The Gulf of Thailand mixed-trawl Fishery Improvement Project (FIP)
Update October 2025 (Peer Review)

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 24**		The summary report in annex 1, Page 11 (Result 2024)
	2. Fishermen Meeting report and provincial fisheries committee meeting report to be made publicly available.	**Dec 22**		The summary report in the annex 1, Page 14 (the update 2025)
	3. FMP 2020-2022 evaluation report.	**Jan 23**		Submitted to peer review
	Output:			
	1. Annual report year (2022-2025) on stock assessment, (MMSY) and indicators species.	**Aug 24**		The summary report in annex 1, Page 11
	2. Fishermen Meeting report and provincial fisheries committee meeting report to publicly available.	**Dec 22**		The summary report in the annex 1, Page 15 (the update 2025)
	3. Report on FMP evaluation.	**Jan 23**		Submitted to peer review
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**		Submitted to peer review
	2. Conduct and analysis of changes in catch composition of trawl fishery, classified by vulnerability groups.	**Dec 22**		Submitted to peer review
	3. Assess the stock status of high-risk species.	**Dec 23**		Submitted to peer review
	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**		Submitted to peer review
	2. The report on data/information of changes in the catch composition of each type of trawl fishing.	**Dec 22**		Submitted to peer review
	3. The report of stock assessment for high-risk species.	**Dec 23**		Submitted to peer review (Aug 24)

	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**		Submitted to peer review (Aug 24)
	2. Set up data collection program for trawl fisheries monitoring and research vessel.	**Dec 22**		Submitted to peer review
	3. Conduct the data collection program, especially the composition of the trash fish.	**Start Jan 23**		Data included in point 4
	4. Analyze data and publish annual report on trawl fisheries and research vessel.	**Dec 24**		Summary report in annex 1, Page 20
	5. Set proposed objectives and TRP for reduction component and juvenile commercial fish.	**Dec 25**		On the process, coordinate with DOF, to set up a workshop/meeting to establish the objective and TRP.

	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.	**Dec 24**		Data included in point 3
	2. Data collection program	**Dec 22**		Submitted to peer review
	3. Annual report on trawl fisheries and research vessel.	**Dec 24**		Summary report in annex 1, Page 20
	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**		Submitted to peer review
	2. Workshop to reviews and planning for ETP species recording and trawl interaction.	**Aug 23**		Submitted to peer review (Aug 24)
	3. Collect Historical data from fisherman at sea observation by DoF.	**Dec 23**		Submitted to peer review (Aug 24)
	4. Monitor population of marine endangered animal by DMCR.	**Dec 23**		Submitted to peer review (Aug 24)
	5. Risk Assessment on trawl fishery and ETP interaction. T2 (As soon as the data available within 5 years)	**Dec 26**		On process, ARDA is in on the process for approving the budget.
	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. - Training program by DMCR on life saving, identification, stranded reporting ETPs.	**Mar 24**		Submitted to peer review (Aug 24)

	Output:			
	1. Effective ETP interaction record approach.	**Dec 25**		On process to create ETP record.
	2. Report on - Updated ETPs of Thailand.	**Dec 24**		Submitted to peer review
	- Risk assessment of trawl interaction to ETP species.	**Dec 26**		On process, ARDA is in on the process for approving the budget.
	3. Best practice on ETP protection on community area management.	**Dec 25**		On processs to issue report.
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**		Submitted to peer review
	1.2 Eastern Gulf of Thailand.	**Dec 23**		Submitted to peer review (Aug 24)
	1.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The summary report in the annex 1, Page 27 and 40
	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**		Submitted to peer review
	2.2Eastern Gulf of Thailand.	**Dec 23**		Submitted to peer review (Aug 24)
	2.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The summary report in the annex 1, Page 27 and 40
	3. Identify and assess the critical habitat effected by trawl fishery. (Apr-May)			
	3.1 Inner Gulf of Thailand.	**Dec 22**		Submitted to peer review
	3.2 Eastern Gulf of Thailand.	**Dec 23**		Submitted to peer review (Aug 24)
	3.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The summary report in the annex 1, Page 27 and 40
	4. Risk Assessment on trawl fishery and habitat interaction.	**Dec 25**		On process, ARDA is in on the process for approving the budget.

	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**		Submitted to peer review
	1.2 Eastern Gulf of Thailand.	**Dec 23**		Submitted to peer review (Aug 24)
	1.3 Southern (Lower) Gulf of Thailand	**Dec 24**		The summary report in the annex 1, Page 27 and 40.
	2. The result of impacts on main habitat and critical habitat effected by trawl fishery (H2).			
	2.1 Inner Gulf of Thailand.	**Dec 22**		Submitted to peer review
	2.2 Eastern Gulf of Thailand.	**Dec 23**		Submitted to peer review (Aug 24)
	2.3 Southern (Lower) Gulf of Thailand.	**Dec 24**		The summary report in the annex 1, Page 27 and 40
	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 timeframes) and expected output	**Action:**			
	1. Review existing research related to the impacts from fisheries on the ecosystem.	**Jun 23**		Submitted to peer review (Aug 24)
	2. Find an expert on Ecopath model.	**Dec 23**		Done
	3. Update Ecopath model by using recent data.	**Dec 25**		The summary report in the annex 1, Page 49
	4. Find key ecological species from Ecopath.	**Dec 25**		The summary report in the annex 1, Page 49
	5. Simulate the model with different scenario [fishing gear/fishing effort].	**Dec 25**		The summary report in the annex 1, Page 49
	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**		Submitted to peer review (Aug 24)
	2. Reports on; E2 (Dec 25).	**Dec 25**		The summary report in the annex 1, Page 49

	- Updated Ecopath model. - Key ecological species identified - Simulation result from different scenario and implication for management			
	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			

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Completed

On process

ANNEX 1:
Section 2A Catch: (Part A) Total Aggregate Catch

- **Annual Report on Stock Assessment, Multi-Species Maximum Sustainable Yield (MMSY) and Indicator Spceics**

The Maximum Sustainable Yield (MSY) assessment 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 of all fishing operations. The MSY assessment was conducted for three species groups 1) demersal fish that refer to all demersal species including demersal fish, squid, cuttle fish and shrimp 2) pelagic fish; and 3) anchovies. The demersal fish group is directly related to trawl fisheries due to marine resources in this group were 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 in the Gulf of Thailand

The sustainable maximum yield (MSY) assessment in the Gulf of Thailand has been conducted since the year 2015-2024. 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 tonnes. The second highest value was recorded in 2015 at 794,771 tonnes, while the lowest value was observed in 2024 with an MSY of 746,982 tonnes. (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
2015	794,771
2016	777,855
2017	795,869
2018	785,358
2019	790,985
2020	775,548
2021	766,890
2022	759,129
2023	754,615
2024	746,982

Sustainable Maximum Yield (MSY) Assessment Results for Demersal fish Group in 2024

The number of demersal species caught in Thai waters in 2024 from all fishing gears was 853,150 tonnes. This catch was divided into 585,465 tonnes from the Gulf of Thailand and 270,685 tonnes 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 458,519 tonnes, which constitutes 78.32.% of the total demersal catch from the Gulf of Thailand. (Table 2).

Table 2 Catch of Demersal fish group in Thai waters in 2024

Demersal fish	Main fishing gears		Other gears		Total	
	Catch	%	Catch	%	Catch	%
Gulf of Thailand	458,519	78.32	126,946	21.68	585,465	100.00

Demersal fish group in Gulf of Thailand

The data used for assessment covers the years 1971 to 2024. The assessment results reveal that the Maximum Sustainable Yield (MSY) is 746,982 tonnes. The fishing effort at the MSY level is equivalent to 24.9 million hours. The catch of demersal marine species in 2024 amounted to 458,519 tonnes, a decrease of 48,422 tonnes from 506,941 tonnes in 2023. The fishing effort for 2024 is 16.05 million hours, a reduction from 0.24 million hours in 2023. The fishing effort in 2024 represents 65.47% of the fishing effort at the MSY level (Figure 1).

Table 3: Summary of Maximum Sustainable Yield (MSY) Assessment Results and Fishing Effort, in 2024

Group Species	MSY (tonnes)	Optimal Fishing Effort (Fmsy) (hrs.)	Correlation coefficient (r^2)	Current Catch in 2024 (ton)	Current Fishing effort in 2024 (hrs)	Status of Fishing effort
Gulf of Thailand Demersal fish	**746,982**	**24,905,641**	**0.72**	**458,519**	**16,057,399**	**65.47% Fmsy**

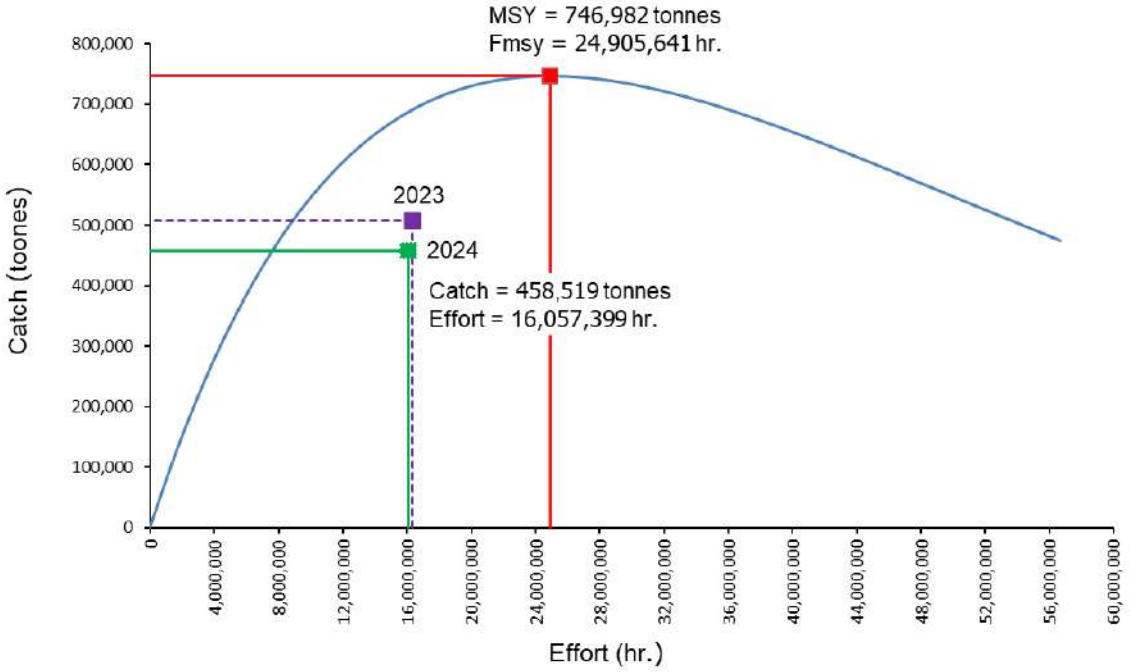


Figure 1 Maximum Sustainable Yield for Demersal group in the Gulf of Thailand in 2024

Source of Reference:

Department of Fisheries (Thailand). 2025. Annual Report on Stock Assessment, Multi-Species Maximum Sustainable Yield (MMSY) and Indicator Species. Marine Fisheries Research and Development Division, Department of Fisheries, Ministry of Agriculture and Cooperatives, Thailand.

- **National Fisheries Policy Committee Meeting Report**

The National Fisheries Policy Committee under the Royal Ordinance on Fisheries B.E. 2558 (2015) and its amendments. The details as follow.

Section 13: A committee called the "National Fisheries Policy Committee" shall be established, consisting of:

- The Prime Minister as the Chairperson,
- The Minister of Agriculture and Cooperatives as the Vice Chairperson,
- The Permanent Secretary of the Ministry of Foreign Affairs,
- The Permanent Secretary of the Ministry of Agriculture and Cooperatives,
- The Permanent Secretary of the Ministry of Transport,
- The Permanent Secretary of the Ministry of Natural Resources and Environment,
- The Permanent Secretary of the Ministry of Labour,
- The Commander-in-Chief of the Royal Thai Navy,
- The Commissioner-General of the Royal Thai Police,
- The Director-General of the Department of Provincial Administration,
- The President of the National Farmers Council,
- The President of the Thai Chamber of Commerce,
- The President of the Federation of Thai Industries,
- And no more than ten qualified members appointed by the Minister.
- The Director-General of the Department of Fisheries shall serve as a committee member and secretary.

Section 19: The Committee shall have the authority and duties to formulate policies and oversee the management of fisheries as follows:

1) Establish policies for the development of fisheries in Thai waters in alignment with the availability of aquatic resources and the capacity for fishing, with reference points as a key consideration.
2) Formulate policies for promoting, developing, and addressing issues related to fisheries beyond Thai waters.
3) Develop policies for the advancement of aquaculture in the country.
4) Set policies for the development of the fisheries-related industrial sector.
5) Establish measures to ensure compliance with the policies specified in (1), (2), (3), and (4).
6) Determine the maximum allowable catch of aquatic animals in Thai waters.
7) Define strategies and objectives for fisheries development in line with the conservation of aquatic resources and environmental protection.

8) Establish guidelines for managing aquatic resources to maintain sustainability and ensure responsible fisheries.
9) Prepare an annual report on operations to be submitted to the Cabinet and made publicly available.
10) Carry out any other duties as prescribed by law or as assigned by the Cabinet.

Note: The policies formulated under (1), (2), (3), and (4) shall be submitted to the Cabinet for approval. Once approved by the Cabinet, all government agencies shall implement and oversee compliance with these policies.

Section 21: The policies outlined in Section 19 (1), (2), (3), (4), (5), (6), and (7) shall, at a minimum, aim to achieve the following outcomes:

1) Ensure the conservation, protection, and prevention of aquatic animals from extinction, allowing for the sustainable use of aquatic resources while maintaining ecological balance and biodiversity.
2) Prevent any support for illegal fishing, including the provision of personnel, fuel, fishing gear, or other related items.
3) Establish measures to regulate and control fisheries in compliance with international laws and global standards.
4) Develop strategies for enhancing fisheries cooperation with other states and international organizations to conserve and manage threats to aquatic resources, migration patterns, and aquatic habitats, using the precautionary principle.
5) Implement measures to prevent overfishing that disrupts or interferes with natural regeneration processes, ensuring that fishing activities align with the maximum sustainable yield of nature and allow for long-term utilization.
6) Require relevant government agencies to revise laws, regulations, procedures, and conditions to align with advancements and developments in international fisheries regulations.
7) Provide mechanisms for fishery operators and other related professions to participate in the conservation and protection of fisheries resources and aquatic animals, ensuring a sustainable and well-maintained fishing environment.

Section 22: The guidelines for managing aquatic resources under Section 19 (8) shall at least cover the following aspects:

1) Guidelines for promoting conservation measures and sustainable fisheries management.

2) Guidelines for protecting and safeguarding rights, as well as developing and promoting the livelihoods and well-being of Thai fishermen.
3) Guidelines for preventing excessive exploitation of aquatic resources.
4) Guidelines for preventing illegal fishing activities.
5) Guidelines for cooperation with international organizations, various countries, and coastal states in disseminating and exchanging information on fisheries statistics and other relevant fisheries-related data.

Section 23: To implement the policies outlined in Section 19, the Department of Fisheries shall prepare a fisheries management plan in accordance with these policies and submit it to the Committee for consideration. The plan shall then be presented to the Cabinet for approval, after which the relevant agencies shall implement it accordingly.

Note: Currently, the committee has approved the Fisheries Management Plan for 2023–2027 during the 2nd meeting of the National Fisheries Policy Committee in 2024 on November 26, 2024. The next step is under the consideration of the Office of the National Economic and Social Development Council (NESDC) before being submitted to the Cabinet for further approval.

Section 24: The Fisheries Management Plan under Section 23 must at least cover the following operational guidelines:

1) Guidelines for issuing fishing licenses in accordance with fishing capacity and the maximum sustainable yield of aquatic resources, using reference points as a basis for consideration.
2) Guidelines for restoring aquatic resources to their natural state.
3) Guidelines for reducing the number of commercial fishing vessels.
4) Guidelines for reducing illegal fishing activities.
5) Guidelines for resolving conflicts of interest between small-scale fisheries and commercial fisheries.
6) Guidelines for preventing the capture of undersized aquatic animals.
7) Guidelines for developing fisheries-related data.
8) Guidelines for strengthening fisheries management.

Summary of the 1st Meeting of the National Fisheries Policy Committee (2025)

On February 13, 2025, the National Fisheries Policy Committee convened its first meeting of the year, chaired by Deputy Prime Minister and Minister of Finance, Mr. Pichai Chunhavachira. The meeting covered several key topics:

1) Maximum Sustainable Yield (MSY) and Total Allowable Catch (TAC) for 2025**:** The committee reviewed the Maximum Sustainable Yield (MSY) reference

points and approved the Total Allowable Catch (TAC) for the 2025 fishing season. The committee decided that the TAC would be set at 98% of the MSY for all fishery groups, including demersal fish, pelagic fish, and anchovies in both the Gulf of Thailand and the Andaman Sea. However, for pelagic fish in the Andaman Sea, the TAC was set at 95% of the MSY. The Department of Fisheries is responsible for implementing these decisions in the allocation of commercial fishing licenses accordingly.

2) Legal Proceedings Update: The secretariat reported progress on the delegation of authority in legal proceedings related to case number ส.14/2567 at the Central Administrative Court.
3) U.S. Marine Mammal Protection Measures: The committee was informed about preliminary communications from the U.S. National Oceanic and Atmospheric Administration regarding the comparability of Thailand's marine mammal protection measures with U.S. regulations.
4) Amendments to Section 69 of the Fisheries Act: The committee was briefed on proposed amendments to Section 69 under the draft Act amending the Royal Ordinance on Fisheries B.E. 2558.
5) Policy Development Initiatives: Progress was reported on brainstorming sessions aimed at identifying key issues for future meetings and policy formulation by the committee.

Summary of the 2nd Meeting of the National Fisheries Policy Committee (2024)
On November 26, 2024, the National Fisheries Policy Committee convened its second meeting of the year, chaired by Deputy Prime Minister and Minister of Finance, Mr. Pichai Chunhavachira, at Room 301, Command Building 1, Government House. Key outcomes of the meeting included:

1. **Approval of the Fisheries Management Plan (2023–2027)**: The committee endorsed the policy and management plan for fisheries, encompassing five key areas:
   - Development of freshwater fisheries
   - Development of fisheries within Thai waters
   - Development of fisheries beyond Thai waters
   - Promotion of aquaculture
   - Enhancement of fishery product processing

This plan aims to establish sustainable fisheries management practices in Thailand.

2. **Establishment of Sub-Committees**:

- **Screening Sub-Committee for Vessel Decommissioning**: Formed to oversee the removal of vessels from operation, supporting sustainable marine resource management.
- **Scientific Sub-Committee on Marine Fisheries Resource Management**: Established to provide scientific guidance on managing marine fisheries resources.

3. **VMS Co-Payment Program**: The committee approved the "Fisheries Unite to Co-Pay for the Thai Fishing Vessel Monitoring System (VMS)" initiative, aiming to enhance monitoring and regulation of fishing activities.
4. **Delegation of Legal Authority**: The committee discussed authorizing relevant agencies to proceed with legal actions concerning case number 14/2567 at the Central Administrative Court.
5. **Artificial Reef Research Project**: The committee acknowledged the progress of a research project on constructing marine habitats (artificial reefs) using decommissioned offshore petroleum platform jackets in the Gulf of Thailand.

These decisions reflect the committee's commitment to sustainable fisheries management, legal compliance, and the advancement of marine resource conservation in Thailand.

Source of Reference:

Department of Fisheries (Thailand). 2024. *Summary of the 2nd Meeting of the National Fisheries Policy Committee, 26 November 2024.* Internal meeting summary provided by the Department of Fisheries.

Department of Fisheries (Thailand). 2025. *Summary of the 1st Meeting of the National Fisheries Policy Committee, 13 February 2025.* Internal meeting summary provided by the Department of Fisheries.

Section 2A Catch: Part C -Reduction component

- Analyze data and publish annual report on trawl fisheries and research vessel.

Annual report on research vessel survey in the Gulf of Thailand in 2023

Marine Fisheries Research and Development Division, Department of Fisheries of Thailand

Introduction

The rapidly development of fisheries in the Gulf of Thailand (GoT) started in 1960s. Under the bilateral agreement for economic and technical cooperation between the Federal Republic of Germany and the Kingdom of Thailand, demersal trawling was first introduced into the GoT. The catch from trawling gears at that time gave astonishing results, it had doubled the marine fisheries yield with 4 years after the introduction (Tiews, 1966). Resulting bottom trawl later became the most popular fishing gear in Thailand. However, the marked development of trawling in the GoT resulted in a declined of fishery resource abundance.

To response this, the Department of Fisheries have conducted the independent survey, started in 1966 to monitor the status and exploitation level of fisheries resources. The survey is systematically designed to have consistency through time and cover fishing area and seasonal variation, which are deemed important to fisheries resource monitoring.

Method

In 2023, the survey in the GoT was conducted on routine basis by using 4 fishery research vessels, namely Pramong 1, Pramong 2, Pramong 9 and Pramong 16. The vessels are equipped with demersal otter board trawl constructing with double layers cod-end, the inner cod-end of 40 mm and covering net of 25 mm mesh. Towing operation was 1 hour per haul per station. The surveys were conducted in January to September 2023. There are the total of 64 stations, with 9 subareas, distributed in the GoT. The summary of number of survey operation and area are presented in Table 1 and Figure 1. Noting that the operations were planned to finish in quarter 3 of the year due to strong monsoon occurring in GoT in October to December.

Table 1 the number of demersal survey operation (station) done in the Gulf of Thailand in 2023

Month	Subarea									Total
	1	2	3	4	5	6	7	8	9	
January	3	5	4	4						16
February				2	9	10				21
March	3	6	5	6	9	8	4	7	8	56
April						3			1	4
May	3	6	5	6						20
June				2	8	10				20
July			5	6						11
August				2	9	9	4	8	9	41
September							5	7	9	21
Total	**9**	**17**	**19**	**28**	**35**	**40**	**13**	**22**	**27**	**210**

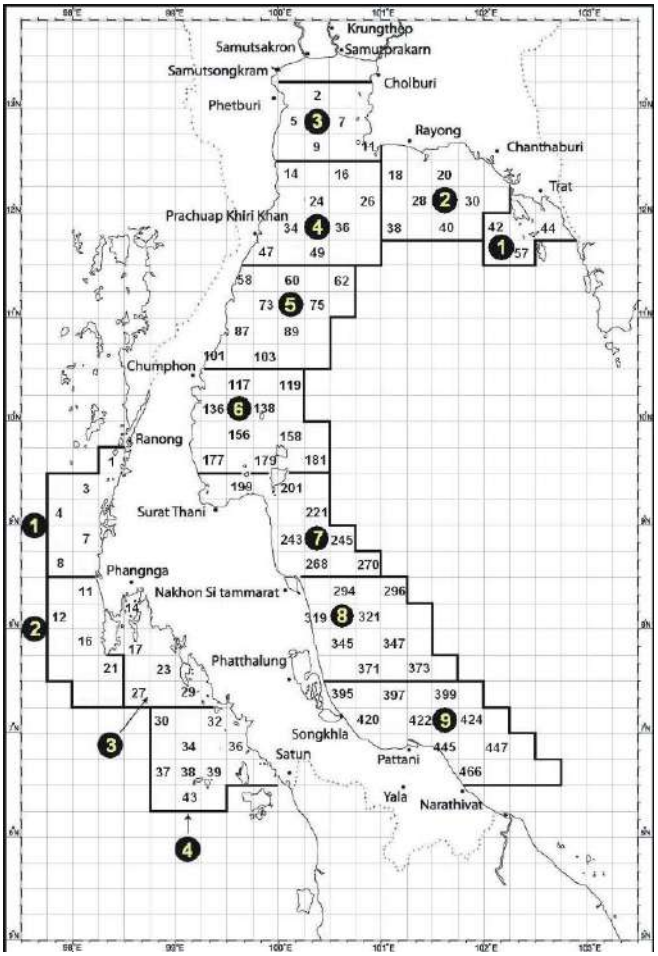


Figure 1 The survey map of demersal survey by research vessel in Thai waters
Remarks: station numbers are presented in the grids, the numbers in the black circles indicate research subareas

Results

1. The catch per unit effort (CPUE) in the Gulf of Thailand

In 2023, the average CPUE in the GoT was 21.521 kg/hr which increased 8.74% from 2022. Considering by subarea, the highest catch rate found in the western area of the gulf (area 6) in Chumporn and connecting area of Surat Thani province with 41.583 kg/hr. Followed by the eastern area of the gulf (area 1) in Trat province with 34.693 kg/hr. The lowest catch rate was found in the upper coastal part of Nokorn Sri Thammarat province (area 7) with 9.283 kg/hr. The CPUE have slightly increased in area 1-4 and 6, whereas the area 5,7 and 9 showed decreased values (Table 2 and Figure 2).

The CPUE by grouped species showed that demersal fish were the largest decreased in percentage, followed by pelagic fish and shrimps respectively. Most of marine faunas catch rate were increased except cephalopod, shrimp and trash fish which slightly decreased. (Table 3).

Table 2 Catch per unit effort (kg/hr) of 40 mm cod-end by subarea in the Gulf of Thailand in 2023

Subarea	2022	2023	+/-	% changes
1	31.486	34.693	3.21	10.19
2	11.769	13.267	1.50	12.73
3	14.561	17.312	2.75	18.89
4	12.033	17.647	5.61	46.66
5	26.766	14.065	-12.70	-47.45
6	31.892	41.583	9.69	30.39
7	27.768	9.283	-18.49	-66.57
8	17.008	15.093	-1.92	-11.26
9	31.635	20.380	-11.26	-35.58
Average	**19.791**	**21.521**	**1.73**	**8.74**

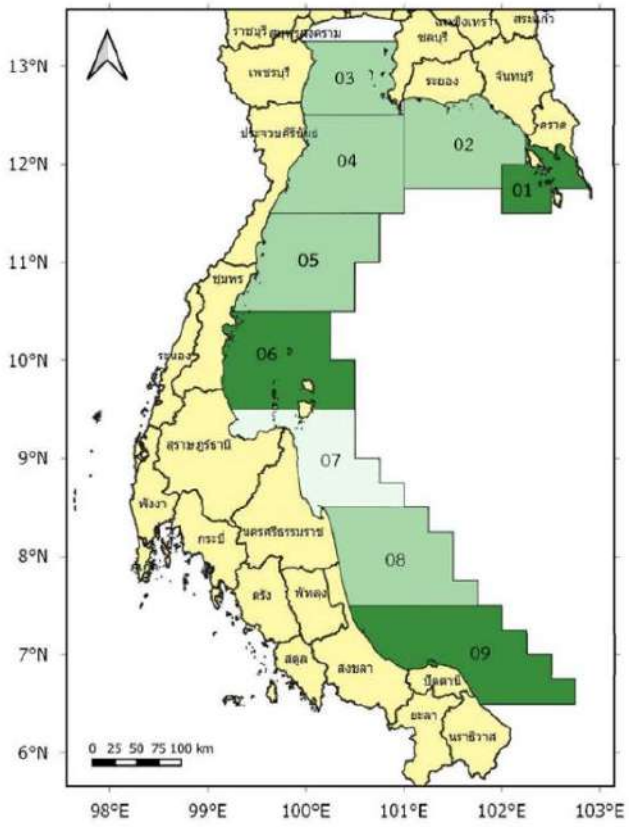


Figure 2 Catch per unit effort (kg/hr) of 40 mm cod-end by subarea in 2023

Table 3 Catch per unit effort (kg/hr) of 40 mm cod-end by grouped species in the Gulf of Thailand in 2023

Grouped species	2022	2023	+/-	% changes
Demersal fish	11.318	13.506	2.19	19.33
Pelagic fish	0.678	0.962	0.28	41.89
Cephalopod	2.693	2.553	-0.14	-5.20
Shrimp	0.031	0.028	-0.003	-9.68
Crab	0.086	0.151	0.07	75.58
Shellfish	0.468	0.687	0.22	46.79
Other fauna	0.063	0.086	0.02	36.51
Trash fish	4.454	3.548	-0.91	-20.34
Total	**19.791**	**21.521**	**1.73**	

2. Catch composition

For catch composition, it was found that demersal fish was the majority in the catch (62.76%), followed by trash fish (16.49%), cephalopod (11.86%), pelagic fish (4.47%) and shellfish (3.19%) respectively (Figure 4). The catch composition was similar to the 2022 survey result.

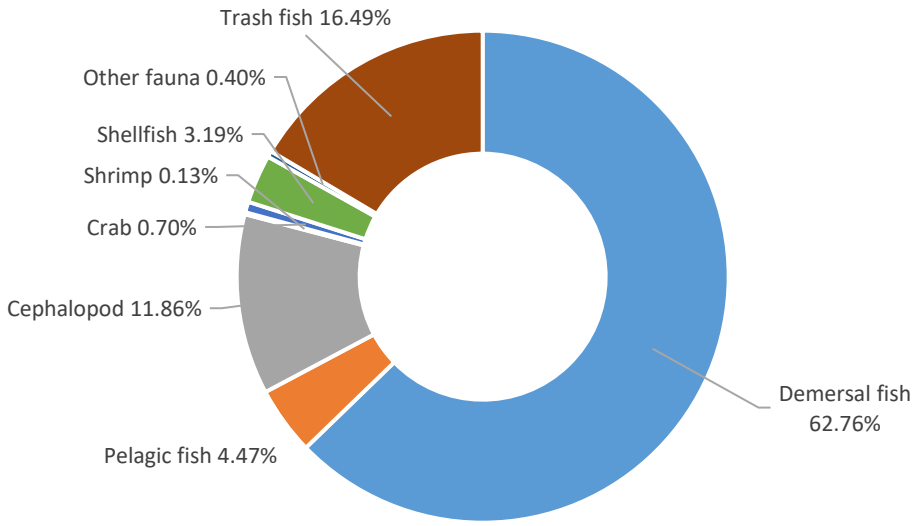


Figure 4 Catch composition by grouped species from the demersal trawl survey in 2023

3. Length of some important economic species

During the survey, some species were measured for length in order to monitor biological changes affected by fisheries. In this report, 17 species are selected based on economic important and how frequently found in surveys, as the representatives to depict the fishing situation. The length of selected species is compared with its length at first maturity from previous studies. The length distribution of the selected species is presented in Table 4 and Figure 5.

Table 4 Length of some important species from demersal trawl survey in 2023

Scientific name	Common name	n	min	max	average
Rastrelliger brachysoma	Short mackerel	114	11	21	15.79 ± 1.98
Rastrelliger kanagurta	Indian mackerel	116	8	23	16.80 ± 4.10
Selar crumenopthalmus	Bigeye scad	93	2.5	25.5	18.86 ± 4.76
Atule mate	Yellowtail scad	318	3.5	28.5	14.69 ± 4.90
Parastromateus niger	Black pomfret	281	5	23	11.19 ± 3.31
Nemipterus hexodon	Ornate threadfin bream	246	4	29	14.40 ± 6.33
Saurida undosquamis	Brushtooth lizardfish	2586	4.5	35	14.53 ± 5.27
Saurida elongata	Slender lizardfish	965	5	41	20.85 ± 8.00
Priacanthus tayenus	Purple-spotted bigeye	401	4	29	14.64 ± 4.52
Scolopsis taeniopterus	Lattice monocle bream	3443	2	52	13.60 ± 3.95
Lutjanus lutjanus	Bigeye snapper	1269	2.5	21	9.27 ± 3.45
Lutjanus vitta	Brownstripe snapper	576	4.5	33.5	15.15 ± 6.61
Epinephelus areolatus	Areolate grouper	202	4	56	19.09 ± 8.01
Epinephelus sexfasciatus	Sixbar grouper	223	3.5	39.5	17.25 ± 6.05
Uroteuthis chinensis	Mitre squid	3493	3.5	42	12.79 ± 5.49
Uroteuthis duvaucelii	Indian squid	8677	1	18	7.86 ± 2.51
Amusium pleuronectes	Asian moon scallop	3458	2	10.5	6.56 ± 1.45

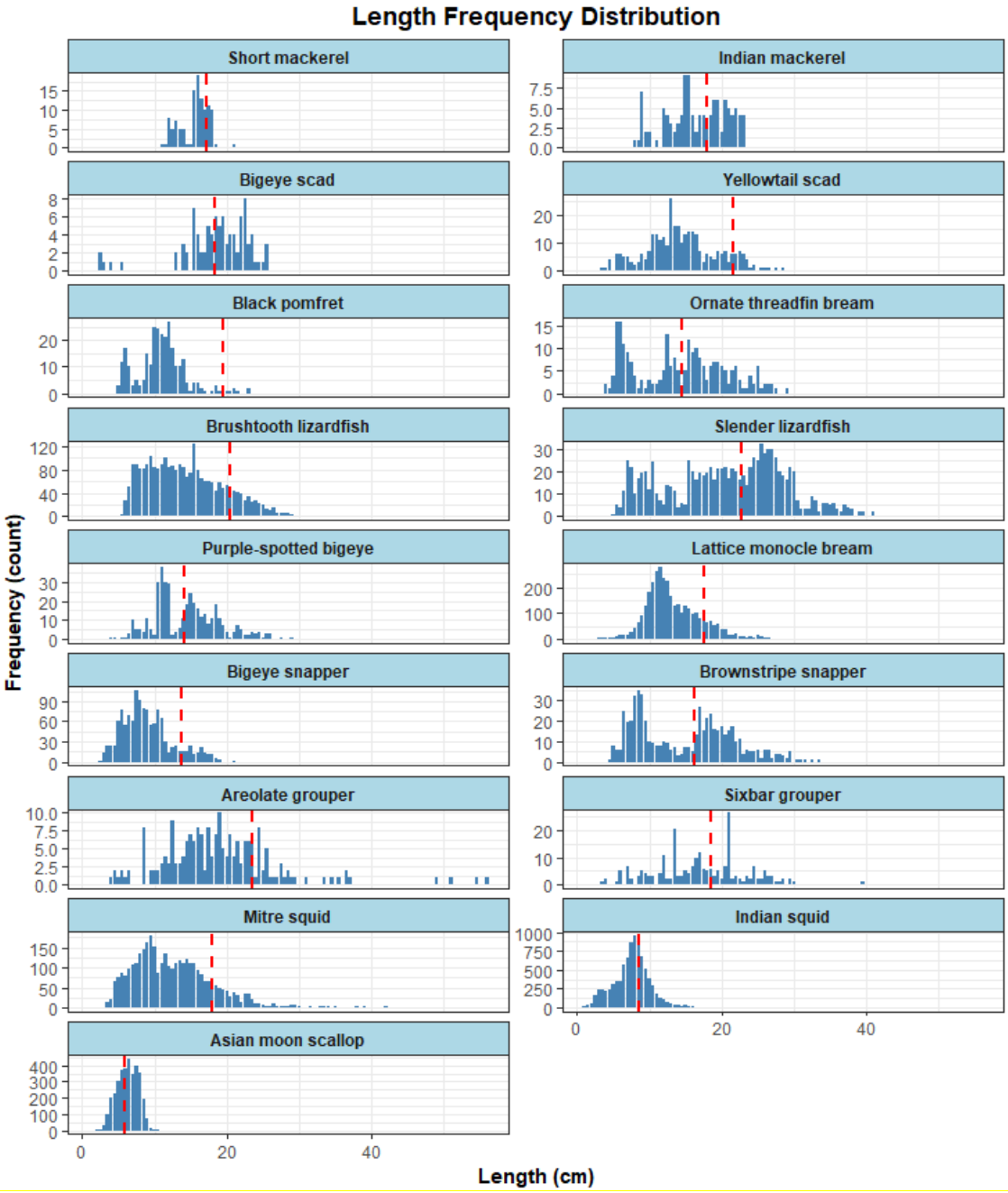


*Figure 5 Length frequency distribution of selected species from the demersal trawl survey in 2023 (*Remark: Red dashed line is length at first maturity)

References

Tiews, K. 1966, The Development of trawl fisheries in Southern Asian countries as a means of increasing marine fisheries production. Proceedings of the Gulf and Caribbean Fisheries Institute, 18. 79 – 83 pp. assessed from http://hdl.handle.net/1834/28025

Source of Reference:

Department of Fisheries (Thailand). 2024. *Annual Report on Research Vessel Survey in the Gulf of Thailand in 2023.* Marine Fisheries Research and Development Division, Department of Fisheries, Ministry of Agriculture and Cooperatives, Thailand.

Section 2C –Habitats

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

Importance and Problem Statement: The environmental impact of bottom trawling is a significant global issue that contributes to the degradation of marine ecosystems. In Thailand, trawl fishing continues to be a factor affecting marine and coastal ecosystems, with both direct and indirect consequences. Affected Marine and Coastal Ecosystems: Key marine ecosystems affected by trawl fishing include: Seagrass Beds, Coral Reefs and Water Column and Seafloor Ecosystems. Direct Impacts: Water column and seafloor ecosystems suffer from sediment disturbance, causing resuspension of sediments and dissolved substances into the water. Indirect Impacts: Seagrass beds and coral reefs are affected by the accumulation of re-suspended sediments, leading to: Increased sediment deposition, which smothers marine habitats. Reduced light penetration, hindering photosynthesis and elevated nutrient concentrations, promoting phytoplankton and algal blooms, which can lead to ecosystem deterioration. Natural recovery processes may not be sufficient to restore these ecosystems to their original state as vital habitats for marine species (Dawes et al., 1997). The Need for Conservation and Management is require. The degradation of marine ecosystems due to trawl fishing leads to unnecessary ecological and economic costs, particularly in terms of: Habitat destruction of nursery areas for marine species and Negative impacts on fisheries resources, affecting both biodiversity and fishery productivity. Without effective management measures, trawl fishing will continue to drive the loss of marine ecosystems and increase restoration expenses.

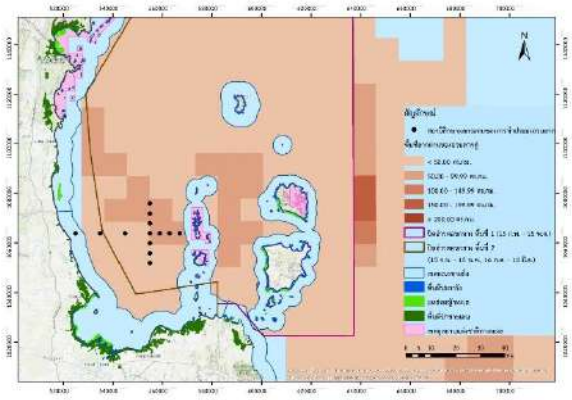
Previous studies have indicated that marine environmental data have not been clearly linked to the impacts of trawl fishing, leading to uncertainties in fisheries management. This study aims to assess the impacts of trawl fishing on biological resources and the marine environment in the Gulf of Thailand, focusing on: Effects on seawater quality and sediment composition in trawling areas,

Impacts on marine resources, including fish populations and habitat conditions and comprehensive assessment of trawl fishing's ecological and environmental consequences. The study seeks to provide scientific insights to support sustainable trawl fishery development in the Gulf of Thailand, aligning with international best practices.

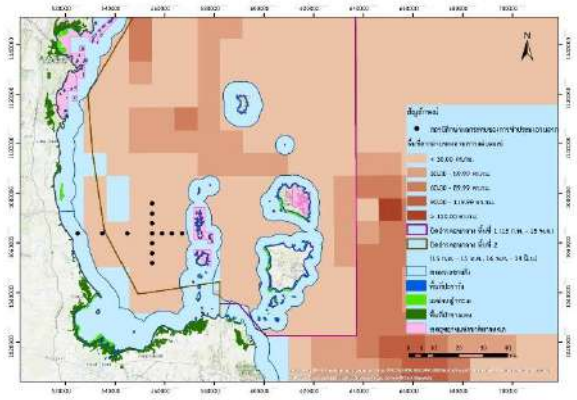
Objectives: To study the impacts of trawl fishing on Seafloor sediments, Water mass and quality in trawling areas and Fisheries resources in the Gulf of Thailand.

Methodology

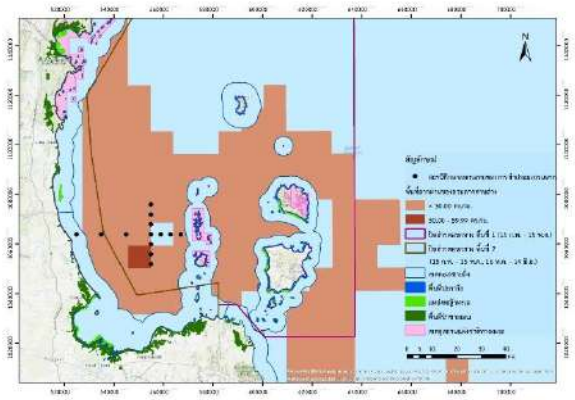
The study on the impacts of trawl fishing on seafloor sediments, water mass, and fisheries resources in the western Gulf of Thailand was conducted by determining the study areas based on an analysis of commercial trawl fishing zones. This analysis incorporated: Fishing ban periods and restricted areas according to Department of Fisheries regulations and trawling behavior with fishing patterns, combined with vessel monitoring system (VMS) data. The sampling method employed was Variable Radius Plot Sampling, where sample collection was centered on high-density trawling areas. Sampling stations were arranged in four directions (north, south, east, and west), with three stations per direction at approximately 4 km intervals, totaling 13 stations. These stations covered both active trawling zones and coastal marine areas without trawl fishing (Figure 2.2-1). Data collection was conducted in two periods: May and August 2023.



Pair Trawl



Otter Board Trawl



Beam Trawl

Figure 2.2-1 Study stations on the impact of trawl fishing on water mass, sediment, and fishery resources—13 stations in the western Gulf of Thailand.

The studied water quality parameters include basic water quality (temperature, dissolved oxygen, and pH), nutrient concentrations (dissolved inorganic nitrogen (DIN), silicate-silicon ($Si(OH)_4$-Si), and orthophosphate-phosphorus (PO_4^{3-}-P)), chlorophyll-a concentration, and total suspended solids. For sediment quality, the studied parameters include grain size, total sulfide in sediment (acid volatile sulfide; AVS), total organic matter in sediment (TOM), pore-water nutrients, heavy metal concentrations in sediment (Cd, Pb, Cu, Zn), and $\delta^{13}C$ and $\delta^{15}N$ values of sediment. Analyze the impact of trawl fishing in the western Gulf of Thailand by integrating research findings from the aforementioned studies. This analysis will assess the effects of trawl fishing on the marine environment and biological resources of the Gulf of Thailand. An interdisciplinary approach will be applied, incorporating knowledge from physical oceanography, chemical oceanography, and marine biology to comprehensively evaluate both the direct and indirect impacts on the resources of the western Gulf of Thailand.

Study Results

The general water quality in the study area of the western Gulf of Thailand was assessed with the following findings:

- Water depth: Ranged from 5.7 to 22.1 meters
- Water transparency: Measured between 2.3 and 12.7 meters
- Temperature: Varied from 28.8 to 33.5°C
- Salinity: Ranged from 28.9 to 30.5 psu

- pH level: Between 7.8 and 8.4
- Dissolved oxygen: Recorded between 2.2 and 6.4 mg/L

Dissolved Nutrient Concentrations: The concentrations of dissolved nutrients in the water column within the study area of the western Gulf of Thailand were as follows:

- Dissolved Inorganic Nitrogen (DIN): Ranged from 1.25 to 6.96 µM
- Silicate-Silicon ($Si(OH)_4$-Si): Varied between 1.73 and 23.04 µM
- Orthophosphate-Phosphorus (PO_4^{3-}-P): Detected in the range of nd (not detected) to 1.76 µM

Chlorophyll-a Concentration: The concentration of Chlorophyll-a in the study area of the western Gulf of Thailand ranged from 0.13 to 8.08 µg/L.

Total Suspended Solids (TSS) Concentration: The concentration of Total Suspended Solids (TSS) in the study area of the western Gulf of Thailand ranged from 0.63 to 14.15 mg/L.

General Characteristics of Sediment: The sediment in the study area was predominantly muddy with shell fragments. The surface sediment layer appeared brown, while deeper layers exhibited a grayish-black color. The oxidized layer on the sediment surface was not well-defined, and there was no strong sulfide odor detected.

Sediment Particle Size: The proportion of sediment particles smaller than 63 micrometers in the surface sediment layer (0–1 cm depth) ranged from 10.83% to 100% of the dry weight.

Total Sulfide Content in Sediment: The concentration of total sulfide in the surface sediment layer (0–1 cm depth) ranged from 0.004 to 0.730 mg/g dry weight.

Sediment Water Content: The **water content** in the **surface sediment layer (0–1 cm depth)** ranged from **69.15% to 84.42% of wet weight.**

The total organic matter content in sediment: at a depth of 0-1 cm ranged from 7.93% to 15.41% of dry weight.

The concentration of nutrients in pore water at a sediment depth of 0-1 cm was as follows: inorganic nitrogen ranged from 461.50 to 1,589.59 µM, silicate-silicon ranged from 158.92 to 546.75 µM, and orthophosphate-phosphorus ranged from 5.28 to 88.92 µM.

The concentration of heavy metals in surface sediment (0-1 cm depth) was as follows: cadmium (nd-1.375 ppm), lead (0.539-4.620 ppm), copper (1.018-2.202 ppm), and zinc (16.647-164.824 ppm).

Benthic Faunal Resources: The overall species composition and distribution patterns of benthic faunal abundance in the western Gulf of Thailand revealed the presence of organisms from nine phyla: **Phylum Platyhelminthes, Phylum Nemertea, Phylum Mollusca, Phylum Annelida, Phylum Arthropoda, Phylum Nematoda, Phylum Echinodermata, Phylum Chaetognatha,** and **Phylum Chordata.** Among these**, Phylum Annelida**—which includes segmented worms, marine polychaetes, and oligochaetes—was the dominant group, followed by **Phylum Arthropoda**. The overall density of benthic faunal communities varied across stations and study areas.

Stable Isotope Composition in Sediments: The stable carbon isotope **($\delta^{13}C$)** values in surface sediments (0–1 cm depth) ranged from **-21.10‰ to -18.85‰.** Generally, coastal marine sediments originate from two primary sources: **terrestrial input** (transported by river discharge or land erosion) and **marine biogenous sedimentation**. In the Gulf of Thailand, the typical **end-member** $d^{13}C_{marine}$ and $?^{13}C_{terrestrial}$ approximately **-21.00‰** for marine sources and **-27.00‰** for terrestrial sources. Based on this study, the sediment sources in the study area were predominantly influenced by **marine-derived** materials.

Stable Isotopes in Marine Organisms: Stable isotope analysis of $\delta^{13}C$ and $\delta^{15}N$ was conducted on five marine species collected from bottom trawl fisheries in the western Gulf of Thailand: cuttlefish (Sepia spp.), squid (Loligo spp.), redspot emperor (Lethrinus lentjan), bigeye snapper (Priacanthus tayenus), and scallop (Amusium spp.) across five sub-areas of the study region.

- $\delta^{13}C$ values varied between species and also among individuals of the same species across different sub-areas, indicating spatial differences in primary carbon sources and feeding habitats.
- $\delta^{15}N$ values revealed distinct trophic levels among the studied species:
    - Scallops had the lowest $\delta^{15}N$ values, confirming their role as primary consumers (filter feeders).
    - Redspot emperor exhibited the highest $\delta^{15}N$ values, positioning it as the top predator among the species studied.
    - The trophic hierarchy, ranked by $\delta^{15}N$ values, followed this order: redspot emperor > bigeye snapper > squid (Loligo spp.) > cuttlefish > scallop.

This study provides insights into the feeding ecology and trophic relationships of demersal species in the western Gulf of Thailand, emphasizing the influence of spatial variability on stable isotope compositions.

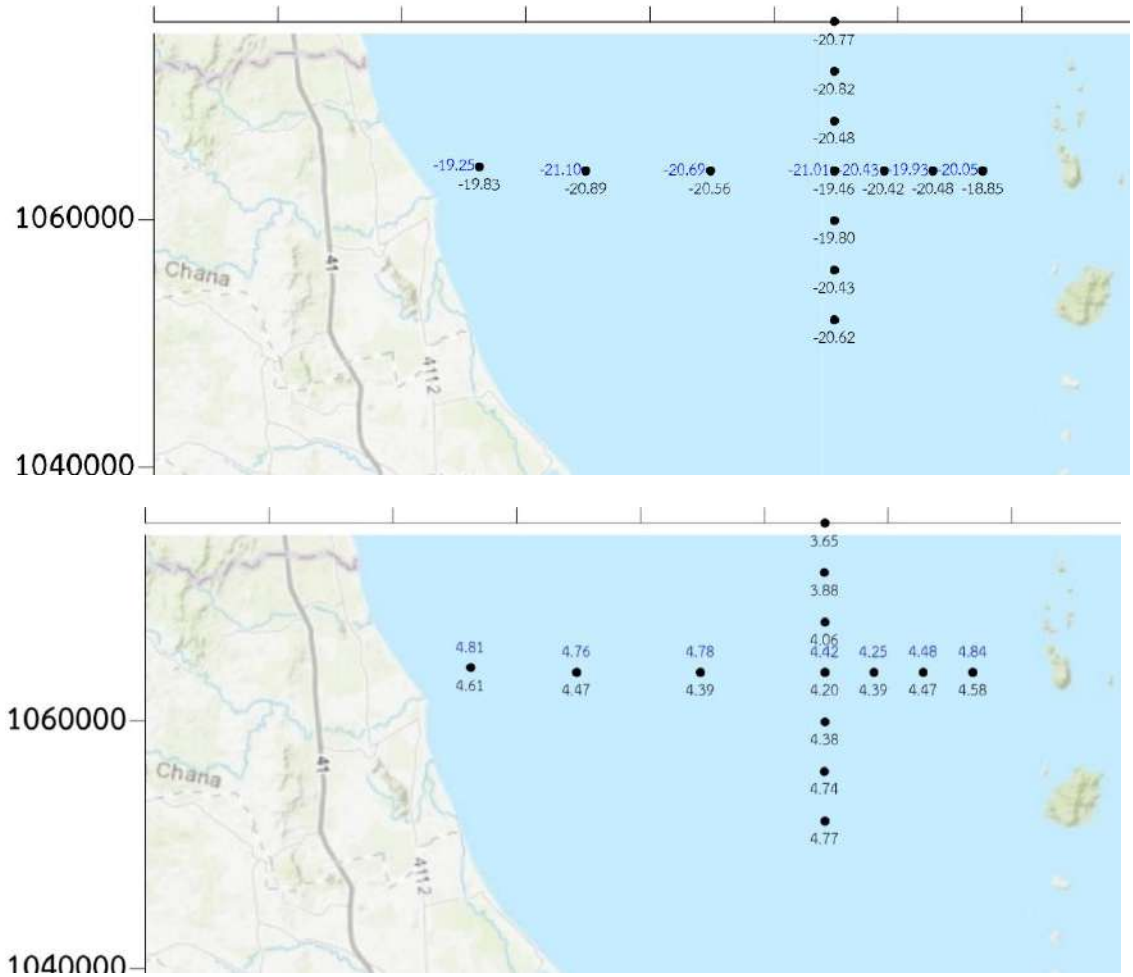


Figure 2.2-2 Stable isotope values **δ^{13}C (‰) (top)** and **δ^{15}N (‰) (bottom)** in sediment samples at a depth of **0–1 cm** in the western Gulf of Thailand, collected in **May 2023 (blue)** and **August 2023 (black).**

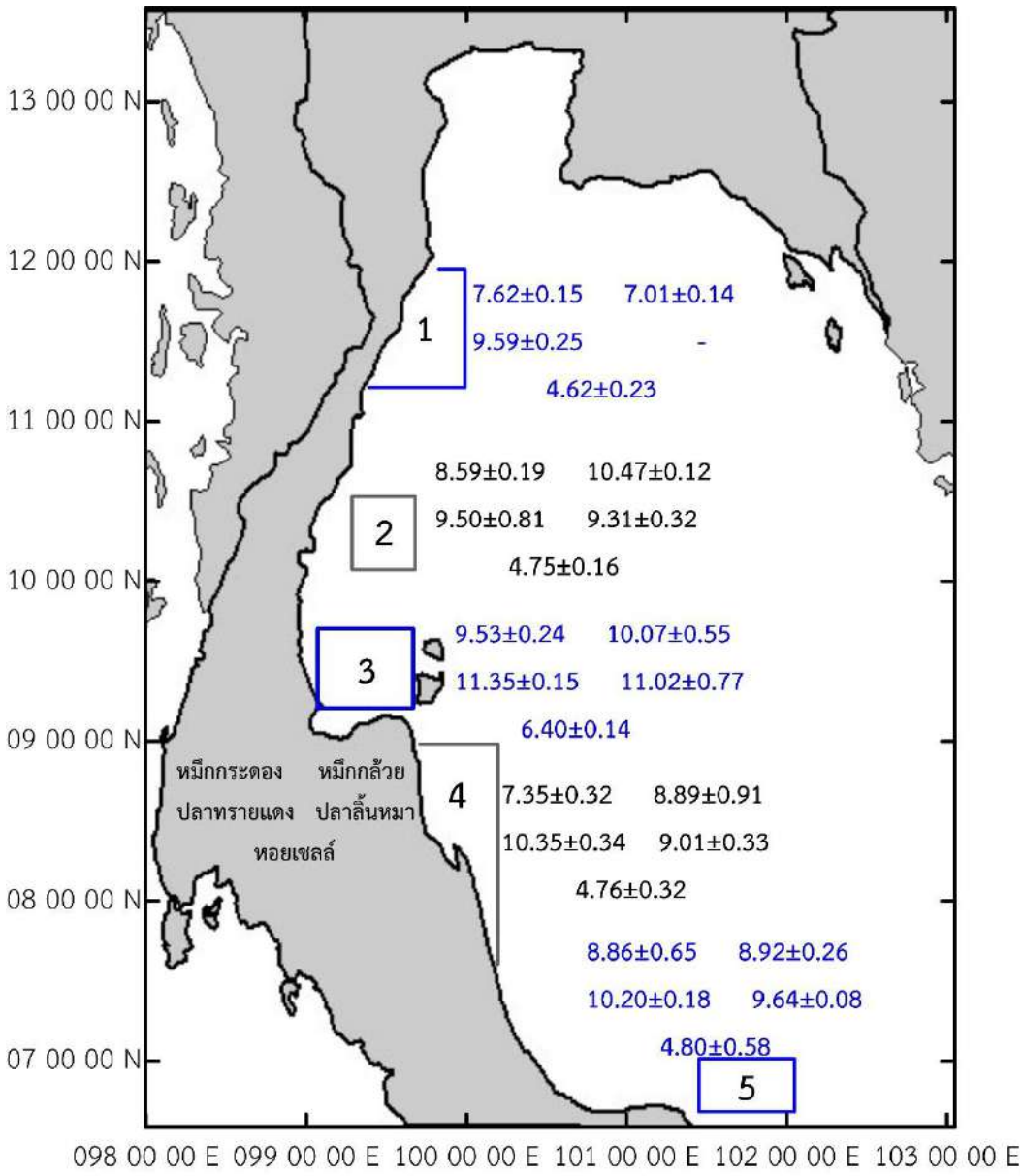


Figure 2.2-3 Stable Isotope Values of **$\delta^{15}N$ (‰)** in Marine Organisms from the Western Gulf of Thailand.

Impacts of Trawl Fishing on Aquatic Environmental Quality

In August 2023, environmental water quality sampling was conducted to monitor the impacts of pair trawl fishing. The studied parameters included general water quality (depth, transparency, temperature, salinity, pH, and dissolved oxygen), total suspended solids (TSS), nutrient concentrations, and sediment particle size. Samples were collected from nine stations, divided into

two groups: before the trawl net passed (stations 1B-9B) and after the trawl net passed (stations 1A-9A). The key finding as follow

1. **Surface Water TSS:**
    - **Before trawling:** 3.45–26.80 mg/L (9.38±8.46 mg/L)
    - **After trawling:** 3.65–8.96 mg/L (6.14±1.90 mg/L)
    - No statistically significant difference was observed (p-value = 0.29).
2. **Bottom Water TSS:**
    - **Before trawling:** 3.00–22.80 mg/L (11.38±5.93 mg/L)
    - **After trawling:** 4.45–17.79 mg/L (10.35±4.47 mg/L)
    - No statistically significant difference was observed (p-value = 0.69).

The similarity in TSS values before and after trawling was attributed to the high density of trawl fishing in the area, which causes continuous sediment disturbance and resuspension.

3. **Comparison with May 2023 Data:**
   A significant difference in TSS was observed between August and May 2023 (p-value = 0.00). TSS levels in August 2023 were higher at both the surface and bottom water levels compared to May 2023.
    - **Reason for Difference:**
      During May 2023, a seasonal fishing closure was in place, restricting trawl fishing activities. Only small trawlers (vessels ≤16 meters in length) were allowed to operate offshore at night, with all trawl fishing banned during the day. This reduced sediment disturbance, resulting in lower TSS levels. In contrast, August 2023 saw higher fishing activity, causing increased sediment resuspension and higher TSS levels.

The water transparency before trawl net operation ranged between 1.3–3.2 meters (2.1±0.7 meters), while after the trawl net passed, it ranged between 1.4–1.9 meters (1.6±0.2 meters). A statistically significant difference was observed at the 0.05 significance level (p-value = 0.044). The decrease in water transparency after the trawl net operation was attributed to sediment resuspension caused by the trawling process (Figures 2.2–4).

Figure 22-4 Sediment Resuspension from Pair Trawling in the Study Area in August 2023.When examining changes in **stable isotope δ13C values** across sediment depth (0-3 cm) in the western Gulf of Thailand, the δ13C values show an increasing trend with depth (as illustrated in **Figure 2.2-5**)**.**

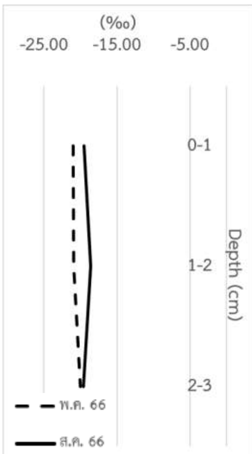
Group 1: Stations where stable isotope **δ13C** values increase with sediment depth include **Station 2** and **Station 10**

Group 2: Stations where stable isotope **δ13C** values remain relatively constant with increasing sediment depth include **Station 1 and Stations 3-9.**

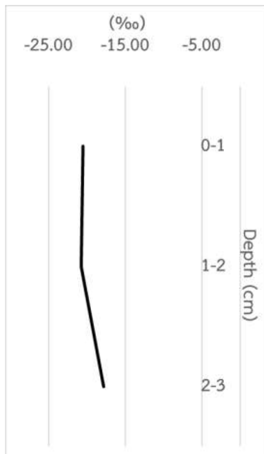
Group 3: Stations where the stable isotope **δ13C** fluctuates without a clear trend as depth increases include **Stations 11-13.**

Typically, the natural stable isotope δ13C values in sediment increase with depth (Group 1) due to the decomposition of organic matter. However, when sediment is disturbed by human activities, δ13C values may decrease with depth, remain stable (Group 2), or show no clear directional change (Group 3). In the study area, intensive trawling activity has caused sediment turnover, bringing deeper

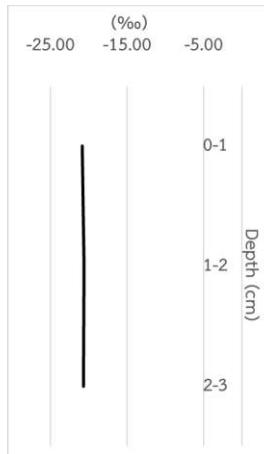
layers to the surface and disrupting the natural stratification of δ13C values. Additionally, the relatively stable δ13C values observed in Group 2 may also result from high sedimentation rates, which prevent significant alteration of surface sediments through decomposition processes.



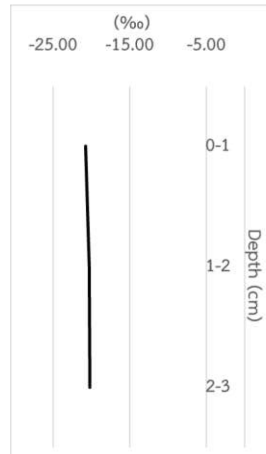
Station 1



Station 2



Station 3



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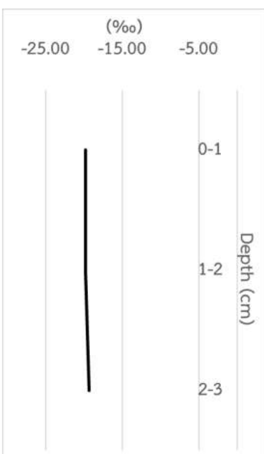
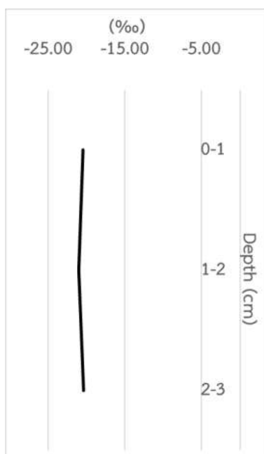
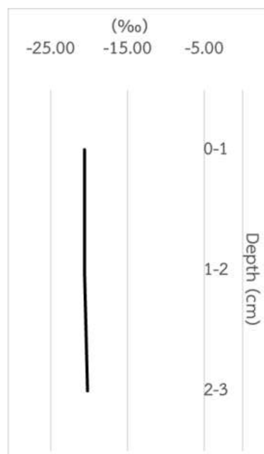


Station 5



Station 6



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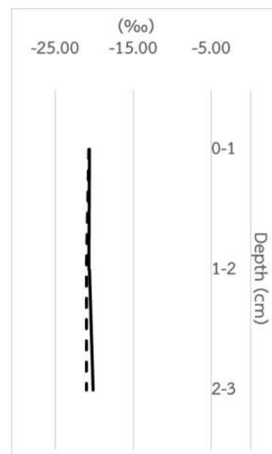

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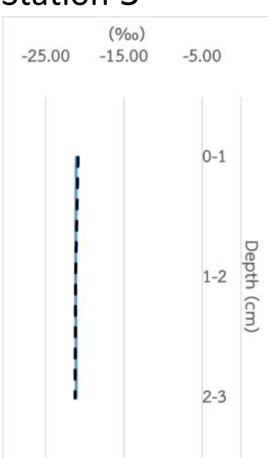
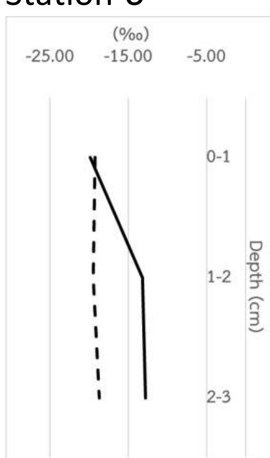
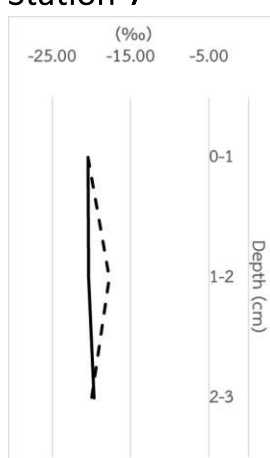
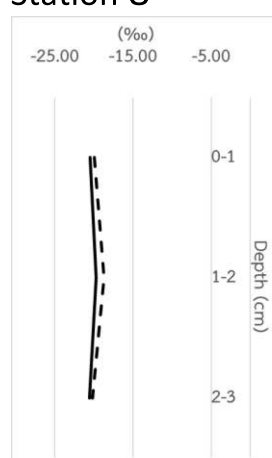
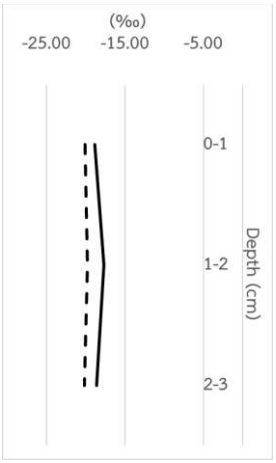








Station 9 Station 10 Station 11 Station 12



Station 13

Figure 2.2-5: Stable isotope **δ13C (‰)** in sediment in the western Gulf of Thailand at depths of **0-3 cm** in **May** (dashed line - Stations 1 and 8-13) and **August 2023** (solid line - Stations 1-13).

Furthermore, areas with high trawling activity tend to have lower water content in the sediment. The influence of trawling on sediment water content becomes more pronounced during the open season, as trawling disturbs the seabed, causing fine sediment to resuspend into the water column and be transported by currents. This effect is evident in the study area, where the sediment contains shell fragments and retains less water. Additionally, the seasonal closure of the fishing ground interacts with trawling intensity to influence the evenness of benthic organisms. During the open season, areas with high trawling density exhibit lower benthic species evenness, which plays a crucial role in maintaining ecosystem stability, resilience, and resource utilization efficiency.

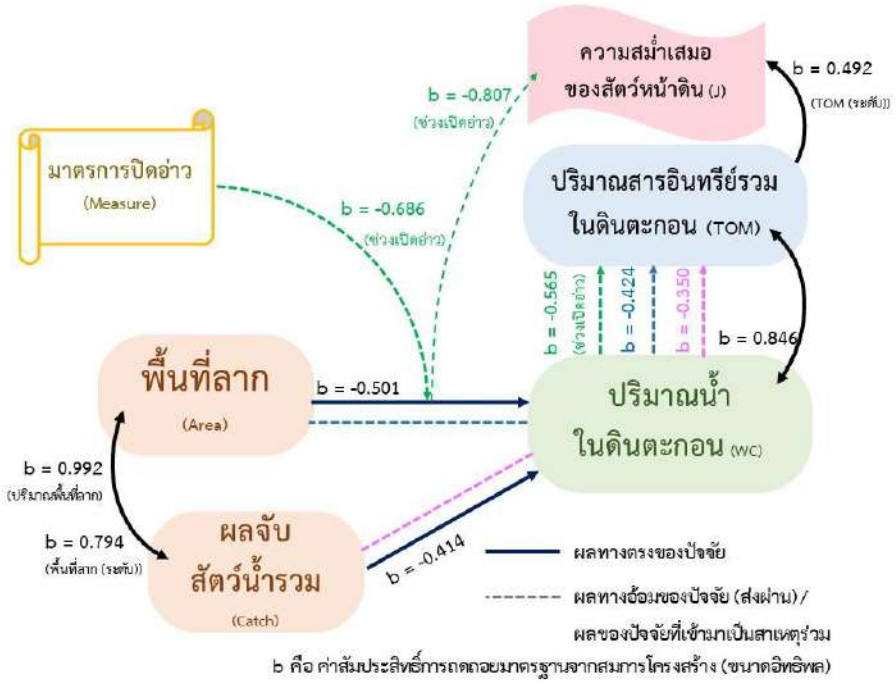


Figure 2.2-6 The Relationship Between Trawling Area, Total Fish Catch, and Seasonal Closure Measures on **Sediment Water Content, Total Organic Matter in Sediment, and Benthic Faunal Evenness.**

Conclusion

1. The general water quality parameters dissolved nutrient concentrations, and sediment quality indicators (total sulfide content and total organic matter in sediments) in the study area mostly remain within normal ranges. The seawater quality observed in this study complies with the Marine Water Quality Standards for Aquaculture in Thai territorial waters, as specified by the National Environmental Board Notification, B.E. 2564 (2021).
2. The **source of organic matter in the sediments** in this study can be confirmed by the **stable isotope δ13C** values in the sediments. The findings indicate that the sediments in the study area are predominantly influenced by **marine-derived sources.**
3. For the **heavy metal concentrations in sediments** in the study area, the levels of **cadmium, lead, and copper** in surface sediments were found to comply with the **coastal sediment quality criteria** set by the **Pollution Control Department (Royal Gazette, 2021).** However, **zinc concentrations** in sediments slightly

exceeded the standard limit, with a recorded value of **119.760 ppm** compared to the standard limit of **≤102 ppm.**

4. Trawling fisheries have a significant impact on total suspended solids (TSS) in water, water transparency, and stable isotope δ13C values in sediments. The impact as follow.

- Water transparency decreases immediately after a trawling vessel passes through an area.
- Total suspended solids (TSS) increase, particularly during the fishing season (August 2023), when trawling activities are at their peak.
- Stable isotope δ13C values in sediments show unnatural variations with depth, influenced by the physical disturbance caused by trawling. The trawl nets, designed to operate close to the seabed, stir up deeper sediments, disrupting the natural sedimentary structure and resuspending bottom sediments into the water column.

5. Trawling fisheries also impact the physical and chemical properties of sediments, as well as the uniformity of benthic fauna. In areas with intensive trawling activity the lower water content in sediments, reduced total organic matter (TOM) in sediments and decreased uniformity of benthic fauna have been found. These changes indicate that trawling disturbs the seafloor structure, affects the availability of organic matter, and alters the distribution and diversity of benthic organisms.

Recommendations

Trawling is an important economic activity that generates employment and revenue for the country. However, it also has significant environmental impacts, particularly on water quality, marine ecosystems, and benthic organisms. This study clearly demonstrates the short-term effects of trawling. To mitigate the impact on sensitive habitats such as coral reef areas, it is recommended that relevant authorities enforce stricter monitoring of trawling activities in designated zones (1.5–4.3 nautical miles from the shoreline adjacent to coastal islands, as per the Ministerial Regulation on Coastal Zone Designation in Surat Thani Province, 2022). For long-term impacts resulting from multiple contributing factors, this still require further investigation and data collection. Therefore, continued research on the environmental effects of trawling is essential for developing sustainable trawling practices that minimize damage to benthic ecosystems. This will help ensure the sustainable use of marine resources in the future.

Sources of Reference:

Meksumpun, C. 2024. Effects of Trawl Fishing on Biological Resources and Marine Environment in western Gulf of Thailand. Summary Research Report.

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

Introduction: Trawling is considered the most important form of marine fishing in Thailand. According to data from 2022, 39.44% of marine species came from trawling activities. The majority of the catch was from the Gulf of Thailand rather than the Andaman Sea, accounting for 74% and 26%, respectively. There are three types of trawling gear used in Thailand: Beam trawl, Otter trawl and Pair trawl. The largest proportion of marine species was captured using pair trawling (61.3%), followed by otter trawling (36.3%) and beam trawling (2.4%). The catch is utilized for both consumption and the fishmeal industry as a raw material for the production of animal feed which extensively used in aquaculture industry (Department of Fisheries Policy and Planning, 2023).

The current management of trawl fisheries involves various measures, including the use of a Vessel Monitoring System (VMS). This system integrates Global Positioning System (GPS) technology and mobile network systems (Global Service Mobile; GSM) into a Vessel Positioning System (VPS) to track the locations of fishing vessels. Developed in Thailand through a collaboration between the Department of Fisheries and the National Electronics and Computer Technology Center (NECTEC) (Department of Fisheries, 2011), this system offers an effective way to monitor vessel activity. By combining data from the VMS with information from the Fishing Info system—managed by the Port In-Port Out Control Center—it is possible to analyze trawl fishing areas. This enables the creation of fishing ground maps and fishing activity maps, which are highly beneficial for further fisheries management.

Objectives

1. To study the patterns of trawl fishing in the Gulf of Thailand
2. To create maps of trawl fishing grounds and develop a trawl fishing database system for the Gulf of Thailand area.

Methodology

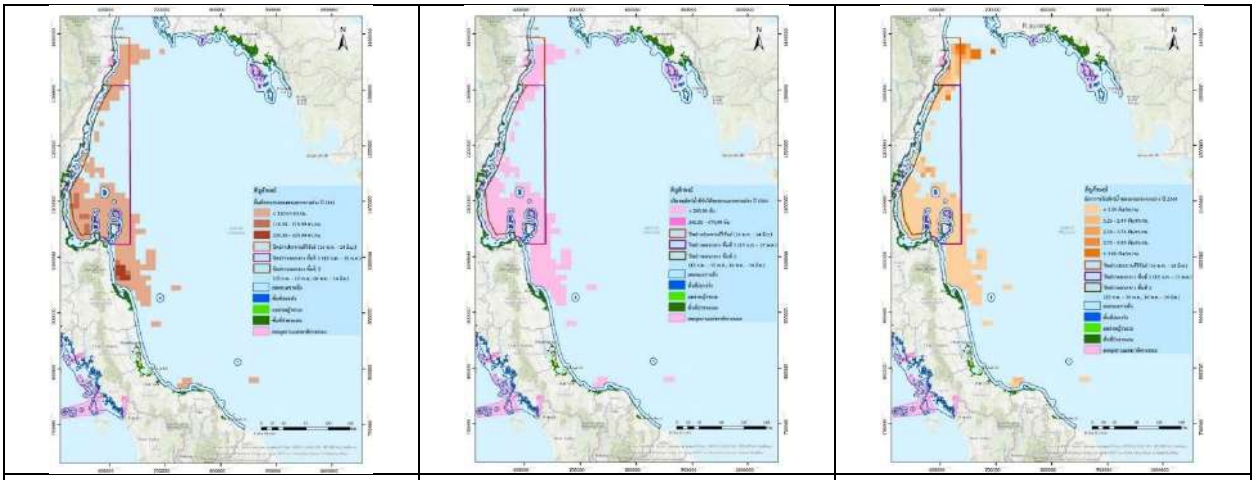
The data used in this study consists of two types: primary data and secondary data. The key secondary data used for calculating trawl areas and fish catch volumes was obtained from the Port In-Port Out database and the vessel monitoring system (VMS) of the Department of Fisheries, covering the period from January 1, 2021, to December 31, 2022. Additionally, data was collected through in-depth interviews with experienced vessel controllers or owners to gather information on the fishing practices of pair trawlers, otter board trawlers, and beam trawlers. These interviews aimed to study the factors affecting vessel speed during trawl fishing operations and to calculate trawl areas for mapping trawl fishing activities in the western Gulf of Thailand, from Prachuap Khiri Khan to Narathiwat provinces, as well as in the central Gulf of Thailand.

Study Results

Trawl fishing in the western Gulf of Thailand can be categorized into three main types: single trawl (beam trawl and otter board trawl) and pair trawl, similar to other areas in the Gulf of Thailand. The primary factors influencing vessel speed during trawling operations are ocean currents (which are seasonal), engine horsepower, gear ratio, propeller size (related to engine size), and seabed characteristics (linked to fishing grounds). Additional factors affecting the number otter board and pair trawlers include fuel prices. From 2021 to 2022, there were 1,707–1,823 trawl fishing vessels (30 gross tons or larger) operating in the western Gulf of Thailand, from Prachuap Khiri Khan to Narathiwat. Among these, pair trawlers were the most common (859–900 vessels), followed by otter board trawlers (637–728 vessels) and beam trawlers (195–211 vessels). However, when considering fishing gear, otter board trawlers were the most prevalent, as pair trawlers require two vessels to operate. The highest trawled area and catch volume were attributed to pair trawlers (90,964–101,933 km² and 127,834–152,481 tons, respectively), followed by otter board trawlers (59,347–91,920 km² and 62,240–87,882 tons), and beam trawlers (6,378–7,049 km² and 5,746–8,331 tons). From 2021 to 2022, the total trawled area ranged between 156,690–200,902 km² per year, averaging 178,796.62 km² annually. The area accessible for trawling in the western Gulf of Thailand was 158,407.41 km², representing 1.13 times the total fishable area. The annual fish catch volume ranged from 198,405 to 246,109 tons. While the trawled area and fish catch volume were higher in 2021 than in 2022, the catch per unit area increased from 1.23 tons/km² in 2021 to 1.27 tons/km² in 2022 (see Table 1 and Figure 1).

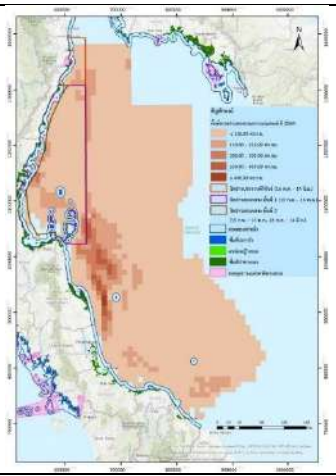
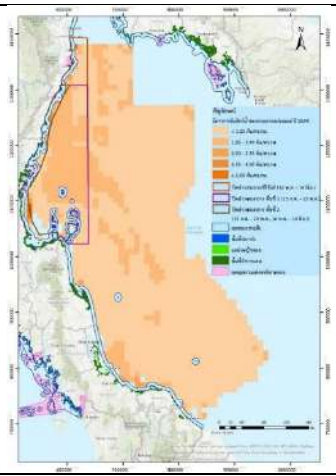
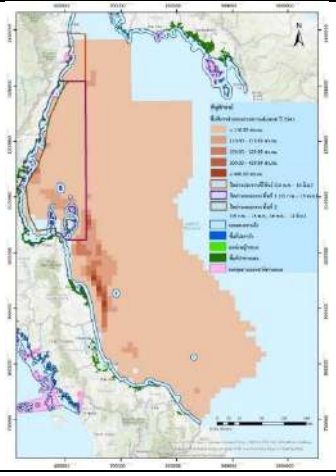
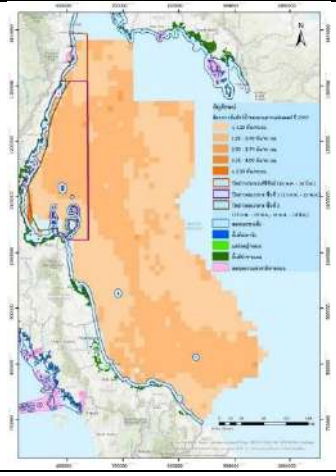
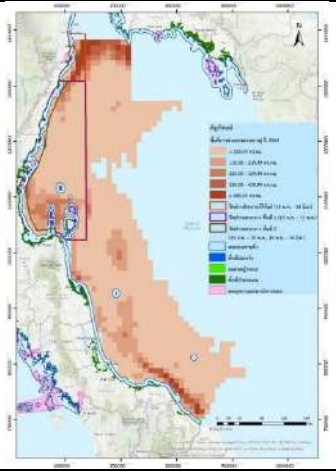
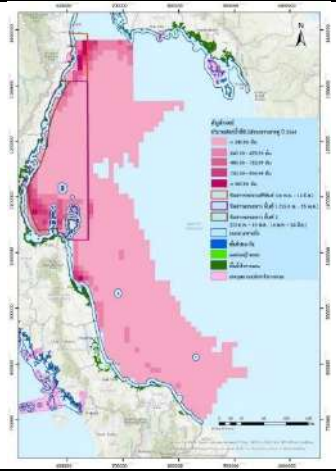
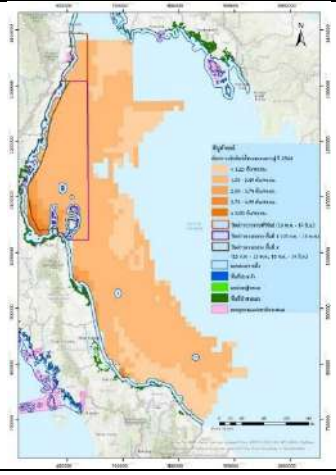
Table 1: Trawled Area, Fish Catch Volume, and Efficiency Catch Rates of Trawl Fishing

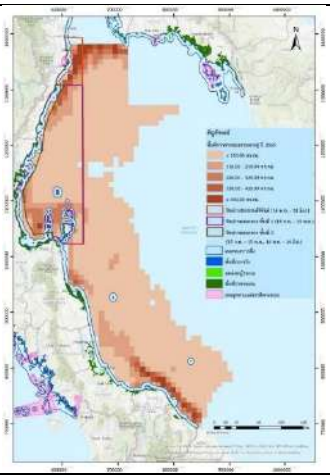
Type of Gear	Trawled Area (sq. km)		Fish Catch Volume (tons)		Fish Catch Volume (%)		Change Rate	Catch Rate (tons/sq. km)	
	2564	2565	2564	2565	2564	2565	+/-	2564	2565
Beam Trawl	7,049.17	6,378.34	5,746.39	8,331.22	2.33%	4.20%	2,584.83	0.82	1.31
Otter Board Trawl	91,920.44	59,347.53	87,882.11	62,240.23	35.71%	31.37%	(25,641.89)	0.96	1.05
Pair Trawl	101,933.31	90,964.45	152,481.26	127,834.14	61.96%	64.43%	(24,647.12)	1.50	1.41
Total	**200,902.92**	**156,690.32**	**246,109.77**	**198,405.59**	**100.00%**	**100.00%**	**(47,704.18)**	**1.23**	**1.27**



Trawled Area in 2021	Fish Catch Volume in 2021	Catch Rate in 2021
Trawled Area in 2022	**Fish Catch Volume in 2022**	**Catch Rate in 2022**

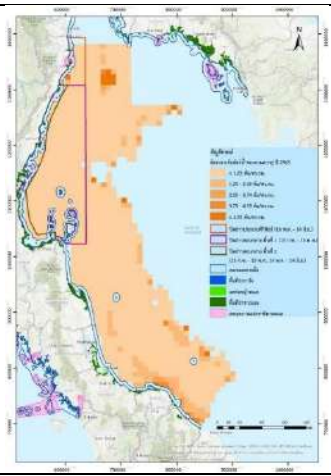
A. Beam Trawl

		
Trawled Area in 2021	**Fish Catch Volume in 2021**	**Catch Rate in 2021**
		
Trawled Area in 2022	**Fish Catch Volume in 2022**	**Catch Rate in 2022**
A. Otter Trawl		
		
Trawled Area in 2021	**Fish Catch Volume in 2021**	**Catch Rate in 2021**



Trawled Area in 2022

Fish Catch Volume in 2022



Catch Rate in 2022

A. Pair Trawl

Figure 1: trawl Area, Fish Catch Volume, and Catch Rate by Trawl Type

In this study, the survey area was divided based on the marine survey zones of the Department of Fisheries, which continuously monitors aquatic resources. The Department of Fisheries divides the survey area into nine zones. This study focused on Zones 4–9 and added a central Gulf area as Fisheries Zone 10. Additionally, the study area was classified into four distance zones from the shore. Distance Zone 1: Extends 10 nautical miles from the coastal baseline. Distance Zone 2: Extends an additional 15 nautical miles beyond Distance Zone 1. Distance Zone 3: Extends another 30 nautical miles beyond Distance Zone 2. Distance Zone 4: Covers all remaining areas. According to Figure 2, Fisheries Zone 6 recorded the highest catch per unit area (1.792–1.820 tons per square kilometer). Similarly, the highest catch per fishing ground unit was also found in Fisheries Zone 6 (3.834–4.065 tons per square kilometer). Fisheries Zone 6, which spans from Mueang Chumphon District to Ban Don Bay in Surat Thani Province, was identified as the most abundant fishing area in the western Gulf of Thailand (Table 2). Furthermore, considering the distance zones, Distance Zones 2 and 3 had the highest fishing intensity in 2021. However, in 2022, fishing activity was most concentrated in Distance Zones 2 and 1. This suggests that fishing in 2022 occurred closer to shore, likely due to rising fuel costs, prompting vessel operators or owners to reduce fuel expenses by avoiding distant fishing grounds. The most abundant distance zone was Distance Zone 1, which extends 10 nautical miles from the shoreline. This zone had the highest fish catch volume (an average of 69,707.94 tons per year or 31.36% of the total) and the highest catch per unit area (an average of 1.518 tons per year) (Table 3)

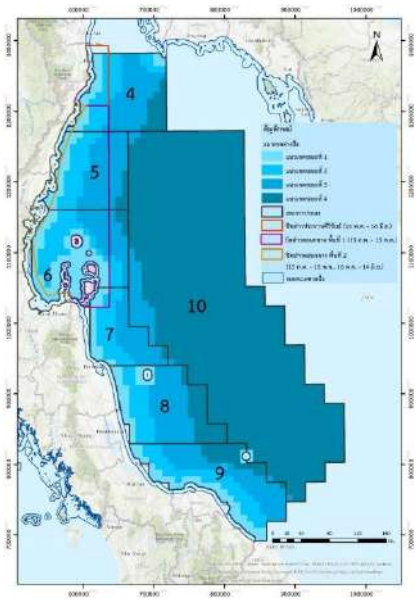


Figure 2: Study Area Classification Based on the Department of Fisheries Survey

Table 2: Fish Catch Volume by Trawl Type Classified by Fisheries Zone

Fisheries Zone	Trawling Area (sq. km)		Fish Catch Volume (tons)		Fish Catch Volume (%)		Catch Rate per Swept Area (tons/sq. km)		
	2021	2022	2021	2022	2021	2022	2021	2022	+/-
4	39,700.51	32,450.60	49,778.17	35,494.93	20.23%	17.89%	1.254	1.094	(0.160)
5	14,551.45	10,393.04	21,430.72	14,644.28	8.71%	7.38%	1.473	1.409	(0.064)
6	31,767.17	29,513.13	56,936.61	53,702.76	23.13%	27.07%	1.792	1.820	0.027
7	26,962.26	23,740.74	26,373.73	24,738.38	10.72%	12.47%	0.978	1.042	0.064
8	23,932.03	19,773.94	27,607.73	24,323.09	11.22%	12.26%	1.154	1.230	0.076
9	29,017.47	24,098.18	25,837.38	22,481.26	10.50%	11.33%	0.890	0.933	0.042
10	34,972.04	16,720.69	38,145.43	23,020.90	15.50%	11.60%	1.091	1.377	0.286

Table 3: Fish Catch Volume from Trawls Classified by Distance Zones from Shore

Distance Zone	Trawling Area (sq. km)		Fish Catch Volume (tons)		Fish Catch Volume (%)		Catch Rate (tons/sq. km)		
	2564	2565	2564	2565	2564	2565	2564	2565	+/-
1	44,411.62	47,433.92	69,575.06	69,840.82	28.27%	35.20%	1.567	1.472	(0.094)
2	61,442.64	53,898.36	71,756.95	57,843.40	29.16%	29.15%	1.168	1.073	(0.095)
3	60,693.52	37,989.82	67,108.04	46,102.83	27.27%	23.24%	1.106	1.214	0.108
4	34,355.14	17,368.23	37,669.72	24,618.54	15.31%	12.41%	1.096	1.417	0.321

The fish caught by trawl nets can be classified into two main groups: fish for consumption and fish used as raw material for fishmeal. During 2021–2022, these two groups accounted for 48.79% and 51.21%, respectively. Within the fish for consumption category, the largest proportion consisted of demersal fish (61.11%), followed by squid (15.89%), pelagic fish (15.88%), shrimp (5.61%), crab (1.27%), shellfish (0.52%), mantis shrimp (0.12%), and other aquatic species (0.05%). The composition of the catch may vary depending on the fishing gear used. The highest proportion of trash fish was caught using pair trawls (56.45%), followed by otter trawls (45.64%) and beam trawls (6.17%). By fisheries zone, Fisheries Zone 6—which covers the sea from Chumphon District to Ban Don Bay in Surat Thani Province—was the most abundant area, yielding economically significant species such as short-bodied mackerel, Indo-Pacific mackerel, Indian scad, Spanish mackerel, black pomfret, red snappers, cuttlefish, Metapenaeus shrimp, banana shrimp, tiger shrimp, blue swimming crab, and trash fish. In Fisheries Zone 4, which covers the coastal area from Hua Hin to Thap Sakae in Prachuap Khiri Khan Province, the main commercial species included goatfish, razorbelly scad, bigfin reef squid, oval squid, mantis shrimp, mud shrimp, and scallops.Meanwhile, Fisheries Zone 10, located in the central Gulf of Thailand, was identified as the primary fishing ground for bigeye fish (Priacanthus tayenus).

The analysis of key economically significant fish populations focused on threadfin bream (Nemipterus hexodon), bigeye (Priacanthus tayenus), and brushtooth lizardfish (Saurida elongata).

Threadfin Bream (Nemipterus hexodon)

- Total catch over two years: 7,453.75 tons
- Estimated population: 165,873,327 individuals
- Percentage of fish caught below the size at first maturity (18.77 cm): 89.31%
- Most critical area: Fisheries Zone 10 (Central Gulf), where 94.88–96.28% of the caught threadfin bream were below the size at first maturity.

Bigeye (Priacanthus tayenus)

- Total catch over two years: 4,174.35 tons
- Estimated population: 49,286,057 individuals

- Percentage of fish caught below the size at first maturity (17.38 cm for males): 86.24%
- Most critical areas: Fisheries Zones 5, 6, and 7, where more than 90.00% of the caught bigeye were below the size at first maturity.

Brushtooth Lizardfish (Saurida elongata)

- Total catch over two years: 3,370.22 tons
- Estimated population: 66,326,104 individuals
- Percentage of fish caught below the size at first maturity (31.62 cm for females): 98.45%
- Critical concern: In all surveyed zones, more than 90% of the caught brushtooth lizardfish were below the size at first maturity.

Recommendations

The recommendations derived from this study are as follows:

1. The catch rate per trawling area for many aquatic species is higher in coastal areas and near island clusters. This highlights the importance of conserving these areas to protect nursery and habitat zones, ensuring higher survival rates before these species enter fishing grounds.

2. The towing speed during trawling operations affects the trawling area, fish catch volume and catch rate per unit area. In addition to factors such as engine and machinery specifications and seasonal variations, which are crucial for all trawl types, fuel prices also play a significant role in decision-making regarding trawling operations (whether to halt, reduce, or increase fishing efforts). This is particularly evident in otter trawls and pair trawls. Continuous monitoring of trawl fishing operations using swept area and fish catch volume as key indicators is essential. These indicators can serve as predictive tools to track resource utilization trends and assess the impact of trawl fishing on marine resources. Moreover, such data will help in developing spatial management measures, especially under special circumstances such as rising fuel prices, to ensure more effective fisheries management.

3. High-Risk Fish Groups: Brushtooth Lizardfish (Saurida elongata) High-risk fish species, such as brushtooth lizardfish (Saurida elongata), are heavily impacted by trawl fishing, which accounts for over 80% of the total catch. Approximately 32–40% of the catch comes from trawling operations in the Central Gulf of Thailand, Lower Gulf of Thailand, and the Central Offshore Gulf. The study highlights a critical concern: over 90% of brushtooth lizardfish caught by trawls are below the size at first maturity.

Key Fishing Grounds: The most significant fishing areas for brushtooth lizardfish are in Fisheries Zones 4 and 5, covering marine waters from Hua Hin District, Prachuap Khiri Khan Province, to Mueang Chumphon District, Chumphon Province. According to the Department of Fisheries' statistical zoning, these areas fall under Fisheries Zone 3.

Population Distribution Patterns

- Smaller-sized brushtooth lizardfish (<10 cm):
  - Found in coastal areas, particularly in grid cells 15, 23, 47, 59, and 73, where they constitute at least 10% of the local population.
- Mature brushtooth lizardfish (≥31.62 cm, first maturity size):
  - Found in grid cells 17, 25, 26, 49, 59, 73, 74, and 75, where they make up at least 10% of the local population.
  - Grid cells 59 and 73 contain high densities of both juvenile and mature individuals.

Conservation and Management Considerations. This to ensure the sustainability of brushtooth lizardfish populations, in-depth spatial studies are recommended to identify nursery and spawning grounds. This research will support conservation, restoration, and sustainable management efforts for this species.

Source of Reference

Wangworalak, S. 2024. *Analysis of Trawl Fishing Grounds in the Western Gulf of Thailand.* Summary Research Report.

Section D-Ecosystems

- **Summary: The ECOPATH model for the Gulf of Thailand**

The ecosystem of the Gulf of Thailand (GoT) was analyzed by using Ecopath model under the mass-balanced assumption, by using the 2020 landings data of the whole GoT's area. A total of 46 functional groups, and a group of detritus, were employed to representatives in the model. All input parameters were taken from scientific reports of the GoT *per se* and the neighbored ecosystems, which made the overall pedigree of the model is closed to 1. The basic results are shown in **Table 1**. The trophic level of the studied components ranged from 1 (phytoplankton, seaweed and detritus) to 4.232 (sharks), which the mean trophic level of the catches was 2.96. The values of ecotrophic efficiency of most components in the ecosystem were over 0.9, implying the high utilization by predation in the system as well as exploitation by fishing fleets. Energy transfer in the GoT's ecosystem was run through both grazing- and detrital- food chains, which the transfer efficiencies were 42 % and 33 %, respectively as described by Lindeman spine analysis (**Figure 1**). The estimated system statistics, from Ecopath, are presented in **Table 2**. Three (3) system statistics of the GoT's ecosystem as gross efficiency (0.0003), transfer efficiency (5.90 %) and Total primary production/total respiration (2.913) indicated that the system is far from mature stage due to the external stressors, in particular the fisheries.

The network flow diagram shows a complex energy transfer in the GoT system and depict the size of biomass flows between groups and trophic level (**Figure 2**). The mixed trophic impact analysis showed that trawl fisheries made negative impacts to various components in the GoT's ecosystem (**Figure 3**). Two (2) species, i.e. mammals and zooplankton, were identified as keystone species, which have considerable impact and play an important role in the GoT's ecosystem. The Ecosim was analyzed under the scenarios of reduction the fishing effort of trawler's fleets to 85 %, 95 % and 80 % of the current situation of the otter-board-, paired and beam- trawlers, respectively. The results showed that there were both positive and negative impacts to the relative biomass of each individual component in the GoT ecosystem (**Table 3**).

Table 1 Final parameters for the ECOPATH model of the Gulf of Thailand.

No	Component	TL	Biomass	P/B	Q/B	EE	P/Q
1	Indian Mackerel	2.851	0.095	3.00	12.00	0.742	0.25
2	Indo-Pacific Mackerel	2.862	0.048	3.00	12.00	0.953	0.25
3	Scomberomorus	3.889	0.025	0.66	3.29	0.950	0.20
4	Adult Caranx	3.444	0.274	1.32	5.92	0.887	0.22
5	Juvenile Caranx	3.000	0.041	3.00	15.00	0.870	0.20
6	Pomfret	3.492	0.024	1.39	6.97	0.950	0.20
7	Adult anchovies	2.900	0.333	3.00	4.28	0.241	0.70
8	Juvenile anchovies	2.900	0.005	4.00	16.00	0.977	0.25
9	Other small pelagics	2.900	0.204	4.00	12.50	0.996	0.32
10	Bream	3.502	0.024	2.00	10.00	0.871	0.20
11	Large piscivores	3.914	0.055	1.00	5.00	0.866	0.20
12	Scianidae	3.403	0.018	1.50	7.50	0.613	0.20
13	Adult Saurida	3.652	0.060	0.80	4.49	0.870	0.18
14	Juvenile saurida	3.000	0.003	3.00	16.00	0.928	0.19
15	Lutianidae	3.718	0.018	1.50	7.50	0.536	0.20
16	Mugiilidae	3.180	0.008	1.40	7.00	0.885	0.20
17	Priacanthus spp.	3.334	0.032	1.80	9.00	0.485	0.20
18	Sillago	3.255	0.004	1.00	5.00	0.893	0.20
19	Adult Nemipterus	3.042	0.106	0.9	4.41	0.992	0.20
20	Juvenile Nemipterus	3.000	0.007	3.00	16.00	0.801	0.19
21	Ariidae	3.247	0.002	1.20	6.00	0.277	0.20
22	Rays	3.115	0.010	0.30	1.50	0.817	0.20
23	Sharks	4.232	0.005	0.50	2.50	0.408	0.20
24	Squid	3.204	0.165	2.00	8.00	0.798	0.25
25	Cuttlefish	3.210	0.043	2.00	8.00	0.988	0.25
26	Octopods	3.233	0.019	1.80	7.20	0.972	0.25
27	Metapenaeids	2.346	0.018	5.00	20.00	0.993	0.25
28	Penaeids	2.346	0.025	5.00	20.00	0.620	0.25
29	Other shrimp	2.346	0.030	5.00	20.00	0.890	0.25
30	Blue swimming crab	2.616	0.089	2.50	10.00	0.433	0.25

31	Other crustaceans	2.616	0.019	2.50	10.00	0.724	0.25
32	Trashfish	2.558	0.758	4.00	16.00	0.738	0.25
33	Small demersal fish	3.151	0.165	3.50	14.00	0.939	0.25
34	Medium demersal piscivore	3.639	0.016	2.20	11.00	0.930	0.2
35	Medium demersal benthivore	3.224	0.015	3.00	15.00	0.938	0.2

Note: TL is trophic level; Biomass is reported in t/km2, P/B is the production to biomass ratio; Q/B is the consumption to biomass ratio; EE is the ecotrophic efficiency and P/Q is the production to consumption ratio.

Table 1 Final parameters for the ECOPATH model of the Gulf of Thailand.

No	Component	TL	Biomass	P/B	Q/B	EE	GE
36	Shellfish	2.200	0.890	3.00	15.00	0.225	0.2
37	Jellyfish	3.000	0.102	5.00	20.00	0.069	0.25
38	Sea cucumber	2.000	1.000	4.50	22.50	0.000	0.2
39	Seaweeds	1.000	0.100	15.00		0.100	
40	Coastal tuna	4.002	0.080	1.20	6.00	0.938	0.2
41	Sergestid shrimp	2.346	0.057	10.00	40.00	0.938	0.25
42	Mammals	3.383	0.100	0.10	30.00	0.000	0.00
43	Pony fishes	2.669	0.101	3.50	14.00	0.990	0.25
44	Benthos	2.232	33	5.00	25.00	0.579	0.2
45	Zooplankton	2.000	17.3	40	160.00	0.145	0.25
46	Phytoplankton	1.000	30	200		0.446	
47	Detritus	1.000	10000			0.168	

Note: TL is trophic level; Biomass is reported in t/km2, P/B is the production to biomass ratio; Q/B is the consumption to biomass ratio; EE is the ecotrophic efficiency and P/Q is the production to consumption ratio.

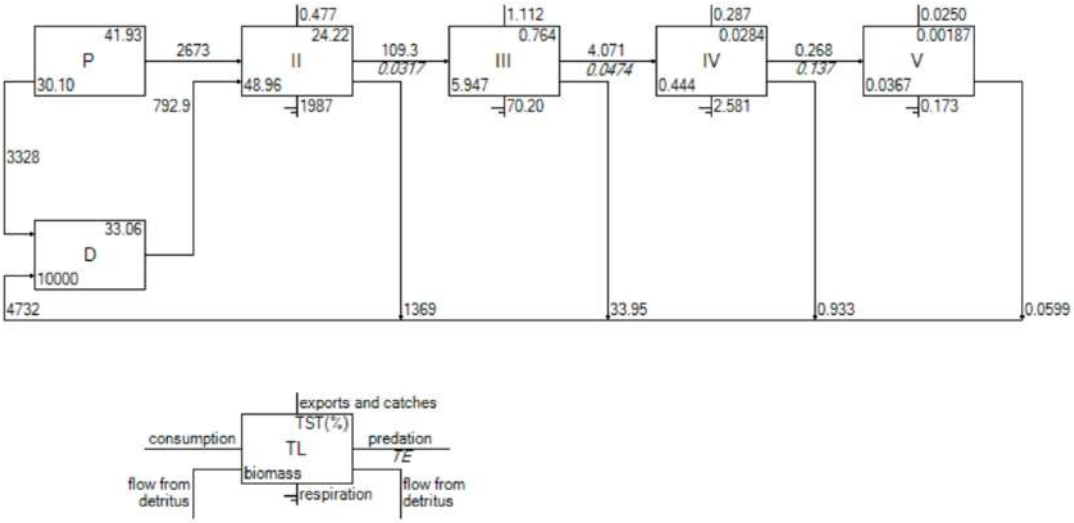


Figure 1. Lindeman spine representation of trophic flows of Gulf of Thailand model. Primary producers (P) and detritus (D) are separated to clarify the representation. TST is the total system throughput.

Table 2 Summary statistics for the Gulf of Thailand's Ecopath model,

Statistics	Estimates	Units
Sum of all consumption	3,667.592	t km^{-1} yr^{-1}
Sum of all exports	3,941.261	t km^{-1} yr^{-1}
Sum of all respiratory flows	2,060.378	t km^{-1} yr^{-1}
Sum of all flows into detritus	4,732.257	t km^{-1} yr^{-1}
Total system throughput	14,401.49	t km^{-1} yr^{-1}
Sum of all production	6,875.195	t km^{-1} yr^{-1}
Mean trophic level of the catch	2.956	
Gross efficiency (catch/net p.p.)	0.00032	
Calculated total net primary production	6,001.5	t km^{-1} yr^{-1}
Total primary production/total respiration	2.913	
Net system production	3,941.122	t km^{-1} yr^{-1}
Total primary production/total biomass	70.20	
Total biomass/total throughput	0.0059	yr^{-1}
Total biomass (excluding detritus)	85.49	t km^{-1}
Total catch	1.90322	t km^{-1} yr^{-1}
Shannon diversity index	1.398	
Connectance index	0.166	
System omnivory index	0.155	

Table 3 Changes in relative biomass under the scenario, using ECOSIM, of the buy-back program by DoF in the Gulf of Thailand

Scenario	Changes in relative biomass under the scenario	
	Positive change	**Negative change**
Otter board trawlers (decrease fishing effort for 15%)	Rays, Large piscivores, Adult Saurida, Priacanthus spp.	Medium demersal piscivore, Scianidae, Pony fishes
Pair trawlers (decrease fishing effort for 5%)	Scomberomorus, Lutianidae, Large piscivores, Saurida, Priacanthus spp.	Sillago, Medium demersal piscivore, Octopods Adult Nemipterus
Beam trawlers (decrease fishing effort for 20%)	Rays, Metapenaeids, Penaeids, Squid	Benthos, Sergestid shrimp, Juvenile fishes
Combined all scenarios	Rays, Large piscivores, Adult Saurida, Priacanthus spp., Sharks, Metapenaeids, Penaeids	Sillago, Medium demersal piscivore, Octopods Adult, Nemipterus, Benthos, Sergestid shrimp, Juvenile fishes

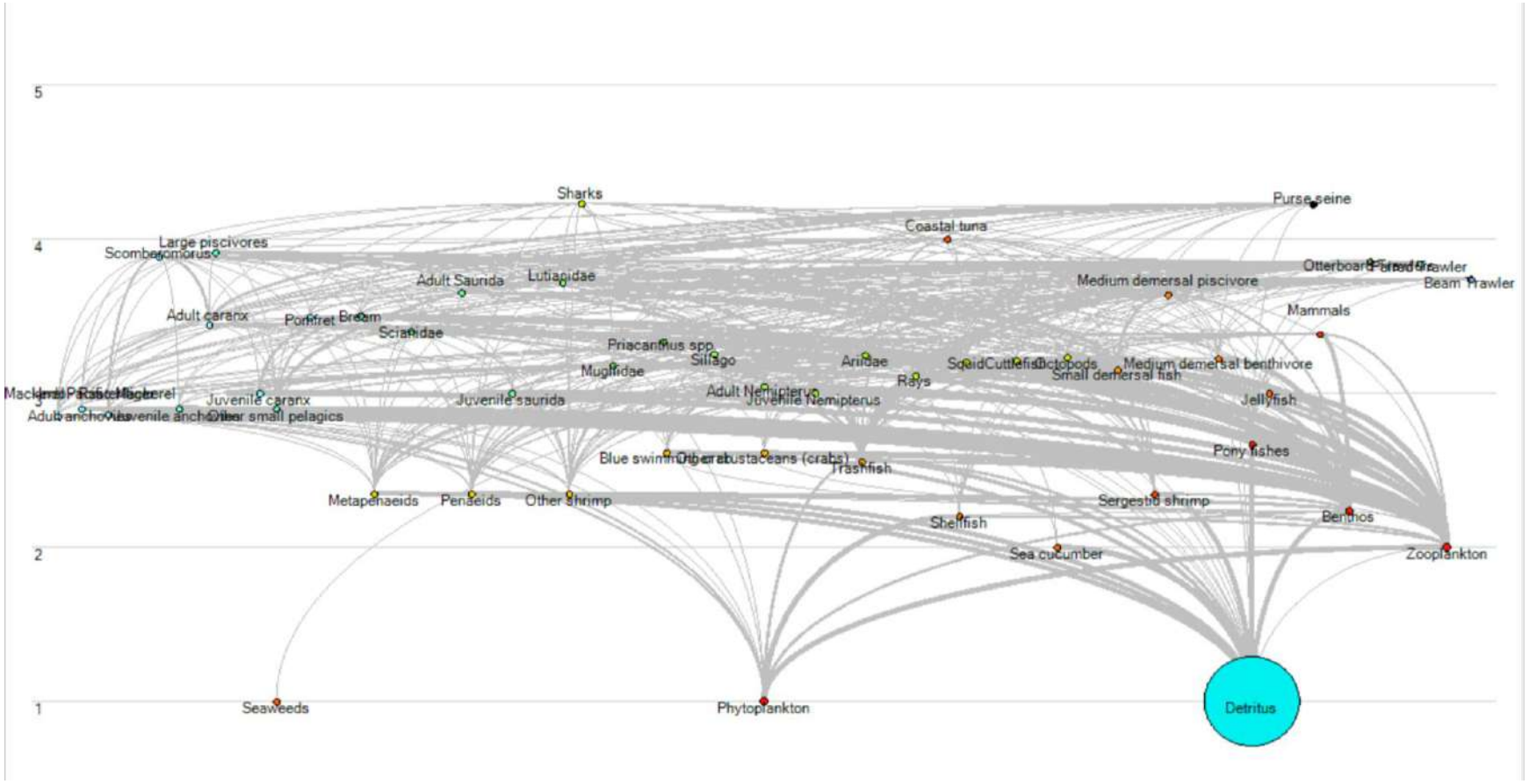


Figure 2. Flow diagrams of the Gulf of Thailand, where the node size indicates biomass, curved lines show food web connectivity and vertical lines show trophic levels.

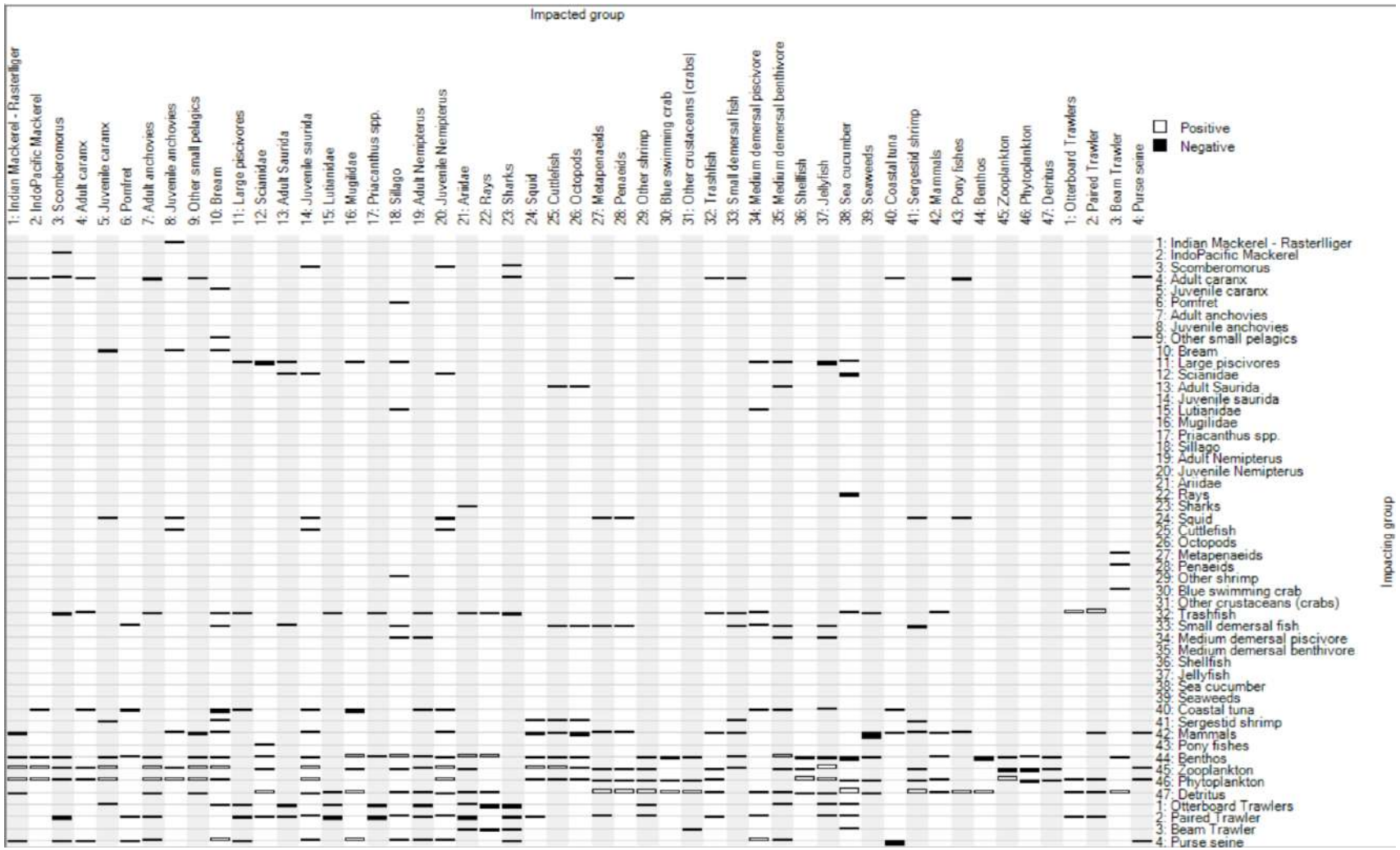


Figure 3. Mixed Trophic Impact analysis of the Gulf of Thailand food web. The size of a bar represents the size of the trophic impact of the functional groups ("above line" white bars indicate positive impact, while "below line" black bars show negative impact)

Source of Reference:

Jutagate, T. 2024. Analysis of the Impacts of Trawl Fisheries on the Ecosystem of the Gulf of Thailand. Summary Research Report.

ANNEX 2: Workshops, Meeting, Activities TSFR engages with stakeholders.

Workshop on Pilot Recording Endangered, Threatened, and Protected (ETP) Marine Species during Fishing Operations.

On 20 June 2025, the Thailand Sustainable Fisheries Roundtable (TSFR) organized a workshop under the project "Recording Encounters with Endangered, Threatened, and Protected (ETP) Marine Species during Trawl Fishing Operations in the Gulf of Thailand." The workshop was held at the Maeklong Fisheries Cooperative meeting room in Samut Songkhram Province.

This workshop was supported by Valura Energy (Thailand) Co., Ltd. and PTTEP Energy Development Co., Ltd. It aimed to develop practical guidelines for recording sightings of marine species during fishing operations, as part of the implementation of the Fisheries Action Plan (FAP).

The Provincial Fisheries Officer of Samut Songkhram presided over the official opening of the workshop. Head of the Fishing Vessel and Port Inspection Division of the Department of Fisheries provided a technical briefing. A total of 35 participants attended, including fishery operators, crew members, and pilot project representatives from Samut Songkhram, Samut Prakan, Samut Sakhon, and Chonburi, along with officers from fisheries inspection station.

Key outcomes from the workshop included:

- The Department of Fisheries will revise the data recording form based on participants' feedback to ensure its practical usability in the field.
- Training sessions will be organized for fishery operators and crew members to ensure accurate and consistent data recording.
- The pilot project is expected to launch in early July 2025, marking a significant step toward sustainable fisheries management through effective stakeholder collaboration.

Thai Sustainable Fisheries Roundtable (TSFR) working group met with the Director-General of the Department of Fisheries

On February 20, 2025, the Thai Sustainable Fisheries Roundtable (TSFR) working group met with the Director-General of the Department of Fisheries to report on the progress of the project "Guidelines for the Development of Trawl Fisheries in the Gulf of Thailand towards Sustainability according to International Standards (Fishery Improvement Project: FIP)". The TSFR also requested cooperation in providing relevant data from the Department of Fisheries to carry out the project. A resolution was made to establish a joint working group, with Mr. Suwat Wongsuwat, Deputy Director-General, appointed as chairman. Representatives from 8 associations in the TSFR working group and relevant officials from the Department of Fisheries were also appointed as members of the working group.

The Working Group Order was issued by the Department of Fisheries (The formal documents on link). https://drive.google.com/file/d/1KN3pg004les4UUBKgDtYBj-BZX3p0qQ3/view?usp=sharing

FIP Sustainable Trawl Fisheries Management Working Group Meeting

On Friday, May 2, 2025, at 2:00 PM, at the Kuladam Meeting Room, 7th Floor, Chulabhorn Building, Department of Fisheries. Mr. Pawarot Noranattrakul, a Marine Fisheries Expert, was delegated by Mr. Suwat Wongsuwat, Deputy Director-General of the Department of Fisheries, to chair the 1st Meeting of the Working Group on FIP Sustainable Trawl Fisheries Management.

The meeting was attended by heads of divisions within the Department of Fisheries, representatives from the private sector, and relevant officials. The objectives were to acknowledge the progress of the project and to deliberate on the implementation plan for the year 2025, aiming to drive the management of trawl fisheries in alignment with Fishery Action Plan and Thailand's fisheries policy, alongside with promote collaboration between the public and private sectors in the sustainable conservation of marine resources.

Publicizing the FIP at VIV Asia 2025

March 12–14, 2025, the TSFR working group participated in an exhibition to promote and disseminate information about the Fishery Improvement Project (FIP) at VIV Asia 2025. The booth attracted interest from organizations involved in raw material certification, sustainability scientists in animal feed raw material production, and international raw material trading companies that prioritize sustainable supply chains. The event was held at IMPACT Exhibition and Convention Center, Muang Thong Thani, with over 51,000 attendees from 129 countries around the world.

The TSFR working group meet with representatives from the Department of Fisheries.

On January 22, 2025, Thai Sustainable Fisheries Roundtable (TSFR) Working Group, the workhorse of the Fishery Improvement Project (FIP) in the Gulf of Thailand has attended a meeting with Ms. Krisana Chantakaew, Director of the Bureau of Fisheries Product Standards and Traceability Development, Department of Fisheries and the team.

During the meeting, the group presented updates on activities aligned with the Fishery Action Plan (FAP) and discussed academic data support and collaboration with relevant organizations to benefit the project. This collaboration will enable the TSFR working group and the DoF division to have a good collaboration that will lead to smooth support in order to drive the project moving forward.

The TSFR meet with the Agricultural Research Development Agency (ARDA) for a research funding popost.

On Wednesday, August 6, 2025, TSFR, together with representatives from eight other associations, attended a joint meeting with experts from the Agricultural Research Development Agency (ARDA), represented by Dr. Adisorn Promthep, to discuss the research proposal and funding support for the research *"Risk Assessment of the Impacts of Trawl Fisheries on Threatened Species (ETP) and Habitat in the Gulf of Thailand",* leaded by Assoc Prof. Dr. Watcharee Ruayruen from Suratthani Rajabhat University. This research is one of the key studies aimed at supporting Fishery Action Plan, FAP, in Thailand Trawl Fishery Improvement Project.

During the meeting, the professor clarified that the proposed research would help to close the existing knowledge gaps in the project, particularly concerning ETP (Endangered, Threatened, and Protected (ETP) species and habitats related to trawl fisheries and the proposed research framework consists of four components:

1. **Baseline Data Collection** – compiling lists of ETP aquatic species potentially affected by trawl fisheries in the Gulf of Thailand.
2. **Field Survey and Data Collection** – including trawl fishery operation data, as well as interviews with fishermen and stakeholders.
3. **Risk and Impact Assessment** – evaluating risks and impacts on ETP species.
4. **Habitat Impact Assessment and Spatial Risk Mapping (Heat Map)** – assessing habitat-level impacts of trawl fisheries and creating spatial risk maps.

ARDA has acknowledged the proposal, and the research team will submit the research proposal into the system for consideration and approval.