Risk Based Framework (RBF) of the Blue Swimming Crab Fisheries in Pamekasan of East Java, Indonesia

Indonesian Blue Swimming Crab Assosiation

www.apri.or.id

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1 Introduction

1.2 Description of the Blue Swimming Crab Fisheries

Pamekasan, especially at southern part of Madura is one of the blue swimming crab (*Portunus pelagicus*) fisheries in East Java Province of Indonesia. In term of unit of area for fisheries management in Indonesia, the southern waters of Madura is part of Fisheries Management Area (FMA) or Wilayah Pengelolaan Perikanan (WPP) of the Republic of the Indonesia (WPP-RI) 712 (**Figure 1**). The contribution of FMA 712 to the national blue swimming crab wild catch production is approximately 40% (DGCF, 2017). Meanwhile, the blue swimming crab of southern Pamekasan might contribute less than 10% of the BSC wild catch production in FMA 712. It is a relatively minor area for BSC production of FMA 712, in which only subset of Indonesian Blue Swimming Crab Association or Asosiasi Pengelolaan Rajungan (APRI) members are active.

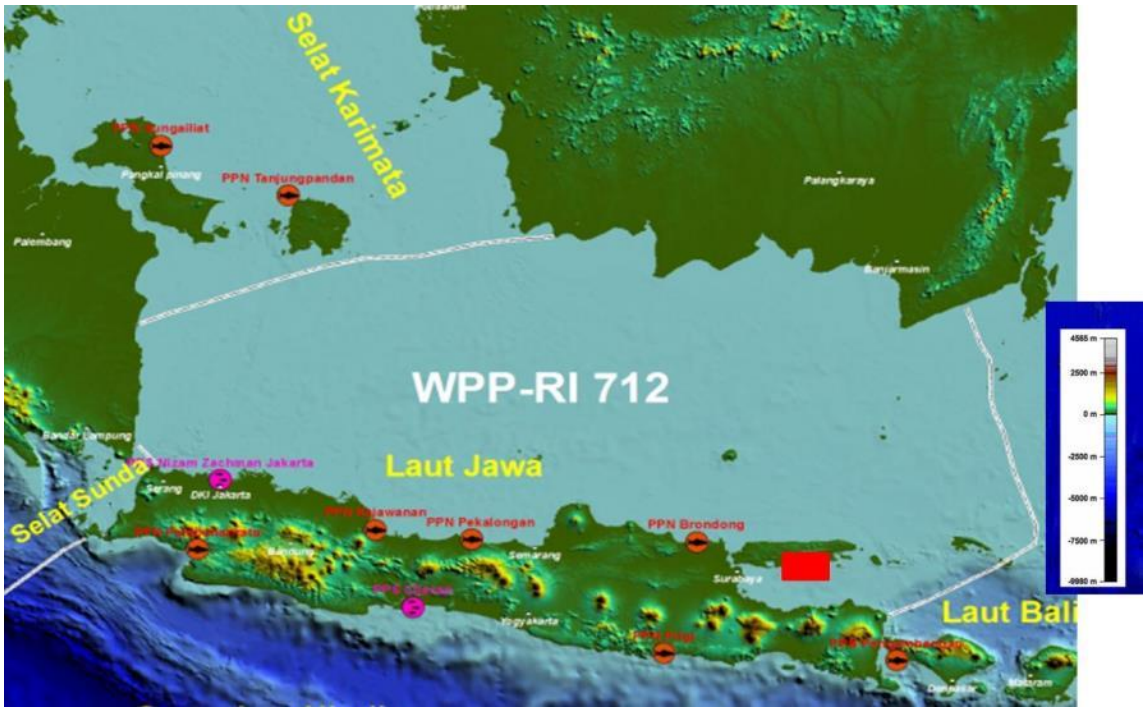


Figure 1. Southern Pamekasan of Southern Madura Waters (red block colour) as part of Fisheries Management Area (FMA or WPP-RI 712) of the Republic of the Indonesia (white line as the boundary of FMA).

The blue swimming crab (BSC) fishery in southern Pamekasan is captured by coastal small-scale fisher using less than 10 gross tonnage (GT) boats with an average of 2 GT boats and 10-23 HP motor. All fisher live in castal villages of southern Pamekasan and they have using traps (collapsible or folding traps) for fishing BSC as well as most of fisher of southern Madura, i.e. Southern Bangkalan, Sampang, Pamekasan and Sumenep (Wijayanti *et al.,* 2018). The fishing ground of the BSC fisher approximately

less than 6-7 NM from the shore line with the water depth less than 20 m (**Figure 2**). Fishing occur as one day fishing or it just several hours during day time or night and almost round years.

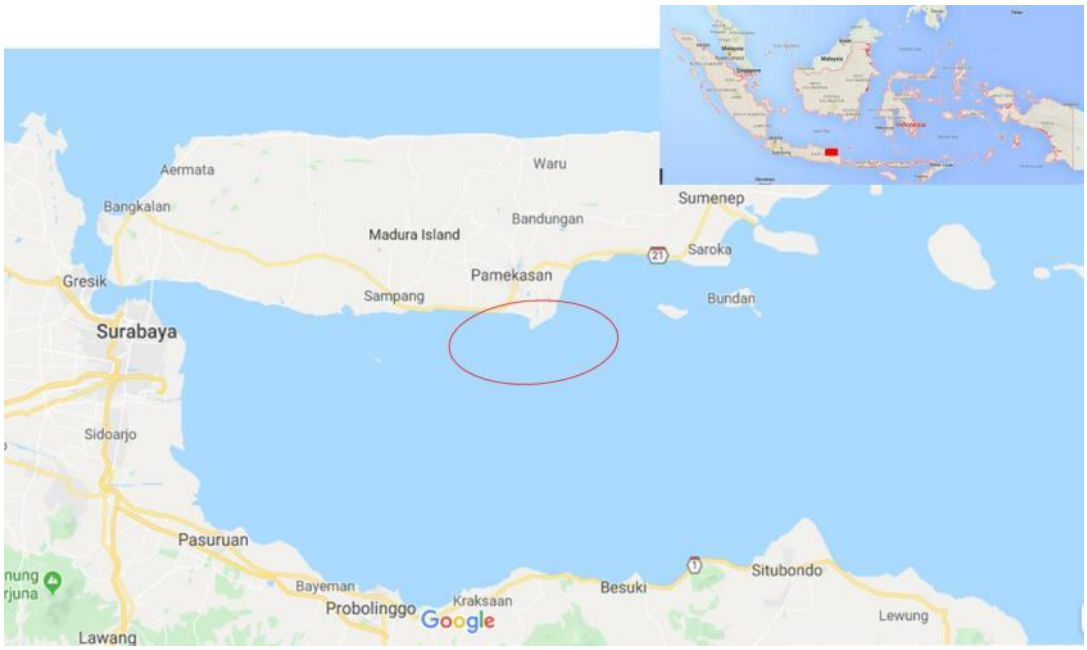


Figure 2. The BSC Fishing Ground in Southern Pamekasan of Southern Madura Waters.

1.2 Risk Based Framework (RBF) Assessment

This Risk-Based Framework (RBF) was developed based on Marine Stewardship Council (MSC) Fisheries Process in order to assess the fishery which has data deficient for certification program against the MSC standard for sustainable fishing. The RBF may be used for evaluating the BSC stock status, and the impact of the fisheries on primary species, secondary species, ETP species, habitat and ecosystem components of MSC standard Principle 2.

1.3 Methods

1.3.1 Data collection

Apart of data collection for Length Base Stock Assessment, APRI was collecting data for non-target species of the BSC fishing using traps in southern Pamekasan from November 3rd, 2018 until November 28th, 2019. Data collection was conducted during seven to 11 days per-month from November 3rd, 2018 until July 30th, 2019, while from August 1st to November 28th, 2019 was conducted every day. Other information was collected during during site visit and RBF workshop at Santika Primere Gubeng Hotel

Surabaya on July 10th, 2019. Participant in the workshop consist of BSC stakeholder in Madura, including: (1) the representative researcher of Brawijaya University-Malang and Trunojoyo Uniersity-Bangkalan Madura; (2) the representative of APRI member from East Java; (3) the representative of Fisheries and Marine Affair Agency of Bangkalan, Sampang, Pamekasan and Sumenap, (4) the representative of some mini plant manager from Pamekasan; (5) the representative of BSC fisher from Pamekasan.

1.3.2 RBF Methodology

The BSC fisheries of Pamekasan-Madura can classified as data deficient. Methodology within the RBF on the fishery and justification shown in **Figure 3** and **Figure 4**.

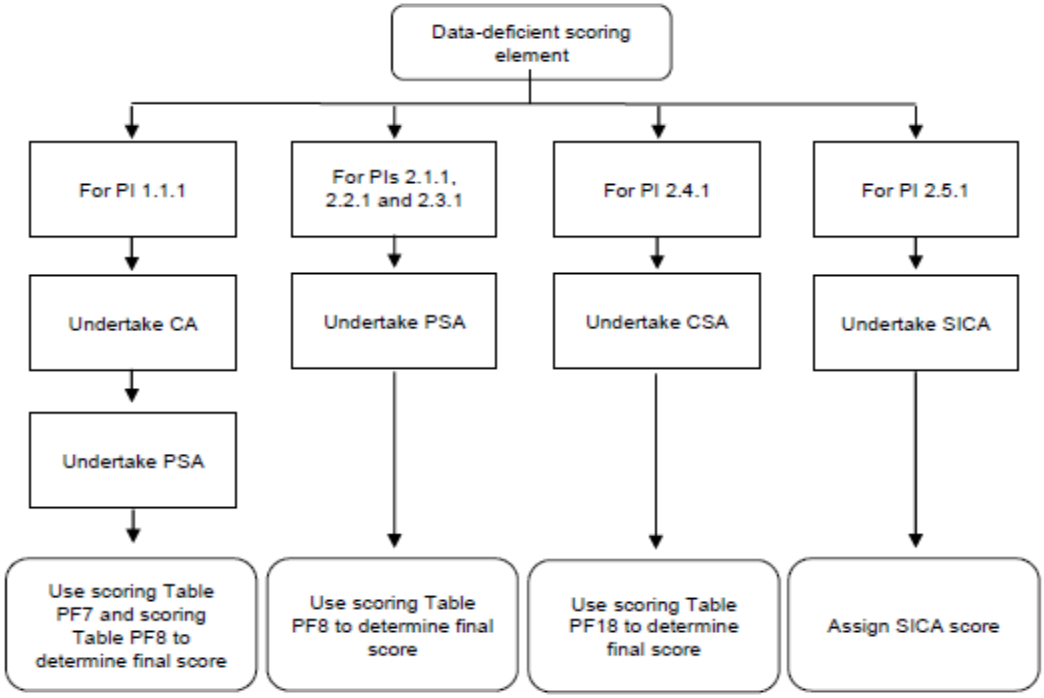


Figure 3. Methodology within the RBF. Note: CA is Consequence Analysis; PSA is Productivity Susceptibility Analysis; CSA is Consequence Spatial Analysis; SICA is Scale Intensity Consequence Analysis (Source: Figure PF1 of MSC Fisheries Certification Process v2.1, p.69)

a. Consequence Analysis (CA)

The Consequence Analysis (CA) is a semi-quantitative analysis that assesses the consequence of fishing activity on a particular species subcomponent. The CA is partly based on the structured collection of qualitative information from a diverse group of stakeholders, as well as using information on proxies that can be used to estimate changes to the relevant subcomponent in a fishery. The CA scoring template can be seen in **Table 1.**

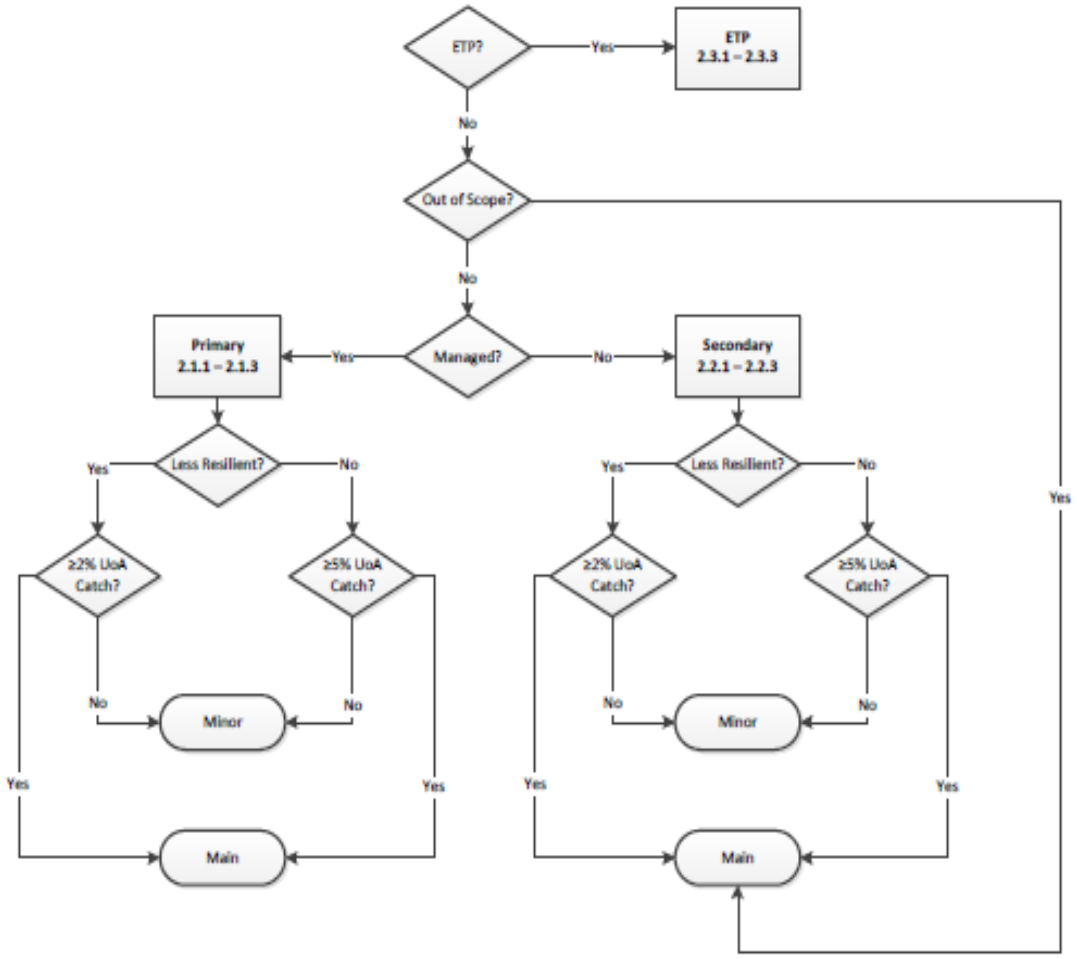


Figure 4. Decision tree to assisst in designation of P2 Species components (Source: Figure GSA4 of MSC Fisheries Standard [Annexes S] and Guidance v2.0, p.418)

Table 1. The Consequence Analysis (CA) Scoring Template

Principle 1: Stock status outcome	**Scoring element**	**Consequence subcomponents**	**Consequence score**
		Population size	
		Reproductive capacity	
		Age/size/sex structure	
		Geographic range	
Rationale for most vulnerable subcomponent			
Rationale for consequence score			

Source: Table PF2 of MSC Fisheries Certification Process v2.1, p.74

b. Productivity Susceptibility Analysis (PSA)

The Productivity Susceptibility Analysis (PSA) requires information about the productivity and susceptibility of each species in a given PI, and uses this information to individually score a set of attributes using pre-established PSA tables. Any attribute for which there is insufficient data is automatically assigned the highest risk score: at least some of information is thus needed to demonstrate low risk in the fishery. The Productivity Susceptibility Analysis attributes and score can be seen in **Table 2** and **Table 3.**

Table 2. The PSA-Productivity Attributes and Scores

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)
Average age at maturity	<5 years	5-15 years	>15 years
Average maximum age	<10 years	10-25 years	>25 years
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer
Trophic Level	<2.75	2.75-3.25	>3.25
Density dependence (to be used when scoring invertebrate only)	Compensatory dynamics at low population size demonstrated or likely	No depensatory or compensatory dynamics at low population size demonstrated or likely	Depensatory dynamics at low population size (Allee effect) demonstrated or likely

Source: Table PF4 of MSC Fisheries Certification Process V 2.1, p. 77-78.

Table 3. The PSA-Susceptibility Attributes and Scores

Susceptibility attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Areal Overlap (Availability) Overlap of the fishing effort with a species concentration of the stock.	<10% overlap	10-30% overlap	>30% overlap

Susceptibility attribute	High productivity (Low risk, score = 1)	Medium productivity (medium risk, score = 2)	Low productivity (high risk, score = 3)
Vertical Overlap (Encounterability) The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the fishing gear.	Low overlap with fishing gear	Medium overlap with fishing gear	High overlap with fishing gear
Selectivity of gear types Potential of gear to capture or retain the species	a. Individual <size at maturity are rarely caught b. Individual <size at maturity can escape or avoid gear	a. Individual <size at maturity are regularly caught b. Individual <half the size at maturity can escape or avoid gear	a. Individual <size at maturity are frequently caught b. Individual <half the size at maturity are retained by gear
Post-capture mortality (PCM) The change that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority released post-capture and survival	Evidence of some released post-capture and survival	Retained species or majority dead when released Default scorefor retained species (Principle 1 or Principle 2).

Source: Table PF5 of MSC Fisheries Certification Process V2.1, p.78-79.

c. Habitat Assessment by Consequence Spatial Analysis (CSA)

The Consequence Spatial Analysis (CSA) requires information about the consequence of fishing activities and spatial distribution of habitat types and uses this information to individually score a set of attributes using pre-established CSA tables. Any attribute for which there are insufficient data is automatically assigned the highest risk score: at least some level of information is needed to demonstrate low risk in the fishery.

Habitats in the UoA shall be categorised on the basis of their substratum, geomorphology, and (characteristic) biota (SGB) characteristics, followed by the biome, sub-biome, and its feature (Table PF10 of MSC Fisheries Certification Process v2.1, p.86). Meanwhile, the score of consequence attributes such as in Table PF11 of MSC Fisheries Certification Process (FCP) v2.1, p.86.

The attribute of regeneration biota shall be also scored on the basis of the rate of the recovery of biota associated with the habitat using information on age, growth, and recolonisation of biota where available (Table PF12 of MSC FCP v2.1, p.87). Where information on age, growth, and recolonisation of associated biota is not available for the UoA, reference shall be made to comparable data from studies elsewhere. In the absence of such comparable studies, the proxies in Table PF12 shall be used as a

surrogate for accumulation and recovery time. Meanwhile, the natural disturbance attribute shall be scored on the basis of the natural disturbance that is assumed to occur at the particular depth zone in which the habitat and fishing activity occurs (Table PF13 of MSC FCP v2.1, p.88). Where information on disturbance is unavailable, proxies shall be used as outlined in Table PF13.

Removability of biota shall be also scored on the basis of the likelihood of attached biota being removed or killed by interactions with fishing gear (Table PF14 of MSC FCP v2.1, p.89). This attribute shall also consider the removability and mortality of structure-forming epibiota and bioturbating infauna. On the other hand, removability of substratum shall be scored on the basis of clast (rock fragment or grain resulting from the breakdown of larger rocks) size and likelihood of the substratum being moved (Table PF14). Scoring of this attribute shall consider the gear type being assessed.

Substratum ruggedness shall be scored on the basis of the extent to which available habitat is actually accessible to mobile gear given the ruggedness of the substratum (Table PF15 of MSC FCP v2.1, p.92).. Scoring of this attribute shall consider the characteristics of the substratum and the gear type being used. Subsequently, seabed slope shall be scored on the basis of the impact to habitat that occurs as a result of slope steepness and mobility of substrata once dislodged. Scoring this attribute shall consider the degree of slope (Table PF15).

Gear footprint is also shall be scored on the basis of the gear's potential for disturbance and the number of encounters required to produce an impact on a habitat, taking into account the size, weight, and mobility of individual gears and the footprint of the gears (Table PF16 of MSC FCP v2.1, p.93). This attribute is followed by Spatial overlap attribute that shall be scored on the basis of spatial overlap between the habitat(s) distribution within the "managed area" and the distribution of areas fished by the UoA (Table PF17 of MSC FCP v2.1, p.94). Moreover, encounterability shall be scored on the basis of the likelihood that a fishing gear will encounter the habitat within the "managed area", taking into account the nature and deployment of the fishing gear and the possibility of its interaction with the habitat (Table PF 17).

d. Ecosystem Assessment by Scale Intensity Consequence Analysis (SICA)

The Scale Intensity Consequence Analysis (SICA) is a qualitative analysis which aims to identify which activities lead to a significant impact on any ecosystem. A SICA is partly based on the structured collection of qualitative information pertaining to the PI in question from a diverse group of stakeholders. In this this assessment, SICA will not conducted.

1.4 Scope of this RBF

This RBF was conducted in the scope of Risk-based assessment and to provide:

- Principle 1, particularly performance indicator (PI) 1.1.1 of the blue swimming crab stocks of the Pamekasan Blue Swimmer Crab Fishery by using the available data;
- Principle 2, particularly PI 2.1.1, PI 2.2.1, PI 2.3.1, PI 2.4.1, PI 2.5.1, using available data;
- Advice on the quality and limitations of each RBF assessment;
- Advice on improvements to the harvest strategy in highlight of the P1 RBF assessment;
- Provides an understanding of the implications of recent changes in the MSC assessment framework from Version 2.1 (which would need to be used in future certification).

2 Retained Species Assessment

2.1 Catch Composition

APRI was implemented an observer programme to assess catches of BSC as target species and other by-catches species in Southern Pamekasan since at the beginning of November 2018. The data was the BSC catches per-unit of effort (CPUE) of fishery, length and weight of BSC samples. Meanwhile, all by-catches or non-targeted species for both retained and discarded species were observed and identified by number of individual or species group and their weight.

Result showed that the proportion of non-target species by weight for BSC traps fisheries was less than 20%, while retained species (R) approximately 16% (**Table 4** and **Table 5**). Therefore, the proportion of discarded species (D) was low (less than 4%). Different number of species and amount of by-catches can be found in small to medium scale of different habitat related to biodiversity in certain area and season in BSC fisheries (Zairion 2015; Sari *et al.,* 2019). Zairion (2015) also reported that mean percentage of non-targeted species caught by gill-net in BSC fisheries at the East Lampung coastal waters was 38% and 68% by weight and the number of individual in the year, respectively. The highest proportion of by-catch was during east monsoon/dry season and it seems has connectivity with wind driven current.

Result showed that ETP species was found in very low proportion and its status as retained species (R). This ETP species is Indo-Pacific (Coastal) horseshoe crab (*Tachypleus gigas*). Meanwhile, result also showed that there was one retained species who has the proportion above 5%, that is Giant mud crab/Giant mangrove crab (*Scylla serrate*). This species is managed under the Ministry of Fisheries and Marine Affair Decree No. 56 year 2016 concerning Prohibition of catching and / or exporting of lobster (*Panulirus* spp.), crab (*Scylla* spp.), and blue swimming crab (*Portunus* spp.) from country region of the Republic of Indonesia. Thus, the *Scylla serrate* can categorized as **primary species**.

Table 4. List of species caught in the traps based on the observation from November 3rd, 2018 to November 28th, 2019

No.	Species	Common name	Group	Proportion in the catch (%)		Status	
				By Weight	By Number of Ind.		
	I. Targeted						
1	*Portunus pelagicus*	Blue swimmer crab	Crustacea	80.62	93.80	R	
	II. Non-targeted			-	-		
1	*Tachypleus gigas**)	Indo-Pacific (Coastal) horseshoe crab	Xiphosuran	0.59	0.04	**ETP/R**	
2	*Johnius amblycephalus*	Bearded croaker	Fish	0.43	0.15	R	
3	*Plotosus canius*	Gray eel-catfish	Fish	0.33	0.04	R	
4	*Halopryne diemensis*	?	Fish	0.04	0.01		D
5	*Epinephelus sexfasciatus*	Sixbar grouper	Fish	0.74	0.39	R	
6	*Terapon theraps*	Largescaled terapon	Fish	0.99	0.34	R	
7	*Cynoglossus lingua*	Long tongue sole	Fish	0.06	0.02	R	
8	*Brevitrygon (Himantura) walga*	Scaly whipray	Fish	0.34	0.04	R	
9	*Arius* sp.	Sea catfish	Fish	0.07	0.01	R	
10	*Scatophagus argus*	Spotted scat	Fish	0.01	0.01	R	
11	*Nemipterus hexodon*	Ornate threadfin bream	Fish	0.85	0.30	R	
12	*Leiognathus* sp.	Ponyfish	Fish	0.04	0.01	R	
13	*Epinephelus coioides*	Orange-spotted grouper	Fish	0.37	0.11	R	
14	*Scylla serrata*	Indo-Pacific swamp crab/ Giant mud crab; Giant mangrove crab	Crustacean	**5.65**	0.90	R	
15	*Harpiosquilla harpax*	Mantis shrimps	Crustacean	0.32	0.13	R	
16	*Charybdis affinis*	Smoothshelled swimming crab	Crustacean	0.29	0.39		D
17	*Charybdis lucifera*	Yelloish brown crab	Crustacean	0.06	0.03		D
18	*Charybdis natator*	Ridged swimming crab	Crustacean	0.06	0.02		D
19	*Charybdis anisodon*	Twospined arm swimming crab	Crustacean	0.26	0.25		D
20	*Charybdis feriata*	Crucifix crab	Crustacean	**3.77**	0.93	R	
21	*Panaeus monodon*	Giant tiger prawn	Crustacean	0.04	0.02	R	
22	*Thenus orientalis*	Flatehead lobster	Crustacean	0.04	0.01	R	
23	*Podophthalmus vigil*	Periscope crab	Crustacean	1.40	0.80		D
24	*Myonippe hardwickii*	?	Crustacean	0.00	0.01		D
25	*Lauderia indica*	?	Crustacean	0.16	0.04		D
26	*Portunus petreus*	?	Crustacean	0.01	0.01		D
27	*Episesarma* sp.	Vinegar crab	Crustacean	0.08	0.01		D
28	*Portunus sanguinolentus*	Threespot swimming crab	Crustacean	0.84	0.52	R	
29	*Babylonia spirata*	Spiral Babylon	Molluscs	0.47	0.34	R	
30	*Natica* sp 1.	Snail	Molluscs	0.20	0.02		D
31	*Natica* sp 1.	Snail	Molluscs	0.11	0.11		D

No.	Species	Common name	Group	Proportion in the catch (%)		Status
				By Weight	By Number of Ind.	
32	*Sepia recurvirostra*	Curvespine cuttlefish	Molluscs	0.05	0.01	D
33	*Melo melo*	Indian volute	Molluscs	0.50	0.13	D
34	*Harpa major*	Major harp	Molluscs	0.11	0.02	D
35	*Murex trapa*	Rarespined murex	Molluscs	0.02	0.01	D
36	*Conus litteratus*	Lettered cone	Molluscs	0.02	0.01	D
37	*Turricula javana*	Javanese turrid	Molluscs	0.04	0.04	D
38	*Strombus canarium*	Dog conch	Molluscs	0.03	0.01	D
				100.00	100.00	

Note: *) = Protected species based on the Regulation of The Minister of Environment and Forestry of The Republic of Indonesia No. 20 Year 2018 Concerning Type of Protected Plants and Animals.
ETP = Endangered, Threatened and Protected species
R = Retained species
D = Discarded species

Table 5. Resume of targeted, retained, and discarded species caught of the BSC trap fishery based on the observation from November 3rd, 2018 to November 28th, 2019.

No.	Description	Unit (kg)	Percentage
1	Total weight of BSC (targeted species) caught	1,672.83	80.62
2	Total weight of retained By-catch	330.98	15.95
3	Total weight of discarded By-catch	71.16	3.43
4	Total weight of Non Target Species	402.14	19.38
	Total catch	1,944.69	

Regulation in managing Giant mud crab/Giant mangrove crab (*Scylla serrate*) is catching and/or removing crabs (*Scylla* spp.), with Harmonized System Code 0306.24.10.00, from the territory of the Republic of Indonesia can only be carried out with the following provisions:

(a) Capturing and/or sending out side of *Scylla* spp. on December 15th to February 5th both in spawning and non-spawning conditions and with carapace widths above 15 (fifteen) cm or weights above 200 (two hundred) grams per individual;
(b) Capturing and/or sending out side on February 6th to December 14th in a non-spawning condition with carapace widths above 15 (fifteen) cm or a weight above 200 (two hundred) grams per individual;
(c) Sending out side on December 15th to February 5th both in spawning and non-spawning conditions and with carapace widths above 15 (fifteen) cm or weights above 200 (two hundred) grams per individual originating from aquaculture and evidenced by a Certificate the Origin; or

(d) Sending out side on February 6th to December 14th in a non-spawning condition with carapace widths above 15 (fifteen) cm or a weight above 200 (two hundred) grams per individual originating from aquaculture and evidenced by a Certificate the Origin.

Other retained species that has the proportion between 2-5% is crucifix crab (*Charybdis feriata* [previously name was *Charybdis feriatus*]). This species is unmanaged yet. Thus, the crucifix crab can categorized as **secondary species**.

2.2 Consequence Analysis of the Blue Swimming Crab Stock

Consequence Analysis (CA) is used to score data-deficiency for stock status outcome. Consequence of the fishing activity on the most vulnerable subcomponent was determined by the stakeholder input during the workshop, using quantitative and qualitative biological indicator data. The CA result of BSC stock showed in **Table 6.**

Table 6. Consequence analysis score and justification

Principle 1: Stock status outcome	**Scoring element**	**Consequence subcomponent**	**Consequence Score**
Pamekasan blue swimming crab fisheries	*Portunus pelagicus*	Population size	60
		Reproductive capacity	80
		Age/Size/Sex structure	60
		Geographic range	
Rationale for most vulnerable subcomponent	Population size as well as reproductive capacity and age/size structure were considered almost equal vulnerable subcomponent based on the impact of exploitation pattern and biomass.		
Rationale for consequence Score	• Based on available information, fleet structure, fishing area and exploitation rate indicated that the BSC stock in southern Pamekasan is fully exploited. However, trend in exploitation rate, biomass and recruitment indicates that fishing is not adversely damaged recruitment dynamics in long time. As the fishery is defined as fully developed and fully capacity, it cannot conclude that its impact on stock size is minimal as well as it's not have an impact to life history and population dynamic parameter. • The BSC stock seems to be intensively fished). Available evidence suggests that there may be a detectable change in reproductive capacity as the BSC are caught in their first year of growth. The Minimum Landing Size (MLS) of 10 cm CW that will be implemented for this fishery also allow for catching individuals in their first year of growth and the BSC at this size is still <20% SPR. A retained BSC is defined as one that is retained by traps without having an escape vent. Even though the BSC in their first year of growth and will became a reproductive period and spawned at least once before being caught, they cannot escape from inner traps. Moreover, caught berried female shall be reduced. The harvest strategy ensures that long term recruitment dynamics is not adversely damaged by fishing.		

Principle 1: Stock status outcome	Scoring element	Consequence subcomponent	Consequence Score
	• Size frequency distribution of the species is available, showing that recruitment is not being adversely damaged. However level of catch and fleet structure do not enable a qualitative assessment to determine that the impact of population dynamics is minimal. <u>Indicators used are:</u> • There is one main fleet structure in all fishing area: traps, while another fleet is operate at outside of UoA. The trap fleets have an access to shallow waters (<10 m depth) and few fleets used traps at deeper. In addition, fishing area where the other fleet operates, there were almost no traps fleets operate in these areas. Thus, all of fleets have full access to the stock at almost the entire BSC habitat. • There was no stock biomass data yet and implementation of minimum landing size of 10 cm CW for existing stock remaining SPR <20% (APRI 2018). • Prohibited to catch crabs at size <10 cm CW was <10% as well as berried female were still neglected by the fisher. <u>Exploitation rate:</u> • Management aim to stock rebuilding is not clearly implemented minimum landing size (MLS) yet. • Identification of nursery habitat for implemented another management measure in sufficient season or wide (close season during peak recruitment or nursery habitat protection). • Data collection of the BSC catch per-unit of effort (CPUE) and stock assessment need to be made durable in order to monitor changes in the stock status over time and improved fisher mindful against unreported fishing. <u>Fishing area and seasonality:</u> • Detail distribution information of traps fleet's fishing effort is collect on a routine seasonal basis (representative of crab fishing season), including the number of traps per-boat. <u>Overall approaches to scoring the BSC stock/biology unit:</u> The BSC biological unit was defined as Southern Pamekasan water as part of southern Madura waters. Therefore, PI 1.1.1 was scored by considering the BSC in the area of Southern Pamekasan water as single stock, including southern Madura waters. The BSC stock in northern Madura waters as part of Java Sea might the same stock with the BSC of southern Madura. However, this approach was considered appropriate to the spawning biology and larval dispersal of the BSC.		

Source: Table PF2 (CA Scoring template) and Table PF3 (CA scoring of subcomponents) of MSC FCP v2.1, p.74-75.

2.3 Productivity-Susceptibility Analysis (PSA)

The BSC stock status in Pamekasan waters not known well and the BSC productivity-susceptibility has not been analysed yet in Southern Madura. The BSC productivity is

influenced by their biological characteristics and habitat, whiles their susceptibility influenced by such as type, spatial and vertical aggregation of fishery. Productivity and Susceptibility of BSC as target species showed in **Table 7** and **Table 8.** All species ≥2% by weight of the total catch have been assessed, including ETP species (**Table 9** to **Table 14**). The score for each component of the PSA is recorded in the MSC PSA Worksheet for RBF assessment (**Table 15** to **Table 19**).

2.4 Retained Species Risks

The BSC or *Portunus pelagicus* stock (PI 1.1.1), *Charybdis feriata* (PI 2.2.1), and *Tachypleus gigas* (PI 2.3.1) in Southern Pamekasan traps fisheries are medium potential risk category in the sound of productivity susceptibility analysis. The PSA score for *Portunus pelagicus* was 2.77 and MSC PSA score 76. The BSC risk category is also influenced high score of susceptibility and it is no clearly catches and effort data of traps fisheries. Subsequently, the PSA score for *Charybdis feriata* was 2.86 and MSC score was 77. Meanwhile, the PSA score for *Tachypleus gigas* was 2.99 and MSC score was 68. However, *Scylla serrata* (PI 2.1.1) can categorized as low potential risk (**Figure 5**), with the PSA score was 2.51 and MSC score was 84.

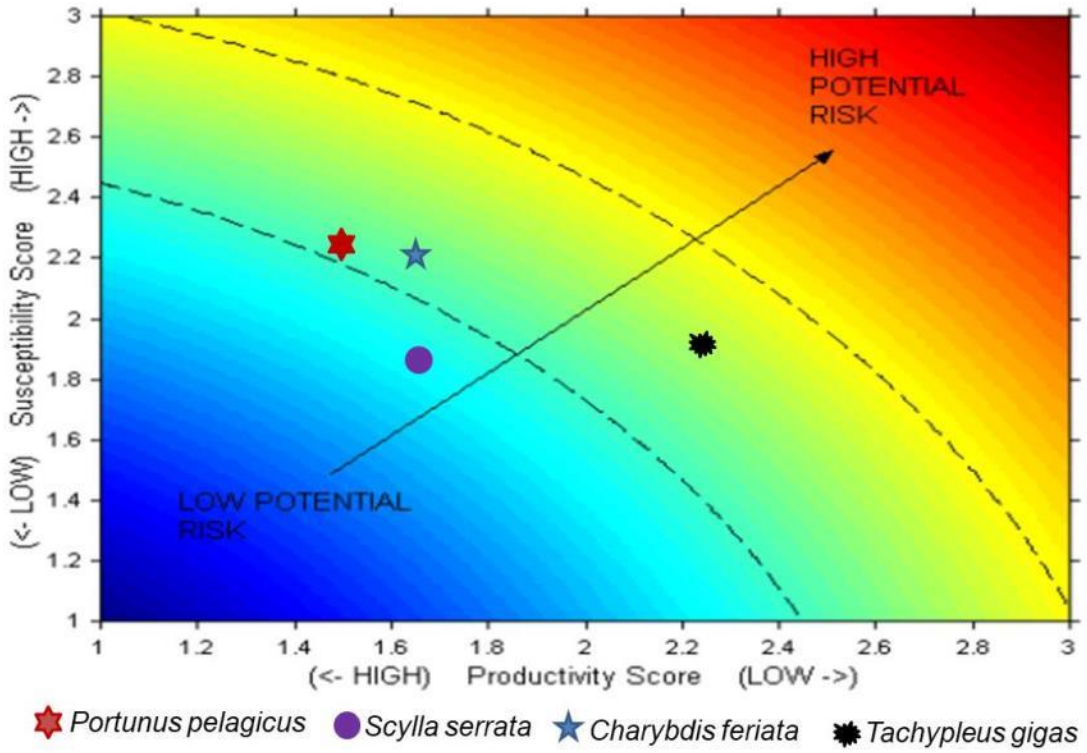


Figure 5. Retained Species Risk of the Southern Pamekasan BSC Traps Fisheries

3 Habitat Assessment

3.1 Habitat Consequence Analysis

The result of habitat consequence spatial analysis (CSA) in this RBF shown that the consequence and spatial score were 1.56 and 1.59, while CSA score was 2.22 (**Table 19**).

3.2 Habitat Risk

Habitat risk of traps fisheries in Southern Pamekasan can categorized as low potential risk in the sound of consequence spatial analysis analysis (**Table 19**).

4 Retained Species and Habitat Assessment MSC Score

Based on consequence analysis (CA) and PSA of target species (PI 1.1.1) as well as PSA analysis of ETP species (PI 2.31), the final MSC RBF Score of each PI was 68 (Pass with condition) (**Table 20**). Meanwhile, based on PSA of primary species (PI 2.1.1) and habitat consequence spatial analysis (PI 2.4.1), the final MSC RBF Score of each PI was 84 and 92 (Unconditional pass).

Table 20. MSC RBF Automated Score of the BSC fishery in Pamekasan water of East Java

Automated MSC scores		
PI	**MSC score**	**Status**
1.1.1	68	Pass with condition
2.1.1	84	Unconditional Pass
2.2.1	77	Pass with condition
2.3.1	68	Pass with condition
2.4.1	92	Unconditional Pass

5 Ecosystem Assessment

Ecosystem assessment using the Scale Intensity Consequence Analysis (SICA) in this RBF cannot be conducted due to lack of appropriate data information and did not have enough time to discuss in the workshop.

Table 7. The Blue Swimming Crab (*Portunus pelagicus*) Productivity Attributes, Ranking, and Scores

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)	*Portunus pelagicus*	Source of Verification	Score
Average age at maturity	<5 years	5-15 years	>15 years	The BSC reach maturity at the age of 8 -10 months.	Kangas (2000); Zairion (2015); Zairion *et al.*, (2015a)	1
Average maximum age	<10 years	10-25 years	>25 years	3-4 years	Kembaren et al. (2012); Ernawati (2013); Zairion (2015); Hamid (2015)	1
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year	264,000-1,534,000 per-batch	Josileen (2013); Ikhwanuddin *et al.,* (2011; 2012); Zairion *et al.*, (2015b)	1
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm	-	-	-
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm	-	-	-
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer	Broadcast spawner	Kangas (2000); Zairion (2015); Hamid (2015)	1
Trophic Level	<2.75	2.75-3.25	>3.25	Approximately 2.8-2.9	http://www.bbc.co.uk/blue planet/infoburts/trphic_levels.bg/html	2
Density dependence (to be used when scoring invertebrate only)	Compensatory dynamics at low population size demonstrated or likely	No depensatory or compensatory dynamics at low population size demonstrated or likely	Depensatory dynamics at low population size (Allee effect) demonstrated or likely	Based on population dynamic study, It seem to be depensatory dynamics at low population size demostrated or likely	Ernawati (2013); Zairion (2015); Hamid (2015)	3

Source: Table PF4 of MSC Fisheries Certification Process V 2.1, p. 77-78.

Table 8. The Blue Swimming Crab (*Portunus pelagicus*) Susceptibility Attributes, Ranking, and Scores

Susceptibility attributes	Low susceptibility (low risk, score=1)	Medium susceptibility (medium risk, score=2)	High susceptibility (High risk, score=3)	*Portunus pelagicus*	Source of Verification	Score
Areal Overlap (Availability) Overlap of the fishing effort with a species concentration of the stock.	<10% overlap	10-30% overlap	>30% overlap	The BSC inhabit in shallow waters to the depth 40 m while fishing effort are distributed in Southern Pamekasan and might overlap with 10-20% of BSC concentration stock in southern Madura waters.	RBF workshop on 9-10 Juli 2019; Wijayanti *et al*., (2018); Nitiratsuwan (2010); Ernawati (2013); Zairion (2015); Hamid (2015).	2
Vertical Overlap (Encounterability) The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the fishing gear.	Low overlap with fishing gear	Medium overlap with fishing gear	High overlap with fishing gear	The position of the BSC stock in Southern Pamekasan waters seem to have high overlap with the trap fishing gear	RBF workshop on July 10th, 2019; Wijayanti *et al*., (2018)	3
Selectivity of gear types Potential of gear to capture or retain the species	a. Individual <size at maturity are rarely caught	a. Individual <size at maturity are regularly caught	a. Individual <size at maturity are frequently caught	Traps fishing gear was using closing net with mesh size 1.5 inch and without escape van, whiles its operation was using bait. However, Individual with the	RBF workshop on July 10th, 2019 and Field observation	3

Susceptibility attributes	Low susceptibility (low risk, score=1)	Medium susceptibility (medium risk, score=2)	High susceptibility (High risk, score=3)	*Portunus pelagicus*	Source of Verification	Score
				size less than the size at maturity are regularly caught.		
	b. Individual <size at maturity can escape or avoid gear	b. Individual <half the size at maturity can escape or avoid gear	b. Individual <half the size at maturity are retained by gear	Individual <half the size at maturity are retained by gear		
Post-capture mortality (PCM) The change that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority released post-capture and survival	Evidence of some released post-capture and survival	Retained species or majority dead when released Default score for retained species (Principle 1 or Principle 2).	Most of retained species are still life, but there was no evidence that some release post-capture and survival.	RBF workshop on July 10th, 2019 and Field observation	3

Source: Table PF5 of MSC Fisheries Certification Process V 2.1, p.78-79.

Table 9. The Indo-Pacific Swamp Crab (*Scylla serrate*) Productivity Attributes, Ranking, and Scores

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)	*Scylla serrata*	Source of Verification	Score
Average age at maturity	<5 years	5-15 years	>15 years	The crab reaches sexual maturity at 18 to 24 months.	Siahaena (2008); Bir (2016) https://www.researchgate.net/publication/336702126_Mud_crab's_Scylla_serrata_Reproduction_and_Breeding_Technique_Course	1
Average maximum age	<10 years	10-25 years	>25 years	5-6 years	Hidayat *et al.*, (2017);	1
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year	0.327 million to 3.41 millions in the size range of 8.7cm to11.4.cm carapace length	Siahainenia (2008); Vijaya Bharathi *et al*., (2017) https://www.researchgate.net/publication/319876434_Sex_ratio_and_Reproductive_Performance_of_the_female_mud_crab_Scylla_serrata_in_India; http://www.fao.org/fishery/culturedspecies/Scylla_serrata/en	1
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm	28 cm	http://www.fao.org/fishery/species/2637/en	-
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm	Female was 11.8 to 12,3 cm and Male 9,2-10 cm	Siahainenia (2008); https://www.sciencedirect.com/science/article/pii/S0272771484710572	-
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer	Broadcast spawner	Siahainenia (2008);	1
Trophic Level	<2.75	2.75-3.25	>3.25	No data yet	No Verification	3
Density dependence (to be used when scoring invertebrate only)	Compensatory dynamics at low population size demonstrated or likely	No depensatory or compensatory dynamics at low population size demonstrated or likely	Depensatory dynamics at low population size (Allee effect) demonstrated or likely	No data, but it seem to be depensatory dynamics at low population size demostrated or likely		3

Source: Table PF4 of MSC Fisheries Certification Process V 2.1, p. 77-78.

Table 10. The Indo-Pacific Swamp Crab (*Scylla serrate*) Susceptibility Attributes, Ranking, and Scores

Susceptibility attributes	Low susceptibility (low risk, score=1)	Medium susceptibility (medium risk, score=2)	High susceptibility (High risk, score=3)	*Scylla serrata*	Source of Verification	Score
Areal Overlap (Availability) Overlap of the fishing effort with a species concentration of the stock.	<10% overlap	10-30% overlap	>30% overlap	*Scylla serrata* inhabit in mangrove habitat and shallow waters and migrate to the sea for spawning while fishing effort are distributed in sounthern Pamekasan and might overlap with above 10% of *Scylla serrata* concentration stock in southern Madura waters.	Siahainenia (2008); Vijaya Bharathi *et al*., (2017); RBF workshop on July 10th, 2019;	2
Vertical Overlap (Encounterability) The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the fishing gear.	Low overlap with fishing gear	Medium overlap with fishing gear	High overlap with fishing gear	The position of the *Scylla serrata* stock in Southern Pamekasan waters seem to have medium overlap with the trap fishing gear, since the trap operate in the depth between 3-25 m.	RBF workshop on July 10th, 2019; and Field observation	2
Selectivity of gear types Potential of gear to capture or retain the species	a. Individual <size at maturity are rarely caught	a. Individual <size at maturity are regularly caught	a. Individual <size at maturity are frequently caught	Traps fishing gear was using closing net with mesh size 1.5 inch and without escape van, whiles its	RBF workshop on July 10th, 2019; and Field observation	3

Susceptibility attributes	Low susceptibility (low risk, score=1)		Medium susceptibility (medium risk, score=2)		High susceptibility (High risk, score=3)		*Scylla serrata*	Source of Verification	Score
							operation was using bait. However, no data yet to individual with the size less than the size at maturity are regularly caught.		
	b.	Individual <size at maturity can escape or avoid gear	b.	Individual <half the size at maturity can escape or avoid gear	b.	Individual <half the size at maturity are retained by gear	Individual <half the size at maturity are retained by gear	RBF workshop on July 10th, 2019; and Field observation	
Post-capture mortality (PCM) The change that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority released post-capture and survival		Evidence of some released post-capture and survival		Retained species or majority dead when released Default score for retained species (Principle 1 or Principle 2).		Most of retained species are still life, but there was no evidence that some release post-capture and survival	RBF workshop on July 10th, 2019; and Field observation	3

Source: Table PF5 of MSC Fisheries Certification Process V 2.1, p.78-79.

Table 11. The Crucifix Crab (*Charybdis feriata*) Productivity Attributes, Ranking, and Scores

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)	*Charybdis feriata*	Source of Verification	Score
Average age at maturity	<5 years	5-15 years	>15 years	The Crucifix crab reaches maturity at the age 7 months.	Dineshbabu (2011) Https://www.researchgate.net/publication/228838508, Biology_and_exploitation_of_the_crucifix_crab_Charybdis	1
Average maximum age	<10 years	10-25 years	>25 years	3-4 years	Dash *et al.,* (2014) http://eprints.cmfri.org.in/10296/1/1_Dash_IJF_61.4.pdf; Dineshbabu (2011)	1
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year	40,000 to 1,400,000 per-batch	Parado-estepa *et at.,* (2007) https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1365-2109.2007.01724.x; Josilen (2011) http://eprints.cmfri.org.in/8696/1/Josileen_jose.pdf;	1
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm	20 cm	https://www.sealifebase.ca/summary/Charybdis-feriatus.html https://www.researchgate.net/publication/279643531_Captive_spawning_hatching_and_larval_development_of_crucifix_crab_Charybdis_feriatus_Linnaeus_1758	-
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm	7 cm	Dineshbabu (2011) Https://www.researchgate.net/publication/228838508,	-

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)	*Charybdis feriata*	Source of Verification	Score
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer	Broadcast spawner	Josilen (2011) http://eprints.cmfri.org.in/8696/1/Josileen_jose.pdf;	1
Trophic Level	<2.75	2.75-3.25	>3.25	No data yet	-	3
Density dependence (to be used when scoring invertebrate only)	Compensatory dynamics at low population size demonstrated or likely	No depensatory or compensatory dynamics at low population size demonstrated or likely	Depensatory dynamics at low population size (Allee effect) demonstrated or likely	Based on population dynamic study, It seem to be depensatory dynamics at low population size demostrated or likely	Dineshbabu (2011) Https://www.researchgate.net/publication/228838508,	3

Source: Table PF4 of MSC Fisheries Certification Process V 2.1, p. 77-78.

Table 12. The Crucifix Crab (*Charybdis feriata*) Susceptibility Attributes, Ranking, and Scores

Susceptibility attributes	Low susceptibility (low risk, score=1)	Medium susceptibility (medium risk, score=2)	High susceptibility (High risk, score=3)	*Charybdis feriata*	Source of Verification	Score
Areal Overlap (Availability) Overlap of the fishing effort with a species concentration of the stock.	<10% overlap	10-30% overlap	>30% overlap	The Crucifix crab inhabit in sandy sediment at shallow waters to the depth 70 m while fishing effort are distributed in Southern Pamekasan and might overlap with 10-20% of Crucifix crab concentration stock in southern Madura waters.	RBF workshop on July 10th, 2019; and Field observation	2
Vertical Overlap (Encounterability) The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the fishing gear.	Low overlap with fishing gear	Medium overlap with fishing gear	High overlap with fishing gear	The position of the Crucifix crab stock in Southern Pamekasan waters seem to have high overlap with the trap fishing gear	RBF workshop on July 10th, 2019; and Field observation	3
Selectivity of gear types Potential of gear to capture or retain the species	a. Individual <size at maturity are rarely caught	a. Individual <size at maturity are regularly caught	a. Individual <size at maturity are frequently caught	Traps fishing gear was using closing net with mesh size 1.5 inch and without escape van, whiles its operation was using bait.	RBF workshop on July 10th, 2019; and Field observation	3

Susceptibility attributes	Low susceptibility (low risk, score=1)		Medium susceptibility (medium risk, score=2)		High susceptibility (High risk, score=3)		*Charybdis feriata*	Source of Verification	Score
							However, no data yet to individual with the size less than the size at maturity are regularly caught		
	b.	Individual <size at maturity can escape or avoid gear	b.	Individual <half the size at maturity can escape or avoid gear	b.	Individual <half the size at maturity are retained by gear	Individual <half the size at maturity are retained by gear	RBF workshop on July 10th, 2019; and Field observation	
Post-capture mortality (PCM) The change that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority released post-capture and survival		Evidence of some released post-capture and survival		Retained species or majority dead when released Default score for retained species (Principle 1 or Principle 2).		Most of retained species are still life, but there was no evidence that some release post-capture and survival	RBF workshop on July 10th, 2019; and Field observation	3

Source: Table PF5 of MSC Fisheries Certification Process V 2.1, p.78-79.

Table 13. The Indo-Pacific Horseshoe Crab (*Tachypleus gigas*) Productivity Attributes, Ranking, and Scores

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)	*Tachypleus gigas*	Source of Verification	Score
Average age at maturity	<5 years	5-15 years	>15 years	No data yet and it assume that one third to half of average maximum age	-	2
Average maximum age	<10 years	10-25 years	>25 years	12 years or 12-20 years	Tan *et al*., (2012)- https://www.researchgate.net/publication/258500377_Horseshoe_Crab_Tachypleus_gigas_Muller_1785_Spawning_Population_at_Balok_Beach_Kuantan_Pahang_Malaysia;	2
Fecundity	>20,000 eggs per year	100-20,000 eggs per year	<100 eggs per year	1,242-6,565 egg	Chatterji (1995)- https://core.ac.uk/download/pdf/33721036.pdf; Brockmann & Smith (2009)- https://www.horseshoecrab.org/research/sites/default/files/UP%20DONE%20Brockmann%20and%20Smith.pdf	2
Average maximum size (not to be used when scoring invertebrate species)	<100 cm	100-300 cm	>300 cm	60 cm	https://www.britannica.com/animal/horseshoe-crab/Conservation-status	-
Average size at maturity (not to be used when scoring invertebrate species)	<40 cm	40-200 cm	>200 cm	24,6 cm	Chatterji (1995)- https://core.ac.uk/download/pdf/33721036.pdf	-

Productivity determinant	High productivity (Low risk, score=1)	Medium productivity (medium risk, score=2)	Low productivity (high risk, score=3)	*Tachypleus gigas*	Source of Verification	Score
Reproductive strategy	Broadcast spawner	Demersal egg layer	Live bearer	Lay down their egg on the beach until 10 cm depth.	Zaleha *et al.*, 2012- https://www.researchgate.net/publication/227859340_Spawning_and_Nesting_Behaviour_of_Tachypleus_gigas_along_the_East_Coast_of_Peninsular_Malaysia	2
Trophic Level	<2.75	2.75-3.25	>3.25	No data	-	3
Density dependence (to be used when scoring invertebrate only)	Compensatory dynamics at low population size demonstrated or likely	No depensatory or compensatory dynamics at low population size demonstrated or likely	Depensatory dynamics at low population size (Allee effect) demonstrated or likely	No data, but it seem to be depensatory dynamics at low population size demostrated or likely	-	3

Source: Table PF4 of MSC Fisheries Certification Process V 2.1, p. 77-78.

Table 14. The Indo-Pacific Horseshoe Crab (*Tachypleus gigas*) Susceptibility Attributes, Ranking, and Scores

Susceptibility attributes	Low susceptibility (low risk, score=1)	Medium susceptibility (medium risk, score=2)	High susceptibility (High risk, score=3)	***Tachypleus gigas***	Source of Verification	Score
Areal Overlap (Availability) Overlap of the fishing effort with a species concentration of the stock.	<10% overlap	10-30% overlap	>30% overlap	Juvenile and adult of Indo-pacific (Coastal) horseshoe crab inhabit in shallow waters to the depth 40 m while fishing effort are distributed in Southern Pamekasan and might overlap with 10-20% of horseshoe crab concentration in southern Madura waters.	RBF workshop on 9-10 Juli 2019; https://www.google.com/search?client=firefox-b-d&q=Indo-Pacific+horseshoe+crab; http://www.wildsingapore.com/wildfacts/arthropoda/limulidae/tachypleus.htm;	2
Vertical Overlap (Encounterability) The position of the stock/species within the water column relative to the fishing gear, and the position of the stock/species within the habitat relative to the fishing gear.	Low overlap with fishing gear	Medium overlap with fishing gear	High overlap with fishing gear	The position of the Indo-pacific (Coastal) horseshoe crab in Southern Pamekasan waters related to the the size of fishing seem to have medium overlap with the trap fishing gear	RBF workshop on July 10th, 2019; and Field observation	2

Susceptibility attributes	Low susceptibility (low risk, score=1)		Medium susceptibility (medium risk, score=2)		High susceptibility (High risk, score=3)		*Tachypleus gigas*	Source of Verification	Score
Selectivity of gear types Potential of gear to capture or retain the species	a.	Individual <size at maturity are rarely caught	a.	Individual <size at maturity are regularly caught	a.	Individual <size at maturity are frequently caught	Traps fishing gear was using closing net with mesh size 1.5 inch and without escape van. However, Individual with the size less than the size at maturity are regularly caught.	RBF workshop on July 10th, 2019; and Field observation	3
	b.	Individual <size at maturity can escape or avoid gear	b.	Individual <half the size at maturity can escape or avoid gear	b.	Individual <half the size at maturity are retained by gear	Individual <half the size at maturity are retained by gear	RBF workshop on July 10th, 2019; and Field observation	
Post-capture mortality (PCM) The change that, if captured, a species would be released and that it would be in a condition permitting subsequent survival	Evidence of majority released post-capture and survival		Evidence of some released post-capture and survival		Retained species or majority dead when released Default score for retained species (Principle 1 or Principle 2).		Most of retained species are still life, but there was no evidence that some release post-capture and survival.	RBF workshop on July 10th, 2019; and Field observation	3

Source: Table PF5 of MSC Fisheries Certification Process V 2.1, p.78-79.

Table 15. MSC RBF Worksheet (PI 1.1.1 PSA) of the BSC fishery by traps in Pamekasan water of East Java

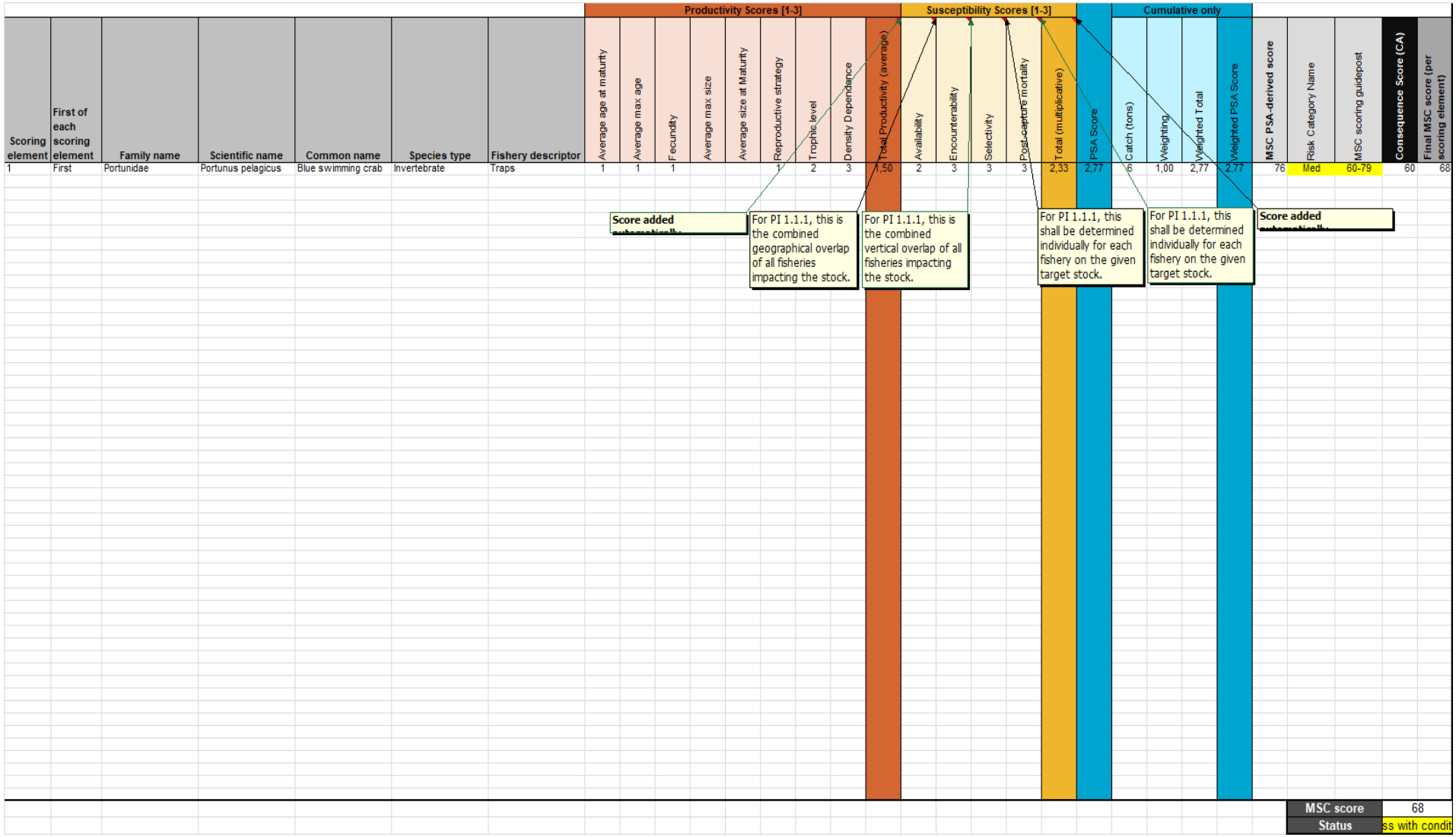
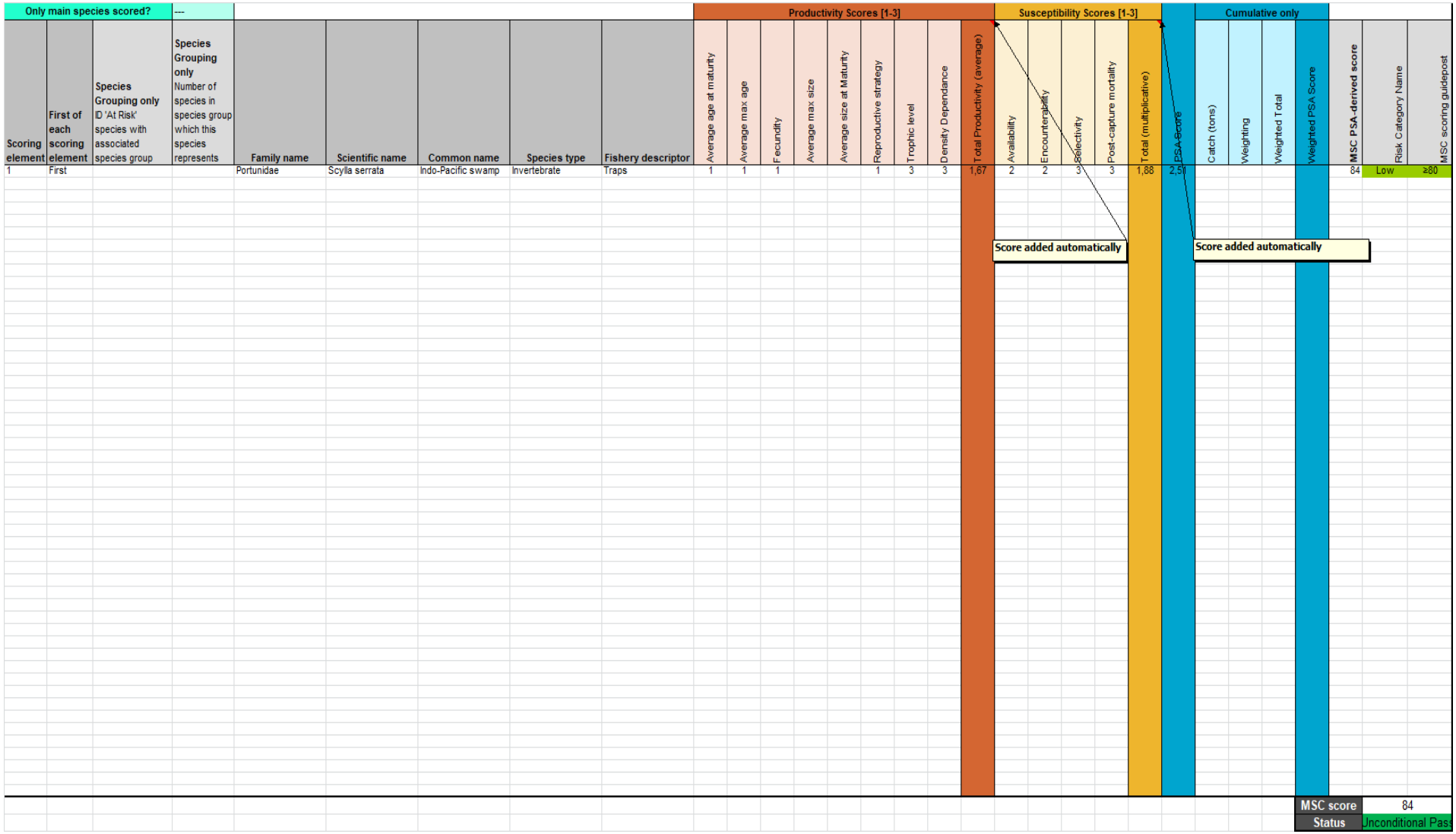


Table 16. MSC RBF Worksheet (PI 2.1.1 PSA) of primary species of the BSC fishery in Pamekasan water of East Java



Only main species scored?	---								Productivity Scores [1-3]									Susceptibility Scores [1-3]						Cumulative only						
Scoring element	First of each scoring element	Species Grouping only ID 'At Risk' species with associated species group	Species Grouping only Number of species in species group which this species represents	Family name	Scientific name	Common name	Species type	Fishery descriptor	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependance	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)	Weighting	Weighted Total	Weighted PSA Score	MSC PSA-derived score	Risk Category Name	MSC scoring guidepost
1	First			Portunidae	Scylla serrata	Indo-Pacific swamp	Invertebrate	Traps	1	1	1			1	3	3	1,67	2	2	3	3	1,88	2,50					84	Low	≥80

Score added automatically

Score added automatically

MSC score	84
Status	Unconditional Pass

Table 17. MSC RBF Worksheet (PI 2.2.1 PSA) of Secondary species of the BSC fishery in Pamekasan water of East Java

Only main species scored?	---								Productivity Scores [1-3]									Susceptibility Scores [1-3]					Cumulative only							
Scoring element	First of each scoring element	Species Grouping only ID 'At Risk' species by selecting associated species group	Species Grouping only Number of species in species group which this species represents (N/2)	Family name	Scientific name	Common name	Species type	Fishery descriptor	Average age at maturity	Average max age	Fecundity	Average max size	Average size at Maturity	Reproductive strategy	Trophic level	Density Dependance	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	Catch (tons)	Weighting	Weighted Total	Weighted PSA Score	MSC PSA-derived score	Risk Category Name	MSC scoring guidepost
1	First			Portunidae	Charybdis feriata	Crucifix crab	Invertebrate	Traps	1	1	1			1	3	3	1,67	2	3	3	3	2,33	2,86					77	Med	60-79

Score added automatically

Score added automatically

MSC score	77
Status	Pass with condition

Table 18. MSC RBF Worksheet (PI 2.3.1 PSA) of ETP species of the BSC fishery in Pamekasan water of East Java

					Productivity Scores [1-3]									Susceptibility Scores [1-3]								
Scoring element	Family name	Scientific name	Common name	Species type	Average age at maturity	Average max age	Fecundity	Average max size	Average size at maturity	Reproductive strategy	Trophic level	Density dependance	Total Productivity (average)	Availability	Encounterability	Selectivity	Post-capture mortality	Total (multiplicative)	PSA Score	MSC PSA-derived score	Risk Category Name	MSC scoring guidepost
1	Limulidae	Tachypleus gigas	Horseshoe crab	Invertebrate	2	2	2			2	3	3	2,33	2	2	3	3	1,88	2,99	68	Med	60-79
														Score added automatically					Score added automatically			
																			MSC score	68		
																			Status	Pass with condition		

Table 19. MSC RBF Worksheet (PI 2.4.1 CSA) of the BSC fishery in Pamekasan water of East Java

Only main habitats scored?	---						Consequence score [1-3]								Spatial score [0.5-3]							
Habitat details							Habitat productivity		Gear-habitat interaction													
Scoring element	UoA/Gear type	Biome	Sub-biome	Feature	Habitat type	Depth (m)	Regeneration of biota	Natural disturbance	Removability of biota	Removability of substratum	Substratum hardness	Substratum ruggedness	Seabed slope	Consequence score	Gear footprint	Spatial overlap	Encounterability	Spatial score	CSA score	MSC CSA-derived score	Risk category	MSC scoring guidepost
1	UoA/Traps	Coast	Coastal-Margin	sediment plan	Fine/low relief/fauna	5-20m	1	1	2	1	3	3	1	1,56	1	2	2	1,59	2,22	92	Low	≥80
																			MSC score	92		
																			Status	Unconditional Pass		

6. General Evaluation

Based on available data and information related to attributes analyzed in RBF, this RBF assessment can figure out representatively of PI 1.1.1 and PI 2.1.1 to PI 2.4.1. However, it is still found several limitations in the RBF assessment.

Susceptibility analysis was conducted roughly due to there was no spatial-temporal fishing ground mapping as well as spatial temporal of community structure at the BSC fishing area and their distribution. Based on available data and information during the workshop, the vulnerable habitat and the high potential BSC nursery habitat were still remained sufficient information. Thus, mapping on the vulnerable habitat, the high potential BSC nursery habitat and its environmental quality status are required for other BSC management options purposes. Species association might also be considered in the sound of community interaction and ecosystem balance.

Based on CA of BSC, the BSC stock seem to be fully exploited, even though based PAS PSA resulted medium risk. This condition might be related to high fishing efforts and fishing intensity or over capacity and influencing the stock. Reducing fishing effort is considered. On the other hand, high productivity of the BSC seem to be not guarantee to stock rebuilding without increasing SPR or reproductive capacity by strictly implementing minimum legal size (MLS) or released captured egg bearing female or both. This condition might relate to offspring survival and recruitment succeeds as well as the BSC habitat quality. Habitat degradation could be also affected by sedimentation along coastal waters, and etc.

7. Conclusion and recommendation

Based on available data and information collected from the field and the RBF workshop, the fully RBF assessment could not be conducted yet. High productivity of the BSC seem to be not guarantee stock rebuilding and might be relate to over fished, over capacity, offspring survival and recruitment succeeds as well as the BSC habitat quality.

Recommendations:

- Recording daily, monthly and annually catches BSC and continued recording of the BSC CPUE data;
- Mapping spatial-temporal fishing ground and spatial-temporal community structure at the BSC fishing area;
- Mapping vulnerable habitat, the high potential BSC nursery habitat and its environmental quality status;
- Stock rebuilding could be by integrated management, i.e., reducing fishing effort; increasing the BSC reproduction capacity, strictly implemented minimum legal size of 10 cm CW, protect the high potential and sufficient wide area of the BSC nursery habitat.

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