Institution: University of Bath

Unit of Assessment: A5 Biological Sciences

Title of case study: Reintroduction of the Great Bustard into the UK

1. Summary of the impact

The project to reintroduce the Great Bustard, a globally endangered bird formerly extinct in the UK, is this country's flagship platform to raise public awareness of threatened species and the need to preserve biodiversity. The group led by Professor Tamás Székely at the University of Bath contributes directly to the implementation of the reintroduction and provides the research that underpins the project. The project has successfully established a new breeding population, enhanced the survival of released birds and achieved ecological enrichment in the release area. In addition, the project has recruited volunteers and supporters from a broad range of society, has been the subject of extensive media coverage and is the focus of a public engagement programme on conservation. The bird has been adopted as the emblem of the county in which it is being released.

2. Underpinning research

The population of Great Bustards declined in Europe over the last two centuries eventually resulting in national extinctions (including the UK). This was probably due to a combination of factors including new agricultural activities, hunting and egg collection [1].

Professor Székely and colleagues are part of a 10 year project (starting in 2004) to reintroduce the Great Bustard *Otis tarda,* a bird that is classified as globally vulnerable to extinction (IUCN Red List, 2013). The project obtains birds from their native Russia for release on Salisbury Plain, their last known breeding site in the UK [1]. Prof Székely is an evolutionary biologist with a mission to combine top quality evolutionary research with an impact on biodiversity conservation [2]. He is passionate about raising public awareness of science, particularly conservation issues. His team is underpinning conservation decisions by monitoring the behaviour, ecology and distribution of bustards [3]. This project critically depends on the scientific research led and carried out at the Biodiversity Lab in Bath, including a PhD student (Robert J. Burnside 2008 – 2011), other research students based at Bath and a Post-doctoral Researcher (Dr Kate Ashbrook 2011 – present) employed on the EU funded LIFE+ project. Bath is the only research group involved in the LIFE+ project. Research findings are being produced alongside the reintroduction programme, with impact emerging in parallel as the project is used as a flagship conservation exercise. The Great Bustard project (http://greatbustard.org/) is a partnership of the University of Bath, Great Bustard Group, RSPB and Natural England, employing around 20 people full-time, for activities such as importing and rearing chicks for release, land management and development of bustard-specific agri-environment schemes, working with farmers in the local area, and running trips to the project area for visitors. Outside the UK, the project involves coordinated actions in Russia where the eggs are collected and early rearing is carried out before chicks are import to the UK. Networking with projects in Spain, Hungary and Austria, contributes to global conservation for the Great Bustard.

Reintroduction projects typically show high mortality of released individuals in the early stages. We have used modelling to show how survival changes from time after release, the main causes of mortality and the factors influencing mortality [1,4]. This research revealed that timing of release into the wild has a significant impact on survival, with birds released in autumn having lower survival than those released in late summer [5].

We analysed the movements and dispersal of birds using satellite monitoring techniques, re-sightings reported by members of the public via the project website, and through monitoring by volunteers using smart-phone based global information system data recording. These unique data showed that although the birds have a south-west movement in late autumn/early winter (perhaps following their innate migratory behaviour exhibited by the stock population in Russia), they do return in the following spring to the close vicinity of the release site and they breed nearby.

The ultimate objective of the project is to establish a self-sustaining breeding population in the UK. To achieve this goal, the Bath team analysed the spatial distribution of Great Bustards [6]. From this analysis we were able to identify how male and female bustards chose areas based upon environmental variables such as land-use, topography and human infrastructure. This has allowed us to prioritise sites where Great Bustards should be released. To inform habitat management strategy further, we have used dietary analysis to identify the preferred diet of released Great Bustards. Data revealed that bustards eat largely plants, with the exception of the breeding period when insect components increase in their diet. This analysis, carried out by a volunteer under the Székely's team supervision, is currently examining how diet changes throughout the year according to the availability of crops and insects.

3. References to the research

[1] **Burnside, R.J**., I Carter, A. Dawes, D. Waters, L. Lock, P. Goriup & **T. Székely** 2011. The UK Great Bustard *Otis tarda* reintroduction trial. ***Oryx*** 46: 112-121. DOI: 10.1017/s0030605311000627
[2] Kelsh, R., **T. Székely** & S. Stuart. 2011. Why should biomedical scientists care about biodiversity? ***Current Biology*** 21: 210-211. DOI: 10.1016/j.cub.2011.02.014
[3] **Burnside, R.J**., Zs. Végvári, R. James, S. Konyhás, G. Kovács & **T. Székely**. 2013. Human disturbance and conspecifics influence display site selection by Great Bustards *Otis tarda*. ***Bird Conservation International*** (in press). Published online 28th March 2013. DOI: 10.1017/S0959270913000142
[4] Végvári, Z, Z. Barta, P. Mustakallio & **T. Székely**. 2011. Consistent avoidance of human disturbance over large geographic distances by a migratory bird. ***Biological Letters*** 7: 814-817. DOI: 10.1098/rsbl.2011.0295
[5*] Williams, T., Taylor, A. Ashbrook, K., Rose, H., Waters, D. (2011). LIFE+ Project "Reintroducing the Great Bustard *Otis tarda* to Southern England (LIFE09/NAT/UK/020):Year 1. (Available from the HEI on request)
[6*] Williams, T., Taylor, A. Ashbrook, K., Rose, H. & Waters, D. (2012). LIFE+ Project (LIFE09/NAT/UK/020): Year 2 Summary. (Available from the HEI on request)
*Note these findings also submitted for publication in peer-reviewed journals.

Grants
£35,000 University Research Studentship, John D Burnside, Conservation and reintroduction of Great Bustard *Otis tarda*
€ 2.2 million EU-LIFE+, Reintroducing Great Bustard to UK, 2010-2015, Consortium application with RSPB, Great Bustard Group and Natural England. The University of Bath is the sole research organisation associated with this project.

4. Details of the impact

1. Impact on the environment. Prof Szekely's team has made substantial impact on the environment by reintroducing a flagship conservation species to the UK. This species is one of the handful of bird species, such as the Red Kite, that has been reintroduced in the UK using stocks from their existing breeding populations.

Research establishing the most important factors that affect mortality of released bustards [1] had an immediate positive effect on the welfare of birds and their post-release survival. Birds that were released earlier in the year were found to have a higher chance of survival and recruitment into the population than those released later [3]; this finding led to a revision of the release protocols and management by the Great Bustard Group and RSPB [5]. The released birds in 2012 had an initial survival success of 100%, whilst in previous years the survival was less than half [1,3]. Monitoring is in progress to establish whether the improved survival will persist for a substantial time period after release.

Research showing that birds return to their release area after winter dispersal to breed [1], has highlighted the importance of maintaining the release area for birds year-round. From this research, we advised the Great Bustard Consortium to prepare and set up plastic decoy bustards in the release pens during the release period and in the breeding season, to socially bind the birds to the release area. This work thus averted a potential criticism arguing that the released birds

would disperse and leave the UK, so that our efforts would be futile. In addition, analysis of spatial distribution of birds released in the UK has provided key information on habitat preferences of Great Bustards [6]. It has been used by the RSPB to locate new release areas and manage the land effectively for Great Bustards [5,6]. Also, a study on diet of released bustards and how this changes throughout the year is critical in developing a targeted agri-environment scheme to be implemented by Natural England. The research was of immediate benefit to the success of the reintroduction programme.

The Head of Nature Recovery, RSPB commented [A]:
"*Bath's role in the project has been that of monitoring and measuring the parameters deemed to be vital to the success of the project. Using a combination of direct observation and remote data collection from satellite and VHF transmitters they have helped build up a picture of the dispersal and survival of the released birds. Dr Kate Ashbrook working under Professor Tamás Székely has helped to provide data to inform the future direction of the project. Research by the University of Bath has showed that birds have a greater chance of survival if released earlier in the year; this work contributed to the decision to import eggs from Russia for the first time in 2012, allowing us to release birds earlier than previously. Survival rate from the 2012 cohort released at a new site chosen based on data collected from monitoring was markedly higher than in any previous year. This vast improvement will undoubtedly increase the chances of the reintroduction succeeding. Habitat selection modelling has confirmed that there is sufficient suitable habitat to support a self-sustaining population on Salisbury Plain*".

Ornithologist, Technical Advice & Designations, Natural England commented [A]:
"*The research undertaken by the University of Bath has helped to identify areas that are favoured by released birds in southern England, based on a combination of observational studies and the collation of data from remote tracking. This will be invaluable in guiding the future development of the release programme and has already helped with the selection of a new release site with a resulting increase in the survival rates of released birds*."

2. Animal health and welfare has been enhanced by the research. By quantifying the behaviour of captive birds and observing post-release behaviour, the team proposed measures that improved their health and welfare [5]. Improvement of the visual experiences of captive birds, using transparent windows and moving them into soft release pens before release, made the transition from captivity to the wild less stressful and contributed to improved survival.

3. Public understanding has improved in regards to environmental conservation and biodiversity. The Great Bustard project partnership produced public awareness materials, for example, 1000s of leaflets and tractor cabs stickers targeting farmers and land-owners who manage habitat accessible to the Great Bustard (widely distributed around Salisbury and Marlborough, Wiltshire and also in Somerset [B]); many 1000s of leaflets distributed via RSPB reserves and Tourist Information centres across the South of England [C]. The project has a permanent exhibit in the Hawk Conservancy Trust (Andover) that welcomes 60,000+ visitors per year [D]. The Great Bustard press releases reached a broad national and international audience as reflected in a high volume of requests for interviews, commentaries and social media activity:

In 2009, the first bustard chick hatched in the UK after 175 years. This news was picked up by 14+ news and blogs including Nature.com, Guardian, BBC News, Times Online, Independent, Daily Mail, Cage & Aviary, Wildlife Extra. Following a press release in 2011, The Bath team featured on BBC West, BBC Wiltshire, Breakfast News and 4 international radio interviews; the project was commented on in 24 Radio, TV and internet-based UK media [E].

In 2013, the team appeared on BBC Newsround, a children's news programme, highlighting how scientific research can directly assist conservation projects and showing the link between collecting data in the field and analysing it in the laboratory. BBC Newsround is watched by 360,000 viewers mainly between the ages of 6 and 12 years old and the footage was also available on the programme's webpage, which receives 45,000 hits per day. This story was also covered in an interview on BBC Wiltshire radio and in the Bird Watching (circulation >15,000 according to Audit

Bureau of Circulation; readership >50,000) and Birdwatch magazines (circulation >13,000) [F]. Tweets; there were 1,239 followers of Great Bustard Group (GBG) and Biodiversity Lab at University of Bath twitter feeds as of 22/05/2013.

The Great Bustard is a charismatic bird, as indicated by the names and signage of numerous inns and public houses scattered throughout the country. People in Wiltshire are extremely proud of having them back again. As a sign of the Great Bustard's significance in SW England, the county flag of Wiltshire (below) was unanimously voted by 98 Wiltshire councillors to display a silhouette of the Great Bustard and is flown at many county events [G]. Great Bustards are released on the Ministry of Defence Salisbury Plain Training Area and consequently, members of the public can only view these magnificent birds in this area on official trips organised through the GBG. Despite this restriction, in the two years of the LIFE+ project (2010-2012), 3,173 people visited the project site on tours run by the GBG [5,6]. Male bustards have conspicuous, eye-catching display behaviour, observation of which is high on the list of birders, photographers and nature-lovers.

The Bath team actively engages the public in the research, including coordinating the daily work of 15 volunteers who assist with collection of research data on the Great Bustard population in S W England. These volunteers learn about bird biology and behaviour, and gain first-hand experience in conservation and assist in generating funding. In addition, the Great Bustard Project relies on re-sightings of birds from the general public, which are reported through the project webpage [H] (3185 hits on LIFE+ project website as of 23/05/2013). Each re-sighting reported is followed up by a member of the team, including corresponding with the reporter and a visit to the area.
Numerous presentations have been given to the public, including bird-watching and natural history groups (e.g. [I, J, K]).

Director of the Great Bustard Group David Waters with BBC Radio Wiltshire presenter Matt Smith, Great Bustard and the Wiltshire Flag at the Hawk Conservancy Trust, Andover.

5. Sources to corroborate the impact

[A] Testimonials from Head of Nature Recovery, RSPB and Ornithologist, Natural England.
[B] Information leaflet aimed at farmers and land-owners in range of the reintroduction project.
[C] Public awareness leaflet distributed via RSPB reserves and Tourist Information Centres across the South of England.
[D] The Hawk Conservancy, boasts the only Great Bustard aviary in the UK and acknowledges their link to the GBP reintroduction project:
http://www.hawk- conservancy.org/Your_visit/GreatBustard.asp
[E] Media Press releases: examples available on request.
[F] Articles from Birdwatch magazine: 10 June 2010, 20 Jan 2011, 2 Jan 2013.
[G] www.wiltshireflag.co.uk
[H] http://greatbustard.org/the-project/sightings/
[I] The team has disseminated their research through talks to non-academic audiences, including 3 talks to the general public in Salisbury, the RSPB Bath group, Bath Literary Society.
[J] LIFE+ project demonstration days; allow first-hand sharing of information and experience with farmers, landowners, government officials and conservation practitioners. Run annually, eight have been delivered to date (as of May 2013).
[K] As the LIFE+ reintroduction project is a partnership between Bath, RSPB, Great Bustard Group and Natural England, dissemination of information is generally carried out jointly