The Gulf of Thailand mixed-trawl Fishery Improvement Project (FIP)
Fishery Action Plan (FAP) update

Section 2A Catch
Part A - Total Aggregate Catch

Action Criteria	A1-6	Due Date	Status	Remark
Objective	To improve the stock assessment and improve the management.			
Action Description and tasks (with timeframes) and expected output	**Action**			
	1. Update assessment report on stock, (MMSY) and indicators species and publicly available.	**Aug 23**		The summary report in the annex 1, page 12. Original Thai version in attached file.
	2. Fishermen Meeting report and provincial fisheries committee meeting report to be made publicly available.	**Dec 22**		The meeting report in the annex 1, page 17.
	3. FMP 2020-2022 evaluation report.	**Jan 23**		The FMP for trawl summary in the annex 1, page 23.
	Output:			
	1. Annual report year (2022-2025) on stock assessment, (MMSY) and indicators species.	**Aug 23**		The summary report in the annex 1, page 12. Original Thai version in attached file.
	2. Fishermen Meeting report and provincial fisheries committee meeting report to publicly available.	**Dec 22**		The meeting report in the annex 1, page 17.
	3. Report on FMP evaluation.	**Jan 23**		The FMP for trawl summary in the annex 1, page 23.
Priority	Medium Priority			
Estimated Cost	TBC			

Responsible Parties with lead agency	1. Department of Fisheries, Marine Fisheries Research & Development Division and Fishery provincial office. 2. Thai Sustainable Fisheries Roundtable (TSFR)
Gaps addressed by the Action	A4-6 and M 3.5

Part B - High-risk species/Species groups

Action Criteria	B1 – 6	**Due Date**	**Status**	**Remark**
Objective	To identify, monitor and assess the high-risk species.			
Action Description and tasks (with timeframes) and expected output	**Action**			
	1. Identify species and species groups of fish, caught in trawl fishing in the Gulf of Thailand and analysing productivity and sensitivity (PSA) to estimate vulnerability.	**Dec 22**		The summary report in the annex 1, Page 37.
	2. Conduct and analysis of changes in catch composition of trawl fishery, classified by vulnerability groups.	**Dec 22**		The summary analysis in the annex 1, Page 37.
	3. Assess the stock status of high-risk species.	**Dec 23**		On process.
	Output:			
	1. The report of analysis for the vulnerability of species/ species groups in catch composition, classified by type of trawl fishing in the Gulf of Thailand.	**Dec 22**		The summary report in the annex 1, Page 37.
	2. The report on data/information of changes in the catch composition of each type of trawl fishing.	**Dec 22**		The summary report in the annex 1, Page 37.

	3. The report of stock assessment for high-risk species.	**Dec 23**		On process
	4. Guidelines/Data/Information for input into the next FMP.	**Dec 28**		On process
Priority	High Priority			
Estimated Cost	1 million Baht			
Responsible Parties with lead agency	1. Prof. TuantongJutagate, UbonRatchathani University 2. Department of Fisheries, Marine Fisheries Research and Development Division. Thai Sustainable Fisheries Roundtable (TSFR)			
Gaps addressed by the Action	B1-4			

Part C -Reduction component

Action Criteria	C1-7: Reduction component	**Due Date**	**Status**	**Remark**
Objective	To assess reduction component, juvenile commercial fish from trawl fishery and establish TRP.			
Action Description and tasks (with timeframes) and expected output	**Action:**			
	1. Review existing research related to trawl catch composition and stock assessment to set TRP.	**Dec 23**		On process
	2. Set up data collection program for trawl fisheries monitoring and research vessel.	**Dec 22**		The report in the annex 1, Page 38
	3. Conduct the data collection program, especially the composition of the trash fish.	**Start Jan 23**		Progress update page 48

	4. Analyze data and publish annual report on trawl fisheries and research vessel.	**Dec 25**		On process
	5. Set proposed objectives and TRP for reduction component and juvenile commercial fish.	**Dec 25**		On process
	6. Conduct workshop with stakeholders to discuss recommendations for input into the next FMP.	**Dec 26**		On process
	Output:			
	1. Report on catch composition, especially for trash fish including juvenile commercial fish from each type of trawl fisheries and stock assessment.	**Jul 24**		On process
	2. Data collection program	**Dec 22**		The report in the annex 1, page 38
	3. Annual report on trawl fisheries and research vessel.	**Jul 24**		On process
	4. Workshop report recommendation for input into the next FMP.	**Dec 26**		On process
Priority	High Priority			
Estimated Cost	TBC			
Responsible Parties with lead agency	1. Marine Department of Fisheries, Marine Fisheries Research and Development Division. 2. Thai Sustainable Fisheries Roundtable (TSFR)			
Gaps addressed by the Action	C1-7			

Section 2B – Endangered, threatened and protected species (ETPs)

Action Criteria	T1-3	Due Date	Status	Remark
Objective	To identify and assess ETP species impacted by trawl fishery.			
Action Description and tasks (with timeframes) and expected output	**Action**			
	1. Review ETP species from IUCN, CITES and National Regulations.	**Mar 23**		The report has been completed. Update on page 51
	2. Workshop to reviews and planning for ETP species recording and trawl interaction.	**Aug 23**		The proposal for workshop has been issued. Update on page 57
	3. Collect Historical data from fisherman at sea observation by DoF.	**Dec 23**		On process
	4. Monitor population of marine endangered animal by DMCR.	**Dec 23**		The report received from DMCR. It's on summary and translation process.
	5. Risk Assessment on trawl fishery and ETP interaction. T2 (As soon as the data available within 5 years)	**Dec 26**		On process
	6. Consultation with stakeholder to improve current fisheries practice. - Mitigation protective measures. - Training program by DoF on logbook to record ETP during at sea operation.	**Mar 24**		On process

	- Training program by DMCR on life saving, identification, stranded reporting ETPs.			
	Output:			
	1. Effective ETP interaction record approach.	**Dec 25**		On process
	2. Report on - Updated ETPs of Thailand. - Risk assessment of trawl interaction to ETP species.	**Dec 24** **Dec 26**		On process
	3. Best practice on ETP protection on community area management.	**Dec 25**		On process
Priority	High Priority			
Estimated Cost	TBC			
Responsible Parties with lead agency	1. Department of Fisheries, Fish Quarantine and fishing Vessels Inspection Division, Fishing and Fleet Management Division 2. Department of Marine and Coastal Resources. 3. Thai Sustainable Fisheries Roundtable (TSFR)			
Gap addressed by the Action	T1-3			

Section 2C –Habitats

Action Criteria	H1-3	Due Date	Status	Remark
Objective	To identify and assess critical habitat impacted by trawl fishery			
Action Description and tasks (with timeframes) and expected output	**Action**			
	1. Collect environmental data of critical habitat (Seagrass, Coral reefs, mangrove and fisheries and marine protected area) and trawl fishing activities, using GIS and VMS (Jun-Dec)			
	1.1 Inner Gulf of Thailand.	**Dec 22**		The summary report in the annex 1 (Page 62, 66).
	1.2 Eastern Gulf of Thailand.	**Dec 23**		The report is on process and will finish end of 2023
	1.3 Southern(Lower) Gulf of Thailand.	**Dec 24**		The funnidng support has been approved. The research will start Jan 24
	2. Analyze and synthesize data to assess the impact of trawl fishing on critical habitat and marine environments in the Gulf of Thailand, including distribution changes as much as available (Jan-Mar).			
	2.1 Inner Gulf of Thailand.	**Dec 22**		The summary report in the annex 1 (Page 62,66)
	2.2Eastern Gulf of Thailand.	**Dec 23**		The report is on process and will finish end of 2023
	2.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The funnidng support has been approved. The research will start Jan 24
	3. Identify and assess the critical habitat effected by trawl fishery. (Apr-May)			
	3.1 Inner Gulf of Thailand.	**Dec 22**		The summary report in the annex 1 (Page 62,66)
	3.2 Eastern Gulf of Thailand.	**Dec 23**		The report is on process and will finish end of 2023

	3.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The funnidng support has been approved. The research will start Jan 24
	4. Risk Assessment on trawl fishery and habitat interaction.	**Dec 25**		On process
	5. Workshop to discuss recommendation on mitigation measure for the input into the next FMP.	**Dec 26**		On process
	Output:			
	1. Report on; Comprehensive environmental data and trawl fishing behaviours (H1).			
	1.1 Inner Gulf of Thailand.	**Dec 22**		The summary report in the annex 1 (Page 62,66) The researcher is on the process of publishing and expect to publish end of 2023
	1.2 Eastern Gulf of Thailand.	**Dec 23**		The report is on process and will finish end of 2023.
	1.3 Southern (Lower) Gulf of Thailand	**Dec 24**		The funnidng support has been approved. The research will start Jan 24
	2. The result of impacts on main habitat and critical habitat effected by trawl fishery (H2).			
	2.1 Inner Gulf of Thailand.	**Dec 22**		The summary report in the annex 1(Page 62,66) The researcher is on the process of publishing and expect to publish end of 2023

	2.2 Eastern Gulf of Thailand.	**Dec 23**		The report is on process and will finish end of 2023.
	2.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The funnidng support has been approved. The research will start Jan 24
	3. Workshop report recommendation on mitigation measure for the input into the next FMP.	**Dec 28**		On process
Priority	High Priority			
Estimated Cost	15 million Baht			
Responsible Parties with lead agency	1. Prof.ShettapongMeksumpun Department of marine sciences and Prof.SansaneeWangvoralak, Department of Fisheries Management, Faculty of Fisheries, Kasetsart University. 2. Department of Fisheries, Fish Quarantine and fishing Vessels Inspection Division, Fishing and Fleet Management Division. 3. Thai Sustainable Fisheries Roundtable (TSFR)			
Gap addressed by the Action	H1-3			

Section D-Ecosystems

Action Criteria	E1 – 4	**Due Date**	**Status**	**Remark**
Objective	To identify and assess the impact of fishery to ecosystem			
Action Description and tasks (with	**Action:**			
	1. Review existing research related to the impacts from fisheries on the ecosystem.	**Jun 23**		The research of "Evolution of the food web in Bandon Bay: Ten years of the blue swimming crab stocking program the Gulf of

timeframes) and expected output				Thailand" has been found. The summary research in the annex 1 (Page 71). The further researchs is on the process.
	2. Find an expert on Ecopath model.	**Dec 23**		On process
	3. Update Ecopath model by using recent data.	**Dec 25**		On process
	4. Find key ecological species from Ecopath.	**Dec 25**		On process
	5. Simulate the model with different scenario [fishing gear/fishing effort].	**Dec 25**		On process
	6. Workshop to discuss recommendation for input into the next FMP.	**Dec 26**		On process
	Output:			
	1. Summary historical changes of the impacts from fisheries on the ecosystem.	**Jun 23**		The summary research in the annex 1 (Page 71)
	2. Reports on; E2 (Dec 25). - Updated Ecopath model. - Key ecological species identified - Simulation result from different scenario and implication for management	**Dec 25**		On process
	3. Workshop report recommendation for input into the next FMP.	**Dec 26**		On process

Priority	Low Priority
Estimated Cost	1 million Baht
Responsible Parties with lead agency	1. Department of Fisheries, Marine Fisheries Research and Development Division 2. Thai Sustainable Fisheries Roundtable (TSFR)
Gap addressed by the Action	E1-3

Remark: Color on udate status column

Completed

On process

ANNEX 1:

Section 2A Catch (Part A) - Total aggregate catch:

- **Annual report year on stock assessment, (MMSY) and indicators species**

Annual Report on Stock Assessment, Multi-Species Maximum Sustainable Yield (MMSY)

The Maximum Sustainable Yield (MSY) assessment is aims to estimate the biological reference point at which stocks can be harvested without any negative effect on resources and equilibrium with the production of nature in Thai waters. MSY for the Gulf of Thailand and the Andaman Sea was estimated by using Fox surplus production model (Fox, 1970). This model requires statistical data and information on catch, catch rate (CPUE) and fishing effort dt of all fishing operations. The MSY assessment was conducted for three species groups 1) demersal fish that referring to all demersal species including demersal fishes, squids, cuttlefishes and shrimps 2) pelagic fishes; and 3) anchovies. Demersal fish group is directly related to trawl fisheries due to marine resources in this group was caught by pair trawl, otter board trawl, beam trawl, gill net (blue swimming crab gill net, trap, hook, squids falling net, squid lift net and push net.

The MSY assessment was conducted since 2015 for reference point for fisheries management by using Fox surplus production model; Fox, 1970 that can explain by equation below:

$$\frac{y_i}{f_i} = e^{c+d*f_i}$$

$$\ln\frac{y_i}{f_i} = c + d * f_i$$

$$MSY = -\frac{1}{d}\, e^{c-1}$$

$$F_{MSY} = -\frac{1}{d}$$

when y = catch
f = fishing effort (hour or day)
c and d = constant from linear regression model
MSY = Maximum Sustainable Yield
F_{MSY} = Optimum Fishing effort

Result of Multi-Species Maximum Sustainable Yield (MSY) for Demersal fish

The sustainable maximum yield (MSY) assessment in the Gulf of Thailand has been conducted since the year 2015-2021. The results of the annual MSY assessment for demersal fish group in the Gulf of Thailand indicate that the year 2017 had the highest MSY value at 795,869 tons. The second highest value was recorded in 2015 at 794,771 tons, while the lowest value was observed in 2022 with an MSY of 759,129 tons. For demersal fish group in the Andaman Sea, the MSY assessment results show that the year 2017 had the highest MSY value at 240,916 tons. The second highest value was recorded in 2015 at 240,519 tons, and the lowest value was observed in 2022 with an MSY of 223,662 tons (table 1)

Table 1 Sustainable Maximum Yield (MSY) Assessment Results by Year using Fox's Surplus Production Model in Thai waters.

year	Gulf of Thailand	Andaman Sea
2558	794,771	240,519
2559	777,855	240,051
2560	795,869	240,916
2561	785,358	230,741
2562	790,985	230,115
2563	775,548	228,348
2564	766,890	233,391
2565	759,129	223,662

Sustainable Maximum Yield (MSY) Assessment Results for Demersal fish Group in 2022

The number of demersal species caught in Thai waters in 2022 from all fishing gears was 743,839 tons. This catch was divided into 526,189 tons from the Gulf of Thailand and 217,650 tons from the Andaman Sea. The quantity of demersal marine species catch used for MSY assessment from the main fishing gears in the Gulf of Thailand was 436,343 tons, which constitutes 82.93% of the total demersal catch from the Gulf of Thailand. Additionally, on the Andaman Sea, 167,651 tons of demersal catch were used for MSY assessment, accounting for 77.03% of the total demersal catch from the Andaman Sea (Table 2).

Table 2 Catch of Demersal fish group in Thai waters in 2022

Demersal fish	Main fishing gears		Other gears		Total	
	Catch	%	Catch	%	Catch	%
Gulf of Thailand	436,343	82.93	8,986	17.07	526,189	100.00
Andaman Sea	167,651	77.03	49,999	22.97	217,650	100.00

Demersal fish group in Gulf of Thailand

The data used for assessment covers the years 1971 to 2022. The assessment results reveal that the Maximum Sustainable Yield (MSY) is 759,129 tons. The fishing effort at the MSY level is equivalent to 23.95 million hours. The catch of demersal marine species in the year 2022 amounted to 436,343 tons, a reduction from 461,606 tons in 2021, which is a decrease of 25,263 tons. The fishing effort for 2022 is 14.92 million hours, a reduction from 3.97 million hours in 2021. The fishing effort in 2022 represents 62.30% of the fishing effort at the MSY level (Figure 1).

Table 3: Summary of Maximum Sustainable Yield (MSY) Assessment Results and Fishing Effort, in 2022

Group Species	MSY (ton)	Optimal Fishing Effort (Fmsy) (hrs.)	Correlation coefficient (r^2)	Current Catch in 2022 (ton)	Current Fishing effort in 2022 (hrs)	Status of Fishing effort
	Gulf of Thailand					
Demersal fish	759,129	23,954,077	0.75	436,343	14,923,835	62.30% Fmsy
	Andaman Sea					
Demersal fish	223,662	5,424,536	0.52	167,651	4,559,182	84.05% Fmsy

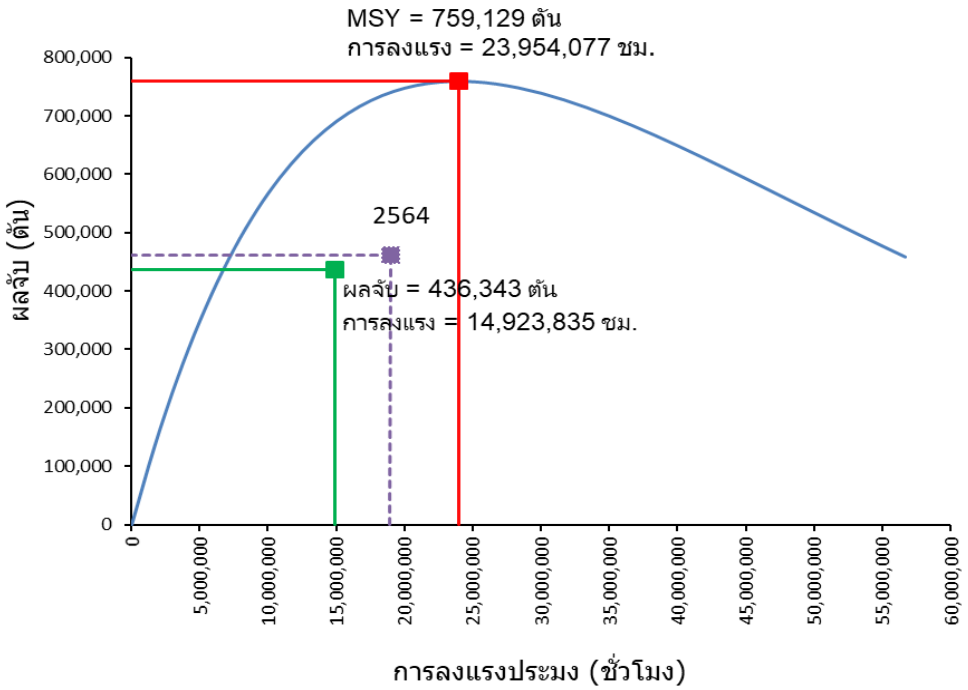


Figure 1 Maximum Sustainable Yield for Demersal group in the Gulf of Thailand in 2022

Demersal fish group in the Andaman Sea

The data used for assessment covers the years 1980 to 2022. The assessment results reveal that the Maximum Sustainable Yield (MSY) is 223,662 tons. The fishing effort at the MSY level is equivalent to 5.42 million hours. The catch of demersal fish group in the year 2022 amounted to 167,651 tons, a reduction from 172,725 tons in 2021, which is a decrease of 4,074 tons. The fishing effort for 2022 is

4.55 million hours, a reduction from 0.38 million hours in 2021. The fishing effort in 2022 represents 84.05% of the fishing effort at the MSY level (Figure 2).

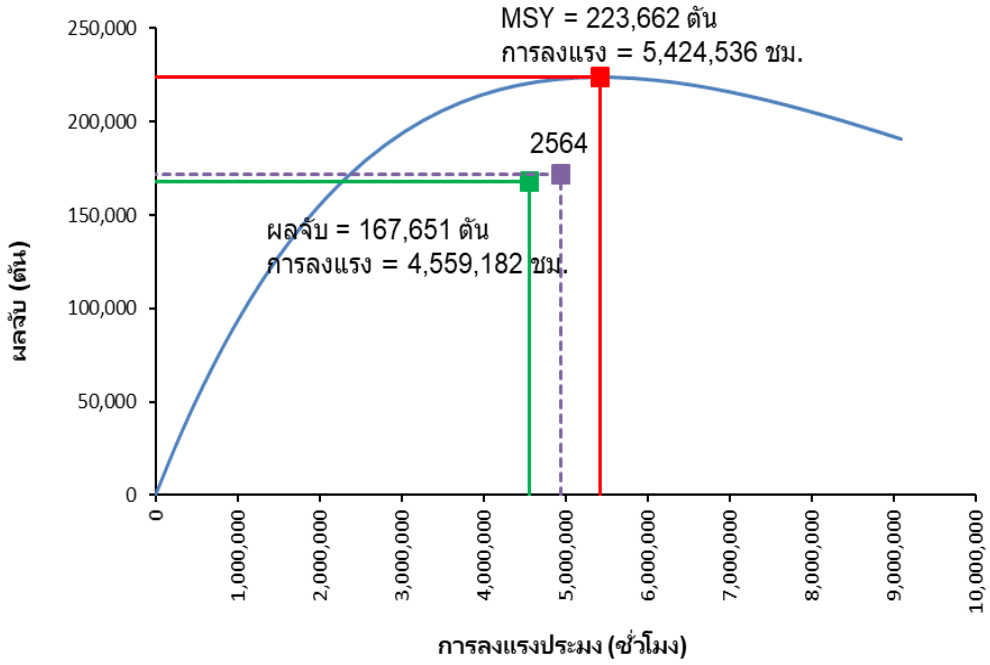


Figure 2 Maximum Sustainable Yield for Demersal group in the Andaman Sea in 2022

- **Fishermen Meeting report and provincial fisheries committee meeting report**

Minutes of the 3rd/2022 Committee on National Fisheries Policy Meeting
On Monday 25th July, 2022, at 09: 30 A.M.
At Meeting Room Five Provinces Boundary Forest Preservation Foundation
And long-distance online system, ZOOM program

Participants

1. Deputy Prime Minister	Chairman
2. Deputy Permanent Secretary, Ministry of Agriculture & Cooperative	Vice President
3. Relevant departments	

Committee

1. Navy Specialist
2. Assistant Commissioner of the Royal Thai Police
3. Inspector General of the Ministry of Labour
4. Director-General of the Department of Marine and Coastal Resources
5. Director of Bureau of Vessel Registration Standards
6. Inspector General, Department of Provincial Administration
7. Deputy Director General of the Department of International Economic Affairs
8. Fisheries Agricultural Organizations
9. Vice Chairman of the Thai Chamber of Commerce
10. President of the Federation of Thai Industries
11. Thai Oversea Fisheries Association of Thailand
12. National Fisheries Association of Thailand
13. Artisanal fisheries Association of Thailand
14. Thai Frozen Food Association
14. Expert in Natural Resources and Environment
16. Professional Diplomat
17. Director General of the Department of Fisheries, Deputy Director General and Director, Expert Academic Department within the Department of Fisheries
18. Working Group of the Deputy Prime Minister

Objectives of this meeting:

To acknowledge the schedule of the 6th Joint Working Group Meeting between the Thai Government and the European Commission on Anti-IUU and the results of the allocation of commercial fishing licenses for the year 2022 - 2023 and

issues to consider the project to remove fishing vessels from the system for sustainable management of fishery resources.

⊙ **Schedule for the 6th Meeting of the Joint Working Group of the Thai Government and the European Commission Against IUU**

The Director-General of the Department of Fisheries reported to the meeting that the European Union has notified a good cooperative mechanism to tackle IUU fishing. However, there are any significant backlogs to monitor progress. The proposed to Department of Fisheries to hold the next meeting, and call for a bilateral meeting between the FAO COFI sessions from 5th - 9th September 2022

The Sub-Committee agreed to hold the meeting during that period and assigned the Department of Fisheries to notify the European Union and prepare a report on progress against IUU fishing in Thailand and submit it within the specified time.Therefore, the chairman approved and assigned the Department of Fisheries to take action.

⊙ **Summary of the allocation of commercial fishing licenses for the year 2022 - 2023**

The Director General Department of Fisheries reported to the meeting that after the National Fisheries Policy Committee approved guidelines for issuing licenses and criteria for allocation of commercial fishing licenses for the year 2022 – 2023, the allocation of licenses according to the request for permission has been considered and finished. There are a total of 9,687 vessels have been considered for license allocation.

⊙ **Project to remove fishing vessels from the system for sustainable management of fishery resources**

The Director-General of the Department of Fisheries informed the meeting that from the 3rd meeting 2021 of the National Fisheries Policy Committee has considered ways to remove fishing vessels from the system for sustainable management of fishery resources. There was a resolution approving the removal of 75 white group vessels by the Ministry of Agriculture and Cooperatives, with the Department of Fisheries submitting a letter to the Cabinet to consider approving this project.

In this regard, the working group checks the history and accuracy of non-compliant fishing vessels On July 11th, 2022. The subcommittee on solving illegal

fishing problems approved that fishing vessels that have been inspected by the working group will be released from compensation.

The meeting resolved to approve the number of fishing vessels removed from the system for sustainable management of fisheries resources and assigned the Department of Fisheries to proceed further to the Cabinet for further consideration.

⊙ **Other matters**

- **Propose the results of the committee to coordinate, monitor, and support sustainable fisheries**.

Director General Department of Fisheries has notified the meeting that The Prime Minister has acknowledge the result of the committee as follow.

1) Progress has been made in solving the problem of labor shortages in the fishing sector according to Article 83 of the B.E. 2015 Fisheries Act.
2) The extension project of loan to enhance liquidity of fishery entrepreneurs.
3) Troubleshooting radio possession on Fishing Vessels by the Customs Department.

The chairman has orders as follow:

1) All relevant agencies cooperate in the implementation and provide information for the preparation of the joint working group meeting between the Thai government and the European Commission.

2) As the government has formulated various projects to mitigate the impact on the people, all agencies must take urgent action to help solve the problem for a concrete result.

Minutes of the 4st/2022 Committee on National Fisheries Policy Meeting
On September 30th, 2022, at 10: 30 A.M.
At Meeting Room 301, Command Building 1, Government House
And long-distance online system, ZOOM program

Participants

1. Deputy Prime Minister — Chairman
2. Deputy Permanent Secretary, Ministry of Agriculture & Cooperative — Vice President
3. Relevant departments

Committee

1. Commander-in-Chief of the Navy
2. Assistant Commissioner of the Royal Thai Police

3. Inspector General of the Ministry of Labour
4. Director-General of the Department of Marine and Coastal Resources
5. Director of Marine Resources Conservation
6. Legal expert Bureau of Investigation
7. Deputy Director General of the Department of International Economic Affairs
8. Fisheries Agricultural Organizations
9. Vice Chairman of the Thai Chamber of Commerce
10. President of the Federation of Thai Industries
11. Thai Oversea Fisheries Association of Thailand
12. National Fisheries Association of Thailand
13. Artisanal fisheries Association of Thailand
14. Thai Frozen Food Association
15. Aquatic Animal Processing Expert
16. Expert in Natural Resources and Environment
17. Professional Diplomat
18. Director General of the Department of Fisheries, Deputy Prime Minister, Deputy Director General and Director, Expert Academic Department within the Department of Fisheries
19. Working Group of the Deputy Prime Minister

Objectives of this meeting:

To track the execution of the order, acknowledging the results of the Bilateral Meeting on Combating IUU Fishing between Thailand and the European Union on 7th September 2022 in Rome, Italy ,and considering 1) Measurement to increase efficiency in notifying targets, and prosecuting suspected offenders by the Fisheries Monitoring Center (FMC). 2) Measurement of the National Fisheries Policy Committee on Guidelines for the withdrawal of fishing vessels from the list of illegal fishing vessels.

⊙ **Order tracking**

- **Report of the 9th SIOFA General Meeting of the Parties**

Director General Department of Fisheries report on the results of the meeting held between 4th - 8th July, 2022, in France, participants from 10 member states attended the meeting with the following key points from the meeting:

1) SIOFA approved the minutes of the meeting of the Compliance Committee. Thailand was able to comply with the agreement and measurement for the conservation and management of SIOFA in all measures. There are no outstanding issues.

2) SIOFA has a resolution approving measurement to conserve and manage resources, such as measurement on data management standards, measurement on fishing vessel permits, measurement on the operation of vessels on the IUU Vessel List, and measurement on vessel control to be by the schedule and measurement for collecting shark data.

3) SIOFA endorses the minutes of the scientific committee meetings and the detail that relevant to Thailand is Mauritius and Seychelles case. They claim the Joint Management Area (JMA) over SIOFA on the Saya de Malha Bank. They inform that fishing affects coral reefs/ seagrass and the SIOFA disagreed with the proposal because it affected the regulations of SIOFA and SIOFA committee has decided to proceed by the resolution of the Scientific Committee that scientific data must be studied clearly before setting measures. The Director- General emphasized that Thailand has no environmental damage issues as doubt.

The Department of Fisheries is in the process to amend the laws and regulations for Thai fishing vessels to be in line with SIOFA revisions and following up on scientific studies in the Saya de Malha Bank area, seeking alliances from parties on issues related to area management measures and related to trawl fisheries in Thailand and follow up on improving the SIOFA Bottom Fishing Footprint to match the Footprint of Thailand.

The committee explained to the meeting that from the report of the Department of Fisheries, it was confirmed that Thailand was able to comply with international regulations. This able to raise the standard of operation and management of Thailand to a higher level because Thailand has a baseline data collection that is globally accepted such as collecting data and documenting sensitive areas of the ecosystem or forecasting the number of aquatic animals to be used for management and issuing a fishing license.

The chairman has approved and assigned the Department of Fisheries to consider the process because the government attaches great importance to fisheries and wants to raise the level to international in order to be accepted internationally along with maintaining sustainable aquatic and natural resources.

⊙ **Order from the meeting of the National Policy Committee**

1) Guidelines and measurement for the development of Thai fisheries to release aquatic animals and products from IUU fishing: The Department of Fisheries has increased the efficiency of staff in their operations by organizing a workshop for Officers inspecting port state measures, the practice of inspecting vessels, strengthens the competency of aquatic animals fishing vessels inspectors and improve factors of production to prepare for MMPA measures. The chairman

assigned the Department of Fisheries to carry out the operation work in an integrated manner for all departments to work together.

- **Results of the Bilateral Meeting on IUU Fishing between Thailand and the European Union on 7th September, 2022, in Rome, Italy**.

The Director-General reported the results of the meeting that the European Union emphasizes rigorous follow-up of countries' post-liberalization from yellow card. For Thailand, the EU needs the country to continue to solve fisheries problems in various dimensions according to scientific principles and in accordance with international principles for the sustainability of fisheries. The meeting has discussed on four main issues, the legal framework, Monitoring Control and Surveillance, vessel management and law enforcement. For investigating the cases, the Assistant Commissioner General of the Royal Thai Police is assigned to carry out after reporting on the progress, the EU is satisfied with law enforcement.

- **Measures to increase efficiency in notifying, inspecting, and prosecuting suspected fishing vessels by the Fisheries Monitoring Center (FMC)**.

The Director-General of the Department of Fisheries clarified measures to increase efficiency in notifying targets and inspecting and prosecuting suspected fishing vessels by the Fisheries Monitoring Center (FMC) to the meeting, which was approved by the sub-committee and to be proposed to the National Fisheries Policy Committee in this regard.

The chairman has approved and assigned the relevant agencies, the Royal Thai Navy, the Royal Thai Police, the Department of Marine and Coastal Resources, and the Marine Department; Thai Maritime Enforcement Command Center implements and operates strictly in order to be effective.

- **Measures of the National Fisheries Policy Committee on Guidelines for the withdrawal of fishing vessels from the list of illegal fishing vessels**

The Director-General of the Department of Fisheries reported to the meeting that the subcommittee resolved to propose to the National Fisheries Policy Committee for consideration and proposed to the meeting to consider approving the measure on the guideline for the removal of fishing vessels from the list of fishing vessels engaged in illegal fishing. The resolution of the meeting approved the measure.

- **FMP 2020-2022 evaluation report.**

Fisheries Management Plan (FMP) 2020-2022 measure related to trawl fishing.

Measures	Achievement
Objective 1: Control the level of fishing effort appropriate to MSY.	
Strictly control the number of fishing vessels according to MSY and FMSY evaluations, by maintain a maximum of TAE every two years. Prioritize the allocation of TAE to low-performing fishing gear.	1. The number of fishing trawlers in Thai waters in 2016 was 3,796 boats, reducing to 3,113 boats in 2023. 2. Fishing Effort of Demersal fish groups have not exceeded the Maximum Sustainable Yield (FMSY) every year since 2016, indicating that overfishing has not occurred on both the Gulf of Thailand and the Andaman Sea.
Allocate the number of fishing days of each vessel and monitor, control, inspect the number of fishing days to be in accordance with the permitted	1. The trawl is a highly efficient gear. Limited number of fishing days in the Gulf of Thailand is 240 days/year, and the Andaman sea is 270 days/year. Low-efficiency gear that catch Demersal fish groups can be fished all year round. without specifying the number of fishing days 2. Fishing vessels using trawlers must proceed Port-In/Port-out procedure to record the number of fishing days
Purchasing vessels (vessel buyback program) to reduce the potential for overfishing	The National Fisheries Policy Committee has approved the removal of 1,007 fishing vessels with commercial fishing permits from the system, including trawlers 303 boats, and the Department of Fisheries is submitting the budget allocation for the 2024 fiscal year to the Cabinet for approval.
Undertaking fishing license consolidation whereby the quantity allocation of a vessel removed from the fishery is combined with the	The Department of Fisheries issued an announcement on determining the type of fishing gear that can be transferred for a license in the form of a combination of

quantity allocation under another vessel's license and the cessation of fishing rights whereby the quantity of aquatic animals allocated but not caught for use by one vessel is surrendered to another.	aquatic animals and the transfer of aquatic animals remaining from the transfer of licenses in the manner of merging aquatic animals and determine the application form for accepting the transfer of a license in the manner of combining aquatic animals and the application form for accepting the transfer of aquatic animals remaining from the transfer of the license in the manner of aquatic animal quantity consolidation. In 2021, the results showed that in the 2020-2021 fishing license cycle, there were 298 trawl boats that were merged and out of the system, and in the 2022-2023 fishing license cycle, there were 45 trawlers boats that were merged and out of the system.
Control fishing vessels to continuously comply with fishing equipment standards.	The Department of Fisheries sets the following standards for trawling gear as follow. **1. Pair trawls** • The length of the Lead line not over than 100 meters. • The size of the bottom net not lesser than 4 centimeters **2. Otter board trawls** • The length of the Lead line not over than 60 meters • The size of the bottom net not lesser than 4 centimeters **3. Beam Trawls.** • Use no more than 2 beams for fishing at a time, the length of each beam not exceeding 7.5 meters. • The net size of each net is not less than 4 centimeters. The Department of Fisheries controls compliance with the standards by

	requiring fishing trawl boats to process on Port-in/Port-out for the officers to randomly inspect fishing gears.
Recommending Fisheries Improvement Project (FIPs) for certain fisheries.	The trawl Fisheries Action Plan (FAP) has been approved by MarinTrust. FAP implementation is now in progress.
Objective 2: Reduce the catch of young aquatic animals	
Maintain or increase measures on the size of nets and other fishing gears	The Department of Fisheries announced that the net size of the bottom net of the trawl gear should not be less than 4 centimeters.
Implement measures to prohibit fishing seasonally and increase the area, base on the information form research that shown such periods and areas are necessary to protect commercial aquatic fry and their spawning grounds.	The Department of Fisheries announced the season for spawning and rearing larvae. which prohibits fishing with different types of fishing gears Including trawling in 4 areas as follow. 1. Central Gulf of Thailand, Prachuap Khiri Khan, Chumphon and Surat Thani province, between 15th February – 15th May of every year and area 7 nautical miles offshore in the central Gulf of Thailand, between 16th May – 14th June of every year. 2. Area between Hua Hin District and central District, Prachuap Khiri Khan Province, between 16th May – 14th June of every year 3. Inner Gulf of Thailand divided into the inner in the west, between 15th June – 15th August and the inner in the northern between 1st August – 30th September of every year.

	4. Andaman sea, area Phuket, Phang Nga, Krabi and Trang provinces from 1st April to 30th June of every year.

Progress Assessment Table of the Fisheries Management Plan (FMP) 2020 – 2022

	Goal Achieved		Good Progress		No Progress

Objective 1: Control the level of fishing effort appropriate to MSY.		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Strictly control the number of fishing vessels according to MSY and FMSY evaluations, by maintain a maximum of TAE every two years. Prioritize the allocation of TAE to low-performing fishing gear.	Fishing effort of 6 aquatic animal groups(3 groups on the Gulf of Thailand and 3 groups on the Andaman Sea) not exceeding TAE,.	
2. Allocate the number of fishing days of each vessel and monitoring, control, inspection the number of fishing days to be in accordance with the permitted	Commercial fishing vessels are allocated a TAC and the number of fishing days is set 100%	
3. Having the actual number of commercial and artisanal fishing boats match the boat registration database.	Maintain a continually up-to-date boat registration database and access it through the Fishing Info system.	
4. Purchasing vessels (vessel buyback program) to reduce the potential for overfishing	The number of vessels with commercial fishing licenses taken out of the system is not less than 900 boats in order not to exceed their fishing potential.	
5. Undertaking fishing license consolidation whereby the quantity allocation of a vessel removed from	There are at least 50 fishing boats out of the system from the merger of fishing licenses	

the fishery is combined with the quantity allocation under another vessel's license and the cessation of fishing rights whereby the quantity of aquatic animals allocated but not caught for use by one vessel is surrendered to another.	and the fishing rights lift has been announced.	
6. Control fishing vessels to continuously comply with fishing equipment standards.	Fishing gear is inspected to meet legal requirements.	
7. Introducing spatial management for some fisheries.	Spatial management or by species of aquatic animals, amount 2 areas/species	
8. Recommending Fisheries Improvement Project (FIPs) for certain fisheries.	4 Fisheries Improvement Projects (FIPs)	
Objective 2: Reduce the catch of young aquatic animals		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Maintain or increase measures on the size of nets and other fishing gears	100% of fishing vessels use legal size nets.	
2. Implement measures to prohibit fishing seasonally and increase the area, base on the information form research that shown such periods and areas are necessary to protect commercial aquatic fry and their spawning grounds.	Three studies/year for evaluating seasonal fishing ban measures, at least one measure issued base on research per year	
3. Support research to invent raw materials that can be substituted for fishmeal.	1 Research to find effective raw materials to replace fishmeal.	
Objective 3: Restore fishery resources by establishing marine habitats and releasing aquatic species.		
Management Measures	**Performance Indicators**	**Evaluation Results**

1. Continue to build marine habitats especially in the area where local and commercial fisheries are connected by promoting cooperation between the public and private sectors	Increase the number of effective marine habitats at least 10 sites/year.	
2. Continue to operate the "Aquaculture Bank" to promote the restoration of aquatic animal resources.	5 communities/year	
Objective 4: Promote and control deep sea fishing in Thai waters		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Conduct deep sea resource surveys and disseminate information about deep sea resources that have potential for fishing in the Andaman Sea.	At least one deep sea resource exploration and dissemination report.	
2. Demonstration of fishing tools and deep-sea fishing by fishing research boats and raising awareness of fishery fishing for fishermen	Demonstrate and convey the results of research to the fishermen at least once.	
3. Determine the number of permits to maintain fishing effort at levels not exceeding the MSY value in the deep sea.	The number of licensed fishing vessels does not exceed the MSY.	
Objective 5: Promote and regulate more diversified offshore fisheries		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Study regulations and prepare memorandums of understanding with coastal states in relation to fishing operations.	There is fishing cooperation with coastal states.	
2. Issuing offshore fishing licenses in accordance with the MCS requirements of Thailand, coastal states and RFMOs.	The total number of licensed fishing vessels must meet the requirements of the MCS.	

3. Promote a variety of fishing tools and fishing methods by demonstrating with fishing research boats and provide technical advice to the Fisheries Association and Fishermen	Providing technical advisory services to fisheries associations and fishermen.	
4. Increase collaboration and coordination with RFMOs.	Make reports and share information and Maintain active membership status under RFMOs	
5. Raise awareness of the conservation and management measures of RFMOs.	- Provide training for all licensees and masters - Produce public relations materials on the conservation and management measures of RFMOs.	
Objective 6: Develop/improve the MCS system to be more efficient.		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Conduct a review of the progress of the National Action Plan on Preventing, Deterring and Eliminating Illegal, Unreported and Unregulated Fishing (Thailand NPOA-IUU) 2015-2019.	Conducted one review of NPOA-IUU	
2. Strengthening coordination between the Department of Fisheries, Department of Marine and Coastal Resources, Customs Department, Royal Thai Police Office, Marine Department, Department of Provincial Administration, Ministry of Labor and the Center for the Protection of National Maritime Interest. continually	Participate in annual MCS-related reviews and drills.	
II. Liability of coastal states of Thailand		
1. Strengthen the MCS in Thai territorial waters under the full implementation of the National Plan	Fully implement the NPCI plan in all relevant departments	

of Control and Inspection (NPCI).		
2. Update the fishing database to be up to date, consisting of fishermen, registration of fishing vessels, fishing crews, fishing operators. fishing license and data on fishing offenses	Maintain and update the fisheries database	
3. Raise awareness and support local fishing communities in preventing IUU fishing.	Educate local fishing communities about IUU fishing.	
III. Responsibility of the flag state of Thailand		
1. There is a requirement that fishing vessels operating in the coastal State's exclusive economic zone/RFMO. Permission must be obtained from the coastal state or international organization to fish in those waters.	All vessels operating in the EEZ of other coastal states or on the high seas must be authorized by the respective State or by the RFMO.	
2. There is a requirement for all vessels engaged in fishing activities in other coastal States or in the high seas, the boat must be registered before the operation begin and having a license to fish in oversea.	- All vessels engaged in fishing activities in the waters of other coastal States or on the high seas. A valid boat registration and boat license is required. - All vessels operating in the territorial waters of other coastal states or on the high seas. Having a valid fishing license	
3. Develop an Electronic Reporting System (ERS) and an Electronic Tracking System (EMS) and operate on all vessels authorized to fish in the waters of other coastal States or on the high seas	ERS and EMS work effectively and a notification system has been developed	
4. Maintain an integrated database system of Thai fishing vessels engaged in offshore fishing.	The database system is developed and used efficiently.	
5. The database of IUU fishing vessels (Thai blacklist) is updated.	Thailand's up to date IUU fishing vessel blacklist database	

6. Implement the development of observer onboard programs for Thai fishing and aquaculture vessels that continue to operate outside Thai waters	- Trained 30 more observers onboard - Trained to develop observer knowledge Observer System Development (ORS)	
7. There is a requirement that vessels fishing outside Thai territorial waters comply with the laws, rules and regulations imposed by the coastal State or RFMO overseeing the respective fishing areas.	Positive Report of the Coastal State or RFMO on the Compliance of Thai Vessels	
IV. Liabilities of the port states of Thailand.		
1. Thailand implements the Port State Measures Agreement (PSMA) of FAO.	Port state measure compliance report.	
Objective 7: Strengthening the traceability system		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Imported and exported goods must comply with the law under CITES	There are no CITES violations imported into Thailand. or export from Thailand	
2. Strengthen the raw material traceability system before entering the entire supply chain.	The traceability system has been improved and strengthened through electronic systems.	
3. Cooperate with SEAFDEC in implementing the ASEAN Catch Certification System (ACDS).	ACDS has been implemented and adopted by the ASEAN Member States. (voluntarily)	
Objective 8: Improve international and regional cooperation to combat IUU fishing		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Collect and exchange IUU fishing data between the State and the RFMO (excluding data from the VMS).	- A Memorandum of Understanding (MOUs) has been prepared and signed on bilateral information exchange or with other coastal states	

	- Establish information exchange mechanisms with coastal states, or RFMOs.	
2. Exchange data on vessels over 24 meters through the ASEAN Fishing Vessel Records Programme.	There is current data on vessels over 24 meters in Thailand in the Fishing Vessel Records Programme.	
3. Provide information about IUU vessels under the RPOA-IUU framework and exchange lists of IUU fishing vessels (blacklists) with other RFMOs	- An official announcement for List of international IUU fishing vessel. - List of international IUU fishing vessels updated every yea - Preparation of lists and announcements of Thai IUU fishing vessels	
4. Establish a system for exchanging information on IUU fishing regulatory violations from a regional AIS/VMS through the MCS network initiative.	Participating in the MCS network initiative and agreeing to the VMS/VMS confidentiality agreements.	
Objective 9: Restore and maintain vulnerable aquatic habitats		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Mangrove forest, sea grass source and coral reefs have been restored or are under proper management in collaboration with the Department of Marine and Coastal Resources. and other related agencies	- Increased mangrove area – Improved seagrass habitat status - Improved coral reef status	
2. There is an Ecological Fisheries Resource Management (EAFM) for coastal communities.	- Consultation with targeted fishing communities to determine fishery types and important aquatic habitats - Train fishermen in coastal fishing communities on ecological fishery resource management - Add 5 EAFM projects/year	

3. Sustainable fish sanctuary management in Thailand	Two aquatic animal sanctuaries have been established.	
Objective 10: Restore Marine Biodiversity.		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Cooperation with the Department of Marine and Coastal Resources and other agencies in the establishment of conservation areas which complies with national and international laws to cover at least 10% of the coastal area and in the sea	- Marine Protected Areas (MPAs) under the Department of Marine and Coastal Resources, Increase by 10% by 2022 - Marine Protected Areas (MPAs) under the Department of Marine and Coastal Resources (such as seagrass beds, mangrove forests, and critical marine habitats for endangered species). Maintained - Marine Protected Areas (MPAs) under the Department of Parks, Wildlife and Plant Conservation. National parks, in particular, are maintained.	
Objective 11: Reduce Marine debris		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Bring marine waste back to shore by commercial fishing boats.	Commercial fishing boats out for fishing, Not less than 60% of the garbage is returned to the shore and the amount of waste is recorded.	
2. Model Marine waste storage (Marin Debris Bank) in fishing ports	The number of model marine waste banks at fishing ports in coastal provinces is 30 per year and the amount of waste is recorded.	
3. Reduce the use of plastic bags in commercial fishing boats.	60 percent of commercial fishing vessels that go out to fish reduce the use of plastic	

	bags. and record the amount of waste	
4. Study the types and amounts of marine debris.	Results of the study of types and amounts of waste on the water floor, 1 study.	
Objective 12: Reduce Conflict Between Resource Users		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Strengthen the Provincial Fisheries Committee to resolve conflicts.	Every provincial fisheries committee has the ability to resolve conflicts in coastal areas.	
2. Identify areas for the use of different fishing gear with stakeholder participation.	- Public hearing/listening in all seaside provinces - The Provincial Fisheries Committee in every province makes decisions through a stakeholder consultation process.	
3. Continuously to operate community conservation areas	At least 10 communities/yea	
4. Develop a warning system for fishing vessels operating in coastal seas and conservation measures from the VMS system.	- Follow up, inspect and analyze fishing vessels in coastal areas. and Conservation Measure Areas	
5. Strengthen existing participatory coastal management systems and encourage fishermen to participate in Integrated Coastal Management (ICM) activities	Implement community awareness-raising on Integrated Coastal Management ICM.	
Objective 13: Improve the quality of life of local fishermen and fishing communities.		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Grant territorial fishing rights (TURFs) in coastal/waterfront areas as appropriate, be fair to society and culture.	Allocate TURFs for at least one community in coastal provinces	

2. Set up a system to record the number of local fishing boats.	Complete a survey of local fishing boats. and develop a registration system and a data collection system for efficiency	
3. Continuous improvement of post-harvest processing through appropriate investment in infrastructure and technology in adding value ,reduce losses after harvesting and reducing waste generation Including increasing marketing channels to sell aquatic products.	- Post-harvest processes are developed for at least 2 fishing communities/year - Fishermen have at least 2 marketing channels	
4. Provide continuous support to fishermen and fishermen and highlighted the important role that women play in post-harvest activities.	- There is budget and support for fishermen and fishermen groups	
Objective 14: Improve the quality and access to fisheries data		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Conduct preliminary data analysis and the information needed to assess progress towards achieving the goals of Thailand's marine fisheries management plan.	Completed 1 data analysis.	
2. Develop a Fisheries Information Management System (FMIS) that links various data sources to assess fish populations. and fishery management.	- A system that can access the website to access information and services (Web-portal) - The FMIS database system that links various data sources can be used.	
3. Every two years, a report is prepared to assess the progress of implementation under the Thailand Marine Fisheries Management Plan by comparing indicators against the established targets.	Publish and disseminate assessment reports every 2 years.	
4. Provide continuous training on data collection and validation for provincial	Trained provincial and district officials	

and regional officials. 6. Check to ensure the quality and timeliness of the information sent to RFMO.		
5. Establish a data quality assurance system by automatically checking data from different sources.	There is an automatic and efficient data verification system.	
6. Check to ensure the quality and timeliness of the information sent to RFMO.	Maintain and have a quality control system for data and all reports sent to RFMOs in a timely manner.	
Objective 15: Increase budget and capacity of government officials, private sectors and key stakeholders		
Management Measures	**Performance Indicators**	**Evaluation Results**
1. Conduct preliminary data analysis between systems that are required to effectively manage fisheries, current organizational structure and personnel competency.	- Organization structure improvement plan - Personnel capacity building project	
2. Increasing training and building experience for stakeholders in fisheries management.	Organize training and provide stakeholders with knowledge and understanding on marine fishery management policies, regulations, and practices.	
3. Continuously working on the capacity development of government personnel.	Provide training and education, particularly in marine fisheries policy and management, to key responsible officials.	

Section 2A Catch (Part B): High-Risk Species/Species groups:

Trawl fisheries in the Gulf of Thailand: Vulnerability assessment and trend analysis of the catches (Attachment on the next page)

Section 2A Catch (Part C) - Reduction Component

- **Data collection program for trawlers and research vessel**

The Department of Fisheries has been collecting data from fishing trawlers monthly since 2016 to the present. The data collection has been gather from 3 types of fishing tools, Otter board trawl, Beam trawls and Pair trawls on a monthly basis. The samples from collecting data of all 3 tools is not less than 50 samples per month and the sample collection has operated by 8 Marine Fisheries Research and Development Centers as follow.

1) Marine Fisheries Research and Development Center at Rayong province.
2) Marine Fisheries Research and Development Center at Samut Prakan province.
3) Marine Fisheries Research and Development Center at Chumphon province.
4) Marine Fisheries Research and Development Center at Songkhla province.
5) Marine Fisheries Research and Development Center at Narathiwat province.
6) Marine Fisheries Research and Development Center at Ranong province.
7) Marine Fisheries Research and Development Center at Phuket province.
8) Marine Fisheries Research and Development Center at Satun province.

The data collected includes Fishing Effort (Table 1) and Aquatic Composition (Table 2). The data has been classified into 7 fisheries statistical areas (Figure 1) as follow.

1) Eastern Gulf of Thailand.
2) Upper Gulf of Thailand.
3) Central Gulf of Thailand.
4) Lower Gulf of Thailand.
5) In the middle of the Gulf of Thailand.
6) Upper Andaman.
7) Lower Andaman.

Data Collection Method

The data were collected from fishing trawlers docked in fishing rafts and fishing piers along the coast of the Gulf of Thailand and the Andaman Sea. The sampling was done by randomly sampling each type of trawl fishing vessel that landed aquatic animals at the sampling site. The samples are collected every month and the collecting details are as follows:

1) Interviewing for information related to Fishing Grounds, Fishing Effort (Number of fishing day, Number of times laying down fishing nets, Number of hours for trawled fishing) along with the amount of fish caught.

2) Sampling and classification of aquatic animals.

2.1 Economic aquatic animal: This group is the aquatic animal used for consumption and trading in the market. The sampling will record the weight of every species by dividing into the following sub-groups such as Demersal fish, Pelagic fish, Cephalopods, Shrimps, Crabs, Shells and Miscellaneous group.

2.2 Trash Fish: This group is divided into small economic aquatic animals and original trash fish. The sampling will record the total weight and sampling 3 - 5 kilograms of Trash Fish per vessel to classify and weigh each species.

3) Economic aquatic animal and small economic aquatic animals were sampled and measured in centimeters. The fish group was measured as total body length. Cephalopods were measured as mantle length. Shrimp, shrimp/mantis shrimp were measured as total length from tip to tail and crab groups measure carapace width. The aquatic animals measured in size as follow.

3.1 Demersal Fish 10 species.

3.2 Pelagic Fish 11 species.

3.3 Shrimp 5 species.

3.4 Cephalopods 5 species.

3.5 Crab 1 specie.

3.6 Shell 1 specie.

3.7 Mantis shrimp 1 specie.

4) The information gathered from item 1-3 to record in the form as in table 1 and 2

Table 1 Fishing Effort data recorded from a sampling of trawling vessel.

Column	Column Name	Record Description
A		Agency Code Record +YYYY+MM+nnn by

Column	Column Name	Record Description	
	Sample Vessel Code	Agency Code	EM Marine Fisheries Research and Development Center at Rayong province.
			UM Marine Fisheries Research and Development Center at Samut Prakan province.
			CM Marine Fisheries Research and Development Center at Chumphon province.
			SM Marine Fisheries Research and Development Center at Songkhla province.
			NM Marine Fisheries Research and Development Center at Narathiwat province
			AP Marine Fisheries Research and Development Center at Phuket province.
			AS Marine Fisheries Research and Development Center at Satun province.
			RN Marine Fisheries Research and Development Center at Ranong province.
		YYYY	Year of sampling, enter the year of the Christian era (AD) in the amount of 4 digits.
		MM	Sample collection month, 2 digits. Use numbers from 01, 02, ..., 12 to refer to the months of January, February and December respectively.
		nnn	The order of the sample for each month, 3 digits.
		For example, EM201901001 means the sample vessel of the Fisheries Research and Development	

Column	Column Name	Record Description	
		Center, Eastern Gulf of Thailand (Rayong) in January 2019, the No 1.	
B	Date	Sampling date	
C	Month	The sampling month uses numbers 1, 2, 3,..., 12.	
D	Year (A.D.)	Sampling year (AD) 4 digits	
E	Place	The Sampling place, for example, the name of the pier, fish raft or fish bridge, etc.	
F	Sub-district	The sampling sub-district	
G	District	Sampling District	
H	Province	Sampling Province	
I	Name of Vessel	Sampled Vessel Name	
J	Vessel Registration	Register of sampling Vessel, consists of 9 digits and recorded consecutively without spaces.	
K	Marking	Marking of a fishing vessel, appearing on both sides of the external prow.	
L	Vessel Length (M.)	Sampled Vessel Length in meters	
M	Ton gross	Ton gross size of the sampled vessels	
N	Engine size (HP)	Engine size (Unit is horse power)	
O	Tools	Type of fishing gear recorded by using English abbreviations as follows	
		BT	Beam Trawls (Use a steel beam to help spread the net entry)
		OBT	Otter Board Trawl (Use otter board to help spread the net entry)
		PT	Pair trawls (Two boats were used to haul the nets and stretch the mouths of the nets.)
P	Tool characteristics	Characteristics of nets that have changed	
Q	Approximate length (m)	Approximate length of the trawl in meters	
R	Net size (cm)	The size of the bottom of the bag net in centimeters	
S	Number of sailing	Number of days from leaving until return to the port.	

Column	Column Name	Record Description
T	Number of fishing days	The total number of days trawled on that trip
U	Day hauling (days)	Number of days of daylight trawling
V	Daily (times)	The number of times the net was dragged during the day (Unit is time/day)
W	Daytime (hours)	Number of hours trawled during daylight hours (The unit is hours/times)
X	Total daylight hours (hours/trip)	Total number of hours of daylight trawl in that trip (U x V x W). The Unit is hours/trip.
Y	Night drag (night)	Number of days trawling at night
Z	Per night (times)	The number of times the net was dragged at night (The unit is times/night)
AA	Night per time (hours)	Number of hours trawled at night (The unit is hours/times)
AB	Total night (hours/trip)	Sum of the total hours of night drag on that trip (Y x Z x AA). The unit is hours/trip.
AC	Fishing grounds	Specify the area, place or source of fishing.
AD	From Latitude (Degree)	Latitude that began the fishing of that voyage (The unit is degrees north)
AE	From Latitude (Linpa)	Latitude that began the fishing of that voyage (The unit is lipda north)
AF	From longitude (Degree)	Longitude that began the fishing of that voyage (The unit is degree east)
AG	From longitude (Lipda)	Longitude that began the fishing of that voyage. (The unit is Linpa east)
AH	To latitude (Degree)	The latitude that ends the fishing of that voyage (The unit is degree north)
AI	To latitude (Lipda)	The latitude that ends the fishing of that voyage (The unit is Linpa north)
AJ	To longitude (Degree)	The longitude that ends the fishing of that voyage (The unit is degree east)
AK	To longitude (Lipda)	The longitude that ends the fishing of that voyage (The unit is Linpa east)

Column	Column Name	Record Description
AL	Minimum water depth (m.)	Minimum water depth in the fishing area (In meters)
AM	Maximum water depth (m.)	Maximum water depth in the fishing area (In meters)
AN	Statistical area	Statistical areas for fishing sites in Thai Waters consists of zones 1-5 in the Gulf of Thailand and 6-7 in the Andaman Sea. In case of fishing more than one statistical area, each agency shall consider specifying only one statistical area of the sample vessel by considering the areas with the most fisheries.
AO	Total catch (kg.)	Total fish catch which is the sum of economic aquatic animals and trash fish in kilograms
AP	Economic aquatic animals (kg.)	Economic aquatic animals catch in kilograms
AQ	Trash Fish (kg.)	Amount of trash fish caught in kilograms
AR	Note	Record observations from interviews or encounters for the examiner or data analyst to know more details.

Table 2 Recording of aquatic animal composition from a random sampling of trawl vessel.

Column	Column Name	Record Description
A	Sample Vessel Code	Sample Vessel Code from "the Effort Worksheet"
B	Place	Sampling locations (According to the Effort worksheet)
C	Sub-district	Sampled sub-district (According to the Effort Worksheet)
D	District	Sampling District (According to the Effort Worksheet)
E	Province	Sampling Province (According to the Effort Worksheet)
F	Tools	Type of fishing gear, recorded by using the English abbreviation according to the Effort worksheet.
G	Aquatic Animals	Sampled of aquatic animals species, consumption fish or trash fish.
H	Group of random species	Identify the sampled aquatic species of each sampled vessel ID. Because the aquatic animals obtained from the trawl are separated by species and size before storage. Therefore, it is necessary to cover all types of fish groups and sizes by specifying the sampled aquatic animals of each sampling vessel code.
I	Weight of group type (kg)	The total weight of aquatic animals of each group species, randomly assigned according to column H (in kg.)
J	Weight randomly from the group (grams)	Total sampled fish weight from each randomized species group (in grams)
K	Aquatic species	Identifiable aquatic species by recording the names of aquatic animals according to the practice of each agency or the understanding of the data recorder.

Column	Column Name	Record Description
		Each agency may have a database of species and scientific names used within its own agency.
L	Scientific name	The scientific name of the aquatic species that can be classified. Species can be converted to scientific names using commands in Excel using the agency's list of species.
M	Statistical Department name	Thai common name
N	No. (Statistics Department)	The order number of fish used for catch composition assessments (using three digits), except for trash fish and other aquatic animals (Using 4-digit numbers)
O	weight, measure length/count (grams)	Total weight of aquatic species measured by length in grams (For agencies that count the number of aquatic animals that do not measure length, they will enter the weight of the aquatic animals counted in this box.)
P	Weight not measured/counted (grams)	Weight of aquatic animals not measured by length or not counting in grams.
Q	Total weight of random (species) (grams)	The total weight of aquatic animals measured and not measured in length. (sum of columns O and P), in grams
R	Weight Raised (Kg)	Distribute the random weight of each species proportionally to the weight of the species group I (Raise Weight) to obtain the total weight of each species in each random species group.
S	number of units measured/counted	The number of characters measuring length or count the number according to the column O
T	Length frequency	Length frequency recorded by using freqtext
U	Raised Length	Distribution of the number of aquatic animals measured by using the length weight (column O) and raise weight (column R), using Freqtext to obtain the

Column	Column Name	Record Description
		total number of individuals of each species in each randomized species group.
V	Note	Record observations from aquatic animal sampling for auditors or data analysts to know more details

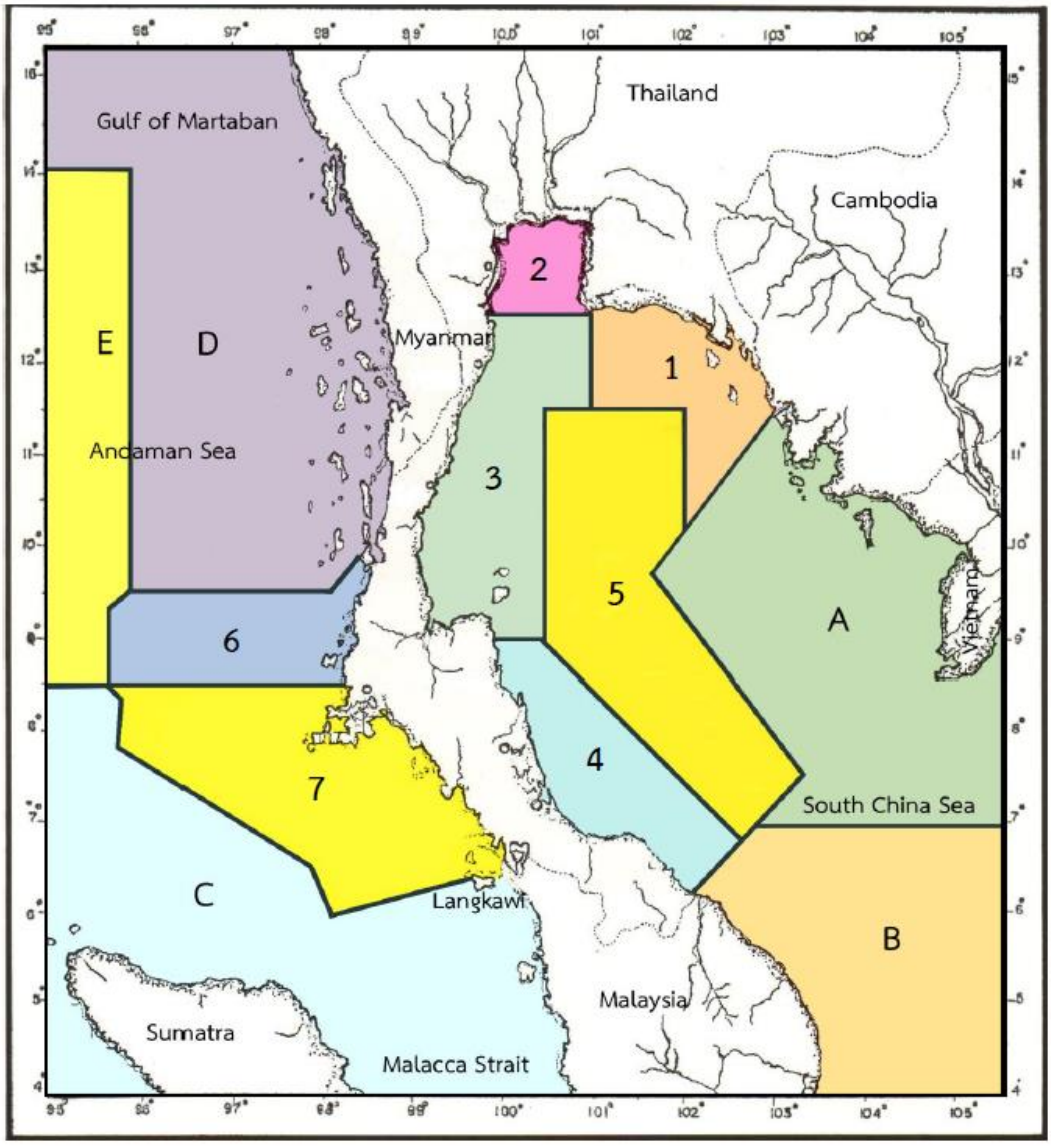


Figure 1 Map showing fisheries statistical zoning.

The Department of Fisheries conducts aquatic animal resource surveys with five marine fishery survey vessels: Fisheries1, Fisheries 2, Fisheries 4, Fisheries 9 and Fisheries 16 of the Marine Fisheries Research and Development Division. Department of Fisheries conducted surveys using otter board trawl, bottom net size 4.0 cm, in 86 survey stations. The survey station divided into 64 stations (9 sub-district) in the Gulf of Thailand

(Covering an area of 115,270 square kilometres) and 22 stations (4 sub-district) in the Andaman Sea (Covering an area of 60,327 square kilometres). Aquatic resource surveys by survey are conducted a total of 19 survey trips per year.

The survey was conducted by random trawling method within the area of each station for 1 hour at a speed of 2.5-3 nautical miles per hour. After the trawling is completed, aquatic animals will be separated according to the type of utilization, which is divided into 2 groups, namely, economic aquatic animals. and trash fish group. The trash fish group is classified as small economic aquatic animals and the true trash fish. After that, aquatic animals in different groups were classified by species for weighing. For the species that are of economic importance, the length will be further measured. The data obtained from the surveys will be used to analyze the composition of aquatic animals as a percentage of total aquatic animals caught. Catch per unit effort (CPUE) of each station has a unit in kilograms per hour. Stock density is measured in kilograms per square kilometer area and to find the average length of aquatic animals that are economically important

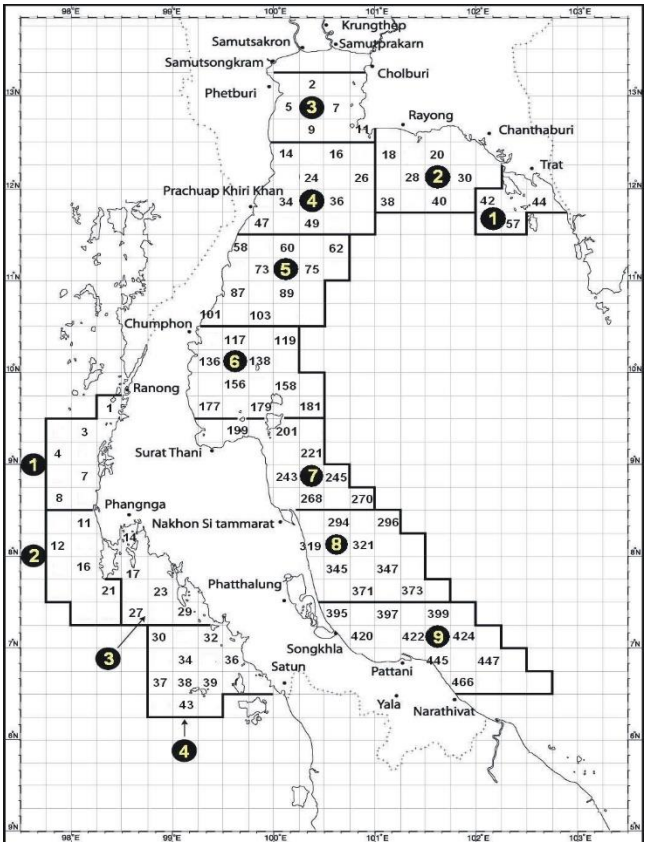


Figure 2 Map showing the demarcation of marine fishery survey stations.

- **Conduct the data collection program, especially the composition of the trash fish.**

Data collection program for trawl fisheries monitoring and research vessel (Progress Update)

In 2023, the Department of Fisheries has been actively collecting data from three types of trawl fishing gears: Otter board trawls, Beam trawls, and Pair trawls on a monthly basis. This data collection effort is carried out by eight Marine Fisheries Research and Development Centers located as follows:

1. Marine Fisheries Research and Development Center in Rayong province.
2. Marine Fisheries Research and Development Center in Samut Prakan province.
3. Marine Fisheries Research and Development Center in Chumphon province.
4. Marine Fisheries Research and Development Center in Songkhla province.
5. Marine Fisheries Research and Development Center in Narathiwat province.
6. Marine Fisheries Research and Development Center in Ranong province.
7. Marine Fisheries Research and Development Center in Phuket province.
8. Marine Fisheries Research and Development Center in Satun province.

Between January and June, a total of 434 samples were collected. These samples were divided into two categories: 300 samples were collected from the Gulf of Thailand, comprising Beam trawl (56 samples), Otter board trawl (193 samples), and Pair trawl (51 samples), while 134 samples were obtained from the Andaman Sea, consisting of Otter board trawl (74 samples) and Pair trawl (60 samples) (Table 1).

This comprehensive data collection initiative holds great significance for enhancing fisheries monitoring and supporting scientific research. The Department of Fisheries underscore the importance of accurate data collection for the sustainable management of trawl fisheries.

The Department of Fisheries conducts comprehensive fisheries resource surveys employing five dedicated marine fisheries research survey vessels: namely, Pramong 1, Pramong 2, Pramong 4, Pramong 9, and Pramong 16, all under the Marine Fisheries Research and Development Division. These surveys are conducted using the otter board trawl method, utilizing a cod end net size of 4.0 cm, across a total of 86 survey stations (Figure 1). These stations are further categorized into 64 in the Gulf of Thailand and 22 stations in the Andaman Sea. From January to August, the Department of Fisheries successfully executed a total of 248 hauls through 15 survey trips (Table 2).

Table 1: Sampling number of trawl fishing vessels from January to June 2023

Sampling number of Trawl vessels in 2023								
Month	Andaman Sea		Subtotal Andaman Sea	Gulf of Thailand			Subtotal Gulf of Thailand	Total
	Otter board trawl	Pair trawl		Beam trawl	Otter board trawl	Pair trawl		
1	15	10	**25**	7	39	13	**59**	**84**
2	11	12	**23**	8	30	5	**43**	**66**
3	13	8	**21**	9	43	9	**61**	**82**
4	10	7	**17**	8	24	6	**38**	**55**
5	12	12	**24**	11	26	7	**44**	**68**
6	13	11	**24**	13	31	11	**55**	**79**
Total	**74**	**60**	**134**	**56**	**193**	**51**	**300**	**434**

Table 2: Number of fisheries resources survey stations from January to August 2023

	Month							
Center	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
EMDEC	9		9		9			
UMDEC	11		11		11		11	
CMDEC		22	22			22		22
SMDEC			23					
AMDEC	22		22		22			
total	**42**	**22**	**87**		**42**	**22**	**11**	**22**

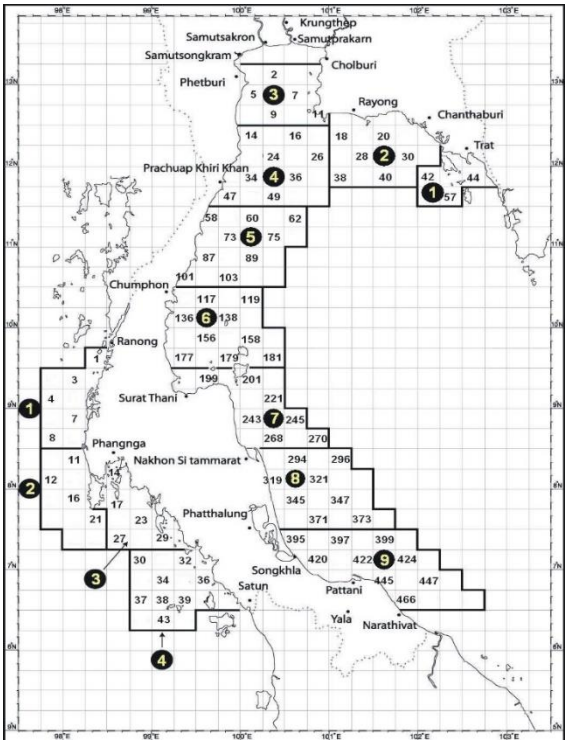


Figure 1: Marine Fisheries research survey station

Section 2B – Endangered, threatened and protected species (ETPs)

- **Review ETP species from IUCN, CITES and National Regulations.**

The report to review Endangered, threatened and protected species (ETP) from IUCN, CITES and National Regulations

This report is a species monitoring review and habitats of the Endangered, Threatened, and Protected (ETP Species) group in Thai territorial waters. This is of great importance to the ecosystem food chain and the growth of aquatic animals, including Thai industry and fishermen who want to do seafood export business. It also creates awareness of marine resources and responsible and sustainable fishing. This review will help to understand the status of Marine Endangered, Threatened, and Protected (ETP Species) around trawl fishing areas, especially the species living in the Gulf of Thailand of the current FIP trawling project in the Gulf of Thailand.

The information published on a list of marine animals in Thailand that are at risk of extinction according to the list attached to the CITES Convention as a guideline for the preliminary classification of species, including those who are interested to know basic information about aquatic animals listed in the list attached to the CITES convention.

- **Marine species in Thailand are at risk of extinction in Thai territorial waters.**

Classified by species status: Critically Endangered, Endangered, Least Concern, Vulnerable species, Near Threatened

No	Types of Vertebrate Animals	Species status	Scientific name
Dolphins and Whales			
1	Mammal	Endangered	*Tursiops aduncus*
2	Mammal	Critically Endangered	*Orcaella brevirostris*
3	Mammal	Endangered	*Sousa spp.*, **Species in Thailand** : *Sousa chinensis*
4	Mammal	Endangered	*Neophocaena phocaenoides*
5	Mammal	Endangered	*Balaenoptera edeni*
6	Mammal	Endangered	*Balaenoptera musculus*
7	Mammal	Endangered	*Balaenoptera omurai*
8	Mammal	Endangered	*Balaenoptera physalus*

9	Mammal	Least Concern	*Megaptera novaeangliae*
10	Mammal	Vulnerable species	*Physeter macrocephalus*
Dugong			
11	Mammal	Critically Endangered	*Dugong dugon*
Sea Turtles			
1	Reptile	Critically Endangered	*Chelonia mydas*
2	Reptile	Critically Endangered	*Dermochelys coriacea*
3	Reptile	Critically Endangered	*Eretmochelys imbricata*
Sharks			
1	Fish	Vulnerable species	*Carcharhinus falciformis*
2	Fish	Vulnerable species	*Carcharhinus longimanus*
3	Fish	Critically Endangered	*Sphyrna lewini*
4	Fish	Critically Endangered	*Sphyrna mokarran*
5	Fish	Critically Endangered	*Sphyrna zygaena*
6	Fish	Vulnerable species	*Alopias spp.*, **Species in Thailand** : *Alopias superciliosus*
7	Fish	Vulnerable species	*Alopias spp.*, **Species in Thailand** : *Alopias vulpinus*
Rays			
8	Fish	Vulnerable species	*Manta spp.*, **Species in Thailand** : *Manta alfredi*
9	Fish	Vulnerable species	*Manta spp.*, **Species in Thailand** : *Manta birostris*
10	Fish	Vulnerable species	*Mobula spp.*, **Species in Thailand** : *Mobul japonica*

11	Fish	Near Threatened	*Mobula spp.*, **Species in Thailand** : *Mobula eregoodootenkee*
12	Fish	Near Threatened	*Mobula spp.*, **Species in Thailand** : *Mobula kuhlii*
13	Fish	Near Threatened	*Mobula spp.*, **Species in Thailand** : *Mobula thurstoni*
Whale Sharks			
14	Fish	Vulnerable species	*Rhincodon typus*
Sawfishes			
15	Fish	Critically Endangered	*Pristidae spp.*, **Species in Thailand** : *Pristis pristis*
16	Fish	Critically Endangered	*Pristidae spp.*, **Species in Thailand** : *Pristis zijsron*
17	Fish	Endangered	*Cheilinus undulatus*
Seahorses			
18	Fish	Vulnerable species	*Hippocampus spp.*, **Species in Thailand** : *Hippocampus comes*
19	Fish	Vulnerable species	*Hippocampus spp.*, **Species in Thailand** : *Hippocampus histrix*
20	Fish	Vulnerable species	*Hippocampus spp.*, **Species in Thailand** : *Hippocampus kelloggi*
21	Fish	Vulnerable species	*Hippocampus spp.*, **Species in Thailand** : *Hippocampus kuda*
22	Fish	Vulnerable species	*Hippocampus spp.*, **Species in Thailand** : *Hippocampus spinosissimus*
23	Fish	Vulnerable species	*Hippocampus spp.*, **Species in Thailand** : *Hippocampus trimaculatus*

In addition, the Marine and Coastal Resources Research and Development Institute Department of Marine and Coastal Resources plans to study and monitor the status of rare marine animals among some cartilaginous fish that have been

declared as wildlife reserves and protected wildlife in the past 6 years, 2016-2021, by working with conservation networks, academics and experts since 2016 until now to conserve rare and endangered marine animals. Some rare marine animals in the cartilaginous group, which are threatened and are few in nature, have been proposed and promoted to be protected, In order to know the population, distribution, threats, and trend of population, also the increase-decrease. After announcement for these animals to be reserved and protected wildlife, the department in charge can find the effective conservation methods.

The latest announcement of the Ministerial Regulations of Natural Resources and Environment, no. 4, dated 12th June 2018, on stipulating that some wild animals are protected wildlife 12 species of fish have been added to the list of protected wildlife, 6 species of saltwater stingrays, 4 species of sawfish, and 1 species of guitarfish are in effect and protected as wildlife according to the Wildlife Preservation and Protection Act. These are divided into 3 groups as follows:

- **Wildlife Conservation Group: (1 species)**
  - **Whale Sharks** :
    Rhincodon typus
- **Protected wildlife group: (2 species)**
  - **Manta ray fish group :**
    Giant manta ray : *Mobula birostris*
    Reef manta ray : *Mobula alfredi*
  - **Devil ray fish group (4 species)**
    Longhorned pygmy devil ray : *Mobula eregoodoo*
    Shortfin devil ray : *Mobula kuhlii*
    Giant devil ray : *Mobula mobular*
    Bentfin deveil ray : *Mobula thurstoni*
    Chilean devil ray : *Mobula tarapacana*
  - **Guitarfish (1 species)**
    Bowmouth guitarfish : *Rhina ancylostoma*
  - **Sawfish (4 species)**
    Largetooth sawfish : *Pristis pristis*)
    Green sawfish : *Pristis zijsron*)
    Narrow sawfish : *Anoxypristis cuspidata*)
    Smalltooth sawfish : *Pristis pectinata* (not found in Thai waters)
  - **Leopard shark (1 species)**
    Leopard shark : *Stegostoma tigrinum*

Reference:

Threatened Species of Thailand Office of Natural Resources and Environmental Policy and Planning, https://www.onep.go.th/reddatavertibrates/#.2 January 2021.

Species of aquatic animals listed in the CITES Convention. Department of Fisheries.

Rare and endangered marine species report, some cartilaginous fish groups that have been declared a wildlife reserve. and protected wildlife in the past 6 years, 2016-2021.

Relevant laws
Endangered, threatened and protected species (ETP species)

The National Legislative Assembly has enacted the Wild Animal Preservation and Protection Act B.E. 2535 which has an agency, the Department of Fisheries, Ministry of Agriculture and Cooperatives, responsible for aquatic animals, operating according to the Wildlife Preservation and Protection Act B.E. 2535. This both are the main laws, and relying on other laws to enhance the conservation and protection of animals and according to the CITES Convention according to the obligations of the current conventions of Thailand.

On February 7th, 2019, the National Legislative Assembly considered according to the Constitution of the Kingdom of Thailand, 2017. The principle and reason that the Wildlife Preservation and Protection Act 1992 has been in force for a long time. This make certain provisions and measures contained in the law inappropriate and inconsistent with the current situation to be used as a tool or facilitating the conservation, conservation, protection, preservation, and restoration of wildlife and their habitats, including other natural resources efficiently. In addition, Thailand has become a member of an international agreement on wild animals and plants, resulting in compliance with the obligations under such international agreements to provide measures to control possession, trade, import, export or bringing through wildlife, carcasses, and wildlife products as well as accessing and utilizing biodiversity, It is expedient to revise the law on the preservation and protection of wildlife to suit the current situation. Therefore, the Wildlife Preservation and Protection Act 2019, was promulgated in the Royal Gazette on May 29th, 2019, scheduled to come into force after 180 days from the date of its publication in the Royal Gazette, This will come into force from November 25th, 2019, relating to Endangered, threatened, and protected species (ETP species) as follows:

Section 1 Wild Animals, Types of Conserved Wildlife Animals: It is a rare or endangered wild animal. There are 19 species on the list of conserved wildlife according to the Wildlife Preservation and Protection Act B.E. 2562 (2019). Types of

Protection Wildlife Animals: It is a wild animal that is important to the ecosystem. Or the population of that species tends to decrease, which may affect the ecosystem (Section 4) determining any species of wildlife as protected wildlife, shall be prescribed in the Ministerial Regulations with the approval of the Wildlife Preservation and Protection Committee (Section 7). Types of Control Wildlife Animals: it is a species protected under the CITES Convention and other wildlife that must have appropriate control measures for the benefit of preserving the population of other wildlife (Section 4) by specifying any kind of wildlife as controlled wildlife to be determined by the Notification of the Minister (Section 9).

The Wildlife Conservation and Protection Law (2019) is a law that stipulates rules and procedures for wildlife conservation and protection by adopting the concept of management natural resources, environment, ecosystem or biodiversity as an important mechanism in driving and creating benefits in using natural resources in a balanced manner. This include using them as a learning resource to study academic research on natural resources and wildlife, wildlife breeding, or a natural study site for the people along with conservation, restoration, and maintenance of the area that is full of wildlife forest resources natural resources, and suitable ecosystems as habitats for wildlife and biodiversity in a balanced and sustainable manner

- **Workshop to reviews and planning for ETP species recording and trawl interaction.**

Proposal for Workshop

"Good fishing practices to reduce the impact on rare marine animals into sustainable fishery standards"

Principle:

Currently, sustainable management of marine fisheries is now a key development goal of the United Nations, and there is a push for fishery products to come from fishing sources certified by international standards traders around the world accept the assessment framework based on the International Marine Stewardship Council (MSC) Sustainable Fisheries Standards which is an organization that sets standards for sustainable fisheries that implements eco-labeling according to the guidelines of the Food and Agriculture Organization of the United Nations (FAO) and use the certification process as a tool to conserve fisheries around the world by creating an economic incentive to drive changes in the global seafood market and to campaign for the conservation of fishery resources on global scale the indicator target for the assessment consists of 3 main topics:

Principle1. Sustainable target fish stocks

Principle2. Environmental impact of fishing

Principle3. Effective management

From the above principles, in addition to setting guidelines to reduce the impact that will occur on aquatic animals that are the main targets still need to evaluate and find ways to reduce the impact that will happen on other Aquatic animals in the same ecosystem, even if it's a catchable gem Endangered Threatened and Protected species (ETP) habitats and ecosystem, including promoting efficient fishery management that requires participation from all relevant sectors the use of scientific information that is up to date with current situations to be adapted appropriate management base on sustainability shared resources.

In addition, the preliminary assessment of the management to reduce the impact of rare marine animals during fishing according to the principles of sustainable fishery standards point out that Thailand has not reported and monitored populations of ETP species associated with fisheries to show that Key fishing targets do not impede the recovery of rare marine ETP species. Therefore, the assessed fisheries targets must develop a reporting format for rare marine species, number of encounters, netting and release of rare marine animals systematic environmental monitoring during fisheries, including leading to a management plan with the participation of all sectors to prevent and reduce the death rate of rare marine animals from fishing effectively.

Objective:

1.To exchange experiences encountering rare marine animals during fishing in fishing vessels such as Surrounding Nets, Trawl, and Crab gill nets.

2 . To introduce sustainable fishing standard requirements in terms of environmental impact reduction.

3.To prepare a manual on good fishing practices to reduce the impact on rare marine animals in the Gulf of Thailand.

Target groups:

Fishing vessels (captains, crew/workers on fishing vessels)

Fisheries scholars on fishing vessel records

Veterinary/Academic Resources

Fishing vessels inspector/berth

Association staff, related entrepreneurs

Time/place waiting for confirmation (relying on fishing ground data):

Four times, one day each time within the area of Samut Prakan Province, Prachuap Khiri Khan, Songkhla, Pattani, Chumphon, Surat Thani (consider the appropriateness of the period and the target area again)

Content:

1. International Sustainable Fisheries Standards (and related international regulations)
2. Database of species and distribution of rare marine animals in the Gulf of Thailand
3. Area of fishing
4. Analysis of risk level
    a. Specify rare marine species – (dolphins, whales, whale sharks, sea turtles, stingrays)
    b. Fishing activities, characteristics, type of gear, net size, period
5. Examples of good fishing practices to reduce the impact on rare marine animals.
    - Practices during the fishing net laying process, Investigating rare marine animals.
6. Guidelines for improving reports of rare marine wildlife encounters
    - Report format, reporter, inspector, assessor
7 . Guidelines for the prevention and reduction of impacts on rare marine animals during fishing

- Draft manual

Meeting method:

Clarification, presenting information, and grouping to exchange experiences/opinions

Moderator/speaker:

Speakers from government agencies, the Department of Fisheries, and the Department of Marine and Coastal Resources

Speakers from private agencies

A total of 4 people

Budget:

Expenses for organizing the meeting are drawn from the study and improvement of the purse seine fishery system development project to increase the competitiveness of sustainable industries under the international standard certification framework as follows:

- Vehicle expenses for organizers and speakers
- Accommodation expenses during the training
- Organizers and speakers
- Accommodation expenses before and after training
- Lunch and snacks and beverages
- Speaker's remuneration
- Other expenses necessary for training such as fuel and lubrication

Expected Benefits:

The target group of fishermen who work on vessels and those involved have knowledge and understanding of the requirements of the international Sustainable Fisheries Standards, It can be adapted to report rare marine species encounters during fishing and develop good fishing practices to reduce the impact on rare marine animals all sectors involved have a guideline/manual on good fishing practices to reduce the impact on rare marine animals in the Gulf of Thailand.

Project Responsibility:

Marine Fisheries Research and Development Division

Fish Quarantine and Fishing Vessel Inspection Division

Fisheries Commodity Standard System and Traceability Division

Working Group TSFR

Traceability System Development Group

FCSTD

- **Collect Historical data from fisherman at sea observation by DoF.**

ETP species sightings of trawlers operation in 2022 from Department of Fisheries data.

This information is gathered from the logbook system that is recorded in the electronic reporting database system of the Department of Fisheries (Thai Flagged Catch Certification System: TFCC). In 2022 , there were a total of 24,280 trawler trips , which sighting ETP species 42 trips from 17 trawler vessels . The Information can be summarized as follows:

ETP species sightings of trawlers operation in 2022 from Department of Fisheries data.

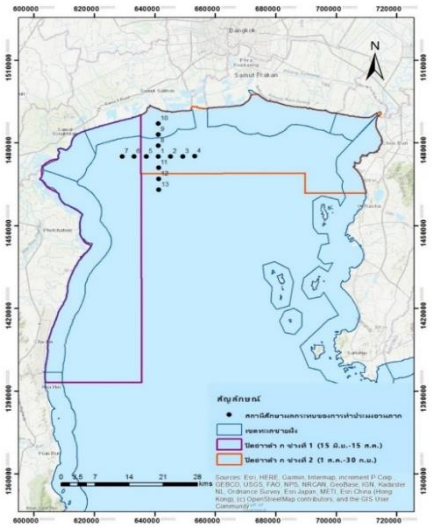
Fishing Gear	ETP Species				Total (times)
	Turtle	Dolphin	Whale Shark	Whale	
Pair-trawler	1	29	1	2	33
Otter board trawl	1	10	-	1	12
Total	**2**	**39**	**1**	**3**	**45**

Section 2C –Habitats

- **(Research 1) Effects of trawl fishing on biological resources and marine environment in inner the Gulf of Thailand.**

The impact on the marine environment from trawl fishing is a problem that affects to the degradation of marine ecosystems. The marine ecosystems that are often indirectly and directly affected by trawl fishing include seagrass, coral reefs, ecosystems within the water mass and the water floor. For seagrass and coral reefs, it is often an ecosystem that is indirectly affected by trawl fishing in terms of sediment deposition and dispersion and blocking light from rising seawater turbidity. At the same time, the ecosystems that are most often directly affected by trawl fishing are ecosystems within the water mass and water floor through sediment disturbances, the diffusion of sediments and solutions. Consequently, natural restorations may not be able to sustain ecosystems that can continue to serve as habitats for aquatic species (Dawes et al., 1997). Therefore, research to restore ecosystems such as seagrass and coral reefs must have been developed and implemented (Short et al., 2002).

The scope of the research is to study the effects of trawl fishing on sedimentary ground, water mass and fishery resources in the Gulf of Thailand. The fishing area is the inner Gulf of Thailand where commercial trawlers enter to fish during the year 2021-22. The objective is to obtain clear and complete technical knowledge on the level of impacts of trawl fishing in important fisheries with specific fishing area characteristics.



The picture shows the study area selected by considering the data on fishing behavior and fishing patterns of trawling vessel, including prohibited fishing areas to analyze fishing areas together with the use of data from the fishing Vessel Monitoring System (VMS).

The sampling in the study area is using "Variable Radius Plot Sampling" which sampling from the center of the study area with the highest concentration of trawl fishing and then set out sampling stations in 4 directions, 3 points in each direction.

The distance between the points are 4 Km and the totaling sampling are 13 stations (as can be seen from the picture). The sampling and analysis methods are 1) Water

quality analysis sampling 2) Sediment quality analysis sampling 3) Study on the impact of trawl fishing on marine resources and 4) Impact analysis of trawl fishing in the inner Gulf of Thailand (Study area).

For water quality analysis sampling, the aim is to analyze physical and chemical properties from general water quality (water depth, water transparency, temperature, salinity, PH, and dissolved oxygen), total suspended solids and the Nutrient content in water. The study found characteristics colors of various water quality in the study area, clear green, green with brown sediment, bright green color (conditions of "Red Tide" from plankton type Noctiluca Scintillans or reddish brown color caused by the abundance of plankton type Ceratium Sp.

The aim of sediment quality analysis sampling is to analyze physical and chemical properties from water content (WC), and Total Organic Matter (TOM). The study in the area found that the sediment texture is soft liquid mud with blackish gray color and the soil surface had a vague Oxidized Layer without clear sulfide odor. In some area, sea worms have been found or yellow-brown sediment, indicating the presence of Benthic Diatoms. Moreover, important economic clams, such as striped clams, are also found in the area where fine soil texture is gray and black.

The impact of trawl fishing on marine resources conducts the study by random sampling of marine benthic species in the target area, also collecting samples of aquatic animals obtained from trawl fishing in each target area for analyzing the data together with comprehensive environmental data and trawl fishing behaviors. The study will have the information to help for more understanding and confirm the food chain of bio-resources in the Gulf of Thailand. The study found that the areas without trawl fishing (stations No. 9-10), the density of marine benthic species is higher than areas with trawl fishing. Similarly, the abundance of benthic resources was found to be high in areas without trawl fishing. High abundance of 11 species was found while the lowest abundance (1-2 species) was found in trawl fishing areas.

The impact analysis of trawl fishing in the inner Gulf of Thailand. This will conduct by bringing the data from the above studies to analyze the effects of trawl fishing on the marine environment as well as biological resources of the Gulf of

Thailand and use the results as an information to develop a sustainable trawl fishing model that meets international standards in the future.

For effects of trawl fishing on water quality, considering from general water quality (water depth, water transparency, temperature, salinity, PH, and dissolved oxygen), total suspended solids and the nutrient content in water, this can be concluded that the water transparency in the study area is within the normal range (not less than 0.3 m), which is suitable for the habitat and growth of aquatic animals. The water temperature was found within the normal range (30.7-31.0 PSU) which changes according to the air temperature during the survey period. Salinity is in the normal range (30.8-31.0 PSU). The PH value has relatively little change in area. Dissolved oxygen content in some stations has relatively low content, sometimes the value is lower than the standard for aquaculture (4.0 milligrams per liter) of the Pollution Control Department (2006) that has been set. The total suspended solids (after the trawling), it was found that the total suspended solids in the water at the water surface increased significantly after the trawling. This increase as a result of trawl fishing in which the net is drawn close to the bottom of the water, causing to stir the sediment to diffuse up in the water mass. This can harmful to the respiratory system of aquatic animals and obstructs the functioning of the gum cavity. In addition, suspended solids that rise up in the water mass can block light from entering the water over time. This might limit the photosynthetic activity of plankton and might cause the amount of natural food in the water source to decrease, although for a short period of time, but can spread over a fairly wide area. The Nutrient content in water. The study focus on the content of Nitrite- Nitrate, Silicate-Silicon, Ammonium-Nitrogen and Orthophosphate-Phosphorus. From the study, it can be demonstrated that the nutrient content in the water at the surface and bottom levels changes significantly after trawling, as this can be seen in the Orthophosphate-Phosphorus content at the water surface and the bottom of the water, which was found to increase after trawling. The increase in nutrient content in the water after trawling is caused by the trawl passing at the soil level and causing sediment diffusion at the surface. This result in the diffusion of nutrients in the water from the gap between the soil to the water mass. In this regard, an increase in the nutrient content of an appropriate amount of water will benefit primary producers of water sources. On the other hand, the excessive increase of nutrients may also have a negative impact on the ecosystem.

From the study on the sediment quality, it was found that the Tha Chin River (at the end of the river) has amount of dissolved nutrients and the amount of organic matter in the sediment quite high quantity. Therefore, there is a necessity to monitor pollution problems, including the management of the affected area for healing and returning to normal condition, that are likely to increase in the future. There is a remark that the ecological process in which the environment naturally heals itself may be inadequate and timely. Therefore, human enforcement is required by applying management techniques such as river delta sediment dredging, increasing the efficiency of wastewater treatment before discharging to water sources that will help drain the water mass as well as reduce the natural treatment burden. In long term management, all sectors should coordinate in order to find ways to deal with problems at the root cause by applying the model, based on the Precautionary approach, Polluter pay principle or the Common but differentiated responsibility, to explore activities that are the actual sources of pollution and lead to the determination of suitable and effective solutions to manage problems at the pollution source. This will lead to the management of sustainable use of resources and ecosystems.

For the impact of trawl fishing on marine resources, the study suggest that trawl fishing activities can also affect marine resources especially marine benthic. This is because such activities can alter the physical and chemical properties of the sediment, affecting marine resources. There are also some researches to support with the study that the direct impact of trawl fishing on the environment and ecosystems is the reducing biodiversity and ecosystems of bottom-water resources, as a result of changes in the water surface caused by trawl fishing that destroys the soil by landfilling or turning the top of the soil., Auster and Langton (1999). Studies by Thrush et al. (1998), Sainsbury et al. (1997), and Smith et al. (1985) found that the otter board trawls fishing affects the destruction of marine resources on the water floor. Similarly, a study by Kaiser and Spencer (1996) found that Beam trawls fishing resulted in a 50% reduction in the abundance of bottom marine resources in the hydroid and coral populations. However, trawl fishermen are of the view that trawling will cause changes in the structure of the seafloor, which is "beneficial" in terms of high productivity of seafloor species that benefit the fish that consume ground animals for food. Including the view that trawl fishing is a "Farming at sea" or "shoveling" and this is a hot topic of debate in recent years (Van Denderen, 2015).

Trawl fishing is an activity that creates jobs and generates income for the community as well as the country. However, at the same time, it is classified as an activity that affects the quality of the aquatic environment and aquatic animals, especially on the bottom ecosystem and benthos resources. The development of suitable trawl fishing plan and policy with minimal impact on the bottom water ecosystem will lead to sustainable utilization of fishery resources in the future.

- **(Research 2) Analysis of trawl fishing ground in the inner Gulf of Thailand:**

Trawl fishing is an important fishery in Thailand with approximately 45% of the total catch from the sea comes from trawl fishing (Department of Fisheries, 2021). The groups of aquatic animals caught by trawl fishery are divided into 2 main groups. Those that are used for human consumption and aquatic animals used to make animal feed, also known as by-catch. For the fishing gears, trawlers can be classified into 3 types: Otter board trawl, Beam trawls and Pair trawls (Department of Fisheries, 2021). All three gears, the Department of Fisheries are classified as highly efficient gears that require a license for commercial fishing. After the issuance of the Royal Fisheries Act in 2015, the law stipulates that commercial fishing vessels of 30 tons or more. The Vessel Monitoring System (VMS) must be installed, the fishing logbook must be submitted and the fishing vessels must be report the enter and exit (Port-In, Port-out) to the PIPO Center. This is a part of the Monitoring, Control and Surveillance (MCS) and traceability system to tackle Illegal, Unreported and Unregulated Fishing (IUU). The application of data from the Vessel Monitoring System (VMS) and the data from the fisheries record system (Fishing Info) by the Vessel Control Center can be used to analyze each type of trawl fishing area. Similarly example, Skaar et al. (2011) used fishing vessel tracking data to assess drag areas in the Barents Sea, or Martin et al. (2014) attempted to use fish data on fishing vessel tracking data for the management of the fishing fleet in the Mediterranean Sea. Analysis of areas with intensive trawl fishing will be useful in further assessing both physical and biological impacts for each area. In addition, mapping of fishing grounds and trawler fishing maps can be made. This will be very useful to further formulate measures for fishery management according to each area.

The scope of the research is to initiate a map of trawl fishing grounds and study trawl fishing patterns in the inner Gulf of Thailand during 2021-2022.

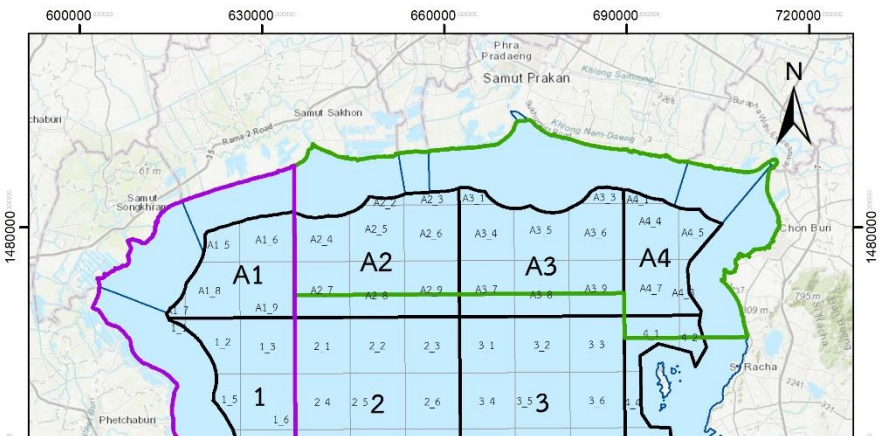
The research has collected the data by using the methodology as follow.

1) Review trawl fishing patterns from academic reports, journals, research reports and in-depth interviews. The data collection of the fishing patterns consisting of fishing area, characteristic of fishing gear used, speed (including factors affecting the speed used in fishing) and 15 fisherman's representative in the vessel controller or vessel owners with knowledge of trawl fishing for each gear, pair trawls, otter board trawls and beam trawls. The results of the analysis will be used as part of the basic data for analyzing fishing pattern and mapping trawl fishing grounds, using geographic information systems.

2) Collecting spatial data to create maps and databases, consisting of Measures Area of Department of Fisheries, Fishery licensed area of the Department of Fisheries and trawl fishing information (from VMS, Fishing Electronic Fishing Log-book, and Port-in Port out)

3) For fishing areas and development of a trawl fishing database system in the Gulf of Thailand, the information used includes oceanographic data collection such as water temperature/depth and a survey of the demersal population of economic important.

For initiate a map of trawl fishing grounds to track changes in fishing and clearly track the swept area. In this study, the inner Gulf of Thailand was divided into 5 × 5 nautical mile grid plots (25 square nautical miles or 85.748 square kilometers) based on minutes of latitude and longitude and in accordance with the survey area currently operated by the Department of Fisheries. The number of grids can be divided is a total of 136 grids, with 21 grids overlapping the coastal/sea area. which commercial fishing vessel cannot go fishing. This leaves only 115 grids (representing an area of 8,171.27 square kilometers) where commercial fishing vessels have the authorize to fish. For greater clarity in the analysis, the grid area of 5 x 5 nautical miles has been adjusted to an area of 15 x 15 nautical miles (1 zone equals 9 grids), which divides the Gulf of Thailand into 16 districts in total (see the map below)



The trawl fishing ground in the Inner Gulf of Thailand. The study found that most of them are located in the central bay area (Zones A2, A3, 2, 3, 6, 7, 9 and 10). Especially the 2 and 3 zones are the areas with a very high swept area ratio with a proportion of more than 3 times. For aquatic animal fish caught, the demersal Fish has found in a high proportion in zones 8 and 11. The pelagic fish are more common in the coastal and mid-western regions (zones 1, 6, 2, 8, and 9). Cephalopods mostly found in upper area (A4) and Lower East (Regions 7, 10, 11 and B). For By-catch, it is predominantly found in the upper shore and mid-gulf (zones 2, 3, 6, 7, 9 and 10). This mean that the area has been swept in the year, which can be inferred that the upper coastal area is a rich source because despite measures "Closing area in the Inner Gulf of Thailand", but still has a higher swept than other areas.

For trawl fishing patterns, the inner Gulf of Thailand covers an area of approximately 10,000 square kilometers. The area where trawl fishing can be accessed is 8,171.268 square kilometers, (representing 81.70 percent). The rest of the area will be coastal areas where commercial fishing vessels are unable to fish. From the calculation of the trawl swept area in the upper Gulf of Thailand in 2020-21, the volume is between 22,704.98- 23,478.46 sq.km. In 2021, the number of fishing vessels entering the inner Gulf of Thailand decreased by 10.05 percent, resulting in a 3.29 percent decrease in the amount of swept area in 2021. Considering the types of trawl vessels, it was found that the number of all types of trawl vessels decreased in the same way. The number of pair trawls decreased the most, at 13.65 percent, followed by beam trawls (6.19 percent) and otter board trawls (4.20 percent). If considering the quantity of the swept area, it was found that both the otter board trawl and beam trawl had the swept area in 2021, decreasing by 48.92 and 34.02 percent respectively. However, Pair trawl had 10.45 percent increase in the swept area. The results of the study show that the decline in the number of vessels did not contribute to the decline in trawl fishing, especially in pair trawl

For the quantity of fish caught, the data has been collected from report in the logbook to analyze together with the vessel position, obtained from the transmission of the fishing vessel tracking system (VMS) to identify the swept area of trawl fishing. The catch from trawl fisheries in the Inner Gulf of Thailand in 2020-2021 amounts between 43,980.50-50,076.31 tons, with the pair trawl fishing gear is the main fishing tool in the inner Gulf of Thailand with the proportion of the catch between 86.09-86.37%. Followed by the beam trawl (11.12-11.54%) and the otter board trawl (2.38-2.51%) respectively. The quantity of aquatic animals caught per area can reflect the abundance of aquatic animals in each area. It was found that the area with the highest amount of aquatic animals caught per area is the upper area of the inner Gulf of Thailand, especially in the above coastal zone. For the species of aquatic animals caught, it can be divided to economic fish and by-catch fish. The study found that the quantity of economic fish is 45.9-50.4% (Mostly demersal Fish 15.3-15.7%, Pelagic Fish 13.6-17.4%, Cephalopods 11.1-11.7% and Shrimp, Crab, Shell about 5%. For by-catch fish, the it was found 49.6-54.1%.

The study has suggested that the fish that has a possibility for high- risk, especially Saurida sp which are found mainly in the western coastal areas (zone 8) and the lower central coast of the inner Gulf of Thailand (zone 6, 7, 9, and 10)

requires in-depth study and monitoring of the biology of the fish in the area whether it is a breeding or nursery area at any time. Including the additional research on catch rate tends to increase or decrease in the past 5 years, this information will be used a data for the assessment of surveillance in determining measures for continuous care and able to set targeted spatial management measures for greater efficiency.

Also, in the case of the inner and central Gulf of Thailand where the close area measures have led to the displacement of fishing areas. This could be a good way to allow enclosed areas to recuperate (Zone A1-A4). At the same time, outside the closed area may be affected by increased fishing, especially zone 2 and 3. However, the aquatic animals caught from both fishery zones was also at a high level. Consequently, it is still unable to determine the appropriate level of fishing for the size of the area that should be at a level that will not cause degradation of resources. Continued studies over a period of time to use the data to help assess the annual catch rate per area will lead to the determination of fish catch per area indicators and the quota approach ensures that trawl fishing does not affect habitats and ecosystems, which is a targeted management.

Finally, an increase in the catch rates of the three types of fishing gear, Otter board trawl, Beam trawls and Pair trawls, may reflect that fishery resources in the Inner Gulf are not deteriorating, or an increase in catch rates may reflect efficiency of fishery resource management over the past few years. If there is a follow-up or ongoing research, these indicators may be used to further inform the resource situation and implement the area-based fisheries management of Thailand