SPRFMO
South Pacific Regional Fisheries Management Organisation

# 8th MEETING OF THE SCIENTIFIC COMMITTEE

*New Zealand, 3 to 8 October 2020*

SC8-JM03

## PFA Self sampling report for SPRFMO 2020

*European Union*

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**8th Meeting of the Scientific Committee**

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# SC8-JM03 PFA selfsampling report for the SPRFMO Science Committee 2020

Martin Pastoors, 13/08/2020

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PFA report 2020_12

## 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 2015 to 2019. The Pelagic Freezer-trawler Association (PFA) is an association that has nine member companies that together operate 17 (in 2019) freezer trawlers in six European countries (www.pelagicfish.eu). In 2015, the PFA has initiated a self-sampling programme that expands the ongoing monitoring programmes on board of pelagic freezer-trawlers aimed at assessing the quality of fish. The expansion in the self-sampling programme 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 programme has been carried out during all trips and all hauls. The self-sampling programme 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 southers rays bream.

New in 2019, is that age sampling for Jack mackerel has been included in the self-sampling programme. Reports on age 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. No PFA fisheries has been carried in the SPRFMO area in 2020, due to the global Corona crisis. As such, no results can be reported for 2020.

The length compositions of the jack mackerel catches in the southern area (division 87.3.3) show a bimodal distribution in 2015, after which the median length increases by year from 29.2 cm in 2016 to 42.5 cm in 2019. This is appears consistent with the recruitment of a strong cohort to the fishery in 2015 and followed thereafter. In the northern area (87.2.6) two recruitment pulses appear to from the catches, one in 2015 and the other, very strong, in 2019.

Catch rates of jack mackerel, defined as the average catch (tonnes) per fishing day was highest in 2015 (160 ton/day), substantially lower in 2016 until 2018 (77-110 ton/day) and close to the value of 2015 again in 2019 (142 ton/day).

The spatial distribution of the main fishing grounds has shown considerable changes over time. More extensive west-ward fishing explorations have been conducted in 2015, 2018 and 2019. The northern areas were mostly fishing in 2017 and 2019.

While jack mackerel is the prime target species for the fishery, some bycatches are taken of chub mackerel (MAS) and southern rays bream (BRU). Total catches of chub mackerel have been between 123 and 1,841 ton by year while median lengths have been between 25 and 36 cm. Total catches of southern rays bream (BRU) have been between 24 and 290 tonnes with median lengths between 29 and 43 cm.

[ Comparison between self-sampling and observer trips ]

The PFA self-sampling program is currently a routine operation on the vessels in freezer-trawler fleet and is yielding consistent information at high temporal and spatial resolution. The information is intended to improve the scientific understanding in relation to the species fishing by the PFA. However, it is also used to inform the skippers and the fleet managers on the development of the fishery and the composition of the catches. Thus, the self-sampling program is providing an effective bridge and communication channel between science and practice.

# 1 Introduction

The Pelagic Freezer-trawler Association (PFA) is an association that has nine member companies that together operate 17 (in 2019) freezer trawlers in six European countries (www.pelagicfish.eu). In 2015, the PFA has initiated a self-sampling programme that expands the ongoing monitoring programmes on board of pelagic freezer-trawlers aimed at assessing the quality of fish. The expansion in the self-sampling programme 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. The scientific coordination of the self-sampling programme is carried out by Martin Pastoors (PFA chief science officer) with support of Floor Quirijns (contractor). During the fisheries in the Pacific, the self-sampling programme has carried out during all trips and all hauls. The self-sampling programme 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 southers rays bream. New in 2019, is that age sampling for Jack mackerel has been included in the self-sampling programme. Reports on age 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.

No PFA fisheries has been carried in the SPRFMO area in 2020, due to the global Corona crisis.

# 2 Overview of self-sampling methodology

The self-sampling programme in the SPRFMO area has been implemented on vessels from the Netherlands, Germany, Lithuania and Poland during the years 2015-2019. All trips by all PFA vessels fishing in the south Pacific will be monitored by self-sampling, also when there is a scientific observer on board for a certain trip.

The self-sampling programme 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 standardized Excel worksheets. 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 Martin Pastoors, 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 programme.

In 2019, the self-sampling has been extended to cover age sampling. From a subset of hauls during each trip, a random sample of fish has been frozen for later analysis in the lab of INPESCA (Chile). Results are presented in this report.
For presentation to SFRFMO, all trips carried out in the Southern Pacific have been selected for the years 2015-2019.

# 3 Results

## 3.1 General

Within the Southern Pacific, there have been 2 PFA vessels fishing in 2015, 1 PFA vessel in 2016 and 2 PFA vessels in 2017 and 1 PFA vessel in 2018 and 2019. In most years, the vessels have been active from March/April to September. In 2019, the PFA vessel has been active from april tot june 2019.

| year | nvessels | ntrips | ndays | nhauls | catch | catch/day | nlength |
|---|---|---|---|---|---|---|---|
| 2015 | 2 | 9 | 177 | 378 | 28,840 | 162 | 7,299 |
| 2016 | 1 | 4 | 93 | 167 | 10,284 | 110 | 6,905 |
| 2017 | 2 | 10 | 273 | 609 | 29,652 | 108 | 20,829 |
| 2018 | 1 | 5 | 130 | 236 | 10,234 | 78 | 4,692 |
| 2019 | 1 | 3 | 85 | 162 | 12,114 | 142 | 7,680 |
| (all) | | 31 | 758 | 1,552 | 91,124 | | 47,405 |

*Table 3.1.1: PFA selfsampling summary with the number of vessels, trips, days, hauls, catch (tonnes), catch per day (tonnes) and number of fish measured.*

**Number of self-sampled hauls in widely distributed pelagic fisheries by year and area**

| division | 2015 | 2016 | 2017 | 2018 | 2019 | all |
|---|---|---|---|---|---|---|
| 87.2.6 | 133 | 62 | 322 | 33 | 66 | 616 |
| 87.3.3 | 245 | 105 | 287 | 203 | 96 | 936 |
| (all) | 378 | 167 | 609 | 236 | 162 | 1,552 |

*Table 3.1.2: PFA selfsampling summary: number of hauls per year and division.*

Catches by species and year (in tonnes).

| species | english_name | scientific_name | 2015 | 2016 | 2017 | 2018 | 2019 | all |
|---|---|---|---|---|---|---|---|---|
| cjm | jack mackerel | Trachurus murphyi | 27,775 | 9,432 | 27,649 | 9,620 | 11,789 | 86,265 |
| mas | chub mackerel | Scomber japonicus | 823 | 674 | 1,841 | 117 | 123 | 3,578 |
| bru | rays bream | Brama australis | 152 | 24 | 82 | 290 | 128 | 676 |
| uba | blue fathead | Cubiceps caeruleus | 55 | 146 | 80 | 208 | 38 | 527 |
| slt | slender tuna | Allothunnus fallai | 36 | 0 | 0 | 0 | 0 | 36 |
| bpq | NA | Brama japonica | 0 | 0 | 0 | 0 | 32 | 32 |
| poa | pomfret | Brama brama | 0 | 6 | 0 | 0 | 0 | 6 |
| bep | NA | Sarda chiliensis | 0 | 0 | 0 | 0 | 2 | 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| ytc | yellowtail amberjack | Seriola lalandi | 0 | 2 | 0 | 0 | 0 |
| 2 | | | | | | | |
| skj | skipjack tuna | Katsuwonus pelamis | 0 | 0 | 0 | 0 | 2 |
| 2 | | | | | | | |
| oth | NA | NA | 0 | 0 | 0 | 0 | 1 |
| 1 | | | | | | | |
| (all) | (all) | (all) | 28,840 | 10,284 | 29,652 | 10,235 | 12,115 |
| 91,126 | | | | | | | |

*Table 3.1.3: PFA selfsampling catch per species. OTH refers to all other species that are not the main target species.*

## Haul positions

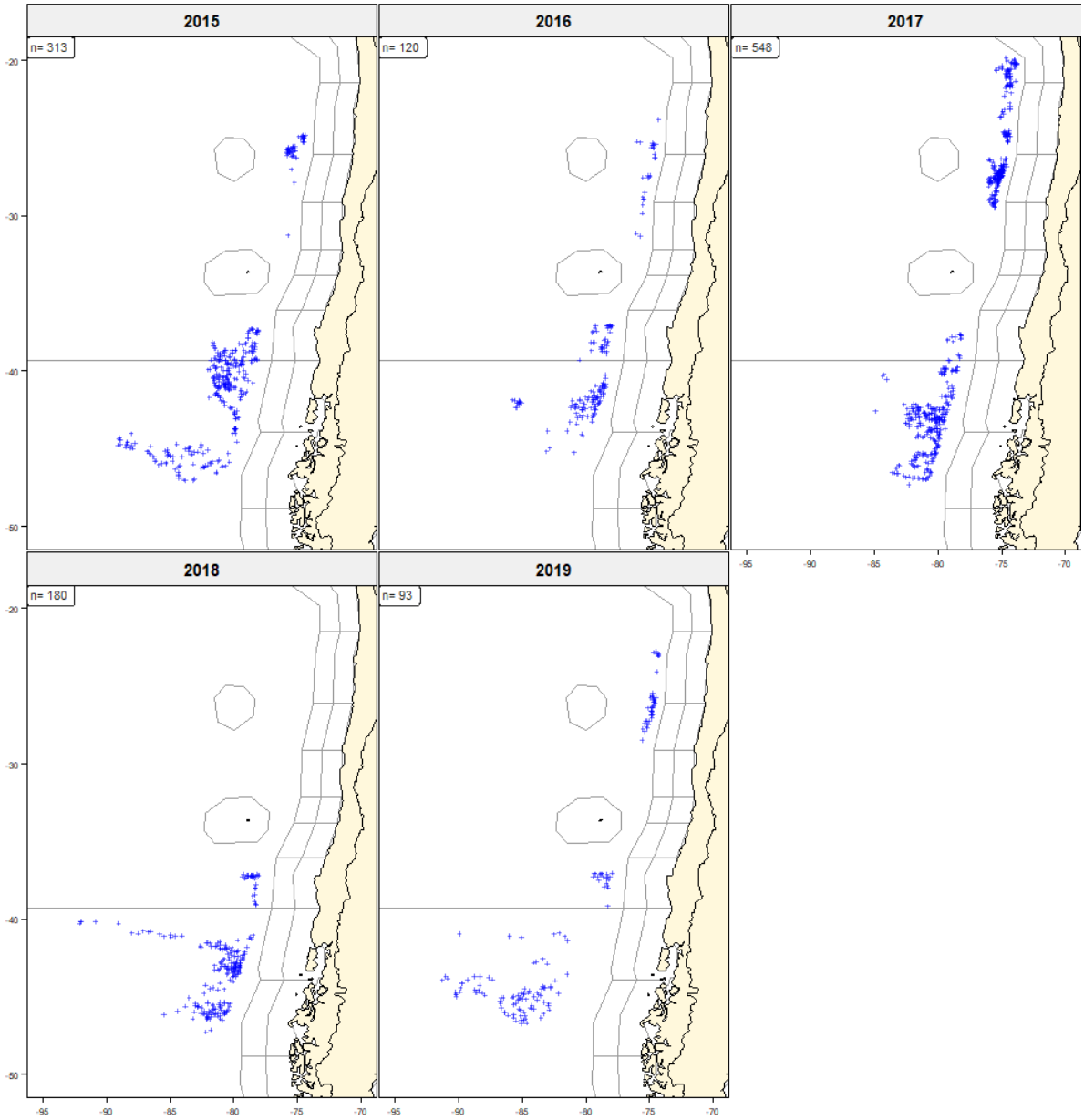


*Figure 3.1.1: Haul positions in PFA fisheries. N indicates the number of hauls.*

### Temporal progression of the fishery by week and latitude/longitude

The temporal progression of the fishery of the fishery is shown by the average latitude and longitude from all haul positions within a certain week-year combination. The north-south distribution (left) shows that the main fishery in the southern area is mostly carried out until week 30 approximately, after which the fishery moves to the northern area. However, in some years (e.g. 2015) the move to the northern area was later than in other years. The east-wester distribution (right) shows that in some years the distribution has been more westwards (e.g. 2015, 2018, 2019) than in other years.

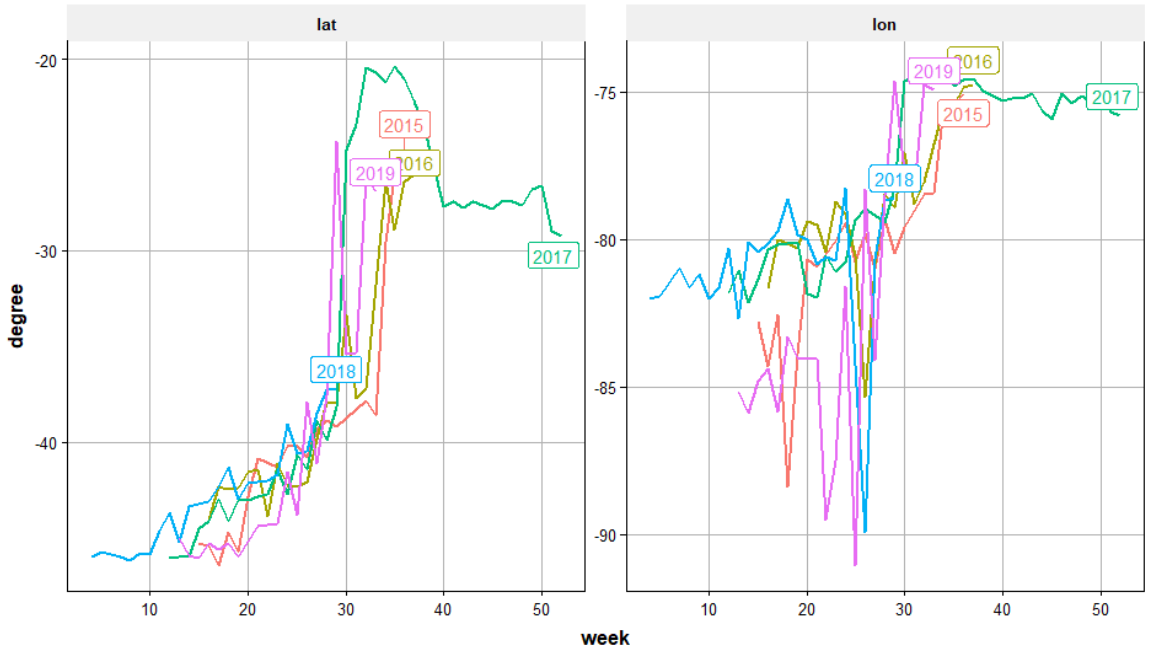


*Figure 3.1.2: Temporal progression by week and latitude/longitude.*

### Total catch per rectangle for the main target species

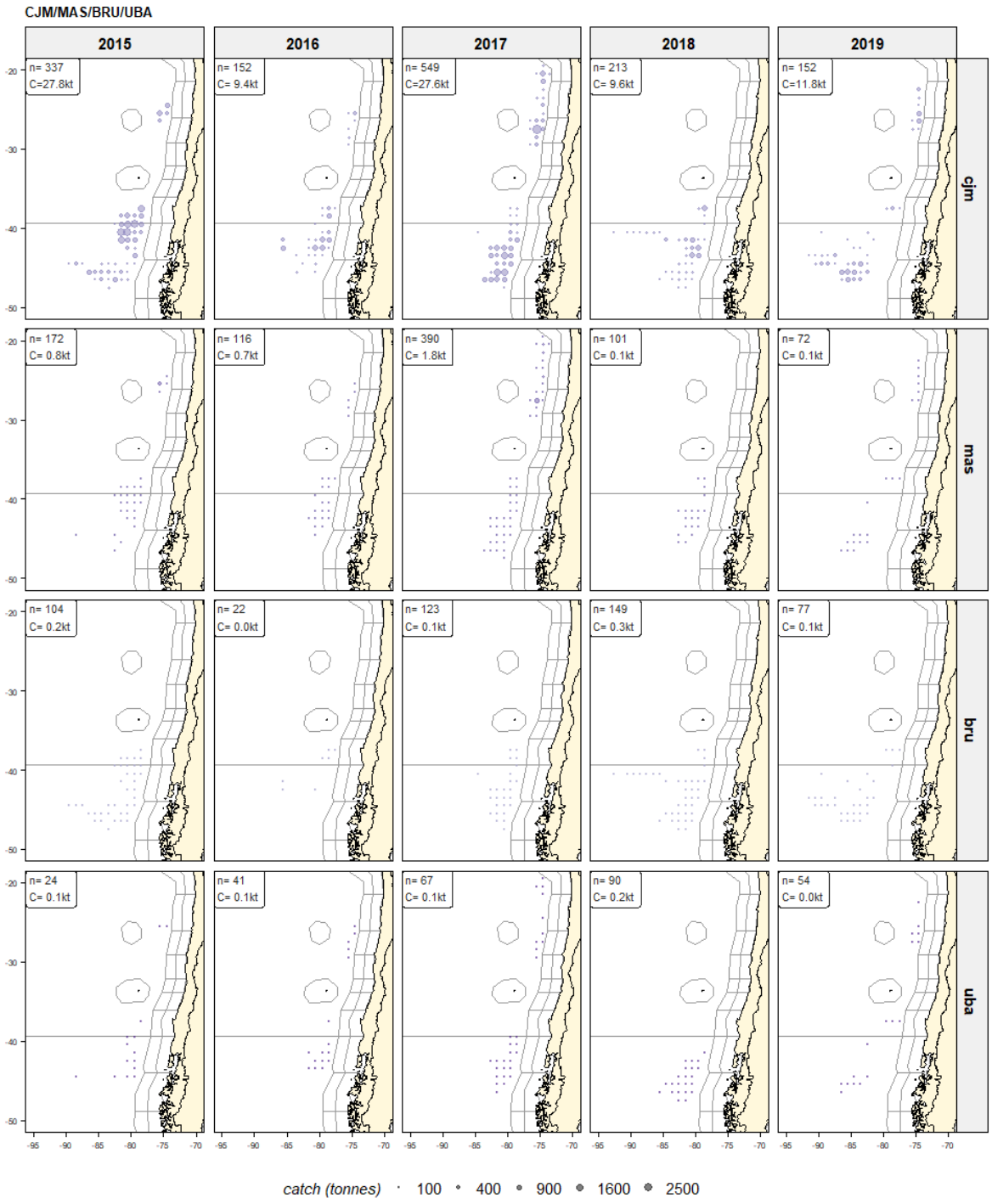


*Figure 3.1.3: Total catch per species and per rectangle. N indicates the number of hauls; Catch refers to the total catch per year. * denotes incomplete year*

## Total catch per rectangle for the main target species

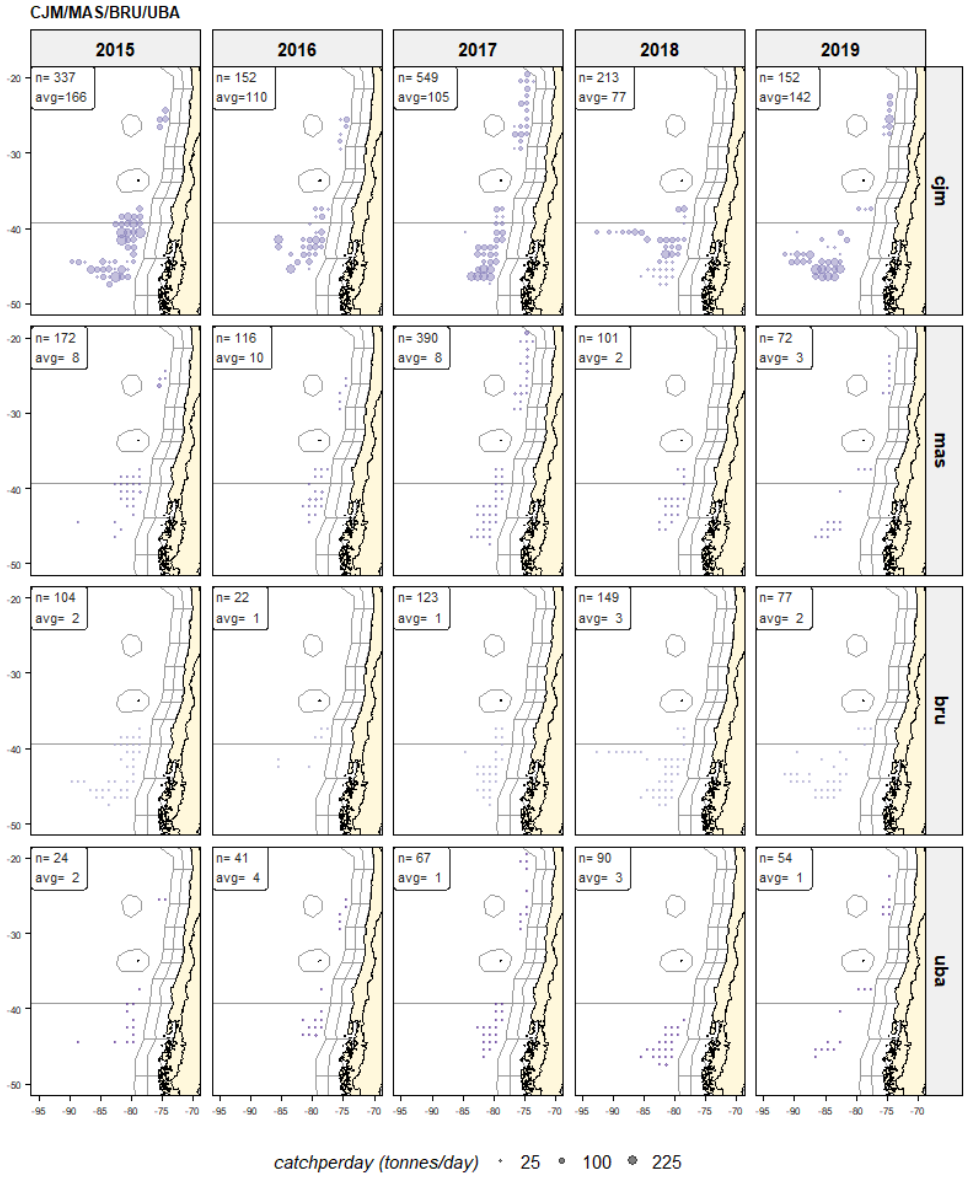


*Figure 3.1.4: Average catch per day, per species and per rectangle. N indicates the number of hauls; avg refers to the average catch per day; * denotes incomplete year*

## Average fishing depth by rectangle

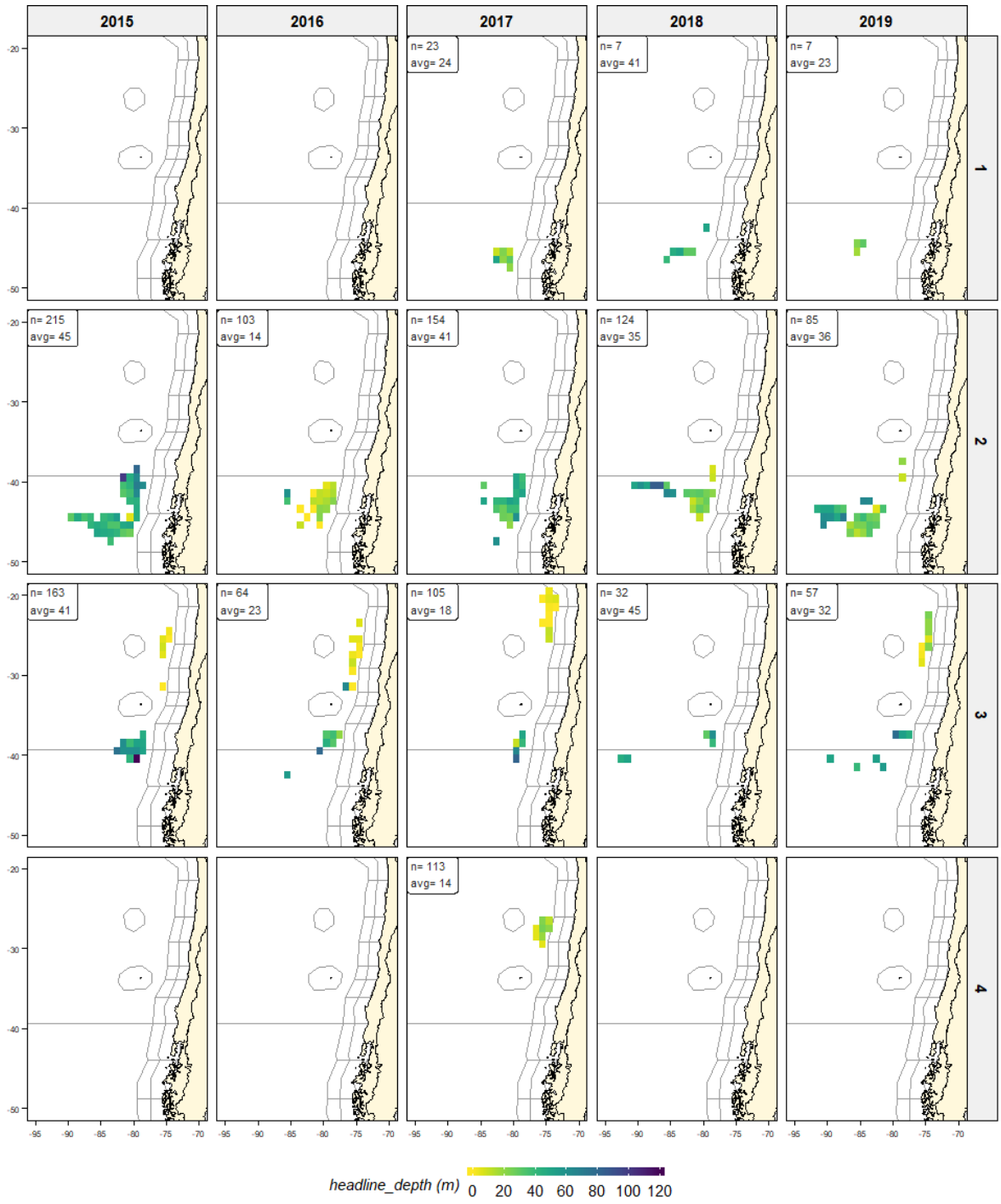


*Figure 3.1.5: Average fishing depth (m) by year and quarter.*

## Average temperature at fishing depth by rectangle


*Figure 3.1.6: Average temperature at fishing depth.*

## Average windspeed by rectangle

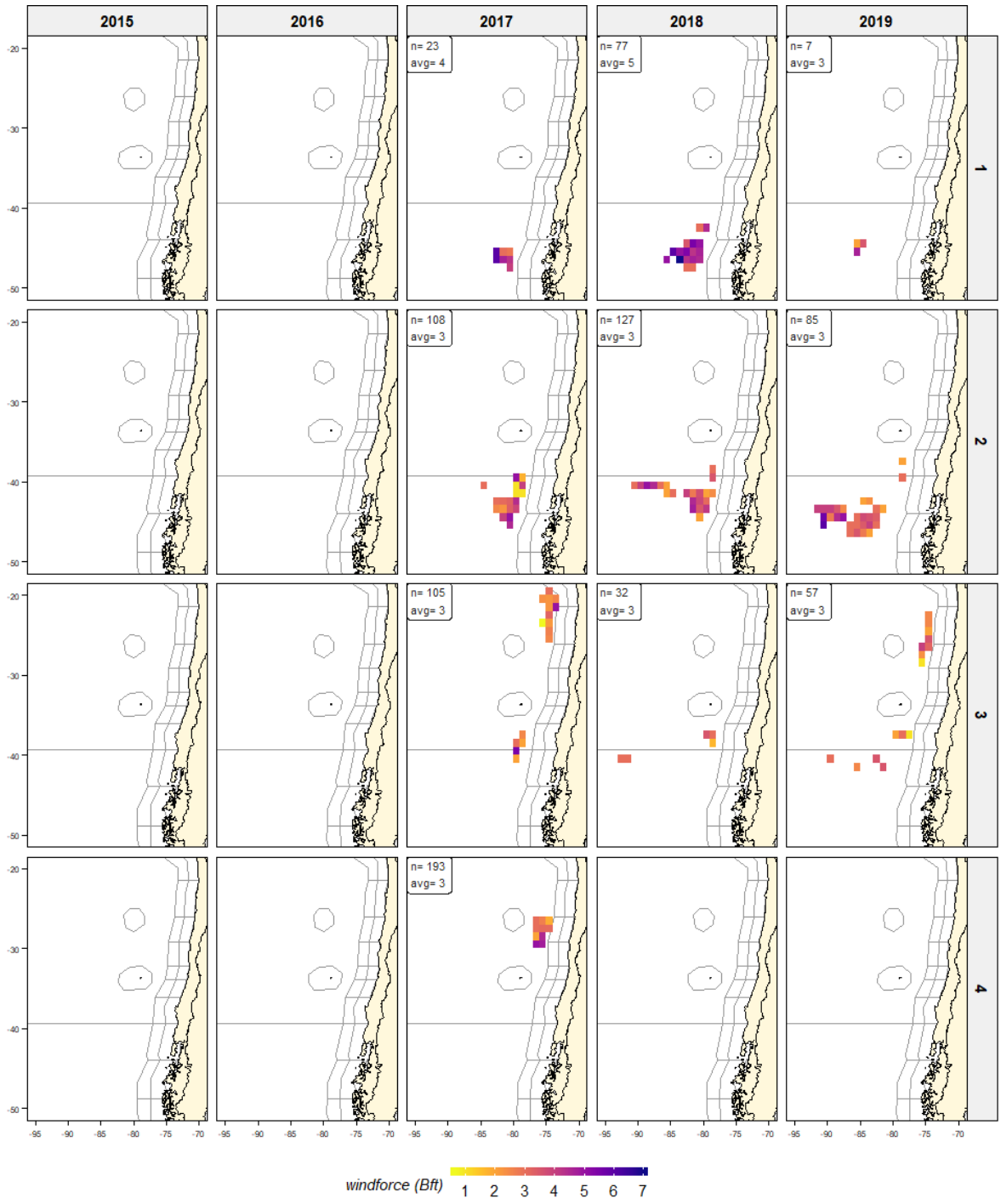


*Figure 3.1.7: Average windforce.*

## 3.2 Jack mackerel (CJM, Trachurus murphyi)

A summary of the Jack mackerel statistics in the self-sampling programme by year are shown in the text tables and figures below.

| species | division | year | nvessels | ntrips | ndays | nhauls | catch | catchperc | catch/day | nlength |
|---|---|---|---|---|---|---|---|---|---|---|
| cjm | 87.2.6 | 2015 | 2 | 5 | 67 | 114 | 8,463 | 30 | 126 | 3,696 |
| cjm | 87.2.6 | 2016 | 1 | 3 | 34 | 54 | 2,054 | 22 | 60 | 2,974 |
| cjm | 87.2.6 | 2017 | 2 | 5 | 129 | 299 | 9,673 | 35 | 75 | 12,367 |
| cjm | 87.2.6 | 2018 | 1 | 1 | 19 | 32 | 1,705 | 18 | 90 | 592 |
| cjm | 87.2.6 | 2019 | 1 | 1 | 34 | 62 | 3,158 | 27 | 93 | 4,259 |
| cjm | 87.3.3 | 2015 | 2 | 8 | 107 | 223 | 19,312 | 70 | 180 | 3,603 |
| cjm | 87.3.3 | 2016 | 1 | 2 | 52 | 98 | 7,378 | 78 | 142 | 3,141 |
| cjm | 87.3.3 | 2017 | 2 | 7 | 134 | 250 | 17,976 | 65 | 134 | 7,264 |
| cjm | 87.3.3 | 2018 | 1 | 5 | 106 | 181 | 7,915 | 82 | 75 | 3,345 |
| cjm | 87.3.3 | 2019 | 1 | 3 | 49 | 90 | 8,631 | 73 | 176 | 2,835 |
| cjm | (all) | 2015 | | 13 | 174 | 337 | 27,775 | 100 | 160 | 7,299 |
| cjm | (all) | 2016 | | 5 | 86 | 152 | 9,432 | 100 | 110 | 6,115 |
| cjm | (all) | 2017 | | 12 | 263 | 549 | 27,649 | 100 | 105 | 19,631 |
| cjm | (all) | 2018 | | 6 | 125 | 213 | 9,620 | 100 | 77 | 3,937 |
| cjm | (all) | 2019 | | 4 | 83 | 152 | 11,789 | 100 | 142 | 7,094 |
| cjm | (all) | (all) | | 40 | 731 | 1,403 | 86,265 | | 118 | 44,076 |

*Table 3.2.1: Jack mackerel. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), percentage of the catch (by division), catch rates (ton/day) and number of length samples.*

## Jack mackerel (CJM). Catch by rectangle

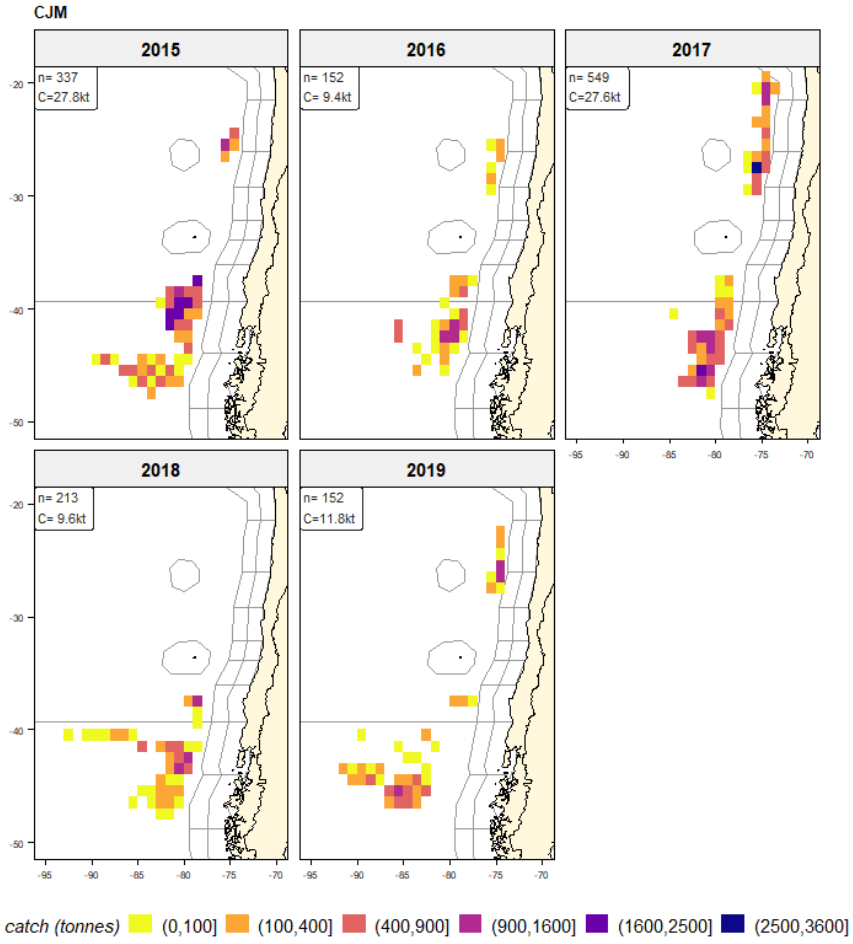


*Figure 3.2.1: Jack mackerel. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.*

## Jack mackerel (CJM). Average catch per day

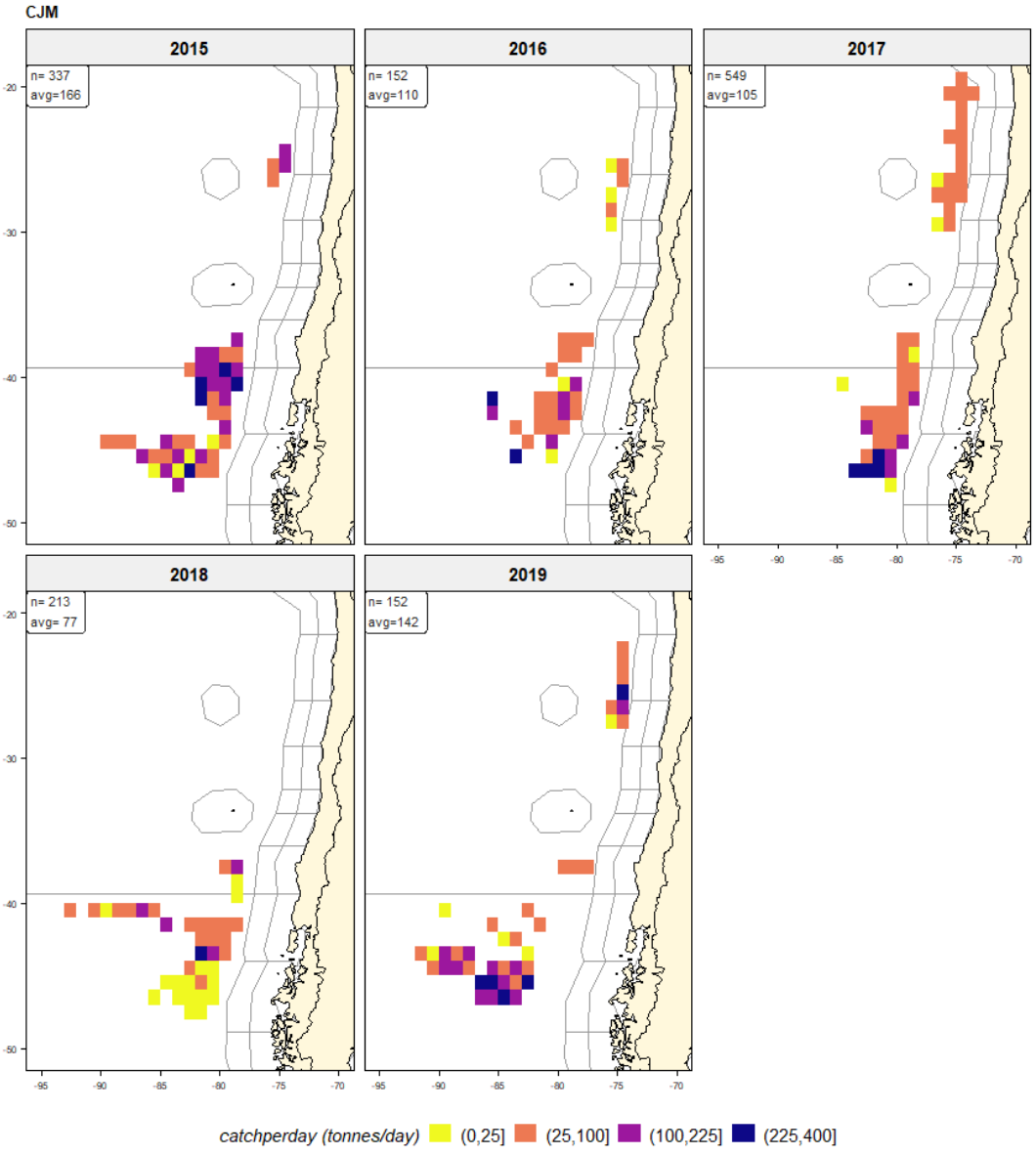


*Figure 3.2.2: Jack mackerel. Average catch per day per rectangle. N indicates the number of hauls; avg refers to the overall average catch per day*

## Jack mackerel (CJM). Length distributions of the catch

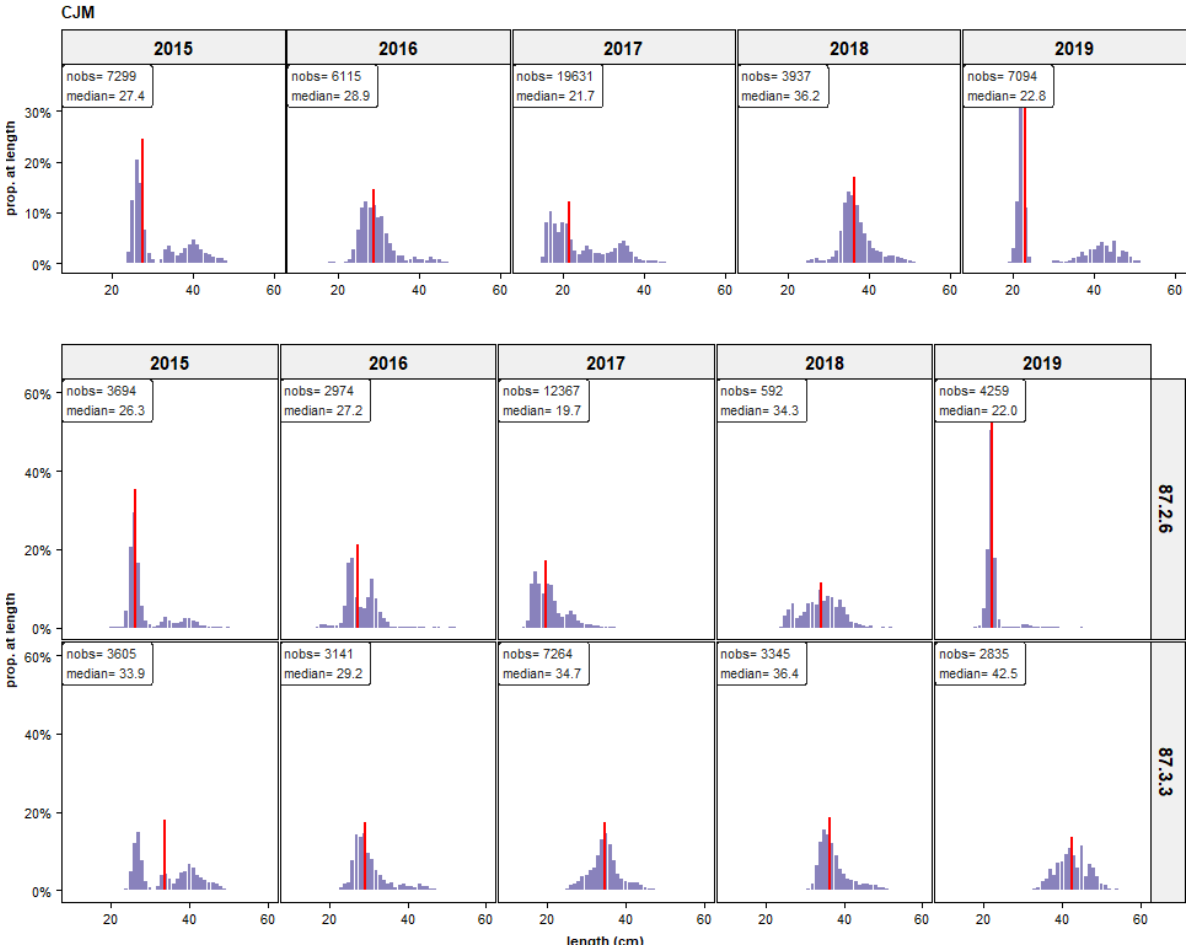


*Figure 3.2.3: Jack mackerel. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length*

## Jack mackerel (CJM). Length frequencies by year and quarter

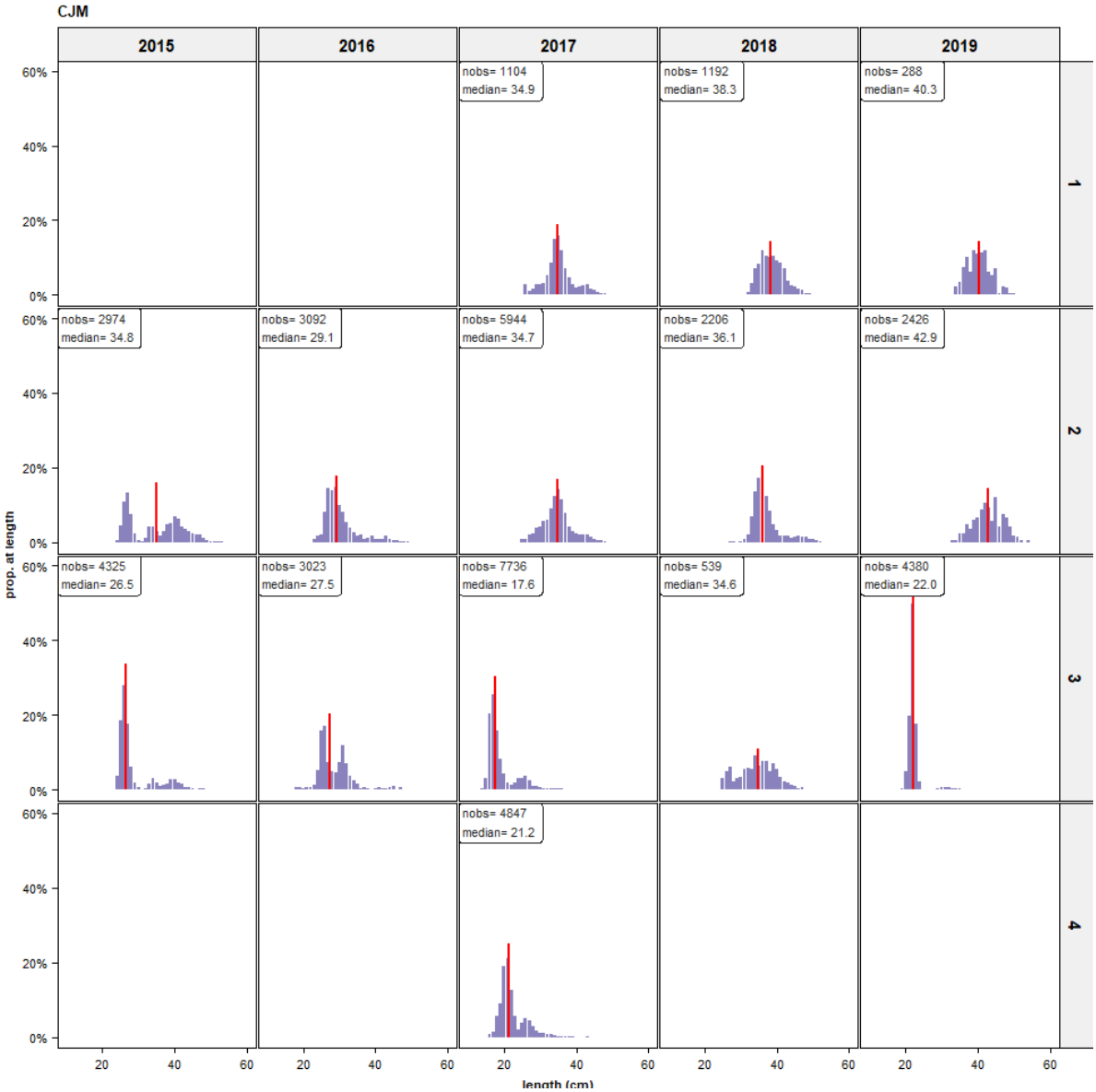


*Figure 3.2.4: Jack mackerel. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length*

## Jack mackerel (CJM). Length distribution by latitude (5 degree groups)

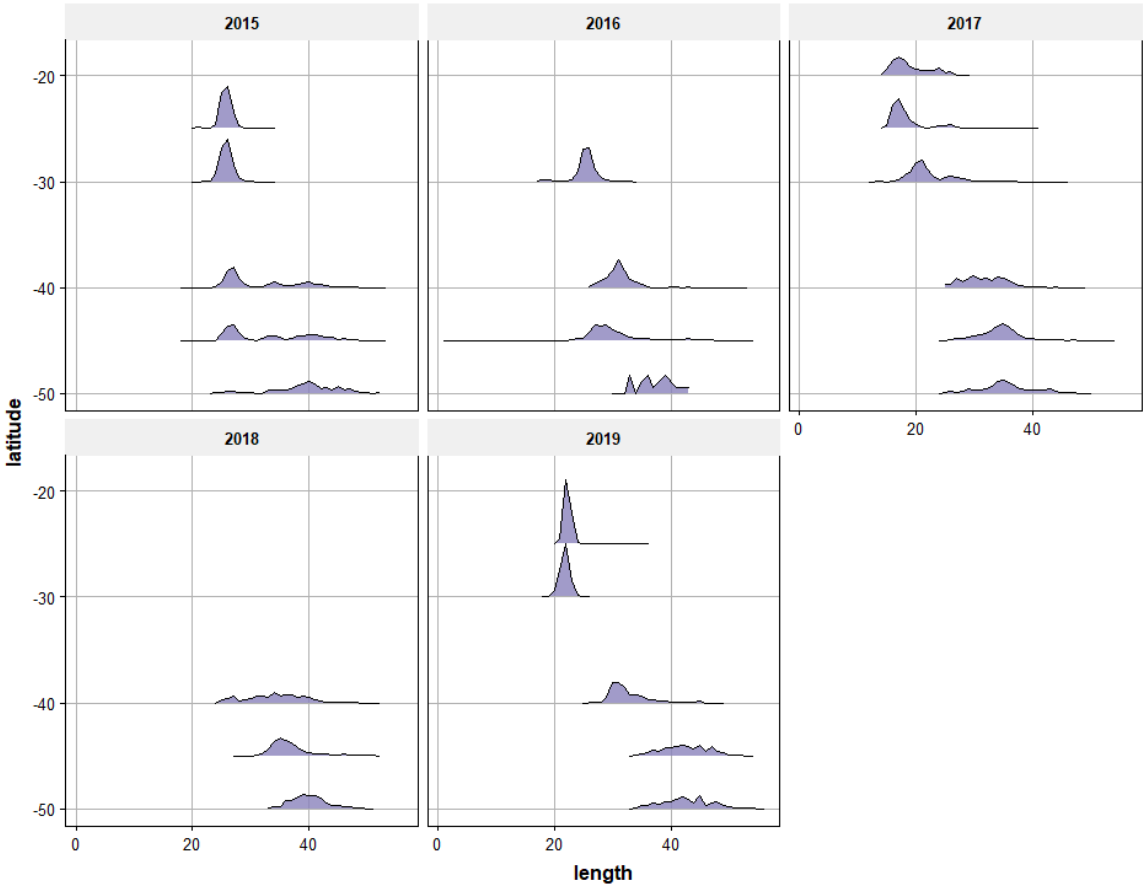


*Figure 3.2.5: Jack mackerel. Length distributions by year and 5 degree latitude group.*

## Jack mackerel (CJM). Weight distributions

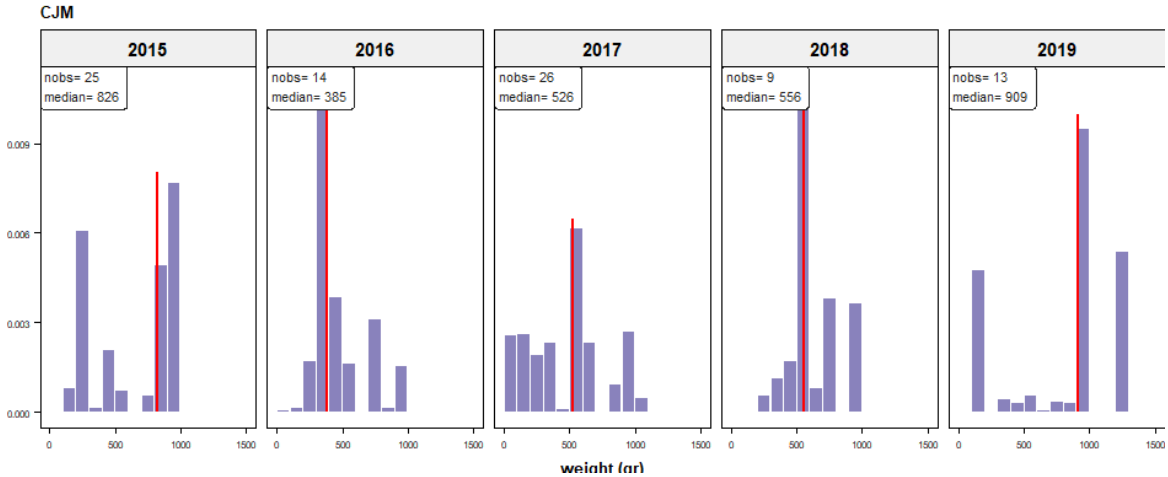


*Figure 3.2.6: Jack mackerel. Weight distributions (100 gram classes). Nobs refers to the number of batches where average weight was measured; median denotes the median length; * denotes incomplete year*

## Jack mackerel (CJM). Fishing depth distributions.

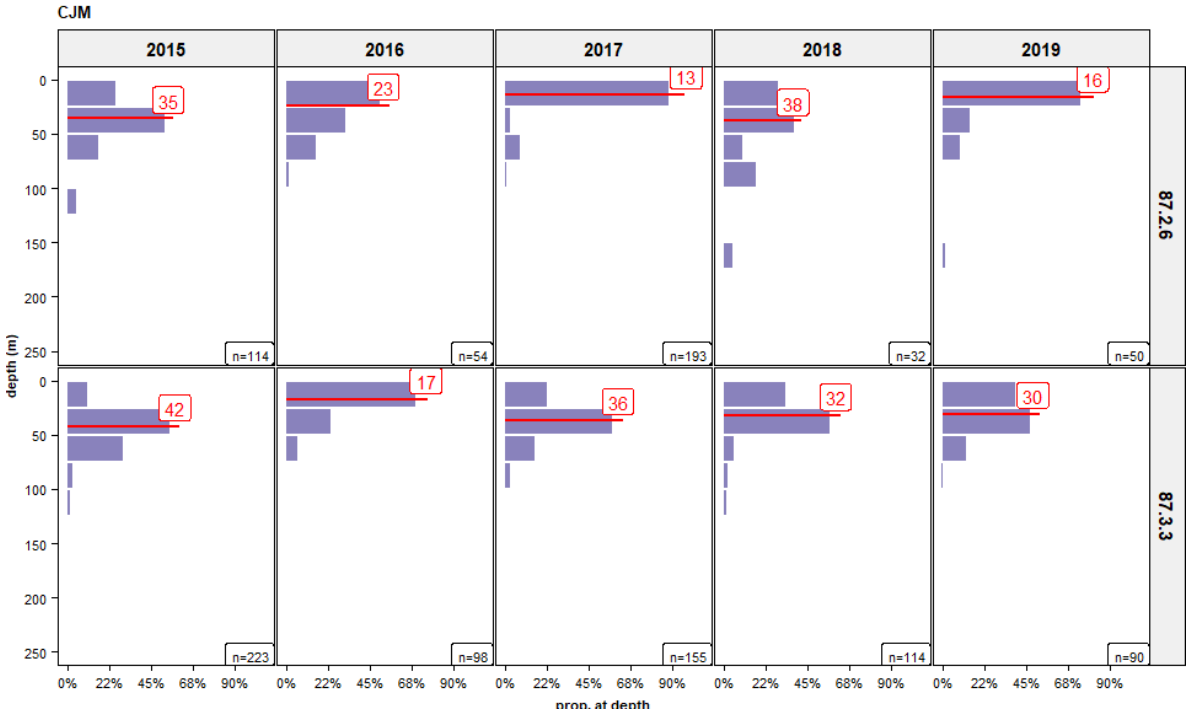


*Figure 3.2.7: Jack mackerel. Depth distributions by year and division. N is number of observations; median depth in red; * denotes incomplete year*

### Jack mackerel (CJM). Age-length key by month (2019 only)

In 2019, the self-sampling has been extended to cover age sampling. From a subset of hauls during each trip, a random sample of fish has been frozen for later analysis in the lab of INPESCA (Chile). A summary of the number of fish sampled by month is in the text table below for length, weight, sex, maturity and age. Samples for the months 6-8 have not been processed for age at present.

| species | year | month | nlen | nweight | nsex | nmat | nage |
|---|---|---|---|---|---|---|---|
| cjm | 2019 | 3 | 22 | 7 | 22 | 7 | 22 |
| cjm | 2019 | 4 | 67 | 28 | 67 | 28 | 67 |
| cjm | 2019 | 5 | 92 | 51 | 92 | 51 | 92 |
| cjm | 2019 | 6 | 41 | 20 | 41 | 20 | 41 |
| cjm | 2019 | 7 | 127 | 127 | 127 | 127 | 0 |
| cjm | 2019 | 8 | 61 | 61 | 61 | 61 | 0 |
| cjm | 2019 | (all) | 410 | 294 | 410 | 294 | 222 |

*Table 3.2.2: Jack mackerel. Self-sampling summary of age-length sampling during 2019.*

The Age-length keys and age distributions by month are presented in the figures below.

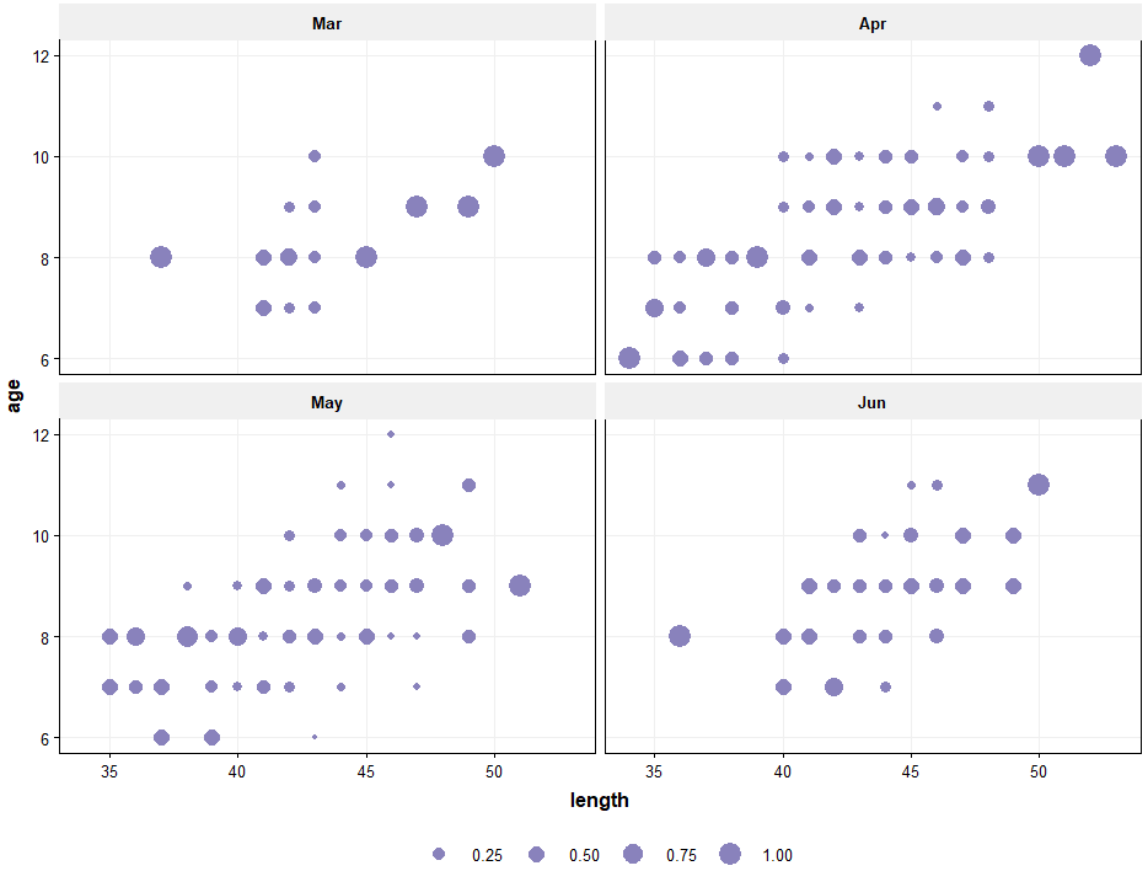

*Figure 3.2.8: Jack mackerel. Age-length keys derived from self-sampling for age and length in 2019*

Age distributions of the self-sampled catches during the 2019. Note that the last few months have not been covered yet, because age reading has not yet taken place. In those case an average annual ALK has been applied when available.

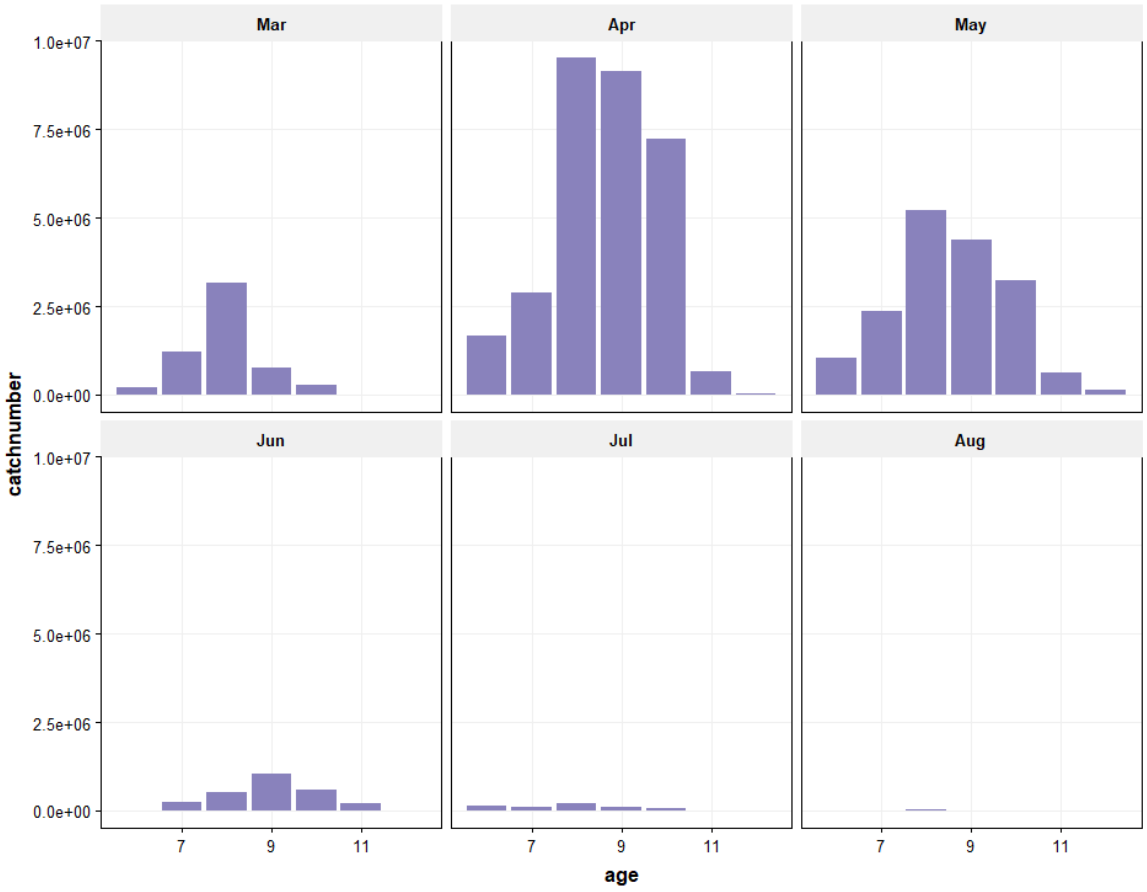


*Figure 3.2.9: Jack mackerel. Age distributions estimated from self-sampling for age and length in 2019*

## 3.3 Chub mackerel (MAS, Scomber japonicus)

| species | year | nvessels | ntrips | ndays | nhauls | catch | nlength | catch/day |
|---|---|---|---|---|---|---|---|---|
| mas | 2015 | 2 | 7 | 104 | 172 | 822 | 0 | 7 |
| mas | 2016 | 1 | 4 | 67 | 116 | 673 | 571 | 10 |
| mas | 2017 | 2 | 10 | 220 | 390 | 1,841 | 1,014 | 8 |
| mas | 2018 | 1 | 5 | 67 | 101 | 117 | 109 | 1 |
| mas | 2019 | 1 | 3 | 47 | 72 | 122 | 78 | 2 |
| mas | (all) | . | 29 | 505 | 851 | 3,575 | 1,772 | . |

| species | division | year | nvessels | ntrips | ndays | nhauls | catch | catchperc | catch/day | nlength |
|---|---|---|---|---|---|---|---|---|---|---|
| mas | 87.2.6 | 2015 | 2 | 5 | 49 | 75 | 567 | 69 | 12 | 0 |
| mas | 87.2.6 | 2016 | 1 | 3 | 28 | 42 | 137 | 20 | 5 | 304 |
| mas | 87.2.6 | 2017 | 2 | 5 | 106 | 209 | 1,587 | 86 | 15 | 878 |
| mas | 87.2.6 | 2018 | 1 | 1 | 18 | 30 | 69 | 58 | 4 | 60 |
| mas | 87.2.6 | 2019 | 1 | 1 | 31 | 55 | 120 | 97 | 4 | 78 |
| mas | 87.3.3 | 2015 | 2 | 6 | 57 | 97 | 256 | 31 | 4 | 0 |
| mas | 87.3.3 | 2016 | 1 | 2 | 39 | 74 | 537 | 80 | 14 | 267 |
| mas | 87.3.3 | 2017 | 2 | 7 | 114 | 181 | 254 | 14 | 2 | 136 |
| mas | 87.3.3 | 2018 | 1 | 4 | 49 | 71 | 49 | 42 | 1 | 49 |
| mas | 87.3.3 | 2019 | 1 | 3 | 16 | 17 | 3 | 3 | 0 | 0 |
| mas | (all) | 2015 | 11 | 106 | 172 | 823 | 100 | 8 | 0 |
| mas | (all) | 2016 | 5 | 67 | 116 | 674 | 100 | 10 | 571 |
| mas | (all) | 2017 | 12 | 220 | 390 | 1,841 | 100 | 8 | 1,014 |
| mas | (all) | 2018 | 5 | 67 | 101 | 118 | 100 | 2 | 109 |
| mas | (all) | 2019 | 4 | 47 | 72 | 123 | 100 | 3 | 78 |
| mas | (all) | (all) | 37 | 507 | 851 | 3,579 | | 7 | 1,772 |

*Table 3.3.1: Chub mackerel. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), number of fish measured, catch rates (ton/effort). Top: by year. Bottom: by year and division.*

## Chub mackerel (MAS). Catch by rectangle

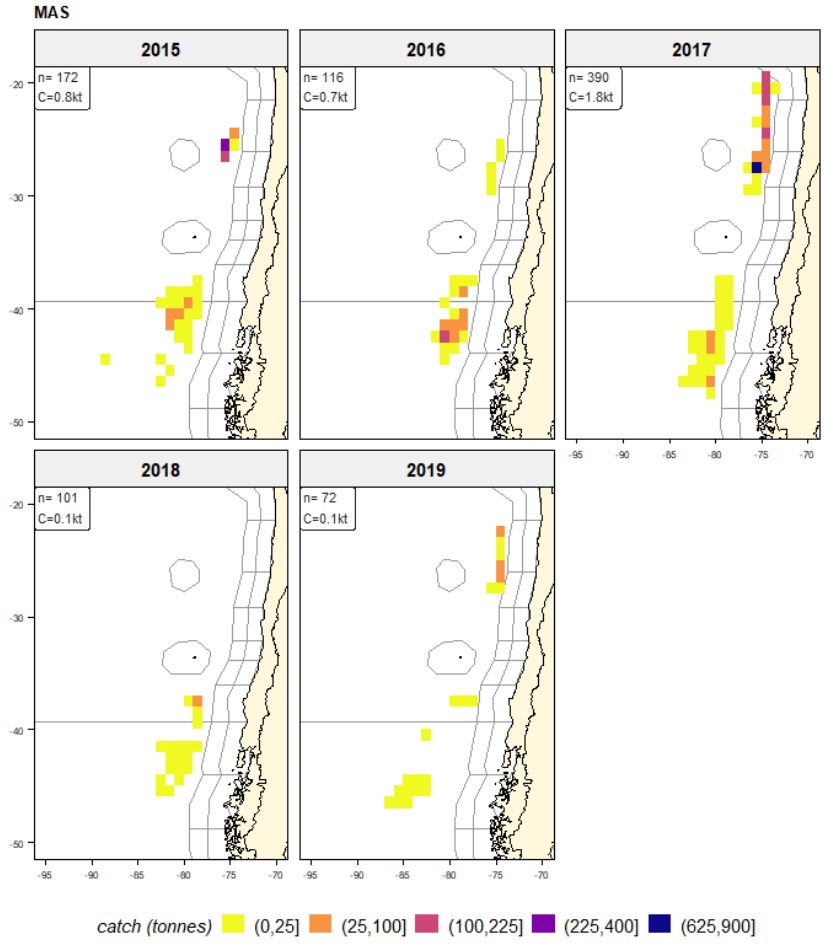


*Figure 3.3.1: Chub mackerel. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.*

## Chub mackerel (MAS). Average catch per day

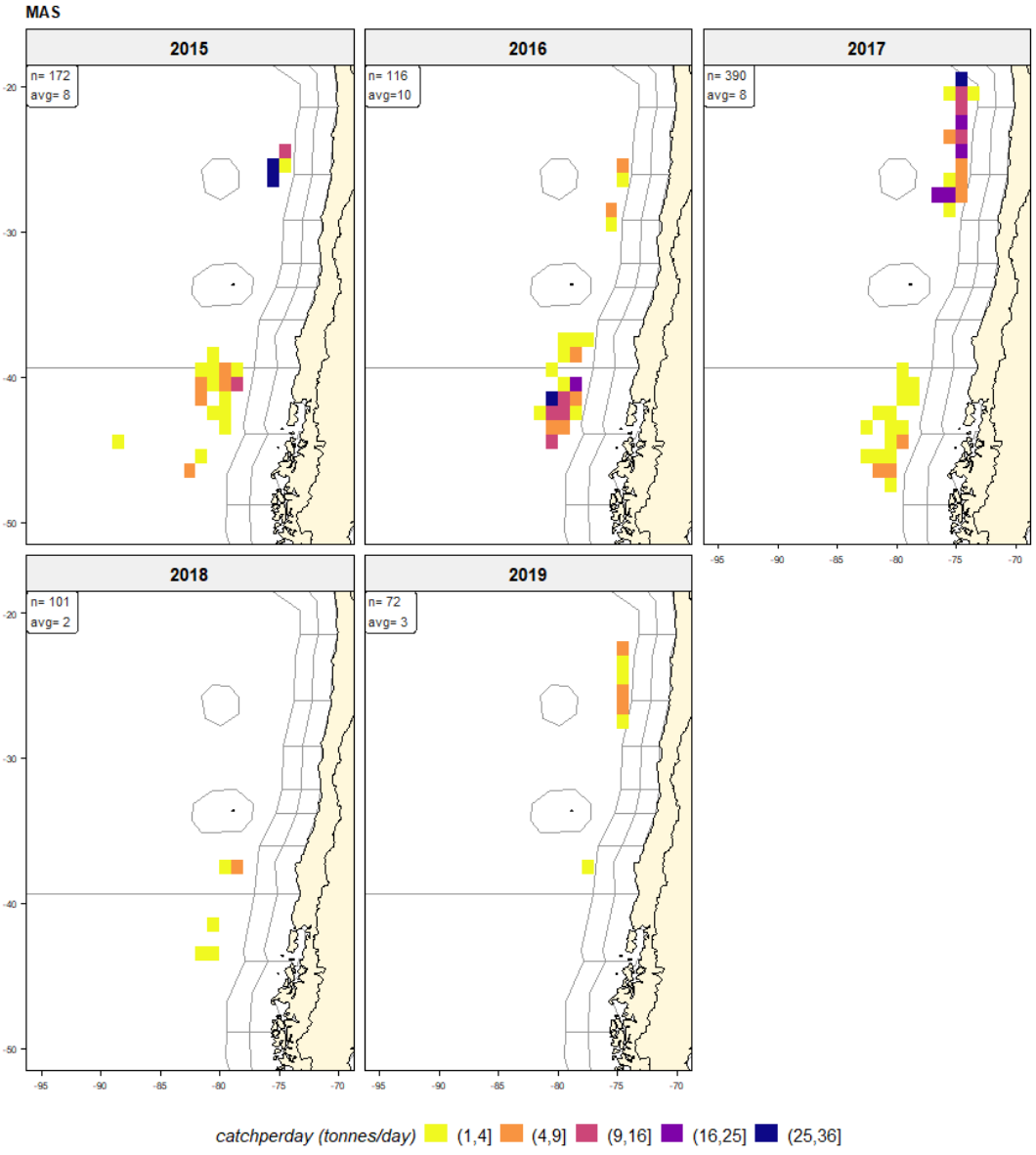


*Figure 3.3.2: Chub mackerel. Average catch per day per rectangle. N indicates the number of hauls; avg refers to the overall average catch per day*

## Chub mackerel (MAS). Length distributions of the catch

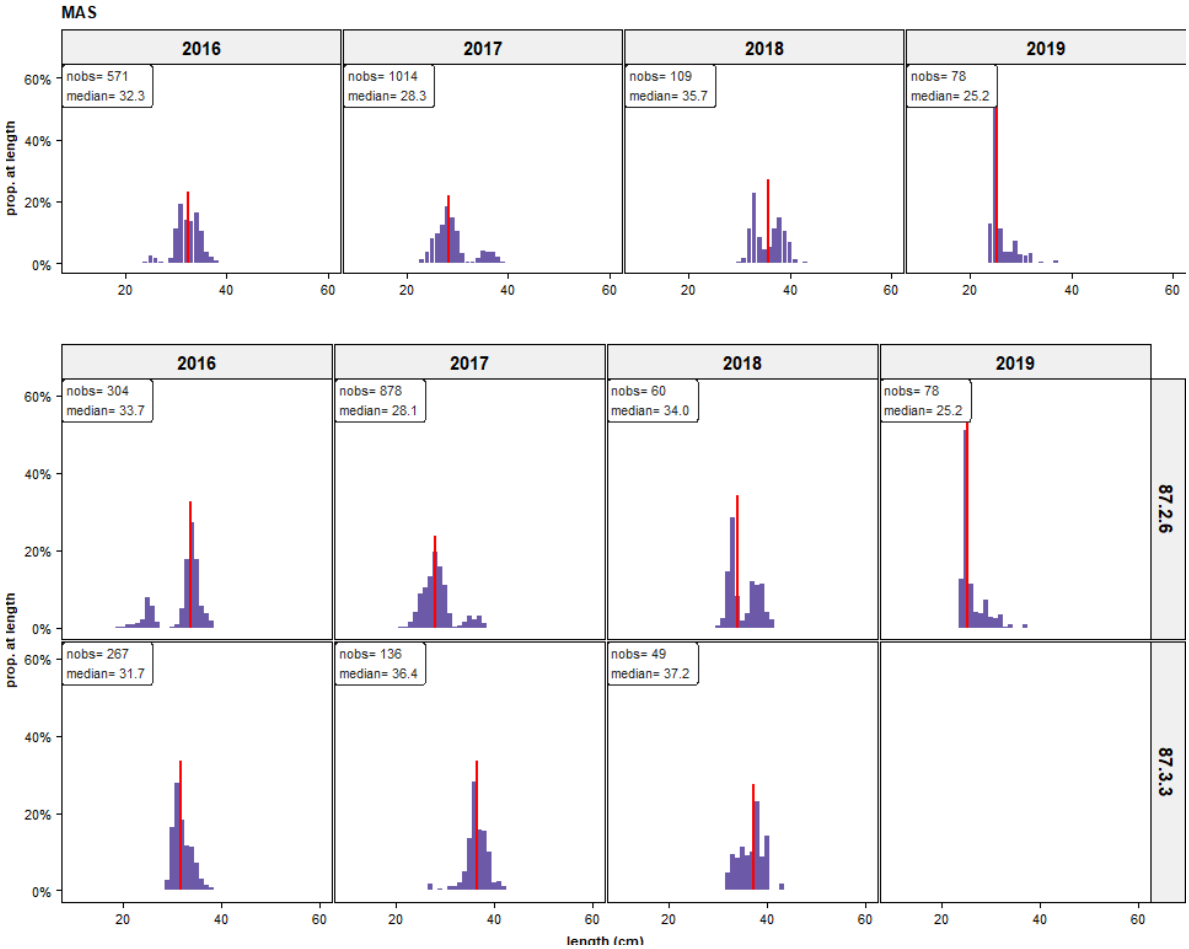


*Figure 3.3.3: Chub mackerel. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length*

## Chub mackerel (MAS). Length frequencies by year and quarter

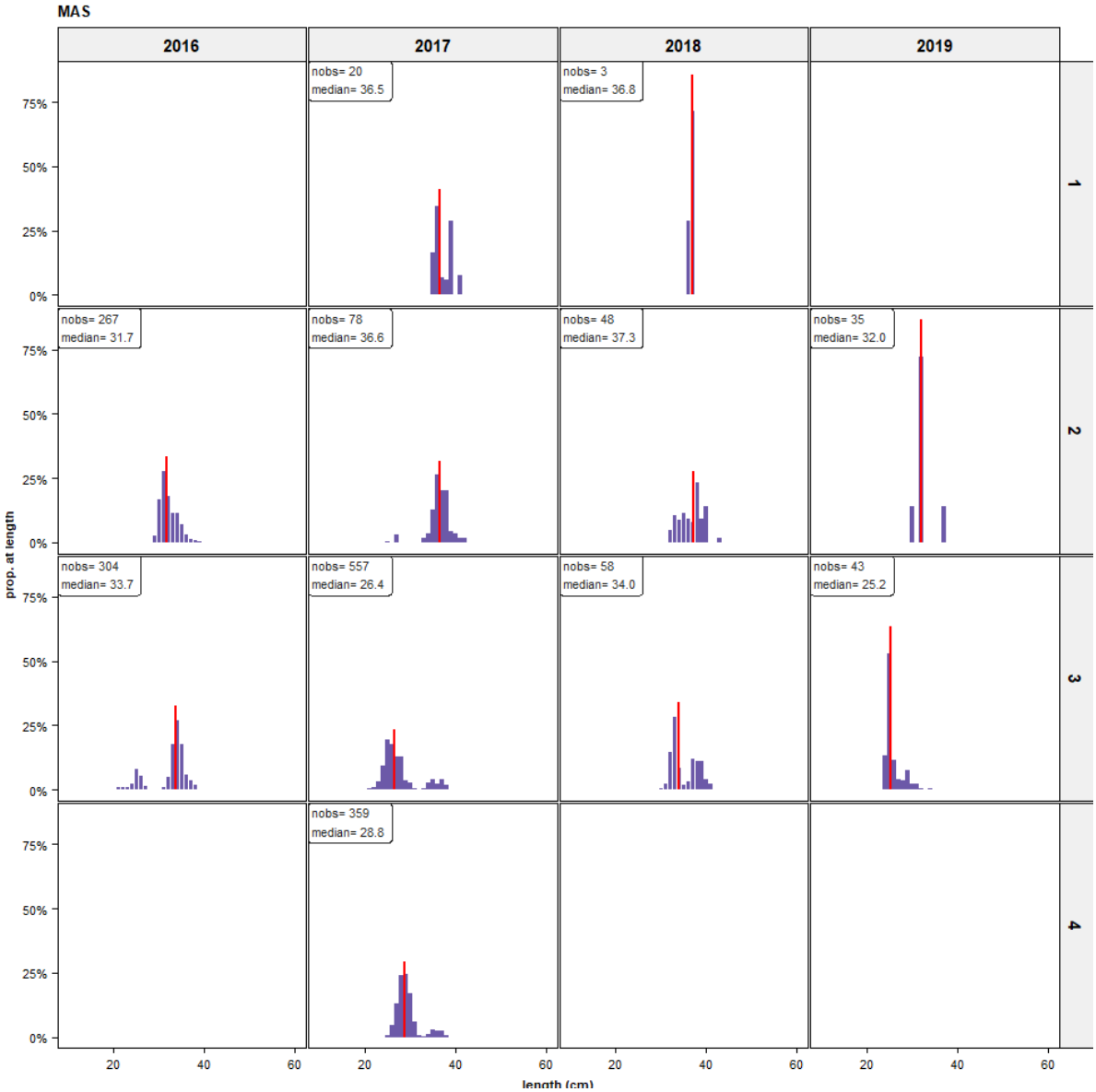


*Figure 3.3.4: Chub mackerel. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length*

## Chub mackerel (MAS). Length distribution by latitude (5 degree groups)

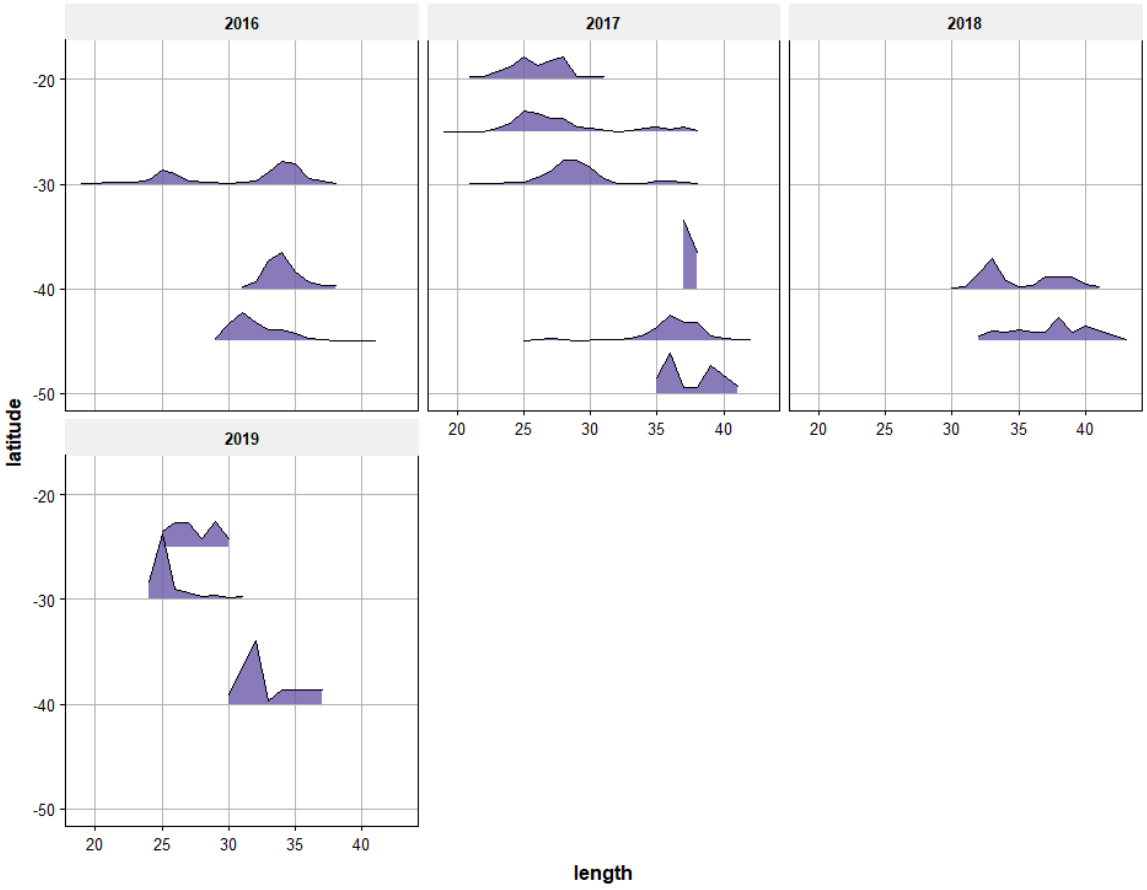


*Figure 3.3.5: Chub mackerel. Length distributions by year and 5 degree latitude group.*

## Chub mackerel (MAS). Weight distributions

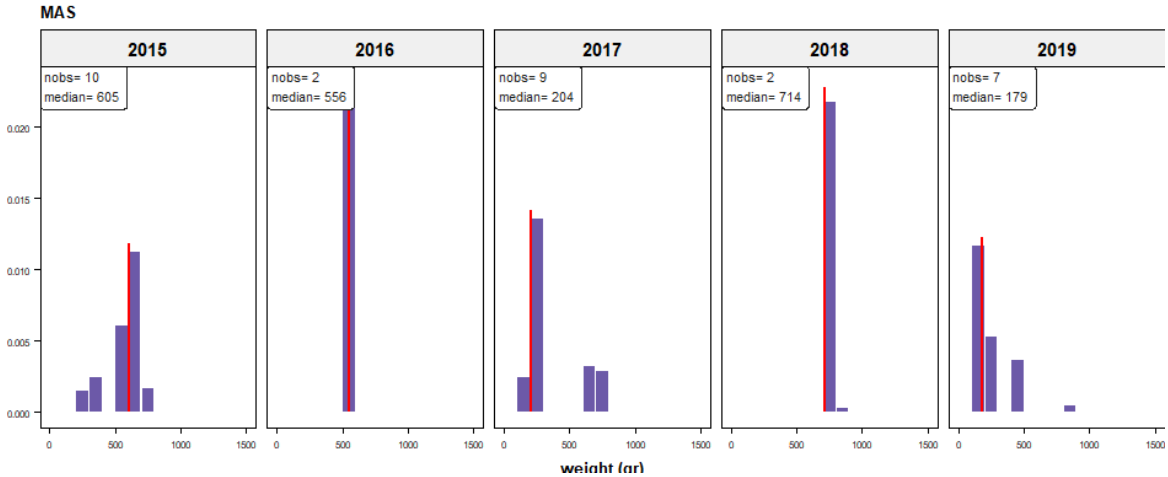


*Figure 3.3.6: Chub mackerel. Weight distributions (100 gram classes). Nobs refers to the number of batches where average weight was measured; median denotes the median length; * denotes incomplete year*

## Chub mackerel (MAS). Fishing depth distributions.

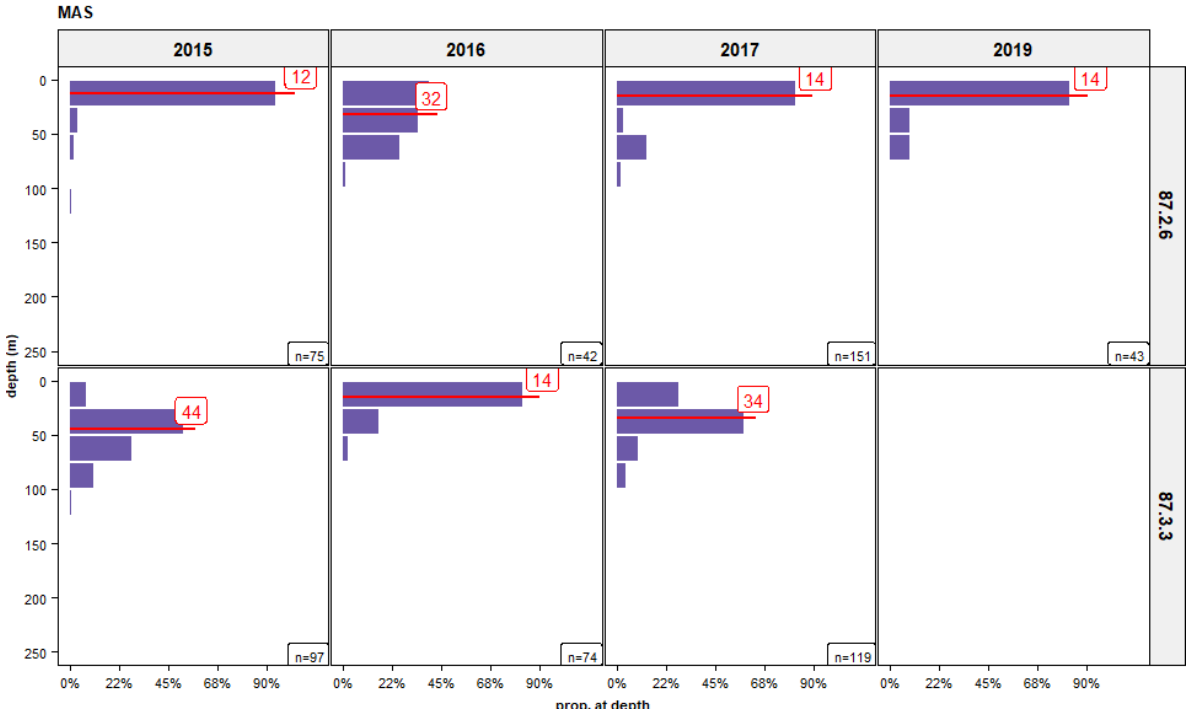


*Figure 3.3.7: Chub mackerel. Depth distributions by year and division. N is number of observations; median depth in red; * denotes incomplete year*

## 3.4 Southern rays bream (BRU, Brama australis)

| species | year | nvessels | ntrips | ndays | nhauls | catch | nlength | catch/day |
|---|---|---|---|---|---|---|---|---|
| bru | 2015 | 2 | 7 | 75 | 104 | 152 | 0 | 2 |
| bru | 2016 | 1 | 2 | 18 | 22 | 24 | 25 | 1 |
| bru | 2017 | 2 | 7 | 90 | 123 | 81 | 63 | 0 |
| bru | 2018 | 1 | 5 | 114 | 149 | 289 | 267 | 2 |
| bru | 2019 | 1 | 3 | 62 | 77 | 127 | 33 | 2 |
| bru | (all) | . | 24 | 359 | 475 | 673 | 388 | . |

| species | division | year | nvessels | ntrips | ndays | nhauls | catch | catchperc | catch/day | nlength |
|---|---|---|---|---|---|---|---|---|---|---|
| bru | 87.2.6 | 2015 | 2 | 3 | 17 | 20 | 13 | 9 | 1 | 0 |
| bru | 87.2.6 | 2016 | 1 | 2 | 10 | 10 | 13 | 52 | 1 | 16 |
| bru | 87.2.6 | 2017 | 2 | 2 | 8 | 12 | 5 | 7 | 1 | 11 |
| bru | 87.2.6 | 2018 | 1 | 1 | 18 | 27 | 101 | 35 | 6 | 69 |
| bru | 87.2.6 | 2019 | 1 | 2 | 15 | 18 | 36 | 28 | 2 | 19 |
| bru | 87.3.3 | 2015 | 2 | 6 | 59 | 84 | 139 | 91 | 2 | 0 |
| bru | 87.3.3 | 2016 | 1 | 1 | 8 | 12 | 12 | 48 | 1 | 9 |
| bru | 87.3.3 | 2017 | 2 | 6 | 82 | 111 | 76 | 93 | 1 | 52 |
| bru | 87.3.3 | 2018 | 1 | 5 | 96 | 122 | 189 | 65 | 2 | 198 |
| bru | 87.3.3 | 2019 | 1 | 3 | 47 | 59 | 92 | 72 | 2 | 14 |
| bru | (all) | 2015 | | 9 | 76 | 104 | 152 | 100 | 2 | 0 |
| bru | (all) | 2016 | | 3 | 18 | 22 | 25 | 100 | 1 | 25 |
| bru | (all) | 2017 | | 8 | 90 | 123 | 81 | 100 | 1 | 63 |
| bru | (all) | 2018 | | 6 | 114 | 149 | 290 | 100 | 3 | 267 |
| bru | (all) | 2019 | | 5 | 62 | 77 | 128 | 100 | 2 | 33 |
| bru | (all) | (all) | | 31 | 360 | 475 | 676 | | 2 | 388 |

*Table 3.4.1: Southern rays bream. Self-sampling summary with the number of days, hauls, trips, vessels, catch (tonnes), number of fish measured, catch rates (ton/effort). Top: by year. Bottom: by year and division.*

## Southern rays bream (BRU). Catch by rectangle

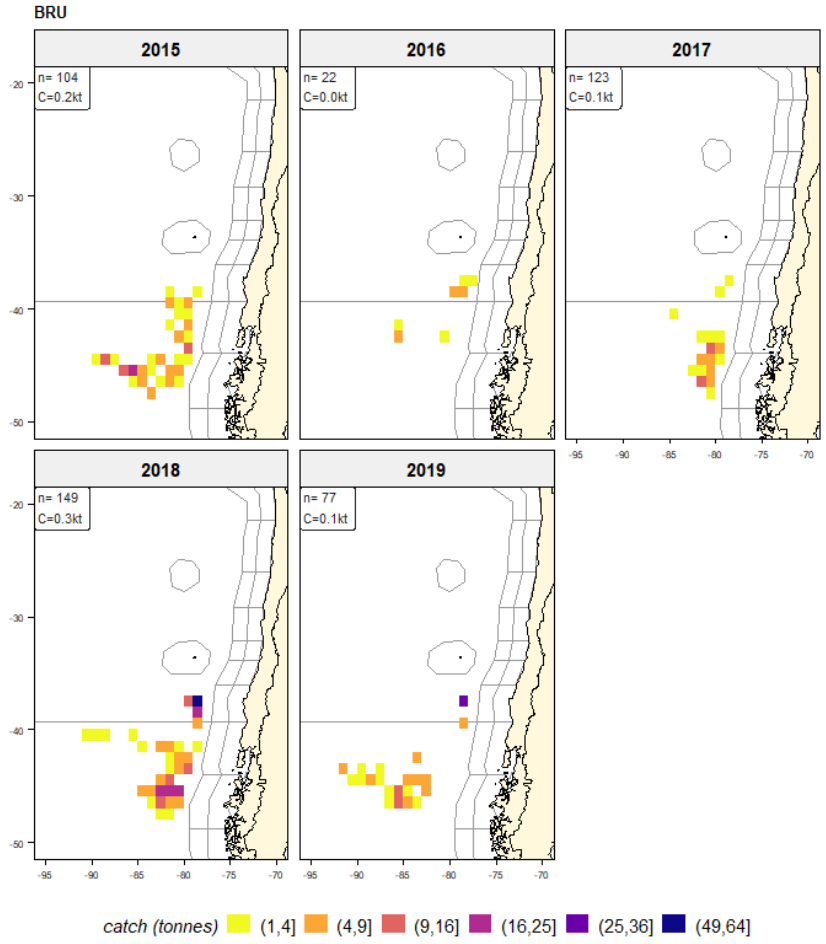


*Figure 3.4.1: Southern rays bream. Catch per per rectangle. N indicates the number of hauls; Catch refers to the total catch per year.*

## Southern rays bream (BRU). Average catch per day

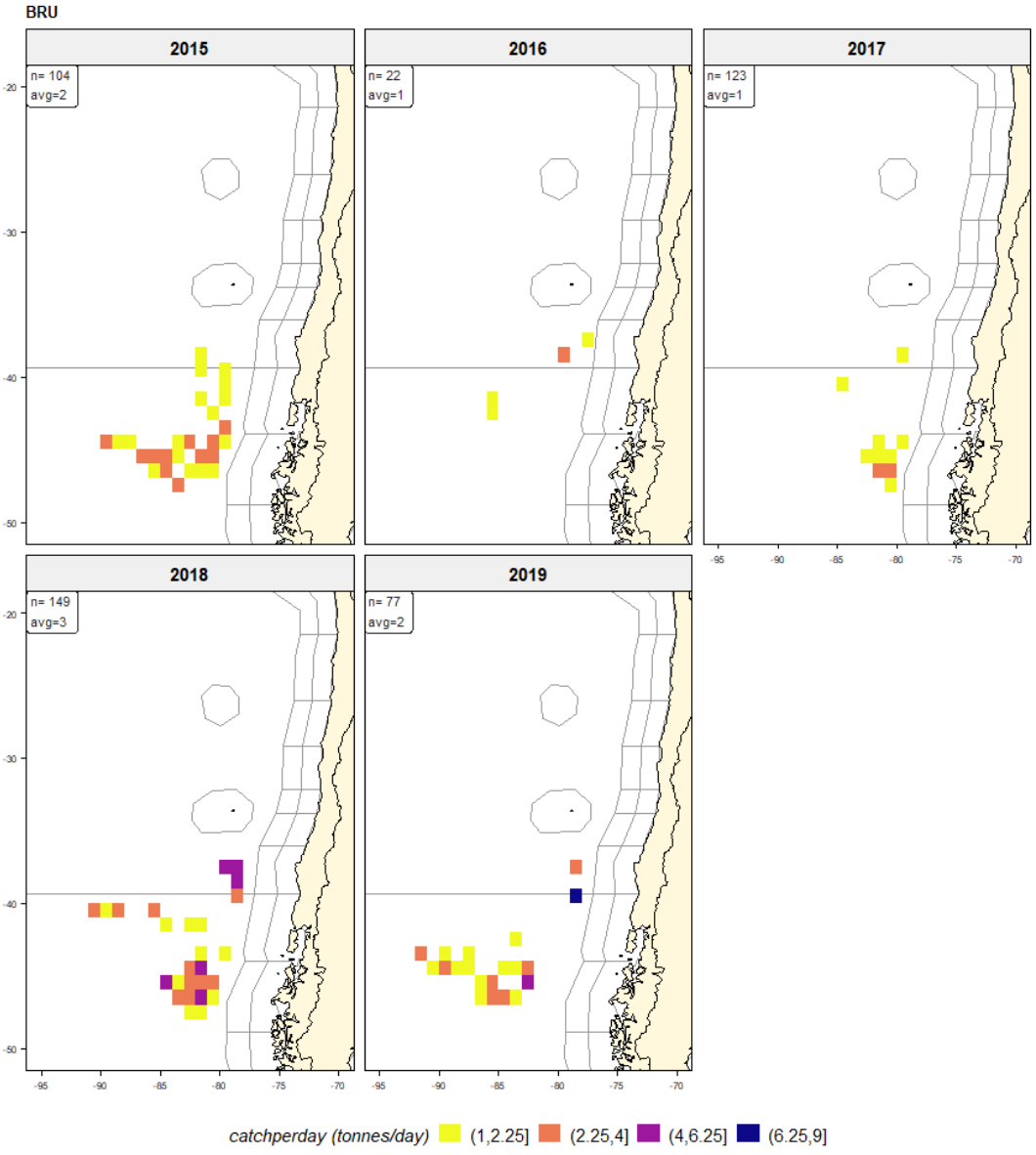


*Figure 3.4.2: Southern rays bream. Average catch per day per rectangle. N indicates the number of hauls; avg refers to the overall average catch per day*

## Southern rays bream (BRU). Length distributions of the catch

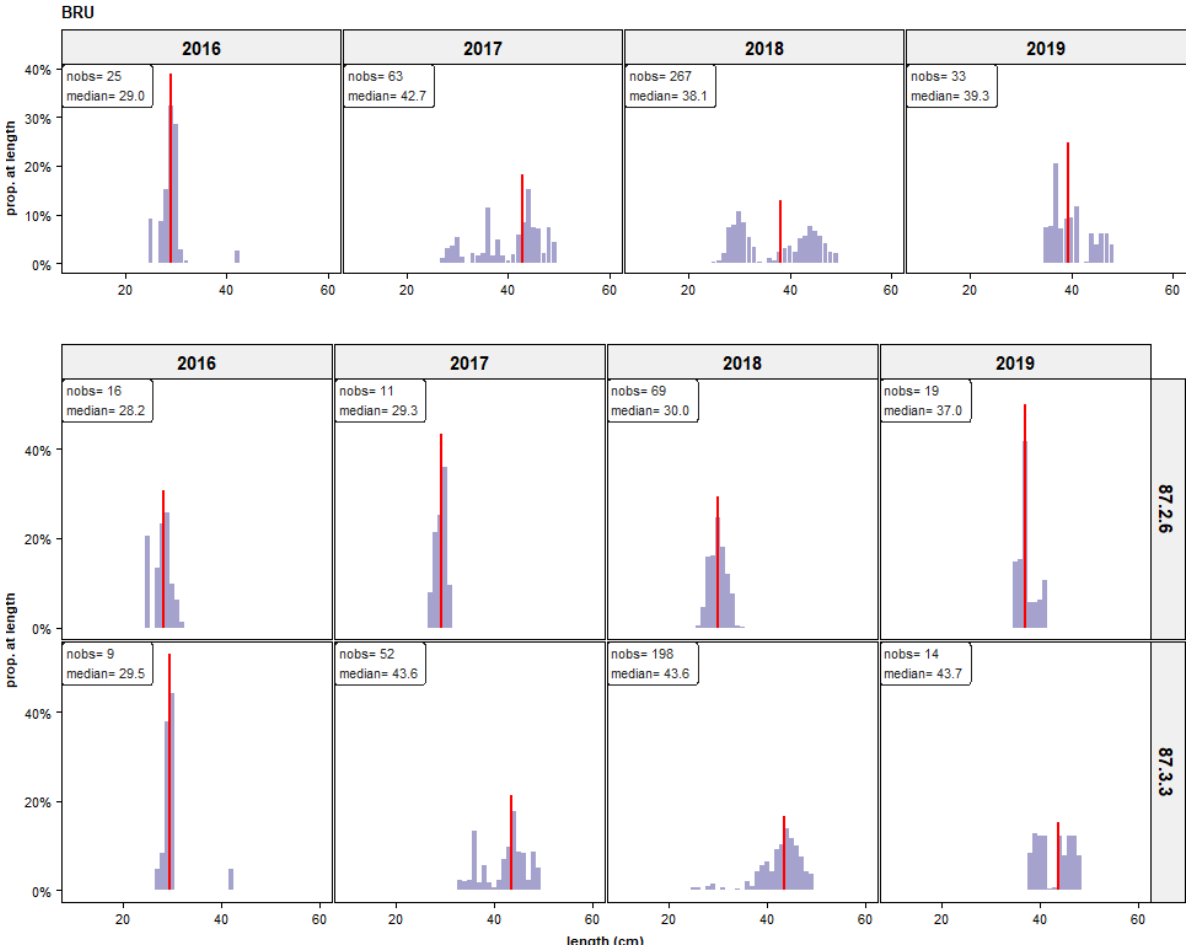


*Figure 3.4.3: Southern rays bream. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length*

## Southern rays bream (BRU). Length frequencies by year and quarter

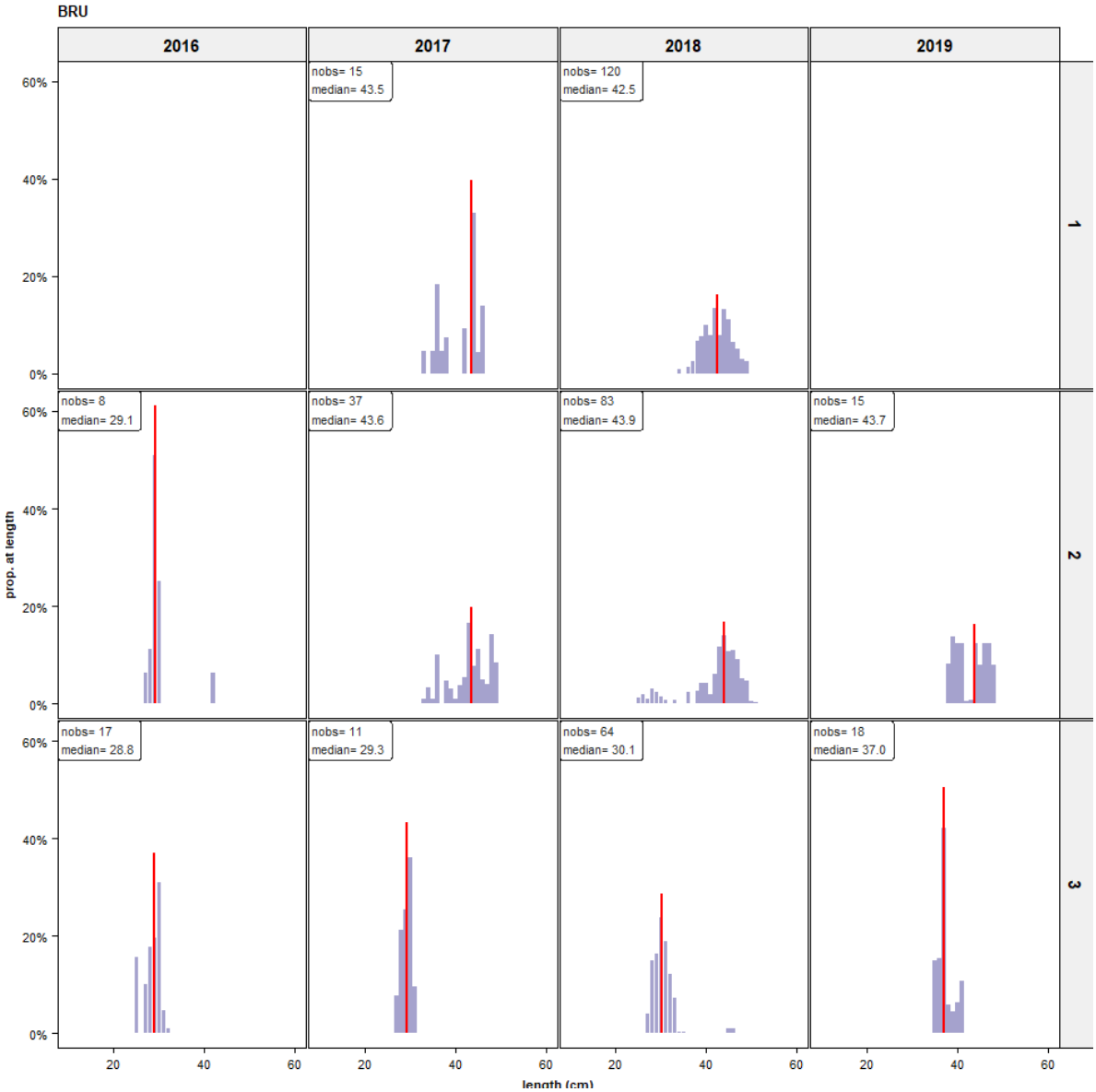


*Figure 3.4.4: Southern rays bream. Length distributions by year (top) and by year and division (bottom). Nobs refers to the number of observations; median denotes the median length*

## Southern rays bream (BRU). Length distribution by latitude (5 degree groups)

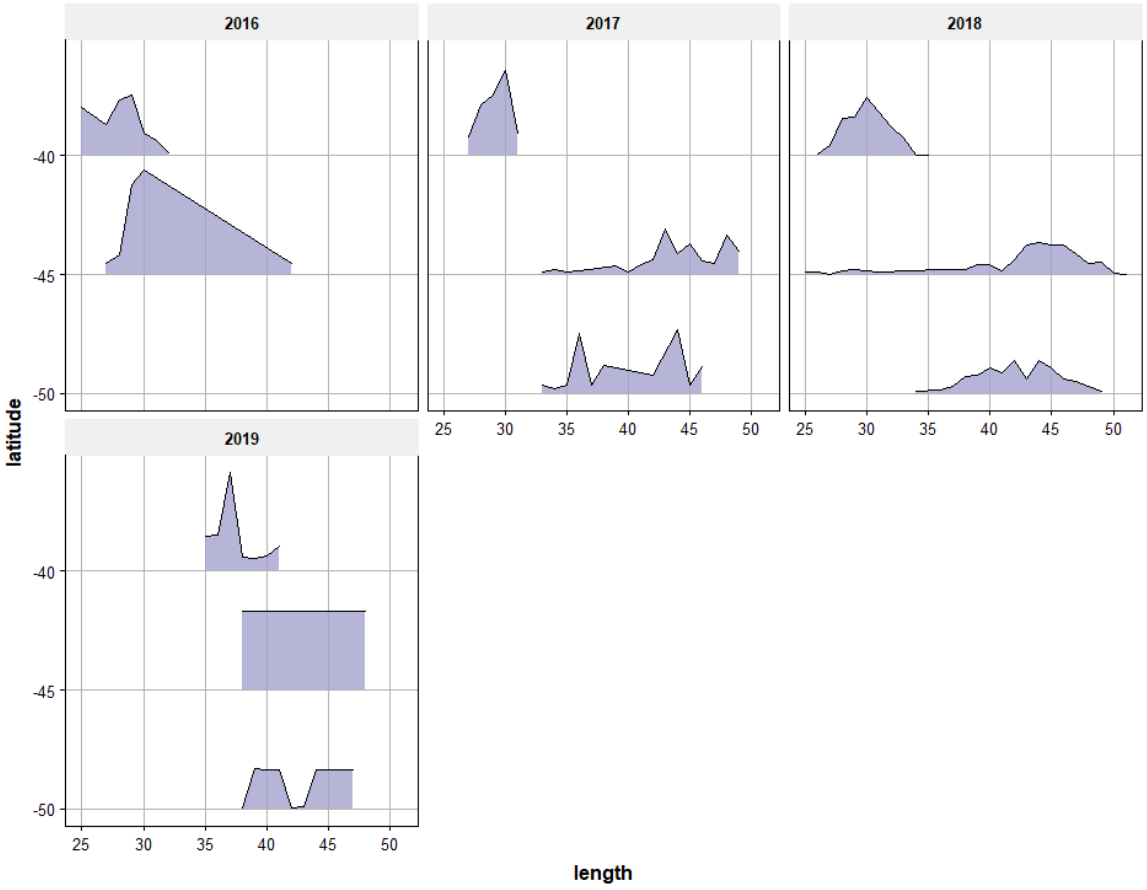


*Figure 3.4.5: Southern rays bream. Length distributions by year and 5 degree latitude group.*

## Southern rays bream (BRU). Weight distributions

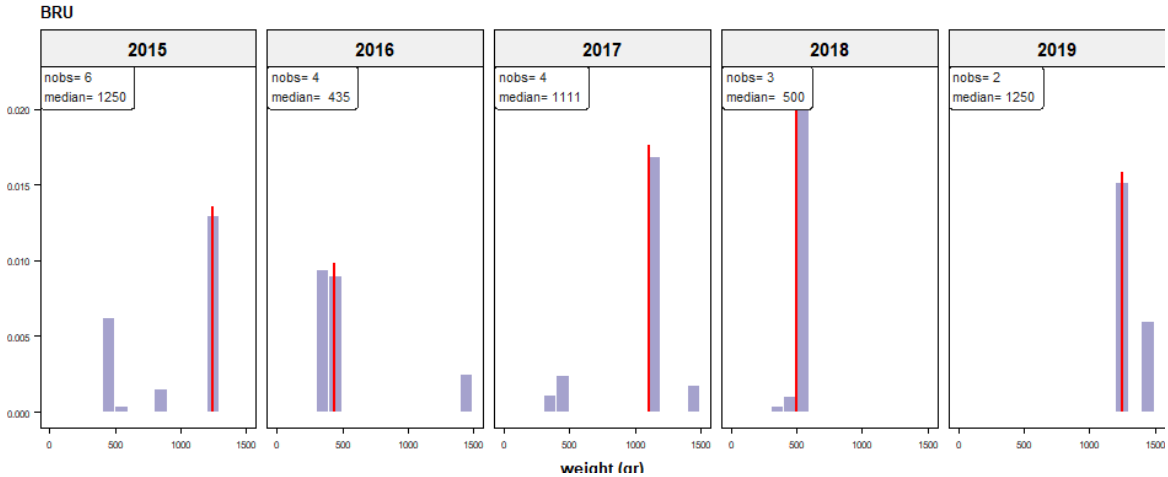


*Figure 3.4.6: Southern rays bream. Weight distributions (100 gram classes). Nobs refers to the number of batches where average weight was measured; median denotes the median length; * denotes incomplete year*

## Southern rays bream (BRU). Fishing depth distributions.

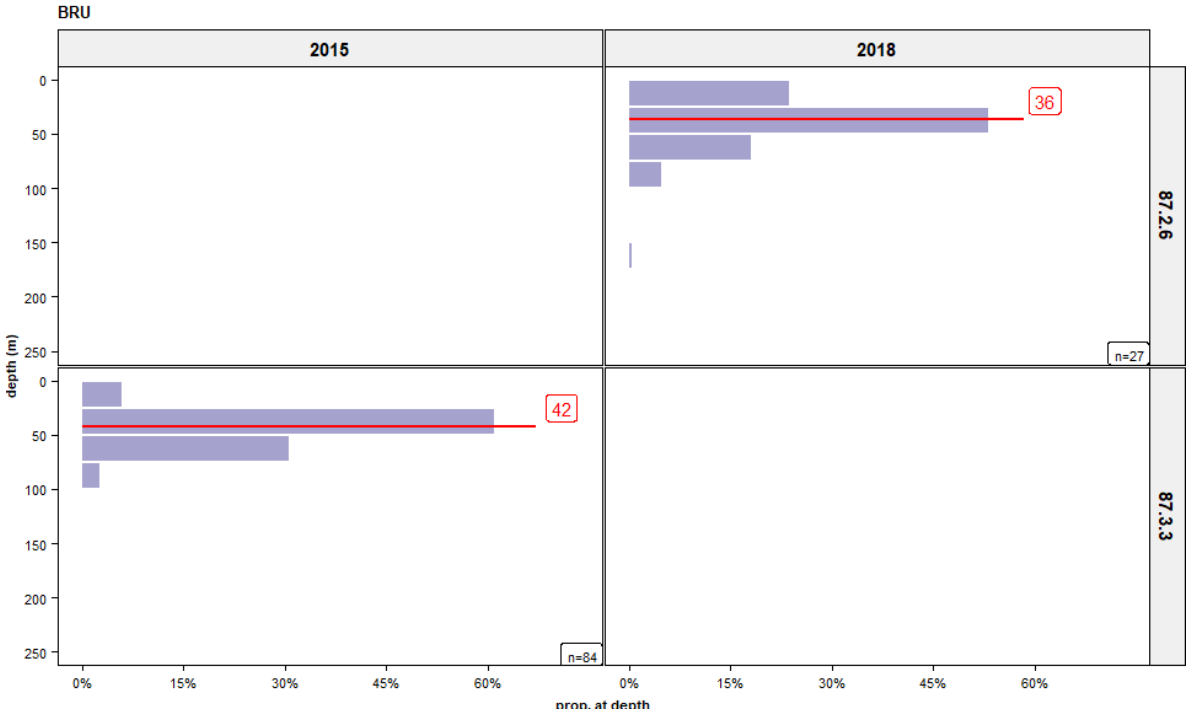


*Figure 3.4.7: Southern rays bream. Depth distributions by year and division. N is number of observations; median depth in red; * denotes incomplete year*

# 4 Discussion and conclusions

The PFA self-sampling programme in the SPRFMO area has been carried out for the fifth year in a row (2015-2019). The results are presented in terms of meta-information on the sampling (number of vessels, trips, days and length measurements per area and/or season), in terms of the spatio-temporal distribution of catches and the length compositions by area and/or season.

Although the information presented in this report does show a considerable overlap with the national report presented by EU - which is logical because the PFA fisheries constitute the bulk of the EU catches in the SPRFMO area in most years - it is considered that there is a benefit in presenting the information from the PFA self-sampling programme directly to the SPRFMO SC. The PFA self-sampling programme is intended to fully monitor the fishery during the entire period that the vessels are active in the SPRFMO area. This delivers spatially and temporally highly resolved information on length composition, catch rates and environmental characteristics. Because of the design of the programme, the information is available on a near to real-time scale, meaning that catch data of the current year can still be processed up to the start of the SC meeting. In addition, the programme has developed in such a way that all information is available in standardized formats and allows for easy mapping and geo-spatial analysis.

The length compositions of the jack mackerel catches in the southern area (division 87.3.3) show a bimodal distribution in 2015, after which the median length increases by year from 29.2 cm in 2016 to 42.5 cm in 2019. This is appears consistent with the recruitment of a strong cohort to the fishery in 2015 and followed thereafter. In the northern area (87.2.6) two recruitment pulses appear to from the catches, one in 2015 and the other, very strong, in 2019.

Catch rates of jack mackerel, defined as the average catch (tonnes) per fishing day was highest in 2015 (160 ton/day), substantially lower in 2016 until 2018 (77-110 ton/day) and close to the value of 2015 again in 2019 (142 ton/day).

The spatial distribution of the main fishing grounds has shown considerable changes over time. More extensive west-ward fishing explorations have been conducted in 2015, 2018 and 2019. The northern areas were mostly fishing in 2017 and 2019.

While jack mackerel is the prime target species for the fishery, some bycatches are taken of chub mackerel (MAS) and southern rays bream (BRU). Total catches of chub mackerel have been between 123 and 1,841 ton by year while median lengths have been between

25 and 36 cm. Total catches of southern rays bream (BRU) have been between 24 and 290 tonnes with median lengths between 29 and 43 cm.

[ Comparison between self-sampling and observer trips ]

The PFA self-sampling program is currently a routine operation on the vessels in freezer-trawler fleet and is yielding consistent information at high temporal and spatial resolution. The information is intended to improve the scientific understanding in relation to the species fishing by the PFA. However, it is also used to inform the skippers and the fleet managers on the development of the fishery and the composition of the catches. Thus, the self-sampling program is providing an effective bridge and communication channel between science and practice.

During 2020, no PFA vessels have been active in the SPRFMO convention area due to the Corona crisis.

A full report on the PFA self-sampling programme 2015-2019 is available at https://www.pelagicfish.eu/media/afbeeldingen/PFA%202020_02%20Selfsampling%20report%202015-2019.pdf

# 5 Acknowledgements

The skippers, officers and the quality managers of the following vessels have invested a lot of time and effort in making the self-sampling in the Pacific work over the past years: KW174/GDY151 Annelies Ilena, ROS171 Maartje Theadora and KL855 Margiris.

# 6 More information

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

## 6.2 Annex 1: haul information 2019

See: *pfa fishingactivitytemplate 2019.csv* in folder **D:/SPRFMO/2020/Assessment data for CJM/selfsampling**.

## 6.3 Annex 2: Jack mackerel length-frequencies 2019 (by quarter and area)

| year | quarter | area | species | length | catchnumber | prop |
|---|---|---|---|---|---|---|
| 2019 | 1 | 87 | cjm | 34 | 53408 | 0.023 |
| 2019 | 1 | 87 | cjm | 35 | 82444 | 0.036 |
| 2019 | 1 | 87 | cjm | 36 | 173735 | 0.075 |
| 2019 | 1 | 87 | cjm | 37 | 234419 | 0.101 |
| 2019 | 1 | 87 | cjm | 38 | 140959 | 0.061 |
| 2019 | 1 | 87 | cjm | 39 | 278813 | 0.12 |
| 2019 | 1 | 87 | cjm | 40 | 254726 | 0.11 |
| 2019 | 1 | 87 | cjm | 41 | 265586 | 0.115 |
| 2019 | 1 | 87 | cjm | 42 | 278375 | 0.12 |
| 2019 | 1 | 87 | cjm | 43 | 142651 | 0.062 |
| 2019 | 1 | 87 | cjm | 44 | 124627 | 0.054 |
| 2019 | 1 | 87 | cjm | 45 | 162288 | 0.07 |
| 2019 | 1 | 87 | cjm | 46 | 10884 | 0.005 |
| 2019 | 1 | 87 | cjm | 47 | 50210 | 0.022 |
| 2019 | 1 | 87 | cjm | 48 | 42400 | 0.018 |
| 2019 | 1 | 87 | cjm | 49 | 10884 | 0.005 |
| 2019 | 1 | 87 | cjm | 50 | 10311 | 0.004 |
| 2019 | 2 | 87 | cjm | 29 | 5279 | 0 |
| 2019 | 2 | 87 | cjm | 30 | 10337 | 0.001 |
| 2019 | 2 | 87 | cjm | 31 | 443 | 0 |
| 2019 | 2 | 87 | cjm | 32 | 1685 | 0 |
| 2019 | 2 | 87 | cjm | 33 | 55831 | 0.004 |
| 2019 | 2 | 87 | cjm | 34 | 68480 | 0.005 |
| 2019 | 2 | 87 | cjm | 35 | 303532 | 0.023 |
| 2019 | 2 | 87 | cjm | 36 | 307951 | 0.023 |
| 2019 | 2 | 87 | cjm | 37 | 625224 | 0.047 |
| 2019 | 2 | 87 | cjm | 38 | 469711 | 0.036 |
| 2019 | 2 | 87 | cjm | 39 | 792785 | 0.06 |
| 2019 | 2 | 87 | cjm | 40 | 873424 | 0.066 |
| 2019 | 2 | 87 | cjm | 41 | 1158540 | 0.088 |
| 2019 | 2 | 87 | cjm | 42 | 1378318 | 0.105 |
| 2019 | 2 | 87 | cjm | 43 | 1229361 | 0.093 |
| 2019 | 2 | 87 | cjm | 44 | 765847 | 0.058 |
| 2019 | 2 | 87 | cjm | 45 | 1607907 | 0.122 |
| 2019 | 2 | 87 | cjm | 46 | 537981 | 0.041 |
| 2019 | 2 | 87 | cjm | 47 | 998186 | 0.076 |
| 2019 | 2 | 87 | cjm | 48 | 859784 | 0.065 |
| 2019 | 2 | 87 | cjm | 49 | 533846 | 0.04 |
| 2019 | 2 | 87 | cjm | 50 | 249220 | 0.019 |
| 2019 | 2 | 87 | cjm | 51 | 208356 | 0.016 |
| 2019 | 2 | 87 | cjm | 52 | 74618 | 0.006 |
| 2019 | 2 | 87 | cjm | 53 | 7012 | 0.001 |
| 2019 | 2 | 87 | cjm | 54 | 52268 | 0.004 |
| 2019 | 2 | 87 | cjm | 55 | 5675 | 0 |
| 2019 | 2 | 87 | cjm | 56 | 7870 | 0.001 |
| 2019 | 3 | 87 | cjm | 18 | 32095 | 0.001 |
| 2019 | 3 | 87 | cjm | 19 | 99621 | 0.004 |
| 2019 | 3 | 87 | cjm | 20 | 1231056 | 0.048 |
| 2019 | 3 | 87 | cjm | 21 | 5052806 | 0.197 |
| 2019 | 3 | 87 | cjm | 22 | 12782371 | 0.498 |
| 2019 | 3 | 87 | cjm | 23 | 4530410 | 0.176 |
| 2019 | 3 | 87 | cjm | 24 | 524814 | 0.02 |
| 2019 | 3 | 87 | cjm | 25 | 22642 | 0.001 |
| 2019 | 3 | 87 | cjm | 26 | 22526 | 0.001 |
| 2019 | 3 | 87 | cjm | 27 | 15015 | 0.001 |
| 2019 | 3 | 87 | cjm | 28 | 38287 | 0.001 |
| 2019 | 3 | 87 | cjm | 29 | 59480 | 0.002 |
| 2019 | 3 | 87 | cjm | 30 | 205249 | 0.008 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 2019 | 3 | 87 | cjm | 31 | 199717 | 0.008 |
| 2019 | 3 | 87 | cjm | 32 | 144083 | 0.006 |
| 2019 | 3 | 87 | cjm | 33 | 77784 | 0.003 |
| 2019 | 3 | 87 | cjm | 34 | 79276 | 0.003 |
| 2019 | 3 | 87 | cjm | 35 | 64596 | 0.003 |
| 2019 | 3 | 87 | cjm | 36 | 45463 | 0.002 |
| 2019 | 3 | 87 | cjm | 37 | 53219 | 0.002 |
| 2019 | 3 | 87 | cjm | 38 | 47911 | 0.002 |
| 2019 | 3 | 87 | cjm | 39 | 48635 | 0.002 |
| 2019 | 3 | 87 | cjm | 40 | 55394 | 0.002 |
| 2019 | 3 | 87 | cjm | 41 | 24987 | 0.001 |
| 2019 | 3 | 87 | cjm | 42 | 41070 | 0.002 |
| 2019 | 3 | 87 | cjm | 43 | 41886 | 0.002 |
| 2019 | 3 | 87 | cjm | 44 | 37383 | 0.001 |
| 2019 | 3 | 87 | cjm | 45 | 38662 | 0.002 |
| 2019 | 3 | 87 | cjm | 46 | 17127 | 0.001 |
| 2019 | 3 | 87 | cjm | 47 | 22071 | 0.001 |
| 2019 | 3 | 87 | cjm | 48 | 13266 | 0.001 |
| 2019 | 3 | 87 | cjm | 49 | 4565 | 0 |
| 2019 | 3 | 87 | cjm | 50 | 2634 | 0 |
| 2019 | 3 | 87 | cjm | 52 | 2364 | 0 |

## 6.4 Annex 3: Jack mackerel ALK 2019 (by quarter and area)

| year | quarter | area | species | length | age | nage | prop |
|---|---|---|---|---|---|---|---|
| 2019 | q1 | 87 | cjm | 37 | 8 | 1 | 1 |
| 2019 | q1 | 87 | cjm | 41 | 7 | 1 | 0.5 |
| 2019 | q1 | 87 | cjm | 41 | 8 | 1 | 0.5 |
| 2019 | q1 | 87 | cjm | 42 | 7 | 2 | 0.222 |
| 2019 | q1 | 87 | cjm | 42 | 8 | 5 | 0.556 |
| 2019 | q1 | 87 | cjm | 42 | 9 | 2 | 0.222 |
| 2019 | q1 | 87 | cjm | 43 | 7 | 1 | 0.25 |
| 2019 | q1 | 87 | cjm | 43 | 8 | 1 | 0.25 |
| 2019 | q1 | 87 | cjm | 43 | 9 | 1 | 0.25 |
| 2019 | q1 | 87 | cjm | 43 | 10 | 1 | 0.25 |
| 2019 | q1 | 87 | cjm | 45 | 8 | 3 | 1 |
| 2019 | q1 | 87 | cjm | 47 | 9 | 1 | 1 |
| 2019 | q1 | 87 | cjm | 49 | 9 | 1 | 1 |
| 2019 | q1 | 87 | cjm | 50 | 10 | 1 | 1 |
| 2019 | q2 | 87 | cjm | 34 | 6 | 1 | 1 |
| 2019 | q2 | 87 | cjm | 35 | 7 | 3 | 0.6 |
| 2019 | q2 | 87 | cjm | 35 | 8 | 2 | 0.4 |
| 2019 | q2 | 87 | cjm | 36 | 6 | 2 | 0.25 |
| 2019 | q2 | 87 | cjm | 36 | 7 | 2 | 0.25 |
| 2019 | q2 | 87 | cjm | 36 | 8 | 4 | 0.5 |
| 2019 | q2 | 87 | cjm | 37 | 6 | 2 | 0.4 |
| 2019 | q2 | 87 | cjm | 37 | 7 | 1 | 0.2 |
| 2019 | q2 | 87 | cjm | 37 | 8 | 2 | 0.4 |
| 2019 | q2 | 87 | cjm | 38 | 6 | 1 | 0.091 |
| 2019 | q2 | 87 | cjm | 38 | 7 | 1 | 0.091 |
| 2019 | q2 | 87 | cjm | 38 | 8 | 8 | 0.727 |
| 2019 | q2 | 87 | cjm | 38 | 9 | 1 | 0.091 |
| 2019 | q2 | 87 | cjm | 39 | 6 | 2 | 0.333 |
| 2019 | q2 | 87 | cjm | 39 | 7 | 1 | 0.167 |
| 2019 | q2 | 87 | cjm | 39 | 8 | 3 | 0.5 |
| 2019 | q2 | 87 | cjm | 40 | 6 | 1 | 0.077 |
| 2019 | q2 | 87 | cjm | 40 | 7 | 4 | 0.308 |
| 2019 | q2 | 87 | cjm | 40 | 8 | 5 | 0.385 |
| 2019 | q2 | 87 | cjm | 40 | 9 | 2 | 0.154 |
| 2019 | q2 | 87 | cjm | 40 | 10 | 1 | 0.077 |
| 2019 | q2 | 87 | cjm | 41 | 7 | 3 | 0.2 |
| 2019 | q2 | 87 | cjm | 41 | 8 | 5 | 0.333 |
| 2019 | q2 | 87 | cjm | 41 | 9 | 6 | 0.4 |
| 2019 | q2 | 87 | cjm | 41 | 10 | 1 | 0.067 |
| 2019 | q2 | 87 | cjm | 42 | 7 | 4 | 0.286 |
| 2019 | q2 | 87 | cjm | 42 | 8 | 3 | 0.214 |
| 2019 | q2 | 87 | cjm | 42 | 9 | 4 | 0.286 |
| 2019 | q2 | 87 | cjm | 42 | 10 | 3 | 0.214 |
| 2019 | q2 | 87 | cjm | 43 | 6 | 1 | 0.048 |
| 2019 | q2 | 87 | cjm | 43 | 7 | 1 | 0.048 |
| 2019 | q2 | 87 | cjm | 43 | 8 | 10 | 0.476 |
| 2019 | q2 | 87 | cjm | 43 | 9 | 7 | 0.333 |
| 2019 | q2 | 87 | cjm | 43 | 10 | 2 | 0.095 |
| 2019 | q2 | 87 | cjm | 44 | 7 | 3 | 0.158 |
| 2019 | q2 | 87 | cjm | 44 | 8 | 5 | 0.263 |
| 2019 | q2 | 87 | cjm | 44 | 9 | 6 | 0.316 |
| 2019 | q2 | 87 | cjm | 44 | 10 | 4 | 0.211 |
| 2019 | q2 | 87 | cjm | 44 | 11 | 1 | 0.053 |
| 2019 | q2 | 87 | cjm | 45 | 8 | 4 | 0.19 |
| 2019 | q2 | 87 | cjm | 45 | 9 | 9 | 0.429 |
| 2019 | q2 | 87 | cjm | 45 | 10 | 7 | 0.333 |
| 2019 | q2 | 87 | cjm | 45 | 11 | 1 | 0.048 |
| 2019 | q2 | 87 | cjm | 46 | 8 | 5 | 0.238 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2019 | q2 | 87 | cjm | 46 | 9 | 9 | 0.429 |
| 2019 | q2 | 87 | cjm | 46 | 10 | 3 | 0.143 |
| 2019 | q2 | 87 | cjm | 46 | 11 | 3 | 0.143 |
| 2019 | q2 | 87 | cjm | 46 | 12 | 1 | 0.048 |
| 2019 | q2 | 87 | cjm | 47 | 7 | 1 | 0.056 |
| 2019 | q2 | 87 | cjm | 47 | 8 | 3 | 0.167 |
| 2019 | q2 | 87 | cjm | 47 | 9 | 7 | 0.389 |
| 2019 | q2 | 87 | cjm | 47 | 10 | 7 | 0.389 |
| 2019 | q2 | 87 | cjm | 48 | 8 | 1 | 0.125 |
| 2019 | q2 | 87 | cjm | 48 | 9 | 2 | 0.25 |
| 2019 | q2 | 87 | cjm | 48 | 10 | 4 | 0.5 |
| 2019 | q2 | 87 | cjm | 48 | 11 | 1 | 0.125 |
| 2019 | q2 | 87 | cjm | 49 | 8 | 1 | 0.2 |
| 2019 | q2 | 87 | cjm | 49 | 9 | 2 | 0.4 |
| 2019 | q2 | 87 | cjm | 49 | 10 | 1 | 0.2 |
| 2019 | q2 | 87 | cjm | 49 | 11 | 1 | 0.2 |
| 2019 | q2 | 87 | cjm | 50 | 10 | 1 | 0.333 |
| 2019 | q2 | 87 | cjm | 50 | 11 | 2 | 0.667 |
| 2019 | q2 | 87 | cjm | 51 | 9 | 1 | 0.25 |
| 2019 | q2 | 87 | cjm | 51 | 10 | 3 | 0.75 |
| 2019 | q2 | 87 | cjm | 52 | 12 | 1 | 1 |
| 2019 | q2 | 87 | cjm | 53 | 10 | 1 | 1 |