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SC11 – JM03

PFA self-sampling report for the SPRFMO Science Committee 2023

European Union

11th Meeting of the Scientific Committee (SC11-JM03)

PFA selfsampling report for the SPRFMO Science Committee 2023

Niels Hintzen, 18/07/2023

PFA report 2022_09 / SC11-JM02

Executive summary

A description is presented of the fisheries carried out by vessels belonging to members of the Pelagic Freezer-trawler Association (PFA) within the SPRFMO area from 2016 to 2023. The Pelagic Freezer-trawler Association (PFA) is an association that has nine member companies that together operate 18 (in 2022) freezer trawlers in six European countries (www.pelagicfish.eu). In 2015, the PFA has initiated a self-sampling program that expands the ongoing monitoring programs on board of pelagic freezer-trawlers aimed at assessing the quality of fish. The expansion in the self-sampling program consists of recording of haul information, recording the species compositions by haul and regularly taking length measurements from the catch. The self-sampling is carried out by the vessel quality managers on board of the vessels, who have a long experience in assessing the quality of fish, and by the skippers/officers with respect to the haul information. During the fisheries in the Pacific, the self-sampling program has been carried out during all trips and all hauls.

The self-sampling program delivers information on spatial and temporal evolution of the fishery, species and length compositions and ambient fishing conditions (temperature and depth). Catch distributions and length compositions by quarter and division are presented for jack mackerel (CJM), chub mackerel (MAS) and southern rays bream (BRU). No PFA fisheries was carried in the SPRFMO area in 2020, due to the global Corona crisis. As such, no results can be reported for 2020. In the first half of 2023, three PFA vessels have been active in the SPRFMO convention area, although they arrived later than in previous years.

The **Jack mackerel fishery** takes place from March through to November. Overall, the self-sampling activities for the jack mackerel fisheries during the years 2016 - 2023 (up to 12/07/2023) covered 50 fishing trips with 2112 hauls, a total catch of 140216 tonnes and 77105 individual length measurements. Compared to the previous years, jack mackerel in the catch in 2021-2023 have been taken much more northerly. Median length of 23.7 cm compared to 27-36cm in the preceding years. The highest catch rates (catch/day) of Jack mackerel has been recorded in 2021 (222 ton/day) and is at 165 ton/day in 2022.

Bycatches of chub mackerel (MAS), Southern rays bream (BRU) and Blue fathead (UBA) are being taken in the fishery for Jack mackerel. During the years, reported here, 1699 hauls with Chub mackerel (MAS), 377 hauls with Southern rays bream (BRU) and 321 hauls with Blue fathead (UBA) have been analysed as part of the program.

In this 2023 self-sampling report, a standardized CPUE calculation has been included. The standardized CPUE is based on a GLM model with a negative binomial distribution. The response variable is the catch by week and vessel, with an offset of the log effort (number of fishing days per week) and explanatory variables year, GT category, month, division and depth category. An assumed technical efficiency increase of 2.5% per year has been included in the fitting of the model (Rousseau et al 2019)

A comparison of the self-sampling program and the EU observer program has been presented in a separate working document (*SC11-JM01 Comparison and protocol for including EU self-sampling data*).

1 Introduction

The Pelagic Freezer-trawler Association (PFA) is an association that has nine member companies that together operate 18 freezer trawlers (in 2022) in six European countries (www.pelagicfish.eu). In 2015, the PFA has initiated a self-sampling program that expands the ongoing monitoring programs on board of pelagic freezer-trawlers by the specialized crew of the vessels. The primary objective of that monitoring program is to assess the quality of fish. The expansion in the self-sampling program consists of recording of haul information, recording the species compositions per haul and regularly taking random length-samples from the catch. The self-sampling is carried out by the vessel quality managers on board of the vessels, who have a long experience in assessing the quality of fish, and by the skippers/officers with respect to the haul information. The scientific coordination of the self-sampling program is carried out by Niels Hintzen (PFA chief science officer) with support of Lina de Nijs and Floor Quirijns (contractor).

During the fisheries in the Pacific, the self-sampling program has carried out during all trips and all hauls.

The self-sampling program delivers information on spatial and temporal evolution of the fishery, species and length compositions and ambient fishing conditions (temperature and depth). Catch distributions and length compositions by quarter and division are presented for jack mackerel, chub mackerel and southern rays bream. New in 2019, is that age sampling for Jack mackerel has been included in the self-sampling program. Reports on age sampling have been reported as ALK by quarter and as worked up age distributions by quarter. While most of the data presented in this report was already included in the 2019 submission to SPRFMO (SC7-JM07), the current report encapsulates the complete data for 2019 and some further analyses.

In the first half of 2023, three PFA vessels have been active in the SPRFMO convention area. In this report, data has been processed up to 12/07/2023 and only reflects activities from one vessel.

2 Overview of self-sampling methodology

The self-sampling program in the SPRFMO area has been implemented on vessels from the Netherlands, Germany, Lithuania and Poland during the years 2016 - 2023. All trips by all PFA vessels fishing in the south Pacific are being monitored by self-sampling, also when there is a scientific observer on board for a certain trip.

The self-sampling program is designed in such a way that it follows as closely as possible the working practices on board of the different vessels and that it delivers the information needed for the SPRFMO Science Committee. The following elements can be distinguished in the self-sampling protocol:

- haul information (date, time, position, weather conditions, environmental conditions, gear attributed, estimated catch, optionally: species composition)
- batch information (total catch per batch=production unit, including variables like species, average size, average weight, fat content, gonads y/n and stomach fill)
- linking batch and haul information (essentially a key of how much of a batch is caught in which of the hauls)
- length information (length frequency measurements, either by batch or by haul)

The self-sampling information is collected using either standardized Excel worksheets or purpose developed software (M-Catch). Each participating vessel will send in the information collected during a trip by the end of the trip. The data will be checked and added to the database by Floor Quirijns and/or Lina de Nijs, who will also generate standardized trip reports (using RMarkdown) which will be sent back to the vessel within one or two days. The compiled data for all vessels is being used for specific purposes, e.g. reporting to expert groups, addressing specific fishery or biological questions and supporting detailed biological studies. The PFA publishes an annual report on the self-sampling program.

3 Results

3.1 General

An overview of all the self-sampled trips for cjm, mas, bru, uba in 87.2.6, 87.3.3, 87.1.4. The percentage non-target species is defined as the catch of non-pelagic species relative to the catch of pelagic species.

year	nvessels	ntrips	ndays	nhauls	catch	catch/day	nontarget	nlength	nbio
2016	1	4	93	167	10,284	111	1.50%	6,823	0
2017	2	10	273	609	29,652	109	0.28%	20,829	0
2018	1	5	130	236	10,235	79	2.03%	4,692	0
2019	1	3	85	162	12,115	143	0.76%	6,615	410
2021	3	10	184	436	44,304	241	4.31%	19,192	536
2022	2	17	267	656	62,809	235	0.18%	32,943	96
2023*	1	1	14	35	2,539	181	0.46%	1,143	0
(all)		50	1,046	2,301	171,938			92,237	1,042

*Table 3.1.1: PFA fisheries in the South Pacific Self-sampling Summary of number of vessels, trips, days, hauls, catch (tonnes), catch per day and number of fish measured. * denotes incomplete year*

Catch and number of self-sampled hauls by year and division

division	2016	2017	2018	2019	2021	2022	2023*	all	perc
87.2.6	2,210	11,305	1,875	3,377	44,260	25,990	2,539	91,554	53.2%
87.3.3	8,075	18,347	8,360	8,738	45	0	0	43,564	25.3%
87.1.4	0	0	0	0	0	36,820	0	36,820	21.4%
(all)	10,284	29,652	10,235	12,115	44,304	62,809	2,539	171,938	100.0%

division	2016	2017	2018	2019	2021	2022	2023*	all	perc
87.2.6	62	322	33	66	428	321	35	1,267	55.1%
87.3.3	105	287	203	96	8	0	0	699	30.4%
87.1.4	0	0	0	0	0	335	0	335	14.6%
(all)	167	609	236	162	436	656	35	2,301	100.0%

*Table 3.1.2: PFA fisheries in the South Pacific Self-sampling Summary of catch (top) and number of hauls (bottom) per year and division. * denotes incomplete year*

Catch and number of self-sampled hauls by year and month

month	2016	2017	2018	2019	2021	2022	2023*	all	perc
Jan	0	0	298	0	0	0	0	298	0.2%
Feb	0	0	521	0	0	0	0	521	0.3%
Mar	0	4,406	748	915	0	0	0	6,069	3.5%
Apr	1,618	6,674	2,644	3,820	1,153	4,321	0	20,229	11.8%
May	3,339	3,675	2,397	2,938	9,133	11,464	0	32,946	19.2%
Jun	2,855	3,311	1,780	786	7,772	10,331	391	27,225	15.8%
Jul	1,511	1,438	1,846	1,444	16,863	7,889	2,148	33,140	19.3%
Aug	377	1,889	0	2,211	5,351	9,234	0	19,062	11.1%
Sep	584	1,741	0	0	4,034	11,343	0	17,702	10.3%
Oct	0	3,331	0	0	0	7,067	0	10,398	6.0%
Nov	0	1,863	0	0	0	1,161	0	3,024	1.8%
Dec	0	1,323	0	0	0	0	0	1,323	0.8%
(all)	10,284	29,652	10,235	12,115	44,304	62,809	2,539	171,938	100.0%

month	2016	2017	2018	2019	2021	2022	2023*	all	perc
Jan	0	0	16	0	0	0	0	16	0.7%
Feb	0	0	29	0	0	0	0	29	1.3%
Mar	0	48	32	7	0	0	0	87	3.8%
Apr	19	83	55	34	21	69	0	281	12.2%
May	41	74	41	30	93	139	0	418	18.2%
Jun	43	71	31	21	106	108	5	385	16.7%
Jul	32	51	32	34	137	74	30	390	16.9%
Aug	17	52	0	36	47	81	0	233	10.1%
Sep	15	37	0	0	32	111	0	195	8.5%
Oct	0	96	0	0	0	63	0	159	6.9%
Nov	0	52	0	0	0	11	0	63	2.7%
Dec	0	45	0	0	0	0	0	45	2.0%
(all)	167	609	236	162	436	656	35	2,301	100.0%

Table 3.1.3: PFA fisheries in the South Pacific Self-sampling summary of catch (top) and number of hauls (bottom) per year and month.

Catch and number of self-sampled hauls by year and country (flag)

flag	2016	2017	2018	2019	2021	2022	2023*	all	perc
DEU	10,284	0	0	0	14,212	0	0	24,496	14.2%
LIT	0	16,020	10,235	0	4,415	32,944	0	63,614	37.0%
NL	0	13,632	0	0	0	0	0	13,632	7.9%
POL	0	0	0	12,115	25,677	29,865	2,539	70,196	40.8%
(all)	10,284	29,652	10,235	12,115	44,304	62,809	2,539	171,938	100.0%

flag	2016	2017	2018	2019	2021	2022	2023*	all	perc
DEU	167	0	0	0	177	0	0	344	15.0%
LIT	0	429	236	0	39	371	0	1,075	46.7%
NL	0	180	0	0	0	0	0	180	7.8%
POL	0	0	0	162	220	285	35	702	30.5%
(all)	167	609	236	162	436	656	35	2,301	100.0%

Table 3.1.4: PFA fisheries in the South Pacific Self-sampling summary of catch (top) and number of hauls (bottom) per year and month.

Catch by species and year

species	english_name	scientific_name	2016	2017	2018	2019	2021	2022	2023
all	perc								
cjm	jack mackerel	Trachurus murphyi	9,432	27,645	9,620	11,788	36,446	43,385	1,900
140,216	81.6%								
mas	chub mackerel	Scomber japonicus	673	1,841	117	123	5,939	19,309	628
28,631	16.7%								
bys	Splendid alfonsino	Beryx splendens	0	0	0	0	1,010	0	0
1,010	0.6%								
uba	blue fathead	Cubiceps caeruleus	146	84	208	39	49	47	1
574	0.3%								
bru	rays bream	Brama australis	24	82	290	112	10	0	0
518	0.3%								
emm	Redbait	Emmelichthys nitidus	0	0	0	0	505	0	0
505	0.3%								
emt	Redbaits	Emmelichthyidae	0	0	0	0	307	0	0
307	0.2%								
bep	Eastern Pacific bonito	Sarda chiliensis	0	0	0	2	5	42	0
49	0.0%								
bpq	NA	Brama japonica	0	0	0	41	0	0	0
41	0.0%								
sqm	Broadtail shortfin squid	Illex coindetii	0	0	0	0	2	27	0
29	0.0%								
msd	Mackerel scad	Decapterus macarellus	0	0	0	0	22	0	0
22	0.0%								
gis	jumbo flying squid	Dosidicus gigas	0	0	0	0	3	0	10
13	0.0%								
skj	skipjack tuna	Katsuwonus pelamis	0	0	0	6	1	0	0
8	0.0%								
poa	pomfret	Brama brama	6	0	0	0	0	0	0
6	0.0%								
edr	NA	Pseudopentaceros richardsoni	0	0	0	3	0	0	0
3	0.0%								
oth	NA	NA	2	0	0	0	5	0	0
7	0.0%								
(all)	(all)	(all)	10,284	29,652	10,235	12,115	44,304	62,809	2,539
171,938	100.0%								

Table 3.1.5: PFA fisheries in the South Pacific Self-sampling Summary of total catch (tonnes) by species. OTH refers to all other species that are not the main target species

Haul positions

An overview of all self-sampled hauls in the PFA fisheries in the South Pacific.

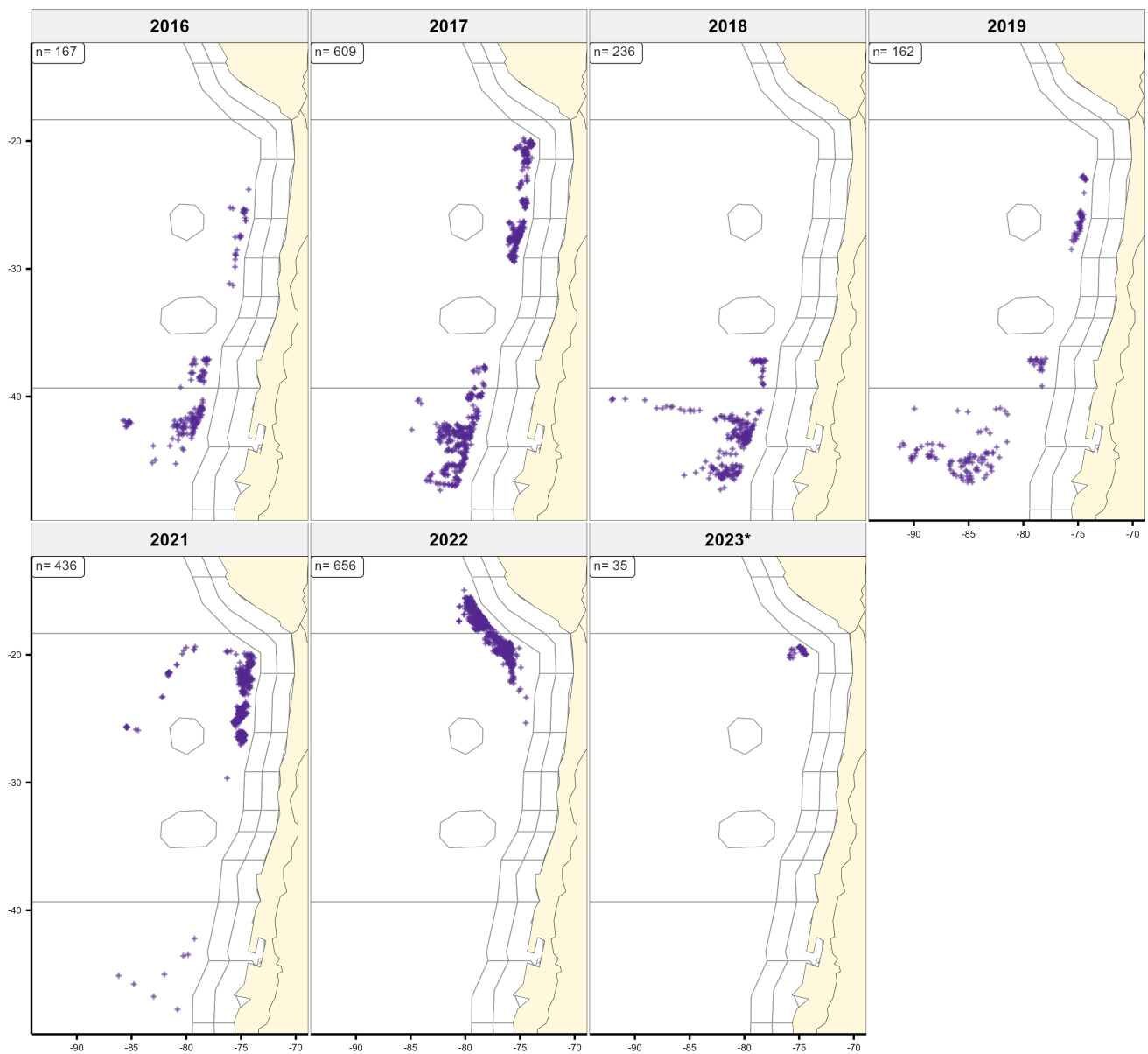


Figure 3.1.1: PFA fisheries in the South Pacific Self-sampling haul positions. N indicates the number of hauls.

Catches for the main target species

Summed catches (tonnes) of the main target species aggregated in rectangles.

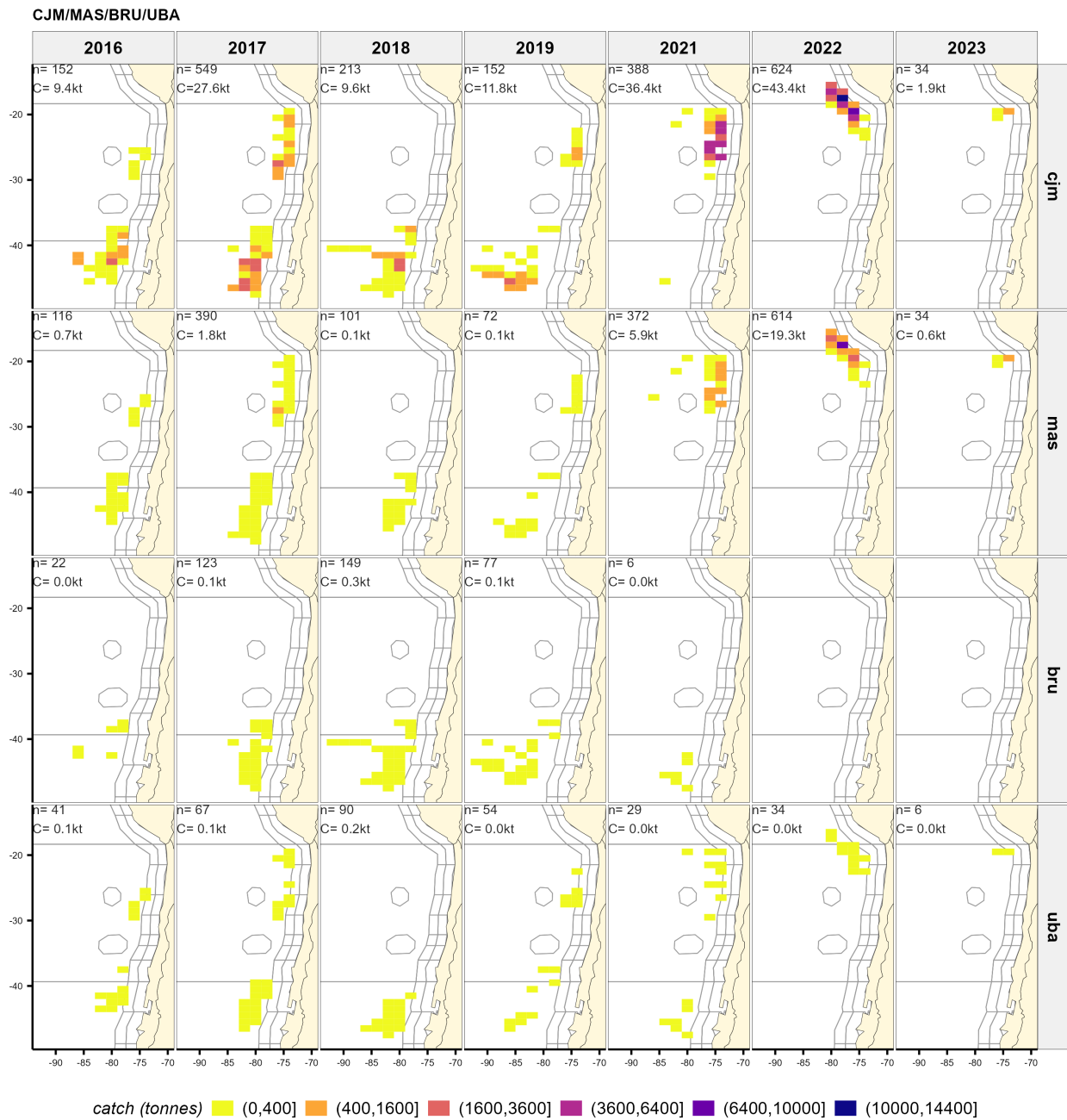


Figure 3.1.2: PFA fisheries in the South Pacific Self-sampling catch per species and per rectangle. *N* indicates the number of hauls. Catch refers to the total catch per year.

Catch rates (catch/day) for the main target species

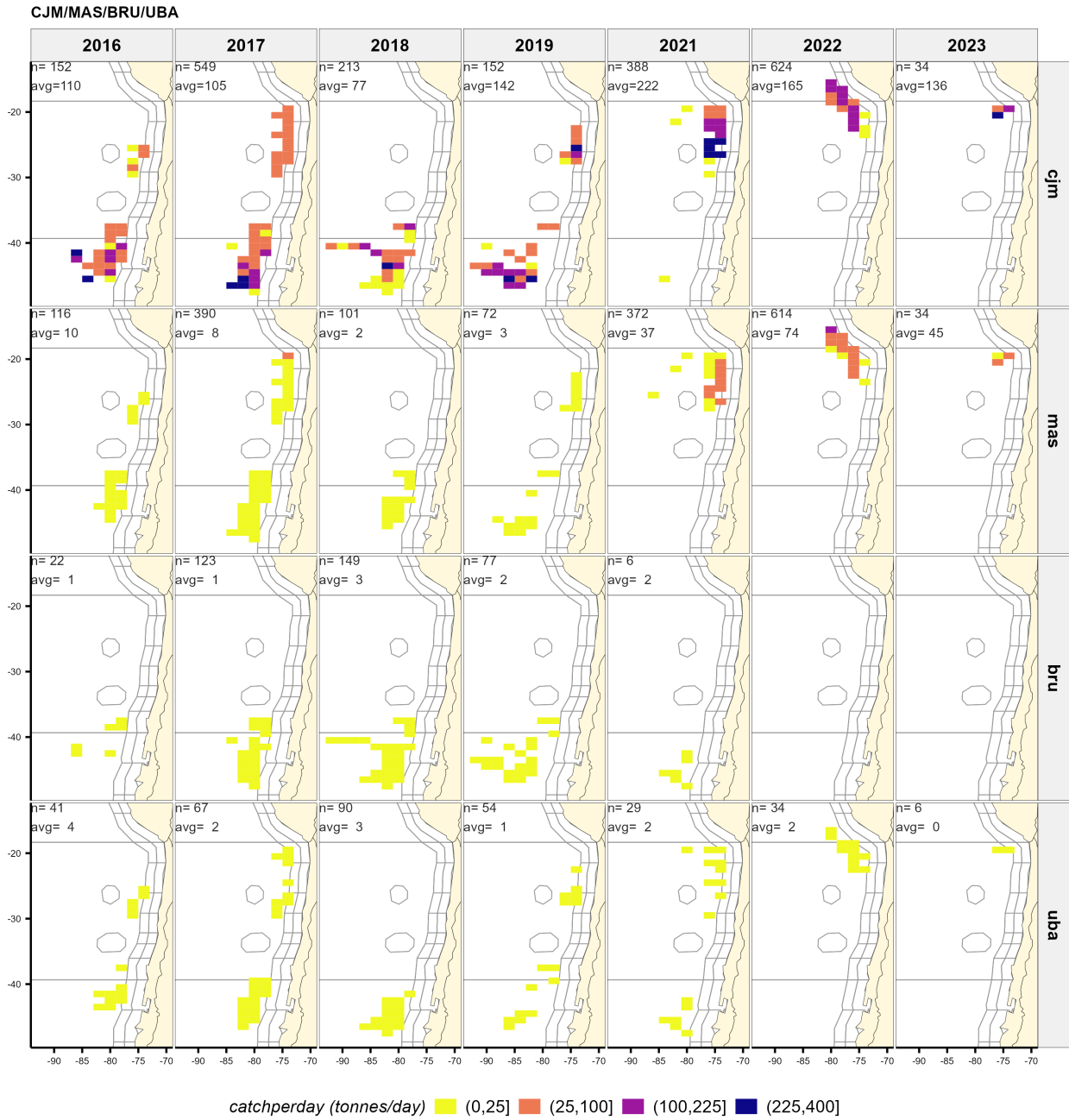


Figure 3.1.3: Average catch per day, per species and per rectangle. N indicates the number of hauls; avg refers to the average catch per day.

Average surface temperature by quarter and by rectangle.

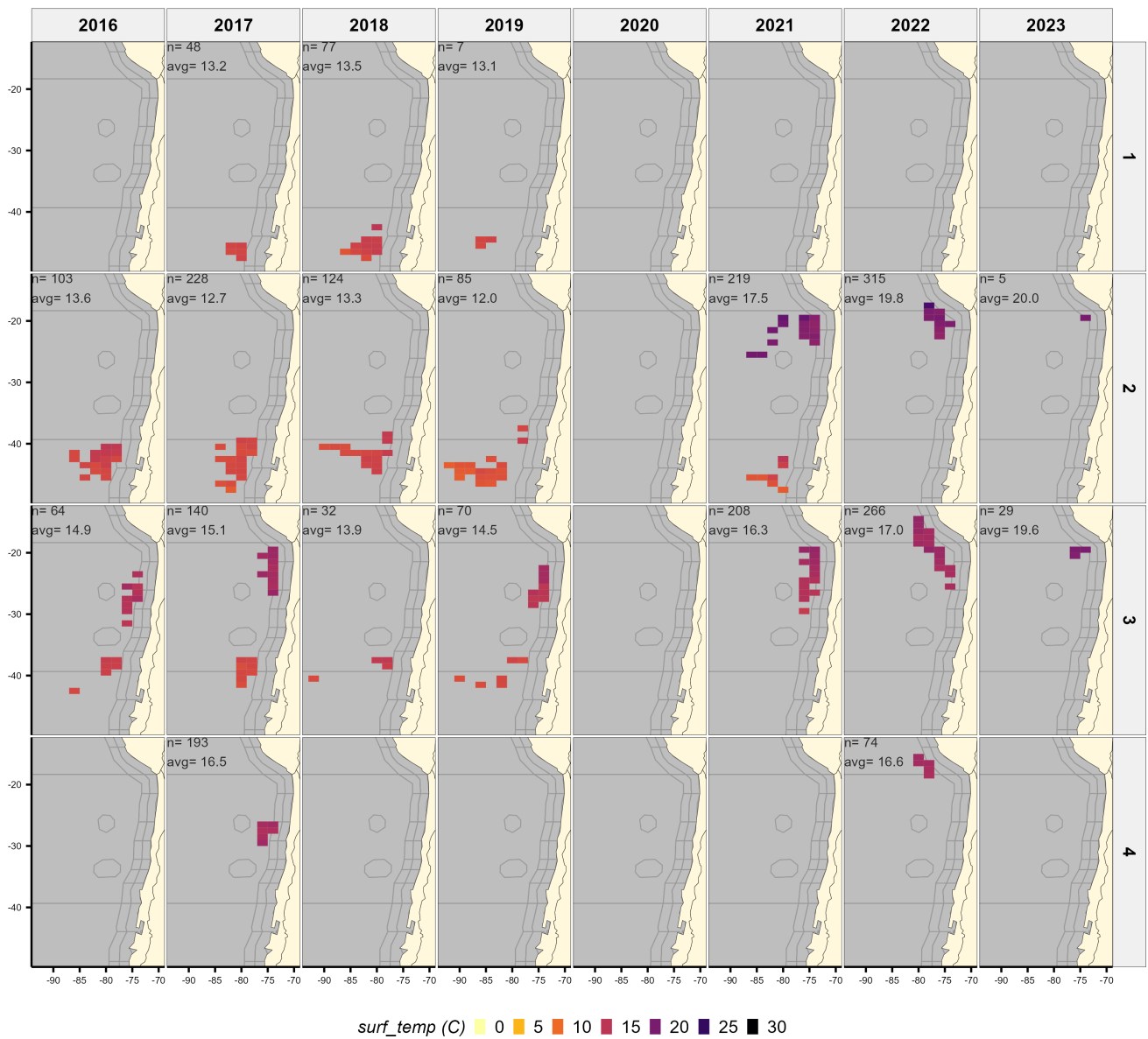


Figure 3.1.4: PFA fisheries in the South Pacific Average surface temperature (C) by year and quarter. N indicates the number of hauls. Avg refers to the average temperature.

Average fishing depth.

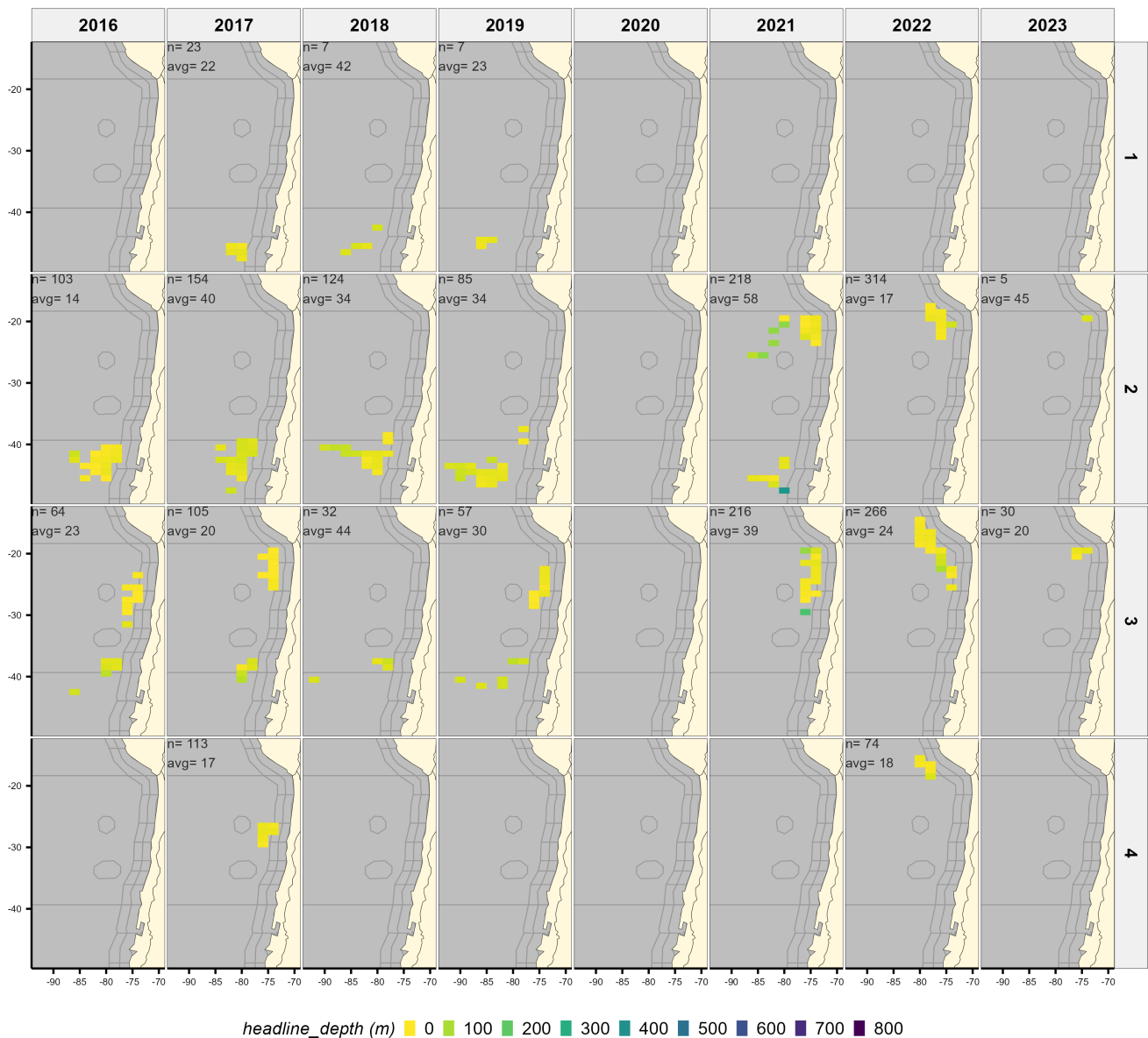


Figure 3.1.5: PFA fisheries in the South Pacific Average fishing depth (m) by year and quarter. N indicates the number of hauls. Avg refers to the average fishing depth.

Average wind force.

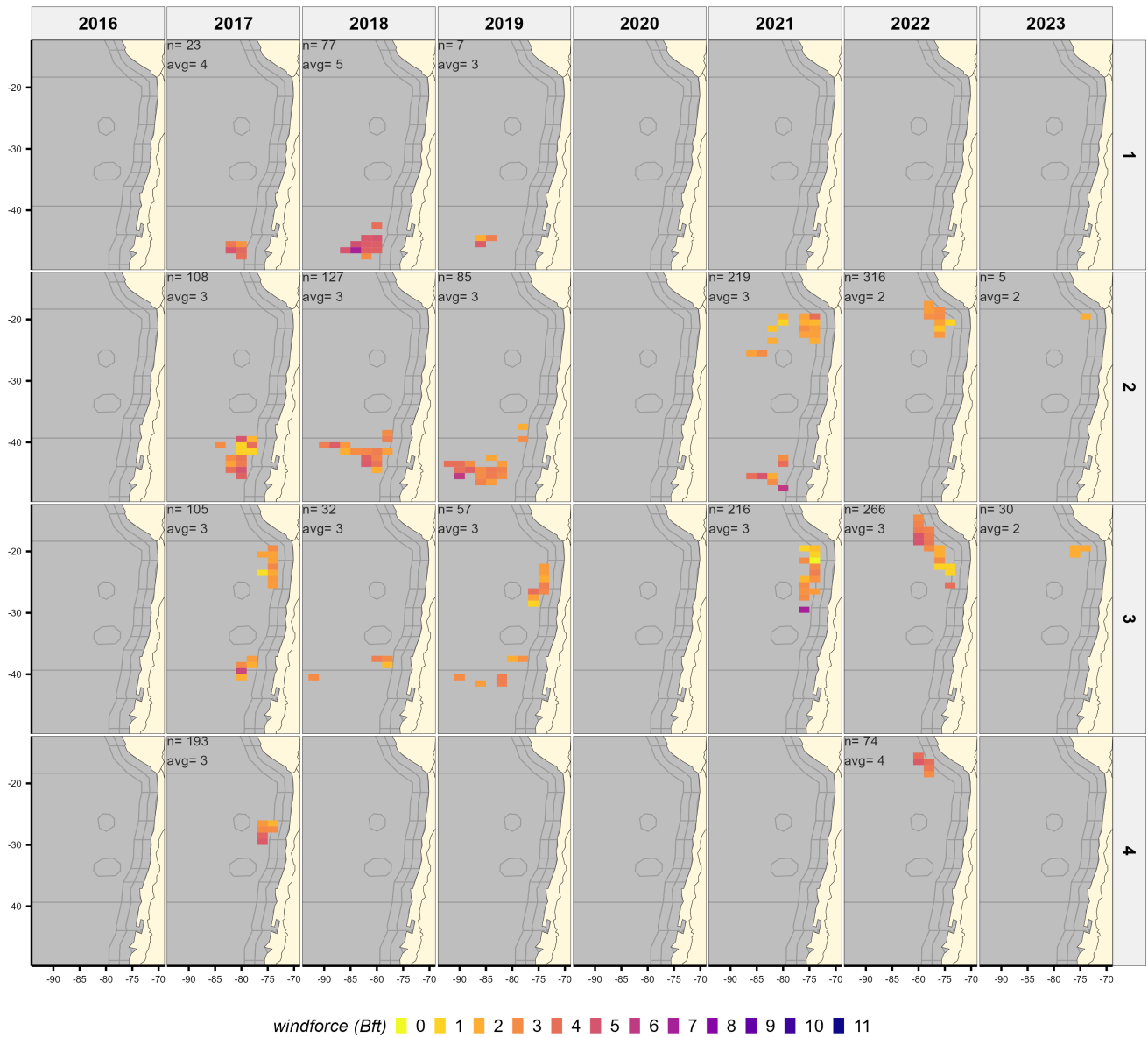


Figure 3.1.6: PFA fisheries in the South Pacific Average windforce (Bft) by year and quarter. N indicates the number of hauls. Avg refers to the average windforce.

3.2 Jack mackerel (CJM, *Trachurus murphyi*)

Jack mackerel self-sampling summary.

species	year	nvessels	nrtrips	ndays	nhauls	catch	catch/day	nlength	nbio
cjm	2016	1	4	86	152	9,432	110	6,042	0
cjm	2017	2	10	263	549	27,645	105	19,631	0
cjm	2018	1	5	125	213	9,620	77	3,937	0
cjm	2019	1	3	83	152	11,788	142	6,032	410
cjm	2021	3	10	164	388	36,446	222	14,842	188
cjm	2022	2	17	263	624	43,385	165	25,727	84
cjm	2023	1	1	14	34	1,900	136	894	0
(all)	(all)		50	998	2,112	140,216		77,105	682

Table 3.2.1: Jack mackerel. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), catch rate (ton/day), number of fish measured, number of biological observations.

Jack mackerel. Catch by division

species	division	2016	2017	2018	2019	2021	2022	2023*	all	perc
cjm	87.1.4	0	0	0	0	0	22,823	0	22,823	16.3%
cjm	87.2.6	2,054	9,673	1,705	3,158	36,443	20,562	1,900	75,495	53.8%
cjm	87.3.3	7,378	17,972	7,915	8,630	3	0	0	41,898	29.9%
(all)	(all)	9,432	27,645	9,620	11,788	36,446	43,385	1,900	140,216	100.0%

Table 3.2.2: Jack mackerel. Self-sampling summary with the catch (tonnes) by year and division

Jack mackerel. Catch by month

species	month	2016	2017	2018	2019	2021	2022	2023*	all	perc
cjm	Jan	0	0	272	0	0	0	0	272	0.2%
cjm	Feb	0	0	442	0	0	0	0	442	0.3%
cjm	Mar	0	4,301	625	902	0	0	0	5,828	4.2%
cjm	Apr	1,534	6,526	2,554	3,786	11	3,222	0	17,632	12.6%
cjm	May	2,911	3,615	2,294	2,904	7,251	9,337	0	28,313	20.2%
cjm	Jun	2,674	3,256	1,743	756	6,312	8,154	285	23,180	16.5%
cjm	Jul	1,413	1,239	1,690	1,347	14,538	6,078	1,615	27,920	19.9%
cjm	Aug	347	1,588	0	2,093	4,613	5,724	0	14,366	10.2%
cjm	Sep	553	1,471	0	0	3,721	6,808	0	12,552	9.0%
cjm	Oct	0	2,731	0	0	0	3,434	0	6,165	4.4%
cjm	Nov	0	1,616	0	0	0	628	0	2,244	1.6%
cjm	Dec	0	1,302	0	0	0	0	0	1,302	0.9%
(all)	(all)	9,432	27,645	9,620	11,788	36,446	43,385	1,900	140,216	100.0%

Table 3.2.3: Jack mackerel. Self-sampling summary with the catch (tonnes) by year and month

Jack mackerel. Catch by rectangle

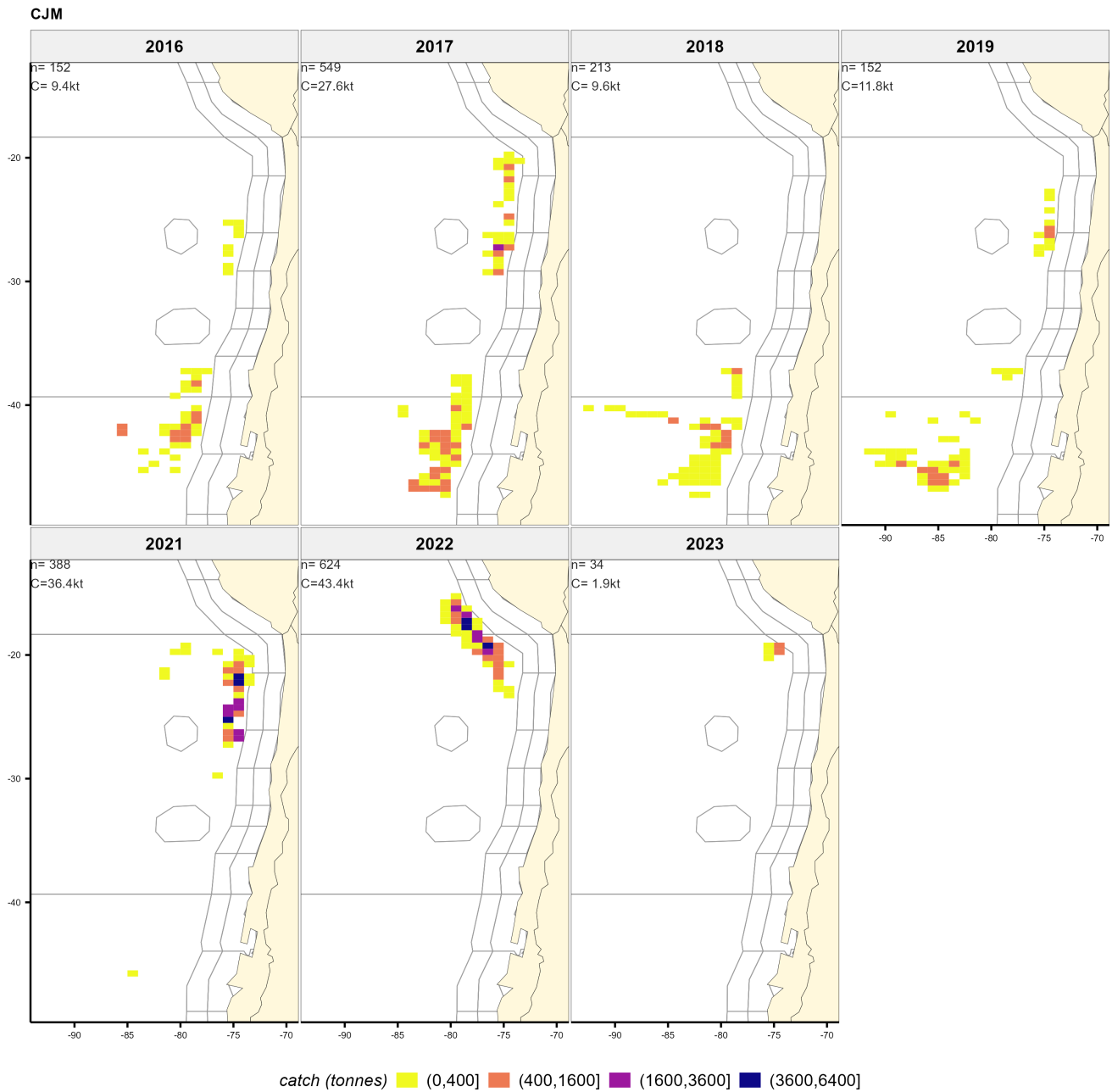


Figure 3.2.1: Jack mackerel. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.

Jack mackerel. Catchrate (ton/day) by rectangle

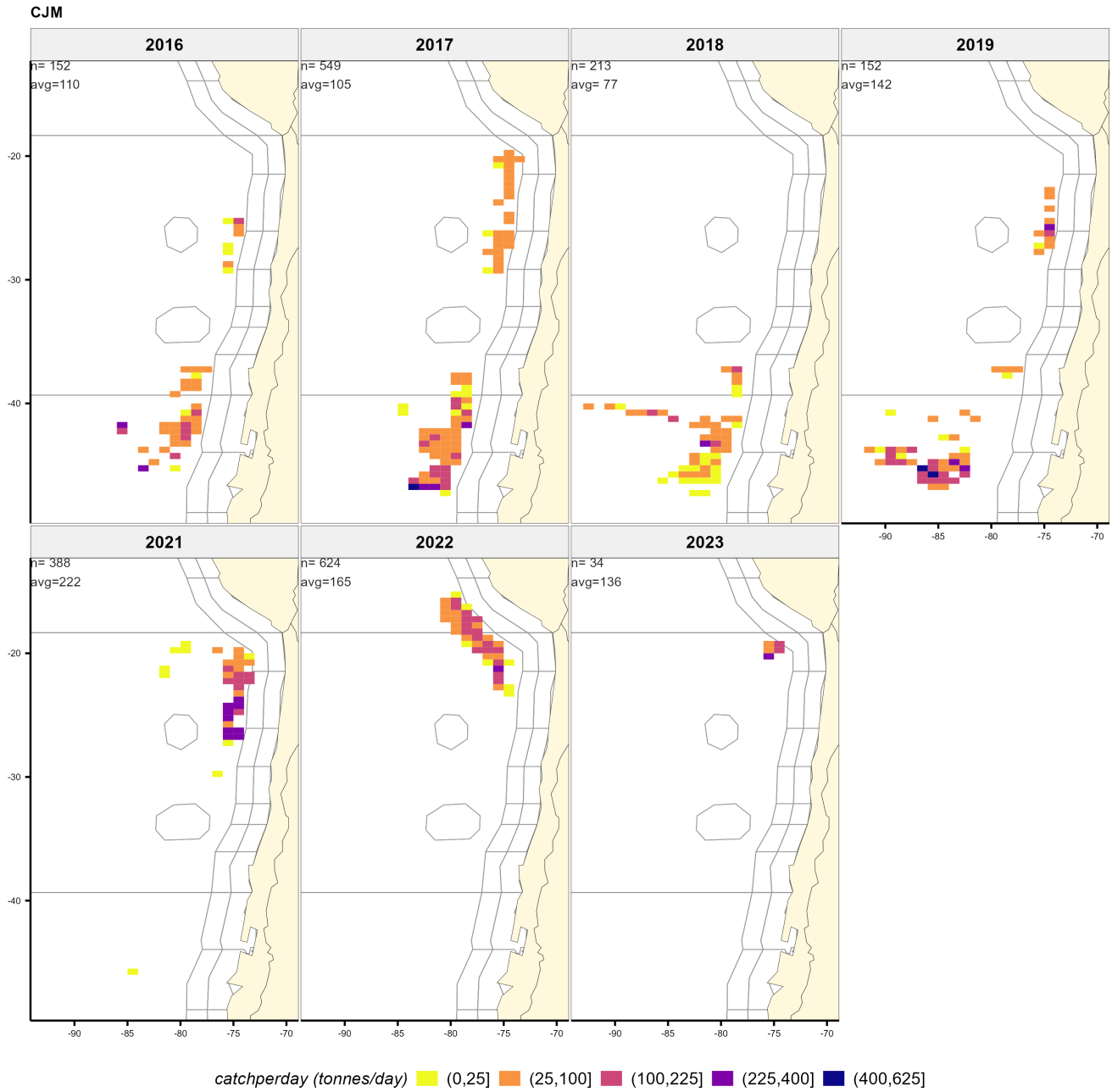


Figure 3.2.2: Jack mackerel. Catchrate (ton/day) per rectangle. N indicates the number of hauls; Avg refers to the average catchrate per rect.

Jack mackerel. Spatio-temporal evolution of catch by month and rectangle

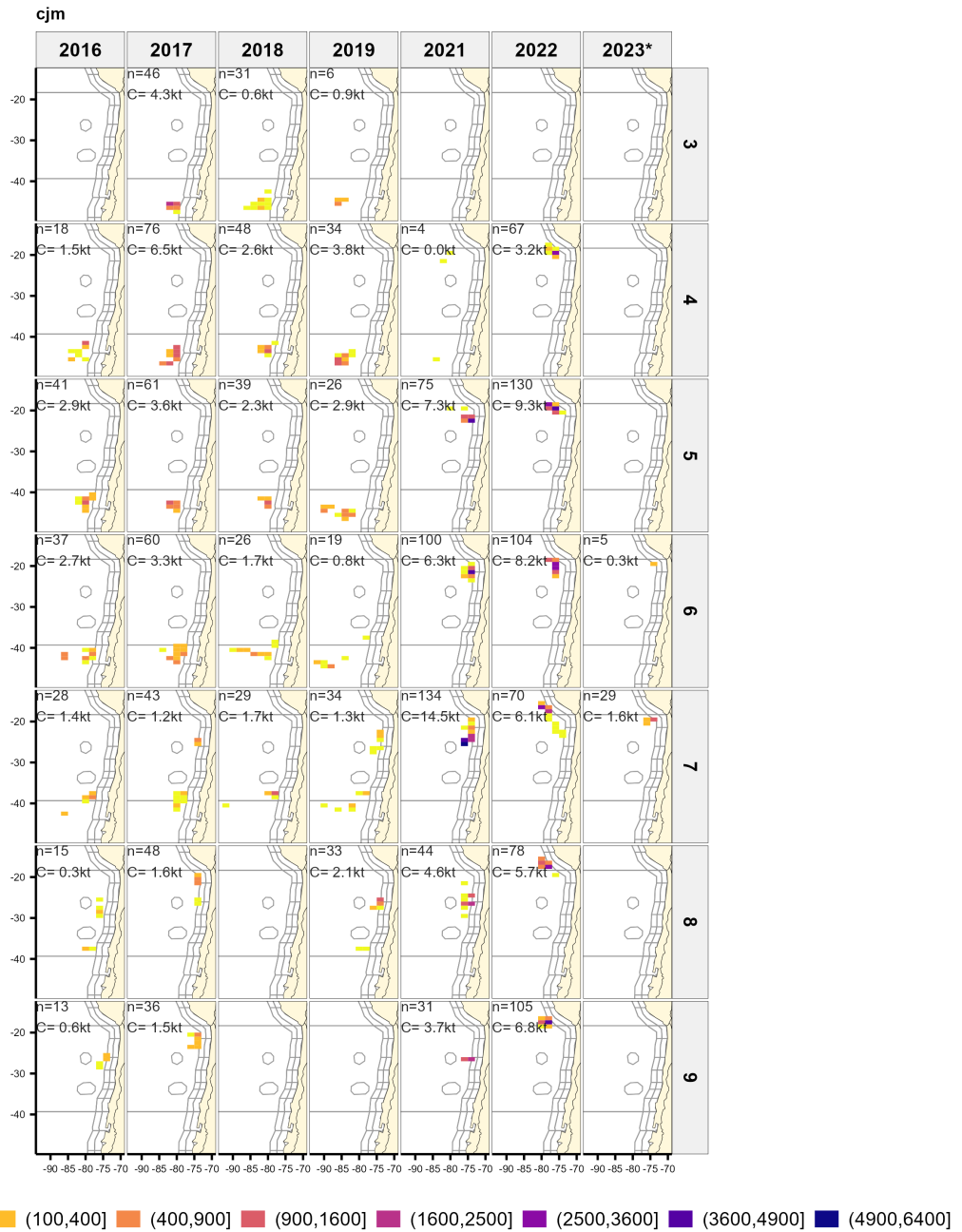


Figure 3.2.3: Jack mackerel. Spatio-temporal evolution of the catches per rectangle and month. *N* indicates the number of hauls; *C* refers to the total catch by year and month.

Jack mackerel. Catch proportion at depth

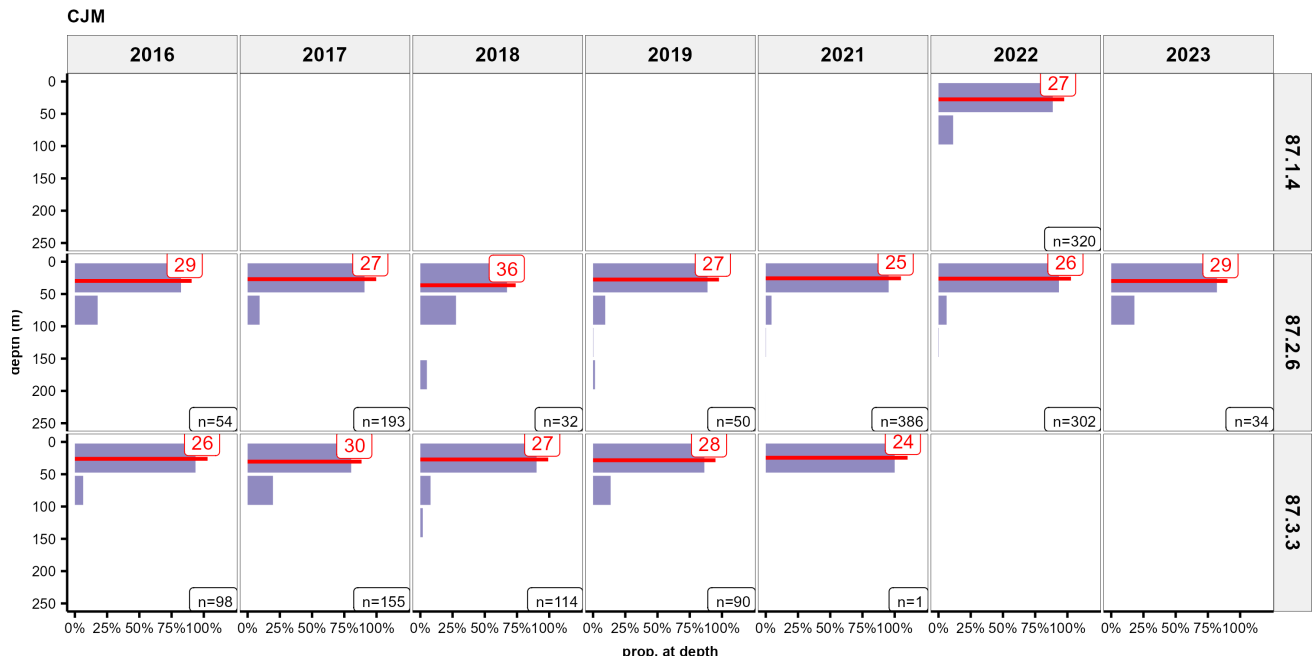


Figure 3.2.4: Jack mackerel. Catch proportion at depth. N indicates the number of hauls.

Jack mackerel. Length distributions of the catch

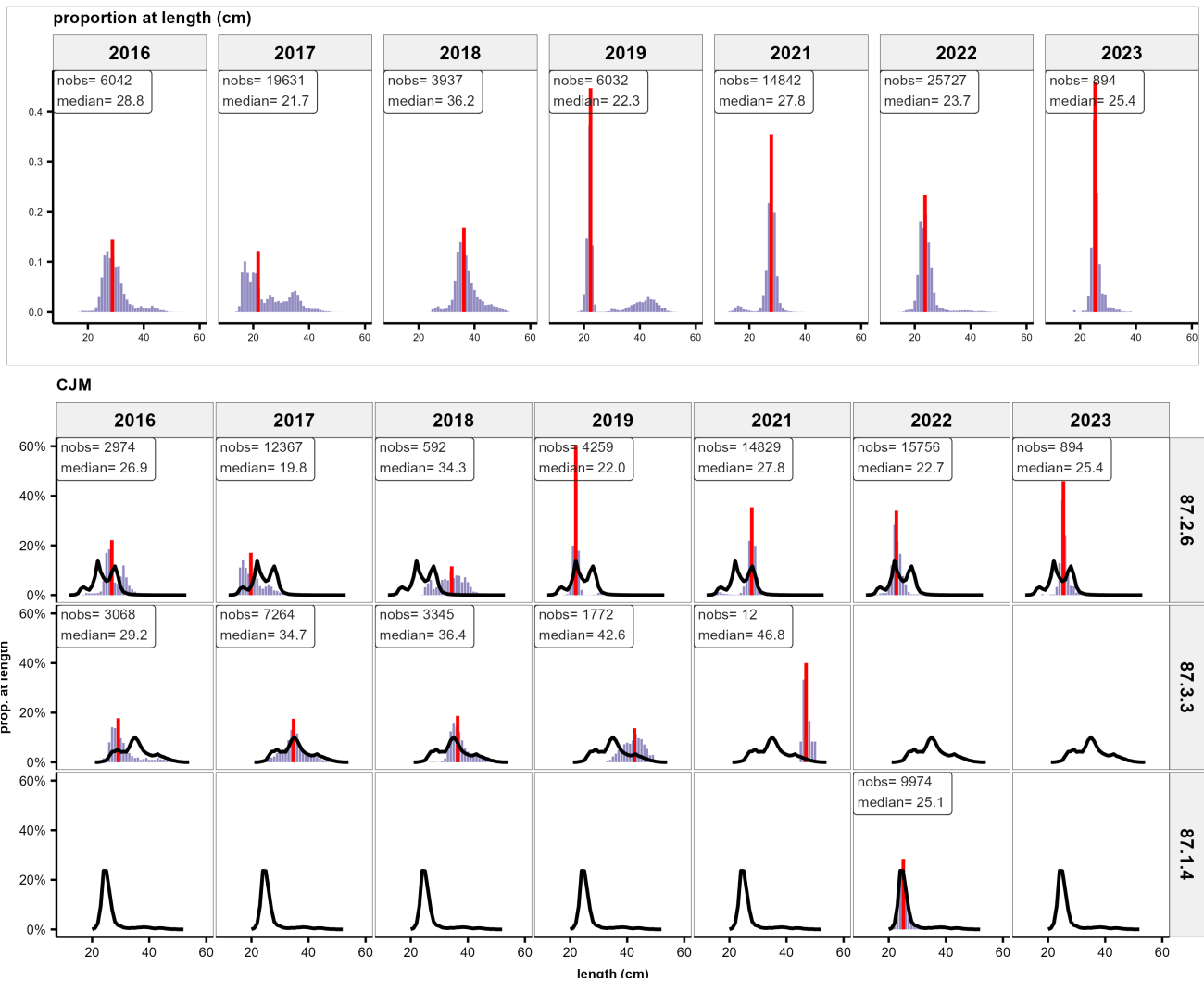
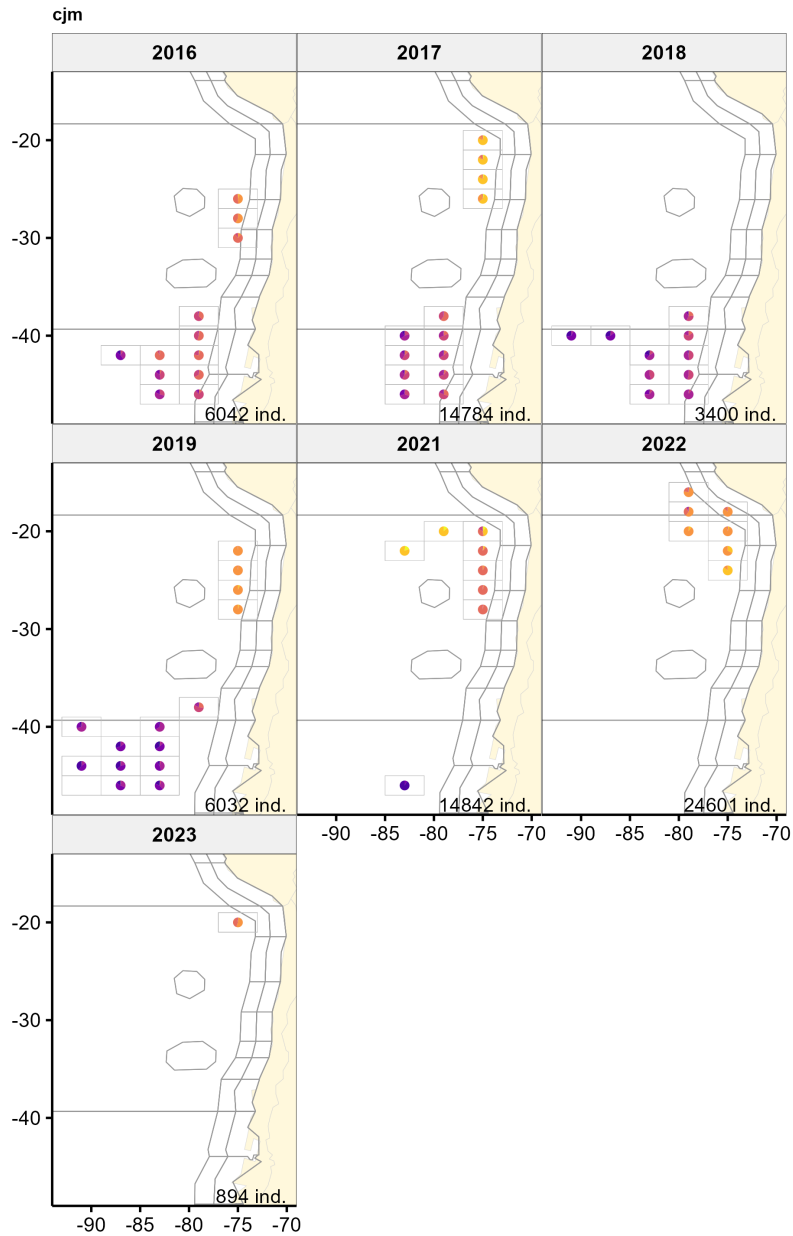


Figure 3.2.5: Jack mackerel. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length.

Jack mackerel. Length distributions as proportions by (large) rectangle



length class (10,15] (15,20] (20,25] (25,30] (30,35] (35,40] (40,45] (45,50] (50,55]

Figure 3.2.6: Jack mackerel. Length distributions as proportions by large rectangle. Ind. refers to the number of length measurements

Jack mackerel. Average length, weight and fat content by year and month

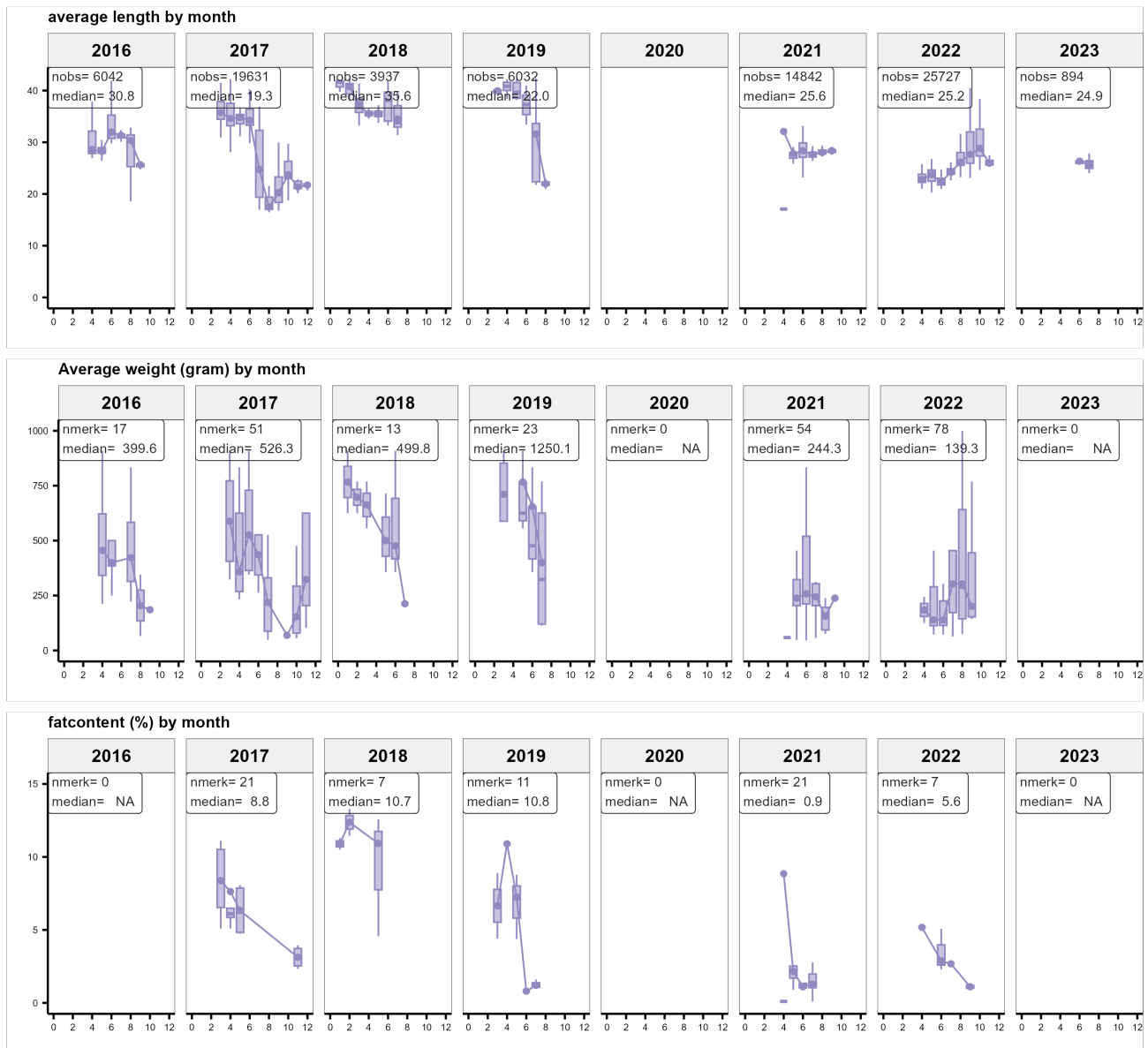


Figure 3.2.7: Jack mackerel. Average length, average weight, and average fat content. Nobs indicates the number of measurements, median indicates the median values

Jack mackerel (CJM). Standardized CPUE

Standardized CPUE (ton/day) from GLM model with factors year, month, GT, division and depth with $\log(\text{days})$ as offset. It is assumed that a 2.5% annual efficiency increase takes place (Rousseau et al 2019).

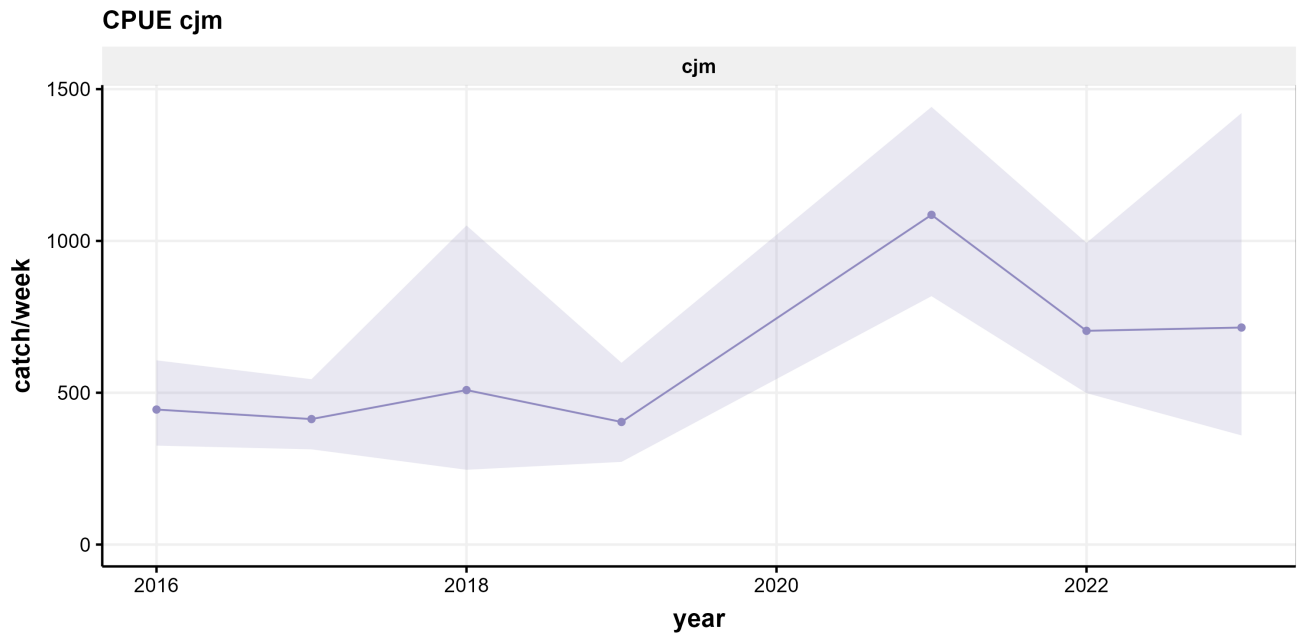


Figure 3.2.8: Jack mackerel. Standardized CPUE (ton/day) from GLM model with factors year, month, GT, division and depth with $\log(\text{days})$ as offset

3.3 Chub mackerel (MAS, *Scomber japonicus*)

Chub mackerel self-sampling summary.

species	year	nvessels	ntrips	ndays	nhauls	catch	catch/day	nlength	nbio
mas	2016	1	4	67	116	673	10	562	0
mas	2017	2	10	220	390	1,841	8	1,014	0
mas	2018	1	5	67	101	117	2	109	0
mas	2019	1	3	47	72	123	3	78	0
mas	2021	3	9	162	372	5,939	37	2,875	152
mas	2022	2	17	261	614	19,309	74	7,184	12
mas	2023	1	1	14	34	628	45	249	0
(all)	(all)		49	838	1,699	28,631		12,071	164

Table 3.3.1: Chub mackerel. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), catch rate (ton/day), number of fish measured, number of biological observations.

Chub mackerel. Catch by division

species	division	2016	2017	2018	2019	2021	2022	2023*	all	perc
mas	87.1.4	0	0	0	0	0	13,953	0	13,953	48.7%
mas	87.2.6	137	1,587	69	120	5,939	5,355	628	13,835	48.3%
mas	87.3.3	537	254	49	3	0	0	0	843	2.9%
(all)	(all)	673	1,841	117	123	5,939	19,309	628	28,631	100.0%

Table 3.3.2: Chub mackerel. Self-sampling summary with the catch (tonnes) by year and division

Chub mackerel. Catch by month

species	month	2016	2017	2018	2019	2021	2022	2023*	all	perc
mas	Jan	0	0	0	0	0	0	0	0	0.0%
mas	Feb	0	0	0	0	0	0	0	0	0.0%
mas	Mar	0	66	2	2	0	0	0	70	0.2%
mas	Apr	59	102	22	1	15	1,096	0	1,295	4.5%
mas	May	317	36	24	1	1,107	2,097	0	3,581	12.5%
mas	Jun	160	44	2	1	1,460	2,167	106	3,940	13.8%
mas	Jul	83	192	68	45	2,315	1,766	522	4,990	17.4%
mas	Aug	25	295	0	74	730	3,485	0	4,608	16.1%
mas	Sep	29	268	0	0	313	4,531	0	5,142	18.0%
mas	Oct	0	588	0	0	0	3,633	0	4,221	14.7%
mas	Nov	0	229	0	0	0	534	0	762	2.7%
mas	Dec	0	21	0	0	0	0	0	21	0.1%
(all)	(all)	673	1,841	117	123	5,939	19,309	628	28,631	100.0%

Table 3.3.3: Chub mackerel. Self-sampling summary with the catch (tonnes) by year and month

Chub mackerel. Catch by rectangle

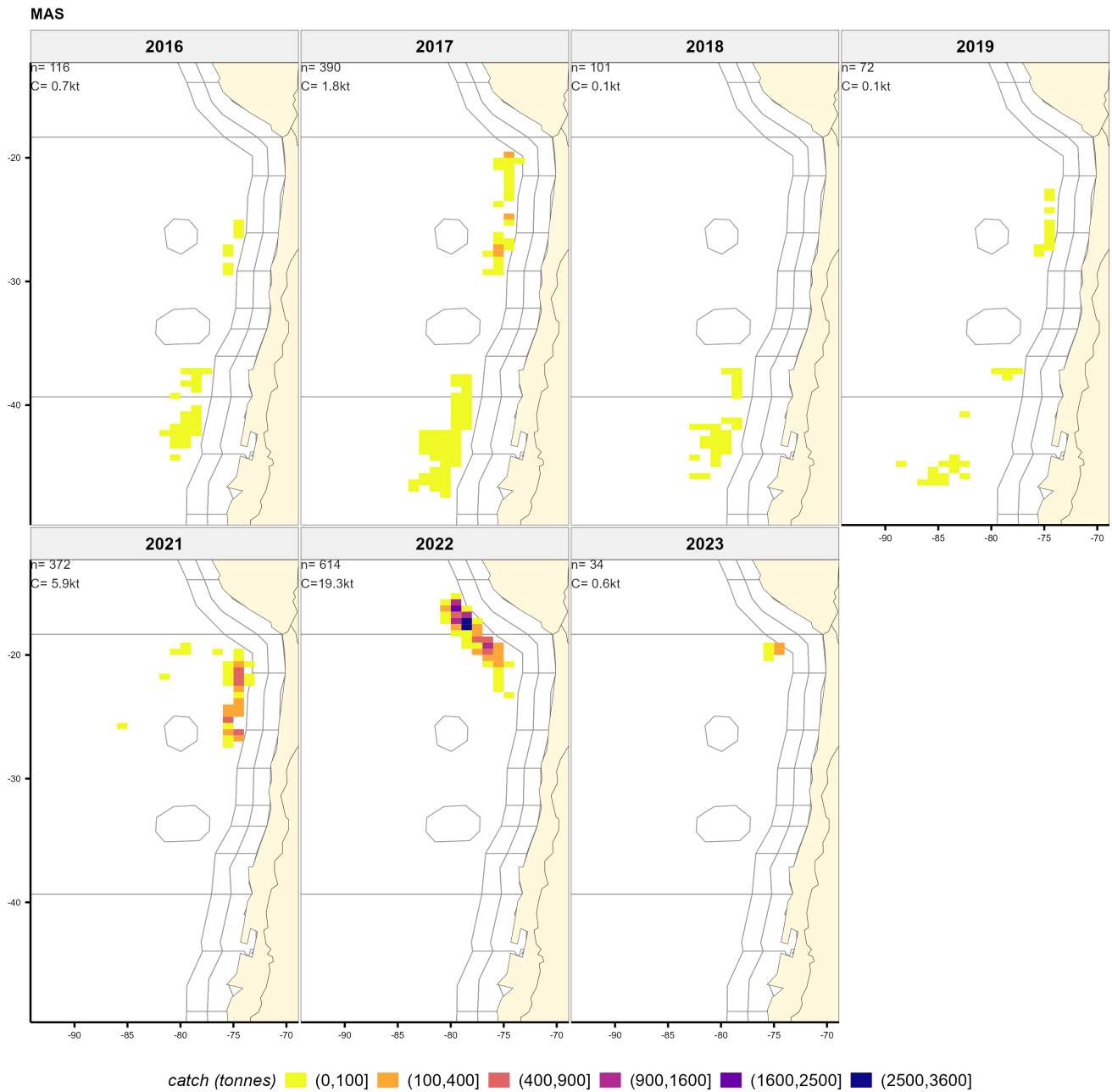


Figure 3.3.1: Chub mackerel. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.

Chub mackerel. Catchrate (ton/day) by rectangle

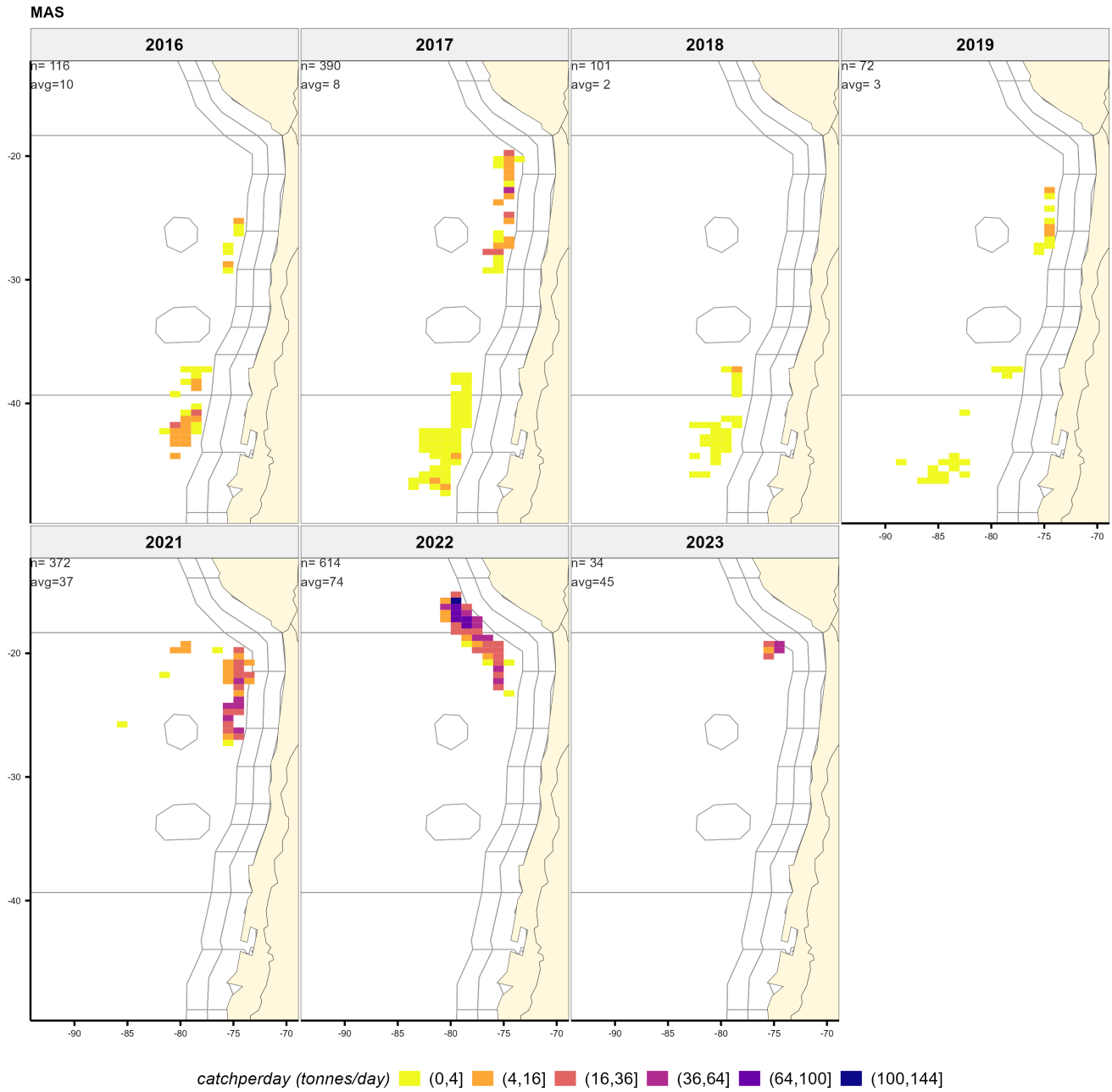


Figure 3.3.2: Chub mackerel. Catchrate (ton/day) per rectangle. N indicates the number of hauls; Avg refers to the average catchrate per rect.

Chub mackerel. Spatio-temporal evolution of catch by month and rectangle

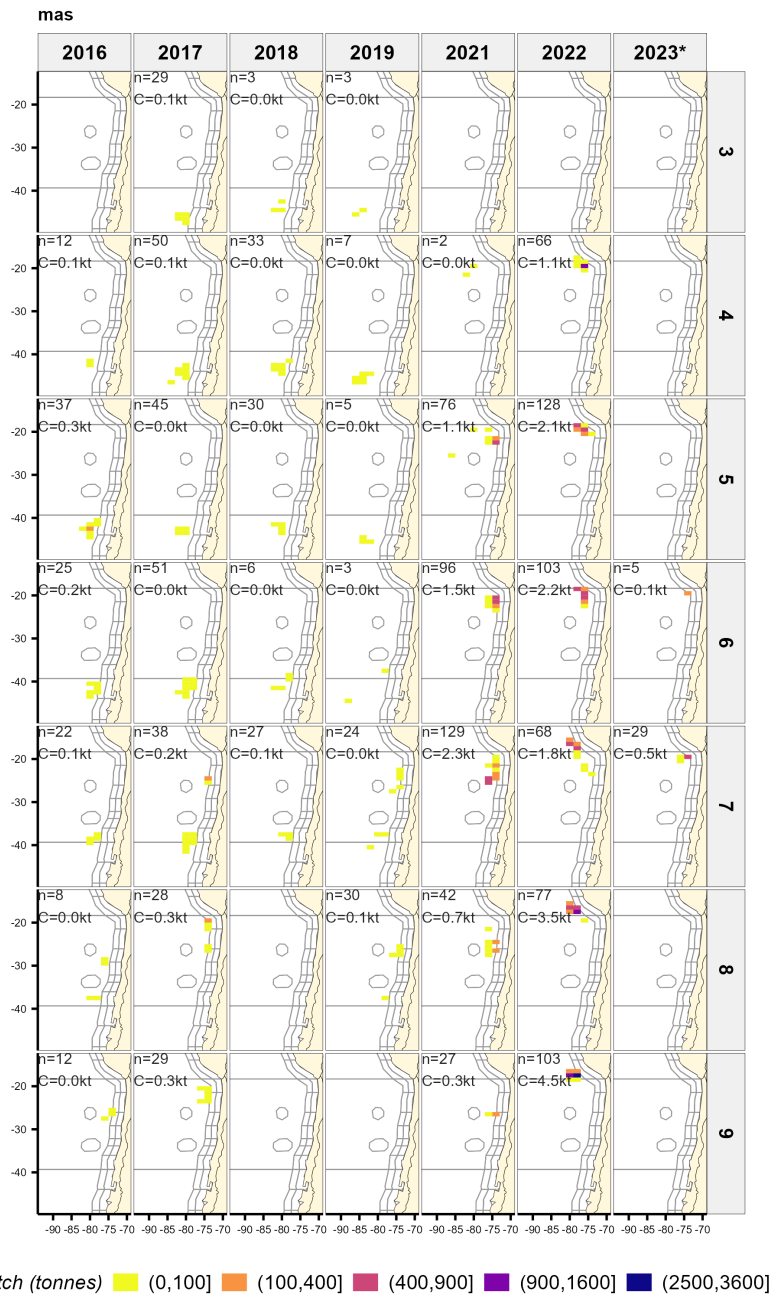


Figure 3.3.3: Chub mackerel. Spatio-temporal evolution of the catches per rectangle and month. *N* indicates the number of hauls; *C* refers to the total catch by year and month.

Chub mackerel. Catch proportion at depth

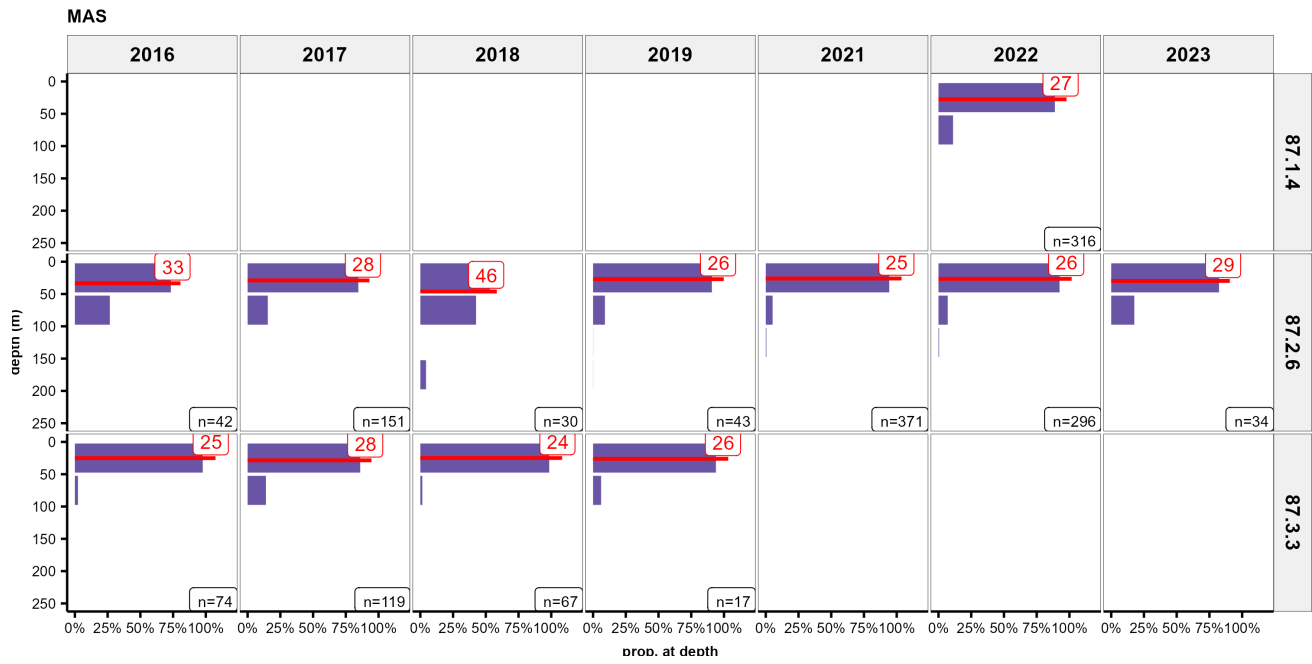


Figure 3.3.4: Chub mackerel. Catch proportion at depth. N indicates the number of hauls.

Chub mackerel. Length distributions of the catch

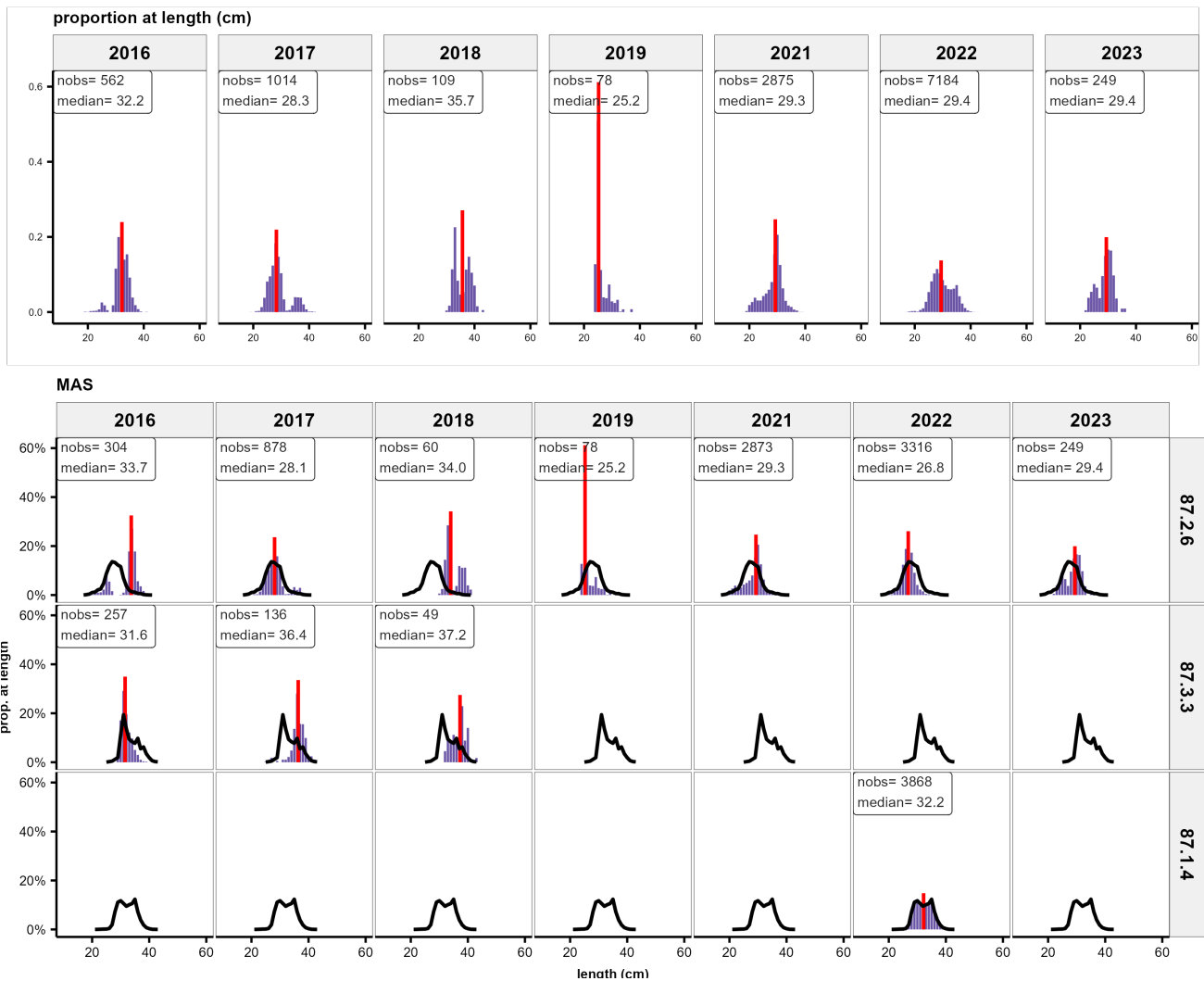


Figure 3.3.5: Chub mackerel. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length.

Chub mackerel. Length distributions as proportions by (large) rectangle

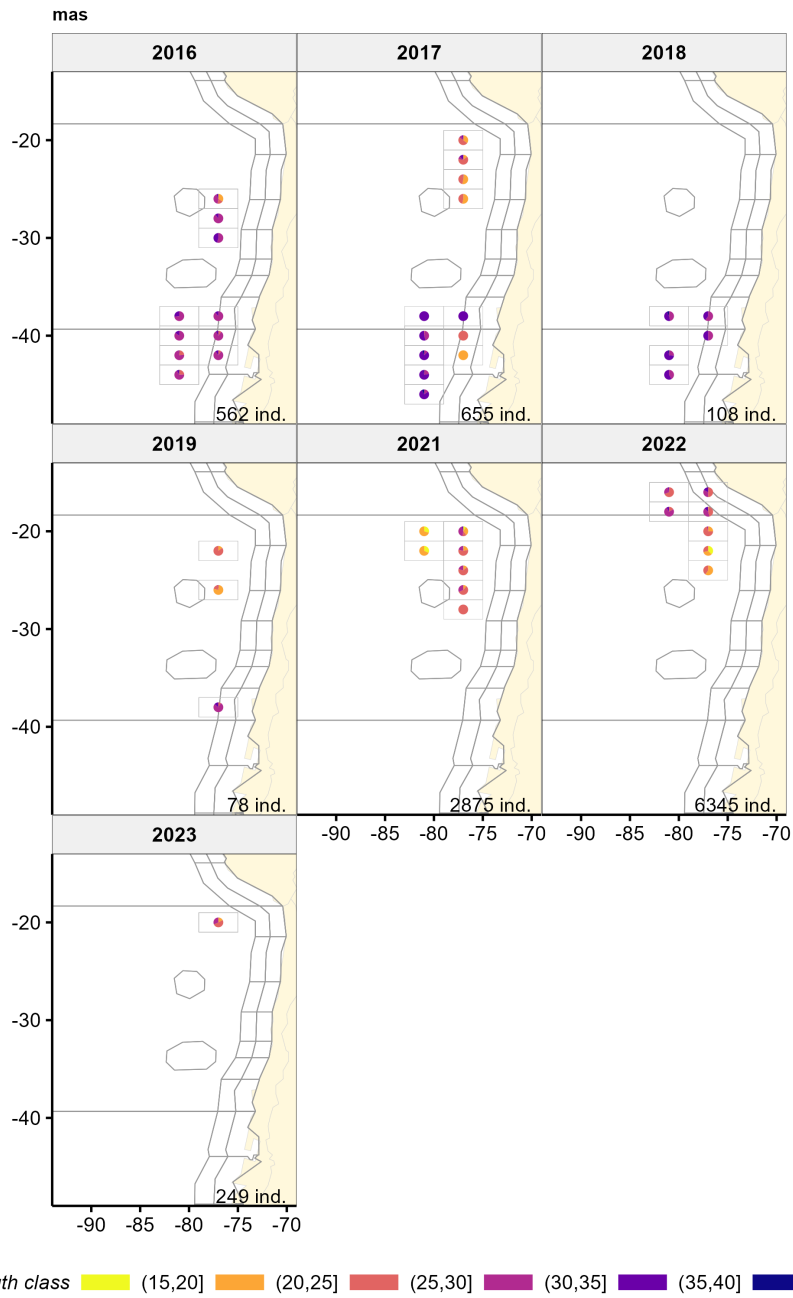


Figure 3.3.6: Chub mackerel. Length distributions as proportions by large rectangle. Ind. refers to the number of length measurements

Chub mackerel. Average length, weight and fat content by year and month

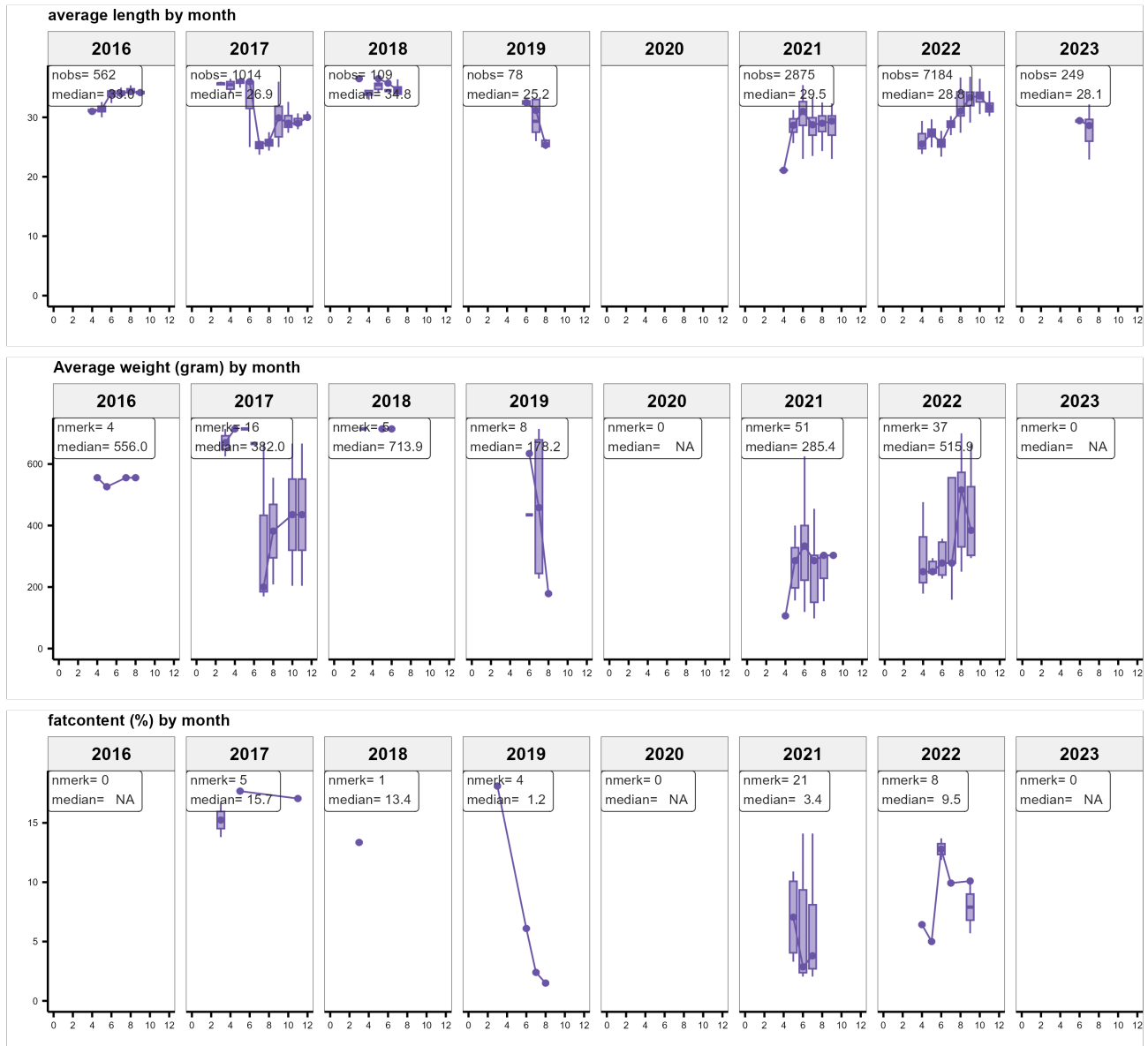


Figure 3.3.7: Chub mackerel. Average length, average weight, and average fat content. Nobs indicates the number of measurements, median indicates the median values

Chub mackerel (MAS). Standardized CPUE

Standardized CPUE (ton/day) from GLM model with factors year, month, GT, division and depth with log(days) as offset. It is assumed that a 2.5% annual efficiency increase takes place (Rousseau et al 2019).

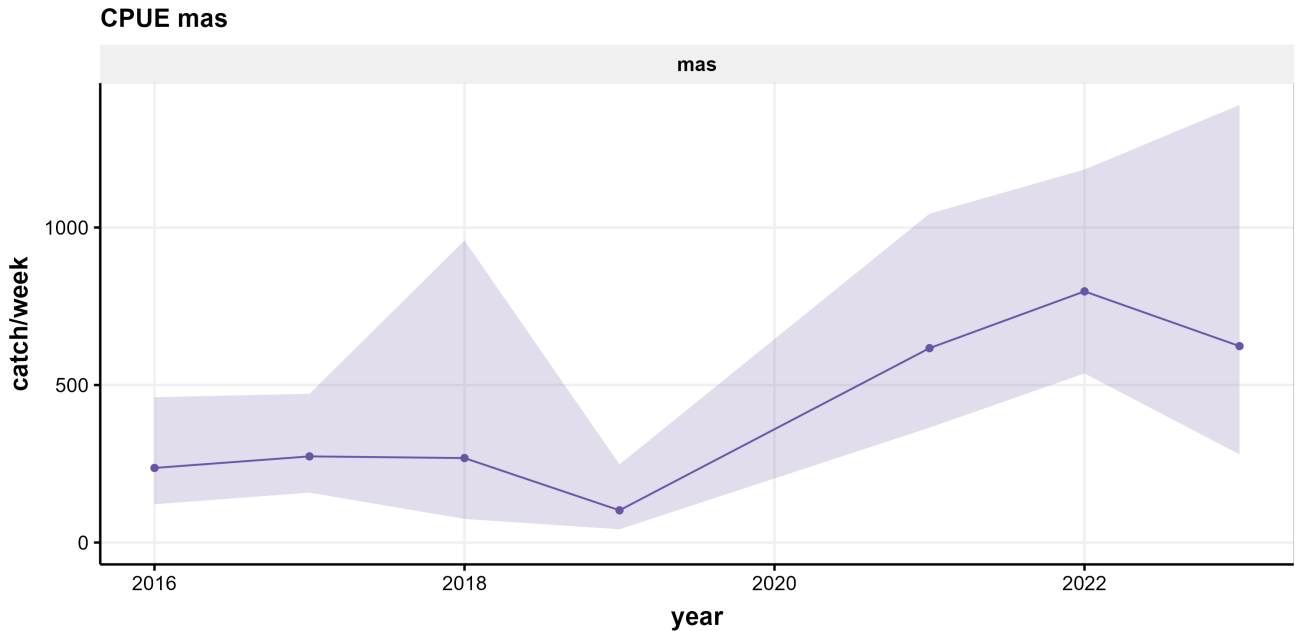


Figure 3.3.8: Chub mackerel. Standardized CPUE (ton/day) from GLM model with factors year, month, GT, division and depth with log(days) as offset

3.4 Southern rays bream (BRU, Brama australis)

Southern rays bream self-sampling summary.

species	year	nvessels	ntrips	ndays	nhauls	catch	catch/day	nlength
bru	2016	1	2	18	22	24	1	25
bru	2017	2	7	90	123	82	1	63
bru	2018	1	5	114	149	290	3	267
bru	2019	1	3	62	77	112	2	30
bru	2021	1	1	6	6	10	2	23
(all)	(all)		18	290	377	518		408

Table 3.4.1: Southern rays bream. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), catch rate (ton/day), number of fish measured, number of biological observations.

Southern rays bream. Catch by division

species	division	2016	2017	2018	2019	2021	all	perc
bru	87.2.6	13	5	101	29	0	148	28.5%
bru	87.3.3	12	76	189	83	10	370	71.5%
(all)	(all)	24	82	290	112	10	518	100.0%

Table 3.4.2: Southern rays bream. Self-sampling summary with the catch (tonnes) by year and division

Southern rays bream. Catch by month

species	month	2016	2017	2018	2019	2021	all	perc
bru	Jan	0	0	19	0	0	19	3.7%
bru	Feb	0	0	48	0	0	48	9.2%
bru	Mar	0	30	57	10	0	97	18.7%
bru	Apr	0	25	29	30	10	94	18.2%
bru	May	0	14	13	24	0	52	10.0%
bru	Jun	8	6	35	19	0	69	13.3%
bru	Jul	14	5	89	18	0	127	24.5%
bru	Aug	2	0	0	11	0	12	2.4%
(all)	(all)	24	82	290	112	10	518	100.0%

Table 3.4.3: Southern rays bream. Self-sampling summary with the catch (tonnes) by year and month

Southern rays bream. Catch by rectangle

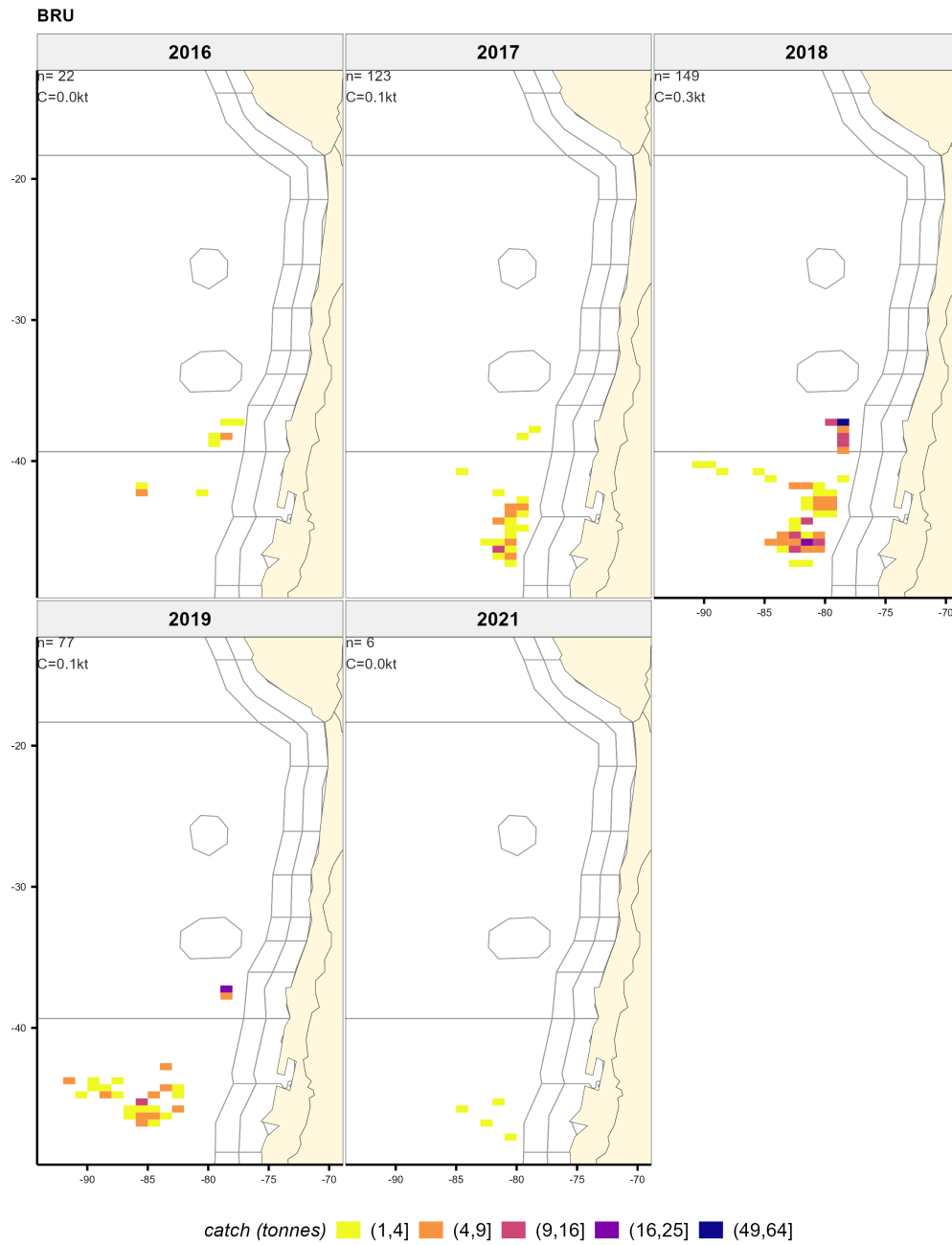


Figure 3.4.1: Southern rays bream. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.

Southern rays bream. Catchrate (ton/day) by rectangle

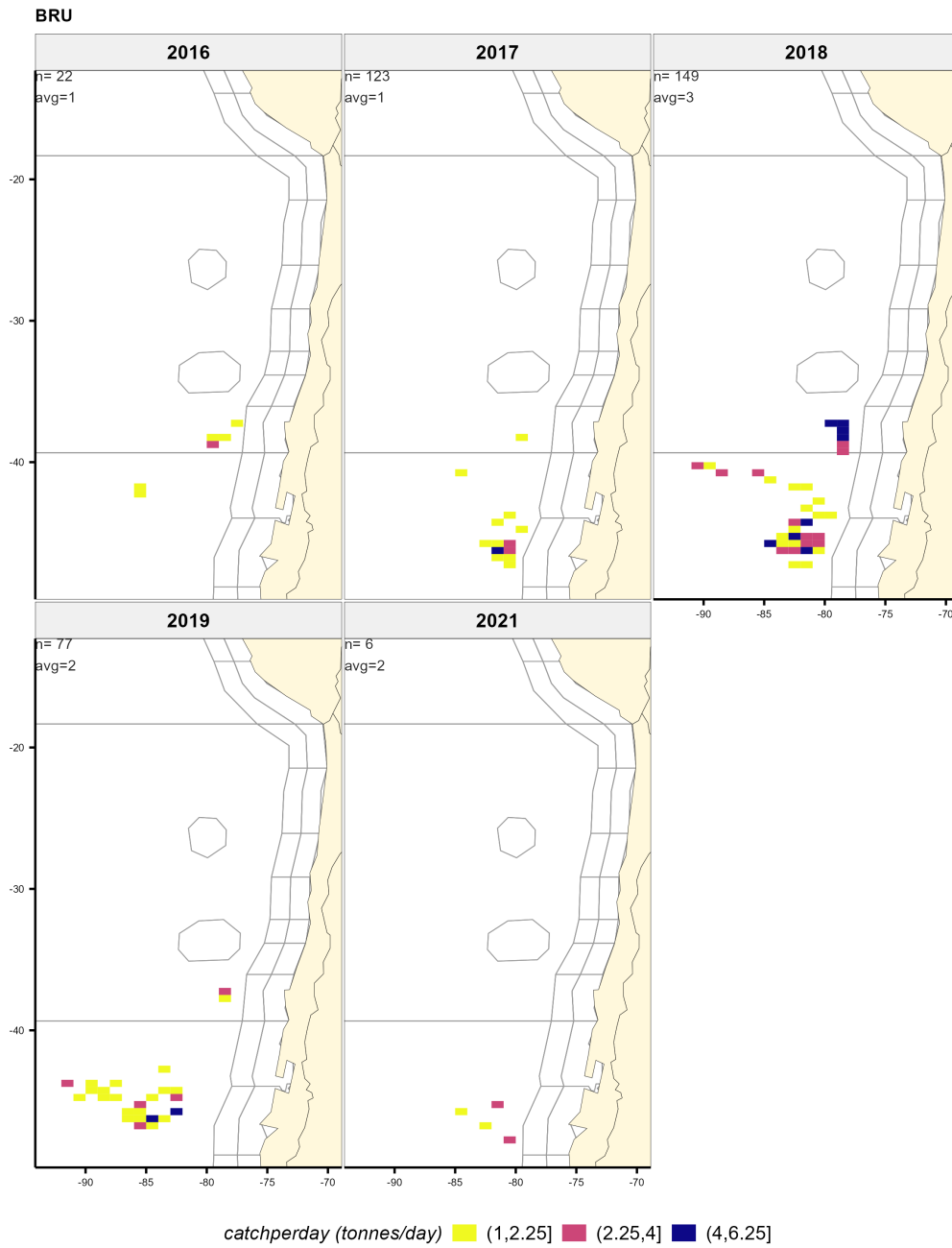


Figure 3.4.2: Southern rays bream. Catchrate (ton/day) per rectangle. N indicates the number of hauls; Avg refers to the average catchrate per rect.

Southern rays bream. Spatio-temporal evolution of catch by month and rectangle

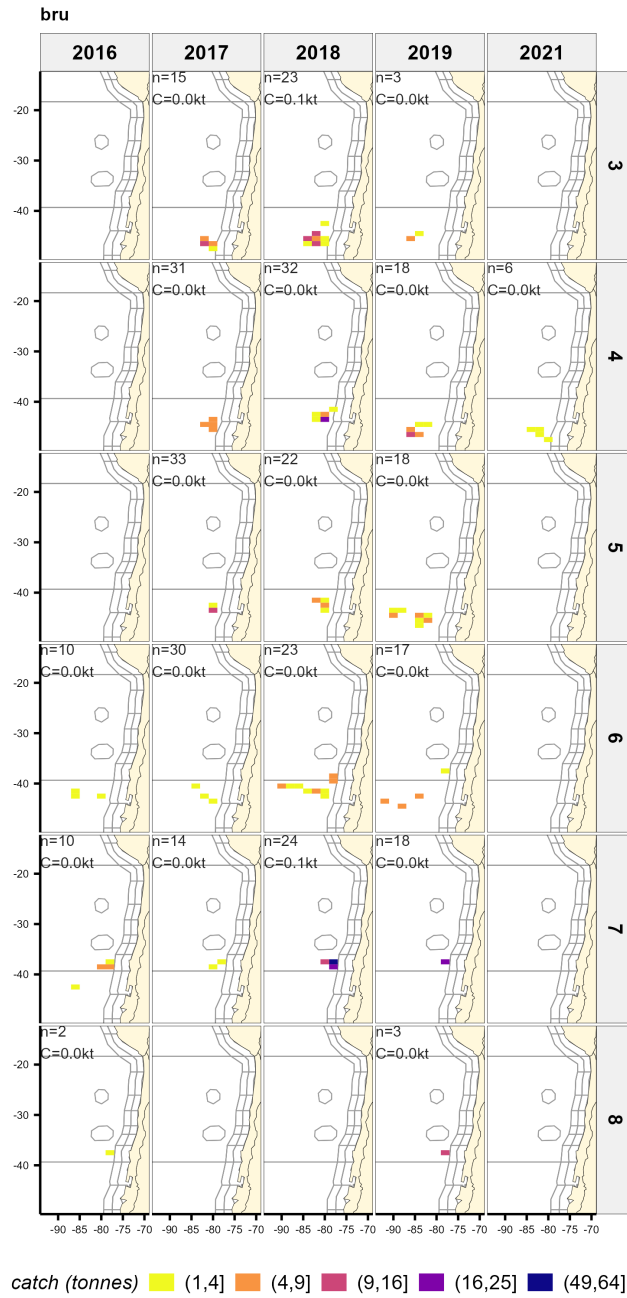


Figure 3.4.3: Southern rays bream. Spatio-temporal evolution of the catches per rectangle and month. N indicates the number of hauls; C refers to the total catch by year and month.

Southern rays bream. Length distributions of the catch

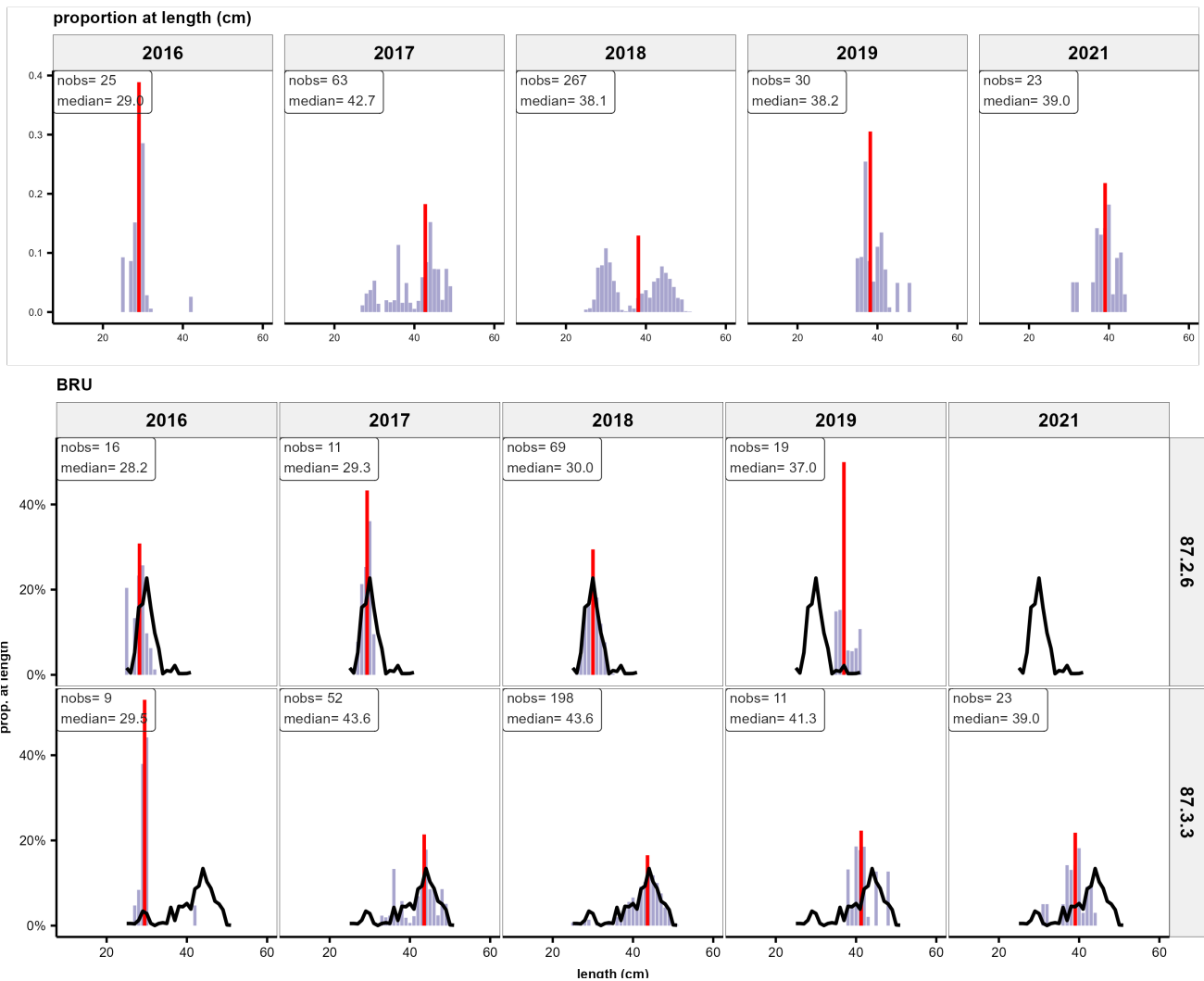


Figure 3.4.4: Southern rays bream. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length.

Southern rays bream. Average length, weight and fat content by year and month

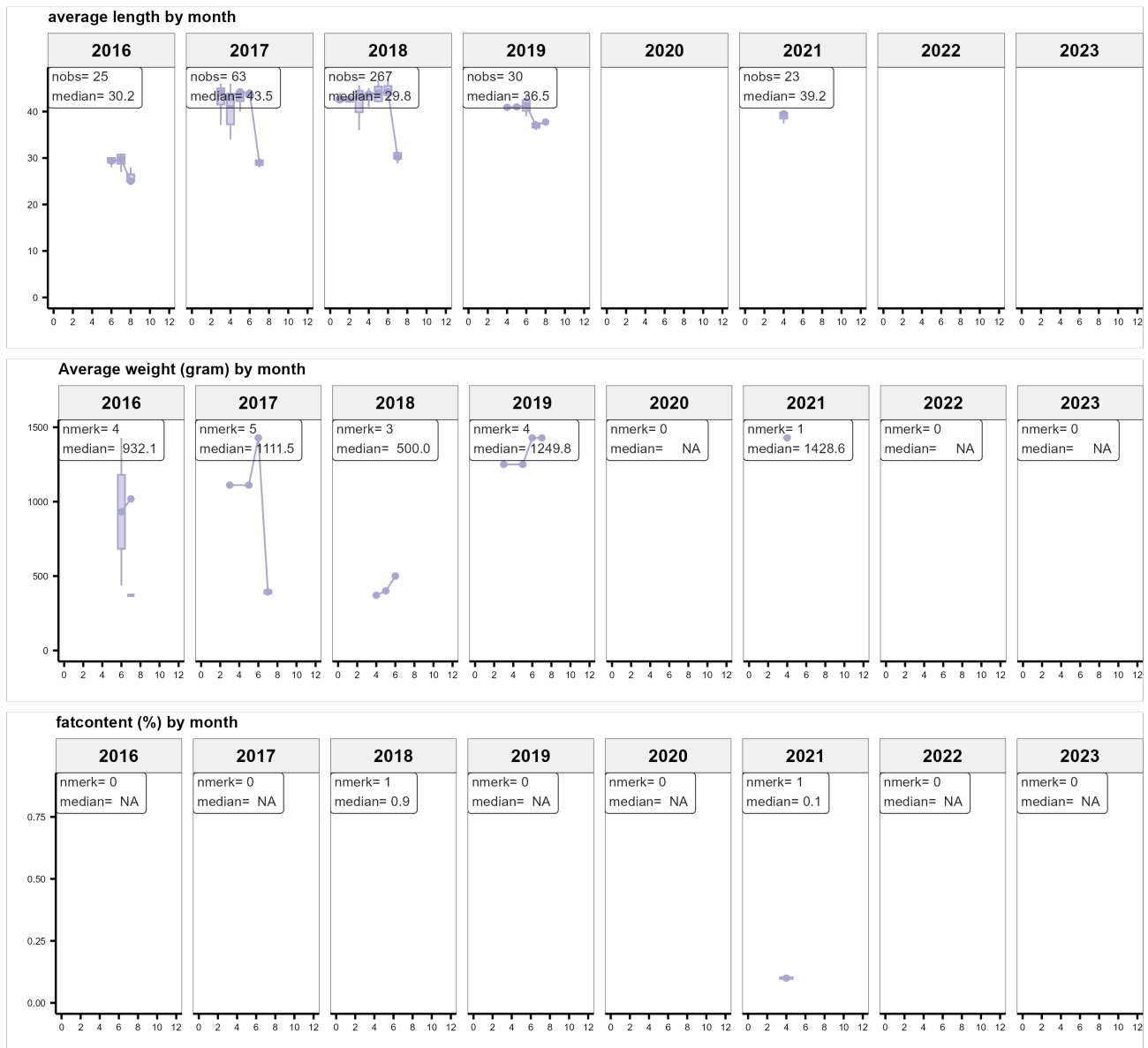


Figure 3.4.5: Southern rays bream. Average length, average weight, and average fat content. Nobs indicates the number of measurements, median indicates the median values

3.5 Blue fathead (UBA, Cubiceps caeruleus)

Blue fathead self-sampling summary.

species	year	nvessels	ntrips	ndays	nhauls	catch	catch/day	nlength
uba	2016	1	4	34	41	146	4	189
uba	2017	2	9	56	67	84	2	121
uba	2018	1	4	70	90	208	3	379
uba	2019	1	3	40	54	39	1	400
uba	2021	2	5	25	29	49	2	465
uba	2022	2	7	21	34	47	2	32
uba	2023	1	1	3	6	1	0	0
(all)	(all)		33	249	321	574		1,586

Table 3.5.1: Blue fathead. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), catch rate (ton/day), number of fish measured, number of biological observations.

Blue fathead. Catch by division

species	division	2016	2017	2018	2019	2021	2022	2023*	all	perc
uba	87.1.4	0	0	0	0	0	2	0	2	0.3%
uba	87.2.6	4	39	0	36	19	45	1	145	25.2%
uba	87.3.3	142	45	208	3	30	0	0	428	74.5%
(all)	(all)	146	84	208	39	49	47	1	574	100.0%

Table 3.5.2: Blue fathead. Self-sampling summary with the catch (tonnes) by year and division

Blue fathead. Catch by month

species	month	2016	2017	2018	2019	2021	2022	2023*	all	perc
uba	Jan	0	0	6	0	0	0	0	6	1.1%
uba	Feb	0	0	32	0	0	0	0	32	5.5%
uba	Mar	0	9	65	1	0	0	0	75	13.0%
uba	Apr	19	21	39	1	30	1	0	111	19.3%
uba	May	110	10	66	0	9	12	0	207	36.0%
uba	Jun	13	5	0	0	0	2	0	20	3.6%
uba	Jul	0	1	0	9	4	31	1	47	8.1%
uba	Aug	1	6	0	27	6	0	0	41	7.1%
uba	Sep	3	3	0	0	0	1	0	7	1.2%
uba	Oct	0	11	0	0	0	0	0	11	1.9%
uba	Nov	0	18	0	0	0	0	0	18	3.1%
(all)	(all)	146	84	208	39	49	47	1	574	100.0%

Table 3.5.3: Blue fathead. Self-sampling summary with the catch (tonnes) by year and month

Blue fathead. Catch by rectangle

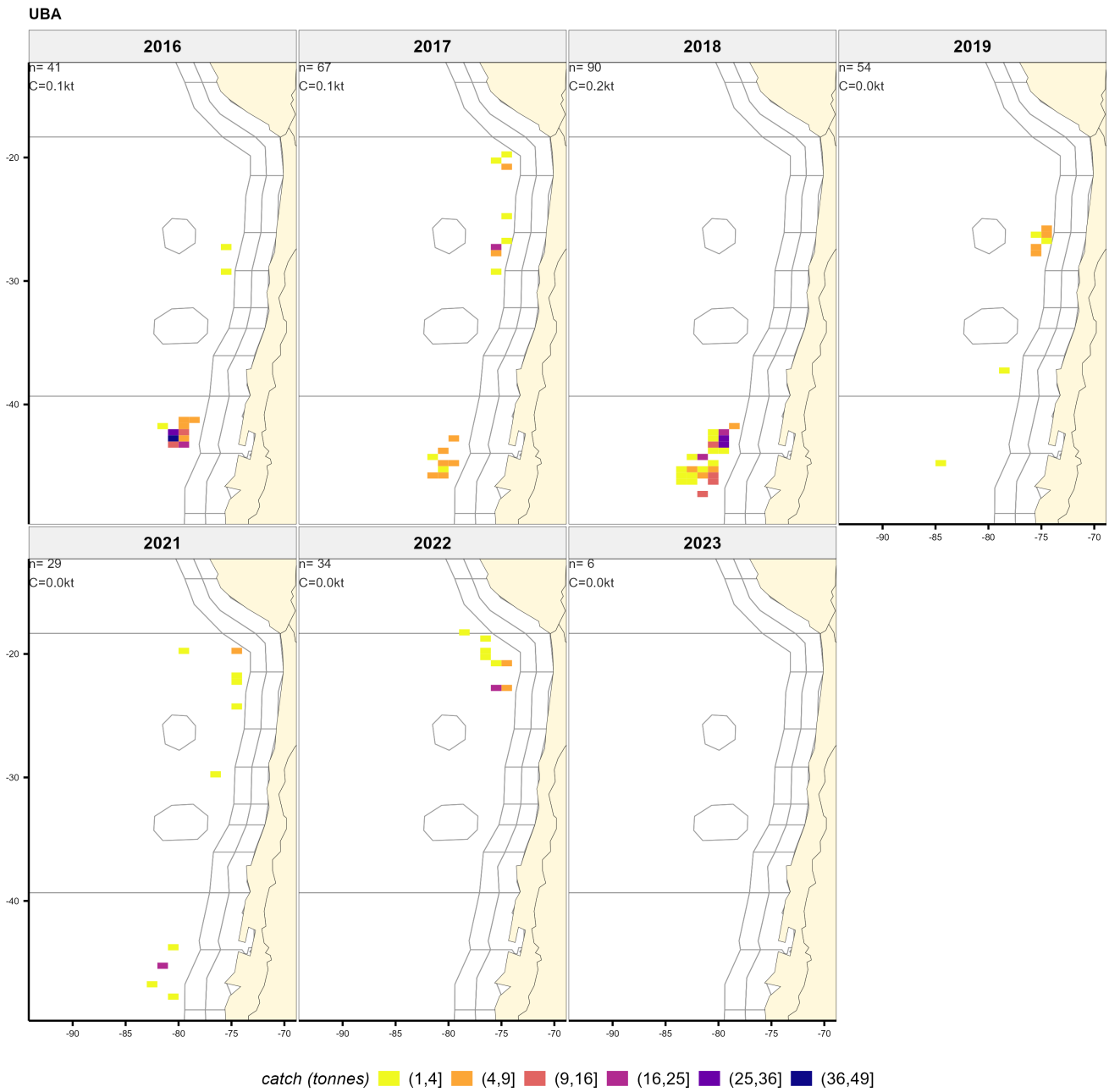


Figure 3.5.1: Blue fathead. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.

Blue fathead. Catchrate (ton/day) by rectangle

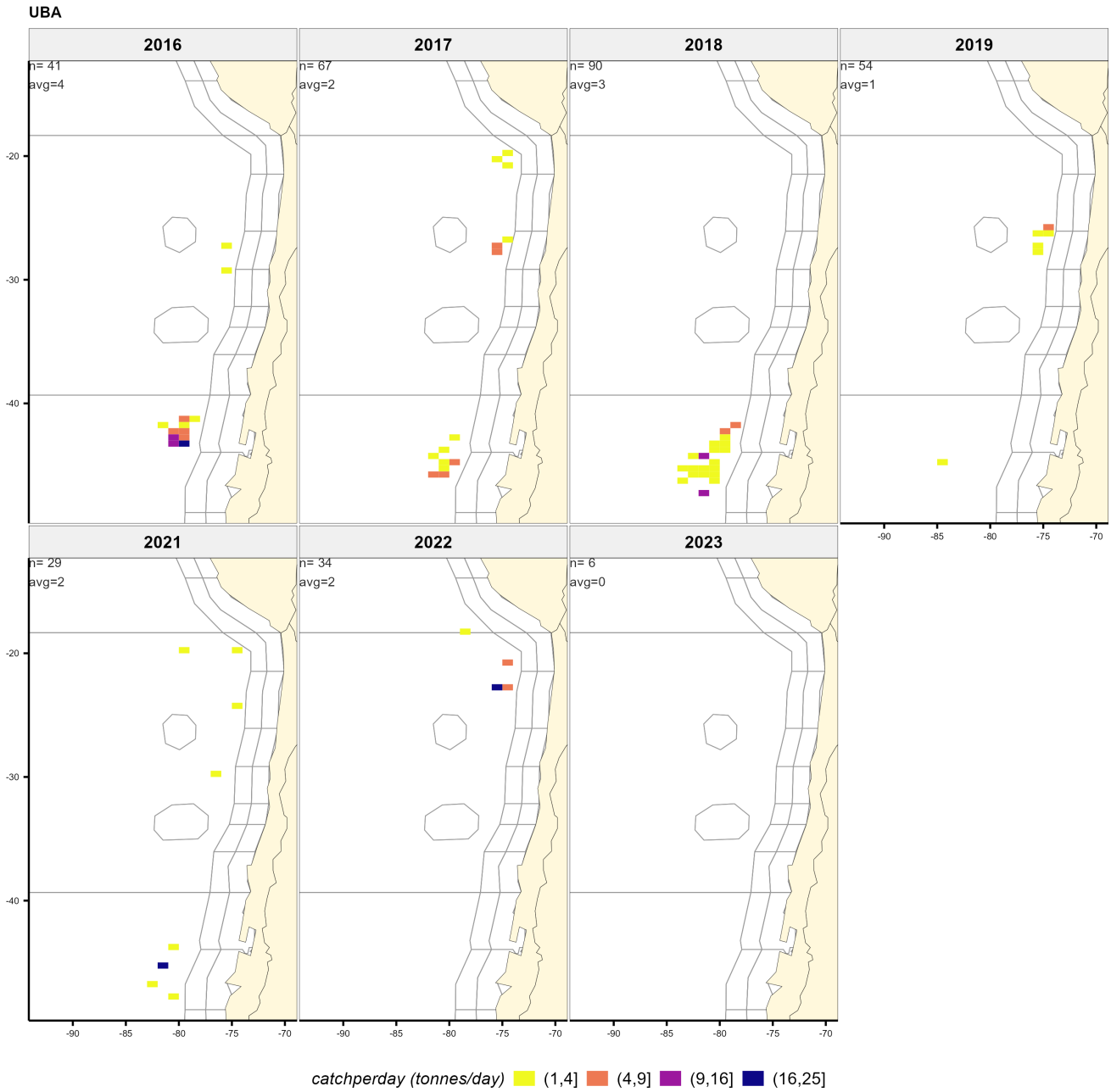


Figure 3.5.2: Blue fathead. Catchrate (ton/day) per rectangle. N indicates the number of hauls; Avg refers to the average catchrate per rect.

Blue fathead. Spatio-temporal evolution of catch by month and rectangle

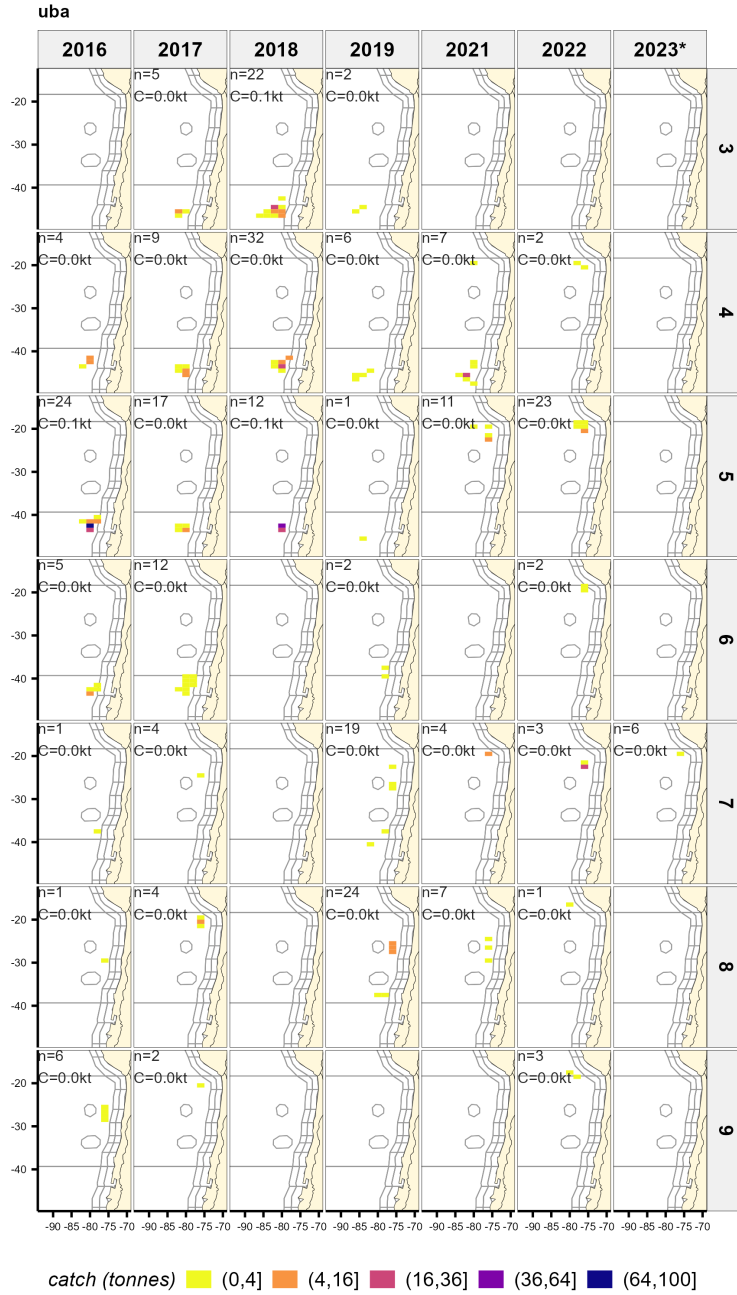


Figure 3.5.3: Blue fathead. Spatio-temporal evolution of the catches per rectangle and month. N indicates the number of hauls; C refers to the total catch by year and month.

Blue fathead. Length distributions of the catch

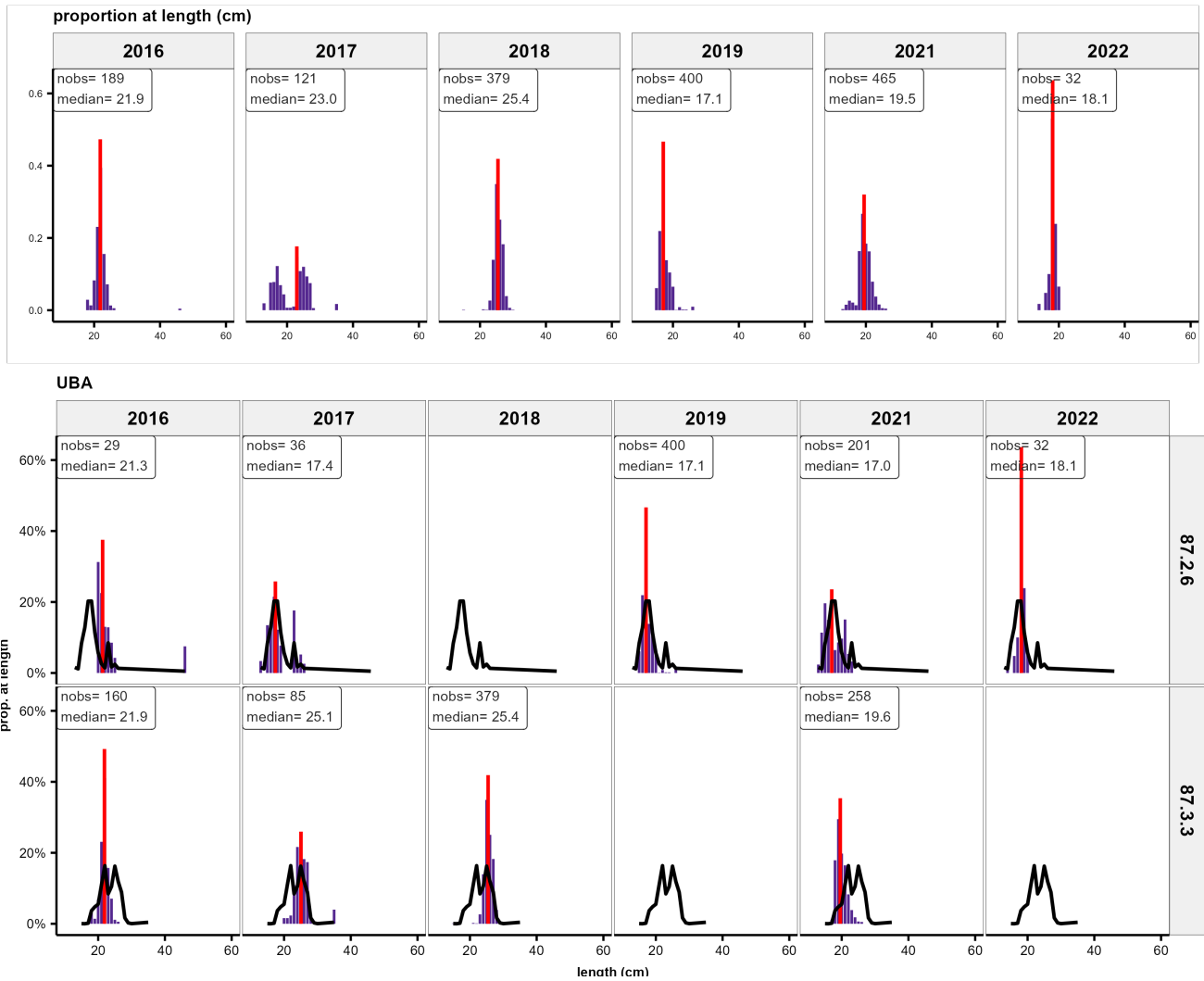


Figure 3.5.4: Blue fathead. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length.

Blue fathead. Average length, weight and fat content by year and month

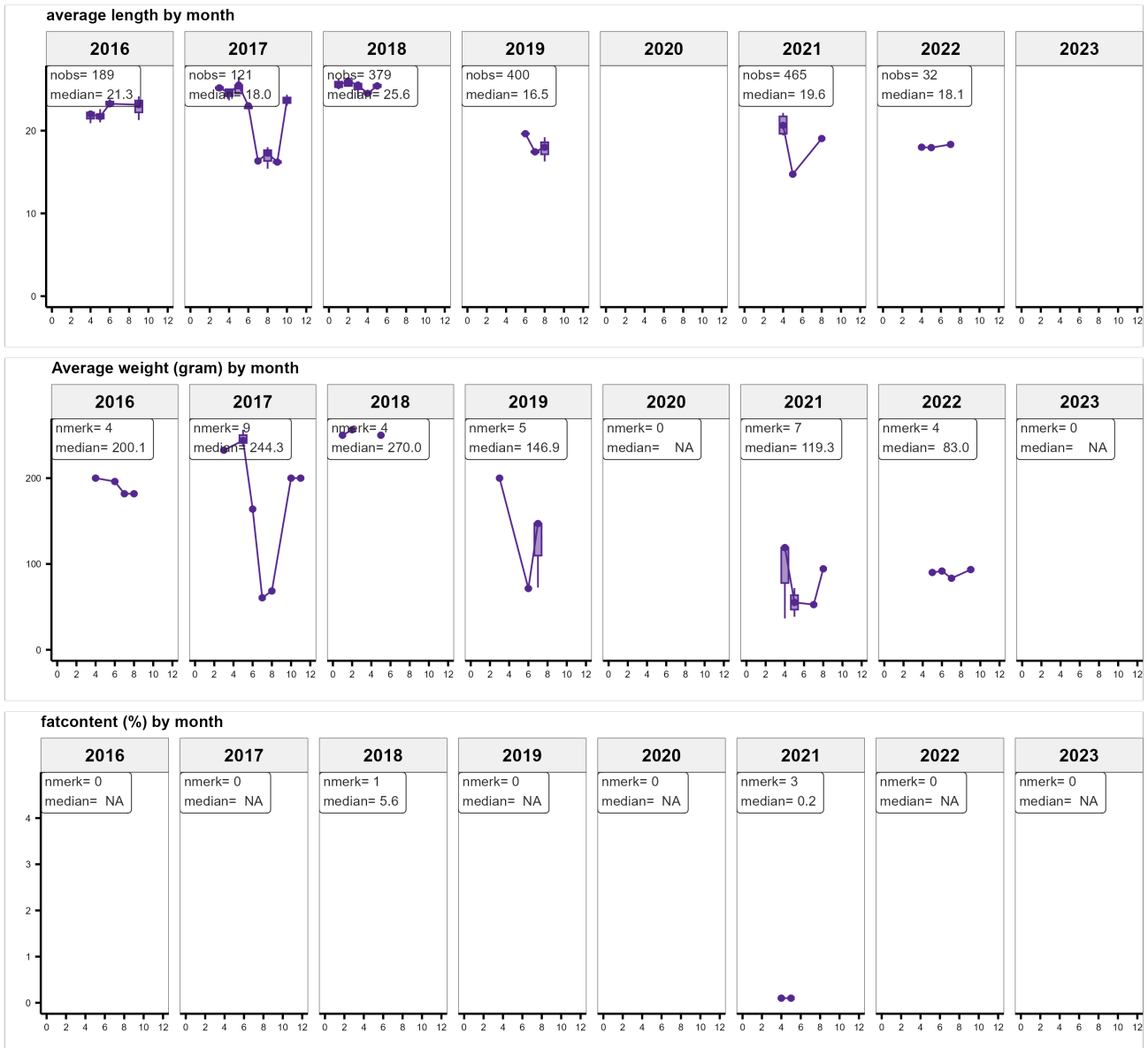


Figure 3.5.5: Blue fathead. Average length, average weight, and average fat content. Nobs indicates the number of measurements, median indicates the median values

4 Discussion and conclusions

A description is presented of the fisheries carried out by vessels belonging to members of the Pelagic Freezer-trawler Association (PFA) within the SPRFMO area from 2016 to 2023. The Pelagic Freezer-trawler Association (PFA) is an association that has nine member companies that together operate 18 (in 2022) freezer trawlers in six European countries (www.pelagicfish.eu). In 2015, the PFA has initiated a self-sampling program that expands the ongoing monitoring programs on board of pelagic freezer-trawlers aimed at assessing the quality of fish. The expansion in the self-sampling program consists of recording of haul information, recording the species compositions by haul and regularly taking length measurements from the catch. The self-sampling is carried out by the vessel quality managers on board of the vessels, who have a long experience in assessing the quality of fish, and by the skippers/officers with respect to the haul information. During the fisheries in the Pacific, the self-sampling program has been carried out during all trips and all hauls.

The self-sampling program delivers information on spatial and temporal evolution of the fishery, species and length compositions and ambient fishing conditions (temperature and depth). Catch distributions and length compositions by quarter and division are presented for jack mackerel (CJM), chub mackerel (MAS) and southern rays bream (BRU). No PFA fisheries was carried in the SPRFMO area in 2020, due to the global Corona crisis. As such, no results can be reported for 2020. In the first half of 2022, two PFA vessels have been active in the SPRFMO convention area.

The **Jack mackerel fishery** continues to yield high catch per day rates (CPUE) although it being somewhat lower than in 2020, the fishery still manages to have an increase in CPUE compared to the years 2016-2019. The fishery is taking place north of the Juan Fernandez islands as was not uncommon in previous years for the second part of the year. In 2021-2023 however, the fishery almost exclusively takes place in this area. This area is associated with smaller sized fish which is apparent from the size distribution as well. Where in 2021 the fishery was out in the high seas off the Chilean coast, in 2022 it shifted even further north.

Bycatches of chub mackerel (MAS), Southern rays bream (BRU) and Blue fathead (UBA) are being taken in the fishery for Jack mackerel. During the years, reported here, 1699 hauls with Chub mackerel (MAS), 377 hauls with Southern rays bream (BRU) and 321 hauls with Blue fathead (UBA) have been analysed as part of the program.

In this 2023 self-sampling report, a standardized CPUE calculation has been included which shows that chub mackerel catches have increased from lower levels in 2016-2019 to higher levels in 2021-2023. Likely, this increase is associated with the shift in fishing location further north. Median lengths of chub mackerel are rather stable at around 29.4cm.

Southern rays bream were absent from the catch in 2022 and 2023, likely also associated with the change in fishing location.

A comparison of the self-sampling program and the EU observer program has been presented in a separate working document (*SC11-JM01 Comparison and protocol for including EU self-sampling data*).

5 Acknowledgements

The skippers, officers and the quality managers of many of the PFA vessels are putting in a lot of effort to make the PFA the self-sampling work. Without their efforts, there would be no self-sampling.

6 References and publications

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- Rousseau, Y., R. A. Watson, J. L. Blanchard and E. A. Fulton (2019). "Evolution of global marine fishing fleets and the response of fished resources." *Proceedings of the National Academy of Sciences* 116(25): 12238-12243.

7 More information

Please contact Martin Pastoors (mpastoors@pelagicfish.eu) if you would have any questions on the PFA self-sampling program or the specific results presented here.

8 Appendix 1: CJM self-sampling overview

species	year	quarter	catch	sampleweight	nsamples	count	catchnumber
cjm	2022	2	20713	1465	293	15650	147807
cjm	2022	3	18609	1772	254	8951	85556
cjm	2022	4	4061	374	72	1126	11928
cjm	2023	2	285	25	5	132	1072
cjm	2023	3	1614	143	27	762	6814

9 Appendix 2: CJM self-sampling length frequencies (counts and raised catch numbers at length)

species	area	year	quarter	length	count	catchnumber	prop
cjm	87	2022	2	12	4	38	0.0003
cjm	87	2022	2	13	1	8	0.0001
cjm	87	2022	2	14	5	49	0.0003
cjm	87	2022	2	15	16	43	0.0003
cjm	87	2022	2	16	39	48	0.0003
cjm	87	2022	2	17	74	337	0.0023
cjm	87	2022	2	18	100	877	0.0059
cjm	87	2022	2	19	116	1151	0.0078
cjm	87	2022	2	20	498	5522	0.0374
cjm	87	2022	2	21	1725	17944	0.1214
cjm	87	2022	2	22	4378	42214	0.2856
cjm	87	2022	2	23	3453	31983	0.2164
cjm	87	2022	2	24	2711	24790	0.1677
cjm	87	2022	2	25	1265	11815	0.0799
cjm	87	2022	2	26	684	6412	0.0434
cjm	87	2022	2	27	202	1766	0.0120
cjm	87	2022	2	28	53	488	0.0033
cjm	87	2022	2	29	65	479	0.0032
cjm	87	2022	2	30	71	509	0.0034
cjm	87	2022	2	31	66	458	0.0031
cjm	87	2022	2	32	46	339	0.0023
cjm	87	2022	2	33	16	126	0.0009
cjm	87	2022	2	34	11	66	0.0004
cjm	87	2022	2	35	15	101	0.0007
cjm	87	2022	2	36	14	111	0.0008
cjm	87	2022	2	37	4	40	0.0003
cjm	87	2022	2	38	2	19	0.0001
cjm	87	2022	2	39	1	10	0.0001
cjm	87	2022	2	40	1	17	0.0001
cjm	87	2022	2	41	1	10	0.0001
cjm	87	2022	2	42	1	10	0.0001
cjm	87	2022	2	43	0	0	0.0000
cjm	87	2022	2	44	0	0	0.0000
cjm	87	2022	2	45	0	0	0.0000
cjm	87	2022	2	46	1	10	0.0001
cjm	87	2022	2	47	0	0	0.0000
cjm	87	2022	2	48	0	0	0.0000
cjm	87	2022	2	49	0	0	0.0000
cjm	87	2022	2	50	0	0	0.0000
cjm	87	2022	2	51	0	0	0.0000
cjm	87	2022	2	52	0	0	0.0000
cjm	87	2022	2	53	0	0	0.0000
cjm	87	2022	2	54	0	0	0.0000
cjm	87	2022	3	12	0	0	0.0000
cjm	87	2022	3	13	0	0	0.0000
cjm	87	2022	3	14	0	0	0.0000
cjm	87	2022	3	15	0	0	0.0000
cjm	87	2022	3	16	11	255	0.0030
cjm	87	2022	3	17	51	615	0.0072
cjm	87	2022	3	18	36	359	0.0042
cjm	87	2022	3	19	30	155	0.0018
cjm	87	2022	3	20	32	21	0.0003
cjm	87	2022	3	21	70	229	0.0027
cjm	87	2022	3	22	199	1964	0.0230
cjm	87	2022	3	23	800	9065	0.1060
cjm	87	2022	3	24	2114	22262	0.2602
cjm	87	2022	3	25	2167	20874	0.2440
cjm	87	2022	3	26	1521	13135	0.1535
cjm	87	2022	3	27	658	5851	0.0684
cjm	87	2022	3	28	226	1950	0.0228
cjm	87	2022	3	29	101	850	0.0099
cjm	87	2022	3	30	101	839	0.0098
cjm	87	2022	3	31	44	386	0.0045
cjm	87	2022	3	32	43	352	0.0041
cjm	87	2022	3	33	43	397	0.0046
cjm	87	2022	3	34	48	408	0.0048
cjm	87	2022	3	35	53	445	0.0052
cjm	87	2022	3	36	63	643	0.0075

cjm	87	2022	3	37	80 651	0.0076
cjm	87	2022	3	38	67 677	0.0079
cjm	87	2022	3	39	65 684	0.0080
cjm	87	2022	3	40	46 456	0.0053
cjm	87	2022	3	41	40 293	0.0034
cjm	87	2022	3	42	30 252	0.0030
cjm	87	2022	3	43	36 274	0.0032
cjm	87	2022	3	44	47 333	0.0039
cjm	87	2022	3	45	45 349	0.0041
cjm	87	2022	3	46	23 157	0.0018
cjm	87	2022	3	47	19 121	0.0014
cjm	87	2022	3	48	12 81	0.0009
cjm	87	2022	3	49	11 107	0.0013
cjm	87	2022	3	50	2 19	0.0002
cjm	87	2022	3	51	2 24	0.0003
cjm	87	2022	3	52	1 5	0.0001
cjm	87	2022	3	53	0 0	0.0000
cjm	87	2022	3	54	0 0	0.0000
cjm	87	2022	4	12	0 0	0.0000
cjm	87	2022	4	13	0 0	0.0000
cjm	87	2022	4	14	0 0	0.0000
cjm	87	2022	4	15	0 0	0.0000
cjm	87	2022	4	16	0 0	0.0000
cjm	87	2022	4	17	0 0	0.0000
cjm	87	2022	4	18	0 0	0.0000
cjm	87	2022	4	19	0 0	0.0000
cjm	87	2022	4	20	0 0	0.0000
cjm	87	2022	4	21	0 0	0.0000
cjm	87	2022	4	22	2 22	0.0019
cjm	87	2022	4	23	13 122	0.0103
cjm	87	2022	4	24	63 624	0.0524
cjm	87	2022	4	25	162 1628	0.1366
cjm	87	2022	4	26	230 2273	0.1906
cjm	87	2022	4	27	181 1992	0.1671
cjm	87	2022	4	28	101 1031	0.0864
cjm	87	2022	4	29	76 823	0.0691
cjm	87	2022	4	30	44 464	0.0390
cjm	87	2022	4	31	32 342	0.0287
cjm	87	2022	4	32	15 205	0.0172
cjm	87	2022	4	33	8 79	0.0066
cjm	87	2022	4	34	17 217	0.0182
cjm	87	2022	4	35	8 105	0.0088
cjm	87	2022	4	36	10 91	0.0077
cjm	87	2022	4	37	12 125	0.0105
cjm	87	2022	4	38	19 216	0.0182
cjm	87	2022	4	39	14 160	0.0135
cjm	87	2022	4	40	23 271	0.0227
cjm	87	2022	4	41	16 215	0.0180
cjm	87	2022	4	42	13 111	0.0094
cjm	87	2022	4	43	21 235	0.0198
cjm	87	2022	4	44	18 225	0.0189
cjm	87	2022	4	45	9 118	0.0100
cjm	87	2022	4	46	10 108	0.0091
cjm	87	2022	4	47	5 74	0.0062
cjm	87	2022	4	48	3 20	0.0017
cjm	87	2022	4	49	1 17	0.0015
cjm	87	2022	4	50	0 0	0.0000
cjm	87	2022	4	51	0 0	0.0000
cjm	87	2022	4	52	0 0	0.0000
cjm	87	2022	4	53	0 0	0.0000
cjm	87	2022	4	54	0 0	0.0000
cjm	87	2023	2	12	0 0	0.0000
cjm	87	2023	2	13	0 0	0.0000
cjm	87	2023	2	14	0 0	0.0000
cjm	87	2023	2	15	0 0	0.0000
cjm	87	2023	2	16	0 0	0.0000
cjm	87	2023	2	17	0 0	0.0000
cjm	87	2023	2	18	0 0	0.0000
cjm	87	2023	2	19	0 0	0.0000
cjm	87	2023	2	20	0 0	0.0000
cjm	87	2023	2	21	0 0	0.0000
cjm	87	2023	2	22	0 0	0.0000
cjm	87	2023	2	23	2 14	0.0131
cjm	87	2023	2	24	7 53	0.0497
cjm	87	2023	2	25	32 248	0.2313
cjm	87	2023	2	26	48 413	0.3855
cjm	87	2023	2	27	30 240	0.2242
cjm	87	2023	2	28	4 31	0.0298
cjm	87	2023	2	29	3 27	0.0253
cjm	87	2023	2	30	1 11	0.0103

cjm	87	2023	2	31	2 13	0.0128
cjm	87	2023	2	32	0 0	0.0000
cjm	87	2023	2	33	1 6	0.0064
cjm	87	2023	2	34	1 6	0.0064
cjm	87	2023	2	35	0 0	0.0000
cjm	87	2023	2	36	0 0	0.0000
cjm	87	2023	2	37	1 5	0.0053
cjm	87	2023	2	38	0 0	0.0000
cjm	87	2023	2	39	0 0	0.0000
cjm	87	2023	2	40	0 0	0.0000
cjm	87	2023	2	41	0 0	0.0000
cjm	87	2023	2	42	0 0	0.0000
cjm	87	2023	2	43	0 0	0.0000
cjm	87	2023	2	44	0 0	0.0000
cjm	87	2023	2	45	0 0	0.0000
cjm	87	2023	2	46	0 0	0.0000
cjm	87	2023	2	47	0 0	0.0000
cjm	87	2023	2	48	0 0	0.0000
cjm	87	2023	2	49	0 0	0.0000
cjm	87	2023	2	50	0 0	0.0000
cjm	87	2023	2	51	0 0	0.0000
cjm	87	2023	2	52	0 0	0.0000
cjm	87	2023	2	53	0 0	0.0000
cjm	87	2023	2	54	0 0	0.0000
cjm	87	2023	3	12	0 0	0.0000
cjm	87	2023	3	13	0 0	0.0000
cjm	87	2023	3	14	0 0	0.0000
cjm	87	2023	3	15	0 0	0.0000
cjm	87	2023	3	16	0 0	0.0000
cjm	87	2023	3	17	0 0	0.0000
cjm	87	2023	3	18	2 28	0.0042
cjm	87	2023	3	19	0 0	0.0000
cjm	87	2023	3	20	2 2	0.0004
cjm	87	2023	3	21	5 21	0.0032
cjm	87	2023	3	22	2 24	0.0036
cjm	87	2023	3	23	23 241	0.0355
cjm	87	2023	3	24	109 954	0.1401
cjm	87	2023	3	25	305 2769	0.4064
cjm	87	2023	3	26	166 1465	0.2150
cjm	87	2023	3	27	66 513	0.0754
cjm	87	2023	3	28	28 261	0.0383
cjm	87	2023	3	29	23 251	0.0369
cjm	87	2023	3	30	7 65	0.0097
cjm	87	2023	3	31	8 60	0.0088
cjm	87	2023	3	32	6 60	0.0089
cjm	87	2023	3	33	2 29	0.0043
cjm	87	2023	3	34	5 31	0.0047
cjm	87	2023	3	35	1 12	0.0019
cjm	87	2023	3	36	1 9	0.0013
cjm	87	2023	3	37	0 0	0.0000
cjm	87	2023	3	38	1 9	0.0013
cjm	87	2023	3	39	0 0	0.0000
cjm	87	2023	3	40	0 0	0.0000
cjm	87	2023	3	41	0 0	0.0000
cjm	87	2023	3	42	0 0	0.0000
cjm	87	2023	3	43	0 0	0.0000
cjm	87	2023	3	44	0 0	0.0000
cjm	87	2023	3	45	0 0	0.0000
cjm	87	2023	3	46	0 0	0.0000
cjm	87	2023	3	47	0 0	0.0000
cjm	87	2023	3	48	0 0	0.0000
cjm	87	2023	3	49	0 0	0.0000
cjm	87	2023	3	50	0 0	0.0000
cjm	87	2023	3	51	0 0	0.0000
cjm	87	2023	3	52	0 0	0.0000
cjm	87	2023	3	53	0 0	0.0000
cjm	87	2023	3	54	0 0	0.0000