



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

**NATIONAL GUIDELINES FOR ESTABLISHMENT AND OPERATION
OF FISHERIES *REFUGIA*: THAILAND**

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1. INTRODUCTION

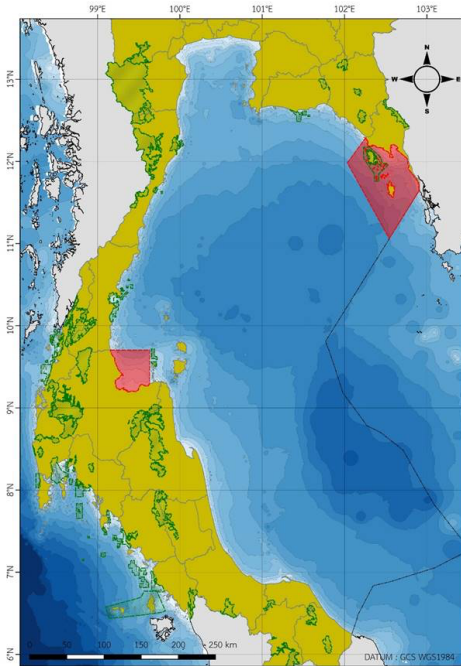


Figure 1-1 Fisheries *refugia* sites in Thailand

Thailand is one of the six countries participating in the project entitled “Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand”. Among fifteen priority fisheries *refugia* sites for project implementation in the region, two sites are located in Thailand – the coastal area of Trat Province in the east and the area around Koh Sed in Ban Don Bay of Surat Thani Province in the south (Figure 1-1).

Implementation of fisheries *refugia* project at the two sites in Thailand was initiated by the agreement between the Southeast Asian Fisheries Development Center and the Department of Fisheries of Thailand, signed in March 2017. National Fisheries *Refugia* Committee, National Scientific and Technical Committee, and Site-Based Fisheries *Refugia* Management Boards in Trat and Surat Thani were subsequently established as the framework of project management. Preliminary surveys were firstly conducted, followed by stakeholder initiation meetings in two sites. The project was further operated by decision-making, guidance, cross-sectorial coordination, technical provision, and community-led action by means of committee/board

meetings, along with stakeholder consultation workshops and technical consultation meetings.

Thailand has carried out the activities at two sites on the basis of fisheries *refugia* concept – “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 used”. Identification of fisheries *refugia* sites and priority species were conducted via decision-making mechanism of national and site-based management committees, as well as stakeholder consultations, which was based on the technical information concerning the context of each site. Work Plan for the achievement of the objectives in four components of project implementation was taken into consideration for development of fisheries *refugia* in Thailand.

These Thailand’s National Guidelines for Establishment and Operation of Fisheries *Refugia* were developed during the implementation of the regional project on Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand. They provide the concept of fisheries *refugia* with its goal and objectives, and the consecutive establishing processes which focus on fishery and ecosystem linkages. Apart from fisheries *refugia*, the information on marine fisheries of Thailand and their existing management schemes are also included in the Guidelines as the supplementary background.

These Guidelines build upon the activities executed under fisheries *refugia* project in Thailand which was based on the components in the project implementation, whereas the Royal Ordinance on Fisheries was regarded as the fundamental for management planning in fisheries *refugia* sites. They also prepared by taking guidance from “Regional Guidelines on the Use of Fisheries *Refugia* for Capture Fisheries Management in Southeast Asia” which is included in “Regional Guidelines for Responsible Fisheries in Southeast Asia”. The aim of these guidelines is being a framework for promotion and application of Fisheries *Refugia* as the alternative community-based and ecosystem-based fisheries management approach in Thailand.

2. MARINE FISHERIES OF THAILAND

2.1 Fisheries Production

Fisheries have played a highly important role in nutritional and economic aspects in Thailand as well as playing as a major source of foreign exchange by export of fishery products. Fish is one of the most significant sources of animal protein for most Thai people, having average annual per capita fish consumption at 33.73 kg in 2016. Thailand is one of the top fish producing nations in the world, with the total amount of 2.62 million tons of fisheries production, valued at 167,021 million baht, in 2020 with the major contribution, 56.2%, from marine capture fisheries (Figure 2-1). Nevertheless, during the past decade, the total production decreased 14 percent from 3.04 million tons in 2011 to 2.62 million tons in 2020 (Figure 2-2). For marine fisheries, the production mainly came from the area of approximately 420,000 km² within Thailand’s Exclusive Economic Zone along a coastline of about 2,600 km; about 75 percent of the production came from the Gulf of Thailand and the other 25 percent came from the Andaman Sea fishing grounds. Regarding marine capture fisheries, the main resources was food fish (53.8%), followed by trash fish (27.99%), squid & cuttlefish (6.8%), and so on (Figure 2-3).

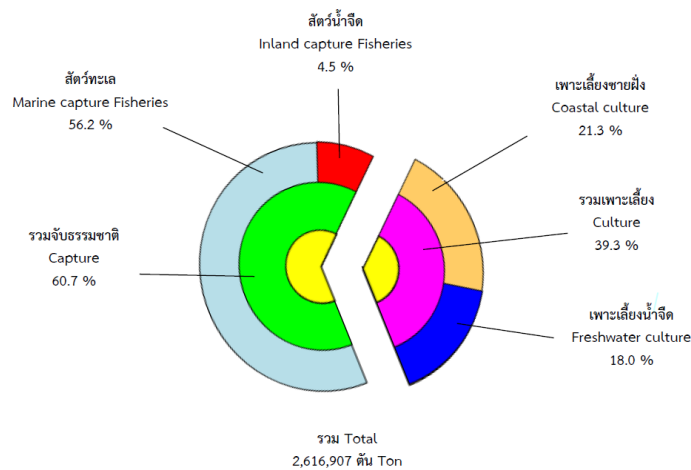


Figure 2-1 Fisheries production of Thailand by sub-sector: 2020
Source: Department of Fisheries (2022 a)

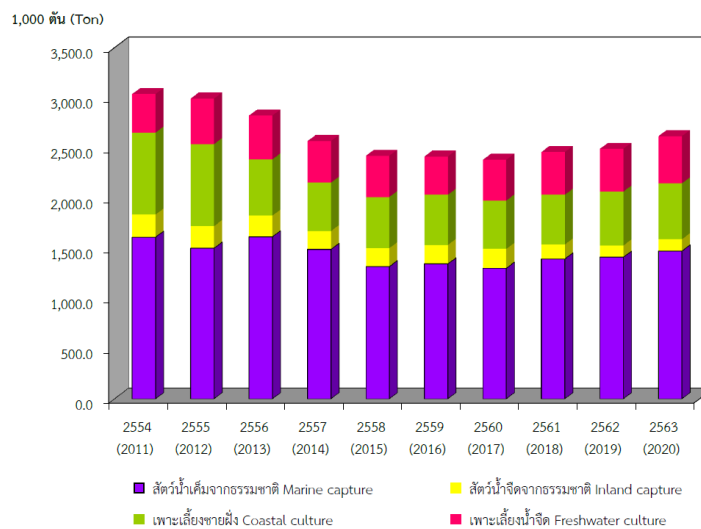


Figure 2-2 Fisheries production of Thailand by sub-sector: 2011-2020
Source: Department of Fisheries (2022 a)

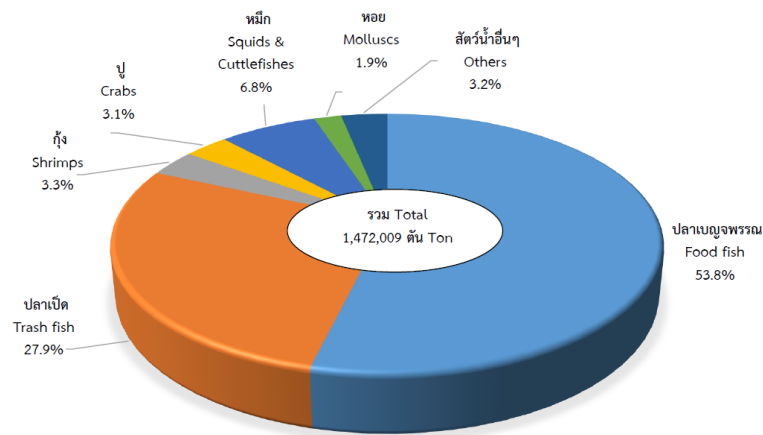


Figure 2-3 Composition of major species groups in marine capture production of Thailand: 2020
Source: Department of Fisheries (2022 a)

2.2 Marine Fishing Classification

Marine fishing in Thailand is classified into commercial fishing and small-scale (artisanal) fishing. According to the Royal Ordinance on Fisheries B.E. 2558 (2015), “commercial fishing” means fishing operations using a fishing vessel of a size from ten gross tonnage or with an engine of a horse power as prescribed by the Minister of Agriculture and Cooperatives, or using a fishing vessel with or utilizing fishing gears of the types, methods, the number of workers used, or natures of fishing as prescribed by the Minister of Agriculture and Cooperatives, including the using such fishing vessel to operate an aquatic animal processing, whether or not any fishing has also been conducted; whereas “small-scale (artisanal) fishing” means fishing operations in coastal seas in which a fishing vessel is used or in which a fishing gear is used without a fishing vessel, but in any case does not include commercial fishing.

Regarding fishing areas, “coastal seas” mean the seas lying within the Kingdom extending up to three nautical miles from the baselines; in light of exigencies based on purposes related to aquatic resource management, a Ministerial Regulation may be issued to determine the expanse of coastal seas in any area to cover a distance starting from the baseline shorter or further than three nautical miles as appropriate, but not less than one point five nautical miles nor further than twelve nautical miles. Offshore seas, defined in the Royal Ordinance, mean the seas located in the Kingdom beyond the coastal seas up to either the extreme bounds of the Exclusive Economic Zones of the Kingdom of Thailand, or the extreme bounds of the continental shelves under the sovereignty of the Kingdom of Thailand, the further boundary of either being the line to prevail.

2.3 Marine Fisheries Resources

With regard to the fisheries statistics of Thailand (Department of Fisheries, 2022 a), resources from marine fisheries are categorized into pelagic fish, demersal fish, crustaceans (shrimps & prawns and crabs), cephalopods (squid & cuttlefish and mollusks), other food fish, and trash fish; among those, pelagic fish dominates landings by volume and value. Dominant pelagic fish in the catches are anchovies (*Engrasicholina* spp. and *Stolephorus* spp.), trevallies (*Selaroides leptolipis*), sardines (*Sardinella* spp.), round scads (*Decapterus* spp.), mackerels (*Rastrelliger* spp.), bigeye scads (*Selar crumenophthalmus*), and tunas (*Thunnus* spp. and *Euthynnus* spp.). Landed demersal fish are mainly threadfin breams (*Nemipterus* spp.), lizard fish (*Saurida* spp.), bigeyes (*Priacanthus* spp.), and croaker. For crustaceans and cephalopods, dominant species are acetes (*Acetes* spp. and others), school prawn (*Metapenaeus* spp.), banana shrimp (*Penaeus merguensis*), blue swimming crab (*Portunus pelagicus*), squid (*Loligo* spp.), cuttlefish (*Sepia* spp.), and short-necked clams (*Paphia undulata*). A number of marine species have been estimated over-exploited, especially those of demersal groups.

2.4 Marine Fisheries Status

In terms of the status of marine fisheries resources in Thailand, standardized trawl surveys have long been regularly undertaken by the research vessels of the Department of Fisheries, resulted in the annual record of Catch per Unit of Effort (CPUE) since the early 1960s. In the Gulf of Thailand, the CPUEs decreased steadily from 1961 to 1990 indicating an early decline in the abundance of demersal fish in the area during a time of heavy fishing pressure that coincided with the introduction of trawling and then purse seining to Thailand. The CPUE in the Gulf of Thailand then plateaued out at a level that is recently only about 11% of the original one (Figure 2-4). In the Andaman Sea, CPUEs also declined steadily in the 1960s and that one was recently at the only about 20% of the value in 1966 (Figure 2-5).

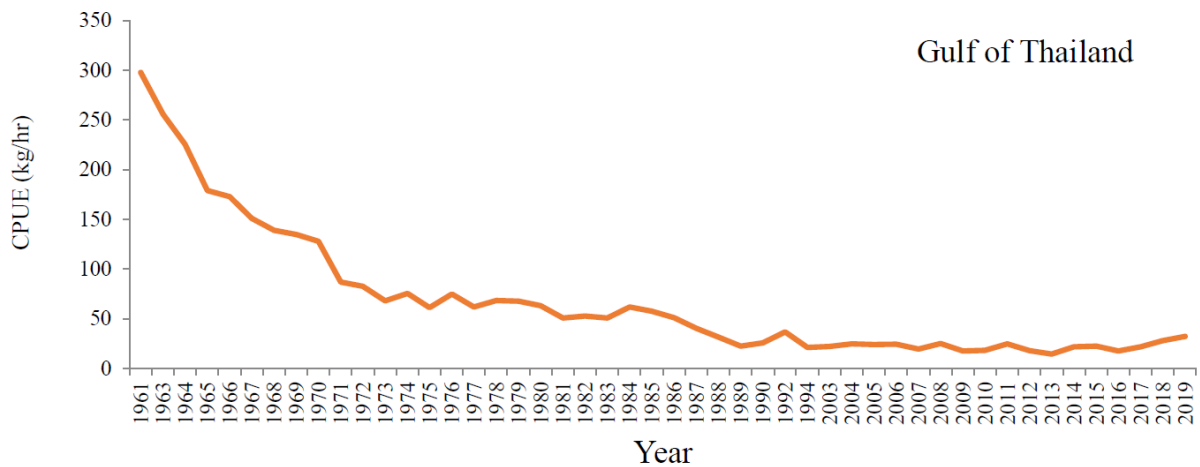


Figure 2-4 CPUEs of marine resources in the Gulf of Thailand: 1961-2019
Source: Department of Fisheries (2020)

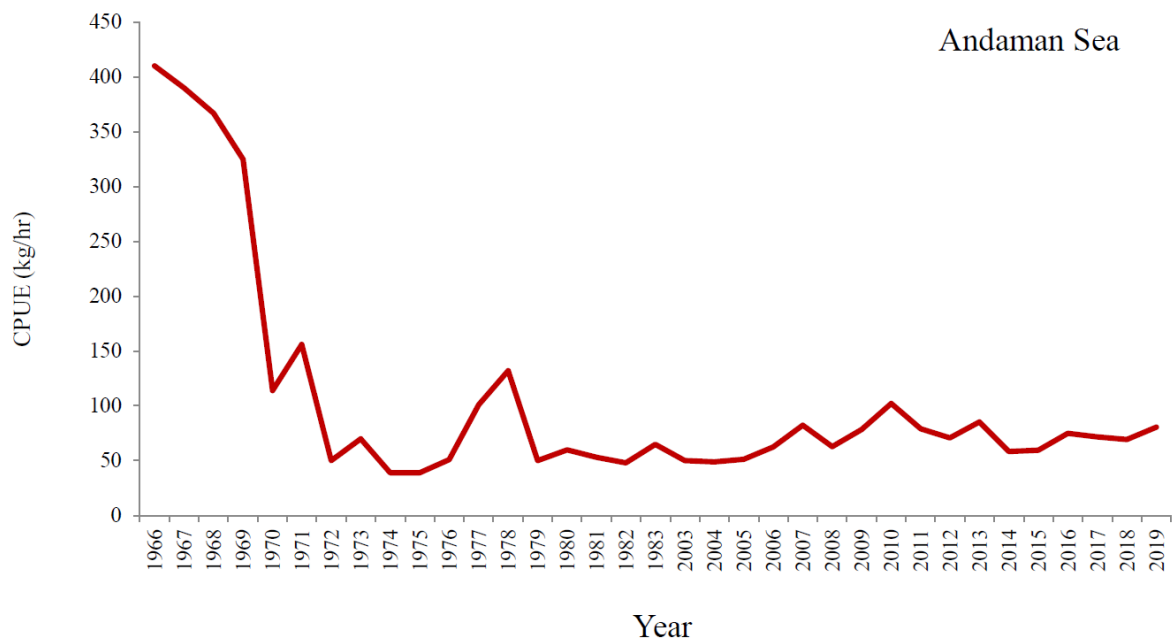


Figure 2-5 CPUEs of marine resources in the Andaman Sea: 1966-2019
Source: Department of Fisheries (2020)

2.5 Marine Fishing Fleet

With regard to fishing fleet profile of Thailand, there were the total of 60,713 fishing vessels registered as of 30th June 2022; they were composed of 50,639 small-scale fishing vessels (83.40%) and 10,074 commercial fishing vessels (16.60%), the majority of which (74.56%) was the small-scale fishing vessels of a size not over 5 gross tonnage (Figure 2-6). In general, commercial fisheries use inboard-powered boats, deploy efficient fishing gears and have the capacity to fish in offshore seas spending several days at sea in one fishing trip; the typical fishing gears employed are mainly medium to large-size trawls, falling nets, purse seines, encircling gill nets, large drift nets, and a large number of traps. Small-scale fisheries use boats either non-powered, or have outboard or inboard engines. Most small-scale fishermen live at or close to subsistence level; they operate near shore and use traditional fishing gears which are mainly gill nets, lift nets, traps, hook and line and other stationary gears that operate in estuaries, bays, inshore waters, and coastal seas.

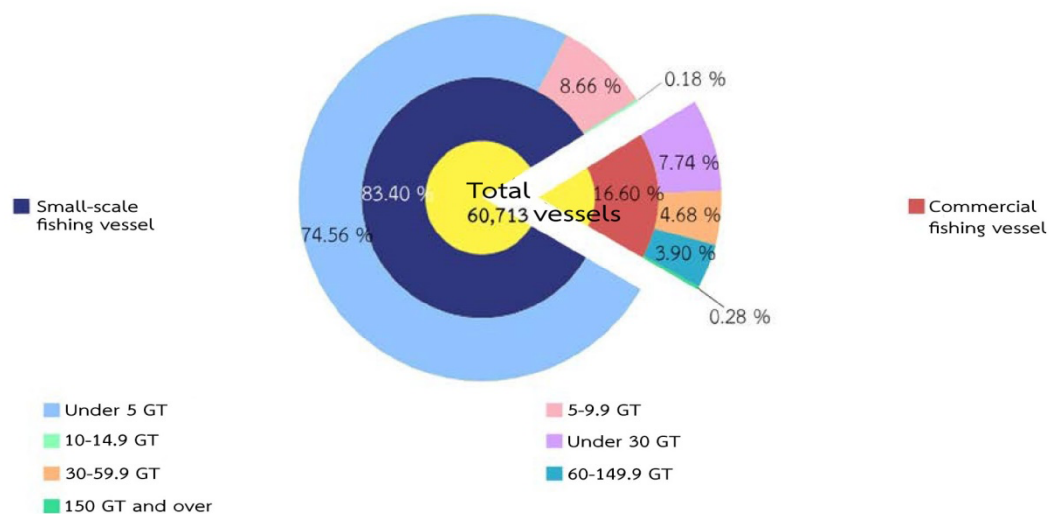


Figure 2-6 Composition of fishing fleet, by size (gross tonnage: GT), of Thailand: 2022

Source: Department of Fisheries (2022 b)

3. NATIONAL POLICY FRAMEWORK AND LEGISLATION FOR FISHERIES IN THAILAND

3.1 National Policy Framework

Fisheries management in Thailand was remarkably reformed since 2015. National Policy for Marine Fisheries Management was developed, entitled “Marine Fisheries Management Plan of Thailand (FMP)”, firstly for the period of 2015-2019 and currently for 2020-2022 (Department of Fisheries, 2015, 2020). The plan is based on international best practice and Thailand’s international fisheries obligations applying the ecosystem approach to fisheries management (EAFM) that aims to balance ecological well-being (fish resources and the environment) with human well-being (social and economic benefits).

FMP (2015-2019) was developed in the recognition that overfishing & overcapacity and illegal, unreported, and unregulated (IUU) fishing are the high priority issues for threats to the sustainable management of marine fisheries in Thailand (Department of Fisheries, 2015). FMP thus aimed at transforming Thailand’s marine fisheries into a limited access regime where the fishing effort is commensurate with the scientific evidence and IUU fishing is eliminated. Apart from the high priority issues, the additional objectives of FMP (2015-2019) were to increase benefits for and reduce conflicts among major stakeholders, to improve marine environment, and to strengthen capacity to sustainably manage the fisheries.

The current FMP (2020-2022) aimed at restoring fisheries resources to a level that can support the MSY in Thai waters, IUU-free fishing, healthy fishery habitats and environment, improved livelihoods of small-scale fishers and fishing communities, and effective fisheries management capacity (Department of Fisheries, 2020). Important management measures specified in the FMP (2020-2022) include 1) the control of fishing effort through a total allowable effort (TAE) and licensing scheme, and the use of incentives such as a buy-backs and license combination schemes to remove excess capacity for fishing vessel, 2) introduction of area-based management, and fishery improvement projects (FIPs) for selected fisheries, 3) maintaining the restrictions on the number and characteristics of fishing gears, 4) promotion of the expansion of sustainable fishing into deeper waters in Thailand and into overseas fishing grounds, 5) reduction of the catch of juvenile market fish through mesh size limits and seasonal closures, and 6) promotion of artificial reefs and restocking programs.

On the whole, the FMP of Thailand outlines the management actions and measures needed to achieve sustainable fisheries and to control the fishing capacity to a level commensurate with the maximum sustainable yield (MSY) of the resources. Strengthening of monitoring, control, and surveillance (MCS) in marine fisheries are also highlighted in FMP. The policies and plans are enabled through the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017).

Particularly, the establishment and operation of two fisheries *refugia* for Thailand's sustainable fisheries management is included in the current FMP (2020-2022) by indicating it as one of the key performance indicators (KPIs) for the Objective 9 – restore and maintain critical habitats – which is specified in the Goal 3 – healthy habitats and environment – of the FMP.

3.2 National Legislation

With regard to principal fisheries regulation, the long-standing national fisheries laws for Thailand – the Fisheries Act B.E. 2490 (1947) (latest amended in B.E. 2558 (2015)) – was repealed in 2015 while the Royal Ordinance on Fisheries B.E. 2558 (2015) was enacted.

In the Royal Ordinance on Fisheries B.E. 2558 (2015), there are 11 Chapters with 176 Sections which provide fundamental fisheries legal framework aiming to reorganize fisheries in Thailand and in waters at large with a view to preventing IUU fishing in order to preserve aquatic animal resources as a sustainable source of food for humanity, and preserve the environment in an appropriate state along the line of approaches, criteria, and standards recognized internationally, as well as to protect the welfare of seamen and prevent all forms of forced labor in the fisheries sector.

In 2017, the Royal Ordinance on Fisheries (No. 2) B.E. 2560 (2017), in which 60 Sections are included, was additionally enacted in order to fulfill more controls on transshipment vessels and supporting vessels, strengthening enforcement of administrative sanctions, and other issues that need cooperation across government agencies.

As for international and regional cooperation, Thailand has ratified a number of key legal instruments relating to fisheries and the environment. Some key global legal instruments relating to fisheries and the environment are:

- Law of the Sea Convention (UNCLOS);
- Convention on Biological Diversity (CBD);
- Convention on International Trade in Endangered Species (CITES);
- Ramsar Convention on Wetlands of International Importance (Ramsar);
- UN Framework Convention on Climate Change (FCCC) and Kyoto Protocol;
- UN Fish Stocks Agreement (UNFSA); and
- FAO Port State Measures Agreement (PSMA).

Thailand, as a member of the ASEAN community, is guided by the ASEAN Roadmap for an ASEAN Community (2009-2015) and its supporting Blueprints. Thailand has also endorsed the ASEAN-SEAFDEC Resolution and Plan of Action on Sustainable Fisheries for Food Security for the ASEAN Region Towards 2020 (Res/POA).

Thailand is also a part of the Regional Plan of Action against IUU fishing (RPOA-IUU), which is a ministerial initiative of eleven countries: Australia, Brunei Darussalam, Cambodia, East Timor, Indonesia, Malaysia, Papua New Guinea, The Philippines, Singapore, Thailand, and Vietnam to promote responsible fishing practices and combat IUU fishing in the Southeast Asian Region.

4. CURRENT PRINCIPAL FISHERIES MANAGEMENT MEASURES IN THAILAND

4.1 Fishing Effort Controls:

- Fishing licenses for commercial fisheries issued on the basis of total allowable effort (TAE) which depend on MSY of the target species;
- Fishing days allocation for fishing vessels equipped with high-efficient fishing gears; and
- Restriction of sizes and characteristics for fishing gears.

4.2 Technical-based Measures:

- Seasonal and spatial closures for protection of spawning stock and juveniles;
- Demarcation of fishing zones between small-scale and commercial fisheries;
- Reduction of fishing gear efficiency by mesh sizes restriction, e.g. 4 cm or over for trawls, 2.5 cm or over for purse seines, and 0.6 cm or over for anchovy purse seine;
- Ban of destructive fishing gears, e.g. set bag net, push net (with an exception of acetes push net), elongate collapsible trap;
- Prohibition of some fishing in a certain areas; and
- Fishing control by zoning (special case for anchovy fishery).

4.3 Fishery Monitoring, Control, and Surveillance:

- Port in – port out measures;
- Port state measures;
- Vessel monitoring system (VMS) obligation for vessels of 30 GT and over;
- Establishment of processing statement system (PSS); and
- Establishment of Thai flagged catch certification system (TF).

4.4 Measures for Critical Habitats:

- Marine protected areas (MPA) for full protection, i.e. aquatic sanctuaries, non-hunting area, marine national park, mangrove swamps, coral reefs, seagrass bed, etc. – with the area of 79,756.72 km² (25.23 % of total sea area in Thai Waters); and
- Reserved areas for special purposes, e.g. coral reefs, sea grass beds, and mangroves.

5. FISHERIES REFUGIA FOR FISHERIES MANAGEMENT IN THE ASEAN REGION

According to SEAFDEC (2006), the initiative of fisheries *refugia* emerged from the fisheries component of the UNEP/GEF SCS Project with the recognition that coastal and marine habitats in the Gulf of Thailand have played in sustaining regional fisheries, many of which are transboundary in the region, having low level coordination between fisheries and habitat management. It is now well recognized that coral reef, seagrass, mangrove, and wetland habitats contribute significantly to the productivity of regional fisheries, and act as refuges for the majority of fished species during critical phases of their life cycle. In this connection, the UNEP/GEF SCS Project has initiated activities, in collaboration with SEAFDEC, to enhance the use of spatial approaches to fisheries management that focus on fishery and habitat linkages. This initiative is considered important regionally because of the potential regional fisheries benefits associated with effective fisheries and habitat management at the local level. It is likely that the role of such approaches to fisheries management will become more

important in the region, especially in light of the continuing importance of fisheries to food security, nutritional security, and maintenance of livelihoods. Such approaches may also assist in curbing the effects of trends in regional fisheries relating to over-capacity and over-exploitation, the use of destructive fishing gear and practices, habitat destruction and pollution, and illegal fishing.

The concept of fisheries *refugia* is based upon the evidence that the existence of natural *refugia* is a basic element explaining the resilience of commercial fish stocks to exploitation. Commercial fisheries in the ASEAN region are subject to high levels of fishing effort, such that stocks of most commercially important species are considered fully fished or overexploited. Maintenance of natural *refugia* should be important priorities for the management of fisheries in the ASEAN region, and may act as effective buffers against uncertainty and recruitment failure, of which the latter is especially important in terms of food security. In the context of fisheries, natural *refugia* arise from the interaction of the spatial dynamics of the population, oceanographic features, fish behavior, and fishing effort dynamics. Three broad types of *refugia* are readily discernable:

- A large population with seasonal or spawning migrations between fishing grounds and spawning *refugia*;
- A large population with some local sub-populations located in fishing grounds and others in *refugia*. Sub-populations located in unexploited areas provide larval subsidies to the exploited populations; and
- In situ behavioral *refugia* (behavior determines the seasonal unavailability of part of the stock in the fishing ground).

Fisheries *refugia* can complement conventional fisheries management measures, such as effort or gear restrictions, and should be a priority consideration in the ASEAN region in situations where fisheries are subject to intense and/or unmanageable fishing pressure. They may also be used to separate potentially conflicting uses of coastal and marine habitats and their limited resources. However, the effectiveness of fisheries *refugia* will largely depend on the selection and appropriate use of fisheries management measures within the *refugia* area, and at the most general level, the process of establishing fisheries *refugia* must consider the following:

- Life-cycle of the species for which *refugia* are being developed;
- Type(s) of *refugia* scenarios(s) that relate to the species for which *refugia* are being developed;
- Location of natural *refugia* and appropriate sites for the establishment of fisheries *refugia*; and
- National and regional level competencies in the use of fisheries management measures and spatial approaches to resource management and planning.

6. COMMON UNDERSTANDING OF FISHERIES REFUGIA

The concept of fisheries *refugia* was developed by the Fisheries Component of the UNEP/GEF Project entitled “Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand” (UNEP/GEF SCS Project) and was promoted for a novel approach to the identification and designation of priority areas in which to integrate fisheries and habitat managements (Paterson, *et al.*, 2013). The description of fisheries *refugia* is:

“Spatially and geographically defined, marine or coastal areas in which specific management measures are applied to sustain important species [fisheries resources] during critical stages of their life cycle, for their sustainable use.”

Thus, fisheries *refugia* should:

- Not be simply “no take zones”;
- Have the objective of sustainable use for the benefit of present and future generations;
- Provide for some areas within *refugia* to be closed due to their critical importance [essential contribution] to the life cycle of a species or group of species;

- Focus on areas of critical importance in the life cycle of fished species, including spawning and nursery grounds, or areas of habitat required for the maintenance of broodstock;
- Have different characteristics according to their purposes and the species or species groups for which they are established and within which different management measures will apply; and
- Have management plans.

Management measures applied within fisheries *refugia* may be drawn from the following list of fisheries management actions:

- Exclusion of a fishing method (e.g. light luring, purse seine fishing);
- Restricted gears (e.g. mesh size);
- Prohibited gears (e.g. push nets, demersal trawls);
- Vessel size/engine capacity;
- Seasonal closures during critical periods of fish life cycles;
- Seasonal restrictions (e.g. use of specific gear that may trap larvae); and
- Limited access and use of rights-based approaches in small-scale fisheries.

There is a general commonality of understanding that fisheries *refugia* relate to specific areas of significance to the life-cycle of particular species. Fisheries *refugia* may be defined in space and time, and serve to protect spawning aggregations, nursery grounds, and migratory routes, the concept of which is illustrated in Figure 6-1.

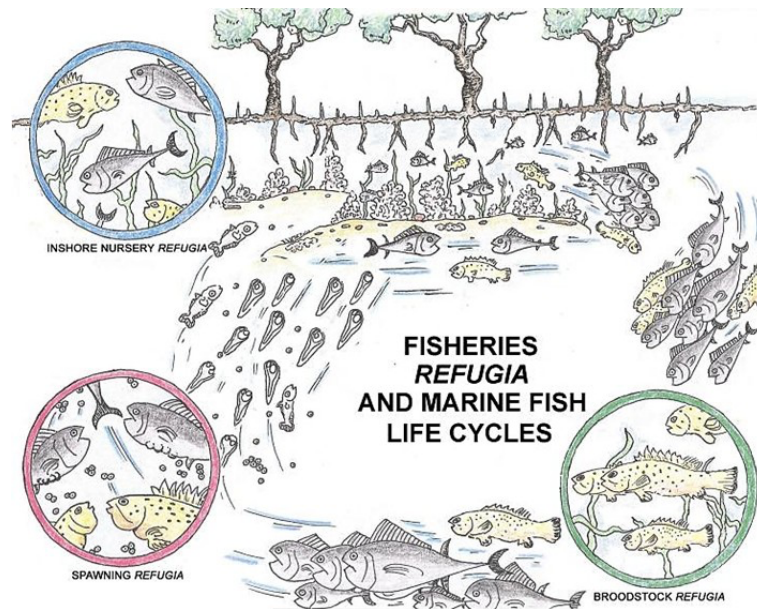


Figure 6-1 Illustration of marine fish life cycles related to fisheries *refugia* concept

Source: UNEP/GEF/SCS (2007)

7. FISHERIES PROBLEMS RELATING TO FISHERIES *REFUGIA*

The promotion and use of fisheries *refugia* approach in Thailand, like in the ASEAN region, is aimed at improving the use of spatial approaches to fisheries management for the sustainable use of fisheries. The specific fisheries management problems and actions related to fisheries *refugia* concept are as follows:

- Capture of juveniles – an action focused on reducing the risk of growth over-fishing due to young recruits to the fishery being caught before they grow to an optimal market size, or a size at first capture less than that required to maximize yield (or value) per recruit;

- Capture of spawning stock in spawning areas at the time of spawning – an action focused on reducing the risk of recruitment over-fishing due to adult stock being reduced to the extent that recruits are insufficient to maintain commercial fish stocks;
- Use of inappropriate fishing gears and practices;
- Poor management of fish habitats, particularly spawning and nursery areas; and
- Conflicts among resource users, such as those between small-scale and commercial fisheries.

8. GOAL, OBJECTIVES, AND CHALLENGES FOR FISHERIES *REFUGIA*

Goal:

“To improve the use of spatial approaches to fisheries management for sustainable use of fish stocks and maintenance of habitats”

Objectives:

- To safeguard spawning and nursery areas and commercial species within these areas at critical stages of their life cycles;
- To enhance fisheries resources and their habitats;
- To prevent habitat degradation and commercial-extinction of important fishery species;
- To improve co-ordination between fisheries and environment agencies and organizations;
- To improve the use of zoning in fisheries management;
- To improved incorporation of species-specific life history characteristics in fisheries management systems;
- To improve understanding amongst stakeholders, including fisher folk, scientists, policy-makers and fisheries managers of ecosystem and fishery linkages; and
- To promote the role of *refugia* in enhancing the resilience of fisheries systems.

Challenges:

- The problem of overcapacity;
- Resistance from fisher folk and fishing communities;
- Difficulties and costs associated with research, specifically the need for specialized vessels/sampling equipment in collecting information regarding the life cycle of commercially important species;
- Low-level collaboration between the responsible national level agency and local government;
- Encroachment during periods in which fishers are excluded; and
- Enforcement of management measures and regulations prohibiting the use of illegal or destructive fishing gear, in order to prevent the unnecessary capture of juveniles and degradation of fisheries habitats.

9. PRIORITY FISHERIES *REFUGIA* TYPES

With reference to SEAFDEC (2006), in relation to fisheries, the two main life history events for fish species are reproduction and recruitment. Often, these events involve movement between areas, and some species, often pelagic fishes, migrate to particular spawning areas. Many species also utilize specific coastal habitats such as coral reefs, seagrass, mangroves, and wetlands as nursery and feeding areas. In terms of the effects of fishing, most populations of fished species are particularly vulnerable to the impacts of high levels of fishing effort in areas where and at times when there are high abundances of stock in spawning condition, or juveniles and pre-recruits. High levels of fishing effort in inshore waters may drive growth over-fishing, while the same circumstances in offshore areas may cause recruitment over-fishing of the same stock (Figure 9-1).

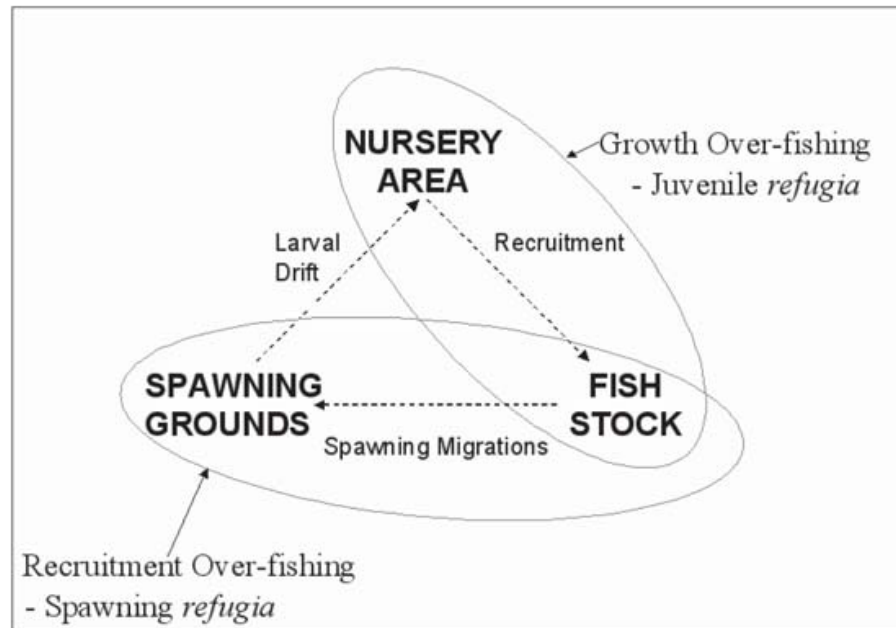


Figure 9-1 Generalized life-history triangle for fished species highlighting the problems of growth and recruitment over-fishing

Source: SEAFDEC (2006)

9.1 Spawning *Refugia*

It is evidenced that landings from commercial fisheries in Southeast Region are dominated by small pelagic species. The problem of recruitment over-fishing is considered as the most relevant to these species and the identification of spawning *refugia* should be prioritized for important pelagic species. Thus, the spawning *refugia* is considered to be effective tools for the management of recruitment over-fishing.

9.2 Juvenile *Refugia*

In terms of the decline in the availability of major demersal species, the problem of growth over-fishing prevails and the use of juvenile *refugia* should be a priority for demersal fisheries management. It is apparent that there may be most benefit in establishing juvenile *refugia* in the context of inshore habitat management which can be used to protect fish during the juvenile and pre-recruit phases of their life-cycle. The design of appropriate fisheries *refugia* in association with initiatives in inshore habitat management may assist in reversing the growth over-fishing problem common to many of the coastal demersal fish species.

10. FISHERIES *REFUGIA* TYPES ESTABLISHED IN THAILAND

10.1 Spawning *Refugia* at Trat Site

Of the two fisheries *refugia* sites in Thailand, spawning *refugia* has been established at Trat Site in Trat Province. The site is located along the coastal zone of the province which is, by scientific and technical evidences, regarded as the spawning area of the priority species, short mackerel (*Rastrelliger brachysoma*), the sub-population of which migrates along the east coast of Thailand for spawning. Main fishing gears targeting short mackerel for their primary catches are restricted in the spawning *refugia* for a certain period of time when the fish is in the peak spawning period in its life cycle.

10.2 Juvenile *Refugia* at Surat Thani Site

Juvenile *refugia* has been established at the coastal area around Koh Sed in Ban Don Bay of Surat Thani Province. The site is well-known as a significant nursery ground for blue swimming crab (*Portunus pelagicus*), which is one of the most important economic species for small-scale fisheries in Thailand. The most prominent critical habitat in Koh Sed is the seagrass bed in its sand and muddy-sand substrates, superior for nursery ground of young blue swimming crab – the priority species – as well as for a number of marine species in the area. Juvenile *refugia* in Surat Thani Site is aimed at protecting the vulnerable critical habitat and enhancing survival of blue swimming crab resources in the early stages of its life cycle by restriction of some destructive fishing in the notified area.

11. ESTABLISHMENT AND OPERATION OF FISHERIES REFUGIA IN THAILAND

11.1 Identification of Fisheries Refugia

To identify fisheries *refugia* in the country, a two-track approach should be considered. The first track involves a review of known spawning areas for important marine animals, focusing on the pelagic and invertebrate species, with the aim of evaluating these sites as candidate spawning *refugia*. Information regarding the spatial dynamics of the populations of such the species, environment features, fish behavior, and fishing effort dynamics should be used to determine the optimum locations and sizes of spawning *refugia*. The second track is the evaluation of inshore areas as potential juvenile/pre-recruit *refugia* for significant marine resources, concentrated on demersal species. These juvenile *refugia* should be aimed at reducing the impact of growth overfishing and may be identified using information concerning the catch and size composition of principal fisheries operating in or adjacent to sites.

Possible directions for establishing and operating fisheries refugia are suggested by the policy, administrative, and technical bodies. Fisheries *refugia* sites and their priority species, together with relating technical information, are to be presented to the management committees at national and local levels including the scientific and technical committees for advises and guidance. Identification of priority species and its fisheries *refugia* site are needed to be consulted with fishers and all stakeholders at sites prior to introducing the results of their agreements to the authorized agencies to process for issuing the management measures.

11.2 Stakeholder Participation

The critically important role of small-scale, coastal, and subsistence fisheries in developing fisheries management approaches is well recognized. Creating opportunities and an enabling environment to support the participation of all sectors in the development process is accordingly one of the main strategies for fisheries *refugia* establishment and operation in Thailand. In providing more opportunity for local communities and people to participate actively in fisheries *refugia* management, the following guidelines are promoted at the national policy level:

- Providing opportunities for people and communities to participate in decision-making, monitoring and evaluation of the establishment and operation of fisheries *refugia*. The national lead agency should facilitate continual public discussion at every stage of establishment such as initiation, preparation, and implementation;
- Providing legal quarantines of the rights of local communities and small-scale fishers to participate in fisheries *refugia* management, as well as the conservation, rehabilitation and maintenance of the critical habitats, to ensure sustainable use of coastal resources, especially those related to the fisheries;
- Creating awareness of local communities in the sustainable management of coastal resources in fisheries *refugia* and other coastal areas;
- Building up and strengthening local capacities in the conservation and rehabilitation of coastal resources in fisheries *refugia* and other coastal areas; and

- Encouraging the coordination among local communities, local government agencies, and NGOs.

As such, in order to achieve the sustainable utilization of coastal resources in fisheries *refugia*, upgrading the capacities of rural communities for economic and social development and for conservation of natural resources and environment is the key element. The private sector working for public interests in the area of fisheries resources and environmental protection and conservation can be found in the form of foundations, associations, projects, clubs, or other formal groups. In general, they can be categorized as non-government organizations (NGOs) registered with government, NGOs not registered with government, business firms, and people's organizations.

From the perspective of the management of fisheries and critical habitat linkages at the *refugia* sites, a key assumption is that there will be adequate local cooperation to agree boundaries and compile and analysis information to identify threats and agree management actions for those sites.

11.3 Implementation Components

Based on the implementation strategy for fisheries *refugia* project (SEAFDEC, 2014), national level activities for establishment and operation of fisheries *refugia* in Thailand are conducted in line with 4 components: (1) Identification and management of fisheries and critical habitat linkages at priority fisheries *refugia* in Thailand, (2) Improving the management of critical habitats for fish stocks of transboundary significance via national actions to strengthen the enabling environment and knowledge-base for fisheries *refugia* management in Thailand, (3) Information management and dissemination in support of national-level implementation of fisheries *refugia* in Thailand, and (4) National coordination for integrated fish stock and critical habitat management in Thailand. The following are the description and activities for each implementation component:

Component 1: Identification and management of fisheries and critical habitat linkages at fisheries *refugia* in Thailand

Activities of this component involve the setting of baselines and consultative processes aimed at facilitating agreement among stakeholders on the boundaries of fisheries *refugia*, key threats to *refugia* sites, and management interventions for the priority species. This includes the conduct of consultations to draft maps of fisheries *refugia* for priority species, elicit fisherfolk input to boundary delineation, conduct assessment of environmental and social impacts of *refugia* designation, and secure formal government designation of sites as fisheries *refugia*. Upon carrying out the activities in this component, community-based *refugia* management plans are developed, adopted, and under implementation at fisheries *refugia* sites. Networks of management boards and community-based fisheries and habitat management volunteers for *refugia* management are established at the priority sites. The activities also involve the design and execution of community capacity programmes, and include participatory activities to monitor fish habitats within *refugia* and develop responsible fishing practices at the community level. An operational program is also established to strengthen civil society and community organization participation in the management of fisheries *refugia*.

National level activities for Component 1 include:

- Activity 1.1** Developing fisheries and coastal habitat information and data collection programs for fisheries *refugia* sites;
- Activity 1.2** Facilitating agreement among stakeholders on the boundaries of fisheries *refugia* sites;
- Activity 1.3** Developing community-based management plans for fisheries *refugia* sites;
- Activity 1.4** Establishing operational management for fisheries *refugia* sites; and
- Activity 1.5** Strengthening civil society and community organization participation in the management of fisheries *refugia* sites.

Component 2: Strengthening the enabling environment for the formal designation and operational management of fisheries *refugia* in Thailand

Activities for this component involve incorporation of measures for the fisheries sector's sustainable use of fish habitats and biodiversity into Thailand's national fisheries policy. National guidelines on the use of fisheries *refugia* in integrating fisheries and habitat are developed. National policy, legal and planning frameworks for demarcating boundaries and managing *refugia*, as well as socio-economic impacts of management measures, are assessed. Efforts to enhance evidence planning of the designation and management of fisheries *refugia* include the production of the synthesis reports of new and additional information and data relating to the stocks of priority species and their habitats in the waters of Thailand. Additionally, an online national database of fish egg and larvae distribution and abundance in Thai Waters is established and populated. This information and data management are complemented via the establishment of a national online geographical information system on fisheries and marine biodiversity featuring information on locations and management status of coastal habitats, fisheries *refugia*, and critical habitats for threatened and endangered species in Thailand. Fisheries and habitat data collection programs are also developed and operated to characterise *refugia* sites in Thailand.

National level activities for Component 2 include:

- Activity 2.1** Enhancing policy guidance for improved management of the effects of fishing on critical habitats;
- Activity 2.2** Defining the policy and legal basis for formal designation and establishment of fisheries *refugia* in Thailand;
- Activity 2.3** Developing national guidelines on the establishment and operation of fisheries *refugia*;
- Activity 2.4** Reforming national policy, legal, and planning frameworks for demarcating boundaries and managing *refugia*;
- Activity 2.5** Enhancing access to information relating to status and trends in fish stocks and habitats in Thai waters;
- Activity 2.6** Improving national-level management and sharing of information and data on fish early life history in Thai waters;
- Activity 2.7** Enhancing access to information relating to the locations and status of coastal habitats and management areas in Thai waters; and
- Activity 2.8** Strengthening the information base for the planning, monitoring and evaluation of management at fisheries *refugia* sites.

Component 3: Information management and dissemination in support of national-level implementation of the fisheries *refugia* in Thailand

This component aims at establishing systems and mechanisms to capture, document, and communicate best practice approaches and measures for integrated fisheries and habitat management generated from fisheries *refugia* sites in Thai Waters. Public awareness and outreach program to promote local social, economic, and environmental benefits of fisheries *refugia* implemented at priority locations in Thailand are developed to enhance community acceptance of area based approaches to marine fisheries management. A national knowledge management system on the use of fisheries *refugia* in capture fisheries management is also established and operated to support the management and sharing of knowledge and experiences in the use of area based tools for fisheries management in Thailand.

National level activities for Component 3 include:

- Activity 3.1** Enhancing national uptake of best practices in integrating fisheries management and biodiversity conservation;
- Activity 3.2** Improving community acceptance of area-based approaches to marine fisheries management; and
- Activity 3.3** Knowledge generated and experiences from establishing and operating fisheries *refugia* captured and shared nationally, regionally, and globally.

Component 4: National cross-sectorial coordination for integrated fisheries and critical habitat management in Thailand

For this Component, a National Fisheries *Refugia* Committee (NFRC) is established and operated to advise national decision-makers and strengthen cross-sectoral coordination in the establishment and operation of fisheries *refugia* in Thailand. In support of this a National Technical and Scientific Committee (NSTC) is established and operated to advise site-level management boards and NFRC on technical and scientific matters relating to the policy, legal, and institutional reforms for fisheries *refugia* management in Thailand. Additionally site-level management boards are established at the fisheries *refugia* sites to catalyse local community action and community-led planning of fisheries *refugia* management.

National level activities for Component 4 include:

- Activity 4.1** Strengthening cross-sectoral coordination in the establishment and operation of fisheries *refugia* in Thailand;
- Activity 4.2** Harnessing national scientific and technical expertise and knowledge to inform policy, legal, and institutional reforms for fisheries *refugia*; and
- Activity 4.3** Catalyzing local community action via establishment and operation of site-based management boards at *refugia* sites.

11.4 Fisheries *Refugia* Management Framework

The framework of fisheries *refugia* management for Thailand is prepared in accordance with the management framework developed for the Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand as shown in Figure 11-1. Regarding overall framework, the possible directions for establishing and operating fisheries *refugia* are suggested by legislative, policy, and administrative options and approaches given by the management committees at national structure, along with guidance from the management committees at regional structure. The Department of Fisheries plays the role of national lead agency providing national coordination, technical guidance, and political support; while advice, guidance, and coordination are supported regionally by Co-ordination Unit/SEAFDEC, UNEP, and GEF.

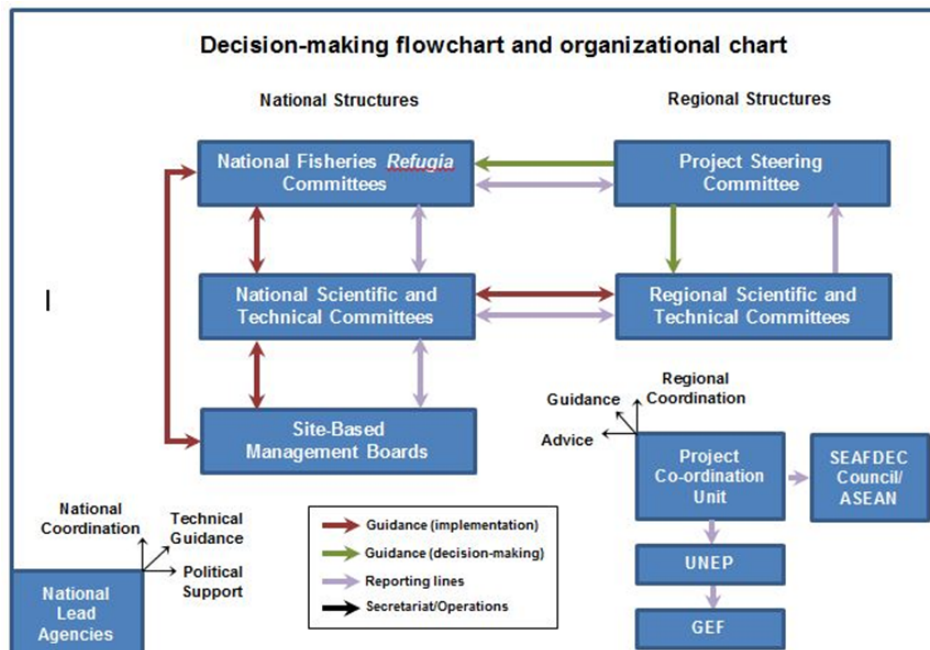


Figure 11-1 Management framework for establishment and operation of fisheries *refugia*

Source: SEAFDEC (2016)

In terms of national level, the role, terms of reference, and membership for each body in fisheries *refugia* management framework for Thailand are as follows:

11.4.1 National Fisheries *Refugia* Committee

Role: To strengthen cross-sectorial coordination in the establishment and management of fisheries *refugia*

Terms of Reference:

1) Assume overarching responsibility for the execution of national level activities of the establishment and operation of fisheries *refugia* in Thailand;

2) Receive, review, and approve reports regarding the establishing and managing of fisheries *refugia* in Thailand;

3) Guide the timely execution of the activities, particularly activities at the individual *refugia* sites, and to consider, amend and endorse quarterly work-plans, narrative progress and financial reports;

4) Provide direction and strategic guidance to the National Lead Agency and Site-based Management Boards for individual *refugia* sites on the national and local reforms to enhance the uptake of the fisheries *refugia* approach and strengthen the integration of fisheries and environmental management;

5) Assess stakeholder involvement in fisheries and environmental management and to take action where necessary to ensure appropriate levels of government, civil society and community organization, fisher groups, environmental NGOs, and private sector engagement in establishing and managing activities;

6) Ensure compatibility between site-based activities for establishment of fisheries *refugia* and other national, provincial and municipal activities in fisheries and environmental management; and

7) Make a decision on the basis of technical advice from the National Scientific and Technical Committees.

Membership:

Organization	Position
1) Department of Fisheries	1.1) Director General (as a Chairperson)
	1.2) Senior Expert in Fisheries Management (as a Vice Chairperson)
	1.3) Director of Marine Fisheries Research and Development Division (as a Vice Chairperson)
	1.4) Senior Expert in Spatial Fisheries
	1.5) Inspector-General-Head
	1.6) Director of Coastal Aquaculture Research and Development Division
	1.7) Directors of Provincial Fisheries Offices responsible for corresponding fisheries <i>refugia</i> sites
	1.8) Senior Expert in Marine Fisheries (National Focal Point) (as a Secretary)
	1.9) Directors of Fisheries Research and Development Centers responsible for corresponding fisheries <i>refugia</i> sites (as Assistant Secretaries)
2) Department of Marine and Coastal Resources	2.1) Special Expert in the Research of Resources and Environment in Marine and Coastal Ecosystem
	2.2) Director of Marine and Coastal Resources Research and Development Institute
3) Corresponding Academics/ Universities	3.1) Deans/Executive persons
4) SEAFDEC/PCU	4.1) Representative (as an Advisor)

Contents of the Appointment of Thailand's National Fisheries *Refugia* Committee can be traced in the Notification of Department of Fisheries No. 459/2564, shown in ANNEX 1

11.4.2 National Scientific and Technical Committee

Role: To harness national scientific and technical expertise and knowledge for the support of establishing fisheries *refugia*

Terms of Reference:

- 1) Review and co-ordinate national scientific and technical activities for the establishment and operation of fisheries *refugia* in Thailand;
- 2) Review and evaluate, from a scientific and technical perspective, progress in the establishment of fisheries *refugia*, and provide guidance for improvement when necessary;
- 3) Provide the National Fisheries *Refugia* Committee with technical guidance and suggestions for national and site-based activities;
- 4) Facilitate co-operation with relevant national and provincial organizations to enhance the information and science base for use in identifying and managing fisheries *refugia* in Thailand;
- 5) Receive and review reports, data, and information from the fisheries *refugia* sites and oversee the national synthesis of this information to identify overall needs and priorities for individual sites and networks of fisheries *refugia* in Thailand; and
- 6) Ensure that the subsequent monitoring and evaluating of the establishment of fisheries *refugia* is undertaken in a standardized and consistent manner.

Membership:

Organization	Position
1) Department of Fisheries	1.1) Senior Expert in Fisheries Management (as a Chairperson) 1.2) Director of Marine Fisheries Research and Development Division (as a Vice Chairperson) 1.3) Senior Expert in Marine Fisheries (National Focal Point) (as a Vice Chairperson) 1.4) Senior Expert in Spatial Fisheries 1.5) Senior Expert in Ecology 1.6) Directors of Fisheries Research and Development Centers responsible for corresponding fisheries <i>refugia</i> sites 1.7) Director of Fisheries Research and Development Center responsible for one of the corresponding fisheries <i>refugia</i> site (as a Secretary) 1.8) Technical Fisheries Officers for Fisheries Research and Development Centers responsible for corresponding fisheries <i>refugia</i> sites (as Assistant Secretaries)
2) Department of Marine and Coastal Resources	2.1) Special Expert in the Research of Resources and Environment in Marine and Coastal Ecosystem 2.2) Directors of Marine and Coastal Resources Research and Development Centers responsible for corresponding fisheries <i>refugia</i> sites
3) Geo-Informatics and Space Technology Development Agency (Public Organization): GISTDA	3.1) Director of Geo-informatics Applications and Service Office
4) Corresponding Academics/ Universities	4.1) Lecturers/Researchers
5) Southeast Asian Fisheries Development Center:	5.1) Technical Officers

Organization	Position
SEAFDEC	

Contents of the Appointment of Thailand's National Scientific and Technical Committee can be traced in the Notification of Department of Fisheries No. 460/2564, shown in ANNEX 2.

11.4.3 Site-based Management Boards

Role: To catalyze community-led action at priority fisheries *refugia* sites

Terms of Reference:

- 1) Plan and guide the timely execution of site-based activities for establishment and operation of fisheries *refugia* in Thailand;
- 2) Ensure co-ordination among the fisheries *refugia* establishing and other local activities undertaken to further enhance local capacity to strengthen the integration of fisheries and habitat management;
- 3) Review and take action where necessary to ensure appropriate levels of government, NGO, community, and private sector engagement in site-level activities;
- 4) Ensure compatibility between the recommendations for action at the fisheries *refugia* site with other local level activities for fisheries and coastal habitat management;
- 5) Review and evaluate, at the site level, progress in establishment of fisheries *refugia*, and provide guidance for improvement to the Fisheries *Refugia* Management Team and National Fisheries *Refugia* Committee;
- 6) Facilitate the approval and implementation, by the competent local authority, of management plans and courses of action developed during the execution of fisheries *refugia* establishment; and
- 7) Work with the Fisheries *Refugia* Management Team in identifying best practices for replication and scaling-up as well as the mainstreaming of the fisheries *refugia* approaches at the local level.

Membership for each fisheries *refugia* site:

Organization	Position
1) Ministry of Natural Resources and Environment	1.1) Director of Provincial Office for Natural Resources and Environment
2) Department of Fisheries	2.1) Director of Provincial Fisheries Office (as a Chairperson)
	2.2) Director of Fisheries Research and Development Center (as a Vice Chairperson)
	2.3) Director of Coastal Aquaculture Research and Development Center
	2.4) Head of Marine Fisheries Patrol Unit
	2.5) Chiefs of Fisheries District Offices
	2.6) Head of Fishing Ground Development and Rehabilitation Unit for corresponding Fisheries Research and Development Center
	2.7) Head of Fisheries Administration and Management Group for corresponding Fisheries Provincial Office (as a Secretary)
	2.8) Technical Fisheries Officer for corresponding Fisheries Research and Development Center (as an Assistant Secretary)
3) Department of Marine and Coastal Resources	3.1) Director of Marine and Coastal Resources Administration Office
	3.2) Director of Marine and Coastal Resources Research and Development Center
	3.3) Head of Marine and Coastal Resources Conservation Unit
4) Department of National Parks, Wildlife and Plant	4.1) Head of Marine National Park

Organization	Position
Conservation	
5) Corresponding Academics/ Universities	5.1) Lecturers/Researchers
6) Department of Local Administration	6.1) Subdistrict Heads
7) Fisheries Associations	7.1) Presidents
8) Local Fishing Community Organizations	8.1) Chairpersons
9) NGOs for fisheries/ resources conservation in the areas of fisheries <i>refugia</i>	9.1) Directors/Presidents

Contents of the Appointments of Site-based Fisheries *Refugia* Management Boards can be traced in the Notification of Trat Province No. 808/2564 shown in ANNEX 3 and Notification of Surat Thani Province No. 2932/2564 shown in ANNEX 4.

11.4.4 National Lead Agency (Department of Fisheries)

Role: To take overall responsibility for the execution of the national-level activities of fisheries *refugia* establishment in Thailand

Terms of Reference:

- 1) Assume overall responsibility for the execution of the national-level activities of Fisheries *Refugia* establishment;
- 2) Provide secretariat support to the operation of the National Fisheries *Refugia* Committee (NFRC) and the National Scientific and Technical Committee (NSTC) and convene meetings of these bodies;
- 3) Plan and implement activities based on the results framework, work plan, and timetable aimed at achieving the national-level goals and objectives for the fisheries *refugia* establishment in Thailand; and
- 4) Guide the execution of national and site-based activities of the fisheries *refugia* establishment in Thailand.

11.5 Development of Fisheries *Refugia* for Sustainable Fisheries Management in Thailand

For the effectiveness of fisheries *refugia* establishment, procedures are developed in line with the management framework mentioned in item 11.4, together with stakeholder consultation and participation throughout the processes. The Department of Fisheries takes the role of key agency for national coordination, technical guidance, and political support in each process. Framework for development of fisheries *refugia* for sustainable fisheries management in Thailand is shown in Figure 11-2. Details of each process are as follows:

1) Development of fisheries *refugia* strategy

The strategy includes principles, goals, objectives, outputs, outcomes, and indicators, which bring about the results framework for establishment and operation of fisheries *refugia* in Thailand. Criteria and guidelines for identification and selection of fisheries *refugia* are also included. The strategy is developed by national lead agency, the Department of Fisheries, in consultation with fishing communities, other stakeholders, and relevant government agencies.

2) Appointments of fisheries *refugia* management committees/boards

Thailand's National Fisheries *Refugia* Committee, and Thailand's National Scientific and Technical Committee are appointed by Director-general of the Department of Fisheries, while Site-based Fisheries *Refugia* Management Board for each fisheries *refugia* site is appointed by Provincial Governor. Members of each committee/board are nominated on the basis of stakeholder analysis.

3) Identification of candidate fisheries *refugia*

Each potential fisheries *refugia* site is identified based on its background information. Criteria and guidelines for identification of fisheries *refugia* site are applied. Baseline data on fisheries and environment particularly the information on the life cycles of priority species in the site are the key components of this process. Socio-economic condition of fishing communities in the area is also taken into consideration. Identification is made by National Fisheries *Refugia* Committee and Site-based Management Boards under technical provision by National Scientific and Technical Committee.

4) Selection of fisheries *refugia*

Fisheries *refugia* site and priority species are selected via the mechanism of fisheries *refugia* management framework, with emphasis on the stakeholder consultations in all relevant communities. Fisheries *refugia* boundary delineation and management planning are undertaken for each *refugia* in accordance with comprehensive technical information on fisheries and environment in the site, as well as the life cycle of its priority species. Policy guidance by National Fisheries *Refugia* Committee is the supportive component for management planning. The selection is finalized by Provincial Fisheries Committee prior to submission to the authorized agencies for legislative process.

5) Notification for fisheries *refugia*

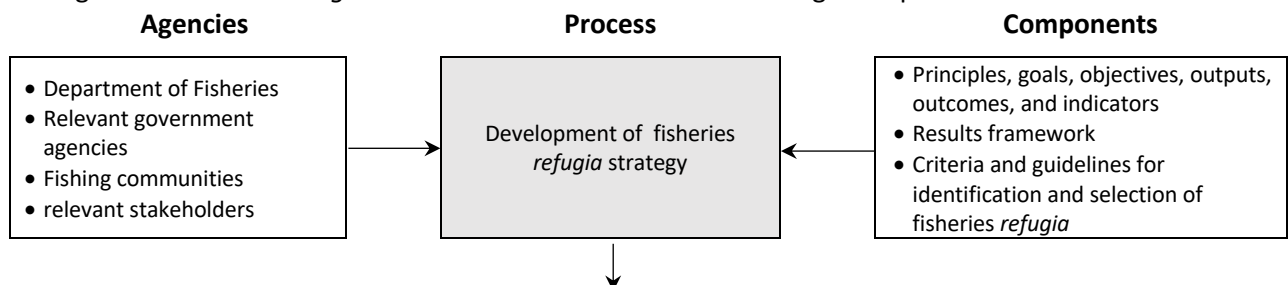
Fisheries *refugia* is legally notified by the competent authority depending on the area of responsibility. It could be notified by the Ministry of Agriculture and Cooperatives, the Department of Fisheries, or the Provincial Fisheries Committee. Contents of the notification include rationale for fisheries *refugia* establishment and its priority species, geographic location of the site, and management measures at fisheries *refugia*. Notifications for establishment of fisheries *refugia* in Thailand, Trat and Surat Thani Sites, are shown in ANNEX 5 and ANNEX 6, respectively.

6) Establishment of operational fisheries *refugia* management

Upon site-based consultations, Operational Management Boards are established, under which site-based management teams are formed and operational management plans are prepared. A volunteer network is developed for the coordination of fisheries *refugia* system in Thailand, and practical capacity building programs for management volunteers are developed. Activities for awareness and pilot management are carried out at sites. Collaborative observers and enforcement programs for management plan are also developed and implemented. Notifications for establishment of operational management boards for fisheries *refugia* at Trat and Surat Thani Sites are shown in ANNEX 7 and ANNEX 8, respectively.

7) Development of monitoring and evaluation plan for establishment and operation of fisheries *refugia*

National Monitoring and Evaluation (M&E) plan is developed in accordance with results framework included in the fisheries *refugia* strategy. In support of M&E, there is a need to review and verify outputs and outcomes indicated in the fisheries *refugia* strategy developed at the initiating period, which concern mainly on the sustainability of critical habitats, fisheries resources, and socio-economic condition of coastal communities in the areas. Indicators for each expected output and outcome are the main tools for assessing implementation progress and achievement of the fisheries *refugia* establishment and operation. Relevant agencies, particularly the Department of Fisheries, have their responsibilities to collect specific information to track those indicators. The review for M&E is carried out using a participatory approach whereby parties, government and private agencies, and relevant communities that may benefit or be affected by the fisheries *refugia* management are included. The goals for fisheries *reugia* are also needed for evaluation at long-term period.



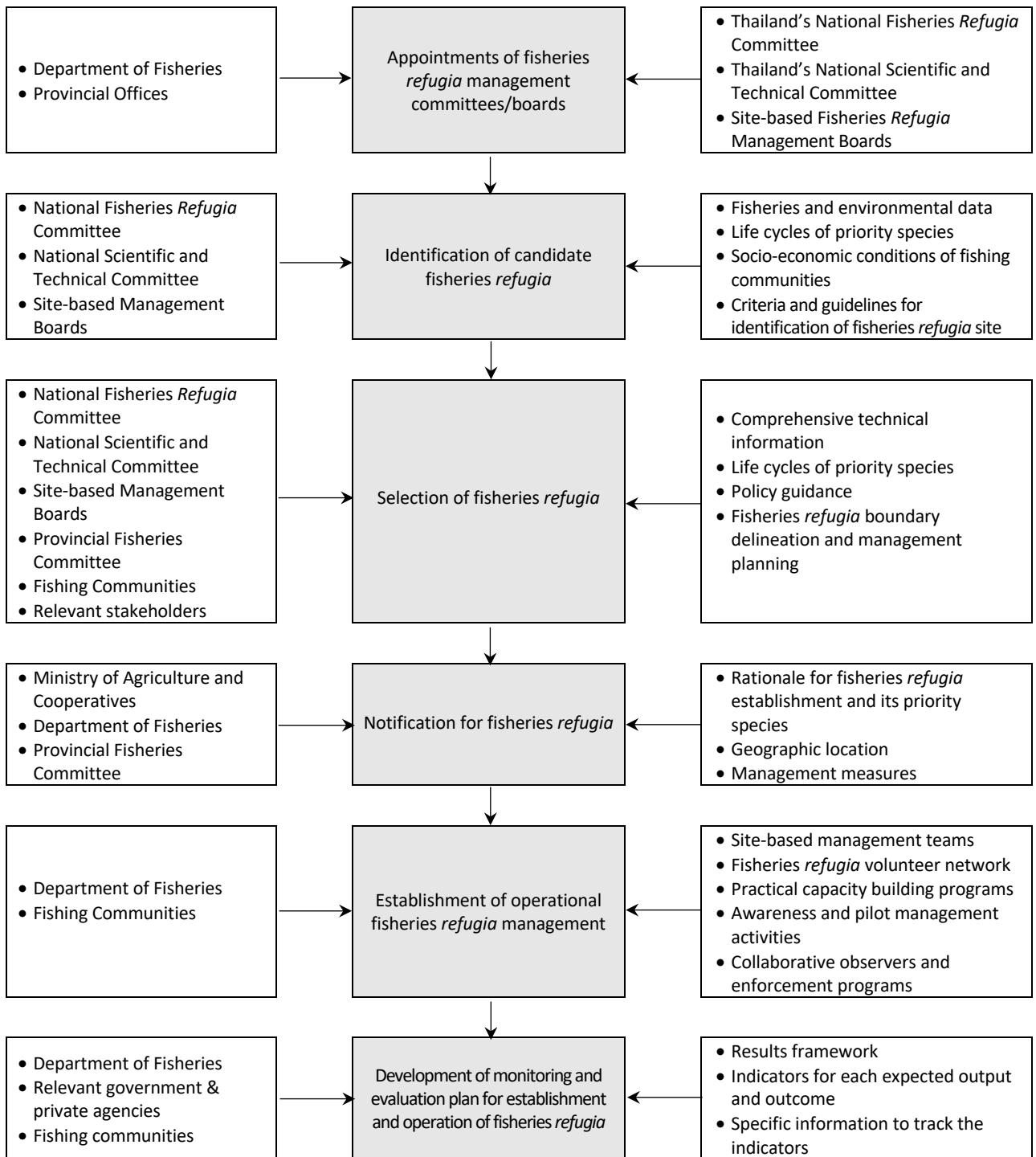


Figure 11-2 Framework for Development of Fisheries Refugia in Thailand

12. REFERENCES

- Department of Fisheries. 2015. Marine fisheries management plan of Thailand: a national policy for marine fisheries management 2015-2019. Department of Fisheries, Ministry of Agriculture and Cooperatives. 114 pp.
- Department of Fisheries. 2020. Marine fisheries management plan of Thailand: 2020-2022. Department of Fisheries, Ministry of Agriculture and Cooperatives. 97 pp.
- Department of Fisheries. 2022 a. Fisheries statistics of Thailand 2020. Document No. 4/2022, Fisheries Development Policy and Planning Division, Department of Fisheries, Ministry of Agriculture and Cooperatives. 84 pp. (*in Thai*)
- Department of Fisheries. 2022 b. Thai fishing vessels statistics 2022. Document No. 8/2022, Fisheries Development Policy and Planning Division, Department of Fisheries, Ministry of Agriculture and Cooperatives. 217 pp. (*in Thai*)
- Paterson, C.J., Pernetta, J.C., Siriraksophon, S., Kato, Y., Barut, N.C., Saikliang, P., Vibol, O., Chee, P.E. , Nguyen, T.N., Perbowo, N., Yunanda, T., Armada, N.B. 2013. Fisheries *refugia*: a novel approach to integrating fisheries and habitat management in the context of small-scale fishing pressure. *Ocean & Coastal Management* 85: 214-229.
- Royal Ordinance on Fisheries B.E. 2558 (2015). (2015, November 13). Government Gazette. Volume 132 Part 108 A. p. 1-45. (*in Thai*)
- Royal Ordinance on Fisheries (No. 2) B.E. 2560 (2017). (2017, June 28). Government Gazette. Volume 134 Part 67 A. p. 1-18. (*in Thai*)
- SEAFDEC. 2006. Supplementary guidelines on co-management using group user rights, fishery statistics, indicators and fisheries refugia. Southeast Asian Fisheries Development Center, Bangkok, Thailand. 84 pp.
- SEAFDEC. 2014. Establishment and operation of a regional system of fisheries *refugia* in the South China Sea and Gulf of Thailand: National project document for Thailand. SEAFDEC/UNEP/GEF Fisheries *Refugia* Project, Training Department of the Southeast Asian Fisheries Development Center, Samut Prakan, Thailand. 55 pp.
- SEAFDEC. 2016. Project management framework for the fisheries *refugia* project. Regional Inception Workshop for the SEAFDEC/UNEP/GEF Project: Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand. Bangkok, Thailand, 1st – 3rd November 2016. 4 pp.
- UNEP/GEF/SCS. 2007. Procedure for establishing a regional system of fisheries *refugia* in the South China Sea and Gulf of Thailand. In: The Context of the UNEP/GEF Project Entitled: “*Reversing Environmental Degradation Trends in the South China Sea and Gulf of Thailand*”. Information on *refugia* based on documentation by UNEP/GEF/SCS. 15 pp.

ANNEX 1

(Unofficial Translation)

Notification of Department of Fisheries**No. 459/2564****Re: Appointment of Thailand's National Fisheries *Refugia* Committee**

Department of Fisheries has have a cooperation for implementation of the project entitled "Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand" funded by Global Environmental Facility (GEF), which aims to improve management system of fisheries and critical marine habitats linkages in the South China Sea and Gulf of Thailand as well as promote sustainability of fisheries and fishing communities in the region. There are six countries participating in the Project, namely, The Kingdom of Cambodia, Republic of Indonesia, Malaysia, Republic of the Philippines, The Socialist Republic of Vietnam, and The Kingdom of Thailand.

Whereas there was a reorganization in the Department of Fisheries which affected the membership of Thailand's National Fisheries *Refugia* Committee, therefore, the Notification of Department of Fisheries No. 1130/1/2561 Re: an Appointment of Thailand's National Fisheries *Refugia* Committee, dated 27th November B.E. 2561 (2018) shall be repealed. Thus, Thailand's National Fisheries *Refugia* Committee shall be appointed comprising the following members:

- | | |
|--|-----------------------------------|
| 1. Director-General of the Department of Fisheries, or his/her Representative | Chairperson |
| 2. Senior Expert in Fisheries Management, Department of Fisheries | Vice Chairperson |
| 3. Director of Marine Fisheries Research and Development Division,
Department of Fisheries | Vice Chairperson |
| 4. Representative of Project Coordinating Unit (SEAFDEC) | Project Advisor |
| 5. Dean of the Faculty of Fisheries, Kasetsart University | Committee |
| 6. Senior Expert in Spatial Fisheries, Department of Fisheries | Committee |
| 7. Inspector-General-Head to the Department of Fisheries | Committee |
| 8. Director of Coastal Aquaculture Research and Development Division,
Department of Fisheries | Committee |
| 9. Director of Marine and Coastal Resources Research and Development Institute,
Department of Marine and Coastal Resources | Committee |
| 10. Special Expert in the Research of Resources and Environment in Marine and
Coastal Ecosystem, Department of Marine and Coastal Resources | Committee |
| 11. Director of Trat Provincial Fisheries Office, Department of Fisheries | Committee |
| 12. Director of Surat Thani Provincial Fisheries Office, Department of Fisheries | Committee |
| 13. Senior Expert in Marine Fisheries, Department of Fisheries
(Thailand's National Focal Point) | Committee and Secretary |
| 14. Director of Rayong Marine Fisheries Research
and Development Center, Department of Fisheries | Committee and Assistant Secretary |
| 15. Director of Chumphon Marine Fisheries Research
and Development Center, Department of Fisheries | Committee and Assistant Secretary |

Terms of Reference for Thailand's National Fisheries *Refugia* Committee are:

1. Approve work plan and financial plan for the implementation of the Project entitled "Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand" in Thailand;
2. Approve quarterly progress report, expenditure report, costed work plan, and cash advance request;

3. Approve annual progress reports for submission to Project Coordinating Unit;
4. Assume overarching responsibility for the project execution of the Department of Fisheries regarding the Letter of Agreement; and
5. Take the other necessary actions for the effectiveness of project implementation in Thailand.

In case of the previous notifications or any other orders contrary to this Notification, this Notification shall be used.

This Notification shall be effective from now on.

Notified on 9th June B.E. 2564 (2021)

Signed Mesak Pakdeekong

(Mr. Mesak Pakdeekong)

Director-General of the Department of Fisheries

ANNEX 2

(Unofficial Translation)

Notification of Department of Fisheries**No. 460/2564****Re: Appointment of Thailand's National Scientific and Technical Committee**

Department of Fisheries has have a cooperation for implementation of the project entitled "Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand" funded by Global Environmental Facility (GEF), which aims to improve management system of fisheries and critical marine habitats linkages in the South China Sea and Gulf of Thailand as well as promote sustainability of fisheries and fishing communities in the region. There are six countries participating in the Project, namely, The Kingdom of Cambodia, Republic of Indonesia, Malaysia, Republic of the Philippines, The Socialist Republic of Vietnam, and The Kingdom of Thailand.

Whereas there was a reorganization in the Department of Fisheries which affected the membership of Thailand's National Scientific and Technical Committee , therefore, the Notification of Department of Fisheries No. 1130/2560 Re: an Appointment of Thailand's National Scientific and Technical Committee, dated 27th November B.E. 2561 (2018) shall be repealed. Thus, Thailand's National Scientific and Technical Committee shall be appointed comprising the following members:

- | | |
|--|-------------------------|
| 1. Senior Expert in Fisheries Management, Department of Fisheries | Chairperson |
| 2. Director of Marine Fisheries Research and Development Division,
Department of Fisheries | Vice Chairperson |
| 3. Ms. Prulai Nootmorn, Senior Expert in Marine Fisheries, Department of Fisheries
(Thailand's National Focal Point) | Vice Chairperson |
| 4. Special Expert in the Research of Resources and Environment in Marine and
Coastal Ecosystem, Department of Marine and Coastal Resources | Committee |
| 5. Director of Chumphon Marine Fisheries Research and Development Center,
Department of Fisheries | Committee |
| 6. Director of Songkhla Marine Fisheries Research and Development Center,
Department of Fisheries | Committee |
| 7. Senior Expert in Spatial Fisheries, Department of Fisheries | Committee |
| 8. Senior Expert in Ecology, Department of Fisheries | Committee |
| 9. Director of the Marine and Coastal Resources Research and Development Center
the Eastern Gulf of Thailand, Department of Marine and Coastal Resources | Committee |
| 10. Director of the Marine and Coastal Resources Research and Development Center
the Central Gulf of Thailand, Department of Marine and Coastal Resources | Committee |
| 11. Director of Geo-informatics Applications and Service Office, Geo-informatics and
Space Technology Development Agency (Public Organization) | Committee |
| 12. Asst. Prof. Dr. Amonsak Sawusdee, Director of the Center for Academic Service,
Walailak University | Committee |
| 13. Ms. Penchan Laongmanee, Lecturer for the Faculty of Marine Technology,
Burapha University, Chanthaburi Campus | Committee |
| 14. Mr. Weerachai Phetsut, Lecturer for Coastal Aquaculture Program,
Maejo University at Chumphon | Committee |
| 15. Technical Officers of Southeast Asian Fisheries Development Center | Committee |
| 16. Director of Rayong Marine Fisheries Research and Development Center,
Department of Fisheries | Committee and Secretary |
| 17. Mr. Udom Khrueniam, Technical Officer of Rayong Marine Fisheries Research | |

- and Development Center, Department of Fisheries Committee and Assistant Secretary
18. Mr. Jirawut Kumpirod, Technical Officer of Chumphon Marine Fisheries
Research and Development Center, Department of Fisheries Committee and Assistant Secretary
19. Mr. Akanit Kuapuag, Technical Officer of Chumphon Marine Fisheries
Research and Development Center, Department of Fisheries Committee and Assistant Secretary

Terms of Reference for Thailand's National Scientific and Technical Committee are:

1. Support data, evaluation, review, co-ordination, and advice, from a scientific and technical perspective, for the implementation of the Project entitled "Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand" in Thailand;
2. Provide the Thailand's National Fisheries *Refugia* Committee with technical guidance and suggestions;
3. Review technical information and progress reports from Site-Based Fisheries *Refugia* Management Boards in line with the purpose of the Project;
4. Facilitate co-operation with relevant organizations to enhance the comprehensive and accurate technical information for managing fisheries *refugia*; and
5. Take the other necessary technical actions for the effectiveness of project implementation in Thailand.

In case of the previous notifications or any other orders contrary to this Notification, this Notification shall be used.

This Notification shall be effective from now on.

Notified on 9th June B.E. 2564 (2021)

Signed Mesak Pakdeekong

(Mr. Mesak Pakdeekong)

Director-General of the Department of Fisheries

ANNEX 3

(Unofficial Translation)

Notification of Trat Province**No. 808/2564****Re: Appointment of Site-Based Fisheries *Refugia* Management Board in Trat Province**

Department of Fisheries has have a cooperation for implementation of the project entitled “Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand” funded by Global Environmental Facility (GEF), which aims to improve management system of fisheries and critical marine habitats linkages in the South China Sea and Gulf of Thailand as well as promote sustainability of fisheries and fishing communities in the region. In this regard, coastal area in Trat Province has been selected for one of the fisheries *refugia* sites in Thailand; and Trat Province has issued the Notification of Trat Province No. 472/2562 Re: Appointment of Site-Based Fisheries *Refugia* Management Board in Trat Province, dated 14th March B.E. 2562 (2019).

In order to implement the project properly and efficiently, covering the entire coastal area of Trat Province, and in accordance with the reorganization in each corresponding institution of the committee, the Notification of Trat Province No. 472/2562 Re: Appointment of Site-Based Fisheries *Refugia* Management Board in Trat Province, dated 14th March B.E. 2562 (2019) shall be repealed. Thus, Site-Based Fisheries *Refugia* Management Board in Trat Province shall be appointed comprising the following members:

- | | |
|--|------------------|
| 1. Director of Trat Fisheries Provincial Office | Chairperson |
| 2. Director of Rayong Marine Fisheries Research and Development Center,
Department of Fisheries | Vice Chairperson |
| 3. Director of Marine and Coastal Resources Research and Development Center,
the Eastern Gulf of Thailand, Department of Marine and Coastal Resources | Committee |
| 4. Head of Mu Ko Chang National Park, Department of National Parks, Wildlife
and Plant Conservation | Committee |
| 5. Head of Marine National Park Operation Center 4 Trat, Department of National
Parks, Wildlife and Plant Conservation | Committee |
| 6. Head of Trat Marine Fisheries Patrol Unit, Department of Fisheries | Committee |
| 7. Head of Trat Marine and Coastal Resources Conservation Unit,
Department of Marine and Coastal Resources | Committee |
| 8. Chief of Mueang Trat Fisheries District Office | Committee |
| 9. Chief of Khlong Yai Fisheries District Office | Committee |
| 10. Chief of Ko Chang Fisheries District Office | Committee |
| 11. Chief of Laem Ngop Fisheries District Office | Committee |
| 12. Chief of Khao Saming Fisheries District Office | Committee |
| 13. Asst. Prof. Sontaya Koolkalya, Ph.D., Lecturer for the Faculty of Agricultural
Technology, Rambhai Barni Rajabhat University | Committee |
| 14. Ms. Penchan Laongmanee, Lecturer for the Faculty of Marine Technology,
Burapha University, Chanthaburi Campus | Committee |
| 15. Director of Sustainable Development Foundation | Committee |
| 16. President of the Fisheries Association of Trat | Committee |
| 17. President of the corporate Fisher Association of Khlong Yai District | Committee |
| 18. Chairperson of the Local Fishing Community Organization of Ko Chang
Ecotourism Small-scale Fishing Boats | Committee |
| 19. Chairperson of the Local Fishing Community Organization of Ban Nam Chieo | |

Ecotourism Small-scale Fishing Boats	Committee
20. Chairperson of the Local Fishing Community Organization of Nom Klao Marine Conservation Group	Committee
21. Chairperson of the Local Fishing Community Organization of Khlong Takhian Small-scale Fishing Group	Committee
22. Chairperson of the Local Fishing Community Organization of Had Lek Sub-district Fishing Group	Committee
23. Chairperson of the Local Fishing Community Organization of Ban Salak Khok Coastal Fishing Group	Committee
24. Chairperson of the Local Fishing Community Organization of Ko Kut Small-scale Fishing Group	Committee
25. Chairperson of the Local Fishing Community Organization of Ban Pak Khlong Small-scale Fishing Conservation Group	Committee
26. Chairperson of the Local Fishing Community Organization of Ban Khlong Lord Full-Egg-Crab Bank Group	Committee
27. President of Ruam Chai Purse Seine Association	Committee
28. Representative of the Local Fishing Community Organization of Ao Yai Coastal Small-scale Fishing Conservation Group	Committee
29. Head of Fishing Ground Development and Rehabilitation Unit, Rayong Marine Fisheries Research and Development Center, Department of Fisheries	Committee and Secretary
30. Head of Fisheries Administration and Management Group, Trat Fisheries Provincial Office, Department of Fisheries	Committee and Assistant Secretary

Terms of Reference for Site-Based Fisheries *Refugia* Management Board in Trat Province are:

1. Recommend for execution of establishment and operation of fisheries *refugia* in Trat Province;
2. Review and approve work plan and outputs of Fisheries *Refugia* Project regarding its purposes and goals;
3. Facilitate co-operation with relevant provincial organizations to promote the integrated approaches for effective management of fisheries resources and fisheries *refugia* under related concepts and regulations;
4. Review and approve progress reports for transmission to the meetings of the National Fisheries *Refugia* Committee;
5. Facilitate laying down the measures for sustainable management of fisheries *refugia* in Trat Province under acceptances from stakeholders and relevant provincial organizations; and
6. Take the other necessary actions for effectiveness of fisheries *refugia* management in Trat Province.

In case of the previous notifications or any other orders contrary to this Notification, this Notification shall be used.

This Notification shall be effective from now on.

Notified on 9th May B.E. 2564 (2021)

Signed Kulchai Thepworachai

(Mr. Kulchai Thepworachai)

Vice Governor, for the Governor of Trat Province

ANNEX 4

(Unofficial Translation)

Notification of Surat Thani Province**No. 2932/2564****Re: Appointment of Site-Based Fisheries *Refugia* Management Board in Surat Thani Province
for Establishment and Operation of a Regional System of Fisheries *Refugia*
in the South China Sea and Gulf of Thailand**

Department of Fisheries has have a cooperation for implementation of the project entitled “Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand” funded by Global Environmental Facility (GEF), which aims to improve management system of fisheries and critical marine habitats linkages in the South China Sea and Gulf of Thailand as well as promote sustainability of fisheries and fishing communities in the region. In this regard, coastal area in Surat Thani Province has been selected for one of the fisheries *refugia* sites in Thailand.

In order to implement the project properly and efficiently, covering the entire coastal area of Surat Thani Province, and in accordance with the reorganization in each corresponding institution of the committee, the Notification of Surat Thani Province No. 2079/2562 Re: Appointment of Site-Based Fisheries *Refugia* Management Board in Surat Thani Province for Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand, dated 20th March B.E. 2562 (2019) shall be repealed. Thus, Site-Based Fisheries *Refugia* Management Board in Surat Thani Province shall be appointed comprising the following members:

- | | |
|--|-------------|
| 1. Director of Surat Thani Fisheries Provincial Office | Chairperson |
| 2. Director of Chumphon Marine Fisheries Research and Development Center,
Department of Fisheries | Committee |
| 3. Director of Surat Thani Coastal Aquaculture Research and Development Center,
Department of Fisheries | Committee |
| 4. Director of Marine and Coastal Resources Research and Development Center,
the Central Gulf of Thailand, Department of Marine and Coastal Resources | Committee |
| 5. Director of Provincial Office of Natural Resources and Environment Surat Thani,
Ministry of Natural Resources and Environment | Committee |
| 6. Chief of Mueang Surat Thani Fisheries District Office | Committee |
| 7. Chief of Tha Chana Fisheries District Office | Committee |
| 8. Chief of Chaiya Fisheries District Office | Committee |
| 9. Chief of Tha Chang Fisheries District Office | Committee |
| 10. Chief of Phun Phin Fisheries District Office | Committee |
| 11. Chief of Kanchanadit Fisheries District Office | Committee |
| 12. Chief of Donsak Fisheries District Office | Committee |
| 13. President of the Fisher Association of Surat Thani | Committee |
| 14. President of the trawl Association of Surat Thani | Committee |
| 15. Tha Chana Subdistrict Head | Committee |
| 16. Takrop Subdistrict Head | Committee |
| 17. Phum Riang Subdistrict Head | Committee |
| 18. Li Let Subdistrict Head | Committee |
| 19. Khlong Chanak Subdistrict Head | Committee |
| 20. Village Headman of Moo 10 Ban Nang Kam, Donsak Subdistrict | Committee |
| 21. Tha Thong Mai Subdistrict Head | Committee |
| 22. Thakhian Thong Subdistrict Head | Committee |
| 23. Kadae Subdistrict Head | Committee |

24. Tha Thong Subdistrict Head	Committee
25. Phlai Wat Subdistrict Head	Committee
26. Chairperson of Tha Krachai Small-Scale Fishing Group	Committee
27. Chairperson of Ao Li Let Mangrove Conservation and Aquatic Resources Enrichment Group	Committee
28. Chairperson of Aquatic Resources Management for Sustainable Community Group	Committee
29. Chairperson of the Local Fishing Community Organization of Ao Don Sak Resource Conservation Group	Committee
30. Chairperson of the Local Fishing Community Organization of Tha Chang Coastal Small-Scale Fishing Group	Committee
31. Chairperson of the Local Fishing Community Organization of Phum Rieng Aquatic Resources Conservation Group	Committee
32. Chairperson of Forest and Sea for Life Foundation	Committee
33. Asst. Prof. Amonsak Sawusdee, Ph.D., Walailak University	Committee
34. Director of Marine and Coastal Resources Administration Office 4, Department of Marine and Coastal Resources	Committee
35. Head of Lang Suan Marine Fisheries Patrol Unit, Chumphon, Department of Fisheries	Committee
36. Head of Koh Tao Marine Fisheries Patrol Unit, Surat Thani, Department of Fisheries	Committee
37. Head of Fishing Ground Development and Rehabilitation Unit, Chumphon Marine Fisheries Research and Development Center, Department of Fisheries	Committee
38. Head of Fisheries Administration and Management Group, Surat Thani Fisheries Provincial Office, Department of Fisheries	Committee and Secretary
39. Assigned Fisheries Technical Officer, Chumphon Marine Fisheries Research and Development Center, Department of Fisheries	Committee and Assistant Secretary

Terms of Reference of Site-Based Fisheries *Refugia* Management Board in Surat Thani Province are:

1. Recommend for execution of establishment and operation of fisheries *refugia* in Surat Thani Province;
2. Review and approve work plan and outputs of Fisheries *Refugia* Project regarding its purposes and goals;
3. Facilitate co-operation with relevant provincial organizations to promote the integrated approaches for effective management of fisheries resources and fisheries *refugia* under related concepts and regulations;
4. Review and approve progress reports for transmission to the meetings of the National Fisheries *Refugia* Committee;
5. Facilitate laying down the measures for sustainable management of fisheries *refugia* in Surat Thani Province under acceptances from stakeholders and relevant provincial organizations; and
6. Take the other necessary actions for effectiveness of fisheries *refugia* management in Surat Thani Province.

In case of the previous notifications or any other orders contrary to this Notification, this Notification shall be used.

This Notification shall be effective from now on.

Notified on 6th May B.E. 2564 (2021)

Signed Witchawut Chinto

(Mr. Witchawut Chinto)

Governor of Surat Thani Province

ANNEX 5

(Unofficial Translation)

Notification of Ministry of Agriculture and Cooperatives
Re: Prescribing Fishing Gears, Fishing Methods, Fishing Areas, and Conditions Prohibited from Fishing
in some Parts of the Fishing Ground in Trat Province
B.E. 2565

Whereas some parts of the fishing ground in Trat Province are places of abundant aquatic animal resources, rich ecosystem, and significant fishing grounds, as well as a migration route for short mackerel population. It is found that particularly in the period from January to February every year, a large number of fully mature short mackerel migrate into the areas for inhabiting, taking refuge, and breeding. At present, however, it appears that some inappropriate fishing gears are used for fishing in such areas. If fishing by such fishing gears continues, it will cause catching a great quantity of short mackerel which affect the abundance of short mackerel resources. Thus, to control fishing so as not to degrade the sustainability of aquatic animal resources, particularly to prevent excess catch of short mackerel breeders which will result in enhancing their opportunity of spawning and propagation so that they can maintain their status as food sources for people and fisheries resources for sustainable fishing, it is expedient to impose conservation and management measures aiming at balancing the nature and maintaining sustainability of aquatic animal resources and ecosystem on the basis of precautionary principle.

By virtue of the provisions of Section 71, first paragraph (1) of the Royal Ordinance on Fisheries B.E. 2558 (2015), the Minister of Agriculture and Cooperatives hereby issues the Notification as follows:

Clause 1 In the period from 1 January to 29 February every year, no person shall fish in some parts of the fishing ground in Trat Province by the following fishing gears:

- (1) Purse seines fitted to motor vessels; and
- (2) Pair trawls fitted to motor vessels.

The boundaries of such areas appear on the map attached to this Notification.

Clause 2 This Notification shall come into force as from the day following date of its publication in the Government Gazette.

Notified on 26th May B.E. 2565 (2022)

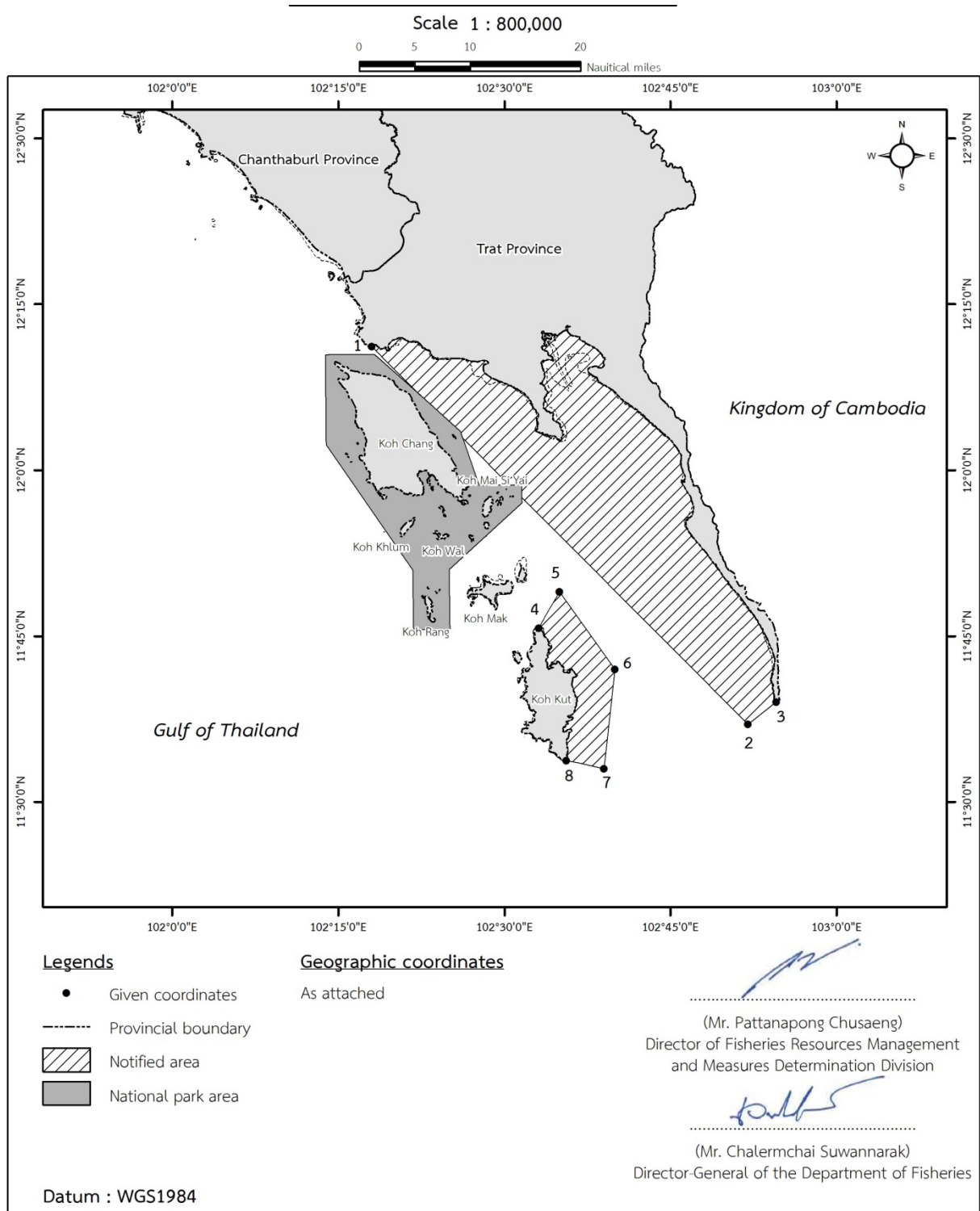
Signed Chalermchai Srion

(Mr. Chalermchai Srion)

Minister of Agriculture and Cooperatives

(Unofficial Translation)

**Map attached to Notification of Ministry of Agriculture and Cooperatives
Re: Prescribing Fishing Gears, Fishing Methods, Fishing Areas, and Conditions Prohibited from Fishing
in some Parts of the Fishing Ground in Trat Province
B.E. 2565**



(Unofficial Translation)

Geographic coordinates for boundaries of the areas in some parts of the fishing ground in Trat Province prohibited from fishing by purse seines and pair trawls fitted to motor vessels

Point	Latitude North	Longitude East
1	12° 11' 10.1040" (12° 11.168')	102° 18' 01.1880" (102° 18.020')
2	11° 37' 00.0000" (11° 37.000')	102° 52' 00.0000" (102° 52.000')
3	11° 39' 01.4040" (11° 39.023')	102° 54' 33.5520" (102° 54.559')
4	11° 45' 43.0920" (11° 45.718')	102° 33' 08.2080" (102° 33.137')
5	11° 49' 00.0000" (11° 49.000')	102° 35' 00.0000" (102° 35.000')
6	11° 42' 00.0000" (11° 42.000')	102° 40' 00.0000" (102° 40.000')
7	11° 33' 00.0000" (11° 33.000')	102° 39' 00.0000" (102° 39.000')
8	11° 33' 42.9480" (11° 33.716')	102° 35' 36.2760" (102° 35.605')

ANNEX 6

(Unofficial Translation)

Notification of Surat Thani Provincial Fisheries Committee**Re: Prohibition of Some Fishing Gears Fishing in the Fishing Ground within the Coastal Seas
around the Area of Koh Sed, Phum Rieng Subdistrict, Chaiya District, Surat Thani Province
B.E. 2565**

Whereas the fishing ground in the coastal seas around the area of Koh Sed, Phum Rieng Subdistrict, Chaiya District, Surat Thani Province is a place of biodiversity and rich of aquatic animal resources and ecosystem as well as seagrass bed which is a significant place for inhabiting, taking refuge, breeding, spawning, and larval rearing of aquatic animals, particularly young blue swimming crabs. At present, however, it appears that some fishing gears inappropriate for young blue swimming crabs are used for fishing in such area. If fishing by such fishing gears continues, it will cause catching a large number of premature blue swimming crabs which will affect the abundance of blue swimming crab resources in the area. Thus, to control fishing so as not to degrade the sustainability of blue swimming crab resources and to conserve seagrass ecosystem for serving as the fisheries refugia for young aquatic animals, it is expedient to impose conservation and management measures aiming at balancing the nature and maintaining sustainability of aquatic animal resources and ecosystem on the basis of precautionary principle.

By virtue of the provisions of Section 28, first paragraph (3) appurtenant to Section 71, first paragraph (1) of the Royal Ordinance on Fisheries B.E. 2558 (2015), Surat Thani Provincial Fisheries Committee, with the approval of the Minister of Agriculture and Cooperatives, hereby issues the Notification as follows:

Clause 1 No person shall use the following fishing gears fishing in the fishing ground within the coastal seas around the area of Koh Sed, Phum Rieng Subdistrict, Chaiya District, Surat Thani Province, the boundary of which appears on the map attached to this Notification:

- (1) Crab traps; and
- (2) Crab gill nets of a mesh size less than 3 inches.

Clause 2 This Notification shall come into force as from the day following date of its publication in the Government Gazette.

Notified on 8th March B.E. 2565 (2022)

Signed Witchawut Chinto

(Mr. Witchawut Chinto)

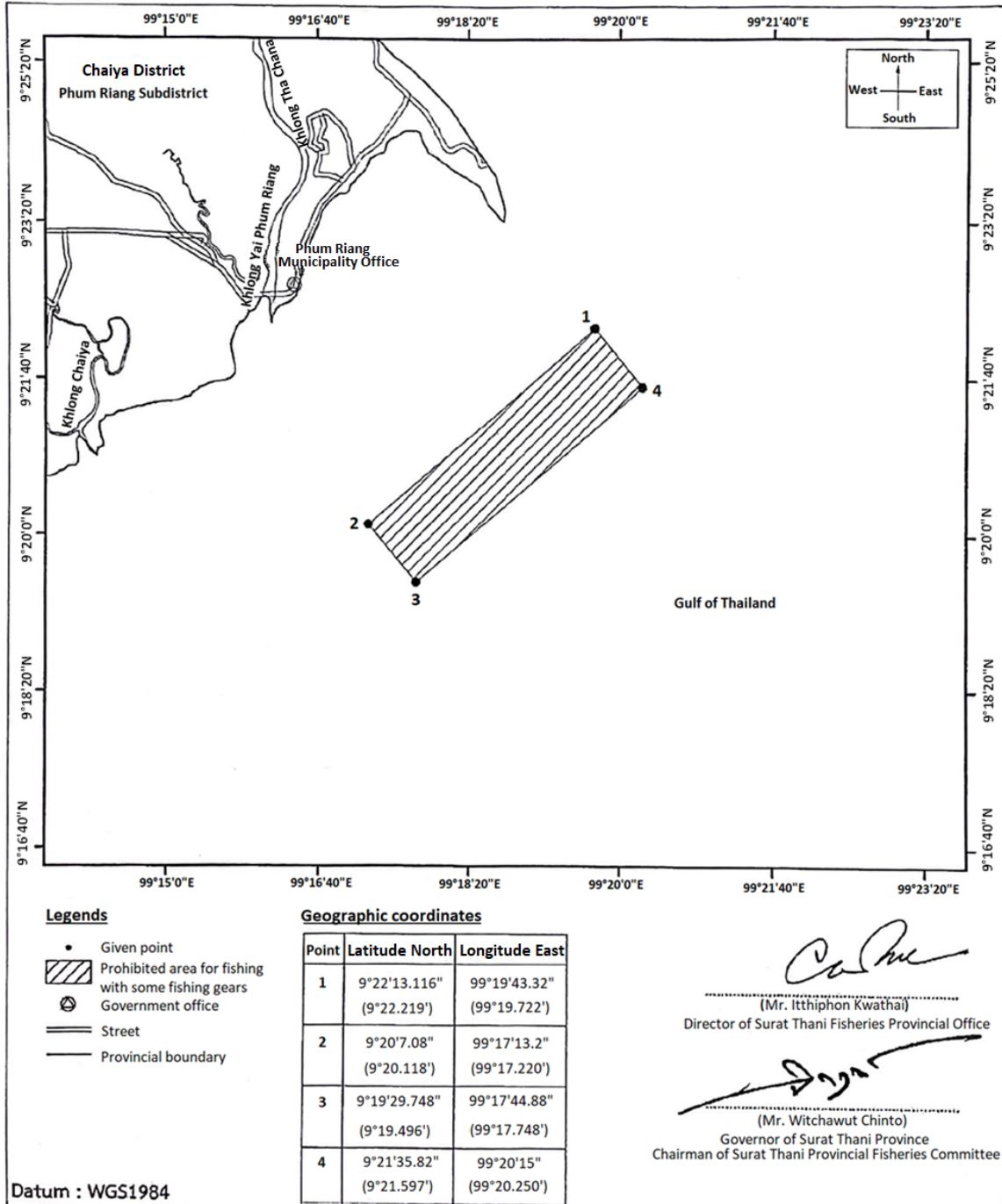
Governor of Surat Thani Province

Chairman of Surat Thani Provincial Fisheries Committee

(Unofficial Translation)

**Map attached to Notification of Surat Thani Provincial Fisheries Committee
 Re: Prohibition of Some Fishing Gears Fishing in the Fishing Ground within the Coastal Seas
 around the Area of Koh Sed, Phum Rieng Subdistrict, Chaiya District, Surat Thani Province
 B.E. 2565**

Scale 1 : 100,000



ANNEX 7

(Unofficial Translation)

Notification of Trat Province**No. 1524/2565****Re: Appointment of Operational Management Board for Fisheries *Refugia* in Trat Province**

According to the mutual agreement of the Department of Fisheries and stakeholders in the coastal communities in five districts of Trat Province, namely, Mueang Trat District, Khlong Yai District, Laem Ngop District, Koh Chang District, and Koh Kut District on the establishment of fisheries *refugia*, particularly for short mackerel spawners, at the area of 966,250 rai in the fishing ground of Trat Province, pursuant to Notification of Ministry of Agriculture and Cooperatives Re: Prescribing Fishing Gears, Fishing Methods, Fishing Areas, and Conditions Prohibited from Fishing in some Parts of the Fishing Ground in Trat Province, B.E. 2565, dated 26th May B.E. 2565 (2022);

In order for effectively operational management and the achievement of being a fisheries *refugia*, Operational Management Board for Fisheries *Refugia* in Trat Province shall be appointed, comprising the following members:

- | | |
|---|------------------|
| 1. Director of Trat Fisheries Provincial Office | Advisor |
| 2. President of the Fisheries Association of Trat | Chairperson |
| 3. Mayor of Had Lek Subdistrict | Vice Chairperson |
| 4. Chief of Mueang Trat Fisheries District Office | Committee |
| 5. Chief of Khlong Yai Fisheries District Office | Committee |
| 6. Chief of Koh Chang Fisheries District Office | Committee |
| 7. Chief of Laem Ngop Fisheries District Office | Committee |
| 8. Chief of Khao Saming Fisheries District Office | Committee |
| 9. Head of Fisheries Administration and Management Group,
Trat Fisheries Provincial Office | Committee |
| 10. Fisheries Technical Officer, Rayong Marine Fisheries Research
and Development Center | Committee |
| 11. President of Trat Small-scale Fishing Sea Watch Association | Committee |
| 12. President of the corporate Fisher Association of Khlong Yai District | Committee |
| 13. Chairperson of the Local Fishing Community Organization
of Koh Chang Ecotourism Small-scale Fishing Boats | Committee |
| 14. Chairperson of the Local Fishing Community Organization
of Ban Nam Chieo Ecotourism Small-scale Fishing Boats | Committee |
| 15. Chairperson of the Local Fishing Community Organization
of Khlong Takhian Small-scale Fishing Group | Committee |
| 16. Chairperson of the Local Fishing Community Organization
of Had Lek Sub-district Fishing Group | Committee |
| 17. Chairperson of the Local Fishing Community Organization
of Ban Salak Khok Coastal Fishing Group | Committee |
| 18. Chairperson of the Local Fishing Community Organization
of Ban Pak Khlong Small-scale Fishing Conservation Group | Committee |
| 19. Chairperson of the Local Fishing Community Organization
of Ban Khlong Lord Full-Egg-Crab Bank Group | Committee |
| 20. Chairperson of the Local Fishing Community Organization
of Koh Kut Small-scale Fishing Group | Committee |
| 21. President of Ruam Chai Purse Seine Association | Committee |

- | | |
|---|-------------------------|
| 22. Chairperson of the Local Fishing Community Organization of Blue Swimming Crab in Ban Laem Klat | Committee |
| 23. Mr. Sak Sahwatdi, Representative of the Local Fishing Community Organization of Ao Yai Coastal Small-scale Fishing Conservation Group | Committee |
| 24. Mr. Praiwan Si-in, a member of Trat Marine and Coastal Resources Committee | Committee |
| 25. Representative of Sustainable Development Foundation | Committee |
| 26. Chairperson of the Local Fishing Community Organization of Nom Klao Marine Conservation Group | Committee and Secretary |

Terms of Reference for Operational Management Board for Fisheries *Refugia* in Trat Province are:

1. Provide communities with management approaches in the area in accordance with Notification of Ministry of Agriculture and Cooperatives Re: Prescribing Fishing Gears, Fishing Methods, Fishing Areas, and Conditions Prohibited from Fishing in some Parts of the Fishing Ground in Trat Province, B.E. 2565, dated 26th May B.E. 2565 (2022);
2. Cooperate with relevant agencies in planning and implementing activities and projects for area management in fisheries *refugia* site;
3. Review and evaluate progress in implementation of the activities and projects, and make an improvement for the effectiveness of the area management;
4. Monitor fishing activities in fisheries *refugia* site in accordance with the Notification and coordinate with relevant agencies; and
5. Conduct any other activities that contribute to the effectiveness of the fisheries management for the sustainability of fisheries resources and ecosystem in Trat fisheries *refugia* site.

This Notification shall be effective from now on.

Notified on 25th August B.E. 2565 (2022)

Signed Chamnanwit Terat
(Mr. Chamnanwit Terat)
Governor of Trat Province

ANNEX 8

(Unofficial Translation)

Notification of Surat Thani Province**No. 1963/2565****Re: Appointment of Operational Management Board for Fisheries *Refugia* in the Coastal Seas around the Area of Koh Sed, Phum Riang Subdistrict, Chaiya District, Surat Thani Province**

According to the mutual agreement of the Department of Fisheries and stakeholders in Ban Don Bay of Surat Thani Province on the establishment of fisheries *refugia*, particularly for young blue swimming crabs, at the area of 5,625 rai in the fishing ground within the coastal seas around the area of Koh Sed, Phum Riang Subdistrict, Chaiya District, Surat Thani Province, pursuant to Notification of Surat Thani Provincial Fisheries Committee Re: Prohibition of Some Fishing Gears Fishing in the Fishing Ground within the Coastal Seas around the Area of Koh Sed, Phum Riang Subdistrict, Chaiya District, Surat Thani Province, B.E. 2565, dated 8th March B.E. 2565 (2022);

In order for effectively operational management and the achievement of being a fisheries *refugia*, Operational Management Board for Fisheries *Refugia* in the Coastal Seas around the Area of Koh Sed, Phum Riang Subdistrict, Chaiya District, Surat Thani Province shall be appointed, comprising the following members:

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| 1. Mayor of Phum Riang Subdistrict, Chaiya District | Chairperson |
| 2. Li Let Subdistrict Head, Phun Phin District | Vice Chairperson |
| 3. Mayor of Takrop Subdistrict, Chaiya District | Committee |
| 4. Mayor of Lamed Subdistrict, Chaiya District | Committee |
| 5. Takrop Subdistrict Head, Chaiya District | Committee |
| 6. Lamed Subdistrict Head, Chaiya District | Committee |
| 7. Chairperson of the Local Fishing Community Organization of Aquatic Animal Resources Management Group for Sustainable Community | Committee |
| 8. Chairperson of the Local Fishing Community Organization of the Group for Releasing Blue Swimming Crab into Ban Don Bay of Thai Seas | Committee |
| 9. Chairperson of the Local Fishing Community Organization of Had Sai Kaew Small-scale Fishing Group | Committee |
| 10. Chairperson of the Local Fishing Community Organization of Fai Phru Small-scale Fishing Group | Committee |
| 11. Representative of Tha Chana District: Mr. Piya Sae-ear | Committee |
| 12. Representative of Tha Chang District: Mr. Jirot Puakkliang | Committee |
| 13. Representative of Phun Phin District: Mr. Pramot Salee | Committee |
| 14. Representative of Muang District: Mr. Thanawon Naksuwan | Committee |
| 15. Representative of Kanchanadit District: Mr. Jarong Plodchum | Committee |
| 16. Representative of Donsak District: Mr. Supphalak Tiewbutr | Committee |
| 17. Chairperson of Forest and Sea for Life Foundation | Committee |
| 18. Chief of Tha Chana Fisheries District Office | Committee |
| 19. Chief of Chaiya Fisheries District Office | Committee |
| 20. Chief of Tha Chang Fisheries District Office | Committee |
| 21. Chief of Phun Phin Fisheries District Office | Committee |
| 22. Chief of Muang Surat Thani Fisheries District Office | Committee |
| 23. Chief of Kanchanadit Fisheries District Office | Committee |
| 24. Chief of Donsak Fisheries District Office | Committee |
| 25. Head of Lang Suan Marine Fisheries Patrol Unit (Chumphon) | Committee |

26. Head of Fisheries Administration and Management Group, Surat Thani Fisheries Provincial Office Committee
27. Fisheries Technical Officer, Chumphon Marine Fisheries Research and Development Center Committee
28. Chairperson of the Local Fishing Community Organization of Phum Riang Subdistrict Aquatic Resources Conservation Group Committee and Secretary

Terms of Reference for Operational Management Board for Fisheries *Refugia* in the Coastal Seas around the Area of Koh Sed, Phum Riang Subdistrict, Chaiya District, Surat Thani Province are:

1. Provide communities with management approaches in the area in accordance with Notification of Surat Thani Provincial Fisheries Committee Re: Prohibition of Some Fishing Gears Fishing in the Fishing Ground within the Coastal Seas around the Area of Koh Sed, Phum Riang Subdistrict, Chaiya District, Surat Thani Province, B.E. 2565, dated 8th March B.E. 2565 (2022);
2. Cooperate with relevant agencies in planning and implementing activities and projects for area management in fisheries *refugia* site;
3. Review and evaluate progress in implementation of the activities and projects, and make an improvement for the effectiveness of the area management;
4. Monitor fishing activities in fisheries *refugia* site in accordance with the Notification and coordinate with relevant agencies; and
5. Conduct any other activities that contribute to the effectiveness of the fisheries management for the sustainability of fisheries resources and ecosystem in Surat Thani fisheries *refugia* site.

This Notification shall be effective from now on.

Notified on 11th March B.E. 2565 (2022)

Signed Sakdaporn Rattanasupa

(Mr. Sakdaporn Rattanasupa)

Vice Governor, for the Governor of Surat Thani Province