Mark-recapture Methods

1. Be able to describe the basic idea of mark-recapture methods.
2. Know the 2 common systematic designs used to establish trap locations and any associated assumptions.
3. Know the 4 general assumptions of mark-recapture methods, and be able to explain the consequence (bias) if the assumption is violated and not accounted for with a specialized model.
4. Be able to describe the difference between open and closed populations.
5. Be able to describe equal catchability, and know the 3 primary ways that probability of capture can differ among individuals.
6. Know the difference between trap happy and trap shy individuals.
7. Given mark-recapture data, be able to estimate population size using the Lincoln-Peterson and Schnabel models, given their assumptions are met.
8. Know the name of the cutting-edge software used commonly to analyze mark-recapture data.
9. Be able to inspect a Jolly-Seber mark-recapture data matrix, and determine how many individuals were captured during time period “i” that were previously caught in time period “h”.
10. Be able to estimate population size using a catch-per-unit effort equation.

Analysis of Habitat Data I

1. Be able to explain and draw a conceptual model that illustrates the process of sampling and use of statistics and probability to make inferences on unknown population parameters.
2. Be able to explain if statistics are necessary for a population census.
3. Be able to define a population parameter and statistic (and know how they are related).
4. Be able to define the following statistical terms: response variable, experimental unit, population, sample, and probability.
5. Be able to calculate the sample median and mean for a small set of habitat data.
6. Be able to explain how and why the sample standard deviation ($S$) is calculated as the square root of average squared deviations (i.e., relate the definition of $S$ to the sample mean).
7. Given a small set of habitat data, be able to calculate and interpret the sample standard deviation.
8. Know the empirical guidelines for symmetric distributions (i.e., what % of your data should lie within one, two, and three standard deviations of the mean if they are distributed equally around the mean).
9. Be able to calculate and interpret the correlation coefficient, $r$.

Analysis of Habitat Data II

1. Understand what is the level of significance ($\alpha$) and how it relates to confidence (probabilistic certainty) when making inferences from hypothesis test results or confidence intervals.
2. Know the 2 primary statistical methods we use to make conclusions about the population mean using our data.
3. Be able to calculate a confidence interval for the large sample size case. You will be given the sample mean, standard deviation, sample size, and the $Z$-value (1.96) associated with 95% confidence.
4. Be able to interpret a confidence interval with respect to the population mean.
5. Know the answers to the CI thought questions on Slide 11 for this lecture.
6. Be able to define the coefficient of variation—required reading.
Analysis of Habitat Data III

1. Be able to define the P-value.
2. Given a P-value and $\alpha$-level, be able to determine if the null hypothesis associated with a natural resource study is rejected.
3. If you reject or fail to reject the null hypothesis for a 2-sample t-test, understand what conclusions (inferences) can be made in each case.
4. Be able to interpret SAS or Excel output from a 2-sample t-test, and determine if the null hypothesis is rejected.
5. Be able to explain when you would perform a 2-sample t-test vs. 2-sample Z-test.
6. Be able to define statistical power and minimal detectable change—required reading.

Forest Management (Sam Jackson)

→ Study lecture notes. Sam will be providing 5 – 10 questions for the test.

Grassland Management (John Gruchy)

→ Study lecture notes. John will be providing 5 – 10 questions for the test.

HSI Models

1. Know what HEP stands for and be able to explain its goal.
2. Know what HSI stands for and understand the goal of HSI models.
3. Be able to interpret the output value of a HSI model in the context of species carrying capacity.
4. Be able to estimate the suitability index for a habitat variable given a suitability graph.
5. Be able to calculate the suitability index for a habitat variable given a suitability equation.
6. Given suitability values for 2 variables measured in a habitat patch for a species, be able to calculate the habitat suitability index using the 3 common forms of HSI models discussed in class.
7. Given the HSI value and area of a habitat patch, be able calculate the habitat units for the patch, and interpret this value with other habitat units from different patches.
8. For #4–7 above, see Eastern Newt example (last slide) from this lecture.