

ROCK LOBSTER INDUSTRY ADVISORY COMMITTEE

**WEST COAST ROCK LOBSTER
MANAGED FISHERY**

**RECOMMENDED MANAGEMENT CHANGES
FOR THE 2008-09 SEASON**

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EXECUTIVE SUMMARY

The main purpose of this report is to inform stakeholders of the Rock Lobster Industry Advisory Committee (RLIAC) recommendations regarding management changes for the 2008/09 season.

The recommendations discussed in this paper are aimed at addressing the sustainability and economic objectives of the fishery for the next three seasons. The relative success of this management package will be monitored annually and be fully reviewed prior to the start of the 2010/11 season.

The focus of the paper is on meeting the management needs to address the sustainability objectives of the West Coast Rock Lobster fishery. The RLIAC is concerned that a higher residual biomass should be left in the fishery, in order to address effort creep in recent years. The management needs for economic objectives are discussed to a much lesser extent, as an economic analysis is being undertaken by the Western Rock Lobster Council (WRLC).

The first part of the report outlines the policy development process for each zone and the issues that Rock Lobster Industry Advisory Committee (RLIAC) has identified, along with the objectives and strategies to address the issues. The second part of the report provides information on the need for management changes for each zone, along with a discussion of the recommendations, with an estimate of the effective effort reduction and expected reduction in pot lifts.

Although there has been renewed interest in a quota management system, the options being proposed are under the current input management system. The development of a quota management system business case is being undertaken as a separate process, by RLIAC and is not under consideration for 2008/09.

RECOMMENDATIONS

1.1.1 Zone C

Objectives

1. Ensure that egg production remains above the threshold level over the next six years, given recent low recruitments.
2. Reduce harvest rate to below the indicative 70 per cent level.
3. Introduce changes that reduce short-term and longer-term costs and have a minimum negative impact on the overall profitability of the fishery.

Recommendations¹

1. An additional 10 per cent pot reduction for the whole season beginning in 2008/09 (equivalent to a 0.74 pot usage for the entire season). [10 per cent].
2. Seven-day moon closures from March to June inclusive, beginning in 2008/09 [4.5 per cent].
3. Closure from 11 – 28 February (or 29 February in a leap year) [approximately 4.6 per cent].

TOTAL EFFECTIVE EFFORT REDUCTION 19.1 PER CENT

1.1.2 Zone B

Objectives

1. Ensure that egg production remains above threshold level over the next six years, given recent low recruitments.
2. Reduce harvest rate to below the indicative 70 per cent level.
3. Ensure equity is maintained between Zone B and A, with the introduction of new management changes.
4. Introduce changes that have a minimum negative impact on the overall profitability of the fishery.

Recommendations¹

1. An additional 10 per cent pot reduction for whole of the season beginning in 2008/09 (equivalent to a 0.66 pot usage from 15 November to 14 March, and a 0.74 pot usage from 15 March to 30 June). [10 per cent].
2. Extend Sundays-off for the whole season beginning in 2008/09 [7.9 per cent].

TOTAL EFFECTIVE EFFORT REDUCTION 17.9 PER CENT

¹ Effective effort reductions are provided in square brackets for each management change

1.1.3 Zone A

Objectives

1. Reduce pot density saturation by reducing the number of pots to maximise overall profitability of the fishery
2. Reduce harvest rate to below the indicative 85 per cent level.
3. Ensure equity between Zones A and B is maintained with the introduction of new management changes.

Recommendations¹

1. Extend the current 10 per cent pot reduction (ending on 15 April) through to 30 June beginning in 2008/09 (equivalent to a 0.74 pot usage from 15 March to 30 June) [Five per cent if there is no pot density saturation].
2. Sundays-off from 15 March to 30 June beginning in 2008/09 [13.7 per cent].

TOTAL EFFECTIVE EFFORT REDUCTION 18.7 PER CENT

SECTION 2 INTRODUCTION

The RLIAC developed the management recommendations presented in this paper to primarily address the sustainability objectives of the fishery, and industry concerns about the state of the fishery. The source of industry views about the need for management changes and the types of changes that were required include:

- Requests made by fishers at coastal tour meetings in October 2007 for the committee to recommend changes to the management arrangements for the 2008/09 season to address concerns about sustainability and profitability.
- The WRLC advice that there was a need for a substantial reduction (30 per cent) in fishing effort to improve profitability and address effort creep.
- Several Professional Fisherman's Association submissions to the Committee about proposed management changes.

In addition to these submissions and the requirement to review the current package in 2007/08, the very low puerulus settlement for 2006/07 and 2007/08 has also added impetus to assess the management strategy for the next three to four years, in order to mitigate the effect of these low settlements on the breeding stock.

While the focus of the package is on addressing the sustainability objective, there are a number of economic issues that are impacting on the industry. Conclusions from the RSM Bird Cameron study on the financial situation (below) highlight these issues:

- Currently the catch sector is experiencing a cost-price squeeze from increasing costs and recent price volatility.
- The long-term impact of these changes will be minimised by the ability of the industry to reduce costs and improve catch efficiency.
- The price of the main cost driver, fuel, shows little sign of easing in the foreseeable future.
- There is evidence suggesting highly-g geared operators are facing an increasing level of financial stress.
- If net earnings are used as the basis for valuing entitlements, reducing profit margins will also reduce the capital value of pots.
- To improve its current rate of return, the fishery must restructure input costs.
- Consideration needs to be given to improving marketing and processing of product.
- The industry is facing challenges in obtaining and maintaining crew.

These financial impacts are likely to result in lower returns to industry over the next three to four years that will create the need for further fleet rationalisation.

While the RLIAC has limited information available to consider the economic impact of its recommendations, it believes its recommendations are likely to minimise the short-term financial impact on operators, while fostering a long-term restructure.

In 1993/94 the fishing effort reduction package, which included an 18 per cent pot reduction was very successful in protecting and improving the breeding stock and it acted as catalyst for fleet rationalisation (i.e. reduction in fishing vessels). However,

these gains have been eroded over the intervening years, as the fishing fleet has increased its fishing efficiency and exploitation.

A decision-rules framework, developed in 2004, based on protecting the breeding stock underpinned the next major change in management arrangements introduced in 2005/06. The 2005/06 management package was aimed at reducing effective effort by 15 per cent in the northern region of the fishery, and five per cent in the southern region.

The package for the north included a combination of pot and time closures, while in the south the package included time closures only. The 2005/06 package was subject to review in the 2007/08 season (i.e. the third season after it was introduced).

The requirement for management changes for sustainability under the current decision-rules framework is based on the biological objective of the protection of the breeding stock (i.e. maintaining the breeding stock above the 1980s level).

New decision rules, which are currently being developed, will incorporate harvest rates into the current decision-rules framework and take into account the uncertainty associated with the estimates of breeding stock and harvest rate indices. Management changes were considered to reduce harvest rates in anticipation of the adoption of the new framework.

Once the reasons for management action based on the decision rules framework have been determined, the actual response should be specified in terms of a measure (i.e. effective effort) that will allow for the comparison and evaluation of management options. Under this package, the RLIAC is recommending effective effort reductions of around 20 per cent for each of the zones of the Fishery.

The period over which the management changes are introduced can be either at one time, or phased-in over a period of time. A large change introduced as a one-off could be very disruptive to industry, but can provide a quick response. On the other hand, if there is no persuasive case for urgent action, changes can be phased-in over a longer time frame.

A one-off response would have the following advantages:

1. Ongoing amendments to the management plan would not be required.
2. Until legislated, additional measures for implementation in years two and three of the package may be seen by industry as being negotiable, hence protracting consultation processes.
3. Having a three-year package in place and implemented would enable industry and the Department of Fisheries to concentrate on discussions regarding the long-term management arrangements for the fishery.
4. It may provide some level of stability for the industry, in terms of rule changes and values of entitlements.

In this instance, the RLIAC, based on the considerations above, is recommending a one-off response for introduction in 2008/09.

There are many options that could provide the required management response. However, the timeframes involved, and the work required to evaluate these effects, means that proposed changes should focus on pot reductions and time closures.

Pot reductions have the long-term advantage of encouraging restructure in the fishery, whereas time closures have the advantage that they can provide an immediate cost saving. In combination they will both provide benefits, so the RLIAC has recommended changes to pot usage and time closures for all the zones.

The process described above is summarised in the following policy development structure.

POLICY DEVELOPMENT STRUCTURE

The structure below has been adopted by the RLIAC in order to assist policy makers with the development of management proposals (specific to each zone) by providing a policy framework in which to guide the decision-making process:

- Identification of issues/objectives.
- Discussion of the ‘pros and cons’ of management tools.
- Zones A, B and C:
 - Identify zone specific issues;
 - Set management objectives; and
 - Develop proposals.

KEY INFORMATION

Information used to support the policy development process included:

- Decision-rules framework:
 - 2004 ²; and
 - 2008 (new framework being developed);
- Catch predictions;
- Breeding stock indices;
- Harvest rates;
- Integrated model predictions for effect of effort reduction on catch and breeding stock;
- Impact of various temporal closures on effective and nominal effort;
- Professional Fisherman’s Association proposals;
- Individual licensee’s proposals;
- Western Rock Lobster Council advice; and
- RSM Bird Cameron study.

² An extract of the 2004 Decision Rules Framework used in the preparation of the RLIAC recommendations can be found at Appendix 9.

Most of this information is provided in the appendices to this document, apart from the draft decision-rules paper, which is being prepared separately, and the RSM Bird Cameron study, released by the Western Rock Lobster Council in 2007. More detailed research information will be made available when the draft stock assessment report (written by Caputi *et al.*) is released later this year.

SECTION 3 PART A: Issues

The RLIAC identified the following issues facing the industry at its October 2007 meeting:

- High harvest rate (including ‘effort creep’);
- Low puerulus settlement;
- Low residual biomass;
- Cost price squeeze
 - Operating costs increasing
 - Capital value/declining unit prices
 - Financial pressures;
- Undersize mortality;
- Equity between Zones A and B;
- Pot saturation (particularly in Zone A);
- Optimum marketing (e.g. peak in ‘reds’ and ‘whites’ lobsters, between years);
- Impact of heavy fishing pressure on low recruitment, thus reducing breeding stock;
- Social (occupational health and safety, family); and
- Carbon footprint.

In addition to the issues listed above, consideration will need to be given to what changes should be made to the management arrangements of the recreational sector under Integrated Fisheries Management principles. This issue is discussed later in the paper.

OBJECTIVES/STRATEGIES

The following objectives and strategies were developed by RLIAC to address some of the issues outlined above.

Table 1 *Table of Objectives, Strategies and Consequences developed by RLIAC in November 2007.*

Objectives	Strategies (08/09)	Strategies (09/10 +)	Consequences
Reduce costs (operating).	Days off (moon, Sundays, June, Feb). Pot reductions.	Pot reductions. Develop more efficient pots.	Days off may not increase profitability, cost savings for processors. See 3.2.1 below.
Reduce costs (capital - i.e. fleet size).	Pot reductions.	Pot reductions.	Reduce fleet size - Social issues.
Increase unit prices.	Pot reductions.	Pot reductions.	May or may not improve stability in prices.
Reduce pot saturation (Zone A).	Pot reductions.	Pot reductions.	Increase in working cost.
Equity between Zones A and B.	1 March opening. 1 March minimum size change.		High mortality, poor product (soft shell), may have to align Sunday closures.
Reduce harvest rates to improve breeding stock.	Day and pot reductions. Maximum size reduction.		Reduces high variability of catch between years, reduces risk of stock failure, could improve profitability. Increases breeding stock and increases resilience loss of catch.
Reduce undersize mortality		Increase number of escape gaps. Education.	Minimizing the handling of catch.
Improve supply pattern for marketing	Day and pot reductions (e.g. December and March). Extend season.		Improved prices.
Reduce carbon footprint	Day and pot reductions (Reduce fuel usage).		Increased capital costs, more targeted fishing days.

EVALUATION OF STRATEGIES

The following information is provided to inform the discussion regarding the choice between strategies.

3.1.1 Pot Reductions

Pot reductions have the potential to reduce the cost associated with fishing, based on the assumption that with less gear the cost of ‘inputs’ (such as pots, ropes, floats, bait and the time required to operate gear) is reduced.

Pot reductions are likely to increase the incentive for fleet rationalisation in the long term as licensees sell their entitlements and pots are redistributed amongst those remaining licensees.

It has been argued that pot reductions would increase demand for units and therefore improve unit and lease prices in the short term, as fishers attempt to maintain the number of pots allowed to be used at the level prior to the reductions.

From an economic perspective, fleet rationalisation can assist the industry to be more efficient and therefore more profitable. Some of the pots will be transferred to more efficient operators.

The impact on catch in the short-term and long-term would be variable between zones with pot reductions.

Overall pot reductions could be considered equitable in the sense that they do not affect the proportional catch share. However, individuals may be affected differentially, depending on when and where they fish and how their business is structured.

Pot reductions may have associated social implications, as the downsizing of the fleet could affect the social structure of smaller “lobster-dependent” communities.

In terms of phasing-in changes over a period of time, pot reductions have the advantage that it is relatively straightforward to implement in legislation and communicate the change to industry.

The RLIAC has previously considered many of the advantages and disadvantages associated with pot reductions that have been identified by industry. Table 2 summarises some of the advantages and disadvantages considered by the RLIAC when developing its management recommendations.

Table 2 *Advantages and disadvantages associated with pot reductions that were identified by industry.*

ADVANTAGES	DISADVANTAGES
<ul style="list-style-type: none"> • Contributes to the breeding stock. • Encourages fleet rationalisation (i.e. a decline in boat numbers or fleet composition). • Seen as equitable for all fishers. • Have economic benefits. • Less pots in water and hence less competition between fishers. • Some smoothing of high catch peaks (spread catch over the year), which could have economic benefits. • No increase in compliance cost. 	<ul style="list-style-type: none"> • Encourages fleet changes (i.e. a decline in boat numbers). • Social impacts from a decrease in boat numbers (community and family). • Could force small boats out of fishery. • Encourages fishers to fish harder and smarter and put more pressure on the fishery. • Seen to shift value of fishery to larger operators. • Less cost-effective compared to other options. • Could impact more on lease operators. • Small pot holdings could become less economically viable.

3.1.2 Time Closures

Time closures such as moon closures, Sundays-off, summer closures in Zone B, and the late start to the season in Zone C generally reduce fishing costs. The actual impact on profitability will depend on the relativity of the cost saving to the reduction in catch (revenue). The impact on catch would have a different effect in the short term (larger impact) and long term (smaller impact).

Time closures have various social and marketing impacts that can be important. For example, long periods of ‘down time’ can negatively affect the ability to hire, retain and train crew, and manage business cash flows. On the other hand, time closures may have a positive impact on family social values and occupational health and safety.

Time closures have a differential effect that depends on the catch rate during that period. Therefore, in assessing different time closures, an estimate is provided for the reduction of pot lifts (nominal effort) as well as an estimate of the reduction in effective effort that takes into account the catch rate in the period.

The relationship between the effective effort and nominal effort can be used as an indicator of the relativity of the cost saving (reduction in fishing inputs) compared to the revenue loss (reduction of catch). For example, if a time closure has a relatively high percentage reduction in nominal effort (high cost savings), but a relatively low

percentage reduction in effective effort (small affect on catch), then this would result in an overall positive benefit in comparison to an alternative that did not have the same outcome.

Marketing impacts are another factor which are relevant to the previous discussions about time closures, such as the capacity to provide product for the Chinese New Year, which traditionally occurs during a period when prices are higher.

3.1.3 Comparison of Pot Reductions Versus Time Closures

The mix of pot reductions versus time closures will need to be assessed in terms of the relative importance of the different objectives in each of the zones of the Fishery. While both pot reductions and time closures reduce effort, the mix of these strategies can be tailored to meet other non-effort related objectives for each zone.

For example, an objective to improve unit values and fleet rationalisation would shift the balance towards pot reductions. Whereas, if reducing operating costs in the short-term was an objective, then the balance could shift towards time closures, noting that social issues will be an important consideration.

3.1.4 Escape Gaps

Increasing the escape gap size from 54mm to 55mm could have a beneficial impact by reducing the handling and mortality of undersize animals and in most cases have no impact on legal catch.

If there is some loss in legal-sized lobsters, it would have the same effect as an effort reduction, where any catch foregone in one year would be available for capture in future seasons. The amount of catch foregone would vary throughout the season and between seasons, depending on the availability of stock.

Although the actual impact is not quantified overall, increasing the escape gap size would have a positive impact.

3.1.5 Maximum and Minimum Size Gauge Control

There are no readily identifiable and direct socio-economic benefits associated with gauge changes. While reducing the maximum size of lobsters that can be taken is an effective biological measure (by directly contributing to the breeding stock with minimal impact on catch) it could add an additional inefficiency, given that oversized animals will continue to be caught and consequently need to be handled with no direct economic return.

ZONE C

4.1.1 Stock Assessment

Due to a period of below-average recruitment, the predicted catches for Zone C will continue to decline - down to 3,100 tonnes in the 2010/11 season (Appendix 1, Table 1, Figure 1). The predicted catch for the whole Fishery in the 2010/11 season is expected to be about 7,200 tonnes (Appendix 1, Table 1), which will make it one of the lowest catches on record.

The harvest rate for Zone C is relatively high, being slightly above the indicative proposed threshold level of 70 per cent³ (Appendix 2, Figure 1).

The weight of setose females returned to the water in 2006/07 has decreased considerably from the previous season, and is now below the amount returned in the 2001/02 season (Appendix 3)

The residual legal biomass estimated to remain at the end of the fishing season has continued to decline, and is below the estimated levels in the early 1990s (Appendix 4, Figure 1).

The RLIAC is concerned at this continued decline in the residual biomass, which may have resulted from overfishing related to 'effort creep', and is of the view that measures are needed to assist the recovery of the biomass.

The median fishery-dependent Breeding Stock Index (BSI) for Zone C is currently above the Biological Reference Point (BRP) threshold (being the level observed in the early 1980s), albeit showing a trend downwards (see Appendix 5, Figure 1).

The fishery-independent BSI, like the fishery-dependent BSI, is also declining and is now at a similar level to that of the early 1990s (Appendix 6, Figure 1).

Model projections of the effect of the current series of low recruitment, coupled with a high harvest rate, indicates that the breeding stock will continue to decline (Figure 1, below).

³ The proposed 70 per cent threshold harvest rate will be subject to further consultation with industry when the updated decision-rules paper is released later this year.

4.1.2 Key Issues

1. Low profitability due to predicted low catches and high costs.
2. Decreasing egg production, which may fall below the threshold level.
3. High harvest rate, meaning low residual legal biomass.

4.1.3 RLIAC Objectives

1. Ensure that egg production remains above the threshold level over the next six years, given recent low recruitment.
2. Reduce harvest rate to below the indicative 70 per cent level.
3. Assist the recovery of the residual legal biomass.
4. Introduce changes that reduce short-term and longer-term costs and have a minimum negative impact on the overall profitability of the fishery.

4.1.4 Assessment of Reductions in Effective Effort

At its meeting in November 2007, the RLIAC requested that the Department of Fisheries provide an assessment of the impact of a range of effective effort reductions (five per cent and 10 per cent per year for three years, and 20 per cent and 30 per cent in the first year) on the predicted BSI and catch for each fishing zone. These impacts were estimated using modelling methods developed by the Department.

The impacts on the BSI are displayed in Figure 1 below. In summary, a five per cent per year reduction in effective effort was estimated to have no significant impact on the decline of the predicted BSI. A 10 per cent per year reduction in effective effort for three years is estimated to slow the decline in the BSI, but the response is not as fast as the 30 per cent reduction.

A 20 per cent and 30 per cent reduction in effective effort in the first year is estimated to provide a more immediate response. In the long term (2013), both the 10 per cent effective effort reduction over three years, and the 30 per cent effective effort one-off reduction are estimated to result in a similar level BSI.

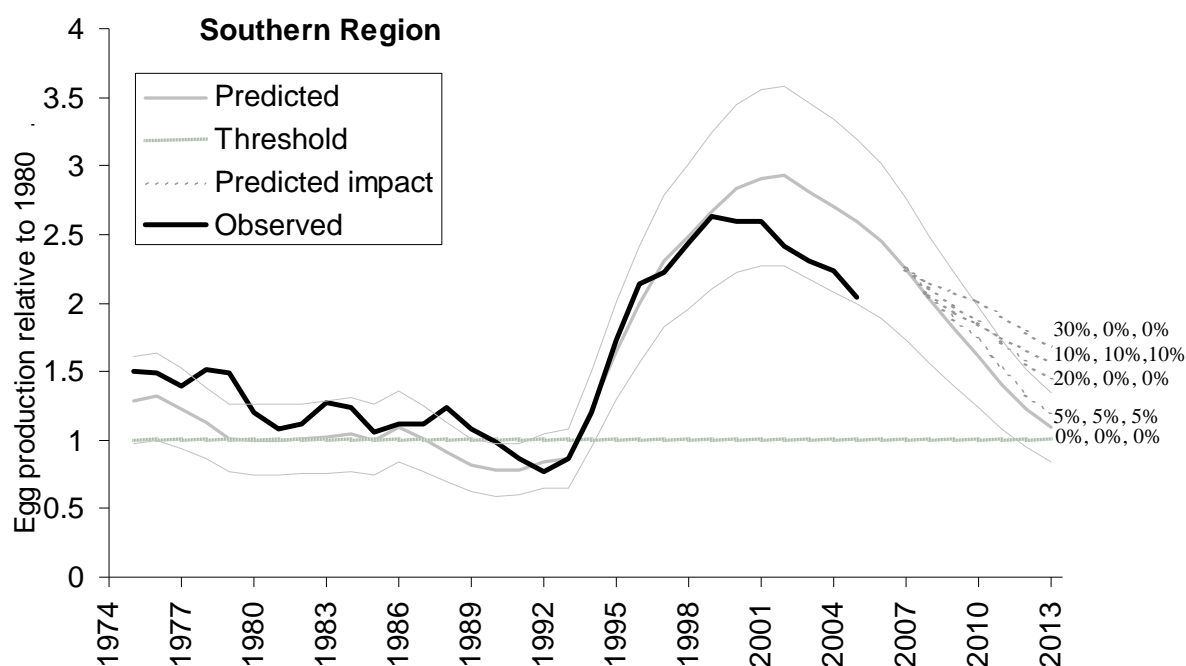


Figure 1 Actual BSI values and BSI Model projections for five per cent and 10 per cent reductions per year over three years and a 20 per cent and 30 per cent reduction in the first year of the three-year management package.

The expected percentage reductions in catch are provided in Table 3. For example, a five per cent reduction per year is estimated to reduce the actual catch by three per cent, three per cent and four per cent below the predicted catches for the seasons 2008/09, 2009/10 and 2010/11 respectively (Table 3).

Table 3 Percentage catch reductions per season from the predicted catch for five per cent and 10 per cent reductions per year over three years and a 20 per cent and 30 per cent reduction in the first year of the three-year management package.

Season	Reduction in Predicted Catch (%)			
	5% Each Year	10% Each Year	20% First Year	30% First Year
2008/09	3	6	12	18
2009/10	3	7	2	5
2010/11	4	10	1	3

A detailed assessment of the impact of effort reductions on key indices is provided in Appendix 7.

4.1.5 Management Proposals

4.1.5.1 Stakeholder Proposals

Below is a brief summary of the management proposals relating to Zone C that has been provided to the RLIAC.

2007 Coastal Tour, Fremantle

- February Closure.

Western Rock Lobster Council

- 30 per cent pot reduction over two years (15 per cent per year).
- 10-day February moon closure (with pots out).
- 77mm minimum size for all zones from 2009/10 season.

Latitude 31 Pro Fish Association

- 8.5 per cent pot reduction to 1 March.
- Closure from 14 February to 1 March or
- February closure or
- June closure or
- Nominate days fished.

Western Australian Rock Lobsters' Fishers Federation

- Close last two weeks of February.
- Close last two weeks of June.

Central West Coast Professional Fisherman's Association

- 20 – 30-pot reduction.
- Seven to 10-day moon closures.
- Season commences on 15 November.

SW Rock Lobster Wet Fisherman's Association

- No change proposed.

Zone C Professional Fisherman's Association

- Will provide comment following the outcomes of a workshop being organised by the Western Rock Lobster Council (to be held on 21 April 2008).

4.1.5.2 RLIAC Recommendation

At its 27 February meeting, the RLIAC resolved to adopt a number of management measures to maintain the current fishery-dependent Breeding Stock Index (BSI) in Zone C, ensuring that at the very least, it remains above the threshold level by the end of this management package in 2010/11 (or preferably by 2013/14, which is when the low recruitments will reach the breeding stock).

The RLIAC also resolved to reduce the harvest rate to below the 70 per cent indicative threshold.

The RLIAC noted that a five per cent effective effort reduction per year for three years commencing in 2008/09 would have little effect on slowing the decline of the BSI (Figure 1), based on modelling that was carried out.

In contrast, modelling showed that a 30 per cent effective effort reduction slowed the decline, with the BSI well above the threshold in six years. A 20 per cent effective effort reduction, (Figure 1) although not slowing the decline to the same extent, resulted in the BSI remaining above the threshold while having a lower impact on catch (Table 3).

As a result, the RLIAC resolved to recommend that a 20 per cent effective effort reduction would achieve the primary objective of maintaining the breeding stock above the threshold in six years.

In terms of this effort reduction, the RLIAC formed the view that an equal mix of pot reductions and time closures were preferred, as they will provide short-term cost savings while bringing about long-term restructuring through pot reductions.

Aim – to reduce the effective effort in Zone C by about 20 per cent by using a mix of both pot reductions and time closures.

4.1.5.3 Time Closures

In order to ensure that any management changes reduce costs and have a minimum impact on the overall profitability of the Fishery (Objective 3), the RLIAC considered the information presented in Tables 1 and 2 at Appendix 8, which compare effective effort versus nominal effort reductions for a variety of temporal closure options.

The ratio of the percentage reduction in nominal effort to effective effort can be used as an indicator of the cost savings relative to the effective effort reduction. Closures that have a higher nominal effort reduction compared to the effective effort reduction will potentially deliver the best economic outcome in the short term.

For example, Table 2 (Appendix 8) shows that a February closure will provide an effective effort reduction of 9.2 per cent and a nominal effort reduction of 14.1 per cent. In contrast, Table 1 (Appendix 8) shows that seven-day moon closures during the “whites” lobster run would deliver a 9.6 per cent reduction in effective effort, but only a 7.1 per cent reduction in nominal effort.

Therefore, a February closure could be expected to have comparatively less financial impact than seven-day moon closures during the “whites”, while achieving a similar reduction in effective effort.

The RLIAC believes that a combination of monthly closures and moon closures would be the best way to achieve the required 10 per cent reduction in effective effort. The committee believes that closing all of February would have too adverse an impact on marketing arrangements because Zone B is closed in the first half of February. Similarly, the committee chose not to recommend a June closure, due to the possibility of achieving higher prices toward the end of the season.

Closing the last half of February was considered to be a suitable option, giving an approximate 4.6 per cent effective reduction. This closure provides the additional benefit of complementing the “summer closure” in Zone B, ensuring continuous supply of rock lobster to the market.

As moon closures are already in place for Zone C and given they are generally well received by industry, the RLIAC recommended that they be extended from three days to seven days (from March onwards) to provide an additional 4.5 per cent reduction in effective effort required to achieve its aim of a 10 per cent effective effort reduction by time closures. The February closure would replace the existing 3-day moon closure in February.

The RLIAC management recommendations (with the effective effort reduction in square brackets) for Zone C are as follows:

Recommendations

- 1. An additional 10 per cent pot reduction for the whole season beginning in 2008/09 (equivalent to a 0.74 pot usage for the entire season). [10 per cent].**
- 2. Seven-day moon closures from March to June inclusive beginning in 2008/09 [4.5 per cent].**
- 3. Closure from the 11th to 28th (or 29th in leap year) of February [approximately 4.6 per cent].**

TOTAL EFFECTIVE EFFORT REDUCTION 19.1 PER CENT

ZONE B

4.1.6 Stock Assessment

Due to a period of below-average recruitment, the predicted catches for Zone B will continue to decline - down to 2,450 tonnes in the 2010/11 season (Appendix 1, Table 1, Figure 1). The predicted catch for the whole fishery in the 2010/11 season is expected to be 7,200 tonnes, which will make it one of the lowest catches on record.

The harvest rate for Zone B is above the indicative threshold level of 70 per cent (Appendix 2, Figure 2). While the harvest rate was above 80 per cent prior to the 2005/06 management package, by the end of the 2006/07 season it had declined to approximately 75 per cent (Appendix 2, Figure 2).

The weight of setose females returned to the water in 2006/07 is very similar to the previous season, but remains at the lower end of the range observed since the mid-1990s (Appendix 3).

The residual legal biomass estimated to remain at the end of the fishing season in Zone B has stabilised, but remains at a relatively low level (Appendix 4, Figure 2).

Prior to the start of the 2005/06 management package the median fishery-dependent Breeding Stock Index (BSI) for Zone B had almost declined to the Biological Reference Point (BRP) threshold (see Appendix 5, Figure 2). As illustrated by Figure 5, Appendix 3), the fishery-dependent BSI has increased following the introduction of the 2005/06 package, but remains close to the threshold.

The fishery-independent BSI, like the fishery-dependent BSI, is also declining slightly and is at a similar level to that of the early 1990s (Appendix 6, Figure 1).

Model projections of the effect of the current series of low recruitment, coupled with a high harvest rate, indicates that the breeding stock in Zone B will start to decline (Figure 2).

4.1.7 Key Issues

1. Egg production is currently close to the threshold, and is expected to reach the threshold by the 2010/11 season.
2. High harvest rate and low recruitment, resulting in low residual legal biomass.
3. Equity with Zone A.

4.1.8 Objectives

1. Ensure that egg production remains above threshold level over the next six years, given recent low recruitment.
2. Reduce the harvest rate to below the indicative 70 per cent level.
3. Ensure equity is maintained between Zones B and A, with the introduction of new management changes.
4. Introduce changes that have a minimum impact on the overall profitability of the fishery.

4.1.9 Assessment of Reductions in Effective Effort

At its meeting in November 2007, the RLIAC requested that the Department of Fisheries provide an assessment of the impact of a range of effective effort reductions (five per cent and 10 per cent per year for three years and 30 per cent in the first year) on the predicted BSI and catch for each Zone. These impacts were estimated using modelling methods developed by the Department.

The impacts on the BSI are displayed in Figure 2 below. In summary, a five per cent per year reduction in effective effort is estimated to have no significant impact on the decline of the predicted BSI. A 10 per cent per year reduction in effective effort is estimated to provide an increase in the BSI, while the 30 per cent reduction provides a substantial initial increase in the BSI.

In the long term (2013) both the 10 per cent effective effort reduction over three years, and the 30 per cent effective effort one-off reduction are estimated to result in a similar level BSI.

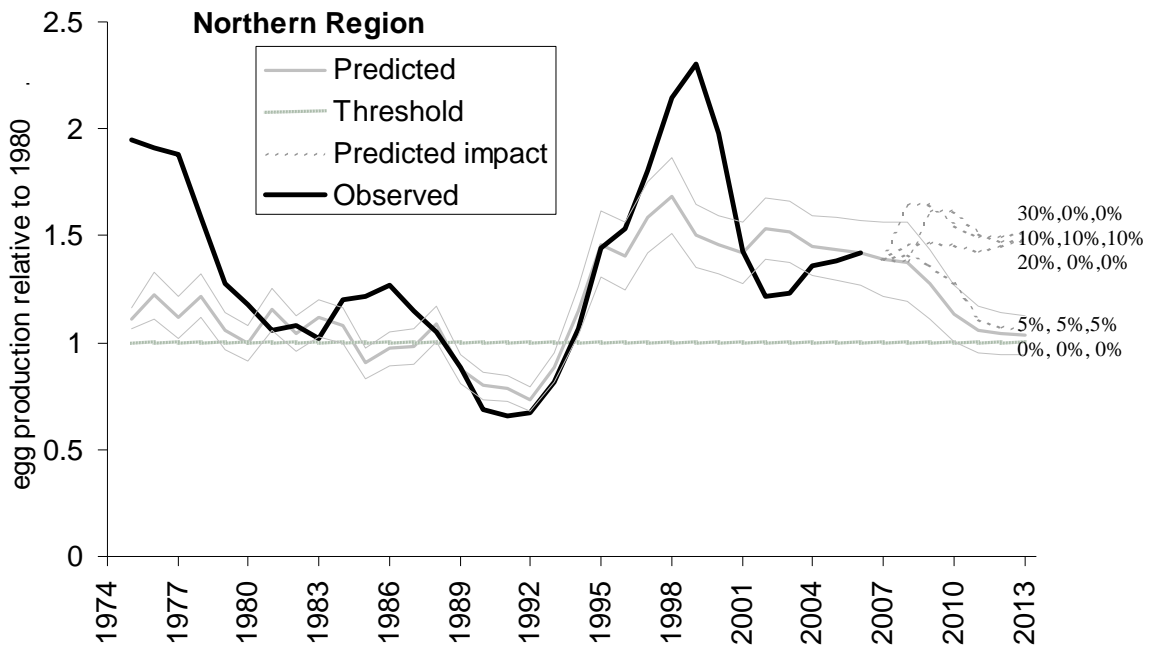


Figure 2 Actual BSI values and BSI Model projections for five per cent and 10 per cent reductions per year over three years and a 20 per cent and 30 per cent reduction in the first year of the three-year management package.

Table 4 (below) provides the estimated percentage reductions in catch for the five per cent and 10 per cent reductions over three years and a 30 per cent reduction in the first year. For example, a five per cent effective effort reduction per will result in a negligible reduction in the predicted catch (Table 4).

In contrast, the 30 per cent reduction in the first year provides a substantial 18 per cent reduction in the first year and a seven per cent reduction in the second year of the package (Table 4). The 10 per cent per year reduction affords a more moderate reduction in catch, with a five per cent, six per cent and seven per cent reduction (Table 4)

Table 4 *Percentage catch reductions per season from the predicted catch for five per cent and 10 per cent reductions per year over three years and a 20 per cent and 30 per cent reduction in the first year of the three-year management package.*

Season	Reduction in Predicted Catch (%)			
	5% Each Year	10% Each Year	20% First Year	30% First Year
2008/09	2	5	9	18
2009/10	1	6	4	7
2010/11	0	7	1	2

A detailed assessment of the impact of effort reductions on key indices is provided in Appendix 7.

4.1.10 Management Proposals

4.1.10.1 Stakeholder Proposals

Below is a brief summary of the management proposals from associations relating to Zone B that have been provided to the RLIAC.

Western Rock Lobster Council

- 10 per cent pot reduction.
- Sundays-off all season.
- No fishing outside 20 fathoms for all fishers between 1 March and 15 March.
- Zone A fishers out of Zone B on 1 March.
- 77mm minimum size for all Zones from 2009/10.

Kalbarri Professional Fisherman’s Association

- Zone A fishers out of Zone B on 1 March.

Geraldton Professional Fisherman’s Association

- 30 per cent pot reduction.

Dongara Professional Fisherman's Association

- 20 per cent pot reduction.
- Maintain the 77mm minimum size until 1 March.
- Replace summer closure (15 January to 10 February) with a February closure.
- Two days in a row off during the week.
- Zone A fishers out of Zone B on 1 March.

4.1.10.2 RLIAC Recommendation

At its 27 February meeting, the RLIAC resolved to adopt a number of management measures to maintain the current fishery-dependent BSI in Zone B above the threshold level by the end of this management package in 2010/11 (or preferably by 2013/14 which is when the low recruitments will reach the breeding stock). The RLIAC also resolved to reduce the harvest rate to below the 70 per cent indicative threshold.

The RLIAC noted that a five per cent effective effort reduction per year for three years commencing in 2008/09 virtually had no effect on slowing the predicted decline of the BSI (Figure 2). A 30 per cent effective effort reduction increased the BSI to well above its current level (and the threshold) after six years.

A 20 per cent effective effort reduction (Figure 2), although not increasing the BSI to the same extent, is nonetheless predicted to raise the BSI above the current level and to maintain it above the threshold, while having a lower impact on catch than a 30 per cent reduction (Table 4). Therefore, the RLIAC resolved to recommend that a 20 per cent effective effort reduction would achieve the primary objective of maintaining the breeding stock above the threshold in six years.

The RLIAC formed the view that a mix of pot reductions and time closures were preferred, as they will provide short-term cost savings while bringing about long-term restructuring through pot reductions.

Aim – to reduce the effective effort in Zone B by 20 per cent by using a mix of pot reductions and time closures

4.1.10.3 Time Closures

In order to ensure that management changes reduce costs and have a minimum impact on the overall profitability of the Fishery (Objective 3), the RLIAC considered Tables 3, and 4 at Appendix 8, which compare effective effort versus nominal effort reductions for a variety of temporal closure options.

The ratio of the percentage reduction in nominal effort to effective effort can be used as an indicator of the cost savings relative to the effective effort reduction. Closures that have a higher nominal effort reduction compared to the effective effort reduction will potentially deliver the best economic outcome.

For example, Table 4 (Appendix 8) shows that a November closure will provide an effective effort reduction of 8.9 per cent and a nominal effort reduction of 11.1 per

cent. In contrast, Table 1 (Appendix 8) shows that seven-day moon closures in December would deliver an 8.8 per cent reduction in effective effort, but only a 6.1 per cent reduction in nominal effort. Therefore, a November closure could be expected to have comparatively less financial impact than seven-day moon closures in December, while achieving a similar reduction in effective effort.

Given that moon closures appear to be unpopular with Zone B fishers, the RLIAC proposed to continue the current “Sundays-off” for the entire season. These closures provide a reduction in effective effort of 7.9 per cent, with an 8.4 per cent reduction in nominal effort.

The management recommendations of the RLIAC (with the additional effective effort reduction in square brackets) for Zone B are as follows:

Recommendations

- 1. An additional 10 per cent pot reduction for whole of the season beginning in 2008/09 (equivalent to a 0.66 pot usage from 15 November to 14 March, and a 0.74 pot usage from 15 March to 30 June). [10 per cent].**
- 2. Extend “Sundays-off” for the whole season beginning in 2008/09 [7.9 per cent].**

TOTAL EFFECTIVE EFFORT REDUCTION 17.9 PER CENT

ZONE A

4.1.11 Stock Assessment

Following a period of increased catches in Zone A, the decline in the recruitment on the coast will bring about a corresponding decline in catches for Zone A. Although the Zone A catch does not tend to vary as greatly as the coastal zones, the predicted catch is expected to decline to 1,650 tonnes in the 2010/11 season (Appendix 1, Figure 2). The predicted catch for the whole fishery in the 2010/11 season is expected to be 7,200 tonnes, which will make it one of the lowest catches on record (Appendix 1, Table 1).

The harvest rate is above the “indicative” threshold level, which has been initially been proposed to be 85 per cent (Appendix 2, Figure 3). Historically, the harvest rate in Zone A has been higher in comparison to the coastal zones - being recorded above 90 per cent. A lowering of the harvest rate should be considered to carry over some residual stock to the following season.

The weight of setose females returned to the water in 2006/07 has declined slightly from the 2005/06 season, but remains well above the levels observed since the mid-1990s (Appendix 3).

The residual legal biomass estimated to remain at the end of the fishing season in Zone A continues to remain above the levels estimated during the 1980s and 1990s, due to good catches achieved in recent years (Appendix 4, Figure 3).

In contrast to the coastal zones, catch is used as an indicator of the breeding stock in Zone A as there has not been a long-term monitoring program in this zone. Recent catch levels have been trending upwards, suggesting that the breeding stock in Zone A is at higher levels (Appendix 5, Figure 3). The apparent migration of “white” lobster at an earlier size appears to be a contributing factor to the increased catches above those predicted in the Abrolhos and below those predicted in Zone B.

Given that the 1993/94 and 2005/06 pot reductions did not result in any significant impact on total catch or catch distribution per month, the pot density saturation effect could be offsetting any reduction in pots operated in that Zone. As a consequence, it would be possible to reduce the number of pots in this Zone (and hence reduce operating costs) without significantly affecting the total catch taken.

Figure 3 (below) illustrates the pot density saturation effect in Zone A of the Fishery. This figure shows that there is a relationship between the number of potlifts (nominal effort) and the catchability of rock lobsters (i.e. with a decrease in potlifts as result of the 18 per cent pot reduction in 1993/94, there has been a corresponding increase in catchability).

However, if potlifts continue to be reduced, at some point the catchability of animals will stop increasing at the corresponding rate and the effort reductions will start to reduce the harvest rate. The number of pots where the pot density saturation effect ceases (illustrated by the slightly curved line in Figure 3) is not known, and can only

be determined by a gradual decrease in pots until a decrease in harvest rate is observed.

Therefore, a pot reduction with a corresponding increase in catchability results in a reduction in potlifts (and hence a cost saving) with little or no reduction in catch. It should be noted that a reduction in potlifts using time-off would result in a reduction in harvest rate.

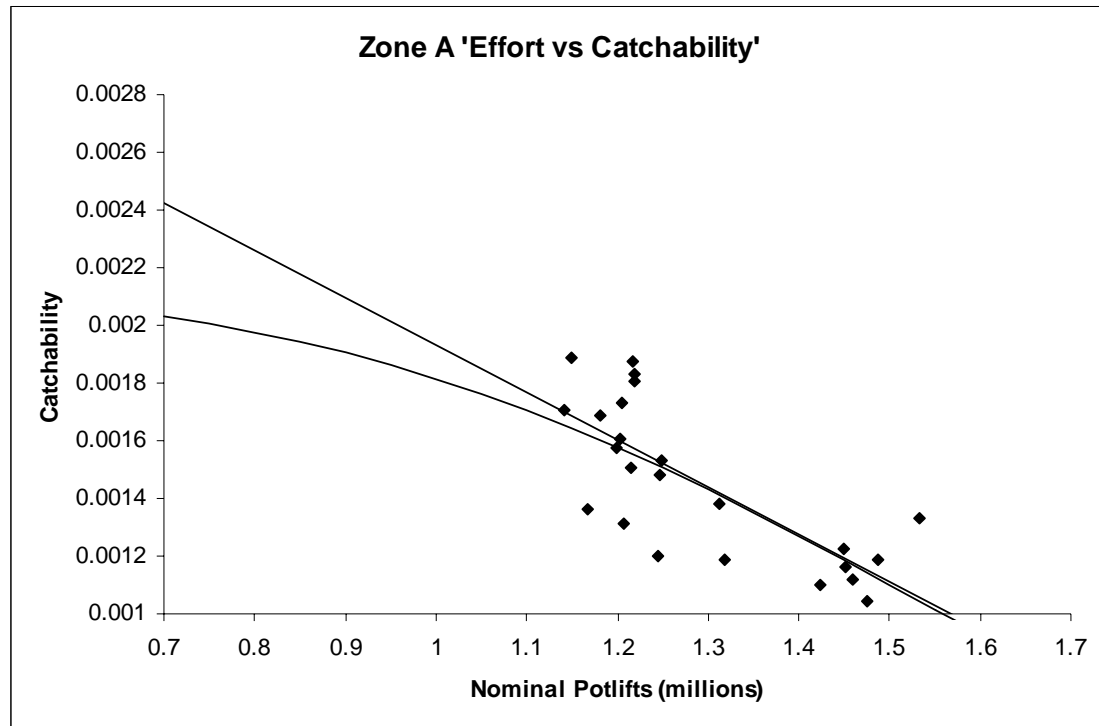


Figure 3 Effort versus catchability in Zone A of the Fishery showing that a decrease in potlifts due to the 18 per cent pot reduction in 1993/94 resulted in a corresponding increase in catchability.

4.1.12 Key Issues

1. Pot density saturation, meaning there are more pots in the water than necessary, which reduces the economic efficiency of the fishery.
2. High exploitation rate, meaning low residual legal biomass.
3. Equity with Zone B.

4.1.13 Objectives

1. Reduce pot density saturation by reducing the number of pots to maximise overall profitability of the fishery
2. Reduce harvest rate to an indicative 85 per cent level.
3. Ensure equity between Zones A and B is maintained with the introduction of new management changes.
4. Introduce changes that have a minimum negative impact on the overall profitability of the fishery.

4.1.14 Assessment of Reductions in Effective Effort

The assessment of effort reductions is complicated by the level of pot density saturation that appears to be occurring in this zone. This was particularly evident with the 18 per cent pot reduction in 1993/94.

As pots are reduced in this fishery the level of pot saturation will be reduced, but it is difficult to predict the rate at which this will occur. Therefore, pot reductions have a different effect in this zone compared to zones B and C where there is little evidence of pot saturation.

An adaptive management approach should be considered to assess the effect of pot saturation. This involves undertaking pot reductions and assessing the effect on the fishery. If pot saturation is still occurring, then there will not be any effect on harvest rates and hence catches but a reduction in nominal effort (and hence costs) will occur.

Time reductions will reduce the effective effort and hence harvest rate and reduce the nominal effort

A detailed assessment of the impact of pot reductions on key indices is provided in Appendix 7.

4.1.15 Management Proposals

4.1.15.1 Stakeholder Proposals

Below is a brief summary of the management proposals relating to Zone A that have been provided to the RLIAC.

Western Rock Lobster Council

- 10 per cent pot reduction.
- the 10 per cent pot reduction in place between 15 March and 15 April continues for the remainder of the season.
- June closure.
- Zone A fishers out of Zone B on 1 March.
- 77mm minimum size for all zones.

Kalbarri Professional Fisherman's Association

- Zone A fishers out of Zone B on 1 March.

Geraldton Professional Fisherman's Association

- 30 per cent pot reductions.

Individual Zone A Licensee

- 30% pot reduction, 10% over three years.
- Sundays off, except in March.
- Remove the 77mm gauge and have a 76mm minimum size all season.

Dongara Professional Fisherman's Association

- Zone A fishers out of Zone B on 1 March.

4.1.15.2 RLIAC Recommendation

At its 27 February meeting, the RLIAC resolved to address the current pot density saturation issue in Zone A, and to reduce harvest rates to below the indicative level of 85 per cent.

Notwithstanding the need to make adjustments for sustainability in Zone A, pot reductions can provide a financial benefit where there is pot density saturation occurring. This is because a pot reduction would lead to a reduction in the number of potlifts (hence the cost savings) without any significant reduction in harvest rate and hence catch.

As the information on the exact amount of pot reductions required to negate the pot density saturation effect is not available, an adaptive management approach could be used to arrive at a figure. That is, pot usage could be reduced a certain amount (say five per cent per year) until a catch or harvest rate response was determined. At that time, the need for further reductions could be determined.

Until the pot saturation density effect has been negated, the only possible way of reducing the extremely high harvest rate in Zone A is by initiating time closures. Due to uncertainty in the wider industry around the pot density saturation effect, the RLIAC aimed to weight its proposal more toward addressing the high harvest rate in Zone A using time closures than addressing the pot density saturation effect with pot reductions.

The RLIAC resolved to reduce the effective effort in Zone A by a similar amount to that of Zones B and C.

Aim – to reduce the effective effort in Zone B by 20 per cent by using time closures and, to a lesser extent, pot reductions

4.1.15.3 Time Closures

In order to ensure that any management changes reduce costs and have a minimum impact on the overall profitability of the Fishery (Objective 4), the RLIAC considered Tables 5, and 6 at Appendix 8, which compare effective effort versus nominal effort reductions for a variety of temporal closure options.

The ratio of the percentage reduction in nominal effort to effective effort can be used as an indicator of the cost savings relative to the effective effort reduction. Closures that have a higher nominal effort reduction compared to the effective effort reduction will potentially deliver the best economic outcome.

Tables 5 and 6 (Appendix 8) show that the June closure with a 16.7 per cent reduction in nominal effort compared to a 6.2 per cent reduction in effective effort is likely to provide the best financial outcome (greatest savings compared to loss of revenue).

However, the RLIAC considered that there may be some marketing advantages in continuing to fish in June.

As a consequence, the RLIAC proposed that Zone A have Sundays-off from the start of the season through to the end of June (a 13.7 per cent reduction in effective effort compared to a 13.1 per cent reduction in nominal effort) as a way of achieving the bulk of the reduction required. This closure is aligned with the “Sundays-off” proposal for Zone B, which will mean that processors will not have to receive rock lobsters from Zones A or B on any Sunday during the season. This should result in cost savings at the processing factories.

The RLIAC management recommendation (with the effective effort reduction in brackets) for Zone A is as follows:

Recommendations

- 1. Extend the current 10 per cent pot reduction (ending on 15 April) through to 30 June beginning in 2008/09 (equivalent to a 0.74 pot usage from 15 March to 30 June) [five per cent if there is no pot density saturation].**
- 2. Sundays-off from 15 March to 30 June beginning in 2008/09 [13.7 per cent].**

TOTAL EFFECTIVE EFFORT REDUCTION 18.7 PER CENT

SECTION 5 APPENDICES

APPENDIX 1

CATCH PREDICTION

The puerulus settlement for the 2007/08 season continued to remain at low levels until the last sampling period in December. The usual peak period of settlement for coastal locations occurs over the period September to November.

Assuming that there will be no change in this trend of low puerulus settlement, a preliminary prediction for the 2010/11 season has been made. The predictions for the next three seasons, *assuming the same effort levels as 2006/07*, are provided in Table 1.

Season	A	B	C	Total
2008/09	1,900	3,150	4,500	9,550
2009/10	1,750	2,700	4,000	8,450
2010/11	1,650	2,450	3,100	7,200

Table 1 Catch predictions (in tonnes) by zone for the period 2008/09 to 2010/11.

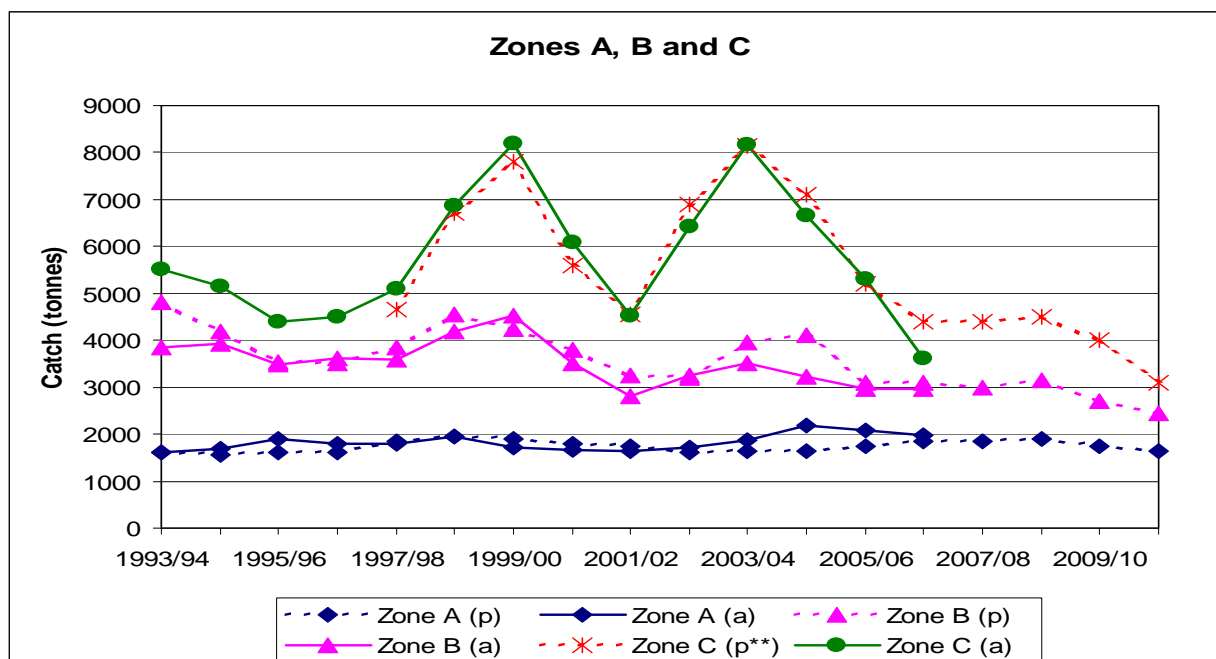


Figure 1 Catch predictions (in tonnes) by zone for the period 2008/09 to 2010/11.

APPENDIX 2

HARVEST RATE INDICES

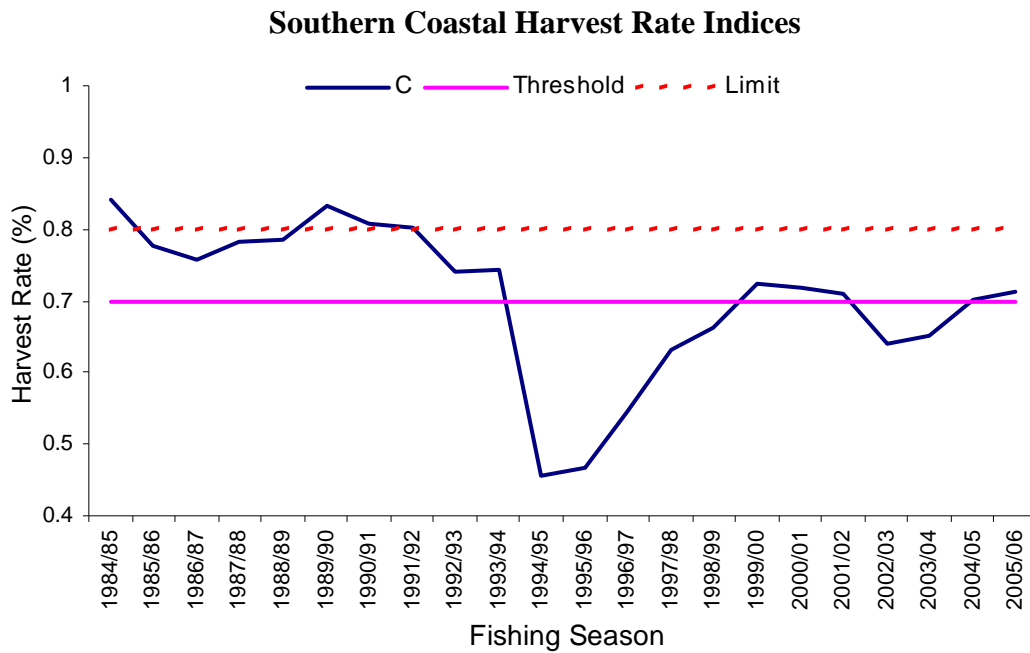


Figure 1 Harvest Rate Index (smoothed) for the southern coastal area (Zone C). The straight solid line is the 70 per cent threshold level.

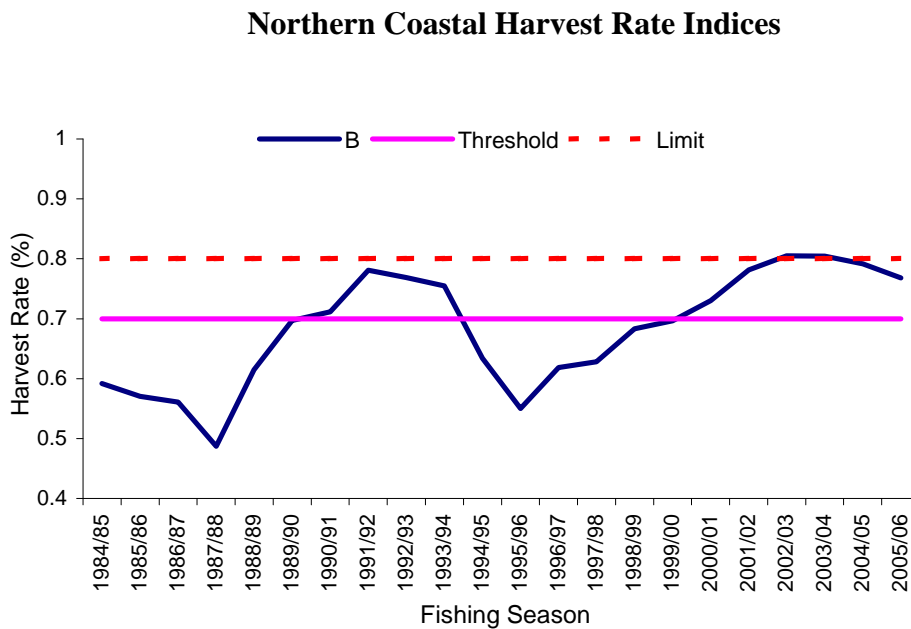


Figure 2 Harvest Rate Index (smoothed) for the northern coastal area (Zone B). The straight solid line is the 70 per cent threshold level.

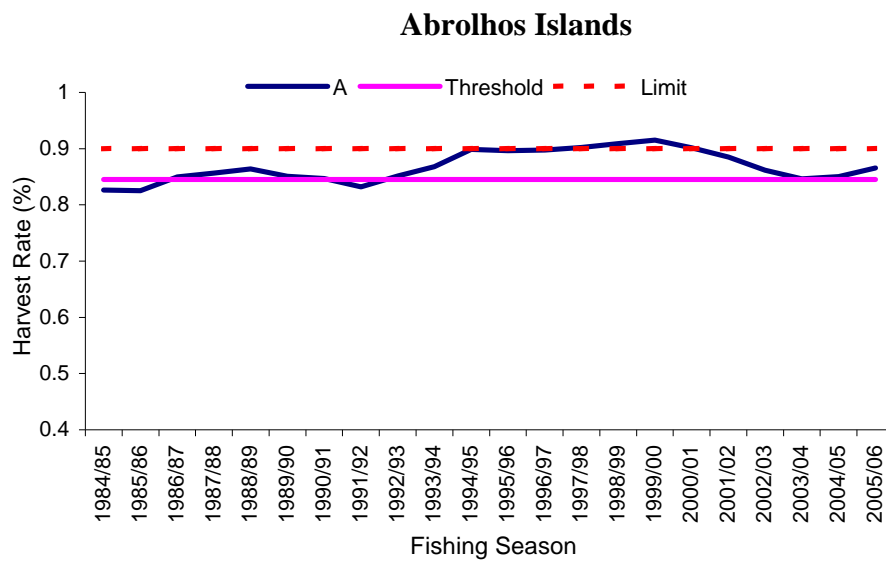


Figure 3 *Harvest Rate Index (smoothed) for the Abrolhos Islands area (Zone A). The straight solid line is the 85 per cent threshold level.*

APPENDIX 3

SETOSE ANIMALS RETURNED

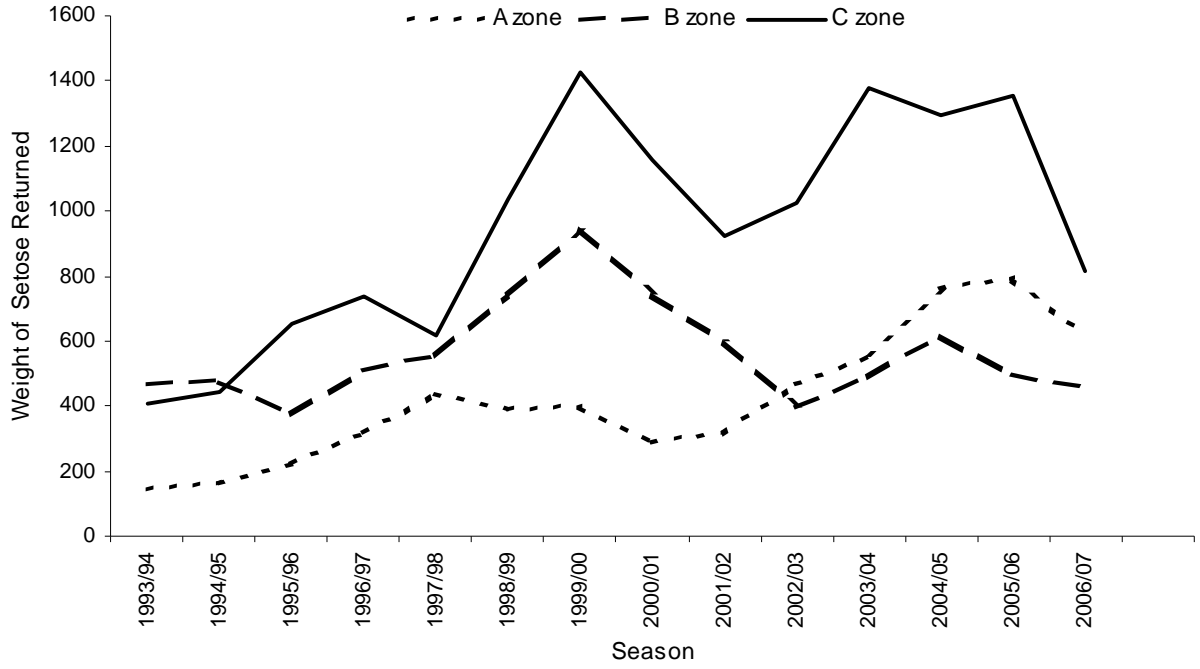


Figure 1 Weight (tonnes) of setose rock lobsters returned to the ocean.

APPENDIX 4

RESIDUAL BIOMASS (LEGAL ANIMALS)

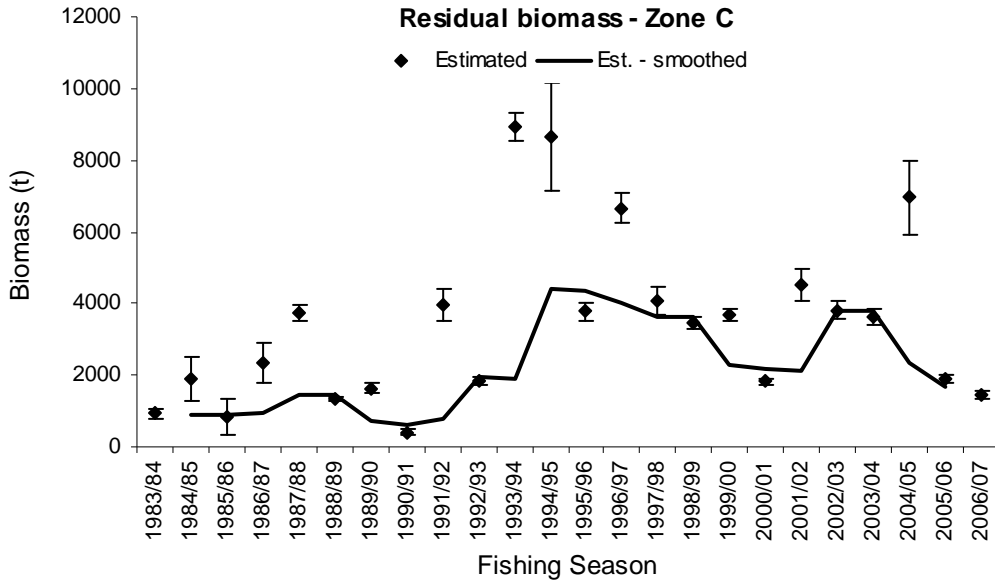


Figure 1 *Estimated residual legal biomass at the end of the fishing season in Zone C.*

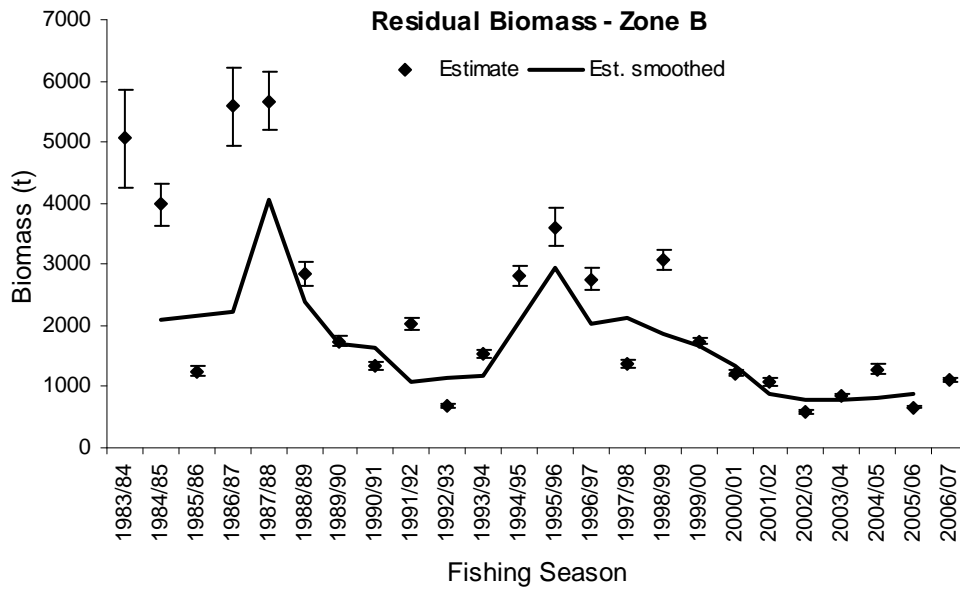


Figure 2 *Estimated residual legal biomass at the end of the fishing season in Zone B.*

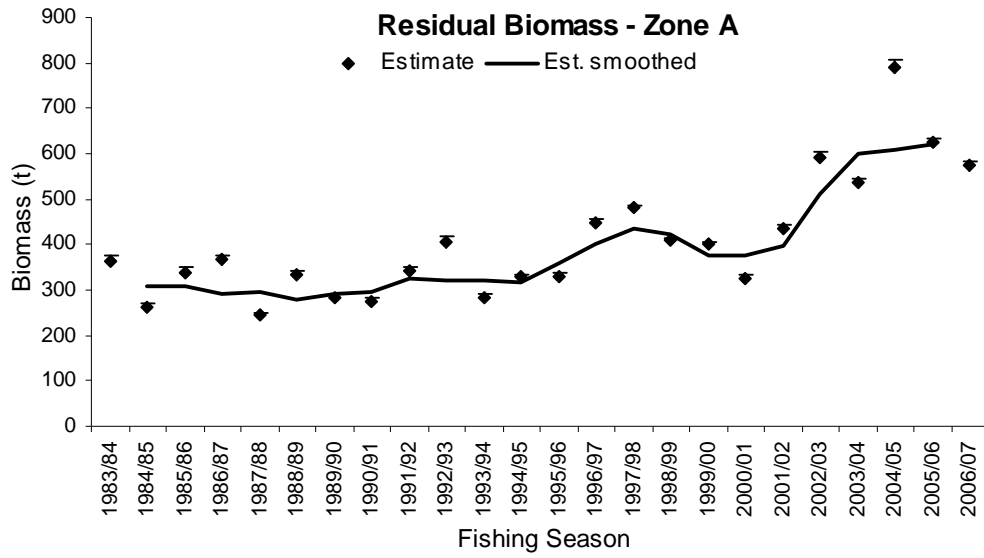


Figure 3 *Estimated residual legal biomass at the end of the fishing season in Zone A.*

APPENDIX 5

FISHERY-DEPENDENT BREEDING STOCK INDICES

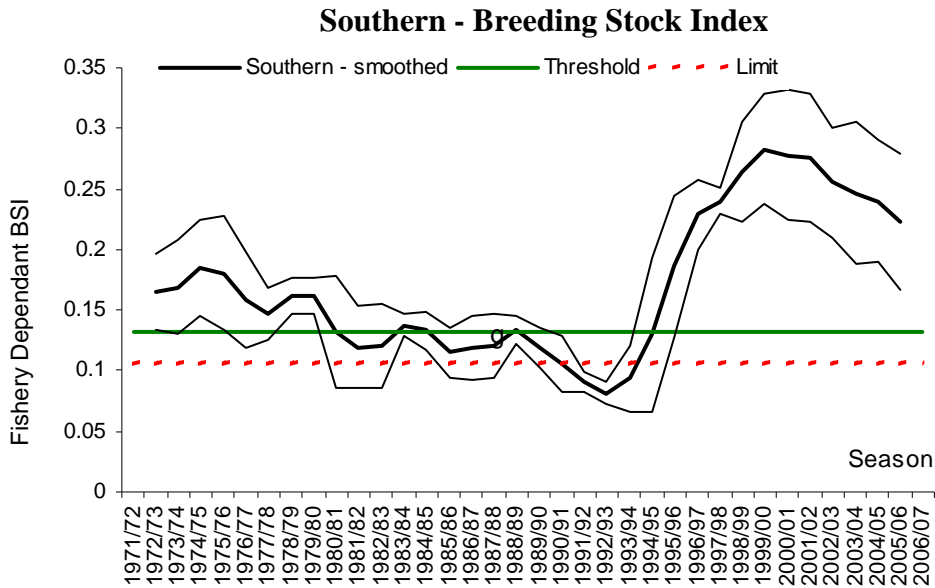


Figure 1 *Fishery-dependent breeding stock indices for the Southern Zone (Zone C) of the fishery with a three-year moving average. The threshold reference point is shown as the straight line and the limit as the dashed line.*

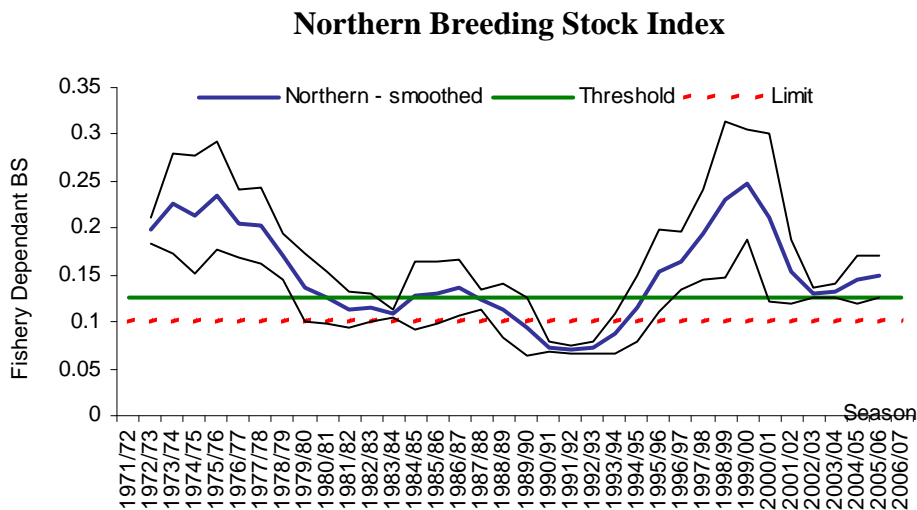


Figure 2 *Fishery-dependent breeding stock indices for the Northern (Zone B) of the fishery with a three-year moving average and standard deviation. The threshold reference point is shown as the solid straight line and the limit as the dashed straight line.*

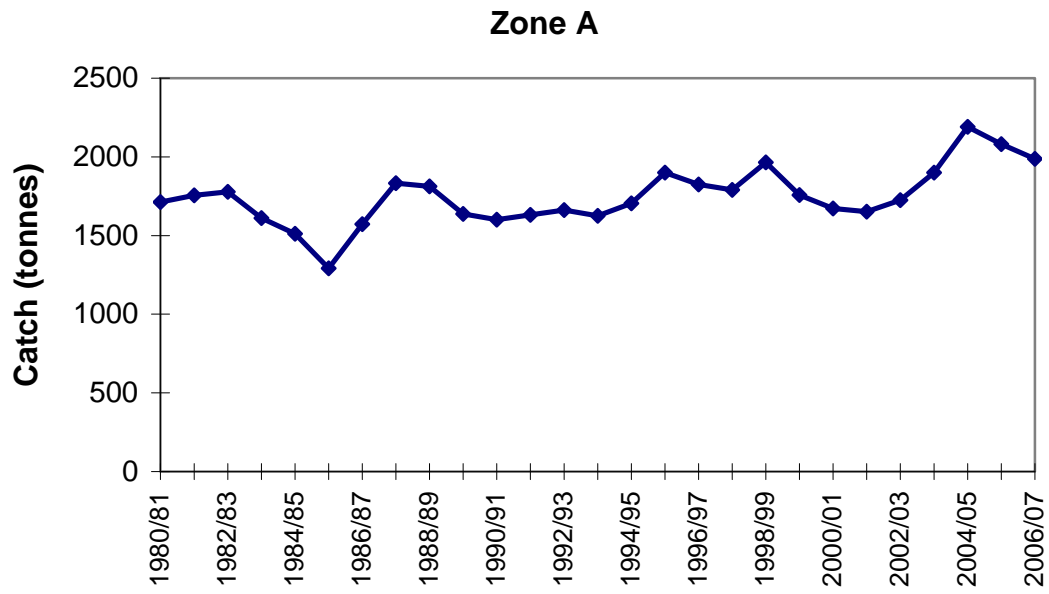


Figure 3 *The catch (tonnes) from Zone A as an index of the breeding stock over the period 1980/81 to 2006/07.*

APPENDIX 6

FISHERY-INDEPENDENT BREEDING STOCK INDICES

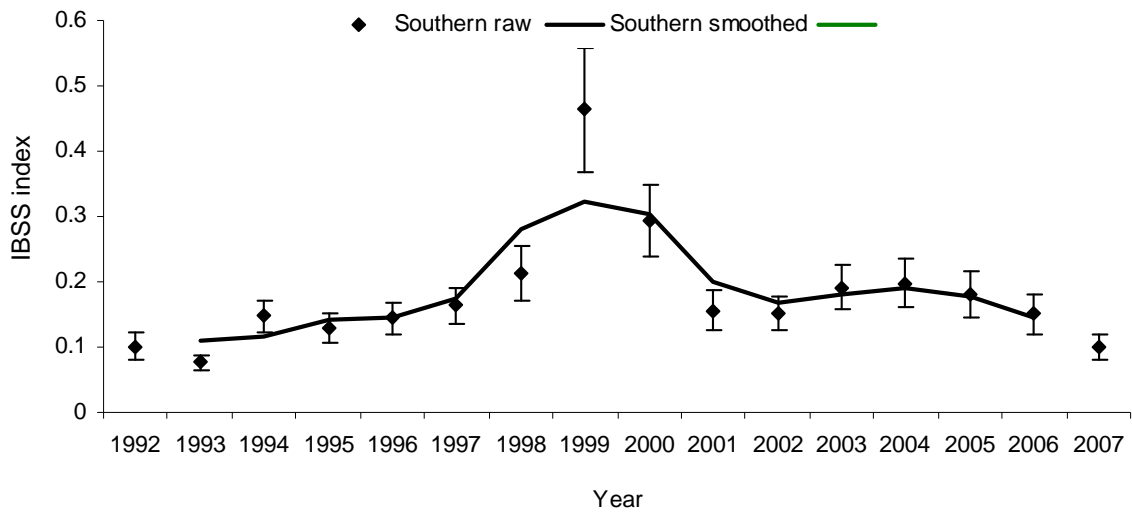


Figure 1 Fishery-independent breeding stock indices for the Southern Zone (Zone C) of the fishery with a three-year moving average.

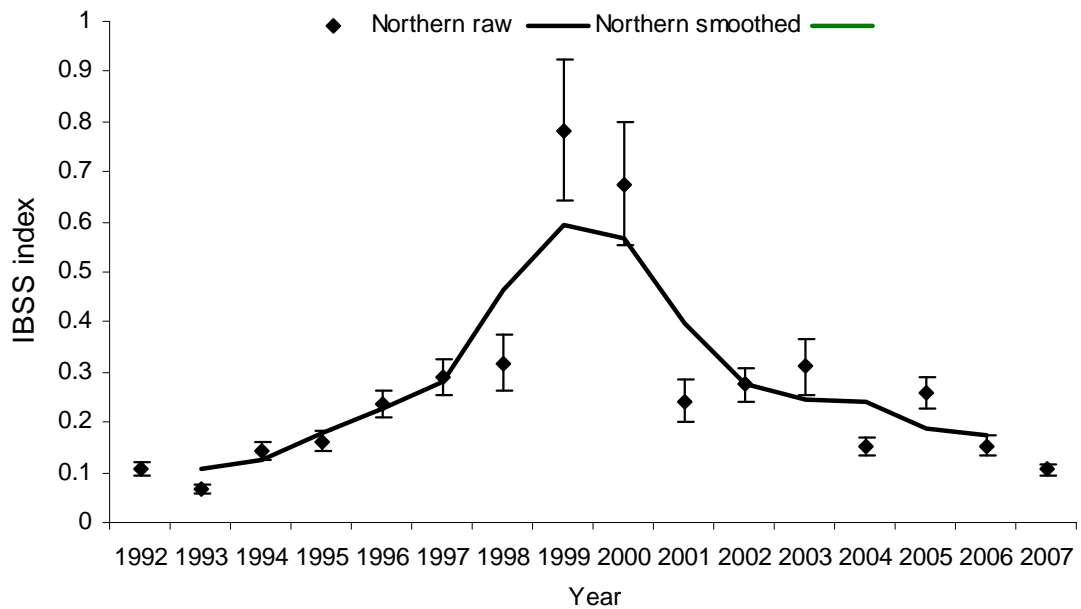


Figure 2 Fishery-independent breeding stock indices for the Northern Zone (Zone B) of the fishery with a three-year moving average.

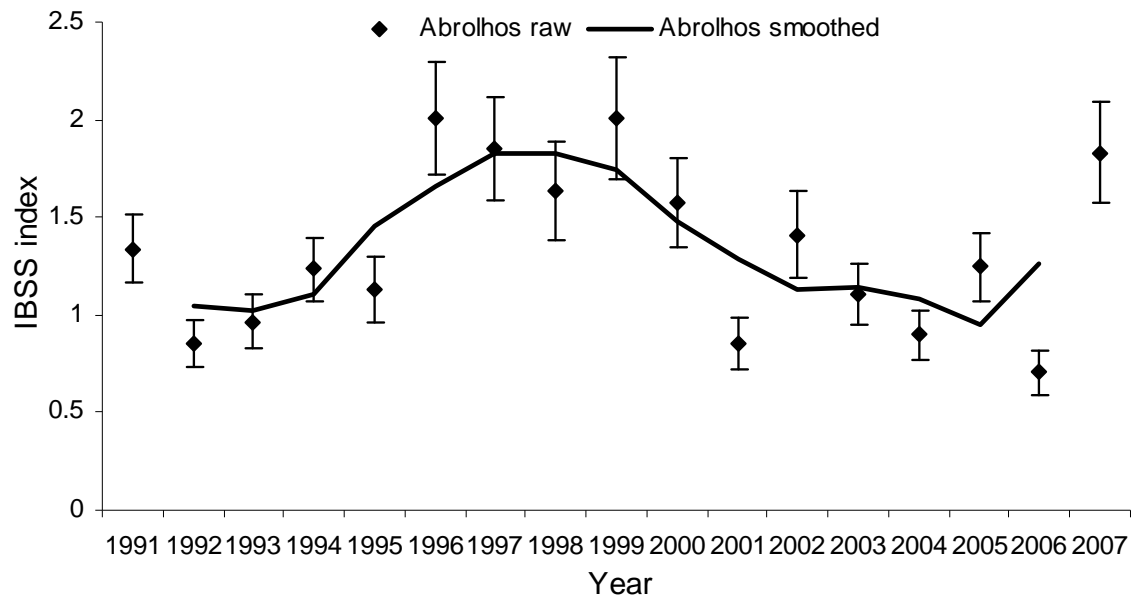


Figure 3 *Fishery-independent breeding stock indices for the Zone A of the fishery with a three-year moving average.*

APPENDIX 7

IMPACT OF EFFORT REDUCTION ON KEY INDICES

Zones B and C

This section attempts to explain how effort reductions affect nominal and effective effort, breeding stock and catch in the short-term (one to two years) and longer term (five to 10 years). These comparisons can be made relative to the year that the reductions were first introduced or in comparison with a given year if the reduction had not occurred:

1. Impact on catch and breeding stock is relative to what it would have been each year without the effort reduction, assuming variable recruitment;
2. Impact on catch and breeding stock can be considered to be relative to that in Year 0, assuming constant recruitment to the fishery; and
3. Impact on effort is relative to Year 0.

Table 1 *Effect of effort reductions on nominal and effective effort, breeding stock and catch in the short-term (one to two years) and longer term (five to 10 years) of a 20 per cent effort reduction and assuming a two per cent efficiency increase per year.*

<i>Year</i>	<i>Nominal effort</i>	<i>Effective effort</i>	<i>Breeding stock</i>	<i>Catch rate (legal size)</i>	<i>Catch</i>	<i>Comment</i>
0	100	100	100	100	100	Baseline set to 100
1	80	82	101	107	88	Large drop in catch in first year
2	80	84	104	117	98	
3	80	86	110	115	99	Catch loss is minimal by year 3
4	80	88	116	113	99	Harvest rate is still lower
5	80	90	122	110	99	Breeding stock is still higher
10	80	100	100	100	100	Effect of effort reduction is totally dissipated after 10 years of two per cent efficiency increases

Key results

- Nominal effort reduction maintained unless there is capacity to fish more days (latent effort) i.e. cost savings is maintained.
- Effective effort reduction of 20 per cent is dissipated by level of efficiency increase, i.e. two per cent per year.
- Catch rate of legal-size lobsters is increased due to lower harvest rate and increase in average size.
- Significant drop in catch in first year. This is dissipated mainly by the catch not taken in the first year being available for capture at a larger size.
- Breeding stock is increased even after five years due to lower harvest rate allowing more lobsters to flow through to breeding stock.
- Effect of effort reduction is totally dissipated (except for nominal effort) after 10 years of two per cent efficiency increases per year.

Assumptions

- No significant pot saturation (evidence of this in Zone A).
- No significant latent effort (capacity to fish more days).
- Harvest rate is relatively high, i.e. > 60 per cent

Zone A

- Assuming significant level of pot saturation (particularly in shallow water), i.e. any pot reduction is compensated immediately by an efficiency increase of remaining pots
- Impact on catch and breeding stock can be considered to be relative to that in Year 0, assuming constant recruitment to the fishery.
- Impact on effort and harvest rate is relative to Year 0.

Table 2 *Effect of effort reductions on nominal and effective effort, breeding stock and catch in the short-term (one to two years) and longer term (five to 10 years) of a 20 per cent pot reduction and assuming a one per cent efficiency increase per year and pot density saturation is still occurring after the pot reduction. The purpose of this table is to illustrate the effect of pot density saturation and a comparison with the coastal fishery (Table 1) and does not represent a model assessment.*

<i>Year</i>	<i>Nominal effort</i>	<i>Effective effort</i>	<i>Breeding Stock</i>	<i>Catch rate (legal size)</i>	<i>Catch</i>	<i>Comment</i>
0	100	100	100	100	100	Baseline set to 100
1	80	97	103	101	98	Large drop in nominal effort but not in effective effort
2	80	98	102	101	99	Effect on catch or breeding stock is minimal
3	80	99	101	101	100	
4	80	100	100	100	100	
5	80	101	99	99	100	Effect on indicators is minimal except for nominal effort
10	80	106	95	95	101	

Key results

- Pot saturation effect is reduced.
- Nominal effort reduction is maintained unless there is capacity to fish more days (latent effort), i.e. cost saving is maintained
- Effective effort (and harvest rate) reduction of 20 per cent is dissipated immediately by an improvement in catchability of the remaining pots
- Minimal drop in catch as the effective effort is not changed.
- Minimal change in breeding stock and legal catch rate, as the effective effort is not changed.

Assumptions

- Significant pot saturation.
- No significant latent effort (capacity to fish more days).
- Harvest rate is relatively high, i.e. > 80 per cent.

APPENDIX 8

TEMPORAL CLOSURES - EFFECTIVE VERSUS NOMINAL EFFORT

Zone C

Table 1 *Southern Coastal (Zone C) percentage reduction in effective and nominal effort due to three, five and seven-day moon closures, in addition to the current (2005/06) management package.*

Month	Moon Closure period					
	Three days		Five days		Seven days	
	Effective %	Nominal %	Effective %	Nominal %	Effective %	Nominal %
November	0.0	0.0	0.0	0.0	0.0	0.0
December	2.4	1.9	4.4	3.2	6.2	4.5
January	1.3	1	2.3	1.6	3.4	2.6
Whites total	3.7	2.9	6.7	4.8	9.6	7.1
February	0.0	0.0	0.6	1	1.1	2
March	0.0	0.0	0.8	1.2	1.6	2.4
April	0.0	0.0	1.2	1.2	1.9	2.1
May	0.0	0.0	0.6	0.9	0.9	1.5
June	0.0	0.0	0.2	0.7	0.5	1.4
Reds total	0.0	0.0	3.4	5.0	6.0	9.4
Total	3.7	2.9	10.1	9.8	15.6	16.5

Table 2 *Southern Coastal (Zone C) percentage reduction in effective and nominal effort due to Sunday closures and entire monthly closures in addition to the current (2005/06) management package.*

Month	Sundays off		Month off	
	Effective %	Nominal %	Effective %	Nominal %
	November	0.6	0.5	3.8
December	3.6	2.4		
January	1.6	1.7		
Whites total	5.8	4.6		
February	1.1	1.7	9.2	14.1
March	1.6	2.0		
April	1.8	1.8		
May	1.1	1.5		
June	0.6	1.1	4.8	9.2
Reds total	6.2	8.1		
Total	12.0	12.7	17.8	26.4

¹ Effective Effort - Predicted effective annual effort reduction, based on an average of the catch and nominal effort during the 2005/06 and 2006/07 fishing seasons.

¹ Nominal Effort - Predicted reduction in pot lifts, based on an average of the catch and nominal effort during the 2005/06 and 2006/07 fishing seasons.

Zone B

Table 3 Northern Coastal (Zone B) percentage reduction in effective and nominal effort due to three, five and seven day moon closures in addition to the current (2005/06) management package.

Month	Moon Closure period					
	Three days		Five days		Seven days	
	Effective %	Nominal %	Effective %	Nominal %	Effective %	Nominal %
November	0.6	1.4	0.7	1.8	0.7	2.1
December	3.6	2.5	6.3	4.3	8.8	6.1
January	0.7	1.2	1.1	1.8	1.6	2.8
Whites total	4.9	5.1	8.1	7.9	11.1	11.0
February	0.6	1.2	1.2	2	1.5	2.5
March	1.1	1.4	2	2.4	2.8	3.4
April	0.8	0.7	1.8	1.5	2.7	2.4
May	0.6	0.8	1	1.4	1.4	1.8
June	0.1	0.4	0.4	1	0.7	1.7
Reds total	3.2	4.5	6.4	8.3	9.1	11.8
Total	8.1	9.6	14.5	16.2	20.2	22.8

Table 4 Northern Coastal (Zone B) percentage reduction in effective and nominal effort due to Sunday closures and entire monthly closures in addition to the current (2005/06) management package.

Month				
	Sundays off		Month off	
	Effective %	Nominal %	Effective %	Nominal %
November	1.1	1.4	8.9	11.1
December	3.5	2.9		
January	0.5	0.9		
Whites total	5.1	5.2		
February	1.9	2.2	11.8	14.3
March	0.9	1.0		
April	0.0	0.0		
May	0.0	0.0		
June	0.0	0.0	5.3	9.1
Reds total	2.8	3.2		
Total	7.9	8.4	26.0	34.5

¹ Effective Effort

Predicted effective annual effort reduction, based on an average of the catch and nominal effort during the 2005/06 and 2006/07 fishing seasons.

¹ Nominal Effort

Predicted reduction in pot lifts, based on an average of the catch and nominal effort during the 2005/06 and 2006/07 fishing seasons.

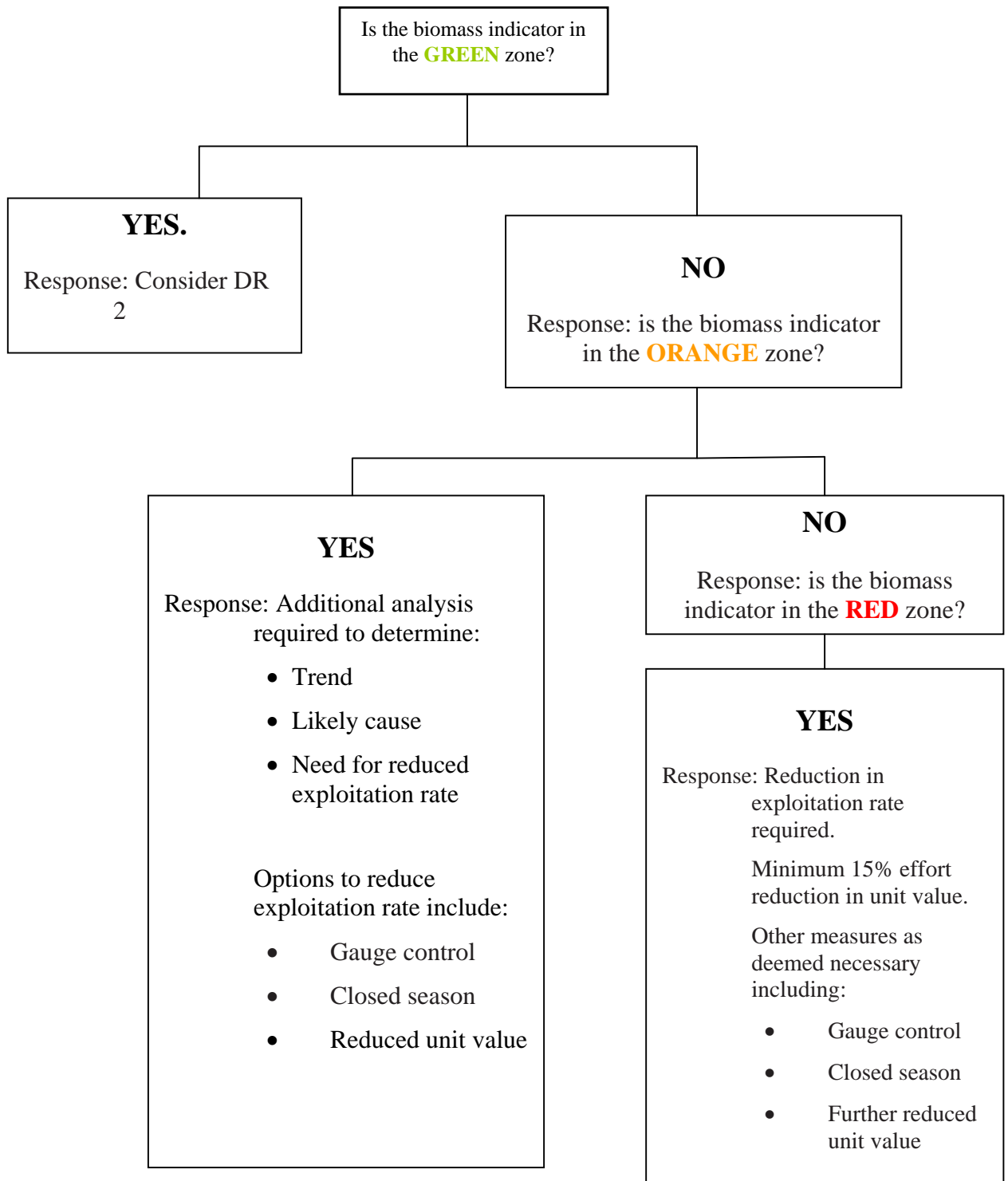
APPENDIX 9

EXTRACT FROM 2004 DECISION RULES FRAMEWORK

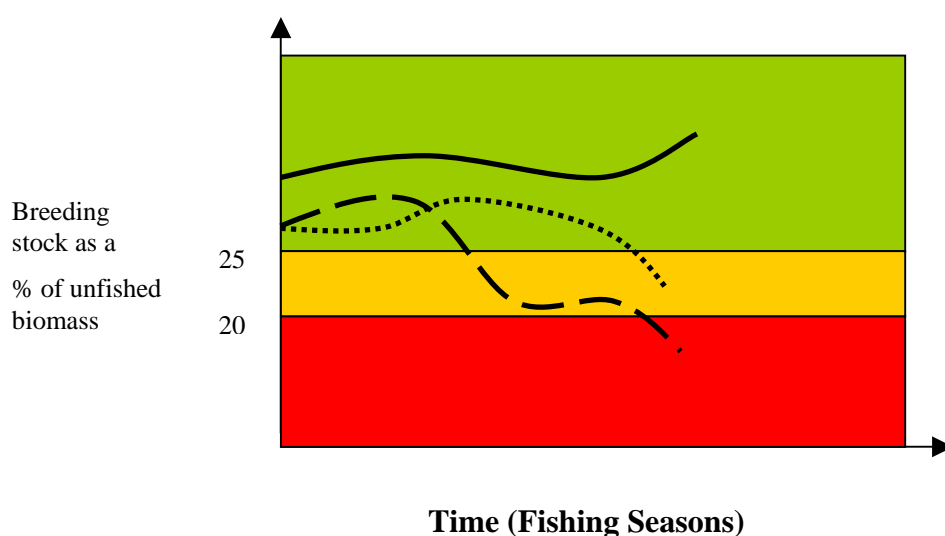
Decision Rule No.1

The formal application of the first decision rule, designed to ensure biological sustainability, needs to occur annually and be based on a formal stock status report provided by the Department of Fisheries Research Division. In the case of western rock lobster this is likely to be in February or March.

DR 1 – biological sustainability



Examples of how DR1 would be applied



Green = healthy

Orange = consider stock status

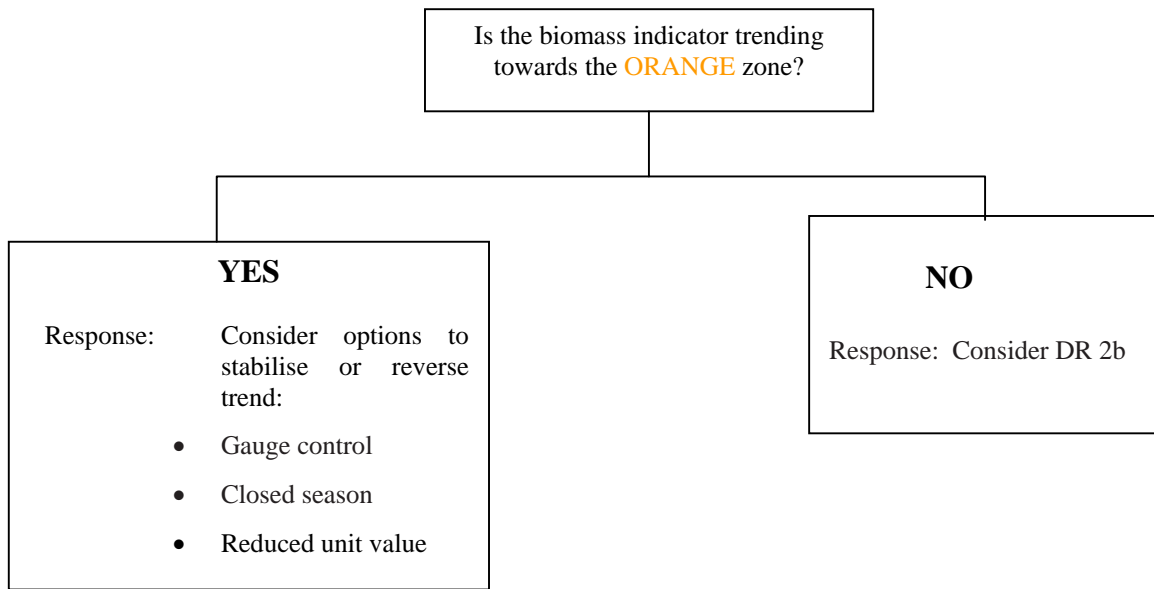
Red = unsustainable

- Example 1** Solid line. Indicator of breeding biomass clearly in the **green** zone, with no indication of a downward trend – no remedial action required, increased freedom for industry to pursue a harvest strategy or management change to optimise economic or social objectives. If the indicator trended downwards, preventative measures to ensure indicator remains in the **green** zone are also relevant.
- Example 2** Dotted line. Indicator of breeding biomass has fallen from the **green** zone and is within the **orange** zone. RLIAC will initiate expanded studies to determine cause of downward trend and develop advice on reducing exploitation rate.
- Example 3** Dashed line. Indicator of breeding biomass clearly in the **red** zone having fallen from healthy levels. Expanded work will be conducted from previous biological reference zones. A reduction in exploitation rate is required and will be achieved by a minimum 15% reduction in unit value plus the possible inclusion of other remedial measures. Consultation will be brief and focussed on informing industry of required change and circulation of evidence that the **red** zone has been entered rather than seeking comment on what should be done.

Decision Rule No.2

The formal application of the second decision rule, designed to ensure other indicators of sustainability are not ignored, follows confirmation through DR 1 that the indicator is in the **green** zone. Application of this rule needs to occur annually and be based on a formal stock status report provided by the Department of Fisheries Research Division. In the case of western rock lobster this is likely to be in February or March. For simplicity this rule is broken into five parts. Each part must be addressed.

DR 2a - Trends in Breeding Biomass



DR 2b - recruitment

