

1. 22.5 pts. Cormorants - practice with CJS model

(a) In this model, the last survival probability and the last capture probability can not be estimated. From the output, we can see that the standard errors of these two parameters are unrealistic (you will see 0 or 20).

(b) $\hat{\phi}_2 = 0.7522$, se = 0.05336

(c) $\hat{\phi}_2 = 0.7863$, se = 0.04906

(d) $\hat{\phi}_2 = 0.7540$, se = 0.05369

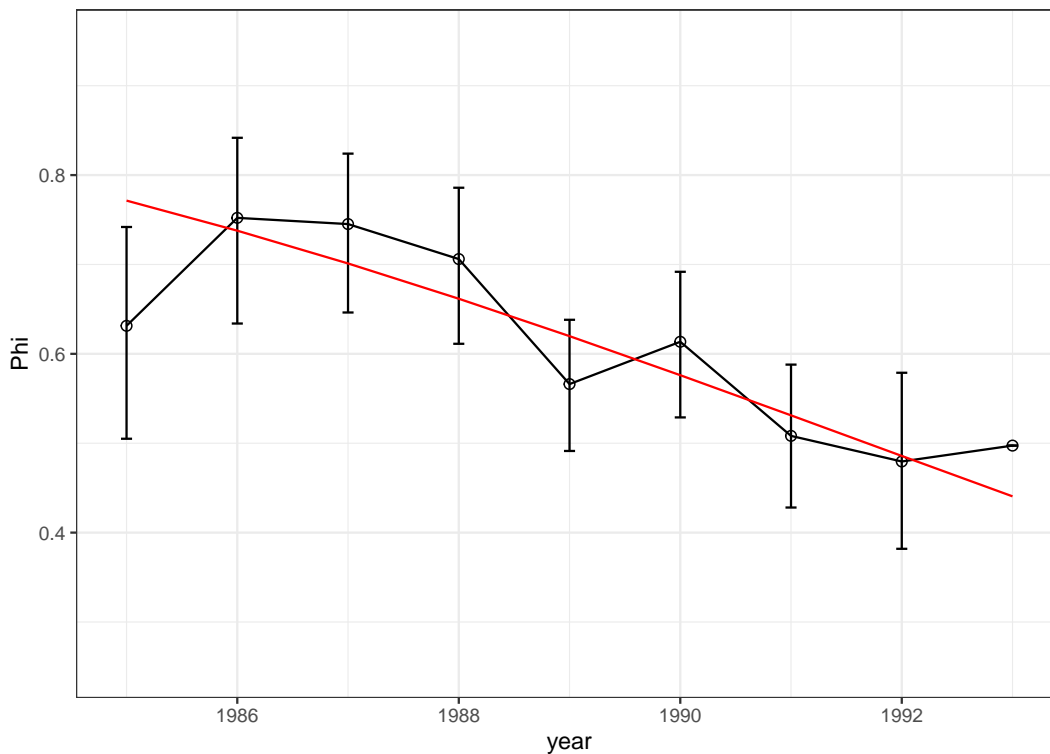
Common mistakes: -1 point if you report the estimated $\hat{\phi}_1$ for 1(b)-(d).

(e) $\hat{\beta}_0 = 1.2165$, se = 0.1211

$\hat{\beta}_1 = -0.1819$, se = 0.02781

(f) The model from 1e is most appropriate for these data since it has the smallest AIC value.

(g) The fitted line falls within the confidence interval except for the first point. And it captures the decreasing trend. So, there is no concern about lack of fit of model 1e.



2. 20 pts. Huggins

- (a) Home range has the most influence on capture probability since it has the lowest AIC value.

Notes: Only add groups to factor variables. If add groups to numeric variables, it will coerce the numeric variables to factors.

(b) $\hat{N} = 220$

(c) $\hat{N} = 203$

Note: we will ignore behavioral and time effects on the capture probability. You may get different numbers if you add behavioral or time effects.

- (d) No. The M_0 model uses the full likelihood, which includes N. The Huggins model uses the conditional likelihood conditioned on captured at least once, which does not include N. Therefore, it's not appropriate to compare lnL or associated AICs between the M_0 and the Huggins model.

- (e) Neither model suggest evidence of heterogeneity based on the low pi value (0.053).

- (f) The pi value is very small. The mixture 1 only has a 5% contribution but has the capture and recapture probability of 0.999998, which is not reasonable.

3. 7.5 pts.

Nice work, everyone gets full credit.