*The following supplements accompany the article*

# Evaluating artificial shelter arrays as a minimally invasive monitoring tool for the hellbender *Cryptobranchus alleganiensis*

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**Supplement 1.**

**Table S1.** Summary and description of covariates used to model occupancy of artificial shelters by hellbenders (*Cryptobranchus alleganiensis*).

| Variable | Description | Mean (range) | Transformation |
|---|---|---|---|
| Density | Mean density of sub-adult/adult hellbenders per 10 $m^2$ | 0.16 (0.03-0.29) | |
| Natural shelter | Percent of stream reach characterized by natural shelter (boulder and bedrock) | 16 (5 – 51) | |
| Day of year | Day of year, defined as days since 1 January of the given year | 200 (35-353) | |
| Days deployed | Number of days since the shelter was deployed in its current location | 243 (6-834) | *ln(x)* |
| Lid | Categorical variable with two levels indicating whether the shelter lid was on (0) or ajar/off (1) | $n_{on}$ = 1647; $n_{off}$ =154 | |
| ID | Factor with 243 levels indicating shelter identity | | |

**Supplement 2.** Script for fitting Bayesian mixed logistic regression models to estimate artificial shelter occupancy by hellbenders (*Cryptobranchus alleganiensis*).

```
model{
## Priors

for(b in 1:nbox){
eps.box[b] ~ dnorm(0,tau.eps)
}
tau.eps <- 1/(sd.eps*sd.eps)
sd.eps ~ dunif(0.01,15)

beta.0 ~ dnorm(0,.1)
beta.1 ~ dnorm(0,.1)
beta.2 ~ dnorm(0,.1)
beta.3 ~ dnorm(0,.1)
beta.4 ~ dnorm(0,.1)
beta.5 ~ dnorm(0,.1)
beta.6 ~ dnorm(0,.1)
beta.7 ~ dnorm(0,.1)
alpha ~ dunif(-1,1) #AR1 term constrained to be between -1 and 1

## Likelihood for occupancy
for(i in 1:nsite){        #loop over sites

psi.trend[i] <- beta.0 + Density[i]*beta.1 +
NaturalShelter[i]*beta.2 +
Density[i]*NaturalShelter[i]*beta.3 +
log.daysout[i]*beta.4  + DOY[i]*beta.5 +
DOY2[i]*beta.6 + LidOff[i]*beta.7 + eps.box[Box[i]]

logit(psi[i]) <- psi.trend[i] + alpha*(prev[i]) #incorporate AR1 term
}

#observation model

for(i in 1:nsite){

y[i] ~ dbern(psi[i])

#Bernoulli likelihood for calculating waic
pd.ar1[i] <- pow(psi[i], y[i]) * pow(1 - psi[i], 1 - y[i])
}
}
```