Aquila (2014), Vol. **121**, p. 95–102

The Austrian Agri-Environmental Scheme for Great Bustard *(Otis tarda)*

Rainer Raab, Eike Julius, Lisa Greis, Claudia Schütz, Péter Spakovszky, Jochen Steindl & Nina Schönemann

Technisches Büro für Biologie

ABSTRACT—In Europe agricultural intensification is one of the major threats for Great Bustards. In order to address this issue within the Austrian agri-environmental scheme "ÖPUL" (Austrian programme for an environmentally appropriate, extensive and natural habitat friendly agriculture) special measures were implemented in order to (financially) support and provide an incentive for Great Bustard friendly habitat management (e.g. fallow land, winter wheat, a certain sowing/mowing regime, etc.). Through the support of both the EU and Austria itself the area managed especially for the Great Bustard through ÖPUL increased in three Great Bustard areas from 1,503 ha in 2001 to 5,110 ha in 2012 and by December 2012 it involved more than 450 farmers participating on a voluntary basis. As a result of the implementation of the Austrian agri-environmental scheme, the Austrian Great Bustard population grew from 60 individuals in the 1990s to ca. 240 individuals by 2012. Both this success, and the high level of satisfaction for all those involved call for a continuation since it is the key for any further improvement of Great Bustard habitat conservation in Austria.

Key words: *Otis tarda*, agriculture, conservation, population, Austria.

Correspondence: *Mag. Dr. Rainer Raab,* Technisches Büro für Biologie, Quadenstraße 13, Deutsch-Wagram A-2232; *E-mail:* rainer.raab@tbraab.at

Introduction

The Great Bustard is a globally threatened bird species, categorized as "vulnerable" according to latest IUCN criteria *(Collar et al., 1994; BirdLife International, 2012)*. In Europe Great Bustard populations suffered large declines mainly due to agricultural intensification, hunting and infrastructural reinforcement during the 20th century *(del Hoyo et al., 1996)*. The Austrian population decreased from 150–170 individuals at the beginning of the 1970s to around 60 individuals in the 1990s *(Kollar, 2001)*. Consecutively, it recovered to ca. 210 individuals by 2008 *(Raab et al., 2010)* and to ca. 240 individuals by 2012 (*Raab et al.*, unpublished data). The critical conservation status of the Great Bustard *(Otis tarda)* throughout its entire European range prompted the European Union to designate it as a priority species for conservation. Member states—including Austria—are therefore obliged to introduce comprehensive conservation measures for the lasting preservation of the remaining populations. The "Memorandum of Understanding on the Conservation and Management of the Middle-European Population of the Great Bustard *(Otis tarda)*" has been in force since the 1st of June 2001 after having been ratified by Hungary and five other states. Austria and Slovakia signed the memorandum on the 28th of November 2001. The aims of the memorandum include strengthening bustard conservation at an international level, supporting existing habitat conservation programmes—some of which have been operating for

many years already—and ensuring the long-term survival of these programmes by putting them into an international legal context.

In Austria, the primary goal in Great Bustard conservation is to provide suitable habitat for the species. For this purpose, there are four large-scale SPAs in Lower Austria and Burgenland, covering more than 28,700 ha in size, with Great Bustard being the priority species. Bustard conservation measures are being implemented inside these SPAs on more than 5,140 ha of land under the Austrian agri-environment scheme "ÖPUL" (Österreichisches Programm für umweltgerechte Landwirtschaft: Austrian programme for environmentally appropriate agriculture).

Habitat requirements and approaches for conservation

In Great Bustards the selection of foraging habitat underlies seasonal changes in response to food availability and specific habitat requirements *(Moreira et al., 2004; Palacín et al., 2012)*. During the breeding season males choose fallows over other habitat types whereas female Great Bustards primarily use cereal fields or fallows as nesting sites *(Moreira et al., 2004; Magaña et al., 2010; Rocha et al., 2013)*. During the winter months herbaceous plants such as cultivated lucerne *(Medicago sativa)* and oilseed rape *(Brassica napus)* become also important *(Faragó, 1996; Kurpé, 1996; Lane et al., 1999; Kalmár & Faragó, 2008; Raab et al., 2014)*. Hence, maintaining a mosaic of different habitat types seems to be essential for providing a suitable biotop to Great Bustards *(Moreira et al. 2004)*.

During the mating season in late winter and early spring Great Bustards of both sexes congregate at traditional leks. These sites are selected by Great Bustards in a way that a maximum probability of encountering females (hotspot hypothesis), a minimized predation risk and low levels of human disturbance are ensured *(Alonso et al., 2012; Burnside et al., 2013)*. Adult Great Bustards of both sexes show high fidelity to these lekking grounds *(Alonso et al., 2000; Morales et al., 2000)*, to the point where spatial distribution of the leks remained stable during a decade *(Alonso et al. 2004)*, even though additional patches of suitable habitat were available *(Lane et al., 2001; Osborne et al., 2001)*. As a consequence, strict conservation measures for securing future occupancy of traditional leks will be more efficient than an establishment of new alternative patches of suitable habitat *(Lane et al., 2001; Osborne et al., 2001; Alonso et al., 2004)*. These conservation measures should be directed particularly towards smaller leks, which are at a higher risk of being abandoned *(Alonso et al., 2004)*. Regarding nest site selection, a preference for cereal fields and fallows has often been reported *(Morgado & Moreira, 2000; Moreira et al., 2004; Magaña et al., 2010; Rocha et al., 2013)*. Characteristic nesting sites are usually located in land-cover types that show the densest vegetation cover in spring compared to other vegetation types, provide good horizontal visibility and are located far from man-made structures *(Magaña et al., 2010)*, as Great Bustards are very sensitive to the higher disturbance levels associated with such infrastructures *(Sastre et al., 2009)*.

Lack of public information and a limited appreciation of Great Bustards and their habitats can lead to unnecessary disturbances, e.g. through leisure activities such as horse riding, cycling, photography, nature observation, private aircraft or Nordic walking. This can

also affect reproductive success seriously if eggs or juvenile bustards are left alone by the female due to anthropogenic disturbance, as they are exposed to a higher risk of predation.

Based on these habitat requirements of Great Bustards, proper conservation measures can be implemented. To ensure the successful breeding of Great Bustards farming activities on cereal fields—a preferred habitat type for breeding—should be adapted to the breeding phenology of the females to prevent the destruction of clutches *(Magaña et al., 2010; Rocha et al., 2013)*.

Furthermore, a sufficient supply of fallow land should also be maintained, offering not only an important breeding habitat *(Morgado & Moreira, 2000; Magaña et al., 2010; Rocha et al., 2013)*, but also high densities of arthropods and important refuges during the post-breeding period for female Great Bustards with their hatchlings when the main cereal areas are already harvested *(Magaña et al., 2010)*. To increase the survival rate of hatchlings and young Great Bustards, the first step will be the bustard-friendly management of suitable habitats, as the intensification of grassland cultivation for example leads to a fast growing, very dense vegetation, which hampers the mobility of the hatchlings *(Litzbarski & Litzbarski, 1996; Ludwig, 1996)*. The very dense vegetation additionally leads to unfavourable microclimate on the ground due to limited sunlight, heat and an increase of humidity *(Litzbarski & Litzbarski, 1996; Ludwig, 1996)*. In addition, use of biocides within agricultural intensification reduces the density of arthropods *(Ludwig, 1996)*, the main food resource of young Great Bustards during their first days *(Litzbarski & Litzbarski, 1996a; Lane et al., 1999)*.

Because the winter diet of Great Bustards consists mainly of green plant material *(Lane et al., 1999; Rocha et al., 2005)*, providing a sufficient supply of herbaceous food and ensuring access to at least parts of these cultivations during winter months should be a priority in habitat management for Great Bustards.

Bustard-friendly habitat management also includes the delaying of the harvest on preferred breeding habitats, at least until the hatchlings are able to escape from the harvester *(Magaña et al., 2010)*. Certain practices such as inward concentric harvesting should also be avoided *(Magaña et al., 2010)*.

In Austria these approaches for Great Bustard conservation are partly implemented through the measures of the Austrian agri-environmental scheme.

The Austrian agri-environmental scheme and conservation measures implemented

The Austrian agri-environmental scheme was originally implemented in 1995. In the Austrian Great Bustard areas special Great Bustard measures are offered to the farmers in the Great Bustard ÖPUL project areas for the entire (5-)7 year period.

Through the support of both the EU and Austria itself the area managed especially for the Great Bustard through ÖPUL increased in three Great Bustard ÖPUL project areas from 1 503 ha in 2001 to 5 110 ha in 2012 and by December 2012 it integrated more than 450 farmers participating on a voluntary basis. If a farmer participates with one or more fields he must stay in the contract for the entire (5-)7 year period. The implementation of the measures is controlled regularly. Between 2007 and 2013, payments of about € 400 to

€ 700 per ha for special bustard conservation sites have provided attractive incentives to these farmers and this will be the case also in the future. Different measures are implemented in the Great Bustard ÖPUL project areas.

Great Bustard fallow land

One of the measures is promoting fallow land. The following measures must be met for fallow land to qualify for ÖPUL. The field must be located in a Great Bustard ÖPUL project area. The use of fertilizers or plant protection agents is prohibited, as is the use of the growth enhancers. The field must be mowed once a year in the period between September 1st and October 15th, but 10-20% of the area has to remain unmown.

There are two more varieties of Great Bustard fallow land. The first—"Bustard fallow with fresh seeding"—requires the one-time ploughing and seeding (with a clover seed mixture) of the field until April 15th once during the (5-)7 year period. In the second—"Bustard fallow with open soil"—the field may be grubbed, ploughed or harrowed 2-4 times per year. Mowing the field beforehand is permitted. At the end of August a mustard-rape-mixture is seeded.

Great Bustard basic protection field

A Great Bustard basic protection field must meet the following criteria during the project period. Like the fallow land, it must be located in a Great Bustard ÖPUL project area. No shelterbelts or tall-growing plants (e.g. elephant grass, poplars, willows, black locust, etc.) are to be planted in the project area. Field size may not be increased and the use of scarecrows is prohibited. If a Great Bustard clutch is found, an area of 50 m around the nest is to be left undisturbed. The use of plastic film or plastic film greenhouses is prohibited. No burning of straw is allowed, except before the planting of rape. Mowing of fields is only permitted with the agreement of the site supervisor of the nature protection department. There is a greening-obligation in place in accordance with the specifications of the nature protection department (a minimum of 2 times in 5-6 years or 3 times in 7 years)—usually with a mixture of mustard *(Sinapis alba)*, rape *(Brassica napus)*, buckwheat *(Fagopyrum esculentum)*, or similar species.

Great Bustard winter wheat cultivation

If a field in the Great Bustard ÖPUL project area complies with the prescriptions of a basic protection field, it may qualify for the winter wheat measure. Winter wheat has to be cultivated minimum 2 times in 5-6 years or 3 times in 7 years. The wheat must not be irrigated and the fields must be left undisturbed from April 20th until it is harvested. For the entire contract period, the use of rodenticides is prohibited and control measures for European Hamster *(Cricetus cricetus)*, European Souslik *(Spermophilus citellus)* and Common Vole *(Microtus arvalis)* are not permitted.

Great Bustard winter foraging areas

If a field in the Great Bustard ÖPUL project area complies with the prescriptions of a basic protection field, it may also qualify as a winter foraging area. The crops must be in accordance with the specifications of the nature protection department and a winter culture

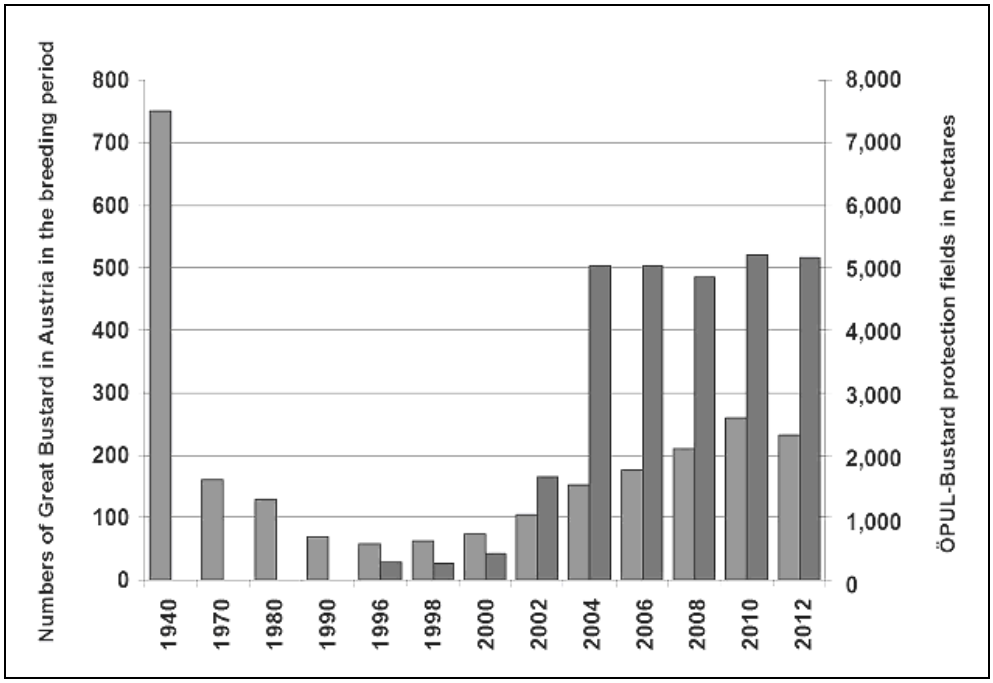

Figure 1. Size of the Austrian Great Bustard population (light grey columns) and the area of ÖPUL-bustard protection fields (dark grey columns) in different years between 1940 and 2012 (after *Raab et al., 2010* and *Raab* & *Spakovszky*, unpubl.)
1. ábra. Az ausztriai túzokállomány (bal oldali skála példányban megadva; világosszürke oszlopok) és az ÖPUL-túzokvédelmi területek (jobb oldali skála hektárban megadva; sötétszürke oszlopok) változása 1940–2012 között (*Raab et al., 2010;* illetve *Raab* & *Spakovszky* le nem közölt adatai alapján)

(rape) must be plated at least once in 7 years. Use of rodenticides and control measures for European Hamster, European Souslik and Common Vole are not permitted during the entire (5-)7 year contract period.

Further combinations

Combining the measure sets above with the following activities is also an option to participating farmers. The nature conservation plan bonus requires the participation with at least three ÖPUL Great Bustard fields/year and the obligatory participation of the enterprise in two further training courses within the contract period. The aim of the training is to explain the farmers the biology of the Great Bustard as well as the habitat requirements and approaches for the conservation for this species.

For the monitoring bonus, the enterprise must participate in a monitoring programme and in obligatory training courses, keeping records is also obligatory on the declared protection objects.

Conclusions

The history of Great Bustard conservation shows that only large-scale habitat management together with professional site supervision can preserve the species in central European agricultural landscapes. Great Bustard populations face many threats, like intensive agriculture, disturbance and habitat fragmentation just to name but a few. The measures of the Austrian agri-environmental scheme addresses them in a way that is manageable and satisfactory to all farmers concerned in Great Bustard conservation. They have already proven to be successful, in view of the increase of the Austrian Great Bustard population from 60 individuals in the 1990s *(Kollar, 2001)* to ca. 240 individuals by 2012 (*Raab et al.*, unpublished data) *(Figure 1).* Because of this success, and the fact that all parties involved are highly satisfied with the results, a continuation is not only desired by the participants, but also a necessity for Great Bustard conservation. A discontinuation of the scheme would largely annihilate past successes with devastating consequences for the Great Bustard population. If, however, this cooperation continues the way the involved parties desire it, the conditions for Great Bustards will further improve.

Acknowledgements

We would like to give our special thanks to more than 450 farmers for providing parts of their fields to support suitable areas for Great Bustards by means of the Austrian Rural Development Program. Without the support of the LIFE Project "Crossborder Protection of the Great Bustard in Austria" (LIFE05NAT/A/000077, *www.grosstrappe.at*), the LIFE+ Project "Crossborder Protection of the Great Bustard in Austria—continuation" (LIFE09 NAT/AT/000225, *www.grosstrappe.at*), the LEADER Project 4A-F-R8511/4-2013, the LPF Project 5-N-A1025/148-2009, the RD Project RU5-S-428/001-2005 and the RD Project RU5-S-941/001-2011, the time-consuming work for the conservation of the entire West Pannonian Great Bustard population during recent years would not have been possible. The LIFE projects have been supported by the EU, many project partners and co-funders.

KIVONAT—Az intenzív mezőgazdálkodás a túzokokat érintő egyik legjelentősebb veszélyforrás Európa-szerte. Ennek kezelésére az ausztriai agrár-környezetgazdálkodási programon (ÖPUL, ausztriai program a környezetbarát, extenzív és természetes élőhelyeknek kedvező mezőgazdálkodásért) belül különleges intézkedéseket hoztak, hogy (pénzügyi) támogatással és ösztönzéssel túzokbarát élőhelykezelés (pl. parlag, őszi búza, megfelelő vetési és betakarítási rendszer stb.) alakuljon ki. Az Európai Unió és Ausztria támogatásával a túzokbarát módon kezelt ÖPUL földterület 2001 és 2012 közt 1503 hektárról 5110 hektárra emelkedett, és 2012 decemberében több mint 450 gazdálkodó vett részt a programban önkéntes alapon. Az ausztriai agrár-környezetgazdálkodási program bevezetésének köszönhetően az osztrák túzokállomány az 1990-es években számlált 60 egyedről 2012-re kb. 240 egyedre nőtt. E siker és a résztvevők teljes elégedettsége miatt a program folytatása kívánatos, sőt a túzokok védelme miatt fontos is, hogy a túzokélőhelyek fejlesztése a jövőben is biztosított legyen.

References

Alonso, J. C., Morales, M. B. & Alonso, J. A. (2000): Partial migration, and lek and nesting area fidelity in female Great Bustards. *Condor* **102,** p. 127–136.

Alonso, J. C., Martín, C. A., Alonso, J. A., Palacín, C., Magaña, M. & Lane, S. J. (2004): Distribution dynamics of a Great Bustard metapopulation throughout a decade: influence of conspecific attraction and recruitment. *Biodiversity and Conservation* **13**, p. 1659–1674.

Alonso, J. C., Álvarez-Martínez, J. M. & Palacín, C. (2012): Leks in ground-displaying birds: hotspots or safe places? *Behavioural Ecology* **23**, p. 491–501.

Burnside, R. J., Végvári, Z., James, R., Konyhás, S., Kovács, G. & Székely, T. (2013): Human disturbance and conspecific influence display site selection by Great Bustard *Otis tarda*. *Bird Conservation International* **24**, p. 32–44.

Birdlife International (2012): *Otis tarda*. In: *IUCN (2012)*. IUCN red list of threatened species. Version 2012.2. URL: *http://www.iucnredlist.org* [accessed: 17.06.2013].

Collar, N. J., Crosby, M. J. & Stattersfield, A. J. (1994): Birds to watch two: the world list of threatened birds. BirdLife International. Cambridge, 407 p.

del Hoyo, J., Elliot, A. & Sargatal, J. (eds.) (1996): Handbook of the birds of the World, vol. 3. Hoatzin to Auks. Lynx Edicions, Barcelona, 821 p.

Faragó, S. (1996): Lage des Großtrappenbestandes in Ungarn und Ursachen für den Bestandsrückgang. *Naturschutz und Landschaftspflege in Brandenburg* **5**(1–2), p. 12–17.

Kalmár, S. & Faragó, S. (2008): A túzok védelme magyarországon, Life Nature Project 2007–2008, évi monitoring jelentése. *Magyar Apróvad Közlemények* (Supplement 2008), p. 14–19.

Kollar, H. P. (2001): Aktionsplan Schutz für die Großtrappe in Österreich. Studie des WWF Österreich im Auftrag des Bundesministeriums für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, 98 p.

Kurpé, I. (1996): Beziehungen zwischen Großtrappenschutz und Landwirtschaft im Raum des Landschaftsschutzgebietes Dévaványa. *Naturschutz und Landschaftspflege in Brandenburg*, **5**(1–2), p. 51–53.

Lane, S. J., Alonso, J. C., Alonso, J. A. & Naveso, M. A. (1999): Seasonal changes in diet and diet selection of Great Bustards *(Otis t. tarda)* in north-west Spain. *Journal of Zoology* **247**, p. 201–214.

Lane, S. J., Alonso, J. C. & Martín, C. A. (2001): Habitat preferences of Great Bustard *Otis tarda* flocks in the arable steppes of central Spain: are potentially suitable areas un-occupied? *Journal of Applied Ecology* **38,** p. 193–203.

Litzbarski, B. & Litzbarski, H. (1996): Der Einfluss von Habitatstruktur und Entomofauna auf die Kükenaufzucht bei der Großtrappe (*Otis t. tarda* L., 1758). *Naturschutz und Landschaftspflege in Brandenburg* **5**(1–2), p. 59–64.

Ludwig, B. (1996): Neue Ergebnisse zum Bestand, zur Brutbiologie und -ökologie sowie zum Schutz der Großtrappe. *Naturschutz und Landschaftspflege in Brandenburg* **5**(1–2), p. 30–36.

Magaña, M., Alonso, J. C., Martín, C. A., Bautista, L. M. & Martín, B. (2010): Nest-site selection by Great Bustards *Otis tarda* suggests a trade-off between concealment and visibility. *Ibis* **152**, p. 77–89.

Morales, M. B., Alonso, J. C., Alonso, J. A. & Martín, E. (2000): Migration patterns in male Great Bustards *(Otis tarda). Auk* **117**, p. 493–498.

Moreira, F., Morgado, R. & Arthur, S. (2004): Great Bustard *Otis tarda* habitat selection in relation to agricultural use in southern Portugal. *Wildlife Biology* **10**, p. 251–260.

Osborne, P. E., Alonso, J. C. & Bryant, R. G. (2001): Modelling landscape-scale habitat use using GIS and remote sensing: a case study with Great Bustards. *Journal of Applied Ecology* **38,** p. 458–471.

Palacín, C., Alonso, J. C., Martín, C. A. & Alonso, J. A. (2012): The importance of traditional farm-

land areas for steppe birds: a case study of migrant Great Bustards *Otis tarda* in Spain. *Ibis* **154,** p. 85–95.

Raab, R., Kollar, H. P., Winkler, H., Faragó, S., Spakovszky, P., Chavko, J., Maderič, B., Škorpíková, V., Patak, E., Wurm, H., Julius, E., Raab, S. & Schütz, C. (2010): Die Bestandsentwicklung der westpannonischen Population der Großtrappe, *Otis tarda* Linnaeus 1758, von 1900 bis zum Winter 2008/2009. *Egretta* **51,** p. 74–99.

Raab R., Kovacs, F. J., Julius, E., Raab, S., Schütz, C., Spakovszky, P. & Timar, J. (2010): Die Großtrappe in Mitteleuropa. Erfolgreicher Schutz der westpannonischen Population. APG, Wien, 304 p.

Raab R., Schütz, C., Spakovszky, P., Julius, E. & Schulze, C. H. (2014): Optimising the attractiveness of winter oilseed rape fields as foraging habitat for the West Pannonian Great Bustard *Otis tarda* population during winter. *Bird Conservation International* (DOI: 10.1017/S0959270914000355).

Rocha, P., Marques, A. T. & Moreira, F. (2005): Seasonal variation in Great Bustard *Otis tarda* diet in South Portugal with a focus on the animal component. *Ardeola* **52,** p. 371–376.

Rocha, P., Morales, M. B. & Moreira, F. (2013): Nest site habitat selection and nesting performance of the Great Bustard *Otis tarda* in southern Portugal: implications for conservation. *Bird Conservation International* **23**, p. 323–336.

Sastre, P., Ponce, C., Palacín, C., Martín, C. A. & Alonso, J. C. (2009): Disturbances to Great Bustards *(Otis tarda)* in central Spain: human activities, bird responses and management implications. *European Journal of Wildlife Research* **55**, p. 425–432.