

TUNA LONGLINE LANDINGS IN PHUKET, THAILAND, FROM 1994 TO 2006

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ABSTRACT

Since the start of the longline fishery landed at Phuket fishing in 1994 have expanded considerably in terms of landing, number of trip and landing per trip. Port sampling was made to collect fishing and biological data of tunas.

*Five hundred and seventy surface tuna longline fleets (Taiwanese, Chinese and Indonesian) have been recording at Phuket fishing port during 1994 to 2006. Nowadays, the Chinese longline fleet wasn't unloaded at Phuket since May 2005. The annual landing and value of tunas at Phuket, Thailand varies from 1,415 mts and 3.6 million US\$ to 5,591 mts and 20.57 million US\$ during 1994 to 2006. The trend of landing and value from longliner was a slight increasing since 1994 (622 mts, 2.07 million US\$) to 2005 (5,591 mts, 19.47 million US\$). Whereas, the fishing ground occurred in the Eastern Indian Ocean when the productive period was pronounced during November to March (northeast monsoon). The target species reported yellowfin, followed by bigeye, bill fish (Striped marlin (*Tetrapturus audax*), blue marlin (*Makaira mazara*), black marlin (*M. indica*), Indo-pacific sailfish (*Istiophorus platypterus*) and shortbill spearfish (*Tetrapturus angustirostris*), swordfish (*Xiphias gladius*) and miscellaneous species (shark, Molar spp., *Lepidocybium* spp., *Coryphaena* spp., *Scomberomorus* spp., *Ruretlus pretiosus*, *Sphyraena* spp., *Taractichtis* spp., *Katsuwonus pelamis*). Taiwanese and Indonesian fleets caught the yellowfin as the main composition while bigeye was the main target species of Chinese fleet. The marketing system and vessel information have reported in present study.*

INTRODUCTION

Tuna fisheries in the Indian Ocean took off in 1973 when the French, Russian, Japanese and Taiwanese fleets their commenced longline, purse seine and pole-and-line fisheries. The Taiwanese, Chinese and Indonesian fleets have developed longline fishing techniques in recent years in the Eastern Indian Ocean. Large tuna fish caught by longline is highly profitable as its meat is suitable for making premium sashimi and in high demand in the Japanese markets. These vessels normally landed their catch in Singapore, Malaysia and Indonesia until 1994. Since then, they preferred to land their catches at the Phuket fishing port which has well developed infrastructures as the port and accessible to the international airport.

At the 1999 Indian Ocean Tuna Commission (IOTC) meeting, held in Kyoto (Japan), the implementation of sampling programmes in different ports of the Indian Ocean was strongly recommended, the primary objective being to monitor the activities of IUU (illegal, unregulated and unreported) longliners operating in the Indian Ocean. Nine Indian Ocean ports were selected as primary targets for the implementation of sampling programmes, namely Bena, Cilacap and Jakarta (Indonesia), Cape Town and Durban (South Africa), Pinang (Malaysia), Phuket (Thailand), Port Louis (Mauritius) and Singapore (Herrera *et al.*, 2000). Since then, IOTC has supported the Department of Fisheries (DOF) in implementing the Sampling Program on Tuna Longline Vessels Unloading in Phuket in April 2000. Under these circumstances, the objective of this study is to improve data collection on tuna longline fisheries in the East Indian Ocean as well as information on the activities, landing catches, catch breakdown by species caught by tuna longliners and unloaded in Phuket; which is considered to be important and is reviewed below.

MATERIALS AND METHODS

Port-sampling was conducted to collect fishing and biological data of tuna, tuna-like and by-catch species: e.g., landing metric ton, mt) and effort (number of trips). They usually include information concerning the vessel (name, flag, and registration number), fishing ground, the vessel's agent, the dates of unloading, and the amount unloaded (processed weight in metric tonnes (mts)) and value (in million US\$) by species from interview data, the shipping agencies, Fish Marketing Organize(FMO) and Customs in Phuket. The staff of the Andaman Sea Fisheries Research and Development Center (AFRDEC) conducted the samplings monthly at the Phuket fishing port since August 1994. In addition, the methodology employed and all the forms used in fishery interviews were provided by IOTC since April 2000.

Estimation of the number of landings in Phuket from August 1994 to December 2006: The number of landings per flag retrieved from the Customs in Phuket was used as basis for the calculation of the total landing unloaded in this port. These figures were compared with records provided by other organizations (FMO) or directly from the shipping agencies consigning the vessels. The overall number obtained once the landings from all sources combine together showed much higher than those in the Customs records. The number of landings per flag could be assessed from AFRDEC (document for Certificated of Origin) and Customs being the information available quite aggregated. Landing catch, catch by species and number of trip and fishing ground were analyzed and illustrated by Excel, Access, ArchView and Wintuna (database program of IOTC) software.

RESULT AND DISCUSSION

Fisheries information

Number of longline fleets, and vessel and gear characteristic had reported by previous studies (Chantawong *et al.*, 1999; Nootmorn and Herrera, 2001; Nootmorn *et al.*, 2002b) from 1994 to 2002. Table 1 show a summarized of vessel characteristic each fleet during 1994 to 2006. In 1994, 200 Taiwanese vessels started to unload at Phuket, followed by 20 Chinese vessels since 1996 and 17 Indonesian vessels since 1999. The update of name list of fresh tuna longline in 2006 reported 570 vessels, mainly from Taiwan, Indonesian and China. In May 2005, the Chinese longline stopped to unload in Phuket.

Monofilament was used for the line of their longliners. Number of hooks ranged from 600 to 1,800 depending on the size of fishing vessels, nationality and fishing condition. The average number of hooks per basket varied 5 to 6 while type of bait were live milk fish, frozen squid, frozen scad and saury. Whereas, the target species are usually stored in storage cold with ice located at front of vessel, others fish (e.g. skipjack, shark, miscellaneous species) are stored in the second hold behind the vessel. Their fishing grounds were located from latitude 15° N to 10° S and longitude 67° to 95° E, the Eastern Indian Ocean (Fig. 1). Fishing ground of Taiwanese fleet was showed the highest distribution, followed by Indonesian and Chinese fleets.

Table 1 Longline vessel and gear characteristic by nationality from 1994 to 2001. Symbol: CHN = Chinese, IDN=Indonesian, TWN=Taiwanese.

Vessel Characteristics		GRT		LOA (m)		Fish CC (t)		Dist Buoys		No Hooks between Buoys			Total no Hooks			Average no Radio Buoy
Flag	Made of	Min	Max	Min	Max	Min	Max	Min	Max	Avg	Min	Max	Avg	Min	Max	Buoys
CHN	Steel/ferro/wood/fiber	35	150	25	33	8	110	280	455	5	4	9	1,015	600	1,400	8
IDN	Fiber glass/steel/wood	29	127	20	37	40	40	168	168	6	4	9	1,200	1,200	1,200	9
TWN	Fiber glass/steel	11.53	79	20	38	8	9	60	120	5	4	6	1,427	800	1,800	10

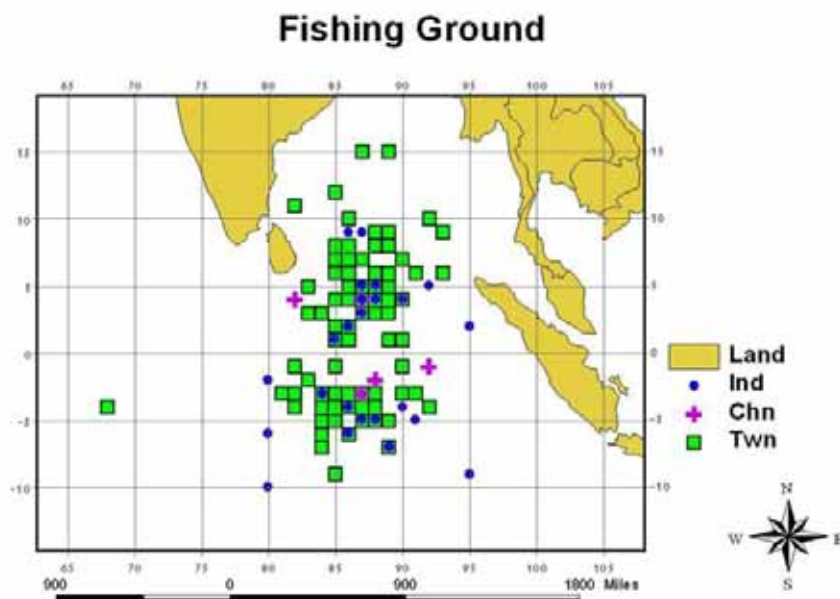


Fig. 1 Fishing ground of tuna longline fleets in the Eastern Indian Ocean.

Symbol: CHN = Chinese, IDN=Indonesian, TWN=Taiwanese.

Pattern of tuna landing and fishing effort

The total landings and value of tuna fisheries from (purse seine and longline (processing weight)) during 1994 were estimated to be 25,108 mts and 26.36 million US\$. The main contribution of total landing in Phuket unloaded from purse seine fleets during 1994 to 2000. Since then, the longliners have represented 56 and 82 percent of total landings and total value, respectively, in 2001. The trend of longline landings and value showed a slight increase from 1994 to 2006 (Table 2 and Nootmorn *et al.*, 2000a).

Total landing and effort of longliner showed the increasing trend during 1994 (622 mts and 72 trips) to 1999 (4,373 mts and 883 trips), decreased awhile in 2000 (3,118 mts and 665 trips). The trend of total catch landing increased again from 2001 to 2005 (4,397, 4,997, 4,996, 5,317 and 5,953 mts), and decreased again in 2006 (4,853 mts). In the meantime, the number of trip decreased slightly from 2001 to 2002 and decreased obviously during 2003 to 2006 (876, 816, 563, 582, 517 and 442 trips) in Fig.2, cause of charging of the fishing activity at sea. Due to oil crisis, all of longliners had been capture and carried the catch from their own vessel and other by transshipment at sea since July 2003 to present. The main target of this gear is yellowfin (58 %), bigeye (28 %), bill fish (*Makaira* spp., *Tetrapturus* spp, *Istiophorus* spp.) (7%), sword fish (5%) and miscellaneous species (Shark, *Lepidocybium* spp., *Coryphaena* spp., *Thunnus alalunga*, *Molar* spp., *Rurellus pretiosus*, *Sphyrna* spp. and *Taractichtis* spp.) (2%) during 1994 to 2006.

The trend of total number of longliners was increased from 1994 (66 vessels) to 2002 (280 vessels), the highest peak showed in 2001 (297 vessels). Taiwanese fleet share the main proportion (55-100% of total number of vessel) as first fleet unloaded at Phuket since 1994, followed by Chinese vessels (15-37 %) since 1996 and Indonesian fleet (7-12 %)since 1999 (Nootmorn, *et al.*, 2002b). The present study, Taiwanese fleet (74-201 vessels) has still the main proportion, followed by Indonesia (17-93 vessels)and Chinese fleets (no found -69 vessels) during 2002 to 2006 (Fig 3). And, the Chinese fleet wasn't recorded to unload fish at Phuket since May 2005.

Landing rate and total landing (10.98 mts/trip and 4,853 mts) in 2006 was higher more than 2001 (5.02 mts/trip and 4,397 mts), 2002 (6.12 mts/trip and 4,997 mts), 2003 (8.87 mts/trip and 4,996 mts) and 2004 (9.14 mts/trip and 5,317 mts), but it lower than 2005 (11.51 mts/trip and 5,953 mts) (Table 3). The present result will support the reason in previous paragraph. In 2006, Yellowfin (74%) was the highest proportion followed by bigeye (13%), bill fish (3%), sword fish (2%) and miscellaneous species (8%) in 2006. The main target in 2005 was yellowfin (73%), bigeye (18%), bill fish (3%) and sword fish 2%).

Fig. 4 show the total landing of longliner from 1994 to 2006, the composition of bigeye show increasingly, especially in 1999 to 2005 and decreased obviously in 2006. The total monthly variations of landing per trip, total landing and number of trip during August in 1994 to December in 2006 reported on Table 3 and Fig.5. Trend of monthly catch was at similar levels from 1995 to 1999 while found the increasing of fishing effort during this time, cause of declining of landing per trip. Number of trip, landing and and landing per trip show the highest peak in 2000, 2005 and 2006, respectively. The peak of fishing season of longliner was at the arrival of the northeast monsoon, during November to March yearly.

Table 2. Total landing (mts) and value (million US\$) for purse seine and longline fleets in Phuket Province, Thailand.

Year	Total	Value	Purse seine		Longline		Period
			Total catch (tones)	Value (million US\$)	Total catch (tones)	Value (million US\$)	
1993	1,750	1.88	1,750	1.88	-	-	December
1994	25,108	26.36	24,486	24.29	622	2.07	PP (Jan-Dec)&LL(Aug-Dec)
1995	18,123	17.64	16,707	14.04	1,415	3.6	January-December
1996	16,599	23.06	13,697	12.85	2,903	10.21	January-December
1997	14,573	27.01	11,941	13.49	2,632	13.52	January-December
1998	34,032	41.32	31,017	29.32	3,015	12	January-December
1999	13,404	21.01	9,031	6.55	4,373	14.46	January-December
2000	9,423	13.58	6,305	3.77	3,118	9.81	January-December
2001	7,662	14.69	3,382	2.62	4,280	12.07	January-December
2002	6,580	17.70	1,900	1.49	4,680	16.21	January-December
2003	6,732	17.12	2,400	1.70	4,332	15.42	January-December
2004	8,052	21.16	2,776	0.60	5,276	20.56	January-December
2005	8,591	21.84	3,000	2.37	5,591	19.47	January-December

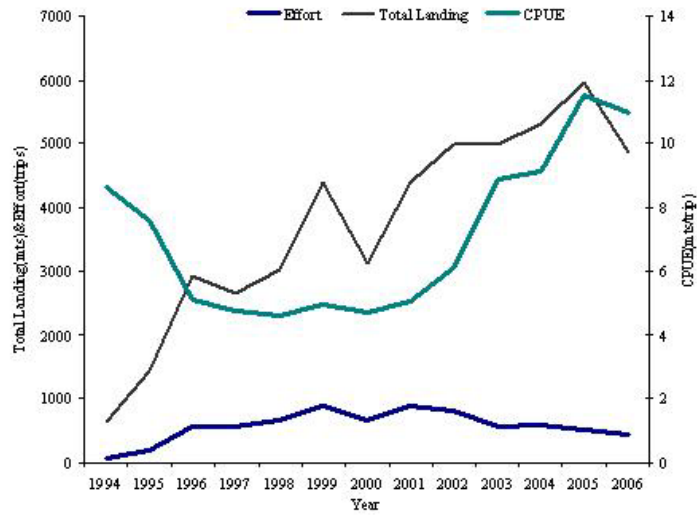


Fig. 2 Change of Total landing (mts), fishing effort (trips) and Unload per trip (CPUE, mts/trip) of longliner from 1994 to 2006.

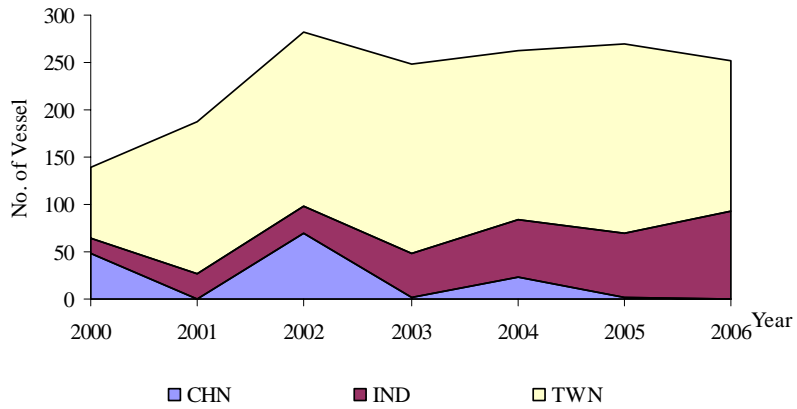


Fig. 3 Number of longline vessels by nationality, 2000 to 2006.

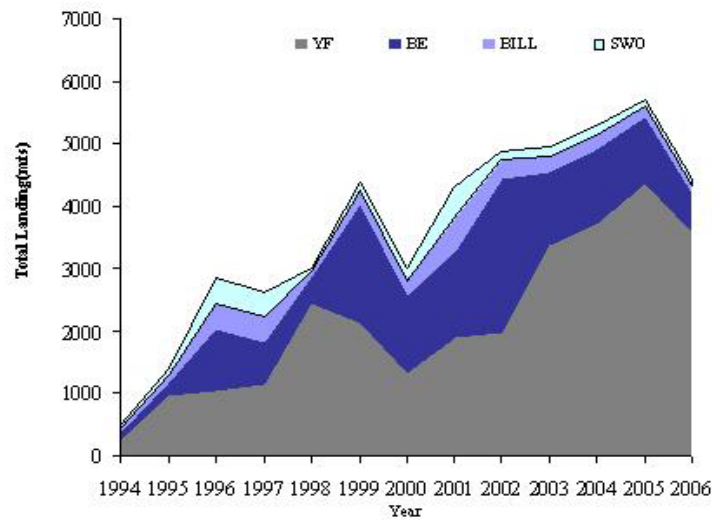


Fig. 4 Total landing by species group of longliner from 1994 to 2006.

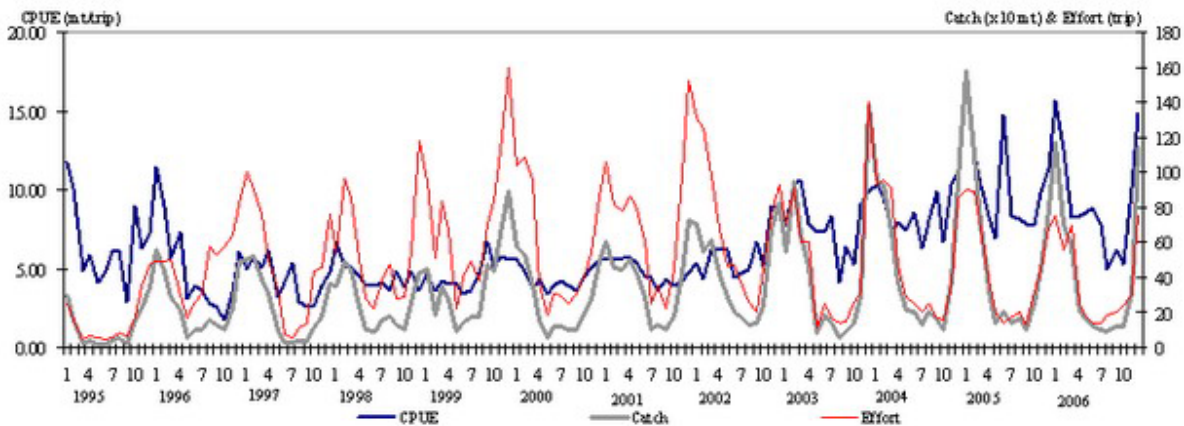


Fig. 5 Changes of landing per trip (mts/trip), total landing (mts) and number of trip of longline fleets from 1995 to 2006.

Table 3 presented total landing and effort statistics by each vessel nationality (Taiwanese, Chinese and Indonesian) during January in 2000 to December in 2006. Landing per trip of Taiwanese longliner showed higher than Chinese longliner while catch rate of Indonesian longliner was the highest variation (1 to 30.60 mts/trip). Cause of high catch of Taiwanese and Indonesian longliners were the fishing day of these fleets that were about 25 to 35 days and 20 to 25 days, respectively, including the operation time was all of day (in day-time and night-time). Where as Chinese longliner has approximated fishing day 10 to 20 days and operated only in day-time or night-time. In 2003 Chinese longline fleet disappeared from the sampling program, because some of this fleet resigned the contract and move back to their own country and some of the rest vessels had repair and docking in Phuket after that shifted to operate in the Oman Water since January to November 2003. Fig.6 showed species composition during 2000-2006 from each vessel nationality which yellowfin tuna was the main composition of Taiwanese and Indonesian longliner, followed by bigeye tuna, swordfish and bill fish, respectively, since 2000, 2001, 2003, 2004 and 2005. In 2006, the main composition is yellowfin tuna followed by bigeye tuna, billfish and swordfish, respectively. Chinese fleet caught bigeye tuna is main target, followed by yellowfin tuna, bill fish, sword fish and others species, during 2000 to 2002 and 2005. The reason was operating time and types of bait, Chinese fleet used only frozen squid which other fleets used frozen squid, live milkfish and saury fish. Whereas 2003-2004, the highest composition of this fleet found yellowfin tuna, followed by bigeye tuna, swordfish and billfish.

Table 3 Fishing effort (no.of trip), total landing (mts) and CPUE (mts/trip) by longliner landed at Phuket Province during January 2000 to December 2006.

Symbol: ' - ' = no data, BE=bigeye, YF=yellowfin, MAR=bill fish, SWO=swordfish, MSC=Fish Nei (Shark, *Molar* spp., *Ruretlus pretiosus*, *Sphyraena* spp., *Taractichtis* spp.), CPUE=landing per trip

Taiwanese:

Year	Month	effort	Total	TUNA	BE	YF	MAR	SWO	MSC	CPUE
2000	Jan	84	484	445	299	146	24	15	0	5.76
	Feb	86	431	396	209	187	21	14	0	5.01
	Mar	64	248	234	167	67	6	7	1	3.87
	Apr	16	84	71	36	35	8	4	1	5.25
	May	8	29	20	12	8	5	2	2	3.59
	Jun	15	70	46	23	23	15	9	0	4.63
	Jul	16	79	50	21	29	9	11	9	4.94
	Aug	8	41	31	13	18	3	3	4	5.13
	Sep	12	53	34	12	22	6	9	4	4.42
	Oct	20	108	95	11	84	1	11	1	5.40
	Nov	39	223	142	37	105	30	27	24	5.72
	Dec	71	435	337	60	277	39	32	27	6.13
	Total	439	2,285	1,901	900	1,001	167	144	73	5.20
2001	Jan	81	474	304	64	240	66	86	18	5.85
	Feb	64	352	276	99	177	27	49	0	5.50
	Mar	45	264	195	77	118	31	37	1	5.87
	Apr	51	354	223	86	137	54	74	3	6.94
	May	37	226	175	74	101	32	17	2	6.11
	Jun	34	193	142	83	59	13	9	4	5.68
	Jul	7	63	59	29	30	1	1	2	9.12
	Aug	15	76	65	26	39	7	4	0	5.07
	Sep	15	82	47	18	29	9	24	2	5.47
	Oct	23	118	93	58	35	14	7	4	5.13
	Nov	66	310	259	88	171	37	12	2	4.73
	Dec	111	555	448	200	248	56	46	3	4.98
	Total	529	2,948	2,218	883	1,335	335	356	39	5.57

2002	Jan	98	541	482	311	171	30	13	16	5.52
	Feb	97	437	407	197	210	18	12	0	4.51
	Mar	60	440	411	213	198	19	9	1	7.33
	Apr	36	243	233	114	119	6	3	1	6.75
	May	26	191	176	83	93	11	3	1	7.35
	Jun	24	140	128	82	46	11	1	0	5.83
	Jul	20	109	89	67	22	12	6	2	5.45
	Aug	18	90	73	45	28	10	6	1	5.00
	Sep	15	116	87	61	26	7	6	16	7.73
	Oct	20	144	125	83	42	6	5	8	7.20
	Nov	64	585	494	237	257	39	16	35	9.14
	Dec	78	740	653	294	359	56	27	4	9.49
Total	556	3,776	3,358	1,787	1,571	225	107	86	6.79	

Table 3 con't
Taiwanese:

Year	Month	effort	Total	TUNA	BE	YF	MAR	SWO	MSC	CPUE
2003	Jan	68	522	477	168	309	27	17	1	7.68
	Feb	88	923	846	190	656	30	29	18	10.50
	Mar	58	609	550	105	445	33	26	0	10.50
	Apr	53	390	376	123	253	6	8	0	7.36
	May	9	65	59	30	29	3	3	0	7.22
	Jun	24	184	169	81	88	9	6	0	7.67
	Jul	15	137	112	60	52	11	6	8	9.13
	Aug	12	51	44	29	15	4	3	0	4.25
	Sep	12	88	76	20	56	7	5	0	7.33
	Oct	19	117	94	52	42	20	3	0	6.16
	Nov	23	215	178	23	155	22	15	0	9.35
	Dec	115	1098	1025	187	838	39	34	0	9.55
Total	496	4,399	4,006	1,068	2,938	211	155	27	8.87	
2004	Jan	70	726	675	119	556	27	24	0	10.37
	Feb	80	726	664	146	518	30	32	0	9.08
	Mar	75	517	467	88	379	22	28	0	6.89
	Apr	29	220	206	53	153	12	2	0	7.59
	May	22	155	148	49	99	6	1	0	7.05
	Jun	17	155	142	39	103	12	1	0	9.12
	Jul	14	104	101	24	77	2	1	0	7.43
	Aug	25	202	183	73	110	14	5	0	8.08
	Sep	15	119	110	33	77	8	1	0	7.93
	Oct	14	104	93	12	81	9	2	0	7.43
	Nov	29	287	242	73	169	11	10	24	9.90
	Dec	73	716	681	202	479	27	8	0	9.81
Total	463	4,031	3,712	911	2,801	180	115	24	8.71	
2005	Jan	80	1,272	1,181	298	883	51	40	0	15.90
	Feb	80	930	885	194	691	20	25	0	11.63
	Mar	62	602	545	96	449	9	2	46	9.71

	Apr	31	285	273	50	223	10	2	0	919
	May	16	128	113	22	91	12	2	1	800
	Jun	13	199	194	61	133	5	0	0	1531
	Jul	15	132	99	33	66	3	0	30	880
	Aug	20	169	111	34	77	16	18	24	845
	Sep	10	87	83	19	64	3	1	0	870
	Oct	26	216	171	7	164	5	5	35	831
	Nov	34	363	309	8	301	5	5	44	1068
	Dec	57	677	600	54	546	15	9	53	1188
	Total	444	5060	4564	876	3688	154	109	233	11.40
2006	Jan	47	779	676	45	631	8	3	92	1657
	Feb	33	449	393	69	324	7	5	44	1361
	Mar	58	518	475	76	399	14	6	23	893
	Apr	16	134	98	17	81	4	3	29	838
	May	11	100	74	11	63	1	1	24	909

Table 3 con't
Taiwanese:

Year	Month	effort	Total	TUNA	BE	YF	MAR	SWO	MSC	CPUE
2006	Jun	9	101	63	12	51	2	1	35	11.22
	Jul	8	88	51	10	41	11	2	24	11.00
	Aug	15	75	54	7	47	11	10	0	5.00
	Sep	15	102	45	5	40	1	4	52	6.80
	Oct	20	102	88	5	83	5	9	0	5.10
	Nov	26	216	189	13	176	15	12	0	8.31
	Dec	57	580	524	46	478	21	8	7	10.18
	Total	315	3,244	2,730	316	2,414	100	84	330	10.30

Chinese:

Year	Month	Effort	Total	TUNA	BE	YF	MAR	SWO	MSC	CPUE	
2000	Jan	20	99	91	61	30	5	3	0	4.94	
	Feb	23	100	91	48	43	6	3	0	4.36	
	Mar	31	105	102	73	29	2	1	0	3.39	
	Apr	14	63	53	30	23	5	3	2	4.50	
	May	10	28	24	15	9	1	1	2	2.80	
	Jun	15	51	28	19	9	9	9	8	6	3.40
	Jul	11	38	21	10	11	5	7	5	5	3.45
	Aug	15	51	38	16	22	4	4	4	5	3.40
	Sep	17	56	39	14	25	5	8	8	4	3.29
	Oct	20	74	45	14	31	15	13	1	3.70	
	Nov	13	36	29	14	15	3	1	3	2.77	
	Dec	10	37	20	4	16	14	1	2	3.70	
Total	199	738	581	318	263	74	53	30	3.71		
2001	Jan	13	41	25	6	19	6	8	2	3.15	
	Feb	10	43	27	9	18	8	8	0	4.30	
	Mar	20	91	71	36	35	8	11	1	4.55	
	Apr	31	111	89	57	32	16	4	2	3.58	
	May	42	203	130	73	57	38	27	8	4.83	

	Sep	1	46	44	25	19	2	0	0	46.00
	Oct	0	0	0	0	0	0	0	0	0.00
	Nov	0	0	0	0	0	0	0	0	0.00
	Dec	0	0	0	0	0	0	0	0	0.00
	Total	48	403	353	162	191	30	20	0	8.40
2005	Jan	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0
	May	2	4	4	3	1	0	0	0	2.0
	Total	0	0	0	0	0	0	0	0	0

Table 3 con't

Indonesian:

Year	Month	Effort	Total	Tuna	BET	YFT	MAR	SWO	MSC	CPUE
2000	Jan	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0
	Mar	1	5	5	4	1	0	0	0	5
	Apr	7	15	13	4	9	1	1	0	2.14
	May	1	8	5	4	1	1	1	1	8
	Jun	1	2	2	1	1	0	0	0	2
	Jul	3	11	7	3	4	1	2	1	3.67
	Aug	2	9	7	3	4	0	1	1	4.5
	Sep	2	4	3	1	2	0	1	0	2
	Oct	2	10	7	1	6	1	2	0	5
	Nov	2	12	9	1	8	1	1	1	6
	Dec	6	19	14	4	10	1	3	1	3.17
	Total	27	95	72	26	46	6	12	5	3.52
2001	Jan	12	87	64	13	51	10	10	3	7.25
	Feb	8	66	59	11	48	2	4	1	8.25
	Mar	13	91	63	16	47	12	16	0	7
	Apr	5	38	30	9	21	4	3	1	7.6
	May	1	2	2	1	1	0	0	0	2
	Jun	3	10	8	4	4	1	1	0	3.33
	Jul	2	8	7	4	3	0	1	0	4
	Aug	2	6	5	2	3	1	0	0	3
	Sep	3	6	5	2	3	1	0	0	2
	Oct	5	10	8	4	4	2	0	0	2
	Nov	2	6	4	1	3	2	0	0	3
	Dec	13	84	64	38	26	13	7	0	6.46
	Total	69	414	319	105	214	48	42	5	6
2002	Jan	11	98	86	55	31	6	3	3	8.91
	Feb	7	27	26	10	16	1	0	0	3.86

Mar	7	47	44	22	22	2	1	0	6.71
Apr	5	74	71	33	38	2	1	0	14.80
May	2	12	12	3	9	0	0	0	6.00
Jun	2	9	9	4	5	0	0	0	4.50
Jul	1	2	2	1	1	0	0	0	2.00
Aug	3	17	12	6	6	4	1	0	5.67
Sep	2	7	5	3	2	0	1	1	3.50
Oct	2	6	6	4	2	0	0	0	3.00
Nov	5	71	60	30	30	5	2	4	14.20
Dec	3	31	25	11	14	5	1	0	10.33
Total	50	401	358	182	176	25	10	8	802

Table 3 con't

Indonesian:

Year	Month	Effort	Total	Tuna	BET	YFT	MAR	SWO	MSC	CPUE
2003	Jan	3	28	26	9	17	1	1	0	9.33
	Feb	3	27	25	7	18	1	0	1	9.00
	Mar	2	29	27	4	23	1	1	0	14.50
	Apr	7	77	74	18	56	1	2	0	11.0
	May	3	23	21	10	11	1	1	0	7.67
	Jun	1	1	1	0.5	0.5	0	0	0	1.0
	Jul	2	6	6	3	3	0	0	0	3.0
	Aug	2	7	7	2	5	0	0	0	3.50
	Sep	3	8	7	3	4	1	0	0	2.67
	Oct	7	22	20	10	10	2	0	0	3.14
	Nov	9	78	68	9	59	7	3	0	8.64
	Dec	20	266	245	41	204	13	8	0	13.30
Total	62	572	527	116.5	40.5	28	16	1	9.22	
2004	Jan	14	167	158	18	140	5	4	0	11.93
	Feb	9	109	99	7	92	5	5	0	12.11
	Mar	9	98	90	19	71	3	5	0	10.89
	Apr	7	86	80	3	77	5	1	0	12.29
	May	6	42	41	3	38	1	0	0	7.00
	Jun	1	13	12	0	12	1	0	0	13.00
	Jul	2	18	18	7	11	0	0	0	9.00
	Aug	0	0	0	0	0	0	0	0	0.00
	Sep	1	3	3	0	3	0	0	0	3.00
	Oct	2	4	4	1	3	0	0	0	2.00
	Nov	8	97	94	17	77	1	2	0	12.13
	Dec	12	246	241	49	192	4	1	0	20.50
Total	71	883	840	124	71.6	25	18	0	12.44	
2005	Jan	10	306	304	77	227	2	0	0	30.60
	Feb	9	164	162	41	121	1	1	0	18.22

Mar	6	104	103	9	94	1	0	0	17.33
Apr	8	45	42	9	33	2	1	0	5.63
May	2	7	7	3	4	0	0	0	3.50
Jun	1	8	8	2	6	0	0	0	8.00
Jul	2	11	10	2	8	1	0	0	5.50
Aug	1	2	2	0	2	0	0	0	2.00
Sep	3	16	15	3	12	1	0	0	5.33
Oct	6	33	32	7	25	1	0	0	5.50
Nov	11	81	71	14	57	5	0	5	7.36
Dec	12	112	107	31	76	3	2	0	9.33
Tota	71	889	863	198	665	17	4	5	12.52

Table 3 con't**Indonesian:**

Year	Month	Effort	Total	Tuna	BET	YFT	MAR	SWO	MSC	CPUE
2006	Jan	28	398	346	61	285	6	1	45	14.21
	Feb	23	255	236	61	175	4	3	12	11.09
	Mar	12	58	57	13	44	1	0	0	4.83
	Apr	9	76	71	16	55	3	2	0	8.44
	May	7	55	39	22	17	1	0	15	7.86
	Jun	5	23	17	5	12	0	1	5	4.60
	Jul	6	23	14	0	14	4	1	4	3.83
	Aug	4	20	18	5	13	2	0	0	5.00
	Sep	5	22	20	2	18	1	1	0	4.40
	Oct	4	26	22	8	14	2	2	0	6.50
	Nov	4	89	87	19	68	1	1	0	22.25
	Dec	20	564	545	90	455	8	11	0	28.20
Total	127	1,609	1,472	302	1,170	33	23	81	12.67	

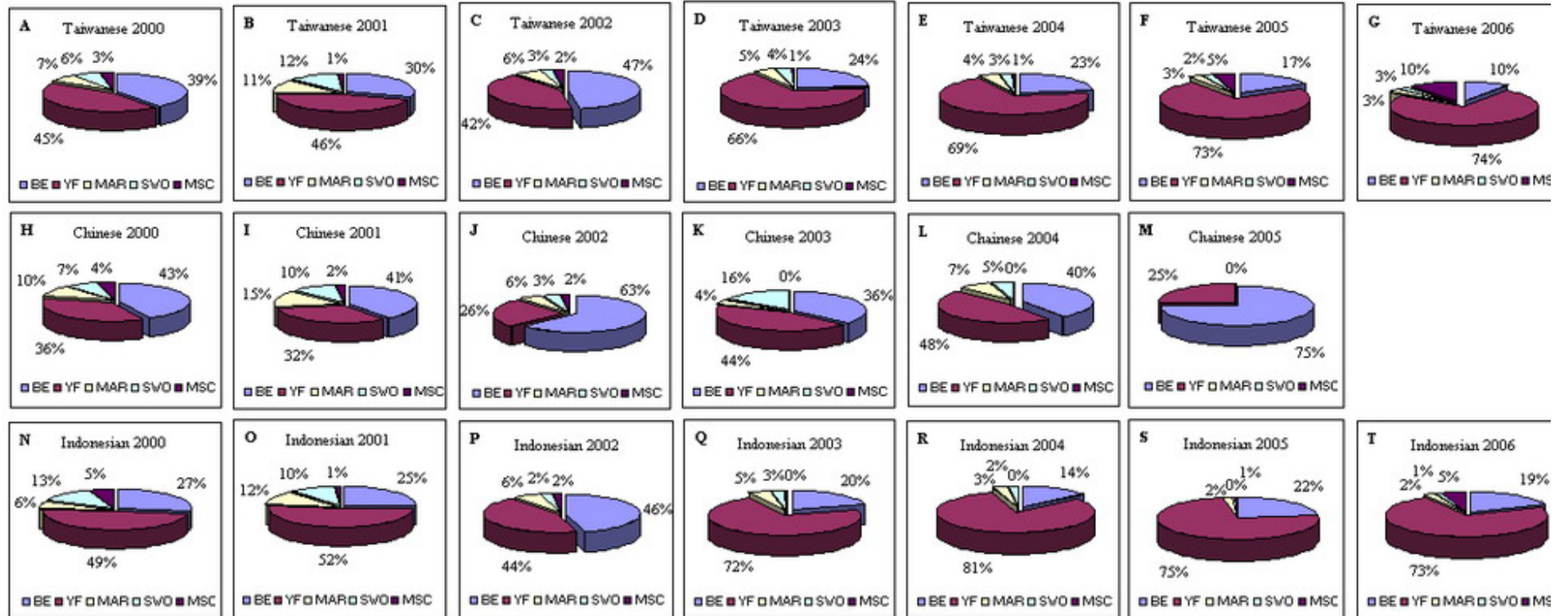


Fig 6. Species composition by country fleets (A, B, C, D, E, F and G = Taiwanese fleet; H, I, J, K, L and M =Chinese fleet; N, O, P, Q, R, S and T=Indonesian fleet during 2000-2006)

Symbol: BE=bigeye, YF=yellowfin, MAR=bill fish, SWO=swordfish, MSC=Fish Nei (Shark, *Molar* spp., *Rurellus pretiosus*, *Sphyræna* spp., *Taractichtis* spp.)

Marketing system

Chart 1 illustrate the longline marketing system at Phuket during 2000-2006, skipper will recall and inform amount of fish and arrival date directly to the owner of fishing companies, 4 companies, before landing. The activities of the fleets have changed from only catch to be catch and carried fish. The companies will contact to shipping agencies (5 agencies) for import permission from Thai Customs while the agencies will sent the documents of their vessels for request “Certificate of Origin” from AFRDEC before this document will sent again to Customs. Longliners unload at 5 processing plants in Phuket Province where is graded, cleaned and packed for the export fish. Fish will sale to the Buyer Company (11 companies, some of them as import companies). There will export the most of tuna and small amount of bill fish and swordfish to the target market at Japan, follow by USA or Singapore via air plane. Export companies (12 companies) will organize for permission document. At present some of expert-fish grade and all of reject-fish grade are sold to local market or/and other buyers, loins packing companies (6 companies) and cold storage plant, where will produce the loins or frozen fish as add-valued for export again. Furthermore, some of import companies have more than one activity as shipping, buyer, packing, producer and exporter such as Phuket Dongher Trading and Thai Ocean Venture. Nootmorn *et al.* (2002b) reported during the 4th Working Party on Tropical Tunas that found only fishing vessel/activity of fresh tuna longline unloaded at Phuket. Whereas, the number of fishing companies (7), processing plants (5) and buyer companies (12) were reported less than the present study.

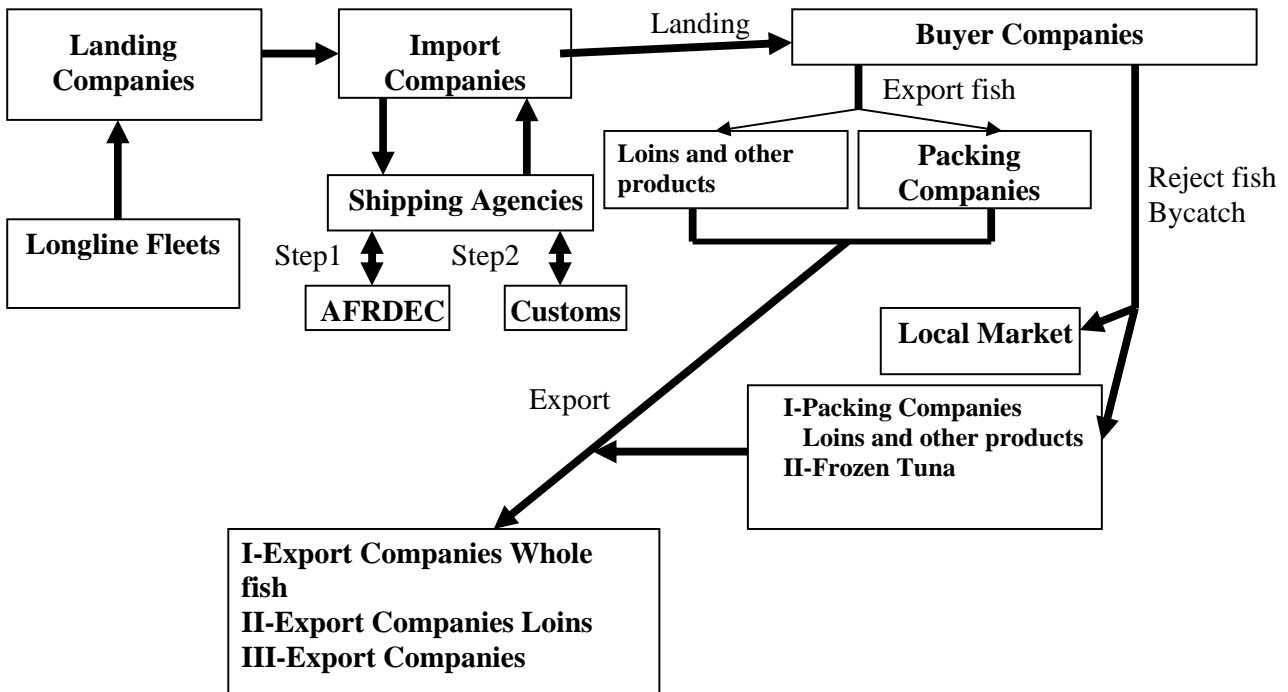


Chart 1 Longline marketing system in Phuket Province 2006.

Table 4 shows the percentage of export fish, reject fish and bycatch in number of fish and weight fish samples. The proportion of export fish in number and weight varied from 39.86 to 80.87 and 42.99 to 80.28 %, whereas the proportion of export fish was decreasing since in 1999 to 2005, while the reject fish was increasing proportion and highest in 2005.

Table 4. The percentage of export, reject and bycatch from fresh tuna longline during 1999 to 2006

Year		Percent			Total Samples
		Export	Reject	Bycatch	
1999	No. of fish	80.87	19.13		13549
	Weight (kg)	80.28	19.72		555630
2000	No. of fish	67.25	30.65	2.1	29350
	Weight (kg)	70.59	28.56	0.85	1058698
2001	No. of fish	60.97	33.3	5.73	76295
	Weight (kg)	66.07	31.16	2.77	2639693
2002	No. of fish	59.08	39.5	1.42	90665
	Weight (kg)	61.06	38.03	0.91	3179342
2003	No. of fish	50.52	48.83	0.65	49.48
	Weight (kg)	52.22	47.49	0.29	47.78
2004	No. of fish	44.38	55.47	0.15	55.62
	Weight (kg)	47.05	52.85	0.1	52.95
2005	No. of fish	39.86	59.26	0.88	60.14
	Weight (kg)	42.99	56.44	0.57	57.01
2006	No. of fish	46.64	52.26	1.10	53.36
	Weight (kg)	48.33	51.00	0.67	51.67

CONCLUSION

Since the start of conventional longline fishery unloaded at Phuket fishing port in August 1994 have expanded considerably in terms of landing, number of trip and landing per trip. Port sampling were made to collect fishing and biological data of tunas. The annual landing and value of tunas at Phuket, Thailand varies from 1,415 mts and 3.60 million US\$ to 5,591 mts and 20.57 million US\$ during 1994 to 2006. The trends of longline catch and value were a slight increase during 1994 to 2005, where have been the percentage of landing and value to be 3 to 57 and 7 to 82 of total landing and total value. About 570 tuna longline vessels of Taiwanese, Chinese and Indonesian had recorded to unload at Phuket fishing port since 1994 to 2006. The fishing ground of this fleets distribute in the Eastern Indian Ocean. The highest total catch was recorded in 2005 (5,591 mts). Trend of monthly catch was a same level from 1995 to 1999 with the increases in fishing effort but the decrease in CPUE. The productive duration with a high peak of catch was pronounced in northeast monsoon. The catch of target species was primarily yellowfin (58 %), followed by bigeye tuna (28 %), bill fish (7 %), swordfish (5%), and other species (2 %). The composition of catch showed a decreasing trend in yellowfin tuna from 1995 to 1996 and 2000, while an increasing trend were observed in bigeye tuna, bill fish and swordfish. An increasing trend of yellowfin catch showed again during 1997 to 1998 and 2006. Regarding, catch indices (catch, effort and CPUE) by nationality can plot out Taiwanese fleet that is the highest efficiency than Chinese and Indonesian fleets, their has more special skill than those fleets. Yellowfin is the main target of Taiwanese and Indonesian vessels while bigeye is the main component by Chinese longliner. The marketing system of tuna business at Phuket have many stakeholder deal with their product such as fishermen, vessel companies, importer, shipping agency, government organizations (AFRDEC and Customs), buyer (local buyer and companies), packing companies, cold storage plants, exporter. In this case, all of stakeholders provide available information data regarding tuna and other production (process from tuna, billfish and swordfish) that will be useful and valued for the certain estimation of landing catch of tuna caught by longline at Phuket.

PROBLEMS ENCOUNTERED AND RECOMMENDATION

However, it seems to have some problems in connection with data collection and statistics these include.

1. Outcome of Sampling Program on Tuna Longline Vessels Unloading in Phuket during April 2000 to December 2006 had improved a lot of knowledge on the activities, total landing, species breakdown and size composition for each species caught by surface longliner for IOTC, OFCF and AFRDEC, DOF Thailand. Even the AFRDEC term would get many problems that cooperated from fishing agency. Anyhow we tried to deal again and again by many ways and now the situation is better. Consequence, the sampling program would be continuous monitoring, Which support fund from Japan or Taiwan or IOTC.
2. The lack of logsheet of foreigner longliner unloaded at Phuket fishing port, only the interview data have been taken from the export company and master fishermen. Then, the data collection system of longliner has to be better established, so that all data users (such as the IOTC) researcher and fishermen may be satisfied.

3. The data collection and statistics address of tuna and billfish should have cooperated between the nation fleet and the nation port have been unloaded or transshipped (such as logsheet for foreigner tuna purse seine and lonliner fisheries in the Eastern Indian Ocean).
4. The logistic of fresh tuna longline should be establish in the Eastern Indian Ocean, including the port sampling approach should be establish as well from IOTC.

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