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Recent levels of catch for SIOFA species of interest

The SIOFA Secretariat

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Abstract	

At its 10th annual meeting, the SIOFA Meeting of the Parties (MoP10) ENDORSED the recommendations in paragraph 178 of the 8th annual meeting of the Scientific Committee (SC8) report regarding candidate Harvest Control Rules for interim management, notably to:

a.   Maintain catches at present levels (unless there is evidence of a marked downward trend in the resource) until sufficient further informative data becomes available for meaningful improvements to the existing assessments. Where not previously defined for specific stocks, the SC recommends the present level be defined as the average (mean) of the 5 year period 2018–2022. For orange roughy, SC7 agreed that recent levels referred to the average of the last six years of that assessment (2015–2020).

This paper aims to provide detailed information on catch and effort levels to the SIOFA SC so that it can further consider their recommendations to the SIOFA MoP.

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Recommendations
• The SIOFA Scientific Committee to **note** the detailed catch and effort information, including average annual catch during the recent period, provided in this paper • The SIOFA Scientific Committee to further **consider** this information when formulating their advice to the SIOFA Meeting of the Parties

Recent levels of catch for SIOFA species of interest

Introduction

At its [10th annual meeting, the SIOFA Meeting of the Parties](#) (MoP10) ENDORSED the recommendations in paragraph 178 of the [8th annual meeting of the Scientific Committee (SC8) report](#) regarding candidate Harvest Control Rules for interim management, notably to:

> 178   Maintain catches at present levels (unless there is evidence of a marked downward trend in the resource) until sufficient further informative data becomes available for meaningful improvements to the existing assessments. Where not previously defined for specific stocks, the SC recommends the present level be defined as the average (mean) of the 5 year period 2018–2022. For orange roughy, SC7 agreed that recent levels referred to the average of the last six years of that assessment (2015–2020).

This paper aims to provide detailed information on catch and effort levels to the SIOFA SC so that it can further consider their recommendations to the SIOFA MoP.

Methods

A database extract was requested by the Science Officer to the Data Officer and was delivered on 15 September 2023. The information presented in this paper was extracted from different sources, depending on the type of data required. To minimize the confusion that can arise from having to interpret multiple data sources, explicit references have been made to data sources have been made in each table/figure in the paper.

The data used for the catch and effort analysis (including per Subarea) (2013–2022) come from the SIOFA HBHCatchEffort, the SIOFA AggregatedCatchEffort database and spatial layers.

The SIOFA Science Officer then used R code to create reproducible summaries of these data, which are also included as different sections of the annual SIOFA Fisheries Overview report 2024 (paper SC-09-14) and of the common mora fishery summary 2024 (paper SC-09-21). The analysis was limited to the creation of summary tables and figures (using the dplyr, tidyverse and ggplot packages), and to calculate average annual catches of the recent period.

Detailed code for these analyses is publicly available at the [SIOFA GitHub repository](#), as part of the SIOFA Fisheries Overview code.

Results

1. Main species catch and effort

The catch of trawl vessels was predominantly alfonsino (1.1) and orange roughy (1.2). Species also caught by trawling include pelagic armourhead, bluenose warehou, violet warehou, ocean blue-eye trevalla and oreo dories, cardinal fish, hapuku wreckfish.

The addition of Thailand's fishery added Lizardfish and scads as a major catch from small trawlers since 2015.

The catch of longline vessels differs between three groups. There are longline vessels (reported by EU, Japan, Korea and France Overseas Territories) that catch Patagonian toothfish (1.3) and associated species, such as blue antimora. The second group catch hapuka (1.4), ocean blue-eye trevalla, pelagic armourhead, rubyfish, common mora and, historically, deep-water sharks. The third group was the Chinese Taipei tuna longline fleet that catch oilfish (1.5).

The catch of the historical gillnet fisheries was predominantly deep-water sharks. Large-scale pelagic driftnets and deepwater gillnets use in the SIOFA Area has been prohibited since October 2016, when CMM 05(2016) entered into force.

China's light seining fishery targeted mackerel and *Brama* species (such as *Brama japonica*) and its bottom longline fishery targeted ruby snapper and other species in the Lutjanid family.

1.1 Alfonsinos (ALF, *Beryx* spp.)

The most common species of alfonsinos caught in the SIOFA Area was splendid alfonsino (BYS, *Beryx splendens*), but sometimes catch of another species (alfonsino, BXD, *Beryx decadactylus*) or not identified to the species level (ALF, *Beryx* spp.) were also reported. The data on all alfonsinos has been aggregated, and is presented here, at the highest taxonomical resolution.

Alfonsinos are long-lived, late-maturing, benthopelagic fishes found at a depth range of 25–1300 m, but more commonly at 400–600 m. Alfonsinos have a global distribution, excluding the north-eastern Pacific and the Mediterranean, and are often aggregating around underwater topographic features (particularly during spawning). Further information on alfonsinos and their fishery in the SIOFA Area are provided in a relative Fisheries Summary.

Catches of alfonsino have been increasing over the last years but are overall within the historical average (Figure 1a). The average annual catch of alfonsinos during the recent (2018–2022) period was 3698.2 t.

Effort has decreased in recent years, from higher values in 2013–2017 (Figure 1a). Alfonsinos are mostly caught in the western SIOFA Area, mainly Subareas 2, 3a, 3b and 4 (Figure 1b).

Figure 1a and b – Yearly alfonsino catch (t) and effort (number of trawls) in the SIOFA Area (upper panel, a) and in different SIOFA Subareas (lower panel, b) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

Recent years have seen lower levels of effort with higher catches (Figure 1a), so unstandardised catches per units of effort (CPUEs) have been rising correspondingly (Figure 2).
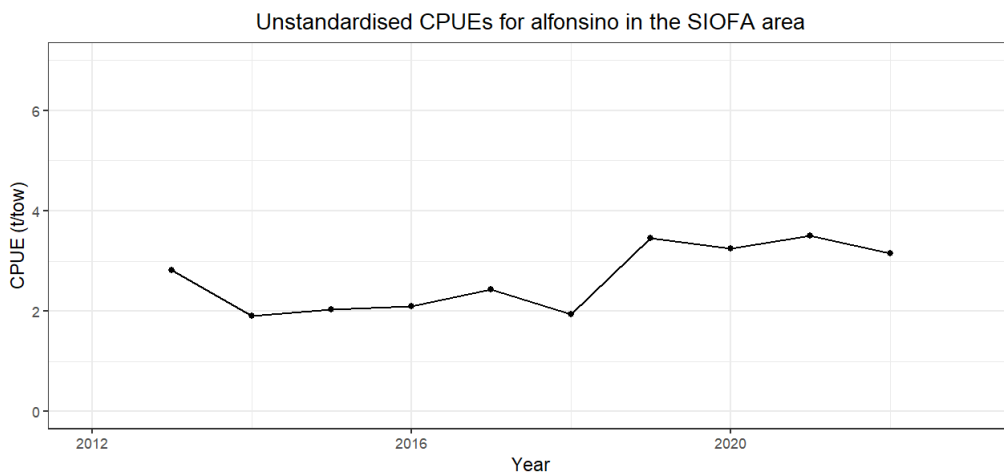

Figure 2– Unstandardised catches per unit of effort (CPUEs) of alfonsino in the SIOFA Area (t/tow) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

1.2 Orange roughy (ORY, *Hoplostethus atlanticus*)

The only species of slimehead caught in the SIOFA Area was orange roughy (ORY, *Hoplostethus atlanticus*).

Orange roughy is a long-lived, late-maturing, bathypelagic species found at a depth range of 180–1809 m, but more commonly at 400–900 m. Orange roughy is present in all oceans and is often found both around underwater topographic features and plateaus. Spawning and non-spawning aggregations are known. Further information on orange roughy and its fishery in the SIOFA Area is provided in the SIOFA Fisheries Summary: orange roughy (*Hoplostethus atlanticus*) 2023.

Catches of orange roughy have been increasing over the last years but are overall within the historical average (Figure 3a). The average annual catch of orange roughy during the recent (2018–2022) period was 1075.7 t. However, note that SC7 defined a period of six years instead of 5 years as the recent period for this species. Using the SC7 criterion, the average annual catch of orange roughy during the recent (2017–2022) period was 1082.8 t.

Effort has decreased in recent years, from higher values in 2015–2018 (Figure 3a). Orange roughy was mostly caught in the western SIOFA Area, mainly Subareas 2 and 3a (Figure 3b).
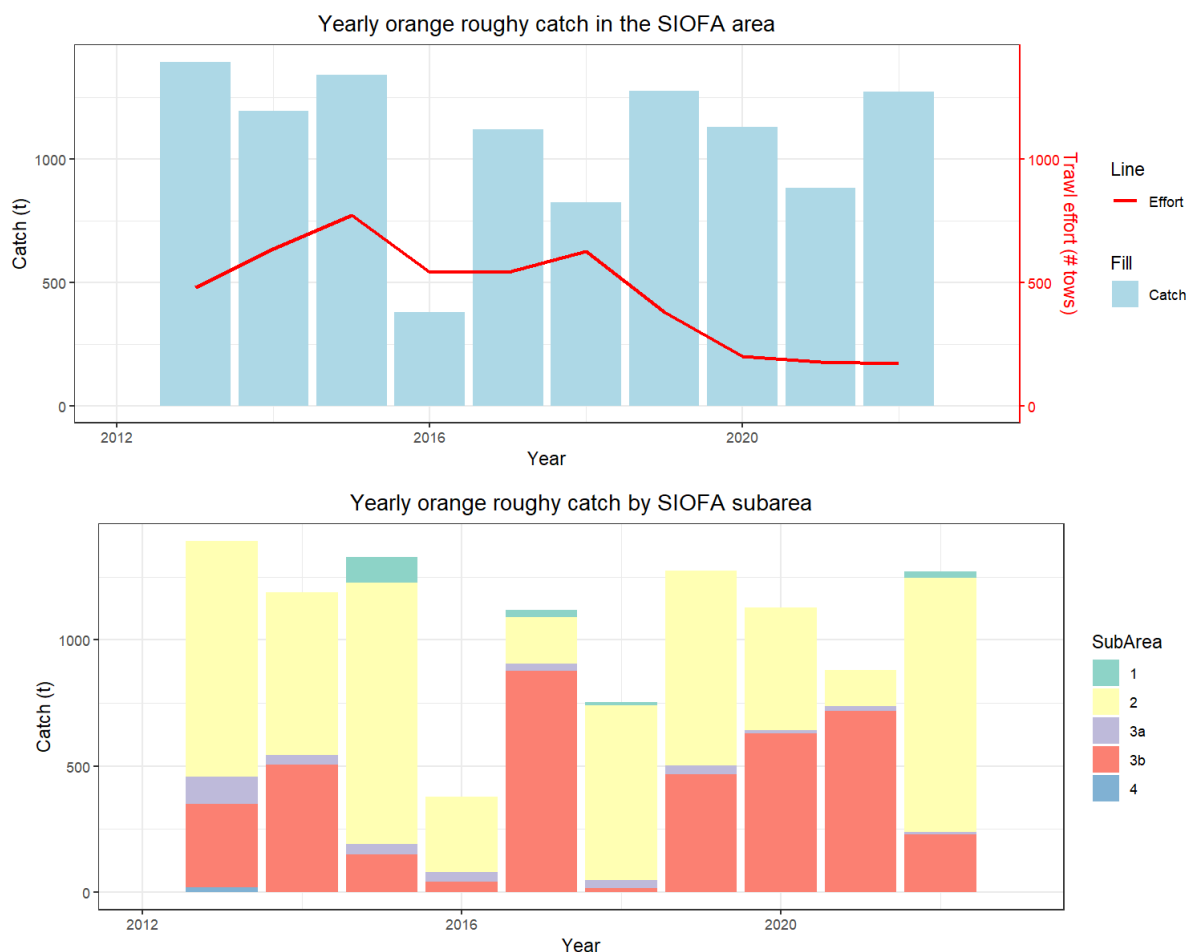

Figure 3a and b – Yearly orange roughy catch (t) and effort (number of trawls) in the SIOFA Area (upper panel, a) and in different SIOFA Subareas (lower panel, b) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022). Values of the figure in panel a are provided in Table A.1 and values of the figure in panel b are provided in Table A.2 (both in Appendix A).

Recent years have seen lower levels of effort with higher catches (Figure 3a), so unstandardised catches per units of effort (CPUEs) have been rising correspondingly (Figure 4).
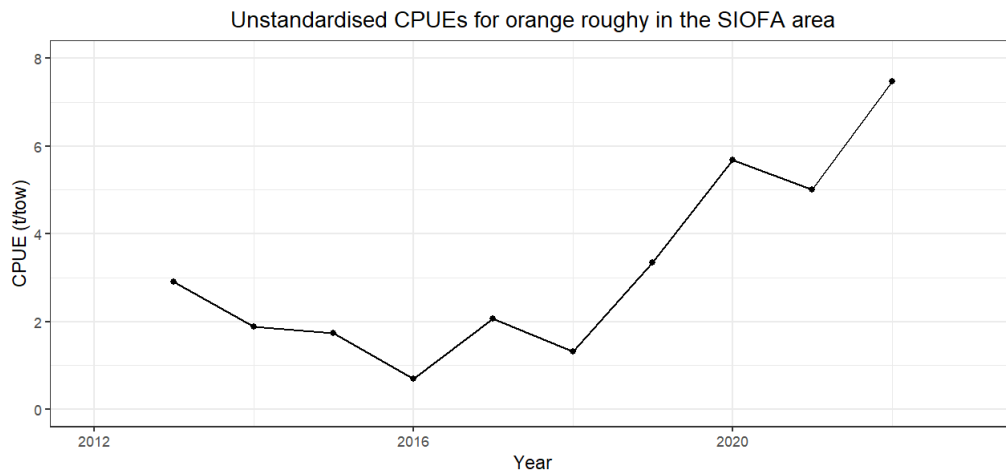

Figure 4 – Unstandardised catches per unit of effort (CPUEs) of orange roughy in the SIOFA Area (t/tow) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

1.3 Toothfish (TOT, *Dissostichus eleginoides* and *Dissostichus mawsoni*)

Patagonian toothfish (TOP, *Dissostichus eleginoides*) was the main species of toothfish caught in the SIOFA Area. However, few Antarctic toothfish (TOA, Dissostichus mawsoni) were caught in 2021 and 2022, which could indicate a distribution shift of this species into the SIOFA Area.

Toothfish are long-lived, late-maturing, large demersal fishes often found at depths greater than 1000 m. Patagonian toothfish is present in waters near the Antarctic, approximately east of southern America to New Zealand. Antarctic toothfish is present in waters near the Antarctic, approximately east of New Zealand to southern America.

Catches of toothfish have been decreasing over the last years, and effort has also decreased in recent years, from higher values in 2018 (Figure 5a), catches of Antarctic toothfish are hardly visible in the figure because of their limited amount. The average annual catch of toothfish (both species combined) during the recent (2018–2022) period was 257.2 t.

Catches of Patagonian and Antarctic toothfish come from the southern SIOFA Area, mainly Subareas 7 and 3b (Figure 5b).

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Figure 5a and b – Yearly toothfish catch (t) and effort (10 thousand hooks) in the SIOFA Area (upper panel, a) and in different SIOFA Subareas (lower panel, b) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022). Note that the Subareas are larger than the toothfish Assessment Areas.

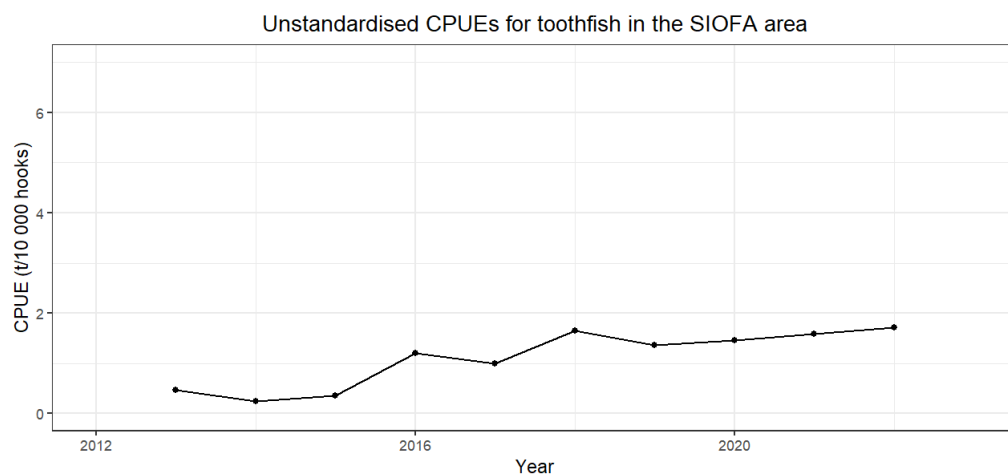Unstandardised catches per units of effort (CPUEs) have been slightly rising in recent years (Figure 6).

Figure 6 – Unstandardised catches per unit of effort (CPUEs) of toothfish in the SIOFA Area (t/10 thousand hooks) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

1.4 Hapuka (HAU, *Polyprion* spp.)

Hapuka is a taxa of groupers that includes both the hapuku wreckfish (WHA, *Polyprion oxygeneios*) and wreckfish (WRF, *Polyprion americanus*) species, as well as catch not identified to the species level (HAU, *Polyprion* spp.). All three taxa have been recorded in catches from the SIOFA Area, mostly derived from demersal longline fisheries but occasionally also from benthopelagic midwater trawl fisheries.

Hapuka are large, long-lived, late-maturing, demersal groupers often found at depths of 50–854 m. Hapuka are found on rough grounds and seamounts off the shelf, with a circumglobal distribution in southern oceans. Further information on hapuka and their fishery in the SIOFA Area are provided in a relative Fisheries Summary.

Catches of hapuka have significantly increased in 2019 and especially 2020, and effort has also correspondingly increased (Figure 19a). The yearly catch composition was relatively variable, but hapuku wreckfish was the most commonly caught species in the last years (Figure 7a). The average annual catch of hapuka (all species combined) during the recent (2018–2022) period was 82.1 t.

Hapuka are caught in the western SIOFA Area, mainly Subareas 2, 3a and 3b (Figure 7b).
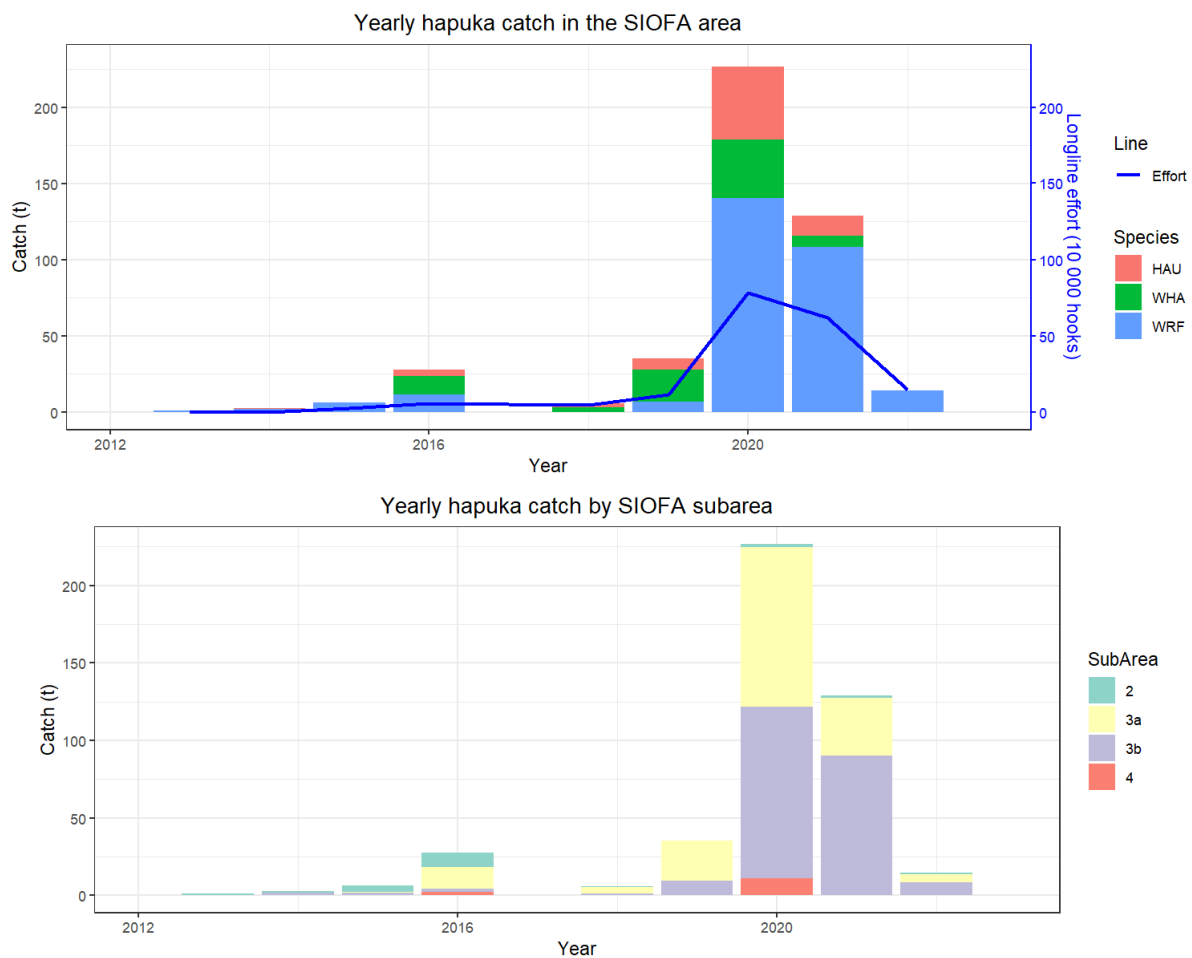

Figure 7a and b – Yearly hapuka catch (t) and effort (10 thousand hooks) in the SIOFA Area (upper panel, a) and in different SIOFA Subareas (lower panel, b) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

Recent years have seen higher levels of effort with higher catches (Figure 7a), with unstandardised catches per units of effort (CPUEs) remaining relatively stable (Figure 8).
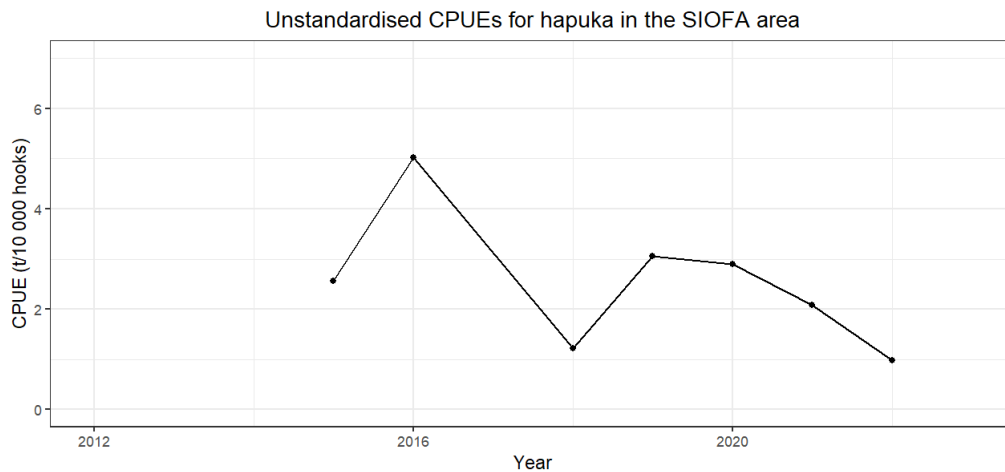

Figure 8 – Unstandardised catches per unit of effort (CPUEs) of hapuka in the SIOFA Area (t/10 thousand hooks) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

1.5 Oilfish (OIL, *Ruvettus pretiosus* and LEC, *Lepidocybium flavobrunneum*)

Oilfish include both oilfish (OIL, *Ruvettus pretiosus*) and escolar (LEC, *Lepidocybium flavobrunneum*) two species of the Gempylidae family.

Oilfish are benthopelagic, found at a depth range of 100– 800 m in subtropical waters of all oceans, and mainly fished with longlines. Note that almost all targeted catch and effort was by Chinese Taipei from its pelagic longline fishery, but a small amount of bycatch was also reported by other CCPs from other gears.

Both oilfish and escolar can grow to over 2 m in length and over 50 kg, but average sizes measured in the SIOFA Area are around 27 kg (see section 10). Despite having very high levels of indigestible wax esters in their flesh (which is likely at the root of the ban on sales in countries like Japan or Italy), these species are sought after in several countries and fished in relatively significant amounts in the SIOFA Area. Further information on oilfish and their fishery in the SIOFA Area are provided in a relative Fisheries Summary.

Catches of oilfish in the SIOFA Area were first reported in 2013, but at very low levels (Figure 9a). The average annual catch of oilfish (both oilfish and escolar combined) during the recent (2018– 2022) period was 13529.6 t.

Effort was only reported starting in 2015, and has progressively increased since, with catches increasing and then stabilizing at levels higher than the other main SIOFA species (Figure 9a). Oilfish are mainly caught in the western SIOFA Area, particularly in Subareas 1 and 3b (Figure 9b). The SIOFA SC8 and MoP10 noted the significant catch of oilfish in cells that are both in exclusive economic zones (EEZs) and in the SIOFA area and stressed the need to consider this catch information for any future assessment of oilfish in the SIOFA Area.
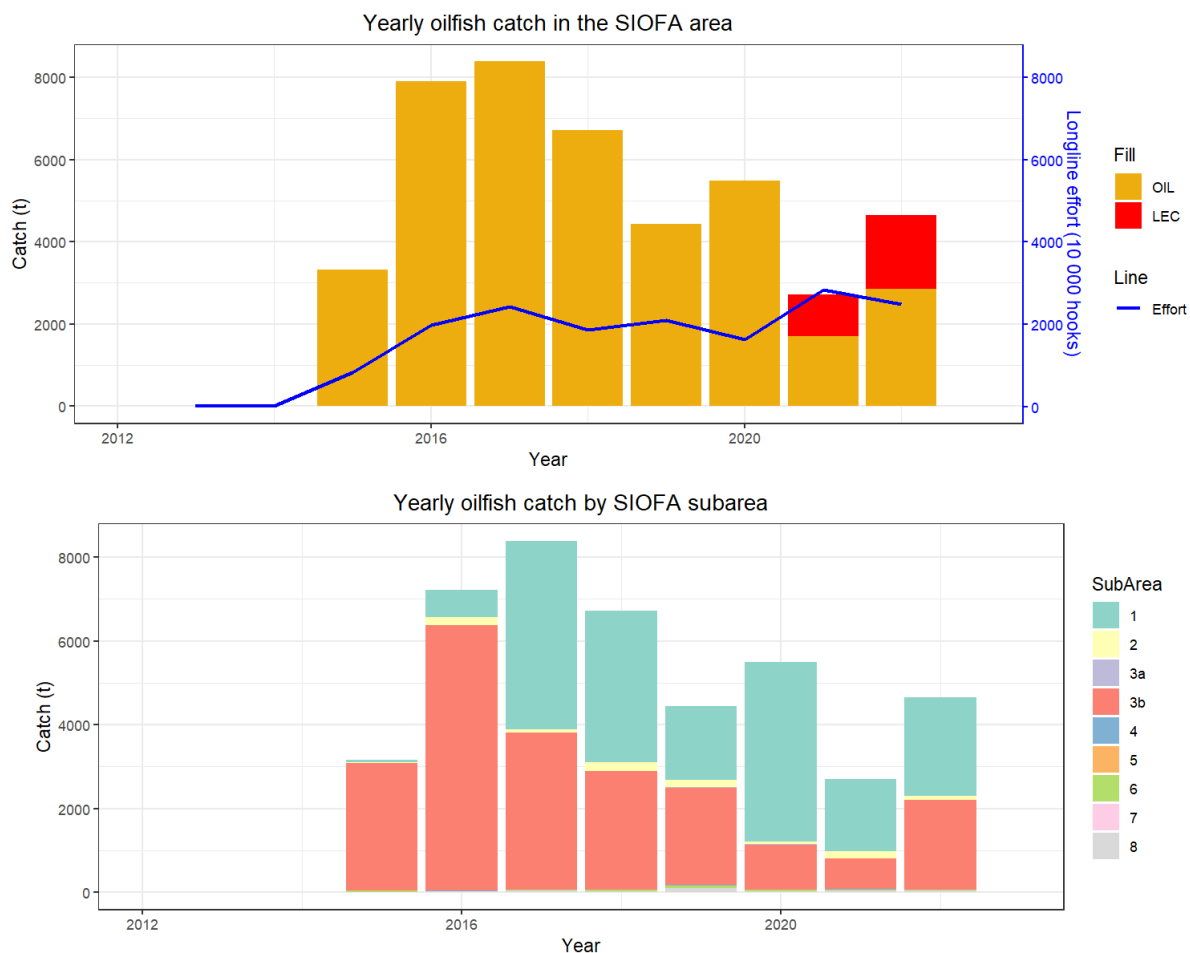
Figure 9a and b – Yearly oilfish catch (t) and effort (10 thousand hooks) in the SIOFA Area (upper panel, a) and in different SIOFA Subareas (lower panel, b) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

Effort has been relatively stable in recent years, with slightly declining catches (Figure 9a), such that unstandardised catches per units of effort (CPUE) declined slightly (Figure 10). In 2021 effort increased and catches decreased, leading to a marked decline of CPUE.

Unstandardised CPUEs cannot be considered a reliable index of abundance. Standardised CPUEs have not been produced for these species.
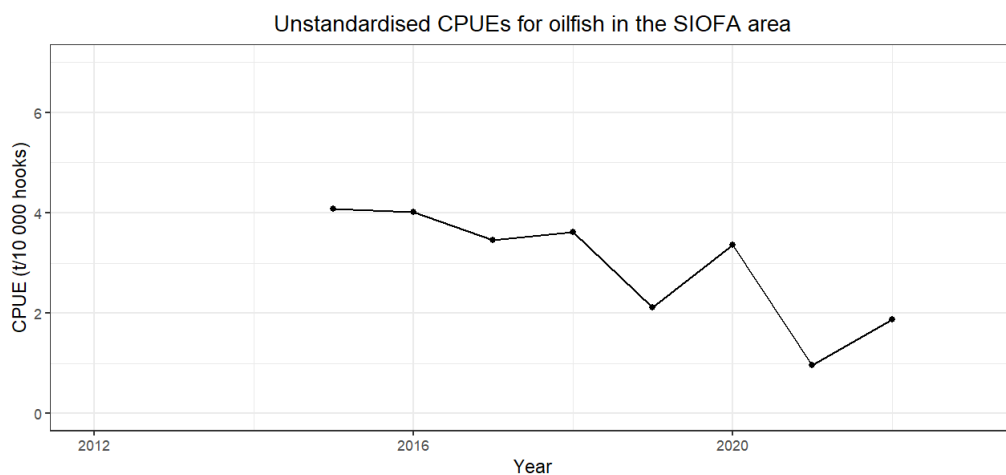

Figure 10 – Unstandardised catches per unit of effort (CPUEs) of oilfish in the SIOFA Area (t/10 thousand hooks) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2022).

2. Other species catch and effort

2.1 Common mora (RIB, *Mora moro*)

Note that fishing effort and catches reported in this section are intended to represent total catch of RIB, irrespective of whether each specific fishing event had been targeting this species or not. There were no fishing events where RIB was declared as a target species. Consequently, CPUE represents the CPUE of all operations that caught common mora even as bycatch, and are likely to depend on the targets of each operation (when declared). In this context CPUE as depicted here cannot be considered a reliable index of abundance.

Catches of common mora in the SIOFA area were first reported in 2013 from deepwater gillnets, and at levels much higher than the most recent years (Figure 11a). Effort and catches decreased between 2015 and 2019 as the fishery switched from gillnets to longlines (Figure 11a). The average annual catch of common mora during the recent (2018–2022) period was 44.7 t.

Effort levels have been increasing in recent years, from 2020 onwards (Figure 3a). Note that the effort figures in Figure 3a include also fishing events that targeted species other than common mora, as long as that fishing event also caught common mora, but exclude all effort for which the common mora catch was zero. For this reason, the unstandardised CPUE shown in Figure 3 cannot be considered an index of abundance.

Common mora is mainly caught in the western edge of the SIOFA area, particularly in subarea 2 (Figure 11b).
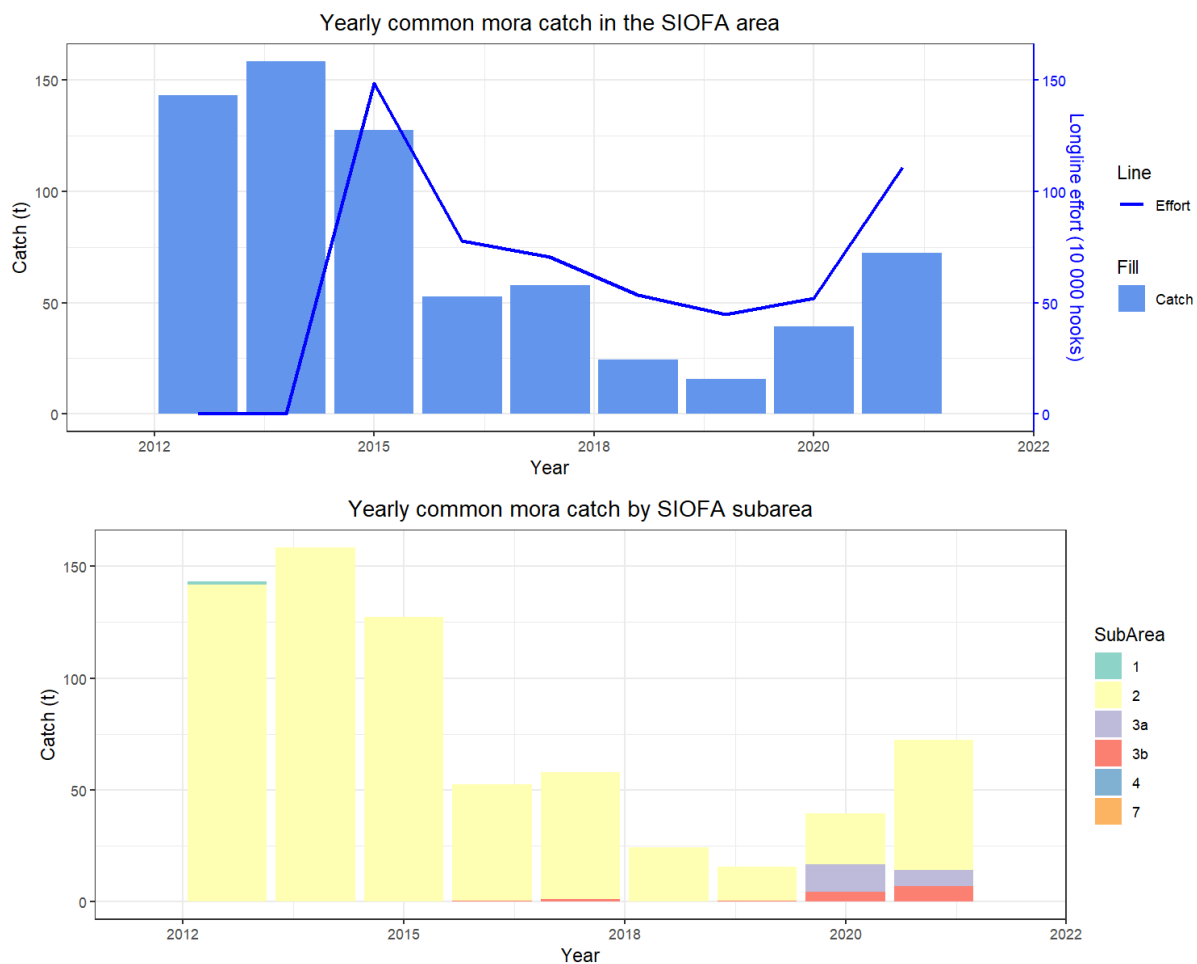
Figure 11a and b — Yearly catch of common mora (t) and effort (10 thousand hooks) in the SIOFA area (upper panel, a) and in different SIOFA subareas (lower panel, b) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2021). Figure 2a displays only longline effort, while prior to 2016 the species was caught with gillnets (for which fishing effort cannot be calculated due to a lack in data reporting details).

Effort has been rising back to 2015 levels from a low point around 2019 (Figure 11), but unstandardised catches per units of effort (CPUE) have remained stable throughout the time series (Figure 12).
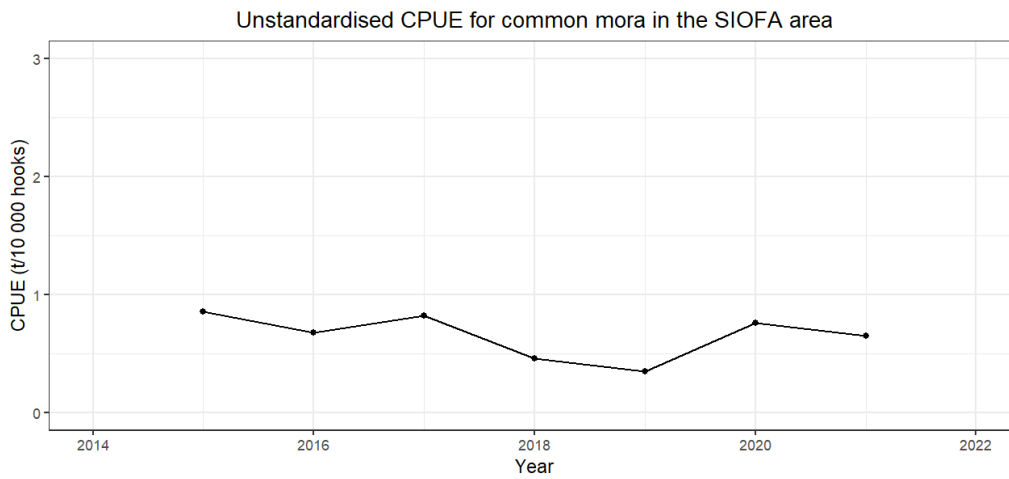
Figure 12 – Unstandardised catch per unit effort (CPUE) of common mora in the SIOFA area (t/10 thousand hooks) (source: SIOFA AggregatedCatchEffort and HBHCatchEffort databases 2013–2021).

Acknowledgments