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Harvest Strategies and Allocation - Preliminary Paper

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Preliminary Paper

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1. Introduction

The Australian National Centre for Ocean Resources and Security (ANCORS) is beginning a new study into the development and implementation of harvest strategies and their interaction with national and regional allocation schemes. We look forward to discussing this study further with delegates on the sidelines of the meeting. In the meantime, we provide this preliminary review of case studies. We intend to further develop this into a comprehensive study in 2020 following feedback and further analysis. A/Prof Quentin Hanich will be attending the WCPFC and can provide further information on the study, or can be contacted at hanich@uow.edu.au

The Western and Central Pacific Fisheries Commission (WCPFC) is unique among tuna regional fisheries management organisations due to the significance of catches from small island developing State exclusive economic zones, and their collective influence on conservation and management negotiations. This has enabled the WCPFC to make significant progress on the development of harvest strategies in fisheries that occur largely inside their waters.

In 2017, the 14th Regular Session of the Commission established target reference points (TRP) for skipjack, yellowfin and bigeye that will enable the development of long term harvest strategies. Simultaneously, the WCPFC agreed to develop a process to allocate rights for the high seas purse seine fisheries, and the tropical longline fisheries more generally. Although harvest strategies do not require explicitly allocated fishing rights, the implementation of harvest control rules (with pre-agreed adjustments to effort or catch on the basis of changes in stock status) does necessitate that there be explicitly agreed responsibilities for implementing adjustments to fishing effort or limits, and clarity over how these adjustments are implemented.

While negotiating these commitments, the WCPFC is required by its founding Convention to ensure that decisions do not transfer a disproportionate burden of conservation action onto developing States.[1] More broadly, the global community has recognised the importance of fisheries to SIDS, and Sustainable Development Goal 14 (SDG14) has committed to increase the economic benefits to Small Island Developing States and least developed countries from the sustainable use of marine resources by 2030.[2]

Looking forward, these simultaneous developments provide opportunities for the WCPFC to carefully negotiate and create transparent and equitable rules to guide management and allocation decisions, and implement their conservation obligations consistent with the WCPFC Convention.

2. Background

The Law of the Sea Convention (LOSC) established the basic framework for reference points and prescribed obligations that would subsequently transform fisheries management and lead to the development of management objectives and harvest control rules. Articles 61 and 119 required States to determine allowable catches and ensure living marine resources were

[1] See Article 30 of the CONVENTION ON THE CONSERVATION AND MANAGEMENT OF HIGHLY MIGRATORY FISH STOCKS IN THE WESTERN AND CENTRAL PACIFIC OCEAN, *supra* note 9.

[2] UN GENERAL ASSEMBLY, *TRANSFORMING OUR WORLD: THE 2030 AGENDA FOR SUSTAINABLE DEVELOPMENT* 1–35 (2015).

not endangered by over-exploitation. States were required to consider the best scientific evidence available and adopt conservation and management measures that maintained or restored populations of harvested species at levels which could produce their maximum sustainable yield, as qualified by relevant environmental and economic factors. These factors included ecosystem concerns, the interdependence of stocks, fishing patterns, special requirements of developing States, and fishing patterns. In effect, this established MSY as the most extreme limit reference point, and laid the framework for the development of target reference points that addressed economic and other considerations.

The United Nations Fish Stocks Agreement subsequently built upon this framework, incorporating precautionary approaches, and further defined obligations for States to develop reference points and address ecosystem concerns. Annex II of the Agreement defined the reference points as:

- 'Limit reference points set boundaries which are intended to constrain harvesting within safe biological limits within which the stocks can produce maximum sustainable yield'

- 'Target reference points are intended to meet management objectives.'

The Agreement required that precautionary reference points be '… stock-specific to account, inter alia, for the reproductive capacity, the resilience of each stock and the characteristics of fisheries exploiting the stock, as well as other sources of mortality and major sources of uncertainty.' The Agreement prescribed that the '… fishing mortality rate which generates maximum sustainable yield should be regarded as a minimum standard for limit reference points. For stocks which are not overfished, fishery management strategies shall ensure that fishing mortality does not exceed that which corresponds to maximum sustainable yield, and that the biomass does not fall below a predefined threshold. For overfished stocks, the biomass which would produce maximum sustainable yield can serve as a rebuilding target.'

The Agreement provided the following guidelines for management strategies:

> 4. Management strategies shall seek to maintain or restore populations of harvested stocks, and where necessary associated or dependent species, at levels consistent with previously agreed precautionary reference points. Such reference points shall be used to trigger pre-agreed conservation and management action. Management strategies shall include measures which can be implemented when precautionary reference points are approached.
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> 5. Fishery management strategies shall ensure that the risk of exceeding limit reference points is very low. If a stock falls below a limit reference point or is at risk of falling below such a reference point, conservation and management action should be initiated to facilitate stock recovery. Fishery management strategies shall ensure that target reference points are not exceeded on average.

In practice, the use of a MSY reference point suggests that fishing effort should be steadily increased until a decline in yield signals that the optimum fishing level has been reached, at

which stage fishing effort should then be reduced to an optimum level to allow the stock to remain at that level. This is based on an understanding that the stock will decline, under pressure from fishing, to a level where more juvenile fish will survive and grow faster (i.e. fishing removes surplus from the stock and increases its productivity).

The MSY concept relies on the assumption that fish stocks are stable in population and behaviour. In reality, this assumption is false as few fisheries are stable due to the impacts of environmental fluctuations. Consequently, MSY could only be maintained if fishing rates varied widely from year to year synchronous with environmental fluctuations. Second, it is difficult to accurately determine MSY in advance. Usually, the MSY reference point is only determined retrospectively after it has been exceeded and stock productivity is declining. Third, the use of MSY as a reference point inevitably resulted in the fishery exceeding MSY, and created economic and political pressures if managers attempted to remove surplus fishing vessels in order to reduce fishing levels down to MSY. Fourth, the MSY concept does not adequately account for the inherently high levels of uncertainty in knowledge of the fishery. Fifth, MSY has been heavily criticised as economically inefficient and reduces the profitability of the fishery by focusing on the quantity of the catch, rather than on maximising the catch per unit of effort, and the value of the fishery.

UNFSA incorporated MSY (with the LOSC qualifiers) but re-focused its use in the context of the precautionary approach. Previously, MSY had been prescribed as an objective that fisheries management should aim towards (i.e. a management or target reference point). UNFSA changed this and established it as a conservation or limit reference point, within the context of the precautionary approach.

2.1 Harvest Control Rules

Tuna RFMOs must now develop management objectives, fisheries management strategies (harvest strategies) and harvest control rules that prescribe pre-defined management actions. Management objectives guide the fishery and define the parameters for reference points, particularly in the case of target reference points. Harvest control rules then prescribe a set of explicitly defined management actions that are implemented in the context of target and limit reference points. The pre-agreed harvest control rules ensure that fisheries managers immediately implement pre-agreed actions if reference points are exceeded. This then avoids highly political negotiations and delays in management responses that can further exacerbate overfishing.

T-RFMOs are required to adopt management objectives, reference points, management strategies, and harvest control rules that then bind members to act within their national jurisdictions. For example, ICCAT adopts a management strategy that prescribes harvest control rules that specify actions in circumstances where a reference point is breached. These actions are binding on all members and will likely require members to implement specific reductions or controls throughout their national jurisdiction, and potentially across their flagged vessels, throughout their EEZs, within their ports and inside their markets.

3. COMMISSION FOR THE CONSERVATION OF SOUTHERN BLUEFIN TUNA

Prior to the formation of the Commission for the Conservation of Southern Bluefin Tuna (**CCSBT**) and concerned with signs of depleting SBT stocks Australia, Japan and New Zealand arranged trilateral meetings to set catch limits.

In 1983, the first agreed catch limits were set at 21,000 tonnes for Australia; 10,000 tonnes for New Zealand and no limit for Japan for the 1983 fishing season.[3] During the 1983 season, Australia caught 15,843 tonnes, Japan caught 23,323 tonnes and New Zealand caught only 93 tonnes. A similar process was followed for the 1984 fishing season.[4]

The actual catch rates for 1983 and 1984 were then used as the basis to inform subsequent agreed catch limits in following years. A trending decline in catch rates ensued until agreed catch limits levelled out to 5,265 tonnes for Australia, 6065 tonnes for Japan and 420 tonnes for New Zealand in 1989.

No formal harvest strategy was in place during this period and scientific assessments served to confirm declining catch rates and declining stock biomass.[5] Although the CCSBT was established in 1993 it was not until 2011 that the Commission adopted harvest control rules.[6]

Despite the relatively late adoption of harvest control rules, the current SBT quota limits and member allocations remains at similar 1989 historical catch levels with the dominant quota shares going to Japan and Australia and the percentage allocation of SBT total allowable catch (**SBT TAC**) to members correlates with historical catch rates.[7] Additionally, the percentage allocation to members generally does not change unless additional members join the Commission.

This demonstrates that the SBT harvest control rules and subsequent allocation of the SBT TAC evolved out of historical catch performance.

The subsequent sections of this case study detail the technical aspects of the SBT harvest control rules and SBT TAC allocation. Namely:

- the CCSBT Management Procedure (**MP**) adopted in 2011 which guides the setting of the SBT TAC and sets out the harvest control rules for the fishery (Section 3.1);[8] and
- the CCSBT *Resolution on the Allocation of the Global Total Allowable Catch* which allocates the SBT TAC to members (Section 3.2).

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[3] A. E. Caton, 'Review of aspects of Southern Bluefin Tuna biology, population and fisheries' in Richard S Shomura, Jacek Majkowski and Sarah Langi (eds), *Interactions of Pacific Tuna Fisheries: Volume 2 Papers on biology and fisheries* (Food and Agricultural Organization of the United Nations, FAO Fisheries Technical Paper 336/2 ed, 1991), 2.Overview, Table 2.

[4] Ibid.

[5] Ibid.

[6] CCSBT, *Resolution on the Adoption of a Management Procedure*, adopted at the Eighteenth Annual Meeting, 10-13 October 2011 (*CCSBT MP Resolution*)

[7] Caton, above n 11.

[8] *CCSBT MP Resolution*.

3.1 CCSBT Management Procedure / Harvest Control Rules known as the 'Bali Procedure' and 'Capetown Procedure'

From 2012, the CCSBT 'Bali Procedure' has guided CCSBT fisheries limit, based on the following principles:

(a) That there is a 70% probability of rebuilding the stock to the interim rebuilding target reference point of 20% of the original spawning stock biomass by 2035;
(b) The minimum TAC change (increase or decrease) is 100 tonnes;
(c) The maximum TAC change (increase or decrease) is 3,000 tonnes;
(d) The TAC will be set on a tri-annual basis (i.e for three-year periods); and
(e) The national allocation of the TAC within each three-year period will be allocated according to the *Resolution on the Allocation of the Global Total Allowable Catch*.[9]

Furthermore,

(f) A meta-rule process is to be adopted by the Extended Scientific Committee (**ESC**).[10] The meta-rule process describes:
    (i) The process to determine whether exceptional circumstances exist;
        - Specifically, an annual review of stock and fishery indicators; a tri-annual in-depth stock assessment and a six-yearly review of the performance of the MP.[11]
    (ii) The process for action where the ESC determines that exceptional circumstances exist;
        - Namely, the ESC will in the same year consider the severity of the circumstances and advise the Commission.[12]
    (iii) The principles for action.
        - If an exceptional circumstance is triggered, the ESC will make recommendations to the Commission that the TAC be revised and advise on the appropriate TAC to be implemented based on defined parameters depending on whether the risk event is a risk to the stock or a risk to the fishery.[13]

This is now in the process of being replaced by the Capetown Procedure (adopted in 2019). This will guide the setting of TACs for 2021 onwards to take into account changes in data availability in relation to recruitment monitoring.[14] This new procedure has a 50% probability of achieving a biomass level of 30% of the original spawning stock biomass by 2035[15].

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[9] *CCSBT MP Resolution*, para. 6.
[10] CCSBT, "Attachment 10: CCSBT Management Procedure: METARULE Process", *Report of the Fifteenth Meeting of the Scientific Committee*, 11 September 2010 (*CCSBT Metarule Process*).
[11] *CCSBT Metarule Process*, para. 1.
[12] *CCSBT Metarule Process,* para.2.
[13] *CCSBT Metarule Process*, para. 3.
[14] CCSBT, *Management Procedures* (2019) <https://www.ccsbt.org/en/content/management-procedure>
[15] CCSSBT, *Management Procedures* (2019) <https://www.ccsbt.org/en/content/management-procedure>

3.2 **CCSBT TAC Allocation Process**

CCSBT members acknowledge that they desire a "transparent and stable process of allocating total allowable catch to Members and Cooperating Non-Members."[16]

SBT TAC is allocated to members and non-members based on a nominal catch percentage level as set out in the Annex to the *Resolution on the Allocation of the Global Total Allowable Catch* and copied below. **Table 1** below sets out the catch for the 2018-2020 three-year block, the amounts are a per annum catch allowance.

Table 1: CCSBT TAC allocations for the 2018-2020 block

Member	*Nominal catch Level (tonnes)*	*Nominal Catch Percentage Level*
Japan	6,165.068	35.5643%
Australia	6,165.068	35.5643%
Republic of Korea	1,240.631	7.1568%
Fishing entity of Taiwan	1,240.631	7.1568%
New Zealand	1,088.273	6.2779%
Indonesia	1001.705	5.7785%
South Africa	422.741	2.4387%
European Union	10.883	0.0628%
Total	**17,335**	**100%**

If there is a decrease in the SBT TAC, then each member's allocation will decrease in proportion with its nominal catch percentage, subject to the allocation to the European Union remaining at 10 tonnes or above.[17]

Additional considerations for allocating the SBT TAC include:

(i) Flexibility for limited carry-forward of unfished allocations between quota years;[18]

(ii) For the 2018-2020 block:
- 6 tonnes is set aside each year for Research Mortality Allowance; and
- 306 tonnes is set aside to account for IUU catch of Non-members.[19]

(iii) All Members are required to account for all sources of mortality (including commercial, discards, recreational and artisanal).[20]

(iv) Requests for increases to national TAC by developing States. For example, for the 2018-2020 block Indonesia and South Africa requested TAC

[16] CCSBT, *Resolution on the Allocation of the Global Total Allowable Catch*, updated at the Twenty-Fourth Annual Meeting, 9-12 October 2017 (*CCSBT TAC Resolution)*.

[17] *CCSBT TAC Resolution*, para. 5.

[18] CCSBT, *Resolution on Limited Carry-forward of Unfished Annual Total Allowable Catch of Southern Bluefin Tuna*, revised at the Twenty Fourth Annual Meeting, 12 October 2017.

[19] CCSBT, *Report of the Twenty Third Annual Meeting of the Commission*, 13 October 2016, para. 53 (*CCSBT 23rd Meeting*). However, note that New Zealand estimates that 1000 tonnes is a more appropriate value to account for the IUU catch of non-members, para. 49.

[20] *CCSBT 23rd Meeting*, Section 7.1 Attributable SBT Catch; CCSBT, *Report of the Twenty Fourth Annual Meeting of the Commission*, 12 October 2017, Section 8.1 Attributable SBT Catch; CCSBT, *Report of the Twenty Fifth Annual Meeting of the Commission*, 18 October 2018, Section 8.1 Attributable SBT Catch.

increases, this was considered and agreed.[21] To this end, Japan attributed a portion of its TAC to Indonesia (21 tonnes) and to South Africa (27 tonnes).[22]

3.3 **Timeline of the Southern Bluefin Tuna Fishery and establishment of the CCSBT**

Table 2: Timeline of the SBT Fishery and establishment of the CCSBT

Date	Event
1938	Tuna fisheries in Australia and tuna research by CSRIO date back to 1938. Trolling was the dominant fishing technique.[a]
1950s – 1960s	Australian fisheries target surface swimming schools of SBT, while the Japanese target deep-swimming SBT using the longline fishing method.[b]
Late 1950s to Early 1960s	SBT caught by live-bait and pole, purse seine and long-line fishing methods for canning. Annual global catch averaged between 60,000 – 80,000 tonnes.[b]
1961	Peak global SBT catch recorded at 81,605 tonnes.[b]
1970s to Early 1980s	NSW Australia surface fisheries fail; WA Australia fishery ceases; Japan longline SBT fishery continues with lower rates; Scientists express concern that parental biomass of SBT is declining.[b]
1982	Voluntary and first trilateral meeting between Australia, New Zealand and Japan regarding stock and biomass depletion of SBT.[b]
1983	Trilateral meeting between Australia, Japan and New Zealand set catch limits at 21,000 tonnes for Australia, no catch limit for Japan and 10,000 tonnes for New Zealand.[b]
Mid 1980s to Late 1980s	Catch limits set according to realised catch and continue to reduce.[b]
1989	Catch limits for SBT set at 5,265, 6065 and 420 tonnes for Australia, Japan and New Zealand respectively (where it remains at similar levels).[b]
May 1993	The *Convention for the Conservation of Southern Bluefin Tuna (SBT Treaty)* was signed by Australia, New Zealand and Japan.[c]
20 May 1994	*SBT Treaty* entered into force and the Commission for the Conservation of Southern Bluefin Tuna was established. Member countries include Australia, New Zealand and Japan.[c]
17 October 2001	Korea joins the CCSBT.[c] SBT TAC set at 15,579 tonnes with allocations for CCSBT Non-Member Countries (Taiwan, Indonesia, Korea and miscellaneous/IUU).[d]
30 August 2002	Fishing entity of Taiwan becomes a member of the Extend Commission.[c]
October 2003	CCSBT invites countries with an interest in the fishery to participate as Cooperating Non-members.[c]

[21] *CCSBT 23rd Meeting*, para. 56-57.

[22] Japan's starting point is 6165 tonnes, from this amount 21 tonnes is allocated to Indonesia and 27 tonnes is allocated to South Africa, refer to *CCSBT 23rd Meeting*, para. 58.

2 August 2004	Philippines, South Africa and the European Union formally accepted as Cooperating Non-members (with status ceasing on 12/10/17, 24/8/06 and 13/10/06 respectively).[c]
8 April 2008	Indonesia joins CCSBT.[c]
10-13 October 2011	CCSBT adopts harvest control rules into the management of the fishery as per the *Resolution on the Adoption of a Management Procedure*, at the Eighteenth Annual Meeting. [e]
13 October 2015	European Union joins as a Member of the Extended Commission.[c]
15 February 2016	South Africa joins as a Member of the Extended Commission.[c]

Table 2 References

[a] G I Murphy, *Fishery Situation Report 1. Southern Bluefin Tuna* (CSIRO Division of Fisheries and Oceanography, Reprint No 1053 ed, 1979) 2.

[b] A. E. Caton, 'Review of aspects of Southern Bluefin Tuna biology, population and fisheries' in Richard S Shomura, Jacek Majkowski and Sarah Langi (eds), *Interactions of Pacific Tuna Fisheries: Volume 2 Papers on biology and fisheries* (Food and Agricultural Organization of the United Nations, FAO Fisheries Technical Paper 336/2 ed, 1991), 2.Overview, Table 2.

[c] CCSBT, *Origins of the Convention* (2019) <https://www.ccsbt.org/en/content/origins-convention>.

[d] CCSBT, *Report of the 8th Annual Meeting*, 15-19 October 2001.

[e] CCSBT, *Resolution on the Adoption of a Management Procedure*, adopted at the Eighteenth Annual Meeting, 10-13 October 2011

4. COMMISSION FOR THE CONSERVATION OF ANTARCTIC MARINE LIVING RESOURCES (CCAMLR) SPECIES: TOOTHFISH

The Commission for the Conservation of Antarctic Marine Living Resources (**CCAMLR**) is widely recognised as a leading regional organisation in developing best practice in the ecosystem-based approach to fisheries management.[23] However, CCAMLR did not start with a pristine fishery as it inherited several depleted and near fully exploited fish stocks when it began in 1982, including toothfish, mackerel icefish and Antarctic krill.[24]

The ecosystem-based management approach was written into the CCAMLR Convention.[25] In particular Article II, aims to maintain both target stocks and their dependent and related species at productive levels; and where any adverse impacts occur, they are to be short lived with a recovery expectancy of two to three decades.[26]

From this basis, operational rules for the harvest of specific species are developed and the precautionary approach is adopted to assess catch limits and set reference points.[27] Conservation Measures detail the decisions in relation to fisheries operational controls (such as spatial and temporal closures and vessel and gear restrictions) and members become bound to these measures when they become party to the Convention.[28]

Whilst there is a total allowable catch limit for species, there is no allocation process to members to limit fishing effort in the CCAMLR area nor has there ever been an allocation process. Therefore, legal fish operators within the CCAMLR system (i.e. CCAMLR members) engage in Olympic style fishing in a race to achieve the best catch within the spatial and temporal limits of the fishery.[29]

For the purpose of this discussion paper, the remainder of this case study focuses on the specific harvest control rules and TAC for Antarctic Toothfish (*Dissostichus mawsoni*) which is managed and harvested within CCAMLR Subareas 88.1 and 88.2. The current status of the fishery in both areas is that it is not subject to overfishing; it is not overfished; the current biomass is above the limit reference point under the CCAMLR Harvest Strategy; and the TAC is conservative relative to the current biomass.[30]

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[23] Andrew J. Constable, "Lessons from CCAMLR on the implementation of the ecosystem approach to managing fisheries" *Fish and Fisheries* (2011) 12, 138; In 2016-2017 CCAMLR was awarded the FAO Margarita Lizárraga Medal for exemplary management of fisheries refer to: CCAMLR, "CCAMLR awarded FAO medal for exemplary management of fisheries" (17 January 2017) <https://www.ccamlr.org/en/news/2017/ccamlr-awarded-fao-medal-exemplary-management-fisheries>.

[24] Constable, above n 30, 139.

[25] *Convention on the Conservation of Antarctic Marine Living Resources* [1982] ATS 9.

[26] Constable, above n 30, 139; *Convention on the Conservation of Antarctic Marine Living Resources,* Art II.

[27] Constable, above n 30, 139.

[28] Ibid.

[29] Ibid 146.

[30] Australian Bureau of Agricultural and Resource Economics and Sciences, Department of Agriculture, Australian Government (ABARES), "Chapter 27: CCAMLR exploratory toothfish fisheries," in ABARES, *Fishery Status Reports 2019*, September 2019, 433.

4.1 CCAMLR Antarctic Toothfish Harvest Strategy

CCAMLR Subareas 88.1 and 88.2 are classed as "exploratory fisheries"[31] and are managed separately with distinct stock assessments.[32] The CCAMLR Harvest Strategies for Antarctic Toothfish are consistent with the precautionary approach adopted by CCAMLR.[33]

The Harvest Strategies for Antarctic Toothfish are based on the following principles:

(a) Target: The "median escapement[34] of the spawning biomass at the end of a 35-year projection period[35] is 50% of its median pre-exploitation level;"[36]
(b) Limit reference point: "The probability of the spawning biomass dropping below 20% of its median pre-exploitation level is less than 10% over the [35 year] projection period;"[37]
(c) For CCAMLR Subarea 88.1: The TAC is set at 4.3% of the estimated current biomass;[38]
(d) For CCAMLR Subarea 88.2: The TAC is set at 4% of the estimated current biomass;[39]
(e) Additionally, bycatch limits are based on a percentage of the catch of toothfish[40] and move-on provisions apply if bycatch thresholds are reached.[41]

Additional input controls include:
Fishing method limited to demersal longline; limited entry; gear restrictions; temporal and spatial closures; nominated primary landing ports (i.e. Hobart, Tasmania and Nelson, New Zealand);[42] and 100% observer vessel coverage (with two observers including one from a member State other than the vessel flag).[43]

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[31] Refer to definition for "exploratory fishery" at CCAMLR, *Conservation Measure 21-02 (2017): Exploratory Fisheries*.
[32] ABARES, "Chapter 27: CCAMLR exploratory toothfish fisheries," above n 38, 434.
[33] Ibid 435.
[34] Escapement refers to the amount of stock that does not get caught by fishing activities and returns to its spawning grounds.
[35] The 35-year projection period is taken from the start of each year that the biomass stock is assessed.
[36] ABARES, "Chapter 27: CCAMLR exploratory toothfish fisheries," above n 38, 435.
[37] Ibid 435.
[38] Ibid 440.
[39] Ibid 443.
[40] Ibid 435.
[41] Ibid 436.
[42] Ibid.
[43] CCAMLR, *CCAMLR Scheme of International Scientific Observation* (2 September 2019) <https://www.ccamlr.org/en/document/publications/text-ccamlr-scheme-international-scientific-observation> 127.

4.2 CCAMLR Antarctic Toothfish Allocation Process: "Olympic" fishing

The Antarctic Toothfish TAC is NOT allocated to any specific CCAMLR members, however, CCAMLR members may receive an allocation to conduct specific research.[44] Rather, the TAC for Antarctic toothfish is allocated as follows:

(a) The TAC is fished by approved vessels that are permitted to fish in specific Subareas or divisions;
(b) Daily catch-and-effort reporting is required by all vessels; [45]
(c) All vessels must carry scientific observers to tag and release toothfish at pre-specified levels as part of a scientific data collection process; [46] and,
(d) Fishing must cease by all participants once the TAC limit is reached.[47]

The TAC set for Antarctic Toothfish for the past two fishing seasons is detailed in the **Table 3** below.[48]

Table 3: CCAMLR TAC for Antarctic Toothfish: 2016-2017 and 2017-2018 fishing seasons

Fishing Area	Fishing Season	T.A.C
Subarea 88.1	2016-2017	2,870
Subarea 88.1	2017-2018	3,157
Subarea 88.2	2016-2017	619
Subareas 88.2	2017-2018	619

[44] ABARES, "Chapter 27: CCAMLR exploratory toothfish fisheries," above n 38, 435.
[45] Ibid 435, 443.
[46] Ibid 435, 443.
[47] Ibid 435, 443.
[48] Ibid 436.

5. AUSTRALIAN DOMESTIC FISHERIES MANAGEMENT

Australia is a global leader in the development of fisheries harvest strategies.[49] Harvest strategies and quota allocations apply to all Australian Commonwealth managed fisheries. The *Commonwealth Harvest Strategy Policy* (**HSP**),[50] the *Commonwealth Bycatch Policy*[51] and their associated Guidelines[52] apply an ecosystem-based fisheries management approach to the management of each Commonwealth fishery.[53]

The *Commonwealth Harvest Strategy Policy* (HSP)

The purpose of the HSP is to utilise the best available scientific evidence and research to apply a precautionary and transparent framework for setting harvest levels in Commonwealth fisheries;[54] and to ensure that commercial fish stocks are managed for long-term ecological sustainability and economic viability and profitability where ecological sustainability takes priority.[55]

Generally, the HSP framework includes management of:

- by-product species;
- flexibility in relation to multi-species fisheries;
- guidance on managing variability (including climate change) and spatial management;
- consideration of indigenous and recreational fishing actives when determining fish stock management; and
- ensures consistent management across fisheries.[56]

Scope of the HSP

The scope of the HSP extends to all "commercial species" (i.e. all species that are landed and sold) and which are most relevant to maximising net economic returns.[57] All commercial species are then classified as either key commercial species or by product species.

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[49] Australian Fisheries Management Authority, "Revamped fisheries harvest policy" (21 November 2018) <https://www.afma.gov.au/news-media/media-releases/revamped-fisheries-harvest-strategy-policy>.

[50] Department of Agriculture and Water Resources, Australian Government, *Commonwealth Fisheries Harvest Strategy Policy: Framework for applying an evidence-based approach to setting harvest levels in Commonwealth fisheries* (Second Edition ed, 2018) (*Commonwealth HSP*)

[51] Department of Agriculture and Water Resources, Australian Government, *Commonwealth Fisheries Bycatch Policy: Framework for managing the risk of fishing-related impacts on bycatch species in Commonwealth fisheries* (Second Edition ed, 2018).

[52] Department of Agriculture and Water Resources, Australian Government, *Guidelines for the implementation of the Commonwealth Fisheries Harvest Strategy Policy* (Second Edition ed, 2018) (*HSP Guidelines*); Department of Agriculture and Water Resources, Australian Government, *Guidelines for the Implementation of the Commonwealth Fisheries Bycatch Policy* (2018).

[53] Australian Fisheries Management Authority, Australian Government, *Guide to AFMA's Ecological Risk Management* (2017) 14-15.

[54] *Commonwealth HSP,* iii, 3.

[55] Ibid 3, 6.

[56] Ibid iii.

[57] *HSP Guidelines*, 5.

The HSP does not prescribe arrangements for stocks that are jointly managed by an international organisation however articulates its preferred approach that Australia pursue measures that are consistent with the HSP when negotiating in international forums.[58]

5.1 Principles of the HSP

The HSP uses an *indicator of stock condition* plus one or more *harvest control rules* to pursue *preferred targets* and avoid *preferred limits* subject to the *90% risk criterion*.[59] Harvest targets are designed to pursue maximum economic yield.[60] General definitions of the HSP principles, targets and limits are contained in Table 4 below.

Table 4: General definitions of principles, targets and limits of the Commonwealth Harvest Strategy Policy[61]

Biomass limit reference point (B_{LIM})	The point beyond which the risk to the stock is regarded as unacceptably high.
Biomass Target (B_{TARG})	The desired biomass of the stock.
Determining limit reference points	The level of an indicator (such as biomass or fishing mortality) beyond which the risk to the stock is regarded as unacceptably high.
Fishing mortality limit reference point (F_{LIM})	The fishing mortality above which the removal rate from the stock is regarded as too high.
Fishing mortality reference level ($F_{REFERENCE}$)	Fishing mortality rate which corresponds to, a specified biomass (that is, the chosen reference biomass).
Fishing mortality target (F_{TARG})	The target fishing mortality rate
Harvest control rules	Pre-determined rules that control fishing activity according to the biological and economic conditions of the fishery (as defined by monitoring or assessment). Also called 'decision rules'. HCR are a key element of a harvest strategy.
HSP 90% risk criterion	A one-in-ten-year risk that stocks will fall below the biomass limit reference point. Forms part of the testing of harvest strategies for stocks managed under the Harvest Strategy Policy.
Maximum economic yield (MEY)	The sustainable catch or effort level for a commercial fishery that allows net economic returns to be maximised. In this context, maximised equates to the largest positive difference between total revenue and total cost of fishing.
Recommended biological catch	An output from (certain) harvest control rules. Provides an estimate of the total fishing mortality (landings from all sectors plus discards) recommended to achieve a predefined target. Distinct from total allowable catch (TAC).
Reference points	Specified level of an indicator used as a benchmark within a harvest strategy.
Target reference point	The desired state of the stock or fishery (for example, MEY or B_{TARG})
Total allowable catch (TAC)	The annual catch limit set for a stock, species or species group. Used to control fishing mortality within a fishery.

[58] *Commonwealth HSP,* 12-13.
[59] *HSP Guidelines*, 5.
[60] Ibid.
[61] Definitions obtained from "Glossary" *HSP Guidelines.*

5.2 Allocation

Allocation is outside the scope of the HSP and its associated guidelines.[62] Harvest strategies are applied to each Commonwealth fishery to carry out stock assessments and determine the Recommended Biological Catch (**RBC**).[63] An allowance for discards and fisheries catches from other sectors and jurisdictions (namely State/Territory commercial catch and recreational fishing) is then subtracted from the RBC to determine the TAC which is recommended to the Australian Fisheries Management Authority (**AFMA**) Commission.[64] AFMA then sets the Total Allowable Catch (**TAC**) (expressed as a weight of fish) and the Total Allowable Effort (**TAE**) (expressed an amount of fishing gear) for each fishing season in relation to each fish species as determined under the fishing management plan for each individual Commonwealth fishery.[65]

TAC is distributed to commercial fishers using a legal instrument called a Statutory Fishing Right (**SFR**), the SFR can change over time depending on the TAC so that catch levels remain sustainable and maximise net economic returns.[66]

Similarly, effort based quota means that commercial fishers can only use a certain amount of fishing gear relative to the amount of quota they are permitted to catch.[67] The TAE can change seasonally, and like the SFR, is subject to TAC levels remaining sustainable and at levels that maximise net economic returns.[68]

Quota (and its corresponding effort) can be traded or leased between quota owners.[69]

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[62] *HSP Guidelines*, 14.
[63] AFMA, "What is fishing quota" (2019) <https://www.afma.gov.au/what-fishing-quota>.
[64] Ibid.
[65] Ibid.
[66] Ibid.
[67] Ibid.
[68] Ibid.
[69] Ibid.

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