



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

**NATIONAL REVIEWS ON REFORMS OF NATIONAL
LEGISLATION FOR RESPONSIBLE FISHERIES RELATING
TO FISHERIES REFUGIA: THAILAND**

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1. INTRODUCTION

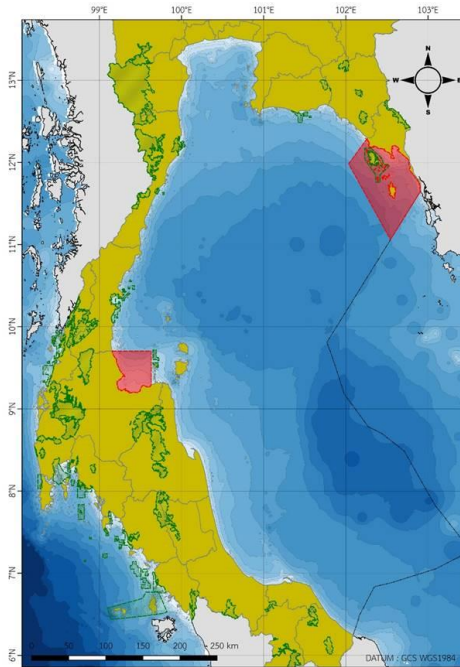


Figure 1 Fisheries *refugia* sites in Thailand

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).

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 to be the framework of project management. Preliminary surveys were firstly conducted, followed by stakeholder initiation meetings in the 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 the 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 the 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.

As per the operation and management of fisheries *refugia*, reforming national policy and legal for demarcating boundaries and managing fisheries *refugia* has been included as an activity in the Component 2 of the project implementation – 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. In this regard, national regulations for fisheries management in Thailand have been remarkably reformed since 2015 by the repeal of the national fisheries laws for Thailand, Fisheries Act B.E. 2490 (1947) (latest amended in B.E. 2558 (2015)), and the enactment of the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017) which are currently the fundamental for fisheries management in the country.

This report aims to review the reformed national legislation for responsible fisheries relating to fisheries *refugia* which are supportive to the management schemes in the priority fisheries *refugia* sites in Thailand. In addition, the report provides the current ministerial, provincial, and municipal regulations issued under the reformed national fisheries laws which have been enforced in the fisheries *refugia* sites. This can be considered as the data set of best practice approaches and measures for responsible fisheries and fisheries *refugia* management planning in the South China Sea and Gulf of Thailand.

2. CURRENT SITUATION OF MARINE FISHERIES FOR 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 2.46 million tons of fisheries production, valued at 168,626 million baht, in 2018 with the major contribution, 56.7%, from marine capture fisheries (Figure 2). Nevertheless, during the past decade, the total production decreased 25 percent from 3.29 million tons in 2009 to 2.46 million tons in 2018 (Figure 3). 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 (56.8%), followed by trash fish (23.3%), squid & cuttlefish (8.0%), and so on (Figure 4).

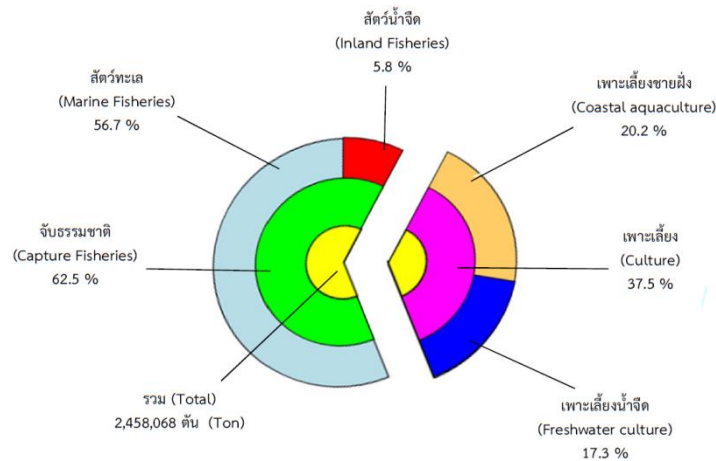


Figure 2 Fisheries production for Thailand by sub-sector: 2018

Source: Department of Fisheries (2020 a)

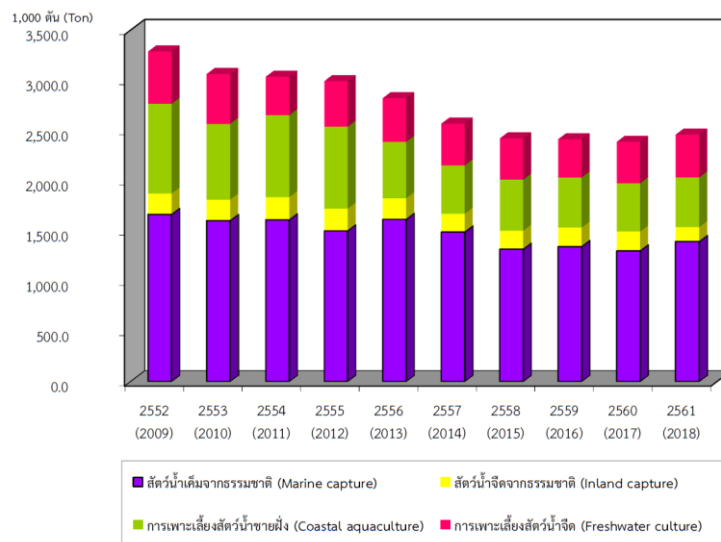


Figure 3 Fisheries production for Thailand by sub-sector: 2009-2018

Source: Department of Fisheries (2020 a)

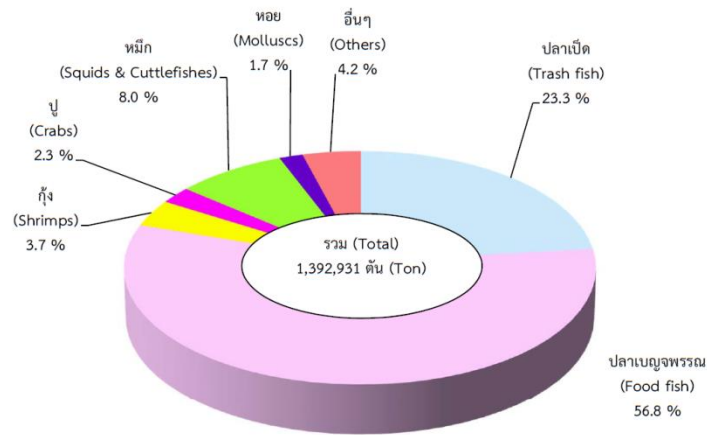


Figure 4 Composition of major species groups in marine capture production for Thailand: 2018
Source: Department of Fisheries (2020 a)

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; while “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. Whereas “offshore seas” 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, 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 (*Engraulis 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 for 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 5). 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 6).

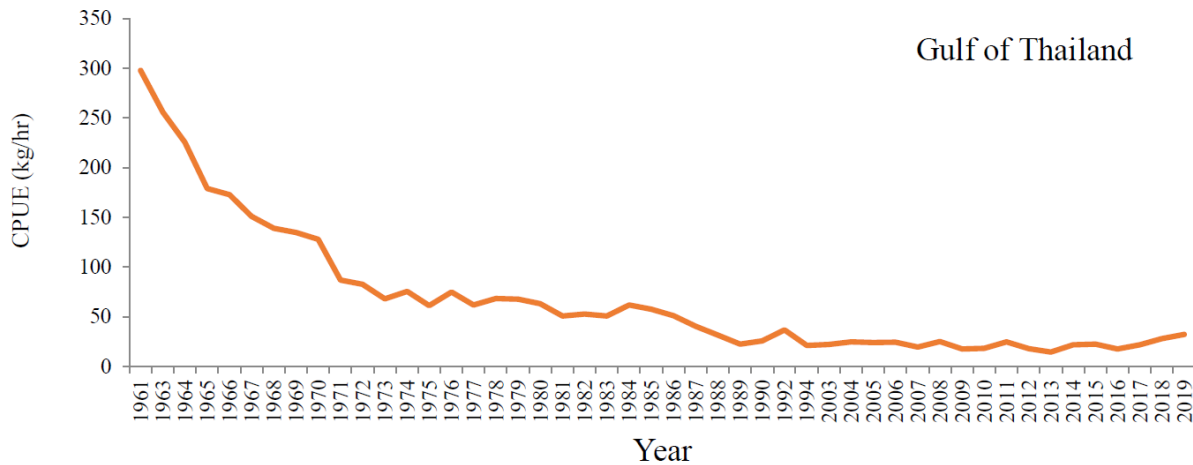


Figure 5 CPUEs of marine resources in the Gulf of Thailand: 1961-2019
Source: Department of Fisheries (2020 b)

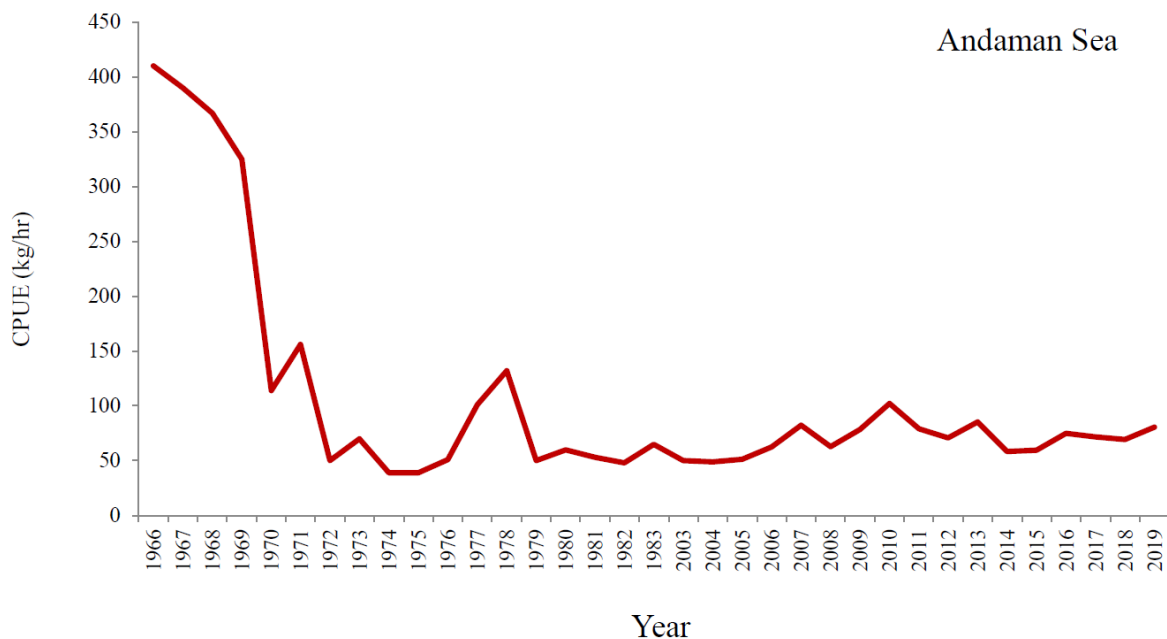


Figure 6 CPUEs of marine resources in the Andaman Sea: 1966-2019
Source: Department of Fisheries (2020 b)

2.5 Marine Fishing Fleet

With regard to fishing fleet profile for Thailand, there were the total of 61,832 fishing vessels registered as of 30th June 2021; they were composed of 51,237 small-scale fishing vessels (82.86%) and 10,595 commercial fishing vessels (17.14%), the majority of which (74.39%) was the small-scale fishing vessels of a size not over 5 gross tonnage (Figure 7). 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.

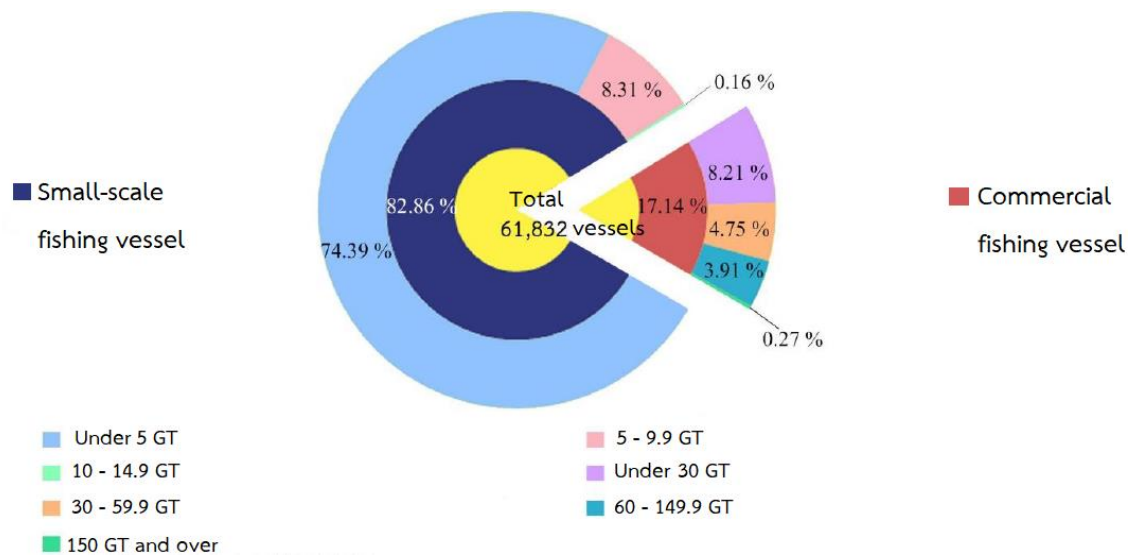


Figure 7 Composition of fishing fleet by size (gross tonnage: GT) for Thailand: 2021

Source: Department of Fisheries (2021)

3. ISSUES AND CHALLENGES

Prior to the major reforms of national legislation for responsible fisheries in Thailand, there were many challenges confronting marine fisheries of Thailand. The following set of seven challenges was identified through a risk assessment based on their likelihood of occurring and their impact on the sustainable management of Thailand's marine fisheries resources (Department of Fisheries, 2015, 2020 b):

- 1) Overfishing and overcapacity, especially in the commercial fleet;
- 2) Illegal, unreported, and unregulated (IUU) fishing;
- 3) Catching large quantities of juvenile fish of larger commercial species, which could grow bigger;
- 4) Conflicts between small-scale and commercial fishers;
- 5) Degraded critical habitats;
- 6) Inadequate fisheries data and information;
- 7) Inadequate fisheries management capacity; and
- 8) Low socio-economic condition of small-scale fishers and communities.

Issues and their causes for the challenges confronting marine fisheries resources management in Thailand are identified in Table 1 below:

Table 1 Issues and their causes for the challenges confronting marine fisheries of Thailand

Issue	Causes of the issue
1) Overfishing and overcapacity, especially in the commercial fleet	<ul style="list-style-type: none"> • Too many vessels harvesting the marine resources, especially commercial vessels • No effective control of the size or number of fishing gears used • Weak enforcement of existing management measures
2) Illegal, unreported, and unregulated (IUU) fishing	<p><i>In Thai waters</i></p> <ul style="list-style-type: none"> • Ineffective enforcement of the fisheries legislation • Inadequate coordination among agencies involved in MCS in Thailand • Lack of information and control over foreign fishing vessels • Lack of effective monitoring and surveillance schemes in place (port monitoring, observers, at sea and port inspections, etc.) • Inadequate communications systems to share monitoring information • Insufficient deterrence for illegal fishing <p><i>Outside Thai waters (responsibility as a Flag State)</i></p> <ul style="list-style-type: none"> • Inadequate control of joint ventures arrangements and permission to fish in other States' EEZ • Inadequate compliance with the rules and regulations of RFMOs • Inadequate cooperation by Thailand with other States <p><i>All waters</i></p> <ul style="list-style-type: none"> • Lack of an appropriate participatory National Plan of Control and Inspection (NPCI) <p>These IUU fishing issues have been compounded by the excess fishing capacity and fishing effort of the Thai fishing fleet (see Issue 1 above).</p>
3) Catching large quantities of juvenile fish of larger commercial species, which could grow bigger	<ul style="list-style-type: none"> • Demand for low value/trash fish for aquaculture • Small mesh sizes in fishing gear
4) Conflicts between small-scale and commercial fishers	<ul style="list-style-type: none"> • Competition for a depleted resource • Inadequate cooperation and coordination mechanisms across the vessel categories
5) Degraded critical habitats	<p><i>Mangroves</i></p> <ul style="list-style-type: none"> • Conversion to agriculture • Conversion to aquaculture • Urban development • Illegal forestry activities • Freshwater runoff and salt intrusions

Issue	Causes of the issue
	<p><i>Coral reefs</i></p> <ul style="list-style-type: none"> • Overfishing • Destructive fishing practices • Tourism • Acidification and temperature rises (climate change) <p><i>Sea grass</i></p> <ul style="list-style-type: none"> • Push nets • Mining • Land development • Destruction of mangroves <p><i>All critical habitats</i></p> <ul style="list-style-type: none"> • Lack of cooperation and coordination amongst agencies responsible for critical habitat protection and restoration
6) Inadequate fisheries data and information	<ul style="list-style-type: none"> • Inadequate human capacity of technical and scientific staff involved in data collection and analyses • Insufficient time and effort (and funds) allocated to collect and analyze data and information required for fisheries management • Lack of regular reporting requirements and obligations to senior policy staff and the Minister • Inadequate scientific communication skills of scientists
7) Inadequate fisheries management capacity	<ul style="list-style-type: none"> • Lack of an effective fisheries management unit in DOF • Insufficient human capacity in fisheries management in DOF headquarters in Bangkok • Insufficient human capacity of provincial/district fishery officers in fisheries management
8) Low socio-economic condition of small-scale fishers and communities	<ul style="list-style-type: none"> • Lack of fishing gear management in overlapping fishing grounds • Management measure cannot be agreed among different groups • Inadequate co-management arrangements for resolving conflicts • Inadequate recognition of the importance of small-scale fisheries • Small-scale fisher well-being dependent on fishing with no alternative livelihoods • Limited access to markets • Inadequate empowerment to negotiate • Lack of infrastructure • Vulnerability to disasters

Sources: Department of Fisheries (2015, 2020 b)

4. REFORMS OF NATIONAL POLICY FRAMEWORK AND LEGISLATION FOR RESPONSIBLE FISHERIES IN THAILAND

4.1 National Policy Framework

Fisheries management in Thailand has been remarkably reformed since 2015 by the enactment of the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017). In accordance with the Royal Ordinance on Fisheries, National Policy for Marine Fisheries Management has been 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 b). The plans are 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). The FMPs outline 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). Details of all management measures needed to meet the FMPs’ objectives, as well as key performance indicators, timelines, and responsible agencies, are included in the plans.

4.1.1 Marine Fisheries Management Plan of Thailand 2015-2019

Marine Fisheries Management Plan of Thailand (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). The FMP thus aimed at transforming Thailand’s open-access marine fisheries into a limited access regime where the fishing effort is commensurate with the scientific-evidenced productivity of the resources (maximum sustainable yield: MSY) and IUU fishing is eliminated. This FMP is closely linked to the National Plan of Action to prevent, deter and eliminate Illegal, unreported and unregulated fishing 2015 (NPOA-IUU) and the National Plan of Control and Inspection (NPCI) 2015. 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.

Vision

“Sustainable marine fisheries that is well governed and supported by healthy habitats and environment, resulting in combating IUU fishing, increasing economic returns and improving livelihoods”

Goals

- 1) Reform Thailand’s marine fisheries into a limited access regime where the fishing effort is commensurate with the maximum sustainable yield (MSY);
- 2) Prevent, deter and eliminate IUU fishing;
- 3) Increase benefits for and reduce conflicts among major stakeholders;
- 4) Improve the marine environment; and
- 5) Strengthen capacity to sustainably manage the fisheries.

Key principles

- **Sustainable development** that promotes a balance between ecological well-being (e.g. healthy fish resources and environment) and human well-being (e.g. food security, employment, livelihoods, income) so that the benefits derived from the fisheries are available for future generations;

- **Good governance** that facilitates the setting of rules and regulations and adequate resources and arrangements for compliance and enforcement;
- **Effective law enforcement** to ensure that management measures are complied with;
- **Cooperation and coordination** both vertically across different levels of government and society and horizontally across agencies and sectors;
- **Adaptive management** that embraces change through learning and adapting; and
- **Precautionary approach** that does not delay action because of lack of information and manages cautiously when uncertainty exists (e.g. uncertainty in the MSY estimate).

Scope

The FMP (2015-2019) applies to all marine capture fisheries both small-scale and commercial vessels in Thai waters as well as marine capture fisheries conducted by Thai vessels in the exclusive economic zone (EEZ) of other states and the high seas. In Thai waters the fishing areas are those in the east (Gulf of Thailand) and those to the west (Andaman Sea). These fishing areas are depicted in Figure 8.

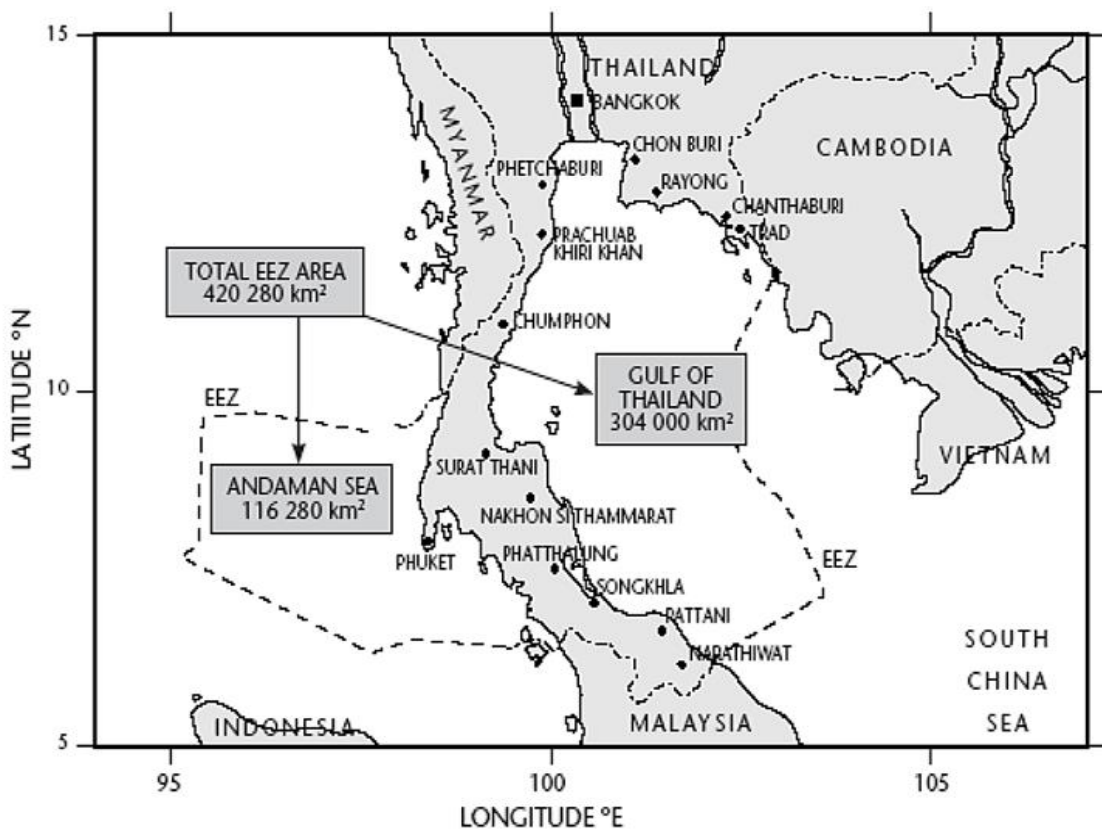


Figure 8 Gulf of Thailand and Andaman Sea marine fishing areas

Source: Department of Fisheries (2015)

The FMP covers the species of:

- All pelagic species;
- All demersal species;
- All highly migratory tuna and tuna-like species (often managed under a Regional Fisheries Management Organization (RFMO)); and
- Other non-target, associate or dependent species taken while fishing, such as endangered and threatened species.

Framework

The FMP (2015-2019) was developed in accordance with the Royal Ordinance for Fisheries B.E. 2558 (2015) and set out management actions and key performance measures to allow for assessment of the degree to which the objectives are being achieved.

Operation

This FMP operated from 2015 to 2019 inclusive. During this period, Thailand Department of Fisheries (DOF) used this plan to implement the measures and to develop the regulations for the fisheries. The FMP evaluated annually, based on the best scientific information available and on the performance of the fishery, with a report to the Minister of Agriculture and Cooperatives and the National Fisheries Committee on the performance of the fishery against all indicators and benchmarks.

Assessment of the progress of FMP (2015-2019)

Assessment and review of the progress against the objectives and targets of the FMP (2015-2019) were carried out and reported, a summary of which is at Table 2. The report concluded that many of the management measures specified in the FMP (2015-2019) had already been implemented and that the FMP needed to be updated by revising objectives and targets of management in the next 3 years. Excellent progress was made against the urgent issues of (i) overfishing and overcapacity, and (ii) IUU fishing. For the other less urgent issues, good progress was made against all objectives.

Table 2 Assessment of the progress of FMP (2015-2019)

	Target achieved		Good Progress		No progress
Goal and objectives					Assessment
Goal 1: Reform Thailand's marine fisheries into a limited access regime where the fishing effort is commensurate with the MSY					
Objective 1: Reduce fishing capacity and fishing effort					
Objective 2: Rebuild fish resources through artificial reefs and restocking					
Objective 3: Reduce the catch of juveniles of economically important species					
Goal 2: Prevent, deter, and eliminate IUU fishing					
Objective 4: Minimize IUU fishing through effective MCS					
Goal 3: Increase benefits for and reduce conflicts among major stake holders					
Objective 5: Resolve conflicts between small-scale and large-scale fishers					
Goal 4: Improve the marine environment					
Objective 6: Restore and maintain critical habitats					
Goal 5: Strengthen capacity to sustainably manage fisheries					
Objective 7: Improve fisheries data and information					
Objective 8: Strengthen fisheries management capacity					

Sources: Department of Fisheries (2020 b)

According to the assessment report (Nootmorn, 2019), overall situation for marine fisheries of Thailand has improved significantly since the adoption of the FMP (2015-2019). Fishing effort in the demersal fleet has been reduced by more than 30% to a level below the fishing effort needed to

produce maximum sustainable yield (MSY), thus allowing rebuilding of the fisheries resources. IUU fishing has been the target of concerted efforts to control and inspect many aspects of the fishing activities throughout the value chain. Law enforcement has been strengthened and penalties for infringements greatly increased. The control of vessels fishing and transshipping fish outside Thai waters has also been strengthened, with no vessel authorized to fish in 2017-2018. Measures have also been taken to reduce the catches of juvenile of economically important species and small low value/trash fish. Critical fisheries habitats and biodiversity have been restored through the planting of mangroves and seagrass and the maintenance and expansion of marine protected areas (MPAs). Some progress has been made to improve the management of the small-scale fishery and its dependent communities, but more has been required. Moreover, illegal labor practices have also been targeted and the overall situation has been improving through issuing seabooks and seaman books and improving working conditions for workers in fishing industries. In addition, from an analysis of the detailed management measures contained in the FMP (2015-2019), there have been 74 measures out of 75 have been implemented, 50% of which were completed.

4.1.2 Marine Fisheries Management Plan of Thailand 2020-2022

The current Marine Fisheries Management Plan of Thailand (FMP) 2020-2022 has been prepared under the Policy for the development of fisheries in Thai waters and the Policy for the promotion, development, and resolution of problems pertaining to fisheries outside of Thai waters (Department of Fisheries, 2020 b). The FMP (2020-2022) has also been built on the success of FMP (2015-2019) and has taken into consideration the assessment of progress against the FMP (2015- 2019) goals and objectives, changes in the status and nature of the fishery, and newer approaches to management. Many of the management measures specified in the FMP (2015-2019) have already been implemented. Excellent progress has made against the urgent issues of (i) overfishing and overcapacity, and (ii) Illegal, unreported and unregulated (IUU) fishing. For the other issues, good progress has been made against all objectives.

This progress is the direct result of a number of fisheries reforms that have been implemented since 2015 which included the conversion from an open-access to a limited-access fishery, tighter controls on IUU fishing including ratification and implementation of the Food and Agriculture Organization of the United Nations (FAO) Port State Measures Agreement (PSMA), implementation and enforcement of technical measures and more stringent requirements for overseas vessels, including ratification and implementation of the United Nations Fish Stock Agreement (UNFSA).

The current FMP (2020-2022), therefore, 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 b). 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) maintaining the artificial reefs and restocking programs.

Vision

“Sustainably managed marine fishery that contributes to increased national prosperity, livelihoods, and environmental well-being”

Goals

- 1) Fisheries resources restored to a level that can support the MSY in Thai waters and sustainable fishing expanded into deep-sea and overseas waters;

- 2) IUU-free fishery;
- 3) Healthy habitats and environment;
- 4) Improved livelihoods of fishers and fishing communities; and
- 5) Effective fisheries management capacity.

Key principles

- **Sustainable development** that promotes a balance between ecological well-being (e.g. healthy fish resources and environment) and human well-being (e.g. food security, employment, livelihoods, income) so that the benefits derived from the fisheries are available for future generations;
- **Ecosystem approach to fisheries management** that implements sustainable development in the fisheries sector;
- **Good governance** that facilitates the setting of rules and regulations and adequate resources and arrangements for compliance and enforcement;
- **Participation and transparency** that encourages stakeholder participation in both fisheries planning and management, especially small-scale fishers and fishing communities;
- **Adoption of international best practice and regional cooperation** with neighboring countries;
- **Science-based decision-making** that ensures fisheries management decisions are based on the best available information;
- **Balance between fishing capacity and fisheries resources** to maintain or restore fish stocks to a level capable of producing the maximum sustainable yield (MSY);
- **Adaptive management** that embraces change through learning and adapting; and
- **Precautionary approach** that does not delay action because of lack of information and manages cautiously when uncertainty exists (e.g. uncertainty in the MSY estimate).

Scope

The FMP (2020-2022) covers managing fishing and fisheries resources, establishing a system of good governance in order to ensure sustainable use as determined by the examination of best scientific evidence and balanced by economic, social, and environmental considerations, promoting the participation of all stakeholders in the management and conservation of aquatic animal resources, and also ensuring that fisheries resources are maintained or restored to a level that can produce the maximum sustainable yield. Moreover, the FMP relates to developing and promoting deep-sea fishery in Thai waters, in order to cover sustainable use of fisheries resources in Thai waters, as well as overseas fisheries in the context of responsible use of fisheries resources from overseas fisheries. On the other hand, inland fisheries management plan, aquaculture development plan, and fisheries-related industry development plan is excluded from this FMP.

The FMP (2020-2022) applies to all marine capture fisheries taken by both small-scale and commercial vessels in Thai waters (including the territorial waters out to 12nm and the Thailand exclusive economic zone (EEZ)) as well as marine capture fisheries conducted by Thai vessels in the territorial waters and EEZs of other states and the high seas. In Thai waters the fishing areas are those in the east (Gulf of Thailand) and those to the west (Andaman Sea).

The FMP covers the species of:

- All pelagic species;
- All demersal species;
- All highly migratory tuna and tuna-like species (often managed under a Regional Fisheries Management Organization (RFMO)); and
- Other non-target, associate or dependent species taken while fishing, such as endangered and threatened species.

Objectives and targets

The 5 goals for FMP (2020-2022) are broken down into the total of 15 objectives. Table 3 shows the objectives and their targets for each goal. In addition, the classification as economic, social, or environment goals are specified for each of the goal.

Table 3 Goals, objectives, and targets of the Marine Fisheries Management Plan of Thailand 2020-2022 (derive from Department of Fisheries, 2020 b)

	Economic goal		Social goal		Environmental goal
Goal and objectives	Target				
Goal 1: Fisheries resources restored to a level that can support the MSY in Thai waters and sustainable fishing expanded into deep-sea and overseas waters					
Objective 1: Control fishing effort to a level that is commensurate with the MSY					
Objective 2: Reduce the catch of juvenile economic species	Maintain fishing effort below the F_{MSY} for the next five years				
Objective 3: Rebuild fish resources through artificial reefs and restocking programs	Reduce the proportion of juvenile caught and landed to 25% of current levels in three years				
Objective 4: Promote and control deep-sea fishing	Increase number of effective artificial reefs at least 5 sites per year and increase community stock enhancement projects at the number of 5 communities project per year				
Objective 5: Promote and control a more diversified overseas fishery	A sustainable and well-controlled deep-sea fishery developed by 2022				
	A sustainable and well-controlled overseas fishery be developed by 2021				
Goal 2: IUU-free fishery					
Objective 6: Minimize IUU fishing through effective MCS					
Objective 7: Strengthen traceability systems					
Objective 8: Improve international and regional cooperation in combatting IUU	Reduce the level of IUU fishing through MCS arrangements				
	All domestic and imported fish and fisheries products traced through the whole supply chain				
	Share IUU information through the regional MCS network				
Goal 3: Healthy habitats and environment					
* Objective 9: Restore and maintain critical habitats	Increase of mangrove area by 2,000 rai by 2022 and regular monitoring and reporting on sea grass area and coral reef status				
Objective 10: Rebuild marine biodiversity	Area covered by MPA increased to 10% by 2022				
Objective 11: Reduce marine debris	120 tons/year debris brought from the sea to land				
Goal 4: Improved livelihoods of fishers and fishing communities					
Objective 12: Resolve conflicts between resource users	Reduce the incidence of conflicts in all Provinces				

Goal and objectives	Target
Objective 13: Improve the well-being of small-scale fishers and communities	Increase the income derived from fishing and marketing fish and fish products by 10% by 2022
Goal 5: Effective fisheries management capacity	
Objective 14: Improve the quality and accessibility of fisheries data and information	Improve data collection and information dissemination systems to a level that can be easily used to monitor the performance of this FMP in two years
Objective 15: Increase the financial and human capacity of officials, NGOs and key stakeholders	An effective and efficient fisheries management capacity within three years

* Establishment and operation of 2 fisheries *refugia* for Thailand's sustainable fisheries in particular is included in the current FMP (2020-2022) by indicating it as one of the key performance indicators (KPIs) for the Objective 9, i.e., restore and maintain critical habitats, which is specified in the Goal 3 – healthy habitats and environment – of the FMP.

Management mechanism

During the period of 2020-2022, Thailand Department of Fisheries has implemented the measures and developed the regulations for the fishery based on FMP (2020-2022). The FMP is cautiously reviewed biennially, based on the best scientific information available, with a report to the Minister of Agriculture and Cooperatives and the National Committee on Fisheries Policy on the performance of the fishery against all indicators and benchmarks. An assessment team is formed and the Fisheries Management Information System, which is able to alert, monitor, and evaluate the performance, is developed.

An evaluation of the performance of this plan against its objectives has been made every second year and submitted to the National Committee on Fisheries Policy. The biennial evaluations may trigger a review and adaptive responses in the management and MCS arrangements. Indicators, benchmarks, and data sources for monitoring and evaluation are detailed in the plan.

Expected outcome

Thailand will achieve good governance in the management and conservation of marine fisheries resources and promote the participation of stakeholders in order to manage the fisheries resources to maintain appropriate condition and be able to sustainably fishing by economic, social, and environmental considerations in line with the ecosystem-based approach. The outcome is broken down into the following:

- 1) Maintain fisheries resources at a level that can produce the maximum sustainable yield (MSY) as well as control the level of fishing effort not exceed the level that can produce MSY;
- 2) Increase and maintain economic stability in marine fisheries sector and the country's downstream industry; and
- 3) Improve quality of life and fisher communities, elevate livelihood, and strengthen fishing occupation particularly small-scale fishers.

4.1.3 International and Regional Cooperation

Thailand has ratified a number of key legal instruments relating to fisheries and 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).

As a member country of FAO, Thailand has adopted the FAO Code of Conduct for Responsible Fisheries (CCRF) and the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (the FAO SSF Guidelines). Thailand is a member of IOTC and SIOFA and a cooperating non-member of Western and Central Pacific Fisheries Commission (WCPFC). In addition, Thailand also cooperates with the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) in information exchange.

Thailand has ratified 20 ILO conventions. The Kingdom ratified the original Forced Labour Convention in 1969 and the 2014 Protocol updates that strengthen the earlier convention to take into account today's problems and changing conditions. The Thai government also ratified the ILO Work in Fishing Convention and has planned two other conventions on collective bargaining and the right to organize for both national and migrant workers.

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 a part of the Regional Plan of Action against IUU fishing (RPOA-IUU), which is a ministerial initiative of eleven countries namely 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.

4.1.4 Linkage to Sustainable Development Goals

Sustainable Development Goals (SDG) of the United Nations has a conceptual framework that links to the economic, social, and environmental dimensions of sustainable development which contains 17 goals (United Nations, 2021). The national policy framework of Thailand, FMP, corresponds to SDG in terms of goals and targets as follows:

SDG Goal 2 Zero hunger: End hunger, achieve food security and improved nutrition, and promote sustainable agriculture

Target 2.3: By 2030, double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment

SDG Goal 14 Life below water: Conserve and sustainably use the oceans, seas and marine resources for sustainable development

Target 14.4: By 2020, effectively regulate harvesting and end overfishing, illegal, unreported and unregulated fishing and destructive fishing practices and implement science-based management plans, in order to restore fish stocks in the shortest time feasible, at least to levels that can produce maximum sustainable yield as determined by their biological characteristics

Target 14.B: Provide access for small-scale artisanal fishers to marine resources and markets

Target 14.C: Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in UNCLOS, which provides the legal framework for the conservation and sustainable use of oceans and their resources, as recalled in paragraph 158 of The Future We Want

4.1.5 Institutional framework

The Department of Fisheries (DOF) under the Ministry of Agriculture and Cooperatives of Thailand is the principle agency who has overall responsibility for marine fisheries management in the country. There are 24 divisions included in DOF, six of which are directly involved in marine fisheries management; namely:

- 1) Fisheries Development Policy and Planning Division;
- 2) Fishing Control and Surveillance Division;
- 3) Fishing and Fleets Management Division;
- 4) Fisheries Foreign Affairs Division;
- 5) Marine Fisheries Research and Development Division; and
- 6) Information and Communication Technology Center.

In addition, there is currently the total of 7 divisions in DOF supporting marine fisheries management, namely:

- 1) Legal Affairs Division;
- 2) Fish Inspection and Quality Control Division;
- 3) Fisheries Resources Management and Measures Determination Division;
- 4) Coastal Aquaculture Research and Development Division;
- 5) Fish Quarantine and Fishing Vessels Inspection Division;
- 6) Fisheries Industrial Technology Research and Development Division; and
- 7) Fisheries Provincial Office.

Apart from DOF, **The Thailand Maritime Enforcement Coordinating Center (Thai-MECC)** was established in March 1997 and upgraded later to have full authority at sea, having a combined maritime task force, e.g., security issues, protection of the marine resources, inspection on maritime transport safety, and identification of zones. THAI-MECC is led by the Royal Thai Navy as the focal point, with other five law enforcement agencies, namely, the Royal Thai Marine Police, Customs Department, Marine Department, DOF, and the Department of Coastal and Marine Resources. Information for maritime task force is shared through a Maritime Information Sharing System (MISS) manned by personnel from all six agencies.

The Thai government established **the Command Center for Combating Illegal Fishing (CCCIF)**, located at the Royal Thai Navy Command Center, in May 2015. The government also set up **Port in-Port out (PIPOs) Centers** in 22 coastal provinces, with the goal of improving control of fishing vessels over 30 GT and fishing vessels less than 30 GT that use high efficiency fishing gears. There are currently 30 PIPO centers and 21 forward inspection points (FiPs) at more convenient locations. The PIPO Centers are under the supervision of the Thai-MECC, which also coordinates Anti-IUU Fishing Task Forces in three areas, which are multi-disciplinary inspection teams at sea, ports, and seafood processing factories.

The Marine Department is mainly responsible for vessel registrations, vessel use permits, changes of vessel type, vessel demolition, seaman books, seafarer's certification, and other matters relating to marine safety.

The Department of Marine and Coastal Resources under the Ministry of Natural Resources and Environment is responsible for the management of marine environment, coastal habitats, and endangered species.

Non-government agencies are also involved in the national policy framework for responsible fisheries in Thailand. They included National Fisheries Association of Thailand, Thai Overseas Fisheries Association, Federation of Thai Fisherfolk Associations, Fish Marketing Organization, Local Fishing Community Organizations, and Non-governmental Organizations (NGOs).

In addition to government and non-government organizations engaged in national policy framework, supportive research on diverse areas of fisheries are undertaken by a number of **academics**, the main of which are Kasetsart University, Chulalongkorn University, Prince of Songkla University, Burapha University, Maejo University, Walailuk University, and Rachamongkol University.

4.2 National Legislation

4.2.1 Royal Ordinance on Fisheries

Regarding 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, and 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.

Overall, the reformed fisheries legislation forms the basis for fisheries regulations across the entire supply chain of the fishery sector and strengthens Thailand's international obligations, as well as broadens the concept of fisheries management under an ecosystem approach. Many of the policy statements of relevance to marine fisheries management are contained in the Royal Ordinance on Fisheries which are as follows:

- 1) Achieving good governance in the management and conservation of aquatic resources and the fisheries sector, and ensuring that complete and accurate data are collected;
- 2) Protection of special interests of small-scale fisheries and local fisheries communities;
- 3) Fulfillment of Thailand's international obligations with regard to the conservation and management of aquatic resources;
- 4) Providing effective means for preventing, deterring, and eliminating IUU fishing, as well as unlawful labor practices in the fisheries sector;
- 5) Using best available scientific evidence to achieve long-term economic, social, and environmental sustainability, in line with the ecosystem-based approach and precautionary approach, to ensure that fisheries resources are maintained or restored to a level that can produce the maximum sustainable yield; and
- 6) Preventing and eliminating overfishing and overcapacity and ensure that the level of fishing effort does not undermine the sustainability of fisheries resources.

As well as the fisheries law, there are also the reforms of the other Acts supplemented to fisheries and coastal habitat management, namely, Emergency Decree Amending the Thai Vessels Act, B.E. 2481 (1938), B.E. 2561 (2018), Marine and Coastal Resources Management Act B.E. 2558 (2015), and the National Maritime Interests Protection Act B.E. 2562 (2019).

4.2.2 Current fisheries management measures

The management measures that were in place under the Fisheries Act B.E. 2490 (1947) were amended or carried forward into the new Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017). In terms of technical-based measures, they include protection of spawning stock and juveniles through closed seasons and areas, demarcation zones between small-scale and commercial fisheries, minimum mesh sizes for purse seines, anchovy purse seines, trawls, anchovy lift/falling nets, and collapsible crab traps. There is also a ban on the use of push nets except for catching sergestid (acetes) shrimp.

Under the Royal Ordinance on Fisheries, small-scale fishing vessels need to be registered but not licensed except those operating high efficiency gears or dredges. Small-scale fishing is managed through co-management activities involving fishing communities, local government and non-government organizations (NGOs).

The Royal Ordinance on Fisheries also introduces broader measures that include the use of marine protected areas/sanctuaries as a management tool. The new law also provides for much better participation of stakeholders, including the private sector, through a National Fisheries Committee and Provincial Fisheries Committees in each coastal province.

Based on the reformed national policy framework and legislation for responsible fisheries, current fisheries management measures in Thailand can be categorized into 4 groups with their enumerated measures as follows:

Fishing effort controls:

- Fishing licenses for commercial fisheries issued on the basis of Total Allowable Effort (TAE) which depend on MSY and F_{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.

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).

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).

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 THAILAND

5.1 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 9.

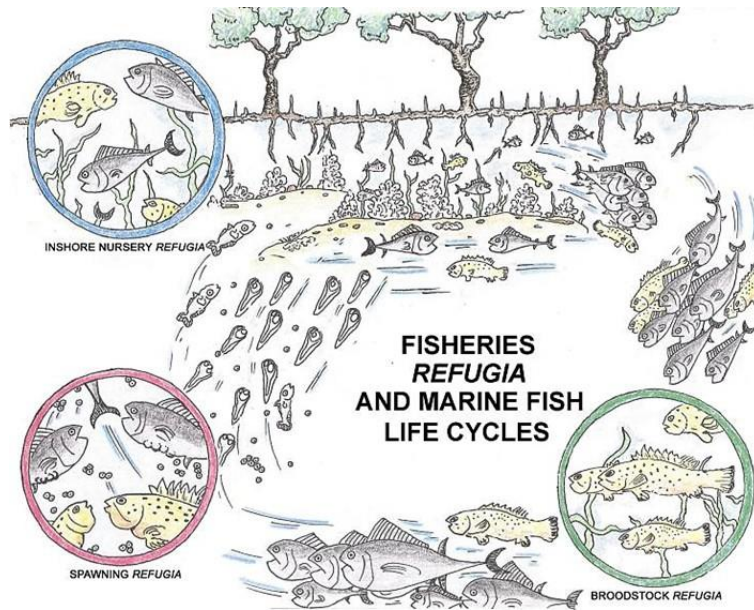


Figure 9 Illustration of marine fish life cycles related to fisheries *refugia* concept
Source: UNEP/GEF/SCS (2007)

5.2 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.

5.3 Fisheries *Refugia* Types Established in Thailand

5.3.1 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 was, 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.

5.3.2 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.

6. REFORMS OF THAILAND'S NATIONAL POLICY FRAMEWORK AND LEGISLATION RELATING TO FISHERIES *REFUGIA*

6.1 Related Goals and Objectives

In accordance with the concept and objectives of fisheries *refugia*, the reformed national policy framework and legislation serve as the fundamental for establishment and operation of fisheries *refugia* in Thailand. In terms of goals and objectives, the Thailand's Marine Fisheries Management Plan (FMP) 2020-2022 and the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017) have provided substantial link to fisheries *refugia*. Out of 5 goals and 15 objectives for FMP (2020-2022), there are 4 goals and 6 objectives corresponding to the *refugia* establishment. In addition, the number of 4 among 6 objectives for marine fisheries management included in the Royal Ordinance on Fisheries B.E. 2558 (2015) also supports the fisheries *refugia* management in Thailand. Goals and objectives of FMP and the Royal Ordinance on Fisheries relating to those of fisheries *refugia* are the following:

FMP (2020-2022):

Goal 1: Fisheries resources restored to a level that can support the MSY in Thai waters and sustainable fishing expanded into deep-sea and overseas waters

Objective 2: Reduce the catch of juvenile economic species

Goal 3: Healthy habitats and environment

Objective 9: Restore and maintain critical habitats *

Objective 10: Rebuild marine biodiversity

Goal 4: Improved livelihoods of fishers and fishing communities

Objective 12: Resolve conflicts between resource users

Objective 13: Improve the well-being of small-scale fishers and communities

Goal 5: Effective fisheries management capacity

Objective 14: Improve the quality and accessibility of fisheries data and information

* Establishment and operation of 2 fisheries *refugia* for Thailand's sustainable fisheries in particular is included in the current FMP (2020-2022) by indicating it as one of the key performance indicators (KPIs) for the Objective 9, i.e., restore and maintain critical habitats, which is specified in the Goal 3 – healthy habitats and environment – of the FMP.

Royal Ordinance on Fisheries B.E. 2558 (2015):

- Objective 1:** Achieving good governance in the management and conservation of aquatic resources and the fisheries sector, and ensuring that complete and accurate data are collected
- Objective 2:** Protection of special interests of small-scale fisheries and local fisheries communities
- Objective 3:** Fulfillment of Thailand's international obligations with regard to the conservation and management of aquatic resources
- Objective 5:** Using best available scientific evidence to achieve long-term economic, social, and environmental sustainability, in line with the ecosystem-based approach and precautionary approach, to ensure that fisheries resources are maintained or restored to a level that can produce the maximum sustainable yield

6.2 Related Management Plan and Measures

With regard to the management plan and measures for fisheries *refugia* in Thailand, the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017) are currently the principal fisheries laws to be taken into consideration and complied with, particularly the contents in Chapter 2: Fisheries Management – Part 2 Provincial Fisheries Committee, and Chapter 5: Conservation and Management Measures – Section 70, and Section 71.

6.2.1 Provincial Fisheries Committee

The Provincial Fisheries Committee has been mandated by the Royal Ordinance on Fisheries B.E. 2558 (2015) to play an important role for fisheries management in the province. Structure and terms of reference for Provincial Fisheries Committee stipulated in the Royal Ordinance are summarized as follows:

- The Provincial Fisheries Committee comprises the Provincial Governor as Chairperson, a representative of the Ministry of Natural Resources and the Environment, a representative of the Marine Department, the Provincial Chief Prosecutor in the capacity of the Head of the Provincial Chief Attorney's Office, the Provincial Commerce Officer, District Chiefs in districts where fisheries operations are undertaken, the Chief Executive of the Provincial Administrative Organization, the President of the Provincial Farmers' Council and a representative of the Royal Thai Navy as *ex officio* committee members, and not more than thirteen experts appointed by the Provincial Governor as committee members. The Provincial Fisheries Officer serves as a committee member and secretary.
 - Expert committee members are appointed from among the following persons:
 - (1) representatives of local fishing community organizations in the fields of coastal fisheries, offshore fisheries, freshwater fisheries, aquaculture or aquatic animal processing as deemed appropriate after due consideration of the fair and comprehensive distribution of the stakeholders; and
 - (2) not more than three persons having knowledge or operational experience in the field of fisheries or natural resources and the environment.
 - The Provincial Fisheries Committee has the following powers and duties:
 - (1) compile recommendations and propose approaches to the promotion of the fishing profession, the management, maintenance, conservation, restoration and sustainable utilization of aquatic animal resources by local fishing community organizations in its jurisdiction and submitting them to the Committee for deliberation in the preparation of fisheries policies;
 - (2) deliberate upon and make suggestions regarding approaches to the development of or the resolution of problems related to fisheries, or the management, maintenance, conservation, restoration and sustainable utilization thereof in fishing grounds in its jurisdiction to the Minister, the Committee or the Director-General; and
 - (3) issue notifications pursuant to Section 56, Section 71, and Section 77 which are to be published in the Government Gazette.

6.2.2 Conservation and Management Measures

Considering fisheries *refugia* management, the sections in the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017) most likely to be complied with are Section 70, and Section 71 in Chapter 5: Conservation and Management Measures, the details of which are as follows:

Section 70: No person shall fish in the area and during the time period in which aquatic animals produce or lay eggs, raise their offspring or during any other periods necessary for protection of aquatic animals as prescribed by the Director-General of the Department of Fisheries, unless the person uses the gears, applies the fishing method, and complies with other conditions as prescribed by the Director-General of the Department of Fisheries.

The Director-General of the Department of Fisheries may assign in writing his power under paragraph one to the Provincial Fisheries Committee.

Section 71: The Minister of Agriculture and Cooperatives or the Provincial Fisheries Committee shall have the power to issue notifications regarding the following:

- (1) fishing gears according to their forms, fishing methods, fishing areas, the size of fishing vessels used in fishing operation and other conditions that are prohibited from fishing operations in fishing grounds;
- (2) requirements to be complied with in relation to bycatches; and
- (3) an area necessitating the use of a fishing gear that requires pegging down, pitching, tying, stretching, pulling, sinking or any other method to keep any such tool fixed during a fishing session.

In a case in which any such notification is issued for enforcement in a particular area, there shall be attached to any such notification a map delineating the area prescribed thereby.

7. CURRENT FISHERIES MANAGEMENT MEASURES AT FISHERIES *REFUGIA* OF THAILAND

In accordance with the reformed national fisheries legislation in Thailand, the Royal Ordinance on Fisheries B.E. 2558 (2015) and its Amendment (No. 2) B.E. 2560 (2017), there have been a range of subordinate laws, regulations and notifications, subsequently enacted for the purpose of responsible fishing practice in the country. Under the related sections in the Royal Ordinance on Fisheries, fisheries laws are issued by the Ministry of Agriculture and cooperatives, the Department of Fisheries, and the Provincial Fisheries Committee. With regard to Trat and Surat Thani Provinces, the areas in which the two fisheries *refugia* are located, marine fisheries management measures have been revised and put in place through Ministerial Regulations and Notifications, the major of which and their concise descriptions are listed as the following.

7.1 Trat Site

7.1.1 Ministerial Regulation on Prescribing Areas for Coastal Seas, B.E. 2560 (2017), and its Amendment (No. 2), B.E. 2563 (2020):

Area of the coastal seas for Trat Province is determined as the distances of 3-6.48 nautical miles from the baseline of mainland, and 3-6.48 nautical miles from the baseline of islands. The map delineating the prescribed area which was attached to the Ministerial Regulation is shown in Figure 10.

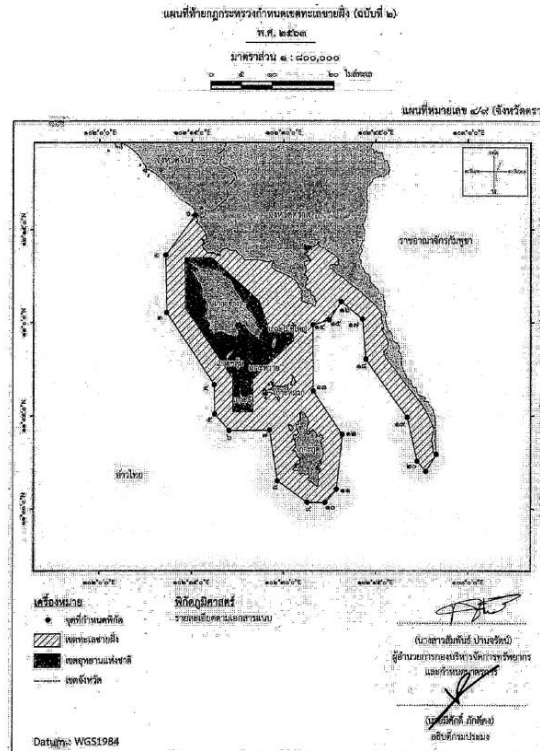


Figure 10 Coastal seas area for Trat Province

Source: Ministerial Regulation on Prescribing Areas for Coastal Seas (No. 2), B.E. 2563 (2020)

7.1.2 Notification of Ministry of Agriculture and Cooperatives Re: Prescribing Fishing Gears, Descriptions, and Fishing Areas of Clam Dredges Prohibited from Fishing in Fishing Grounds, B.E. 2560 (2017):

(1) No person shall use clam dredges fitted to motor vessels fishing in the fishing grounds in inland waters and coastal seas; and

(2) No person shall use clam dredges fitted to motor vessels having the following gear descriptions and vessel sizes fishing in the fishing grounds in offshore seas:

- Clam dredges with a width over 3.5 meters;
- Clam dredges with a sieve-size of below 1.2 centimeters;
- Fishing vessels with a length over 18 meters; and
- A fishing vessel with over 3 dredges.

7.1.3 Notification of Ministry of Agriculture and Cooperatives Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in Coastal Seas, B.E. 2560 (2017), and its Amendment (No. 2), B.E. 2562 (2019):

The prohibited fishing gears are:

- (1) All types of trawl nets fitted to motor vessels;
- (2) Purse seines with purse lines;
- (3) Fish gill nets, 2,500 meters in length or over, in a fishing vessel;
- (4) Crab gill nets, 3,000 meters in length or over, in a fishing vessel;
- (5) Shrimp gill nets, 2,500 meters in length or over, in a fishing vessel;
- (6) Squid gill nets, 2,500 meters in length or over, in a fishing vessel;
- (7) Crab traps, below 2.5 inch in mesh-size or over 300 traps, in a fishing vessel;
- (8) Squid traps, over 100 traps, in a fishing vessel;
- (9) Octopus traps, over 2,000 traps, in a fishing vessel;

- (10) Squid falling nets or lift nets operated with electric generators;
- (11) Anchovy falling nets or lift nets operated with electric generators; and
- (12) All types of fishing gears operated with electric generators by using underwater fish-luring lights.

The jellyfish trawl nets are prescribed in the Amended Notification (No. 2) B.E. 2562 (2019) as an exception to all types of trawl nets prohibited from fishing in coastal seas prescribed in the previous Notification. The exception lasts for 2 years, from November 2019 to December 2021, for the purpose of technical study. Specifications for the exceptional jellyfish trawl nets are described in such Notification.

7.1.4 Notification of Trat Provincial Fisheries Committee Re: Prescribing Areas for Aquatic Species Sanctuaries, B.E. 2561 (2018):

The following areas are prescribed as aquatic species sanctuaries:

- (1) Fishing ground in the coastal seas off Ban Laem Thein, Ao Yai Sub-district, Muang District, Trat Province, covering the area of 81,989 m² (Figure 11(1));
- (2) Fishing ground in Nong (swamp) Wat Sai Thong, Nong Sano Sub-district, Muang District, Trat Province, covering the area of 3,606 m² (Figure 11(2)); and
- (3) Fishing ground in Koh Kra, Koh Mak Sub-district, Koh Kut District, Trat Province, covering the area of 3,349 m² (Figure 11(3)).

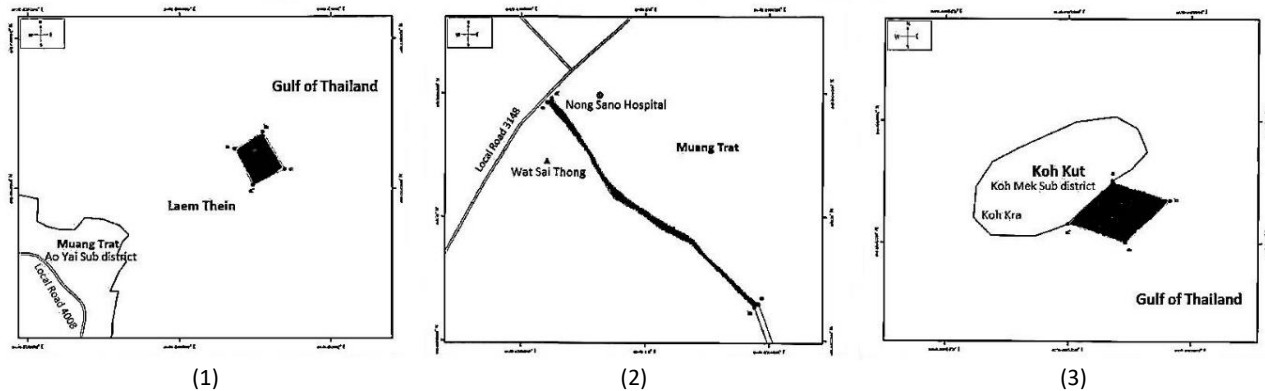


Figure 11 Aquatic species sanctuaries in Trat Province

Source: Notification of Trat Provincial Fisheries Committee Re: Prescribing Areas for Aquatic Species Sanctuaries, B.E. 2561 (2018)

7.1.5 Notification of Trat Provincial Fisheries Committee Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in Fishing Grounds, B.E. 2561 (2018), and its Amendment (No. 2), B.E. 2562 (2019):

A number of 15 fishing grounds in Trat Province are prohibited from fishing by any types of fishing gears, with an exception of some specified small-scale fishing gears prescribed in each of them. The total prohibited areas are 12.96 km² (8,101 Thai rai). Area maps of those 15 fishing grounds are illustrated in Figure 12.

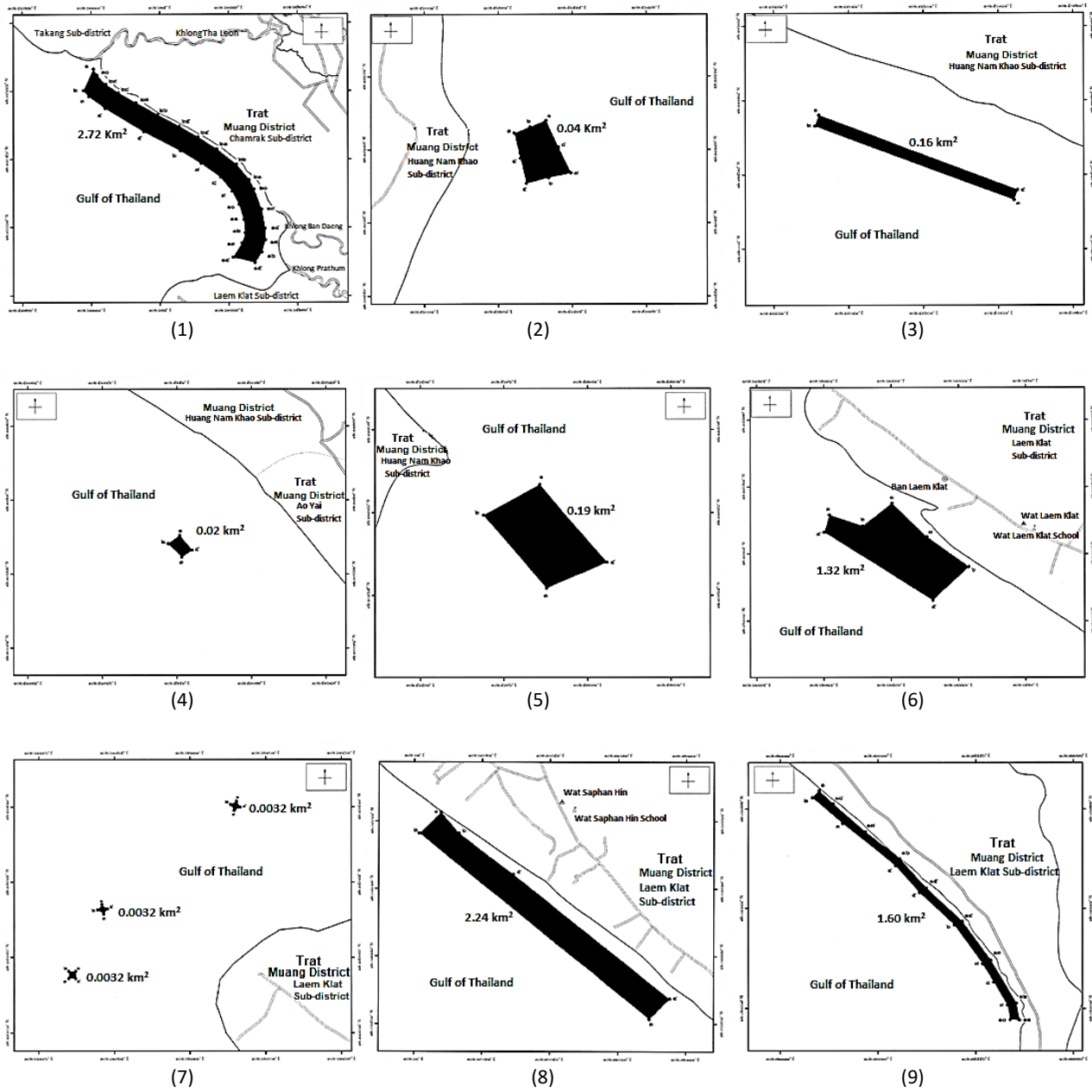


Figure 12 Prohibited fishing grounds in Trat Province

Source: Notification of Trat Provincial Fisheries Committee Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in the Fishing Grounds, B.E. 2561 (2018)

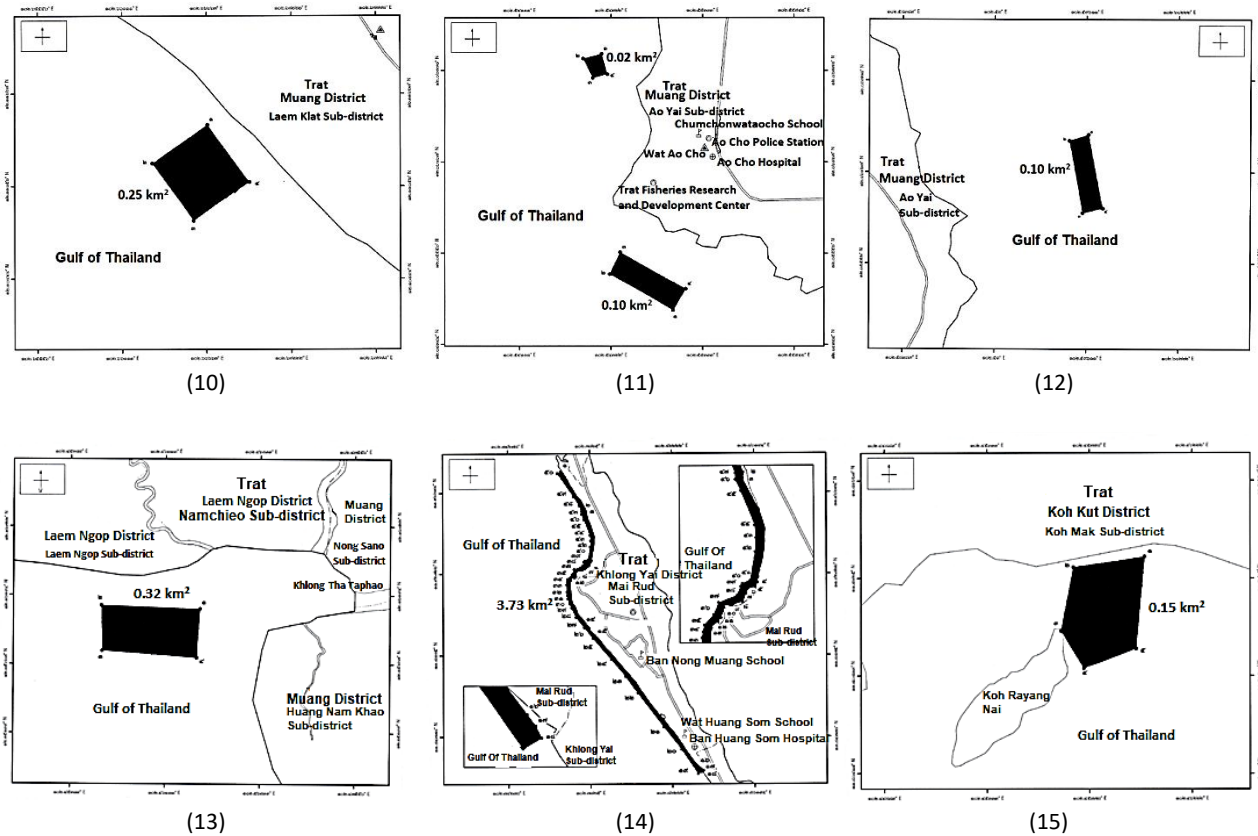


Figure 12 (cont.) Prohibited fishing grounds in Trat Province

Source: Notification of Trat Provincial Fisheries Committee Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in the Fishing Grounds, B.E. 2561 (2018)

7.1.6 Notification of Trat Provincial Fisheries Committee Re: Prescribing Aquaculture Zones for Aquaculture Enterprises under Control for Marine Shellfish, B.E. 2563 (2020), and its Addition (No. 2), B.E. 2563 (2020):

The total of 28 areas along the coast of Trat Province is prescribed as aquaculture zones for aquaculture enterprises under control for marine shellfish. They are located in Muang, Khao Saming, and Khlong Yai Districts of the Province. Details and area maps are described in such Notifications.

7.2 Surat Thani Site

7.2.1 Ministerial Regulation on Prescribing Areas for Coastal Seas, B.E. 2560 (2017):

Areas of the coastal seas for Surat Thani Province are determined as:

- (1) A distance of 3 nautical miles from the baselines of Surat Thani mainland and of Koh Tao; and
- (2) A distance of 2 nautical miles from the baselines of any islands except Koh Tao.

The map delineating the prescribed areas which was attached to such Ministerial Regulation is shown in Figure 13.

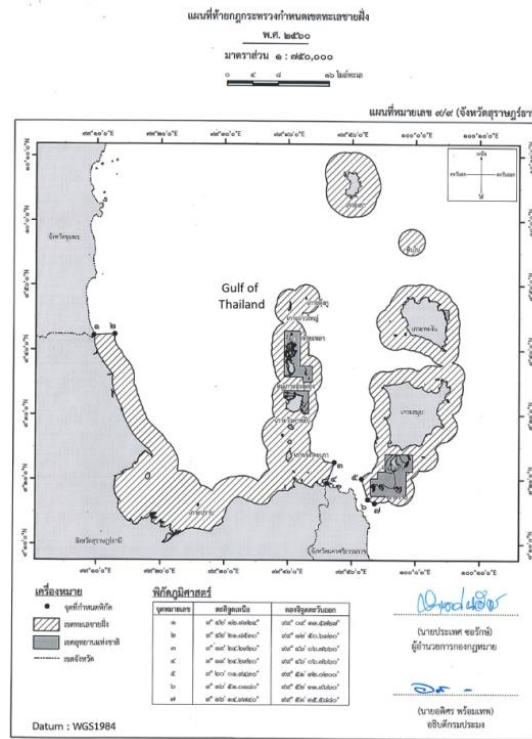


Figure 13 Coastal seas areas for Surat Thani Province

Source: Ministerial Regulation Prescribing Areas for Coastal Seas, B.E. 2560 (2017)

7.2.2 Notification of Ministry of Agriculture and Cooperatives Re: Prescribing Fishing Gears, Descriptions, and Fishing Areas of Clam Dredges Prohibited from Fishing in Fishing Grounds, B.E. 2560 (2017):

(1) No person shall use clam dredges fitted to motor vessels fishing in the fishing grounds in inland waters and coastal seas; and

(2) No person shall use clam dredges fitted to motor vessels having the following gear descriptions and vessel sizes fishing in the fishing grounds in offshore seas:

- Clam dredges with a width over 3.5 meters;
- Clam dredges with a sieve-size of below 1.2 centimeters;
- Fishing vessels with a length over 18 meters; and
- A fishing vessel with over 3 dredges.

7.2.3 Notification of Ministry of Agriculture and Cooperatives Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in Coastal Seas, B.E. 2560 (2017), and its Amendment (No. 2), B.E. 2562 (2019):

The prohibited fishing gears are:

- (1) All types of trawl nets fitted to motor vessels;
- (2) Purse seines with purse lines;
- (3) Fish gill nets, 2,500 meters in length or over, in a fishing vessel;
- (4) Crab gill nets, 3,000 meters in length or over, in a fishing vessel;
- (5) Shrimp gill nets, 2,500 meters in length or over, in a fishing vessel;
- (6) Squid gill nets, 2,500 meters in length or over, in a fishing vessel;
- (7) Crab traps, below 2.5 inch in mesh-size or over 300 traps, in a fishing vessel;
- (8) Squid traps, over 100 traps, in a fishing vessel;
- (9) Octopus traps, over 2,000 traps, in a fishing vessel;

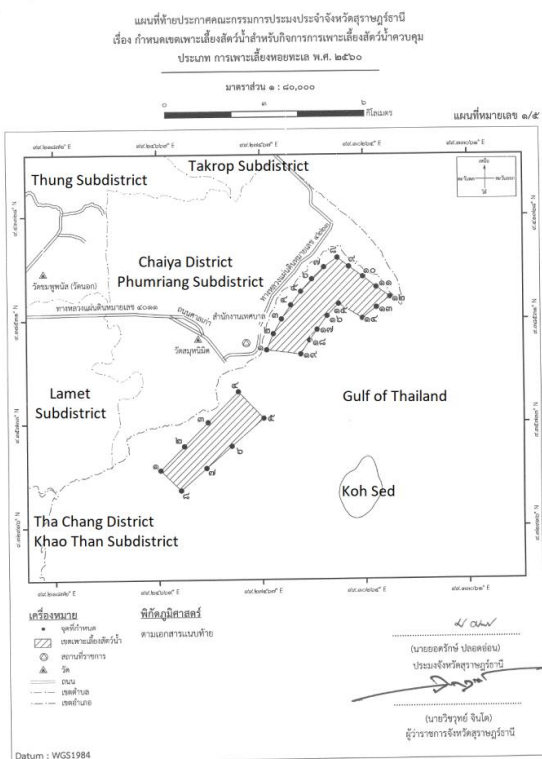
- (10) Squid falling nets or lift nets operated with electric generators;
- (11) Anchovy falling nets or lift nets operated with electric generators; and
- (12) All types of fishing gears operated with electric generators by using underwater fish-luring lights.

The jellyfish trawl nets are prescribed in the Amended Notification (No. 2) B.E. 2562 (2019) as an exception to all types of trawl nets prohibited from fishing in coastal seas prescribed in the previous Notification. The exception lasts for 2 years, from November 2019 to December 2021, for the purpose of technical study. Specifications for the exceptional jellyfish trawl nets are described in such Notification.

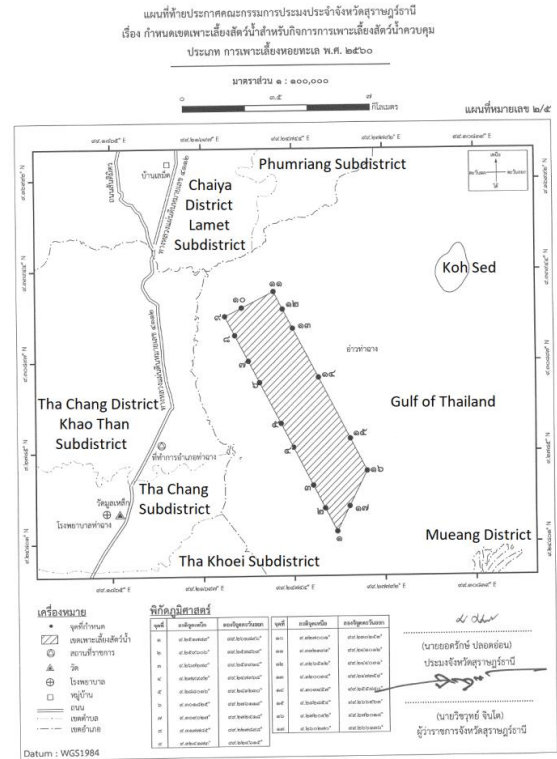
7.2.4 Notification of Surat Thani Provincial Fisheries Committee Re: Prescribing Aquaculture Zones for Aquaculture Enterprises under Control for Marine Shellfish, B.E. 2560 (2017), and its Amendment (No. 2), B.E. 2562 (2019):

The following areas shall be aquaculture zones for aquaculture enterprises under control for marine shellfish in Surat Thani Province:

- (1) Ao Phumriang in Phumriang Subdistrict of Chaiya District, Surat Thani Province (Figure 14 (1));
- (2) Ao Tha Chang in Khao Than, Tha Chang, and Tha Khoei Subdistricts of Tha Chang District, Surat Thani Province (Figure 14 (2));
- (3) Ao Thong Puek, Ao Tha Na, Ao Thong Khao, and Ao Bang Oon in Takhian Thong, Kadae, Phlai Wat, and Tha Thong Subdistricts of Kanchanadit District, Surat Thani Province (Figure 14 (3));
- (4) Ao Ban Pod in Chonlakhram Subdistrict of Don Sak District, Surat Thani Province (Figure 14 (4)); and
- (5) Ao in front of Koh Mat Sum in Taling Ngam Subdistrict of Samui District, Surat Thani Province (Figure 14 (5)).



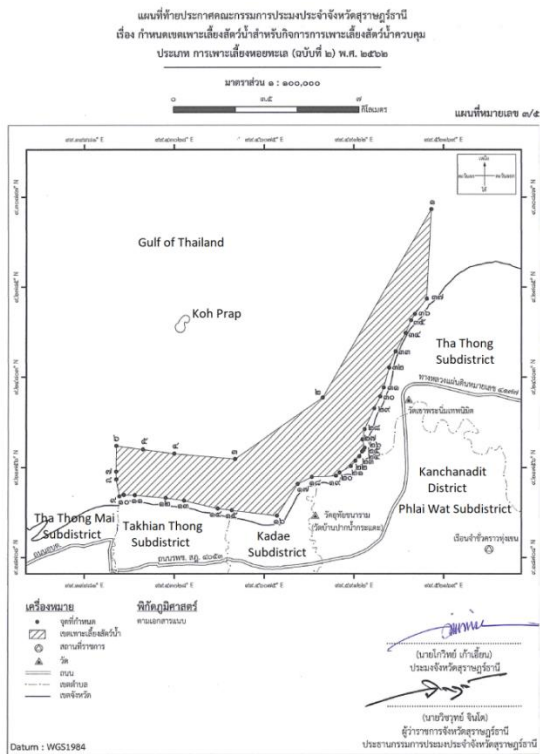
(1)



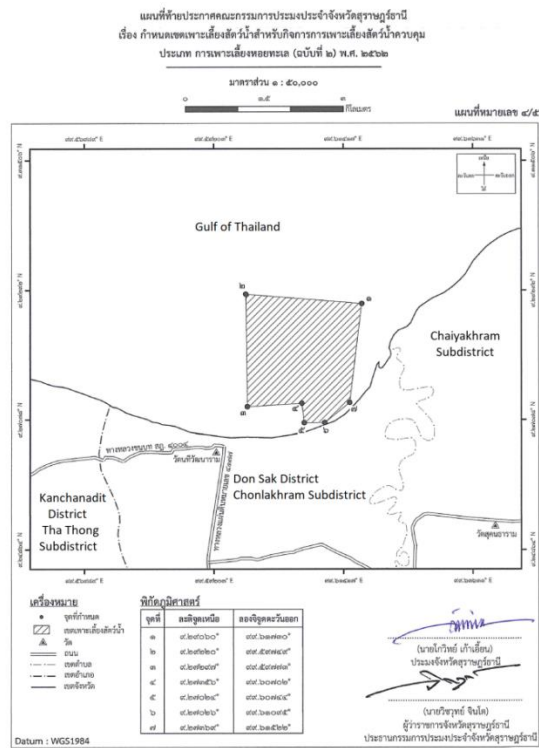
(2)

Figure 14 Aquaculture zones for aquaculture enterprises under control for marine shellfish in Surat Thani Province

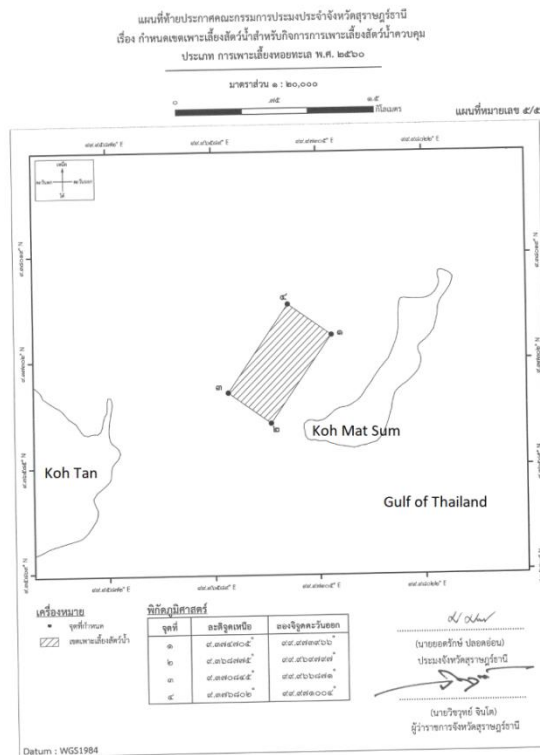
Source: Notification of Surat Thani Provincial Fisheries Committee Re: Prescribing Aquaculture Zones for Aquaculture Enterprises under Control for Marine Shellfish (no. 2), B.E. 2562 (2019)



(3)



(4)



(5)

Figure 14 (cont.) Aquaculture zones for aquaculture enterprises under control for marine shellfish in Surat Thani Province

Source: Notification of Surat Thani Provincial Fisheries Committee Re: Prescribing Aquaculture Zones for Aquaculture Enterprises under Control for Marine Shellfish (No. 2), B.E. 2562 (2019)

7.2.5 Notification of Department of Fisheries Re: Prescribing Areas and Periods of Egg-bearing, Spawning, and Larval Rearing of Aquatic Animals in Some Parts of the Fishing Grounds in Prachuap Khiri Khan, Chumphon, and Surat Thani Provinces, B.E. 2561 (2018):

1) In the period from 15 February to 15 May every year, no person shall fish in some parts of Prachuap Khiri Khan, Chumphon, and Surat Thani Provinces, determined as the area from point no. 1 to no. 7 shown in Figure 15 (1).

2) There shall be an exception for fishing in such prescribed area by fishing gears and fishing methods complying with the following conditions:

(1) Otter-board trawls and beam trawls, fitted to motor vessels not over 16 m length, fishing night-time beyond the coastal seas;

(2) Fish gill nets fitted to motor vessels of below 10 gross tonnage, 2 inch or over in mesh-size, with an exception of over 2,500 meters in length of the net in a fishing vessel fishing in the coastal seas;

(3) Crab gill nets and shrimp gill nets;

(4) Squid falling nets or lift nets, operated with electric generators, fishing beyond the coastal seas;

(5) Crab traps with an overall mesh-size of 2.5 inch or over, and not over 300 traps in a fishing vessel, fishing in the coastal seas; or crab traps with a bottom mesh-size of 2.5 inch or over, fishing beyond the coastal seas;

(6) All types of squid traps;

(7) All types of fish aggregating devices engaged in small-scale fishing in the coastal seas;

(8) Clam dredges fitted to not over 18 meters motor vessels with a dredge-width not over 3.5 meters, a sieve-size of 1.2 centimeters or over, and not over 3 dredges in a fishing vessel, fishing beyond the coastal seas, with an exception of those prescribed in the Notification of Ministry of Agriculture and Cooperatives, B.E. 2560 (2017);

(9) Acetes push nets fitted to motor vessels not over 14 m length, with an exception of those prescribed in the Notification of Ministry of Agriculture and Cooperatives, B.E. 2559 (2016);

(10) Lift nets, cast nets, dip nets, scoop nets, hooks and lines, traps, oyster hammers, harpoons, and other fishing gears not fitting to motor vessels; and

(11) Small-scale fishing gears fitted to vessels of below 10 gross tonnage and motor of below 280 horse power, with an exception of those prescribed in the Notification of Ministry of Agriculture and Cooperatives, B.E. 2560 (2017).

3) In the period from 16 May to 14 June every year, no person shall fish in some parts of Prachuap Khiri Khan, Chumphon, and Surat Thani Provinces, determined as the area from point no. 1 to no. 13 shown in Figure 15 (2).

4) There shall be an exception for fishing in such prescribed area by fishing gears and fishing methods complying with the following conditions:

(1) Otter-board trawls and beam trawls fishing beyond the coastal seas;

(2) Fish gill nets fitted to motor vessels of below 10 gross tonnage, 2 inch or over in mesh-size, with an exception of over 2,500 meters in length of the net in a fishing vessel fishing in the coastal seas;

(3) Crab gill nets and shrimp gill nets;

(4) Squid falling nets or lift nets, operated with electric generators, fishing beyond the coastal seas;

(5) Crab traps with an overall mesh-size of 2.5 inch or over, and not over 300 traps in a fishing vessel, fishing in the coastal seas; or crab traps with a bottom mesh-size of 2.5 inch or over, fishing beyond the coastal seas;

(6) All types of squid traps;

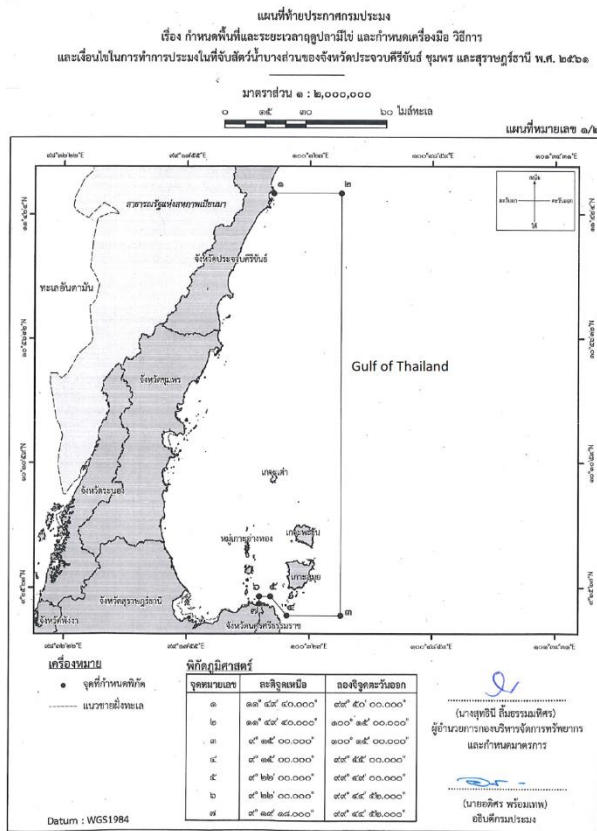
(7) All types of fish aggregating devices engaged in small-scale fishing in the coastal seas;

(8) Clam dredges fitted to not over 18 meters motor vessels with a dredge-width not over 3.5 meters, a sieve-size of 1.2 centimeters or over, and not over 3 dredges in a fishing vessel, fishing beyond the coastal seas, with an exception of those prescribed in the Notification of Ministry of Agriculture and Cooperatives, B.E. 2560 (2017);

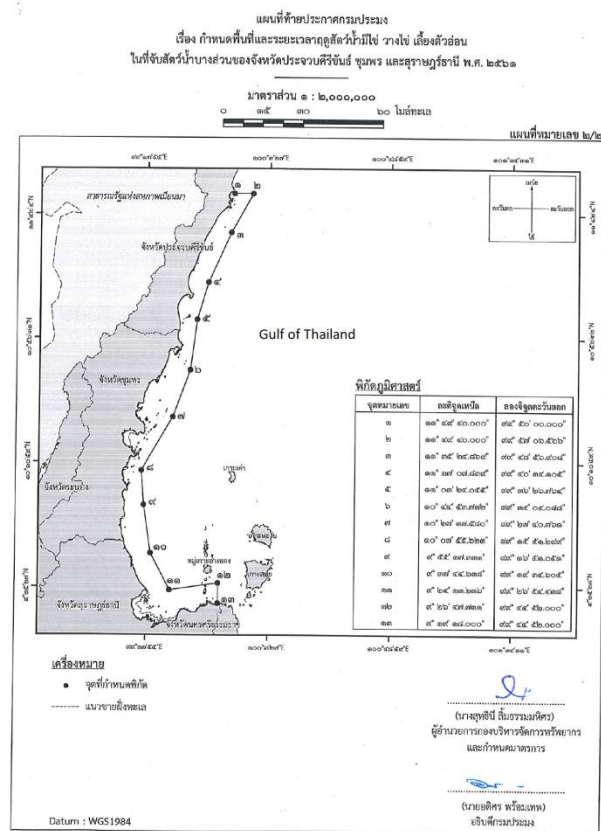
(9) Acetes push nets fitted to motor vessels not over 14 m length, with an exception of those prescribed in the Notification of Ministry of Agriculture and Cooperatives, B.E. 2559 (2016);

(10) Lift nets, cast nets, dip nets, scoop nets, hooks and lines, traps, oyster hammers, harpoons, and other fishing gears not fitting to motor vessels; and

(11) Small-scale fishing gears fitted to vessels of below 10 gross tonnage and motor of below 280 horse power, with an exception of those prescribed in the Notification of Ministry of Agriculture and Cooperatives, B.E. 2560 (2017).



(1)



(2)

Figure 15 Prohibited areas for some fishing in Prachuap Khiri Khan, Chumphon, and Surat Thani Provinces, every year during 15 February – 15 May (1) and 16 May – 14 June (2)

Source: Notification of Department of Fisheries Re: Prescribing Areas and Periods of Egg-bearing, Spawning, and Larval Rearing of Aquatic Animals in Some Parts of the Fishing Grounds in Prachuap Khiri Khan, Chumphon, and Surat Thani Provinces, B.E. 2561 (2018)

7.2.6 Notification of Surat Thani Provincial Fisheries Committee Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in Some Fishing Grounds, B.E. 2561 (2018), its Second Amendment (No. 2), B.E. 2562 (2019), and its Third Amendment (No. 3), B.E. 2562 (2019):

No person shall fish by the following fishing gears in a certain area in the coastal seas off Don Sak Subdistrict, Don Sak District, Surat Thani Province as shown in Figure 16:

- (1) All types of fishing gears fitted to motor vessels, with an exception of mullet gill nets, catfish gill nets, hooks and lines, and grabbing/collecting aquatic animals with non-motor vessels;
- (2) Gill nets operated with water splashing devices;
- (3) All types of traps; and
- (4) Bamboo stake traps, setbag nets with wings, or any other similar fishing gears in different names.

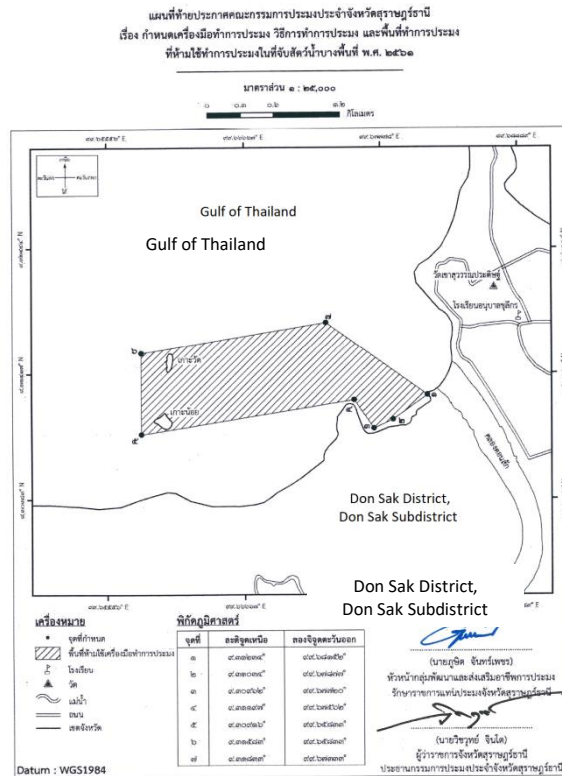


Figure 16 Prohibited area for some fishing in Don Sak District, Surat Thani Province

Source: Notification of Surat Thani Provincial Fisheries Committee Re: Prescribing Fishing Gears, Fishing Methods, and Fishing Areas Prohibited from Fishing in Some Fishing Grounds (No. 3), B.E. 2562 (2019)

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