



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

**REVIEW ON PROVINCIAL AND NATIONAL REGULATIONS OF
FISHERIES AND MARINE SPATIAL MANAGEMENT IN INDONESIA**

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I. INTRODUCTION

As the world's largest archipelago country, Indonesia has tens of thousands of islands with a total area of about 7.81 million km² and a coastline of 108,000 km. Behind this potential, the use of marine resources and space raises various problems. It threatens Indonesia's fish resources, including overfishing, unsustainable fishing practices, climate change, massive development of coastal areas, marine pollution, conflicts of interest between sectors in the use of marine space, and degradation of coastal and marine ecosystems. The various threats to fish resources require management measures that regulate the use of fish resources and their marine space.

One of the fisheries management approach in the world is fisheries refugia. The fisheries refugia approach is related to the sustainability of the availability of fish and shrimp resource stocks in certain areas which is focused on the relationship between the life cycle of fish and shrimp and important habitats in nursery grounds, spawning grounds, and fishing grounds. According to UNEP (2006), this concept is based on a zoning approach in fisheries management through habitat improvement and efforts to minimize the influence of fishing on fish and shrimp stocks that have economic and strategic value in certain habitats that play a role in their life cycle.

Fisheries management measures in Indonesia have long been familiar with the components of fisheries refugia. These measures are revealed from various regulations governing the utilization and management of fish resources in Indonesia, such as marine spatial planning, fisheries management plans, management of coastal areas and small islands, and regulation of the use of fishing gear and total allowable catch. The policy regulations are prepared and rolled out to ensure the community's welfare and the sustainability of existing resources. This report will explain several regulations relating to fisheries refugia, especially in FMA 711 as part of the project activities "Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand", covering the waters of West Kalimantan and Bangka Belitung.

II. OVERVIEW

a. Fisheries Management in Indonesia

In general, fisheries management mainly aims to keep stocks in optimal conditions and can be harvested sustainably by maintaining pressure due to fishing through fisheries management (Hilborn et al., 2005; Melnychuk et al., 2017). Sustainable fisheries can occur only with healthy and effectively managed fish stocks (Mora et al., 2009). Therefore, the role of institutions is very important (Adrianto et al., 2011; Hilborn et al., 2005; Melnychuk et al., 2017). In the institutions, the governance tools, besides other basic aspects (human resources, technical and planning capabilities, and financial management), are developed to ensure that the selected policies can be implemented and have the expected impact (cf. Amblard & Mann, 2011; Theesfeld et al., 2010).

Indonesia's marine waters have a large area with diverse biological, ecological, social, and economic characteristics and are divided into 11 Fisheries Management Areas (FMA) (based on the Regulation of the Minister of Marine Affairs and Fisheries No. 18 / Permen-KP / 2014 concerning the Fisheries Management Area of the Republic of Indonesia (FMARI). This measure is taken to optimize management in the framework of sustainable fisheries. In determining 11 FMA, Indonesia refers to the fishing area designated by FAO; fishing area 57 (Indian Ocean, Eastern) and fishing area 71 (Pacific, Western Central).

The Ministry of Marine Affairs and Fisheries, with academics and scientists, also assessed the potential estimation, the total allowable catch, and the exploitation rate in each fish group, following the characteristics of each FMA. Management measures in each FMA can then be carried out based on the potential and exploitation rate of fish resources and problems related to them by involving all stakeholders under their respective roles.

b. Marine Spatial Management in Indonesia

Referring to Law No.32 of 2014 concerning Marine Affairs, which was then integrated into the 2020 Job Creation Law, it was stated that marine space management includes planning, utilizing, supervising, and controlling marine space. Spatial planning in the territory of Indonesia is administratively divided into national, provincial, and district/city spatial plans (Law No. 26 of 2007 concerning spatial planning). It is explained in detail by the Law of the Republic of Indonesia on Marine Affairs no. 32 of 2014 concerning Marine Affairs and Law No. 27 of 2007 jo. Law Number 1 of 2014 concerning The Management of Coastal Areas and Small Islands, that marine spatial planning can include national marine spatial planning, Marine area zoning planning, and coastal areas and small islands zoning planning.

Marine spatial planning produces marine spatial plans and/or zoning plans to determine the structure of marine space, marine space patterns, and the migration route of marine life. The structure of marine space is the arrangement of marine growth centres and a network system of marine infrastructure and facilities that support the community's socio-economic activities, which hierarchically have functional relationships. Marine spatial patterns include public use areas, conservation areas, marine flows, and certain national strategic areas. Marine space planning is used to determine areas used for economic and socio-cultural purposes, i.e. fisheries activities, marine transportation infrastructure, maritime industry, tourism, settlements, and mining; to protect the sustainability of Marine resources; and to determine the waters used for shipping lanes, submarine cable pipelines, and marine life migration.

Utilization of marine space is carried out through:

- o implementation of the suitability of Marine space utilization activities (SMSUA);
- o SMSUA data management; and
- o delegation of authority for the implementation and management of SMSUA data

Control of the use of marine space is carried out through the implementation assessment of SMSUA, assessment of the realization of spatial plan or zoning plan, provision of incentives and disincentives, imposition of sanctions and fulfilment of Spatial Planning disputes. Supervision is carried out through auditing, reviewing, monitoring, evaluation, and reporting actions.

c. Fisheries Refugia

The fisheries refugia is defined as "spatially and geographically defined marine or coastal areas in which specific management measures are applied to sustain important species [fisheries resources] during critical phases of their life-cycle, for their sustainable use (UNEP, 2006). The fisheries refugia concept is integrated management between fish stocks and their habitats that is applied to certain areas and focuses on the relationship between the life cycle of fish and these habitats for the sustainability of fish stocks (UNEP, 2007).

The concept of fisheries refugia is based on a region-based or zoning approach to fisheries management that aims to maintain the habitat of fish resources as well as minimize the effect of fishing on fish stocks in the area and at a critical time for their life cycle. Fisheries refugia is a support/complement to the concepts of fish resource management and conservation that have developed so far. The implementation of this concept will produce an area that is geographically and spatially an important / critical area in an early life cycle of fish resources (early life cycle) as a fisheries refugia area (SEAFDEC, 2006; Paterson., et al., 2013).

The approach taken to identify fisheries refugia areas of certain species can be accomplished in two ways:

1. conduct a study or research on the spawning area of the target species. Information regarding the spatial dynamics of fish populations, oceanographic features, fish behavior, and the dynamics of fishing efforts is used to determine the location and optimum size of spawning grounds.
2. conduct studies of coastal areas as potential refugia areas for fish in the juvenile/pre-recruitment stage. Juvenile refugia areas aim to reduce the impact of overfishing and can be identified using information regarding the composition of the catch and the size of small-scale and commercial fisheries operating in or adjacent to the site.

Fisheries refugia is not a no-take zone but is an area that can be managed sustainably and at a certain time must be closed (closed season) for the benefit of recruitment and survival of certain species of fish resources (SEAFDEC, 2006; Paterson., et al., 2013).

The effectiveness of fisheries refugia will largely depend on the selection and suitability of implementing management measures within the fisheries refugia area. As for the process of forming fisheries refugia should aware to:

- o Life cycle of target species at refugia sites
- o Targeted species associated with protection/refugia under development,
- o The location of natural refugia located in nature and the location suitable for the development of artificial refugia
- o Competency of national and regional in the implementation of management measures and spatial approaches to resource management and planning

Characteristics of Fisheries Refugia

1. It is not a "no-take zone";
2. Have a goal for sustainable use for the benefit of current and future generations;
3. Provide closed areas within the refugia because critically important to the life cycle of a species or group of species;
4. Focus on critical areas that are important in the life cycle of fish, including spawning and nursery areas;
5. Have different characteristics according to their goals (species, management measures);
6. Have a management plan.

Management measures implemented in the refugia area:

1. Exceptions to certain methods or fishing gear, especially those that are at risk of damage (push-net, demersal trawl);
2. Setting the specifications of the fishing gear (mesh size);
3. Restriction of ship size/engine capacity;
4. Seasonal closures during critical periods (spawning seasons);
5. Seasonal restrictions include using certain fishing gear that can catch larvae/juveniles.
6. Restrictions on access and application of rights-based approaches to small-scale fisheries.

III. REGULATIONS RELATING TO FISHERIES REFUGIA

A. Fisheries Management Plan-FMP

The Fisheries Management Plan (FMP) is determined based on the Fisheries Management Areas of the Republic of Indonesia (FMA) and/or fish species. FMA, which is established through the Regulation of the Minister of Maritime Affairs and Fisheries No. 18 / PERMEN-KP / 2014, is a fisheries management area for fishing, fish farming, conservation, research, and development of fisheries covering inland waters, archipelagic waters, territorial seas, additional zones, and exclusive economic zones of Indonesia.

There are currently 11 FMA in marine waters (Figure 1):

- FMA 571 covers the waters of the Strait of Malacca and the Andaman Sea,
- FMA 572 covers the waters of the Indian Ocean west of Sumatra and the Sunda Strait
- FMA 573 covers the waters of the Indian Ocean south of Java to the south of Nusa Tenggara, the Sawu Sea, and the western Timor Sea,
- FMA 711 covers the waters of the Karimata Strait, the Natuna Sea, and the South China Sea.
- FMA 712 covers the waters of the Java Sea
- FMA 713 covers the waters of the Makassar Strait, Bone Bay in the east of Sulawesi, the Flores Sea, and the Bali Sea.

- FMA 714 covers the waters of Tolo Bay and banda sea;
- FMA 715 covers the waters of Tomini Bay, Maluku Sea, Halmahera Sea, Seram Sea, and Berau Bay.
- FMA 716 covers the waters of the Sulawesi Sea and the north of Halmahera Island;
- FMA 717 covers the waters of Cenderawasih Bay and the Pacific Ocean;
- FMA 718 covers the waters of the Aru Sea, the Arafuru Sea, and the Eastern Timor Sea.

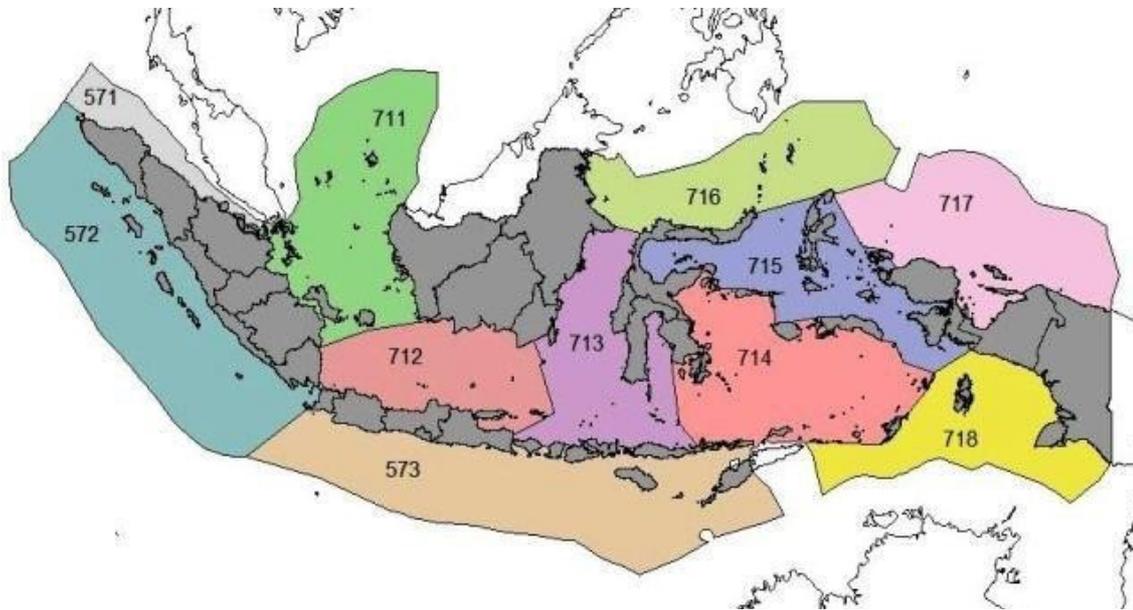


Figure 1. Fisheries Management Area of the Republic of Indonesia

Based on the Regulation of the Minister of Maritime Affairs and Fisheries No. 22 of 2021 concerning the Preparation of Fisheries Management Plans (FMP) and Fisheries Management Institutions in the Fisheries Management Area of the Republic of Indonesia, the fish species as the basis in determining FMP include: a. the fish that have important economic value; b. the fish included in the CITES appendix list; c. protected fish; d. endemic fish species; and/or e. endangered fish species.

The preparation of the RPP is carried out based on the principle of:

- benefit;
- fairness;
- adaptive;
- detailed;
- measurable;
- realistic;
- Ecosystem Approach to Fisheries Management;
- precautionary;
- notice on customary law;
- notice on local wisdom; and
- community participation.

FMP is carried out based on the fisheries status: fish resources, fish resource environment; fisheries socio-economic, and fisheries governance. The status of fish resources includes: 1) potential estimation of fish resources; (2) the total allowable catch; (3) the exploitation rate of fish resources; and (4) the allocation of fish resources. The fish resource environment is a marine ecosystem that includes coastal ecosystems, and/or marine ecosystems that support the

abundance of fish resources. The socio-economic of fisheries includes the level of fishermen's welfare, customs, local wisdom, social conflicts, level of education, ownership of fishing facilities, and the availability of fishing infrastructure. Fisheries governance includes fisheries management rules, compliance with fisheries regulations, and fisheries management institutions.

Fisheries management in the waters of West Kalimantan and Bangka Belitung which are included in FMP 711, is regulated in the FMP of FMA of Republic of Indonesia 711. The fisheries management plan in FMA 711 is regulated through the Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia No. 78 of 2016. The purpose of this regulation is as a direction and guideline for the Government, local governments, and stakeholders in the implementation of fish resource management and their environment in FMA

711. The scope in the FMP includes the status of fisheries and the strategic management plan in FMA 711. The FMP review planned to be carried out in 2023, and the fisheries refugia concept is expected to be part of the management strategy in FMP 711.

The management with fisheries refugia approach has been aligned with existing fisheries management plans, where most of the information needed in management with a fisheries refugia approach is also needed in fisheries management plans, such as fisheries status, fish resource environment (linkage with ecosystems), fishing technology, socio-economic conditions, governance, and stakeholders. Management with fisheries refugia emphasizes the management of fish stocks in its critical phase, such as juvenile and mature stages, where both stages have not been accommodated in the FMP FMA 711 of 2016.

B. Estimated Potential, Total Allowable Catch, and Exploitation Rate

The estimation of the potential, the total allowable catch, and the exploitation rate of each fish group are determined in accordance with the characteristics of each FMA, with the latest regulations related to this being determined through the Decree of the Minister of Maritime Affairs and Fisheries Number 19 of 2022 concerning Potential Estimation, Total Allowable Catch, and Exploitation Rates of Fish Resources in the Fisheries Management Area of the Republic of Indonesia. Management actions in each FMA are carried out based on the potential and exploitation rate of fish resources and problems related to fish resources by involving all stakeholders in accordance with their respective roles.

The determination of the potential and number of catches allowed as policy material in responsible fisheries management in fisheries management areas of the Republic of Indonesia is recommended by the National Commission for the Assessment of Fish Stocks which is in charge of providing input and / or recommendations to the Minister of Marine Affairs and Fisheries through the collection and review of the results of research / assessment of fish resources from various sources, including the best scientific evidence available (Regulation of the Minister of Maritime Affairs and Fisheries No. PER.16 / MEN / 2012 which has been changed to Regulation of the Minister of Maritime Affairs and Fisheries No. 30 / PERMEN-KP / 2016).

These recommendations on fisheries potential and the total allowable catch (TAC) will then be used by the Ministry of Marine Affairs and Fisheries as one of the basis for fisheries management policies in each FMA. The latest recommendations from the national commission related to the potential, TAC, and status of fisheries in each FMA have been stipulated in the Decree of the Minister of Maritime Affairs and Fisheries No. 19 of 2022 concerning Potential Estimation, TAC, and Exploitation Rate of Fish Resources. This decree is the basis for policies for fisheries management, especially for the determination of quotas/allocations for fish resource utilization in each FMA.

Fish resources in Indonesia's territorial waters are one of the biological resources that are more than enough to fulfil national needs, and even have the opportunity in supplying and serving global needs. The sustainable potential of Indonesia's marine fish resources as stipulated by the Decree of the Minister of Maritime Affairs and Fisheries No. 19 / KepmenKP / 2022 is estimated at 12.01 million tons spread across waters and jurisdictional areas, consisting of small pelagic fishes 4.19 million tons, large pelagic fishes 2.97 million tons, demersal fishes 3.29 million tons, reef fishes 829 thousand tons, penaeid shrimps 392 thousand tons, lobsters 13 thousand tons, crabs 40 thousand tons, blue swimming crabs 57 thousand tons, and squids 221 thousand tons.

Ministerial Decree No. 19 of 2022 concerning Potential Estimation, TAC, and Exploitation Rate of Fish Resources in FMARI states the estimation of fish resource potential in FMA of Republic of Indonesia (Table 1). The waters of West Kalimantan and Bangka Belitung (proposed fisheries refugia areas) which are part of FMA 711 have the third largest fishery potential after FMA 718 and FMA 573. The potential in FMA 711 for Penaeid shrimps which is the target of fisheries refugia management is 71,810 tons and squids is 32,369 tons.

Table 1. Estimation of fish resource potential in FMA of Republic of Indonesia

FMA		Small pelagic fishes	Large pelagic fishes	Demersal fishes	Reef fishes	Penaeid shrimps	Lobsters	Crabs	Blue swimming crabs	Squids	Total
FMA 571	Potency (Tons)	157,151	75,095	230,000	34,518	47,610	477	10,870	2,906	32,511	591,138
FMA 572	Potency (Tons)	479,503	438,877	204,500	33,429	35,560	2,722	6,787	2,533	26,039	1,229,950
FMA 573	Potency (Tons)	624,366	354,215	299,600	23,725	8,514	1,563	585	3,750	22,124	1,338,442
FMA 711	Potency (Tons)	536,917	163,744	289,300	197,580	71,810	1,467	3,388	9,804	32,369	1,306,379
FMA 712	Potency (Tons)	275,486	145,863	358,832	71,526	83,820	1,481	7,360	23,508	66,609	1,034,485
FMA 713	Potency (Tons)	284,302	162,506	374,500	167,403	56,835	765	6,213	9,253	11,370	1,073,147
FMA 714	Potency (Tons)	222,881	370,653	292,000	121,326	6,472	724	1,758	4,705	13,460	1,033,979
FMA 715	Potency (Tons)	443,944	74,908	80,226	105,336	5,295	1,217	336	157	3,874	715,293
FMA 716	Potency (Tons)	197,012	176,382	215,900	24,909	6,705	1494	1470	265	1,908	626,045
FMA 717	Potency (Tons)	135,140	189,718	69,210	19,814	7,423	736	545	291	1,826	424,703
FMA 718	Potency (Tons)	836,973	818,870	876,722	29,485	62,842	1,187	1,498	775	9,212	2,637,564

Furthermore, after obtaining the estimated value of potential fish resources, TAC is determined. TAC is the large number of fish resources that can be fished in the fisheries management area of the Republic of Indonesia. Accurate data and information are needed about the availability of fish resources that can be accounted for scientifically and factually for each fishing ground. In addition, implementing the TAC principle must lead to international obligations in fisheries.

The TAC value is obtained from the estimated potential results divided by the exploitation rate (Table 2). The TAC value for the over-exploited group is 50% of the estimated potential that has been decided, the TAC value for the fully-exploited group is 70% of the estimated potential, and the TAC value for the moderate group is 90% of the estimated potential.

Table 2. TAC in FMA of Republic of Indonesia

FMA		Small pelagic fishes	Large pelagic fishes	Demersal fishes	Reef fishes	Penaeid shrimps	Lobsters	Crabs	Blue swimming crabs	Squids	Total
FMA 571	TAC (tons)	141,436	37,548	115,000	31,066	23,805	239	5,435	2,034	22,758	379,321
FMA 572	TAC (tons)	431,553	219,439	143,150	16,715	17,780	1,361	6,108	1,267	23,435	860,808
FMA 573	TAC (tons)	437,056	247,950	269,640	11,863	4,257	782	410	2,625	11,062	985,645
FMA 711	TAC (tons)	375,842	114,621	202,510	138,306	50,267	734	1,694	4,902	22,658	911,534
FMA 712	TAC (tons)	247,937	72,932	179,416	57,221	58,674	1,037	5,152	16,456	46,626	685,451

FMA 713	TAC (tons)	142,151	113,754	337,050	83,702	39,785	383	4,349	4,627	5,685	731,486
FMA 714	TAC (tons)	156,017	259,457	204,400	60,663	3,236	362	879	3,294	9,422	697,730
FMA 715	TAC (tons)	310,761	52,436	56,158	52,668	3,707	609	235	110	2,712	479,396
FMA 716	TAC (tons)	137,908	123,468	194,310	12,455	4,694	1046	1029	186	1,336	476,432
FMA 717	TAC (tons)	121,626	132,803	48,447	9,907	6,681	515	491	146	1,278	321,894
FMA 718	TAC (tons)	669,579	655,096	701,378	23,588	50,274	950	1,198	620	7,370	2,110,053

Table 2 shows that the TAC of fisheries resources in FMA 711 (including West Kalimantan Waters and Bangka Belitung Waters) is about 911,534 tons. The TAC for Penaeid shrimps (a targeted commodity in West Kalimantan) and the TAC for squids (a targeted commodity in Bangka Belitung) were 50,267 tons and 22,658 tons, respectively.

The exploitation rate of fish resources describes the exploitation level carried out on fish resources (Table 3). The value of the exploitation rate is obtained from the ratio between the current exploitation rate of fish resources (F actual) and the optimum exploitation rate of fish resources (F optimum). F optimum is the recommended fishing effort to achieve optimum utilization of fish resources or, more simply, the amount of fishing effort when TAC is reached. The actual F is the current fishing effort according to the recorded data.

Table 3. Exploitation Rate of Fish Resources in FMA of Republic of Indonesia

FMA	Small pelag	Large pelag	Demersal	Reef	Penaeid	Lobsters	Crabs	Blue swimmi	Squids
FMA 571	0.	1.	1.	0.	1.	1.	1.	0.	0.
FMA 572	0.	1.	0.	1.	1.	1.	0.	1.	0.
FMA 573	0.	0.	0.	2.	1.	2	0.	0.	1.
FMA 711	0.	0.	0.	0.	0.	1.	1.	1.	0.
FMA 712	0.	1.	1.	0.	0.	0.	0.	0.	0.
FMA 713	1	0.	0.	1.	0.	1.	0.	1.	1.
FMA 714	0.	0.	0.	1.	1	1.	1.	0.	0.
FMA 715	0.	0.	0.	1.	0.	1.	0.	0.	0.
FMA 716	0.	0.	0.	1.	0.	0.	0.	0.	0.
FMA 717	0.	0.	0.	1.	0.	0.	0.	1.	0.
FMA 718	0.5	0.9	0.6	1.07	0.86	0.97	0.85	0.7	1.2

The exploitation rate of fish resources is divided into three conditions: moderate, fully-exploited, and over-exploited. The exploitation rate value of squid in FMA 711 was moderate, and for Penaeid shrimp 0.6 was fully exploited. Moderate condition is obtained if the actual F ratio with the optimum F is below 0.5. The fully-exploited condition is obtained if the ratio of the actual F to the optimum F is 0.5 to below 1.0. The over-exploited condition was obtained if the actual F ratio with the optimum F was above or equal to 1.

C. Marine Spatial Plan or Zoning Plan

The mandate of Law 32/2014 concerning Marine Affairs (State Gazette of the Republic of Indonesia of 2014 No. 294, Supplement to the State Gazette of the Republic of Indonesia No. 5603) in Article 42 Paragraph 2 states that the management of marine space includes planning, utilization, supervision, and control. Marine spatial planning includes national marine spatial planning, coastal and small islands zoning planning, and marine area zoning planning (Article 43 Paragraph 1). Article 43 states that marine area zoning planning is a plan to produce a National Strategic Area Zoning Plan,

a Certain National Strategic Area Zoning Plan, and an Interregional Area Zoning Plan. The inter-regional area is a trans-provincial sea area that includes the sea, strait, and bay.

A zoning plan determines the direction of resource use for each planning unit, accompanied by the planning area's structure and spatial pattern determination. It contains allowed and prohibited activities and also activities that the community can only conduct after obtaining permission (Law no. 27 of 2007 jo. Law No. 1 of 2014 concerning the management of Coastal Areas and Small Islands). Following the mandate of laws and regulations, about 194 marine spatial planning documents are the central and provincial governments' responsibility and authority. The documents include the following:

- 20 Inter-regional areas zoning plans.
- 34 National strategic areas zoning plans.
- 106 Certain national strategic areas zoning plans.
- 34 Coastal and small islands areas zoning plans.

The zoning plan for coastal areas and small islands (RZWP3K) includes the land covering the administrative area of the sub-district in the coastal area; and towards the sea as far as 12 nautical miles measured from the coastline. The Zoning Plan for Coastal Zone and Small Islands aims to manage coastal areas and small islands in an integrated and sustainable manner to improve the community's welfare.

One of the inter-regional areas at the proposed fisheries refugia is the Natuna-North Natuna Sea, stipulated by Presidential Regulation Number 41 of 2021. The space allocation in the Natuna - North Natuna Sea Interregional Area is allocated for Public Utilization Areas, Conservation Areas, Sea Channels, and Certain National Strategic Areas. Public Use Areas consist of zones for capture fisheries, aquaculture, mineral and coal mining, oil and gas mining, and defense and security. Sea channels consist of submarine cable lines and submarine pipelines.

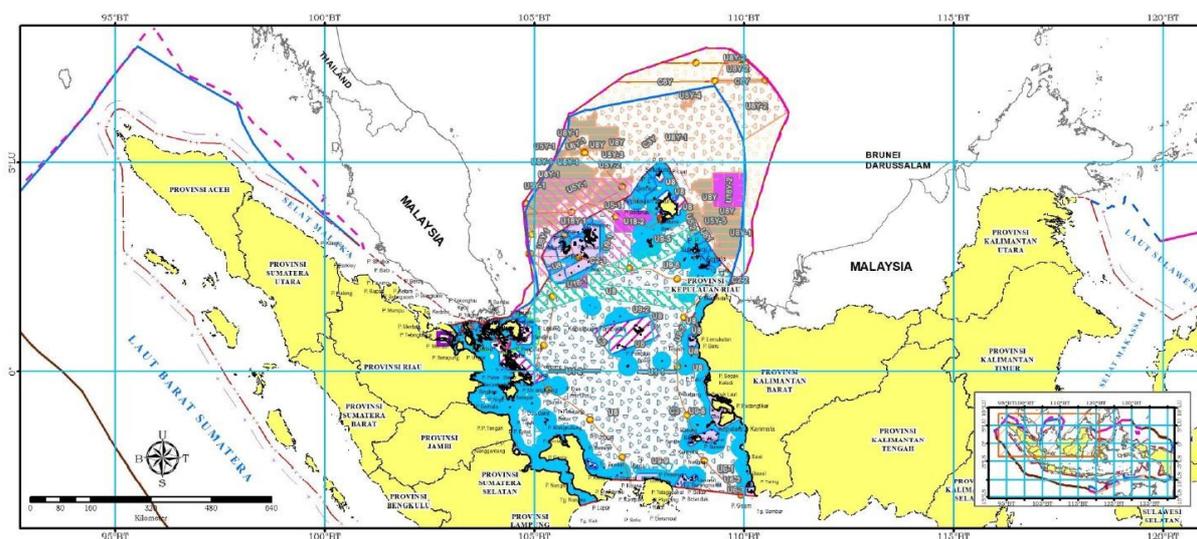


Figure 2. Spatial pattern map of the Natuna – North Natuna Sea inter-regional areas zoning plan

The term of the zoning plan is 20 years and can be reviewed every five years. The review can be carried out more than once in five years if there is a change in the strategic environment: a. Large-scale natural disasters stipulated by laws and regulations; b. Changes to the country's territorial boundaries determined by law; and/or c. Changes to regional boundaries determined

by law. A review in less than five years is carried out if there is a change in national policies and strategies that affect the use of provincial space.

The management of Indonesia's coastal areas and small islands are divided based on provincial authority. Two coastal areas of the province that are candidates for fisheries refugia areas are West Kalimantan and Bangka Belitung.

- The Province of West Kalimantan has issued a provincial regulation on the zoning plan for coastal areas and small islands (RZWP3K) for 2018-2038 (Provincial Regulation of West Kalimantan Province No. 1 of 2019).
- The Province of Bangka Belitung has issued a provincial regulation on the zoning plan for coastal and small islands in 2020-2040 (Provincial Regulation of Bangka Belitung Islands Province No. 3 of 2020).

The scope of the zoning plan for coastal and small islands in the Provinces of West Kalimantan and Bangka Belitung covers at least:

- a. planning area, timeframe, and function;
- b. policies and strategies;
- c. space allocation plan;
- d. program indication;
- e. direction of space utilization regulations;
- f. institutional;
- g. disaster mitigation;
- h. representative lawsuit;
- i. supervision and control of space utilization;
- j. rights, obligations, and community participation;
- k. investigation provisions;
- l. criminal provisions;
- m. coaching, monitoring, and evaluation;
- n. transition conditions.

The allocation of marine space in West Kalimantan Province consists of public use areas, conservation areas, and sea channels. Figure 3 shows the zoning plan for coastal and small islands in the spatial allocation map for the West Kalimantan Province. Table 4 shows the allocation, strategy, and spatial coverage of coastal areas and small islands in West Kalimantan Province.

Table 4. Space allocation plan, strategy, and spatial allocation for coastal areas and small islands in West Kalimantan Province.

Marine space allocations	Strategies	Coverage
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a. Public Utilization Areas;	<ul style="list-style-type: none"> • Improving law enforcement in the management and utilization of space and natural resources; • Develop capture fisheries and aquaculture activities by taking into account the sustainable potential supported by the improvement of the functions of the processing industry and the service industry of fishery products; • Developing potential and nature-based tourism; • Develop an integrated capture fisheries center that is environmentally friendly; • Developing ports to support transportation, defense, and security economy in coastal areas and small islands; • Plan, build, and develop facilities and infrastructure that are integrated with the area; and • Supervise and control the use of space in capture fisheries, aquaculture, tourism, ports, and 	<ul style="list-style-type: none"> a. Tourism Zone, b. Port zone, c. Mangrove Forest Zone, d. Capture Fisheries Zone, e. Culture Fisheries Zone
b. Conservation Areas	<ul style="list-style-type: none"> • Establishing coastal conservation areas and small islands by considering the sustainable potential; • Protect, conserve and rehabilitate coastal resources and small islands; • Improving the supervision and protection of protected biota; and • Increase supervision and/or control 	<ul style="list-style-type: none"> a. Marine Protected Area b. Coastal and Small Islands Conservation Areas
c. Sea Channels	<ul style="list-style-type: none"> • Develop shipping lanes by improving shipping lane security and safety services; • Improving supervision, security, and safety services on subsea pipelines and cables; and • Improve monitoring and protection of the migration route of protected biota 	<ul style="list-style-type: none"> a. Cruise-line and/or b. Subsea pipelines/cables

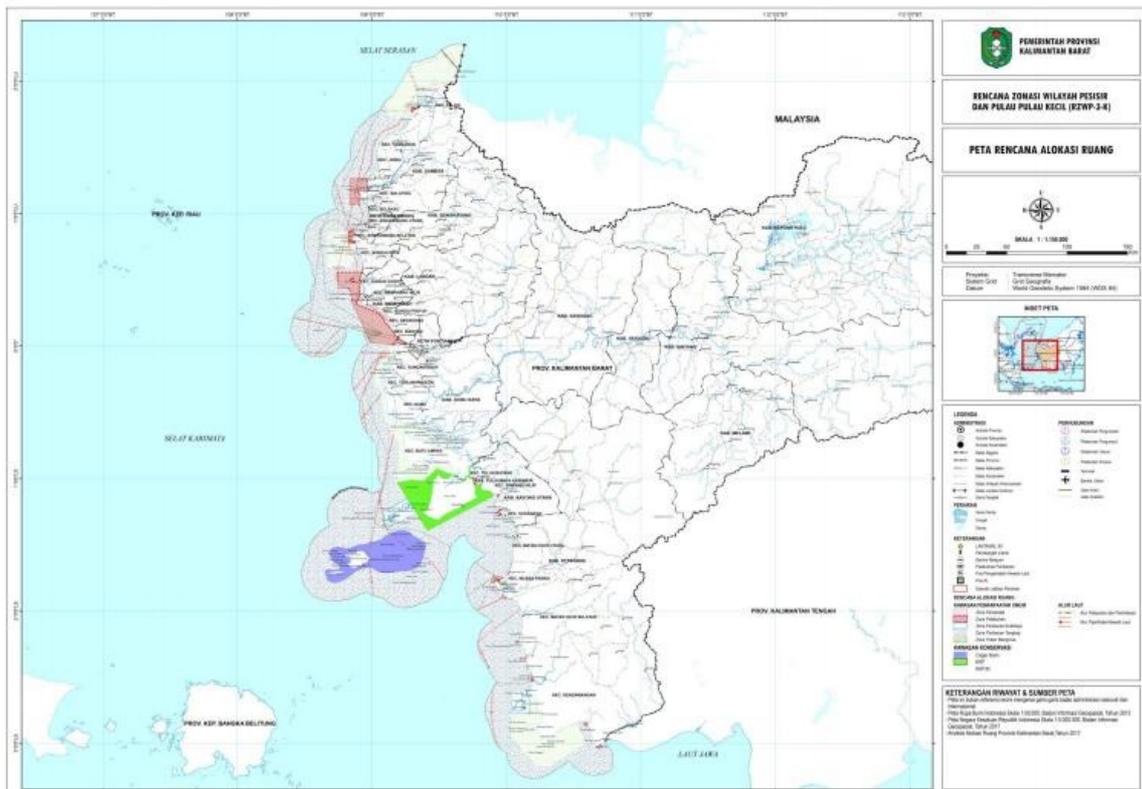


Figure 3. Map of spatial allocation for coastal and small islands zoning plans of West Kalimantan Province

Protection, preservation, and utilization of Penaeid shrimp (with an emphasis on the nursery area) fisheries in West Kalimantan before have been established based on the Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 89/KEPMEN- KP/2020 concerning Aquatic Conservation Areas of Kubu Raya and North Kayong Water Conservation Areas in West Kalimantan Province (Figure 4) and Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 92/KEPMEN-KP/2020 concerning the Coastal Conservation Area and Small Islands of Kubu Raya and the Surrounding Waters in West Kalimantan Province (Figure 5).

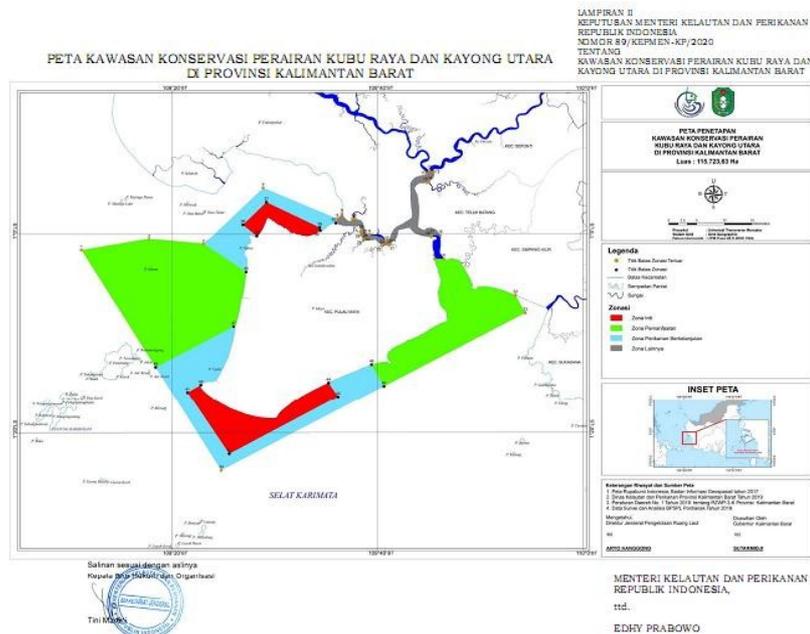


Figure 4. Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 89/KEPMEN-KP/2020 concerning Aquatic Conservation Areas in the Kubu Raya and North Kayong Water Conservation Areas in West Kalimantan Province.

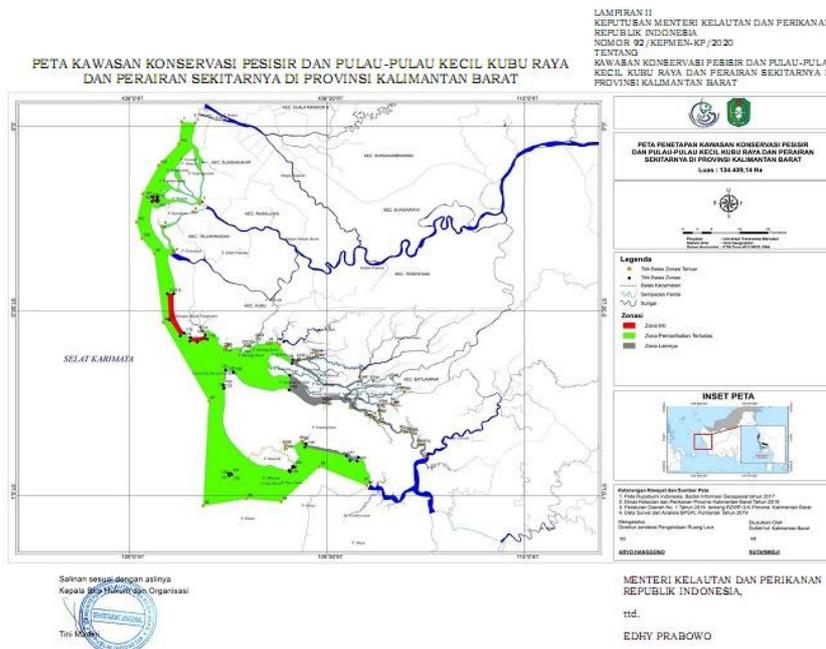


Figure 5. Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number 92/KEPMEN-KP/2020 concerning the Coastal and Small Islands Conservation Area of Kubu Raya and the Surrounding Waters in West Kalimantan Province.

Table 5 shows the spatial allocation plan, strategy, and spatial allocation of coastal areas and small islands in the Province of the Bangka Belitung Islands. The allocation of marine space in the Province of the Bangka Belitung Islands consists of public use areas, conservation areas, and sea channels. Figure 5 shows the spatial allocation map for the coastal and small islands zoning plans of Bangka Belitung Islands Province.

Table 5. Space allocation plan, strategy, and spatial allocation for coastal areas and small islands in Bangka Belitung Province.

Space allocation plan	Coverage	Strategies
a. Public use areas;	o Tourism Zone, o Port zone, o mining zone, o Aquaculture Zone, o Capture Fisheries Zone, Industrial Zone	Encourages business development in the Coastal and Small Islands Areas provide convenience in business in the Coastal and Small Islands Areas Accelerate the business process licensing in the Coastal and Small Islands Areas Consistent in the licensing with the established zoning plan Guide and supervise the spatial use in the Coastal and Small Islands Areas
b. Conservation areas; and	Marine Protected Area	monitor and evaluate the spatial use in the Coastal and Small Islands Areas.
c. Sea channels	a. Cruise-line b. Subsea pipelines/cables c. Marine biota migration route	

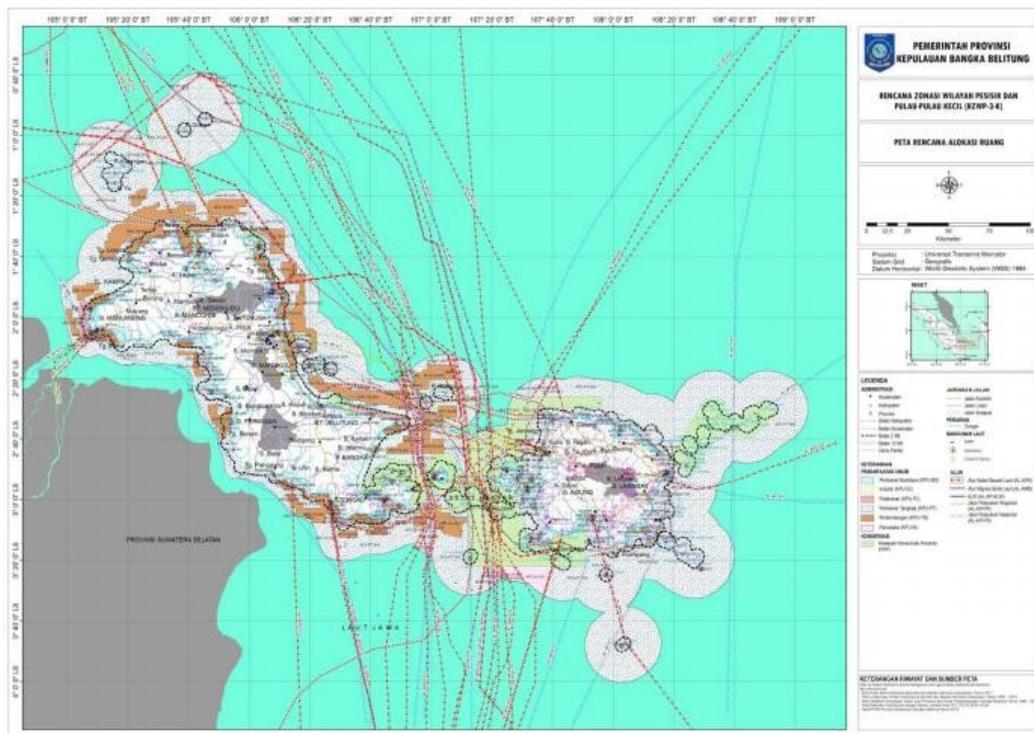


Figure 5. Map of spatial allocation for coastal and small islands zoning plans the Province of the Bangka Belitung Islands

Based on the Decree of the Governor of Bangka Belitung Islands No. 188.44/739/DKP/2018, one of the areas on the coast of Bangka Regency, is designated with a reserve status for the Waters Conservation Area of the Tuing Fishery Reserve Area. This area is reserved for the squid fishery reserve, a target commodity in the fisheries refugia area candidate of Bangka Belitung Province. The status of the reserved conservation area is encouraged to be a designated conservation area.

In general, the coastal and small islands' zoning plan is aligned with the management plan for the fisheries refugia area. Both in the coastal and small islands' zoning plans of the Province of West Kalimantan and the Bangka Belitung Islands, they have been regulated that the use of the coastal area and small islands of the province is allowed for activities that will be allocated to a space, and no influence and impact so that it does not have limitations in its implementation because they basis and function of the surrounding space are mutually supportive and related. The prohibited activities damage the environment and interfere with other activities in the surrounding area.

For example, in the capture fisheries zone in the coastal and small islands zoning plans of Bangka Belitung islands, it has been regulated that fishing activities using fishing gear are following regulations and fishing gears that damage the environment such as explosives, potash, and fishing gear that have the potential to damage the environment is not allowed. In the coastal and small islands zoning plans of West Kalimantan, the use of the Capture Fisheries Zone should be carried out sustainably, rationalizing fishing areas so that they are in the right location and season, do not overlap or interfere with fish spawning areas, develop environmentally friendly fishing gear technology, and apply post-catch cold chain technology to maintain the quality of the catch. Of course, a study with sufficient data and information is needed to strengthen sustainable use based on the zoning plan that has been determined. This goal is expected to be achieved through fisheries refugia activities.

D. Fisheries Resource Utilization

The regulation on the utilization of fisheries resources is stated in the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 18 of 2021 concerning the Arrangement of Fishing Equipment and Fishing Aids in the Fisheries Management Area of the Republic of Indonesia and the High Seas and the Arrangement of Fishing Andon. This regulation was issued by the Ministry of Marine Affairs and Fisheries to revise the four previous regulations:

1. Regulation of the Minister of Marine Affairs and Fisheries No. 26 of 2014 concerning FADs.
2. Regulation of the Minister of Marine Affairs and Fisheries No. 25 of 2020 concerning Fishing Andon.
3. Regulation of the Minister of Marine Affairs and Fisheries No. 59 of 2020 concerning Fishing Routes and Fishing Equipment in the Fisheries Management Area of the Republic of Indonesia and the High Seas.
4. Ministerial Decree No. 06 of 2010 concerning Fishing Equipment in the Fisheries Management Area of the Republic of Indonesia.

This ministerial regulation regulates fishing routes, gears, and locations for fishing activities.

Fishing route

Chapter II in ministerial regulation No. 18 of 2021 regulates Fishing Route. The fishing route is a water area that is part of the fishery management area of the Republic of Indonesia and the high seas for regulating and managing fishing activities using permitted and/or prohibited fishing gear. FMA of RI consists of three fishing route categories:

- a. Fishing route I
 - Fishing route IA covers waters up to two nautical miles measured from the coastline outwards to the high seas and/or towards archipelagic waters; and
 - Fishing route IB covers waters outside the IA Fishing route up to four nautical miles.
- b. Fishing route II covers waters outside Fishing route I up to 12 nautical miles.
- c. Fishing route III covers waters outside Fishing route I and Fishing route II, including Indonesia's exclusive economic zone

Fishing routes are determined by considering the characteristics of the waters, divided into two, based on the depth of the waters: shallow waters (waters with a depth of at most 200 meters) and deep waters (waters with a depth of more than 200 meters). FMA 711, covering the waters of the Karimata Strait, Natuna Sea, and the South China Sea, is included in the shallow water category.

Fishing Equipment

This ministerial regulation also regulates the types of fishing gear that are allowed and prohibited in FMA 711, as stated in Chapter III. Types of fishing gear (API) that are allowed and prohibited are shown in Table 6. Even though it is allowed, fishing using allowed fishing gear still considers the allocation of fish resources.

Table 6. Types of allowed and prohibited fishing gear

No.	The types of fishing	Allowed fishing gears	Prohibited fishing gears

1.	Surrounding nets	1. small pelagic fish purse seines with single boat; 2. Large pelagic fish purse seines with single boat; 3. Anchovy purse seines; 4. small pelagic fish purse seines with two	
2.	Seine nets	1. Beach seines; 2. Border seines; 3. Payang seine nets; and 4. cod-end	1. Danish seines; 2. pair seines; 3. Boat seines;
3.	Trawls	1. cod-end shrimp trawls; and 2. Cod-end fish trawls	1. Beam trawls; 2. Bottom shrimp trawls; 3. Otter twin trawls; 4. Bottom pair trawls; 5.
4.	Dredges	1. Boat dredges; dan 2. Hand	
5.	Lift nets	1. portable lift nets; 2. Boat lift nets; 3. Stick Held Deep Net; and 4.	
6.	Falling gears	1. Cast nets; 2. Falling gear	
7.	Gillnets and Entangling Nets	1. set gillnets; 2. driftnets; 3. Encircling gillnets; 4. Fixed gillnets; 5. Trammel nets; dan 6. Combined	Aerial traps
8.	Traps	1. set net; 2. Pots; 3. Fyke pots; 4. Long bag set net; 5. Togo traps; 6. Ambai traps; 7. Tidal traps; 8. Pengerih	
9.	Hooks and lines	1. handlines; 2. Handlines tuna; 3. Hand operated; 4. Squid jigging; 5. Mechanized squid jigging; 6. Kite lines; 7. Pole and lines; 8. Mechanized pole and lines; 9. Set	
10.	Other fishing gears	1. harpoons; 2. spears; 3. arrows; 4. Push nets; 5. Scoopnets; dan 6. <i>pacangan</i>	Muroami

Types of fishing gear prohibited are fishing gears that interfere with and damage the sustainability of fish resources so can a. threaten the extinction of biota; b. influence habitat destruction; and/or c. risk user safety. In addition to fishing gear, a ban is also charged on fishing activities that destroy the sustainability of fish resources by using explosives, poisons, electricity, and/or other dangerous tools or materials. All fishing gear and activities that disrupt and damage the sustainability of fish resources are prohibited from operating in all FMAs of the Republic of Indonesia.

Locations of Fishing Activities

Article 8 in CHAPTER III prohibits fishing activities in critical areas such as spawning and nursery areas, shipping lanes, core zones of marine protected areas, marine biota migration routes, and other fishing areas as determined by the Minister. Identification of spawning and nursery areas is one of the main elements in fisheries management with the fisheries refugia approach, where fishing activities are limited at certain times (e.g., peak spawning season). Therefore, the concept of fisheries refugia is very aligned to support the regulation of fishing activities.

E. Supervision in the Utilization of Fish Resources

The regulation of the utilization supervision of fisheries resources is stated in the Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 47 of 2020 concerning the Implementation of Fisheries Supervision tasks. Supervision activities carried out on fisheries subjects include a. FMA; b. Fishing Vessels; c. Fishing Port and/or other designated port; d. Tangkahan Harbor; e. Fisheries Activity Center; f. fish hatchery area; g. Fish Cultivation area; h. Fish Processing Unit; and/or i. Conservation area.

In Chapter III, concerning the procedures for implementing supervision, it contains:

1. Supervision in the FMAs includes supervision of fishing activities, fish transportation and distribution, fish species protection, pollution, and utilization of germplasm. Supervision is carried out through patrols and monitoring of the movement of fishing vessels
2. Supervision of fishing vessels, includes: fishing, transporters, and fish processing vessels
3. Supervision in the conservation area covers the utilization of the conservation area, fish species, and fish genetics.

Furthermore, fisheries management oriented towards the sustainability of fish resources and the environment must provide business opportunities, investment certainty, justice, and welfare of fishermen and parties related to fisheries activities. Currently, Indonesia is starting to apply the Fishing Capture Based on Quota-Setting (*Perikanan Tangkap Terukur*) that will regulate zoning, quotas, and the distribution of catches. Fishing Capture Based on Quota-Setting is controlled fishing carried out in predetermined zones and based on fishing quotas to maintain the fish resources' sustainability, the environment, and even national economic growth. The existence of zoning in the Fishing Capture Based on Quota-Setting is suited to fisheries management with a fisheries refugia approach, which regulates zoning, especially for critical phase habitats of fish stocks (spawning and nursery areas).

IV. CLOSING

Fisheries refugia complement the management measures and conservation of fish resources developed so far in Indonesia. For its implementation, the fisheries refugia activities should be accommodated by the government in the Fisheries Management Plan (FMP), Zoning Plan, and/or Spatial Plan to ensure the continuity of the implementation of Fishery Refugia activities.

REFERENCES

- 1) Law No. 27 of 2007 jo. Law No. 1 of 2014 concerning the Management of Coastal Areas and Small Islands.
- 2) Minister of Marine Affairs and Fisheries Regulation No. 18/PERMEN-KP/2014 concerning Fisheries Management Areas of the Republic of Indonesia.
- 3) Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 47 of 2020 concerning the Implementation of Fisheries Supervision tasks.
- 4) Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 18 of 2021 concerning the placement of Fishing Equipment and Fishing Aids in the Fisheries

Management Area of the Republic of Indonesia and the High Seas and Arrangement of Fishing Andon.

- 5) Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 22 of 2021 concerning the Preparation of Fisheries Management Plans and Fisheries Management Institutions in the Fisheries Management Area of the Republic of Indonesia.
- 6) The Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 89/KEPMEN-KP/2020 concerning Water Conservation Areas in the Kubu Raya and North Kayong Water Conservation Areas in West Kalimantan Province.
- 7) Decree of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia No. 92/KEPMEN-KP/2020 concerning the Coastal Conservation Area and Small Islands of Kubu Raya and the Surrounding Waters in West Kalimantan Province.
- 8) Decree of the Minister of Marine Affairs and Fisheries No. 19 of 2022 concerning Potential Estimation, Total Allowable Catch, and Exploitation rate of Fish Resources in the Fisheries Management Area of the Republic of Indonesia.
- 9) Provincial Regulation of West Kalimantan No. 1 of 2019 concerning the zoning plan for coastal areas and small islands (RZWP3K) for 2018-2038.
- 10) Provincial Regulation of Bangka Belitung Islands No. 3 of 2020 concerning the zoning plan for coastal areas and small islands for 2020-2040.