

# Is small really small? Re-characterising tuna fisheries in the Indian Ocean

Bianca Haas & Umair Shahid

## Executive Summary

Small-scale fisheries (SSF) are central to food security, livelihoods and employment across the Indian Ocean and represent more than 50 per cent of the tuna catch, yet they remain insufficiently defined and inadequately integrated in the IOTC. The absence of a clear and operational definition of SSF has been acknowledged in recent IOTC meetings, including the 16<sup>th</sup> Meeting of the Technical Committee on Allocation Criteria. This paper traced how SSF are defined within the convention texts and resolutions of RFMOs and national legislation of IOTC member states and proposed a tailored definition of SSF for the IOTC.

The results revealed that none of the examined RFMOs has adopted an official definition of SSF. Nevertheless, references to SSF and related definitions are occasionally included in resolutions and are largely inconsistent, often based on a single parameter. The most comprehensive definition was identified within ICCAT, which specifies five characteristics, of which at least three must be met for a fishery to be considered small-scale. Considerable variation exists across definitions, particularly with respect to vessel length, which ranges from less than 12 metres (e.g. ICCAT) to more than 24 metres (e.g. IOTC, WCPFC). In regard to the fisheries management legislation of IOTC members, less than half of the members include a definition of SSF in their regulatory frameworks, and where definitions exist, they display substantial diversity.

Drawing on existing literature, reports, and legislation, to address these gaps, the paper proposes a revised classification based on three fishery classifications. Within this framework, SSF are defined (using a multi-criteria approach) as fishing operations conducted by vessels under 12 metres in length or below 10 gross tonnages, operating within the territorial sea and exclusive economic zone, employing fewer than 12 crew members, and undertaking fishing trips of no more than two weeks' duration.

This paper seeks to contribute to and inform the ongoing discussions within the IOTC on this matter. SSF are the backbones of coastal communities, hence it is important that their interests are not diluted by industrial fisheries, which are currently falling under the SSF definition.



## Research article

## Is small really small? Re-characterising tuna fisheries in the Indian Ocean

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## ABSTRACT

Small-scale fisheries (SSF) play a critical role in providing food security, livelihood, and employment. However, SSF have received less attention in the context of regional fisheries management and continue to be poorly understood and not well included in fishery management frameworks. The lack of understanding concerning SSF within regional fisheries management organisations (RFMOs) might be further exacerbated by the absence of a unified definition of SSF within RFMOs, which often undermines data collection and the general availability of information on SSF. This paper aims to trace SSF definitions within RFMO convention texts and conservation and management measures, and to develop a definition of SSF for the Indian Ocean Tuna Commission, which would result in a more nuanced characterisation of fishery types. The results showed that all RFMOs lack an official definition, although SSF are mentioned in various conservation and management measures. To respond to this gap, we propose a definition of SSF, based on the overall size of the fishing vessel (<12m or 10 gross tonnage), the location of the fishing ground (e.g., within the territorial sea and exclusive economic zone), crew size (not more than 12), and the duration of the fishing trip (no more than 2 weeks). Furthermore, besides the current two fishery types, SSF and industrial, we suggest a third type – semi-industrial fisheries. This would help RFMOs close loopholes arising from the absence of a unified SSF definition, which currently enables some large-scale vessels to qualify for exemptions and protections intended for genuine SSF. Proposing a more realistic operational classification of fishery types within RFMOs would strengthen data reporting and monitoring and would lead to a more sustainable and equitable fisheries management regime.

## 1. Introduction

Fish and marine resources are an essential source of protein and micronutrients. Around 40 % of the global fish catch comes from small-scale and artisanal fisheries (FAO, 2024a). Given that the terms “small-scale”, “artisanal”, and “coastal” are often used interchangeably (Rousseau et al., 2019), and to ensure consistency, this paper uses SSF to refer to small-scale, artisanal and coastal fisheries. For example, while some official documents only refer to artisanal fisheries, in this paper, artisanal fisheries are captured by the term SSF. SSF account for nearly 90 % of total employment in the fisheries sector globally (Berkes and Franz, 2025). The importance of SSF is also acknowledged in the 1995 United Nations Fish Stocks Agreement (UNFSA), which highlights the need to ensure that conservation and management measures (CMMs) do

not adversely impact SSF (UNFSA, 1995; Article 24.2(b)). However, despite the SSF's contribution to food security, especially in coastal communities (e.g., Cojocarú et al., 2022; Viridin et al., 2023; Andreoli et al., 2025), SSF are often not considered in regional fishery policies and management decisions (Kolding et al., 2014; Basurto et al., 2025). In addition, the biennial State of World Fisheries and Aquaculture (SOFIA) reports have similarly noted that a large proportion of unassessed global fisheries is presumed to stem from SSF (FAO, 2024a). This under-representation poses risks to both data integrity and equitable access to marine resources. Reasons for the lack of recognition of SSF in ocean governance and regional decision-making bodies are often linked to the lack of data on SSF and the limited financial, organisational, or institutional capacity to engage in the decision-making process (Basurto et al., 2025).

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Regional fisheries management organisations (RFMOs)<sup>1</sup> are often dominated by the voice and input from the more visible industrial fleets (Basurto et al., 2025). While this is to be expected for general RFMOs<sup>2</sup> whose mandate is limited to the high seas, the convention areas of tuna RFMOs (hereinafter tRFMOs) include the exclusive economic zones (EEZs) of coastal states, which are critical fishing grounds for SSF (Basurto et al., 2025). The overlap of fishing grounds for SSF and industrial fisheries often leads to conflicts between SSF and industrial fishing fleets (Cánovas Molina and Gourguet, 2025). For example, the presence of industrial vessels may discourage SSF from fishing or reduce local fish availability (Leroy et al., 2016; James et al., 2018). This might harm food security. In some regions, the growth of the industrial fishing sector came at the cost of SSF, resulting in increasing inequities faced by SSF (Ertör, 2023).

The inclusion of SSF within tRFMOs might be undermined due to the absence of a standardised definition of SSF, which is also compounded in several CMMs<sup>3</sup> in the form of exemptions or applicability due to logistical challenges for enforcement. For example, the Indian Ocean Tuna Commission's (IOTC) CMM 23/06 on the conservation of cetaceans does not apply to SSF fisheries operating exclusively within their EEZs (IOTC, 2023a). Such exemptions may be considered to avoid disproportionate burden on SSF (Haas et al., 2023); however, it increases the risk for larger vessels to fall under the SSF category even though they fish with modern technology. Hence, such exemptions might undermine data quality and submission, and result in non-compliances to CMMs, as larger vessels might exploit this loophole. The low recognition of SSF within tRFMOs is further exacerbated by the diversity of SSF (Funge-Smith et al., 2023), which makes it difficult to have a unified voice for SSF.

The lack of definition is not only found at the RFMO level, but also in global instruments. The Food and Agriculture Organisation's (FAO) Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (FAO, 2015) does not define SSF, arguing that due to the vast variability of SSF, it would not be appropriate to have a definition (FAO, 2017). However, the need for a definition has been recognised in several regional and international forums, such as the Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea (FAO, 2018), as well as in ongoing IOTC discussions and proposals for updating fishery definitions to better characterise small-scale operations (IOTC, 2022a). The first action point of the Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea highlighted the need to “adopt, as soon as possible, a characterisation of small-scale fisheries” (FAO, 2018, p. 10). Generally, the lack of a definition of SSFs undermines the effectiveness of multilateral fisheries agreements, for example, due to inadequate reporting (Sumaila, 2017) and might result in unintended consequences for SSF themselves, including inequitable fisheries management measures (Funge-Smith et al., 2023).

This paper aims to develop a definition of SSF for the Indian Ocean Tuna Commission (IOTC) and, based on this definition, re-characterises tuna fisheries in the Indian Ocean. Currently, for data collection purposes, the IOTC glossary defines SSF based on vessel size, composed of fishing vessels less than 24 m, and the location of fishing activities (i.e., exclusively within the EEZ of the respective coastal state) (IOTC, nd). However, this is not an official definition, but simply a working

definition. Furthermore, vessels under 24 m and that operate solely within EEZ are not included in the IOTC Record of Authorised Vessels (RAV) (IOTC, 2014; paragraph 1), hence information on how many vessels are actually fishing for tuna is limited.

This paper focuses on the IOTC, as the majority of the IOTC members are coastal developing states, which rely heavily on SSF for food security (Zeller et al., 2023). Additionally, scientific estimates calculate that while the SSF catch of tropical tuna species (i.e., yellowfin, bigeye, and skipjack) is lower compared to industrial fisheries (Fig. 1), SSF dominate neritic tuna catch (Fig. 2). Two out of the four assessed neritic tuna species are overfished (Longtail tuna (IOTC, 2024a), and Narrow-barred Spanish mackerel (IOTC, 2024b)). However, due to a lack of data reporting from SSF (IOTC, 2019; paragraph 34), uncertainties regarding the catch of SSF remain.

The IOTC Secretariat has started to engage with members to develop a regional SSF definition and a more nuanced characterisation of fishery types. For example, at the 18th meeting of the Working Party on Data Collection and Statistics (WPDCS), the secretariat tabled a proposal to update the type of fisheries to include more granularity (IOTC, 2022a). The proposal was to divide fishing operations into 7 categories: recreational (<24m), subsistence (>15 m), small-scale (>15m), semi-industrial (15–24m), semi-industrial (high seas) (<24m), industrial (≥24m), and exploratory (≥24m) (IOTC, 2022a). However, this proposal was not adopted. The IOTC also works with the FAO and encourages members to engage with the FAO matrix for the characterisation of fishing activities (IOTC, 2022b; FAO, Duke University, & World Fish, 2023). However, while it is useful to explore the characteristics of various fisheries, it is important to have clear boundaries between the different fishery types for management and scientific purposes.

The issue of having a too broad definition or no definition at all was also notable in the 15th Meeting of the Technical Committee on Allocation Criteria (TCAC) of the IOTC in 2025. The TCAC is currently negotiating an allocation framework for stocks covered by the IOTC. During the 15th TCAC meeting, some members proposed to exclude all SSF from a potential allocation framework (IOTC, 2025; paragraph 48). A position that was strongly opposed by some of the other members, especially given that the IOTC does not have an official definition of SSF. This highlights the governance risks associated with the IOTC, identifying the need for improved SSF and understanding of shared tuna resources.

We acknowledge that it would be difficult to find a universal definition of SSF due to the variability of SSF (e.g., Aguión et al., 2025); however, having an Indian Ocean-specific definition would directly respond to the recommendation by the 25th FAO Capture Fisheries subject Group meeting that “countries, regional & subregional organisations choose their own definition of small-scale according to the management needs and political incentives” (FAO, 2016, p.46).

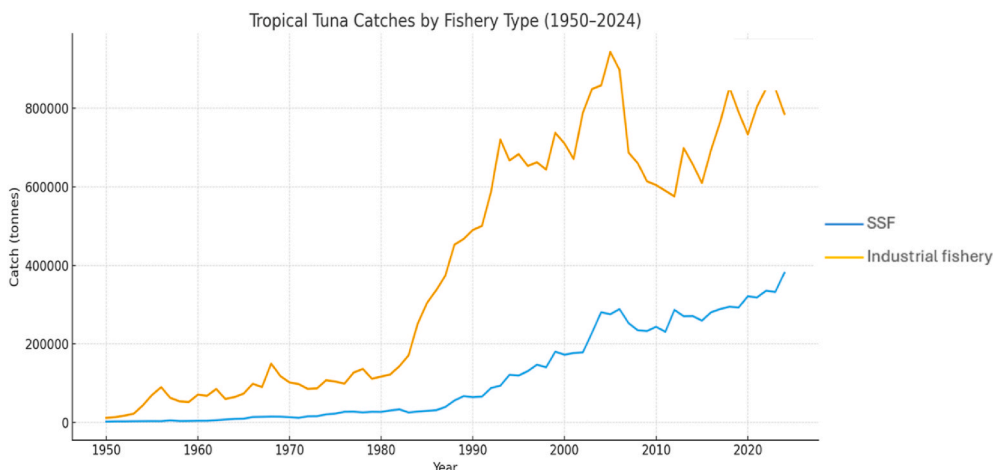
A lot of research has been conducted on the importance of SSF and the potential inclusion of SSF in policy making (e.g., Funge-Smith et al., 2023; Virdin et al., 2023; Basurto et al., 2025; Aguión et al., 2025; Andreoli et al., 2025). This paper complements this research by specifically focusing on the IOTC as a political forum for the voice of SSF. By proposing a definition of SSF, we aim to support work on strengthening data reporting, closing loopholes for industrial vessels that masquerade as SSF, and the development of SSF-specific management measures.

To develop an SSF definition for the IOTC, we first assessed all RFMOs on whether they have an SSF definition in place. Following this, we wanted to understand what definition IOTC member states have in place and assess the national fisheries legislation of IOTC members. Based on these assessments, as well as assessments of scientific literature and grey literature, we developed a definition for SSF for the IOTC. While this definition would be limited to the Indian Ocean region, we strongly believe that this paper will provide important information that might be useful for other RFMOs and might encourage them to consider an SSF definition for their region.

<sup>1</sup> No universally accepted definition for RFMOs exists. This paper defines RFMOs as organisations that have the mandate to manage fisheries on the high seas, consist of more than two members, and can establish legally binding measures. As per this definition, there are 13 RFMOs.

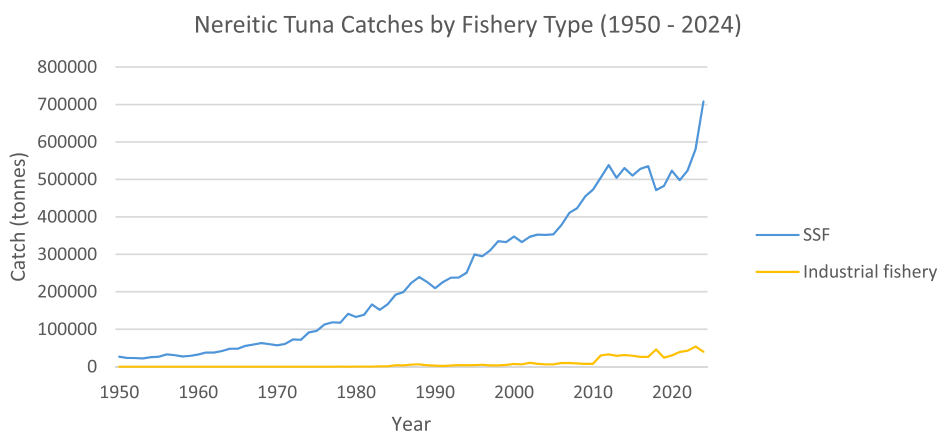
<sup>2</sup> General RFMOs manage straddling and deep-sea species such as squid, jack mackerel, or orange roughy while tuna RFMOs manage highly migratory species such as tuna species, billfish, or sharks.

<sup>3</sup> Some RFMOs refer to CMMs as resolutions. To ensure consistency, all binding measures will be referred to as CMMs.



**Fig. 1.** Catch of tropical tuna by industrial fisheries (orange) and SSF fisheries (blue). As per the IOTC's glossary, SSF includes all fisheries with a vessel below 24 m length and that fish entirely within the coastal state's EEZ.

Source: <https://foodandagricultureorganization.shinyapps.io/iotc-data-browser/#NC-SCI>.



**Fig. 2.** Catch of neritic tuna by industrial fisheries (orange) and SSF (blue). As per the IOTC's glossary, SSF includes all fisheries with a vessel below 24 m length and that fish entirely within the coastal state's EEZ.

Source: <https://iotc.org/data/datasets/latest/NC/SCI>.

## 2. Tracing SSF in RFMOs

Mentions of SSF were found in all but one RFMO (Table 1). In the 13 RFMOs examined here (Table 1), none has an official definition<sup>4</sup> of SSF in place. While SSF have been mentioned in the treaty texts of five general RFMOs, the only tuna RFMO that includes SSF in its treaty text is the Western and Central Pacific Fisheries Commission (WCPFC). Under Article 5 on the principles and measures for conservation and management, members have to “take into account the interests of artisanal and subsistence fishers” (WCPFC, 2000; Article 5(h)). Furthermore, Article 30 on the recognition of the special requirements of developing states notes the need to “ensure access to fisheries by subsistence, small-scale and artisanal fishers and fish workers” (WCPFC, 2000; Article 30.2(b)). The Southern Indian Ocean Fisheries Agreement (SIOFA) (i.e., general RFMO), for example, highlights the need to avoid adverse impact on SSF (SIOFA, 2006).

While an official definition is mostly lacking, definitions of SSF are

<sup>4</sup> Understood as having a definition under the “use of terms” section in the treaty text or a specific CMM or resolution that aims to define SSF for operational or management purposes.

sometimes included in CMMs, although these are not always aligned. For example, in IOTC Resolution 15/02 on mandatory statistical reporting requirements for IOTC contracting parties and cooperating non-contracting parties, coastal and artisanal fishing are defined as “Fisheries other than longline or surface fisheries (i.e., purse seines, pole & line, gillnet fisheries, hand-line and trolling vessels)” (IOTC, 2015). In the reporting guidelines for fisheries statistics to the IOTC, artisanal and small-scale fisheries are synonymous and are defined as fisheries that use vessels less than 24 m and operate exclusively within the respective coastal state's EEZs (IOTC, nd). However, IOTC Resolution 23/03 on establishing a voluntary fishing closure only exempts vessels below 12 m, not indicating whether they are SSF (IOTC, 2023b). In the WCPFC, CMM 2018-03 on mitigating the impact of fishing for highly migratory fish stocks on seabirds, defines small-scale vessels as vessels below 24 m (WCPFC, 2018). None of the CMMs in the Inter-American Tropical Tuna Commission (IATTC) or the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) defines SSF.

The most comprehensive definition was provided by the International Commission for the Conservation of Atlantic Tuna's (ICCAT) Recommendation 22-08, amending Recommendation 21-08 on establishing a multi-annual management plan for bluefin tuna in the eastern Atlantic and the Mediterranean (ICCAT, 2022). Acknowledging the

**Table 1**  
Overview of whether RFMOs have definitions for SSF in place.

RFMOs	Acronym	Official definition?	Mentioned in treaty text?	Mentioned in CMMs?
<b>General RFMOs</b>				
Commission for the Conservation of Atlantic Marine Living Resources	CCAMLR	No	No	Yes
General Fisheries Commission for the Mediterranean	GFCM	No	Yes	Yes
Northwest Atlantic Fisheries Organisation	NAFO	No	Yes	No
North-East Atlantic Fisheries Commission	NEAFC	No	No	No
North Pacific Fisheries Commission	NPFC	No	No	Yes
South East Atlantic Fisheries Organisation	SEAFO	No	Yes	No
Southern Indian Ocean Fisheries Agreement	SIOFA	No	Yes	No
South Pacific Regional Fisheries Management Organisation	SPRFMO	No	Yes	Yes
<b>Tuna RFMOs</b>				
Commission for the Conservation of Southern Bluefin Tuna	CCSBT	No	No	Yes
Inter-American Tropical Tuna Commission	IATTC	No	No	Yes
International Commission for the Conservation of Atlantic Tuna	ICCAT	No	No	Yes
Indian Ocean Tuna Commission	IOTC	No	No	Yes
Western and Central Pacific Fisheries Commission	WCPFC	No	Yes	Yes

diversity of SSF, a SSF vessel is defined as follows:

*“is a catching vessel with at least three of the five following characteristics: (a) length overall < 12 m; (b) the vessel is fishing exclusively inside the territorial waters of the flag CPC; (c) fishing trips have a duration of less than 24 hours; (d) the maximum crew number is established at four persons; or (e) the vessel is fishing using techniques which are selective and have a reduced environmental impact;” (ICCAT, 2022)*

The only two general RFMOs that included a definition of SSF in a CMM are the South Pacific Regional Fisheries Organisation (SPRFMO) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR). In SPRFMO's CMM 05 on a commission record of vessels authorised to fish in the convention area, artisanal fisheries have been defined as fishing vessels of no more than 15 m (SPRFMO, 2023). In the non-binding measure on the application of VMS in the catch documentation scheme, CCAMLR defined artisanal vessels as vessels with a length of less than 19 m (CCAMLR, 2025). RFMOs often define SSF by vessel length; however, an assessment of the existing definitions of SSF revealed a broad spectrum of lengths (Table 2). Concentrating solely on vessel length to define SSF might lead to mischaracterisations (Funge-Smith et al., 2023).

The RFMO that included the term SSF in the most CMMs is the General Fisheries Commission for the Mediterranean (GFCM). SSF are

**Table 2**  
Vessel lengths used to define SSF in RFMOs.

RFMO	Length	Source CMM
ICCAT	<12m	Recommendation 22-08 Amending the recommendation 21-08, establishing a multi-annual management plan for bluefin tuna in the Eastern Atlantic and the Mediterranean
SPRFMO	<15 m	CMM 05–2023 Commission record of vessels authorised to fish in the convention area.
CCAMLR	<19 m	Resolution 16/XIX Application of VMS in the Catch Documentation Scheme
IATTC	<20 m	Resolution C-24-09 Interim minimum standards for the use of electronic monitoring systems (EMS) in IATTC fisheries
IOTC	<24 m	As per guidelines for the reporting of fisheries statistics (IOTC, nd)
	<12 m	Resolution 23/03 On establishing a voluntary fishing closure in the Indian Ocean for the conservation of tropical tunas
WCPFC	<24 m <sup>a</sup>	CMM 2018-03 To mitigate the impact of fishing for highly migratory fish stocks on seabirds.

<sup>a</sup> Only applies to longline vessels. There is no definition for SSF purse seine vessels in place.

key stakeholders in the GFCM and, for example, a Working Group on Small-Scale Fisheries has been established (FAO, 2024b). Furthermore, the GFCM is an implementing organisation for the Regional Plan of Action for Small-Scale Fisheries in the Mediterranean and the Black Sea, which includes a ten-year plan “towards the long-term environmental, economic and social sustainability of the sector” (FAO, 2018, p. 1). Despite all the SSF work undertaken by the GFCM, SSF have not yet been defined, and the need for a definition has been highlighted in the Regional Plan of Action (FAO, 2018).

### 2.1. Exemptions

In most CMMs, SSFs are not explicitly mentioned. However, some CMMs exempt SSFs from the respective obligations (Table 3). This is especially true for the management of bycatch species such as sharks, cetaceans, whale sharks, or mobulid rays. Acknowledging the importance of these species for SSF in terms of food security and cultural value, the lack of definition opens the door to unintended consequences. For example, the lack of oversight of SSF might negatively impact the health of the marine ecosystem due to overfishing and habitat destruction (Silvestrini et al., 2025). Compared to all RFMOs, the IOTC has the highest number of SSF exemptions. Having a more specific definition of SSF and, as a result, more granular fisheries characteristics would be imperative to better differentiate between SSF and industrial fisheries. Furthermore, this could support the development of CMMs that specifically target SSF, intending to reduce the environmental pressure of SSF, for instance, through gear restrictions, effort controls or area-based management.

### 2.2. Performance reviews

Issues concerning SSF were also mentioned in RFMO performance review reports, predominantly concerning the lack of data from SSF (IATTC, 2016; CCSBT, 2021). Some performance reviews expressed concerns regarding the interaction between SSF and bycatch species such as sharks, mobulid rays, or seabirds, and the lack of data (IATTC, 2016). The IOTC's performance review report specifically noted the absence of an official definition of SSF (IOTC, 2016). For the purpose of the report, the authors of the IOTC performance review report defined SSF as fisheries using vessels with a length overall (LOA) of less than 15 m and fishing within the EEZ (mechanized or non-mechanized), while industrial vessels are those with LOA greater than 15 m and fishing outside the EEZ (on the high seas) (IOTC, 2016; paragraph 24). This definition is not aligned with the current working definition of the IOTC, which uses 24m as the defining length (IOTC, nd).

**Table 3**  
Exemptions of SSF in CMMs and non-binding measures of RFMOs.

RFMOs	Exemptions
CCAMLR	<b>Resolution 16/XIX Application of VMS in the catch documentation scheme</b> Footnote 1: This requirement does not extend to vessels of less than 19 m engaged in artisanal fisheries.
SPRFMO	<b>CMM 07–2025 on minimum standards of inspection in port</b> Paragraph 3(b): vessels of a neighbouring State that are engaged in artisanal fishing for subsistence [...] <b>CMM 05–2023 for the commission record of vessels authorised to fish in the convention area</b> Annex 1, Footnote 2: [...] Artisanal fishing vessels from coastal developing States of no more than 15 m in length fishing for jumbo flying squid will not be required to provide such information if not qualified to be issued one. [...]
IATTC	<b>Resolution C-24–05 for the protection and sustainable management of sharks</b> Paragraph 14: [...] with a goal to implement and maintain a standardized program that includes the monitoring of shark catches in small scale, coastal fisheries, as identified in SAC-15- 10, by 2026, taking into consideration the capacity requirements of those CPCs. <b>Resolution C-15–04 on the conservation of mobulid rays caught in association with fisheries in the IATTC convention area</b> Paragraph 5: As an exception, the requirements of this resolution do not apply to developing CPCs' small-scale and artisanal fisheries exclusively for domestic consumption.
ICCAT	<b>Recommendation 19–05 to establish rebuilding programs for blue marlin and white marlin/roundscale spearfish</b> Paragraph 10: Blue marlin and white marlin/roundscale spearfish that are caught for local consumption by [...] small-coastal fisheries are exempt from Para 4 [...] <b>Recommendation 09–07 on the conservation of thresher sharks caught in association with fisheries in the ICCAT convention area</b> Paragraph 1: [...] shall prohibit [...] with exception of a Mexican small-scale coastal fishery with a catch of less than 100 fish
IOTC	<b>Resolution 13/06 on a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries</b> Paragraph 3: [...] The provision of this measure does not apply to artisanal fisheries operating exclusively in their EEZ for the purpose of local consumption <b>Resolution 23/03 on establishing a voluntary fishing closure in the Indian Ocean for the conservation of tropical tunas</b> Paragraph 7: To prevent a disproportionate burden on artisanal fisheries, this closure period shall not apply to fishing vessels less than 12 m LoA fishing in their own EEZ [...] <b>Resolution 23/06 on the conservation of cetaceans</b> Paragraph 1: [...] These provisions of this measure do not apply to artisanal fisheries operating exclusively in their respective EEZ. <b>Resolution 16/11 on port state measures to prevent, deter and eliminate illegal, unreported and unregulated fishing</b> Paragraph 3.1 (a) vessels of a neighbouring State that are engaged in artisanal fishing for subsistence [...] <b>Resolution 13/05 on the conservation of whale sharks (<i>Rhincodon Typus</i>)</b> Paragraph 1: [...] The provisions of this measure do not apply to artisanal fisheries
WCPCF	<b>CMM 2023–03 for north pacific swordfish</b> Footnote 2: For the Chinese Taipei's coastal artisanal longline fishery, the level of fishing effort shall not be increased beyond the number of vessels licensed during 2008–2010

### 3. Tracing SSF in IOTC members' fisheries legislation<sup>5</sup>

SSF play an important role in many of the 29 member states of the IOTC, the majority being coastal states and that do not operate on an equal playing field. In some coastal developing members, SSF are the main fishery, as they have yet to develop their industrial fleets. To support our development of a definition of SSF for the IOTC, the fisheries

<sup>5</sup> This section specifically refers to artisanal or small-scale fisheries to accurately reflect the respective legal documents. However, as noted in the introduction, the term SSF includes artisanal and small-scale fisheries

management legislation of all IOTC members was assessed. We acknowledge that due to language barriers and the focus on fisheries legislation, detailed or specific information might not have been captured.

Overall, eleven IOTC members included a definition of SSF in their fisheries legislation. These definitions captured components such as length, tons, location of fishing, reason for fishing, and vessel type (Table 4). For example, Mauritius defines artisanal fishing vessels as vessels of less than 12 m and which are used within 15 nautical miles of Mauritius' baseline (Mauritius, 2023; paragraph 2). Bangladesh defines artisanal fishing vessels as vessels with a carrying capacity of net 15 tonnes or below (Bangladesh, 2020), while Tanzania defines artisanal fisheries as small-scale and not commercially oriented (Tanzania, 2003).

Generally, less than half of the IOTC members define SSF, and the existing definitions are very diverse, often concentrating on only one characteristic of SSF (i.e., length, gross tonnage, or vessel type). While most members characterise their fisheries into artisanal and industrial, Mauritius divides its fisheries into artisanal, semi-industrial, and industrial (Mauritius, 2023). The Philippines did not define artisanal fisheries, but instead defined commercial fisheries, which are divided into three groups: small-scale commercial fishing, medium-scale commercial fishing, and large-scale commercial fishing (Philippines, 1998). These groups are characterised by the type of gear used and gross tonnage (Philippines, 1998). This variation across the IOTC members' legislation underscores the absence of a standardised approach to SSF classification, which entails that no one parameter can be used to define them, but on the other hand, having multiple criteria may lead to fragmentation and complicate regional-level policy alignment, data harmonisation and the equitable application of conservation and management of living resources.

### 4. Defining SSF in the context of the IOTC

SSF play an important role in coastal communities; however, SSF are often excluded<sup>6</sup> from regional fisheries management (Basurto et al., 2025), and CMMs are often designed to support or complement the work of industrial fisheries. It is difficult to illuminate how much of the catch actually comes from SSF, as all RFMOs lack a definition of SSF. This lack of information might negatively impact regional fisheries management and all the involved stakeholders (e.g., large-scale fisheries) (Westlund et al., 2023). The absence of an agreed definition of SSF across RFMOs has implications that go beyond statistical classification, as without a clear and operational definition, SSF catches are often aggregated and

**Table 4**  
Summary of SSF characteristics as per the IOTC members' national legislation. These characteristics were selected and extracted because they represent the most commonly recurring operational criteria used by member states themselves to distinguish small-scale/artisanal fleets from larger commercial or industrial ones.

Length	Tons	Location of fishing	Reason for fishing	Vessel	Further characteristics
<10 m	<10 GT	Up to 12 NM – territorial sea	Livelihood	Canoe	Owner is involved
<12 m	<15 GT	Up to 15 NM	Subsistence	Un-decked vessel	Not commercially oriented
<24 m	<40 GT			Non-motorised	

<sup>6</sup> The IOTC's convention area includes the high sea and the EEZ in the Indian Ocean. Hence, if SSF fish in the EEZ, they are part of the IOTC management regime.

overshadowed by industrial data, hiding the SSFs' contribution among the global large harvesters (Bell et al., 2009; Basurto et al., 2025).

While some argue that due to the variability and diversity of SSF, it is not possible to define them (FAO, 2017; Rousseau et al., 2019), the lack of such a definition can undermine fisheries management efforts, for example, due to incomplete data, which might negatively impact stock assessments (Sumaila, 2017; Edgar et al., 2024). Moreover, the definitional gaps might result in undermining CMMs or being inconsistent in how CMMs are applied. The results showed that none of the RFMOs have an official definition for SSF, although some CMMs defined SSF in footnotes. Most of these definitions used only one characteristic of SSF, such as length (WCPFC, 2018; IOTC, 2023b; SPRFMO, 2023) or gear type (IOTC, 2015, 2019). The most comprehensive definition was found in the ICCAT Recommendation 22-08, which included five characteristics that define a small-scale fishing vessel and at least three of these characteristics need to apply. A similar approach of providing two characteristics for artisanal fisheries was found in the Mauritian Fisheries Act (Mauritius, 2023).

To support members in their effort to address the problem, the following proposal (Table 5) for a fisheries characterisation was developed, based on the IOTC secretariat proposal submitted to the 18th WPDCS (IOTC, 2022b), the "Illuminating Hidden Harvests" Report, which developed a matrix to characterise fisheries activities (FAO, Duke University, & World Fish, 2023), RFMO SSF definitions, and IOTC member states' national legislation (Table 4). For example, the vessel size component is heavily based on the SSF definition provided in the Mauritian Fisheries Act (Mauritius, 2023). It is important to have one consistent definition within the IOTC, as relying solely on national definitions (i.e. when they exist) can lead to inconsistent data reporting (MRAG, 2019).

By basing the fisheries classifications, on several categories instead of only one, for example, length, the approach will be more balanced, while still allowing some flexibility for member states, acknowledging the differences among SSF. This balance will be achieved by adopting a multi-criteria approach to SSF classification (as summarised in Table 5), which integrates multiple operational dimensions such as vessel length, gross tonnage, fishing location, crew size, and trip duration, rather than relying on a single parameter such as length. This would enable clearer differentiation between SSF and semi-industrial or industrial fishing

**Table 5**  
Classification for fisheries managed by the IOTC.

Fishery classification	Vessel size (meters or GT)	Area of operation	Further characteristics
SSF	<12 m; <10 GT	Territorial sea and contiguous Zone EEZ	- Fishing trips are of short duration, typically less than 24 h but not greater than 2 weeks - Crew size is small, not more than 12. - Use selective fishing or passive gears (e.g., handline, troll, traps, beach seine, boat seine, monofilament gillnets (less than 1 km)) (FAO, 2024a)
Semi-industrial	12–20 m; 10–40 GT	EEZ	- Fishing trips can range from less than two weeks but not greater than a month (30 days) - Fishing boats are motorised, - Crew size is medium-large, more than 12, but not greater than 22.
Industrial	>20 m; >40 GT	EEZ and high seas	- Fishing trips can range from a week to many months - Fishing boats are technically advanced

operations, proving operational clarity. The characterisation focuses on meters and gross tonnage, as some members characterise their fisheries according to GT and might not record length data. For example, Indonesia characterise SSF as fisheries below 10 GT (Indonesia, 2016). Unlike the fisheries characterisation put forward to the 18th WPDCS, subsistence and recreational fishing have not been included. SSF can be subsistence but also commercial, for example, as fishers might sell some of the fish at local markets. While the use of vessel size has been criticised, it is nevertheless an important characteristic of fisheries (Funge-Smith et al., 2023). Compared to the base definition, we down-scaled the vessel lengths for the three categories from 15 to 12 m for SSF and from 24 to 20 m for industrial vessels.

Dividing vessels into three categories would notably increase the data collection and reporting requirements, which might be challenging for some members, as will be described below. For example, as noted beforehand, the current IOTC approach does not require vessels less than 24m and those that fish entirely in EEZs to be included in the vessel registry. The three-category approach would instead promote greater transparency in fishing areas and significantly improve data collection, as SSF catches, particularly for neritic and tropical tunas, are currently poorly documented. This would allow managers to more accurately account for actual tuna catch and effort from each category (including area), leading to more informed and equitable stock assessment and management decisions. Furthermore, the proposed characterisation would allow for a more nuanced approach when managing tuna fisheries. For example, the impact on the marine ecosystem would be lower when only vessels below 12 m or 10 GT that fish predominantly within the territorial sea are exempt from respective management measures (e.g., catch reductions). For semi-industrial vessels, a staggered approach can be applied, for example, with a lower catch reduction compared to industrial vessels. A similar approach has already been applied for the yellowfin tuna catch limits (IOTC, 2021). In addition, there are several vessels which are highly advanced with technology, perfectly capable and equipped with storage and freezing facilities on board within the range of 20–24 m, but are still categorised as 'SSF' under the current IOTC working definition. Furthermore, we also propose that all industrial and semi-industrial vessels need to be registered in the IOTC RAV, independently of whether they only fish in EEZs. This would be an important step towards improving the transparency of fishing operations.

However, we acknowledge that applying this fisheries characterisation, or any characterisation that differs from the current approach, will not be easy. For example, current catch limits and allocation negotiations centre around catch history, and it would be very difficult to reassess historical catch series as per the new criteria. To address this concern, we suggest a transition phase of five years that allows the IOTC secretariat and its members to revise their data collection approach and start collecting data based on the new approach. During this period, it is important that various capacity-building opportunities are provided, either internally through the IOTC or externally funded programmes. This capacity support will be imperative as the increase in data collection and reporting requirements will place an additional burden on member states and might disproportionately burden coastal developing states, which are already lacking the capacity to fulfil current reporting requirements.

Overall, a regional definition for SSF and an aligned vessel characterisation approach is a necessary step towards a more equitable and sustainable fisheries management. Although the simple existence of a definition would not automatically lead to increased data collection, it would give a better understanding of the fisheries operations occurring within the Indian Ocean. However, as noted beforehand, increased data collection and reporting requirements and the alignment of national regulations with the fisheries characterisation will add an additional burden on coastal developing states. Hence, a targeted capacity support program needs to accompany the adoption of revised fishery types. Furthermore, more research is needed to develop low-cost data

collection mechanisms or alternate data reporting systems that are compatible with existing frameworks.

## 5. Conclusion

Under the UNFSA, states are required to avoid negatively impacting SSF. However, none of the RFMOs have an official definition of SSF in place, with sometimes differing definitions adopted in the various CMMs. This problem has been highlighted in various fora, including the 15th Meeting of the TCAC of the IOTC in 2025. While the IOTC has no official definition in place, like many other RFMOs, to support data collection, SSF have been defined as vessels below 24 m in length. Given the great amount of catch taken by SSF, this classification might undermine efforts to sustainably manage fisheries. Hence, this paper aimed to develop a more nuanced definition of SSF and, based on that, align and revise fishery types. We propose a 3-classification system – SSF, semi-industrial fisheries, and industrial fisheries. These three groups are characterised, for example, by the size of the vessels (i.e., <12 m/10 GT, 12–20 m/10–40 GT, >20 m/40 GT) and the location of fishing grounds (i.e., the territorial sea and EEZ, the EEZ, and EEZ and the high seas).

SSF are the backbone for most coastal developing communities, and it is important to ensure that they are not negatively impacted by fisheries management activities. However, it is equally important to ensure that the definition of SSF is not too broad and does not provide a loophole for industrial fisheries. Such loopholes might result in negative impacts on the marine ecosystem, but also on SSF themselves.

## Declaration of generative AI and AI-assisted technologies in the manuscript preparation process

During the preparation of this work, the authors used Grammarly to support the writing process. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

## CRedit authorship contribution statement

**Bianca Haas:** Writing – review & editing, Writing – original draft, Visualization, Investigation, Conceptualization. **Umair Shahid:** Writing – review & editing, Writing – original draft, Conceptualization.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Data availability

No data was used for the research described in the article.

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