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Bottom Fishing Impact Assessment (BFIA) for proposed fishing activities by Australia in the Southern Indian Ocean Fisheries Agreement (SIOFA) Area - 2020 Update

Dirk Welsford, Philippe Ziegler, Dale Maschette and Mike Sumner
November 2020



Australian Government
Department of Agriculture, Water and the Environment
Australian Antarctic Division



AUSTRALIAN
ANTARCTIC
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2020

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Executive Summary

This project by the Australian Antarctic Division (AAD) has updated Australia's bottom fishing impact assessment for the Southern Indian Ocean Fisheries Agreement (SIOFA) area. The historic Australian fishing footprint was revised to include:

- A small amount of fishing effort which had not been included in the original footprint presented to SIOFA (Williams et al. 2011; Delegation of Australia 2018); and
- Updated bathymetric data for the entire SIOFA area.

In addition, an assessment was conducted of Australia's intention to undertake fishing using integrated weight longline to target Patagonian Toothfish (*Dissostichus eleginoides*) on William's Ridge, according to SIOFA CMM 2019/05, and potting for Spiny Lobsters (*Palinurus spp.* and *Jasus paulensis*) within its historical fishing footprint from 2020/21.

Background

Australia has been fishing in the area of the Southern Indian Ocean Fisheries Agreement (SIOFA) since 1999, mainly with trawl gear targeting Alfonsino (*Beryx splendens*) and Orange Roughy (*Hoplostethus atlanticus*). Australia provided a detailed Bottom Fishing Impact Assessment (BFIA) of historical and proposed bottom fishing activities using trawls and longlines in 2018 (Williams et al. 2011; Delegation of Australia 2018), in accordance with CMM 2017/01. This BFIA needed updating to reflect additional data and a change in the fishery.

Aims/objectives

1. An updated estimation of Australia's bottom fishing footprint using approved fishing gear types (trawl, dropline, longline) and a risk assessment of significant adverse impacts on vulnerable marine ecosystems (VMEs) by Australian vessels using these gear types in the Southern Indian Ocean Fisheries Agreement (SIOFA) Area.
2. A risk assessment of Significant Adverse Impacts (SIA) on VMEs by Australian vessels using Lobster pots in the SIOFA Area.
3. Deliver the BFIA to the SIOFA SC5 meeting in La Réunion, March-April 2020.
4. Approval of Australia's updated BFIA by the SIOFA SC5 meeting.

Results and key findings

The Australian fishing footprint in the SIOFA area was updated with a small amount of data from trawling and longlining on William's Ridge in SIOFA Statistical Area 7. Inclusion of the fishing effort from William's Ridge increased the total area of Australia's historical fishing footprint in the SIOFA area by 3280 km² or 1.4%. The overlap of the Australian fishing footprint with the total SIOFA area was 0.85%.

The status and impact of the proposed longline and potting activities on target species (Patagonian Toothfish and Spiny Lobsters), bycatch species and VMEs was assessed. The report recommends monitoring of target, bycatch and VME species, including the collection of biological data and deployment of cameras on longlines and pots, and mitigation measures such as pot limits and move-on rules to avoid high bycatch and VME interaction rates.

Based on the current monitoring, mitigation and management arrangements, including effort limitation under CMM 2019/05 and those recommended here, the residual risk of the proposed Australian fishing activities in the SIOFA area causing or contributing to Significant Adverse Impacts (SAI) to stocks of Patagonian Toothfish, Spiny Lobsters, associated bycatch species or VME was considered to be low.

Implications for relevant stakeholders

This updated BFIA was presented as working paper SC-05-17 to the SIOFA Scientific Committee in 2020. The Scientific Committee acknowledged the work done by Australia and recognised that the BFIA meets an appropriate standard in light of international standards and the SIOFA BFIA Standard (BFIAS) (SIOFA SC-05, para. 82). Through this acknowledgement by the Scientific Committee, Australia is now eligible to fish for Patagonian Toothfish using longlines on William's Ridge and Spiny Lobster using pots within Australia's historical fishing footprint.

Recommendations

- Collect biological measurements on representative samples of catch and bycatch during all Australian fishing activities in the SIOFA area;
- Deploy underwater cameras attached to longlines and pots to characterise the habitat where fishing is undertaken and quantify the nature and extent of any interactions with benthic organisms;
- Exchange all data from any toothfish recaptured with tags on William's Ridge with the Members that tagged the fish, and CCAMLR as appropriate;
- Monitor trends in the Patagonian Toothfish Fishery on William's Ridge; and
- Revise the BFIA for Australian fishing activities as required, taking into account the results of all catches and biological samples of Patagonian Toothfish and Spiny Lobsters in the SIOFA area, and any new information collected on the composition, distribution and abundance of bycatch and VME indicator species.

Keywords

Bottom Fishing Impact Assessment, Southern Indian Ocean Fisheries Agreement (SIOFA), Patagonian Toothfish, Spiny Lobster, Lobster, longline, pots

1. Introduction

Australia has been fishing in the area of the Southern Indian Ocean Fisheries Agreement (SIOFA) since 1999, mainly with trawl gear targeting Alfonsino (*Beryx splendens*) and Orange Roughy (*Hoplostethus atlanticus*). A minor component of the Australian fishing activity was using demersal autolines.

As part of Australia's overall commitment to the United Nations General Assembly (UNGA) resolutions 61/105, 64/72 and 66/68, and to the 'Food and Agriculture Organization (FAO) International Guidelines for the Management of Deep-Sea Fisheries in the High Seas', Australia is committed to ensuring that bottom fishing activities are managed such that they avoid Significant Adverse Impacts (SAI) to Vulnerable Marine Ecosystems (VMEs). This is exemplified by Australia's precautionary measures in 2011, prior to the enforcement of the Southern Indian Ocean Fisheries Agreement (SIOFA), including:

- Prohibiting of the use of deep-water gillnets;
- Interim limitation of all bottom fishing activities to the historical fishing footprint of Australian vessels using bottom trawl and longline between 1999 and 2009; and
- Providing a detailed Bottom Fishing Impact Assessment (BFIA) of historical and proposed bottom trawl and longline fishing activities in 2018 (Williams et al. 2011; Delegation of Australia 2018), in accordance with CMM 2017/01 (accessible at <https://www.apsoi.org/bf-impact>).

The BFIA considered impact, risk, and existing monitoring, management and mitigation measures in assessing the potential for SAIs on VMEs in fishable areas up to depths of 2000 m. The fishable area was divided into five ecological zones (bathomes). The bathomes reflected the distribution of commercially-targeted fish species and the depth-correlated composition and structure of VME-associated marine biota such as deep-water corals. The risk of SAI at the scale of the fishery was estimated to be low, considering:

- Low overall fishing effort by Australian vessels;
- Limited spatial extent of the Australian fishing effort;
- Few areas of high fishing intensity;
- Restriction of future fishing to the existing footprint area; and
- Management arrangements to monitor and mitigate impacts and risks.

However, the BFIA recommended ongoing monitoring, management, and mitigation measures because the risk assessment also has to consider possible future impacts.

Under SIOFA CMM 2019/01, paragraph 24 (e):

"All BFIA, including the SIOFA BFIA, shall be updated when a substantial change in the fishery has occurred, such that it is likely that the risk or impacts of the fishery may have changed."

Here, we update the historic Australian fishing footprint with a small amount of fishing effort which was not included in the footprint presented to SIOFA by Williams et al. (2011). Australia also proposes to undertake fishing using bottom fishing gears that were not assessed in the BFIA prepared by Williams et al. (2011) and presented by Australia to SIOFA in 2018 (Delegation of Australia 2018). These new methods are integrated weight longline targeting Patagonian Toothfish (*Dissostichus eleginoides*) and potting for Spiny Lobsters (*Palinurus* spp. and *Jasus paulensis*) from the 2020/21 season, within the historical fishing footprint. We have therefore developed this document, following the SIOFA Bottom Fishing Impact Assessment Standard.

2. Objectives

1. An updated estimation of Australia's bottom fishing footprint using approved fishing gear types (trawl, dropline, longline) and a risk assessment of significant adverse impacts on vulnerable marine ecosystems (VMEs) by Australian vessels using these gear types in the Southern Indian Ocean Fisheries Agreement (SIOFA) Area.
2. A risk assessment of Significant Adverse Impacts (SIA) on VMEs by Australian vessels using traps in the SIOFA Area.
3. Deliver the BFIA to the SIOFA SC5 meeting in La Réunion, March-April 2020.
4. Achieve approval of Australia's updated BFIA by the SIOFA SC5 meeting.

3. Results and Discussion

3.1 Description and location of proposed bottom fishing activities

3.1.1 Updated fishing footprint

The Australian fishing footprint in the SIOFA area has been updated with small amount of data from trawling and longlining on William’s Ridge in SIOFA Statistical Area 7 (Figures 1 and 2). These effort data had not been included in the previous analyses of Australian bottom fishing activities (Williams et al. 2011, Delegation of Australia 2018).

These data consist of five exploratory trawls in 1998 and 2000, and five longline hauls in 2003. At that time, William’s Ridge was subject to intensive illegal, unreported and unregulated (IUU) fishing by vessels targeting Patagonian Toothfish (*Dissostichus eleginoides*) (Delegation of Australia 2019). Since Patagonian Toothfish catch rates from the Australian fishing activity were low, Australian vessels did not continue to fish on William’s Ridge.

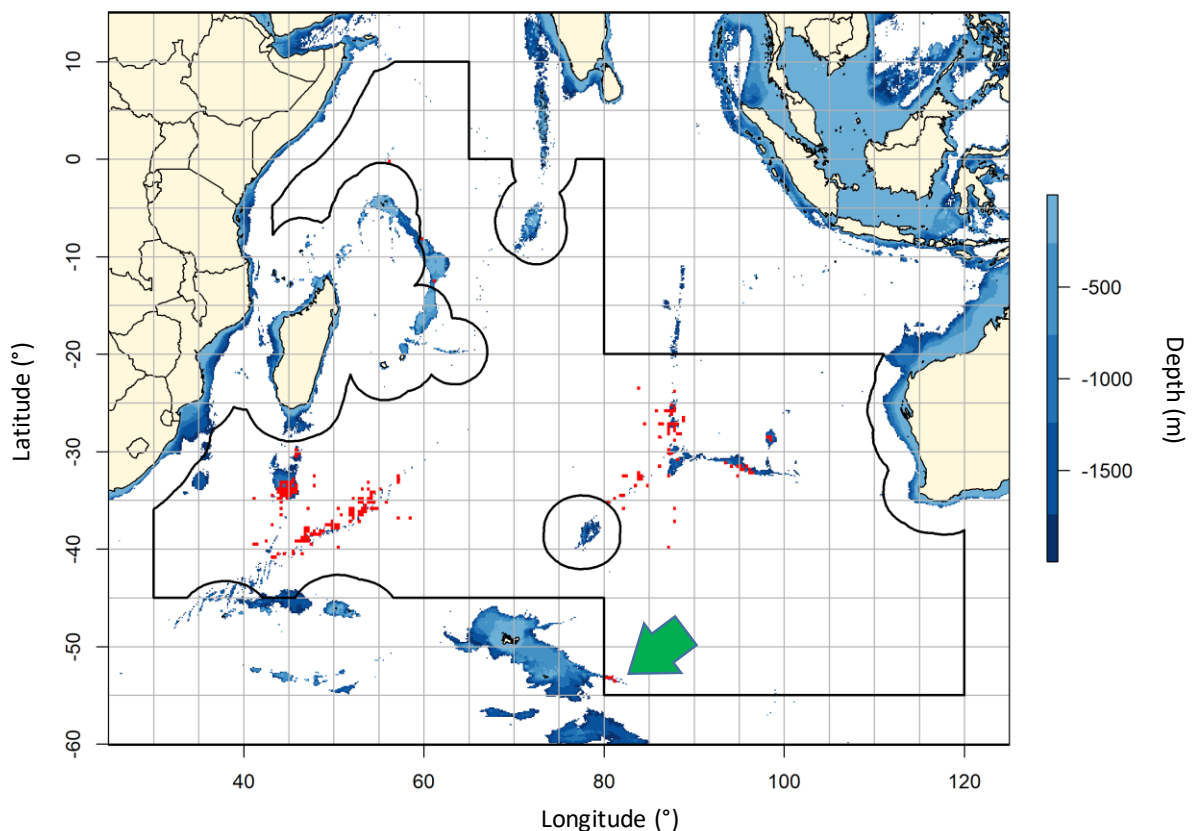


Figure 1. Updated Australia’s historical bottom fishing footprint within the SIOFA area. 20’x20’ grid squares that contain at least one instance of bottom fishing activity (i.e. a demersal trawl or longline set) are indicated in red (see Williams et al. 2011 for methods). Note that this figure includes four grid squares on William’s Ridge (SIOFA Statistical Area 7, green arrow) that were not included in the previous calculations of Australia’s footprint. Seafloor deeper than 2000 m is uncoloured - bathymetry is based on GEBCO 2019 bathymetric data (GEBCO Compilation Group 2019).

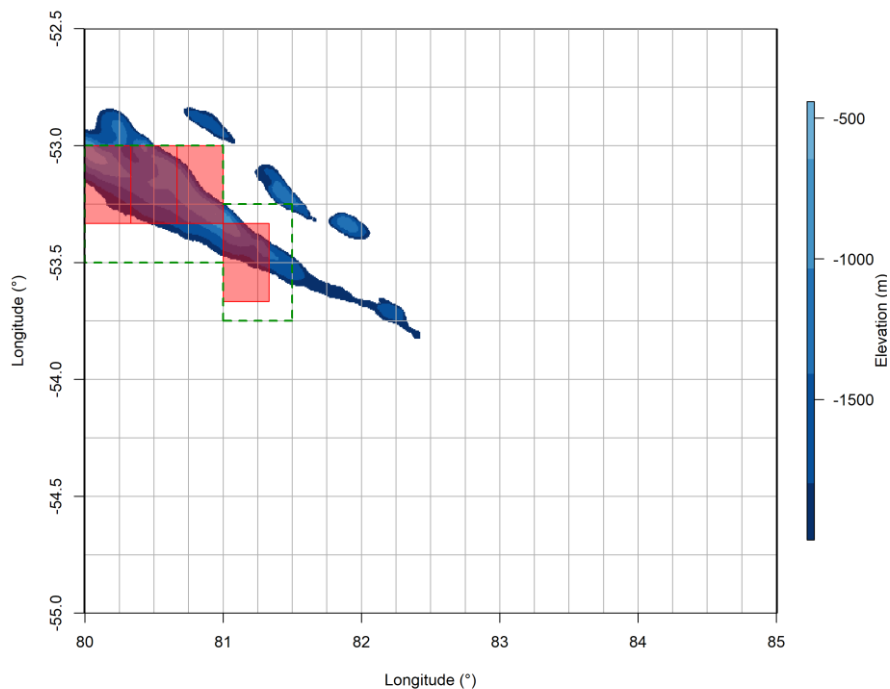


Figure 2. Australia’s historical bottom fishing footprint on William’s Ridge in SIOFA Statistical Area 7 as defined in Table 2 of CMM 2019/05. Shown are the bathymetry (using GEBCO 2019 grid with seafloor deeper than 2000 m uncoloured), and 15’x15’ grid squares (grey) as defined under the temporary measures to regulate fishing on William’s Ridge in SIOFA (CMM 2019/05). Australia’s bottom fishing footprint, defined as 20’x20’ grid squares with at least one instance of bottom fishing activity (i.e. a demersal trawl or longline set) between 1999 and 2009, is indicated in red. The green box bounds all 15’x15’ grid squares that overlap with Australia’s bottom fishing footprint, and indicates the area Australia proposes to fish for Patagonian Toothfish.

The area of Australia’s fishing footprint was recalculated accordingly, relative to bathomes within the SIOFA area (Table 1). Inclusion of the fishing effort from William’s Ridge increased the total area of Australia’s historical fishing footprint by 3280 km² or 1.4%. The fishing activity on William’s Ridge occurred in the upper (trawl) and mid (longline) continental slope bathomes, increasing the proportion of the Australian fishing footprint in the deep upper continental slope by about 2% to 46.9% of the total area and in the shallow mid-continental slope by 1% to 25.0% of the total area.

The areal extent of bathomes and the Australian fishing footprint in the SIOFA area were also recalculated using the SIOFA GIS shape file (FAO 2010), the GEBCO 2019 bathymetric data (GEBCO Compilation Group 2019), and the library ‘raster’ in R (Table 1). Using this approach as opposed to the GEBCO 2008 bathymetric data and ArcGIS (Williams et al. 2011), the estimated total SIOFA area increased by 0.2% (or 48,435 km²) and the Australian fishing footprint by 0.05% (or 120 km²). The total overlap of the Australian fishing footprint with the SIOFA area remained low and virtually unchanged at 0.85%. Changes in the estimated footprint, SIOFA area and overlap were small in depths deeper than 1000 m, however the estimated area of the continental shelf (0-200 m) increasing by over 14,500 km² whereas the shallow upper continental slope bathome (201-700 m) decreased by almost 11,000 km². While the Australian fishing footprint on the continental shelf was very small, the estimated overlap in the shallow upper continental slope bathome increased from 8.96% to 12.45% as a consequence.

Table 1. Estimated Australian historical fishing footprint (km²), SIOFA area (km²) and overlap (%) of Australian fishing footprint with total area by bathome, (a) as reported by Williams et al. (2011) using GEBCO 2008 bathymetry data and ArcGIS, (b) when Australians trawl and longline hauls on William’s Ridge were included (‘Williams et al. (2011) incl. William’s Ridge’), and (c) when recalculated using the GEBCO 2019 bathymetry data (GEBCO Compilation Group 2019) and the library ‘raster’ in R (‘Recalculated (GEBCO 2019) incl. William’s Ridge’).

Bathome	Name	(a) Williams et al. (2011)			(b) Williams et al. (2011) incl. William’s Ridge			(c) Recalculated (GEBCO 2019) incl. William’s Ridge		
		Footprint Area (km ²)	SIOFA Area (km ²)	Overlap (%)	Footprint Area (km ²)	SIOFA Area (km ²)	Overlap (%)	Footprint Area (km ²)	SIOFA Area (km ²)	Overlap (%)
0-200 m	Continental shelf	272	37,402	0.73	272	37,402	0.73	185	51,952	0.36
201-700 m	Shallow upper continental slope	2,773	32,101	8.64	2,875	32,101	8.96	2,651	21,288	12.45
701-1000 m	Deep upper continental slope	11,307	25,133	44.99	11,779	25,133	46.87	10,446	23,598	44.27
1001-1500 m	Shallow mid-continental slope	26,677	110,781	24.08	27,687	110,781	24.99	29,953	111,275	26.92
1501-2000 m	Deep mid-continental slope	33,795	260,633	12.97	34,388	260,633	13.19	35,506	266,320	13.33
> 2000 m	Unfished depths	151,074	26,414,597	0.57	152,178	26,414,597	0.58	150,558	26,454,649	0.57
All depths		225,899	26,880,647	0.84	229,179	26,880,647	0.85	229,299	26,929,082	0.85

3.1.2 Longlining targeting Patagonian Toothfish

Australia proposes to fish using demersal longlines to target Patagonian Toothfish within its historical bottom fishing footprint in SIOFA Statistical Area 7 (William's Ridge, Figure 3). Australia's fishing footprint on William's Ridge is contained within the area defined by the temporary measures to regulate fishing on William's Ridge agreed by the 6th Meeting of the Parties to SIOFA in 2019, hence Australia's plan to fish in this area for Patagonian Toothfish is consistent with CMM 2019/15¹.

Since 2003, Australian vessels have targeted Patagonian Toothfish with longline in the Australian Exclusive Economic Zone (EEZ) at Heard Island and McDonald Islands (HIMI) within the Convention for the Conservation of Antarctic Marine Living Resources (CCAMLR) Area, adjacent to Statistical Area 7. The history of this fishery is detailed in SC-04-21 (Delegation of Australia 2019) and on the CCAMLR website².

The proposed fishing gear is identical to that described in Williams et al. (2011). Vessels will set integrated weight autolines, comprising of an 11.5 mm mainline with a lead core, weighted at 50g/m to achieve sink rates that mitigate seabird interactions, consistent with CCAMLR Conservation Measure CM 25-02³ and Australian legislation (Figure 3). Hooks are attached to nylon snoods which in turn are attached to the mainline, around 1.4 m apart. Hooks are set as magazines of around 900 hooks, attached together in series, between nylon downlines with heavy chain and grapnels to hold the mainline on the seafloor, and windy buoys and GPS buoys marking the gear at the surface.

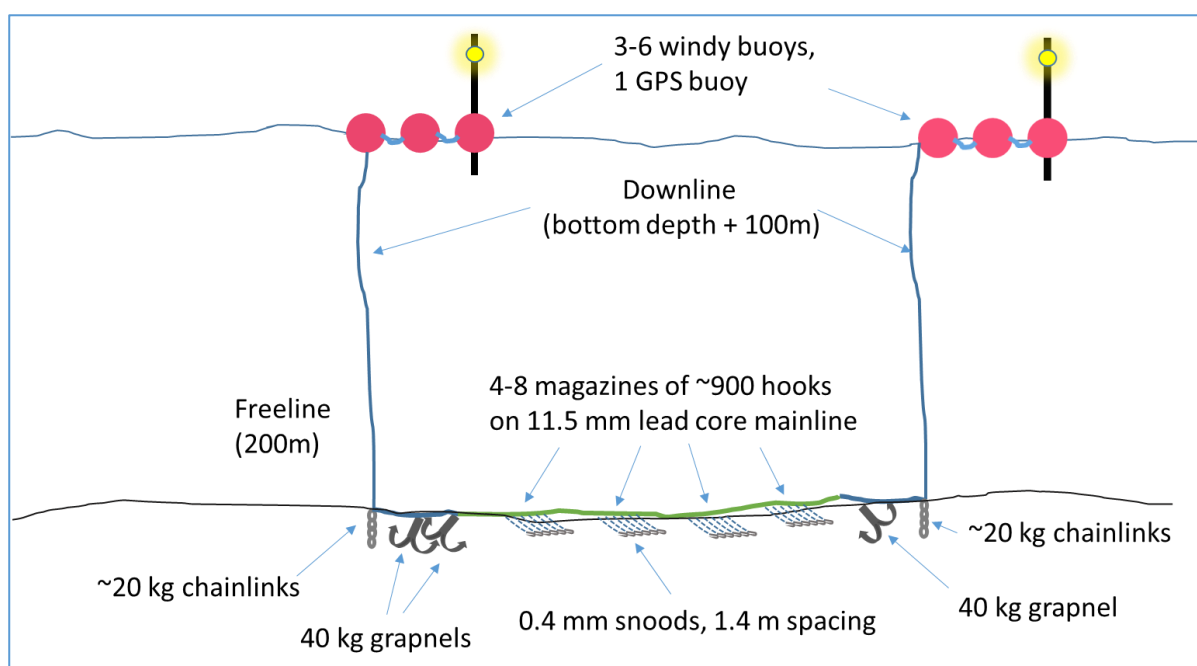


Figure 3. Diagram and indicative measures of the integrated weight autoline system proposed for use by Australian vessels to target Patagonian Toothfish within its historical fishing footprint in SIOFA Statistical Area 7.

¹http://apsoi.org/sites/default/files/documents/cmm/CMM%202019_15%20Management%20of%20Demersal%20Sto%20cks.pdf - accessed 17/9/2020

²<https://www.ccamlr.org/en/document/publications/fishery-report-2018-dissostichus-eleginoides-heard-island-australian-eez> - accessed 17/9/2020

³ <https://www.ccamlr.org/en/measure-25-02-2018> - accessed 17/9/2020

3.1.3 Potting targeting Spiny Lobsters

Australia proposes to fish using demersal pots to target Spiny Lobsters (mainly *Palinurus barbarae*, *P. delagoae* and *Jasus paulensis*) within its historical fishing footprint across the SIOFA Area (Figure 1). Australian vessels have never fished using pots within the SIOFA area, however they have conducted extensive trials using pots in the Australian EEZ at Heard Island and McDonald Islands, targeting Patagonian Toothfish, as described in SC-04-21 (Delegation of Australia 2019).

The proposed pots have a truncated cone, around 0.65 m high, 1.4m width at the base and 0.9 m wide at the top (Figure 4). They are constructed from 16 mm diameter steel rod with 20 mm diameter rod to reinforce the base and ensure the pots settle upright on the seafloor. The pots are covered in mesh, with a conical stocking leading into the pot towards the bait bag, sewn with biodegradable twine to ensure any lost pots do not ‘ghost fish’. The vessel intends to trial setting single pots and strings of pots linked by 50 m of floating line, up to a maximum of 2.5 km total length.

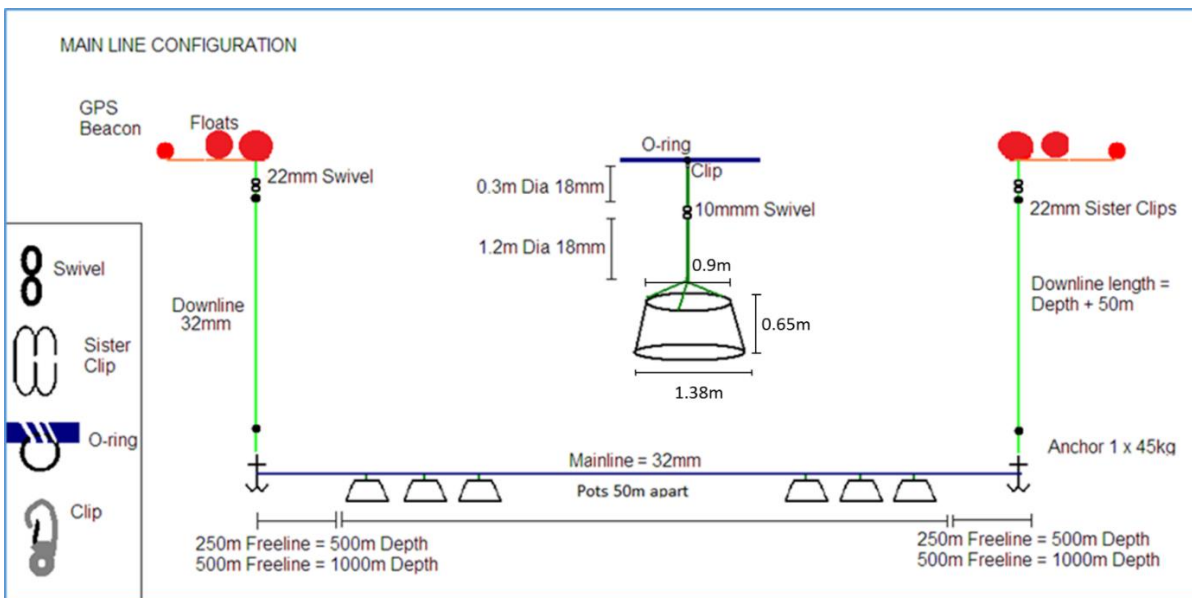


Figure 4. Diagram and indicative measures of the pot line system proposed for use by Australian vessels to target Spiny Lobster across its historical fishing footprint in the SIOFA area.

3.2 Status and assessment of impact of proposed activities on deep-water stocks and Vulnerable Marine Ecosystems (VMEs)

3.2.1 Patagonian Toothfish

A substantial body of scientific information supports the hypothesis that the Patagonian Toothfish populations found in SIOFA Statistical Area 7 are closely linked to, and share similar characteristics of relative abundance and productivity with, those found in the adjacent Divisions of the CCAMLR Area and within the EEZs of France and Australia around Kerguelen Islands and Heard Island and McDonald Islands (HIMI), respectively. The characteristics of the HIMI stock was described in detail by the Delegation of Australia (2019). CCAMLR reviewed an updated integrated stock assessment in 2019 (Ziegler 2019) and revised the total allowable catch for this stock based on this assessment (CCAMLR 2019). The 2019 assessment indicated that the stock is currently close to its target reference point of 50% of the virgin spawning stock biomass and, due to estimated recent lower-than-average recruitment, is likely to decline below the target reference point over the next few years before recovering to the target reference point.

The most common bycatch encountered in the HIMI EEZ when targeting Patagonian Toothfish with longlines are Grenadiers *Macrourus whitsoni*, *M. caml*, *M. carinatus* and *M. holotrachys*, and the Skate *Bathyraja irrasa*. Modelling of fish communities in this region predicts that the fish community on William's Ridge is similar to that on the slope of the Kerguelen Plateau (Hill et al. 2017, 2019), and hence it is likely that any bycatches will be dominated by these same species. This is further supported by reports by the European Union that bycatch from Spanish vessels targeting Patagonian Toothfish in Statistical Area 7 contained primarily *Macrourus* spp. (Delegation of the European Union 2019). The European Union also reported a small bycatch of the Skate *Amblyraja taaf*, however this may be misidentified *B. irrasa*. While these two species have similar morphological features, *A. taaf* typically lives in depths down to 600 m in this region, which is shallower than typically fished by longline targeting Patagonian Toothfish (Duhamel et al. 2005; Nowara et al. 2017).

Assessments of the biomass and status of these species within CCAMLR Division 58.5.2 indicates that these stocks can sustain annual removals of up to a maximum of 409 t for the *M. caml* and *M. whitsoni* species group, 360 tonnes for the *M. holotrachys* and *M. carinatus* species group, and 120 t of Skates (Dell et al. 2015; Dell et al. 2019). Current bycatch totals in the HIMI EEZ rarely reach these levels⁴, and these catches are estimated to be a low risk to the ecological sustainability of these species and the HIMI fishery as a whole (Bulman et al. 2018). Hence, mitigation measures similar to those mandated by CCAMLR at HIMI are recommended below to avoid SAI to these stocks (see below).

3.2.2 Spiny Lobsters

Little information is available on the diversity, distribution and abundance of Spiny Lobster stocks in the SIOFA area. Australia has never targeted Spiny Lobsters in the region, and we were unable to find published information on catch or effort targeting Spiny Lobsters in the SIOFA area, with the exception of Lobster fishing by Spanish-flagged vessels on Walters Shoals in 2006. This activity led to the description of a new Lobster species, *Palinurus barbarae* (Groeneveld et al. 2006). The Lobster species most likely to occur within Australia's historical fishing footprint are therefore *P. barbarae* and potentially *P. delagoae* which is recorded in depths down to 400 m on continental and insular slopes of south-western Africa and south of Madagascar (Holthuis 1991). *Jasus paulensis* may also be encountered on the South-western Indian Ocean Ridge in the SIOFA area in depths down to 350 m (Sieben et al. 2019).

⁴ <https://www.ccamlr.org/en/document/publications/fishery-report-2018-dissostichus-eleginoides-heard-island-australian-eez> - accessed 17/9/2020

The abundance and current stocks status of Spiny Lobsters that may be captured in the SIOFA area is currently uncertain. However, as deep-water Lobsters can be long lived and have relatively low productivity (Holthuis, 1991; Fennessy and Groeneveld 1997; Groeneveld 2000; Sieben et al. 2019), it is appropriate to take a precautionary approach to the mitigation of impacts on stocks until such time as sufficient data are collected and a stock assessment can be undertaken. Similarly, as stock assessments of bycatch species are currently not possible due to a paucity of data, a precautionary approach is also warranted, and measures are proposed below.

3.2.3 Vulnerable Marine Ecosystems (VMEs)

Due to their proximity and similar environmental conditions, the habitats where Patagonian Toothfish are targeted in Statistical Area 7 are likely to support similar benthic communities as the deep slope of the western Kerguelen Plateau (Welsford et al. 2014; Hill et al. 2019; Martin et al. 2019). Such deep-slope communities are characterised by low biomass and high biodiversity relative to shallower slope and bank areas. VME indicators (*sensu* CCAMLR 2009) likely to be encountered include sea pens (Pennatulaceans including *Umbellula* spp.) and basket stars (Euryalids including *Gorgonocephalus* spp.), and these taxa are observed in bycatch by bottom longlines in the HIMI EEZ.

We consider that Australia confining its fishing effort to its historical fishing footprint is a significant mitigation to the risk of SAI to VMEs resulting from its planned activities in Statistical Area 7. Furthermore, the temporary measures to regulate fishing on William's Ridge in SIOFA CCM 2019/05 limit the amount of longline gear that can be set by any vessel and the total set gear. We also note the large no-take Marine Reserve within the HIMI EEZ that includes 65,000 km² of benthic habitat. The Marine Reserve is at the same latitudinal and depth range as William's Ridge (Welsford et al. 2014; Weragoda and Fleming 2019), and hence is likely to protect representative species assemblages that are similar to those on William's Ridge, further reducing the risk that SAI may occur in the interim of other Conservation and Management Measures (CMMs) being developed by SIOFA for this area.

Relatively little is known regarding the impact of potting for Lobsters on VMEs in the SIOFA Area. Few consolidated data exist on the benthic impacts on VME assemblages occurring along the Southeast and Southwest Indian Ridges where Lobsters will be targeted. However, BFIA's by the Delegation of the European Union (2019) and anecdotal reports from other Members suggest these regions are likely to support slow growing, sessile, benthic invertebrates such as demosponges, glass sponges (Hexactinellids), stony corals (Antipatharians and Scleractinians), Alcyonaceans (Gorgonians and Pennatulaceans) and basket stars (Euryalids).

3.3. Monitoring, Management and Mitigation of impact of proposed activities

Australia will ensure that all Australian registered fishing vessels comply with any Conservation and Management Measures (CMMs) adopted by SIOFA for monitoring fishing activities in the SIOFA area. All vessels will carry tamper-proof Vessel Monitoring Systems (VMS), and compliance will be ensured through the routine monitoring of VMS data by national authorities. Vessels will also be required to provide comprehensive fine-scale catch, bycatch and effort reports for all fishing activities, and fishery observers will be deployed aboard all vessels undertaking fishing activities.

3.3.1 Toothfish

Vessels will be required to carry out biological measurements on representative samples of catch and bycatch, including total length, standard length, sex, weight and reproductive developmental stage of fish. Toothfish will be tagged and released at a rate of 5 fish per tonne of green weight retained. Any tagged fish recovered will be retained and measured for length, weight, sex and reproductive developmental stage, and otoliths removed for later analysis.

As noted above, the Patagonian Toothfish stock within SIOFA Statistical Area 7 is highly likely to have a similar status to the stock in the adjacent HIMI area which is close to the target reference point (Ziegler 2019). To ensure that any catches taken in the SIOFA area do not lead to overfishing, Australian vessels will conduct all fishing activities consistent with the fishing effort limits defined under the temporary measures to regulate fishing on William's Ridge in SIOFA CCM 2019/15. There have been considerable efforts to tag and release toothfish in Statistical Area 7 and the adjacent CCAMLR fisheries, and Australia undertakes to exchange all data from any fish recaptured with tags with the Members which tagged the fish, and CCAMLR as appropriate. Furthermore, Australia will include all catches from William's Ridge in future toothfish stock assessments in Division 58.5.2 presented to CCAMLR.

As noted above, the main bycatch species in Statistical Area 7 are likely to be the same as those encountered in the Australian EEZ at HIMI. Therefore, we recommend that equivalent bycatch mitigation measures also apply to vessels fishing in Statistical Area 7, i.e. vessels will move 5 nm for a minimum 5 days away from any set line that catches in excess of 3 tonnes of *Macrourus* spp. combined, or 2 tonnes of Skates, or 1 tonne of all other species combined⁵.

3.3.2 Spiny Lobsters

Vessels will be required to carry out biological measurements on representative samples of catch and bycatch, including total length, standard length, sex, weight and reproductive developmental stage for fish, and total carapace length, sex and reproductive developmental stage for Spiny Lobsters and any other crustacean bycatch. Details of any tagged individuals recovered will also be recorded.

The distribution and stock status of Spiny Lobsters within the SIOFA Area are highly uncertain and caution must be taken to ensure catches taken in the SIOFA area do not lead to overfishing. Therefore, Australian vessels will limit effort during the 2020/21 season to a total of 2000 pot lifts.

To limit overfishing of immature Lobster, vessels will move, for a period of at least 5 days, at least 5 nm away from the midpoint of the potline from where the catch of undersized Lobsters exceeded 25% of the catch. Undersized Lobsters are defined as having less than 70 mm total carapace length, which is the approximate

⁵ <https://www.ccamlr.org/en/measure-33-02-2019> - accessed 17/9/2020

size at 50% maturity (based on data for *P. delagoae* (Groeneveld 2000) and *Jasus paulensis* (Sieben et al. 2019)). All undersize Lobsters or other bycatch with a reasonable chance of survival will be returned to the water.

The likely bycatch in pots is unknown. The bycatch species may be similar to that seen on longlines set in the same area, although their relative ratios and the ratio of target to bycatch species is unknown. As such we recommend a move-on rule be implemented for the 2020/21 season, similar to that in Conservation Measure 33-03 for CCAMLR Exploratory Fisheries, i.e. if bycatch of any non-target species exceeds 32% of the weight of the catch of Spiny Lobsters, the vessel shall move at least 5 nm away from the midpoint of the potline where the bycatch occurred, for a period of at least 5 days⁶.

3.3.3 Vulnerable Marine Ecosystems (VMEs)

Australia will voluntarily implement data collection measures consistent with CCAMLR CM 22-07, including requiring comprehensive data collection on bycatch of VME indicator species by line segment. Pots are unlikely to retain bycatch of VME indicators, even where they interact with the seafloor. However, Australia will trial the deployment of cameras attached to pots to characterise the habitat where fishing occurs and quantify the nature and extent of any interactions with benthic organisms (Kilpatrick et al. 2011; Welsford et al. 2014; Lamb et al. 2019).

Longlines are estimated to cause significantly less damage and mortality to vulnerable benthic organisms across an equivalent area compared to trawl hauls. For example, Welsford et al. (2014) estimated that when taxa and area of interactions were the same, a bottom-set integrated weight longline would cause around 60% less damage and mortality than a trawl haul.

With the pot design proposed by Australia, interaction between pots and the seafloor is even less than that for an equivalent length of bottom-set integrated weight longline, as only the base of the pot is in contact with the seafloor as opposed to the entire length of a bottom-set longline. For example, assuming that longlines and pots may move up to ten metres sideways along their entire length during hauling (Welsford et al. 2014), interactions may occur with the seafloor over an area of up to 10,000 m² for each 1000 m of bottom-set longline. For the same length of a pot line, the estimated interactions would only occur over 2,830 m². Limiting the number of pot lifts will further mitigate the likelihood that Australia's potting activity will lead to SAI to VMEs.

⁶ <https://www.ccamlr.org/en/measure-33-03-2019> – accessed 17/9/2020

3.4. Residual risk of Significant Adverse Impacts on deep-water stocks and Vulnerable Marine Ecosystems

3.4.1 Patagonian Toothfish and associated bycatch species

Given the current monitoring, mitigation and management arrangements, including effort limitation under CMM 2019/5 as well as those measures recommended above, Australia considers that the residual risk of Australian vessels' activities targeting Toothfish in Statistical Area 7 causing or contributing to SAI to deep-water stocks of Patagonian Toothfish and associated bycatch species is **low**, and hence we recommend SIOFA permit them to proceed as proposed.

This assessment should be updated regularly, taking into account the results of all catches of Toothfish in Statistical Area 7 and nearby in the CCAMLR Convention Area, revised assessment of the Toothfish stocks in CCAMLR Division 58.5.2, as well as any new assessments or information collected on the composition, distribution and abundance of bycatch species.

3.4.2 Spiny Lobsters and associated bycatch species

Noting the above measures, Australia considers that the residual risk of Australian vessels' activities targeting Spiny Lobster in the SIOFA area causing or contributing to SAI to Spiny Lobsters or associated bycatch species is **low**, and hence we recommend SIOFA permit them to proceed as proposed.

This assessment should be revised taking into account the results of all catches of Spiny Lobsters in the SIOFA area and any new information collected on the composition, distribution and abundance of bycatch species.

3.4.3 Vulnerable Marine Ecosystems (VMEs)

Noting the above measures, Australia considers that the residual risk of Australian vessels' activities using longlines and pots in the SIOFA area causing or contributing to SAI to VMEs is **low**, and hence we recommend SIOFA permit them to proceed as proposed.

This assessment should be revised taking into account any new information collected on the composition, distribution and abundance of VME indicator species.

4. Conclusions

This project by the Australian Antarctic Division (AAD) has updated Australia's bottom fishing impact assessment for the Southern Indian Ocean Fisheries Agreement (SIOFA) area. The historic Australian fishing footprint was revised to include:

- A small amount of fishing effort which had not been included in the original footprint presented to SIOFA (Williams et al. 2011; Delegation of Australia 2018); and
- Updated bathymetric data for the entire SIOFA area.

In addition, an assessment was conducted of Australia's intention to undertake fishing using integrated weight longline to target Patagonian Toothfish (*Dissostichus eleginoides*) on William's Ridge, according to SIOFA CMM 2019/05, and potting for Spiny Lobsters (*Palinurus spp.* and *Jasus paulensis*) within its historical fishing footprint from 2020/21.

The report recommends monitoring of target, bycatch and VME species, including the collection of biological data and deployment of cameras on longlines and pots, and mitigation measures such as pot limits and move-on rules to avoid high bycatch and VME interaction rates.

Based on the current monitoring, mitigation and management arrangements, including effort limitation under CMM 2019/05 and those recommended here, the residual risk of the proposed Australian fishing activities in the SIOFA area causing or contributing to Significant Adverse Impacts (SAI) to stocks of Patagonian Toothfish, Spiny Lobsters, associated bycatch species or VME was considered to be low.

5. Implications

Australia has restricted its bottom fishing activities in SIOFA to the historical fishing footprint of Australian bottom trawl and longline vessels between 1999 and 2009. The previous BFIA (Williams et al. 2011) did not include historical fishing effort on William's Ridge.

This updated BFIA was presented as working paper SC-05-17 to the SIOFA Scientific Committee in 2020. The Scientific Committee acknowledged the work done by Australia and recognised that the BFIA meets an appropriate standard in light of international standards and the SIOFA BFIA Standard (BFIAS) (SIOFA SC-05, para. 82).

Through this acknowledgement by the Scientific Committee, Australia is now eligible to fish for Patagonian Toothfish using longlines on William's Ridge.

William's Ridge is located in the immediate proximity of the Australian EEZ around Heard Island and McDonald Islands (HIMI), with continuous Patagonian Toothfish habitat between the two areas. Based on available genetic information, catch composition, and tag-recapture data from survey and the commercial Patagonian Toothfish fishery, it is highly likely that toothfish on William's Ridge belong to the same population as those in the Australian EEZ. To further improve the understanding of the biology, stock structure and movement dynamics of toothfish on the Kerguelen Plateau, Australian vessels fishing for Patagonian Toothfish on William's Ridge will collect extensive biological data.

Based on the updated BFIA, Australian fishing vessels are now also eligible to fish with pots to target Spiny Lobsters (e.g. *Palinurus spp.* and *Jasus paulensis*) within Australia's historical fishing footprint in the SIOFA Area.

6. Recommendations

There are a number of recommendations based on this BFIA:

- Collect biological measurements on representative samples of catch and bycatch during all Australian fishing activities in the SIOFA area;
- Deploy underwater cameras attached to longlines and pots to characterise the habitat where fishing is undertaken and quantify the nature and extent of any interactions with benthic organisms;
- Exchange all data from any toothfish recaptured with tags on William's Ridge with the Members that tagged the fish, and CCAMLR as appropriate;
- Monitor trends in the Patagonian Toothfish fishery on William's Ridge; and
- Revise the BFIA for Australian fishing activities as required, taking into account the results of all catches and biological samples of Patagonian Toothfish and Spiny Lobsters in the SIOFA area, and any new information collected on the composition, distribution and abundance of bycatch and VME indicator species.

7. Extension and Adoption

This report was circulated for comment to industry stakeholders, the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and the Fisheries portfolio in DAWE as part of the clearance process for submission to SIOFA. The updated BFIA for Australia was presented as paper SC-05-17⁷ to the 5th Meeting of the Southern Indian Ocean Fisheries Agreement (SIOFA) Scientific Committee, held as a virtual meeting from 22 to 31 July 2020. The Scientific Committee acknowledged the work done by Australia and recognised that it meets an appropriate standard in light of international standards and the SIOFA BFIA Standard (BFIAS) (SIOFA SC-05, para. 82).

⁷ available at <http://apsoi.org/sites/default/files/documents/meetings/SC-05-17%20BFIA-update-Australia.pdf> - accessed 17/9/2020

Appendices

Appendix 1 - List of project staff

Dirk Welsford (AAD) - Principal Investigator

Philippe Ziegler (AAD) - Co-Investigator

Dale Maschette (AAD, IMAS/UTAS) - Project Officer

Mike Sumner (AAD) - Project Officer

Appendix 2 - Intellectual Property

No intellectual property that needs protection has been identified as likely to derive from this project.

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