

## Comparable roadkill rates using open-population capture-recapture models

A comparable roadkill metric is necessary to make inferences between different roads, periods, and species and thus to better plan and assess mitigation effectiveness. As carcass counting on roads has associated sampling errors due to imperfect detection, roadkill rates must account for carcass detection and persistence probabilities and not be only based on the observed number. Open-population models used to estimate demographic parameters in living animal populations can be adapted to the context of roadkills and account for these issues. Here, we present an approach using carcass capture-recapture data and an open-population model to estimate comparable roadkill rates under a Bayesian framework. For that, we used roadkill data from the white-eared opossum (*Didelphis albiventris*) and the black-and-white tegu lizard (*Salvator merianae*) recorded on four road stretches from Southernmost Brazil. Data was collected during four consecutive road survey (occasions) visits in seven independent sampling sessions for one stretch and during eight occasions in two sampling sessions for the other three. Carcasses received a unique identification used to recognize individuals over the occasions, that were gathered in capture histories. Data was fitted to the superpopulation formulation of the open-population model and the daily roadkill rate per kilometer was derived from samples of Bayesian posteriori distributions. We recorded 1501 captures from 461 carcasses of opossums, and 511 captures, from 217 carcasses of tegus. The estimated roadkill metric (with its associated uncertainty) gives roadkill numbers from a known time interval and stretch length and account for imperfect detection without the necessity to perform extra experiments besides the repeated visits. Precision in the estimates was higher as the number of captures and recaptures increased, which resulted in higher precision for surveys with eight occasions and for the most captured species, the opossum. By using the roadkill rate we found different rankings between stretches and sessions when compared to observed data. This approach could be adapted to estimate fatalities from other infrastructures for which repeated observations of marked carcasses are an option.