Elasmobranchs bycatch in purse seine fishery in the Andaman Sea of Thailand

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Abstract

The concern of ETP bycatch in Thai fisheries has significantly increased in past decades. The data of elasmobranch bycatch from purse seine in the Andaman Sea of Thailand were collected through landing statistics and landing sampling between 2021 and 2023. About 71,157 purse seine landing declaration and 2,412 purse seine fishing trips were observed. It was found that purse seine fishery in the area had very few elasmobranch bycatch, accounted for 0.000004% of the total catch, which was dominant by sharks. There are 5 records of elasmobranch found during landing sampling, consisted of 3 records of shark and 2 records of ray. All elasmobranchs were found from purse seine operating with fish aggregating devices while free schooled purse seine had no elasmobranch bycatch. By plotting location of found elasmobranchs, it shows that sharks likely distribute in deeper areas than rays. This study concludes that purse seine fishery in the Andaman Sea of Thailand has low impact on elasmobranchs.

Keywords: Elasmobranch, bycatch, purse seine, Andaman Sea, Thailand

1. Introduction

Elasmobranchs play a crucial role in marine ecosystems as top predators. They help balancing of population of their prey species which made them recognized as indicators of ecosystem health. Elasmobranchs frequently caught as bycatch in fisheries especially in tropical regions which have wide variety of species and fishing method.

In the Andaman Sea of Thailand, purse seine is the commercial fishing gear used to fish in IOTC competence area. The fishery primarily targets small pelagic fishes, e.g., mackerels, round scads, jacks, sardines, etc. with small catch of neritic tunas, and elasmobranchs are occasionally reported from this gear. Regarding to implementation following on the National Plan of Action on Shark of Thailand, the Department of Fisheries has collected elasmobranch bycatch data in Thai waters since 2021. The activity covers data recorded by fishing logbook, catch landing declaration which later compiled to national statistics and together with bycatch landing sampling at the fishing ports along the coasts for scientific purposes. This study aims to provide information on elasmobranch bycatch from Thai purse seine fishery in the Andaman Sea of Thailand and emphasize the impact of this fishery on the resources.

2. Methodology

The data use in this study was collected in 2021 – 2023 by 2 approaches. Firstly, the annual catch of elasmobranchs from purse seine fishery in the Andaman Sea was derived from Landing declaration statistic from Department of Fisheries (DOF, 2024), which reported as aggregated group, i.e., sharks and rays. Secondly, the landing accidental sampling was separately conducted on monthly basis at landing ports along the Andaman Sea coast of Thailand (Figure 1) to determine elasmobranchs composition in the catches and length measuring.

Purse seiners were sampled at least 40 vessels/month. The vessel masters were interviewed for relevant information of the trip, e.g., number of fishing day, number of sets, fishing duration, fishing location, etc. The catch of interviewed vessels was sampled and identified to species level. Consequently, elasmobranch bycatch was observed and identified to finest taxonomic level as possible following Ahmad et al. (2017, 2020) and Krajangdara et al. (2022), then weighted and measured total length (TL) for sharks and disc length (DL) for rays. The data were analyzed for proportion of elasmobranch in purse seine catch, number of elasmobranch found, and spatial distribution of elasmobranch in the Andaman Sea of Thailand.
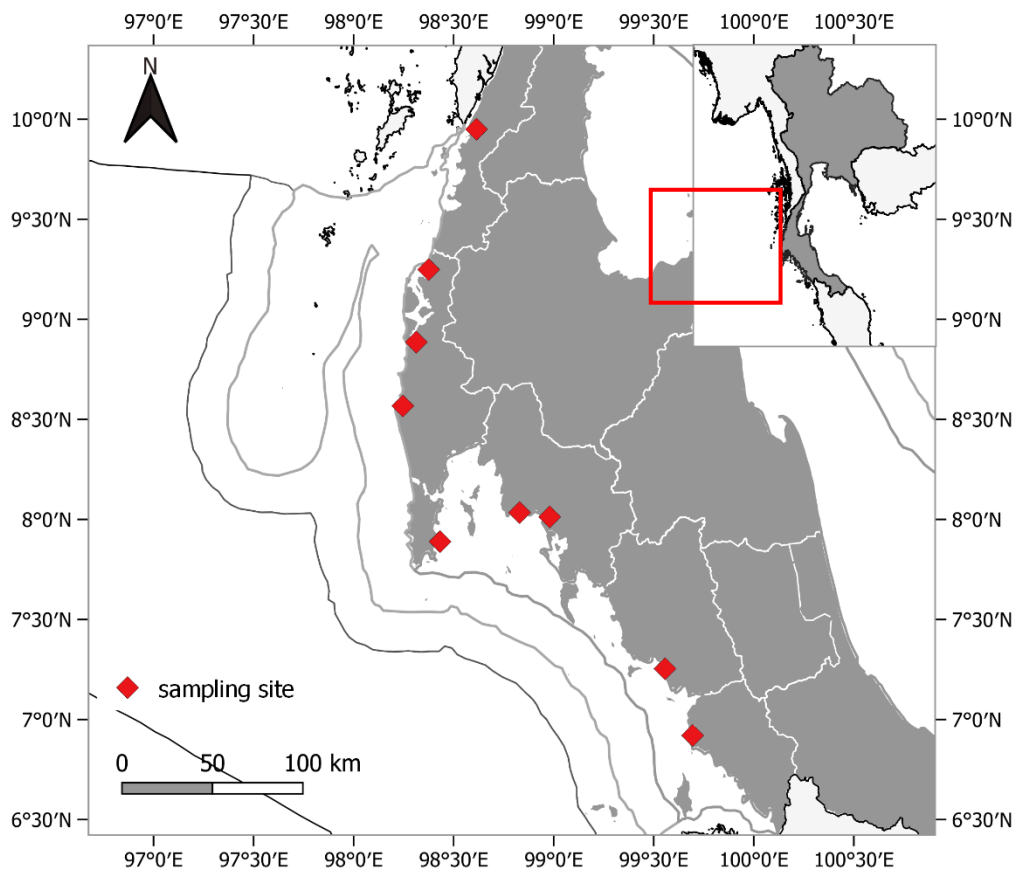

Figure 1 Sampling sites of purse seine vessels along the Andaman Sea coast of Thailand in 2021 - 2023

3. Results

3.1 Elasmobranch bycatch in purse seine fishery

There were 71,157 purse seine landing declaration record in 2021-2023. All sampled purse seine vessels were operated within Thai waters. The analysis shows that catch from purse seine fishery in the Andaman Sea rarely comprises of elasmobranchs. These fish were occasional caught throughout the years by purse seine fishery, about 1.3 tons in the study period, accounted for 0.000004% of purse seine catch in the Andaman Sea of Thailand. Among this, sharks are dominant in the elasmobranch bycatch (Table 1).

Table 1 Elasmobranch bycatch (tons) from purse seine fishery in the Andaman Sea of Thailand in 2021-2023

Year	Month	Sharks	Rays	Other species
2021	January	0	0	8,274.9
	February	0	0	9,406.7
	March	0	0	15,247.5
	April	0	0	13,249.2
	May	0.287	0	15,250.0
	June	0	0	7,791.3
	July	0	0	7,372.1
	August	0.053	0	6,356.4
	September	0	0	6,548.5
	October	0	0.023	4,748.1
	November	0	0	6,946.7
	December	0.010	0	7,713.4
2022	January	0	0	10,132.9
	February	0	0	10,311.6
	March	0.139	0	12,954.6
	April	0.018	0	13,842.5
	May	0.149	0	7,651.1
	June	0	0	8,348.5
	July	0.002	0	5,981.5
	August	0.042	0	5,657.2
	September	0.0135	0	4,691.0
	October	0	0.061	4,483.0
	November	0.245	0	6,892.4
	December	0.074	0	6,581.1

Year	Month	Sharks	Rays	Other species
2023	January	0	0	7,271.4
	February	0.195	0	6,725.5
	March	0	0	12,796.1
	April	0	0	15,695.2
	May	0	0	9,466.4
	June	0	0	9,247.2
	July	0	0	6,686.9
	August	0	0	7,103.0
	September	0	0	6,384.7
	October	0	0.0022	8,747.3
	November	0	0	12,410.6
	December	0.012	0	14,579.8
Total		1.2395	0.0862	323,546.6

3.2 Elasmobranchs in purse seine catch

Based on the survey, the total purse seine of 2,412 trip were sampled. The fishing day ranged 1-3 days/trip with average of 1.5 day/trip. The average catch was 3,253 kg/trip. The fishing ground was found distributed along the coast in the Andaman Sea, densely within territorial waters area at the average depth of 47 meters. Purse seines in this area can be categorized into two different fishing methods, Thai purse seine (TPS) or sonar purse seine used for free schooled and purse seine with anchored fish aggregating devices (FAD). Despite differences of fishing method, primary species of purse seiners in this area are similar. Purse seine catch was dominant by small pelagic fishes, i.e., sardines, mackerels, round scads, jacks, bigeye scads, and neritic tunas, while elasmobranch bycatch was very rare in purse seine landing catch.

Table 2 shows elasmobranch species found in the survey. There are 5 elasmobranch bycatch consist of 3 records of shark and 2 records of ray. All observed sharks were common species in Thai waters listed in Carcharhinidae, i.e., *Carcharhinus amboiensis*, *C. brevipinna*, and unidentified sharks. The observed rays are dwarf whipray (*Brevitrygon heterura*) and ocellated eagle ray (*Aetobatus ocellatus*). Elasmobranchs were only found from FAD while no catch from TPS. It corresponds with elasmobranchs behavior as opportunistic predators or scavengers that gather and prey on schooled fish aggregated by FAD. Figure 2 shows the location of found elasmobranch by species. The map depicts that sharks likely found distributed farther shoreline than rays.

Table 2 Elasmobranchs found in purse seine landing sampling in the Andaman Sea of Thailand in 2021-2023

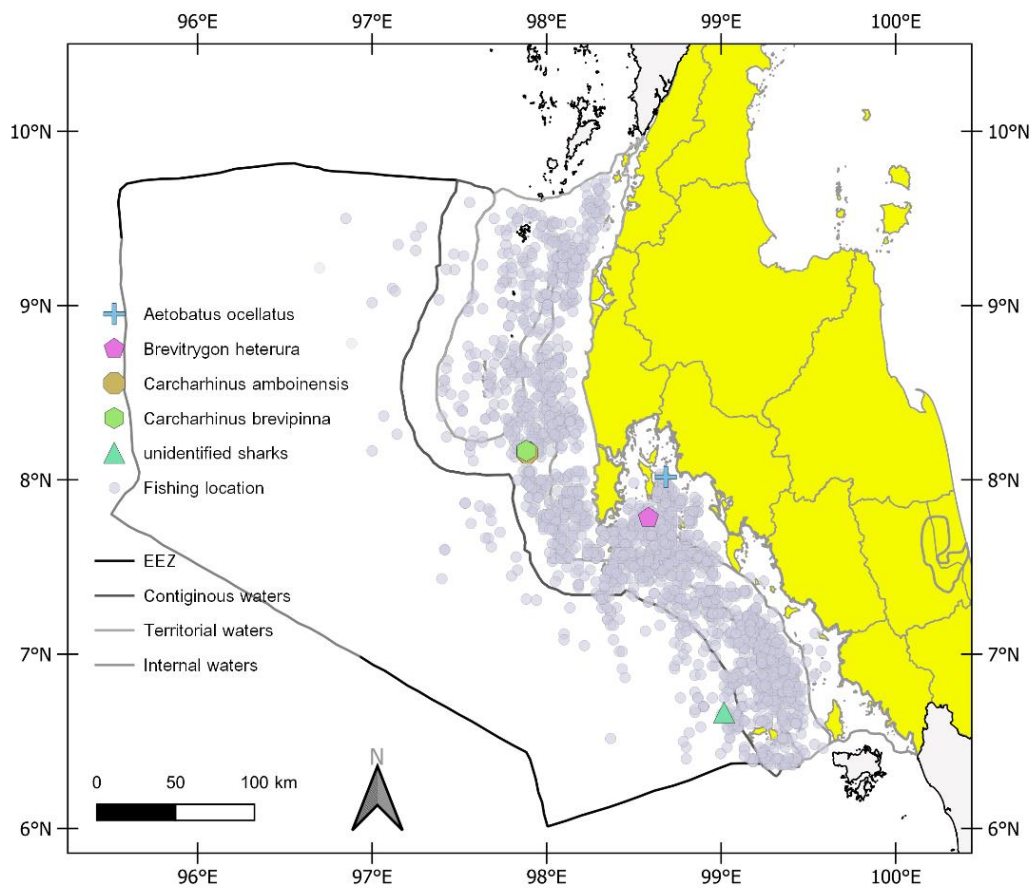| Year	Month	Method	Group	species	Weight (kg)	Length (cm)	Amount
2021	9	FAD	shark	Unidentified sharks	6*	n/a	1
2022	8	FAD	shark	*Carcharhinus amboinensis*	159	270	1
2022	8	FAD	shark	*Carcharhinus brevipinna*	111	210	1
2021	5	FAD	ray	*Brevitrygon heterura*	0.02	17	1
2022	11	FAD	ray	*Aetobatus ocellatus*	47*	n/a	n/a

Note: *aggregated weight

Figure 2 Elasmobranchs distribution from purse seine fishery in the Andaman Sea of Thailand in 2021-2023

4. Conclusion

Thailand has implemented the National Plan of Action on Sharks since 2021. Under the plan, the elasmobranch data were collected through catch statistics and scientific sampling at fishing ports. The statistics show that elasmobranchs are occasionally caught by purse seine fishery in the Andaman Sea with relatively low percentage, less than 0.01% of the catch. Sharks are dominant in elasmobranch bycatch. The landing sampling depicts that elasmobranch bycatch in purse seine fishery differs in different fishing methods. The fishing method which attracts or aggregate fish tend to catch elasmobranchs greater than the method that target schooling fish. The spatial distribution also shows that rays are distributed closer shoreline than sharks. Based on the study results, we could conclude that purse seine fishery in the Andaman Sea of Thailand has low impact on elasmobranchs as it has very low elasmobranch bycatch.

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