

**Marine Stewardship Council Pre-Assessment Report**

**India, Kerala & Karnataka**

**Unicorn leatherjacket (*Aluterus monoceros*)**

**Trawl fishery**

**On behalf of  
NETUNO USA Inc.  
Sept. 2025**

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## Glossary

Acronym	Definition
AKFBOA	All-Kerala Fishing Boat Operators Association
B	Biomass (current)
BMSY	Biomass at MSY
BoBPIGO	Bay of Bengal Programme Intergovernmental Organisation
BRD	Bycatch Reduction Device
CBD	Convention on Biological Diversity
CMFRI	Central Marine Fisheries Research Institute
CICEF	Central Institute of Coastal Engineering for Fishery
CIFE	Central Institute of Fisheries Education
CIFNET	Central Institute of Fisheries Nautical and Engineering Training
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CPUE	Catch Per Unit Effort
CRZ	Coastal Regulation Zone
DAHDF	Department of Animal Husbandry, Dairying & Fisheries
DoF	Department of Fisheries
DML	Dorsal Mantle Length
EAFM	Ecosystem Approach to Fisheries Management
EEZ	Exclusive Economic Zone
FIP	Fishery Improvement Project
F	Fishing mortality (current)
FMSY	Fishing mortality at MSY
FSI	Fishery Survey of India
GFCCA	Gujarat Fisheries Central Co-operative Association Limited
GoI	Government of India
ICAR-CMFRI	Indian Council of Agricultural Research- CMFRI
IPI	Inseparable or Practicably Inseparable
KMFRA	Kerala Marine Fisheries Regulation Act
KSMTF	Kerala Swathantra Matsya Thozhilali Federation
KUFOS	Kerala University of Fisheries and Ocean studies
LVB	Low Value Bycatch
MCS	Monitoring Control and Surveillance
MDTN	Mechanized trawl net (multi day)
MTN	Mechanised Trawl net (Single day)
MLS	Minimum Landing Size

<b>Acronym</b>	<b>Definition</b>
MoEF	Ministry of Environment and Forests
MPAs	Marine Protected Areas
MPEDA	Marine Products Export Development Authority
NFDB	National Fisheries Development Board
NIFPHATT	National Institute of Fisheries Post Harvest Technology and Training
NMFDC	National Marine Fishery Resources Data Centre
NPOA	National Plan of Action
OBMs	Out Board Motors
PA	Pre-assessment
RSA	Rapid Stock Assessment
SEAI	Seafood Exporters Association of India
SHG	Self Help Groups
SMRSD	Stratified Multistage Random Sampling Design
SPR	Spawning Potential Ratio
SSB	Spawning Stock Biomass
SSBO	Virgin Spawning Stock Biomass (when $F = 0$ )
<i>TAC</i>	<i>Total Allowable Catch</i>
<i>TED</i>	<i>Turtle Excluder Device</i>
UT	Union Territory
VME	Vulnerable Marine Ecosystem
VMS	Vessel Monitoring System
VTS	Vessel Tracking System

## 1. Executive summary

This MSC pre-assessment for India Kerala and Karnataka Unicorn leather jacket (*Aluterus monoceros*) Trawl Fishery caught mainly in off bottom trawl gear along with other fish and cephalopods. The fishery operates in the West coast of India within India's EEZ – under the jurisdiction of Kerala and Karnataka States (FAO area 51). There are currently 2 UoAs in this assessment.

The assessment team consists of Jo Gascoigne (Principle 1) and Vineetha Aravind (Principle 2 and 3). This pre-assessment evaluates the UoA(s) against the version 2.01 of the MSC Fisheries Standard, following the MSC Certification Process version 2.3. This report is the pre-assessment, which provides indicative scoring and rationales and identifies where more information is needed.

No site visit was conducted as part of this audit and the information and scoring in this report relies upon information supplied by the client and from independent stakeholders contacted by the team.

As a result of the initial scoring, the assessment team have identified the following strengths and weaknesses across each of the Principles. Overall, the biggest limitation of this assessment is the lack of a site visit as this produced key information gaps particularly with not being able to have a meeting with the Central Marine Fisheries Research Institute (CMFRI) and the substantial lack of information about catch composition and the fishery footprint, in order to inform Principle 2. A key recommendation is to consider spatially structuring the UoAs by States.

### Principle 1 Strengths:

- There is information available on the biology and life history of unicorn leatherjacket
- There are spatial restrictions through the form of marine protected areas with zonal restrictions for artisanal fisheries in territorial waters, which affords protection to juvenile squid and squid eggs laid in inshore waters.
- There is a substantial and long-established system for collecting data at the landing sites.

### Principle 1 Weaknesses:

- No information on stock assessment of unicorn leatherjacket
- Mesh-size regulations for cod ends are not specific for excluding juveniles.
- There are no catch limits or escapement rates in place to limit catches.
- The seasonal fishery closure (~July) is not specific to the peak spawning and hatching period (October–November).

### Principle 2 Strengths:

- Some useful recent studies on the off-bottom trawl fishery that aid some understanding of the likely status of Principle 2
- There is recent stock assessment activity for many Principle 2 species
- There is a comparative Fishery Improvement Project (FIP) running in Kerala, which is also trawl fishery
- Trawls are off-bottom, therefore, have reduced interactions with benthic species and habitats compared to shrimp trawls

### Principle 2 Weaknesses:

- There is a substantial lack of data on catch composition data (when targeting or catching higher yields of Unicorn leather jacket).
- The information to define species composition was taken from national landings and information available in the annual reports from CMFRI. Without representative and

accurate sampling or catch composition data (and not purely landings data), primary and secondary designations are not accurate, complete or comprehensive. The assessment team has worked with the only catch composition publicly available at the time of drafting this report – more information will likely be available through CMFRI.

- Many data gaps – see below

#### Principle 3 Strengths:

- There is a system for artisanal fishers and boat registration, and for licensing led by State governments.

#### Principle 3 Weaknesses:

- There is insufficient capacity for enforcement agencies to fully enforce existing fisheries regulations (e.g., Minimum Landing Sizes) at state levels and in the national jurisdiction.
- There is a lack of data and information on infractions, sanctions and surveillance activities and their effectiveness.

The assessment team have also identified the following information gaps and key issues for further investigation. These should be considered by key stakeholders to provide information against in the event of any future assessment.

#### Principle 1 information gaps and key issues summary

- Detailed catch data by sector and state
- Any abundance indices and/or stock assessments
- Scientific basis for the closure periods
- Scientific basis for the cod end size

#### Principle 2 information gaps and key issues summary

- A substantial lack of data on catch-composition. Catch profiles are required to determine a comprehensive and accurate secondary main species list. This would then be used to determine if measures are appropriate to manage these species. It is not clear how frequent reviews are for this gear type in particular and if the mesh size / cod end regulations are adhered to.
- Improved information required on ETP encounters, fate and impact / compliance to ETP mitigation measures. More information about the efficacy and compliance of measures are required e.g. adoption of TEDs.
- No independent validation of catches and ETP interactions from observers /REM or independent research.
- There needs to be information on impact of the UoA on the habitats encountered. If there is no interaction with the seabed, evidence is required to support this. If the UoA is found to interact with Vulnerable Marine Ecosystem (VMEs), maps and specific position information relating to the UoA's footprint are required, along with the position of the closed areas to protect VMEs, and catch (and catch rates) of VME-indicators and information to support the scientific definition of precautionary trigger levels (if used) – see MSC Fisheries Standard 2.01 SA3.15.6 for more information.
- It's likely that main habitat interactions are minimal as there is some evidence to suggest that interactions are associated with a semi-pelagic environment not benthic habitat. Sufficient evidence is needed to verify this. If a Risk Based Framework (RBF) is to be used, more information on the nature of the fishing operations is needed – on potential interactions between the off bottom trawling is required, along with potential habitats to be interacted with. Maps of fishing areas needed.

### Principle 3 information gaps and key issues summary

- More information needed on consultation mechanisms and legal disputes.
- More information needed on Monitoring, Compliance and Surveillance activities and compliance (infractions, sanctions etc).

The RBF was used for this pre-assessment. The Consequence Analysis for Principle 1 and the Productivity-Susceptibility Analyses (Principle 1 and Principle 2) were completed by the assessment team without stakeholder input and therefore only represents as a guidance to the likely scores possible for the fishery. In any full assessment a full RBF process with stakeholder engagement may result in different scores.

At present based on the information evaluated for the fishery it is not consistent with the MSC Fisheries Standard. 15 Performance Indicators were found not to be meeting SG60.

## 2. Report details

### 2.1. Aims and constraints of the pre-assessment

A pre-assessment does not attempt to duplicate a full assessment against the MSC Fisheries Standard. A full assessment involves a group of assessment team members and public consultation stages that are not included in a pre-assessment. This pre-assessment was conducted without site visit and stakeholder consultations and is limited by desk review.

We did not have a full catch profile from the fishery, nor any details of the stock assessments conducted by CMFRI, which means that this pre-assessment is more uncertain than it would have been with more information.

### 2.2. Version details

Table 1: Fisheries program documents versions

Document/Assessment Tree	Version number/Type
MSC Fisheries Certification Process	Version 2.3
MSC Fisheries Standard	Version 2.01
Assessment tree	<i>Default with RBF</i>
MSC General Certification Requirements	Version 2.5
MSC Reporting Template	Version 1.3
MSC Pre-Assessment Reporting Template	Version 3.4

## 3. Unit(s) of Assessment and Unit(s) of Certification

### 3.1. Unit(s) of Assessment

Table 2: Units of Assessment (UoA)

UoA 1	Description
Target Stock	Unicorn Leatherjacket, <i>Aluterus monoceros</i>
Geographical area	Kerala, India (South West Coast); FAO 51
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Netuno, USA
Other eligible fishers	N/A
Justification for choosing the Unit of Assessment	Client wishes to conduct a pre-assessment for Unicorn leather jacket from Kerala waters
UoA 2	Description
Target Stock	Unicorn Leatherjacket, <i>Aluterus monoceros</i>
Geographical area	Karnataka, India (South West Coast); FAO 51
Fishing gear type(s) and, if relevant, vessel type(s)	Trawl
Client group	Netuno, USA
Other eligible fishers	N/A

Justification for choosing the Unit of Assessment	Client wishes to conduct a pre-assessment for Unicorn leather jacket from Karnataka waters
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### 3.2. Vessels list(s) (optional)

Not available at this point

## 4. Confirmation of scope

The auditors confirm that the fishery under assessment is within the scope of the MSC Fisheries Standard v2.01 (7.4– 7.5 of the MSC Fisheries Certification Process v3.0):

- The target species is not an amphibian, reptile, bird or mammal
- The UoA does not use poisons or explosives ;
- The UoA is not conducted under a controversial unilateral exemption to an international agreement;
- The fishery has not been convicted for a forced or child labour violation in the last two years (MSC Labour Eligibility Requirements has not been completed);
- The client or client group does not include an entity that has been convicted for a shark-finning violation in the last two years;
- The UoA has in place a mechanism for resolving disputes, and disputes do not overwhelm the UoA;
- The UoA is not an enhanced fishery;
- The fishery is not an introduced species-based fishery

## 5. Pre-assessment results

### 5.1. Pre-assessment results overview

#### 5.1.1. Overview

This document is a MSC pre-assessment for the Indian Unicorn leather jacket (*Aluterus monoceros*) trawl fishery, covering the states of Kerala and Karnataka on the South West coast of India within India's EEZ. The fishery uses high opening off-bottom trawls targeting squids and fish (99-110m head rope length).

The fishery overview is provided in Section **Error! Reference source not found.** below.

There are several potential obstacles to certification. 15 Performance Indicators failed to meet SG60 – a summary of the scoring and rationales is provided in Section **Error! Reference source not found.**

This PA covers two states with different rules and regulations and stakeholders which makes it awkward for a FIP to coordinate its activities across the entire fishery.

#### 5.1.2. Recommendations

We would like to propose the following recommendations for future assessments:

- Stakeholder communications with management agencies of each state, conservation groups (especially WWF who are involved in the fishery), post-harvest sectors (the landing sites and enumerators acting at landing sites), scientific institutes e.g. CMFRI, CIFT and relevant commercial entities relating to future certification.

In addition, data needed for a future assessment includes:

- Landings data
- Low Value Bycatch and discard data
- ETP interactions (not just ETP landings) are reported – consider fate data (or likely fate data).
- Independent observation / recording of catches
- Habitat impact data
- Information on rates of gear loss
- Compliance data and infractions for UoC vessels
- Any UoC Vessel list
- VMS/ AIS data
- List of landings ports
- Separate landing data of catches from multi day or single day trawlers?
- Description of traceability within the fishery (from catch to 1st change of ownership) and updated traceability form completed

## 5.2. Summary of potential conditions by Principle

Table 3: Summary of Principle level scores

Principle of the Fisheries Standard	Number of PIs with draft scoring ranges <60
Principle 1 – Stock status	4
Principle 2 – Minimising environmental impacts	8
Principle 3 – Effective management	3

## 5.3. Summary of Performance Indicator level scores

Table 4: Summary of Performance Indicator level scores

Performance Indicator	Draft scoring range	Data deficient?
<b>1.1.1 – Stock status (risk-based framework)</b>	<60	Yes
Rationale or key points		
Risk-based analyses suggest potential for high risk to the stock from the fishery		
Performance Indicator	Draft scoring range	Data deficient?
<b>1.1.2 – Stock rebuilding</b>	NA	NA
Rationale or key points		
Not scored when the risk-based framework is used to score PI 1.1.1.		
Performance Indicator	Draft scoring range	Data deficient?
<b>1.2.1 – Harvest Strategy</b>	<60	No
Rationale or key points		

The UoA in all three states is a multispecies trawl fishery, which takes a very large number of species while targeting shrimp, cephalopods and/or fish. It is impossible to manage all these species separately, so the states take the approach of using various methods to control overall fishing effort, as well as technical measures to protect juvenile fish as far as is compatible with maintaining the catch of the target species. There is no information on the stock status for this species to evaluate directly whether this harvest strategy is working for *A. monoceros* in either state, and the risk-based analysis suggest that there is the potential for a significant risk to the stock.

Performance Indicator	Draft scoring range	Data deficient?
<b>1.2.2 – Harvest control rules and tools</b>	<60	No

Rationale or key points

The implementation of HCRs in the sense of individual rules for each stock is very difficult in this multi-species fishery. The management system is clearly able to respond in general to information about the important stocks in the fishery (e.g. by working to control effort or limit juvenile catch). However, it is not clear whether for these stocks this system is able to reduce the exploitation rate as the PRI is approached.

Performance Indicator	Draft scoring range	Data deficient?
<b>1.2.3 – Information and monitoring</b>	<60	No

Rationale or key points

Fleet composition and catch is known, and there is sufficient data on the species biology to infer stock productivity. There is, however, no information on stock structure as far as we are aware, but applying the harvest strategy at state level is probably reasonable. However, the harvest strategy would benefit from data which allow trends in population abundance to be evaluated (even qualitatively) – e.g. via an analysis of landings and catch-at-size, or a data-deficient type stock assessment.

Performance Indicator	Draft scoring range	Data deficient?
<b>1.2.4 – Assessment of stock status</b>	≥80	Yes

Rationale or key points

Receives a default score of 80 when the risk-based framework is used to score PI 1.1.1.

Performance Indicator	Draft scoring range	Data deficient?
<b>2.1.1 – Primary species outcome</b>	≥80	No

Rationale or key points

No primary species. There are no main species occurring landings data or scientific studies that are managed to reference points. As per SA 3.2.1, if a team determines that a UoA has no impact on a particular component, it shall receive a score of 100 under the Outcome PI.

Performance Indicator	Draft scoring range	Data deficient?
<b>2.1.2 – Primary species management strategy</b>	≥80	No

Rationale or key points

Given that there are no primary species considered to be caught with Unicorn leather jacket (see above), management is considered adequate to manage against primary species. However, caution is noted since there is very little catch data available that is directly applied to the UoA gear type.

Performance Indicator	Draft scoring range	Data deficient?
<b>2.1.3 – Primary species information</b>	≥80	No

Rationale or key points

As per the above, there are no known primary species. Landings data are available, along with some scientific studies on trawl fisheries in general. Evidence suggests that no primary species are caught. Thus, information and monitoring seem appropriate to detect primary species caught in the fishery.

Performance Indicator	Draft scoring range	Data deficient?
<b>2.2.1 – Secondary species outcome (RBF used)</b>	<60	Yes

Rationale or key points

The information available to analyse the secondary species is derived either from CMFRI annual reports (national landings) or selected studies determining catch composition from landings data/sampling – however, this is not representative of the true catch composition for the UoA. Therefore, the accuracy and adequacy of the data to assess the fishery to the MSC requirements, is unclear at the time of drafting this pre-assessment. The status of the secondary species and the real catch composition is not well-defined and more information at the species level is needed as catch composition data are not available for this UoA.

Scored using the PSA; see Table 22. Most of the species scored as ‘medium risk’ (yellow), but cuttlefish scored as ‘high risk’ (red).

Performance Indicator	Draft scoring range	Data deficient?
<b>2.2.2 – Secondary species management strategy</b>	<60	Yes

Rationale or key points

There are some measures in place, like- no trawling zones, annual monsoon fishing ban, mesh size regulations and MLS. There is some monitoring and assessment for these species’ groups: threadfin bream, scad, lizardfish and ribbonfish (as species groups). However, it is not clear that monitoring is able to evaluate their status relative to biologically-based limits; at least, not for all the species individually, and it is not clear how it could react (in this mixed-fished context) should a stock be shown to be depleted.

Several recent initiatives have sought to improve stock assessment methods and assess more species (Sathianandan et al., 2021 and CMFRI 2023b). CMFRI has conducted a study to determine target species for assessment in multispecies and multi gear fisheries (Varghese et al. 2021). However, it is not clear how applicable this is for the UoA gear description. In addition, efficacy of enforcement of measures is unclear e.g. for BRDs and cod end. CIFT has developed many gear-based technical measures to reduce bycatch rates in Indian waters. However, the adoption of these measures is poor (Madhu et al. 2020).

Discards are of two types

- i) species with no commercial value – in particular benthic invertebrates such as gastropods, echinoderm, ascidians etc.; and
- ii) grading of low-value species towards the end of long trips.

Dineshbabu et al. 2022 analysed potential alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species and the impact of different Government agencies efforts for bycatch mitigation (e.g. MLS) to reduce the proportion of unwanted juveniles in bycatch. This included a social survey-based on fisher’s perceptions and suggestions on successful bycatch mitigation. There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main in-scope species. But reviews are not regular.

Performance Indicator	Draft scoring range	Data deficient?
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<b>2.2.3 – Secondary species information</b>	<60	Yes
Rationale or key points		
<p>Qualitative information is available to estimate productivity and susceptibility attributes for main secondary species. However, it cannot be said that this information is 'adequate' as there is no clear catch profile for the gear type across the UoA. Whilst the RBF has been used to assess PI 2.1.1, stock assessments are increasingly available for many of the species caught in the fishery (Sathianandan et al.,2021).</p> <p>Currently it is difficult to make a list of minor in-scope species, with no clear catch profile. Information is sufficient to support some measures to manage the fishery like, MLS and mesh size regulations, but not to form a partial/full strategy.</p>		
<b>Performance Indicator</b>	<b>Draft scoring range</b>	<b>Data deficient?</b>
<b>2.3.1 – ETP species information- RBF used</b>	<60	Yes
Rationale or key points		
<p>Data on actual interactions between the UoA and ETP are not available, but some information is available to indicate the general risk of ETP species to the fishery. There is also a lack of species-specific data on ETP species that are landed, such as sharks. It is not possible to determine mortality rates given that there is little information about the fishing activity over the UoA e.g. on trawl duration, which is a key factor in determining mortality. There are no log books and no independent at-sea verification of catches, or monitoring of rules and regulations.</p> <p>For the turtles and dolphins, interactions are reported by all stakeholders to be rare and unlikely to result in mortality. For whale sharks, landings data suggest that interactions are rare, but discards are unknown and a PSA scores this interaction as potentially 'high risk'. For the sawfish and guitarfish, it is not possible to say that the UoA is not hindering recovery. PSA scores for elasmobranch species – all of which receive a 'high risk' score. See Appendix 2.</p>		
<b>Performance Indicator</b>	<b>Draft scoring range</b>	<b>Data deficient?</b>
<b>2.3.2 – ETP species management strategy</b>	60 – 79	Yes
Rationale or key points		
<p>Because of the issues mentioned above in regard to unclear risks to ETP species, more information on UoA activities, ETP interactions would be needed to better understand the efficacy of measures / strategies to reduce said impacts.</p> <p>For some ETP species, the measures / strategy is the nature of the fishery, which results in few interactions (this applies to turtles, dolphins and whale sharks).</p> <p>For the sawfish and giant guitarfish, there are some measures in place to limit interactions (inshore trawl ban), but we have no means of saying that they are 'likely to work'. A National Plan of Action (NPOA) is currently in draft format and undergoing development.</p>		
<b>Performance Indicator</b>	<b>Draft scoring range</b>	<b>Data deficient?</b>
<b>2.3.3 – ETP species information</b>	<60	Yes
Rationale or key points		
<p>More information on UoA operations, and ETP interactions would be required and need to be 'adequate' to estimate the impact of the UoA on ETP species. There is not enough information to say that the UoA supports measures/ strategy to manage those ETP species as there is insufficient information about the ETP species in the catch.</p> <p>Aside from the turtles and dolphins, for which interactions are limited, data for other ETP species is available from landings (although discards, if any, are unknown). For most species, information is</p>		

adequate to evaluate impacts at least qualitatively. For the sawfish and guitarfish, however, there may not be enough information at the population level to evaluate the impact of the fishery, or to determine suitable management measures.

Performance Indicator	Draft scoring range	Data deficient?
<b>2.4.1 – Habitats outcome</b>	<60	No
Rationale or key points		
<p>There is information on the benthic structure of the trawling grounds and biota, but and information on fishing grounds of species caught along with target species are available. VMEs are not present in the UoAs assessed, and the only one 'Nethrani island' off Karnataka is an MPA. The fishery seems to be off-bottom, but with limited information the team scored this precautionarily.</p>		
Performance Indicator	Draft scoring range	Data deficient?
<b>2.4.2 – Habitats management strategy</b>	<60	No
Rationale or key points		
<p>There are some measures in place, like no fishing zones, MPAs, however, it is unclear if these are sufficient to reach a Habitat Outcome of SG80 without more information on potential habitat encounters, VME encounters and fishery footprints. It cannot be said with confidence whether these measures work and compliance to these measures are adhered to. Ghost gear reporting and retrieval is not practiced.</p>		
Performance Indicator	Draft scoring range	Data deficient?
<b>2.4.3 – Habitats information</b>	<60	No
Rationale or key points		
<p>The distribution of habitats (benthic sand/mud/clay and pelagic) is broadly understood (CMFRI, 2017; Harkantra et al. 1980). The benthic fauna and physio-chemical factors are also broadly studied (Meenakumari et al., 2008; Bhagirathan et al., 2010 &amp; 2014). The available information points to some changes in the benthic community and sediment characteristics. Detailed study on the nature, distribution and vulnerability of the main habitats in the UoA area is not known at a level of detail relevant to the scale and intensity of the UoA. There is not 'adequate' information, or information on the spatial overlap of habitat with fishing gear.</p>		
Performance Indicator	Draft scoring range	Data deficient?
<b>2.5.1 – Ecosystem outcome</b>	60 – 79	No
Rationale or key points		
<p>Key elements of ecosystem are mostly known. Given the high-productivity of the ecosystem, especially given the strength of the upwelling system, it is considered that the UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. However, it cannot be said that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm as there is insufficient ecosystem modelling across all states, and particularly a lack of information about ecosystem outcomes from the UoA gear type.</p>		
Performance Indicator	Draft scoring range	Data deficient?
<b>2.5.2 – Ecosystem management strategy</b>	60 – 79	No
Rationale or key points		

There are measures in place to limit ecosystem impacts including an overall cap on effort, monitoring of landings, stock assessments, marine protected areas, and ecosystem modelling (KASE model and ECOSIM simulations for Kerala). However, there is insufficient evidence to suggest that measures/partial strategy are expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.

The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems). There have been some examples of where there is testing to evidence that the measures work e.g. testing of closures of the mechanised fishery in Kuriakose et al. (2021). However, more evidence across the states is required to say that the measures work across the states.

Performance Indicator	Draft scoring range	Data deficient?
<b>2.5.3 – Ecosystem information</b>	60 – 79	No

#### Rationale or key points

The main impacts of the UoA on key ecosystem elements and ecosystem dynamics have been studied. There have been studies on physical processes including upwelling and biogeochemical cycles and on the biology of the main species and their ecological interactions, though with important data gaps e.g. on stock structure. CMFRI scientists have developed a Trophic model (KASE Model) for Kerala fisheries. However, the studies have not been performed across the all the states under the UoA, or for many years. Information is adequate to broadly understand the key elements of the ecosystem.

Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail: the information from the UoAs is very limited and main impacts caused in the key elements of the ecosystems cannot be identified.

The main functions of the components (i.e., P1 target species, secondary species, ETP species and Habitats) in the ecosystem cannot be determined without better data on catch composition, habitat interactions and ETP/OOS interactions.

Adequate data are not collected on the UoA catch enough to determine increases in risks.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.1.1 – Legal and/or customary framework</b>	60 – 79	No

#### Rationale or key points

The national legal framework in India gives individual States control of the seas and living marine resources up to 12 nautical miles (nm) from the shore, while the Central Government has control from 12 nm to the 200 nm exclusive economic zone (EEZ) boundary. The National Policy on Marine Fisheries published in 2017, is a nation-wide sectoral document aiming at ensuring the health and ecological integrity of the marine living resources of India's Exclusive Economic Zone (EEZ) through sustainable harvests for the benefit of present and future generations of the nation. It is based on seven pillars, namely (i) sustainable development; (ii) socio-economic enrichment of fishers; (iii) principle of subsidiarity; (iv) partnership; (v) inter-generational equity; (vi) gender justice; and (vii) precautionary approach. These seven pillars will guide the actions of various stakeholders in meeting the Vision and Mission set for the marine fisheries sector of the country, and that are respectively "A healthy and vibrant marine fisheries sector that meets the needs of the present and future generations", and "to meet the national, social and economic goals, livelihood sustainability and socio-economic enrichment of the fisher community and to guide the coordination and management of marine fisheries in the country during the next ten years". The National Marine Fisheries (Regulation and Management) Bill, 2019 intends to reduce and manage interstate/international conflicts and

facilitate holistic resource utilization in EEZ. This is further envisaged in the National Fisheries Policy 2020 (NFP), which is under stakeholder discussion currently.

3.1.1a outlays the Marine Fishing Regulation Acts applicable for each state. It can be assumed that there exists an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2 in all the states assessed. However, the system cannot currently be considered to operate in an organised and effective manner.

There are transparent mechanisms for the resolution of legal disputes – this is available via the website Indiankanoon.

Finally, the MFR Act therefore has specific provisions for the protection of legal rights of traditional fishers. The respective state governments have the power to regulate, restrict or prohibit fishing in specified areas, the number of vessels allowed to fish in a specified area, the catching of certain species spatially and temporally and the use of fishing gear in certain areas. These orders are made with particular regard to “the need to protect the interests of different sections of persons engaged in fishing, particularly those engaged in fishing using of traditional fishing craft such as catamaran, country craft or canoe”. This suggests the management system has a mechanism to observe legal rights of traditional fishers.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.1.2 – Consultation, roles, and responsibilities</b>	60 – 79	No

Rationale or key points

Organisations and individuals involved in the management process are explicitly defined and well-understood for all areas. At the Central Government level, management is currently under the Department of Fisheries under the Ministry of Fisheries, Animal Husbandry & Dairying. The Department of Animal Husbandry, Dairying & Fisheries (DAHDF), Ministry of Agriculture and Farmers Welfare, which is responsible for fisheries development and management in the country, formulates developmental strategies for the sector and issues policy guidelines for Fisheries and Aquaculture development and management. Department of Fisheries, GoI is responsible for fisheries management from 12nm to the 200nm EEZ boundary.

The Department of Fisheries of the respective states are responsible for implementation of State fisheries policy and legislation covering territorial waters. It manages investments in fisheries infrastructure, distributes subsidies for fishing equipment, vessel registration and licensing, and monitoring. DoF also implements fisher welfare instruments, such as social security schemes and social infrastructure, and supports para-state organisations like fisheries cooperatives, fisheries corporation, and fishermen welfare board. (The organisational structure of DoF, Government of Kerala is given in Figure 21, Karnataka has a similar organisational structure).

Scientific research is undertaken by a variety of organisations in India including: (i) the Central Marine Fisheries Research Institute (CMFRI) a national research institute headquartered in Kochi, Kerala undertakes research on marine fisheries catch and effort, taxonomy and bio-economic modelling; (ii) the Central Institute of Fisheries Education (CIFE) in Mumbai, which undertakes education and research in fisheries; (iii) the Fishery Survey of India (FSI) in Mumbai, which undertakes national fish stock assessments and; (iv) the Central Institute of Fisheries Technology (CIFT) in Kochi, which carries out research on fishing technology, craft and gear, processing and preservation and also helps in quality control certification for the export of seafood.

There are also several local fisher organisations that participate in the management process.

The organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction.

The management system in India includes consultation processes that obtain relevant information from stakeholders involved as evident from the drawing of National Fisheries Policy 2020. In all the states assessed, the management system includes consultation processes that obtain relevant information from stakeholders directly involved in the management (all meetings are minuted). The government of India and the respective state governments encourages consultation process and provides opportunity for organisations and individuals to be involved in important decisions. The 2017 National Policy on Marine Fisheries (2017) under Paragraph 14 references the importance of a co-management approach, which involves groups of fishers and “will be worked out in consultation with the fisheries research institutions, coastal States/UT Governments, fishers and their associations and other concerned stakeholders in the sector”.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.1.3 – Long term objectives</b>	≥80	No

Rationale or key points

The vision of the sixth draft of National Fisheries Policy 2020 is to develop an ecologically healthy, economically viable and socially inclusive fisheries sector through sustainable and responsible fishing. The policy focuses on managing the fisheries resources sustainably and responsibly by following an Ecosystem Approach of Fisheries (EAF) management and modern, scientific and diverse fishing practices in the ocean. This draft is also emphasising precautionary approach in managing sustainability of resources. This policy has clear precautionary approach, is rooted in sustainability and has plan for the long term (10 years). However, evidence of the implementation of these policies is needed.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.2.1 – Fishery-specific objectives</b>	<60	No

Rationale or key points

There are no specific fishery management plans for the fisheries/species under assessment and so no objectives to manage the specific stocks covered in the UoAs. For Principle 2, the marine policy objective to promote the protection of living aquatic resources includes the requirement to realize “mainstreaming biodiversity conservation in production processes; species-specific and area-specific management plans, including conservation of Ecologically and Biologically Significant Areas (EBSAs) and Vulnerable Marine Ecosystems (VMEs); protection of iconic and endangered and threatened (ETP) species; spatial and temporal measures for sustainable utilization of resources; and creation of fish refugia through consultative processes”. However, it’s not clear if this has been enacted.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.2.2 – Decision-making processes</b>	60 – 79	No

Rationale or key points

This PI is asking about the decision-making processes used in determining and delivering fishery-specific management. The fishery under assessment is without fishery-specific management objectives contained in a management plan. However, the assessment team felt that should fishery-specific objectives be developed, there are decision-making processes in place, possibly even established, that would be able to guide management decision-making such that SG 60 would be met and SG 80 could possibly be met. Examples were provided of decision-making processes. However, based on lack of ability to audit informal traditional approaches on the available information and noting that the team is unaware of any fishery-specific objectives based on the available information SG 60 is not met for Sla.

There is evidence of decision-making processes responding to serious issues identified in relevant research, monitoring, evaluation and consulting in all the assessed states. For example, through research and information collected by CMFRI at landing sites and stakeholder consultation, minimum size limits were implemented in the fishery through notifications in the Gazette. However, it cannot be said that decision-making processes respond to serious and other important issues identified in

relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.

As per 3.2.2c, it cannot be said that decision-making processes use the precautionary approach and are based on best available information.

Information on fishery performance and management actions taken are available on request. Documents related to impact of trawl ban, fishery management plans for each coastal state, etc are available online (<https://eprints.cmfri.org.in/>) on the CMFRI website and e-prints. The regulation acts and rules and its amendments, programmes & schemes of Central and state government, subsidies, allocation, compliance and fisheries management decisions and legal actions taken by the government are available on the respective state websites. (<https://fisheries.kerala.gov.in/>; <https://fisheries.karnataka.gov.in/english>; <https://fisheries.goa.gov.in/>; <https://fisheries.maharashtra.gov.in/en>; <https://cof.gujarat.gov.in/index.htm>). The National Fisheries Policy and its amendments and details of PMMSY is available on the National Government's website (<https://dof.gov.in/>). MPEDA website [https://mpeda.gov.in/?page\\_id=589#](https://mpeda.gov.in/?page_id=589#) gives information on fishery statistics of the country, and broadcasts major decisions of the state and national government. However, whilst findings from relevant reviews, research and notifications are published in the Gazette, are not all regularly published online and cannot be said to constitute formal reporting to all stakeholders.

There is no evidence of the fishery being subject to legal challenges that the assessment team could find, however further information would need to be sought on this PI if undertaking a full assessment.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.2.3 – Compliance and enforcement</b>	<60	No

#### Rationale or key points

The NMPF, 2017 and the NFP 2020 has explicitly outlined the importance of Monitoring, Control and surveillance (MCS) mechanisms for sustainable fisheries. Currently the MCS tools in the fishery are licensing and registration for all vessels, as well as at-sea and in-port inspections which is under the respective state fishery departments' jurisdiction. The coast guard also helps in MCS. Under the MFR Act, compliance officers are given powers to search vessels used or suspected to have been used in contravention of any of the provisions of the Act, or the rules framed thereunder, or of any of the conditions of the licence. The compliance officers will report the contravention to the Adjudicating Officer who will hold an enquiry into the matter and determine a sufficient penalty if applicable under the MFR Act. The Adjudicating Officer can also cancel, revoke or suspend the registration or licence of the vessel involved. Monsoon seasonal ban on fishing is effectively implemented in all states.

It is not clear whether there is a dedicated enforcement wing under the department of Fisheries for MCS in Karnataka, whereas Kerala has one. There are no at-sea observers or vessel monitoring system (VMS) implemented in the fishery. Automatic Identification System (AIS) is installed in almost all vessels but the data from these is not available to the enforcement officials. It has to be noted that many reports and articles have highlighted the difficulties in enforcing fisheries regulations due to a lack of sufficient personnel, financial constraints, and lack of patrol boats (Pillai, 1997; World Bank, 2010) and that MCS needed to be improved in areas such as, control of fishing fleets, in-port inspections after landing, monitoring of destructive fishing practices (Ail et al., 2014). Concerns have also been raised as to the awareness of fishers with existing rules and regulations and their necessity (Mohamed, et al., 2014b; DOF, 2016; World Bank 2010). Therefore, the team were doubtful whether the MCS system has sufficiently demonstrated an ability to enforce management measures. Some information on monitoring and enforcement is available like the vessels impounded and fine obtained, but the number and area of patrols, number of inspections at-sea and in-port is not available to the assessment team.

Sanctions to deal with non-compliance exist and are specified in the FMR Act of respective states along with the violations. However, there was enough evidence available at the time of this assessment to determine if these are applied consistently.

Some evidence exists to suggest fishers comply with the management system but the assessment team has noted there is non-compliance and enforcement is not completely effective in deterring the violators. Compliance to seasonal closure during monsoon is almost 100% in all the states assessed. This is achieved through monitoring by the department and also reporting by traditional fishers. However, there are several sources of information that suggest that regulations are not complied within the fishery. Illegal, Unreported and Unregulated (IUU) fishing potentially occurs, where boats (in-State and out-of-State) may take undersized fish in the Kerala fishery, but these are not then landed in Kerala (i.e., landed out of State where enforcement is not strict) (personal communication trawl boat owners). This would need further investigation during a full assessment.

Many news articles suggest that fishers do not comply with legal mesh size and MLS and resort to illegal fishing practices like bull trawling and LED fishing as enforcement is not strict. The lack of a dedicated enforcement department and low penalties are also reasons for non-compliance. Therefore, there is insufficient evidence currently available to suggest that there is no systematic levels of non-compliance.

Performance Indicator	Draft scoring range	Data deficient?
<b>3.2.4 – Monitoring and management performance evaluation</b>	<60	No

Rationale or key points

Fishery-specific management is not prevalent in India. Yet evaluations happen in management and new policies are drawn up. For example, the National Marine Fishery Policy in 2017, the National Marine Fisheries (Regulation and Management) Bill, 2019 and the sixth draft National Fisheries Policy 2020. This is also true for state-level management. However, reviews are rather part of the political process than requirements of policy and procedure. The NFP 2020 has plans to develop a management programme over a timeline and revisit the policy over a time period. This is yet to be implemented. The extent to which mechanisms are in place to evaluate key parts of the fishery-specific management system is unknown.

At present, there is no fishery specific management system in the states are assessed. There have been internal audits but the scope of these audits was not clear.

## 6. Fishery overview

### 6.1 Client Fishery

Netuno USA was founded in 1993. Netuno USA supplies over 9,000 metric tons of seafood to distributors, foodservice and supermarkets in US and Caribbean. The company sources a wide variety of seafood species, including finfish, mollusks and crustaceans from both wild-capture and farmed-sources. Netuno USA is the leading US importer of frozen snapper and grouper, but also imports seabass, corvina, mahi-mahi, cobia, flounder, and unicorn fish. Several Fishery Improvement Projects (FIPs) and/or pre-assessments have been undertaken and supported by Netuno USA, including the gillnet and trawl grouper and squid fishery in India, Yucatan octopus fisheries in Mexico, spiny lobster fisheries in Honduras, Venezuela and Jamaica, the Caribbean red, yellowtail and lane snappers fisheries in Brazil, all registered and publicly available on [FisheryProgress.org](https://fisheryprogress.org).

### 6.2 Management of the fishery

This fishery is part of the 'mechanised trawl' sector. Indian fisheries out to 12 miles are the responsibility of the states; outside 12 miles the responsibility of the Central Government. Although the mechanised trawl fishery may operate outside 12 miles (which it is legally permitted to do), responsibility for management devolves to the states for this fishery. Legislation and management

regulations are established by the State Governments of Kerala and Karnataka. Details of the regulation in each state are given below.

### 6.3 Gear and operation of the fishery

Gear, vessels and fishery operations differ across the western states of India. The fishery is prosecuted by relatively small boats that are involved in other fisheries but use different nets depending on the target species (largely associated with the shrimp fishery). To provide an idea of scale, there are around 5,000 boats operating in the India Kerala shrimp and cephalopods – trawl, which are mostly 18m to 25m in length. There are ~12 different types of nets on-board. Trawl nets, operating up to 100 m depth are used for UoA fishery.

Unicorn leather jacket is usually caught as a by catch in fish & cephalopod trawls which operate slightly off-bottom. But they sometimes form part of shrimp trawl catches too. Fishing trips may last around three to four days at the beginning of the season (August/September) increasing to ~15 days later in the season (April/May). Fishing trip length is dependent on vessel storage, ice and fuel capacity.

There is a trawling ban in place for mechanised vessels during the southwest monsoon season since 1985 (see section **Error! Reference source not found.** for the timing of each ban for each state). Motorised (outboard) and non-motorised boats are not included in this ban. Trawling was previously prohibited between 15<sup>th</sup> June to July 21<sup>st</sup>, but has been extended, with the ban commencing on the 10<sup>th</sup> June in order to increase the closure to 61 days (Deccan Herald, 2022), during which, the harbours are closed, and boats cannot leave. The ban is enforced by the state fisheries department and police.

There are cod end mesh size restrictions (35 mm square mesh for the fish and cephalopod trawl). Trawling is restricted inshore with no mechanised trawling permitted shallower than 27.5 metre north of Kollam and 18 metre south of Kollam (to reduce conflicts between commercial and traditional fishers).

Minimum landing sizes (MLS) are defined for 58 species in Kerala and 19 species in Karnataka. As landings are so mixed, the requirement is that <50% of each species must be below their respective MLS. A MLS for the current target species is not established in either state.



Figure 1. The trawl net. Source: photographs taken by the author of the Kerala multi-species trawl fishery pre-assessment. (Dr Jo Gascoigne/Dr Kat Collinson)

Mesh sizes are regulated by the State Fisheries Department; however, these are not considered to be very effective (CMFRI, 2022a).

The mechanised sector is the largest contributor to landings by sector, with 79% of the total landings (Figure 2). Pelagic resources formed 55% of the total landings whereas demersal landings accounted for 26% (Figure 3).

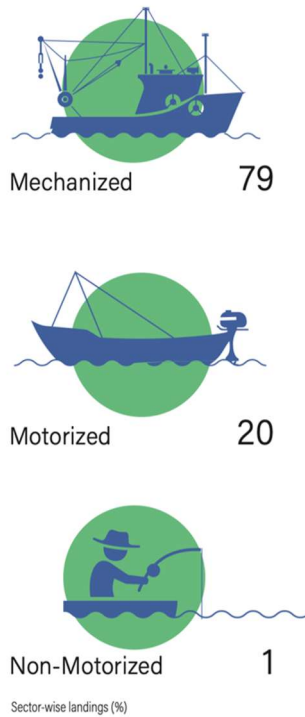


Figure 2. Sector-wise marine fish landings (%) (CMFRI 2024)

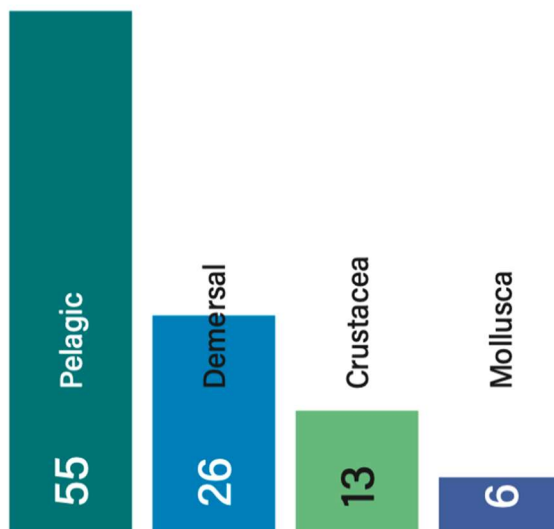


Figure 3. Marine fishery resource landings along the Indian coast (by percentage). Source: CMFRI 2024

Mechanized multiday trawl net (MDTN) catch is the largest contributor of trawl catch, operated by trawlers fishing overnight for 2 to 14 days in a single fishing trip (Dineshbabu et al., 2022).

#### 6.4 Fishing areas and seasons

The Indian coast is divided into four regions – South west, North west, South east and North east. The current UoAs come under the South west region which includes, Kerala, Karnataka and Goa. In 2023, the maximum landings were in the southwest (SW) region with 1.3 million tonnes (37%),

followed by 1.12 million tonnes (32%) in the northwest (NW) region, 0.81 million tonnes (23%) in the southeast (SE) region and 0.3 million tonnes (8%) in the northeast (NE) region (Figure 4).

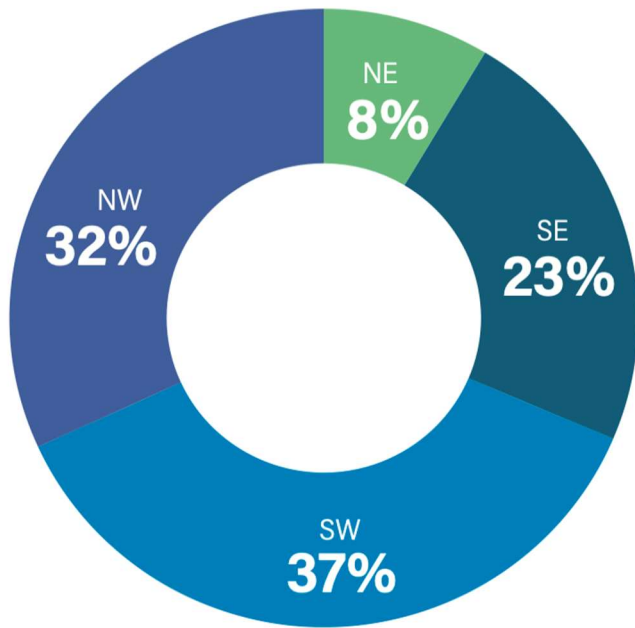


Figure 4. Region wise landings in India, 2023. Source. CMFRI 2024

The main fishing season is August to October. Catch rates begin to decline around December, with landings mainly consisting of fish species later in the season (April-May) (Figure 5).

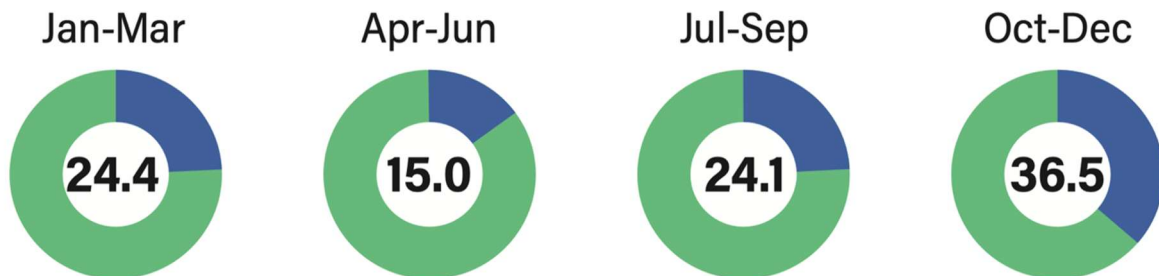


Figure 5. Season wise landings in India, 2023. Source. CMFRI 2024

# India

Estimated Landings (mainland):  
**3.53** million tonnes

**3.53**  
**3.49** million tonnes

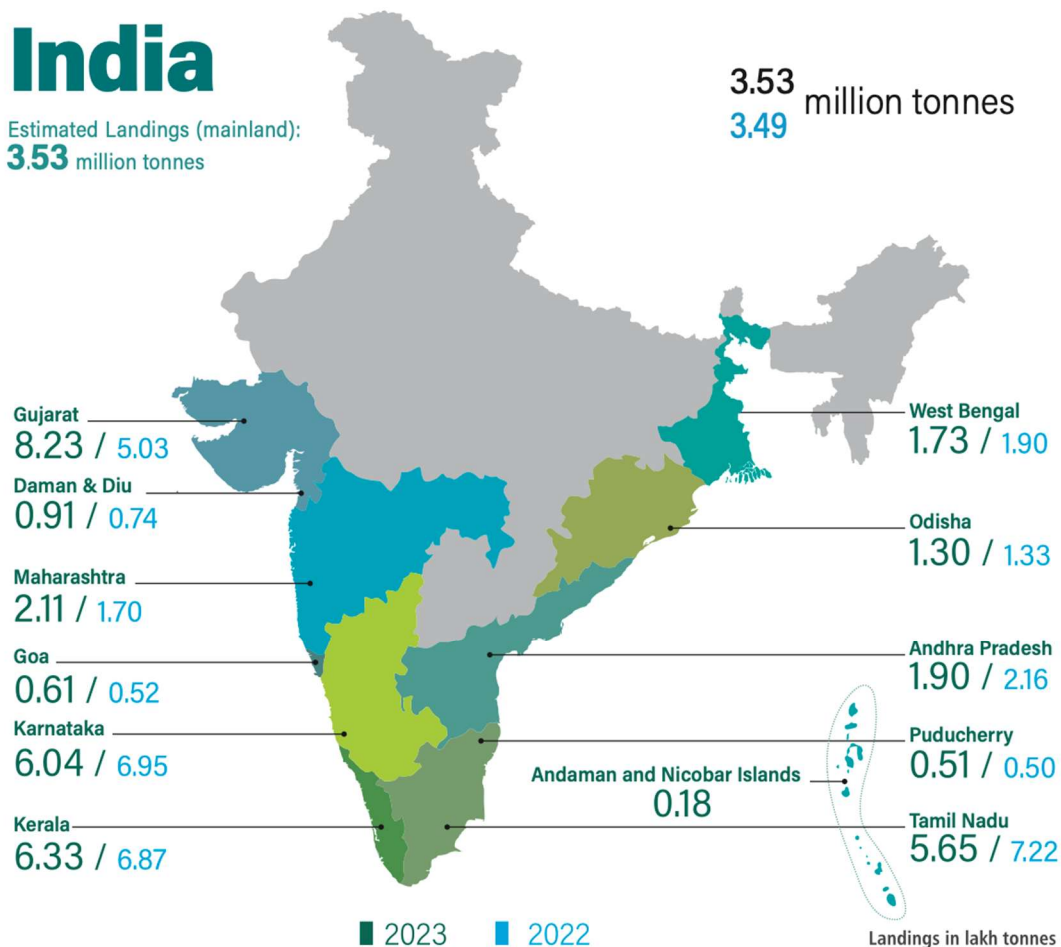


Figure 6. Proportion of marine fisheries landings (%) by region in 2022 & 2023. Source: CMFRI, 2024

Region wise landings and fleet structure is given in the Table 5

Table 5. Region landings and fleet structure. Source: Sathianandan et al. 2021

Region	Fleet
<b>Northwest (Maharashtra, Gujarat, and Daman Diu (UT))</b>	The marine fish harvest along the northwest coast is from the maritime states of Gujarat (65.8%), Maharashtra (26.9%), and UT of Daman Diu (7.3%). Nearly 93.3% of the harvest from this region is by mechanized fishing vessels, whereas 6.5% is by outboard fishing vessels and only 0.2% by non-mechanized fishing crafts.
<b>Southwest (Kerala, Karnataka, and Goa)</b>	On the southwest coast, 8.5% of the marine fish harvest is from Goa, 43.7% is from Karnataka, and 47.8% is from Kerala. A major portion of the harvest from this region is by mechanized fishing crafts (75.7%), and the remaining by motorized fishing crafts (21.8%) and non-mechanized country crafts (2.5%).

## 7. Traceability and eligibility

### 7.1 Traceability – initial review

Table 6. Traceability initial planning

<b>The proposed point of change of ownership of product to any party not covered by the fishery certificate</b>
The proposed point of change of ownership is upon landing at the landing ports listed below, where the boat owners/captains sell squid directly to suppliers after weighing and grading takes place: Kerala – Sakthikulangara, Munambam, Beypore Karnataka - Mangalore, Malpe <i>Note: This list is not exhaustive, there might be more landing centres the team is not aware of</i>
<b>The proposed point from which subsequent Chain of Custody (CoC) is required</b>
Not known to the team currently
The plan for reviewing traceability at the site visit
N/A for pre-assessment.

### 7.2 Traceability within the fishery

Table 7. Traceability within the fishery

<b>Statement on fishery’s ability to track and trace to each Unit of Certification</b>
Systems <b>do not</b> allow the fishery client to track and trace any fish or fish products sold as MSC certified back to the individual UoC.
<b>Movement of fish and fish product between harvest and landing</b> <i>An illustration of movement of product between harvest and landing. Include when any of the following happen: Harvesting, At-Sea processing, Translocation, Transshipment, Offloading, Landing.</i>
The assessment team could not determine the movement of fish and fish product between harvest and landing due to a lack of information.
<b>Movement of fish and fish products between landing and start of the CoC if relevant.</b> <i>An illustration of movement of product between landing and start of CoC. Include when any of the following is happening: Transport, Storage, Sorting/ Grading, Packing, Auction.</i>
The assessment team could not determine the movement of fish and fish product between harvest and landing due to a lack of information.
<b>Description of any processing and sorting/ grading prior to change of ownership</b>
Unicorn leather jacket is stored on ice on-board. No other processing takes place prior to change of ownership.

**For the critical tracking events (i.e. where in the product flow this data needs to be transferred) of all fish and fish product handling and sale not covered by CoC describe:**

- **Process of segregating to each Unit of Certification**
- **Key data elements (i.e. the data or documents to identify the UoC such as species, catch area, gear)**

Whilst the assessment team could not determine the movement of fish and fish product between harvest and landing (due to a lack of information), it was clear that segregation does not take place on board the vessels.

Where there are IPI stock(s) describe the verification of traceability systems

No IPI stocks – there is two species of *Aluterus* in these waters but they are both highly distinctive

Other relevant information on the systems to track and trace to each UoC

N/A for now

### 7.3 Traceability risks and mitigations

Table 8. Traceability risks and mitigation within the fishery

Factor	Description of the traceability risk factors and details of the risk mitigation and management
<p>Will the fishery use gears that are not part of the UoC? If Yes, include in the description:</p> <ul style="list-style-type: none"> <li>• If this may occur on the same trip, on the same vessels, or during the same season;</li> <li>• How any risks are mitigated.</li> </ul>	<p>Yes, multiple gears are used on each vessel.</p> <p>No information on how the risk is mitigated.</p>
<p>Will vessels in the UoC also fish outside the UoC geographic area? If Yes, include in the description:</p> <ul style="list-style-type: none"> <li>• If this may occur on the same trip;</li> <li>• How any risks are mitigated.</li> </ul>	<p>The client informed us that vessels do not fish outside the UoA's geographic area and that this is monitored using GPS. However, this could not be verified.</p>
<p>Do vessels from outside the UoC and/or client group ever fish on the same stock?</p>	<p>Yes. The vessels fish for fish, cephalopods and shrimp during a same trip, therefore using different nets to target shrimps (shrimp net) and fish/cephalopods (squid nets). The shrimp net is therefore a different UoC.</p>
<p>Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate?</p>	<p>This is a PA and there are no certified species here – thus no risk of handling both certified and non-certified product.</p>
<p>Does transshipment occur within the fishery?</p>	<p>No, transshipment does not occur within the fishery.</p>

Factor	Description of the traceability risk factors and details of the risk mitigation and management
Are trading agents to be covered within the fishery certificate?	No
Are there any other risks of mixing or substitution between certified and non-certified fish? If No, refer to the section describing product movement and segregation which demonstrates this.	This is a PA and there are no certified species here – thus no risk of handling both certified and non-certified product.
Are there any other risks of mixing between different Units of Certification? If Yes, include in the description: <ul style="list-style-type: none"> <li>link to any relevant variations relating to this</li> </ul> If No, refer to the section describing product movement and segregation which demonstrates this.	It was not possible to determine other risks of mixing due to a lack of information.

## 7.4 Inseparable or Practicably Inseparable (IPI) stock(s)

There are no IPI stocks.

## 8 Principle 1

### 8.1 Principle 1 background

#### 8.1.1 Biology and stock structure

The unicorn leatherjacket (*Aluterus monoceros*; a species of filefish) is widely distributed in the tropics and sub-tropics of all oceans, including around the entire coast of India (Matsuura et al. 2015). Adults are generally found associated with reefs according to IUCN, but on sandflats close to reefs or drop-offs and rarely on reefs themselves according to FishBase), but juveniles are pelagic, often found around jellyfish or floating objects. Kanthan and Zacharia (2011) report that adults may also form large schools under floating rafts of weed (or rubbish) although on reefs they are generally solitary or in pairs.

According to information collected by CMFRI over the last few years (e.g. Ghosh et al. 2011, 2022; Kanthan and Zacharia 2011, Varghese et al. 2011, Saleela et al. 2011, Lingappa Chaniyappa et al. 2015), it seems that this species started appearing in the trawl catch in significant numbers about two decades ago, and since then catches can be quite variable, with periodic large quantities landed, although taking the overall average it remains quite a small component of the catch. A processor we spoke to for this pre-assessment also noted that catches are variable, and come from different areas at different times – sometimes Kerala, sometimes Karnataka. It is also reported in significant numbers from other states, especially Tamil Nadu, but we understand that Netuno are not procuring from elsewhere.

The drivers behind these 'blooms' are not known, and could be related to the fishery operations, or the behaviour of the fish, or the population dynamics, but either way, this very patchy data makes stock assessment difficult.

As far as we know, there is no information about stock structure for this species in SW India. For the purpose of this assessment, we assume a single stock covering Kerala and Karnataka, but some evidence about stock structure will be helpful for MSC assessment.

### 8.1.2 Stock status

Some data on trawl catch by species for Kerala from 2015-17 suggest that this species made up ~0.5% of the stock, so it is not surprising that it is not considered a priority for CMFRI scientists. It does not appear from CMFRI annual reports (CMFRI 2021, 2022) that there is any stock assessment for this species, or even for filefish as a group. As previously noted, the dynamics of the fishery for this species makes stock assessment difficult. We have therefore used MSC's 'risk-based framework' to evaluate the risk posed by the fishery for the stock – see Section 11.

### 8.1.3 Information and stock assessment

Landings data: The monitoring of landings is subject to a range of constraints in India: there are large number of vessels, trips and landing sites and a high diversity of both gears and target species. It is impractical for fishers to complete logsheets, so monitoring of catch (landings) is done by enumerators at landing sites. CMFRI has a system for collecting landings data, which across India takes about half a million enumerator-hours a year, leaving aside the time spent entering, checking, correcting, storing and analysing the data.

The sampling system is designed on the basis of stratified random sampling (Stratified Multistage Random Sampling Design; Srinath et al. 2005). The coast is divided into 'fishing zones' which may comprise one large landing centre (e.g. Kochi, Kollam) or several smaller ones; fishing zones are in turn nested within states (Kerala, Karnataka) and regions (SW). Sampling is also stratified by vessel and gear type, and sampling frequency is based on the number of vessels but also the observed variability in fishing intensity and landings. Data collected by enumerators includes: catch by species, effort, type of vessel and gear, fishing grounds and sometimes other information including environmental information (Srinath et al. 2005). Catch has been reported by species since 2007 and enumerators receive training in species identification (CMFRI 2017), and there are quality checks by CMFRI scientific staff, who also provide the enumerators with monthly workplans based on the sampling strategy. Lately CMFRI enumerators use a tablet-based data collection system, where they can send information on real time to the headquarters and to scientists (e.g. for help in identifying species).

Discard data: Indian fisheries have very few discards as anything that is not used as food still is utilised by the fish meal industry. At the same time, as there is no logbook system, data are lacking on this.

Data handling and analysis: Data are provided by each enumerator to CMFRI's National Marine Fisheries Data Centre in Kochi, which maintains a database of catch data, and provide an online service of catch and price data ('FishWatch'). The database is available to CMFRI staff for their analyses, as well as to other stakeholders by agreement. A second database ('BioBase') includes biological and environmental data. CMFRI has completed the development of a web/tablet-based interface for direct entry of data from landing sites (CMFRI 2017).

Stock assessment: CMFRI report the basic qualitative results of stock assessments (sustainable vs over-exploited etc.) for the main species or species groups, but do not provide any information about the methodology, nor any detail on specific values, uncertainties, timeframes etc. in their public reports (e.g. CMFRI 2022). However, there is no information provided on this species, or on filefish as a species group, in any of the reports examined.

### 8.1.4 Stock management

In India, fisheries out to 12 nautical miles are managed by the state governments, and those outside 12 miles by the Central Government. Although there is an overarching National Marine Fishery Policy, each state has its own Marine Fishery Regulations Act which differ in many aspects. This UoA operates largely inside 12 miles, and is therefore mainly affected by measures at state level. The relevant states are Kerala and Karnataka (SW region).

Central government: There is a uniform ban on fishing by all vessels in the Indian Exclusive Economic Zone (EEZ) beyond territorial waters on the east coast (including the Andaman & Nicobar Islands)

and the west coast (including Lakshadweep Islands), for an annual period of 61 days (Govt Order No. 30035/15/97-Fy (T-1)/Ind.Vol.VI<sup>1</sup>). This is for conservation and management of fishery resources and also for sea safety reasons. The ban along the west coast is from 1 June to 31 July. Traditional non-motorized units are exempt (although it is probably highly unwise for these vessels to venture outside 12 miles during this period). It is important to note that the states are free to change this ban period within their territorial waters.

Kerala: Kerala was one of the first states to have its own Marine Fishing Regulation Act (KMFRA), which came into existence in 1980 and has been amended many times since, the latest being in 2017 and 2021 (the Kerala Marine Fishing Regulation (Amendment) Act 2021)<sup>2</sup>. The Act was thoroughly revised in 2017, and the 2021 amendment makes smaller changes – mainly updating the level of fines.

The 2017 KMFR Amendment Act gives the state power to restrain the increase in fishing effort by requiring permits for the construction of fishing vessels. Currently, there is a moratorium on the construction of new vessels >12m, although existing vessels can be replaced with one of the same capacities. The regulation does not apply to smaller vessels. The amended Act also regulates fishing on juveniles by prescribing a minimum legal size (MLS) for 58 species at the landing sites of Kerala, but filefish are not included.

There are also regulations around the design and operation of gears. For the trawl fishery, there is a minimum mesh-size of 25mm square mesh for the shrimp trawl and 35 mm square mesh for the fish and cephalopod trawl. Mechanised trawling is not permitted shallower than 15 fathoms (~30m depth) north of Kollam and 10 fathoms (~20m depth) south of Kollam. The main purpose of this regulation is to avoid conflict with traditional fishers. There is a trawling ban for mechanised vessels in place in Kerala for 52 days during the SW monsoon season (9 June to 31 July). Motorised (outboard) and non-motorised boats are not included in this ban. During this period, the harbours are closed and boats cannot leave. The ban is enforced by the state fisheries department and police. Note that this is aligned with the central government policy, although for a slightly shorter period.

Karnataka: The Karnataka Marine Fishing Regulation Act came into existence in 1986, followed by the Karnataka Marine Fishing (Regulation) Rules in 1987. There have not been any new versions of the Act/Rules, but many changes have nevertheless been brought in since then, via orders and notifications by the government. The Act gives the State Government has the power to regulate or restrict fishing by area, time period, species or gear type, and it establishes a licensing system<sup>3</sup>.

Karnataka also regulates the landing of juvenile fishes via an Order dated 28/02/2019, but filefish are not included. A Notification dated 16/07/2018, imposes a 35 mm square mesh cod end for all trawl nets. There are also notifications banning light fishing and bull (pair) trawling. As in Kerala, an Order<sup>4</sup> demarcates fishing areas for fishing vessels using different gears. Specifically, the zone out to 3 miles (5km) is reserved for traditional fishers (rampani). The fishing closure is applied in Karnataka for 61 days from 1 June to 31 July. As well as the mechanised (inboard) boats, it includes all traditional boats fitted with inboard or outboard engines of 10hp and above<sup>5</sup> (unlike in Kerala). (Traditional fishing boats with engines <10hp engines can continue to fish). Sanctions for violating the ban include withdrawal of eligibility for subsidised diesel for 12 months.

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<sup>1</sup>[https://mpeda.gov.in/?page\\_id=589](https://mpeda.gov.in/?page_id=589)

<sup>2</sup>[https://fisheries.kerala.gov.in/en/acts\\_rules](https://fisheries.kerala.gov.in/en/acts_rules)

<sup>3</sup><https://www.fao.org/faolex/results/details/en/c/LEX-FAOC063779/>

<sup>4</sup><https://fisheries.karnataka.gov.in/info-4/Department+Orders/Marine+Fishing+Related/en>

<sup>5</sup><https://www.deccanherald.com/india/karnataka/61-day-fishing-ban-comes-into-force-in-karnataka-1114465.html>

### 8.1.5 Catch profiles

Not publicly available.

### 8.1.6 Total Allowable Catch (TAC) and catch data

The fishery is not managed via a TAC. We do not have catch information for this species at present.

## 8.2 Principle 1 Performance Indicator scores and rationales

### PI 1.1.1 – Stock status

<b>PI 1.1.1</b>		<b>The stock is at a level that maintains high productivity and has a low probability of recruitment overfishing</b>		
Scoring issue		<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>
<b>a</b>	<b>Stock status relative to recruitment impairment</b>			
	Guidepost	It is <b>likely</b> that the stock is above the point of recruitment impairment (PRI).	It is <b>highly likely</b> that the stock is above the PRI.	There is a <b>high degree</b> of certainty that the stock is above the PRI.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale	Scored using risk-based framework – see Section 11			
<b>b</b>	<b>Stock status in relation to achievement of maximum sustainable yield (MSY)</b>			
	Guidepost		The stock is at or fluctuating around a level consistent with MSY.	There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		<b>No</b>	<b>No</b>
Rationale				

<b>Stock status relative to reference points</b>			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Reference point used in scoring stock relative to PRI (SIa)	No reference points for this stock as far as we are aware		
Reference point used in scoring stock relative to MSY (SIb)			

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>Information sufficient to score PI using risk-based framework</b> <i>For information gaps in risk-based analyses, please see Section 11</i>
Data-deficient? (Risk-Based Framework needed)	<b>Yes</b>

### PI 1.1.1A – Scoring of key LTL stocks

Fishbase estimate the trophic level of this species at 3.8 – so this does not apply.

### PI 1.1.2 – Stock rebuilding

Not scored when risk-based framework used for 1.1.1 above.

### PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring issue		SG 60	SG 80	SG 100
a	<b>Harvest strategy design</b>			
	Guide post	The harvest strategy is <b>expected</b> to achieve stock management objectives reflected in PI 1.1.1/PI 1.1.1A SG80.	The harvest strategy is <b>responsive</b> to the state of the stock and the elements of the harvest strategy <b>work together</b> towards achieving stock management objectives reflected in PI 1.1.1/PI 1.1.1A SG80.	The harvest strategy is <b>responsive</b> to the state of the stock and is <b>designed</b> to achieve stock management objectives reflected in PI 1.1.1/PI 1.1.1A SG80.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		<p>The UoA in both the states is a multispecies trawl fishery, which takes a very large number of species while targeting shrimp, cephalopods and/or fish. It is impossible to manage all these species separately, so the states take the approach of using various methods to control overall fishing effort, as well as technical measures to protect juvenile fish as far as is compatible with maintaining the catch of the target species.</p> <p>The various measures in place in each state are, in summary:</p> <ul style="list-style-type: none"> <li>• Moratorium on the construction of new fishing vessels (except for like-for-like replacement) (both states)</li> <li>• Zoning to keep mechanised trawl vessels out of near-shore waters (both states although details vary)</li> <li>• Trawl ban June and July for mechanised trawlers (both states, also including motorised &gt;10hp in Karnataka, slightly shorter period in Kerala)</li> <li>• Minimum trawl mesh sizes (both states – 25mm square mesh for trawlers targeting shrimp and 35mm square mesh for trawlers targeting fish and cephalopods)</li> </ul> <p>There is no information on the stock status for this species to evaluate directly whether this harvest strategy is working for <i>A. monoceros</i> in both states and the risk-based analysis suggest that there is the potential for a significant risk to the stock. For the moment, pending scientific information, we cannot say whether SG60 is met.</p> <p>Making a harvest strategy responsive to the state of specific stocks (as required by SG80) is a significant challenge in the context of a mixed fishery with multiple target species. However, collecting and analysing more information (catch, catch-at-size) and extending regulations such as the MLS to this species and would be an important start in this direction.</p>		
b	<b>Harvest strategy evaluation</b>			
	Guide post	The harvest strategy is <b>likely</b> to work based on prior	The harvest strategy may not have been fully <b>tested</b> but evidence	The performance of the harvest strategy has been <b>fully evaluated</b> and evidence exists to show

<b>PI 1.2.1</b>		<b>There is a robust and precautionary harvest strategy in place</b>		
		experience or plausible argument.	exists that it is achieving its objectives.	that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale	There is some evidence that elements of the harvest strategy are working, at least for the main species in the trawl catch. For example, the analysis by Thomas and Dinesh babu (undated but sometime after 2013) shows that at the end of the trawl closure in Karnataka there is significantly higher biomass of reproductive size threadfin bream, suggesting that the trawl ban works as intended to protect stocks subject to high fishing pressure. However, there is no evidence as far as we know for <i>A. monoceros</i> specifically. The trawl minimum mesh size is likely to result in the capture of the species from below the size at maturity (~35 cm TL). On this basis, we cannot be completely confident that the harvest strategy is likely to work at present.			
<b>Harvest strategy monitoring</b>				
<b>c</b>	Guide post	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	<b>Yes</b>		
Rationale	Monitoring of catch and effort is described in Section 8.1 above. CMFRI also conduct biological research and stock assessments on species considered a priority, even if the details of these are not public. Met.			
<b>Harvest strategy review</b>				
<b>d</b>	Guide post			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			<b>No</b>
Rationale	There is clearly a process of review and improvement in both states; e.g. in Kerala the KMFRA was comprehensive reviewed; and in both states, regulations and orders have been brought in recently on minimum size, technical measures etc. In the absence of good information about the stock it is hard to say whether is sufficient or not – it could be but unfortunately, we can't say for sure without this information.			
<b>Shark finning</b>				
<b>e</b>	Guide post	There is a <b>high degree of certainty</b> that shark finning is not taking place.	It is <b>highly likely</b> that shark finning is not taking place.	There is a <b>high degree of certainty</b> that shark finning is not taking place.
	Met?	<b>NA</b>	<b>NA</b>	<b>NA</b>
Rationale	NA – <i>A. monoceros</i> is not a shark			
<b>Review of alternative measures</b>				
<b>f</b>	Guide post	There has been a review of the potential	There is a <b>regular</b> review of the potential	There is a <b>biennial</b> review of the potential

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
		effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	<b>NA</b>	<b>NA</b>	<b>NA</b>
Rationale	There is no minimum size limit for <i>A. monoceros</i> in both states, and therefore no particular size that defines 'unwanted catch' from a regulatory point of view. It may be that smaller fish are of less value, but as far as we understand, the entire catch is sold, albeit to different markets depending on size and quality. Therefore, we score this as NA – no unwanted catch.			

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>Information sufficient to score PI</b>

### PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well-defined and effective HCRs in place		
Scoring issue	SG 60	SG 80	SG 100	
<b>a</b>	<b>HCRs design and application</b>			
	Guide post	<b>Generally understood</b> HCRs are in place <b>or available</b> that are <b>expected</b> to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	<b>Well defined</b> HCRs are <b>in place</b> that <b>ensure</b> that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock <b>fluctuating around</b> a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock <b>fluctuating at or above</b> a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, <b>most</b> of the time.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale	The implementation of HCRs in the sense of individual rules for each stock is very difficult in this multi-species fishery. The management system is clearly able to respond in general to information about the important stocks in the fishery (e.g. by working to control effort or limit juvenile catch). However, it is not clear whether for these stocks this system is able to reduce the exploitation rate as the PRI is approached.			
<b>b</b>	<b>The robustness of HCRs to uncertainty</b>			
	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a <b>wide</b> range of uncertainties including the ecological role of the stock, and there is <b>evidence</b> that the HCRs are robust to the main uncertainties.
	Met?		<b>Yes</b>	<b>No</b>
Rationale	Catch, fishery and stock dynamics and in fact more or less everything about the management of this fishery is uncertain.			
<b>c</b>	<b>Evaluation of HCRs</b>			
	Guide post	There is <b>some evidence</b> that tools used or <b>available</b> to implement HCRs are appropriate and effective in controlling exploitation.	<b>Available evidence indicates</b> that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	<b>Evidence clearly shows</b> that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale	As noted above, analyses such as the evaluation of the 2-month trawl ban by Thomas and Dinesh babu provide some evidence that this tool is working as intended to reduce the risk from the trawl fishery to various stocks. However, we do not have information for this species specifically, nor do we have evidence that the management tools as a whole are working, across both states.			

Draft scoring range

<60

Information gap indicator	Information sufficient to score PI
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**PI 1.2.3 – Information and monitoring**

PI 1.2.3		Relevant information is collected to support the harvest strategy		
Scoring issue		SG 60	SG 80	SG 100
a	<b>Range of information</b>			
	Guide post	<b>Some</b> relevant information related to stock structure, stock productivity, and fleet composition is available to support the harvest strategy.	<b>Sufficient</b> relevant information related to stock structure, stock productivity, fleet composition, and other data are available to support the harvest strategy.	A <b>comprehensiverange</b> of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals, and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		The data collection system is described in the background section above. Fleet composition and catch is known, and there is sufficient data on the species biology to infer stock productivity (see analyses used for the risk-based framework; Section 11). There is, however, no information on stock structure as far as we are aware, but applying the harvest strategy at state level is probably reasonable. SG60 is met. However, the harvest strategy would benefit from data which allow trends in population abundance to be evaluated (even qualitatively) – e.g. via an analysis of landings and catch-at-size, or a data-deficient type stock assessment. SG80 is not met.		
b	<b>Monitoring</b>			
	Guide post	Stock abundance and UoA removals are monitored and <b>at least 1 indicator</b> is available and monitored with sufficient frequency to support the harvest strategy.	Stock abundance and UoA removals are <b>regularly monitored at a level of accuracy and coverage consistent with the harvest strategy</b> , and <b>1 or more indicators</b> are available and monitored with sufficient frequency to support the harvest strategy.	<b>All information</b> required by the harvest strategy is monitored with high frequency and a high degree of certainty, and there is a good understanding of the inherent <b>uncertainties</b> in the information (data) and the robustness of assessment and management in dealing with this uncertainty.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		UoA removals are monitored by CMFRI using the data collection system described in the background section above, but as far as we know, stock abundance has never been systematically evaluated, even at the level of filefish as a group.		
c	<b>Comprehensiveness of information</b>			
	Guide post		There is good information on all other fishery removals from the stock.	
	Met?		<b>Yes</b>	
Rationale		The CMFRI monitoring system covers all fisheries across all coastal states of India. As far as we are aware, there are no systematic gaps in the data.		

Draft scoring range	<60
Information gap indicator	Information sufficient to score PI

#### PI 1.2.4 – Assessment of stock status

This PI is given a default score of 80 when the RBF is used to score PI 1.1.1.

## 9 Principle 2

### 9.1 Principle 2 background

#### 9.1.1 Designation of species under Principle 2

**Primary** species (MSC Component 2.1) are defined as follows:

- Species in the catch that are not covered under P1;
- Species that are within scope of the MSC program, i.e. no amphibians, reptiles, birds or mammals;
- Species where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit (LRP) or target reference points (TRP). Primary species can therefore also be referred to as 'managed species'.

**Secondary** species (MSC Component 2.2) are defined as follows:

- Species in the catch that are not covered under P1;
- Species that are not managed in accordance with limit or target reference points, i.e. do not meet the primary species criteria;
- Species that are out of scope of the programme, but where the definition of ETP species is not applicable (see below)

**ETP (Endangered, Threatened or Protected)** species (MSC Component 2.3) are assigned as follows:

- Species that are recognised by national ETP legislation
- Species listed in binding international agreements (e.g. CITES, Convention on Migratory Species (CMS), ACAP, etc.)
- Species classified as 'out-of scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN Red list as vulnerable (VU), endangered (EN) or critically endangered (CE).

Both primary and secondary species are defined as '**main**' if they meet the following criteria:

- The catch comprises 5% or more by weight of the total catch of all species by the UoC;
- The species is classified as 'Less resilient' and comprises 2% or more by weight of the total catch of all species by the UoC. Less resilient is defined here as having low to medium productivity, or species for which resilience has been lowered due to anthropogenic or natural changes to its life-history
- The species is out of scope but is not considered an ETP species (secondary species only)

- Exceptions to the rule may apply in the case of exceptionally large catches of bycatch species

Unicorn leather jacket is usually caught in off bottom trawls that target fish and cephalopods with cod end mesh size of 28 mm (trawl boat owner personal communication). Therefore, it is less likely to interact with benthic invertebrates, corals, biogenic habitats of forage fish, finfish, sharks and turtles.

However, the assessment team has not been provided with catch composition data from the client group or the vessels under assessment, therefore, all the information available to analyse the catch composition is the information provided in the annual reports of the CMFRI or publicly available literature. More details of the type of information will be given below in a specific section but, the clarity on the catch composition is minimal and all the analyses have been done in a generic way with no information directly from the fleet. Therefore, there is no clear catch profile associated with this fishery.

Due to the lack of information to split UoA by state, the designated species are identical for each state, however, as described below, catch composition will vary between states, and as noted previously UoA definition could be considered at more constricted spatial scale (state level) in the future.

Without UoA specific catch and by catch data, general trawl studies have been drawn on to determine likely co-occurring species.

The mechanised trawl fishery is a mixed fishery which targets different species opportunistically; according to availability and market. Varghese et al. (2021) reviewed species interactions among fleets operating in Kerala waters. There are two trawl fleets: Mechanised Trawl net (Single day) (code: MTN) and the Mechanised Trawl net (Multi day – MDTN), The MTN fleet operates close to the shore and has the highest number of species caught with the maximum number of species exclusively caught by the gear (compared to other gears): Varghese et al. (2021) recorded 764 species caught via the MTN fleet over the study period and 750 by the MDTN fleet. This was by far the highest number of species caught, compared to all other gears. They do not provide a full catch profile, but based on published information (CMFRI annual reports) and observations of landings, we can have a reasonable idea of the main species which are landed by this fishery in Kerala – set out under ‘secondary species’ below. (For the purpose of this pre-assessment, we assume that the species composition is broadly similar in Karnataka as well.)

As marine catches in tropical countries can result in high species diversity, the practicality of reporting species catches at sea is problematic as there is very little time to report all species. Also, there are many vessels operating in each state. Therefore, data are collected through a scientific sampling scheme to ensure that landings are logged - India’s system for collecting data on catch and effort data is based on a sampling theory, a stratified multistage random sampling design (SMRSD), which is used to estimate landings and fishing effort each month. The SMRSD was developed by ICAR-Central Marine Fisheries Research Institute (ICAR-CMFRI), which began collecting landings data along the west coast of India in 1959 (Sukhatme et al., 1958). Data are collected from fishing villages, landing centres, vessels and gears and updated over time through a scientific sampling scheme called ‘India Frame Surveys’. ICAR–CMFRI collect data for smaller non-overlapping geographical regions (referred to as fishing zones), to cover the entire coast. There are around 1269 landing centres (CMFRI-FSI-DoF, 2020) along the mainland coastline, across nine coastal states and the two Union Territories (UT). In the data collection system, dedicated technicians (harbour-based observers) with species identification skills visit the landing centres according to work schedules generated under SMRSD and record different aspects of the fishery from sampled boats. The data thus collected is stored in a database of the National Marine Fishery Resources Data Centre (NMFDC) maintained in ICAR-CMFRI headquarters at Kochi (Table 1 – Varghese et al., (2021).

Landing centres are classified by fishing intensity (by High-Intensity Landing Centres (HiLC), Major Landings Centres (MaLC), and Minor Landing Centres (MiLC)). Of 1,269 landing centres, 52 are HiLC (300 or more vessels in operation), 37 are MaLC (100–299 vessels in operation), and the remaining are MiLC (< 100 vessels in operation). Greater sampling coverage is applied for HiLC, compared to

other classifications. Dedicated field observers, with species identification skills visit the landing centres as decided by the SMRSD to record landings. The resulting data are centrally processed and stored in the NMFDC (Sathianandan et al. 2021).

Data on landings by species and effort are collected from different landing centres according to the sampling plan discussed above and recorded by field observers. The quantity by species landed is known (available within National Marine Fishery Resources Data Centre (NMFDC) of ICAR-CMFRI (Sathianandan et al., 2021). It is to be noted that these data would only cover landings data and not catches.

### 9.1.2 Information

Landings data: The monitoring of landings is subject to a range of constraints in India: there is a very large number of vessels, trips and landing sites and a high diversity of both gears and target species. As above, it is impractical for fishermen to complete log sheets, so monitoring of catch (landings) is done by enumerators at landing sites.

Sampling is stratified by fishing location, vessel and gear type, and sampling frequency is based on the number of vessels but also the observed variability in fishing intensity and landings. Data collected by enumerators includes: catch by species, effort, type of vessel and gear, fishing grounds and sometimes other information including environmental information (Srinath et al. 2005; Dr TV Sathianandan, pers. com. from Gascoigne & Collinson; 2019). Catch has been reported by species since 2007 (although this remains a bit problematic for the cephalopods); but enumerators receive training in species identification, and there are quality checks by CMFRI scientific staff, who also provide the enumerators with monthly work plans based on the sampling strategy.

Effort data: In addition to the above, there is a Marine Fishery Census across India approximately every five years, which attempts to quantify the number of fishers, fishing-dependent households, vessels, gears etc.

Discard data: as per PI 2.2.3, discarding data are sparse – discarding data are generally only available from sampling studies, or from trawlers that are willing to provide those data.

Data handling and analysis: Data are provided monthly by each enumerator to CMFRI's National Marine Fisheries Data Centre in Kochi, which maintains a database of catch data, and provide an online service of catch and price data ('FishWatch'). The database is available to CMFRI staff for their analyses, as well as to other stakeholders (by agreement). A second database ('BioBase') includes biological and environmental data. CMFRI has completed the development of a web/tablet-based interface for direct entry of data from landing sites.

It may be that there remain some issues with data quality assurance. It seems that there is no systematic process for assigning all samples to species and might be assigned as  *spp*. Rather; it is left to individual scientists or team to undertake this type of processing on the data as part of their individual analyses. But with the introduction of tabs for enumerators this seems to be solved. For a full assessment this has to be confirmed.

### 9.1.3 Primary species

There are no primary species as the fishery is not managed via individual management objectives (target or limit reference points) by species. All non-P1, non-ETP species in the catch are therefore categories under 'secondary' rather than 'primary'.

### 9.1.4 Secondary species

It is difficult to obtain a species-specific catch data of each UoA for this fishery due to the reasons listed below:

- There are no log book data for the fishery.
- There is no independent observer programme or research programme.
- The fleet is heterogeneous and catch profile differs accordingly.

- Catches will vary over time & space: Catches will not only differ by State but also by fleet (whether MTN or MDTN). Catch composition can vary between the multi-day and single day trawlers due to differences in fishing depth, distance from shore, trawling speed, and fishing grounds (Devi et al. 2019). Catch composition can vary between seasons.
- There are very few catch studies. The majority of the studies on composition are based on landings, rather than catch because in tropical fisheries, it's extremely difficult for fishers to log the vast variety of species. There are some sampling surveys in place – but these are difficult to find for this particular fishery. It's also unclear how representative these are of the fishery over time and space.
- True discards are unknown – landings data are widely available from the landing centres around the country – see PI 2.2.3 for more detail, however, landings data do not include discard data and therefore, do not equate to catch level information.
- There is significant number of species, including IPI species, thus, species identification is challenging.
- In many of the studies focused on catch composition / landed composition data, the type of trawl is not specified.
- Lack of specificity of the fishery / fleet (and Unit of Assessment) – further discussion on defining the UoA recommended at the scoping stage for any FIP.

The list of likely secondary species has been determined based on the following studies (secondary species for consideration are in bold).

#### 9.1.4.1 UoA1 – Kerala

The Shrimp & Cephalopod pre-assessment (Gascoigne & Collinson, 2019) identified **threadfin breams (17%), penaeid prawns (11.4%), scads (10%), perches (9.3%), squids (6.5%), lizardfish (6.3%), ribbonfish (5.6%), cuttlefish (5.3%), Indian mackerel (4.7%), soles (3.4%), carangids (2.8%) and 'miscellaneous' (2.4%)** as the main species groups making up >2% of the total landings. The 'main' secondary species were derived from total landings data from 2015-17 from 'trawl' fishery.

Varghese et al. 2021 reviewed species interactions among fleets operating in Kerala waters. There are two types of fleets operating in the UoAs (*for a full assessment the client needs to confirm whether they want both or only one type included*): Mechanised Trawl net (Single day) (code: MTN) and the Mechanised Trawl net (Multi day – MDTN). These fleets include many types of nets (e.g. used for targeting shrimps or finfish) and therefore, are not distinct to any particular target species. The MTN fleet operates close to the shore and has the highest number of species caught with the maximum number of species exclusively caught by the gear (compared to other gears): Varghese et al. 2021 recorded 764 species caught via the MTN fleet over the study period and 750 by the MDTN fleet. This was by far the highest number of species caught, compared to all other gears.

The species encountered are as per Table 10:

Table 9. Commonly encountered species in trawl fisheries. Source. Varghese et al 2021

MDTN		MTN	
Latin name	Common name	Latin name	Common name
<i>Decapterus russeli</i>	Indian scad	<i>Cyanoglossus spp.</i>	Tongue fish/tongue sole
<i>Metapenaeus dobsoni</i>	Kadal shrimp	<i>Decapterus russeli</i>	Indian scad
<i>Nemipterus spp.</i>	Threadfin bream	<i>Metapenaeus dobsoni</i>	Kadal shrimp
<i>Priacanthus spp.</i>	Big eye/bull's eye (Genus of marine ray-finned fishes)	<i>Nemipterus spp.</i>	Threadfin bream

<i>Rastrelliger karnagurta</i>	Indian mackerel	<i>Parapenaeopsis stylifera</i>	Kiddi shrimp
<i>Saurida tumbil</i>	Greater lizardfish	<i>Stolephorus spp.</i>	Commerson's anchovy
<i>Sepia spp.</i>	Cuttlefishes	<i>Uroteuthis duvaucelii</i>	Indian squid
<i>Trichiurus spp.</i>	Large head hair tail		
<i>Uroteuthis duvaucelii</i>	Indian squid		

Information from personal interactions with trawl fishers:

In Kerala, unicorn leather jacket is usually caught in fish/cephalopod nets (28 mm cod end trawl; though the specified cod end by law is 35 mm). The common species caught along in such trawls are threadfin breems (*Nemipterus* spp), lizard fishes (*Saurida* spp), Indian squid (*Uroteuthis duvaucelii*), cuttle fish (*Sepia* spp), barracuda (*Sphyraena* spp), Silver bellies/pony fishes (*Leognathus* spp), puffer fish (*Lagocephalus inermis*), amberjack/butter fish (*Seriola* spp), silver croaker (scieanids), Indian scad (*Decapterus russelli*), red toothed trigger fish (*Odonus niger*), squilla/mantis shrimp.

Out of this threadfin breems, lizard fishes, Indian squid, cuttle fish, barracuda, silver bellies/pony fishes, silver croaker and Indian scad are either exported or sold through local markets. The juveniles of these groups along with puffer fish, squilla and trigger fish usually are sold in local markets or to fish meal plants.

Dineshbabu et al., 2022, studied the LVB and species composition of multi day trawlers in Kerala. The study recorded around 254 species of trawl bycatch in Kerala, of which *O. niger*, *L. inermis*, *Thryssa* spp., *Decapterus* spp. *Platycephalus indicus*, *Saurida tumbil*, *Muraenesox* spp., *Uranoscopus* spp., *Fistularia petimba* and juveniles of *Epinephelus diacanthus*, *N. randalli*, *Priacanthus hamrur* and *T. lepturus* were the major constituents. The juvenile composition in LVB considerably reduced from 44% to 16% from 2017 to 2019. This was accounted to the successful implementation of minimum legal size (MLS) during the period in Kerala. The same paper mentions that Madhu et al. 2017 reported that juveniles of commercially important species constituted about 84% of the total bycatch landed by commercial trawlers along the coast of central Kerala.

#### 9.1.4.2 UoA2– Karnataka

Unicorn leather jacket catches are mainly reported from multi day trawl nets (MDTN) in Karnataka. Chaniyappa et al., 2015 have reported low catch volumes prior to 2015 and higher volumes post April 2015. As the fish is found off bottom, it is assumed that the trawls that operate slightly off bottom, targeting fish and cephalopods might catch this species too. (Currently the team has no clear information on this and was not able to interact with fishers on this matter. During a full assessment this has to be explored in detail.)

A study (Panda et al. 2022) focusing on ichthyofaunal biodiversity loss due to trawling conducted between August 2010 to May, 2012 along Mangalore coast of Karnataka, recorded 131 species of finfish and shellfish (of 62 families and 18 orders) (**Error! Reference source not found.**). During the period of 2010- 11 the landings by single day trawlers was accounted to 67% of commercial catch and 33% trash fish or the bycatch whereas the landings for the year 2011-12 had 57.5% commercial catch and 42.5% of fish were sent to the processing and reduction industry for fish meal and fish oil production. It was also noted that commercial fish landings increased during pre-monsoon periods in SDTs.

The multiday Trawlers (MDTs) landed 82% commercial fishes during 2010-11 and 18% trash fishes. Similarly, in the year 2011- 12 77.5% was contributed by commercially important fishes and 22.5% were from trash fish catches. The trend in catches indicated that starting of fishing season after trawl ban contributed the most landings after which it started declining.

**Carangidae** represented 10.69% of the total number of species of fin fishes, followed by **Engraulidae** (6.11%), **Leiognathidae** (6.11%), **Synodontidae** (3.82%), **Tetraodontidae** (3.82%), **Nemipteridae** (3.05%), **Sciaenidae** (3.05%) and **Scombridae** (3.05%) with other families representing < 3%. The study cited several other studies detailing catch composition of trawlers on the Mangalore Coast, whereby pelagic landings from trawlers included oil sardines, others sardines, ribbonfish, Indian Mackerel, seer fish; and demersal landings included elasmobranchs, threadfin breams, groupers, sciaenids, lizard fishes, eels, catfishes, snappers, white fishes, pomfrets and soles (Panda et al. 2022).

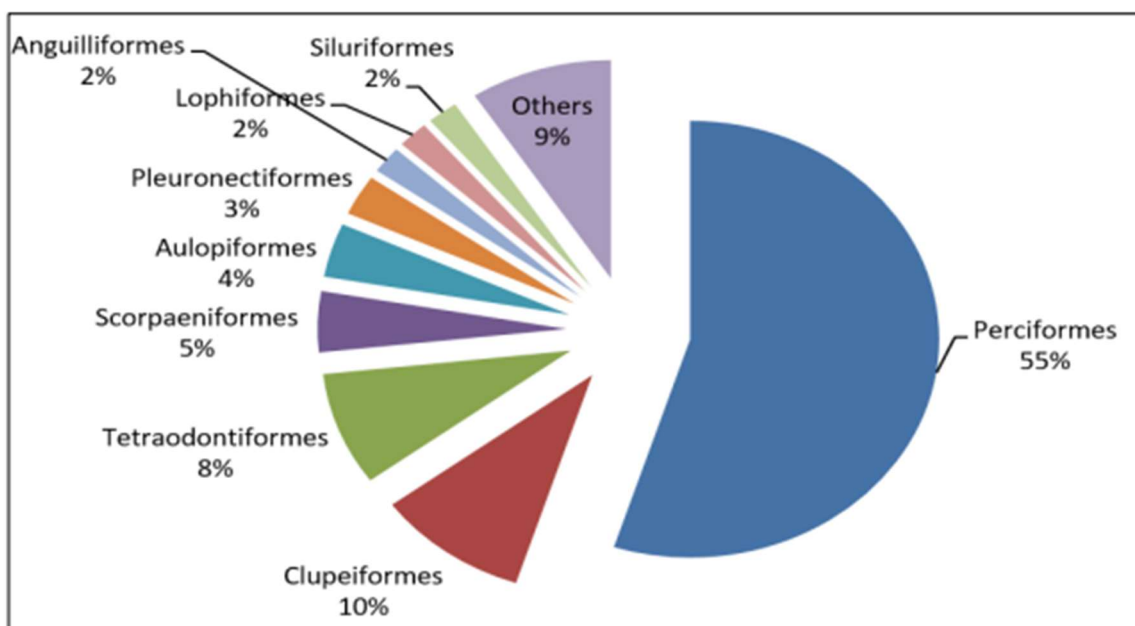
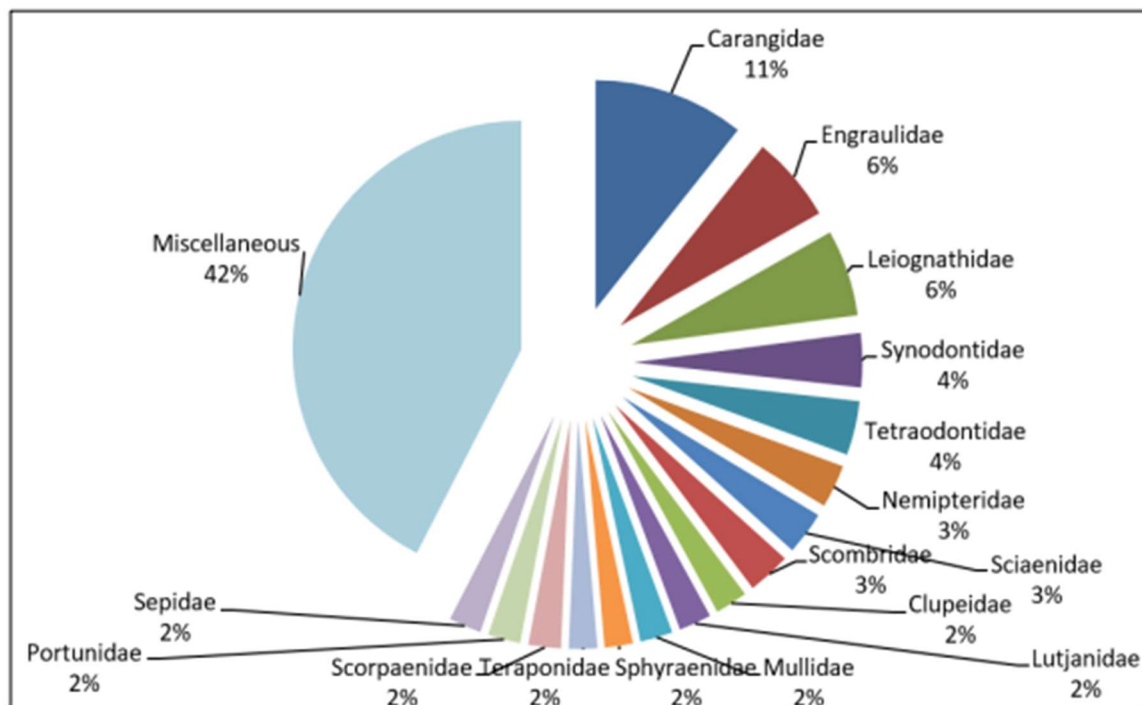


Figure 7. Percentage wise contribution of finfish and shellfish in by catch in Multiday Trawlers (MDTs) Top-Family and bottom- Order between 2010 and 2012. Source: Panda et al. 2022

In Karnataka, trawlers usually target high-value species including **prawns, squids, cuttlefish, threadfin brems and ribbonfish**. Single-day trawlers (SDT) retain the by catch and land them, whereas the multiday trawlers (MDT) fleet discard by catch, caught in the first few days of a trip (Zacharia et al., 2006). Between 1980-81 and 1981-82, by catch represented 85% of the total trawl catch (largely comprised of stomatopods) (Kurup et al., 1987). As single day trawlers (SDT) generally operate locally and in waters down to ~30 m, the entire catch is landed (and separated into commercial/ edible catch and LVB) e.g. in 2008, commercial/ edible catches represented 74% of the catch and LVB represented 26%. Conversely in the same year for the MDT fleet, 98% was commercial and the rest, LVB. Vessels with increased fish hold capacity will land by catch for LVB. Mangalore trawl landings constituted >300 species of fishes and shellfish, including juveniles. LVB species largely included **lizard fishes, pufferfishes, threadfin brems and flatheads**. Elasmobranchii were also included in landings (Dineshababu et al. 2012).

**Stomatopods** are considered the dominant (61%) group of LVB landed by single day trawlers (SDT), followed by gastropods and crabs (15 % each), with finfish (8 %) and cephalopods (1 %) representing much lower levels. For the MDT, finfish dominated landed LVB (87 %) along with cephalopods (8%), crustaceans (3 %), bivalves and gastropods (1 % each) Figure 8.(Mahesh et al., 2019).

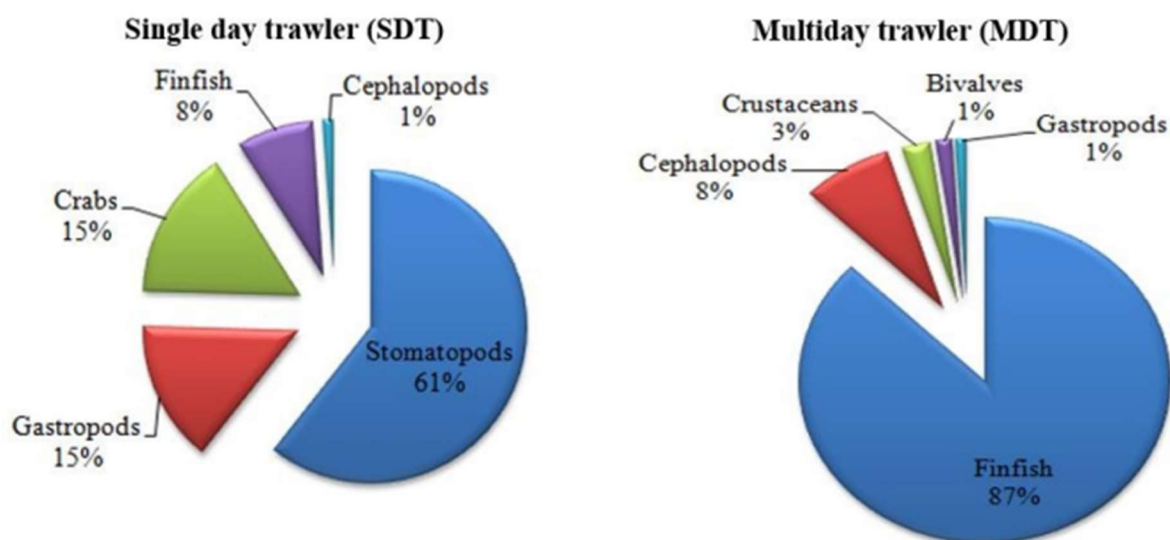


Figure 8. Major species groups and their % composition of LVB (2012-2014) Source: Mahesh et al. (2019)

A study examining by catch from single day trawlers during the fishing year 2007-08, from Mangalore Fisheries harbour landings constituted 36.44% LVB – of which stomatopods dominated, followed by finfishes, whereas non-edible crabs, invertebrates, cephalopods and other molluscs were present in lesser quantities. The bycatch from single day trawlers consisted of 35 species of finfishes, 20 species of crustaceans, 20 gastropods species, 3 echinoderms species and 2 species of coelenterates and one sea snake (Dineshababu, 2014). Bycatch and discards from multi-day trawlers - 3.69% were landed as LVB, where 14% of the catch was discarded (Naik, 2019).

Dineshababu et al., 2022 have identified 242 species from LVB landings of Karnataka, of which fishes formed the majority. *O. niger*, *Sardinella gibbosa*, *Megalaspis cordyla*, *L. inermis*, *Therapon* spp. and juveniles of *Trichiurus lepturus* and *Nemipterus randalli* were the major constituents of LVB. During the last decade, *L. inermis* contributed to 12.80% of LVB landings forming the highest finfish component of LVB. This has reduced substantially, since large-sized *L. inermis* are now accepted in the edible market.

#### 9.1.4.3 All India

Between 2017 and 2019, 30–60% of trawl landings in India were characterised as LVB (mainly used for fishmeal preparation) (Dineshababu et al. 2022).

In demersal fisheries, finfishes contribute to 26.8% of total landings (including **threadfin breams, croakers, silver bellies, bullseyes (*Priacanthus spp.*), and catfishes**; crustaceans contributed to 12.6% of the landings (shrimps, crabs and lobsters) and molluscs represented 6.6% (squids, cuttlefish, clams and oysters) (CMFRI, 2018). The finfishes exploited by trawls belong to **21 major fish groups, out of which, sciaenids contributed maximum (18.4%) to the demersal landings along the Indian coast, followed by threadfin breams (17.3%). Each region is characterised by dominance of specific finfish groups: the Southwest coast by the threadfin breams and other perches, and the northwest coast by the sciaenids, catfish and threadfin breams (Zacharia, 2012 in Naik, 2019).**

Across the western Indian States, LVB catch varies significantly on MDTN fleets – from around 15 – 52% and discards represent between 10 – 25% of the catch (Table 10).

Table 10. Multi-day trawl net (MDTN) catch, low-value bycatch (LVB) landing and LVB percentage, estimated discard percentage and details of fish meal/fish oil plants in States from the west coast of India Dineshbabu et al. 2022

State	Average MDTN catch (tonne; 2017–19)	Coordinating centre	Trawl operating centre	MDTN catch at the centre (tonne)	Percentage of state MDTN catch	LVB landed (tonne)	Percentage of LVB	Percentage of discards*	Fish meal/ Fish oil plants**	
Gujarat	367,048	Veraval	Veraval	160,310	44	40,341	25–30	20	5/1	
			Mangrol	54,992	15	18,461	30–35	15		
Maharashtra	145,871	Mumbai	New ferry Warf	42,293	29	22,275	40–52	10	6/5	
Karnataka	329,180	Mangaluru	Mangaluru	145,398	44	48,398	30–35	10	20/21	
			Malpe	111,690	34	34,779	30–35	10		
Kerala	254,046	Calicut	Calicut	82,867	33	37,422	15–35	10–25	5/5	
			Kochi	Munambam	68,980	27	20,694	15–30	10–25	
			Quilon	67,819	27	20,346	15–40	10–25		

\*Questionnaire based information. \*\*Marine Products Export Development Authority (MPEDA) (ref. 20).

#### 9.1.4.4 Discards

Much of the studies on trawl fisheries focus on landings, however, discards can represent a substantial part of the catch. Discards occur from two sources: i) species with no commercial value – in particular benthic invertebrates such as gastropods, crustaceans like crabs, echinoderms, ascidians etc, or protected species; and ii) high grading (of low-value species and juveniles of high value species) towards the end of long trips. Fishermen report that the main taxon which is discarded is gastropods; presumably these are mainly alive on discard. The multi-species FIP (Gascoigne & Collinson) also states that the crew always discards pufferfish (which damage the catch) and jellyfish, which is likely to be the case in the present fishery too. None of these sources of discards are quantified, although CMRFI is identifying the main species in the former category, based on last-haul analysis (species list provided by CMFRI). Space on-board permitting, low value or damaged fish is likely to be taken for sale to fish meal plants rather than being discarded (as part of LVB); in which case it would be quantified with the rest of the landings. For a full assessment, data on discarding would be required.

In Kerala state, quantity of discards was estimated at 262 000 t during 2000-2001 and 225 000 t during 2001-2002 (Kurup et al., 2003). In Karnataka, during 2001-2002, the bycatch from trawlers formed 47.9 to 54.4% and discards formed 33.9 to 35.1% of the total catch (Zacharia et al., 2006).

The quantity of bycatch generated by trawling along Karnataka coast was estimated as 56,035 tin 2001 and 52,380 t in 2002 forming 54 % and 48 % of total trawl catch respectively. The quantity of discards was estimated as 34,958 t in 2001 (34 % of total trawl catch) and 38,318 t in 2002 (35 % of total the trawl catch). In multi-day trawlers, 33,098 t of bycatch was landed annually and in single day trawlers the quantity was 21,109 t. About 30 % of total catch from multi-day trawlers was discarded (21,336 t) whereas it was about 44 % from single day trawlers (15,301 t). The most dominant group among bycatch was stomatopods in single day trawlers forming over 39 % followed by finfishes (36%) while finfishes formed the dominant group in multi-day trawlers (69 %). The data pooled for two years showed that, catch rate of discards ranged from 7.5 kg h<sup>-1</sup> to 27. 0 kg h<sup>-1</sup> in single day trawlers and from 2.0 kg h<sup>-1</sup> to 16.7 kg h<sup>-1</sup> in multi-day trawlers. The discarded catch in multi-day trawlers consisted

of 53 species of fishes (23 always discarded), 12 crustaceans (6 always discarded), 27 molluscs (22 always discarded) and 7 other invertebrates (always discarded). In the single day trawlers, 53 species was seen in the landings and 60 in discard. The catch rate of discards was high during monsoon in multi-day trawlers and pre-monsoon in single day trawlers. Juveniles of various groups constituted an important bycatch of trawl fishery of Karnataka forming about 15.9 % of the total catch in single day trawlers and 23.5 % in multi-day trawlers at catch rate of 7.8 kg h<sup>-1</sup> and 9.4 kg h<sup>-1</sup> respectively. Juveniles in general constituted 36 % of bycatch in single day trawlers and 78 % in multi-day trawlers. Bottom trawling annually removes 14,400 t of juveniles of finfishes, 2,448 t of shrimps, 1,673 t of cephalopods and 1,702 t of crabs besides 4,059 t of juveniles of other groups (Zachariah et al., 2006)

Sea snakes, *Hydrophis schistosus* (formerly *Enhydrina schistosa*) are encountered in the trawl fishery. According to IUCN (Rasmussen et al. 2018) this is a widespread and common species which can live in a range of habitats, including disturbed areas, and is not considered to have any major threats. According to fishers and scientists' sea snakes are usually released live (Jeyabhaskaran et al. 2014).

Secondary species from the emboldened text above has been summarised below – duplicated species have been corrected for. Where there are multiple species, the genus has been provided.

### 9.1.4.5 Summary

Table 11. Designated Secondary species (main and minor)

Common name	Latin name
<b>Main species</b>	
Shrimps	Kiddi shrimp ( <i>Parapaeneopsis stylifera</i> ), Jinga shrimp ( <i>Metapenaeus affinis</i> ), Kadal shrimp ( <i>Metapenaeus dobsoni</i> ), <i>Solenocera crassicornis</i> , <i>Metapenaeus monoceros</i> , <i>Mantis shrimp</i> (order <i>Stomatopoda</i> )
Croaker (Sciaenidae family)	<i>Johnius macrorhynchus</i> , <i>Johnius glaucus</i> , <i>Johnieops vogleri</i> / <i>Johnius borneensis</i> , <i>Johnius spp.</i>
<i>Priacanthidae</i> family	<i>Priacanthus hamrur</i> , <i>Priacanthus prolixus</i>
Scads	<i>Decapterus russeli</i>
Perches	Spinycheek grouper <i>Epinephelus diacanthus</i> , <i>Epinephelus spp.</i>
Squids	<i>Uroteuthis (P.) singhalensis</i> , <i>Uroteuthis (P.) edulis</i> , <i>Uroteuthis (Photololigo) sibogae</i>
Lizardfish	<i>Saurida tumbil</i> , <i>S. undosquamis</i>
Ribbonfish	<i>Trichiurus lepturus</i> , <i>T. auriga</i> , <i>T. pantului</i> , <i>T. haumela</i> , <i>Lepturacanthus savala</i> , <i>L. gangeticus</i> , <i>Eupleurogrammus muticus</i> and <i>E. intermedius</i>
Sole	Soleidae (no species names provided)
Threadfin bream	<i>Nemipterus spp.</i> , <i>Nemipterus randalli</i> , <i>Nemipterus japonicus</i> , <i>Nemipteridae</i>
Indian mackerel	<i>Rastrelliger karnagurta</i>
Cuttlefishes	<i>Sepiella inermis</i> , <i>Sepia pharaonis</i> , <i>Sepia elliptica</i> , <i>Sepia aculeata</i> , <i>Sepia spp.</i>
<b>Minor species</b>	
Anchovy	<i>Engraulidae</i>
Ponyfishes	<i>Leiognathidae</i>
Silver bellies	<i>Gerres subfasciatus</i>
<b>Neglected ocellate octopus</b>	<i>Amphioctopus neglectus</i>
Pufferfish	<i>Tetraodontidae</i>

### 9.1.5 ETP species

The key source of protection for wildlife in Indian is the Wildlife Protection Act (1972, last amended 2022, and came into force 1st April 2023), gives full protection to those species on Schedules 1-4 (although the penalties vary). This includes all sea turtles (Schedule 1), all cetaceans (mainly Schedule 2), some seabirds (Schedule 4), dugongs (Schedule 1) and some sharks (Schedule 1). The following acts are also relevant to ETP designations in this fishery:

- The Indian Fisheries Act, 1857
- The Indian Forest Act, 1927
- The Wildlife (Protection) Act, 1972
- The Wildlife (Transactions and Taxidermy) Rules, 1973
- The Wildlife (Stock Declaration) Central Rules, 1973
- Terrestrial water, continental shelf, Exclusive Economic Zone, and other marine zones Act, 1976
- Water (Prevention and control of pollution) Act, 1977
- Maritime Zones of India (Regulation and fishing by foreign vessels) Act, 1980
- The Wildlife (Protection) Licensing (Additional matters for consideration) Rules, 1983
- Environmental (Protection) Act, 1986
- Coastal Zone Regulation Notification, 1991
- Wildlife (Protection) Amendment Act, 1991
- The Wildlife (Protection) Rules, 1995
- National Biodiversity Act, 2002 Global Conventions and Agreements
- International Convention for the Regulation of Whaling, 1946: implemented in 1948 with a protocol of amendment to the Convention; adopted in 1956; the International Whaling Commission (IWC) was established.
- Convention on International Trade in Endangered Species of Wild Fauna and Flora –CITES, 1973: implemented in 1975, prohibits international trade in species listed in Appendix 1
- MARPOL Agreement, 1973/1978: the 1973 International Convention on the Prevention of Pollution from Ships and 1978 Protocol relating thereto covers all technical aspects of pollution from ships of all types: accidental and operational oil pollution, pollution by chemicals, goods in packaged form, sewage, and garbage; implemented in 1983.
- UN Convention on the Law of the Sea (UNCLOS), 1982; implemented in 1995 and established for the preservation and protection of the marine environment and conservation of marine living resources both within and beyond national jurisdiction.
- Convention on the Conservation of Migratory Species (CMS- Bonn Convention), 1979: implemented in 1983, provides strict protection for 28 endangered migratory species listed in Appendix I.
- Convention on Biological Diversity (CBD- Earth Summit), 1992: implemented in 1994, requires each signatory to identify The Ministry of Environment and Forest, Government

of India, published in 2011 a list of the Critically Endangered Animal Species of India. The list included the following marine species:

- The Leatherback Turtle (*Dermochelys coriacea*) found in tropical and temperate waters of the Atlantic, Pacific, and Indian Oceans.
- The Pondicherry Shark (*Carcharhinus hemiodon*). Indian Ocean - from Gulf of Oman to Pakistan, India and possibly Sri Lanka
- The Ganges Shark (*Glyphis gangeticus*) that occurs in the turbid waters of the Ganga River and the Bay of Bengal
- The Knife-tooth Sawfish (*Anoxypristis cuspidata*), widespread in western part of the Indo-Pacific region
- The Large-tooth Sawfish (*Pristis microdon*), in the western part of the Indo-Pacific (East Africa to New Guinea, Philippines and Vietnam to Australia)
- The Long-comb Sawfish or Narrow-snout Sawfish (*Pristis zijsron*), in the Indo-Pacific region including Australia, Cambodia, China, India, Indonesia and Malaysia.
- The Fire corals (*Millepora boschmai*), living in Indonesia, Gulf of Chiriquí, Panama Pacific Province but possibly extinct from India.

Bycatch data available for the UoAs is limited. Therefore, the current report has used multiple literature sources to determine the likely designated ETP species. As stated at the beginning of Principle 2, there is a significant gap of information specifically on ETP interactions with the UoA fleet. Therefore, information has been sought at a more general level to inform risk: initially seeking information about interactions at a taxa level in Indian fisheries > then determining interactions between taxa (or species where available) with the fleet level (mechanised trawlers) > species level interactions with shrimp trawling in general.

A study by Varghese et al (2021) conducted in Kerala evaluated ETP interactions between fleets from the expanded ICAR-CMFRI-NMFDC fish catch and effort database (which collates marine fish landings data collected by ICAR-CMFRI from landing centres along the Kerala coast between 1985-2019). Maximum interaction rates were observed with Mechanised Gillnet (MGN), followed by mechanized multiday trawl net (MDTN), mechanized trawl net (MTN) and OBGN- Outboard Gillnet (OBHL). In MDTN fleet, there were only three interactions recorded with ETP in the last 35 years, representing 0.027% of the catch; though there were a higher number of interactions with ETP species in the MTN fleet over the 35 years, the percentage that they represented of the total catch, was low (<0.01%). However, the fleets covered here can only be used as a guide to potential ETP species interactions because they contain many types of fishery such as the shrimp or fish trawls, which use different nets and fish different areas (Varghese et al., 2021).

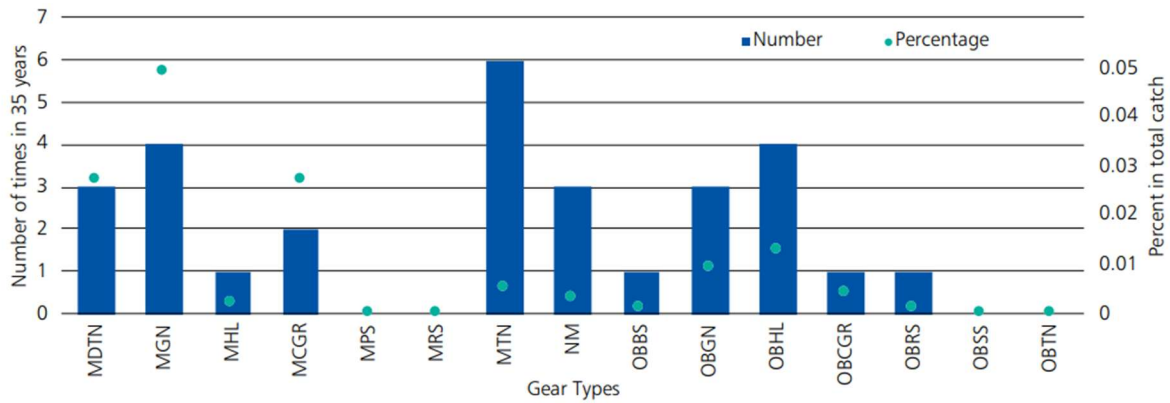


Figure 9. Rate of incidental ETP species interactions in Kerala over 35 years. Source: Varghese et al., 2021

The following table below considers the designation of ETP species by taxa. Further information about their populations/ encounter rates / risk of interaction is discussed in PIs 2.3.1 – 2.3.3.

Table 12 ETP designations and rationale for the squid fishery

Taxa	Rationale for designation/ non-designation as an ETP species	ETP species? (Yes/No)
Cetaceans	<p>The multi species PA found that ‘cetaceans are considered to be at the greatest risk from drift gillnets; particularly, small- and medium sized Delphinidae such as spinner dolphins (<i>Stenella longirostris</i>), bottlenose dolphins (<i>Tursiops truncatus</i>) and common dolphins (<i>Delphinus delphis</i>), and a few larger delphinids—particularly Risso’s dolphin (<i>Grampus griseus</i>), false killer whales (<i>Pseudorca crassidens</i>) and short-finned pilot whales (<i>Globicephala macrorhynchus</i>)—depredate longlines, but the interactions are less lethal than entanglement in other gears (Clarke et al., 2014; Garcia &amp; Herrera, 2018; Huang &amp; Liu, 2010; Kiszka et al., 2021; Murua et al., 2018; Wallace et al., 2010)’. In the stakeholder meetings for the multi-species PA, dolphin interactions are reported by all stakeholders were considered to be rare and unlikely to result in mortality.</p> <p>From interviews with fishermen, Joseph et al (2021) found that the most frequently encountered cetaceans were Indo-pacific humpback dolphin (<i>Sousa chinensis</i>) (27.6%), spinner dolphin (<i>Stenella longirostris</i>) (22.5%), long beaked common dolphin (<i>Delphinus capensis</i>) (19.7%), Indo-Pacific bottlenose dolphin (<i>Tursiops aduncus</i>) (15%), Finless Porpoise (<i>Neophocaena phocaenoides</i>) (10.7%) and Risso’s Dolphin (<i>Grampus griseus</i>) (2.8%) (Joseph et al. 2021).</p> <p>Joseph et al. (2021) report that high-seas gears like large gillnets, longline cum gillnets and trawl nets have lower interaction rates with marine mammals compared to other gears (Joseph et al. 2021).</p> <p>Preliminary discussions with fishermen operating squid trawls suggest that there no interaction with dolphins.</p> <p>Fishermen report that dolphins are also released if accidentally entangled, but this is rare; strandings are also monitored by CMFRI, which notes that almost all mortality comes from gillnets (CMFRI, 2017). There is, however, no objective information about interactions and outcomes. Although shrimp are exported to the US, the fishery is exempt from the requirement to use Turtle Exclusion Devices (TEDs) as a ‘traditional’ fishery.</p>	Yes

<b>Sharks</b>	Shark interactions with the trawl fishery are not known. However, Appendix I shark species include large tooth sawfish <i>Pristis microdon</i> . Species that are recognised by national ETP legislation, namely, The WILDLIFE (PROTECTION) ACT, 1972 that may be interacted with in this fishery include whale shark <i>Rhincodon typus</i> and the giant guitarfish <i>Rhynchobatus djiddensis</i> . Manta rays also receive protection e.g. <i>Mobula birostris</i> . Therefore, these are the only shark and ray species classified as ETP species. The other shark species are considered as 'secondary' species.	Yes - largetooth sawfish <i>Pristis microdon</i> , whale shark <i>Rhincodon typus</i> , giant guitarfish <i>Rhynchobatus djiddensis</i> , Manta ray e.g. <i>Mobula birostris</i> .
<b>Seabirds and dugongs</b>	Interaction with seabirds and dugongs is nil (the latter only occur on the east coast). As per the fishers there are no interaction with birds. There is no clear literature observing bird interactions with the trawls.	No
<b>Turtles</b>	<p>Turtle nesting is only sporadic on the west coast of India, in contrast to the east coast. There are reportedly a few turtle nesting beaches in Kerala and Karnataka for Olive ridleys.</p> <p>Strandings are monitored by CMFRI and are also reported to be Olive ridleys. Some fishermen report that turtles are never encountered, others that they are but rarely – this is supported by information from the CMFRI research trawler, which notes rare interactions. All report that they are released alive as there is a belief among traditional fishers that turtle death is inauspicious to them.</p> <p>Currently TED is not used in the fishery, but due to pressure from US, an amendment to implement TED in all states in India is passed in the policy. Department of Fisheries, Government of India has requested all coastal States and Union Territories (UTs) to take necessary steps to review their respective Marine Fisheries Regulation Act (MFRA) with particular reference to harvesting of wild shrimp and use of Turtle Excluder Device (TED) in trawl nets. All coastal States and Union Territories were also requested to consider immediate declaration of turtle conservation zones, sensitization of concerned authorities and fishermen for strict compliance of turtle conservation measures while fishing. Presently out of 13 coastal states/UTs, 9 have already amended their MFR Acts (Marine Fishing Regulation Acts) to mandate TED use (press release by Union Minister of State, Ministry of Fisheries, Animal Husbandry and Dairying). CIFT and MPEDA-NETFISH has finalised TED design and the state DoFs are directed to manufacture, implement and enforce it under the Pradhan Mantri Matsya Sampad Yojana (PMMSY). The unit cost of TED will be shared between the Centre and concerned State Governments on a 60:40 sharing basis (PMMSY guidelines on TED, 2025).</p>	Yes

### 9.1.6 Habitats

The MSC Fisheries Certification Requirements v2.01 requires habitats interacting with the fishery to be defined as 'commonly-encountered', 'VME' or 'minor', with definitions as given in Table 13.

Table 13. Habitat definitions as per the MSC Fisheries Certification Requirements v2.01.

FCR reference	Definition
SA3.13.3.1	A commonly encountered habitat shall be defined as a habitat that regularly comes into contact with a gear used by the UoA, considering the spatial (geographical) overlap of fishing effort with the habitat's range within the management area(s) covered by the governance body(s) relevant to the UoA.
SA3.13.3.2	A Vulnerable Marine Ecosystem (VME) shall be defined as is done in paragraph 42 subparagraphs (i)-(v) of the FAO Guidelines (definition provided in GSA3.13.3.2). This definition shall be applied both inside and outside EEZs and irrespective of depth.
GSA3.13.3.2	VMEs have one or more of the following characteristics, as defined in paragraph 42 of the FAO Guidelines: Uniqueness or rarity – an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas or ecosystems Functional significance of the habitat – discrete areas or habitats that are necessary for survival, function, spawning/ reproduction, or recovery of fish stocks; for particular life-history stages (e.g., nursery grounds, rearing areas); or for ETP species Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities Life-history traits of component species that make recovery difficult – ecosystems that are characterised by populations or assemblages of species that are slow growing, are slow maturing, have low or unpredictable recruitment, and/or are long lived Structural complexity – an ecosystem that is characterised by complex physical structures created by significant concentrations of biotic and abiotic features
N/A	Minor habitats are those that do not meet the above definitions.

There are several important considerations regarding the MSC's VME habitat requirement that were clarified through the MSC Interpretations website (<https://mscportal.force.com/interpret/s/global-search/VME>):

- It is not the responsibility of an assessment team to identify habitats as VME within the fished area. Instead, VMEs need to be identified by a local, regional, national, or international management authority/governance body.
- The history of fishing and when the VME was identified is critical to establishing what the 'unimpacted level' is; if a VME was already impacted by any fishery/UoA prior to its identification as a VME, and fishing impacts occurred prior to 2006, then the 'unimpacted level' is considered to be the status at the point of designation<sup>6</sup>.

The habitat under consideration in this assessment is not well defined in the context of Unicorn leather jacket specifically. However, Varghese S P. et al., 2024 (Fishery Survey of India), published 'An Atlas of India's Demersal Fishery Resources and Fishing Grounds' which covers the trawl fishing grounds of ten commonly caught species (9 species of fish and squid) Figure 10 & Figure 11. As Unicorn leather jacket is caught in the same trawl it can be assumed that the fishing grounds are same. Therefore the footprint of the fishery in Kerala and Karnataka is known.

<sup>6</sup> Note: The year 2006 was chosen because it is the date of the UNGA Resolution 61/105

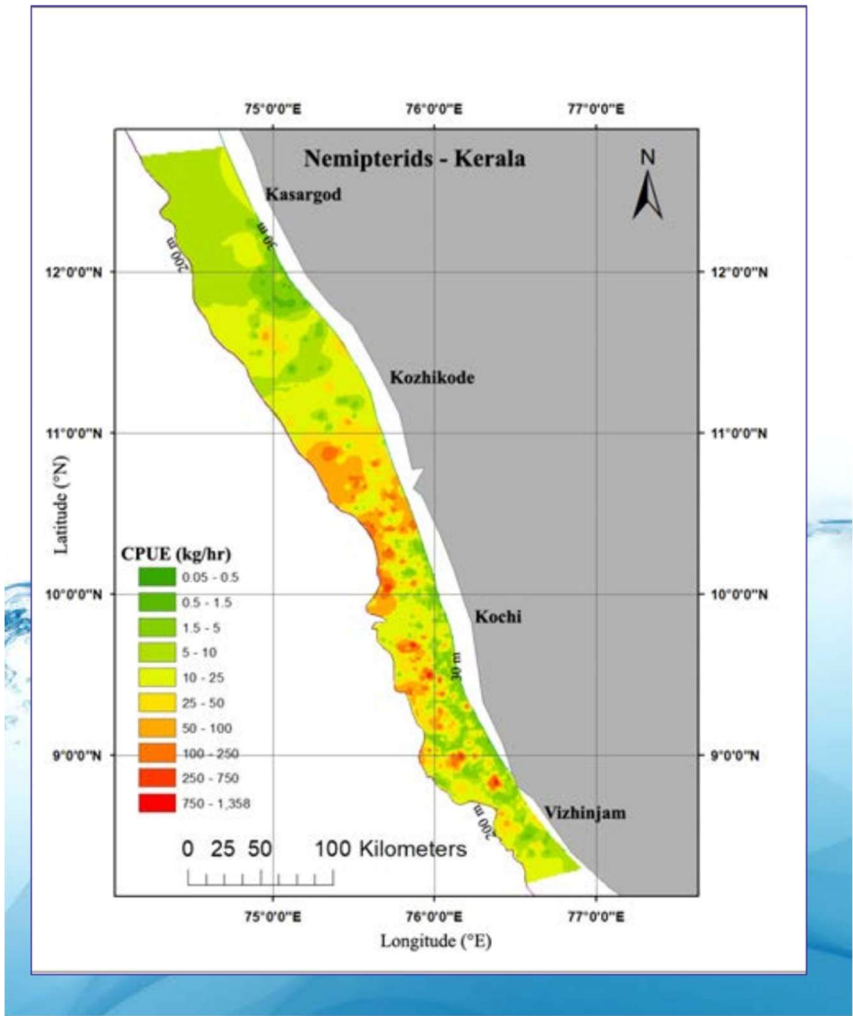


Figure 10. Trawl fishing grounds of Threadfin bream in Kerala (Source: Varghese S P. et al., 2024)

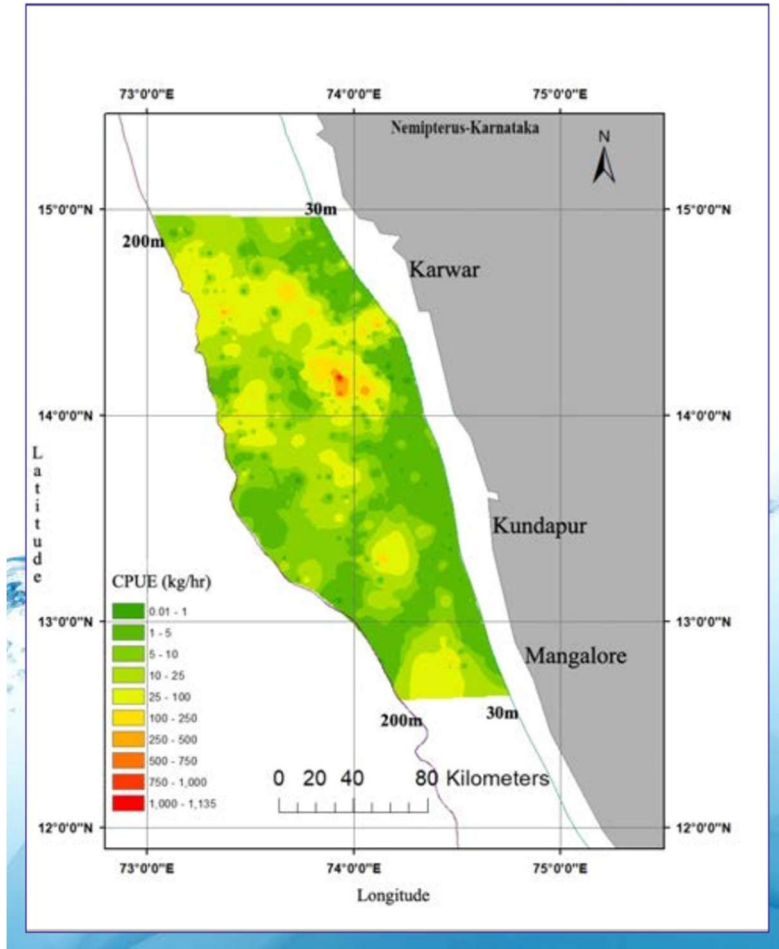


Figure 11. Trawl fishing grounds of Threadfin bream in Karnataka (Source: Varghese S P. et al., 2024)

In this assessment the UoA falls into the management of two states – Kerala and Karnataka – out to 12 nautical miles, and beyond that it comes under the jurisdiction of Indian government. The target species is caught in off-bottom or semi-pelagic trawls along with fish and squid.

The pre-assessment of south coast Squid (O’Kane 2024) reports the following which will be applicable to the current UoAs too. ‘The squid fishery in Indian seas is considered to have no impact on the benthic habitat (CMFRI, 2022b). Shubhadeep et al. (2024) states “squid are caught by high opening off-bottom (semi-pelagic) otter trawl nets that are operated above the sea bottom. Hence, there is no impact on benthic invertebrates, corals and biogenic habitats. The trawl nets are not operated above submerged reefs, to avoid net damage and gear loss”. In addition, where squid form a high proportion of the catch / bycatch e.g. many pelagic species are identified – Abdul-Azeez et al. 2024. Finally, Arkhipkin et al. (2015) states that “trawl nets operating up to 100 m depth account for nearly 85% of the cephalopod landings in Indian marine waters” (Sundaram and Deshmukh, 2011). For example, along the Karnataka coast the trawl fishery is made up of a single-day fleet and a multi-day fleet (Mohamed and Rao, 1997), with the latter undertaking fishing trips of up to seven days in depths from 25–100 m and accounting for 98% of the squid catch (Mohamed and Rao, 1997)’.

Harkantra et al. (1980) studied the benthos of the shelf region along the west coast of India and reported that the sea bottom is largely silty clay. Patches of clayey sand and sandy clay were noticed south of Ratnagiri. A sandy belt was observed in the outer shelf of Karnataka coast. A clayey sand band extended from the inner shelfarea of the Kerala coast up to Cochin. Clayey silt was observed in the inner and outer shelf of Karnataka and Kerala coast respectively. South of Cochin, up to Kollam, it was sandy clay (Figure 12).

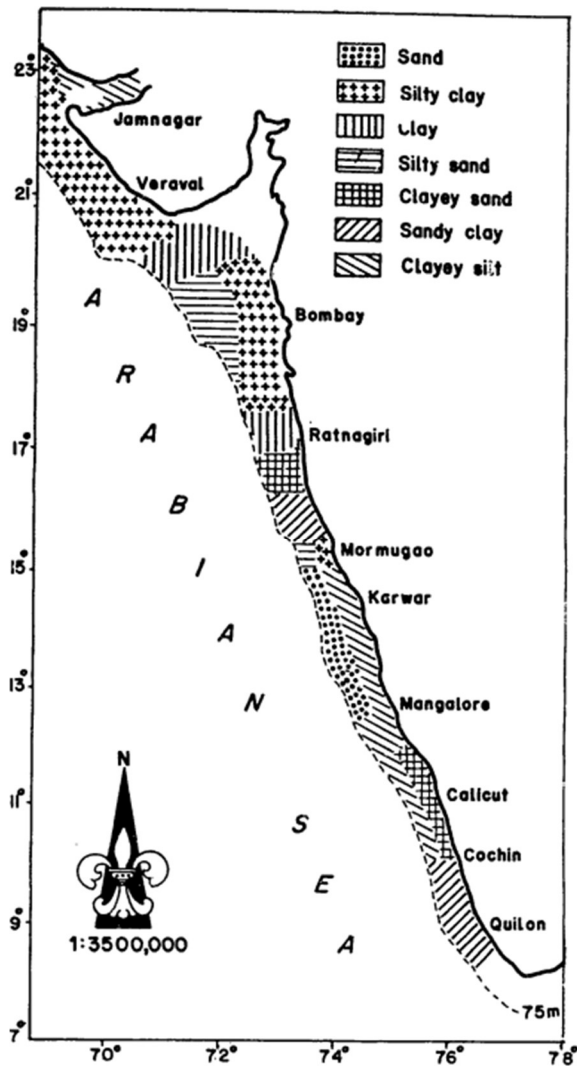


Figure 12. Sediment distribution along west coast of India (Source Harkantra et al., 1980)

In Kerala, north of Kollam, the habitat is reportedly to be muddy, while south of Kollam it is sandier. Areas of hard substrate are provided by laterite clay – very compacted clay part-way between rock and sediment; a geological feature of tropical areas which was first identified in this part of India. These laterite areas are used, for example, as egg-laying substrate by the cephalopods. The width of the shelf narrows from north to south, with the ecosystem becoming more oceanic and oligotrophic; benthos such as corals occurs only in the far south of Kerala.

The trawl operates on the bottom (although less so when targeting the cephalopods & fish). There are lead weights on the trawl footrope, and the bycatch (last haul analysis) shows a wide range of benthic invertebrates; mainly crustaceans and gastropods but also bivalves, ascidians, echinoderms and scaphopods, but no corals or sponges or other habitat-forming invertebrates.

In terms of the area trawled, the deepest is reported to be 60 fathoms (120m), although there is trawling to ~300 fathoms for deep-sea shrimp (not included in this assessment). In addition, trawlers are (or should be) not allowed in the inshore areas (inshore of 15 fathoms (30m) north of Kollam, 10 fathoms (20m) south). Fishermen also report that some of the rocky (laterite?) areas are unsuitable for trawling. There is, therefore, some area of habitat that is protected from the impacts of this fishery, although some more detailed mapping is required to evaluate the proportion.

Zacharia P U (undated) on marine biodiversity of Karnataka mentions Netrani Islands – coral rich islands 19 km away from the Karnataka coastline. This is a protected marine wildlife sanctuary and is the only more sensitive habitat in the UoA. As it is protected no trawling is allowed here. Sivakumar et

al. 2014 in the Coastal and Marine Protected Areas In India: Challenges And Way Forward, states that there are no vulnerable marine ecosystems in the UoA (Figure 13).

The Shrimp & cephalopod pre-assessment (Gascoigne & Collinson, 2018), South coast Squid pre-assessment (O’Kane, 2024) and SW coast Threadfin bream pre-assessment (Gascoigne & Aravind, 2024) also notes that there is no evidence that the fishery interacts with any Vulnerable Marine Environments (VMEs). Again, a better picture is needed to confirm the fishery footprint and habitat interaction for a full MSC assessment.

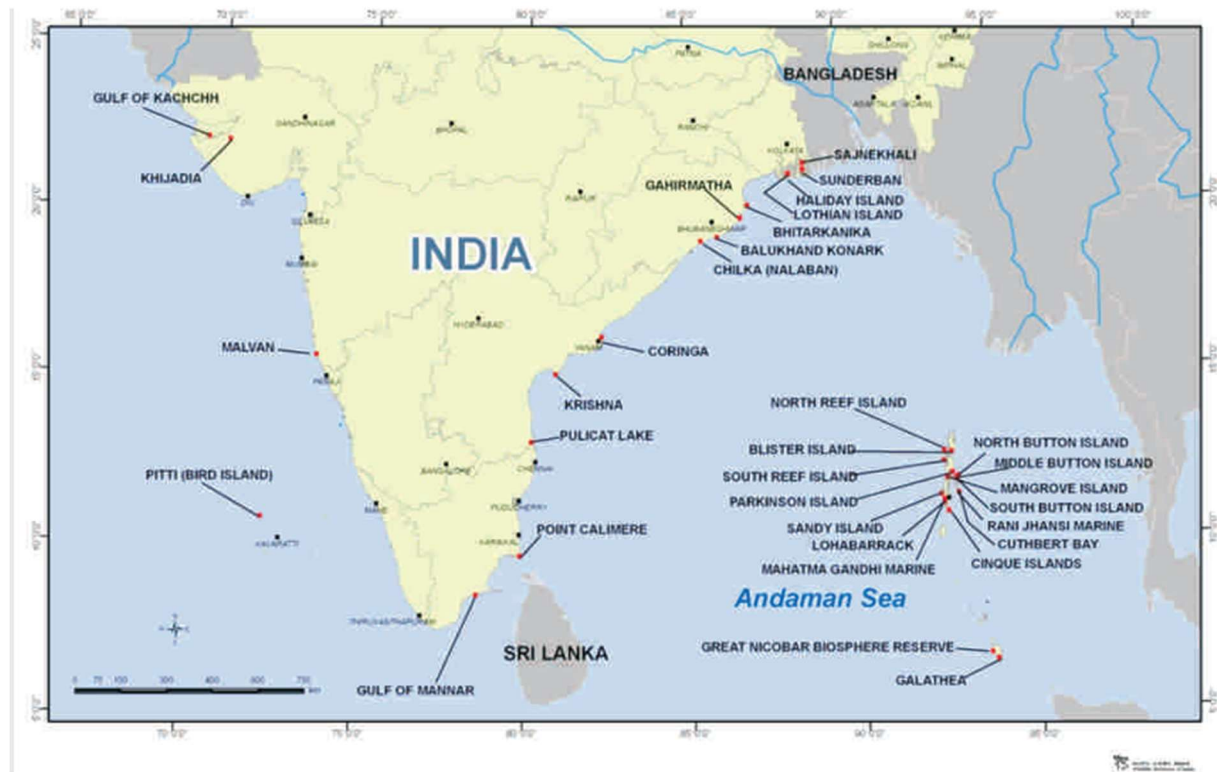


Figure 13: important coastal and marine protected areas of India (Source: Sivakumar et al. 2014)

### 9.1.7 Ecosystem

The fishery is operating in the Arabian Sea. The Arabian Sea is located in the northwestern part of the Indian Ocean covering a total area of about 3,862,000 km<sup>2</sup>. It is bounded to the west by the Horn of Africa and the Arabian Peninsula, to the north by Iran and Pakistan, to the east by India, and to the south by the remainder of the Indian Ocean. To the north the Gulf of Oman connects the sea with the Persian Gulf via the Strait of Hormuz. To the west, the Gulf of Aden connects it with the Red Sea via the Bab el-Mandeb Strait. The mean depth is 2,434 m with no islands in the middle.

The Arabian Sea has a monsoon climate. Minimum air temperatures of about 24 to 25 °C (sea surface) occur in the central Arabian Sea in January and February, while temperatures higher than 28 °C occur in both June and November. During the rainy season, which occurs when the southwest monsoon winds blow (April to November), salinities of less than 35 parts per thousand have been recorded in the upper 45 m of the sea, while during the dry season (November to March), when the northeast monsoon winds blow, salinities of more than 36 parts per thousand have been recorded at the surface over the entire Arabian Sea north of latitude 5° N, except off the Somali coast.

The Arabian Sea is divided into three distinct subsystems: the Western Arabian Sea along the African coast, the Central Arabian Sea, and the Eastern Arabian Sea bordering the coasts of Sri Lanka, India, and Pakistan. Each area differs in oceanic current patterns, physical characteristics, physiochemical qualities, dominant species and biodiversity. Monsoon winds, local topography, backwaters, width and

depth of the continental shelf, and drainage of coastal areas also varies between the regions and have further created three coastal sub-ecosystems, each with their own distinct productivity characteristics and species distribution: the Southwest Coast Ecosystem (extending off the Kerala and Karnataka coasts) has a shallow continental shelf, many backwaters and mangrove swamps with a warm climate of temperatures ranging from 20 to 38 °C; the Central West Coast Ecosystem (encompassing the coasts of Goa and Maharashtra), and the Northwest Coast Ecosystem and Islands (extending off of the Gujarat coast), characterized by the widest continental shelf of the three sub-ecosystems, up to 125 km wide (Dwivedi and Choubey, 1998). Monsoon occurs from June to September in the Southwest region, and from October to November in the Northwest region.

In addition to the oceanographical features listed above, the Arabian Sea is also characterized by the occurrence of strong coastal upwellings along the southwest coast of India, generated by the seasonal monsoon wind that blow in a south-westerly from May to September, which drives an offshore Ekman transport supporting the upwelling. During this season, coastal temperatures are lowered by 4–5 °C and even more during the upwelling events. These bring to the surface high density, low-temperature and high-nutrient rich water, thus kick-starting the organic carbon production in the nutrient-deficit and sunlight-replete waters of the upper layer through phytoplankton blooming all along the southwest coast of India. The upwelling phenomenon typically starts in March in the more southern part at deeper layers of approximately 90 m deep, and the upwelled water reached the surface during the month of May till June. Then upwellings gradually extend towards the more northern part, and get intensified by the southwest monsoon winds, reaching their maximum strength during the months of July and August. The upwelling intensity then gradually decreases by the end of September following the southwest monsoon winds weakening (Sharma, 1978).

Compared to the other components in Principle 2, there are several studies relevant to the ecosystem component. However, most of the research focuses on Kerala state.

CMFRI scientists have developed the trophic model (KASE Model). The KASE model, built using ECOPATH and ECOSIM suite of software, encompasses an area of 86,894 km<sup>2</sup> and has 48 functional ecological groups (aggregating more than 400 species). Fish landings and fishing effort data are used. The ECOSIM simulations have been conducted by incorporating time series on landings into the ECOPATH model. India-Case study reports from Ecopath model Kerala Lenfest Report from August 2021 showed different scenarios in its trials that will need further consideration (Kuriakose et al. 2021).

The main results presented in this trial using KASE model for temporal simulations were that ECOSIM provides a dynamic simulation capability at the ecosystem level, with key initial parameters inherited from the base ECOPATH model was an important preliminary conclusion from applications to various ecosystems is that the model can produce a reasonable fit, for all available time series related to the ecological resources of an ecosystem in one go. ECOSIM routine in ECOPATH was used to investigate how the changes in the fishing effort of different fleets operating in the Kerala Coast and closure of fishery in different seasons affect yields and biomass of different functional groups. The different scenarios considered were:

- Closure of mechanized fishing in different seasons from 2020 (March & April, June & July, and November & December)
- Closure of ring seine fishery in different seasons (April & May, June & July, and November & December)
- Doubling the fishing effort of gillnet and hook and line with a gradual reduction in fishing effort of trawls from 2020

CMFRI collect and analyse a wide range of oceanographic and biogeochemical information, as described, for example, in the most recent annual report (CMFRI, 2017). Several ecosystem models have been developed, focusing on different aspects of the ecosystem; it is not clear if any of the existing models are suitable for evaluating the role of this fishery specifically, but in any case, the technical capacity is available.

There are few trophic modelling systems applied to Indian waters: an initial assessment was produced for the southwest region (Vivekanadan et al. 2003), followed by a model for the Arabian Sea off Karnataka (Mohamed et al. 2008 and Mohamed and Zacharia, 2009 in Mohamed, 2014).

The findings of KASE model, especially regarding a ban during November have been advised to the Kerala Fisheries Department.

### 9.1.8 Scoring elements

Table 14. Principle 2 scoring elements

Component	Scoring elements	Designation	Data-deficient
Primary	None	N/A	N/A
Secondary	See Table 11	Main	Yes
	Hundreds of species (see Section 9.1.4)	Minor	Yes
ETP	<p><b>Sharks:</b> Largetooth sawfish <i>Pristis microdon</i>, whale shark <i>Rhincodon typus</i>, giant guitarfish <i>Rhynchobatus djiddensis</i>, manta rays.</p> <p><b>Turtles:</b> Olive ridley</p> <p><b>Cetaceans:</b> Indo-pacific humpback dolphin (<i>Sousa chinensis</i>); spinner dolphin (<i>Stenella longirostris</i>); long beaked common dolphin (<i>Delphinus capensis</i>); Indo-Pacific bottlenose dolphin (<i>Tursiops aduncus</i>), Finless Porpoise (<i>Neophocaena phocaenoides</i>) and Risso's Dolphin (<i>Grampus griseus</i>)</p>	N/A	Yes
Habitat	Not clear at this stage	N/A	Yes
Ecosystem	Tropical – eastern Arabian sea	N/A	No

## 9.2 Principle 2 Performance Indicator scores and rationales

### PI 2.1.1 – Primary species outcome

<b>PI 2.1.1</b>		<b>The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI</b>		
Scoring issue		<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>
<b>a</b>	<b>Main primary species stock status</b>			
	Guide post	Main primary species are <b>likely</b> to be above the PRI.  OR  If the species is below the PRI, the UoA has measures in place that are <b>expected</b> to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are <b>highly likely</b> to be above the PRI.  OR  If the species is below the PRI, there is either <b>evidence of recovery</b> or a demonstrably effective strategy in place <b>between all MSC UoAs which categorise this species as main</b> , to ensure that they collectively do not hinder recovery and rebuilding.	There is a <b>high degree of certainty</b> that main primary species are above the PRI <b>and are</b> fluctuating around a level consistent with MSY.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
Rationale		As per SA3.2.1 'If a team determines that a UoA has no impact on a particular component, it shall receive a score of 100 under the Outcome PI', and as there are no main primary species in this fishery (since management is not applied by species-specific reference points for any species), <b>SG100 is met by default.</b>		
<b>b</b>	<b>Main primary species stock status</b>			
	Guide post			<b>Minor</b> primary species are <b>highly likely</b> to be above the PRI.  or  If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of <b>minor</b> primary species.
	Met?			<b>Yes</b>
Rationale		As per SA3.2.1 'If a team determines that a UoA has no impact on a particular component, it shall receive a score of 100 under the Outcome PI', and as there are no main primary species in this fishery (since management is not applied by species-specific reference points for any species), SG100 is met by default.		

Draft scoring range	<b>≥80</b>
Information gap indicator	<b>Information sufficient to score PI</b>
Data-deficient? (Risk-Based Framework needed)	<b>No</b>

## PI 2.1.2 – Primary species management strategy

PI 2.1.2	There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch			
Scoring issue	SG 60	SG 80	SG 100	
a	<b>Management strategy in place</b>			
	Guide post	There are <b>measures</b> in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI.	There is a <b>partial strategy</b> in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the PRI.	There is a <b>strategy</b> in place for the UoA for managing main and minor primary species.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>Not scored</b>
Rationale	There are no main primary species in this fishery since management is not by species-specific reference points for any species. Therefore, the term 'if necessary' is applied and SG60 and SG80 are met by default. SG100 is not scored at the pre-assessment stage.			
b	<b>Management strategy evaluation</b>			
	Guide post	The measures are considered <b>likely</b> to work, based on plausible argument (e.g. general experience, theory or comparison with similar fisheries/species).	There is some <b>objective basis for confidence</b> that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	<b>Testing</b> supports <b>high confidence</b> that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>Not scored</b>
Rationale	There are no main primary species in this fishery, since management is not by species-specific reference points for any species. As per the MSC interpretation, the 'if necessary' clause applies to SI (b) and SI (c) also. Thus, SG80 is met. SG100 is not scored at this pre-assessment stage.			
c	<b>Management strategy implementation</b>			
	Guide post		There is <b>some evidence</b> that the measures/partial strategy is being <b>implemented successfully</b> .	There is <b>clear evidence</b> that the partial strategy/strategy is being <b>implemented successfully and is achieving its overall objective as set out in scoring issue (a)</b> .
	Met?		<b>Yes</b>	<b>Not scored</b>
Rationale	There are no main primary species in this fishery, since management is not by species-specific reference points for any species. As per the MSC interpretation, the 'if necessary' clause applies to SI (b) and SI (c) also. Thus, SG80 is met. SG100 is not scored at this pre-assessment stage.			
d	<b>Shark finning</b>			

<b>PI 2.1.2</b>		<b>There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch</b>		
	Guide post	It is <b>likely</b> that shark finning is not taking place.	It is <b>highly likely</b> that shark finning is not taking place.	There is a <b>high degree of certainty</b> that shark finning is not taking place.
	Met?	<b>NA</b>	<b>NA</b>	<b>NA</b>
Rationale		Scoring Issue need not be scored if no sharks are primary species		
<b>Review of alternative measures</b>				
<b>e</b>	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species.	There is a <b>regular</b> review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate.	There is a <b>biennial</b> review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	<b>NA</b>	<b>NA</b>	<b>NA</b>
Rationale		Given that there are considered to be no main primary species, this SI is scored N/A.		

Draft scoring range	<b>≥80</b>
Information gap indicator	<b>Information sufficient to score PI</b>

### PI 2.1.3 – Primary species information

<b>PI 2.1.3</b>		<b>Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
<b>Information adequacy for assessment of impact on main primary species</b>				
<b>a</b>	Guide post	Qualitative information is <b>adequate to estimate</b> the impact of the UoA on the main primary species with respect to status.  OR  <b>If RBF is used to score PI 2.1.1 for the UoA:</b> Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is <b>adequate to assess</b> the impact of the UoA on the main primary species with respect to status.  OR  <b>If RBF is used to score PI 2.1.1 for the UoA:</b> Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is <b>adequate to assess with a high degree of certainty</b> the impact of the UoA on main primary species with respect to status.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Rationale		There are no main primary species in this fishery, since management is not by species-specific reference points for any species. SG80 is met by default.		

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
b	Information adequacy for assessment of impact on minor primary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			<b>Not scored</b>
Rationale		There are no main primary species in this fishery, since management is not by species-specific reference points for any species. However, SG100 levels are not scored at this pre-assessment stage.		
c	Information adequacy for management strategy			
	Guide post	Information is adequate to support <b>measures</b> to manage <b>main</b> primary species.	Information is adequate to support a <b>partial strategy</b> to manage <b>main</b> primary species.	Information is adequate to support a <b>strategy</b> to manage <b>all</b> primary species and evaluate with a <b>high degree of certainty</b> whether the strategy is achieving its objective.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>Not scored</b>
Rationale		There are no main primary species in this fishery, since management is not by species-specific reference points for any species. SG80 is met by default. SG100 levels are not scored at this pre-assessment stage.		

Draft scoring range	<b>≥80</b>
Information gap indicator	<b>Information sufficient to score PI as scoring is conducted by default given the lack of primary species.</b>

### PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
a	<b>Direct effects</b>			
	Guide post	Main secondary species are <b>likely</b> to be above biologically based limits.  OR  If below biologically based limits, there are <b>measures</b> in place expected to ensure	Main secondary species are <b>highly likely</b> to be above biologically based limits.  OR  If below biologically based limits, there is either <b>evidence of recovery or a demonstrably effective partial strategy</b> in place	There is a <b>high degree of certainty</b> that main secondary species are above biologically based limits.

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit															
	that the UoA does not hinder recovery and rebuilding.	such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are <b>considerable</b> , there is either <b>evidence of recovery</b> or a, <b>demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species</b> , to ensure that they collectively do not hinder recovery and rebuilding.															
Met?	All species score 60-79, except <i>Sepia pharaonis</i> <60	All species score 60-79, except <i>Sepia pharaonis</i> <60		All species score 60-79, except <i>Sepia pharaonis</i> <60													
Rationale	<p>For some of the stocks below, Sathianandan et al. (2021) and CMFRI (2023) have recently provided stock assessments, however, until there is a clear catch profile distinguishing species caught by UoA, stock assessments cannot be relied upon to score 2.2.1. Therefore, for each species, the stock status has been provided (where available), and RBF score has been allocated for either the species directly, or, an example species has been provided where either multiple species of a taxonomic group are known to be caught, or only a genus/ family is known to be caught (with no species-specific information).</p> <p>Table 15 Stock status of secondary main species.</p> <table border="1"> <thead> <tr> <th>Common name</th> <th>Latin name (examples of species)</th> <th>Karnataka</th> <th>Kerala</th> <th>Stock status of SW coast of India</th> <th>RBF ID</th> </tr> </thead> <tbody> <tr> <td>Shrimps (penaeid)</td> <td>Kiddi shrimp (<i>Parapaeneopsis stylifera</i>), Jinga shrimp (<i>Metapenaeus affinis</i>), Kadal shrimp (<i>Metapenaeus dobsoni</i>), <i>Solenocera crassicornis</i>, <i>Metapenaeus monoceros</i>, <i>Mantis shrimp</i> (order <i>Stomatopoda</i>)</td> <td>Sustainable</td> <td>Overfished</td> <td>Sustainable</td> <td>I, J</td> </tr> </tbody> </table>					Common name	Latin name (examples of species)	Karnataka	Kerala	Stock status of SW coast of India	RBF ID	Shrimps (penaeid)	Kiddi shrimp ( <i>Parapaeneopsis stylifera</i> ), Jinga shrimp ( <i>Metapenaeus affinis</i> ), Kadal shrimp ( <i>Metapenaeus dobsoni</i> ), <i>Solenocera crassicornis</i> , <i>Metapenaeus monoceros</i> , <i>Mantis shrimp</i> (order <i>Stomatopoda</i> )	Sustainable	Overfished	Sustainable	I, J
Common name	Latin name (examples of species)	Karnataka	Kerala	Stock status of SW coast of India	RBF ID												
Shrimps (penaeid)	Kiddi shrimp ( <i>Parapaeneopsis stylifera</i> ), Jinga shrimp ( <i>Metapenaeus affinis</i> ), Kadal shrimp ( <i>Metapenaeus dobsoni</i> ), <i>Solenocera crassicornis</i> , <i>Metapenaeus monoceros</i> , <i>Mantis shrimp</i> (order <i>Stomatopoda</i> )	Sustainable	Overfished	Sustainable	I, J												

PI 2.2.1 The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit						
Croaker (Sciaenidae family)	<i>Johnius macrorhynchus</i> , <i>Johnius glaucus</i> , <i>Johnieops voglerii</i> <i>Johnius borneensis</i> , <i>Johnius spp.</i>	-	Sustainable	Overfished or Sustainable (stock dependent)		<b>O</b>
Spinycheek grouper	<i>Epinephelus diacanthus</i>	-	-	Overfished		<b>M</b>
<i>Priacanthidae</i> family	<i>Priacanthus hamrur</i> , <i>Priacanthus prolixus</i>	-	-	Sustainable		<b>A</b>
Scads	<i>Decapterus russeli</i>	Overfished	Overfished	Sustainable		<b>H</b>
Squids	<i>Uroteuthis (Photololigo) duvauceli</i> , <i>Uroteuthis (P) singhalensis</i> , <i>Uroteuthis (P.) edulis</i> , <i>Uroteuthis (P) sibogae</i>	Recovering	Sustainable	Sustainable		<b>L</b>
Lizardfish	Synodontidae	Sustainable	-	Sustainable		<b>C</b>
Ribbonfish	<i>Trichiurus lepturus</i>	Recovering	Recovering	Sustainable		<b>D</b>
Sole	Soleidae (no species name provided)	Sustainable	Sustainable	-		<b>N</b>
<i>Nemipteridae</i>	Threadfin bream ( <i>Nemipterus spp.</i> , <i>Nemipterus randalli</i> , <i>Nemipterus japonicus</i> )	Overfished	-	Sustainable		<b>G</b>
Indian mackerel	<i>Rastrelliger karnagurta</i>	Overfished	Sustainable	No trawl-based assessment		<b>E</b>
Cuttlefishes	<i>Sepia spp.</i> , <i>Sepiella inermis</i> , <i>Sepia pharaonis</i> , <i>Sepia elliptica</i> , <i>Sepia aculeata</i>	Recovering	Sustainable	Sustainable		<b>F</b>
<p>As per FCP 2.3, PF4.1.5, "When assessing a large number of species under PI 2.1.1 or PI 2.2.1, the team may elect to group species according to similar taxonomies and undertake a reduced number of PSAs.", thus, where there are 'secondary species' mentioned at genus level or above, example species from Indian waters have been provided. The RBF was undertaken for all species and their PSAs are provided in <b>Error! Reference source not found.</b> A score of 3 was assumed for all parts of the susceptibility table. The scores are provided below:</p>						

PI 2.2.1

The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit

Scientific name	Common name	Species type	Fishery descriptor	Productivity Scores [1-3]							Susceptibility Scores [1-5]					Cumulative only				MSC PSA-derived score	Risk Category Name	MSC scoring guideline			
				Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependence	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)				Weighting	Weighted Total	Weighted PSA Score
Parapenaeopsis stylifera		Invertebrate	Trawl	1	1	1				1	1	3	1.33	3	3	3	3	3.00	3.28				65	Med	60-70
Melapenaeus dobsoni		Invertebrate	Trawl	1	1	1				1	2	3	1.50	3	3	3	3	3.00	3.35				63	Med	60-70
Sepia pharaonis	F	Invertebrate	Trawl	1	1	2				2	3	3	2.00	3	3	3	3	3.00	3.61				54	High	<60
Uroteuthis douvaucei	L	Invertebrate	Trawl	1	1	1				2	2	3	1.67	3	3	3	3	3.00	3.43				60	Med	60-70
Nemipterus japonicus	G	Vertebrate	Trawl	1	2	1	1	1	1	3			1.43	3	3	3	3	3.00	3.32				64	Med	60-70
Nemipterus mesoprius	G	Vertebrate	Trawl	1	1	2	1	1	1	3			1.43	3	3	3	3	3.00	3.32				64	Med	60-70
Nemipterus randalli	G	Vertebrate	Trawl	1	1	1	1	1	1	3			1.29	3	3	3	3	3.00	3.26				66	Med	60-70
Decaplerus russelli	H	Vertebrate	Trawl	1	1	1	1	1	1	3			1.29	3	3	3	3	3.00	3.26				66	Med	60-70
Priacanthus hamrui	A	Vertebrate	Trawl	2	2	1	1	1	1	3			1.67	3	3	3	3	3.00	3.39				62	Med	60-70
Saurida tumbi	C	Vertebrate	Trawl	1	1	1	1	1	1	3			1.29	3	3	3	3	3.00	3.26				66	Med	60-70
Trichurus lepturus	D	Vertebrate	Trawl	1	2	1	2	2	1	3			1.71	3	3	3	3	3.00	3.46				60	Med	60-70
Rastrelliger kanagurta	E	Vertebrate	Trawl	1	1	1	1	1	1	3			1.29	3	3	3	3	3.00	3.26				66	Med	60-70
Cynoglossus macrolepis	N	Vertebrate	Trawl	2	2	1	1	1	2	3			1.71	3	3	3	3	3.00	3.46				60	Med	60-70
Johnius caudata	O	Vertebrate	Trawl	2	1	1	1	1	2	3			1.57	3	3	3	3	3.00	3.39				62	Med	60-70
Ephippelus diacanthi	M	Vertebrate	Trawl	1	2	2	1	1	1	3			1.57	3	3	3	3	3.00	3.39				62	Med	60-70
Sphyrna mokarran		Vertebrate	Trawl	2	3	3	3	3	3	3			2.86	3	3	3	3	3.00	4.14				34	High	<60
Rhizoprionodon oligotrix		Vertebrate	Trawl	3	3	3	1	2	3	3			2.57	3	3	3	3	3.00	3.95				42	High	<60
Scoliodon laticaudus		Vertebrate	Trawl	1	1	3	1	1	3	3			1.86	3	3	3	3	3.00	3.53				57	High	<60

Elasmobranchs:

Elasmobranch interactions with the trawl fishery are not known clearly. Najmudeen (2024) reports that trawl nets accounts for 48.8%, gillnets 35.6% and hook & line units 6% of the total elasmobranch landings of the country. The composition of elasmobranch landings from 2000-2023 is given in Figure 14. All India landings of elasmobranchs during 2000-2023 was 49,259 tonnes, forming 2.0% of finfish catch.

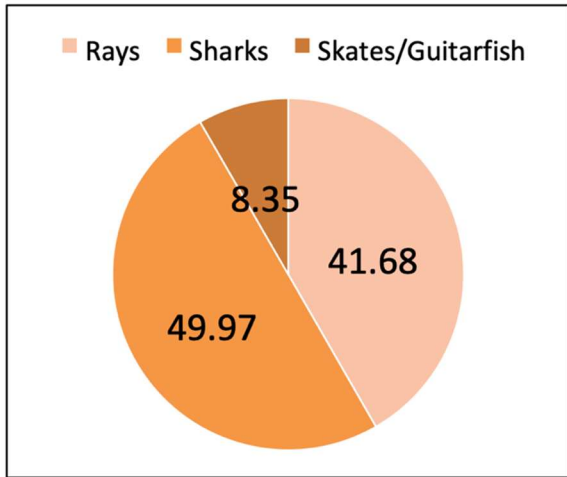


Figure 14. Composition of elasmobranchs landed in India during 2000 - 2023

Appendix I shark species include large tooth sawfish *Pristis microdon*. Convention on the Conservation of Migratory Species of Wild Animals (CMS) Appendix II species on the landings data include three species of the hammerhead shark (*Sphyrna zygaena*, *S. lewini* and *S. mokarran*). Note that the frequency of interaction of the fishery with these species is reported to be quite rare. Furthermore, CMFRI (2023) consider that the majority of shark and ray species caught as bycatch in trawl fisheries include smaller-sized species that have relatively high resilience, including *Rhizoprionodon* spp. and *Scoliodon laticaudus*. CMFRI (2023) consider that “there is no/minimal interaction” of large sharks with the semi-pelagic trawls used in squid fisheries (CMFRI, 2022b)), which happens to be the same as fish trawling nets.

Elasmobranch landings in India during 2023 was 0.32 lakh tonnes forming about 1% of the total marine fish catch. This showed an increase of 14% when compared to 2022. West coast (which includes Kerala and Karnataka) contributed 53% of the total elasmobranch catch.

PI 2.2.1

**The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit**

Mechanized sector contributed to 73% to the total landings (Figure 15). However, mechanized fishing also refers to gillnets and longlines, targeting large pelagic resources such as tunas and billfishes, which are more likely to co-occur with sharks.

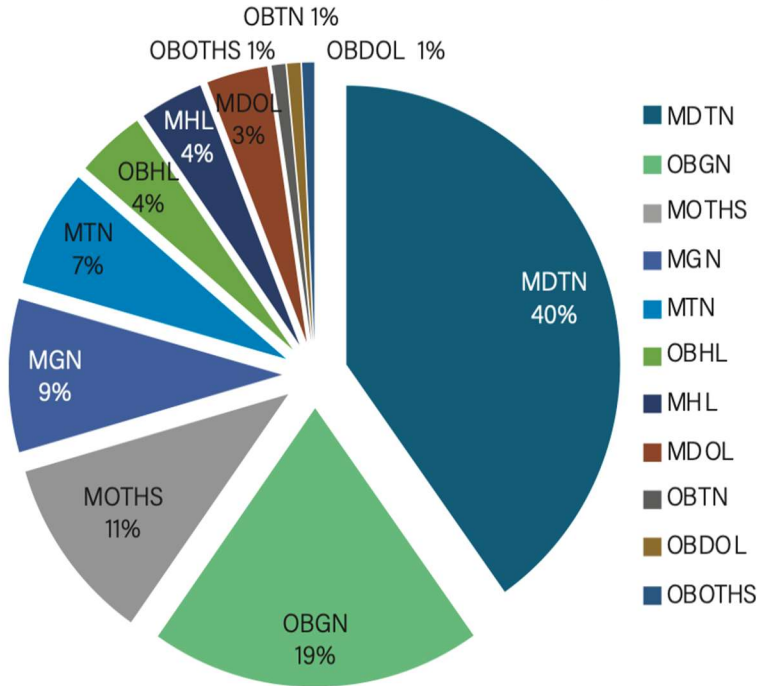


Figure 15. Major gears contributing to elasmobranch fishery (CMFRI annual report 2023)

Sharks contributed 53% of the total elasmobranch landings followed by rays 43%, guitarfishes 3% and chimeras 1%. About 116 species contributed to the elasmobranch fishery. Seventeen genera of sharks were prevalent in the fishery, alongside 19 genera of rays and four genera of guitarfishes, constituting the dominant species in the catch during 2023. Kerala and Karnataka states contribution to shark landings is low compared to other states (Figure 16)

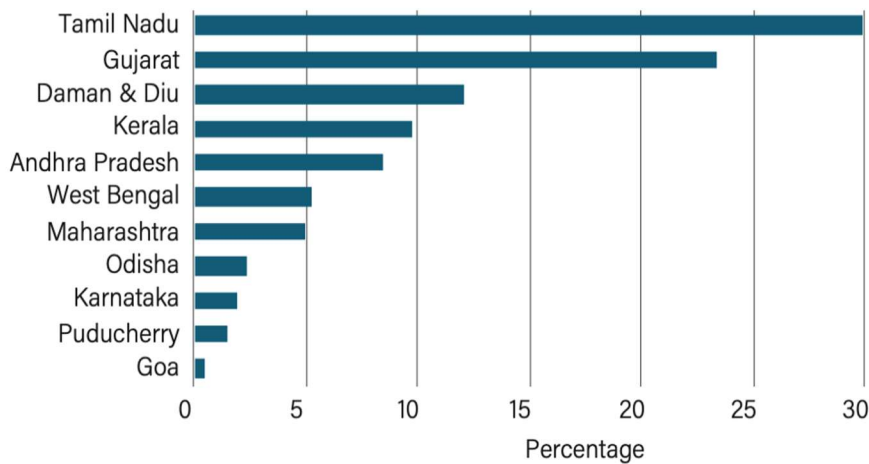


Figure 16. State-wise contribution (%) to elasmobranch landings in India -2023 (CMFRI annual report 2023)

A rapid stock assessment (RSA) (Kizhakudan et al. 2015) compared the previous average three years' landing data for elasmobranchs against the historical (1985–2013) average, combining that with classification criteria. The study indicated that elasmobranchs were either 'declining' or 'less abundant' in most parts of the Indian coast. Landings have declined for sharks (Akhilesh et al. (2023) and many studies have shown signs of being overexploited (Akhilesh et al. 2023). Of 174 species of

PI 2.2.1	<b>The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit</b>		
	<p>elasmobranchs, 168 have been assessed against the IUCN Red List – of which 25 species are listed as Critically Endangered (15%), 41 as ‘Endangered’ (24%) and 47 as ‘Vulnerable’ (28%) (Akhilesh et al. 2023). Shark landings along the north-west coast of the country are dominated by the milk sharks <i>Rhizoprionodon oligolinx</i> and the spadenose shark <i>Scoliodon laticaudus</i> (Kizhakudan et al. 2015, CMFRI, 2023a). From the studies discussed, interaction rates are likely to be low. However, without catch profiles/ observer data, the impact of the UoA on each ETP species cannot be analytically determined, therefore the RBF is applied.</p> <p><b>Rhizoprionodon spp.</b> Grey sharpnose shark (<i>Rhizoprionodon oligolinx</i>) is evaluated as ‘near threatened’ by IUCN (Rigby et al. 2021) and is a major constituent of the Northwest trawl fishery elasmobranch landings, being considered to be overfished (CMFRI, 2023a). See RBF (Section 11) – MSC score &lt;60.</p> <p><b>Spadenose shark</b> (<i>Scoliodon laticaudus</i>) is evaluated as ‘near threatened’ by IUCN (Dulvy et al. 2021) and is also a major constituent of the Northwest trawl fishery elasmobranch landings, being considered to be overfished (Kizhakudan et al. 2015). See RBF Section 11 - MSC score &lt;60.</p> <p>Although interactions of these two species with the trawl fishery are not known and discard data unavailable, CMFRI (2023) consider that the majority of elasmobranchs caught as bycatch in trawl fisheries mostly include smaller-sized species that have relatively high resilience (including <i>Rhizoprionodon</i> spp. and <i>S. laticaudus</i>). However, during this pre-assessment, a PSA was conducted for the two species based on their respective known productivity and susceptibility attributes, and this scored the interaction for both species as potentially ‘high risk’.</p> <p><b>Hammerhead sharks:</b> Since these species are listed on CITES and the CMS Appendix II, CMFRI conducted an analysis to evaluate whether a ‘non-detriment finding’ was appropriate for the fishery (Zacharia et al., 2017). For hammerhead sharks (<i>Sphyrna zygaena</i>, <i>S. lewini</i> and <i>S. mokarran</i>), CMFRI concluded that a non-detriment finding was appropriate, although for all three species, they recommend a check on the exploitation of juveniles in inshore waters (it is not known if this applies to this fishery).</p> <p>In the multi-species FIP PA (Gascoigne &amp; Collinson, 2018), total landings for all three species of hammerheads and three years (2015-2017) were ~180 t (~60 t per year). However, discards are unknown, and a PSA scores this interaction as potentially ‘high risk’. See RBF for species <i>Sphyrna mokarran</i> in Section 11 – MSC score &lt;60.</p>		
b	<b>Minor secondary species stock status</b>		
	Guide post		<p>Minor secondary species are highly likely to be above biologically based limits.</p> <p>OR</p> <p>If below biologically based limits’, there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species</p>
	Met?		<b>No</b>
Rationale	<p>At the pre-assessment stage there is no need to identify minor bycatch species (primary and secondary) since they intervene in scoring only at SG100. Without a comprehensive and complete catch composition and list of secondary species, and without biological based limits for the species, RBF should be conducted in full. However, due to the large number of species and considering that they are minor species, the assessment team has made use of the MSC interpretations Minor species</p>		

<b>PI 2.2.1</b>	<b>The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit</b>
	and scoring element approach at SG100, that RBF is not necessarily applied for all minor species and the precautionary approach of a maximum scoring of SG80 should be applied.

Draft scoring range	All species score 60-79, except <i>Sepia pharaonis</i> <60 All shark species <60
Information gap indicator	<b>More information sought</b> <i>Catch profile is needed</i>
Data-deficient? (Risk-Based Framework needed)	<b>Yes</b>

## PI 2.2.2 – Secondary species management strategy

PI 2.2.2	There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.			
Scoring issue	SG 60	SG 80	SG 100	
a	<b>Management strategy in place</b>			
	Guide post	There are <b>measures</b> in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a <b>partial strategy</b> in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a <b>strategy</b> in place for the UoA for managing main and minor secondary species.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale	<p>In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):</p> <ul style="list-style-type: none"> <li>- “Measures” are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.</li> <li>- A “partial strategy” represents a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically.</li> <li>- A “strategy” represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts.</li> </ul> <p>Measures available in the UoA regions:</p> <ul style="list-style-type: none"> <li>• The living marine resources up to 12 nautical miles (nm) from the shore are controlled by the respective states governments and the Central Government has control from 12 nm to the 200 nm EEZ boundary. Each State has its own marine fisheries legislation.</li> <li>• No-trawl fishing zones within 5 nautical miles under the ‘Fishing Regulation Act’ (KMFRA 1980).</li> <li>• Annual fishing ban (CMFRI, 2022b) – see Section <b>Error! Reference source not found.</b> for number of days per state</li> <li>• Benthic habitats in coastal areas where most of these species lay eggs and hatch may receive natural protection as mechanised fishing operation is prohibited in the inshore waters (State MFRAs).</li> </ul>			

<b>PI 2.2.2</b>	<b>There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</b>
	<ul style="list-style-type: none"> <li>• Stock assessments are available for many species e.g. Sathianandan et al. (2021) and CMFRI (2023a) e.g. squid stocks along Karnataka are marginally 'overexploited'.</li> <li>• There is cod end mesh size regulations in the respective state MFRAs (different for the states, refer Section 7.6.1.1 for state wise details) and Kerala and Karnataka has specified square mesh cod ends to minimise by catch of juveniles. But in practice these are not implemented and fishers use smaller cod ends than specified. In Kerala, GoF stated recently that 200 square mesh cod ends have been distributed on a subsidy basis to fishers, though it is not clear if these are in use. CIFT along with MPEDA NETFISH and NGOs like WWF has conducted many trials on cod end modifications (Rajeswari et al., 2013; Vettiyattil et al. 2023 and Madhu V.R. et al., 2017)</li> <li>• A minimum legal size for 58 species in Kerala and 19 species in Karnataka which includes most of the secondary species discussed above.</li> <li>• The cod end mesh in trawls targeting cephalopods are generally much below the permitted or notified size, which should reduce quantities of juveniles. However, mesh size regulations are implemented by the State Fisheries Department and considered to be 'not very effective' (CMFRI, 2022a). In Kerala, GoF stated recently that 200 square mesh codends have been distributed on a subsidy basis to fishers, though it's not clear if these are in use. Cod end modifications have been tested e.g. Vettiyattil et al. (2023).</li> <li>• A minimum legal size for three species of cephalopods has been agreed by the Kerala Governments (CMFRI, 2022a).</li> </ul> <p>There is some evidence available to suggest that interactions between the UoAs and hammerheads species are low, resulting in few interactions. There has been an evaluation showing that these 'measures' i.e. the nature of the fishery, are considered by CMFRI to be 'likely to work' – i.e. the CITES non-detriment finding (although subject to some caveats).</p> <p>The Central government has made TEDs mandatory under the PMMSY scheme and it is added to respective state MFRAs as extraordinary gazettes. It is yet to be implemented.</p> <p>The management strategy for main secondary species includes controlling effort, technical measures (cod-end mesh-size limits) and an MLS for certain species e.g. Indian mackerel, Decapturus russelli, Nemipterus japonicus and Trichiurus lepturus. There is some monitoring and assessment for these species' groups: threadfin bream, scad, lizardfish and ribbonfish (as species groups). Overall, there are measures in place, however, it is not clear that monitoring is able to evaluate their status relative to biologically-based limits; at least, not for all the species individually, and it is not clear how it could react (in this mixed-fished context) should a stock be shown to be depleted. Therefore, it cannot be said that the measures are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery. SG60 is not met.</p>
<b>b</b>	<b>Management strategy evaluation</b>

<b>PI 2.2.2</b>		<b>There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</b>		
	Guide post	The measures are considered <b>likely</b> to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is some <b>objective basis for confidence</b> that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	<b>Testing</b> supports <b>high confidence</b> that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		<p>It cannot be said that the measures are likely to work given that there is no clear mechanism across UoAs to manage UoA impact on main in-scope species. Some measures are in place and monitoring is conducted to an extent. Stock assessments are conducted on a variety of species. Several recent initiatives have sought to improve stock assessment methods and assess more species (Sathianandan et al., 2021 and CMFRI 2023a). CMFRI has conducted a study to determine target species for assessment in multispecies and multigear fisheries (Varghese et al. 2021). However, it is not clear how applicable this is for the UoA gear description. In addition, efficacy of enforcement of measures is unclear e.g. for BRDs and cod end.</p> <p>CIFT has developed many gear-based technical measures to reduce bycatch rates in Indian waters. However the adoption of these measures is considered to be poor (Madhu et al. 2020) Also, some measures such as implementing an MLS, have led to increased LVB and discarding (Dineshbabu et al. 2022). Although the Central and state governments are keen to implement TED, the work is still progressing. SG60 not met.</p>		
<b>Management strategy implementation</b>				
<b>c</b>	Guide post		There is <b>some evidence</b> that the measures/partial strategy is being <b>implemented successfully</b> .	There is <b>clear evidence</b> that the partial strategy/strategy is being <b>implemented successfully and is achieving its objective as set out in scoring issue (a)</b> .
	Met?		<b>No</b>	<b>No</b>
Rationale		<p>Without a clear catch profile, there is insufficient evidence to determine if measures are applied to the relevant main secondary species. In addition, there is evidence to suggest that measures are not implemented successfully. For example, CMFRI (2022) states that mesh size regulations are implemented by the State Fisheries Department and considered to be 'not very effective'. Conversely the trawl ban during the monsoon period appears to be implemented across all maritime States (CMFRI, 2022a). In addition, Madhu et al. (2020) states that a large number of gear-based technical measures have been developed to reduce bycatch rates in Indian waters. However, the adoption of these measures is considered to be poor (Madhu et al. 2020).</p>		
<b>Shark finning</b>				
<b>d</b>	Guide post	It is <b>likely</b> that shark finning is not taking place.	It is <b>highly likely</b> that shark finning is not taking place.	There is a <b>high degree of certainty</b> that shark finning is not taking place.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>

PI 2.2.2	<b>There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</b>		
Rationale	<p>The complete ban on shark fin trade implemented in India in 2015 (Govt of India, through Notification No.110/ (RE-2013)/2009-2014) (CMFRI, 2022b). SG 60 is met.</p> <p>However, without better information on compliance rates, it cannot be said that it is likely that shark finning is not taking place. <b>SG80 or 100 is not met.</b></p>		
e	<b>Review of alternative measures to minimise mortality of unwanted catch</b>		
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of <b>unwanted</b> catch of main secondary species.	There is a <b>regular</b> review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of <b>unwanted</b> catch of main secondary species and they are implemented as appropriate.
	There is a <b>biennial</b> review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of <b>unwanted</b> catch of all secondary species, and they are implemented, as appropriate.		
Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale	<p>Discards are of two types  iii) species with no commercial value – in particular benthic invertebrates such as gastropods, echinoderm, ascidians, crustaceans etc.; and  iv) ii) grading of low-value species towards the end of long trips.</p> <p>Fishermen report that they mainly discard gastropods and some crustaceans which has no commercial value; and it can be assumed that these are alive on discard. They also discard pufferfish, which damage the catch (though now a days there is market for these too and on a recent visit to harbour by the assessor they were seen landed) and jellyfish.</p> <p>Discards are not quantified, although CMRFI is identifying the main species in the former category, based on last-haul analysis. Space on-board permitting, low value or damaged fish is likely to be sold to fish meal plants rather than being discarded (as part of LVB); in which case it would be quantified with the rest of the landings. On this basis, it is presumed that this source of discarding is not significant, but for a full assessment, data on discarding would be required. Benthos is considered further below under habitats.</p> <p>Dineshbabu et al. 2022 analysed potential alternative measures to minimise UoA-related mortality of unwanted catch of main in-scope species and the impact of different Government agencies efforts for bycatch mitigation (e.g. MLS) to reduce the proportion of unwanted juveniles in bycatch. This included a social survey-based on fisher’s perceptions and suggestions on successful bycatch mitigation. Therefore, <b>SG60 is met</b> as there is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main in-scope species.</p> <p>However, <b>SG80 is not met</b> as it cannot be said that reviews are ‘regular’ for each UoA and that measures resulting from reviews are ‘implemented as appropriate’ e.g. cephalopod nets have a large-mesh panel (1000mm) to reduce bycatch and there is little incentive in the fishery to discard species of commercial value (as the fishery is not managed by quotas) but there is little evidence for its implementation across the fleet. In addition, there is still considered to be a variable but high proportion of LVB.</p>		

<b>PI 2.2.2</b>	<b>There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch.</b>
	<p>The Central Marine Fisheries Research Institute (CMFRI) and Central Institute of Fisheries Technology (CIFT) have recommended the following measures:</p> <ul style="list-style-type: none"> <li>• “Square meshed trawl nets with 35 mm cod end which curtails juvenile fish catch.</li> <li>• Stop using high Horse Power (HP) (&gt; 250 HP) engines and restrict the upper limit of engine power in trawls as per craft dimensions (crafts up to 15m Over All Length (OAL) - 140 HP, 15-17.5 m OAL - 200 HP and 17.5 - 20 m OAL - 250 HP).</li> <li>• Employ JFE-SSD in trawls which have an in-situ sorting effect (LVB reduction up to 43 %, and shrimp holding of 95 % with capability to eliminate jellyfish).</li> <li>• Use only &gt; 22 mm meshed seine nets while intending to catch pelagic fishes like mackerel and oil sardine.</li> <li>• Willingly avoid juvenile fish shoals during fishing activity using seine nets”</li> </ul> <p>(Mahesh et al. 2019).</p>

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<p><b>More information sought</b>  <i>Catch profiles are required to determine a comprehensive and accurate secondary main species list. This would then be used to determine if measures are appropriate to manage these species. It is not clear how frequent reviews are for this gear type in particular and if the mesh size / cod end regulations are adhered to.</i></p>

### PI 2.2.3 – Secondary species information

<b>PI 2.2.3</b>	<b>Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>
	<b>Information adequacy for assessment of impactson main secondary species</b>		
<b>a</b>	<p>Guide post</p> <p>Qualitative information is <b>adequate to estimate</b> the impact of the UoA on the main secondary species with respect to status.</p> <p>OR</p> <p><b>If RBF is used to score PI 2.2.1 for the UoA:</b></p> <p>Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.</p>	<p>Some quantitative information is available and <b>adequate to assess</b> the impact of the UoA on main secondary species with respect to status.</p> <p>OR</p> <p><b>If RBF is used to score PI 2.2.1 for the UoA:</b></p> <p>Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.</p>	<p>Quantitative information is available and <b>adequate to assess with a high degree of certainty</b> the impact of the UoA on main secondary species with respect to status.</p>
Met?	<b>No</b>	<b>No</b>	<b>No</b>

PI 2.2.3	<b>Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species</b>
Rationale	<p>The RBF was used to score PI 2.2.1 for the UoA. Qualitative information is available to estimate productivity and susceptibility attributes for main secondary species. However, it cannot be said that this information is 'adequate' (based on the definitions below) as there is no clear catch profile for the gear type across the UoA. <b>SG60 is not met.</b></p> <p>MSC Fisheries Standard 2.01. Table SA8: <i>"Adequate" refers to the quantity and quality of information needed to justify the level of risk or certainty associated with the specific Scoring Guidepost (SG). The adequacy of information may vary for the different information scoring issues and SGs, depending on what the information is used to support.</i></p> <p>MSC Fisheries Standard 2.01. Table GSA3: <i>Information is adequate if, given consideration of the continuity of data collection, precision of estimates, comprehensiveness of information and any bias, etc. it is:</i> • Capable of supporting an outcome score with relevant confidence levels, or • Capable of supporting the management strategy given the level of precaution that is implicit in the strategy and the requirements of the strategy for detecting changes in either impact or outcome status of affected components (e.g., species).</p> <p>Regarding UoA specific catch data, several reasons make it very difficult to create a singular list of secondary species for the UoA:</p> <ul style="list-style-type: none"> <li>• There is no catch profile for trawls. CMFRI seems to collect by catch data, but this is not available publicly.</li> <li>• The heterogeneity of the fleet and the difference in catch profile resulting from those differences.</li> <li>• Catches vary over time &amp; space: Catches not only differ by State but also by fleet (whether MTN or MDTN). Catch composition can vary between the multi-day and single day trawlers due to differences in fishing depth, distance from shore, trawling speed, and fishing grounds (Devi et al. 2019).</li> <li>• There are very few catch studies. The majority of the studies on composition are based on landings, rather than catch because in tropical fisheries, it's extremely difficult for fishers to log the vast variety of species. There are some sampling surveys in place – but these are difficult to find for this particular fishery. It's also unclear how representative these are of the fishery over time and space.</li> <li>• True discards are unknown – landings data are widely available from the landing centres around the country – see PI 2.2.3 for more detail, however, landings data do not include discard data and therefore, do not equate to catch level information.</li> <li>• There are significant number of species, including IPI species, thus, species identification is challenging. At the same time, CMFRI collects data on a real-time basis from the fish landing centres using electronic devices and process it, through a web-based application software called Fish Catch Survey and Analysis. It is a user-friendly interface with a variety of data entry options, and a suite of analysis tools. It includes species-wise, gear-wise and catch-per-unit-effort analysis also (Mini et al., 2023). Unfortunately, this data is not available to the team for now.</li> <li>• In many of the studies focused on catch composition / landed composition data, the type of trawl is not specified.</li> </ul>

PI 2.2.3	Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species																																																																						
	<ul style="list-style-type: none"> <li>Lack of specificity of the fishery / fleet (and Unit of Assessment) – further discussion on defining the UoA recommended at scoping stage.</li> <li>India is the largest contributors to elasmobranch fisheries worldwide (Dent and Clarke 2015), however, only two of 155 species have been identified in the catches. The majority of the elasmobranch landings are from non-target fisheries and are often discarded at sea (Barker and Schluessel, 2005), therefore, catches are unlikely to be underestimated (Hari et al. 2022).</li> </ul> <p>Data on landings by species and effort are collected from different landing centres according to the sampling plan discussed above and recorded by enumerators. The quantity by species landed is known (available within National Marine Fishery Resources Data Centre (NMFDC) of ICAR-CMFRI (Sathianandan et al., 2020). (CMFRI, 2022b) reports on bycatch and discards along the Indian Coast. These data would only cover landings data and not catches within the fishery, therefore, do not assess UoA impact per se.</p> <p>Whilst the RBF has been used to assess PI 2.2.1, it is unclear from For some of the stocks below, Sathianandan et al. (2021) and CMFRI (2023) have recently provided stock assessments, however, until there is a clear catch profile distinguishing species caught by UoA, stock assessments cannot be relied upon to score 2.2.1. Therefore, for each species, the stock status has been provided (where available), and RBF score has been allocated for either the species directly, or, an example species has been provided where either multiple species of a taxonomic group are known to be caught, or only a genus/ family is known to be caught (with no species-specific information). Table 15 that stock assessments are increasingly available for many of the species caught in the fishery. The RBF was applied because the catch profile is unclear and for species identified as potential main secondary species, there are conflicting stock status, or they vary across states, and whilst a catch profile per UoA is unclear, the RBF was applied. However, in the final column of <b>Error! Reference source not found.</b>, below, Sathianandan et al. (2021) show that the majority of stocks landed in each state have received a stock assessment.</p> <p>Table 16. Number of fish stocks assessed in each maritime state. Final column means “number of fish stock assessed with percentage accounted by them to the state total annual catch”. Source: Sathianandan et al. 2021</p> <table border="1"> <thead> <tr> <th rowspan="2">State/union territory</th> <th rowspan="2">Region</th> <th colspan="2">Length of the coast</th> <th colspan="2">Average annual landings</th> </tr> <tr> <th>km</th> <th>%</th> <th>Million tonnes</th> <th>%</th> </tr> </thead> <tbody> <tr> <td>Gujarat &amp; Daman Diu</td> <td>Northwest</td> <td>1621</td> <td>26.7</td> <td>0.817</td> <td>23.</td> </tr> <tr> <td>Maharashtra</td> <td>Northwest</td> <td>720</td> <td>11.9</td> <td>0.301</td> <td>8.</td> </tr> <tr> <td>Goa</td> <td>Southwest</td> <td>104</td> <td>1.7</td> <td>0.094</td> <td>2.</td> </tr> <tr> <td>Karnataka</td> <td>Southwest</td> <td>300</td> <td>4.9</td> <td>0.482</td> <td>13.</td> </tr> <tr> <td>Kerala</td> <td>Southwest</td> <td>590</td> <td>9.7</td> <td>0.527</td> <td>14.</td> </tr> <tr> <td>Tamil Nadu</td> <td>Southeast</td> <td>1076</td> <td>17.7</td> <td>0.694</td> <td>19.</td> </tr> <tr> <td>Puducherry</td> <td>Southeast</td> <td>45</td> <td>0.8</td> <td>0.063</td> <td>1.</td> </tr> <tr> <td>Andhra Pradesh</td> <td>Southeast</td> <td>974</td> <td>16.1</td> <td>0.276</td> <td>7.</td> </tr> <tr> <td>Odisha</td> <td>Northeast</td> <td>480</td> <td>7.9</td> <td>0.132</td> <td>3.</td> </tr> <tr> <td>West Bengal</td> <td>Northeast</td> <td>158</td> <td>2.6</td> <td>0.156</td> <td>4.</td> </tr> </tbody> </table> <p>Since low value bycatch (LVB) is so important in Indian fisheries, data collection on LVB species composition and quantities is also conducted from the landing centres. LVB from MDTN can be landed a poor condition and therefore LVB estimation can be conducted based on baskets/crates of unloaded LVB, with species composition estimated from samples collected from decomposed heaps. Since trawl operators or marketing personnel are not</p>	State/union territory	Region	Length of the coast		Average annual landings		km	%	Million tonnes	%	Gujarat & Daman Diu	Northwest	1621	26.7	0.817	23.	Maharashtra	Northwest	720	11.9	0.301	8.	Goa	Southwest	104	1.7	0.094	2.	Karnataka	Southwest	300	4.9	0.482	13.	Kerala	Southwest	590	9.7	0.527	14.	Tamil Nadu	Southeast	1076	17.7	0.694	19.	Puducherry	Southeast	45	0.8	0.063	1.	Andhra Pradesh	Southeast	974	16.1	0.276	7.	Odisha	Northeast	480	7.9	0.132	3.	West Bengal	Northeast	158	2.6	0.156	4.
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<b>PI 2.2.3</b>	<b>Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species</b>			
	required to disclose LVB, sampling for LVB is an arduous process for trawl landing centres. For multi-day trawling, the quantity of discarded bycatch is only known to trawl operators and there is no current mechanism to know their exact discards. This increasingly became the case after the introduction of MLS. Only some results are available from sampling boats in participatory programmes, or experimental trawling, or and selected trawler operators who are willing to provide the data ( <a href="#">Dineshbabu et al. 2022</a> ).			
<b>b</b>	<b>Information adequacy for assessment of impacts on minor secondary species</b>			
	Guide post		Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.	
	Met?		<b>No</b>	
Rationale	Without a comprehensive catch profile, the list of minor species is unclear. <b>SG100 is not met.</b>			
<b>c</b>	<b>Information adequacy for management strategy</b>			
	Guide post	Information is adequate to support <b>measures</b> to manage <b>main</b> secondary species.	Information is adequate to support a <b>partial strategy</b> to manage <b>main</b> secondary species.	Information is adequate to support a <b>strategy</b> to manage <b>all</b> secondary species, and <b>evaluate</b> with a <b>high degree of certainty</b> whether the strategy is <b>achieving its objective</b> .
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale	The information has been sufficient to implement some measures for some species, but not all main species (e.g. to define an MLS or the closed season); based on the biological data available, this could be applied for other secondary species. Increasing information is available on the stock status of species caught e.g. Sathianandan et al. (2021) and CMFRI (2023). <b>SG60 is met.</b> However, information is not adequate to support a partial strategy without a clear catch profile. <b>SG80 is not met.</b>			

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>More information sought</b> <b>Information gap on catch-profile and current information available cannot be considered 'adequate'</b> Independent analysis of the catch profile

### PI 2.3.1 – ETP species outcome

<b>PI 2.3.1</b>	<b>The UoA meets national and international requirements for the protection of ETP species</b> <b>The UoA does not hinder recovery of ETP species</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species						
Effects of the UoA on population/stock within national or international limits, where applicable								
a	Guide post	Where national and/or international requirements set limits for ETP species, the <b>effects of the UoA</b> on the population/ stock are known and <b>likely</b> to be within these limits.	Where national and/or international requirements set limits for ETP species, the <b>combined effects of the MSC UoAs</b> on the population /stock are known and <b>highly likely</b> to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a <b>high degree of certainty that the combined effects of the MSC UoAs</b> are within these limits.				
	Met?	NA	NA	NA				
Rationale		Since there are no formal catch limits for ETP species in this fishery, Sla is not scored.						
Direct effects								
b	Guide post	Known direct effects of the UoA are likely to not <b>hinder recovery</b> of ETP species.	Direct effects of the UoA are <b>highly likely</b> to not <b>hinder recovery</b> of ETP species.	There is a <b>high degree of confidence</b> that there are no <b>significant detrimental direct effects</b> of the UoA on ETP species.				
	Met?	<b>All Sharks species - RBF = &lt;60</b> <b>Olive Ridley – Yes</b> Cetacean species- Yes	<b>All Sharks species - RBF = &lt;60</b> <b>Olive Ridley – No</b> Cetacean species- No	<b>All Sharks species - RBF = &lt;60</b> <b>Olive Ridley – No</b> Cetacean species- No				
Rationale		<p>In general, CMFRI consider that <i>'the high opening off-bottom trawls used in squid fisheries are less likely to interact with the benthic invertebrates, corals and biogenic habitats of forage fish, finfish, sharks and turtles'</i> (CMFRI, 2022b). The ETP species identified in this pre-assessment as interacting with the fishery are:</p> <ul style="list-style-type: none"> <li>• Sharks: largetooth sawfish <i>Pristis microdon</i>, whale shark <i>Rhincodon typus</i>, giant guitarfish <i>Rhynchobatus djiddensis</i> and manta rays.</li> <li>• Turtles: Olive ridley</li> </ul> <table border="1"> <thead> <tr> <th>Taxa</th> <th>Rationale</th> </tr> </thead> <tbody> <tr> <td>Sharks - largetooth sawfish <i>Pristis microdon</i>, whale shark <i>Rhincodon typus</i>, giant guitarfish <i>Rhynchobatus djiddensis</i> and manta rays)</td> <td>Shark interactions with the trawl fishery are not clearly known. Appendix I shark species include largetooth sawfish <i>Pristis microdon</i>. Species that are recognised by national ETP legislation, namely, The WILDLIFE (PROTECTION) ACT, 1972 that may be interacted with in this fishery include whale shark <i>Rhincodon typus</i> and the giant guitarfish <i>Rhynchobatus djiddensis</i>. Manta rays also receive protection e.g. <i>Mobula birostris</i>, however, without more knowledge of which species are caught, evaluating the impact of the fishery on the specific species is not achievable.  Note that the frequency of interaction of the fishery with large shark and ray species is reported to be</td> </tr> </tbody> </table>			Taxa	Rationale	Sharks - largetooth sawfish <i>Pristis microdon</i> , whale shark <i>Rhincodon typus</i> , giant guitarfish <i>Rhynchobatus djiddensis</i> and manta rays)	Shark interactions with the trawl fishery are not clearly known. Appendix I shark species include largetooth sawfish <i>Pristis microdon</i> . Species that are recognised by national ETP legislation, namely, The WILDLIFE (PROTECTION) ACT, 1972 that may be interacted with in this fishery include whale shark <i>Rhincodon typus</i> and the giant guitarfish <i>Rhynchobatus djiddensis</i> . Manta rays also receive protection e.g. <i>Mobula birostris</i> , however, without more knowledge of which species are caught, evaluating the impact of the fishery on the specific species is not achievable.  Note that the frequency of interaction of the fishery with large shark and ray species is reported to be
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PI 2.3.1

The UoA meets national and international requirements for the protection of ETP species  
The UoA does not hinder recovery of ETP species

quite rare. However, there is a lack of information on ETP interactions in this gear type, in particular, with the juveniles of the species considered below.

Najmudeen (2024) reports that trawl nets accounts for 48.8%, gillnets 35.6% and hook & line units 6% of the total elasmobranch landings of the country. The composition of elasmobranch landings from 2000-2023 is given in the figure below. All India landings of elasmobranchs during 2000-2023 was 49,259 tonnes, forming 2.0% of finfish catch.

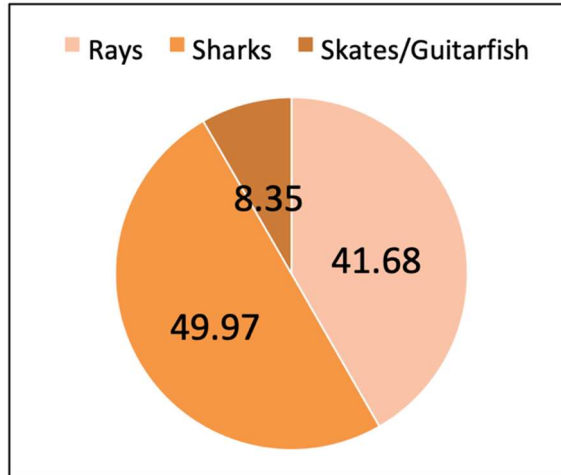


Figure 17. Composition of elasmobranch landings from India (2000-2023) (Najmudeen 2024)

Appendix I shark species include large tooth sawfish *Pristis microdon*. Convention on the Conservation of Migratory Species of Wild Animals (CMS) Appendix II species on the landings data include three species of the hammerhead shark (*Sphyrna zygaena*, *S. lewini* and *S. mokarran*). Note that the frequency of interaction of the fishery with these species is reported to be quite rare. Furthermore, CMFRI (2023) consider that the majority of shark and ray species caught as bycatch in trawl fisheries include smaller-sized species that have relatively high resilience, including *Rhizoprionodon* spp. and *Scoliodon laticaudus*. CMFRI (2023) consider that “there is no/minimal interaction” of large sharks with the semi-pelagic trawls used in squid fisheries (CMFRI, 2022b)), which happens to be the same as fish trawling nets.

Elasmobranch landings in India during 2023 was 0.32 lakh tonnes forming about 1% of the total marine fish catch. This showed an increase of 14% when compared to 2022. West coast (which includes Kerala and Karnataka) contributed 53% of the total elasmobranch catch.

Mechanized sector contributed to 73% to the total landings (see figure). However, mechanized fishing also refers to gillnets and longlines, targeting large pelagic resources such as tunas and billfishes, which are more likely to co-occur with sharks.

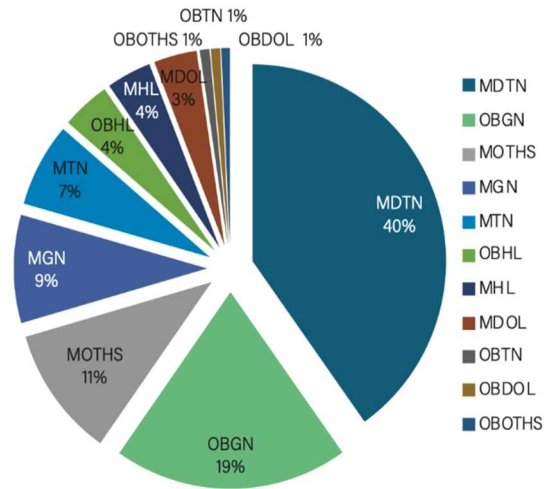


Figure 18. Major gears contributing to elasmobranch fishery (CMFRI annual report 2023)

Sharks contributed 53% of the total elasmobranch landings followed by rays 43%, guitarfishes 3% and chimeras 1%. About 116 species contributed to the elasmobranch fishery. Seventeen genera of sharks were prevalent in the fishery, alongside 19 genera of rays and four genera of guitarfishes, constituting the dominant species in the catch during 2023. Compared to Karnataka, Kerala's contribution to elasmobranch fisheries is high. But still it is low compared to most of the other states (see Figure 19).

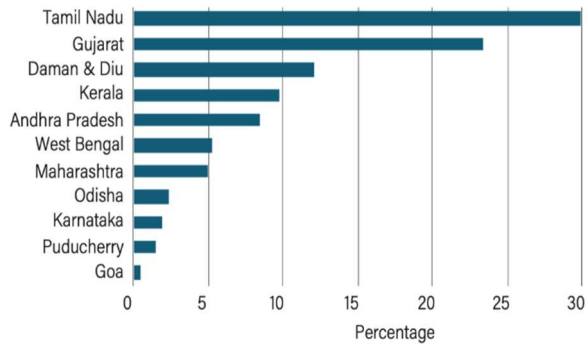


Figure 19. Elasmobranch landings by state (CMFRI 2023)

A rapid stock assessment (RSA) (Kizhakudan et al. 2015) compared the previous average three years' landing data for elasmobranchs against the historical (1985–2013) average, combining that with classification criteria. The study indicated that elasmobranchs were either 'declining' or 'less abundant' in most parts of the Indian coast. Landings have declined for sharks (Akhilesh et al. (2023) and many studies have shown signs of being overexploited (Akhilesh et al. 2023). Of 174 species of elasmobranchs, 168 have been assessed against the IUCN Red List – of which 25 species are listed as Critically Endangered (15%), 41 as 'Endangered' (24%) and 47 as 'Vulnerable' (28%) (Akhilesh et al. 2023).

PI 2.3.1	<p>The UoA meets national and international requirements for the protection of ETP species</p> <p>The UoA does not hinder recovery of ETP species</p>	
		<p>From the studies discussed, interaction rates are likely to be low. However, without catch profiles/ observer data, the impact of the UoA on each ETP species cannot be analytically determined, therefore the RBF is applied.</p> <p><b>Whale shark (<i>Rhincodon typus</i>):</b> is evaluated by IUCN as 'endangered' (Pierce and Norman, 2016), with a 'recovery status of largely depleted'. The multi-species FIP PA reported landings of 750 kg (2015-2017), representing only one or two individuals caught over that time period. For whale sharks, landings data suggest that interactions are rare and probably insignificant for the population (750 kg in three years – i.e. a few individuals), but discards are unknown and a PSA scores this interaction as potentially 'high risk'. See in Figure 20 and in <b>Error! Reference source not found.</b>, MSC scoring Guidepost &lt;60.</p> <p><b>Giant guitarfish (<i>Rhynchobatus djiddensis</i>)</b> is evaluated by IUCN<sup>7</sup> as 'critically endangered' (Kyne et al. 2019), based on essentially the same reasons as for the sawfish; i.e. low population growth rates and an inshore habitat. In the 2015-2017 landings, the multi-species FIP PA recorded 9.4 t of this species over the three years, with another 228 t of <i>Rhynchobatus</i> spp. (potentially also part of the guitarfish landings) and individuals of other closely related genera (<i>Rhinobatos</i> spp., <i>Rhina</i> spp.). There are four species known to occur in Indian waters - <i>G. granulatus</i>, <i>G. obtusus</i>, <i>G. typus</i>, and <i>G. thouin</i>; all of which are assessed as critically endangered. Therefore, the impact of the fishery on giant guitarfish is difficult to quantify but they form a very small proportion (1.1%) of elasmobranch landings (CMFRI, 2019). However, discards are unknown and a PSA scores this interaction as potentially 'high risk'. See in Figure 20 and in <b>Error! Reference source not found.</b> – MSC scoring Guidepost &lt;60. <b>Note that the multi-species FIP PA has determined the overlap of trawl fishery with sawfish and guitarfish species but this is not available for this assessment.</b></p> <p><b>Sawfish:</b> There is apparently some confusion about the genus <i>Pristis</i>: CMFRI categorize sawfish landings in this fishery as <i>Pristis microdon</i>, the largetooth<sup>8</sup> sawfish; this is correct according to FishBase. However, IUCN conflate this species with <i>Pristis pristis</i>, which they call the largetooth sawfish, but which FishBase categorized as a separate species; the common sawfish. During this assessment, it is assumed that the IUCN assessment of <i>P. pristis</i> is also relevant to <i>P. microdon</i>. This categorizes the species as 'critically endangered'. Sawfish are extremely vulnerable to overfishing because of their low population growth rate, with maturity estimated to</p>

<sup>7</sup> They call it the 'whitespotted wedgefish'; reportedly it is actually a complex of four or more species.

<sup>8</sup> Oddly since 'microdon' should mean 'small tooth'

<p>PI 2.3.1</p>	<p><b>The UoA meets national and international requirements for the protection of ETP species</b>  <b>The UoA does not hinder recovery of ETP species</b></p> <p>be reached at almost 3m and several years old; and also because they live in shallow coastal waters and estuaries, usually at &lt;10m depth. IUCN report that in some areas of the Indian west coast they were previously common but are now rare, with the same scenario of local depletions and extinctions played out over all of southeast Asia and even in Australia, which usually prides itself on its marine conservation. It would be extremely interesting to evaluate the bycatch trend of sawfish over time in this fishery. The multi-species FIP PA reported total landings as 400 kg (between 2015-2017), which probably represents a small number of individuals. (It is also of interest in as much as the species is not supposed to occur much deeper than 10m, which is well within the inshore trawl exclusion zone, although this rule may be more recent than the dataset.) However, discards are unknown and a PSA scores this interaction as potentially 'high risk'. See RBF in Figure 20 and in <b>Error! Reference source not found.</b> – MSC scoring Guidepost &lt;60. <b>Note that the multi-species FIP PA has determined the overlap of trawl fishery with sawfish and guitarfish species but this is not available for this assessment.</b></p> <p><b>Manta rays:</b> Some manta rays are protected under THE WILDLIFE (PROTECTION) ACT, 1972 e.g. Giant Manta. Mobulids in general form ~8% of the total elasmobranch landings in India. Whilst there is no targeted fishery, they 'occasionally' form bycatch species taken in hook and line, gillnet and trawl fisheries. Mobulid rays occupy the upper levels of the water column, and therefore, are more likely to encounter gears like surface-set gillnets, purse seines and longlines targeting large pelagic fishes like tunas, sword fishes etc. Mobulids are also caught via harpoons and traps. Compared to all the gears, gillnets are reported as the major gear catching mobulids in the tropical Indo-Pacific. Therefore, these squid trawl gears are relatively less likely to interact with these species (ICAR-CMFRI, 2022).</p> <p>In the multi-species FIP PA, total landings for manta rays were ~5.5 t (&lt;2t per year – probably just a few individuals). However, discards are unknown.</p> <p>There are limited quantitative stock assessments available for manta rays and their stock statuses are highly uncertain, especially given that they are often not identified to species levels in their wider stock distributions. In terms of their IUCN status' <i>Mobula eregoodoo</i>: scores Endangered (January, 2020); <i>Mobula japanica</i>: Endangered (November 2018); <i>Mobula kuhlii</i>: Endangered (January 2020); <i>Mobula mobular</i>: Endangered (November 2018); <i>Mobula tarapacana</i>: Endangered (November 2018); <i>Mobula thrustoni</i>: Endangered (November 2018) (ICAR-CMFRI, 2022).</p>
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PI 2.3.1

The UoA meets national and international requirements for the protection of ETP species  
 The UoA does not hinder recovery of ETP species

From these studies, known direct effects of the UoA are likely to not hinder recovery of ETP species and **SG60 is met.** however, without more specific data on the UoA, it cannot be said that “direct effects of the UoA are highly likely to not hinder recovery of ETP species”. Thus, **SG80 is not met.**

Indo-pacific humpback dolphin (*Sousa chinensis*); spinner dolphin (*Stenella longirostris*); long beaked common dolphin (*Delphinus capensis*); Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), Finless Porpoise (*Neophocaena phocaenoides*) and Risso’s Dolphin (*Grampus griseus*)

Stakeholders in the multi-species PA FIP reported that dolphin interactions are rare and unlikely to result in mortality. In the case of cetaceans being caught in trawl gear, the chances of mortality is relatively high due to the long duration of entanglement or dragging. However, Joseph et al. (2021) suggest that cetacean interaction with trawl gear is much relatively low compared to other gear groups (gillnets (57.7%), ring seine (16.2%), purse seines (11.3%), longline cum gillnet (7.8%) and trawls (6.7%)). Trawl nets are considered less likely to capture cetacean as they are ‘active gears made of high strength twine.

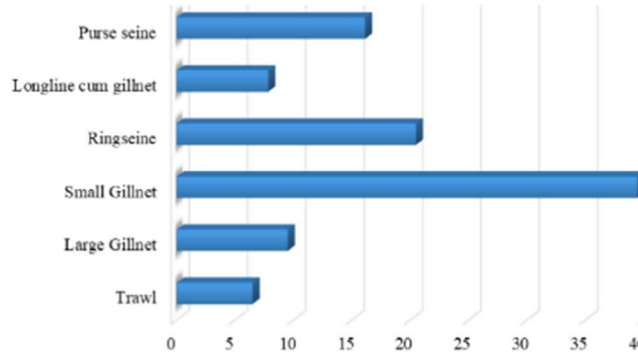


Figure 21 Cetacean interaction with fishing gear; x axis is %. Source: Joseph et al. 2021

Interview studies with fishermen reported that 15.3% of respondents reported incidental bycatch of cetaceans, mainly in gillnets, purse seines and trawls. Interactions largely occurred during pre-monsoon season (54.3%) (Figure 22) and the squid fishery largely occurs post-monsoon, where the proportion of interactions of cetaceans with gear were post-monsoon (37.4%). Indo-pacific humpback dolphin and spinner dolphin were the dominant species that observed in all the seasons of interaction data (Joseph et al. 2021).

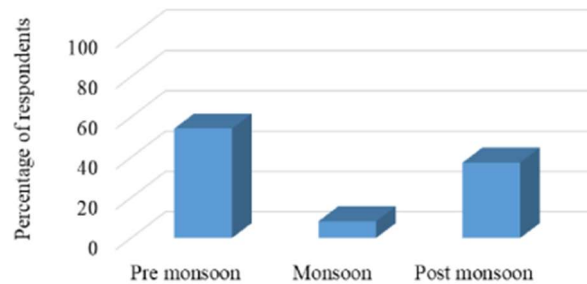


Figure 22 . Seasonal distribution of cetaceans. Source: Joseph et al. 2021

<b>PI 2.3.1</b>		<b>The UoA meets national and international requirements for the protection of ETP species</b> <b>The UoA does not hinder recovery of ETP species</b>	
		<p>Varghese et al. (2021) determined that ETP species represent &lt;0.03% of the MDTN, and &lt;0.01% of the MTN catch.</p> <p>Given the low level of interaction recorded with trawl gears, from these studies, known direct effects of the UoA are likely to not hinder recovery of ETP species and <b>SG60 is met</b>. However, without more specific data on the UoA, it cannot be said that “direct effects of the UoA are highly likely to not hinder recovery of ETP species”. Thus <b>SG80 is not met</b>. In a full assessment, the RBF may be required depending on population data available for these species and the information availability for the ETP interactions with this gear type.</p> <p>Cetaceans: Indo-pacific humpback dolphin (<i>Sousa chinensis</i>); spinner dolphin (<i>Stenella longirostris</i>); long beaked common dolphin (<i>Delphinus capensis</i>); Indo-Pacific bottlenose dolphin (<i>Tursiops aduncus</i>), Finless Porpoise (<i>Neophocaena phocaenoides</i>) and Risso’s Dolphin (<i>Grampus griseus</i>)</p>	
<b>c</b>	<b>Indirect effects</b>		
	Guide post	Indirect effects have been considered for the UoA and are thought to be <b>highly likely</b> to not create unacceptable impacts.	There is a <b>high degree of confidence</b> that there are no <b>significant detrimental indirect effects</b> of the UoA on ETP species.
	Met?	<b>No</b>	<b>No</b>
Rationale	Indirect effects are not known at the time of writing this report, and there is a lack of direct and indirect information on ETPs species. Due to the large number of species that can be caught in the trawling fishery, indirect impacts are likely, but more information is needed.		

Draft scoring range	<b>Elasmobranch species = &lt;60</b> Turtles and cetaceans – 60-79
Information gap indicator	<b>More information sought</b> ETP species interaction data needed with gear type. Indirect effects likely to be available through ecosystem studies, however, direct information on UoA impact on ETP species is needed first
Data-deficient? (Risk-Based Framework needed)	Yes for sharks. RBF may also need to be considered for cetaceans

### PI 2.3.2 – ETP species management strategy

<b>PI 2.3.2</b>	<b>The UoA has in place precautionary management strategies designed to:</b> <ul style="list-style-type: none"> <li>• Meet national and international requirements.</li> <li>• Ensure the UoA does not hinder recovery of ETP species.</li> </ul> <p><b>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species</b></p>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>

PI 2.3.2	<p><b>The UoA has in place precautionary management strategies designed to:</b></p> <ul style="list-style-type: none"> <li>• <b>Meet national and international requirements.</b></li> <li>• <b>Ensure the UoA does not hinder recovery of ETP species.</b></li> </ul> <p><b>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species</b></p>			
a	<b>Management strategy in place (national and international requirements)</b>			
	Guide post	There are <b>measures</b> in place that minimise the UoA-related mortality of ETP species, and are expected to be <b>highly likely to achieve</b> national and international requirements for the protection of ETP species.	There is a <b>strategy</b> in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be <b>highly likely to achieve</b> national and international requirements for the protection of ETP species.	There is a <b>comprehensive strategy</b> in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to <b>achieve above</b> national and international requirements for the protection of ETP species.
	Met?	<b>NA</b>	<b>NA</b>	<b>NA</b>
Rationale	No known limits in place.			
b	<b>Management strategy in place (alternative)</b>			
	Guide post	There are <b>measures</b> in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a <b>strategy</b> in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a <b>comprehensive strategy</b> in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.
	Met?	<b>Yes- for all species</b>	<b>No- for all species</b>	<b>No- for all species</b>
Rationale	<p>In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):</p> <ul style="list-style-type: none"> <li>- “Measures” are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.</li> <li>- A “partial strategy” represents a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically.</li> <li>- A “strategy” represents a cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome, and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification fishing practices in the light of the identification of unacceptable impacts.</li> </ul> <p>Measures include:</p> <ul style="list-style-type: none"> <li>• Turtles - fishers release live turtles as soon as possible, due to religious reasons. Turtle Excluder Device (TED)s are not used in trawls – regulations are being implemented to require their use (under PMMSY) and all coastal states have amended their policy accordingly, but this is not yet implemented across all states.</li> </ul>			

<p><b>PI 2.3.2</b></p>	<p><b>The UoA has in place precautionary management strategies designed to:</b></p> <ul style="list-style-type: none"> <li>• <b>Meet national and international requirements.</b></li> <li>• <b>Ensure the UoA does not hinder recovery of ETP species.</b></li> </ul> <p><b>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species</b></p>
	<p>Jayasankar et al. (2022) provides evidence to show low levels of turtle interactions and but trawl interactions account for the maximum number of fatalities (21%) out of all gears.</p> <ul style="list-style-type: none"> <li>• The design of TED is finalized by CIFT in collaboration, with US experts. CIFT called for large-scale tenders to manufacture this, and the state governments will implement this.</li> <li>• Minimum Landing Size</li> <li>• Monsoon ban – see Section 10.1.1 for number of days per state;</li> <li>• No-trawl fishing zones under the ‘Fishing Regulation Act’;</li> <li>• Vessels licenses and vessel registration;</li> <li>• Cetacean measures: relocation of fishing effort, modification in fishing gear and the use of acoustic devices (Goetz et al., 2014; Dawson et al., 2013). Studies to identify marine mammals have been conducted since 2010 by the Marine Mammal Research and Conservation. The majority of the cetacean interactions have been reported with gillnets (57.7%), followed by ring seine (16.2%), purse seines (11.3%), longline cum gillnet (7.8%) and trawls are the lowest of all gear interactions (6.7%). The interactions mostly occur in pre-monsoon season (54.3%) followed by post-monsoon (37.4%). Thus, trawls appear to be naturally of a lower risk to cetaceans (Joseph et al. 2021);</li> <li>• Stock assessments have been conducted for sharks and rays and landings would be reported at landings centres (CMFRI, 2022b);</li> <li>• CMFRI conduct research on elasmobranch fisheries in each maritime states with an Action Plan initiated on the basis of guidance on NPOA (including sawfish and guitarfish) (Mohamed et al. 2021);</li> <li>• A draft NPOA for sharks has been prepared (by the Bay of Bengal Programme Intergovernmental Organisation (BoBPIGO) (Akhilesh et al. 2023);</li> <li>• In August 2013, the Ministry of Environment and Forests (Wildlife Division) approved a policy advisory on shark finning (vide F. No4-36/2013WL, 21 August 2013) and banned international trade since 2015, prohibiting the removal of shark fins on board a vessel in the sea, and advocates landing of the whole shark. India has extended the protection of ten species of sharks under the Wildlife (Protection) Act, 1972 - there is no restriction on the harvest, domestic trade, and consumption of elasmobranchs (Akhilesh et al. 2021). However, multiple measures are in place including bans on retention (whitetail oceanic shark), no finning policies, MPAs, MLS) for capture of common species, gear-specific mesh size regulations, BRDs (Kizhakudan et al. 2015);</li> <li>• There are some programmes improving at-sea shark release practices (e.g. in Gujarat and Maharashtra) via monetary incentives. In other areas, bycatch reduction techniques such as increasing mesh size regulations (or square mesh) and BRDs has occurred, but these are not consistently applied or ubiquitous (Akhilesh et al. 2023);</li> <li>• Consultation and training by ICAR-CMFRI e.g. awareness programmes on catching juvenile sharks and determination of</li> </ul>

**PI 2.3.2**

**The UoA has in place precautionary management strategies designed to:**

- **Meet national and international requirements.**
- **Ensure the UoA does not hinder recovery of ETP species.**

**Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species**

potential measures to reduce catches, such as through spatial measures (hotspots) (Akhilesh et al. 2021), with shark research largely conducted by Fishery Survey of India (FSI). ICAR-CMFRI estimates stock status (using catch and effort data, and species-specific length-based/age-based assessments) based on landings data (Akhilesh et al. 2023)).

There are a suite of agencies working on elasmobranch species in the fisheries (Figure 23):

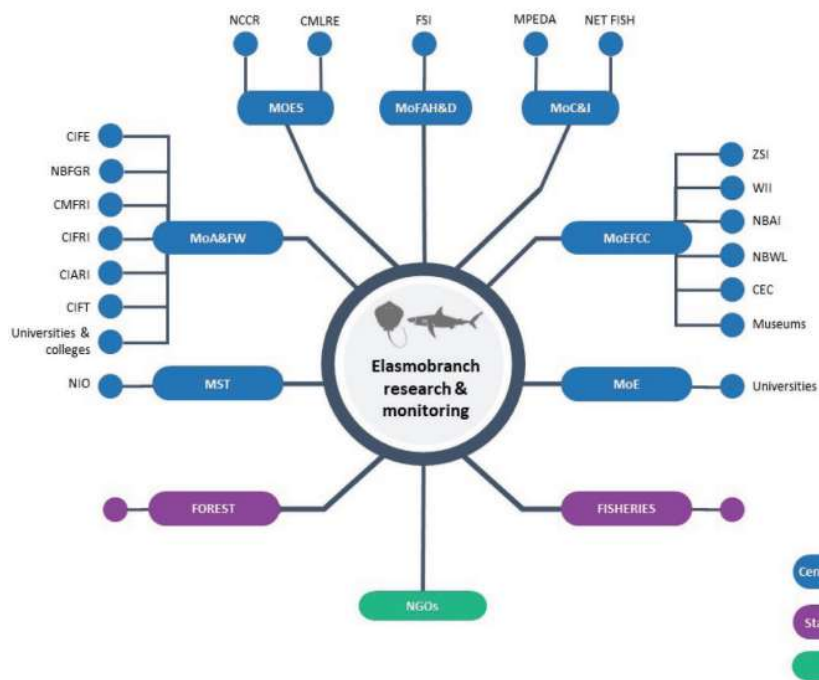


Figure 23 Organisations and ministries involved in elasmobranch research in India. Source: Akhilesh et al. (2023)

There is some evidence available to suggest that interactions between the UoAs and ETP species are low, resulting in few interactions (see PI 2.3.1 e.g. Varghese et al 2021 suggests that there were only 3 interactions with ETP species in MDTN during the last 35 years). For some of the ETP species (turtles, dolphins and whale sharks), the measures are applicable via the nature of the fishery – exhibited through low rates of known interactions. For these species, at least **SG60 is met**. For the sawfish and giant guitarfish, there are some measures in place to limit interactions, as these are very coastal species, whereas the trawl fishery should not operate inside 18/27.5 metre. For the sawfish at least, this should be sufficient to exclude interactions, since it mainly lives in waters shallower than 10m. Therefore, there are measures in place for all ETP species and **SG60 is met for all species**. However, it cannot be said that there is a strategy in place given the lack of data on interactions with the gear type, lack of effective onboard monitoring and lack of a systematic review of measures sufficient to constitute a strategy. **SG80 is not met**.

Management strategy evaluation				
c	Guide post	The measures are <b>considered likely</b> to work, based on	There is an <b>objective basis for confidence</b> that the measures/strategy will	The strategy/comprehensive strategy is mainly based

PI 2.3.2		<p>The UoA has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> <li>• Meet national and international requirements.</li> <li>• Ensure the UoA does not hinder recovery of ETP species.</li> </ul> <p>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species</p>		
		<p><b>plausible argument</b> (e.g. general experience, theory or comparison with similar fisheries/species).</p>	<p>work, based on <b>information</b> directly about the fishery and/or the species involved.</p>	<p>on information directly about the fishery and/or species involved, and a <b>quantitative analysis</b> supports <b>high confidence</b> that the strategy will work.</p>
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		<p>The measures are likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species e.g. Varghese et al 2021 suggesting low ETP interactions with trawl gears. However, not enough is known about the at-sea interactions (rather than purely landings data) to suggest that there is an objective basis for confidence that the measures will work. <b>Thus, only SG60 is met.</b></p>		
		<b>Management strategy implementation</b>		
d	Guide post		<p>There is some <b>evidence</b> that the measures/strategy is being implemented successfully.</p>	<p>There is <b>clear evidence</b> that the strategy/comprehensive strategy is being implemented successfully and <b>is achieving its objective as set out in scoring issue (a) or (b).</b></p>
	Met?		<b>No</b>	<b>No</b>
Rationale		<p>Some measures are implemented successfully e.g. shark fin regulations (Table 12 in Kizhakudan et al. 2015). In addition, several studies show low encounter rates between the gear and ETP species e.g. marine mammals, turtles (see PI 2.3.1). However, several factors suggest that the measures are not all implemented effectively, TEDs (CMFRI, 2022b), and enforcement of minimum sizes is not well managed <b>Error! Reference source not found.</b> (Akhilesh et al. 2023). Though international shark fin trade is banned, localised shark consumption is 'common'. Akhilesh et al. (2023) recommends an implementation of a National Plan of Action (NPOA-Sharks). Akhilesh et al. (2023) states that <i>"India is yet to achieve its international commitments to regulations/conventions under CITES, CMS and CBD specific to elasmobranch conservation."</i> In response, a national expert consultative workshop was conducted in 2020 at Central Marine Fisheries Research Institute (ICAR-CMFRI), Kochi, India due to the need to set specific action plans for elasmobranch species (Akhilesh et al. 2023). <b>SG80 is not met.</b></p>		

**PI 2.3.2**

**The UoA has in place precautionary management strategies designed to:**

- **Meet national and international requirements.**
- **Ensure the UoA does not hinder recovery of ETP species.**

**Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species**

Table 17. National and state regulations and their level of compliance. Source: Akhilesh et al. (2023)

Policy	Current authority	Current implementing agency	Compliance level	Duration	Remarks
Management of fisheries in coastal waters within 12 nm	State Government	State Fisheries Department	Limited	Throughout the year, Marine Fishing Regulation Acts (MFRAs)	Collaboration with other law enforcement agencies to enhance compliance and also improve cooperation with fisher community to implement the same
Closed season in territorial waters	State Government	State Fisheries Department	Good	Once every year, 61 days (15 April to 14 June along the east coast, and 1 June to 31 July along the west coast)	
Fisheries spatial zones for artisanal fisheries in territorial waters	State Government	State Fisheries Department	Limited	Throughout the year, MFRA	Mechanism of implementation must be participatory, with support of local fisher community, village-level governance mechanism and enforcement agencies
Fishing efforts in exclusive economic zone (EEZ)/fishing boat license and registration	State Government	State Fisheries Department	Limited	Throughout the year	
Closed season in EEZ beyond 12 nm	Central Government	Coast Guard, in coordination with state governments	Excellent	Once in a year, 45 days	
Wildlife Protection Act (WPA)	Central Government	State Forest Departments, WCCB	Limited	Throughout the year	Need to consider other high-risk groups and species that are of conservation concern at the regional level
Minimum legal size	State Government	Fisheries Department	Good	Throughout the year	Needs to be implemented in all maritime states
Mesh size	State Government	Fisheries Department	Limited	Throughout the year	To be incorporated across all coastal states and Union Territories
Marine protected areas	Central Government	State Forest Departments	Good	Throughout the year	
Awareness	Open	Open	Limited		
Fin attached policy	Central Government	State Forest Departments, WCCB	Excellent	Throughout the year	
Blanket ban on shark fin export	Central Government, Ministry of Commerce	Customs, Coastguard, Navy, other security/screening agencies	Good	Throughout the year	Shark fins are mostly exported to Southeast Asian markets as a delicacy. The blanket ban on shark fin exports initiated their illegal trade. Fisher's share in consumer rupee decreased considerably. Certification program for sustainable harvest or whole shark export can be considered
Conservation incentives for release of marine WPA species	Maharashtra, Gujarat (restricted to whale shark)	State Forest Departments	Good	Throughout the year	Wider acceptance and documentation of the protected fauna
Marine protected area	State Government/ Central Government	State Forest Departments	Good	Throughout the year	Restricted/no access, zones. Based on ecosystem importance of species

**Review of alternative measures to minimise mortality of ETP species**

<b>e</b>	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a <b>regular</b> review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a <b>biennial</b> review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species, and they are implemented, as appropriate.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>

**Rationale**

There have been reviews conducted on ETP species interactions in the fishery e.g. Varghese et al 2021. **SG60 is met.** However, it cannot be said that reviews are regular, nor can it be said that alternative measures to minimise UoA-related mortality of ETP species are implemented as appropriate as there are insufficient data on the UoA to effectively determine interactions. **SG80 is not met.**

Draft scoring range	<b>60-79</b>
Information gap indicator	<b>More information sought</b>

	Accurate encounter rates/ interaction rates required for the UoA. More information about the efficacy and compliance of measures are required e.g. adoption of TEDs
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**PI 2.3.3 – ETP species information**

<b>PI 2.3.3</b>	<b>Relevant information is collected to support the management of UoA impacts on ETP species, including:</b>			
	<ul style="list-style-type: none"> <li>• <b>Information for the development of the management strategy;</b></li> <li>• <b>Information to assess the effectiveness of the management strategy; and</b></li> <li>• <b>Information to determine the outcome status of ETP species</b></li> </ul>			
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
<b>a</b>	<b>Information adequacy for assessment of impacts</b>			
	Guide post	Qualitative information is <b>adequate to estimate</b> the UoA related mortality on ETP species.  OR  <b>If RBF is used to score PI 2.3.1 for the UoA:</b> Qualitative information is <b>adequate to estimate productivity and susceptibility attributes</b> for ETP species.	Some quantitative information is <b>adequate to assess</b> the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species.  OR  <b>If RBF is used to score PI 2.3.1 for the UoA:</b> Some quantitative information is <b>adequate to assess productivity and susceptibility attributes</b> for ETP species.	Quantitative information is available to assess with a high degree of certainty the <b>magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status</b> of ETP species.
	Met?	<b>No</b>	<b>No</b>	<b>no</b>
Rationale	Information on ETP species interactions with trawl fisheries is available through the following sources: landings data (through the SMRSD system), Varghese et al. 2021, some cetacean and turtle strandings CMFRI data. Available data suggest very limited interactions between trawl fisheries and turtles and dolphins in particular. There is a population-level information to evaluate impacts on sawfish and guitarfish. For elasmobranchs in general, there is considered to be good information on species' spatial distributions, their biology, but information on species-specific stock status, critical habitats is limited (Akhilesh et al. 2023). There is also a lack of UoA catch data as the majority of known interactions are from landings data. Thus, discards are not known. Therefore, it cannot be said that data are 'adequate' to determine the UoA related mortality on ETP species. <b>SG60 is not met.</b>			
<b>b</b>	<b>Information adequacy for management strategy</b>			
	Guide post	Information is adequate to support <b>measures</b> to manage the impacts on ETP species.	Information is adequate to measure trends and support a <b>strategy</b> to manage impacts on ETP species.	Information is adequate to support a <b>comprehensive strategy</b> to manage impacts, minimise mortality and injury of ETP species, and evaluate with a <b>high degree of certainty</b>

PI 2.3.3		<b>Relevant information is collected to support the management of UoA impacts on ETP species, including:</b> <ul style="list-style-type: none"> <li>• Information for the development of the management strategy;</li> <li>• Information to assess the effectiveness of the management strategy; and</li> <li>• Information to determine the outcome status of ETP species</li> </ul>		
				whether a strategy is achieving its objectives.
	Met?	<b>No – Elasmobranch species</b>  <b>Yes – turtles and cetaceans</b>	<b>No – all species.</b>	<b>No – all species</b>
Rationale		<p>Information is adequate to support measures to manage the impacts on ETP species – the measures discussed in PI 2.3.2 SI a are applied and there are considered to be low interaction levels with turtle and cetacean species. According to the multi-species PA FIP, the Kerala multi-species fishery is also collecting ETP information via log sheets (yet to be analysed by the research institute) from the model boat, which would be useful here to determine if information is adequate to support measures in place, particularly for elasmobranch species. Similarly, the FIP also has planned to conduct regular studies on to square mesh trials, on bycatch characterisation and selectivity analysis for an entire year with the help of the research organisation CIFT. The study will be conducted at Kochi &amp; Kollam between August 2024 to July 2025. Results are not yet out. For elasmobranch species, there is currently insufficient evidence to determine if measures manage the impacts on ETP species, whilst there is evidence to support that trawl fisheries (albeit not necessarily this UoA's gear type) are associated with higher catches and mortality rates (Zacharia et al. 2017) and mechanised trawl has the second highest CPUE of elasmobranchs out of all major gear groups (CMFRI, 2019). <b>SG60 not met for elasmobranch species.</b> However, the low level of interactions on turtle and cetacean species provides sufficient evidence to suggest that measures manage the impact on ETP species. <b>SG60 met for turtle and cetacean species.</b> Information is not adequate to support a strategy to manage UoA impacts as there is insufficient information on discards.</p>		

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>More information sought</b> Improved information required on ETP encounters, fate and impact / compliance to ETP mitigation measures

**PI 2.4.1 – Habitats outcome**

PI 2.4.1		<b>The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
<b>a</b>	<b>Commonly encountered habitat status</b>			
	Guide post	The UoA is <b>unlikely</b> to reduce structure and function of the commonly encountered habitats to a point where there would	The UoA is <b>highly unlikely</b> to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is <b>evidence</b> that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.

<b>PI 2.4.1</b>		<b>The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates</b>		
		be serious or irreversible harm.		
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		<p>There is information on the benthic structure of the trawling grounds and biota, so that RBF is not necessary. Harkantra et al., 1980 studied the benthos of the shelf region and reported that the bottom is clayey silt and sandy in Karnataka, and clayey sand, silty sand and sandy clay in Kerala (refer section 7.5 for details). It can be assumed from this study that the impact of trawling on such substratum may not cause serious and irreversible harm. Varghese S P et al., 2024, mapped the fishing grounds of major fishes caught along Indian coasts. Though this list does not indicate the target species, as the fishery is the same this can be considered as a fishery footprint of trawl fishery. A research paper by Meenakumari et al., 2008 discusses the impact of trawling on bottom communities and reports that there is change in benthic community structure and composition. An experimental study (for 17 months) along Veraval coast, Gujarat (west coast of India) on the impact of trawling in commercial grounds and found that there are changes in organic matter and sediment characteristics (Bhagirathan et al., 2010). Still there are no long-term studies on the impact of trawling in the less sensitive habitats in India and on a precautionary note, this is scored <b>below 60</b>. With some more information on the benthic organisms affected by trawling this SI could score higher.</p>		
		<b>VME habitat status</b>		
<b>b</b>	Guide post	The UoA is <b>unlikely</b> to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is <b>highly unlikely</b> to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is <b>evidence</b> that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		<p>The habitat under consideration in this assessment is not well defined in the context of Unicorn leather jacket exclusively. However, Varghese S P. et al., 2024 (Fishery Survey of India), published 'An Atlas of India's Demersal Fishery Resources and Fishing Grounds' which covers the trawl fishing grounds of ten commonly caught species (9 species of fish and squid). As Unicorn leather jacket is caught in the same trawl it can be assumed that the fishing grounds are same. Therefore the footprint of the fishery in Kerala and Karnataka is known.</p> <p>At the same time from interactions with fishers, there are rocky (laterite) areas which they avoid as it damages the net.</p> <p>This shows that such areas are protected from trawling. There are no VMEs in Kerala.</p> <p>The only known VME habitat is off Karnataka, 'Netrani island' which is a protected area and trawling is not allowed there. Sivakumar et al., 2014 has mapped the protected areas along Indian coast and there are no vulnerable marine ecosystems in the UoA states. The available information suggests that there are no more sensitive habitats in the area under assessment. Therefore, it can be assumed that the fishery is unlikely to impact the VME in the fishing area and <b>SG 60 is met</b>.</p> <p>Currently <b>SG 80 is not met</b> as we need more evidence to support the impact of trawl on VMEs.</p>		
<b>c</b>	<b>Minor habitat status</b>			

<b>PI 2.4.1</b>		<b>The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates</b>		
	Guide post			There is <b>evidence</b> that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			<b>No</b>
Rationale		At the pre-assessment stage there is no need to identify minor habitats since they intervene in scoring only at SG100.		

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<p><b>More information needed on</b></p> <ul style="list-style-type: none"> <li>- <b>The UoA gear type habitats encountered– if no interaction with the seabed, evidence is required.</b></li> <li>- <b>There needs to be information on impact of UoA on habitats encountered.</b></li> </ul> <p>If the UoA is found to interact with VMEs, maps and specific position information relating to the UoA's footprint are required, along with the position of the closed areas to protect VMEs, Location and rationales for the location of closed areas (MPAs) and catch (and catch rates) of VME-indicators and information to support the scientific definition of precautionary trigger levels (if used) – see MSC Fisheries Standard 2.01 SA3.15.6 for more information</p>
Data-deficient? (Risk-Based Framework needed)	<b>No</b>

#### PI 2.4.2 – Habitats management strategy

<b>PI 2.4.2</b>		<b>There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
<b>a</b>	<b>Management strategy in place</b>			
	Guide post	There are <b>measures</b> in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a <b>partial strategy</b> in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a <b>strategy</b> in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale	<p><i>In the context of this PI, MSC v3.0 states that: Measures could include the closure of an area that was primarily put in place to avoid the catch of juvenile target species and enhance target species sustainability, but also has a beneficial effect on other species caught by the UoA, such as other juvenile finfish.</i></p> <p><i>A partial strategy may not have been designed to manage the impact on that component specifically. However, if such measures are effective in assisting the UoA to achieve the SG80 level for the outcome PI, this could be considered as sufficient in meeting the criteria for partial strategy.</i></p>			

<b>PI 2.4.2</b>		<b>There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats</b>		
		<p><i>A strategy could include voluntary or customary arrangements, agreements, or practices, and/or codes of practice where they can be demonstrated to be working by achieving the corresponding outcome PI at SG80 or higher</i></p> <p>There are measures in place to protect inshore habitats from trawling (see below) but measures are limited for offshore areas:</p> <ul style="list-style-type: none"> <li>• Trawling is banned in inshore waters during the seasonal monsoon to protect juvenile and spawning habitat for fish and invertebrate species.</li> <li>• India has a network of 611 Protected areas, including 96 national parks, 510 wildlife sanctuaries, three conservation reserves, and two community reserves, covering a total of 155,978.05 km, or approximately 4.75% of the geographical area of the country, including both terrestrial and marine ecosystems. There is only one MPA in the UoA states (Zacharia P U -undated)</li> <li>• Mechanised fishing operation is prohibited in the inshore waters (State MFRAs) to minimise overlap of the fishing effort with the inshore spawning and egg laying of most commercial species. Fishermen also report that some rocky (laterite?) areas are unsuitable for trawling.</li> <li>• Trawlers are excluded from inshore areas (inshore of 15 fathoms (30m) north of Kollam, 10 fathoms (20m) south).</li> <li>• Almost all coastal states of India have allocated no-trawl fishing zones under the 'Fishing Regulation Act' (CMFRI, 2022b).</li> <li>• There is an inability to trawl in certain areas like coral grounds as fishers try to avoid corals in case nets are damaged or lost (source-fisher interactions).</li> <li>• Some trawl fishery footprint mapping has been done by FSI (Varghese S P. et al., 2024)</li> </ul> <p>There is, therefore, some area of habitat that is protected from the impacts of this fishery, although more detailed mapping is required to evaluate the proportion of the area that is protected.</p> <p>There are some measures in place, however, it is unclear if these are sufficient to reach a Habitat Outcome of SG80 without more information on potential habitat encounters, VME encounters and fishery footprints. <b>SG60 not met.</b></p>		
<b>Management strategy evaluation</b>				
<b>b</b>	Guide post	The measures are <b>considered likely</b> to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some <b>objective basis for confidence</b> that the measures/partial strategy will work, based on <b>information directly about the UoA and/or habitats</b> involved.	<b>Testing</b> supports <b>high confidence</b> that the partial strategy/strategy will work, based on <b>information directly about the UoA and/or habitats</b> involved.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		There are few measures related to trawling activities but it is not clear if these are likely to work in terms of protecting habitats as there is little evidence on habitat interactions. <b>SG60</b> is not met until more information is available on habitat interactions between the gear and the commonly encountered habitats and VMEs.		
<b>Management strategy implementation</b>				
<b>c</b>	Guide post		There is <b>some quantitative evidence</b> that the measures/partial	There is <b>clear quantitative evidence</b> that the partial

<b>PI 2.4.2</b>		<b>There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats</b>		
			strategy is being implemented successfully.	strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		<b>No</b>	<b>No</b>
Rationale		As PI 2.4.2b does not meet SG60, SI(c) is not scored.		
<b>Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs</b>				
<b>d</b>	Guide post	There is <b>qualitative evidence</b> that the UoA complies with its management requirements to protect VMEs.	There is <b>some quantitative evidence</b> that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is <b>clear quantitative evidence</b> that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		There is insufficient information on habitats outcome to know if VMEs are affected by the UoA. Therefore, the team is not aware of any qualitative evidence that the UoA complies with its management requirements to protect VMEs. <b>SG60 is not met.</b>		

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>More information sought</b> The UoA gear type habitats encountered– if no interaction with the seabed, evidence is required. There needs to be information on impact of UoA on habitats encountered. If the UoA is found to interact with VMEs, maps and specific position information relating to the UoA's footprint are required, along with the position of the closed areas to protect VMEs, and catch (and catch rates) of VME-indicators and information to support the scientific definition of precautionary trigger levels (if used) – see MSC Fisheries Standard 2.01 SA3.15.6 for more information

### PI 2.4.3 – Habitats information

<b>PI 2.4.3</b>		<b>Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
<b>a</b>	<b>Information quality</b>			
	Guide post	The types and distribution of the main habitats are <b>broadly understood</b> .  OR	The nature, distribution and <b>vulnerability</b> of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.  OR	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.

<b>PI 2.4.3</b>		<b>Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat</b>		
		<b>If CSA is used to score PI 2.4.1 for the UoA:</b> Qualitative information is adequate to estimate the types and distribution of the main habitats.	<b>If CSA is used to score PI 2.4.1 for the UoA:</b> Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		<p>The distribution of habitats (benthic sand/mud/clay and pelagic) is broadly understood (CMFRI, 2017; Harkantra et al. 1980). The benthic fauna and physio-chemical factors are also broadly studied (Meenakumari et al., 1980; Bhagirathan et al., 2010 &amp; 2014). Thus, <b>SG60 is met.</b></p> <p>However, the nature, distribution and vulnerability of the main habitats in the UoA area is not known at a level of detail relevant to the scale and intensity of the UoA as there is no clear fishery footprint. SG80 is not met.</p>		
<b>Information adequacy for assessment of impacts</b>				
<b>b</b>	Guide post	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.  OR <b>If CSA is used to score PI 2.4.1 for the UoA:</b> Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear.  OR <b>If CSA is used to score PI 2.4.1 for the UoA:</b> Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	The physical impacts of the gear on all habitats have been quantified fully.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		<p>The information available is scarce and the assessment team will not be able to define any impact of the fishing gears as there are no footprint information of the UoAs. There is not 'adequate' information, or information on the spatial overlap of habitat with fishing gear. In 2018, CMFRI have produced an App with an interactive map for field observers to collect data on landings data and to passively geolocate fishing grounds, based on interviews with fishers (Akhilesh et al. 2021). Some information on impact of trawling on benthic habitat and fauna is available from Veraval, Gujarat, but not from the UoA states (though this could be comparable) (Bhagirathan et al., 2010&amp;2014). Again the study is for a short duration of 17 months and long term studies are necessary to understand the impact of gear on habitat. <b>SG 60 not met.</b></p>		
<b>c</b>	<b>Monitoring</b>			

<b>PI 2.4.3</b>		<b>Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat</b>		
	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in all habitat distributions over time are measured.
	Met?		<b>No</b>	<b>No</b>
Rationale		The SI c is not scored as there is not enough information to meet SG 60 on the other SIs and as there is no information base to score Sia or b at SG60 clearly continued adequate data collection for risk to main habitats (SG80 here) will not be met.		

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>More information sought</b> It's likely that main habitat interactions are minimal as there is qualitative evidence to suggest that interactions are associated with pelagic environment. Though evidence is needed to verify this. If an RBF (CSA) is to be used, more information on the nature of the fishing operations is needed – on potential interactions with the trawl is required, along with potential habitats to be interacted with.

### PI 2.5.1 – Ecosystem outcome

<b>PI 2.5.1</b>		<b>The UoA does not cause serious or irreversible harm to the key elements underlying ecosystem structure and function</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
<b>a</b>	<b>Ecosystem status</b>			
	Guide post	The UoA is <b>unlikely</b> to disrupt the <b>key</b> elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.	The UoA is <b>highly unlikely</b> to disrupt the <b>key</b> elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.	There is <b>evidence</b> that the UoA is <b>highly unlikely</b> to disrupt the <b>key</b> elements underlying ecosystem structure and function to a point where there would be serious or irreversible harm.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		<p>The Western India Coastal Current flows north-south during the SW monsoon (~June-August), driving seasonal coastal upwelling in the SW region during this period (the 'Malabar upwelling zone'). Upwelling is highest at Goa and diminishes gradually towards the south. In October, the current switches direction to northwards, and weakens. Coastal waters are moved inshore/offshore by these longshore currents (Ekman transport) and the annual migration patterns of many species (including the P1 species) tends to mirror this inshore/offshore pattern (Mohamed, 2014a).</p> <p>This is a multi-species fishery, with the ecosystem driven by upwelling. Species-level stock assessments have been conducted for many of the dominant 'bycatch' species, including elasmobranchs (see PI 2.2.1). There are catch profiles available for the trawl fishery, though little data are available for catch compositions by the gear described by the UoA.</p> <p>The Kerala marine ecosystem is extremely diverse, whereby 1,097 species have been recorded in total in landings data, including 781 in its southwest region, where a high proportion make up &lt;&lt;1% of catch. During the upwelling season,</p>		

PI 2.5.1	<p><b>The UoA does not cause serious or irreversible harm to the key elements underlying ecosystem structure and function</b></p>
	<p>the Kerala and some part of Karnataka coast has an unusual oceanographic phenomenon: ‘mud banks’. These are areas of high turbidity which form in association with upwelling, whereby the high load of fine suspended sediment causes patches of calm water (in contrast to the situation usually prevailing during the SW monsoon). Despite the high suspended sediment load, chlorophyll and zooplankton concentrations are also high in these areas, which attract fish and hence fishers. The specific drivers for the creation of these mud banks are still not completely understood, despite several years of study (Suneela &amp; Sureshkumar, 2021). As well as studying these mud banks, CMFRI collect and analyse a wide range of oceanographic and biogeochemical information, as described, for example, in the annual report (CMFRI, 2017). Several ecosystem models have been developed, focusing on different aspects of the ecosystem; it is not clear if any of the existing models are suitable for evaluating the role of this fishery specifically, but in any case, the technical capacity is available.</p> <p>In Kerala and Karnataka, the overall effort is capped by a moratorium placed on new boat construction, resulting in a lower likelihood of the biomass of main target species being reduced to a level of serious or irreversible harm to the ecosystem. Given the multi-species nature of the tropical fishery, there have been several ecosystem studies mainly in Kerala: CMFRI built a trophic model (KASE Model), based on ECOPATH and ECOSIM, applying landings and effort data (for the period 2007-2017) with 48 functional ecological groups (aggregating more than 400 species) to model the impact of fishery on the ecosystem and how changes in the fishing effort in Kerala and the closure of fishery during different seasons would impact yield and biomass of the different functional groups. Varghese et al. (2021) describes the ICAR-CMFRI-CSIRO-LENFEST project on "Benchmarks for ecosystem assessment: Indicators and guidelines for ecosystem-based fisheries management (EBFM)": where a major project objective was the development of models for ‘ecosystem-based fishery management suitable for tropical conditions where fish species diversity is very high and multiple gears are operated for harvesting the resources’ (Varghese et al. 2021).</p> <p>Mohamed et al., 2008 developed trophic model of Arabian sea ecosystem off Karnataka. The prey and predator niche overlaps for the Arabian Sea ecosystem of Karnataka indicates that tunas, cephalopods and large benthic carnivores have significant overlap in their diets with marine mammals. Maximum prey overlaps were observed for group 9, medium benthic carnivores. Similarly, large pelagics and large benthopelagics had significant predator overlaps. Maximum omnivory index (OI) for medium benthic carnivores, followed by small benthic carnivores like threadfin breams.</p> <p>There is no stock status report of the target species and many of the other species caught have a mixed or overfished status e.g. croakers, groupers and it is not clear how much of the catch they represent. Current removals are also not clear (but can be indicated through good landings data and some discard data).</p> <p>Given the high-productivity of the ecosystem, especially given the strength of the upwelling system, it is considered that the UoA is unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. <b>SG60 is met.</b> However, it cannot be said that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm as there is insufficient ecosystem modelling across all states, and particularly a lack of information about ecosystem outcomes from the UoA gear type. <b>SG80 not met.</b></p>

Draft scoring range	60-79
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Information gap indicator	<b>More information sought</b> Information sufficient to score PI for Kerala but not for Karnataka
Data-deficient? (Risk-Based Framework needed)	<b>No</b>

### PI 2.5.2 – Ecosystem management strategy

<b>PI 2.5.2</b>		<b>There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function</b>		
Scoring issue		<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>
<b>a</b>	<b>Management strategy in place</b>			
	Guide post	There are <b>measures</b> in place, if necessary which take into account the <b>potential impacts</b> of the UoA on key elements of the ecosystem.	There is a <b>partial strategy</b> in place, if necessary, which takes into account <b>available information and is expected to restrain impacts</b> of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a <b>strategy</b> that consists of a <b>plan</b> , in place which contains measures to <b>address all main impacts of the UoA</b> on the ecosystem, and at least some of these measures are in place.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		There are measures in place to limit ecosystem impacts including an overall cap on effort, monitoring of landings, stock assessments, marine protected areas and ecosystem modelling (KASE model and ECOSIM simulations). Thus, <b>SG60 is met</b> as there are measures in place, which take into account the potential impacts of the UoA on key elements of the ecosystem. However, there is insufficient evidence to suggest that measures/ partial strategy are expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. <b>SG80 not met.</b>		
<b>b</b>	<b>Management strategy evaluation</b>			
	Guide post	The <b>measures</b> are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/ ecosystems).	There is <b>some objective basis for confidence</b> that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	<b>Testing</b> supports <b>high confidence</b> that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems). There have been some examples of where there is testing to evidence that the measures work e.g. testing of closures of the mechanised fishery in Kuriakose et al. (2021). However, without more evidence across the states to suggest that the measures work across the states, <b>only SG60 is met.</b>		
<b>c</b>	<b>Management strategy implementation</b>			
	Guide post		There is <b>some evidence</b> that the measures/partial strategy is being <b>implemented successfully.</b>	There is <b>clear evidence</b> that the partial strategy/strategy is being <b>implemented successfully and is achieving its objective</b>

<b>PI 2.5.2</b>	<b>There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function</b>		
			<b>as set out in scoring issue (a).</b>
	Met?	<b>No</b>	<b>No</b>
Rationale	There is insufficient evidence to suggest that measures are implemented successfully. <b>SG60 is not met.</b>		

Draft scoring range	<b>60-79</b>
Information gap indicator	<b>More information sought</b> On impact of UoA on ecosystem Effectiveness of current measures

### PI 2.5.3 – Ecosystem information

<b>PI 2.5.3</b>	<b>There is adequate knowledge of the impacts of the UoA on the ecosystem</b>		
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>
<b>a</b>	<b>Information quality</b>		
	Guide post	Information is adequate to <b>identify</b> the key elements of the ecosystem.	Information is adequate to <b>broadly understand</b> the key elements of the ecosystem.
	Met?	<b>Yes</b>	<b>No</b>
Rationale	<p>The main impacts of the UoA on key ecosystem elements and ecosystem dynamics have been studied by CMFRI (Mohamed et al., 2008) and others (Chakraborty et al., 2020). There have been studies on physical processes including upwelling and biogeochemical cycles and on the biology of the main species and their ecological interactions, though with important data gaps e.g. on stock structure.</p> <p>CMFRI scientists have developed a Trophic model (KASE Model) for Kerala fisheries. The KASE model, built using ECOPATH and ECOSIM suite of software, encompasses an area of 86,894 km<sup>2</sup> and has 48 functional ecological groups (aggregating more than 400 species). Fish landings and fishing effort data over the period 2007-2017 are used. The ECOSIM simulations have been done by incorporating time series on landings into the ECOPATH model.</p> <p>Ecosystem models have been made in the shrimp trawl fishery of South east coast of India (Antony et al., 2010), which can be applied here. However, the studies have not been performed across the all the states under the UoA, or for many years.</p> <p>Information is adequate to broadly understand the key elements of the ecosystem. <b>SG 60 is met.</b> As information is not adequate to broadly understand the key elements of the ecosystem, <b>SG 80 is not met.</b></p>		
<b>b</b>	<b>Investigation of UoA impacts</b>		
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but <b>have not been investigated</b> in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and <b>some have been investigated in detail.</b>

<b>PI 2.5.3</b>		<b>There is adequate knowledge of the impacts of the UoA on the ecosystem</b>		
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		Main impacts of the UoA on these key ecosystem elements can be inferred from existing information but have not been investigated in detail: the information from the UoAs is very limited and main impacts caused in the key elements of the ecosystems cannot be identified. The identity of the catch composition at species level would be useful first step. <b>SG60 is met</b> however, without more accurate catch composition data, it cannot be said that these key ecosystem elements have been investigated in detail. <b>SG 80 not met.</b>		
		<b>Understanding of component functions</b>		
<b>c</b>	Guide post		The main functions of the components (i.e. P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are <b>known</b> .	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are <b>understood</b> .
	Met?		<b>No</b>	<b>No</b>
Rationale		It cannot be said that the main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are known without better data on catch composition, habitat interactions and ETP species interactions. <b>SG80 is not met.</b>		
		<b>Information relevance</b>		
<b>d</b>	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components <b>and elements</b> to allow the main consequences for the ecosystem to be inferred.
	Met?		<b>No</b>	<b>No</b>
Rationale		There is insufficient information available on the impacts of the UoA on these ecosystem components across all states to determine some of the main consequences for the ecosystem. <b>SG80 not met.</b>		
		<b>Monitoring</b>		
<b>e</b>	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		<b>No</b>	<b>No</b>
Rationale		Adequate data are not collected on the UoA catch enough to determine increases in risks. <b>SG80 is not met.</b>		

Draft scoring range	<b>60-79</b>
Information gap indicator	<b>More information sought</b> on interaction of key elements, management

## 7.1.10 Principle 3

### 10.1 Principle 3 background

#### 10.1.1 Legal and Customary framework

The evolution of fisheries legislation in India traces back to the Indian Fisheries Act, 1857.

In the National Legal Framework of India, individual States have control of the seas and living marine resources up to 12 nautical miles (nm) from the shore, while the Central Government has control from 12 nm to the 200 nm exclusive economic zone (EEZ) boundary.

The general framework for fisheries legislation is provided by the Marine Fishing Regulation Act (MFRA). The Government of India circulated a model bill to all states with a recommendation to enact similar legislation. In the Federal Constitution of India, it is the responsibility of each state government to implement all laws relating to fisheries and the legal frameworks. Therefore, each state has their own MFRAs. The act intends to maintain the law and order of the sea for protecting the interest of traditional fishers by regulating fishing vessels in the 12-nautical mile territorial sea. The act was first implemented in the states of Kerala and Goa in 1980. They were subsequently enacted in other States, the latest being in 2003, in Gujarat.

The Marine Fishing Regulation Acts (MFRAs) have provision for regulating fishing and conservation measures in the territorial waters. These include regulation of mesh size to avoid catch of juvenile fish; minimum-maximum fish sizes, regulation of gear to avoid over exploitation of certain species; reservation of zones to traditional fishermen and declaration of closed seasons. These Acts demarcate fishing zones in territorial waters for fishing by non-mechanized and mechanized fishing vessels. The distance from the shore earmarked for each category varies from state to state. In general, 5 to 10 km is reserved for operation by artisanal<sup>9</sup> (non-mechanized) vessels.

Unlike regulations of fishing areas provided in the Acts, the decision on seasonal closure is taken on a year-to-year basis normally prior to or during the onset of the south-west monsoon. As per the order issued by Department of Animal Husbandry, Dairy and Fisheries, Government of India, dated 9th March 2011, a uniform ban on fishing by all fishing vessels in the Indian Exclusive Economic Zone (EEZ) beyond territorial waters on East Coast including Andaman & Nicobar Islands and West coast including Lakshadweep has been imposed for conservation and effective management of fishing resources and for sea safety reasons. Along the east coast, uniform seasonal closure of 61 days is being implemented from 15th April to 15th June, while along the west coast all states except Kerala impose a ban for 61 days from June 1<sup>st</sup> to July 31<sup>st</sup> whereas Kerala has a shorter ban period of 52 days from 9th June to 31st July.

The National Marine Fisheries (Regulation and Management) Bill, 2019 intends to reduce and manage interstate/international conflicts and facilitate holistic resource utilization in EEZ. The overall goal of the draft national marine policy 2019 is to enhance sustainable seafood production, food and nutritional security of the nation and to ensure livelihood security of the fisher/coastal community through additional livelihood/entrepreneurial options.

Later the National Fisheries Policy 2020 (NFP) has been drafted by merging existing policies such as National Policy on Marine Fisheries, 2017 (NPMF), Draft National Inland Fisheries and Aquaculture Policy (NIFAP) and Draft National Mariculture Policy (NMP). The policy framework will act as a model framework to states and Union Territories (UTs) for developing location-specific legislation and policies with regulatory and developmental features. The policy document envisages export growth, enhanced fishers' income and better choice for consumers through sustainable development of the fisheries sector. The policy focuses on managing the fisheries resources sustainably and responsibly by following an Ecosystem Approach of Fisheries (EAF) management and modern, scientific and diverse fishing practices in the ocean. The policy aims in improved coordination among centre, States/ UTs and other stakeholders for better fisheries governance. An updated model bill by the centre, considering international norms, will enable delegation of power to the coastal States/ UTs enabling granting marine fishing licence beyond 12 nautical miles in the EEZ.

The policy has plans to promote sustainable fishing methods using inputs from scientific institutions and fishers to prevent resource depletion. Another priority is the safety of the enlisted fishing vessels at sea. There are plans to enable a good Monitoring, Control and Surveillance (MCS) system through real-time monitoring and communication

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<sup>9</sup> Artisanal is defined under Chapter II Regulation of Fishing in both Kerala Marine Fisheries Regulation Act and Karnataka MFRA

between vessels at sea and concerned authorities. Adequate training and capacity building of the coastal guard, coastal police and fisher community is necessary to strengthen the MCS system. A sound mechanism will be in place for the prevention/ elimination of Illegal, Unreported and Unregulated (IUU) fishing. Ratification of ILO Convention 188 in a time-based manner is also prioritised. It is also planning to address transboundary stock management issues with neighbouring countries.

For holistic management of the fisheries sector, the policy is considering the following:

- Identifying knowledge gaps
- Identifying stakeholders
- Identifying institution/ organizations/ change agents
- Developing the management programme over a timeline
- Evolving a legal framework
- Consensus building across stakeholders
- Integrating policy elements across location/ time
- Political will to implement and governance/compliance against all odds
- Regular review of policy

(Salim & Anuja, 2022)

In 1991, the Ministry of Environment and Forests issued a Coastal Regulation Zone Notification to protect the coastal zone. The coastal regulation zone (CRZ), as defined in the notification, consists of the area within 500 metres from the high tide line. The coastal zone also includes riparian lands by the side of rivers, creeks and backwaters up to the point where the tidal effect is felt.

Since the notification was issued, several amendments have been made. The notification on 2011 restricts the setting up and expansion of any industry, operations or processes and manufacture or handling or storage or disposal of hazardous substances as specified in the Hazardous Substances (Handling, Management and Transboundary Movement) Rules, 2009 in the CRZ. Later a committee examined various issues and concerns of coastal States and Union territories and various stakeholders and formed the Coastal Regulation Zone Notification 2019. This notification gave more importance to protection of mangroves.

The CRZ was subdivided into CRZ-I, CRZ-II, CRZ-III and CRZ-IV.

- **CRZ-I** areas are environmentally most critical and shall be further classified as under:
  - **CRZ-I A** ecologically sensitive areas and the geomorphological features which play a role in the maintaining the integrity of the coast like mangroves, corals and coral reefs, sand dunes, biologically active mudflats, national parks, marine parks, sanctuaries, reserve forests, wildlife habitats and other protected areas under the provisions of Wild Life (Protection) Act, the Forest (Conservation) Act or Environment (Protection) Act; including biosphere reserves, salt marshes, turtle nesting grounds, horse shoe crabs habitats, sea grass beds, nesting grounds of birds, areas or structures of archaeological importance and heritage sites
  - **CRZ-I B** the intertidal zone i.e. the area between Low Tide Line and High Tide Line
- **2.2 CRZ-II** the developed land areas up to or close to the shoreline, within the existing municipal limits or in other existing legally designated urban areas, which are substantially built-up with a ratio of built-up plots to that of total plots being more than 50% and have been provided with drainage and approach roads and other infrastructural facilities, such as water supply and sewerage mains etc.
- **CRZ-III** land areas that are relatively undisturbed (viz rural areas etc.) and those do not fall under CRZ-II. CRZ-III is further classified into following categories:
  - **CRZ-III A** densely populated areas. Here an area up to 50 mts from the HTL on the landward side shall be earmarked as the No Development Zone (NDZ)
  - **2.3.2 CRZ-III B** less dense population and an area upto 200 mts from HTL has to be marked as NDZ.
- **CRZ-IV** the water area and shall be further classified
  - **CRZ-IV A** water area and the sea bed area between the Low Tide Line up to twelve (12) nautical miles on the seaward side

In addition, there is an Environment (Protection) Act 1986, which deals with pollution and more general protection of the environment. It is an umbrella Act providing a framework for local, state and federal agencies to work together to protect the environment and prevent hazards to humans and other living beings. This was amended a few times the latest being in 2022 and a draft amendment was issued in 2023.

The Government of India's National Environment Policy (GoI 2006) is mainly concerned with habitat. The policy does cover coastal resources, but includes no specific actions related to fisheries. GoI (2006) indicates that the following further actions will be taken up (note: a time is not given and no updates are available):

- a) Mainstream the sustainable management of mangroves into the forestry sector regulatory regime, ensuring that they continue to provide livelihoods to local communities.
- b) Disseminate available techniques for regeneration of coral reefs, and support activities based on application of such techniques.
- c) Explicitly consider sea-level rise and vulnerability of coastal areas to climate change and geological events, in coastal management plans, as well as infrastructure planning and construction norms.
- d) Adopt a comprehensive approach to Integrated Coastal Management by addressing linkages between coastal areas, wetlands, and river systems, in relevant policies, regulation, and programs.
- e) Develop a strategy for strengthening regulation, and addressing impacts, of ship-breaking activities on human health, and coastal and near marine resources.

The Wildlife Protection Act, 1972 provides for the protection of plants and animal species. Among other things, the Act established schedules of protected plant and animal species, so that hunting or harvesting these species has been largely outlawed. It has six schedules which give varying degrees of protection. Schedule I and part II of Schedule II provide absolute protection - offences under these are prescribed the highest penalties. Species listed in Schedule III and Schedule IV are also protected, but the penalties are much lower. Schedule V includes the animals which may be hunted. There have been several amendments, the latest being the Wildlife (Protection) Act Amendment 2022, which seeks to give effect to India's obligations under the CITES. The Bill also enhances the penalties prescribed for violation of provisions of the Act.

The Water Prevention and Control of Pollution Act (1974) was created to prevent pollution of waters by industry, agriculture and household sources. Its main objectives were to prevent and control pollution and restore water bodies, also to assess pollution levels and create repercussions for polluters.

The Maritime Zones of India (Regulations of fishing by foreign vessels) Act, 1981 was introduced to control activities of foreign fishing vessels within Indian Maritime Zone. The Act provides basis for joint ventures and chartered vessels and also for bilateral / multilateral fishing access agreements.

The Marine Fishing Policy, 2004 deals with deep-sea fishing, resource conservation and socio-economic security of fishermen. The Charter Policy in 1981 permitted entry of foreign fishing vessels to fish in the Indian EEZ, under the enforcement of Ministry of Agriculture.

The New Deep Sea Policy of 1991 permitted Indian companies to enter into Joint Venture arrangements with foreign fishing companies and acquire fishing vessels for fishing in the Indian EEZ, flying the Indian flag.

The measures for resource conservation include implementation of closed season, ban on destructive methods of fishing and mesh size regulations. The policy also envisages prohibition of catching of juveniles and non-targeted species and discarding less preferred species once they are caught through legislation. Monitoring control and surveillance system (MCS) would be enforced through posting of observers on commercial fishing vessels.

The policy highlights ensuring socio-economic security of the fishermen. Artisanal fisheries deploying out Board Motors (OBMs) and small mechanized boats up to 12 m would be treated par with agriculture while small scale fisheries involving mechanized boats under 20 m registered length would be treated at par with small scale industries. Fishing vessels above 20 m and fishing activity involving mother ships or factory vessels would be treated as industrial activity. Further, full time occasional fishermen whose household does not own a boat would be treated at par with landless labourers and would qualify for special care and protection. Housing scheme for fishermen, greater focus by financing institutions and improved safety at sea are the other components of fishermen welfare programmes.

The Department of Fisheries under the Ministry of Fisheries, Animal Husbandry & Dairying came into existence with effect from 05.02.2019 through carving out Fishery Division from the erstwhile Department of Animal Husbandry, Dairying and Fisheries vide Cabinet Secretariat's Notification F.No.1/21/21/2018-Cab dated 05.02.2019. The Department is responsible for matters relating to formulation of policy and schemes relating to Development of Inland , Marine and Coastal Fisheries and Fishery Institutes namely Fishery Survey of India Mumbai, Central Institute of Fisheries Nautical and Engineering Training (CIFNET), Kerala, Central Institute of Coastal Engineering For Fishery (CICEF), Bangalore, National Institute of Fisheries Post Harvest Technology and Training,(NIFPHATT), Kochi, National Fisheries Development Board (NFDB), Hyderabad, Coastal Aquaculture Authority, Chennai.

Currently the Central Government has identified Blue Economy as an area of high priority given its potential for robust economic growth along with welfare. Realising the pivotal role that the fisheries and aquaculture sector can play in sustaining and enriching livelihoods, the government introduced its flagship scheme called **Pradhan Mantri Matsya Sampada Yojana** (PMMSY) to further augment fisheries production, productivity, and livelihoods—keeping infrastructural development at the center. The fishermen are given assistance with replacement boats and nets, a livelihood support during fishing ban or lean periods along with extension and support services through 2,494 Sagar Mitras and 79 Matsya Seva Kendras.

The UoA of the current Pre-assessment lies in the jurisdiction of two states, Kerala and Karnataka

**Kerala:** The Kerala Marine Fishing Regulation Act (KMFRA) came into existence during 1980 and was formed to regulate the fishing by vessels in the sea along the coast of the state of Kerala.

The KMFRA provides for the regulation, restriction and prohibition of fishing by vessels in the sea along the whole or part of the coast line of the State. The act enables regulation of fishing in areas and periods by species, vessel type and gear. There is no specific allowance for catch quotas.

Included explicitly in KMFRA is the need to protect the interest of different sections of persons engaged in fishing particularly those engaged in fishing using traditional fishing craft such as catamaran, country craft or canoe (section 2 a), the need to conserve fish and to regulate fishing on a scientific basis (section 2 b) and the need to maintain law and order in the sea (section 2c). Fishing vessels are registered under KMFRA.

In 2017, the KFMRA Act was amended to include participatory management councils at the village, district and state level. These councils have representatives from fishers, government officials, vessel owners, vessel builders, fish traders, non-government organisation (NGO) representatives and scientists. The amended KFMRA Act is still not completely implemented, so at present the process is not formalised. It is therefore difficult to confirm that the cooperation is effective, as there has not been evidence of successful collaboration. Being said, the enforcement team of Government of Kerala has been able to curb juvenile fishing by imposing penalties. The Government has also successfully distributed the Bycatch Reduction Device (BRD), square mesh cod-end to about 200 trawlers at a subsidised rate, though enforcement of its usage is still in the preliminary stage.

The most recent Kerala Marine Fisheries (Amendment) Bill, 2021 makes it obligatory for all the fisher crew in the boat to carry biometric identification cards and strictly prohibits the use of fishing vessels for other activities. The bill has also reduced the penalties imposed on fishing vessels for first time violations following a plea by boat owners.

A 2010 report by the World Bank suggested the current legal framework in India is not comprehensive and contains several gaps, particularly in regard to fisheries management. On a positive note, the fisheries management system in Kerala State has a transparent mechanism for the resolution of legal disputes. The KMFRA Act therefore has specific provisions for the protection of legal rights of traditional fishers.

There is a trawling ban for mechanised vessels in place in Kerala for 52 days during the Southwest monsoon season, from 9 June to 31 July. Motorised (outboard) and non-motorised boats are not included in this ban. At this time, the harbours are closed, and boats cannot leave. The ban is enforced by the state fisheries department and police, and is in allegiance with the central government policy of 61-day trawl ban in each state (Kerala opts for a shorter period).

**Karnataka:** The Karnataka Marine Fishing Regulation Act came into existence during 1986 and was formed to regulate the fishing by vessels in the sea along the coast of the state of Karnataka. This was followed by the Karnataka Marine Fishing (Regulation) Rules in 1987.

The Act gives the State government power to regulate, restrict or prohibit fishing in specified areas, and periods by species, vessel type and gear. There is no specific allowance for catch quotas.

The Act emphasises on the need to protect the interests of different sections of persons engaged in fishing particularly those engaged in fishing using traditional fishing craft such as country craft or canoe.

There are no new amendments to the Act/Rules, but many changes are prescribed via, orders and notifications by the government.

Fishing vessels must be registered under the Department of Fisheries, Karnataka.

The Order dated 28.02.2019 by Department of Fisheries, Karnataka has given Minimum legal size of 19 fish species which includes the Indian squid (*Uroteuthis photololigo duvauceli*). A notification dated 16/07/2018 is imposing 35 mm square mesh codend for all trawl nets. The state has a ban on catching 9 species of sharks. There are also notifications banning light fishing, bull trawling etc. There is an order demarcating fishing areas for operation of fishing vessels using different gears. Accordingly, a belt from the seashore up to 3 miles (5km) is reserved for Rampani and

traditional fishing operations. As far as the team could gather the enforcement is quite poor in the state of Karnataka and many of these regulations remain in paper form only.

There is fishing ban along Karnataka coast for 61 days from 1 June to 31 July in allegiance with a central government policy of 61-day trawl ban in each state. It is a total fishing ban and mechanised boats and traditional boats fitted with inboard or outboard engines of 10 HP and above are banned from fishing during the period. The traditional fishing boats fitted with less than 10 hp engines are permitted to carry out fishing. Those violating the ban will not be eligible for subsidised diesel for a period of 12 months.

### **10.1.2 Consultation, roles and responsibilities**

Potential stakeholders of the Indian squid fishery are many and varied. At the Central Government level, management is currently overseen by the Department of Fisheries under the Ministry of Fisheries, Animal Husbandry & Dairying. This came into existence from 05.02.2019. The Department is responsible for matters relating to formulation of policy and schemes, and relating to Development of Inland, Marine and Coastal Fisheries and Fishery Institutes namely the Fishery Survey of India Mumbai, Central Institute of Fisheries Nautical and Engineering Training (CIFNET), Kerala, Central Institute of Coastal Engineering For Fishery (CICEF), Bangalore, National Institute of Fisheries Post Harvest Technology and Training, (NIFPHATT), Kochi, National Fisheries Development Board (NFDB), Hyderabad, Coastal Aquaculture Authority, Chennai. It also provides technical and financial assistance for implementation of fishery development schemes to various States/Union Territories (UT)s and other implementing agencies. Department of Fisheries, GoI is responsible for fisheries management from 12nm to the 200nm EEZ boundary. The Department of Fisheries, Ministry of Fisheries, Animal Husbandry and Dairying, of the Government of India, is implementing Pradhan Mantri Matsya Sampada Yojana (PMMSY) – a scheme to bring about Blue Revolution through sustainable and responsible development of fisheries sector in India. PMMSY is being implemented in all the States and Union Territories for a period of 5 years from FY 2020-21 to FY 2024-25.

PMMSY is designed to address critical gaps in the fisheries value chain from fish production, productivity and quality to technology, post-harvest infrastructure and marketing. It aims to modernize and strengthen the value chain, enhance traceability, and establish a robust fisheries management framework while simultaneously ensuring the socio-economic welfare of fishers and fish farmers.

In all the five states assessed, The Department of Fisheries, under the state Government is responsible for implementation of State fisheries policy and legislation covering territorial waters. It manages investments in fisheries infrastructure, distributes subsidies for fishing equipment, vessel registration and licensing, and monitoring. DoF also implements fisher welfare instruments, such as social security schemes and social infrastructure, and supports para-state organisations like fisheries cooperatives, fisheries corporation, and fishermen welfare board.

A National Fisheries Advisory Board reviews fisheries policies and schemes and is made up of representatives of all state fisheries departments, fisheries agencies, representatives of fishermen associations, etc. However, it has no powers as such, but advises the Ministry on policies through ad hoc meetings.

The Ministry of Defence is responsible for patrolling the seas around India using the Indian Navy and the Coast Guard. It is working with fisheries departments to ensure that all boats and fishermen are properly registered and have proper documents. The Coast Guard was set up in 1979 to guard India's economic interests within its EEZ and primarily undertakes patrolling and other control and surveillance activities beyond 12 nautical miles.

The District Administration (under the Revenue Department) and the District Collector in practice has plays a key role in resolving major inshore fisheries conflicts and implementing development schemes.

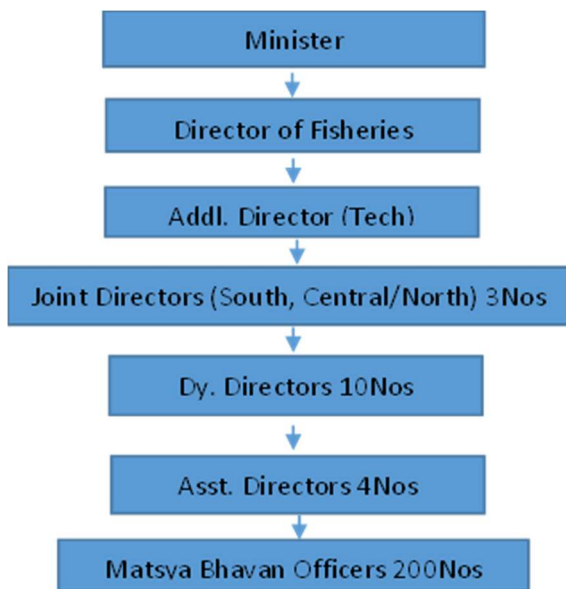


Figure 24 Organisational setup of Dept. of Fisheries, Kerala (The other states have a similar organisational set up with slight changes)

Ministry of Environment and Forests (MoEF) is the most relevant organisation for formulating and implementing environment policies, legislations, regulations, and the Wildlife Protection Act. The CRZ is also an instrument used by the MoEF.

The Central Marine Fisheries Research Institute (CMFRI) is the main agency responsible for marine fisheries science, especially fisheries biology, fish catch statistics and stock assessments. It collects all fish landings data through a sampling programme of mainland landing sites.

Fisheries Survey of India conducts surveys, but is concerned only with offshore resources (but not usually for the artisanal fleet). The Central Institute of Fishing Technology (CIFT) is involved in gear technology research, and would be relevant to any gear developments to improve selectivity (TED/BRD etc.). Also, organisations like the Central Institute of Fisheries Education (CIFE) undertake education and research in fisheries and the Fishery Survey of India (FSI) conducts national fish stock assessments.

CMFRI scientists have played an important role in the development of various reports that have shaped fisheries management in India including: Indian Marine Fisheries Code: Guidance on a marine fisheries management model for India and Report of the Committee to Evaluate Fish Wealth/Impact of Trawl ban along Kerala coast. They were also involved with the Department of Fisheries, Kerala in the development of the 2017 report – Recommendations on Amendments to the KMFR Act and Rules that made recommendations on proposed amendments to the KMFR Act to improve fisheries management and sustainability of marine resources in Kerala. It is based on the reports by CMFRI that almost all states now have a minimum legal-size legislation. Both Kerala and Karnataka have implemented MLS in their MFRAs. The research by CMFRI scientists have resulted in major policy changes at the national level and state level.

The Central Institute of Fishing Technology (CIFT) has played a major role in craft and gear modifications in the country. They were involved in the recommendations on amendments to the KMFR Act to regulate bycatch and total capacity of vessels. CIFT is playing a major role in popularisation of the bycatch reduction device (BRD) square mesh cod-end which is part of regulations in both the assessed states. They are also involved in the trials and implementation of TED in the coastal states.

In terms of fisheries science research and education in Kerala, institutes like Kerala University of Fisheries and Ocean studies (KUFOS) and School of Industrial Fisheries under Cochin University of Science and Technology, which offers courses and undertakes research and extension work. In Karnataka, The College of Fisheries under Karnataka Veterinary, Animal and Fisheries science University offers higher education and undertakes research activities.

The Marine Products Export Development Authority (MPEDA) is a set up under the Ministry of Commerce to provide technical and financial support to India's seafood export industry. It regulates seafood exporters and promotes fish quality improvement and value addition. It is also involved in fisheries management of selective parts of the fleet, including supporting initiatives for improved fish quality and improvements in fishing gear. Fishing vessels and all fishery units interested in MPEDA subsidies must register with MPEDA. It has offices in Tokyo, Brussels, and New York to promote Indian seafood. NETFISH is an autonomous society set up under MPEDA to undertake extension work among fishing communities for improvement of fish quality and for better fisheries conservation/ management

specifically to deal with perceived threats to Indian seafood such as higher quality standards imposed on imports and labelling schemes like the MSC.

The Seafood Exporters Association of India (SEAI) represents seafood exporters working on export policies. They take up common issues affecting the seafood industry; including fisheries management issues that concerns buyers.

There are many institutions devoted to fisher welfare. Fisheries Cooperative Societies are primarily used to channel state schemes to fishing communities. The Kerala State Cooperative Federation for Fisheries development Ltd., also known as Matsyafed are primary level welfare societies in the coastal fishery sector with the objective of ensuring the economic and social development of the fishermen community by implementing various schemes aimed at promoting the production, procurement, processing and marketing of fish and fish products.

The Karnataka State Co-operative Fisheries Federation Ltd takes up activities for the socio-economic development of fishermen by effectively organizing production, procurement, processing and marketing of fish through its member fishermen co-operative societies at the grass root level on co-operative principles. These societies represent fishermen interests and are organised along traditional lines among groups of fishers sharing common culture and needs.

The Fishermen Welfare Boards of the states provides various social security to fishing communities including insurance, insurance, grants for education, old age pensions etc. The Department of Rural Development and Panchayati Raj promotes rural livelihoods, self-help groups, and provides rural infrastructure, and could help develop alternative employment for fishers.

Fishing villages have been historically self-governing and regulate many aspects of life in the village, including fishing. They make rules related to fishing and settle disputes.

There are Self Help Groups (SHG) where small groups of women (up to 20) come together for savings and credit. These are mostly organised by NGOs. There are SHG federations which coordinate and provide higher order services organised by some NGOs as well as by Government.

Apart from these, there are associations of fishermen that work for the rights of fishers. They fight for rights and lobby Government on fishery policy matters. They campaign for fuel subsidies, coastal issues, and welfare. Various trade unions also take up welfare issues on behalf of their members (trade unions feed into government and management through voting and there are associations who meet with government policy makers and representatives).

In Kerala, several local fisher organisations participate in the management process including, the Kerala Swathantra Matsya Thozhilali Federation (KSMTF) representing artisanal fishers and the All- Kerala Fishing Boat Operators Association (AKFBOA) representing the mechanised sector. The role of these organisations in the consultation and management process has become clearer through the 2017 amendment to the KFMR Act. In 2017, the KFMR Act was amended to include participatory management councils at the village, district and state level (Figure 25). These councils have representatives from fishers, government officials, vessel owners, vessel builders, fish traders, non-government organisation (NGO) representatives and scientists. Section 13A of the amended KFMR Act explicitly outlines the composition of each council. Sections 13 (B, C and D) outline the powers, duties and functions of each village, district and state council. Importantly, each council is tasked with contributing to the development of a marine fisheries management plan. The State Fisheries Council and District Fisheries Council are already fully functional, while the village Fisheries Councils have been formed and is gearing up.

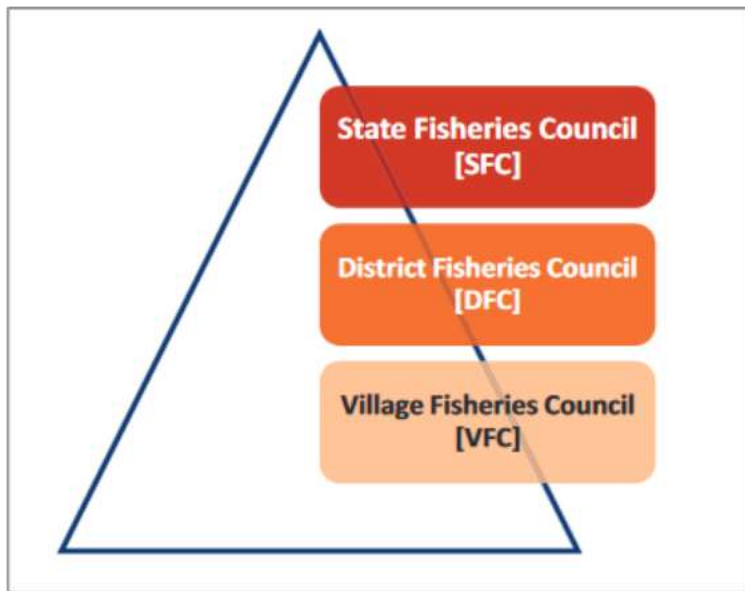


Figure 25. Hierarchical 3-tiered fishery management councils implemented under the 2017 amendment to the KMFR Act. Source: Mohamed et al., 2017b

The new participatory management councils will improve overall consultation processes in Kerala and this has been recognised in the National Policy on Marine Fisheries 2017 under Paragraph 14 which states that a co-management approach “will be worked out in consultation with the fisheries research institutions, coastal States/UT Governments, fishers and their associations and other concerned stakeholders in the sector”. Nevertheless, there is evidence that consultation processes in the past have provided opportunity for all relevant stakeholders to be involved and provide information that can be used by government in decision-making. For example, a committee with officials from the Department of Fisheries and central fisheries research institutes was formed in 2016 with the mandate to make recommendations on proposed amendments to the KMFR Act that would improve fisheries management and sustainability of marine resources in Kerala. This committee held multiple public consultations to develop draft recommendations and then convened a meeting of all trade union representatives to seek their suggestions on the draft recommendations before finalising them (DOF, 2016). Furthermore, an expert committee formed in 2014 to assess the impact of the monsoon trawl ban conducted multiple stakeholder consultations before developing recommendations, which were then submitted in a draft report and placed on the Fisheries Department website for the general public and stakeholders to comment (Mohamed, et al., 2014b). Following this, further meetings with stakeholders and the committee members occurred to get opinions on draft recommendations before they were finalised. Another example of how local knowledge is incorporated into the development of regulations is through the 2015 and 2017 notifications in the Gazette that prohibited catches of juvenile fish through the imposition of minimum size limits on 58 species of fish. Consultation on the minimum size limits regularly occurred, with State fisheries officers visiting villages and communicating the issues and proposals for changes in the local language. CMFRI and the State Fisheries Department also have regular contact with fishers at landing sites through the establishment of local Fisheries offices. There is a lack of information on how frequent meetings are held with fishers.

In Karnataka, fisher organisations like Dakshina Kannada Mogaveera Mahanjana Sangha, Aala Samudra Meenugara Sangha play an active role in raising the problems of fishers in front of the Government and gaining attention towards it. A council system as it is envisaged in the Kerala Marine Fisheries Act amendment 2017 is lacking in Karnataka.

The Indian Marine Fisheries Code developed jointly by CMFRI and CIFT scientists (Mohamed et al., 2017b) has recommended 3-tiered fishery management councils for every maritime state. Currently on Kerala has implemented this, the other states are yet to bring this into their MFRA.

### 10.1.3 Long term objectives

National objectives have been laid out in the National Policy on Marine Fisheries (2017). The policy states that its overarching goal is to ensure “the health and ecological integrity of the marine living resources of India’s Exclusive Economic Zone (EEZ) through sustainable harvests for the benefit of present and future generations of the nation.” It states that it is based on seven pillars, namely sustainable development, socio-economic upliftment of fishers, principle of subsidiarity, partnership, inter-generational equity, gender justice and precautionary approach. The precautionary approach is explicit within this Policy under Paragraph 7, in “taking a precautionary approach in line with the global standards regarding wild fish harvests” and again in Paragraph 11 through reviews of spatial and temporal closures “taking into account the best scientific information available, including a precautionary approach...” in the development of fishery management plan. Great reference is made to FAO’s Code of Conduct for Responsible

Fisheries in guiding the policy and in its detail, the policy appears entirely consistent with MSC Principles. The India Voluntary National Review (VNR) report, 2020, of Government of India clearly states the importance of ecolabelling and supporting initiatives leading to sustainable marine resources.

Objectives of the State governments appear to be more of social nature than conservation aspects. Both the State's MFRA have the following in common-

- The need to protect the interests of different sections of persons engaged in fishing particularly those engaged in fishing using traditional fishing craft such as catamaran, country craft or canoe;
- The need to conserve fish and to regulate fishing on a scientific basis;
- The need to maintain law and order in the sea; such other matters as may be prescribed.

There are no fishery-specific objectives to guide decision-making as outlined above, however if they did exist, there are some decision-making processes established that could guide management. For example, the implementation of minimum size limits through a notification in the Gazette as per clause (d) of sub-section (1) of Paragraph 4 of the Kerala MFR Act for a further 44 juvenile fish species, was based on recommendations that came out of the expert committee report to the Department of Fisheries (DOF, 2016) as a result of stakeholder concern that too many juveniles and under-minimum size fish were being caught in trawls. The overall decision behind this was based on the marine policy objective to promote the protection of living aquatic resources. Furthermore, in 2014, there was a review of the monsoon trawl ban by an expert committee, which recommended that the duration of the trawling ban be extended to increase yield and value (Mohamed et al., 2014b). Parties to this review were the State fisheries department and CMFRI. It is clear from the report how the recommendations were derived, and these were used by the government as justification for extension of the trawl ban from 47 to 52 days in 2018 as a first step to raising it to 61 days, as similarly implemented by other southern States (Anon, 2018).

These examples outlined above illustrate the process of decision-making and suggest that the government responds to serious issues identified in relevant research, monitoring, evaluation and consulting. The implementation of the minimum size limits (outlined in the previous paragraph) occurred following stakeholder consultation and was likely in a timely manner (i.e., around a year after the release of DOF, 2016). In saying that however, these are only a few examples and it is clear that other important issues that have been identified, have not been responded to by government. For example, many of the recommendations from the expert committee report to the Department of Fisheries (DOF, 2016) have not been implemented, such as to mesh size limits used by mechanised vessels using gear other than trawl nets, which is resulting in continued fishing of juveniles (Sudhish, 2018; Mohammed, 2016). This suggests that the general principles and policies of fisheries management based on international treaties and conventions, such as the precautionary approach, use of the best scientific information and the ecosystem approach to fisheries (EAFM) are not being implemented in practice as yet. In addition, with the lack of reviews in place (see PI 3.2.4), issues are likely to not be identified and not receive amendments. Nevertheless, the National Policy on Marine Fisheries 2017 explicitly references the precautionary approach under Paragraphs 7 and 11 of the "Fisheries Management" section. Similarly, the need to take into account the best scientific information and the ecosystem approach to fisheries management (EAFM) is reflected in Paragraphs 11 and 14 respectively. It is still too early to determine if the strategies outlined in this policy will be implemented in management decision-making in Kerala.

The Department of Fisheries in Kerala provides information on fishery performance and management actions upon request. Some documents such as the "Report of the Committee to Evaluate Fish Wealth/Impact of Trawl Ban along Kerala Coast" are available online on the CMFRI website, while relevant legislation is also available on the Department of Fisheries website. Findings from relevant reviews, research and notifications in the Gazette however, are not all regularly published online and cannot be said to constitute formal reporting to all stakeholders, nor can it be said that comprehensive information on the fishery's performance and management actions. There is no evidence of the fishery being subject to legal challenges and in the future, it is likely it will be proactive in avoiding these through the formation of participatory management councils at the village, district and state level (as enacted through the 2017 amendment to the KMFRA Act), which will facilitate co-management and involvement of relevant stakeholders in decision-making. In the interim, Kerala does have transparent mechanism for the resolution of legal disputes, which would allow it to respond to legal challenges in a transparent and timely fashion. Legal challenges can be heard through the Appellate Authority (Civil Court) or the High Court or Supreme Court. There is evidence that a timely response to legal challenges has previously occurred. For example, the monsoon trawl ban was challenged as unreasonable under the Constitution by the owners and operators of mechanised trawlers in Kerala Trawl net Boat Operator's Association vs. State of Kerala in the High Court and Supreme Court upon appeal (Pillai, 1997).

In Karnataka, there is an order further to KA-MFRA (1986) on 28.02.2019 which specifies minimum legal size for 19 varieties of fish, including grouper. The order was based on the policy recommendations by CMFRI after considering the inputs, suggestions and comments of various stakeholders. A notification issued by state government on

16.07.2018 stipulates mesh size regulation of 35 mm cod end for all trawl nets. The overall decision behind this was based on the marine policy objective to promote the protection of living aquatic resources. This shows the process of decision-making and suggest that the government responds to serious issues identified in relevant research, monitoring, evaluation and consulting. At the same time, it is to be noted that there is no provision for penalising those who does not comply with the MLS or mesh size regulations. Clarification on a timeline for the implementation of MLS or mesh size regulation is lacking from the state government. There is no evidence of the management policy implementation.

The policy documents are available on the Karnataka Fisheries Department website. The Department of Fisheries in Karnataka provides information on fishery performance and management actions upon request. Management policy recommendation documents are available on the e repository of CMFRI. The state fisheries website also has a monthly e newsletter 'Matsyavaani' but this is mostly on the social policies of the department rather than conservation aspects. Some information on relevant reviews, research and regulations is available online in CMFRI website. Therefore, it cannot be said to constitute formal reporting to all stakeholders, nor can it be said that comprehensive information on the fishery's performance and management actions. Discussions on introducing co-management in Karnataka fisheries sector was jointly organized in 2011 by the College of Fisheries, Mangalore, CMFRI Mangalore Regional Centre and Dakshin Foundation (An NGO). Many suggestions came up during the three-day workshop, but none of it was implemented (Dakshin, 2012). Legal challenges can be heard through the Appellate Authority (Civil Court) or the High Court or Supreme Court.

#### **10.1.4 Fishery specific objectives**

No fishery specific objectives currently exist in the fishery in the form of fishery management plans.

#### **10.1.5 Decision making process**

There are no fishery-specific objectives to guide decision-making as outlined above, however if they did exist, there are some decision-making processes established that could guide management. For example, the implementation of minimum size limits through a notification in the Gazette as per clause (d) of sub-section (1) of Paragraph 4 of the Kerala MFR Act for a further 44 juvenile fish species, was based on recommendations that came out of the expert committee report to the Department of Fisheries (DOF, 2016) because of stakeholder concern that too many juveniles and under-minimum size fish were being caught in trawls. The overall decision behind this was based on the marine policy objective to promote the protection of living aquatic resources. Later this was adopted by four other states in the west coast under assessment, though the number of species differs from state to state.

In 2014, there was a review of the monsoon trawl ban by an expert committee, which recommended that the duration of the trawling ban be extended to increase yield and value (Mohamed et al., 2014b). Parties to this review were the concerned state fisheries departments and CMFRI. It is clear from the report how the recommendations were derived and these were used by the government as justification for extension of the trawl ban from 47 to 52 days in 2018 as a first step to raising it to 61 days in Kerala and a total of 61 days in the other states. (Anon, 2018, letter no.30035/15/97-Fy(T-1) Vol.IV dated 10/03/2017). These examples outlined above illustrate the process of decision-making and suggest that the government responds to serious issues identified in relevant research, monitoring, evaluation and consulting.

The decision of the minimum size limits (outlined in the previous paragraph) occurred following stakeholder consultation in all the states. It should be noted that, the state of Kerala has started implementing this but the other states are still in the preliminary stages of implementation. However, many important issues that have been identified, have not been responded to or has not reached the implementation stage by the respective governments. For example, many of the recommendations from the expert committee report to the Department of Fisheries (DOF, 2016) have not been implemented, such as the mesh size limits used by mechanised vessels using gear other than trawl nets, which is resulting in continued fishing of juveniles (Sudhish, 2018; Mohammed, 2016). This suggests that the general principles and policies of fisheries management based on international treaties and conventions, such as the precautionary approach, use of the best scientific information and the ecosystem approach to fisheries management (EAFM) are not being implemented in practice yet. Nevertheless, the National Policy on Marine Fisheries 2017 explicitly references the precautionary approach under Paragraphs 7 and 11 of the "Fisheries Management" section. Similarly, the need to consider the best scientific information and EAFM is reflected in Paragraphs 11 and 14 respectively. It is still too early to determine if the strategies outlined in this policy will be implemented in management decision-making in the respective states.

The Department of Fisheries websites provide a wide range of information including fishery performance and management actions, though some information can be obtained only upon request. Relevant legislations are also available on the corresponding states Department of Fisheries website. The Department of Fisheries Maharashtra has listed details of legal actions taken against illegal fishing in the state.

Some documents such as the “Report of the Committee to Evaluate Fish Wealth/Impact of Trawl Ban along Kerala Coast” are available online on the CMFRI website, while Findings from relevant reviews, research, and notifications in the Gazette however, are not all regularly published online and cannot be said to constitute formal reporting to all stakeholders, nor can it be said that comprehensive information on the fishery’s performance and management actions.

There is no evidence of the fishery being subject to legal challenges. In Kerala, it is likely it will be proactive in avoiding these through the formation of participatory management councils at the village, district and state level (as enacted through the 2017 amendment to the KMFR Act), which will facilitate co-management and involvement of relevant stakeholders in decision-making. Discussions on introducing co-management in Karnataka fisheries sector was jointly organized in 2011 by the College of Fisheries, Mangalore, CMFRI Mangalore Regional Centre and Dakshin Foundation (An NGO). Many suggestions came up during the three-day workshop, but none of it was implemented (Dakshin, 2012).

A transparent mechanism for the resolution of legal disputes is included in all the states MFRA, which would allow it to respond to legal challenges in a transparent and timely fashion. Legal challenges can be heard through the Appellate Authority (Civil Court) or the High Court or Supreme Court. There is evidence that a timely response to legal challenges has previously occurred. For example, the monsoon trawl ban was challenged as unreasonable under the Constitution by the owners and operators of mechanised trawlers in Kerala Trawl net Boat Operator’s Association vs. State of Kerala in the High Court and Supreme Court upon appeal (Pillai, 1997).

### 10.1.6 Compliance and enforcement

The five-year plan (2012-2017) of the National Government suggests improved Monitoring, Control and Surveillance (MCS) and expects to bring more discipline and regulate the activities so as to maintain the growth rate in a sustainable manner. It is not clear whether this is implemented. The **Pradhan Mantri Matsya Sampada Yojana** (PMMSY) for a period of 5 years from 2020-21 to 2024-25 aims in bringing about Blue Revolution through sustainable and responsible development of fisheries sector in India.

In Kerala, MCS tools include licensing and registration for all vessels, as well as at-sea and in-port inspections. Patrol vessels (five in total) are based in Kollam and Kochi and operated by the Department of Fisheries enforcement wing. There are no at-sea observers, vessel monitoring system (VMS) or other remote monitoring methods implemented in the fishery (that the team can find), though the amended KMFR Act suggests a Vessel Tracking System (VTS). Almost all boats use AIS (Automatic Identification System) though the Department do not have access to its data. Under the KMFR Act, compliance officers are given powers to search vessels used or suspected to have been used in contravention of any of the provisions of the Act, or the rules framed thereunder, or of any of the conditions of the licence. The compliance officers will report the contravention to the Adjudicating Officer who will hold an enquiry into the matter and determine a sufficient penalty if applicable under the KMFR Act. The Adjudicating Officer can also cancel, revoke or suspend the registration or licence of the vessel involved. Financial penalties for violations were strengthened in the 2017 amendment to the KMFR Act based on recommendations from the DOF (2016) report but these remain low compared to other global jurisdictions (World Bank, 2010). The penalties were revised as per the Amendment in 2021 and is given below in the Table. The size of the fine depends on the horse-power of the boat (see Table 18).

Table 18 Financial penalties listed under for contravention of the amended KMFR Act 1980

Horse power of UoA vessels	Fine under Act (Rupees)	Fine in US Dollars
Up to 10 HP	5000	60
10 HP-25 HP	10,000	120
25 HP-50 HP	25,000	300
50 HP-90 HP	50,000	600
90 HP-120 HP	90,000	1,080
120 HP-150 HP	1,20,000	1,440
150 HP-200 HP	1,50,000	1,800
200 HP -280 HP	2,00,000	2,400
Above 280 HP	2,50,000	3,000

The Adjudicating Officer can also confiscate (seize) the catch under Paragraph 15 and revoke, cancel or suspend the fishing licence for the vessel under Paragraph 17(2), which may act as an even greater deterrence than the fines listed under Paragraph 17(1). Therefore, there is a clear protocol for penalising fishers under the Act for violations, which is considered by the Department of Fisheries to be consistently applied and thought by the government and fishers to provide effective deterrence. While data on the number of violations are known by the Department of Fisheries, this has not been analysed to determine subsequent rates of non-compliance, so it was not possible to evaluate whether the sanctions demonstrably provide effective deterrence to reduce or eliminate non-compliance. This would need to be further discussed at any future full assessments.

The increased penalties (KMFRA 2017) have made fishers aware of the impact of violations. Fishers inform the Department if a boat tries to land catch below legal size. During the monsoon, when the trawl ban is in force, the harbour is closed, so no boats may leave to fish, thus contravention of the ban is prevented. These are all examples of compliance with regulations and effective MCS, however there is also some literature suggesting the contrary. There are reports and articles highlighting the difficulties Kerala State have had in enforcing fisheries regulations due to a lack of sufficient personnel, financial constraints and lack of patrol boats (Pillai, 1997; World Bank, 2010) and that MCS needed to be improved in areas such as, control of fishing fleets, in-port inspections after landing, monitoring of destructive fishing practices (Ail et al., 2014). Concerns have also been raised as to the awareness of fishers with existing rules and regulations and their necessity (Mohamed, et al., 2014b; DOF, 2016; World Bank 2010). The CMFRI has also previously noted that the minimum mesh size limit of 35mm is often violated by trawlers (Mohammed, 2016). It has to be noted that these studies were conducted prior to 2017.

Scientists are of the opinion that government should promote the legal bycatch reduction device (BRD) square mesh cod-end to reduce non-compliance with MLS rather than penalising fishers for catching small fishes (Sunil Mohammed, Retd. Scientist, CMFRI). The two trawl Fishery Improvement Programmes (FIPs) presently active in Kerala is working on creating awareness among fishers regarding MLS and compliance. The Department of Fisheries, Government of Kerala has successfully distributed more than 200 square mesh cod-ends to fishers on a subsidy scheme in the last year, but it is still doubtful whether it is used for fishing. At present the officials are not keen in insisting the use of this BRD.

In Karnataka, MCS tools include licensing and registration for all vessels, as well as at-sea and in-port inspections. It is not clear if Karnataka has a marine enforcement wing as such, there are reports on coast guard patrolling the waters, though their work is limited to rescue of boats and not enforcement. There are no at-sea observers or vessel monitoring system (VMS) implemented in the fishery, though there are suggestions by the research organization, CMFRI for VMS. Penalties for fishing without licence is as low as five thousand rupees if the value of the fish involved is one thousand rupees or less or five times the value of the fish, if the value of the fish involved is more than one thousand rupees and the Department itself feels it must be amended (from newspaper articles). The Department has proposed an amendment to increase penalties to curb illegal activities and to reduce non-compliance by fishers, but this long-awaited amendment has not yet materialised as far as the team understands. Non-compliance is common and there are newspaper reports of banned bull-trawling (the practice of using two boats to trawl an area), light fishing etc. commonly being carried out in Karnataka waters. Illegal activities are prevailing, and the authorities turn a blind eye to most.

### **10.1.7 Management performance evaluation**

There is a lack of mechanisms in place to evaluate parts of the fishery-specific management system in the five states of West coast of India. There have been internal audits, but the scope of these audits was not clear to the assessment team. The National Policy on Marine Fisheries 2017 calls for “periodic reviews” of management measures and marine protected areas (MPAs) but this is yet to be fully implemented. Typically, reviews have been part of the political process rather than requirements of policy and procedure. For example, when a new government is elected (for a five-year term), the fishery would be reviewed, a report produced a couple of years later, but no progress has been made on improvements, as potentially another new government would be in power before changes could be made. Nevertheless, the National Policy on Marine Fisheries developed in 2017 is set to have an implementation plan, which will include “a monitoring and evaluation section that will address the timeliness and efficacy of implementation.” Furthermore, this Policy is expected to be reviewed every ten years.

In Kerala, amendments to the KMFR Act were due to CMFRI involvement (Dr. Sunil Mohammed, CMFRI) rather than due to existing mechanisms of review. The participatory management system being implemented in Kerala is thought to improve this area. Currently the State Fisheries Management Councils and District fisheries Management Councils are active and Village level councils are formed, though not functional. To date, certainly reviews have happened, as mentioned above, but the extent to which mechanisms are in place to evaluate the fishery-specific management system is unknown.

## 10.2 Principle 3 Performance Indicator scores and rationales

### PI 3.1.1 – Legal and/or customary framework

PI 3.1.1	<p>The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:</p> <ul style="list-style-type: none"> <li>• Is capable of delivering sustainability in the UoA(s);</li> <li>• Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and</li> <li>• Incorporates an appropriate dispute resolution framework</li> </ul>			
Scoring issue	SG 60	SG 80	SG 100	
a	<b>Compatibility of laws or standards with effective management</b>			
	Guide post	<p>There is an <b>effective national legal system</b> and a <b>framework for cooperation</b> with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.</p>	<p>There is an <b>effective national legal system</b> and <b>organised and effective cooperation with other parties</b>, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.</p>	<p>There is an <b>effective national legal system</b> and <b>binding procedures governing cooperation with other parties</b> that deliver management outcomes consistent with MSC Principles 1 and 2.</p>
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale	<p>The national legal framework in India gives individual States control of the seas and living marine resources up to 12 nautical miles (nm) from the shore, while the Central Government has control from 12 nm to the 200 nm exclusive economic zone (EEZ) boundary. The National Policy on Marine Fisheries published in 2017, is a nation-wide sectoral document aiming at ensuring the health and ecological integrity of the marine living resources of India's Exclusive Economic Zone (EEZ) through sustainable harvests for the benefit of present and future generations of the nation. It is based on seven pillars, namely (i) sustainable development; (ii) socio-economic enrichment of fishers; (iii) principle of subsidiarity; (iv) partnership; (v) inter-generational equity; (vi) gender justice; and (vii) precautionary approach. These seven pillars will guide the actions of various stakeholders in meeting the Vision and Mission set for the marine fisheries sector of the country, and that are respectively "A healthy and vibrant marine fisheries sector that meets the needs of the present and future generations", and "to meet the national, social and economic goals, livelihood sustainability and socio-economic enrichment of the fisher community and to guide the coordination and management of marine fisheries in the country during the next ten years". The National Marine Fisheries (Regulation and Management) Bill, 2019 intends to reduce and manage interstate/international conflicts and facilitate holistic resource utilization in EEZ. This is further envisaged in the National Fisheries Policy 2020 (NFP), which is under stakeholder discussion currently.</p> <p>Each State has its own marine fisheries legislation to manage fisheries in their respective area, which is called the marine Fisheries Regulation (Rules) Act (MFRA). There are periodic amendments to the MFRAs. The inception of MFRA and its amendments differ from state to state. Basically, all MFRAs have provision for regulation of marine fishing in the territorial sea through vessel registration, licensing, seasonal fishing closures (monsoon ban) and delimitation of fishing zones for vessels.</p> <p>In Kerala State, fisheries management is guided by the Kerala Marine Fishing Regulation Act, 1980 (KMFR Act). The KMFR Act and subsequent amendments In Kerala, also provide for participatory management councils,</p>			

<p>PI 3.1.1</p>	<p><b>The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:</b></p> <ul style="list-style-type: none"> <li>• <b>Is capable of delivering sustainability in the UoA(s);</b></li> <li>• <b>Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and</b></li> <li>• <b>Incorporates an appropriate dispute resolution framework</b></li> </ul>
	<p>MLS for 58 species (not for Unicorn leather jacket) and mesh size regulations for trawlers, apart from the general framework of all coastal states. Thus, in Kerala there is a general framework for cooperation that may allow the delivery of management outcomes consistent with MSC Principles 1 and 2. In 2017, the KMFR Act was amended to include participatory management councils at the village, district, and state level (<b>Error! Reference source not found.</b>). These councils have representatives from fishers, government officials, vessel owners, vessel builders, fish traders, non-government organisation (NGO) representatives and scientists. The SFMC and DFMC (9, one in each coastal district) are fully functional, the VFMCs (222, one in each coastal village) are formed but not fully functional. The amended KMFR Act is yet to be fully implemented, so at present the process is not formalised. It is therefore difficult to confirm that the cooperation is effective, as there has not been evidence of successful collaboration.</p> <p>In Karnataka, several amendments were proposed for the 1986 MFR Act, which could have helped in delivering the management outcomes consistent with MSC Principles 1 &amp; 2, but most of them are still under consideration. A Government order dated 28.02. 2019 has made MLS for 19 species (not for Unicorn leather jacket), but enforcement is not strict. Seasonal closure (monsoon ban on fishing activities) is implemented for 61 days regularly. Vessel registration is mandatory, but many newspaper articles indicate that illegal vessels fishing in the waters are common. A proposal to amend the KA-MFRA to include participatory management is under consideration.</p> <p>The Central Marine Fisheries Research Institute (CMFRI) have multiple data collection sites, so it is possible to collect data across fisheries and stocks, with the ability to share that information with States. Indian States are in discussions about the implementation of minimum size limits on shared stocks, however nationwide agreement of implementing the minimum size limits has not yet occurred. The Central Institute of Fisheries Technology (CIFT) works with the government – both national and respective state governments – in making gear modifications and technology related matters.</p> <p>It can be assumed that there exists an effective national legal system and a framework for cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2 in all the states assessed and <b>SG60 is met.</b></p> <p>A 2010 report by the World Bank suggested the current legal framework in India at the time was not comprehensive, containing several gaps, particularly regarding fisheries management. For example, the mesh size regulation varies from state to state. The seasonal bans used to be different between states, but is now consistent for most states except Kerala, which has a slightly shorter ban period. Participative management seems to be implemented only in Kerala, not in other states. At the same time, it is to be noted that the World Bank report is old and many changes have happened in the fisheries policy in India. The National Marine Fisheries (Regulation and Management) Bill, 2019 intends to reduce and manage interstate conflicts. There are discussions on zone wise management of fishery resources, with the advice of CMFRI. Therefore, even though <b>SG 80 and SG 100 cannot be met</b> now, it could in the future.</p>
<p><b>b</b></p>	<p><b>Resolution of disputes</b></p>

PI 3.1.1		<p><b>The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:</b></p> <ul style="list-style-type: none"> <li>• <b>Is capable of delivering sustainability in the UoA(s);</b></li> <li>• <b>Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and</b></li> <li>• <b>Incorporates an appropriate dispute resolution framework</b></li> </ul>		
	Guide post	The management system incorporates or is subject by law to a <b>mechanism</b> for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a <b>transparent mechanism</b> for the resolution of legal disputes which is <b>considered to be effective</b> in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a <b>transparent mechanism</b> for the resolution of legal disputes, which is appropriate to the context of the fishery and has been <b>tested and proven to be effective</b> .
	Met?	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Rationale		<p>The management system incorporates or is subject by law to a mechanism for the resolution of legal disputes arising within the system at a national level, and this is also applied in State law. SG60 is met. SG80 is also met because the management system for all the states under assessment, incorporates or is subject by law, to a <i>transparent</i> mechanism for the resolution of legal disputes, which is considered to be effective in dealing with most issues and that is appropriate to the context of the UoA: Under the MFR Act of all the states, fishers may appeal a refusal to grant a fishing licence, suspension, cancellation of fishing licence or registration of a vessel. They can also appeal against any penalty determined by the Adjudicating Officer for infractions under the MFR Act (for all states). Any person aggrieved by this order may appeal within thirty days to the Appellate Authority constituted under the Act, who will hear the appeal and make a final decision. A unique feature of the legislation is that any penalty must be paid prior the appeal being heard. The Appellate Authority is deemed a civil court under the Code of Civil Procedure 1908. If disputes remain unsettled, fishers can appeal to the High Court and Supreme Court.</p> <p>There is published evidence that this has occurred in Kerala. For example, the monsoon trawl ban was challenged as unreasonable under the Constitution by the owners and operators of mechanised trawlers in Kerala Trawl net Boat Operator's Association vs. State of Kerala in the High Court (Pillai, 1997). In this case the contentions of the fishers were upheld but then reversed by the Supreme Court upon appeal by the State government. This decision has meant that the validity of the monsoon trawl ban is judicially recognised (Pillai, 1997) and the mechanism for disputes are tested and proven to be effective.</p> <p>In Karnataka, during 2019, the Akhil Karnataka Purse seine fishermen Sangha went to the High Court to quash the State Government order following the Central Government direction on use or installation or operation of surface or submerged artificial lights / LED lights, fish light attractors or any other light equipment with or without generator on mechanized fishing vessel or motorized fishing craft for trawling, purse-seining and gill netting operations in the Indian Exclusive Economic Zone beyond territorial waters. The Sangha argued that they will conduct fishing as per license given to them using surface lights and the high court saw that it is not able to challenge the policy decision of Government, but the petitioner can go for grievance redressal to competent authority. The court took advice from CMFRI in this case (<a href="https://indiankanoon.org/doc/120789441/">https://indiankanoon.org/doc/120789441/</a>).</p> <p>Not all of the above examples are appropriate to the context of the fishery and therefore, SG 100 is not met at this pre-assessment stage.</p>		

PI 3.1.1	<p><b>The management system exists within an appropriate and effective legal and/or customary framework which ensures that it:</b></p> <ul style="list-style-type: none"> <li>• <b>Is capable of delivering sustainability in the UoA(s);</b></li> <li>• <b>Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and</b></li> <li>• <b>Incorporates an appropriate dispute resolution framework</b></li> </ul>		
c	<b>Respect for rights</b>		
	Guide post	<p>The management system has a mechanism to <b>generally respect</b> the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>	<p>The management system has a mechanism to <b>observe</b> the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.</p>
Met?	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Rationale	<p>One of the main reasons for developing the MFR Act was due to the “conflict of interests between the operators of mechanised boats and trawlers, and traditional fishermen using non-mechanised boats”. The Act therefore has specific provisions for the protection of legal rights of traditional fishers. The respective state governments have the power to regulate, restrict or prohibit fishing in specified areas, the number of vessels allowed to fish in a specified area, the catching of certain species spatially and temporally and the use of fishing gear in certain areas. These orders are made with particular regard to “the need to protect the interests of different sections of persons engaged in fishing, particularly those engaged in fishing using of traditional fishing craft such as catamaran, country craft or canoe”. This suggests the management system has a mechanism to observe legal rights of traditional fishers such that <b>SG 60 and 80 are met.</b></p> <p>The zoning introduced in the respective states’ MFRA is given in under section 10.1.1.</p> <p>The importance of this zoning has also been recognised by the Central Government of India in their National Policy on Marine Fisheries, 2017 which under paragraph 13 states “...States have specified areas reserved (based on depth or distance from shore) for traditional fishers where mechanized fishing is not permitted. Such Territorial Use Rights for Fisheries or TURFs have proved to be useful in sustaining the livelihoods of artisanal fishers. The government will continue to provide such support to artisanal/traditional fishers and in consultation with user groups.” The need to protect the rights of artisanal fishers is emphasised in the National Marine Fisheries (Regulation and Management) Bill, 2019 and later in the draft National Fisheries Policy 2020. This suggests the management system has a mechanism to formally commit to the legal rights of traditional fishers in a manner consistent with achieving MSC Principles 1 and 2. However, <b>SG 100 is not met at this pre-assessment stage and would be further discussed at a future site visit.</b></p>		

Draft scoring range	<b>60-79</b>
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Information gap indicator	<b>More information sought</b> <b>A discussion with respective Government officials would be better, currently most of the information is from the internet</b>  More information/ examples about disputes would be helpful for future site visits etc
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### PI 3.1.2 – Consultation, roles, and responsibilities

PI 3.1.2	<b>The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</b>			
Scoring issue	<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>	
a	<b>Roles and responsibilities</b>			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles, and responsibilities are <b>generally understood</b> .	Organisations and individuals involved in the management process have been identified. Functions, roles, and responsibilities are <b>explicitly defined and well understood for key areas</b> of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles, and responsibilities are <b>explicitly defined and well understood for all areas</b> of responsibility and interaction.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>Yes, for Kerala No for Karnataka</b>
Rationale	<p>Organisations and individuals involved in the management process are explicitly defined and well-understood for all areas. At the Central Government level, management is currently under the Department of Fisheries under the Ministry of Fisheries, Animal Husbandry &amp; Dairying. The Department of Animal Husbandry, Dairying &amp; Fisheries (DAHDF), Ministry of Agriculture and Farmers Welfare, which is responsible for fisheries development and management in the country, formulates developmental strategies for the sector and issues policy guidelines for Fisheries and Aquaculture development and management. Department of Fisheries, GoI is responsible for fisheries management from 12nm to the 200nm EEZ boundary.</p> <p>The Department of Fisheries of the respective states are responsible for implementation of State fisheries policy and legislation covering territorial waters. It manages investments in fisheries infrastructure, distributes subsidies for fishing equipment, vessel registration and licensing, and monitoring. DoF also implements fisher welfare instruments, such as social security schemes and social infrastructure, and supports para-state organisations like fisheries cooperatives, fisheries corporation, and fishermen welfare board. (The organisational structure of DoF, Government of Kerala is given in Figure 24 and Karnataka have a similar organisational structure).</p> <p>Scientific research is undertaken by a variety of organisations in India including: (i) the Central Marine Fisheries Research Institute (CMFRI) a national research institute headquartered in Kochi, Kerala undertakes research on marine fisheries catch and effort, taxonomy and bio-economic modelling; (ii) the Central Institute of Fisheries Education (CIFE) in Mumbai, which undertakes education and research in fisheries; (iii) the Fishery Survey of India (FSI) in Mumbai, which undertakes national fish stock assessments and; (iv) the Central Institute of Fisheries Technology (CIFT) in Kochi, which carries out research on fishing technology, craft and gear, processing and preservation and also helps in quality control certification for the export of seafood.</p> <p>There are also several local fisher organisations that participate in the management process. There are separate associations for artisanal and mechanized fishers (like trawl boat owners association, gillnetters association etc).</p> <p>The organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are explicitly defined and</p>			

PI 3.1.2	<b>The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</b>			
	<p>well understood for key areas of responsibility and interaction, <b>SG60 and SG 80 are met for all states.</b></p> <p>In Kerala, the 2017 Amendment to the MFRA describes the roles of the different management tiers (Figure 25) and outlines their obligations, for example information sharing from the village council level up to subsequent district and state levels. The role and responsibilities of individuals and organisations involved in the fisheries management process in Kerala are therefore explicitly defined and well understood for all areas. Therefore, may be <b>SG 100 is met for Kerala</b>, but not scored as this is pre-assessment stage. <b>However, SG100 is not met at present for Karnataka which lack a participatory management system.</b></p>			
b	<b>Consultation processes</b>			
	Guide post	The management system includes consultation processes that <b>obtain relevant information</b> from the main affected parties, including <b>local knowledge</b> , to inform the management system.	The management system includes consultation processes that <b>regularly seek and accept</b> relevant information, <b>including local knowledge</b> . The management system demonstrates consideration of the information obtained.	The management system includes consultation processes that <b>regularly seek and accept</b> relevant information, including <b>local knowledge</b> . The management system demonstrates consideration of the information and <b>explains how it is used or not used.</b>
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale	<p>The management system in India includes consultation processes that obtain relevant information from stakeholders involved as evident from the drawing of National Fisheries Policy 2020. The sixth draft of the policy has been placed in the public domain for stakeholder suggestions since March 2021. About 14 states, including maritime states such as West Bengal, Tamil Nadu, Andhra Pradesh, Karnataka and Odisha gave their comments on the draft policy. The policy also envisions a bottom-up approach involving stakeholder consultation.</p> <p>In both the states assessed, the management system includes consultation processes that obtain relevant information from stakeholders directly involved in the management (all meetings are minuted). <b>SG 60 is met.</b> For example, a committee with officials from the Department of Fisheries and central fisheries research institutes discussed and proposed the amendments to the MFRA of respective states, which led to the introduction of MLS, mesh size regulations and square mesh cod-end. This committee held multiple public consultations to develop draft recommendations and then convened a meeting of all trade union representatives to seek their suggestions on the draft recommendations before finalising them (DOF, 2016). In Kerala, an expert committee was formed in 2014 to assess the impact of the monsoon trawl ban and conducted multiple stakeholder consultations before developing recommendations (Mohamed, et al., 2014b). The national wide ban in territorial waters during monsoon is also based on such consultations. These examples demonstrate how information and knowledge, including local knowledge, is regularly sought from stakeholders and consideration given to them in the formation of recommendations such that <b>SG 80 is likely to be met.</b> But on a precautionary note, this PA is <b>not scoring 80</b> and the FIP could gather more evidence to prove that consultations have occurred on other issues also for a full</p>			

PI 3.1.2	<b>The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</b>		
	<p>assessment and that consultation processes regularly seek and accept relevant information, including local knowledge.</p> <p>Except for the recommendations from the assessment of the monsoon trawl ban report by Mohamed, et al., (2014b), it is unclear how other information from stakeholders is used or not used so <b>SG 100 is probably not met</b> by both the states assessed.</p> <p>Once the National Policy 2020 draft is implemented, this PI might score higher.</p>		
c	<b>Participation</b>		
	Guide post		<p>The consultation process <b>provides opportunity</b> for all interested and affected parties to be involved.</p> <p>The consultation process <b>provides opportunity and encouragement</b> for all interested and affected parties to be involved, and <b>facilitates</b> their effective engagement.</p>
	Met?		<p><b>Yes</b></p> <p><b>No</b></p>
Rationale	<p>The government of India and the respective state governments encourages consultation process and provides opportunity for organisations and individuals to be involved in important decisions. The 2017 National Policy on Marine Fisheries (2017) under Paragraph 14 references the importance of a co-management approach, which involves groups of fishers and “will be worked out in consultation with the fisheries research institutions, coastal States/UT Governments, fishers and their associations and other concerned stakeholders in the sector”.</p> <p>For example, during the implementation of National Marine Fisheries Policy, 2017, a National Workshop was organised to develop an implementation plan for India’s National Policy for Marine Fisheries (NPMF), 2017, to discuss the Voluntary Guidelines for Securing Sustainable Small-scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines). Over 80 participants with 52 representatives of small-scale-fishing communities from ten coastal states and union territories participated in the programme. The sixth draft of the National Fisheries Policy 2020 has been placed in the public domain for stakeholder suggestions since March 2021. About 14 states, including maritime states such as West Bengal, Tamil Nadu, Andhra Pradesh, Karnataka and Odisha gave their comments on the draft policy. Thus, there is consultation process that provides opportunity for all interested parties to be involved.</p> <p>CMFRI and the respective State Fisheries Departments also have regular contact with fishers at landing sites. There are also local Fisheries offices that facilitate grassroots engagement. The MPEDA-NETFISH, (Network for Fish Quality Management and Sustainable Fishing) is a registered society under the Marine Products Export Development Authority, which has a network at landing centres all over the country and is in constant contact with fishers and other fish workers.</p> <p>The MFRA of the states are required to lay out the rules before the legislative assembly for 14 days where consultation on them can occur and modifications and amendments made prior to their effect.</p>		

PI 3.1.2	<p><b>The management system has effective consultation processes that are open to interested and affected parties. The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties</b></p>
	<p><b>SG 80 is met</b> for both the states.</p> <p>In 2014, an expert committee was formed to assess the impact of the monsoon trawl ban conducted multiple stakeholder consultations before developing recommendations, which were then submitted in a draft report and placed on the Fisheries Department website for the public and stakeholders to comment (Mohamed, et al., 2014b). Following this, further meetings with stakeholders and the committee members occurred to get opinions on draft recommendations before they were finalised. Furthermore, consultation on the minimum size limits implemented through the 2017 amendments to the KMFR Act regularly occurred, with State fisheries officers visiting villages and communicating the issues and proposals for changes in the local language.</p> <p>As previously outlined in 3.1.1(a) the amendments made to the Kerala MFR Act in 2017 include participatory management councils at the village, district, and state level (<b>Error! Reference source not found.</b>), which will facilitate active engagement of stakeholders. The amendments are in the process of implementation, State and District management councils are functional and village management councils are formed, but not fully functional. These are expected to be active by the end of 2024. On this basis <b>SG 100 is likely met for Kerala, but not scored at this pre-assessment stage.</b></p> <p>In Karnataka, participatory management councils is yet to materialise, though it was suggested for all maritime states (Mohamed et al., 2017b). Therefore, <b>SG 100 is not met for Karnataka.</b></p>

Draft scoring range	<b>60-79</b>
Information gap indicator	<p><b>More information sought</b>  More information sought on participatory management and consultation process in management in the states other than Kerala. More evidences on consultation process for all states.</p>

### PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with the MSC Fisheries Standard, and incorporates the precautionary approach		
Scoring issue		SG 60	SG 80	SG 100
a	<b>Objectives</b>			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the <b>precautionary approach</b> , are <b>implicit</b> within <b>management policy</b> .	<b>Clear</b> long-term objectives that guide decision-making, consistent with the MSC Fisheries Standard and the <b>precautionary approach</b> , are <b>explicit</b> within <b>management policy</b> .	<b>Clear</b> long-term objectives that guide decision-making, consistent with the MSC Fisheries Standard and the <b>precautionary approach</b> , are <b>explicit</b> within <b>and required by</b> management policy.
	Met?	<b>Yes</b>	<b>Yes</b>	<b>No</b>
Rationale		<p>The Indian fisheries legislation was not consistent with the concepts and requirements of the United Nations Convention on the Law of the Sea (UNCLOS) and subsequent international instruments requiring the use of the ecosystem and precautionary approach to fisheries management (World Bank, 2010). The development of the Indian Marine Fisheries Code in 2017, identified this issue and the importance of India having a comprehensive national policy on marine fisheries encompassing “all aspects of sustainable use of marine fisheries resources, with provision to review and revise the same every 10 years” (Mohamed et al., 2017b). Following this recommendation, a National Policy on Marine Fisheries was released in 2017 that is “intended to guide the coordination and management of marine fisheries in the country during the next ten years”. The precautionary approach is explicit within this Policy under Paragraph 7, in “taking a precautionary approach in line with the global standards regarding wild fish harvests” and again in Paragraph 11 through reviews of spatial and temporal closures “taking into account the best scientific information available, including a precautionary approach...” The strategy in the National Policy on Marine Fisheries is also consistent with the MSC fisheries standard. One of the major foci of PMMSY is to enhance traceability and establish a robust fisheries management framework.</p> <p>The overarching goal of the National Policy on Marine Fisheries, 2017 (NPMF, 2017) is to ensure the health and ecological integrity of the marine living resources of India’s Exclusive Economic Zone (EEZ) through sustainable harvests for the benefit of present and future generations of the nation. The overall strategy of the NPMF, 2017 is based on seven pillars, namely sustainable development, socio-economic upliftment of fishers, principle of subsidiarity, partnership, inter-generational equity, gender justice and precautionary approach. These seven pillars will guide the actions of various stakeholders in meeting the vision and mission set for the marine fisheries sector of the country.</p> <p>The vision of the sixth draft of National Fisheries Policy 2020 is to develop an ecologically healthy, economically viable and socially inclusive fisheries sector through sustainable and responsible fishing. The policy focuses on managing the fisheries resources sustainably and responsibly by following an Ecosystem Approach of Fisheries (EAF) management and modern, scientific and diverse fishing practices in the ocean. This draft is also emphasising precautionary approach in managing sustainability of resources.</p> <p>Therefore, <b>SG 60 and 80 are met as the 2019 policy has clear precautionary approach, is rooted in sustainability and has plan for the</b></p>		

PI 3.1.3	The management policy has clear long-term objectives to guide decision-making that are consistent with the MSC Fisheries Standard, and incorporates the precautionary approach
	long term (10 years). However, evidence of the implementation of these policies are needed to score <b>SG 100</b> .

Draft scoring range	<b>≥80</b>
Information gap indicator	<b>Information sufficient to score PI</b>

### PI 3.2.1 – Fishery-specific objectives

<b>PI 3.2.1</b>		<b>The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC Principles 1 and 2</b>		
Scoring issue		<b>SG 60</b>	<b>SG 80</b>	<b>SG 100</b>
<b>a</b>	<b>Objectives</b>			
	Guide post	<b>Objectives</b> , which are broadly consistent with achieving the outcomes expressed by MSC Principles 1 and 2, are <b>implicit</b> within the fishery-specific management system.	<b>Short and long-term objectives</b> , which are consistent with achieving the outcomes expressed by MSC Principles 1 and 2, are <b>explicit</b> within the fishery-specific management system.	<b>Well-defined and measurable short- and long-term objectives</b> , which are demonstrably consistent with achieving the outcomes expressed by MSC Principles 1 and 2, are <b>explicit</b> within the fishery-specific management system.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		<p>There are no specific fishery management plans for the fisheries/species under assessment and so no objectives to manage the specific stocks covered in the UoAs.</p> <p>For Principle 2, the marine policy objective to promote the protection of living aquatic resources includes the requirement to realize “mainstreaming biodiversity conservation in production processes; species-specific and area-specific management plans, including conservation of Ecologically and Biologically Significant Areas (EBSAs) and Vulnerable Marine Ecosystems (VMEs); protection of iconic and endangered and threatened (ETP) species; spatial and temporal measures for sustainable utilization of resources; and creation of fish refugia through consultative processes”. However, it’s not clear if this has been enacted.</p> <p><b>SG60 is therefore not met</b></p>		

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>Information sufficient to score PI</b>

### PI 3.2.2 – Decision-making processes

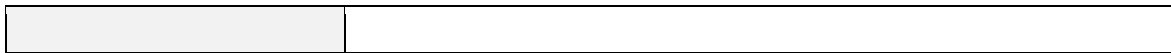
PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Scoring issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are <b>some</b> decision-making processes in place that result in <b>measures</b> and <b>strategies</b> to achieve the fishery-specific objectives.	There are <b>established</b> decision-making processes that result in <b>measures</b> and <b>strategies</b> to achieve the fishery-specific objectives.	
	Met?	<b>No</b>	<b>No</b>	
Rationale		<p>This SI is asking about the decision-making processes used in determining and delivering fishery-specific management. The fishery under assessment is without fishery-specific management objectives contained in a management plan. However, the assessment team felt that should fishery-specific objectives be developed, there are decision-making processes in place, possibly even established, that would be able to guide management decision-making such that SG 60 would be met and SG 80 could possibly be met.</p> <p>For example, the implementation of minimum size limits of commercial fish species in the states under assessment was based on recommendations that came out of the expert committee report to the Department of Fisheries, Government of India (Mohamed et al., 2017b) as a result of stakeholder concern that too many juveniles and under-minimum size fish were being caught in trawls. The overall decision behind this was based on the marine policy objective to promote the protection of living aquatic resources. Furthermore, in 2014, there was a review of the monsoon trawl ban by an expert committee for Kerala state, which recommended that the duration of the trawling ban be extended to increase yield and value (Mohamed et al., 2014b). Parties to this review were the State fisheries department and CMFRI. As a result, changes have recently been made in Kerala to extend the ban from 47 to 52 days in 2018 as a first step to raising it to 61 days, as similarly implemented by other southern States (Anon, 2018).</p> <p>Fishing Ban in the EEZ has been increased from 47 days to 61 days based on the recommendation of a Technical Committee of scientists that was constituted under the Chairmanship of the Director, CMFRI, Cochin. The said Committee was also formed during May 2013, i.e., at the time of UPA Government. The Committee in its report has recommended for fishing ban in the East Coast from April 15 till June 14 (61 days), and from June 1 to July 31 (61 days) in the West Coast. During the meeting held on March 18, 2015, all the coastal states/UTs (except Kerala) have given their consent for above recommendation. However, Kerala was of the opinion to impose fishing ban of 47 days.</p> <p>There are discussions going on between the fishermen community members and government on changing the trawl ban period to the North-west monsoon time (both States), as fishermen feel that it is the right time to reduce fishing effort. The scientific community too is supporting this with data on reproductive biology and timing of many commercial fish/shellfish species.</p> <p>Recently the Government of India decided to introduce TED in all trawlers and the coastal states made amendments accordingly in their respective MFRAs. Several stakeholder meetings were held in this regard among the government</p>		

PI 3.2.2		<b>The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery</b>		
		officials, scientific community and fisher folk (Dr. Madhu, CIFT & Dr. Joyce, MPEDA NETFISH, personal communication).		
		Based on lack of ability to audit informal traditional approaches on the available information and noting that the team is unaware of any fishery-specific objectives based on the available information <b>SG 60 is not met.</b>		
<b>Responsiveness of decision-making processes</b>				
b	Guide post	Decision-making processes respond to <b>serious issues</b> identified in relevant research, monitoring, evaluation, and consultation, in a transparent, timely and adaptive manner, and take some account of the wider implications of decisions.	Decision-making processes respond to <b>serious and other important issues</b> identified in relevant research, monitoring, evaluation, and consultation, in a transparent, timely, and adaptive manner, and take account of the wider implications of decisions.	Decision-making processes respond to <b>all issues</b> identified in relevant research, monitoring, evaluation, and consultation, in a transparent, timely, and adaptive manner, and take account of the wider implications of decisions.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
	Rationale	<p>There is evidence of decision-making processes responding to serious issues identified in relevant research, monitoring, evaluation and consulting in all the assessed states. For example, through research and information collected by CMFRI at landing sites and stakeholder consultation, minimum size limits were implemented in the fishery through notifications in the Gazette by all the states. This was seen as the most effective/practical way to reduce undersized fish being caught in the fishery. It can be argued that this demonstrates management change in response to serious issues arising in the fishery. The implementation of the minimum size limits occurred following stakeholder consultation and was likely in a timely manner. There are other examples of serious issues dealt with new decisions like a moratorium on fishing craft new licenses, mesh size regulations (though different for different states) etc. <b>SG60 is met</b> for all states.</p> <p>At the same time, not all recommendations from the expert committee are implemented or regulations amended. For example, many of the recommendations from the expert committee report to the Department of Fisheries (DOF, 2016) have not been implemented, such as to mesh size limits used by mechanised vessels using gear other than trawl nets, which is resulting in continued fishing of juveniles (Sudhish, 2018; Mohammed, 2016). <b>SG80 and SG100 are not met.</b></p>		
<b>Use of precautionary approach</b>				
c	Guide post		Decision-making processes use the <b>precautionary approach</b> and are based on best available information.	
	Met?		<b>No</b>	
Rationale		The need for a precautionary approach to management decision-making was recommended in the Indian Marine Fisheries Code in 2017, with CMFRI tasked		

PI 3.2.2	<b>The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery</b>			
	with, identifying fish stocks on which adequate scientific information is not available and for which a precautionary approach is required. CMFRI has published a paper on the status of Indian Marine fish stocks: modelling stock biomass dynamics in multi-gear fisheries, which could form the basis of further research in this area (Sathianandan et al., 2017). The National Policy on Marine Fisheries 2017 explicitly references the precautionary approach under Paragraphs 7 and 11 of the “Fisheries Management” section. Similarly, the need to consider the best scientific information and the ecosystem approach to fisheries management (EAFM) is reflected in Paragraphs 11 and 14 respectively. The National Fisheries Policy 2020 also envisages precautionary approach. It is still too early to determine if the strategies outlined in this policy have been implemented in management decision-making in the coastal states. <b>Therefore, SG80 is not met.</b> It should be noted that this score may improve if the fishery can demonstrate implementation of the objectives outlined in PI 3.1.3 above.			
d	<b>Accountability and transparency of management system and decision-making process</b>			
	Guide post	Some information on the fishery’s performance and management action is generally available on request to stakeholders.	<b>Information on the fishery’s performance and management action is available on request,</b> and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation, and review activity.	Formal reporting to all interested stakeholders <b>provides comprehensive information on the fishery’s performance and management actions</b> and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation, and review activity.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale	<p>Information on fishery performance and management actions taken are available on request. Documents related to impact of trawl ban, fishery management plans for each coastal state, etc are available online (<a href="https://eprints.cmfri.org.in/">https://eprints.cmfri.org.in/</a>) on the CMFRI website and e-prints. The regulation acts and rules and its amendments, programmes &amp; schemes of Central and state government, subsidies, allocation, compliance and fisheries management decisions and legal actions taken by the government are available on the respective state websites. (<a href="https://fisheries.kerala.gov.in/">https://fisheries.kerala.gov.in/</a>; <a href="https://fisheries.karnataka.gov.in/english">https://fisheries.karnataka.gov.in/english</a>). The National Fisheries Policy and its amendments and details of PMMSY is available on the National Government’s website (<a href="https://dof.gov.in/">https://dof.gov.in/</a>). MPEDA website <a href="https://mpeda.gov.in/?page_id=589#">https://mpeda.gov.in/?page_id=589#</a> gives information on fishery statistics of the country, and broadcasts major decisions of the state and national government. <b>SG60 is met</b> for all states.</p> <p>It is not clear whether explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from</p>			

PI 3.2.2	<b>The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery</b>			
	research, monitoring, evaluation, and review activity. Though findings from relevant reviews, research and notifications are published in the Gazette, however, are not all regularly published online and cannot be said to constitute formal reporting to all stakeholders. Therefore, <b>SG80 nor 100 are met.</b>			
e	<b>Approach to disputes</b>			
	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability of the fishery.	The management system or UoA is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or UoA acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	<b>Yes</b>	<b>Yes for Kerala No for Karnataka</b>	
Rationale	<p>There is no evidence of the fishery being subject to legal challenges that the assessment team could find, however further information would need to be sought on this PI if undertaking a full assessment. As previously outlined in PI 3.1.1(b), the fisheries management system of all the States has a transparent mechanism for the resolution of legal disputes, which would allow it to respond to legal challenges in a transparent and timely fashion. Legal challenges can be heard through the Appellate Authority (Civil Court) or the High Court or Supreme Court. There was no evidence for the repeated violations of the same law and regulations necessary for the sustainability for the fishery <b>therefore SG60 is met.</b></p> <p>There is evidence from Kerala that a timely response to legal challenges has previously occurred. For example, the monsoon trawl ban was challenged as unreasonable under the Constitution by the owners and operators of mechanised trawlers in Kerala Trawl net Boat Operator’s Association vs State of Kerala in the High Court and Supreme Court upon appeal (Pillai, 1997). <b>Therefore SG 80 is met.</b> There is evidence that the management system (in the future) will try to proactively avoid legal disputes through improving communication with stakeholders through participatory management councils at the village, district, and state level (2017 KMFR Act amendment). Therefore, once the councils come to full power, <b>SG100 could potentially be met for Kerala.</b></p> <p>For Karnataka, the assessment team could not find any evidence of timely response to legal challenges and <b>SG 80 is not met.</b> But with proper evidence this can be met.</p>			

Draft scoring range	<b>60-79</b>
Information gap indicator	<b>More information sought</b> More information sought on decision making process, information dissemination and approach to legal disputes. Also, more information is needed on compliance data (to comply with SA4.8.5 and SA4.8.6)



### PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with		
Scoring issue		SG 60	SG 80	SG 100
a	<b>MCS system</b>			
	Guide post	Monitoring, control and surveillance <b>mechanisms</b> exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance <b>system</b> has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A <b>comprehensive</b> monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	<b>Yes for Kerala</b>	<b>No</b>	<b>No</b>
Rationale		<p>The NMPF, 2017 and the NFP 2020 has explicitly outlined the importance of Monitoring, Control and surveillance (MCS) mechanisms for sustainable fisheries. Currently the MCS tools in the fishery are licensing and registration for all vessels, as well as at-sea and in-port inspections which is under the respective state fishery departments' jurisdiction. The coast guard also helps in MCS.</p> <p>Under the MFR Act, compliance officers are given powers to search vessels used or suspected to have been used in contravention of any of the provisions of the Act, or the rules framed thereunder, or of any of the conditions of the licence. The compliance officers will report the contravention to the Adjudicating Officer who will hold an enquiry into the matter and determine a sufficient penalty if applicable under the MFR Act. The Adjudicating Officer can also cancel, revoke or suspend the registration or licence of the vessel involved. Monsoon seasonal ban on fishing is effectively implemented in all states.</p> <p>Kerala has a dedicated enforcement wing under the department of Fisheries for MCS. Penalties are also higher in Kerala. Therefore <b>SG 60 is met for Kerala.</b></p> <p>For Karnataka, the team could not find whether there is a dedicated enforcement wing under the department of Fisheries for MCS. There are no at-sea observers or vessel monitoring system (VMS) implemented in the fishery. Automatic Identification System (AIS) is installed in almost all vessels but the data from these is not available to the enforcement officials. It has to be noted that many reports and articles have highlighted the difficulties in enforcing fisheries regulations due to a lack of sufficient personnel, financial constraints, and lack of patrol boats (Pillai, 1997; World Bank, 2010) and that MCS needed to be improved in areas such as, control of fishing fleets, in-port inspections after landing, monitoring of destructive fishing practices (Ail et al., 2014). Concerns have also been raised as to the awareness of fishers with existing rules and regulations and their necessity (Mohamed, et al., 2014b; DOF, 2016; World Bank 2010). Therefore, the team were doubtful whether the MCS system has sufficiently demonstrated an ability to enforce management measures. Some information on monitoring and enforcement is available like the vessels impounded and fine obtained, but the number and area of patrols, number of inspections at-sea and in-port is not available to the assessment team.</p> <p>In states other than Kerala, penalties are low whereas Kerala imposes hefty penalties especially for juvenile fishing. Square mesh cod-end is part of the regulations yet it is not monitored. LED fishing and bull trawling is also prevailing, and the system is not effective in controlling the illegal activities.</p>		

PI 3.2.3		<b>Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with</b>		
		Therefore, <b>SG 80 or 100 cannot be met.</b>		
b	<b>Sanctions</b>			
	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, <b>are consistently applied</b> and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and <b>demonstrably</b> provide effective deterrence.
	Met?	<b>Yes for Kerala No for Karnataka</b>	<b>No</b>	<b>No</b>
Rationale		<p>Sanctions to deal with non-compliance exist and are specified in the FMR Act of respective states along with the violations. Violations include, not fishing with a valid licence and landing fish below the minimum legal size. Financial penalties are specified in the amendments of MFR acts. Apart from imposing fine, the catch can also be confiscated (seized) under Paragraph 15 and the vessel licence revoked, cancelled, or suspended under Paragraph 17(2), which may act as an even greater deterrence than the fine. There is a clear protocol for penalising fishers for violations, which is considered by the Department of Fisheries to be enforced to provide effective deterrence meeting.</p> <p>Only Kerala has a high penalty (even this is low compared to other global jurisdictions (World Bank, 2010). Penalties imposed in Kerala is given in section 8.3.6 (Table 18). The assessment team could get the list of penalties only from Kerala. Therefore, <b>SG 60 is met</b> for Kerala.</p> <p>At this stage the assessment team is not convinced on the consistency of sanctions applied or the effectiveness of them in deterring violations. Even though sanctions have helped in curbing juvenile fishing to an extent in Kerala, but the same cannot be said for other regulations like square mesh cod end. Therefore, on a precautionary note, <b>SG 80</b>.</p> <p>The number of violations is known by the Department of Fisheries because the names of fishers are recorded when they are fined etc., as part of the sanction process. However, data on non-compliance (e.g., the number of offences) has not been analysed by the Department of Fisheries to determine subsequent rates of non-compliance. It was not possible to evaluate whether the sanctions demonstrably provide effective deterrence to reduce or eliminate non-compliance, <b>so SG100 is not met.</b></p>		
c	<b>Compliance (information)</b>			
	Guide post	Fishers are <b>generally thought</b> to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	<b>Some evidence exists</b> to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a <b>high degree of confidence</b> that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	<b>Yes for Kerala</b>	<b>No</b>	<b>No</b>

PI 3.2.3		<b>Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with</b>	
		<b>No for Karnataka</b>	
Rationale	<p>Compliance to seasonal closure during monsoon is almost 100% in all the states assessed. This is achieved through monitoring by the department and also reporting by traditional fishers.</p> <p>In Kerala, the increased monetary value of the penalties for non-compliance has, to an extent, made the fishers aware of the cost and implications of violations. Penalties are mostly levied for not complying with MLS or fishing without a licence. Fishers will inform the Department of Fisheries if other fishers are landing fish below the minimum legal size. This meets <b>SG 60</b> for Kerala.</p> <p>Some evidence exists to suggest fishers comply with the management system. Telephone interviews held with few fishers suggest that they are complying with the regulations. But the assessment team has noted there is non-compliance and enforcement is not completely effective in deterring the violators. For example, the mesh size regulations are often violated, and this is never enforced. Some fishers mentioned that pair trawling, and light trawling is happening and the enforcement is not effective in keeping this under check. Therefore, <b>SG 80 is not met</b>. As mentioned in PI 3.2.3(b), there is no data available on the rates of non-compliance, so the assessment team could not say that there is a high degree of confidence that fishers are complying with the management system, therefore <b>SG 100 is not met</b>.</p> <p>In Karnataka, the assessment team could not find much evidence to suggest that the fishers are in general complying with the sanctions. The team was not able to interview stakeholders and newspaper reports suggest that violations are common. A lack of a strong enforcement team and low penalties could be the reason for violations of sanctions. And there is a lack of data provided to enforcement officials to suggest that fishers comply with measures for e.g. "Automatic Identification System (AIS) is installed in almost all vessels but the data from these is not available to the enforcement officials". Therefore, <b>SG 60 is not met for these states</b>.</p>		
d	<b>Compliance (outcome)</b>		
	Guide post		There is no evidence of systematic non-compliance
	Met?		<b>No</b>
Rationale	<p>The National Fisheries Policy 2020 emphasises the importance of sustainable practices, but it is still in the draft form. All the states have listed out important sustainable practices to manage the fishery at optimal level.</p> <p>Among the states assessed the minimum non-compliance is in Kerala where enforcement is much stricter, and penalties are high. Communication with DoF officials of Kerala in a recent workshop confirmed that they are working on the implementation of the amended rules and regulations. At the same time, it needs to be noted that the changes take time to materialise considering the large number of stakeholders involved in the fishery.</p> <p>There are several sources of information that suggest that regulations are not complied within the fishery. For example, in an assessment of the compliance of the marine fisheries of Kerala with the UN Code of Conduct for Responsible Fisheries, during a survey of fishing gears trawlers were using nets with codend mesh sizes as small as 16mm. Even with the combined effort of DoF, Kerala, NETFISH MPEDA and the two FIPs running in the state, compliance with legal</p>		

PI 3.2.3	<b>Monitoring, control, and surveillance (MCS) mechanisms ensure the management measures in the UoA are enforced and complied with</b>
	<p>mesh size or use of square mesh cod end is not promising. The CMFRI has also previously noted that the minimum mesh size limit of 35mm is often violated by trawlers (Mohammed, 2016). The state fisheries department concentrates more on penalising the trawlers not complying with MLS, but many a times have been found to turn a blind eye towards violations of mesh size regulations. Illegal, Unreported and Unregulated (IUU) fishing potentially occurs, where boats (in-State and out-of-State) may take undersized fish in the Kerala fishery, but these are not then landed in Kerala (i.e., landed out of State where enforcement is not strict) (personal communication trawl boat owners). This would need further investigation during a full assessment. Therefore, <b>SG80 is not met.</b></p> <p>For Karnataka, the information was limited and according to whatever information is available, there is systematic non-compliance. Many news articles suggest that fishers do not comply with legal mesh size and MLS and resort to illegal fishing practices like bull trawling and LED fishing as enforcement is not strict. The lack of a dedicated enforcement department and low penalties are also reasons for non-compliance. Therefore, <b>SG80 is not met.</b></p>

Draft scoring range	<b>60-79 for Kerala</b>
	<b>&lt;60 for Karnataka</b>
Information gap indicator	<p><b>More information sought regarding legal mesh size compliance and number of sanctions issued in Kerala and enforcement of rules and regulations in Karnataka, Goa, Maharashtra, Gujarat</b></p> <p>Full MCS review needed with up-to-date data for any future assessments.</p>

### PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system		
Scoring issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate <b>some</b> parts of the fishery-specific management system.	There are mechanisms in place to evaluate <b>key</b> parts of the fishery-specific management system.	There are mechanisms in place to evaluate <b>all</b> parts of the fishery-specific management system.
	Met?	<b>Yes</b>	<b>No</b>	<b>No</b>
Rationale		<p>Fishery-specific management is not prevalent in India. Yet evaluations happen in management and new policies are drawn up. For example, the National Marine Fishery Policy in 2017, the National Marine Fisheries (Regulation and Management) Bill, 2019 and the sixth draft National Fisheries Policy 2020. At the state level, the introduction of MLS, mesh size regulation, licensing and registration and banning of destructive fishing practices like bull trawling and LED fishing are all part of evaluation of management by research organisations and government. Therefore, mechanisms are in place to evaluate some parts of the fishery-specific management system. Therefore, <b>SG 60 is met.</b></p> <p>However, reviews are rather part of the political process than requirements of policy and procedure. For example, when a new government is elected (for a five-year term), the fishery would be reviewed, a report produced a couple of years later, but no progress made on improvements, as potentially another new government would be in power before changes could be made. Nevertheless, the National Policy on Marine Fisheries developed in 2017 is set to have an implementation plan, which will include “a monitoring and evaluation section that will address the timeliness and efficacy of implementation.” Furthermore, this Policy is expected to be reviewed every 10 years. The NFP 2020 has plans to develop a management programme over a timeline and revisit the policy over a time period. This is yet to be implemented.</p> <p>Amendments to MFRA of the states were due to the advice from research institutes like CMFRI and CIFT rather than existing mechanisms of review. In Kerala, once the participatory management system becomes fully functional, it is likely that there will be systematic review. To date, certainly reviews have happened, as mentioned above, but the extent to which mechanisms are in place to evaluate key parts of the fishery-specific management system is unknown such that <b>SG80 could not be awarded.</b></p>		
b	Internal and/or external review			
	Guide post	The fishery-specific management system is subject to <b>occasional internal</b> review.	The fishery-specific management system is subject to <b>regular internal</b> and <b>occasional external</b> review.	The fishery-specific management system is subject to <b>regular internal and external</b> review.
	Met?	<b>No</b>	<b>No</b>	<b>No</b>
Rationale		<p>At present, there is no fishery specific management system in the states are assessed. There have been internal audits, but the scope of these audits was not clear. The National Policy on Marine Fisheries 2017 calls for “periodic reviews” of management measures and marine protected areas (MPAs) but this has never materialised. The sixth draft of National Fisheries Policy 2020 has ‘Regular review of policy’ as one of its agendas (Salim &amp; Anuja, 2022). The World Bank externally-reviewed the marine fisheries in India in 2010 so SG 80</p>		

PI 3.2.4	There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system
	could potentially be met in the future if evidence was provided of regular internal review. Due to lack of clarity of when and what is reviewed, <b>SG 60 is not met.</b>

Draft scoring range	<b>&lt;60</b>
Information gap indicator	<b>More information sought</b> More information sought on mechanisms to evaluate fishery-specific management system and internal and external review.

## 11 Appendices

### 11.1 Evaluation processes and techniques

**Methodology for information gathering:** Review of data and documentation, interview of stakeholders by the local auditor.

**Scoring process:** Scoring at each stage of the MSC process was agreed by the team via email correspondence. Consensus was reached for all scores. The scores were determined using the FCP v2.3, Section 7.15 and all subclauses.

The scores were decided as follows:

How many scoring issues met?	SG60	SG80	SG100
All	60	80	100
Half	FAIL	70	90
Less than half	FAIL	65	85
More than half	FAIL	75	95

Note that where there is only one scoring issue in the SG, the issue can be partially scored – in this case the team used their judgement to determine what proportion of it was met, e.g. at the 100 level, a small part met = 85, about half met = 90, nearly all met = 95.

### 11.2 Site visits and stakeholders

No site visit was conducted as part of this audit and the information and scoring in this report relies upon information obtained from published information and from independent stakeholders contacted by the team.

The team recommends the following stakeholders are contacted for any future assessment:

- CIFT
- CMFRI
- State Fisheries Department of both the states
- Processing facilities
- WWF India
- Dr Sunil Mohamed (Retired Principal Scientist CMFRI and Chair SSNI)
- Fisher organizations
- MPEDA-NETFISH

## 11.3 Risk-Based Framework outputs

### 11.3.1 Consequence Analysis (CA)

A CA is required for species under Principle 1. Below is the CA for *A. monoceros*.

Table 19: CA scoring template

Principle 1: Stock status outcome	Scoring element	Consequence subcomponents	Consequence score
	<i>Aluterus monoceros</i>	Population size	60
		Reproductive capacity	
		Age/size/sex structure	
		Geographic range	
<b>Justification for most vulnerable subcomponent</b>	The geographic range of this species is very large and not vulnerable to change from this fishery. All the available information about age, size and sex structure, and reproduction (see PSA below) suggests that the species does not have any particular biological traits that would make it more vulnerable on this score (e.g. sexual dimorphism or sex change, very late or large maturity, spawning aggregations, low fecundity etc.). Therefore we assume that population size is the parameter most likely to be impacted by the fishery, and the other parameters would be impacted mainly via the medium of a reduction in population size.		
<b>Justification for consequence score</b>	We are lacking quantitative or even semi-quantitative data on the dynamics of this stock or the exploitation rate imposed by the fishery. The reports of periodic large landings suggest a situation where either there is a large biomass which is only periodically available to the fishery (due to fish behaviour), or a stock where the biomass is naturally highly variable. Either way, this would suggest a low vulnerability to the fishery. The biology of the species (fast growth, early maturity, high fecundity) also suggests strong resilience. We can therefore infer that the fishery is not likely to be impacting recruitment dynamics (60) but we cannot be sure about the quantitative impact on biomass (80 not met).		

### 11.3.2 Productivity Susceptibility Analysis (PSA)

Below is the PSA scoring table for Principle 1 (*Aluterus monoceros*). The score for PI 1.1.1 is this score combined with the CA above.

Table 20: PSA productivity and susceptibility attributes and scores for fish

Performance Indicator	1.1.1	
<b>Productivity</b>		
Scoring element (species)	<i>Aluterus monoceros</i>	
<b>Attribute</b>	<b>Justification</b>	<b>Score</b>
Average age at maturity	Estimated to reach maturity at age 2-3 (2.39 years on average) (Ghosh et al. 2022). Less than 5 years considered low risk.	1
Average maximum age	Estimated average lifespan 9.32 years (Ghosh et al. 2022). <10 years considered low risk.	1

Fecundity	<p>According to Lavudya et al. (2022), average female fecundity per gram body weight was 6537 eggs, and the average overall fecundity determined for the study period (seven months, Gujarat) was 116195 eggs.</p> <p>Ghosh et al. (2021) estimated female fecundity in the range 33,640 eggs to 12,39,202 eggs, from a sample 1036 individuals from the Bay of Bengal (2017-19).</p> <p>&gt;20,000 eggs per female considered low risk.</p>	1
Average maximum size	<p>Ghosh (2011) estimated maximum size (von Bertalanfy Linf) at 64 cm (Gujarat, 2009); Ghosh et al. (2022) found the maximum length in a sample of 1031 fish also to be 64 cm (Bay of Bengal; same value for males and females), although from this sample they estimated Linf at 68cm. Fishbase puts maximum size for males at 76cm but the data source and geographical area is not given. Maximum size &lt;100cm considered low risk.</p>	1
Average size at maturity	<p>Ghosh et al. (2022) estimates mean length at maturity 36.8 cm. &lt;40cm taken as low risk.</p>	1
Reproductive strategy	<p>Not clear for this species but other filefish are known to be demersal egg layers; considered medium risk.</p>	2
Trophic level	<p>3.8 (Fishbase); &gt;3.25 considered high risk.</p>	3
<b>Susceptibility</b>		
<b>Attribute</b>	<b>Justification</b>	<b>Score</b>
Areal Overlap	<p>The species distribution is very large (global) but we have no information about the stock structure. Assume the fishery overlaps with the relevant stock(s) at 30% or more (high risk).</p>	3
Encounterability	<p>This considers the overlap of the species and the gear in the water column (i.e. depth range). Normally for a Principle 1 species this automatically scores 'high risk' because it is being targeted (i.e. the gear goes where the fish are) but it is not clear that this is always the case here. Nevertheless, trawling can take place down to 400 m (Kanthan and Zacharia 2011), while the species distribution may end generally shallower than that. These fish may also be found in surface waters (under mats of drifting weed or rubbish) but are also potentially vulnerable to trawls here. Therefore the default score of three is given here.</p>	3
Selectivity of gear type	<p>It is estimated that the species recruits to the fishery (becomes vulnerable to trawling) at ~30 cm (Ghosh et al. 2022). The trawl minimum mesh size is 25 or 35mm (square mesh) which would take fish of this length given their rather square shape. Average size at maturity is slightly larger than this (see above), so we can expect that juveniles are frequently caught.</p>	3
Post capture mortality	<p>Retained species</p>	3
<b>Scores</b>		
Productivity score		1.43
Susceptibility score		3.00
PSA score		3.32
MSC score from PSA		<60

MSC score from CA		<b>60</b>
Overall MSC score (PSA and CA combined)		<b>&lt;60</b>

### 11.3.3 Productivity Susceptibility Analysis (PSA)

Table 21. PSA for P2 species

green = low risk score, orange = medium risk score, pink = high risk score

Productivity

Species	Av. age at maturity	Av. max age	Fecundity	Av. max size	Av. size at maturity	Reproductive strategy	Trophic level	Density dependence	Productivity score
<i>Decapterus russelli</i>	~1 year	~ 2.5 years	8000 - 110000	Max 40cm, usually ~30cm	~16 cm	Broadcast spawners	3.7	n/a	1.29
<i>Priacanthus hamrur</i>	No age data, assume 5-15 years	No age data, assume 10-25	13000 - 81000	~ 40 cm	~ 22 cm	Broadcast spawner	3.6	n/a	1.57
<i>Epinephelus diacanthus</i>	<5 years	~11 years	6,300-1,60,000 eggs per season	<100 cm	<40cm	Broadcast spawning	3.8	n/a	1.57
<i>Saurida tumbil</i>	~ 2 years	~8 years	10000 - 260000	~60 cm	~ 30 cm	Broadcast spawner	4.4	n/a	1.29
<i>Trichiurus lepturus</i>	~1 year	15 years max	21 000 - 157 000 eggs	Max 234cm, common 100cm	~53 cm	Broadcast spawner	4.4	n/a	1.71
<i>Rastrelliger kanagurta</i>	~ 1 year	4 years	37 000 - 170 000 eggs	Max ~42 cm, common 25 cm	20-24.5 cm	Broadcast spawner	3.2	n/a	1.29
<i>Uroteuthis duvauceli</i>	3 years max	3 years	1000 – 73 000 eggs	n/a	n/a	Demersal egg layer	>3.25	No info	1.67
<i>Parapenaeopsis stylifera</i>	~7 months	2 years	40 000 – 240 000 eggs	n/a	n/a	Broadcast spawners (internal fertilization)	2.2 - 2.8	No info	1.33
<i>Metapenaeus dobsoni</i>	~5 months	~2 years	34 500 – 160 000 eggs	n/a	n/a	Broadcast spawning (internal fertilization)	2.2 - 2.8	No info	1.33

Species	Av. age at maturity	Av. max age	Fecundity	Av. max size	Av. size at maturity	Reproductive strategy	Trophic level	Density dependence	Productivity score
<i>Sepia pharaonis</i>	~1 year	~3 years	517 – 1525 eggs	n/a	n/a	Demersal egg layer	Likely to be >3.25	No info	1.67
<i>Cynoglossus macrolepidotus</i>	Based on <i>C. lingua</i>	Based on <i>C. lingua</i>	Based on <i>C. lingua</i> 360 - 36000	Based on <i>C. lingua</i> ~45cm max, common 25cm	Based on <i>C. lingua</i> ~9-12 cm	Based on <i>C. lingua</i> : broadcast spawner	3.5	n/a	1.86
<i>Pristis microdon</i>	7-10 years	30 - 80 years	1-13 young, (7 on average)	280 – 300 cm	Biggest on record: 700 cm, common adult size: 500 cm	Live bearer	3.9	n/a	2.86
<i>Rhynchobatus djiddensis</i>	No data; shovelnose guitarfish 7-8 years	No data; shovelnose guitarfish up to 11 years	4 on average (up to 10)	No data	Biggest on record 300cm, commonly 44-229cm.	Live bearer	3.6	n/a	3.0
<i>Sphyrna mokarran</i>	8 years	44 years	Litter size 6-33, max 42, every 2 years	450 - 610 cm	50% of males / females mature at 309 cm / 336 cm	Live bearer	4.3	n/a	2.86
<i>Rhincodon typus</i>	~ 30 years	80-100 years	Litters of up to 300 pups	800-900 m	1000 – 1500cm	Live bearer	3.6	n/a	3.0
<i>Rhizoprionodon oligolinx</i>	No data	~8 years	1–8 pups per year	85-93 cm	Males: 55–60 cm Females : 60–65 cm	live bearer: 1–8 pups	4.1	n/a	2.57
<i>Scoliodon laticaudus</i>	2 years	7 years	1–19 pups	74 cm	Males: 24–36 cm, Females : 33–35 cm	live bearer: 1–19 pups	3.8	n/a	1.86
<i>Hydrophis schistosus</i>	~ 18-24 month	Snakes above the age of 4 are rare.	5-30 live young	90cm	~47-101 cm, average 74.5 cm	Live bearer	>3.25	n/a	2.0

Susceptibility and overall scores

Species	Depth range (m)	Habitat preference	Availability	Encounterability	Selectivity of fishing gear	Post-capture mortality	Susceptibility score	Overall MSC score
<i>Decapterus russelli</i>	40-275 m	Predominantly mesopelagic, occasionally inshore	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Target species	3.0	60-79
<i>Priacanthus hamrur</i>	8-250 m	Reef associated species (coral or rock)	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Target species	3.0	60-79
<i>Epinephelus diacanthus</i>	0-90 m	Mud, sand and rock	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Target species	3.0	60-79
<i>Saurida tumbil</i>	20-60m	Reefs, mud	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Target species	3.0	60-79
<i>Trichiurus lepturus</i>	100-350m	Muddy bottoms, estuaries	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Target species	3.0	60-79
<i>Rastrelliger kanagurta</i>	Preferred depth 20-90 m	Plankton rich turbid waters	Widely distributed stock including coastal	Trawl can cover whole water column	Juveniles may be caught	Retained species	1.65	>80
<i>Uroteuthis duvauceli</i>	3 – 170m	Water column, deeper with age	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	60-79
<i>Parapenaopsis stylifera</i>	0-90m	Mud, sand/mud	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	<60
<i>Metapenaeus dobsoni</i>	0-70m	Mud, sand/mud, seagrass	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	<60
<i>Sepia pharaonis</i>	0-130m, usually 0-40m	Prefers sandy or seagrass substrates	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	<60
<i>Cynoglossus macrolepidotus</i>	Based on C. lingua 10-961m	Very little data, assume sand / mud	No significant refuges	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	<60
<i>Pristis microdon</i>	0-10 m	Shallow sandy/mud, coastal waters, rivers, estuaries	Shallow water refuge	Trawl can cover whole water column	Juveniles may be caught	Retained species	2.33	<60
<i>Rhynchobatus djiddensis</i>	Usually 2-50m	Sandy benthos, around reef areas	Shallow water refuge	Trawl can cover whole water column	Juveniles may be caught	Retained species	2.33	<60

Species	Depth range (m)	Habitat preference	Availability	Encounterability	Selectivity of fishing gear	Post-capture mortality	Susceptibility score	Overall MSC score
<i>Sphyrna mokarran</i>	Down to 300m	Pelagic	Widely distributed stock	Trawl can cover whole water column	Juveniles may be caught	Retained species	1.65	<60
<i>Rhincodon typus</i>	Top 100m but down to 1900m	Pelagic	Widely distributed stock	Trawl can cover whole water column	Juveniles may be caught	Retained species	1.65	<60
<i>Rhizoprionodon oligolinx</i>	0-36 m	Demersal, reef associated	Mating aggregations vulnerable	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	<60
<i>Scoliodon laticaudus</i>	Mostly < 30 m	Mud and sand, brackish	Mating aggregations vulnerable	Trawl can cover whole water column	Juveniles may be caught	Retained species	3.0	>80
<i>Hydrophis schistosus</i>	3- 22m	Mangroves, coastal lagoons, reefs	Refuge in shallow water	Trawl can cover whole water column	Age range unknown	Discarded	1.88	>80

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## 11.4 Assessment Team –summaries of CVs

### **Dr Jo Gascoigne**

Jo has been working with MSC pre- and full assessments since 2009, and has worked with fisheries on MSC all over the world. Her main expertise as a fisheries scientist is in invertebrate fisheries, although she has also worked a great deal on tuna in a MSC context. Her PhD from the Virginia Institute of Marine Science (USA) focused on population biology of queen conch, and her postdoc on the dynamics of mussels; she has also worked on blue crabs and spiny lobster. In recent years Jo has continued to act as a Principle 1 expert for various MSC pre- and full assessments, but she also has had a focus on FIPs, supporting FIPs to prepare assessments and action plans in various parts of the world, and currently acting as coordinator for three ongoing FIPs.

### **Dr Vineetha Aravind**

Vineetha has been working as an MSC assessor from 2019 onwards and has worked on numerous pre-assessments, full assessments and three-year audit reports (for fisheryprogress.org based on MSC standards). Her PhD from Central Marine Fisheries Research Institute (Kochi, India) was on the reproductive biology of flower shrimp. She is currently acting as coordinator for two FIPs in Kerala involving eight species, and advises the other FIPs in India. She is also the coordinator of the MSC ITM project in India for deep-sea shrimp certification. Vineetha has done assessments using all the three Principles.

(Detailed c.v's of both assessors are available on request)

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*The CAB should delete the table below:*

Table 22: Template version control

Version	Date of publication	Description of amendment
1.0	15 August 2011	Date of first release
1.1	31 October 2013	Updated in line with changes to CR v1.3
2.0	08 October 2014	Confirmed background sections (Section 3) as optional (use of 'may' statements)  Modified Table 6.3 to create a simplified scoring sheet to be completed in place of full evaluation tables  Made amendments to PIs based on Fishery Standard Review changes (e.g. removed original PIs 1.1.2, 3.1.4 and 3.2.4).
2.1	9 October 2017	Inclusion of optional full evaluation tables
3.0	17 December 2018	Release alongside Fisheries Certification Process v2.1
3.1	29 March 2019	Minor document changes for usability
3.2	25 March 2020	Release alongside Fisheries Certification Process v2.2
3.3	26 October 2022	Release alongside Fisheries Certification Process v2.3
3.4	01 May 2023	Added optional vessels list section 5.2.

A controlled document list of MSC program documents is available on the MSC website (<https://www.msc.org/for-business/certification-bodies/supporting-documents>).

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