

Demography of small populations: incorporating prior information in multistate capture-recapture models

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Abstract: Capture-recapture models are often used to estimate demographic parameters of populations in natura, such as survival probabilities and population size. Multistate capture-recapture models in particular allow the estimation of cause-specific mortalities while accounting for the fact that the detection probability of an individual at any given year may be lower than 1.

Despite their advantages, multistate capture-recapture models are data hungry and their application to small populations often leads to inaccurate estimates which, in turn, translate into uncertainty in viability models that are used to devise conservation strategies.

Here, we will illustrate the use of informative priors in order to improve the precision of multistate capture-recapture model parameters estimates by resorting to data from other ecologically similar populations. Our work is in line with recent results that promote the elicitation of prior information in ecological models (Gedir et al 2013, Martin et al 2013).

As a case study, we will study the French-Spanish population of brown bears (*Ursus arctos*) in the Pyrénées. We use as priors the results of analyses performed on the Austrian and Italian brown bear populations, which share similarities with the French-Spanish one.

The use of informative priors helps in reducing uncertainty in demographic estimates, like extinction probabilities or abundance.

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