

RECENT DEVELOPMENTS IN STATISTICAL ECOLOGY

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Early probability models in statistical ecology were simple, and used for the description of relatively short data sets. Current models can be far more complex, supported by long-term data sets. We describe some of the early models and then focus on a range of recent developments within the *National Centre for Statistical Ecology*, motivated by the need to describe detailed data on grey herons, *Ardea cinerea*, Soay sheep, *Ovis aries*, and the lizard orchid, *Himantoglossum hircinum*. We shall present state-space models for census data, fitted by means of a Kalman filter, capture-recapture models for estimating the survival of marked wild animals, and new ways of including appropriate covariates, for both survival and reproduction; the covariates include time-varying individual measures with missing values, such as weight, and global measures such as winter weather and population density. Prediction is often made through population projection matrices, and we present an exact method for perturbation analysis based on implicit plotting using symbolic algebra. The different parts of this talk describe joint work with Takis Besbeas, Simon Bonner, Ted Catchpole, David Miller, Martin Ridout, and Peter Rothery, as well as ecologists Peter Carey, Tim Coulson and Giacomo Tavecchia.