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What ospreys teach us about model development

Demography changes continuously in space and time. Especially migratory species that use space over large scales experience very different influencing conditions. We can learn about their survival and space use from different types of reencounters of marked individuals such as dead recoveries and resightings. In former studies, we have developed a model that estimates survival, migratory connectivity, and the observation process. We apply this to a large data set of osprey dead-reencounters in Europe and Africa showing how survival and space use of different osprey populations look when the observation process is heterogeneous. At the same time, we also learn that our spatial model can only conditionally represent the life of an osprey, as it does not include certain elementary features of an osprey life, such as age-dependent and seasonal survival or space use. We explain this using a simulation study. In the discussion we show possibilities how data that vary over the full annual cycle can nevertheless be evaluated with our model and motivate a further development of the model.