SC11 – JM01_rev2
Trachurus murphyi catch history data
(rev2, 13 September 2023)

Secretariat

Rev1 and 2 of this document includes changes to Annex 1, and specifically the estimated 2023 jack mackerel catches.

- The European Union's estimated 2023 catch was changed from 16,361 t to 55,144 t.
- Peru's estimated catch from Areas of National Jurisdiction was changed from 180,175 t to 210,000 t.
- Chile's estimated 2023 catches for Fleets 1 and have been changed to 80,466 t and 736,292 t from 76,264 t and 686,378 t, respectively.
- The Russian Federation's catch estimate for 2023 was changed from 20,548 t to 32,649 t. Their 2022 catch estimate was also updated from 27,043 t to 29,443 t.
- Resulting from the above changes, the estimated catch total for 2023 has also been affected, as well as the final estimates for 2022 in the 2023 catch estimates tab.

1. Summary Paragraph

The Secretariat has provided an updated historical catch data series to 2023 as **Annex 1 rev2.** There are no notable changes to the historical catch history. As final annual catch figures are not due until September 30th, in many cases the 2022 data remain estimates.

Initial 2023 catch estimates, by fleet, have been provided by calculating the ratio of annual catch figures to the cumulative total catch reported through July of the corresponding year (based on monthly catch reports), on an annual basis. These ratios were then averaged to produce a multiplier for the 2023 catch estimates through July, to estimate total annual catches for the 2023 calendar year. The time frame over which these ratios were calculated varied by fleet, due to changes in fishing behaviour through time (Figure 1). Specifically, for Fleets 1-2 the mean ratio from 2020-2022 was used, for Fleet 3, 2019-2022, and for Fleet 4, the mean ratio from 2018-2022 was used.

This approach for estimating the total annual catches for the present year (i.e., 2023) is the same as the approach used in 2022. For many of the fleets, fishing patterns throughout the year have changed considerably, and therefore a more tailored approach was predicted to yield more realistic estimates. It should be noted, that given these changes, estimating catches within the current year may be more accurate if considered on a flag/fleet basis. There was no need to estimate the high seas catches for Peru in 2023, as the Secretariat was notified in July that they had closed their high seas fishery as they were approaching the allocated quota. Therefore, all catch reports for 2023 has been submitted to the Secretariat prior to drafting this paper.

Members are asked to either accept these initial estimates or provide adjustments based upon their knowledge of the current fishing season. Some Members have provided updated estimates for 2023; these values are reflected in this revision.

Previous estimates for total current catches have always been within about 10% of the final figures. Last year's SC10-2022 estimates for total catch show a relative overestimation of 3.3915% overall, with the previous 5 years having initial annual catch estimates deviating from the final figures in the range of -1 to 10.1%, with a mean of 3.9%.

Boxplots showing historical monthly catches for each of the major fleets are presented and compared with the current monthly catches from the first half of 2023.

This paper also provides a short explanation of the *Trachurus murphyi* (CJM) catch history as used in the SPRFMO jack mackerel stock assessment.

Section 6 has been included to show information provided by IATTC on catches of epipelagic forage fishes (including *Trachurus* spp) for the entire IATTC area.

2. Annual Catch Totals

Historical catch data for the years prior to 2007 were originally provided to the (Interim) SPRFMO Secretariat under the 2007 interim data standards. Thus, the SPRFMO Secretariat holds catch data for all major fish species (including CJM) caught in the SPRFMO Area, in many cases back to the 1970s. The 2007 interim data standards were revised and the term "annual catch total" was introduced in the 2012 interim data standards. This term persists in the current Conservation and Management Measure 02-2022 (Data standards). Members and CNCPs provide annual catch totals raised to 'live' weight for all species caught during the previous calendar year.

A summary of this information was first published in 2008 (SPRFMO-V-SWG-10) and it is updated annually. In this paper, where possible, these annual catch totals are used to create the historical catch data series for the jack mackerel stock assessment up to and including 2022[1].

The 2022 annual catch totals are due on 30 September 2023 (after this paper was drafted); therefore, monthly catch reports were used to provide the 2022 catch estimates.

Initial 2023 (current year) catch estimates have been provided based on the monthly catch data reported through July and the estimation methodology described above. These catch estimates will be revised as necessary in advance of the meeting.

3. Monthly Catch Reports

CMM 01-2023 (*Trachurus murphyi*) requires Members and CNCPs to report monthly catches to the Secretariat within 20 days of the end of the calendar month, except that when total catches have reached 70% of the amount indicated in paragraph 9, Members and CNCPs agree to implement a 15-day reporting period, in which the calendar month is divided into two reporting periods, day 1 to 15 and day 16 to the end of the month.

In 2023, total catches reached 70% during the month of June, so the first 15-day reporting period was from the 1st until the 15th of July (Letter G83-2023). At the time of SC11, the Secretariat expects to have access to monthly/15-day catch reports through to the 31st of August (this current paper is based on catch information through to the end of July).

4. Fleets used in the assessment

The Joint Jack Mackerel model (JJM) used by the SC to assess jack mackerel stocks, recognises four distinct fleets. Fleet 1 is a coastal purse seine fishery in northern Chile. Fleet 2 is a purse seine fishery in central-south Chile that extends into the high seas. Fleet 3 combines the far-north coastal purse seine fisheries occurring in the EEZs and territorial waters of Ecuador and Peru. Finally, Fleet 4 corresponds to the offshore trawl fleet operating solely in the SPRFMO Area.

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[1] Noting the fleet descriptions in Section 4

In most cases, data submitted to the Secretariat can be assigned to the correct Fleet. However, while the Secretariat has an estimate for the total Chilean catch it can only be split into the High seas and EEZ portions, and not into northern and central-south portions, so the Secretariat is not able to split the Chile catch between Fleets 1 and 2 (northern and central-south Chile). In previous years, Chile has provided these estimates at the SC meeting.
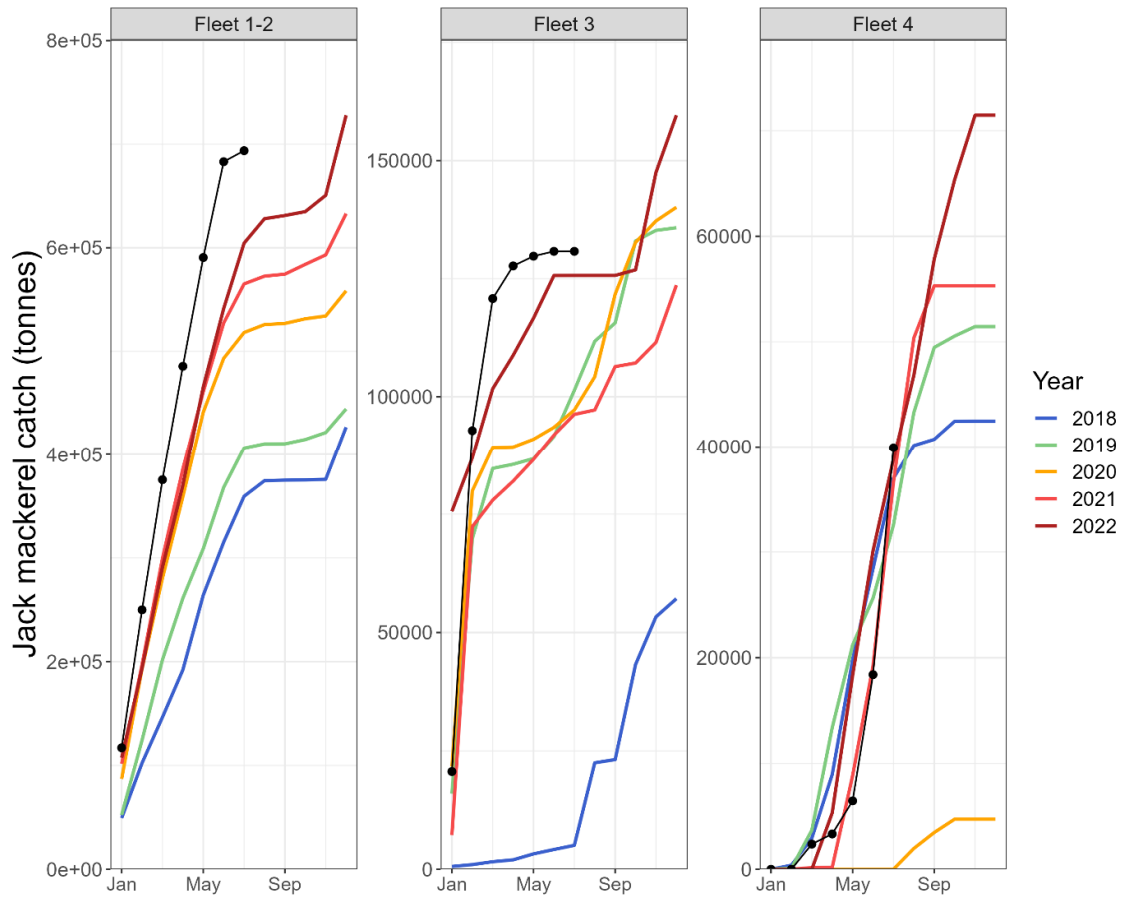
Figure 1. Cumulative catches of jack mackerel by year and fleet (noting Fleets 1 and 2 are combined). The black line with points represents the cumulative catches through July of 2023.
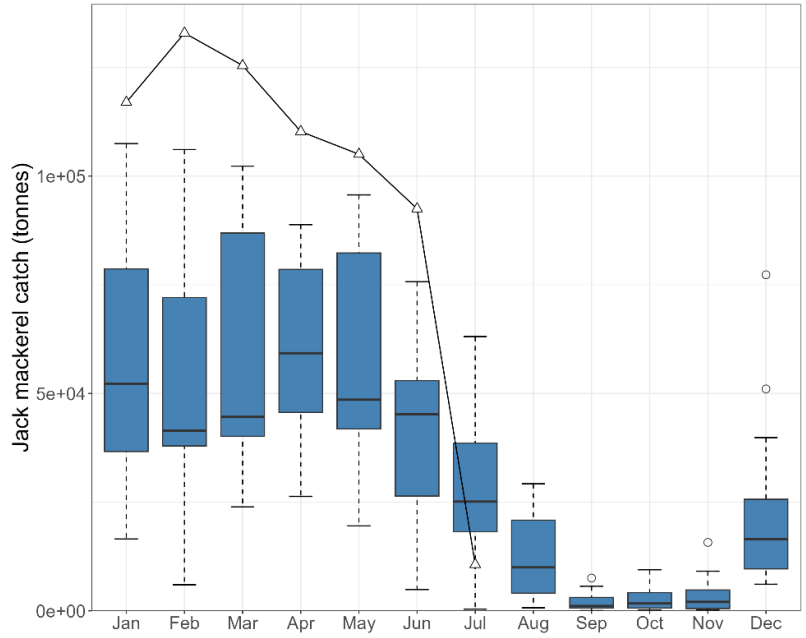
Figure 2: Box plots for 2010-2022 monthly catch reports of *Trachurus murphyi* from Fleets 1 & 2 combined (Northern and Central Chile). The line connecting triangles shows the 2023 catch from monthly catch reports.
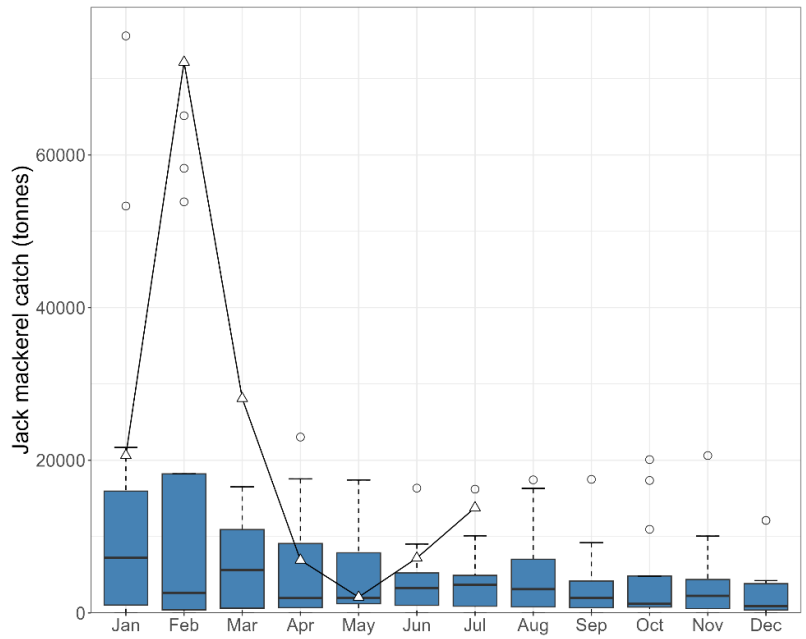

Figure 3: Box plots for 2011-2022[2] monthly catch reports of *Trachurus murphyi* from Fleet 3 (Far-North). The line connecting triangles shows the current 2023 catch from monthly catch reports.

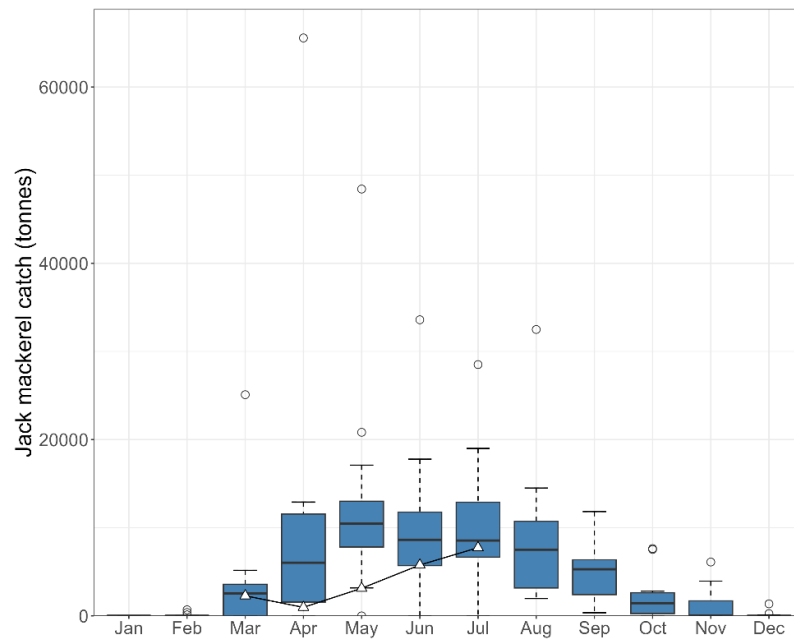[2] Fleet 3 Monthly catches for 2010 are not available.

Figure 4: Box plots for 2010-2022 monthly catch reports of *Trachurus murphyi* from Fleet 4 (Offshore Trawl). The line connecting triangles shows the current 2023 catch from monthly catch reports.

5. Excel attachment

An Excel workbook is annexed to this paper (**Annex 1 rev2**).

- Tab 1 (CJM Stock Assess input) contains the jack mackerel annual catch totals by Member and CNCP and is structured by Fleet. There are various notes that reflect previous decisions taken by the SC about this data series. Underlined figures have been updated since last assessment (refer to table A10.1 of SC10 Report Annex 10).

- Tab 2 (2023 catch estimates) contains the initial catch estimates for 2023 and shows the underlying calculations. Please note that there is a blank column for the 2023 Assessment input that will be populated based on Member input.

- Tab 3 (Accuracy of previous estimates) shows the relative change associated with each of the current year catch estimates used in previous SC meetings.

6. IATTC provided information

Due to interest expressed by a Member in 2021, to better understand jack mackerel catches in the tuna seine fishery managed by IATTC, Table 1 was provided in 2022 in SC10-JM01_rev1 and has been updated for 2023. These data were obtained from the IATTC's 14th Scientific Advisory Committee meeting on Ecosystem Considerations (SAC-14-11). In Table J-7 of their paper there is a summary of the epipelagic forage fishes, including *Trachurus* species, catch from the purse seine fishery from the IATTC area.

Table 1 shows estimated purse-seine catches by set type in metric tons (t) of small forage fishes by observers onboard size-class 6 vessels with a carrying capacity >363 t and minimum reported longline (LL) catches of small forage fishes (gross-annual removals in t) (1993-2022).

"Epipelagic forage fishes" include various mackerels and scad (*Decapterus* spp., *Trachurus* spp., *Selar crumenophthalmus*), Pacific saury (*Cololabis saira*), and tropical two-wing flyingish (*Exocoetus volitans*).

As shown in Table 1 and noted by IATTC, the catches, across all the species included in the group, are relatively small (averaging 7.5 t per year since 2010 with a maximum of ~25 t in a single year). Small pelagic species are not targeted by these fisheries and are generally not associated with target species. These small pelagic fishes are likely to have very low gear selectivity due to their size relative to the mesh size of a tuna purse seine net. There is 100% observer coverage of the purse-seine fleet, so any substantial catches of small pelagics would be recorded, or at least noted if the observer was unable to make a thorough catch estimate for a set.

Because these figures include species other than *Trachurus murphyi* and include an area to the north not included in the SPRFMO area, these should be considered upper limits for the purpose of the jack mackerel stock assessment.

Table 1: Extracted estimated catches of "Epipelagic forage fishes" from Table J-7 of IATTC paper SAC-14-11. A - indicates no catch whereas an * indicates that data were not available.

	Epipelagic forage fishes			
Method	Purse Seine			Longline
Set type	Floating object (OBJ)	Unassociated tuna schools (NOA)	Dolphins (DEL)	LL
1993	-	-	-	-
1994	-	-	-	-
1995	-	-	-	-
1996	-	-	-	-
1997	-	-	-	-
1998	<1	-	-	-
1999	<1	-	-	-
2000	-	-	-	-
2001	-	-	-	-
2002	-	-	-	-
2003	<1	-	-	-
2004	<1	<1	-	-
2005	6	<1	<1	-
2006	7	1	-	-
2007	2	5	-	-
2008	3	<1	-	-
2009	<1	<1	-	-
2010	4	<1	<1	-
2011	2	<1	<1	-
2012	13	12	-	-
2013	4	-	<1	-
2014	3	<1	<1	-
2015	6	-	-	-
2016	21	-	<1	<1
2017	3	-	-	-
2018	5	<1	-	-
2019	5	8	<1	-
2020	4	<1	-	-
2021	15	-	-	-
2022	15	-	<1	*
Total (t)	118	28	<1	<1