

## **Control Union (UK) Limited**

**DFC/HEC Western and Central Pacific longline bigeye,  
yellowfin and albacore tuna fishery**

**MSC Use of the Risk-Based Framework (RBF)  
in a Fishery Assessment**

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# 1 Marine Stewardship Council use of the Risk-Based Framework

**Table 1 – Fishery information**

1	Fishery name
	DFC/HEC Western and Central Pacific longline bigeye, yellowfin and albacore tuna fishery
2	CAB
	Control Union (UK) Limited
3	Date that the proposal to use the RBF is submitted to the MSC
	1 <sup>st</sup> June 2022
4	Date stakeholder comment period closes on the proposal to use the RBF
	31 <sup>st</sup> July 2022
5	PI that the RBF is to be applied for
	2.2.1 Secondary Species Outcome
6	Justification for use
	<p>There are no biologically based limits for the following species:</p> <ol style="list-style-type: none"> <li>1. <u>Indian oil sardine (<i>Sardinella longiceps</i>)</u></li> </ol> <p>An assessment of standing stock, total biomass and MSY was undertaken by Zaki et al. (2011) using data from the period 2005 to 2009. According to that assessment, the yield from the entire coastal waters of Oman was estimated at 27,151 t, lower than the estimated MSY of 34,048 t (note that another MSY value was estimated using a Thompson and Bell analysis, which was 46,144 t) (Sieben et al., 2020). The main issue with using the assessment from Zaki et al. (2011) to assess sustainability of the Indian oil sardine stock in Oman is the amount of time that has elapsed since it was undertaken. The work of Zaki et al. (2011) determined this MSY based on annual average landings of 30,112 t between 2000 and 2009. However, current catches have substantially increased since then, with 275,186 t of sardine landed in 2019 (NCSI, 2020). Indian oil sardine contributes around 80-95% to Omani sardine landings (Dorr_III et al., 1990; Zaki et al., 2011).</p> <p>Therefore, on a precautionary basis, the assessment team agreed that too much time had lapsed to determine the outcome status of this species with respect to biologically based limits. The RBF has thus been triggered and a PSA was undertaken. The rationales for the PSA scoring can be found in Section 9.</p> <ol style="list-style-type: none"> <li>2. <u>Amberstrip scad (<i>Decapterus muroadsi</i>)</u></li> </ol> <p>Given that there is not sufficient information to determine the outcome status with respect to biologically based limits, the Risk Based Framework (RBF) has been triggered and a Productivity Susceptibility Analysis (PSA) was undertaken for this species. The rationales for the PSA scoring can be found in Section 11. In undertaking the RBF there was only limited information found on the life history characteristics of Amberstripe scad. Therefore, where there were data gaps, proxy data were used from other scad species</p>

within the same genus, as similarly undertaken by Jones et al. (2020). All information concerning this species and other related scad species was taken from either [www.fishbase.org](http://www.fishbase.org) or the references cited in the PSA scoring tables (Section 11).

Stakeholder comments on the use of the RBF need to be considered (FCP v2.2 Annex PF 2.1.1.e). The stakeholder comment and CAB response shall be included in the Public Comment Draft Report (FCP v2.2 7.20.5).

A key purpose of the site visit is to collect information and speak to stakeholders with an interest in the fishery. For those parts of the assessment involving the MSC's Risk-Based Framework (RBF, see [msc.org](http://msc.org)), we will be using a stakeholder-driven, qualitative and semi-quantitative analysis. To achieve a robust outcome from this consultative approach, we rely heavily on participation of a broad range of stakeholders with a balance of knowledge of the fishery. We encourage any stakeholders with experience or knowledge of the fishery to participate in these RBF analysis. Stakeholders wishing to be involved should review the information provided below and return answers to the questions posed in Sections 10 and 12 to CU (UK), using the email address [infofishuk@controlunion.com](mailto:infofishuk@controlunion.com) by **17:00 UTC on the 31<sup>st</sup> of July 2022**. Stakeholders who complete this questionnaire will also be offered the opportunity to discuss this RBF at a meeting as requested.

**Marine Stewardship Council (MSC) Risk Based Framework  
Stakeholder Input**

**Secondary species**

**DFC/HEC Western and Central Pacific longline bigeye, yellowfin  
and albacore tuna fishery**

**Prepared by**

**Control Union (UK) Limited**

**May 2022**

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## QA

Role	Signature	Date
Originator:	D. Duggan and T. Emery	26/04/22
Reviewer:	H. Jones	23/05/22
Approver:		

## 1 Background

Following the preparation of the ACDR for this fishery, two secondary main species were identified as triggering RBF scoring. As such CU (UK) are required to announce the use of RBF for PI2.2.1 for these elements. The species are listed below. The gear types concerned are gill nets and purse seines.

### 1. Indian oil sardine (*Sardinella longiceps*)

Table 3 (FCP v2.2) was consulted when assessing this species. An assessment of standing stock, total biomass and MSY was undertaken by Zaki et al. (2011) using data from the period 2005 to 2009. According to that assessment, the yield from the entire coastal waters of Oman was estimated at 27,151 t, lower than the estimated MSY of 34,048 t (note that another MSY value was estimated using a Thompson and Bell analysis, which was 46,144 t) (Sieben et al., 2020). The main issue with using the assessment from Zaki et al. (2011) to assess sustainability of the Indian oil sardine stock in Oman is the amount of time that has elapsed since it was undertaken. The work of Zaki et al. (2011) determined this MSY based on annual average landings of 30,112 t between 2000 and 2009. However, current catches have substantially increased since then, with 275,186 t of sardine landed in 2019 (NCSI, 2020). Indian oil sardine contributes around 80-95% to Omani sardine landings (Dorr\_III et al., 1990; Zaki et al., 2011).

Therefore, on a precautionary basis, the assessment team agreed that too much time had lapsed to determine the outcome status of this species with respect to biologically based limits. The RBF has thus been triggered and a PSA was undertaken. The rationales for the PSA scoring can be found in Section 9.

### 2. Amberstrip scad (*Decapterus muroadsi*)

Table 3 (FCP v2.2) was consulted when assessing this species. Given that there is not sufficient information to determine the outcome status with respect to biologically based limits, the Risk Based Framework (RBF) has been triggered and a Productivity Susceptibility Analysis (PSA) was undertaken for this species. The rationales for the PSA scoring can be found in Section 11. In undertaking the RBF there was only limited information found on the life history characteristics of Amberstripe scad. Therefore, where there were data gaps, proxy data were used from other scad species within the same genus, as similarly undertaken by Jones et al. (2020). All information concerning this species and other related scad species was taken from either [www.fishbase.org](http://www.fishbase.org) or the references cited in the PSA scoring tables (Section 11).

As per the requirements of Annex PF of the MSC FCP v2.2., the required approach for PI 2.2.1 is use of the Productivity Susceptibility Analysis (PSA). The PSA is a tool that can be used by MSC Assessment Teams to assess the risk posed by a fishery to species for which there is only limited information available. The RBF process is intended to gather and use information from stakeholders in a structured manner; it is also intended to produce a more precautionary assessment of impact than if the MSC's default assessment tree is employed. We have tried to simplify the PSA process to produce this

questionnaire, but there is still some complexity in the process. Where we ask for information from stakeholder on areas of this PSA we have highlighted in the following sections in **green highlight**.

If you have any queries about the MSC process, you can find more information at the MSC website ([www.msc.org](http://www.msc.org)), including information about the fishery; alternatively, you can get in touch with us directly (using the contact details below). The MSC also provides an official template for stakeholder comments, to use if you have views on this aspect of the fishery; it can be downloaded at <http://www.msc.org/documents/get-certified/stakeholders>. Thank you for taking the time to participate in this assessment.

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## 2 Stakeholder information

Before you start the questionnaire, we need to have your contact details so that we can keep in touch with you as the assessment of the fishery proceeds through its different steps. This will ensure that you are kept fully up to date with progress and that you have further opportunities to participate in the assessment process.

We respect your privacy and security and will only use this information in accordance with the statement below and in compliance with EU GDPR.

## 3 Privacy, Transparency and Confidentiality

1. We ask for your e-mail address in case we need to contact you for clarification of your comments.
2. The MSC process requires assessment inputs to be transparent and verifiable. We will list you as a stakeholder that has contributed to this assessment and may publish your interview response in assessment documents.
3. Your privacy is important to us. We will not publish your e-mail address, nor will we share it with any third parties.

In accordance with the statement above, please provide the following information:

Name:

Company/Organisation:

City/Town:

Country:

Email Address:

Phone Number (please include international code):

## 4 Principle 2

### Catch profiles and data availability

Table 1 presents information on bait use (RBF species) by the UoA fleet through 2018-20, including source country and as a percentage of overall logbook reported catch (see ACDR for this fishery, Table 17). Bait use averaged around 41% of the average total retained catch between 2018 and 2020. The main bait species used by the fishery included *Decapterus muroadsi*, *Sardinella longiceps* and *Sardinops sagax* (the latter not considered in RBF scoring).

**Table 1. Bait species used by the UoA fleet through 2018-20 and percentage of total overall logbook catch. Source: Dongwon Fisheries Co. Ltd and Hansung Enterprise Co.**

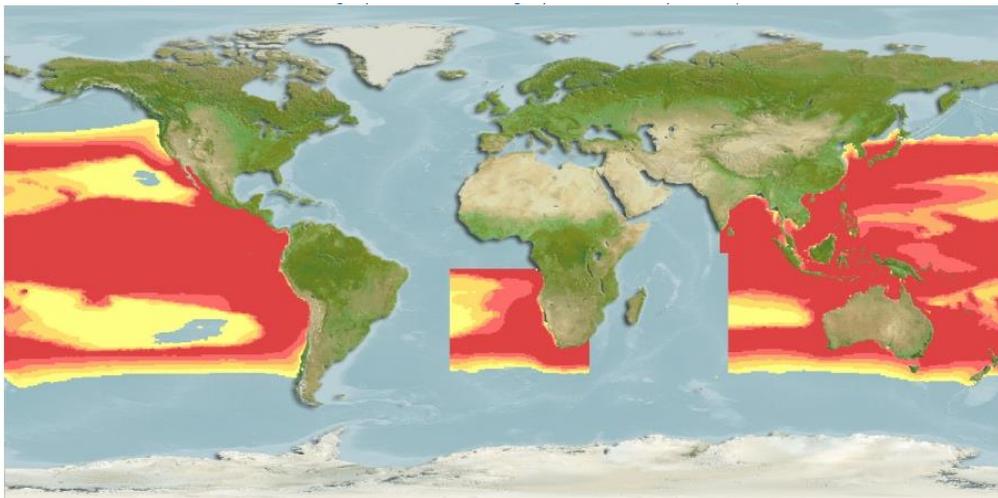
Species	Fishery/country	Bait use (tonnes)				% of overall logbook catch			
		2018	2019	2020	Total	2018	2019	2020	Average 2018-20
<i>Sardinella longiceps</i>	Oman	148.0	236.0	332.2	716.2	4.7%	5.5%	7.7%	6.1%
<i>Decapterus muroadsi</i>	China	24.0	0.0	0.0	24	0.8%	0.0%	0.0%	0.2%
	Indonesia	532.7	739.5	876.8	2149	17.1%	17.4%	20.2%	18.3%
	Vietnam	136.3	0.0	0.0	136.3	4.4%	0.0%	0.0%	1.2%
	<b>Total</b>	<b>693</b>	<b>739.5</b>	<b>876.8</b>	<b>2309.3</b>	<b>22.2%</b>	<b>17.4%</b>	<b>20.2%</b>	<b>19.7%</b>

## 5 Supporting information

### 1. Amberstrip scad (*Decapterus muroadsi*)

According to the information provided by the client, the majority of amberstripe scad (*Decapterus muroadsi*) used as bait by the UoAs between 2018 and 2020 was sourced from Indonesia (with a small amount in 2018 also sourced from Vietnam and China).

Amberstripe scad belongs to the *Carangidae* family and genus *Decapterus*. The genus *Decapterus* (Bleeker, 1851) contains 11 valid species, distributed in tropical to temperate areas of the Pacific, Indian and Atlantic Oceans (Eschmeyer et al., 2018). Amberstripe scad are very widely distributed in the tropics and well into the temperate zone, everywhere except the western and northern Atlantic Ocean (Figure 1) and are found to a depth of 320 metres (Jawad and Al-Mamry, 2018). Generally these species are not vulnerable to fishing due to their fast life history (growth, maturation, reproduction).



**Figure 1. Distribution of amberstripe scad (*Decapterus muroadsi*).** Source: Kaschner et al. (2019).

There is limited information to be found on commercial catches or management of this species in Indonesia. Jones et al. (2020) reported anecdotal information from several bait suppliers estimating that approximately 2,000 tonnes of this species were harvested annually in Indonesia. Primary gear types include gillnets and purse seine, although purse seine is the dominant gear type used (Jones et al. 2020).

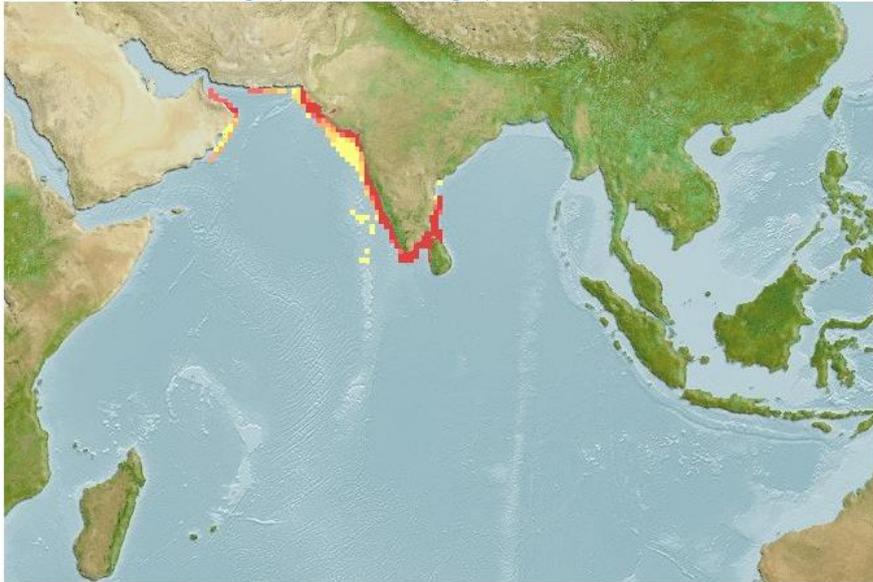
Given that there is not sufficient information to determine the outcome status with respect to biologically based limits, the Risk Based Framework (RBF) has been triggered and a Productivity Susceptibility Analysis (PSA) was undertaken for this species. The rationales for the PSA scoring can be found in Section 11. In undertaking the RBF there was only limited information found on the life history characteristics of Amberstripe scad. Therefore, where there were data gaps, proxy data were used from other scad species within the same genus, as similarly undertaken by Jones et al. (2020). All information concerning this species and other related scad species was taken from either [www.fishbase.org](http://www.fishbase.org) or the references cited in the PSA scoring tables (Section 11).

### 2. Indian oil sardine (*Sardinella longiceps*)

According to the information provided by the client, all of the Indian oil sardine (*Sardinella longiceps*) used as bait by the UoAs between 2018 and 2020 was sourced from Oman.

Indian oil sardine belongs to the Family Clupeidae and Genus *Sardinella*, which contains 22 species. It is distributed within tropical waters of the northern and western Indian Ocean: Gulf of Aden, Gulf of

Oman (not including the Red Sea or Persian Gulf) and eastward to India, including the Andaman Islands (Figure 2). According to Shaklee and Shaklee (1990), Indian oil sardine in Omani waters is its own stock and recent genetic work using microsatellite markers provides confirmation (Sebastian et al., 2017). The species makes up one of the main domestic marine fisheries in Oman, representing ~32% of national catches according to reconstructed data for the period 1950 – 2010 (Khalfallah et al., 2016). The Omani sardine fishery is a market driven coastal traditional fishery targeted by beach seine, purse seine, and encircling gillnets (Al Jufaili and Piontkovski, 2020).



**Figure 2. Distribution of Indian oil sardine (*Sardinella longiceps*).** Source: Kaschner et al. (2019).

An assessment of standing stock, total biomass and MSY was undertaken by Zaki et al. (2011) using data from the period 2005 to 2009. According to that assessment, the yield from the entire coastal waters of Oman was estimated at 27,151 t, lower than the estimated MSY of 34,048 t (note that another MSY value was estimated using a Thompson and Bell analysis, which was 46,144 t) (Sieben et al., 2020). The main issue with using the assessment from Zaki et al. (2011) to assess sustainability of the Indian oil sardine stock in Oman is the amount of time that has elapsed since it was undertaken. The work of Zaki et al. (2011) determined this MSY based on annual average landings of 30,112 t between 2000 and 2009. However, current catches have substantially increased since then, with 275,186 t of sardine landed in 2019 (NCSI, 2020). Indian oil sardine contributes around 80-95% of Omani sardine landings (Dorr\_III et al., 1990; Zaki et al., 2011).

Therefore, on a precautionary basis, the assessment team agreed that too much time had lapsed to determine the outcome status of this species with respect to biologically based limits. The RBF has thus been triggered and a PSA was undertaken. The rationales for the PSA scoring can be found in Section 9.

## 6 Guide to PSA

The PSA is described in detail in the MSC Fisheries Certification Process V2.2 (Annex PF4, MSC 2018). In summary, the data required for the PSA are divided in to two sections, one covering ‘productivity’ attributes (which effectively describe the biological attributes of the species’), and one covering ‘susceptibility’ attributes (which effectively describe the potential for interaction between the species and the UoA).

The productivity attributes for a species are species-specific and do not change between fisheries. The Assessment Team has already derived productivity information for each species from the available literature.

Information and provisional scoring of ‘Productivity’ is provided in the following sections. We request that you review this information and confirm that you agree with the Assessment Team’s findings, or otherwise.

Information of “Susceptibility” is provided in the following sections. Please, review the ‘Susceptibility’ information provided and please use the space provided to draft your own scores for susceptibility to support finalisation of the PSA scores for the species under review.

## 7 Susceptibility attributes and scores

A few guidance notes have been listed below to aid stakeholders in the completion of the susceptibility questionnaire. Please note that this guidance is not exhaustive and stakeholders are encouraged to consult the MSC Fisheries Certification Process v2.2 (Annex PF). Where there is limited information available to score a susceptibility attribute, the more precautionary score shall be awarded.

**Table: PSA susceptibility attributes and scores (extract from MSC FCP v2.2, Annex PF)**

Susceptibility attribute	Low susceptibility (Low risk, score=1)	Medium susceptibility (medium risk, score=2)	High susceptibility (high risk, score=3)
Areal overlap (availability) Overlap of the fishing effort with a species concentration of the stock	<10% overlap	10-30% overlap	>30% overlap
Encounterability The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the position of the gear	Low overlap with fishing gear (low encounterability)	Medium overlap with fishing gear	High overlap with fishing gear (high encounterability)  Default score for target species (P1)
Selectivity of gear type Potential of the gear to retain species	a Individual < size at maturity are rarely caught	a Individuals < size at maturity are regularly caught	a Individuals < size at maturity are frequently caught
	b Individuals < size at maturity can escape or avoid gear	b Individuals < half the size at maturity can escape or avoid gear	b Individuals < half the size at maturity are retained by gear
Post-capture mortality (PCM) The chance that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority released postcapture and survival	Evidence of some released postcapture and survival	Retained species or majority dead when released  Default score for retained species (P1 or P2)

**Aerial overlap:**

- Where the impacts of fisheries other than the UoA are taken into account, the areal overlap shall be scored as the combined overlap of all listed fisheries with the areal concentration of a stock
- The scoring of areal overlap shall consider the concentration of species and the overlap of the fishing gear with the concentration species

**Encounterability:**

- Where the impacts of fisheries other than the UoA are taken into account, encounterability shall be scored as the combined encounterability of all listed fisheries
- The scoring of encounterability shall consider the concentration of species and the overlap of the fishing gear with the concentration species
- The deployment of fishing gear in relation to each species adult habitat is the main aspect to be considered for each species

**Gear selectivity:**

- 'Rarely' means that the capture of individuals smaller than the size at maturity occurs in less than 5% few gear deployments.
- 'Regularly' means that the capture of individuals smaller than the size at maturity occurs in 5% to 50% of the gear deployments.
- 'Frequently' means that the capture of individuals smaller than the size at maturity occurs in more than 50% of gear deployments.

**Post-capture mortality:**

- The team shall use its knowledge of species biology and fishing practice together with independent field observations to assess the chance that, if captured, a species would be released and that it would be in a condition to permit subsequent survival
- In the absence of observer data or other verified field observations made during commercial fishing operations that indicate the individuals are released alive and post-release survivorship is high, the default value for the PCM of all species shall be high

## 8 Productivity attributes and scores

A few guidance notes have been listed below to aid stakeholders in the completion of the productivity questionnaire. Please note that this guidance is not exhaustive and stakeholders are encouraged to consult the MSC Fisheries Certification Process v2.2 (Annex PF). Where there is limited information available to score a productivity attribute, the more precautionary score shall be awarded.

Table PF4: PSA productivity attributes and scores ■

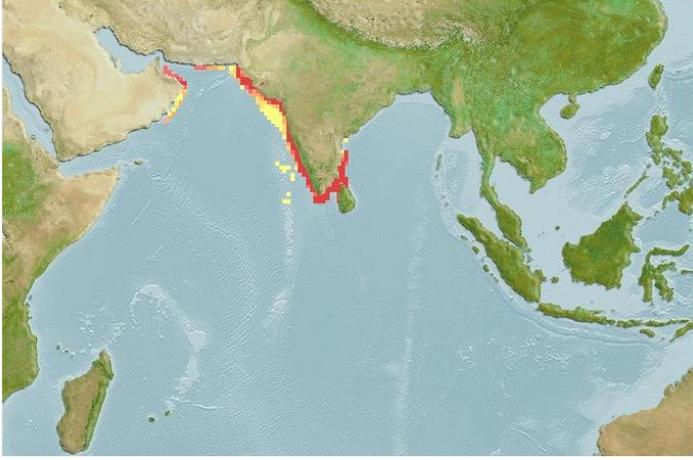
Productivity attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Average age at maturity	<5 years	5-15 years	>15 years
Average maximum age	<10 years	10-25 years	>25 years
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer
Trophic Level	<2.75	2.75-3.25	>3.25

## 9 *Sardinella longiceps* (Indian oil sardine)

The following PSA analyses are provisional only and were carried out to provide an indicative score in the ACDR. The analyses will be finalised following stakeholder input during the site visit.

Table 2. PSA Rationale Table – Indian oil sardine (*Sardinella longiceps*)

PI number	2.2.1 (Secondary species outcome)	
Productivity		
Scoring element (species)	<b>Indian oil sardine (<i>Sardinella longiceps</i>)</b>	
Attribute	Rationale	Score
Average age at maturity.	Average age of maturity is one year according to Nair et al. (2016) and Zaki et al. (2011). This is below five years so is considered low risk and awarded a 1 in the PSA.	1
Average maximum age	Average max age of Indian oil sardine is 2.5 years (Zaki et al., 2013) or 3 years according to <i>Fishbase</i> <a href="https://fishbase.mnhn.fr/summary/1511">https://fishbase.mnhn.fr/summary/1511</a> and around 2.5-3 years by Balan (1964). This is below 10 years and is considered low risk and awarded a 1 in the PSA.	1
Fecundity	Indian oil sardine is a highly fecund species producing an average 40,000 eggs (22,456-61,867 eggs) each spawning (Zaki et al., 2012). This is considered low risk and awarded a 1 in the PSA.	1
Average maximum size	Average max size: 23cm according to Fishbase, Balan (1964) and Jayabalan et al. (2014). This is considered low risk and awarded a 1 in the PSA. ( <i>Fishbase</i> - <a href="https://fishbase.mnhn.fr/summary/1511">https://fishbase.mnhn.fr/summary/1511</a> )	1
Average size at maturity	Average size at maturity for the species depends on the location of sampling across the Omani coastal waters but studies indicate this is consistently below 20cm (see examples below).  Between 15.6cm and 16.3cm (Zaki et al., 2012) 18.2cm (Al-Anbouri et al., 2013)  This is considered low risk and awarded a 1 in the PSA.	1
Reproductive strategy	Is a broadcast spawner according to <i>Fishbase</i> and Al-Jufaili (2012) so is considered low risk and awarded a 1 in the PSA. <a href="https://fishbase.mnhn.fr/summary/1511">https://fishbase.mnhn.fr/summary/1511</a>	1
Trophic level	Trophic level $2.4 \pm 0.22$ se according to <i>Fishbase</i> so is considered low risk and awarded a score of 1 in PSA. <a href="https://fishbase.mnhn.fr/summary/1511">https://fishbase.mnhn.fr/summary/1511</a>  Feeds mainly on phytoplankton (especially diatoms) and small crustaceans.	1
<b>Susceptibility</b>		
Fishery only where the scoring element is scored cumulatively		
Attribute	Rationale	Score
Areal Overlap	Indian oil sardine is distributed within the tropical waters of the northern and western Indian Ocean, Gulf of Aden, Gulf of Oman	3

	<p>(not including the Red Sea or Persian Gulf) and eastward to India, including the Andaman Islands (Figure A). One study investigating genetic stock structure using microsatellite markers from locations along the Indian coast and Gulf of Oman (Sebastian et al., 2017) found significant genetic differentiation between samples from Oman and the Indian coastline. Coupled with evidence from Shaklee and Shaklee (1990), Indian oil sardine in Omani waters is considered a single unit stock. Fishing activity within Oman is therefore likely to cover &gt;30% of the distribution of the Omani stock based on the distribution in Figure A. A score of 3 has been awarded as a precaution.</p>  <p>Figure A. Distribution of Indian oil sardine (<i>Sardinella longiceps</i>). Source: Aquamaps (2019).  <a href="https://www.aquamaps.org/receive.php?type_of_map=regular">https://www.aquamaps.org/receive.php?type_of_map=regular</a></p>	
<b>Encounterability</b>	<p>Indian oil sardine makes up one of the many target species taken by Oman in its small pelagic fisheries. Therefore by default must score 3.</p>	<b>3</b>
<b>Selectivity of gear type</b>	<p>The specific gear types that were used to catch this bait species for the vessels in the UoA is likely to be purse seine. However, there is evidence that other gears, such as beach seine and encircling gillnets are also used in the Omani artisanal fishery to catch Indian oil sardine (Al Jufaili and Piontkovski, 2020). Due to an inability to assess the selectivity of this gear and overall high level of uncertainty due to a lack of information it was decided to take a precautionary approach to scoring this attribute. Therefore, the highest risk level score was awarded.</p>	<b>3</b>
<b>Post capture mortality</b>	<p>This is a retained species for the Omani artisanal fishery by all gear types. Therefore, by default must score 3.</p>	<b>3</b>

## 10 Stakeholder comments on *Sardinella longiceps* (Indian oil sardine) PSA

- 1) Are there any 'Productivity' provisional scores that you do not agree with?
- 2) If you disagree with any provisional score, please provide your score and any supporting information with references if available.
- 3) Are there any 'suspectability' provisional scores that you do not agree with?

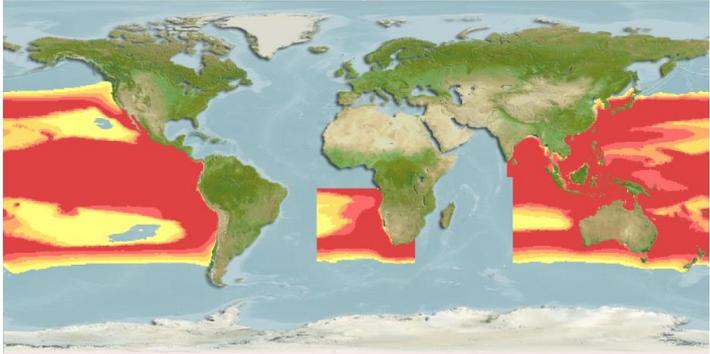
4) If you disagree with any provisional score, please provide your score and any supporting information with references if available.

## 11 *Decapterus muroadsi* (Amberstripe scad)

The following PSA analyses are provisional only and were carried out to provide an indicative score in the ACDR. The analyses will be finalised following stakeholder input during the site visit.

Table 3. PSA Rationale Table – Amberstripe Scad (*Decapterus muroadsi*)

PI number	2.2.1 (Secondary species outcome)	
Productivity		
Scoring element (species)	<b>Amberstripe Scad (<i>Decapterus muroadsi</i>)</b>	
Attribute	Rationale	Score
Average age at maturity.	While this is not available for this species, it is known for other scad species including <i>Decapterus russelli</i> , <i>Decapterus macrosoma</i> , <i>Decapterus macarellus</i> and <i>Decapterus maraudsi</i> which indicate average age at maturity of two years (Ohshimo et al., 2006; Shiraishi et al., 2010). This is below 5 years so are considered low risk and awarded a 1 in the PSA.	1
Average maximum age	While this is not available for this species, it is known for only two other scad species from the same Genus including <i>Decapterus russelli</i> and <i>Decapterus maraudsi</i> , which indicate average maximum age between six and 13-15 years (Ohshimo et al., 2006). As this ranges across the high and medium productivity classifications a precautionary approach has been taken by awarding a higher PSA score to account for the highest age value.	2
Fecundity	Scad species such as <i>Decapterus russelli</i> and <i>Decapterus maraudsi</i> , are all highly fecund species producing well over 20,000 eggs each spawning. Some species such as <i>Decapterus russelli</i> produce over 100,000 eggs (Poojary et al., 2015). This is considered low risk and awarded a 1 in the PSA.	1
Average maximum size	Average max size: 50cm more commonly found around 30cm ( <i>Fishbase</i> - <a href="https://www.fishbase.se/summary/12302">https://www.fishbase.se/summary/12302</a> )	1
Average size at maturity	Average size at maturity ranges for the species, including:  24-27cm for <i>Decapterus macarellus</i> (Costa et al., 2020). 16-19cm for <i>Decapterus macrosoma</i> (Asni and others, 2019) 17cm for <i>Decapterus russelli</i> (Bintoro et al., 2019) 15.3cm for <i>Decapterus russelli</i> (Poojary et al., 2015) 14-24.5cm for <i>Decapterus russelli</i> ( <a href="https://www.fishbase.se/summary/Decapterus-russelli.html">https://www.fishbase.se/summary/Decapterus-russelli.html</a> )  These values are all below the 40cm value so are considered low risk and awarded a 1 in the PSA.	1
Reproductive strategy	All scads are broadcast spawners so are considered low risk and awarded a 1 in the PSA. <a href="https://www.fishbase.se/summary/12302">https://www.fishbase.se/summary/12302</a>	1
Trophic level	Trophic level $3.4 \pm 0.5$ se so considered high risk and awarded a score of 3 in PSA. <a href="https://www.fishbase.se/summary/12302">https://www.fishbase.se/summary/12302</a> .  Feeds mostly on planktonic invertebrates primarily copepods, but also on gastropod larvae, ostracods and pteropods.	3

	<a href="http://fishesofaustralia.net.au/home/species/4271#moreinfo">http://fishesofaustralia.net.au/home/species/4271#moreinfo</a>																							
<b>Susceptibility</b>																								
Fishery only where the scoring element is scored cumulatively																								
<b>Attribute</b>	<b>Rationale</b>	<b>Score</b>																						
<b>Areal Overlap</b>	<p>The UOAs currently source Amberstripe scad from three countries, China, Indonesia and Vietnam with the majority coming from Indonesia between 2018 and 2020. The percentage contributions from suppliers as provided by the client are detailed below:</p> <table border="1"> <thead> <tr> <th>Year</th> <th>Country</th> <th>Tonnes</th> <th>%</th> </tr> </thead> <tbody> <tr> <td rowspan="3">2018</td> <td>Indonesia</td> <td>533</td> <td>77%</td> </tr> <tr> <td>China</td> <td>24</td> <td>3%</td> </tr> <tr> <td>Vietnam</td> <td>136</td> <td>20%</td> </tr> <tr> <td>2019</td> <td>Indonesia</td> <td>740</td> <td>100%</td> </tr> <tr> <td>2020</td> <td>Indonesia</td> <td>877</td> <td>100%</td> </tr> </tbody> </table> <p>The species has a global distribution with a distribution map available from Aquamaps (Figure B) . Knowledge of stock structure is unknown, but given the reproductive strategy of the species (broadcast spawners) is likely at a broad scale as per <i>Decapterus russelli</i> (Sen et al., 2011). Fishing activity within Indonesia would likely cover less than &lt;10% of the global distribution and the Indo-Pacific basin. The inclusion of the other two minor countries fisheries in question would still cover less than 10 % of the species concentration of the stock in the Indo-Pacific basin. A score of 1 has been awarded.</p>  <p>Figure B. Distribution of amberstripe scad (<i>Decapterus muroads</i>). Source: Aquamaps (2019) <a href="https://www.aquamaps.org/receive.php?type_of_map=regular">https://www.aquamaps.org/receive.php?type_of_map=regular</a></p>	Year	Country	Tonnes	%	2018	Indonesia	533	77%	China	24	3%	Vietnam	136	20%	2019	Indonesia	740	100%	2020	Indonesia	877	100%	<b>1</b>
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2019	Indonesia	740	100%																					
2020	Indonesia	877	100%																					
<b>Encounterability</b>	This species makes up one of the many target species taken by China, Indonesia and Vietnam fisheries, and is a target species of these fisheries, therefore by default must score 3.	<b>3</b>																						
<b>Selectivity of gear type</b>	The specific fisheries and gear types that were used to catch this bait species for the vessels in the UoA is assumed to be the same as in Jones et al. (2020) and identified as gillnet and purse seine.	<b>3</b>																						

	However, there are many other various fisheries and gear types that catch this species within the three countries where it was sourced. Due to an inability to assess the selectivity of this gear and overall high level of uncertainty it was decided to take a precautionary approach to scoring this attribute. Therefore, the highest risk level score was awarded.	
Post capture mortality	This is a retained species from all fisheries and by all gear types. Therefore, by default must score 3.	3

## 12 Stakeholder comments on *Decapterus muroadsi* (Amberstripe scad) PSA

- 1) Are there any 'Productivity' provisional scores that you do not agree with?
- 2) If you disagree with any provisional score, please provide your score and any supporting information with references if available.
- 3) Are there any 'suspectability' provisional scores that you do not agree with?
- 4) If you disagree with any provisional score, please provide your score and any supporting information with references if available.

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