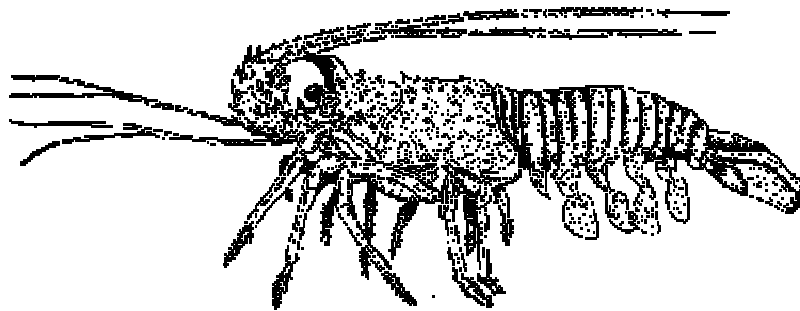

Fisheries management paper

Western Rock Lobster Management - Options and Issues



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on behalf of the Rock Lobster Industry Advisory Committee

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EXECUTIVE SUMMARY

Following the Rock Lobster Industry Advisory Committee (RLIAC) meeting of the 3 March 1998 the Minister has advised that his position is that there will be no management changes for the 1998/99 season. This is in line with the Minister's previous commitment to licence holders that he would announce forthcoming seasonal management arrangements well in advance unless exceptional circumstances prevailed. Some sectors of the industry are nonetheless concerned about the impact two seasons of unprecedented high catches will have on the industry and have identified the lack of information as a difficulty in fully considering management options.

Accordingly, the purpose of this paper is primarily to provide information explaining management options and issues for consideration of the long term management of the fishery. The RLIAC acknowledges that some of the options included in the paper have been presented previously, in particularly off-season fishing proposals, and have not received a lot of support. However, for the sake of completeness, these options are included in this paper.

The options presented in this paper are primarily aimed at achieving the following objectives:

- ***to make available supplies of live lobsters for the longest period practicable; and/or***
- ***to smooth the catch within, and between, years.***

The outlook for the 1998/99 season is for significantly increased production but a down turn in demand and price is expected particularly in Taiwan and Japan. The immediate prospect is for a fall in prices in an attempt to boost demand for the increase in production from key business and private catering sectors

In 1992/93, the western rock lobster fishery was at a critical point, with declining breeding stock levels and forecasts of low recruitment for the years 1994/95 to 1996/97. The management plan introduced in 1993/94 reversed the trend in breeding stock levels and by 1996/97 had reduced exploitation to a safe level.

Concurrent with the improvement in the breeding stock, the fishery has experienced improved puerulus settlement for a number of years, mainly due to environmental conditions. This situation should generate well above average catches in 1998/99 and 1999/2000.

Since early 1997 the RLIAC has been considering its advice in relation to what changes, if any, should be made to the existing management arrangements to make the most of the forecast high catch years. This paper draws together the information that is relevant to RLIAC deliberations and provides a number of options for discussion.

The paper is divided into three main sections which detail options that have been identified as having the potential to increase the catch value over the next three years. In the first section, an option for enhancing the catch value by transferring lobsters to the off-season is provided.

In the second section, options for enhancing the catch value by transferring lobsters within and between seasons are provided. In the third section, options for enhancing the catch value by taking oversize female lobsters are provided.

The main points of discussion from each of these sections are briefly outlined below.

To make available supplies of live lobsters for the longest period practicable

In the past, 'live' lobsters sold in overseas markets have generally attracted a higher price than other lobster products, with the price being reported as highest in the off season. Consequently, there may be potential to increase the catch value by extending the supply period of live lobster. The two principle methods of supplying live lobster in the off-season are:

1. storing lobsters in live holding facilities during the season for sale in the off-season (as occurs now in a limited way); and
2. fishing in the off-season.

Although holding lobsters alive for long periods of time is technically feasible, the costs are prohibitive (see Section 3.1.1) and therefore this method is not likely to be economically viable at this stage.

Fishing the off-season is discussed as a means of extending the period live lobsters can be supplied to markets and gathering information to assist long-term decision making. Various increases in gauge sizes during the season are proposed as methods of delaying the capture of lobsters within the season to make additional lobsters available for capture in the off season.

It should be noted that it is doubtful that off-season fishing can be supported as a means of increasing the economic benefits to the fishery if it is associated with increased fishing and management costs.

To smooth the catch within and between years

Transferring catches between fishing seasons has been identified as desirable because it has the potential to increase the overall catch value. A more 'even' catch is likely to mean average incomes for fishermen could be relatively stable or perhaps increase.

A proposal to delay harvesting 1000 tonnes of the 1998/99 season and 2000 tonnes of the 1999/2000 predicted catches is provided for consideration as a management strategy that could be used to smooth the catch over a three year period. An alternative option for consideration is to only transfer catch from the 1999/2000 season to the predicted average 2000/2001 season. However, it must be realised that at this stage the exact quantity to transfer from year to year is a matter of judgement.

The management strategy proposed to allow the transfer of animals from one season to another is to increase the gauge size thereby protecting some of the smaller animals in the population from exploitation. Although there are other management strategies that could be used to achieve a similar outcome, such as changing pot usage throughout the season these strategies have not been fully developed. Increasing the gauge size has the added benefit that it would eventually lead to a greater average size of the rock lobster population - which could be beneficial *because*

larger lobsters currently attract a higher price. Potential management options for delaying the capture of lobsters using both the same gauge size and different gauge sizes for males and females have been suggested.

It should be noted that the shortcoming in discussing these options is that the frame work is not yet available for estimating the dollar values of different options, and/or for giving a clear understanding of the volume of 'whites' or particular lobster sizes that have to be shifted elsewhere to optimise the value of the catch. The Value Optimisation Model being developed by Fisheries WA's Research Division should provide some of this information, but will not be available until about February 1999. In the meantime, RLIAC as a starting point for discussion has suggested transferring about 1000 tonnes for 1998/99 as this is likely to be an achievable target.

Taking oversize females

The taking of large setose females has been identified as a method of increasing the catch value, albeit one that would probably not have a large impact because there is only a small quantity of animals that would become available to capture. The biological advice is that while target breeding stocks are being maintained, these animals could be taken without adversely affecting egg production.

The RLIAC Market Research Advisory Subcommittee has identified that the best times of the year to market additional large lobsters is two weeks before the Chinese New Year (between 21 January and 19 February) and during the months of May and June. An alternative option would be to take all oversize non-setose females thereby increasing the supply of large lobsters over the period March April and May.

Summary

In summary, the predicted high catch years represent a significant challenge for industry to work towards developing a management package that will ensure that the best use is made of the opportunity this presents. The options provided in this paper are aimed at facilitating ongoing discussions on the development of the long term management package.

Following this executive summary each of the management options are listed under the relevant management objectives. An outline of the timetable for consultation follows, which for managed fishery licences includes the opportunity to complete a survey form provide with this paper.

MANAGEMENT OPTIONS

The options discussed in this document are all variations on the 1997/98 management arrangements. However, clearly one option is to maintain the 1997/98 management arrangements for 1998/99, ie. no change.

NO CHANGE OPTION - 1998/99

Purpose

Maintain the 1997/98 management arrangements.

Option 1 - no change option - 1998/99
--

All 1997/98 management rules to be maintained for the 1998/99 season.
--

MAKE AVAILABLE SUPPLIES OF LIVE LOBSTERS FOR THE LONGEST PERIOD PRACTICABLE

Purpose

- To make available about 1000 tonnes of the 1998/99 catch for fishing in the period July to August 1999.
- Facilitate the collection of fishery data for longer term consideration of off-season fishing.

Option 2a - Catch transfer within and between seasons, no split gauge

a) Gauge size for 1998/99 season of:

Zone A & B 77 mm

Zone C 78 mm

b) Lower gauge size to 76 mm in the two month off-season period.

c) All other rules to stay the same.

d) Any fisherman can choose to fish in the off-season.

e) Those vessels fishing in the off-season must not start fishing in the following 'whites' until such time as those vessels fishing the 'whites' have caught on average per-pot per-zone the same as those vessels fishing the off-season.

f) Off-season fishing to only occur in Zones B and C.

g) Fishing to occur over a two month period in the off-season

MAKE AVAILABLE SUPPLIES OF LIVE LOBSTERS FOR THE LONGEST PERIOD PRACTICABLE

Purpose

- To make available about 1000 tonnes of the 1998/99 catch for fishing in the period July to August 1999.
- Facilitate the collection of fishery data for longer term consideration of off-season fishing.

Option 2b - Catch transfer within and between seasons, split gauge

a) Gauge sizes for the 1998/99 season of:

Females:	Zone A & B	78 mm	all season
	Zone C	79 mm	all season
Males:	Zone A	76 mm	all season
	Zone B	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.
	Zone C	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.

- b) Lower gauge size to 76 mm in the two month off-season period.**
- c) All other rules to stay the same.**
- d) Any fisherman can choose to fish in the off-season.**
- e) Those vessels fishing in the off-season must not start fishing in the following 'whites' until such time as those vessels fishing the 'whites' have caught on average per-pot per-zone the same as those vessels fishing the off-season.**
- f) Off-season fishing to only occur in Zones B and C.**
- g) Fishing to occur over a two month period during the off-season.**

MAKE AVAILABLE SUPPLIES OF LIVE LOBSTERS FOR THE LONGEST PERIOD PRACTICABLE

Purpose

- To collect fishery data during July and August 1999 for longer term consideration of off-season fishing.

Option 3 - Short term, no split gauge

- a) All rules to stay the same as in the 1997/98 season.**
- b) Any fisherman can choose to fish the two month off-season period.**
- c) Those vessels fishing in the off-season must not start fishing in the following 'whites' until such time as those vessels fishing the 'whites' have caught on average per-pot per-zone the same as those vessels fishing the off-season.**
- d) Off-season fishing to only occur in Zones B and C.**
- e) Fishing to occur over a two month period during the off-season**

SMOOTH THE CATCH WITHIN AND BETWEEN YEARS

Purpose

- Reduce the 1998/99 catch by about 1000 tonnes.
- Reduce the 1999/2000 catch by about 2000 tonnes.
- Increase the average size of lobsters for the Hong Kong/China market.

Option 4a: Reduce 1998/99 and 1999/2000 catches, no split gauge

1998/99

Gauge sizes: Zones A & B 77 mm - all season
Zone C 78 mm - all season

- **No off-season fishing**

1999/2000

Gauge sizes: Zones A & B 78 mm - all season
Zone C 79 mm - all season

- **No off-season fishing**

2000/2001

Gauge sizes to be reviewed with the prospect of lower gauge sizes

SMOOTH THE CATCH WITHIN AND BETWEEN YEARS

Purpose

- Reduce the 1998/99 catch by about 1000 tonnes.
- Reduce the 1999/2000 catch by about 2000 tonnes.
- Increase the average size of lobsters for the Hong Kong/China market.

Option 4b: Reduce 1998/99 and 1999/2000 catches, split gauge

1998/99

Gauge sizes for 1998/99 season of:

Females:	Zone A & B	78 mm	all season
	Zone C	79 mm	all season
Males:	Zone A	76 mm	all season
	Zone B	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.
	Zone C	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.

- **No off season fishing**

1999/2000

Gauge sizes for 1999/2000 season of:

Females:	Zone A & B	79 mm	all season
	Zone C	80 mm	all season
Males:	Zone A	76 mm	all season
	Zone B	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.
	Zone C	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.

- **No off-season fishing**

2000/2001

Gauge sizes to be reviewed with the prospect of lower gauge sizes

SMOOTH THE CATCH WITHIN AND BETWEEN YEARS

Purpose

- Reduce the 1999/2000 catch by about 1000 tonnes

Option 5a: Reduce the 1999/2000 catch, no split gauge

1997/98

No change to 1996/97 gauge sizes

- **No off-season fishing**

1999/2000

Gauge sizes: Zones A & B	77 mm - all season
Zone C	78 mm - all season

- **No off-season fishing**

2000/2001

Gauge sizes to be reviewed with the prospect of lower gauge sizes

SMOOTH THE CATCH WITHIN AND BETWEEN YEARS

Purpose

- Reduce the 1999/2000 catch by about 1000 tonnes

Option 5b: Reduce the 1999/2000 catch, split gauge

1997/98

No change to the 1996/97 gauge sizes

- **No off-season fishing**

1999/2000

Gauge sizes for 1999/2000 season of:

Females:	Zone A & B	78 mm	all season
	Zone C	79 mm	all season
Males:	Zone A	76 mm	all season
	Zone B	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.
	Zone C	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.

- **No off-season fishing**

2000/2001

Gauge sizes to be reviewed with the prospect of lower gauge sizes

TAKING OVERSIZE LARGE FEMALES

Purpose

- Permit the selective harvesting of large female lobsters.

Option 6

- a) **Remove the protection of all females (no setose protection) greater than 115 mm in Zone C two weeks before the Chinese New Year and for the months of May and June.**
- b) **Remove the protection of all females (no setose protection) greater than 105 mm in Zones A and B two weeks before the Chinese New Year and for the months of May and June.**

Purpose

1. Permit the supply of additional animals to overseas markets in March, April and May.

Option 7

- a) **Remove the protection of all non-setose oversize animals all season.**

PROPOSED CONSULTATION

The steps RLIAC proposes to undertake to ensure industry has the opportunity to be involved in discussions on these management options are:

- | | | |
|-----------|---|--------------------------------|
| 1. | Options and Issues document is released to industry | Early June |
| 2. | Individual associations and processors meet to discuss the options and issues document | Early June to late July |
| 3. | Mini Coastal Tour | 1 July to 3 July |
| 4. | Joint meeting between processors, Association representatives and RLIAC | 24 July |
| 5. | RLIAC meeting | 24 July |
| 6. | Advice provided to Minister | Early August |

1. The release of the document follows the RLIAC meeting of 13 May;
2. About six weeks is allowed for individual associations and processors to organise meetings of their members to discuss the options;
3. A mini coastal tour will take place in the first week of July;
- 4/5. A joint meeting where the 'whole of industry' position can be discussed with RLIAC members will take place prior to the RLIAC meeting on 24 July; and
6. As soon as possible following the RLIAC meeting of 24 July the Minister will be provided RLIAC's advice for the 1998/99 season.

Venues and dates for the Mini Coastal Tour

Date	Location	Venue
Wednesday 1 July	Geraldton	Geraldton Entertainment Centre Urch Street Geraldton
Thursday 2 July	Jurien Bay	Jurien Community Centre Bashford Street Jurien
Friday 3 July	Perth	Convention Centre Underwater World

All meetings to run from 1.00 pm to 5.30 pm

The RLIAC Chairman Mr John Paterson will chair each of the meetings. The intent of the meetings will be to give associations and individuals the opportunity to put forward their points of view to RLIAC members on the management options and issues presented in this management paper.

Format of the meetings

- 1) Opening address by the Chairman
- 2) Presentation of biological information
- 3) Question time on biological information
- 4) Presentation of market information
- 5) Question time on market information
- 6) Explanation of options by RLIAC member
- 7) Associations submissions
- 8) Open forum

1.0 INTRODUCTION

The preparation of the document is primarily in response to the industry request for more information regarding management options of the rock lobster fishery.

At a joint meeting between the WAFIC Rock Lobster subcommittee, Western Rock Lobster Development Association (WRLDA) representatives and RLIAC members on 3 March 1998, association delegates indicated that the existing proposals were not well understood and/or there was not enough information about them. This was despite presentations on the proposals at the 1997 Coastal Tour and a series of meetings in December 1997.

Association delegates also doubted that fishing in the off-season would be beneficial in the long term. As a result RLIAC has requested that this document be prepared in order to clearly set out the available information and seek comments on the strategies which RLIAC are considering for the 1998/99 season and the following two seasons.

The western rock lobster industry is heading towards two years of unprecedented high catches, with predicted catches well in excess of 13,000 tonnes for the 1998/99 and the 1999/2000 rock lobster seasons. These predictions are substantially higher than the present highest catch of 12,900 tonne in 1982/83.

The major increase in catch is expected in Zone C. These high catches are expected to depress prices, and cause cash flow and handling problems for the southern processors, particularly during the 'whites' phase of the fishery.

Industry was first informed of preliminary proposals for increasing the worth of the catch with the release of Fisheries Management Paper 94 (Prokop 1997). One of the key initiatives in that paper was a proposal to fish the period from July to September in Zone C, primarily to pre-fish some of the predicted high December catch of 'whites'.

After consultation with industry, this proposal was not submitted to the Minister for Fisheries. Subsequently, the original proposal was modified to a fishing trial that included fishing in both Zone C and Zone B by a limited numbers of boats. This proposal was discussed with industry at the 1997 Coastal tour and in December 1997 at industry meetings.

Following the RLIAC meeting of 16 January 1998 the RLIAC resolved to seek comment on management options for fishing the period July to September 1998 and for the 1998/99 season (Appendix 1). A summary of the comments can be found in Appendix 5.

On 3 March 1998, the RLIAC reconsidered its management proposals in the light of the industry comments and resolved not to advise the Minister to make any changes to the 1997/98 management arrangements (ie. no fishing in July to September 1998) . The RLIAC requested that a Fisheries Management Paper be prepared, providing information and an explanation for industry on management options for the 1998/99 season and longer term.

Background information relevant to consideration of the management options is provided in Appendix 2.

1.1 The Rock Lobster Industry Advisory Committee

The RLIAC is a statutory committee appointed by the Minister for Fisheries to provide corporate advice relating to the management of the valuable and important West Coast Rock Lobster Managed Fishery.

RLIAC as the Minister for Fisheries' Industry Advisory Committee on Rock Lobster has a pivotal role in the management of the Western Rock Lobster Managed Fishery - to provide corporate advice to the Minister. Whilst the committee can identify issues and provide advice to the Minister, the Minister may also take the lead and request advice from the committee on a particular issue.

The committee comprises:

- Independent Chairperson
- Eight commercial fishing representatives
- Two processor representatives
- One recreational fishing representative
- Two Fisheries WA representatives

The committee members are to provide advice to the Minister based on their knowledge and expertise, rather than as a representative of a particular group or individual. In providing advice to the Minister, the committee considers what is best for the industry as a whole, which may mean that from time to time the advice from the committee may be unpopular with various sectors of the industry.

In order to operate effectively, RLIAC must be able to communicate well with the industry. Recent developments to improve this process have been the production of the RLIAC Newsletter, which is circulated to all Managed Fishery Licensees, Processors, Associations and other interested persons. The individual RLIAC members also have a communication role to play in discussing those issues which arise within the local fishing communities.

Providing industry input into the advisory process is an important consideration of RLIAC. The RLIAC receives advice from a number of sources, including the WAFIC Rock Lobster Association Subcommittee.

Delegates attending subcommittee meetings of associations are able to provide a representative views of their members. Recently, RLIAC has undertaken to hold joint meetings with association delegates and processors as part of a whole of industry approach to consultation.

Fishermen also have the opportunity to put their points of view directly to RLIAC members at association meetings and at RLIAC's meetings with industry.

2.0 GENERAL INFORMATION

2.1 Management objectives

There are two basic management objectives set out under the *Fish Resources Management Act 1994* relating to the biology of the stock and economic social benefits from exploitation. These objectives are:

1. to ensure stocks are fished at sustainable levels; and
2. to achieve the optimal economic, social and other benefits from the use of the rock lobster resource.

Under these broad objectives, some specific outcomes required for the western rock lobster fishery are to:

- 1. ensure that breeding stocks levels in each zone are maintained at, or above, 'safe' egg production index levels of the late 1970s and early 1980s.**
- 2. ensure that the commercial catch is harvested and processed in such a way that the maximum value is achieved from the resource for fishermen, processors and the community at large.**

RLIAC has a role in developing long term strategies to deal with varying levels of rock lobster recruitment whilst maintaining breeding stocks. The previous long term strategy management package introduced in 1993, following concerns about breeding stock levels, has improved the level of breeding stocks.

Breeding stocks are now estimated to be at levels of the late 1970s and early 1980s as a result of a prohibition on the taking of setose rock lobster and oversize females; an increase in the gauge size in the early part of the season; and the temporary reduction in pot usage by 18%.

Although the core responsibility is for RLIAC to provide advice on the sustainability of the stock, the prediction of record high catches has shifted the focus towards advice related to objective two above. The RLIAC management plan principles, as documented at the joint RLIAC WAFIC Rock Lobster Subcommittee meeting of the 31 October 1997, are:

1. Doing nothing is not an option.
2. The establishment of a trial extension of the season in July/August 1998.
3. Flexibility of management to try to take advantage of biological/market opportunities in the high catch seasons.

Thus, if there are alternative management arrangements consistent with these principles that could provide a greater return from the industry, then RLIAC has an obligation to advise the Minister.

Options to increase the value of the catch have been reported elsewhere (in Fisheries Management Paper 94) and are summarised in Appendix 3. Out of these options, this document focuses on the following two objectives.

- ***to make available supplies of live lobsters for the longest period practicable; and/or***
- ***to smooth the catch within and between years.***

The two obvious questions that arise in relation to the objective above are:

1. to what time periods should lobsters be transferred?; and
2. what quantities should be transferred?

The two periods discussed in this document are:

1. the off season (July to August) - because this has the potential to 'transfer' low valued products to higher valued live lobster products; and
2. the following seasons - because this could lessen the downward pressure on price in large catch years, improve the returns to the catching sector in low-to-average catch years and increase the average size of lobsters caught.

The quantities to transfer are discussed later in the document.

As the catch patterns of fishing in Zone A and B differ from Zone C, the relative merits of transferring catches in each of these Zones are discussed prior to more detailed consideration of management options.

2.2 Catch transfers - Zones A & B

The current management package and catches taken in recent years from the northern rock lobster fishing zones (Zone A & B) largely meet the market requirements, with the exception of supplying the off-season months July to October. Annual variations in catch are relatively small overall and the product available on a monthly basis generally meets market demand, particularly for live product.

Management to further reduce the now small peak in production in December and the larger peak in March is possible using a combination of within season variable pot usage for the 'whites' and 'reds' and/or the use of further short-term gauge changes. Fishing in the current off-season would be possible, but appears to have limited benefit given the already small 'whites' catch in the northern area and the lower overall growth rate in this sector.

2.3 Catch transfers - Zone C

In contrast to Zones A & B, the current catch distribution both between and within years in Zone C is significantly out of step with the market ideal of consistent monthly and yearly supply. Management options to restructure the within season catch and smooth the catch between seasons in Zone C are therefore inherently more difficult and complex than those for Zone A & B.

In this context, long-term management arrangements for this zone need to take into account both the natural levels of variations in product availability that occur (a) between seasons, as well as (b) within season.

In considering (a), it should be noted that Zone C typically has runs of good and poor seasons. For example, since 1971 there have been four sequences of two to three consecutive years of well-above-average catches, with another series forecast to begin from 1998/99.

Equally, there have been several sequences of two to three consecutive below-average years during the same period. In these circumstances, achieving a consistent annual catch from Zone C, as occurs in the northern zones (combined Zone A & B catch of 5,000 - 5,500 tonnes per annum), is not biologically practical. That is, any catch not taken in year one of a run of high catch years would be reflected in very high catch rates in the second or third year in a sequence of good years. This, of course, is not the case for an individual good year preceding a very poor year, when a single year's above-average catch can be delayed to be taken in a later catch season with less difficulty.

While the characteristic runs of good and poor years typical of Zone C negates management ability to create a constant catch without the imposition of radical and variable effort controls, or catch quotas, a considerable smoothing of the monthly and peak year's catches can be achieved by delaying some of the within-season catch until the off-season or subsequent seasons.

Management controls to delay some of the within-season catch are relatively straightforward, but require some fishing in the less favourable winter/spring period. Regulation changes necessary to allow a delay of some of the within-season fishing during an above average year or a series of years include:

- (i) a decrease pot utilisation during the early part of season;
- (ii) an extension of the season into July to October period; and
- (iii) a gauge reduction to allow economically viable catch during the extended season (unless measures such as the 'female' gauge had been applied previously to 'create' additional product in the off-season).

However, all such changes have to allow for sufficient escapement to the 'whites' fishery to maintain a flow of lobsters to the breeding stock.

Alternatively where a forecast low year follows a run of good years, the last 'good' year's catch can be reduced to provide improved catch rates and catches in the following poor year. This scenario can be achieved through:

- (i) reductions in pot utilisation for all or part of the preceding good catch season; and/or

- (ii) increases in the gauge size to reduce exploitation during all or part of the preceding good season.

However, such management changes will have secondary impacts on future catches, eg. the catch taken in the 'enhanced' poor season will show a significant increase in size, and there is the potential for some additional 'white' lobsters to migrate out of Zone C.

Conversely, delaying the catch in a peak year will automatically result in an overall reduction in quantities of lobsters being produced within the season.

In summary, for Zone C a combination of delaying the catch in runs of above average years and delaying the catch in a year before a run of forecast low catch years can be achieved using a combination of season extensions (equals effort transfer) plus gauge changes (in the range 76 - 74mm and 76 - 80mm).

However, for such mechanisms to provide benefits directly to the rock lobster fishing (catching) sector, there would need to be adjusting mechanisms to transfer effort, or to relocate effort, to off-season months so that the overall operating costs are not significantly increased for the rock lobster fishing fleet as a whole. Low catch rates in winter are a disincentive to fish in the winter.

3.0 TO MAKE AVAILABLE SUPPLIES OF LIVE LOBSTERS FOR THE LONGEST PERIOD PRACTICABLE

The potential to increase returns to the rock lobster fishery by increasing the supply of live lobsters from 1 July to 14 November has been identified by Marec (1997). Marec (1997) identified four principle benefits from increasing the supplies of live lobster throughout the year. These:

1. provide the potential to increase demand by providing access to an existing live lobster market not supplied by the WA industry;
2. provide a continuity of supply of WA live lobster over a longer period of time;
3. allow the industry to shift catch of relatively low value to a period where it has the potential to have a higher value; and
4. provide the potential to increase the value of the 'whites' catch, by shifting the catch out of the 'whites' period of the season.

There is evidence that lobsters caught and sold during the 'whites' period generally attract a lower price. This may be due to a number of factors such as:

1. the colour of the shell (white);
2. grades of lobster caught (mostly A and Bs);
3. lower quality of catch taken during peak harvest period; and
4. the greatest supply occurring in the 'whites' phase.

However, there may be other considerations that could influence the price received by fishermen, such as some evening out of payments to them due to the way processors structure their cash flow. That is to say that the true price of the 'whites' may not be reflected in fishermen's payments, as the payments are averaged over a longer period of time than the whites period of the season.

Overall though, there is concern that the low price during the 'whites' part of the season occurs over a short period where the harvest peaks in Zone C - this impacts on catch quality, processors cash flow and production capacity.

Two strategies that could be implemented to increase supplies of live lobsters are:

- holding of live animals for sale during the period July to October; and
- extending the period of fishing.

3.1 Live Holding

Stocking of live animals for sale during the period July to October requires:

- (a) a mechanism to transfer the catch to later in the season so processors can build up stocks immediately prior to the closure, so as to minimise long term holding costs;
- (b) significant additional live holding capacity with associated capital costs; and
- (c) improved technology for long term live holding and feeding of the western rock lobster.

3.1.1 Current status of live holding

At present, the processing industry has approximately 300- 500 tonnes (WRLDA pers. comm.) of live holding capacity, which provides the capacity to market approximately 600 tonnes per month of live lobsters during the existing season. Live holding capacity is also currently utilised to supply some product into the market in July after the close of the present season.

These existing live holding systems are designed to hold and purge rock lobsters, but not feed or fatten them. That is, lobsters being held for short periods, up to one month or more, do not require feeding, particularly during the current off-season when cool temperatures occur. However, extended periods of live holding without feeding results in declining product quality and meat condition.

Industry advice indicates that although holding lobsters is beneficial for short periods, long term holding is not feasible due to the high operating costs and mortality that occurs in the tanks.

Processors undertaking trials on holding lobsters have reported that the high cost per week of holding lobsters far exceeds any gain obtained from higher prices. In addition, it only takes a small increase in mortality to significantly reduce profits.

3.1.2 Long term holding - feeding/fattening

Holding and growing rock lobsters for extended periods is technically feasible, as evidenced by previous research at Western Australian Marine Research Laboratories (WAMRL). Lobsters held at low densities in the WAMRL aquarium have regularly been grown from puerulus to legal sized length - and greater - without difficulty.

Research to hold and grow rock lobsters on a commercial scale has yet to be attempted in Western Australia, but has recently been undertaken under an FRDC grant in South Australia using the southern rock lobster. Preliminary reports from this work to date indicate that long term holding is technically feasible, but has yet to be shown to be economically viable. It has also raised questions regarding the ultimate quality and marketability of the product.

Considerable further work on this topic is required and likely to be undertaken for western rock lobster, as part of the planned research into future grow-out of puerulus.

In summary, the prospect for long term holding as a means of smoothing product supply does not appear to be economically viable on a large scale at present. This is particularly the case in the southern zone, where a high proportion of the catch is taken as 'whites' in the month of December each year and the lobsters can all be expected to undergo a moult in captivity in February/March before being available for the live market later in the year. The March moult in captivity is likely to be associated with a large increase in mortality.

The investment of capital into the construction of large scale holding facilities to hold lobsters long term during the off-season does not appear to be viable at this juncture.

3.2 Extending the period of fishing

Fishing during the two month period from July to September as a method of extending the period of supply of live lobster has previously been proposed by RLIAC and discussed with the industry. However, this proposal has had limited support from the fishing sector of the rock lobster industry.

The strategy is simply aimed at supplying overseas live markets at times of the year when there is a shortage of supply and increased prices. The payments to fishermen may be increased due to the higher live prices at this time of the year, but increased payments would be offset to some extent by the increased costs of fishing and processing the catch. The increase in fishing effort that would result also needs to be addressed.

In considering management options, it is important to firstly establish if there is a viable market at that time of the year. The Market Research Advisory Subcommittee has carried out some market research on this subject - a summary of the results of this are presented in Appendix 4.

The conclusions of the research from limited information is that an estimated 400 - 460 tonnes of live lobster could be supplied live to Japan, Taiwan and HK/China during the period July to September. However, the only way to verify the actual potential is to trial these markets.

The catch can be transferred to the off-season in one of two ways:

- (a) bringing the catch forward (ie. pre-fish the whites); or
- (b) delaying the catch to a later period.

Pre-fishing the 'whites' is dependent on the gauge size being reduced to 74 mm.

3.2.1 Bringing forward the catch - pre-fishing the next season's 'whites' - lower gauge

As there will be no commercial fishing in July to September 1998, this strategy is only relevant to July to September 1999 and future years. The predicted 1998/99 increase in catch for the northern area is not as significant as that for the southern area, so the pre-fishing option is not likely to be as significant an issue in the north as it is in the south.

However, taking significant quantities of lobsters in the off-season months will require a reduction in the minimum gauge size for at least July onwards. Simply extending the previous season and/or increasing the effort in May and June or in the July to October periods will not allow a significant take of lobsters, since the majority of future seasons stock is undersize or setose at that time.

A reduction in minimum gauge size to approximately 74 mm may therefore be required in the first instance to achieve significant off-season catches, ie. in excess of 1000 - 1500 tonnes. Some modelling could be used to set the specific amount of the gauge size decrease and level of effort (pot usage) necessary to achieve the target catch level selected. However, this would need to be done on an adaptive management basis.

Market predictions of the possible effects of a supply of smaller lobsters for a short period would need to be evaluated.

Decreasing the gauge size to 74 mm has not been supported by the fishing sector of the rock lobster industry because of concerns about the inequity of the proposal and about continuity of supply by the processing sector. As the option is not likely to gain support in the future, pre-fishing the 'whites' by lowering the gauge size is not being proposed as a management option in this paper.

3.2.2 Delaying the catch till the off-season

Off-season fishing is primarily being considered in this paper in the context of no overall increase to the rock lobster catch. Therefore any catch taken in the off-season will be animals that have been transferred from another period, ie. earlier, in the season. Therefore a fundamental element of any management package will be a mechanism for delaying some of the within-season catch.

The RLIAC has been considering a transference of about 1000 tonnes of animals as a workable arrangement, although the Market Research Advisory Subcommittee (MRASC) has advised that about 400 - 460 tonnes of live product could be sold without affecting the price of live lobster (see Appendix 4 for a discussion of this matter). Some fishermen have stated that to make the off-season fishing worthwhile, there would need to be as much as 2000 tonnes of catch available. Accordingly, the RLIAC proposal of making available 1000 tonnes is reasonable in the context of the conflicting opinions.

From Table 1 and Table 2, the use of minimum gauge sizes of 77 mm for both sexes of rock lobster in Zones A and B and minimum gauge sizes of 78 mm all season in Zone C would return about 2138 tonnes of lobster to the water within the season. The situation would be equitable in the sense that this quantity ranges from 13 - 16 % of predicted catches (see Table 2).

Advice from Fisheries WA's Research Division (pers. comm.) is that about half of these lobsters (about 1000 tonnes) could be expected to escape capture and be available for fishing in the off-season. About 1000 tonnes could then be made available to capture by reducing the gauge to 76 mm in the period July to August.

Table 1: Catch estimates of rock lobsters (tonnes) by Zone and length for 1998/99 (% of total catch in Zone)

Length (in mm)	Zone A			Zone B			Zone C		
	(%)	(%)	cum (%)	(%)	(%)	cum (%)	(%)	(%)	cum (%)
	Male	Female	Female	Male	Female	Female	Male	Female	Female
76	79 (4)	192 (10)	192 (10)	184 (4)	400 (9)	400 (9)	168 (2)	248 (3)	248 (3)
77	76 (4)	150 (8)	342 (18)	269 (6)	346 (8)	746 (17)	377 (5)	490 (6)	738 (9)
78	87 (4)	158 (8)	500 (26)	290 (7)	307 (7)	1053 (24)	403 (5)	460 (6)	1198 (15)
79	70 (4)	91 (5)	591 (31)	206 (5)	195 (4)	1248 (28)	234 (3)	251 (3)	1449 (18)
80	78 (4)	69 (5)	660 (35)	217 (5)	152 (3)	1400 (31)	271 (3)	248 (3)	1697 (21)
81	100 (5)	65 (3)	725 (38)	188 (4)	144 (3)	1544 (34)	239 (3)	231 (3)	1928 (24)
82	99 (5)	32 (2)	757 (40)	166 (4)	114 (3)	1658 (37)	243 (3)	219 (3)	2147 (27)

Assumptions/Comments

These are:

- estimate for 76 mm catch is for the period February to June; and
- based on 1995/96 length monitoring data weighted up to 1998/99 predicted catches, using Alkimos puerulus collection;
- small sizes of rock lobster may be under-represented as 1998/99 will contain more new recruits than 1995/96; and
- Abrolhos Islands monitoring data is extremely limited.

Table 2: Catch estimates with 77 mm and 78 mm gauges of rock lobsters (in tonnes) by Zone and Length for 1998/99 (% of total catch in zone)

Gauge Size								
77 mm (return 76 mm)						78 mm (return 76-77mm)		
A			B			C		
Male	Female	All	Male	Female	All	Male	Female	All
79(4)	192(10)	271(14)	184(4)	400(9)	584(13)	545(7)	738(9)	1283(16)

It is proposed that any option should fulfill the following criteria:

- fishermen can choose to fish, ie. there is equal opportunity;
- those choosing not to fish are not disadvantaged; and
- there should be minimal changes to the rules operating in the season.

Option 2a

The elements of a management option to fish the off-season by transferring some of the within-season catch during 1998/99 that meets the aforementioned criteria follows:

Purpose

- to make available about 1000 tonnes of the 1998/99 catch for fishing in the period July to August 1999; and
- facilitate the collection of fishery data for longer term consideration of off-season fishing.

Option 2a - Catch transfer within and between seasons, no split gauge

a) Gauge size for 1998/99 season of:

Zone A & B 77 mm

Zone C 78 mm

b) Lower gauge size to 76 mm in the two month off-season period.

c) All other rules to stay the same.

d) Any fisherman can choose to fish in the off-season.

e) Those vessels fishing in the off-season must not start fishing in the following 'whites' until such time as those vessels fishing the 'whites' have caught on-average per-pot per-zone the same as those vessels fishing the off-season.

f) Off-season fishing to only occur in Zones B and C.

g) Fishing to occur over a two month period in the off-season

An alternative to using the same gauge size for males and females is to use a split gauge that protects large female lobsters, further enhancing the spawning stock and increasing the average size of lobsters in the population. This alternative is used in Option 2b - which is similar in all respects to Option 2a apart from the use of a split gauge.

Option 2b

Purpose

- To make available about 1000 tonnes of the 1998/99 catch for fishing in the period July to August 1999.
- Facilitate the collection of fishery data for longer term consideration of off-season fishing.

Option 2b - Catch transfer within and between seasons, split gauge

a) Gauge sizes for the 1998/99 season of:

Females:	Zone A & B	78 mm	all season
	Zone C	79 mm	all season
Males:	Zone A	76 mm	all season
	Zone B	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.
	Zone C	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.

b) Lower gauge size to 76 mm in the two month off-season period.

c) All other rules to stay the same.

d) Any fisherman can choose to fish in the off-season.

e) Those vessels fishing in the off-season must not start fishing in the following 'whites' until such time as those vessels fishing the 'whites' have caught on-average per-pot per-zone the same as those vessels fishing the off-season.

f) Off-season fishing to only occur in Zones B and C.

g) Fishing to occur over a two month period during the off-season.

Option 3

An alternative short term option to provide information without any rules changes (ie. rather than delaying the within-season catch) is Option 3, ie. no catch is transferred and the total catch for the season increases.

Purpose

- To collect fishery data during July and August 1999 for longer term consideration of off-season fishing.

Option 3 - Short term, no split gauge.

a) All rules to stay the same as in the 1997/98 season.

b) Any fisherman can choose to fish the two month off-season period.

c) Those vessels fishing in the off-season must not start fishing in the following 'whites' until such time as those vessels fishing the 'whites' have caught on-average per-pot per-zone the same as those vessels fishing the off-season.

d) Off-season fishing to only occur in Zones B and C.

e) Fishing to occur over a two month period during the off season.

Break even analysis

A hypothetical break even analysis for the catching sector of the fishery follows, in order to provide a context for discussing the costs and benefits of an off-season fishing strategy. For this purpose, a number of simplifying assumptions are made:

1. the total catch for the season remains the same;
2. one thousand tonnes is caught in the off-season;
3. the average rock lobster price per kg for the season is \$20; and
4. boats fish 27 days over the two month period July to August (Fisheries Management Paper No. 68).

Under this scenario, the income forgone by not taking the catch in the season would be 1,000,000kg × \$20=\$20 million. Therefore to break even, the earnings from fishing the off-season would have to be \$20 million, plus the additional costs of fishing.

Estimates of the break even price for different numbers of boats and operating costs are provided in Table 3 below.

Table 3: Break even price for combination of boats fishing and operating costs - season price of \$20 and 1000 tonnes taken

No. of Boats	100	100	200	200
Av. Cost Trip	500	1000	500	1000
Total Cost	\$1,350,000	\$2,700,000	\$2,700,000	\$5,400,000
Break Even Price	\$21.35	\$22.70	\$22.70	\$25.40

If we look at Table 3, under the worst case scenario in this hypothetical situation, the rock lobster price would have to increase by \$5.40 before there was a net benefit to the fishery. Furthermore, it can be surmised from this simple example that larger price increases will be required for greater numbers of boats fishing and higher operating costs and smaller quantities transferred.

If there are only a few boats fishing, then it is likely that not all of the catch transferred during the season would be taken. These uncaught lobsters would then transfer to the following season and then become 'available' to capture. However, the complexities of the long term outcome are beyond the scope of this document.

The options provided above are based on a workable arrangement for a long term management option of transferring some of the within-season predicted catch to the off-season, or a shorter

term management option of facilitating the collection of data so a better assessment of long term off-season fishing can be undertaken.

At this stage due to the uncertainty about the benefits to the fishery, off-season fishing should take place on a trial basis with the main objective of gathering data, rather than as an economic objective for the fishery.

4.0 SMOOTH THE CATCH WITHIN AND BETWEEN YEARS

The alternative option to 'transferring' animals to the off-season period to enhance the value of the rock lobster catch is to transfer these animals within season or between season. However, as currently there is not much difference in price between 'white' and 'red' lobsters, the focus of the discussion is on management options to transfer lobsters between seasons.

The catch forecasts indicate that more significant modifications to the Zone C catch will be required than are needed in the northern zones. That is, the northern zones are expected to increase by 800 tonnes in 1998/99 and then decrease by 200 tonne in 1999/2000.

In Zone C, both the 1998/99 and 1999/2000 seasons - and possibly the following year - are forecast to provide catches approximately 2200 - 2700 tonnes (40% - 50%) above the average of approximately 5500 tonnes. The most significant part of this catch is expected to be taken during the 'whites' fishery in December of each year (Figure 7, Appendix 2).

Quantifying the effect that transferring various quantities of rock lobsters has on the stock and the projected increases in returns is a difficult task and requires some sophisticated modelling. The Value Optimisation Model, currently being developed by Fisheries WA's Research Division, would provide the type of information RLIAC and industry requires to assist with the assessment of the various options. However, the model is not expected to be available until February 1999. Accordingly, at this juncture it becomes a matter of judgement on how much to transfer and what the effects of this might be.

To date, RLIAC has been considering a short term catch transfer of about 1000 tonnes from the 1998/99 season as a workable arrangement. However, a one-off catch transfer from 1998/99 would make the 1999/2000 catch even larger and create a greater catch variation - which would not be consistent with the management objective.

Obviously, a longer term perspective is required, given that the seasonal catches for the next three years are predicted respectively at about 14.2 million kg, 14.3 million kg and 11 million kg. Evening out the catch would require average catches of about 13 million kg over three years. Management regulation changes that would achieve transfers of 1 million kg from 1998/99 to 1999/2000 and 2 million kg from 1999/2000 to 2000/01 are therefore discussed below.

4.1 Regulatory tools

Basically, the regulatory tools available to achieve the catch transfers are:

- gauge sizes;
- pot usage;
- time; and
- quotas.

In practice, these tools may be used in combination. Although each regulatory tool has potential to be used to meet management objectives, RLIAC has recently only been considering the manipulation of the gauge as a mechanism to achieve management objectives. A brief discussion of why the alternative regulatory tools are non-preferred is provided in the following sections.

4.2 Pot usage

Pot usage can be increased or decreased, according to the result desired. A temporary reduction in pot usage during the 'whites' phase of the fishery is likely to have the following advantages:

1. additional catch during January/February;
2. a greater number of lobsters undergoing the February/March moult and reaching larger grades (ie more grades B & C);
3. increased March to June catches of the same year, but with most being caught in the March, April months;
4. limited catch flow to subsequent seasons (as experienced with the current package);
5. some small flow of lobsters from Zone C to Zone B due to an increased number of migrating lobsters; and
6. less handling of totally protected animals.

Increasing the number of pots in the 'reds' phase of the fishery would be most beneficial in the later part of the season from May onwards, when the supply of live 'red' lobster decreases below apparent market capacity. However, this option has the disadvantage of increasing the handling of totally protected animals.

The advice provided from Fisheries WA's Research Division with respect to pot usage as a mechanism for delaying the catch is that it would require a significant reduction in pot usage to reduce the catch appreciably. The RLIAC members considered that this would not be the preferred method. Accordingly, management options manipulating pot usage are not provided in this paper.

4.3 Time

Changing the fishing periods may also be a reasonably effective method of transferring catch, ie delaying the start to the rock lobster season would reduce the 'whites' catch, but may disadvantage those who take a proportionally greater percentage of their catch earlier in the

season. In conclusion, although there is potential to change fishing times to achieve management objectives, this has primarily only been discussed by RLIAC in relation to off-season fishing.

4.4 Quotas

The concerns being expressed by industry particularly in respect to the inequity of fishing the off-season and the consequent disruption to lifestyle highlight some of the difficulties in limitations of the input control scheme. Once introduced, quotas are a very direct method of changing catching patterns, but their allocation is a very contentious issue.

A comprehensive review of the use of quotas as a long term management option for the Western Rock Lobster Fishery was undertaken in 1994. Following discussion with industry and canvassing of fishermen's views, it was decided that quota management was not appropriate for the fishery at that time.

The use of quotas as a regulatory tool is a very complex issue and well beyond the scope of this document. Nonetheless, once introduced quotas could overcome some of the concerns over perceptions about inequity through the use of other regulatory instruments. For example, if year-round fishing was permitted, taking lobsters in the off-season would not impinge on another persons rights at another time of the year and there would be no need for a trade-off arrangement.

Under an individual quota system it could be left to the market to determine when an individual chooses to fish. If a greater return could be made later in the year from the 'reds' by postponing fishing in the 'whites', then this would be a decision that could be made without losing any entitlement in the fishery or catch share to competitors.

Fishermen could thus choose to fish during periods that suited their life style, without affecting their share of the catch. Quotas have the potential to be used in a more sophisticated way to limit the total catch directly at certain times of the year and/or allow trading between fishermen as to when and where they take their catch.

The RLIAC has not been considering the introduction of quotas, but recognises that there are advantages and disadvantages to this management technique and that there are many factors to consider in any application of it. In practice though, any discussion on the introduction of quotas would be in the context of long term management and in combination with input controls.

4.5 Gauge sizes

Changes in gauge size are an effective method of shifting catch to later in the same season and if applied for a longer period, ie. until the end of the season, can directly 'flow' product on to either the July - September period or the next season. Small shifts in the gauge size can impact significantly on the total catch, the seasonal distribution of catch, and catch size composition.

Given the difference in catch predictions, the impact of increasing the gauge size would be greater in Zone C than in Zones A and B. The benefits for Zone A and B are less than for Zone C, with probably most benefit arising from the potential to eventually increase the proportion of larger size animals in the catch for the HK/China market (over a period of several years).

The impact of increasing the gauge size on the Zone C catch is more significant as this has the potential to increase earnings by increasing the supply of live 'reds'. However, as discussed previously, if the 'reds' catch finishes up as boiled product because of an oversupply later in the year, then the benefits are not so obvious. The options to enhance the worth of the catch without an extended season involve the transfer of some lobsters to subsequent seasons.

Unless there is any overriding reason, the simplest approach to achieving a transfer of animals is to use the one gauge size throughout the rock lobster season.

Gauge sizes of 77 mm for Zones A & B and 78 mm for Zone C could be used to transfer 1000 tonnes of lobsters from the 1998/99 season (as discussed for the off-season). However, to transfer 2000 tonnes would require even larger increases in gauge size - from Table 4, the gauge sizes would need to be about 78 mm for Zones A & B and 79 mm for Zone C, assuming half of the animals returned to the water are available to be caught the next season.

Table 4: Catch estimates with 78 mm and 79 mm gauges of rock lobsters (in tonnes) by zone and length for 1998/99 (% of total catch in zone) - (based on 1998/99 predictions from Table 1)

Gauge Size

78 mm (return 76-77 mm)						79 mm (return 76-78mm)		
Zone A			Zone B			Zone C		
Male	Female	All	Male	Female	All	Male	Female	All
155(8)	342(18)	497(26)	453(10)	746(17)	1199(27)	948(12)	1198(15)	2146(27)

This strategy may result in catches of about 12,000 - 13,000 tonnes for the next three seasons. Option 4a below is a management strategy that is aimed at achieving these transfers with similar gauge sizes for male and female lobsters.

Option 4a

Purpose

- Reduce the 1998/99 catch by about 1000 tonnes.
- Reduce the 1999/2000 catch by about 2000 tonnes.
- Increase the average size of lobsters for the Hong Kong/China (HK/China) market.

Option 4a: Reduce 1998/99 and 1999/2000 catches, no split gauge	
1998/99	
Gauge sizes: Zones A & B	77 mm - all season
Zone C	78 mm - all season
<ul style="list-style-type: none"> • No off-season fishing 	
1999/2000	
Gauge sizes: Zones A & B	78 mm - all season
Zone C	79 mm - all season
<ul style="list-style-type: none"> • No off-season fishing 	
2000/2001	
Gauge sizes to be reviewed with the prospect of lower gauge sizes	

An alternative option for achieving similar results to Option 4a, but using a split gauge is given in Option 4b below.

Option 4b

Purpose

- Reduce the 1998/99 catch by about 1000 tonnes.
- Reduce the 1999/2000 catch by about 2000 tonnes.
- Increase the average size of lobsters for the Hong Kong/China (HK/China) market.

Option 4b: Reduce 1998/99 and 1999/2000 catches, split gauge	
1998/99	
Gauge sizes for 1998/99 season of:	
Females:	Zone A and B 78 mm all season
Zone C	79 mm all season
Males:	Zone A 76 mm all season
Zone B	77 mm 15 Nov. to 31 Jan.
	76 mm 1 Feb. to 30 Jun.

Zone C	77 mm 15 Nov. to 31 Jan. 76 mm 1 Feb. to 30 Jun.
1999/2000	
• No off-season fishing	
Gauge sizes for 1999/2000 season of:	
Females:	Zone A and B 79 mm all season
Zone C	80 mm all season
Males:	Zone A 76 mm all season
Zone B	77 mm 15 Nov. to 31 Jan. 76 mm 1 Feb. to 30 Jun.
Zone C	77 mm 15 Nov. to 31 Jan. 76 mm 1 Feb. to 30 Jun.
2000/2001	
• No off-season fishing	
Gauge sizes to be reviewed with the prospect of lower gauge sizes	

The outcome of implementation of Options 4a or 4b for the 1998/99 season would be:

1. a decrease in the 'whites' catch;
2. an increase in the 'reds' catch; and
3. transfer about 1000 tonnes of lobster to the 1999/2000 season.

The outcome for the 1999/2000 season is likely to be:

1. A decrease in the 'whites' catch;
2. An increase in the 'reds' catch;
3. transfer about 2000 tonnes of lobster to the 2000/2001 season (current indication is for a near average catch for the 2000/2001 season, therefore the outcome of the shift would be a third good year);
4. grade A animals likely to only be available from Zones A and B; and
5. an increase in the average size of the catch and therefore a greater percentage of larger animals available in Zone C to export to Taiwan and Hong Kong/China.

An alternative to delaying the catch over two seasons with increasing gauge sizes in order to transfer catches to the 2000/2001 season is to transfer lobsters from the predicted above-average 1999/2000 season to the predicted about-average 2000/2001 season, thereby smoothing the catch over two years rather than three as in Option 4a and 4b. Option 5a (with the same gauge size for males and females) and 5b (with a split gauge) are two such options.

Option 5a

Purpose

- Reduce the 1999/2000 catch by about 1000 tonnes

Option 5a: Reduce the 1999/2000 catch, no split gauge

1997/98

No change to 1996/97 gauge sizes

- **No off-season fishing**

1999/2000

Gauge sizes: Zones A & B	77 mm - all season
Zone C	78 mm - all season

- **No off-season fishing**

2000/2001

Gauge sizes to be reviewed with the prospect of lower gauge sizes

Option 5b

Purpose

- Reduce the 1999/2000 catch by about 1000 tonnes

Option 5b: Reduce the 1999/2000 catch, split gauge

1997/98

No change to the 1996/97 gauge sizes

- **No off-season fishing**

1999/2000

Gauge sizes for 1999/2000 season of:

Females:	Zone A and B	78 mm	all season
	Zone C	79 mm	all season
Males:	Zone A	76 mm	all season
	Zone B	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.
	Zone C	77 mm	15 Nov. to 31 Jan.
		76 mm	1 Feb. to 30 Jun.

- **No off-season fishing**

2000/2001

Gauge sizes to be reviewed with the prospect of lower gauge sizes
--

The outcome of implementing Options 5a or 5b for the 1999/2000 season is likely to be:

1. a decrease in the 'whites' catch;
2. an increase in the 'reds' catch; and
3. transfer about 1000 tonnes of lobster from the 1999/2000 season to the 2000/2001 season.

5.0 TAKING OVERSIZE FEMALES

Although the taking of oversize females does not relate to the primary objective of this document, the matter has arisen at discussions with the rock lobster industry and is therefore included as a management option because it can increase the catch value. The taking of all oversize animals (ie. lobsters larger than the current maximum size) including setose females has been proposed as a method of increasing the catch value.

The purpose of the RLIAC proposing to permit the taking of all oversize animals (regardless of setose) was twofold:

- (a) to increase the overall catch, increasing the economic viability of fishing; and
- (b) to take advantage of the lucrative high price HK/China market for large live lobsters.

The question as to whether to take these animals is very much dependent on the effect this would have on the breeding stock. The advice from Fisheries WA's Research Division is that provided the levels of breeding stock are adequate to maintain the biological objective (see management objectives discussed earlier) these animals could be taken. Overall, if the restriction was lifted there would be a small increase in the total catch of large animals that could be exported to HK/China live at a premium price.

The RLIAC was advised by the Market Research Advisory Subcommittee that there were two periods of the year where it was advantageous to supply additional large live animals to overseas markets these were:

- (a) the two weeks prior to the Chinese New Year (beginning of the lunar year falling between 21 January and 19 February); and
- (b) from May to October.

Accordingly, a management option for fishing large oversize females is proposed to include the following elements.

Option 6

Purpose

- Permit the selective harvesting of large female lobsters.

Option 6

- a) Remove the protection of all females (no setose protection) greater than 115 mm in Zone C two weeks before the Chinese New Year and for the months of May and June.**
- b) Remove the protection of all females (no setose protection) greater than 105 mm in Zones A and B two weeks before the Chinese New Year and for the months of May and June.**

Alternatively, the oversize rule could be removed all season which would still leave oversize female setose animals protected, but during the non-setose months of March, April and May these oversize females could be taken and sold into the Hong/Kong China market.

Option 7

Purpose

- Permit the supply of additional animals to overseas markets in March, April and May.

Option 7

- a) Remove the protection of all non-setose oversize animals all season.**

6.0 RISKS

The following risks have been identified:

- a one-off fishing trial could be detrimental to long term rock lobster markets;
- selling 74 mm animals as part of a fishing trial may affect existing markets;
- failure to smooth the catch could cause a market crisis in December 1998;
- failure to act could result in the western rock lobster fishery losing overseas market share, particularly in markets for live lobster; and
- failure to act could result in returns to the industry decreasing over time.

7.0 CONCLUSION

A primary consideration of a preferred management option for the longer term is that the management arrangements proposed take into account market requirements, in order to maximise returns from the appropriate level of catch. As there are significant catch increases predicted for the 1998/99 and 1999/2000 seasons, the possibility arises that lobsters may be transferred from periods of low market value, ie. December 'whites' to periods of higher value, the off-season or later years of lower production.

The preferred mechanism to facilitate the 'transfers' is by gauge size manipulation. Other mechanisms may be effective in this regard, but have yet to be developed.

The potential of obtaining higher unit prices by increasing the exploitation of larger size animals has been recognised by including an option to remove protection of oversize large female lobsters two weeks before the Chinese New Year and during May to June.

A major difficulty with providing management options at this stage is the lack of a suitable framework for considering the outcome of various management strategies and a long term marketing strategy. The lack of an analytical framework is being addressed through the development of the Value Optimisation Model, but the lack of a long term marketing strategy needs to be addressed by industry.

Understandably, the lack of an analytical framework and long term marketing strategy makes it difficult for the rock lobster industry to accept management changes during periods of peak production. Nonetheless, the options provided are likely to be headed in the right direction and therefore better than keeping management arrangements unchanged during a period of unprecedented high catches.

8.0 REFERENCES

- Lindner, B. 1994, Long Term Management Strategies for the Western Rock Lobster Industry (four volumes): Economic Efficiency of Alternative Input and Output Based Management Systems in the Western Rock Lobster Fishery (October 1994), Vol.2, Fisheries Management Paper No. 68, Fisheries Department of Western Australia, Perth.
- Marec Pty Ltd. 1997, Optimising the Worth of the Lobster Catch: Options and Issues, Fisheries Management Paper No. 101, Fisheries Department of Western Australia, Perth.
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APPENDIX 1

Results of previous 12 months consultation

ALL ROCK LOBSTER ASSOCIATIONS

RLIAC is seeking comment on management proposals for a July - September 1998 off season fishing trial and the 1998/99 season.

Background

The Rock Lobster Industry Advisory Committee (RLIAC) has since early 1997 been considering what advice it is going to provide the Minister on management arrangements for the 1998/99 season and beyond. These discussions initially involved consideration of an extension to the 1997/98 season however, more recently the committee has been focusing on a fishing trial in the off season to:

- provide additional biological data;
- provide information on whether there are market opportunities;
- transfer some of the 1998/99 'whites' catch to within and later seasons; and
- increase the catch of large female lobsters.

RLIAC met with all rock lobster associations in October 1997 and there was general agreement for RLIAC to progress proposals and then reconvene with the rock lobster associations in early 1998. The objective of these meetings was to provide industry with an opportunity to "fine tune" the RLIAC proposals prior to final recommendations being forwarded to the Minister for Fisheries.

After considering the advice from the RLIAC Market Research Advisory Subcommittee, researchers, processors and industry, RLIAC on the 6 February 1998, resolved to seek comment from industry on proposed management options prior to providing final advice to the Minister. Given that the Minister has requested advice be provided to him by March, a meeting of the rock lobster associations and RLIAC has been organised for the morning of 3 March 1998. Having been informed of industry views in the morning RLIAC will then meet in the afternoon to finalise its advice to the Minister. In the meantime RLIAC is encouraging all associations to meet to discuss the options and provide comments through their nominated representatives at the 3 March meeting. To facilitate discussions within industry and clarify any issues that association members may have the RLIAC chairman Mr John Paterson and Executive Officer Mr Kevin Donohue will be available to attend association meetings. Please take the opportunity to meet with the Chairman and Executive Officer not only to discuss these issues but to familiarise yourselves with them and raise any other matters that may be of concern to your members.

PROPOSAL 1

July - September 1998 Off Season Fishing Trial

It is important to note that the trial at this stage is being considered for **one year only**. The various options RLIAC is seeking comment on are summarised in Table 5.

Option 1 is essentially the off season trial that had been under discussion during recent months. Option two is a variation to option 1. Further explanation is given below.

Selection/Boat numbers

The main difference between the two options is the selection process. Under option 1 a ballot would be conducted to select a maximum of 120 boats, if more than 120 boats nominated for the trial. Only those boats drawn from the ballot could fish the off season. Option 2 allows all licensed vessels the opportunity to fish off season through nominating by an agreed date in much the same way as the Big Bank nomination arrangements. That is, persons have until a cut off date the right to nominate to fish the off season. However, they may withdraw their nomination so long as it is before the cut off date for nominations. The list of licensees who nominate would be on a public registrar and enquires could be made on who has nominated.

Minimum size

The minimum gauge size under option 1 is proposed to be 74 mm to allow enough animals to be available for capture given that the numbers of legal size (above 76 mm) are generally low at the end of June. Under option 2 there is the option of keeping the minimum size at 76 mm. RLIAC is seeking comment on the preferred minimum size under both option 1 and 2.

Period

Under option 2 RLIAC is seeking comment on whether the trial fishing period should be for two months from the 1 July or remain, as for option 1, from 15 July to 15 September. There has been the suggestion that starting on 15 July provides the opportunity to allow a two week break for vessel crews and families. It also allows for the availability of live lobsters over a longer period into September.

Catch trade- off

It is proposed that there be some catch trade-off by those boats participating in the trial fishing period. Catch trade-off refers to the catch foregone at the beginning of the following season (1998 'whites') by those boats that fish the off-season. The catch to be traded off during the 'whites' by a boat fishing the off season is proposed to be based on the average of the catch of all boats fishing the off season within a zone. For example if 100 boats fish Zone C in the off season and take 500 tonne the average catch is 5 tonne (note individual catches may vary around this average). The 100 boats would not commence fishing, at the beginning of the next season, until the boats that **did not fish the off season** (203 ie. 303 - 100) had taken on average 5 tonnes (ie 1015 tonnes in total). In practice this may not be a long time (possibly 3-5 weeks) given the large catches of 'whites' early in the season. Note, Zone A boats would be

allowed to fish in Zone B as their catch trade-off would occur mostly at the start of the 'whites' in Zone B in 1998.

Maximum size setose protection

Both options allow the take of large females over 115 mm - C Zone and 105 mm - B Zone regardless of whether they are setose or not. This increase in catch of larger animals is to be timed for the market for large live lobsters in China.

Standard ports

Under option 1 it is proposed that there be a limited number of landing locations to reduce the operating costs of some of the processors and make it easier to monitor the catch. Under option 2 this issue has been left open and comments are sought on which is the most preferred, noting that it does depend to some extent on the overall number of boats fishing.

RLIAC's preferred option is option 2 with the revised vessel nomination system, as it allows all boats the opportunity to fish the off season, but does not penalise those who don't, because it provides a trade-off in catch.

PROPOSAL 2

1998/99 Season - Catch transfer to within and later seasons

The RLIAC is mindful of the prediction of a larger catch next season and the potential this has to cause a glut on markets and consequential lower prices and returns to fishermen in 1998/99 and subsequent years. Accordingly, RLIAC examined management mechanisms that could be used to lessen the effect on prices of a large supply of lobsters to overseas markets. It also allows for the take of larger lobsters for the China market.

The management proposal detailed below has therefore primarily been developed with the longer term objective of transferring more of the catch into the off season and future seasons. This part of the proposed management package has two components. Increased minimum size for females and reduced protection for large setose females.

The 1998/99 proposal is summarised in Table 6.

Increase minimum size

Increasing the minimum size was considered to be the appropriate mechanism for transferring some of the catch out of the 'whites' and into the "reds" and into subsequent seasons. The minimum sizes that were considered to be the most appropriate were a 77 mm minimum size (ie returning all female lobsters 76 mm and smaller to the water) for Zones A& B and a 78 mm minimum size (ie returning all female lobsters 77 mm and smaller to the water) for Zone C. The shift in the gauge size will provide the opportunity to return/transfer about 1300 tonnes during the course of the 1998/99 season. With experience and refinement of this approach it could be feasible to transfer catches out of high catch years into lower catch years. These size predictions indicate a shift of tonnage of about 10% in each zone through to later parts of the season or subsequent seasons. Comment is also being sought by RLIAC on this proposal.

Setose protection

RLIAC is taking a long term view with respect to setose females above the maximum size and is aiming to review each year the opportunities to market these large lobsters. For the 1998/99 season there appears to be an opportunity to market large lobsters to China at a premium price over two periods; one commencing 2 weeks before the Chinese new year and finishing at the Chinese new year (usually late January early February) and the other from May through to August.

Comments and queries

RLIAC is seeking comments on the two separate proposals one covering the trial period for 1998 and the other for the 1998/99 season seeking to transfer the catch within season and to later seasons.

Please pass this information onto your members at the earliest opportunity and feel free to direct any queries to RLIAC Executive Officer Mr Kevin Donohue on (08) 94267396.

John Paterson
CHAIRMAN RLIAC

10 February 1998

Table 5: Off-season Fishing Trial Options - February 1998

	Option 1	Option 2
*Selection	Ballot	Nomination
*Boat Numbers	120 (80 C, 40 A&B)	Max 603
*Minimum Gauge	74 mm	74 mm or 76 mm
*Period	15 July to 15 September	15 July to 15 September or 1 July to 31 August
Catch Trade-off in next 'whites'	Yes	Yes
Fishing Zones	B & C ⁺	B & C ⁺
Maximum size	None	None
Setose available	> 115 mm Zone C >105 mm Zone B	> 115 Zone C >105 mm Zone B
*Standard ports	yes	?
Pot usage	82 % (current level)	82% (current level)

* indicates that there is a difference between option 1 and option 2

+ note: Zone A licensed boats fish in Zone B in both periods

Table 6: 1998/99 Management Proposals - February 1998

Zone	C		B			A	
	Size/s	Period	Size/s	Period	Size/s	Period	
Current Package							
Minimum	77	15/11 31/1	-	77	15/11 31/1	-	
Both sexes	76	1/2 30/6	-	76	1/2 30/6	- 76	15/3 - 30/6
Maximum Females	115	15/11 30/6	-	105	15/11 30/6	- 105	15/3 - 30/6
Setose	all	15/11 30/6	-	all	15/11 30/6	- all	15/3 - 30/6
Proposed Package							
Minimum Males	77	15/11 31/1	-	77	15/11 31/1	-	
	76	1/2 30/6	-	76	1/2 30/6	- 76	15/3 - 30/6
Females	78	15/11 30/6	-	77	15/11 30/6	- 77	15/3 - 30/6
Maximum	none none	*2 weeks 1/5 30/6	-	none none	*2 weeks 1/5 - 30/6	none	1/5 - 30/6

*2 weeks before the Chinese new year (usually late January early February)

APPENDIX 2

BACKGROUND

In this appendix information is provided that showing breeding stocks are at or above long term targets as a consequence there is no immediate concern over the status of the stocks. Data on the forecasts of unprecedented high catches for 1998/99 and 1999/2000 are also provided. These data indicate the difference in the catch predictions for each of the Zones for the 1998/99 and 1999/2000 seasons ie there is a large increase predicted for Zone C with a relatively small increase predicted for Zones A and B. Zone C licensees can therefore expect to catch significantly more lobster in the 1998/99 and 1999/2000 seasons than Zone A and B licensees. Accordingly, southern processors are faced with the difficulty of marketing a significantly greater share of the catch than previously.

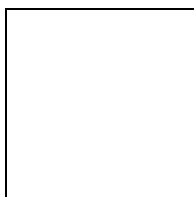
Some information on how the catch is marketed is provided with particular reference to the type of products sold and to what markets. Generally, the fishery is reliant on the South East Asian markets of Japan and Taiwan and the emerging markets of H/K China with the USA being an important destination for tails. It is noted that H/K China has a preference for large lobsters. Because of the reliance on the South East Asian markets any downturn in these economies, changes in consumption patterns and exchange rates are likely to have an important impact on the marketing of western rock lobster by Western Australian processors.

Current market status

1996/97 catch by month

The distribution of the catch by month from the northern and southern areas of the fishery for the 1996/97 season are given in Figure 1. The catch of 9.9 million kilograms was just below the long term average.

Figure 1: 1996/97 Catch profile by Month north and south of 30° Latitude



The 'whites' catch (November to January 1996/97) was 3.5 million kg (35% of the total catch). From Figure 1 it is noticeable that the proportion of 'whites' of the annual catch varies between the two areas ie the southern region 'whites' were 41% of the annual catch compared with 30% for the northern area. In high recruitment years the proportion of 'whites' in the southern region is even greater.

Production

The lobster catch is marketed primarily as four products:

1. Live;
2. Boiled (almost all frozen);
3. Tails (almost all raw and frozen); and
4. Whole Raw (almost all frozen).

The breakdown of the production of each type of product for 1996/97 is given in Table 7. Most of the catch is marketed as boiled lobster followed by live lobster with these two categories making up 79% of total production.

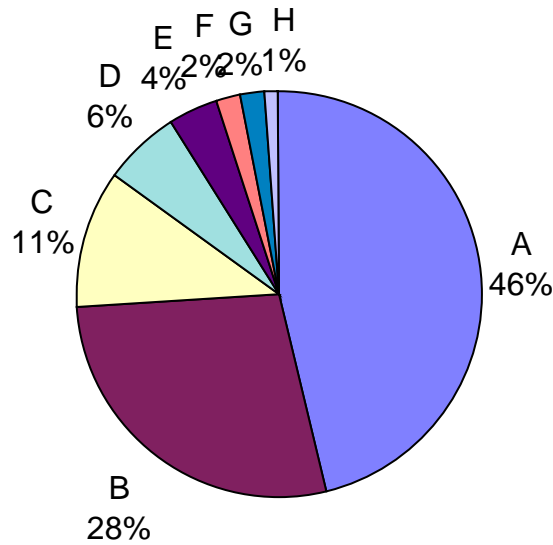
Table 7: Production of lobster products for the 1996/97 season

PRODUCT	PRODUCTION WEIGHT	PROPORTION OF TOTAL CATCH %
Boiled	3,900	42.5%
Live	3,400	36.5%
Tails	500	14.0%
Whole Raw	700	7.0%

Grade composition

Most of the production (72%) is of small grade lobsters (Grades A & B) as is evident in Figure 2. The proportion of grades A & B in the catch will increase in the next two years due to higher levels of recruitment.

Figure 2: Proportion each grade is of total production - 1996/97



Most A and B sized lobsters are processed and exported as boiled lobster to Japan, Table 8. Larger sizes (size C and above) are mainly processed as live lobster and exported to China and Taiwan. Most of the increase in catch for 1998/99 would come from the smaller grades A and B and overseas markets would have to be found to sell these small size lobsters.

Table 8: The form composition of grades produced (1996/97) (Source: Marec, 1997)

Grade/Form	A	B	C	D	E	F	G	H
	%	%	%	%	%	%	%	%
Live	30	36	53	61	67	82	86	76
Boiled	58	53	29	8	0	0	0	0
Tails	2	4	7	26	33	18	14	24
Whole Raw	10	6	11	5	0	0	0	0

Of the grades and forms exported during 1996/97 (Table 8):

- nearly 60% of live lobster were grades A and B;
- over 90% of boiled lobster were made up of grades A and B;
- about 60% of tails came from grades D to H; and
- almost all of the whole raw lobster were grades A, B and C.

Exports

There are four main export destinations for the Western Australian rock lobster; Taiwan, Japan, USA and HK/China. The quantity exported to each country during 1996/97 is given in Table 9.

Table 9: Exports by country of destination 1996/97

Country	Share of Catch %
Taiwan	41
Japan	38
USA	11
HK/China	9
Other	1

Taiwan and Japan are the two main markets for the catch making up 79 % of total exports. The breakdown of the type of product exported to each of the countries listed above is provided in Table 10.

Table 10: Percentage of each product exported to overseas countries - 1996/97

COUNTRY	PRODUCT TYPE			
	BOILED	LIVE	TAILS	W RAW
Taiwan	52%	43%		62%
Japan	47%	34%	6%	37%
Hong Kong /China	1%	23%	1%	
USA			92%	
Other			1%	1%

Almost the entire production of boiled lobster is exported to Taiwan and Japan or consumed locally. Taiwan and Japan are the major export destinations of live lobster, however, HK/China is an emerging market and imports a significant quantity of large live lobsters (70% of imports are grades E, F, G, H). Almost the entire production of tails is exported to the USA.

Local consumption

The domestic consumption of western rock lobster is about 1% (WRLDA pers. com.) of total production representing a small component of the catch. There may be some merit in investigating market opportunities within Australia. Processors may be able to pre-sell certain product lines from the expected 'whites' catch to major Australian food chains that would enable the food chains to market lobster over the Christmas period.

Marketing during periods of peak production

Although there have been significant increases in production in the past, the effect on price movements has been dampened because processors have been able to find markets to absorb the increased catch and there have been favourable movements in exchange rates. Marec (1997) has provided an analysis of two major events; the 1987/88 and 1991/92 seasons when there were catch increases of 3.5 and 3.0 million kg respectively.

The pertinent points Marec (1997) made about the marketing of the catch during these periods are provided below.

1987/88

- The lobster industry absorbed a 3.5 million kg catch increase in the 1987/88 season with an apparent drop of \$1.60 per kg but an increase of around 30% in fishermen's earnings
- It was achieved with a favourable exchange rate in 1987/88 and the continuation of the Taiwanese boiled and live lobster markets would have provided strong demand. The Taiwanese market in particular had emerged in 1986 and grew quickly.
- The increased production of lobster tails foreshadowed a price fall in the United States tail market
- The 1988/89 boiled lobster production increase shows what can occur when the US tail market contracts and processors have to resort to other markets to sell the catch.
- While frozen products can be purchased in peak times for resale at other times such an option is not available to live lobster markets. These markets therefore provide little opportunity to cope with peak catches unless there is a strong emerging market and the capacity (air space and storage) to handle the additional weight is available. Thus for any future peak catch the frozen, particularly, the boiled lobster markets represent the main avenue to absorb catch.
- The increase in catch was after two very poor years of 8.2 million kg and 8.5 million kg.

1991/92 and 1992/93

- As a result of the 3.0 million kg increase in catch in the 1991/92 season the payment to fishermen was up 24% while the price per kg to fishermen was down.
- In 1991/92 and more particularly in 1992/93, there was a favourable currency effect.
- The increased catch was taken when there was strong demand created by the live lobster market which increased its consumption in 1991/92 and nearly doubled in 1992/93.
- It is not clear to what extent the increased catch supply helped create the market or the market was in a state to accept the increase in catch. However, the live market had been emerging and the currency effect in 1992/93 would have helped to increase demand.
- Similar to the 1987/88 season the full implication of a substantial catch increase appears to be reflected in both the year of the increase and the following year which was also a good catch year.

Never before in the history of the fishery has the situation arisen where there are two good years of production (1998/99 and 1999/2000) on top of an oversupply as is now the case. There were a number of factors that contributed favourably to maintaining the payments to fishermen during previous periods of significant increases in production in the past. The industry faces another challenge in the next three years to deal with significant catch increases in an environment that is uncertain given that:

- Asian countries have been experiencing downturns in their economies;
- there are no obvious emerging markets other than China; and
- competitors have been looking to increase their market share in markets that have traditionally been supplied by western rock lobster.

RLIAC Market Research Advisory Subcommittee

RLIAC's marketing subcommittee is developing a market data-base and providing information on the marketing aspects of management proposals RLIAC is considering. The marketing subcommittee terms of reference are:

1. Provide expert advice on relevant management strategies to maximise economic returns from the marketing of rock lobster
2. Undertake ongoing analytical work to describe the rock lobster market for the industry, government and RLIAC
3. To identify strategies which could increase market returns on issues such as trade barriers, tariffs etc.

Stock status

Breeding stock levels

The basic health of the stock is measured by comparing the current egg production of breeding females relative to historical virgin levels. When breeding stocks were depleted and had declined to less than 20% of virgin levels in the early 1990s, target safe levels were set for each zone. These targets were set at levels of approximately 25% of the estimated virgin levels which were equivalent to the breeding stock levels present in the late 1970s and early 1980s (Figures 3 and 4). While the breeding stock indices for each section of the fishery have now reached those target levels (1996/97) it is anticipated there will still be year to year variability, and some bias in these industry data-based spawning indices. Independent breeding stock surveys have therefore been developed to allow for calibration of the impact of technology changes and changes in fishing pattern which could otherwise give a false and optimistic impression of the western rock lobster breeding stocks levels across the fishery.

Figure 3: Time series of monitoring of spawning stock index for south coastal region (Source: 1997 Coastal tour)

SPAWNING INDEX – SOUTH COASTAL

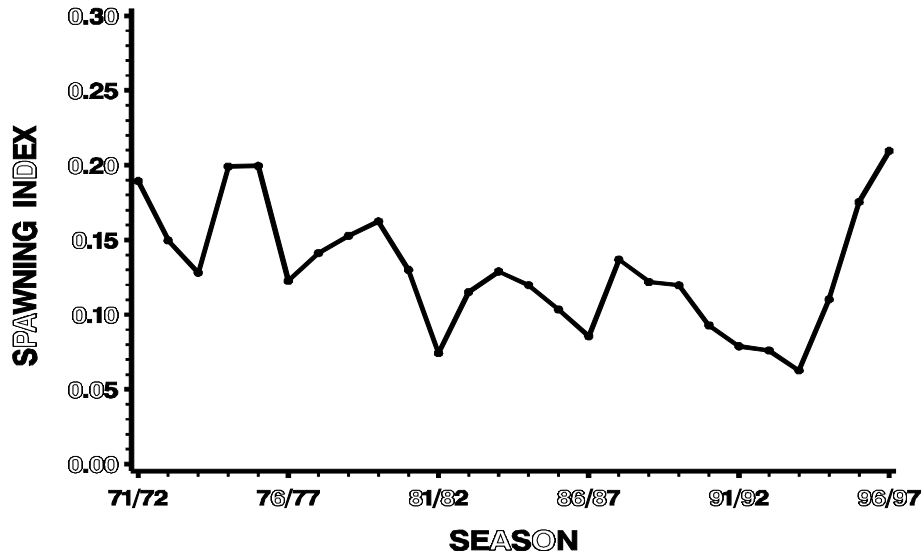
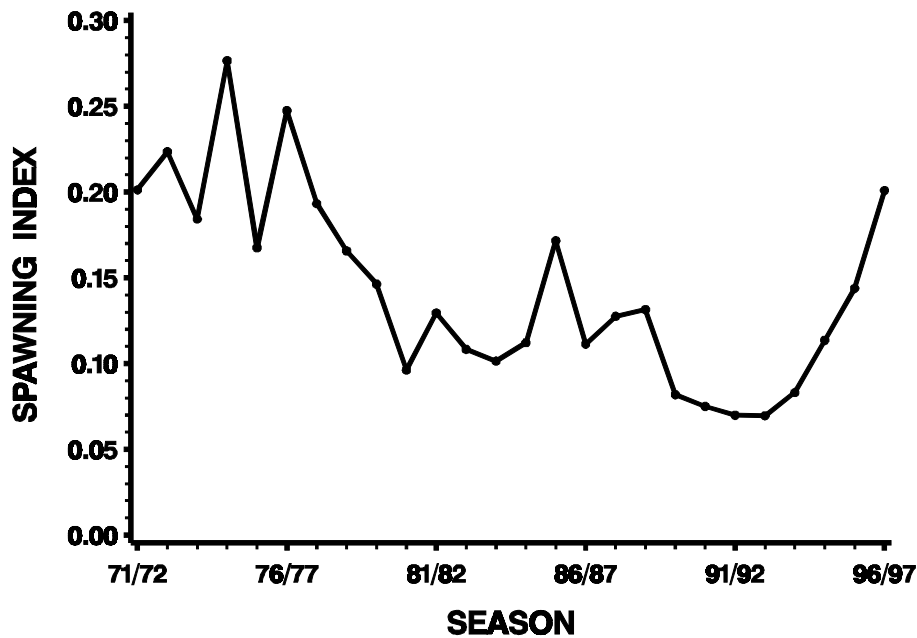


Figure 4: Time series of monitoring of spawning stock index for north coastal region (Source: 1997 Coastal tour)

SPAWNING INDEX – NORTH COASTAL



Catch forecasts

Latitudinal variation in recruitment

Research on the biology and distribution of western rock lobster over the past two decades has now confirmed that:

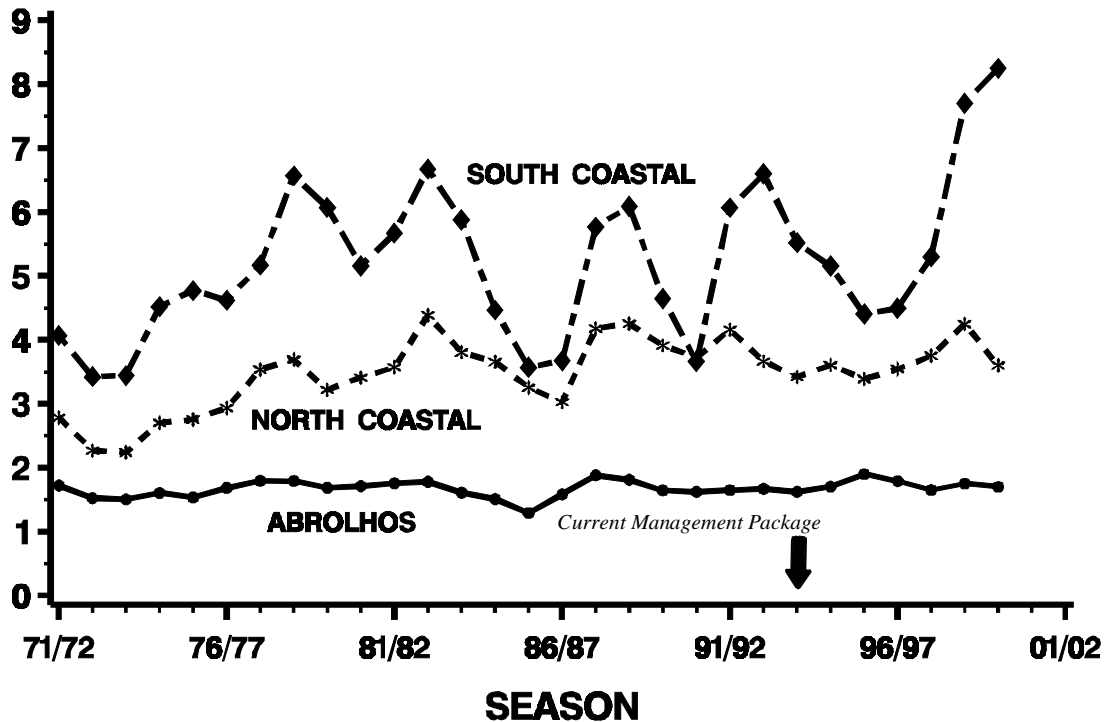
1. Recruitment of puerulus varies widely across the fishery although the variation in the north is low in comparison with the significant variation experienced in the south. Catches flowing from this puerulus settlement show similar trends from north to south.
2. Growth also varies regionally, being fastest in the south and slowest in the north, ie moult increments for legal sized lobsters of up to 6mm occur in the Fremantle sector while moult increments of 4mm are typical of the northern sectors of the fishery, including the Abrolhos Island.
3. Survival from puerulus settlement to legal size also appears to be density dependent, which means that the higher densities in the northern areas produce relatively consistent catches even when puerulus settlement varies significantly. In contrast similar percentage variations in puerulus settlement in the southern areas cause significant variations in catch.

The combination of these three factors results in increasing variability in catches from north to south in the fishery. This variation is most evident in the southern sector of Zone C particularly south of Fremantle, where catches typically vary up to four times between very poor and very good seasons. For Zone C as a whole, catches in good seasons are often 1.8 times poor season catches. In comparison the variation in Zone B is approximately 1.4 from high to low catch years and there are minimal changes from year to year in Zone A. This variability in catches over an extended period is demonstrated in Figure 5.

Figure 5: Catch by Zones from 1971/72 to 1996/97 and predicted catches for next three years (Source: 1997 Coastal Tour)

CATCH BY ZONES

(Millions of kg)



Catch forecasts

Catches three to four years ahead are now able to be forecast from puerulus settlement for each major sector of the fishery. These forecasts have been used to estimate future catches in each management zone of the fishery and for the respective 'white' lobster fishing period of November to January and 'red' lobster period of February to June, within each year. Using these forecasts and the typical seasonal catch distribution in each zone, the projected monthly catches under the current management package have been estimated for the years 1998/99 to 1999/2000. These forecasts together with historical catches since 1992/93 have been plotted (Figures 6 and 7).

Figure 6: Zone A and B Catch 1992/93 to 1999/2000 (Source: 1997 Coastal Tour)

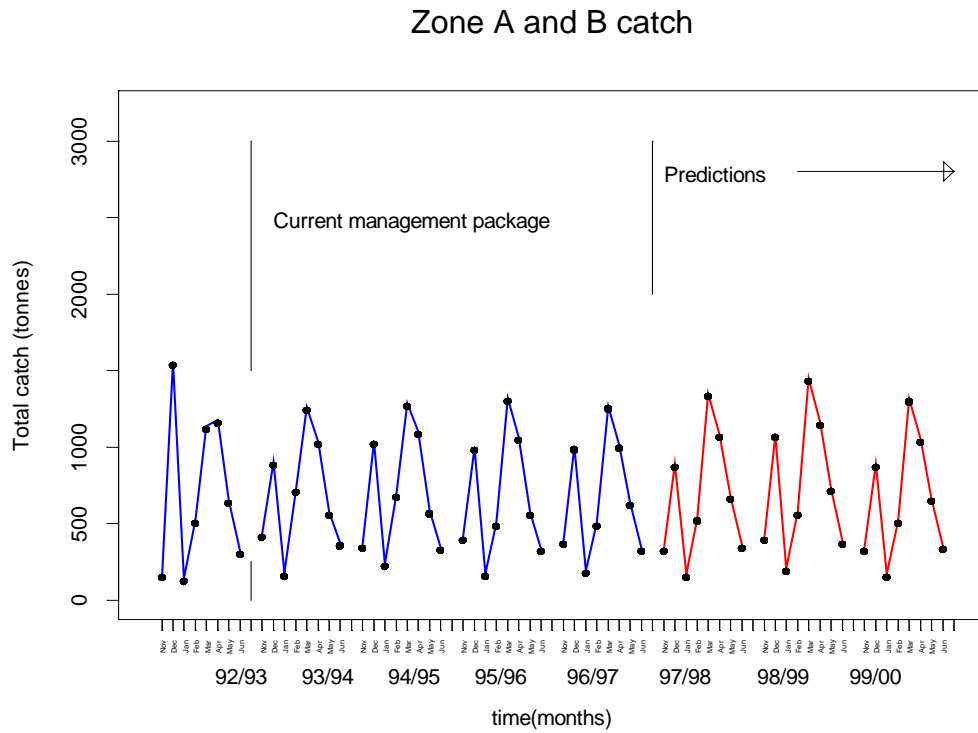
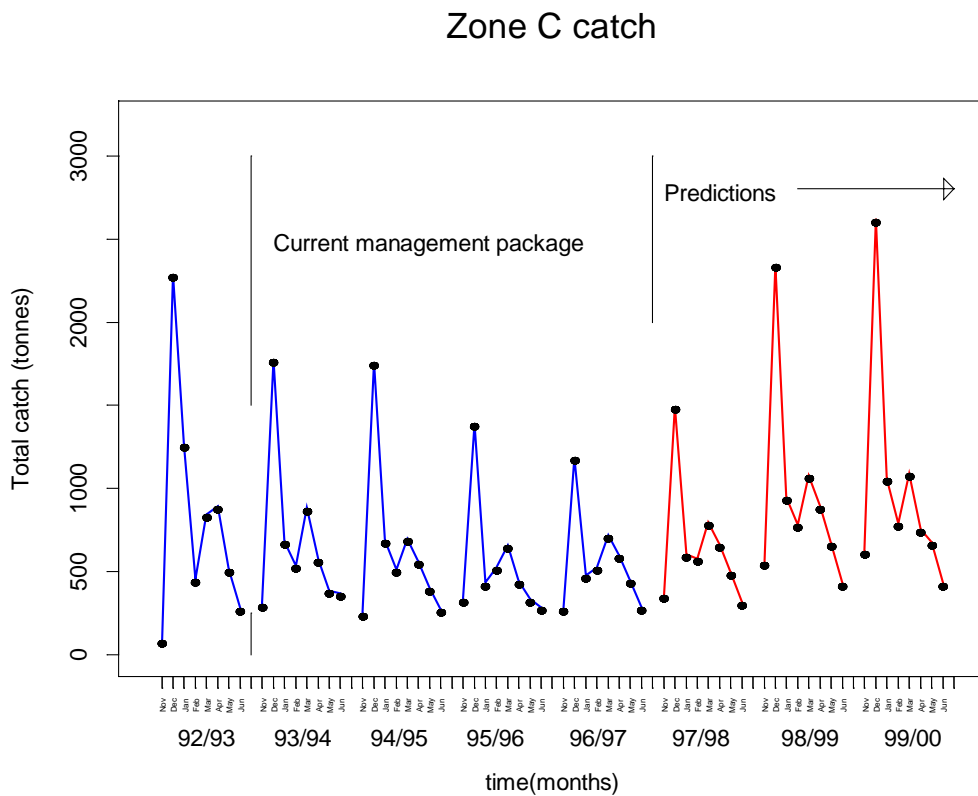


Figure 7: Zone C Catch 1992/93 to 1999/2000 (Source: 1997 Coastal Tour)



From Table 11 most of the forecasted increase in catch for the next two seasons will come from the southern region of the fishery. This increased catch is likely to result in a downward pressure on prices in the southern fishery because of larger catches. However, in the northern area catches are not predicted to increase to the same extent.

Table 11: The catch for 1996/97 and projections by Zone for 1997/98 to 1999/2000 (Zone C predictions based on the Alkimos collector and using all collector sites in brackets)

Zone	1996/97 (t)	1997/98 (t)	1998/99 (t)	1999/2000 (t)
C	4,500	5,300(4650)	7,700(6700)	8,200(8000)
A&B	5,400	5,700	6,500	6,300
Total	9,900	11,000(10350)	14,200(13200)	14,500(14,300)

It is apparent from Table 12 that most of the increase in the projected catch of 'whites' will come from Zone C. Zone C processors may therefore have to market an additional 2,000 tonnes of 'white' lobster for the 1998/99 season compared with the 1996/97 season. Zone A and B fishermen are likely to face reduced demand due to increased supply from Zone C.

Table 12: The 'whites' (Nov-Jan, 1996/97 catch and projected 'whites' catch 1997/98 to 1999/2000 (Zone C predictions based on the Alkimos collector)

Zone	1996/97 (t)	1997/98 (t)	1998/99 (t)	1999/2000 (t)
C	1,840	2,450	3,900	4,400
A&B	1,615	1,600	1,900	2,050
Total	3,465	4,450	5,800	6,450
Diff to 1996/97		+985	+2,335	+2,985

As 'red' lobsters have attracted a higher price than 'white' lobsters, the ratio of 'white' to 'red' is an important consideration in determining the value of production. The percentage of 'whites' over the period 1996/97 to 1999/2000 is given in Table 13 below.

Table 13: Percentage of 'whites' 1996/97 and predictions for 1997/98 to 1999/2000

Zone	1996/97 (%)	1997/98 (%)	1998/99 (%)	1999/2000 (%)
C	41	46	51	54
A&B	30	28	29	33
Overall	35	40	41	44

The percentage of 'whites' from Table 13 shows that in Zone C more of the increased catch is predicted to come in the 'whites' phase of the fishery.

APPENDIX 3

Increasing the worth of the catch

The stock of western rock lobster is exploited by both commercial (95%) and recreational fishermen (5%). The commercial catch is mostly exported (greater than 99%), to markets primarily in Asia and the USA. A previous review of the factors affecting the value of the commercial western rock lobster catch (Monaghan 1993) indicated that increased benefits may flow from a more steady flow of rock lobster during each season, an extension to the length of the fishing season and a reduction in the 'whites' catch peak in December. This assessment was based on the markets available at that time and the experience of the above average 12,300 tonne catch in 1992/93 season when beach prices to Rock Lobster fishermen fell to \$10-\$14 per kilo during the 'white' season.

Suggestions in Monaghan's paper (1993) of a more market directed monthly distribution of catches from the fishery have now in part been achieved as a secondary effect from the 1993/94 conservation-orientated management package. This change is now reflected to some extent in the licence and product value increases since 1993/94, particularly north of the 30° in Zones A and B where the 'white' catch now makes up a small (approximately) 30% of the catch (Figure 6) and most of the product is taken during the typically better market price period of March to June. In contrast to the northern zones, the impact of the 1993/94 package on the monthly catch distribution in Zone C (Figure 7) was much less and has had limited market benefits, although it did achieve its conservation objectives slightly more rapidly than in the northern part of the fishery. In an update of the 1992/93 report Monaghan (1997) has now provided data which indicates that:

1. There will continue to be significant market benefits gained if all product is landed in a condition suitable for live export which allows factories to process the lobsters into which ever product type is in demand.
2. A trial extension to provide the availability of live rock lobster throughout the year but particularly into the July, August, September - northern summer consumption period, would be beneficial in planning the long term development of markets.
3. Any increase in production in the present off season, that reduces the quantity of 'whites' available in December will possibly have a secondary beneficial impact on the value of the 'whites' catch.
4. There will be limited benefits in altering the catch available during the existing 'red' lobster season, eg in the northern half of the fishery (Zones A and B), ie separating the coastal and Abrolhos March peaks will have limited overall market impact (most of the catch is frozen).
5. That a more corporate approach to managing the fishery where the value of the product is more fully taken into account in determining when catches are taken would be beneficial.
6. Management measures that reduce the variations in production levels between seasons would be of overall benefit in development of markets.

Thus any management arrangements which modify the distribution of catches in the long term, need to take into account the future overall directions of the markets. Clearly all product frozen in one form or another can be distributed to meet market requirements over longer periods than the existing catch season. While there will be some benefits to the frozen product price from smoothing supply, ie reducing the need for freezer space and inventory costs etc, these are likely to be relatively minor. The focus of future product flow management is therefore of necessity likely to be focussed on live markets and the future growth of this sector (currently approximately 35-40% of the catch).

In terms of live product, management controls therefore need to focus primarily on the monthly supply requirements relative to market demand and the issues of holding capacity for live product. That is, any proposal to extend the period within a year when lobsters are available is only relevant to the live product supply as the existing frozen product can clearly be managed to supply markets year round. Should the proportion of catch going into the live market increase this issue of monthly supply level will become increasingly important.

Marec (1997) put forward nine options for consideration as potential to increase the worth of the catch however there was no assessment made of the cost to the catching and processing sectors. These options are:

Number	Option
1.	To compete for the live lobster market throughout the year
2.	Stock Financing (forward selling)
3.	The establishment of an industry marketing group (established 1997)
4.	Market access: the removal of barriers to trade
5.	Moving the catch within season
6.	Research and Development
7.	Developing new markets
8.	Moving catch from season to season
9.	Moulding the catch to match the consumption pattern of the market

Although each of the options has merit in further investigation the focus of this management paper is on management options relevant to implementing options 1, 5, 8, 9.

APPENDIX 4

Are there markets available to take additional live lobster in the off season and what prices could be expected?

The source of much of the information provided in this section is from a report provide to RLIAC by marketing consultant Mr E Ciciriello (unpublished data).

The three current markets for WA live lobster are Japan, Taiwan and HK/China (HK/China). The Japan and Taiwan markets have a preference for smaller lobster and the HK/China market a preference for larger lobster. A brief description of each of the markets follows.

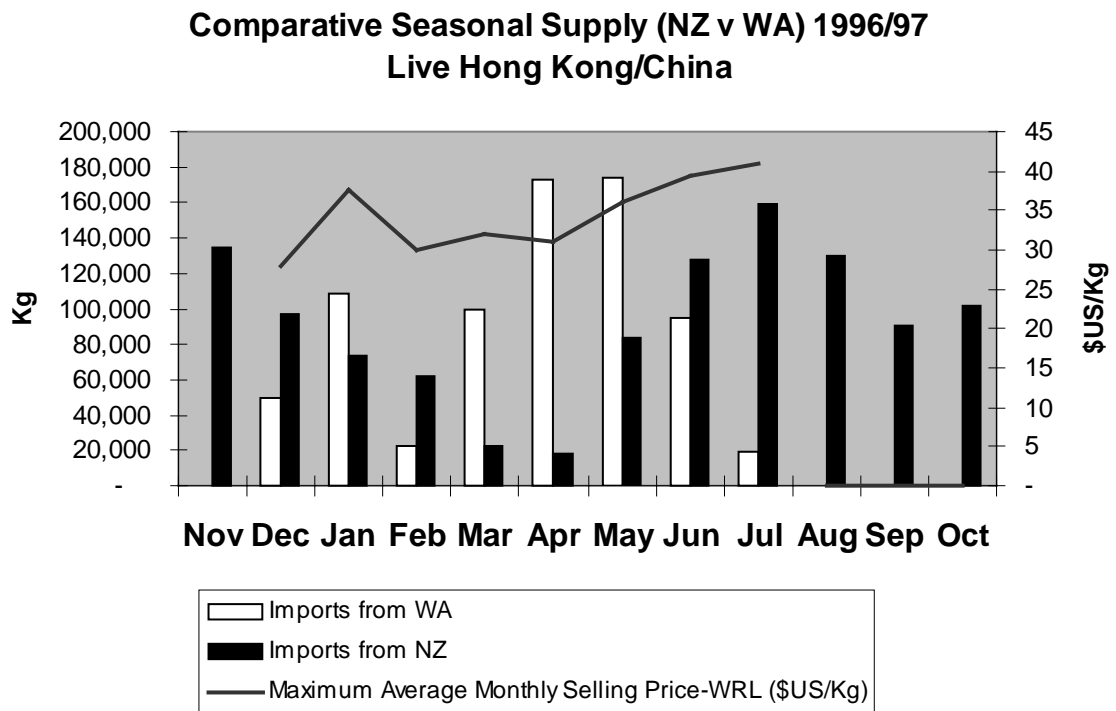
Hong Kong/China

The two premium species imported live into HK/China are Southern Rock Lobster (SRL) and Western Rock Lobster (WRL). Southern Rock Lobster, the most preferred species in HK/China market, is supplied by New Zealand, southern Australian states and South Africa. Western Rock Lobster also has a significant market share. However, lower grade products (at lower prices) supplied by Cuba, Mexico, India, Canada and the USA have been increasing their market acceptance.

Most of the lobster in China is consumed in restaurants at traditional celebrations such as weddings, birthdays and other special events. The SRL is the preferred species because of its consistent rich red colouration, larger size and longer term availability. The WRL is growing in popularity particularly during periods when imports of SRL are low.

There is no information available on supply of lobster in the period July to October other than from New Zealand. Therefore inferences about the demand for Western Rock Lobster are drawn from the New Zealand supply pattern and the small carry over of WRL into July.

Figure 8: Monthly Distribution of Live WRL Exports to HK/China



From Figure 8 it is apparent that there is a significant demand for live lobster in July through to September. The quantity of lobster that could be supplied from Western Australia depends on the preference by HK/China for WRL compared to SRL and a number of other factors. Although it is difficult to be generalise about markets the following comments are relevant. Assuming the SRL and WRL are good substitutes if there is excess demand by HK/China at the current price then the shortfall in supply could be met by WA without affecting the price up to the point where the excess demand was met. If on the other hand there is no shortfall in supply at the current price then WA could supply product at a lower price to gain market share and would be in direct competition with other suppliers.

Prices received for WRL vary by period and grade and depend on supplies by other competitors particularly New Zealand. The highest price recorded for WRL in 1996/97 was \$US41 per kg in July 1997 which may be a guide as to the maximum price that may be expected in July to September. Information on prices received for New Zealand lobster are unavailable.

In summary, the limited information available indicates that there would be demand for WRL from HK/China during the period July to September. Based on the assumption that the June imports by HK/China amount to about 220 tonnes (Figure 8) it has been estimated that there is a shortfall in supply of lobster to HK/China of about 260 tonnes (July to September). This estimate is only a guide and there may be other factors to consider that could influence the demand such as imports from other countries and/or changes in product preference.

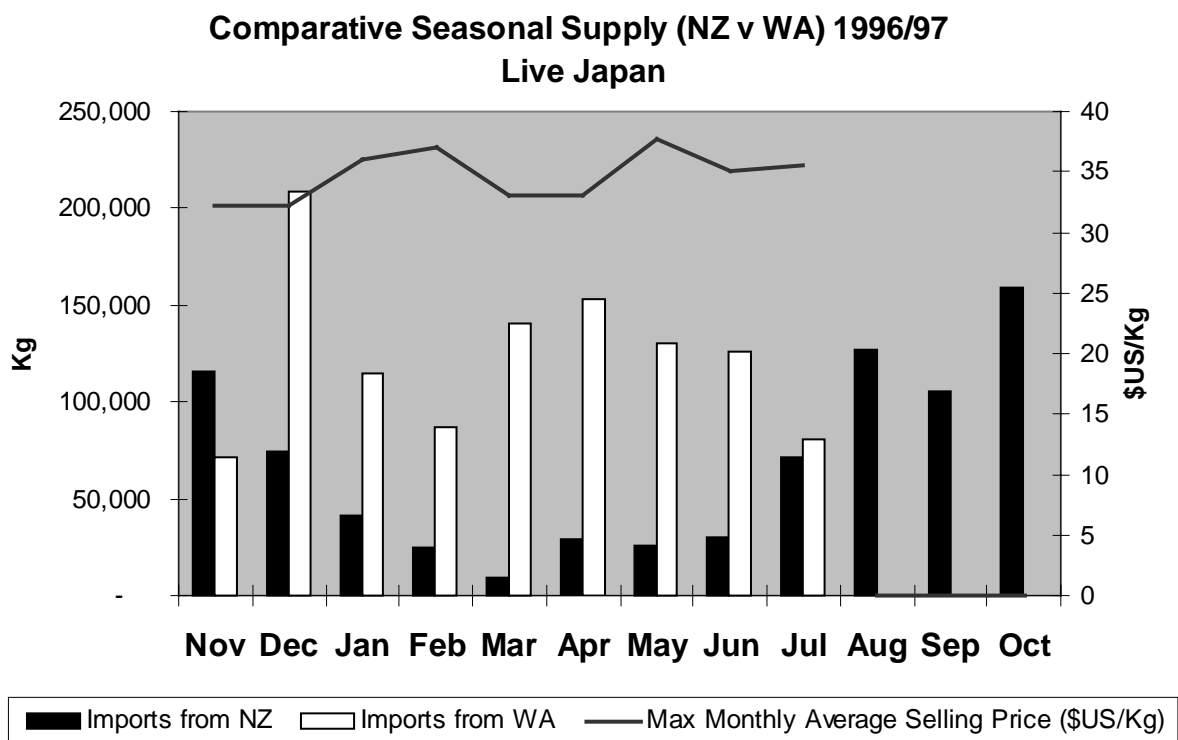
Japan

Japan is one of the largest importers of lobster products in the global market. Australia is the major supplier of spiny lobster to Japan. WA exports account for 80% of Australian exports to Japan with South Australia, Tasmania and Victoria supplying the remaining 20%.

Other major suppliers to the Japan market are New Zealand (790 tonnes in 1996/97) South Africa with other nations; Cuba, Mexico, South America (Brazil), India and Indonesia, Canada and the USA supplying lower grade products.

As was the case for the HK/China market there is no information available on supplies of live lobster to Japan in the period July to October from countries other than New Zealand (Figure 9). Accordingly, a similar analysis of potential demand is based on New Zealand's live exports to Japan.

Figure 9: Monthly Distribution of Live Lobster Exports to Japan



As for HK/China the supply of lobster to Japan in the period July to September is indicative of the demand that exists. New Zealand exports a greater quantity of live lobsters during the period when there is no supply from WA - the period in which demand is traditionally high for supply at wedding banquets.

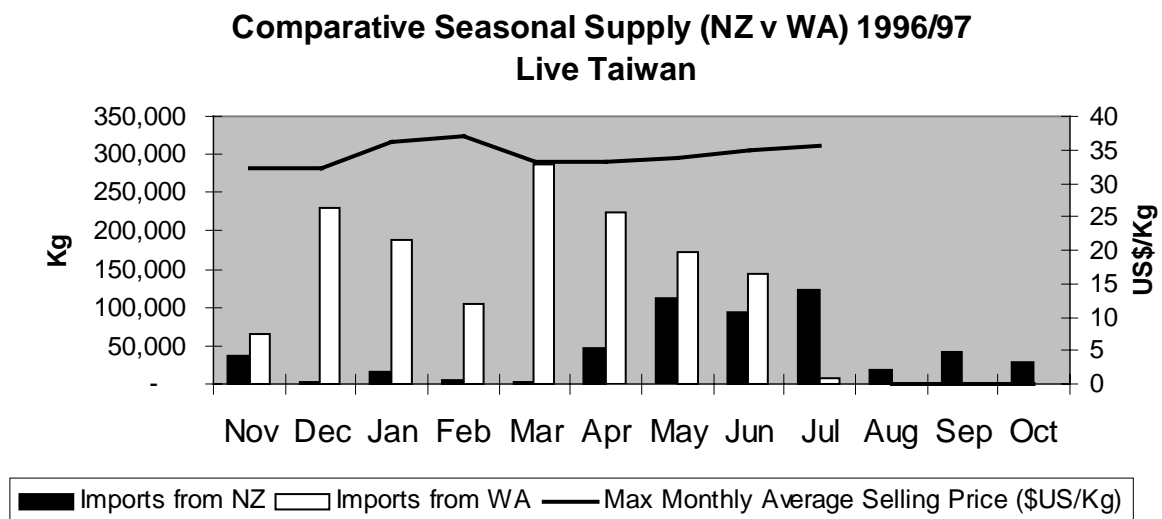
The price of WRL remains fairly constant at an average price of \$35US per kg. This may be indicative of the price that would be received in the period July to September.

Indications from importers are that additional quantities of live WRL could be exported in May and June and certainly in July to September although demand in August is expected to be lower because of the Obon festival (the festival of the dead) a time of the year in which live products lose their appeal. Based on the limited information from importers and examination of the supply by New Zealand it has been estimated that 150-250 tonnes of live lobster could be exported to Japan in the months July to September.

Taiwan

Taiwan is the largest importer of Western Australian lobster products. Similar to the HK/China market Taiwan has a preference for dark red medium sized spiny lobster. Anecdotal evidence indicates that WA exports more live lobster to Taiwan than any of the other Australian states. New Zealand and South Africa are other significant suppliers with exports of lower grade products from Cuba, Mexico, South American producers (eg Brazil), Asian producers (Eg India and Indonesia), Canada (Homarus) and the US (Homarus and spiny).

Figure 10: Monthly Distribution of Live Lobster Exports to Taiwan



Similar to the other two major markets for live WRL there is no information available on exports of live lobster by month to Taiwan other than New Zealand (Figure 10). Accordingly, the imports from New Zealand and information from importers have been used to make inferences about the demand for lobsters during the period July to September. New Zealand exported 190 tonnes to Taiwan in the period July to September during 1996/97. Although the low imports of live lobster in August can be attributed to the traditional “hungry ghost” celebration - where live products tend to lose their appeal there is no available explanation for the low imports during the months of September and October. It may also be a function of New Zealand supplying other countries in preference to Taiwan.

The price received for WRL is similar to the Japanese market which is not surprising considering they are similar products being imported (predominantly small grades). The average price of about \$35US does vary much by month and it could be expected that a similar price could be received in the period August to October.

The supply of live lobster to the Taiwan market is more uncertain than the other two markets as there are large variations in supply and a low quantity of imports from New Zealand in July,

August September, October and November. There is no information on imports from other countries during July to November however importers have indicated that imports of lower quality lobsters from California and Mexico increase over that period. Based on the limited information it has been estimated that conservatively it would be possible to export 150 tonne of WRL to Taiwan over the period of July to September.

APPENDIX 5

Industry views to date

A brief summary of the issues discussed and identified by industry to date for each management options discussed above are briefly outlined.

Fishing the off season

Economically un-viable for fishermen

Many fishermen have expressed concerns that it would not be profitable for them to fish the off season. This is a matter of judgement however RLIAC addressed this issue by proposing in the first instance a ballot to limit the number of boats fishing and secondly to permit boats to nominate to fish. Some fishermen have suggested that the catch would need to be at least 1000 tonnes and preferably 1500 tonnes to make it worth their while to go fishing if all of the fleet fished in Zone C.

Although there is the potential to supply an additional quantity of animals to the three major markets for live lobster the price of live lobster tends to increase in July to September in the HK/China market, a market which currently WA has limited potential to supply because of the preference for large sized lobsters. There is perhaps the potential to increase benefits if the catch could be evened out so that more of the catch could be sold at a higher price eg into the live market. If currently no more can be sold as live product during the season then a strategy of delaying capture of some animals in the season for capture later in the off season would have some attraction because of the higher price that might be obtained. However, it has to be recognised that fishing the off season would incur additional operating costs.

An individual's catch will depend on such factors as: the availability of the stock, fishing effort, the number of fishermen choosing to fish and weather conditions. The returns to fishermen would receive is therefore unable to be quantified. The price of the product will be influence by the operating margins of processors largely dependent on operating costs and prices obtained in overseas markets.

Some general comments may be made however, the fewer the boats fishing the higher the benefits will accrue from the additional operating costs and the benefits are then assumed to mostly arise from the transference of the catch to future periods. Too many boats competing for the catch would increase the costs of fishing and as individuals share of the catch decreases so to do the benefits.

The RLIAC members acknowledged that the returns to fishermen was an important consideration and although higher prices could be expected with a limited catch spread between the entire fleet, the average catch per boat could be low.

Generally it would be more economic the higher the average catch of each boat. RLIAC considered some mechanisms that could be used to achieve this.

1. Limiting the number of boats.
2. Increasing the catch of:
 - small animals by decreasing the gauge; and
 - large animals by permitting all oversize animals to be taken.

Also, to allay those concerns that those participating would have an unfair advantage RLIAC proposed a trade off in the whites phase of the fishery whereby those boats fishing the winter period would trade off some of their 'whites' catch and have a later start to the season.

Economically not viable for processors

Processors have concerns about the viability of operating receival depots during a period of low supply. The processors have also been concerned about the original proposal of a ballot because it could result in some processors having very low numbers of boats supplying them. Under this scenario if a processor choose not to receive product it faced the risk of losing one on its suppliers to a rival processor. The RLIAC acknowledged the legitimate concerns of processors and proposed that the number of delivery locations be limited to keep operating cost lows and a proposal that would permit all boats to nominate to fish. The Western Rock Lobster Development Association recently indicated support of a proposed fishing trial in the off season by nomination.

Ballot and nomination system is unfair

Fishermen have expressed concerns about the inequity of a ballot because everyone would not have the opportunity to fish. The RLIAC subsequently proposed that boats be allowed to nominate. The nominated and ballot systems were linked to a catch trade off in the 'whites' phase of the fishery so that any perceptions about the inequity of fishing the off season could be addressed.

Fisheries WA inability to implement an effective compliance program

There is a high level of compliance in the Fishery under the current arrangements and it is not expected to deteriorate due to fishing in the off-season. The Agency already has an effective catch monitoring program using processor and monthly returns both of these sources could be used to obtain an accurate measure of the catch taken during the off season. Under a trade-off arrangement the catch would have to be monitored more closely via processors and daily reporting requirements could be introduced.

Trading of pots during the period

The prospect of some licensees entering into agreements to transfer pots between licences so as to increase the number of pots on a boat during the fishing trial has not been fully discussed by RLIAC. However, selective trading of pots between fishing periods could become a problem in terms of equity during a trial and would require a mechanism to be developed to ensure the pots used in the trail are not used at the start of the season.

Who pays the additional enforcement cost

The cost of the compliance program for fishing the off season has been estimated to be about \$500,000. There have been divergent views on who should pay the additional enforcement costs. Some sectors of the industry think that those who fish in that period should pay the surveillance and enforcement costs whereas the alternative view is that everyone should share the cost. This matter has yet to be resolved.

Changes to size limits

A decrease in the minimum size to 74 mm was proposed to allow some pre-fishing of the 1998/99 'whites' and increase the catch of those boats fishing. All associations have been opposed to a decrease in the minimum size to 74 mm. The economics of fishing the off season in normal catch years without a lower minimum size is questionable and the objectives of the pre-fishing the 'whites' would have limited potential. Should an off season fishery be linked with a preceding season size limit increase it is possible to transfer legal sized animals to the off season having previously reduced the catch of 'whites' with a higher gauge.

Disruption to life style

Fishing in the off season was viewed as major disruption to family life and maintenance programs particularly in the southern half of the fishery as traditionally it is a time when fishermen:

- spend time with their families;
- carry out maintenance and refit boats; and
- generally take a break from the rigours of fishing.

Depending on the number of fishermen fishing it would mean that refits would have to be accommodated in a shorter time frame which it has been suggested would lead initially to congestion at harbours.

Health and safety

Fishing during the winter months would be limited due to the unfavourable weather conditions and the risks to the safety of the vessel and crew could be compromised.

Additional handling of animals

It has been suggested that the additional handling of breeding females and undersized lobsters will restrict growth rates and reproductive capability and there is the possibility that octopus predation will increase due to pots being unattended for longer periods of time or being lost.

Bait

Some fishermen are concerned that the additional bait required to fish the off season could cause a shortage for the following season and possibly increase the overall cost.

Recreational Fishing Advisory Committee's (RFAC) Position

The RFAC support in principle the improvement in economic performance of commercial fisheries but not at the expense of the recreational fishery. The RFAC considered that pre-fishing the 'whites' at a gauge size of 74 mm would threaten the quality of the recreational fishery. Accordingly, the committee's preliminary view is the pre-season fishing by the commercial sector should occur outside areas of major recreational significance that is; Perth metropolitan, inshore of the three-mile reef system, between Yanchep and Warnbro sound, reef areas within three nautical miles of the Jurien Bay Marina, and a similar closure near Geraldton.

Increasing the Gauge size

Changes to fishing patterns

Smaller boats - fishing inshore early in the 'whites'

Several fishermen have concerns that raising the gauge unilaterally will adversely impact the catch of smaller boats in the early part of the season. Generally the smaller pot holders fish in the inshore areas at the beginning of the season. They catch the bulk of their 'whites' in the very early part of the 'whites' run on the inshore reefs which are almost entirely smaller lobsters. By raising the gauge early in the season there would be a significant escapement of animals to deeper waters. Operators of smaller boats with small pot entitlements have argued that they would then be disadvantaged because they would have to compete for their share of the catch with the larger pot holders.

Fishing in the north of Zone C

Two concerns have been expressed by licensees fishing the waters close to the northern boundary of Zone C:

- a) the overall smaller size of animals in that area will mean that catch rates will be too low for them to continue to fish in that area and they will have to relocate further south causing congestion on southern fishing grounds (unless they have traded off their catch for the off season fishing);and
- b) that because of the general northerly migration of animals in that area that animals left in the water could migrate into Zone B and therefore there will be a permanent loss of catch to those fishermen fishing the area.

Benefits to Zone A and B licensees

Fishermen in Zone B have commented that there is no real benefit to delaying the catch in Zone B as catches for the next two years will not be increasing significantly and the proportion of the catch from those areas in the 'whites' phase is lower than Zone C.

Different gauge sizes for males and females

Many fishermen have commented that having two different gauges is unnecessary and practically difficult to implement in practice. It would result in increased handling times as the sex of all small size animals would have to be checked. The general comment has that it would be preferential to have one gauge size for both sexes.

Keeping the one minimum size throughout the entire season was preferred by most fishermen as it simplified compliance and operations of the catching activities.

Changes to setose

Generally the views expressed by fishermen about this proposal were that either:

- (a) they were opposed to the proposal because of concerns that taking these animals would adversely impact the breeding stock; or
- (b) they supported the proposal but thought that they should be able to take all oversize animals all year round.

Several fishermen were concerned that having protected these animals in the past they should remain protected to ensure adequate breeding stocks in the future.