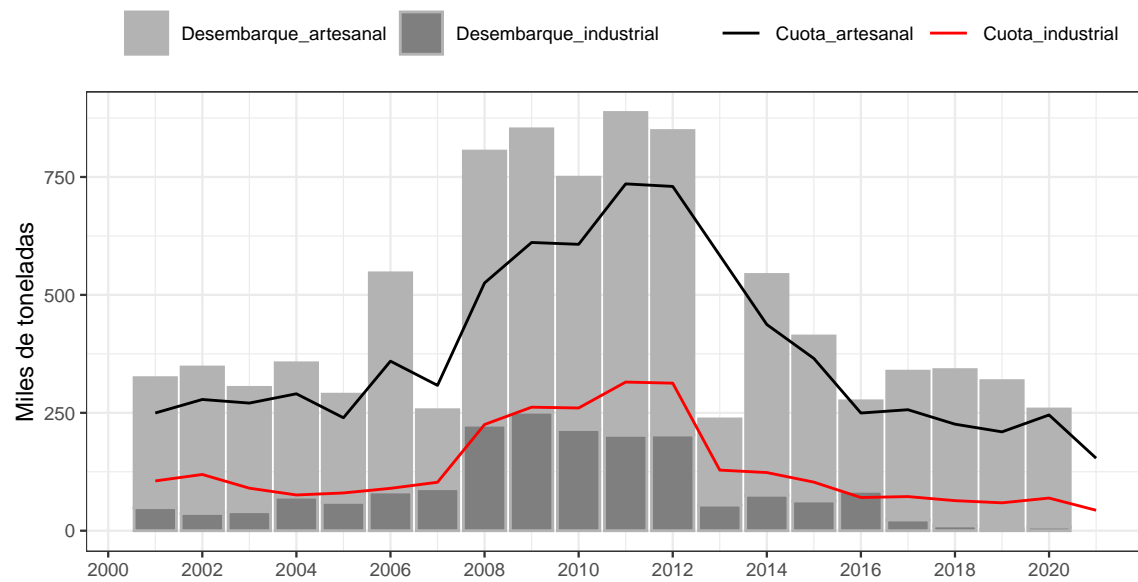


Figuras y Tablas para Tercer Informe de sardina común Centro sur

1. ANTECEDENTES

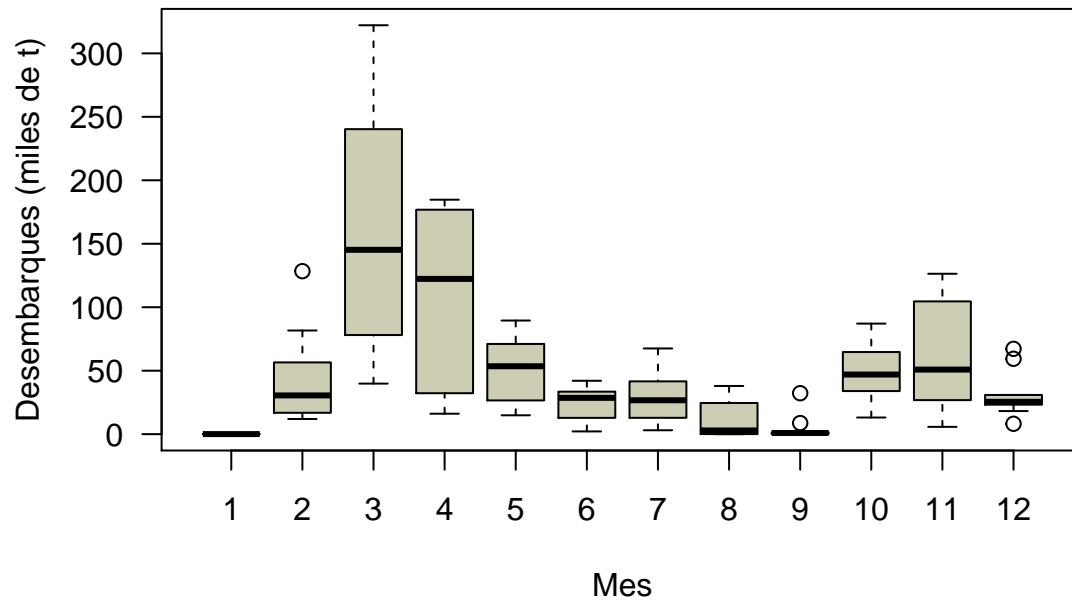


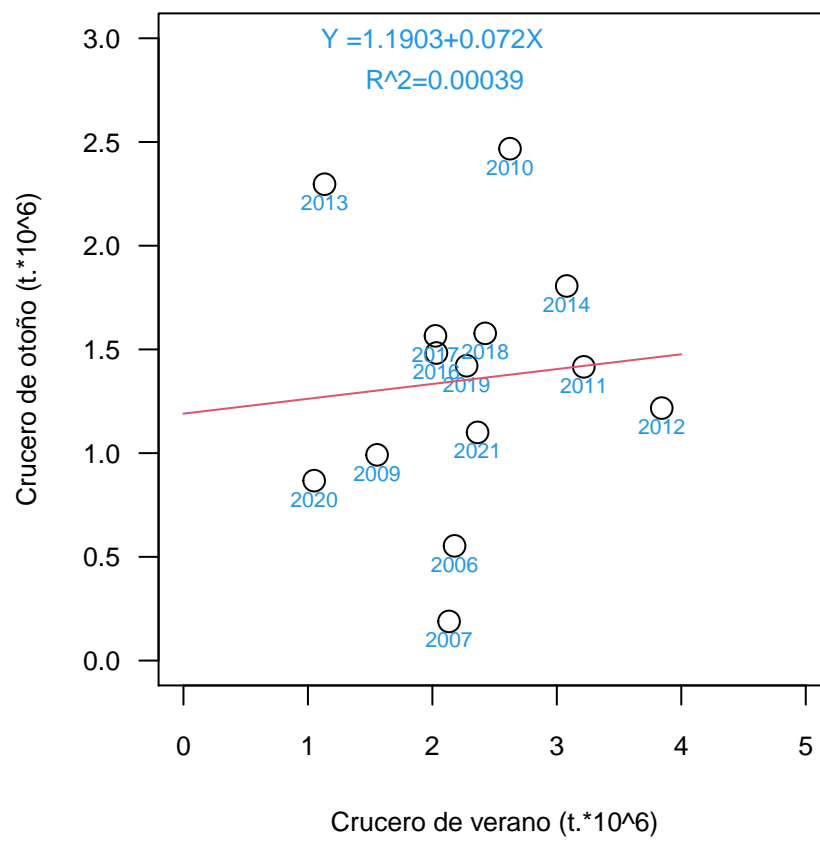
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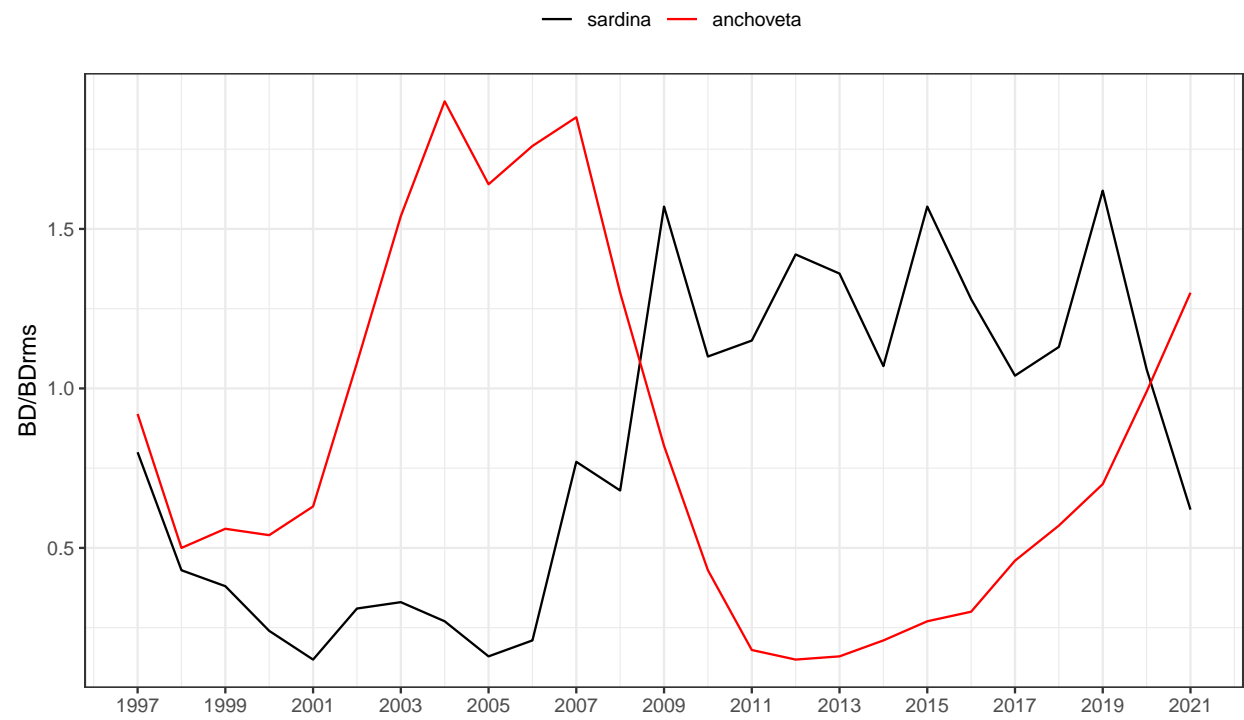
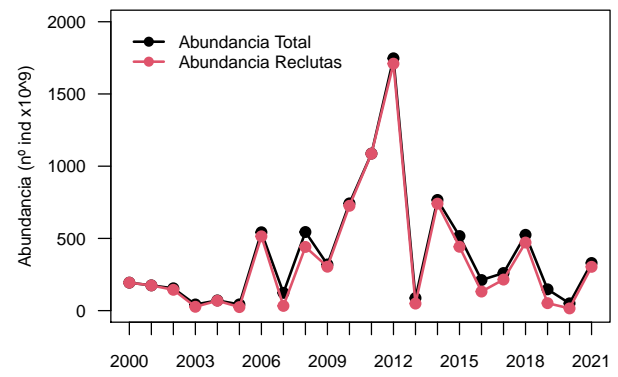
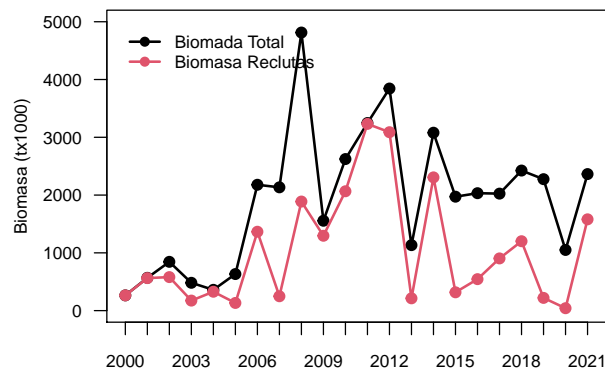
ano<-ant$desembarques_sernapesca[,1]
des_mes<-data.frame(mes=rep(seq(1,12,1),27),
                    ano=gl(27,12,labels=ano),
                    desem=c(t(ant$desembarques_sernapesca[,2:13])))

par(mfcol=c(1,1),mar=c(4,4,1,1))
boxplot(des_mes$desem[145:264]/10^3~des_mes$mes[145:264],las=1,xlab="Mes",
        ylab="Desembarques (miles de t)",col="lightyellow3")

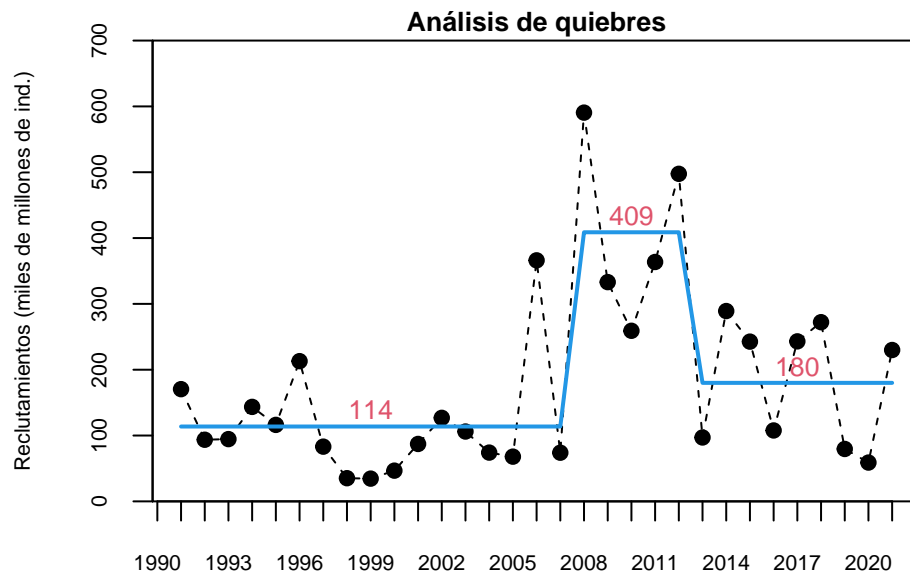
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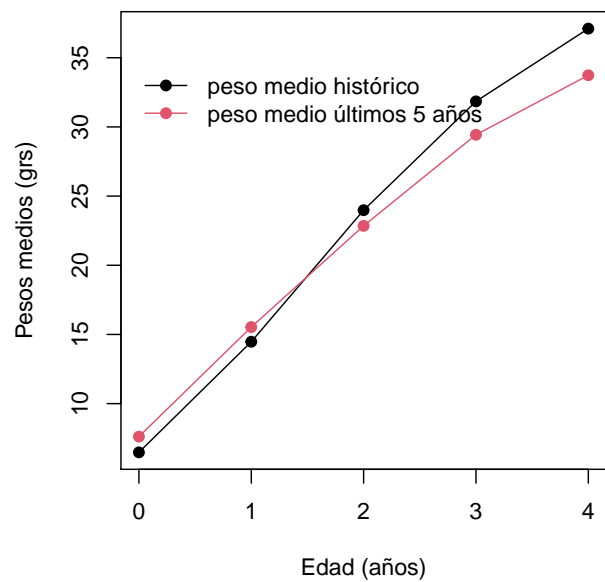
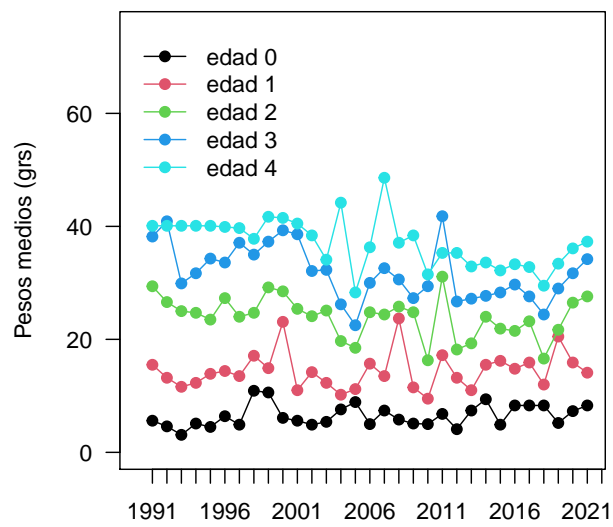






2. METODOLOGÍA

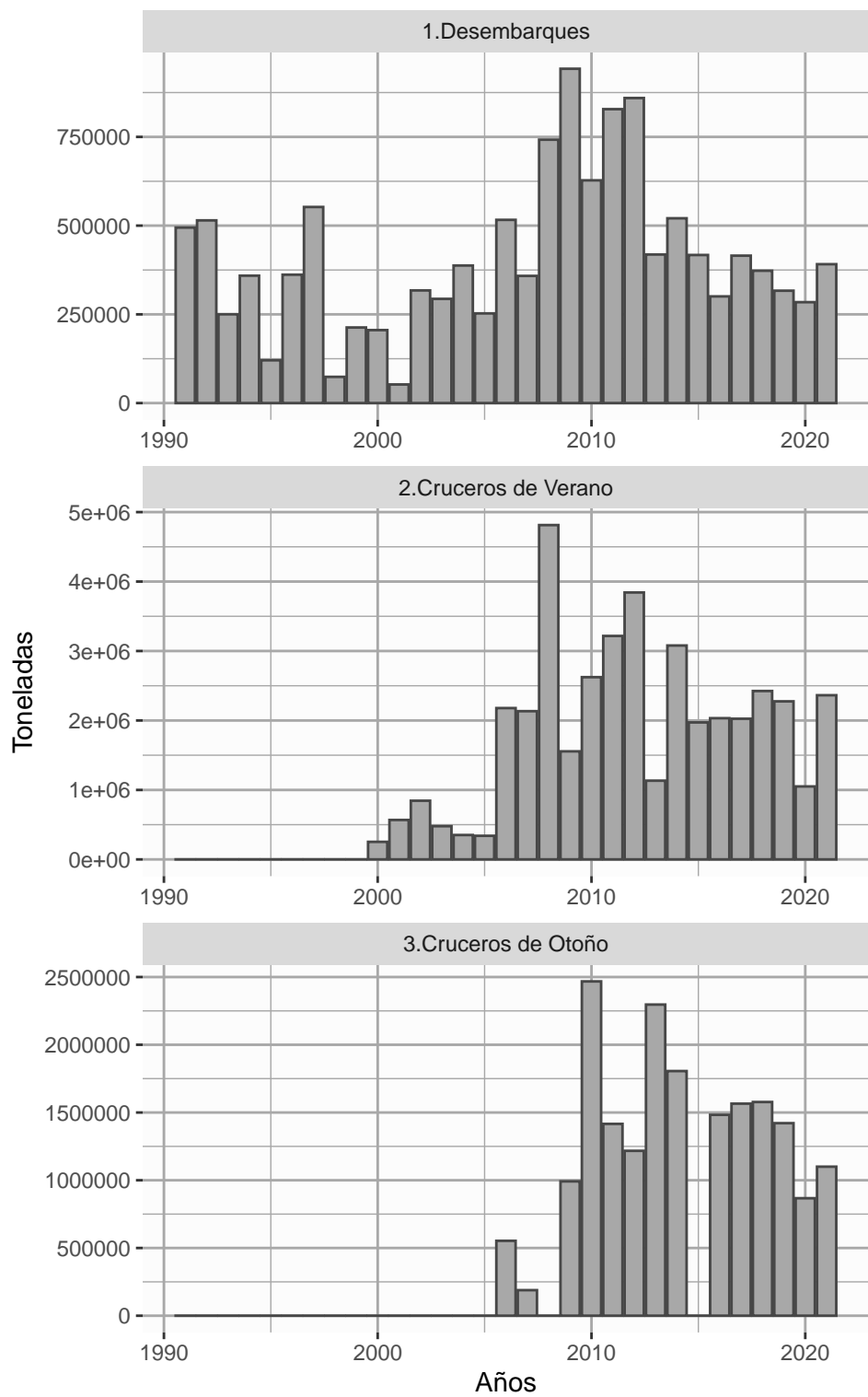


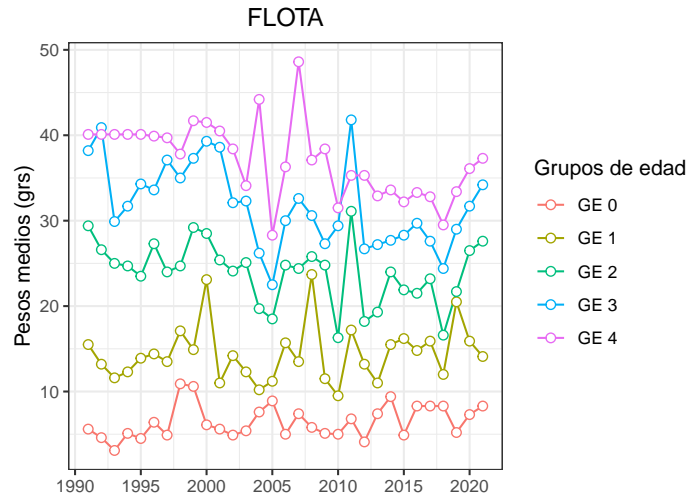
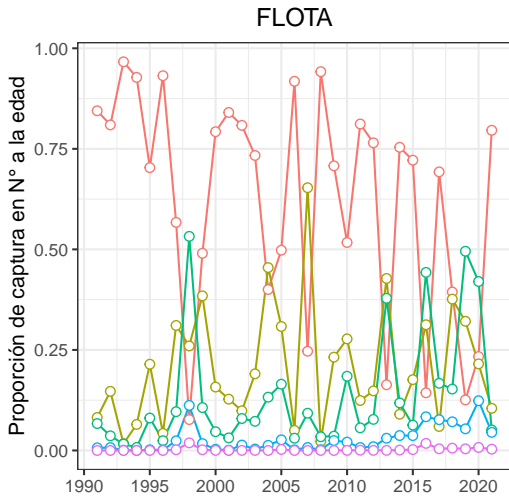


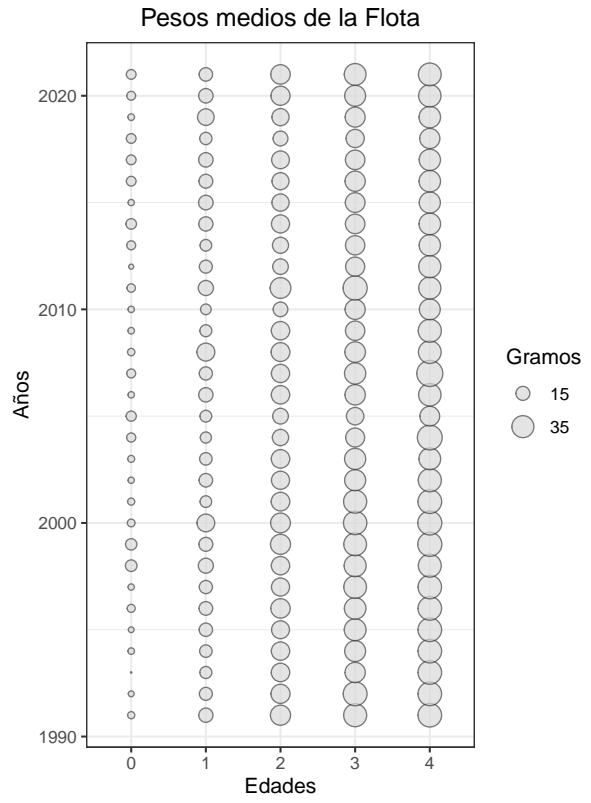
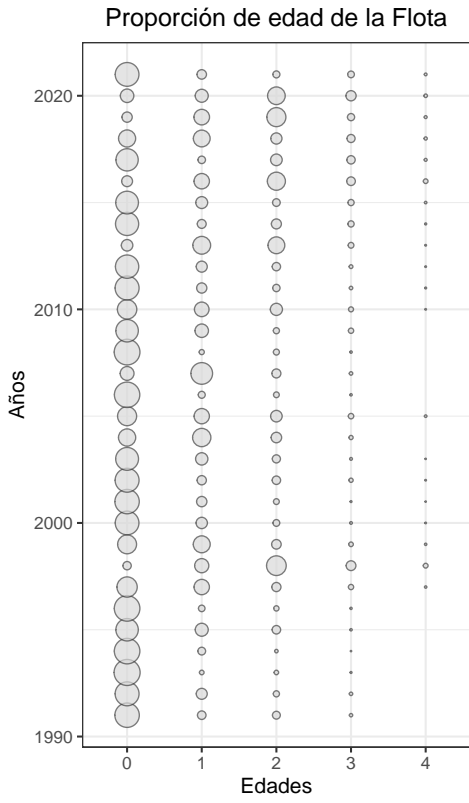
Año.biológico	Desembarques.t.	Porcentaje.descarte	Captura.descartada.t.	Captura.total.t.
1990-91	494567	0%	0	494567
1991-92	514787	0%	0	514787
1992-93	250237	0%	0	250237
1993-94	358949	0%	0	358949
1994-95	120608	0%	0	120608
1995-96	361735	0%	0	361735
1996-97	552515	0%	0	552515
1997-98	73892	0%	0	73892
1998-99	212993	0%	0	212993
1999-00	205616	0%	0	205616
2000-01	50451	4%	2018	52469
2001-02	305257	4%	12210	317467
2002-03	282360	4%	11294	293654
2003-04	372689	4%	14908	387597
2004-05	242976	4%	9719	252695
2005-06	496438	4%	19858	516296
2006-07	344596	4%	13784	358380
2007-08	713623	4%	28545	742168
2008-09	905818	4%	36233	942051
2009-10	603450	4%	24138	627588
2010-11	796319	4%	31853	828172
2011-12	826505	4%	33060	859565
2012,13	402507	4%	16100	418607
2013-14	500641	4%	20026	520667
2014-15	401201	4%	16048	417249
2015-16	289013	4%	11561	300574
2016-17	399415	4%	15977	415391
2017-18	348574	7%	24400	372974
2018-19	301557	5%	15078	316634
2019-20	273376	4%	10935	284311
2020-21	376245	4%	15050	391294

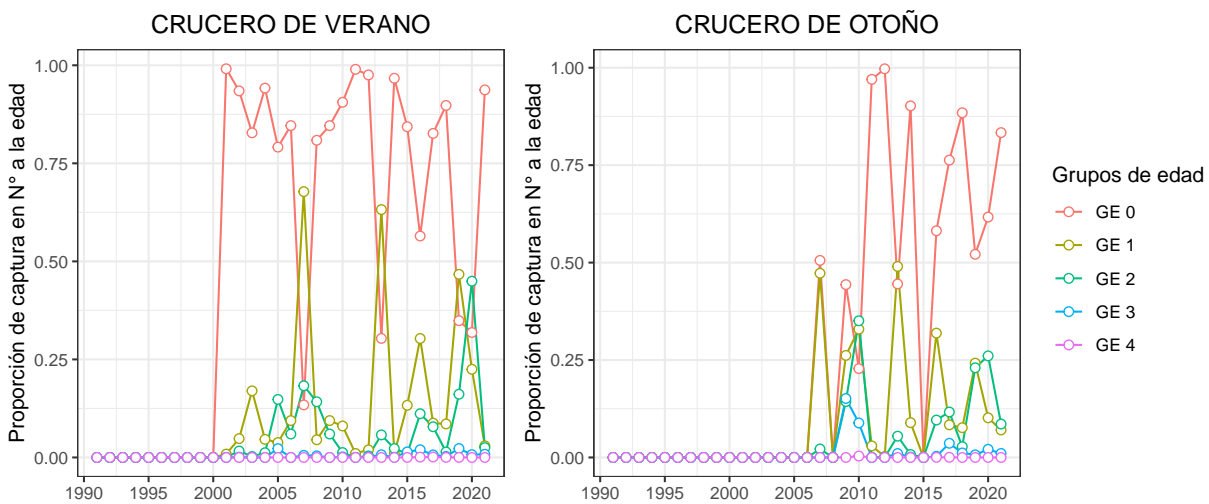
3. RESULTADOS

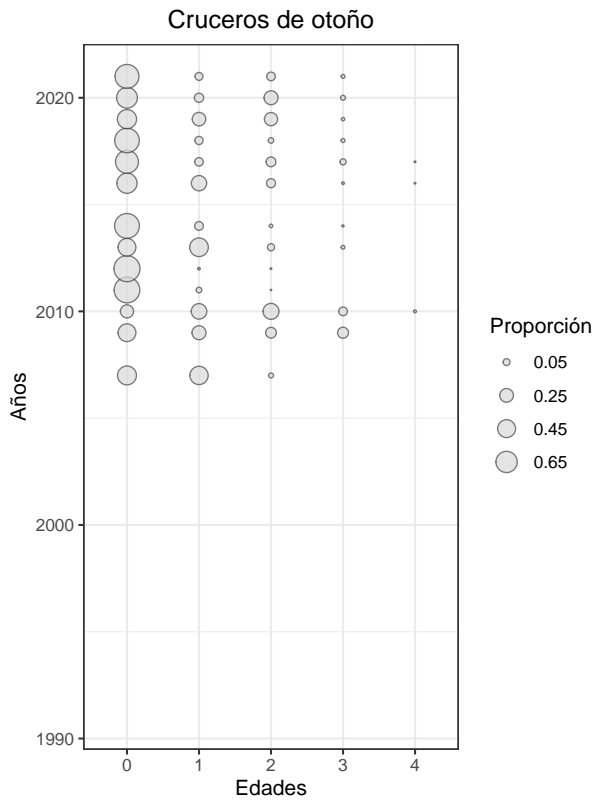
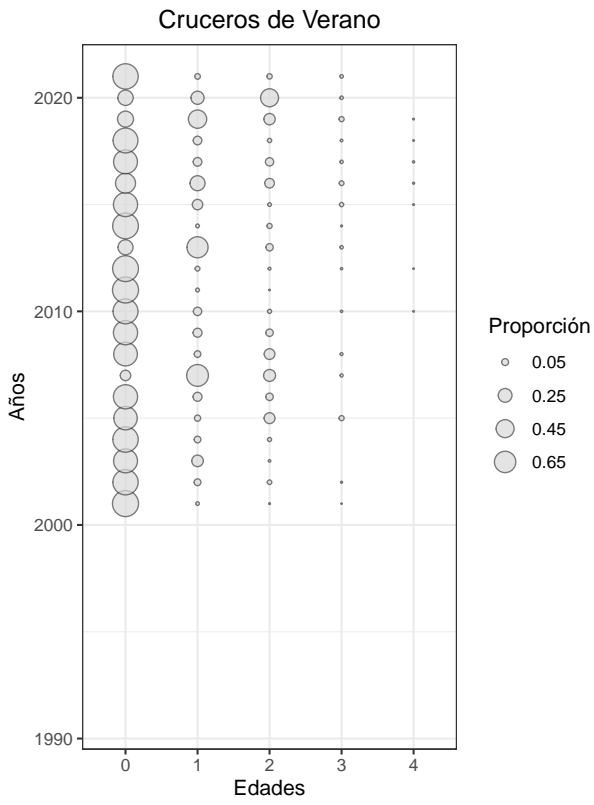




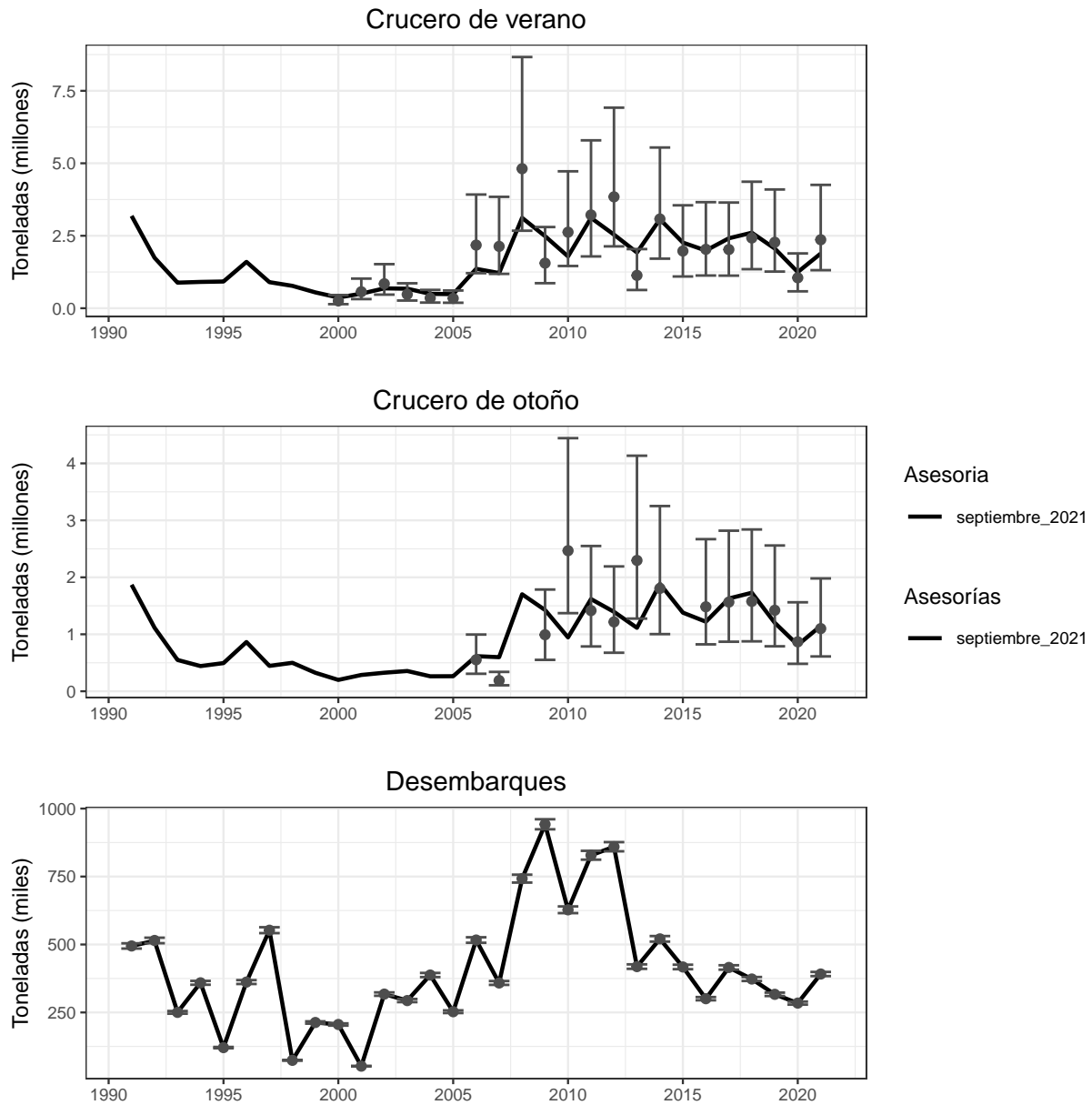


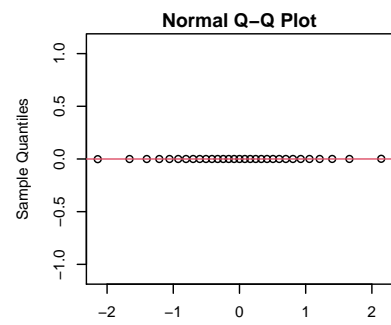
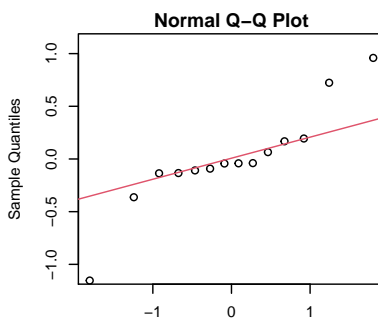
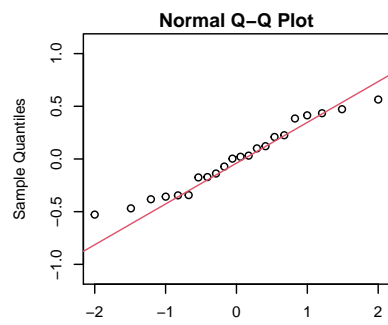
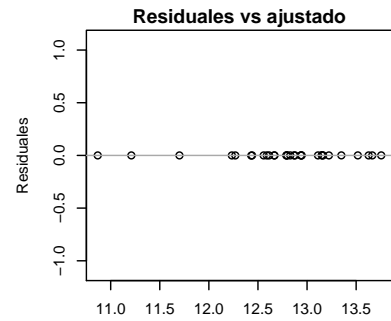
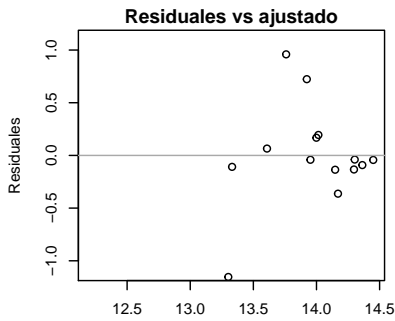
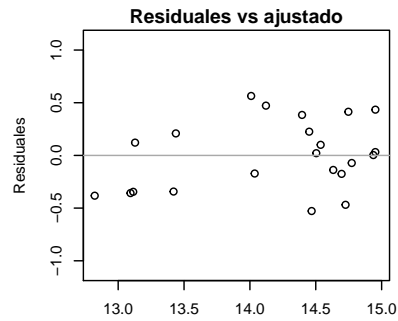
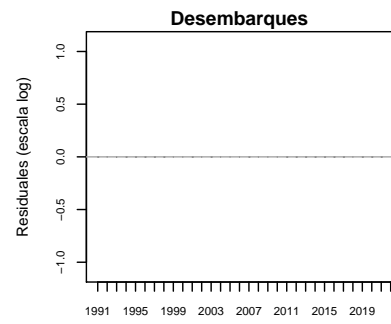
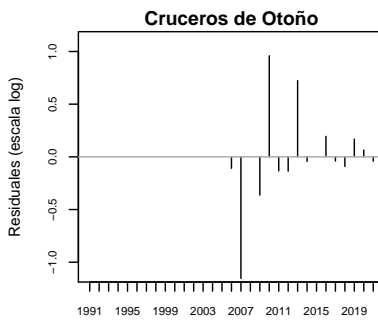
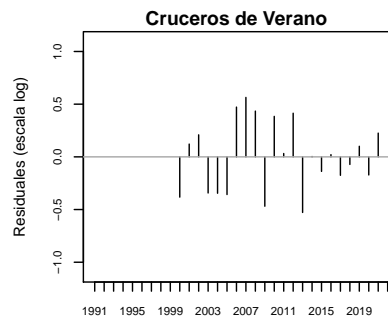


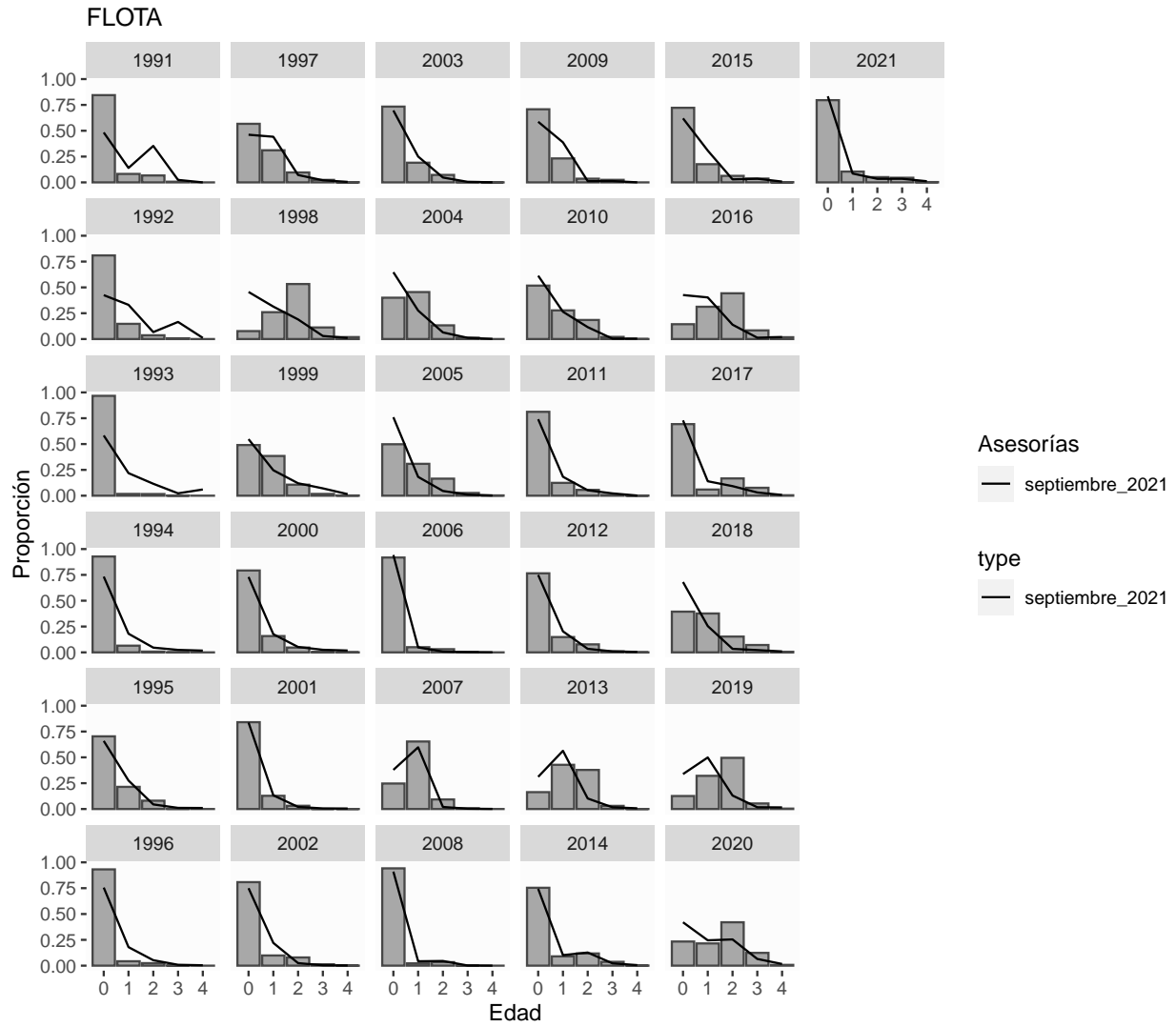




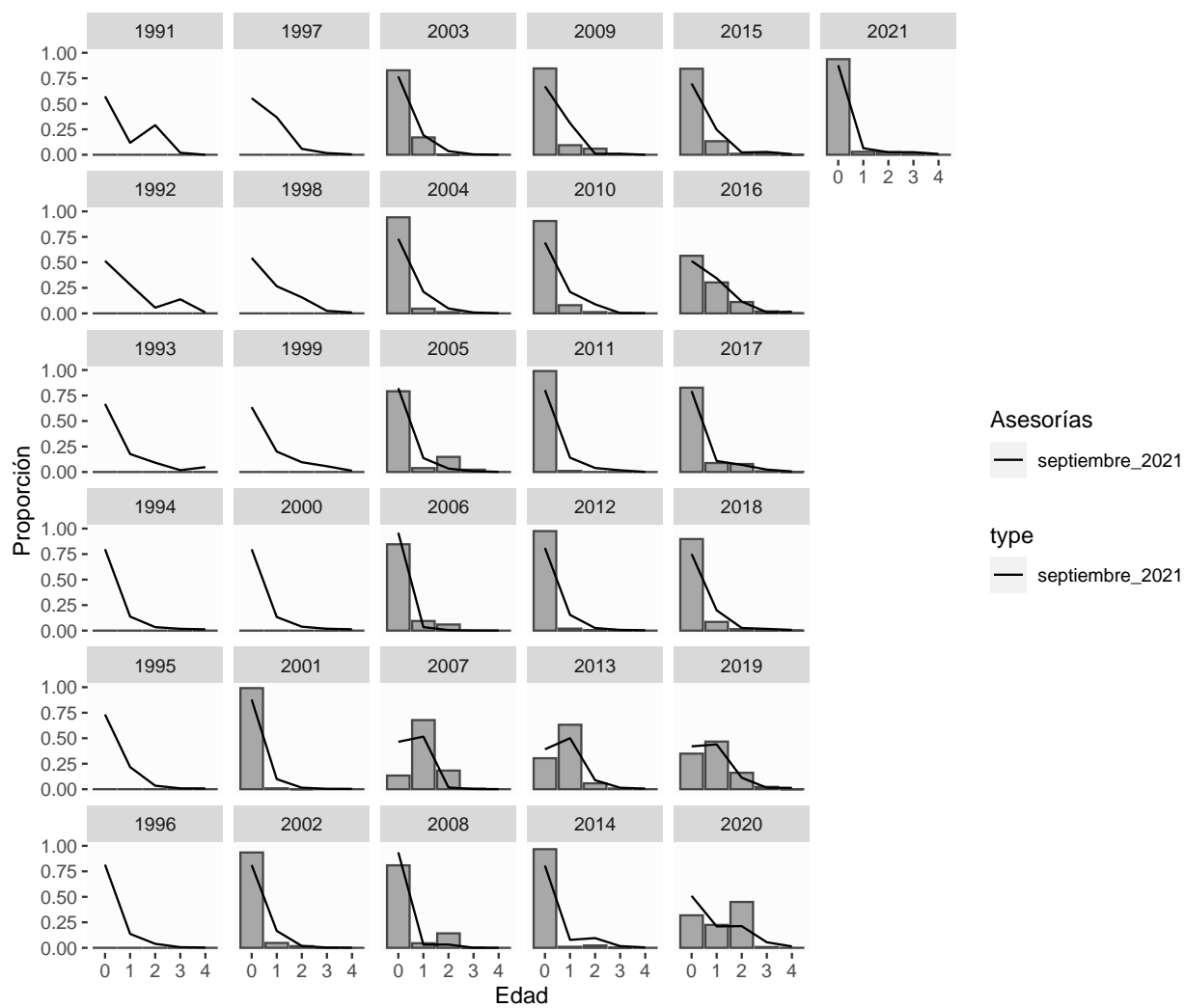
3.1. Ajuste del modelo a los datos



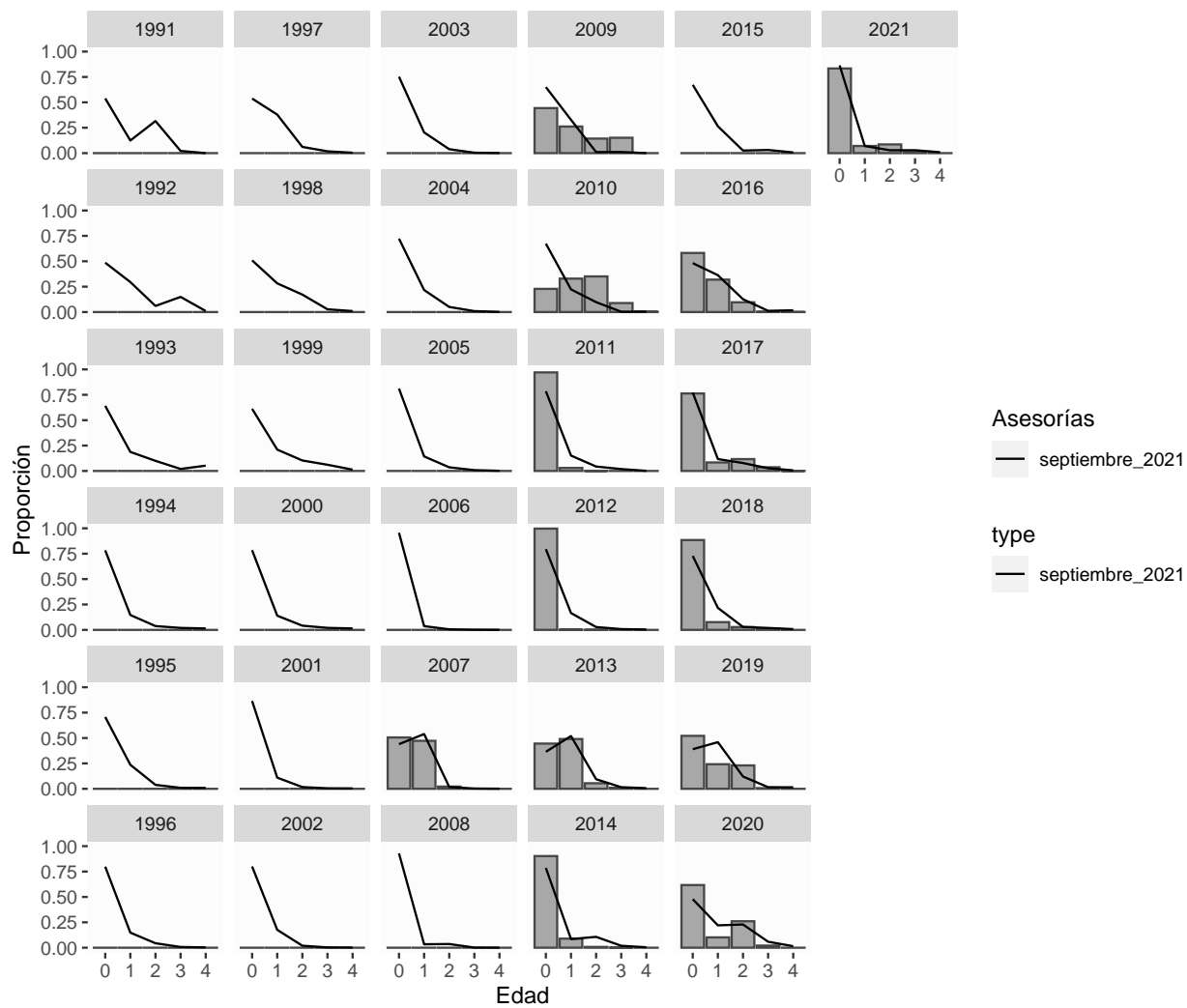


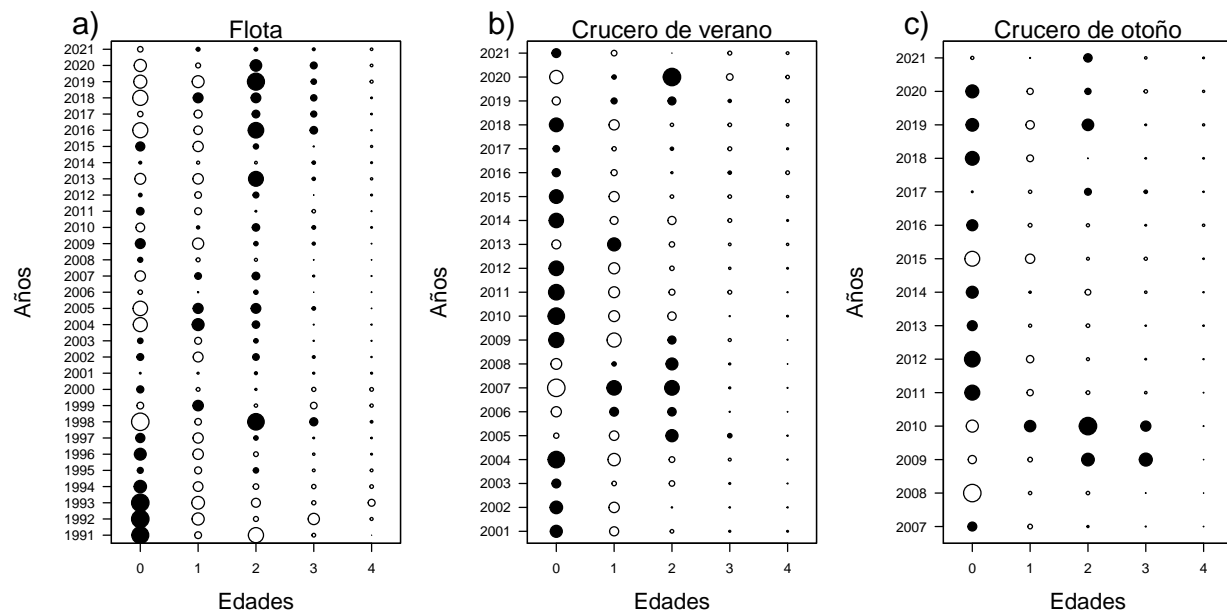


CRUCEROS DE VERANO

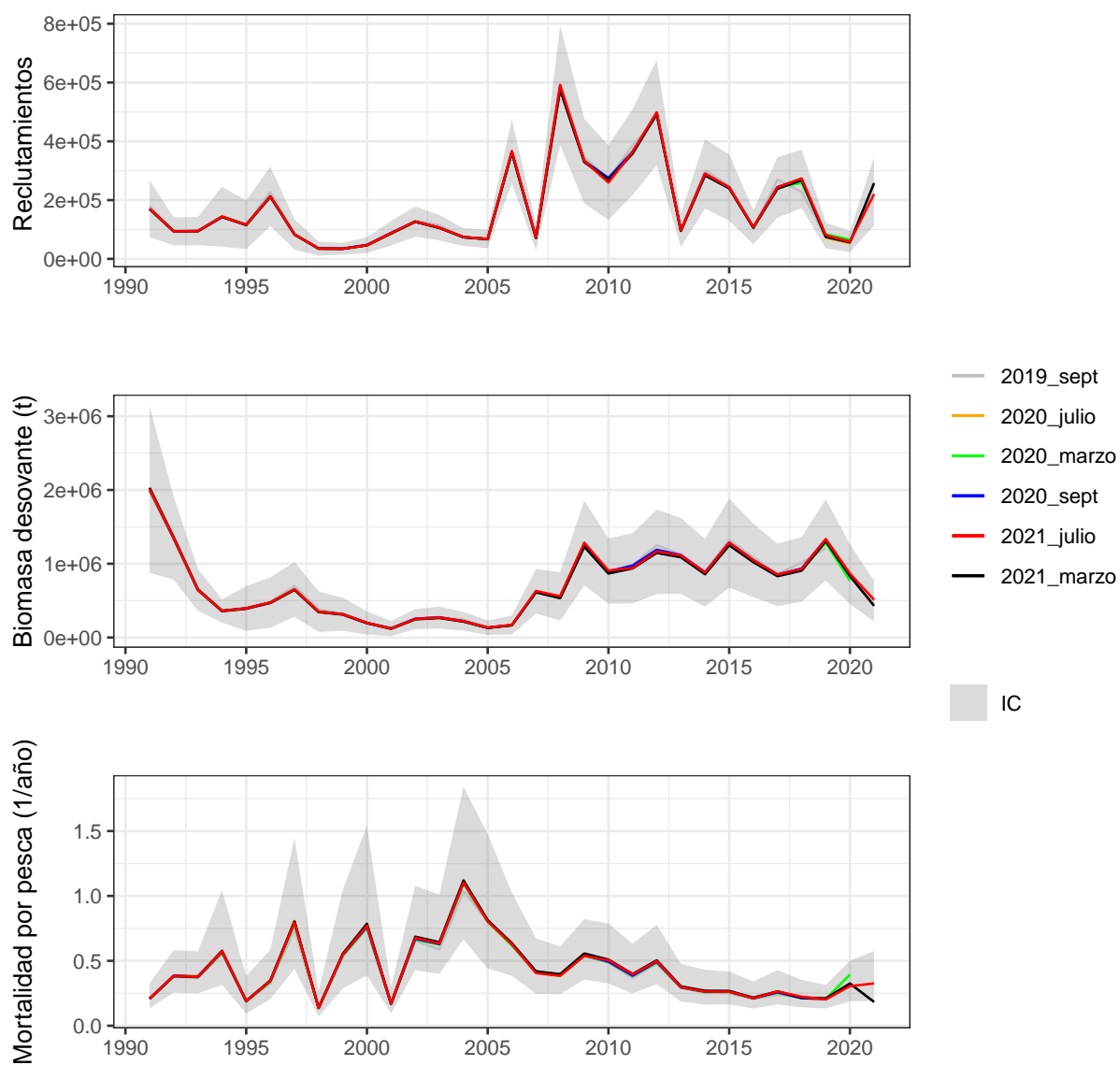


CRUCEROS DE OTOÑO

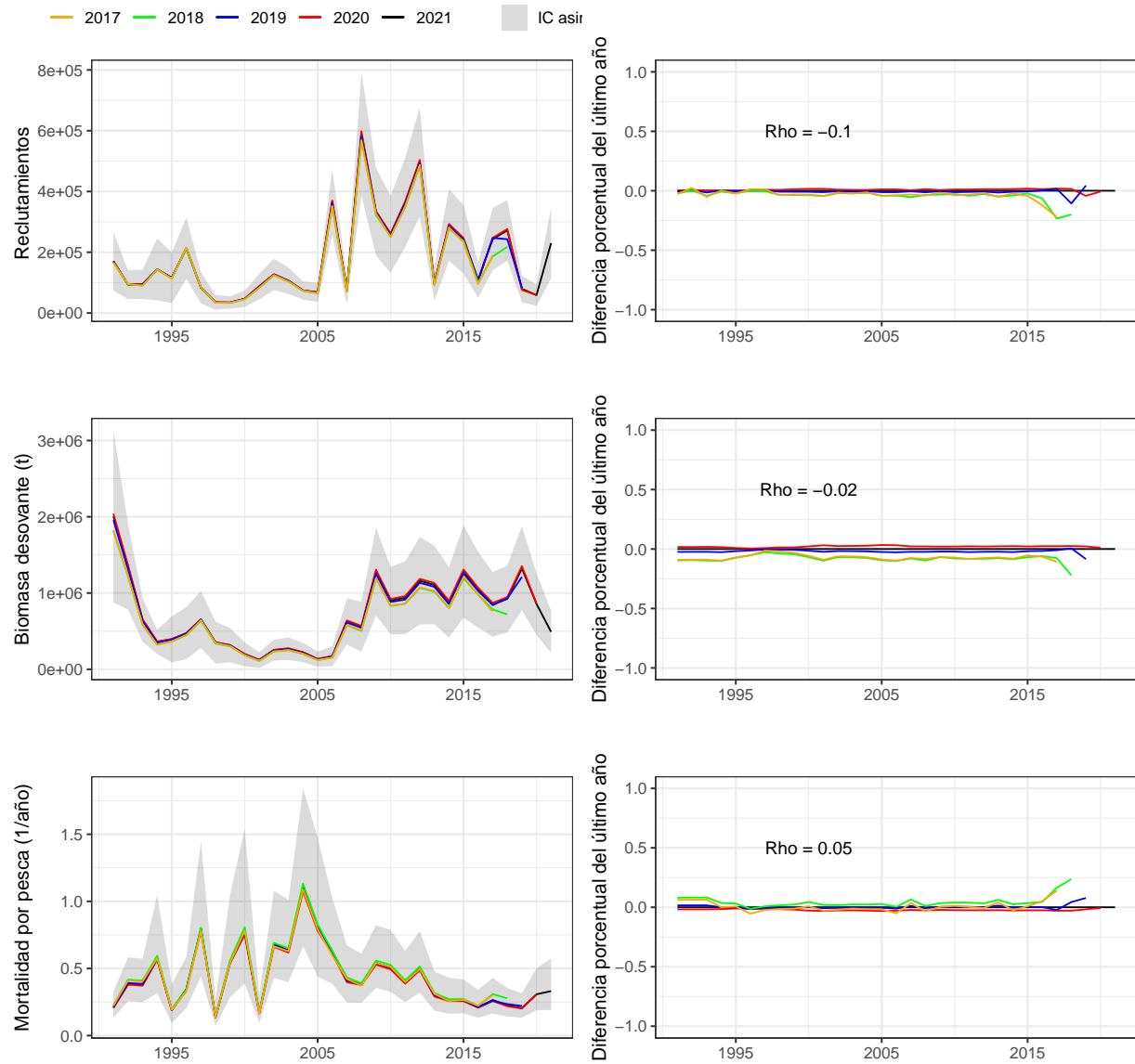




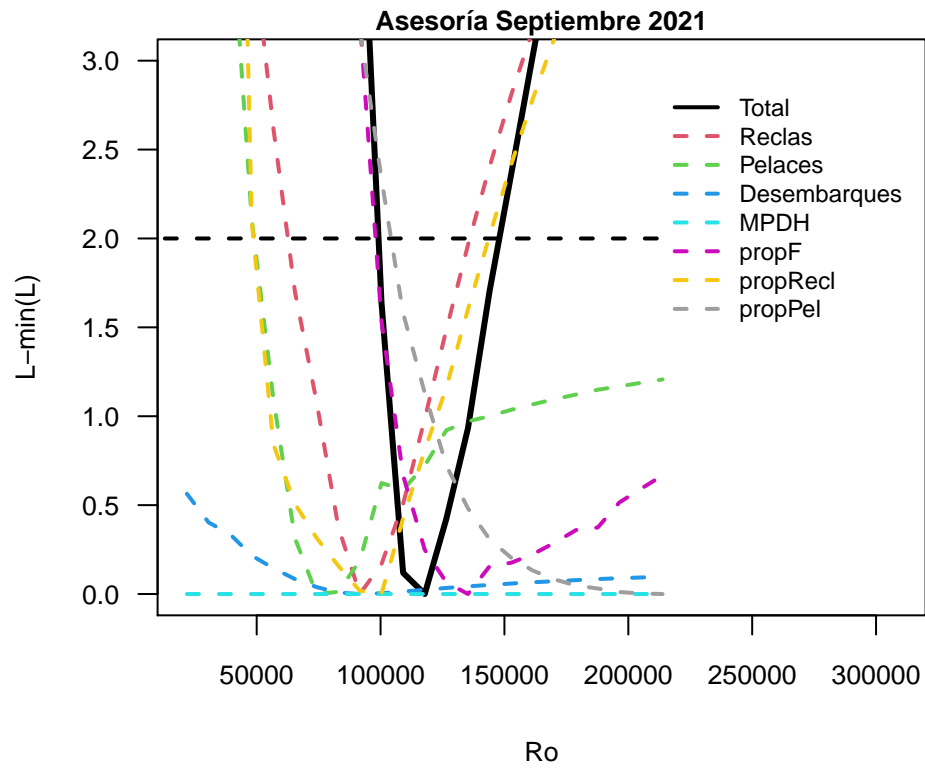
3.2. Comparación con asesorías previas



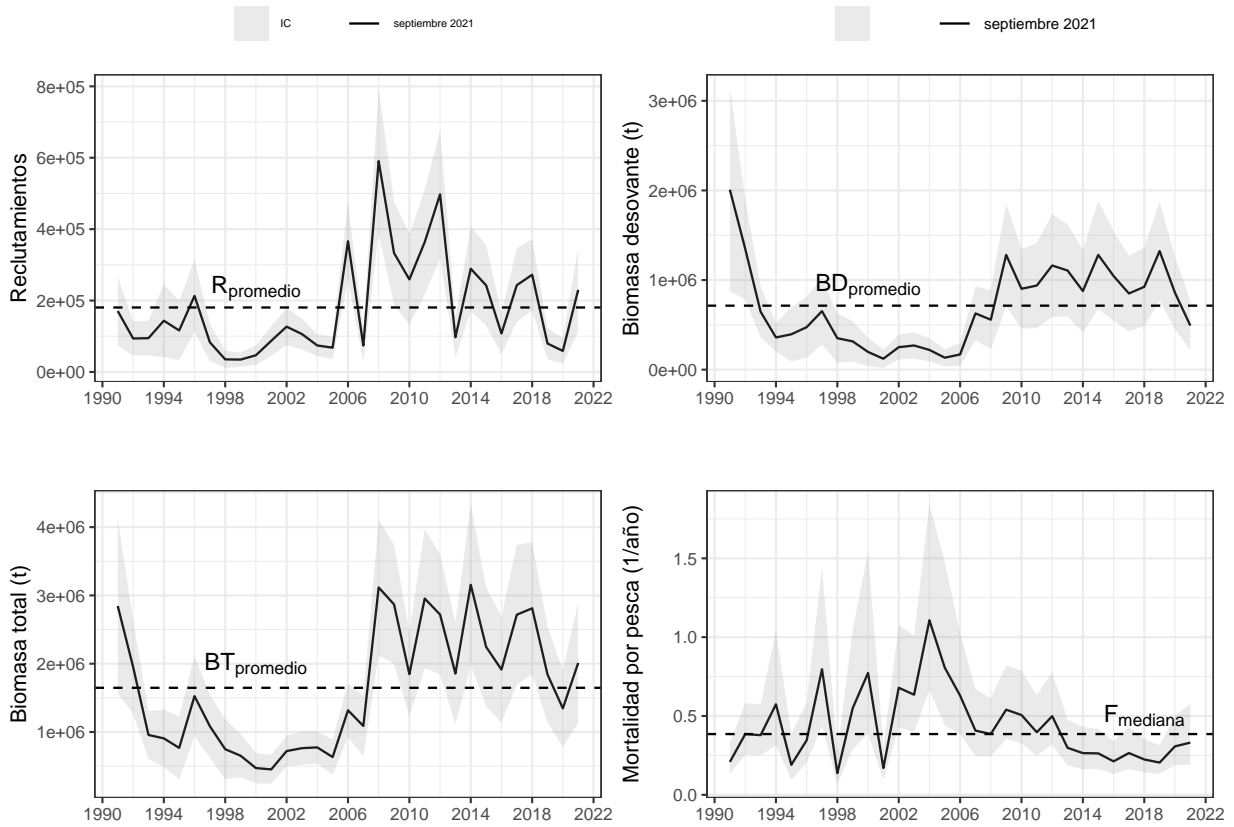
3.3. Análisis retrospectivo



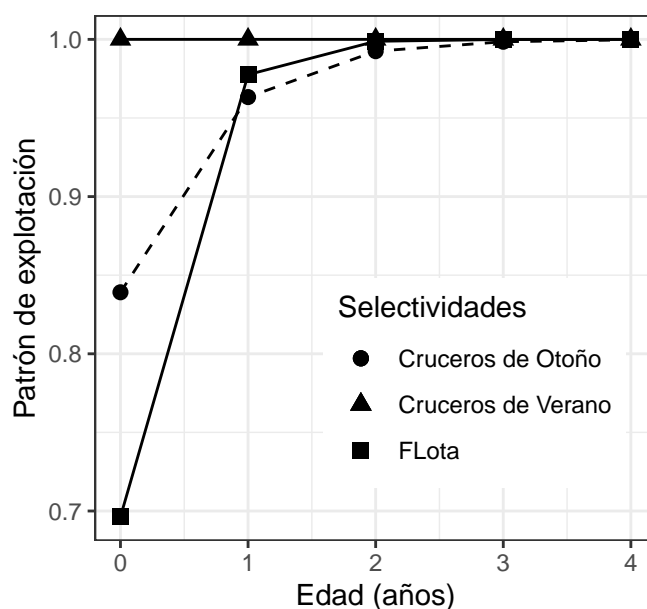
3.4. Perfil de verosimilitud



3.5. Variables poblacionales

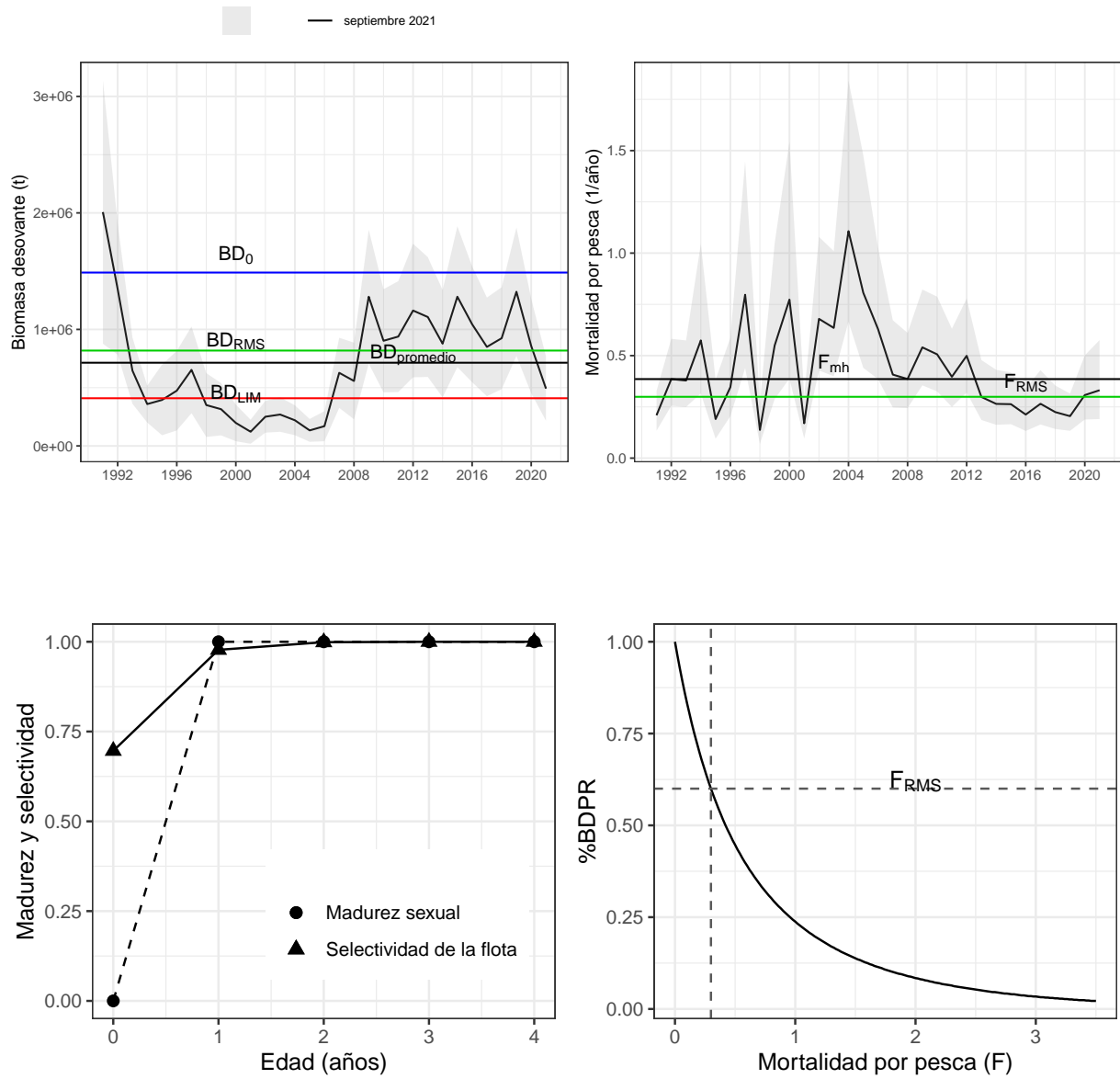


Año	BD_{sept}	BD_{marzo}	BD_{julio}	BT_{sept}	BT_{marzo}	BT_{julio}	R_{sept}	R_{marzo}	R_{julio}	F_{sept}	F_{marzo}	F_{julio}
1990/92007000	2030000	2015480	2844200	2870400	2854570	170470	170120	170639	0.209	0.207	0.208	
1991/92345500	1358500	1351070	1950300	1966700	1957010	93630	94041	93684.9	0.386	0.382	0.384	
1992/9346070	652550	648897	956570	964360	960132	94588	94707	94732.2	0.378	0.375	0.377	
1993/9459110	362070	360662	906560	909000	908707	143530	143180	143611	0.574	0.57	0.573	
1994/9594340	395090	395593	767360	767170	769117	116190	115760	116301	0.191	0.19	0.19	
1995/9674070	473120	475138	1524800	1517100	1526620	213000	211490	213115	0.346	0.347	0.346	
1996/9752790	647450	653825	1084700	1077600	1086140	83143	82828	83214	0.797	0.803	0.796	
1997/9850640	346010	351479	747860	741130	749454	35196	35062	35261.1	0.137	0.138	0.137	
1998/9915340	311640	316169	652660	646260	654159	34570	34292	34642.9	0.55	0.555	0.548	
1999/0097450	194090	198246	471920	465230	473346	46684	46073	46792.4	0.773	0.786	0.77	
2000/0121680	118470	122362	451930	444970	453525	87216	86319	87439.7	0.17	0.172	0.169	
2001/0250610	246340	251598	720530	713020	722233	126870	126130	127032	0.679	0.686	0.678	
2002/0369460	264590	270551	763250	753550	765101	106090	105110	106224	0.635	0.643	0.633	
2003/0420060	215090	221022	774220	767100	775923	74079	73955	74159.6	1.107	1.12	1.104	
2004/0533220	130190	133954	632780	626840	634685	67948	67638	68097.8	0.807	0.813	0.804	
2005/0669440	166450	170388	1317900	1299600	1321650	366140	361230	366988	0.629	0.636	0.628	
2006/0727440	612730	630224	1088000	1058400	1091760	73946	70839	74055.3	0.407	0.419	0.406	
2007/0857470	533910	560080	3116600	3029800	3125370	590530	576230	591892	0.386	0.397	0.385	
2008/09280800	1230300	1285730	2868400	2794700	2875880	333050	329460	333486	0.54	0.557	0.539	
2009/1002390	867720	906147	1846800	1828600	1852850	259120	268470	259700	0.506	0.509	0.505	
2010/1138520	936800	942980	2954600	2926400	2963710	363670	358290	364438	0.397	0.398	0.395	
2011/12162100	1147700	1167280	2719300	2690600	2728000	497560	492960	498579	0.499	0.504	0.498	
2012/13106300	1088100	1111240	1855800	1824500	1862960	97047	95115	97325.9	0.298	0.303	0.297	
2013/1477460	857790	881823	3155500	3096700	3165820	289110	284180	289821	0.265	0.269	0.264	
2014/15280800	1250400	1286070	2246000	2202700	2254280	242630	240020	243378	0.263	0.268	0.262	
2015/16044600	1021300	1049280	1914100	1876300	1921390	107730	106000	108023	0.213	0.217	0.212	
2016/1750040	831090	853911	2717300	2663200	2726220	243040	238570	243660	0.265	0.264	0.264	
2017/1824370	907150	928190	2811400	2763000	2826010	272200	267990	273830	0.224	0.216	0.223	
2018/19323200	1307200	1331900	1842500	1811000	1855990	79600	75099	80726.6	0.205	0.21	0.203	
2019/2058050	832960	866506	1346200	1305400	1352630	58944	56309	58187.9	0.307	0.326	0.306	
2020/2192050	430060	511108	2011100	1782600	2000590	229910	257750	220797	0.331	0.183	0.326	



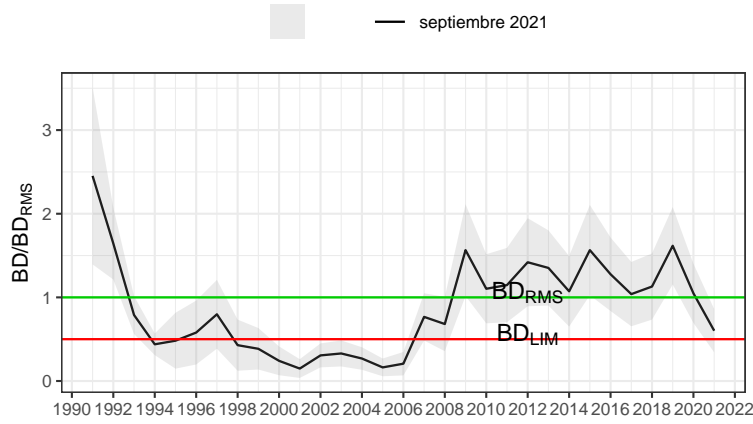
3.6. Puntos biológicos de referencia

	Septiembre	Marzo	Julio
BDpromedio	714.00	702.00	718.00
Fmh	0.39	0.38	0.38
%BDPR_Fmh	52.60	52.90	52.80
%BDPR_F _{RMS}	60.00	60.00	60.00
%BD_Fmh	47.60	47.90	47.80
%BD_F _{RMS}	55.00	55.00	55.00
BDo	1488.00	1456.00	1491.00
BD55%	818.00	801.00	820.00
BD27.5%	409.00	401.00	410.00

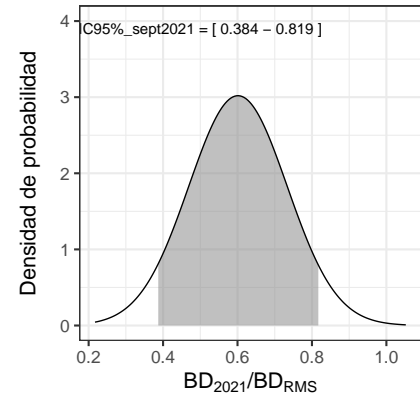


3.7. Estatus

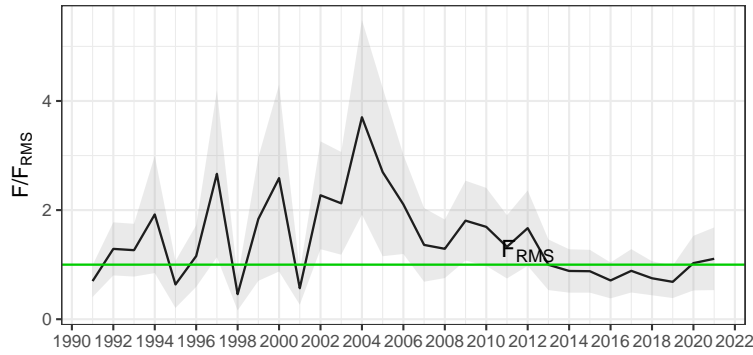
a)



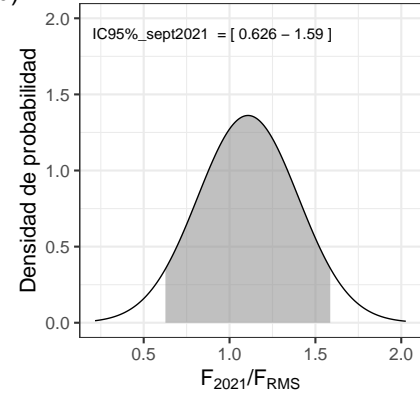
b)



c)



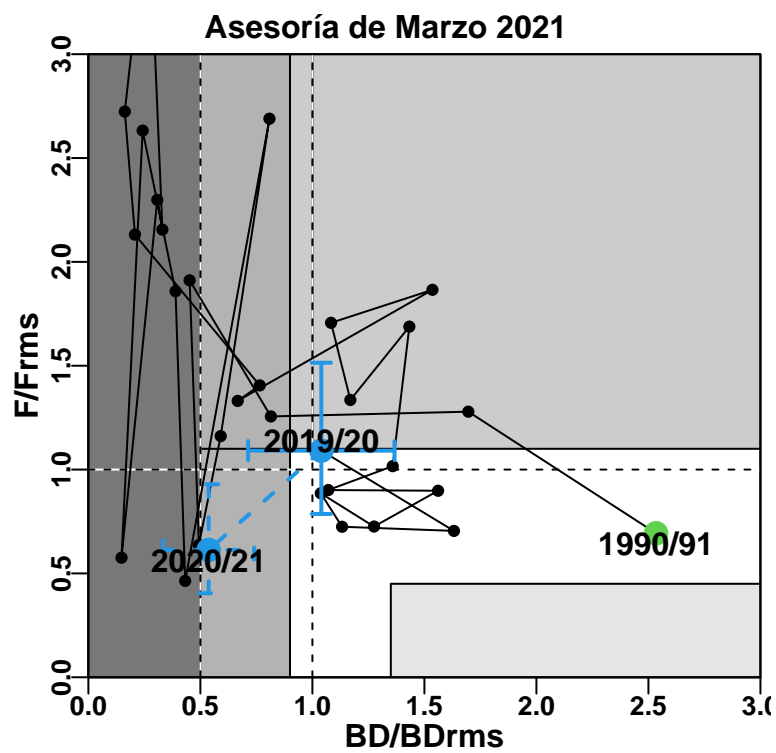
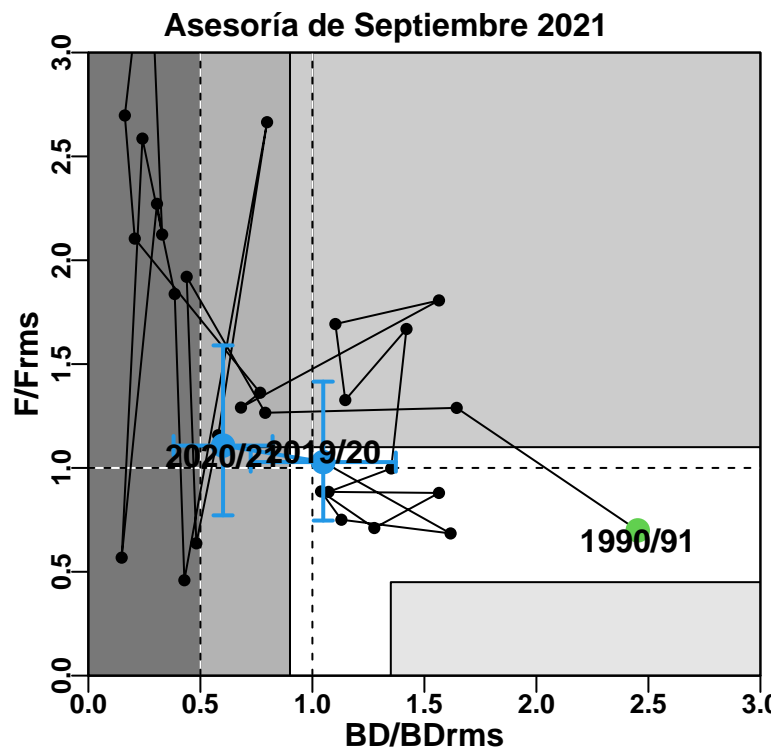
d)

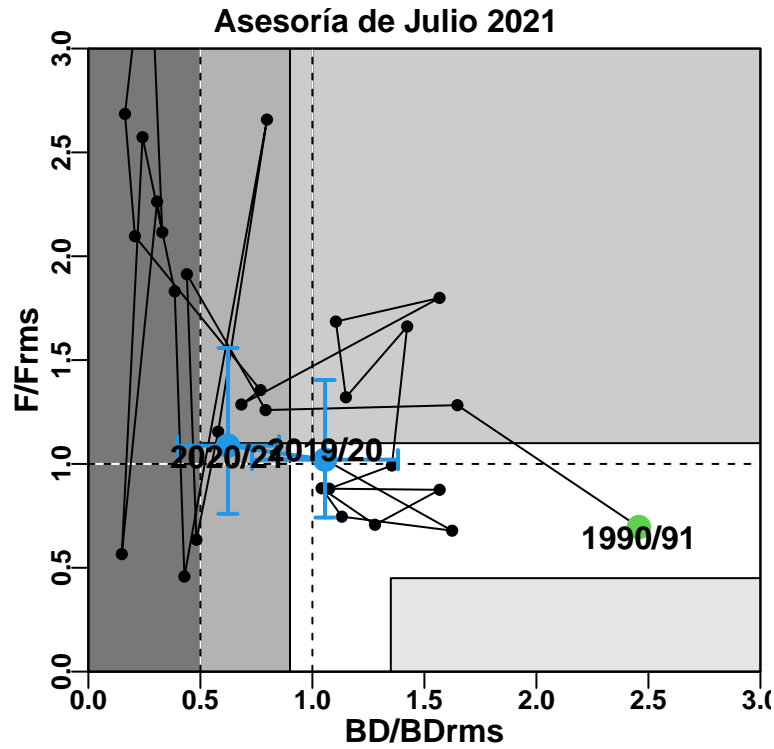


Años	$F/F_{RMS_{sept}}$	$F/F_{RMS_{marzo}}$	$F/F_{RMS_{julio}}$	$BD/BD_{RMS_{sept}}$	$BD/BD_{RMS_{marzo}}$	$BD/BD_{RMS_{julio}}$
1990/91	0.699	0.693	0.696	2.452	2.534	2.457
1991/92	1.289	1.279	1.283	1.644	1.696	1.647
1992/93	1.265	1.256	1.259	0.789	0.815	0.791
1993/94	1.92	1.911	1.913	0.439	0.452	0.44
1994/95	0.637	0.637	0.635	0.482	0.493	0.482
1995/96	1.157	1.161	1.155	0.579	0.591	0.579
1996/97	2.665	2.689	2.658	0.798	0.808	0.797
1997/98	0.459	0.464	0.458	0.428	0.432	0.429
1998/99	1.837	1.859	1.831	0.385	0.389	0.385
1999/00	2.586	2.632	2.573	0.241	0.242	0.242
2000/01	0.568	0.576	0.566	0.149	0.148	0.149
2001/02	2.272	2.299	2.263	0.306	0.308	0.307
2002/03	2.124	2.155	2.116	0.329	0.33	0.33
2003/04	3.702	3.751	3.687	0.269	0.269	0.269
2004/05	2.697	2.724	2.685	0.163	0.163	0.163
2005/06	2.104	2.131	2.096	0.207	0.208	0.208
2006/07	1.362	1.405	1.355	0.767	0.765	0.768
2007/08	1.291	1.331	1.286	0.681	0.667	0.683
2008/09	1.807	1.865	1.799	1.565	1.536	1.568
2009/10	1.693	1.707	1.685	1.103	1.083	1.105
2010/11	1.327	1.335	1.321	1.147	1.17	1.15
2011/12	1.669	1.688	1.662	1.42	1.433	1.423
2012/13	0.998	1.016	0.992	1.352	1.358	1.355
2013/14	0.885	0.901	0.881	1.072	1.071	1.075
2014/15	0.88	0.898	0.875	1.565	1.561	1.568

Años	$F/F_{RMS_{sept}}$	$F/F_{RMS_{marzo}}$	$F/F_{RMS_{julio}}$	$BD/BD_{RMS_{sept}}$	$BD/BD_{RMS_{marzo}}$	$BD/BD_{RMS_{julio}}$
2015/16	0.711	0.726	0.707	1.276	1.275	1.279
2016/17	0.887	0.886	0.883	1.039	1.038	1.041
2017/18	0.751	0.725	0.746	1.13	1.133	1.132
2018/19	0.685	0.705	0.679	1.617	1.632	1.624
2019/20	1.028	1.091	1.021	1.048	1.04	1.056
2020/21	1.108	0.613	1.088	0.601	0.537	0.623

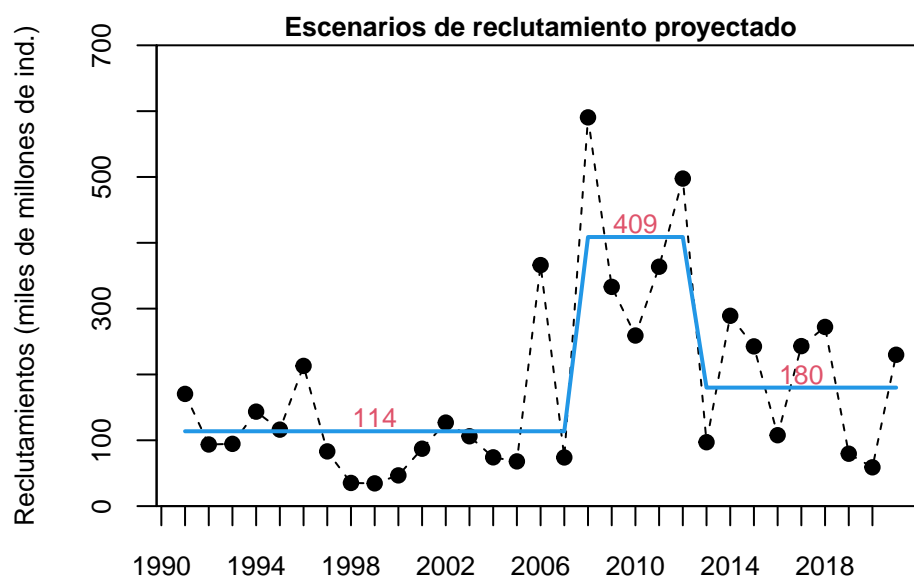
Años	Y/BT_{sept}	Y/BT_{marzo}	Y/BT_{julio}	C/N_{sept}	C/N_{marzo}	C/N_{julio}
1990/91	0.174	0.172	0.173	0.101	0.101	0.101
1991/92	0.263	0.261	0.263	0.179	0.178	0.179
1992/93	0.262	0.26	0.261	0.168	0.167	0.167
1993/94	0.396	0.395	0.395	0.23	0.23	0.23
1994/95	0.157	0.157	0.157	0.088	0.088	0.087
1995/96	0.237	0.238	0.237	0.148	0.149	0.147
1996/97	0.509	0.513	0.509	0.321	0.324	0.321
1997/98	0.099	0.1	0.099	0.069	0.069	0.069
1998/99	0.326	0.33	0.326	0.234	0.236	0.233
1999/00	0.436	0.442	0.435	0.293	0.298	0.292
2000/01	0.116	0.118	0.116	0.075	0.076	0.074
2001/02	0.441	0.445	0.44	0.263	0.266	0.262
2002/03	0.385	0.39	0.384	0.253	0.256	0.252
2003/04	0.501	0.505	0.499	0.39	0.394	0.389
2004/05	0.399	0.403	0.398	0.301	0.304	0.3
2005/06	0.392	0.397	0.391	0.236	0.239	0.235
2006/07	0.329	0.339	0.328	0.19	0.196	0.189
2007/08	0.238	0.245	0.237	0.156	0.161	0.155
2008/09	0.328	0.337	0.327	0.227	0.234	0.227
2009/10	0.34	0.343	0.339	0.214	0.215	0.213
2010/11	0.28	0.283	0.279	0.167	0.169	0.167
2011/12	0.316	0.319	0.315	0.204	0.206	0.203
2012/13	0.226	0.229	0.225	0.148	0.15	0.147
2013/14	0.165	0.168	0.164	0.116	0.119	0.116
2014/15	0.186	0.189	0.185	0.12	0.122	0.119
2015/16	0.157	0.16	0.156	0.104	0.107	0.104
2016/17	0.153	0.153	0.152	0.117	0.117	0.116
2017/18	0.133	0.129	0.132	0.101	0.098	0.101
2018/19	0.172	0.176	0.171	0.104	0.107	0.103
2019/20	0.211	0.222	0.21	0.147	0.155	0.146
2020/21	0.195	0.123	0.196	0.139	0.08	0.137





	Septiembre 2021	Marzo 2021	Julio 2021
Año biológico	2020/21	2020/21	2020/21
F_{RMS}	0.3	0.3	0.3
BD_{RMS}	818	801	820
BD_{LIM}	409	401	410
$p(BD_{last} < BD_{RMS})$	1	1	1
$p(F_{last} > F_{RMS})$	0.64	0.02	0.62
$p(sobre - explotación)$	0.99	1	0.98
$p(agotado/colapsado)$	0.22	0.38	0.18
$p(sobrepesca)$	0.51	0	0.48

3.8. CBA 2021 Inicial (Asesoría de septiembre 2021)



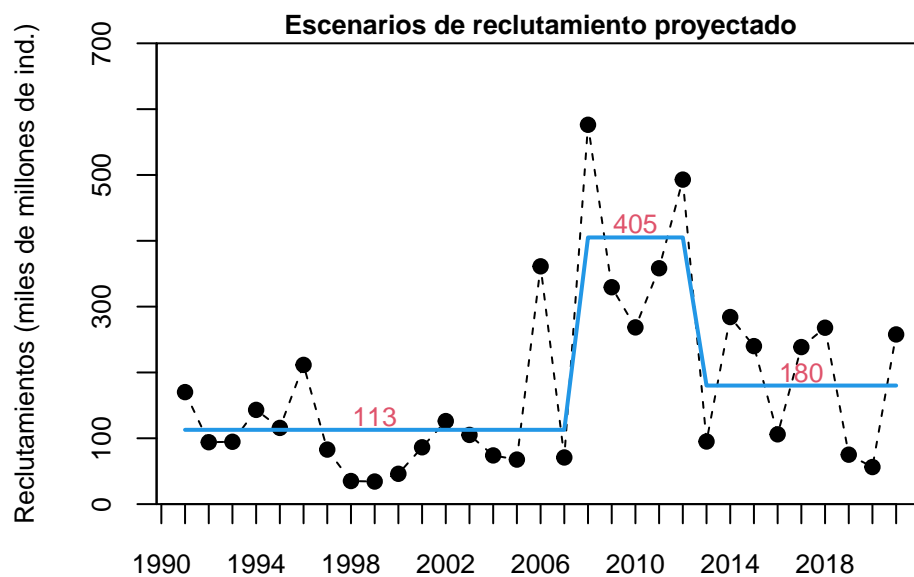
	1991-2007	2008-2012	2013-2020
mean	344140	515560	373590
std	64476	89358	79682
10%	261511	401043	271473
20%	289876	440354	306528
30%	310329	468701	331805
40%	327805	492921	353403
50%	344140	515560	373590

	1991-2007	2008-2012	2013-2020
10%	0.24	0.22	0.27
20%	0.16	0.15	0.18
30%	0.10	0.09	0.11
40%	0.05	0.04	0.05
50%	0.00	0.00	0.00

	1991-2007	2008-2012	2013-2020
10%	256280	393022	266044
20%	284078	431547	300397
30%	304122	459327	325169
40%	321249	483063	346335
50%	337257	505249	366118

	1991-2007	2008-2012	2013-2020
10%	245820	376981	255185
20%	272483	413933	288136
30%	291709	440579	311896
40%	308137	463346	332199
50%	323492	484626	351175

3.9. Primera revisión CBA 2021 (Asesoría de marzo 2021)



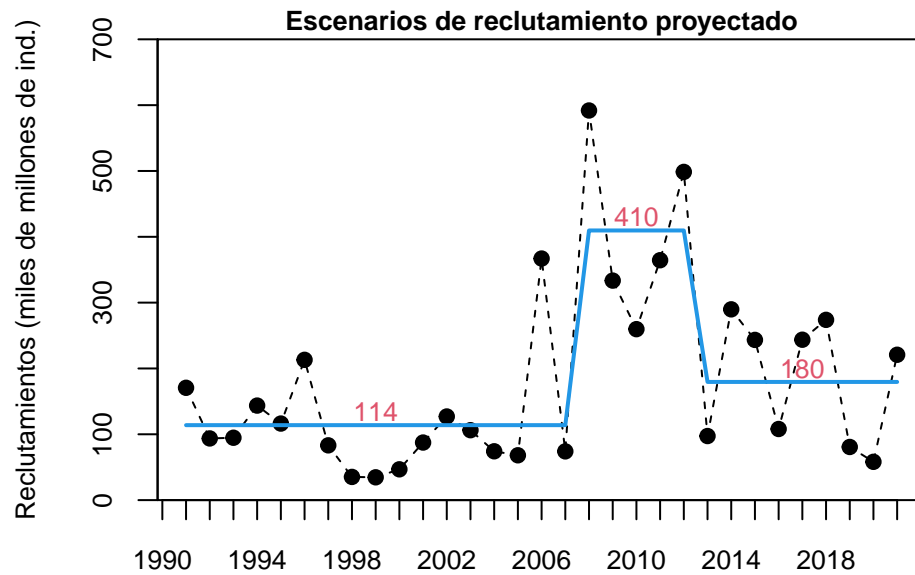
	1991-2007	2008-2012	2013-2021
mean	271720	313030	279570
std	29384	34291	33911
10%	234063	269084	236111
20%	246990	284170	251030
30%	256311	295048	261787
40%	264276	304342	270979
50%	271720	313030	279570

	1991-2007	2008-2012	2013-2021
10%	0.14	0.14	0.16
20%	0.09	0.09	0.10
30%	0.06	0.06	0.06
40%	0.03	0.03	0.03
50%	0.00	0.00	0.00

	1991-2007	2008-2012	2013-2021
10%	224700	258321	226667
20%	237110	272803	240989
30%	246059	283246	251316
40%	253705	292169	260140
50%	260851	300509	268387

	1991-2007	2008-2012	2013-2021
10%	-9	-31	-11
20%	-13	-34	-16
30%	-16	-36	-19
40%	-18	-37	-22
50%	-19	-38	-24

4.0. Segunda revisión CBA 2021 (Asesoría de julio 2021)



```
library(strucchange)
library(tidyverse)

## -- Attaching packages ----- tidyverse 1.3.0 --

## v tibble 3.0.3      v purrr 0.3.4
## v tidyr 1.1.2      v forcats 0.5.0
## v readr 1.3.1

## -- Conflicts ----- tidyverse_conflicts() --
## x strucchange::boundary() masks stringr::boundary()
## x tidyr::expand()         masks reshape::expand()
## x dplyr::filter()         masks stats::filter()
## x dplyr::lag()            masks stats::lag()
## x dplyr::rename()         masks reshape::rename()
library(lubridate)

##
## Attaching package: 'lubridate'

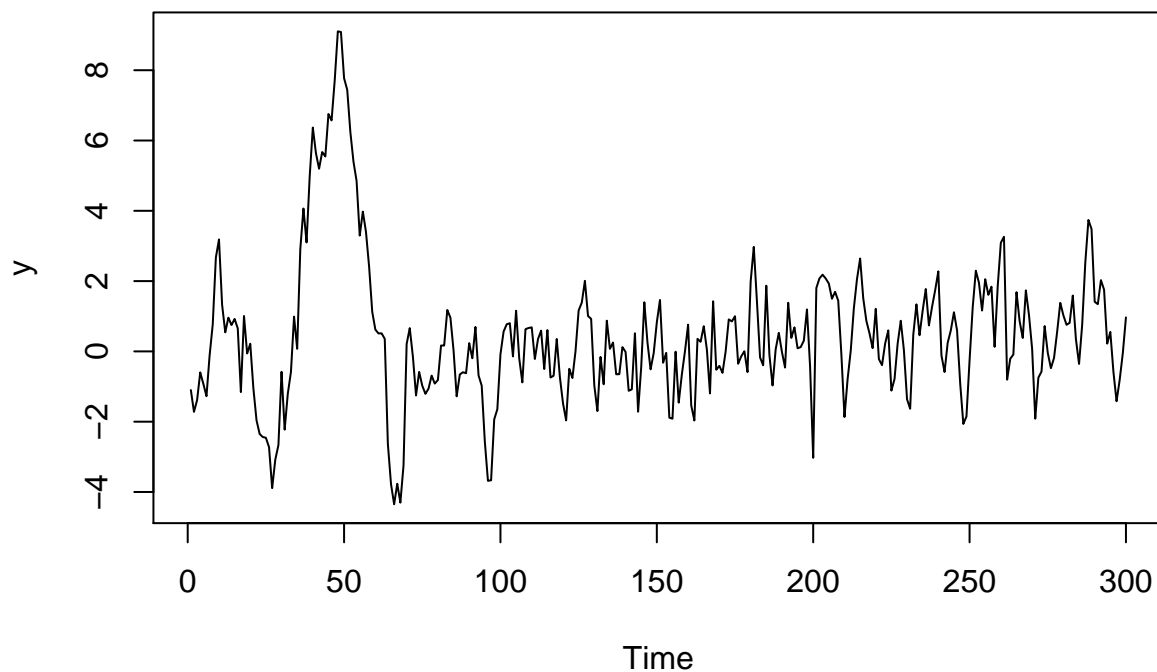
## The following object is masked from 'package:reshape':
##
##   stamp

## The following objects are masked from 'package:base':
##
##   date, intersect, setdiff, union

x1 <- arima.sim(model = list(ar = 0.9), n = 100)
x2 <- arima.sim(model = list(ma = 0.1), n = 100)
x3 <- arima.sim(model = list(ar = 0.5, ma = 0.3), n = 100)

y <- c((1 + x1), x2, (0.5 - x3))

plot.ts(y)
```



```
dat <- tibble(ylag0 = y, ylag1 = lag(y))

qlr <- Fstats(ylag0 ~ ylag1, data = dat)

sctest(qlr, type = "supF")
```

```
##
## supF test
##
## data: qlr
## sup.F = 40.5, p-value = 5.997e-08
```

	1991-2007	2008-2012	2013-2021
mean	378670	419950	385460
std	22259	28186	25850
10%	350144	383828	352332
20%	359936	396228	363704
30%	366997	405169	371904
40%	373031	412809	378911
50%	378670	419950	385460

	1991-2007	2008-2012	2013-2021
10%	0.08	0.09	0.09
20%	0.05	0.06	0.06
30%	0.03	0.04	0.04
40%	0.01	0.02	0.02
50%	0.00	0.00	0.00

	1991-2007	2008-2012	2013-2021
10%	336138	368475	338239
20%	345539	380379	349156
30%	352317	388962	357028
40%	358110	396297	363755
50%	363523	403152	370042

	1991-2007	2008-2012	2013-2021
10%	37	-2	33
20%	27	-8	21
30%	21	-12	14
40%	16	-14	9
50%	12	-17	5

```
#####
# Asesoría septiembre R1
#####
# densidad de probabilidad
xbs1a <-rnorm(1000, mean = CBAp_sept[1], sd = CBApstd_sept[1])
xbsa <-seq(min(xbs1a),max(xbs1a),0.5)
ybsa <-dnorm(xbsa, mean = CBAp_sept[1], sd =CBApstd_sept[1])
icbsa <-qnorm(c(0.10,0.50,0.5),CBAp_sept[1],CBApstd_sept[1])

#distribución probabilidad
xxbsa <- c(xbsa[xbsa>=icbsa[1]&xbsa<=icbsa[2]],
          rev(xbsa[xbsa>=icbsa[1]&xbsa<=icbsa[2]]))
yybsa <- c(ybsa[xbsa>=icbsa[1]&xbsa<=icbsa[2]],
          rep(0,length(ybsa[xbsa>=icbsa[1]&xbsa<=icbsa[2]])))

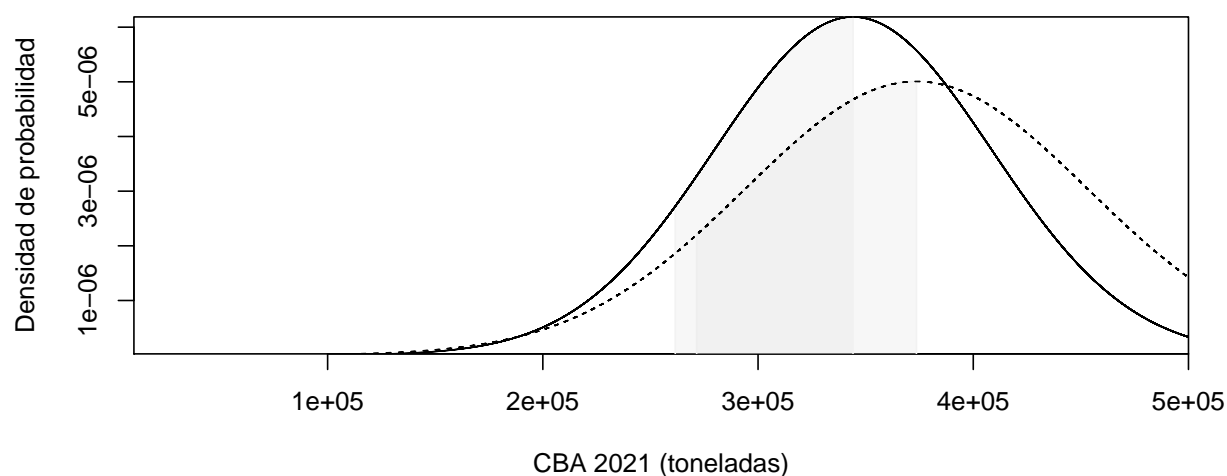
densb_bsa <- data.frame(x=xxbsa, y=yybsa , t=rep('a', length(xxbsa)), r=seq(1,length(xxbsa),1))

#####
# Asesoría septiembre R2
#####
# densidad de probabilidad
xbs1b <-rnorm(1000, mean = CBAp_sept[3], sd = CBApstd_sept[3])
xbsb <-seq(min(xbs1b),max(xbs1b),0.5)
ybsb <-dnorm(xbsb, mean = CBAp_sept[3], sd = CBApstd_sept[3])
icbsb <-qnorm(c(0.10,0.50,0.5),CBAp_sept[3],CBApstd_sept[3])

#distribución probabilidad
xxbsb <- c(xbsb[xbsb>=icbsb[1]&xbsb<=icbsb[2]],
          rev(xbsb[xbsb>=icbsb[1]&xbsb<=icbsb[2]]))
yybsb <- c(ybsb[xbsb>=icbsb[1]&xbsb<=icbsb[2]],
          rep(0,length(ybsb[xbsb>=icbsb[1]&xbsb<=icbsb[2]])))

densb_bsb <- data.frame(x=xxbsb, y=yybsb , t=rep('a', length(xxbsb)), r=seq(1,length(xxbsb),1))

plot(xbsa,ybsa ,type="n",ylab="Densidad de probabilidad",xaxs="i",yaxs= "i",xlab="CBA 2021 (toneladas)", main="",xlim=c(10000,50000),ylim=c(0,0.0022),
polygon(xxbsb,yybsb,col=gray(0.9,0.3),border="gray95")
polygon(xxbsa,yybsa,col=gray(0.9,0.3),border="gray95")
lines(xbsb,ybsb,lwd=1,lty=2,col=1)
lines(xbsa,ybsa,lwd=1,lty=1,col=1)
legend(1000,0.00017,c("CBA2021_Hito1_Rbajo","CBA2021_Hito1_Rreciente"),lwd=c(2,1),col=c(1,2),lty=c(1,1),bty="n",cex=0.8)
text(904.3,0.0022,"Crms")
```

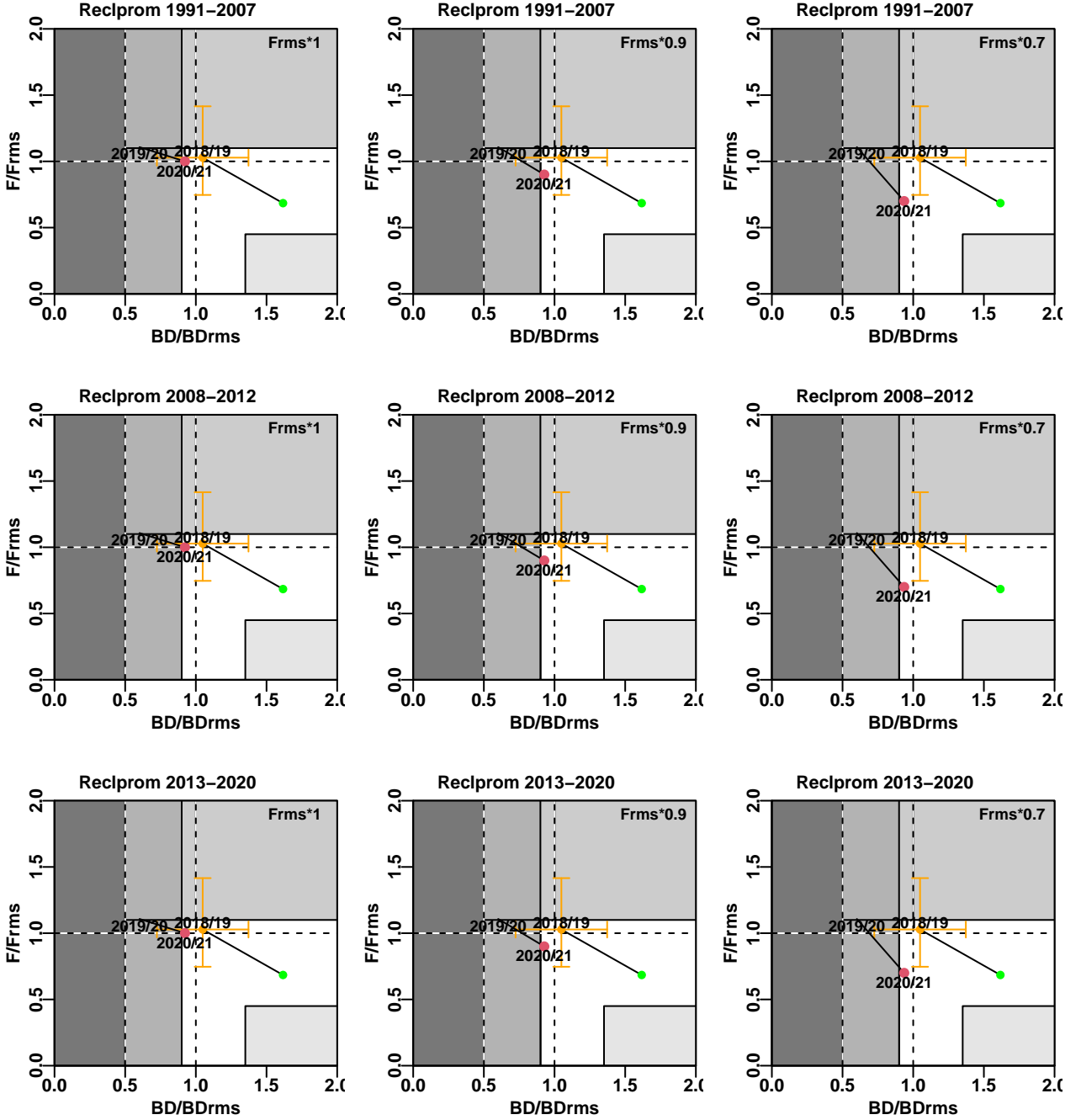


4.0. Proyección del stock (Asesoría de septiembre 2021)

	1991-2007[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(sobre-explotación)_2018/19	0.21	0.21	0.21
p(colapso)_2018/19	0.00	0.00	0.00
p(sobre-explotación)_2019/20	0.99	0.99	0.99
p(colapso)_2019/20	0.22	0.22	0.22
p(sobre-explotación)_2020/21	0.46	0.45	0.44
p(colapso)_2020/21	0.03	0.03	0.03

	2008-2012[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(sobre-explotación)_2018/19	0.21	0.21	0.21
p(colapso)_2018/19	0.00	0.00	0.00
p(sobre-explotación)_2019/20	0.99	0.99	0.99
p(colapso)_2019/20	0.22	0.22	0.22
p(sobre-explotación)_2020/21	0.46	0.45	0.44
p(colapso)_2020/21	0.03	0.03	0.03

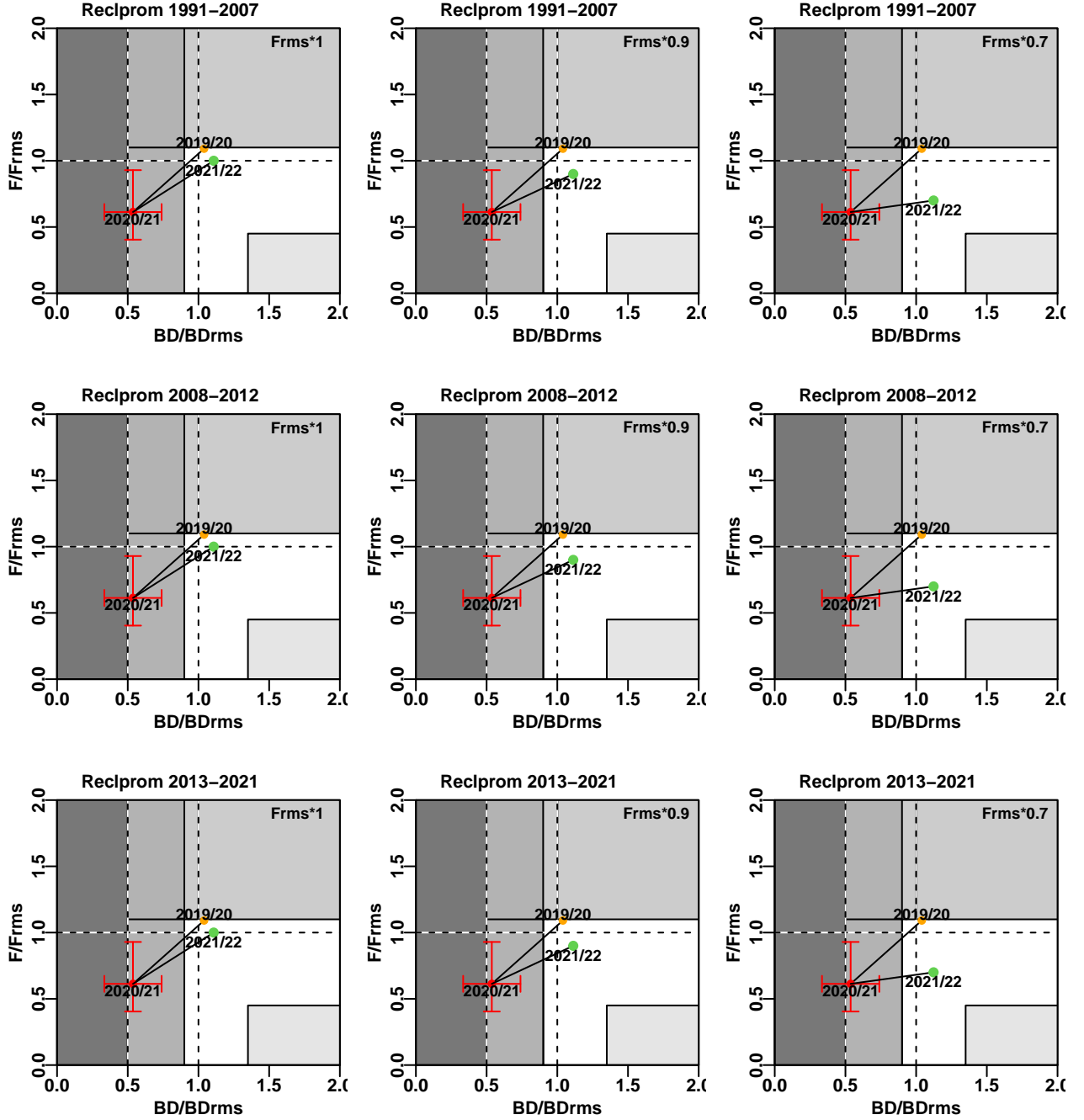
	2013-2020[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(sobre-explotación)_2018/19	0.21	0.21	0.21
p(colapso)_2018/19	0.00	0.00	0.00
p(sobre-explotación)_2019/20	0.99	0.99	0.99
p(colapso)_2019/20	0.22	0.22	0.22
p(sobre-explotación)_2020/21	0.46	0.45	0.44
p(colapso)_2020/21	0.03	0.03	0.03



	1991-2007[$F_{RMS} * 1$]	[$F_{RMS} * 0.9$]	[$F_{RMS} * 0.7$]
$p(BD < 0.9BD_{RMS})_{2020/21}$	1.00	1.00	1.00
$p(BD < 0.5BD_{RMS})_{2020/21}$	0.38	0.38	0.38
$p(BD < 0.9BD_{RMS})_{2021/22}$	0.27	0.26	0.26
$p(BD < 0.5BD_{RMS})_{2021/22}$	0.04	0.03	0.03

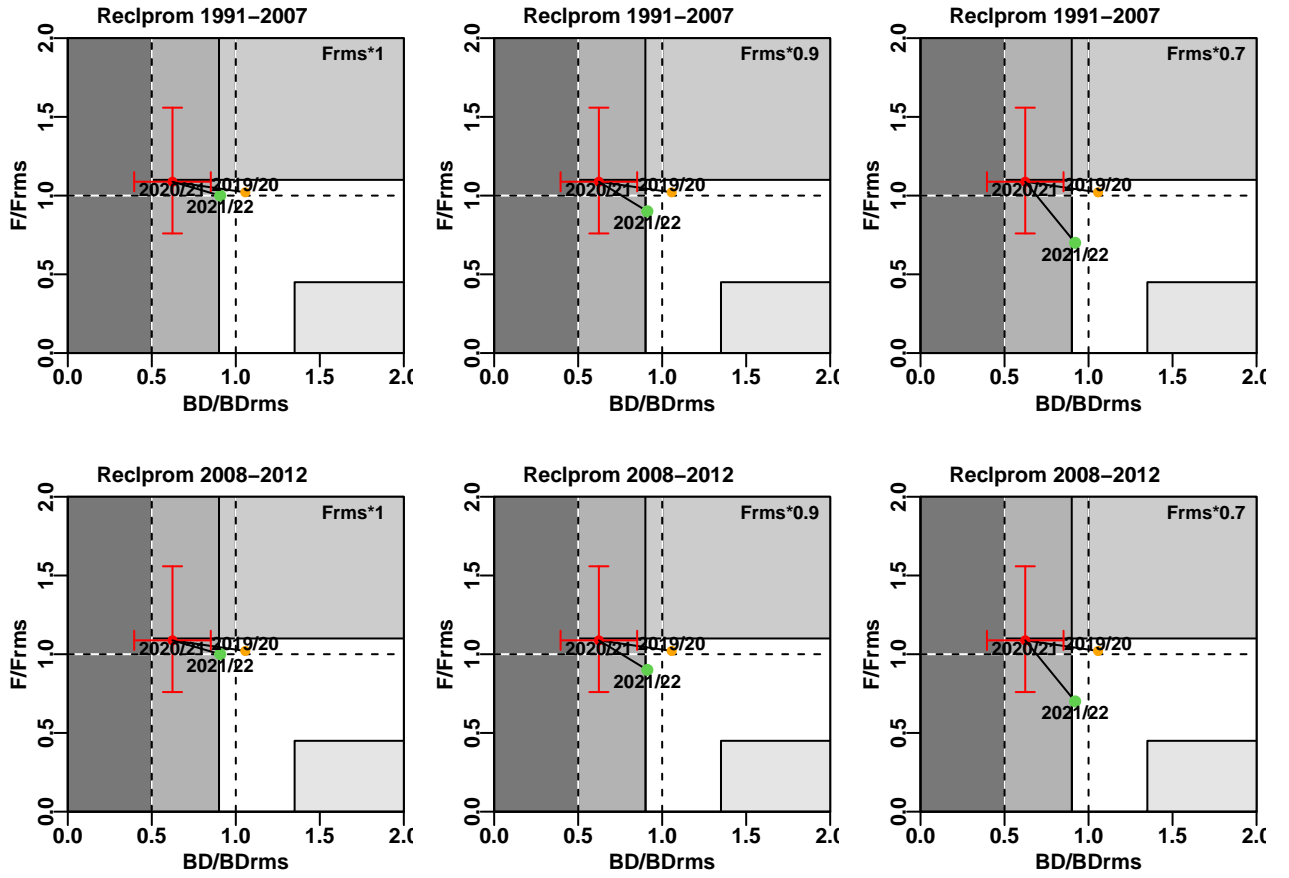
	2008-2012[$F_{RMS} * 1$]	[$F_{RMS} * 0.9$]	[$F_{RMS} * 0.7$]
$p(BD < 0.9BD_{RMS})_{2020/21}$	1.00	1.00	1.00
$p(BD < 0.5BD_{RMS})_{2020/21}$	0.38	0.38	0.38
$p(BD < 0.9BD_{RMS})_{2021/22}$	0.27	0.26	0.26
$p(BD < 0.5BD_{RMS})_{2021/22}$	0.04	0.03	0.03

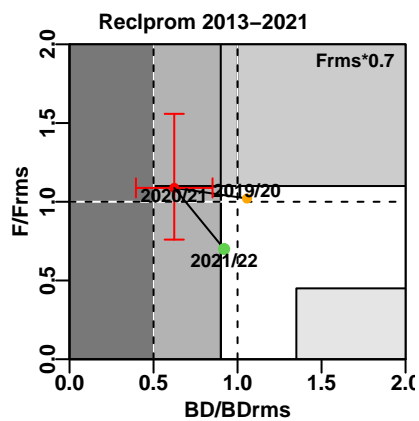
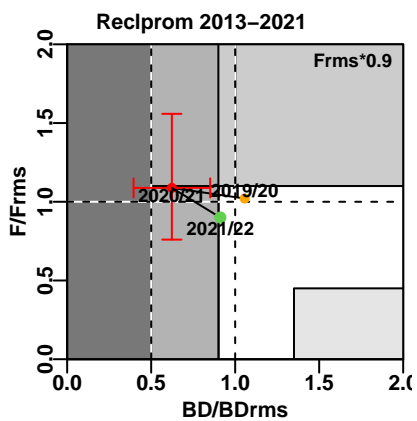
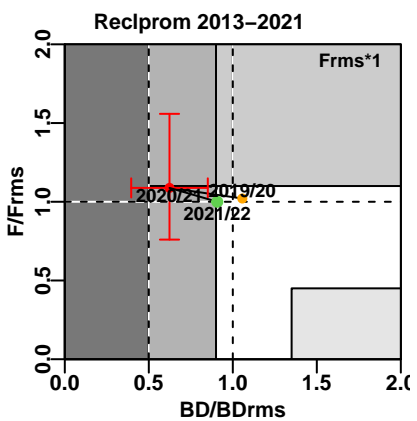
	2013-2021[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(BD<0,9BD _{RMS})_2020/21	1.00	1.00	1.00
p(BD<0,5BD _{RMS})_2020/21	0.38	0.38	0.38
p(BD<0,9BD _{RMS})_2021/22	0.27	0.26	0.26
p(BD<0,5BD _{RMS})_2021/22	0.04	0.03	0.03



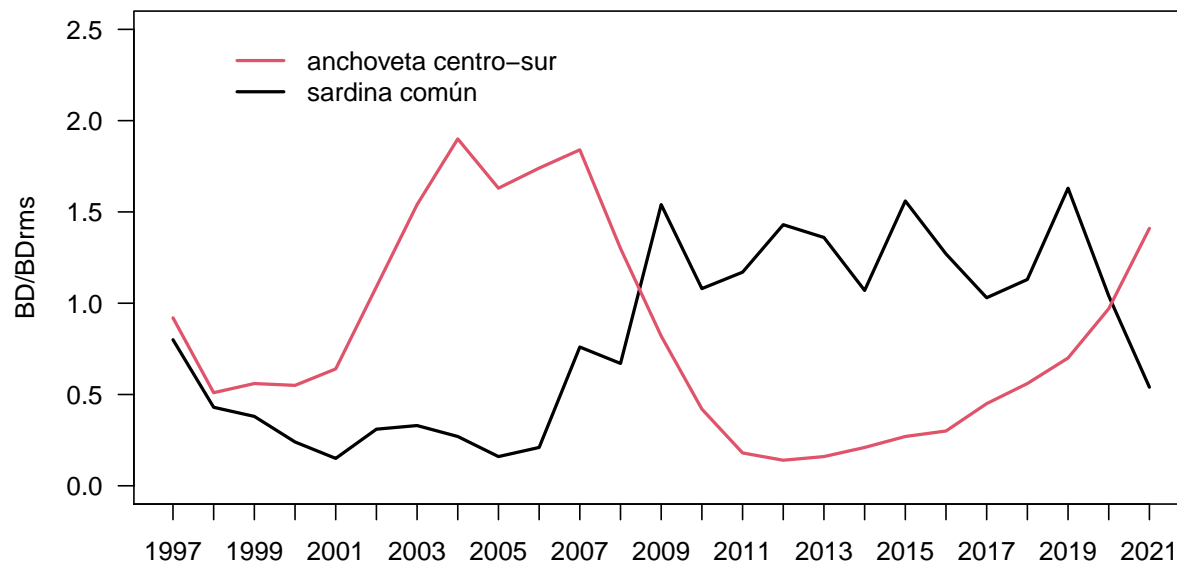
	1991-2007[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(BD<0,9BD _{RMS})_2020/21	0.98	0.98	0.98
p(BD<0,5BD _{RMS})_2020/21	0.18	0.18	0.18
p(BD<0,9BD _{RMS})_2021/22	0.49	0.48	0.46

	1991-2007[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(BD<0,5BD _{RMS})_2021/22	0.04	0.03	0.03
<hr/>			
	2008-2012[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(BD<0,9BD _{RMS})_2020/21	0.98	0.98	0.98
p(BD<0,5BD _{RMS})_2020/21	0.18	0.18	0.18
p(BD<0,9BD _{RMS})_2021/22	0.49	0.48	0.46
p(BD<0,5BD _{RMS})_2021/22	0.04	0.03	0.03
<hr/>			
	2013-2021[F _{RMS} *1]	[F _{RMS} *0.9]	[F _{RMS} *0.7]
p(BD<0,9BD _{RMS})_2020/21	0.98	0.98	0.98
p(BD<0,5BD _{RMS})_2020/21	0.18	0.18	0.18
p(BD<0,9BD _{RMS})_2021/22	0.49	0.48	0.46
p(BD<0,5BD _{RMS})_2021/22	0.04	0.03	0.03





5. DISCUSIÓN



- ¿Cuánto se sobrepasa el RMS en la captura 2020/21?

Por lo tanto, podríamos concluir que la causa de exceder el objetivo de manejo Frms para el año 2020/21 se debe al remanente de cuota autorizado.

¿Cuál es la captura semestral del año biológico 2020/21 y la captura descartada?

- CBA recomendada 2021 = 251.316 t
- Desembarque 1er semestre 2021 = 22% sobre CBA recomendada (306.406 t)

¿Cuál debería haber sido la captura para un F_{RMS} ?

La captura 2020/21 al RMS debería ser $359.250 (C_{RMS}) - 14.370 (4\% \text{descarte}) = 344.880 \text{ t}$

Por lo tanto, de las 344.880 t que se podían capturar entre el 2020/21, si consideramos que durante el 2do semestre 2020 se capturaron 69.839 t, entonces, durante el 1er semestre 2021 la captura no debería haber superado las 275.041 t. Se sobrepasó en torno a las 31 mil toneladas la captura biológicamente aceptable 2020/21.

Sobre las estacionalidad de las capturas

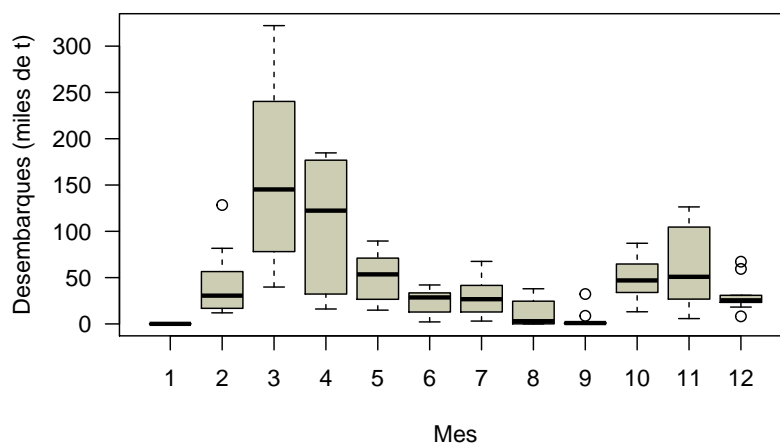


Figure 1: Capturas mensuales de sardina común realizadas entre 2007-2021, registradas por SERNAPESCA en la zona centro-sur.

- Revisar la estacionalidad de la captura en año biológico

```
prop1ersemestre<-c(0.81, 0.70, 0.65, 0.77, 0.47, 0.81, 0.72, 0.81, 0.85, 0.90, 0.81)

plot(seq(1991,2021),prop1ersemestre,type="o",ylab="Proporción de captura 1er semestre (año biológico)",xlab="Año biológico")
```

Separar la Captura en año biológico para revisar el efecto de la Captura 2020/21 sobre el cálculo de CBA en año calendario

Qué pasaría si los usuarios deciden no capturar durante el 2do semestres y traspasar ese remanente de cuota para el 1er semestre del siguiente año???

cuál es la captura biológicamente aceptable 2021/2022