The potential for lynx reintroduction to Scotland
Innovative modelling provides robust scientific evidence to inform decision making

The Eurasian lynx (*Lynx lynx*) is a large, but shy species of cat that depends on woodland habitat. Approximately 65cm tall and weighing between 12-35 kg, lynx became extinct in the UK during the late medieval period. The potential reintroduction of lynx to Scotland has been the focus of significant recent debate, but any decision to proceeded would need to be supported by comprehensive and favourable public consultations and robust scientific evidence.

Recent modelling work delivers up to date and reliable evidence that Scotland possesses sufficient, well-connected habitat in the Highlands to give a reintroduced population of lynx a good chance of success. However, this success is heavily dependent on the careful selection of appropriate reintroduction site(s).

This briefing paper summarises research that has developed a quick, safe and cost effective tool to explore the suitability of different candidate sites around Scotland for the reintroduction of lynx. Equally, this new approach can be applied to conservation management and reintroduction planning for both lynx and other species.

Reintroduction

Advocates for the reintroduction of the Eurasian lynx to Scotland point to the potential restoration of ecological processes and ecosystem functioning as key benefits to be gained from the reinstatement of a historically present carnivore. Reintroduction could bring potential economic savings (for example through the natural control of roe deer) and boost wildlife tourism.

Conversely, concerns have been raised that the reintroduction of lynx could have detrimental impacts on farming, specifically through risks to livestock. Equally, it is important to assess broader public attitudes and any potential risk to existing native habitats and species, all of which now exist in a landscape that is considerably different from when lynx were last present in the UK.

Scottish Natural Heritage, the statutory body responsible for deciding whether to issue a licence for any prospective reintroduction to Scotland, sets out the need for a comprehensive assessment of issues around the reintroduction of lynx. This includes ecological issues such as habitat availability, together with the views of the public, livestock and land managers, the wider UK perspective, and any socio-economic impacts.

While there is significant crossover between these considerations, it is beyond the scope of any one tool to adequately address all of these points. However, aspects of each can be investigated independently in detail, with the results considered collectively. The modelling approach detailed in this paper contributes valuable evidence in assessing the ecological suitability of the Scottish landscape for the reintroduction of Eurasian lynx. The research does not indicate whether lynx should be reintroduced to Scotland, but advocates the use of rigorous and robust scientific evidence to allow appropriate and effective decision making.

Key findings

- A new and innovative modelling approach can contribute robust scientific evidence to inform debate around the potential reintroduction of lynx to Scotland.

- Initial findings suggest that the Highlands of Scotland possess enough well-connected habitat to give a reasonable chance of a lynx reintroduction being successful. However, appropriate site selection is critical.

- This modelling approach can be used to reliably explore, and effectively communicate a complex but critical aspect of reintroduction planning and landscape suitability assessments quickly, safely and inexpensively.

The model

Reintroductions, especially those of large carnivores, are often complex, costly and have to be considered over longer time horizons than policy or practice are historically accustomed to. As such, it is essential that there is a high degree of confidence that any reintroduction will succeed before decisions are taken to move ahead.

We used a new model that combines advances in both technology and ecological theory in a novel approach to reintroduction planning. This new modelling approach allows policymakers to simulate multiple different reintroduction scenarios using real information on the species recorded in other countries, such as birth rates, how individuals move through a landscape and what habitat they need. This is coupled with multiple different ways of measuring what a successful reintroduction might look like, allowing a broad understanding of what might happen following a release and critically, confidence in predicted outcomes.

The modelling allows reintroductions to be simulated at different locations in Scotland. Through modelling different numbers of reintroduced lynx of different sexes, the approach can provide insights into:

1. **Probability of population persistence –** How likely it is that a population of lynx will still be around after an ecologically meaningful period of time e.g. 100 years, and how big might that population be?

2. **First year of colonisation –** How will a population spread across a landscape following a release and how long will it take for an individual lynx to reach what seems to be suitable woodland habitat?

3. **Habitat occupancy probability –** How likely is it that each patch of seemingly suitable habitat will be occupied at different points in time after an attempted reintroduction?
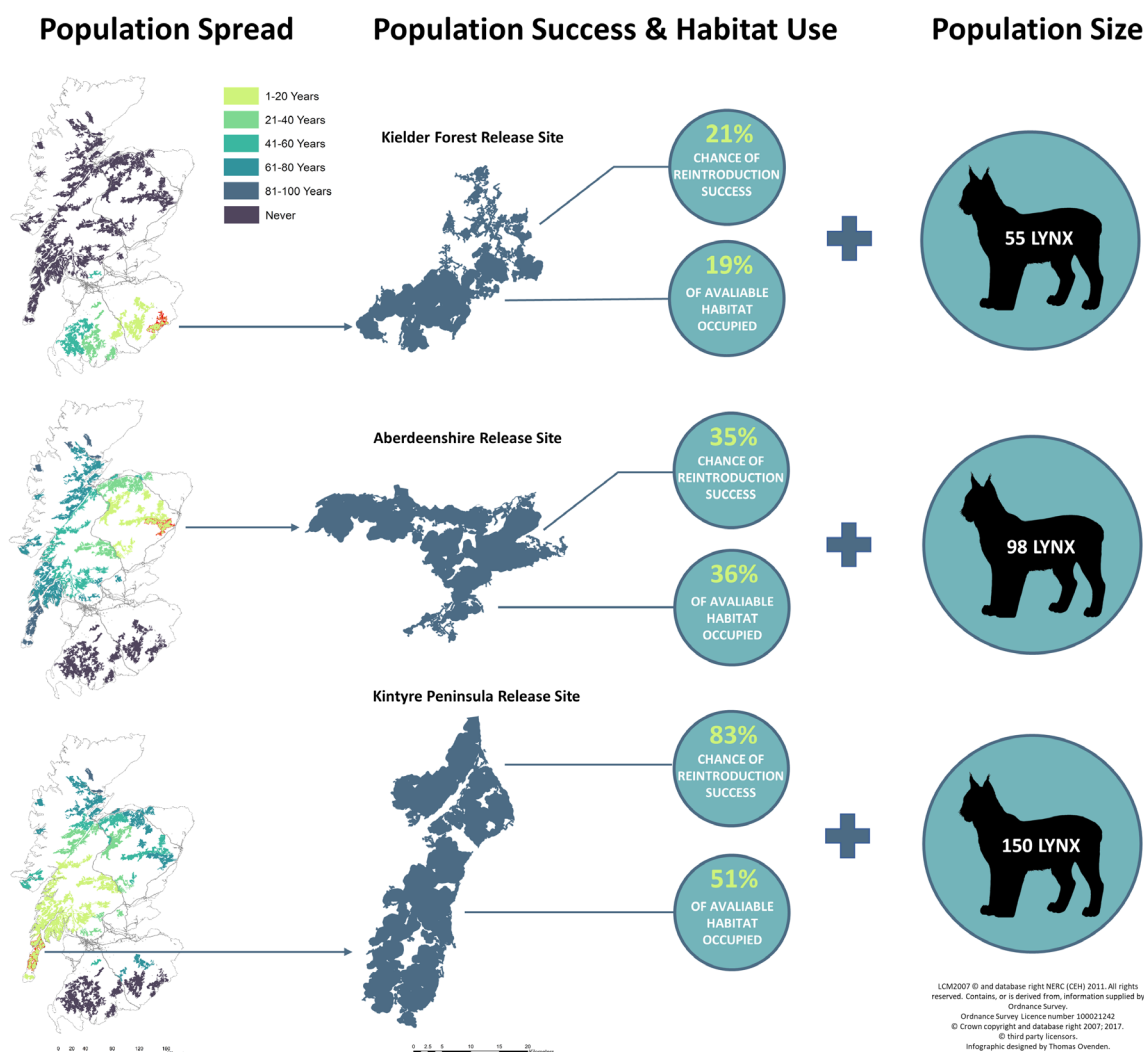

Fig. 1 - Modelling results of lynx reintroduction to three alternative locations in Scotland, 100 years after reintroduction.

These measures provide a 'high level' indication of the likelihood of reintroduction success and how the population might behave. More detailed analysis of modelled output can then investigate where certain barriers to lynx movement might exist, which in turn can help inform management decisions or target limited resources to improve the connectivity of suitable habitat at a landscape scale. This modelling approach can even be used to test and measure how effective different management interventions would be relative to one another, before implementing them on the ground.

Study

Researchers modelled the reintroduction of ten lynx to three previously identified candidate reintroduction sites: in the Scottish component of Kielder Forest, in Aberdeenshire and on the Kintyre peninsula.

Modelling was run over a 100 year period and repeated 100 times for each reintroduction site to provide confidence in the results. The release site on the Kintyre Peninsula always outperformed the other sites, regardless of how we chose to measure success (**Fig. 1**). After 100 years, the modelled reintroduction from the Kintyre Peninsula resulted in an 83% chance that reintroduction would succeed and result in a healthy population size.

This modelling demonstrates that Scotland does appear to have enough connected habitat for a lynx reintroduction to succeed. However, this is highly dependent on where this reintroduction takes place, as some areas are unsuitable. Equally, this work convincingly demonstrates how much of a formidable barrier the central belt poses to lynx movement, as very few individuals ever successfully crossed this area in any of the simulations.

Application

This ready-to-use model can easily investigate the suitability of other potential reintroduction sites. Equally, it can be adapted for different species and further work can refine the accuracy of our predictions by building in other important aspects. This could include how the availability of prey (particularly roe deer) may change over time, how changes in land use and forestry strategy may affect the availability of habitat for lynx, or areas that should be avoided due to identified risks.

Implications for policy and practice

- Policymakers should consider using this modelling approach when assessing the case for both lynx reintroduction to Scotland and for conservation planning of other species in the future.

- Further modelling should now be conducted to refine the model predictions, and investigate the opportunities afforded by alternative reintroduction sites or reintroduction strategies.

- The outcome of any modelling should be complemented with rigorous and comprehensive public consultation on the appetite for reintroduction.

About this research

This briefing is based on research undertaken by
- **Mr Thomas Ovenden,** Faculty of Natural Sciences, University of Stirling
- **Dr Stephen Palmer,** School of Biological Sciences, University of Aberdeen
- **Professor Justin Travis,** School of Biological Sciences, University of Aberdeen
- **Professor John Healey,** School of Natural Sciences, Bangor University

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Contact

Tom Ovenden
Faculty of Natural Sciences
University of Stirling
✉ thomas.ovenden@stir.ac.uk