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Estimates of unreported longline effort by CCSBT non-cooperating non-member states between 2007 and 2020

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EXECUTIVE SUMMARY

Edwards, C.T.T.; Hoyle, S.D. (2022). Estimates of unreported longline effort by CCSBT non-cooperating non-member states between 2007 and 2020.

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Longline fishing effort reported to the WCPFC, IOTC and ICCAT, by non-cooperating non-members of the CCSBT, is presented. Changes in the non-member effort provide an indication of likely changes in the magnitude of unaccounted SBT mortality. These data are necessary for a review of Exceptional Circumstances for the current Management Procedure.

Overall, total non-member effort has increased from around 26 million hooks per annum in 2007 to around 65 million hooks per annum in 2017. Most of this effort is reported to the WCPFC and concentrated in statistical area 12 to the north of New Zealand. Alongside a gradual increase in effort reported to the WCPFC, in 2017 there was an increase in non-member effort reported to the IOTC in statistical area 14, to the east of South Africa. Since 2017 the total effort has been reasonably consistent.

1. INTRODUCTION

The level of unaccounted mortality (UAM) by non-members of the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) is a key input to assessments of stock status for southern bluefin tuna (SBT). However there is no reliable information available on SBT catch by non-cooperating non-members (NCNMs) of the CCSBT. Analysis of the effort data reported to other regional fisheries management organisations (RFMOs), particularly the IOTC (Indian Ocean Tuna Commission) and WCPFC (Western and Central Pacific Fisheries Commission), shows a large degree of overlap with SBT fishing grounds for these tuna fisheries (e.g. Larcombe 2014, Francis & Hoyle 2019). However, SBT catch is generally not reported to the IOTC, WCPFC or the ICCAT (International Committee for the Conservation of Atlantic Tunas), even though these tuna fleets likely take quantities of SBT bycatch in their albacore, bigeye and yellowfin target fisheries. Some catches may also be targeted, and in general, the extent to which non-member SBT catches are due to targeted or bycatch fishing is unknown.

Following work by the Extended Scientific Committee in 2014 (ESC19), two separate papers were presented to ESC20 that provided estimates of non-member catches of SBT from fleets reporting to the IOTC and WCPFC (Chambers & Hoyle 2015, Hoyle & Chambers 2015). Edwards et al. (2016) presented updates (including ICCAT effort data) to ESC21 (CCSBT 2016), and Edwards et al. (2019) included revisions to the data that increased the estimated non-member catches for the Indian and Atlantic Oceans (ESC24; CCSBT 2019) (addressed in further work by Edwards et al. 2020).

In 2021, the ESC noted the following in relation to estimates of the UAM (CCSBT 2021):

141. The ESC noted that a “best estimate” of non-Member UAM is required for the stock assessment, while the review of Exceptional Circumstances for the MP only requires an evaluation of whether the non-Member UAM is likely to be larger than that evaluated in the robustness tests.

142. The ESC further noted that an evaluation of changes in the level of non-Member effort since the last estimate would provide a good indication of the relative magnitude of changes in non-Member UAM, and that the level of non-Member UAM would need to be substantially larger than the previous estimate to trigger Exceptional Circumstances.

143. The ESC agreed that the priority work for UAM in 2022 should include an analysis of changes in non-Member effort to support the evaluation of Exceptional Circumstances in 2022.

On the basis of these recommendations, the current work was undertaken with the objective of providing updates to the non-member effort timeseries from the IOTC, WCPFC and ICCAT, up to and including 2020. This will provide input for the 12th CCSBT Operating Model and Management Procedure Technical Meeting.

2. DATA

Longline effort data from 2007 onwards were collected from relevant other tuna RFMOs (other tRFMOs) as detailed by Edwards et al. (2019):

- **IOTC:** Publicly available longline effort data were obtained directly from www.iotc.org.
- **ICCAT:** Task II longline effort data were obtained directly from the databases available at www.iccat.int.
- **WCPFC:** Effort data from the WCPFC is submitted to the CCSBT, and was obtained from the secretariat.

Effort data from the Inter-American Tropical Tuna Commission (IATTC) was not included, due to likely low catches of SBT in that region.

Effort is typically reported by $5^\circ \times 5^\circ$ grid, by month, year and flag. For the IOTC and WCPFC, all the effort data are represented in the database extracts. For ICCAT however, the effort data are incomplete, since only strata containing effort from three or more vessels is released publicly. The amount of effort missing is unknown. In preparing the data, a small amount of effort is reported in days fished rather than h ooks. These were converted to hooks using an assumption of three thousand hooks per day. The imputed data amount to $< 1\%$ of the effort for each other tRFMO.

All effort data were assigned to the centre point of each grid, to allow data from the different ttRFMOs to be aligned. Based on the previous work, only effort from below the parallel at 20°S was retained. We note that some SBT spawn above 20°S near Indonesia, and this assumption may need to be revised in future work. Catch data from the CCSBT was further used to identify grids likely to yield a positive SBT catch from non-member fleets: specifically, only effort within grids with a positive SBT catch in the CCSBT data were retained. To ensure consistency when comparing the data extracts, the same grids used by Edwards et al. (2019) were used in the current work. When calculating the final effort time series, seasonal changes were also considered, and only non-member effort matched to a positive SBT catch by grid and quarter were included in the results.

The spatial limits of each other tRFMO, and the statistical area definitions for CCSBT are shown in Figure 1. No spatial overlap was observed in the effort data retained from each other tRFMO.

2.1. Data validation

For purposes of validating the data extracts, we plotted the raw data from Edwards et al. (2019), which covered the period from 2007 to 2018, alongside the new extracts (2007 to 2020). We note that for the IOTC and ICCAT data, only member effort was available for the 2018 year at the time of the previous data extract (Figure 2 of Edwards et al. 2019). Figure 2 shows that the two WCPFC extracts are similar, but not identical. Also shown are the spatial distributions of the data, which indicate no substantial change. Similar results were obtained for the IOTC (Figure 3). In this case, the 2017 data appears to have been incomplete in the 2019 extract. For ICCAT, the differences are more substantial. As can be seen in Figure 4, there have been large reductions in the reported non-member effort in 2010, 2012 and 2013. Closer inspection indicated apparent transcription errors in the 2019 extract that have since been corrected in the database. This correction to the data has reduced the apparent non-member effort, particularly in CCSBT area 11, in the Western Atlantic.

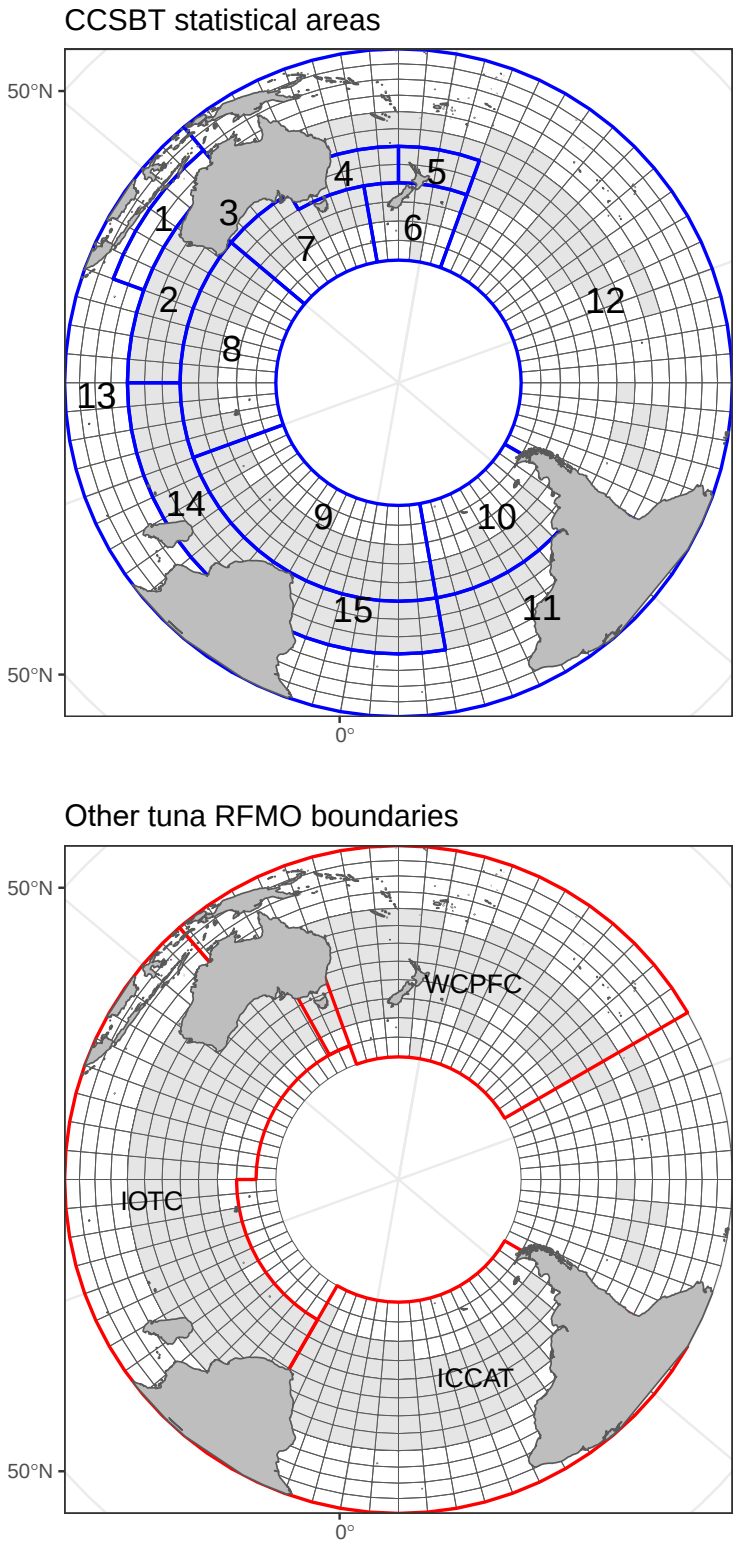

Figure 1: Spatial boundaries for each other tRFMO (excluding IATTC) and for the CCSBT statistical areas. The mapped area is cropped at 0 and 60°S, which are the CCSBT latitudinal limits. Grids are shown and shaded in grey if they contain positive SBT catch reported to the CCSBT since 1990.

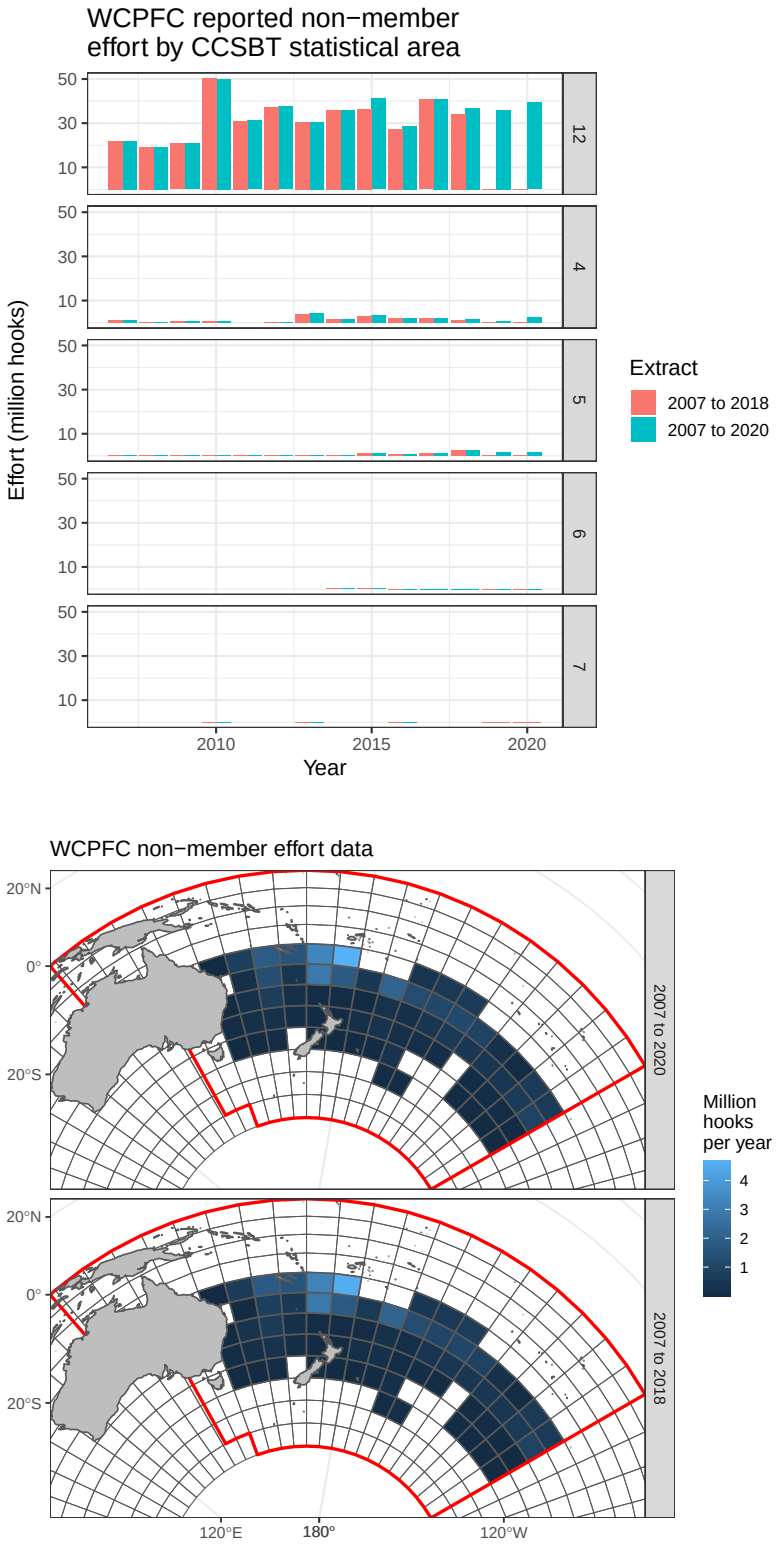

Figure 2: Validation of WCPFC longline, non-member effort data extracts. Total effort (million hooks) is shown per year and spatial grid for the WCPFC area.

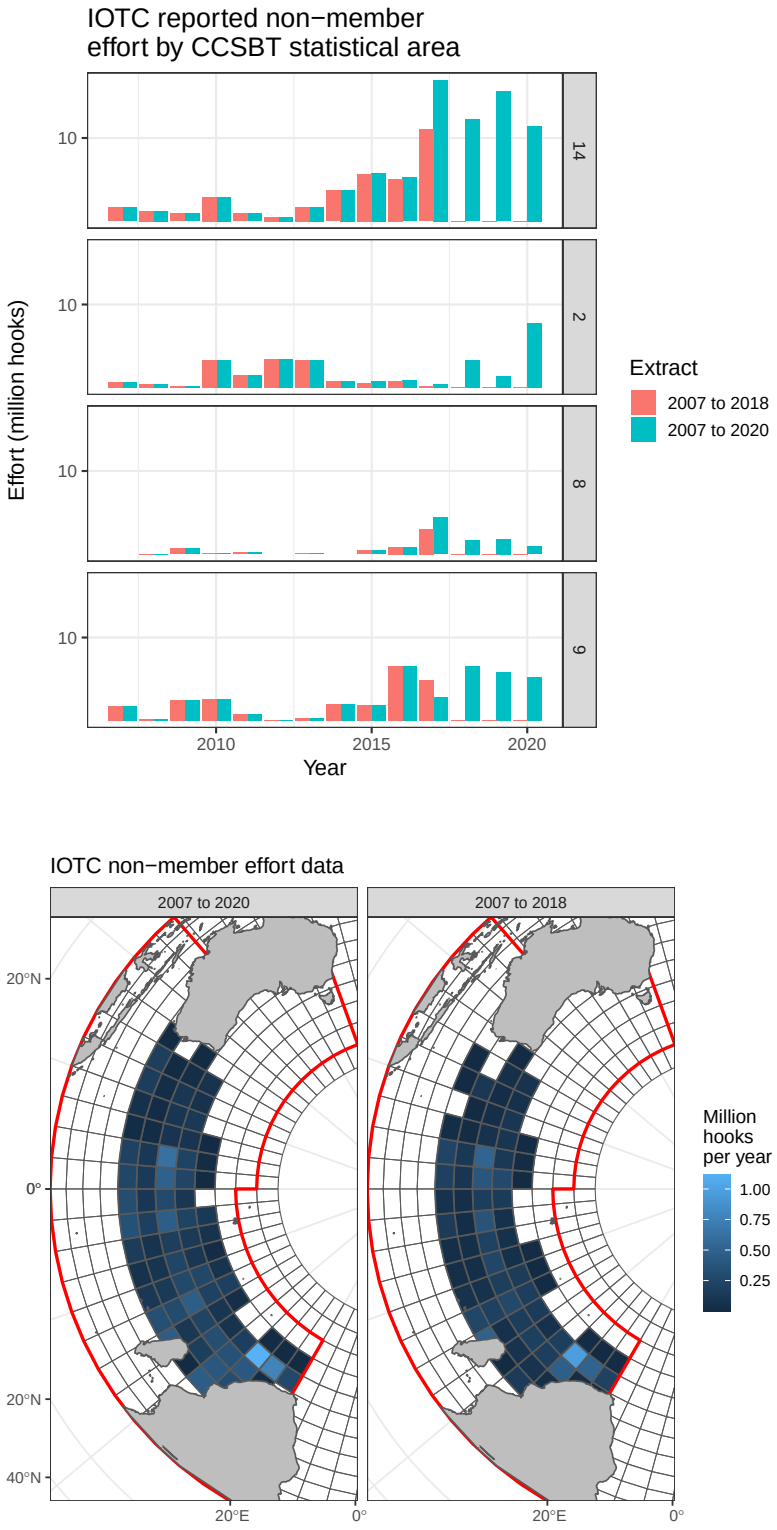

Figure 3: Validation of IOTC longline, non-member effort data extracts. Total effort (million hooks) is shown per year and spatial grid for the IOTC area.

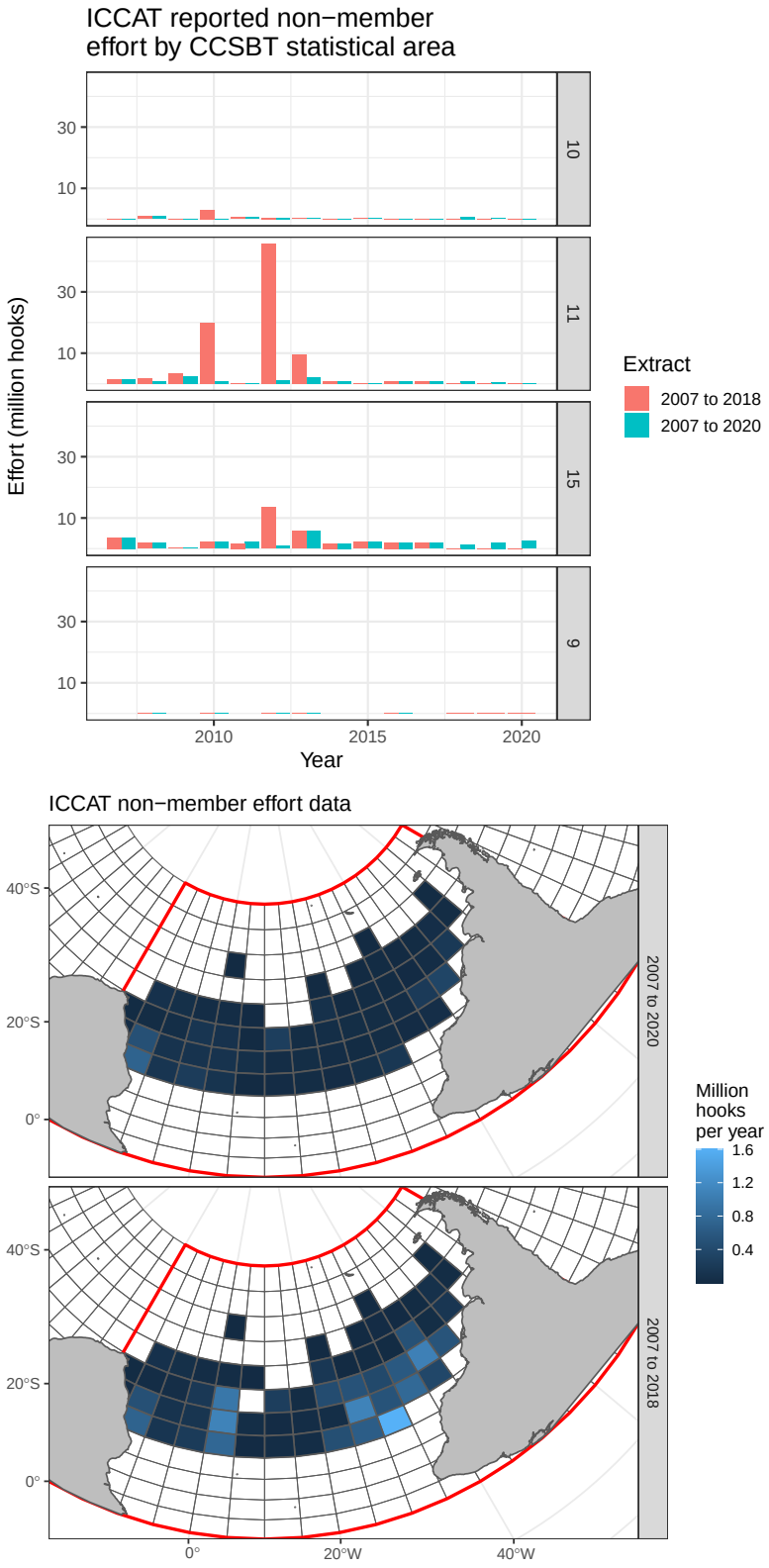

Figure 4: Validation of ICCAT longline, non-member effort data extracts. Total effort (million hooks) is shown per year and spatial grid for the ICCAT area.

3. RESULTS AND DISCUSSION

Total non-member effort per year is listed in Table 1 and Table 2, by other tRFMO and CCSBT statistical area respectively. The total non-member effort per year is illustrated in Figure 5.

Effort is consistently highest for the WCPFC, with a notably higher effort reported in 2010. Most of the WCPFC effort is reported in statistial area 12, to the north of New Zealand (Figure 6). For both the WCPFC and IOTC, there has been a gradual increase in total NCNM effort over time, whereas non-member effort reported to ICCAT has been consistently low, apart from a small peak in 2013.

Overall, total NCNM effort has increased from around 26 million hooks per annum in 2007 to around 65 million hooks per annum in 2017. In 2017 there was a large increase in non-member effort reported to the IOTC in statistical area 14, to the east of South Africa. Since 2017 the total effort has been reasonably consistent.

Table 1: Non-member effort per year per other tRFMO (million hooks), within grids by quarter with positive SBT catch reported to CCSBT.

Year	ICCAT	IOTC	WCPFC	Total
2007	4.97	4.00	17.46	26.42
2008	3.56	1.83	14.30	19.69
2009	2.76	4.15	16.83	23.74
2010	2.50	8.78	39.84	51.12
2011	2.40	3.43	21.06	26.89
2012	2.20	4.05	26.73	32.98
2013	8.04	5.42	26.82	40.27
2014	2.47	6.54	29.74	38.75
2015	2.55	9.28	35.71	47.54
2016	2.74	13.51	22.32	38.57
2017	2.50	24.70	31.79	58.98
2018	2.61	23.72	30.40	56.74
2019	2.55	24.59	28.30	55.44
2020	2.65	25.28	36.71	64.64

Table 2: Non-member effort per year per statistical area (million hooks), within grids by quarter with positive SBT catch reported to CCSBT.

Year	2	4	5	6	7	8	9	10	11	12	14	15	Total
2007	0.68	1.03	0.08	–	–	–	1.68	0.04	1.24	16.35	1.63	3.68	26.42
2008	0.48	0.23	0.03	–	–	0.01	0.17	0.78	0.57	14.03	1.20	2.18	19.69
2009	0.13	0.54	0.08	–	–	0.66	2.44	0.02	2.42	16.22	0.93	0.32	23.74
2010	3.25	0.63	0.05	–	0.00	0.09	2.73	0.00	0.17	39.16	2.90	2.13	51.12
2011	1.56	–	0.02	–	–	0.18	0.75	0.45	0.18	21.04	0.94	1.77	26.89
2012	3.48	0.35	0.25	–	–	–	0.04	0.36	0.98	26.13	0.53	0.86	32.98
2013	3.27	4.11	0.09	–	0.08	0.08	0.50	0.22	1.91	22.53	1.72	5.75	40.27
2014	0.80	1.51	0.09	0.08	–	–	1.98	0.03	0.80	28.05	3.75	1.64	38.75
2015	0.94	3.22	0.92	0.06	–	0.59	1.83	0.16	0.19	31.51	5.92	2.20	47.54
2016	0.85	2.07	0.71	0.05	0.05	0.86	6.53	0.04	0.63	19.44	5.27	2.07	38.57
2017	0.47	1.88	1.01	0.05	–	4.39	2.83	0.05	0.59	28.86	16.99	1.86	58.98
2018	3.26	1.46	2.58	0.12	–	1.69	6.56	0.65	0.64	26.25	12.21	1.32	56.74
2019	1.34	0.68	1.42	0.01	–	1.82	5.85	0.27	0.26	26.18	15.59	2.02	55.44
2020	7.74	2.43	1.74	0.13	–	0.91	5.20	0.02	0.05	32.41	11.42	2.58	64.64

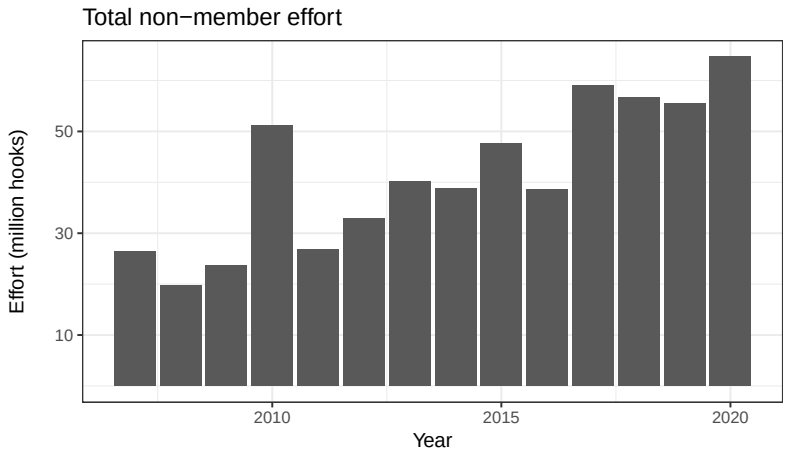

Figure 5: Total longline effort (million hooks) reported by non-cooperating non-members of the CCSBT to other tRFMOs per year.

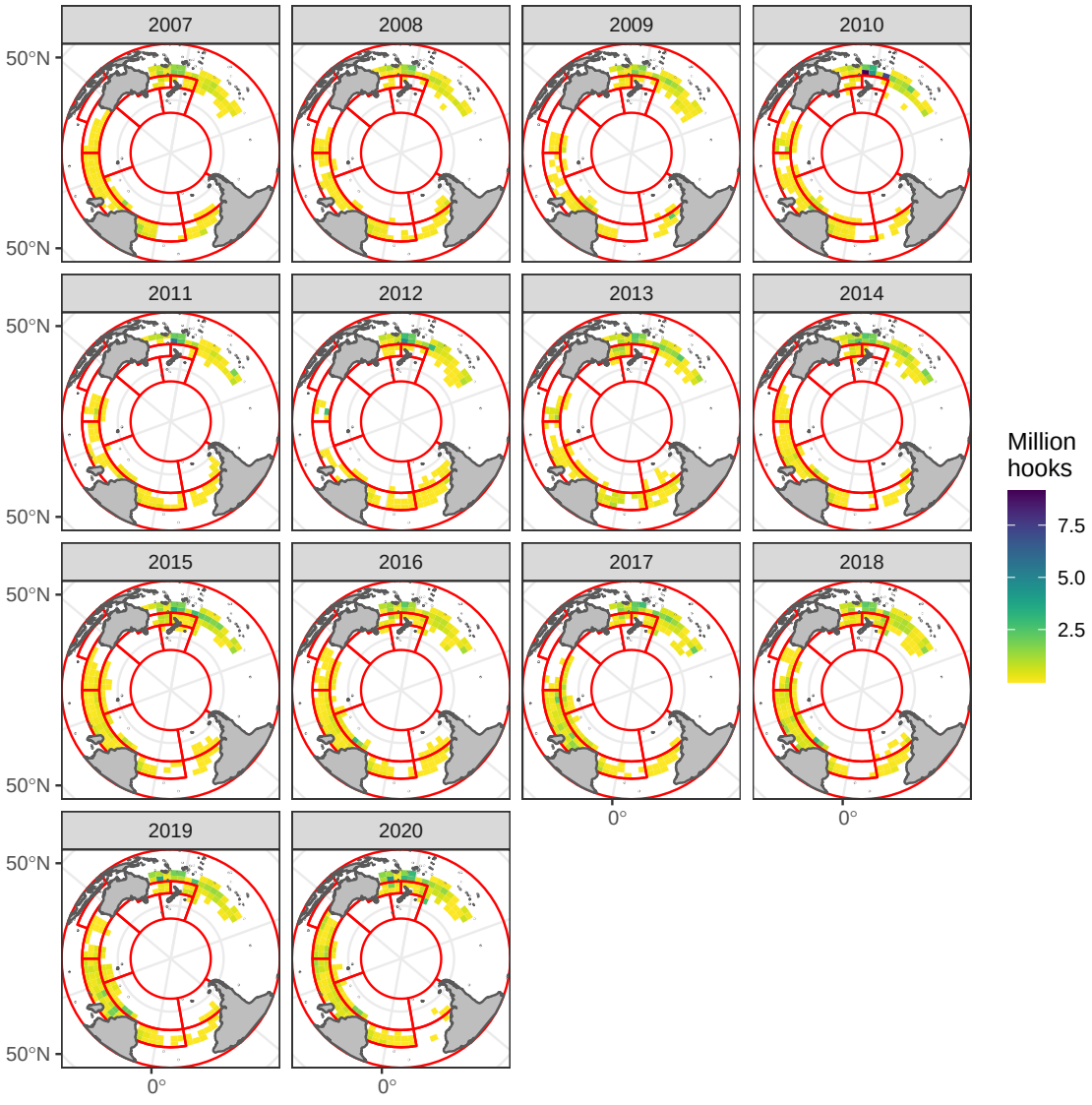

Figure 6: Spatial distribution of non-member longline effort per year.

4. ACKNOWLEDGEMENTS

This work was funded by the CCSBT and overseen by Pamela Mace (Fisheries New Zealand).

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