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**Ecological Risk Assessment for Teleosts in SPRFMO Demersal Trawl, Midwater
Trawl and Demersal Longline Fisheries**

Australia

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**Ecological risk assessment for teleosts in SPRFMO demersal trawl,
midwater trawl and demersal longline fisheries**

(including relevant considerations on the SPRFMO species list and
categorisation of species into SPRFMO assessment framework)

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Purpose of this paper

This paper provides an update on an ecological risk assessment (ERA) for SPRFMO demersal teleosts. It describes the results of the current assessment and discusses development of the SPRFMO demersal teleost species list and progress towards the categorisation of SPRFMO demersal species into the tiered assessment framework. It also has relevance to paper SC07-DW9 *Candidate species for stock structure delineation*.

Introduction

ERA methods are useful for rapidly assessing the impact of fishing activities on fish stocks, particularly in data-limited fisheries. We adapted Productivity-Susceptibility Analysis (PSA) and Sustainability Assessment for Fishing Effects (SAFE) ERA tools to assess the vulnerability of 159 teleost species to demersal trawl, midwater trawl and demersal longline gears in the SPRFMO Convention area. The majority of species were categorised by the PSA and SAFE as being at low vulnerability to the three gears assessed. Fourteen species were categorised as high or extreme vulnerability in the SAFE assessment across the three gears. Of these 14 species, six were data deficient (missing productivity or susceptibility values). The SAFE assessment for longline gears resulted in a larger number of at-risk species than the trawl gears. For trawl gears, no data-robust species were assessed to be at high or extreme vulnerability in the SAFE assessment. For demersal longline gears, data-robust target species assessed to be at high or extreme vulnerability included *Polyprion oxygeneios* (SAFE - extreme), *Hyperoglyphe antarctica* (SAFE - extreme) and *Nemadactylus macropterus* (SAFE - high). Overall, there was good concurrence between PSA and SAFE results at the upper end of the vulnerability spectrum, with most species assessed to be at high or extreme vulnerability in the SAFE also ranked high in the PSA. Due to the precautionary nature of the PSA, there were more potential false positives (i.e. species assessed to be at risk that are probably not at risk), particularly among species ranked at medium vulnerability. Our findings should be considered in the context of existing information on catches and species biology, as well as objectives regarding the application of the precautionary and ecosystem approach to fisheries management within SPRFMO. The results suggest that categorisation into Tier 3 of the SPRFMO assessment framework (no further assessment required) would be appropriate for the majority of species. Despite this proposed categorisation, management measures may still be required for a number of species being taken in relatively large volumes. For all species not categorised into Tier 3, a precautionary approach should be taken to categorise and prioritise species for further assessment, research and/or management measures.

Background

Following discussion of the ERA for SPRFMO demersal teleosts presented in [SC6-DW07](#), SC6:

- Noted that the methodological assumptions and results of this assessment were preliminary and needed further refinement;
- Noted that a provisional species list was developed and was used for that assessment but contained some species outside SPRFMO's mandate and potentially species that did not interact with SPRFMO fisheries; and

- Noted that the results, once refined, may help the SC prioritise species for consideration for other non-standard assessment approaches as part of the categorisation of SPRFMO demersal species into the tiered assessment framework.

SC6 encouraged linking the ERA work for teleost species with the SPRFMO assessment framework as it would be desirable to prioritise assessments for those species that appear to be most at risk, and noted that the preliminary categorisation could be used in conjunction with the results of the teleosts ERA to prioritise stocks into Tier 3 (as well as strengthening justification for assessment of species at Tiers 1 and 2). As a result of these discussions, this paper combines the update on the ERA for SPRFMO demersal teleosts with consideration of the SPRFMO demersal teleosts species list and efforts towards categorising these species into the SPRFMO tiered assessment framework.

Methods

Methods used and methodological limitations are described in [SC6-DW07](#) and are not included here. Additional detail on the PSA and SAFE methods can be found in Hobday et al. (2011) and Zhou et al. (2007, 2011, 2016).

There has been one change to the PSA methodology that substantially changes the PSA results from those presented in [SC6-DW07](#). This change is relevant to how the susceptibility attributes are scaled relatively within the overall PSA vulnerability score. The previous method used to scale the susceptibility score¹ applied the formula $S = ((A \times E \times S \times PCM) - 1) / 40 + 1$, which was found to be a superseded methodology. The new formula is $S = (A \times E \times S \times PCM)^{1/4}$, which linearly rescales the range of scores back to [1-3] interval. There are no other changes to the methodology. The implications of this change are that the vulnerability scores from the PSA for many species will be higher than when using the previous calculation. The change does not apply to the SAFE assessment.

Formulation and refinement of the species list

The species list used in the preliminary assessment ([SC6-DW07](#)) was developed using Australian and New Zealand catch records available in the SPRFMO database. A list of all codes against which catch data had been reported was requested from the SPRFMO Secretariat. These codes were mapped to the species with corresponding '3-alpha' codes in the [FAO AFSIS list of species](#). All 188 species codes were included in the preliminary analysis.

For this updated analysis, the distribution of each species, and whether the species occurred in the SPRFMO Convention area, was checked using www.aquamaps.org, which is also the source of the species distribution data used in the assessment. A number of codes were found to be for species occurring outside the SPRFMO area and these species were removed. Species that had catches reported in the SPRFMO database but are outside SPRFMO's mandate (e.g. tunas, billfish, neritic species) as well as non-teleosts were also removed. One hundred and fifty-nine species were retained for this updated analysis.

¹ The susceptibility score is calculated as the product of four attributes: S – Susceptibility; A – Availability, E – Encounterability, S – Selectivity, PCM – Post-capture mortality.

Since completing this analysis, an updated extract from the SPRFMO database has identified a number of additional species that have not been included in this ERA. It is clear that development of an exhaustive species list is a non-trivial task. Issues that may need to be resolved for this to occur include the fact that codes removed from the list correlate to recorded catch or interactions with an 'unknown' species. Resolving this would require Members and CNCPs to work closely with the Secretariat to correlate erroneous codes submitted for entry into the SPRFMO database with the correct species and their official FAO codes.

Furthermore, there is a large amount of data in the SPRFMO catch database that has been collected at a genus or coarser taxonomic level. This presents challenges for the attribution of catch to the appropriate species and has implications for understanding the results of this assessment (and future assessments) in the context of overall catches of certain species. Despite these limitations, we have a high level of confidence that most species of interest and/or concern are reflected in the current species list and that any additional species added to the species list for inclusion in an updated analysis would likely fall into the Tier 3 category of the SPRFMO assessment framework (no further assessment required) because of the very low levels of catches typically associated with obscure non-target or discarded species that only rarely interact with SPRFMO demersal fisheries.

Results

Productivity-Susceptibility Analysis (PSA)

The PSA results presented herein are substantially different to those presented in SC06-DW07 due to the change in the PSA methodology (see Methods). The revised results accord more closely with what we would expect in terms of the prevalence of false positives in the PSA (i.e. species assessed to be at risk that only rarely if ever interact with the fishery).

There was a total of 15, 13 and 26 teleost species ranked as high relative vulnerability in the South Pacific Ocean to demersal trawl, midwater trawl and demersal longline fisheries, respectively (Figure 1). A subset of species assessed to be at high PSA vulnerability that corresponded with high or extreme vulnerability rankings in the SAFE assessment for demersal trawl, midwater trawl and demersal longline gears are shown in Table 1.

Of the 159 teleost species assessed, 23 were classified in this assessment as PSA data deficient (i.e. missing three or more productivity and/or susceptibility attributes). Many of these data deficient species are classified as high vulnerability in the PSA (Figure 1) and most are likely to be false positives as catch records indicate they rarely interact with the fishery.

Sustainability Assessment for the Effects of Fishing (SAFE)

The SAFE classified a total of seven, seven and 14 teleost species as high ($F > F_{lim}$) or extreme ($F > F_{crash}$) vulnerability in the South Pacific Ocean to demersal trawl, midwater trawl and demersal longline fisheries, respectively (Table 1 and Figure 2). Teleost species classified as high or extreme vulnerability across all fisheries (Table 1 and Figure 2) in the South Pacific Ocean included *Diretmus argenteus*, *Regalecus glesne*, *Grammicolepis brachiusculus*, *Diretmichthys parini*, *Derichthys serpentinus*, *Diastobranchnus capensis* and *Melanostomias valdiviae*. All of these were data deficient species for which F_{msm} , F_{lim} and F_{crash} could not be calculated because of a lack of biological data to inform the productivity attributes. Out of the 159 species assessed, two additional species (*Ostracion cubicus* and *Triodon macropterus*) were missing data needed to calculate F-based reference points, meaning a total of nine species are not present in Figure 2.

The PSA and SAFE vulnerability scores for all 159 teleost species are compared in Table 1 and Figure 2. The results indicate good concurrence between the PSA and SAFE results for most species categorised as being at high or extreme vulnerability in the SAFE. However, around half of these species were data deficient, resulting in higher vulnerability scores in both the PSA and SAFE. Many species classified as high or medium vulnerability by the PSA were ranked as low vulnerability by the SAFE (Table 1 and Figure 2) and many of these are very likely to be false positives. False positives in the PSA are expected and are a design feature of the method that assigns higher rankings to species with less information, but false negatives are often more difficult to identify. Running PSA and SAFE together provides enhanced ability to identify potential false positives and false negatives. There are some examples of species being ranked higher in the SAFE than in the PSA (e.g. *Nemadactylus macropterus* in the assessment for demersal longline gears, which was ranked medium in the PSA and high in the SAFE and may indicate a potential false negative in the PSA). Evidence of potential false positives at the medium and upper end of the PSA vulnerability rankings, include, for example, *Bassanago hirsutus* (PSA high, SAFE low), *Helicolenus percoides* (PSA medium, SAFE low) and *Rexea solandri* (PSA medium, SAFE low) for demersal trawl and midwater trawl gears (Table 1).

For demersal trawl gears, data-robust species assessed by the SAFE to be at medium vulnerability were *Bassanago hirsutus* and *Hoplostethus atlanticus*. For midwater trawl gears, data-robust species assessed by the SAFE to be at medium vulnerability were *Bassanago hirsutus* and *Pseudopentaceros richardsoni*. For longline gears, data-robust species assessed to be at high vulnerability were *Bassanago hirsutus*, *Helicolenus percoides*, *Epigonus telescopus*, *Nemadactylus macropterus*, *Rexea solandri* and data-robust species assessed to be at extreme vulnerability were *Polyprion oxygeneios* and *Hyperoglyphe antarctica* (Table 1).

Catch of assessed species in the SPRFMO area

Table 2 provides details of the top ten species (or groups of species) caught in the SPRFMO area between 2012 and 2016² and their respective vulnerability ranking from both the PSA and SAFE. Of the top ten species, four (*Hyperoglyphe antarctica*, *Polyprion spp.*, *Nemadactylus macropterus* and *Epigonus telescopus*³) were classified as high or extreme vulnerability in the SAFE (all in the assessment for demersal longline gears) (Table 2).

² This corresponds to the Australian and New Zealand effort dataset used in the ERA

³ Note that this species was caught exclusively by demersal trawl gears during the 2012-2016 period, indicating a probable false positive in the demersal longline SAFE assessment.

Figure 1. PSA results for 159 teleost species thought to occur and have the potential to interact with demersal and midwater trawl and longline gears in the South Pacific Ocean. Size of symbol represents number (n) of species with the same vulnerability score, while the shape equates to whether the species is 'data deficient' (circle) or 'data robust' (triangle). The green, yellow and red shading indicates low, medium and high vulnerability rankings, respectively. Data deficient species are defined as those missing three or more productivity and/or susceptibility attributes.

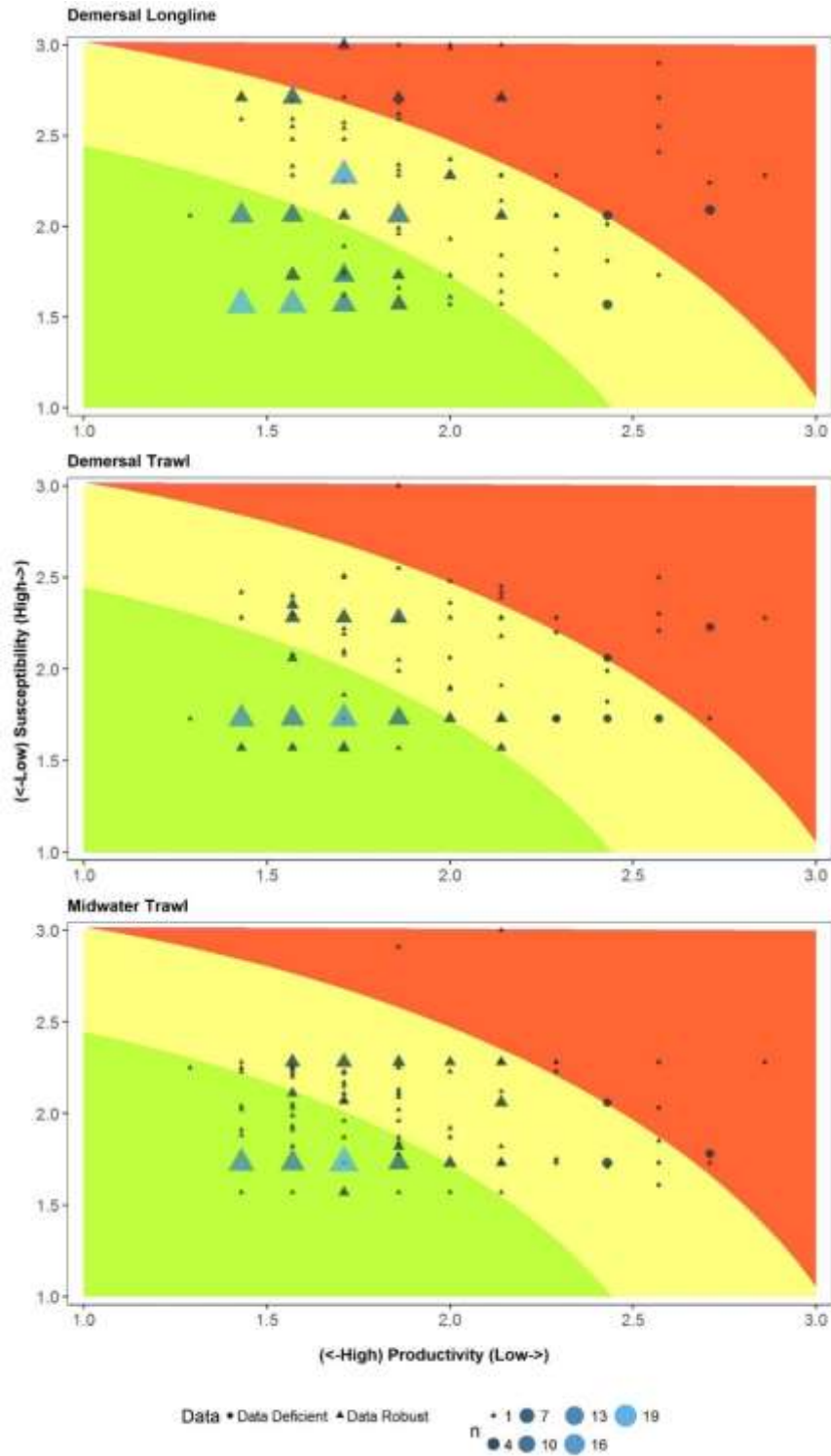


Figure 2: Relationship between SAFE and PSA results for 159 teleost species thought to occur and have the potential to interact with demersal, midwater trawl and demersal longline gears in the South Pacific Ocean. Points are coloured dark red, light red, yellow and green to signify species classified as extreme, high, medium and low vulnerability respectively in the SAFE. Dashed red and orange lines represent PSA risk high and medium score boundaries. Nine species are not shown on the panels as *F*-based reference points were unable to be calculated.

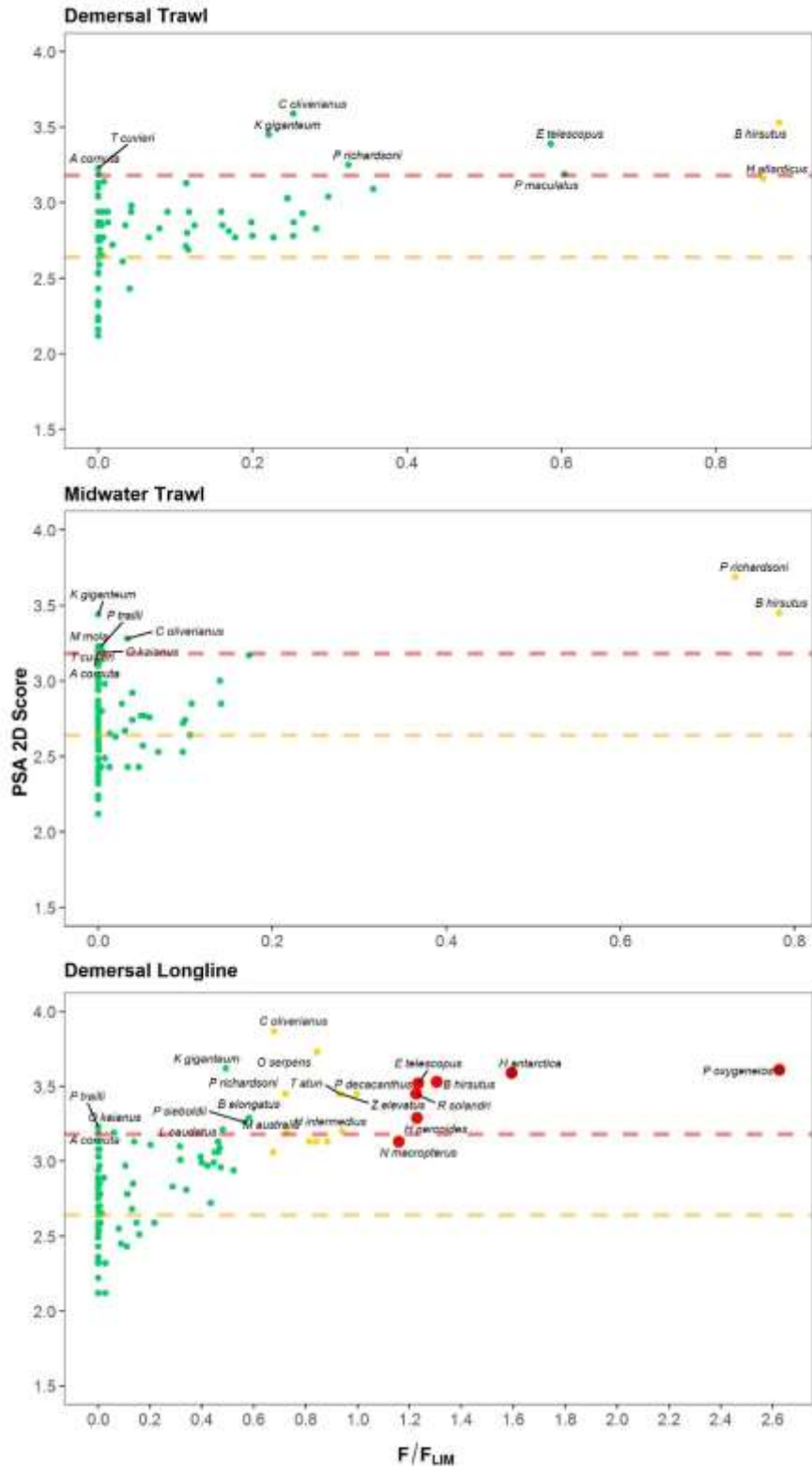


Table 1. Matrix of high and extreme vulnerability teleost species from the SAFE and their respective PSA score for each fishery along with 2012-2016 catch totals in the South Pacific Ocean.

Teleost species	Data deficient in PSA	2012-2016 fishing activity (kg)	Proportion of catch (last five years 2014-2018) by gear type	Demersal Trawl		Midwater Trawl		Demersal Longline	
				PSA	SAFE	PSA	SAFE	PSA	SAFE
<i>Diretmus argenteus</i> (DD)	Yes	0	N/A	High	Extreme	High	Extreme	High	Extreme
<i>Regalecus glesne</i> (DD)	Yes	6	100% Demersal Trawl	Medium	Extreme	Medium	Extreme	Medium	Extreme
<i>Grammicolepis brachiusculus</i> (DD)	Yes	N/A a	N/A	High	Extreme	High	Extreme	High	Extreme
<i>Diretmichthys parini</i> (DD)	Yes	0	N/A	Medium	Extreme	Medium	Extreme	Medium	Extreme
<i>Derichthys serpentinus</i> (DD)	Yes	N/A a	N/A	High	Extreme	High	Extreme	High	Extreme
<i>Diastobranthus capensis</i> (DD)	No	295	100% Demersal Trawl	High	Extreme	Medium	Extreme	Medium	Extreme
<i>Melanostomias valdiviae</i> (DD)	Yes	N/A a	N/A	High	Extreme	Medium	Extreme	Medium	Extreme
<i>Polyprion oxygeneios</i>	No	12,366 ⁴	72% Longline 28% Demersal Trawl	Medium	Low	Medium	Low	High	Extreme
<i>Hyperoglyphe antarctica</i>	No	358,260	92% Longline 5% Demersal Trawl 2% Midwater Trawl	Medium	Low	Medium	Low	High	Extreme
<i>Bassanago hirsutus</i>	No	930	100% Longline	High	Medium	High	Medium	High	High
<i>Helicolenus percoides</i>	No	26,238	99% Longline 1% Demersal Trawl	Medium	Low	Medium	Low	High	High
<i>Epigonus telescopus</i>	No	71,484	100% Demersal Trawl	High	Low	Medium	Low	High	High
<i>Rexea solandri</i>	No	2,472	100% Longline	Medium	Low	Medium	Low	High	High
<i>Nemadactylus macropterus</i>	No	162,591	100% Longline	Low	Low	Medium	Low	Medium	High

Notes: DD = Data deficient in SAFE, defined as species for which F-based reference points were unable to be calculated. N/A = Not applicable. **a** Interactions with these species are recorded in the SPRFMO database but there is no catch data associated with them.

⁴ Note that 192,844 kg of '*Polyprion* spp.' is recorded in the SPRFMO database for this period.

Table 2. Matrix of top 10 species (or species groups) by catch volume based on 2012-2016 catch and their respective PSA and SAFE vulnerability score for each gear type assessed in the South Pacific Ocean.

Teleost species/group	2012-2016 fishing activity (kg)	Proportion of catch (last five years 2014-2018) by gear type	Specific species	Demersal Trawl		Midwater Trawl		Demersal Longline	
				PSA	SAFE	PSA	SAFE	PSA	SAFE
<i>Hoplostethus atlanticus</i>	5,427,208	100% Demersal Trawl		Medium	Medium	Medium	Low	Medium	Low
<i>Beryx spp.*</i>	767,106	68% Demersal Trawl 31% Midwater Trawl <1% Longline	<i>Beryx splendens</i>	Medium	Low	Low	Low	Medium	Low
			<i>Beryx decadactylus</i>	Medium	Low	Medium	Low	Medium	Low
<i>Hyperoglyphe antarctica</i>	358,260	92% Longline 5% Demersal Trawl 2% Midwater Trawl		Medium	Low	Medium	Low	High	Extreme
<i>Polyprion spp.</i>	274,172	98% Longline 2% Demersal Trawl	<i>Polyprion americanus</i>	Medium	Low	Medium	Low	Medium	Low
			<i>Polyprion oxygeneios</i>	Medium	Low	Medium	Low	High	Extreme
<i>Seriola lalandi</i>	171,886	100% Longline		Medium	Low	Medium	Low	Medium	Low
<i>Nemadactylus macropterus</i>	162,591	100% Longline		Low	Low	Medium	Low	Medium	High
<i>Macrourus spp^</i>	97,848	99% Demersal Trawl <1% Longline	<i>Macrourus carinatus</i>	Medium	Low	Medium	Low	Medium	Low
			<i>Macrourus whitsoni</i>	Medium	Low	Low	Low	Low	Low
			<i>Macruronus novaezelandiae</i>	Medium	Low	Medium	Low	Medium	Low
<i>Pseudopentaceros richardsoni</i>	80,607	79% Demersal Trawl 14% Midwater Trawl 7% Longline		High	Low	High	Medium	High	Medium
<i>Epigonus telescopus</i>	71,484	100% Demersal Trawl		High	Low	Medium	Low	High	High
<i>Neocyttus rhomboidalis</i>	64,373	100% Demersal Trawl		Medium	Low	Medium	Low	Medium	Low

* Catch total is a combination of *Beryx spp.*, *Beryx splendens* and *Beryx decadactylus* from the SPRMFO database. *Beryx spp.* is assumed to comprise mostly *Beryx splendens*

^ Catch total is a combination of *Macrourus spp*, *Macruronus novaezelandiae*, *Macrouridae*, *Macrourus whitsoni* and *Macrourus holotrachys* from the SPRMFO database

Discussion

The results of our assessment indicate that a number of demersal teleost species are potentially vulnerable to demersal trawl, midwater trawl and demersal longline fishing gears in SPRFMO. Our results, when combined with information on catches and understanding of species' biological and life history characteristics, could be used to categorise species into the SPRFMO assessment framework and to prioritise species for additional data collection, research, assessment or management measures.

The results from the SAFE assessment for demersal and midwater trawl gears were somewhat surprising due to the low number of data-robust species being assessed at high vulnerability compared to demersal longline gears. Furthermore, low productivity species such as *Hoplostethus atlanticus* (orange roughy) that are targeted by the trawl fisheries and that we therefore might expect to be at the upper end of the vulnerability spectrum were assessed to be at medium vulnerability in both the PSA and SAFE. This is driven by a combination of the productivity and susceptibility attributes and how these correlate to the overall PSA and SAFE scores. To use *Hoplostethus atlanticus* as an example, out of all data-robust species, it ranked highest in terms of overall susceptibility in the PSA (i.e. AxExSxPCM), indicating that the productivity score is driving the overall vulnerability ranking down. Analysis of its individual productivity attributes reveal that the method is ranking *Hoplostethus atlanticus* as a moderately productive species. This is due to the influence of the individual productivity attributes for which *Hoplostethus atlanticus* is given a low vulnerability score (i.e. fecundity, average maximum size, average size at maturity and reproductive strategy are scored a 1), despite being given a high vulnerability score for the remaining productivity attributes used in this PSA (i.e. average age at maturity, average maximum age and trophic level are scored a 3).

The assumption that each individual productivity attribute provides a theoretically equal contribution to the overall productivity score has been challenged by Hordyk and Carruthers (2018), with their study showing a complex non-linear relationship between individual attributes and over-parameterisation caused by irrelevant or correlated attributes. In a statistical exploration of productivity attributes Griffiths et al. (2017) showed a number of productivity attributes were redundant for species assessed in a purse seine fishery in the Eastern Pacific Ocean, with a clear correlation between attributes such as age at maturity and maximum age. They postulated that the use of these redundant attributes would create an implicit weighting and positive bias in productivity scores, leading to an overestimation of species productivity and underestimation of the effects of fishing.

Consequently, the example of *Hoplostethus atlanticus*, despite being somewhat 'surprising', is not unexpected as the original Hobday et al. (2011) attributes and risk cut-off scores were based on a large database of teleosts and chondrichthyans with a very broad productivity range, with an intention to allow assessment and differentiation of the relative vulnerability of very low productivity (e.g. deepwater chondrichthyans) and very high productivity (e.g. small pelagic) species.

Such an example may highlight a key limitation of ERA and suggests: 1) that, where possible, species' vulnerability rankings should be considered in the context of catches by gear type and our understanding of species' biological and life history attributes; 2) relative vulnerability (within both the PSA and SAFE) is more informative than absolute vulnerability based on the

limitations of the methodology when applied in this context; and 3) species overall vulnerability rankings in this assessment will likely be more sensitive to susceptibility attributes, in particular availability and encounterability, than to productivity attributes.

The results for trawl gears indicate that careful attention should be given to those species assessed to be at medium vulnerability in the SAFE assessment (i.e. not just those assessed as high or extreme vulnerability). Species ranked as medium vulnerability in the SAFE include *Hoplostethus atlanticus* and *Bassanago hirsutus* for demersal trawl, and *Pseudopentaceros richardsoni* and *Bassanago hirsutus* for midwater trawl. In the context of available SPRFMO catch data, <1 t of catch has been reported for *Bassanago hirsutus* (deepsea conger) since 1990, and consequently this species may not warrant further attention. Conversely, ~83 t was reported for *Pseudopentaceros richardsoni* using predominantly demersal trawl gears between 2012 and 2016, and 46 t was reported as caught between 2014 and 2018, which may indicate that further attention is warranted. Given the relatively low levels of catch for *Pseudopentaceros richardsoni*, a suitable management response might include, *inter alia*, prioritisation of biological data collection, a catch trigger that requires the SC to take a closer look at the species, or expert input on possible precautionary catch limits for the species based on, for example, its distribution, habitat or life history. However, this example highlights key challenge of interpreting these ERA results in that there are many other species or species groupings that are not assessed to be at high vulnerability to trawl gears but may be caught in relatively high volumes, such as *Beryx* spp., *Macrourus* spp. and Oreosomatidae, that may warrant additional attention and where more quantitative assessment and/or measures may be necessary to avoid risks of overexploitation.

In summary, for demersal and midwater trawl gears, the results of our assessment in conjunction with information on SPRFMO catch levels and existing stock assessments suggest that current efforts to assess and manage *Hoplostethus atlanticus* are appropriate. Despite *Beryx splendens* not being assessed to be vulnerable to trawl gears in either the PSA or SAFE, we suggest that further research into stock structure delineation (see SC7-DW09) and more quantitative assessment may be appropriate given the high level of catches relative to other demersal teleosts and the fact that they are a target species. For the majority of other species caught in the trawl fisheries, the current low catches leading to a probable inability to apply non-standard stock assessment approaches to estimate status and yields suggests that catch triggers and adequate monitoring may be appropriate management measures to mitigate risks to these species for the time being.

For demersal longline gears, the results indicate a relatively high number of species assessed to be at the upper end of the PSA and SAFE vulnerability spectrum compared to the trawl gears. For data robust species, this is likely being driven by relatively high scores for two susceptibility attributes: availability and encounterability. We did not have access to the confidential spatial data to investigate the contribution of the availability attribute, but for the encounterability attribute—which is informed by the level of overlap between the gear depths and core depth range of each species—it is likely that a shallower minimum depth for demersal longline gears relative to trawl gears is contributing to the higher number of species assessed to be at the upper end of the vulnerability spectrum. This is because the gear depth data that informs scoring of this attribute will include the core depth range of more species that live in shallower habitats. This could be explored further and confirmed in future analyses.

Our results suggest that there are a number of species assessed to be vulnerable to longline gears that should be prioritised for further research and/or assessment (see, e.g. SC7-DW09). Of these, *Hyperoglyphe antarctica*, *Polyprion* spp. and *Nemadactylus* spp. are of particular interest as they comprise key target stocks and are assessed to be at high or extreme vulnerability to longline gears. There are a number of additional species caught in relatively large volumes in the demersal longline fishery that may warrant further attention based on knowledge of catches, productivity, targeting characteristics and/or other information, including *Seriola lalandi*, *Lethrinus miniatus* and *Etelis coruscans*.

For other species caught in the demersal longline fisheries, including those assessed as medium vulnerability in the SAFE assessment, catches may be deemed to be so low that there is unlikely to be a measurable influence on biomass. Consequently, an appropriate response may be ongoing monitoring of catches and potentially the development of precautionary catch and/or effort triggers until such time as it can be established that risks to these species are suitably mitigated or managed.

Recommendations

The SC is invited to consider the following recommendations for the SC7 report.

The SC:

- **Agrees** that cost and effort for ERA should be commensurate with the management needs and that methodological refinements to the current analysis may not be necessary at this time, but acknowledges that interpretation of results for particular species of concern may benefit from additional spatial analysis of species distribution and depth ranges in relation to fishing effort, and closer consideration of the other productivity and/or susceptibility attributes driving overall vulnerability rankings for these species;
- **Notes** that additional research into species biology, gear selectivity and/or post capture mortality may reduce uncertainty in the outputs of future assessments;
- **Requests** that the SPRFMO Secretariat work collaboratively with Members and CNCPs to resolve species coding issues in the SPRFMO database, which would provide additional certainty that all species potentially at risk are included in future assessments;
- **Agrees** that species listed at Annex A could be considered for additional management measures and/or research, which could include, *inter alia*, more quantitative assessment, enhanced data collection, precautionary catch triggers and monitoring, or stock structure delineation studies, and that attempts are continued to categorise these species into Tier 1 or Tier 2 of the SPRFMO assessment framework;
- Based on the results of this ERA and knowledge of catches and species biology, **notes** that species listed at Annex B have been proposed for categorisation into Tier 3 of the SPRFMO assessment framework (i.e. no further assessment required);
- **Requests** that SPRFMO participants aim to identify all species listed at Annex A to a species level (or the highest taxonomic resolution possible) in the collection and reporting of catch and other relevant data;
- **Recommends** that ERA assessments be repeated at least every five years and/or if there are substantial changes in the characteristics of SPRFMO bottom fisheries, and that this is reflected in the SPRFMO SC workplan. Such assessments could be expanded to include

all SPRFMO fish, marine mammals, reptiles, seabirds and other species of interest/concern.

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Annex A – Species proposed for further attention and/or categorisation into Tier 1 or Tier 2 of the SPRFMO assessment framework

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)	Notes
<i>Hoplostethus atlanticus</i>	Orange Roughy	Demersal Trawl	Medium	Medium	5,427,208	5,862,492	0.0%	100.0%	0.0%	Already regarded as a Tier 1/2 species
<i>Epigonus telescopus</i>	Black Deepsea Cardinalfish	Demersal Trawl	Low	High	71,484	74,440	0.0%	100.0%	0.0%	Low SAFE ranking and relatively low catches may indicate this species could be moved to Tier 3 but may require precautionary monitoring and/or management measures. Ability to apply non-standard assessment approaches unlikely.
<i>Pseudopentaceros richardsoni</i>	Pelagic Armourhead	Demersal Trawl	Low	High	80,607	46,061	7.1%	78.7%	14.2%	Medium SAFE ranking for midwater trawl. Relatively low catches may indicate this species could be moved to Tier 3 but may require precautionary monitoring and/or management measures. Ability to apply non-standard assessment approaches unlikely.
<i>Beryx splendens</i>	Alfonsino	Demersal Trawl (also MWT)	Low	Medium	244,018	3,689*	8.9%	91.1%	0.0%	*Additional 807,154 kgs of <i>Beryx spp.</i> caught between 2014-2018 Historically taken in relatively significant proportions using midwater trawl gears. Proposed for retention as Tier 1/2 species.
<i>Mora moro</i>	Ribaldo	Demersal Trawl	Low	Medium	52,160	100,945*	10.1%	89.9%	0.0%	*Additional 3,627 kgs of <i>Moridae spp.</i> caught between 2014-2018. Low SAFE ranking and relatively low catches may indicate this species could be moved to Tier 3 but may require precautionary monitoring and/or management measures. Ability to apply non-standard assessment approaches unlikely.
<i>Neocyttus rhomboidalis</i>	Spikey Oreodory	Demersal Trawl	Low	Medium	64,373	112,697	0.0%	100.0%	0.0%	Low SAFE ranking and relatively low catches may indicate this species could be moved to Tier 3 but may require precautionary monitoring and/or management measures. Ability to apply non-standard assessment approaches unlikely.
<i>Polyprion oxygeneios</i>	Hapuku	Longline	Extreme	High	12,366	10,408*	72.3%	27.7%	0.0%	*Additional 173,552 kgs of <i>Polyprion spp.</i> caught between 2014-2018. ERA rankings and relatively significant catch volumes suggest <i>Polyprion spp.</i> should be retained as Tier 2 species.
<i>Hyperoglyphe antarctica</i>	Blue-Eye Trevalla	Longline	Extreme	High	358,260	258,875	92.3%	5.5%	2.2%	ERA rankings and relatively significant catch volumes suggest <i>H. antarctica</i> should be retained as Tier 2 species.
<i>Bassanago hirsutus</i>	Deepsea Conger	Longline	High	High	930	930	100.0%	0.0%	0.0%	Negligible catches but ranked as high vulnerability to longline. Proposed to be moved to Tier 3 but may require monitoring.
<i>Helicolenus percoides</i>	Reef Ocean Perch	Longline	High	High	26,238	20,057	98.6%	1.4%	0.0%	Relatively low catch volumes. Proposed to be moved to Tier 3 but may require monitoring.
<i>Epigonus telescopus</i>	Black Deepsea Cardinalfish	Longline	High*	High	71,484	74,440	0.0%	100.0%	0.0%	*Ranked as high vulnerability in longline but caught exclusively in trawl during 2014-2018 period. May require monitoring.

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)	Notes
<i>Rexea solandri</i>	Gemfish	Longline	High	High	2,472	2,222	100.0%	0.0%	0.0%	Relatively low catch volumes. Proposed to be moved to Tier 3 but may require monitoring.
<i>Nemadactylus macropterus</i>	Jackass Morwong	Longline	High	Medium	162,591	124,450*	100.0%	0.0%	0.0%	*Additional 45,656 kgs of <i>Nemadactylus spp.</i> caught between 2014-2018. Historically significant as a target species in LL fishery. Proposed to be retained at Tier 2 although ability to apply non-standard assessment approaches may be unlikely.
<i>Seriola lalandi</i>	Yellowtail Kingfish	Longline	Low	Medium	171,886	153,737	100.0%	0.0%	0.0%	Low SAFE ranking but of significance as a retained species. Ability to assess using non-standard assessment may be unlikely; thus, species could be moved to Tier 3 but may require catch triggers and monitoring.
<i>Etelis coruscans</i>	Flame Snapper	Longline	Low	Medium	41,039	61,528	100.0%	0.0%	0.0%	Low SAFE ranking but of significance as a retained species. Ability to assess using non-standard assessment may be unlikely; thus, species could be moved to Tier 3 but may require catch triggers and monitoring.
<i>Polyprion americanus</i>	Bass Groper	Longline	Low	Medium	68,962	76,739*	99.9%	0.1%	0.0%	*Additional 173,552 kgs of <i>Polyprion spp.</i> caught between 2014-2018. Other comments as per <i>P. oxygeneios</i> .
<i>Lethrinus miniatus</i>	Redthroat Emperor	Longline	Low	Low	58,330	83,734	100.0%	0.0%	0.0%	Low SAFE ranking but of significance as a retained species. Ability to assess using non-standard assessment may be unlikely; thus, species could be moved to Tier 3 but may require catch triggers and monitoring.

Annex B: Species recommended to be categorised into Tier 3 of the SPRFMO assessment framework (i.e. no further assessment required)

Note: This list is structured against the three main gear types assessed – Demersal trawl, midwater trawl and demersal longline. Consequently, there may be species proposed for categorisation as a Tier 3 species for one gear that are included in Annex A as a potential Tier 1/2 species for the main gear used to target them. Additionally, this list is not intended to suggest that management measures such as monitoring and precautionary catch triggers may not be required, but rather that the results of the ERA in conjunction with information on catches may indicate that further assessment may not be required or may not be possible given the generally low levels of catches and the probable inability of non-standard assessment methods to be applied.

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Bassanago hirsutus</i>	Deepsea Conger	Demersal Trawl	Medium	High	930	930	100.0%	0.0%	0.0%
<i>Pseudocyttus maculatus</i>	Smooth Oreodory	Demersal Trawl	Low	High	22,417	25,657	0.0%	100.0%	0.0%
<i>Hyperaglyphe antarctica</i>	Blue-Eye Trevalla	Demersal Trawl	Low	Medium	358,260	258,875	92.3%	5.5%	2.2%
<i>Pleuroscopus pseudodorsalis</i>	Scaled Stargazer	Demersal Trawl	Low	Medium	3	0	0.0%	0.0%	0.0%
<i>Lepidorhynchus denticulatus</i>	Toothed Whiptail	Demersal Trawl	Low	Medium	90	398	0.0%	100.0%	0.0%
<i>Zenopsis nebulosa</i>	Mirror Dory	Demersal Trawl	Low	Medium					
<i>Oreosoma atlanticum</i>	Oxeye Oreodory	Demersal Trawl	Low	Medium	7,000	0	0.0%	0.0%	0.0%
<i>Hoplostethus intermedius</i>	Blacktip Sawbelly	Demersal Trawl	Low	Medium					
<i>Epigonus robustus</i>	Robust Deepsea Cardinalfish	Demersal Trawl	Low	Medium	673	673	0.0%	100.0%	0.0%
<i>Polyprion oxygeneios</i>	Hapuku	Demersal Trawl	Low	Medium	12,366	10,408	72.3%	27.7%	0.0%
<i>Coelorinchus oliverianus</i>	Hawknose grenadier	Demersal Trawl	Low	High	0	20	0.0%	100.0%	0.0%
<i>Lepidion microcephalus</i>	Smallhead Cod	Demersal Trawl	Low	Medium	616	430	0.0%	100.0%	0.0%
<i>Coelorinchus fasciatus</i>	Banded Whiptail	Demersal Trawl	Low	Medium					
<i>Kathetostoma giganteum</i>	Giant stargazer	Demersal Trawl	Low	High	123	83	14.5%	85.5%	0.0%
<i>Pseudophycis bachus</i>	Red Cod	Demersal Trawl	Low	Medium	141	311	98.1%	1.9%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Coelorinchus kaiyomaru</i>	Kaiyomaru Whiptail	Demersal Trawl	Low	Medium					
<i>Cyttus traversi</i>	King Dory	Demersal Trawl	Low	Medium	0	10	0.0%	100.0%	0.0%
<i>Rexea solandri</i>	Gemfish	Demersal Trawl	Low	Medium	2,472	2,222	100.0%	0.0%	0.0%
<i>Macrourus carinatus</i>	Ridgescale Whiptail	Demersal Trawl	Low	Medium					
<i>Lepidocybium flavobrunneum</i>	Escolar	Demersal Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Merluccius australis</i>	Southern Hake	Demersal Trawl	Low	Medium	2,634	3,949	0.5%	99.5%	0.0%
<i>Seriolella caerulea</i>	White Warehou	Demersal Trawl	Low	Medium	5	696	15.1%	84.9%	0.0%
<i>Argentina elongata</i>	Argentina elongata	Demersal Trawl	Low	Medium					
<i>Halargyreus johnsonii</i>	Slender Cod	Demersal Trawl	Low	Medium	1,366	1,979	0.0%	100.0%	0.0%
<i>Benthodesmus elongatus</i>	Slender Frostfish	Demersal Trawl	Low	Medium					
<i>Centriscops humerosus</i>	Banded Bellowsfish	Demersal Trawl	Low	Medium	15	15	0.0%	100.0%	0.0%
<i>Beryx decadactylus</i>	Imperador	Demersal Trawl	Low	Medium	2,979	2,418	100.0%	0.0%	0.0%
<i>Helicolenus percoides</i>	Reef Ocean Perch	Demersal Trawl	Low	Medium	26,238	20,057	98.6%	1.4%	0.0%
<i>Alepocephalus australis</i>	Smallscale Slickhead	Demersal Trawl	Low	Medium	78	113	0.0%	100.0%	0.0%
<i>Thyrsites atun</i>	Barracouta	Demersal Trawl	Low	Low	565	1,156	99.6%	0.0%	0.4%
<i>Ruvettus pretiosus</i>	Oilfish	Demersal Trawl	Low	Medium	4,046	2,453	97.4%	2.6%	0.0%
<i>Seriolella punctata</i>	Silver Warehou	Demersal Trawl	Low	Low	0	155	90.3%	9.7%	0.0%
<i>Lepidopus caudatus</i>	Southern Frostfish; Frostfish	Demersal Trawl	Low	Medium	389	181	12.7%	46.4%	40.9%
<i>Persparia kopua</i>	Spangled Tubeshoulder	Demersal Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Ostichthys kaianus</i>	Kai soldierfish	Demersal Trawl	Low	Medium					
<i>Tubbia tasmanica</i>	Tasmanian Rudderfish	Demersal Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Allocyttus verrucosus</i>	Warty Oreodory	Demersal Trawl	Low	Medium	1,472	1,871	0.0%	100.0%	0.0%
<i>Pentaceros decacanthus</i>	Bigspine Boarfish	Demersal Trawl	Low	Medium	0	50,604	0.0%	100.0%	0.0%
<i>Seriola lalandi</i>	Yellowtail Kingfish	Demersal Trawl	Low	Medium	171,886	153,737	100.0%	0.0%	0.0%
<i>Centrolophus niger</i>	Rudderfish	Demersal Trawl	Low	Medium	145	105	0.0%	100.0%	0.0%
<i>Paratrachichthys trailli</i>	Sandpaper fish, Common roughy	Demersal Trawl	Low	Medium	545	603	0.0%	100.0%	0.0%
<i>Brama brama</i>	Ray's Bream	Demersal Trawl	Low	Medium	576	356	99.7%	0.0%	0.3%
<i>Schedophilus velaini</i>	Violet warehou	Demersal Trawl	Low	Medium	848	833	100.0%	0.0%	0.0%
<i>Antimora rostrata</i>	Violet Cod	Demersal Trawl	Low	Medium	67	162	100.0%	0.0%	0.0%
<i>Pterygotrigla picta</i>	Spotted gurnard	Demersal Trawl	Low	Medium	132	679	23.0%	77.0%	0.0%
<i>Phosichthys argenteus</i>	Silver Lightfish	Demersal Trawl	Low	Low					
<i>Lampadena speculigera</i>	Mirror lanternfish	Demersal Trawl	Low	Low					
<i>Anoplogaster cornuta</i>	Fangtooth	Demersal Trawl	Low	High					
<i>Pristipomoides argyrogrammicus</i>	Ornate jobfish	Demersal Trawl	Low	Low	378	621	100.0%	0.0%	0.0%
<i>Rhombosolea plebeia</i>	Sand flounder	Demersal Trawl	Low	Low	1	1	0.0%	100.0%	0.0%
<i>Epinephelus retouti</i>	Red-tipped grouper	Demersal Trawl	Low	Low					
<i>Pristipomoides auricilla</i>	Goldflag jobfish	Demersal Trawl	Low	Low					
<i>Carangoides orthogrammus</i>	Island trevally	Demersal Trawl	Low	Low					
<i>Luposicya lupus</i>	Wolfsnout goby	Demersal Trawl	Low	Low					
<i>Ophisurus serpens</i>	Serpent Eel	Demersal Trawl	Low	Medium	40	0	0.0%	0.0%	0.0%
<i>Chauliodus sloani</i>	Sloane's Viperfish	Demersal Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Cnidogobius macrocephalus</i>	Estuary Cobbler	Demersal Trawl	Low	Medium	7	7	100.0%	0.0%	0.0%
<i>Pseudophycis breviuscula</i>	Bastard Red Cod	Demersal Trawl	Low	Low	12	14	100.0%	0.0%	0.0%
<i>Macruronus novaezealandiae</i>	Blue Grenadier	Demersal Trawl	Low	Medium	2,979	3,828	7.3%	92.6%	0.1%
<i>Genypterus blacodes</i>	Pink Ling	Demersal Trawl	Low	Medium	7,282	8,346	98.7%	1.3%	0.0%
<i>Macrourus whitsoni</i>	[a whiptail]	Demersal Trawl	Low	Medium	56	62	100.0%	0.0%	0.0%
<i>Centroberyx affinis</i>	Redfish	Demersal Trawl	Low	Low	1,705	21,055	7.9%	92.1%	0.0%
<i>Centroberyx gerrardi</i>	Bight Redfish	Demersal Trawl	Low	Low	302	242	100.0%	0.0%	0.0%
<i>Cyttus australis</i>	Silver Dory	Demersal Trawl	Low	Low	150	150	0.0%	100.0%	0.0%
<i>Zeus faber</i>	John Dory	Demersal Trawl	Low	Low	1	1	100.0%	0.0%	0.0%
<i>Cyttus novaezealandiae</i>	New Zealand Dory	Demersal Trawl	Low	Low	48	50	0.0%	0.0%	100.0%
<i>Lampris guttatus</i>	Spotted moonfish;Opah	Demersal Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Chelidonichthys kumu</i>	Red Gurnard	Demersal Trawl	Low	Low	1,760	1,760	0.0%	100.0%	0.0%
<i>Pterygotrigla polyommata</i>	Latchet	Demersal Trawl	Low	Low	36	61	100.0%	0.0%	0.0%
<i>Platycephalus richardsoni</i>	Tiger Flathead	Demersal Trawl	Low	Low	56	0	0.0%	0.0%	0.0%
<i>Lepidoperca pulchella</i>	Eastern Orange Perch	Demersal Trawl	Low	Low	167	13	100.0%	0.0%	0.0%
<i>Epinephelus coioides</i>	Orange-spotted Grouper	Demersal Trawl	Low	Low					
<i>Epinephelus maculatus</i>	Highfin Grouper	Demersal Trawl	Low	Low					
<i>Epinephelus fasciatus</i>	Blacktip Rockcod	Demersal Trawl	Low	Low	103	349	100.0%	0.0%	0.0%
<i>Epinephelus fuscoguttatus</i>	Flowery Rockcod	Demersal Trawl	Low	Low	0	41	100.0%	0.0%	0.0%
<i>Variola albimarginata</i>	White-edge Coronation Trout	Demersal Trawl	Low	Low	0	6	100.0%	0.0%	0.0%
<i>Epinephelus quoyanus</i>	Longfin Rockcod	Demersal Trawl	Low	Low	762	2,270	100.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Cephalopholis sonnerati</i>	Tomato Rockcod	Demersal Trawl	Low	Low	48	126	100.0%	0.0%	0.0%
<i>Epinephelus septemfasciatus</i>	Convict Grouper	Demersal Trawl	Low	Low					
<i>Plectropomus leopardus</i>	Common Coral Trout	Demersal Trawl	Low	Low	0	281	100.0%	0.0%	0.0%
<i>Caprodon longimanus</i>	Longfin Perch	Demersal Trawl	Low	Low	3,856	4,342	100.0%	0.0%	0.0%
<i>Cephalopholis cyanostigma</i>	Bluespotted Rockcod	Demersal Trawl	Low	Low					
<i>Epinephelus cyanopodus</i>	Purple Rockcod	Demersal Trawl	Low	Low	467	467	100.0%	0.0%	0.0%
<i>Epinephelus ergastularius</i>	Banded Rockcod	Demersal Trawl	Low	Low					
<i>Epinephelus morrhua</i>	Comet Grouper	Demersal Trawl	Low	Low	16	107	100.0%	0.0%	0.0%
<i>Variola louti</i>	Yellowedge Coronation Trout	Demersal Trawl	Low	Low	319	508	100.0%	0.0%	0.0%
<i>Polyprion americanus</i>	Bass Groper	Demersal Trawl	Low	Medium	68,962	76,739	99.9%	0.1%	0.0%
<i>Seriola hippos</i>	Samsonfish	Demersal Trawl	Low	Low					
<i>Gnathanodon speciosus</i>	Golden Trevally	Demersal Trawl	Low	Low	0	2	100.0%	0.0%	0.0%
<i>Seriola dumerilli</i>	Amberjack	Demersal Trawl	Low	Low					
<i>Elagatis bipinnulata</i>	Rainbow Runner	Demersal Trawl	Low	Low	69	78	100.0%	0.0%	0.0%
<i>Caranx sexfasciatus</i>	Bigeye Trevally	Demersal Trawl	Low	Low	202	207	100.0%	0.0%	0.0%
<i>Seriola rivoliana</i>	Highfin Amberjack	Demersal Trawl	Low	Low					
<i>Caranx lugubris</i>	Black Trevally	Demersal Trawl	Low	Low	0	6	100.0%	0.0%	0.0%
<i>Pseudocaranx georgianus</i>	Silver Trevally	Demersal Trawl	Low	Low					
<i>Emmelichthys nitidus</i>	Redbait	Demersal Trawl	Low	Low	425	420	0.0%	100.0%	0.0%
<i>Plagiogeneion rubiginosum</i>	Cosmopolitan Rubyfish	Demersal Trawl	Low	Low	637	59	100.0%	0.0%	0.0%
<i>Aphareus rutilans</i>	Rusty Jobfish	Demersal Trawl	Low	Low	55	129	100.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Pristipomoides multidens</i>	Goldbanded Jobfish	Demersal Trawl	Low	Low					
<i>Lutjanus malabaricus</i>	Saddletail Snapper	Demersal Trawl	Low	Low	7	7	100.0%	0.0%	0.0%
<i>Lutjanus lutjanus</i>	Bigeye Snapper	Demersal Trawl	Low	Low					
<i>Etelis carbunculus</i>	Ruby Snapper	Demersal Trawl	Low	Low	343	361	100.0%	0.0%	0.0%
<i>Lutjanus argentimaculatus</i>	Mangrove Jack	Demersal Trawl	Low	Low					
<i>Aprion virescens</i>	Green Jobfish	Demersal Trawl	Low	Low	5,379	10,291	100.0%	0.0%	0.0%
<i>Lutjanus bohar</i>	Red Bass	Demersal Trawl	Low	Low	58	66	100.0%	0.0%	0.0%
<i>Pristipomoides filamentosus</i>	Rosy Snapper	Demersal Trawl	Low	Low	3,648	6,595	100.0%	0.0%	0.0%
<i>Lutjanus adetii</i>	Hussar	Demersal Trawl	Low	Low	516	573	100.0%	0.0%	0.0%
<i>Etelis coruscans</i>	Flame Snapper	Demersal Trawl	Low	Low	41,039	61,528	100.0%	0.0%	0.0%
<i>Lutjanus fulvus</i>	Blacktail Snapper	Demersal Trawl	Low	Low	0	0	0.0%	0.0%	0.0%
<i>Pristipomoides flavipinnis</i>	Goldeneye Snapper	Demersal Trawl	Low	Low					
<i>Pristipomoides zonatus</i>	Oblique-banded Snapper	Demersal Trawl	Low	Low	3	11	100.0%	0.0%	0.0%
<i>Pristipomoides sieboldii</i>	Lavender Snapper	Demersal Trawl	Low	Low					
<i>Diagramma pictum</i>	Painted Sweetlip	Demersal Trawl	Low	Low	384	459	100.0%	0.0%	0.0%
<i>Lethrinus olivaceus</i>	Longnose Emperor	Demersal Trawl	Low	Low					
<i>Gymnocranius grandoculis</i>	Robinson's Seabream	Demersal Trawl	Low	Low	26,316	40,186	100.0%	0.0%	0.0%
<i>Lethrinus lentjan</i>	Red Spot Emperor	Demersal Trawl	Low	Low					
<i>Lethrinus miniatus</i>	Redthroat Emperor	Demersal Trawl	Low	Low	58,330	83,734	100.0%	0.0%	0.0%
<i>Lethrinus rubrioperculatus</i>	Spotcheek Emperor	Demersal Trawl	Low	Low	0	14,445	100.0%	0.0%	0.0%
<i>Gymnocranius euanus</i>	Paddletail Seabream	Demersal Trawl	Low	Low	0	1,077	100.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Wattsia mossambica</i>	Mozambique Seabream	Demersal Trawl	Low	Low	15	49	100.0%	0.0%	0.0%
<i>Paristiopterus labiosus</i>	Giant Boarfish	Demersal Trawl	Low	Medium	380	400	0.0%	5.0%	95.0%
<i>Pentaceropsis recurvirostris</i>	Longsnout Boarfish	Demersal Trawl	Low	Medium					
<i>Zanclistius elevatus</i>	Blackspot Boarfish	Demersal Trawl	Low	Medium					
<i>Nemadactylus douglasii</i>	Grey Morwong	Demersal Trawl	Low	Low	1,564	1,564	100.0%	0.0%	0.0%
<i>Nemadactylus macropterus</i>	Jackass Morwong	Demersal Trawl	Low	Low	162,591	124,450	100.0%	0.0%	0.0%
<i>Latris lineata</i>	Striped Trumpeter	Demersal Trawl	Low	Low	894	922	100.0%	0.0%	0.0%
<i>Latridopsis forsteri</i>	Bastard Trumpeter	Demersal Trawl	Low	Low	162	109	100.0%	0.0%	0.0%
<i>Latridopsis ciliaris</i>	Blue Moki	Demersal Trawl	Low	Low					
<i>Sphyaena jello</i>	Pickhandle barracuda	Demersal Trawl	Low	Low					
<i>Bodianus perditio</i>	Goldspot Pigfish	Demersal Trawl	Low	Low	328	367	100.0%	0.0%	0.0%
<i>Dissostichus eleginoides</i>	Patagonian toothfish	Demersal Trawl	Low	Medium	0	7	100.0%	0.0%	0.0%
<i>Dissostichus mawsoni</i>	[an icefish]	Demersal Trawl	Low	Medium	28,961	57,797	100.0%	0.0%	0.0%
<i>Gempylus serpens</i>	Snake Mackerel	Demersal Trawl	Low	Low					
<i>Scomber australasicus</i>	Blue Mackerel	Demersal Trawl	Low	Low	0	11	100.0%	0.0%	0.0%
<i>Seriolella brama</i>	Blue Warehou	Demersal Trawl	Low	Low	1,396	850	100.0%	0.0%	0.0%
<i>Tetragonurus cuvieri</i>	Smalleye Squaretail	Demersal Trawl	Low	High					
<i>Abalistes stellaris</i>	Starry Triggerfish	Demersal Trawl	Low	Low	663	1,877	100.0%	0.0%	0.0%
<i>Pseudobalistes flavimarginatus</i>	Yellowmargin Triggerfish	Demersal Trawl	Low	Low					
<i>Sphoeroides pachygaster</i>	Balloonfish	Demersal Trawl	Low	Low					
<i>Lagocephalus lagocephalus</i>	Oceanic puffer;Ocean Puffer	Demersal Trawl	Low	Low					

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Allomycterus pilatus</i>	Australian Burrfish	Demersal Trawl	Low	Medium					
<i>Mola mola</i>	Ocean Sunfish	Demersal Trawl	Low	Medium					
<i>Bassanago hirsutus</i>	Deepsea Conger	Midwater Trawl	Medium	High	930	930	100.0%	0.0%	0.0%
<i>Pseudopentaceros richardsoni</i>	Pelagic Armourhead	Midwater Trawl	Medium	High	80,607	46,061	7.1%	78.7%	14.2%
<i>Epigonus telescopus</i>	Black Deepsea Cardinalfish	Midwater Trawl	Low	Medium	71,484	74,440	0.0%	100.0%	0.0%
<i>Polyprion oxygeneios</i>	Hapuku	Midwater Trawl	Low	Medium	12,366	10,408	72.3%	27.7%	0.0%
<i>Rexea solandri</i>	Gemfish	Midwater Trawl	Low	Medium	2,472	2,222	100.0%	0.0%	0.0%
<i>Thyrsites atun</i>	Barracouta	Midwater Trawl	Low	Medium	565	1,156	99.6%	0.0%	0.4%
<i>Hoplostethus atlanticus</i>	Orange Roughy	Midwater Trawl	Low	Medium	5,427,208	5,862,492	0.0%	100.0%	0.0%
<i>Zenopsis nebulosa</i>	Mirror Dory	Midwater Trawl	Low	Medium					
<i>Lepidorhynchus denticulatus</i>	Toothed Whiptail	Midwater Trawl	Low	Medium	90	398	0.0%	100.0%	0.0%
<i>Hoplostethus intermedius</i>	Blacktip Sawbelly	Midwater Trawl	Low	Low					
<i>Beryx splendens</i>	Alfonsino	Midwater Trawl	Low	Low	244,018	3,689	8.9%	91.1%	0.0%
<i>Lepidocybium flavobrunneum</i>	Escolar	Midwater Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Hyperoglyphe antarctica</i>	Blue-Eye Trevalla	Midwater Trawl	Low	Medium	358,260	258,875	92.3%	5.5%	2.2%
<i>Oreosoma atlanticum</i>	Oxeye Oreodory	Midwater Trawl	Low	Low	7,000	0	0.0%	0.0%	0.0%
<i>Beryx decadactylus</i>	Imperador	Midwater Trawl	Low	Medium	2,979	2,418	100.0%	0.0%	0.0%
<i>Pleuroscopus pseudodorsalis</i>	Scaled Stargazer	Midwater Trawl	Low	Low	3	0	0.0%	0.0%	0.0%
<i>Benthodesmus elongatus</i>	Slender Frostfish	Midwater Trawl	Low	Medium					
<i>Pseudocyttus maculatus</i>	Smooth Oreodory	Midwater Trawl	Low	Medium	22,417	25,657	0.0%	100.0%	0.0%
<i>Lepidion microcephalus</i>	Smallhead Cod	Midwater Trawl	Low	Low	616	430	0.0%	100.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Coelorinchus oliverianus</i>	Hawknose grenadier	Midwater Trawl	Low	High	0	20	0.0%	100.0%	0.0%
<i>Cyttus traversi</i>	King Dory	Midwater Trawl	Low	Medium	0	10	0.0%	100.0%	0.0%
<i>Ruvettus pretiosus</i>	Oilfish	Midwater Trawl	Low	Medium	4,046	2,453	97.4%	2.6%	0.0%
<i>Coelorinchus fasciatus</i>	Banded Whiptail	Midwater Trawl	Low	Low					
<i>Epigonus robustus</i>	Robust Deepsea Cardinalfish	Midwater Trawl	Low	Medium	673	673	0.0%	100.0%	0.0%
<i>Mora moro</i>	Ribaldo	Midwater Trawl	Low	Low	52,160	100,945	10.1%	89.9%	0.0%
<i>Centriscomps humerosus</i>	Banded Bellowsfish	Midwater Trawl	Low	Low	15	15	0.0%	100.0%	0.0%
<i>Alepocephalus australis</i>	Smallscale Slickhead	Midwater Trawl	Low	Medium	78	113	0.0%	100.0%	0.0%
<i>Ostichthys kaianus</i>	Kai soldierfish	Midwater Trawl	Low	High					
<i>Neocyttus rhomboidalis</i>	Spikey Oreodory	Midwater Trawl	Low	Medium	64,373	112,697	0.0%	100.0%	0.0%
<i>Halargyreus johnsonii</i>	Slender Cod	Midwater Trawl	Low	Low	1,366	1,979	0.0%	100.0%	0.0%
<i>Paratrachichthys trailli</i>	Sandpaper fish, Common roughy	Midwater Trawl	Low	High	545	603	0.0%	100.0%	0.0%
<i>Schedophilus velaini</i>	Violet warehou	Midwater Trawl	Low	Medium	848	833	100.0%	0.0%	0.0%
<i>Persparsia kopua</i>	Spangled Tubeshoulder	Midwater Trawl	Low	Low	0	0	0.0%	0.0%	0.0%
<i>Phosichthys argenteus</i>	Silver Lightfish	Midwater Trawl	Low	Low					
<i>Pristipomoides argyrogrammicus</i>	Ornate jobfish	Midwater Trawl	Low	Low	378	621	100.0%	0.0%	0.0%
<i>Pterygotrigla picta</i>	Spotted gurnard	Midwater Trawl	Low	Medium	132	679	23.0%	77.0%	0.0%
<i>Kathetostoma giganteum</i>	Giant stargazer	Midwater Trawl	Low	High	123	83	14.5%	85.5%	0.0%
<i>Rhombosolea plebeia</i>	Sand flounder	Midwater Trawl	Low	Low	1	1	0.0%	100.0%	0.0%
<i>Argentina elongata</i>	Argentina elongata	Midwater Trawl	Low	Medium					

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<i>Epinephelus retouti</i>	Red-tipped grouper	Midwater Trawl	Low	Low					
<i>Pristipomoides auricilla</i>	Goldflag jobfish	Midwater Trawl	Low	Low					
<i>Carangoides orthogrammus</i>	Island trevally	Midwater Trawl	Low	Low					
<i>Luposicya lupus</i>	Wolfsnout goby	Midwater Trawl	Low	Low					
<i>Optivus elongatus</i>	Slender roughy	Midwater Trawl	Low	Medium	48,640	56,811	0.0%	100.0%	0.0%
<i>Lampadena speculigera</i>	Mirror lanternfish	Midwater Trawl	Low	Low					
<i>Ophisurus serpens</i>	Serpent Eel	Midwater Trawl	Low	Medium	40	0	0.0%	0.0%	0.0%
<i>Chauliodus sloani</i>	Sloane's Viperfish	Midwater Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Cnidogobius macrocephalus</i>	Estuary Cobbler	Midwater Trawl	Low	Medium	7	7	100.0%	0.0%	0.0%
<i>Pseudophycis bachus</i>	Red Cod	Midwater Trawl	Low	Medium	141	311	98.1%	1.9%	0.0%
<i>Antimora rostrata</i>	Violet Cod	Midwater Trawl	Low	Low	67	162	100.0%	0.0%	0.0%
<i>Pseudophycis breviuscula</i>	Bastard Red Cod	Midwater Trawl	Low	Low	12	14	100.0%	0.0%	0.0%
<i>Macruronus novaezelandiae</i>	Blue Grenadier	Midwater Trawl	Low	Medium	2,979	3,828	7.3%	92.6%	0.1%
<i>Merluccius australis</i>	Southern Hake	Midwater Trawl	Low	Medium	2,634	3,949	0.5%	99.5%	0.0%
<i>Genypterus blacodes</i>	Pink Ling	Midwater Trawl	Low	Medium	7,282	8,346	98.7%	1.3%	0.0%
<i>Coelorinchus kaiyomaru</i>	Kaiyomaru Whiptail	Midwater Trawl	Low	Low					
<i>Macrourus carinatus</i>	Ridgescale Whiptail	Midwater Trawl	Low	Medium					
<i>Macrourus whitsoni</i>	[a whiptail]	Midwater Trawl	Low	Low	56	62	100.0%	0.0%	0.0%
<i>Anoplogaster cornuta</i>	Fangtooth	Midwater Trawl	Low	High					
<i>Centroberyx affinis</i>	Redfish	Midwater Trawl	Low	Medium	1,705	21,055	7.9%	92.1%	0.0%
<i>Centroberyx gerrardi</i>	Bight Redfish	Midwater Trawl	Low	Medium	302	242	100.0%	0.0%	0.0%

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<i>Cyttus australis</i>	Silver Dory	Midwater Trawl	Low	Low	150	150	0.0%	100.0%	0.0%
<i>Zeus faber</i>	John Dory	Midwater Trawl	Low	Low	1	1	100.0%	0.0%	0.0%
<i>Cyttus novaezealandiae</i>	New Zealand Dory	Midwater Trawl	Low	Low	48	50	0.0%	0.0%	100.0%
<i>Allocyttus verrucosus</i>	Warty Oreodory	Midwater Trawl	Low	Medium	1,472	1,871	0.0%	100.0%	0.0%
<i>Allocyttus niger</i>	Black Oreodory	Midwater Trawl	Low	Low	32,904	42,182	0.0%	100.0%	0.0%
<i>Lampris guttatus</i>	Spotted moonfish;Opah	Midwater Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Helicolenus percoides</i>	Reef Ocean Perch	Midwater Trawl	Low	Medium	26,238	20,057	98.6%	1.4%	0.0%
<i>Chelidonichthys kumu</i>	Red Gurnard	Midwater Trawl	Low	Low	1,760	1,760	0.0%	100.0%	0.0%
<i>Pterygotrigla polyommata</i>	Latchet	Midwater Trawl	Low	Low	36	61	100.0%	0.0%	0.0%
<i>Platycephalus richardsoni</i>	Tiger Flathead	Midwater Trawl	Low	Low	56	0	0.0%	0.0%	0.0%
<i>Lepidoperca pulchella</i>	Eastern Orange Perch	Midwater Trawl	Low	Low	167	13	100.0%	0.0%	0.0%
<i>Epinephelus coioides</i>	Orange-spotted Grouper	Midwater Trawl	Low	Low					
<i>Epinephelus maculatus</i>	Highfin Grouper	Midwater Trawl	Low	Low					
<i>Epinephelus fasciatus</i>	Blacktip Rockcod	Midwater Trawl	Low	Low	103	349	100.0%	0.0%	0.0%
<i>Epinephelus fuscoguttatus</i>	Flowery Rockcod	Midwater Trawl	Low	Low	0	41	100.0%	0.0%	0.0%
<i>Variola albimarginata</i>	White-edge Coronation Trout	Midwater Trawl	Low	Low	0	6	100.0%	0.0%	0.0%
<i>Epinephelus quoyanus</i>	Longfin Rockcod	Midwater Trawl	Low	Low	762	2,270	100.0%	0.0%	0.0%
<i>Cephalopholis sonnerati</i>	Tomato Rockcod	Midwater Trawl	Low	Low	48	126	100.0%	0.0%	0.0%
<i>Epinephelus septemfasciatus</i>	Convict Grouper	Midwater Trawl	Low	Low					
<i>Plectropomus leopardus</i>	Common Coral Trout	Midwater Trawl	Low	Low	0	281	100.0%	0.0%	0.0%
<i>Caprodon longimanus</i>	Longfin Perch	Midwater Trawl	Low	Low	3,856	4,342	100.0%	0.0%	0.0%

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<i>Cephalopholis cyanostigma</i>	Bluespotted Rockcod	Midwater Trawl	Low	Low					
<i>Epinephelus cyanopodus</i>	Purple Rockcod	Midwater Trawl	Low	Low	467	467	100.0%	0.0%	0.0%
<i>Epinephelus ergastularius</i>	Banded Rockcod	Midwater Trawl	Low	Low					
<i>Epinephelus morrhua</i>	Comet Grouper	Midwater Trawl	Low	Low	16	107	100.0%	0.0%	0.0%
<i>Variola louti</i>	Yellowedge Coronation Trout	Midwater Trawl	Low	Low	319	508	100.0%	0.0%	0.0%
<i>Polyprion americanus</i>	Bass Groper	Midwater Trawl	Low	Medium	68,962	76,739	99.9%	0.1%	0.0%
<i>Seriola lalandi</i>	Yellowtail Kingfish	Midwater Trawl	Low	Medium	171,886	153,737	100.0%	0.0%	0.0%
<i>Seriola hippos</i>	Samsonfish	Midwater Trawl	Low	Low					
<i>Gnathanodon speciosus</i>	Golden Trevally	Midwater Trawl	Low	Low	0	2	100.0%	0.0%	0.0%
<i>Seriola dumerilli</i>	Amberjack	Midwater Trawl	Low	Low					
<i>Elagatis bipinnulata</i>	Rainbow Runner	Midwater Trawl	Low	Low	69	78	100.0%	0.0%	0.0%
<i>Caranx sexfasciatus</i>	Bigeye Trevally	Midwater Trawl	Low	Low	202	207	100.0%	0.0%	0.0%
<i>Seriola rivoliana</i>	Highfin Amberjack	Midwater Trawl	Low	Low					
<i>Caranx lugubris</i>	Black Trevally	Midwater Trawl	Low	Low	0	6	100.0%	0.0%	0.0%
<i>Pseudocaranx georgianus</i>	Silver Trevally	Midwater Trawl	Low	Low					
<i>Brama brama</i>	Ray's Bream	Midwater Trawl	Low	Low	576	356	99.7%	0.0%	0.3%
<i>Emmelichthys nitidus</i>	Redbait	Midwater Trawl	Low	Medium	425	420	0.0%	100.0%	0.0%
<i>Plagiogeneion rubiginosum</i>	Cosmopolitan Rubyfish	Midwater Trawl	Low	Medium	637	59	100.0%	0.0%	0.0%
<i>Aphareus rutilans</i>	Rusty Jobfish	Midwater Trawl	Low	Low	55	129	100.0%	0.0%	0.0%
<i>Pristipomoides multidens</i>	Goldbanded Jobfish	Midwater Trawl	Low	Low					
<i>Lutjanus malabaricus</i>	Saddletail Snapper	Midwater Trawl	Low	Low	7	7	100.0%	0.0%	0.0%

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<i>Lutjanus lutjanus</i>	Bigeye Snapper	Midwater Trawl	Low	Low					
<i>Etelis carbunculus</i>	Ruby Snapper	Midwater Trawl	Low	Medium	343	361	100.0%	0.0%	0.0%
<i>Lutjanus argentimaculatus</i>	Mangrove Jack	Midwater Trawl	Low	Low					
<i>Aprion virescens</i>	Green Jobfish	Midwater Trawl	Low	Low	5,379	10,291	100.0%	0.0%	0.0%
<i>Lutjanus bohar</i>	Red Bass	Midwater Trawl	Low	Low	58	66	100.0%	0.0%	0.0%
<i>Pristipomoides filamentosus</i>	Rosy Snapper	Midwater Trawl	Low	Medium	3,648	6,595	100.0%	0.0%	0.0%
<i>Lutjanus adetii</i>	Hussar	Midwater Trawl	Low	Low	516	573	100.0%	0.0%	0.0%
<i>Etelis coruscans</i>	Flame Snapper	Midwater Trawl	Low	Medium	41,039	61,528	100.0%	0.0%	0.0%
<i>Lutjanus fulvus</i>	Blacktail Snapper	Midwater Trawl	Low	Low	0	0	0.0%	0.0%	0.0%
<i>Pristipomoides flavipinnis</i>	Goldeneye Snapper	Midwater Trawl	Low	Low					
<i>Pristipomoides zonatus</i>	Oblique-banded Snapper	Midwater Trawl	Low	Low	3	11	100.0%	0.0%	0.0%
<i>Pristipomoides sieboldii</i>	Lavender Snapper	Midwater Trawl	Low	Low					
<i>Diagramma pictum</i>	Painted Sweetlip	Midwater Trawl	Low	Low	384	459	100.0%	0.0%	0.0%
<i>Lethrinus olivaceus</i>	Longnose Emperor	Midwater Trawl	Low	Low					
<i>Gymnocranius grandoculis</i>	Robinson's Seabream	Midwater Trawl	Low	Low	26,316	40,186	100.0%	0.0%	0.0%
<i>Lethrinus lentjan</i>	Red Spot Emperor	Midwater Trawl	Low	Low					
<i>Lethrinus miniatus</i>	Redthroat Emperor	Midwater Trawl	Low	Low	58,330	83,734	100.0%	0.0%	0.0%
<i>Lethrinus rubrioperculatus</i>	Spotcheek Emperor	Midwater Trawl	Low	Low	0	14,445	100.0%	0.0%	0.0%
<i>Gymnocranius euanus</i>	Paddletail Seabream	Midwater Trawl	Low	Low	0	1,077	100.0%	0.0%	0.0%
<i>Wattsia mossambica</i>	Mozambique Seabream	Midwater Trawl	Low	Low	15	49	100.0%	0.0%	0.0%
<i>Paristiopterus labiosus</i>	Giant Boarfish	Midwater Trawl	Low	Medium	380	400	0.0%	5.0%	95.0%

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<i>Pentaceroopsis recurvirostris</i>	Longsnout Boarfish	Midwater Trawl	Low	Medium					
<i>Pentaceros decacanthus</i>	Bigspine Boarfish	Midwater Trawl	Low	Medium	0	50,604	0.0%	100.0%	0.0%
<i>Zanclistius elevatus</i>	Blackspot Boarfish	Midwater Trawl	Low	Medium					
<i>Nemadactylus douglasii</i>	Grey Morwong	Midwater Trawl	Low	Low	1,564	1,564	100.0%	0.0%	0.0%
<i>Nemadactylus macropterus</i>	Jackass Morwong	Midwater Trawl	Low	Medium	162,591	124,450	100.0%	0.0%	0.0%
<i>Latris lineata</i>	Striped Trumpeter	Midwater Trawl	Low	Medium	894	922	100.0%	0.0%	0.0%
<i>Latridopsis forsteri</i>	Bastard Trumpeter	Midwater Trawl	Low	Low	162	109	100.0%	0.0%	0.0%
<i>Latridopsis ciliaris</i>	Blue Moki	Midwater Trawl	Low	Low					
<i>Sphyaena jello</i>	Pickhandle barracuda	Midwater Trawl	Low	Low					
<i>Bodianus perditio</i>	Goldspot Pigfish	Midwater Trawl	Low	Low	328	367	100.0%	0.0%	0.0%
<i>Dissostichus eleginoides</i>	Patagonian toothfish	Midwater Trawl	Low	Medium	0	7	100.0%	0.0%	0.0%
<i>Dissostichus mawsoni</i>	[an icefish]	Midwater Trawl	Low	Medium	28,961	57,797	100.0%	0.0%	0.0%
<i>Gempylus serpens</i>	Snake Mackerel	Midwater Trawl	Low	Medium					
<i>Lepidopus caudatus</i>	Southern Frostfish; Frostfish	Midwater Trawl	Low	Medium	389	181	12.7%	46.4%	40.9%
<i>Scomber australasicus</i>	Blue Mackerel	Midwater Trawl	Low	Low	0	11	100.0%	0.0%	0.0%
<i>Tubbia tasmanica</i>	Tasmanian Rudderfish	Midwater Trawl	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Centrolophus niger</i>	Rudderfish	Midwater Trawl	Low	Medium	145	105	0.0%	100.0%	0.0%
<i>Seriolella brama</i>	Blue Warehou	Midwater Trawl	Low	Low	1,396	850	100.0%	0.0%	0.0%
<i>Seriolella punctata</i>	Silver Warehou	Midwater Trawl	Low	Medium	0	155	90.3%	9.7%	0.0%
<i>Seriolella caerulea</i>	White Warehou	Midwater Trawl	Low	Medium	5	696	15.1%	84.9%	0.0%
<i>Tetragonurus cuvieri</i>	Smalleye Squaretail	Midwater Trawl	Low	High					

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Abalistes stellaris</i>	Starry Triggerfish	Midwater Trawl	Low	Low	663	1,877	100.0%	0.0%	0.0%
<i>Pseudobalistes flavimarginatus</i>	Yellowmargin Triggerfish	Midwater Trawl	Low	Low					
<i>Sphoeroides pachygaster</i>	Balloonfish	Midwater Trawl	Low	Medium					
<i>Lagocephalus lagocephalus</i>	Oceanic puffer;Ocean Puffer	Midwater Trawl	Low	Medium					
<i>Allomycterus pilatus</i>	Australian Burrfish	Midwater Trawl	Low	Medium					
<i>Mola mola</i>	Ocean Sunfish	Midwater Trawl	Low	High					
<i>Pentaceros decacanthus</i>	Bigspine Boarfish	Longline	Medium	High	0	50,604	0.0%	100.0%	0.0%
<i>Hoplostethus intermedius</i>	Blacktip Sawbelly	Longline	Medium	High					
<i>Thyrsites atun</i>	Barracouta	Longline	Medium	High	565	1,156	99.6%	0.0%	0.4%
<i>Zanclistius elevatus</i>	Blackspot Boarfish	Longline	Medium	High					
<i>Centroberyx affinis</i>	Redfish	Longline	Medium	Medium	1,705	21,055	7.9%	92.1%	0.0%
<i>Ophisurus serpens</i>	Serpent Eel	Longline	Medium	High	40	0	0.0%	0.0%	0.0%
<i>Zenopsis nebulosa</i>	Mirror Dory	Longline	Medium	Medium					
<i>Lepidorhynchus denticulatus</i>	Toothed Whiptail	Longline	Medium	Medium	90	398	0.0%	100.0%	0.0%
<i>Merluccius australis</i>	Southern Hake	Longline	Medium	High	2,634	3,949	0.5%	99.5%	0.0%
<i>Pseudopentaceros richardsoni</i>	Pelagic Armourhead	Longline	Medium	High	80,607	46,061	7.1%	78.7%	14.2%
<i>Cyttus australis</i>	Silver Dory	Longline	Medium	Medium	150	150	0.0%	100.0%	0.0%
<i>Coelorinchus oliverianus</i>	Hawknose grenadier	Longline	Medium	High	0	20	0.0%	100.0%	0.0%
<i>Ostracion cubicus</i>	Yellow Boxfish	Longline	Low	Medium					
<i>Triodon macropterus</i>	Threetooth Puffer	Longline	Low	High					

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Benthodesmus elongatus</i>	Slender Frostfish	Longline	Low	High					
<i>Pristipomoides sieboldii</i>	Lavender Snapper	Longline	Low	High					
<i>Caprodon longimanus</i>	Longfin Perch	Longline	Low	Medium	3,856	4,342	100.0%	0.0%	0.0%
<i>Kathetostoma giganteum</i>	Giant stargazer	Longline	Low	High	123	83	14.5%	85.5%	0.0%
<i>Lepidopus caudatus</i>	Southern Frostfish; Frostfish	Longline	Low	High	389	181	12.7%	46.4%	40.9%
<i>Pterygotrigla polyommata</i>	Latchet	Longline	Low	Medium	36	61	100.0%	0.0%	0.0%
<i>Lepidocybium flavobrunneum</i>	Escolar	Longline	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Sphoeroides pachygaster</i>	Balloonfish	Longline	Low	Medium					
<i>Cyttus traversi</i>	King Dory	Longline	Low	Medium	0	10	0.0%	100.0%	0.0%
<i>Ruvettus pretiosus</i>	Oilfish	Longline	Low	Medium	4,046	2,453	97.4%	2.6%	0.0%
<i>Beryx splendens</i>	Alfonsino	Longline	Low	Medium	244,018	3,689	8.9%	91.1%	0.0%
<i>Hoplostethus atlanticus</i>	Orange Roughy	Longline	Low	Medium	5,427,208	5,862,492	0.0%	100.0%	0.0%
<i>Oreosoma atlanticum</i>	Oxeye Oreodory	Longline	Low	Medium	7,000	0	0.0%	0.0%	0.0%
<i>Variola louti</i>	Yellowedge Coronation Trout	Longline	Low	Medium	319	508	100.0%	0.0%	0.0%
<i>Pseudophycis bachus</i>	Red Cod	Longline	Low	Medium	141	311	98.1%	1.9%	0.0%
<i>Beryx decadactylus</i>	Imperador	Longline	Low	Medium	2,979	2,418	100.0%	0.0%	0.0%
<i>Allomycterus pilatus</i>	Australian Burrfish	Longline	Low	Medium					
<i>Pleuroscopus pseudodorsalis</i>	Scaled Stargazer	Longline	Low	Medium	3	0	0.0%	0.0%	0.0%
<i>Coelorinchus fasciatus</i>	Banded Whiptail	Longline	Low	Low					
<i>Centriscops humerosus</i>	Banded Bellowsfish	Longline	Low	Medium	15	15	0.0%	100.0%	0.0%
<i>Chelidonichthys kumu</i>	Red Gurnard	Longline	Low	Low	1,760	1,760	0.0%	100.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Seriolella punctata</i>	Silver Warehou	Longline	Low	Low	0	155	90.3%	9.7%	0.0%
<i>Argentina elongata</i>	Argentina elongata	Longline	Low	Medium					
<i>Lagocephalus lagocephalus</i>	Oceanic puffer; Ocean Puffer	Longline	Low	Medium					
<i>Lutjanus argentimaculatus</i>	Mangrove Jack	Longline	Low	Low					
<i>Pseudocyttus maculatus</i>	Smooth Oreodory	Longline	Low	Medium	22,417	25,657	0.0%	100.0%	0.0%
<i>Pterygotrigla picta</i>	Spotted gurnard	Longline	Low	Medium	132	679	23.0%	77.0%	0.0%
<i>Lepidion microcephalus</i>	Smallhead Cod	Longline	Low	Low	616	430	0.0%	100.0%	0.0%
<i>Carangoides orthogrammus</i>	Island trevally	Longline	Low	Low					
<i>Ostichthys kaianus</i>	Kai soldierfish	Longline	Low	High					
<i>Mora moro</i>	Ribaldo	Longline	Low	Low	52,160	100,945	10.1%	89.9%	0.0%
<i>Lethrinus olivaceus</i>	Longnose Emperor	Longline	Low	Low					
<i>Halargyreus johnsonii</i>	Slender Cod	Longline	Low	Low	1,366	1,979	0.0%	100.0%	0.0%
<i>Alepocephalus australis</i>	Smallscale Slickhead	Longline	Low	Medium	78	113	0.0%	100.0%	0.0%
<i>Epigonus robustus</i>	Robust Deepsea Cardinalfish	Longline	Low	Medium	673	673	0.0%	100.0%	0.0%
<i>Tubbia tasmanica</i>	Tasmanian Rudderfish	Longline	Low	Low	0	0	0.0%	0.0%	0.0%
<i>Neocyttus rhomboidalis</i>	Spikey Oreodory	Longline	Low	Medium	64,373	112,697	0.0%	100.0%	0.0%
<i>Centrolophus niger</i>	Rudderfish	Longline	Low	Medium	145	105	0.0%	100.0%	0.0%
<i>Allocyttus verrucosus</i>	Warty Oreodory	Longline	Low	Medium	1,472	1,871	0.0%	100.0%	0.0%
<i>Mola mola</i>	Ocean Sunfish	Longline	Low	Medium					
<i>Schedophilus velaini</i>	Violet warehou	Longline	Low	Medium	848	833	100.0%	0.0%	0.0%
<i>Persparsia kopua</i>	Spangled Tubeshoulder	Longline	Low	Low	0	0	0.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Lampris guttatus</i>	Spotted moonfish;Opah	Longline	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Brama brama</i>	Ray's Bream	Longline	Low	Medium	576	356	99.7%	0.0%	0.3%
<i>Phosichthys argenteus</i>	Silver Lightfish	Longline	Low	Low					
<i>Lampadena speculigera</i>	Mirror lanternfish	Longline	Low	Low					
<i>Anoplogaster cornuta</i>	Fangtooth	Longline	Low	High					
<i>Paratrachichthys trailli</i>	Sandpaper fish, Common roughy	Longline	Low	High	545	603	0.0%	100.0%	0.0%
<i>Pristipomoides argyrogrammicus</i>	Ornate jobfish	Longline	Low	Medium	378	621	100.0%	0.0%	0.0%
<i>Rhombosolea plebeia</i>	Sand flounder	Longline	Low	Low	1	1	0.0%	100.0%	0.0%
<i>Epinephelus retouti</i>	Red-tipped grouper	Longline	Low	Low					
<i>Pristipomoides auricilla</i>	Goldflag jobfish	Longline	Low	Medium					
<i>Luposicya lupus</i>	Wolfsnout goby	Longline	Low	Low					
<i>Optivus elongatus</i>	Slender roughy	Longline	Low	Medium	48,640	56,811	0.0%	100.0%	0.0%
<i>Chauliodus sloani</i>	Sloane's Viperfish	Longline	Low	Medium	0	0	0.0%	0.0%	0.0%
<i>Cnidoglanis macrocephalus</i>	Estuary Cobbler	Longline	Low	Medium	7	7	100.0%	0.0%	0.0%
<i>Antimora rostrata</i>	Violet Cod	Longline	Low	Low	67	162	100.0%	0.0%	0.0%
<i>Pseudophycis breviuscula</i>	Bastard Red Cod	Longline	Low	Low	12	14	100.0%	0.0%	0.0%
<i>Macruronus novaezelandiae</i>	Blue Grenadier	Longline	Low	Medium	2,979	3,828	7.3%	92.6%	0.1%
<i>Genypterus blacodes</i>	Pink Ling	Longline	Low	Medium	7,282	8,346	98.7%	1.3%	0.0%
<i>Coelorinchus kaiyomaru</i>	Kaiyomaru Whiptail	Longline	Low	Low					
<i>Macrourus carinatus</i>	Ridgescale Whiptail	Longline	Low	Medium					

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Macrourus whitsoni</i>	[a whiptail]	Longline	Low	Low	56	62	100.0%	0.0%	0.0%
<i>Centroberyx gerrardi</i>	Bight Redfish	Longline	Low	Low	302	242	100.0%	0.0%	0.0%
<i>Zeus faber</i>	John Dory	Longline	Low	Low	1	1	100.0%	0.0%	0.0%
<i>Cyttus novaezealandiae</i>	New Zealand Dory	Longline	Low	Low	48	50	0.0%	0.0%	100.0%
<i>Allocyttus niger</i>	Black Oreodory	Longline	Low	Low	32,904	42,182	0.0%	100.0%	0.0%
<i>Platycephalus richardsoni</i>	Tiger Flathead	Longline	Low	Low	56	0	0.0%	0.0%	0.0%
<i>Lepidoperca pulchella</i>	Eastern Orange Perch	Longline	Low	Low	167	13	100.0%	0.0%	0.0%
<i>Epinephelus coioides</i>	Orange-spotted Grouper	Longline	Low	Low					
<i>Epinephelus maculatus</i>	Highfin Grouper	Longline	Low	Low					
<i>Epinephelus fasciatus</i>	Blacktip Rockcod	Longline	Low	Low	103	349	100.0%	0.0%	0.0%
<i>Epinephelus fuscoguttatus</i>	Flowery Rockcod	Longline	Low	Low	0	41	100.0%	0.0%	0.0%
<i>Variola albimarginata</i>	White-edge Coronation Trout	Longline	Low	Low	0	6	100.0%	0.0%	0.0%
<i>Epinephelus quoyanus</i>	Longfin Rockcod	Longline	Low	Low	762	2,270	100.0%	0.0%	0.0%
<i>Cephalopholis sonnerati</i>	Tomato Rockcod	Longline	Low	Low	48	126	100.0%	0.0%	0.0%
<i>Epinephelus septemfasciatus</i>	Convict Grouper	Longline	Low	Low					
<i>Plectropomus leopardus</i>	Common Coral Trout	Longline	Low	Low	0	281	100.0%	0.0%	0.0%
<i>Cephalopholis cyanostigma</i>	Bluespotted Rockcod	Longline	Low	Low					
<i>Epinephelus cyanopodus</i>	Purple Rockcod	Longline	Low	Low	467	467	100.0%	0.0%	0.0%
<i>Epinephelus ergastularius</i>	Banded Rockcod	Longline	Low	Medium					
<i>Epinephelus morrhua</i>	Comet Grouper	Longline	Low	Low	16	107	100.0%	0.0%	0.0%
<i>Seriola hippos</i>	Samsonfish	Longline	Low	Medium					

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Gnathanodon speciosus</i>	Golden Trevally	Longline	Low	Low	0	2	100.0%	0.0%	0.0%
<i>Seriola dumerilli</i>	Amberjack	Longline	Low	Medium					
<i>Elagatis bipinnulata</i>	Rainbow Runner	Longline	Low	Low	69	78	100.0%	0.0%	0.0%
<i>Caranx sexfasciatus</i>	Bigeye Trevally	Longline	Low	Low	202	207	100.0%	0.0%	0.0%
<i>Seriola rivoliana</i>	Highfin Amberjack	Longline	Low	Low					
<i>Caranx lugubris</i>	Black Trevally	Longline	Low	Low	0	6	100.0%	0.0%	0.0%
<i>Pseudocaranx georgianus</i>	Silver Trevally	Longline	Low	Low					
<i>Emmelichthys nitidus</i>	Redbait	Longline	Low	Medium	425	420	0.0%	100.0%	0.0%
<i>Plagiogeneion rubiginosum</i>	Cosmopolitan Rubyfish	Longline	Low	Medium	637	59	100.0%	0.0%	0.0%
<i>Aphareus rutilans</i>	Rusty Jobfish	Longline	Low	Medium	55	129	100.0%	0.0%	0.0%
<i>Pristipomoides multidens</i>	Goldbanded Jobfish	Longline	Low	Medium					
<i>Lutjanus malabaricus</i>	Saddletail Snapper	Longline	Low	Low	7	7	100.0%	0.0%	0.0%
<i>Lutjanus lutjanus</i>	Bigeye Snapper	Longline	Low	Low					
<i>Etelis carbunculus</i>	Ruby Snapper	Longline	Low	Medium	343	361	100.0%	0.0%	0.0%
<i>Aprion virescens</i>	Green Jobfish	Longline	Low	Low	5,379	10,291	100.0%	0.0%	0.0%
<i>Lutjanus bohar</i>	Red Bass	Longline	Low	Low	58	66	100.0%	0.0%	0.0%
<i>Pristipomoides filamentosus</i>	Rosy Snapper	Longline	Low	Medium	3,648	6,595	100.0%	0.0%	0.0%
<i>Lutjanus adetii</i>	Hussar	Longline	Low	Low	516	573	100.0%	0.0%	0.0%
<i>Lutjanus fulvus</i>	Blacktail Snapper	Longline	Low	Low	0	0	0.0%	0.0%	0.0%
<i>Pristipomoides flavipinnis</i>	Goldeneye Snapper	Longline	Low	Medium					
<i>Pristipomoides zonatus</i>	Oblique-banded Snapper	Longline	Low	Medium	3	11	100.0%	0.0%	0.0%

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Diagramma pictum</i>	Painted Sweetlip	Longline	Low	Low	384	459	100.0%	0.0%	0.0%
<i>Gymnocranius grandoculis</i>	Robinson's Seabream	Longline	Low	Low	26,316	40,186	100.0%	0.0%	0.0%
<i>Lethrinus lentjan</i>	Red Spot Emperor	Longline	Low	Low					
<i>Lethrinus rubrioperculatus</i>	Spotcheek Emperor	Longline	Low	Low	0	14,445	100.0%	0.0%	0.0%
<i>Gymnocranius euanus</i>	Paddletail Seabream	Longline	Low	Low	0	1,077	100.0%	0.0%	0.0%
<i>Wattsia mossambica</i>	Mozambique Seabream	Longline	Low	Low	15	49	100.0%	0.0%	0.0%
<i>Paristiopterus labiosus</i>	Giant Boarfish	Longline	Low	Medium	380	400	0.0%	5.0%	95.0%
<i>Pentaceropsis recurvirostris</i>	Longsnout Boarfish	Longline	Low	Medium					
<i>Nemadactylus douglasii</i>	Grey Morwong	Longline	Low	Low	1,564	1,564	100.0%	0.0%	0.0%
<i>Latris lineata</i>	Striped Trumpeter	Longline	Low	Medium	894	922	100.0%	0.0%	0.0%
<i>Latridopsis forsteri</i>	Bastard Trumpeter	Longline	Low	Low	162	109	100.0%	0.0%	0.0%
<i>Latridopsis ciliaris</i>	Blue Moki	Longline	Low	Low					
<i>Sphyræna jello</i>	Pickhandle barracuda	Longline	Low	Low					
<i>Bodianus perditio</i>	Goldspot Pigfish	Longline	Low	Low	328	367	100.0%	0.0%	0.0%
<i>Dissostichus eleginoides</i>	Patagonian toothfish	Longline	Low	Low	0	7	100.0%	0.0%	0.0%
<i>Dissostichus mawsoni</i>	[an icefish]	Longline	Low	Medium	28,961	57,797	100.0%	0.0%	0.0%
<i>Gempylus serpens</i>	Snake Mackerel	Longline	Low	Medium					
<i>Scomber australasicus</i>	Blue Mackerel	Longline	Low	Low	0	11	100.0%	0.0%	0.0%
<i>Seriolella brama</i>	Blue Warehou	Longline	Low	Low	1,396	850	100.0%	0.0%	0.0%
<i>Seriolella caerulea</i>	White Warehou	Longline	Low	Low	5	696	15.1%	84.9%	0.0%
<i>Tetragonurus cuvieri</i>	Smalleye Squaretail	Longline	Low	Medium					

Species name	Common Name	Main gear type	SAFE risk for main gear type	PSA risk for main gear type	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)
<i>Abalistes stellaris</i>	Starry Triggerfish	Longline	Low	Low	663	1,877	100.0%	0.0%	0.0%
<i>Pseudobalistes flavimarginatus</i>	Yellowmargin Triggerfish	Longline	Low	Low					

Annex C: Data deficient species that have not been categorised in the SPRFMO assessment framework

Note: Based on very low catches these species could probably be included in Tier 3.

Species name	Common Name	Risk SAFE	Risk PSA	Catch (kgs) 2012-2016	Catch (kgs) 2014-2018	% Longline (14-18)	% Demersal Trawl (14-18)	% Midwater Trawl (14-18)	Notes
<i>Diretmus argenteus</i>	Silver spinyfin	Extreme	High	0	0	0.0%	0.0%	0.0%	Data Deficient in SAFE
<i>Regalecus glesne</i>	Oarfish ("king of herrings")	Extreme	Medium	6	6	0.0%	100.0%	0.0%	Data Deficient in SAFE
<i>Grammicolepis brachiusculus</i>	Thorny Tinsel fish	Extreme	High						Data Deficient in SAFE
<i>Diretmichthys parini</i>	Black Spinyfin	Extreme	Medium	0	2	0.0%	100.0%	0.0%	Data Deficient in SAFE
<i>Derichthys serpentinus</i>	Deepwater Neck Eel	Extreme	High						Data Deficient in SAFE
<i>Diastobranchius capensis</i>	Basketwork Eel	Extreme	High	295	386	0.0%	100.0%	0.0%	Data Deficient in SAFE
<i>Melanostomias valdiviae</i>	Valdivia black dragon fish	Extreme	High						Data Deficient in SAFE
<i>Ostracion cubicus</i>	Yellow Boxfish	Low	Medium						Data Deficient in SAFE
<i>Triodon macropterus</i>	Threetooth Puffer	Low	High						Data Deficient in SAFE