COLLABORATIVE RESEARCH SURVEY ON MARINE FISHERIES RESOURCES AND ENVIRONMENT IN THE GULF OF THAILAND 2018

Fisheries Resource Survey in the Gulf of Thailand off Thailand and Cambodia by Using Bottom Trawl

Presented by

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Outline

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Introduction

➢ **The Gulf of Thailand (GoT) is** one of Large Marine Ecosystem (LME), located in Southeast Asia.

➢ Semi-enclosed gulf and surrounded by Malaysia, Thailand, Cambodia and Vietnam

➢ Influenced by river outflow, high nutrient input

➢This area is rich with fisheries resources and recognized as an important fishing ground in the South China Sea

Introduction

The survey was carried out in Thai waters and Cambodian waters by M.V. SEAFDEC 2 in cooperation with the Department of Fisheries, and academic institutions from Thailand, Cambodia and Vietnam

Aims to

- Explore the current status of fisheries resources in the Gulf of Thailand including Thai waters and Cambodian waters

- Determine the exploitation status of some economically important species

Materials and methods

Material

- M.V. SEAFDEC 2
- Bottom trawl; 4.0 cm cod-end net
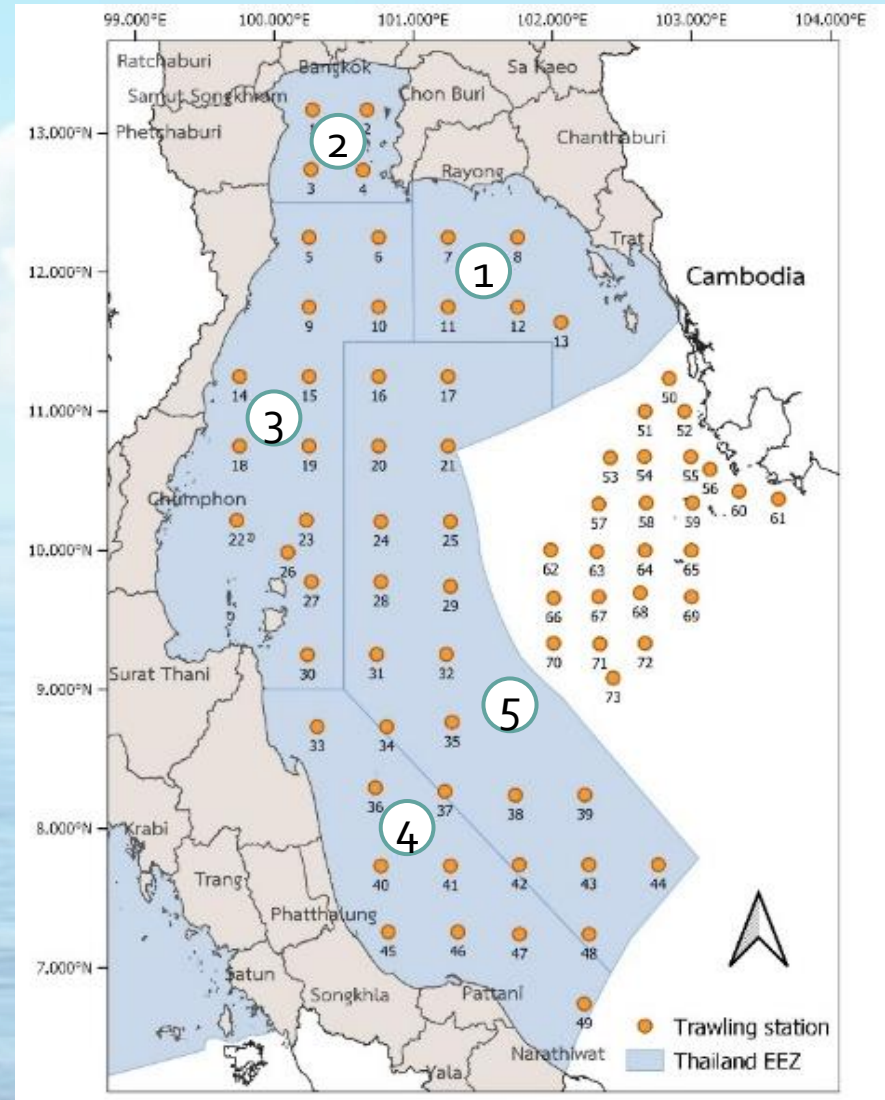
Survey period

- 17 August to 11 October 2018

Survey stations : 73 stations

- 49 stations in Thai waters divided into 5 areas
- 24 stations in Cambodian waters

Trawl operation

- Daytime operation
- 3 knots towing speed
- towing time - one hour in each station

Materials and methods

- Catches were sorted onboard and identified to species level

- Length of some economically important species was measured by using punching paper

Materials and methods

Data analysis

- Catch per unit effort (CPUE)
    - Thai and Cambodian waters
    - Five areas in Thai waters

$$CPUE_j = \frac{\sum_{i=1}^{n} C_i}{\sum_{i=1}^{n} F_i}$$

$CPUE_j$ = Catch per unit effort in Area j (kg/hr)
C_i = Catch in station i (kg)
F_i = Fishing effort in station i (hr)
i = Station 1, 2, 3, ..., n

- Species composition
    - Thai and Cambodian waters
    - Five areas in Thai waters

$$Comp_i = \frac{\sum_{j=1}^{n} w_{ij}}{\sum_{j=1}^{n} W_j} \times 100$$

$Comp_i$ = Composition of species / group i
w_{ij} = Weight of species / group i (kg) in station j
W_j = Total weight in station j
j = Station 1, 2, 3, ..., n

- Length of some economic species
    - Thai and Cambodian waters
    - Mean length compared to size at first maturity (L_m)

$$\bar{X} = \frac{\sum_{i=1}^{n} x_i f_i}{\sum_{i=1}^{n} f_i}$$

$\bar{X}$ = Mean length (cm)
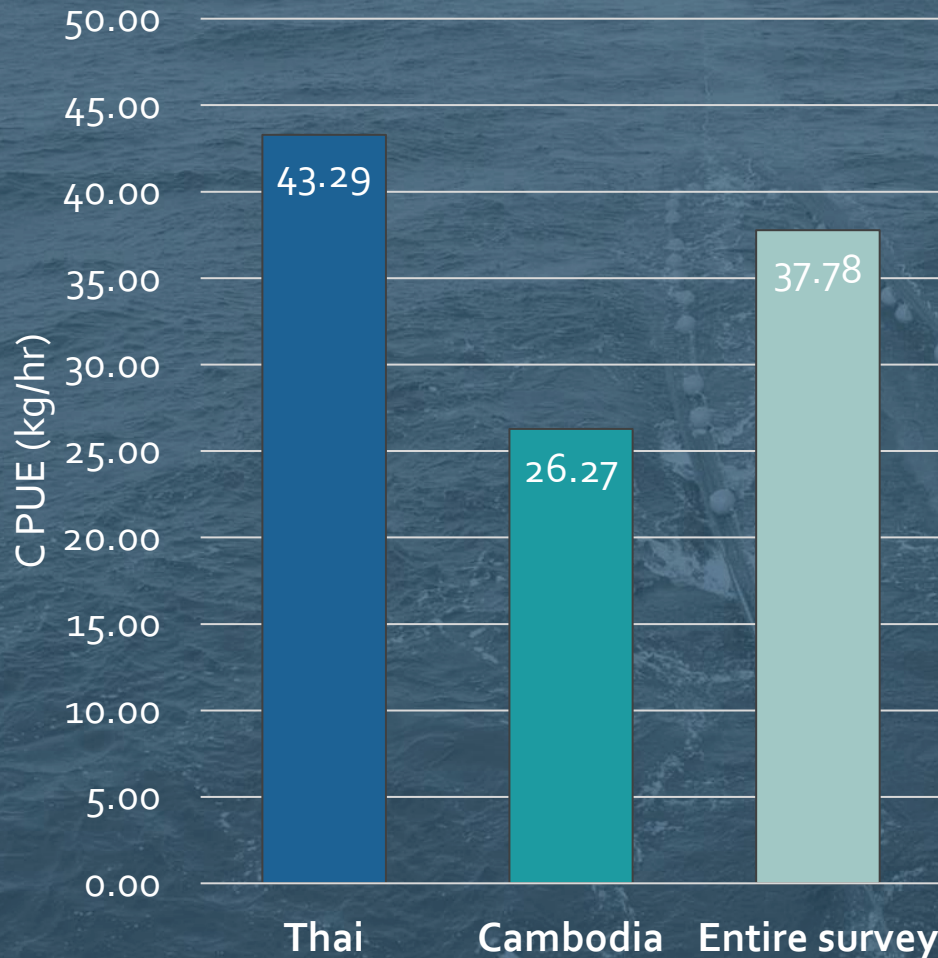x_i = Mid length of class interval i
f_i = Frequency of class interval i
i = Class interval 1, 2, 3, ..., n

Results and Discussion

1. Catch per unit effort (CPUE) : Overall CPUE

Bar chart, CPUE (kg/hr):
- Thai: 43.29
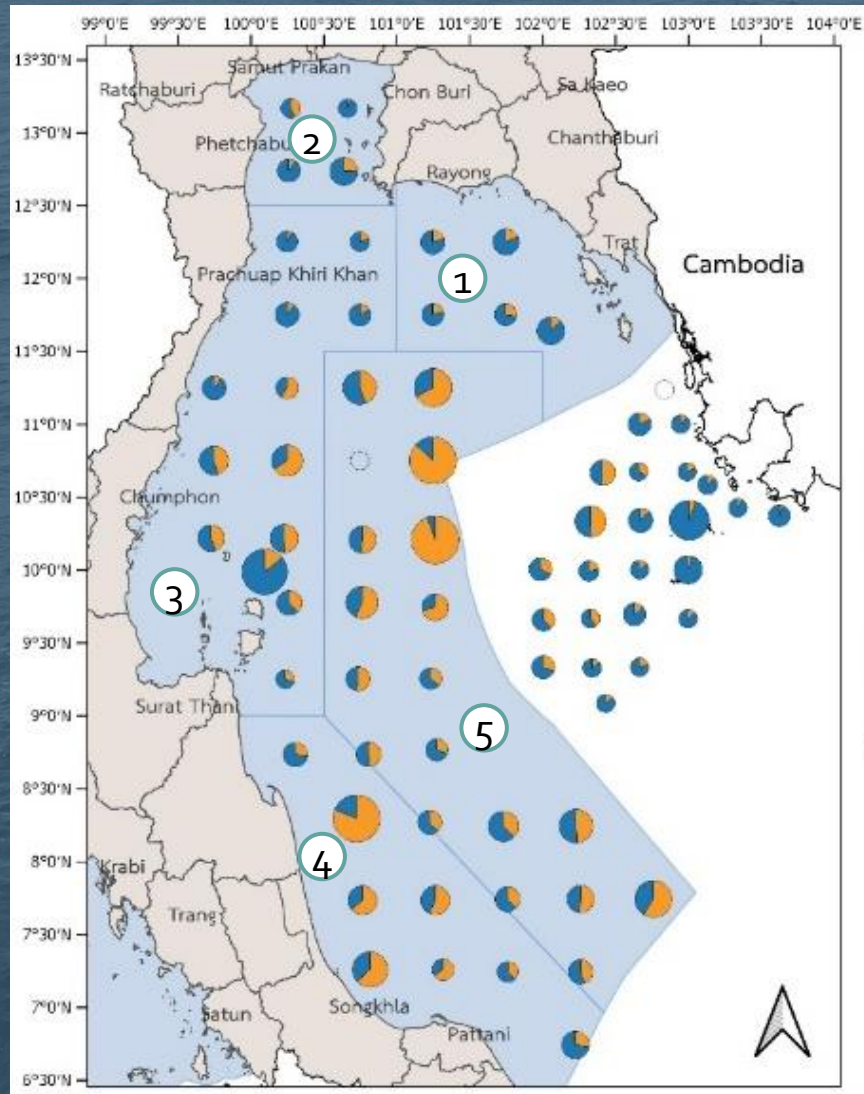- Cambodia: 26.27
- Entire survey: 37.78

- The CPUE in Thai waters was higher than in Cambodian waters

- Due to higher accumulated nutrients in Thai waters caused by several Thai river runoff in the gulf, whereas there are few small rivers in Cambodian waters

Results and Discussion

1. Catch per unit effort (CPUE) : CPUE by areas and stations

➤ CPUE in Thai waters by areas

- Area 5 Central GoT; 53.01 kg/hr

- Area 4 Southern GoT; 43.77 kg/hr

- Area 3 Western GoT; 39.55 kg/hr

- Area 1 Eastern GoT; 32.11 kg/hr

- Area 2 Inner GoT; 26.04 kg/hr

➤ The CPUEs of each area in Thai waters were corresponded with CPUE from commercial trawlers.

Composition (%)
- ■ Economic fish
- ■ Trash fish
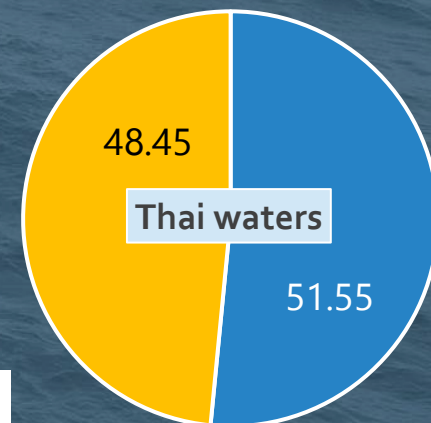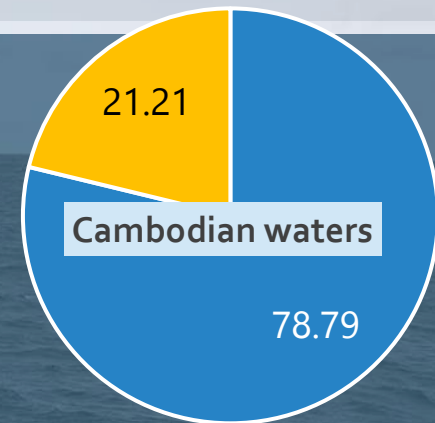
CPUE (kg/hr)
- ○ <20.00
- ○ 20.01-40.00
- ○ 40.01-60.00
- ○ >60.00
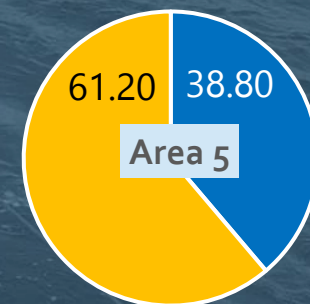
Results and Discussion

2. Catch composition : Catch ratio

- Catch composition was different between Thai waters and Cambodian waters
  - Trash fish was higher in Thai waters; 48.45% of trash fish in the total catch while 21.21% in Cambodian waters

- Catch composition by areas
  - Trash fish was the main composition in the Central Gulf, 61.20% whereas, in the Eastern GOT, catch was mostly comprised of economic fish; 81.30%

Cambodian waters
21.21
78.79

Thai waters
48.45
51.55

Composition (%)
- Economic fish
- Trash fish

Area 1
18.70
81.30

Area 2
20.88
79.12

Area 3
31.69
68.31

Area 4
42.14
57.86

Area 5
61.20
38.80
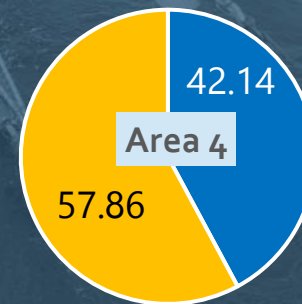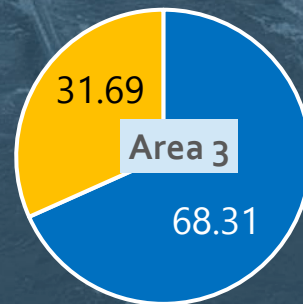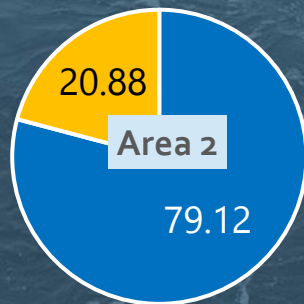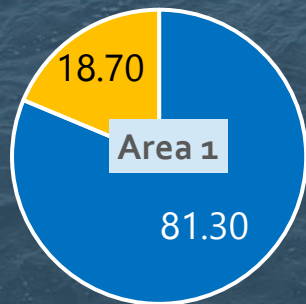
Results and Discussion

2. Catch composition : group composition

- Demersal fish was the major catch in both Thai and Cambodian waters
- Followed by pelagic fish and cephalopods respectively

	Group	Thai waters' sub area					Thai waters	Cambodian waters
		Area 1	Area 2	Area 3	Area 4	Area 5		
Economic fish	**Total**	**81.30**	**79.12**	**68.31**	**42.14**	**38.80**	**51.55**	**78.79**
	Demersal fish	47.47	37.84	45.36	23.22	28.50	33.17	57.97
	Pelagic fish	17.50	21.87	9.40	6.29	6.20	8.61	9.33
	Cephalopod	10.78	16.81	11.72	9.85	3.13	7.78	8.45
	Shellfish	4.07	1.58	0.74	0.87	0.44	0.93	2.53
	Crab	0.76	0.24	0.35	1.01	0.27	0.48	0.31
	Shrimp	0.14	0.57	0.59	0.52	0.15	0.35	0.03
	Mantis shrimp	0.13	0.03	0.13	0.08	0.04	0.07	0.06
	Others	0.45	0.17	0.01	0.31	0.08	0.15	0.11
Trash fish	**Total**	**18.70**	**20.88**	**31.69**	**57.86**	**61.20**	**48.45**	**21.21**
	Fish	14.60	4.29	28.42	47.76	60.53	44.14	20.44
	Shellfish	0.00	0.17	0.10	0.04	0.01	0.04	0.00*
	Crab	0.60	6.22	1.71	1.20	0.36	1.15	0.22
	Others	3.49	10.20	1.47	8.85	0.31	3.11	0.54

Remark * Less than 0.005

Results and Discussion

2. Catch composition : species composition

There were at least 299 species found in Thai waters and 190 species in Cambodian waters
Main species composition for economic fish and trash fish in Thai and Cambodian waters

Thai waters		
Common name	**Scientific name**	**%**
Economic fish		
Doublewhip threadfin bream	*Nemipterus nematophorus*	4.39
Obtuse barracuda	*Sphyraena obtusata*	3.25
Japanese goatfish	*Upeneus bensasi*	2.71
Indian squid	*Uroteuthis duvaucelii*	2.67
Mitre squid	*Uroteuthis chinensis*	2.52
Trash fish		
Orangefin ponyfish	*Leiognathus bindus*	18.42
Longfin mojarra	*Pentaprion longimanus*	13.60
Whipfin ponyfish	*Leiognathus leuciscus*	2.70

Cambodian waters		
Common name	**Scientific name**	**%**
Economic fish		
Dark-barred goatfish	*Upeneus luzonius*	9.44
Doublewhip threadfin bream	*Nemipterus nematophorus*	6.99
Pink ear emperor	*Lethrinus lentjan*	6.70
Brown-banned bambooshark	*Chiloscyllium punctatum*	5.13
Indian squid	*Uroteuthis duvaucelii*	4.92
Trash fish		
Longfin mojarra	*Pentaprion longimanus*	11.84
Orangefin ponyfish	*Leiognathus bindus*	3.16
Filefish	Monacanthidae	0.95

Results and Discussion

3. Size of some economically important species : Thai waters

- Length of 18 economically important species in Thai waters was studied
- Average length of 10 species was smaller than their size at first maturity (L_m)
- Average length of 3 species was larger than their size at first maturity (L_m)

Common name	Scientific name	Range (cm)	Average (cm)	L_m (cm)	% of immature fish	% of mature fish
Pink ear emperor	*Lethrinus lentjan*	16.75 - 26.25	20.60 ± 2.53	n/a	n/a	n/a
Ornate threadfin bream	*Nemipterus hexodon*	8.25 - 27.25	16.47 ± 4.88	18.77	65.38	34.62
Doublewhip threadfin bream	*Nemipterus nematophorus*	7.25 - 24.25	13.00 ± 2.58	n/a	n/a	n/a
Five-lined threadfin bream	*Nemipterus tambuloides*	10.25 - 29.25	19.57 ± 4.02	n/a	n/a	n/a
Purple-spotted bigeye	*Priacanthus tayenus*	4.25 - 29.75	10.69 ± 5.23	14.83	82.50	17.50
Slender lizardfish	*Saurida elongate*	7.25 - 41.25	25.44 ± 6.88	31.62	82.41	17.59
Brushtooth lizardfish	*Saurida undosquamis*	8.25 - 29.75	18.56 ± 4.14	28.26	99.73	0.27
Japanese goatfish	*Upeneus bensasi*	4.75 - 16.25	10.62 ± 1.68	n/a	n/a	n/a
Dark-barred goatfish	*Upeneus luzonius*	14.25 - 23.25	18.50 ± 2.26	n/a	n/a	n/a
Yellowtail scad	*Atule mate*	6.75 - 31.75	14.35 ± 4.09	21.25	91.57	8.43
Torpedo scad	*Megalaspis cordyla*	6.25 -19.75	12.51 ± 3.49	21.55	100.00	0.00
Short mackerel	*Rastrelliger brachysoma*	15.25 - 19.25	17.05 ± 0.93	17.95	86.36	13.64
Indian mackerel	*Rastrelliger kanagurta*	14.25 - 23.75	19.61 ± 2.24	17.12	11.39	88.61
Goldstripe sardinella	*Sardinella gibbosa*	10.75 - 17.75	13.27 ± 1.52	10.35	0.00	100.00
Bigeye scad	*Selar crumenophthalmus*	9.25 - 24.25	17.28 ± 3.22	18.25	66.45	33.55
Mitre squid	*Uroteuthis chinensis*	2.75 - 38.25	13.00 ± 5.76	17.71	80.91	19.09
Indian squid	*Uroteuthis duvaucelii*	3.25 - 16.25	8.28 ± 2.23	9.04	65.96	34.04
Greasyback shrimp	*Metapenaeus ensis*	10.25 -16.75	13.44 ± 1.69	11.24	4.76	95.24

Results and Discussion

3. Size of some economically important species : Cambodian waters

- Length of 14 economically important species in Cambodian waters was studied.

- Average length of only 5 species was smaller than their L_m

- Average length of 5 species was larger than their L_m

Common name	Scientific name	Range (cm)	Average (cm)	L_m (cm)	% of immature fish	% of mature fish
Pink ear emperor	*Lethrinus lentjan*	13.75 - 26.25	20.62 ± 2.02	n/a	n/a	n/a
Ornate threadfin bream	*Nemipterus hexodon*	16.25 - 23.25	20.15 ± 2.97	18.77	40.00	60.00
Doublewhip threadfin bream	*Nemipterus nematophorus*	6.75 - 22.25	13.19 ± 2.05	n/a	n/a	n/a
Five-lined threadfin bream	*Nemipterus tambuloides*	6.75 - 26.75	17.46 ± 3.28	n/a	n/a	n/a
Purple-spotted bigeye	*Priacanthus tayenus*	17.25 - 26.25	20.96 ± 2.75	14.83	0.00	100.00
Slender lizardfish	*Saurida elongata*	15.75 - 38.75	27.37 ± 4.91	31.62	81.82	18.18
Brushtooth lizardfish	*Saurida undosquamis*	10.75 - 29.75	20.72 ± 3.88	28.26	98.16	1.84
Dark-barred goatfish	*Upeneus luzonius*	6.25 - 16.25	12.03 ± 1.34	n/a	n/a	n/a
Yellowtail scad	*Atule mate*	7.25 - 24.75	16.18 ± 3.10	21.25	92.86	7.14
Indian mackerel	*Rastrelliger kanagurta*	13.75 - 22.25	19.22 ± 2.22	17.12	18.18	81.82
Goldstripe sardinella	*Sardinella gibbosa*	11.25 - 17.25	12.92 ± 1.12	10.35	0.00	100.00
Bigeye scad	*Selar crumenophthalmus*	12.75 - 24.25	18.48 ± 2.02	18.25	47.46	52.54
Mitre squid	*Uroteuthis chinensis*	3.75 - 36.25	13.19 ± 5.42	17.71	82.81	17.19
Indian squid	*Uroteuthis duvaucelii*	2.25 - 29.75	7.24 ± 4.73	9.04	83.57	16.43

Summary and recommendation

➢ Fisheries resource in Thai waters seems to be more abundance. The CPUE in Thai waters, 43.29 kg/hr, was higher than in Cambodian waters, 26.27 kg/hr.

➢ The ratio of economic fish and trash fish in two countries' waters were quit different. In Thai waters, it was 51.55 : 48.45; while, in Cambodian waters, it was 78.79 : 21.21.

➢ Species composition was not much different. Demersal fish was the main composition followed by pelagic fish and squid.

➢ The average length of fish in Cambodian waters was mostly bigger than in Thai waters

- In Thai waters, average length of 10 species out of 18 species was smaller than Lm

- In Cambodian waters, average length of 5 species out of 14 species was smaller than Lm

➢ The percentage of mature fish was higher in Cambodian waters, 5 of 10 species while it was only 3 of 13 species in Thai waters

Summary and recommendation

However,

- This survey emphasized the demersal resource survey. It did not cover all fisheries resources that have been currently exploited such as pelagic resource, and also not cover all areas in the Gulf of Thailand.

Hence, there is a recommendation that

- Additional survey which covers all fisheries resource and all countries in the Gulf of Thailand including Vietnam, Cambodia, Thailand and Malaysia should be carried out, in order to broadening perspective of fisheries resource status in the Gulf of Thailand.

Acknowledgement

The authors would like to give deeply gratitude and sincerely thanks to;

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- All of Department of Fisheries' officers for their hard work in data collection and analysis

- And also like to extend gratitude to SEAFDEC for financial support in this survey

Thank you

ありがとうございました

ขอบคุณ

ကျေးဇူးတင်ပါတယ်

ຂອບໃຈ

Terima kasih

Salamat

ขอบคุณ

Cảm ơn bạn

谢谢