Title: Health and Disease in Translocated Wild Animals

Carter, Ian[1], Sainsbury, Anthony W[2], Walsh, Katherine[1], Hartley, Matthew[3], Curson, Jon[1] and Ewen, John G.[2]

1. Natural England
2. Institute of Zoology, Zoological Society of London, Regent's Park, London NW1 4RY
3. Royal Society for the Protection of Birds, Sandy, Bedfordshire, UK

Running Head: (no more than 50 characters) Translocated Wild Animals

Key Words: (at least 6 general words or short phrases that will make your manuscript easy to find on an indexing & abstracting service) conservation; release; disease risk analysis; decision analysis; reintroduction; translocation

Word Count: (*not* including abstract, references, and figure/table legends)

Corresponding Author:

Anthony W Sainsbury
Institute of Zoology
Zoological Society of London
Regent's Park
London NW1 4RY
UK
+442074496668
Tony.sainbury@ioz.ac.uk

Acknowledgments: This Special Issue sprang from a joint Zoological Society of London, Natural England and Royal Society for the Protection of Birds Symposium, held at the Zoological Society of London, which celebrated 25 years of the Zoological Society of London and Natural England partnership in Health Surveillance for the Species Recovery Programme. We would like to thank all the speakers and chairs who contributed to the symposium: Katie Beckmann, Tim Blackburn, Mark Brown, Stefano Canessa, Sarah Converse, Ruth Cromie, Molly J Dickens, Myra Finkelstein, Jim Foster, Andrew Greenwood, Tim Hill, Peter J Hudson, Carl Jones, Richard Kock, Leigh Lock, Nic Masters, Tony Mitchell-Jones, Axel Moehrenschlager, James D Nichols, Gabriela Peniche, Bruce Rideout, Richard Shore and Rebecca Vaughan-Higgins. Special thanks to the Symposium Coordinator, Jennifer Howes and the Head of Scientific Publications, Linda DaVolls for organising a brilliant event.

Why have species conservation translocations become so important as a conservation tool? In short, because historic and ongoing losses and degradation have severely reduced and fragmented our wildlife habitats. Increasingly, species struggle to persist in the wild and fragmentation of remaining habitat makes moving across hostile landscapes between suitable sites difficult. Direct human

intervention is essential to help many threatened species survive and, in some cases, to restore those that have already been lost.

In Britain, for example, we have the opportunity to see species like the white-tailed eagle (*Haliaeetus albicilla*), beaver (*Castor fiber*), pool frog (*Pelophylax lessonae*) and large blue butterfly (***Maculinea arion)*** only because they have been reintroduced (one form of conservation translocation). The conservation status of many other species has been improved because of translocations from one site to another. This Special Issue describes some of the painstaking work that has gone into ensuring that these conservation translocations are done responsibly with respect to the health and disease risks inherent in such interventions. These conservation translocation efforts can be celebrated for placing these species on a much firmer footing. Considerations of health and disease in responsible conservation translocations are also playing vital roles in saving species globally, for example the California Condor (*Gymnogyps californianus*) (Bakker et al, this Issue).

In a world where we hear so much gloomy news about the environment, conservation translocations provide some hope; a tangible sign that we can make a difference if we choose to. And critically, by focussing conservation effort on single, often high-profile species, restoration work helps to substantially improve habitats for a wide range of other wildlife. This approach is about far more than simply 'cherry-picking' a few token species to save. Increasingly species are selected exactly because of the important ecosystem functions they perform and ecosystem restoration has frequently become the fundamental objective of these programmes.

Conservation translocations can help to restore species and/or ecosystem functions, but done badly they can do more harm than good. Much has changed in our understanding of good translocation practice in the last few decades and the importance of taking disease risks into account when moving species from place to place is now far more widely recognised. In the past, the health of translocated animals may have been left to chance when species were moved around. Sometimes we got away with it… and sometimes we were not so lucky. We now have much better systems in place to assess and minimise the risks from diseases and parasites. These are reflected in protocols and guidelines on this subject (OIE and IUCN 2014) and are a core focus of this Special Issue. For example, Dalziel et al (in this Issue) contrast three methods for qualitative disease risk analysis available to practitioners for conservation translocations, while Hartley and Sainsbury review the pros and cons of all available methods, and Brown et al provide an important case study on short-haired bumblebee (*Bombus subterraneus*) translocation. Two further contributions outline methods which potentially make important advances in the analysis of the risk from disease in undertaking translocation: Bobadilla Suarez et al explains how an understanding of the geographical and ecological barriers crossed in a translocation is essential to distinguish high risk from lower risk translocations and Rideout et al set out the traits of non-native parasites which would increase their ability to invade, persist and spread and therefore increase risk from disease. Further developments in disease risk analysis methods for conservation translocations can be expected as the number of translocations analysed increases, our evidence-base on effectiveness is enhanced and post-release monitoring methods improve, providing crucial feedback on disease impact at the destination. Setting and maintaining high standards not only increases the chances that individual projects will succeed but also helps to minimise the risk that there will be adverse effects on other wildlife.

Practices to manage risk from disease following translocation benefit from models to predict the spatial and temporal patterns of risks (Bakker et al), molecular methods to identify suspected hazards (Peniche et al), analyses of biosecurity methods (Vaughan-Higgins et al) and studies on the ecosystem effects of therapeutic treatment of translocated animals (Northover et al). Decision-analytic models for predicting the effects of multiple risk management options on the outcome of

translocation (Converse et al) offer potential advantages in assessing the relative importance of management decisions in the face of uncertainty. Post-release disease monitoring is crucial to learn lessons from a conservation translocation and ensure future management decisions reduce the risk from disease (Nichols et al).

Species are moved from one place to another with alarming frequency for reasons outside the remit of conservation translocation (as defined by the IUCN 2013) including for development, trade, hunting, and amenity purposes, often without sufficient controls. We strongly encourage that all animal movements should be subject to the same high standards of disease risk analysis as those discussed in this special issue for conservation translocations. Only in this way can we reduce the accidental negative outcomes that occur because of translocations, and also continue to test and improve on the methods we use.

International Union for the Conservation of Nature 2013. IUCN Guidelines on Reintroduction and other Conservation Translocations. IUCN, Gland, Switzerland.

World Organisation for Animal Health (OIE) & International Union for Conservation of Nature (IUCN) (2014). – Guidelines
for Wildlife Disease Risk Analysis. OIE, Paris, 24 pp. Published in association with the IUCN and the Species Survival Commission.