

Billfish bycatch from different fishing methods of purse seine fishery in the Andaman Sea of Thailand

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Abstract

The billfish bycatch from different purse seine methods in the Andaman Sea of Thailand was studied during 2021-2023. The 2,412 of landing purse seiners were sampled for catch composition and length measurement of billfish. The results indicate that billfish were rarely caught by purse seine with approximately 0.05% of the total catch. Only black marlin and Indo-Pacific sailfish were found in the catches. The purse seine using aggregating fishing method had higher catch rate and variety of billfish compared to schooling fishing method. The observed billfish commonly found distributed in near Phuket Island and southern Andaman Sea of Thailand. The average length of observed black marlin was 170 ± 49.50 cm and average length of Indo-Pacific sailfish was 136.79 ± 35.11 cm. The observed length of billfish shows not difference between different fishing methods.

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

1. Introduction

Billfish are important as apex predators in ecosystem. They prey on juveniles to larger faunas like tunas and adult fishes. Billfish are important in fisheries especially in recreational fisheries and frequently caught in commercial fisheries which often caught as bycatch in tropical purse seine fisheries. But the catch is generally lower compared to other fishing methods like longline.

In the Andaman Sea of Thailand, purse seine is an important fishing gear catching pelagic fishes that greatly contribute to local livelihood and economic for more than five decades. Purse seine fishery in the area can be classified based on fishing methods, i.e., Thai purse seine (TPS) that targeting free-school pelagic fish and purse seine with anchored fish aggregating devices (FAD) that use to aggregate fish. The purse seine mesh size is 2.5 cm, which can be used for both fishing methods, and both fishing methods can be found in one fishing trip. Thai purse seiners primarily target small pelagic fishes, e.g., mackerels, sardines, scads, jacks and neritic tunas. However, the catch also includes larger species for direct human consumption including billfish. This study aims to investigate billfish bycatch from different purse seine fishing methods in order to gain a deeper understanding of billfish bycatch of this fishery in the area.

2. Methods

The data used in this study were collected monthly by using random sampling of purse seine vessels landed at fishing ports along the Andaman Sea Coast of Thailand (Figure 1) during 2021-2023. At least 40 purse seine vessels were sampled monthly. 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 the vessels was later sampled and identified to species. All billfish were observed and identified to finest taxonomical level as possible based on Nakamura (1985), then measured the length of lower jaw to fork length (LJFL) and weighted. The data was analyzed for catch per unit effort (CPUE) and catch composition by different fishing methods, spatial distribution of billfish in the area, and length composition of found billfish by method.

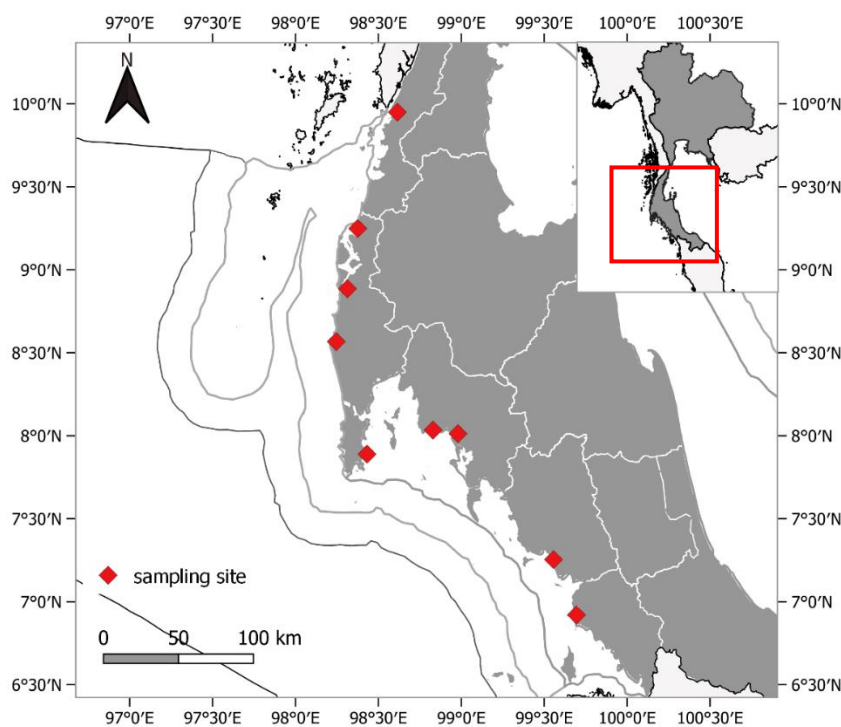


Figure 1 Sampling sites of purse seine vessels along the Andaman Sea coast of Thailand in 2021 - 2023

3. Results

3.1 Catch rate and composition by fishing methods

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. Billfish can be caught by all purse seine fishing methods. There are two species of billfish observed during the study, namely Black marlin (*Istiompax indica*) and Indo-Pacific sailfish (*Istiophorus platypterus*). Indo-Pacific sailfish was found by both fishing methods, but Black marlin was only found by FAD. The catch rate by species was very low comparing to other species in the catches, ranged 0.04 -1.10 kg/day. The result shows that FAD has variety of billfish than the TPS (Table 1).

The catch composition of purse seine slightly differs by fishing method. Table 2 shows catch composition of purse seine catches of different fishing methods. It shows that in general, purse seine catches dominant with small pelagic fishes accounted for >70% of total catch for FAD and >50% of the total catch for TPS, and billfish are occasionally caught by purse seine accounted for 0.05% and 0.04% of the total catch of FAD and TPS respectively. It is clear that small pelagic fishes, like jacks, scads, and sardines, large pelagic and elasmobranchs can be caught by FAD more than TPS.

Table 1 Billfish catch rate (kg/day) from Thai purse seine vessels by different fishing methods in the Andaman Sea coast of Thailand in 2021 -2023

Species	FAD	TPS
<i>Istiompax indica</i>	0.04	0.00
<i>Istiophorus platypterus</i>	0.85	1.10
Other faunas	1,851.63	2,540.78
Total	1,852.52	2,541.88

Notes: FAD means purse seine with anchored fish aggregating devices
 TPS means Thai purse seine targeting free-school fish

Table 2 Composition of purse seine catch by different fishing methods in the Andaman Sea coast of Thailand in 2021-2023

Species group	FAD	TPS
Jacks	21.66%	27.02%
Scads	20.36%	6.05%
Mackerels	17.93%	16.12%
Sardines	12.49%	3.80%
Neritic tunas	10.39%	31.23%
Cephalopod	3.26%	0.36%
Tunas	0.91%	2.03%
Sailfish	0.05%	0.04%
Marlins	0.00%*	0.00%
Sharks	0.00%*	0.00%
Rays	0.00%*	0.00%
Others	12.9%	13.35%
Total	100.00%	100.00%

Notes: FAD means purse seine with anchored fish aggregating devices
 TPS means Thai purse seine targeting free-school fish
 *Value less than 0.005%

3.2 Spatial distribution of billfish

It appears that majority of observed billfish was Indo-Pacific sailfish. Black marlin was found associated with FAD only. The mapping of purse seine fishing ground shows that purse seiners had densely operated in contiguous zone and territorial zone of Thai waters. Fishing ground spread along Thai coastline from Ranong province in the north to Satun province in the south. However, billfish were commonly found around Phuket Island and in the southern Andaman Sea, the adjacent to Malaysia maritime (Figure 1 and 2). It might be because a reason that this area is abundance with sediment and nutrients from current movement. The south-east Andaman Sea area is influenced by current circulation. The water masses influenced by tides, wind and heat flux flow south from the northern Indian Ocean to east coast of Andaman Sea, whereas the second water masses flow from Malacca strait along the coast of Malaysia peninsular northward to Phuket Island (Rizal et al., 2012). The flows bring sediment and nutrient exchanging that made the area is well known as an important coastal fishing ground.

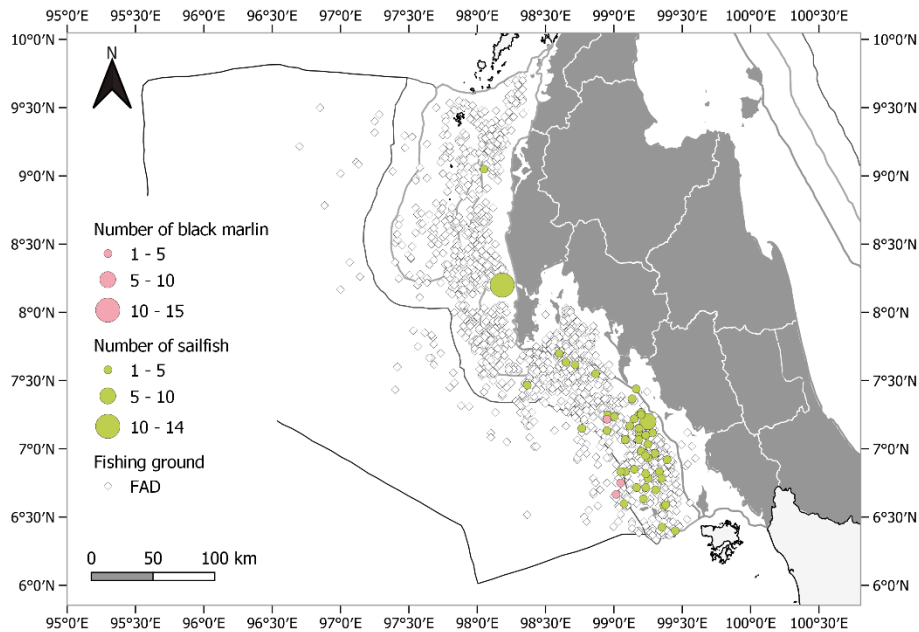


Figure 1 Fishing ground and distribution of billfish from FAD method in the Andaman Sea of Thailand in 2021 - 2023

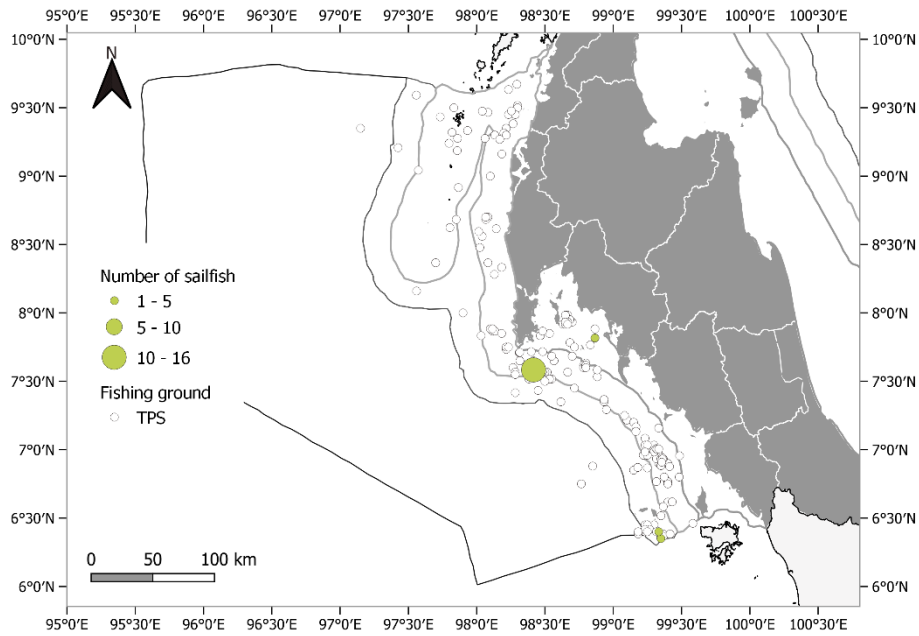


Figure 2 Fishing ground and distribution of billfish from TPS method in the Andaman Sea of Thailand in 2021 - 2023

3.3 length of billfish found in purse seine fishery

Several sizes of billfish were found from purse seine fishery in the area. Based on sampling, the total 125 fish were measured for lower jaw – fork length (LJFL) consisting of 2 black marlin and 123 sailfish (Table 3). Table 4 shows length frequency of measured billfish at 10 cm interval. Black marlin ranges from 130 – 200 cm with average of 170 ± 49.50 cm, while sailfish ranges from 40 – 210 cm with average of 136.79 ± 35.11 cm. The size measurement of sailfish shows similar distribution by different fishing methods.

Table 3 Number of observed billfish by purse seine using different fishing methods in the Andaman Sea of Thailand in 2021-2023

Fishing method	Species	2021	2022	2023	Total
FAD	<i>Istiompax indica</i>	2	0	0	2
	<i>Istiophorus platypterus</i>	42	41	21	104
TPS	<i>Istiophorus platypterus</i>	1	2	16	19
Total		45	43	37	125

Table 4 Length frequency distribution of billfish by purse seine using different fishing methods in Andaman Sea of Thailand in 2021-2023

Length (cm)	FAD		TPS	
	<i>Istiompax indica</i>	<i>Istiophorus platypterus</i>	<i>Istiophorus platypterus</i>	
40		1		
50		2		
60		1		
70		3		
80		6	1	1
90		10		
100		3		
110		8		
120		11	2	2
130	1	9	3	3
140		8	7	7
150		12	5	5
160		10		
170		8	1	1
180		5		
190		5		
200	1	1		
210		1		
Average	170.00 ± 49.50	135.77 ± 37.36	142.37 ± 18.21	

4. Conclusion

The findings of this study reveal some information of billfish in the Andaman Sea of Thailand. It appeared that billfish are occasional caught in purse seine fishery, composed very low percentage in the catch. Only black marlin and Indo-Pacific sailfish were found in landing survey. By considering different fishing methods of purse seine used, the aggregating method using fish aggregating devices has higher catch rate and species variety of billfish than free schooling method. The size of observed billfish is not clearly differed by different fishing methods. In addition, billfish are commonly found distribute in the southern coast of the Andaman Sea of Thailand and near Phuket Island.

References

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