

ST 506 Homework Set 9 2008
Due Tuesday October 28, 2008

Q1. Consider the following band return data for adult male mallards banded just before the hunting season in the fall. There are only two years of banding.

No. Banded	Returns	
	Yr1	Yr2
1000	121	144
500		93

- Write down the expected cell structure for the three cells of returns under a time-dependent survival and recovery rate Brownie model.
- Estimate survival rate in year 1 and the recovery rates in years 1 and 2 based on intuitive estimation ideas.
- Suppose we know, from a reward tagging study, that 80% of the bands were reported and, from an exhaustive search of a wildlife management area, that 90% of the birds were retrieved when shot. Estimate the kill rate in each year.
- Think about what assumptions you are making and list them.

Q2. Here is the MARK input file for a data set with young and adult mallards.

```
/* San Luis Valley Mallards: Page 92, Brownie et al. 1985
encounter occasions=9, groups=2
glabel(1)=Adults
glabel(2)=Young */
recovery matrix group=1;
10 13 06 01 01 03 01 02 00;
 58 21 16 15 13 06 01 01;
 54 39 23 18 11 10 06;
 44 21 22 09 09 03;
 55 39 23 11 12;
 66 46 29 18;
 101 59 30;
 97 22;
 21;
231 649 885 550 943 1077 1250 938 312;
recovery matrix group=2;
83 35 18 16 06 08 05 03 01;
103 21 13 11 08 06 06 00;
 82 36 26 24 15 18 04;
153 39 22 21 16 08;
109 38 31 15 01;
113 64 29 22;
124 45 22;
```

95 25;
 38;
 962 702 1132 1201 1199 1155 1131 906 353;

The output from the best model using AIC (a*t means there are age and year effects) is now attached. There was little support for simpler models

Parameter	Real Function Parameters of {S(a*t) f(a*t)}			
	Estimate	Standard Error	95% Confidence Interval	
			Lower	Upper

Adult				
1:S	0.5790607	0.1140626	0.3547409	0.7748847
2:S	0.6390973	0.0759381	0.4815465	0.7714901
3:S	0.6259779	0.0735878	0.4747628	0.7560299
4:S	0.8689343	0.1050261	0.5210058	0.9758509
5:S	0.6531186	0.0727386	0.5008726	0.7793807
6:S	0.5550080	0.0583563	0.4397461	0.6646409
7:S	0.5761244	0.0668246	0.4428870	0.6991430
8:S	0.5654541	0.1343077	0.3083159	0.7916103
Young				
9:S	0.4737898	0.0597854	0.3600963	0.5902678
10:S	0.5089717	0.0702331	0.3740422	0.6426066
11:S	0.5533463	0.0670617	0.4212566	0.6783104
12:S	0.5944920	0.0720382	0.4493911	0.7247734
13:S	0.4801967	0.0612914	0.3634239	0.5991740
14:S	0.6550466	0.0726275	0.5028301	0.7809607
15:S	0.4669480	0.0682741	0.3384925	0.5999404
16:S	0.4099617	0.1183286	0.2103343	0.6444346
Adult				
17:f	0.0432901	0.0133899	0.0234478	0.0785725
18:f	0.0855840	0.0091885	0.0692084	0.1053955
19:f	0.0590013	0.0061065	0.0481101	0.0721712
20:f	0.0673598	0.0071992	0.0545481	0.0829166
21:f	0.0520411	0.0050400	0.0430036	0.0628532
22:f	0.0632709	0.0054977	0.0533135	0.0749410
23:f	0.0789097	0.0060517	0.0678340	0.0916160
24:f	0.0888059	0.0080390	0.0742601	0.1058750
25:f	0.0673082	0.0141848	0.0442915	0.1010215
Young				
26:f	0.0862786	0.0090525	0.0701094	0.1057528
27:f	0.1467237	0.0133545	0.1224315	0.1748752
28:f	0.0724382	0.0077043	0.0587142	0.0890664
29:f	0.1273939	0.0096208	0.1096980	0.1474716
30:f	0.0909091	0.0083023	0.0758945	0.1085452
31:f	0.0978355	0.0087418	0.0819885	0.1163572

32:f	0.1096375	0.0092903	0.0927101	0.1292154
33:f	0.1048565	0.0101784	0.0865162	0.1265463
34:f	0.1076487	0.0164962	0.0793236	0.1445007

Write a very brief report on this data analysis emphasizing the important conclusions. (Hint-Are there diffs between estimates for years and ages?).

Q3. In South Carolina there is an important recreational fishery on Red Drum. As part of an evaluation of a tagging study the biologists realized that they needed to know the tag reporting rate. They carried out a special reward tagging study in which they used regular tags that just have "reward" written on them, and special reward tags that say "reward \$100". (Note-The regular tag reward is a baseball cap with a picture of a red drum on it.) In the first year they put out 200 "reward \$100" tags and got 43 tags returned by anglers, while they put out 1000 regular tags and got 175 tags returned by anglers. (Note: no tags were solicited by survey agents here so the formula in the book simplifies).

- i. Estimate the tag reporting rate.
- ii. State clearly what assumptions are being made.
- iii. Is there any danger in applying this reporting rate to other years when reward tagging is not going on? Why?
- iv. State how this estimate could be used in conjunction with a regular tagging study to estimate the two components of mortality (fishing and natural). I just want a brief answer here (4-5 lines)

Q4. I want you to take the full lake trout data set (10 years) and run the standard models in MARK using the appropriate procedure to estimate survival and recovery rates. I did this in class for the 5 year data set. Please append the model selection Table and then the best model estimates Table. Are there any important differences from the analysis of the 5 year data set?