

# Preliminary analysis of the *Foyle Fisher* T90 trial data

For discussion

## 1 Data

```
library(gdata) ## convert to xlsx
## read in the Foyle Fisher data
ff.dat <- read.xls("../data/Foyle Fisher T90 Trial_edited.xlsx",
                  sheet = "Lengths",
                  stringsAsFactors = FALSE)

## Change some names that have spaces
names(ff.dat)[names(ff.dat) == "Port...Starboard"] <- "Port.Starboard"
names(ff.dat)[names(ff.dat) == "Control...Experimental"] <- "Control.Experimental"
names(ff.dat)[names(ff.dat) == "Length..cm."] <- "Length.cm"
names(ff.dat)[names(ff.dat) == "Haul.No."] <- "Haul.No"

## subset out valid hauls
ff.dat <- subset(ff.dat, Haul.No %in% c(2,3, 6:18))

## order the data by haul number, species and length class
ff.dat <- ff.dat[with(ff.dat, order(Haul.No, Species, Length.cm)),]

## get the subsratio
ff.dat$SUBSRATIO <- with(ff.dat, Weight.of.Fish.Measured / Total.Weight)
## not needed generally but it read in ultra small differences
ff.dat$SUBSRATIO <- round(ff.dat$SUBSRATIO, 10)

## Net position
ff.dat$Net.position <- NA
ff.dat$Net.position[ff.dat$Control.Experimental == "T90 80 mm" &
                    ff.dat$Haul.No %in% c(2,3,10:13)] <- "Port"
ff.dat$Net.position[ff.dat$Control.Experimental == "Diamond 80 mm" &
                    ff.dat$Haul.No %in% c(2,3,10:13)] <- "Starboard"
ff.dat$Net.position[ff.dat$Control.Experimental == "T90 80 mm" &
                    ff.dat$Haul.No %in% c(6:9, 15:18)] <- "Starboard"
ff.dat$Net.position[ff.dat$Control.Experimental == "Diamond 80 mm" &
                    ff.dat$Haul.No %in% c(6:9, 15:18)] <- "Port"

## subset by species
plaice.dat <- subset(ff.dat, Species == "Plaice")
whit.dat <- subset(ff.dat, Species == "Whiting")
```

```
had.dat <- subset(ff.dat, Species == "Haddock")
```

```
## get count per length bin per haul by experimental gear
```

```
library(reshape)
```

```
## variables to keep
```

```
vars2keep <- c("Control.Experimental", "Length.cm", "Haul.No", "Count")
```

```
## melt the data frame
```

```
plaice.dat.melt <- melt(plaice.dat[, vars2keep],  
  id = c("Control.Experimental", "Length.cm", "Haul.No"))
```

```
## re-form the dataframe in required format
```

```
plaice.dat.cast <- cast(plaice.dat.melt, Length.cm + Haul.No ~ Control.Experimental + var
```

```
plaice.dat.cast <- plaice.dat.cast[order(plaice.dat.cast$Haul.No, plaice.dat.cast$Length.cm
```

```
plaice.dat.cast[is.na(plaice.dat.cast)] <- 0
```

```
## show the first few rows
```

```
head(plaice.dat.cast, 2)
```

```
##      Length.cm Haul.No Diamond 80 mm_Count T90 80 mm_Count  
## 1          17         2              1              0  
## 2          18         2              1              2
```

```
## format the subsampling ratio similarly
```

```
vars2keep <- c("Control.Experimental", "Haul.No", "SUBSRATIO")
```

```
subs.melt <- melt(unique(plaice.dat[, vars2keep]), id = c("Control.Experimental", "Haul.No"
```

```
subs.cast <- cast(subs.melt, Haul.No ~ Control.Experimental + variable)
```

```
## get net position of each
```

```
vars2keep <- c("Control.Experimental", "Haul.No", "Net.position")
```

```
netpos.melt <- melt(unique(plaice.dat[, vars2keep]), id = c("Control.Experimental", "Haul.No"
```

```
netpos.cast <- cast(netpos.melt, Haul.No ~ Control.Experimental + variable)
```

```
## merge counts and subsampling ratio back together
```

```
plaice.dat.cast0 <- merge(plaice.dat.cast, subs.cast, by = "Haul.No", all.x = TRUE)
```

```
plaice.dat.cast <- merge(plaice.dat.cast0, netpos.cast, by = "Haul.No", all.x = TRUE)
```

```
## show first few lines
```

```
head(plaice.dat.cast, 2)
```

```
##      Haul.No Length.cm Diamond 80 mm_Count T90 80 mm_Count  
## 1          2          17              1              0  
## 2          2          18              1              2  
##      Diamond 80 mm_SUBSRATIO T90 80 mm_SUBSRATIO Diamond 80 mm_Net.position  
## 1              0.7515528              0.5742188              Starboard  
## 2              0.7515528              0.5742188              Starboard  
##      T90 80 mm_Net.position
```

```
## 1          Port
## 2          Port

## Extract the matrix of counts
count.vars <- c("T90 80 mm_Count", "Diamond 80 mm_Count")
plaice.count.mat <- as.matrix(plaice.dat.cast[, count.vars])

## Extract the matrix of subsampling ratios
subsratio.vars <- c("T90 80 mm_SUBSRATIO", "Diamond 80 mm_SUBSRATIO")
subsratio.mat <- as.matrix(plaice.dat.cast[, subsratio.vars])

## Create the offset
offset.mat <- log(apply(subsratio.mat, 2, FUN =
                        function(zz){zz/subsratio.mat[,1]}))
```

## 2 Plots

Plot the data

```
library(ggplot2)

## Get the proportions
raised.count.mesh <- as.matrix(plaice.dat.cast[, count.vars]) / subsratio.mat

prop.mesh <- prop.table(raised.count.mesh, margin = 1)
m <- dim(prop.mesh)[1]

prop.mesh.df <- data.frame(
  Length.cm = plaice.dat.cast$Length.cm,
  Haul.No = plaice.dat.cast$Haul.No,
  proportion = c(prop.mesh[,1]),
  total.count = rowSums(raised.count.mesh))

plaice.agg.count <- aggregate(plaice.dat.cast[, c("T90 80 mm_Count", "Diamond 80 mm_Count")],
  plaice.agg.count$proportion <- prop.table(as.matrix(plaice.agg.count[,2:3]), margin = 1)[,2])

plaice.plot <- ggplot(prop.mesh.df, aes(x = Length.cm, y = proportion)) +
  geom_point(colour = "#FF9900", alpha = 0.5, aes(size = log(total.count))) +
  ylab("Proportion of Plaice in T90") + theme(legend.position = "none") +
  geom_line(data = plaice.agg.count, colour = "grey")

plaice.plot
```

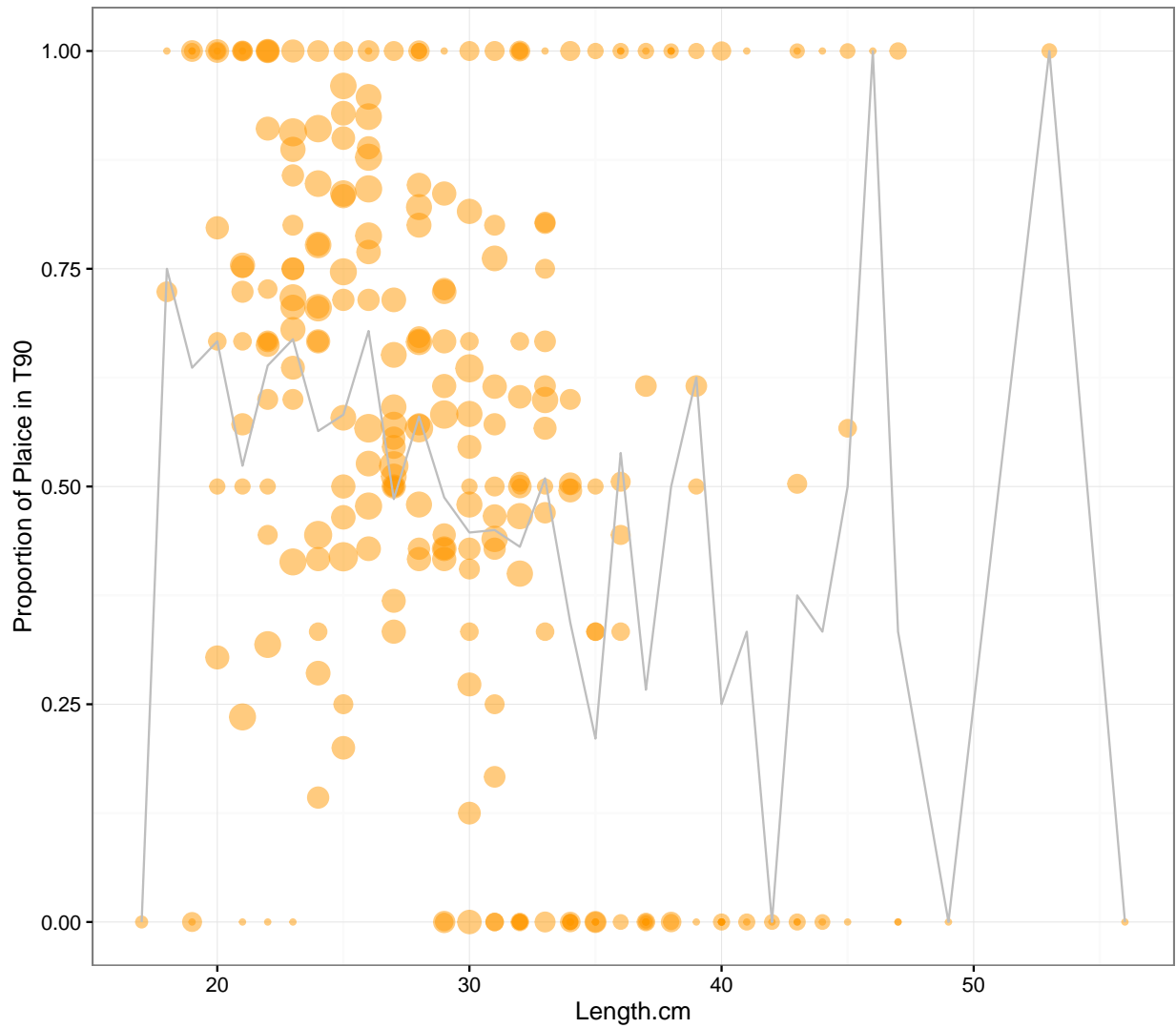


Figure 1: Proportion of plaice catch retained per haul. Each point represents the proportion of the plaice catch (in number) per haul and length class retained in the T90 experimental gear. The size of the point is proportional to the log of the count.