Indonesia Blue Swimming Crab Fishery Improvement Project

Stock Assessment of the Blue Swimming Crab (*Portunus pelagicus*) for Sustainable Management in Indonesia – 2021 Midterm Report

Asosiasi Pengelolaan Rajungan Indonesia (APRI)
Indonesian Blue Swimming Crab Association

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PERSONELS

The research was implemented by experts, research staff, as well as some of support enumerators in each sampling sites.

Steering Committee :

1. Dr. Hawis Madduppa, Executive Director of Indonesian Blue Swimming Crab Association (APRI)
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4. Maulana Fikri – Gresik, East Java (FMA 712)
5. Farhan R – Pamekasan, East Java (FMA 712)
6. Nyoman Asteyase – Kuala Penet, Lampung (FMA 712)
7. Habibi – Cirebon, West Java (FMA 712)
8. Muh. Welis – Pangkajene Island, South Sulawesi (FMA 713)
9. Muh. Cardin – Pamandati, Southeast Sulawesi (FMA 714)
10. Navisa Fairuz – Batubara, North Sumatera (FMA 571)

FIP Activities :

Stock Assessment of the Blue Swimming Crab (*Portunus pelagicus*) for Sustainable Management in Indonesia

Period :

Jan – Aug 2021

Indonesia Blue Swimming Crab Association (APRI)

Kuncoro Catur Nugroho
Chairman

Dr. Hawis Madduppa
Executive Director

INTRODUCTION

The blue swimming crab (BSC) *Portunus pelagicus* (Linnaeus 1758) that locally called rajungan is an economically important commodity and is the the third rank of export of Indonesian fisheries after shrimps and tuna. Processing industries of blue swimming crab plays an important role on the crab production and marketing them abroad. It support fisherman and pickers across Indonesia. Their volume and value of blue swimming crab and mangrove crab exports from Indonesia in 2017 were 29.038 tonnes valued at US$ 411 million. USA as main country country exporter 90% of total export (Ministry of Marine Affairs and Fishery 2018).

Blue swimming crab are found along Indonesian waters. They were landed from Medan, Lampung, West, Central and East Java, South Sulawesi, Southeast Sulawesi and West Kalimantan. From studies on crab stock and exploitation, reported that some locations mostly overfished. In addition, some crab exploitation rates and population dynamic parameters have been recently studied Kembaren et al. (2012), Ernawati (2013) Hamid and Wardiatno (2015). The results of these studies have shown that the population dynamic parameters (such as growth parameters, recruitment, and mortality) and exploitation rates of crabs varied among locations.

Study of the length-weight relationship in aquatic animals has wide application in delineating the growth patterns during their developmental pathways. In population studies, morphometric analysis provides a powerful complement to genetic and environmental stock identification approaches and length-weight relationships allow the conversion of growth-in-length

equations to growth-in-weight for use in a stock assessment model. Information about individual body weight length/width relationships in populations is important for estimating the population size of a stock, specifically for the purpose of its exploitation. The length-width/weight relationships are regarded as more suitable for evaluating crustacean populations.

Historically, the official stock assessments were conducted using a surplus production model. However, in 2015, Length Based Spawning Potential Ratio (LB-SPR), was adopted by *Komnas Kajiskan* (Ernawati et al. 2017*)*. SPR is a measure of the proportion of the unfished reproductive potential left at any given level of fishing pressure. SPR is commonly used to set target and limit reference points for fisheries (Hordyk, et al., 2015a; Hordyk, et al., 2015b). However, assessment of many data poor fisheries is often limited by incomplete knowledge of life history parameters required to perform quantitative assessment such as SPR.

Management measures based on stock assessment and referent points have been applied in BSC fisheries of Indonesia. Currently, BSC fisheries management in Indonesia was made based on size limitations of BSC and maturity stages of females by the Regulation of the Minister of Marine Affairs and Fisheries No. 17/2021. These regulation contained that minimum legal size (MLS) for BSC caught was 10 cm in carapace width or individual weight of 55 grams. Meanwhile, ovigerous female should not be caught. For the management purposes, the evaluation should always be performed to assess whether the need for adjustments or new measures are necessary. The evaluation should be done together with the stakeholders, as the basic fisheries manager part of their territory of interest.

Activities

The activities includes stock assessment of Blue Swimming Crabs (*Portunus pelagicus*) in Indonesian waters, including the Java Sea (FMA 712), Pamandati (FMA 714), Pangkajene (FMA 713), and Batubara (FMA 571). The scope of these activities includes biological sampling at ten landing sites in Pemalang, Pati, Rembang, Gresik, Pamekasan, Pamandati, Pangkajene Island, Lampung, Cirebon, and Batubara. The outputs are expected to be used as a basic for development planning and Fisheries Management Plan (RPP), such as: stock status and population dynamic.

Objectives

The objectives of the research are as follows:

1. To calculate the percentage of undersized crabs and egg berried female caught and to analyze catch per unit effort (CPUE)
2. To estimate stock status of blue swimming crab using length-based spawning potential ratio (LB-SPR) methods.

MATERIALS AND METHODS

Research Area

The study area cover FMA-712, FMA-713, FMA-714, FMA-571 of Indonesian waters, which include ten landing sites (Pemalang, Pati, Rembang, Pamekasan, Gresik, Konawe Selatan, Pangkajene, Lampung, Cirebon, and Batubara) (Fig. 1).

Fig. 1. Sampling site for BSC research activities in Indonesia over period Jan-Aug 2021

Data Collection

Biological sampling activities of the BSC were conducted every day and reported each month. Trained local enumerators were placed at each site to collect the biological data of landed BSC from local fishers, which include carapace width (mm), weight (g), sex (male and female), and the maturity stages of female crabs. Carapace width was measured to the nearest 0.1 mm using digital caliper. Gonad maturity stages was determined using the scale of three level, which are immature, mature, and berried females. Minimum number of sample collected was 700 of female crabs per month. A total of 117530 crabs were recorded over period 2019-2020. Detailed information about BSC samples at each landing site was listed in Table 1.

Table 1 Overview of sampling sites and number of the blue swimming crabs (*Portunus pelagicus*) samples in Indonesia from Jan-Aug 2021

No	Landing Site	Location	BSC Sample (n)		
			Female	Male	Total
1	Pejarakan	Pemalang, Central Java	6396	4589	10985
2	Alasdowo	Pati, Central Java	6856	6026	12882
3	Gedongmulyo	Rembang, Central Java	5641	5952	11593
4	Pagagan	Pamekasan, East Java	6390	4682	11072
5	Mengare	Gresik, East Java	5200	9589	14789
6	Grogol	Cirebon, West Java	4785	3269	8054
7	Kuala Penet	Lampung	5608	5361	10969
8	Batubara	North Sumatera	6386	9861	16247
9	Pamandati	Konawe, Southeast Sulawesi	5950	4308	10258
10	Lempangeng	Pangkajene, South Sulawesi	5741	4936	10677

Data Analysis

The percentage of undersized and berried female crabs

Ministry of Fisheries and Marine Affair (MMAF) of Indonesia regulated the minimum legal size policy for BSC fisheries (Minister Decree No. 17, year 2021). The policy set a minimum carapace width of 100 mm and the restriction of harvesting berried females. BSC was considered undersized when carapace width less than 100 mm. Berried female was obviously seen by egg mass covering the abdominal flap (Zairion et al. 2015). Percentages of undersized crabs (MLS) and egg berried female (EBF) can be calculated as follows:

$$\mathrm{MLS} = \frac{\text{number of BSC}<100\text{ mm}}{\text{total number of samples}} \times 100\% \quad (5)$$

$$\mathrm{EBF} = \frac{\text{number of egg berried female}}{\text{number of female crab samples}} \times 100\% \quad (6)$$

Spawning potential ratio (SPR)

The length-based assessment of spawning potential ratio (LBSPR) have been widely used for evaluating the stock status of BSC fisheries due to its well-developed theoretical foundation and relatively simple data requirements (Hordyk et al. 2015; Prince et al. 2020). Spawning potential ratio (SPR) is defined as the proportion of natural, or unfished, reproductive production left in a population under fishing pressure (Walters and Martell 2004).

Given the fact, unfished stocks have an SPR of 100%, therefore SPR of 20% is accepted as a limit reference point below which stocks risk recruitment impairment, and SPR of 30-40% is a target level for ensuring sustainable stocks. LBSPR was performed using the web-based interface software (http://barefootecologist.com.au/) (Hordyk et al. 2015). The inputs to the LBSPR models are: (i) the M/K ratio, (ii) the mean asymptotic length (L_∞), and (iii) the estimated size of maturity (L_{50} and L_{95}). The life history parameters used to calculate the SPR can be seen in APRI (2020).

Catch per unit effort (CPUE)

The catch per unit effort (CPUE) is an indirect measure of the abundance of a target species. Changes in the catch per unit effort are inferred to signify changes to the target species' true abundance. A decreasing CPUE indicates overexploitation, while an unchanging CPUE indicates sustainable harvesting. CPUE is calculated by dividing the catch of each fishing trip by the number of days fished during that trip. This gives CPUE in units of kilograms per day.

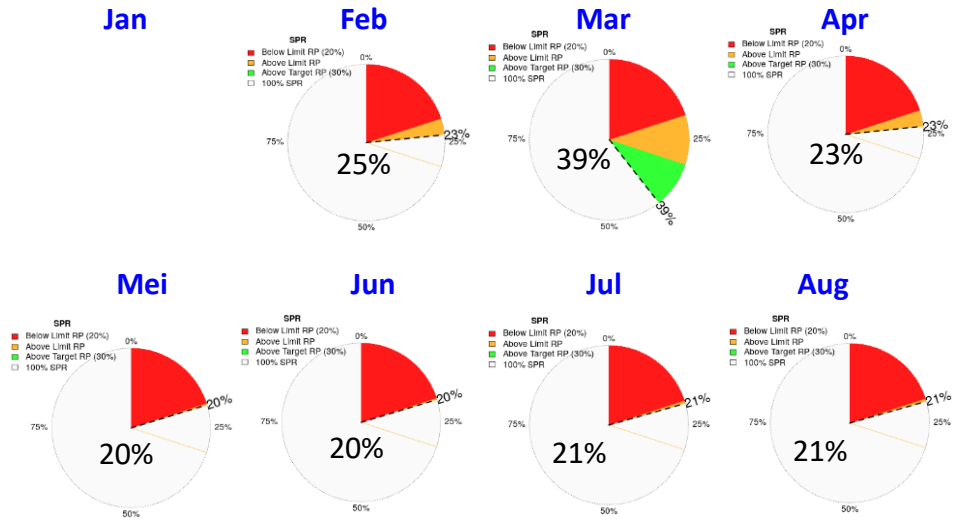
Results – Batubara (North Sumatera)

A. Size of Blue Swimming Crab Caught in Batubara, North Sumatera in 2021

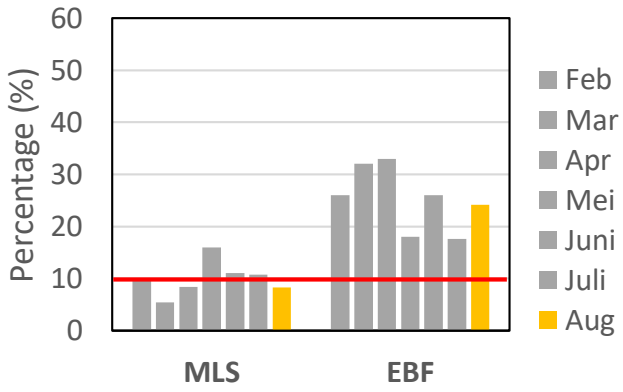
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan							
Feb	1099	759	340	106 (10%)	89 (26%)	110.36 ± 10.55	113.03 ± 9.49
Mar	2141	1398	742	116 (5.4%)	234 (32%)	117.98 ± 11.11	117.45 ± 15.95
Apr	2571	1420	1151	217 (8.4%)	376 (33%)	114. 53 ± 8.95	110.57 ± 10.64
May	1821	1029	792	295 (16%)	147 (18%)	112.09 ± 9.67	107.41 ± 11.18
Jun	2808	1513	1295	312 (11%)	339 (26%)	112.14 ± 8.64	108.30 ± 9.17
Jul	2429	1464	965	262 (11%)	170 (18%)	111.30±8.21	109.11±9.86
Aug	2133	1413	720	177 (8.3%)	174 (24%)	110.01±7.81	109.80±9.75

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

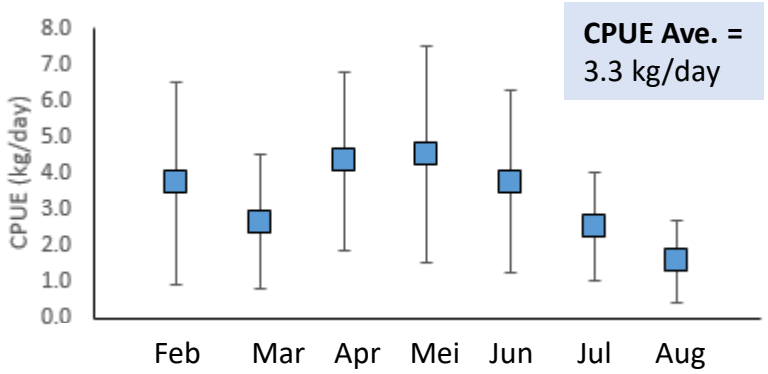
D. Spawning Potential Ratio (SPR)



B. Percentage of undersized crabs (< 10 cm) and egg berried female



C. Catch per unit of effort (CPUE)



- Undersized crabs caught in Batubara ranged from 5-16%, while egg berried female were found in high percentage (>10%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached limit *reference point* of SPR20% with average value of 24%.

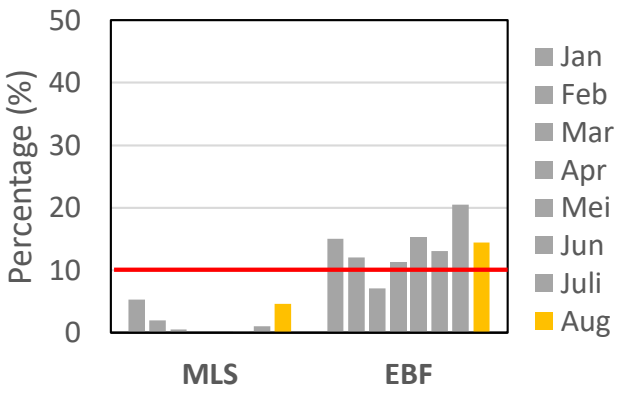
Results – Kuala Penet (Lampung)

A. Size of Blue Swimming Crab Caught in Kuala Penet, Lampung in 2021

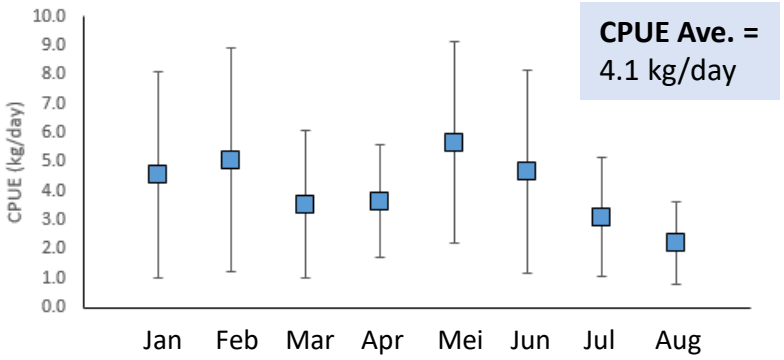
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1706	850	856	90 (5%)	128 (15%)	119.05 ±12.72	118.86±14.65
Feb	1817	916	901	33 (2%)	107 (12%)	128.80±14.29	127.08±14.63
Mar	1348	682	666	7 (0.5%)	47 (7.1%)	142.61 ± 16.15	134.17 ± 16.19
Apr	1447	730	717	0 (0%)	81 (11.3%)	145.44 ± 15.63	135.47 ± 15.50
May	1120	517	603	0 (0%)	93 (15.4%)	152.11 ± 14.91	146.83 ± 15.13
Jun	1062	634	428	3 (0.3%)	83 (13.1%)	153.85 ± 18.04	150.09 ± 16.79
Jul	1072	364	708	11 (1%)	145 (20%)	145.84 ± 18.31	145.91 ± 17.96
Aug	1397	668	729	64 (4.6%)	105 (14%)	126.92±15.99	125.71±18.44

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

B. Percentage of undersized crabs (< 10 cm) and egg berried female

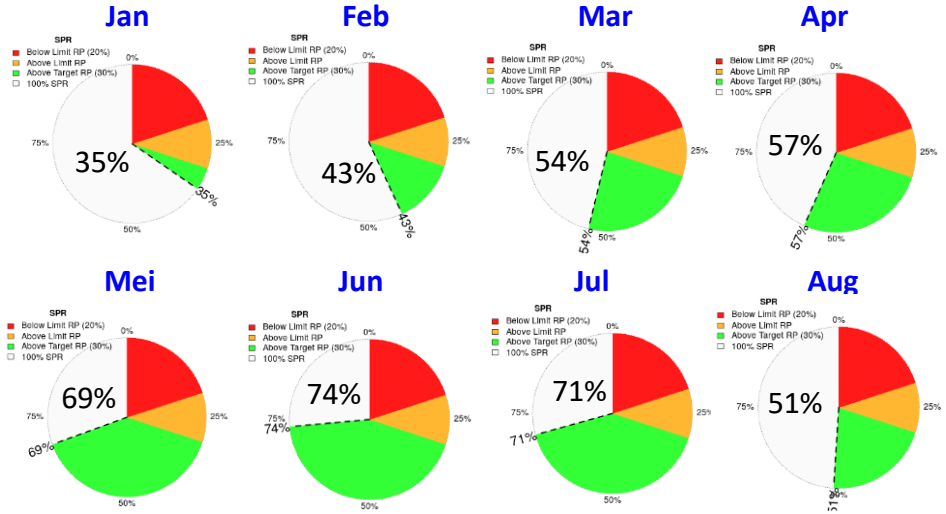


C. Catch per unit of effort (CPUE)



CPUE Ave. = 4.1 kg/day

D. Spawning Potential Ratio (SPR)



- Undersized crabs caught in Kuala Penet, Lampung were few (<5%), while egg berried female were found in high percentage (>10%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached target reference point of SPR30% with average value of 56%.

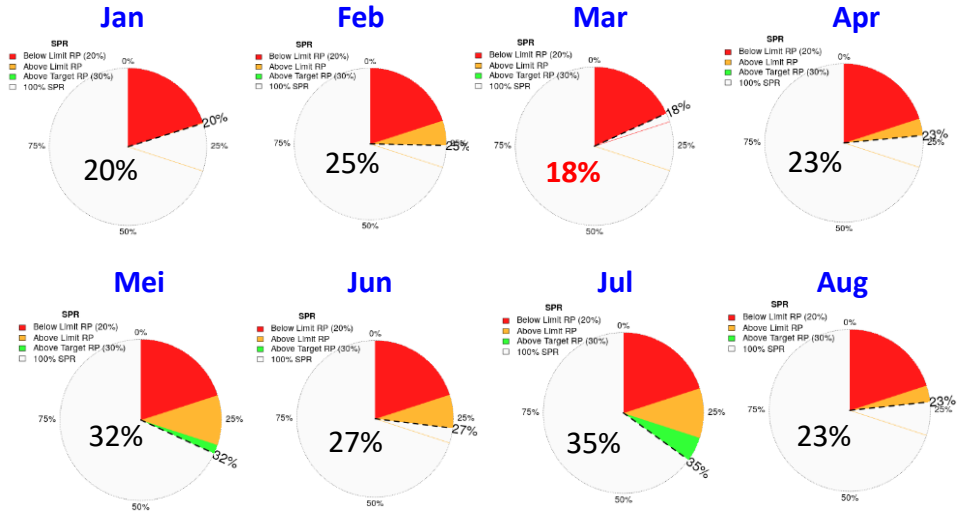
Results – Cirebon (West Java)

A. Size of Blue Swimming Crab Caught in Cirebon, West Java in 2021

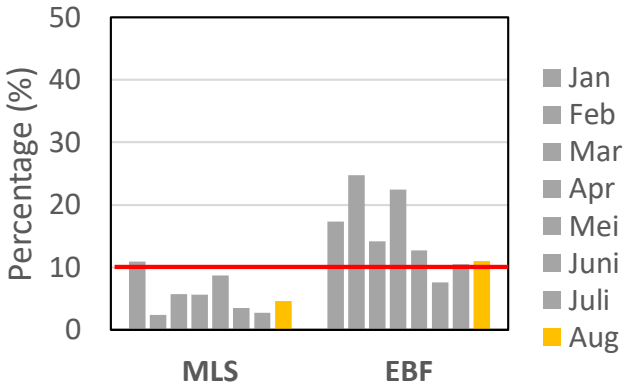
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1106	402	704	121 (11%)	122 (17%)	117.23 ±9.73	111.75±12.63
Feb	877	226	651	21 (2%)	161 (25%)	120.28± 9.17	116.53 ± 11.14
Mar	472	294	176	27 (5.7%)	25 (14.2%)	120.76±10.64	109.62±13.78
Apr	626	332	294	35 (5.6%)	66 (22.4%)	128.02± 11.62	114.50±13.08
May	1205	494	711	105 (8.7%)	90 (12.7%)	122.49 ± 14.36	116.75 ± 15.72
Jun	1258	456	802	44 (3.5%)	61 (7.6%)	122.19 ± 11.73	117.49 ± 11.91
Jul	1084	362	722	29 (2.7%)	76 (10.5%)	128.30 ± 12.36	122.30 ± 13.12
Aug	1428	703	725	65 (4.6%)	80 (11%)	118.11±10.87	115.11±11.61

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

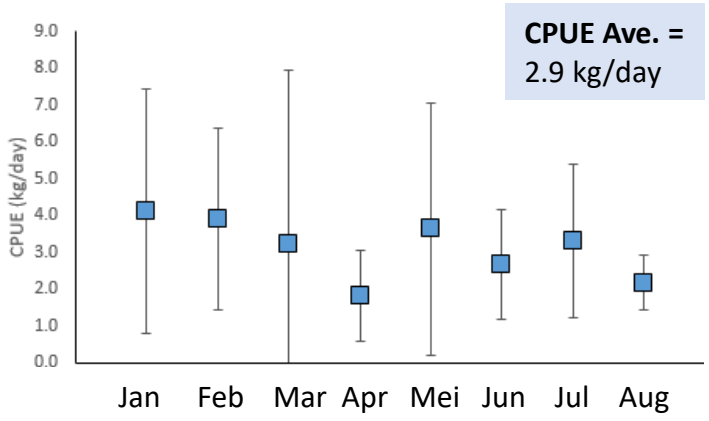
D. Spawning Potential Ratio (SPR)



B. Percentage of undersized crabs (< 10 cm) and egg berried female



E. Catch per unit of effort (CPUE)



- Undersized crabs caught in Cirebon were mostly lower than 10%, while egg berried female were still high (>10%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached limit reference point of SPR20% with average value of 25%.

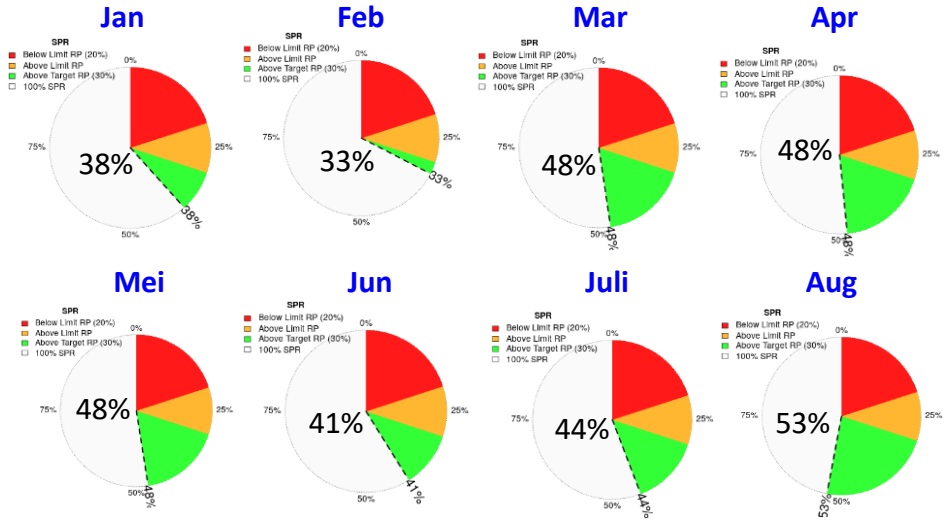
Results – Pemalang (Central Java)

A. Size of Blue Swimming Crab Caught in Pemalang, Central Java in 2021

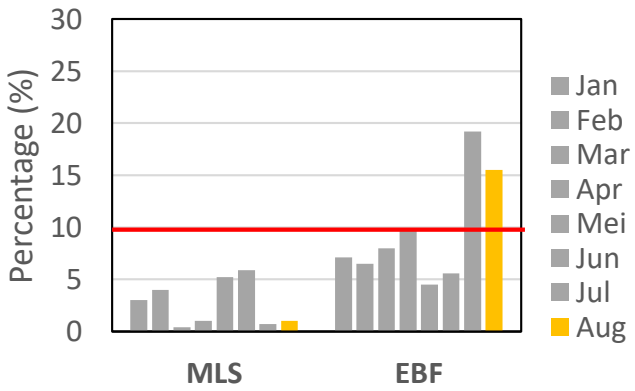
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1519	715	804	46 (3%)	57 (7.1%)	121.69±12.32	122.20±13.70
Feb	1115	422	693	46 (4%)	45 (6.5%)	117.43±10.90	120.00±12.53
Mar	1309	587	722	5 (0.4%)	58 (8%)	136.35±58.62	132.25±11.58
Apr	989	426	563	10 (1%)	55 (9.8%)	136.2±13.03	132.64±12.73
May	1734	823	911	91 (5.2%)	41 (4.5%)	124.12±19.20	128.18±17.74
Jun	2004	902	1102	118 (5.9%)	62 (5.6%)	118.62±13.36	121.66±15.37
Jul	1063	356	707	7 (0.7%)	136 (19%)	128.48±12.27	128.21±12.64
Aug	1252	358	894	13 (1%)	139 (15%)	131.88±12.48	134.14±12.42

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

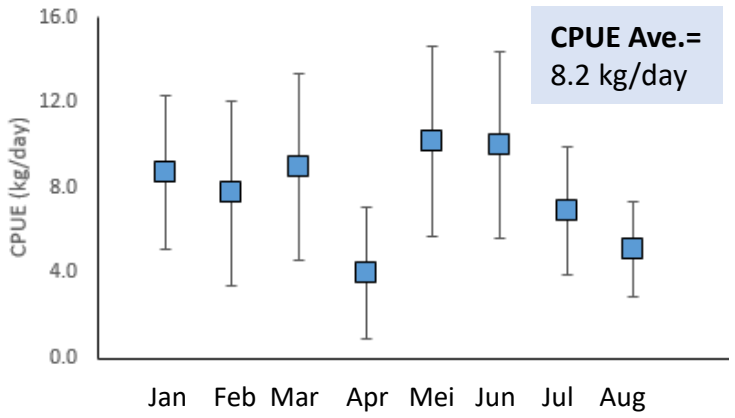
D. Spawning Potential Ratio (SPR)



B. Percentage of undersized crabs (< 10 cm) and egg berried female



E. Catch per unit of effort (CPUE)



- Undersized crabs caught in Pemalang were mostly lower than 10%, while egg berried female were still high (>10%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached target reference point of SPR30%, with average value of 44%.

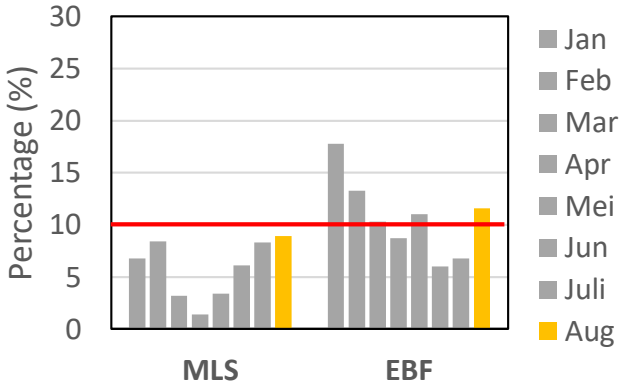
Results – Pati (Central Java)

A. Size of Blue Swimming Crab Caught in Pati, Central Java in 2021

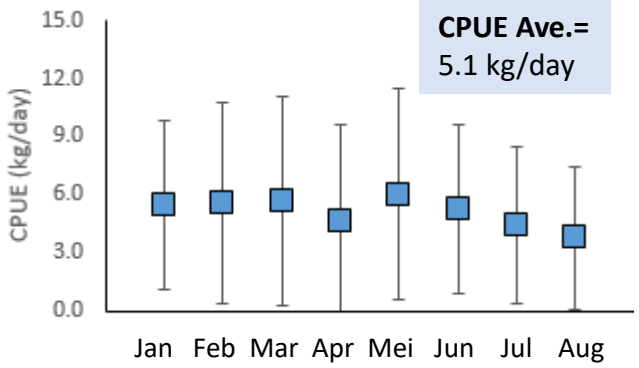
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1714	805	909	137 (8%)	186 (20%)	114.80±11.09	114.64±13.36
Feb	1628	779	849	137 (8.4%)	113 (13%)	113.02±11.29	113.13±11.26
Mar	1431	646	785	46 (3.2%)	81 (10.3%)	116.34±10.84	114.52±10.84
Apr	1580	729	851	28 (2.1%)	65 (8.7%)	121.13±10.10	116.32±9.38
May	1401	600	801	48 (3.4%)	88 (11%)	126.82±13.50	125.90±12.61
Jun	1712	884	828	104 (6.1%)	50 (6%)	114.67±12.22	121.12±15.03
Jul	1524	724	800	127(8.3%)	54 (6.8%)	115.44±13.17	118.43±13.07
Aug	1892	859	1033	168 (9%)	120 (12%)	113.20±12.62	115.75±12.66

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

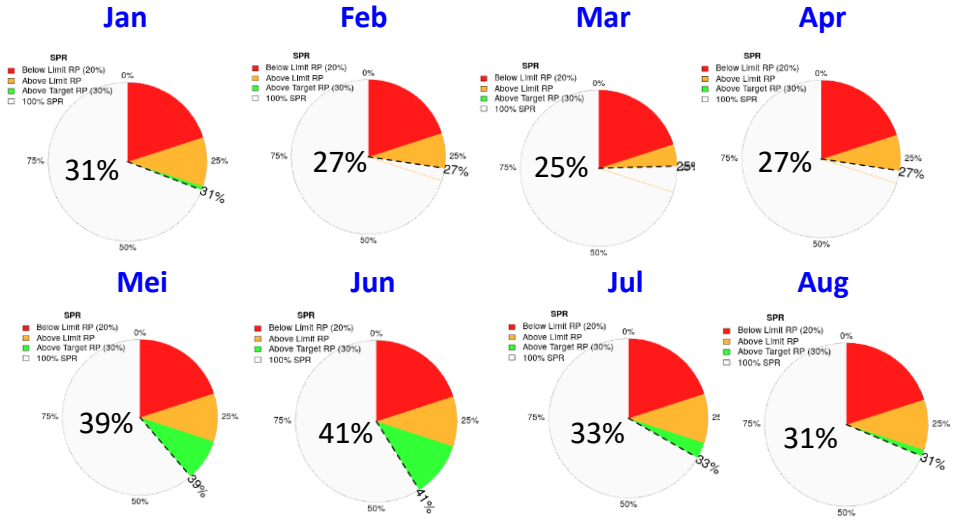
B. Percentage of undersized crabs (< 10 cm) and egg berried female



C. Catch per unit of effort (CPUE)



D. Spawning Potential Ratio (SPR) – BUBU



- Undersized crabs caught in Pati were mostly lower than 10%, while egg berried female were fluctuated.
- Monthly CPUE relatively stable but tend to decrease in the last three months.
- BSC stock status has reached target reference point of SPR30%, with average value of 32%.

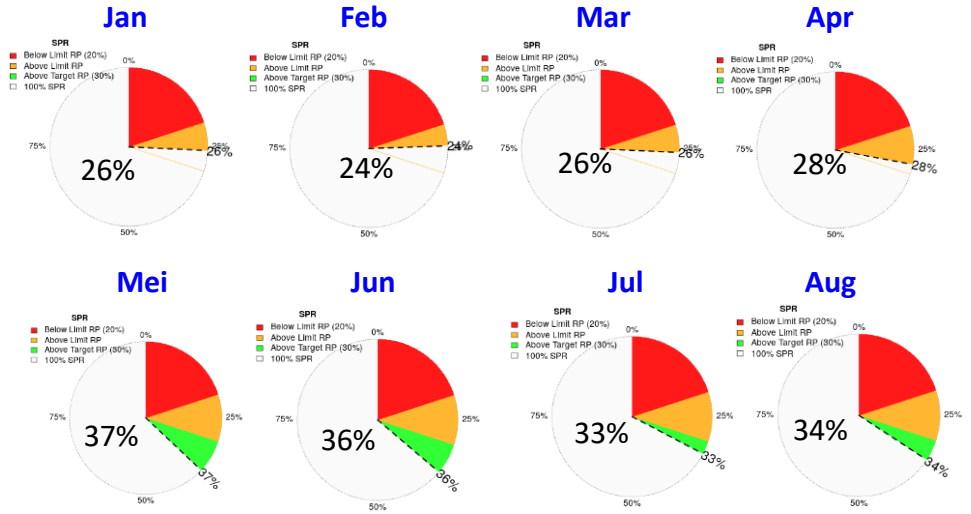
Results – Rembang (Central Java)

A. Size of Blue Swimming Crab Caught in Rembang, Central Java in 2021

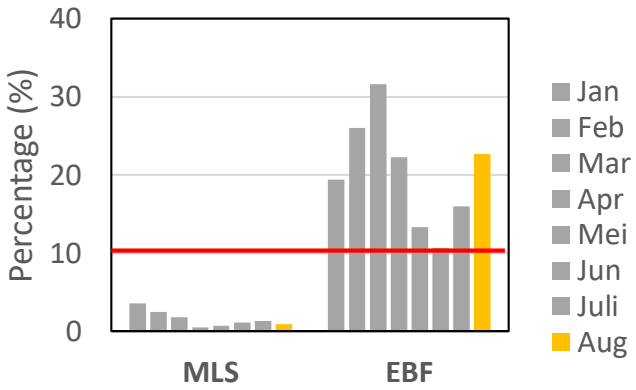
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1754	1042	712	64 (4%)	138 (19%)	115.64 ±9.4 9	113.52±11.49
Feb	1280	651	629	32 (2.5%)	162 (26%)	116.85±8.80	113.15±10.46
Mar	1464	720	744	26 (1.8%)	235 (31.6%)	118.10±8.40	114.51±10.45
Apr	1457	750	707	8 (0.5%)	158 (22.3%)	125.17±9.46	117.77±9.02
May	1623	918	705	11 (0.7%)	94 (13.3%)	132.77±11.64	122.71±11.91
Jun	1426	716	710	16 (1.1%)	76 (10.7%)	157.23±63.16	117.09±47.77
Jul	1307	605	702	13 (1.3%)	109 (16%)	138.99±48.06	115.90±43.18
Aug	1282	550	732	12 (0.9%)	166 (23%)	124.58±10.98	121.17±11.14

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

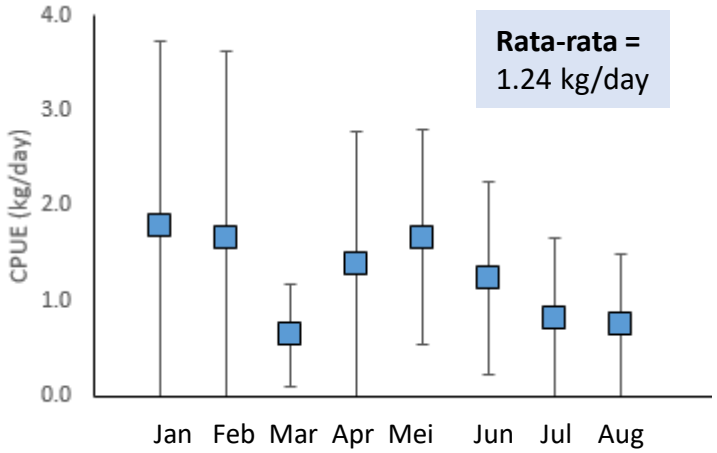
D. Spawning Potential Ratio (SPR)



B. Percentage of undersized crabs (< 10 cm) and egg berried female



C. Catch per unit of effort (CPUE)



- Undersized crabs caught in Rembang were very few (<5%), while egg berried female were still high (>20%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached target reference point of SPR30%, with average value of 31%.

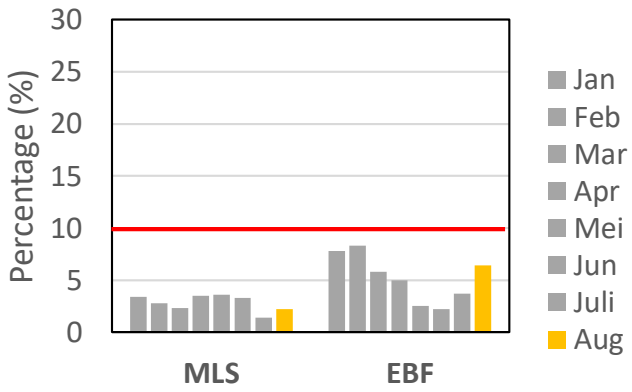
Results – Pamekasan (East Java)

A. Size of Blue Swimming Crab Caught in Pamekasan, East Java in 2021

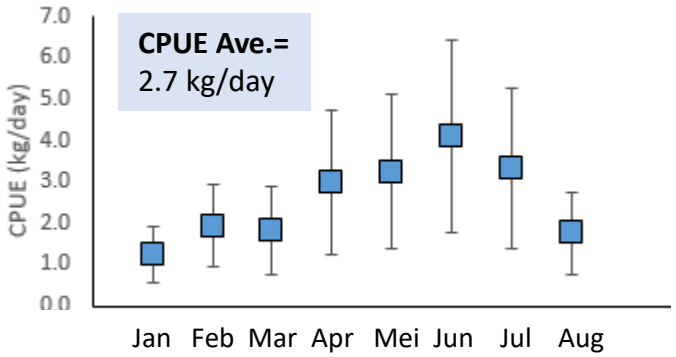
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1241	524	717	42 (3%)	56 (7.8%)	109.99±9.44	118.58±12.36
Feb	1243	486	757	27 (2.2%)	61 (8.1%)	113.31 ± 10.87	119.44 ± 12.31
Mar	1223	444	779	28 (2.3%)	45 (5.8%)	114.71 ± 10.37	114.96 ± 12.60
Apr	1509	675	834	53 (3.5%)	42 (5%)	116.83 ± 11.60	115.41 ± 10.40
May	1359	648	711	49 (3.6%)	18 (2.5%)	119.90±11.94	116.13±10.34
Jun	1721	809	912	56 (3.3%)	20 (2.2%)	118.63±12.22	118.14±11.22
Jul	1434	577	857	20 (1.4%)	32 (3.7%)	119.27±11.00	119.50±10.49
Aug	1342	519	823	30 (2.2%)	53 (6.4%)	119.25±11.45	122.74±10.99

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

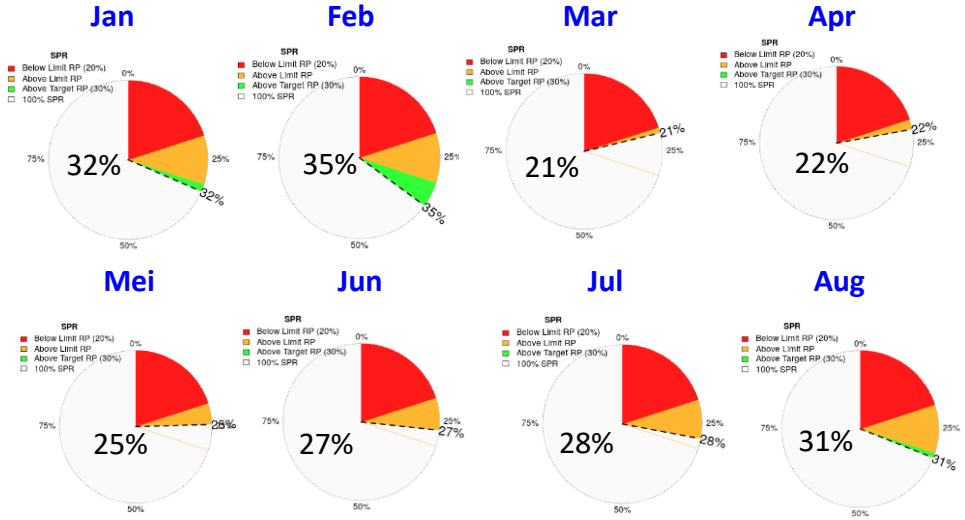
B. Percentage of undersized crabs (< 10 cm) and egg berried female



C. Catch per unit of effort (CPUE)



D. Spawning Potential Ratio (SPR)



- Undersized crabs and egg berried female caught in Pamekasan were found in low percentage (<10%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached limit reference point of SPR20%, with average value of 28%.

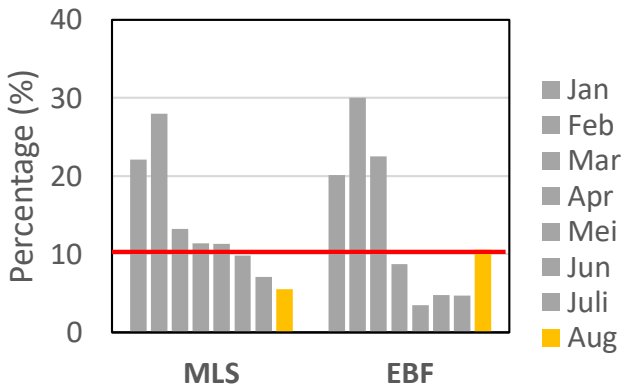
Results – Gresik (East Java)

A. Size of Blue Swimming Crab Caught in Gresik, East Java in 2021

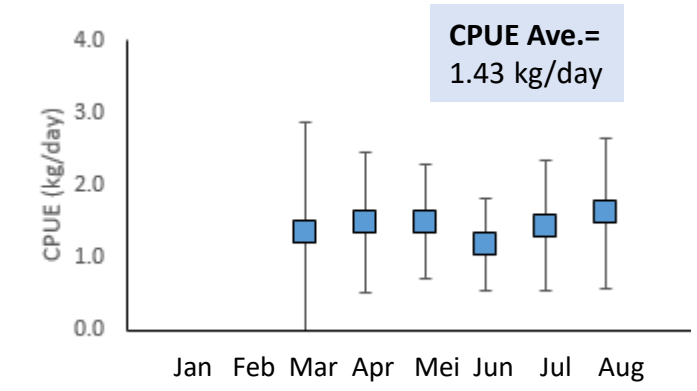
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	984	522	462	217 (22%)	93 (20%)	109.72±9.99	102.87±14.61
Feb	637	413	224	175 (28%)	66 (30%)	110.45±10.98	102.31±13.91
Mar	2383	1591	792	315 (13.2%)	178 (22.5%)	108.89±9.36	104.38±9.60
Apr	2486	1758	728	283 (11.4%)	63 (8.7%)	113.96±10.92	107.28±12.72
May	1917	1205	712	216 (11.3%)	25 (3.5%)	111.65±9.86	107.48±11.56
Jun	1763	993	770	173 (9.8%)	37 (4.8%)	112.02±8.80	108.08±11.17
Jul	2167	1430	737	153 (7.1%)	35 (4.7%)	109.63±7.43	108.54±9.40
Aug	2452	1677	775	135 (5.5%)	82 (10.6%)	110.96±7.68	112.35±9.97

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

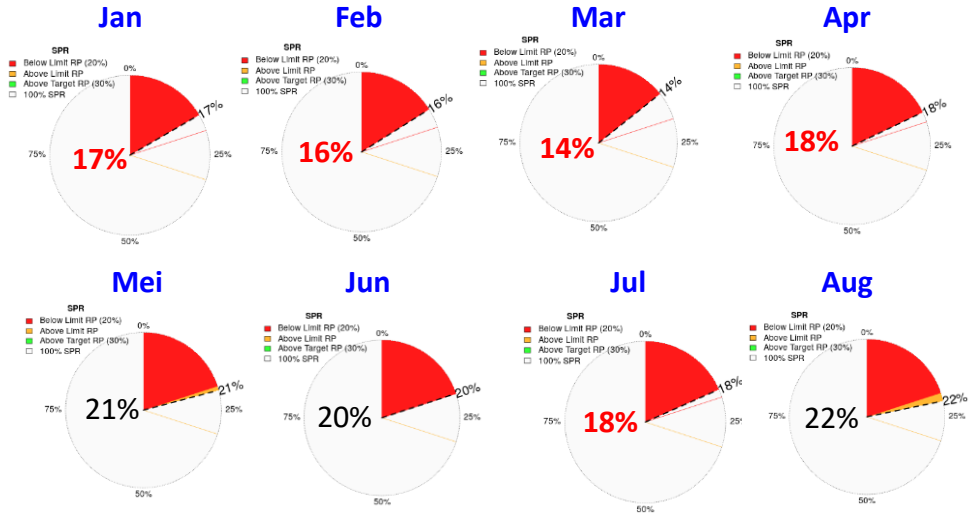
B. Percentage of undersized crabs (< 10 cm) and egg berried female



C. Catch per unit of effort (CPUE)



D. Spawning Potential Ratio (SPR)



- Undersized crabs and egg berried female caught in Gresik during Jan-Mar were very high (>20%), it tend to decrease over time.
- Monthly CPUE fluctuated and tend to increase in the last three months.
- BSC stock status mostly did not meet the limit reference point of SPR20%, with average value of 18%.

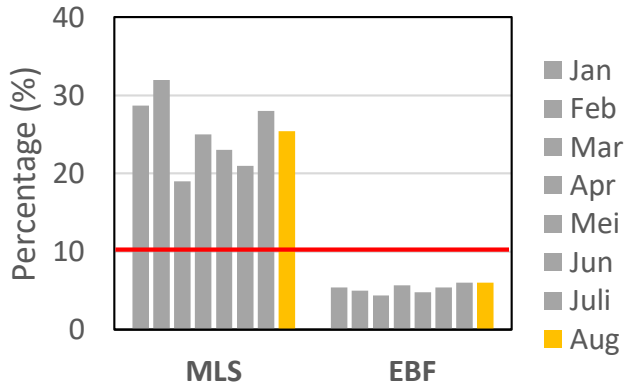
Results – Pamandati (Southeast Sulawesi)

A. Size of Blue Swimming Crab Caught in Pamandati, Southeast Sulawesi in 2021

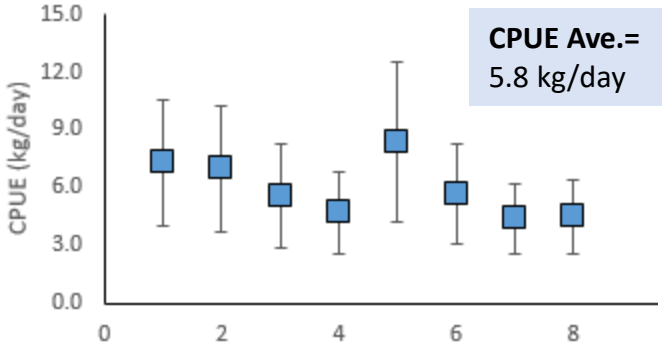
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1156	451	705	332 (28%)	38 (5%)	109.39±14.78	109.98±15.21
Feb	853	315	537	272 (32%)	29 (5%)	109.96±14.36	108.45±13.39
Mar	1268	536	732	238 (19%)	32 (4.4%)	112.35 ± 13.52	112.10 ± 13.53
Apr	1395	596	799	335 (24%)	54 (6.8%)	108.75±13.29	110.39±13.70
May	1411	702	709	282 (20%)	49 (7%)	111.71±14.40	113.72±14.98
Jun	1469	605	864	310 (21%)	47 (5.4%)	111.84±15.66	115.38±15.56
Jul	1395	586	809	395 (28%)	47 (6%)	106.56±13.00	111.04±14.79
Aug	1312	517	795	333 (25%)	48 (6%)	106.39±11.56	111.34±13.53

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

B. Percentage of undersized crabs (< 10 cm) and egg berried female

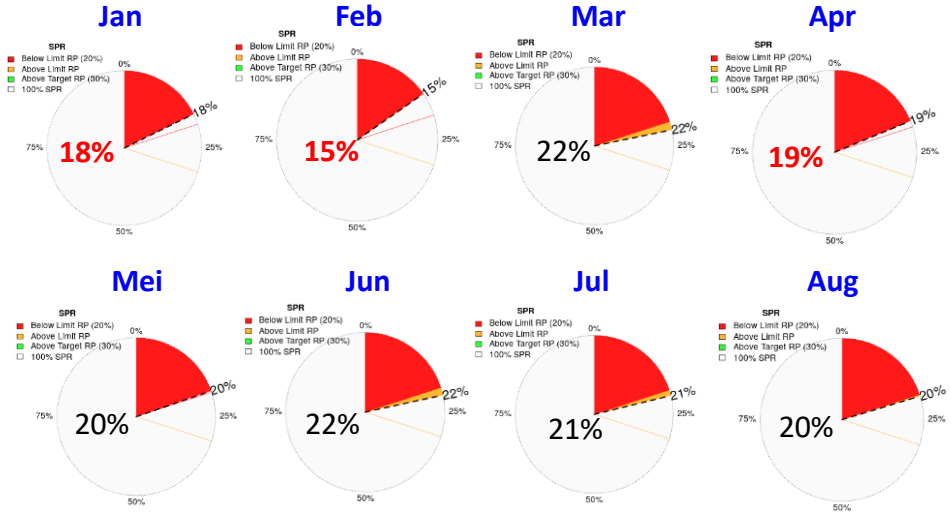


C. Catch per unit of effort (CPUE)



CPUE Ave.= 5.8 kg/day

D. Spawning Potential Ratio (SPR)



- Undersized crabs caught in Pamandati were very high (>20%), while egg berried female were still high (>20%).
- Monthly CPUE fluctuated and tend to decrease in the last three months.
- BSC stock status has reached limit reference point of SPR20% from May-Aug, with average value of 19%.

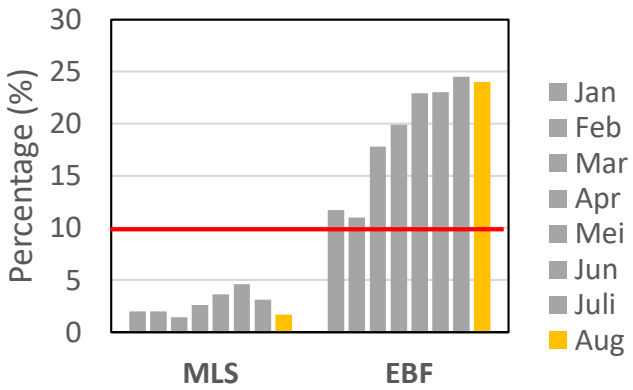
Results – Pangkajene Island (South Sulawesi)

A. Size of Blue Swimming Crab Caught in Pangkajene, South Sulawesi in 2021

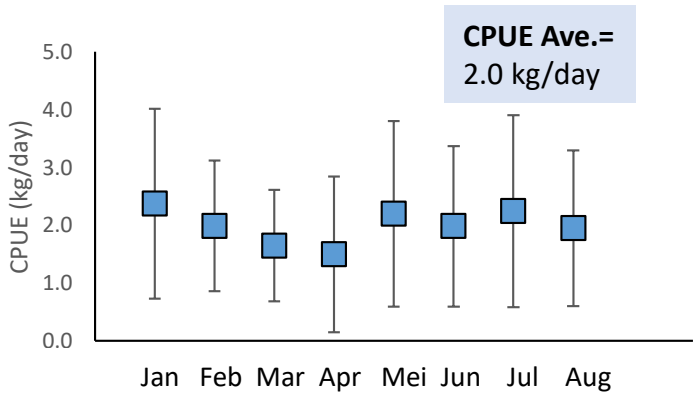
Month	Total (ind)	Catch				Carapace Width ± SD	
		M (ind)	F (ind)	MLS (ind)	EBF (ind)	M (mm)	F (mm)
Jan	1419	665	754	28 (2%)	88 (12%)	114.92±8.66	116.73±9.19
Feb	1278	559	719	23 (2%)	65 (10%)	113.66±7.97	115.65±9.39
Mar	1173	458	715	16 (1.4%)	127 (17.8%)	118.86 ± 9.32	118.01 ± 9.95
Apr	1110	401	709	29 (2.6%)	141 (19.9%)	119.32±11.95	121.72 ± 11.33
May	1343	637	706	48 (3.6%)	162 (22.9%)	114.04±9.83	117.26±10.96
Jun	1570	863	707	72 (4.6%)	162 (23%)	110.74±9.30	113.91±11.22
Jul	1539	821	718	48 (3.1%)	176 (24.5%)	110.18±7.41	110.77±9.01
Aug	1245	532	713	21 (1.7%)	171 (24%)	113.61±8.50	112.61±8.26

Note: M=male, F=female, MLS=undersized crab, EBF=egg berried female

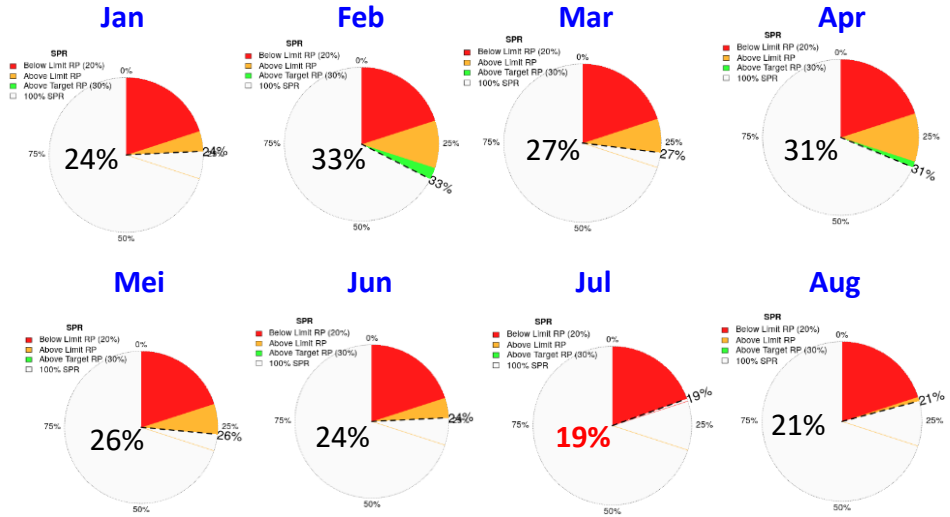
B. Percentage of undersized crabs (< 10 cm) and egg berried female



C. Catch per unit effort (CPUE)



D. Spawning Potential Ratio (SPR)



- Undersized crabs caught in Pangkajene were low(<5%), while egg berried female were very high (>20%).
- Monthly CPUE fluctuated with average value of 2 kg/day.
- BSC stock status mostly has reached limit reference point of SPR20%, with average value of 25%.

Conclusion

The size of Indonesian blue swimming crabs (*Portunus pelagicus*) varied among study sites. The percentages of undersized crab (<10cm) were relatively low in all locations (<10%), except for Pamandati, while the percentages of egg berried female were still found to be high (>10%). Catch per unit effort (CPUE) showed variation among sites and fluctuated every month. Catches in Pemalang was highest compared to other sites. Spawning potential ratio (SPR) of BSC in Indonesia mostly ranged from 20% to 30%, indicating the moderate status. Management measures are still needed to improve the BSC fishery in Indonesia, such as through GTK5! Program by releasing small crab and egg berried female to the sea or by building crab apartment as a shelter for berried female.

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Ayo Kampanyekan

#GTK5Menit

Gerakan Tangkap Kembalikan Sebelum 5 Menit

APRI

1. Berusaha untuk tidak menangkap **rajungan kecil lebar karapas <10 cm** dan **rajungan bertelur** sesuai PERMEN KP No. 12 Tahun 2020

2. Apabila Tertangkap segera **di kembalikan** ke laut **sebelum 5 menit**

3. Nelayan dianjurkan mengembalikan **sebelum 5 menit saat masih di laut** untuk mencegah kematian dan menuju **perikanan rajungan berkela-jutan**

4. Kembalikan Rajungan kecil dan Bertelur **dalam keadaan tetap hidup** meski tidak sengaja tertangkap

5. Apabila rajungan bertelur luar tertangkap **segera kembalikan** atau **karantina di Apartemen rajungan**

Bubu Lipat Modifikasi akan memudahkan menangkap rajungan sesuai PEMEN KP No.12 Tahun 2020

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