**PART I**

Examine power of sampling design for detecting changes in occupancy over time

Questions:

1. How many sample sites do we need to detect X% change in occupancy over time? (e.g. 30, 60, 90, 120)
2. How many days of sampling do we need to detect X% change in occupancy over time? (e.g. 15, 30, 45, 60)
3. How does this vary depending on detection probability (e.g. 0.01, 0.05, 0.08, 0.2, 0.5)
4. How does this vary with the number of years of data (e.g. 3, 10, 20)

Approach:

* + Use “colext” function in unmarked package
  + Simulate data using code in colext vignette / Jorge’s jaahumadap Github account with rare species code.R
  + Run ~100 models to 100 realizations of simulated data for each combination of parameters of interest to generate a distribution
  + Start with one species with one model to explore the number of simulations needed to capture the distribution, then expand.

**PART II**

Examine sensitivity of the WPI to changes in occupancy, richness and evenness

Questions:

1. When all species are declining at X%, at what point does the WPI detect change?
2. When all species are increasing at X%, at what point does the WPI detect change?
3. What proportion of species need to be lost before seeing changes in the WPI?
4. What level of change in dominance/evenness is needed before seeing changes?

Approach:

* Simulate an X% decline in occupancy (set colonization = 0), then simulate an X% increase in occupancy (set extinction = 0)
* Start with most pessimistic pattern of all species decreasing at X% (e.g. 10%, 20%, 30%, 50%); similarly start with most optimistic pattern of all species increasing at X%
* For changes in species richness, remove X% of species at the middle time step (e.g. 1%, 10%, 25%, 50%)
* For changes in dominance/evenness, alter community from completely even to a single species dominating.