

Birdlife International  
European Division

## *Annex 1*

of the Guidelines for monitoring of population parameters of  
Great Bustard and of the effects of management measures

### **Guidelines to determine the age of Great Bustard in field**



Prepared for the Memorandum of Understanding on the conservation and  
management of the Middle-European population of the Great Bustard under the  
Convention on Migratory species (CMS) by

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To determine the age of the Great Bustards in field is very difficult, the chance for it turns up very rarely and great experience is required. For the fulfilment of this possibility the observation distance must be relatively short, the observation circumstances must be good and high quality telescopes are necessary. However if this good opportunity presents itself, let's take time by the forelock to get better knowledge about our Great Bustards.

It is possible to deduce the age of the chicks from the state of their development. At the age of 1 week (figure 1), their primary feathers begin to grow, at the age of 2-3 weeks (figure 2), the tail and the body feathers are growing faster respectively, and as they are 1 month old, the first moult has nearly finished. The young Great Bustards reach the ability to fly, when they are 5-6 weeks old, although they rather squat in danger then fly in this time (figure 3). From this time their growth is roughly constant until they reach the size of their mother in generally September. Since this time to distinguish the juvenile from an adult undoubtedly is difficult in field, except the juvenile male, because they grow further, their size will bigger, their neck will broader usually in October compared to the females (Gewalt, 1959, Cramp & Simmons 1980).



**Figure 1:** A circa one week old Great Bustard chick.



**Figure 2:** A female Great Bustard with her juvenile.



**Figure 3:** A squat chick which would be able to fly due to its development.



**Figure 4:** This juvenile Great Bustard has just reached the ability for fly.

Till this point of time quite easy to determine the age of a Great Bustard chick, but because of the usual hiding behaviour of them, generally most of the chicks grow up „invisibly”, thus the occasional observations are not enough to draw a conclusion about the whole population.

But in turn, the determination of the age of the Great Bustard males in the mating period (from the beginning of March till the end of May) is possible with approximate precision, forasmuch they wear signs on their body in correlation to their maturity, so thus their age. By individual based monitoring with radio and satellite telemetry, Spain scientists won wide knowledge in this field, their publication titled as '*Field determination of age in male great bustards (Otis tarda) in spring*' (Alonso et al, 2006) contains the most important details, some parts are cited below. (We must note, that there are plumage differences between the central European and Iberian populations, in the central European population, the chestnut neck base collar is more open in younger adults, increasing in width with age and reaching almost half the total height of the neck in very old males (Gewalt, 1959), so thus the description of the Spain scientists should be a bit modulated.)

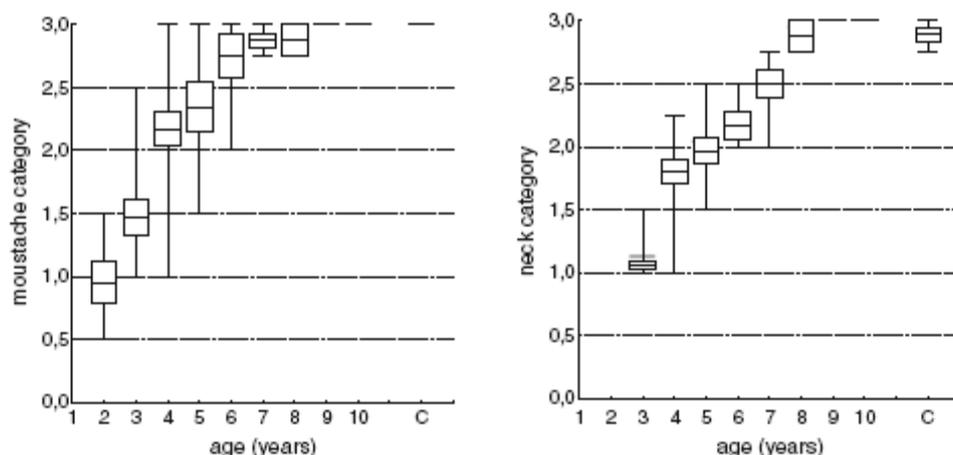
„Juvenile males acquired full adult plumage between their fourth and seventh years. The main changes occurred at the neck, coinciding with the onset of sexual maturity. The grey colour typical of immature males turned to ivory white around the fourth to fifth spring, and a gradual increase was appreciated in adults in the brightness of the white colour of the upper neck and in the contrast between this and a progressively more intense chestnut brown at the neck base. Based on earlier studies (Gewalt, 1959) and on our own experience from a preliminary study with marked birds at Villafáfila, we established the following four moustache development categories and the following four neck patterns:

- Moustaches 0: No moustachial feathers.
- Moustaches 1: Poorly developed, exceeding a few centimetres the rear end on the bill gapes.

- Moustaches 2: Viewing the head from the side, the moustaches reach the nape outline.
- Moustaches 3: The moustaches clearly exceed the nape outline.
- Neck 0: Relatively thin, uniform grey spotted with brown at the base, with a slim fringe of brown colour at the neck base on its dorsal face.
- Neck 1: Somewhat thicker, with a brown wide band at the lower half and grey at the upper half, of lighter shade than in the previous category.
- Neck 2: Notably thicker, with wide brown, chestnut-coloured band at the base, a broad intermediate creamy-yellow band and upper neck of a whitish to very light greyish colour that grades to grey under the lower mandible. The three bands of the neck, lower chestnut, intermediate creamy-yellow and upper whitish, are approximately of the same height.
- Neck 3: A thick, substantially bulkier neck, with well-developed, hanging breast feathers, very intense chestnut-coloured basal band, not as wide as in the previous category, bordered upwards by a narrow creamy-yellow fringe, above which there is an intense ivory to pure white upper neck reaching the chin.

Each spring throughout the study period, after observing each individual several times in the morning display activity time through the main display phase between late March and early May, we obtained for each bird a mean annual value of moustache and neck categories and plotted the resulting series of values on a graph ranging between ages 1 and 10 years.

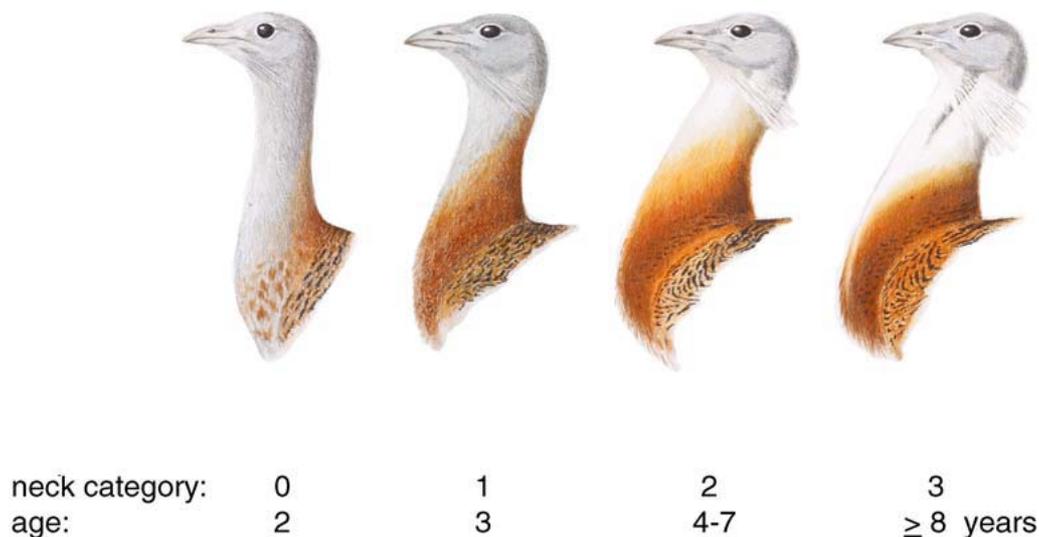
Figure 5 shows the development of sex traits with age in male great bustards. Males developed short moustachial feathers already in their second spring after hatching, i.e. during their third calendar year (Fig. 1, left). At the age of 3 years, the moustaches exceeded the nape outline in only one male and just reached it in another male, out of 15 birds. Between the third and sixth springs, the average moustache category increased rapidly with age, reaching maximum values in the seventh spring in most birds. However, interindividual variability was relatively high during this age interval (2–6 years). As for the neck category, it scored 0 in all birds in their first and second springs, increasing to values around 1 in all birds in the third spring (Fig. 2, right). In the fourth spring, only one bird scored 1, most being close to value 2. Between that age and the seventh spring, neck values increased regularly and with lower interindividual variation than in the moustache category. Maximum neck scores were reached in birds aged 8 years or more.



**Figure 5:** Development of moustache and neck categories with age in male great bustards. Means $\pm$ 1 S.E., minimum and maximum values of both sex traits during the mating period (late March–early May) are represented. Birds aged 1 were about to be 1 year old that spring, i.e. in their second calendar year. To confirm the categories for ages >8 years, for which our sample of birds marked as chicks was

too small, we used a control sample of five males captured as adults and tracked throughout 5–7 years. Their mean moustache and neck values for the springs when they were of ages 8 years or more are represented under C in both graphs.

Our results confirmed that average moustache length and neck categories increased with age in male great bustards. We suggest that four post-juvenile age classes can be distinguished through their neck plumage designs in spring (Figure 6). The first corresponds to 2-year-old birds, which can usually be distinguished from 1-year-old birds (hatched on the previous year) by the more apparent brown spots at both sides of the neck base. First-year males strongly resemble adult females, with whole neck and central chest pale ash-grey and brown only on the lower hindneck, extending to both sides of the upper chest, but spots in the foreneck base usually absent or much less marked than in 2-year-old birds. In addition, none of our marked birds had moustaches when they were 1 year old, whereas all had already grown short moustaches at the age of 2 years. The differentiation of 1- and 2-year-old males is sometimes difficult even for experienced observers, and behavioural traits may be helpful in such cases. First-year males are typically associated to females during the spring of their second calendar year, in contrast to 2-year-old males, who tend to aggregate in male flocks with individuals of their same or subsequent immature cohorts.



**Figure 6:** Development of spring neck plumage with age in post-juvenile male great bustards (drawings by J.C. Alonso).

The second age class that can be recognized corresponds to 3-year-old birds. The upper half of their neck is grey, of a lighter shade than in younger males, but clearly different from the ivory white of older males. The lower half of the neck is chestnut brown, forming at the neck base a collar of much wider extension and notably duller shade than in older males. The chestnut colour of hindneck almost reaches the nape. A key character of this neck pattern is the absence of a creamy-yellow fringe separating the upper grey half from the lower chestnut-brown half.

The third age class includes males aged 4–7 years. It is interesting to note that this change in plumage pattern coincides with the acquisition of sexual maturity and access to females (4–5 years). Males aged  $\geq 4$  years can be distinguished from younger birds by the white throat and upper foreneck and the broad intermediate creamy-yellowish band, which grades to intense chestnut brown on the chest. Each of these three bands, white, yellowish and chestnut, occupy approximately one third of the neck's height, and the chestnut colour is

much more brilliant than in neck category 1. The neck base is also bulkier due to the longer, hanging breast feathers, which according to Gewalt (1959) grow after the partial moult in winter to more than double their length of the non-breeding season. This provides the necks of adult males with their typical massive, powerful appearance.



Photo: Franz Kovacs

**Figure 7:** Adult males are fighting in spring. From this point of view the male in the right seems younger likely than the others, ranked to the second or the third age class.

Finally, our fourth age class comprises males aged 8 years or more (see the front cover of this annex and figure 7). The white colour of the neck is much brighter at this age than in younger males, particularly at the neck sides, extending approximately over the upper two thirds of the neck height. The chestnut colour of the neck base is also much more intense, and the intermediate yellowish band separating white from chestnut is typically reduced to a thin fringe. This produces a highly contrasting white–chestnut pattern and makes the chestnut collar appear narrower than in younger males. In addition, the chestnut collar is open in the front so that the pure white colour of the upper foreneck reaches the lower breast, notably increasing the overall extent of the white plumage surface. The white colour of the upper neck is most visible when the male is in rest or alert posture and under good light conditions. When males inflate their neck during display, the stretched front neck feathers may show up a more creamy-yellowish colour and appear less white.

## References

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