

The Status of Longtail Tuna (*Thunnus tonggol*) Resource and Fisheries in Thailand

Marine Fisheries Research and Development Bureau

Department Of Fisheries

1. Background

Marine fisheries play a very important role for the economy of Thailand in terms of the sources of incomes, employment and fishery industry establishment (e.g. fish processing, ship building industry, frozen food factories, fish meal factories). Fish products are not only the important source of protein within country but also the important export products that bring substantial income to country. Fish products of Thailand mainly come from marine capture fisheries. Catch production from Thai waters used to reach 2.83 million tons. It was because not only Thai fishers are efficient in fishing but also the geographics of Thailand supports the abundance of marine resources. Thailand locates on the Southern Indochina Peninsular with two long coasts of 2,615 km in total (i.e. 1,660 km coast along the Gulf of Thailand and 955 km coast along the Andaman Sea). Furthermore, the wide continental shelf of the coast, particularly along the Gulf of Thailand, is suitable for fishing operation. However, due to the rapid development of Thai fisheries resulting in the big increase of the number of fishing vessels, as well as the adoption of high fishing technologies that enhances fishing efficiency resulting in the quick increase of catch production, marine resources in Thai waters have been in overexploited stage. Moreover, owing to a large variety of the type and size of fishing vessels, the multi-species nature of resources, and the complicated structure of fishery industry and socioeconomic status involving with many different beneficiaries, the problems unavoidably occur both due to domestic consumption of the resources and the impact from the rules applied on international trade.

Neritic tunas are one of the important pelagic resources in Thailand. They consist of three main species, i.e. longtail tuna (*Thunnus tonggol*), the eastern little tuna (*Euthynnus affinis*), and frigate tuna (*Auxis thazard*). These species abundantly distribute in coastal areas having more than 20 meters of sea depth. According to the fisheries statistics of Thailand, the production of neritic tunas in 2007 amounted to 112,646 tons or 15.04% of total pelagic catch, and valued 3,296 million THB or 17.92% of total value of pelagic catch (Department of Fisheries, 2009). The demand of neritic tunas consumption gradually increases as they become important materials for growing canned tuna industry in Thailand. With more than 10 billion THB of annual export value of canned tuna, Thailand has been placed as the world top exporter since 1985 (Piumsomboon, 1995). Nonetheless, neritic tunas in Thai waters have been found overexploited, or utilized beyond the level of Maximum Sustainable Yield (MSY), which is 110,000 tons with the effort at MSY of 221,330 days for the Gulf of Thailand (Chullasorn, 1998) and 8,651 tons with the effort at MSY of 71,104 days for the Andaman Sea (Bhatiyasevi, 1997).

Based on the importance and high demand of neritic tunas aforesaid, the Department of Fisheries (DOF) has realized such importance of longtail tuna resource, and therefore appointed a subcommittee of longtail tuna resource management to study related issues and draft a sustainable management plan for longtail tuna in Thailand.

2. Situation and Fisheries of Longtail Tuna

2.1 Catch production and fisheries statistics of longtail tuna

The DOF generally collects marine fisheries statistics based on fishing zones, comprising zone 1, 2, 3, 4, and 5 within Thai EEZs in the Gulf of Thailand; zone 6 and 7 within Thai EEZs in the Andaman Sea; and zone A, B, C, D and E in areas beyond Thai EEZs (Figure 1). According to fisheries statistics from year 1992 to 2012, the total catch production of longtail tuna in Thailand ranges from 13,545 to 81,525 tons (Figure 2A), consisting of the catch from the Gulf of Thailand ranging from 10,012 to 79,094 tons (Figure 2B), and from the Andaman Sea ranging from 1,726 to 22,036 tons (Figure 2C). Also, the statistics clearly show that the catch of longtail tuna obtained outside Thai waters is much greater than the catch obtained in Thai EEZs. However, from 2008 onward the catch of longtail tuna obtained overseas substantially decreased as fishing contract under joint-venture arrangement for Thai fishing vessels operating in Indonesian waters was discontinued. The amount of longtail tuna caught inside Thai EEZs, on the other hand, has stably ranged from 6,453 to 9,974 tons during 2008 to 2012 (Figure 2A).

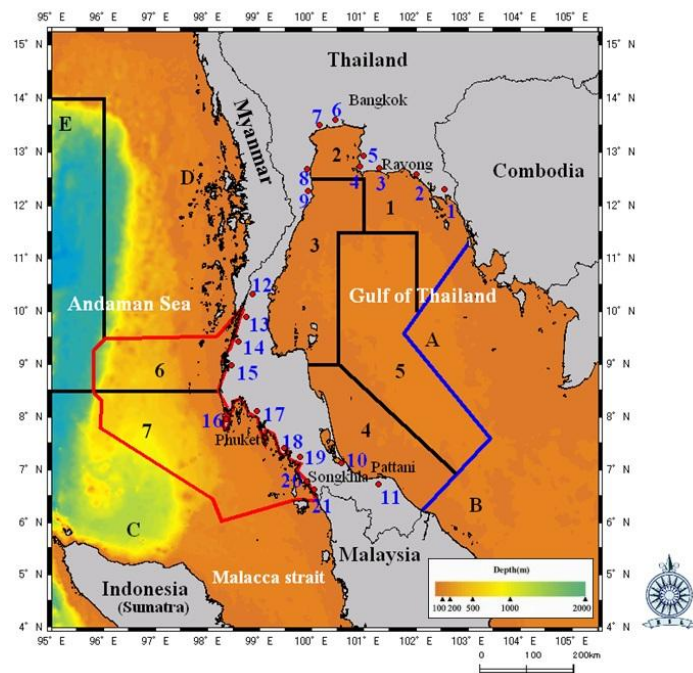


Figure 1. Fishing zones in Thai waters and adjacent areas.

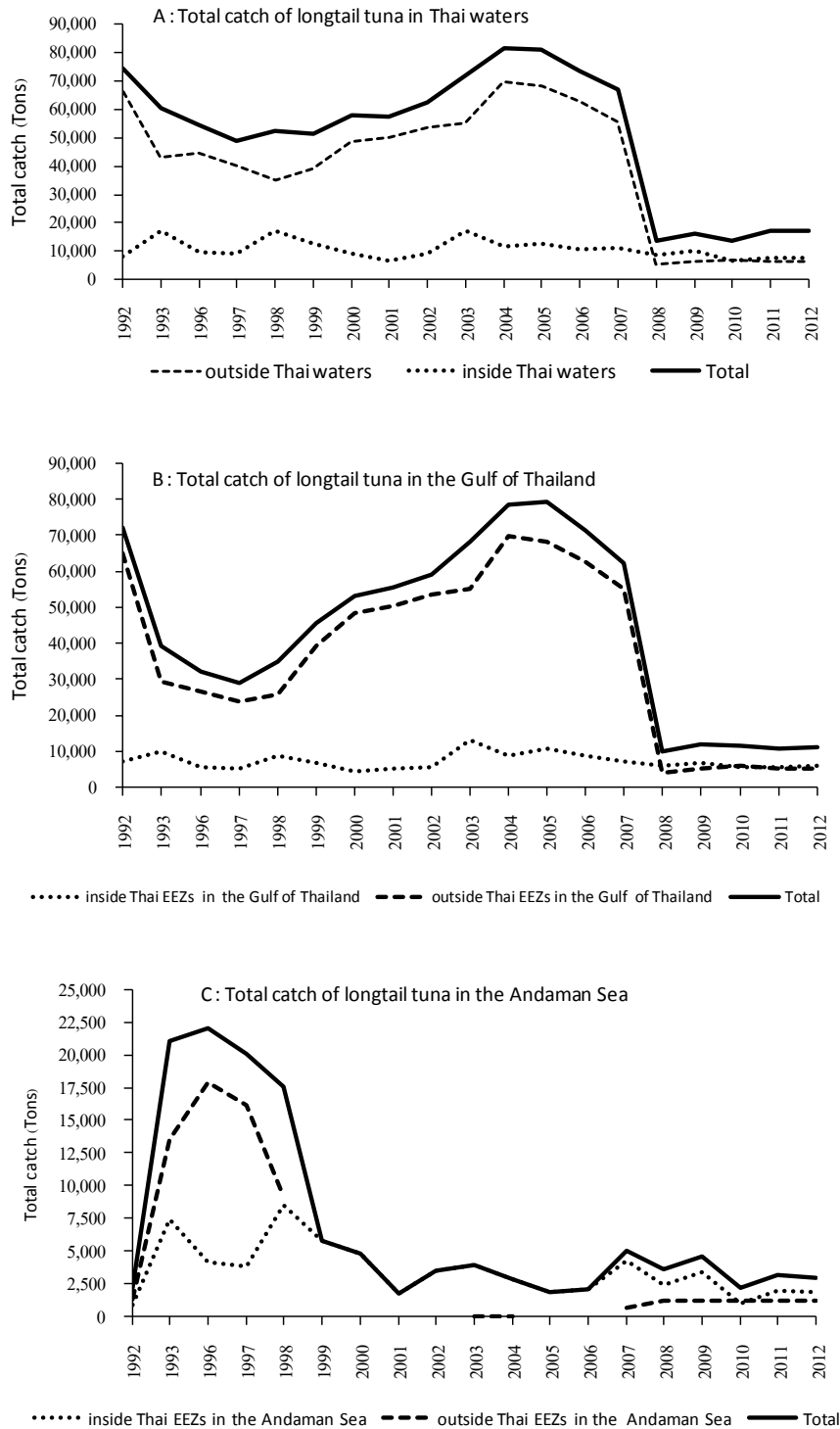


Figure 2. Total catch production of longtail tuna obtained from Thai waters and adjacent areas.
Source: Fishery Statistics Analysis and Research Group, Department of Fisheries.

2.2 Technical Study

The study on neritic tuna resources in Thai waters aims to analyze the status of resources, fisheries, and reproductive biology of neritic tunas in the areas. It has been conducted during October 2011 to September 2014. Longtail tuna is one of neritic tuna species studied. There are four research projects under this study as the following.

Research Project 1: Reproductive Biology of the Eastern Little Tuna, Frigate Tuna and Longtail Tuna in the Gulf of Thailand. For longtail tuna, it was found that the relationship between fork length (FL) and weight (W) can be presented as an equation $W = 0.012FL^{3.104}$ (FL 10.50-56.40 cm) for both sexes, $W = 0.016FL^{3.039}$ (FL 18.10-55.00 cm) for male, and $W = 0.023FL^{2.936}$ (FL 15.50-56.40 cm) for female. Sex ratio between male and female longtail tuna is 1:0.97. The minimum FL of fish having mature sexual organ (stage 3) or $L_{m(\text{observe})}$ is 27.40 cm for male and 28.80 cm for female. The size at first maturity (L_{m50} , length at which 50% of the population is estimated to be mature) is 40.77 cm for male and 42.16 cm for female (Figure 3). In terms of spawning season, it was found that longtail tuna spawns throughout the year with the peaks during February to May and July to August (Table 1).

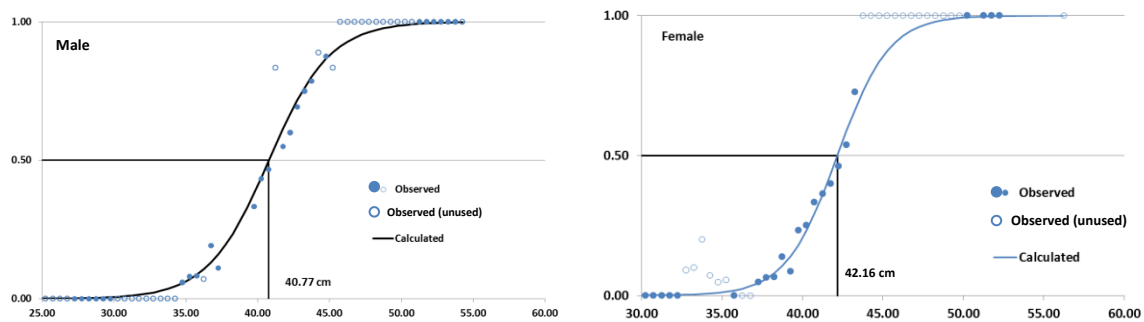


Figure 3. Size at first maturity (L_{m50}) of longtail tuna from purse seines in the Gulf of Thailand, 2012.

Research Project 2: Reproductive Biology of the Eastern Little Tuna, Frigate Tuna and Longtail Tuna in the Andaman Sea Coast of Thailand. The result showed that the relationship between FL and W of longtail tuna can be presented as an equation $W = 0.0125FL^{3.1105}$ (FL 10.00-64.40 cm) for both sexes, $W = 0.0239FL^{2.9367}$ (FL 22.70-64.40 cm) for male, and $W = 0.0251FL^{2.9187}$ (FL 18.50-58.80 cm) for female. Sex ratio between male and female longtail tuna is 1:0.76. The minimum FL of fish having mature sexual organ (stage 3) or $L_{m(\text{observe})}$ is 38.50 cm for male and 41.00 cm for female. The size at first maturity (L_{m50}) is 41.46 cm for male and 43.17 cm for female (Figure 4). It was found that longtail tuna spawns throughout the year with the peak in April (Table 1).

Table 1. Biological parameters of longtail tuna in Thai waters.

The relationships between fork length and body weight			
	Total	Male	Female
Gulf of Thailand	$W = 0.0120FL^{3.1040}$ (FL= 10.50-56.40 cm, n = 1,507)	$W = 0.0160FL^{3.0390}$ (FL= 18.10-55.00cm, n = 585)	$W = 0.0230FL^{2.9360}$ (FL= 15.50-56.40 cm, n = 568)
Andaman Sea	$W = 0.0125FL^{3.1105}$ (FL= 10.00-64.40 cm, n = 1,714 *)	$W = 0.0239FL^{2.9367}$ (FL= 22.70-64.40 cm, n = 551)	$W = 0.0251FL^{2.9187}$ (FL= 18.50-58.80 cm, n = 421)
Sex ratio (Male : Female)			
Gulf of Thailand	1:0.97		
Andaman Sea	1:0.76		
Size at first maturity			
Gulf of Thailand	Male	$L_{m(\text{observe})} = 27.40$ cm	$L_{m50} = 40.77$ cm
	Female	$L_{m(\text{observe})} = 28.80$ cm	$L_{m50} = 42.16$ cm
Andaman Sea	Male	$L_{m(\text{observe})} = 38.50$ cm	$L_{m50} = 41.46$ cm
	Female	$L_{m(\text{observe})} = 41.00$ cm	$L_{m50} = 43.17$ cm
Spawning period			
Gulf of Thailand	Throughout the year with 2 peaks in February-May and July-August		
Andaman Sea	Throughout the year with a peak in April		

Remark: * number of total samples is bigger than the combined number of male and female samples since some fish samples were too small to have sex identified.

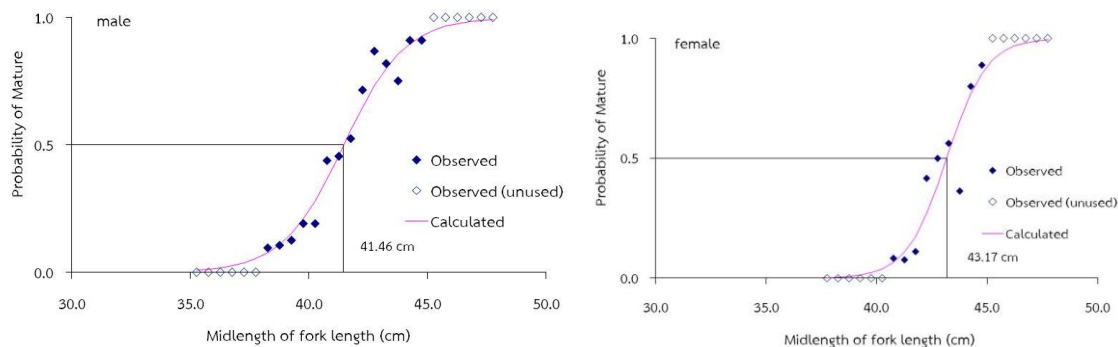


Figure 4. Size at first maturity (L_{m50}) of longtail tuna from purse seines in the Andaman Sea, 2012.

Research Project 3: The Status of Neritic Tuna Resources and Fisheries in the Gulf of Thailand. It was conducted by collecting data from different types of purse seines, i.e. purse seines with fish aggregating devices (FADs), light luring purse seines (LPS), Thai purse seines (TPS), and neritic tuna purse seines (TUNA-PS), that landed fish at fishing ports along the Gulf of Thailand during January to December 2012. The result showed that fishing grounds for longtail tuna spread from Prachuap Khiri Khan Province to Pattani Province (Figure 5). The average catch per unit effort (CPUE) of FADs, LPS, TPS, and TUNA-PS was 2,982.26, 2,666.28, 3,005.78, and 1,471.91 kg/day with 6.56, 19.73, 0.93, and 982.08 kg/day of the average CPUE of longtail tuna, respectively. Based on data assessment, the total catch production of longtail tuna obtained from the Gulf of Thailand (Zone 1, 2, 3, 4, and 5) by FADs, LPS, TPS, and TUNA-PS was 382.78, 997.35, 45.48, and 14,436.58 tons, respectively. The size (FL) of longtail tuna was found in the range of 10.00-48.00, 10.00-48.00, 15.00-54.00, and 23.00-49.00 cm, respectively (Table 2). Length distribution of longtail tuna by month is presented in Figure 6. Based on the result, it is also important to note that none of purse seines caught rare species¹.

¹Endangered, threatened and protected species.

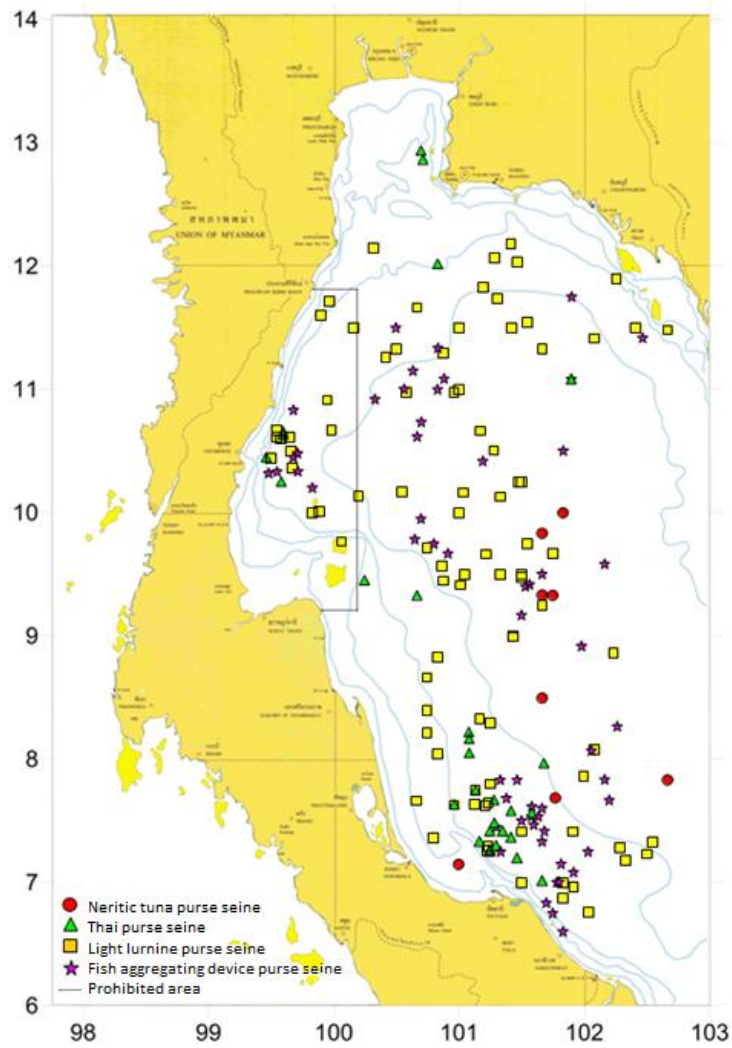


Figure 5. Fishing grounds of longtail tuna fisheries in the Gulf of Thailand.

Table 2. Longtail tuna fisheries by purse seines in the Gulf of Thailand, 2012.

	Type of purse seines			
	FADs	LPS	TPS	TUNA-PS
- Total CPUE (kg/day)	2,982.26	2,666.28	3,005.78	1,471.91
- CPUE of longtail tuna (kg/day)	6.56	19.73	0.93	982.08
- Total catch (tons)	174,014.87	134,780.45	146,982.64	21,637.08
- Total catch of longtail tuna (tons)	382.78	997.35	45.48	14,436.58
- Length of longtail tuna (cm)	10.00-48.00	10.00-48.00	15.00-54.00	23.00-49.00
- The average length (cm)	19.82	19.88	37.95	36.74

Remark: FADs = purse seine with fish aggregating devices, LPS = purse seine with light luring, TPS = Thai purse seine, TUNA-PS = neritic tuna purse seine

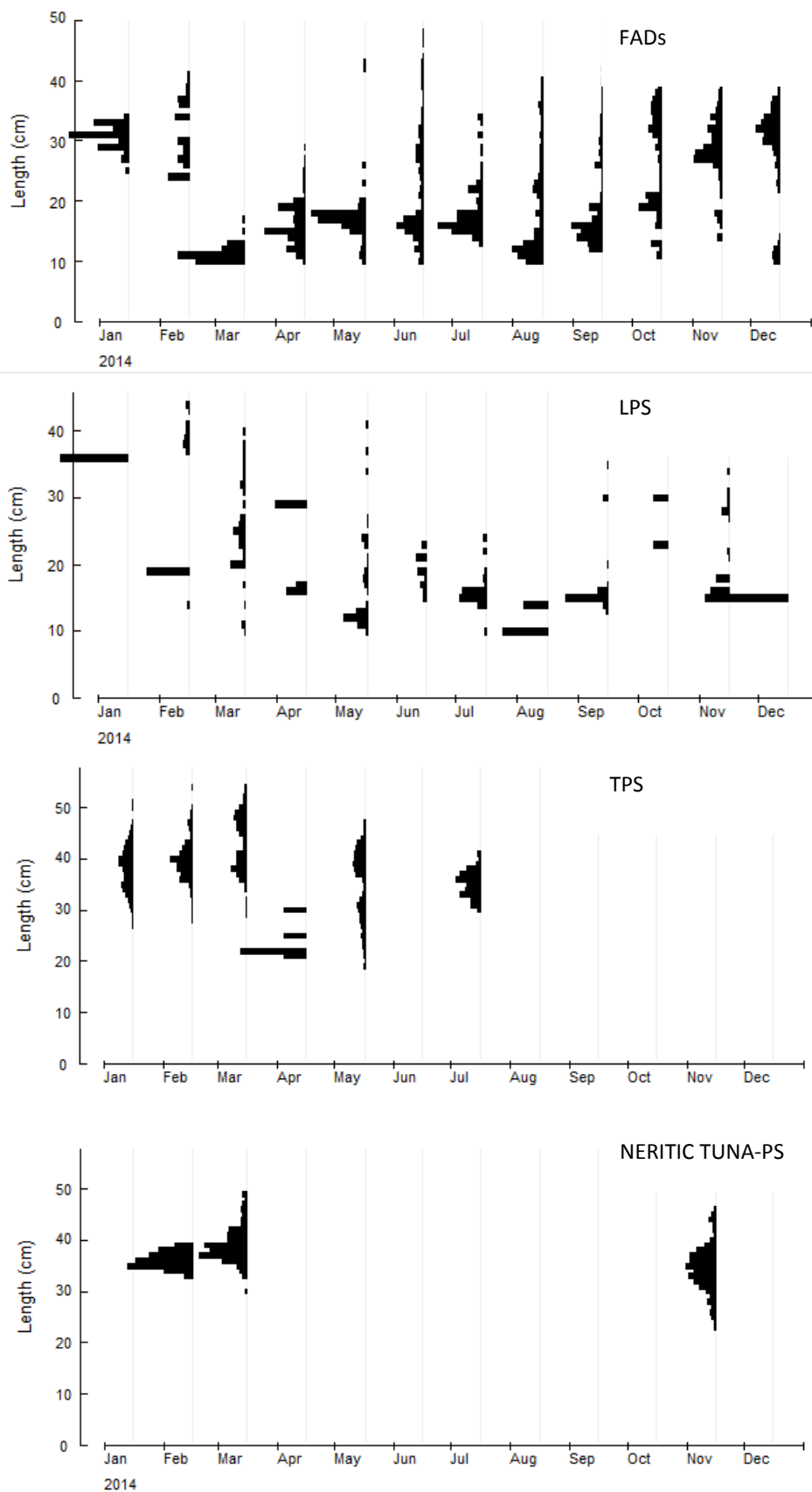


Figure 6. Length frequency of longtail tuna from purse seines in the Gulf of Thailand, 2012.

Research Project 4: The Status of Neritic Tuna Resources and Fisheries in the Andaman Sea Coast of Thailand. It was conducted by collecting data from fishing ports along the Andaman Sea

Coast during January to December 2012. The result showed that the main fishing gears for catching longtail tuna are also FADs, LPS, TPS, and TUNA-PS. The fishing grounds spread in the areas having 30-120 meter of sea depth of Ranong, Phang-nga, Phuket, Krabi, Trang, and Satun Provinces (Figure 7). The average CPUE of FADs, LPS, TPS, and TUNA-PS was 2,777.00, 2,128.00, 2,851.00, and 2,106.00 kg/day with 101.07, 77.42, 89.47, and 1,339.42 kg/day of the average CPUE of longtail tuna, respectively. Based on data assessment, the total catch production of longtail tuna obtained from the Andaman Sea (Zone 6 and 7) by FADs, LPS, TPS, and TUNA-PS was 1,710.10, 1,407.50, 837.44, and 1,076.75 tons, respectively. The size (FL) of longtail tuna was found in the range of 13.50-52.50, 10.00-70.00, 14.00-48.50, and 33.50-54.50 cm, respectively (Table 3). Length distribution of longtail tuna by month is presented in Figure 8. The result of this study also confirms that none of purse seines caught rare species.

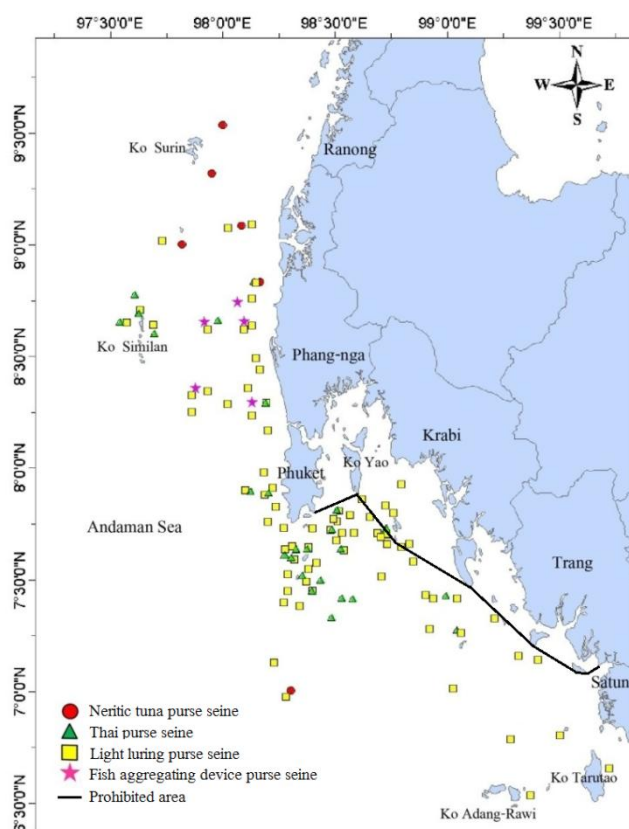


Figure 7. Fishing grounds of longtail tuna fisheries in the Andaman Sea Coast of Thailand.

Table 3. Longtail tuna fisheries by purse seines in the Andaman Sea, 2012.

	Type of purse seines			
	FADs	LPS	TPS	TUNA-PS
- Total CPUE (kg/day)	2,777.00	2,128.00	2,851.00	2,106.00
- CPUE of longtail tuna (kg/day)	101.07	77.42	89.47	1,339.42
- Total catch (tons)	46,986.84	38,687.04	26,685.36	1,990.17
- Total catch of longtail tuna (tons)	1,710.10	1,407.50	837.44	1,076.75
- Length of longtail tuna (cm)	13.50-52.50	10.00-70.00	14.00-48.50	33.50-54.50
- The average length (cm)	37.02	33.16	27.22	39.35

Remark: FADs = purse seine with fish aggregating devices, LPS = purse seine with light luring, TPS = Thai purse seine, TUNA-PS = neritic tuna purse seine

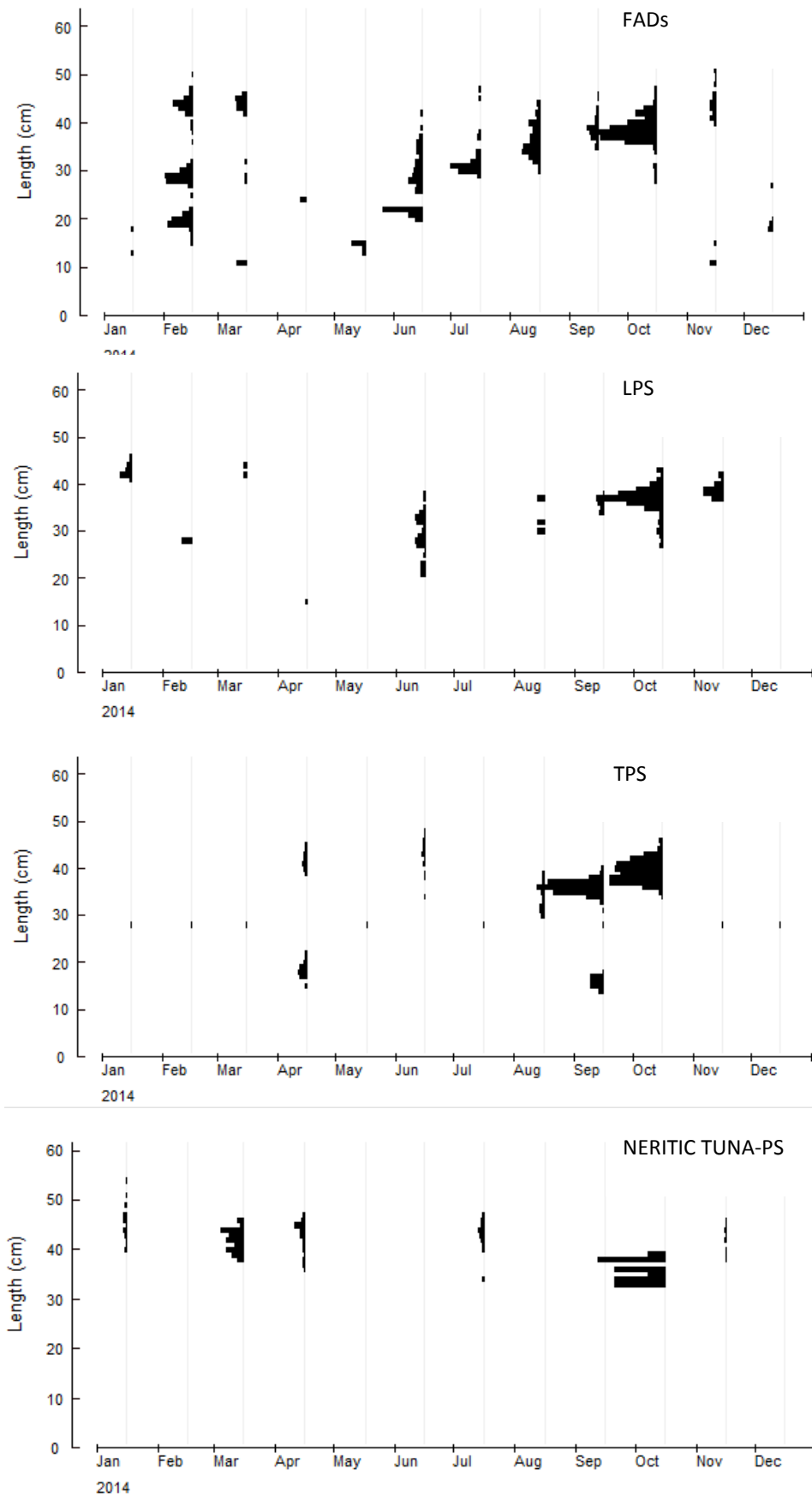


Figure 8. Length frequency of longtail tuna from purse seines in the Andaman Sea, 2012.

Conclusion and Recommendation from Technical Study

According to the study results on biology, resource and fisheries status of longtail tuna described earlier, it can be seen that biology data of longtail tunas obtained from the Gulf of Thailand and the Andaman Sea is slightly different. The main fishing gear for longtail tuna is TUNA-PS (3.7-4.0 inch of mesh size) that basically use sonar to spot the fish schools (targeting big pelagic species, e.g. neritic tunas) instead of using FADs or lights to lure fish. Based on the study, the percentage of longtail tuna caught by TUNA-PS operating in the Gulf of Thailand and the Andaman Sea was not big different, accounting 66.72% and 63.60% of total catch, respectively. Additionally, it can be concluded that tunas caught by TUNA-PS are appropriate for utilization as most of them have the size larger than the size at first maturity. For FADs, LPS, and TPS that use the net with 1-1.7 inches (or 2.5 cm) of mesh size, and target small pelagic (e.g. mackerels, sardines, round scads, hardtail scads, yellow-stripe scads), these gears are also able to catch longtail tuna but in a very small portion, less than 5% of total catch. In terms of endangered, threatened and protected species, they have not been found in the catch of purse seines fisheries.

Since Thailand is in tropical zone where having multi-species nature, marine fisheries management of Thailand, therefore, focuses on the implementation of closed seasons, closed areas, and gear restrictions rather than the management measures applied on single species. In this sense, in order to manage longtail tuna resource more effectively, TUNA-PS as the main fishing gear for this species should be managed separately from other types of purse seines. This is also based on the fact that TUNA-PS is clearly different from other purse seines all in terms of fishing ground, gear and fishing method used, and target species.

2.3 Resource Management of Longtail Tuna in Thai Waters

Currently, there is none of fishery law or regulations specially governing longtail tuna fisheries. Nonetheless, a number of legislation essentially enforced by six Marine Fisheries Management Centers nationwide can be beneficial for the status of longtail tuna resource. Such legislation is as follows:-

1. Notification of the Ministry of Agriculture and Cooperatives Re: Prohibition of certain kinds of fishing appliances in spawning and breeding seasons in some localities of Prachuap Khiri Khan, Chumphon and Surat Thani Provinces, given on 24 January B.E. 2550 (2007)
2. Notification of the Ministry of Agriculture and Cooperatives Re: Prohibition of certain kinds of fishing appliance in spawning and breeding seasons in some localities of Phuket, Phangnga, Krabi and Trang Provinces during specified period, given on 24 October B.E. 2551 (2008).
3. Notification of the Ministry of Agriculture and Cooperatives Re: Prohibition of surrounding nets having meshes of smaller than 2.5 cm in width in fishing at night, given on 14 November B.E. 2534 (1991).

The DOF has strongly been aware of the importance of longtail tuna resource in Thai waters. Apart from the fishery law and regulations enforced, the DOF has conducted researches on neritic tuna resources since 1981. In addition, the catch production of longtail tuna is continuously recorded and annually published in national fisheries statistics of Thailand. Moreover, Marine Fisheries Research and Development Bureau on behalf of the DOF assigns the concerned authorities to constantly monitor purse seine fisheries in order to examine the state of important pelagic

resources, including neritic tunas like longtail tuna. Subsequently, all of relevant data and information obtained will be together analyzed and used in preparing the sustainable management plan for longtail tuna of Thailand.

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