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Updated SIOFA bottom fishing footprint

The SIOFA Secretariat on behalf of the SIOFA Scientific Committee

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Abstract

During PAEWG4, the SIOFA Secretariat presented a bottom fishing footprint, which was endorsed by both PAEWG4 and SC7. SC7 recommended that further checks be performed on the footprint, and that it be presented to MoP9. While performing these checks, discrepancies in the footprint have been highlighted but could not be resolved in time, which led MoP9 to adopt the footprint as an interim footprint and recommend that further work be done to resolve the discrepancies.
Paper SC-08-23-Rev1 provided SC8 with a full account of the data analysis and revision that led to an updated bottom fishing footprint. This work included resolving the discrepancies with national data and the removal of fishing operations that utilised gears that MoP9 considered not to be bottom fishing gears. The updated footprint was also compared with the interim footprint, to present any relevant changes in area and position, and compared with the area with depths shallower than 2000m within the SIOFA area.
Recommendations contained in this paper are SC8 recommendations to the SIOFA MoP.

[1] Restricted documents may contain confidential information. Please do not distribute restricted documents in any form without the explicit permission of the SIOFA Secretariat and the data owner(s)/provider(s).
[2] Documents available only to members invited to closed sessions.

Recommendations

- The SC recommended that the MoP **adopt** the updated bottom fishing footprint, which should supersede the interim footprint adopted at MoP9.
- The SC recommended that the MoP **instruct** the Secretariat to be the repository of the footprint, to provide it to CCPs on a request-basis and to utilise it, if required, for compliance purposes. This should be accompanied by full documentation of the procedure for creating the footprint.
- The SC recommended that the data layer of the footprint, along with the SIOFA Subareas, should be made available in the SIOFA Secretariat GitHub account (https://github.com/SIOFASecretariat).
- The SC recommended the MoP **consider** the implications of the bottom fishing footprint once it is agreed, including for CMM 2020/01 (Interim Management of Bottom Fishing) and how new fishing should be considered.

Updated SIOFA bottom fishing footprint

1. Aims

This paper is meant to provide SC8 with a full account of the data analysis and revision that lead to an updated bottom fishing footprint.

2. Rebuilding and consolidating the bottom fishing footprint presented at PAEWG4

The data used in PAEWG-04-12 (restricted paper) consisted of a total of 20,081 records of separate fishing operations for which haul by haul information was available in the SIOFA databases. Ideally, for each of these records, the year, gear, CCP and, most importantly, geographical position were available. These data were underlying the PAEWG-04-12 footprint which SC7 recommended MoP9 to adopt as the SIOFA footprint, and which was ultimately adopted as an interim footprint (see MoP9 report) pending further verification of the discrepancies highlighted between (MoP-09-12, restricted paper).

The PAEWG-04-12 data was re-analysed using R (R Core Team 2021), for the purpose of updating the footprint and assessing discrepancies with national data. 6,332 records were missing endpoints and 2 records were missing both endpoints and starting points of fishing operations. Midpoints between start and endpoints would probably be the most appropriate way to locate fishing operations but would have eliminated 1/5th of the total available data. Therefore, the Secretariat utilised starting points to identify the location of each fishing operation to maximise data availability (and thus retained 20,079 data points in the following analyses). While this could lead to potential challenges where fishing was started in a grid square and concluded in another, the approximation should be generally acceptable at the spatial resolution of this analysis (a 20'+30' hybrid grid).

3. Resolution of national discrepancies

To resolve discrepancies with data from the three CCPs indicated in paper MOP-09-12, the Secretariat held correspondence and virtual meetings with the SC HoDs of the CCPs. As a result of these meetings, the discrepancies were clarified, and additional data submissions were made by the CCPs to integrate the data utilized for the purpose of the footprint.

CCP1 provided 2,089 fishing operation data to the SIOFA Secretariat, spanning the period 1976–2020. CCP2 provided the coordinates of 87 fishing operations with an accuracy of 30', time period unspecified, to the SIOFA Secretariat. These data were not part of the dataset that the Secretariat held when it produced the PAEWG4, SC7 and MoP9 footprint. These data were confidential, were not submitted to the SIOFA database, and only submitted for the purpose of verifying the footprint.

These data were added to the haul-by-haul dataset that was utilized when producing the PAEWG4/SC7/MoP footprint. At the end of the process the footprint dataset included a total of 22,255 fishing operations within the 1976–2020 period, but please note that further operations were performed on these data (see 4) and several data points were not included in the final hybrid footprint.

CCP3 provided shapefiles at the 20' and 30' resolution, detailing the spatial extent of fishing events in 2015–2017 and 2019–2020. The 2015–2017 data were not part of the dataset that the Secretariat held when it produced the PAEWG4, SC7 and MoP9 footprint, and were derived from VMS data using cutoff speeds that correspond to bottom fishing activities. These data were confidential, were not submitted to the SIOFA database, and only submitted for the purpose of verifying the footprint.

Because of the nature of these data, it was not possible to quantify the number of fishing events added to the dataset, but only the spatial extent of these in relation to the other data.

After coordinating with the relevant CCPs, the Secretariat recommends that these new data be included in the updated footprint, as they represent an addition of data that was not available when the interim footprint was first produced.

4. Grooming fishing events using midwater and handlines gears, as well as events outside the SIOFA area

The footprint presented at PAEWG4, and subsequently at SC7 and at MoP9, utilized data on midwater trawl activity and on handline gears.

Following discussions at CC6 and MoP9 (see MoP9 report, annex), the SIOFA MoP decided that midwater trawls and handlines are not to be considered bottom fishing gears (and thus also not to be restricted within the footprint). Therefore, the footprint has been updated excluding midwater trawl and handlines activities ("Midwater trawls (nei)", "Single boat midwater otter trawls" and "Handlines and hand-operated pole-and-lines").

Furthermore, the bottom fishing operation data was groomed to exclude all fishing events that occurred outside of the SIOFA area.

These grooming operations resulted in the elimination of 4,051 data points, thus 16,028 fishing operation records were retained in the analysis.

5. Updated SIOFA bottom fishing footprint

This footprint includes the data that was used in the PAEWG4 footprint, minus the midwater gear that MoP9 decided does not constitute bottom fishing gear. This footprint also has additional data compared to the PAEWG4 footprint, as a result of the work on resolving discrepancies between three CCPs data and the PAEWG4 footprint. Please note that CCP3 provided data that could not be resolved at the single operation level, for some years, but that was integrated with the rest of the data.

In total, 16,070 bottom fishing operations by 7 SIOFA CCPs, between 1977 and 2020, were included in the final footprint. Table 1 details the data timespan for each CCP, along with the gear utilised as reported in the SIOFA database.

Table 1 – Data included in the updated SIOFA bottom fishing footprint, detailing the timespan and the gear included in each CCP dataset.

CCP	Timespan of haul-level data	Fishing gear
AUS	1998–2020	Trawls (nei) Demersal longlines Bottom trawls (nei) Dropline Set longlines Longlines (nei) Traps (nei)
CHN	no haul level data available	no haul level data available
COK	2019–2020 (+ no date)	Trawls (nei) Bottom trawls (nei)
COM	no haul level data available	no haul level data available
EU	2001-2020	Longlines (nei) Gillnets and entangling nets (nei) Bottom trawls (nei) Set longlines Traps (nei)
FR-OT	2006-2020	Longlines (nei) Set longlines Traps (nei) Vertical lines
JPN	1977-2020	Bottom trawls (nei)
KOR	2009-2013	Set longlines Bottom trawls (nei) Trawls (nei)
MUS	no bottom fishing (handline fishing only)	no bottom fishing (handline fishing only)
SEY	not fishing in SIOFA area	not fishing in SIOFA area
TPE	no bottom fishing (pelagic longline fishing only)	no bottom fishing (pelagic longline fishing only)
THA	2015–2020	Single boat bottom otter trawls

Overall, the addition of new data and the elimination of data from gears no longer considered bottom fishing gears had no significant changes in the overall area of the bottom fishing footprint (Figure 2). The updated bottom fishing footprint was 6% larger than the interim footprint (presented at PAEWG4, accepted at SC7 and adopted at MoP9). This could be partly due to the fact that single fishing operations recorded at the corner of grid cells can light up to 4 adjacent 30’ grid squares and thus increase the total area of the footprint.

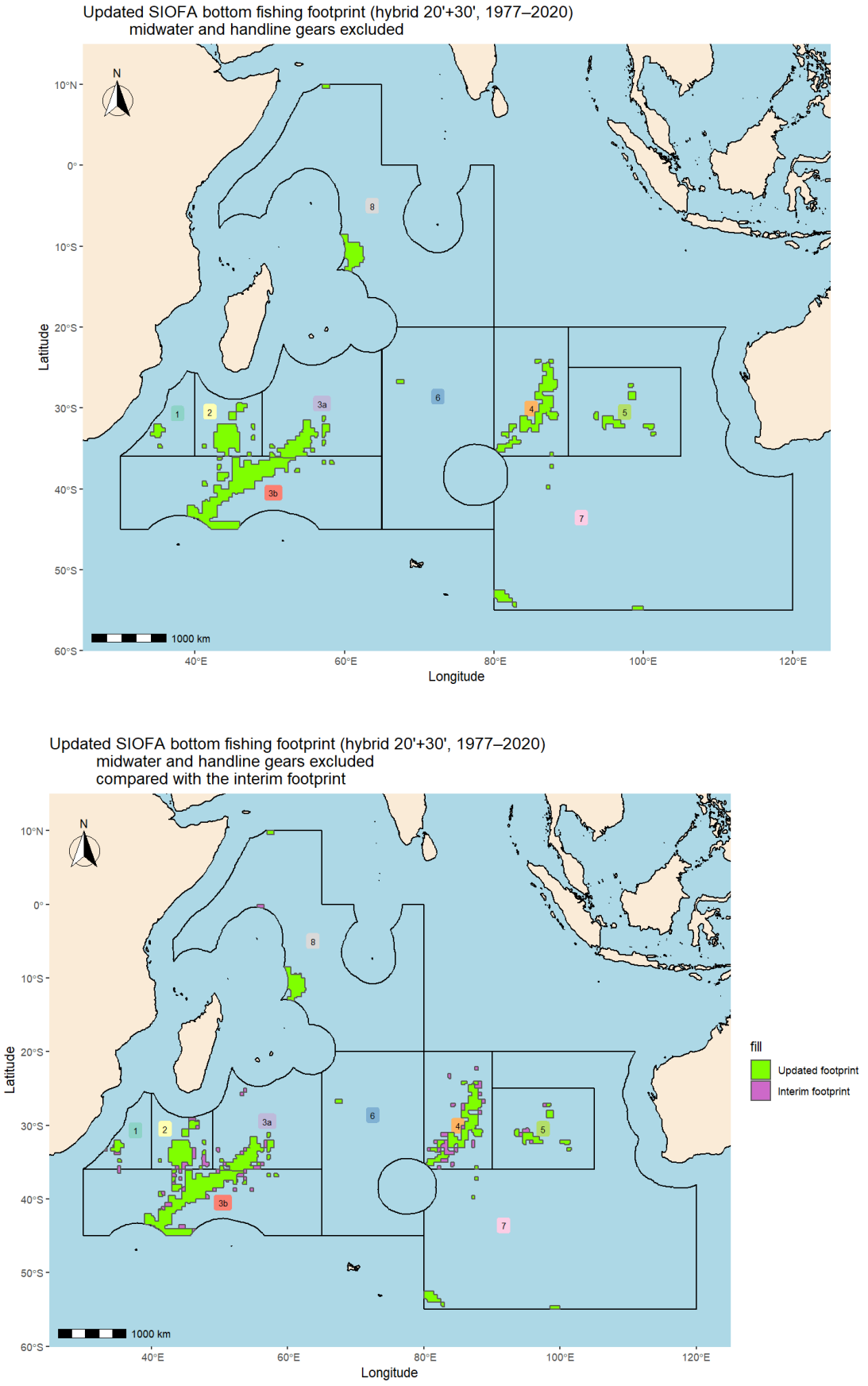

Figure 2 – Updated SIOFA bottom fishing footprint (upper panel, in green) and comparison with the interim footprint presented at PAEWG4, accepted at SC7 and adopted at MoP9 (lower panel, in purple).

Please note that, while not changing significantly in overall area, the updated SIOFA bottom fishing footprint shifted its spatial coverage compared to the interim footprint.

The total surface area of the updated footprint is (approximately) 1 131 244 km^2.

The total surface area of the SIOFA area is (approximately) 27 162 002 km^2. Therefore, the updated footprint area is (approximately) 4.16% of the total SIOFA area.

Within the SIOFA area, the total area with depths shallower than 2000m is (approximately) 834 497 km^2 (3.1% of the total SIOFA area). The updated footprint overlaps with this area for (approximately) 646 236 km^2 (77.4% of the total area), leaving (approximately) 188 261 km^2 outside of the footprint (22.6% of the total area).

6. References

R Core Team. 2021. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.