Spatially explicit capture-recapture methods in practice; estimating the density of an elusive reedbed Passerine

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The Bearded Reedling, *Panurus biarmicus,* is a rare Passerine so dependent on reedbed habitats that individuals may spend their entire life within a single reedbed stand. Despite being widespread throughout Europe, only 800 individuals inhabit the UK making it a specially protected species. Additionally, this species is known for fluctuating population sizes, to which migration, emigration and immigration contribute to a poorly known extent. The Tay Reedbeds, Scotland, are thought to hold the largest population of Bearded Reedlings in the UK. Precise estimates of abundance and density are essential for informed management and monitoring of this vulnerable population, but the difficulties of surveying in inaccessible reedbed habitats, mean number of birds inhabiting this reedbed remains unclear. There is also interest in the effect of harvesting reeds on Reedling distribution and abundance. Mark-recapture data are available from monthly mistnetting with ringing to mark individuals, and data on animal movement is available from telemetry tags attached to a sample of individuals. We use spatially explicit capture-recapture (SECR) methods with non-uniform animal distribution models to estimate the density and distribution of birds throughout the reedbeds; covariates such as distance from managed (cut) reed patches allow inferences to be drawn about the effects of reed cutting on the population.