

FIGURAS Y TABLAS PRIMER INFORME ESTATUS Y CBA 2022 SARDINA AUSTRAL LOS LAGOS

PRIMER PARTE: CORRE CÓDIGOS Y FUNCIONES

```
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) # librería 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 2021 MODELO BASE NUEVO
data.0 <- lisread(paste(dir.1, "MAT0921.dat", sep="/"));
names(data.0) <- str_trim(names(data.0), side="right")
rep0 <- reptoRlist("MAT0921.rep")
std0 <- read.table("MAT0921.std", header=T, sep=" ", na="NA", fill=T)
```

FUNCIÓN DE RETROSPECTIVO

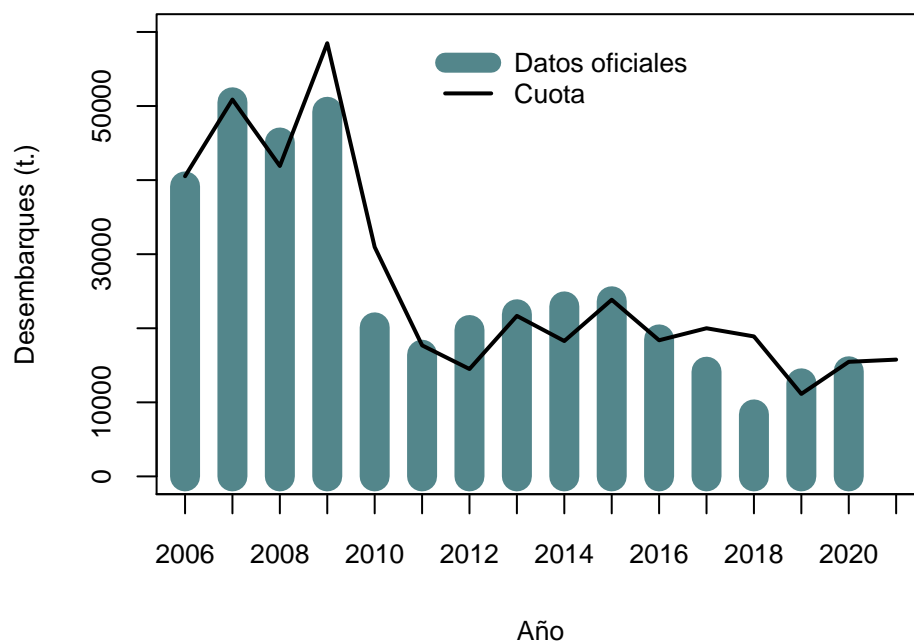
FUNCIÓN DE VEROSIMILITUD

FUNCIÓN DE CBA

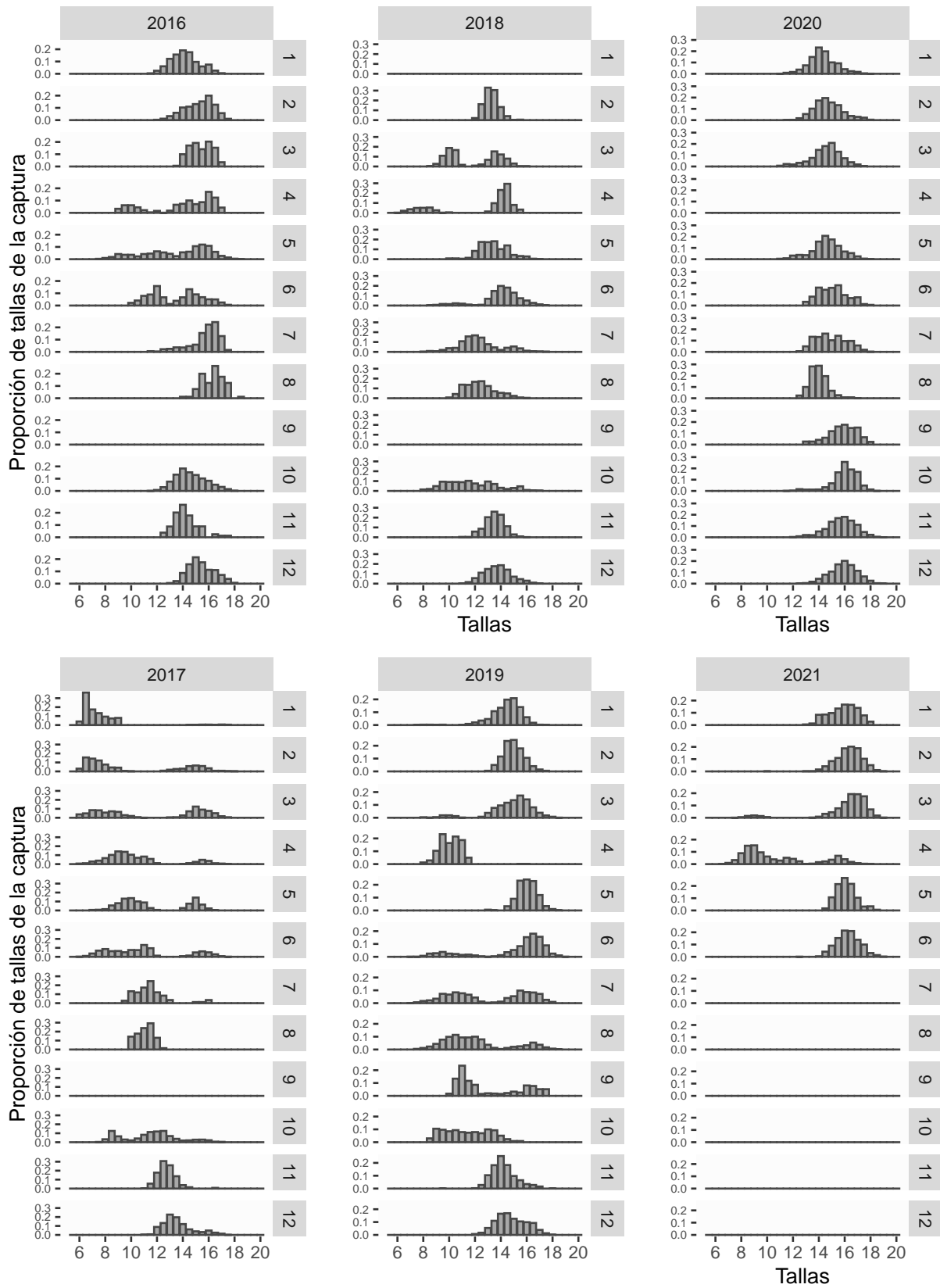
CÁLCULO DE TAMAÑO DE MUESTRA

SEGUNDA PARTE: GENERA GRÁFICAS Y TABLAS

1. Antecedentes

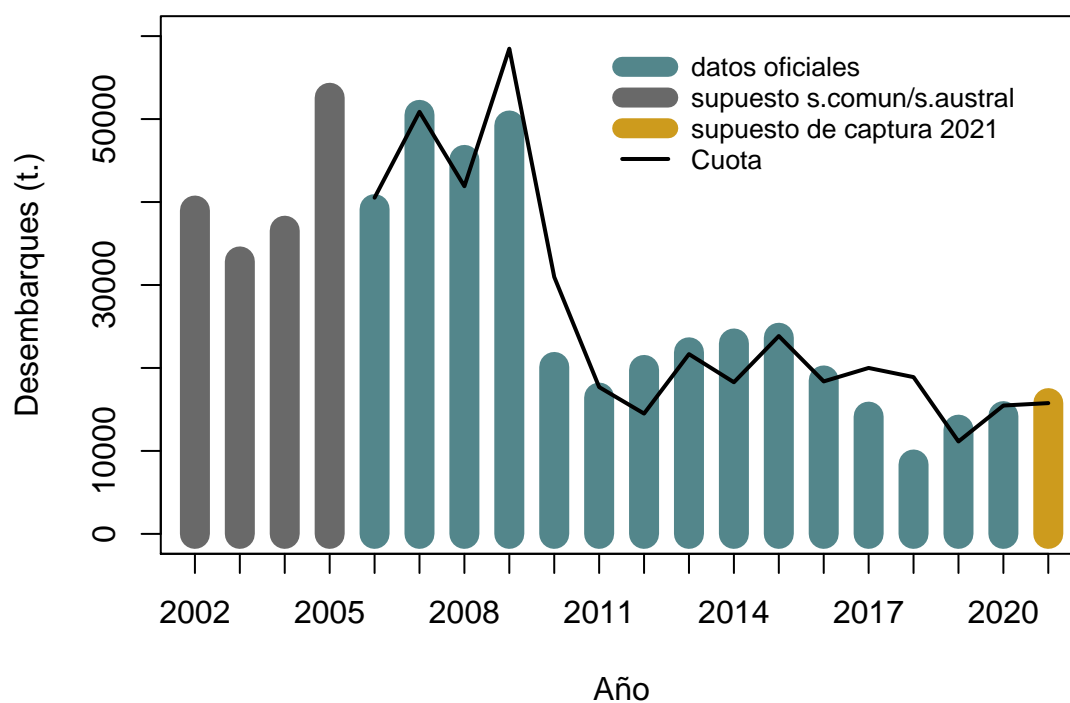


| year | desemb | cuota |
|------|--------|-------|
| 2006 | 39146 | 40522 |
| 2007 | 50506 | 50872 |
| 2008 | 45078 | 41904 |
| 2009 | 49225 | 58481 |
| 2010 | 20123 | 30966 |
| 2011 | 16429 | 17693 |
| 2012 | 19763 | 14500 |
| 2013 | 21888 | 21670 |
| 2014 | 22951 | 18276 |
| 2015 | 23643 | 23848 |
| 2016 | 18495 | 18380 |
| 2017 | 14134 | 20000 |
| 2018 | 8366 | 18897 |
| 2019 | 12565 | 11137 |
| 2020 | 14194 | 15471 |
| 2021 | NA | 15765 |

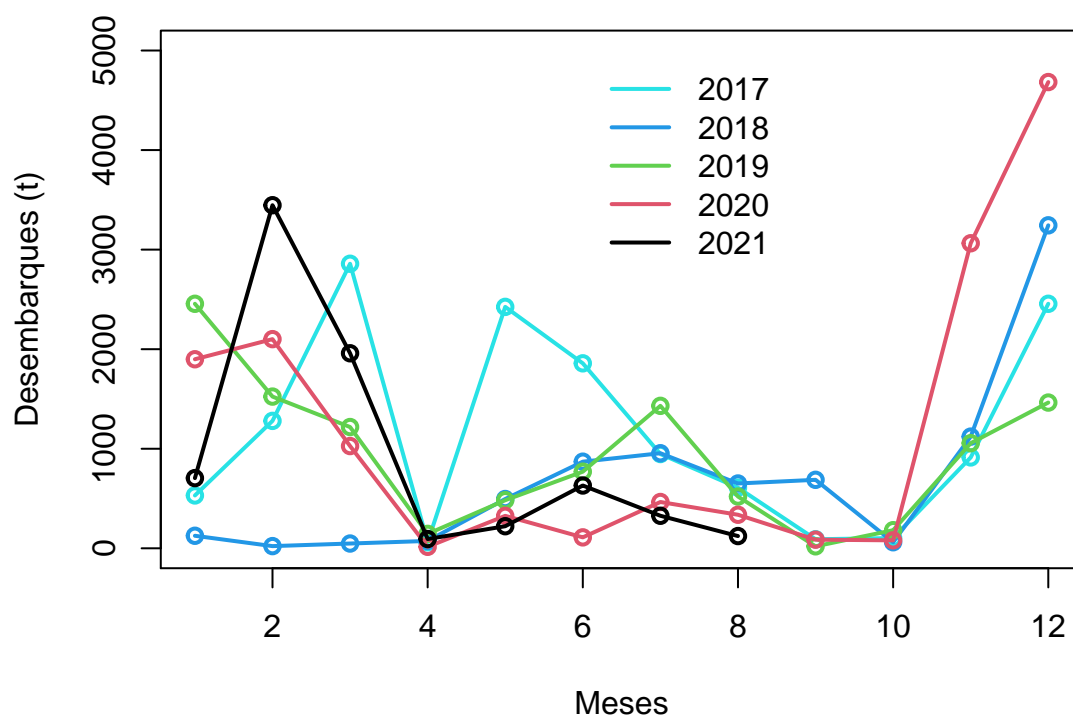


3. RESULTADOS OBJETIVO 1

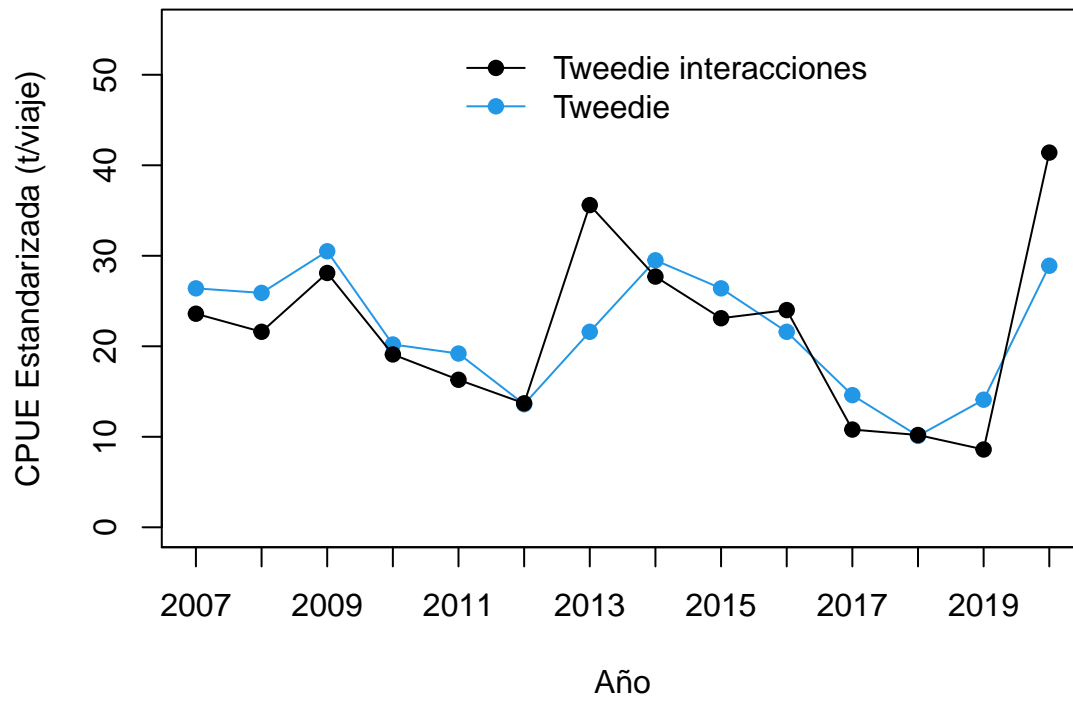
3.1. Descripción de los datos de entrada al modelo de evaluación de stock



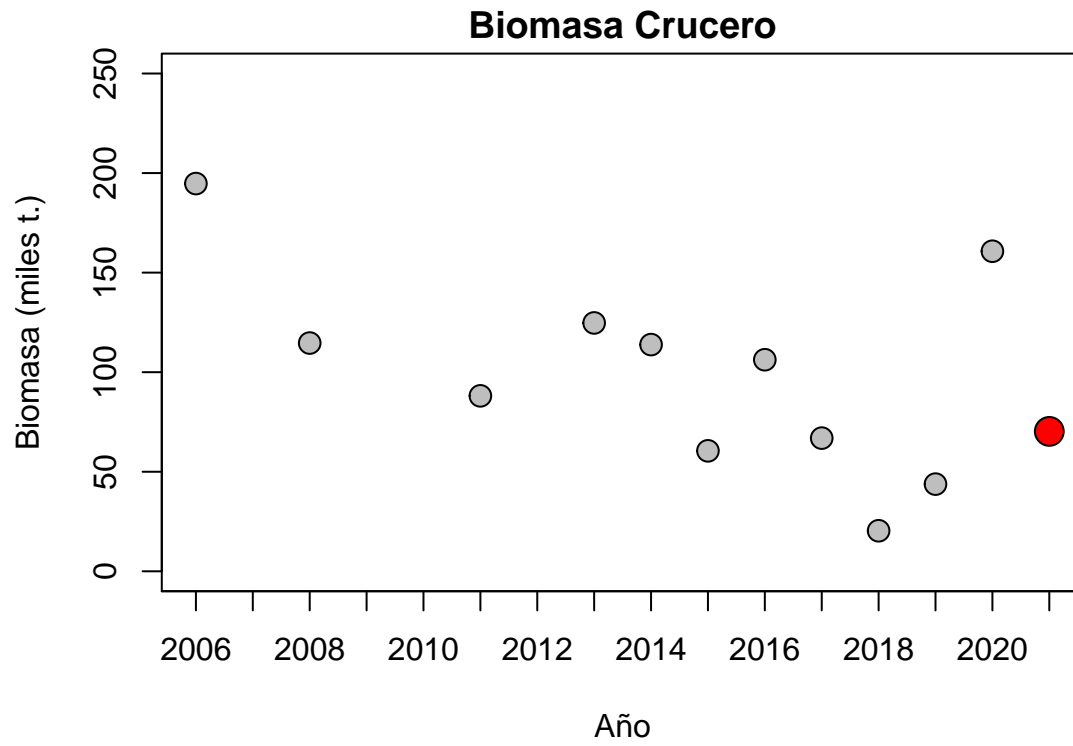
| year | desemb | cuota | comun_austral | supuesto |
|------|--------|-------|---------------|----------|
| 2002 | NA | NA | 38974 | NA |
| 2003 | NA | NA | 32843 | NA |
| 2004 | NA | NA | 36545 | NA |
| 2005 | NA | NA | 52569 | NA |
| 2006 | 39146 | 40522 | NA | NA |
| 2007 | 50506 | 50872 | NA | NA |
| 2008 | 45078 | 41904 | NA | NA |
| 2009 | 49225 | 58481 | NA | NA |
| 2010 | 20123 | 30966 | NA | NA |
| 2011 | 16429 | 17693 | NA | NA |
| 2012 | 19763 | 14500 | NA | NA |
| 2013 | 21888 | 21670 | NA | NA |
| 2014 | 22951 | 18276 | NA | NA |
| 2015 | 23643 | 23848 | NA | NA |
| 2016 | 18495 | 18380 | NA | NA |
| 2017 | 14134 | 20000 | NA | NA |
| 2018 | 8366 | 18897 | NA | NA |
| 2019 | 12565 | 11137 | NA | NA |
| 2020 | 14194 | 15471 | NA | NA |
| 2021 | NA | 15765 | NA | 15765 |



| | X1 | X2 | X3 | X4 | X5 | X6 | X7 | X8 | X9 | X10 | X11 | X12 |
|-------|------|-------|------|-------|------|------|------|------|-----|------|------|------|
| d2006 | NA | 8384 | 7485 | 2008 | 3410 | 2760 | 3286 | 723 | 367 | 2885 | 2822 | 1831 |
| d2007 | 5740 | 5101 | 4181 | 4651 | 7430 | 4694 | 3027 | 3718 | 17 | 1822 | 4093 | NA |
| d2008 | NA | 10122 | 6489 | 4329 | 4823 | 951 | 282 | 13 | 34 | 7046 | 5954 | 5035 |
| d2009 | NA | 5 | 9488 | 13247 | 9750 | 6553 | 4407 | 1514 | 88 | NA | 1814 | 2356 |
| d2010 | 164 | 1445 | 6826 | 3397 | 4686 | 1564 | 180 | 56 | 143 | NA | 758 | 1006 |
| d2011 | 623 | 279 | 2887 | 2785 | 3744 | 700 | 53 | 111 | 21 | 14 | 2027 | 3549 |
| d2012 | NA | 3855 | 3190 | 2151 | 1193 | 2160 | 6521 | NA | NA | 3 | 4 | 642 |
| d2013 | 826 | 6454 | 5252 | 1976 | 300 | 637 | 618 | 737 | 240 | 220 | 1776 | 2715 |
| d2014 | 1087 | 3299 | 4284 | 756 | 1822 | 1877 | 2678 | 354 | 43 | 175 | 2722 | 3681 |
| d2015 | 9088 | 5533 | 4603 | 8 | 116 | 665 | 365 | 65 | 42 | 59 | 66 | 3100 |
| d2016 | 2523 | 6362 | 739 | 1715 | 569 | 1698 | 871 | 134 | 37 | 62 | 86 | 3664 |
| d2017 | 531 | 1280 | 2858 | 61 | 2425 | 1858 | 947 | 609 | 91 | 103 | 913 | 2456 |
| d2018 | 126 | 22 | 48 | 74 | 495 | 870 | 955 | 651 | 688 | 61 | 1122 | 3244 |
| d2019 | 2456 | 1524 | 1218 | 145 | 483 | 770 | 1431 | 520 | 20 | 182 | 1056 | 1464 |
| d2020 | 1899 | 2101 | 1027 | 15 | 326 | 110 | 465 | 337 | 87 | 80 | 3064 | 4683 |
| d2021 | 705 | 3446 | 1959 | 93 | 222 | 631 | 327 | 123 | NA | NA | NA | NA |

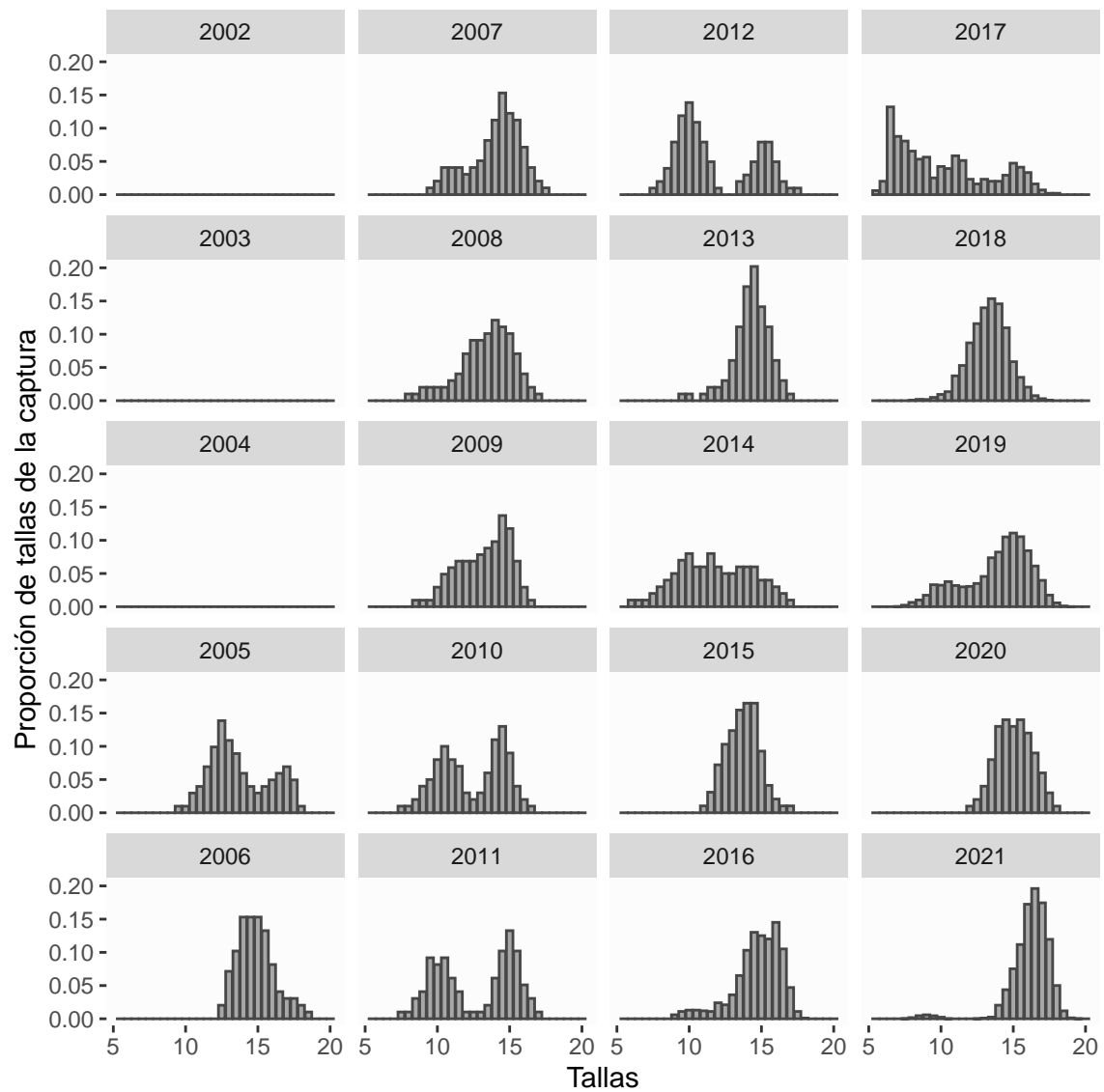


| year | tweedie | tweedie_inter |
|------|---------|---------------|
| 2007 | 26.4 | 23.6 |
| 2008 | 25.9 | 21.6 |
| 2009 | 30.5 | 28.1 |
| 2010 | 20.2 | 19.1 |
| 2011 | 19.2 | 16.3 |
| 2012 | 13.6 | 13.7 |
| 2013 | 21.6 | 35.6 |
| 2014 | 29.5 | 27.7 |
| 2015 | 26.4 | 23.1 |
| 2016 | 21.6 | 24.0 |
| 2017 | 14.6 | 10.8 |
| 2018 | 10.1 | 10.2 |
| 2019 | 14.1 | 8.6 |
| 2020 | 28.9 | 41.4 |

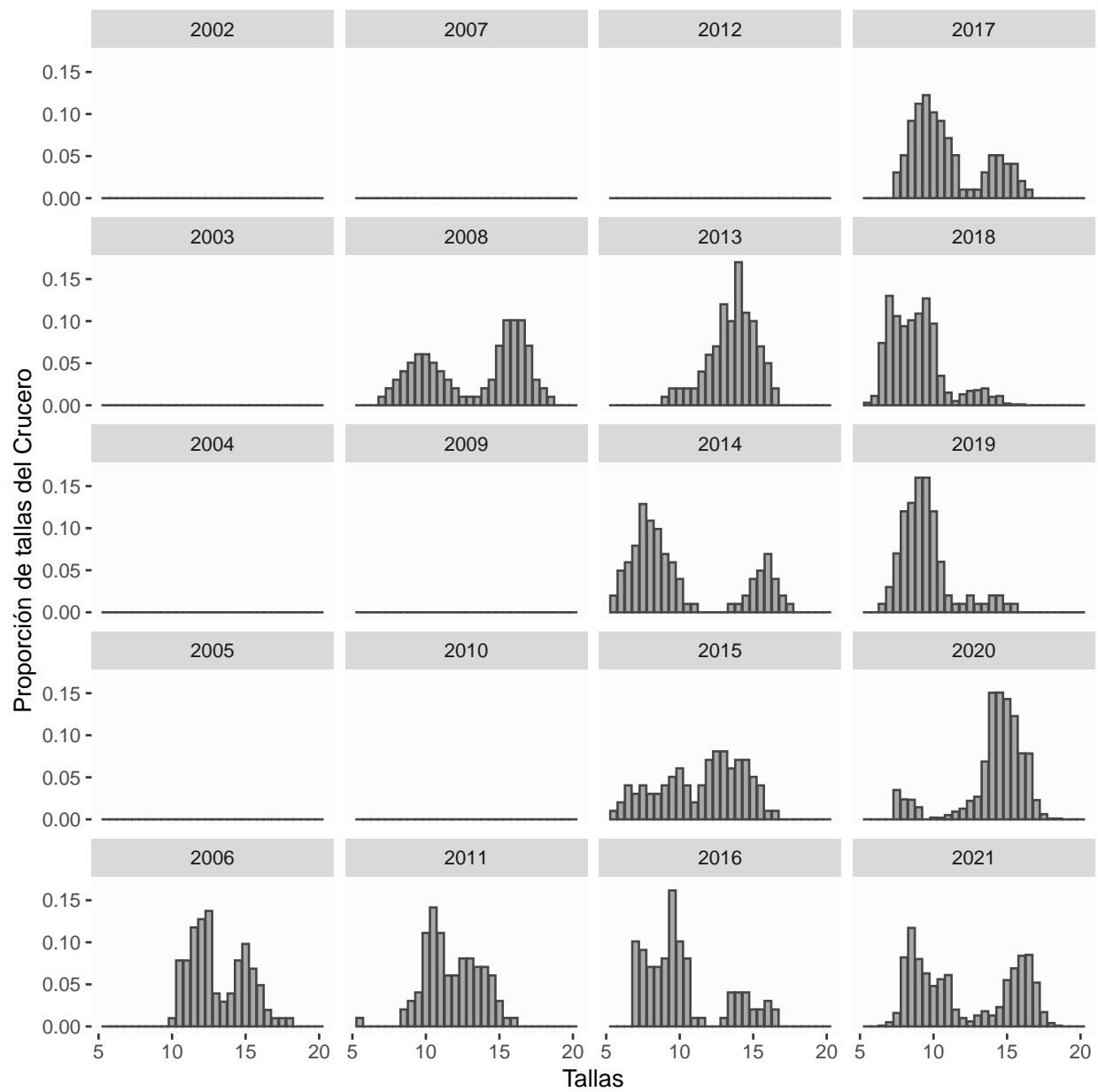


| Año | BioCrucero |
|------|------------|
| 2006 | 194.719 |
| 2007 | NA |
| 2008 | 114.640 |
| 2009 | NA |
| 2010 | NA |
| 2011 | 88.116 |
| 2012 | NA |
| 2013 | 124.729 |
| 2014 | 113.855 |
| 2015 | 60.498 |
| 2016 | 106.245 |
| 2017 | 66.882 |
| 2018 | 20.361 |
| 2019 | 43.788 |
| 2020 | 160.742 |
| 2021 | 70.259 |

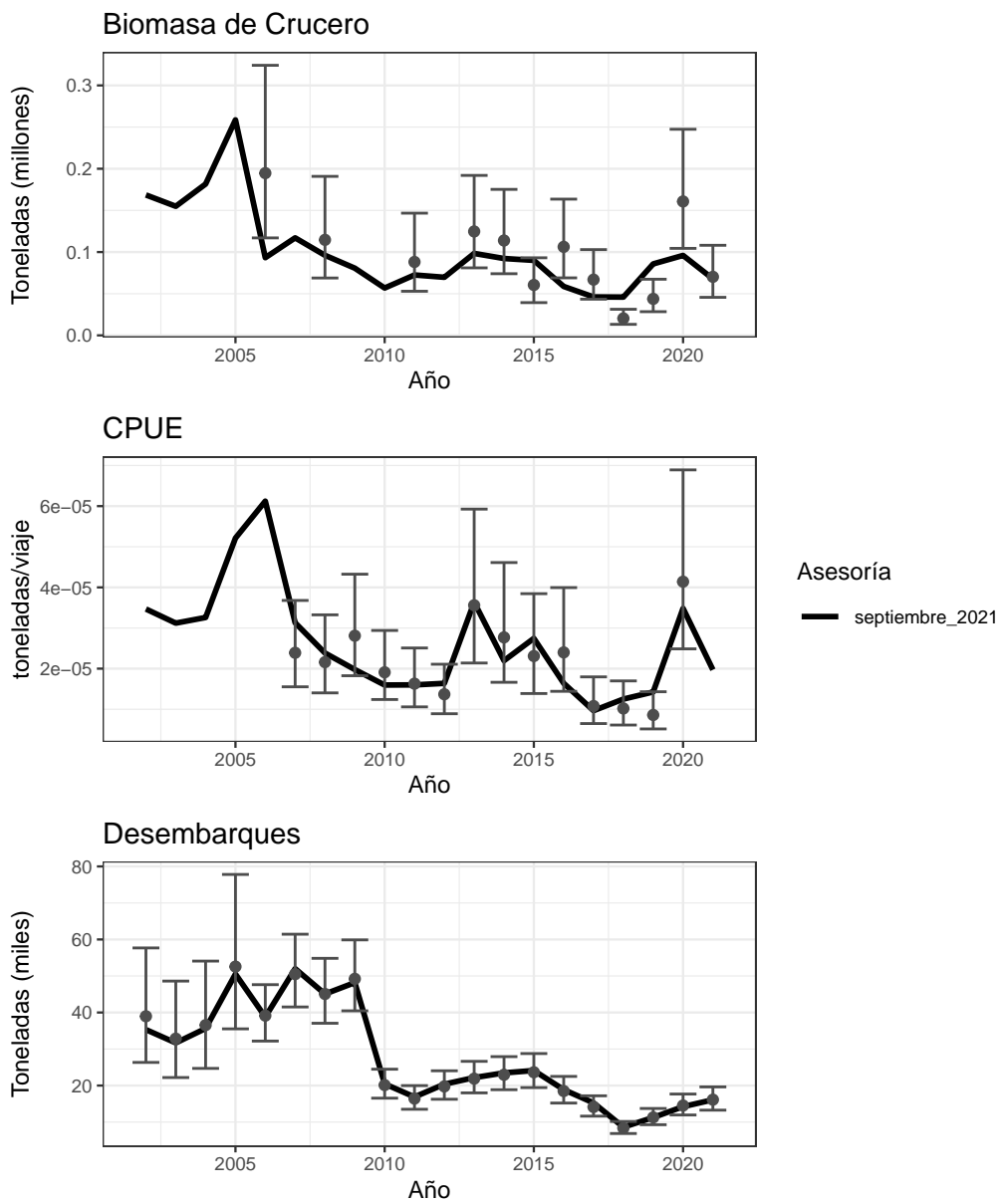
ESTRUCTURA DE TALLAS DE LA FLOTA



ESTRUCTURA DE TALLAS DEL CRUCERO



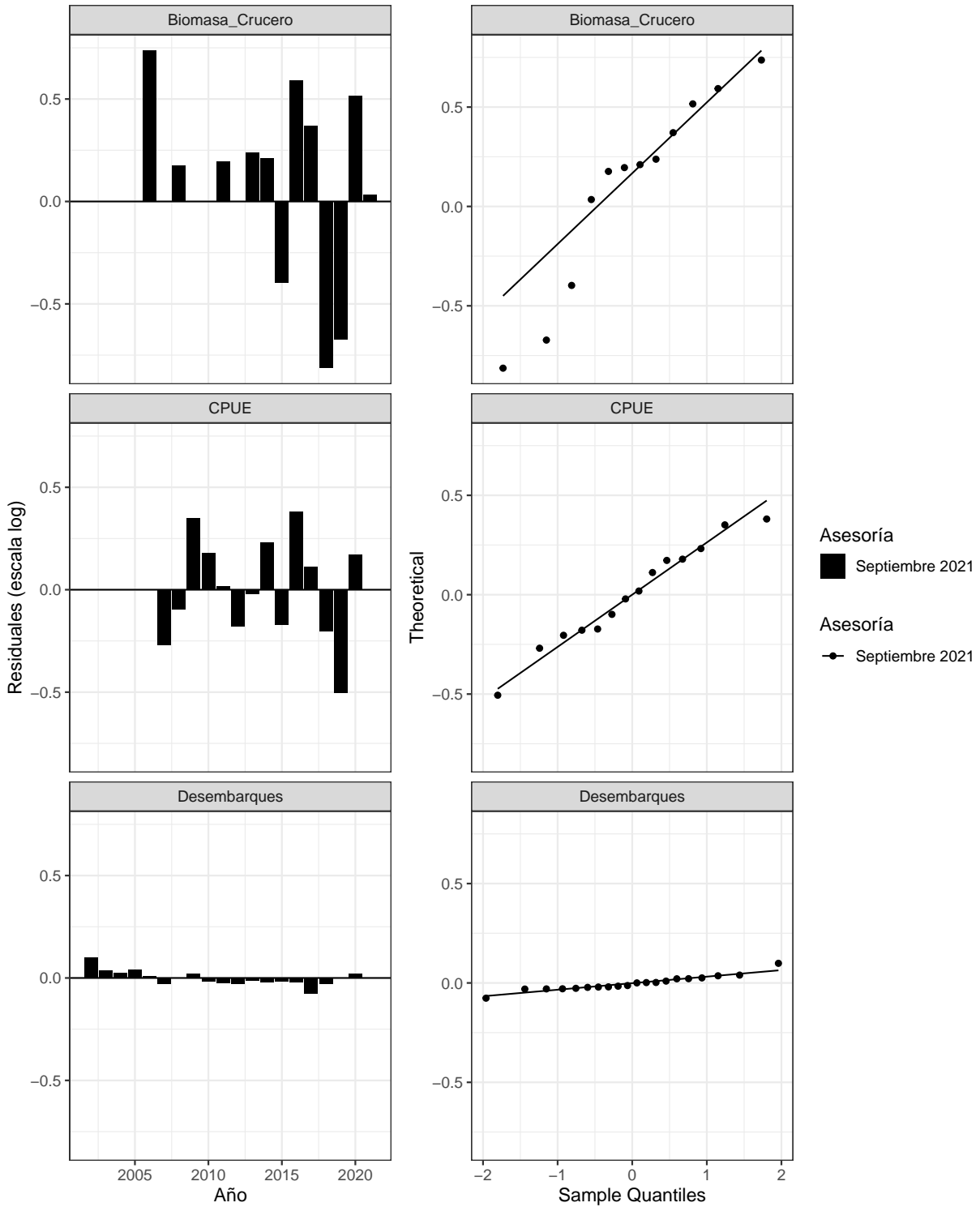
3.2. Ajustes del modelo a los datos de índices



| Biomasa_Crucero | CPUE | Desembarques |
|-----------------|------|--------------|
| NA | NA | 38974 |
| NA | NA | 32843 |
| NA | NA | 36545 |
| NA | NA | 52569 |
| 194719 | NA | 39146 |
| NA | 23.9 | 50506 |
| 114640 | 21.6 | 45078 |
| NA | 28.1 | 49225 |
| NA | 19.1 | 20123 |
| 88116 | 16.3 | 16429 |
| NA | 13.7 | 19763 |
| 124729 | 35.6 | 21888 |
| 113855 | 27.7 | 22951 |
| 60498 | 23.1 | 23643 |
| 106245 | 24.0 | 18495 |
| 66882 | 10.8 | 14134 |
| 20361 | 10.2 | 8355 |
| 43788 | 8.6 | 11278 |
| 160742 | 41.4 | 14523 |
| 70259 | NA | 16136 |

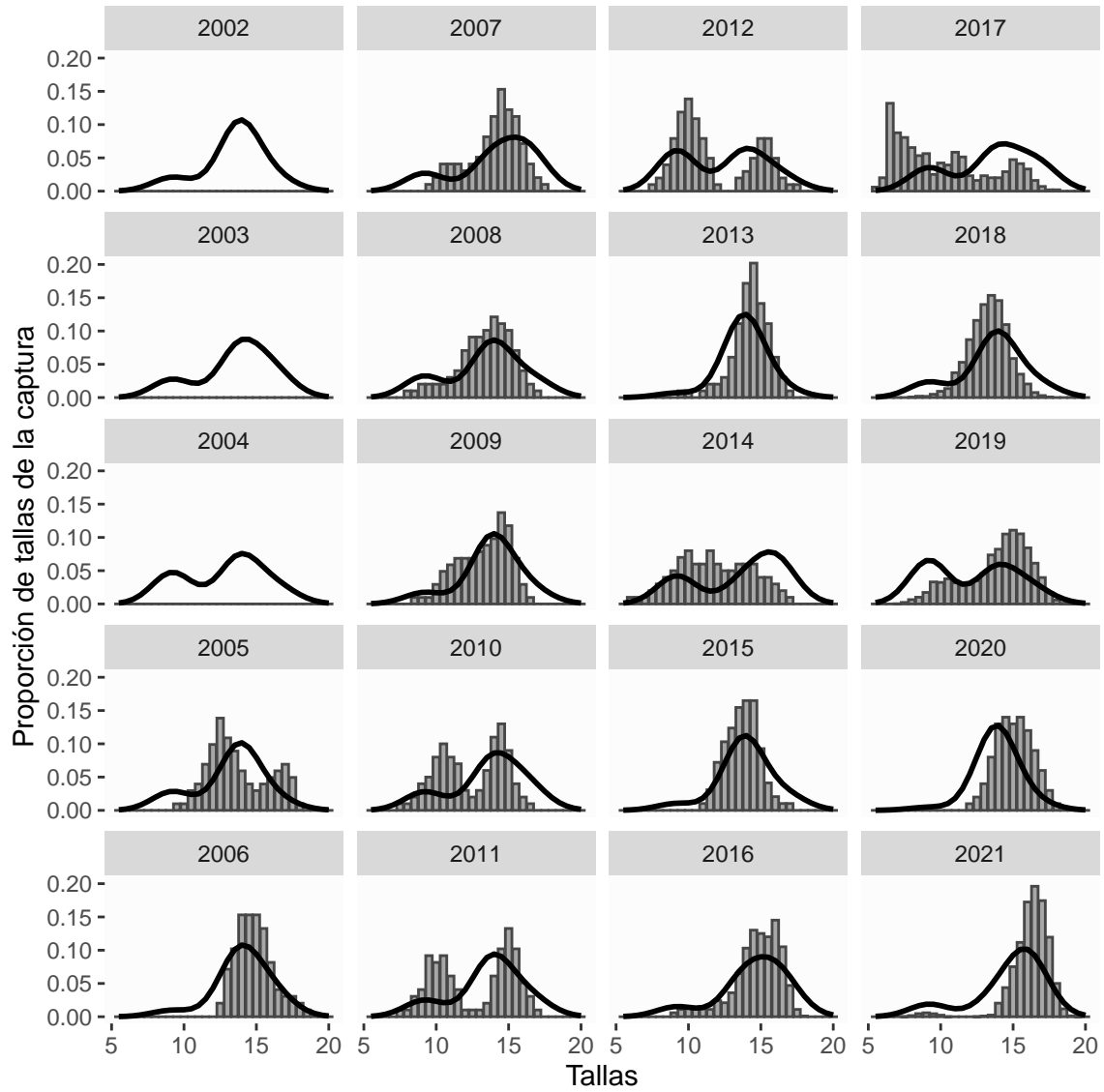
| Biomasa_Crucero | CPUE | Desembarques |
|-----------------|------|--------------|
| 168540 | 35 | 35310 |
| 154906 | 31 | 31681 |
| 181624 | 33 | 35631 |
| 258633 | 52 | 50532 |
| 93230 | 61 | 38784 |
| 117061 | 31 | 52006 |
| 96118 | 24 | 45069 |
| 80656 | 20 | 48181 |
| 56854 | 16 | 20455 |
| 72474 | 16 | 16879 |
| 69707 | 16 | 20379 |
| 98347 | 36 | 22175 |
| 92264 | 22 | 23466 |
| 90012 | 27 | 24113 |
| 58724 | 16 | 18879 |
| 46140 | 10 | 15259 |
| 45940 | 13 | 8609 |
| 85770 | 14 | 11258 |
| 95948 | 35 | 14224 |
| 67861 | 20 | 16098 |

3.2. Análisis de Residuales de los índices

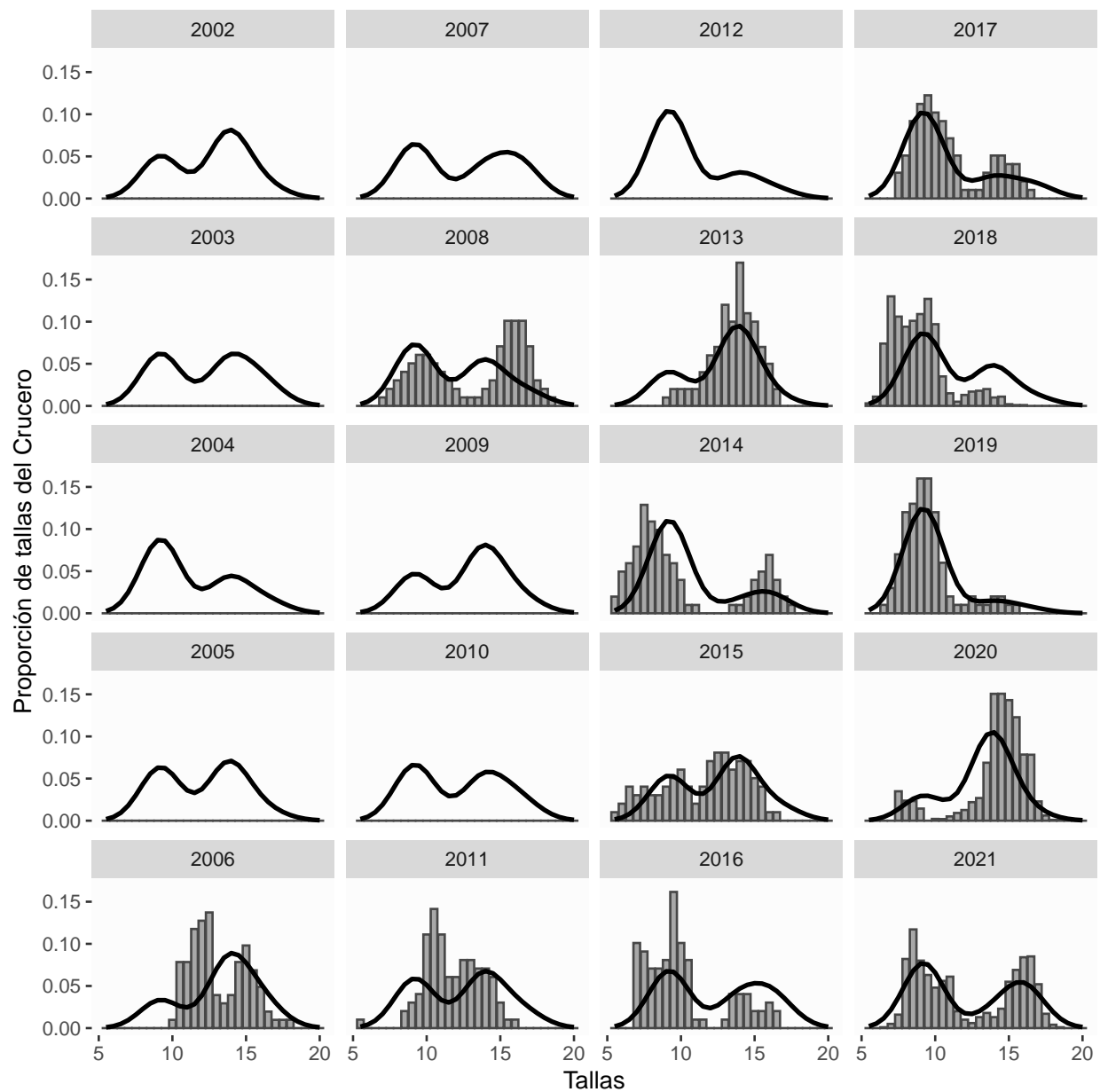


3.3. Ajustes del modelo a los datos de Composiciones de tallas

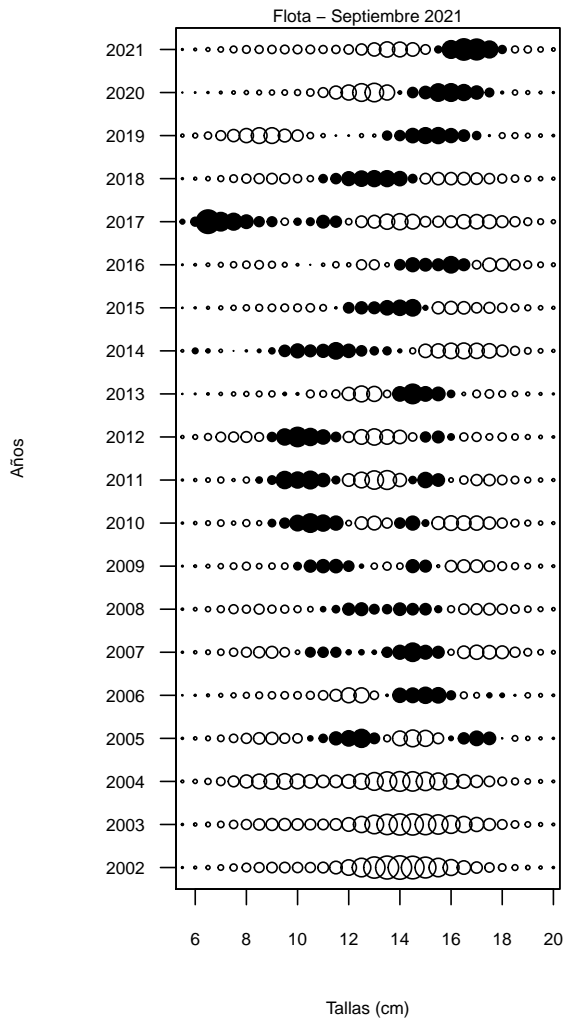
FLOTA



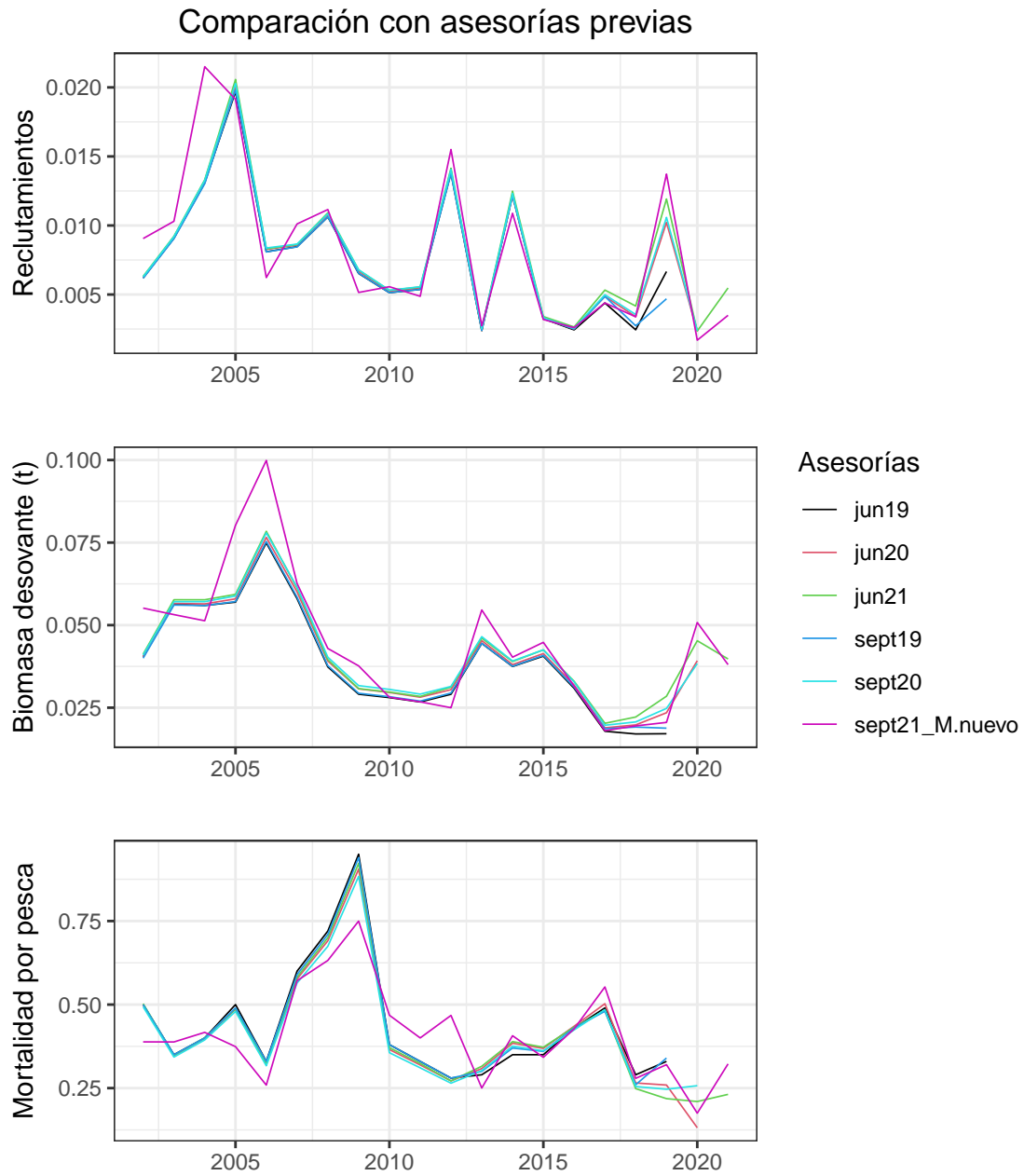
CRUCERO



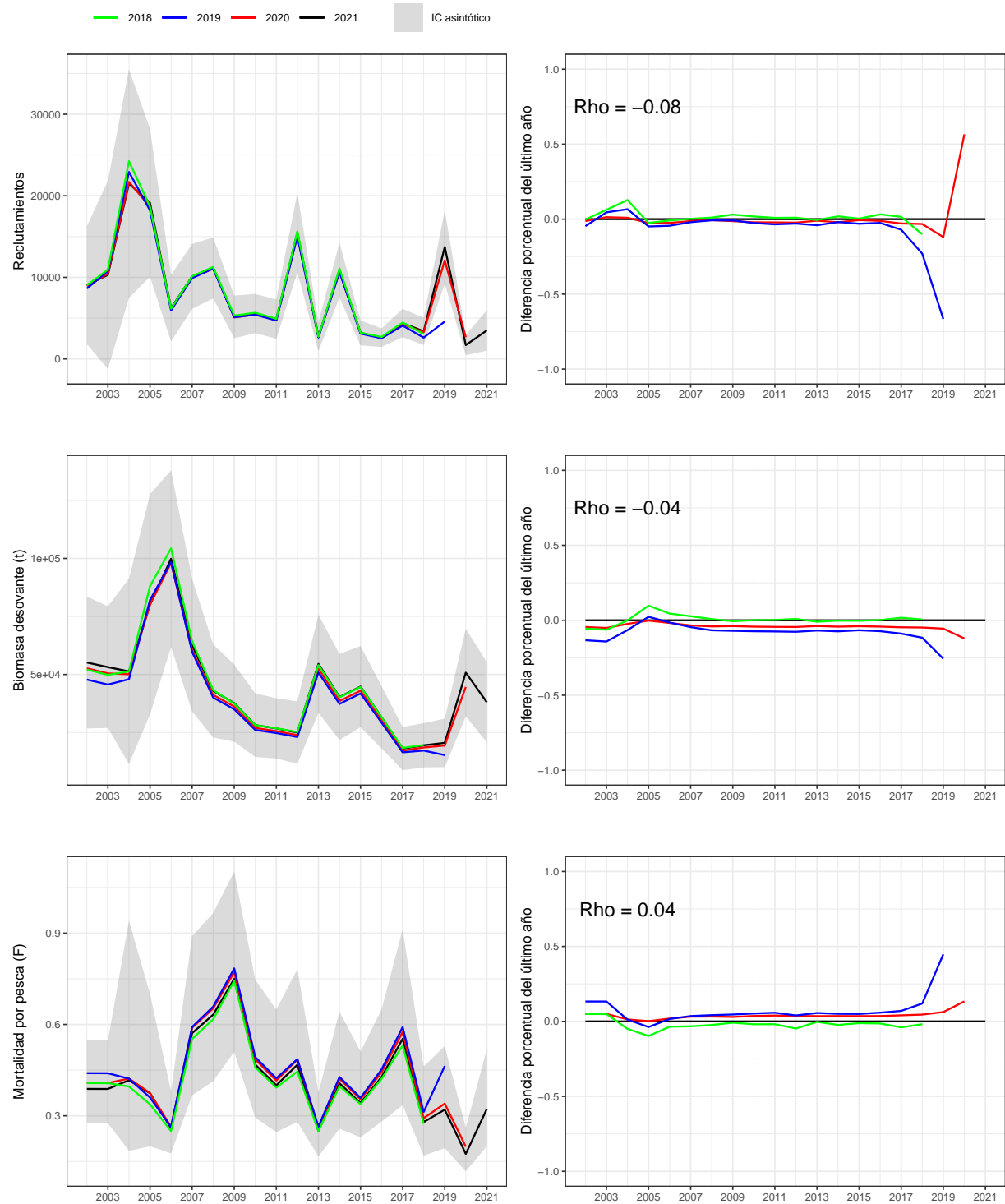
3.4. Análisis de Residuales de Composiciones de tallas



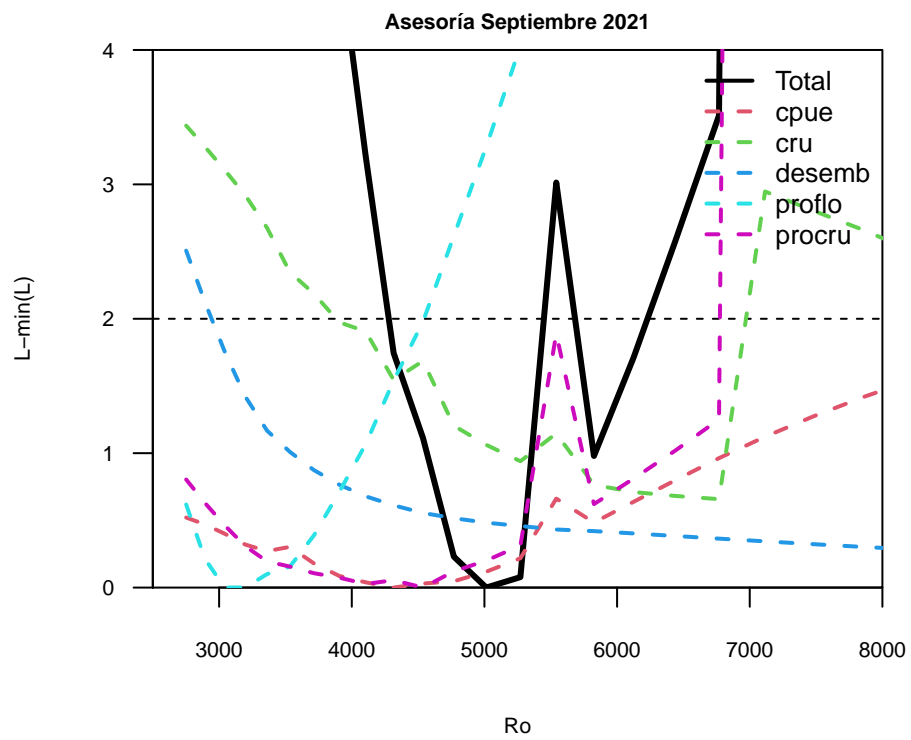
3.5. Comparación con evaluaciones anteriores



6.5. Análisis retrospectivo modelo alternativo



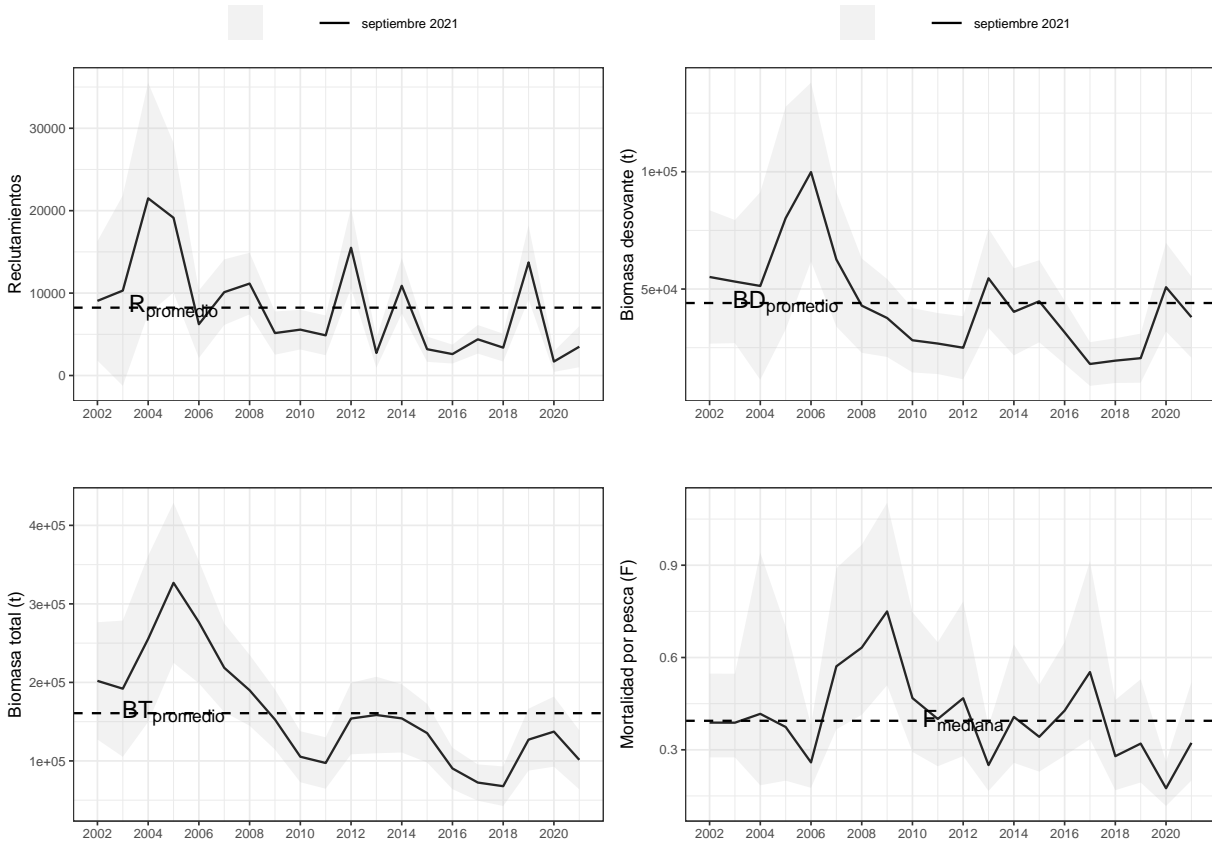
3.7. Perfil de verosimilitud



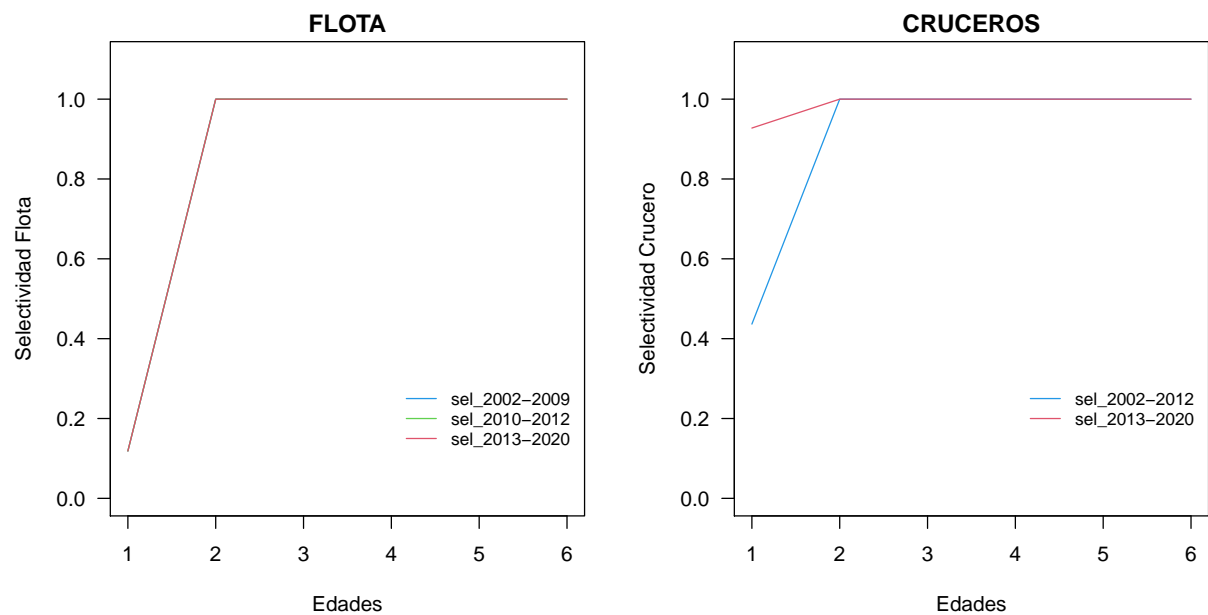
4. RESULTADOS OBJETIVO 2

“Establecer el estatus actualizado de sardina austral, sobre la base de sus principales indicadores estandarizados de estado y flujo, propagando para estos efectos todas las fuentes de incertidumbre subyacente a la pesquería.”

4.1. Indicadores del stock



| | |
|----------|------------|
| Rt0_mean | 8233.890 |
| BT0_mean | 160776.100 |
| BD0_mean | 44048.700 |
| R15_18 | 3391.875 |
| BT16_18 | 76887.667 |
| BT19_20 | 132210.000 |



| | Edades | Selbloque1 | Selbloque2 | Selbloque3 |
|----|--------|------------|------------|------------|
| V1 | 1 | 0.118519 | 0.118519 | 0.118519 |
| V2 | 2 | 1.000000 | 1.000000 | 1.000000 |
| V3 | 3 | 1.000000 | 1.000000 | 1.000000 |
| V4 | 4 | 1.000000 | 1.000000 | 1.000000 |
| V5 | 5 | 1.000000 | 1.000000 | 1.000000 |
| V6 | 6 | 1.000000 | 1.000000 | 1.000000 |

| | Edades | SelCrubloque1 | SelCrubloque2 |
|----|--------|---------------|---------------|
| V1 | 1 | 0.436492 | 0.927575 |
| V2 | 2 | 1.000000 | 1.000000 |
| V3 | 3 | 1.000000 | 1.000000 |
| V4 | 4 | 1.000000 | 1.000000 |
| V5 | 5 | 1.000000 | 1.000000 |
| V6 | 6 | 1.000000 | 1.000000 |

Tabla 13.

Indicadores poblacionales de sardina austral en aguas interiores de Chiloé. Tabla comparativa entre los resultados de la evaluación de septiembre (primer hito) y junio (segundo hito).

| anos | BD_sep | BT_sep | R_sep | F_sep |
|------|--------|--------|-------|-------|
| 2002 | 55152 | 201970 | 9055 | 0.39 |
| 2003 | 53179 | 192010 | 10303 | 0.39 |
| 2004 | 51321 | 255450 | 21500 | 0.42 |
| 2005 | 80232 | 326810 | 19139 | 0.37 |
| 2006 | 99869 | 276750 | 6226 | 0.26 |
| 2007 | 62607 | 218600 | 10112 | 0.57 |
| 2008 | 42930 | 189970 | 11155 | 0.63 |
| 2009 | 37663 | 152740 | 5150 | 0.75 |
| 2010 | 28169 | 105360 | 5565 | 0.47 |
| 2011 | 26766 | 97339 | 4873 | 0.40 |
| 2012 | 24980 | 153960 | 15503 | 0.47 |
| 2013 | 54598 | 158470 | 2735 | 0.25 |
| 2014 | 40289 | 154170 | 10885 | 0.41 |
| 2015 | 44786 | 135440 | 3191 | 0.34 |
| 2016 | 31542 | 90428 | 2601 | 0.43 |
| 2017 | 18053 | 72424 | 4392 | 0.55 |
| 2018 | 19482 | 67811 | 3384 | 0.28 |
| 2019 | 20535 | 127120 | 13723 | 0.32 |
| 2020 | 50792 | 137300 | 1693 | 0.17 |
| 2021 | 38029 | 101400 | 3494 | 0.32 |

4.2. Estados de explotación

| Septiembre 2021 | |
|-------------------------------|--------|
| BD_0 | 61.480 |
| BD_{RMS} | 33.814 |
| BD_{LIM} | 16.907 |
| F_{RMS} | 0.299 |
| $p(BD_{2021} < BD_{RMS})$ | 0.250 |
| $p(F_{2021} > F_{RMS})$ | 0.610 |
| $p(\text{sobreexplotación})$ | 0.120 |
| $p(\text{agotado/colapsado})$ | 0.000 |
| $p(\text{sobrepesca})$ | 0.470 |

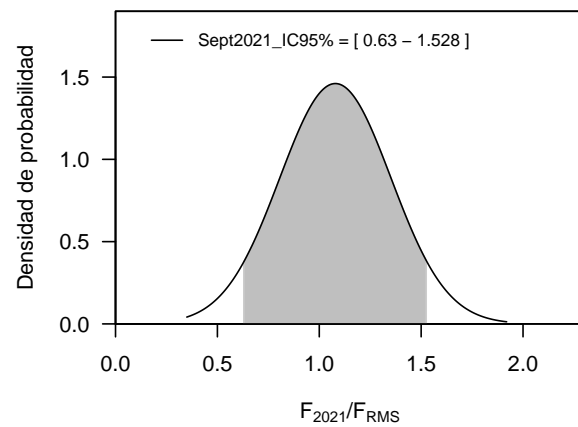
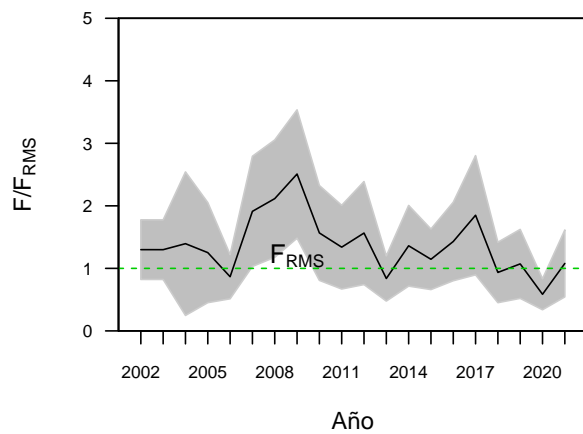
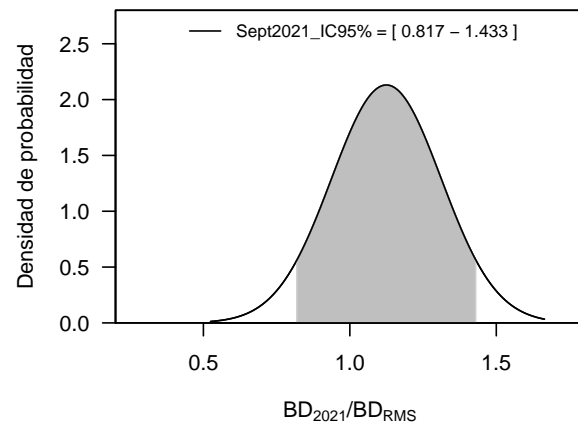
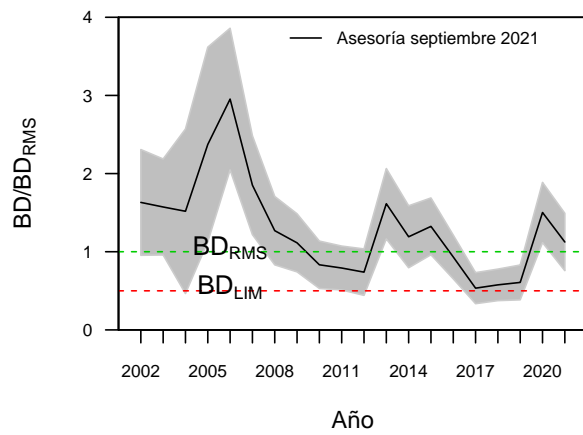
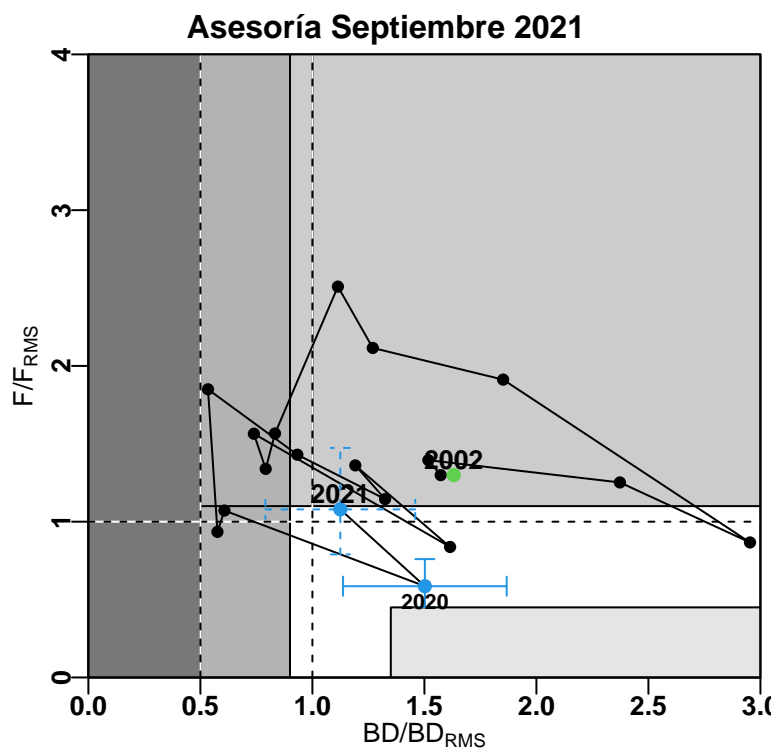


Tabla 15.

Variación interanual de F respecto de F_{RMS} (F/F_{RMS}), BD respecto de $BDRMS$ (BD/BD_{RMS}), y de las tasas de explotación referidos a la biomasa total (Y/BT) en la pesquería de sardina austral.

| anos | F/F_{RMS} | BD/BD_{RMS} | Y/BT |
|------|-------------|---------------|--------|
| 2002 | 1.300 | 1.631 | 0.175 |
| 2003 | 1.299 | 1.573 | 0.165 |
| 2004 | 1.395 | 1.518 | 0.139 |
| 2005 | 1.252 | 2.373 | 0.155 |
| 2006 | 0.867 | 2.953 | 0.140 |
| 2007 | 1.912 | 1.852 | 0.238 |
| 2008 | 2.115 | 1.270 | 0.237 |
| 2009 | 2.509 | 1.114 | 0.315 |
| 2010 | 1.566 | 0.833 | 0.194 |
| 2011 | 1.339 | 0.792 | 0.173 |
| 2012 | 1.565 | 0.739 | 0.132 |
| 2013 | 0.838 | 1.615 | 0.140 |
| 2014 | 1.361 | 1.191 | 0.152 |
| 2015 | 1.145 | 1.324 | 0.178 |
| 2016 | 1.430 | 0.933 | 0.209 |
| 2017 | 1.850 | 0.534 | 0.211 |
| 2018 | 0.935 | 0.576 | 0.127 |
| 2019 | 1.072 | 0.607 | 0.089 |
| 2020 | 0.586 | 1.502 | 0.104 |
| 2021 | 1.079 | 1.125 | 0.159 |

Diagramas de Fase

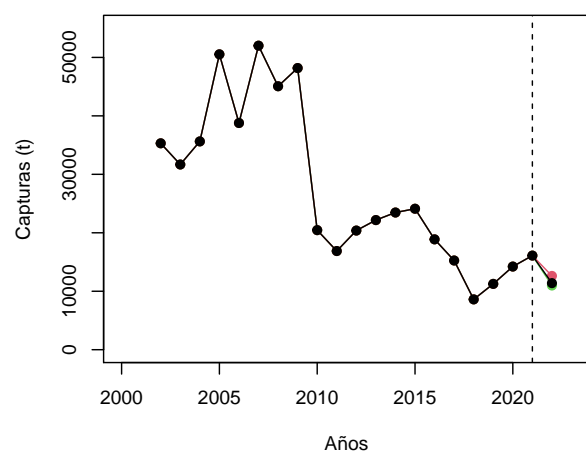
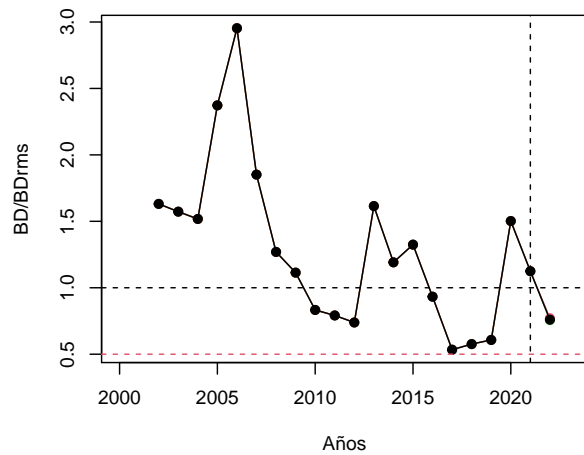
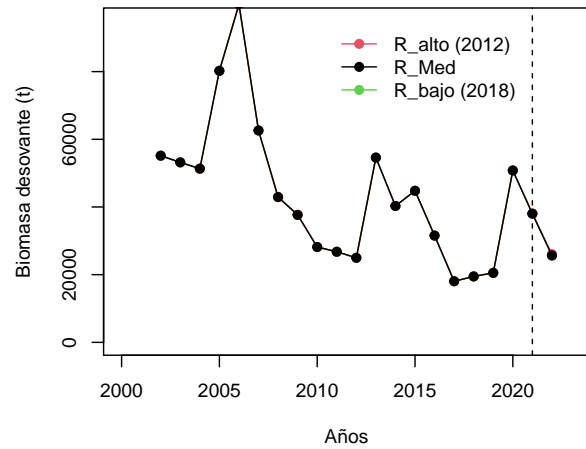
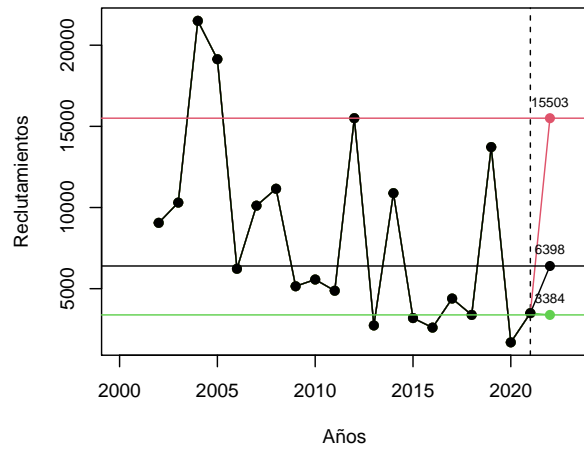


5. RESULTADOS OBJETIVO 3

“Determinar niveles de Captura Biológicamente Aceptable (CBA) que lleven y/o mantenga la pesquería en torno al Rendimiento Máximo Sostenible (RMS), a partir de un análisis de riesgo en condiciones de incertidumbre de no alcanzar los objetivos de conservación y sostenibilidad conforme lo establece la LGPA y contenidos en el Plan de Manejo y/o en el Programa de Recuperación respectivo, según corresponda.”

1. Proyección del stock

| | R_med | R_alto | R_bajo |
|-------------------------------|-------|--------|--------|
| BD_{RMS} (mil t) | 33.81 | 33.81 | 33.81 |
| BD_{2022} (mil t) | 26.00 | 26.00 | 26.00 |
| BD_{2022}/BD_{RMS} | 0.76 | 0.77 | 0.76 |
| $p(BD_{2022} < BD_{RMS})$ | 0.96 | 0.95 | 0.96 |
| $p(\text{sobreexplotación})$ | 0.84 | 0.82 | 0.85 |
| $p(\text{agotado/colapsado})$ | 0.03 | 0.03 | 0.03 |

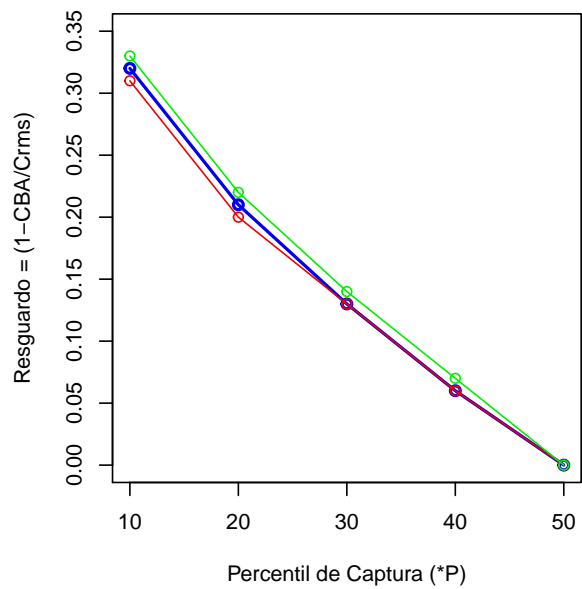
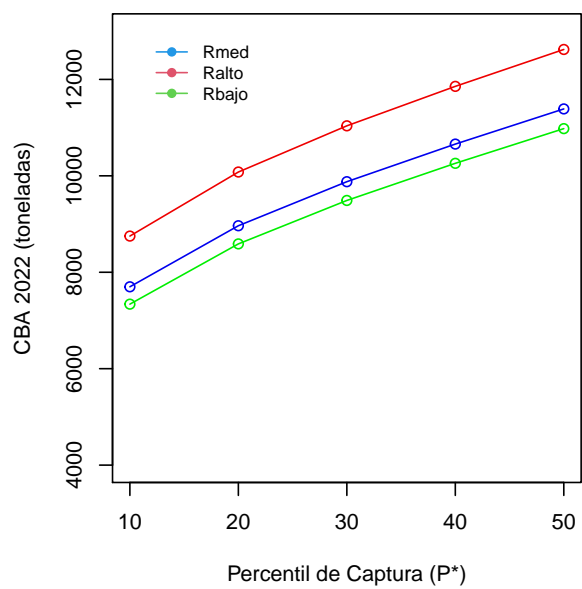
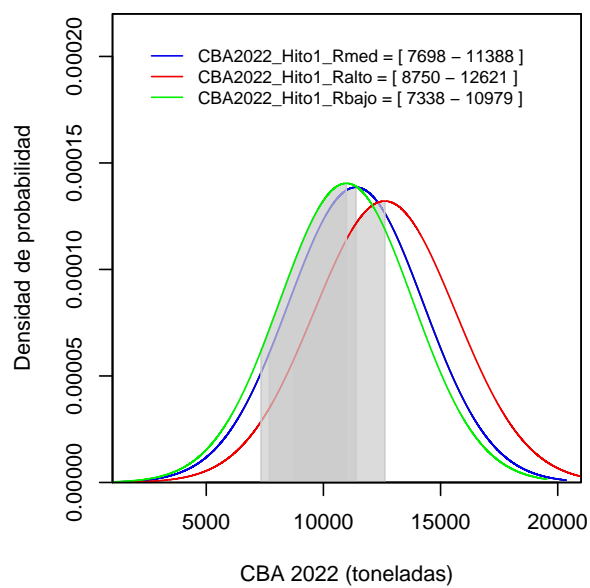
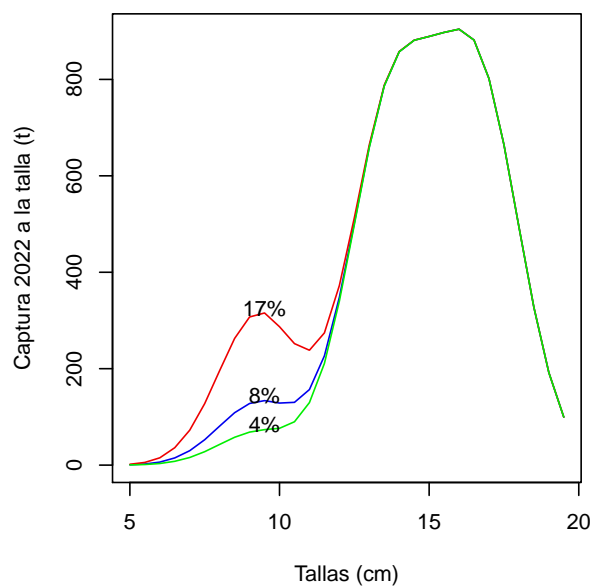


2. Tablas de decisión CBA para cada escenario de reclutamiento, percentil de captura y resguardo

| percentil | CBA_Rmed | CBA_Ralto | CBA_Rbajo |
|-----------|----------|-----------|-----------|
| 10 | 7698 | 8750 | 7338 |
| 20 | 8965 | 10079 | 8588 |
| 30 | 9878 | 11037 | 9489 |
| 40 | 10659 | 11856 | 10259 |
| 50 | 11388 | 12621 | 10979 |

| percentil | Resguardo_Rmed | Resguardo_Ralto | Resguardo_Rbajo |
|-----------|----------------|-----------------|-----------------|
| 10 | 0.32 | 0.31 | 0.33 |
| 20 | 0.21 | 0.20 | 0.22 |
| 30 | 0.13 | 0.13 | 0.14 |
| 40 | 0.06 | 0.06 | 0.07 |
| 50 | 0.00 | 0.00 | 0.00 |

| percentil | Aporte_Rmed | Aporte_Ralto | Aporte_Rbajo |
|-----------|-------------|--------------|--------------|
| 10 | 0.10 | 0.21 | 0.05 |
| 20 | 0.09 | 0.19 | 0.05 |
| 30 | 0.08 | 0.18 | 0.05 |
| 40 | 0.08 | 0.17 | 0.04 |
| 50 | 0.08 | 0.17 | 0.04 |



ESCENARIOS DE CAPTURA 2021 Y ESTRUCTURA DE TALLAS 2021 ALTERNATIVOS PARA EVALUAR EL EFECTO EN EL ESTATUS 2021, SOBREVIVENCIA 2022 Y CBA 2022.

Escenarios alternativos de captura 2021

La CBA recomendada por el CCT-PP en julio 2021 (https://www.subpesca.cl/portal/616/articles-111622_documento.pdf) fueron 16.136 toneladas, descontando el descarte, la recomendación fue de 15.765 toneladas para el año 2021.

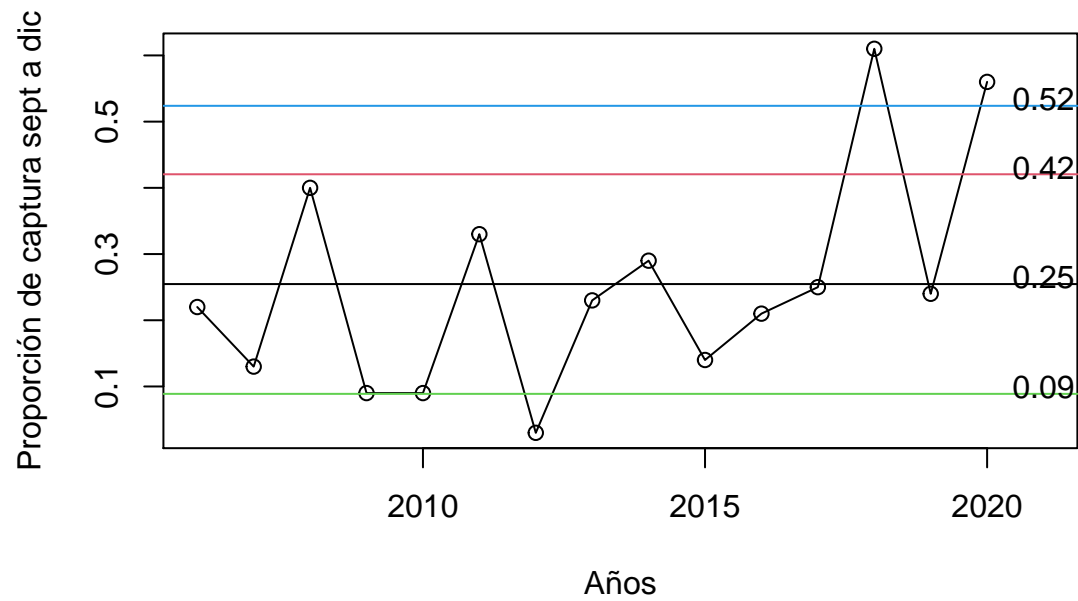
A Agosto 2021 se han capturado 7506 toneladas, es decir un 48% de la CBA recomendada (15765). De este modo, se asume que entre los meses de septiembre a diciembre se capturaran 8259 toneladas (52% de CBA recomendada). (Similar a lo ocurrido durante el año 2020)

Si tomamos como referencia el desembarque mensual del año 2020, a agosto se capturaron 6280 toneladas, esto es , un 44% del desembarque total (14194 t). Entre los meses de septiembre a diciembre 2020 se capturaron 7914 toneladas.

En promedio entre los meses de septiembre a diciembre se capturan x% de los desembarques anuales (años 2006-2020).

- Caso 0 = Captura 2021 igual a CBA recomendada (15765 (con descarte 16136)
- Caso 1 = Captura 2021 igual a CRMS
- Caso 2 = Captura 2021 igual a 10000 (según cálculo de Doris)

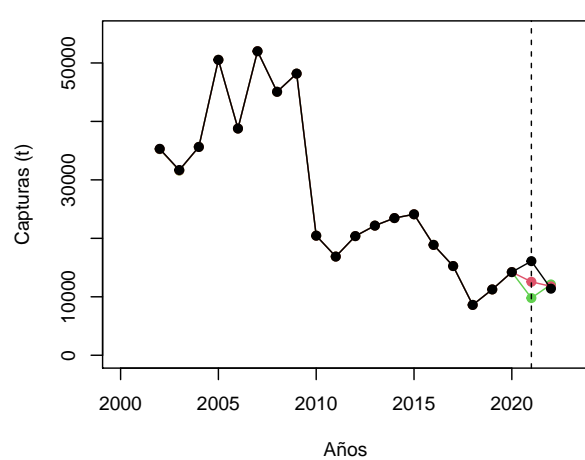
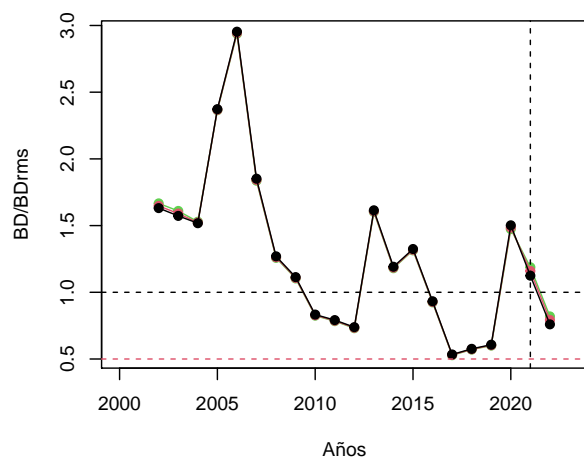
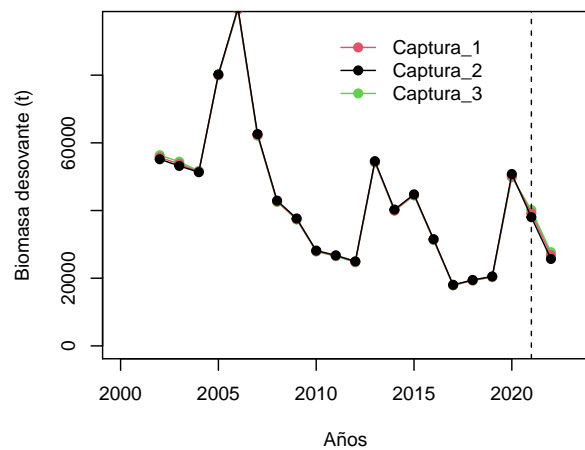
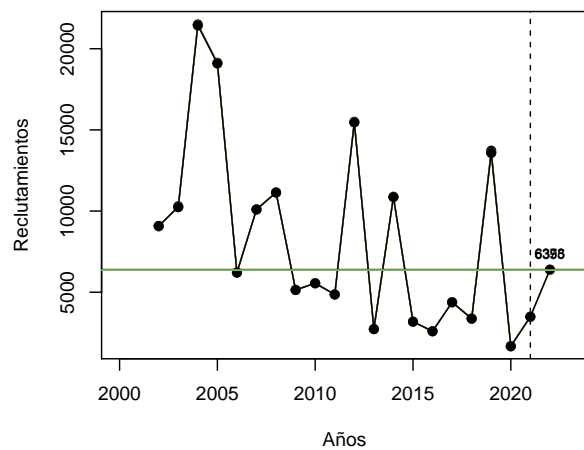
| Años | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|------|------|-------|------|-------|------|------|------|------|-----|------|------|------|
| 2006 | 0 | 8384 | 7485 | 2008 | 3410 | 2760 | 3286 | 723 | 367 | 2885 | 2822 | 1831 |
| 2007 | 5740 | 5101 | 4181 | 4651 | 7430 | 4694 | 3027 | 3718 | 17 | 1822 | 4093 | 0 |
| 2008 | 0 | 10122 | 6489 | 4329 | 4823 | 951 | 282 | 13 | 34 | 7046 | 5954 | 5035 |
| 2009 | 0 | 5 | 9488 | 13247 | 9750 | 6553 | 4407 | 1514 | 88 | 0 | 1814 | 2356 |
| 2010 | 164 | 1445 | 6826 | 3397 | 4686 | 1564 | 180 | 56 | 143 | 0 | 758 | 1006 |
| 2011 | 623 | 279 | 2887 | 2785 | 3744 | 700 | 53 | 111 | 21 | 14 | 2027 | 3549 |
| 2012 | 0 | 3855 | 3190 | 2151 | 1193 | 2160 | 6521 | 0 | 0 | 3 | 4 | 642 |
| 2013 | 826 | 6454 | 5252 | 1976 | 300 | 637 | 618 | 737 | 240 | 220 | 1776 | 2715 |
| 2014 | 1087 | 3299 | 4284 | 756 | 1822 | 1877 | 2678 | 354 | 43 | 175 | 2722 | 3681 |
| 2015 | 9088 | 5533 | 4603 | 8 | 116 | 665 | 365 | 65 | 42 | 59 | 66 | 3100 |
| 2016 | 2523 | 6362 | 739 | 1715 | 569 | 1698 | 871 | 134 | 37 | 62 | 86 | 3664 |
| 2017 | 531 | 1280 | 2858 | 61 | 2425 | 1858 | 947 | 609 | 91 | 103 | 913 | 2456 |
| 2018 | 126 | 22 | 48 | 74 | 495 | 870 | 955 | 651 | 688 | 61 | 1122 | 3244 |
| 2019 | 2456 | 1524 | 1218 | 145 | 483 | 770 | 1431 | 520 | 20 | 182 | 1056 | 1464 |
| 2020 | 1899 | 2101 | 1027 | 15 | 326 | 110 | 465 | 337 | 87 | 80 | 3064 | 4683 |
| 2021 | 705 | 3446 | 1959 | 93 | 222 | 631 | 327 | 123 | 0 | 0 | 0 | 0 |



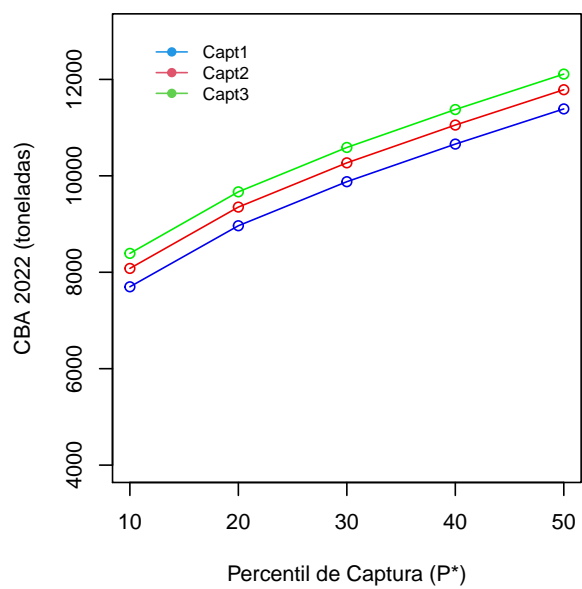
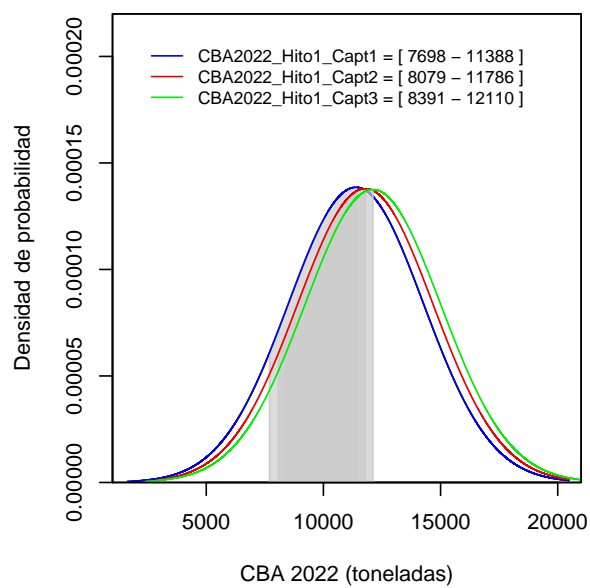
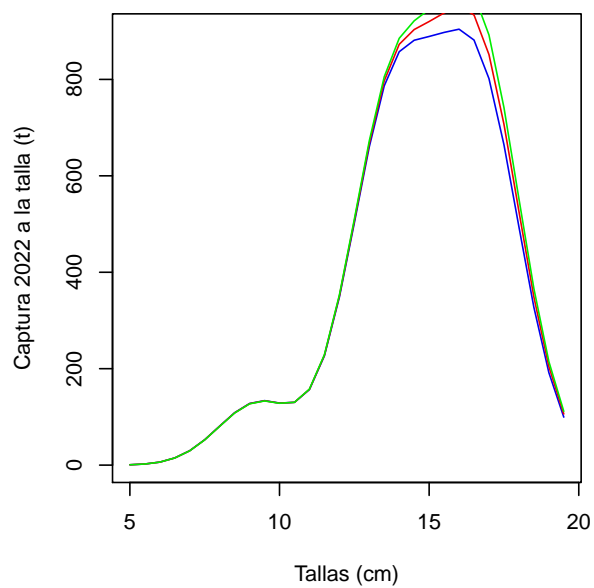
| escenarios | PropCapt2sem | Cap1sem | supuestoCap2sem | SupuestoCapt2021 | Condescarte |
|------------|--------------|---------|-----------------|------------------|-------------|
| 1 | 0.25 | 7506 | 5076 | 12582 | 12874 |
| 2 | 0.42 | 7506 | 8086 | 15592 | 15954 |
| 3 | 0.09 | 7506 | 2066 | 9572 | 9794 |
| 4 | 0.52 | 7506 | 8259 | 15765 | 16131 |

Escenarios alternativo Captura en torno al $RMS = 14900$

| | Captura_1 | Captura_2 | Captura_3 |
|-------------------------------|-----------|-----------|-----------|
| BD_{RMS} (mil t) | 33.81 | 33.81 | 33.81 |
| BD_{2022} (mil t) | 26.00 | 27.00 | 28.00 |
| BD_{2022}/BD_{RMS} | 0.76 | 0.80 | 0.82 |
| $p(BD_{2022} < BD_{RMS})$ | 0.96 | 0.93 | 0.90 |
| $p(\text{sobreexplotación})$ | 0.84 | 0.78 | 0.71 |
| $p(\text{agotado/colapsado})$ | 0.03 | 0.02 | 0.01 |

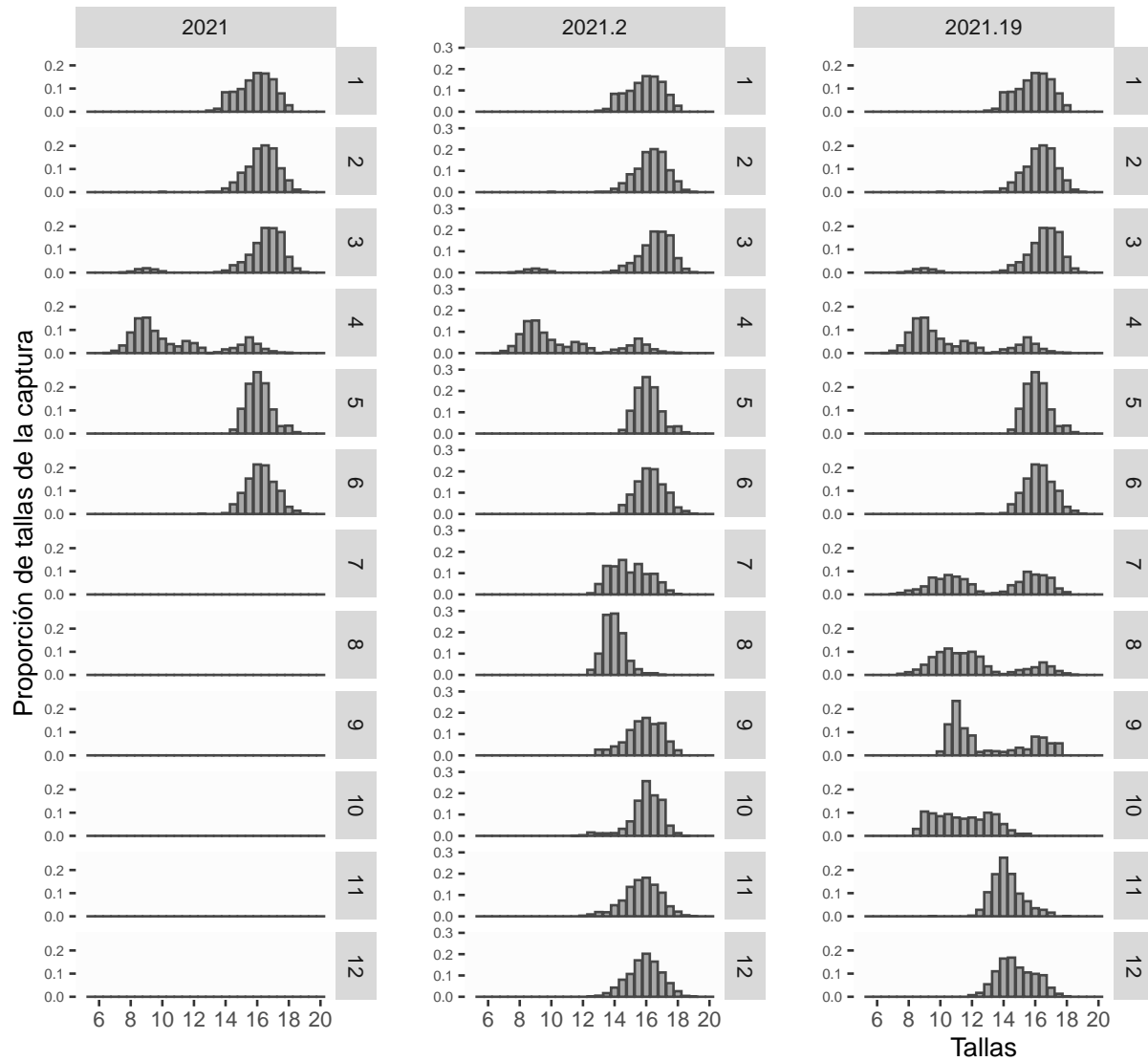


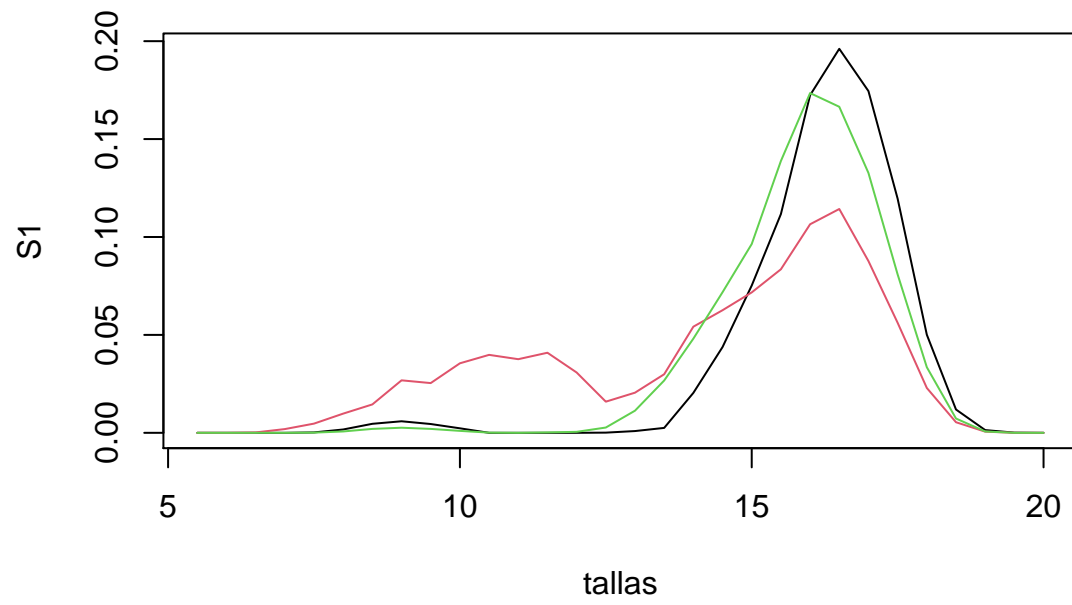
| percentil | CBA_Captura1 | CBA_Captura2 | CBA_Captura3 |
|-----------|--------------|--------------|--------------|
| 10 | 7698 | 8079 | 8391 |
| 20 | 8965 | 9352 | 9668 |
| 30 | 9878 | 10269 | 10588 |
| 40 | 10659 | 11053 | 11375 |
| 50 | 11388 | 11786 | 12110 |



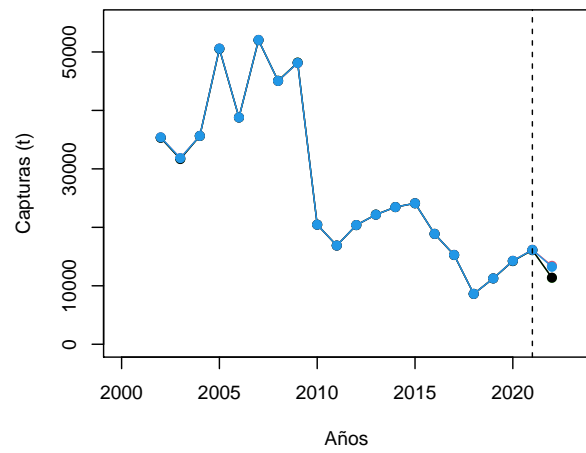
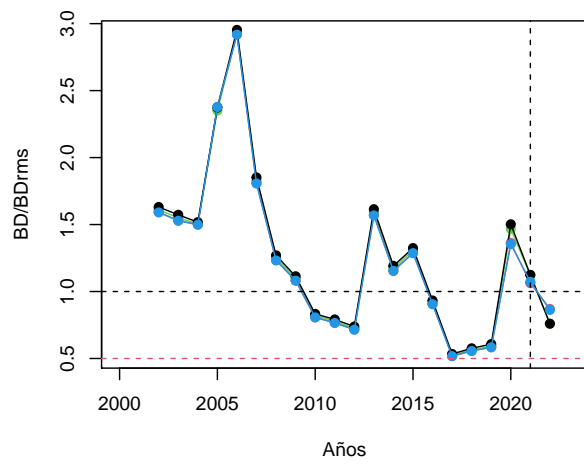
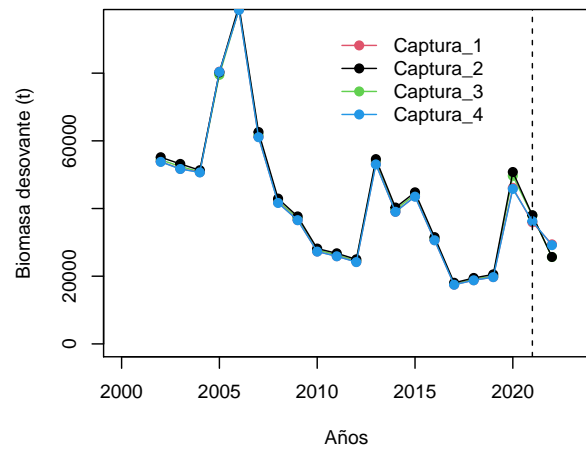
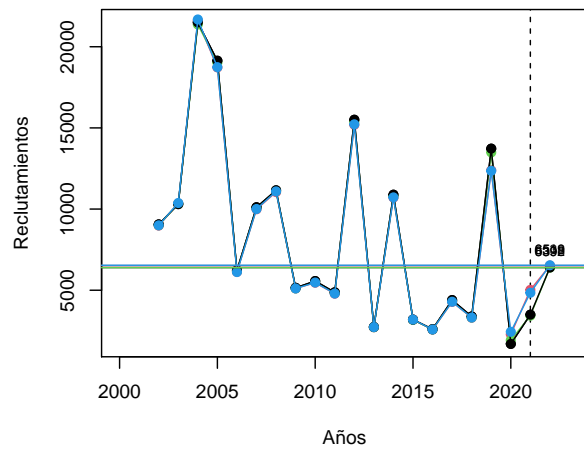
Escenarios alternativos de estructura de tallas 2021

- Caso 0 = estructura de tallas a junio 2021
- Caso 1 = sin estructura de tallas (estimadas por el modelo)
- Caso 2 = se asume un ingreso de juveniles durante el segundo semestre similar a lo ocurrido el año 2019
- Caso 3 = se asume bajo aporte de juveniles durante el segundo semestre similar a lo ocurrido el ao 2020





| | Tallas_1 | Tallas_2 | Tallas_3 | Tallas_4 |
|-------------------------------|----------|----------|----------|----------|
| BD_{RMS} (mil t) | 33.81 | 33.81 | 33.81 | 33.81 |
| BD_{2022} (mil t) | 26.00 | 29.00 | 26.00 | 29.00 |
| BD_{2022}/BD_{RMS} | 0.76 | 0.85 | 0.76 | 0.84 |
| $p(BD_{2022} < BD_{RMS})$ | 0.96 | 0.82 | 0.96 | 0.82 |
| $p(\text{sobreexplotaci3n})$ | 0.84 | 0.62 | 0.84 | 0.63 |
| $p(\text{agotado/colapsado})$ | 0.03 | 0.02 | 0.03 | 0.02 |



| percentil | CBA_Tallas1 | CBA_Tallas2 | CBA_Tallas3 | CBA_Tallas4 |
|-----------|-------------|-------------|-------------|-------------|
| 10 | 7698 | 8919 | 7673 | 8608 |
| 20 | 8965 | 10463 | 8937 | 10201 |
| 30 | 9878 | 11576 | 9848 | 11349 |
| 40 | 10659 | 12528 | 10626 | 12331 |
| 50 | 11388 | 13417 | 11354 | 13248 |

