



**SCIENTIFIC COMMITTEE
EIGHTEENTH REGULAR SESSION**

ELECTRONIC MEETING
10 – 18 August 2022

**A revised draft conservation and management measure for
South Pacific Swordfish in the WCPFC Area**

WCPFC-SC18-2022/MI-WP-08

Australia

A revised draft conservation and management measure for southwest Pacific swordfish in the WCPFC Area

Australia

Purpose

The purpose of this paper is to seek scientific/technical feedback from WCPFC Members and Participating Territories on a revised draft CMM for southwest Pacific swordfish (**Attachment A**).

Specifically, the Scientific Committee is asked to provide feedback regarding:

- If there is sufficient assessment, catch statistical and catch projections information to support a Commission decision on a revised and strengthened measure for this stock.
- That the total catch limit specified in the measure is consistent with the objective of the draft measure.
- If there are additional “alternate options” for managing swordfish bycatch that could be considered in the measure, and the research/evidence that supports the likely effectiveness of these.

Australia will use this feedback, along with feedback from TCC19 and further bilateral consultations to inform a revised draft CMM for WCPFC19 consideration.

Background

The need for a revised CMM

The current measure for southwest Pacific swordfish (CMM 2009-03) contains no restrictions on fishing mortality in the high seas area north of 20°S and contains flag-based limits south of 20°S that, in combination with unconstrained catches north of 20°S, may be too high to prevent future overfishing. Subsequently, it lacks the overall provisions required to ensure the ongoing sustainability of the stock and does not protect either future fishery development opportunities for SIDS nor the economic viability of either current swordfish targeting fisheries or fisheries for which swordfish is an important economic bycatch.

Key principles for a revised CMM

At WCPFC16 in 2019, Australia committed to helping the Commission develop a revised draft measure (Attachment A) that would meet a set of key principles, linked to the WCPFC Convention. The following principles aim to ensure a CMM that will:

1. apply in EEZs and high seas throughout the whole area of the stock (consistent with Article 3 and Article 5);
2. be reflective of our current best understanding of swordfish science and its assessed status;
3. prevent further increases in fishing mortality on the stock to avoid future overfishing and an overfished stock (as per Article 5);
4. accommodate subregional zone-based management approaches and limits and ensure compatible management and limits on the high seas (as per Article 8).
5. recognise the sovereign rights of coastal States to explore, exploit, conserve and manage HMS within areas under their national jurisdiction (as per Article 7), and
6. recognise the special requirements of, and avoid transferring a disproportionate burden of conservation upon, SIDS and Participating Territories (as per Article 30).

WCPFC16 also recognised the need to seek the development of a consistent set of conservation and management measures for fish stocks that occur in both the WCPFC and IATTC Convention Areas (as per Article 22).

Progress to date

In the period since WCPFC16, a large suite of work has been funded and undertaken within the WCPFC processes to ensure that the revised draft CMM can be based on the latest relevant fisheries information, data and science, and be able to meet the principles outlined above. A significant body of work has been completed to inform the revision of the CMM including:

- [WCPFC16-2019-DP19](#) (AU paper to WCPFC16): A review of the current CMM 2009-03 and based on that review, the proposal to design a revised CMM around the above principles.
- [SC17-MI-IP-10](#): A review of potential management options for fisheries taking swordfish as bycatch (provided to SC16 and updated at SC17).
- [\(SC17-MI-IP-12\)](#) and [\(SC18-MI-IP-11\)](#) – A spatial and temporal characterisation of catch data for fisheries targeting swordfish or taking swordfish as bycatch, both on the high seas and within EEZs.
- [SC17-SA-IP-08](#): A general characterisation of fisheries taking swordfish in the southern WCPFC Area (SC17 paper by SPC).
- [SC17-SA-WP-04](#): A revised stock assessment for SWPO Swordfish (SC17 paper by SPC).
- [WCPFC18-2021-21](#): Outcomes of a suite of Southwest Pacific Swordfish catch projections (<https://meetings.wcpfc.int/node/14248>)

Overview of draft CMM

The revised draft CMM at Attachment 1 draws upon the above suite of technical and information papers presented to the Commission over the past two years to both address the key principles outlined above and ensure the CMM can meet its high-level objective.

Objective

The objective of this draft measure is to maintain spawning biomass depletion ratio at or above recent (2019) levels. This objective ensures the sustainability of the stock but importantly also recognises:

- the importance of this stock to the commercial viability of fisheries targeting this stock (noting further depletion would result in declines in CPUE),
- its economic value as a significant retained bycatch for some fisheries, and
- its importance to the future development aspirations of Small Island Developing States and Territories.

It is important to note that as a result of the healthy status of the stock, and moderate stock depletion levels, **this draft CMM does not seek to reduce fishery catches** but rather, focuses on preventing significant increases in future catches (fishing mortality) to levels that would lead to additional depletion of the stock, relative to recent (2019) levels.

Area of application

At WCPFC16, members expressed support for broadening the spatial scope of the measure to the whole area of the stock within the WCPFC Area. The revised CMM at **Attachment A** applies to the whole area of the stock (i.e. south of the equator within the WCPFC area of competence), both within EEZs and on the high seas.

This addresses a key gap in the current CMM 2009-03, which applies only to fisheries south of 20S, noting that in the recent period 2017-2021, 42-57% of annual catches have been taken north of 20S

(ie 0-20S), with the majority of that catch taken on the high seas. This draft CMM thus addresses **Principle 1 (above)** relating to **Articles 3 and 5 of the Convention**.

Consideration of stock status and catch projections

The revised draft measure (**Attachment A**) aims to be reflective of our current best understanding of swordfish science and its assessed status, consistent with **Principle 2** (above). The measure takes account of the most recent stock assessment (SC17-SA-WP-04) which indicated that the stock is not overfished nor subject to overfishing against reference points currently applied to tuna's (20% SSB depletion or MSY based reference points¹). The revised measure takes account of the Scientific Committees recent advice, including the continued importance for WCPFC to develop a revised and strengthened CMM that will ensure the ongoing future sustainability of the SWP swordfish.

It also takes account of catch projections (summary tables in **Attachment B**) presented in the WCPFC19-2021-20, which demonstrate that:

- Projections that maintained the 2016-2018 “status quo” catch levels tended to result in the stock being maintained at similar depletion levels to the starting year of 2019, both at the 10 year and terminal (30) year stage of the projections.
- A catch increases of 20% above the 2016-18 status quo level resulted in a 22% risk of breaching the 20% $SB_{F=0}$ LRP applied to tunas (overfished status) and a 21% risk of F exceeding F_{MSY} (overfishing status) over the 30 year projection.
- A catch increases of 30% above the 2016-18 status quo level resulted in a 30% risk of breaching the LRP applied to tunas (overfished status) and a 26% risk of F exceeding F_{MSY} (overfishing status) over the 30 year projection
- Under the two high catch scenarios (“fully caught limits” and “maximum catch”) the stock became considerably more depleted (to 10-18% of unfished spawning biomass levels after 30 years), with a relatively high number of projections that resulted in the stock crashing after only 10 years.

Fishing mortality controls

Given the outcomes of the assessment and projections, the revised CMM (**Attachment A**) acknowledges the current healthy state of the stock and as such:

- *does not* seek to implement catch reductions from recent levels for any fleets, however,
- *does* propose a system of catch limits for target fleets and alternate measures (currently specified as either a bycatch limit or method/gear limitation) for bycatch fleets, that in combination would seek to both prevent increases in future fishing mortality that could lead to overfishing, and also maintain the stock at levels that maintain future fishery development opportunities for SIDS, and protect the economic viability of existing swordfish fisheries and bycatch fisheries that swordfish makes an economic contribution to.

Consistent with the objective of avoiding further depletion of the stock (relative to the 2019 reference year) and utilising information from the catch projections (**Attachment C**) and SPC Catch statistics (**Attachment B**) the draft CMM aims to prevent total annual catch levels exceeding **7558 t**. It is important to note that this level of catch is significantly higher than catches taken in recent years (e.g. it is 2022 t greater than the 2021 catch). Relevant information pertaining to CCMs historical catches, and overall catch from the stock, are provided in **Attachment B**.

¹ Noting that a decision on an LRP for billfishes, including swordfish, is yet to be made by the Commission.

The revised CMM (in 2022) is also informed by information in *SC17-MI-IP-10*, relating to potential options (alternate measures) for fisheries taking swordfish as bycatch. A summary of the relative merits and appropriateness of the alternate measures explored in that paper is provided in **Attachment D**. That summary concludes that the two most appropriate options for bycatch fisheries are either bycatch limits or gear/method restrictions. Given the healthy status of the stock, measures for the major high seas bycatch fisheries simply aim to prevent increases in future bycatch above the “status quo” levels tested in the catch projections (**Attachment C**).

For Coastal State EEZ fisheries, adoption of an “alternate measure” for swordfish bycatch is only required by the draft CMM if the recent annual catch in that EEZ exceeds a 150t trigger. The reason for this is explained further below.

In considering the above framework for controlling fishing mortality, CCMs should note the following:

- **Keeping total catch consistent with objective** - The draft CMM does not currently contain proposed CCM EEZ and high seas limits and alternate measures, which are to be negotiated. However, it will be important that the sum total of negotiated limits and expected catches (e.g. under gear restriction options) does not exceed the overall catch limit stated in the measure.
- **Bycatch fishery options** - CCMs are encouraged to bring forward additional alternate options for consideration in the alternate options table, alongside supporting research and evidence to demonstrate the likely effectiveness of the CCMs proposed option in helping achieve the objectives of the draft measure.
- **Limit reference point (LRP)** - It should also be noted that potential limit reference points (LRPs) for billfish including swordfish are yet to be agreed by the Commission but were explored in a paper to SC17. Noting that median biomass depletion is currently substantially above any likely agreed LRP level, and the draft CMM aims to prevent any significant future decline in biomass, the draft CMM addresses this current gap by seeking a commitment from the Commission to agree an LRP for swordfish by 2024 at the latest.

Other key elements

The revised draft CMM aims to ensure that the future management of the stock can, in a manner consistent with the Convention:

- Accommodate subregional zone-based management approaches and limits and ensure compatible management and limits on the high seas (Principle 4 - as per Article 8 of the Convention);
- Recognise the sovereign rights of coastal States to explore, exploit, conserve and manage HMS within areas under their national jurisdiction (Principle 5 - as per Article 7); and
- Recognise the special requirements of, and avoid transferring a disproportionate burden of conservation upon, SIDS and Participating Territories (Principle 6 - as per Article 30).

To achieve this, the revised draft CMM contains a framework of provisions (see also Figure 1 below) to manage fishing mortality in a manner consistent with these principles by:

- Clearly dividing fishing mortality controls into zone based and high seas-based provisions.
- Further dividing those controls into catch limit-based controls for targeted fisheries and “alternate measure” controls for fisheries taking swordfish as bycatch – to avoid the transfer of disproportionate burden and to accommodate existing zone-based approaches.
- Only applying alternate measures requirements to Coastal States whose annual catches exceed 150t. Most Coastal State EEZs in the area of the stock are SIDS with minimal historical swordfish catch or contribution to its current depletion level (Attachments B, C). The trigger provision aims to mitigate the risk of disproportionate burden for those members.

- Allowing for swordfish fishery development in SIDS EEZs in the future, to maintain coastal state sovereign rights to explore and exploit fishery resources in their zones.

Paper SC18-MI-IP-11 to the SC17 demonstrates that most (e.g >90% between 2000-2021) fishery catches (and therefore fishing mortality and catch driven stock depletion) can be attributed to swordfish target fisheries (operating in EEZs and on the high seas) **and** fisheries taking swordfish as bycatch on the high seas. The revised CMM recognises these factors and aims to protect the rights of SIDS to access and develop fisheries for this resource in future, and not impose measures that impact on SIDS fishery tuna catches in the meantime.

Finally, it is worth noting that WCPFC should seek the development of a consistent set of conservation and management measures for fish stocks that occur in both the WCPFC and IATTC Convention Areas (as per Article 22). The WCPFC Commission Chair wrote to the IATTC Chair, as per the WCPFC16 decision, on 21 April 2020. The IATTC Chair replied on 23 April 2020, affirming the IATTC's commitment to a revised assessment, development of an IATTC management measure and cooperation with WCPFC on the management of southwest Pacific swordfish.

MCS provisions:

Note that the key MCS provisions for the draft measure will be further developed between SC and TCC, for review at TCC18.

CMM 2013-06 Assessment

Please note that a full assessment of the revised draft CMM against CMM 2013-06 will be provided to the Commission alongside the draft CMM in December 2022, following further consultation with WCPFC SIDS.

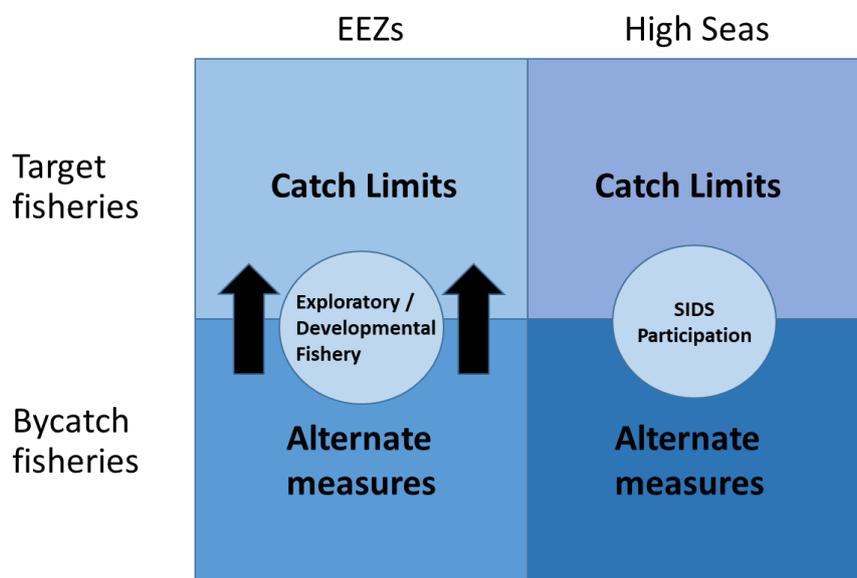


Figure 1 – Schematic representing the suite of controls on fishing mortality proposed to be included in the draft CMM, with swordfish targeting fisheries managed under catch limits and fisheries taking swordfish as bycatch managed via a suite of alternate measures (from which CCMs might select one or two, depending on their fishery circumstances and associated preferences).

Next steps

Following feedback from SC18 on the technical aspects of the revised draft CMM (Attachment A), Australia will seek to further progress development of the draft throughout the remainder of 2022 via:

Draft Swordfish CMM - AU Management Issues theme paper for SC18

- Further bilateral discussions with CCMs;
- Forum Fisheries Committee meetings,
- Technical and Compliance Committee review; and
- WCPFC19.

ATTACHMENT A

DRAFT CONSERVATION AND MANAGEMENT MEASURE FOR SOUTHWEST PACIFIC SWORDFISH

Conservation and Management Measure 20xx-xx*

PREAMBLE

The Western and Central Pacific Fisheries Commission (WCPFC):

Recognising that SC17 noted the current [preceding] measure (CMM 2009-03) for this stock does not contain provisions to limit total fishing mortality on the stock and emphasized the continued importance of WCPFC to develop a revised and strengthened CMM that will ensure the ongoing future sustainability of the SWP swordfish.

Recognizing that SC17 noted that fishing mortality is predicted to have increased gradually across the assessment region through the mid-1990s, increased sharply in the early-2000s and stabilized at high levels in the last decade, and that the median latest spawning potential depletion ($SB_{latest}/SB_{F=0}$) level is 0.39.

Recognizing that the SC17 determined that the southwest Pacific swordfish stock is likely not experiencing overfishing (80% probability $F < F_{MSY}$) and is likely not in an overfished condition (13% probability that $SB_{latest}/SB_{MSY} < 1$ and a 10% probability that $SB_{latest}/SB_{F=0} < 0.2$).

Further recognizing that SC17 stated that the outcomes of the assessment are on average more optimistic in relation to the 2017 assessment, but the estimated uncertainty has increased. Further, unresolved uncertainties combined with the need to further refine and review the new ensemble approach suggest additional caution may be appropriate when interpreting the current assessment outcomes to guide management decisions.

Further noting that SC17 noted that over the past two decades, the majority of catch has been taken by a combination of swordfish targeting fleets (in the area south of 20°S; 42%) and fleets taking swordfish as a bycatch on the high seas (in particular in the eastern stock area north of 20°S; 34%).

Noting that SC17 noted the suite of catch projections requested by WCPFC16, and undertaken by the SSP, are intended to test the future likely state of the stock under a range of potential future catch or effort scenarios and this information informs this conservation and management measure.

Recognising that catch projections presented to WCPFC18 highlighted that “status quo” catches (i.e. average catch for 2016-2018) would maintain the stock at slightly above recent (2019) depletion levels over 10 and 30 yr time frames and **noting that** recent (2019-2020) catch levels are significantly below status quo catch levels.

Further noting the range of potential alternate management measures for fisheries taking swordfish as bycatch, reviewed by SC16 and SC17 and the importance of ensuring that measures adopted for swordfish do not significantly impact on catches of tuna by longline fisheries targeting tuna.

Acknowledging IATTC’s recognition of the importance of establishing complementary conservation and management measures for species of mutual interest, and that swordfish stocks in the central Pacific are likely to occur in waters under the competence of both the WCPFC and IATTC;

Recognising the need for both IATTC and WCPFC to adopt conservation and management measures to provide for the sustainable management of swordfish stocks across the Pacific Ocean.

Noting that Article 30(1) of the Convention requires the Commission to give full recognition to the special requirements of developing States that are Parties to the Convention, in particular small island developing States and territories and possessions, in relation to the

conservation and management of highly migratory fish stocks in the Convention Area and development of fisheries for such stocks. This recognition should include the provision of financial, scientific, and technological assistance;

Noting further that Article 30(2) of the Convention requires the Commission to take into account the special requirements of developing States, in particular Small Island developing States, territories and possessions. This includes the need to ensure that conservation and management measures adopted by it do not result in transferring, directly or indirectly, a disproportionate burden of conservation action onto developing States Parties, territories and possessions;

Noting that Article 8(1) of the Convention which requires compatibility of conservation and management measures established for the high seas and those adopted for areas under national jurisdiction;

Recalling Article 8(4) of the Convention which requires the Commission to pay special attention to ensuring compatibility between conservation and management measures established for the high seas in the Convention Area that are surrounded by exclusive economic zones (EEZs) and measures established by surrounding coastal States in areas under national jurisdiction;

Noting further that the Parties to the Nauru Agreement have adopted and implemented a Vessel Day Scheme for the longline fishery and may establish longline effort limits, or equivalent catch limits for longline fisheries within their exclusive economic zones.

Noting furthermore that the Members of the Pacific Islands Forum Fisheries Agency have indicated their intention to adopt a system of zone-based longline limits **and alternate measures** to replace the current system of flag-based **swordfish** catch limits within their EEZs;

Recalling Article 25(1)(b) of the UNFSA places a responsibility on all States to cooperate either directly or through RFMOs to ensure that developing States can participate in high seas fisheries;

OBJECTIVE

1. The objective of this measure is to maintain the spawning biomass depletion ratio of southwest Pacific swordfish at or above recent (2019) levels.
This objective ensures the sustainability of the stock but also recognises:
 - a. the importance of this stock to the commercial viability of fisheries targeting this stock,
 - b. its economic value as a significant retained bycatch for some fisheries, and
 - c. its importance to the future development aspirations of Small Island Developing States and Territories.

Principles for the application of this measure

2. **Area of Application** - This Measure applies to all areas of high seas and all EEZs in the Convention Area south of the equator except where otherwise stated in the Measure.
3. **Sustainability and Economic viability** - This measure aims to reflect the current best understanding of swordfish science and its assessed status, and ensure that overfishing and an overfished stock do not occur in future (as per Convention Article 5). Furthermore, the measure aims to maintain the stock at levels that will support the economic viability of existing and potential future coastal state fisheries for this species.
4. **Compatibility** - Conservation and management measures established for the high seas and those adopted for areas under national jurisdiction shall be compatible in order to ensure conservation and management of the swordfish stock in its entirety.
5. **Small Island Developing States** - nothing in this Measure shall prejudice the rights of those small island developing State Members and Participating Territories in the Convention Area seeking to develop their domestic fisheries. For the avoidance of doubt, where the term

“SIDS” is used throughout this measure, the term includes Participating Territories. The term “CCM” means Members, Cooperating Non-Members and Participating Territories.

6. **Sovereign rights of coastal states and zone-based management** - This measure shall allow for the application of a zone-based management approach by FFA member coastal states and recognition of the sovereign rights of coastal states to explore, exploit, conserve and manage highly migratory species within areas under their national jurisdiction

Adopts as follows:

7. **Total catch** – The total catch of swordfish from this stock shall not exceed 7558 t² per year. This overall limit will be maintained until such time as revised limits can be developed based on revised stock assessment and projections.
8. **Zone based fisheries targeting swordfish** - Coastal states in the Convention area south of the equator with established fisheries for (targeting) swordfish shall restrict catches of swordfish within their EEZs in accordance with catch limits specified in Annex 1 Table X1 [**to be developed by the Commission*].
9. **Zone based exploratory/developing swordfish fisheries** - Coastal states in the Convention area south of the equator currently developing (or intending to develop) fisheries for (targeting) swordfish within their EEZ shall notify the Commission of intended zone based limits by [*within X months of targeted fishing commencing, or similar*] and subsequently restrict catches of (or targeted effort for) swordfish within their EEZs in accordance with that notified limit (to be reflected in Annex 1 Table X1 after notification). Such notified limits may be amended from time to time.
10. **Zone based fisheries taking swordfish as bycatch** - Coastal states in the Convention area south of the equator with fisheries taking swordfish as a bycatch only, and having taken more than 150 mt within their EEZs, [*annual reference period to be determined*] shall notify the Commission, by [specify date] of at least one of the "alternate measures" listed in Annex 1 Table X3, to be implemented in longline fisheries operating within their EEZ. Should that coastal state wish to develop a targeted fishery within its EEZ in future, the coastal state shall instead be subject to paragraph 9 (above).
11. **High Seas fisheries targeting swordfish** – CCMs fishing on the high seas in the Convention area south of the equator, with established fisheries for (targeting) swordfish, shall restrict catches of swordfish in accordance with the catch limits specified in Annex 1 Table X2.
 - a. **11bis – SIDS Participation in high seas fisheries** – [*e.g. TBD – A process to be developed for a SIDS to notify the Commission that it is ready to participate in the high seas and a consequent limit to be set*]
12. **High seas fisheries taking swordfish as bycatch** – CCMs fishing on the high seas in the Convention area south of the equator, which take swordfish as a bycatch, will notify the Commission, by [specify date] of at least one of the “alternate measures” listed in Annex 1 Table X3, to be implemented in their longline fisheries before [*specify date*].
13. **Adoption of a limit reference point** – The Commission will consider and adopt a limit reference point for this stock no later than 2024, and will task the Scientific Committee with developing further advice to inform a decision on an LRP in the intervening period.
14. **Review and amendment of longline provisions** – the Scientific Committee and the Technical and Compliance Committee shall review the implementation of this CMM at least every two years. Should the Scientific Committee identify that the sum total of limits and/or recent catches are inconsistent with the intent of this measure [specifically paragraphs 1 and 7], the Commission shall review the measure and consider amendment of limits and

² This is the catch level estimated by catch projections (WCPFC18-2021-21) to maintain the stock at or above recent (2019) biomass depletion level over 10 and 30 year time frames.

conditions at the next Commission meeting (post SC) to ensure the intent of the measure is met in future.

GENERAL PROVISIONS

DATA PROVISION REQUIREMENTS

15. CCMs will ensure the following additional minimum reporting requirements for longline operational characteristics that will include: a priority target species, light stick use, bait type, setting time (or fraction of night time soak) and gear settings that influence fishing depth (e.g. hooks between floats, branch line length, float line length, and/or line setting speed).

MONITORING CONTROL AND SURVEILLANCE PROVISIONS

16. All vessels conducting their fishing activities pursuant to this measure shall comply with all other relevant CMMs. Vessels found to be non-compliant with this measure shall be dealt with in accordance with CMM 2019-07, and any other applicable measure adopted by the Commission.
17. CCMs shall ensure that zone-based fisheries targeting swordfish and high seas fisheries targeting swordfish within the convention area shall be subject to the Commission's VMS SSP and are subject to x% of observer coverage or equivalent electronic monitoring coverage while actively fishing.
18. CCMs shall ensure that zone-based fisheries targeting swordfish and high seas fisheries targeting swordfish within the convention area shall be subject to any future electronic-reporting/CDS obligations adopted by the Commission.

[This example text is example text for MCS provisions – TCC feedback will be sought on practical implementation of these and alternate MCS provisions.]

Annex 1 (of Attachment A)

Table X1 – Coastal CCM EEZ longline catch limits (for fisheries that target swordfish)

Coastal CCM EEZ	Annual Catch Limit (mt)	Comment
CCM-1		
CCM-2		

Table X2 – High seas longline catch limits (for fisheries that target swordfish)

CCM	Annual Catch Limit (mt)	Comment
CCM-3		

Table X3 – CCM nominated alternate measures for longline fisheries taking swordfish as bycatch

No.	Measure	Description
1	Fleet specific swordfish bycatch limits	CCMs selecting this option will nominate and seek agreement on an annual catch limit (specified in metric tonnes) ³
2	Gear limitations	CCMs selecting this option agree to implement a ban on the targeting of swordfish, that includes a ban on the use of light sticks and squid bait (and, optionally, night setting) by their longline fleets.
3	Other Management Options?	<i>[..may be proposed by CCMs alongside evidence and information to support their effectiveness..]</i>

³ Noting that the sum of any catch limits and average expected catches under the combination of limits and gear restrictions must not exceed the total allowable catch that supports the measures objective

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ATTACHMENT B – LONGLINE SWORDFISH CATCHES

Table B1 – Longline Swordfish catch by flag, in the WCPFC Area south of the equator, for the period 2000 – 2021. Source - WCPFC-SC18-2022/MI-IP11 (SPC 2022).

flag	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
AMERICAN SAMOA	1	0	0	0	0	8	38	13	7	8	2	12	52	28	25	32	50	56	47	4	2	2
AUSTRALIA	2,696	2,267	2,275	2,039	1,784	1,730	1,136	1,353	1,483	1,315	942	916	1,157	1,062	1,183	1,150	992	1,066	854	729	576	615
BELIZE	3	128	10	417	117	44	23	7	4	2	7	19	10	43	0	0	0	0	0	0	0	0
CHINA	0	0	29	862	582	434	1,210	1,890	2,192	1,661	1,025	1,808	2,280	2,038	2,275	2,037	1,289	1,574	1,481	968	437	479
COOK ISLANDS	0	0	13	164	170	97	98	36	17	11	78	41	140	16	14	18	25	56	44	30	26	12
EU-PORTUGAL												197	222	223	107	177	168	0	0	0	0	0
EU-SPAIN					683	1,244	3,104	4,217	3,410	1,721	994	1,431	2,131	1,780	1,680	1,337	1,651	932	1,123	1,194	1,415	1,778
FIJI	118	115	170	160	261	177	210	86	85	107	90	128	128	128	167	122	141	117	105	118	106	62
FRENCH POLYNESIA	47	79	70	117	86	79	83	68	80	71	80	89	116	128	142	109	101	150	218	170	179	174
FSM													4	7	4	15	38	6	5	51	8	10
JAPAN	914	825	842	581	670	444	371	434	442	503	560	641	675	538	393	357	414	287	357	152	152	131
KIRIBATI	0	0	0	0	0	0	0	0	0	0	0	0	10	10	20	0	9	24	5	37	139	35
NEW CALEDONIA	40	41	46	48	17	12	10	19	15	7	8	10	10	9	14	9	8	22	8	24	9	10
NEW ZEALAND	975	1,027	920	635	538	348	581	392	347	418	535	738	686	777	583	713	755	504	463	264	219	302
NIUE						1	2	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0
PAPUA NEW GUINEA	12	22	22	30	73	98	80	82	81	79	93	125	177	114	114	2	6	6	21	15	0	0
REPUBLIC OF KOREA	1,120	1,100	1,116	636	758	470	388	139	455	505	782	992	985	933	550	433	362	356	634	356	322	322
SAMOA	123	27	14	12	4	1	3	5	6	5	7	5	5	3	4	5	4	16	11	21	27	4
SOLOMON ISLANDS	5	2	3	3	3	0	0	0	0	0	74	10	0	0	202	167	33	0	55	82	95	45
CHINESE TAIPEI	172	473	963	883	1,667	791	828	1,147	1,067	1,152	1,482	1,426	1,471	1,625	1,778	1,517	1,618	1,815	1,425	1,408	1,485	1,108
TONGA	29	44	42	25	10	18	21	31	28	22	26	22	19	26	37	42	39	32	44	33	16	9
TUVALU												10	38	6	3	6	3	12	2	1	1	1
VANUATU	1	5	149	135	704	423	148	140	131	117	200	122	178	316	333	450	213	411	410	189	295	437
WALLIS AND FUTUNA												0	0	0	0	0	0	0	0	0	0	0

Table B2 – Longline Swordfish catch, in the WCPFC Area south of the equator, by EEZ and high seas. Source - WCPFC-SC18-2021/MI-IP11 (SPC 2022).

Area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
High Seas	2,303	2,646	3,204	3,703	5,413	3,984	6,132	7,822	7,546	5,481	4,860	6,347	7,415	7,002	6,974	6,233	5,466	5,195	5,273	4,163	4,229	4,250
AMERICAN SAMOA	0	0	0	0	0	2	19	2	1	1	0	3	17	8	5	7	19	30	30	2	1	1
AUSTRALIA	2,499	2,130	2,084	1,773	1,481	1,498	1,030	1,298	1,461	1,293	921	905	1,141	1,028	1,161	1,147	963	1,050	842	725	565	615
COOK ISLANDS		0	13	161	170	94	85	35	16	17	80	69	390	118	91	82	86	71	47	92	44	32
FIJI	107	126	168	123	174	112	133	60	61	74	72	75	72	73	103	89	106	86	87	85	73	44
FRENCH POLYNESIA	117	79	70	116	85	76	79	68	80	71	80	89	116	128	142	109	101	150	218	170	179	174
NEW CALEDONIA	40	41	46	48	17	12	10	19	15	7	8	10	10	9	14	9	8	22	8	24	9	10
NEW ZEALAND	963	1,014	913	634	532	333	571	389	346	418	532	735	686	775	583	713	754	503	463	264	219	302
NIUE			0			1	2	2	0	0	2			3	2	1	0	0	1	3	2	1
PAPUA NEW GUINEA	12	22	22	30	73	98	81	88	84	82	93	128	181	117	141	9	55	58	80	62	15	8
SAMOA	123	27	14	12	4	1	3	5	6	5	7	5	5	3	4	5	3	7	6	10	13	2
SOLOMON ISLANDS	7	5	30	35	56	60	72	108	138	158	169	197	228	212	191	117	98	67	91	94	61	55
TOKELAU									0			7	25	0	13	23	23	23	9	17	27	6
TONGA	29	37	39	21	10	18	20	30	28	22	26	28	78	124	56	60	62	37	45	42	24	15
TUVALU	18	18	24	5	13	25	3	60	7	20	91	25	47	67	42	24	73	50	68	66	5	3
VANUATU	37	9	55	87	98	106	94	76	61	54	45	118	83	143	106	69	100	92	42	28	42	19
WALLIS AND FUTUNA						0						0										

1. Source: Annual catch estimates by EEZ/high seas areas (may differ from aggregate catch/effort data)

ATTACHMENT C

CATCH PROJECTIONS RESULTS (Source: WCPFC18-2021-20_rev1)

Table C1 – List of catch projections undertake to explore potential future stock status

- **“Status quo (SQ) catches”**: this projection assumes recent (average 2016-2018) levels of fishing (catch) both north and south of 20°S.
- **+/- “SQ catches”**: an additional limited number of projections which assume future catch scenarios across the region that are a fixed percentage above and below “status quo” and that result in a range of upward and downward long-term biomass trends. For this request we provide projections with a 20% decrease and increase on the status quo catch.
- **“SQ effort”**: this projection assumes recent (average 2016-2018) levels of fishing effort both north and south of 20°S.
- **+/- “SQ effort”**: for this request we provide projections under a 20% decrease and increase on the status quo effort.
- **“Fully caught limits”**: this projection assumes recent (average 2016-2018) levels of fishing (catches) north of 20°S and CCM-nominated maximum total catch levels (para 4 CMM 2009-13) of fishing south of 20°S.
- **“Maximum catch”**: this projection assumes peak (2011-2013) levels of fishing (catches) north of 20°S and CCM nominated maximum total catch levels (para 4 CMM 2009-13) for fishing south of 20°S.

Note: supplementary projection results for catch and effort scenarios of +/- 10 and 30% of SQ levels are included in appendices.

Table C2 – Fleet catch levels used in catch projections

Fishery	Name	Fleet	Catch (mt)			Scalar	
			SQ (2016-18)	FCL	MAX	FCL	MAX
1	DW_1N	DWFN	129.7	129.7	577.0	1.00	4.45
2	DW_1C	DWFN	147.8	337.7	337.7	2.28	2.28
3	DW_1S	DWFN	97.0	473.8	473.8	4.88	4.88
4	AU_1	AU	968.5	2165.1	2196.5	2.24	2.27
5	EU_1	EU	56.5	138.6	138.6	2.46	2.46
6	Other_1	PICT	44.7	44.7	199.1	1.00	4.46
7	DW_2N	DWFN	3566.7	3566.7	4843.0	1.00	1.36
8	DW_2C	DWFN	274.1	360.1	360.1	1.31	1.31
9	DW_2S	DWFN	0.0	0.0	0.0	1.00	1.00
10	NZ_2	NZ	574.0	1027.0	1027.0	1.79	1.79
11	EU_2	EU	1234.9	3031.7	3031.7	2.46	2.46
12	Other_2N	PICT	299.3	299.3	472.3	1.00	1.58
13	Other_2C	PICT	164.6	164.6	164.6	1.00	1.00
Total			7557.7	11738.9	13821.4		

Table C3 – Summary of main catch projection results

Summary table of projection outcomes at the end of 10 years and 30 years, in terms of median depletion ($SB/SB_{F=0}$) and risk relative to the tuna LRP), and median MSY-related metrics and associated risks under each scenario examined. The first row is the outcome for the 26 models from the 2021 assessment (last year 2019) using the model uncertainty only and the length-weight bias correction. Note risk level values from the assessment are not directly comparable to those from the projection period.

Scenario No.	Scenario	10-year outcome						30-year outcome					
		$SB/SB_{F=0}$		F/F_{MSY}		SB/SB_{MSY}		$SB/SB_{F=0}$		F/F_{MSY}		SB/SB_{MSY}	
		Median value	Risk < 0.2	Median value	Risk > F_{MSY}	Median value	Risk < SB_{MSY}	Median value	Risk < 0.2	Median value	Risk > F_{MSY}	Median value	Risk < SB_{MSY}
Projection start values	Assessment values	0.39	4%	0.53	15%	3.70	4%	0.39	4%	0.53	15%	3.70	4%
1	SQ catch -20%	0.49	6%	0.34	8%	3.24	4%	0.54	1%	0.24	1%	3.62	1%
2	SQ catch	0.41	12%	0.38	11%	3.19	4%	0.44	9%	0.32	9%	3.04	7%
3	SQ catch +20%	0.35	22%	0.46	15%	3.15	4%	0.36	22%	0.43	21%	2.52	17%
4	Fully caught limits	0.21	46%	0.51	23%	3.03	5%	0.18	54%	0.80	43%	1.45	40%
5	Max catch	0.16	59%	0.31	24%	2.98	6%	0.10	69%	1.21	56%	0.95	51%
6	SQ effort -20%	0.47	5%	0.34	8%	3.25	4%	0.48	4%	0.27	4%	3.39	2%
7	SQ effort	0.41	11%	0.36	8%	3.20	4%	0.42	9%	0.33	8%	2.98	5%
8	SQ effort +20%	0.36	18%	0.31	12%	3.16	4%	0.36	17%	0.40	15%	2.66	8%

Table C4 – Supplementary projections (10 and 30%) – Spawning biomass depletion levels after 10 and 30 years

Values for the 10th, 50th and 90th percentiles of the terminal (equilibrium) $SB/SB_{F=0}$ for the 100 stochastic projections for the supplementary future catch and effort scenarios. The first row is the outcome for the 26 models from the 2021 assessment (last year 2019) using the model uncertainty only and the length-weight bias correction.

Scenario No.	Scenario	Percentiles for 10-year projections			Percentiles for 30-year projections		
		10	(median)	90	10	(median)	90
Projection start value	2019 model uncertainty only	0.24	0.39	0.53	0.24	0.39	0.53
1	SQ catch -30%	0.28	0.53	0.69	0.42	0.59	0.74
2	SQ catch -10%	0.22	0.45	0.63	0.29	0.49	0.66
3	SQ catch +10%	0.15	0.38	0.57	0.15	0.40	0.58
4	SQ catch +30%	0.10	0.32	0.51	0.00	0.31	0.51
5	SQ effort -30%	0.26	0.50	0.66	0.31	0.52	0.68
6	SQ effort -10%	0.22	0.44	0.60	0.24	0.45	0.61
7	SQ effort +10%	0.18	0.39	0.55	0.18	0.39	0.55
8	SQ effort +30%	0.15	0.34	0.50	0.14	0.34	0.50

Table C5 – Supplementary projections (10 and 30%) – the percentage of supplementary scenario projections that breached standard WCPFC reference points for tuna species.

No.	Scenario	Percentages for 10-year projections			Percentages for 30-year projections		
		$(SB/SB_{F=0}) < 0.2$	$(F/F_{MSY}) > 1.0$	$(SB/SB_{MSY}) < 1.0$	$(SB/SB_{F=0}) < 0.2$	$(F/F_{MSY}) > 1.0$	$(SB/SB_{MSY}) < 1.0$
Projection start value	2019 'model uncertainty' only	4	15	4	4	15	4
1	SQ catch -30%	3	8	4	0	0	0
2	SQ catch -10%	8	9	4	4	5	4
3	SQ catch +10%	17	13	4	16	15	11
4	SQ catch +30%	26	17	4	30	26	23
5	SQ effort -30%	4	8	4	1	0	0
5	SQ effort -10%	8	8	4	5	8	4
7	SQ effort +10%	14	12	4	13	12	7
8	SQ effort +30%	22	15	4	22	23	12

SUMMARY OF ALTERNATE MEASURES OPTIONS FOR FISHERIES THAT TAKE SWORDFISH AS A BYCATCH

Note - the term “*bycatch fishery*” is used to describe fisheries that do not target swordfish but rather take swordfish as a bycatch while targeting other species (e.g. tuna’s). This term helps to distinguish these fisheries from those that do target swordfish (i.e. *target fisheries*). ***It is recognised that for some bycatch fisheries, this swordfish bycatch is still a significant and economically and commercially important component of those fisheries catch.***

Introduction

The following provides a summary of some of the key information on past swordfish bycatch and potential future “alternate measures” for managing swordfish bycatch levels under the revised draft CMM. This information is drawn from papers SC17-MI-IP-10 and SC17-MI-IP12 submitted to SC17 in August 2021. Readers are encouraged to look at those original documents in full, along with other papers developed to support CMM discussions for swordfish.

The intent of the draft CMM is to include a table of bycatch management options for CCMs, with the intent that CCMs will choose one of these options which best suits their fishery given the specific conditions and circumstances of that fishery. For example:

- **Example 1** - A CCM whose fishery predominantly fishes for tuna during the day using fish bait and no light sticks might choose to ban squid bait and light sticks (used to target swordfish) on the basis that those methods are not used anyway and it will not impact the fisheries tuna catch, but this would prevent future targeting of swordfish and associated increased fishing mortality.
- **Example 2** - A fishery that fishes at night with squid bait and light sticks for bigeye tuna might be better suited to having a catch limit, set at a level that allows normal ongoing bycatch levels including natural interannual variability (noting the stocks current healthy condition), ensures no impact on tuna catch, but prevents significant increases in future swordfish catch by actual targeting of swordfish.

This flexible multi-option approach is similar to that used in CMMs adopted by WCPFC for managing interactions with seabirds and sharks.

Key catch statistics

Based mainly on data provided in SC18-MI-IP11 (SPC, 2022), using the last 5 years spanning 2017-2021:

- Swordfish catch can be divided into catch taken by:
 - Fisheries taking swordfish as bycatch - accounting for 50-66% of total annual catch.
 - Fisheries targeting swordfish – accounting for 34-50% of total annual catch.
- 42-57% of the total annual swordfish catch has been taken north of 20S and 43-58% has been taken south of 20S (the area to which the current CMM 2009-03 applies).
- North of 20S, >98% of the catch is taken as bycatch, and of that 83-88% is bycatch taken on the high seas, mainly in the north-eastern area.
- 37-50% of the total annual (recent) catch from the stock has been taken north of 20S as bycatch on the high seas, and the majority of that bycatch is taken in the north-eastern high seas.
- South of 20S, the majority (75-84%) of swordfish catch is taken by swordfish target fisheries operating on the high seas and in EEZs, with about a fifth (15-26%) taken as bycatch by fisheries targeting tuna.

Summary evaluation of potential bycatch measures

1. Fleet specific bycatch limits

Background

Bycatch limits have been applied in fisheries globally via a number of different means, including as:

- number or weight of fish, or percentage of catch composition and
- proxy effort limits (e.g. fishing days).

They have also been applied at different temporal scales (e.g. trip limits, season or annual limits).

It is recommended for the draft CMM to include, in the table of “alternate measures”, an *option* for a annual bycatch limit in metric tonnes. This is the simplest type of catch limit to implement and monitor and has a direct relationship to fishing mortality.

What fisheries might this suit?

This might be considered a good option to adopt by a CCM whose fishery has a large retained bycatch of swordfish but who does not wish to choose a gear restriction option (e.g. light sticks and squid bait ban) due to the latter’s likely impact on tuna catches (e.g. on night sets aimed at bigeye tuna).

Given the current healthy status of the stock, it should be possible to agree bycatch limit levels for these fisheries that:

- firstly, allows normal ongoing swordfish bycatch levels, including natural interannual variability, and which subsequently ensures no impact on tuna catches, but which also..
- secondly, prevents targeting of swordfish and associated significant increases in future swordfish catch, and is thus consistent with the intent of the measure to avoid additional depletion of the stock.

2. Gear limitations

Background

Longliners targeting swordfish typically:

- use lightsticks, squid bait, and afternoon/night setting;
- set gear shallow (using short floatlines, branchlines, few branchlines between floats ~3-10);
- target seafloor features (seamounts, canyons, ridges, rises) or ocean temperature fronts/convergences/eddies, and;
- target the period on or close to the full moon.

It is recommended that the draft CMM ‘alternate measures’ table include an option for CCMs to choose to implement a ban on lightsticks and squid bait use. An additional associated option would be a ban on late afternoon/night setting. Of the targeting method features described above, these would be the most easily implemented and monitored, albeit still with some monitoring challenges similar to those encountered for seabird and other mitigation measures.

Which fisheries might this suit?

This might be considered a good option for CCMs whose fishery predominantly fishes for tuna (e.g. yellowfin or albacore tuna) during the day, using fish bait and no light sticks, on the basis that lightsticks and squid bait are not used anyway and it will therefore not impact at all on tuna catches by these fisheries, but it will prevent targeting and associated increased fishing mortality of swordfish.

This option is less likely to suit tuna fisheries targeting bigeye tuna at night, so those fisheries might choose a different option (e.g. catch limit).

Key considerations

There are some key issues associated with implementing such a measure:

- firstly, it does not directly cap catch and fishing mortality – so very large increases in fishing effort targeted at tuna could result in significant increase in bycatch of swordfish. The draft CMM includes a review by the SC every 2 years that could be used to check that fishing effort trends remain within the recent historical range and if they exceed this, the SC could consider the need for a review of the CMM (see para 14 of draft CMM).
- Secondly there are challenges in monitoring the implementation of such a measure. These are the same challenges as already encountered for monitoring mitigation measures for seabirds and turtles and sharks, which rely on at sea inspections, observers and port inspections. Monitoring can be strengthened in future through the adoption of EM in the fishery, including on the high seas.

3. *Prohibition of swordfish retention*

This potential measure is described in detail in SC17-MI-IP-10. It is not recommended that this option be included in the “alternate measures” table of the draft CMM, on the basis of:

- the current healthy status of the stock.
- the draft measure is not seeking catch reductions (relative to recent or “status quo” levels) for this stock.
- the important economic value of retained swordfish bycatch to some tuna fisheries.

Furthermore, its value in reducing fishing mortality requires further investigation, including a better understanding of the interaction of at haul mortality and post release mortality (as detailed in SC17-MI-IP-10).

Should the future status of the stock decline and catch reductions be required, then consideration of a option such as this might be further warranted, providing research/information to demonstrate its likely effectiveness is available at the time.

4. *Prohibition of live or undersized swordfish retention*

This potential measure is described in detail in SC17-MI-IP-10. It is not recommended that this option be included in the “alternate measures” table of the draft CMM, for generally the same reasons as described for option (3) (*Prohibition of swordfish retention*) above.

5. *Spatial, Temporal and Combined Management Options*

There are a range of possible combinations of the bycatch management options described above that may provide more effective and acceptable options for managing swordfish bycatch in the stock area, than a single option considered in isolation. Furthermore, the addition of specific spatial or temporal elements to those options can help to refine and focus their application.

CCMs are encouraged to bring forward additional alternate options for consideration in the alternate options table, alongside supporting research and evidence to demonstrate their likely effectiveness in helping achieve the objectives of the draft measure.