DEPARTMENT OF
FISHERIES AND WILDLIFE
WESTERN AUSTRALIA



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# The Western Rock Lobster Fishery 1975–1976

BY

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AND

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PERTH
WESTERN AUSTRALIA

1979

Department of Fisheries and Wildlife

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PERTH

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# THE WESTERN ROCK LOBSTER FISHERY 1975-76

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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. The fishery is governed by a complex set of regulations which have been reviewed by Bowen (1971) and which are designed to limit the total effort to acceptable levels and to enforce a legal minimum size. It is thus important to constantly monitor the state of the fishery both to ensure that the 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 fishing practice, gear, etc., which may lead to increases in efficiency which may not be detectable through the usual calculated effort figures.

This paper is the fifth of a series of annual reviews of the previous rock lobster season which will discuss fishing practice, catches, effort, mean size and various other factors, a knowledge of which will help towards a better understanding of the status of the fishery.

## II METHODS

Catch and effort data were extracted from figures supplied by the Australian Bureau of Statistics and also from research log book data, while 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 from 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 14 August and may be subdivided into three distinct

phases, viz (i) the "whites" fishery (George, 1958) which begins suddenly in late November (as pale-coloured newly-moulted rock lobsters leave the shallow reef areas) and arbitrarily finishes on 31 December; (ii) the "coastal red" fishery which begins on 1 January and ends on 14 August, and (iii) the Abrolhos Islands fishery which is open from 15 March to 14 August.

In 1975 the "whites" run commenced on about 23 November in both northern and southern areas, which is about the average starting time and slightly later than the previous season.

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

| | | |
|---|---|---|
| "Whites" catch | = | 2 859 281 kg |
| "Whites" effort | = | 2 562 679 pot lifts |
| "Coastal Reds" catch | = | 4 518 125 kg |
| "Coastal Reds" effort | = | 6 366 979 pot lifts |
| Abrolhos catch | = | 1 342 374 kg |
| Abrolhos effort | = | 1 328 152 pot lifts |
| Total catch | = | 8 719 780 kg |
| Total effort | = | 10 257 810 pot lifts |

These figures do not include "cash" sales (i.e. rock lobsters which are sold for cash and are not recorded in the fishermans monthly returns of catches) totalling 153 100 kg, or the total amateur catch which is estimated at approximately 200 000 kg. Figure 1 shows comparative catch, effective fishing effort (see below) and catch per effort data from previous years.

Catch and effort data from various statistical blocks (Figure 2) are shown in Table 1 with catches expressed in kgs weight and effort as number of pot lifts. Table 2 shows catch per pot data for the same statistical blocks. Using the method of Gulland (1969) to calculate effective fishing intensity, with each month's effort in pot lifts being weighted according to the relative catchability in the month (Morgan, 1974), the total effective fishing intensity was 8 099 616 units of effort, 0.8% greater than the 1974/75 season.

## *B EXPORTS AND GRADE CATEGORIES

Rock lobster tails processed for export are graded by weight and packed in 11.34 kg cartons. The various

* Section B is based on data provided by the Australian Department of Primary Industry.

grades together with the percentage of cases packed in each grade for the period November 1975 to August 1976 were as follows:-

| Grade | | % of cases |
|---|---|---|
| A | (140 - 170 grams) | 16.32 |
| B | (170 - 226 grams) | 46.76 |
| C | (226 - 283 grams) | 25.33 |
| D | (283 - 340 grams) | 5.74 |
| E | (over 340 grams) | 5.85 |

## C MEAN SIZE

Samples of rock lobsters were measured aboard commercial vessels using standard pots with 54mm escape gaps in four depth categories at various ports. The sample would hence include all commercial size rock lobsters, plus undersize which would have been reduced in number by selection by the escape gap (Bowen, 1963). Mean carapace lengths of males and females in the various depth categories at Fremantle, Lancelin, Dongara and Jurien throughout the fishing season have been 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 in Zones A, B, C, D and E to fish for rock lobsters is carefully controlled, though boat owners are able to nominate their choice of fishing area, viz. north or south of 30°S.

| | | |
|---|---|---|
| Number of boats licensed in 1975/76 | = | 808 |
| Number of boats licensed north of 30°S | = | 403 |
| Number of boats licensed south of 30°S | = | 405 |

## E FORECAST OF 1975/76 RECRUITMENT

Maintenance of good levels of puerulus settlement during 1972/73 B.F. Phillips, (pers. comm.) resulted in good recruitment to the fishery in 1975/76 and in the maintenance of the high levels of catch rates characteristic of the previous year.

## F INTRODUCTION OF NEW LEGISLATION

1. The boat replacement policy was amended on a trial basis to enable the pots of a disabled boat to be worked by another boat. This concession however only applied between 15 November to 15 January and 1 March to 30 April and was subject to various other conditions.

2. With the introduction of limited entry fishery licenses (which authorise the zone in which a boat may be used to take rock lobsters, licensees were required to apply for approval to change zones.

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

Vol. 8 No. 3/4 (Dec. 1975) pp. 55, 56;
Vol. 9 No. 1 (March 1976) p.2.

## G EFFECTS OF NEW LEGISLATION

The changes in the legislation were of an administrative nature and hence had little direct effect on the industry.

## H INNOVATIONS TO BOATS AND GEAR

Figures supplied by the Harbour and Light Department showed that a total of 14 rock lobster boats were replaced during the period 1 July 1975 to 30 June 1976 and ranged in length from 7.30 metres to 15.84 metres. The trend was towards small and medium sized craft constructed mainly of fibre glass. There was a decrease of 13% on the number of boats replaced during the same period in 1974/75. The boat replacements were constructed of :-

| | Wood | Fibre glass | Aluminium |
|---|---|---|---|
| Fremantle | 3 | 3 | 1 |
| Geraldton | 1 | 6 | - |
| | 4 | 9 | 1 |

In the southern area the boats replaced averaged 12.06 metres in length, and in the northern area averaged 10.49 metres in length.

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

| | Stick and cane beehive | Batten | Steel beehive |
|---|---|---|---|
| North | 14% | 75% | 11% |
| South | 66% | 27% | 7% |

## I BAIT

Data from research log books showed that in both northern and southern areas cattle hocks were more

popular than pieces of hide. Hocks and hides were used in combination with various fish baits. Some of the more important fish baits used were:- Western Australian salmon heads (*Arripis trutta esper*), Eastern salmon heads (*Arripis trutta marginata*), Australian herring or ruff (*Arripis georgianus*), snapper heads (*Chrysophrys sp.*), pilchards (*Sardinops neopilchardus*), bony herring (*Fluvialosa vlaminghi*), scaly mackerel (*Amblygaster postera*), Canadian salmon heads (*Oncorhynchus sp.*), mullet (*Mugil cephalus*), yellow-eyed mullet (*Aldrichetta forsteri*) and tuna heads. The use of Craylure, a prepared rock lobster bait, became more widespread during the 1975/76 season.

Rock lobster bait produced by Southern Ocean Fish Processors from trawl fish caught in the Great Australian Bight became available during the 1975/76 season. The wholesale price of hocks remained stable, cattle hide dropped in price, whilst various types of fish bait increased in price by between 6% and 32%.

## J DISTRIBUTION OF FISHING

The distribution of fishing 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.

## K AVERAGE NUMBER OF DAYS WORKED PER BOAT PER MONTH

| Month | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug |
|---|---|---|---|---|---|---|---|---|---|---|
| Days worked | 11.6 | 22.0 | 15.0 | 18.6 | 21.7 | 20.3 | 17.2 | 15.3 | 17.0 | 6.4 |

The average number of days worked per month during November and December was 6.1% down on the 1974/75 season and for the period January to August was 2.3% down on the 1974/75 season.

The average number of days worked per month for the 1975/76 season was 17.0, which was a reduction of 3.4% on the 1974/75 season.

*L PRICE OF ROCK LOBSTERS

Price to fishermen $3.92 - $4.50 per kg.
The range of prices paid on the New York wholesale market :-

| Grade | $Aust. per kg |
|---|---|
| 4 - 6 oz (113 - 170 grams) | 10.19 - 13.40 |
| 6 - 8 oz (170 - 226 grams) | 9.93 - 12.87 |
| 8 - 10 oz (226 - 283 grams) | 9.93 - 12.93 |
| 10- 12 oz (283 - 340 grams) | 10.02 - 12.60 |
| 12- 16 oz (340 - 453 grams) | 9.96 - 12.51 |
| 16- 20 oz (453 - 566 grams) | 9.84 - 12.48 |
| over 20 oz (over 566 grams) | 9.65 - 12.07 |

M MARKET TRENDS AND ECONOMIC FACTORS

The U.S.A. market was unusually bare of W.A. lobster tails at the end of 1975 and consequently very receptive to first arrivals of the 1976 season with prices opening at a higher level.

Supplies of all the more popular shell fish species fell short of demand during the year. In fact the U.S.A. competed quite favourably with Japan for Australian prawns thus prices of the preferred smaller sized W.A. lobster tails increased by as much as 20% on an ex warehouse U.S.A. basis at season's close and it seemed certain a new plateau for prices had been reached.

The Australian dollar had, by a series of smallish adjustments, devalued about 8% in terms of the U.S. dollar compared with 1975 season. Exchange rates fluctuated within a narrow band during 1976, the large devaluation of that year, taking place late November, came after all shipments had been completed.

N AVERAGE VALUE PER POT ON POT REDISTRIBUTION

About $275.

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 14 August) at Waterman (aquarium intake temperature) was 20.7°C, with a maximum of 24.3°C on 22 February 1976 and a minimum of 16.6°C on 11 July, 1976. The average salinity during the season at Waterman (aquarium) was 35.43‰ with a maximum of 36.22‰ on 23 February 1976 and a minimum of 34.74‰ on 16 August, 1976.

* Section L is based on data provided by the Australian Department of Primary Industry.

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 C.S.I.R.O.

P SPAWNING ROCK LOBSTERS

While most of the breeding females are found in the 20-30 fathom depth 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 Jurien over 30 fathoms may be pooled to indicate the size frequency of breeding (i.e. "berried" and mated) females and this has been done in Figure 3. The mean size of breeding females was greater at Fremantle and Lancelin than at either Jurien or Dongara with the mean sizes being 92 mm for Jurien, 95mm for Dongara, 105mm for Fremantle and 103mm for Lancelin. By comparison the mean sizes at first breeding (i.e. the smallest carapace length at which 50% have been mated) were found to be 99mm at Fremantle, 93mm at Lancelin, 94mm at Jurien and 88mm at Dongara.

## IV DISCUSSION

As a result of high densities of legal sized animals, attributed directly to continuing high levels of puerulus settlement, the 1975/76 catch rose to 8 719 780 kg.

Good catches and high taxation levels resulted in many fishermen completing the season early, which was reflected in an increase of only 0.8% in the total effective fishing intensity and a reduction of 3.4% on the 1974/75 season in the average number of boat days worked.

The price paid to fishermen for their catch increased significantly. However, this was somewhat offset by increases in the price of fuel and bait. Economically the industry was buoyant although this was not reflected in boat replacements as the number of boats replaced dropped by 13% on the 1974/75 season. The Federal Government's Income Tax Investment Allowance Scheme which came into force on 1 January 1976 was too late to assist in boat and plant replacements during the 1975/76 season, although its effect should be more pronounced in future seasons.

## V ACKNOWLEDGEMENTS

Measurements aboard fishing vessels were performed by Mr. R. Bell and Mr. G. Lymn. The information on Market Trends and Economic Factors was provided by Mr. R.D. Harrison of Craig Mostyn & Co. Pty. Ltd.

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TABLE 1: CATCH (IN KGS WEIGHT) AND EFFORT (IN POT LIFTS) FOR THE 1975/76 ROCK LOBSTER SEASON IN VARIOUS STATISTICAL BLOCKS.

| BLOCK | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2612 | - | - | - | - | - | - | - | - | - | - | - |
| 2613 | - | - | 200 (675) | 1052 (825) | 1916 (2970) | - | - | - | 2115 (3195) | 700 (660) | 5983 (8325) |
| 2712 | - | - | - | - | - | - | - | 1283 (1729) | - | - | 1283 (1729) |
| 2713 | 6181 (15471) | 36175 (42711) | 19632 (41616) | 14435 (26232) | 23889 (32250) | 28080 (32160) | 21485 (25103) | 13344 (20539) | 11241 (23497) | 4914 (9292) | 179376 (268871) |
| 2714 | 2795 (7665) | 24720 (26058) | 11314 (19676) | 5187 (6568) | 9815 (11866) | 12688 (13422) | 11206 (10918) | 6079 (10950) | 6573 (12018) | 3757 (4533) | 94134 (123674) |
| 2812 | - | - | - | - | 5801 (2775) | 5816 (5713) | 1122 (1872) | - | 1923 (3285) | - | 14662 (13645) |
| 2813 | - | 3359 (3316) | 818 (2025) | 443 (1266) | 497285 (268136) | 509095 (451305) | 187983 (291819) | 50533 (104526) | 71323 (157276) | 26155 (55090) | 1346994 (1334759) |
| 2814 | 82089 (136779) | 236820 (267049) | 38274 (82601) | 51252 (103501) | 74366 (111771) | 86432 (70840) | 36238 (64270) | 37520 (63042) | 45019 (68603) | 10689 (19827) | 698699 (988283) |
| 2912 | - | - | - | - | - | - | - | - | - | - | - |
| 2913 | 286 (456) | 15972 (13992) | 771 (1452) | 1822 (2784) | 24380 (24066) | 9872 (6543) | 1856 (3741) | 1431 (2508) | 1886 (3795) | 122 (228) | 58398 (59565) |
| 2914 | 206034 (255165) | 600623 (447123) | 112293 (187901) | 154778 (264362) | 228873 (273578) | 162368 (207430) | 97422 (175352) | 82219 (143445) | 88315 (163692) | 23223 (44707) | 1756148 (2162755) |
| 3012 | - | - | - | - | - | - | - | - | - | - | - |
| 3013 | - | - | - | - | - | - | - | - | - | - | - |
| 3014 | 78568 (114617) | 514247 (293003) | 191944 (191130) | 133859 (201860) | 191920 (227695) | 141230 (177348) | 70817 (107253) | 50850 (87714) | 49765 (100712) | 12413 (24188) | 1435613 (1525520) |
| 3015 | 17857 (30724) | 75410 (52548) | 36279 (44301) | 35090 (52713) | 45966 (60930) | 30493 (43019) | 12307 (20648) | 9747 (21315) | 10631 (20177) | 2872 (4348) | 276652 (350723) |
| 3112 | - | - | - | - | - | - | - | - | - | - | - |
| 3113 | - | - | - | - | - | - | - | - | - | - | - |
| 3114 | 11313 (15076) | 134754 (78015) | 55809 (48301) | 32861 (42948) | 40368 (43349) | 21536 (26023) | 5304 (10281) | 5302 (6368) | 4348 (6328) | 699 (855) | 312294 (277544) |
| 3115 | 132158 (196802) | 449887 (376479) | 252833 (306425) | 251924 (340696) | 372076 (392764) | 167619 (261277) | 75080 (169990) | 98519 (143732) | 70206 (132668) | 20202 (41148) | 1890504 (2361981) |
| 3212 | - | - | - | - | - | - | - | - | - | - | - |
| 3213 | - | - | - | - | - | - | - | - | - | - | - |
| 3214 | - | - | 6954 (3957) | - | 2690 (2250) | 2480 (2855) | - | - | - | - | 12124 (9062) |
| 3215 | 24225 (41200) | 198548 (141991) | 80024 (94294) | 101146 (108707) | 82285 (124941) | 32858 (64656) | 23435 (43862) | 24518 (45035) | 21343 (42913) | 5651 (12166) | 594033 (719765) |
| 3314 | - | - | 628 (1190) | 2539 (3165) | 3396 (4197) | 1228 (2002) | - | 1208 (1092) | 878 (1311) | 271 (504) | 10148 (13461) |
| 3315 | 1336 (1769) | 5924 (4670) | 1411 (1632) | 5732 (5473) | 5091 (5528) | 2505 (3530) | 4621 (6666) | 2272 (3057) | 2632 (4583) | 1211 (1240) | 32735 (38148) |
| 3414 | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL | 562842 (815724) | 2296439 (1746955) | 809184 (1027176) | 792120 (1161100) | 1610117 (1589066) | 1214300 (1368123) | 548876 (931775) | 384825 (655052) | 388198 (744053) | 112879 (218786) | 8719780 (10257810) |

TOTAL CATCH = 8719780 KGS

TOTAL EFFORT = 10257810 POT LIFTS

EFFORT FIGURES ARE SHOWN IN PARENTHESIS AND CATCH FIGURES ARE UNDERLINED.

TABLE 2: CATCH/EFFORT DATA FOR 1975/76 SEASON IN VARIOUS STATISTICAL BLOCKS.

| Block | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2612 | - | - | - | - | - | - | - | - | - | - | - |
| 2613 | - | - | 0.30 | 1.28 | 0.65 | - | - | - | 0.66 | 1.06 | 0.72 |
| 2712 | - | - | - | - | - | - | - | 0.74 | - | - | 0.74 |
| 2713 | 0.40 | 0.85 | 0.47 | 0.55 | 0.74 | 0.87 | 0.86 | 0.65 | 0.48 | 0.53 | 0.67 |
| 2714 | 0.36 | 0.95 | 0.58 | 0.79 | 0.83 | 0.95 | 1.03 | 0.56 | 0.55 | 0.83 | 0.76 |
| 2812 | - | - | - | - | 2.09 | 1.02 | 0.60 | - | 0.59 | - | 1.07 |
| 2813 | - | 1.01 | 0.40 | 0.35 | 1.85 | 1.13 | 0.64 | 0.48 | 0.45 | 0.47 | 1.01 |
| 2814 | 0.60 | 0.89 | 0.46 | 0.50 | 0.67 | 1.22 | 0.56 | 0.60 | 0.66 | 0.54 | 0.71 |
| 2912 | - | - | - | - | - | - | - | - | - | - | - |
| 2913 | 0.63 | 1.14 | 0.53 | 0.65 | 1.01 | 1.51 | 0.50 | 0.57 | 0.50 | 0.54 | 0.98 |
| 2914 | 0.81 | 1.34 | 0.60 | 0.59 | 0.84 | 0.78 | 0.56 | 0.57 | 0.54 | 0.52 | 0.81 |
| 3012 | - | - | - | - | - | - | - | - | - | - | - |
| 3013 | - | - | - | - | - | - | - | - | - | - | - |
| 3014 | 0.69 | 1.76 | 1.00 | 0.66 | 0.84 | 0.80 | 0.66 | 0.58 | 0.49 | 0.51 | 0.94 |
| 3015 | 0.58 | 1.44 | 0.82 | 0.67 | 0.75 | 0.71 | 0.60 | 0.46 | 0.53 | 0.66 | 0.79 |
| 3112 | - | - | - | - | - | - | - | - | - | - | - |
| 3113 | - | - | - | - | - | - | - | - | - | - | - |
| 3114 | 0.75 | 1.73 | 1.16 | 0.77 | 0.93 | 0.83 | 0.52 | 0.83 | 0.69 | 0.82 | 1.13 |
| 3115 | 0.67 | 1.19 | 0.83 | 0.74 | 0.95 | 0.64 | 0.44 | 0.69 | 0.53 | 0.49 | 0.80 |
| 3212 | - | - | - | - | - | - | - | - | - | - | - |
| 3213 | - | - | - | - | - | - | - | - | - | - | - |
| 3214 | - | - | 1.76 | - | 1.20 | 0.87 | - | - | - | - | 1.34 |
| 3215 | 0.59 | 1.40 | 0.85 | 0.93 | 0.66 | 0.51 | 0.53 | 0.54 | 0.50 | 0.46 | 0.83 |
| 3314 | - | - | 0.53 | 0.80 | 0.81 | 0.61 | - | 1.11 | 0.67 | 0.54 | 0.75 |
| 3315 | 0.76 | 1.27 | 0.86 | 1.05 | 0.92 | 0.71 | 0.69 | 0.74 | 0.57 | 0.98 | 0.86 |
| 3414 | - | - | - | - | - | - | - | - | - | - | - |
| TOTAL | 0.69 | 1.31 | 0.79 | 0.68 | 1.01 | 0.89 | 0.59 | 0.59 | 0.52 | 0.52 | 0.85 |

TOTAL CATCH = 8719780 KGS

TOTAL EFFORT = 10257810 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 |
| 1975/76 | Fremantle | Nov | 79 | 76 | 78 | 76 | | | | |
| | | Dec | 77 | 75 | 85 | 81 | | | | |
| | | Jan | 75 | 73 | | | 98 | 100 | 93 | 88 |
| | | Feb | 76 | 72 | 78 | 77 | | | | |
| | | Mar | 79 | 74 | | | 91 | 89 | | |
| | | Apr | 76 | 74 | | | 100 | 92 | | |
| | | May | 75 | 74 | | | 95 | 87 | | |
| | | Jun | 76 | 73 | | | | | | |
| | | Jul | 74 | 71 | | | 107 | 95 | | |
| | | Aug | 70 | 69 | | | 97 | 96 | | |
| 1975/76 | Lancelin | Nov | 74 | 73 | | | | | | |
| | | Dec | 72 | 70 | | | | | 92 | 87 |
| | | Jan | 71 | 70 | 94 | 92 | 92 | 92 | | |
| | | Feb | 72 | 69 | 94 | 85 | | | | |
| | | Mar | 72 | 71 | 93 | 83 | 95 | 93 | 100 | 97 |
| | | Apr | 74 | 73 | 116 | 103 | 107 | 99 | 103 | 101 |
| | | May | 72 | 71 | 92 | 89 | | | | |
| | | Jun | 74 | 74 | | | | | | |
| | | Jul | 73 | 74 | | | 93 | 96 | | |
| | | Aug | 69 | 69 | | | | | | |
| 1975/76 | Jurien | Nov | 75 | 74 | | | | | | |
| | | Dec | | | | | 82 | 77 | 82 | 81 |
| | | Jan | 75 | 72 | 79 | | | | | |
| | | Feb | 76 | 74 | | | | | | |
| | | Mar | 75 | 73 | 76 | 74 | 85 | 87 | | |
| | | Apr | 75 | 73 | 74 | 72 | | | 90 | 87 |
| | | May | 73 | 71 | | | | | | |
| | | Jun | 78 | 76 | | | | | | |
| | | Jul | 74 | 73 | | | | | | |
| | | Aug | | | | | | | | |
| 1975/76 | Dongara | Nov | 72 | 70 | | | | | | |
| | | Dec | 76 | 74 | 80 | 76 | 80 | 76 | | |
| | | Jan | | | 78 | 74 | | | | |
| | | Feb | 74 | 72 | 74 | 71 | 93 | 87 | | |
| | | Mar | 75 | 73 | 80 | 77 | | | 96 | 89 |
| | | Apr | 74 | 73 | | | | | 97 | 88 |
| | | May | 73 | 71 | | | | | | |
| | | Jun | 73 | 72 | | | 101 | 85 | | |
| | | Jul | 75 | 75 | | | 88 | 78 | | |
| | | Aug | 74 | 73 | 76 | 76 | 95 | 94 | | |

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 1975/76 SEASON.

| Area | Depth Fath | Nov Temp | Nov Sal | Dec Temp | Dec Sal | Jan Temp | Jan Sal | Feb Temp | Feb Sal | Mar Temp | Mar Sal | Apr Temp | Apr Sal | May Temp | May Sal | Jun Temp | Jun Sal | Jul Temp | Jul Sal | Aug Temp | Aug Sal |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Fremantle | 0-10 | 20.4 | 35.46 | | | 21.8 | 35.97 | 23.0 | 35.86 | 23.7 | 35.96 | 21.5 | 36.04 | 20.2 | 35.39 | 17.1 | 35.40 | 18.1 | 35.45 | 18.4 | 35.21 |
| | 10-20 | | | 20.4 | 35.52 | | | | | | | | | | | | | | | | |
| | 20-30 | | | | | | 35.55 | | | 22.1 | 35.71 | 22.4 | 35.45 | 21.4 | 35.23 | | | 22.0 | 35.26 | | |
| | 30+ | | | | | 21.2 | 35.86 | | | | | | | | | | | | | | |
| Lancelin | 0-10 | 20.5 | 35.52 | 22.8 | 35.90 | | | 23.2 | 36.29 | 23.5 | 35.95 | 21.7 | 35.39 | 20.8 | 35.69 | 19.4 | 35.46 | 20.0 | 35.12 | 18.2 | |
| | 10-20 | | | | | 21.5 | 35.61 | 22.9 | 35.72 | 23.8 | 35.55 | 22.4 | 35.23 | | | 20.3 | 35.35 | | | | |
| | 20-30 | | | | | 21.8 | 35.51 | | | 24.3 | 35.55 | 22.4 | 35.18 | | | | | 21.5 | 35.08 | | |
| | 30+ | | | 21.4 | 35.43 | | | | | | | 23.2 | 35.07 | | | | | | | | |
| Jurien | 0-10 | 21.3 | 35.41 | | | 22.3 | 35.87 | | | 22.5 | 35.39 | 21.3 | 36.11 | 19.4 | 35.52 | 18.7 | 35.28 | 19.4 | 35.24 | | |
| | 10-20 | | | | | | | | | 21.9 | 35.58 | 21.2 | 35.68 | | | | | | | | |
| | 20-30 | | | | | | | | | | | | | | | | | | | | |
| | 30+ | | | 20.7 | 35.21 | | | | | | | 23.5 | 35.18 | | | | | | | | |
| Dongara | 0-10 | 20.7 | 35.30 | 20.8 | 35.35 | | | 24.8 | 36.21 | 24.4 | 35.60 | 22.9 | 35.69 | | | 17.5 | 35.41 | 18.6 | 35.89 | 18.0 | 35.23 |
| | 10-20 | | | 21.8 | 35.32 | 22.0 | 35.62 | 24.8 | 36.29 | 25.3 | 35.64 | | | | | | | | | 18.6 | 35.17 |
| | 20-30 | | | 21.6 | 35.26 | | | 24.1 | 35.82 | | | | | | | 21.8 | 35.17 | | | 19.8 | 35.17 |
| | 30+ | | | | | | | | | 23.0 | 35.21 | 23.9 | 35.00 | | | | | | | | |

Temperatures were taken using an unprotected reversing thermometer and surface water samples were taken and later analysed to determine salinity.

TABLE 5: 1975/76 SEX RATIO BY MONTH AND DEPTH CATEGORY, FIGURES ARE % OF FEMALES IN THE TOTAL

| AREA | DEPTH RANGE FATH. | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Dongara | 0-10 | 49 | 54 | | 49 | 52 | 55 | 51 | 52 | 58 | 51 |
| | 10-20 | | 58 | 64 | 45 | 61 | | | | | 65 |
| | 20-30 | | 64 | | 57 | | | | 51 | 54 | 72 |
| | 30+ | | | | | 58 | 65 | | | | |
| Jurien | 0-10 | 55 | | 52 | 53 | 56 | 55 | 51 | 46 | 54 | |
| | 10-20 | | | | | 55 | 55 | | | | |
| | 20-30 | | 61 | | | 58 | 70 | | | | |
| | 30+ | | 58 | | | | | | | | |
| Lancelin | 0-10 | 55 | 57 | 54 | 48 | 53 | 58 | 60 | 57 | 56 | 55 |
| | 10-20 | | | 65 | 61 | 59 | 58 | | 37 | | |
| | 20-30 | | | 62 | | 66 | 55 | | | 53 | |
| | 30+ | | 64 | | | 68 | 83 | | | | |
| Fremantle | 0-10 | 55 | 55 | 52 | 50 | 49 | 55 | 51 | 53 | 54 | 51 |
| | 10-20 | 57 | 54 | | 59 | | | | | | |
| | 20-30 | | | 52 | | 55 | 58 | 56 | | 72 | 64 |
| | 30+ | | | 58 | | | | | | | |

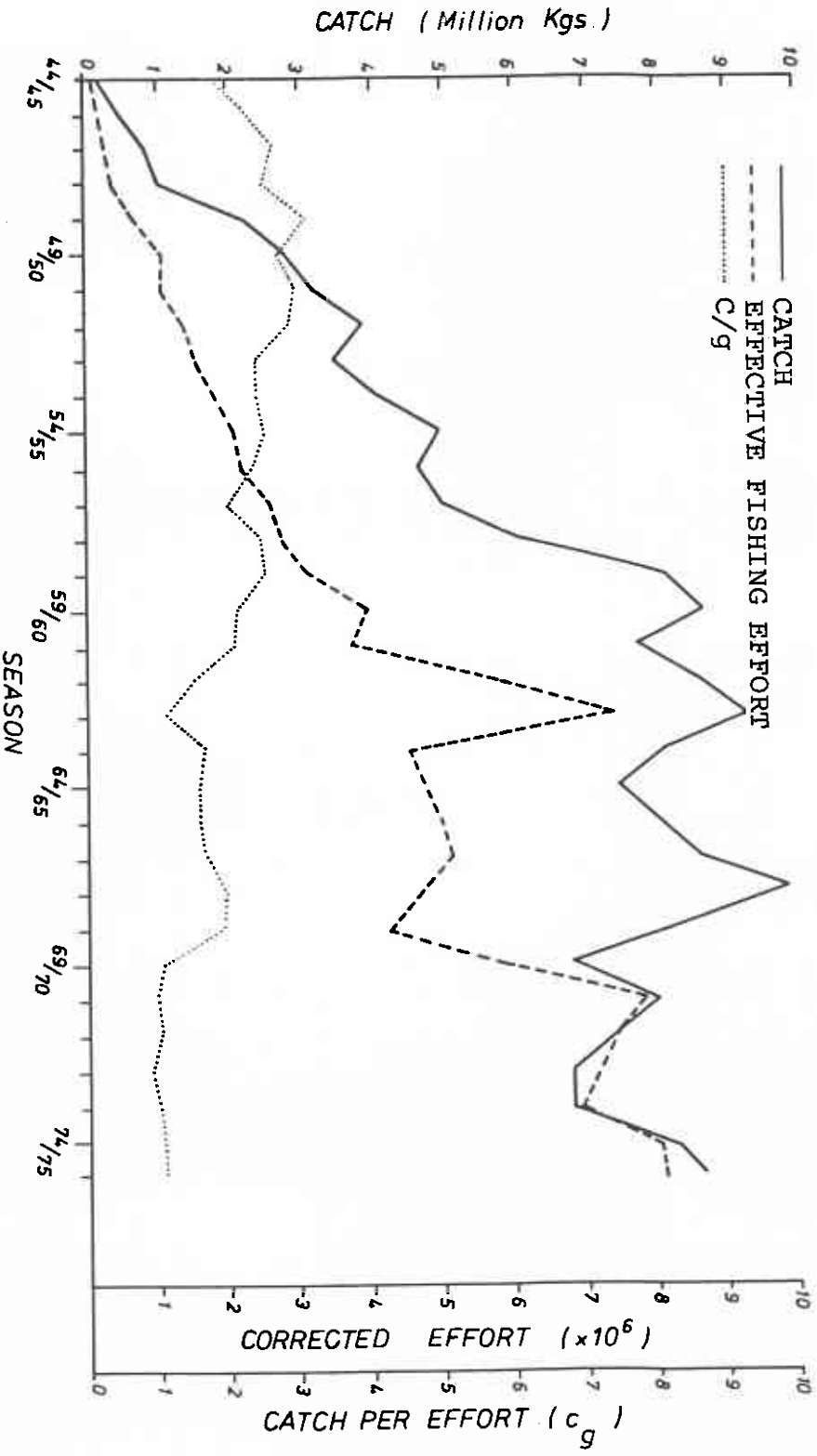


Figure 1. Rock Lobster Catch, Effective Fishing Effort and Catch per Unit of Effort Data.

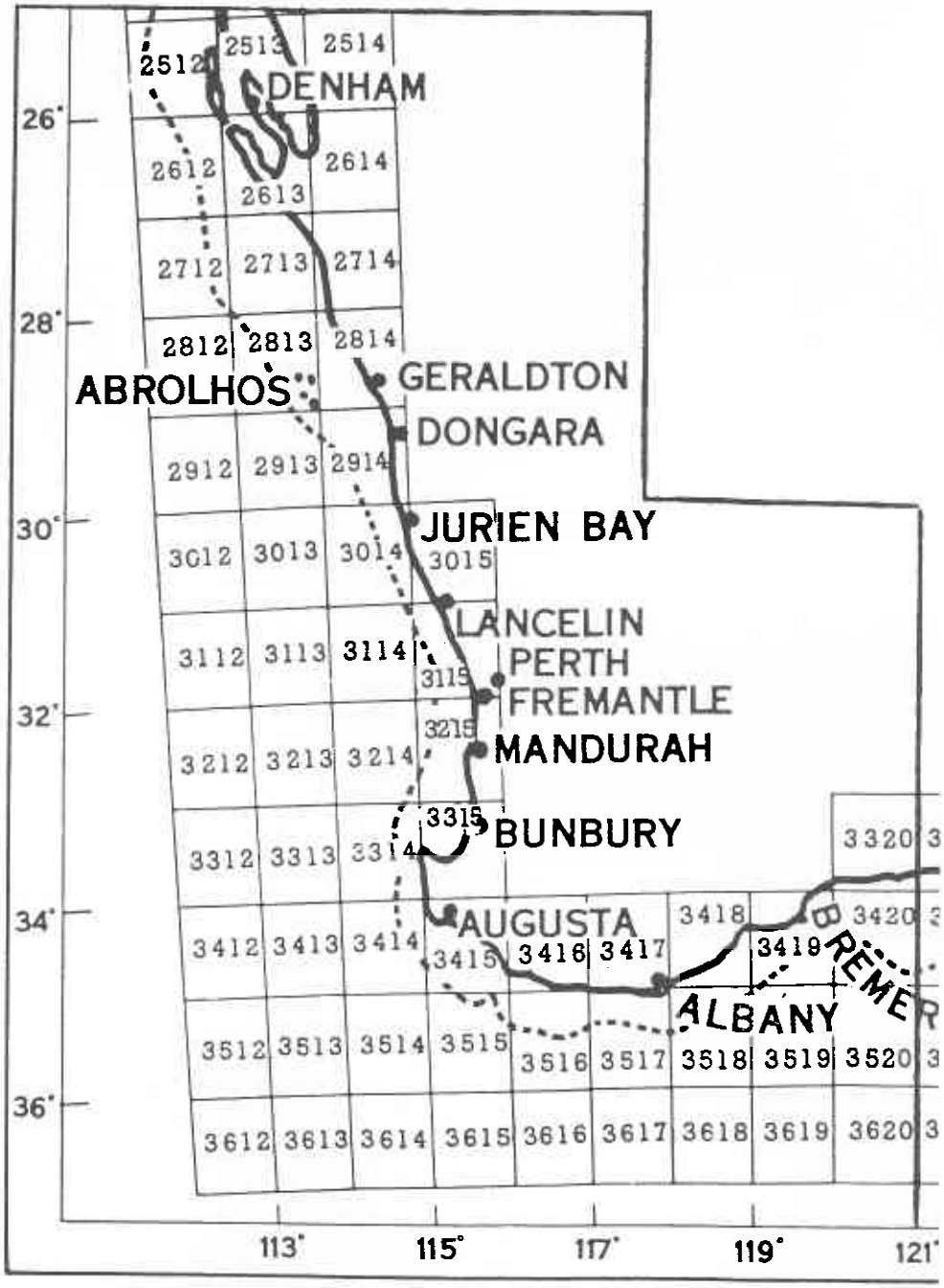


FIGURE 2. Rock Lobster Fishing Areas

85082/5/79-800-L/2998

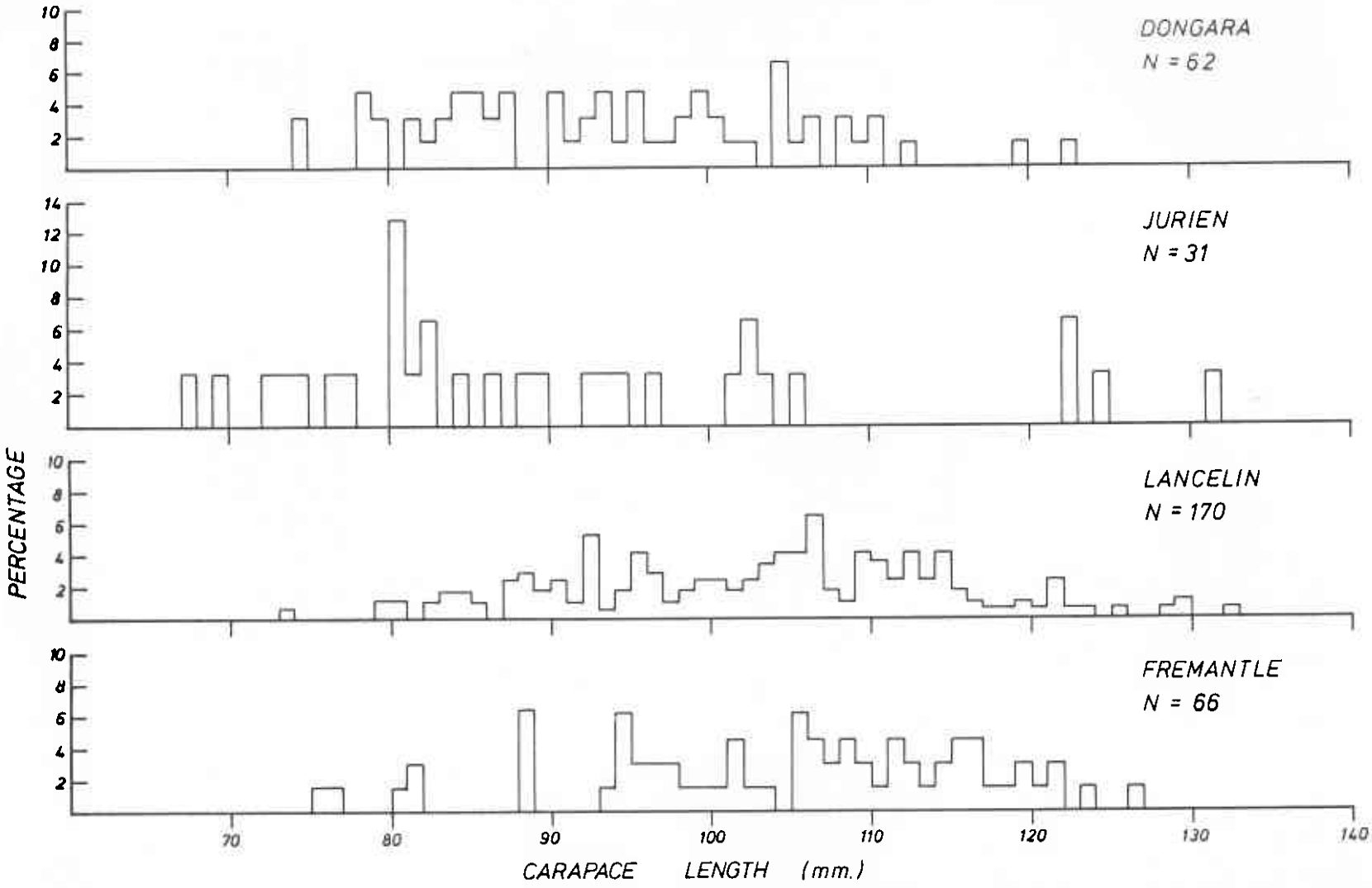


Figure 3. Length Frequency of Breeding Female Rock Lobsters Taken from December 1975 to February 1976.

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