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Wójcik I.

(National Marine Fisheries Research Institute, Gdynia, Poland)

Pastors, M.A.

(Pelagic Freezer-trawler Association, Netherlands)

Hintzen, N.T.

(Wageningen Marine Research, IJmuiden, Netherlands)

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Summary

This report presents the European Union (EU) fishing activity in 2021 in the South Pacific Regional Fisheries Management Organization (SPRFMO) Convention area and the observer program implementation in 2021. The data on catches of Jack mackerel (*Trachurus murphyi*) by three EU trawlers in 2021 covers the period from April to September. Total catch in 2021 was just over 51 182 (39 528 CJM) tonnes. Two scientific observers were deployed on two EU fishing vessels in the period from end of March till mid-August 2021.

A short section on the PFA self-sampling program has been included in the report, demonstrating the main results of the self-sampling activities that cover all trips by EU vessels in the area.

A comparison of the EU observer data on jack mackerel with the PFA self-sampling data has been submitted to the SPRFMO SC (SC10-JM03). The document first assessed the quality and reliability of the self-sampling data in trips where both observer data and self-sampling data were available. Over the years 2015-2021, 16 trips were covered by both self-sampling and scientific observers. In total, the fishery took place during 16 quarters of which 12 had at least some observer coverage and 4 quarters had no observer coverage (but did have self-sampling coverage). The overall number of length measurements between the observer trips (61,875) and the self-sampling trips (66,952) up to and including 2021 is comparable. The self-sampling program samples fewer fish per trip (1632 compared to 3867 in observer trips) but samples more trips than in the observer program (41 vs. 16). The resulting length distributions by trip were found to be comparable and of sufficient quality.

A comparison of the overall length compositions by year derived from all self-sampled trips or derived from the raised observer trips, demonstrates that the self-sampling covers a wider part of the fishery (season, area) which explains some of the differences between the two data sources. Thus self-sampling provides a substantial improvement in the coverage of the fishery and thereby a more realistic length composition to be used in the assessment of jack mackerel. The combination of self-sampling and observer trips allows for quality control of both programs while being able to assure a wide coverage of the fishing season.

During the Jack mackerel Benchmark Working Group (SCW14) it was decided to develop a protocol for inclusion of self-sampling data for the EU fleet for those quarters where no observer trips were carried out. This document describes that protocol and the selection of quarters for which the self-sampling data will be used. For SC10, it is proposed to use 2021_Q2, 2022_Q2 and 2022_Q3 from the self-sampling data.

Exploratory fishing for toothfish was undertaken by the Spanish vessel Tronio in accordance with CMM 14e-2021 where nearly 75t of toothfish was caught in 27 longline sets. Fishing took place in the George V Fracture zone in the SPRFMO convention area. Due to human error 3 sets were set at less than 3nm distance from previous sets. Biological samples were taken as well as seabird observations executed via EM, oceanographic parameters collected and bycatch of seabirds, marine mammals and reptiles was zero. Only minor amounts of VME indicator taxa were recovered from 8 out of 27 lines. A detailed survey report is presented to the SC.

1 Introduction

The present report refers to the activity of the three pelagic trawlers: "Annelies Ilena" (EU, Poland), "Maartje Theadora" (EU, Germany) and "Margiris" (EU, Lithuania) in period from April 2021 to September 2021 fishing for *Trachurus murphyi* in the SPRFMO Convention area.

The catch and effort data for 2021 refer to six months of fishing activity (April - September). Biological data were collected for two periods (1-16 April and 03 July to 18 August), when the observers were on board of f/v "Maartje Theadora" and "Annelies Ilena". Four fishing trips of the EU vessels were observed out of total of 10 fishing trips in 2021.

Data presented in this report cover catch and effort data reported directly by the vessels and the data collected by scientific observers on board of the vessels.

2 Description of the EU Fisheries on Jack mackerel in the Pacific - overall summary

The first EU pelagic trawler arrived in the Pacific in 2005 and it conducted fishing operations for three months in the second half of the year. The following year, the same vessel returned and undertook fishing activities for the whole season from March to October. The number of EU vessels varied from 6 to 9 in the following four years (2007 – 2010). Since 2011, the number of EU vessels decreased as shown in Table 1.

Table 1. EU pelagic trawlers in the Pacific in 2005-2021.

Year	EU Member States and number of vessels
2005	Netherlands (1)
2006	Netherlands (1)
2007	Germany (3), Lithuania (1), Netherlands (2)
2008	Germany (3), Lithuania (1), Netherlands (2)
2009	Germany (3), Poland (3), Lithuania (1), Netherlands (2)
2010	Germany (3), Poland (3), Lithuania (1), Netherlands (1)
2011	Germany (1), Netherlands (1), Poland (1)
2012	no fishing
2013	Lithuania (1)
2014	Germany (1), Netherlands (1)
2015	Netherlands (1), Lithuania (1)
2016	Germany (1), Poland (1)
2017	Netherlands (1), Lithuania (1)
2018	Lithuania (1)
2019	Poland (1)
2020	No fishing
2021	Germany (1), Lithuania (1), Poland (1)

3 Catch, Effort and CPUE Summaries

3.1 Catch composition

The fishery by EU trawlers in the SPRFMO Convention area is targeting *Trachurus murphyi*. Other species make up only a small fraction of the total catch, as shown in Table 2.

Table 2. Total catch (tons) and species composition (%) of the EU fleet in 2009 – 2021. Based on landing data provided by the vessels owners.

Year	Total EU catch in tons	Species composition in percentages			
		<i>Trachurus murphyi</i>	<i>Scomber japonicus</i>	<i>Brama australis</i>	Other species
2009	91 336	95.3	4.3	0.4	0.0
2010	34 083	97.2	1.9	0.6	0.3
2011	1 810	98.3	0.2	1.3	0.2
2012	0	0	0	0	0
2013	10 390	97.2	2.2	0.6	0.0
2014	21 431	95.7	3.5	0.3	0.5
2015	27 955	98.1	1.1	0.6	0.2

2016	12 828	91.9	6.3	0.3	1.5
2017	29 652	93.3	6.2	0.3	0.3
2018	10 235	94.0	1.2	2.8	2.0
2019	12 114	97.3	1.0	1.1	0.6
2020	0	0	0	0	0
2021	51 182	77.2	14.4	0.02	8.4

The catch in 2021 was approximately five times higher than in the years 2018 and 2019 (there were no EU fishing activity in the SPRFMO area in 2020). This increase was due to the 150% higher fishing effort and high catch rates in May to August especially in July.

Similar to the previous years, the species composition of the catch in 2021 was dominated by *Trachurus murphyi* – the target species. This species made up 77,2% of the total catch. The EU catches in 2021 were significantly different from the picture in previous years in terms of the level of by-catch. The by-catch of other species in 2021 reached the highest share in the period 2009-2021 (22.8%) with *Scomber japonicus* reaching 14.4 % and *Beryx splendens* reaching 5.8%. The share of other species was low (2.6%).

The monthly distribution of the catch in the year 2021 is presented in Figure 1, with the highest catch taken in July.

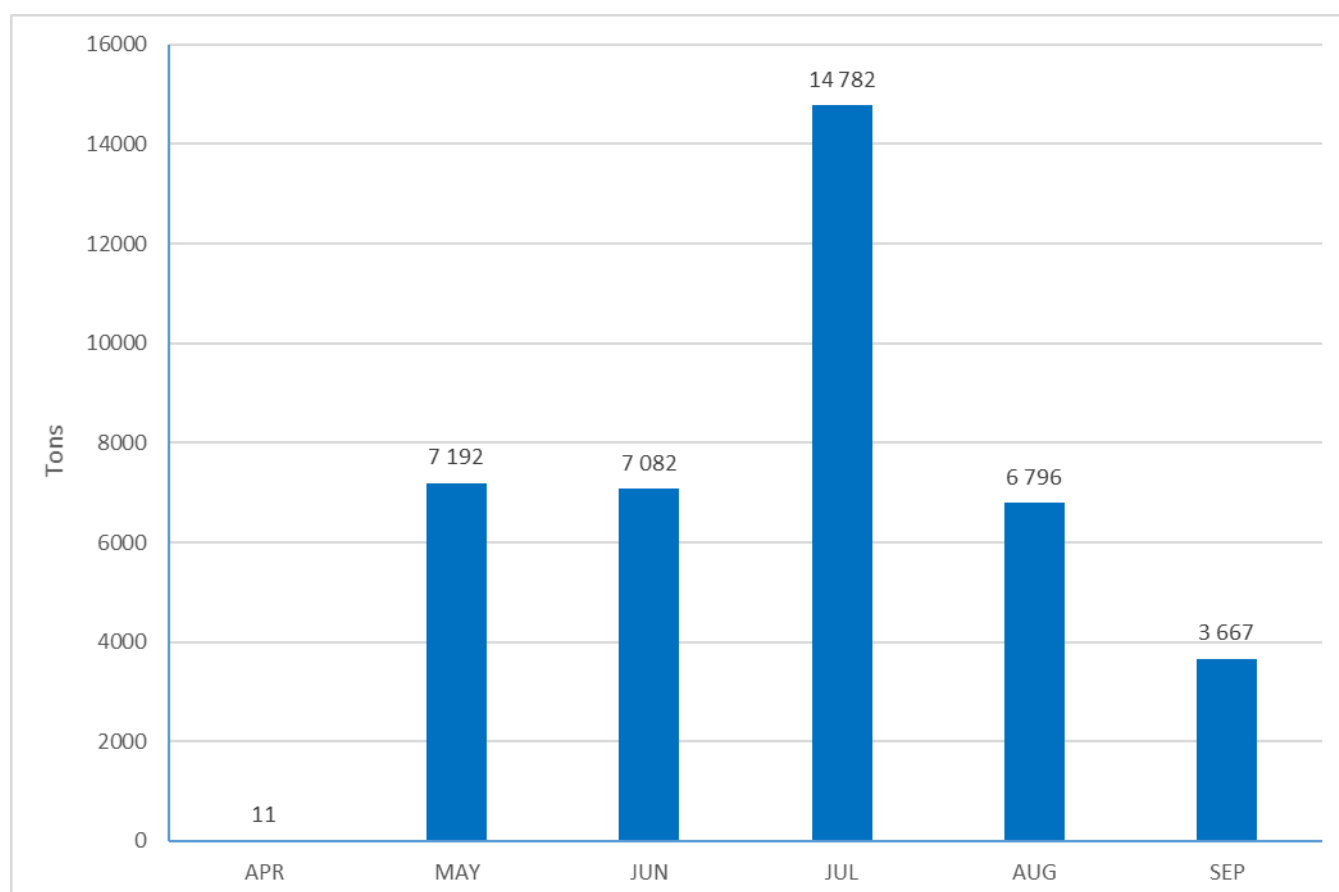


Figure 1. Monthly catch of *Trachurus murphyi* by EU vessels in 2021. Data based on catch reported by the vessels.

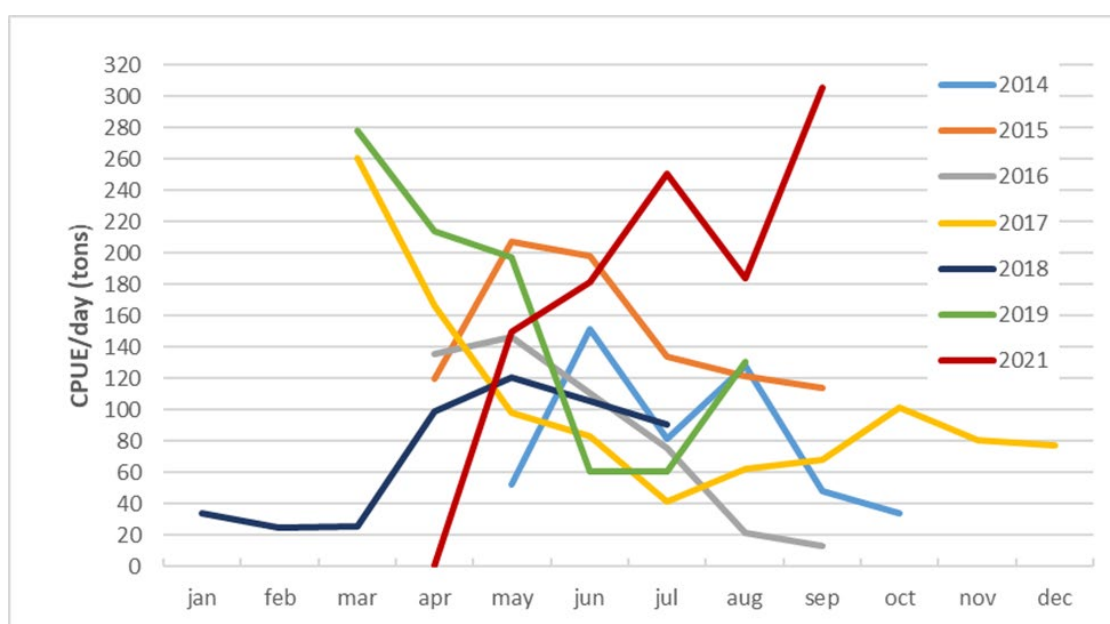
3.2 Effort and catch per unit of effort (CPUE)

The series of CPUE (in tons per day) for *Trachurus murphyi* presented in Table 3 is based on catch and effort of the EU fleet. The highest catch in 2021 was taken in July (over 14,8 th. tons) and was related to CPUE of 250 t/day (Figure 2). The highest CPUE in 2021 was recorded in September (305 t/day). The fishing took place mainly in the northern fishing area.

Data for 2021 indicate that the CPUE in that year was very low in April, then raised significantly from May to July and after a slight decrease in August reached a peak in September. The average CPUE for EU fleet in 2021 was 189 t/day.

Table 3. Catch and effort of the EU fleet. Fishing days based on data provided by the vessels.

Year	Number of fishing days	Catch <i>Trachurus murphyi</i> (in tons)	CPUE (tons per day)
2005	44	6 187	141
2006	109	33 766	310
2007	401	123 523	308
2008	423	108 174	256
2009	436	87 043	200
2010	274	33 129	121
2011	32	1 779	56
2012	0	0	0
2013	140	10 010	72
2014	231	20 510	89
2015	149	25 504	157
2016	115	11 470	100
2017	273	27 652	101
2018	132	9 620	73
2019	88	11 789	134
2020	0	0	0
2021	209	39 529	189

Figure 2. Monthly CPUE of *Trachurus murphyi* in the EU fleet for 2014 – 2021.

4 Fisheries Data Collection and Research Activities

Tow-by-tow data on catch and effort were collected directly by the vessel. The observers collected detailed biological information on catch. Some information on birds observed around the vessels were also collected.

Position, time and catch composition is provided for each haul. An Excel spreadsheet form was used to record the information at sea. The information recorded in this spreadsheet corresponds to the data guidelines as set in the SPRFMO CMM on Data Standards.

Biological characteristics such as individual length, weight, sex, maturity stage, stomach fullness and otoliths for age reading were collected for *Trachurus murphyi*. In addition, discards and incidental by-catches of species of concern were monitored.

Otoliths of *Trachurus murphyi* collected in 2021 have been read by a specialist of the National Marine Fisheries Research Institute (Poland) and the information on age/length relationship were used to convert length distributions into age compositions of the catch. This information could be used subsequently by the Scientific Committee in the stock assessments.

The fishing activities in 2021 were conducted close to the 200 Nm Chilean EEZ. The geographical distribution of the fishery in 2021 is presented in Figures 3-5.

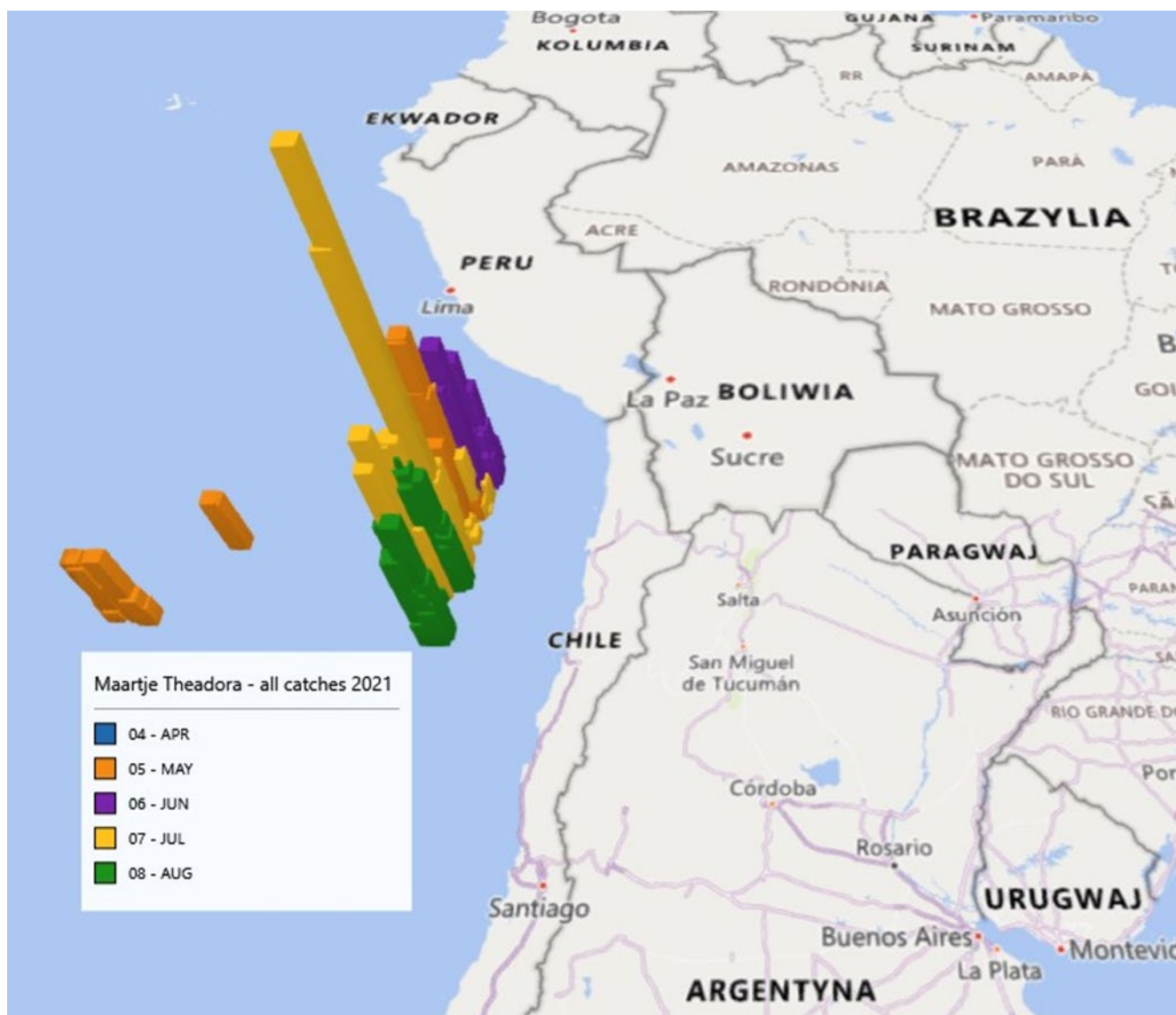


Figure 3. Catch distribution by month of the EU f/v Maartje Theadora in 2021 (April - August).

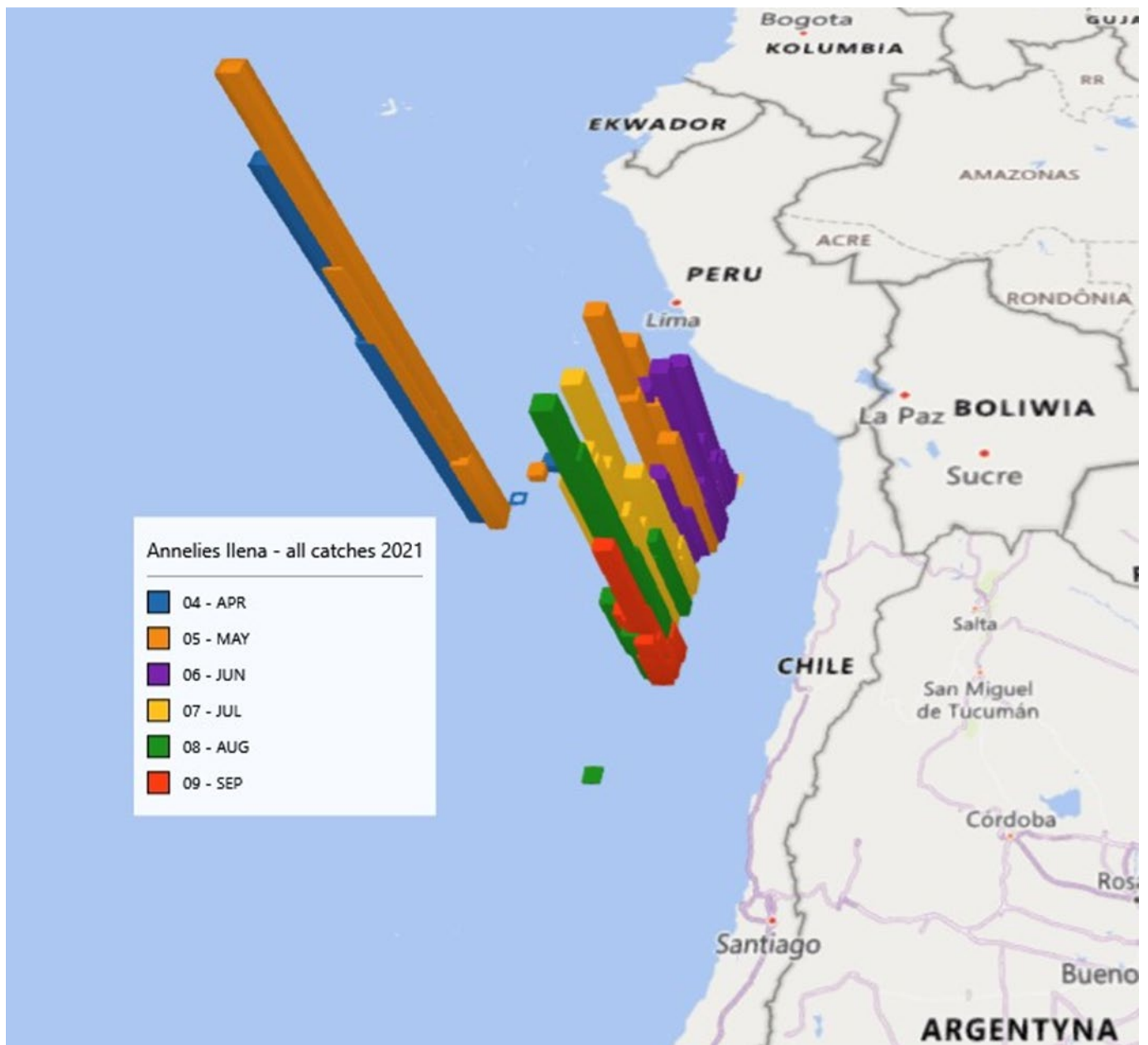


Figure 4. Catch distribution by month of the EU f/v Annelies Ilena in 2021 (April – September).



Figure 5. Catch distribution by month of the EU f/v Margiris in 2021 (July).

4.1 Observer data

Until 2016 the observer program was organized by the Dutch consultant agency Corten Marine Research (CMR). This agency had been responsible for observer missions on board EU (Dutch, German, Lithuanian and Polish) trawlers in the SPRFMO Convention area since 2007. The coordination of the observer program to collect data from the EU fishing fleet in the SPRFMO Convention area from 2017 was taken over by the National Marine Fisheries Research Institute, Poland (NMFRI).

As from 2015, the program is financed through the EU Data Collection Framework (DCF) and is based on the Multi-lateral agreement for biological data collection of pelagic fisheries in SPRFMO Convention area amongst the responsible institutions of the EU Member States concerned.

In the period 2014-2021, the total number of fishing days with observers on board was 430 (Table 3 and Table 4), which means that 36% of fishing days was observed.

In 2021 number of fishing days with observers on board was 36, which means that 17% of fishing days was observed (Table 4). All 8 hauls made by “Maartje Theadora” (EU, Germany) with observer on board were observed. Total number of hauls with observers on board “Annelies Ilena” (EU, Poland) was 66 including 49 observed (74% coverage). In 2021 EU fishing vessels made 10 fishing trips including 4 observed, which gives 40% observer coverage in terms of fishing trips. The observer programme started on 26th March and continued till 18th August.

Table 4. Observer missions in 2014 - 2021

Year	Period	Vessel	Observer	Days with observations
2014	20 April – 30 May	Maartje Theadora	Tomasz Raczynski	23
	31 May – 19 August	Maartje Theadora	Co de Klerk	80
2015	29 April - 13 July	Annelies Ilena	Co de Klerk	60
	13 June - 24 July	Margiris	Tomasz Raczynski	28
2016	15 May - 17 June	Janus	Tomasz Raczynski	14
	18 June – 17 August	Maartje Theadora	Tomasz Raczynski	23
2017	15 March – 17 May	Margiris	Tomasz Raczynski	34
	05 April – 17 May	Margiris	Łukasz Dziemian	
	09 August – 20 September	Margiris	Tomasz Raczynski	32
2018	22 March – 02 May	Margiris	Tomasz Raczynski	26
	02 May – 13 June	Margiris	Kamil Kisielewski	27
	02 May – 13 June	Margiris	Piotr Pankowski	
2019	25 March – 13 May	Annelies Ilena	Łukasz Giedrojc	25
	13 May – 24 June	Annelies Ilena	Kamil Kisielewski	22
2020	-	-	-	-
2021	26 March – 24 April	Maartje Theadora	Piotr Pankowski	8
	02 July – 18 August	Annelies Ilena	Michał Szymański	28

The observers collected data on species and length composition of the main species observed in the catch (*Trachurus murphyi*, *Scomber japonicus* and other). Biological characteristics such as individual length, weight, sex, maturity stage, stomach fullness as well as otoliths for age reading were collected for *Trachurus murphyi*. In addition, discards and incidental by-catch of species of concern were monitored.

As in the previous years, the observers also monitored interactions of sea-birds with the vessel and fishing gear as well as the presence of birds around the vessels (see Section 6).

4.1.1 Observer training

The observers employed by NMFRI in the program in 2021 had a wide experience in observer missions at sea: both observers are ichthyologists with a University degree who have worked as observers on board Polish vessels (pelagic and demersal trawlers, long-liners, gill-netters) in the Baltic Sea since 2015 (first observer) and 2017 (second observer) as well as on the EU vessels active in the SPRFMO area in previous years.

No special training activities were organized for the NMFRI observers in 2021 as no training needs were identified. The NMFRI observers are very experienced - biological and fisheries data collection is their daily routine under the EU DCF and other fisheries monitoring projects executed by the Institute and they are regularly briefed. Before each deployment of the observer on the vessel operating in the SPRFMO Convention area, observers are briefed on the updated Conservation and Management Measures applicable to the *Trachurus murphyi* fisheries in the SPRFMO area and as regards observer's obligations with respect to the methods and scope of the data to be collected.

At NMFRI an internal policy is in force regarding qualifications and safety requirements of the scientific observers. According to this policy, a two-stage observer training is applied:

- First - general maritime training confirming the ability to work at sea on board fishing vessels, resulting in obtaining relevant certificates in accordance with national rules and the requirements of the STCW Convention - Seaman's Book, Deck Hand Certificate, Basic Safety Training Certificate (incl. Personal Survival Techniques, Fire Prevention and Fire Fighting, Elementary First Aid, Personal Safety). This training lasts one week. Each observer working at sea must at all-time be in possession of all valid basic maritime certificates, including specific Marine Health Certificate.

- Second - practical training on observer's work, both in the lab and in the field and at sea (including species identification, otoliths/scales collection and reading, maturity determination, data recording etc.). Each newly employed observer is working under the supervision of Institute's Data Collection Coordinator and, when working in lab or at sea, is trained under direct supervision of an experienced observer. This training last minimum 3 weeks.

No additional special training is planned, unless new requirements regarding EU observer program are identified.

4.1.2 Program design and coverage

The observer program was designed to meet the requirements of the paragraph 22 of the SPRFMO CMM 01-2020¹, *i.e.* to ensure a minimum of 10% scientific observer coverage of trips for trawlers flying the EU flag and to ensure that such observers collect and report data as described in the SPRFMO CMM 02-2020² (Data Standards) respectively.

Table 4. Fishing activity coverage.

Year	Fishing		Observed		Coverage	
	Trips	Days	Trips	Days	Trips	Days
2017	10	273	3	66	30%	24%
2018	6	132	2	53	33%	40%
2019	3	88	2	47	66%	53%
2020	0	0	0	0	0	0
2021	10	209	4	36	40%	17%

In 2021 one observer was placed on board f/v "Maartje Theadora" (26 March – 24 April) for one fishing trip and one observer on board f/v "Annelies Ilena" for three fishing trips (2 July – 18 August).

¹ Conservation and Management Measure for *Trachurus murphyi*

² Conservation and Management Measure on Standards for the Collection, Reporting, Verification and Exchange of Data

5 Biological Sampling and Length/Age Composition

In total 5 241 individuals of *Trachurus murphyi* were measured (Table 6). Otoliths from 212 fish were collected for age reading.

Samples for length measurements were collected from 52 hauls out of total of 74 hauls in observed trips. For biological data collection (including sampling for age) for *Trachurus murphyi*, a revised sampling protocol provides that 4-5 individual fish for each length class represented in the catch should be collected per trip per fishing area with the aim to have even representation for all length classes recorded.

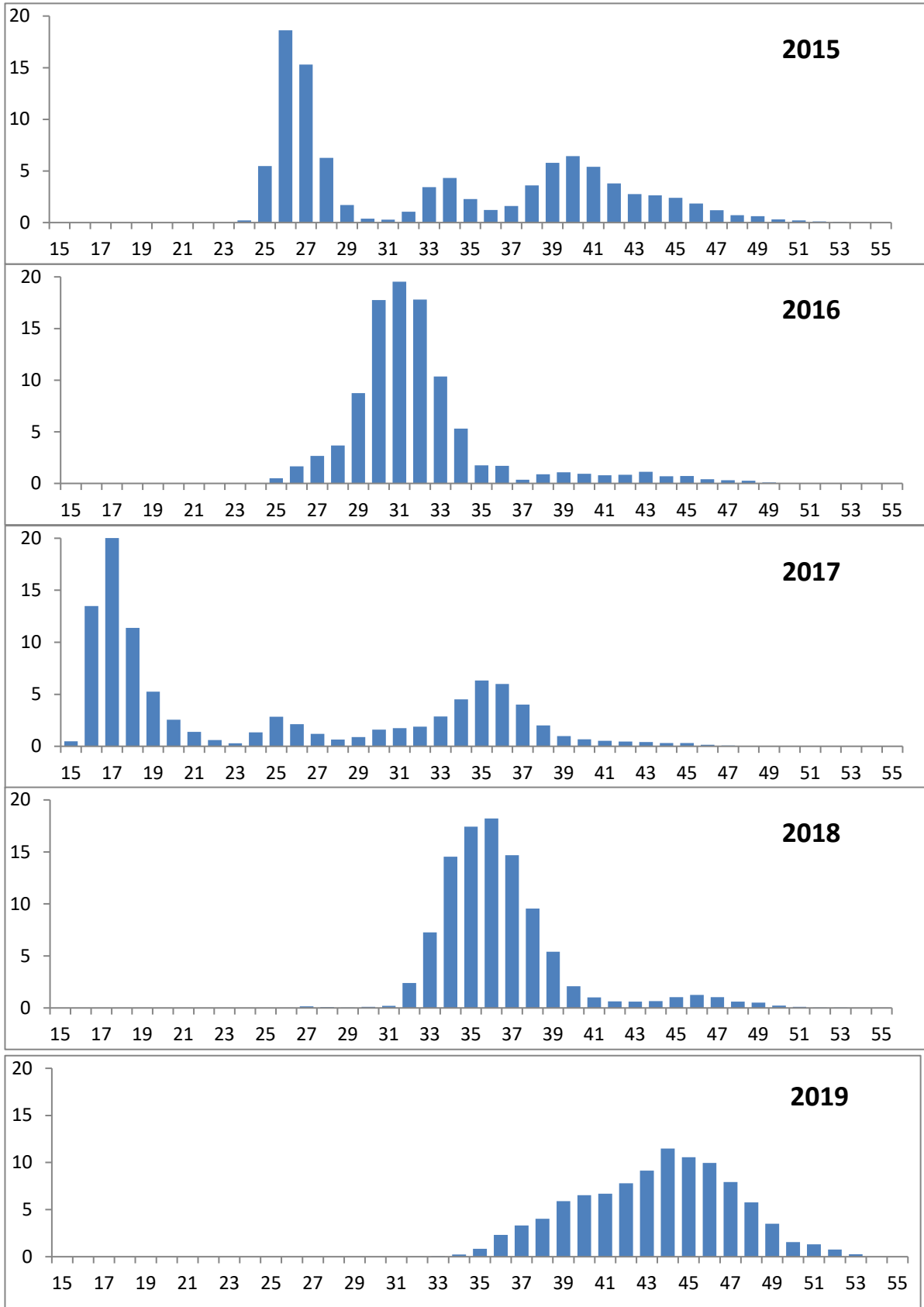
Table 5. Number of *Trachurus murphyi* measured by scientific observers during 2008-2021.

Year	Number of <i>Trachurus murphyi</i> measured
2008	28 250
2009	15 744
2010	10 540
2011	2 194
2013	2 727
2014	15 148
2015	17 563
2016	25341
2017	13843
2018	7465
2019	5152
2020	0
2021	5241

The length of *Trachurus murphyi* fished in 2021 was in the range of 13 to 52 cm, with significant difference in length distributions between spring season (range: 1-26 cm; with no clear peak) and summer seasons (range: 13-37 cm; peak: 27-29 cm).

The length composition of *Trachurus murphyi* sampled in 2015-2021 is presented in Figure 6.

Age structure for *Trachurus murphyi* sampled in 2021 is presented in Figure 7.



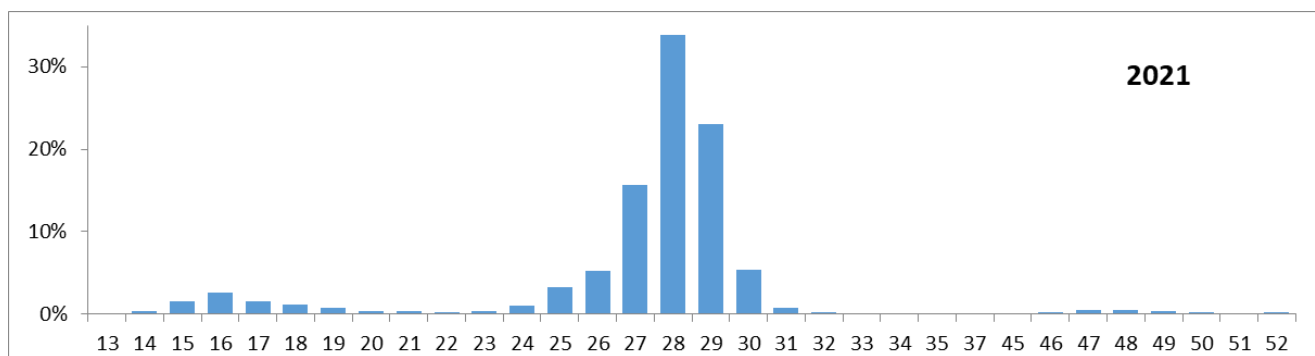


Figure 6. Percentage length composition of *Trachurus murphyi* in EU catch in 2015 – 2021.

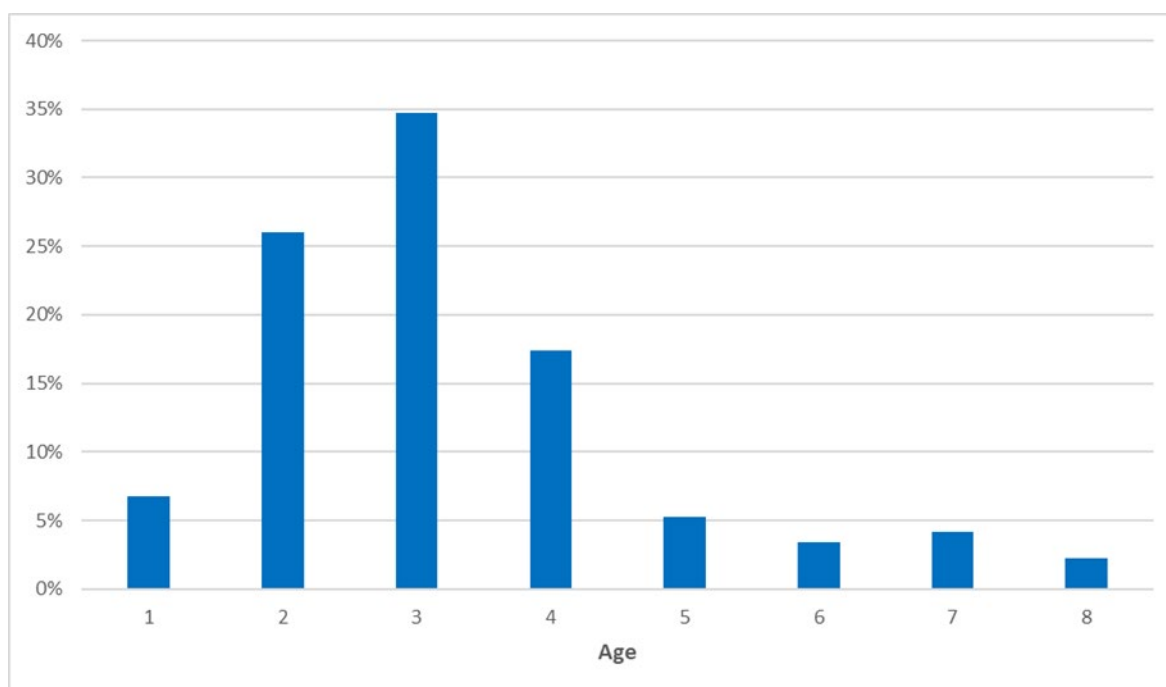


Figure 7. Age-frequency distribution of *Trachurus murphyi* in EU catch in 2021.

6 Ecosystem approach considerations

During the observed trips, interactions of birds with fishing gear were observed. No mortality of birds in the fishing gear was recorded during the fishing operations observed.

There were no discards recorded during the observed trip. All fish caught, including broken fish were processed.

More detailed results of the seabird observations in 2016 presented in a separate document to the SC meeting in 2016 (Raczynski, 2016) indicated that pelagic trawlers do not inflict a significant observed mortality on seabirds.

7 PFA self-sampling data

Since 2015 a full self-sampling program has been initiated on all EU fishing vessels belonging to members of the Pelagic Freezer-trawler association (PFA) and fishing in the SPRFMO Convention area, which is being reported directly to the SPRFMO Science Committee (SC10 JM04). The self-sampling program covers all trips and all hauls of the vessels that are active in the area and thereby delivers information on spatial and temporal evolution of the fishery, species and length compositions and ambient fishing conditions (temperature and depth).

The relative length compositions by year were estimated from raised catch numbers at length (raised by haul, (Figure 8). The relative length compositions show some deviations from the length compositions derived from the observer trips (figure 6) due to more trips, areas and seasons being covered in the self-sampling activities. A separate analysis comparing the observer trips and the self-sampling trips has been submitted to the SPRFMO SC10 (SC10-JM03).

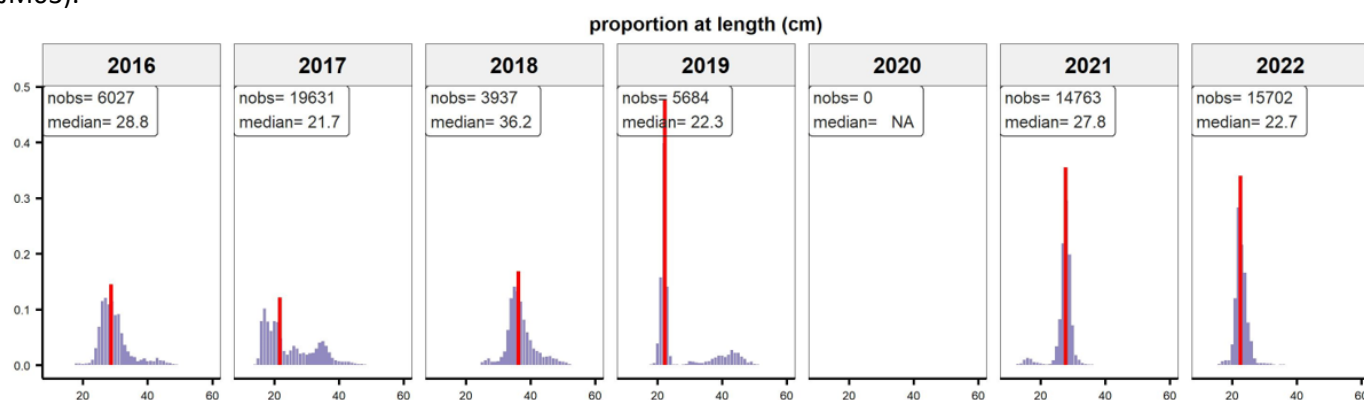


Figure 8. Relative length distributions of *Trachurus murphyi* in the PFA self-sampling program 2016-2019. Nobs indicates the number of length measurements while median indicates the median length (cm).

8 Combination of observer-data and self-sampling data

During the Jack mackerel Benchmark Working Group (SCW14) it was decided to develop a protocol for inclusion of self-sampling data for the EU fleet for those quarters where no observer trips were carried out. The comparison

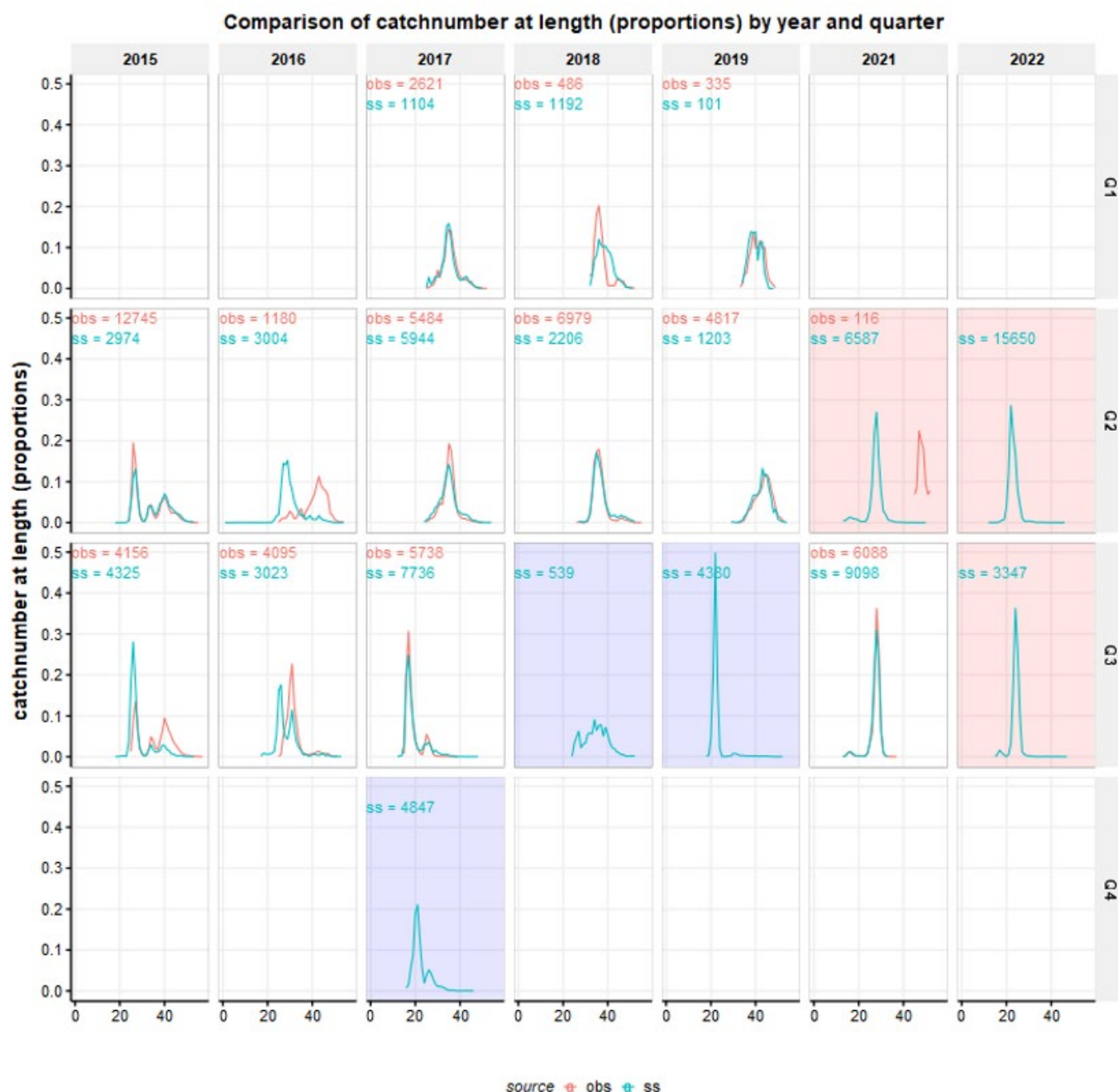


Figure 9. Comparison of relative length distributions of *Trachurus murphyi* in the EU observer program (“obs”) and the PFA self-sampling program (“ss”) by year and quarter. The facets with blue-ish backgrounds refer to the quarters in the past where no observer trips were carried out. The facets with reddish backgrounds refer to the quarters where the length distributions are proposed to be taken from the self-sampling program. These will be added to the EU data submission for 2021 (final data) and 2022 (preliminary data).

In general it is proposed to only use the self-sampling data from 2021 and onwards and only for quarter for which no observer data is present. It is therefore proposed that the quarters for which the self-sampling data will be used in the SC10 data submission, are:

- 2021_Q2: observer data only from trip where no catches were taken
- 2022_Q2 and 2022_Q3: no observer data available yet. .

9 General information on European Union (EU) observer activity in 2021

The fishing in 2021 was conducted by f/v “Maartje Theadora” (EU, Germany), f/v “Margiris” (EU, Lithuania) and f/v “Annelies Ilena” (EU, Poland), (type of vessel: TTF) close to the 200 Nm Chilean EEZ.

Basic information on observers' activity in two missions in 2021 (March – August) are provided in Table 7 and Table 8.

Table 7. Basic information the first observer mission in 2021.

Name of observer	Piotr Pankowski	
Vessel	f/v MAARTJE THEADORA ROS171	
Start mission on board of vessel	Date: 2021-MAR-26	Time: UTC – 20:00
End mission on board of vessel	Date: 2021-APR-24	Time: UTC – 15:00
No. of days on vessel	29	
No. of fishing days	8	
No. of days with observations	8	
Total no. of hauls	8	
No. of hauls observed	8	
Total catch (tons)	42	
Total catch of Jack mackerel (tons)	3	
No. of hauls sampled (length frequency)	5	
No. of Jack mackerel measured	116	
No. of Jack mackerel biological samples	26	
No. of otoliths	26	
No. of other species measured	462	

Table 8. Basic information the second observer mission in 2021.

Name of observer	Michał Szymański	
Vessel	f/v Annelies Ilena GDY- 151	
Start mission on board of vessel	Date: 2021-JUL-02	Time: UTC – 20:30
End mission on board of vessel	Date: 2021-AUG-18	Time: UTC – 20:30
No. of days on vessel	47	
No. of fishing days	32	
No. of days with observations	28	
Total no. of hauls	66	
No. of hauls observed	49	
Total catch (tons)	9457	
Total catch of jack mackerel (tons)	8118	
No. of hauls sampled (length frequency)	47	
No. of jack mackerel measured	5125	
No. of jack mackerel biological samples	186	
No. of otoliths	372	
No. of other species measured	1233	

10 Exploratory fishing for toothfish

An exploratory Patagonian toothfish (*Dissostichus* spp.) fishery took place in 2021 by the Spanish vessel Tronio. For details on the fishing trip can be found in a separate paper for SC10 - Exploratory Patagonian toothfish demersal longline fishery: George V Fracture Zone, SPRFMO Convention Area.