

1 **Appendix 1. Supplementary Text**

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3 #####

4 # Jags model for mark-recapture data #

5 #####

6

7 # OBSERVATIONS (OBS)

8 # 1 detected

9 # 0 not detected

10

11 # STATES (ALIVE): latent variable except on first capture

12 # 1 alive

13 # 0 dead (never observed)

14

15 model {

16 #####

17 ### PRIORS ###

18 #####

19 ## fixed effects

20 beta[1] ~ dnorm(0.0, 0.4444444) # survival (logit scale)

21 gamma[1] ~ dnorm(0.0, 0.4444444) # detection (logit scale)

22 beta[2] ~ dnorm(0.0, 4.0) # HWI effect

23 gamma[2] ~ dnorm(0.0, 4.0) # trap happiness effect

24 beta[3] ~ dnorm(0.0, 4.0) # group size effect

25

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26  ## random effects
27  # year effect on detection probability
28  sigma_year ~ dnorm(0.0, 4.0)T(0.0,);
29  tau_year <- 1/(sigma_year * sigma_year);
30  for(k in 1:n_year) {
31    etap[k] ~ dnorm(0.0, tau_year)
32  }
33  # group
34  sigma_group ~ dnorm(0.0, 4.0)T(0.0,)
35  tau_group <- 1 / (sigma_group * sigma_group)
36  for(k in 1:n_group) {
37    etag[k] ~ dnorm(0.0, tau_group)
38  }
39  #####
40  ### LIKELIHOOD ###
41  #####
42  for (i in 1:n_ind) {
43    ## initial condition
44    # Survival
45    ps[i, FIRST[i]] <- 1
46    # Detection
47    po[i, FIRST[i]] <- 1
48    ## rest of the process
49    for(t in (FIRST[i] + 1):n_year) {
50      # survival

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51     ps[i, t] <- ilogit(beta[1] + beta[2] * HWI[i] + beta[3] * SIZE[i]) * ALIVE[i, t - 1] #
52 conditional on survival at (t-1), survival proba at t
53     # Detection: trap-dependence
54     po[i, t] <- ilogit(gamma[1] + gamma[2] * OBS[i, t - 1] + etap[t] + etag[GROUP[i]]) *
55 FIELDWORK[t] # conditional on fieldwork at t; is structurally 0 if no fieldwork
56 }
57 ## observation and state
58 for(t in FIRST[i]:n_year) {
59     ALIVE[i, t] ~ dbern(ps[i, t])
60     OBS[i, t] ~ dbern(po[i, t] * ALIVE[i, t]) # can only be detected if i is alive at t
61     ### log posterior probability density for WAIC
62     log_lik[CUMUL[i] + t - FIRST[i]] <- OBS[i, t] * log(po[i, t]*ps[i, t]) + (1 - OBS[i, t]) *
63 log(1 - po[i, t]*ps[i, t])
64 }
65 }
66 }
67 Jags Code to fit Model M10.
68
69

```

70 Table S1-1: Posterior estimates of detection probabilities from model M10.

71

Year	Not detected at (t-1)			Detected at (t-1)		
	Lower	Mean	Upper	Lower	Mean	Upper
1988	0.631	0.836	0.991	0.690	0.863	0.991
1989	0.256	0.486	0.731	0.326	0.536	0.755
1990	0.397	0.612	0.817	0.460	0.659	0.836
1991	0.000	0.000	0.000	0.000	0.000	0.000
1992	0.000	0.000	0.000	0.000	0.000	0.000
1993	0.000	0.012	0.031	0.000	0.015	0.043
1994	0.000	0.014	0.037	0.000	0.018	0.049
1995	0.000	0.000	0.000	0.000	0.000	0.000
1996	0.001	0.017	0.044	0.000	0.021	0.056
1997	0.000	0.010	0.031	0.000	0.013	0.040
1998	0.463	0.675	0.868	0.506	0.717	0.902
1999	0.015	0.069	0.141	0.018	0.083	0.160
2000	0.224	0.402	0.592	0.260	0.453	0.657
2001	0.001	0.015	0.038	0.001	0.018	0.047
2002	0.016	0.074	0.142	0.017	0.092	0.187
2003	0.149	0.317	0.508	0.157	0.364	0.584
2004	0.062	0.163	0.277	0.079	0.193	0.311
2005	0.618	0.774	0.911	0.663	0.807	0.942
2006	0.309	0.499	0.686	0.384	0.550	0.712
2007	0.703	0.820	0.927	0.747	0.849	0.935
2008	0.638	0.780	0.912	0.702	0.815	0.918
2009	0.885	0.954	0.998	0.910	0.963	0.999
2010	0.658	0.812	0.938	0.732	0.844	0.940
2011	0.596	0.755	0.900	0.671	0.793	0.912
2012	0.864	0.939	0.994	0.896	0.952	0.993
2013	0.846	0.938	0.996	0.889	0.952	0.996
2014	0.700	0.850	0.974	0.764	0.877	0.975

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