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REVIEW OF TORI-LINE SPECIFICATIONS FOR LARGE LONGLINE VESSELS IN THE SOUTH PACIFIC UNDER CMM2018-03: EVALUATING EFFECTIVENESS AND PRACTICALITY

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REVIEW OF TORI-LINE SPECIFICATIONS FOR LARGE LONGLINE VESSELS IN THE SOUTH PACIFIC UNDER CMM2018-03: EVALUATING EFFECTIVENESS AND PRACTICALITY

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SUMMARY

During discussions in the past WCPFC-SC meetings, it is recognized that there is a need for modifications in the current tori-line specifications (Annex 1: 1.1a) for large longline vessels (overall vessel length ≥35m) operating in the Southern Hemisphere under the seabird bycatch mitigation measure CMM2018-03, particularly from a practical perspective. This document aims to review the relevant provisions of other tuna RFMOs, as well as the currently available scientific information, to clarify the key discussion points that require further consideration.

INTRODUCTION

The current seabird bycatch mitigation measure, CMM-2018-03, is presently under ongoing review regarding its application and effectiveness. In previous meetings up to last year, discussions have primarily focused on the specifications of tori-lines for small vessels and operations in the Northern Hemisphere. However, there has yet to be sufficient consideration or debate regarding the specifications for tori-lines used by large vessels operating in the Southern Hemisphere. The current specifications for tori-lines in the Southern Hemisphere were established in the early 2010s by WCPFC and other tuna RFMOs. Since that time, however, there has been little subsequent review or discussion about the appropriateness of these technical measures. Therefore, this document aims to review the current specifications for tori-lines for large vessels across various tRFMOs measures, and, based on the latest available scientific information, consider measures that could balance both bycatch mitigation performance and operational practicality.

REVIEW OF TORI-LINE SPECIFICATIONS IN tRFMO MEASURES

The specifications for tori-lines deployed by large longline vessels in southern hemisphere—defined as those with an overall length of 35 meters or more—are established across tRFMOs. In this review, specifications from the WCPFC (CMM-2018-03), IATTC (C-11-02), IOTC (Res. 23/07), and ICCAT (Rec. 11-09) are considered. Additionally, the CCAMLR (25-02), which is the only RFMO that defines detailed tori-line requirements for non-tuna longline fisheries, as well as the “best practice advice” established by ACAP (ACAP-BP, ACAP 2024) for

large pelagic longline vessels, are also referenced.

To facilitate a comprehensive comparison, tori-line specifications were categorized into four main components that significantly influence their effectiveness and operational practicality: the main line, streamers, poles and others. The detailed requirements for each component were compiled and compared across organizations.

In the case of IOTC and CCAMLR, schematic illustrations about tori-line deployment are provided and are considered to reflect the respective specifications. These have been included as part of the comparison table. Furthermore, both IOTC and ICCAT present, as annexes to their minimum standards, additional technical guideline aimed at support with the minimum standard of tori-line specifications. Then, the technical guidelines have also been incorporated into the comparison table.

A summary of the specifications compared in this section is presented in Table 1 and explained in the next section.

DIFFERENCES IN TORI-LINE SPECIFICATIONS AMONG CURRENT tRFMOs

1) Main Line

- **Total Length:** Only the WCPFC and IATTC specify the total length of the mainline, while ICCAT and IOTC provide only for the length of the aerial extent.
- **Aerial Extent:** With the exception of the IATTC, all tRFMO, CCAMLR and ACAP-BP commonly require a 100m aerial extent.
- **Line Material:** Many RFMOs do not specify the material of the main line. However, ICCAT and IOTC include recommendations regarding preferred materials in their guidelines.
- **Towing Device:** The use of a towing device is specified only for certain tori-line specifications under the IATTC (with ICCAT and IOTC addressing this in their guidelines), and ACAP-BP. However, detailed specifications for the towed object itself are not provided by any tRFMOs.

2) Streamers

- **Streamer Type:** The WCPFC uniquely recommends a "hybrid" design combining both long and short streamers, whereas other RFMOs generally require only long streamers. ACAP-BP also recommend deploying “hybrid design”.
- **Streamer Intervals:** The WCPFC specifies intervals for both long and short streamers, resulting in the highest number of streamers among RFMOs. While ACAP Best Practice guidelines recommend mixing short streamers, they do not specify intervals for them.
- **Streamer Length:** Most RFMOs require long streamers to extend to the water surface while length of short streamers are varied among RFMOs. No information provided for short streamers by ACAP-BP.
- **Attachment Method**: The use of swivels for streamer attachment is either mandated or encouraged. Notably, CCAMLR and ACAP-BP advise against using heavy swivels, instead specifying alternatives or lighter swivels. Furthermore, ICCAT and IOTC guidelines recommend the use of clips for streamer

attachment.

- **Attachment Position:** Surprisingly, most RFMOs and ACAP-BP do not specify where on the main line streamers should be attached. Streamers placed on the underwater section of the main line are not only ineffective but also increase the risk of gear entanglement and should therefore be avoided. The IOTC guidelines illustrate that streamers should only be attached to the aerial section. In non-tuna fisheries, CCAMLR's specification requires attaching streamers along the aerial section from a designated pole position.

3) Pole

- **Pole Height:** A pole height of 7 meters is commonly mandated or recommended, except for ACAP-BP, which stipulates 8 meters.
- **Pole Position:** The tori-line attachment pole is required to be placed on the windward side. For double tori-line systems, line-setting should occur within the area covered by the tori-lines.

4) Other Operational Practices

- **Number of Tori Lines:** All tRFMOs require at least one tori-line and encourage to deploy two tori-lines under a condition of high seabird abundance while ACAP-BP requires two.
- **Operational Practice:** ICCAT and IOTC provide detailed technical guideline, advising crews to adjust bait-casting so that baited hooks are deployed within the area protected by the tori-line, and to keep spare tori-lines on board. In contrast, the WCPFC specifications only broadly require baited hooks to be set downwind of the tori-line (for single tori-line systems) or between the lines (for double tori-line systems), without offering further operational guidance.

SUGGESTED REVISIONS TO THE TORI-LINE SPECIFICATIONS

There are several critical requirements for the scientific effectiveness of tori-lines deployed by large vessels operating in the Southern Hemisphere, where seabird attacks are particularly severe. These include: “securing a sufficiently long aerial section to provide an effective spatial deterrent”; “ensuring the presence of visible and stable streamers in the aerial section”; and “casting baited hooks within the area protected by the tori-line(s)”.

However, the current specifications for tori-lines under the WCPFC CMM 2018-03 include a range of supplementary requirements and provisions concerning operational practicality, which are intermixed with these core requirements. Such mixed specifications may limit fishers’ opportunities to develop or select flexible and innovative configurations that could be more effective and practical for their operations. Moreover, from a compliance perspective, the presence of ambiguous specifications, such as those regarding streamer color or attachment position, may lead to confusion and inconsistency in compliance verification at sea or port inspection.

In contrast, the approaches taken by IOTC and ICCAT are notably more flexible: they clearly distinguish between “MINIMUM STANDARDS” and additional “TECHNICAL GUIDELINES”. The technical guidelines provide fishers with practical, situation-specific options without compliance requirements. Therefore, this could be

considered to be applied for the tori-line specification in WCPFC.

The following are suggested specifications for improvement（Table 2）:

- **Mainline Length:** The requirement for mainline length primarily serves to support the aerial extent requirement and is no longer specified by ICCAT or IOTC as a mandatory. It would be preferable to move this specification to the technical guidelines.
- **Pole Height:** While several tRFMOs specify pole height, this is a supplementary specification to ensure sufficient aerial extent. Notably, excessively high poles may reduce the effective aerial extent (Ochi 2023). Therefore, pole height shall be moved to the technical guidelines.
- **Towed Devices:** Although currently not specified by the WCPFC, towed objects are considered a supplementary specification to create sufficient aerial extent. Including specifications for their use, as seen in other tRFMOs, would be beneficial.
- **Streamer Swivels:** The use of swivels for streamers is intended to prevent entanglement, but it have shown that heavy aerial section causes the shortened actual aerial extent (Ochi 2023). As described in CCAMLR and ACAP-BP recommendation, alternatives to heavy swivels, such as pulleys, unweighted swivels, or other technical substitutes, should be provided as options in the technical guidelines.
- **Streamer Color:** Given the limited scientific evidence regarding the impact of streamer color on effectiveness (Sato et al. 2012), this specification should be moved to guidance within the technical guidelines. It would be better to define colors to avoid (i.e. black/blue) rather than to define preferable colors.
- **Streamer and Main Line Materials:** Specifications should be based on information provided by member countries already employing effective materials, and included in the technical guidelines as examples.
- **Number of Tori Lines:** While deployment of two tori-lines simultaneously probably enhance bycatch mitigation (Sato et al. 2013), operational challenges may make this difficult in some cases. The current measure encourages double lines in locations of high seabird abundance. The minimum standard should require at least one tori-line, with technical guidelines encourages the use of two tori-lines (one on each side) in seabird-abundant locations.
- **Operational Practice:** The current specifications provide only vague guidance regarding where baited hooks should cast into the water. However, it is well-established that effectiveness is maximized by avoiding propeller turbulence and casting the baited hooks close to the tori-line aerial coverage area (Sato et al. 2016; ACAP 2024). Therefore, these requirements should be incorporated into the minimum standards for line-setting practice.
- **Inclusion of Schematic Illustrations:** Adding schematic diagrams of tori-line specifications to the technical guidelines, as is the practice of IOTC and CCAMLR, would provide practical reference for managers and fishers. Inclusion of such illustrations should be considered for comprehensive understanding for tori-line specification.

Adopting a two-tiered structure that separates minimum, compliance-based standards from adaptable technical guidelines would enable the WCPFC to strengthen seabird bycatch mitigation and enhance operational flexibility

and practicality for fishers.

UPDATES BASED ON FEEDBACK FROM SC21

The above proposals were discussed at SC21. The transition to a two-tiered approach for tori-line specifications received support from CCMs and observers, and SC21 endorsed the concept, requesting further discussion at TCC21. However, feedback was provided regarding specific details of the proposed specifications. In particular, it was suggested that pole height should remain in the minimum standards from a compliance verification perspective. The revised list of tori-line specifications, updated based on the discussions at SC21, is presented in Annex 1 for consideration at TCC21.

REFERENCES

ACAP (2024) ACAP Review of mitigation measures and Best Practice Advice for Reducing the Impact of Pelagic Longline Fisheries on Seabirds. Reviewed at the Fourteenth Meeting of the Advisory Committee.

Ochi, D. (2022). Consideration for tori-line and tori-pole design suitable for small-scale tuna longline vessels in the North Pacific based on experimental results. WCPFC-SC18-2022/EB-WP-04.

Sato, N., Katsumata, N., Yokota, K., Uehara, T., Fusejima, I., & Minami, H. (2016). Tori-lines with weighted branch lines reduce seabird bycatch in eastern South Pacific longline fishery. *Aquatic Conservation: Marine and Freshwater Ecosystems*, *26*, 95-107.

Sato, N., Minami, H., Katsumata, N., Ochi, D., & Yokawa, K. (2012). Comparison of the effectiveness of paired and single tori lines for preventing bait attacks by seabirds and their bycatch in pelagic longline fisheries. Fisheries Research, 140, 14–19.

Table 1 Comparison of tori-line specifications for large longline vessels operating in the Southern Hemisphere, as established by each tRFMO, CCAMLR, and ACAP Best Practice. For IOTC and ICCAT, the specifications are divided into minimum standards and technical guidelines; specifications from the technical guidelines are indicated in parentheses.

	Specifications	WCPFC CMM-2018-03	IATTC C-11-02 (type a)	IATTC C-11-02 (type b)	ICCAT Rec. 11-09	IOTC Res. 23/07	CCAMLR 25-02	ACAP-BP 2024
Mainline	**Mainline length**	≧200m	≧100m	≧100m or ≧x3 total vessel length	N/A	N/A	≧150m	N/A
	Aerial extent	≧100m	Maintained over sinking hooks		≧100m	≧100m	Optimise as far as possible	≧100m
	Material	N/A	N/A		• [With appropriate weight] • [Insertion of break point]	• [With appropriate weight] • [Insertion of break point]	N/A	• Lightest practical strong fine line • Insertion of break point
	Towing device	N/A	Yes (<150m mainline length)	N/A	[Yes]	[Yes]	Yes	Yes
Streamer	**Streamer type**	Long and short	Long	Short	Long	Long	Long	Long and short
	Streamer length	Long: Close to the water Short: >1m	Close to the water	≧30cm	Close to the water	Close to the water	• 6.5m from the stern to 1m for seaward end • Close to the water	Close to the water
	Interval	Long: <5m Short: <1m	<5m	<1m	<5m	<5m	<5m	<5m (none for short?)
	Material	N/A	N/A		• [≧ 2 strands] • [Fine line w/ red polyurethane tubing]	• [≧ 2 strands] • [Fine line w/ red polyurethane tubing]	Plastic tubing or cord (≧3 mmφ)	N/A
	Color	Brightly coloured	N/A		[Red]	[Red or Yellow]	Brightly coloured	Brightly coloured
	Attachment Method	Swivels (MUST)	Swivels (MUST)	N/A	• [Swivel] • [Clip attachment]	• [Swivel] • [Clip attachment]	Swivels or a similar device	Unweighted swivel
	Where streamers should be attached?	N/A	N/A		N/A	[Aerial extent part]	5m from pole along with aerial extent	N/A
Pole	**Height (from sea surface)**	>7m	>5m		[>7m]	[>7m]	>7m	>8m
	Mainline and pole placement	Windward deployment	Windward deployment		• [Windward deployment] • [Barrel swivel for mainline]	• [Windward deployment] • [Barrel swivel for mainline]	Poles should be set <5m from stern, Windward deployment	Barrel swivel for mainline
Others	**Number of tori-lines**	1-2	1-2		1-2	1-2	1-2	2
	Operation practice	N/A	N/A		• [Bait casting practice] • [Spare tori line]	• [Bait casting practice] • [Spare tori line]	N/A	N/A

Table 2. List of proposed revisions to the tori-line specifications for large vessels operating in the Southern Hemisphere under WCPFC CMM 2018-03, using the "two-tier structure."

	Current measure	Suggested revision		
	South of 25S >=35m vessel	Minimum Standard	Technical Guidline	Details
Mainline length	≧200m		✓	Move to technical guideline
Aerial extent	≧100m	✓		Keep minimum standard
Mainline material	N/A		✓	Add some preferred options in the technical guideline
Towing device	N/A		✓	Add some preferred options in the technical guideline
Streamer type	Mix of long and short	✓		Keep minimum standard
Streamer length	Long: sufficient length to sea surface Short: >1m	✓		For short streamers, add the requirement that they must be at least 1 meter long or reach the water surface.
Streamer interval	Long: <5m Short: <1m	✓		Keep minimum standard
Streamer material	N/A		✓	Add some preferred options in the technical guideline
Streamer color	Brightly coloured		✓	Move to technical guideline in the technical guideline Specify colors to avoid (e.g., low-vis colors like black/blue) instead of "brightly colors".
Attachment method	Swivels (MUST)	✓	✓	The minimum standard shall not specify particular tools, only that "methods must be taken to prevent the streamer from entangling with the main line." The technical guidelines list specific options like swivels, pulleys or the other ways.
Where streamers should be attached?	N/A	✓		The minimum standard should state that the streamer is to be attached along the mainline from just behind the stern to the point where the mainline enters the water.
Pole height	>7m		✓	Move to technical guideline
Mainline and pole placement	Windward side of sinking bait	✓		Keep minimum standard
Number of tori-lines	1 or 2	✓	✓	The requirement to use at least one tori-line should remain in the minimum standard. Encouragement to use two tori-lines in areas with many seabirds, if practical, should be moved to the guidelines.
Operational practice	N/A	✓	✓	The minimum standard should newly specify that baited hooks must be cast to avoid areas of propeller turbulence and should landed close to the tori-line coverage area. The technical guidelines should state that a spare tori-line should be prepared, and that when using a bait-casting machine, the landing position should be adjusted in advance.

Annex 1

Proposed amendments of tori-line specs for large vessels in the SPO.

1. Minimum Standard – mandate for compliance

The minimum standards are necessary to ensure the essential elements for seabird bycatch mitigation.

- Securing a sufficiently long aerial section to provide an effective spatial deterrent
- Ensuring the presence of visible and stable streamers in the aerial section
- Casting baited hooks within the area protected by the tori-line(s)

Spec	Current measure	Suggested revision
Aerial extent	≧100m	Same text as current measure
Streamer type	Mix of long and short	Same text as current measure
Streamer length	Long: sufficient length to sea surface Short: >1m	**“For long streamers, they must have sufficient length to sea surface.** **For short streamers, they must be at least 1 meter long or reach the sea surface.”**
Streamer interval	Long: <5m Short: <1m	Same text as current measure
Attachment method	Swivels (MUST)	**"Make the streamers so that it does not get tangled in the main line."**
Streamer area	N/A	**"Streamers are to be attached along the mainline from behind the stern to the point where the mainline enters the water."**
Pole placement	Windward side of sinking bait	Same text as current measure
Number of tori-lines	1 or 2	**"Deploy at least one tori line. If two tori-lines are deployed, both tori lines shall be deployed simultaneously, one on each side of the line being set. "**
Operational practice	N/A	**"During line setting, baited hooks must be landed close to the tori-line coverage area, and it should be avoided areas of propeller turbulence."**
Pole height	≧7m	Same text as current measure

2. Technical Guideline – non-mandate

The guidelines take into account environmental and operational variables such as weather conditions, setting speed and ship size, all of which influence tori line performance and design in protecting baits from birds. Tori line design and use may change to take account of these variables provided that line performance is not compromised.

Spec	Current measure	Suggested revision
Mainline length	≧200m	**To achieve sufficient aerial extent, the tori line shall have a total length of 200m**
Mainline material	N/A	· **It is effective to use different materials for the main line above water and below water.** · **For the aerial section, a lightweight material with a braided rope that is easy to insert a streamer is desirable.** · **For the underwater section, a material that floats in water is preferrable to reduce entanglement with fishing gear, and a rope with a rough texture to provide towing power is preferrable too.** · **It is better not to use nylon monofilament for the main line due to low durability and coiling problem.** · **It should be noted that entanglement between fishing gear and tori-lines poses serious safety risks, including pole breakage. To avoid such incidents, it is advisable to incorporate a mechanism that allows the main line to be disconnected when excessive tension is applied. Examples of such safety measures include connecting lower-durability rope sections along the line to create break points, or using hardware that disconnects under high tension loads.**
Towing device	N/A	· **The towing object (e.g. triangular cone) attached to the end of the main line can generate strong drag power to create sufficient aerial extent, but this increases the serious risk of entanglement with fishing gear (see above). It is necessary to adjust the size and shape based on actual operational circumstance.** · **It is also effective to insert a number of 20-30 cm sturdy flat straps (e.g. plastic packing strap) near the end of the main line as an alternative to the towing object.**

Streamer material	N/A	· **Plastic or vinyl tubes, or nylon cords are preferred for long streamers. Avoid materials that tear easily.** · **Light weight plastic packing straps or ribbon-like materials are preferred for short streamers.**
Streamer color	Brightly coloured	**Low-visible colours, such as blue and black, should be avoided as streamer colors.**
Attachment method	Swivels (MUST)	· **The use of metal swivels as mounting hardware should be avoided, as they add extra weight to the line and make it difficult to achieve sufficient aerial extent.** · **Plastic joints or pulleys, or long streamers made of relatively rigid materials, can be used to prevent entanglement.**
Number of tori-lines	1 or 2	**Vessels are encouraged to use a second tori line at times of high bird abundance or activity.**
Pole height	≧7m	**Note that raising the tori-line attachment position may require lengthening the total line length or adding an additional towing device to ensure sufficient aerial extent.**
Operational practice	N/A	**A spare tori-line should be prepared, and that when using a bait-casting machine, the landing position should be adjusted in advance.**