A framework for estimating human-wildlife conflict probabilities conditional on species occupancy
Appendix B

Model for estimating conflict reporting probabilities conditional on species occupancy, when data are collected over multiple survey seasons.

$$
\begin{aligned}
y_{i,t} &\sim \begin{cases} 0, & z_{i,t} = 0 \\ \text{Binom}(K_{i,t}, r), & z_{i,t} = 1 \end{cases} \\
w_{i,t} &\sim \begin{cases} \text{Binom}(J_{i,t}, p_{10}), & z_{i,t} = 0 \\ \text{Binom}(J_{i,t}, p_{11}), & z_{i,t} = 1 \end{cases} \\
z_{i,1} &\sim \text{Bern}(\psi_{i,1}) \\
\psi_{i,1} &= \mathbf{X}'\boldsymbol{\beta} \\
z_{i,t} &\sim \begin{cases} \text{Bern}(\phi_t), & z_{i,t-1} = 1 \\ \text{Bern}(\gamma_t), & z_{i,t-1} = 0 \end{cases}
\end{aligned} \tag{1}
$$

In the above equations ϕ_t is the probability that a site that was occupied in the previous time step $z_{i,t-1} = 1$, stays occupied in the subsequent time step. Whereas, γ_t is the probability that a site that was unoccupied in in the previous time step $z_{i,t-1} = 0$, will transition to an occupied state. These parameters may themselves be modeled as functions of covariates to explore how a species uses an area over time and the consequent changes in rates of conflicts.