Multistate Jolly-Seber with multievent detection process: Notes

Simulation example (Multistate\_JollySeber\_multieventDetection.R)

* We assume N\* total individuals use the site at least once across T occasions.
* States are: 1 = not entered, 2 = egg burrow, 3 = chick burrow, 4 = terminated
* Observations are: 1 = burrow visit, 2 = prey delivery, 3 = not detected
* Observed capture histories are augmented up to M individuals

State at entry:

* Occasion 0 is a dummy occasion where all burrows are in state “not entered”
* On occasion 1, burrows may be in state not entered, egg, or chick
* After occasion 1, burrows can only enter as egg (e.g, a chick burrow on day t must have previously been an egg nest or entered as a chick nest on day 1).
  + We do this by setting alpha[1] ~ dunif(0,1) and alpha[t > 1] <- 0, where alpha is the probability that a burrow that entered on time t is a chick burrow.
  + There are multiple ways to parameterize this process. I followed Kery and Schaub 10.3.2 gamma[t] formulation and added a single parameter (alpha) to allow entry as egg or chick on occasion 1 only.

Simulation script is draft and MAY CONTAIN ERRORS! Feel free to build on it, but please check everything.

A few things to ponder

1. There are 70+ sites in the PIGU dataset. Does each site need its own augmentation parameter?
2. I played with the PIGU dataset, but question #1 has me stumped.
3. Can information on incubation duration or fledging ages also be incorporated? For instance, observing a prey delivery on day 15 probably tells us there was an egg on day 1 (if incubation period is >15 days).
4. I attached the PIGU R file BUT IT IS NOT RETURNING REASONABLE ANSWERS. I subsetted the data to one site, but something is going wrong as abundances always want to go to M. Not sure if this is a data issue or coding error. (pigu\_MultiEventJS\_njh\_test.R)