# NONPARAMETRIC ESTIMATION OF SURVIVAL IN THE WILD USING CAPTURE-RECAPTURE DATA: APPLICATIONS IN ECOLOGY AND EVOLUTION

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In the last forty years, a challenging research topic in ecological statistics has been the estimation of demographic parameters, including survival, using capture-mark-recapture data and when possible, to explain variation using auxiliary variables (e.g. time, age, temperature, rainfall...) These explanatory factors are typically accommodated using a logistic regression framework, assuming linear or/and quadratic relationships. However, the biological truth is certainly more complex, and nonlinearities are more likely to able to capture the patterns in survival variation and therefore should be considered. We show how nonparametric methods using penalized splines can be used for modeling in a more flexible way the relationship between survival and explanatory factors. Two case studies are investigated using data sets on birds. In ecology, quantifying the effect of climate on survival may be useful in showing an influence of global warming. In evolution, assessing the form of the relationship between fitness and an individual trait like body mass or age may be useful in proving the action of natural selection on this trait.