area of 134 km$^2$, including the main parts of leks 1 to 5 (Fig. 1), which we surveyed with incomplete coverage in 1988 (Alonso *et al*., 1990b) and 1997 (own *unpub. data*); [5] Palacín (1993).

*[Resumen de los censos fidedignos de avutardas realizados en Madrid antes de 1998. [1] Martín & Ortas (1987); [2] Alonso* et al. *(1990b) and own unpublished data; [3] Gesnatura (1994); [4] superficie de 134 km$^2$, que comprende las áreas principales de los núcleos reproductivos 1-5 (Fig. 1), censadas en 1988 (Alonso* et al.*, 1990b) y 1997 (datos propios inéditos); [5] Palacín (1993).]*

| | 1986 [1] | | 1988 [2] | | 1993 [5] | | 1994 [3] | | 1997 [2] | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | ♂♂ >1 y | Total | ♂♂ >1 y | Total | ♂♂ >1 y | Total | ♂♂ >1y | Total | ♂♂ >1y |
| Leks 1-5 [4] | | | 253 | 73 | | | | | 382 | 111 |
| Cobeña | 52 | 12 | 47 | 15 | | | | | 45 | 5 |
| Campo Real | | | 84 | 29 | | | 103 | | 94 | 33 |
| Pinto | | | 84 | 32 | | | 97 | | 91 | 28 |
| Torrejón de Velasco E | 36 | 13 | 43 | 16 | 70 | 24 | | | 78 | 31 |
| Torrejón de Velasco W | | | | | 23 | 3 | | | | |
| Estremera-Fuentidueña | | | 62 | 21 | | | | | 54 | 17 |

1997, based on our own counts of the main lekking area (Table 2). In these years we did not survey some minor marginal areas where a few males and females were found in 1998, which increased the total birds at this lek by 30 individuals, 5 of them being males (Tables 1 and 2). A third count made by another team in 1994 (Gesnatura, 1994) confirms this increasing trend when compared with our 1998-2002 counts (Tables 1 and 2).

In contrast to these leks, Great Bustard numbers have decreased continuously at Cobeña, Estremera-Fuentidueña and Pinto (Tables 1 and 2). The decrease at Cobeña was not very marked in total numbers, but especially clear for adult males. These went down from 15 counted in 1988 to only one surviving at present, mostly due to the high mortality occurring at powerlines crossing the main display area. Between 1996 and 2002, 11 males, 7 females and 11 unsexed Great Bustards have been found dead beneath these lines. Collision with powerlines has been shown to be the major cause of mortality for adult male Great Bustards (Alonso *et al*., 1994; own *unpub. data*). The construction of two main roads through the same area has also contributed to the habitat deterioration at this lek.

The decrease at Estremera-Fuentidueña has also been significant (*ca*. 60% in total numbers, and 70% for males older than one year, between 1988 and 2002; Tables 1 and 2). Here, the decrease may be attributed to recent agricultural transformations of cereal fields into irrigated maize fields, combined with high mortality at powerlines and low productivity (own *unpub. data*).

The decrease observed since 1994 at Pinto (26% of total birds, 66% for males older than one year) has proceeded simultaneously to the increases observed at the nearby leks Torrejón de Velasco East and West. The marked decreases observed in Pinto between 1998 and 1999 in total birds, and between 1999 and 2000 for males, were coincident with increases at Torrejón de Velasco West (between 1998 and 1999) and East (between 1999 and 2000), suggesting that some movement of birds between these leks did exist. The movements of Great Bustards between these three leks have been confirmed through radiotracking (4 males marked between 1997 and 2000 showed a preference to display in Torrejón de Velasco after visiting both areas). The causes of these movements have probably been related to the higher human disturbances at Pinto. Roads and urban areas with ever-growing traffic of vehicles surround this small lek, and a rubbish dump located nearby has been recently enlarged. Hunting pressure is also high at this site, where poachers killed three radiotagged adult males between 1998 and 2001. Finally, the mean young productivity throughout the last decade has been very low at Pinto, as compared to Torrejón de Velasco, where productivity values were among the highest for the province. These differences are probably the consequence of the differences in habitat quality between both sites.

Finally, the trend at Aranjuez is difficult to evaluate. Although we have seen males only in March 2000, there are other observations of displaying males later in early April 1998 (Gómez & Salmerón, 1999). The presence of a stable lek at this marginal area should be confirmed in future years.

Summing up all reliable counts in table 2 gives 573 bustards in 1988 and 744 in 1997. This represents an increase of a 30% in total numbers, and 17% for males older than one year. If we extrapolate this result to the whole province, the total Great Bustard population of Madrid might have experienced an overall increase between the mid 1980s and the late 1990s. This suggests than the cessation of hunting in 1980 could have favoured the recovery of the population. Alternatively, the overall increasing trend of the data in table 2 could simply mean that Great Bustards living in marginal areas not surveyed in 1988 could have shifted to more central parts of these same lek sites due to habitat deterioration of their marginal areas as a consequence of urban development. Probably both, an increase in total numbers and a concentration at the less disturbed habitat patches, have occurred between the early 80s and late 90s. A decline had probably occurred during the decades immediately before the 1980 hunting ban, when Great Bustards were subjected to high hunting pressure (up to 2057 birds were shot officially each year in Spain; Trigo de Yarto, 1971). Hunting, both legal and illegal, was probably the main cause of the only extinction of a lek reported in Madrid, near Navalcarnero, *ca*. 40 km west of Madrid (Domínguez & Vigal, 1982).

The surveys of the last five years suggest population stability at a regional scale. However, some leks still show clear declining trends, particularly among males. The overall sex-ratio is at present 2.42 females per male (mean of the last five years; Table 1), i.e. more female-biased than the sex-ratio recorded fifteen years ago (2.21 females per male; Alonso *et al*., 1990). This means that male mortality rates have been higher than female rates throughout this period. However, looking in detail at the annual sex-ratio values of the last five years, we observe that in 1998 the sex-ratio was 2.17, similar to that recorded in 1988, and thus that bias is due to the proportional decrease in the number of males during the last five years. Males have indeed decreased regularly from *ca*. 360 in 1998-99 to *ca*. 310 counted in 2001-02. In three leks such a decrease in the number of males has been particularly dramatic in the last five years, in one of them (Cobeña) almost to extinction.

From these sex-ratio trends, together with those in total numbers, we can draw two conclusions. First, it seems that the population is subjected to demographic oscillations, determined by years of high and low productivity. Maximum total numbers were reached in 2000, 2-3 years after years with highest productivity (1997-1998; Martín, 2001), to decline to minimum numbers in 2002, after three years of low to very low breeding success (own *unpub. data*). These trends affect much more males than females. Males older than one year had fallen down to 275 in 1998 and recovered to 340 after recruitment of the 1997 cohort (75 young males survived up to autumn; Martín, 2001). From that number the decrease in the male fraction has been constant to minimum values of 301 males older than one year in 2002. Our data indicate that in years with low young productivity the sex-ratio among the young Great Bustards that survived after summer and recruited into the population is more biased towards females than in years with high productivity (Martín, 2001). This means that low productivity through a series of years will determine an increase in the sex-bias in the adult population. Thus, males will probably need some years with excellent breeding success to recover again.

Second, overall male mortality is abnormally high in Madrid, when compared with populations with a more favourable conservation status like Villafáfila, where the average sex-ratio is 1.6 females per male (Alonso *et al*., 1996). This is also corroborated by our direct estimates of mortality rates obtained from marked birds (own *unpub. data*). Data from more threatened populations suggest a clear tendency for sex-ratio values to increase as the conservation situation deteriorates, up to extreme values like those recorded in Morocco (over 3 females per male for the whole population, with an extreme bias of 20 females per male at one lek; Alonso *et al*., 2000).

In conclusion, in spite of the overall population stability shown by recent surveys in Madrid, several leks show alarming decreases and some are threatened with extinction in a near future if strict conservation measures are not implemented urgently. These conservation measures should be directed towards protecting all sites currently used by the species in the region, and improving habitat quality to keep breeding success as high as possible and decrease current mortality rates.

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