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FRENCH POLYNESIA YELLOWFIN AND BIGEYE TUNAS FISHERY

by

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1 - Presentation - fleet review

Yellowfin tuna is actually exploited by a great variety of fishing techniques : pole and line, trolling, handline and longline. On the other hand, bigeye tuna is caught only by handline and above all longline.

1. Pole and line

In 1996, the fleet comprised 92 units « bonitiers » mainly based in the Society archipelago where 85% of the population live. These vessels essentially catch skipjack and yellowfin tunas but they also catch billfishes, mahimahi and wahoo when trolling ; very few practise handline under FADs.

Summer is the best season for both skipjack and yellowfin but winter usually brings bigger fishes.

2. Handline

The fleet known as « poti marara » is specialized in the drop-stone handline technique that catch deep tuna under FADs or at « tuna holes » ; in 1996, the fleet comprised about 200 units. Depending of the year, more albacore (usually) or yellowfin tuna are caught. Bigeye tuna are also caught but in a much less quantity.

Yellowfin sizes usually comprises between 18 and 30 kg whilst bigeye sizes are higher (30 to 50 kg).

These « poti marara » are polyvalent fishing units as they also practise trolling (tuna, billfishes, mahimahi, wahoo), harpoon mahimahi or scoop flying fishes (« marara ») at night.

3. Trolling

In French Polynesia, almost every existing boat use trolling at a certain time but with a wide variation of importance.

As we pointed out upper, « bonitiers » and « poti marara » commonly use trolling apart from their respective fishing speciality, but the big majority concerns the little fishing boats or game fishing boats which are about a thousand in number.

Catches, in decreasing order, consist of skipjack, yellowfin tuna, billfishes, mahimahi, wahoo, dogtooth tuna, various carangids and barracudas.

4. Longline

The domestic monofilament longliner fleet started with 2 vessels in 1990 and is planned to reach 65 active units by the end of 1997.

Vessels sizes vary from 12 m to 35 m long and gross tonnage from 9 to 150 tons.

Each operation sets between 300 and 2500 hooks, baited with imported fish, usually herring and pilchard but also horse mackerel, sanma or squid.

Longline has introduced significant changes in French Polynesia landings both in catches composition that in quality and quantity.

Indeed, « new » fishes like bigeye tuna , swordfish, striped marlin or opah for the main species, rather rare before, are now available to consumers.

Moreover, the specific processing of the catches on board has brought a new high standard of quality, that actually forces fishermen to increase the quality of their catches whatever technique they use, for the profit of consumers.

A foreign longline fleet is still authorized to fish in our EEZ. These vessels are all equipped with transponders to monitor their presence and fishing effort.

These vessels which operate in the area of the Marquesas archipelago, so between 5-12°S and 135-145°W, target bigeye tuna but catch also a great amount of yellowfin tuna.

2 - Longliners results

Data presented in table 1 for the recent period 1990-1996 have been compiled with regard to fishing gear and the 4 main tuna species.

We can see that although artisanal fisheries still remain preponderant for skipjack and even yellowfin tunas, longline is by far the main provider for albacore and bigeye tunas, and its importance for yellowfin tuna will increase in the future.

Table 2 summarizes the domestic longline fleet catches for the period 1994-1996.

Albacore is by far the main tuna caught, followed by yellowfin, bigeye and skipjack tunas.

A few bluefin tuna are also caught each year for a global tonnage reaching around 1 ton at all.

Graphs 1&2 show size-frequency data for yellowfin and bigeye tunas caught by domestic longliners for years 1995 and 1996 ; more and more effort is made to increase collection of biometric data.

An attempt to separate catches in relation to the 150°W meridian limit is presented in table 3.

It shows that the east part of this limit is mainly exploited by longliners and that significant differences in yellowfin and bigeye tunas CPUE exist.

It is important also to point out that foreign longliners in the recent years have exclusively exploited the area east of 150°W, targeting bigeye tuna.

Maps 1 to 4 show a representation of domestic longliners deployment during the period 1994-1996, with the mean CPUE obtained ; data used for these graphs cover 48% of the total amount of fishing effort data for the period. CPUE values plotted are considered good estimations but the real fishing effort map would show a much greater importance of the 1000 km diameter circle area centered on Tahiti island, the main home longliner port.

No fundamental changes have been recorded in the longline material gear nor in the setting of the line ; the few general variations would concern :

- a constant increase, each year, in the number of hooks set per fishing operation that underlies a better utilization rate of the vessels ;
- a strong variation in the bait used : almost exclusively herring in 1994 and 1995 ; a mixture of herring and pilchard (sardine) in 1996 and the large dominance of pilchard for the first half of 1997 ; both better prices and apparently better yields explain the extension of pilchard actually.

Live-bait have not been used by longliners until now, although rough results known from Taiwanese experiments in Guam area are about to re-activate an ancient live-bait production program for milkfish.

The foreign longliners catches composition is very different from the domestic one as bigeye tuna is preponderant. Many things can explain this, in particular fact that this species is specifically targeted and that these vessels operate in a network.

Maps 5&6 give data for the period 1984-1992 for Japanese, Korean and Taiwanese vessels for a total fishing effort of 26.5 million hooks, and a production of :

- 8.5 thousand tons of bigeye,
- 3.4 thousand tons of yellowfin,
- 0.9 thousand tons of albacore and
- 1 ton of skipjack.

It appears clear that skipjack and bluefin tunas are under-reported.

3 - Miscellaneous

- 4 vessels have experienced typical swordfish longlining in 1996 and 1997 ; results seem to show that the resource well exists but is generally rather far away from Tahiti and is subject to seasonal influences.
- a tagged bigeye tuna has been recovered on April 8th 1997. It was caught by a longliner by 153°30'W / 16°10'S and measured 132 cm (FL) for 46 kg (gilled & gutted weight). Information provided by SPC indicates that this fish had been tagged on October 26th 1991 by 147°03'E / 15°22'S near Australia ; at that time, it was 80 cm long. This fish has been living 1991 days (5 years and 5 months) at sea after tagging and cruised a minimum 3420 Nm. If we base one's argument on this fish, bigeye tuna growth seems to be rather slow compared to a few existing growth models.
- Since 1992 and till now, 12 yellowfin and 4 bigeye tunas have been monitored in their movement by acoustic tags in relation to a research program developed in French Polynesia on tuna behaviour. Final results are expected by 1998.

Table 1 : French Polynesian tuna catches (metric tons) between 1990 and 1996

		DOMESTIC VESSELS							FOREIGN VESSELS							
YEAR	GEAR	Vessels active	Vessels covered	Yellowfin	Bigeye	Albacore	Skipjack	Total	% gear /total	Nb vessels	Yellowfin	Bigeye	Albacore	Skipjack	Total	% gear /total
1990	pole & line	118	101	214			1 213	1 427	76,6%							
	handline & troll	173	65	63	na	45		108	5,8%							
	troll 40°S	3	3			299		299	16,0%							
	longline	2	2	6	4	20		30	1,6%	63 (47) ¹	1 082	1 768	876	0,5	3 727	100,0%
	total 1990	296	171	283	4	364	1 213	1 864	100,0%	63 (47)	1 082	1 768	876	0,5	3 727	100,0%
% species/total				15,2%	0,2%	19,5%	65,1%	100,0%			29,0%	47,4%	23,5%	0,0%	100,0%	
1991	pole & line	106	92	214			1 178	1 392	65,5%							
	handline & troll	104	54	66	na	70	18	154	7,2%							
	troll 40°S	4	4			326		326	15,3%							
	longline	8	8	100	35	115	4	254	11,9%	79 (31) ²	1 243	3 220	533	-	4 996	100,0%
	total 1991	222	158	380	35	511	1 200	2 126	100,0%	79 (31)	1 243	3 220	533	0	4 996	100,0%
% species/total				17,9%	1,6%	24,0%	56,4%	100,0%			24,9%	64,5%	10,7%	0,0%	100,0%	
1992	pole & line	111	91	233			1 096	1 329	71,5%							
	handline & troll	106	30	34	na		16	50	2,7%							
	troll 40°S	2	2			72		72	3,9%							
	longline	25	25	150	57	195	7	409	22,0%	55 (8) ²	513	1 305	231	-	2 049	100,0%
	total 1992	244	148	417	57	267	1 119	1 860	100,0%	55 (8)	513	1 305	231	0	2 049	100,0%
% species/total				22,4%	3,1%	14,4%	60,2%	100,0%			25,0%	63,7%	11,3%	0,0%	100,0%	
1993	pole & line	70	40	547			380	927	40,4%							
	handline & troll	152	53	41	na		14	55	2,4%							
	troll 40°S	4	4			45		45	2,0%							
	longline	50	50	366	163	714	25	1 268	55,3%	50	321	706	100	-	1 127	100,0%
	total 1993	276	147	954	163	759	419	2 295	100,0%	50	321	706	100	0	1 127	100,0%
% species/total				41,6%	7,1%	33,1%	18,3%	100,0%			28,5%	62,6%	8,9%	0,0%	100,0%	
1994	pole & line	70	58	126			892	1 018	35,7%							
	handline & troll	#1000 ¹	#1000	154	na	78	208	440	15,4%							
	troll 40°S	0	0					0	0,0%							
	longline	66	66	275	165	913	43	1 396	48,9%	64	532	1 231	133	-	1 896	100,0%
	total 1994	#1136	#1124	555	165	991	1 143	2 854	100,0%	64	532	1 231	133	0	1 896	100,0%
% species/total				19,4%	5,8%	34,7%	40,0%	100,0%			28,1%	64,9%	7,0%	0,0%	100,0%	
1995	pole & line	77	77	319	1	13	1 278	1 611	45,5%							
	handline & troll	#1000 ¹	#1000	182	1	93	208	484	13,7%							
	troll 40°S	4	4			183		183	5,2%							
	longline	65	65	297	182	772	10	1 261	35,6%	46	328	1 336	121	-	1 785	100,0%
	total 1995	#1146	#1146	798	184	1 061	1 496	3 539	100,0%	46	328	1 336	121	0	1 785	100,0%
% species/total				22,6%	5,2%	30,0%	42,3%	100,0%			18,4%	74,8%	6,8%	0,0%	100,0%	
1996	pole & line	92	92	159	1		1 159	1 319	32,2%							
	handline & troll	#1000 ¹	#1000	225	2	209	225	661	16,1%							
	troll 40°S	4	4			69		69	1,7%							
	longline	59	59	380	184	1 463	26	2 053	50,1%	64	911	879	104	-	1 894	100,0%
	total 1996	#1155	#1155	764	186	1 741	1 410	4 101	100,0%	64	911	879	104	0	1 894	100,0%
% species/total				18,6%	4,5%	42,5%	34,4%	100,0%			48,1%	46,4%	5,5%	0,0%	100,0%	
TOTAL	pole & line	644	551	1 812	1	13	7 196	9 022	48,4%							
	handline & troll	#3535	#3535	765	3	495	689	1 952	10,5%							
	troll 40°S	21	21	0	0	994	0	994	5,3%							
	longline	275	275	1 574	790	4 192	115	6 871	35,8%	421 (86)	4 930	10 445	2 098	0,5	17 474	100,0%
	total 1994-1996	#4475	#4061	4 151	794	5 694	8 000	18 639	100,0%	64	4 930	10 445	2 098	0,5	17 474	100,0%
% species/total				22,3%	4,3%	30,5%	42,9%	100,0%			28,2%	59,8%	12,0%	0,0%	100,0%	

¹ : from 1994 to 1996, estimates concern the production of the fleet of all the little fishing boats.

² : Korean vessels (Japanese vessels)

na : data not available

Domestic longline weights are live weights

Troll 40°S weights are frozen whole weights

Table 2 : Domestic longline catches between 1994 and 1996

YEAR	FISHING EFFORT			Albacore		Yellowfin		Bigeye		Skipjack		Billfishes ¹		Other market. ²		Sharks		Other non market. ³		Total nominal	
	Vessels	Sets	Hooks	nb	kg	nb	kg	nb	kg	nb	kg	nb	kg	nb	kg	nb	kg	nb	kg	nb	kg
1 994	66	5 242	5 026 417	44 292	912 900	11 637	275 439	5 520	164 967	4 507	43 350	8 343	560 051	18 814	273 218	10 315	419 949	2 514	37 535	105 843	2 652 879
mean weight					20,6		23,7		29,9		9,6		67,1		14,5		40,7		14,9		25,1
CPUE (/ 100 hooks)				0,88	18,16	0,23	5,48	0,11	3,28	0,09	0,86	0,17	11,14	0,37	5,44	0,21	8,35	0,05	0,75	2,11	52,78
catches composition				41,8%	34,4%	11,0%	10,4%	5,2%	6,2%	4,3%	1,6%	7,9%	21,1%	17,8%	10,3%	9,7%	15,8%	2,4%	1,4%	100,0%	100,0%
1 995	65 (75) ⁴	5 659	5 897 637	37 517	772 643	14 128	296 928	6 489	182 472	1 071	9 864	9 372	556 380	11 286	200 966	9 416	364 583	4 879	61 157	95 227	2 454 856
mean weight					20,6		21,0		28,1		9,2		59,4		17,8		38,7		12,5		25,8
CPUE (/ 100 hooks)				0,64	13,10	0,24	5,03	0,11	3,09	0,02	0,17	0,16	9,43	0,19	3,41	0,16	6,18	0,08	1,04	1,61	41,62
catches composition				39,4%	31,5%	14,8%	12,1%	6,8%	7,4%	1,1%	0,4%	9,8%	22,7%	11,9%	8,2%	9,9%	14,9%	5,1%	2,5%	100,0%	100,0%
1 996	59 (77) ⁴	5 997	6 600 778	69 136	1 462 715	16 771	380 390	7 239	184 130	3 250	26 000	9 290	595 185	10 409	199 994	9 182	386 765	17 266	137 430	142 543	3 372 606
mean weight					21,2		22,7		25,4		8,0		64,1		19,2		42,1		8,0		23,7
CPUE (/ 100 hooks)				1,05	22,16	0,25	5,76	0,11	2,79	0,05	0,39	0,14	9,02	0,16	3,03	0,14	5,86	0,26	2,08	2,16	51,09
catches composition				48,5%	43,4%	11,8%	11,3%	5,1%	5,5%	2,3%	0,8%	6,5%	17,6%	7,3%	5,9%	6,4%	11,5%	12,1%	4,1%	100,0%	100,0%
TOTAL 1994-1996	191 (159)	16 898	17 324 832	150 945	3 148 258	42 534	952 757	19 247	531 568	8 828	79 214	27 004	1 711 616	40 509	674 178	28 914	1 171 296	24 659	236 122	343 613	8 480 343
mean weight					20,9		22,4		27,6		9,0		63,4		16,6		40,5		9,6		24,7
CPUE (/ 100 hooks)				0,86	17,96	0,24	5,44	0,11	3,03	0,05	0,45	0,15	9,77	0,23	3,85	0,16	6,68	0,14	1,35	1,96	48,39
catches composition				43,9%	37,1%	12,4%	11,2%	5,6%	6,3%	2,6%	0,9%	7,9%	20,2%	11,8%	7,9%	8,4%	13,8%	7,2%	2,8%	100,0%	100,0%

¹ marketable billfishes : blue marlin, striped marlin, black marlin and swordfish

² mahimahi, wahoo, opah and pomfrets

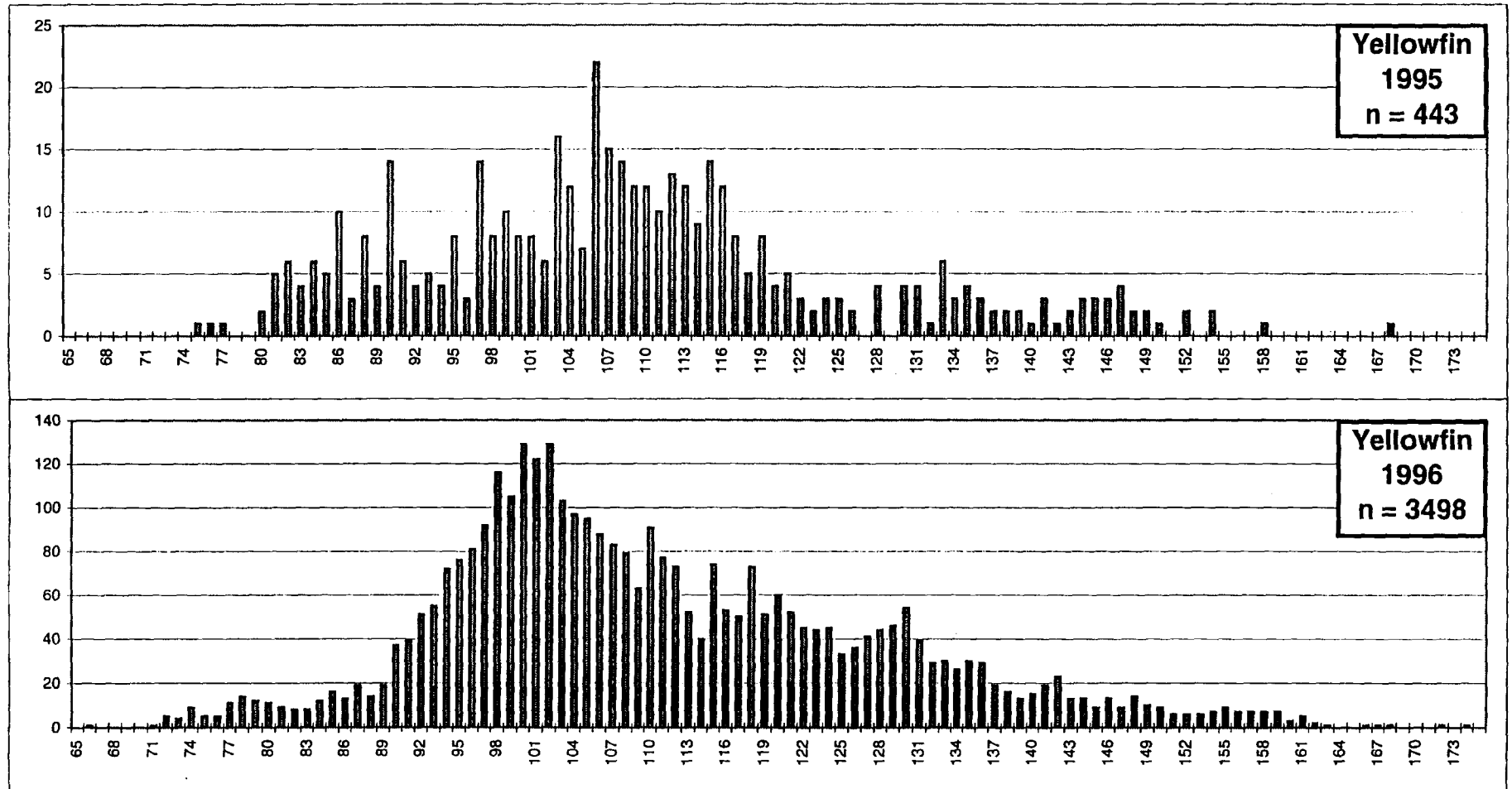
³ non-marketable catches : shortbill spearfish, sailfish, oilfish, giant sea-pike, lancetfish, etc...

⁴ active vessels (total longliners fleet)

**Table 3 : DISPATCH OF YELLOWFIN AND BIGEYE TUNA CAUGHT BY LONGLINERS IN RELATION TO THE 150°W MERIDIAN LIMIT
BETWEEN 1994 AND 1996**

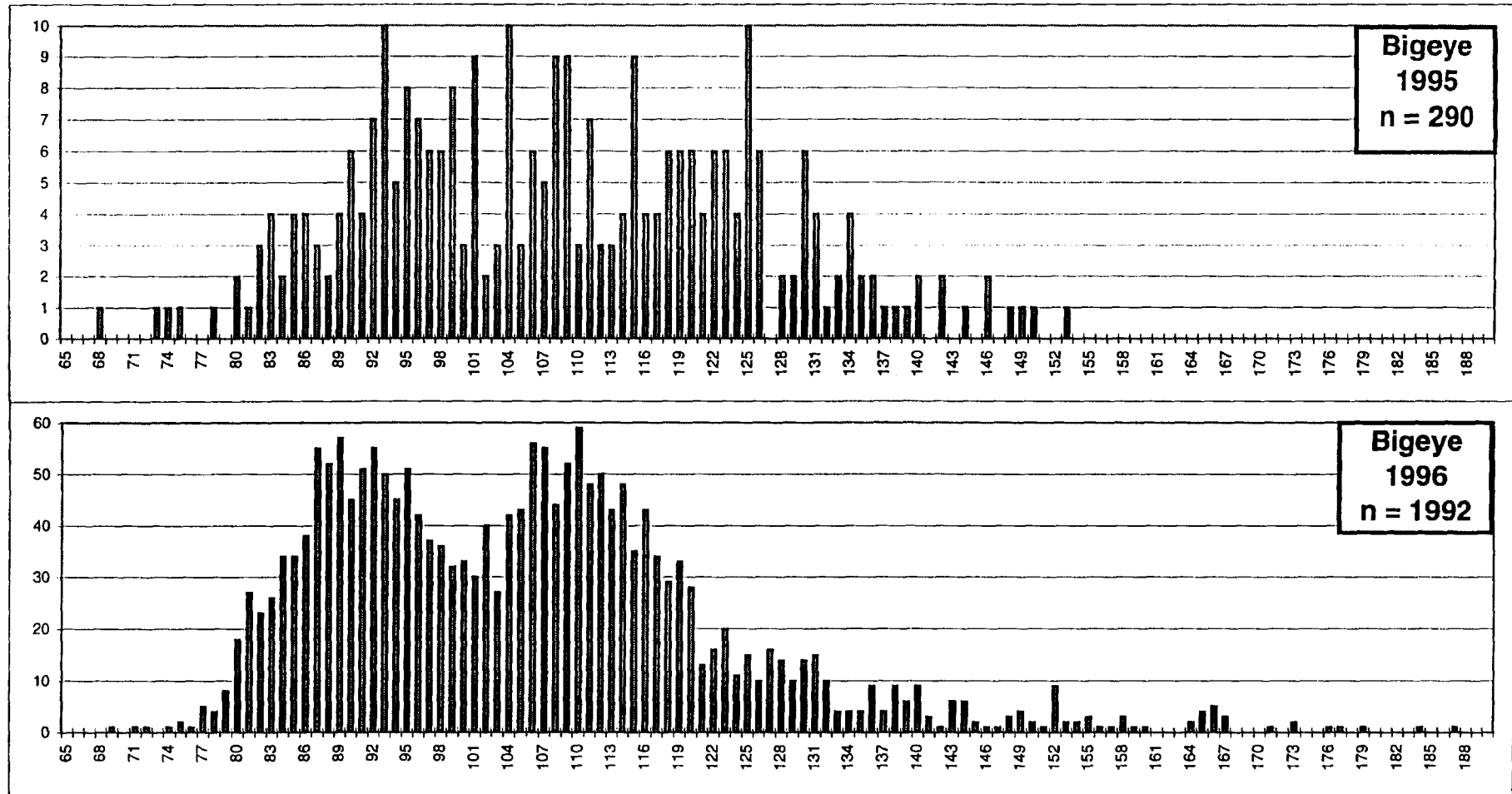
YEAR	WEST OF 150°W					EAST OF 150°W				
	Fishing effort (number of hooks)	YELLOWFIN		BIGEYE		Fishing effort (number of hooks)	YELLOWFIN		BIGEYE	
		Production (kg)	CPUE (kg/100 hooks)	Production (kg)	CPUE (kg/100 hooks)		Production (kg)	CPUE (kg/100 hooks)	Production (kg)	CPUE (kg/100 hooks)
1994	1 613 480	52 609	3,26	67 801	4,2	3 412 937	222 830	13,81	97 166	6,02
%	32,1%	19,1%		41,1%		67,9%	80,9%		58,9%	
1995	2 465 212	100 659	4,08	83 390	3,38	3 432 425	196 269	5,72	99 082	2,89
%	41,8%	33,9%		45,7%		58,2%	66,1%		54,3%	
1996	2 429 086	87 490	3,6	70 522	2,9	4 171 692	292 900	7,02	113 608	2,72
%	36,8%	23,0%		38,3%		63,2%	77,0%		61,7%	
TOTAL	6 507 778	240 758	3,7	221 713	3,41	11 017 054	711 999	6,46	309 856	2,81
%	37,1%	25,3%		41,7%		62,9%	74,7%		58,3%	

Graph 1 : SIZE FREQUENCY OF YELLOWFIN TUNA FOR YEARS 1995-1996 (longline)



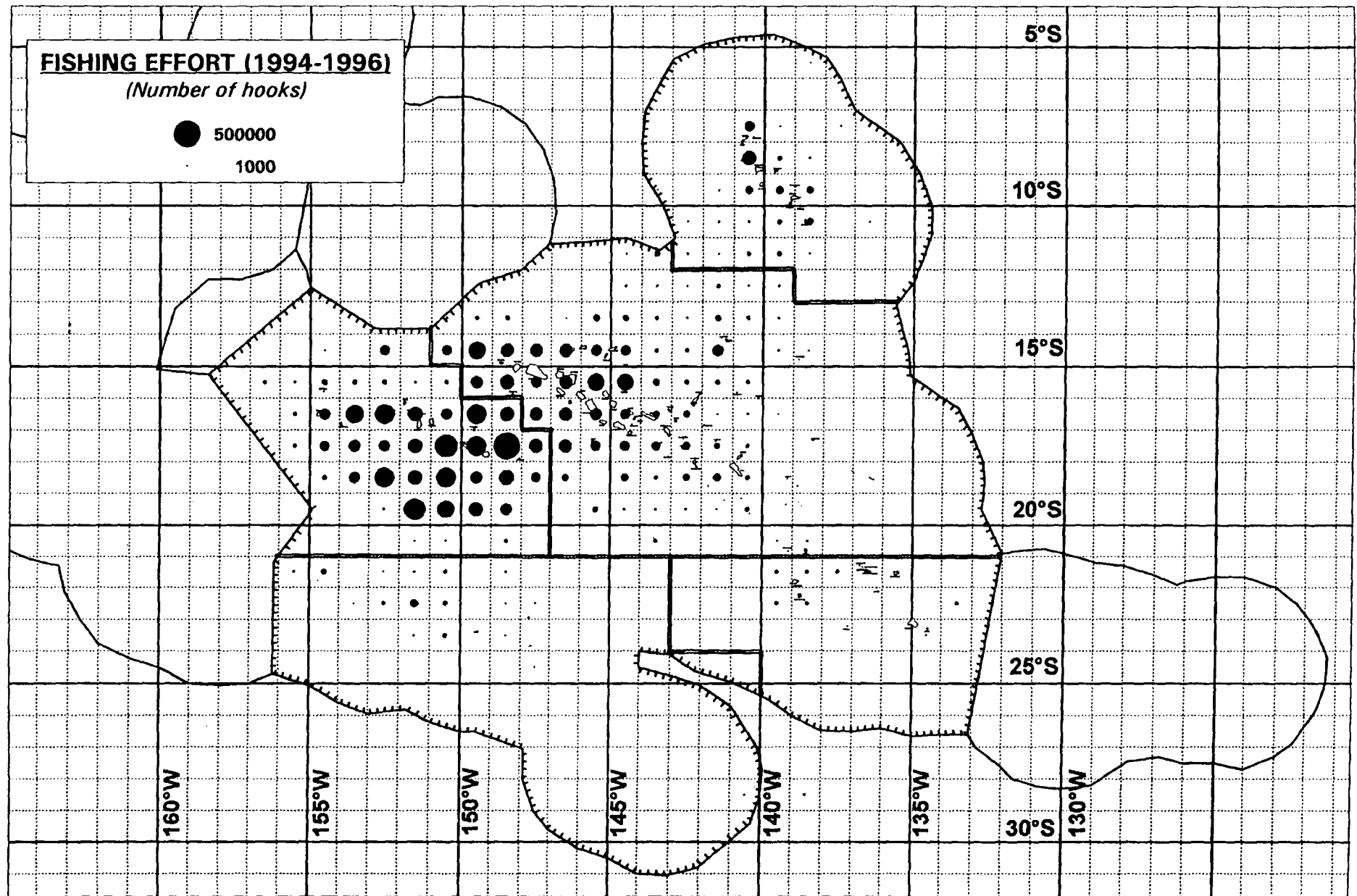
Fork length (cm)

Graph 2 : SIZE FREQUENCY OF BIGEYE TUNA FOR YEARS 1995-1996 (longline)

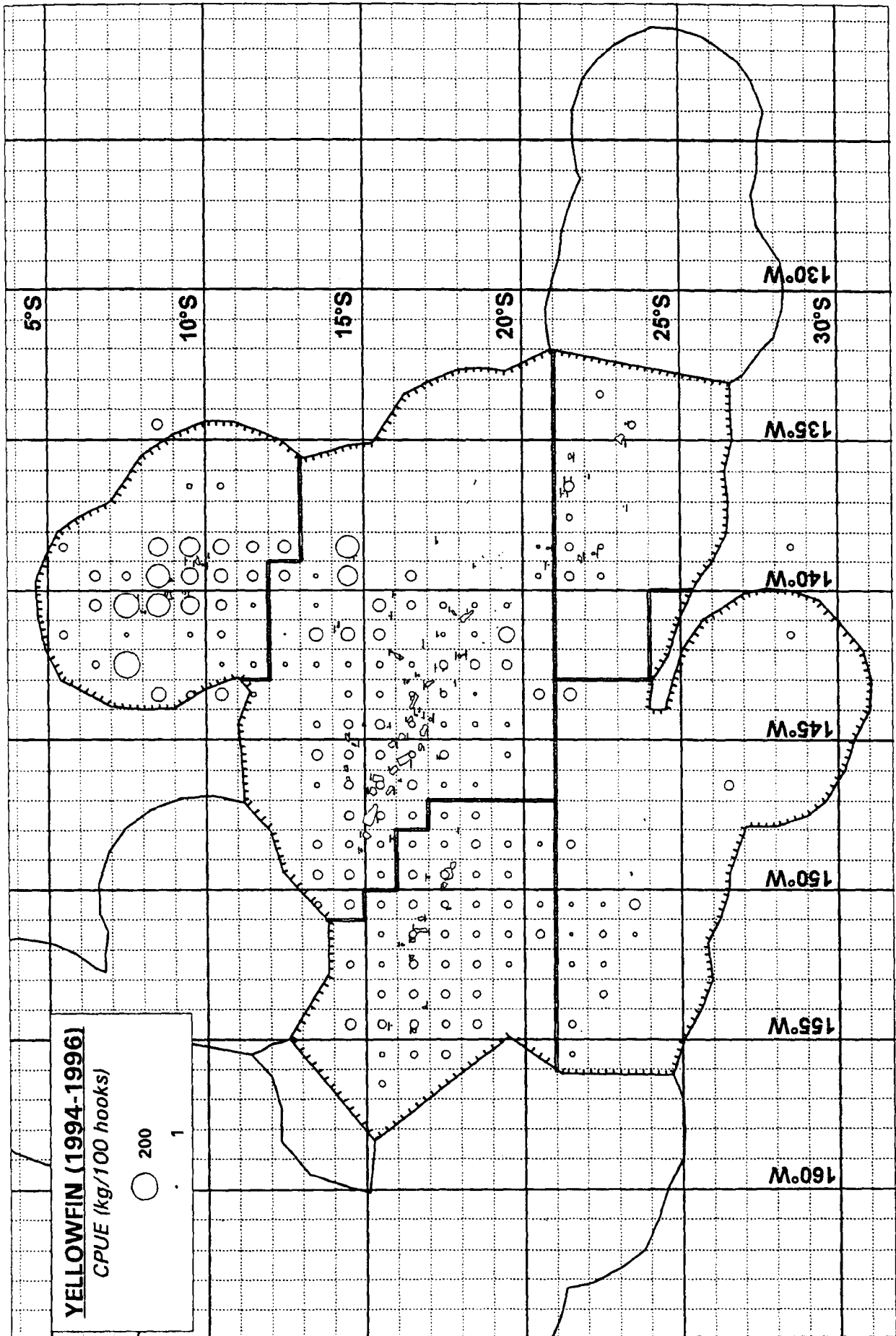


Fork length (cm)

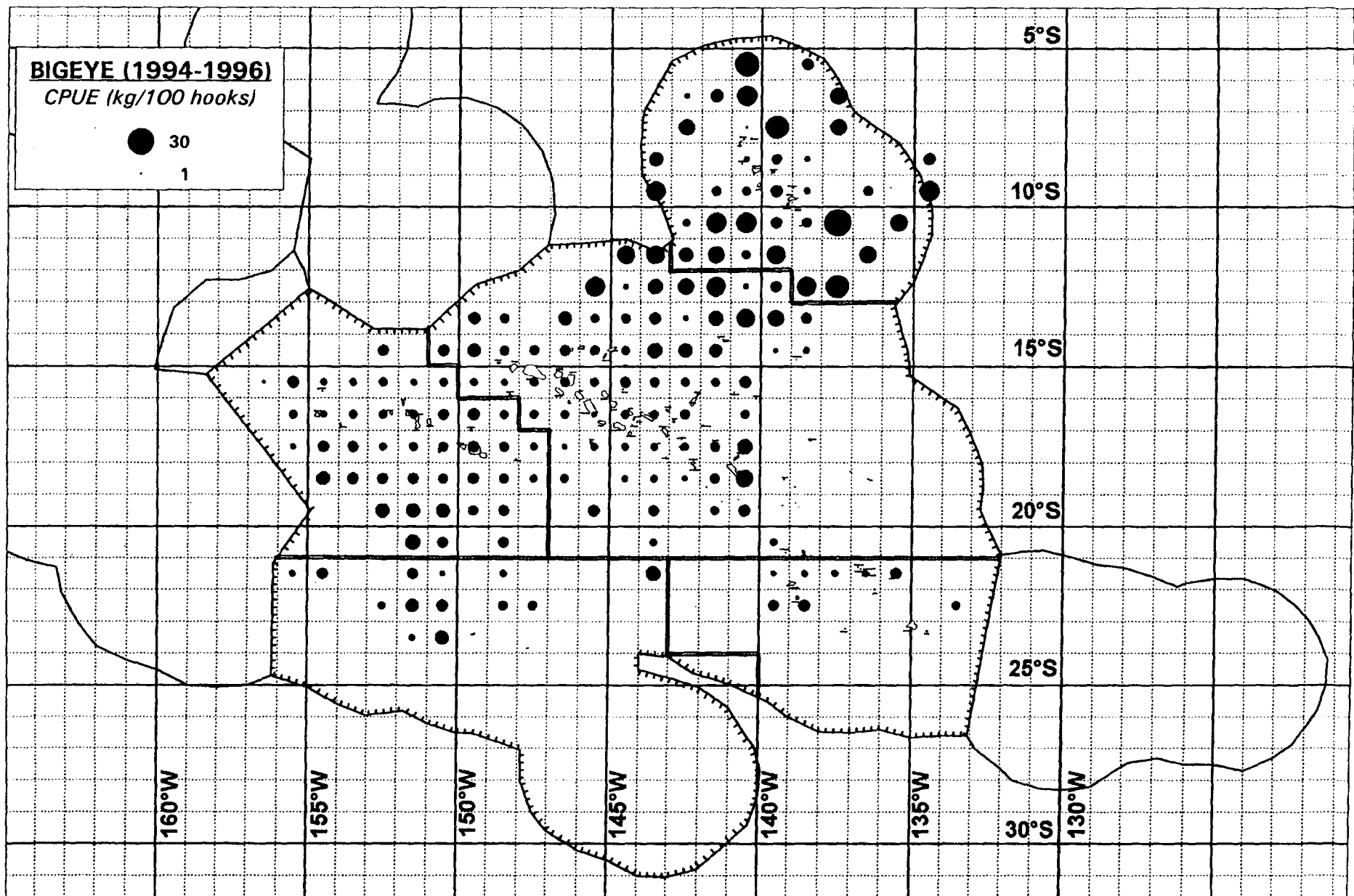
Map 1



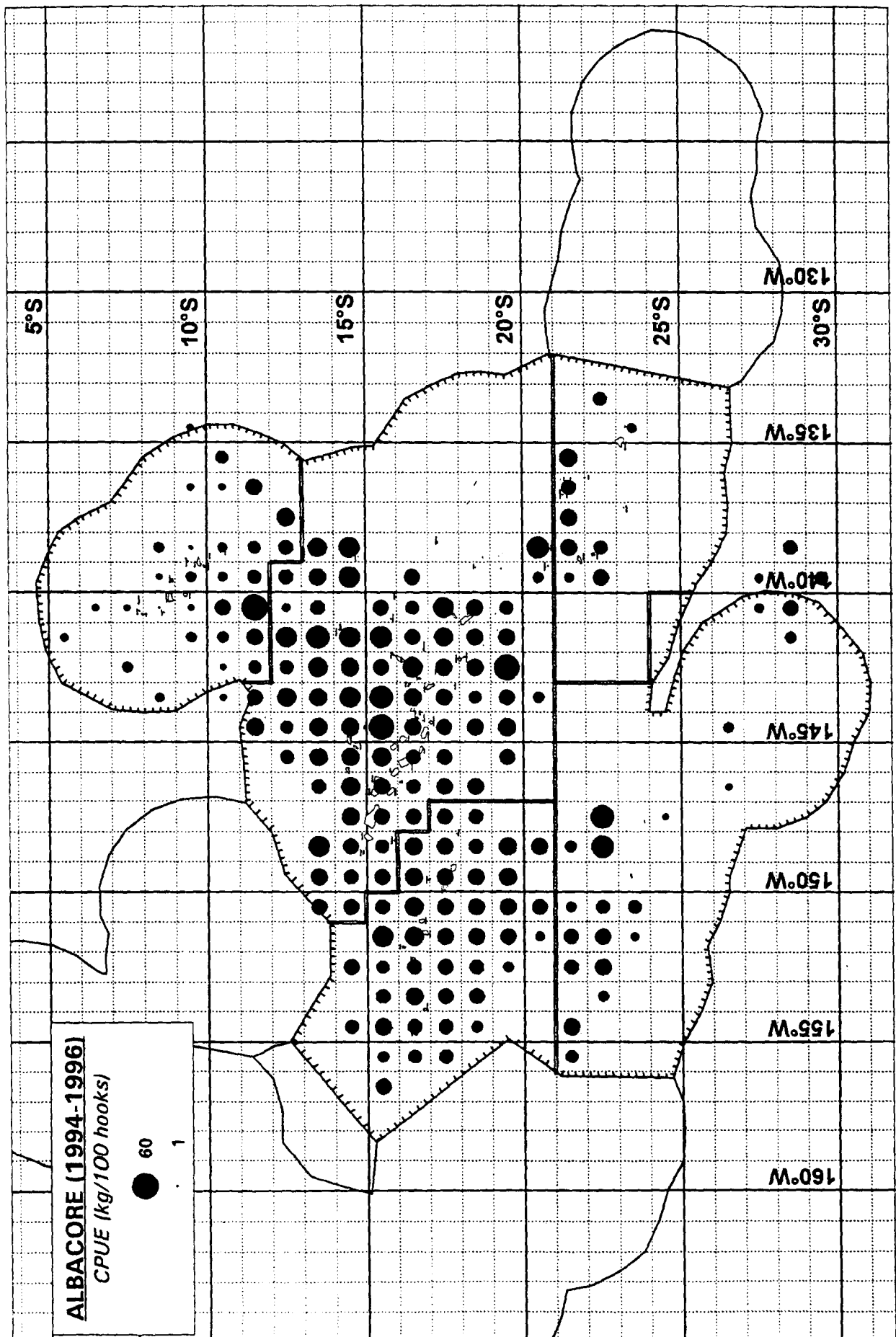
Map 2



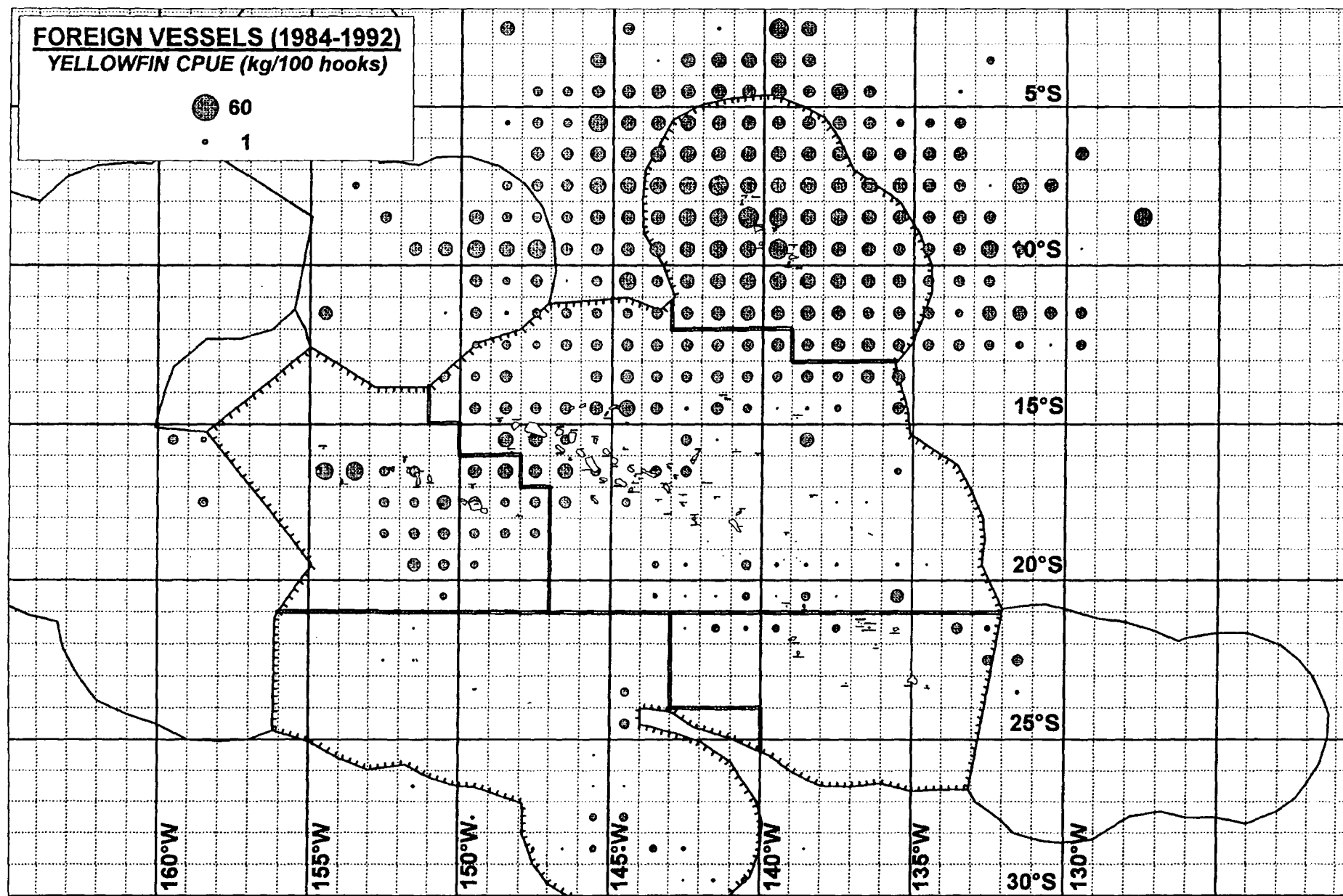
Map 3



Map 4



Map 5



Map 6

