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The western rock lobster fishery 1995/96 to 1996/97

C. F. Chubb and E. H. Barker

Department of **Fisheries**
Government of **Western Australia**

Fisheries Research Division
WA Marine Research Laboratories
PO Box 20 NORTH BEACH
Western Australia 6920

Department of Fisheries

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Enquiries
Department of Fisheries
3rd floor SGIO Atrium
168-170 St George's Terrace
PERTH WA 6000
Telephone (08) 9482 7333
Facsimile (08) 9482 7389
Website: http://www.wa.gov.au/westfish/res

Department of Fisheries
Government of Western Australia

Fish for the future

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Fisheries research in Western Australia
The Fisheries Research Division of the Department of Fisheries is based at the Western Australian Marine Research Laboratories, P.O. Box 20, North Beach (Perth), Western Australia, 6020. The Marine Research Laboratories serve as the centre for fisheries research in the State of Western Australia.

Research programs conducted by the Fisheries Research Division and laboratories investigate basic fish biology, stock identity and levels, population dynamics, environmental factors, and other factors related to commercial fisheries, recreational fisheries and aquaculture. The Fisheries Research Division also maintains the State data base of catch and effort fisheries statistics.

The primary function of the Fisheries Research Division is to provide scientific advice to government in the formulation of management policies for developing and sustaining Western Australian fisheries.

Contents

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C.F. Chubb and E.H. Barker
Western Australian Marine Research Laboratories
PO Box 20, North Beach WA 6920

Abstract

This report is the latest in a series covering the West Coast Rock Lobster Managed Fishery (formerly the West Coast Rock Lobster Limited Entry Fishery), Western Australia's largest and most valuable fishery. These reports form an historical record of fishery data and information documented season by season for use by industry and research personnel now and in the future. The reports provide information on catch, fishing effort and biology; value of the product and licences; input costs (fuel, bait, etc.); changes in fishing practices, gear, technology and boats and management/legislative changes. By necessity, the information contained herein is summarised from the extensive and detailed data bases maintained by the Department of Fisheries. Commercial Fisheries Production Bulletins issued periodically, summarising the status of the fishery during each season, are included as an appendix to this report.

The 1995/96 and 1996/97 seasons produced below average landings of 9,800 and 9,900 tonnes respectively valued at approximately $234 million and $266 million. These below average catches were landed by 615 vessels in 1995/96 and 611 vessels in 1996/97, with nominal fishing effort of 10.5 million and 10.6 million pot lifts respectively. The fishing effort increased 1% in 1995/96 and 2% in 1996/97 when compared to the stable 10.4 million pot lifts in each of the previous two seasons. Similar catch rates of 0.94 and 0.93 kg of rock lobster per pot lift were recorded for both seasons, reduced slightly from the 1.04 to 1.06 kg per pot lift in the previous two seasons.

Season 1995/96 was significant for it saw the introduction of the new Fish Resources Management Act 1994 and cost recovery (where the fishers were to bear the cost of research, enforcement and management), and produced a record catch of 1900 tonnes for the Abrolhos. Expansion into the European market was attempted in 1996/97. With the stable management regime, the breeding stock continued to rebuild and, despite the below average catches, the fishery consolidated and planned for the forecast increased catches.

1.0 Introduction

The fishery for the western rock lobster, *Panulirus cygnus*, is the most important single species fishery in Australia and an important source of export income for Western Australia. During the two seasons covered by this report, Western Australia produced annual rock lobster catches of 9,800 and 9,900 tonnes. The fishery is governed by a complex set of regulations designed to limit the exploitation rate to an acceptable level and to enforce regulations such as a legal minimum size (Bowen 1971, Hancock 1981, Bowen and Hancock 1989, Phillips and Brown 1989). Thus, it is important to monitor the state of the fishery constantly, both to ensure that the fishing effort remains within acceptable limits and that the regulations are adequately performing their function of maintaining sustainable catches. Inherent in this continual fishery assessment, is careful examination of changes in fishing practice, gear modifications and so on, as these innovations lead to increases in efficiency which may not be detectable through the usual calculations of fishing effort (Brown, Caputi and Barker 1995).

This paper is the nineteenth in a series of reviews of the rock lobster seasons which discuss fishing practice, catches, fishing effort, mean size and various other factors which affect the rate of exploitation of the stock. This knowledge provides a good understanding of the status of the fishery and is documented herein to ensure historical data for the fishery are readily available. Each review follows a standardised format to allow season to season comparisons and examination of long term trends. This particular report covers the two seasons 1995/96 and 1996/97 and is the fourth of several reports intended to bring the series up to date. It includes, as an appendix, the Commercial Fisheries Production Bulletins issued for these two seasons.

2.0 Methods

Catch and effort data were extracted from figures obtained from fishermen's monthly returns supplied from the Department of Fisheries catch and effort statistical system (CAESS) and from voluntary rock lobster research log books. Catch composition and mean size information was gathered from measurements made by the Department of Fisheries research staff aboard commercial vessels fishing from Dongara, Jurien, Lancelin and Fremantle. Information on trends in fishing practice was gathered principally from interviews with fishermen at various ports as well as from comments made in research log books.

The percentage of rock lobster fishers who submitted rock lobster research records voluntarily during 1995/96 and 1996/97 was as follows:

Season	Percentage
1995/96	33.0
1996/97	37.5

3.0 Results

3.1 Catch and effort data

The fishing season extends from 15 November to 30 June following and may be subdivided into three distinct components:

i. the "whites" fishery (George 1958) begins in late November, as pale-coloured newly-moulted rock lobsters migrate offshore from the shallow reef areas, and finishes arbitrarily on 31 December;

ii. the "coastal reds" fishery 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). During the period covered by this report, the "whites" run commenced (initial large increases in catches of "whites") in the Fremantle, Jurien and Geraldton areas approximately at the following times:

Season	Fremantle	Jurien	Geraldton
1995/96	30 November	26 November	22 November
1996/97	n/a	n/a	n/a

Total catches (kg) and fishing effort (number of pot lifts), recorded by fishermen in their monthly returns, were as follows (Figure 1):

Catch and effort	1995/96	1996/97
"Whites" catch (15 Nov-31 Dec)	3,127,229	2,783,860
"Whites" effort (15 Nov-31 Dec)	2,426,613	2,349,732
"Coastal reds" catch (1 Jan-30 June)	4,790,841	5,295,221
"Coastal reds" effort (1 Jan-30 June)	6,824,394	7,070,816
Abrolhos catch (15 March-30 June)	1,880,927	1,823,083
Abrolhos effort (15 March-30 June)	1,209,103	1,200,149
Total catch	**9,798,997**	**9,902,164**
Total effort	**10,460,110**	**10,620,697**

	1995/96	1996/97
B Zone Catch	3,507,056	3,622,732
B Zone Effort	3,915,019	3,938,605
C Zone Catch	4,411,014	4,456,346
C Zone Effort	5,335,988	5,481,943

Abrolhos catch (A Zone) figures are derived from statistical blocks 27131, 28130, 28131, 28141, 29131, 29141 and 97011 to 97015 (See Figures 2a, b).

Catch figures are corrected, for any unreported catches or missing records in the monthly returns, so that the table of catches agrees with processors monthly production figures.

However, since season 1992/93 (Chubb and Barker 1998) the difference between the two figures varied by less than 0.2% and therefore is considered negligible.

Not included in the above production figures are the estimated annual recreational catches listed below:

Season	Annual recreational catch (kg)
1995/96	309,300
1996/97	307,600

Note: The recreational catches given in previous reports in this series, up to and including the 1994/95 season, were adjusted by a factor which estimated the illegal take of rock lobsters. This practice has been discontinued and the recreational catch is given here only as the catch actually reported by recreational fishers through research surveys. Thus, in the 1994/95 season report, the recreational catch was reported as 526 tonnes. Without the correction factor it was 308 tonnes. For more information see Melville-Smith, R. and Anderton, S.M. (2000) Western rock lobster mail surveys of licenced recreational fishers 1986/87 – 1998/99. *Fisheries WA Fisheries Research Report No. 122.*

Figure 1 shows comparative commercial catch (excluding the recreational component), fishing effort (*i.e.* the number of pot lifts [pulls]) and catch per pot lift data from 1944/45 to 1996/97. Fishing effort is measured as the number of pot lifts recorded by fishermen in their monthly returns. In the annual reports prior to 1977/78 fishing effort was calculated as effective fishing effort by the method of Gulland (1969). Catch and effort data from various statistical blocks (Figures 2a, b), are shown in Tables 1 and 2 with catches expressed by weight in kilograms and fishing effort as number of pot lifts. Tables 3 and 4 show catch per pot lift data for the same statistical blocks. The total levels of fishing effort recorded for each of the 1995/96 and 1996/97 seasons were as follows:

Season	Total fishing effort	Variation on previous season
1995/96	10,460,110	0.8% up
1996/97	10,620,697	1.6% up

3.2 Exports and grade categories

This section is based on data provided by all processing establishments from Fremantle to Geraldton. Over the years, the export of rock lobster products has changed from predominantly frozen raw tails to a mixture of live, frozen whole cooked, frozen whole raw and tails. Thus to compare the grade composition of the catch over the years, all product lines have been changed to the equivalent in numbers of cartons of tails (11.34 kg) in each grade. The following table represents each season's total production for all grades with all product lines expressed as percentages of the total equivalent number of cartons of tails by grade.

Percentage of each grade packed

Area	Season	Grades A % (140-179g)	B % (180-239g)	C % (240-279g)	D % (280-359g)	E % (360-479g)	F % (480-599g)	G % (600-667g)	H % (>668g)
South (Augusta to Wedge Is)	95/96	32.53	25.10	14.85	10.85	7.26	4.10	3.34	1.97
	96/97	39.15	23.35	11.81	8.78	6.92	4.79	4.13	1.07
Central (Green Islets to Green Head)	95/96	58.27	18.16	12.77	5.88	2.69	0.87	0.98	0.37
	96/97	44.35	20.63	8.97	9.66	8.11	3.76	1.68	2.83
North (Leeman to Denham)	95/96	42.24	30.92	13.09	6.00	3.73	1.86	2.15	0.01
	96/97	45.92	30.21	11.17	6.05	3.45	1.60	1.59	0.01
Total	95/96	48.31	28.94	11.79	5.73	2.93	1.28	0.88	0.14
	96/97	52.82	27.39	9.47	5.24	2.82	1.33	0.83	0.11

3.3 Mean size

Samples of rock lobsters were measured aboard commercial vessels (from Fremantle, Lancelin, Jurien and Dongara) which used standard pots (each with 54 mm escape gaps) in four depth categories. The sample included all commercial size rock lobsters, plus some undersize which would have been reduced in number due to the escape gap selection (Bowen 1963; Brown and Caputi 1986), breeding females and females above a maximum size limit. Mean carapace lengths of males and females taken throughout the fishing season from the various depth categories at the four sites and the Abrolhos Islands in March, are compared in Tables 5 and 6. The omissions in the tables are due either to fishers not fishing the area in question or to some circumstance which prevented the data from being collected (vessel breakdown, etc.).

3.4 Number of boats and pots

The number of boats licensed to fish for rock lobster in the various zones is carefully controlled. Provided certain conditions are met, boat/licence owners are able to transfer their pot entitlement between fishing zones (A, B or C zones). The zones are defined as follows:

Zone A - Abrolhos Islands, see Figures 2a, b;
Zone B - coastal fishery from 21°44' S to 30° S excluding the A zone;
Zone C - the waters between 30° south latitude and 34°24' south latitude excluding all waters on the south coast east of 115°8' east longitude;
Big Bank - see Figure 2c.

The number of boats licensed to fish in the various zones was as follows:

Zone	Number of licensed boats 1995/96 (as at 17/01/96)	1996/97 (as at 14/01/97)
A	149	149
B	155	154
C	311	308
Total	615	611

Listed below are the numbers of licensed pots by the various zones for the seasons 1995/96 to 1996/97:

Zone	Number of licensed pots 1995/96 (as at 17/01/96)	1996/97 (as at 14/01/97)
A	16,478	16,594
B	17,071	16,953
C	35,748	35,744
Total	69,297	69,291

Note: Under the management arrangements only 82% of these pots were allowed to be fished.

3.5 Forecast of recruitment

The settlement of puerulus on collectors of artificial seaweed along the coast is monitored continually.

Annual indices of puerulus settlement to predict future recruitment were based on the mean of the number of puerulus settling per collector at Abrolhos, Seven Mile Beach and Alkimos (Caputi *et al.*). To ensure comparisons which historical data presented in this series of reports, the total catch and average puerulus settlement from Jurien and Seven Mile Beach are given in Figure 3.

Research indicates that puerulus settlement three years prior to the catch year provide a significant proportion of new recruits late in the reds catch for that year, while the puerulus settling four years prior to the catch year provides the whites catch (Caputi, Brown and Chubb 1995).

1995/96

Puerulus settlements in 1991/92 (59) and 1992/93 (52) produced the below average commercial catch of 9.8 million kg in 1995/96.

1996/97

Puerulus settlements in 1992/93 (52) and 1993/94 (49) produced the below average commercial catch of 9.9 million kg in 1996/97.

3.6 Introduction of new legislation

Note: While these reports detail the legislative changes applicable to the WRL fishery, it has been past policy to include legislative changes related to all rock lobster fisheries in WA for information. This policy is continued herein.

1995/96

Clause 10 of the Rock Lobster Limited Entry Fishery Notice was amended so that the closing time of the Big Bank fishery was altered from midnight on the last day of February to midday on the last day of February. This change was brought in to enable ease of policing, in daylight hours, of pot re-setting in the coastal fishery following closure of the Big Bank fishery.

Clause 17 of the Rock Lobster Limited Entry Fishery Notice was amended to remove the

limit of three boats to be endorsed to fish north of Cape Inscription and replaced by: "(6) when considering an application made under subclause (4) the Director shall have regard to the number of boats which are already authorised to operate in the Cape Inscription area."

Clause 16 of the Rock Lobster Limited Entry Fishery Notice was amended for ease of administration to allow the correct number of pots for a replacement boat to be transferred to the existing boat when processing a boat replacement application. This applied when the permitted number of pots on the replacement boat was different from the existing boat.

The Minister's 1993/94 management package, (full protection for setose and tar-spotted females; eighteen percent pot reduction for all boats in all zones; increase in the minimum legal size from 76mm to 77mm for the period 15 November to 31 January and a prohibition on the taking of female rock lobsters greater than 115mm south of Wedge Island, and greater than 105mm north of Wedge Island), was retained for the duration of the 1995/96 season.

The Fisheries Act 1905 was repealed and replaced by the new Act and Regulations. The new Fish Resources Management Act 1994, and the associated Fish Resources Management Regulations were introduced from 1 October 1995.

The boat replacement rule which caused a vessel to lose five percent of its pots when the vessel being replaced was less than six years old was repealed. This became effective from 1 July 1995.

The Minister gave approval for the transfer of a rock lobster processing license from Fremantle Fishermen's Coop Society Ltd, 8 Ahoy Road, Coogee to Batavia Coast Fisheries Pty Ltd, Lot 20606 Fisherman's Wharf Road, Geraldton. This transfer took place on 7 March 1996.

From 22 December 1995, Schedule 2, Part 2, Division 1 – Certain reproducing crustaceans was amended from "Female western rock lobsters with eggs or spawn attached beneath its body", to "Female rock lobsters with eggs or spawn attached beneath its body", thereby giving protection to all species of rock lobsters with eggs or spawn attached to their bodies.

1996/97

From 21 February 1997 Regulation 61(2) was amended to ensure that rock lobsters landed north of 30° 48° south latitude (Wedge Island) also were labelled with the following particulars:

a) The place of landing those rock lobsters; and

b) The zone of the fishery from which those rock lobsters were taken.

From 5 November 1996, under Section 65 (1) of the Act it was declared that the Rock Lobster Industry Advisory Committee is the committee that is to be consulted before the management plan is amended or revoked.

The Ministers management package which first came into force during the 1993/94 season and was aimed at restoring the breeding stock to the levels of the late seventies, early eighties, was maintained for the duration of the 1996/97 season.

As a result of declining catches over time and a high degree of non-profitability within the Windy Harbour/Augusta Rock Lobster Managed Fishery, the Minister re-structured the

Fishery under the Fisheries Adjustment Scheme from 17 December 1996. The rationalisation of the Fishery reduced the number of boats authorised to fish, down to two boats and at the same time reduced the number of pots by sixty six percent to 350 pots (200 and 150 pots respectively).

Insertion of Clause 21A made provision for offences and major provisions under the Fish Resources Management Act 1994.

During the two seasons covered by this report the following scale of Fisheries licence fees and charges came into effect. The new fees were as follows:

Rock lobster (limited entry fisheries)

	1995/96	1996/97
West Coast	$70.00 per pot	$70.00 per pot
Windy Harbour/Augusta	$5.00 per pot	$5.00 per pot
Esperance	$9.25 per pot	$9.25 per pot
Areas outside existing limited rock lobster fisheries	$55.00 per pot	$55.00 per pot
FISHING BOATS		
Not exceeding 7.5 metres	$55.00	$55.00
Over 7.5 metres but under 10.5 metres	$55.00	$55.00
Over 10.5 metres but under 16.5 metres	$55.00	$55.00
Over 16.5 metres	$55.00	$55.00
CARRIER BOATS		
Not exceeding 7.5 metres	$55.00	$55.00
Over 7.5 metres but under 10.5 metres	$55.00	$55.00
Over 10.5 metres but under 16.5 metres	$55.00	$55.00
Over 16.5 metres	$55.00	$55.00
Professional Fisherman's Licence	$55.00	$55.00
Recreational Fishing Licence (Rock Lobster)	$25.00	$25.00
PROCESSORS LICENCES (LAND BASED ESTABLISHMENTS)		
Rock Lobster or Prawns only	$555.00	$555.00
Rock Lobster and Prawns only	$1110.00	$1110.00
Rock Lobster, Prawns and Wetfish	$1380.00	$1380.00
Rock Lobster or Prawns and Wetfish only	$825.00	$825.00
Wetfish only	$270.00	$270.00
Transfer of Processors Licence	$350.00	$350.00
Removal of Processors Licence	$350.00	$350.00
SEAGOING PROCESSING ESTABLISHMENT	$270.00	$270.00

3.7 Effects of new legislation

1995/96

From a legislative viewpoint 1995 was a milestone. The Fisheries Act 1905 was repealed and replaced by the Fish Resources Management Act 1994. The FRMA and new regulations

came into effect from 1 October 1995. For the rock lobster industry, the introduction of the FRMA did not mean wholesale changes. Rather it was "business as usual' but with a streamlined Act and increased penalties for offences.

The Management package introduced in 1993/94 (Chubb and Barker 2000) remained in place for 1995/96 and was having the desired effect of rebuilding the breeding stock and maintaining relatively higher catch rates.

As expected, little fishing occurred north of Cape Inscription and the restriction of allowing only three vessels to fish in that area served no real purpose. This regulation was replaced by the common sense approach of allowing vessels to fish in that area, giving consideration to the number of vessels authorised to do so at the time of an application. Interest in fishing this region continued to be minimal.

The repeal of the 6 year rule for replacing vessels in July 1995 saw the end of the 5% penalty for early replacement of a fishing boat. The penalty was introduced to reduce the rate at which the fleet developed and so contain the fleet capacity to catch rock lobsters within acceptable bounds. By 1995, the fleet had developed to such a degree that the rule was considered outmoded and the penalty dropped. Further increases in fishing efficiency were to be viewed in the context of future gains in the breeding stock resulting from the management package of 1993/94 and the overall exploitation rate required for sustainability of the resource.

1996/97

The 1993/94 management package had been effective, gained full acceptance and lent stability to the industry. The package was maintained through the 1996/97 season.

Other changes in both seasons were administrative in nature and intended to streamline procedure or clarify definitions.

3.8 Innovations to boats and gear (including costs)

Data supplied by the Department of Transport showed that during the years 1995 to 1997 the following number of new boats were constructed each fiscal year (1 July to 30 June).

Year	Area	Construction material			Size range (m)	Average size (m)	% Change on previous season
		Wood	Fibre-glass	Aluminium			
1995/96	North 30° south	-	4	9	10.00-17.62	14.33	
	South 30° south	-	14	3	12.50-19.90	16.40	
	Total	-	18	12			51.1% down
1996/97	North 30° south	-	3	6	13.30-19.72	16.97	
	South 30° south	-	8	3	13.40-19.92	17.04	
	Total	-	11	9			33.3% down

Listed below are the approximate costs of new aluminium or fibre-glass vessels (approximate size 14 to 17 metres) designed specifically for rock lobster fishing. Also listed are the costs of navigational and fish finding equipment, viz. GPS, auto-pilot, radio, radar, colour and black and white echo-sounders, etc., which must be added onto the basic vessel costs. The cost of a new vessel varies greatly, depending on design, type and number of

motors, and the type and amount of equipment installed. The prices were supplied by a major builder of vessels for the rock lobster industry:

Season	Cost of vessel ($)	Approx. average size	Cost of navigational & fish finding equipment ($)
1995/96	400,000	14-15 metres	30,000
1996/97	445,000-495,000	16-17 metres	55,000

The approximate price paid by fishermen for boat fuel (distillate) during the two seasons is listed below. The price paid by fishermen varies greatly, depending on location (cartage) and distributor. The prices were provided by a major distributor in the northern sector of the fishery. Fishermen are entitled to claim a diesel fuel rebate which also is listed and has not been deducted from the basic fuel price:

Season	Fuel price range (¢/litre)	Approx. average price (¢/litre)	Fuel rebate price range (¢/litre)	Approx average rebate price (¢/litre)
1995/96	61.03-63.64	63.40	33.03-33.96	33.53
1996/97	65.21-69.11	66.47	34.37-34.65	34.54

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

Season	Area	TYPE OF POT				
		Stick & Cane Beehive	Batten	Steel Beehive	Plastic Beehive	Steel Bottom Beehive
1995/96	North 30° south	1%	99%	-	-	-
	South 30° south	11%	94%	5%	-	-
1996/97	North 30° south	-	100%	-	-	-
	South 30° south	13%	93%	1%	-	-

Note: Total percentage greater than 100% is due to boats using a combination of pot types.

1995/96 and 1996/97 seasons

In the southern sector of the fishery a small but increasing number of fishermen have used a second set of gear (stick and cane beehive pots) to successfully fish for large animals in the "mid-water" grounds (approximately 20 – 30 fathoms) during the "reds" (February to June).

A small number of fishermen have tried innovative changes to batten pots. These changes include:

- different coloured plastic necks and bait baskets and experimentation with the number and position of escape gaps, eg. escape gap on top of the pot adjacent to the rear bait basket;
- filling in the gaps between the bottom steel bars with wooden battens or plastic mesh to prevent intrusion by weed, etc. into the pot;
- wire bridles to replace rope bridles on pots to prevent "cut off's" (fraying) during periods of very congested potting, eg fishing on the northern Abrolhos line during the Big Bank run;

- wire safety lines from the pot to the pulling line to prevent the loss of a pot in the event of the bridle breaking (see above); and
- a plastic sleeve over the bridle knot to prevent fraying.

Small numbers of batten pots with wooden bottoms still continue to be used in the northern sector of the fishery.

During the period covered by this report, a number of vessels had Differential GPS installed. Differential GPS provides more accurate navigation and allows very precise setting of pots.

	PRICE OF POTS ($)			
	1995/96		1996/97	
	North 30° S	South 30° S	North 30° S	South 30° S
Batten[1]				
Steel Bottom	125.00	132.00	128.00	135.00
Wood Bottom	119.00	128.00	127.00	130.00
Steel Framed Batten[2]				
Steel Bottom	136.50	-	141.60	-
Stick and Cane Beehive[3]	-	80.00	-	85.00

1. Batten pots are either constructed with a steel or wooden bottom and come complete with two built-in bait baskets, plastic or wood finger neck, escape gaps, ballast and an anode in steel bottom pots.
2. Steel framed batten pots are constructed with a removable top and side panels comprised of pine, karri or jarrah battens, depending on personal preference.
3. The price quoted for stick and cane beehive pots does not include ballast or a skid board, which was approximately $6.50 per pot for the skid board.

The above prices were supplied by selected pot manufacturers, however, pot prices vary between manufacturers.

Listed below are the prices charged by a major distributor of commercial fishing gear in the southern sector of the fishery for 10 mm pot rope and 200 mm pot floats. Once again prices varied depending on the distributor and in the case of rope, the country of origin.

Season	Pot rope ($) (220 m coil)	Country of origin	Pot float ($) (each)
1995/96	65.00-72.00	Thailand	2.55-2.70
1996/97	57.00 (old stock)	Thailand	2.55-3.00

3.9 Bait

Data from research log books showed that of those skippers who filled in a research log book, the following usage of bullock hocks and pieces of cattle hide as a holding and/or catching bait north and south of 30° S took place:

Season	Area	Hocks	Hide
1995/96	North 30° S	1%	70%
	South 30° S	2%	51%
1996/97	North 30° S	2%	65%
	South 30° S	4%	50%

Fishermen were able to choose from a wide range of local and imported fish baits. These fish baits generally were used in combination with either pieces of cattle hide or, to a lesser extent, cattle hocks. During the 1995/96 and 1996/97 seasons the following baits, listed in order of popularity, were the most commonly used:

Imported mackerel (*Scomber* sp.), North Sea herring (*Clupea* sp.), Australian salmon and New Zealand Kahawai (*Arripis truttaceus* and *Arripis trutta*), Australian herring (*Arripis georgianus*), scaly mackerel (*Sardinella lemura*), tuna heads (*Thunnus* spp.), sea mullet (*Mugil cephalus*), pilchards (*Sardinops neopilchardus*), orange roughy heads (*Hoplostethus atlanticus*), bony bream (*Nematalosa vlaminghi*) and kangaroo (*Macropus* spp.).

Listed below are some of the baits used during the two seasons. The numbers indicate the order of popularity, with 1 being the most popular bait.

Common names	1995/96		1996/97	
	North 30° S	South 30° S	North 30° S	South 30° S
Imported mackerel	1	1	1	1
North Sea herring	2	3	2	3
Australian salmon and New Zealand Kahawai	3	6	4	2
Australian herring	4	-	3	-
Scaly mackerel	5	7	5	7
Tuna heads	6	-	8	-
Mullet	7	5	10	6
Pilchards	-	2	-	4
Orange roughy heads	-	4	7	5
Bony bream	-	-	6	-
Kangaroo	-	-	9	-

Listed below are the retail prices paid by fishermen both north and south of 30° S for a variety of rock lobster baits. Prices quoted here are from selected processing establishments and do vary between suppliers:

Type of Bait	1995/96 Retail price ($)		1996/97 Retail price ($)	
	North 30° S	South 30° S	North 30° S	South 30° S
Hocks per bag	-	18.30	-	13.50
Hides per bag	17.50-18.50	16.80	17.50 – 18.50	16.50
Australian salmon per kg	1.05-1.30	1.50	1.10-1.20	1.30
New Zealand salmon per kg	1.50	1.55	1.15	1.32-1.60
Australian herring per kg	1.10	1.15	1.10	1.20
Yelloweye mullet per kg	1.00	-	1.05	-
Mullet per kg	-	1.00	-	0.95
Scaly mackerel per kg	0.95	1.25	0.95	1.30
Bonito per kg	-	-	-	-
Perth or bony herring per kg	1.00	-	1.05	-
Imported mackerel per kg	1.05-1.26	1.00-1.35	1.05-1.30	1.12-1.32
Tuna heads per kg	0.95	0.95	0.95	1.07
Kangaroo per kg	0.80	0.85	0.80	0.85
Pilchards per kg	-	1.00	-	1.05
North Sea herring per kg	1.05	1.00	1.05	1.07

3.10 Distribution of fishing

The distribution of fishing, indicated by catch and effort records in fishermen's returns, is shown in Tables 1 and 2. The pattern of fishing does not vary greatly from season to season and is dependent on the density of rock lobsters in the various depths. Throughout a season, the usual pattern is concentrated fishing in the shallows during November and early December; followed by a move to deeper water fishing during the latter part of December and early January as the "whites" migration is followed; then back to the shallows, with some fishing in the middle grounds, during February, March and April; and finally fishing in mixed depths (mainly shallower), depending on weather and density of rock lobsters, throughout the remainder of the season.

During the period covered by this report, vessels fished for rock lobsters in the extreme northern and southern areas of the fishery, viz. in the area around South Passage in Shark Bay in the north and Augusta in the south. Most of the rock lobsters caught in the Augusta area (statistical blocks 3414, 3415, 3416 and 3517) were outside the West Coast Rock Lobster Managed (Limited Entry) Fishery concession area. However, because of the boundary at 34°24' S, blocks 3414 and 3415 include catches from both the West Coast Rock Lobster and Windy Harbour-Augusta Rock Lobster Managed (Limited Entry) fisheries. The catch from the latter fishery was minimal in the two years covered by this report.

Prior to the 1986/87 season, a small number of vessels fished for rock lobsters in deep water north-west of Kalbarri in an area known as Big Bank (Figure 2c). From 1986/87 through to 1996/97, up to 119 vessels fished in the above area during January and February of each season, taking large numbers of migratory rock lobsters in very deep water (70 to 100 fathoms) (Chubb, Barker and Dibden 1994). Regulations controlling the timing of the commencement of fishing there have been in force since 1991.

3.11 Average number of days worked per boat per month

Listed below are the average total number of days worked per boat each month for both north and south of 30° S latitude and a total for the combined areas:

Month	North 30° S		South 30° S		Total	
	1995/96	1996/97	1995/96	1996/97	1995/96	1996/97
November	15.6	15.4	15.1	14.7	15.3	15.0
December	28.2	26.8	26.8	26.1	27.5	26.5
January	17.4	17.2	22.9	24.0	20.2	20.6
February	24.8	25.4	27.1	27.0	26.0	26.2
March	25.3	25.6	27.3	27.2	26.3	26.4
April	28.9	28.9	22.1	24.5	25.5	26.7
May	27.2	26.6	22.1	23.5	24.6	25.1
June	21.3	22.4	18.6	20.5	19.9	21.4

3.12 Price of rock lobsters (per kg)

The prices gained by exporters for the sale of rock lobsters are governed by a complex set of factors, *eg*. demand, size of lobster, product type, exchange rate, etc. Thus this section deals only with the average price paid to fishermen (the "beach price") selling their catch directly to licensed rock lobster processors.

1995/96

Throughout the 1995/96 fishing season, the price that fishermen received for their catches varied considerably, both between the northern and southern sectors and throughout the season. The approximate average price paid for the whole season was, in the northern sector $25.50 per kg and in the southern sector $22.00 per kg. The ex-vessel value of the landed catch was approximately $234 million.

1996/97

As in the previous season, the price that fishermen received for their catches varied considerably, with the final approximate price being $27.50 in the northern sector and $26.00 in the southern sector. The ex-vessel value of the landed catch was approximately $266 million.

3.13 Marketing

Each season, depending on market demand, rock lobsters were processed into various product types; frozen tails, frozen whole cooked (boiled), frozen whole raw and live. The processed rock lobsters, with the exception of a small quantity destined for the local market, were exported chiefly to Japan, Taiwan, USA and China with a very small quantity marketed in France. Whole cooked, whole raw and live were marketed in Japan and Taiwan, live in China, whilst the frozen tails were exported to the USA.

Average wholesale New York price for Australian rock lobster tails. (NA not available):

Grade	$US per Kg	
	1995/96	1996/97
5-6 oz (113-170 gm)	45.10	NA
6-8 oz (170-226 gm)	45.47	NA
8-10 oz (226-283 gm)	37.95	NA
12-16 oz (300-453 gm)	37.51	NA

NOTE: Grades (weights) stated here are different from Western Australian grades shown in Section 3.2.

Listed below are the percentages of each product type for the seasons 1995/96 to 1996/97 converted to landed live weight equivalents.

The production figures have been separated into three fishing/processing sectors, viz. Augusta to Wedge Island, Green Islets to Green Head, Leeman to Denham, together with a total for the whole coast. It must be noted however, that due to transportation of some product between centres for processing, the figures are a combination of what was caught and what was processed in each area:

Area	Season	PRODUCT TYPE (%)			
		Tails	Cooked	Raw	Live
South	1995/96	13.38	30.06	7.93	48.63
(Augusta to Wedge Island)	1996/97	14.04	28.04	4.00	53.92
Central	1995/96	5.25	36.45	10.52	47.78
(Green Islets to Green Head)	1996/97	28.87	40.95	10.60	19.58
North	1995/96	8.99	52.08	9.10	29.83
(Leeman to Denham)	1996/97	10.85	53.12	8.20	27.83
Total	1995/96	10.68	42.19	8.67	38.46
	1996/97	13.78	42.95	6.94	36.33

3.14 Average value per pot on pot redistribution

(i.e. market price paid for a licensed pot)

1995/96

Zones A and B approximately $30,000.
Zone C from approximately $21,000 to approximately $23,500.

1996/97

Zones A and B approximately $25,000.
Zone C from approximately $18,000 to approximately $21,500.

3.15 Sea water temperatures and salinities

These environmental variables have relevance to the behaviour and catch rates of rock lobsters (Morgan 1974). The average sea water temperatures (°C) and salinities (parts per thousand) together with maximum and minimum sea water temperatures and salinities during the following rock lobster seasons (i.e. 1995/96 to 1996/97, 15 November to 30 June) at the Western Australian Marine Research Laboratories (aquarium header tank) were:

Season	Max. temp (°C)	Week ending	Min temp (°C)	Week ending	Avg temp (°C) (season)	Max salinity	Week ending	Min salinity	Week ending	Avg salinity (season)
1995/96	24.7	17/02/96	17.8	29/06/96	21.4	36.859	01/04/96	35.033	01/07/96	35.930
1996/97	23.9	01/03/97	17.4	21/06/97	21.4	36.750	17/03/97	34.860	09/12/96	35.800

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 (see section 2.0) and are shown in Tables 7 and 8. Limited information is available for the Abrolhos Islands in March.

3.16 Spawning rock lobsters

Monitoring on board commercial vessels provides a detailed description of the lobsters caught in commercial pots, particularly with respect to the breeding stock and undersize animals. The sex ratios between males and females in different depth categories are given in Tables 9 and 10.

Most of the breeding females are found in the 20-50 fathom range with no variation in the size of first breeding observed from one depth category to another. Hence the data for December, January and February from all depths may be pooled to indicate the size frequency of breeding (*i.e.* "berried" and/or mated) females (Figures 4a and b). The mean sizes of breeding females from monitoring data collected during the period 1995/96 to 1996/97 were as follows:

Season	CARAPACE LENGTH (mm)			
	Fremantle	Lancelin	Jurien	Dongara
1995/96	102.8	100.3	84.2	92.0
1996/97	102.9	100.5	87.5	94.2

By comparison the mean sizes at first breeding (*i.e.* the smallest carapace length at which 50% are "berried" and/or mated) were found to be:

Season	CARAPACE LENGTH (mm)			
	Fremantle	Lancelin	Jurien	Dongara
1995/96	97.0	92.7	96.5	92.3
1996/97	94.4	89.0	88.4	90.4

4.0 Discussion

1995/96 was a significant season, if not for it's below average catch, then for the introduction of the new Fish Resources Management Act 1994, repealing the outdated Fisheries Act of 1905, and for the introduction of cost-recovery. The cost recovery process was an agreement between the fishing industry of Western Australia (WA Fishing Industry Council) and the government, whereby the rock lobster industry would bear the cost of research, enforcement and management of the fishery. The costs were to be phased in over several years. To many in industry this was interpreted as "user pays – user says". In reality that was not the case, but the rock lobster industry had a much greater role in determining its future. The cost was collected as a pot fee, which in 1995/96 and 1996/97 was $70 per pot.

The below average catches of 9,800 and 9,900 tonnes in both seasons were due entirely to very poor puerulus settlements over the period 1991/92 to 1993/94, a period of persistent ENSO events in the Pacific Ocean. The catches were about 9% below the average catch of about 10,800 tonnes over the previous ten seasons. In spite of this, the Abrolhos Islands catch of 1,900 tonnes in 1995/96 was a record, catches of over 1,800 tonnes having been recorded only in the mid to late 1960s and once in 1987/88.

Whilst overall landings were reduced, the fishery was observing the benefits of the introduction of the management package in 1993/94. Breeding stock indices in 1995/96 and 1996/97 showed that levels of egg production were significantly higher than in the early 1990s. The improvement noted in the indices was echoed by widespread fishers' reports of greater numbers of breeding lobsters seen on the spawning grounds in deeper water. By this time, industry had accepted fully that there was a real need to rebuild the breeding stock from drastically low levels, and while catches were low for these two seasons, better catches were forecast in the coming years and the sustainability of the resource was becoming assured.

Restructuring of the fleet continued with the retirement of 6 boats in 1995/96 and a further 4 boats in 1996/97. This brought the total from 621 vessels in 1994/95 to 611 in 1996/97. Interestingly, the number of A zone vessels remained constant at 149 while 4 boats retired from the B zone fleet. The pots from the retired vessels were transferred to A zone concessions, so that in 1996/97, A zone boats held almost 50% of the pots in the northern sector of the fishery. In C zone, 6 boats were retired (3 in each season) and the pots transferred to more active fishers, and nominal fishing effort increased 5% between 1994/95 and 1996/97. A zone effort levels jumped by a similar amount while nominal effort in B zone remained constant.

Monaghan (1989) recorded export market share by country of destination as USA 42%, Japan 41% and Taiwan just 17% in 1988/89. Whole boiled and frozen tails representing 49% and 40% of the product respectively and live exports just over 4%. The development of the lucrative Asian market saw a major shift in market share away from the United States tail market to Taiwan where whole cooked and live lobsters were sought after. Seven years later, in 1995/96, Taiwan was taking 42%, Japan 40% and USA just 9% of production. Whole boiled lobster represented 40% of the catch but live export to Japan and Taiwan had dramatically increased from 700 tonnes in 1988/89 to 3,750 tonnes (38% of production) in 1995/96. The United States tail market share was 11%. An expansion into the European market was attempted with trial shipments of lobsters in 1996/97. Unfortunately, the development of this market was (and still is) restricted by heavy import duties applying to Australian lobster exports.

Relatively high beach prices of between $22 and $27.50 per kg in 1995/96 and 1996/97 ensured returns to the fishers of $234 million and $266 million respectively. The prosperity, despite lower than average catches, an expectation of better catches in coming seasons and the prospect of a "guaranteed" sustainable resource were reflected in the price of pots of $25,000 - $30,000 in the two seasons for A and B zone and $18,000 to $23,500 in C zone. Only 30 new vessels entered the fishery in 1995/96 (55.1% lower than 1994/95) and even fewer boats (20) were replaced with new ones in 1996/97. Although some fishing costs were rising, eg, boat and pot construction and fuel costs, most fishers were happy to consolidate their operations, plan for the predicted average landings in 1997/98 and look forward to the forecast of a record 13,000 tonne catch in 1998/99.

5.0 Acknowledgments

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7.0 Tables

Table 1. Catch (in kg weight) and fishing effort (in pot lifts) for the 1995/96 rock lobster season in various statistical blocks.

Block		Date								
		9511	**9512**	**9601**	**9602**	**9603**	**9604**	**9605**	**9606**	**Total**
25120	Catch	-	-	-	874	-	3883	-	-	4757
	Effort	-	-	-	902	-	4791	-	-	5693
26120	Catch	-	-	-	7791	-	6338	-	-	14129
	Effort	-	-	-	11392	-	5146	-	-	16538
26131	Catch	-	-	1440	3999	7879	21921	13547	2897	51683
	Effort	-	-	2784	5640	5778	14187	14194	4044	46627
27120	Catch	-	-	-	6696	1561	-	-	-	8257
	Effort	-	-	-	8794	714	-	-	-	9508
27130	Catch	1756	7797	2331	21750	26074	23535	11075	3226	97544
	Effort	2334	5484	5020	31909	15511	17490	12128	5056	94932
27132	Catch	-	14762	3657	64908	54289	41176	6455	1267	186514
	Effort	-	10425	6111	89286	32231	31105	7946	1449	178553
27140	Catch	12474	92907	14590	20738	53948	52668	27636	17406	292367
	Effort	14535	64834	28875	24687	31172	39481	35031	26441	265056
28130	Catch	-	-	-	-	-	-	698	720	1418
	Effort	-	-	-	-	-	-	1380	1371	2751
28132	Catch	-	-	1541	-	-	-	-	-	1541
	Effort	-	-	1350	-	-	-	-	-	1350
28140	Catch	26027	45732	11869	36481	22780	7940	8713	8117	167659
	Effort	29236	41515	36341	43759	20196	10178	13597	12523	207345
28142	Catch	114732	198024	47226	137324	115628	67491	59569	60488	800482
	Effort	125908	182788	137615	183828	109848	75898	95942	94321	1006148
29130	Catch	-	-	458	-	-	-	-	-	458
	Effort	-	-	1653	-	-	-	-	-	1653
29132	Catch	-	3771	456	-	-	-	-	-	4227
	Effort	-	2660	1140	-	-	-	-	-	3800
29140	Catch	108150	272139	35550	98110	137405	98239	63015	46960	859568
	Effort	110507	196218	108665	126466	133577	109264	96415	61333	942445
29142	Catch	131867	364998	51334	105093	123735	82033	67368	91442	1017870
	Effort	142638	269962	135187	138778	123692	90148	108855	126111	1135371
30140	Catch	122418	587880	121647	192817	318625	166776	107274	95252	1712689
	Effort	153561	312278	214105	267384	345845	242912	215049	184131	1935265
30150	Catch	34058	116784	29003	52652	63954	31196	22455	19922	370024
	Effort	44861	58756	47326	73679	79116	55220	47458	38484	444900
31140	Catch	2622	35201	10862	7375	7851	5990	6744	5316	81961
	Effort	5445	17833	13411	11141	11602	10109	15278	10265	95084
31150	Catch	139543	514638	201944	223275	236698	176765	128717	102849	1724429
	Effort	196837	297721	304842	348425	287556	269970	264250	222847	2192448
32140	Catch	765	12975	1558	1062	1662	1193	907	316	20438
	Effort	1358	8253	2625	2619	2716	2037	2425	1455	23488
32150	Catch	27852	137334	62357	48432	40531	43724	50262	50996	461488
	Effort	38645	90191	82882	85629	67202	61941	80367	74608	581465
33140	Catch	-	-	901	2054	1810	4269	4561	2581	16176
	Effort	-	-	3301	4432	3210	6382	6945	4510	28780
33151	Catch	-	-	752	1024	-	1455	11150	6420	20801
	Effort	-	-	1035	1495	-	818	12231	6374	21953
34140	Catch	-	-	-	-	758	-	-	-	758
	Effort	-	-	-	-	2394	-	-	-	2394
34150	Catch	8	15	60	267	684	420	363	30	1847
	Effort	780	1050	450	1340	1562	1696	1556	360	8794
35150	Catch	-	-	-	-	-	209	-	98	307
	Effort	-	-	-	-	-	792	-	205	997
96010	Catch	-	-	-	-	-	-	45	51	96
	Effort	-	-	-	-	-	-	300	120	420
97011	Catch	-	-	-	-	37395	31906	17600	1625	88526
	Effort	-	-	-	-	10696	17235	15327	2934	46192
97012	Catch	-	-	-	-	349137	297424	134233	48230	829024
	Effort	-	-	-	-	98201	164937	152203	100945	516286
97013	Catch	-	-	-	-	254738	169190	82716	35679	542323
	Effort	-	-	-	-	75078	115849	109329	75499	375755
97014	Catch	-	-	-	-	125630	126563	56417	21415	330025
	Effort	-	-	-	-	36594	72238	65108	38750	212690
97015	Catch	-	-	-	-	27659	45737	13112	3103	89611
	Effort	-	-	-	-	8636	25928	15611	5254	55429
Total	**Catch**	**722272**	**2404957**	**599536**	**1032722**	**2010431**	**1508041**	**894632**	**626406**	**9798997**
	Effort	**866645**	**1559968**	**1134718**	**1461585**	**1503127**	**1445752**	**1388925**	**1099390**	**10460110**

Table 2. Catch (in kg weight) and fishing effort (in pot lifts) for the 1996/97 rock lobster season in various statistical blocks.

Block		Date								
		9611	9612	9701	9702	9703	9704	9705	9706	Total
26120	Catch	-	-	-	12379	-	-	-	-	12379
	Effort	-	-	-	11576	-	-	-	-	11576
26130	Catch	-	-	-	-	3772	-	-	-	3772
	Effort	-	-	-	-	3286	-	-	-	3286
26131	Catch	-	-	515	1746	5969	6524	6324	3502	24580
	Effort	-	-	615	2503	3813	4750	4650	3567	19898
27120	Catch	-	-	-	6658	-	-	-	-	6658
	Effort	-	-	-	4389	-	-	-	-	4389
27130	Catch	1197	8848	1178	17852	17045	11110	4648	2419	64297
	Effort	1794	6726	3132	17906	12190	10276	5772	3896	61692
27132	Catch	587	5785	1904	44903	31471	22057	8804	3162	118674
	Effort	414	3436	2578	50479	23458	17533	7090	3575	108563
27140	Catch	9896	83612	19108	24080	46156	37510	32617	24971	277949
	Effort	12232	61716	39781	31331	35712	38325	34282	30655	284034
28130	Catch	1102	2584	350	1376	-	-	-	-	5411
	Effort	1185	2370	1027	2133	-	-	-	-	6715
28132	Catch	-	-	903	999	-	810	-	-	2712
	Effort	-	-	2329	2219	-	800	-	-	5343
28140	Catch	1432	-	-	735	-	236	-	-	2403
	Effort	1350	-	-	1008	-	336	-	-	2694
28142	Catch	132526	256293	72920	173534	152994	96910	89476	78957	1053610
	Effort	147173	197718	168296	249503	135575	91591	113093	114959	1217908
29130	Catch	-	1284	-	-	-	-	-	-	1284
	Effort	-	1653	-	-	-	-	-	-	1653
29132	Catch	-	4077	527	-	2979	4680	-	-	12263
	Effort	-	2375	1425	-	2325	5211	-	-	11336
29140	Catch	16384	-	-	1189	980	-	-	-	18552
	Effort	15258	-	-	1596	963	-	-	-	17817
29142	Catch	232253	657996	101053	220338	289973	199100	174103	143372	2018188
	Effort	247444	461394	248251	312037	267839	223623	217074	204039	2181701
30140	Catch	88079	448593	135465	164710	304281	182238	121259	101512	1546136
	Effort	150048	290950	202107	252080	321301	236045	205913	195444	1853888
30150	Catch	29893	116275	42363	60255	84967	48272	31585	23819	437428
	Effort	46074	75073	65613	87432	96188	62561	54544	45514	532999
31140	Catch	3158	29836	6928	5357	6654	9633	5853	3978	71397
	Effort	5011	19662	9687	9005	6640	10549	11537	9006	81097
31150	Catch	131203	408339	222642	244486	267455	260407	197930	142729	1875191
	Effort	192520	295336	333919	366383	296183	309237	299767	263843	2357188
32140	Catch	300	3978	1281	1178	2918	1681	1103	400	12839
	Effort	1023	3941	2418	2604	4181	2418	2046	1530	20161
32150	Catch	18395	89938	56011	38550	54541	78012	74738	50173	460359
	Effort	33091	71825	78995	68890	67796	76861	97025	78153	572636
33140	Catch	-	-	2149	730	620	3065	3353	2188	12106
	Effort	-	-	3723	1898	848	2493	3058	2449	14469
33150	Catch	-	-	1386	1519	3616	3680	2514	2365	15080
	Effort	-	-	2500	2100	4250	2700	2100	1800	15450
33151	Catch	-	-	966	500	1150	9332	9104	4061	25112
	Effort	-	-	1176	848	1484	9866	11983	4320	29677
34150	Catch	-	12	10	95	147	-	225	202	691
	Effort	-	450	270	1128	480	-	490	620	3438
35150	Catch	3	3	1	-	-	-	-	-	7
	Effort	120	370	450	-	-	-	-	-	940
97011	Catch	-	-	-	-	26643	57542	16404	1756	102345
	Effort	-	-	-	-	9080	31866	16101	2776	59823
97012	Catch	-	-	-	-	302113	224089	121502	56114	703818
	Effort	-	-	-	-	95711	154728	140090	101621	492150
97013	Catch	-	-	-	-	234848	156796	81983	40064	513691
	Effort	-	-	-	-	74358	102645	100373	67457	344833
97014	Catch	-	-	-	-	132888	155203	76876	27682	392648
	Effort	-	-	-	-	39196	86651	72438	43806	242091
97015	Catch	-	-	-	-	33053	50708	21794	5026	110581
	Effort	-	-	-	-	10971	26160	16818	7303	61254
Total	**Catch**	**666408**	**2117452**	**667660**	**1023169**	**2007232**	**1619595**	**1082193**	**718455**	**9902164**
	Effort	**854737**	**1494995**	**1168292**	**1479043**	**1513828**	**1507225**	**1416244**	**1186333**	**10620697**

Table 3. Catch (kg) per unit of fishing effort (*i.e.* kilograms of rock lobster per pot lift) data for the 1995/96 season in various statistical blocks (see figures 2a, b).

Block	Date								
	9511	**9512**	**9601**	**9602**	**9603**	**9604**	**9605**	**9606**	**Total**
25120	-	-	-	0.969	-	0.810	-	-	0.836
26120	-	-	-	0.684	-	1.232	-	-	0.854
26131	-	-	0.517	0.709	1.364	1.545	0.954	0.716	1.108
27120	-	-	-	0.761	2.186	-	-	-	0.868
27130	0.752	1.422	0.464	0.682	1.681	1.346	0.913	0.638	1.028
27132		1.416	0.598	0.727	1.684	1.324	0.812	0.874	1.045
27140	0.858	1.433	0.505	0.840	1.731	1.334	0.789	0.658	1.103
28130	-	-	-	-	-	-	0.506	0.525	0.515
28132	-	-	1.141	-	-	-	-	-	1.141
28140	0.890	1.102	0.327	0.834	1.128	0.780	0.641	0.648	0.809
28142	0.911	1.083	0.343	0.747	1.053	0.889	0.621	0.641	0.796
29130	-	-	0.277	-	-	-	-	-	0.277
29132	-	1.418	0.400	-	-	-	-	-	1.112
29140	0.979	1.387	0.327	0.776	1.029	0.899	0.654	0.766	0.912
29142	0.924	1.352	0.380	0.757	1.000	0.910	0.619	0.725	0.897
30140	0.797	1.883	0.568	0.721	0.921	0.687	0.499	0.517	0.885
30150	0.759	1.988	0.613	0.715	0.808	0.565	0.473	0.518	0.832
31140	0.482	1.974	0.810	0.662	0.677	0.593	0.441	0.518	0.862
31150	0.709	1.729	0.662	0.641	0.823	0.655	0.487	0.462	0.787
32140	0.563	1.572	0.594	0.405	0.612	0.586	0.374	0.217	0.870
32150	0.721	1.523	0.752	0.566	0.603	0.706	0.625	0.684	0.794
33140	-	-	0.273	0.463	0.564	0.669	0.657	0.572	0.562
33151	-	-	0.727	0.685	-	1.779	0.912	1.007	0.948
34140	-	-	-	-	0.317	-	-	-	0.317
34150	0.010	0.014	0.133	0.199	0.438	0.248	0.233	0.083	0.210
35150	-	-	-	-	-	0.264	-	0.478	0.308
96010	-	-	-	-	-	-	0.150	0.425	0.229
97011	-	-	-	-	3.496	1.851	1.148	0.554	1.916
97012	-	-	-	-	3.555	1.803	0.882	0.478	1.606
97013	-	-	-	-	3.393	1.460	0.757	0.473	1.443
97014	-	-	-	-	3.433	1.752	0.867	0.553	1.552
97015	-	-	-	-	3.203	1.764	0.840	0.591	1.617
Total	**0.833**	**1.542**	**0.528**	**0.707**	**1.337**	**1.043**	**0.644**	**0.570**	**0.937**

Total catch = 9, 798, 997 kg
Total effort = 10,460,110 pot lifts

Table 4. Catch (kg) per unit of fishing effort (i.e. kilograms of rock lobster per pot lift) data for the 1996/97 season in various statistical blocks (see figures 2a, b).

Block	Date								
	9611	**9612**	**9701**	**9702**	**9703**	**9704**	**9705**	**9706**	**Total**
26120	-	-	-	1.069	-	-	-	-	1.069
26130	-	-	-	-	1.148	-	-	-	1.148
26131	-	-	0.838	0.698	1.565	1.373	1.360	0.982	1.235
27120	-	-	-	1.517	-	-	-	-	1.517
27130	0.667	1.316	0.376	0.997	1.398	1.081	0.805	0.621	1.042
27132	1.419	1.684	0.739	0.890	1.342	1.258	1.242	0.884	1.093
27140	0.809	1.355	0.480	0.769	1.292	0.979	0.951	0.815	0.979
28130	0.930	1.090	0.341	0.645	-	-	-	-	0.806
28132	-	-	0.388	0.451	-	1.013	-	-	0.508
28140	1.061	-	-	0.730	-	0.703	-	-	0.892
28142	0.900	1.296	0.433	0.696	1.128	1.058	0.791	0.687	0.865
29130	-	0.777	-	-	-	-	-	-	0.777
29132	-	1.717	0.370	-	1.281	0.898	-	-	1.082
29140	1.074	-		0.745	1.017	-	-	-	1.041
29142	0.939	1.426	0.407	0.706	1.083	0.890	0.802	0.703	0.925
30140	0.587	1.542	0.670	0.653	0.947	0.772	0.589	0.519	0.834
30150	0.649	1.549	0.646	0.689	0.883	0.772	0.579	0.523	0.821
31140	0.630	1.517	0.715	0.595	1.002	0.913	0.507	0.442	0.880
31150	0.682	1.383	0.667	0.667	0.903	0.842	0.660	0.541	0.796
32140	0.293	1.009	0.530	0.452	0.698	0.695	0.539	0.262	0.637
32150	0.556	1.252	0.709	0.560	0.804	1.015	0.770	0.642	0.804
33140	-	-	0.577	0.385	0.732	1.229	1.096	0.894	0.837
33150	-	-	0.554	0.723	0.851	1.363	1.197	1.314	0.976
33151	-	-	0.821	0.590	0.775	0.946	0.760	0.940	0.846
34150	-	0.027	0.037	0.084	0.306	-	0.459	0.326	0.201
35150	0.025	0.008	0.002	-	-	-	-	-	0.007
97011	-	-	-	-	2.934	1.806	1.019	0.633	1.711
97012	-	-	-	-	3.157	1.448	0.867	0.552	1.430
97013	-	-	-	-	3.158	1.528	0.817	0.594	1.490
97014	-	-	-	-	3.390	1.791	1.061	0.632	1.622
97015	-	-	-	-	3.013	1.938	1.296	0.688	1.805
Total	**0.780**	**1.416**	**0.571**	**0.692**	**1.326**	**1.075**	**0.764**	**0.606**	**0.932**

Total catch = 9,902,164 kg
Total effort = 10,620,697 pot lifts

Table 5. Mean carapace lengths (mm) of male and female rock lobsters in various depth categories at Fremantle, Lancelin, Jurien, Dongara and Abrolhos Islands throughout the 1995/96 fishing season.

Location	Month	0-10 Fathoms		10-20 Fathoms		20-30 Fathoms		30+ Fathoms	
		Male	Female	Male	Female	Male	Female	Male	Female
Abrolhos	Mar	79	75	81	77	83	77	82	77
Dongara	Nov	67	68	78	75	-	-	-	-
	Dec	79	75	82	79	82	78	85	81
	Jan	76	74	-	-	-	-	76	75
	Feb	73	73	76	75	83	79	-	-
	Mar	76	75	74	74	85	82	-	-
	Apr	75	74	-	-	86	82	-	-
	May	77	75	81	78	-	-	-	-
	Jun	76	74	-	-	-	-	-	-
Jurien Bay	Nov	77	75	78	75	81	77	-	-
	Dec	80	76	79	76	85	80	82	76
	Jan	77	74	76	77	85	82	-	-
	Feb	77	74	78	75	84	81	-	-
	Mar	75	73	77	75	83	82	-	-
	Apr	77	74	78	75	83	81	91	82
	May	76	74	76	74	100	91	-	-
	Jun	76	74	78	75	-	-	-	-
Lancelin	Nov	76	75	-	-	-	-	-	-
	Dec	76	75	84	80	86	83	94	87
	Jan	76	75	90	91	97	94	-	-
	Feb	76	74	88	82	94	84	-	-
	Mar	77	75	89	84	95	92	-	-
	Apr	76	74	90	85	98	90	-	-
	May	74	74	-	-	99	96	107	102
	Jun	75	74	96	85	97	85	-	-
Fremantle	Nov	82	79	86	81	-	-	-	-
	Dec	85	82	87	82	95	92	95	88
	Jan	80	-	101	90	103	94	96	91
	Feb	82	78	-	-	114	107	-	-
	Mar	84	79	90	90	105	99	-	-
	Apr	81	78	-	-	102	96	-	-
	May	83	79	-	-	107	82	-	-
	Jun	84	80	-	-	112	97	-	-

Table 6. Mean carapace lengths (mm) of male and female rock lobsters in various depth categories at Fremantle, Lancelin, Jurien, Dongara and Abrolhos Islands throughout the 1996/97 fishing season.

Location	Month	0-10 Fathoms		10-20 Fathoms		20-30 Fathoms		30+ Fathoms	
		Male	Female	Male	Female	Male	Female	Male	Female
Abrolhos	Mar	80	76	81	75	82	78	82	78
Dongara	Nov	75	74	81	78	-	-	-	-
	Dec	77	75	76	75	84	82	83	80
	Jan	70	70	75	74	86	84	78	75
	Feb	77	75	78	76	-	-	-	-
	Mar	75	74	76	75	85	88	-	-
	Apr	75	74	72	71	86	92	88	81
	May	75	74	81	77	90	87	-	-
	Jun	75	73	74	74	93	84	-	-
Jurien Bay	Nov	77	75	78	76	-	-	-	-
	Dec	-	-	77	76	78	76	84	79
	Jan	76	74	-	-	82	82	-	-
	Feb	74	72	77	76	84	77	-	-
	Mar	76	74	79	76	84	80	-	-
	Apr	74	72	76	74	86	83	88	84
	May	77	74	78	77	81	78	-	-
	Jun	76	74	78	75	83	78	90	78
Lancelin	Nov	76	74	-	-	-	-	-	-
	Dec	78	76	94	85	86	83	-	-
	Jan	76	74	92	95	105	98	-	-
	Feb	74	71	85	81	93	84	-	-
	Mar	76	74	86	83	85	83	-	-
	Apr	76	74	95	98	105	101	-	-
	May	75	74	-	-	94	93	-	-
	Jun	77	75	90	82	86	79	-	-
Fremantle	Nov	79	77	78	76	-	-	-	-
	Dec	-	-	92	87	93	95	97	92
	Jan	78	76	91	85	95	87	95	95
	Feb	76	73	-	-	109	102	-	-
	Mar	80	77	-	-	96	102	114	107
	Apr	87	80	-	-	102	104	108	104
	May	79	78	79	76	96	89	-	-
	Jun	80	77	83	78	97	81	-	-

Table 7. Bottom temperature (°C) and surface salinity (in parts per thousand) in various depth categories in waters out from Fremantle, Lancelin, Jurien and Dongara throughout the 1995/96 fishing season, and from the Abrolhos Islands in March.

Location	Depth	November		December		January		February		March		April		May		June	
	(fathoms)	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal
Abrolhos	0-10	-	-	-	-	-	-	-	-	23.4	36.65	-	-	-	-	-	-
	10-20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	20-30	-	-	-	-	-	-	-	-	23.7	36.47	-	-	-	-	-	-
	30+	-	-	-	-	-	-	-	-	21.9	36.68	-	-	-	-	-	-
Dongara	0-10	-	-	21.3	36.90	22.9	36.98	24.5	37.00	23.4	-	21.6	-	20.9	-	19.4	-
	10-20	-	-	-	-	-	-	-	-	23.7	-	-	-	20.3	-	-	-
	20-30	-	-	23.1	36.63	-	-	24.0	37.00	22.2	-	22.5	-	-	-	-	-
	30+	-	-	20.9	36.49	22.0	36.50	-	-	-	-	-	-	-	-	-	-
Jurien Bay	0-10	20.8	-	20.9	36.92	22.6	37.00	23.7	37.00	21.8	-	-	-	21.4	-	-	-
	10-20	21.0	-	20.9	36.89	21.7	36.85	23.5	37.00	-	-	22.1	-	21.6	-	-	-
	20-30	-	-	20.6	36.85	20.5	36.81	22.5	36.62	22.7	-	23.3	-	22.9	-	-	-
	30+	-	-	21.4	36.46	-	-	-	-	-	-	22.5	-	-	-	-	-
Lancelin	0-10	21.6	-	21.0	36.86	-	-	23.9	37.00	23.0	37.00	19.6	-	21.0	-	19.5	-
	10-20	-	-	20.7	36.78	21.2	-	23.6	36.79	22.9	36.88	21.8	-	-	-	21.4	-
	20-30	-	-	20.9	36.82	20.5	-	22.4	36.48	22.1	36.74	22.5	-	22.8	-	20.4	-
	30+	-	-	21.2	36.61	-	-	-	-	-	-	-	-	23.1	-	-	-
Fremantle	0-10	20.5	-	-	-	22.1	-	23.2	37.00	22.1	37.00	20.5	-	19.9	-	18.6	-
	10-20	19.8	-	20.0	36.72	21.5	-	-	-	-	-	-	-	-	-	-	-
	20-30	-	-	19.9	36.81	21.4	-	22.4	36.86	22.1	36.83	21.6	-	19.9	-	20.2	-
	30+	-	-	20.0	36.72	21.5	-	-	-	-	-	-	-	-	-	-	-

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

Table 8. Bottom temperature (°C) and surface salinity (in parts per thousand) in various depth categories in waters out from Fremantle, Lancelin, Jurien and Dongara throughout the 1996/97 fishing season, and from the Abrolhos Islands in March.

Location	Depth	November		December		January		February		March		April		May		June	
	(fathoms)	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal	Temp	Sal
Abrolhos	0-10	-	-	-	-	-	-	-	-	23.1	35.79	-	-	-	-	-	-
	10-20	-	-	-	-	-	-	-	-	23.3	35.73	-	-	-	-	-	-
	20-30	-	-	-	-	-	-	-	-	23.2	35.73	-	-	-	-	-	-
	30+	-	-	-	-	-	-	-	-	23.2	35.72	-	-	-	-	-	-
Dongara	0-10	21.7	35.98	-	35.85	23.8	35.94	23.4	36.26	22.6	36.11	22.5	36.03	20.5	35.65	20.2	35.62
	10-20	21.3	35.73	-	-	23.4	35.97	23.5	35.90	-	36.03	22.3	36.11	21.6	35.92	-	-
	20-30	-	-	21.9	35.73	21.9	35.73	-	-	22.7	35.67	23.6	35.87	22.6	35.50	21.5	35.51
	30+	-	-	21.5	35.73	22.5	35.53	-	-	-	-	23.6	35.64	-	-	-	-
Jurien Bay	0-10	21.4	35.89	-	-	-	35.93	23.1	36.42	-	36.06	22.0	36.06	21.6	35.85	20.1	35.51
	10-20	21.2	35.78	-	-	-	-	23.9	36.12	-	36.02	22.7	35.96	21.5	35.95	21.1	35.55
	20-30	-	-	21.3	35.61	22.6	35.54	23.5	35.64	-	35.78	22.7	35.75	22.6	35.72	21.9	35.51
	30+	-	-	21.4	35.69	-	-	-	-	-	-	-	-	-	-	-	-
Lancelin	0-10	21.1	35.51	21.8	35.73	23.5	35.70	23.3	36.46	-	36.40	23.4	35.73	20.6	35.81	18.9	35.50
	10-20	-	-	21.2	35.71	22.6	35.84	22.4	35.88	22.4	35.97	22.9	35.72	-	-	19.1	35.53
	20-30	-	-	20.8	35.67	22.0	35.86	22.0	35.73	21.7	35.98	23.6	35.68	19.8	35.82	20.0	35.53
Fremantle	0-10	20.8	35.27	-	-	21.9	35.97	23.4	36.41	21.8	36.25	21.1	36.10	18.7	36.13	18.1	35.77
	10-20	20.0	35.31	20.3	35.59	21.5	35.91	-	-	-	-	-	-	20.7	35.89	18.7	35.57
	20-30	-	-	20.4	35.67	20.9	35.85	22.0	35.82	21.5	35.91	21.0	35.89	21.5	35.95	19.3	35.58
	30+	-	-	20.5	35.81	20.8	35.92	-	-	-	-	22.8	35.73	-	-	-	-

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

Table 9. 1995/96 sex ratio by location, depth category and month. Figures are the percentage of female rock lobster in the total sampled catch.

Location	Depth (fathoms)	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Abrolhos	0-10	-	-	-	-	53	-	-	-
	10-20	-	-	-	-	56	-	-	-
	20-30	-	-	-	-	60	-	-	-
	30+	-	-	-	-	62	-	-	-
Dongara	0-10	50	56	54	59	61	58	56	58
	10-20	59	57	-	62	62	-	70	-
	20-30	-	66	-	64	66	74	-	-
	30+	-	65	88	-	-	-	-	-
Jurien Bay	0-10	59	54	44	55	58	63	52	55
	10-20	53	64	19	56	59	60	58	60
	20-30	56	58	66	68	72	68	64	-
	30+	-	75	-	-	-	67	-	-
Lancelin	0-10	56	36	54	60	66	71	57	65
	10-20	-	59	70	59	65	71	-	58
	20-30	-	58	76	62	79	65	66	40
	30+	-	63	-	-	-	-	50	-
Fremantle	0-10	57	60	-	50	51	58	49	57
	10-20	56	57	47	-	58	-	-	-
	20-30	-	59	54	68	72	67	33	30
	30+	-	52	66	-	-	-	-	-

Table 10. 1996/97 sex ratio by location, depth category and month. Figures are the percentage of female rock lobsters in the total sampled catch.

Location	Depth (fathoms)	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Abrolhos	0-10	-	-	-	-	50	-	-	-
	10-20	-	-	-	-	54	-	-	-
	20-30	-	-	-	-	55	-	-	-
	30+	-	-	-	-	41	-	-	-
Dongara	0-10	54	59	55	57	63	55	58	59
	10-20	64	62	59	66	69	62	62	65
	20-30	-	62	71	-	77	82	64	43
	30+	-	76	75	-	-	66	-	-
Jurien Bay	0-10	56	-	47	52	63	58	57	48
	10-20	56	53	-	47	72	61	61	58
	20-30	-	69	69	57	69	79	71	60
	30+	-	65	-	-	-	82	-	58
Lancelin	0-10	53	54	56	55	62	61	58	64
	10-20	-	54	86	61	67	77	-	51
	20-30	-	59	75	64	69	82	69	45
Fremantle	0-10	56	-	41	51	47	48	48	46
	10-20	53	61	47	-	-	-	55	44
	20-30	-	59	55	65	83	79	55	34
	30+	-	62	69	-	78	76	-	-

8.0 Figures

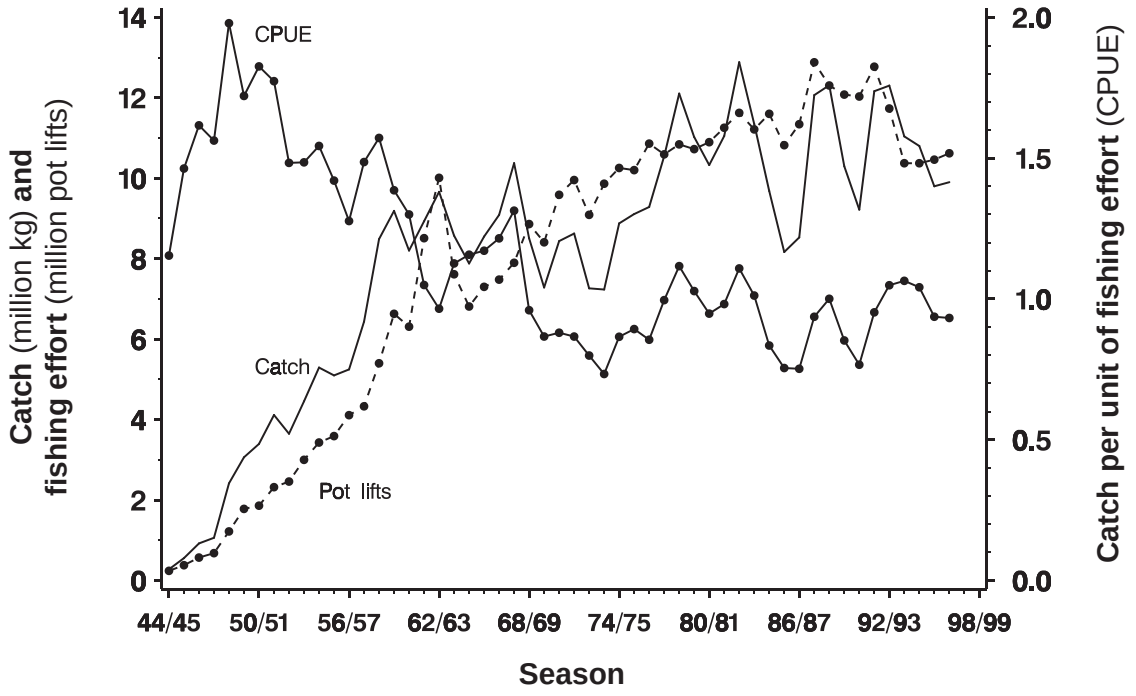

Figure 1. Rock lobster catch (kg), fishing effort (pot lifts) and catch per unit of fishing effort (kg/pot lift) data.

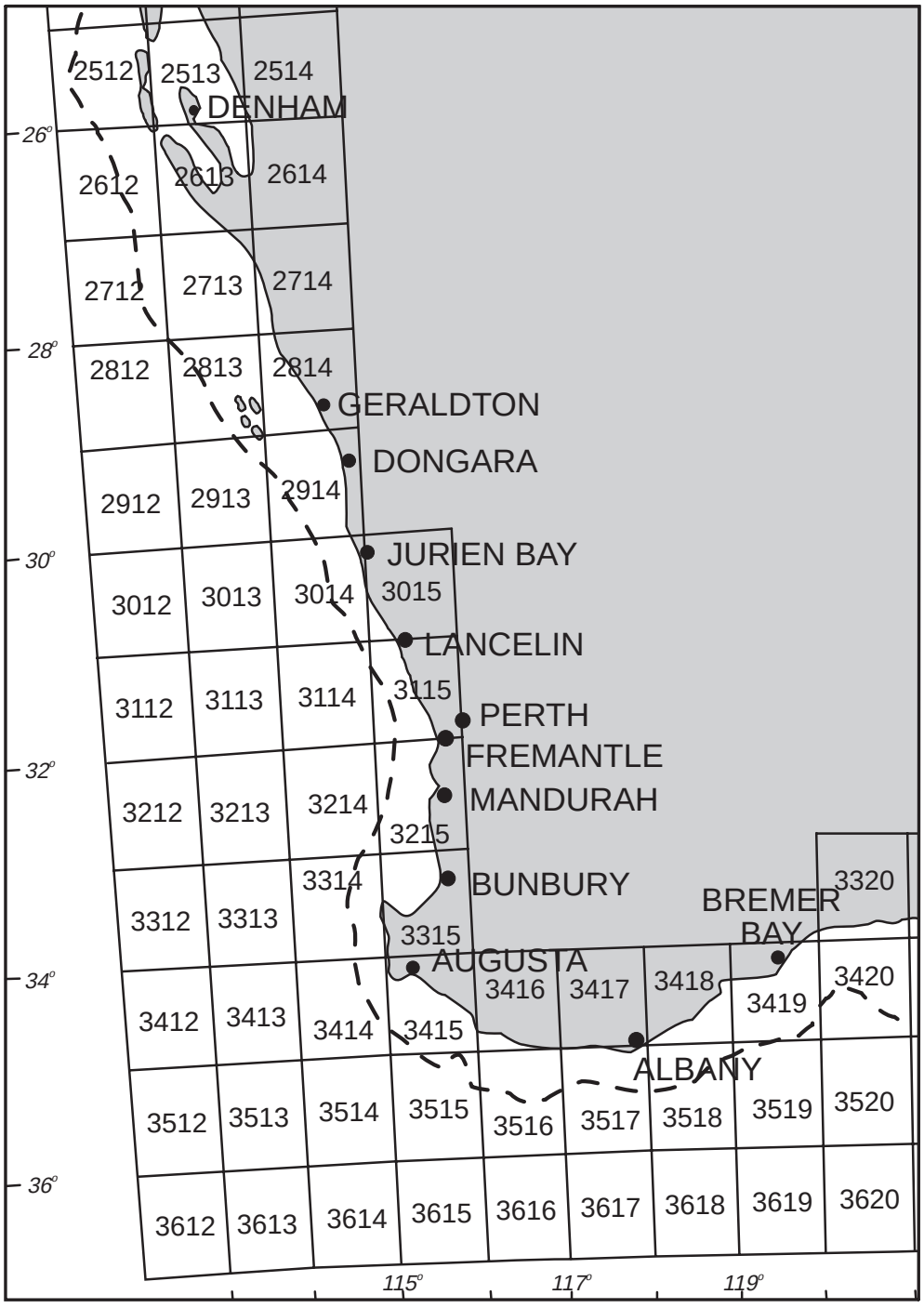

Figure 2a. Rock lobster fishing areas.

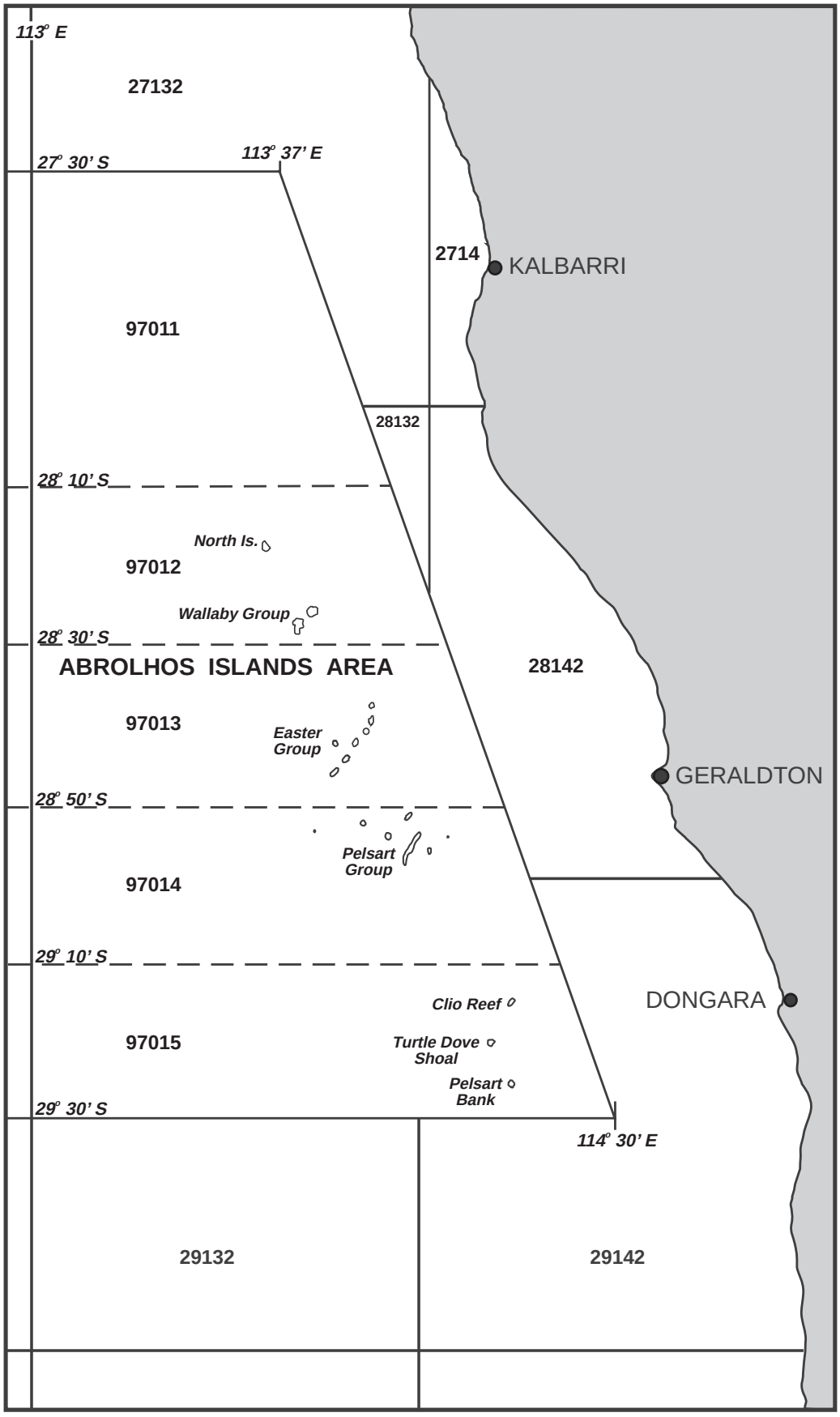

Figure 2b. Rock lobster fishing areas. (The new series of Abrolhos Island statistical blocks were introduced at the commencement of the 1989/90 season).

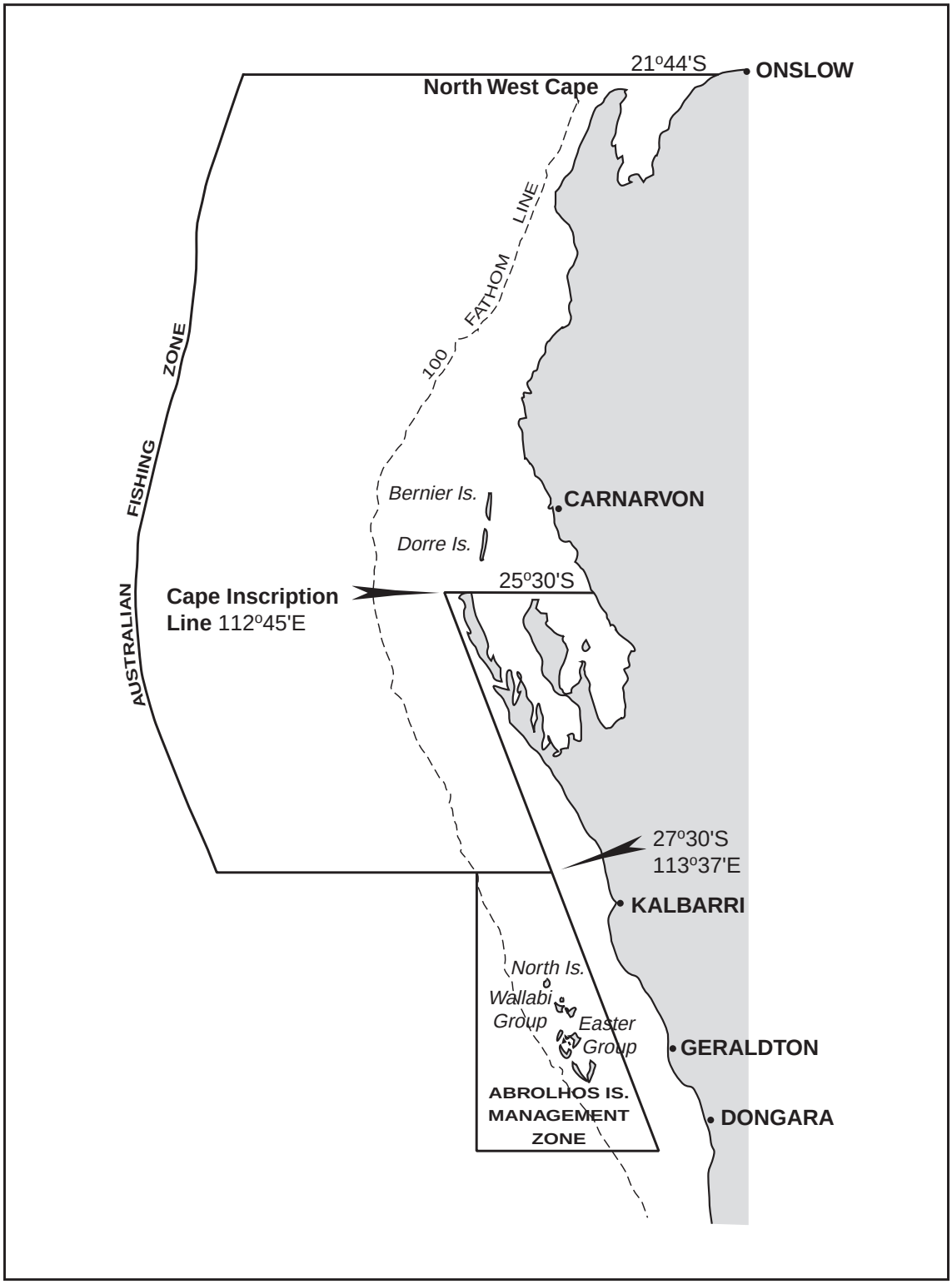

Figure 2c. Big Bank fishing area (adapted from Chubb *et al.* 1994).

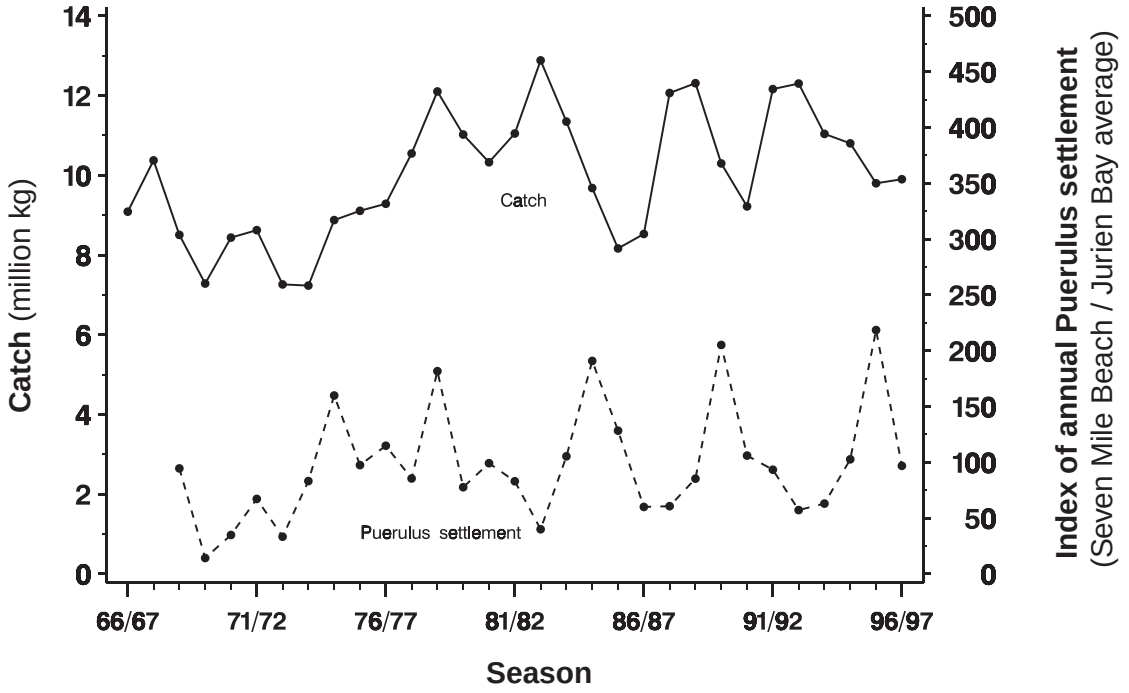

Figure 3. Rock lobster catch and index of annual puerulus settlement (puerulus take three to four years to grow to legal size).

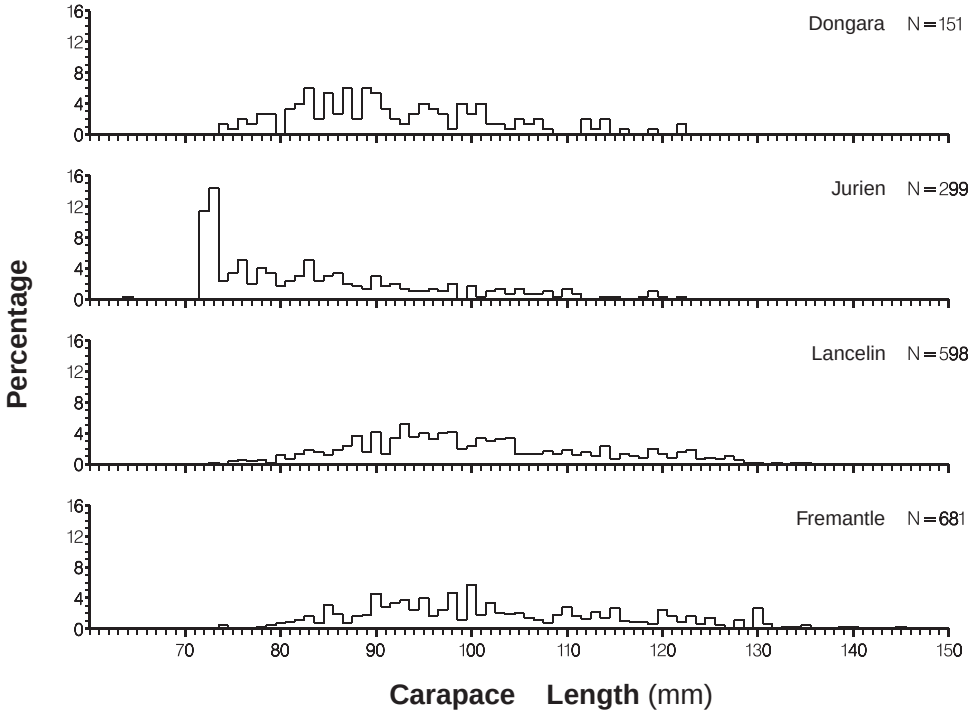

Figure 4a. Length frequency of breeding female rock lobsters (berried and/or mated) taken from December 1995 to February 1996.

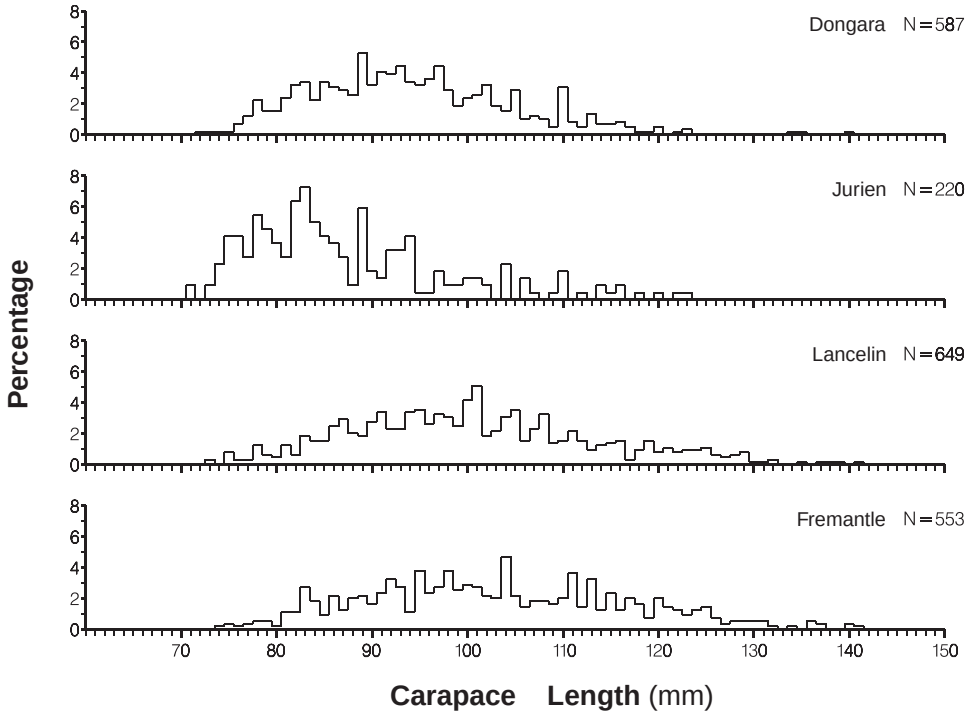

Figure 4b. Length frequency of breeding female rock lobsters (berried and/or mated) taken from December 1996 to February 1997.

Bulletin No 7 November 1995

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1995/96 SEASON

SUMMARY OF 1994/95 SEASON

The 621 licensed rock lobster vessels produced rock lobster landings of 10 800 tonnes from 10.3 million pot lifts during the 1994/95 season. This is about 2% lower than the previous season's catch but about 2% above the average catch of 10 600 tonnes over the past 10 years. The landed catch was valued at $300 million.

The management package introduced in 1993/94 is having the desired impact of reducing the exploitation rate. In 1993/94 and 1994/95 nominal fishing effort was reduced by about 20% compared to the 1991/92 level of 12.8 million pot lifts (the last year before major modifications to the management of the fishery were introduced by previous and present governments). Since fishermen no longer have the ability to utilise latent effort to overcome effort reductions, the 18% temporary pot reductions have been instrumental in increasing the survival of rock lobsters.

Analysis of the 1994/95 processors' grade category data (after accounting for product mix) showed reduced numbers of A and B grade lobsters and increased quantities of C, D and E grades, compared with the 1993/94 season. A similar shift in grades was seen between 1992/93 and 1993/94. The change in grade composition reflects the predicted reduced levels of recruitment for 1994/95 and the increased survival and growth of lobsters to larger sizes resulting from the management package. However, it should be noted that any effort shift targeting the larger lobsters (as a result of reduced recruitment) also would increase the numbers of larger lobsters landed.

The shift in size of product was more marked in the southern sector of the fishery, where a greater decline in recruitment had been predicted from previous puerulus settlements. In the north of the fishery, the production of A and B grades was similar to 1993/94, but quantities of the larger grades showed a slight increase. The apparent shift to larger sizes is consistent with the predictions made when assessing the current management package. This trend to a higher proportion of larger lobsters must occur if the breeding stock is to recover.

The spawning stock indices have shown a pleasing upturn in 1994/95. While a number of factors such as higher water temperature leading to higher catchability may be contributing to this, there is strong evidence that the breeding stock is responding to the current management measures. However, noting the previous year to year variation in these spawning indices, caution should be used when interpreting this single data point. A much clearer trend will emerge over the next few years.

The package aimed to transfer white lobsters into the deeper water reds fishery and even out catches throughout the season. However, this was more effective in the north coastal sector than in the south coastal region. With industry's endorsement, the Rock Lobster Industry Advisory Committee is considering methods of shifting the large catches of whites in C Zone in December to other catching periods to improve the quality and potential worth of the catch. In these deliberations the prime objective of improving and maintaining the breeding stock will not be compromised.

PREDICTION FOR THE 1995/96 SEASON

With below average puerulus settlement in 1991/92 and 1992/93 leading to reduced recruitment to the fishery in 1995/96, poorer catches are forecast throughout the fishery. The exception may be the far north of the fishery where settlement three to four years ago was average to above average.

The predictive relationships have been updated and assume effort levels equivalent to those in 1994/95 and a constant Big Bank catch of 350 tonnes.

A total catch of about 10 100 tonnes is forecast for 1995/96, a 6.5% decline on last season's 10 800 tonnes. Catches in Zones A, B and C are estimated to be around 1 600 tonnes (down 4%), 3 500 tonnes (down 10%) and 5 000 tonnes (down 4%) respectively.

It should be recognised that the predictions are the best estimate and differing environmental conditions each season will affect what is actually caught. Variations between the forecast and actual catches also reflect the uncertainty associated with the parameters used in the predictive relationships. Looking further ahead, a lower catch of about 9 500 tonnes is expected for 1996/97

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before catches return to about average levels in 1997/98 (10 500 tonnes).

PUERULUS SETTLEMENT

The 1994/95 puerulus season saw improved but variable settlement throughout the fishery. Abrolhos Islands puerulus numbers returned to the average high levels seen in the 1970s, above average settlement occurred at Shark Bay and Alkimos recorded it's second highest level of settling puerulus. Jurien Bay and Seven-Mile Beach puerulus settlement returned to long-term average levels while settlement at Warnbro and Cape Mentelle remained poor.

The presence of a steadily flowing Leeuwin Current along the coast has signified the end of the long running El Nino-Southern Oscillation (ENSO) event. The Leeuwin Current together with significant winter storms have contributed to the very good puerulus settlement seen so far this year.

The November 1995 collection (October settlement) of puerulus has just been completed. So far this settlement period, South Passage (Shark Bay) has received above average levels of settlement; Rat Island is above the average seen in the 1970s (*ie* very good); the first season of monitoring settlement at Port Gregory has seen good numbers of puerulus; Seven Mile Beach, Jurien, Lancelin, Alkimos and Warnbro are all well above average and Cape Mentelle has had the first puerulus settling in 4 years, settlement there being average.

This very good settlement of puerulus will be reflected in the catches of reds in 1998/99 and of whites in 1999/2000.

MARKET OUTLOOK 1995/96 SEASON*

Overview
Without exception, the traditional markets can best be described as gloomy for the forthcoming rock lobster season.

Frozen Lobster Tails
Inventories of last season's catches in the USA are still high. Prices during 1994/95 dropped in some grades by as much as US$9.50 per lb (A$27 per kg). Tail production increased by about 30% last season compared to 1993/94.

Live Lobsters
The market for live lobster is very weak with increasing volumes of Mexican and Californian lobster being shipped to our markets at very low prices. This development has caused a big fall in the price for the New Zealand product and caused many of these producers to consider freezing the catch.

Slow consumption due to poor economic performance for Taiwan and Japan and also good supply of low priced frozen lobster will keep pressure on live lobster prices for the coming season.

Cuba, in particular, is the unknown quantity. Clearly the Cubans are competing successfully in the market place and will have an impact on pricing. The transit time to market place for Cuban lobster may be to our benefit.

Just on 3 million kg were exported live last season and a slight increase on this figure is envisaged for 1995/96.

Frozen Whole Lobster (cooked & raw)
***Taiwan*:** This will be the market of most concern for the new season. In the 1994/95 season, considerable market share was lost to Cuba and Florida. This product was selling at very low prices and quality has improved, in recent years, to a point where consumers are satisfied and importers and wholesalers can enjoy a higher return than for the Western Australian product. This coming season will demand that WA packers regain market share through aggressive pricing (*ie* lower prices). The aim will be to drive Cuban lobster back to the European market where discriminatory tariff barriers prevent Australian lobster from competing with the Cuban product on the same terms.

***Japan*:** Stocks of pink cooked lobster are relatively low with consumption slow due to consumer concerns about the economy and good supply of much cheaper lobsters from other sources.

General
The Japanese prawn market has declined dramatically in the last two to three months. This is usually one indicator of what might be expected in the Japanese lobster market. The consumption of luxury imported consumables (foods) is down in Japan. The effects of the Kobe disaster, the gas scare, the collapse of a Japanese bank (the first in 40 years) and the exchange rate (yen) are all factors weighing heavily against Australian lobster exports to this major market.

New Zealand finished its season on a low note, not being able to hold their selling prices particularly in Japan where they witnessed a drop of approximately 500 yen per kg for some grades.

South Australian production looks at this stage to be normal, however, the beach price has already dropped by up to $5.00 per kg from the opening day of their season.

Air space for live lobster export will be tight, however, the airlines and freight forwarders know the value of live lobsters not only to themselves but also to the economy in general and we will be fairly well assured of our share of available space.

* This information was provided by the Rock Lobster and Prawning Association of Western Australia (Inc.), Suite 6, 41 Walters Drive, Osborne Park WA 6017. Chairman Mr Tony Gibson ph: 244 2933 fax: 244 2934.

Except where acknowledged, the information in this bulletin has been supplied by the FISHERIES RESEARCH DIVISION of the WA DEPARTMENT OF FISHERIES. Contact Dr Chris Chubb or Mr Eric Barker ph: (09) 246 8444 fax: (09) 447 3062.

Bulletin No 8 29 February 1996

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1995/96 SEASON

THE 1995/96 WHITES SEASON (Nov 15 - Jan 31)

The 614 commercial vessels licensed to operate in the western rock lobster fishery landed 3,741 tonnes of lobster during the whites segment of the 1995/96 rock lobster season. This is 13.3% lower than the 4,314 tonnes caught over the same period last year and 17.4% below the average (4,528t) over the previous ten seasons. Significant declines in the catches in C Zone were responsible for the overall reduction in total catch from the fishery during the whites. Catch reductions of 9.0% in the central region and almost 27% in the southern region (south of Wedge Island) contrasted markedly with the catch in the northern region (B Zone) which remained at a similar level to last season (+0.7%).

Table 1. Rock lobster production figures.

Production (kg) to end of January 1996

Fremantle	Jurien	Geraldton	Total
1 386 582	803 319	1 551 494	3 741 395

Production (kg) to end of January 1995

Fremantle	Jurien	Geraldton	Total
1 890 361	882 890	1 540 366	4 313 617

Difference (kg) and percentage difference

Fremantle	Jurien	Geraldton	Total
-503 779	-79 571	11 128	-572 222
-26.6%	-9.0%	+0.7%	-13.3%

10 yr cumulative ave. (to end Jan 95) = 4 528 000kg
Production to end of January 1996 = 3 741 000kg
Difference = -787 000kg or -17.4%

The differences in catches can be directly attributed to previous levels of puerulus settlement and subsequent whites abundance. At Dongara puerulus settlement in 1991/92 was average whereas at Jurien and Alkimos numbers of puerulus were below average and well below average respectively. This has led to much lower densities of lobsters in the central and southern sectors of the fishery and hence the lower catches. The decline in catches is expected to bottom out in the 1996/97 season.

In general terms catches have been patchy throughout the fishery particularly in deep water with only occasional good catches recorded. This is indicative of the lower densities of juveniles migrating across the fishing grounds to deeper waters.

The grade categories in the northern sector of the fishery are similar to last season being predominantly A and B with some C and D grades. The numbers in the larger grades (C to G) appear to be gradually increasing each year. In the south the poor recruitment and more rapid growth due to lower densities of lobsters have led to small numbers of A and B grades with the catch comprising principally C, D and some E grades mainly coming from deeper water. The shift to larger grades also is evident in the northern sectors of the fishery

Environmental factors, such as lengthy periods of calm weather and low swell, also seem to have played a role in reducing catches. At the same time good conditions have enhanced puerulus settlement indicating good catches in three to four years.

PUERULUS SETTLEMENT

With the 1995/96 puerulus settlement season almost at an end, the preliminary mean index of settlement at Seven-Mile Beach (Dongara) and Jurien is twice the annual average. This marked improvement follows the average puerulus settlement seen at these locations last season (Figure 1).

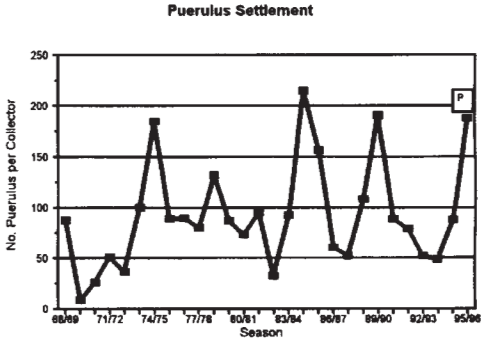

Figure 1 (P - preliminary value)

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With one exception, very high levels of puerulus settlement have occurred at all other locations during 1995/96. South Passage (Shark Bay) is above average and Port Gregory, a new site, has shown good levels of settlement. The Abrolhos settlement is above the average of the 1970s and twice the average over the last 10 years. In the south, Warnbro Sound has had about 2.5 times the average settlement and record levels in the order of four times the average number of puerulus have been recorded at Lancelin and Alkimos. The exception is Cape Mentelle (near Margaret River) where although settlement was recorded for the first in four years, numbers still are expected to be about 25% below the long term average.

The Leeuwin Current appears to play a special role in transporting puerulus to settle at Cape Mentelle. Recent research suggests that only strong Leeuwin Currents will provide good puerulus settlements in the far southern sector of the fishery and poor settlement accompanies average or weak Leeuwin Currents. This relationship is supported by this year's average current strength and resultant below average settlement.

The very good puerulus settlement has resulted from strong winter storms and westerly winds and a return to normal oceanographic conditions following the cessation of the long running El Nino-Southern Oscillation (ENSO) events of the past four years. Settlement was strong along the coast during July to September with a second peak occurring in November.

Recruitment to the fishery from these very good settlements will appear first in catches in three years time (1998/99) where a small proportion (about 10%) of faster growing lobsters will be caught in the whites. Some will appear in the reds the same season and the remainder will comprise the whites catch in season 1999/2000.

IMPACTS OF THE MANAGEMENT PACKAGE

Rock lobster fishers have indicated that large numbers of breeding females are being seen throughout the fishery. These observations are supported by data from the research programme monitoring catches on board commercial rock lobster vessels This follows on from last season's upturn in the spawning stock indices. In addition the rock lobster stock appears to be moving towards a larger average size which indicates a greater survival of animals reaching breeding size. The apparent positive effect on the abundance of the breeding stock is a result of the effective management arrangements in place since the 1993/94 season.

The very good puerulus settlement in 1995/96 clearly is related to better environmental conditions. However, improved egg production should ensure adequate recruitment of puerulus in future years. Environmental conditions will determine the levels of puerulus settlement and hence future catches.

MARKETING*

General

After a relatively quiet start to the season in terms of price, buyers' scepticism about reduced catches is being replaced by the realisation that catches are lower and availability of product for the export market is diminished.

Japan

Japan had product in store at the commencement of the season and buyers were sceptical about the quantities of lobster expected to flow from the new season. However, buyers have realised that catches are down which has resulted in prices firming steadily over the course of the season.

Taiwan

Whilst the Taiwanese market commenced with very little product on hand, the same scepticism about the likely level of catches prevailed. The market also was concerned about the availability of product from Cuba. In a similar manner to the Japanese market, the tentative start has given way to firmer prices matching those in Japan particularly for small grades. Pre-Chinese New Year demand for lives has been good due to the absence of product from our competitors.

Hong Kong / China

Generally the market outlook in both areas is encouraging.

United States

The tail market in the USA commenced slowly but is now showing signs of recovery. The market is sending a note of caution that it can not accept unlimited supplies.

STOP PRESS - BIG BANK CATCHES POOR

While the figures still have to be collated, it is clear that the catches from the Big Bank region are the lowest for many years. The virtual absence of any migration may in part be due to the timing of the opening of the region for fishing, but is almost certainly attributable to low densities of legal size lobsters in the northern sectors due to previous well below average levels of puerulus settlement.

* This information was provided by the Western Rock Lobster Development Association (Inc.), Suite 6, 41 Walters Drive, Osborne Park WA 6017. Chairman Mr Tony Gibson ph: 244 2933 fax: 244 2934.

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Bulletin No 9 6 June 1996

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1995/96 SEASON

THE COASTAL FISHERY TO DATE

The 615 commercial vessels licenced to operate in the western rock lobster fishery landed 8,257 tonnes of lobster from November 15, 1995 to April 30, 1996. This is about 10% below the 9,155 tonnes caught over the same period during the 1994/95 season and 10.5% below the average (9,224t) caught over the previous ten years. Table 1 indicates that when compared to the same time last season, catches from the northern, central and southern regions of the coast were 2.7%, 0.4% and 24.2% lower respectively.

Table 1. Rock lobster production figures.

Production (kg) to end of April 1996

Fremantle	Jurien	Geraldton	Total
2 402 057	1 408 985	4 446 181	8 257 223

Production (kg) to end of April 1995

Fremantle	Jurien	Geraldton	Total
3 168 769	1 414 651	4 571 286	9 154 706

Difference (kg) and percentage difference

Fremantle	Jurien	Geraldton	Total
-766 712	-5 666	-125 105	-897 483
-24.2%	-0.4%	-2.7%	-9.8%

10 yr cumulative ave. (to end Apr 95) = 9 224 000kg
Production to end of April 1996 = 8 257 000kg
Difference = -967 000kg or -10.5%

The differences in regional catches can be directly attributed to the levels of puerulus settlement three to four years prior to this season, *ie* in 1991/92 and 1992/93, and the movement of the fleet. The combination of these two puerulus settlement periods led to much lower densities of lobsters in the southern sector with the central and northern parts of the fishery faring a little better. The consequence of this was a movement in March and April of boats from the southern part of C Zone to Green Head, Jurien and Cervantes and some to Lancelin. Hence the catches in the central and southern regions are influenced by increased landings in the northern part of C Zone and decreased catches in the southern sector.

The northern region catch is 125t below last year's figure at the same time principally as a result of the poor Big Bank catch (see later). Good catches in the first six weeks of the Abrolhos Islands' season are included in the northern catch figure (Table 1).

In general terms, since the "whites" run ended, the catches from the shallow waters of C Zone have been poor and fishing has been concentrated mainly in the middle grounds where landings were dominated by larger grades. A similar situation existed in the northern region of the fishery where, with the exception of February, the middle grounds have been more productive yielding B, C and D grade lobsters. The calm weather and lack of swell in March, April and May in both B and C Zones has had a negative impact on catches.

The continued presence of significant numbers of breeding females is a positive sign that the management package is having the desired effect of boosting the breeding stock. However, two to three more years of data are required before any trend may be positively identified and quantified.

THE BIG BANK SEASON

The total catch for the Big Bank region was 91 tonnes, down 72.4% on the previous season's catch of 330 tonnes. Compared to the 119 boats fishing in 1995, 15% fewer vessels (101) fished the region in 1996. Very small catches were taken in the deep water near the edge of the shelf, waters that normally provide the bulk of the catch, and so practically all of the catch was taken in the "shallow" areas of the region. Some fishers have put forward the hypothesis that the deep water migration took place earlier than usual, however, the available evidence suggests otherwise. Firstly, the abundance of migrating "white" lobsters was low, stemming from below average puerulus settlements three to four years ago. Secondly, the whole deep water area, from the Abrolhos Islands boundary to west of Shark Bay, was thoroughly searched by fishers and little or nothing was caught. These two facts tend to suggest that if the migration occurred this season it was comprised of small groups

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of lobsters moving separately, rather than the normal aggregation of "whites" that is targeted.

THE ABROLHOS ISLANDS SEASON

The Abrolhos Islands season has been very good and catches are estimated to be approximately 10% better than at the same time last year. A request by processors to reduce the weight of lobsters per basket together with the introduction of carting during the day has led to the catch being delivered from the Islands to the processors at Geraldton in excellent condition. Thus a greater proportion of the Islands' production is going to the live export market. The increase in the number of extremely large lobsters caught in the deep water, particularly at the Wallibi group and North Island, mainly during late March through to late April and even into early May, may be due to a change in their catchability resulting from environmental effects. However, the current management package plays a role in ensuring greater survival of the Abrolhos lobsters leading to higher numbers of larger animals (having grown) being caught each season.

PUERULUS SETTLEMENT

The 1995/96 puerulus settlement season has been remarkable. During 1995 and 1996, El Nino conditions dissipated allowing local conditions to return to normal heralding the arrival of a stronger Leeuwin Current. Coupled with strong winter storm events this led to favourable environmental conditions and very good settlement along virtually the entire coast (Figure 1).

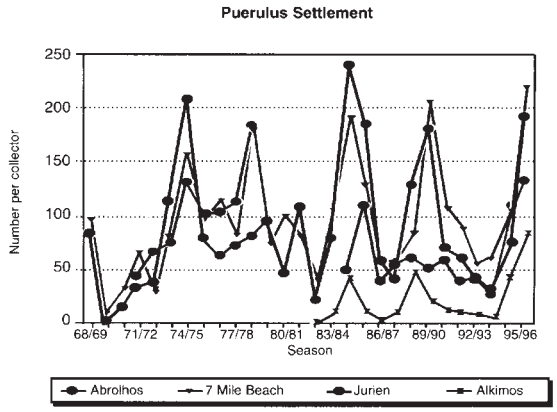

Figure 1

Record settlement was recorded at Seven-Mile Beach, Lancelin and Alkimos. The Abrolhos Islands and Warnbro received their second highest levels of settlement and Jurien recorded its third highest number of settling puerulus.

At the extremities of the fishery, above average settlement was recorded for South Passage (Shark Bay) while Cape Mentelle (near Margaret River) recorded average puerulus numbers after negligible settlement in the previous five years. At Port Gregory, a new site between Geraldton and Kalbarri, good levels of settlement have been recorded in the first full year of puerulus collection.

Recruitment to the fishery from these very good settlements will appear first in catches in three years time (1998/99).

MARKETING*

Live Lobster

The production of live lobster from Western Australia continues to expand with each month showing an increase in the amount produced and exported. Buyer resistance in the Japanese market is very real and whilst product continues to move slowly through the market, there appears to be very little prospect of improvement. On a positive note, the Taiwanese market peaked around Mothers Day and is still trading very strongly. In addition, demand from Hong Kong and China is encouraging.

Whole Boiled Lobster

Generally the Japanese market has shown strong interest for both Pink and Red whole boiled lobster. Some shipments to Japan have attracted higher prices than last season. Both Japan and Taiwan have very low inventories of whole boiled lobsters, with the vast majority of shipped product having been consumed. There are some indications that this market has peaked.

Lobster Tails

It is summer in the northern hemisphere and a strong demand for lobster tails exists in the United States market. Price levels are reasonable and demand is expected to continue in this the period of highest consumption. However, it is anticipated that Brazilian tails soon will enter the market at much lower asking prices which will dampen demand for Western Australian product.

General

The strengthening of the Australian dollar against the Yen and US dollar has proven to have had a negative impact on product prices realised in Australian dollars with approximately a 10% swing against Australian exports. Little can be done to off-set currency movements and we can only hope that the economic forecasters tipping a further strengthening of our dollar relative to other currencies are incorrect.

* This information was provided by the Western Rock Lobster Development Association (Inc.), Suite 6, 41 Walters Drive, Osborne Park WA 6017. Chairman Mr Tony Gibson ph: 244 2933 fax: 244 2934.

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Bulletin No 10 11 September 1996

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1995/96 SEASON

1995/96 SEASON SUMMARY

Preliminary estimates of catch and fishing effort for the 1995/96 season show that almost 10.5 million pot lifts from 615 licensed fishing vessels produced landings of 9 800 tonnes valued at approximately $225 million. While the effort increased marginally, this season's catch was down about 9% on the 1994/95 landings and 8.4% below the average catch of 10 700 tonnes over the previous 10 years. Landings in the Geraldton and Jurien regions were respectively 2.4% and 1.0% lower than in 1994/95 while the Fremantle region had a much poorer catch where landings were almost 23% below last season.

Table 1. Rock lobster production figures.

Production (t) for 1995/96 Season

Fremantle	Jurien	Geraldton	Total
2 821	1 615	5 351	9 787

Production (t) for 1994/95 Season

Fremantle	Jurien	Geraldton	Total
3 648	1 631	5 485	10 764

Difference (t) and percentage difference

Fremantle	Jurien	Geraldton	Total
-827	-16	-134	-977
-22.7%	-1.0%	-2.4%	-9.1%

10 year cumulative average = 10 688t
Production for 1995/96 = 9 787t
Difference = -901t or -8.4%

The small reduction in catch in the Jurien region and the substantial decline in landings in the Fremantle region in part reflect the considerable movement of vessels from the latter region up the coast during the season. Thus more catch was taken in the central coastal fishing grounds and less in the southern areas than would otherwise have been the case. Nonetheless catches in southern C Zone were poor. The season was typified by patchy catches particularly in deeper water indicating the lower lobster densities on the grounds.

While the south coastal and north coastal catches were low, a record 1 900 tonnes was landed at the Abrolhos, a 200 tonne increase on last season. Catches over 1 800 tonnes have been recorded only in the mid to late 1960s and again in 1987/88. It was of interest that the Big Bank region generated only 91 tonnes of product this season, much of this coming from the shallower waters of the region rather than the deep water run. This prompted many fishers to suggest the migratory run of lobsters from the Abrolhos to the Big Bank region did not occur this past February.

In general terms the catches are lower this year in response to the poorer puerulus settlement three and four years ago. The appearance of generally larger grades of lobsters also can be attributed in part to the lower settlement, extensive fishing in the middle grounds in all regions and to the effects of the management arrangements which are allowing lobsters to survive longer and thus grow larger.

IMPACT OF MANAGEMENT ON THE BREEDING STOCK

Widespread fishers reports of greater numbers of breeding females strongly suggest the management package is having its intended positive effect on the breeding stock.

This is supported by results from both the Independent Breeding Stock Survey (IBSS) and the spawning stock index based on the commercial monitoring data.

Data from the IBSS show a general, slight improvement in egg production in 1994/95 compared to the 1993/94 season. The results for 1995/96 show egg production stabilising at the higher level, except at the Abrolhos where egg production improved in 1995/96 after remaining constant since 1991/92.

The spawning stock index based upon the commercial monitoring data indicates substantial improvement in both 1994/95 and 1995/96. While the current evidence is strongly suggesting the spawning stock is rebuilding, other factors such as differences in environmental conditions affecting lobster catchability (*eg* temperature, swell) have not yet been taken into account in the analyses.

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In both indices, improvements at most sites in the coastal fishery have been seen only over a period of about two years. In order to establish a meaningful trend about five years of data will be needed. Nonetheless, the scientific evidence and the observations of fishers are generally supportive of the conclusion that the current management arrangements are achieving their objective of conserving the breeding stock and improving egg production.

PUERULUS SETTLEMENT

Very good environmental conditions including a stronger Leeuwin Current and strong winter storm events led to the excellent puerulus settlement along virtually the entire coast in 1995/96. Record or near record numbers of puerulus settled at many sites.

Highlights for 1995/96 saw average numbers of puerulus settling at Cape Mentelle (near Margaret River) after negligible settlement in the previous five years; record settlement at Alkimos in the southern sector of the fishery, following on from the good settlement in the previous year; and Abrolhos puerulus numbers continuing to improve with settlement twice the last ten year average and 30-40% above the average for the 1970s. In the north, at South Passage, Shark Bay, above average puerulus numbers continued to be recorded. For Jurien and Seven Mile Beach, sites in operation since the late 1960s, the combined puerulus figures indicated near record levels of settlement (Figure 1).

The exceptional puerulus settlement in the 1995/96 season will be reflected first in the catches in 1998/99. The early puerulus collections for this season (1996/97) indicate a continuation of good levels of settlement.

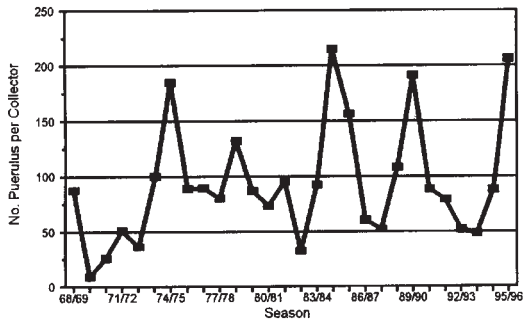

Figure 1. Average of Jurien & Seven-Mile Beach puerulus.

MARKETING*

1995/96 SEASON IN REVIEW

While the catch was down 9% on the previous season, WA's export of live lobsters was the highest on record. Exports of live lobster have increased considerably over the past few years so that now live lobster production almost equals whole boiled production (Table 2).

The major receivers of western rock lobster products were Taiwan taking 42% and Japan buying 40%. The Hong Kong/China and USA markets both took 9% each. Other minor markets bought just over 1% (*nb* these percentages are rounded figures).

Table 2. Weight of catch into production.

Product	Weight	Percentage
Whole Boiled	3 950t	40%
Live	3 750t	38%
Tails	1 060t	11%
Whole Raw	820t	8%
Local	207t	2%

A, B and C grade lobsters were important providing 98% of whole boiled, 70% of live lobsters and 43% of the tails.

Some of the highlights of season 1995/96 were the December production of boiled lobster which peaked at almost 1 200 tonnes while tail production in the same month dropped by over 250 tonnes on the previous season. Another record for live lobster production was set in April when 655 tonnes were produced.

It is interesting to reflect that Monaghan, in his 1989 report on the distribution and marketing of western rock lobster, estimated the relative catch share by country of destination in 1988/89 as USA-42%, Japan-41% and Taiwan-17%. Whole boiled lobster and frozen tails represented 49% and 40% of the catch respectively, whole raw almost 7% and live lobster just over 4%. In seven years the Taiwanese market has been developed at the expense of the USA market and live production has increased from 700 tonnes to 3 750 tonnes with obvious benefits to the value of production.

RLIAC COASTAL TOUR DATES

The 1996 Rock Lobster Industry Advisory Committee annual public seminar and management forums will be held during the week 23-27 September. All meetings will commence at 8.30 AM sharp. All fishers and interested members of the public are encouraged to attend.

DATE	LOCATION
23 SEPTEMBER	FREMANTLE (South Fremantle Football Club)
24 SEPTEMBER	LEDGE POINT (Ledge Point Country Club)
25 SEPTEMBER	JURIEN (Jurien Community Centre)
26 SEPTEMBER	DONGARA (Dongara Professional Fishermen's Association Hall)
27 SEPTEMBER	GERALDTON (Geraldton Entertainment Centre)

* This information was provided by the Western Rock Lobster Development Association (Inc.), Suite 6, 41 Walters Drive, Osborne Park WA 6017. Chairman Mr Tony Gibson ph: 244 2933 fax: 244 2934.

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Bulletin No 11 14 January 1997

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1996/97 SEASON

THE COASTAL FISHERY TO DATE

The 611 commercial vessels licensed to operate in the western rock lobster fishery landed 2 851 tonnes of lobster from 15 November to 31 December 1996. This is approximately 283 tonnes (9.0%) below the 3 134 tonnes landed over the same period during the 1995/96 season and 19.4% below the average caught over the previous 10 years (3 538 tonnes). Table 1 indicates that in comparison to the same time last season, catches from the northern, central and southern regions of the fishery were 0.03%, 21.5% and 12.5% lower respectively.

Table 1. Rock lobster production figures.

Production (kg) to end of December 1996

Fremantle	Jurien	Geraldton	Total
913 651	552 977	1 384 600	2 851 228

Production (kg) to end of December 1995

Fremantle	Jurien	Geraldton	Total
1 044 752	704 663	1 385 022	3 134 437

Difference (kg) and percentage difference

Fremantle	Jurien	Geraldton	Total
-131 101	-151 686	-422	-283 209
-12.5%	-21.5%	-0.03%	-9.0%

10 yr cumulative ave.(to end Dec 95) = 3 538 t
Production to end of December 1996 = 2 851 t
Difference = -687 t or -19.4%

During November the fleet was confined almost entirely to the nearshore grounds (0-10fm) and catches with some exceptions, were generally patchy. "Whites" were present in the catches from the very start of the season.

Catches in the shallows picked up quite dramatically during the last few days of November and the first few days of December, then fell away again. The exception to a rather "lack lustre" November, were the areas of Cervantes, Greenhead and Leeman where good catches were taken consistently. By the second week of December much of the fleet had moved into the middle grounds (20-30fm) with some boats even deeper. Generally, catches from the middle grounds were not consistent. The deep-water run of "whites", with the exception of isolated good catches, was poor reflecting the low densities of migratory animals predicted from the 1992/93 puerulus settlement. The majority of the fleet started to return to the middle and shallow grounds from about the last week in December.

Fishers again have reported exceptionally high numbers of breeding animals present in the middle grounds. Their presence continues to provide evidence that the current management package is meeting the objective of rebuilding the breeding stock.

PREDICTION FOR THE 1996/97 SEASON

The catch for the 1996/97 season is predicted to be about 9 600 tonnes which is below average and slightly below last year's catch of 9 800 tonnes. The catches in all zones are expected to be similar to those in 1995/96. This prediction is based upon the puerulus settlements 3 and 4 years previously which were below average throughout the fishery

Catches will improve in the next 3 or 4 years as a result of improved puerulus settlement. Evidence of this is the many small undersized reds already being seen in the shallows along the coast. The 1997/98 catch is anticipated to be close to the long term average catch with about 10 000 to 10 500 tonnes predicted. The following season, 1998/99, catches are predicted to be very good as a result of the exceptional puerulus settlement in 1995/96 (Fig. 1). Above average catches are expected to continue into 1999/2000.

PUERULUS SETTLEMENT

The 1996/97 puerulus season is well underway and so far settlement has been above average in the north, excellent in the central part of the fishery but falling away south of Fremantle. South Passage in Shark Bay and Seven Mile Beach near Dongara are showing levels of settlement that are slightly above average. The Abrolhos has seen lower numbers of puerulus than in the past couple of years, however, the settlement in this area occurs later than on the coast and numbers could still improve. The centre of the fishery from Jurien to

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Alkimos near Two Rocks has had settlement from two to four times the average, carrying on the excellent recruitment seen in past two years (Fig. 1). South of Fremantle, at Warnbro, settlement is above average but at Cape Mentelle near Margaret River puerulus numbers are well below average. The Leeuwin Current, and its associated eddies, flowing down the coast has an impact on the level and distribution of puerulus settlement, with a strong Leeuwin Current being evident in 1996/97.

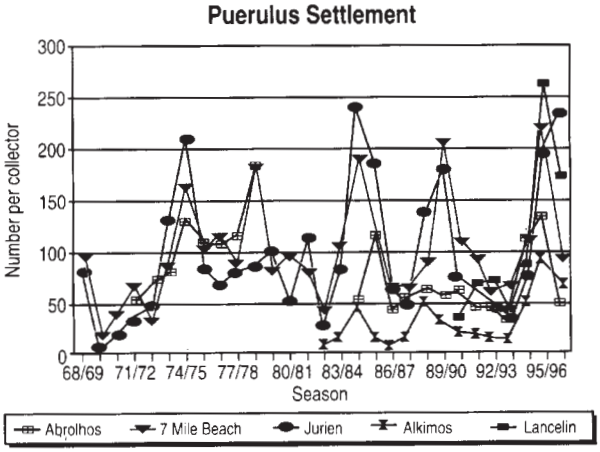

Figure 1. Trends in puerulus settlement at selected coastal sites and the Abrolhos Islands. (Note the figures for 1996/97 are the puerulus settlement to date and will increase.)

1996 INDEPENDENT BREEDING STOCK SURVEY

The Independent Breeding Stock Survey again was conducted during October 1996 at Fremantle, Lancelin, Jurien, Dongara, Kalbarri and the Abrolhos Islands. Preliminary analysis of the 1996 results has shown that the trend of improving egg production has continued. This is confirmation that the current management package is performing well in it's goal of rebuilding the breeding stock from its previously very low levels.

"WHITE" ROCK LOBSTER TAGGING 1996

A request by industry to investigate the movement of undersize "white" western rock lobsters was received from the Fremantle Professional Fishermen's Association. After considering this request in light of other priorities and management objectives, the Rock Lobster Research Unit undertook a tagging programme specifically targeting undersize "white" rock lobsters. This was conducted from commercial vessels in late November to mid December around the Fremantle and Two Rocks regions. A similar request was put to the Minister for Fisheries at a meeting with Kalbarri fishers. This request focussed on the migration of whites from the Geraldton/Horrocks region of the coast, an area directly east of the Abrolhos Islands and one in which tagging has not been carried out before. Approximately 2000 animals were tagged in the Fremantle region and 4000 in the Geraldton area.

THANKS

The Rock Lobster Research Unit would like to extend their thanks to those skippers and crews who assisted in the Independent Breeding Stock Survey and "white" rock lobster tagging programmes.

MARKETING*

OVERVIEW

Marketing this season will be very difficult as the prices being sought are the highest on record and the competition from other lobster producing nations is the most intense yet encountered.

The new season opened up with what could best be described as cautious optimism. Japan held a reasonable stock of unsold "red" lobsters from last season and this, combined with an early appearance of lobsters from competing nations, caused a little concern for WA exporters.

LIVE LOBSTER

Whilst the live market opened up on a high note the movement in the exchange rate meant that the prices achieved made the product very expensive. The competition from Canada and South Africa offering product at much lower prices has had some impact by lowering prices achieved by Western Australian producers. At this time demand is still high from Japan and Taiwan, however, this was not the case earlier in the season for both China and Hong Kong which only recently have begun buying in earnest.

WHOLE COOKED AND FROZEN RAW

Buyer resistance was evident from the start of the season particularly in Japan. Demand for "pink" whole cooked was moderate, but as the season has progressed and the catch levels have not improved, demand has increased for whole cooked and frozen raw. The Taiwanese market saw early high demand which has steadied recently. There is very strong competition from Cuba and USA providing lobsters at up to 50% less than the asking price for Australian product.

FROZEN TAILS

The USA market was devoid of any Australian lobster tails and so the market opened firmly. Demand has levelled and as Australian product starts to arrive in America, prices will fall away. Hopefully we will not see a dramatic drop in price, however, it is a 'wait and see' situation.

* This information was provided by the Western Rock Lobster Development Association (Inc.), Suite 6, 41 Walters Drive, Osborne Park WA 6017. Chairman Mr Tony Gibson ph: 244 2933 fax: 244 2934.

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Bulletin No 12 24 April 1997

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1996/97 SEASON

PRODUCTION FIGURES

THE COASTAL FISHERY TO DATE

The 611 commercial vessels licensed to operate in the Western Rock Lobster Fishery landed 6 538 tonnes of lobster from 15 November 1996 to 31 March 1997. This is approximately 211 tonnes (3.1%) below the 6 749 tonnes landed over the same period during the 1995/96 season and 15.0% below the average caught over the previous ten years (7689 tonnes). Table 1 indicates that in comparison to the same time last season, catches from the northern, central and southern regions of the fishery were 0.5%, 13.4% and 1.1% lower respectively.

Table 1. Rock lobster production figures.

Production (t) to end of March 1997

Fremantle	Jurien	Geraldton	Total
2 102	1 088	3 348	6 538

Production (t) to end of March 1996

Fremantle	Jurien	Geraldton	Total
2 126	1 257	3 366	6 749

Difference (t) and percentage difference

Fremantle	Jurien	Geraldton	Total
-24	-169	-18	-211
-1.1%	-13.4%	-0.5%	-3.1%

10 yr. cumulative ave. to end of March 1996	= 7 689 t
Production to end of March 1997	= 6 538 t
Difference	= 1 151 t
% Difference	= - 15.0%

Following a somewhat lacklustre deep water "whites" run, by mid January there were very few boats remaining in deep water. From January through to the early part of April , the fleet essentially targeted the mid-water grounds, with some boats fishing even deeper, together with opportunistic fishing in shallow waters. Lower densities of sized animals in the shallows, resulting from poor puerulus settlement in previous years, contributed largely to the high fishing pressure on the mid-water grounds.

The catch of large animals from the middle grounds was high, with fishermen again reporting very large numbers of setose and oversize females, together with undersize in the shallows.

During the early part of April, catches declined, most likely as a result of a spell of calm weather and sea conditions. The total catch for January was approximately 11% up on the previous January, whereas the total catches for February and March were almost identical to February and March catches in 1996.

THE ABROLHOS ISLANDS SEASON

Carrier boat landings (baskets) from the Islands to date (11 April), were down approximately 12% on the same period for 1995/96 However, more fishermen are carting their own catches back to the mainland this season and hence this may overstate the reduction in catch. Preliminary processors production figures indicate that the catch is more likely to be in the order of 3 - 4% down on last season's record catch of 1886 tonnes.

BIG BANK FISHERY

The Big Bank season opened on February 10 with 64 boats nominating to fish the area compared to last year's total of 101. Catches in deep water were extremely patchy and were spread throughout the area to as far north as Shark Bay. The low catches of migrating lobsters is most certainly the result of low densities of "whites" resulting from poor puerulus settlement in previous years.

The total catch of 73 tonnes was about 20% below last season's landings from the region of 91 tonnes (Figure 1). The average catch per boat of 1.1 tonnes was slightly higher than last season's 0.9 tonnes per boat (Figure 1).

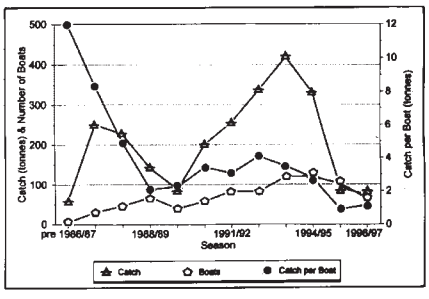

Figure 1. Big Bank Catch and Fishing Effort

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CATCH PREDICTIONS

The catch for the 1996/97 season should be close to that predicted of 9600 tonnes, which is below average and slightly below last year's catch of 9800 tonnes.

Catches will improve in the next 3 or 4 years as a result of improved puerulus settlement. Evidence of this is the many small undersized reds already being seen in the shallows along the coast. The 1997/98 catch is anticipated to be close to the long term average catch of 10500 tonnes. The following season, 1998/99, catches are predicted to be very good as a result of the exceptional puerulus settlement in 1995/96 (Fig 2). Above average catches are expected to continue into 2000/2001. These predictions are based upon the puerulus settlements 3 and 4 years previously.

ROCK LOBSTER TAGGING 1996

A total of approximately 22,000 rock lobsters were tagged during the Independent Breeding Stock Survey together with undersize "whites" during December.

To date fishermen (including recreational fishers) have returned information on 1800 tagged rock lobsters, or in percentage terms approximately 8%. Researchers at the Waterman's Laboratories would like to thank all those fishermen who have forwarded data on tagged lobsters and to inform them that rewards in the form of "scratch and match" tickets will be in the mail shortly. Some rewards have already been forwarded. Payments for whole tagged rock lobsters returned will also be forwarded in the near future.

PUERULUS SETTLEMENT

With the exception of Cape Mentelle near Margaret River there have been good levels of settlement recorded at all sites so far during the 1996/97 settlement period. In the northern region of the fishery settlement has been above average, excellent in the central area but declining south of Fremantle, whilst South Passage in Shark Bay is showing levels above average.

At the Abrolhos, settlement returned to average levels after an initial period of low settlement.
Settlement at Seven Mile Beach (near Dongara) remained at average levels, whilst Jurien, Alkimos (near Two Rocks) and Warnbro Sound settlement is above average. For the Jurien and Seven Mile Beach sites which have been in operation since the late 1960s, the combined puerulus index figure is near the record level recorded last year (Figure 2).These good levels of settlement in 1996/97 will first be seen in the commercial catch in the 1999/2000 season.

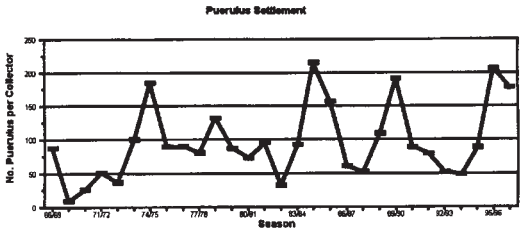

Figure 2. Average of Jurien & Seven-Mile Beach puerulus settlement. Figure for 96/97 is preliminary.

MARKETING

MARKETING OVERVIEW

It is still very difficult in all markets as record prices have been achieved even with good supplies available from competing nations. Japan in particular, has started to move away from our lobster with preference for cheaper alternatives.

LIVE LOBSTER

Japan has kept up with good demand at the highest prices achieved. There is a concern that for a bigger volume to be sold the price must drop considerably. Taiwan has been moderate all season with fewer than expected peaks, although once again prices have been higher than last year. Hong Kong and China have yet to "fire up" this season. Hopefully, the last months of the season will see this market improve significantly.

WHOLE COOKED AND RAW

There has been significant buyer resistance in Japan for "A" size red lobster. Importers have taken the view that the price is far too high and they are currently not buying until their decided price level is achieved. Buyers who bought at early season high levels are now looking for a significant reduction to "average" the cost of thin stock. Taiwan demand has been good as supply has been short. They too have changed their emphasis to cheaper competitors products, but as yet, we have not felt the full impact of this.

TAILS

As supply has been short once again, prices have moved to a very high level. As with previous years when the bulk of the cargo arrives we will see the impact on the price. Many shippers have air freighted tails to ensure that the current price levels are achieved fearing a collapse later.

CURRENCY

The currency factor is causing a great deal of concern. The US$/Yen has moved from 110Y to 127Y during this current season, which has caused the Japanese buyers costs to skyrocket, with our own returns actually decreasing because of the movement in the US$/A$. Should the US$ price appreciate further against the A$ or the Yen, then new significantly lower price levels will be attained by Australian exporters.

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Bulletin No 13 29 July 1997

Commercial Fisheries Production Bulletin

WESTERN ROCK LOBSTER FISHERY

1996/97 SEASON

COASTAL FISHERY TO END OF SEASON

The 611 commercial vessels licensed to operate in the Western Rock Lobster Fishery produced landings of 9 901 tonnes of lobster from 15 November 1996 to 30 June 1997. This is approximately 114 tonnes (1.2%) above the 9 787 tonnes landed during the 1995/96 season and 8.7% below the average caught over the previous ten years (10 850 tonnes). Table 1 indicates that in comparison to last season, catches from the northern, central and southern regions of the fishery were 0.1% up, 9.2% down and 9.2% up respectively.

Table 1. Rock lobster production figures.

Production (t) for 1996/97 Season

Fremantle	Jurien	Geraldton	Total
3 081	1 466	5 354	9 901

Production (t) for 1995/96 Season

Fremantle	Jurien	Geraldton	Total
2 821	1 615	5 351	9 787

Difference (t) and percentage difference

Fremantle	Jurien	Geraldton	Total
260+	149-	3+	114+
9.2% up	9.2% down	0.1% up	1.2% up

10 yr. cumulative ave. to end of June 1996	= 10 850 t
Production to end of June 1997	= 9 901 t
Difference	= *- 949 t*
% Difference	= *- 8.7%*

During the latter part of April and into early May the majority of the fleet was situated in the mid-water grounds. In May, some of the fleet remained in the mid-water grounds, whilst most of the fleet moved back into the shallows and remained in the near-shore grounds until the end of the season. The good catches from the mid-water grounds were partly the result of large numbers of female rock lobsters moulting into a non-setose state.

Individual monthly catches for April, May and June were up on the same months in the previous season. The monthly differences(%) in catch by the three regional centres were as follows:

	Fremantle	Jurien	Geraldton	Total
April	55.5% up	10.4% up	6.1% down	6.8% up
May	43.0% up	8.3% up	12.1% up	19.6% up
June	16.1% up	3.9% down	5.3% up	7.1% up

THE ABROLHOS ISLANDS SEASON.

The final carrier boat landings (number of baskets) indicate an 11.2% reduction on last seasons landings, however, as more vessels are now carting their own catches back from the Islands, this figure may not reflect the actual landings. Preliminary processors production figures suggest that the Islands catch was approximately 1750 tonnes, approximately 8% down on last season record catch of nearly 1900 tonnes.

CATCH PREDICTIONS

The catch for the 1996/97 season of approximately 9 900 tonnes was slightly above the 9 600 tonnes predicted, but was below the 10 year average catch of 10 850 tonnes. This below average catch was the direct result of low puerulus settlement three and four years previously.

The 1997/98 season catch is anticipated to be close to the long term average catch of 10 850 tonnes. Whilst the 1998/99 season is predicted to be very good as a result of exceptional puerulus settlement in 1995/96 (Fig 1), above average catches are expected to continue into 2000/2001. These predictions are based upon the puerulus settlements three and four years previously.

PUERULUS SETTLEMENT

With the exception of Cape Mentelle near Margaret River there have been good levels of settlement recorded at all sites during the 1996/97 settlement period (Fig 1). In the northern region of the fishery settlement has been above average, excellent in the central area but declining south of Fremantle, whilst South Passage in Shark Bay is showing levels above average. At the Abrolhos, settlement returned to average levels after an initial period of low settlement.

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Settlement at Seven Mile Beach (near Dongara) remained at average levels, whilst Jurien, Lancelin, Alkimos (near Two Rocks) and Warnbro Sound settlement is above average.

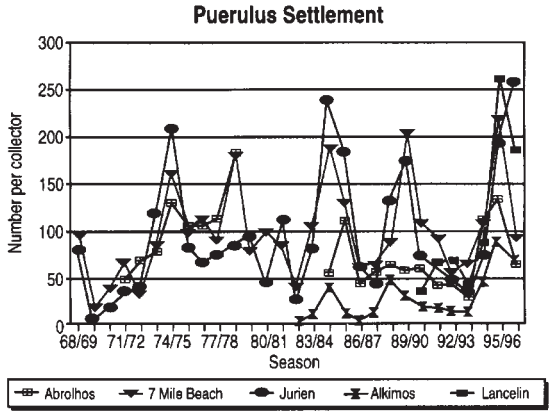

Figure 1. Trends in puerulus settlement at selected coastal sites and the Abrolhos Islands.

ROCK LOBSTER TAGGING 1996

To date a total of 3368(16%) tagged rock lobsters have been returned by both commercial and recreational fishers out of a total of 22,000 tagged rock lobsters originally released prior to and during the past season.

Researchers at the Waterman's Laboratories would again like to thank all those fishers who either returned tagged rock lobsters and/or recapture information. Final reward payments, together with a personal summary showing tagging details will be forwarded in the near future.

MARKETING*

At the end of June Taiwan again emerged as the single largest market for lobster exports. The breakdown of exports for the season was as follows:

Taiwan	42%
Japan	37%
USA	10%
Hong Kong/China	10%
Other	1%

Whole Cooked Lobster - Whilst the outlook for "cooked" was reflected in the early part of the season with good prices being achieved, demand weakened considerably in the latter part to a lower than expected level. Even with some discounting which was warranted to move product, inventories were high at the seasons end both in Japan and in cold storage in Australia.

The Taiwanese market remained consistent, however, with the bulk of the catch being small sized product the level of sales was not as large as anticipated. The outlook for the 1997/98 season is certainly not as optimistic as it was at the start of the season just concluded.

Live Lobster - The demand for "lives" in Japan was poor, however, price was maintained for the duration of the season. In Taiwan demand was steady, however, price levels did not improve as was predicted.

The China/Hong Kong market increased significantly once competition from South Australia ceased with demand exceeding supply.

Tails - As reported in the last review prices achieved were "good" with contrary to expectations, larger sized tails achieving a premium.

Currency - A fairly significant appreciation in the Japanese Yen assisted in the latter part of the season as did the US$ position. This was however, partially offset in the nett position of sales levels achieved.

Market development - As always small trial shipments were exported to a number of "new" markets, however, the European import duties still preclude any volume of product entering the EC. It will be a number of years before W.A. exporters can compete on a level playing field with other producers of lobsters who are not burdened with the heavy import duty we face. The Asian region was again the recipient of small shipments to new buyers.

Outlook for 1997/98 season - There is a great deal of uncertainty in the marketplace with higher than normal production expected not only for next season but for the next few seasons. A cautious approach will be needed to ensure maximum return with absolutely no room for adventurous or innovative ideas which have not been proven to be effective. It can only be hoped that Australia does not suffer any major adverse currency movements in the season ahead.

RESEARCH LOG BOOK PROGRAM

A record number (37%) of skippers/deckies completed and forwarded research records to the Laboratories at Waterman. Once again the rock lobster research team would like to pass on sincere thanks to all those fishermen who participated and urge those who are not part of the team to join next season.

RLIAC COASTAL TOUR DATES

The 1997 Rock Lobster Industry Advisory Committee annual public seminar and management forums will be held during the week 22-27 September. Meetings will commence at 8.30 AM sharp and all fishers and interested members of the public are encouraged to attend.

DATE	LOCATION
22 SEPTEMBER	DONGARA (Dongara Professional Fishermen's Association Hall)
23 SEPTEMBER	GERALDTON (Geraldton Entertainment Centre)
24 SEPTEMBER	JURIEN (Jurien Community Centre) Venue to be confirmed
25 SEPTEMBER	LEDGE POINT(Ledge Point Country Club)
26 SEPTEMBER	FREMANTLE (South Fremantle Football Club) - Venue to be confirmed

*This information was provided by the Western Rock Lobster Development Association (Inc), Suite 6, 41 Walters Drive, Osborne Park WA 6017. Chairman Tony Gibson pH: 244 2933 fax: 244 2934.

Except where acknowledged, the information in this bulletin has been supplied by the FISHERIES RESEARCH DIVISION of the WA DEPARTMENT OF FISHERIES. Contact Mr Eric Barker or Mr Mark Rossbach pH: (09) 246 8444 fax: (09) 447 3062.