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

# REPORT

# THE SECOND MEETING OF THAILAND'S NATIONAL SCIENTIFIC AND TECHNICAL COMMITTEE

**BANGKOK, THAILAND**
26 NOVEMBER 2019

Prepared by
**DEPARTMENT OF FISHERIES**
**THAILAND**

**SOUTHEAST ASIAN FISHERIES DEVELOPMENT CENTER**
**TRAINING DEPARTMENT**

**Southeast Asian Fisheries Development Center** | **United Nations Environment** | **Global Environment Facility**

First published in Phrasamutchedi, Samut Prakan, Thailand in November 2019 by the SEAFDEC-UNEP-GEF Fisheries Refugia Project, Training Department of the Southeast Asian Fisheries Development Center



Southeast Asian Fisheries Development Center
Training Department
P.O.Box 97, Phrasamutchedi, Samut Prakan, Thailand
Tel: (66) 2 425 6100
Fax: (66) 2 425 6110
https://fisheries-refugia.org and
https://seafdec.or.th

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For citation purposes this document may be cited as:

DOF/Thailand. 2019. Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand, Report of the Second Meeting of Thailand's National Scientific and Technical Committee. Southeast Asian Fisheries Development Center, Training Department, Samut Prakan, Thailand; FR/REP/TH22, 29 p.

**REPORT OF THE MEETING**

1. The second meeting of Thailand's National Scientific and Technical Committee for the project entitled "Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand" was conducted by the Department of Fisheries on 26th November 2019, 13.00 – 17.00 hours, at Department of Fisheries, Bangkok. Ms. Praulai Nootmorn Senior Expert in Marine Fisheries for the Department of Fisheries and the National Focal Point for Thailand acted for the Senior Expert in Fisheries Management as the chairperson. Meeting agenda and list of participants are shown in annex 1 and 2, respectively. The meeting minutes are as follows:

**AGENDA 1 REPORT OF THE CHAIRPERSON**

2. **Ms. Praulai Nootmorn**, acted as the chairperson, welcomed all the committee to the meeting and noted that the meeting was aimed to make a consultation mainly on the technical matters of resource mappings for fisheries *refugia* sites in Trat Province and Koh Sed in Surat Thani Province. She expressed her pleasure for all comments and recommendations; she then opened the meeting.

**AGENDA 2 APPROVAL OF REPORT OF THE PREVIOUS MEETING**

3. **Ms. Praulai Nootmorn** informed the meeting that report of the previous meeting, i.e., the first meeting of Thailand's National Scientific and Technical Committee on 17th December 2018, had been already handed out to each committee for consideration. In this regard, she requested the committee to consider, amend, and approve the report.

4. **Meeting Resolution:** The committee approved report of the first meeting of Thailand's National Scientific and Technical Committee on 17th December 2018.

**AGENDA 3 MATTERS OF REPORT**

**3.1 Progress of Project Implementation**

5. **Ms. Praulai Nootmorn** reported to the meeting the progress of project implementation carried out after the previous meeting of Thailand's National Scientific and Technical Committee, regionally and nationally. She highlighted that the fisheries *refugia* project was executed via local actions, national actions, and regional actions, under decision making of national and regional committees, namely, Project Steering Committee, Regional Scientific and Technical Committee, National Fisheries *Refugia* Committee, National Scientific and Technical Committee, and Site-Based Management Boards.

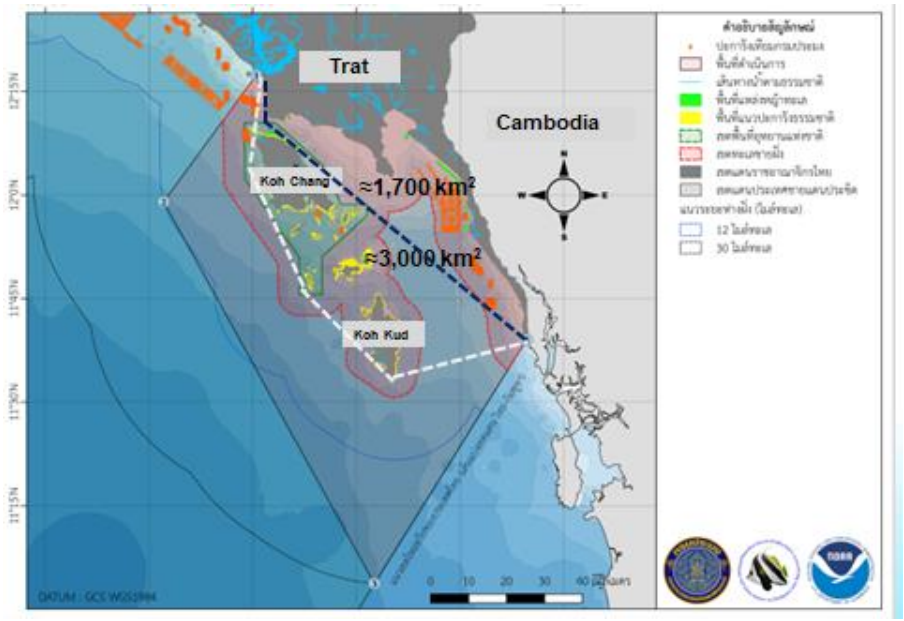
6. **Ms. Praulai** noted about the progress by referring to the regional and national committee meetings shown in annex 3 and subsequently concluded the overall results from the implementations up to date that priority species and study areas for fisheries *refugia* in Trat and Surat Thani Provinces were finally confirmed and approved. For Trat Province, priority species was Indo-Pacific mackerel *(Rastrelliger brachysoma*) and study area was the main fishing ground off Trat coast including Koh Chang and Koh Kut, while in Surat Thani Province, priority species was blue swimming crab *(Portunus pelagicus*) and study area was the main fishing ground off Surat Thani coast close to Mu Koh Ang Thong National Marine Park, emphasizing the area around Koh Sed in Ban Don Bay. Details of her presentations are shown in annex 3.

7. **Meeting Resolution:** the meeting acknowledged.

**AGENDA 4 MATTERS FOR CONSIDERATION**

**4.1 Technical Mappings as the fundamentals for Establishment of Fisheries *Refugia* for Indo-Paific Mackerel in Trat Province**

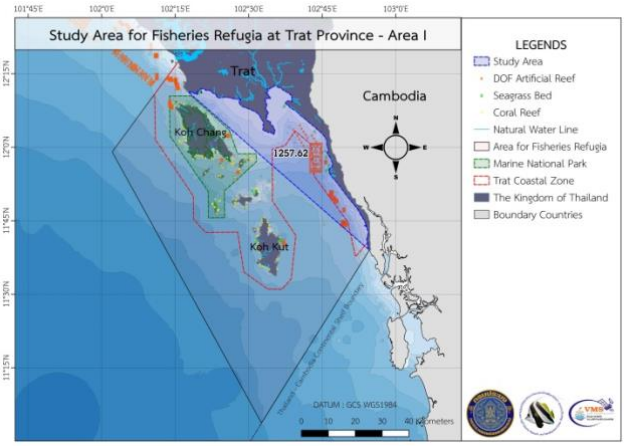
8. **Mr. Kumpon Loychuen**, Director of the Eastern Gulf Fisheries Research and Development Center (Rayong), presented to the meeting the ecosystems and fisheries in Trat Province as shown in annex 4 and concluded as follows:
   - There were 798 registered fishing boats, > 10 GT, comprising 552 high efficient boats and 246 low efficient boats; while 2,064 non-registered fishing boats, < 10 GT, were recorded;
   - Area for baseline study was approximately 6,400 km$^2$ covering the main fishing ground and spawning ground of Indo-Pacific mackerel, in which there were 162 km$^2$ of mangroves, 10 km$^2$ of seagrass beds, 28 km$^2$ of coral reefs, and 118 km$^2$ of the total of 44 units of artificial reefs;
   - Fishing gears having high effect on Indo-Pacific mackerel were purse seines, falling nets with light aggregating devices (having high composition of juvenile mackerel in their catches), and fish gill nets;
   - High fishing season of purse seining in Trat Province was the period of January-April, while that of falling netting with aggregating devices was January-June;
   - Fish gill netters fished all year in the areas of Chang Strait, Bann Had Lek and Klong Yai District;
   - From the study results in 2017-2018, Indo-Pacific mackerel had their peak spawning season during January-April in the areas of Chang Strait and Trat Bay; and
   - **-** There were 5 existing measures for coastal fisheries management in Trat Province, namely, 1) notified coastal seas: 5 nm from shoreline, 2) notification on 3 aquatic species sanctuaries, 3) notification on determining fishing gears, fishing methods, and fishing areas prohibited from fishing in 15 fishing grounds covering the area of 5,800 rai (9.28 km$^2$), 4) notification on determining fishing gears, fishing methods, and fishing areas prohibited from fishing in 15 fishing grounds (no.2): determining mesh sizes, lengths, and depths of the nets, and 5) determination of fishing gears, fishing methods, and fishing areas prohibited from fishing in coastal seas.
9. **Ms. Praulai Nootmorn** recommended that compositions of Indo-Pacific mackerel in the catches of relevant fishing gears should be included in the presentations to show the significance of those gears affected to the mackerel resources.
10. **Mr. Kumpon** acknowledged the recommendation and proceeded to the presentation of tentative sites and management measures for Indo-Pacific mackerel in Trat Province. He showed 2 options of fisheries *refugia* sites: 1) an area of approximately 1,700 km$^2$ having straight boundary line off the coast of Trat Province excluding Koh Chang and Koh Kut, shown by black dash-line in the picture bellow; and 2) an area of approximately 3,000 km$^2$ with its boundary stretching over Koh Chang and Koh Kut as shown by white dash-line. For management scheme, he proposed a prohibition of trawlers, purse seiners, anchovy falling netters, gill netters and entangling netters, of which mesh size less than 2 inches, fishing in fisheries *refugia* site during February-March each year. The meeting was then invited to consider, discuss, and comment on his presentation.

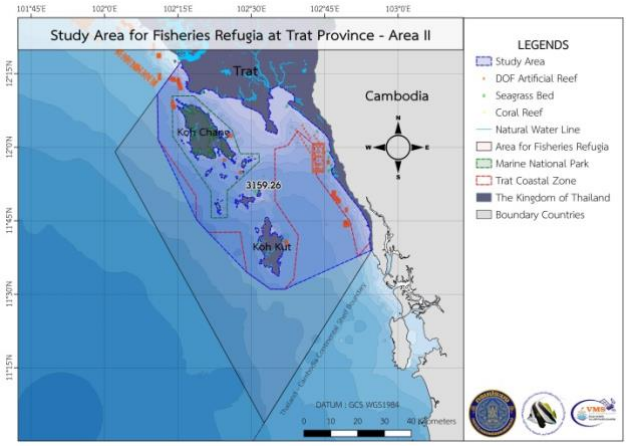



11. **Ms. Praulai Nootmorn** recommended showing the numbers of mackerel fishing gears operated in the proposed fisheries *refugia* sites so as to know how many fishers affected by the management measures in the areas. She noted that such the numbers could be obtained from the existing database in the Department of Fisheries.
12. **Ms. Penchan Laongmanee**, Lecturer of the Faculty of Marine Technology, Burapha University, asked about the target of mackerel's critical life cycles that was aimed to be protected.
13. There was some discussion regarding that issue, followed by the conclusion which was considered from the technical data that the fisheries *refugia* for Indo-Pacific mackerel would be established in order to conserve its spawners.
14. **Mr. Weerasak Yingyuad**, Representative from SEAFDEC/Project Coordinating Unit, expressed his opinion that fisheries *refugia* was not the new concept in Thailand regarding the existing notification on prohibitions of destructive fishing gears in certain of times and areas in the Gulf of Thailand to protect spawners and juveniles of the important economical species. He also mentioned that one of the indicators for success, 50% reduction of fishing pressures, should be taken into consideration for the accomplishment of Indo-Pacific mackerel fisheries *refugia* management in Trat Province; for that, fishing pressures to be reduced could be the number of fishing boats, fishing days, or fishing grounds.
15. **Ms. Praulai** suggested that fishing gears not affected the mackerel should be excluded from technical data presentation to avoid unnecessary information.
16. **Ms. Ratana Munprasit**, Fisheries Refugia Project Staff of the Department of Fisheries, recommended that besides effects on fishing, the advantages of fisheries *refugia* for Indo-Pacific mackerel should be highlighted in the upcoming meeting of Site-Based Management Board in Trat Province. She also reminded the meeting that multi-fishing gears normally used by each small-scale fisher, therefore the alternative methods rather than mackerel fishing could be operated in the nominated conservative period and area for Indo-Pacific Mackerel.
17. **Ms. Praulai** noted that the results from closed-season measures in the upper and middle Gulf of Thailand could be shown as the best practice of fisheries *refugia* in Thailand.
18. **Mr. Weerasak** mentioned data collection in Cambodia that the fishers were asked about the locations the mackerel spawners found; he noted that this would raise data acceptances of the fishers. In this regard, **Ms. Ratana** and **Mr. Kumpon** noted that collecting data by fisher's

participations was also conducted in Trat Province; larval collections were carried out in the location the fully-mature mackerel found as told by fishers.

19. In seeking the conclusions, **Ms. Ratana** invited the meeting to make a discussion and recommendations on the appropriate fisheries *refugia* sites and management measures which would be prepared for the upcoming meeting of Site-Based Management Board in Trat Province.
20. There followed an extensive discussion regarding the fisheries *refugia* site suited for the existing technical data of the mackerel and its fisheries status. Overlay mappings of proposed fisheries *refugia* sites on resources and fisheries data were mainly taken into consideration. Adjusted mappings of fisheries *refugia* sites were then prepared and agreed to propose for consideration in the meeting of Site-Based Management Board in Trat Province on 17th December 2019.
21. **Meeting Resolution:** the meeting agreed on the conclusions as follows:
    - Fisheries *refugia* in Trat Province was aimed to protect the spawners of Indo-Pacific mackerel in the area;
    - Percentages of Indo-Pacific mackerel in the catches of specified fishing gears, namely, purse seine, falling net, trawl, and fish gill net, were to be prepared in order to indicate the effects of those gears on the mackerel resources;
    - Numbers of fishing boats for Indo-Pacific mackerel fishing in the proposed periods and sites of fisheries *refugia* were to be presented for the estimation of affected fishers;
    - Fishing gears not affecting Indo-Pacific mackerel were to be excluded from the presentation;
    - Mappings of fishing ground of each fishing gear were to be discriminated by forms and colors of the data plots;
    - Advantages of fisheries *refugia* for Indo-Pacific mackerel were to be highlighted; and
    - Boundaries of the 2 proposed fisheries *refugia* sites were adjusted by not overlapping protected zone of Koh Chang Marine National Park, resulted in 2 options: area I−1,257.62 km$^2$ not including Koh Chang and Koh Kut, and area II−3,159.26 km$^2$ covering the coastal seas of Koh Chang and Koh Kut, each of which is shown as purple zone in the following pictures:



**4.2 Provision of Technical Data of Fisheries Resources and Coastal Ecosystems around Koh Sed in Ban Don Bay for Establishment of Blue Swimming Crab Fisheries *Refugia* in Surat Thani Province**

22. **Mr. Jirawut Kumpirod**, Technical Fisheries Officer of the Central Gulf Fisheries Research and Development Center (Chumphon), presented to meeting some information of blue swimming crab resources and fisheries in Surat Thani Province, details of which are shown in annex 5 and concluded as follows:
    - Surat Thani Province is located in the east of the southern part of Thailand covering coastline of 156 km. It includes several islands, namely, Koh Samui, Koh Pha-ngan, Koh Tao, and Mu Koh AngThon. People in the province earn their living on agriculture, fisheries, vending, hotel business, and tourism;
    - Ten species of seagrass were found in the area of 17,820 rai in Surat Thani Province. They distributed along the coastal areas of 8,147 rai in Ao Ban Don, 20 rai in Ao Nang Kam, 158 rai in Koh Nok Ta Pao, 60 rai in Koh Tao, 4,018 rai in Koh Pha-ngan, and 5,417 rai in Koh Samui;
    - Coastal seas of Surat Thani Province were indicated by the lines of 3 nm from mainland and Koh Tao shorelines, and 2 nm from shorelines of all the islands except Koh Tao;
    - There were 2 main conservation measures covering the seas of Surat Thani Province: closed season in the spawning and nursery grounds of the important economical marine species during 15 February – 15 May each year, and prohibition of some destructive fishing gears in 7 nm from shoreline during 16 May – 14 June each year;
    - Fishing grounds of crab gill nettings and crab trappings were scattered around the seas of Surat Thani Province;
    - Main fishing operations in Surat Thani Province were trawling, purse seining, gill netting, crab trapping, and squid trapping;
    - In 2017-2018, catch compositions of blue swimming crab in Surat Thani Province were found at 43.86-99.72% from crab gill nettings, 62.86-100.00% from crab trappings, and 8.13%-45.07% from trawlings; and
    - Crab gill netters fishing around Koh Sed in Ban Don Bay was operated by small-scale fishers from the mainland in Chaiya District; normally 100% of blue swimming crab in the catches was found.
23. **Asst. Prof. Amonsak Sawusdee**, Head of the Natural Resources and Environmental Technology Program, Walailak University, presented about his study on biology and related ecosystems regarding blue swimming crab in Ban Don Bay of Surat Thani Province. He noted that peak of the spawning period was found during March-May followed by August-October. He highlighted that spatial suitability for blue swimming crab conservation was 1 month after spawning as numbers of young crab were recruited. In this regard, he recommended that the periods for blue swimming crab fisheries *refugia* should be April-May or September-October. He also supported Koh Sed for fisheries *refugia* site due to its suitable habitats for young crabs, especially sand bars and sea grass beds; moreover, it was evident that eggs and larval crabs were brought into Koh Sed by current in the area. However, he mentioned that there was a lack of the topography illustrations regarding ecosystems and blue swimming crab resources in Koh Sed which was essential for indicating the actual boundary of fisheries *refugia* site.
24. **Asst. Prof. Amonsak** then explained about the TORs provided for Walailak University to study on topography of Koh Sed including:
    - Conduct drone photography to provide high-resolution aerial photograph of the tidal topography;
    - Survey for ecosystems and coastal resources;

- Conduct aerial photography and satellite survey to provide Digital Elevation Model (DEM);
- Provide GIS data of seagrass beds by field survey and drone photography; and
- Provide GIS data of the habitats of young blue swimming crabs by surveying its density.

25. **Dr. Suthira Thongkao**, Lecturer of the School of Engineering and Technology, Natural Resources and Environmental Technology Program, Walailak University, gave an explanation to the meeting that the topography would be provided in high-resolution 3D-GIS-mapping conducted via drone photography. He noted that the study could be started in mid-January which was the time of off-Monsoon season and the lowest tide in the morning.
26. **Ms. Ratana Munprasit** recommended that the information about coastal ecosystems in Surat Thani Province could be additionally shared from the database of the Department of Marine and Coastal Resources. She consequently requested the Eastern Gulf Fisheries Research and Development Center to prepare baseline mappings of the ecosystems and environments in Surat Thani Province using GIS database which could be obtained from the Department of Marine and Coastal Resources.
27. There followed a discussion regarding the releasing of blue swimming crab spawners from trawlers in Surat Thani Province. **Ms. Praulai Nootmorn** explained that there were about 40 trawlers participated in the activity which was initiated from the previous project stakeholder consultation meeting; numbers and sites of released crabs were recorded. **Mr. Weerasak Yingyuad** recommended that besides nursery ground protection at Koh Sed, spawner releasing could be taken into consideration for voluntary activity of fisheries *refugia* approach for blue swimming crab in Surat Thani Province. He noted that this could be the success story in Thailand, and its capacity building could be supported by PCU.
28. **Ms. Praulai Nootmorn** finally requested approval for outsourcing Walailak University to provide the topography and resource mappings of Koh Sed in Surat Thani Province.
29. **Meeting Resolution:** the committee approved.

**AGENDA 5 ANY OTHER BUSINESS**

30. **Ms. Praulai Nootmorn** informed the meeting that the project was going to organize workshop on “Socio-Economic Study and Value Chain Analysis of Fisheries” aiming for strengthening the knowledge management and sharing information for analysis of the linkage chains among fishers and fishery stakeholders, consequently usable for project evaluation. She highlighted that the workshop would be beneficial for strengthening the knowledge of socio-economic study and evaluation procedures to the relevant officers. She then welcomed all the meeting members to participate in the workshop.**Meeting Resolution:** the meeting acknowledged.

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**ANNEX 1**

**AGENDA**

**AGENDA 1** **REPORT OF THE CHAIRPERSON**

**AGENDA 2** **APPROVAL OF REPORT OF THE PREVIOUS MEETING**

**AGENDA 3** **MATTERS OF REPORT**

3.1 Progress of Project Implementation

**AGENDA 4** **MATTERS FOR CONSIDERATION**

4.1 Technical Mappings as the fundamentals for Establishment of Fisheries *Refugia* for Indo-Pacific Mackerel in Trat Province

4.2 Provision of Technical Data of Fisheries Resources and Coastal Ecosystems around Koh Sed in Ban Don Bay for Establishment of Blue Swimming Crab Fisheries *Refugia* in Surat Thani Province

**AGENDA 5** **ANY OTHER BUSINESS**

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**ANNEX 2**

**LIST OF PARTICIPANTS**

**Thailand's National Scientific and Technical Committee**

| | | | |
|---|---|---|---|
| 1. | Ms. Praulai Nootmorn (National Focal Point for Thailand) | Senior Expert in Marine Fisheries, Department of Fisheries | Acting Chairperson |
| 2. | Mr. Supawat Kan-atireklap, Ph.D. | Special Expert in the Research of Resources and Environment in Marine and Coastal Ecosystem, Department of Marine and Coastal Resources | Committee |
| 3. | Ms. Jinda Petchkamnerd | Acting Director, Central Gulf Fisheries Research and Development Center (Chumphon), Department of Fisheries | Committee |
| 4. | Ms. Mitila Pransilpa | Fisheries Technical Officer, Marine and Coastal Resources Research and Development Center the Eastern Gulf of Thailand, Department of Marine and Coastal Resources (represented Director) | Committee |
| 5. | Mr. Sompong Bantiwiwatkul | Fisheries Officer, Marine and Coastal Resources Research and Development Center the Central Gulf of Thailand, Department of Marine and Coastal Resources (represented Director) | Committee |
| 6. | Ms. Penchan Laongmanee | Lecturer, Faculty of Marine Technology, Burapha University, Chanthaburi Campus | Committee |
| 7. | Asst. Prof. Amonsak Sawusdee, Ph.D. (Mr.) | Head of the Natural Resources and Environmental Technology Program, Walailak University | Committee |
| 8. | Mr. Apisit Kongprom | Geo-informatics Officer, Geo-informatics Applications and Service Office, Geo-Informatics and Space Technology Development Agency (Public Organization) (represented Director) | Committee |
| 9. | Mr. Weerachai Phetsut | Lecturer, Science Program in Fisheries, Maejo University at Chumphon | Committee |
| 10. | Mr. Isara Chanrachkij | Technical Officer, Southeast Asian Fisheries Development Center | Committee |

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|---|---|---|---|
| 11. | Mr. Kumpon Loychuen | Director, Eastern Gulf Fisheries Research and Development Center (Rayong), Department of Fisheries | Committee and Secretary |
| 12. | Mr. Jirawut Kumpirod | Fisheries Technical Officer, Central Gulf Fisheries Research and Development Center (Chumphon), Department of Fisheries | Committee and Assistant Secretary |

**Technical Assistants**

| | | |
|---|---|---|
| 1. | Dr. Suthira Thongkao | Lecturer, School of Engineering and Technology, Natural Resources and Environmental Technology Program, Walailak University |
| 2. | Mr. Pinyo Prasaraya | Fisheries Technical Officer, Eastern Gulf Fisheries Research and Development Center (Rayong), Department of Fisheries |

**Observers**

| | | |
|---|---|---|
| 1. | Mr. Weerasak Yingyuad | Technical Officer, SEAFDEC/Project Coordinating Unit |
| 2. | Mr. Chalerm Pusririt | Fisheries Technical Officer, Department of Fisheries |
| 3. | Ms. Ratana Munprasit | Fisheries Refugia Project Staff, Department of Fisheries |
| 4. | Ms. Pannalak Srithong | Fisheries Refugia Project Staff, Department of Fisheries |
| 5. | Ms. Jutima Jangjaiboon | Fisheries Refugia Project Staff, Department of Fisheries |
| 6. | Ms. Chanokporn Muenchamnan | Fisheries Refugia Project Staff, Department of Fisheries |

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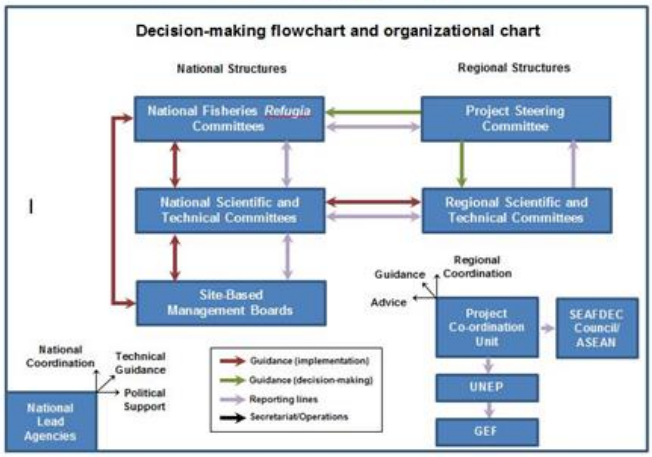
**ANNEX 3**

**PROGRESS OF PROJECT IMPLEMENTATION**


**Development of a Regional System of Fisheries *Refugia***

| Regional Actions | National Actions | Local Actions |
|---|---|---|
| • Regional information and data management for *refugia* system | • Enhancing national coordination | • Establish local management boards |
| • Targeted demonstration activities | • Strengthening the enabling environment | • Delineate *refugia* boundaries/formal designation of sites |
| • Capacity development | • Building the national and site-level science and information base | • Identify fisheries management problems/solutions for *refugia* sites |
| • Supporting regional fisheries management | • Planning operational management of *refugia* | • Establish regulations and monitoring |
| • Monitoring and evaluation | | |



## Regional Main Activities (1/2)

2018, 11-13 Sep: 1st Regional Scientific and Technical Committee Meeting (Bangkok, Thailand)

2018, 4-5 Dec: 1st Project Steering Committee Meeting (Bangkok, Thailand)

2019, 21-23 May: 2st Regional Scientific and Technical Committee Meeting (Kampot, Cambodia)

2019, 5-6 Nov: 2st Project Steering Committee Meeting (Sarawak, Malaysia)

## Regional Main Activities (2/2)

2019, 10-11 Sep: Regional Meeting on Indicators for Fisheries *Refugia* Management and Discussion on Project Follow-up (Pattaya, Thailand)

2019, 12-13 Sep: Technical Consultative Meeting on Drafting of the Regional Action Plan for Management of Transboundary Species: Indo-Pacific Mackerel (*Rastrelliger brachysoma*) in the Gulf of Thailand (Pattaya, Thailand)

## Thailand Main Activities (1/3)

2019, 16 Jan: 3rd Thailand National Fisheries *Refugia* Committee Meeting (Bangkok)

2019, 29 Jan: Consultation Meeting for Arrangement of Site-Based Fisheries Refugia Management Board in Surat Thani Province (Surat Thani)

2019, 20 Feb: Consultation Meeting for Arrangement of Site-Based Fisheries Refugia Management Board in Trat Province (Trat)

## Thailand Main Activities (2/3)

2019, 28 Feb: Consultation Meeting for Arrangement of Baseline Data Collection (Bangkok)

2019, 7 Mar: Consultation Meeting on the Preparation for Financial Audit (Bangkok)

2019, 29 Mar: 4th Thailand National Fisheries Refugia Committee Meeting (Bangkok)

## Thailand Main Activities (3/3)

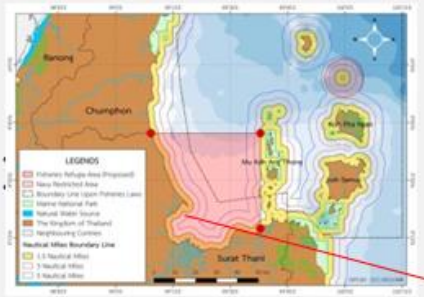
2019, 4 Apr: Site-Based Fisheries Refugia Management Board in Trat Province (Trat)

2019, 26 Apr: Site-Based Fisheries Refugia Management Board in Surat Thani Province (Surat Thani)

2019, 20 Jun: 5th Thailand National Fisheries Refugia Committee Meeting (Bangkok)

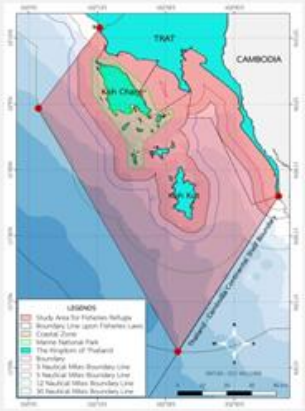
2019, 28 Oct: 6th Thailand National Fisheries Refugia Committee Meeting (Bangkok)

## Study Area and Priority Species in Surat Thani Province



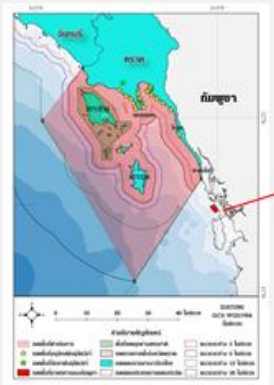

Blue Swimming Crab
(*Portunus pelagicus*)

## Study Area and Priority Species in Trat Province



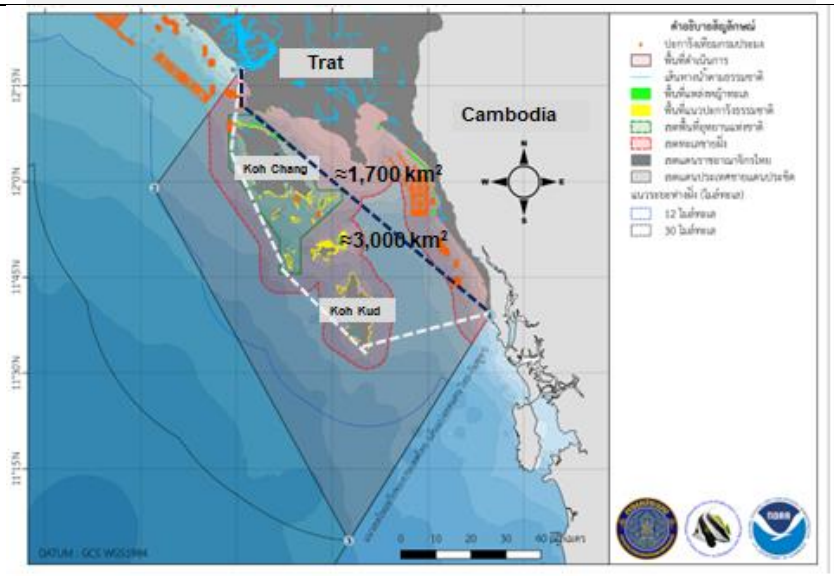

Indo-Pacific Mackerel
(*Rastrelliger brachysoma*)

## Fisheries Refugia for Indo-Pacific Mackerel in Koh Kong of Cambodia
(valid from 16th September 2019)



18.63 km²

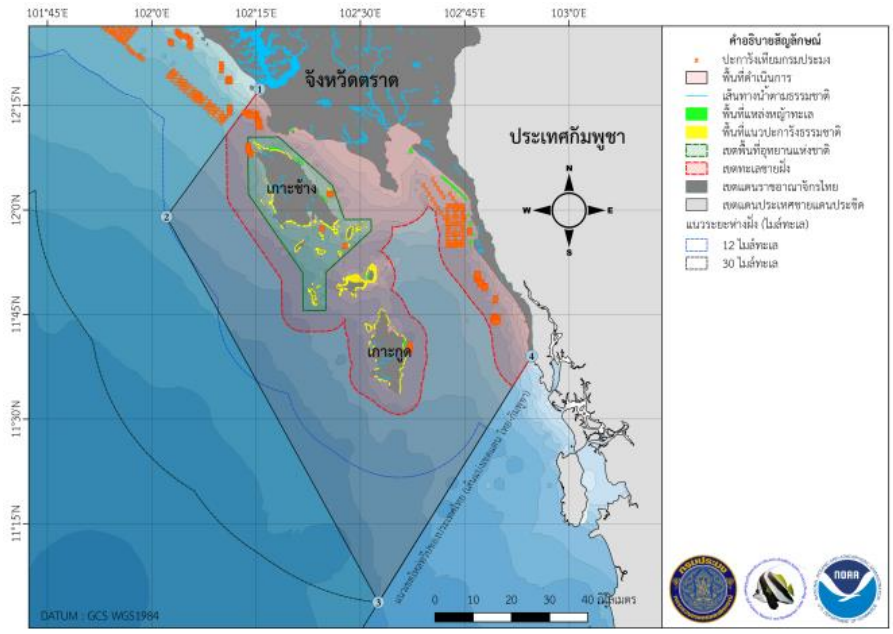
all kinds of fishing and other activities in mackerel fisheries *refugia* in Koh Kong were banned from 1st December to 31st March each year



## ANNEX 4

## TECHNICAL MAPPINGS AS THE FUNDAMENTALS FOR ESTABLISHMENT OF FISHERIES REFUGIA FOR INDO-PACIFIC MACKEREL IN TRAT PROVINCE

### Coastal Resources and Artificial Reefs




### Numbers of Small-Scale and Comercial Fishing Boats in 2019 (2,862 Boats)

จำนวนเรือจากการสำรวจร่วม 3 ฝ่าย เรือต่ำกว่า 10 ตันกรอส

| ชนิดเครื่องมือ | จำนวน (ลำ) |
|---|---|
| ลอบปู | 133 |
| ลอบหมึก | 43 |
| อวนครอบปลากะพัก | 39 |
| อวนครอบหมึก | 3 |
| อวนไดหมึก | 22 |
| อวนติดตา (ปลากระบอก) | 10 |
| อวนติดตา (ปลาทู) | 44 |
| อวนติดตา (ปลาอื่นๆ) | 23 |
| อวนติดตา (อวนกุ้ง) | 413 |
| อวนติดตา (อวนปู) | 267 |
| อวนรุน | 57 |
| อวนลากแผ่นตะเข่ | 98 |
| อื่นๆ | 912 |
| ผลรวมทั้งหมด | 2,064 |

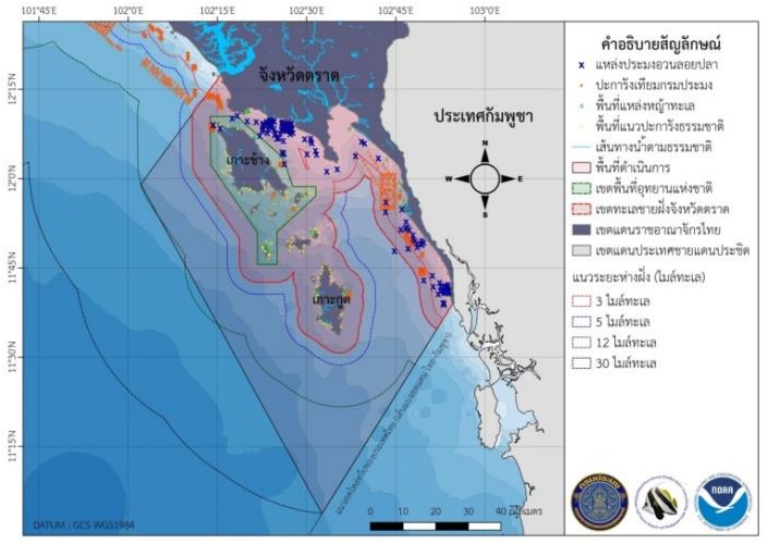
ข้อมูลใบอนุญาตทำการประมงพาณิชย์ จังหวัดตราด รอบปีการประมง 2561-2562

ผลรวมทั้งหมด 798 ลำ

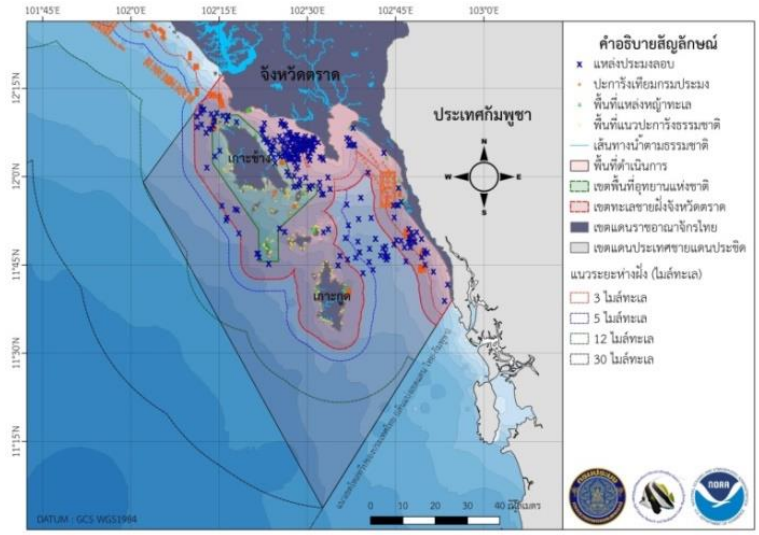
| เรือประมง | จำนวนราย |
|---|---|
| คราดหอยลาย | 16 |
| คราดหอยอื่น | 4 |
| เบ็ดราว | 15 |
| ลอบปลา | 2 |
| ลอบปู | 72 |
| ลอบหมึก | 2 |
| ลอบหมึกสาย | 9 |
| อวนครอบหมึก | 88 |
| อวนติดตา | 38 |
| เครื่องมือประสิทธิภาพต่ำ | 246 |

| เรือประมง | จำนวนราย |
|---|---|
| เรือประกอบเครื่องกำเนิดไฟฟ้า | 102 |
| อวนครอบปลากะตัก | 208 |
| อวนล้อมจับ | 31 |
| อวนล้อมจับปลากะตัก | 17 |
| อวนลากคานถ่าง | 55 |
| อวนลากคู่ | 4 |
| อวนลากแผ่นตะเข่ | 135 |
| เครื่องมือประสิทธิภาพสูง | 552 |

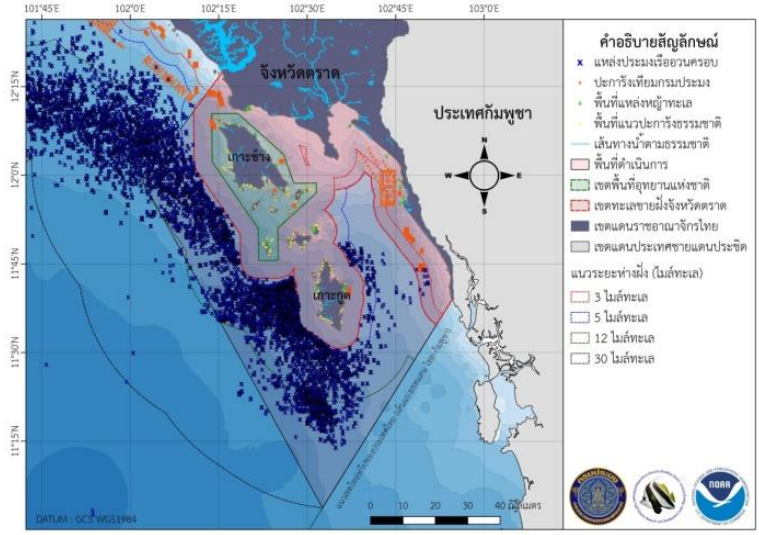
**Small-Scale Fishing Area of Fish Gill Nets**



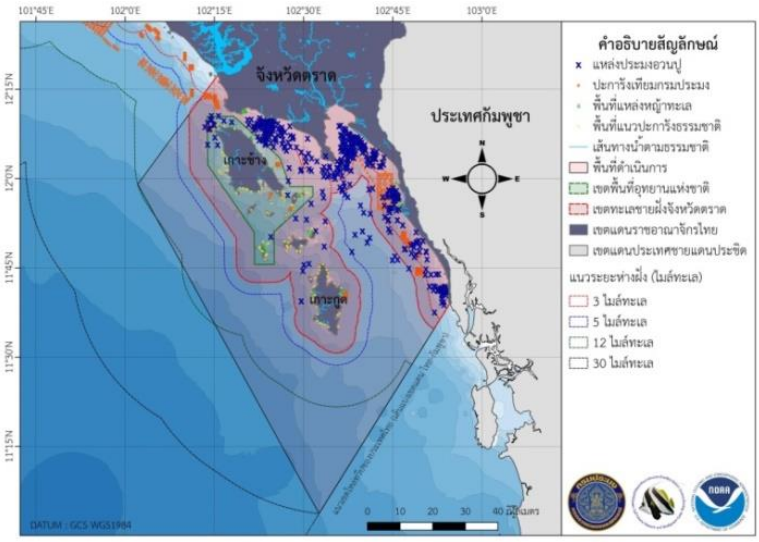

**Small-Scale Fishing Area of Traps**



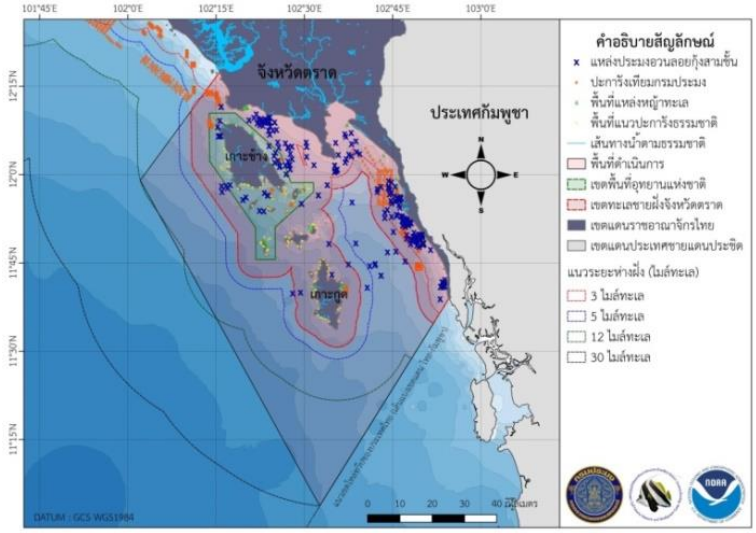

**Commercial Fishing Area (Falling Nets with aggregating devices)**



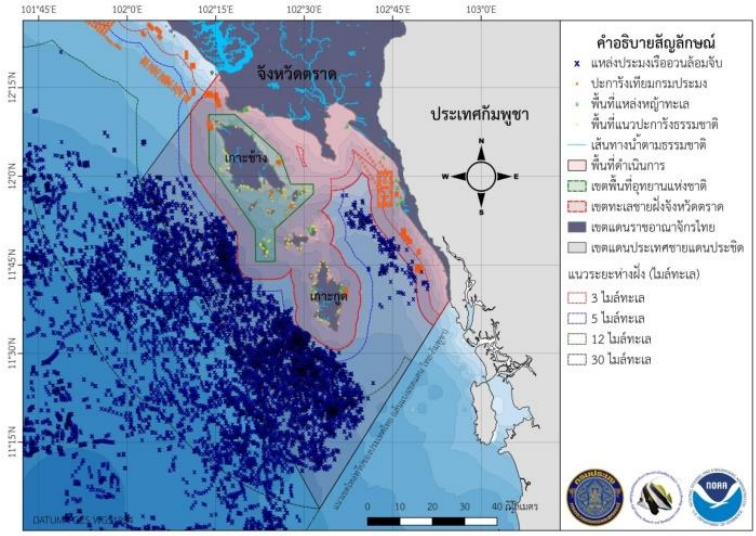
**Small-Scale Fishing Area of Crab Gill Nets**



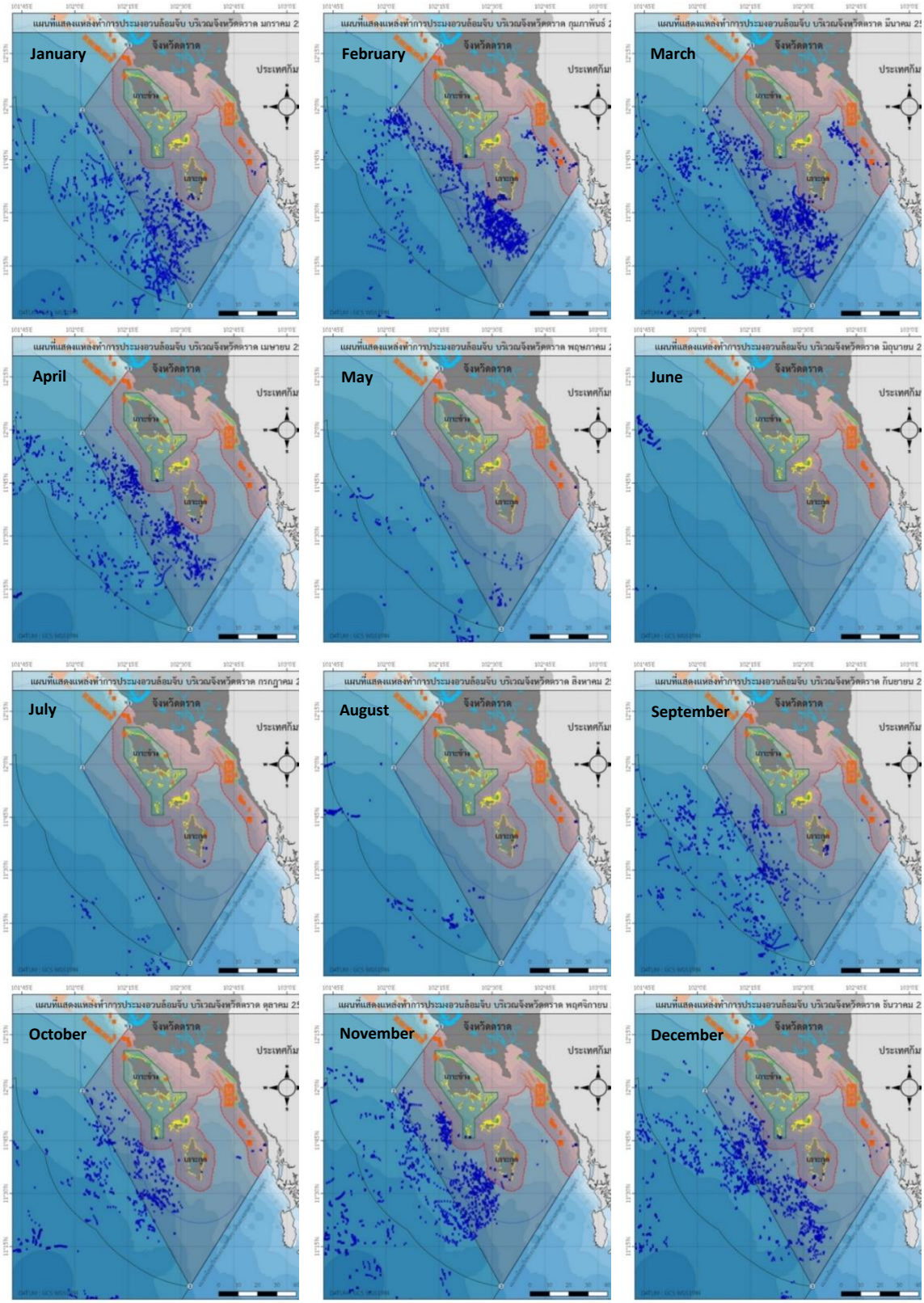

**Small-Scale Fishing Area of Shrimp Gill Nets/Tremmel Nets**



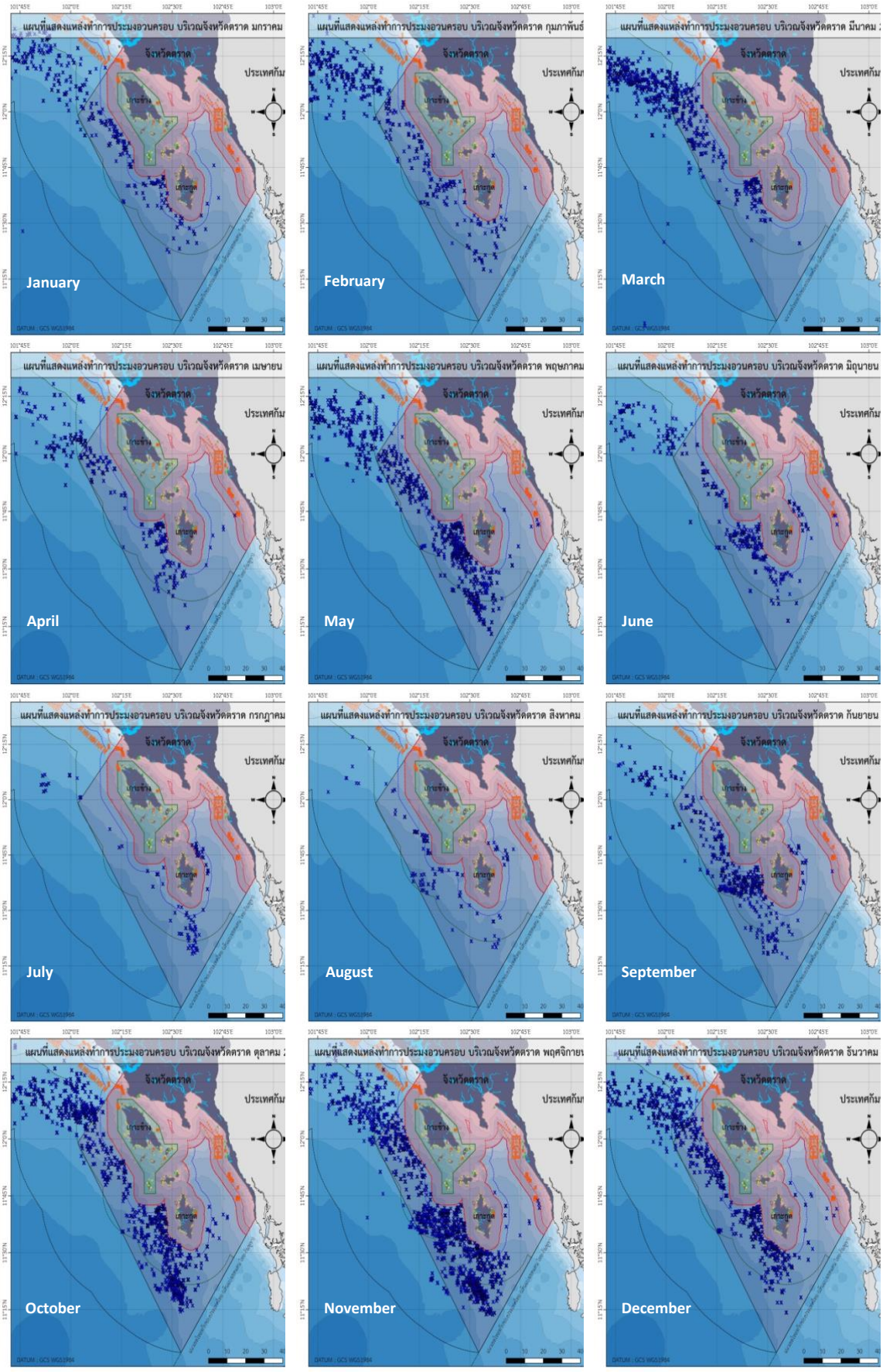

**Commercial Fishing Area (Purse Seines)**



**Purse Seine Fishing Areas, monthly in 2018**

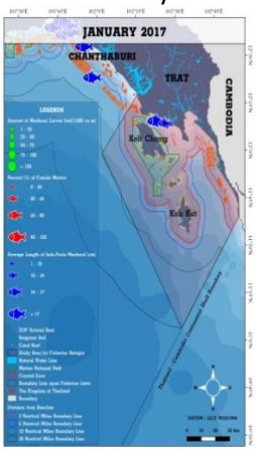


**Falling Net Fishing Areas, monthly in 2018**

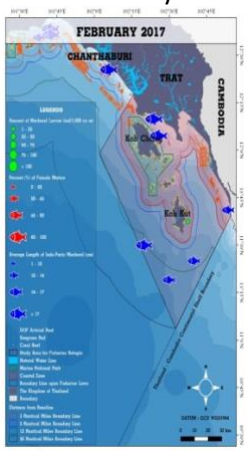


**Distributions of Indo-Pacific Mackerel (Larvae, Adults, and Mature fish) in the waters off Trat Province in 2017**

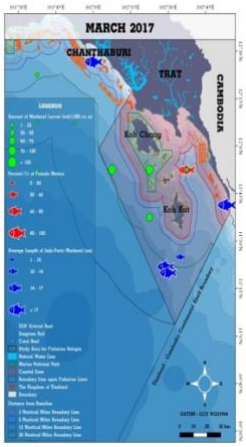
January



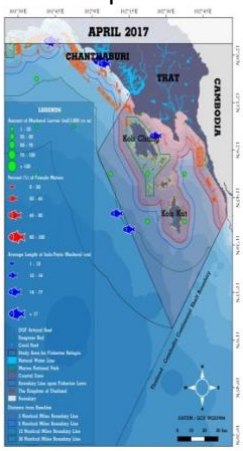

February



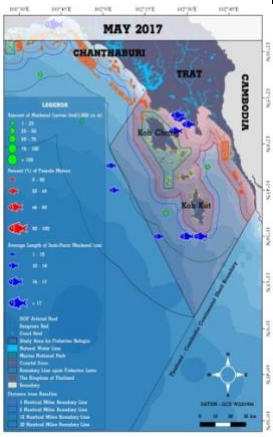

March



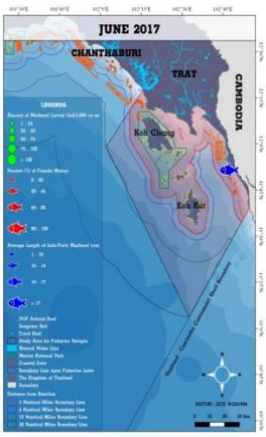

April



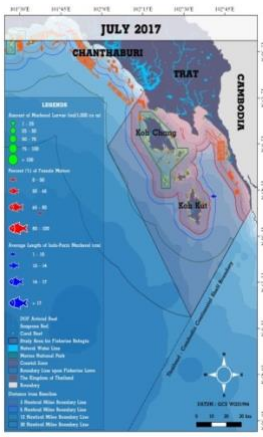

May



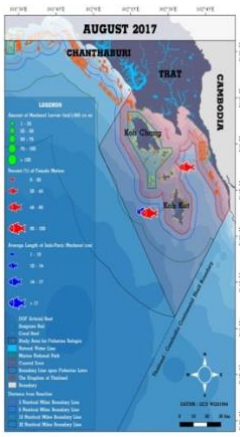

June



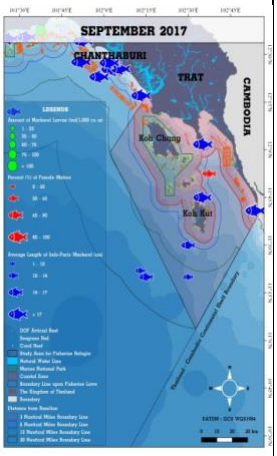

July



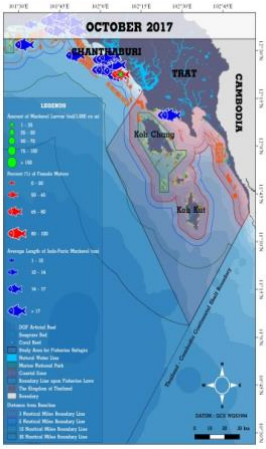

August



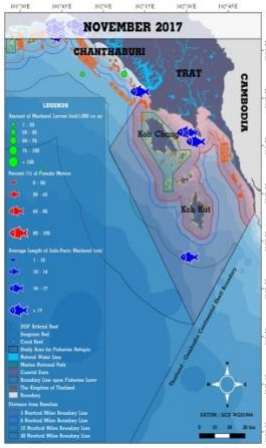

September



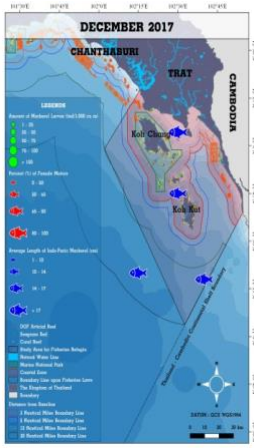

October




November

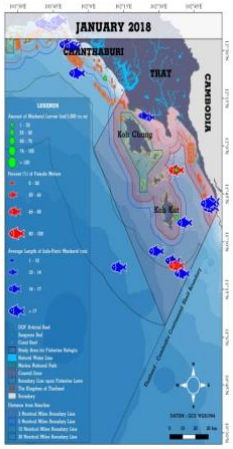



December

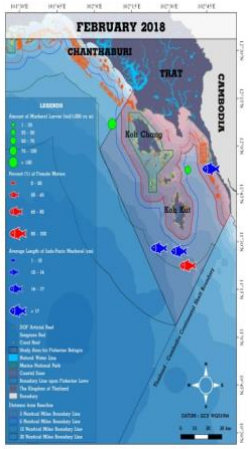


**Distributions of Indo-Pacific Mackerel (Larvae, Adults, and Mature fish) in the waters off Trat Province in 2018**

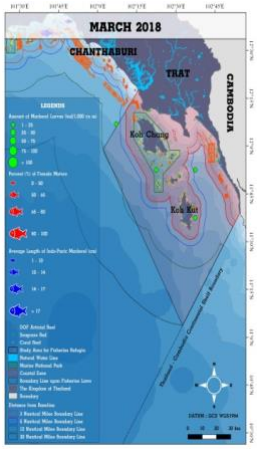
January



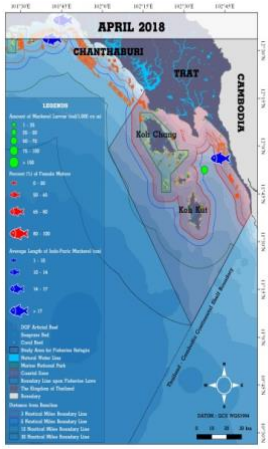

February



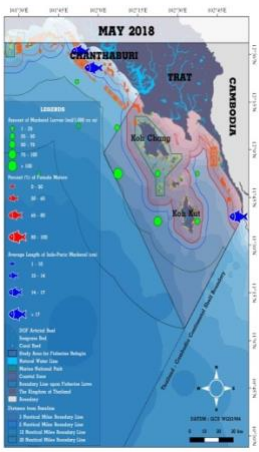

March



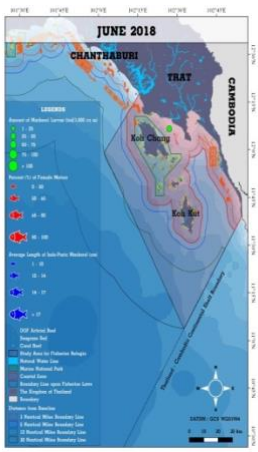

April



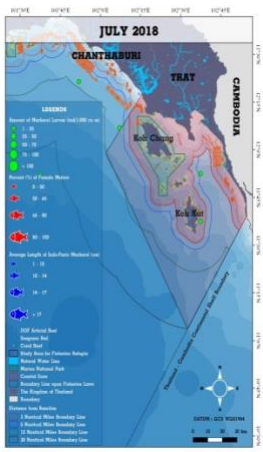

May



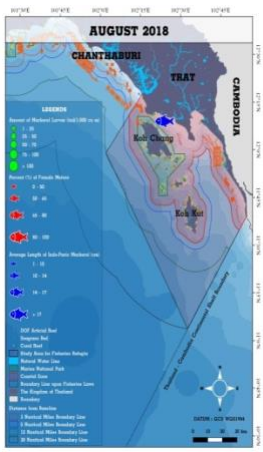

June



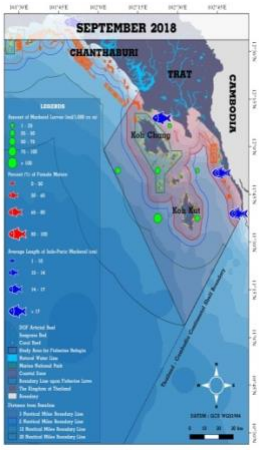

July



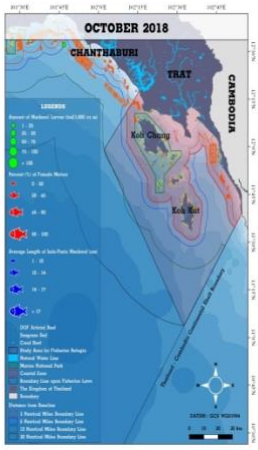

August



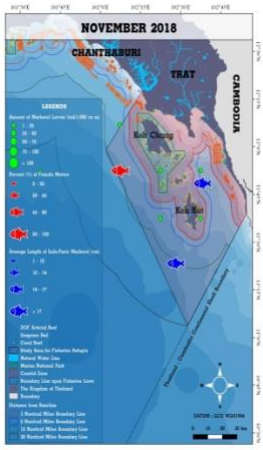

September



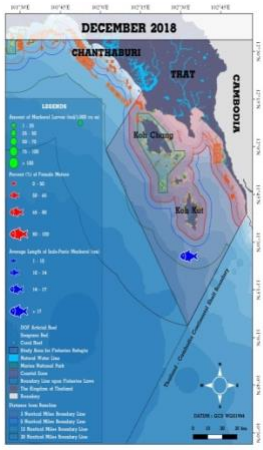

October



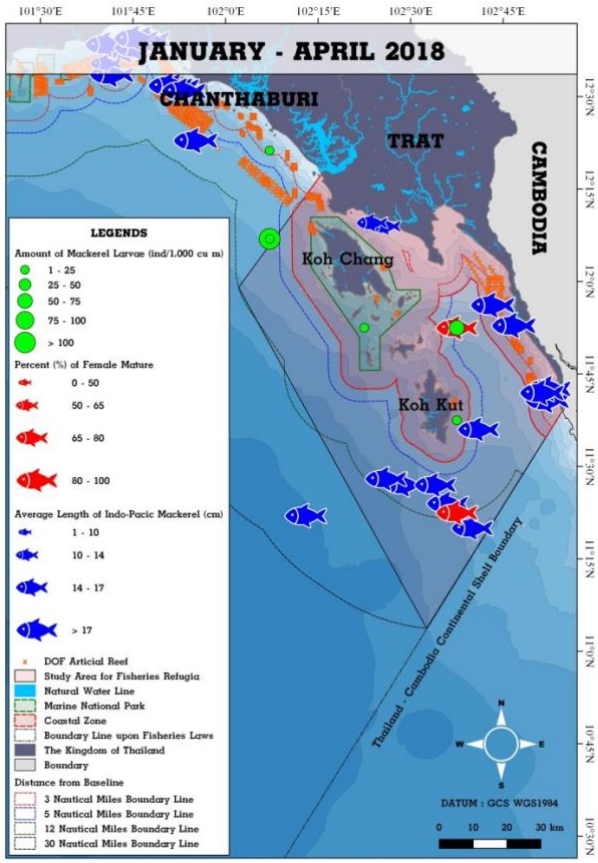

November



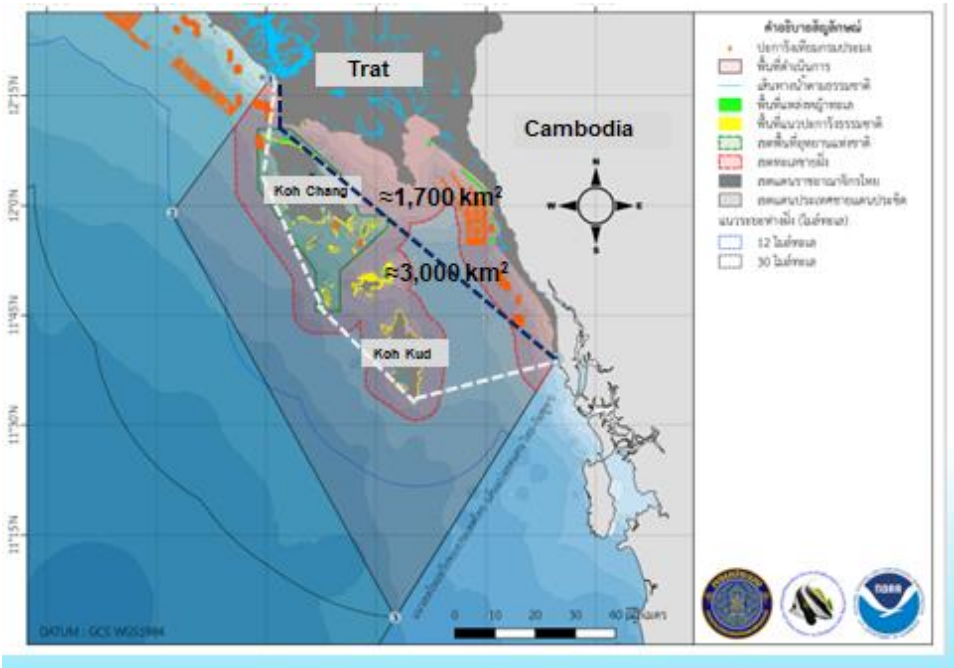

December



**Distribution of Indo-Pacific Mackerel in the Spawning Peak Period: January-April**




**Proposed Fisheries Refugia Sites in Trat Province**



**ANNEX 5**

**SOME INFORMATION OF BLUE SWIMMING CRAB RESOURCES AND FISHERIES IN SURAT THANI PROVINCE**

Some Information of
Blue Swimming Crab Resources & Fisheries
in Surat Thani Province

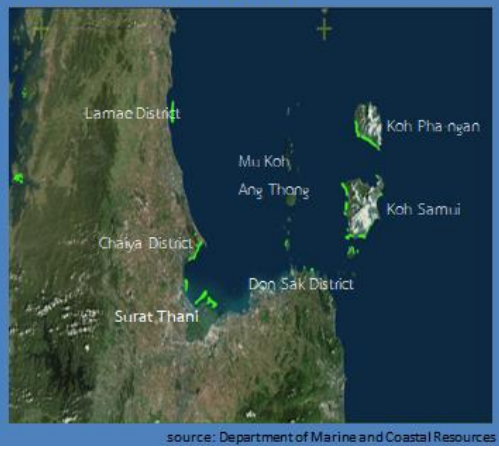
## General Information of Surat Thani Province

- Located at the east of the southern part of Thailanc covering the area of the sea and islands in the Gulf of Thailand
- Area: 12,892 km$^2$
- Coastline: 156 km
- Islands: Koh Samui, Koh Pha-ngan, Koh Tao, and Mu Koh Ang Thong
- Living earned: agriculture, fisheries, vending, hotel and tourism

## Seagrass beds in Surat Thani Province

แหล่งหญ้าทะเลจังหวัดสุราษฎร์ธานี
Ten species of seagrass were found in the area of 17,820 rai of Surat Thani Province:

1. อ่าวบ้านดอน มีพื้นที่ 8,147 ไร่
2. อ่าวนางกำ มีพื้นที่ 20 ไร่
3. เกาะนกตะเภา มีพื้นที่ 158 ไร่
4. เกาะเต่า มีพื้นที่ 60 ไร่
5. เกาะพะงัน และเกาะใกล้เคียง มีพื้นที่ 4,018 ไร่
6. เกาะสมุย และเกาะใกล้เคียง มีพื้นที่ 5,417 ไร่



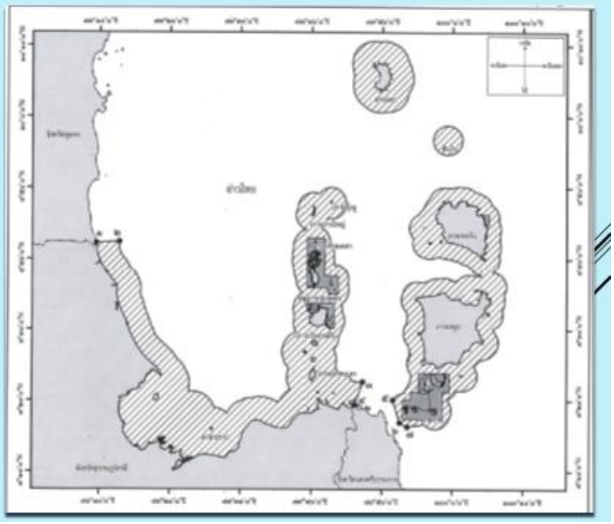

source: Department of Marine and Coastal Resources

**Coastal Seas of Surat Thani Province**

กำหนดให้จังหวัดสุราษฎร์ธานี มีเขตทะเลชายฝั่ง ดังต่อไปนี้

(๑) ระยะสามไมล์ทะเลนับจากแนวชายฝั่งทะเลที่น้ำทะเลจรดแผ่นดิน บริเวณชายฝั่ง และบริเวณชายเกาะเต่า

(๒) ระยะสองไมล์ทะเลนับจากแนวชายฝั่งทะเลที่น้ำทะเลจรดแผ่นดิน บริเวณชายเกาะ ยกเว้นเกาะเต่า



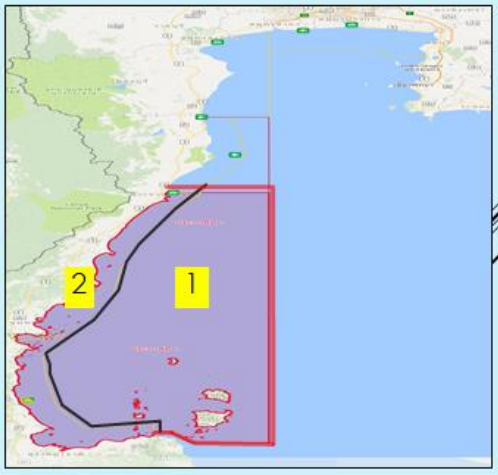
**Fisheries Measures**

1. มาตรการปิดอ่าวฤดูสัตว์น้ำมีไข่วางไข่เลี้ยงตัววัยอ่อน ระหว่างวันที่ 15 กุมภาพันธ์ ถึงวันที่15 พฤษภาคม

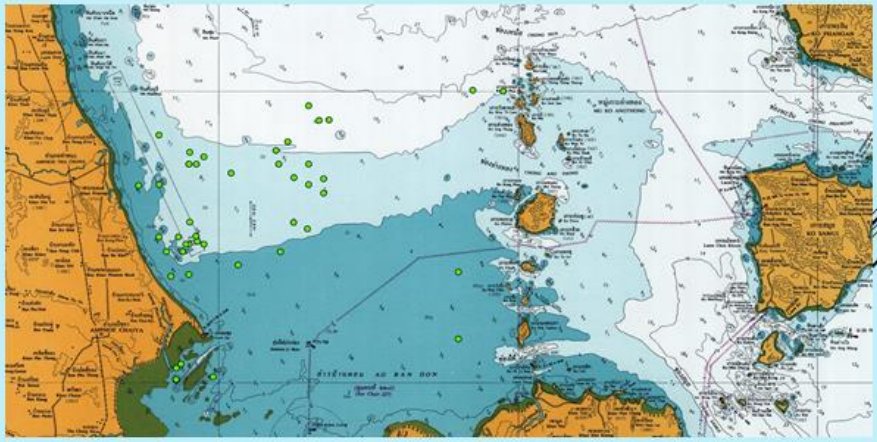
90 วัน

2. ห้ามทำการประมงตามระยะห่างฝั่ง 7 ไมล์ วันที่ 16 พค. ถึง 14 มิย.

30 วัน




**Fishing Ground of Crab Gill Net Fisheries**



Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

## Fishing Ground of Crab Trap Fisheries

Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

## Catch Composition (%) of Crab Gill Net Fisheries in Surat Thani Province in 2017

| สัตว์น้ำ | ร้อยละองค์ประกอบสัตว์น้ำ | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | ก.พ. 60 | มี.ค. 60 | เม.ย. 60 | พ.ค. 60 | มิ.ย. 60 | ก.ค. 60 | ส.ค. 60 | ก.ย. 60 | ต.ค. 60 | พ.ย. 60 | ธ.ค. 60 |
| กลุ่มกั้ง | | 0.25 | | | | | 0.64 | 1.68 | | | |
| กลุ่มกุ้ง | 0.59 | 0.07 | | | | | 0.10 | 0.13 | | | |
| กลุ่มปลา | 23.19 | 15.97 | | 0.35 | | 2.76 | 1.91 | 3.35 | | | 38.96 |
| กลุ่มปู | | | | | | | | | | | |
| - Portunus pelagicus | 43.86 | 75.18 | 99.19 | 94.05 | 99.72 | 89.28 | 85.07 | 92.13 | 99.46 | | 57.33 |
| - Charybdis feriatus | 0.59 | 2.14 | 0.30 | 5.60 | | 7.49 | | | | | |
| - other crab | | 2.98 | 0.51 | | 0.28 | | 11.81 | 0.68 | 0.54 | | 2.57 |
| กลุ่มหมึก | | | | | | 0.46 | 0.47 | 2.02 | | | |
| กลุ่มหอย | 2.08 | 3.41 | | | | | | | | | |
| สัตว์น้ำอื่นๆ | 29.69 | | | | | | | | | | 1.14 |
| ผลรวม | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | | 100.00 |
| อัตราการจับ (กก./ชวน 100 เมตร) | 0.06 | 0.19 | 0.14 | 0.54 | 0.32 | 0.50 | 0.13 | 0.31 | 0.36 | - | 0.36 |

Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

## Catch Composition (%) of Crab Gill Net Fisheries in Surat Thani Province in 2018

| สัตว์น้ำ | ร้อยละองค์ประกอบสัตว์น้ำ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ม.ค. 61 | ก.พ. 61 | มี.ค. 61 | เม.ย. 61 | พ.ค. 61 | มิ.ย. 61 | ก.ค. 61 | ส.ค. 61 |
| กลุ่มกั้ง | 3.49 | 0.00 | 0.00 | 0.18 | 0.00 | 0.00 | 0.45 | 4.68 |
| กลุ่มกุ้ง | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 | 0.00 | 0.90 | 0.00 |
| กลุ่มปลา | 36.51 | 4.30 | 0.00 | 0.00 | 0.00 | 0.00 | 11.96 | 0.07 |
| กลุ่มปู | | | | | | | | |
| - Portunus pelagicus | 53.81 | 92.15 | 97.94 | 98.14 | 98.40 | 98.67 | 84.81 | 93.63 |
| - Charybdis feriatus | 0.00 | 3.27 | 1.67 | 1.68 | 1.60 | 0.38 | 1.07 | 0.86 |
| - other crab | 6.19 | 0.00 | 0.40 | 0.00 | 0.00 | 0.95 | 0.21 | 0.77 |
| กลุ่มหมึก | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 | 0.00 |
| กลุ่มหอย | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| สัตว์น้ำอื่นๆ | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ผลรวม | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| อัตราการจับ (กก./ชวน 100 เมตร) | 0.12 | 0.46 | 0.29 | 0.63 | 0.19 | 0.19 | 0.41 | 0.27 |

Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

**Catch Composition (%) of Crab Trap Fisheries in Surat Thani Province in 2017**

| สัตว์น้ำ | ร้อยละองค์ประกอบสัตว์น้ำ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ม.ค. 60 | ก.พ. 60 | มี.ค. 60 | เม.ย. 60 | พ.ค. 60 | มิ.ย. 60 | ก.ค. 60 | ส.ค. 60 | ก.ย. 60 | ต.ค. 60 | พ.ย. 60 | ธ.ค. 60 |
| กลุ่มกั้ง | 0.00 | 0.83 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 | 4.06 | 0.00 | 0.00 | 0.70 |
| กลุ่มปู | | | | | | | | | | | | |
| Portunus pelagicus | 93.00 | 87.73 | 62.86 | 84.16 | 91.19 | 73.84 | 94.89 | 100.00 | 79.90 | 90.13 | 91.35 | 77.96 |
| Charybdis feriatus | 6.42 | 9.84 | 25.16 | 15.68 | 8.50 | 4.90 | 3.88 | 0.00 | 4.85 | 0.01 | 1.38 | 7.30 |
| other crab | 0.58 | 0.99 | 11.98 | 0.16 | 0.02 | 21.25 | 0.00 | 0.00 | 11.19 | 9.86 | 7.27 | 13.68 |
| กลุ่มหมึก | 0.00 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 1.23 | 0.00 | 0.00 | 0.00 | 0.00 | 0.36 |
| ผลรวม | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| อัตราการจับ (กก./ลอบ 10 ลูก) | 0.145 | 0.190 | 0.285 | 0.162 | 0.450 | 0.233 | 0.256 | 0.361 | 0.263 | 0.284 | 0.239 | 0.198 |

Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

**Catch Composition (%) of Crab Trap Fisheries in Surat Thani Province in 2018**

| สัตว์น้ำ | ร้อยละองค์ประกอบสัตว์น้ำ | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | ม.ค. 61 | ก.พ. 61 | มี.ค. 61 | เม.ย. 61 | พ.ค. 61 | มิ.ย. 61 | ก.ค. 61 | ส.ค. 61 |
| กลุ่มกั้ง | 0.00 | 0.83 | 0.00 | 0.00 | 0.28 | 0.00 | 0.00 | 0.00 |
| กลุ่มปู | | | | | | | | |
| Portunus pelagicus | 93.00 | 87.73 | 62.86 | 84.16 | 91.19 | 73.84 | 94.89 | 100.00 |
| Charybdis feriatus | 6.42 | 9.84 | 25.16 | 15.68 | 8.50 | 4.90 | 3.88 | 0.00 |
| other crab | 0.58 | 0.99 | 11.98 | 0.16 | 0.02 | 21.25 | 0.00 | 0.00 |
| กลุ่มหมึก | 0.00 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 | 1.23 | 0.00 |
| ผลรวม | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |
| อัตราการจับ (กก./ลอบ 10 ลูก) | 0.130 | 0.104 | 0.144 | 0.127 | 0.172 | 0.263 | 0.219 | 0.242 |

Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

**Catch Composition (%) of Trawl Fisheries in Surat Thani Province in 2017-2018**

| สัตว์น้ำ | ร้อยละองค์ประกอบสัตว์น้ำ | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | ต.ค. 60 | พ.ย. 60 | ธ.ค. 60 | ม.ค. 61 | ก.พ. 61 | มี.ค. 61 | เม.ย. 61 | พ.ค. 61 | มิ.ย. 61 | ก.ค.61 |
| ปลาทรายแดง | 0.09 | 9.76 | | 0.08 | | | | 0.07 | 3.04 | 0.03 |
| ปลาปากคม | 0.02 | | | | | 0.13 | | 0.08 | 0.34 | 0.61 |
| ปลาผิวน้ำอื่นๆ | | | | 0.09 | | | | 0.21 | 0.12 | 0.15 |
| ปลาหน้าดินอื่นๆ | 35.41 | 14.70 | | 14.41 | | 27.59 | | 11.54 | 20.94 | 18.43 |
| **ปูม้า** | **25.57** | **8.13** | | **13.72** | | **13.96** | | **45.07** | **10.86** | **13.96** |
| สัตว์น้ำอื่นๆ | 38.91 | 67.41 | | 71.70 | | 58.32 | | 43.03 | 64.70 | 66.82 |
| รวม | 100.00 | 100.00 | | 100.00 | | 100.00 | | 100.00 | 100.00 | 100.00 |
| **อัตราการจับ (กก. /ชม)** | **18.57** | **23.87** | | **32.54** | | **12.37** | | **8.22** | **14.93** | **26.18** |

Source: Middle Gulf Fisheries Research and Development Center (Chumphon)

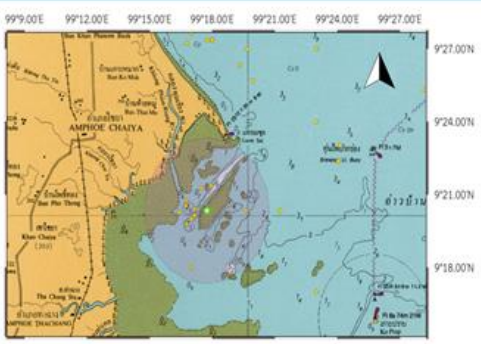
## Crab Gill Net Fisheries around Koh Sed, Surat Thani Province

จากข้อมูลระหว่างปี 2560-2562 (ตุลาคม) พบว่า

1. ขนาดของเรือประมง: เป็นเรือหางยาว มีความยาวเรือประมาณ 5 -17 เมตร

2. ชาวประมงส่วนใหญ่เป็นคนในพื้นที่บ้านแหลมโพธิ์ หมู่ 5 และหมู่บ้านใกล้เคียงเข้ามาทำการประมง เช่น หมู่ 2บ้านหัวเลน หมู่ 3 บ้านปากกิว หาดสมบูรณ์

3. ขนาดของอวน : มีความยาวอวน 180 เมตรต่อผืน โดยความยาวอวนที่มาดแล้วอยู่ระหว่าง 30-80 เมตรต่อผืน




## Catches and Composition in Crab Gill Net Fisheries Around Koh Sed

**2017**

| เดือน | ส.ค | ก.ย |
|---|---|---|
| อัตราการจับ (กก./ชวน 100 เมตร) | 0.10 | 0.17 |
| องค์ประกอบ | | |
| ปูม้า | 100.00 | 100.00 |
| รวม | 100.00 | 100.00 |

**2018**

| เดือน | ม.ค | ก.พ | มี.ค | เม.ย | มิ.ย | ส.ค |
|---|---|---|---|---|---|---|
| อัตราการจับ (กก./ชวน 100 เมตร) | 0.26 | 0.30 | 0.36 | 0.41 | 0.45 | 0.23 |
| องค์ประกอบ | | | | | | |
| ปูม้า | 53.81 | 79.74 | 100.00 | 100.00 | 99.15 | 100.00 |
| ปูอื่นๆ | 6.19 | | | | 0.85 | |
| ปลาทรายขาว | 2.62 | 0.00 | | | | |
| ปลาเห็ดโคน | | 0.39 | | | | |
| กุ้งกุลาดำ | | 1.25 | | | | |
| ปลาจวด | | 2.37 | | | | |
| กลุ่มกั้ง | 3.49 | | | | | |
| ปลาเฮย | 33.89 | 16.25 | | | | |
| รวม | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

**2019**

| เดือน | มี.ค | พ.ค |
|---|---|---|
| อัตราการจับ (กก./ชวน 100 เมตร) | 0.10 | 0.31 |
| องค์ประกอบ | | |
| ปูม้า | 100.00 | 100.00 |
| รวม | 100.00 | 100.00 |

## Compositions of Maturity Stages of Blue Swimming Crabs in Crab Gill Net Fisheries Around Koh Sed

**2017**

| เดือน | ส.ค | ก.ย |
|---|---|---|
| F2 | 0.00 | 0.62 |
| F3-1 | 0.00 | 16.45 |
| F3-2 | 0.00 | 4.11 |
| F3-3 | 1.31 | 2.10 |
| F3-4 | 4.54 | 6.83 |
| F4 | 27.72 | 28.78 |
| M | 66.43 | 41.12 |
| Grand Total | 100.00 | 100.00 |

**2019**

| เดือน | มี.ค | พ.ค |
|---|---|---|
| F2 | 1.20 | 0.00 |
| F3-2 | 5.20 | 0.00 |
| F3-3 | 5.60 | 0.00 |
| F3-4 | 2.80 | 0.00 |
| F4 | 5.20 | 13.51 |
| M | 80.00 | 86.49 |
| Grand Total | 100.00 | 100.00 |

**2018**

| เดือน | ม.ค | ก.พ | มี.ค | เม.ย | มิ.ย | ส.ค |
|---|---|---|---|---|---|---|
| F2 | 8.68 | 7.80 | 4.57 | 20.57 | 15.63 | 16.11 |
| F3-1 | 0.00 | 0.00 | 0.00 | 4.02 | 0.00 | 0.00 |
| F3-2 | 18.52 | 1.98 | 2.31 | 4.29 | 0.00 | 4.06 |
| F3-3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.72 |
| F4 | 25.54 | 22.08 | 15.09 | 27.54 | 10.16 | 49.29 |
| M | 47.25 | 68.14 | 78.02 | 43.58 | 74.22 | 28.83 |
| Grand Total | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 | 100.00 |

**ANNEX 6**

**MEETING ATMOSPHERE**