



COMMUNICATING SCIENCE SERIES

'RE-WILDING' EUROPE AND THE RETURN OF PREDATORS

Tuesday, 13 July 2010

The Meeting Rooms, The Zoological Society of London, Regent's Park, London NW1 4RY

Chairs: Sarah Durant and Rosie Woodroffe, ZSL

Modeling tools to better understand the dynamics of large carnivore reintroductions

Thorsten Wiegand, Helmholtz Centre for Environmental Research – UFZ, Germany

Managing reintroductions of large carnivores is especially challenging: complex dynamics influence a variety of factors, such as habitat suitability, conflicts with human activity, movement behavior, social system and demographics. In this talk I present a modeling framework which aims to improve our understanding of the dynamics of expanding populations, anticipate potential conflicts with human activity and guide management. The framework is centered on three basic questions that require modeling tools with increasing complexity. The first question 'where are potentially suitable areas for species?' requires use of GIS and statistical methods of habitat modeling. The outcomes are maps of habitat suitability or the spatial distribution of different habitat types (e.g., breeding habitat, dispersal habitat, avoided matrix, or barriers) as well as critical areas with potentially high conflicts with human activity. The second question 'are potentially suitable patches connected?' requires use of individual-based dispersal models, based on empiric movement rules, which are driven by the habitat map and scenarios of human-caused mortality. The outcomes are potential movement corridors, patch connectivity values and its dependence on mortality scenarios. The third question 'under which conditions are the different patches and/or the network of patches viable on the long term?' requires use of spatially explicit population models that relate the demographics of the species to the landscape and to scenarios of human-caused mortality. This full model allows us to analyse a variety of applied questions, for example, identifying the limiting factors of the population expansion, assessing optimal initial conditions (i.e., location and number of released individuals), identifying critical corridor or barrier areas and areas with high conflict potential.

Further reading

Lynx in Germany, habitat model:

Schadt, S., Revilla, E., Wiegand, T., Knauer, F., Kaczensky, P., Breitenmoser, U., Bufka, L., Cerveny, J., Koubek, P., Huber, T., Stanisa, C. & Trepl, L. (2002): Assessing the suitability of central European landscapes for the reintroduction of Eurasian lynx. *Journal of Applied Ecology* **39**: 189–203.

Lynx in Germany, dispersal model:

Kramer-Schadt S., Revilla, E., Wiegand, T. & Breitenmoser, U. (2004): Fragmented landscapes, road mortality and patch connectivity: modelling dispersal for the Eurasian lynx in Germany. *Journal of Applied Ecology* **41**: 711–723.

Lynx in Germany, spatially explicit population model:

Kramer-Schadt, S., Revilla, E. & Wiegand, T. (2005): Lynx reintroductions in fragmented landscapes of Germany: projects with future or misunderstood wildlife conservation? *Biological Conservation* **125**: 169–182.

Lynx in Germany, model evaluation and parameterization:

Kramer-Schadt, S., Revilla, E., Wiegand, T. & Grimm, V. (2007): Patterns for parameters in simulation models. *Ecological Modelling* **204**: 553–556.

Brown bears in eastern Alps, spatially explicit population model:

Wiegand, T., Knauer, F., Kaczensky, P. & Naves, J. (2004): Expansion of brown bears (*Ursus arctos*) into the eastern Alps: a spatially explicit population model. *Biodiversity and Conservation* **13**: 79–114.

Wolves in Italian Alps, spatially explicit population model:

Marucco, F. & McIntire, E. J. B. (2010): Predicting spatio-temporal recolonization of large carnivore populations and livestock depredation risk: wolves in the Italian Alps. *Journal of Applied Ecology* **47**: 789–798.

General theory spatially structured populations

Revilla, E. & Wiegand, T. (2008): Individual movement behavior, matrix heterogeneity and the dynamics of spatially structured populations. *PNAS* **105**: 19120–19125.

Restoring and managing wolves in Sweden

Guillaume Chapron, Grimsö Wildlife Research Station, Swedish University of Agricultural Sciences

Wolves have been regarded with a negative attitude in the Nordic countries and it has taken a long time for the species to be perceived in the context of modern conservation biology. When wolves were finally protected in Sweden in 1966 and Norway in 1972, the species had already been exterminated in Scandinavia. In the late 1970s, a new wave of immigrant wolves arrived in Sweden from Finland and the population slowly began to increase. By the winter of 2000/2001 there were nearly 100 wolves in southern Scandinavia. During the winter 2009/2010, the population had increased to 263 animals. The population is seriously inbred and genetic analysis has shown that the number of founders was only three. In 2010 Sweden started implementing a new large carnivore management policy approved by the Swedish Parliament. Licensed hunting of 27 wolves was the first step with the goal to ease acceptance of wolves by the public. The next step should be to introduce new wolves in order to improve genetic diversity in the population. The return of the wolf has not been without problems, and the level of controversy has increased in tandem with the size of the population and with more proactive management practices. In this context and during the last decade, the Scandinavian Wolf Project (SKANDULV) has been delivering scientific knowledge for the best management of wolves, as well as disseminating information on wolf biology and management to a broad audience.

Does the lynx have a cat's chance in modern Britain?

David Hetherington, Cairngorms National Park Authority

NOTE: the discussions of lynx in this meeting are David Hetherington's own opinions from research conducted prior to working for CNPA

Britain has lost many of its native species over the centuries. Elsewhere in Europe, large mammal species are recovering lost range, often recolonising the continent across international boundaries by themselves, or by being actively reintroduced by humans.

However, large mammals cannot recolonise island Britain unaided and compared to our European neighbours we have been slow to implement mammal reintroduction programmes. Britain is not the thickly wooded, thinly populated wilderness of the past, when our full complement of large mammals roamed the island. But does that matter? Could a long-lost predator thrive once again in the worked and farmed landscapes of modern Britain?

Further reading

Cairns, P. & Hamblin, M. (2007): *Tooth & Claw: living alongside Britain's predators*. Dunbeath: Whittles Publishing.

Hetherington, D. (2008): The history of the Eurasian Lynx in Britain and the potential for its reintroduction. *British Wildlife* **December**: 77–86.

Hetherington, D.A., & Gorman, M.L. (2007): Using prey densities to estimate the potential size of reintroduced populations of Eurasian lynx. *Biological Conservation* **137**: 37–44.

Hetherington, D.A., Miller, D.R., Macleod, C.D. & Gorman, M.L. (2008): A potential habitat network for the Eurasian lynx *Lynx lynx* in Scotland. *Mammal Review* **38**: 28–303.

Stolzenburg, W. (2008): *Where the wild things were: life, death and ecological wreckage in a land of vanishing predators*. New York: Bloomsbury.

The Cairngorms Wildcat Project: www.highlandtiger.com

Rewilding the UK: reintroduction for restoration

David W. Macdonald and Chris Sandom, WildCRU, Zoology Dept, University of Oxford

We explore lessons learnt from past reintroductions and apply our findings to the question of how reintroductions could aid rewilding the UK. We begin with a brief assessment of the importance of habitat quality for water vole reintroduction and then review the difficulties in selecting animals suitable for reintroduction, using the grey partridge as an example. The use of fenced, managed meta-populations is then considered in the context wild dog conservation in South Africa. The difficulties faced by the beaver reintroduction to Scotland are also explored. These case studies are used to consider the ecological feasibility of constructing a landscape-scale fenced reserve for wolves in the Scottish Highlands. The prospect of constructing such a reserve raises numerous issues, and we describe a theoretical investigation to determine whether the concept warrants further examination. We attempt to answer the following questions: How big must a fenced reserve be? Is there sufficient space in the Highlands? Will wolves regulate deer numbers? How do we assess land suitability? Our results indicate that (1) an area of at least 600 km² is needed, (2) there is sufficient space in the Scottish Highlands, (3) the wolf population has the potential to regulate the deer population and (4) despite numerous potentially contentious issues, the land may be suitable for such a reserve. We conclude that, from an ecological perspective, the release of wolves to a fenced reserve is potentially feasible and our preliminary results support further exploration of this concept.