Review of Japanese Tuna Fisheries in the Western Pacific Ocean, and the fishing activities in 1996

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1. Introduction

In the western and central Pacific Ocean, there have not been so drastic short time changes in catch of any tuna species in major tuna fisheries of Japan, while low catch by longline fishery in the eastern Pacific Ocean has been a serious problem since 1993. In 1996, unusual event was observed on purse seine fishery in western and central Pacific Ocean. Adult yellowfin larger than 10 kg have been caught in summer, from June to August in ordinary year. However, catch of yellowfin of this size was less than half of previous year, and total yellowfin catch was about 60% of that in 1995. This reduction of adult yellowfin catch caused higher price for canning products. Although the reason for this low catch of large sized yellowfin is not clear, it seems to be caused by change in oceanographic condition rather than resource condition.

In this paper, fishing activities and trends of major Japanese fisheries in 1996 are reported and the latest statistics of these fisheries in the western Pacific Ocean are provided. As the statistics area for this report, WPYF area (Pacific Ocean of 40° N-40° S and west of 150° W) were used.

Classification of each fishery is the followings.

Longline fishery is classified into three categories (coastal, offshore and distant water) according to the license and boat size (coastal :less than 20 gross tonnage (GRT), offshore:20-120GRT, and distant 120-500GRT). Coastal and offshore licensed boats are limited their operations in the western and central Pacific Ocean, while there is no limitation in the operation area for distant water licensed boats. However, fishing activity by distant water fleet in the western and central Pacific has been much less than that in the other categories. Pole-and-line fishery is similarly classified into three categories (coastal, offshore and distant water). The offshore and distant water categories need to be licensed by the Minister of Government. Purse seiners need license issued by the Minister except the very small-sized boat. Licenses of purse seine consist of many types derived from the combination of the fishing area and season allowed. Purse seine vessels which operate in the western and central Pacific except of Japan offshore area (north of 20°N, west of 180°) are greater than 200GRT (most of them are 349GRT), and vessels of 100-150GRT make operation at offshore of Japan northern from 20°N. Table 1 shows the number of the Japanese tuna boats registered in each fishery and category.

The number of longline vessels in coastal category did not show clear trend in the last decade, while those of distant and offshore categories have been gradually decreasing. Especially, declining trend was obvious in offshore vessel, the number of offshore boats was 221 in 1995 which is 87% of that of 1994, about half number of 1986, and fewest in these two decades. The declining trend was also obvious in pole-and line, in which the boat number of distant and offshore pole and line (61 and 110 vessel in 1995, respectively) were about half of those of 1986. The number of vessel of distant and offshore pole and line decreased about 7 and 12 boats respectively per year in average in the last 10 years. Although the number of coastal pole and line in 1995 was 480, 1350 vessels fewer than that of 1994, it was because more than 1000 vessels which belonged to this category in 1994, were included in another (trolling) category in 1995 because of the change in definition of statistical categories. In purse seine, there isn't remarkable change in number of boats greater than 200GRT (39 vessels) which is main vessel type in tropical western Pacific, while boats in 50-200GRT class (22 vessel in 1995) shows declining trend in the last decade.

2. Latest statistics and Tuna fishing activity in western and central Pacific Ocean in 1996

Longline fishery

Latest available statistics is that of 1995 for longline fishery. Fishing effort and catch in number and weight of tunas (albacore, yellowfin, and bigeye tunas), swordfish and billfishes (striped and blue marlines) caught by Japanese longliners in the total WPYF area by years from 1970 to 1995, are shown in Table 2. Distribution of fishing effort and catch for each species are shown in Figs. 1 and 2, respectively. Fishing effort showed a declining trend from early 80's and was 135 million hooks in 1995, which was the fewest in 25 years from 1970. This decline probably is caused mainly by decrease of the number of vessels. For tunas, catch of albacore kept high level more than 0.9 million fishes in the last three years. In bigeye tuna, catch amount was less than 30000MT in the last three years, and catch in 1995 (25204 MT) was the lowest from 1970 to 1995.

Fishing activity of Japanese longliners in the western and central Pacific Ocean in 1996 was the following.

Ogasawara Islands to Mariana Islands:

In offshore of Ogasawara, main fishing ground was located in 26°-28°N, 138°-145°E from early to middle of the 1st quarter, and spread to about 150°E in the late of this quarter, and disappeared in early of 2nd quarter. Albacore was dominant in catch, and average catch weight per operation was 2.40 MT (catch rate: 6.4%) in January, and decreased gradually to 1.50 MT (catch rate: 6.0%) in March. In albacore catch, large size fish (6 year old) which had mode in 103cm, 22kg were dominant by late of January, and middle size fish (4 year old) came to be main since February. In the 3rd quarter, 7 to 10 coastal longliners (<20GRT) made operation around 24°-27°N, 140°-145°E, and had catch of 0.5-0.6 MT in average, in which yellowfin was dominant, including albacore, bigeye, and billfishes. In this area, 4-5 coastal longline vessels performed another kind of longline, 'vertical longline', in 3rd quarter, and had good catch of yellowfin (catch rate was 9.2%). In early half of 4th quarter, 7 to 8 coastal longliners made operation around 26°-27°N, 135°-142°E, and had yellowfin and albacore dominant catch of 1.4 MT in average (catch rate: 3.2 in yellowfin, and 1.8 in albacore).

In Mariana Islands area, fishing zone was formed in 24°-25°N, 145°-150°E from 1st to early of 2nd quarter, and around 16°-20°N, 150°-152°E, and 17°-18°N, 138°-140°E, in middle to late of 2nd quarter. Catch in 1st quarter was dominant in albacore including bigeye, yellowfin and billfish, average catches per operation were 2.00 MT and 1.40 MT in February and March respectively, and decreased to 1.10 MT in early half of 2nd quarter. Most albacore were large, 90-120cm, 14-36kg, while small fishes less than 15kg were mainly comprised of yellowfin. 30-35 vessels made operation at area from east off Mariana Islands to south of Marcus Island (15°-22°N, 150°-160°E) through 3rd and 4th quarter and had 0.8-1.5 MT of average catch in which albacore and yellowfin were predominant. Main caught size were 90-120cm, 15-35kg for albacore and small yellowfin which had modes at 18kg and 27-30kg.

Equatorial area of the western and central Pacific : In the first quarter, coastal longliners made operation in southern area of Sonsorol Island and Truk Islands. Catch consisted of bigeye, yellowfin and billfishes, and average catches were 0.7 MT and 1.30MT in the former and the later area, respectively. Main fish size were larger than 40kg for bigeye and larger than 25kg for yellowfin. In the area from south of Nukuoro Islands to Gilbert Islands (3°-5°N, 155°-175°E), 25 vessels made operation in middle to late of 1st quarter, and had 1.25-1.00 MT catch in which bigeye and yellowfin were abundant. At offshore of Marshall Islands, 10-15 vessels had 1.0-1.5 MT catch comprising of bigeye, yellowfin, blue marlin and albacore in 1st and 2nd quarter. Main size classes were middle to small size for bigeye smaller than 40kg, around 30 kg for albacore, 45-50 kg for blue marlin and 18-20 kg for striped marlin. In southern area of Pohnpei Island, and Solomon area, 25-1.20 MT of bigeye and yellowfin dominant catch were made (catch rate: 1.2% and 1.0% in bigeye and yellowfin, respectively) in middle and late of 2nd quarter. Small size fishes (2 years old) less than 20 kg were main in bigeye catch, while 2

years old (mode in 20 kg) and 3 years old (mode in 32 kg) were dominant in yellowfin. In south to west area of Truk Islands (1°-5°N, 150°-155°E), 10-15 vessels made operation through 3rd and early half of 4th quarter, and had catch of 1.1-1.2 MT in average. Main catch species were yellowfin and bigeye. In 3rd quarter, good catch of these fishes were observed in Gilbert Island area, 1.2-7.9 MT catch (3.0 MT in average) were reported.

Coral Sea to Solomon Island area: 15-18 distant water licensed boats (200-500GRT) operated in the 1st quarter around Solomon Islands and offshore of New Caledonia, and had 2.0-3.0 MT catches constantly in which albacore and yellowfin were dominant. In the 2nd quarter, 30 boats made operations in this area, and had 1.5-2.0 MT catch per operation. 45-60 boats in 3rd and 23-25 boats in the 4th quarter operated in offshore of New Caledonia, Coral Sea and Solomon Islands area, and had 2.0-3.0 MT catch consisted of mainly albacore and yellowfin.

Pole and line fishery

The catch and effort statistics in the WPYF area by Japanese pole and liners are shown in Table 3 . Catches of skipjack, yellowfin, and bigeye tuna in 1995 were 113700MT, 3980MT and 2520MT, respectively. Fishing effort showed a gradual and steady declining trend during the past decade mainly because of decrease in vessel number, and was 17179 days in 1995, which was less than half of those in early 80's. Catch of skipjack and yellowfin showed declining trend in this decade partially because of the decrease of the effort. Distribution of fishing effort and catch for skipjack, albacore, yellowfin and bigeye are shown in Figs. 3 and 4, respectively.

Large-sized boats (298-499 GT) started tropical pole and line fishing in early half of 1st quarter, around Ellice Islands (7° -9° S, 170° -173° E), and 8-10 MT catch per day per boats was reported. Body weight of skipjack was 3-7kg. In the middle of 1st quarter, main fishing ground were formed in northern area of Gilbert Islands (3° - 5° N, 175° -178° E) and southern area of Naul Island (4° -6° S, 165° -167° E). 3-25 MT of skipjack (2-7kg) and 9-35 MT of skipjack (3-8kg) were caught per day per boat in the former and the later area, respectively. In southern area of Naul Island, catches were not so good, 2-27 MT (8 MT in average, 2.0-7.0 kg skipjack) in latter half of the1st quarter. Catches per day per boat were 4-45 MT (3.5-6.0 kg skipjack) in early half of the 2nd quarter, in western area of Mariana Islands, 5-25 MT (2.0-8.0 kg) in middle of this quarter in eastern area of Mariana Islands, 10-50 MT (4.0-6.0kg) in late of this quarter in east of Mariana Islands and offshore of Marcus Island. Most of vessels moved to south of the Emperor Sea Mount (30° -33° N, 168° -174° E) in early June. From June to late November, these large-sized boats operated in the northwestern part of North Pacific (north of 30° N, 147° - 170° E) in order to catch albacore. Although, these large-sized boat returned to tropical fishery ground in early of the 4th quarter in ordinary year, six boats shifted to south in July and operated at 24° -26° N,156° -158° E, because they could not have good albacore catch in northern fishing ground. In late of the 3rd quarter, 24-26 vessels operated in 20° -24° N, 171° -174° E and 16° -18° N, 170° -172° E, and caught 6-25 MT of skipjack (3.5-5.0 kg and 8.0-14.0 kg) and 15-110 MT (25 MT in average) of skipjack (3.5-5.0kg) per day per vessel. In the 4th quarter, main fishing grounds formed in offshore of Gilbert Islands (3° -5° N, 171° -175° E and eastern area of Mariana Islands (15° -20° N, 152° -160° E). Although 3-4 vessels operated in Tasman Sea in late of the 4th quarter to catch skipjack which was rich in body fat, catches were not so good, 1.0-17.0 MT of skipjack and albacore (2.0-4.0 kg for skipjack and 4.0-11.0 kg for albacore).

Purse seine fishery

The catch and effort statistics in the WPYF area by Japanese purse seiners are shown in Table 4. In 1996, amounts of skipjack, yellowfin, and bigeye tuna unloaded at Yaizu port where most of purse seine catch (90-95% of total PS catch) are unloaded, were 138,545 MT, 26,882 MT and 1,880 MT, respectively. Distribution of fishing effort and catch for these species are shown in Figs.5 and 6. Catches of skipjack and bigeye tuna did not show

remarkable change in the last decade, while that in yellowfin tuna dropped to 60% of the previous year in 1996 (Table 3).

In the first half of 1996, catch estimates were 71,194, 14,147 and 937 MT for skipjack, yellowfin and bigeye, respectively.

In south of Truk Islands (5° N-0° S, 152° E-162° E), 24 to 25 vessels operated in early to mid of January, where SST ranged from 29.5℃ to 30.3℃. Free swimming school was more frequently encountered than log-associated one. Catch per set ranged from 0 to 200 MT with an average of 20 MT, comprising 1.5 to 6.0 kg of skipjack and 20 to 50 kg of yellowfin (8-15kg fish were the main component). An approximate ratio of yellowfin to the total weight of fish was 30 to 35%. The vessels moved slightly northward toward the end of January, where the log-associated schools were more abundant. 10 to 150 MT/set with an average of 30 MT/set was recorded. The fish size ranged from 0.7 to 3.0 kg in skipjack, and 0.7 to 15 kg in yellowfin. Ratio of yellowfin to the total weight of fish was 5 to 30%.

In February, 20 vessels operated around Nauru Island (1° S-4° S, 161° E - 164° E), and 4 to 5 vessels were in south of Nucuole Islands (0° N-4° N, 155° E-160° E). High SST (30℃) was observed in both area. Most of the fish school found in the former area was free swimming one, comprising mainly of large skipjack (4 to 7 kg) with small number of yellowfin (8 to 15 kg). Catch per set ranged from 0 to 170 MT with an average of 25 MT. Log-associated and free swimming schools both were targeted in the later area. Smaller skipjack (1 to 4 kg) dominated in the catch. There were not many large schools, which in turn made number of set per day increase (2 to 4 sets/day).

In March and early and mid of April, 24 to 25 vessels operated in south of Truk Islands and around Nucuole Islands (0° N-6° N, 143° E-159° E). Most of fish schools encountered were log-associated one, and the catch per set ranged from 20 to 140 MT with an average of 35 MT/set, comprising 1 to 3 kg of skipjack and 1 to 15 kg of yellowfin (10-13%). Vessels shifted westward (2° N-4° N, 133° E-137° E) at late in April. Main body of the fleets stayed in this area by mid of May, while 5 to 6 vessels moved northward (10° N-12° N, 135° E-138° E). SST ranged from 29.2 to 30.1℃ in the former area. Through April to May, the catch in the former area ranged from 0 to 120 MT/set for free swimming school and from 20 to 150 MT/set for log-associated school. In both type of fish school, the main component of the catch was 0.8 to 4 kg of skipjack. On the other hand, SST ranged from 28.8 to 29.2℃ and free swimming school was predominantly encountered in the later area. The catch ranged from 0 to 180 MT/set, comprising 3 to 7 kg of skipjack with no yellowfin. All vessels were expelled from this area because of typhoon after mid of May.

In June, 24 to 25 vessels operated in south of Solol Islands (2° N-4° N, 143° E-145° E) and 4 vessels in west of Kiribati Island (1° N-3° N, 160° E-170° E). In the former area, SST ranged from 29.6 to 29.8℃. The catch for free swimming school ranged from 0 to 150 MT/set with an average of 25 MT, comprising 2 to 5 kg of skipjack and 20 to 40 kg of yellowfin (20-35%). The catch for log-associated school ranged from 5 to 50 MT/set, comprising of much smaller skipjack and yellowfin (0.8 to 2 kg). 3 to 10 kg of bigeye was frequently observed in the catch, and maximum record of bigeye catch reached 50 MT/cruise. SST ranged from 28.8 to 29.9℃ in the later area. The catch ranged from 0 to 180 MT/set with an average of 30 MT, comprising of 2 to 6 kg of skipjack and 10 to 20 kg of yellowfin (10-15%).

In the second half of 1996, catch estimates are 67,351, 12,735 and 943 MT for skipjack, yellowfin and bigeye, respectively.

In July 24 to 25 vessels operated in west of Caroline Islands (3° N-9° N, 139° E-145° E) in July. Operation on log-associated school was main here, recording 5 to 70 MT/set with an average of 20 MT. The fishes were small, ranging from 0.5 to 2.5 kg in skipjack, and 0.5 to 4 kg in yellowfin. Ratio of yellowfin to the total weight of fish was 25 to 30%.

In early of August, 5 to 6 vessels operated in south of Truk Islands (3° N-4° N, 150° E-153° E), where SST ranged from 29.7 to 30.4℃. The catches from log-associated and free swimming schools ranged from 0 to

175 MT/set with an average of 30 MT, comprising of 0.7 to 4.0 kg of skipjack and 0.7 to 12 kg of yellowfin (15-20%). The vessels moved westward in mid of this month. 20 to 25 vessels operated in west of Caroline Islands (3° N-7° N, 140° E-148° E), where SST ranged from 29.3 to 30.1℃. Main fish school encountered here was log-associated one, and the catch ranged from 0 to 90 MT/set with an average of 20 MT. The size of skipjack ranged from 0.7 to 3.0 kg and yellowfin from 0.7 to 15 kg. Ratio of yellowfin to the total weight of fish was 15 to 30%, and individuals larger than 2.5 kg was the main component.

In early of September, 24 to 25 vessels operated in south of Caroline Islands (2° N-4° N, 140° E-146° E), where SST ranged from 29.7 to 30.3℃. The catch on log-associated school ranged from 10 to 140 MT/set, comprising of 0.7 to 2.5 kg of skipjack and 0.7 to 5 kg of yellowfin (5-10%). In mid of September, these vessels moved MTorth of Yap Islands (10° N-12° N, 131° E-138° E), where SST ranged from 29.6 to 30.6℃. The catch on log-associated school ranged from 20 to 100 MT/set with an average of 35 MT, comprising of 1 to 4 kg of skipjack and 0.7 to 5 kg of yellowfin (15-18%).

Operation from October to mid of November shared the same area with that in mid of September. The catch in October ranged from 30 to 150 MT/set for log-associated school comprising 1.5 to 5 kg of skipjack with a little yellowfin, and from 20 to 100 MT/set for free swimming school comprising of 3 to 8 kg of skipjack with no yellowfin. SST dropped to 28.4 to 29.8℃ in early to mid of November. 25 to 30 vessels operated mainly on log-associated school, recording 15 to 170 MT/set with an average of 55 MT/set. The size of skipjack ranged from 1.5 to 7 kg and yellowfin from 1.5 to 10 kg. Ratio of yellowfin to the total weight of fish was 5 to 10%. In late of November, vessels moved down to south because of the foul weather and made operation in south of Truk Islands (4° N-5° N, 143° E-152° E), where SST was 29℃. The catch on log-associated and free swimming schools ranged from 15 to 40 MT/set, comprising of 1.4 to 4 kg of skipjack and 1.5 to 10 kg of yellowfin (10-15%).

In December, 25 to 30 vessels operated in south of Truk Islands (3° N-6° N, 147° E-156° E), where SST ranged from 29.3 to 30.5℃. By mid of this month, free swimming school of skipjack was more abundant than else. The catch ranged from 0 to 150 MT/st with an average of 30 MT, comprising 3 to 9 kg of skipjack. On the other hand, log-associated school became more frequently encountered in late of this month. Catch per set ranged from 10 to 20 MT, comprising 1 to 4 kg of skipjack and 1 to 5 kg of yellowfin (10%).

As described in introduction, low catch of large sized yellowfin in summer was topical event for the Japanese tuna fishery in 1996. In ordinary year, large yellowfin were caught in eastern fishing area (150° -160° E), in summer. Usually, logs and floating objects which attract fishes are concentrated in equatorial region of western Pacific by north or south equatorial current in early half of year. They are moved eastward by north equatorial counter current in later half of year and purse seine fishery ground are formed widely from west to east along the eastward current. In 1996, however, north equatorial current was weak and float objects did not spread to eastward. It is supposed that such as 'non turbulence condition' did not make concentration of small prey fishes for large yellowfin.

Table 1. Number of the Japanese tuna boats in the world, registered by fishery and category.

Year	Longline			Pole-and-line			Purse seine	
	Distant Water	Offshore	Coastal	Distant Water	Offshore	Coastal	200GRT >	50-200 GRT
70	973	580	890	226	286	3148	NA	NA
71	998	564	908	230	280	3168	6	23
72	942	489	940	272	282	3596	7	31
73	917	511	959	299	351	3020	6	37
74	962	554	518	325	391	3225	10	42
75	883	535	720	324	372	2648	12	42
76	840	556	827	292	361	3101	15	43
77	842	586	726	293	369	3348	14	50
78	847	633	669	285	360	3035	14	47
79	860	635	648	270	355	3480	17	46
80	883	637	821	240	332	3232	16	50
81	892	630	774	216	332	3064	23	50
82	802	554	722	179	296	3011	33	52
83	747	523	561	157	277	3021	36	59
84	810	478	523	142	254	2904	33	54
85	823	476	620	129	227	2754	35	47
86	818	442	536	120	210	2455	38	53
87	819	398	661	115	199	2404	34	47
88	807	385	586	97	180	2613	39	48
89	806	353	650	94	175	2254	37	43
90	791	362	685	88	167	2228	35	43
91	790	332	768	82	160	2277	45(10)*1	38
92	768	302	793	63	153	2093	48(10)*1	31
93	767	272	790	59	144	1927	46(10)*1	27
94	749	255	819	63	122	1830	43(11)*1	23
95	740	221	738	61	110	480*2	39	22

*1 Numbers in the bracket are boats operating in the Indian Ocean.

*2 More than one thousand of boats which had been included in coastal pole-and-line category before 1994, were classified to other fishing category (trolling) in 1995.

Table 2. Catch in number (in thousand) and weight (MT), and fishing effort (million hooks) of the Japanese Longline Fishery (offshore and distant water boats) in the WPYF total area.

		Number of fish						Weight					
Year	Hooks	ALB	BET	YFT	SWO	STM	BLM	ALB	BET	YFT	SWO	STM	BLM
70	172	1072	694	1149	114	170	135	18296	28645	33843	5955	6111	8152
71	176	786	720	1056	128	123	76	12827	29678	28979	6781	4785	4642
72	174	721	976	1046	118	86	100	11933	39476	29358	6272	3445	6168
73	160	793	684	1134	108	97	87	13130	27823	29785	5705	3762	5047
74	185	641	778	1152	119	91	89	11410	31368	32686	6194	3467	5110
75	158	425	734	995	126	59	58	7597	29247	27413	6416	2228	3311
76	179	762	871	1118	146	56	62	12699	37949	32131	7559	2110	3694
77	169	647	983	1535	132	37	68	10768	39735	42980	7255	1502	4157
78	183	573	839	2213	140	48	79	9626	31367	61236	7616	2028	4899
79	213	669	939	1759	158	88	69	10786	35497	49688	8411	3568	4439
80	222	703	913	2294	129	86	93	11804	34285	62597	6407	3382	6011
81	242	1047	756	1930	153	69	83	16917	28388	53594	7836	3080	5382
82	225	1007	872	1617	131	61	81	16213	32710	46202	6759	3084	5440
83	198	856	815	1627	151	45	64	13302	28987	47484	7909	2093	4234
84	203	717	889	1254	146	63	93	11187	31506	36669	7518	2786	6006
85	211	764	947	1328	196	88	80	11683	33348	38278	10205	3649	5185
86	184	673	752	996	175	114	85	10463	29820	29968	9109	4389	5422
87	182	660	942	901	177	70	61	10496	38416	28028	9099	2800	3805
88	202	789	769	1077	178	126	78	12111	29326	33021	9243	4740	4932
89	185	741	827	859	134	89	61	11205	32184	25636	6789	3825	3934
90	177	793	933	890	125	55	46	11798	37116	26862	6298	2333	2842
91	158	689	680	635	100	67	46	10935	25499	19220	5133	2528	2832
92	148	813	708	716	111	54	36	12466	30852	24067	8780	2330	2558
93	159	1167	625	746	118	83	53	17318	25791	24050	8977	3222	3446
94	154	1129	612	734	109	72	51	17213	23075	24445	8127	2922	3498
95	135	954	513	861	82	76	49	14730	19420	25204	6706	2903	3288

Table 3. Total catch (MT) of the Japanese pole and line fishery (offshore and distant water boats) in the WPYF area.

Year	F. Days	SKJ	YFT	BET
72	44128	131678	5534	1626
73	53263	197151	6047	1141
74	53283	210915	4406	969
75	56753	171564	5415	1264
76	61798	212607	7306	3313
77	71276	233302	9895	3231
78	59621	219781	7628	3170
79	60943	197044	5833	2118
80	58180	215464	6186	1994
81	60768	192625	9050	2337
82	56619	182219	9490	3807
83	48343	209300	9326	3762
84	46531	245242	8690	3192
85	43324	158513	12920	3981
86	40093	222149	8410	2519
87	38400	170755	8452	2810
88	15564	122813	1908	1449
89	32095	174467	7789	3544
90	32135	110095	6925	3276
91	22330	144846	5405	1230
92	21735	109447	6829	1033
93	21624	144001	4526	1770
94	17934	93443	3936	1878
95	17179	113700	3980	2520

Table 4. Total catch (MT) by the Japanese purse seine fishery (larger than 100 GRT boats) in the WPYF area.

Year	Days fishing	SKJ	YFT	BET
70	114	365	164	0
71	2651	7946	2837	129
72	3304	12071	4184	119
73	3355	12334	7268	182
74	2074	4837	9419	294
75	2510	6732	5595	265
76	3136	17719	7649	390
77	2638	18387	6841	302
78	2932	25821	8523	609
79	4219	28298	19013	706
80	4271	42040	19973	564
81	5393	44473	27539	925
82	7150	75016	31029	1129
83	10086	115751	30819	1468
84	12698	128528	38647	697
85	12491	119287	47947	1381
86	11716	130805	44463	1531
87	11199	112975	44634	1602
88	11178	174373	30106	605
89	11273	120495	40872	1527
90	10178	139271	37741	2122
91	9851	147437	48498	1950
92	9287	137828	53078	2563
93	10720	132522	57866	1885
94	8747	157692	39858	1676
95	10536	142318	45144	1637
*96	10074	131128	26056	1941

* 1996 PS catches were from landing statistics.

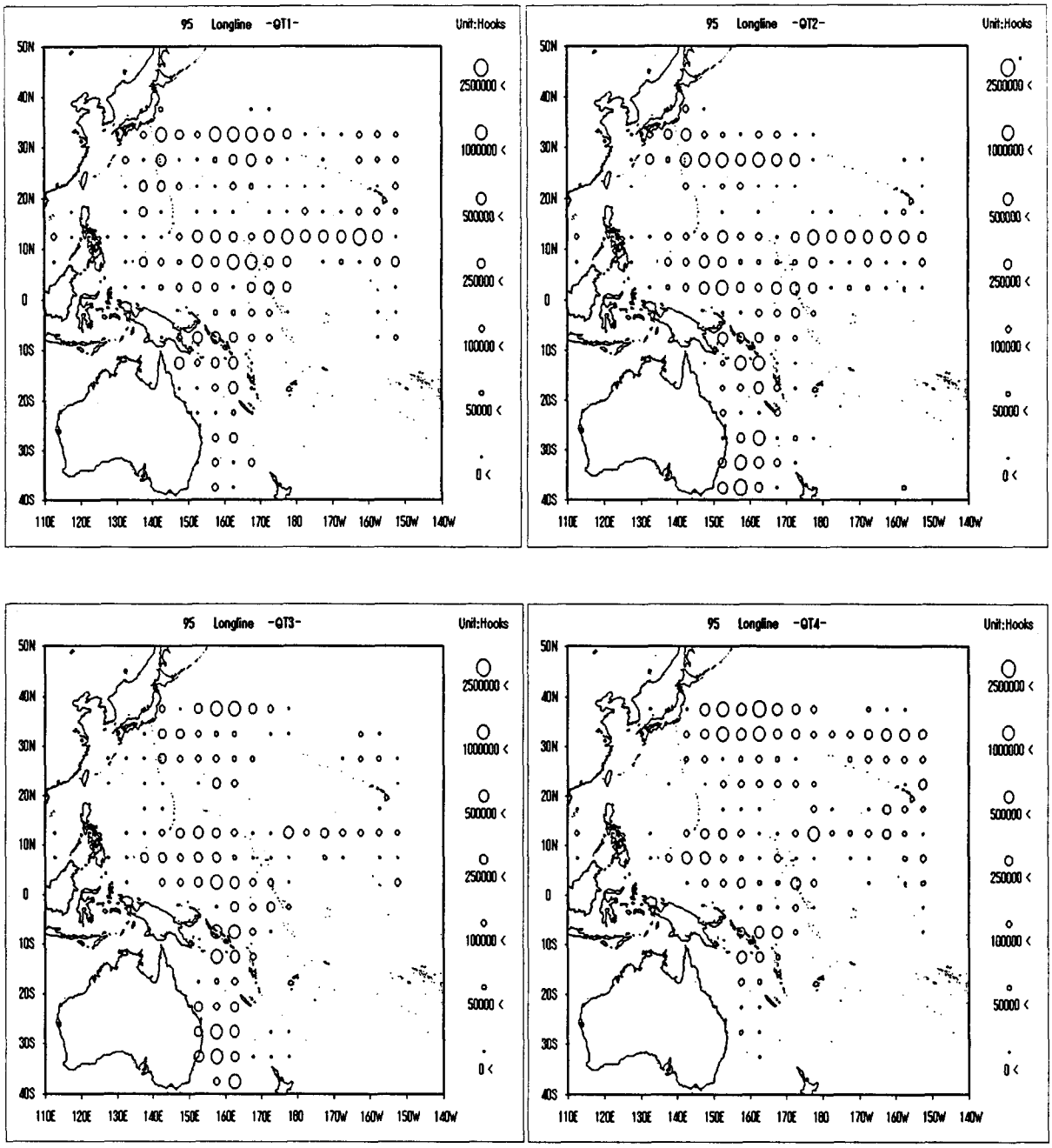

Fig. 1. Distribution of fishing effort for the Japanese longline fishery (offshore and distant water) in the western and central Pacific Ocean in 1995.

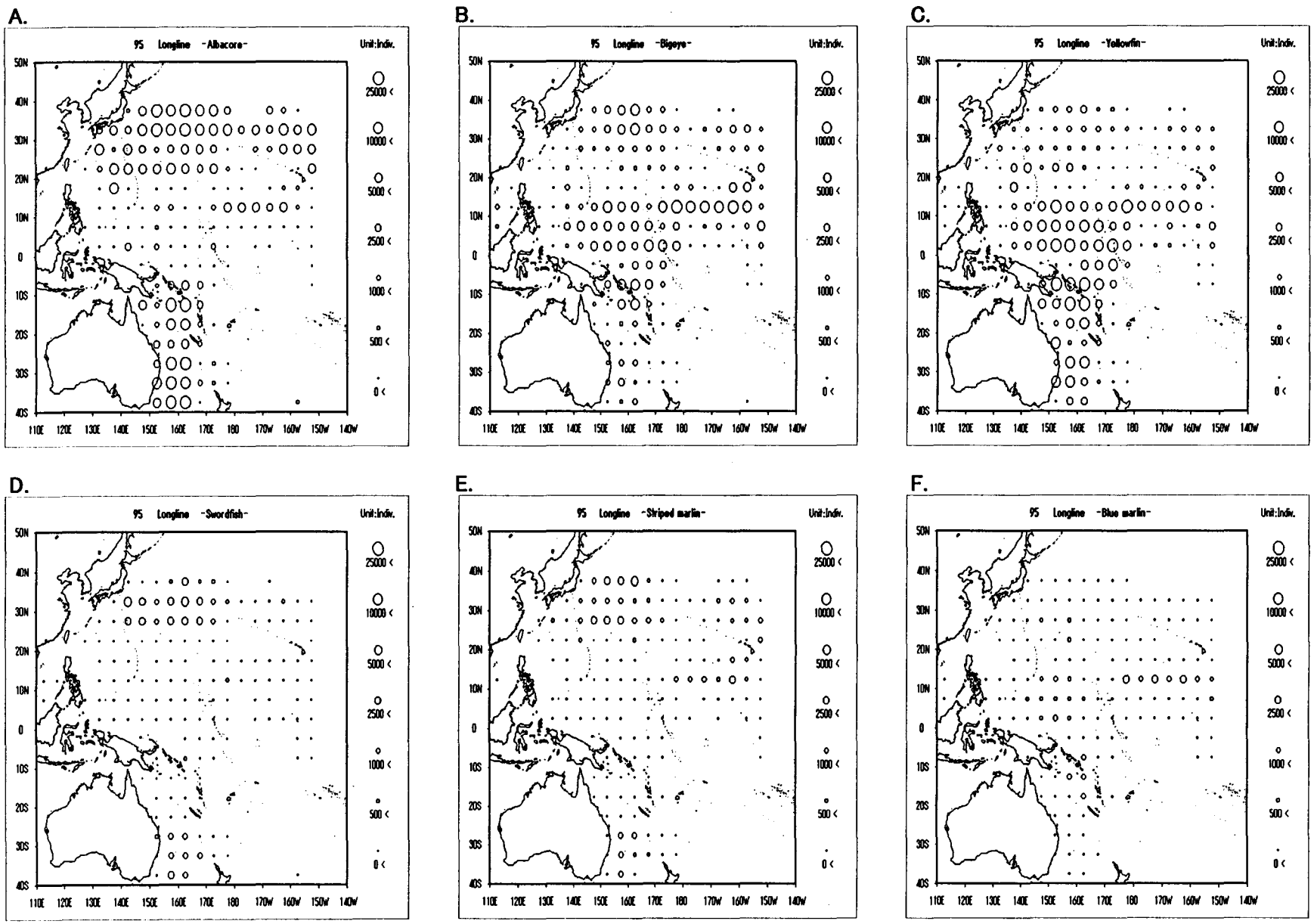

Fig.2. Distributions of longline catch in number in 1995 for six main target species (A:albacore, B: bigeye tuna, C: yellowfin tuna, D: swordfish,E: striped marlin and F: blue marlin).

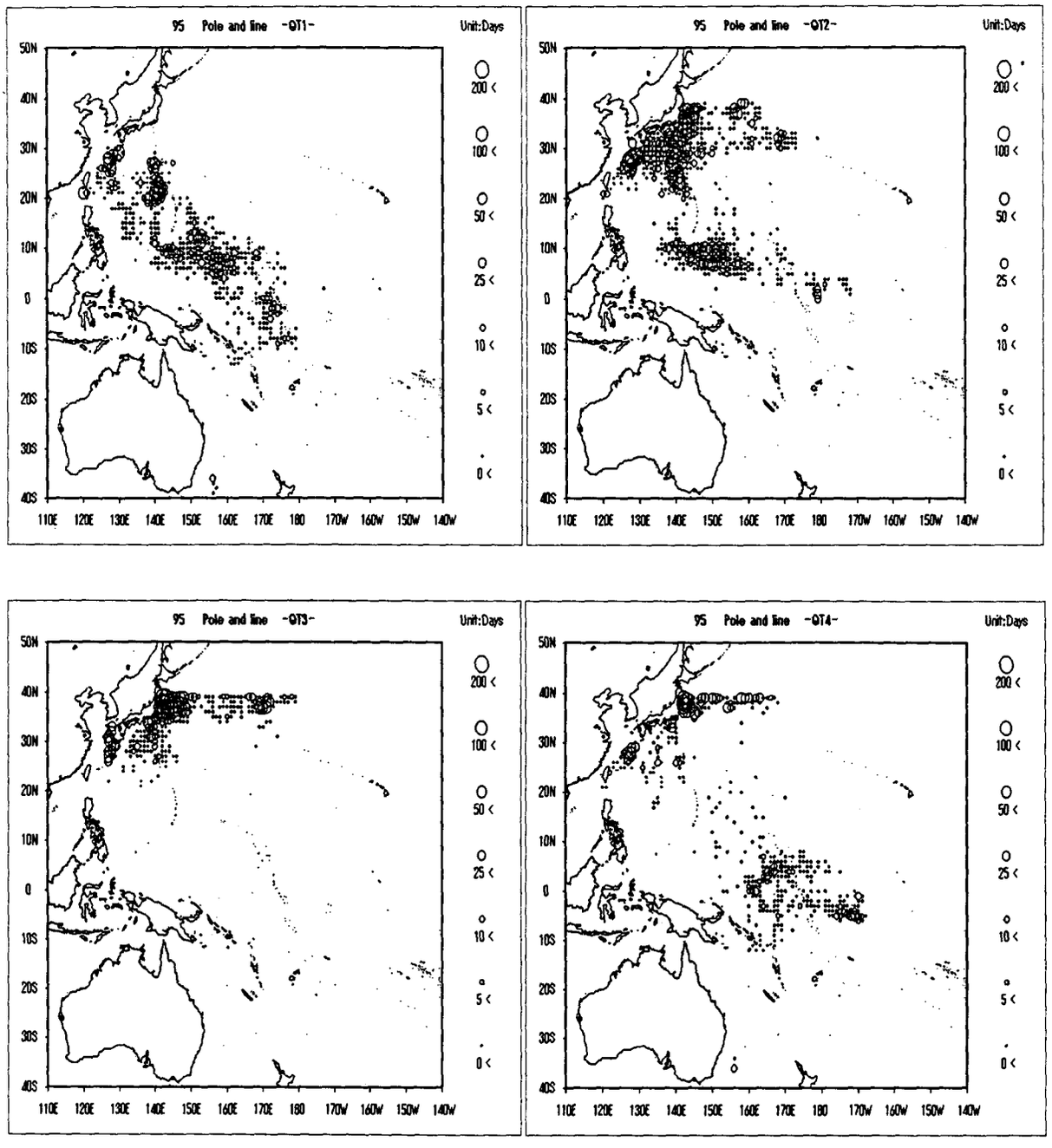

Fig. 3. Distribution of fishing effort for the Japanese pole and line fishery (offshore and distant water) in the Pacific Ocean in 1995.

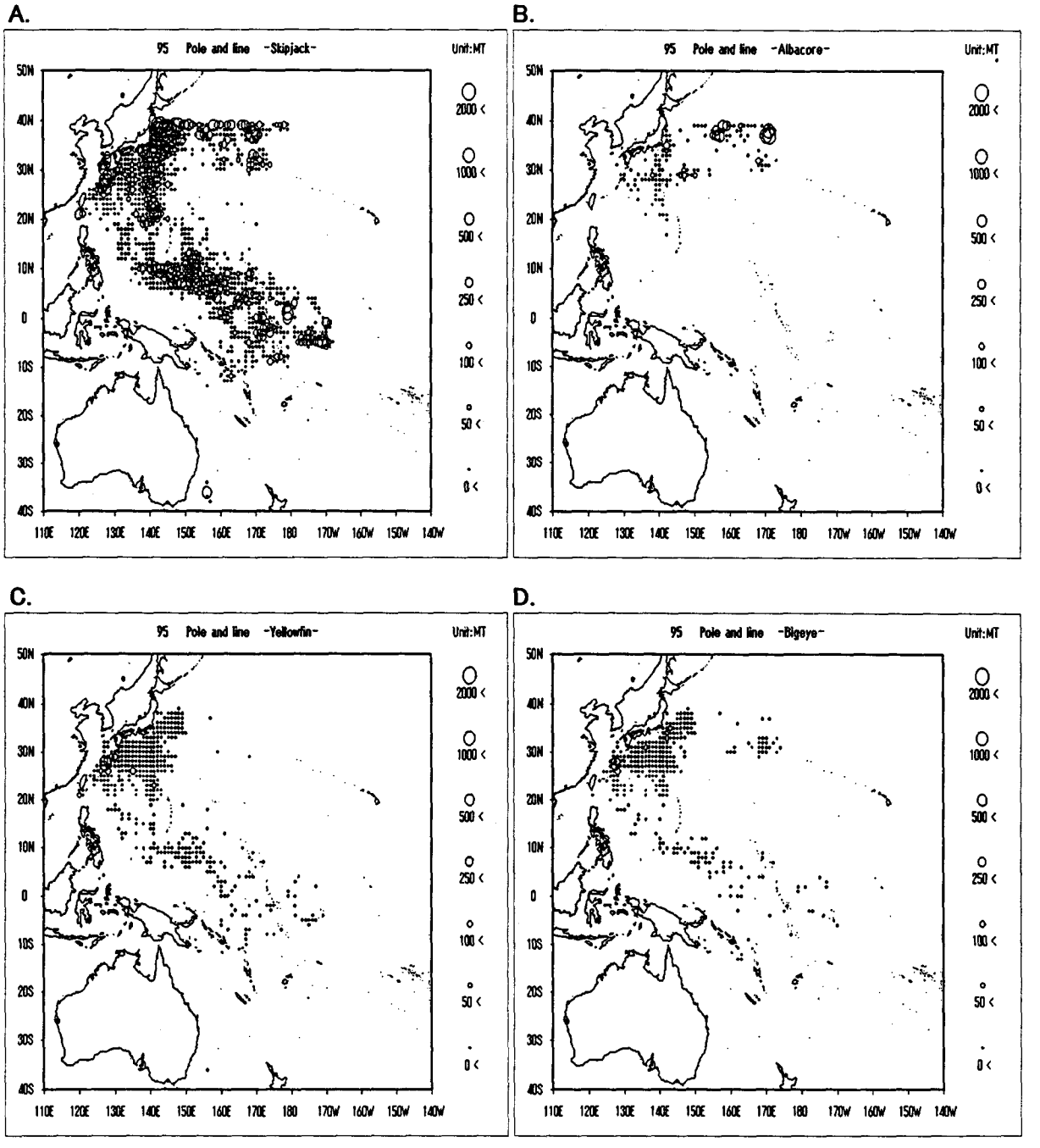

Fig. 4. Distribution of pole and line catch in weight in 1995 for skipjack tuna(A), albacore(B), yellowfin tuna(C), and bigeye tuna(D).

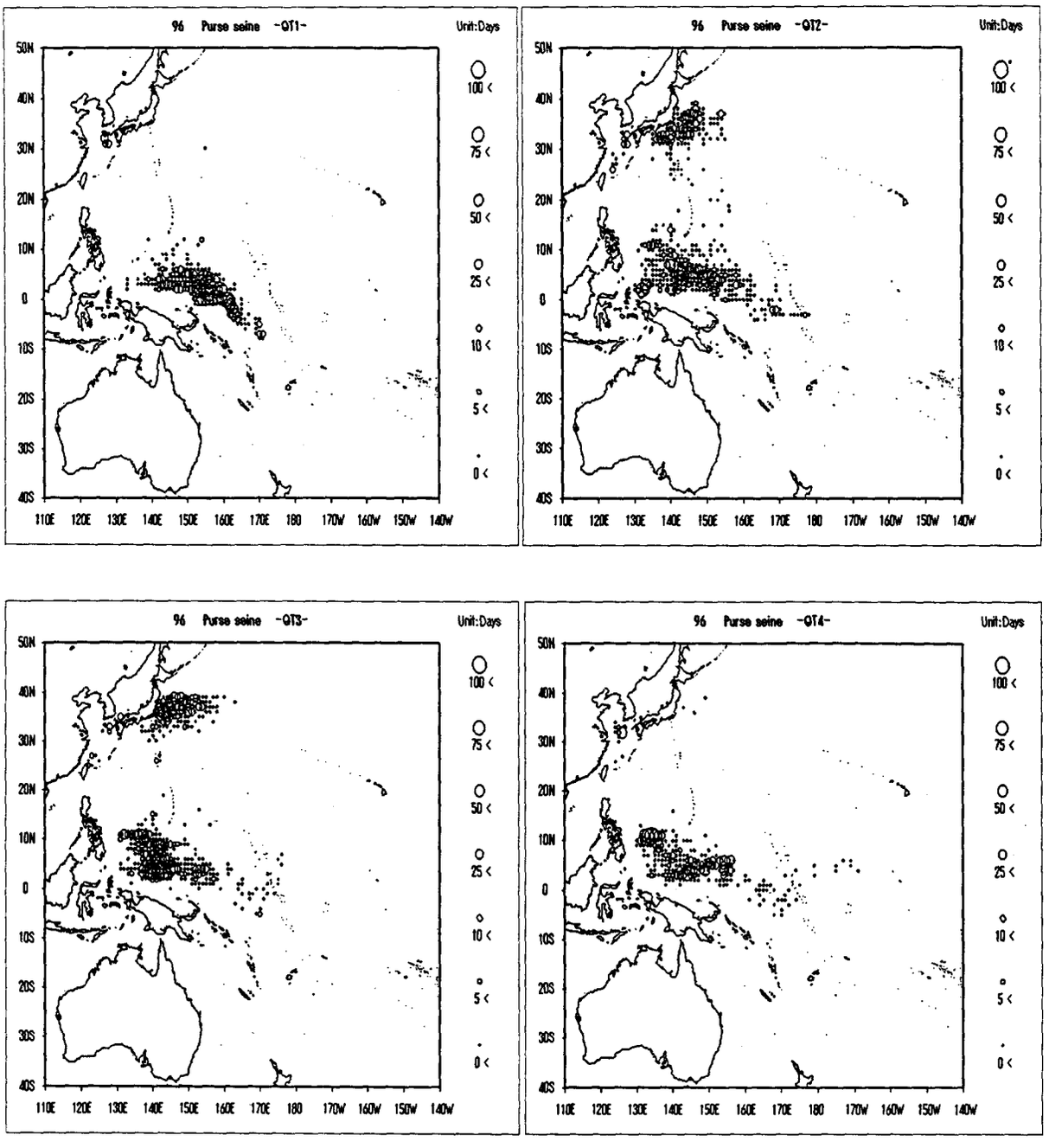

Fig. 5. Distribution of fishing effort for the Japanese purse seine fishery (larger than 100 GRT) in the Pacific Ocean in 1996.

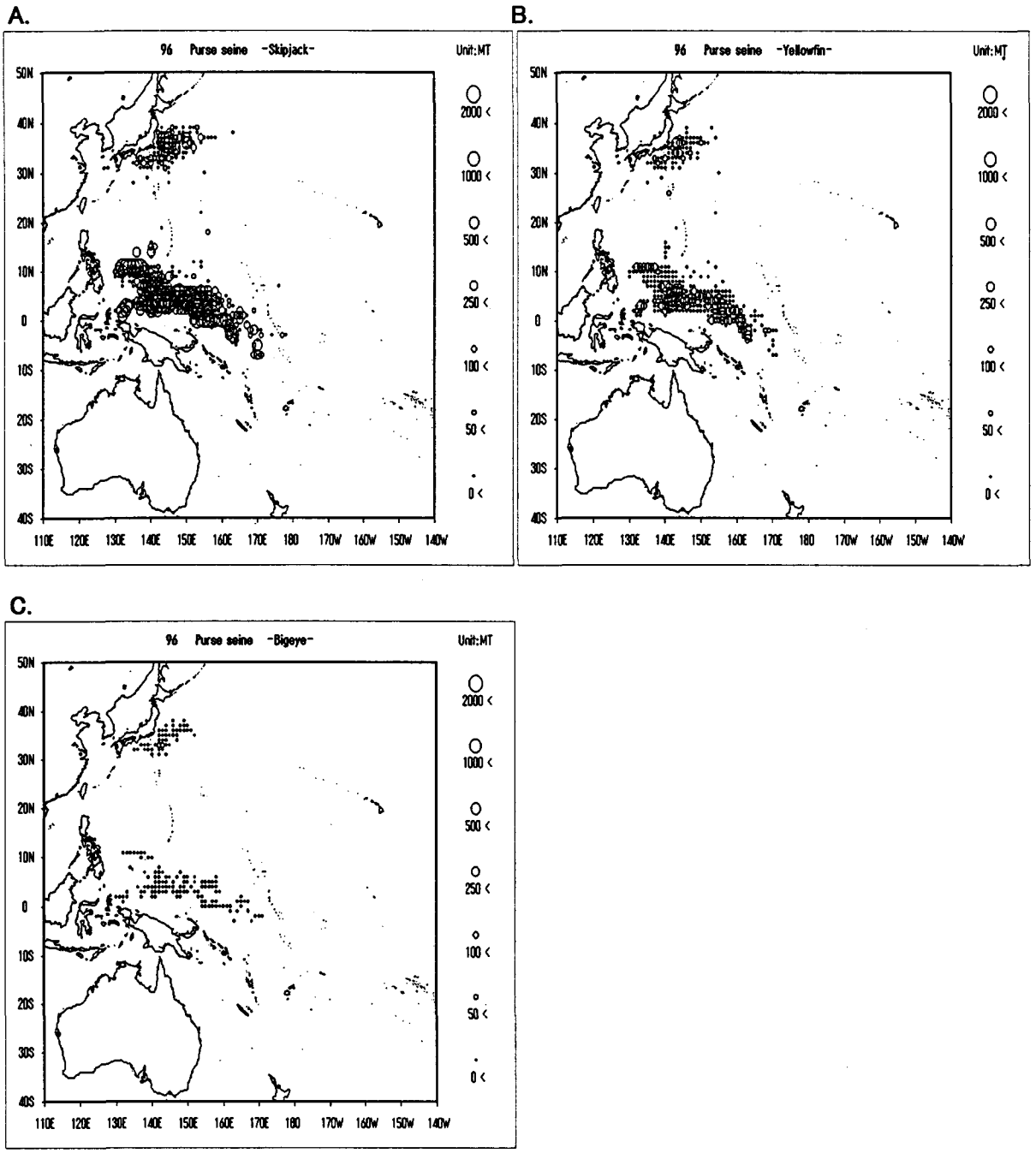

Fig.6. Distribution of puese seine catch in weight in 1996 for skipjack tuna(A), yellowfin tuna(B), and bigeye tuna(C).