Lab 05- Odds ratios & design matrix

Background – You recently completed a telemetry study examining to examine the effect of several habitat treatments on the survival of a vertebrate for a management agency. During this study adult females were monitored weekly for 6 weeks following a 2-week period for acclimation to marking and capture myopathy. The agency had already applied different habitat treatments applied to 2 of the 3 management units they owned, but the units receiving each treatment were not selected at random, and the treatments were not replicated spatially or temporally. However, the habitat was reasonably similar in all three units at the beginning of the study. One treatment (E) provided additional escape cover, while the other increased food resources (F). Prior to conducting the research you developed several hypotheses about the way this creature would be affected by the management practices used by the agency. Mean daily temperature and precipitation were monitored at central location. Temperatures each week averaged 38, 56, 49, 58, 60, and 55 degrees. Precipitation levels each week were 0.5, 1.25, 1.25, 1.0, ,0.9, and 0.0 inches. Your working hypotheses were as follows:

1. Survival rates were unaffected by either management practices or environmental stressors during the study.

2. Survival rates were unaffected by management practices, but survival is correlated with temperature during the previous week.

3. The effects of environmental stressors (temperature and precipitation) were negligible, but both predation and food availability affected survival differently among the treatments.

4. The effects of environmental stressors (temperature and precipitation) were negligible, but predation is limiting survival and changing food availability did not affected survival measurably.

5. When temperatures are cooler these animals forage more frequently, thus increasing their forage requirements and vulnerability to predation. This should result in greater survival in F and lowered survival in E in relation to the untreated area when temperatures are cooler.

6. Food is more limiting than predation; both affect the survival rates at different levels. Temperature also influences survival, but the affect is similar among treatments.

Making inference

1. Will these results provide information on necessary or sufficient causation? Is this study inductive or deductive in nature? Why?

2. What could be done to improve the scientific rigor of this very applied research project?

Modeling hypotheses

3. For each of the hypotheses above write the equation for the survival estimator including the logit model using β_1, β_2, β_3, ... to symbolize the estimated parameters, and tmp, prcp, trtF, trtE, trtU, tmpU, tmpE, and tmpF to indicate temperature, precipitation, food increase, escape cover

increase, no habitat treatment, temperature effects in the untreated area, temperature effects E, and temperature effects in F, respectively.

4. Start an analysis in MARK using KM53.inp, which includes 6 weeks of data for 200 animals marked in each of the three treatments. Group 1 is trtU (untreated), Group 2 is trtF, and Group 3 is trtE. Cast one model corresponding to each of the 6 hypotheses listed above. Paste the results of the model selection exercise in the spreadsheet on the worksheet labeled model selection. Discuss the strength of evidence for the top 3 models.

5. On the worksheet labeled Odds, calculate and plot the logits and the survival functions for the model S(g+tmp).

6. Examine the βs for the model 5, S(g+tmp). On the worksheet labeled Odds, discuss these results in terms of the change in odds in relation to the untreated site.