Mark / RMark practice exercise #2

The data in demo.txt are a capture-recapture data set for an imaginary critter. There 5 years of data, during which you saw 169 individuals at least once. The two columns are the capture history and the sex and body weight of the individual. Your goal is to analyze the data using a Cormack-Jolly-Seber model and answer these questions:

1) If you ignore sex, estimate the time-specific survival probabilities and time-specific capture probabilities. What is the capture probability for time 1?

2) You believe you got better at capturing individuals over the years. You are willing to assume a regression model for capture probabilities, i.e. that capture probabilities follow a logit-linear model over time. Fit this model and estimate time-specific survival probabilities.

3) Which capture probability model (time-specific or logit-linear) better fits these data?

4) Which model gives the most precise estimate of survival probability from year 1 to year 2?

5) Estimate the model averaged survival probability and its standard error for year 2 - 3

6) Estimate year-specific lambdas using a Pradel reverse-time model. Assume the logit-linear model for capture probabilities.

The following questions return to CJS models. Assume the logit-linear model for capture probabilities.

7) Is there a sex difference in survival probability?

8) Is there a sex difference in capture probability? Start with the logit-linear regression model for capture probability.

9) Is body weight associated with survival probabilities? Fit a model that has a different intercept for each time and a common slope for body weight.

Optional “understanding what RMark is doing” questions concerning the relationship between the beta coefficients in the Mark model and the estimated real parameters. All use results from the CJS model from question 2 (logit-linear model for capture probability).

O1) Use the estimated betas to compute the survival probability for year 1 – 2.

O2) Use the estimated betas to compute the survival probability for year 2 - 3.

O3) Use the estimated betas to compute the capture probability for year 2.

O4) Use the estimated betas to compute the capture probability for year 5.