Lab 10

Multi-state models

In general, we will follow Cooch and White's example using the deer.inp data set in section 9.2 of their Program MARK: A gentle introduction. Create a new MARK results file by opening deer.inp. The data type is multi-strata, and there are 8 occasions and 2 strata. The strata are indicated in the capture histories as N – nonbreeder, and B – breeder. Cast these 4 models described by Cooch:

{S(g) p(g) Psi(g)} – Survival, recapture, and movement differ among strata but not time.

{S(.) p(g) Psi(g)} – Survival is constant between strata and over time, and recapture, and movement differs between strata but not times.

{S(g) p(g) Psi(.)} – Survival, and recapture differ between strata, movement is constant between strata and over time.

{S(.) p(g) Psi(.)} – Survival and movement are constant between strata and over time, recapture differs between strata but not times.

And two additional models to address these biological hypotheses:

1. There is a cost of breeding in terms of survival; the portion of females that do not breed varies each year (in no particular pattern); the portion of females return to breeding status each year is similar; recapture probabilities differ by breeding status.

2. There is a cost of breeding in terms of survival; the portion of females that do not breed has decreased over time; the portion of females return to breeding status each year is similar; recapture probabilities differ by breeding status.

Paste the results table at the top of page 1 the spreadsheet.

Answer these questions at the bottom of page 1 in the spreadsheet:

3. Can you conclude from these 6 models that the rate of nonbreeding in this population has been constant? Why or why not?

4. What is the relative strength of evidence for the models in 1 and 2 above when compared to a model where there has been no change in breeding (and nonbreeding) probability over time (S(g) p(g) Psi(g))?

5. Based on the model {S(g) p(g) Psi(g)}, how do the mean odds of survival differ between breeders and nonbreeders?

Bonus (Read section 8.3 in Cooch and White):

On the last page of the spreadsheet, create a design matrix for the model that constrains Psi (N to B) and Psi (B to N) have different odds ratios at time 1 and reciprocal slopes, i.e., one increasing and the other decreasing at the same rate.

Variance Components

Open the GOF Dipper results file from Lab 8 in MARK. Select Specific Model Output from the pull-down menu under Output. Select Variance Components, and then Real Parameters—a dialogue box should pop up.
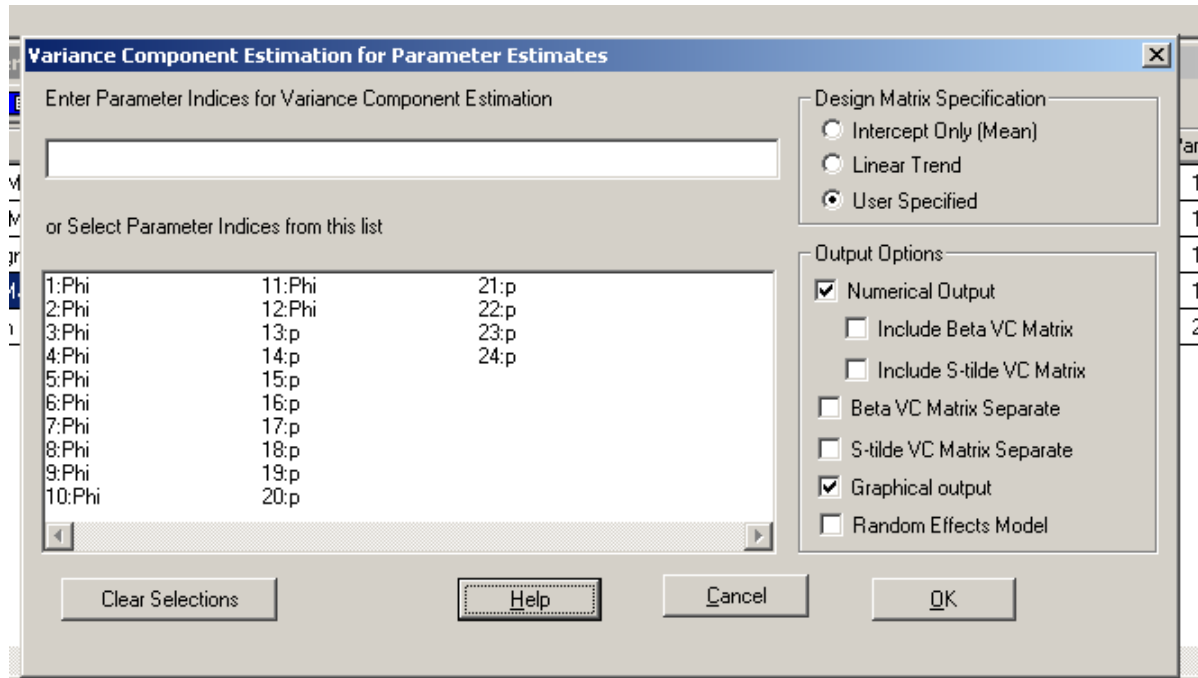
The default Design Matrix Specification is the Intercept Only model. Choosing this model estimates process variance around the mean. Choosing linear trend estimates variation around a linear trend of the selected parameter. Choosing User Specified uses the current model.

Choose the Intercept Only Design Matrix and select the parameters that correspond the **estimable** survival rates for Group 1 (Males) and click OK. Paste the results on sheet 2 in the lab_10 spreadsheet.