

TAIWANESE LONGLINE FISHERY IN THE MEDITERRANEAN WITH EMPHASIS ON CATCH AND CATCH-AT-SIZE OF BLUEFIN TUNA

Hsu, C.C.

Institute of Oceanography, National Taiwan University, Taipei, Taiwan

SUMMARY

Taiwanese longliners commenced their operations in the Mediterranean in April, 1993. The main target species of the fishery is bluefin tuna. In 1993, a total of 932,000 hooks were deployed, and 328 MT of bluefin tuna were caught. The catches of other species were minor. In 1994, the preliminary estimated catch of bluefin tuna amounted to 733 MT.

Due to the short time series of the catch and effort data, the standardized catch per unit effort could not be determined. However, 1994 size frequency data were submitted and 1993 size data were substituted by 1994 data.

RESUME

Les palangriers taiwanais ont commencé leurs activités dans la Méditerranée en avril 1993. La principale espèce visée par la pêche est le thon rouge. En 1993, un total de 932 mille hameçons ont été mouillés, et ont donné 328 TM de thon rouge. Les prises d'autres espèces ont été minimales. En 1994, la prise de thon rouge a été estimée provisoirement à 733 TM.

Vu l'étendue réduite de la série temporelle de données de capture et d'effort, il est impossible d'obtenir la prise par unité d'effort standardisée. Toutefois, les fréquences de taille de 1994 ont été remises, et la taille de 1993 a été substituée par les données de 1994.

RESUMEN

Los palangreros de Taiwan iniciaron sus operaciones en el Mediterráneo en abril de 1993. El principal objetivo de la pesquería es el atún rojo. En 1993 se desplegó un total de 932.000 anzuelos, y se obtuvieron 328 t de atún rojo. Las capturas de otras especies fueron de menor importancia. En 1994, la captura preliminar estimada de atún rojo ascendía a 733 t.

Debido a las cortas series temporales de datos de captura y esfuerzo, no se ha podido determinar la captura por unidad de esfuerzo normalizada. Sin embargo, en 1994 se comunicó la frecuencia de tallas y se sustituyeron las tallas de 1993 por los datos de 1994.

INTRODUCTION

There are almost three decades for Taiwanese longliners operating in the Atlantic Ocean, however, Taiwanese fleets operating in the Mediterranean Sea started from April, 1993. At the beginning, Taiwanese longliners operated around the tropical region of the Atlantic, and targeted on tropical species during the early 1960's; then expanded fishing region to almost the Atlantic Ocean, and shifted the target to albacore after late 1960's; following probable economic reason, Taiwanese fleets usually operating in north Atlantic shifted largely to southern Atlantic after 1987, and by almost the same time, vessels with super-cold freezer transplanted into Atlantic Ocean, and tried to fish species for sashimi market, although fishermen may change their targets in according to the oceanic condition and hobby (Chang and Hsu 1994). Taiwanese longline fishery activities in the Atlantic have been elucidated in the ICCAT relevant meetings. As far as the information of Taiwanese fishery in the Mediterranean Sea started in April, 1993 was not provided yet. The report attempts to describe Taiwanese fishery in the Mediterranean Sea and emphasis on the fishery-related data collection of the main target species, bluefin tuna, and by-catch species.

FISHERY ACTIVITIES

1. Vessels

Since April, 1993, Six (6) Taiwanese longline vessels have operated in Mediterranean Sea in the first time, and those vessels obviously targeted on bluefin tuna, and during the fishing period of 1994, April and May, Fourteen (14) Taiwanese longliners have involved in the fishery. Those vessels are in over 500 tonnages class and with super-cold freezer facility.

The six vessels employed their 932 thousand hooks in the Mediterranean Sea in 1994. Fig. 1 shows the efforts (hooks) distribution of those vessels in the Mediterranean Sea.

2. Operation time

The elapsed operation time in the Mediterranean Sea for Taiwanese longliners was concentrated on April to July, 1993; and May, 1994. The fishing season is more or less depending on the seasonal dynamics of bluefin tuna. Due to the limitation of bluefin tuna in the Mediterranean Sea for the species conservation, the ICCAT regulation measure of prohibiting fishing in June and July for the Mediterranean bluefin tuna has been adopted by Taiwan Fisheries Authority, the allowable fishing season in 1994 has strickly been restricted, All of the 14 have completely obeyed the regulation terminating the 1994 fishing season on May 31 and retreated to based port, Las Palmas.

3. Operation ground

The fishing grounds were not significantly different between 1993 and 1994 (Fig. 2). In 1993, the fishing areas were sparsely distributed, but mainly around 35°N-40°N and 0°E-10°E, and next around 32°N-34°N and 11°E-18°E; Comparatively in 1994, the fishing areas were much concentrated on the region, mainly between 35°N-40°N and 1°W-7°E, and next between 32°N-34°N and 15°E-17°E.

4. Catch data collection

The fishery-dependent data collection was based on the logbook system (Hsu and Lin 1994) and ICCAT Bluefin Tuna Statistical Document. Hence, 1993 catch was summed from logbooks that are reported by fishermen, and using appropriate conversion coefficients to raise dressed weight (DW), gilled and Gutted (GG) and filet (FL) to whole weight for the bluefin tuna, then the 1993 annual catches of Taiwanese longline fishery in the Mediterranean Sea was shown in Table 1.

Table 1 Monthly catches of Taiwanese longliners in the Mediterranean Sea by species in 1993.

Unit: number; wieight (kg) in parentheses

Month	BET	BFT	SWO	STM	BUM	SHK
April*		29 (4,220)	1 (90)			
May		509 (104,430)	10 (520)			
June		1,151 (207,820)	18 (820)		20 (90)	
July		67 (11,580)	1 (41)	2 (120)	10 (30)	
Total	52 (1,670)	1,756 (328,050)	30 (1,471)	2 (120)	30 (120)	

* There are 52 bigeye tuna (1,670 kg), 24 bluefin tuna (4680 kg), 10 swordfish (500 kg) and 11 sharks (310 kg) caught in the eastern Atlantic around Las Palmas waters during this month.

Moreover, the 1994 annual catch was estimated only for bluefin tuna because the logbooks were not completely recovered yet. And the estimated bluefin catch was based on the daily reports of fishermen when they caught bluefin tuna and certificate of origin issued by Taiwan Fishery Authority (Department of fishery, Construction Bureau, Kaohsiung Manicipal Government). The 1994 annual bluefin tuna catch is preliminarily estimated about 732,965 MT, and by-catch information is unknown due to the logbooks are not returned yet.

5. Catch composition

In 1993, only three species, i.e., bluefin tuna, swordfish and blue marlin were recorded from fishermen's logbooks. Also checking with captains of 6 longliners fishing in the Mediterranean Sea, No positive answer of discreded fish for these three and other pelagic species. Actually if including a significant number of effort operating around the eastern Atlantic region westward the Strait of Gibraltar, bigeye tuna and sharks were also caught in a samll amount comparatively to the bluefin tuna.

The monthly catch composition of 1993 Taiwanese longline fishery was estimated in Table 2, which shows that bluefin tuna is the target (> 96% for monthly catch and > 96% in number and > 98% in weight for overall months combined); next the swordfish (< 2% in number).

The catch composition of 1994 catch was unable to be processed due to not completely return of the logbooks.

BLUEFIN TUNA CATCH

1. Catch distribution

Taiwanese bluefin tuna (northern bluefin, *Thunnus thynnus*) fisheries were mainly on the southwestern Pacific waters around Taiwan Island, comparatively a less amounts were caught from distant-waters fisheries. Nonetheless a significant amount of southern bluefin tuna (*Thunnus maccoyii*) was caught from southern hemisphere of the three Oceans since 1980's (Hsu 1992; 1993). Since 1993, the bluefin catch is much more notable for Taiwanese tuna fishery than this time before, and in Atlantic and Mediterranean Sea, Taiwanese catch of bluefin tuna was mainly coming from western and middle parts of Mediterranean Sea (Figs. 3 and 4), and very small amounts was from eastern Atlantic. 1993 catch was estimated about 328 MT (excluding 4.7 MT caught from eastern Atlantic Ocean) in the Mediterranean Sea, and about 733 MT was caught in 1994 for Mediterranean Sea, and none from eastern Atlantic.

Table 2 The species percentage counted in individual catch of Taiwanese tuna longline fishery by month and by species in 1993, where in weight percentage were filled in parentheses.

	Bluefin tuna	Swordfish	Blue marlin	Striped marlin
April	96.67 (97.91)	3.33 (2.09)	0 (0)	0 (0)
May	98.07 (99.51)	1.93 (0.49)	0 (0)	0 (0)
June	96.81 (99.57)	1.51 (0.39)	1.68 (0.04)	0 (0)
July	83.75 (98.39)	1.25 (0.34)	12.5 (0.25)	2.50 (1.02)
Overall	96.59 (99.48)	1.65 (0.04)	1.65 (0.04)	0.11 (0.01)

2. Catch per unit effort

Only one year catch and effort was available for Taiwanese longline fishery in the Mediterranean Sea, hence standardized catch per unit effort series of bluefin tuna was not pursued at the time being. However the monthly nominal catch per unit effort (in number and in weight) were estimated by dividing the monthly catch by nominal effort, and results with mean weight are tabulated in Table 3. The high catch per unit effort appeared in June, and next in July.

The spatial catch per unit effort distribution of bluefin tuna by Taiwanese longline fishery shows two appranet groups, one is in between 31°-35°N and 15°-20°E, and the other westward 5°E (Fig. 5).

There is about 733 MT bluefin tuna catch in the 1994 fishing season, the efforts are unknown, so the catch per unit effort for the year cannot be estimated.

3. Catch-at-size

Fig. 6 showed the length frequency distribution of 1994 catch. The most of length in the catch locate at between 200 cm and 270 cm, and peak at 225 cm - 230 cm. Based on this size distribution, the catch-at-size was estimated (Table 4), because all catch were coming from operation in May, the size distribution and catch-at-size are pooled in one data.

Table 3 The nominal catch per unit effort of bluefin tuna in the Mediterranean by Taiwanese longline fishery in 1993.

	Effort (1000 hooks)	CPUE in No/1000 hooks	CPUE in kg/1000 hooks	Mean Weight (kg)
April	30	0.9552	138.9987	145.52
May	432	1.1787	241.8279	205.17
June	440	2.6139	471.9514	180.56
July	30	2.2483	388.5906	172.84
Overall	932	1.8834	351.8574	186.82

Due to no size measurement of bluefin tuna in 1993 catch and the fishing grounds are almost similar, I assumed the sizes in 1993 catch by month were similar with those of 1994, and applied the 1994 measurements to substitute 1993 catch, then the catch-at-size for 1993 catch was also estimated and tabulated in Table 4, 1993 catch were pooled in one month in compliance with 1994 size data to estimate catch-at-size.

LITERATURE CITED

Chang, S. K., C. C. Hsu and H. C. Liu. 1994. To extract Taiwanese longline catches targeting on albacore through daily catch composition. Working paper submitted to the Final Albacore Reserach Meeting, Sukarrieta, Spain, June 1-8, 1994. (SCRS/94/44)

Hsu, C. C. 1992. The catches of bluefin tunas by Taiwanese in the Atlantic, Indian and Pacific Oceans. International Commission for the Conservattion of Atlantic Tunas, Coll. Vol. Sci. Pap., 40(1):242-248.

Hsu, C. C. 1994. A preliminary catch estimates of southern bluefin tuna by Taiwanese fisheries. Working paper submitted to the Thirteenth Meeting of Australian, Japanese and New Zealand Scientists on Southern Bluefin Tuna, 19-29 April 1994, MAF Fisheries Greta Point, Wellington, New Zealand.

Hsu, C. C. and M. C. Lin. 1994. The recent catch estimating procedures of Taiwanese longline fisheries. Working paper submitted to the Final Albacore Research Meeting, Sukarrieta, Spain, June 1-8, 1994. (SCRS/94/43)

Table 4 The catch-at-size of bluefin tuna caught by Taiwanese longline fishery in the Mediterranean Sea in 1993 and 1994, where 1993 data were estimated by substitution of 1994 size frequency.

Length class (cm)	1994 size	1993 size	Length class (cm)	1994 size	1993 size	Length class (cm)	1994 size	1993 size
- 49.9	4.000	2.424	166.0 - 166.9	3.000	1.818	239.0 - 239.9	78.000	47.263
			167.0 - 167.9	3.000	1.818	240.0 - 240.9	42.000	25.449
61.0 - 61.9	1.000	.606	168.0 - 168.9	.000	.000	241.0 - 241.9	22.000	13.331
			169.0 - 169.9	10.000	6.059	242.0 - 242.9	30.000	18.178
						243.0 - 243.9	37.000	22.420
64.0 - 64.9	2.000	1.212	172.0 - 172.9	4.000	2.424	244.0 - 244.9	48.000	29.085
			173.0 - 173.9	3.000	1.818	245.0 - 245.9	21.000	12.725
69.0 - 69.9	2.000	1.212	174.0 - 174.9	10.000	6.059	246.0 - 246.9	24.000	14.542
			175.0 - 175.9	1.000	.606	247.0 - 247.9	42.000	25.449
89.0 - 89.9	4.000	2.424	176.0 - 176.9	1.000	.606	248.0 - 248.9	16.000	9.695
			177.0 - 177.9	6.000	3.636	249.0 - 249.9	71.000	43.021
			178.0 - 178.9	4.000	2.424	250.0 - 250.9	12.000	7.271
99.0 - 99.9	9.000	5.453	179.0 - 179.9	19.000	11.513	251.0 - 251.9	27.000	16.360
			180.0 - 180.9	.000	.000	252.0 - 252.9	15.000	9.089
102.0 - 102.9	1.000	.606	181.0 - 181.9	4.000	2.424	253.0 - 253.9	19.000	11.513
103.0 - 103.9	.000	.000	182.0 - 182.9	3.000	1.818	254.0 - 254.9	25.000	15.148
104.0 - 104.9	2.000	1.212	183.0 - 183.9	1.000	.606	255.0 - 255.9	17.000	10.301
			184.0 - 184.9	8.000	4.847	256.0 - 256.9	13.000	7.877
107.0 - 107.9	3.000	1.818	185.0 - 185.9	1.000	.606	257.0 - 257.9	16.000	9.695
108.0 - 108.9	.000	.000	186.0 - 186.9	1.000	.606	258.0 - 258.9	1.000	.606
109.0 - 109.9	6.000	3.636	187.0 - 187.9	4.000	2.424	259.0 - 259.9	39.000	23.631
			188.0 - 188.9	2.000	1.212	260.0 - 260.9	6.000	3.636
112.0 - 112.9	2.000	1.212	189.0 - 189.9	17.000	10.301	261.0 - 261.9	8.000	4.847
113.0 - 113.9	.000	.000	190.0 - 190.9	2.000	1.212	262.0 - 262.9	1.000	.606
114.0 - 114.9	2.000	1.212	191.0 - 191.9	4.000	2.424	263.0 - 263.9	8.000	4.847
			192.0 - 192.9	6.000	3.636	264.0 - 264.9	35.000	21.208
119.0 - 119.9	14.000	8.483	193.0 - 193.9	9.000	5.453	265.0 - 265.9	6.000	3.636
120.0 - 120.9	1.000	.606	194.0 - 194.9	36.000	21.814	266.0 - 266.9	16.000	9.695
121.0 - 121.9	.000	.000	195.0 - 195.9	7.000	4.242	267.0 - 267.9	9.000	5.453
122.0 - 122.9	1.000	.606	196.0 - 196.9	1.000	.606	268.0 - 268.9	1.000	.606
123.0 - 123.9	4.000	2.424	197.0 - 197.9	2.000	1.212	269.0 - 269.9	14.000	8.483
124.0 - 124.9	6.000	3.636	198.0 - 198.9	2.000	1.212	270.0 - 270.9	6.000	3.636
			199.0 - 199.9	57.000	34.538	271.0 - 271.9	1.000	.606
127.0 - 127.9	1.000	.606	200.0 - 200.9	4.000	2.424	272.0 - 272.9	1.000	.606
128.0 - 128.9	3.000	1.818	201.0 - 201.9	11.000	6.665	273.0 - 273.9	1.000	.606
129.0 - 129.9	10.000	6.059	202.0 - 202.9	21.000	12.725	274.0 - 274.9	7.000	4.242
130.0 - 130.9	2.000	1.212	203.0 - 203.9	7.000	4.242	275.0 - 275.9	.000	.000
131.0 - 131.9	.000	.000	204.0 - 204.9	54.000	32.720	276.0 - 276.9	1.000	.606
132.0 - 132.9	5.000	3.030	205.0 - 205.9	22.000	13.331	277.0 - 277.9	2.000	1.212
133.0 - 133.9	3.000	1.818	206.0 - 206.9	19.000	11.513	278.0 - 278.9	.000	.000
134.0 - 134.9	7.000	4.242	207.0 - 207.9	26.000	15.754	279.0 - 279.9	7.000	4.242
135.0 - 135.9	2.000	1.212	208.0 - 208.9	11.000	6.665	-----	-----	-----
136.0 - 136.9	1.000	.606	209.0 - 209.9	56.000	33.932	283.0 - 283.9	1.000	.606
137.0 - 137.9	3.000	1.818	210.0 - 210.9	13.000	7.877	284.0 - 284.9	8.000	4.847
138.0 - 138.9	1.000	.606	211.0 - 211.9	23.000	13.937	-----	-----	-----
139.0 - 139.9	14.000	8.483	212.0 - 212.9	28.000	16.966	289.0 - 289.9	5.000	3.030
140.0 - 140.9	2.000	1.212	213.0 - 213.9	29.000	17.572	290.0 - 290.9	.000	.000
141.0 - 141.9	3.000	1.818	214.0 - 214.9	82.000	49.687	291.0 - 291.9	2.000	1.212
142.0 - 142.9	1.000	.606	215.0 - 215.9	37.000	22.420	292.0 - 292.9	1.000	.606
143.0 - 143.9	2.000	1.212	216.0 - 216.9	22.000	13.331	293.0 - 293.9	.000	.000
144.0 - 144.9	5.000	3.030	217.0 - 217.9	46.000	27.873	294.0 - 294.9	2.000	1.212
145.0 - 145.9	2.000	1.212	218.0 - 218.9	62.000	37.568	-----	-----	-----
146.0 - 146.9	1.000	.606	219.0 - 219.9	94.000	56.958	299.0 - 299.9	3.000	1.818
147.0 - 147.9	4.000	2.424	220.0 - 220.9	69.000	41.810	-----	-----	-----
148.0 - 148.9	3.000	1.818	221.0 - 221.9	52.000	31.509	-----	-----	-----
149.0 - 149.9	15.000	9.089	222.0 - 222.9	88.000	53.322	-----	-----	-----
150.0 - 150.9	1.000	.606	223.0 - 223.9	25.000	15.148	-----	-----	-----
151.0 - 151.9	2.000	1.212	224.0 - 224.9	68.000	41.204	-----	-----	-----
152.0 - 152.9	3.000	1.818	225.0 - 225.9	42.000	25.449	-----	-----	-----
153.0 - 153.9	3.000	1.818	226.0 - 226.9	47.000	28.479	-----	-----	-----
154.0 - 154.9	8.000	4.847	227.0 - 227.9	33.000	19.996	-----	-----	-----
155.0 - 155.9	1.000	.606	228.0 - 228.9	41.000	24.843	-----	-----	-----
156.0 - 156.9	2.000	1.212	229.0 - 229.9	118.000	71.500	-----	-----	-----
157.0 - 157.9	7.000	4.242	230.0 - 230.9	51.000	30.903	-----	-----	-----
158.0 - 158.9	3.000	1.818	231.0 - 231.9	49.000	29.691	-----	-----	-----
159.0 - 159.9	17.000	10.301	232.0 - 232.9	71.000	43.021	-----	-----	-----
160.0 - 160.9	1.000	.606	233.0 - 233.9	37.000	22.420	-----	-----	-----
161.0 - 161.9	1.000	.606	234.0 - 234.9	70.000	42.415	-----	-----	-----
162.0 - 162.9	.000	.000	235.0 - 235.9	33.000	19.996	-----	-----	-----
163.0 - 163.9	1.000	.606	236.0 - 236.9	52.000	31.509	-----	-----	-----
164.0 - 164.9	6.000	3.636	237.0 - 237.9	48.000	29.085	-----	-----	-----
165.0 - 165.9	2.000	1.212	238.0 - 238.9	25.000	15.148	-----	-----	-----

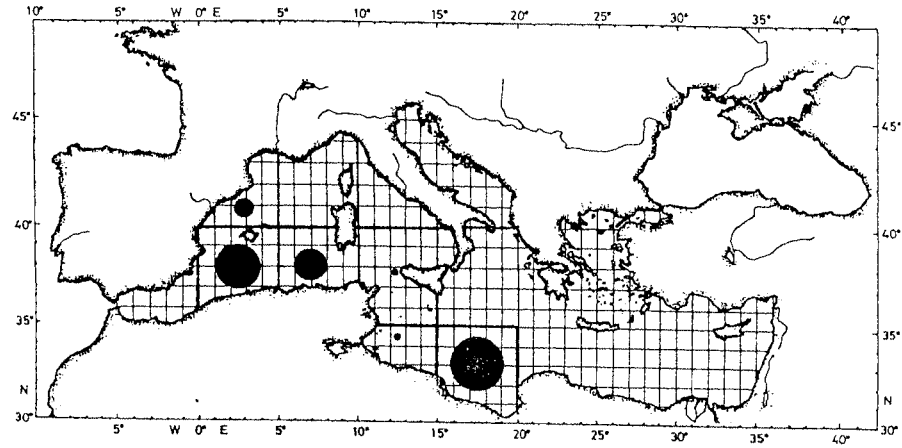


Fig. 1 The effort distribution of Taiwanese tuna longline fishery in the Mediterranean Sea in 1993, where the solid circles indicate that figures of effort in order are 441, 303, 125, 53, 5, and 4 thousand hooks, respectively.

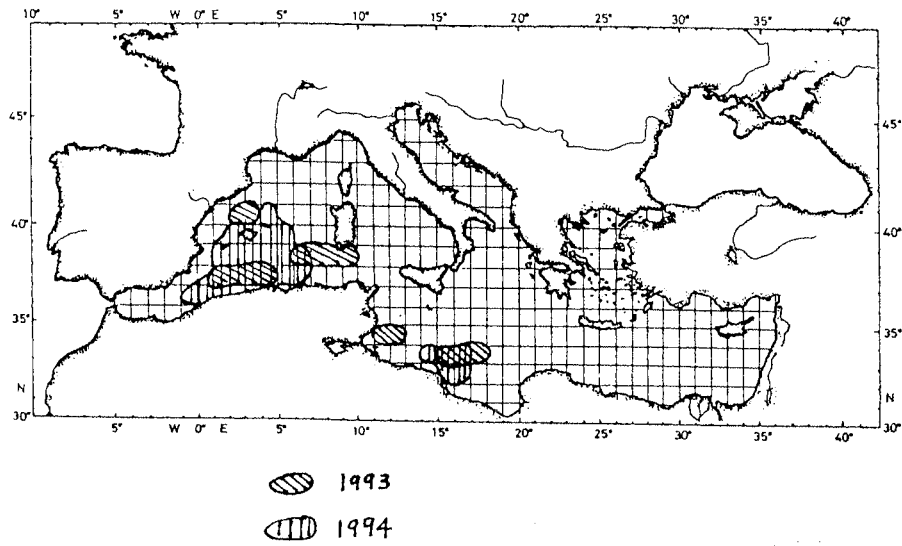


Fig. 2 The comparison of fishing grounds of Taiwanese longliners in the Mediterranean Sea between 1993 and 1994 fishing seasons.

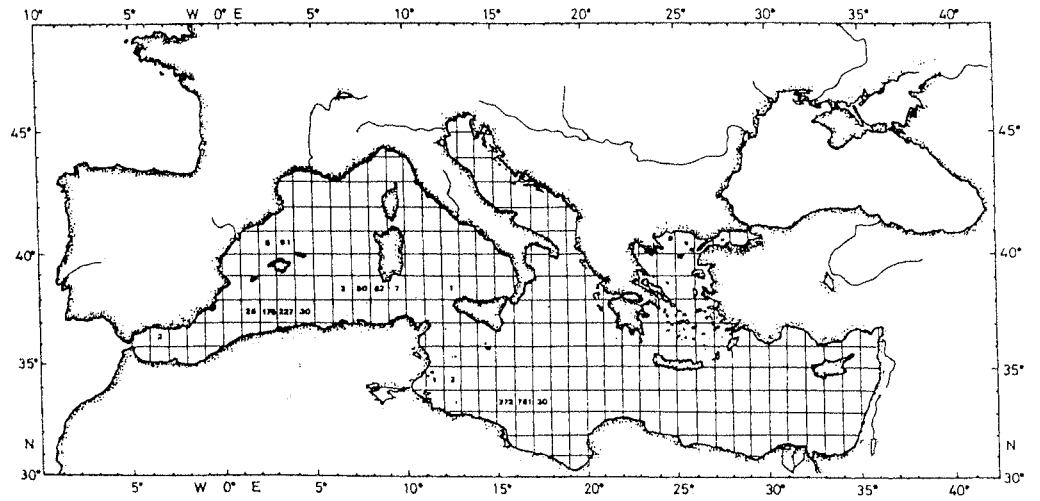


Fig. 3 1993 catch distribution of bluefin tuna by Taiwanese longline fishery in Mediterranean Sea. (in numbers)

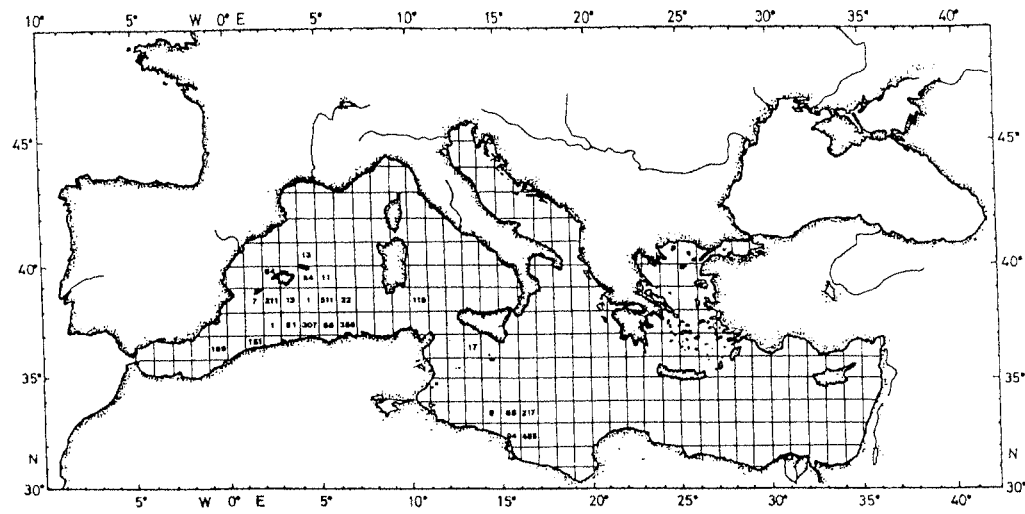


Fig. 4 1994 catch distribution of bluefin tuna by Taiwanese longline fishery in Mediterranean Sea. (in numbers)

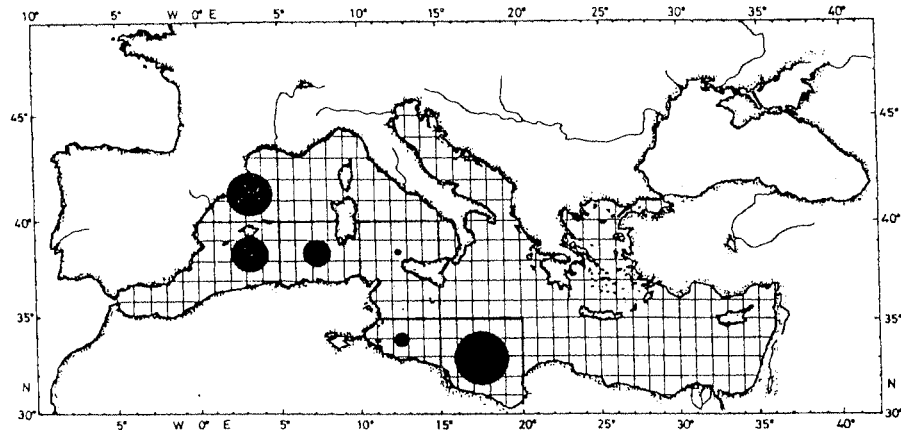


Fig. 5. The catch per unit effort distribution of bluefin tuna by Taiwanese longline fishery in the Mediterranean Sea in 1993, where the solid circles indicate that figures of catch per unit effort in order are 471.95, 308.82, 251.73, 209.13, 130.53, and 48.0 kg/1000 hooks, respectively.

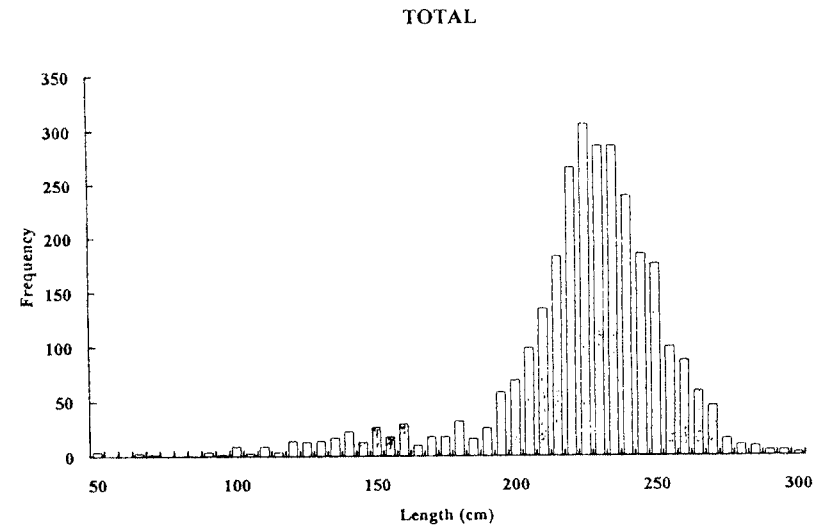


Fig. 6 The size frequency of bluefin tuna caught by Taiwanese longline fishery in Mediterranean Sea in 1994.