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Using imputation and mixture model approaches to integrate multi-state capture-recapture models with assignment information. (English) [Zbl 1419.62475](#)
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Summary: In this article, we first extend the superpopulation capture-recapture model to multiple states (locations or populations) for two age groups., *Z. Wen et al.* [*Biometrics* 67, No. 3, 691–700 (2011; [Zbl 1226.62135](#)); “A robust design capture-recapture model with multiple age classes augmented with population assignment data”, *Environ. Ecol. Stat.* 21, No. 1, 41–59 (2013; [doi:10.1007/s10651-013-0243-6](#))] developed a new approach combining capture-recapture data with population assignment information to estimate the relative contributions of in situ births and immigrants to the growth of a single study population. Here, we first generalize Wen et al.’s [loc. cit.] approach to a system composed of multiple study populations (multi-state) with two age groups, where an imputation approach is employed to account for the uncertainty inherent in the population assignment information. Then we develop a different, individual-level mixture model approach to integrate the individual-level population assignment information with the capture-recapture data. Our simulation and real data analyses show that the fusion of population assignment information with capture-recapture data allows us to estimate the origination-specific recruitment of new animals to the system and the dispersal process between populations within the system. Compared to a standard capture-recapture model, our new models improve the estimation of demographic parameters, including survival probability, origination-specific entry probability, and especially the probability of movement between populations, yielding higher accuracy and precision.

MSC:

[62P10](#) Applications of statistics to biology and medical sciences; meta analysis

Keywords:

[capture](#); [recapture](#); [dispersal](#); [genetic assignment tests](#); [imputation approach](#); [kangaroo rat](#); [mixture model](#); [multi-state](#); [population assignment procedure](#); [robust-design](#); [semiparametric](#); [superpopulation](#)

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