6th Meeting of the Scientific Committee (SC6)

22-26 March 2021

SIOFA Fishing Footprint

Relates to agenda item: 6.5   Working paper ☒ Info paper ☐

SIOFA Secretariat

Abstract

The Scientific Committee requested the SIOFA Secretariat to prepare specific maps of the spatial distribution of effort to develop an appropriate SIOFA fishing footprint (SFFP). PAEWG3 provided additional specifications to prepare footprint that encompass a maximum of available data, to consider all gears together and to not exclude deep areas.

The Secretariat produced 2 sets of maps: historical period (up to 2015) and whole period (up to 2019). The area of each footprint has been calculated and comparison between periods and scaling choice is highlighted.

Recommendations *(working papers only)*

1. The SC to consider the footprints for submission to MoP8.

Contents

A. Introduction

SIOFA CMM 2019/01 para 7 request (amongst others) the following:

> "*The Scientific Committee shall, by no later than the close of the ordinary meeting of the Scientific Committee in 2020, and thereafter whenever a substantial change to the fishery has occurred or new data has otherwise been provided to the Scientific Committee warranting changes, develop and provide advice and recommendations to the Meeting of the Parties on*
> *- an appropriate SIOFA bottom fishing footprint based on the data provided by CCPs to the Secretariat under paragraph 20.*"

SIOFA CMM 2019/01 para 20a requests:

> "*CCPs shall, at least 30 days prior to the commencement of the ordinary meeting of the Scientific Committee in 2018, submit to the Secretariat (a) relevant data on the spatial extent of its historical bottom fishing effort in the Agreement Area expressed as grid blocks of at least 20 minutes resolution or, if available, a finer scale […]*".

Very few CCPs provided relevant and usable data in relation to this requirement, but the CCPs historical catch and effort data provide with what is necessary to establish bottom fishing footprints as long as the requirements of the CMM on data standards are respected, especially providing accurate location of each fishing activities.

In 2019, SC4 requested the SIOFA Secretariat to prepare specific maps of the spatial distribution of effort to develop an appropriate SIOFA fishing footprint (SFFP). Several SFFP were presented at SC5 in 2020. The works previously done for SC5 are available on the SC5 meeting pages or on request to the SIOFA Secretariat.

Following this, SC5 requested the MoP to provide information on the usage of the SFFP to help in selecting the most

appropriate SFFP. Unfortunately, the MoP did not provide with additional information and let the SC6 to deal with this subject.

PAEWG3 chair opted that the SFFP should be built only with the data provided at fine resolution (up to 20-minutes degree resolution) and uses a 20-minutes resolution grid. Fishing footprint for each CCP should also be prepared so each CCP can clearly see the resulting extension of its historical fishing, it highlighted that that when fine data is not provided, that data is excluded from the footprint. Those results are available in paper PAEWG-03-05.

PAEWG3 discussed the latest footprint and requested the Secretariat to provide new maps of footprint (ref. PAEWG3 report para 59) with these specifications: at 1° resolution to take into account a maximum of data available (provided at a coarser resolution than 20') and at 20' resolution. All gears should be aggregated and no depth limit should be applied.

B. Data Material

B.1. Database

The data that have been used to produce these fishing footprints come from 2 databases that are currently maintained at SIOFA Secretariat:

  1. The haul-by-haul catch and effort database. It contains fine level catch and effort data on a haul-by-haul basis, i.e., every haul has its own date/time and a position.

  2. The aggregate catch and effort database. It contains various level of aggregation of catch and effort data when CCPs fail to provide data on a haul-by-haul basis (e.g., when multiple hauls have been merged into one day or into a one-degree square, etc.).

B.2. Data period

Two periods have been selected:
  - The historical period: that extent from the first data available to 2015 (included).
  - The historical AND recent periods that use all data available to 2019 (included).

Note: **Comoros** has only fishing activity in the recent years in the Agreement area.

B.3. Data accuracy

2 sets of spatial accuracy have been selected:
  - Fine resolution data: this sets consider only the fine scale data provided to 20-minutes resolution.
  - Coarser resolution data: this set uses both fine and coarser resolution data (up to 1° resolution). Data provided at a coarser scale than 1° has been ignored as they do not provide with any usable spatial information.

Notes:
  - Historical activities from **Japan** and **Thailand** are not at fine resolution and do not fit the fine resolution criteria.
  - No fishing activities from **Korea** could be used because it is provided only on a FAO-area level. Korea informed the Secretariat that finer data are being verified and will be provided soon.
  - No fishing data from **China** could be used because no usable spatial information is available.
  - No data from **Mauritius** could be considered because Mauritius did not provide SIOFA with any data.

B.4. Gear selection

Only gears which may have contact with the sea floor have been used: trawls (mid-water, bottom and other trawls), longlines (exclusion of drifting and pelagic longlines), handline, nets, traps and pots.

Note: CCPs which have no bottom fishing activities in the Agreement area are not considered in the footprint (this is the case of **Seychelles** and **Chinese Taipei**).

C. Methods

Data have been imported into qGIS (Quantum Geographic Information System software) to perform the spatial processing. Imported data show as a points layer in the GIS software. Only a single point has been selected to represent a fishing event.

Geoprocessing

A 20-minutes square grid and a 1-degree square grid have been used to project the fishing events points.

The squares are extracted from the full grid where at least on fishing event intersects with a cell.
See the process illustrated in figure 1 with the 20-minutes grid and in figure 2 with the 1-degree grid.
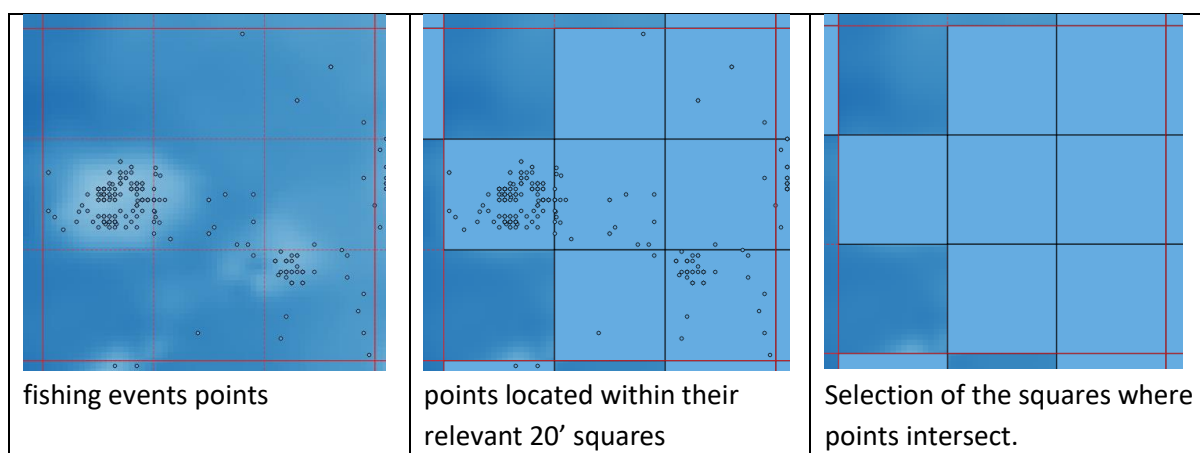
| fishing events points | points located within their relevant 20' squares | Selection of the squares where points intersect. |

Figure 1: fine resolution fishing activity points turned into 20' squares.

| aggregated activities data points | data points highlighting relevant 1° squares | Selection of 1° squares |

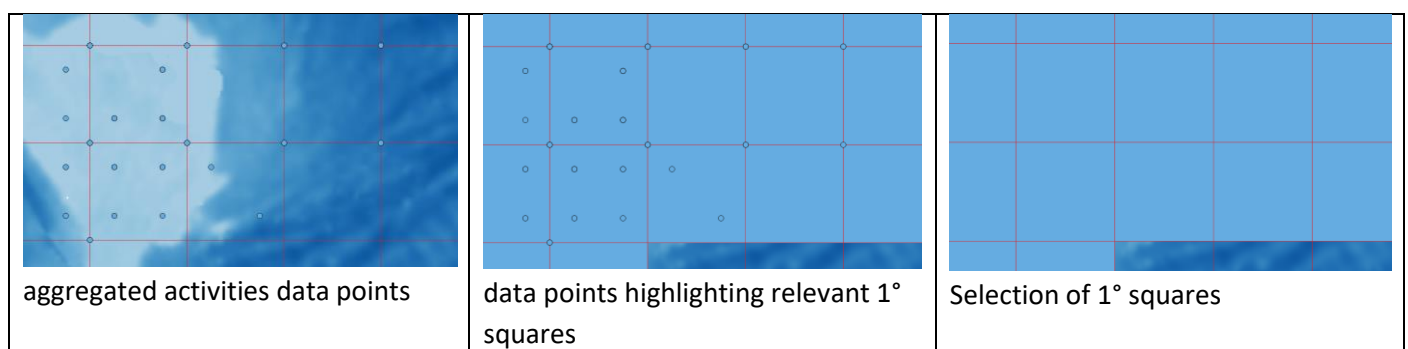*Figure 2: coarse resolution fishing activity points turned into 1° squares.*

All squares have been merged into a single polygon shape.

<u>Depth threshold</u>

No depth threshold has been applied. The bathymetry model (ETOPO1 Global Relief Model from NOAA) resolution ignores several higher fishing grounds fishing (like seamounts), where fishing activities would not show in the footprint anymore (see PAEWG-03-05).

Four datasets have been used to generate four different footprint maps. The area of each footprint has been calculated using the GIS geometry calculation tool.

D. Results

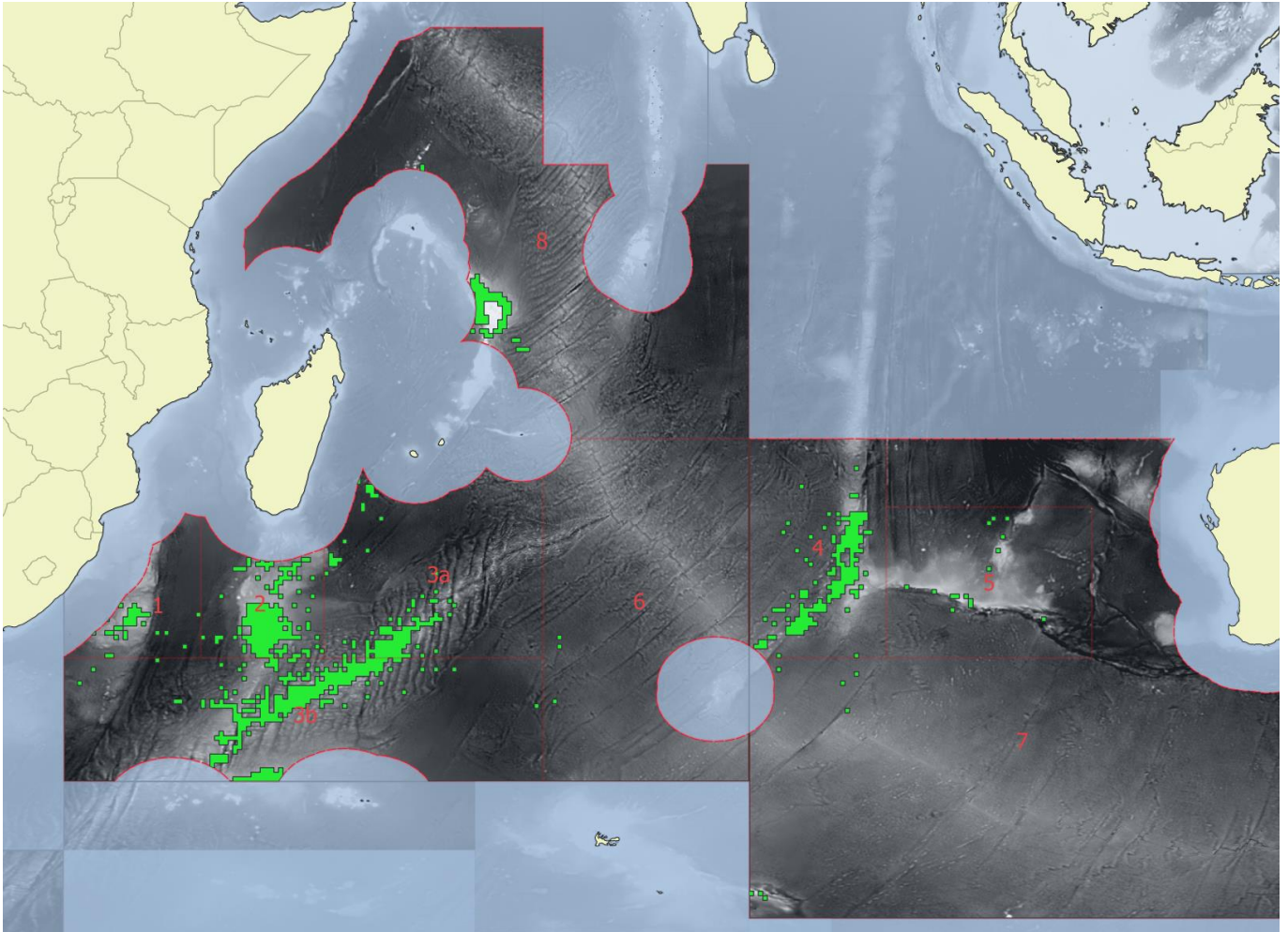# MAP 1: Fishing footprint from fine resolution and historical data (to 2015)

Figure 3: Historical SIOFA fishing footprint from fine level data at 20-minutes resolution (MAP 1).

Total footprint area: 86 square degrees.

MAP 2: Fishing footprint from fine and coarse resolution and historical data (to 2015)
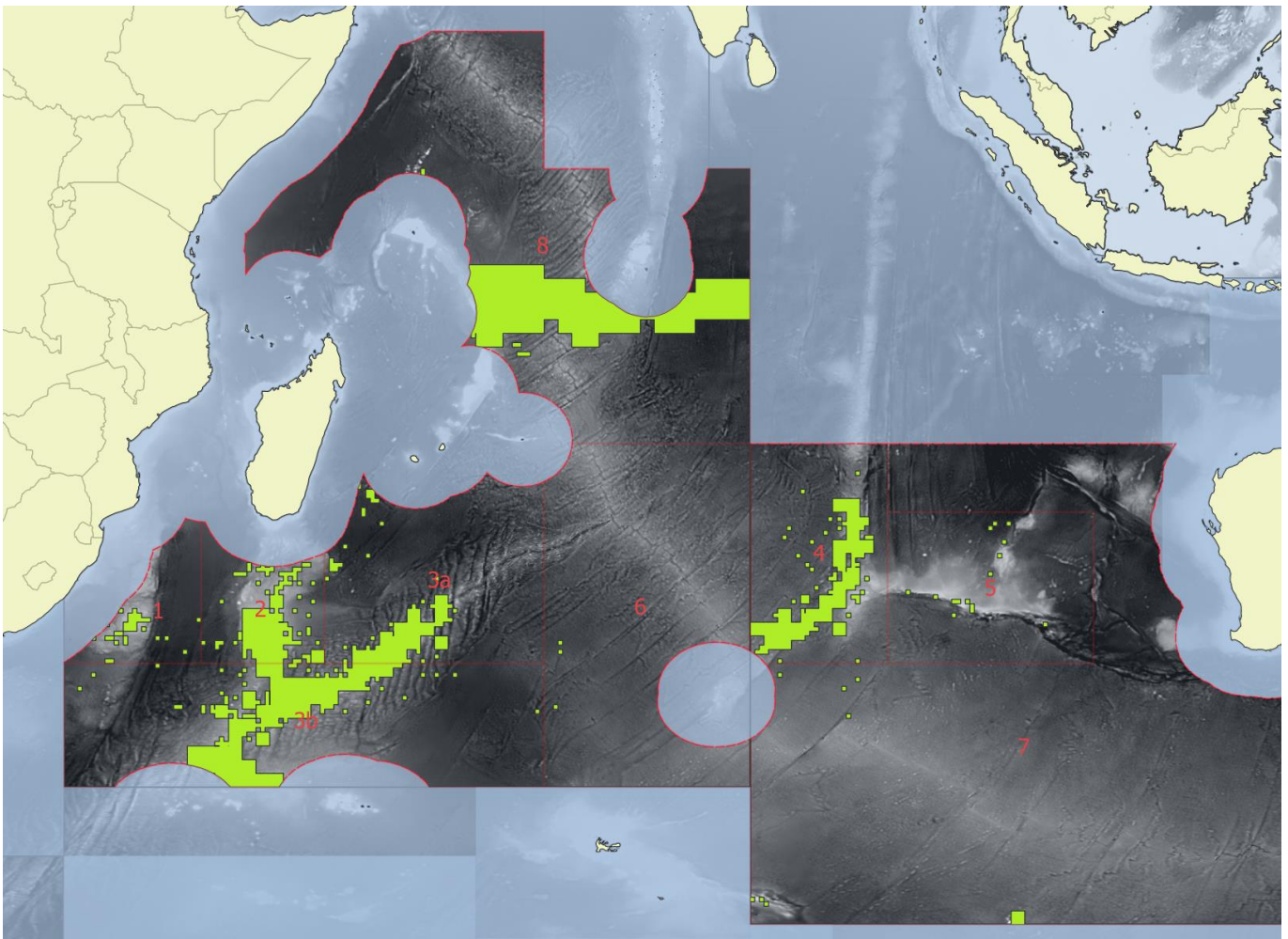

Figure 4: Historical SIOFA fishing footprint from fine and coarse level data at mixed 20-minutes and 1-degree resolution (MAP 2).

Total footprint area: 193 square degrees

MAP 3: Fishing footprint from fine resolution and historical + recent data (to 2019)
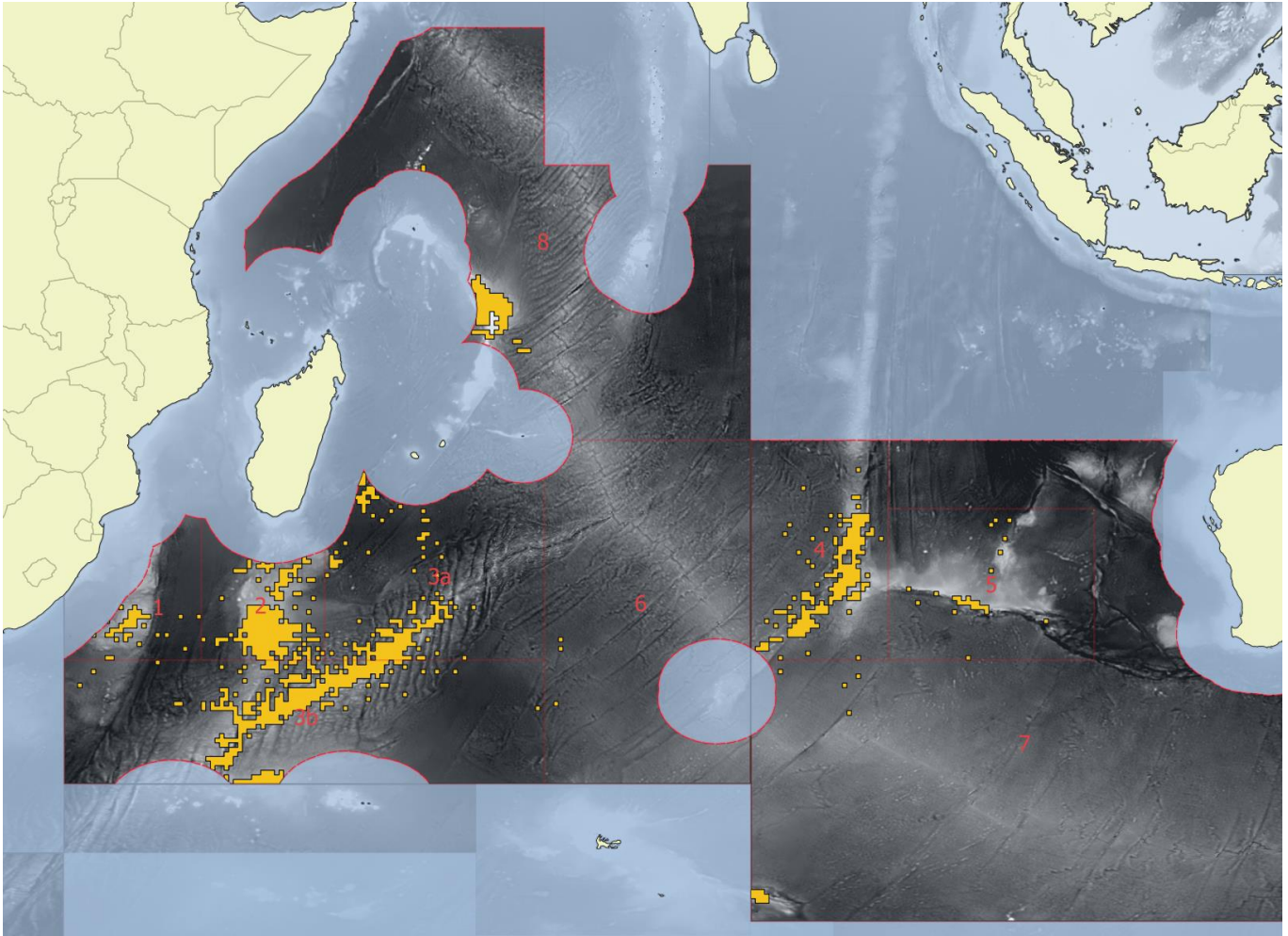

Figure 5: Historical and recent SIOFA fishing footprint from fine resolution data at 20-minutes resolution (MAP 3).

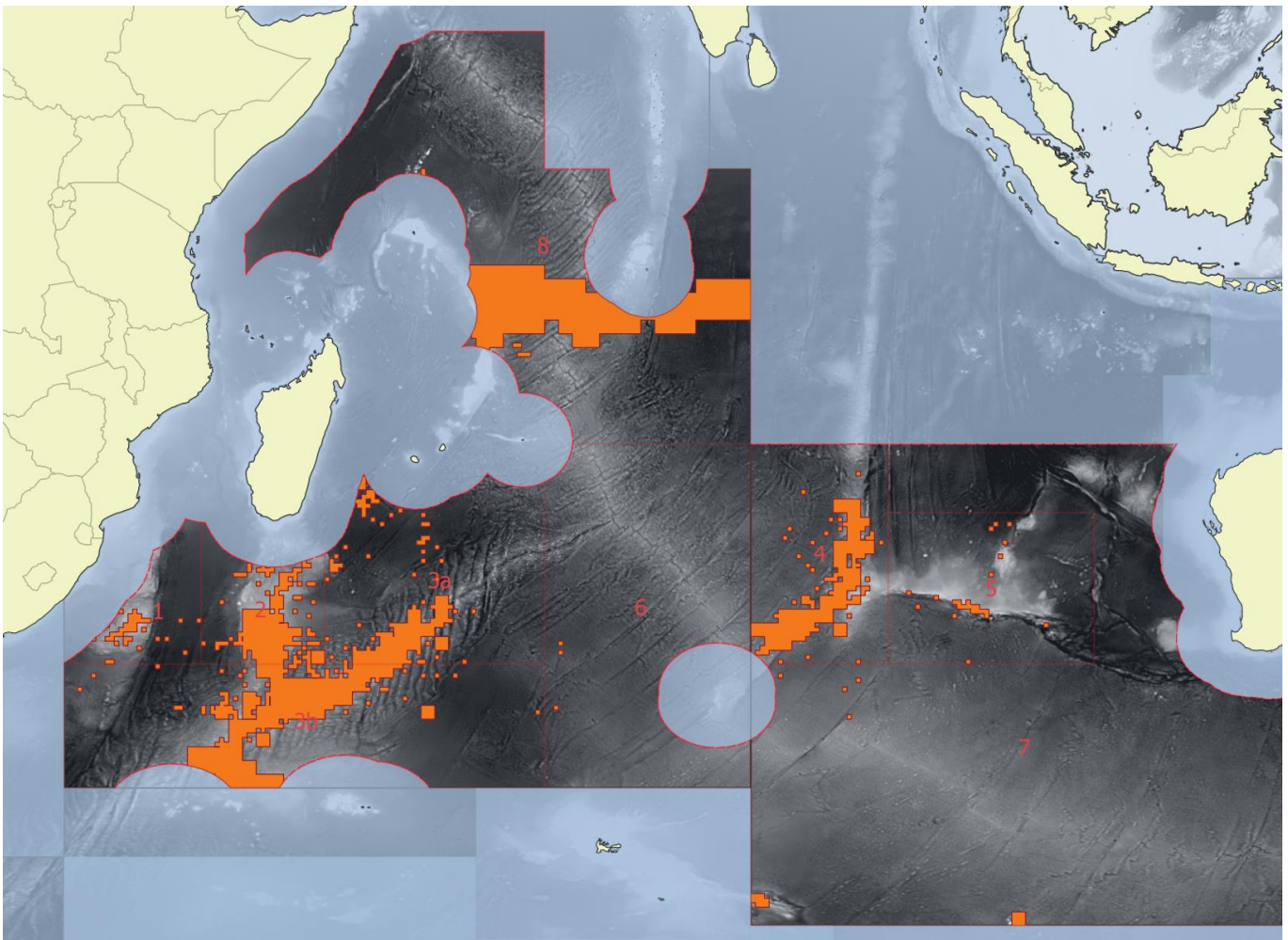Total footprint area: 104 square degrees

Figure 6: France (Overseas Territories) historical fishing footprint at 20-minutes resolution.

Total footprint area: 207 square degrees.

Summary of footprints produced, and data used:

	fine resolution data (haul by haul to 20-minutes)	fine and coarse resolution (haul by haul to 1-degree)
Historical period (up to 2015)	MAP 1 Area: 86 °² excludes MUS, KOR, COM, CHN, THA, JPN	MAP 2 Area: 193 °² excludes MUS, KOR, CHN, COM
Historical and recent period (up to 2019)	MAP 3 Area: 104 °² excludes MUS, KOR, CHN	MAP 4 Area: 207 °² excludes MUS, KOR, CHN

Adding the recent fishing activities into the historical footprint increases by about 10% the footprint total area. However, taking into consideration coarse resolution fishing activities increases by about 100% the footprint area.

Annex 1 provide with a visual of the expansion in the footprint when coarse resolution data is being added into the footprint calculation for historical data, and annex 2 illustrate the same for the recent fishing period.

E. Discussion and conclusion

The above footprint encompasses a maximum of the available data that is available at the Secretariat. However, some CCP activities are not taken into consideration (and do not show) either because of loss of historical data, unusable data spatial accuracy or no provision of data to SIOFA.

These maps of footprint result from the data that has been selected and the methods that has been applied. Many other methods and data selection can be chosen and will result in other footprint outputs. For example, the addition of a depth limit has an important impact on the total footprint area (depth below which fishing does not occur). This has been tested in previous footprint papers with a depth threshold set at 2,000 meters (ref. PAEWG2, SC5 and PAEWG3).

The final objective is to obtain a simple and usable fishing footprint. The footprints proposed here should be presented to the MoP and the MoP could consider one of them as a basis for further advices and recommendations.

This map shows the extension of the footprint (light green) when considering coarse resolution data into the footprint for the historical period (up to 2015).
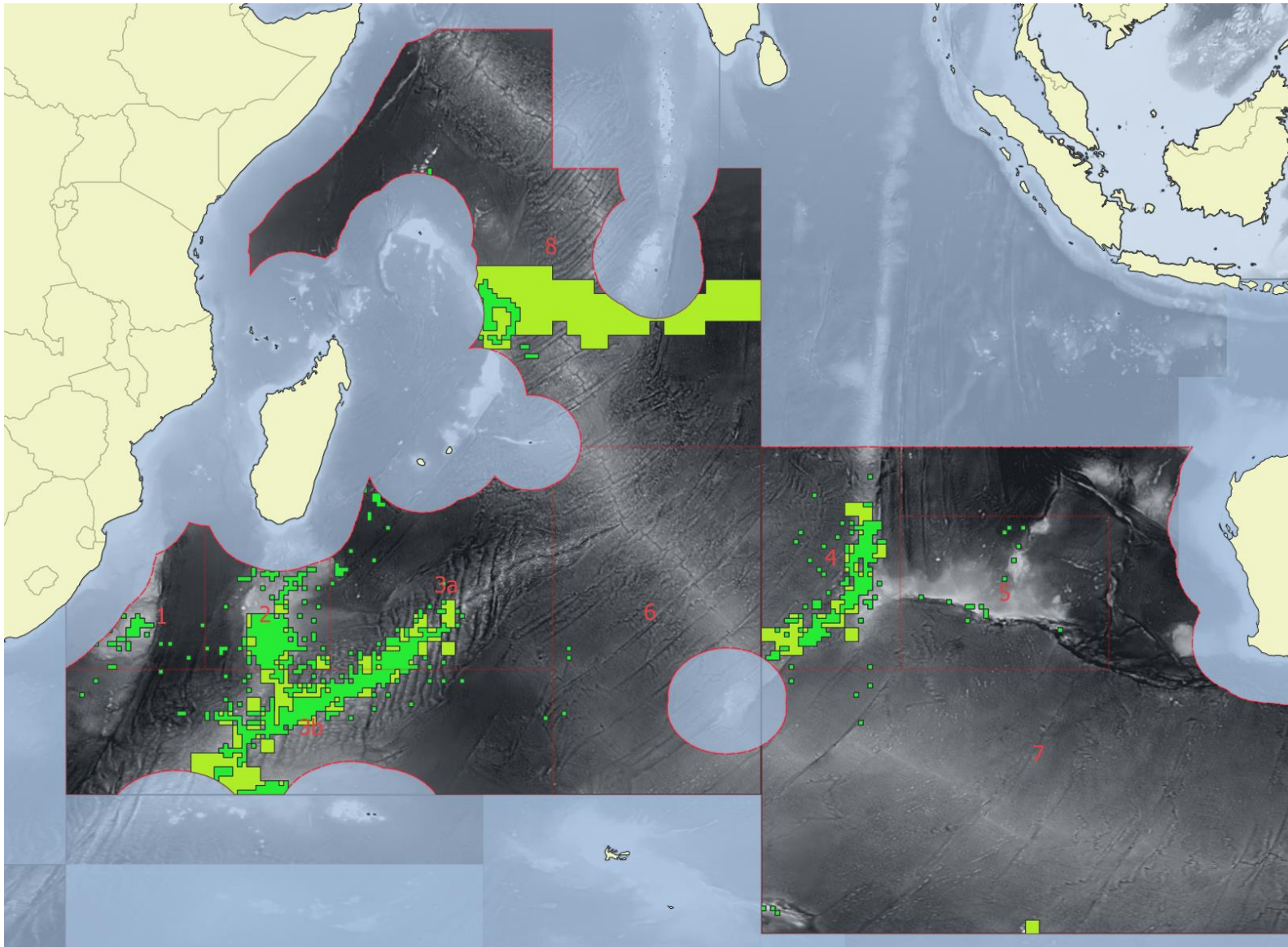
This map shows the extension of the footprint (orange) when considering coarse resolution data into the footprint for the historical + recent period (up to 2019).