

GAM Models

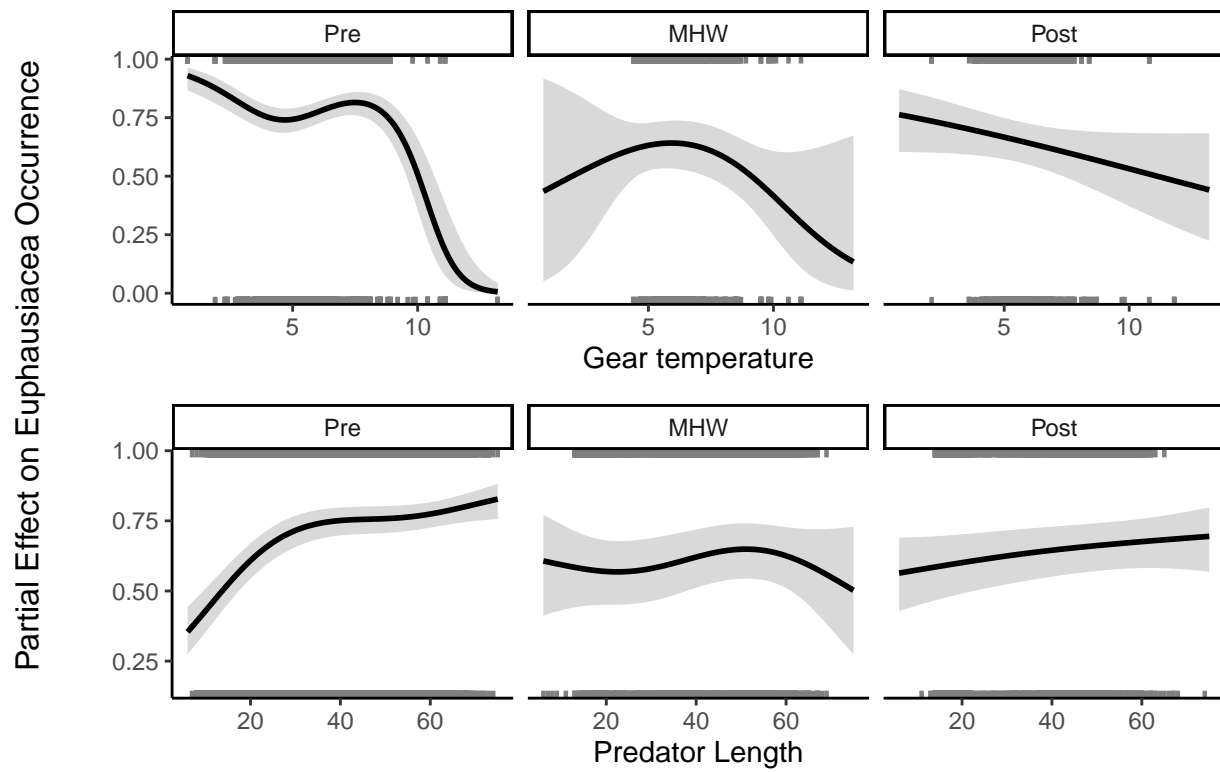
Catalina Burch

2023-05-24

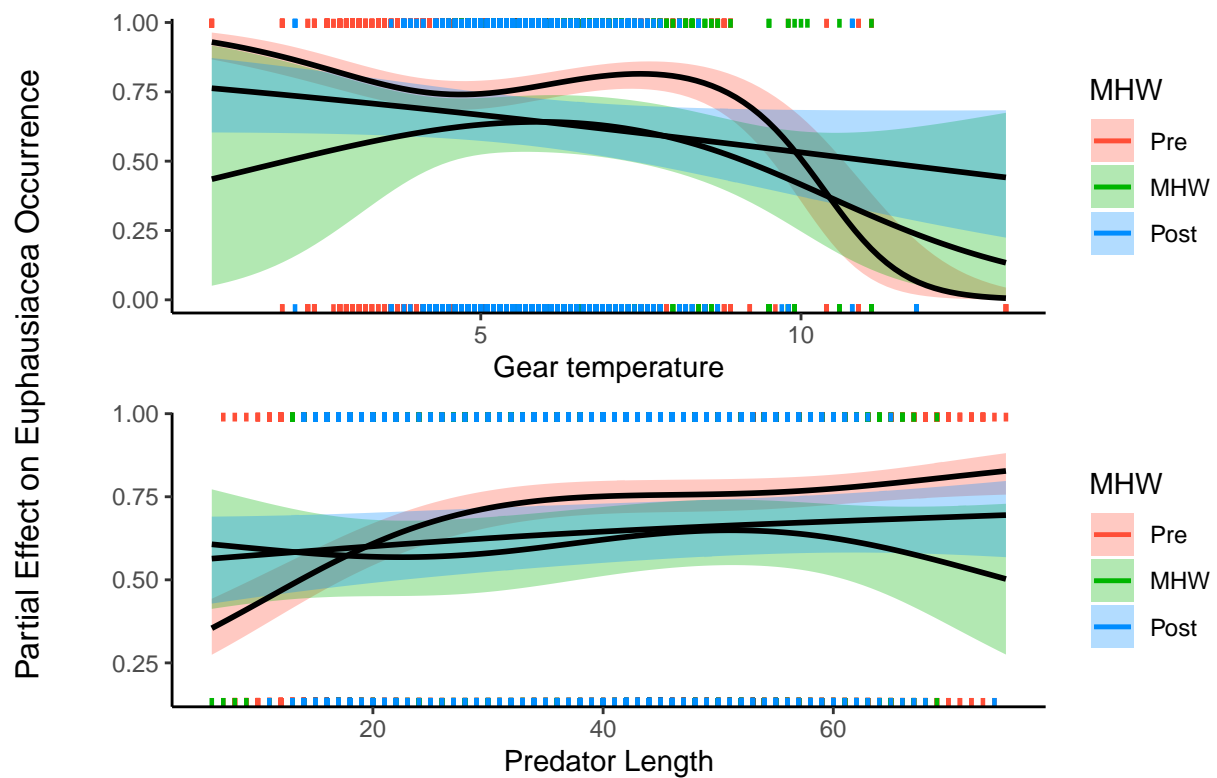
This document runs all of the GAMs included in my thesis.

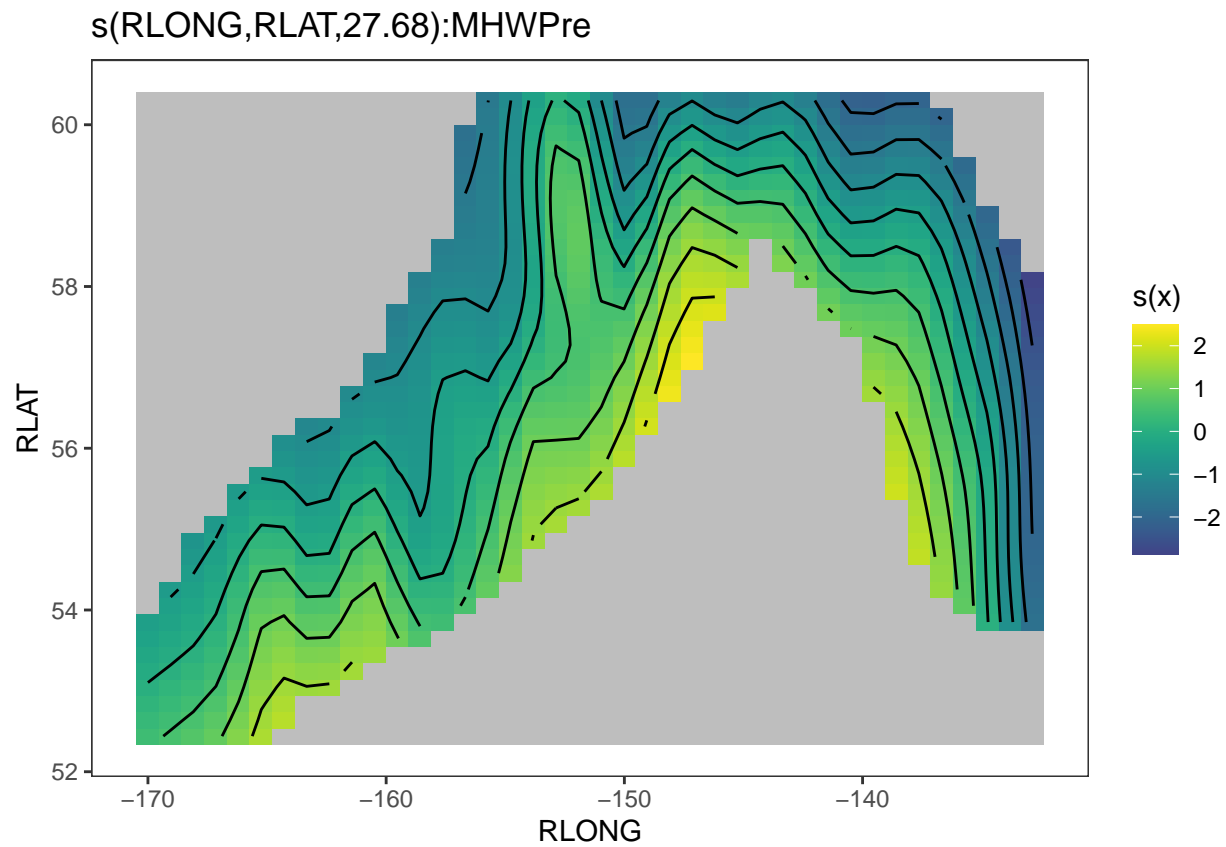
Model 1: Euphausiacea Prey

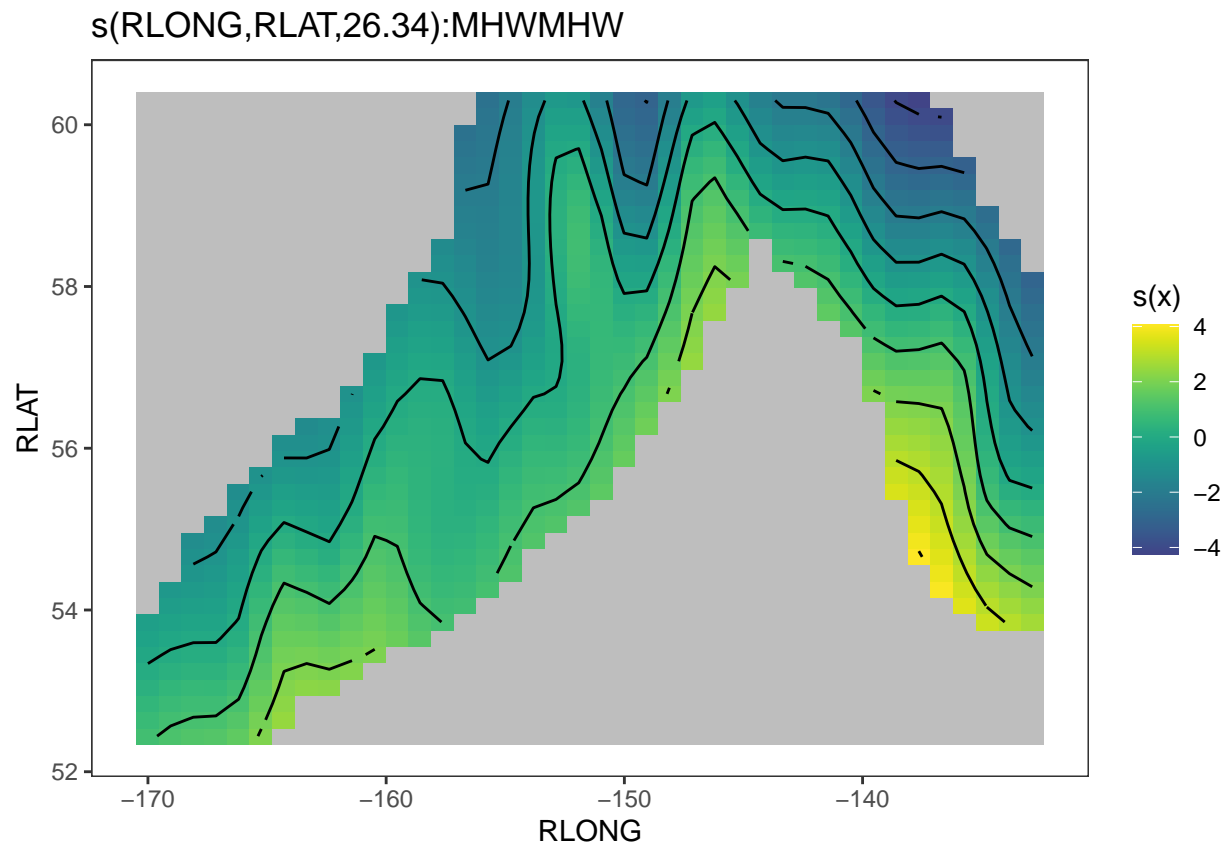
Predator: Walleye Pollock



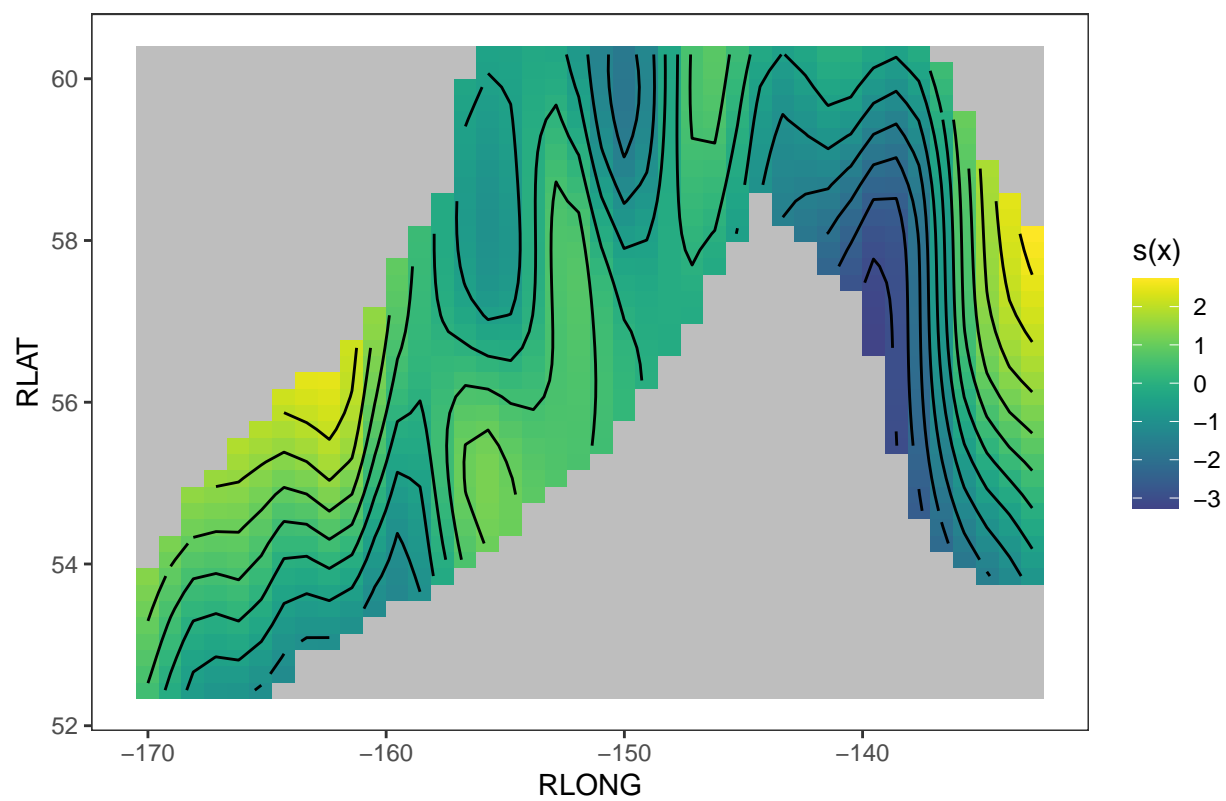
Predator: Walleye Pollock





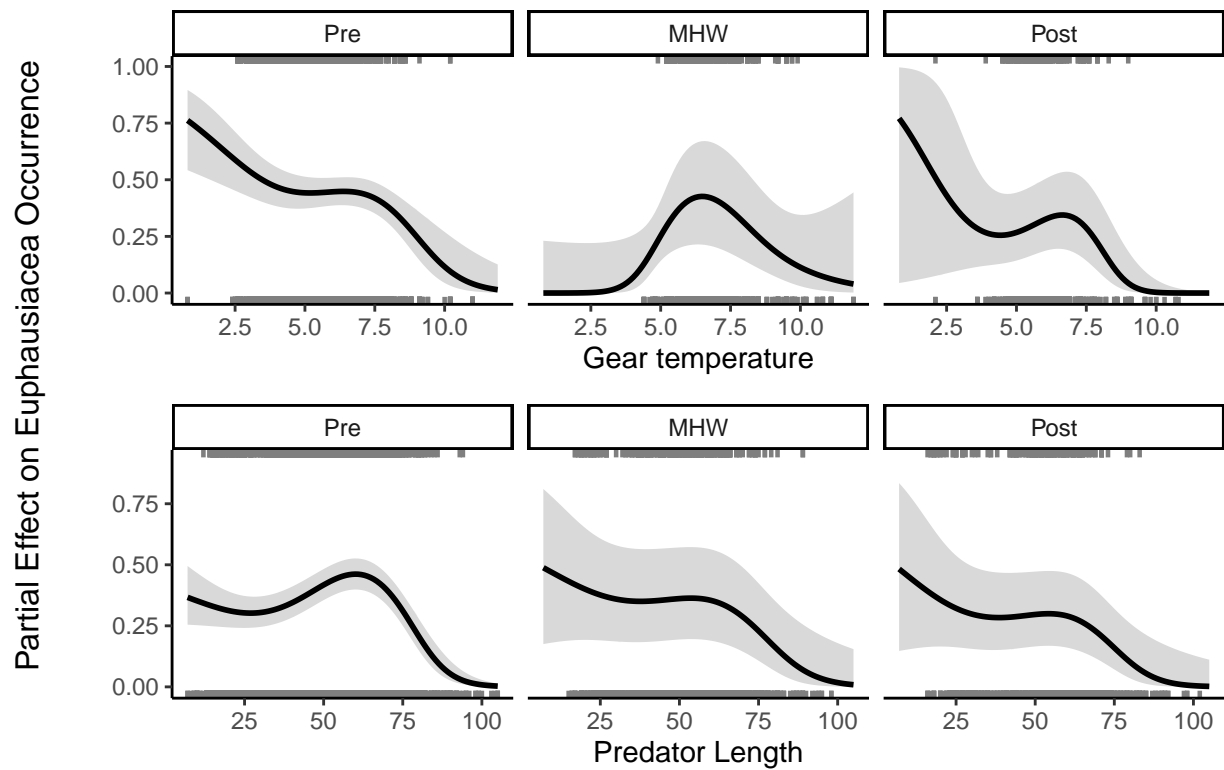


s(RLONG,RLAT,25.36):MHWPost

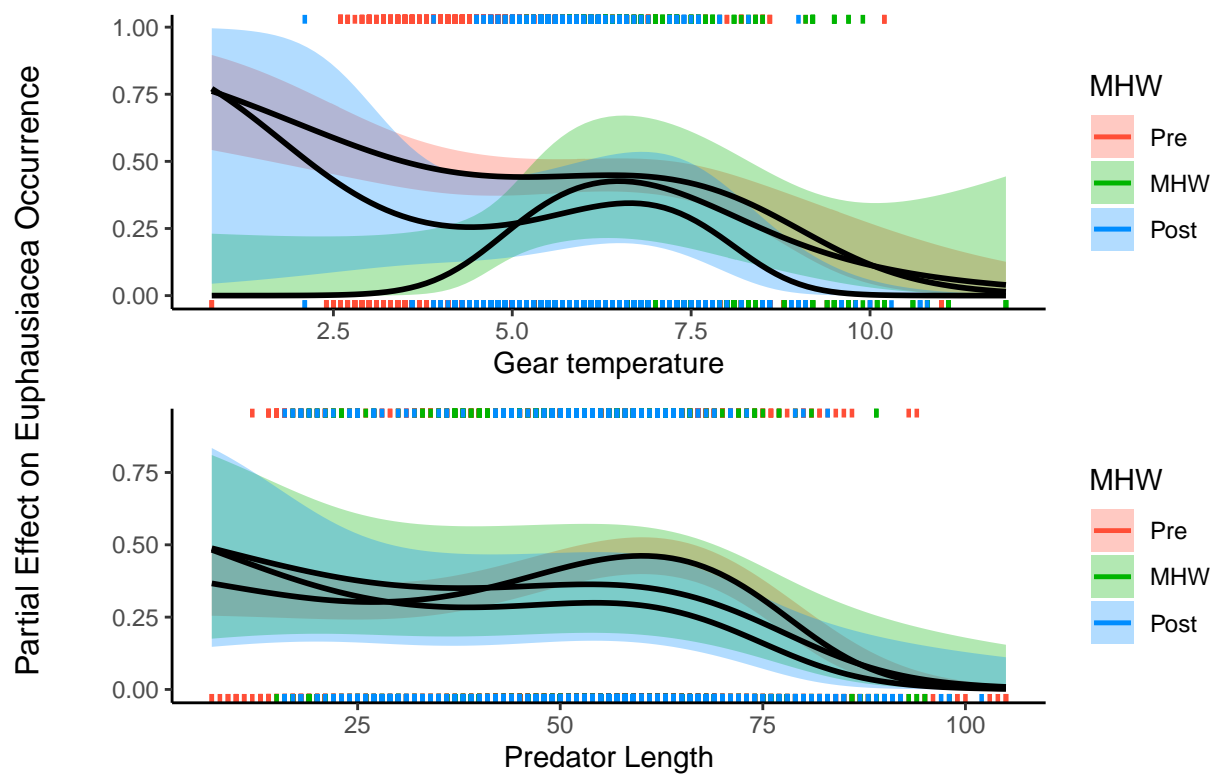


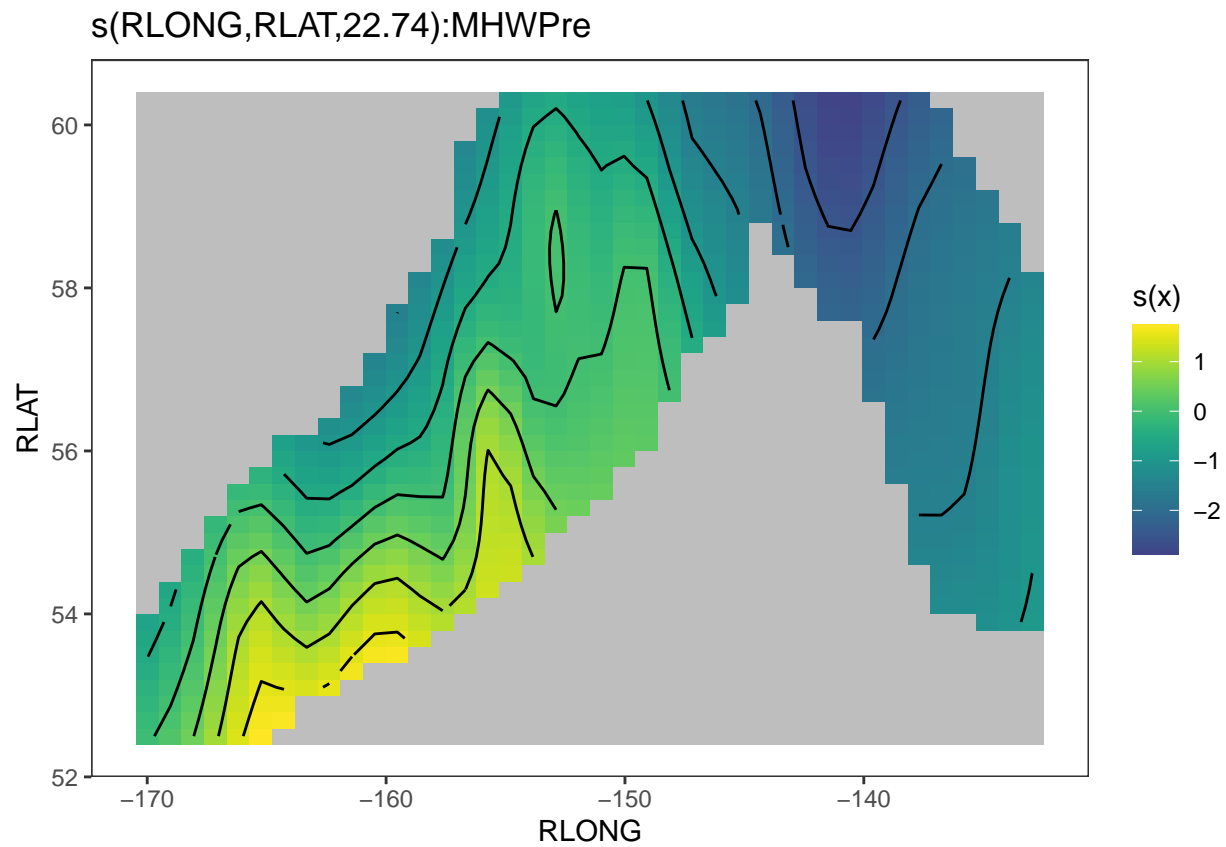
Model 1: Euphausiacea Prey

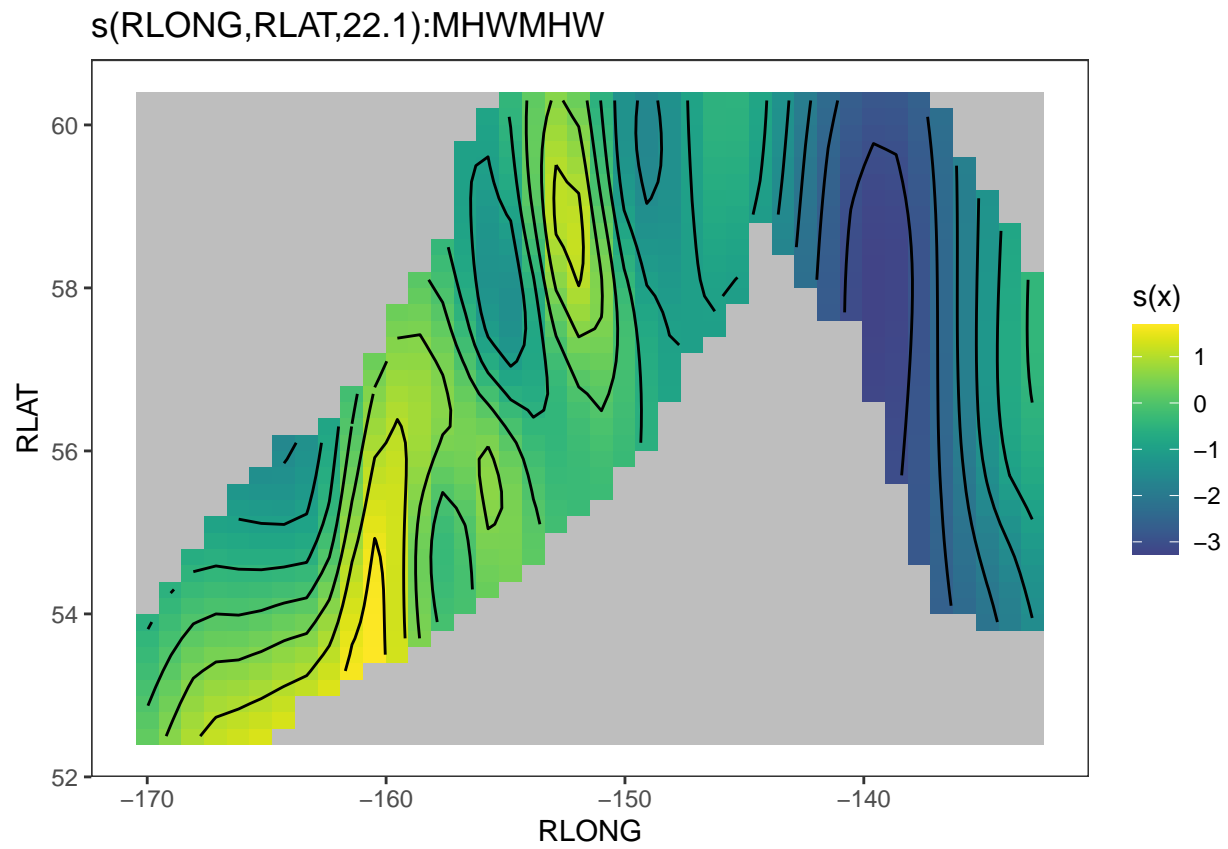
Predator: Pacific Cod

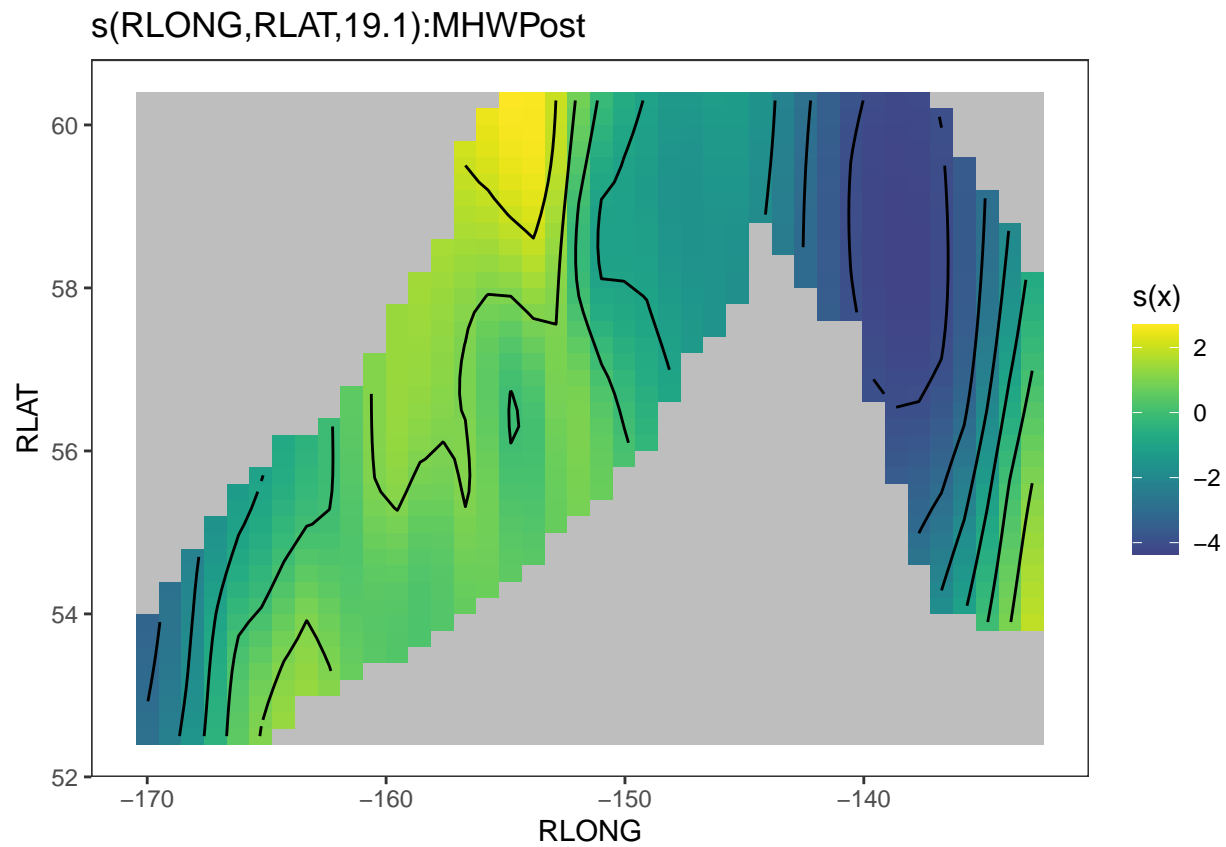


Predator: Pacific Cod



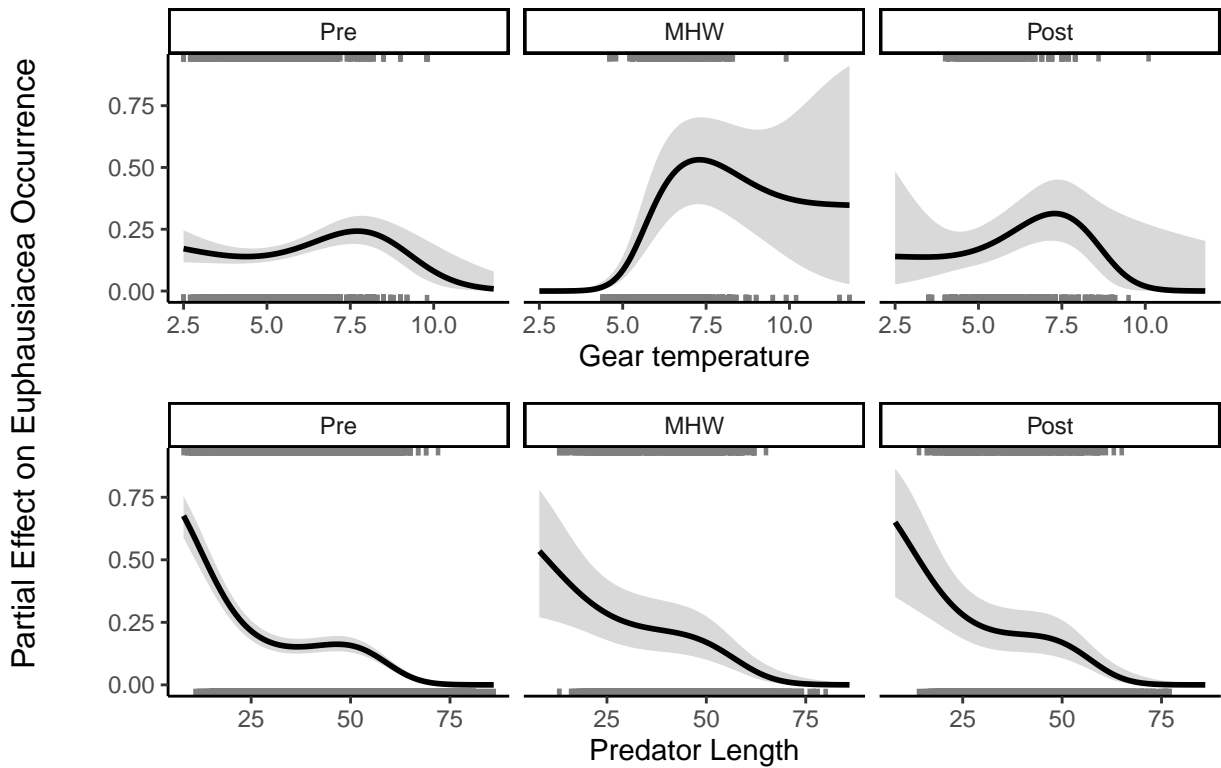




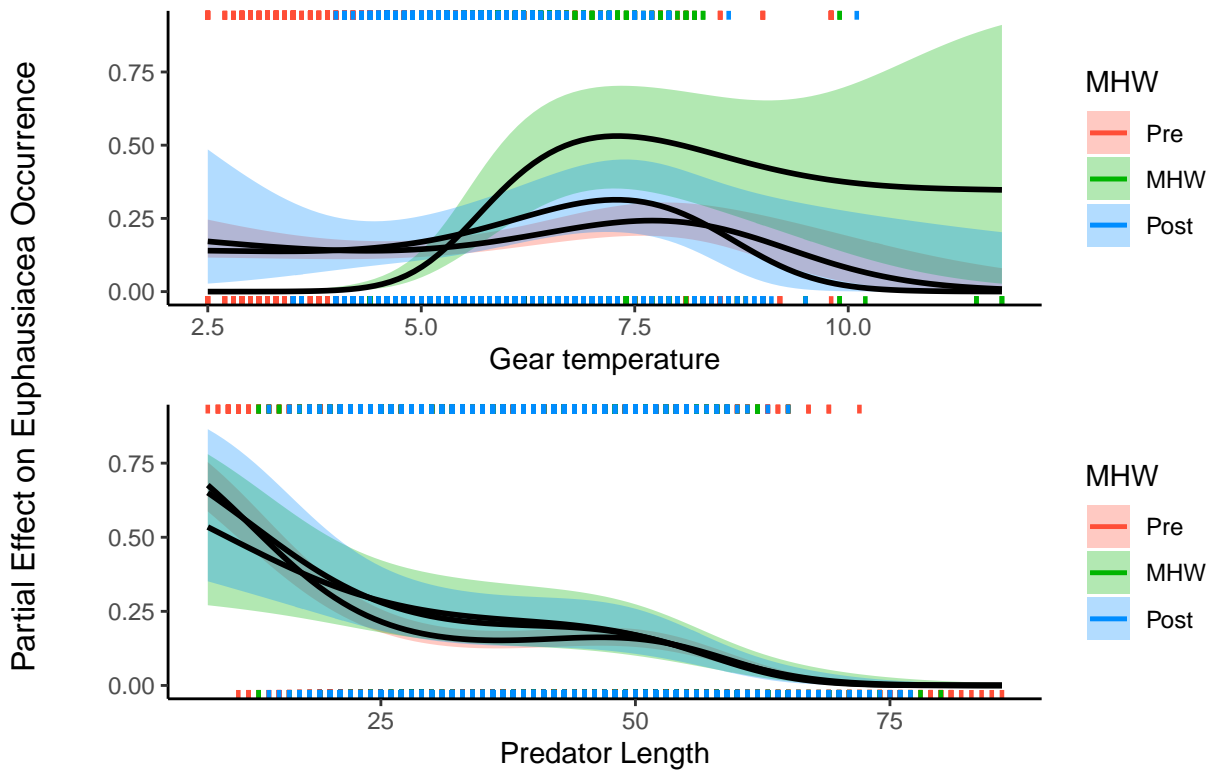


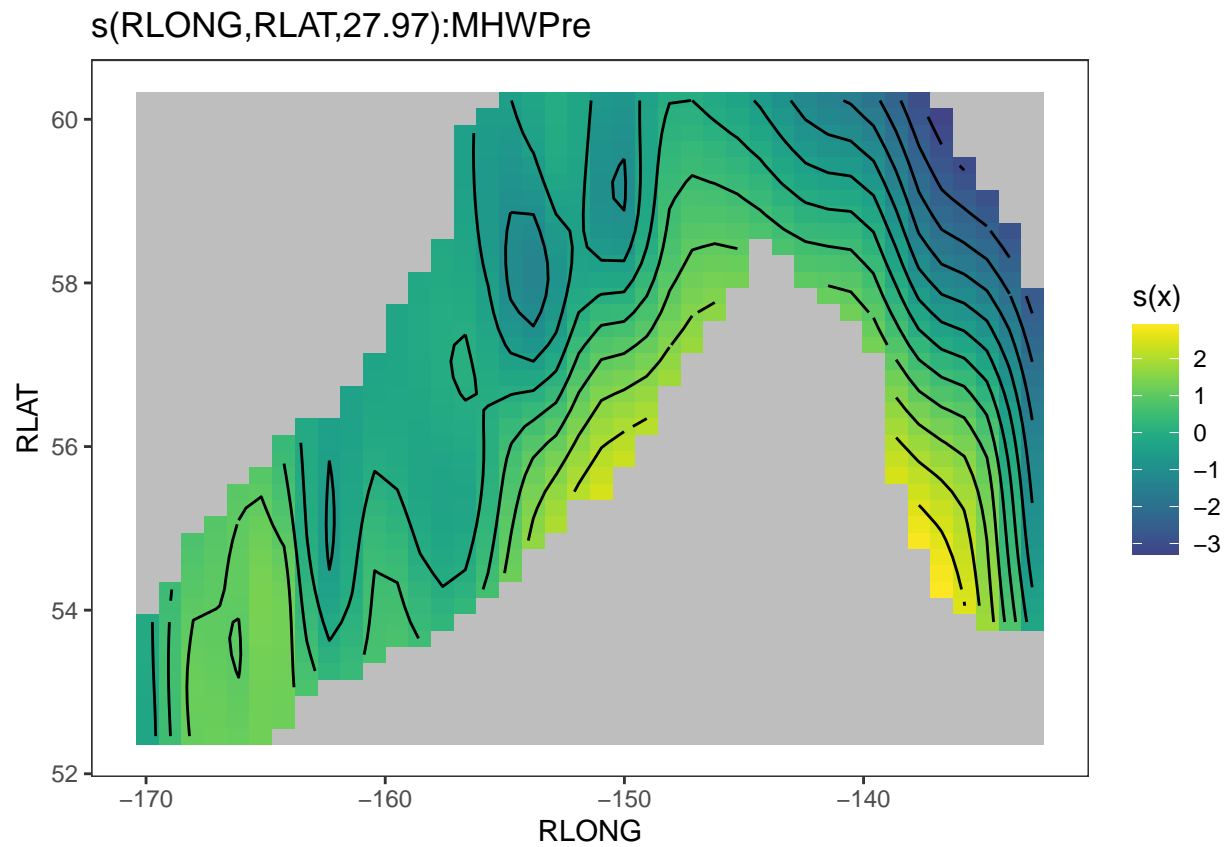
Model 1: Euphausiacea Prey

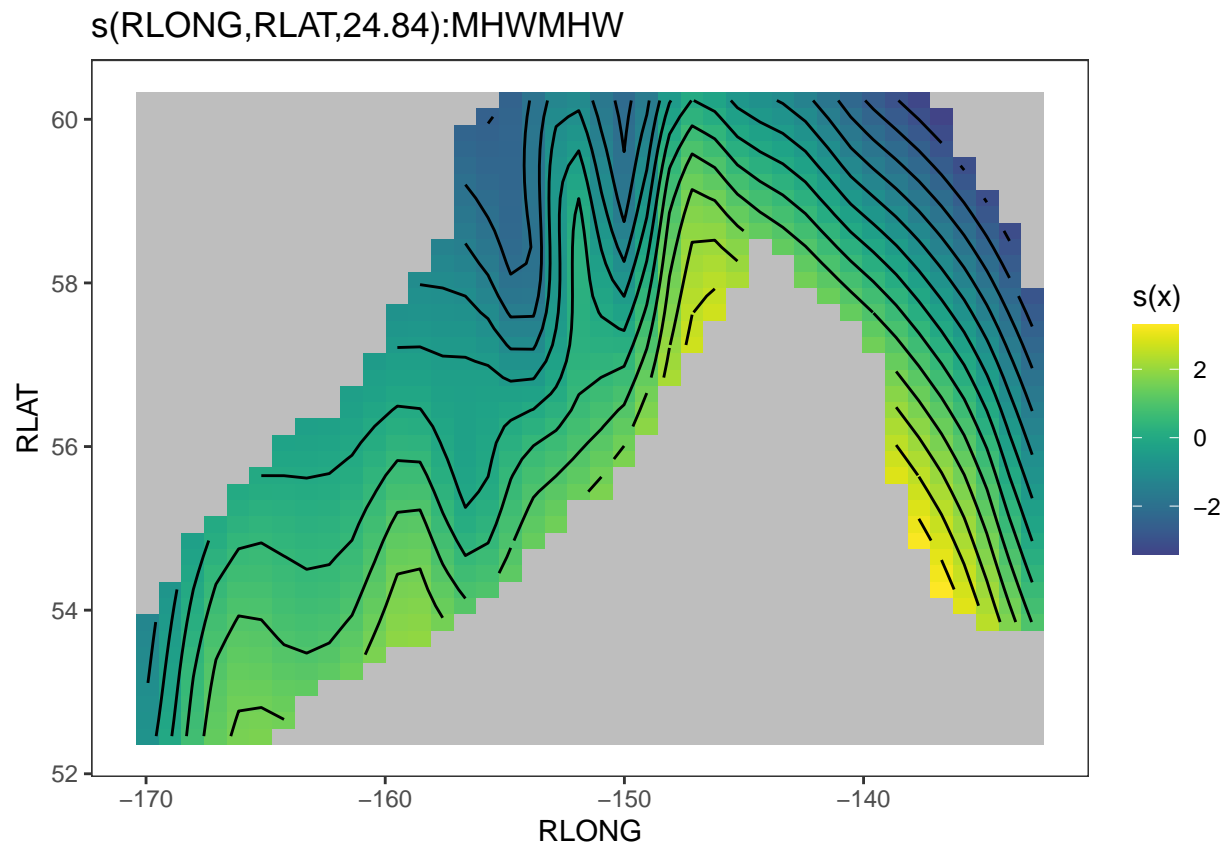
Predator: Arrowtooth Flounder

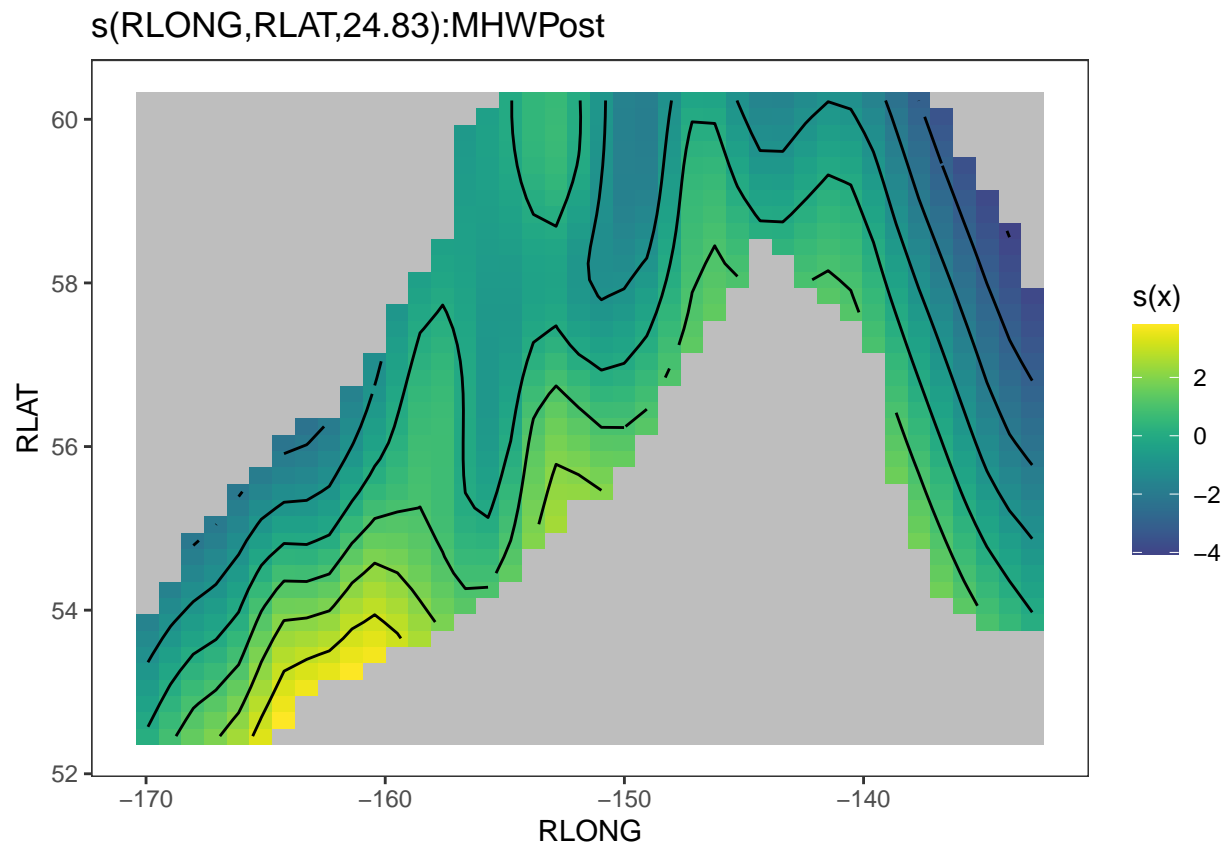


Predator: Arrowtooth Flounder



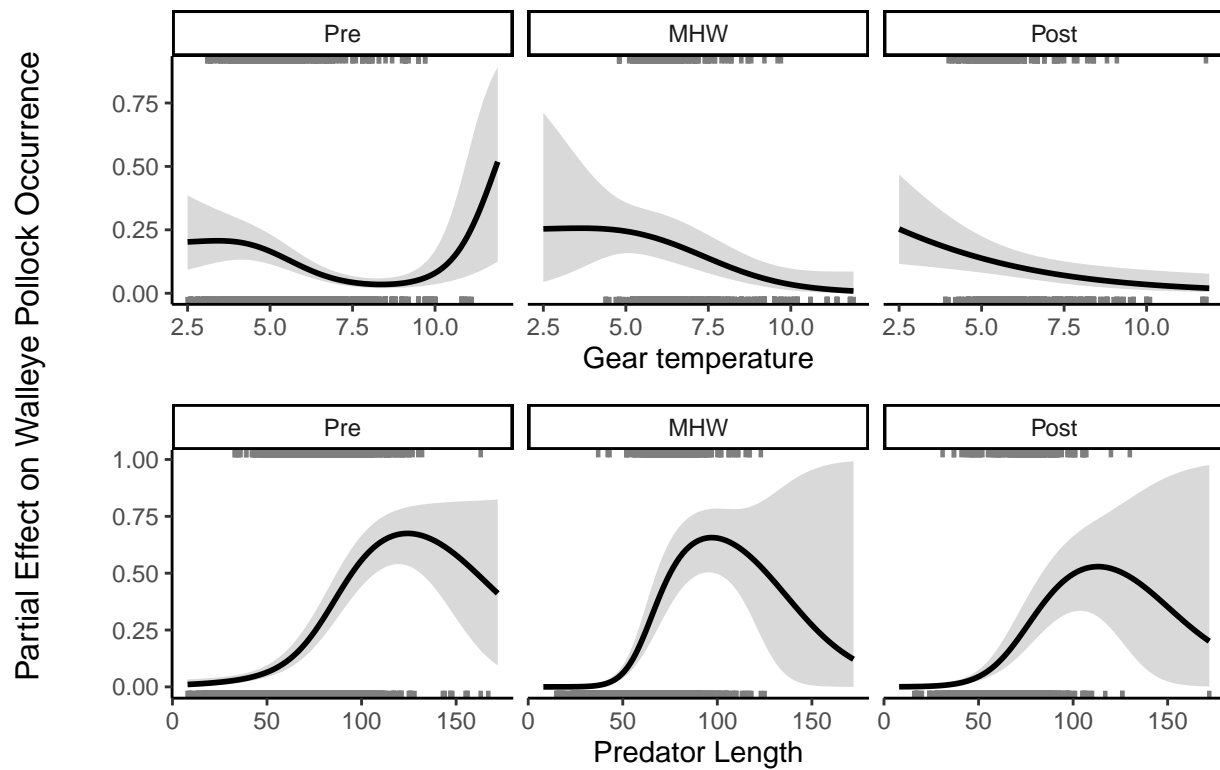




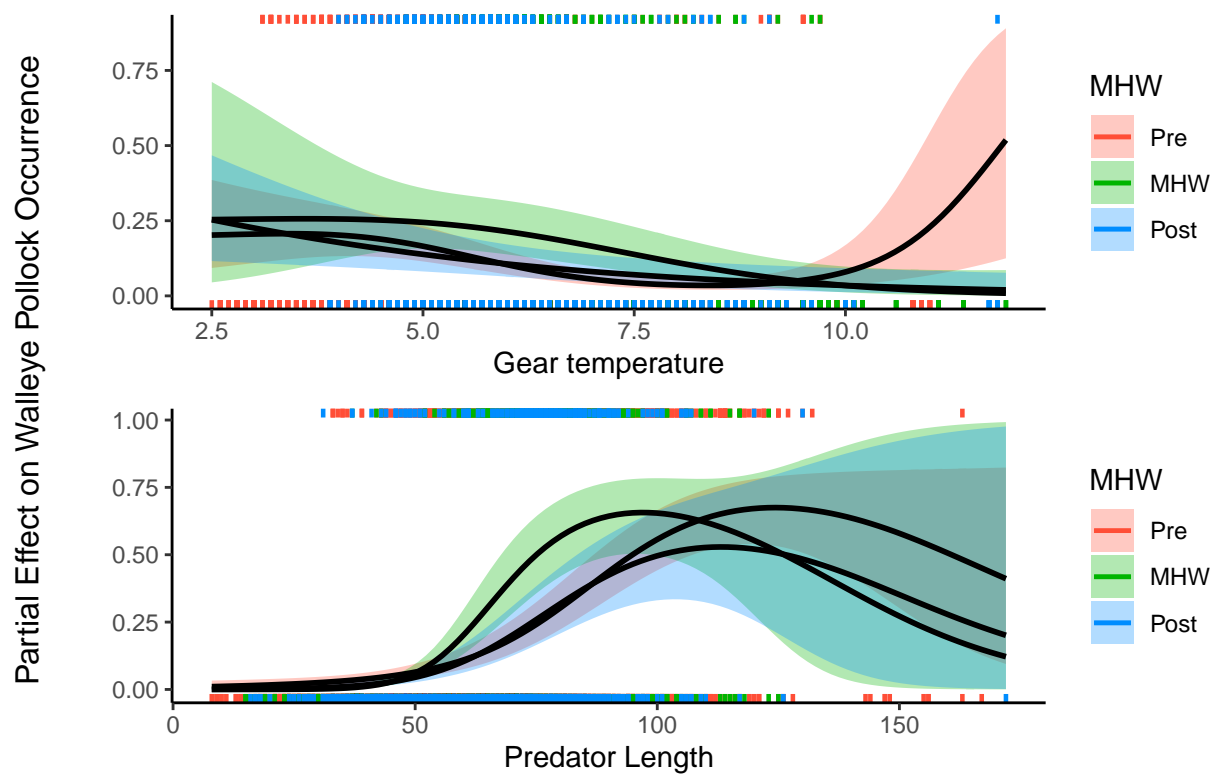


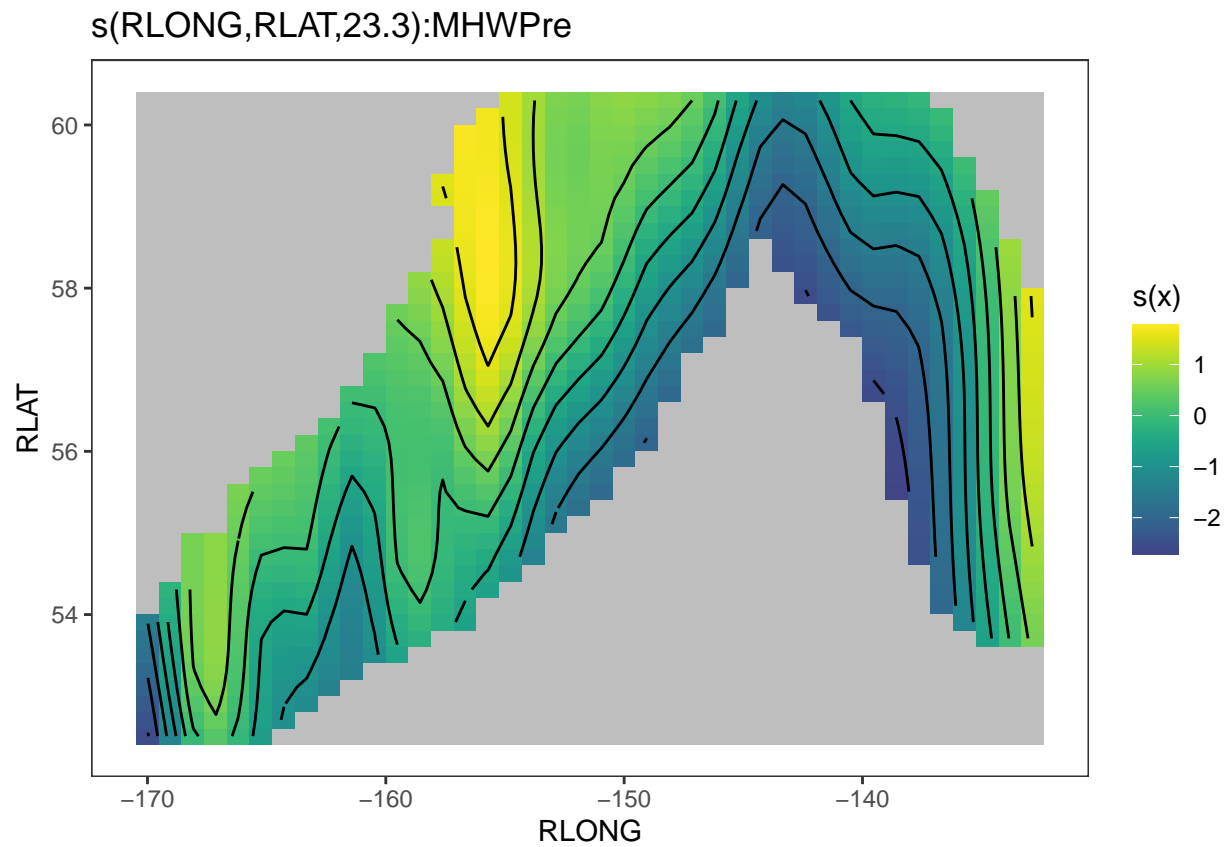
Model 2: Walleye Pollock Prey

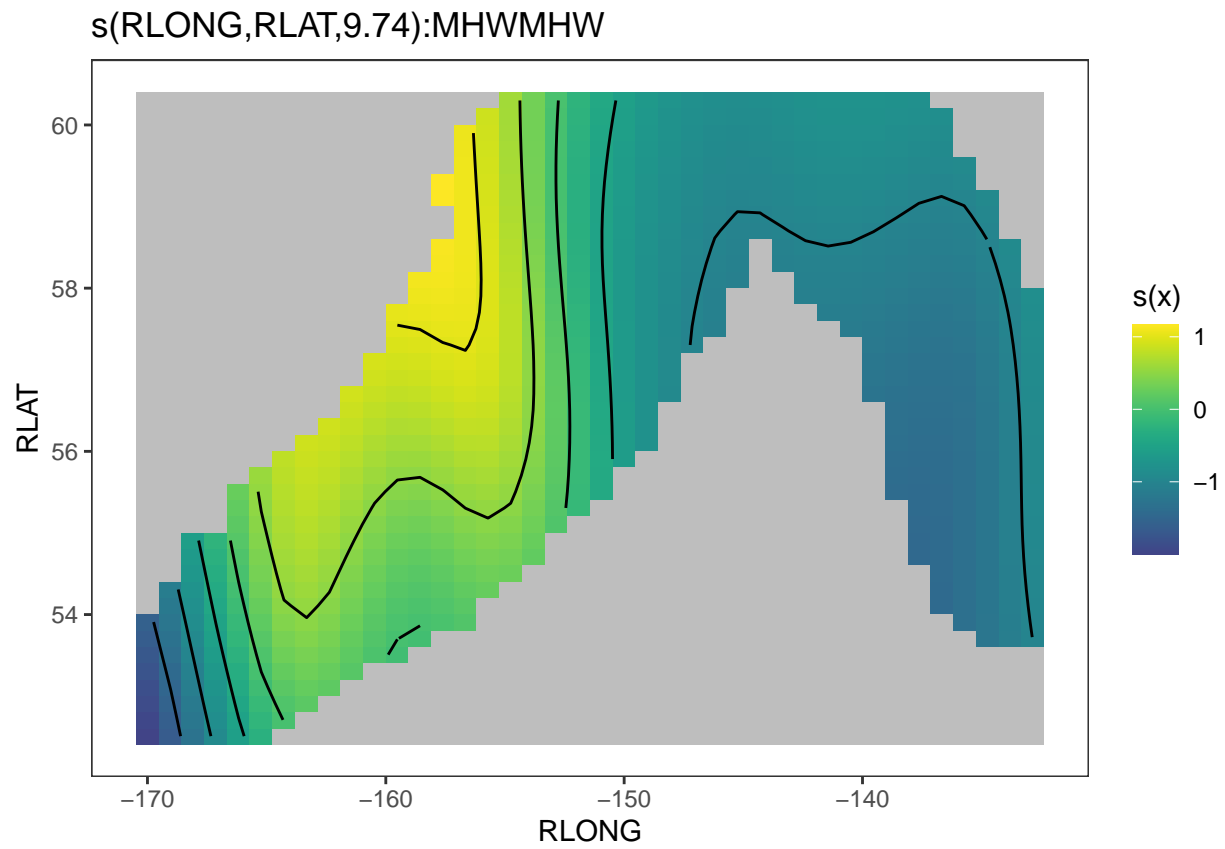
Predator: Pacific Halibut



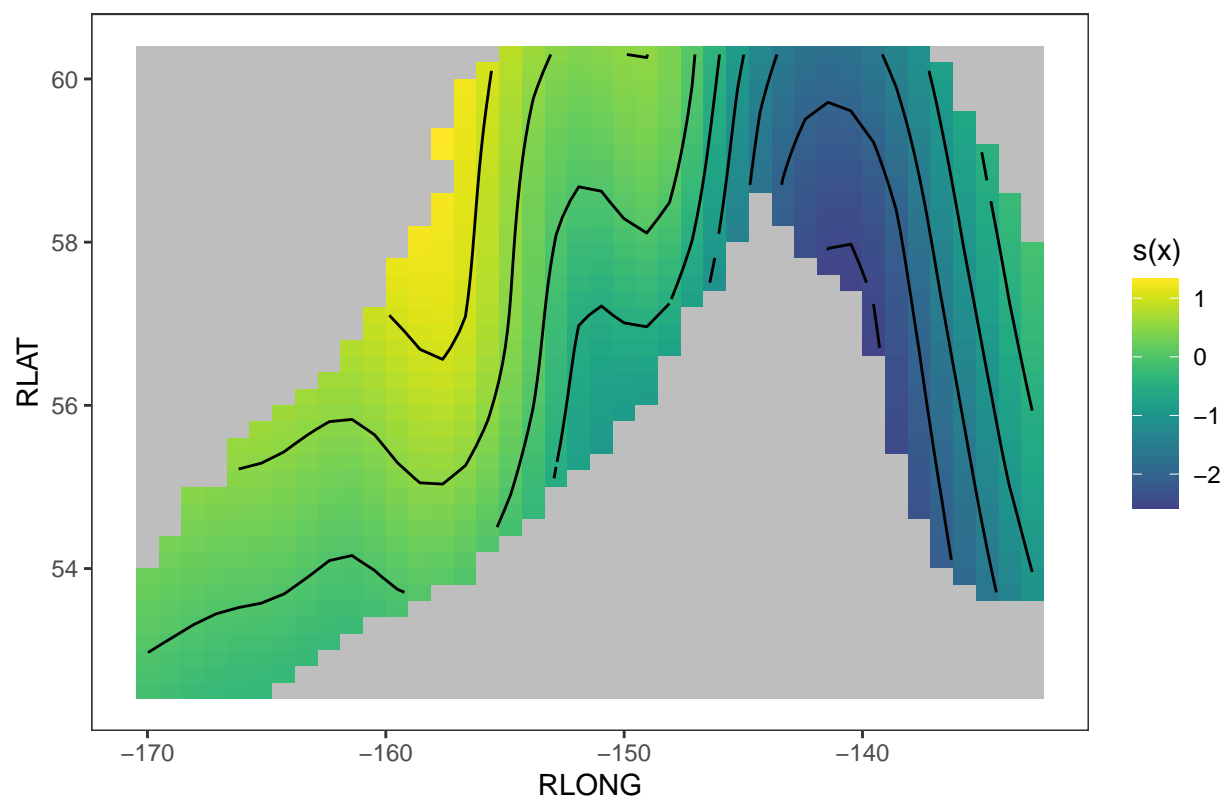
Predator: Pacific Halibut





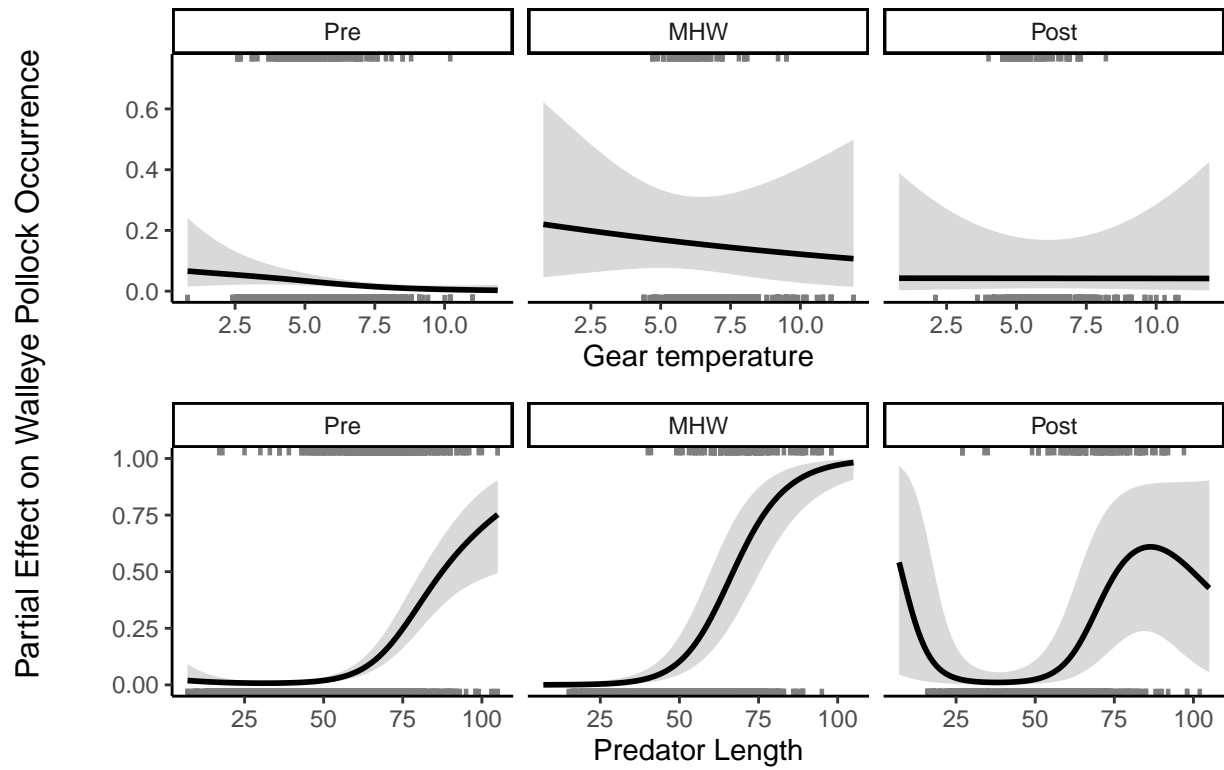


s(RLONG,RLAT,11.03):MHWPost

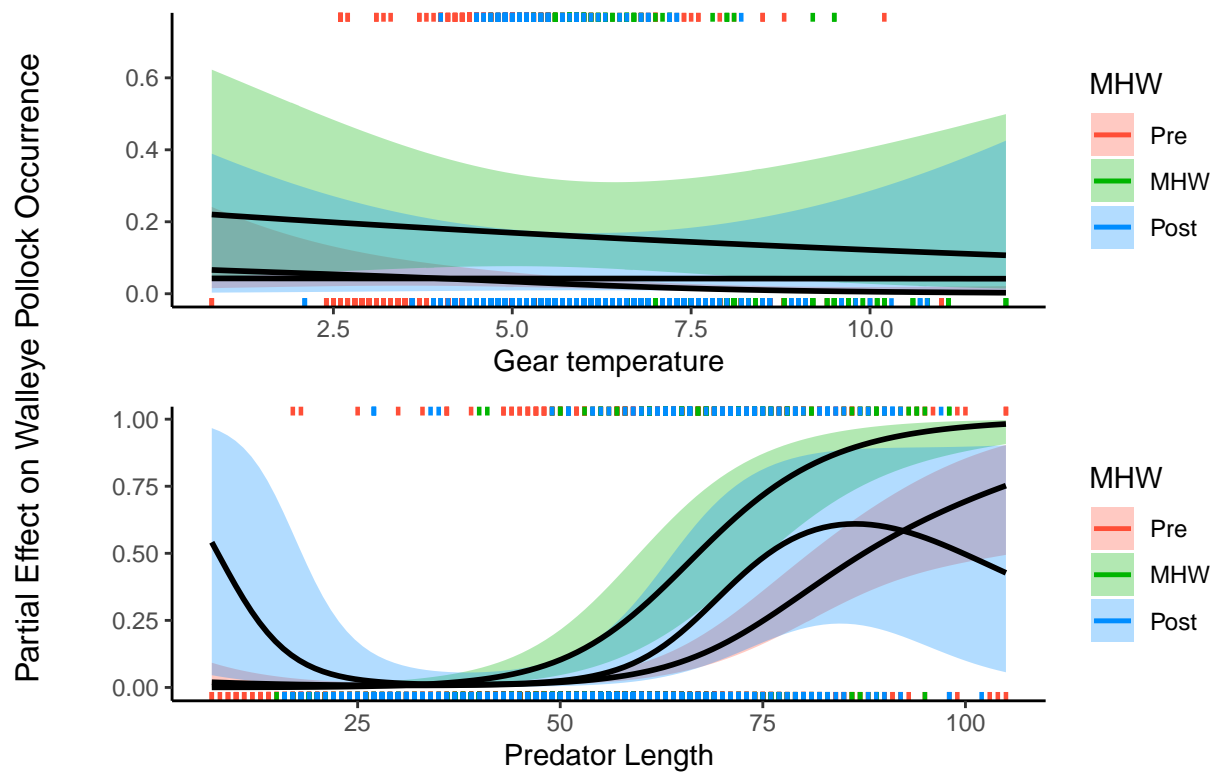


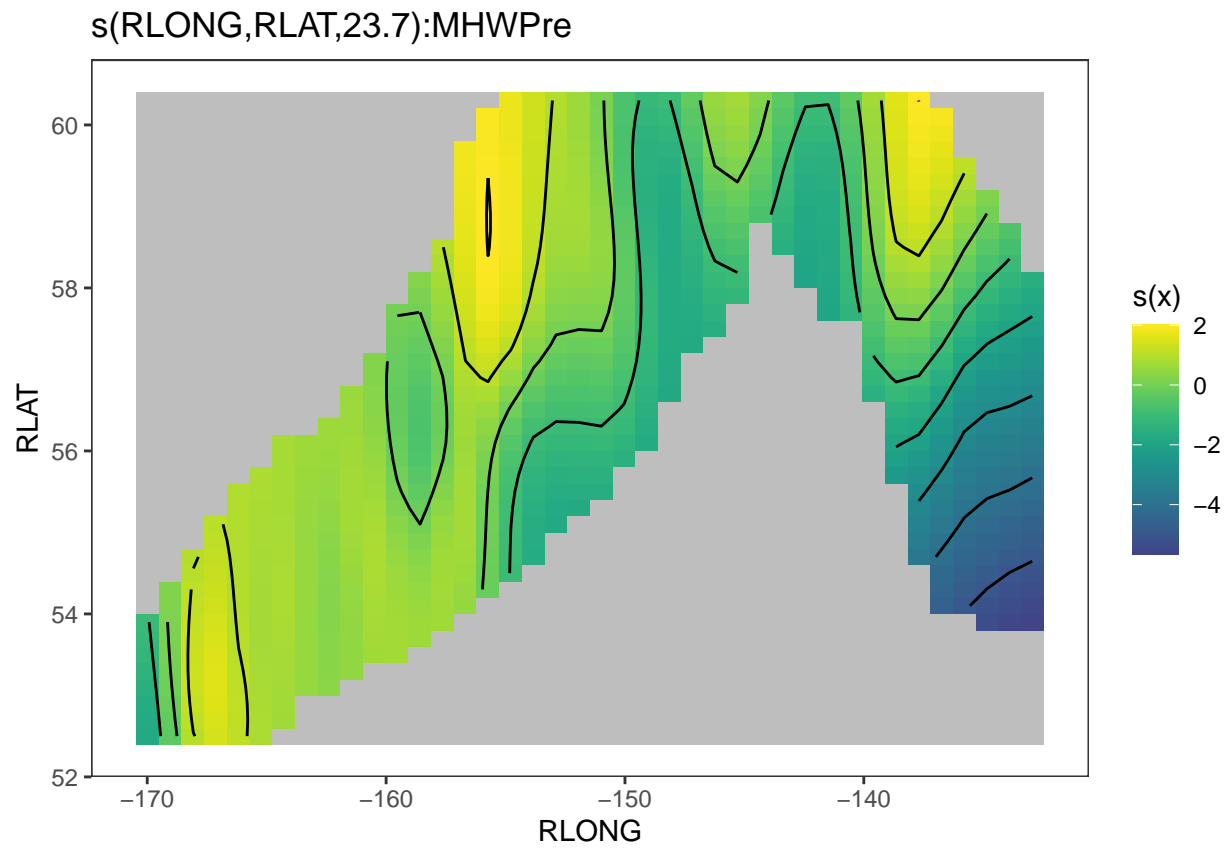
Model 2: Walleye Pollock Prey

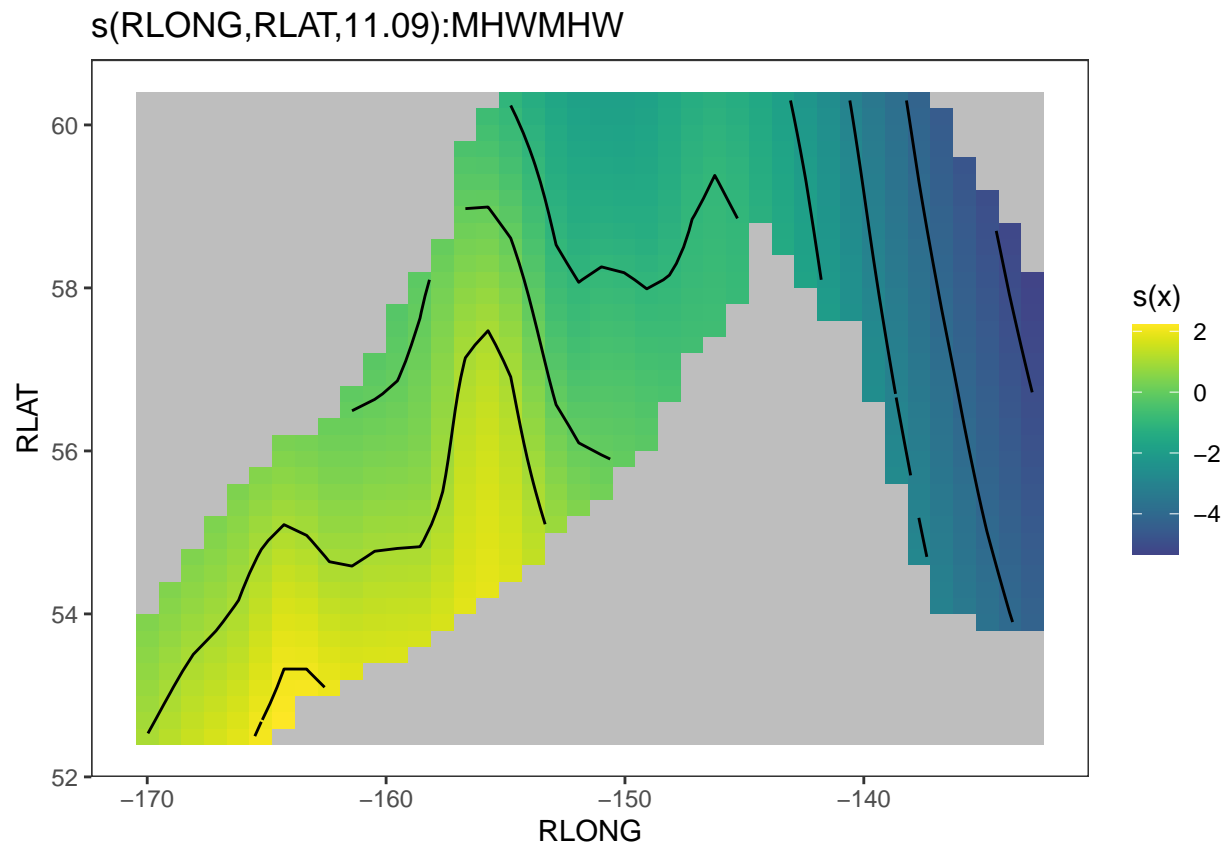
Predator: Pacific Cod

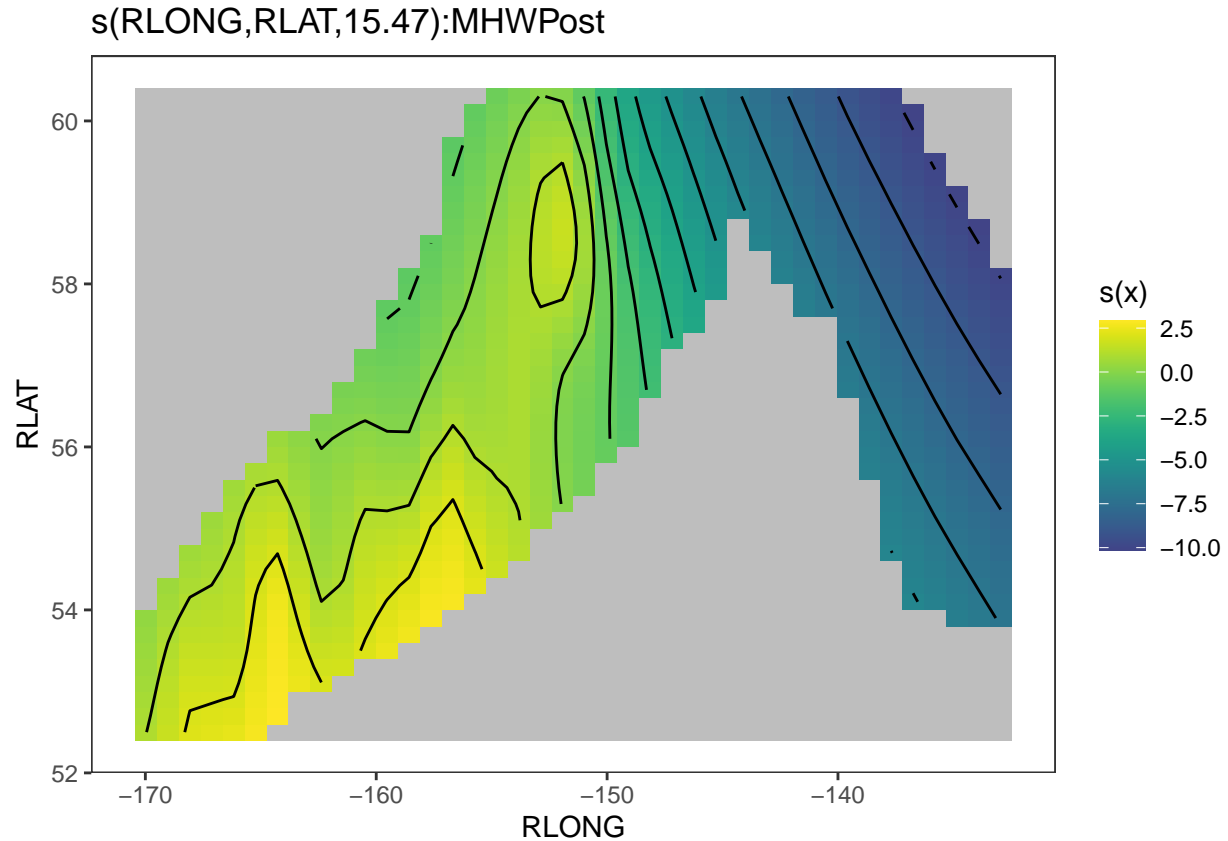


Predator: Pacific Cod









Model 2: Walleye Pollock Prey

```
#Arrowtooth Flounder
#MHW Interaction Model
start <- Sys.time()

Model1 <- gam(Walleyepollock ~ s(GEAR_TEMP, k = 4, by = MHW) + s(RLONG, RLAT, by = MHW) +
              s(PRED_LEN, k = 4, by = MHW) +
              s(Year, bs = "re"),
              data = AF,
              family = binomial())

end <- Sys.time()
mod1.time <- end - start

#Base Model
start <- Sys.time()
Model2 <- gam(Walleyepollock ~ s(GEAR_TEMP, k = 4) + s(RLONG, RLAT) + s(PRED_LEN, k = 4) +
              s(Year, bs = "re"),
              data = AF,
              family = binomial())

end <- Sys.time()
mod2.time <- end - start
```

```

AIC_Diff <- AIC(Model1) - AIC(Model2)

AIC_Mat[7,1] <- "WP"
AIC_Mat[7,2] <- "AF"
AIC_Mat[7,3] <- AIC(Model1)
AIC_Mat[7,4] <- AIC(Model2)
AIC_Mat[7,5] <- (AIC(Model1) - AIC(Model2))

print(AIC_Mat)

#Plotting partial effects

#Model1
Plot1 <- visreg(Model1, "GEAR_TEMP", "MHW", type = "conditional", scale = "response",
  gg = TRUE, line=list(col="black"), xlab = "Gear temperature", ylab = "") +
  theme_classic()

Plot2 <- visreg(Model1, "PRED_LEN", "MHW", type = "conditional", scale = "response",
  gg = TRUE, line=list(col="black"), xlab = "Predator Length", ylab = "") +
  theme_classic()

Plot1_0 <- visreg(Model1, "GEAR_TEMP", "MHW", type = "conditional", scale = "response",
  gg = TRUE, line=list(col="black"), xlab = "Gear temperature", ylab = "",
  overlay = T) +
  theme_classic()

Plot2_0 <- visreg(Model1, "PRED_LEN", "MHW", type = "conditional", scale = "response",
  gg = TRUE, line=list(col="black"), xlab = "Predator Length", ylab = "",
  overlay = T) +
  theme_classic()

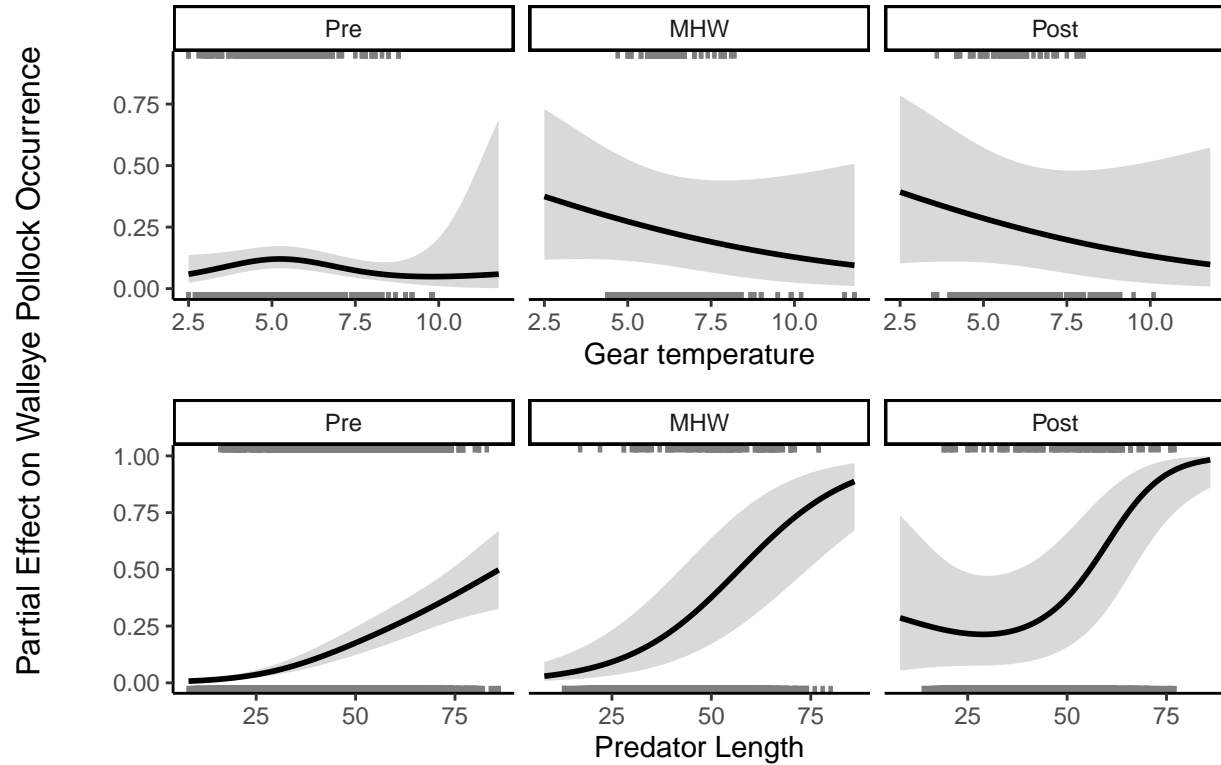
MainP <- (Plot1 / Plot2) +
  plot_annotation(title = "Predator: Arrowtooth Flounder")

MainP0 <- (Plot1_0 / Plot2_0) +
  plot_annotation(title = "Predator: Arrowtooth Flounder")

grid.arrange(patchworkGrob(MainP), left = "Partial Effect on Walleye Pollock Occurrence")

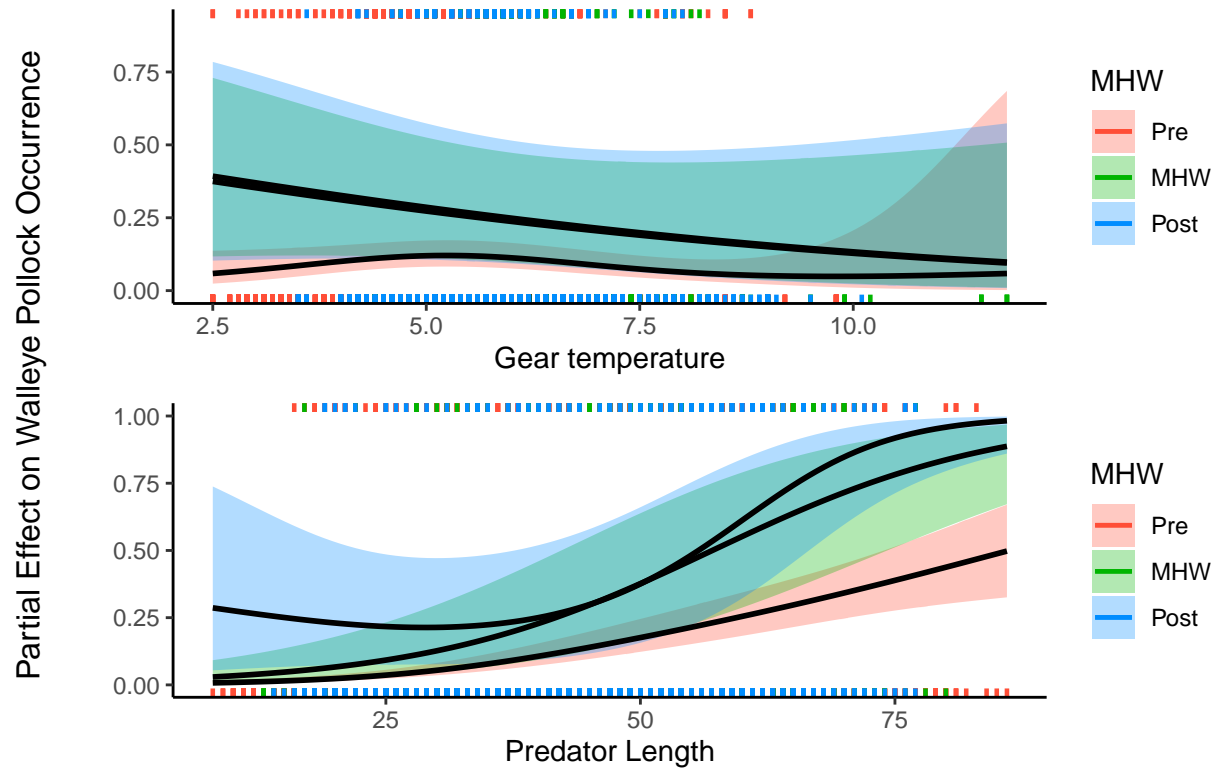
```

Predator: Arrowtooth Flounder

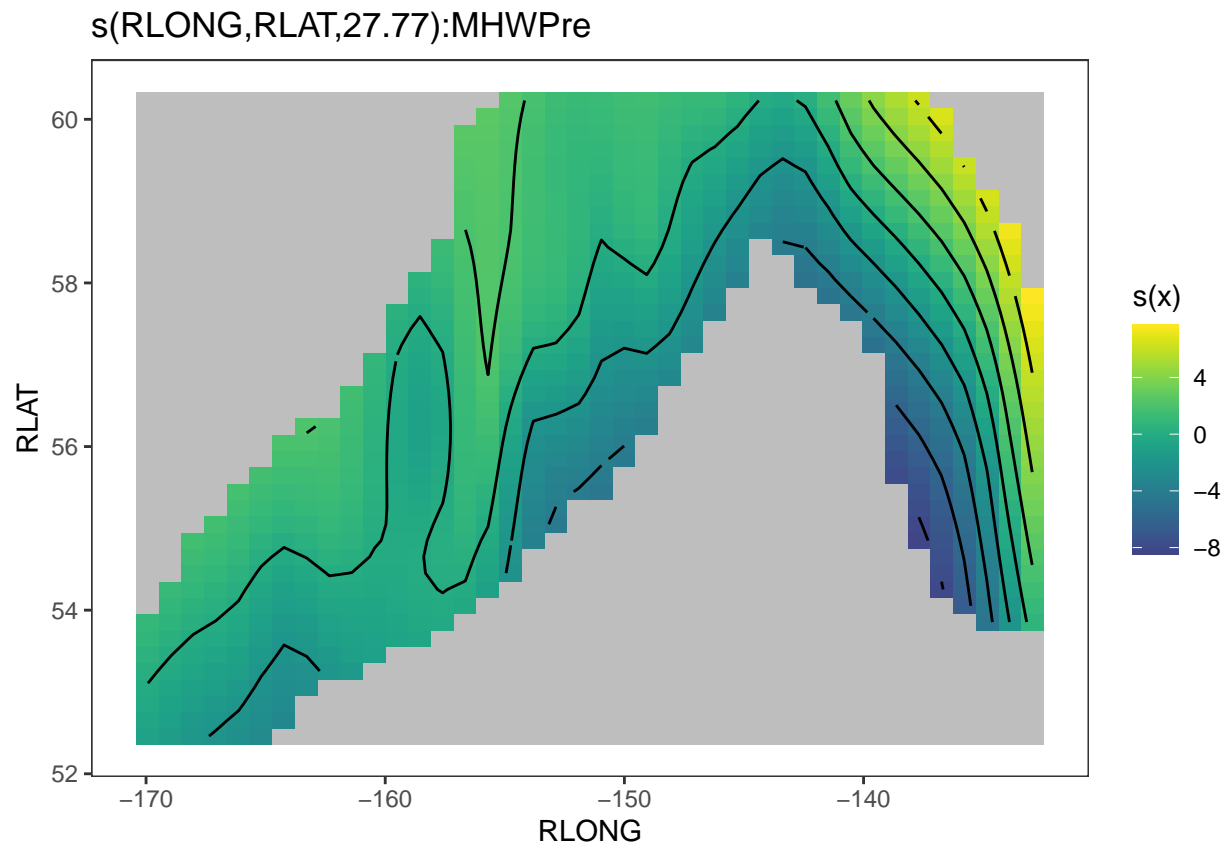


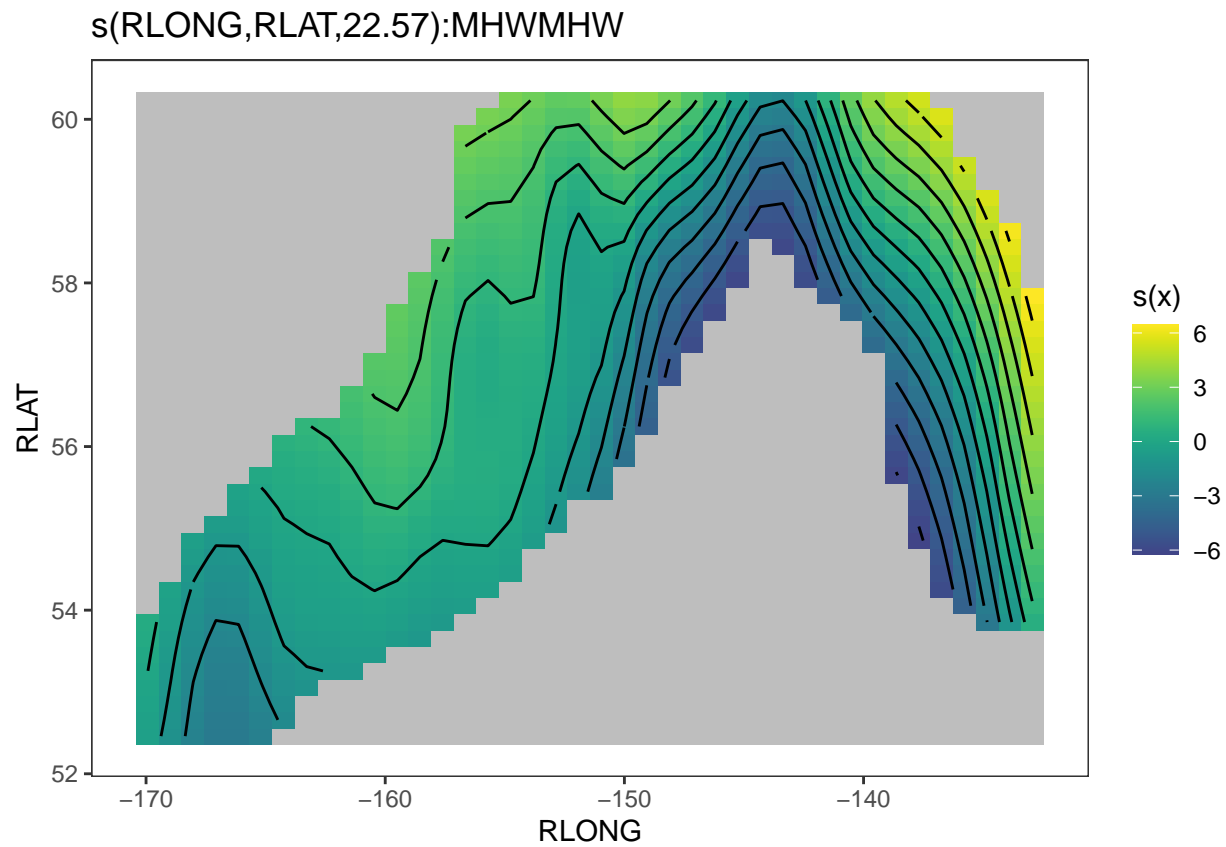
```
grid.arrange(patchworkGrob(MainP0), left = "Partial Effect on Walleye Pollock Occurrence")
```

Predator: Arrowtooth Flounder

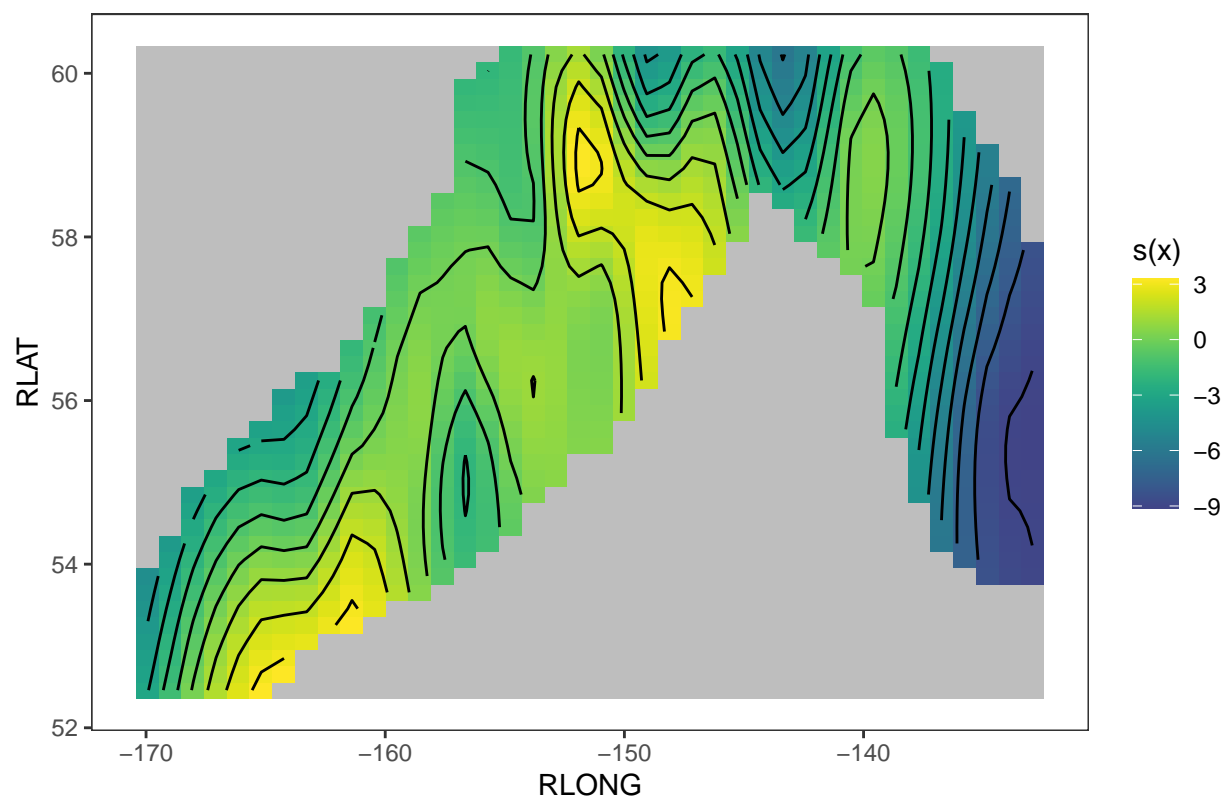


```
p <- getViz(Model11)
plot(p, select = c(4,5,6), pages = 1)
```

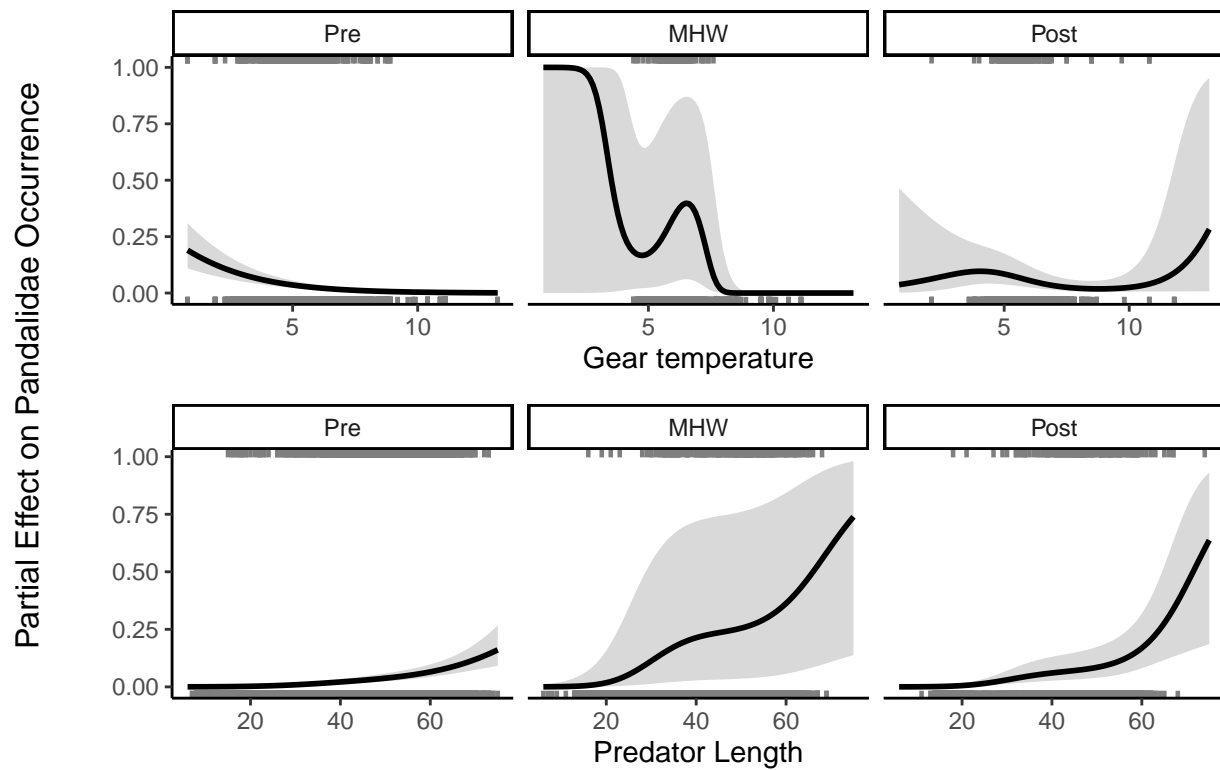


s(RLONG,RLAT,24.87):MHWPost

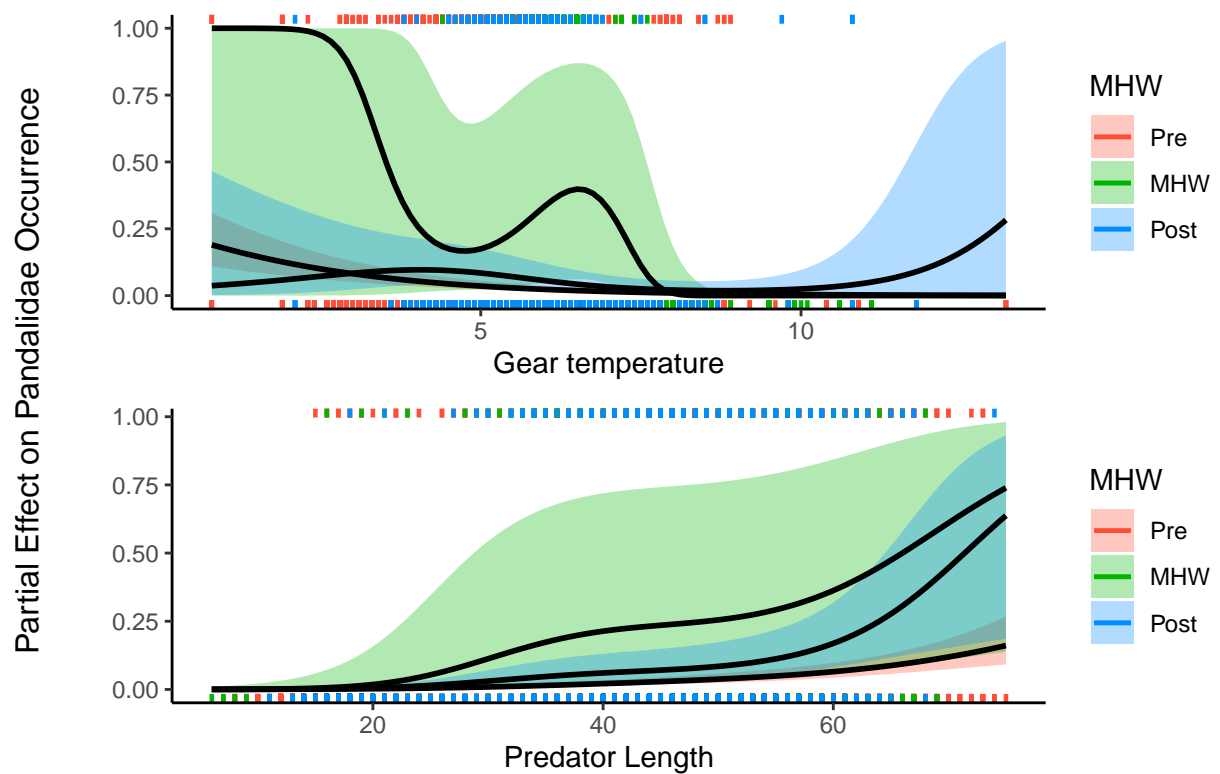


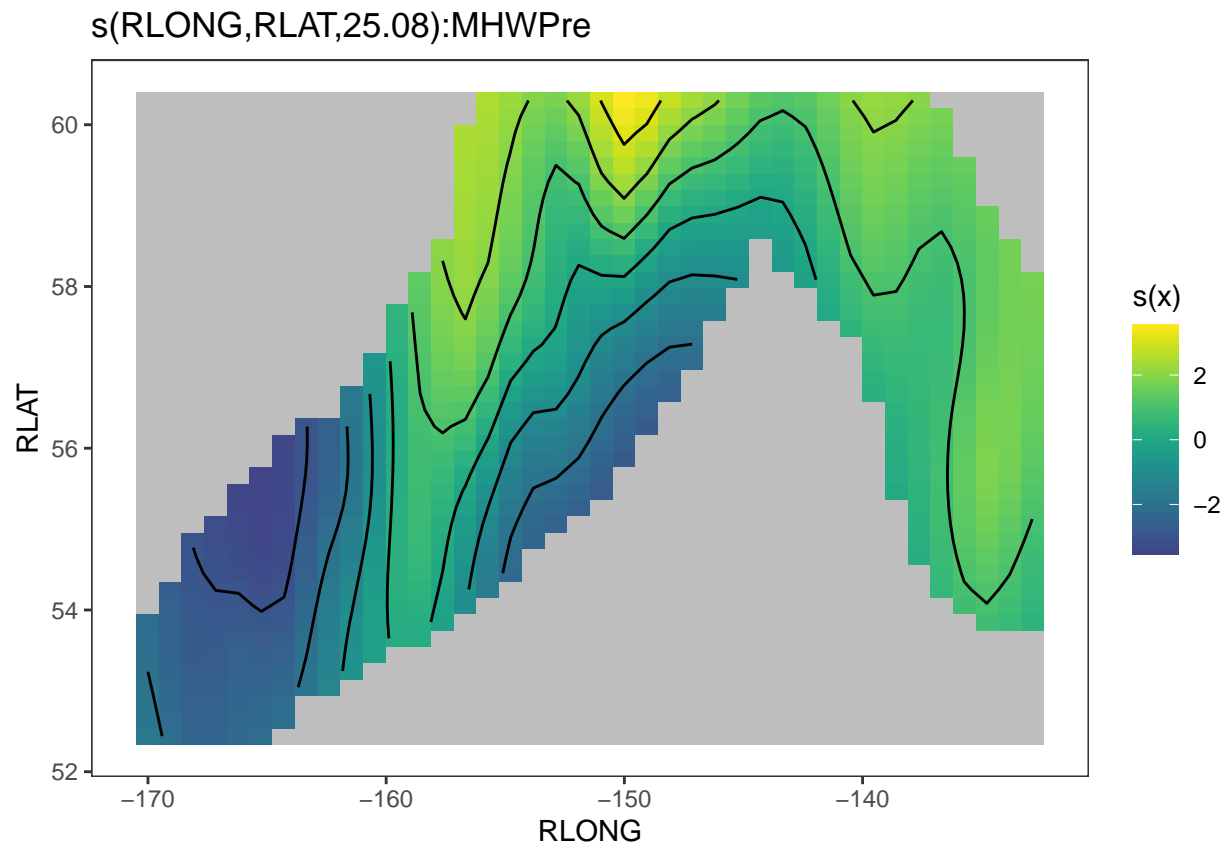
Model 3: Pandalidae Prey

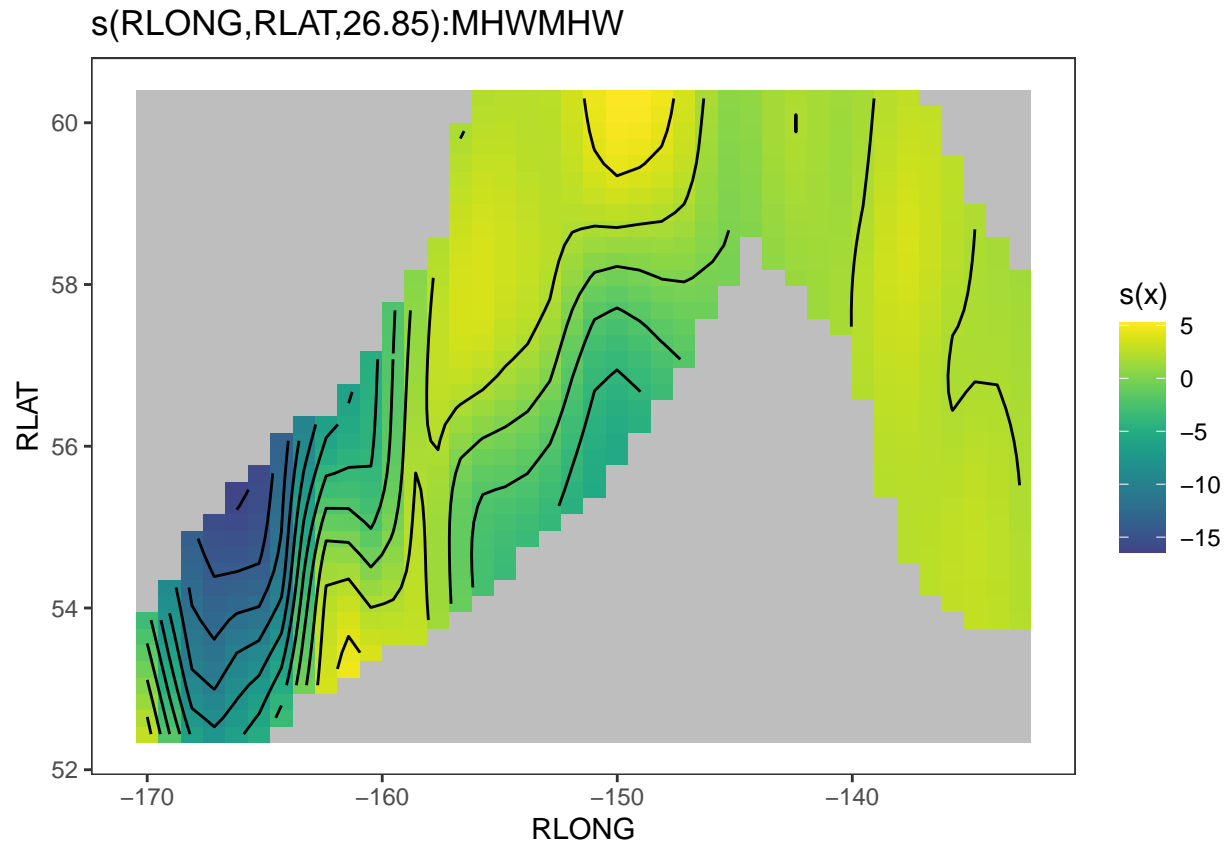
Predator: Walleye Pollock

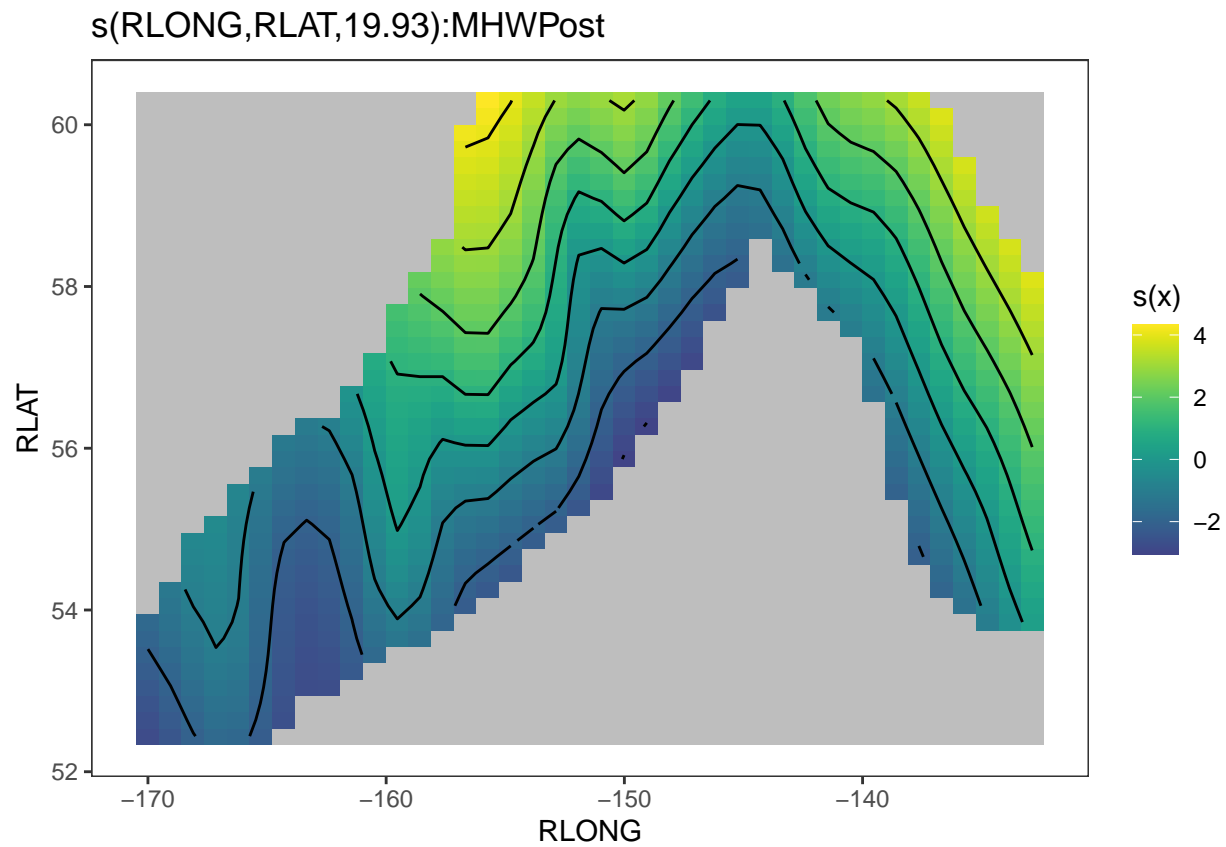


Predator: Walleye Pollock



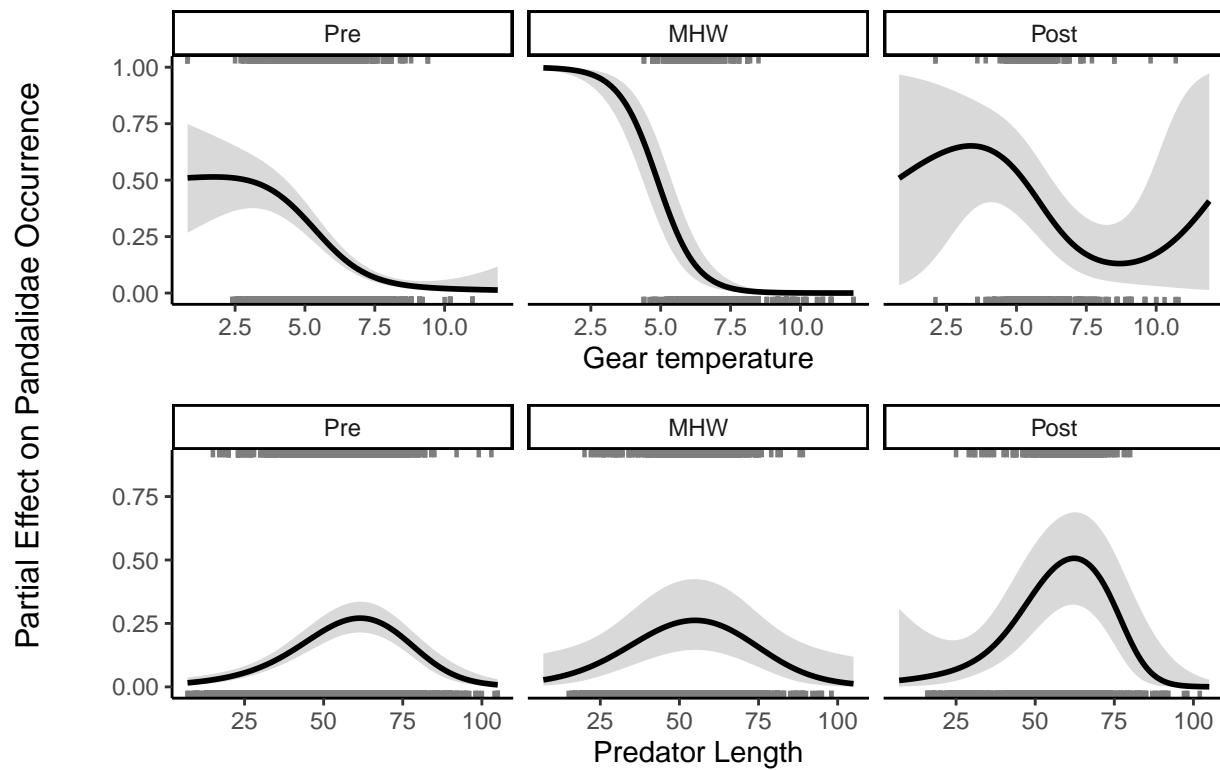




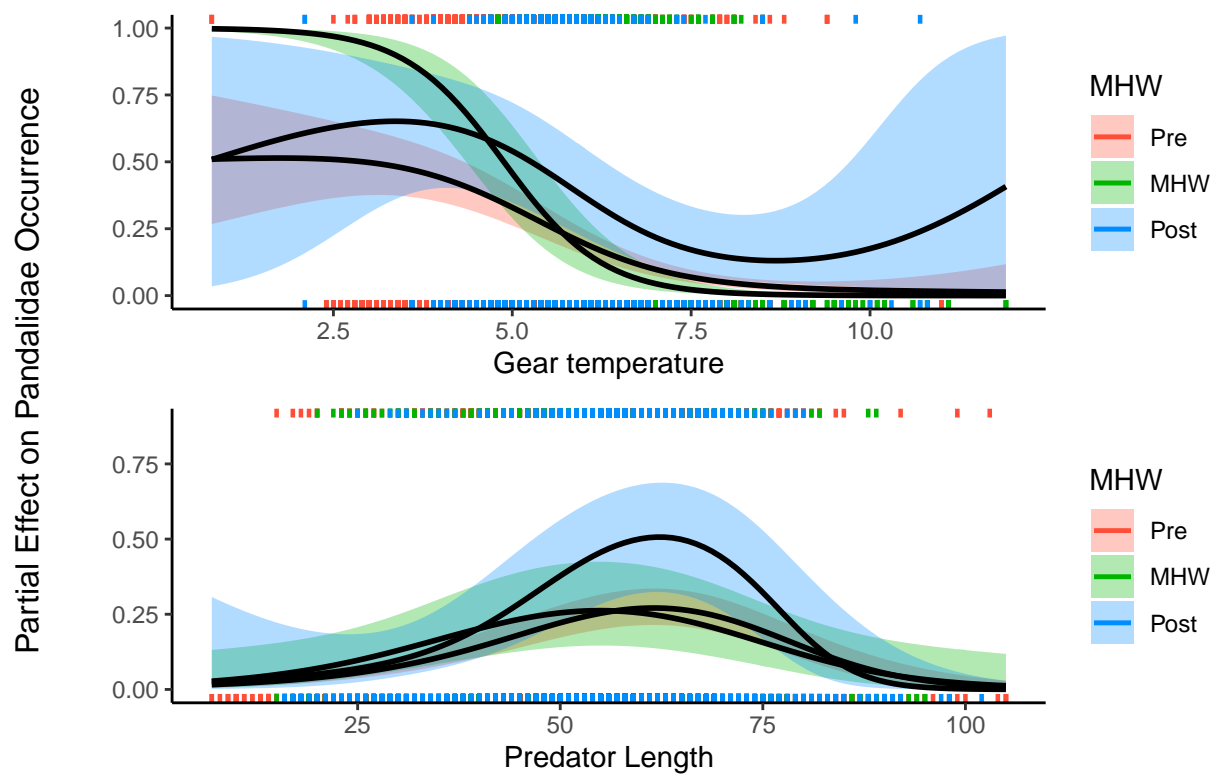


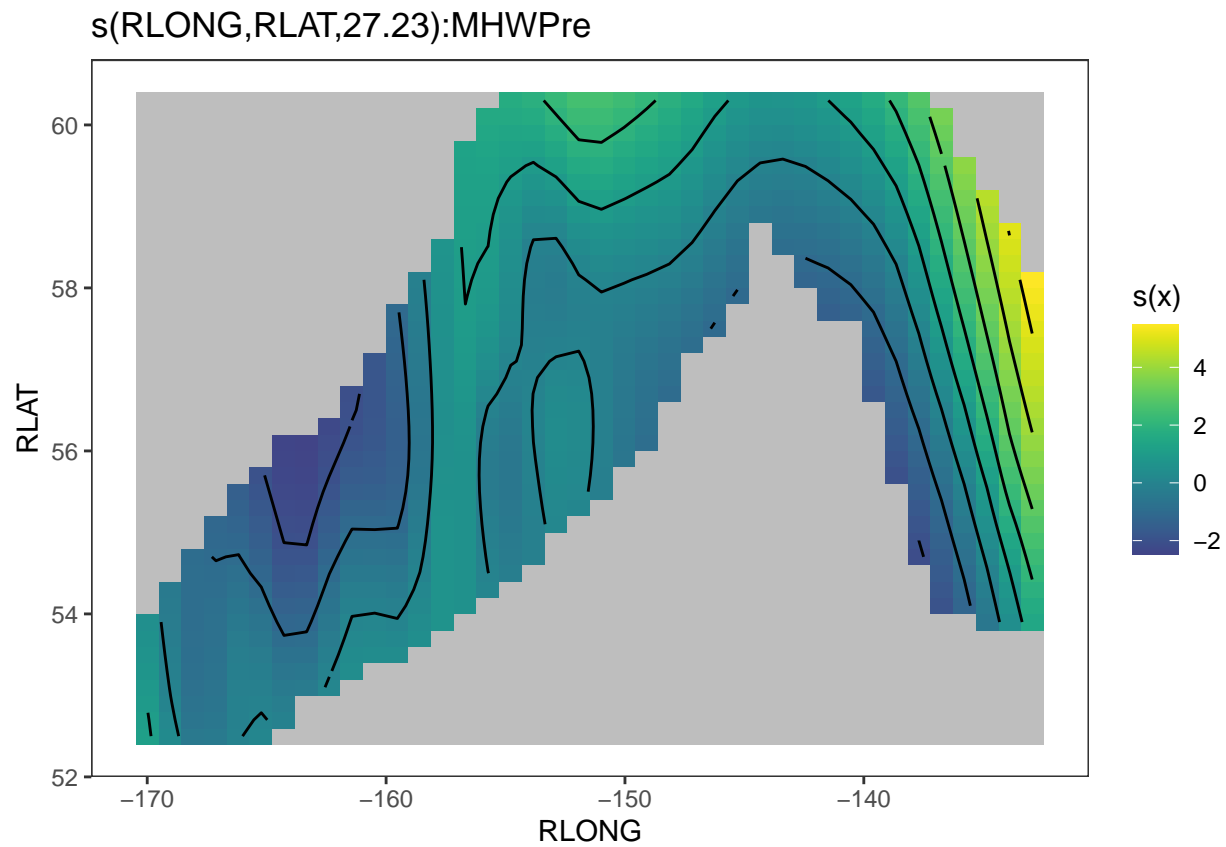
Model 3: Pandalidae Prey

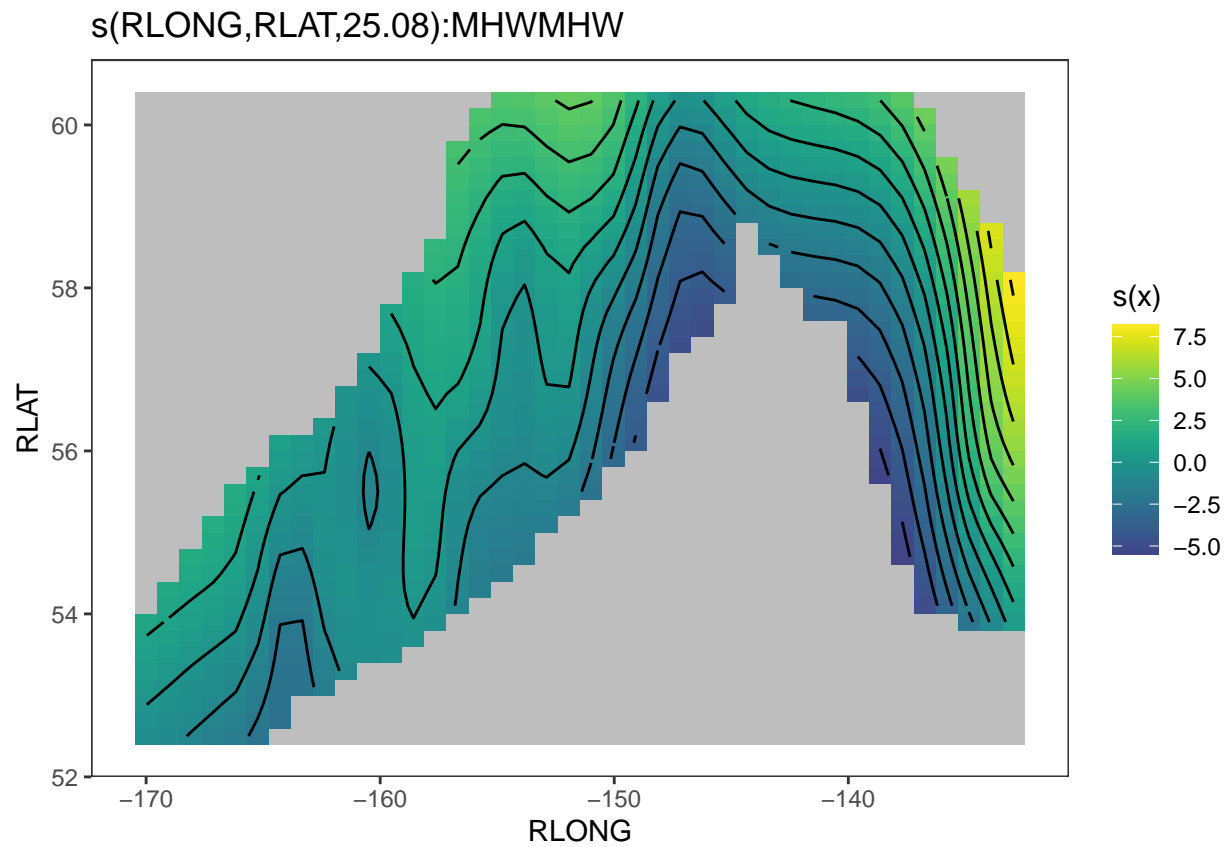
Predator: Walleye Pollock

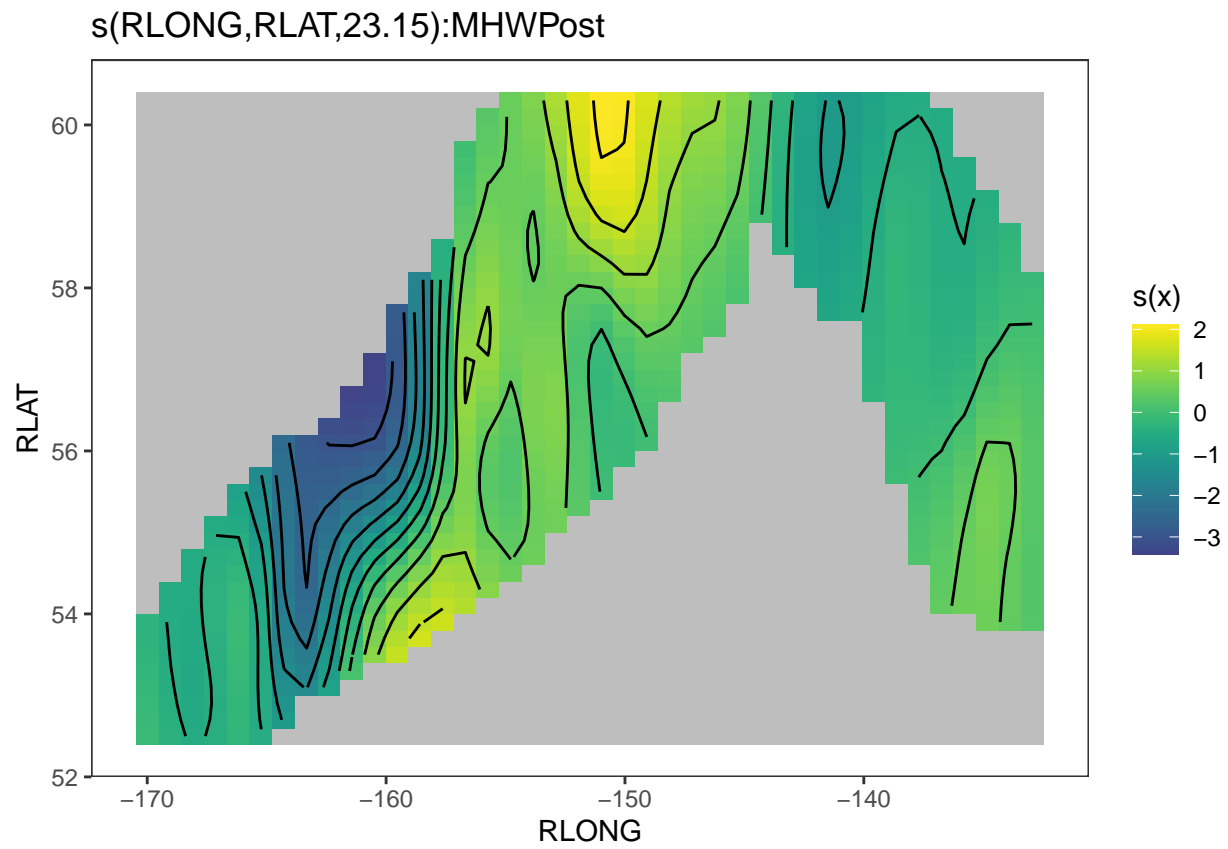


Predator: Walleye Pollock



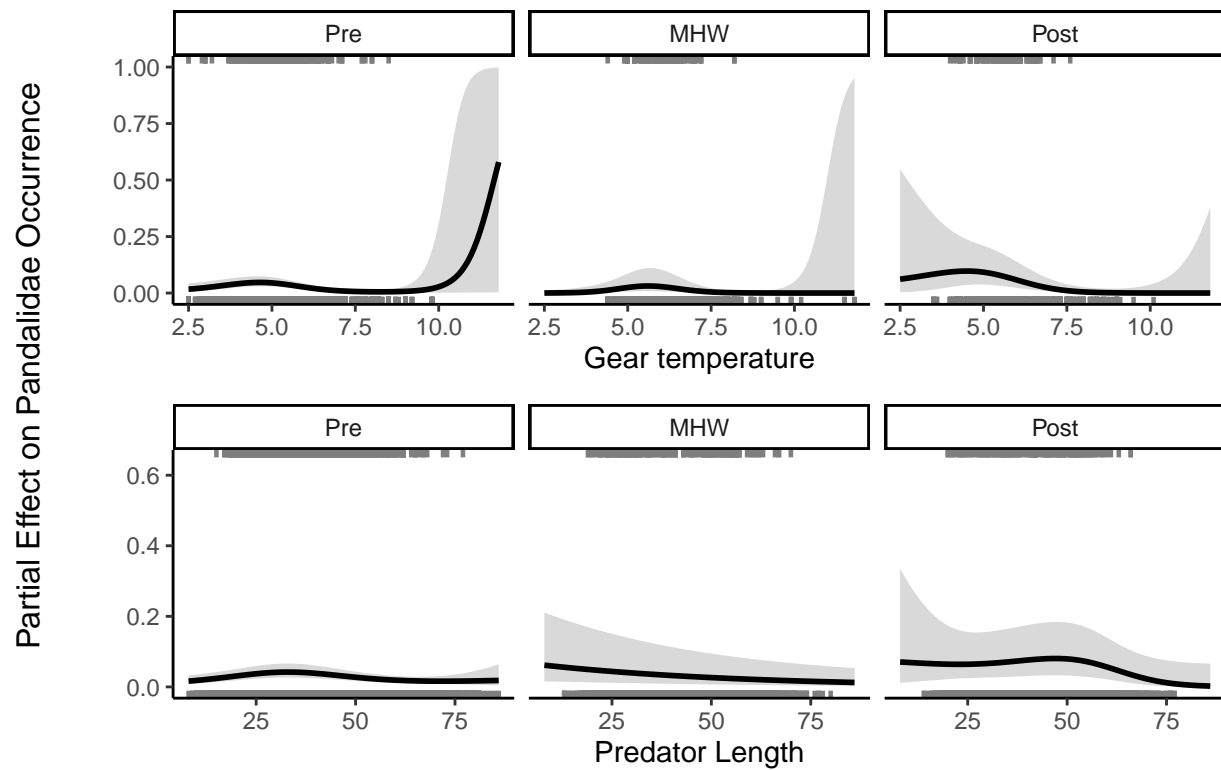




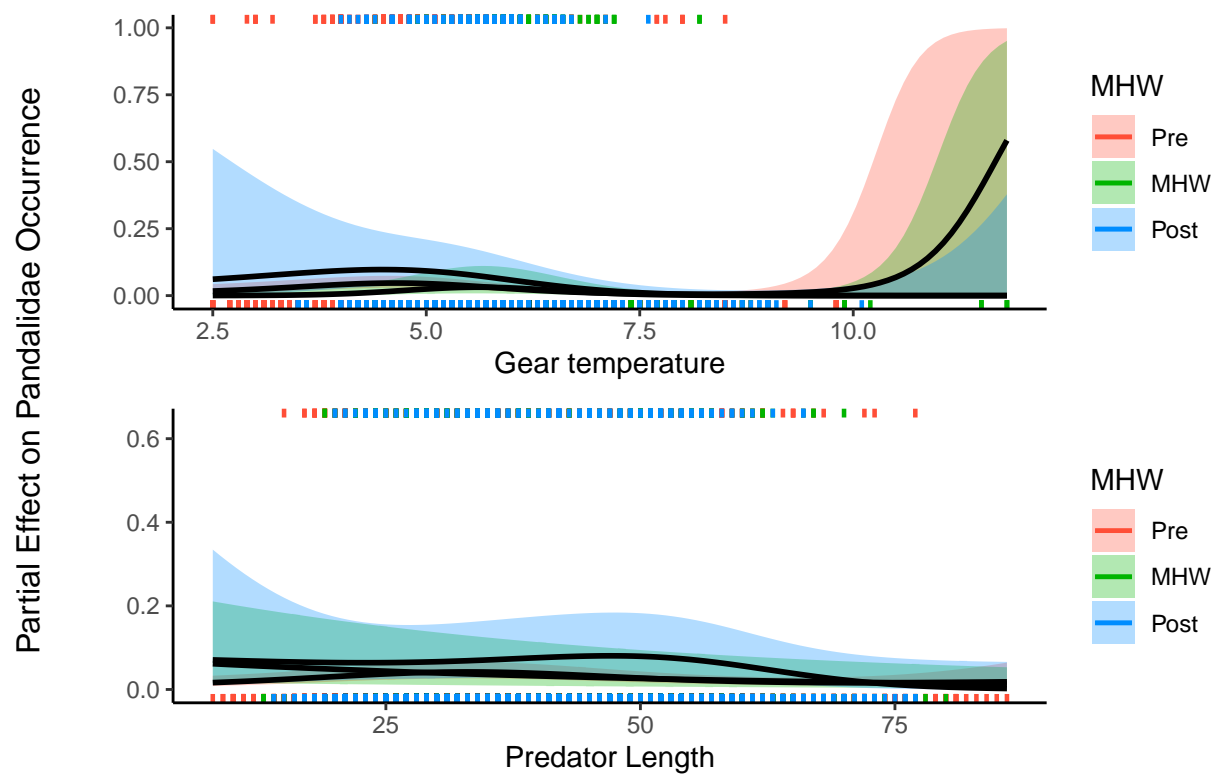


Model 3: Pandalidae Prey

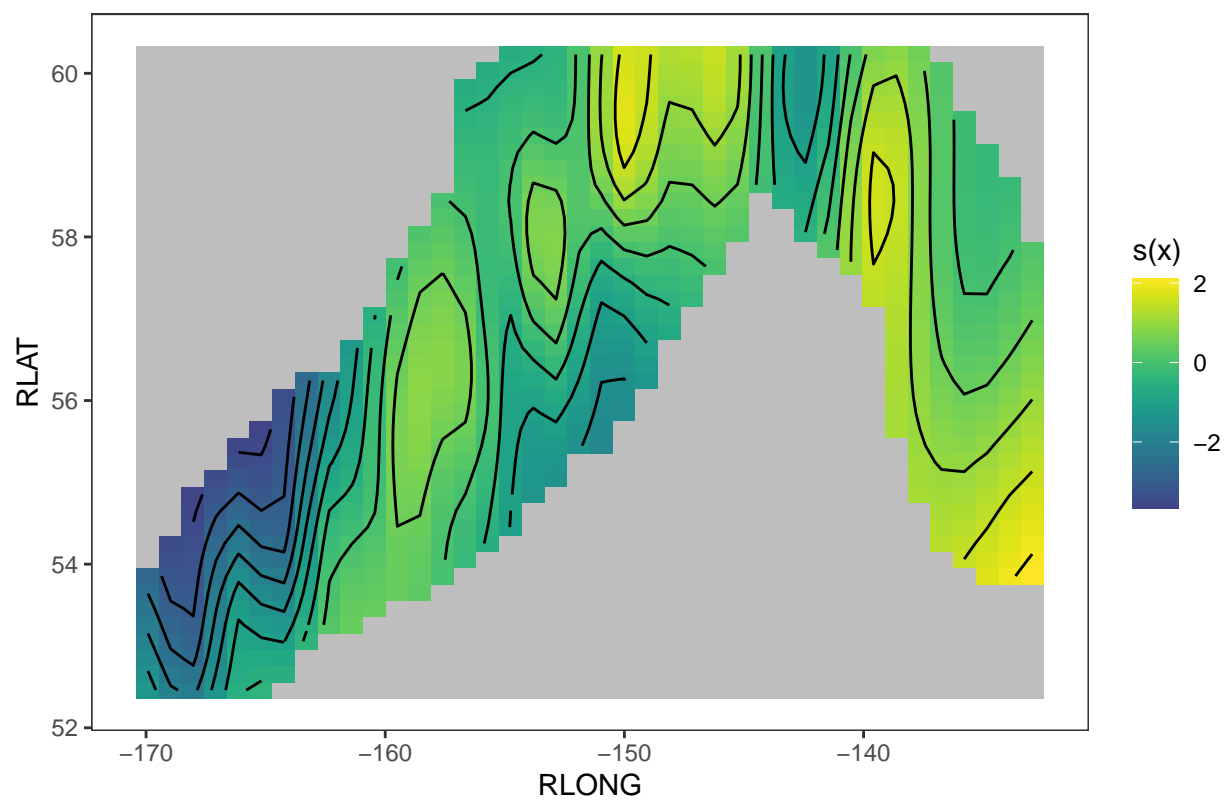
Predator: Arrowtooth Flounder

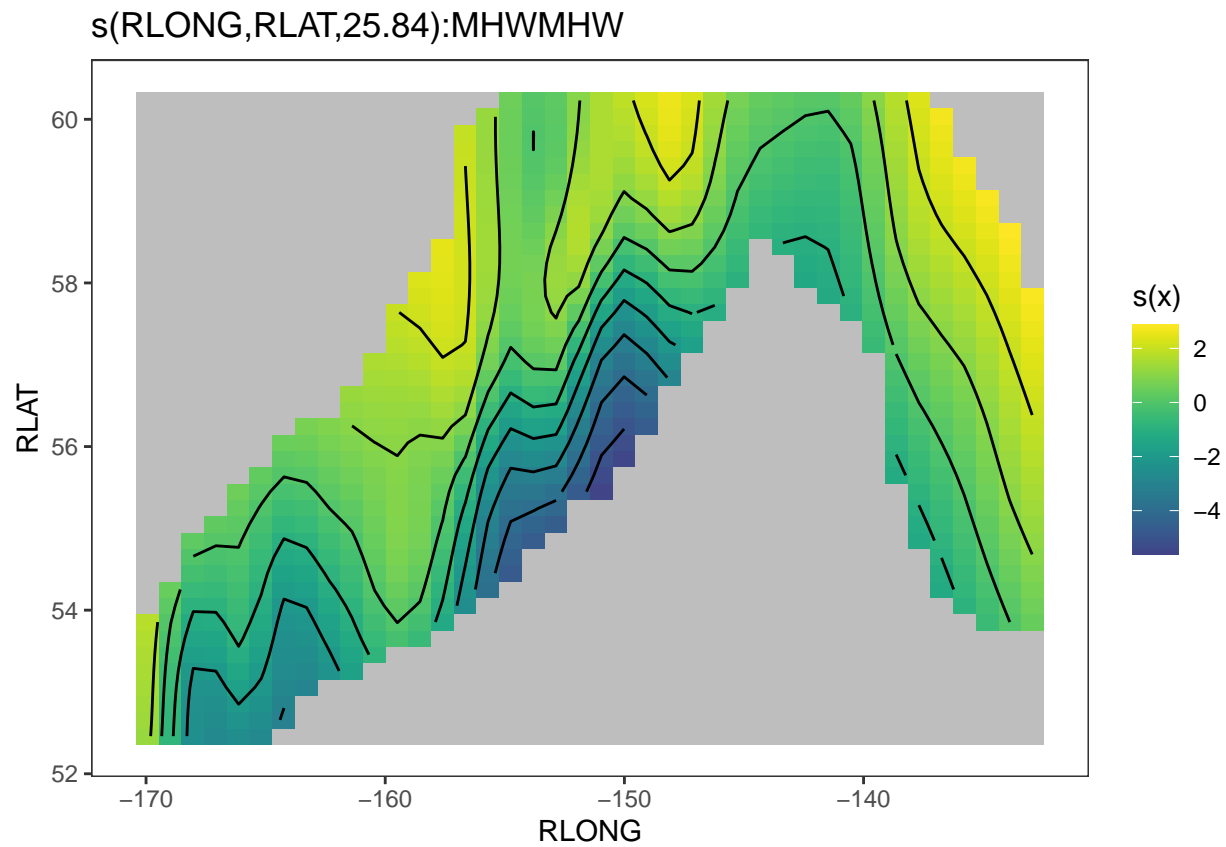


Predator: Arrowtooth Flounder

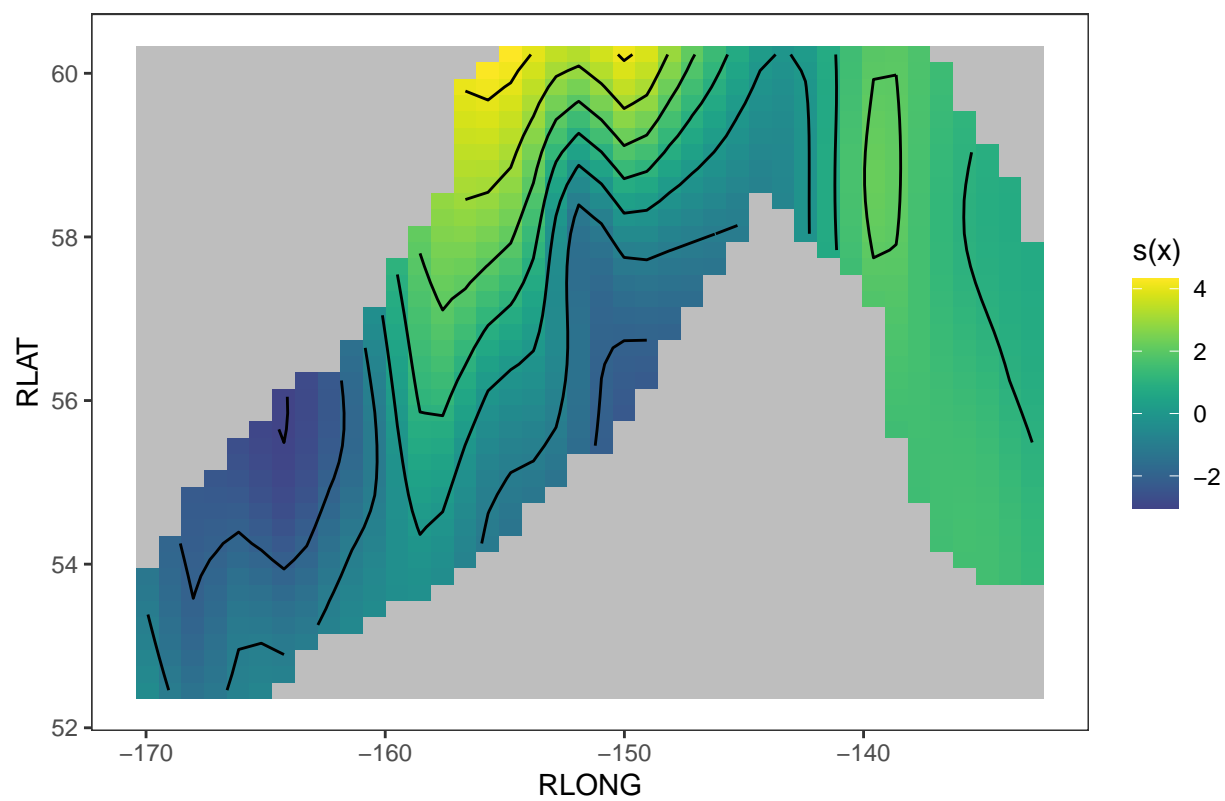


s(RLONG,RLAT,27.38):MHWPre



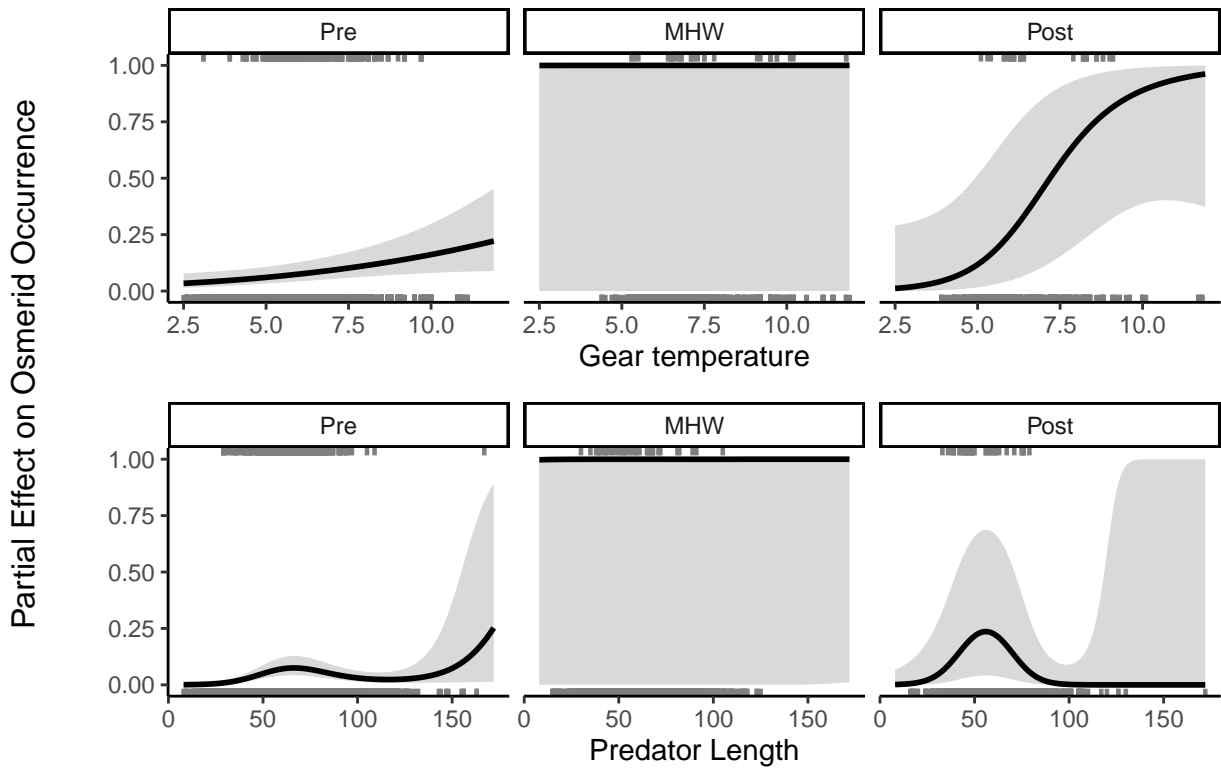


s(RLONG,RLAT,21.85):MHWPost

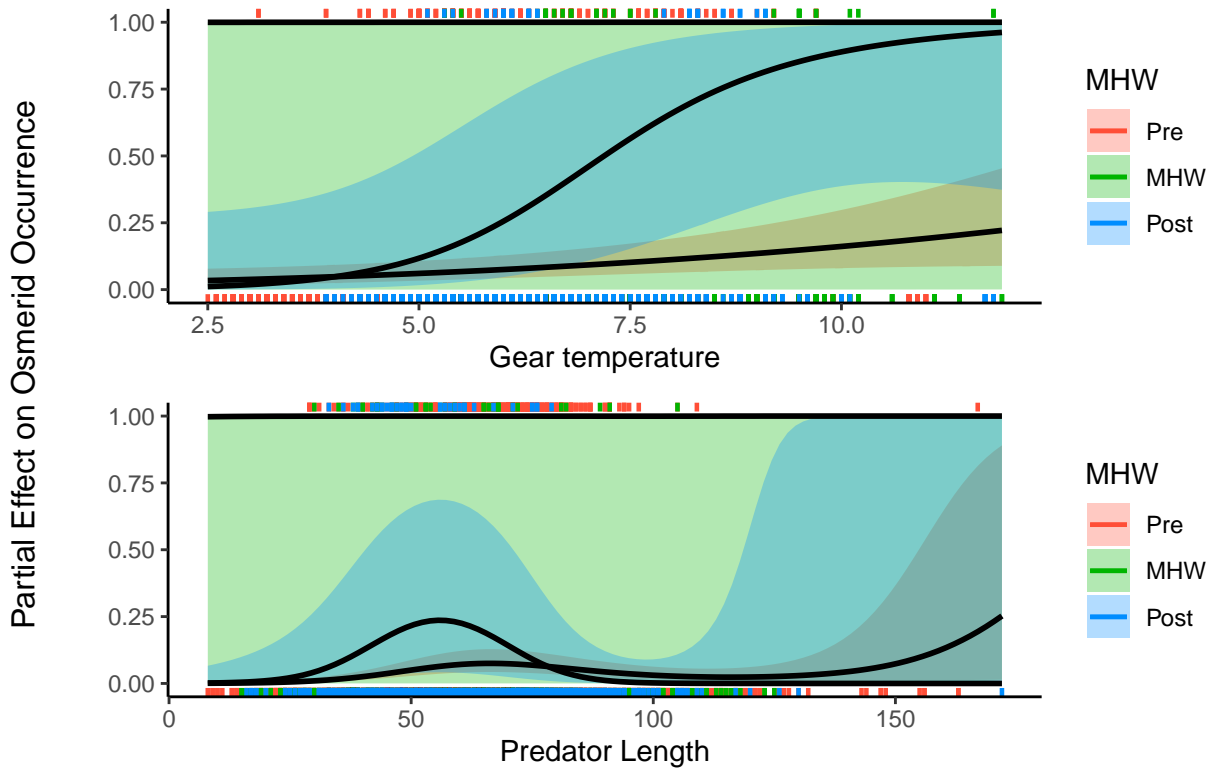


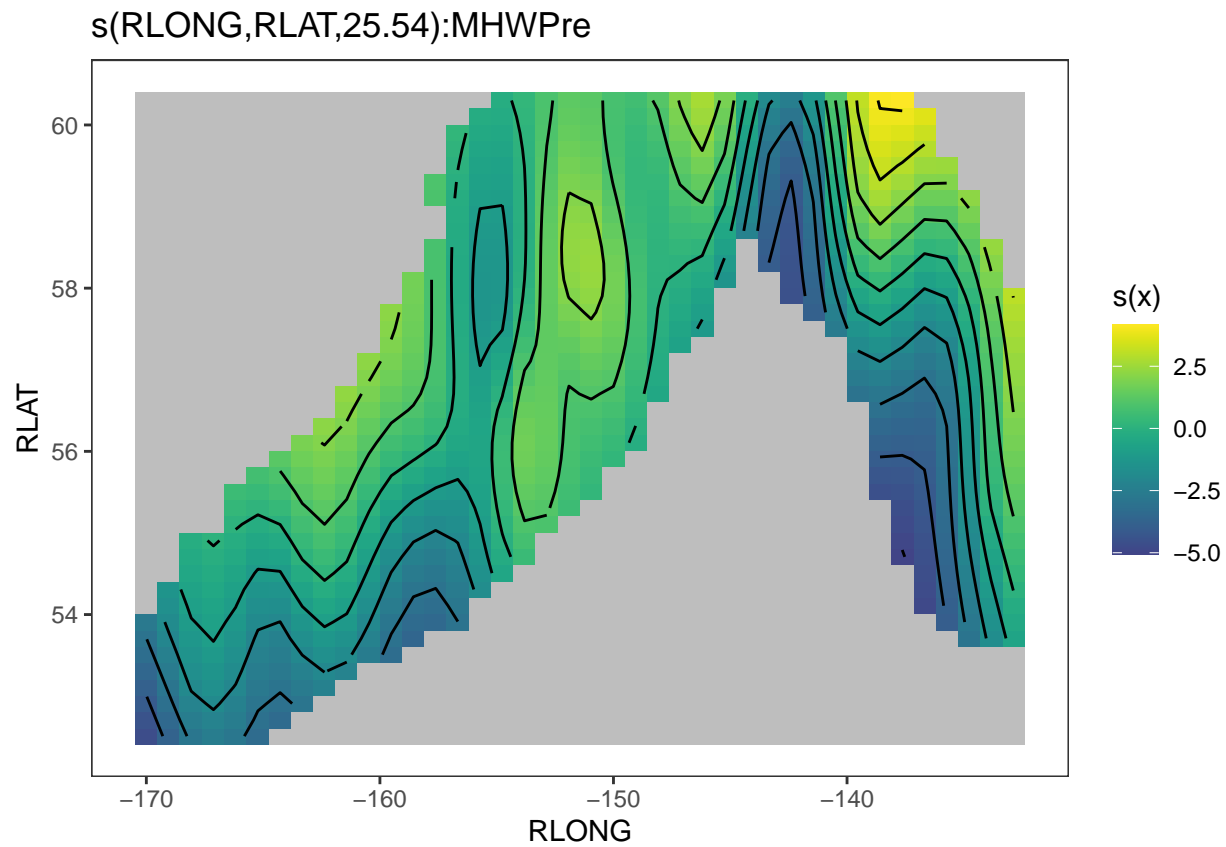
Model 5: Osmerid Prey

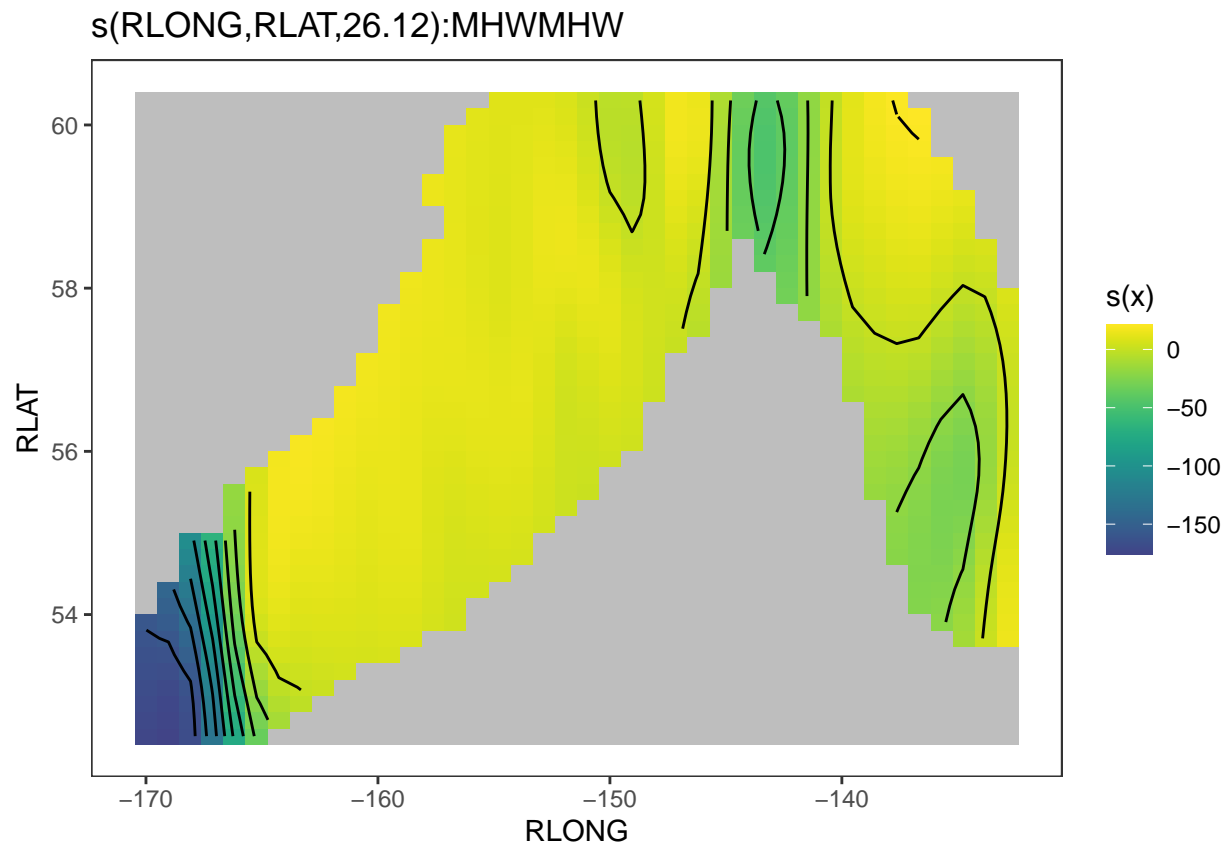
Predator: Pacific Halibut



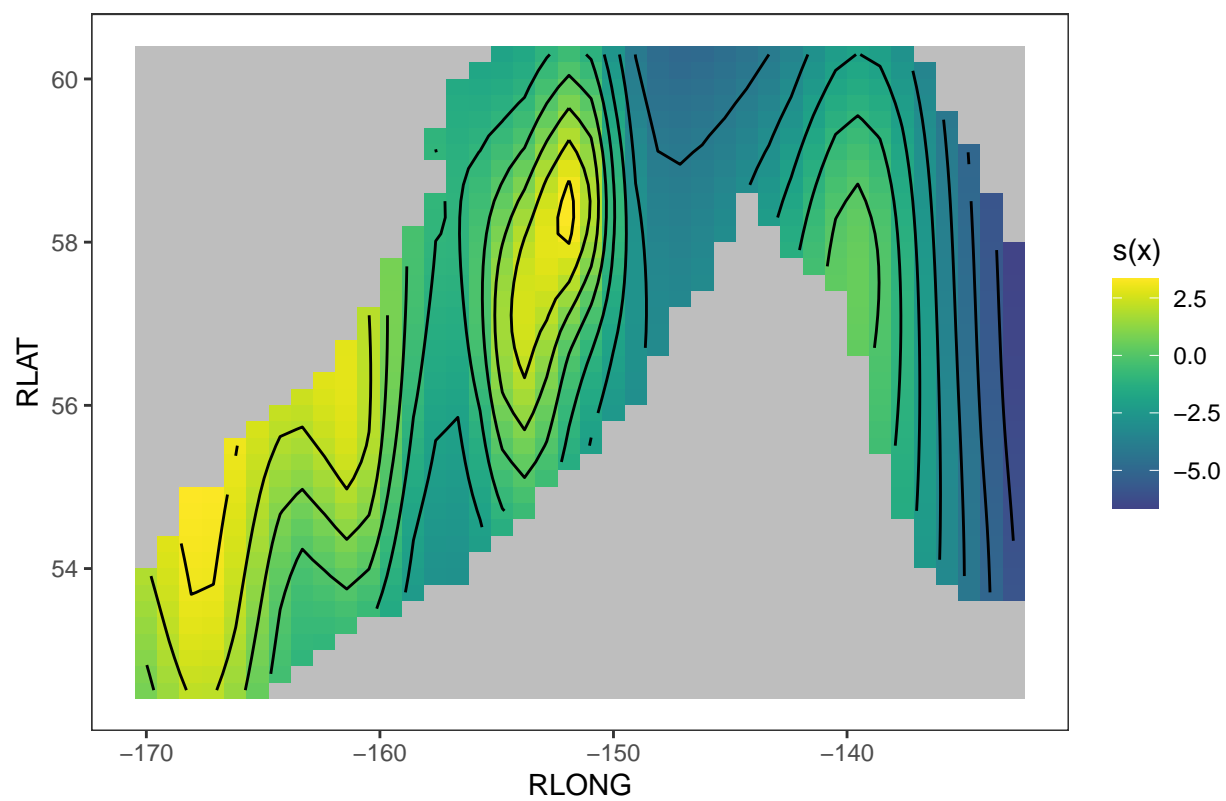
Predator: Pacific Halibut





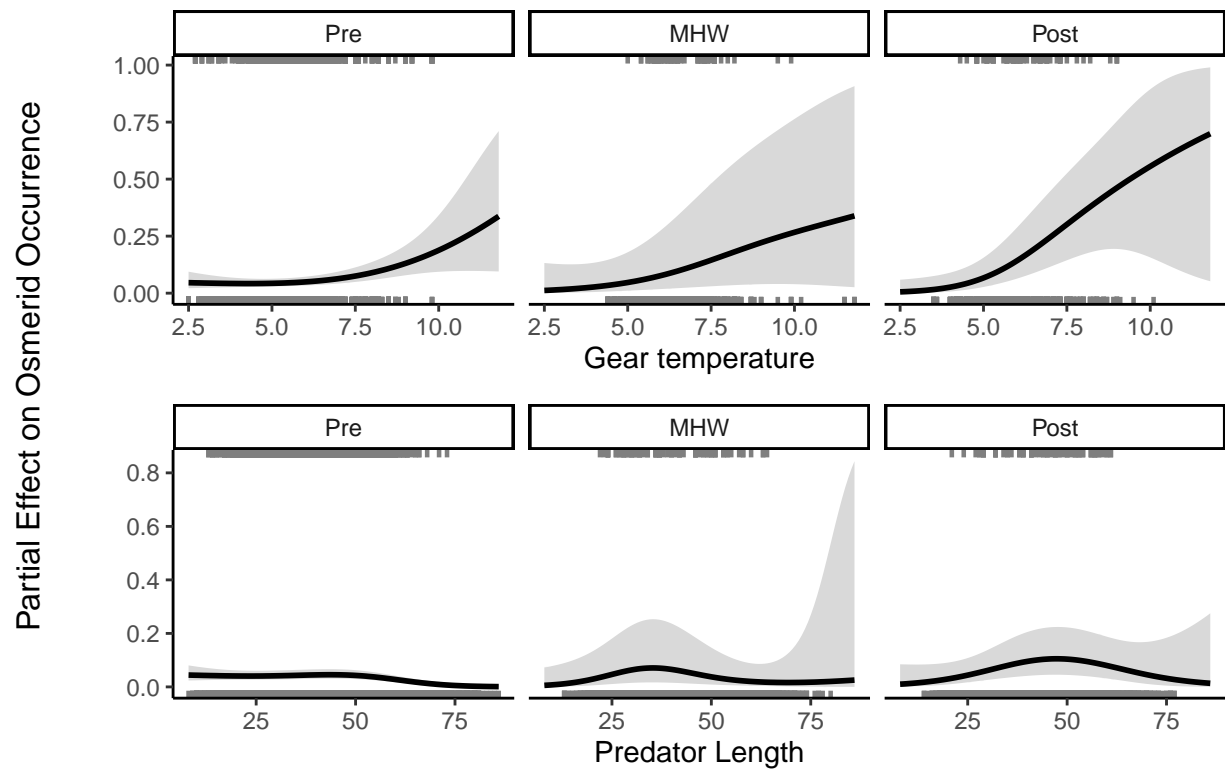


s(RLONG,RLAT,15.77):MHWPost

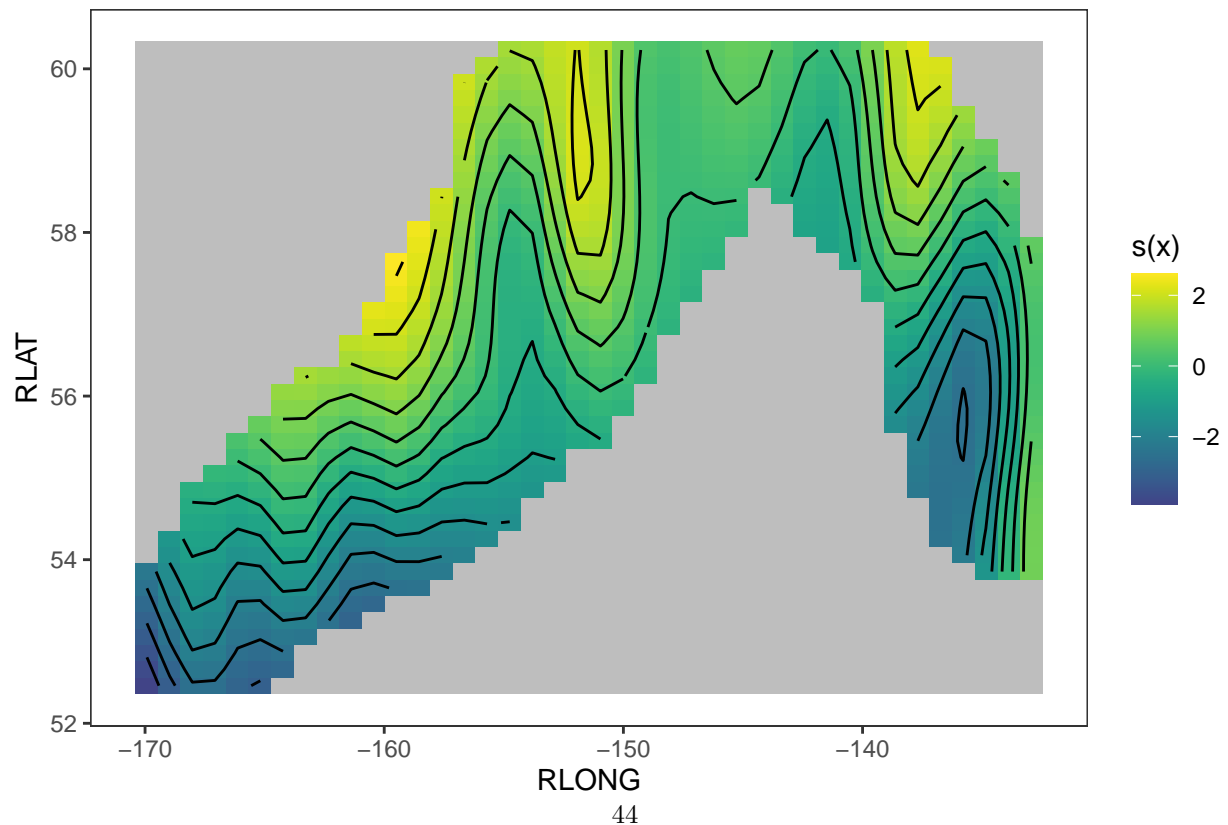


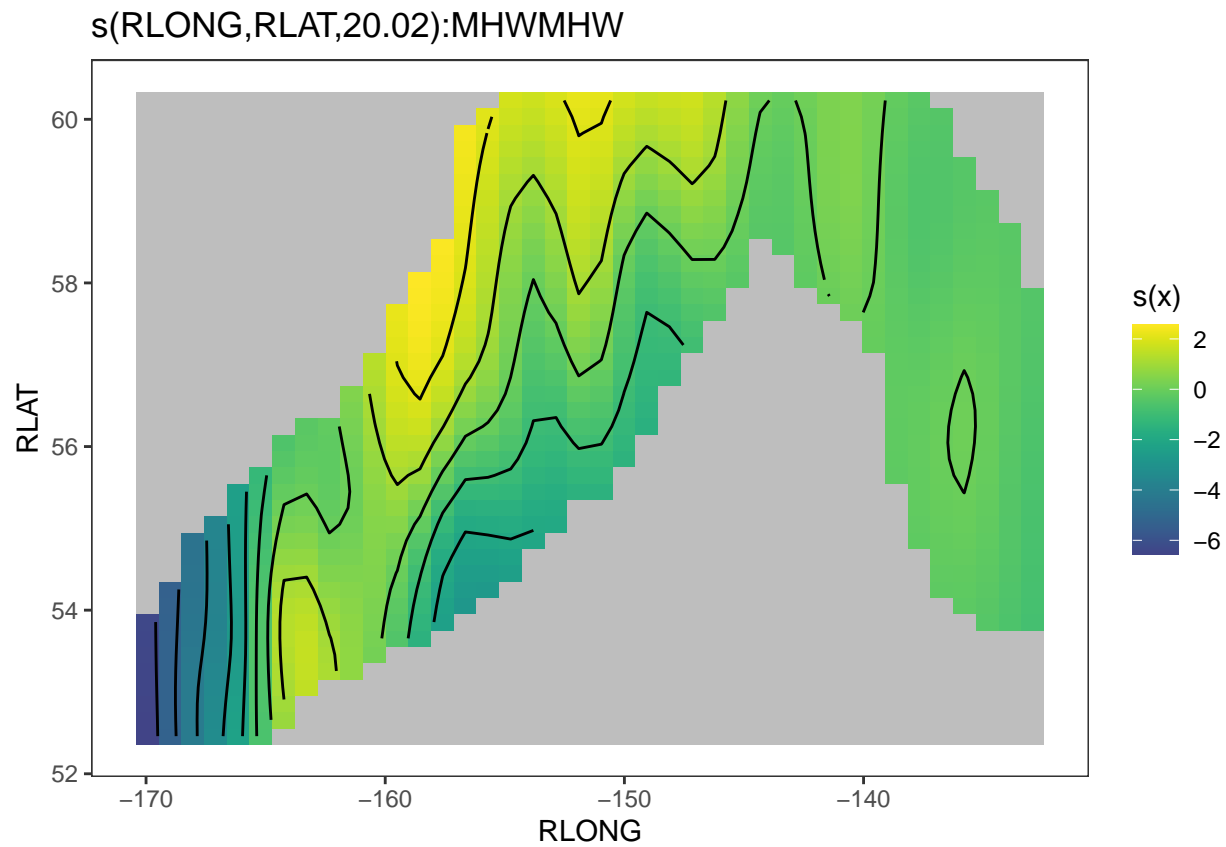
Model 5: Osmerid Prey

Predator: Arrowtooth Flounder

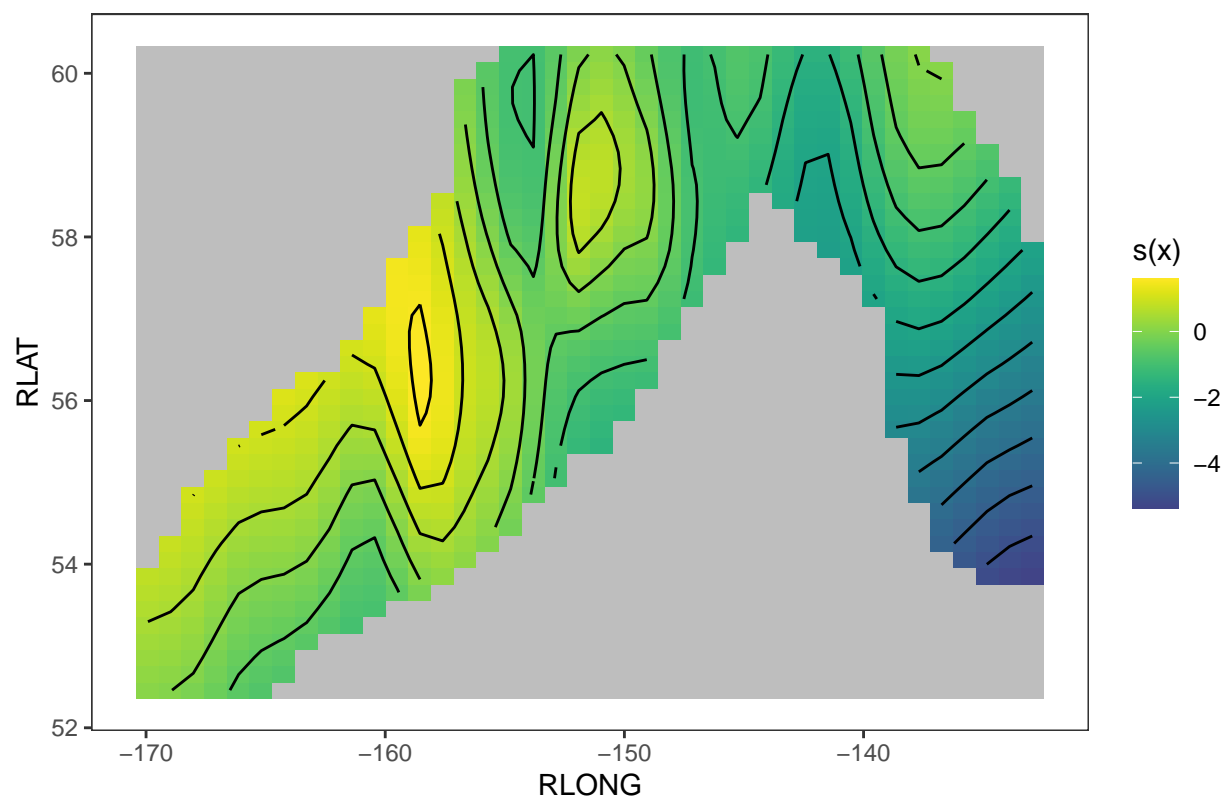


s(RLONG,RLAT,26.29):MHWPre



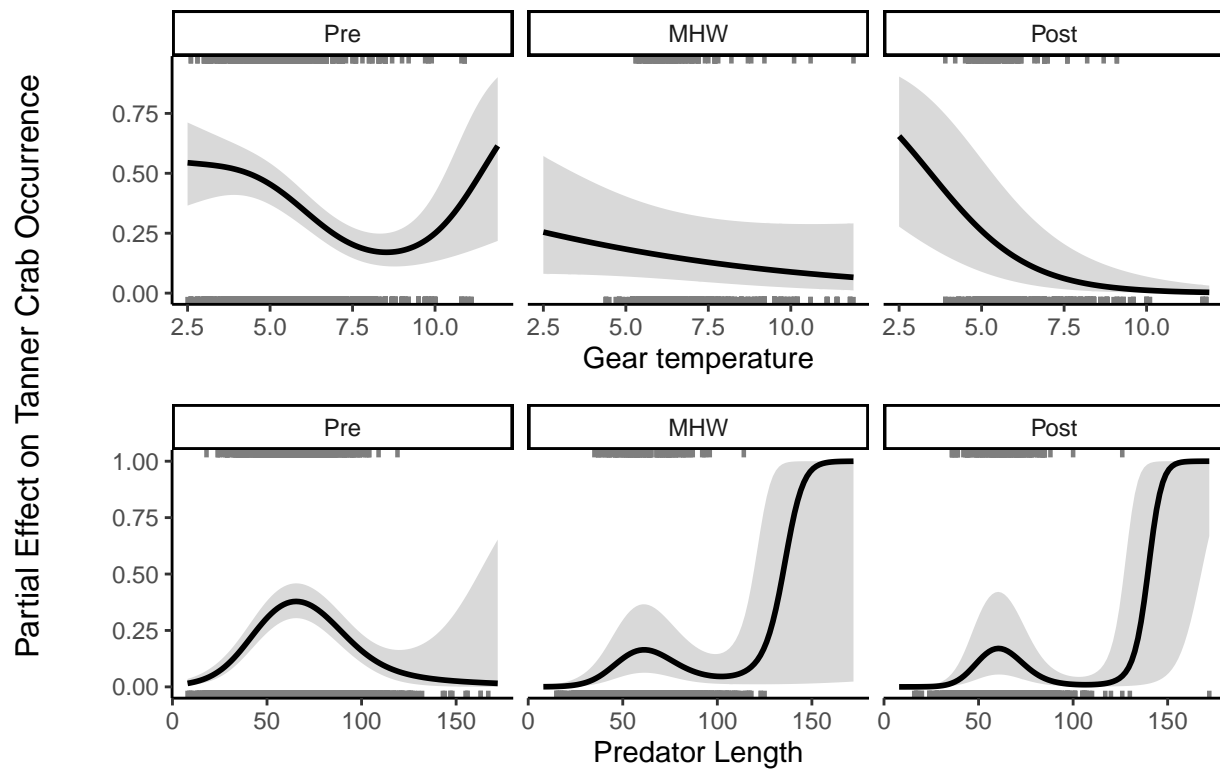


s(RLONG,RLAT,16.56):MHWPost

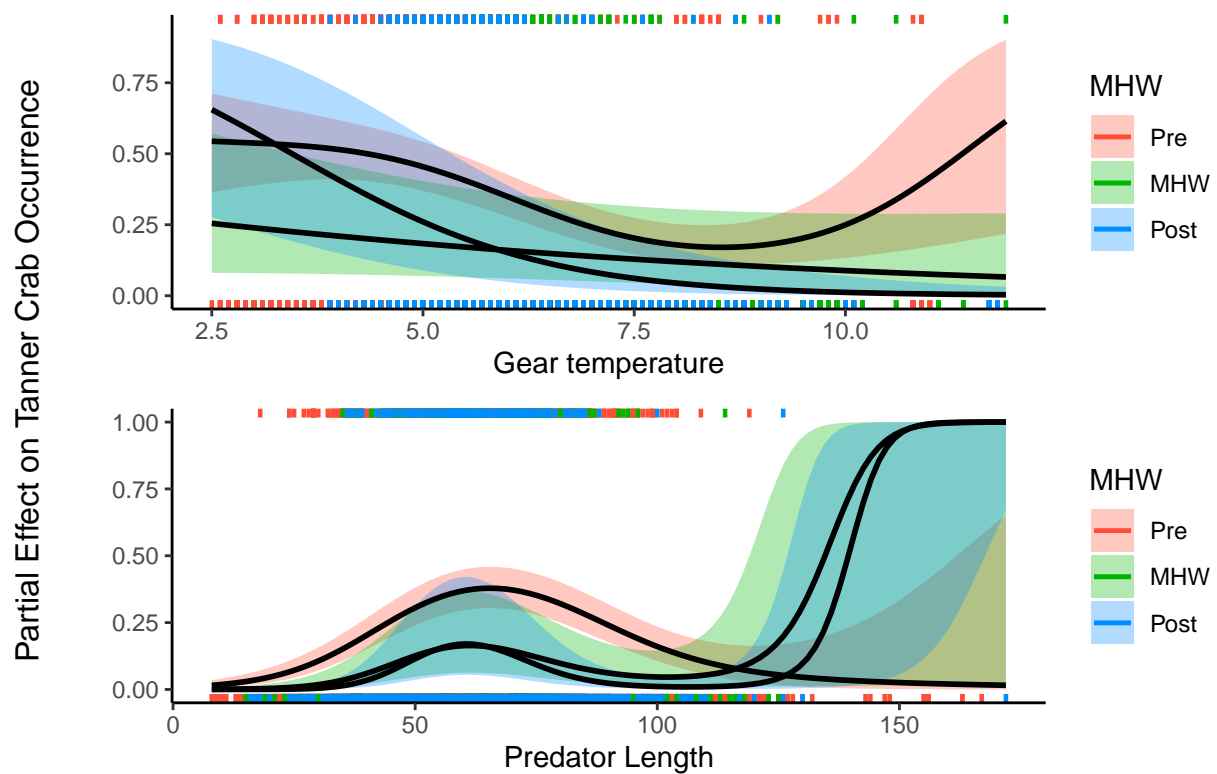


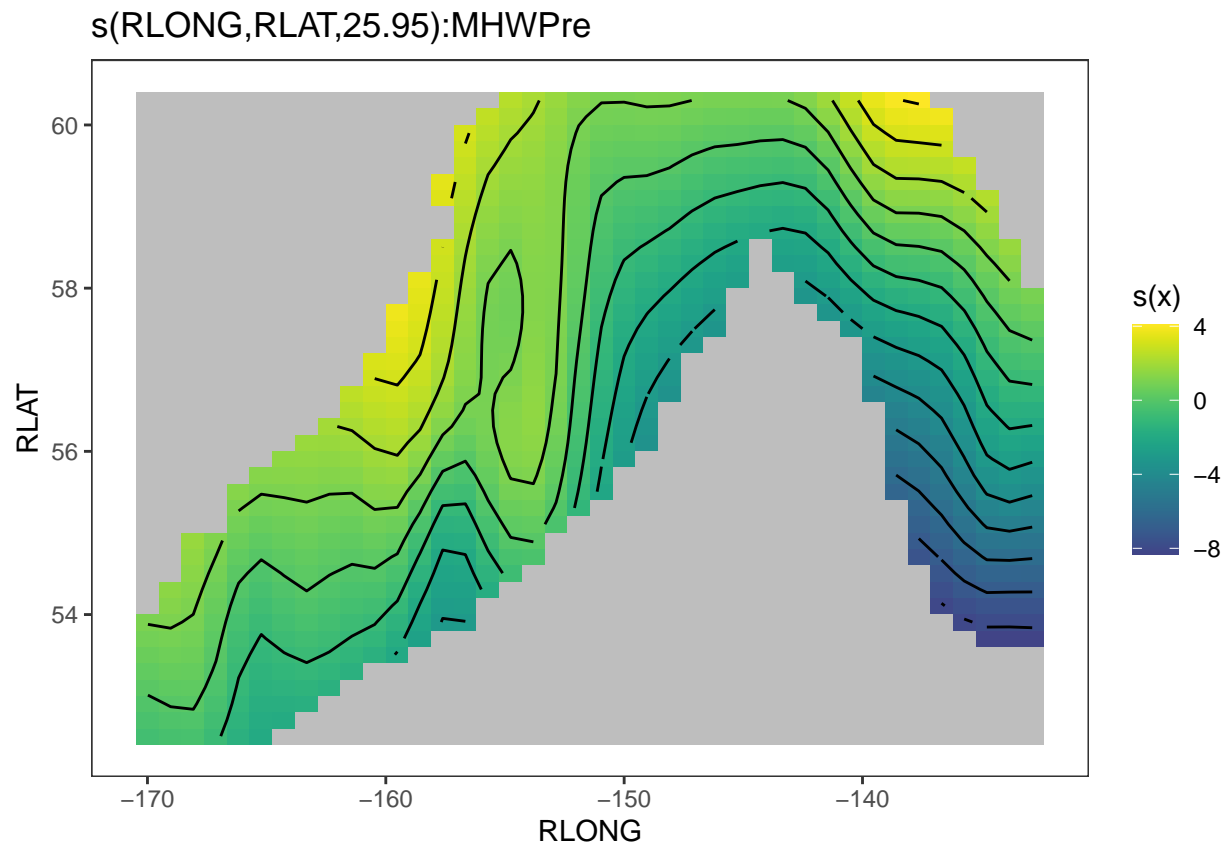
Model 6: Tanner Crab Prey Occurrence

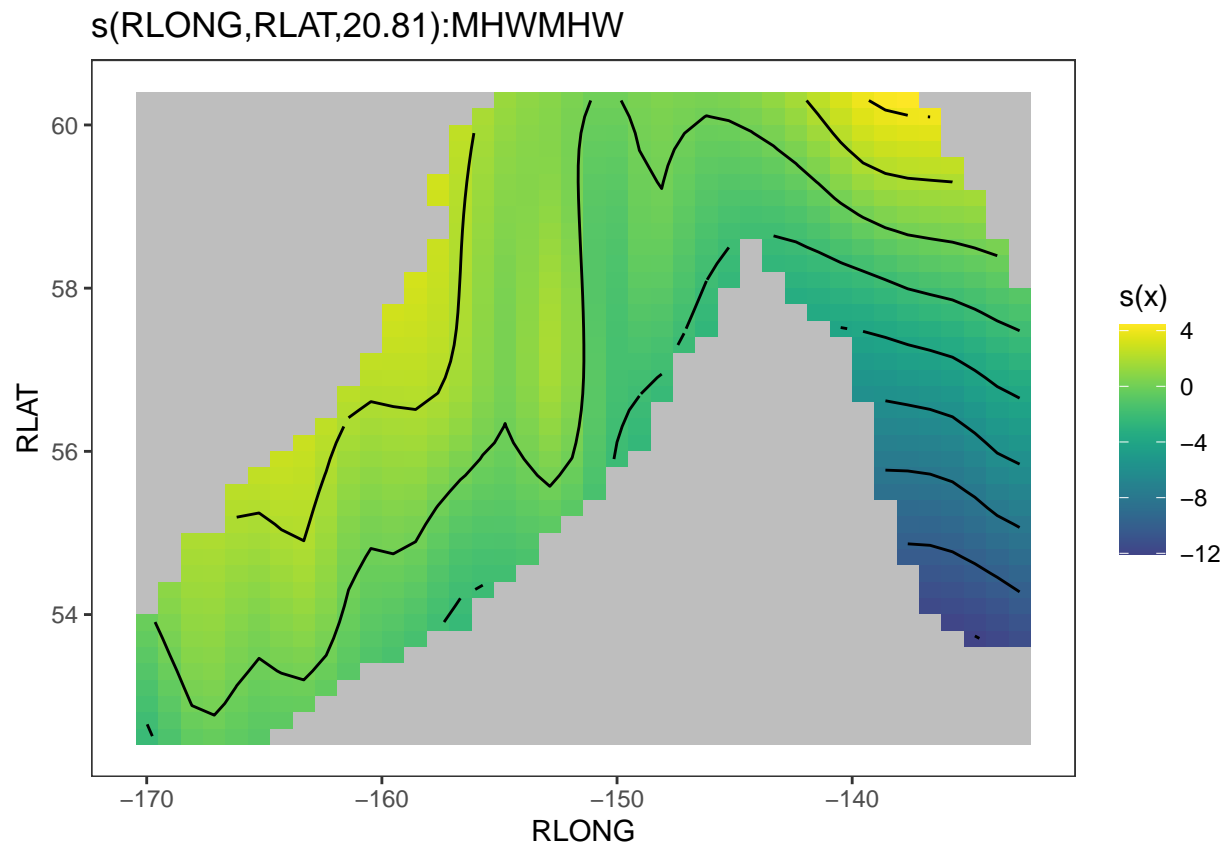
Predator: Pacific Halibut

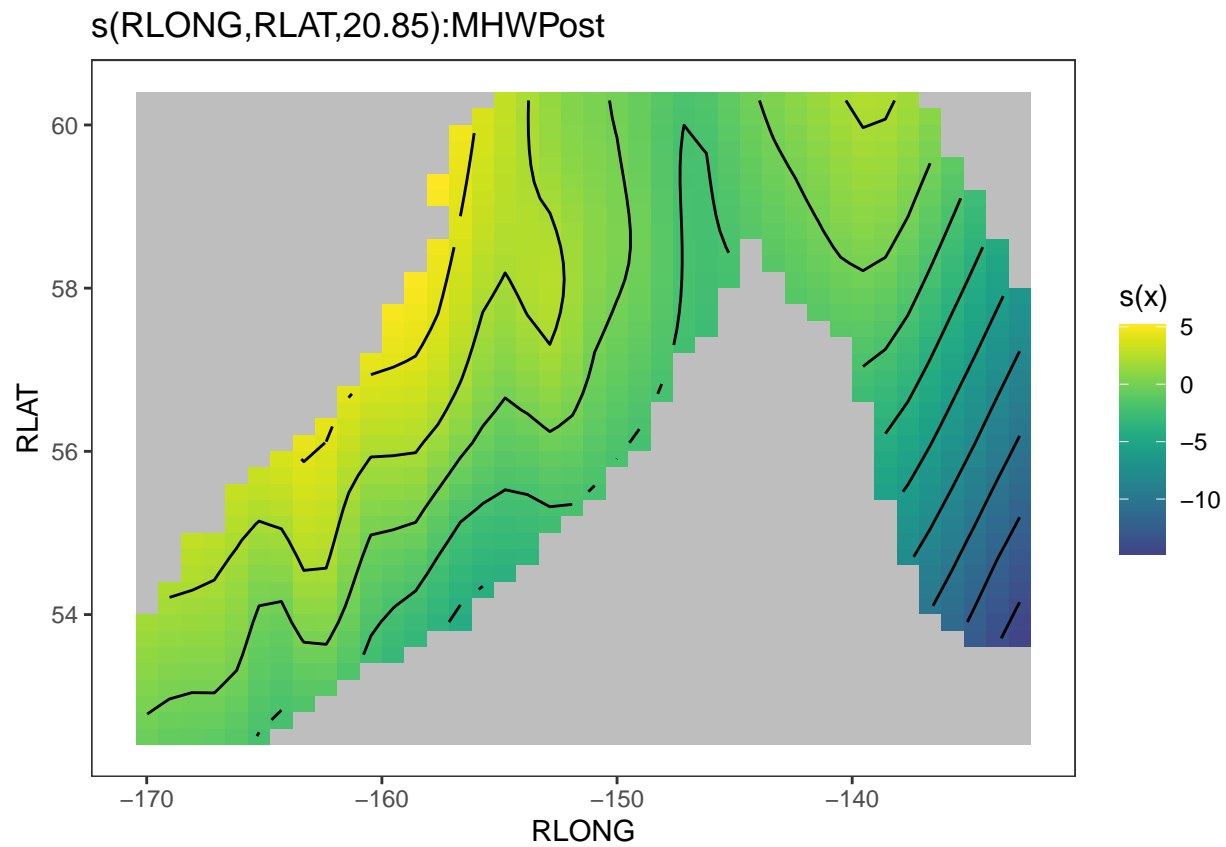


Predator: Pacific Halibut



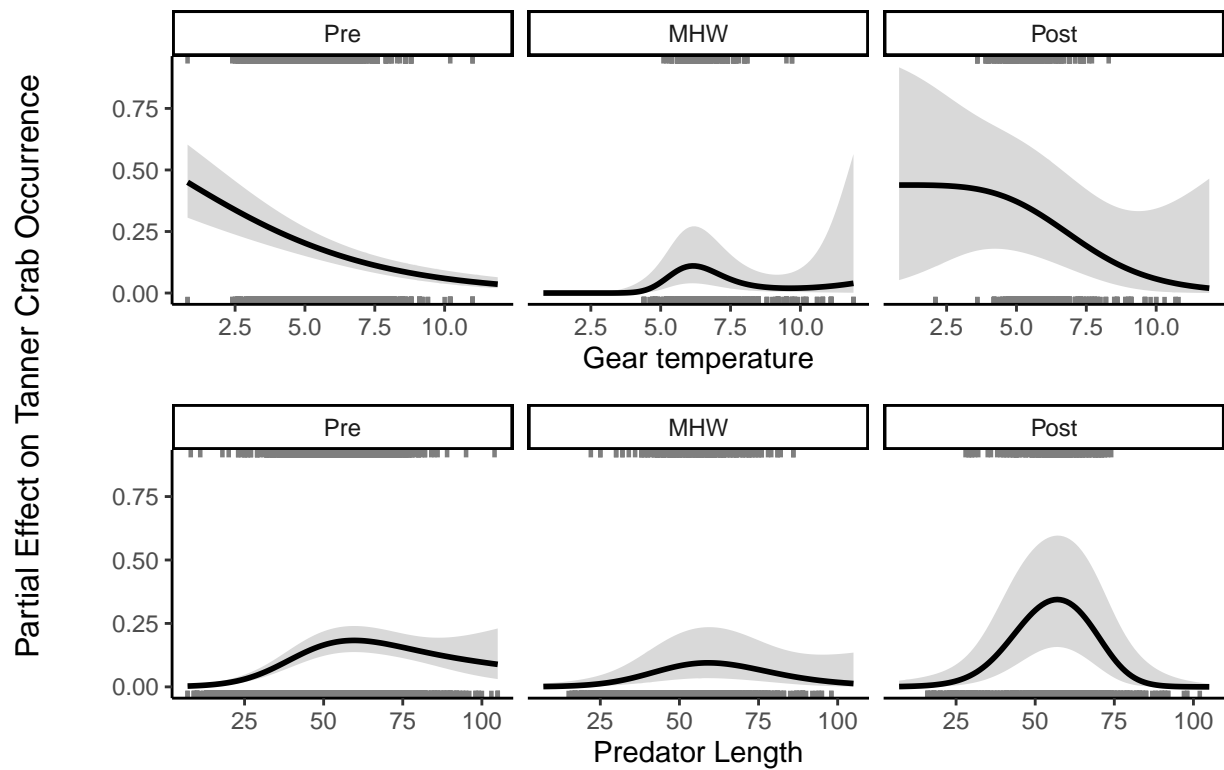




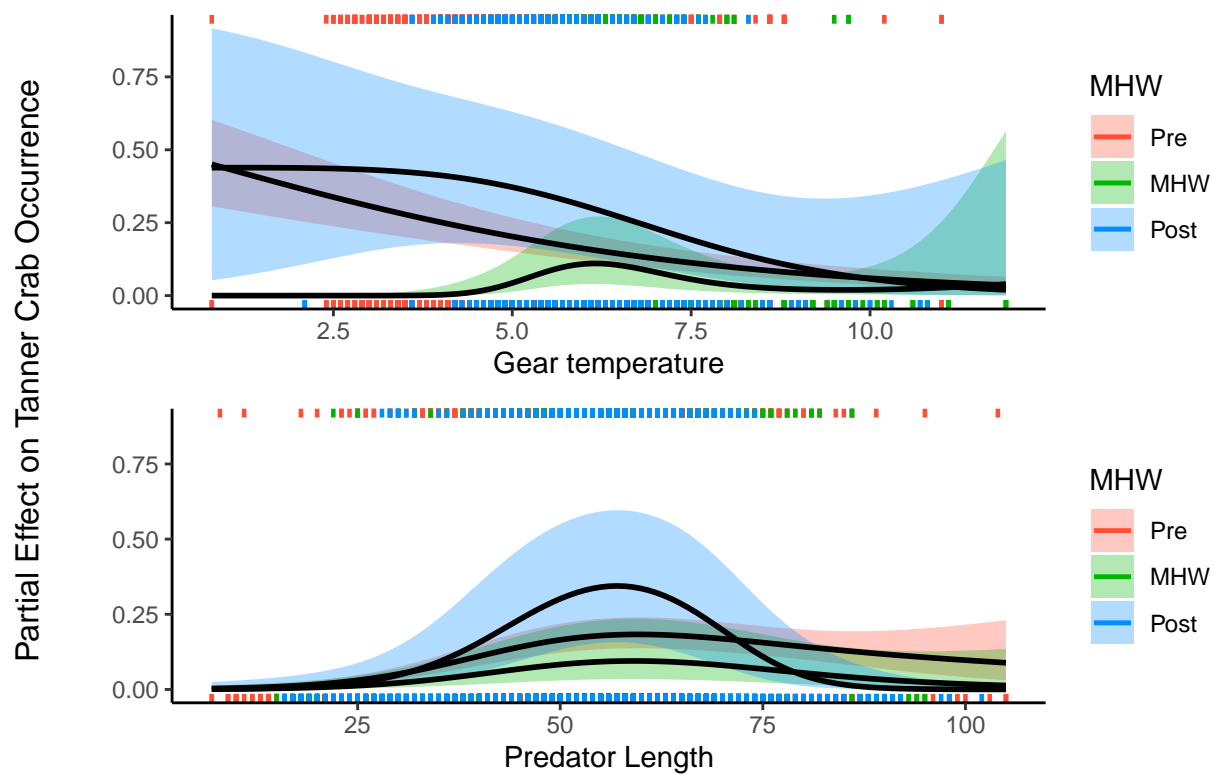


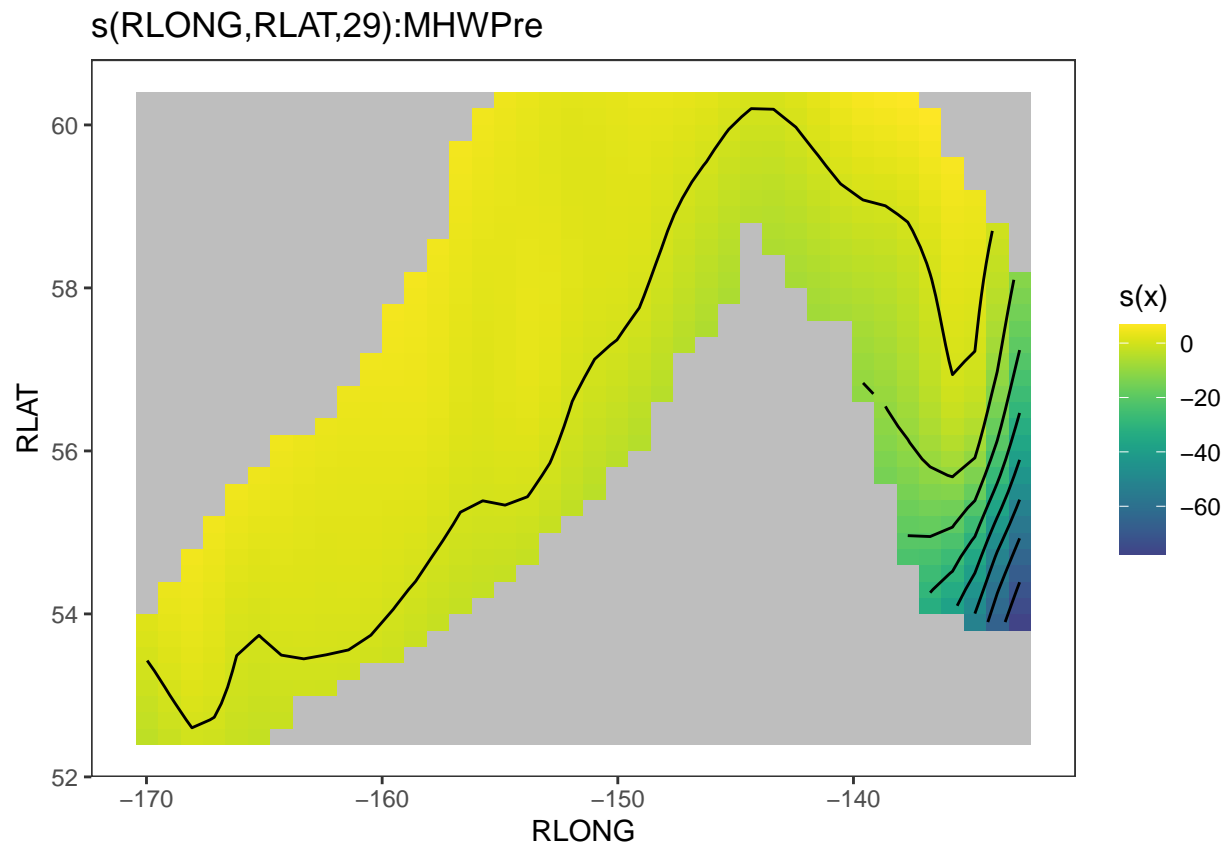
Model 6: Tanner Crab Prey Occurrence

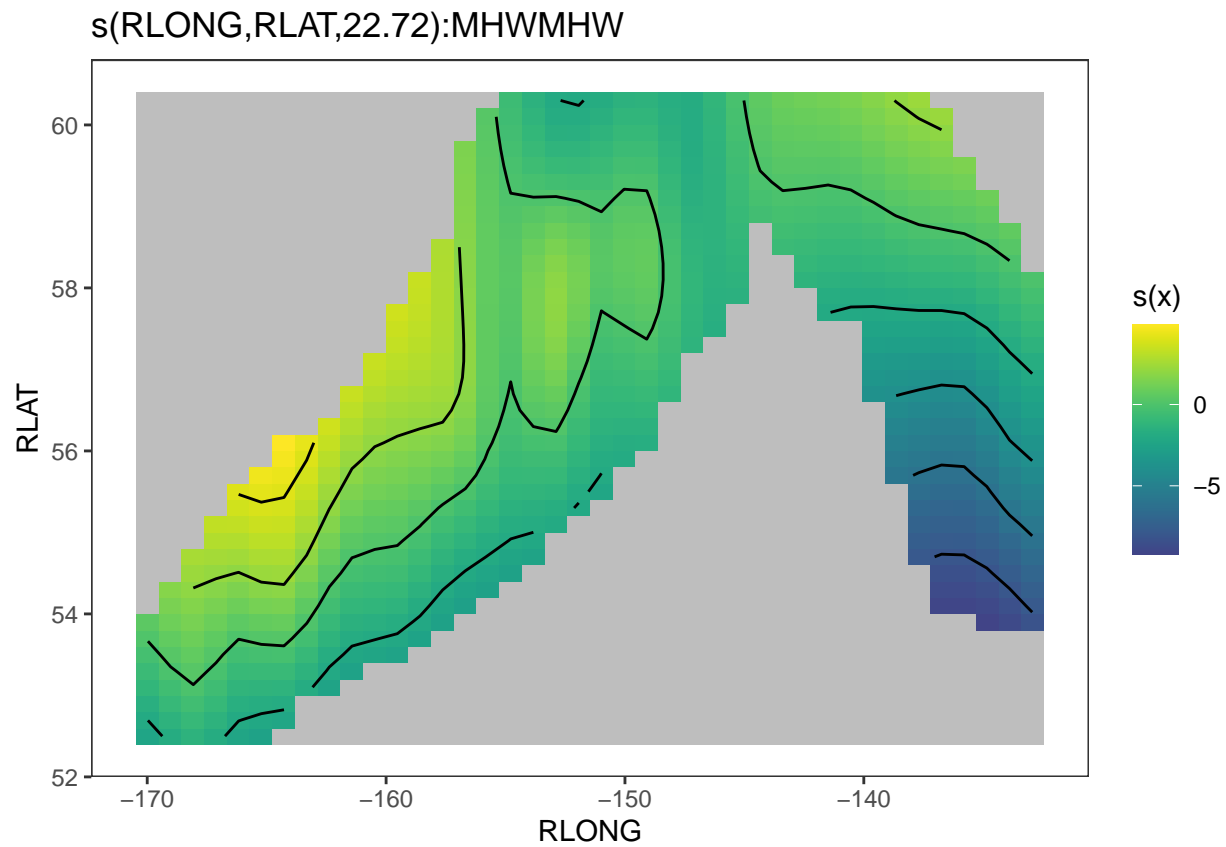
Predator: Pacific Halibut

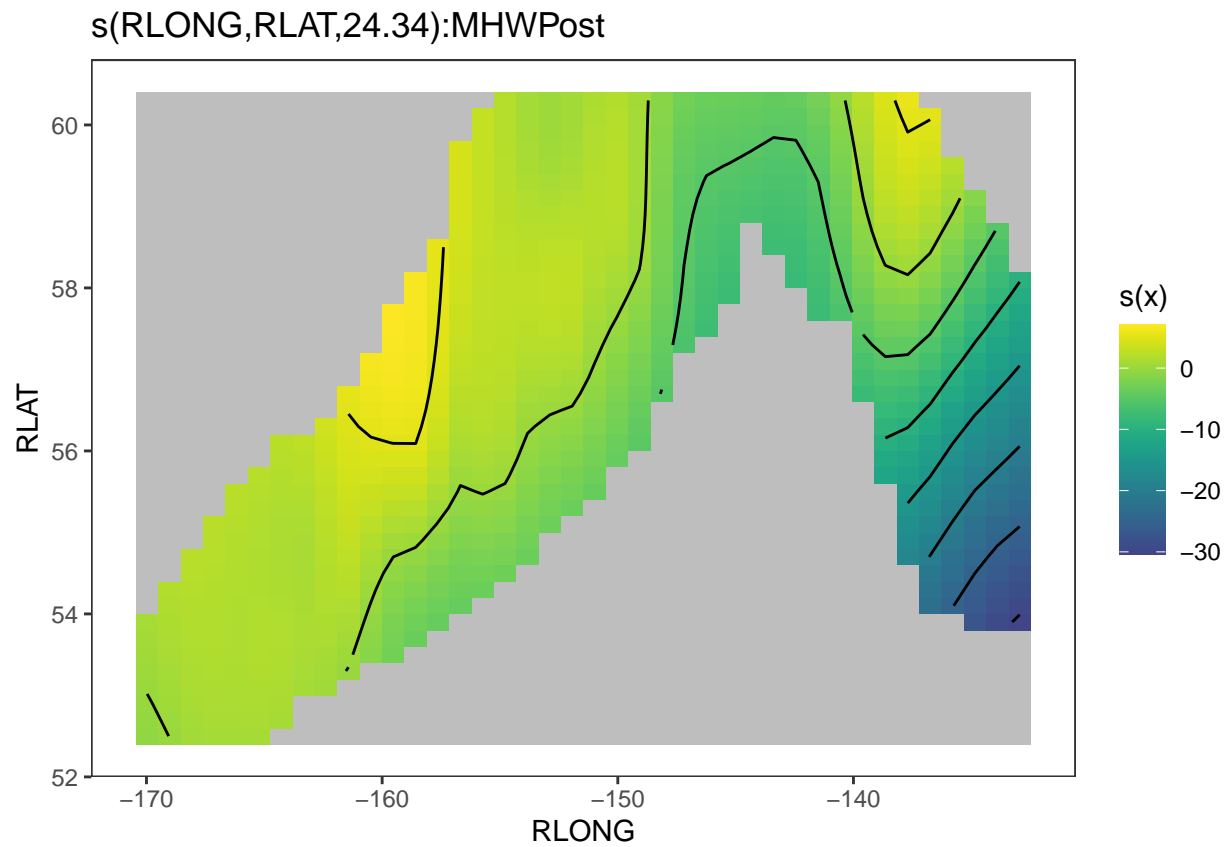


Predator: Pacific Halibut



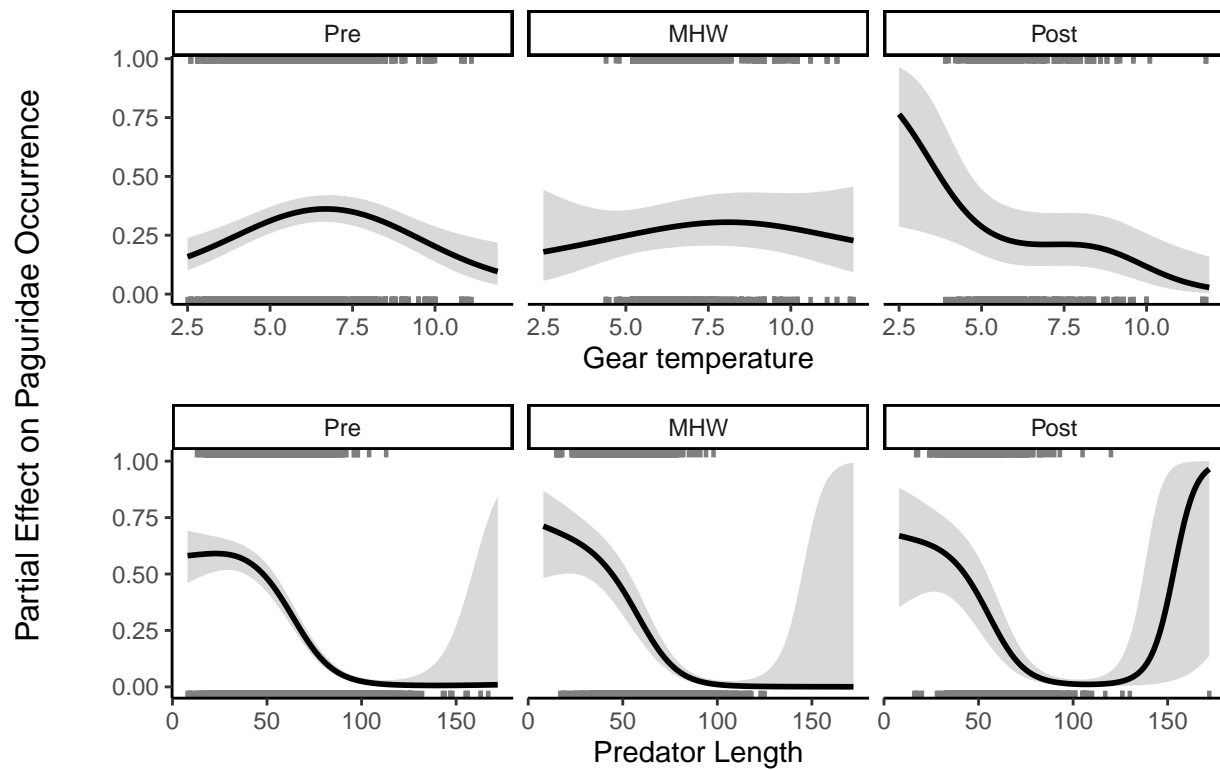




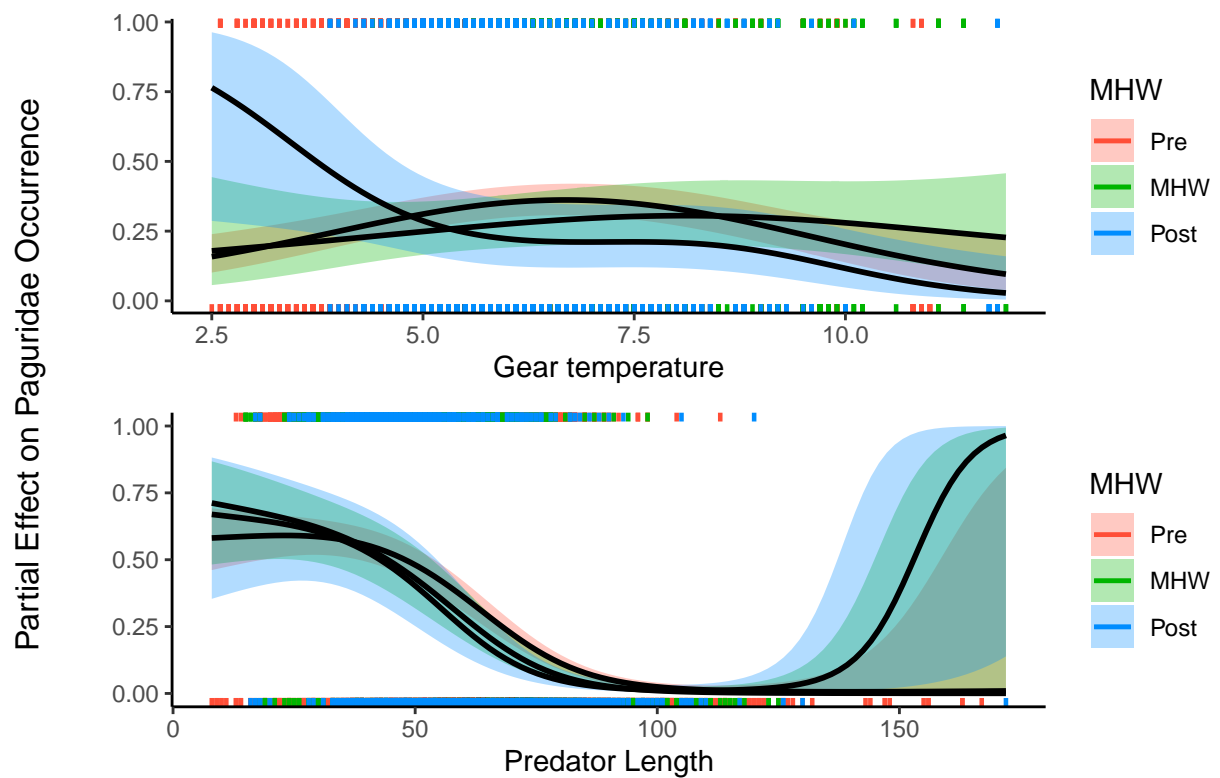


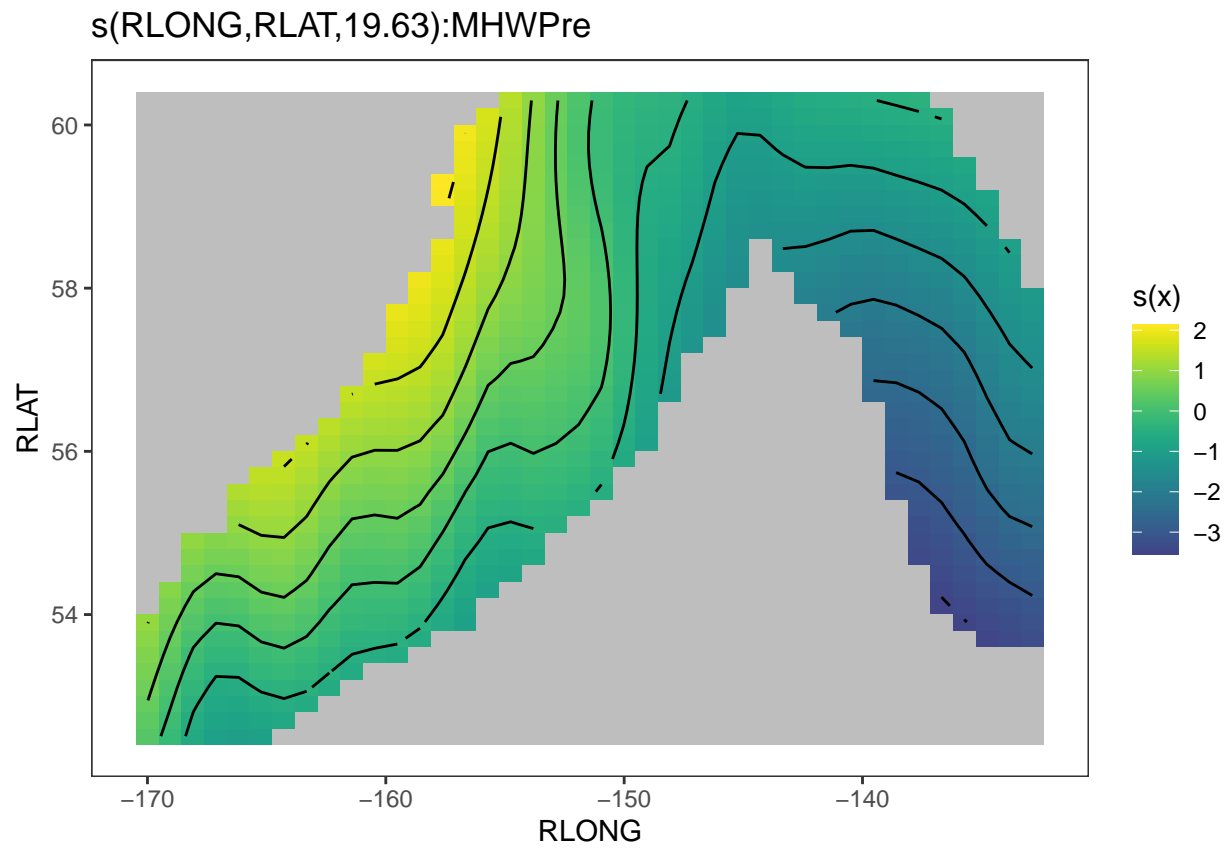
Model 7: Paguridae Prey Occurrence

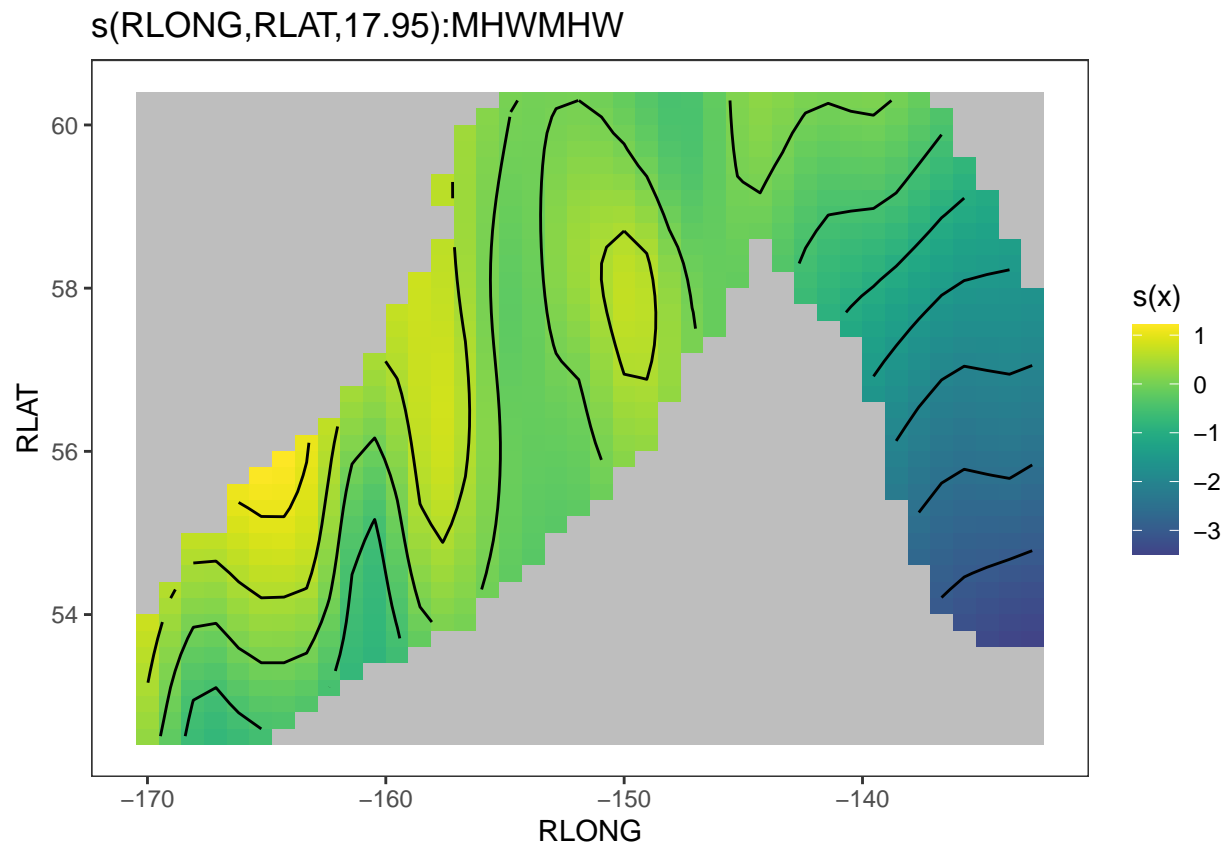
Predator: Pacific Halibut

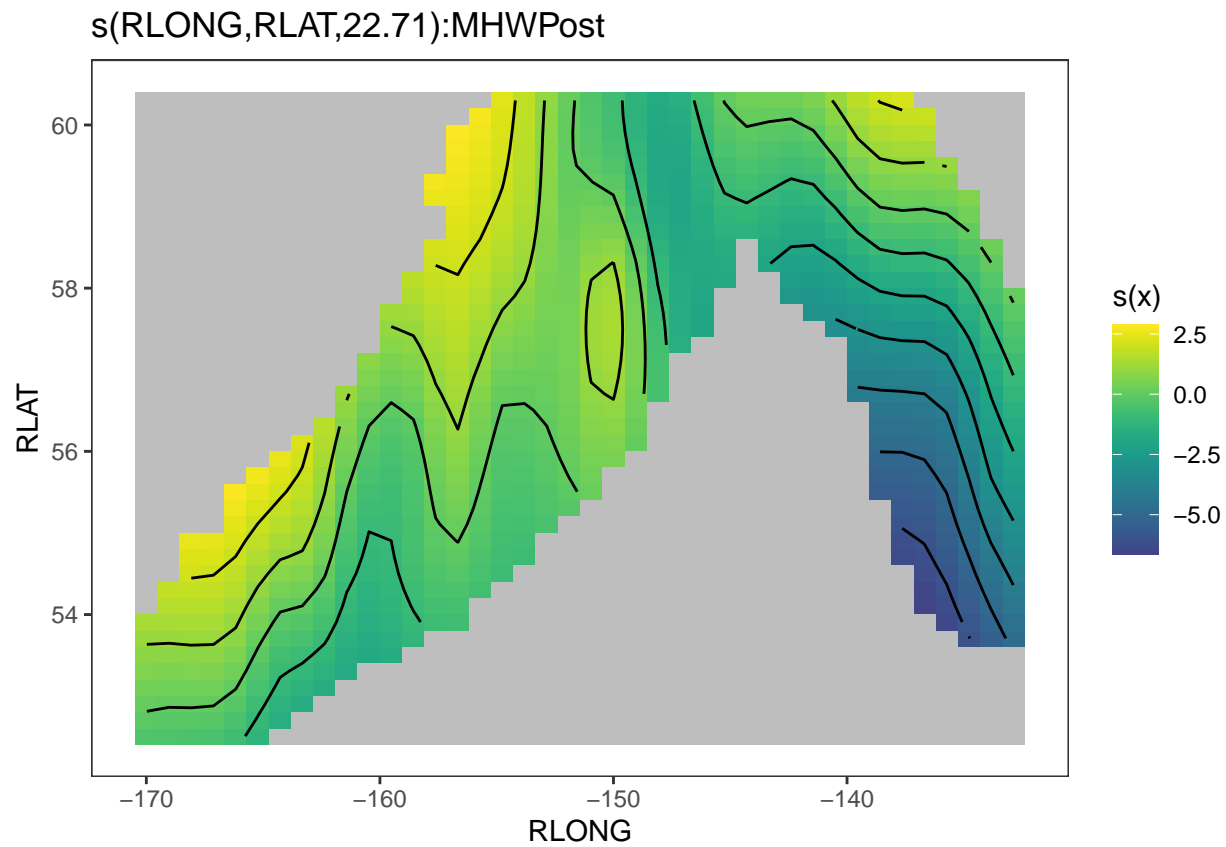


Predator: Pacific Halibut



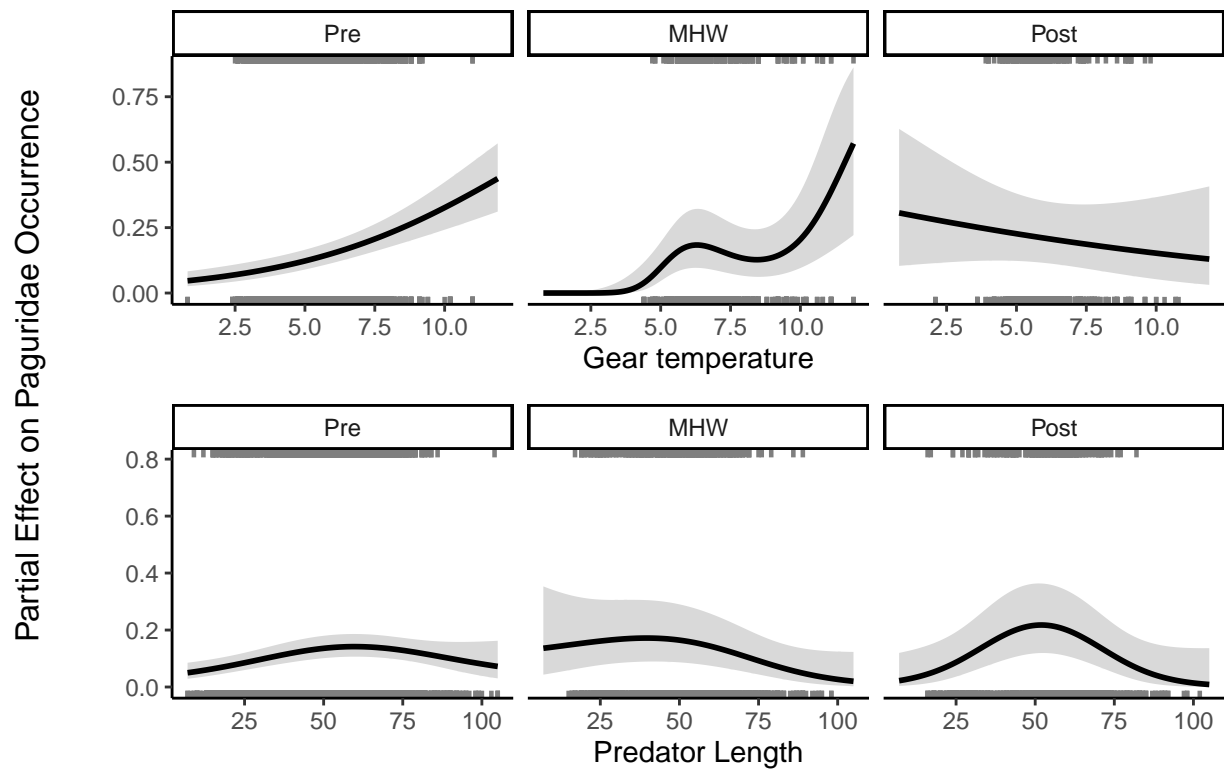






Model 7: Paguridae Prey Occurrence

Predator: Pacific Cod



Predator: Pacific Cod

