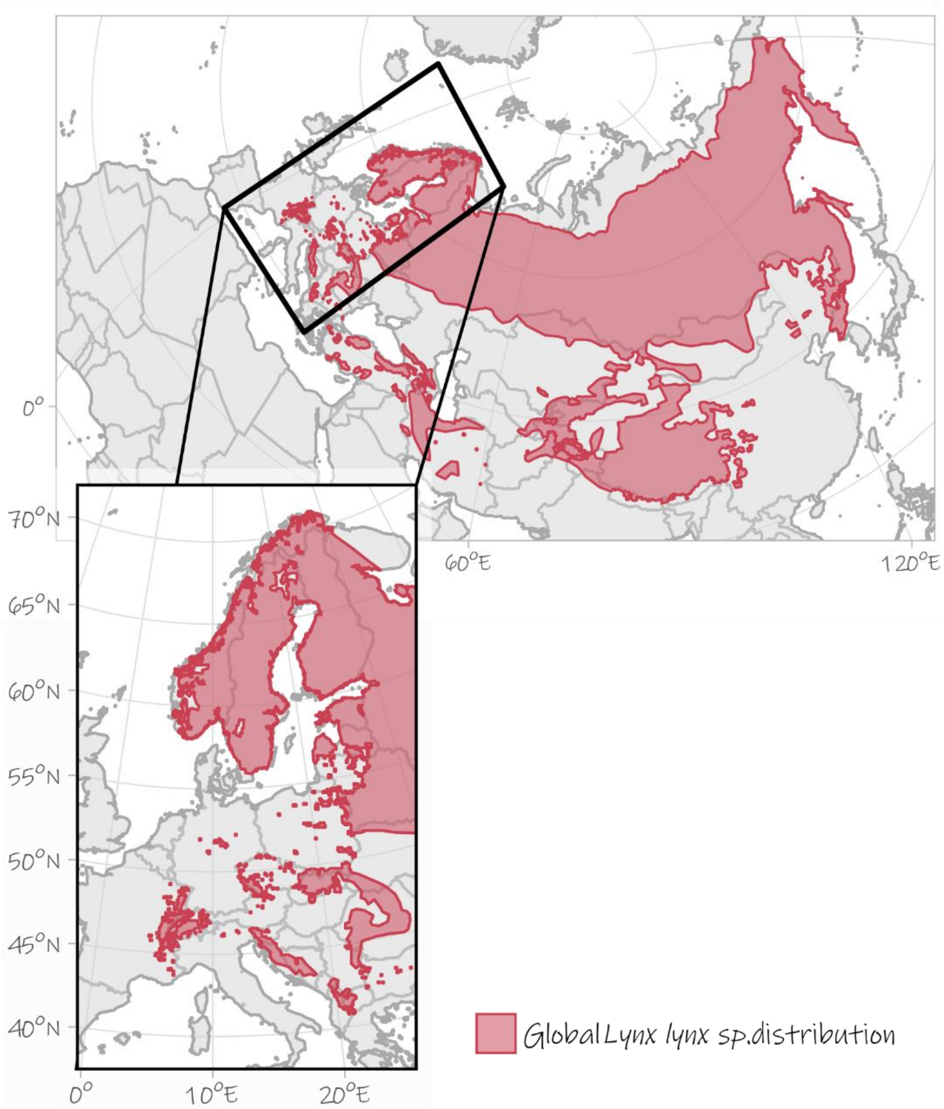
GLOSSARY OF TERMS

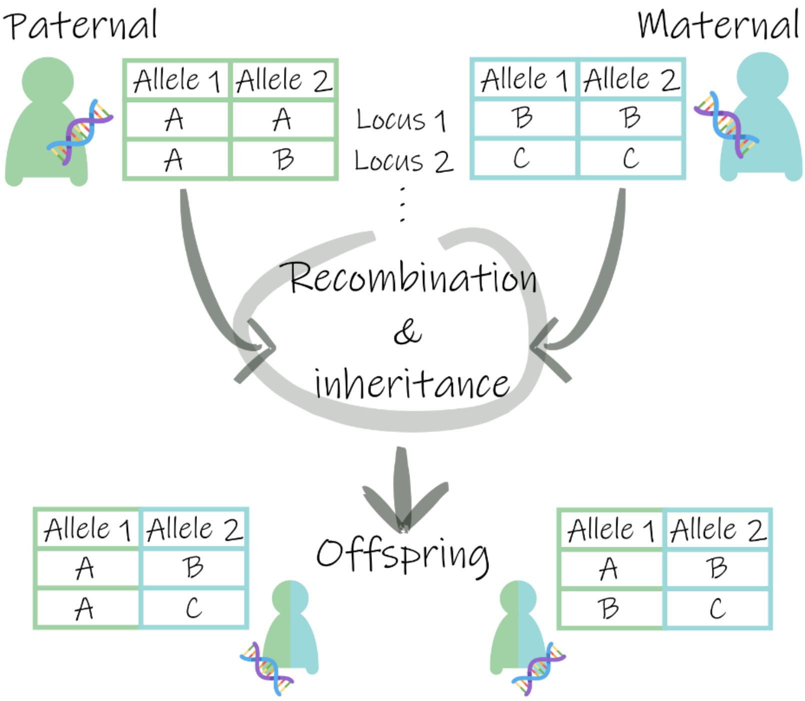
The terms below are mentioned in the accompanying Lifescape Project Report *Ecological Feasibility of Eurasian Lynx Reintroduction to Britain*, and we provide definitions on the following pages that may be useful to the reader.

Global distribution of Eurasian lynx



Genetic diversity

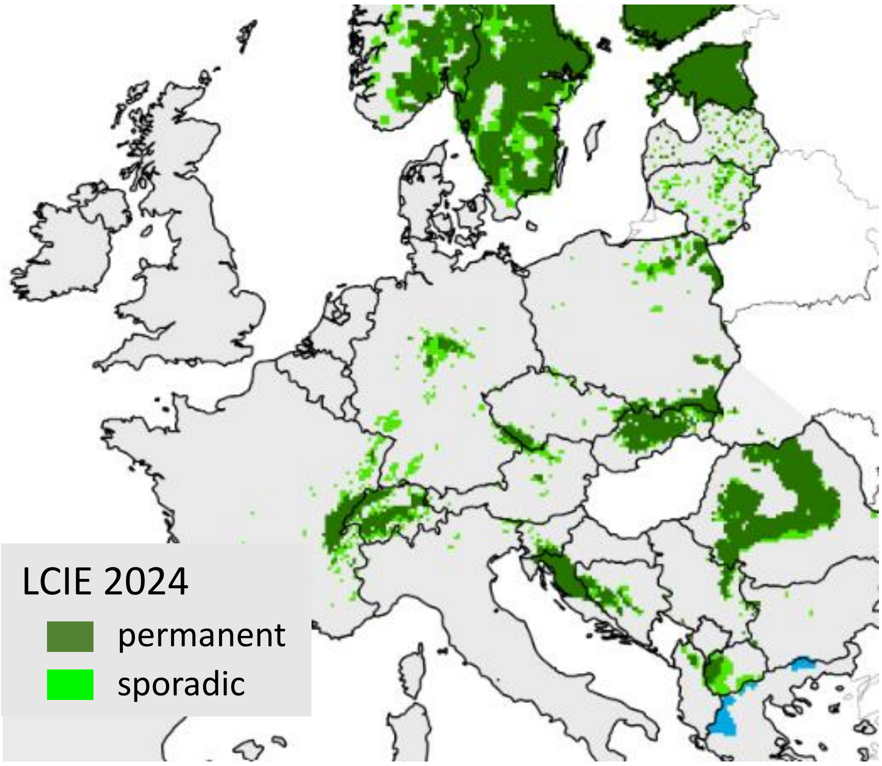
Mammals, like lynx, are “diploid”, which means they have two full sets of chromosomes - one inherited from the mother and one inherited from the father. At every location in the DNA (“locus”), like each gene, there is a pair of encoded genetic data. The possible data, which describe different variations at that locus, are called “alleles”. Different alleles are ultimately responsible for the emergence of different traits ("phenotypes”), such as hair or eye colour. During reproduction, at each locus an allele is randomly taken from each parent and then recombined to form a pair of alleles in the offspring’s DNA.



By analysing, or simulating, individuals’ genes we can ascertain their genetic condition. In the diagram, the paternal locus 1 is the same at allele 1 and 2 (“homozygous”), while at locus 2 they are different (“heterozygous”). We can use the proportion of heterozygous loci in an individual’s, or population’s, genes as a measure of genetic diversity ("heterozygosity”). We can also use the average number of different alleles at each locus as a complementary measure of genetic diversity (“allelic richness”). High genetic diversity is advantageous, for example to avoid inbreeding depression.

Metapopulation

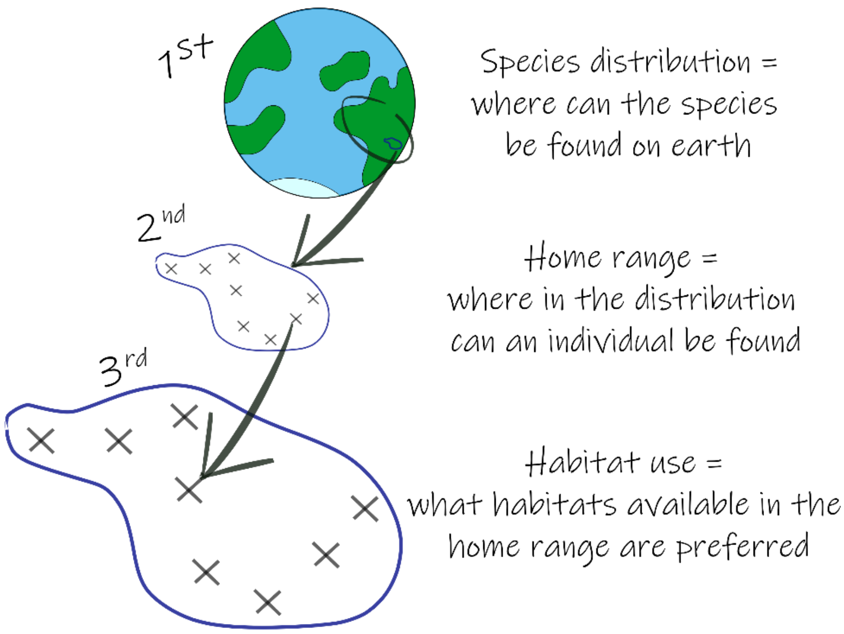
A population is a grouping of individuals based on some criteria, for example geographic location. Many of the lynx populations in Europe are quite small, which over time can lead to reduced genetic diversity (a process called “drift”) and even inbreeding (when highly related individuals reproduce). These factors can reduce the health of the population and can ultimately lead to the population’s demise. In natural conditions, populations are large and have exchanged with individuals from other populations, which reduces the effects of these factors. Unfortunately, this is not possible in Europe because of the fragmented landscape.



Experts in lynx conservation have proposed a so-called “metapopulation” management of lynx in Europe. This means a constellation of small populations joined together by moving individuals between these various populations (“translocation”) when the natural movements between them are insufficient. This effectively creates a large population that ensures the longevity of lynx in each of the component populations. Perhaps a British lynx population could be included in this one day?

Habitat suitability and selection

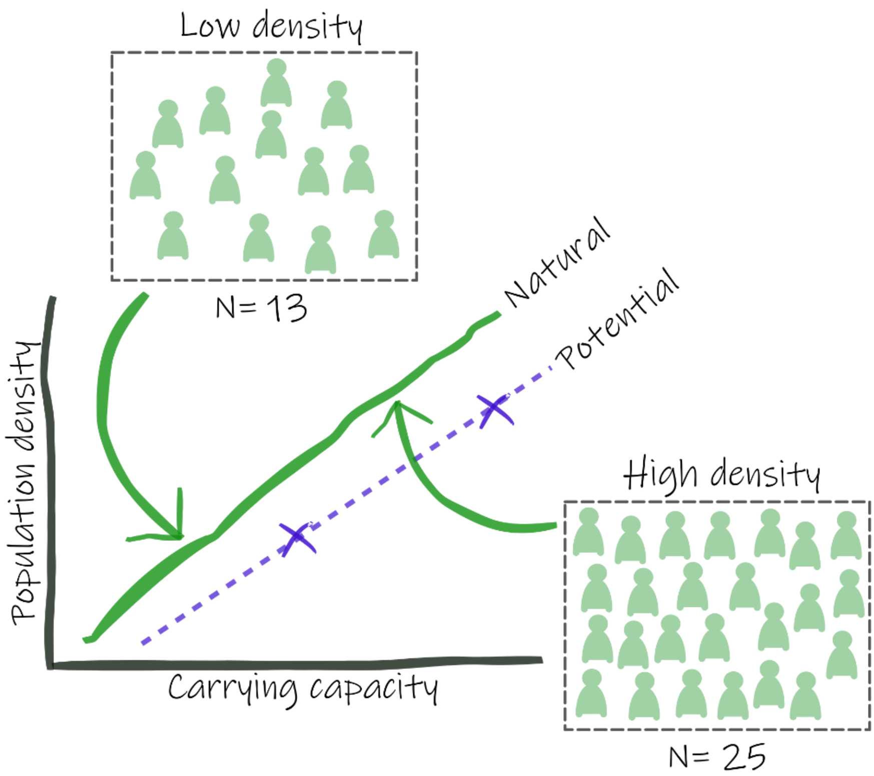
Habitat selection describes the behaviour of wild animals and how their preference for certain habitats or conditions drives their occurrence at a given place. This is process can be considered at many different "orders" of selection. The 1st order, the coarsest order, describes where the individuals of a species are distributed on earth. The 2nd order describes how individuals are distributed within the 1st order, also known as home range selection. The 3rd order describes how individuals prefer to use the habitats within their home range.



Statistically analysing where lynx go means we can see what habitats they prefer, which is the basis of predictively mapping the **habitat suitability** for lynx.

Carrying capacity

Carrying capacity describes the number of individuals a certain area or habitat can naturally support, which depends on the species in question. If an area has a low carrying capacity for a certain species it likely has a low abundance of resources that this species needs to survive, and vice versa for an area with a high carrying capacity. This can lead to populations with either low or high densities (individuals per area), respectively.



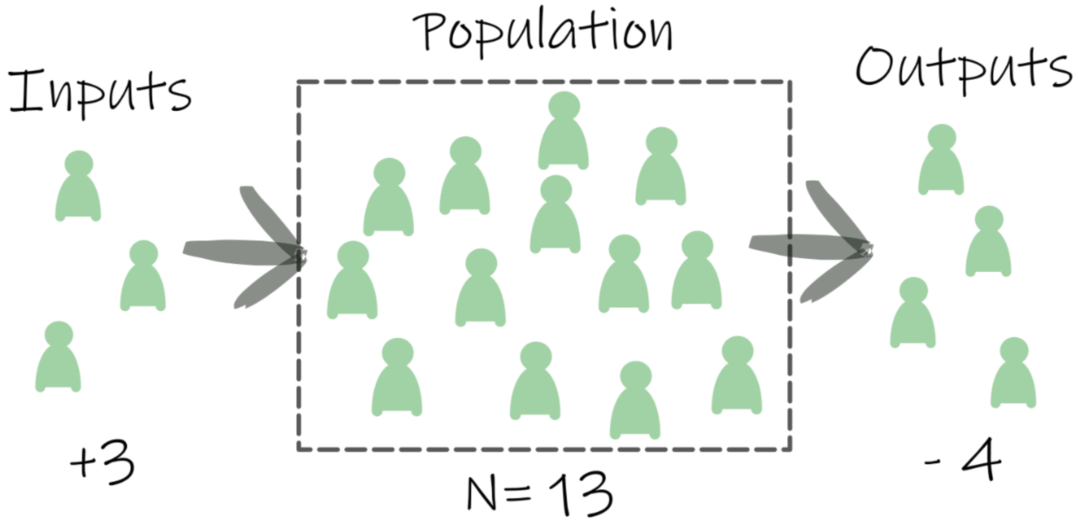
In less natural areas, like most of Europe, the natural carrying capacity is unlikely to be reached. This is because the number of individuals, and hence density, is limited by mortality causes that would not exist without humans – like road collisions.

Rule-based modelling

This type of modelling uses a set of rules or operations to predict a certain outcome. While these rules can be derived from empirical data or statistical analyses, in ecological modelling they are often used to convert expert knowledge and observation into a predictive framework. The benefit of this is that a set of simple rules can be used to imply a much more complicated model than data may allow.

Demography

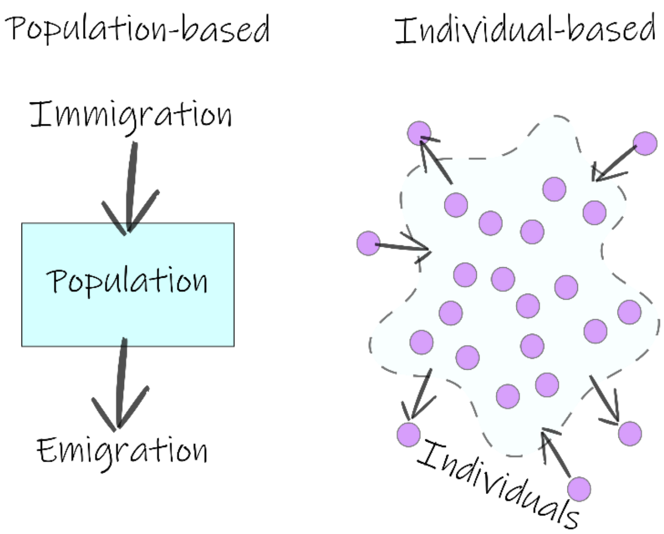
Demography is a term used to describe any information about groups of individuals, or populations, and includes all the demographic parameters that affect the growth or decline of populations.



Demographic parameters include, for example: population size (N), density, age structure, sexual maturation, and sex ratio. Many of these have been ascertained for lynx.

Individual-based modelling

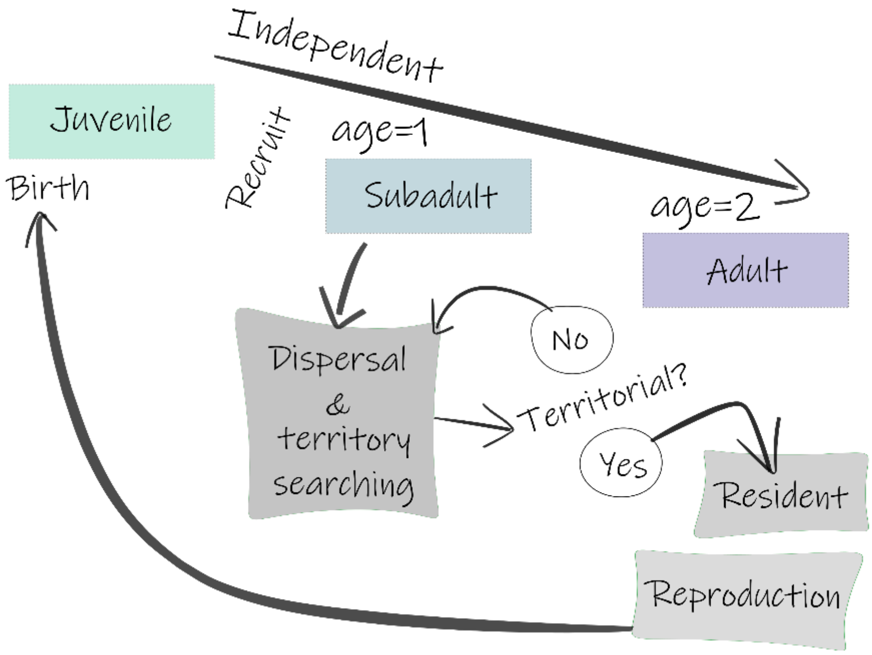
To predict how populations will change over time they must first be modelled. This can be done in a few different ways, but two key methods are “population-based” and **“individual-based” models**. In population-based models the basic entity is the population, this is an entity with certain properties, such as population size. All modelled processes, like birth, death, immigration, or emigration, are applied to the population.



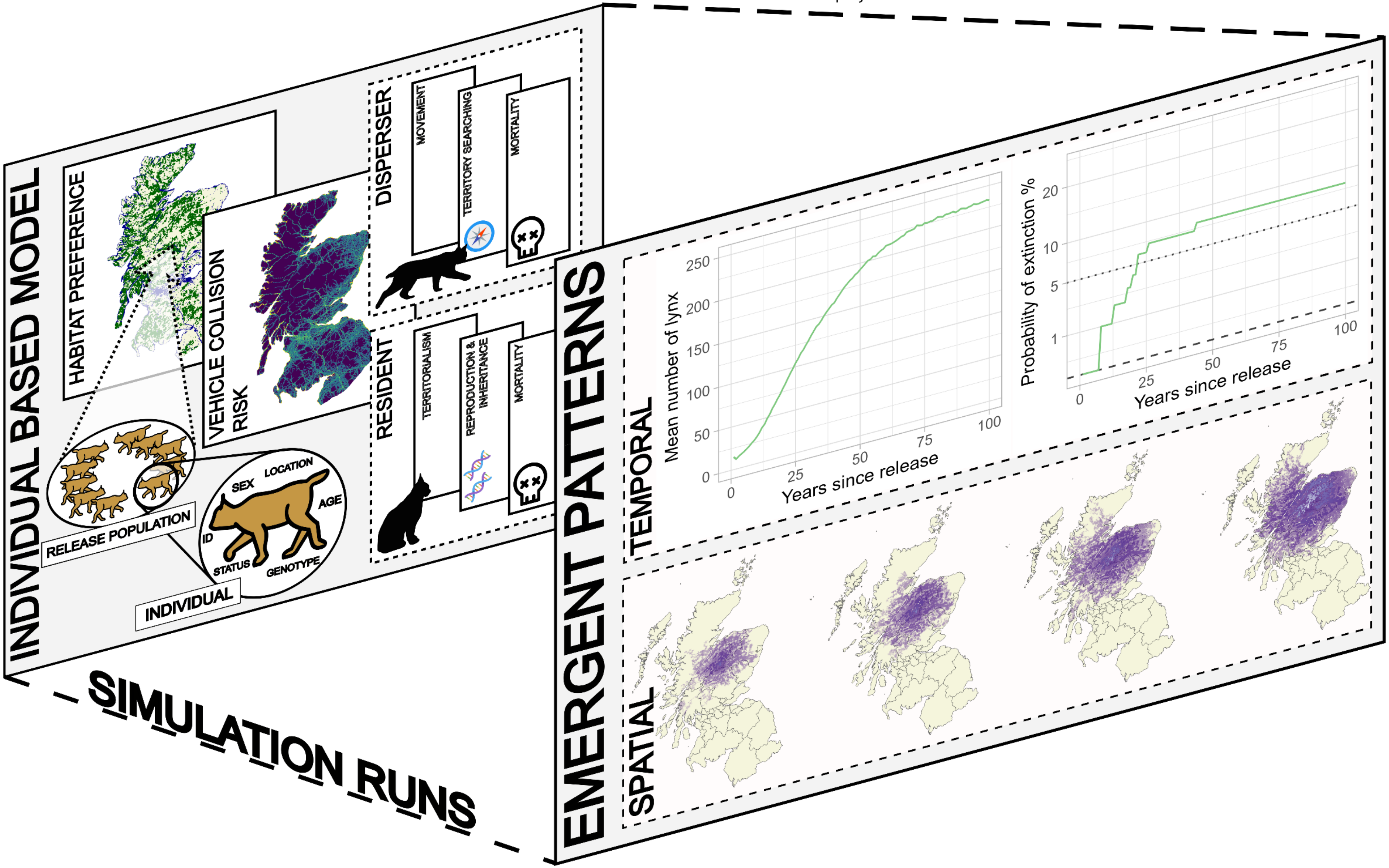
Individual-based models consider individuals as the basic entity, so that the population size emerges as the result of individual processes that describe how individuals interact with each other and their environment. These are very useful for complicated systems and especially when the spatial context of individuals should be considered in simulations.

Modelled life history stages of lynx

An important part of constructing an IBM is to distil the critical **life history** stages and behaviours of the species. For lynx there are 3 main life stages, which are partially related to age. The first stage is from birth until independence (age<1) when lynx are juvenile. Around 10-12 months juvenile lynx leave their mothers and at 1 year are known as subadults. Subadults normally “disperse” from the mother’s territory, which means they begin to search for their own territory. At 2 years of age lynx are considered adults.

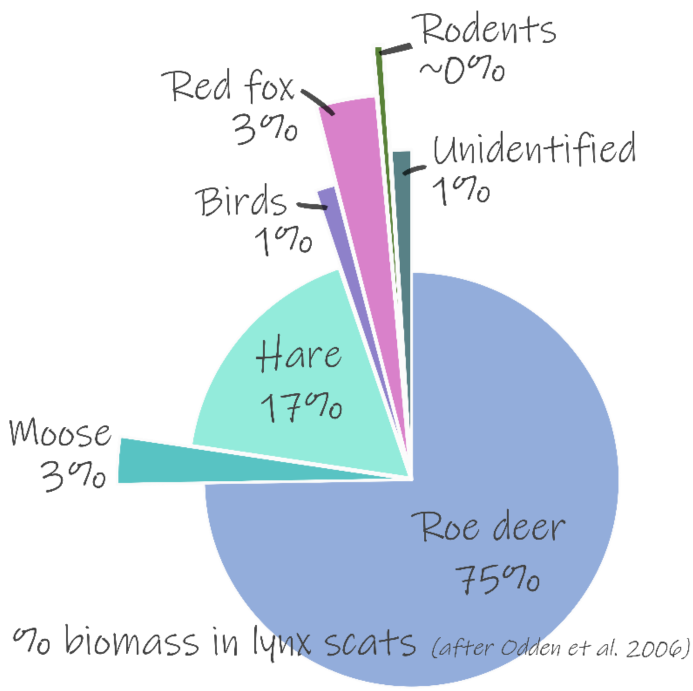


Demogenetic population model



Diet of lynx

Lynx are extremely adaptable animals that as a species can live in northerly arctic regions to southerly Mediterranean regions. This means they must subsist on diverse prey across this range depending on what is available. Across most of their European range, roe deer make up most of their diet. Even at low densities, roe deer seem to be the preferred prey of lynx. The availability of prey affects lynx's population densities.



In Britain there are currently six deer species present, namely: roe, red, fallow, sika, water, and muntjac. These would likely be lynx's main prey where they overlap. Smaller species including rabbits, hares, foxes, martens, squirrels, and some birds are also likely prey. Evidence from Europe shows that livestock are not frequently targeted by lynx, however it is possible that smaller livestock, such as sheep, might be predated occasionally.

Social-spatial organisation of lynx

Females and male lynx use space differently. Females choose a home range that provides enough resources, also to support kitten rearing, while males select a home range for resources and mates. That means one male may overlap in space with more than one female. The density of a population therefore emerges from the spatial distribution of habitats and resources, as well as the social structure of lynx.