Review on the status of small tunas along the Andaman Sea Coast of Thailand

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Introduction

Rapid development of Thailand's fisheries in the past two decades has successfully put the country into the world's frontrunner in fishery industry. In 1996, 78 % of the total fishery production came from the sea, of which the Gulf of Thailand had a 70 % share and the Andaman Sea contributed 30 %. Nevertheless, the leap in fishery development has led to overexploitation of fishery resources, particularly for demersal fishes and invertebrates. At the same time, the catch of pelagic fish has increased significantly. Pelagic catch accounted for 33 %-38 % of the marine fishery harvest during 1991-1996, whereas the catch was only 24 %-28 % during 1979-1982. At the time the catch of pelagics in the Andaman Sea was about 100,000-288,195 metric tonnes (t) in 1989-1996, compared with 30,000-44,000 t during the period 1979-1982.

Among these, small tuna are gaining more economic importance, having become the main target species for Thai fishermen since 1982 because of attractive prices offered by tuna canneries. According to Department of Fisheries statistics, the total catches of small tunas in Thailand was 169,071 t in 1993, four times the 49,307 t in 1982 (Department of Fisheries, 1985 and 1996). Presently, Thailand is the main supplier of canned tuna to foreign markets throughout the world. However, the rapid development may lead to the deterioration of tuna fisheries in Thailand. Thus, it is urgent to study the current situation and status tuna stocks to determine any current problems.

Development of small tunas fisheries

Development of pelagic fisheries in Thailand resulted from high efficiency purse seines, expansion to new fishing grounds both nearshore and offshore and new fish luring techniques. For example, drifting Payao or fish aggregating devices (FADs) or coconut fronds are used for day-time catching, while lighting techniques especially light luring purse seine (LPS) were developed in 1973 by installing a power generator on board the fishing vessels. This technique has become a predominant fishing gear for mixed target pelagic species since 1982. Subsequently, larger purse seine boats (tuna purse-seine, TUN) were developed to raise the fishing capacity for catching coastal tunas in deeper water. Since 1985, the vessels have been fitted with electronic equipment such as depth recorder and sonar. In 1990, installation of labour saving devices on board fishing vessels has been very popular. The development resulted in a spectacular increase in small tuna captures from approximately 1,887 t in 1971 to 43,361 t in 1996. Small tunas along the Andaman Sea are caught by purse seine and king mackerel gill net. The fishermen utilize modern fishing gears and have the capacity to fish both inshore and offshore. Moreover, the ships are capable of staying at sea several days. It is common for them to use ice to preserve their catch.

Fishing gears

Purse seiners : Purse seiners along the Andaman Sea coast are basically classified into regular purse seines (RPS) and Chinese purse seine (CPS). RPS consist of Thai purse seine (TPS), green purse seine (GPS), fish aggregating device (FAD), light luring purse seine (LPS) and tuna purse seine (TUN) Purse seiners whose length is between 18-25 m in length (LOA) have been the most popular on the Andaman coast since 1994. The common mesh size use in TPS, LPS, FAD are approximately 2.5 cm, while the length and depth of the net range from 500-1,200 m and 50-

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150 m respectively, and number of crew is in the range 25-40 persons. For CPS, the mesh size is about 2.5 cm, 300-500 m in length and 50-70 m in depth and the crew number is 20-30 persons. The length, depth and mesh size of GPS net are 500-1,300 m, 60-140 m and 3.8-4.3 cm respectively, and crew number is 25-40 persons.

For the TUN, the boats are longer than 24 m, the length of the nets is between 1,200-1,600 m, with a depth of 120-150 m, and 9.4 cm mesh size. The number of crew is between 35-45 persons. Normally, TUN operate further offshore in November to May during the Northeast monsoon. The gear can be substituted to both LPS and TPS to catch other pelagic species in coastal or offshore areas by using a net with mesh size of 2.5 cm.

RPS and CPS are widely registered gears along the Andaman Sea. The number of registered CPS was 27-50 units from 1970-1974. The numbers of this gear then showed a steep decline. There were only 37 units registered in 1974 and 17 in 1975. During 1975-1991, the number of registered CPS was reported at merely 12-24 units. During 1992-1996 there were no recorded CPS, maybe due to the CPS being registered as RPS. The registered RPS showed a steady increase from 54 in 1970, reached a peak of 273 in 1994. Based on the annual registration records during the past 26 years, there were lesser than 100 units of the gear during 1970-1976. During 1977-1986, the number of registered RPS gears was estimated at 115-155 units. And recently, from 1987-1996 the numbers of the gear were reported at 198-273 units (Fig1).

King mackerel gill net: The number of king mackerel gill net (KMG) was reported at 13-61 units during 1970-1985. The number of KMG hit a peak in 1993, when the gear was reported at 73 units (Fig1). The common mesh size is 6.3-8.0 cm, with 12-20 m depth and 1,000-6,000 m length. The number of crew is 3-8 persons. KMG is used along the coast at depths of 20-50 m. This gear targets small tunas and spanish mackerel (Chantawong *et al*., 1994).

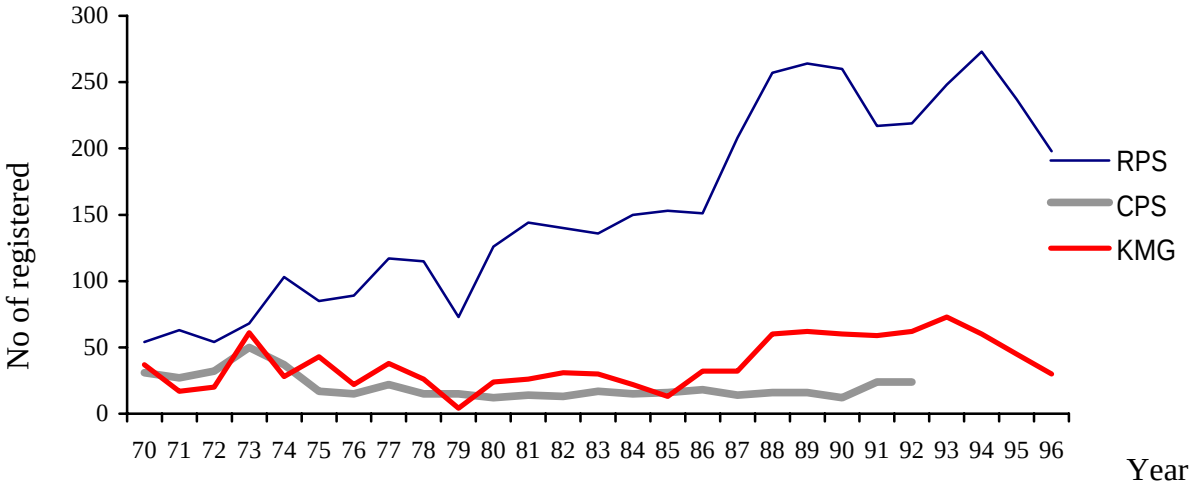

Fig.1: No. of registered of purse seiners (RPS&CPS) and KMG in the Andaman Sea during 1970-1996.

Source: Thai Fishing Vessels Statistics, Department of Fisheries1972-1999.

Species composition

The small tunas are pelagic species which are widely distributed throughout tropical waters. The species commonly found in the Andaman Sea are kawakawa or eastern little tuna (*Euthynnus affinis*), frigate tuna (*Auxis thazard*), longtail tuna (*Thunnus tonggol*) and skipjack tuna (*Katsuwonus pelamis*). Yellowfin tuna (*Thunnus albacares*), bullet tuna (*Auxis rochei*), Indo-Pacific bonito (*Sarda orientalis*) and dogtooth tuna (*Gymnosarda unicolor*) are occasionally caught in a less quantity by TPS, LPS and CPS gears in the Andaman Sea. Longtail tuna, kawakawa and frigate tuna are dominant species both in the Gulf of Thailand and the Andaman Sea. Catches are often constituted of the three species, particularly mixed schools of kawakawa and frigate tuna. Prior to 1979, catch statistics of Thailand classified small tunas as “bonito” without breakdown into species (Table 1). From 1980 onward, tunas

were separated into two groups as longtail tuna and bonito (consisting of kawakawa and frigate tuna). Only small numbers of skipjack and bullet tuna are caught by KMG, troll line and sport fishing.

Size composition.

Kawakawa The size caught by purse seines is 10-50 cm folk length (FL) and modes in the catches are at 21-23 cm, 31-36 cm and 40-43 cm by TPS and 14-17 cm, 19-24 cm and 26-29 cm by LPS, respectively. The juveniles entered the TPS fishery in January and August in 1996.

Frigate tuna The size caught by purse seines is 14-41 cm FL, with juveniles caught by TPS and LPS fisheries in January-February and May in 1996. Modes in the catch are at 16-19 cm, 23-27 cm and 32-36 cm by TPS, 16-19 cm, 23-26 cm, 35-37 cm by LPS and 29-36 cm for TUN.

Longtail tuna The size caught by purse seines was 27-52 cm. The mode of catch FL is at 36-40 cm.

Table 1 Total catch (t) of small tunas in the Andaman Sea, 1971-1996.

Year	Total	kawakawa & frigate tuna	longtail tuna
1971	1,887		
1972	1,691		
1973	1,704		
1974	1,210		
1975	3,017		
1976	1,827		
1977	1,511		
1978	2,095		
1979	2,133		
1980	788	605	183
1981	2,076	470	1,606
1982	9,644	2,534	7,110
1983	3,828	472	3,356
1984	7,369	1,460	5,909
1985	4,208	3,249	959
1986	4,904	4,167	737
1987	12,835	11,451	1,384
1988	8,014	5,531	2,483
1989	13,573	9,222	4,351
1990	16,783	14,145	2,638
1991	19,034	11,531	7,503
1992	11,767	9,627	2,140
1993	12,715	6,164	6,551
1994	31,182	16,442	14,740
1995	42,611	26,322	16,289
1996	43,361	21,325	22,036

Source: 1971-1984 and 1994-1996 from Department of Fisheries 1972-1986 and 1995-1999. 1985-1993 from the sampling survey conducted by Andaman Sea Fisheries Development Center.

Fishing ground and seasons

Fishing grounds for small tunas have been expanding extensively along the coast and offshore, where the depth of sea is more than 40 m (Fig.2). Fishing is all year round, while the high season is from November to May in the Northeast Monsoon (Boonragsa, 1990).

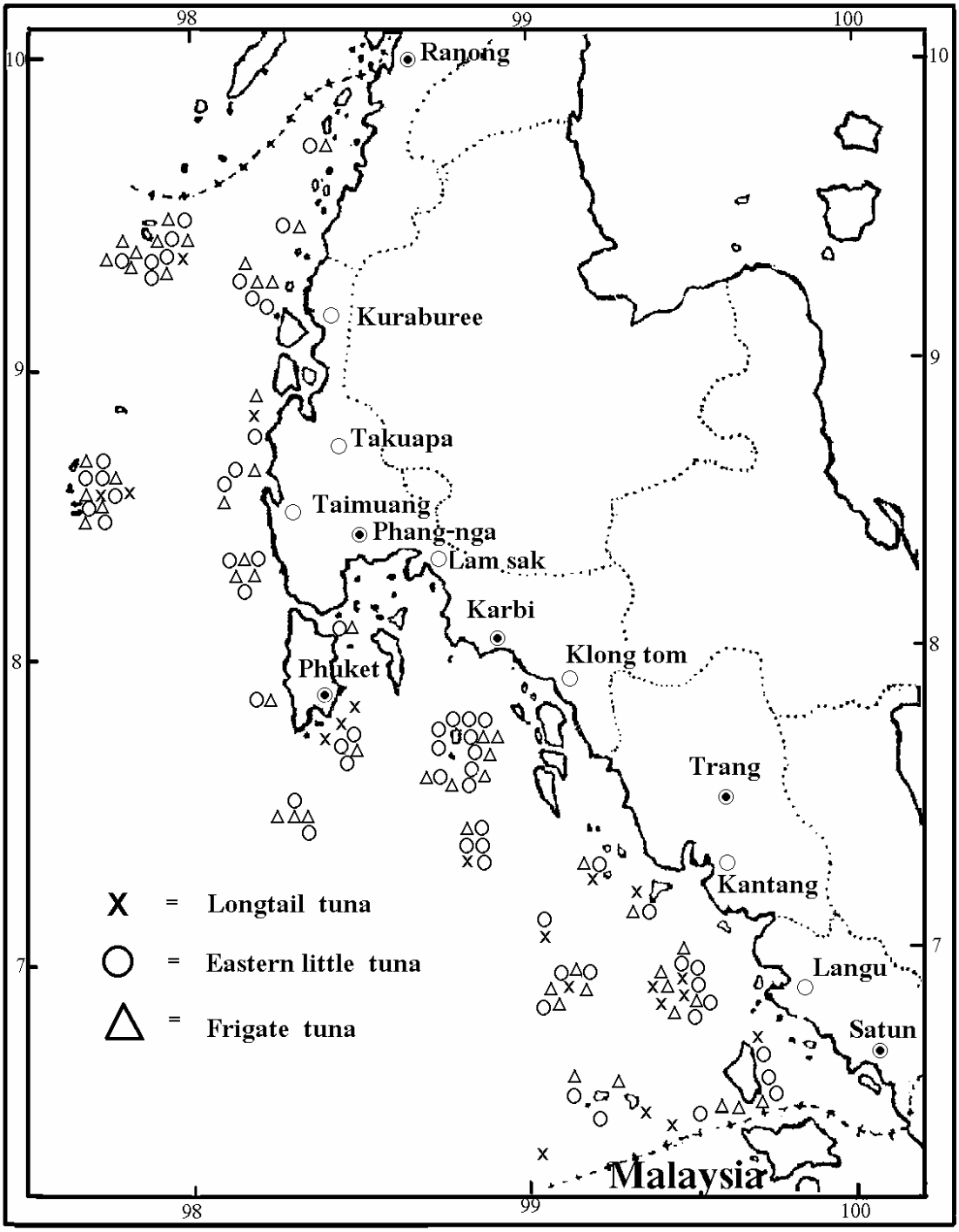

Fig. 2 Fishing grounds of small tunas on the West Coast of Thailand, 1986-1987 (Boonragsa, 1990).

Production and catch rate

Boonragsa and Boonsuk (1998) reported the production and catch rate of pelagic species caught by purse seines during the period 1985-1993. Small tunas are exploited by LPS, TPS, GPS,TUN and Contracting Parties in proportion of approximately 65 %, 21 %, 6 %, and 2 % respectively.

The annual production showed an increasing trend which a fluctuated in some periods from a low of 4,208 t in 1985 to a peak of 19,034 t in 1991, then declined to 11,767 t in 1992, production doubling from 1994 to 1996 (Table 1).

By using purse seines as standard gears, annual CPUE shows a fluctuation at the level of 100-316 kg/day. At the same time the annual fishing effort shows an upward trend from the low of 36,204 kg day in 1986 to a peak of 64,378 kg day in 1990, declining to 40,291 kg day in 1993. (Table 2 and Fig.3)

Table 2 Catch rate and standard fishing effort of small tunas by purse seiners in the Andaman Sea Coast of Thailand during 1985-1993.

Year / Purse seiners	1985	1986	1987	1988	1989	1990	1991	1992	1993
TPS	1,278	723	252	842	1,064	2,489	7,173	3,796	3,612
LPS	1,634	3,089	9,968	5,244	10,058	12,988	9,539	7,041	8,354
GPS	1,146	944	1,259	1,239	456	110	1,034	121	268
CPS	150	148	598	80	105	109	107	123	211
FAD	-	-	-	-	8	109	36	-	108
TUN	-	-	758	609	1,882	978	1,145	686	162
Total catch (ton)	4,208	4,904	12,835	8,014	13,573	16,783	19,034	11,767	12,715
CPUE(kg/day)	100	135	303	181	258	261	315	274	316
Effort (days)	42,147	36,204	42,324	44,220	52,529	64,378	60,379	42,992	40,291

Source: 1985-1993 from the sampling survey conducted by Andaman Sea Fisheries Development Center.

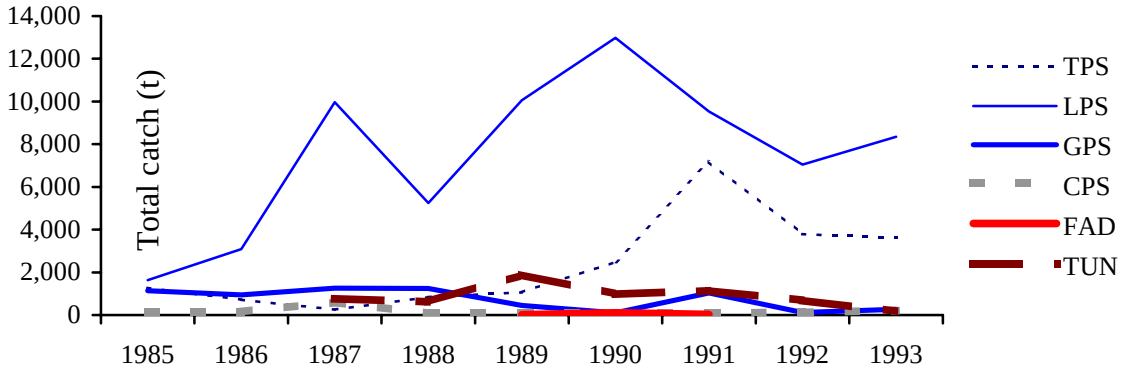

Fig. 3 Annual catch of small tunas by purse seiners in the Andaman Sea during 1985-1993 (Boonragsa and Boonsuk, 1998).

Maximum sustainable yield and optimum fishing effort

Boonragsa and Boonsuk (1998) reported the annual production, catch rate of standard gear and standard fishing effort on small tunas during 1985-1993. By applying a Schaefer model to estimate the maximum sustainable yield (MSY) and the optimum fishing effort, the result showed that those small tunas have not been overfished. In addition, small tunas are widely migratory species and have a better chance to escape from one fishing ground to another.

Interaction between fisheries

Interactions have not yet appeared between fisheries for tuna along the coast as there is no gear specifically designed for catching tuna. Only a small number of tuna purse seiner is targeting only offshore tuna, on fishing grounds separate from those where other purse seiners operate.

Conclusion and discussion

The annual production of small tunas in the Andaman Sea varied from 788 to 3,016 t during 1971-1980. It shared about 4 percent in total pelagic catch. After 1981, the production increased rapidly from 2,076 to 43,361 t in 1996. There were about 10 percent of small tunas in pelagic catches during 1985-1993. The main species of small tunas caught commercially in Thai Waters are kawakawa, frigate tuna and longtail tuna. The other species of tunas, including skipjack, yellowfin tuna, dogtooth tuna and bullet tuna are caught in a less quantity

in the Andaman Sea. The size of longtail tuna, kawakawa and frigate tuna caught by LPS were smaller than those caught by TPS and KMG (Boonragsa, 1990; Poreeyanond, 1998).
The two main fishing gears for catching small tunas in Thailand are KMG and purse seines, which consist of LPS, TPS, TUN, GPS, FAD and CPS. Purse seine fisheries were initially developed to catch small pelagic fish other than small tunas. In 1982, the gears targeted small tunas along with the expansion of tuna canning industry. The good fishing season for small tunas in the Andaman Sea is during the northeast monsoon period.
It is clear that small tuna resources are in satisfactory condition. The stock size of tuna cannot be estimated from an area limited only to Thai waters because tunas are highly migratory species. They migrate beyond the Thai waters to the entire Malacca Strait or throughout the Andaman Sea. More studies are required to explain their distribution. To assess the stock size of tuna, an appropriate production analysis should be carried out based on data from the whole stock distribution area.
Based on the fishing effort, especially of purse seiners, it is considered that tuna stocks entering the fishing ground on the west coast of Thailand are unlikely to be affected by the present fishing efforts in this area.

References

Boonragsa, V. 1990. Present status of small tunas fisheries and resources on the west coast of Thailand, Andaman Sea. Paper presented at the Expert Consultation on Stock Assessment of tunas in the Indian Ocean,2-6 July 1990, Bangkok, Thailand. 25pp.

Boonragsa, V. and S. Boonsuk. 1998. Pelagic fisheries and resources along the Andaman Sea Coast of Thailand. Andaman Sea Fisheries Development center, Marine Division, Department of Fisheries. 52pp.

Chantawong, P., T. Chantawong and N. Ubonsuwan. 1994. King mackerel gillnet fishery along the Andaman Sea Coast of Thailand. Technical paper no. 29/1994. Marine Resources Survey Unit, Andaman Sea Fisheries Development Center, Marine Division, Department of Fisheries. 40pp.(in Thai)

Department of Fisheries. 1972-1999. Thai fisheries vessels statistics 1970-1994. Fisheries Economics and Information Technology Sub-Division, Fisheries Economics Division, Department of Fisheries. (in Thai).

Department of Fisheries. 1982-1998.The marine fisheries statistics 1983-1995 base on the sample survey. Fisheries Economics and Information Technology Sub-Division, Fisheries Economics Division, Department of Fisheries. (in Thai).

Department of Fisheries. 1999. Fisheries Statistics of Thailand 1996. Fisheries Economics and Information Technology Sub-Division, Fisheries Economics Division, Department of Fisheries. (in Thai).

Poreeyanond, D. 1998. Review of tuna fishing in Thailand. Paper presented at the 7th Expert Consultation on Indian Ocean Tunas, 9-14 November 1998, Victoria, Seychelles. 13pp.