

## The Gulf of Thailand mixed-trawl Fishery Improvement Project (FIP) Update April 2025 (6 Months)

#### 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						
	1. Update assessment report on stock, (MMSY) and indicators species and publicly available.	Aug 24		The summary report in annex 1, Page 11			
Action Description and	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)			
tasks (with timeframes)	3. FMP 2020-2022 evaluation report.	Jan 23		Submitted to peer review			
and expected	Output:						
output	1. Annual report year (2022-2025) on stock assessment, (MMSY) and indicators species.	Aug 24		The summary report in annex 1, Page 11			
	<ol> <li>Fishermen Meeting report and provincial fisheries committee meeting report to publicly available.</li> </ol>	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						
<b>Estimated Cost</b>	ТВС						



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	A4-6 and M 3.5
by the Action	

### 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 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		
Action	<ol> <li>Conduct and analysis of changes in catch composition of trawl fishery, classified by vulnerability groups.</li> </ol>	Dec 22		Submitted to peer review		
tasks (with	3. Assess the stock status of high-risk species.	Dec 23		Submitted to peer review		
timeframes)	Output:					
and expected 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		
	<ol> <li>The report on data/information of changes in the catch composition of each type of trawl fishing.</li> </ol>	Dec 22		Submitted to peer review		
	3. The report of stock assessment for high-risk species.	Dec 23		Submitted to peer review (Aug 24)		



	<ol> <li>Guidelines/Data/Information for input into the next FMP.</li> </ol>	Dec 28		On process			
Priority	High Priority						
<b>Estimated Cost</b>	1 million Baht						
Responsible Parties with lead agency	<ol> <li>Prof. TuantongJutagate, UbonRatchathani University</li> <li>Department of Fisheries, Marine Fisheries Research and Development Division.</li> <li>Thai Sustainable Fisheries Roundtable (TSFR)</li> </ol>						
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:	Action:					
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			
tasks (with	3. Conduct the data collection program, especially the composition of the trash fish.	Start Jan 23		Data included in point 4			
expected output	<ol> <li>Analyze data and publish annual report on trawl fisheries and research vessel.</li> </ol>	Dec 24		The summary report in annex 1, Page 20			
	<ol><li>Set proposed objectives and TRP for reduction component and juvenile commercial fish.</li></ol>	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.	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		The summary report in annex 1, Page 20		
	4. Workshop report recommendation for input into the next FMP.	Dec 26		On process		
Priority	High Priority	_				
<b>Estimated Cost</b>	ТВС					
Responsible	1. Marine Department of Fisheries, Marine Fisheries Research and Development Division.					
lead agency	2. Thai Sustainable Fisheries Roundtable (TSFR)					
Gaps addressed	C1-7					
by the Action						



### 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 tr	To identify and assess ETP species impacted by trawl fishery.				
	Action					
	<ol> <li>Review ETP species from IUCN, CITES and National Regulations.</li> </ol>	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)		
Action	<ol> <li>Monitor population of marine endangered animal by DMCR.</li> </ol>	Dec 23		Submitted to peer review (Aug 24)		
Description and tasks (with timeframes)	<ol> <li>Risk Assessment on trawl fishery and ETP interaction. T2 (As soon as the data available within 5 years)</li> </ol>	Dec 26		On process		
and expected output	<ul> <li>6. Consultation with stakeholder to improve current fisheries practice.</li> <li>Mitigation protective measures.</li> <li>Training program by DoF on logbook to record ETP during at sea operation.</li> <li>Training program by DMCR on life saving, identification, stranded reporting ETPs.</li> </ul>	Mar 24		Submitted to peer review (Aug 24)		
	Output:					
	1. Effective ETP interaction record approach.	Dec 25		On process		



	<ol> <li>Report on</li> <li>Updated ETPs of Thailand.</li> </ol>	Dec 24		Submitted to peer review			
	<ul> <li>Risk assessment of trawl interaction to ETP species.</li> </ul>	Dec 26		On process			
	3. Best practice on ETP protection on community area management.	Dec 25		On process			
Priority	High Priority						
<b>Estimated Cost</b>	ТВС						
Responsible Parties with lead agency	<ol> <li>Department of Fisheries, Fish Quarantine and fi Management Division</li> <li>Department of Marine and Coastal Resources.</li> <li>Thai Sustainable Fisheries Roundtable (TSFR)</li> </ol>	shing Vesse	els Inspectio	n Division, Fishing and Fleet			
Gap addressed	T1-3						
by the Action							



### Section 2C – Habitats

Action Criteria	H1-3	Due Date	Status	Remark		
Objective	To identify and assess critical habitat impacted by trawl fishery					
	Action	Action				
	1. Collect environmental data of critical habitat (S	eagrass, Co	oral reefs, m	angrove and fisheries and		
	marine protected area) and trawl fishing activities	s, using GIS	and VMS (J	un-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		
Action	2. Analyze and synthesize data to assess the impact of trawl fishing on critical habitat and marine					
Description and	environments in the Gulf of Thailand, including distribution changes as much as available (Jan-Mar).					
tasks (with	2.1 Inner Gulf of Thailand.	Dec 22		Submitted to peer review		
timeframes)	2.2Eastern Gulf of Thailand.	Dec 23		Submitted to peer review (Aug 24)		
output	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		



	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		
	<ol> <li>Workshop report recommendation on mitigation measure for the input into the next FMP.</li> </ol>	Dec 28		On process		
Priority	High Priority					
Estimated Cost	15 million Baht					
Responsible	1. Prof.ShettapongMeksumpun Department of ma	irine scienc	es and Prof.	SansaneeWangvoralak,		
Parties with	Department of Fisheries Management, Faculty of	of Fisheries	, Kasetsart l	Jniversity.		
lead agency	2. Department of Fisheries, Fish Quarantine and fishing Vessels Inspection Division, Fishing and Fleet Management Division.					
	3. Thai Sustainable Fisheries Roundtable (TSFR)					



Gap addressed	H1-3
by the Action	

### Section D-Ecosystems

Action Criteria	E1-4	Due Date	Status	Remark			
Objective	To identify and assess the impact of fishery to ecosystem						
	Action:						
	<ol> <li>Review existing research related to the impacts from fisheries on the ecosystem.</li> </ol>	Jun 23		Submitted to peer review (Aug 24)			
	2. Find an expert on Ecopath model.	Dec 23		Done			
Action Description and	<ol> <li>Update Ecopath model by using recent data.</li> </ol>	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			
tasks (with timeframes) and	<ol> <li>Simulate the model with different scenario [fishing gear/fishing effort].</li> </ol>	Dec 25		The summary report in the annex 1, Page 49			
	<ol><li>Workshop to discuss recommendation for input into the next FMP.</li></ol>	Dec 26		On process			
	Output:						
	<ol> <li>Summary historical changes of the impacts from fisheries on the ecosystem.</li> </ol>	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			



	<ul> <li>Updated Ecopath model.</li> <li>Key ecological species identified</li> <li>Simulation result from different</li> </ul>			
	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	<ol> <li>Department of Fisheries, Marine Fisheries Rese</li> <li>Thai Sustainable Fisheries Roundtable (TSFR)</li> </ol>	earch and [	)evelopmen <sup>.</sup>	t Division
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 on Stock Assessment, Multi-Species Maximum Sustainable Yield (MMSY) and Indicator Species

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	У	= catch
	f	= fishing effort (hour or day)
	c and d	= constant from linear regression model
	MSY	= Maximum Sustainable Yield
	<b>F</b> <sub>MSY</sub>	= 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 fishi	ng gears	Other g	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 andFishing Effort, in 2024

Group Species	MSY (tonnes)	Optimal Fishing Effort (Fmsy) (hrs.)	Correlati on coefficien t (r <sup>2</sup> )	Current Catch in 2024 (ton)	Current Fishing effort in 2024 (hrs)	Status of Fishing effort
Gulf of Thail	and					
Demersal fish	746,982	24,905,641	0.72	458,519	16,057,399	65.47% Fmsv



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



#### • 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.

<u>Note:</u> 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) <u>Legal Proceedings Update</u>: The secretariat reported progress on the delegation of authority in legal proceedings related to case number a.14/2567 at the Central Administrative Court.
- 3) <u>U.S. Marine Mammal Protection Measures:</u> 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) <u>Amendments to Section 69 of the Fisheries Act</u>: The committee was briefed on proposed amendments to Section 69 under the draft Act amending the Royal Ordinance on Fisheries B.E. 2558.
- 5) <u>Policy Development Initiatives:</u> 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
  - $_{\circ}$   $\,$  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 α.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.



#### 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

	Subarea									
Month	1	2	З	4	5	6	7	8	9	Total
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



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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).

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

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





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 t	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	



#### 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.



#### 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.



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	$16.80 \pm 4.10$
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
	Ornate threadfin	246			
Nemipterus hexodon	bream		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

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





#### Length Frequency Distribution

*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 <u>http://hdl.handle.net/1834/28025</u>



#### 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 highdensity 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.





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**Otter Board 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)<sub>4</sub>-Si), and orthophosphate-phosphorus (PO<sub>4</sub><sup>3-</sup>-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)<sub>4</sub>-Si): Varied between 1.73 and 23.04  $\mu M$
- Orthophosphate-Phosphorus (PO4<sup>3-</sup>-P): Detected in the range of nd (not detected) to 1.76  $\mu M$

**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  $\mu$ g/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  $\mu$ M, silicate-silicon ranged from 158.92 to 546.75  $\mu$ M, and orthophosphate-phosphorus ranged from 5.28 to 88.92  $\mu$ M.

**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  $\mathbb{P}^{13}C_{terrestrial}$  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:
  - $_{\circ}$  Scallops had the lowest δ<sup>15</sup>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  $\delta^{13}C$  (‰) (top) and  $\delta^{15}N$  (‰) (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).







#### 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