

## **Removal sampling with migration**

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Immigration that occurs during the course of a removal study will lead to positive bias in abundance estimation and negative bias in detection probability estimation when fitting standard removal models. We present models that account for two types of migration, which we show can be modeled in the same way: infill migration, when the space left behind by removed animals attracts other animals into the catchable population; and background migration, a steady rate of movement of animals into and out of the catchable population. Our models assume that the intensity of migration is proportional to net removals, and we consider versions in which the number of migrants arriving between removal samples is either a random variable with a Poisson distribution, or is deterministic. The results of a simulation study show that in the presence of migration, our models lead to much lower bias than standard removal modeling. We apply the models to a survey of brushtail possums in New Zealand forest and farmland.