

## FigyTab\_ANEXO\_II\_Sensibilidad

```
library(knitr) # para generar reporte Rmarkdown
library(stringr)
library(reshape)
library(dplyr)
library(ggplot2)
library(ggthemes) # para ggplot
library(patchwork) # para unir gráficos de ggplot
library(strucchange) # libreria utilizada para análisis de quiebres

dir.Fig      <- "Figuras/" # carpeta de las figuras utilizadas y generadas en este estudio
fig          <- c("pdf") # formato de figuras generadas por este código
dir.0        <- getwd() # directorio de trabajo
dir.1        <- paste(dir.0, "/codigos_admb", sep="") # carpeta de códigos ADMB
dir.2        <- paste(dir.0, "/Retrospectivobase", sep="") # carpeta de códigos ADMB
dir.3        <- paste(dir.0, "/Retrospectivoalternativo", sep="") # carpeta de códigos ADMB
dir.4        <- paste(dir.0, "/Verosimilitudalternativo", sep="") # carpeta de códigos ADMB
dir.5        <- paste(dir.0, "/Verosimilitudbase", sep="") # carpeta de códigos ADMB

dir.fun      <- paste(dir.0, "/funciones/", sep="") # carpeta de funciones utilizadas en este informe
source(paste(dir.fun, "functions.R", sep="")) # funciones para leer .dat y .rep
source(paste(dir.fun, "Fn_PBRs.R", sep="")) # funciones para leer .dat y .rep

setwd(dir.1)
#Asesoría septiembre 2020 MODELO BASE
data.0      <- lisread(paste(dir.1, "MTT0920.dat", sep="/"));
names(data.0) <- str_trim(names(data.0), side="right")
rep0        <- reptoRlist("MTT0920.rep")
std0        <- read.table("MTT0920.std", header=T, sep=" ", na="NA", fill=T)

#Asesoría junio 2021 MODELO BASE
data.1      <- lisread(paste(dir.1, "MTT0621.dat", sep="/"));
names(data.1) <- str_trim(names(data.1), side="right")
rep1        <- reptoRlist("MTT0621.rep")
std1        <- read.table("MTT0621.std", header=T, sep=" ", na="NA", fill=T)

#####
# AREGLOS DE DATOS
#####

library(patchwork)

yrs      <- rep1$Years
nyrs     <- length(yrs)
lasty    <- yrs[nyrs]
cvCB     <- data.1$Ind[,7]
cvcpue   <- data.1$Ind[,5]
cvdes    <- data.1$Ind[,3]
```

```

Bcru_obs_jun<-rep1$Bcru_obs      ;Bcru_obs_jun[Bcru_obs_jun==0] <- NA
CPUE_obs_jun<-rep1$CPUE_obs      ;CPUE_obs_jun[CPUE_obs_jun==0] <- NA
Desemb_obs_jun<-rep1$Desemb_obs ;Desemb_obs_jun[Desemb_obs_jun==0] <- NA

Bcru_obs_sept<-rep0$Bcru_obs      ;Bcru_obs_sept[Bcru_obs_sept==0] <- NA
CPUE_obs_sept<-rep0$CPUE_obs      ;CPUE_obs_sept[CPUE_obs_sept==0] <- NA
Desemb_obs_sept<-rep0$Desemb_obs ;Desemb_obs_sept[Desemb_obs_sept==0] <- NA

ind_jun  <- cbind(c(Bcru_obs_jun), c(CPUE_obs_jun), c(Desemb_obs_jun))
colnames(ind_jun) <- c('Biomasa_Crucero', 'CPUE', 'Desembarques')

ind_sept <- cbind(c(Bcru_obs_sept,NA), c(CPUE_obs_sept,NA), c(Desemb_obs_sept,NA))
colnames(ind_sept) <- c('Biomasa_Crucero', 'CPUE', 'Desembarques')

junio  <- data.frame(ind_jun) %>% mutate (Asesoría='junio_2021') %>%
  mutate (yrs= yrs) %>% melt(id.var=c('yrs', 'Asesoría'))
sept   <- data.frame(ind_sept) %>% mutate (Asesoría='septiembre_2020') %>%
  mutate (yrs= yrs) %>% melt(id.var=c('yrs', 'Asesoría'))

base1 <- data.frame(rbind(junio, sept))

#####
# GRAFICAS
#####

f1 <- ggplot(base1 %>% filter(Asesoría!='observado', variable=='Biomasa_Crucero'),
  aes(yrs,value/1000000)) +
  geom_line(aes(colour=Asesoría,linetype = Asesoría), size=1) +
  scale_colour_manual(values=c('red','black')) +
  geom_point(data = base1 %>% filter(Asesoría=='observado',
    variable=='Biomasa_Crucero'),
    aes(yrs,value/1000000), shape = 19, colour = 'gray30') +
  scale_x_continuous(breaks = seq(from = 1985, to = 2020, by = 2)) +
  labs(title='Biomasa de Crucero', x = 'Año', y = 'Toneladas (millones)') +
  theme_bw(base_size=9)

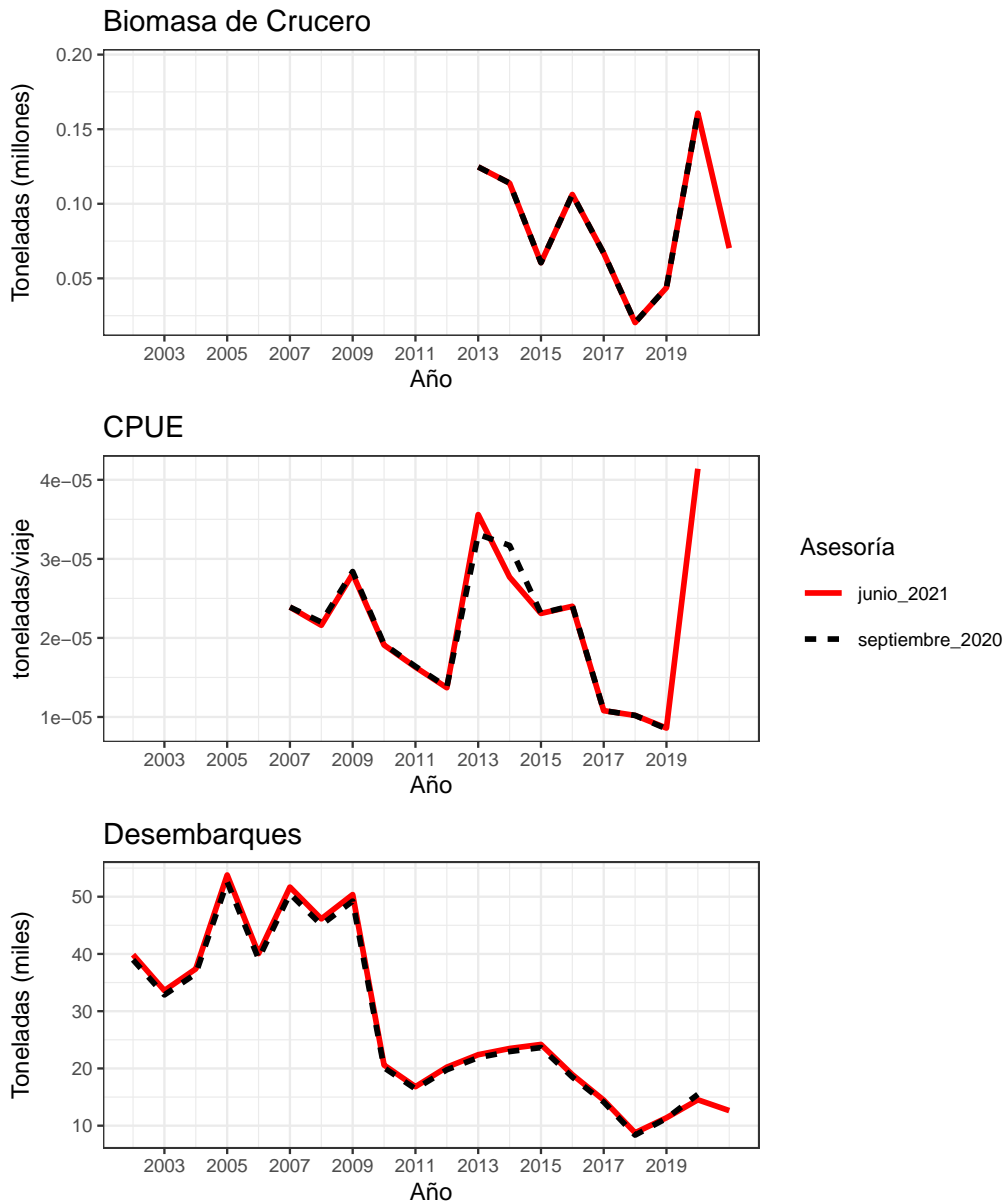
f2 <- ggplot(base1 %>% filter(Asesoría!='observado', variable=='CPUE'),
  aes(yrs,value/1000000)) +
  geom_line(aes(colour=Asesoría,linetype = Asesoría), size=1) +
  scale_colour_manual(values=c('red','black')) +
  geom_point(data = base1 %>% filter(Asesoría=='observado',
    variable=='CPUE'),
    aes(yrs,value/1000000), shape = 19, colour = 'gray30') +
  scale_x_continuous(breaks = seq(from = 1985, to = 2020, by = 2)) +
  labs(title='CPUE', x = 'Año', y = 'toneladas/viaje') +
  theme_bw(base_size=9)

f3 <- ggplot(base1 %>% filter(Asesoría!='observado', variable=='Desembarques'),
  aes(yrs,value/1000)) +

```

```
geom_line(aes(colour=Asesoría, linetype = Asesoría), size=1) +
scale_colour_manual(values=c('red','black')) +
geom_point(data = base1 %>% filter(Asesoría=='observado',
                                variable=='Desembarques'),
aes(yrs,value/1000), shape = 19, colour = 'gray30') +
scale_x_continuous(breaks = seq(from = 1985, to = 2020, by = 2)) +
labs(title='Desembarques', x = 'Año', y = 'Toneladas (miles)') +
theme_bw(base_size=9)
```

```
f1/f2/f3 + plot_layout(guides="collect")
```



```
Tallas<-rep1$Tallas
Tallasflota_jun<-rep1$Propfl_obs[nyrs-1,]
Tallasflota_sept<-rep0$Propfl_obs[nyrs-1,]
```

```

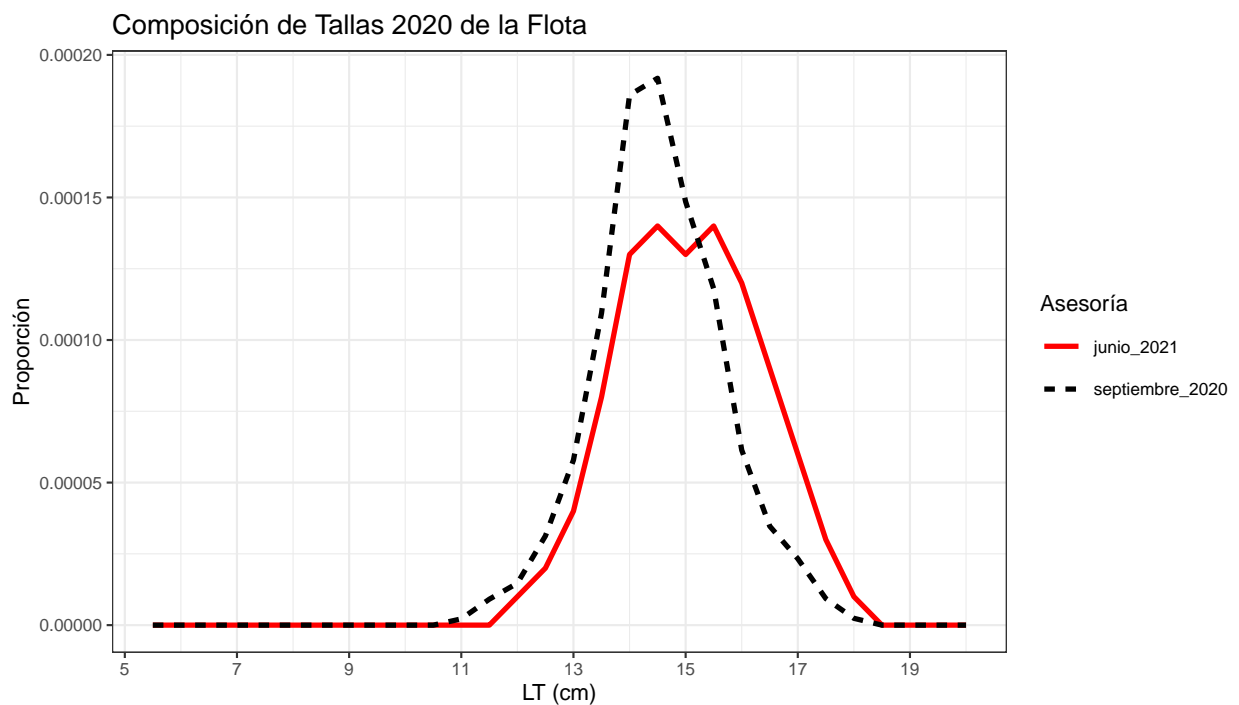
Tjunio  <- data.frame(Tallasflota_jun) %>% mutate (Asesoría='junio_2021') %>%
  mutate (Tallas= Tallas) %>% melt(id.var=c('Tallas', 'Asesoría'))
Tsept   <- data.frame(Tallasflota_sept) %>% mutate (Asesoría='septiembre_2020') %>%
  mutate (Tallas= Tallas) %>% melt(id.var=c('Tallas', 'Asesoría'))

Tbase1 <- data.frame(rbind(Tjunio, Tsept))

f1<-ggplot(Tbase1 %>% filter(Asesoría!='observado'),
  aes(Tallas,value/1000)) +
  geom_line(aes(colour=Asesoría,linetype = Asesoría), size=1) +
  scale_colour_manual(values=c('red','black')) +
  scale_x_continuous(breaks = seq(from = 5, to = 20, by = 2)) +
  labs(title='Composición de Tallas 2020 de la Flota', x = 'LT (cm)', y = 'Proporción') +
  theme_bw(base_size=9)

```

f1



```

Tallas<-rep1$Tallas
Tallascru_jun<-rep1$Propcru_obs[nyrs,]
Tallascru_sept<-rep(NA,length(Tallas))

Tjunio  <- data.frame(Tallascru_jun) %>% mutate (Asesoría='junio_2021') %>%
  mutate (Tallas= Tallas) %>% melt(id.var=c('Tallas', 'Asesoría'))
Tsept   <- data.frame(Tallascru_sept) %>% mutate (Asesoría='septiembre_2020') %>%
  mutate (Tallas= Tallas) %>% melt(id.var=c('Tallas', 'Asesoría'))

Tbase1 <- data.frame(rbind(Tjunio, Tsept))

f1<-ggplot(Tbase1 %>% filter(Asesoría!='observado'),

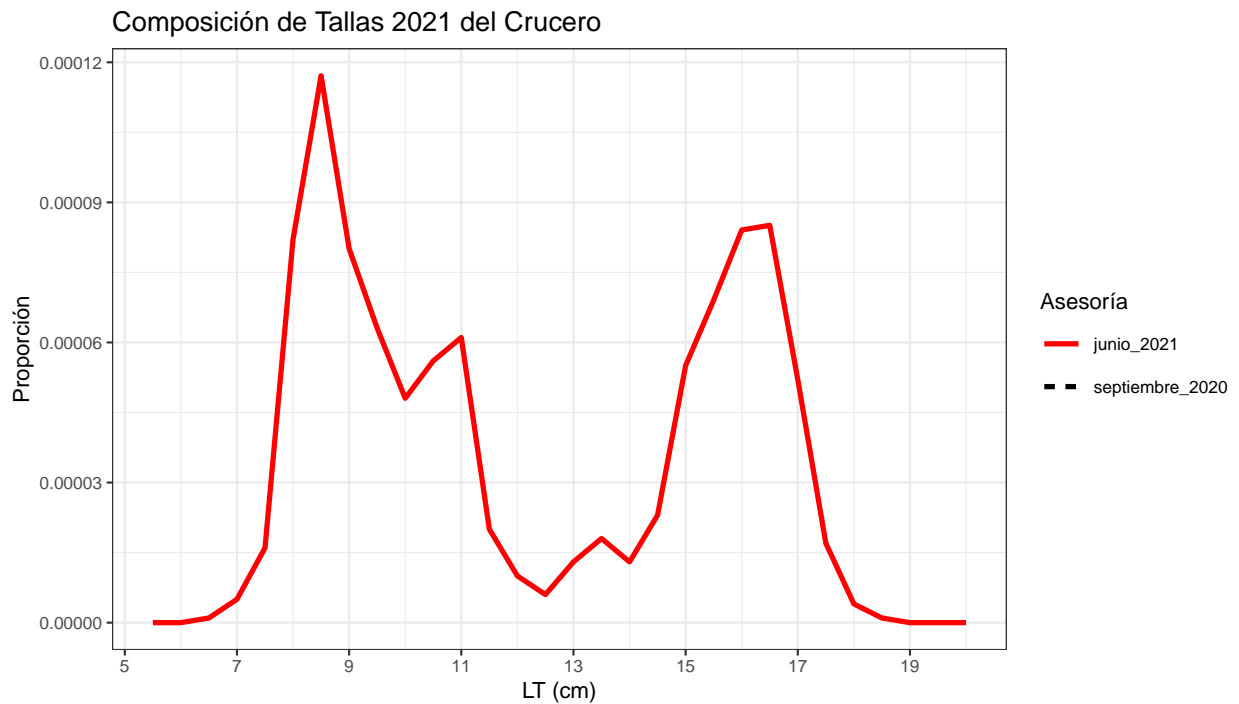
```

```

aes(Tallas,value/1000)) +
geom_line(aes(colour=Asesoría,linetype = Asesoría), size=1) +
scale_colour_manual(values=c('red','black')) +
scale_x_continuous(breaks = seq(from = 5, to = 20, by = 2)) +
labs(title='Composición de Tallas 2021 del Crucero', x = 'LT (cm)', y = 'Proporción') +
theme_bw(base_size=9)

```

f1



```

Carpeta<-"./Sensibilidad_al_update_junio21"
dir<-paste(dir.0,Carpeta,sep="")

setwd(dir)
admb<-"MTT0920"
#####

years      <- rep1$Years
nyears     <- length(years)
retros     <- seq(1,7)
nretros    <- length(retros)

retroR     <- matrix(0,nrow=nyears,ncol=nretros)
retroBD    <- matrix(0,nrow=nyears,ncol=nretros)
retroBT    <- matrix(0,nrow=nyears,ncol=nretros)
retroF     <- matrix(0,nrow=nyears,ncol=nretros)
retroBD_BDrms <- matrix(0,nrow=nyears,ncol=nretros)

for(i in 1:(nretros-2)){
  rep <- reptoRlist(paste(admb,"s",i,".rep",sep=""))

```

```

std <- read.table(paste(admb,"s",i,".std",sep=""),header=T,sep=" ",na="NA",fill=T)
retroR[,i] <- c(rep$Reclutamiento,NA)
retroBD[,i] <- c(rep$Biomasa_desovante,NA)
retroBT[,i] <- c(rep$Biomasa_total,NA)
retroF[,i] <- c(rep$F,NA)
retroBD_BDrms[,i] <-c(subset(std,name=="RPR")$value,NA)
}

```

## Warning in lapply(X = X, FUN = FUN, ...): NAs introduced by coercion

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## Warning in lapply(X = X, FUN = FUN, ...): NAs introduced by coercion

```

for(i in 6:(nretros)){
  rep <- reptoRlist(paste(admb,"s",i,".rep",sep=""))
  std <- read.table(paste(admb,"s",i,".std",sep=""),header=T,sep=" ",na="NA",fill=T)
  retroR[,i] <- c(rep$Reclutamiento)
  retroBD[,i] <- c(rep$Biomasa_desovante)
  retroBT[,i] <- c(rep$Biomasa_total)
  retroF[,i] <- c(rep$F)
  retroBD_BDrms[,i] <-subset(std,name=="RPR")$value
}

```

## Warning in lapply(X = X, FUN = FUN, ...): NAs introduced by coercion

## Warning in lapply(X = X, FUN = FUN, ...): NAs introduced by coercion

*# Diferencia relativa con caso base actual*

```

rel.diff.r <- matrix(NA, nrow=nyears, ncol=(nretros))
rel.diff.ssb <- matrix(NA, nrow=nyears, ncol=(nretros))
rel.diff.bt <- matrix(NA, nrow=nyears, ncol=(nretros))
rel.diff.f <- matrix(NA, nrow=nyears, ncol=(nretros))
rel.diff.bd_bdrms <- matrix(NA, nrow=nyears, ncol=(nretros))

```

```

for(j in 1:nretros){
  rel.diff.r[,j] <- (retroR[,j])-retroR[,1])/retroR[,1]
  rel.diff.ssb[,j] <- (retroBD[,j])-retroBD[,1])/retroBD[,1]
  rel.diff.bt[,j] <- (retroBT[,j])-retroBT[,1])/retroBT[,1]
  rel.diff.f[,j] <- (retroF[,j])-retroF[,1])/retroF[,1]
  rel.diff.bd_bdrms[,j] <- (retroBD_BDrms[,j])-retroBD_BDrms[,1])/retroBD_BDrms[,1]
}

```

```

datR <- data.frame(years=years,
  S1=rel.diff.r[,1],
  S2=rel.diff.r[,2],
  S3=rel.diff.r[,3],
  S4=rel.diff.r[,4],
  S5=rel.diff.r[,5],
  S6=rel.diff.r[,6],
  S7=rel.diff.r[,7])%>%

```

```

mutate(Series=rep("Reclutamientos",nyears))%>%
melt(id.var=c('years', 'Series'))

datBT <- data.frame(years=years,
                    S1=rel.diff.bt[,1],
                    S2=rel.diff.bt[,2],
                    S3=rel.diff.bt[,3],
                    S4=rel.diff.bt[,4],
                    S5=rel.diff.bt[,5],
                    S6=rel.diff.bt[,6],
                    S7=rel.diff.bt[,7])%>%
mutate(Series=rep("Biomasa_total",nyears))%>%
melt(id.var=c('years', 'Series'))

datBD <- data.frame(years=years,
                    S1=rel.diff.ssb[,1],
                    S2=rel.diff.ssb[,2],
                    S3=rel.diff.ssb[,3],
                    S4=rel.diff.ssb[,4],
                    S5=rel.diff.ssb[,5],
                    S6=rel.diff.ssb[,6],
                    S7=rel.diff.ssb[,7])%>%
mutate(Series=rep("Biomasa_desovante",nyears))%>%
melt(id.var=c('years', 'Series'))

datF <- data.frame(years=years,
                    S1=rel.diff.f[,1],
                    S2=rel.diff.f[,2],
                    S3=rel.diff.f[,3],
                    S4=rel.diff.f[,4],
                    S5=rel.diff.f[,5],
                    S6=rel.diff.f[,6],
                    S7=rel.diff.f[,7])%>%
mutate(Series=rep("Mortalidad_por_pesca",nyears))%>%
melt(id.var=c('years', 'Series'))

data <- data.frame(rbind(datR,datBT,datBD,datF))

#####
# GRAFICAS
#####
f1<- ggplot(data %>% filter(Series=="Reclutamientos"),
            aes(years,value)) + ylim(-0.30, 0.30) +
geom_line(aes(colour=variable), size=0.3)+
labs(x = '', y = 'Diferencia relativa',colour='Asesorías') +
scale_x_continuous(breaks = seq(from = 1990, to = 2021, by = 5)) +
scale_colour_manual(values=seq(1,7,1))+
theme_bw(base_size=9) +
ggtitle('Reclutamientos')+
theme(plot.title = element_text(hjust = 0.5),legend.position="none")

f2<- ggplot(data %>% filter(Series=="Biomasa_total"),
            aes(years,value)) + ylim(-0.30, 0.30) +
geom_line(aes(colour=variable), size=0.3)+

```

```

labs(x = '', y = 'Diferencia relativa',colour='Asesorías') +
scale_x_continuous(breaks = seq(from = 1990, to = 2021, by = 5)) +
scale_colour_manual(values=seq(1,7,1))+
theme_bw(base_size=9) +
ggtitle('Biomasa total')+
theme(plot.title = element_text(hjust = 0.5),legend.position="none")

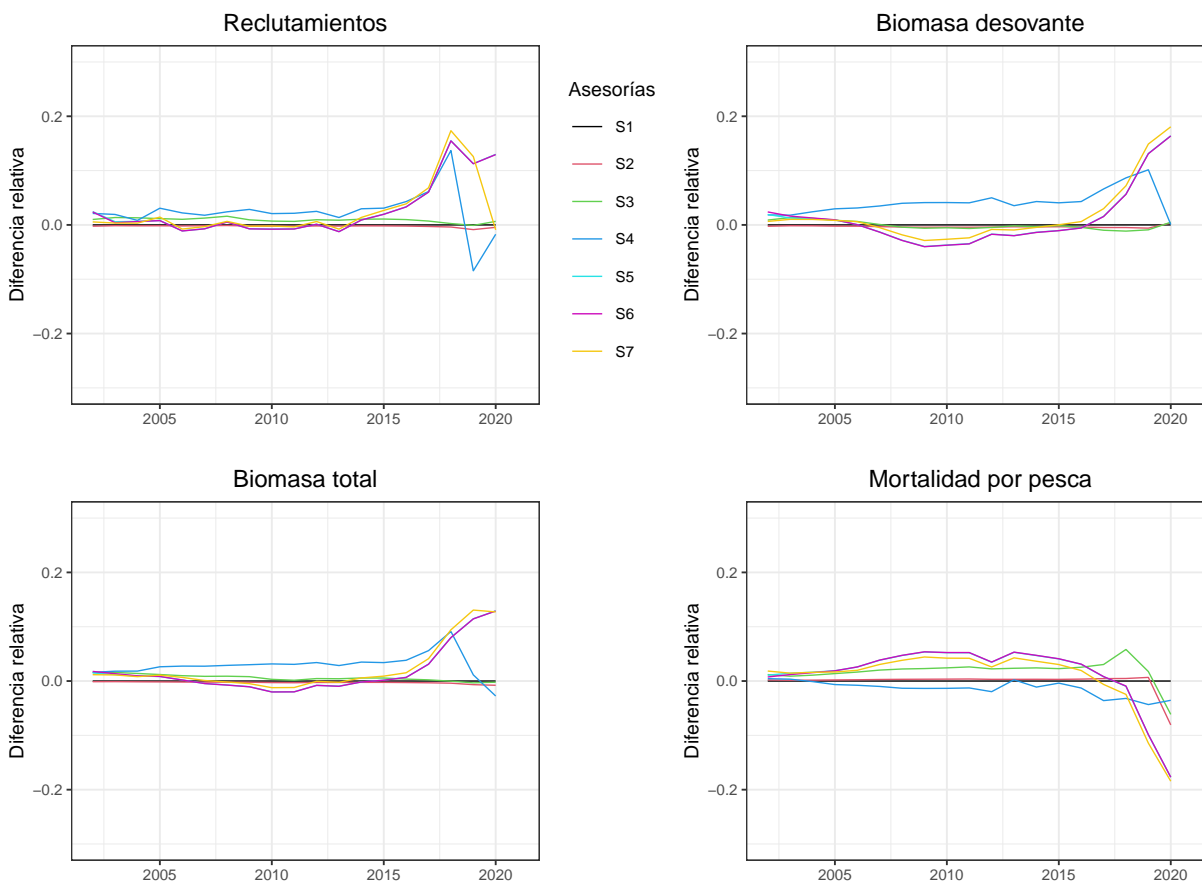
f3<- ggplot(data %>% filter(Series=="Biomasa_desovante"),
          aes(years,value)) +  ylim(-0.30, 0.30) +
geom_line(aes(colour=variable), size=0.3)+
labs(x = '', y = 'Diferencia relativa',colour='Asesorías') +
scale_x_continuous(breaks = seq(from = 1990, to = 2021, by = 5)) +
scale_colour_manual(values=seq(1,7,1))+
theme_bw(base_size=9) +
ggtitle('Biomasa desovante')+
theme(plot.title = element_text(hjust = 0.5),legend.position="left")

f4<- ggplot(data %>% filter(Series=="Mortalidad_por_pesca"),
          aes(years,value)) +
  ylim(-0.30, 0.30) +
geom_line(aes(colour=variable), size=0.3)+
labs(x = '', y = 'Diferencia relativa',colour='Asesorías') +
scale_x_continuous(breaks = seq(from = 1990, to = 2021, by = 5)) +
scale_colour_manual(values=seq(1,7,1))+
theme_bw(base_size=9) +
ggtitle('Mortalidad por pesca')+
theme(plot.title = element_text(hjust = 0.5),legend.position="none")

(f1/f2) | (f3/f4)

```





```
kable(data.frame(indicador=rep("Rt",nyears),years=years,retroR))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
Rt	2002	6279.72	6264.81	6342.66	6412.38	6432.93	6429.29	6314.60
Rt	2003	9191.00	9177.90	9315.86	9367.92	9244.73	9228.47	9222.09
Rt	2004	13264.30	13242.20	13437.60	13374.90	13349.70	13346.70	13307.20
Rt	2005	20281.70	20250.00	20516.60	20905.60	20444.40	20441.60	20573.40
Rt	2006	8369.45	8353.22	8455.40	8554.37	8277.43	8276.03	8305.40
Rt	2007	8651.36	8638.11	8760.06	8805.12	8590.04	8589.29	8624.02
Rt	2008	10848.00	10835.60	11021.60	11109.10	10906.90	10906.30	10918.50
Rt	2009	6789.41	6775.65	6852.76	6983.17	6740.97	6739.90	6772.86
Rt	2010	5311.60	5299.34	5348.83	5422.12	5270.75	5269.94	5300.68
Rt	2011	5564.11	5550.28	5599.93	5683.19	5523.16	5522.21	5543.88
Rt	2012	14058.00	14031.50	14191.70	14408.80	14076.00	14074.60	14145.50
Rt	2013	2520.90	2515.41	2542.71	2555.28	2489.89	2489.37	2501.26
Rt	2014	12318.90	12297.20	12448.70	12684.70	12430.80	12429.60	12489.00
Rt	2015	3317.14	3311.18	3352.91	3419.54	3382.50	3382.00	3405.46
Rt	2016	2550.45	2544.99	2575.49	2659.95	2635.26	2634.86	2649.26
Rt	2017	4984.22	4969.83	5019.65	5289.99	5285.76	5285.04	5324.47
Rt	2018	3550.68	3536.96	3559.57	4036.80	4100.63	4099.91	4166.38
Rt	2019	10586.10	10494.50	10576.60	9691.33	11779.70	11777.80	11917.60
Rt	2020	2377.60	2366.95	2393.05	2336.62	2686.29	2685.36	2356.00
Rt	2021	NA	NA	NA	NA	NA	7588.31	5474.80

```
kable(data.frame(indicador=rep("Rt.diff",nyears),years=years,round(rel.diff.r,2)))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
Rt.diff	2002	0	0.00	0.01	0.02	0.02	0.02	0.01
Rt.diff	2003	0	0.00	0.01	0.02	0.01	0.00	0.00
Rt.diff	2004	0	0.00	0.01	0.01	0.01	0.01	0.00
Rt.diff	2005	0	0.00	0.01	0.03	0.01	0.01	0.01
Rt.diff	2006	0	0.00	0.01	0.02	-0.01	-0.01	-0.01
Rt.diff	2007	0	0.00	0.01	0.02	-0.01	-0.01	0.00
Rt.diff	2008	0	0.00	0.02	0.02	0.01	0.01	0.01
Rt.diff	2009	0	0.00	0.01	0.03	-0.01	-0.01	0.00
Rt.diff	2010	0	0.00	0.01	0.02	-0.01	-0.01	0.00
Rt.diff	2011	0	0.00	0.01	0.02	-0.01	-0.01	0.00
Rt.diff	2012	0	0.00	0.01	0.02	0.00	0.00	0.01
Rt.diff	2013	0	0.00	0.01	0.01	-0.01	-0.01	-0.01
Rt.diff	2014	0	0.00	0.01	0.03	0.01	0.01	0.01
Rt.diff	2015	0	0.00	0.01	0.03	0.02	0.02	0.03
Rt.diff	2016	0	0.00	0.01	0.04	0.03	0.03	0.04
Rt.diff	2017	0	0.00	0.01	0.06	0.06	0.06	0.07
Rt.diff	2018	0	0.00	0.00	0.14	0.15	0.15	0.17
Rt.diff	2019	0	-0.01	0.00	-0.08	0.11	0.11	0.13
Rt.diff	2020	0	0.00	0.01	-0.02	0.13	0.13	-0.01
Rt.diff	2021	NA	NA	NA	NA	NA	NA	NA

```
kable(data.frame(indicador=rep("BT",nyears),years=years,retroBT))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
BT	2002	194918.0	194680.0	197999.0	198043.0	197829.0	198365.0	197197.0
BT	2003	200800.0	200571.0	203975.0	204446.0	203185.0	203511.0	203055.0
BT	2004	210788.0	210489.0	213728.0	214643.0	212717.0	212817.0	212494.0
BT	2005	266799.0	266369.0	269989.0	273795.0	269042.0	269045.0	269680.0
BT	2006	252551.0	252076.0	255042.0	259490.0	253055.0	253030.0	254245.0
BT	2007	207379.0	206952.0	209171.0	213043.0	206435.0	206406.0	207577.0
BT	2008	176058.0	175698.0	177623.0	181133.0	174769.0	174744.0	175738.0
BT	2009	150359.0	150030.0	151570.0	154878.0	148785.0	148761.0	149632.0
BT	2010	107454.0	107143.0	107787.0	110841.0	105314.0	105291.0	106142.0
BT	2011	99342.1	99031.5	99484.5	102392.0	97382.1	97359.1	98158.6
BT	2012	146178.0	145798.0	146841.0	151150.0	145028.0	144999.0	146100.0
BT	2013	140569.0	140197.0	141165.0	144576.0	139238.0	139213.0	140236.0
BT	2014	149189.0	148828.0	150027.0	154396.0	148957.0	148931.0	150039.0
BT	2015	135135.0	134802.0	135881.0	139723.0	135356.0	135334.0	136354.0
BT	2016	90698.1	90444.1	91018.9	94162.8	91314.7	91296.9	92081.1
BT	2017	74463.8	74223.0	74627.1	78630.0	76783.4	76766.9	77529.4
BT	2018	70331.4	70054.6	70313.6	76741.7	75967.3	75950.1	76962.2
BT	2019	110237.0	109503.0	109868.0	111484.0	122875.0	122848.0	124638.0
BT	2020	113795.0	112904.0	113546.0	110658.0	128494.0	128465.0	128277.0
BT	2021	NA	NA	NA	NA	NA	122379.0	108909.0

```
kable(data.frame(indicador=rep("BD",nyears),years=years,retroBD))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
BD	2002	40951.4	40849.6	41315.8	41707.8	41733.7	41929.4	41213.4
BD	2003	57096.5	57007.1	57865.9	58120.0	57826.9	58022.9	57681.6
BD	2004	57102.0	57006.0	57800.3	58481.4	57740.0	57827.6	57677.6
BD	2005	58821.2	58690.3	59321.3	60563.5	59364.8	59377.8	59314.5
BD	2006	77956.9	77772.3	78451.4	80387.3	77998.9	77991.6	78421.9
BD	2007	61494.2	61298.9	61541.2	63637.7	60688.6	60675.6	61185.5
BD	2008	40283.3	40126.0	40114.8	41887.3	39142.2	39130.7	39547.0
BD	2009	31676.5	31542.4	31483.1	32977.9	30416.4	30406.9	30767.6
BD	2010	30535.2	30409.0	30372.6	31791.4	29403.3	29394.1	29728.1
BD	2011	29096.8	28972.0	28904.7	30279.4	28088.9	28079.4	28404.9
BD	2012	31431.6	31305.5	31284.3	33001.1	30899.9	30889.3	31171.2
BD	2013	46501.3	46341.4	46418.3	48146.9	45587.0	45575.4	46065.4
BD	2014	39131.0	38986.0	38999.6	40815.1	38599.8	38588.7	38952.6
BD	2015	42500.6	42357.1	42440.1	44229.2	42060.0	42049.6	42512.3
BD	2016	32793.0	32665.6	32645.3	34202.7	32613.0	32604.2	32993.1
BD	2017	19677.1	19582.0	19484.0	20977.9	19986.4	19979.3	20263.9
BD	2018	20680.2	20579.1	20444.0	22471.0	21851.4	21844.4	22170.5
BD	2019	24775.7	24628.0	24550.9	27289.9	28031.4	28022.7	28464.4
BD	2020	38349.2	38484.0	38536.4	38377.3	44640.5	44628.7	45275.4
BD	2021	NA	NA	NA	NA	NA	41209.9	39749.4

```
kable(data.frame(indicador=rep("BD.diff",nyears),years=years,round(rel.diff.ssb,2)))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
BD.diff	2002	0	0.00	0.01	0.02	0.02	0.02	0.01
BD.diff	2003	0	0.00	0.01	0.02	0.01	0.02	0.01
BD.diff	2004	0	0.00	0.01	0.02	0.01	0.01	0.01
BD.diff	2005	0	0.00	0.01	0.03	0.01	0.01	0.01
BD.diff	2006	0	0.00	0.01	0.03	0.00	0.00	0.01
BD.diff	2007	0	0.00	0.00	0.03	-0.01	-0.01	-0.01
BD.diff	2008	0	0.00	0.00	0.04	-0.03	-0.03	-0.02
BD.diff	2009	0	0.00	-0.01	0.04	-0.04	-0.04	-0.03
BD.diff	2010	0	0.00	-0.01	0.04	-0.04	-0.04	-0.03
BD.diff	2011	0	0.00	-0.01	0.04	-0.03	-0.03	-0.02
BD.diff	2012	0	0.00	0.00	0.05	-0.02	-0.02	-0.01
BD.diff	2013	0	0.00	0.00	0.04	-0.02	-0.02	-0.01
BD.diff	2014	0	0.00	0.00	0.04	-0.01	-0.01	0.00
BD.diff	2015	0	0.00	0.00	0.04	-0.01	-0.01	0.00
BD.diff	2016	0	0.00	0.00	0.04	-0.01	-0.01	0.01
BD.diff	2017	0	0.00	-0.01	0.07	0.02	0.02	0.03
BD.diff	2018	0	0.00	-0.01	0.09	0.06	0.06	0.07
BD.diff	2019	0	-0.01	-0.01	0.10	0.13	0.13	0.15
BD.diff	2020	0	0.00	0.00	0.00	0.16	0.16	0.18
BD.diff	2021	NA	NA	NA	NA	NA	NA	NA

```
kable(data.frame(indicador=rep("F",nyears),years=years,retroF))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
F	2002	0.493403	0.494405	0.499264	0.495589	0.498774	0.497093	0.502480

indicador	years	X1	X2	X3	X4	X5	X6	X7
F	2003	0.342980	0.343465	0.346041	0.344151	0.347904	0.347060	0.347954
F	2004	0.394266	0.394916	0.398526	0.393878	0.400665	0.400356	0.400601
F	2005	0.479449	0.480427	0.486027	0.476322	0.488488	0.488474	0.487429
F	2006	0.316877	0.317621	0.322106	0.314409	0.325060	0.325100	0.323135
F	2007	0.564667	0.566296	0.576029	0.559047	0.586359	0.586475	0.581911
F	2008	0.674416	0.676569	0.689382	0.665456	0.706155	0.706322	0.700167
F	2009	0.883464	0.886423	0.903705	0.871448	0.930757	0.930981	0.922582
F	2010	0.355950	0.357200	0.364600	0.351162	0.374516	0.374614	0.370934
F	2011	0.310689	0.311853	0.318763	0.306732	0.326876	0.326970	0.323712
F	2012	0.264742	0.265577	0.270668	0.259554	0.273916	0.273986	0.271593
F	2013	0.302481	0.303438	0.309587	0.303151	0.318494	0.318569	0.315392
F	2014	0.375407	0.376619	0.384493	0.371222	0.393040	0.393145	0.389083
F	2015	0.361497	0.362605	0.369743	0.360108	0.376238	0.376324	0.372476
F	2016	0.424240	0.425743	0.435037	0.418775	0.437334	0.437444	0.432460
F	2017	0.484830	0.486986	0.499590	0.467363	0.488656	0.488816	0.481815
F	2018	0.254721	0.255914	0.269531	0.246574	0.252278	0.252354	0.248448
F	2019	0.246693	0.248342	0.251000	0.236002	0.222304	0.222369	0.218486
F	2020	0.257286	0.236508	0.241493	0.248166	0.211709	0.211765	0.209844
F	2021	NA	NA	NA	NA	NA	0.214557	0.231305

```
kable(data.frame(indicador=rep("F.diff",nyears),years=years,round(rel.diff.f,2)))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
F.diff	2002	0	0.00	0.01	0.00	0.01	0.01	0.02
F.diff	2003	0	0.00	0.01	0.00	0.01	0.01	0.01
F.diff	2004	0	0.00	0.01	0.00	0.02	0.02	0.02
F.diff	2005	0	0.00	0.01	-0.01	0.02	0.02	0.02
F.diff	2006	0	0.00	0.02	-0.01	0.03	0.03	0.02
F.diff	2007	0	0.00	0.02	-0.01	0.04	0.04	0.03
F.diff	2008	0	0.00	0.02	-0.01	0.05	0.05	0.04
F.diff	2009	0	0.00	0.02	-0.01	0.05	0.05	0.04
F.diff	2010	0	0.00	0.02	-0.01	0.05	0.05	0.04
F.diff	2011	0	0.00	0.03	-0.01	0.05	0.05	0.04
F.diff	2012	0	0.00	0.02	-0.02	0.03	0.03	0.03
F.diff	2013	0	0.00	0.02	0.00	0.05	0.05	0.04
F.diff	2014	0	0.00	0.02	-0.01	0.05	0.05	0.04
F.diff	2015	0	0.00	0.02	0.00	0.04	0.04	0.03
F.diff	2016	0	0.00	0.03	-0.01	0.03	0.03	0.02
F.diff	2017	0	0.00	0.03	-0.04	0.01	0.01	-0.01
F.diff	2018	0	0.00	0.06	-0.03	-0.01	-0.01	-0.02
F.diff	2019	0	0.01	0.02	-0.04	-0.10	-0.10	-0.11
F.diff	2020	0	-0.08	-0.06	-0.04	-0.18	-0.18	-0.18
F.diff	2021	NA	NA	NA	NA	NA	NA	NA

```
kable(data.frame(indicador=rep("BD_BDrms",nyears),years=years,retroBD_BDrms))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
BD_BDrms	2002	1.38590	1.38580	1.38510	1.36850	1.37030	1.37030	1.37260
BD_BDrms	2003	1.93230	1.93400	1.93990	1.90700	1.89870	1.89620	1.92110

indicador	years	X1	X2	X3	X4	X5	X6	X7
BD_BDrms	2004	1.93250	1.93400	1.93770	1.91890	1.89590	1.88980	1.92090
BD_BDrms	2005	1.99060	1.99110	1.98870	1.98720	1.94920	1.94050	1.97550
BD_BDrms	2006	2.63820	2.63850	2.63010	2.63770	2.56110	2.54880	2.61180
BD_BDrms	2007	2.08110	2.07960	2.06320	2.08810	1.99270	1.98290	2.03780
BD_BDrms	2008	1.36330	1.36130	1.34480	1.37440	1.28520	1.27880	1.31710
BD_BDrms	2009	1.07200	1.07010	1.05550	1.08210	0.99871	0.99370	1.02470
BD_BDrms	2010	1.03340	1.03160	1.01820	1.04310	0.96545	0.96060	0.99009
BD_BDrms	2011	0.98471	0.98289	0.96903	0.99353	0.92229	0.91764	0.94603
BD_BDrms	2012	1.06370	1.06210	1.04880	1.08280	1.01460	1.00950	1.03820
BD_BDrms	2013	1.57370	1.57220	1.55620	1.57980	1.49680	1.48940	1.53420
BD_BDrms	2014	1.32430	1.32260	1.30750	1.33920	1.26740	1.26110	1.29730
BD_BDrms	2015	1.43830	1.43700	1.42280	1.45130	1.38100	1.37420	1.41590
BD_BDrms	2016	1.10980	1.10820	1.09440	1.12230	1.07080	1.06550	1.09880
BD_BDrms	2017	0.66592	0.66433	0.65320	0.68833	0.65625	0.65293	0.67489
BD_BDrms	2018	0.69987	0.69816	0.68538	0.73732	0.71748	0.71388	0.73839
BD_BDrms	2019	0.83847	0.83552	0.82307	0.89544	0.92040	0.91579	0.94801
BD_BDrms	2020	1.29780	1.30560	1.29190	1.25920	1.46580	1.45850	1.50790
BD_BDrms	2021	NA	NA	NA	NA	NA	1.34670	1.32390

```
kable(data.frame(indicador=rep("BD_BDrms.diff",nyears),years=years,round(rel.diff.bd_bdrms,2)))
```

indicador	years	X1	X2	X3	X4	X5	X6	X7
BD_BDrms.diff	2002	0	0.00	0.00	-0.01	-0.01	-0.01	-0.01
BD_BDrms.diff	2003	0	0.00	0.00	-0.01	-0.02	-0.02	-0.01
BD_BDrms.diff	2004	0	0.00	0.00	-0.01	-0.02	-0.02	-0.01
BD_BDrms.diff	2005	0	0.00	0.00	0.00	-0.02	-0.03	-0.01
BD_BDrms.diff	2006	0	0.00	0.00	0.00	-0.03	-0.03	-0.01
BD_BDrms.diff	2007	0	0.00	-0.01	0.00	-0.04	-0.05	-0.02
BD_BDrms.diff	2008	0	0.00	-0.01	0.01	-0.06	-0.06	-0.03
BD_BDrms.diff	2009	0	0.00	-0.02	0.01	-0.07	-0.07	-0.04
BD_BDrms.diff	2010	0	0.00	-0.01	0.01	-0.07	-0.07	-0.04
BD_BDrms.diff	2011	0	0.00	-0.02	0.01	-0.06	-0.07	-0.04
BD_BDrms.diff	2012	0	0.00	-0.01	0.02	-0.05	-0.05	-0.02
BD_BDrms.diff	2013	0	0.00	-0.01	0.00	-0.05	-0.05	-0.03
BD_BDrms.diff	2014	0	0.00	-0.01	0.01	-0.04	-0.05	-0.02
BD_BDrms.diff	2015	0	0.00	-0.01	0.01	-0.04	-0.04	-0.02
BD_BDrms.diff	2016	0	0.00	-0.01	0.01	-0.04	-0.04	-0.01
BD_BDrms.diff	2017	0	0.00	-0.02	0.03	-0.01	-0.02	0.01
BD_BDrms.diff	2018	0	0.00	-0.02	0.05	0.03	0.02	0.06
BD_BDrms.diff	2019	0	0.00	-0.02	0.07	0.10	0.09	0.13
BD_BDrms.diff	2020	0	0.01	0.00	-0.03	0.13	0.12	0.16
BD_BDrms.diff	2021	NA	NA	NA	NA	NA	NA	NA

```
kable(base1)
```

yrs	Asesoría	variable	value
2002	junio_2021	Biomasa_Crucero	NA
2003	junio_2021	Biomasa_Crucero	NA
2004	junio_2021	Biomasa_Crucero	NA

yrs	Asesoría	variable	value
2005	junio_2021	Biomasa_Crucero	NA
2006	junio_2021	Biomasa_Crucero	194719.0
2007	junio_2021	Biomasa_Crucero	NA
2008	junio_2021	Biomasa_Crucero	114640.0
2009	junio_2021	Biomasa_Crucero	NA
2010	junio_2021	Biomasa_Crucero	NA
2011	junio_2021	Biomasa_Crucero	88116.0
2012	junio_2021	Biomasa_Crucero	NA
2013	junio_2021	Biomasa_Crucero	124729.0
2014	junio_2021	Biomasa_Crucero	113855.0
2015	junio_2021	Biomasa_Crucero	60498.0
2016	junio_2021	Biomasa_Crucero	106245.0
2017	junio_2021	Biomasa_Crucero	66882.0
2018	junio_2021	Biomasa_Crucero	20361.0
2019	junio_2021	Biomasa_Crucero	43788.0
2020	junio_2021	Biomasa_Crucero	160742.0
2021	junio_2021	Biomasa_Crucero	70259.0
2002	junio_2021	CPUE	NA
2003	junio_2021	CPUE	NA
2004	junio_2021	CPUE	NA
2005	junio_2021	CPUE	NA
2006	junio_2021	CPUE	NA
2007	junio_2021	CPUE	23.9
2008	junio_2021	CPUE	21.6
2009	junio_2021	CPUE	28.1
2010	junio_2021	CPUE	19.1
2011	junio_2021	CPUE	16.3
2012	junio_2021	CPUE	13.7
2013	junio_2021	CPUE	35.6
2014	junio_2021	CPUE	27.7
2015	junio_2021	CPUE	23.1
2016	junio_2021	CPUE	24.0
2017	junio_2021	CPUE	10.8
2018	junio_2021	CPUE	10.2
2019	junio_2021	CPUE	8.6
2020	junio_2021	CPUE	41.4
2021	junio_2021	CPUE	NA
2002	junio_2021	Desembarques	39878.0
2003	junio_2021	Desembarques	33605.0
2004	junio_2021	Desembarques	37393.0
2005	junio_2021	Desembarques	53789.0
2006	junio_2021	Desembarques	40054.0
2007	junio_2021	Desembarques	51678.0
2008	junio_2021	Desembarques	46124.0
2009	junio_2021	Desembarques	50367.0
2010	junio_2021	Desembarques	20590.0
2011	junio_2021	Desembarques	16810.0
2012	junio_2021	Desembarques	20222.0
2013	junio_2021	Desembarques	22396.0
2014	junio_2021	Desembarques	23483.0
2015	junio_2021	Desembarques	24192.0
2016	junio_2021	Desembarques	18924.0

yrs	Asesoría	variable	value
2017	junio_2021	Desembarques	14462.0
2018	junio_2021	Desembarques	8761.0
2019	junio_2021	Desembarques	11383.0
2020	junio_2021	Desembarques	14523.0
2021	junio_2021	Desembarques	12633.0
2002	septiembre_2020	Biomasa_Crucero	NA
2003	septiembre_2020	Biomasa_Crucero	NA
2004	septiembre_2020	Biomasa_Crucero	NA
2005	septiembre_2020	Biomasa_Crucero	NA
2006	septiembre_2020	Biomasa_Crucero	194719.0
2007	septiembre_2020	Biomasa_Crucero	NA
2008	septiembre_2020	Biomasa_Crucero	114640.0
2009	septiembre_2020	Biomasa_Crucero	NA
2010	septiembre_2020	Biomasa_Crucero	NA
2011	septiembre_2020	Biomasa_Crucero	88116.0
2012	septiembre_2020	Biomasa_Crucero	NA
2013	septiembre_2020	Biomasa_Crucero	124729.0
2014	septiembre_2020	Biomasa_Crucero	113855.0
2015	septiembre_2020	Biomasa_Crucero	60498.0
2016	septiembre_2020	Biomasa_Crucero	106245.0
2017	septiembre_2020	Biomasa_Crucero	66882.0
2018	septiembre_2020	Biomasa_Crucero	20361.0
2019	septiembre_2020	Biomasa_Crucero	43788.0
2020	septiembre_2020	Biomasa_Crucero	160742.0
2021	septiembre_2020	Biomasa_Crucero	NA
2002	septiembre_2020	CPUE	NA
2003	septiembre_2020	CPUE	NA
2004	septiembre_2020	CPUE	NA
2005	septiembre_2020	CPUE	NA
2006	septiembre_2020	CPUE	NA
2007	septiembre_2020	CPUE	23.9
2008	septiembre_2020	CPUE	22.0
2009	septiembre_2020	CPUE	28.4
2010	septiembre_2020	CPUE	19.2
2011	septiembre_2020	CPUE	16.4
2012	septiembre_2020	CPUE	13.8
2013	septiembre_2020	CPUE	33.1
2014	septiembre_2020	CPUE	31.7
2015	septiembre_2020	CPUE	23.1
2016	septiembre_2020	CPUE	24.1
2017	septiembre_2020	CPUE	10.8
2018	septiembre_2020	CPUE	10.2
2019	septiembre_2020	CPUE	8.5
2020	septiembre_2020	CPUE	NA
2021	septiembre_2020	CPUE	NA
2002	septiembre_2020	Desembarques	38974.0
2003	septiembre_2020	Desembarques	32843.0
2004	septiembre_2020	Desembarques	36545.0
2005	septiembre_2020	Desembarques	52569.0
2006	septiembre_2020	Desembarques	39146.0
2007	septiembre_2020	Desembarques	50506.0
2008	septiembre_2020	Desembarques	45078.0

yrs	Asesoría	variable	value
2009	septiembre_2020	Desembarques	49225.0
2010	septiembre_2020	Desembarques	20123.0
2011	septiembre_2020	Desembarques	16429.0
2012	septiembre_2020	Desembarques	19763.0
2013	septiembre_2020	Desembarques	21888.0
2014	septiembre_2020	Desembarques	22951.0
2015	septiembre_2020	Desembarques	23643.0
2016	septiembre_2020	Desembarques	18495.0
2017	septiembre_2020	Desembarques	14134.0
2018	septiembre_2020	Desembarques	8355.0
2019	septiembre_2020	Desembarques	11278.0
2020	septiembre_2020	Desembarques	15471.0
2021	septiembre_2020	Desembarques	NA