EXPLORING MIGRATION DATA USING INTERVAL-CENSORED TIME-TO-EVENT MODELS[1]

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ABSTRACT

Ecologists and wildlife biologists rely on periodic observation of radiocollared animals to study habitat use, survival, movement, and migration, resulting in response times (e.g., mortality and migration) known only to occur within an interval of time. We illustrate methods for analyzing interval-censored data using data on the timing of fall migration (from spring-summer-fall to winter ranges) for white-tailed deer (*Odocoileus virginianus*) in northern Minnesota during years 1991-1992 and 2005-2006. We compare both nonparametric and parametric methods for estimating the cumulative distribution function of migration times, and we suggest a parametric (cure rate) model that accounts for conditional (facultative) migrators as a potential alternative to traditional parametric models. Lastly, we illustrate methods for exploring the effect of environmental covariates on migration timing. Models with time-dependent covariates (snow depth, temperature) were sensitive to the treatment of the data (as interval-censored or known event times), suggesting the need to account for interval-censoring when modeling the effect of these covariates.