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The Western Rock Lobster Fishery 1983-1984

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THE WESTERN ROCK LOBSTER FISHERY 1983/84

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I INTRODUCTION

The fishery for the western rock lobster *Panulirus cygnus* is one of the most important single fisheries in Australia and an important export earner for the State. Western Australia produced 10,576 tonnes in 1983/84, out of a total Australian rock lobster catch, with the exception of Queensland, of 15,777 tonnes. The fishery is governed by a complex set of regulations which are designed to limit the total fishing effort to acceptable levels and to enforce a legal minimum size (Bowen 1971, Hancock 1981). Thus, it is important to monitor the state of the fishery constantly both to ensure that the fishing effort is remaining within the accepted limits and that the regulations are adequately performing their function of maintaining reasonably stable catches. Inherent in this monitoring of the fishery is a careful examination of changes in fishing practice, gear, etc. since these may lead to increases in efficiency which may not be detectable through the usual calculations of fishing effort.

This paper is the thirteenth in a series of annual reviews of the rock lobster season which will discuss fishing practice, catches, effort, mean size and various other factors. A knowledge of these will help towards a better understanding of the status of the fishery. Each review follows a standardised format to allow season to season comparisons and examination of long term trends.

II METHODS

Catch and effort data were extracted from figures obtained from fishermens' monthly returns, supplied by the Australian Bureau of Statistics, and also from rock lobster research log book data*. Mean size information was gathered from measurements made by Departmental Research Staff aboard commercial vessels fishing from Dongara, Jurien, Lancelin and Fremantle. Information on trends in fishing practice was gathered principally by conversation with fishermen at various ports as well as from comments made in research log books.

III RESULTS

A. CATCH AND EFFORT DATA

The fishing season extends from 15 November to 30 June and may be subdivided into three distinct phases, viz., (i), the "whites" fishery (George, 1958) which begins suddenly in late

* Twenty-nine percent of skippers voluntarily submitted rock lobster research records during the 1983/84 season.

November (as pale-coloured newly-moulted rock lobsters leave the shallow reef areas) and finishes, arbitrarily, on 31 December; (ii), the "coastal red" fishery which begins on 1 January and ends on 30 June; and, (iii), the Abrolhos Islands fishery which is restricted to the period 15 March to 30 June.

In fishing seasons prior to 1977/78 both the coastal and the Abrolhos Islands fisheries ended on 14 August. The season was shortened by six weeks in 1977/78 as a conservation measure (Hancock, 1981).

In 1983 the "whites" run commenced in Geraldton on about 22 November, on 24 November in Jurien and on 25 November in Fremantle.

Catches (kg) and fishing effort (in number of pot lifts) were as follows:

"Whites" catch	(15 Nov-31 Dec)	=	4,415,953 kg
"Whites" effort	(" " ")	=	3,126,435 pot lifts
"Coastal Reds" catch	(1 Jan-30 June)	=	4,830,366 kg
"Coastal Reds" effort	(" " ")	=	6,916,276 pot lifts
Abrolhos catch	(15 Mar-30 June)	=	1,329,412 kg
Abrolhos effort	(" " ")	=	1,171,712 pot lifts
Total catch		=	10,575,731 kg
Total effort		=	11,214,423 pot lifts

These figures do not include unrecorded sales (ie. rock lobsters which are sold for cash, etc. and are not recorded in the fishermens' monthly returns of catches which totalled approximately 783,328 kg), or the total amateur catch which was estimated at approximately 200,000 kg (Norton, 1981). Figure 1 shows comparative catch, fishing effort (ie. the number of pot lifts[1]) and catch per fishing effort data from previous years.

Catch and effort data from various statistical blocks (Figure 2), are shown in Table 1 with catches expressed by weight in kg and fishing effort as number of pot lifts. Table 2 shows catch per pot lift data for the same statistical blocks. The total fishing effort was 11,214,423 units of fishing effort, 3.5% greater than the 1982/83 season.

B.[2] EXPORTS AND GRADE CATEGORIES

Rock lobster tails processed for export are graded by weight and packed in 11.34 kg cartons. The various grades, together with the percentage of cases packed in each grade for the period November 1983 to June 1984 were as follows:

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1. Fishing effort is measured as the number of pot lifts (pulls) recorded by fishermen in their Australian Bureau of Statistics monthly returns. In the annual reports prior to 1977/78 fishing effort was calculated as effective fishing effort by the method of Gulland (1969).

2. Section B is based on data provided by selected processing establishments from Fremantle to Geraldton.

Grade	% of Cases
A (140 - 179 grams)	35.2
B (180 - 239 grams)	38.4
C (240 - 279 grams)	11.6
D (280 - 359 grams)	8.2
E (360 - 479 grams)	3.7
F (480 - 599 grams)	1.8
G (600 - grams)	1.1

C. MEAN SIZE

Samples of rock lobsters were measured aboard commercial vessels, from various ports, which used standard pots with 54 mm escape gaps in four depth categories. Hence, the sample would have included all commercial size rock lobsters, plus undersize which would have been reduced in number by the escape gap selection (Bowen, 1963). Mean carapace lengths of males and females, taken throughout the fishing season from the various depth categories at Fremantle, Lancelin, Dongara and Jurien are compared in Table 3. The many omissions in the table are due to either fishermen not fishing the area in question or to some circumstance (breakdown, etc.) which prevented the data from being collected.

D. NUMBER OF BOATS

The number of boats licensed to fish for rock lobsters in Zones A, B, C, D and E is carefully controlled, though boat owners are able to nominate their choice of fishing area, viz. north or south of 30°S. As at 30 November 1984, the number of boats licensed to fish in the various zones was as follows:

Total number of licensed boats	=	769
Number of boats licensed in Zone A	=	197
Number of boats licensed in Zone B	=	167
Number of boats licensed in Zone C	=	389
Number of boats licensed in Zone D	=	7
Number of boats licensed in Zone E	=	9

These figures indicate the number of vessels that were fishing in the various zones at the commencement of the following season (1984/85). There may have been some minor changes to the number of boats in the various zones during the off-season, which will not be reflected in the above figures.

E. FORECAST OF 1983/84 RECRUITMENT

The puerulus settlement (1979-80) that resulted in the 1983-84 catch was average but was well down on the puerulus settlement (1978-79) that produced the record catch of 1982-83 (see Figure 3).

F. INTRODUCTION OF NEW LEGISLATION

From 7 October 1983, a person who is not the holder of an amateur fisherman's license shall not take, or attempt to take, rock lobsters at any time in the area described in the following schedule:

All that portion of the Indian Ocean bounded by a line starting from a point on the high water mark situated at the southwestern-most extremity of Quobba Point and extending south to South latitude 24 degrees 34 minutes; thence east to a point on the high water mark, and thence generally northwesterly along the high water mark aforesaid to the starting point.

From 25 November 1983, the wording of the Regulations governing amateur rock lobster fishermens' activities was changed. This had the effect of overcoming previous ambiguities that existed in the Regulations. At the same time, the Regulations now formally recognise, and allow, two licensed amateur rock lobster fishermen to pull a maximum of four pots from their boat in a twenty-four hour period.

Information regarding these changes to the legislation governing the rock lobster fishery, as well as the Fisheries Department's policies on various issues, may be found in the following volumes of the Fishing Industry News Service (F.I.N.S.):

Vol. 16, No. 3 (1983) p 22.
Vol. 17, No. 1 (1984) p 20.

G. EFFECTS OF NEW LEGISLATION

The changes in the legislation were of an administrative nature and, hence, could have no direct effect on levels of catch and fishing effort.

H. INNOVATIONS TO BOATS AND GEAR

Data supplied by the Marine and Harbours Department showed that a total of 62 vessels were replaced during the period 1 July 1983 to 30 June 1984. In the northern area a total of 30 boats were replaced; these ranged in size from 9.20 metres to 18.60 metres and averaged 12.56 metres in length. In the southern area a total of 32 boats were replaced, ranging in size from 9.80 metres to 18.54 metres and averaging 14.82 metres in length. The trend in boat replacements was towards medium size vessels in the northern area and medium to large size vessels in the southern area. In comparison to the previous season, there was an 82.4% increase in the number of new boat replacements during the same period. The vessel replacement were constructed as follows:

	WOOD	FIBREGLASS	ALUMINIUM
North 30°S	1	15	14
South 30°S	4	17	11
	5	32	25

The cost of new rock lobster vessels varies greatly, depending on size (length), type of motors, general fittings, navigational and fish finding aids, etc. Information provided by one of the largest manufacturers of commercial vessels for the rock lobster industry in the southern sector of the fishery, indicate that the cost of a basic 15 metre vessel

during the 1983/84 season in either aluminium or fibre glass, ready to launch, with reasonable navigation aids, including radar and a colour echo sounder, was approximately $160,000 to $170,000.

The approximate, average price paid by fishermen for fuel (distillate) per litre throughout the season was as follows:

NORTH 30°S	SOUTH 30°S
42.28 cents	42.71 cents

The prices quoted are from selected fuel outlets and processsing establishments. Fishermen were also entitled to claim a diesel fuel rebate of 7.155 cents per litre which has not been deducted from the above prices.

Data from research log books showed the following usage of the various types of pots by fishermen north and south of 30°S:

	STICK AND CANE BEEHIVE	BATTEN	STEEL BEEHIVE
NORTH 30°S	11%	87%	3%
SOUTH 30°S	33%	65%	2%

As at 30 November 1983 the number of pots licensed in the various zones was as follows:

Zone	Number of Pots
A	19 032
B	15 844
C	40 142
D	823
E	669

The trend again, as in the previous season was toward the use of batten pots, with built in bait containers and plastic necks.

The Mansom mechanical rope coiler designed and manufactured at Geraldton continued to be fitted to new and existing rock lobster boats.

The price of rock lobster pots varies with manufacturers; however, an average price paid by fishermen in the southern sector of the fishery for a batten pot complete with anodes, two built in bait baskets, plastic neck and ballast was approximately $61.00; the price for a similar batten pot in the northern sector of the fishery was approximately $63.50.

In the southern sector, the price paid by fishermen for a ti-tree and cane beehive pot complete with skid board was $36.00. In the northern sector, ti-tree and cane pots are not commonly used; however, some fishermen do manufacture their own and small number are purchased from southern, beehive pot manufacturers.

The price of 10 mm polyethylene mono pot rope varies considerably depending on brand, supplier and quantity purchased; however, the price quoted by a supplier in the southern sector of the fishery was 29 cents a metre or $63.80 for a 220 metre coil; eight inch (200 mm) polystyrene pot line floats sold for $2.38 each.

I. BAIT

A great variety of rock lobster baits are available for use by fishermen and the popularity of the various baits varies from season to season. Data from research log books showed the following usage of bullock hocks or pieces of bullock hide as holding bait during the 1983/84 season.

	HOCKS	HIDE
NORTH 30°S	38%	63%
SOUTH 30°S	26%	74%

North of 30°S, some of the more popular baits used in combination with hocks or hides are listed in order of popularity, were: Australian herring or Ruff (*Arripis georgianus*), Australian and New Zealand Salmon (Kahawai) heads and pieces of salmon meat (*Arripis trutta esper, Arripis trutta marginata and Arripis trutta trutta*), mullet (*Mugil cephalus*), scaly mackerel (*Sardinella lemura*), pieces of kangaroo meat (*Macropus* spp.) pilchards (*Sardinops neopilchardus*) and chicken heads. South of 30°S, the following baits, used in combination with hocks or hides are also listed in order of popularity were: Australian and New Zealand salmon heads and pieces of salmon meat, pilchards, mullet, imported mackerel (*Scomber* sp.), Australian herring, scaly mackerel and tuna heads (*Thunnus* sp.).

Listed below are the prices paid by fishermen during the 1983/84 season for some of the more popular lines of rock lobster bait. The price of bait varies between suppliers, with the prices quoted being, taken from a selection of processing establishments.

	NORTH 30°S	SOUTH 30°S
Hocks per bag of 24	$10.00	$9.50
Hides per 30kg bag	$10.00	$10.50
Australian salmon per kg	$1.03	$1.05
New Zealand salmon (Kahawai) per kg	$1.03	$ -
Australia herring per kg	$1.05	$0.98
Yellow-eyed mullet per kg	$0.93	$ -
Mullet per kg	$ -	$0.88
Scaly mackerel per kg	$0.80	$0.75
Bonito per kg	$0.68	$0.65

Perth or bony herring per kg	$ -	$0.78
Imported mackerel per kg	$ -	$0.80
Tuna heads per kg	$ -	$0.70
Kangaroo per kg.	$0.70	$ -

J. DISTRIBUTION OF FISHING

The distribution of fishing, as catches and effort, is shown in Table 1. The pattern of fishing does not vary greatly from season to season and is dependent on the density of rock lobsters in the various depth categories. Throughout the season, the usual pattern of fishing occurred, i.e. concentrated in the shallows during November and December, followed by deep water potting during the latter part of December, January and February, back to the shallows during the latter part of February, March and April and in mixed depths (mainly shallower), depending on weather and density of rock lobsters, throughout the remainder of the season.

During the 1983/84 season, a number of vessels again fished for rock lobsters from South Passage in Shark Bay, Augusta and Windy Harbour. The vessels fishing from Augusta and Windy Harbour were outside the West Coast Rock Lobster limited entry fishery concession area.

K. AVERAGE NUMBER OF DAYS WORKED PER BOAT PER MONTH

NORTH OF 30°S

MONTH	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
DAYS WORKED	15.0	27.9	15.7	20.4	21.6	26.0	21.5	17.9

SOUTH OF 30°S

MONTH	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
DAYS WORKED	12.8	27.2	19.4	21.7	24.6	17.8	12.7	12.0

TOTAL

MONTH	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
DAYS WORKED	13.9	27.5	17.7	21.1	23.2	21.7	17.1	14.9

North of 30°S, the average number of days worked per boat during November and December was 7.0% up on the 1982/83 season and for the period January to June was 1.9% down on the 1982/83 season. South of 30°S, the average number of days worked per boat during November and December was 2.6% up and for the

period January to June was 9.4% down on the previous season. For both the northern and southern areas combined, the average number of days worked for November and December was 5.1% up and for the period January to June was 5.8% down on the previous season.

The average number of days worked per boat per month for the 1983/84 season was 19.8, which was a reduction of 2.9% on the 1982/83 season.

L. PRICE OF ROCK LOBSTERS

Price to fishermen:

Fishermen received $8.00 per kg for their catch until the end of January and then $9.00 per kg until the end of the season. A small proportion of fishermen received an additional 50 cents per kg for their catch when it was destined for the live export market. The average pool price paid was $10.00 per kg.

Average wholesale New York price for Australian rock lobster tails:

GRADE*		$US PER KG
5-6 oz	(113-170 grams)	25.41
6-8 oz	(170-226 grams)	23.14
8-10 oz	(226-283 grams)	21.66
10-12 oz	(283-340 grams)	20.63
12-16 oz	(340-453 grams)	20.11
16-20 oz	(453-566 grams)	NA
over 20 oz	(over 566 grams)	NA

* Grades (weights) stated here are different from Western Australian grades as shown in Section B.

M. MARKET TRENDS AND ECONOMIC FACTORS

Prices for W.A. Rock Lobster tails on the U.S. market in the first quarter remained fairly static, following the trend of the first six months of 1983.

The second quarter saw the market improve with increasing demand and a decline in supplies. In February/March 1984 there was a slight decline in prices due to an increase in supplies but this was temporary since the final quarter saw demand exceeding supplies and inventories decreasing, resulting in very high prices being obtained. The market was especially strong for sizes of 8 oz and smaller.

The effect of the 10% devaluation in March 1983 was carried into the second half of 1983 with a slight strengthening, peaking in February 1984. The year ended with the Australian Dollar approximately 2% weaker than in June 1983.

N. AVERAGE VALUE PER POT ON POT RE-DISTRIBUTION

About $2000 to $2700 with an average price of about $2300.

O. SEA WATER TEMPERATURES AND SALINITIES

These have relevance to the behaviour and catch rates of rock lobsters (Morgan, 1974). The average sea water temperature

during the rock lobster season (i.e. 15 November to 30 June) at Waterman (aquarium header tank) was 20.5°C, with a maximum of 24.1°C on the week commencing 12 February 1984 and a minimum of 16.9°C on the week commencing 24 June 1984. The average salinity during the season at Waterman (aquarium) was 35.660‰ with a maximum of 36.890‰ on 19 February 1984 and a minimum of 33.726‰ on 15 April 1984.

Bottom temperatures and surface salinities in waters of various depths in the Fremantle, Lancelin, Jurien and Dongara areas were collected as part of the monitoring of rock lobster catches (Item B) and are shown in Table 4. Other records are maintained by CSIRO.

P. SPAWNING ROCK LOBSTERS

While most of the breeding females are found in the 20-30 fathom range, no variation has been observed in the size at first breeding from one depth category to another, except at Jurien over 30 fathoms (Chittleborough, pers. comm.). Hence the data for December, January and February from all depths with the exception of that at Jurien from over 30 fathoms, may be pooled to indicate the size frequency of breeding (i.e., "berried" and mated) females (Figure 4). The mean size of breeding females at various locations was, 107.7 mm at Fremantle, 92.8 mm at Lancelin, 77.8 mm at Jurien and 92.5 mm at Dongara. By comparison, mean size at first breeding (i.e. carapace length at which 50% have been mated) was found to be 103.7 mm at Fremantle, 92.5 mm at Lancelin, 103.7 mm at Jurien and 86.7 mm at Dongara.

IV DISCUSSION

The 1983/84 season catch declined by almost 15% to 10,575,731 kg from the record catch of the previous season of 12,415,604 kg. This fall in catch was largely the result of reduced, (average) puerulus settlement onto the inshore areas four years earlier (1979/80) and hence reduced recruitment of legal sized animals into the commercial fishery. The drop in catch was also accompanied by a 3.5% reduction in fishing effort (total number of pot lifts) from 11,623,545 pot lifts in the 1982/83 season to 11,214,423 pot lifts, together with almost a 3% reduction in the average number of days worked per boat per month. The demand for rock lobsters on the overseas markets was high as shown by the higher prices that fishermen received for their catch compared to the previous season, although this was partly as a result of the weaker Australian dollar. However, higher returns were offset, slightly, by small increases in the prices of fuel and some of the more popular lines of rock lobster bait. New boat replacements rose by 82% on the 1982/83 season which reflected the general optimism felt within the industry.

V ACKNOWLEDGEMENTS

Measurements on board fishing vessels were performed by Mr M. Rossbach and Mr G. Davis. The information on Market Trends and Economic Factors was provided by Mr P. Rogers of the Fisheries Department.

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TABLE 1: CATCH (IN KG WEIGHT) AND FISHING EFFORT (IN POT LIFTS) FOR THE 1983/84 ROCK LOBSTER SEASON IN VARIOUS STATISTICAL BLOCKS.

BLOCK	NOVEMBER	DECEMBER	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	TOTAL
2412	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
2413	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
2512	-	-	-	2 526	4 654	1 056	-	-	8 236
	-	-	-	(5 930)	(7 880)	(2 400)	-	-	(16 210)
2612	-	-	2 733	3 248	-	-	-	2 100	8 081
	-	-	(3 775)	(7 534)	-	-	-	(1 615)	(12 924)
2613	-	-	10 455	7 264	10 776	4 742	3 489	2 549	39 275
	-	-	(14 505)	(13 700)	(8 165)	(5 100)	(4 200)	(2 200)	(47 870)
2712	-	-	-	-	1 155	-	2 818	-	3 973
	-	-	-	-	(3 200)	-	(1 760)	-	(4 960)
2713	3 181	32 087	7 935	13 273	30 647	21 372	17 150	9 461	135 106
	(5 475)	(19 684)	(12 946)	(19 162)	(27 650)	(26 386)	(22 413)	(13 014)	(146 730)
2714	8 568	39 983	20 377	14 290	19 757	17 204	16 403	12 618	149 200
	(12 360)	(26 703)	(28 987)	(22 787)	(23 971)	(21 735)	(18 666)	(20 686)	(175 895)
2812	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
2813	1 667	-	-	-	528 031	501 830	208 731	90 820	1 331 079
	(1 445)	-	-	-	(263 880)	(432 261)	(323 514)	(152 057)	(1 173 167)
2814	187 852	392 210	70 287	82 712	81 932	66 937	51 607	49 378	982 915
	(162 891)	(283 373)	(135 215)	(184 886)	(93 707)	(92 180)	(91 715)	(91 922)	(1 135 889)
2912	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
2913	-	2 221	-	718	14 383	28 533	2 932	547	49 334
	-	(2 175)	-	(1 725)	(7 930)	(21 842)	(5 446)	(1 500)	(40 618)
2914	346 469	927 870	205 253	182 274	306 084	210 346	123 889	85 310	2 387 495
	(330 663)	(625 364)	(316 326)	(350 143)	(324 428)	(265 340)	(218 740)	(167 279)	(2 598 283)
3012	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
3013	1 439	-	-	-	-	-	-	-	1 439
	(1 224)	-	-	-	-	-	-	-	(1 224)
3014	139 165	703 288	220 088	128 112	247 966	170 662	62 031	42 546	1 713 858
	(164 772)	(373 722)	(219 026)	(220 068)	(280 912)	(245 562)	(141 892)	(105 661)	(1 751 615)
3015	39 137	152 802	47 669	36 064	43 311	19 934	7 659	3 670	350 246
	(38 019)	(73 894)	(38 433)	(56 196)	(54 748)	(30 139)	(16 066)	(9 488)	(316 983)
3112	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
3113	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
3114	17 420	55 845	46 686	22 413	28 071	10 646	1 897	672	183 650
	(17 095)	(39 198)	(38 269)	(38 526)	(39 263)	(14 247)	(3 458)	(1 446)	(191 502)
3115	252 584	697 751	365 684	253 069	300 349	164 890	81 357	50 898	2 166 582
	(245 132)	(455 191)	(346 338)	(396 809)	(453 661)	(291 779)	(185 831)	(143 209)	(2 517 950)
3212	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
3213	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
3214	616	33 129	15 936	15 597	9 164	11 731	3 223	816	90 212
	(648)	(18 771)	(12 020)	(17 053)	(13 211)	(15 657)	(4 264)	(2 430)	(84 054)
3215	47 011	300 633	159 544	95 161	104 584	60 373	40 130	20 910	828 346
	(51 688)	(150 356)	(124 616)	(128 510)	(152 708)	(95 036)	(71 243)	(52 306)	(826 463)
3314	-	2 385	11 240	4 685	5 579	4 144	-	-	28 033
	-	(415)	(9 566)	(3 654)	(4 615)	(3 610)	-	-	(21 860)
3315	3 702	25 547	3 265	12 061	14 412	7 535	13 125	5 760	85 407
	(4 838)	(14 530)	(3 270)	(9 154)	(13 825)	(9 111)	(16 881)	(11 940)	(83 549)
3414	63	169	2 719	2 299	6 825	5 297	986	828	19 186
	(696)	(1 856)	(4 553)	(4 717)	(7 198)	(5 996)	(1 883)	(1 029)	(27 928)
3415	255	882	1 905	3 360	2 756	2 566	941	377	13 042
	(897)	(3 065)	(5 604)	(7 790)	(5 442)	(4 690)	(2 612)	(1 872)	(31 972)
3416	-	22	422	431	-	80	81	-	1 036
	-	(285)	(1 860)	(2 465)	-	(2 080)	(87)	-	(6 777)
3515	-	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-	-
TOTAL	1 049 129	3 366 824	1 192 198	879 557	1 760 436	1 309 878	638 449	379 260	10 575 731
	(1 037 853)	(2 088 582)	(1 315 309)	(1 490 809)	(1 786 394)	(1 585 151)	(1 130 671)	(779 654)	(11 214 423)

TOTAL CATCH = 10 575 731 kg
TOTAL EFFORT = 11 214 423 pot lifts

CATCH FIGURES ARE UNDERLINED AND EFFORT FIGURES ARE SHOWN IN PARENTHESIS. NOT INCLUDED IN THESE CATCH FIGURES ARE 7727 KG OF ROCK LOBSTERS TAKEN BY DIVING.

THESE FIGURES ARE DERIVED FROM DATA KINDLY PROVIDED BY THE AUSTRALIAN BUREAU OF STATISTICS AND REFLECT SLIGHTLY MORE INTENSIVE EDITING BY THE DATA PROCESSING SECTION OF THE FISHERIES DEPARTMENT.

TABLE 2: CATCH (KG) PER UNIT OF FISHING EFFORT (IE. KILOGRAM OF ROCK LOBSTERS PER POT LIFT) DATA FOR 1983/84 SEASON IN VARIOUS STATISTICAL BLOCKS (SEE FIGURE 2).

BLOCK	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	TOTAL
2412	-	-	-	-	-	-	-	-	-
2413	-	-	-	-	-	-	-	-	-
2512	-	-	-	0.43	0.59	0.44	-	-	0.51
2612	-	-	0.72	0.43	-	-	-	1.30	0.63
2613	-	-	0.72	0.53	1.32	0.93	0.83	1.16	0.82
2712	-	-	-	-	0.36	-	1.06	-	0.80
2713	0.58	1.63	0.61	0.69	1.11	0.81	0.77	0.73	0.92
2714	0.69	1.50	0.70	0.63	0.82	0.79	0.88	0.61	0.85
2812	-	-	-	-	-	-	-	-	-
2813	1.15	-	-	-	2.00	1.16	0.65	0.60	1.13
2814	1.15	1.38	0.52	0.45	0.87	0.73	0.56	0.54	0.87
2912	-	-	-	-	-	-	-	-	-
2913	-	1.02	-	0.42	1.81	1.31	0.54	0.36	1.21
2914	1.05	1.48	0.65	0.52	0.94	0.79	0.57	0.51	0.92
3012	-	-	-	-	-	-	-	-	-
3013	1.18	-	-	-	-	-	-	-	1.18
3014	0.84	1.88	1.00	0.58	0.88	0.69	0.44	0.40	0.98
3015	1.03	2.07	1.24	0.64	1.79	0.66	0.48	0.39	1.10
3112	-	-	-	-	-	-	-	-	-
3113	-	-	-	-	-	-	-	-	-
3114	1.02	1.42	1.22	0.58	0.71	0.75	0.55	0.46	0.96
3115	1.03	1.53	1.06	0.64	0.66	0.57	0.44	0.36	0.86
3212	-	-	-	-	-	-	-	-	-
3213	-	-	-	-	-	-	-	-	-
3214	0.95	1.76	1.33	0.91	0.69	0.75	0.76	0.34	1.07
3215	0.91	2.00	1.28	0.74	0.68	0.64	0.56	0.40	1.00
3314	-	5.75	1.17	1.28	1.21	1.15	-	-	1.28
3315	0.77	1.76	1.00	1.32	1.04	0.83	0.78	0.48	1.02
3414	0.09	0.09	0.60	0.49	0.95	0.88	0.52	0.80	0.69
3415	0.28	0.29	0.34	0.43	0.51	0.55	0.36	0.20	0.41
3416	-	0.08	0.23	0.17	-	0.04	0.93	-	0.15
3515	-	-	-	-	-	-	-	-	-
TOTAL	1.01	1.61	0.91	0.59	0.99	0.83	0.56	0.49	0.94

* - = NO RECORD OF FISHING

TOTAL CATCH = 10,575,731 KG
TOTAL EFFORT = 11,214,423 POT LIFTS

TABLE 3: MEAN CARAPACE LENGTHS (MM) OF MALE AND FEMALE ROCK LOBSTERS IN VARIOUS DEPTH CATEGORIES AT FREMANTLE, LANCELIN, JURIEN AND DONGARA THROUGHOUT THE FISHING SEASON.

YEAR	AREA	MONTH	0-10 FMS		10-20 FMS		20-30 FMS		30+ FMS	
			MALE	FEMALE	MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
83/84	FREMANTLE	NOV	78	76	-	-	-	-	-	-
		DEC	84	80	83	79	92	88	-	-
		JAN	75	72	-	-	103	93	95	89
		FEB	77	74	-	-	97	101	104	96
		MAR	78	75	-	-	104	98	-	-
		APR	84	79	-	-	106	92	-	-
		MAY	76	75	-	-	-	-	-	-
		JUN	82	78	98	90	-	-	-	-
83/84	LANCELIN	NOV	-	-	-	-	-	-	-	-
		DEC	77	75	84	78	89	86	-	-
		JAN	73	72	-	-	91	90	88	82
		FEB	73	73	90	84	-	-	-	-
		MAR	72	71	73	73	96	89	98	90
		APR	71	71	91	79	89	84	97	92
		MAY	75	74	-	-	-	-	-	-
		JUN	71	70	-	-	98	88	-	-
83/84	JURIEN	NOV	76	75	-	-	-	-	-	-
		DEC	78	75	79	75	81	76	85	81
		JAN	75	71	-	-	84	79	90	83
		FEB	75	72	78	76	84	79	83	78
		MAR	74	73	77	75	85	80	90	83
		APR	76	74	83	80	99	86	90	86
		MAY	75	73	75	74	-	-	-	-
		JUN	75	72	-	-	-	-	-	-
83/84	DONGARA	NOV	78	76	78	76	-	-	-	-
		DEC	74	71	80	75	83	78	86	84
		JAN	73	71	75	73	89	89	87	84
		FEB	74	72	75	73	-	-	90	81
		MAR	75	73	74	73	88	85	-	-
		APR	75	72	75	74	97	90	95	83
		MAY	75	73	73	73	98	87	104	88
		JUN	75	73	73	73	-	-	102	87

TABLE 4: BOTTOM TEMPERATURE (°C) AND SURFACE SALINITY IN PARTS PER THOUSAND FOR FREMANTLE, LANCELIN, JURIEN AND DONGARA OF WATERS BETWEEN VARIOUS DEPTH CONTOURS FOR THE 1983/84 SEASON.

	DEPTH	NOV		DEC		JAN		FEB		MAR		APR		MAY		JUN	
AREA	FATH	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL	TEMP	SAL
FREMANTLE	0-10			19.7	35.58	22.8	-	23.8	36.27	21.1	36.07	20.8	35.78	19.6	35.26	17.5	34.70
	10-20			-	35.59											20.5	34.73
	20-30			20.0	35.73	21.4	36.21	21.4	35.36	21.3	35.47						
	30+					20.9	35.39	21.8	35.36								
LANCELIN	0-10			19.9	35.43	23.4	35.67	22.2	35.43	19.8	35.92	21.8	35.56	20.8	35.17	22.0	35.11
	10-20			19.8	35.73			20.5	35.37	20.8	35.75	21.9	35.55				
	20-30			20.0	35.03	21.8	35.31			22.3	35.31	21.9	-				
	30+									22.4	35.28						
JURIEN	0-10	21.4	35.31	20.8	35.30			21.9	36.41	20.6	35.71	21.2	35.70	20.4	35.18	19.7	35.10
	10-20			21.9	35.40	20.6	-			21.4	35.76	22.4	35.24				
	20-30			20.7	35.29			22.1	35.44	22.0	35.52	22.4	35.39				
	30+			20.6	35.34	21.7	-			22.2	35.56	23.6	-				
DONGARA	0-10	-	35.31	20.6	35.38	22.8	35.83	23.4	35.62	-	36.21	22.0	35.59	19.8	35.82	19.1	35.05
	10-20			20.6	35.30	22.3	35.58	21.8	35.44	23.5	35.82	21.6	35.89	21.5	35.25		
	20-30			20.2	35.28	21.8	-					22.6	35.48	23.2	35.05		
	30+			20.1	-	21.6	35.50	22.0	35.38			23.7	35.00				

TEMPERATURES WERE TAKEN USING A PROTECTED REVERSING THERMOMETER AND SURFACE WATER SAMPLES WERE TAKEN AND LATER ANALYSED TO DETERMINE SALINITY.

TABLE 5: 1983/84 SEX RATIO BY MONTH AND DEPTH CATEGORY, FIGURES ARE % OF FEMALES IN THE TOTAL SAMPLED CATCH.

AREA	DEPTH RANGE FATH.	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
DONGARA	0-10	57	53	55	53	55	61	55	60
	10-20	62	59	61	66	61	71	64	57
	20-30		65	87		80	57	68	
	30+		66	78	76		77	66	35
JURIEN	0-10	65	65	52	58	63	60	57	55
	10-20		57		49	62	69	61	
	20-30		53	58	61	72	72		
	30+		65	71	67	75	81		
LANCELIN	0-10		71	55	62	60	61	65	58
	10-20		59		56	63	54		
	20-30		61	71		80	64		61
	30+			68		69	76		
FREMANTLE	0-10	57	59	58	46	55	64	59	49
	10-20		64						
	20-30		57	42	69	75	50		
	30+			51	49				

FIGURE 1 Rock Lobster Catch (kg), Fishing Effort (pot lifts)* and Catch per Unit of Fishing Effort (c/f) Data.

* Prior to the 1977/78 season, fishing effort was calculated as effective fishing effort by the method of Gulland (1969). The complete set of fishing effort data shown here (1944/45 to 1983/84) is obtained as described in the footnote on page 6.

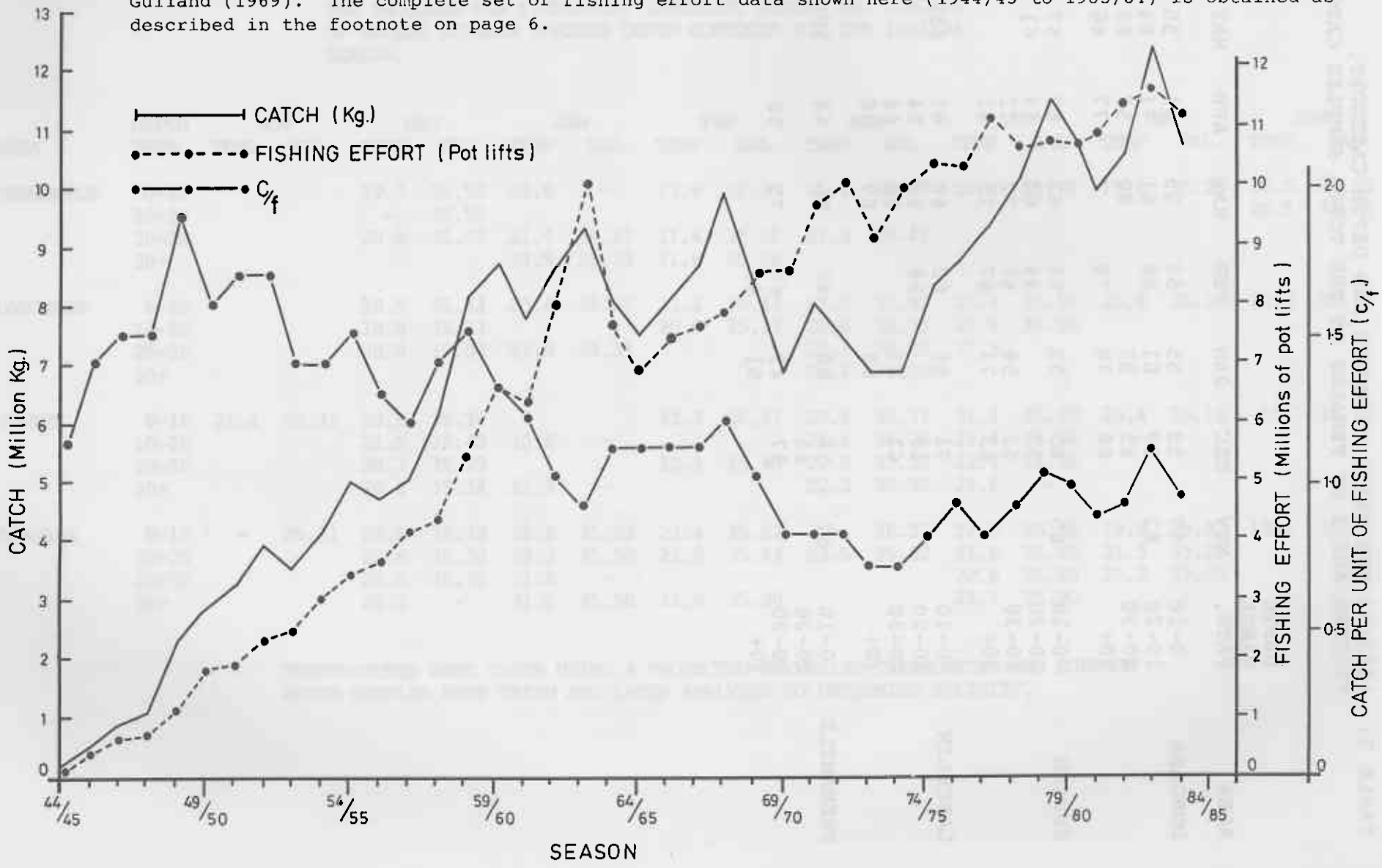


Figure 2 Rock Lobster Fishing Areas

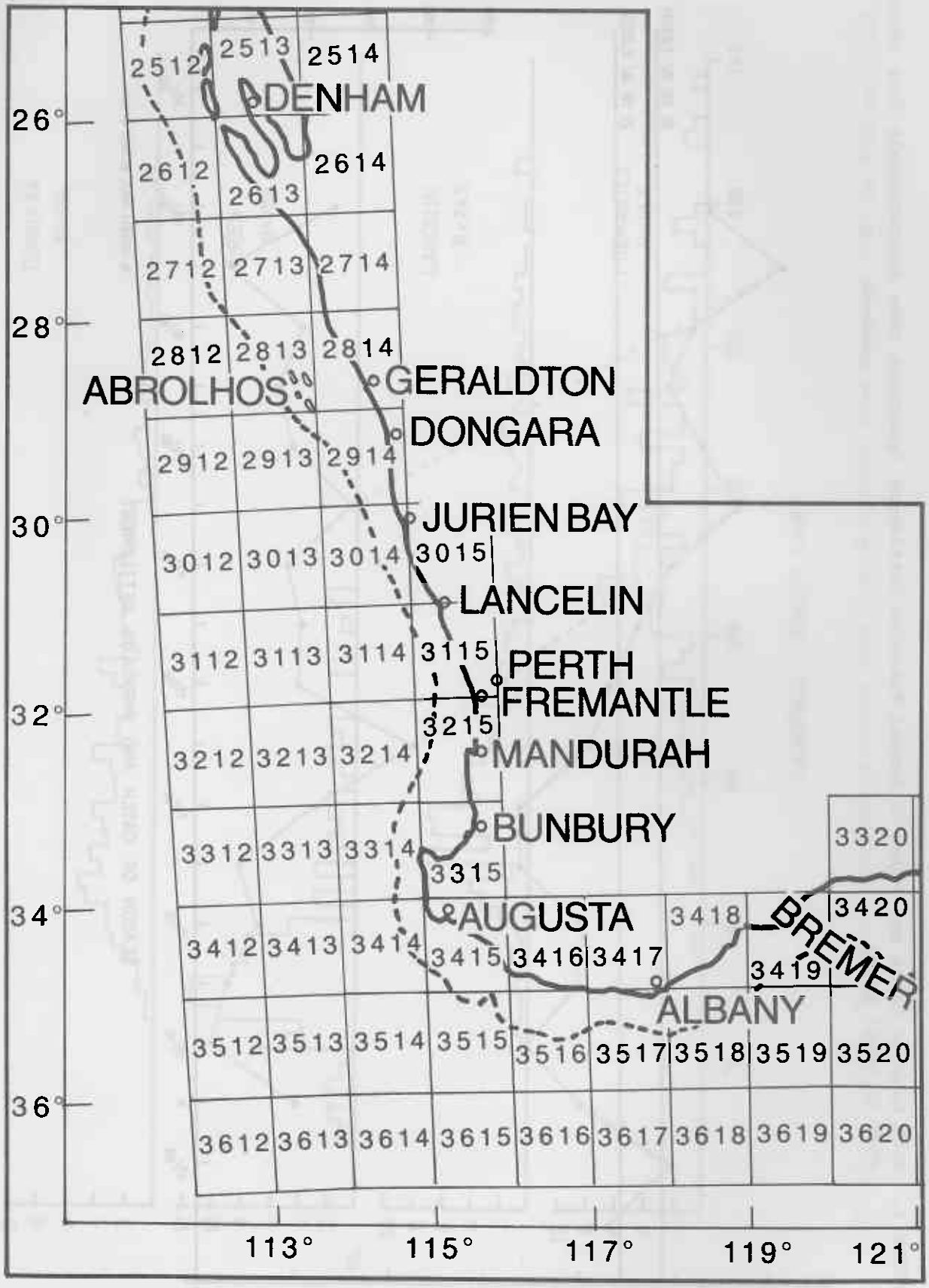
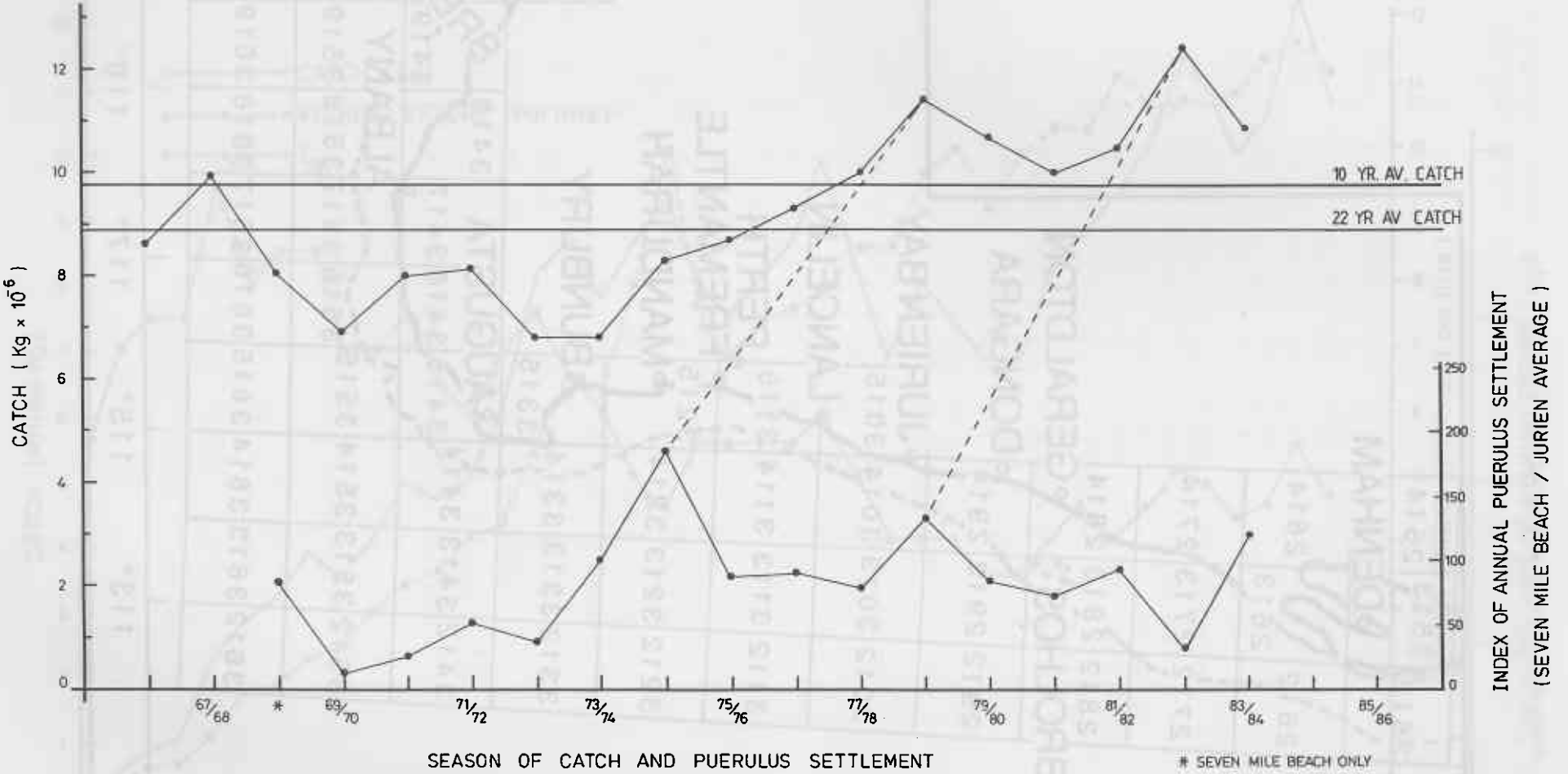


FIGURE 3. Rock Lobster Catch and Index of Annual Puerulus Settlement (puerulus take approximately four years to grow to legal size).



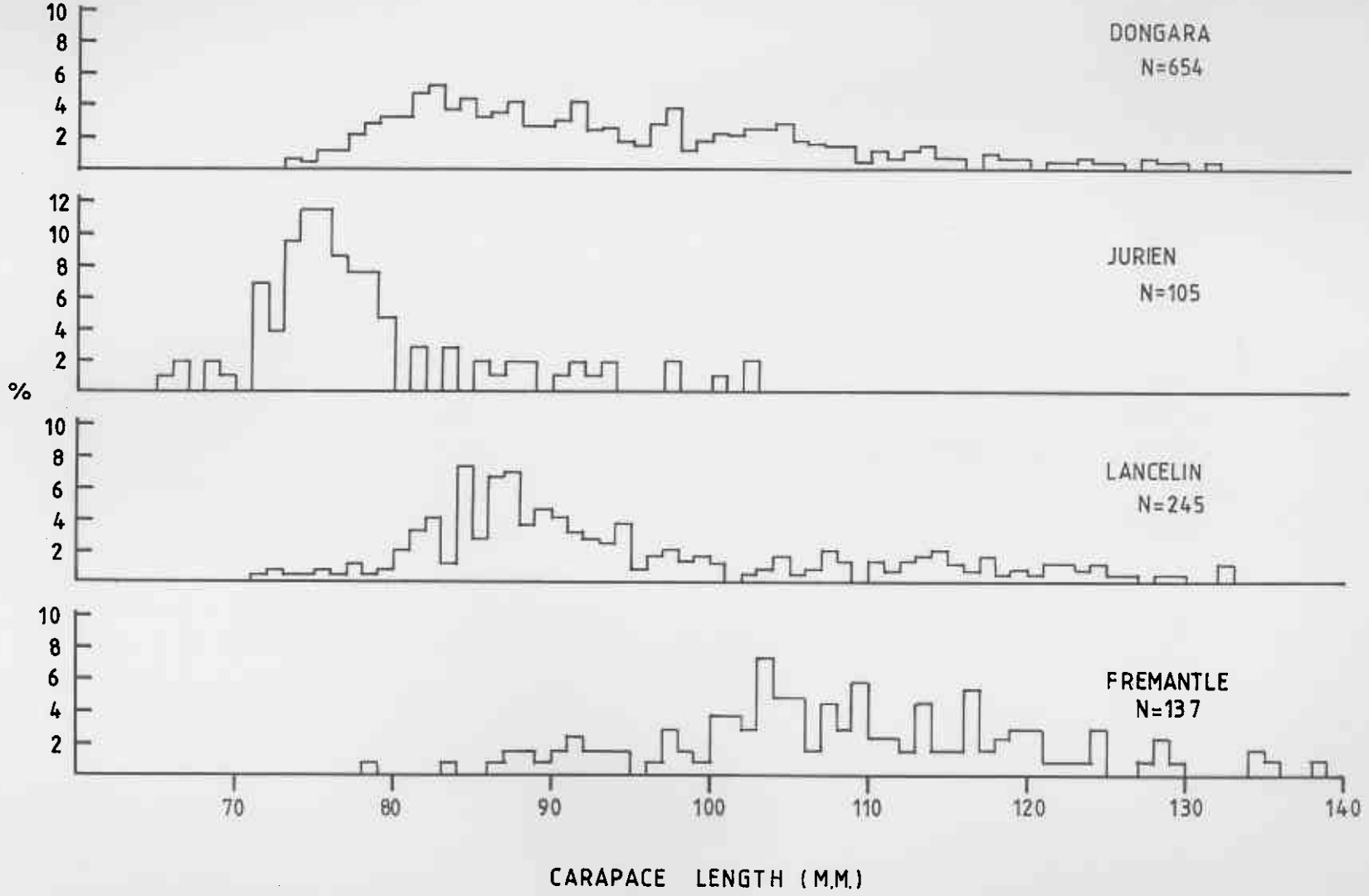


FIGURE 4. Length Frequency of Breeding Female Rock Lobsters taken from December 1983 to February 1984.