Oman Indian oil sardine fishery

MarinTrust whole fish assessment

Assessment by MarinTrust from February 2023, updated to MarinTrust Standard version 3 by Jo Gascoigne, March 2024. Should be read together with MarinTrust (2023) (the MarinTrust version 2 assessment) which provides full details of analyses.

1. Scope

Management Authority	Sultanate of Oman
Main species	Indian oil sardine (Sardinella longiceps)
Fishery Location	FAO Area 51 (Indian Ocean West), Oman EEZ
Gear type	beach seine, purse seine, encircling gillnets

2. Summary of outcome

Overall	outcome	GAP
Clauses	failed	Reason for fail
M1.1.3	Fisher access to information	Assessor has no information
M1.2.3	Legal dispute resolution	Assessor has no information
M1.2.4	Legal rights of subsistence fishers	Assessor has no information
M1.3.2	Scientific advice on stock / ecosystem status	Unclear if this exists
M1.3.3	Transparent and independent scientific advice	Unclear how scientific advice is
		prepared (if any)
M1.4.1	Management principles of sustainability and	Use of precautionary approach in
	precaution	management unclear
M1.5.1	Stakeholder participation	Extent and frequency of consultations
		unclear
M1.5.2	Transparency of decision making	Assessor has no information
M1.5.3	Management review	Assessor has no information
M2.1.3	Scale of monitoring, control and surveillance	Assessor lacking information
M2.2.2	Systematic non-compliance	Concerns are reported
M2.3.1	Documentation and transparency of levels of	Assessor has no information
	compliance	
M2.3.2	Fishery cooperation with management	Assessor has no information
M2.3.3	Catch reporting and tracing for traceability	Assessor has no information
	and exclusion of IUU	
A1.1	Landings data for sardines	No information on species composition
A1.2	Sufficient information for stock assessment	No information on species composition
	for sardines	
A2.1	Systematic periodic stock assessments	Does not seem to exist, insufficient
		species-level information
A2.2	Stock status relative to reference points	Does not seem to exist at species level
A2.3	Estimation of appropriate level of removals	Not available?
A2.4	Internal or external review of assessment	No assessment?
A2.5	Stock assessments public	No assessment?
A3.1	Mechanism to restriction fishing mortality	Not in place
A3.2	Removals at recommended level	Not in place
A3.3	Fishing stopped when stock below Blim	Not in place – no reference points
A4.1	Stock status	Unclear

E1.1.1	ETP species interacting with the fishery known	Assessor has no information
E1.1.2	ETP interactions reported and recorded	Assessor has no information
E1.1.3	Fishery impacts on ETP species known	Assessor has no information
E1.2.1	No negative impact of the fishery on ETP spp	Assessor has no information
E1.3.1	Measures to protect ETP species	Assessor has no information
E1.3.2	Measures are working	Assessor has no information
E2.1.2	Information on time / place / scale of fishing	Assessor has no information
	operations	
E2.2.1	Fishery impact on habitats	Impacts unlikely but need to confirm
E3.1.1	Main elements of ecosystem known	Assessor has no information
E3.1.3	Impact of fishery on ecosystem	Need information on stock status
E3.1.2	Fishery not having impact on ecosystem	Unclear
E3.3.1	Measures to protect ecosystem	Stock-level measures needed first
E3.3.2	Measures are working	See above

3. Species composition of fishery

At present, we have no direct information from the fishmeal factories as to the species composition of the raw material. This analysis is therefore based for now on information on the total catch of small pelagics in Oman, taken from the previous version of this assessment (MarinTrust 2023) (which used information from the Statistical Yearbook for 2021).

On this basis, out of a total small pelagic catch of 564,708 t in 2021, the species composition was as follows:

- 'Sardine' (i.e. sardinella species; see below) 78%
- Small jacks (species unknown; see below) 12.7%
- Anchovy (various species; see below) 3.8%
- Indian mackerel (*Rastrelliger kanagurta*) 3.1%
- Mullets (species unknown) 1.9%
- Needlefish (Hemiramphus spp.) 0.2%
- Other 0.3%

In relation to the sardine (sardinella) species, the previous assessment identifies three species: Sardinella longiceps (Indian oil sardine) making up ~80% of the total sardine catch, plus S. gibbosa and S. sindensis. This may need to be verified. Note that these species are difficult to distinguish.

For the jacks, information is insufficient to identify species, although MarinTrust (2023) give *Atule mate* and *Selar crumenophthalmus* as examples.

For the anchovy species, different sources identify a range of up to 10 possible species (Fishbase, Afrand et al. 2020), but some may be misidentified (these species are also exceptionally difficult to distinguish) and others only present further into the Persian Gulf. *Stolephorus indicus, Thryssa hamiltonii* and *T. setirostris* seem likely but there may well be others.

4. Species categorisation

The species categories has not changed from version 2 to version 3; i.e. Type 1 species are 'target' species and should make up a minimum of 95% of fishery; Type 2 species are non-target. Category A

species are Type 1 species with a species-specific management regime, while Category B species are Type 1 species without; Categories C and D are the same for Type 2 species.

According to the previous assessment, however, consideration of the management regime (in terms of species categorisation) is not relevant at this stage, because the FIP can decide what kind of management regime is appropriate and what changes are required. Therefore, following MarinTrust (2023), the sardinella species are categorised A and the others D.

The species table (Table 5 in MarinTrust 2023) is updated below.

Species		IUCN	MT	References
		category	category	
Sardine	Sardinella longiceps	LC	А	Di Dario and Munroe 2020
	S. gibbosa	LC	А	Santos et al. 2018
	S. sindensis	LC	А	Di Dario 2018
Jacks			D	
Anchovy			D	
Indian mackerel	Rastrelliger kanagurta	LC	D	Collette and Pollard 2023
Mullets			D	
Needlefish	Hemiramphus spp.	LC*	D	
Other			D	

Table 3: Species categorisation table (LC = least concern)

*All species of Hemiramphus assessed by IUCN are LC, but there are other similar genera

5. Assessment

M1. Management Framework

M1.1 Th	M1.1 There is an organisation responsible for managing the fishery		
M1.1.1	The management and administration organisations within the fishery are	Pass	
	clearly identified		
M1.1.2	The functions and responsibilities of the management organisations include	Pass	
	the overall regulation, administration, science and data collection and		
	enforcement roles, and are documented and publicly available		
M1.1.3	Fishers have access to information and/or training materials through	GAP	
	nationally-recognised organisations		
M1.1.1: The organisation responsible for managing the fishery is the Ministry of Agriculture,			
Fisheries and Water Resources (MAFWR) as established by Sultanate of Oman Royal Decree			
92/2020.			
M1.1.2: The Decree 92/2020 sets out the structure, functions and responsibilities of MAFWR,			
includin	including regulation, science and data collection and enforcement (see MarinTrust 2023 for		
details). Sultan Qaboos University (SQU) also has a scientific role. The roles are clear – the level of			
monitoring and scientific information available is evaluated further below.			
M1.1.3:	We currently have no information on this.		

M1.2 Fishery management organisations are legally empowered to take management actions		
M1.2.1	There are legal instruments in place to give authority to the management	Pass
	organisation(s) which can include policies, regulations, acts or other legal	
	mechanisms	

M1.2.2	Vessels wishing to participate in the fishery must be authorised by the	Pass
	management organisation(s	
M1.2.3	The management system has a mechanism in place for the resolution of	GAP
	legal disputes	
M1.2.4	There is evidence of the legal rights of people dependent on fishing for food	GAP
	or livelihood	
M1.2.1: The MAFWR is empowered by Royal Decree 92/2020 to issue regulations and take action		
to protect fish stocks. The MAFWR is also empowered by other fisheries legislation, particularly		
Royal Decree 53/1981, promulgating the Law of Maritime Fishing and the Protection of Aquatic		
Living Re	esources.	
M1.2.2: All fishers, whether part- or full-time, must have a license, although the licence is not		
specific to any particular fishery (Al Jufaili 2020).		
M1.2.3: We do not have any information on this for the moment		
M1.2.4:	License holders must be Omani citizens, but we do not have further information	n for the

moment

M1.3 There is an organisation responsible for collecting data and (scientifically) assessing the			
fishery			
M1.3.1	The organisation(s) responsible for collecting data and assessing the fishery	Pass	
	is/are clearly identified		
M1.3.2	The management system receives scientific advice regarding stock, non-	GAP	
	target species and ecosystem status		
M1.3.3	Scientific advice is independent from the management organisation(s) and	GAP	
	transparent in its formulation through a clearly defined process		
M1.3.1:	M1.3.1: Royal Decree 92/2020 places responsibility for fisheries research with the MAFWR. In		
practice, much of the research reviewed for the purposes of this assessment was produced by the			
Department of Marine Science and Fisheries at Sultan Qaboos University. There may or may not			
be a formal relationship between the two but there are close links.			
M1.3.2: MarinTrust (2023) notes that it is unclear at present how MAFWR solicits, receives and			
takes ac	takes account of all research findings – further information is needed.		

M1.3.3: Unclear at present

M1.4 The fishery management system is based on the principles of sustainable fishing and a precautionary approach

M1.4.1	In reaching a determination for M1.4, the assessor should consider if the	GAP
	following is in place: A policy or long-term management objective for	
	sustainable harvesting based on the best scientific evidence and a	
	precautionary approach is publicly available and implemented for the fishery	

According to MarinTrust (2023), the strategic objectives of the MAFWR include 'Management and development of agricultural, fisheries and water resources to ensure their sustainability...', and 'Managing and ensuring the abundance of food and water stocks' (Google translation). The stated objective of the long-term plan for fisheries management in Oman is a 'World class profitable and environmentally sustainable fisheries sector' (See MarinTrust 2023 for details and references). We do not have any information about the precautionary approach, however.

M1.5 There is a clearly defined decision-making process which is transparent, with processes and results made publicly available

M1.5.1	There is participatory engagement through which fishery stakeholders and	GAP	
	respond to the management systems' decision making process		
	respond to, the management systems decision-making process		
M1.5.2	The decision-making process is transparent, with results made publicly	GAP	
	available		
M1.5.3	The fishery management system is subject to periodic internal or external	GAP	
	review to validate the decision-making process, outcomes and scientific data		
M1.5.1: According to MarinTrust (2023), the long-term vision for fisheries management in Oman			
(2015) sets out the intent to implement a consultation mechanism, but it is not clear to what			
extent it been implemented nor how frequently such consultations are held.			
M1.5.2:	M1.5.2: Unclear at present		
M1.5.3:	Unclear at present		

M2. Surveillance, Control and Enforcement

M2.1 Th	M2.1 There is an organisation responsible for monitoring compliance with fishery laws and		
regulati	regulations		
M2.1.1	There is an organisation responsible for monitoring compliance with specific	Pass	
	monitoring, control and surveillance (MCS) mechanisms in place		
M2.1.2	There are relevant tools or mechanisms used to minimise IUU fishing activity	Pass	
M2.1.3	There is evidence of monitoring and surveillance activity appropriate to the	GAP	
	intensity, geography, management control measures and compliance		
	behaviour of the fishery		
M2.1.1:	M2.1.1: The organisation responsible for monitoring compliance with fisheries laws and		
regulations is the Department of Fisheries Control and Licensing within the MAFWR.			
M2.1.2 and M2.1.3: In 2022, 2,757 sets of fishing equipment were confiscated (including boats,			
engines, nets and other devices), along with 3.5 tonnes of fish, according to reports cited in			
MarinTrust (2023), so there are clearly tools in place, as well as surveillance and control, but to			
what ex	what extent it is effective is unclear.		

M2.2 There is a framework of sanctions which are applied when infringements against laws and regulations are discovered

M2.2.1	The laws and regulations provide for penalties or sanctions that are	Pass
	adequate in severity to act as an effective deterrent	
M2.2.2	There is no evidence of systematic non-compliance	GAP

M2.2.1: Chapter 5 of Royal Decree 53/1981 sets out the sanctions for breaches of fishery laws and regulations. These include fines, imprisonment, confiscation of gear, vessel, and catch, and revocation of fishing license. The Decree also provides for the doubling of sanctions for repeat violations.

M2.2.2: 5000 violations of fisheries regulations were reported in 2022 by the Department (according to MarinTrust 2023), so there is considerable non-compliance, although at least some is detected by the monitoring system. According to MarinTrust (2023), widespread non-compliance is a concern expressed by stakeholders.

M2.3 There is substantial evidence of widespread compliance in the fishery, and no substantial		
evidence of IUU fishing		
M2.3.1	The level of compliance is documented and updated routinely, statistically	GAP
	reviewed and available	

M2.3.2	Fishers provide additional information and cooperate with	GAP
	management/enforcement agencies/organisations to support the effective	
	management of the fishery	
M2.3.3	The catch recording and reporting system is sufficient for effective	GAP
	traceability of catches per vessel and supports the prevention of IUU fishing	
M2.3.1: Unclear		
M2.3.2: Unclear		
M2.3.3: Unclear. Note, however, that Oman has a catch certification system which is sufficient to		
allow export of fisheries products to the EU. MAFWR is the competent authority. There is,		
therefore, a traceability system in place, although to what extent it can be bypassed is unclear.		

Species requirements: Category A species

A1. Data collection (Category A species)		
A1.1	Landings data are collected such that the fishery-wide removals of this	GAP
	species are known	
A1.2	Sufficient additional information is collected to enable an indication of stock	GAP
	status to be estimated	
A1.1: Landings data are collected and published (see above). However, landings are recorded as		
'sardine', and it is not clear whether there is any sampling to provide species composition of the		
'sardine' catch (reportedly made up of three species).		
A1.2: Reportedly there is work on stock assessments, using data such as size and CPUE, but it is		
unclear whether this is systematic, and to what extent it is species specific.		

A2. Stoc	A2. Stock assessment		
A2.1	A stock assessment is conducted at least once every 3 years (or every 5	GAP	
	years if there is substantial supporting information that this is sufficient for		
	the long-term sustainable management of the stock) and considers all		
	fishery removals and the biological characteristics of the species		
A2.2	The assessment provides an estimate of the status of the biological stock	GAP	
	relative to a reference point or proxy		
A2.3	The assessment provides an indication of the volume of fishery removals	GAP	
	which is appropriate for the current stock status		
A2.4	The assessment is subject to internal or external peer review	GAP	
A2.5	The assessment is made publicly available	GAP	

A2.1: There has been considerable work over the years (see summary and details in MarinTrust 2023) but it seems to be ad hoc as to the area and species grouping considered, and it is not clear how it feeds into the management of the fishery. Lacking quantitative data as to the species composition of 'sardine', it is never going to be adequate to manage the species.

A2.2: The issue of 'biological stock' is difficult for Oman, because all the species of sardine are thought to be migratory (although the assessor is unclear to what extent stock structure and migratory pathways are understood). According to MarinTrust, MSY reference points have been estimated, but by species group (small pelagics) rather than by species.

A2.3: Unclear – see above

A2.4 and A2.5: The assessments cited by MarinTrust (2023) are publically-available, peer-reviewed papers, but it is not clear if there is also a systematic assessment which is not available.

A3.1	There is a mechanism in place by which total fishing mortality of this species is restricted	GAP	
A3.2	Total fishery removals of this species do not regularly exceed the level	GAP	
	indicated or stated in the stock assessment. Where a specific quantity of		
	10% ONLY if the stock status is above the limit reference point or proxy		
A3.3	Commercial fishery removals are prohibited when the stock has been	GAP	
	estimated to be below the limit reference point or proxy (small quotas for		
	research or non-target catch of the species in other fisheries are		
	permissible).		
A3.1: A licence is required to access the fishery, but reportedly this does not impose any			
restrictions as to catch, gear or effort. The fishery is in essence open access.			
A3.2: There does not appear to be a recent stock assessment, and in any case, 'sardine' is a			
species complex.			
A3.3: As	A3.3: As far as we know there is no limit reference point, nor any such rules.		

A4. Stoc	A4. Stock status		
A4.1	The stock is at or above the target reference point; OR IF NOT: the stock is above the limit reference point or proxy and there is evidence that a fall below the limit reference point would result in fishery closure; OR IF NOT: the stock is estimated to be below the limit reference point or proxy, but fishery removals are prohibited	GAP	
As far as we know, there is no robust recent information on stock status			

Species requirements: Category D species

Category D species are:

Jacks	
Anchovy	
Indian mackerel	Rastrelliger kanagurta
Mullets	
Needlefish	Hemiramphus spp.

Only minor changes have been made to the analysis for Category D species between the MarinTrust standard versions 2.2 and 3, which according to MarinTrust analysis should not have an impact on the outcome. The scoring is therefore reported here, with details given in MarinTrust (2023).

- Indian mackerel: PASS
- Jacks: PASS
- Mullets: PASS
- Needlefish: PASS

Anchovy was not previously scored, so this analysis is given below. For scoring tables, please refer to MarinTrust (2023).

Species name	Stolephorus indicus, Thryssa spp.
Productivity	

Attribute	Rationale	Score
Average age at maturity	Most likely less than 2.5 years (see below)	1
Average maximum age	For <i>Stolephorus commersonnii</i> estimated at 2.5 years (Kamukuru et al. 2020)	1
Fecundity	10,000-150,000 eggs per female per spawn according to data cited by FishBase, from the Philippines	2
Average maximum size	For <i>S. indicus</i> , 155mm given by FishBase and very similar by IUCN (Santos et al. 2017). For <i>S. commersonnii</i> , 112 mm given by FishBase, 100mm by IUCN (Munroe 2018), but reports 65-70mm typical in the Philippines. Probably variable.	1
Average size at maturity	Length at first maturity 57mm (Kamukuru et al. 2020); value of 72mm given by FishBase. Probably variable.	1
Reproductive strategy	Broadcast spawner	1
Trophic level	2.94 +/- 0.11 (Santos et al. 2017)	2
Productivity score		1.29
Susceptibility		
Attribute	Rationale	Score
Areal Overlap	These anchovy stocks are all widespread and mainly migratory	1
Encounter- ability	High overlap (pelagic)	3
Selectivity of gear type	A fishery of this type is not typically size-selective	3
Post capture mortality	Target species - retained	3
Susceptibility score		2.5
PSA risk rating		Pass

E1. Impact on ETP species

E1.1 Information on interactions between the fishery and ETP species is collected		
E1.1.1	ETP species which may be directly affected by the fishery have been	GAP
	identified	
E1.1.2	Interactions between the fishery and ETP species are recorded and reported	GAP
	to management organisations	

E1.1.3	Collection and analysis of ETP information is adequate to provide a reliable	GAP
	indication of the impact the fishery has on ETP species	
As far as we know, the fishery does not interact with ETP species, but there does not seem to be		
any formal reporting or other information to confirm this.		

E1.2 The fishery has no significant negative impact on ETP species		
E1.2.1	1.2.1 The information collected in relation to E1.1.3 indicates that the fishery does G	
	not have a significant negative impact on ETP species	
See above		

E1.3 There is an ETP management strategy in place for the fishery		
E1.3.1	There are measures applied to the fishery which are designed to manage the	GAP
	impacts of the fishery on ETP species	
E1.3.2	The measures are considered likely to achieve the objectives of regional,	GAP
	national and international legislation relating to ETP species	
As far as we know, there are no measures in place		

E2. Impact on the habitat

E2.1 Information on interactions between the fishery and marine habitats is collected		
E2.1.1	Habitats which may be directly affected by the fishery have been identified,	Pass
	including any habitats which may be particularly vulnerable	
E2.1.2	Information on the scale, location and intensity of fishing activity relative to	GAP
	habitats is collected	
E2.1.3	Collection and analysis of habitat information is adequate to provide a	Pass
	reliable indication of the impact the fishery has on marine habitats	
The fishery uses pelagic gear and therefore logically does not have any impact on habitats.		
However, it would be useful to have full details of gear and operations before ticking this all off as		
a Pass, so E2.1.2 is set as a gap, as a placeholder to ensure that operational information is		
collected and reviewed.		

E2.2 The fishery has no significant impact on marine habitats		
E2.2.1	The information collected in relation to E2.1.3 indicates that the fishery does	GAP
	not have a significant negative impact on marine habitats	
See above – to be reviewed when better gear / operational data are available		

E2.3 There is a habitat management strategy in place for the fishery.		
E2.3.1	There are measures applied to the fishery which are designed to manage the	Pass
	impact of the fishery on marine habitats	
E2.3.2	The measures are considered likely to prevent the fishery from having a	GAP
	significant negative impact on marine habitats	
See above. The gear types are likely to constitute sufficient 'measures' but E2.3.2 is set as a GAP		
to ensure that this is fully verified.		

E3. Impact on the ecosystem

E3.1 Information on the potential impacts of the fishery on marine ecosystems is collected

E3.1.1	The main elements of the marine ecosystems in the area(s) where the	GAP
	fishery takes place have been identified	
E3.1.2	The role of the species caught in the fishery within the marine ecosystem is	Pass
	understood, either through research on this specific fishery or inferred from	
	other fisheries	
E3.1.3	Collection and analysis of ecosystem information is adequate to provide a	GAP
	reliable indication of the impact the fishery has on marine ecosystems	
According to MarinTrust (2023) there is no information on this; however, the role of small pelagics		
in the ecosystem can easily be inferred from other similar upwelling ecosystems and related		
species (e.g. in NW Africa)		

 E3.2 There is no substantial evidence that the fishery has a significant negative impact on the marine ecosystem

 E3.2.1
 The information collected in relation to E3.1.3 indicates that the fishery does not have a significant negative impact on marine ecosystems
 GAP

 See above
 See above
 See above

E3.3 There is an ecosystem management strategy in place for the fishery		
E3.3.1	There are measures applied to the fishery which are designed to manage the	GAP
	impacts of the fishery on marine ecosystems	
E3.3.2	The measures are considered likely to prevent the fishery from having a	GAP
	significant negative impact on marine ecosystems	
See above		

6. References

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