

Hunting hastened the local extinction of the Great Bustard *Otis tarda* in part of Andalusia (S Spain) in the 1950s

José Luis Medina-Gavilán¹

Knowledge of the historical distribution of threatened species is necessary for designing suitable conservation strategies. In Burguillos (Seville, S Spain) there was a breeding population (lek) of Great Bustards until 1954 that was unknown until it was recently discovered via reliable testimony from a direct witness and dated material (photographs and a stuffed bird). Legal hunting during the 1940s and 1950s was the most likely cause of the extinction of this population. Agricultural intensification and the transformation to irrigated crops this population was unable to withstand hunting pressure and have prevented its recovery ever since.

Key words: Great Bustard, *Otis tarda*, historical distribution, ethnobiology, steppe birds, Iberian Peninsula.

¹ Ayuntamiento de San Juan de Aznalfarache, Plaza de la Mujer Trabajadora, s/n. 41920 Sevilla. E-mail: jl.med.gav@gmail.com

Received: 03.11.19; Accepted: 26.12.19 / Edited by O. Gordo

Historical data on the distribution of endangered species are useful for assessing long-term changes in their geographical ranges and ecological niches, determining the main factors driving their current status, and designing suitable conservation strategies (Sáenz-Arroyo *et al.* 2005, Turvey *et al.* 2015, Clavero & Delibes 2016). The Great Bustard *Otis tarda* is a large, long-lived steppe bird that has an exploded *lek* mating system and great sexual dimorphism (Alonso & Palacín 2015). Its distribution in Eurasia, from Eastern China to the Iberian Peninsula and North Morocco, is extremely fragmented (Palacín & Alonso 2008). It is a globally threatened species and is classified as Vulnerable (BirdLife International 2017).

The world's largest population of Great Bustards (ca. 65% of individuals) occurs in the dry cereal croplands of the Iberian Peninsula (Alonso 2014). These Great Bustards are subjected to several threats including agricultural intensification, the implantation of irrigated croplands, winter cropping, the spread of urban

infrastructure, and collision with power lines and fences (Pinto *et al.* 2005, Sastre *et al.* 2009, López-Jamar *et al.* 2011, Palacín *et al.* 2012, 2017). The distribution of this population is fragmented, with a core breeding area in central Spain and several minor peripheral areas in NE and SW Spain and S Portugal (Palacín *et al.* 2004). In Andalusia (S Spain), this species is described as "in danger of extinction" (Decree 27/2012) and its population consists of 413 individuals in nine areas, of which ca. 90% are in Seville and Cordoba provinces (Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible 2019). At present, Great Bustards only survive in three areas in Seville province (Figure 1), although Alonso *et al.* (2003) cite six other populations, which presumably became extinct in 1970–1990.

During the course of an ethnobiological project in Seville province, I had the opportunity to interview Joaquín Vázquez Parladé (1932-2015; JVP hereafter), an agricultural engineer and hunter from Seville. He and his

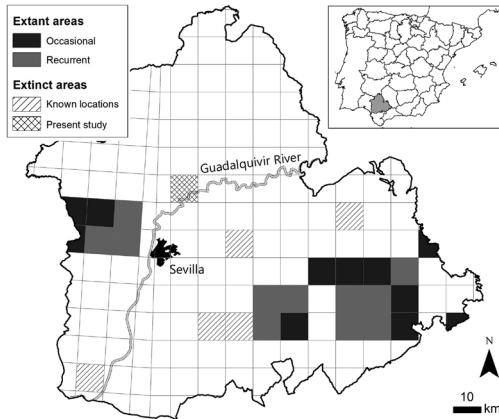


Figure 1. Present and historical distribution of the Great Bustard *Otis tarda* in the province of Seville (SW Spain). Overwintering and breeding areas have been combined. Squares represent the UTM 10x10 km grid. *Distribució actual i històrica del pioc salvatge a la província de Sevilla. Les àrees d'hivernada i reproducció s'han agregat com una sola dada. Els quadrats representen els UTM 10x10 km. L'UTM amb doble barrat és la ubicació del lek descrit en aquest estudi. En barrat simple es mostren altres localitats conegudes on també s'ha extingit l'espècie. La resta de quadrats representen la distribució actual; els de color negre indiquen on es troba de manera regular i els grisos on es troba de manera ocasional.*

family had large landholdings (i.e. farmland) in Burguillos. He himself was a direct witness to the presence of Great Bustards in this municipality until the 1950s and, thanks to his reliable testimony and dated materials (photographs and a stuffed specimen), I was able to reconstruct the final years of this hitherto unknown population.

The population, located in the wheat fields of Mudapelo (UTM 30STG4164, 20-60 m a.s.l.) in the transitional area between the Guadalquivir plain and the mountains of the Sierra Morena, would have been the northernmost-known Great Bustard population in Seville province (Figure 1). In the 1940s, courtship displays by male Great Bustards was often observed in the fields of Mudapelo, where there was a lek. JVP remembers that “in spring, there were many *barbones* [the local name for Great Bustard males] in the wheat fields of Mudapelo. When we looked with binoculars, some of them would be doing the *rueda*” [the name given to the nuptial courtship of this species in which males resemble a white rolling balloon; see Hidalgo

de Trucios & Carranza (1991)]. Great Bustards were present in this area throughout the year and were apparently sedentary, according to JVP: “Great Bustards were grouped in resident flocks of up to 50 individuals since they did not migrate”. Thus, the maximum population size in the 1940s and 1950s would have been around 50 individuals. Flocks showed marked preference for a cultivated hill running parallel to the course of a seasonal stream, the Mudapelo. From there, Great Bustards would have had optimal views of approaching predators and females (Alonso *et al.* 2012).

According to JVP, hunting was the main threat to this population: “Hunting of Great Bustards was a social entertainment but was usually reserved for my father [the owner of the lands where the lek was located] and his friends”. The hunting technique consisted of an organized sweep by people on horseback through the wheat fields, which pushed the Great Bustards towards the hunters stationed under the trees lining the stream. Hunting led to the decline of the species in this area and the last three individuals, all males, were shot on 3 March 1954. One weighed 15.8 kg, outside the typical reported weight range for this species (Alonso & Palacín 2015). This specimen is currently preserved as a stuffed trophy in JVP family’s private collection. A genetic analysis of the only biological material remaining from this extinct population would improve knowledge of the phylogeography of the Andalusian Great Bustard population and reveal unknown alleles that may have been lost during the species’ decline in recent decades (Horreo *et al.* 2014).

From the fifteenth century onwards, the landscape of Burguillos has consisted of a mosaic of dry cereal croplands, pastures and low open shrublands dominated by the dwarf-palm *Chamaerops humilis* (Montesdeoca *et al.* 1755, Blázquez & Delgado-Aguilera 1910, Heran 1980, Rodríguez Hernández 1999). However, in 1950, the building of the Viar Canal promoted a shift in agrarian policies towards irrigated crops (e.g. cotton and beetroot) (Palma Valderrama 1964, Cruz Villalón *et al.* 1980, Villanueva Paredes *et al.* 1991). At the same time, agriculture was intensified by the introduction of machinery such as tractors, which replaced traditional animal-based farming techniques. These new landscape management techniques endangered

the survival of the last Great Bustards and made any subsequent recolonization of the area impossible. In this unfavourable context, hunting pressure would have catalysed the extinction process. The transformation of the landscape has recently culminated in the substitution of mosaic dry cereal fields by irrigated crops with fruit trees (Sánchez López 1980, Galindo Pérez de Azpillaga 2009).

The protection of Great Bustards in Andalusia is essential for the conservation of the species because this population has an important role as a reservoir of genetic diversity (Horreo *et al.* 2014). The knowledge of the historical distribution of leks in Andalusia and the causes of local extinctions can help design management plans aimed at promoting the progressive recolonization of former breeding areas and improving the connectivity between current populations.

Acknowledgements

This study is dedicated *in memoriam* to Joaquín Vázquez Parladé. The author would like to thank the editor O. Gordo and the reviewers C. Palacín and C. A. Martín for their comments that helped improve a first draft of this article.

Resum

La caça legal va causar l'extinció local de piocs salvatges *Otis tarda* a Andalusia (S Espanya) cap a 1950

El coneixement sobre la distribució històrica de les espècies amenaçades resulta necessari per dissenyar estratègies apropiades per a la seva conservació. A Burguillos (província de Sevilla) hi va haver un grup reproductiu (*lek*) sedentari de piocs salvatges fins al 1954 de fins a 50 exemplars. La seva existència s'ha pogut descobrir gràcies al testimoni del propietari de les terres on es trobava, així com a materials (fotografies i un espècimen dissecat) datats. La caça, legal en aquella època, va accelerar l'extinció local de la població, que ja estava patint importants transformacions del seu entorn gens favorables per a l'espècie, a causa de la intensificació agrícola i a la conversió a cultius de regadiu de la zona fruit de la construcció del canal del Viar a principi dels anys 50. El nou paisatge agrícola ha impedit la recuperació de l'espècie des d'aleshores.

Resumen

La caza legal causó la extinción local de avutardas *Otis tarda* en Andalucía (S España) hacia 1950

El conocimiento sobre la distribución histórica de las especies amenazadas resulta necesario para diseñar estrategias apropiadas para su conservación. En Burguillos (provincia de Sevilla) hubo un grupo reproductivo (*lek*) sedentario de avutardas de unos 50 ejemplares hasta 1954, cuya existencia se ha podido descubrir gracias al testimonio del propietario de las tierras donde se hallaba, así como a materiales (fotografías y un espécimen disecado) fechados. La caza, legal en aquel momento, aceleró la extinción local de la población, que ya se veía sometida a importantes transformaciones de su entorno nada favorables para la especie, debido a la intensificación agrícola y la conversión a cultivo de regadío a raíz de la construcción del canal del Viar a principio de los 50. El nuevo paisaje agrícola ha impedido la recuperación de la especie desde entonces.

References

- Alonso, J.C. 2007. *La avutarda común en Andalucía*. Jaén: Junta de Andalucía.
- Alonso, J.C. 2014. The Great Bustard: past, present and future of a globally threatened species. *Ornis Hungarica* 22: 1-13.
- Alonso, J.C., Álvarez-Martínez, J.M. & Palacín, C. 2012. Leks in ground-displaying birds: hotspots or safe places? *Behav. Ecol.* 23: 491-501.
- Alonso, J.C. & Palacín, C. 2015. Avutarda - *Otis tarda* Linnaeus, 1758. In Salvador, A. & Morales, M.B. (eds.): *Enciclopedia virtual de los vertebrados españoles*. Madrid: Museo Nacional de Ciencias Naturales.
- Alonso, J.C., Palacín, C. & Martín, C.A. 2003. Status and recent trends of the Great Bustard (*Otis tarda*) population in the Iberian Peninsula. *Biol. Conserv.* 110: 185-195.
- BirdLife International. 2017. *Otis tarda*. The IUCN Red List of Threatened Species 2017: e.T22691900A119044104.
- Blázquez & Delgado-Aguilera, A. 1910. *Descripción y cosmografía de España por Hernando Colón*. Madrid: Imprenta de patronato de huérfanos de la administración militar.
- Clavero, M. & Delibes, M. 2013. Using historical accounts to set conservation baselines: the case of *Lynx* species in Spain. *Biodivers. Conserv.* 22: 1691-1702.
- Consejería de Agricultura, Ganadería, Pesca y Desarrollo Sostenible. 2019. *La población de avutarda se mantiene estable en Andalucía, con un ligero aumento de ejemplares el último año*. Available at: <http://www.juntadeandalucia.es/medioambiente/site/portalweb/menuitem>. [accessed 19 June 2019].

- Cruz Villalón, J., Ojeda Rivera, J.F., Rodríguez Becerra, S., Sánchez López, A.J. & Zoido Naranjo, F.** 1980. *La colonización de la zona regable del Viar. Análisis de las transformaciones realizadas y de su significación actual*. Sevilla: Informe inédito.
- Galindo Pérez de Azpillaga, L.** 2009. Elementos y procesos de la actividad productiva agropecuaria en la vega media de Sevilla. *Espacio y Tiempo* 23: 111–132.
- Hidalgo de Trucios, S.J. & Carranza, J.** 1991. Timing structure and functions of the courtship display in male Great Bustard. *Ornis Scand.* 22: 360–366.
- Horreo, J.L., Alonso, J.C., Palacín, C. & Milá, B.** 2014. Genetic structure in Iberian and Moroccan populations of the globally threatened Great Bustard (*Otis tarda*): a microsatellite perspective. *J. Avian Biol.* 45: 507–513.
- Heran, F.** 1980. *Tierra y parentesco en el campo sevillano: la revolución agrícola del siglo XIX*. Madrid: Ministerio de Agricultura.
- López-Jamar, J., Casas, F., Díaz, M. & Morales, M.B.** 2011. Local differences in habitat selection by Great Bustards *Otis tarda* in changing agricultural landscapes: implications for farmland bird conservation. *Bird Conserv. Int.* 21: 328–341.
- Magaña, M., Alonso, J.C., Martín, C.A., Bautista, L.M. & Martín, B.** 2010. Nest-site selection by Great Bustards *Otis tarda* suggest a trade-off between concealment and visibility. *Ibis* 152: 77–89.
- Montesdeoca, J., Daza, B. & de Cazalla, J.M.** 1755. Catastro de Ensenada: villa de Burguillos. Copia en extracto de sus respuestas generales (ms. Archivo General de Simancas CE/L560).
- Palacín, C., Alonso, J.C., Martín, C.A., Alonso, J.A., Magaña, M. & Martín, B.** 2004. Avutarda Común (*Otis tarda*). In Madroño, A., González, C. & Atienza, J.C. (eds.): *Libro Rojo de las Aves de España*. Pp. 209–213. Madrid: SEO/BirdLife y Ministerio de Medio Ambiente.
- Palacín, C. & Alonso, J.C.** 2008. An updated estimate of the world status and population trends of the Great Bustard *Otis tarda*. *Ardeola* 55: 13–25.
- Palacín, C., Alonso, J.C., Martín, C.A. & Alonso, J.A.** 2012. The importance of traditional farmland areas for steppe birds: a case study of migrant female Great Bustards *Otis tarda* in Spain. *Ibis* 154: 85–95.
- Palacín, C., Alonso, J.C., Martín, C.A. & Alonso, J.A.** 2017. Changes in bird migration patterns associated with human induced mortality. *Conserv. Biol.* 31: 106–115.
- Palma Valderrama, V.** 1964. *Observaciones sobre la colonización en España y sobre la zona del Viar en Sevilla*. Madrid: Instituto Nacional de Colonización
- Pinto, M., Rocha, P. & Moreira, F.** 2005. Long-term trends in Great Bustard (*Otis tarda*) populations in Portugal suggest concentration in single high quality area. *Biol. Conserv.* 124: 415–423.
- Rodríguez Hernández, F.** 1999. *El señorío de Burguillos (Sevilla): una aproximación a su historia*. Sevilla: Ayuntamiento de Burguillos-Diputación de Sevilla.
- Sáenz-Arroyo, A., Roberts, C.M., Torre, J. & Cariño-Olvera, M.** 2005. Using fishers' anecdotes, naturalists' observations and Grey literature to reassess marine species at risk: the case of the Gulf grouper in the Gulf of California, Mexico. *Fish. Fish.* 6: 121–133.
- Sánchez López, A.J.** 1980. La colonización y el mantenimiento de la dependencia entre gran y pequeña propiedad: el caso del Viar. *Agricultura y Sociedad* 17: 69–108.
- Sastre, P., Ponce, C., Palacín, C., Martín, J.A. & Alonso, J.C.** 2009. Disturbances to Great Bustard (*Otis tarda*) in Central Spain: human activities, bird responses and management implications. *Eur. J. Wildl. Res.* 55: 425–432.
- Turvey, S.T., Crees, J.J. & Di Fonzo, M.M.I.** 2015. Historical data as baseline for conservation: reconstructing long-term fauna extinction dynamics in Late Imperial-modern China. *Proc. R. Soc. B* 282: 20151299.
- Villanueva Paredes, A. & Leal Maldonado, J.** 1991. *Historia y evolución de la colonización agraria en España. La planificación del regadío y los pueblos de colonización. Volumen III*. Madrid: Ministerio de Agricultura, Pesca y Alimentación; Ministerio para las Administraciones Públicas; Ministerio de Obras Públicas y Transportes.