Supplementary material 2. JAGS code to implement the Markovian movement model, with movement rates estimated as a function of an environmental covariate.

MODELmove<-function(){

#Priors for entry and exit rate parameters

alpha1~dnorm(mu.alpha1, tau.alpha1); alpha2~dnorm(mu.alpha2, tau.alpha2)

beta1~dnorm(mu.beta1, tau.beta1); beta2~dnorm(mu.beta2, tau.beta2)

#Hyperpriors for means

mu.alpha1~dnorm(0,1/3); mu.alpha2~dnorm(0,1/3)

mu.beta1~dnorm(0,1/3); mu.beta2~dnorm(0,1/3)

#Hyperpriors for sigmas, Cauchy (or half t-dist with df=1)

sigma.alpha1~dt(0,1/3,1)%\_%T(0,); sigma.alpha2~dt(0,1/3,1)%\_%T(0,)

sigma.beta1~dt(0,1/3,1)%\_%T(0,); sigma.beta2~dt(0,1/3,1)%\_%T(0,)

tau.alpha1<-pow(sigma.alpha1,-2); tau.alpha2<-pow(sigma.alpha2,-2)

tau.beta1<-pow(sigma.beta1,-2); tau.beta2<-pow(sigma.beta2,-2)

#---------Likelihood----------------

N.out[1]<-0.0 #No fish start outside the array

N.in[1]<-nfish #All fish start inside the array

for (i in 1:(ndays-1)){

tag.loss.out[i]~dbin(0.0125, N.out[i]) #tag loss for unobserved fish; rate from observed fish

#probability a fish exits

theta1[i]<-exp(alpha1 + alpha2\*covariate[i])/(1 + exp(alpha1 + alpha2\*covariate[i]))

#probability a fish enters

theta2[i]<-exp(beta1 + beta2\*covariate[i])/(1 + exp(beta1 + beta2\*covariate[i]))

entries[i]~dbin(theta2[i], (N.out[i]-tag.loss.out[i]))

exits[i]~dbin(theta1[i], (N.in[i]-tag.loss[i]))

N.in[i+1]<-N.in[i]+entries[i]-exits[i]-tag.loss[i]

N.out[i+1]<-N.out[i]-entries[i]+exits[i]-tag.loss.out[i]

}

} #end MODELmove