REPORT ON PROFILES OF FISHERIES REFUGIA CANDIDATES: WEST KALIMANTAN AND BANGKA-BELITUNG WATERS

SEAFDEC/UNEP/GEF/INDONESIA

Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand

Ngurah N. Wiadnyana

National Technical and Scientific Focal Point

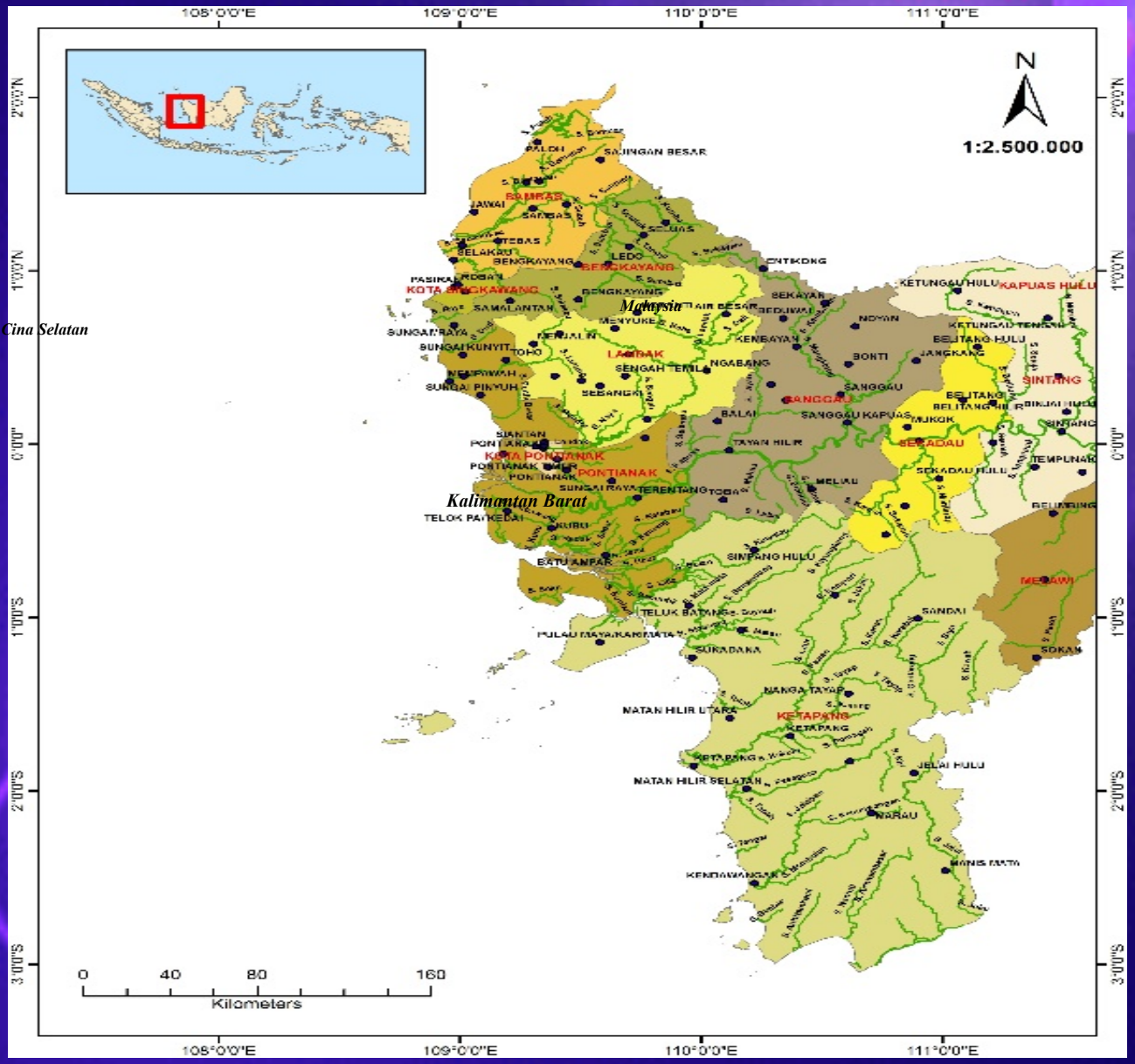
Indonesia

Viet Nam, 5 -7 February 2020

Candidates Fisheries Refugia Location

- Two locations: West Kalimantan and Bangka-Belitung waters were chosen for Fisheries Refugia Establisment
- West Kalimantan Waters are designated for shrimp (*Fenneropenaeus* spp)
- Bangka – Belitung Waters are designated for squids (*Uroteuthis chinensis*)

PROFILE OF WEST KALIMANTAN WATERS



IMPORTANT OF SHRIMP PRODUCTION

Shrimp types and its price at certain locations in West Kalimantan

Name of shrimps	Price (x 1,000 Rupiah/kg)			
	Pemangkat Zone	Kubu Raya Zone	Teluk Batang Zone	Ketapang Zone
Tiger prawn (Udang windu/wangkang)	60	80	80	80
White shrimp (Udang Putih/jerbung)	40	45	50	50
Endevour shrimp (Udang Dogol/bangkit)	35	32	40	40
Yellow shrimp (Udang kuning/DK/T/sudu)	25	28	25	25
Rainbow shrimp (Udang Krosok/udang merah/halus)	10	6	10	10
Yellow small-white shrimp (Udang ambai/sungkur)	-	15	-	-

IMPORTANT OF SHRIMP PRODUCTION

The number of fishing fleets in West Kalimantan in 2017

Type of Boat/Vessel	Total Number			%
1. Boat without motor			4,800	32.9
a. Jukung or Kano	:	1,000		
a. Small plank boat	:	1,000		
a. Medium plank boat	:	1,484		
a. Big plank boat	:	1,316		
2. Outboard fishing board			3,690	25.3
3. Fishing vessel			6,102	41.8
a. Less than 5GT	:	4,467		
a. 5 - 10 GT	:	1,068		
a. 10 - 20 GT	:	238		
a. 20 - 30 GT	:	224		
a. 30 - 50 GT	:	59		
a. More than 50 GT	:	46		
Total number of Fleets			14,592	

Important of Shrimp Production

The number of fishing gears in West Kalimantan in 2017

No.	Type of Fishing Gear	Total number (unit)	(%)
A.	Active Fishing Gear:		
1	Single Shrimp Dragged Gear	766	6.0
2	Seines (including bottom trawls, dredges)	1,899	14.8
3	Three layer net	2,828	22.0
4	Drag net / Plastic trawl	3,299	25.7
B.	Passive Fishing Gear:		
1	Lift net/Pound net	113	0.9
2	Gill nets (Sero)	1,168	9.1
3	Jermal (net, pole with chamber)	850	6.6
4	Plaited rattan fish trap (including bubu ambai)	1,175	9.1
5	Cast net	763	5.9

IMPORTANT OF SHRIMP PRODUCTION

The number of shrimp fishermen in research location

No.	District	Fishermen (persons)	Number of Fishermen Household	Gears (unit)						
				Seine nets	Bottom trawl	Gill net	Trammel net	Lift nets	Ambai trap	Togok Trap
1.	Tanjung Tempurung	-	1,453	884	400	30	-	6	113	20
2.	Tanjung Bunga	-	471	300	120	30	-	21	-	-
3.	Batu Ampar	-	436	-	-	200	100	86	20	30
4.	Teluk Batang	4.682	951	-	118	407	360	55	418	-
5.	Ketapang	328	1,072	1,263	173	472	392	46	288	173
6.	Pemangkat	9,238	1,474	240	1,263	505	197	-	14	-

Shrimp Fisheries Production

Institution

Several indicators to measure the readiness of the social system in accepting management programs are among others:

(1) community support level (social capital),

(2) (value system and local wisdom, and also customs,

(3) the potential of local institution,

(4) the significant value of the region for people's economy,

(5) potential threats to resources to be protected, and

Institution

Supporting parameters for Social Economy and Institution along the Coast of West Kalimantan

No	Supporting Parameters (Socioeconomic Institution)	Zone					
		Tanjung Tempurung	Tj. Bunga	Pd. Tikar	Teluk Batang	Ketapang	Pemangkat
1.	Social Capital						
	1.1. Community Perception towards Significant Value of Resources	low	moderate	moderate	high	high	moderate
	1.2. Community participation in management activities	low	low	moderate	moderate	high	low (at a stage of attending the meeting)
2.	Value System & local wisdom	Existing, passive	Existing, active	Existing, active for particular interests	Not existing	Not existing	Not existing

Institution

Supporting parameters for Social Economy and Institution along the Coast of West Kalimantan

No	Supporting Parameters (Socioeconomic Institution)	Zones					
		Tanjung Tempurung	Tj. Bunga	Pd. Tikar	Teluk Batang	Ketapang	Pemangkat
3.	Potential threats to resources (extractive economy)				Safe enough	Safe enough	Safe enough
	3.1. terrestrial vegetation	Not safe	Not safe	Not safe	Low degraded	Prone to abrasion	Low degraded
	3.2. Fishery activities	Not safe	Not safe	Not safe	Safe (domination of trammel net)	Not safe (domination of trawl)	Not safe (destructive fishing gears are still used)
4.	Potential conflicts of benefit/interest	moderate	moderate	moderate	moderate	moderate	minimum

Institution

Supporting parameters for Social Economy and Institution along the Coast of West Kalimantan

No	Supporting Parameters (Socioeconomic Institution)	Zones					
		Tanjung Tempurung	Tj. Bunga	Pd. Tikar	Teluk Batang	Ketapang	Pemangkat
5.	Potential of Institution	Performing-maturing (performing co-management function)	Performing-maturing (performing co-management function)	norming (establishment of a value system)	Brainstorming	Brainstorming	Brainstorming
6.	Significant value of area for people's economy	Main source of livelihood/raw materials for people's industries/export	Main source of livelihood / part time	Main source of livelihood / part time	Main source of livelihood / export	Main source of livelihood / export	Main source of livelihood/raw materials for people's industries/export
	Resources contribution to the region				Significant enough	Significant enough	Significant enough
	Resources contribution to				Significant	Significant	Significant

Characteristics of coastal areas

Some characteristics of coastal areas of West Kalimantan and several development strategies that can be done are as follow:

- The villagers living in coastal areas of West Kalimantan can be categorized into two community groups, representatives of isolated villages and representatives of coastal villages.
- The social structures that lead to social polarization (two-class community structure) indicate that inequality and even backwardness have occurred.
- Rich of natural resources of the coastal areas of West Kalimantan, the protection of the environment of coastal areas is needed that should be carried out to create various sources of income of fishing community; it is not only from fishery and agricultural sectors, but also from non-agricultural sector.
- Based on socio-economic characteristics and natural resources owned, several alternative development strategies that can be implemented are: (1) for isolated villages; the development strategy that is possible to be done is combining participative strategy with welfare strategy, and (2) for fishing villages, integrated strategy should be implemented; it should combine growth strategy, welfare strategy, and participative strategy.

PROFILE OF WATERS ON COASTAL AREAS OF WEST KALIMANTAN

Critical Habitat for Juvenile Shrimps

No	Parameter	Unit	Coastal condition of West Kalimantan	Reference
	Biogeophyscal Aspects:			
1.	Abundance of Penaeid shrimp larvae	Ind/1,000 m^3	Location with the highest level of abundance compared to other locations.	Conservation of Shrimp Resources at Cempi Bay (Anonymous, 2012, 2013)
2.	Composition of Penaeid shrimp larvae against the total number of other shrimps	%	dominant	
3.	Abundance of Penaeid shrimp juvenile	Ind/1,000 m^3	Location with the highest level of abundance	

PROFILE OF WATERS ON COASTAL AREAS OF WEST KALIMANTAN

Critical Habitat for Juvenile Shrimps

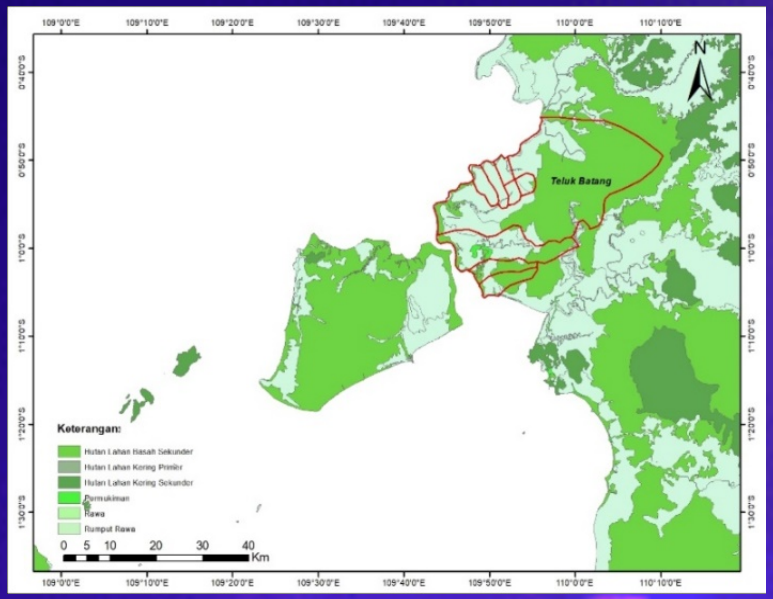
No	Parameter	Unit	Coastal condition of West Kalimantan	Reference
5.	Depth of Water	m	>1-15m (relatively shallow)	
6.	Temperature of Water	^{o}C	27-32	KLH, 2004
7.	Turbidity of Water	NTU	0-5	KLH, 2004
8.	Basic Substrate of Water	quantitative	Sandy mud, sandy clay mud	Holthuis, 1980; delMundo, 2000; Pratiwi, 2008.
9.	pH	unit	7.5-8	KLH, 2004
12.	Mangrove Vegetation			

Matchability of waters for prospective shrimp refugia in West Kalimantan

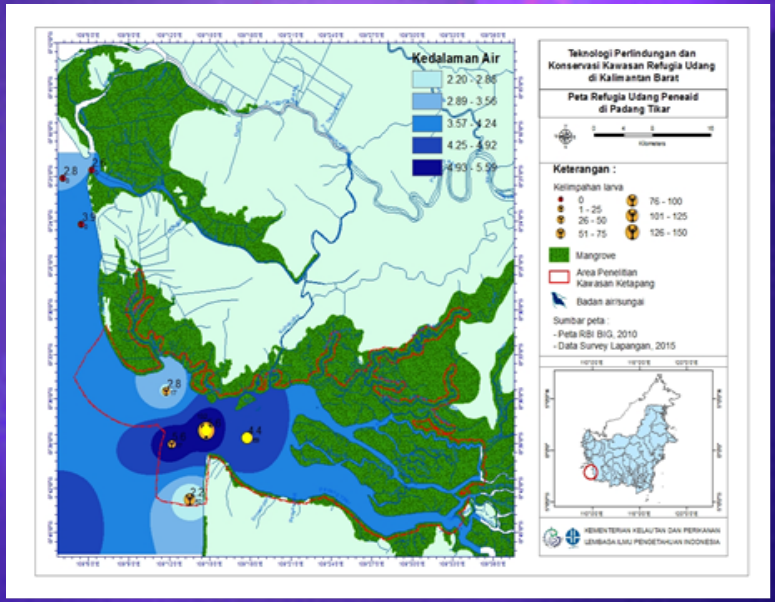
No	Parameter of prospective penaeid shrimp refugia based on nursery area	Research Location					
		Tanjung Tempurung	Tanjung Bunga	Padang Tikar	Teluk Batang	Ketapang	Pemangkat
1	Penaeid shrimp						
	Penaeid larvae composition	3	2	3	3	3	1
	Penaeid juvenile composition	1	3	2	2	2	3
2	Water environment:						
	salinity	1	1	3	2	2	3
	turbidity	2	1	3	1	2	1
3	Mangrove :						
	Cover (%)	2	2	3	2	1	1
	Real mangrove type	1	2	3	1	1	1
	Nypa fruticans (ind/Ha)	3	1	2	1	1	1
	Density (ind/Ha)	1	2	3	3	3	
4	Destructive fishing gear	1	1	3	3	3	3
5	Utility						
6	Social capital						
	Community perception on significant value of resources	1	2	2	3	3	3
	Community participation in management activities	1	1	1	2	3	1
	Local wisdom	2	2	3	1	1	1

Critical habitat of shrimp juvenile phase

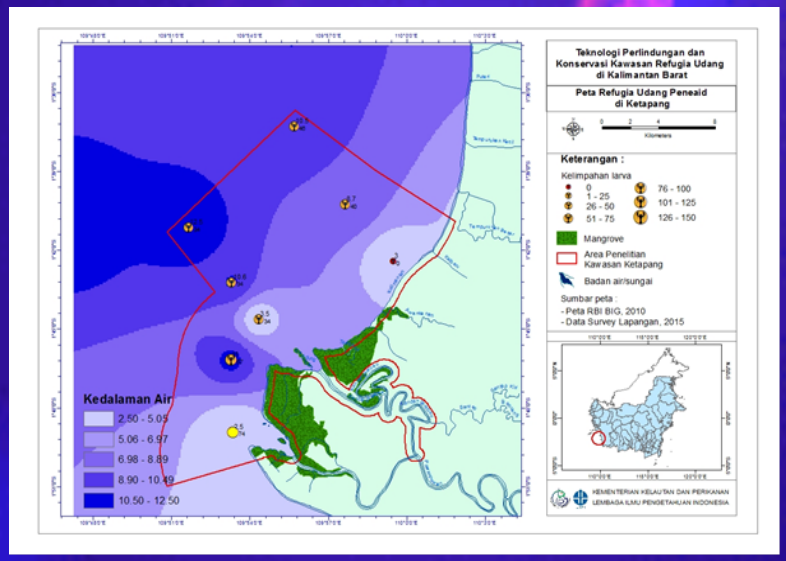
1



2



3



1. Padang Tikar
2. Teluk Batang
3. Ketapang

Fenneropenaeus indicus
(local name: *wangkang* shrimp)

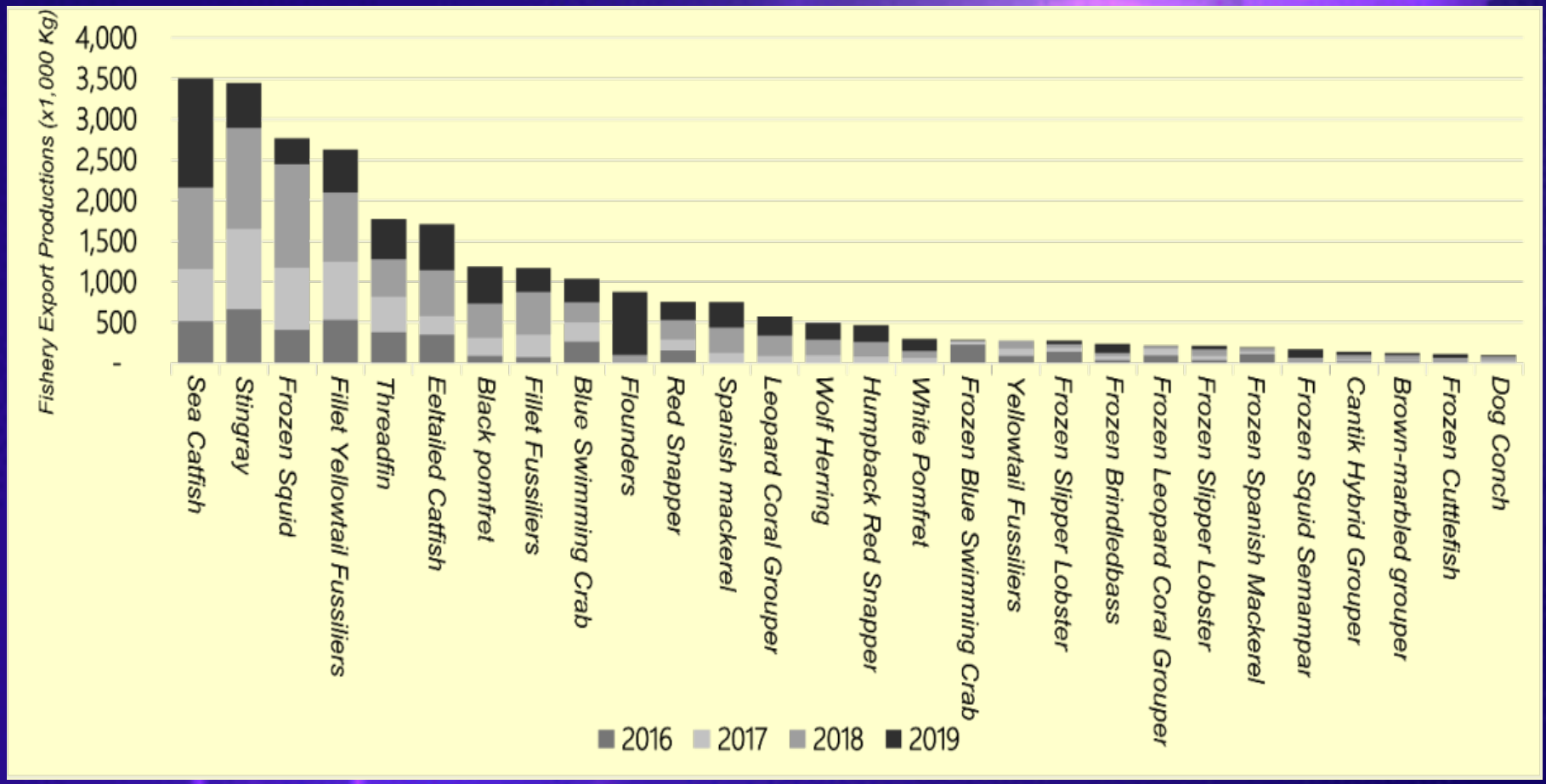
PROFILE OF BANGKA - BELITUNG WATERS

Bathymetric map of waters of Bangka Belitung Islands

Selection of Superior Commodity of Small Pelagic (Squids)

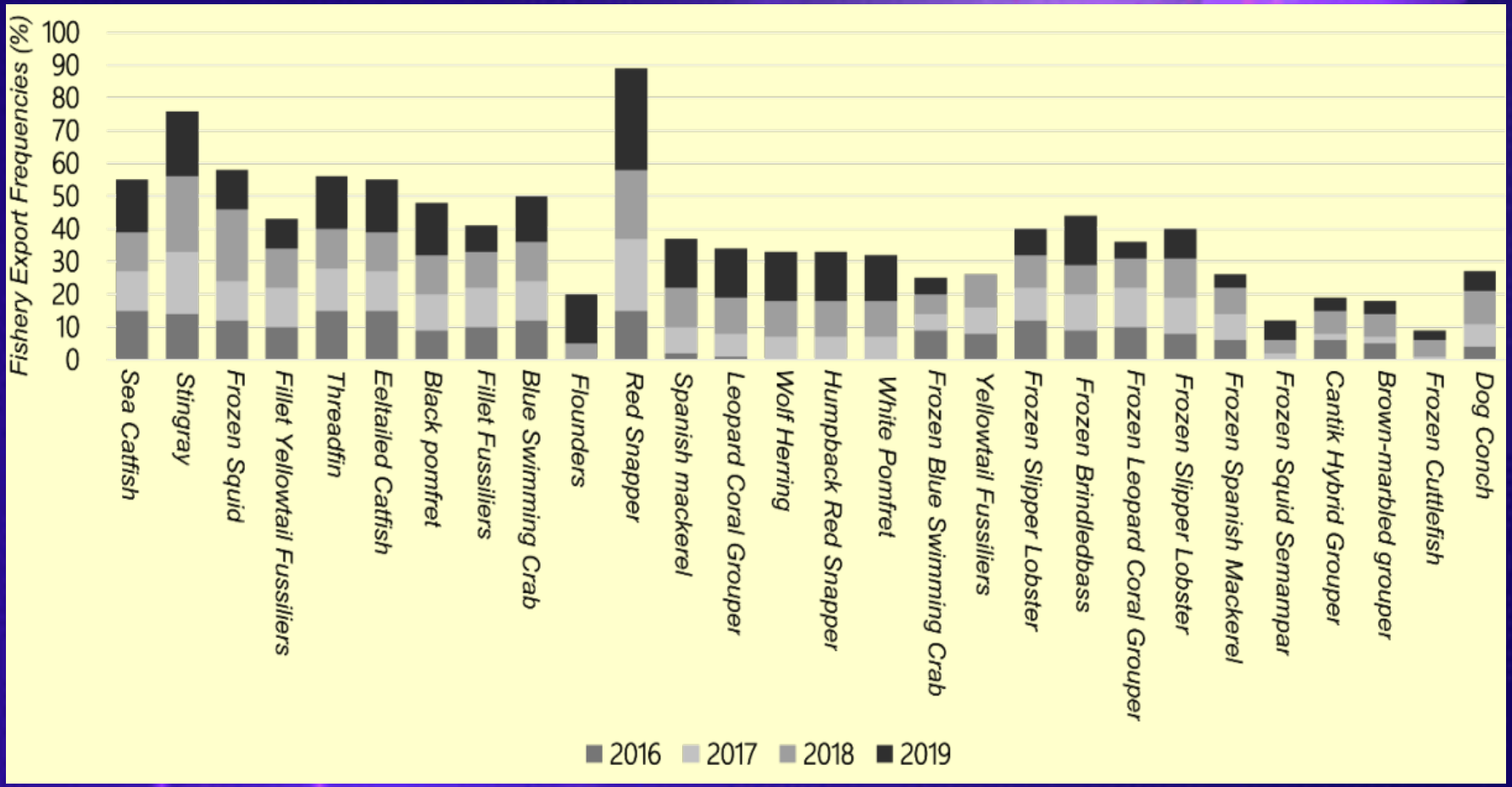
Fish Commodity	Value of Production	Value Function	Price (Rp/Kg)	Value Function	Area	Value Function	Value Added	Value Function	Combined	Average Value Function	Rank
Bared/spanish mackerel	309,960,060.70	0.52	65.00	0.52	2	0.67	2	1.00	2.710	0.678	1
Red snapper	590,566,495.10	1.00	65.00	0.52	2	0.67	1	0.50	2.690	0.673	2
Banana prawn	86,326,494.00	0.15	120.00	0.96	3	1.00	1	0.50	2.610	0.653	3
Leopard coral grouper	587,344,144.60	0.99	30.00	0.24	2	0.67	1	0.50	2.400	0.600	4
Mud crab	97,537,604.30	0.17	125.00	1.00	2	0.67	1	0.50	2.340	0.585	5
Squid	136,686,065.00	0.23	70.00	0.56	3	1.00	1	0.50	2.290	0.573	6
King mackerel	20,963,502.60	0.04	45.00	0.36	2	0.67	2	1.00	2.070	0.518	7
Threadfine bream	187,071,944.70	0.32	50.00	0.40	1	0.33	2	1.00	2.050	0.513	8
Fringescale sardine	126,800,428.30	0.21	25.00	0.02	2	0.67	2	1.00	1.900	0.475	9
Blue Swimming Crab	321,763,277.90	0.54	60.00	0.48	1	0.33	1	0.50	1.850	0.463	10
Seabass/White snapper	28,826,530.30	0.05	80.00	0.64	2	0.67	1	0.50	1.860	0.465	11
Anchovy	59,300,015.60	0.10	60.00	0.48	2	0.67	1	0.50	1.750	0.438	12
Round herring	143,504,150.20	0.24	8.00	0.06	1	0.33	2	1.00	1.630	0.408	13
Long jawed mackerel	63,910,456.00	0.11	45.00	0.36	2	0.67	1	0.50	1.640	0.410	14
White pomfret	121,313,890.90	0.21	25.00	0.20	2	0.67	1	0.50	1.580	0.395	15
Grouper	71,803,873.10	0.12	30.00	0.24	2	0.67	1	0.50	1.530	0.383	16
White pomfret	89,053,696.90	0.15	25.00	0.20	2	0.67	1	0.50	1.520	0.380	17
Threadfin	21,725,892.00	0.04	12.00	0.10	1	0.33	2	1.00	1.470	0.368	18
Giant trevally	134,132,136.80	0.23	50.00	0.40	1	0.33	1	0.50	1.460	0.365	19
Spotted sardine	60,722,195.70	0.10	3.00	0.02	1	0.33	2	1.00	1.450	0.363	20

Selection of Superior Commodity of Small Pelagic (Squids)



The quantity (in kg) of exported fishery commodities of Bangka Belitung Island Province in period of 2016-2018

Selection of Superior Commodity of Small Pelagic (Squids)



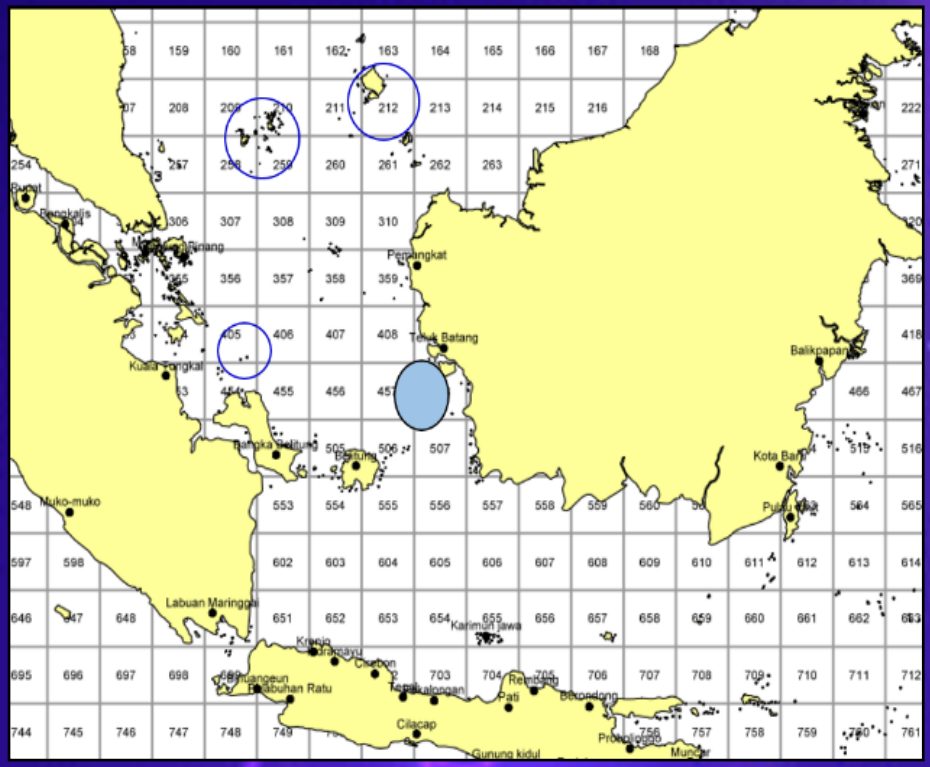
Fishery Commodity export frequency dynamics of Bangka Belitung Islands Province, 2016-2017

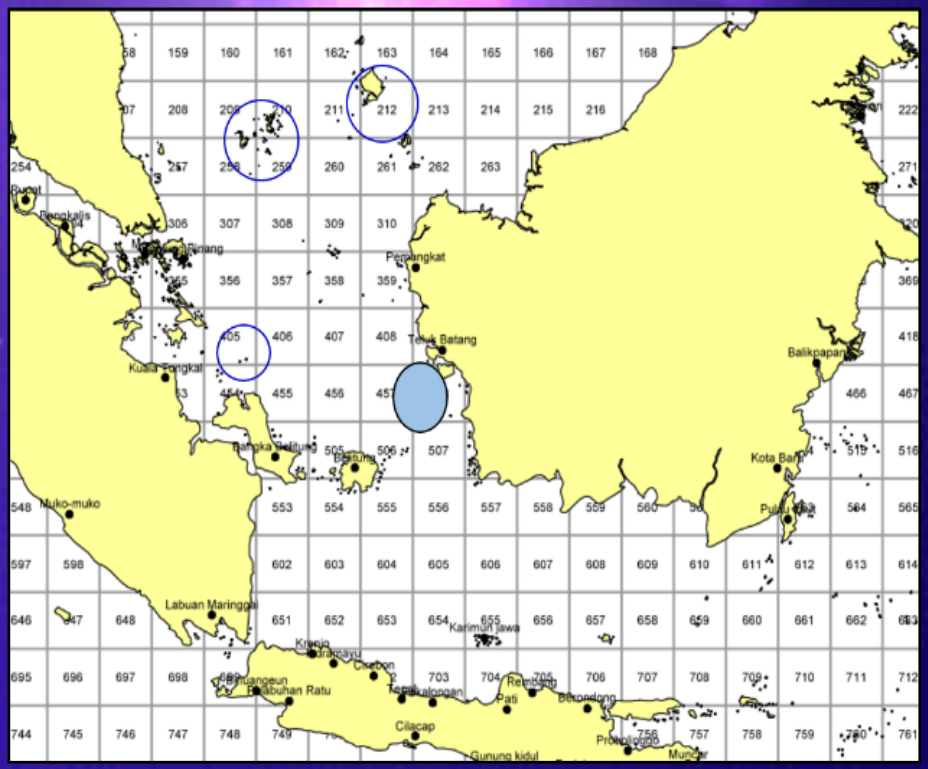
Selection of Superior Commodity of Small Pelagic (Squids)

Commodity	Production Value (In Billion Rupiah)	Price (Rp/Kg)	Marketing Area	Fish Ranking In Bangka Belitung Islands Province	Commodity Ranking of Superior Small Pelagic Fish
Squid	136.7	70,000	1	6	1
Sardine	126.8	25,000	2	9	2
Anchovy	59.3	60,000	2	12	3
Japuh	143.5	8,000	1	13	4
Mackerel	63.9	45,000	2	14	5
Siro	60.7	3,000	1	20	6

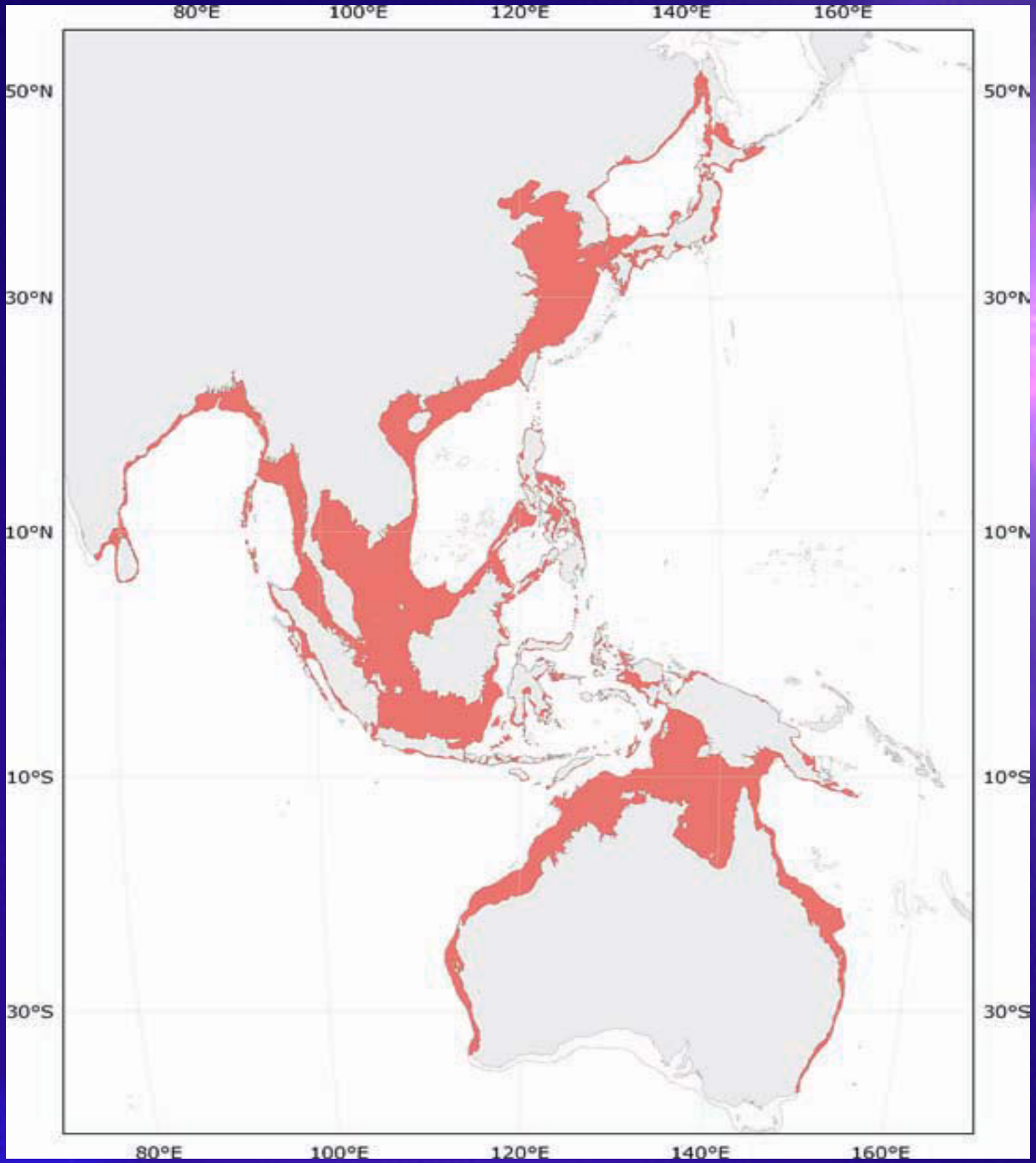
Exp. Marketing Area: 1 = local; 2 = national; 3 = international

Characteristics of the Selected Superior Small Pelagic Species (Squid)



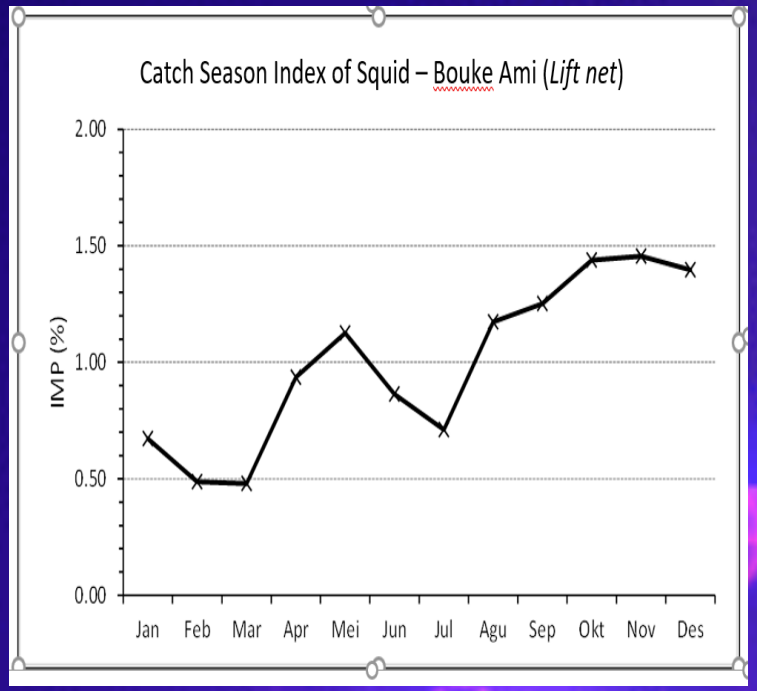


Map of fishing area of small pelagic fish and squids

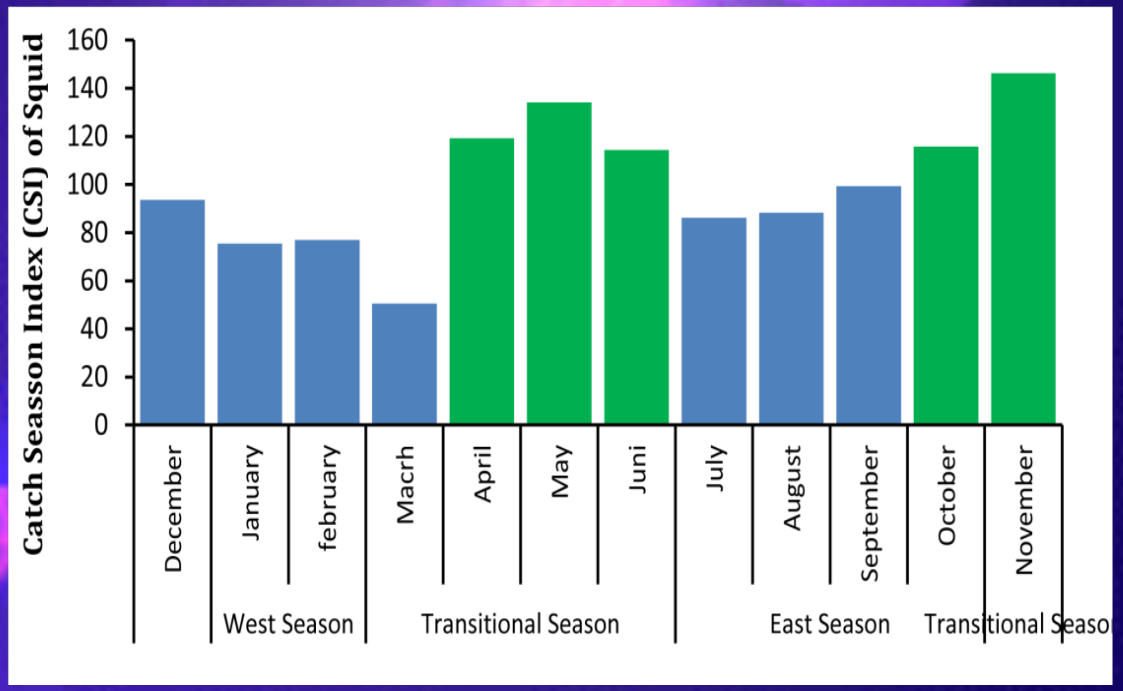


Distribution of *Uroteuthis chinensis* (Jereb et al., 2010).

Abundance and Seasons

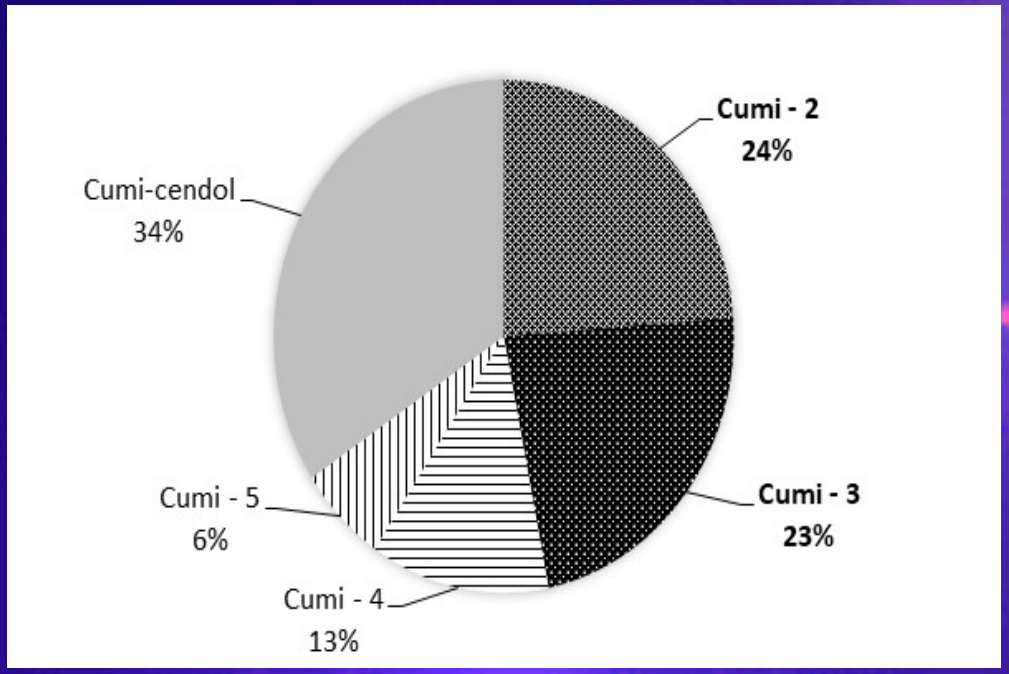


Fluctuations of the Abundance Index (CPUE) and Catch Season Index (IMP)



Catch season index of squids in fishing ground in Bangka-Belitung Waters

The Sizes of squids that are caught and utilized



Composition of squids according to size category landed at Muara Angke, Jakarta in 2019

Category of big size, consisting of:

1. **Squid-2, that is 2 layers in each pack;**
2. **(Squid-3, that is 3 layers in each pack;**
3. **Squid-4, that is 4 layers, and**
4. **Squid-5, that is 5 layers in each pack.**

Cathegory of small sizes called "*cendol*", consisting of:

(5)Squid B;

(6)(Squid A or more popular with the term "*cendol*" or Squid Ck, and;

(7)Squid CB,

Other categories are consisting of:

REGULATION CENCERNING MANAGEMENT AND CONSERVATION

1. **Conservation Area of the waters of East Belitung Regency. This area is at 124,000 ha in width and has the potential area for napoleon fish and turtle. This area was established based on the Decree of the Minister of Marine Affairs and Fisheries.**
2. **Conservation area in the waters of Belitung Regency. This area is at 662,984 ha in width and has the potential area for dolphins. This area was established based on the Decree of the Head of Belitung Regency number 188.45/156.A/Kep/DKP/2014.**
3. **Marine Protected Areas (DPL) of West Bangka Regency. The marine protected area is at 2,161.7 ha in width and has the potential as the area for barking snails. This area was established based on the Decree of the Head of West**

REGULATION CENCERNING MANAGEMENT AND CONSERVATION

4. **Marine Protected Areas (DPL) of South Bangka Regency. This protected marine area is at 186 ha in width and has the potential as the area for barking snails. This area was established based on the Decree of the Head of South Bangka number 188.45/119.4/DKP/2012.**
5. **Conservation area in the waters of Central Bangka Regency. This area is at 10,918 ha in width. This area was established based on the Decree of the Head of Central Bangka Regency.**
6. **Conservation area of fisheries in Bangka Regency. This area is at 9,809 ha in width and has established based on the Decree of the Head of the Province of Bangka Belitung Islands number 178.44/799/DKP/2018 regarding Squid protected area. This area is to protect the habitat**

AFTERWORD

\Conclusion

- West Kalimantan

1) The waters of Padang Tikar, Teluk Batang and Ketapang can be chosen as the prospective shrimp refugia areas at juvenile phase/stage in the nursery ground.
2) The type of preserved shrimp is *Fenneropenaeus indicus* (local name: *wangkang* shrimp)

AFTERWORD

\Conclusion

- Bangka – Belitung Islands

1) The squid is one of fishery commodities that is strategic in the Province of Bangka Belitung Islands, exploited extensively and its status in the waters of Bangka Belitung and Karimata Straight at the level of over exploited.
2) The squid resources have been managed by managing catch effort stipulated in Ministerial Decree Number 50 of 2017 regarding the number of catches allowed (JTB) .The management attempt conducted by the government is to reserve conservation areas for squid fishery at 9,809 ha in width, around the coastal area of Tuing, Bangka Regency in order to protect squid spawning areas.
3) Both mature and juvenile squids in the waters around Bangka Belitung have been exploited by the fishing trawls. The squid catching is performed all year round, either using squid jig, nets, trawls, so that squid lifecycle is disturbed. In order to avoid the growth overfishing caused by the catching of squid juveniles, the recruitment overfishing due to the catch of egg laying broodstocks, the management of squid resources should be implemented by considering important stages in squid lifecycle (fisheries *refugia*).

FURTHER ACTIONS

\West Kalimantan:

1. Conducting studies relating to the areas and spawning season.
   - It still needs biology data and shrimp fishery including individual size of shrimp (to decide on the size when caught for the first time and when spawning for the first time), spawning season and spawning area, tendency of yield of catch per unit of effort based on types of fishing gears in nursery ground and shrimp fishing area.
   - To get information about critical habitat of migration pathways and the habitat of shrimp pawning through interviews and with the assistance of Map of West Kalimantan Coast.
2. Deciding on the prospective of refugia area and disseminating to the stake holders (Local/Regional Government and local fishermen).
3. Analyzing *Fenneropenaeus* spp DNA.
4. Analyzing the composition of the catches of *F.indicus* and *F.merquensis* using bottom trawl and trammel net.
5. Encouraging Local Government to draw up regulations concerning the decision on prospective refugia area.

FURTHER ACTIONS/FOLLOW UP

\Bangka Belitung Island:

To support refugia-based squid management, further study about the most dominant species of squid, *Uroteuthis chinensis* is needed, in particular concerning:

1. Determination of the lifecycle of the squid/spawning area
2. Squid distribution based on size and lifecycle
3. Distribution of size and gonad maturity level
4. Important habitat of squids in their respective stages of life

Terima Kasih
THANK YOU