Model Formulas

**Estimating Presence GAM**

gam(Presence ~ s(Year, by = as.factor(State)) + s(Bottemp) + s(Depth) + as.factor(State), family = binomial(link = "logit"), method = "REML")

where

(equation 3 relates to eq 1 where E[X]=np)

**Estimating Biomass GAM**

gam(Biomass ~ s(Year, by = as.factor(State)) + s(Bottemp) + s(Depth) + as.factor(State), family ="quasipoisson"(link="log"), method = "REML”)

where

(eq 3 is an inflated Poisson)

**VAST**