

**A MANAGEMENT PROPOSAL FOR THE 1995/96 NORTHERN  
ZONE ROCK LOBSTER FISHERY (NZRLF) AND AN  
EVALUATION OF THE EFFORT REDUCTION PACKAGE  
IMPLEMENTED DURING THE 1994/95 SEASON**

**September 1995**

**Prepared for: The Northern Zone Rock Lobster Fishery (NZRLF) Management  
Committee and the Director of Fisheries.**

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## 1.0 Introduction

The NZRLF Management Committee provides the principal source of management advice to the Director of Fisheries and the Minister for Primary Industries in relation to the NZRLF.

At present, the NZRLF is managed by input or effort controls only. The NZRLF Management Committee prefers this system of management for a number of reasons. These include:

- a. The fishery apparently operates in an environment of high recruitment variability, and consequently variable stock abundance;
- b. the ability for scientists to predict future recruitment strengths and stock sizes reliably may be impossible; and
- c. the potential for quota evasion is high due to the expansive coastline and the number of suitable landing points in the NZRLF.

Although the NZRLF Management Committee prefers input management, it is well aware that effort controls will only remain effective provided that measures are taken to offset the effect of any increase in the fishing power of the fleet. To assist the committee to evaluate the increase in fishing power of the fleet and develop a management strategy to control effort in the fishery, a formal process of consultative meetings are scheduled each year. A management strategy which has the wide support of industry members is then presented to the NZRLF Management Committee for their consideration.

The committee then has the task of evaluating the practical considerations for implementing the strategy before the proposal is presented for consideration by the Director of Fisheries. This will include an assessment of whether additional compliance effort is required to ensure that the system can be effectively managed in the field and whether there will be an increase in resources to administer the system.

This document has been prepared on behalf of the NZRLF Management Committee. It reviews the trends in the fishery over the last decade or so and outlines past strategies to control effort in the fishery. A summary of historical catch and effort statistics along with data on recruitment in the fishery are also presented.

The document does not constitute a formal stock assessment. Some of the data have only come to hand recently and have not been rigorously analyzed as it would be for publication, as time will not permit that process to occur. Although the review does not present many parameter estimates, it does provide sufficient data to be able to evaluate the status of this fishery.

An evaluation of the effectiveness of the management package implemented to control effort in the fishery during 1994/95 is a vital section of this document. This evaluation is particularly important as the NZRLF Management Committee has recommended a management package based on a flexible system of time closures for implementation in the 1995/96 fishing season.

Mr Jim Prescott, (Senior rock lobster scientist from the South Australian Research and Development Institute, SARDI), and Dr R McGarvey (SARDI) provided the fishery assessment information contained in this document. Ms Bev Tyrer (Manager, Shellfish, PISA Fisheries) assisted also in preparing the document and Mr Roger Edwards (Industry Liaison Officer for the South Australian Northern Zone Rock Lobster Fishermens Association Inc.) and other NZRLF licence holders provided input on behalf of industry.

## 2.0 History of management in the NZRLF

The NZRLF has progressively reduced potential fishing effort for a number of years through adjustments to the numbers of pots and the length of the season. The management timeline for the fishery is shown in Figure 1.

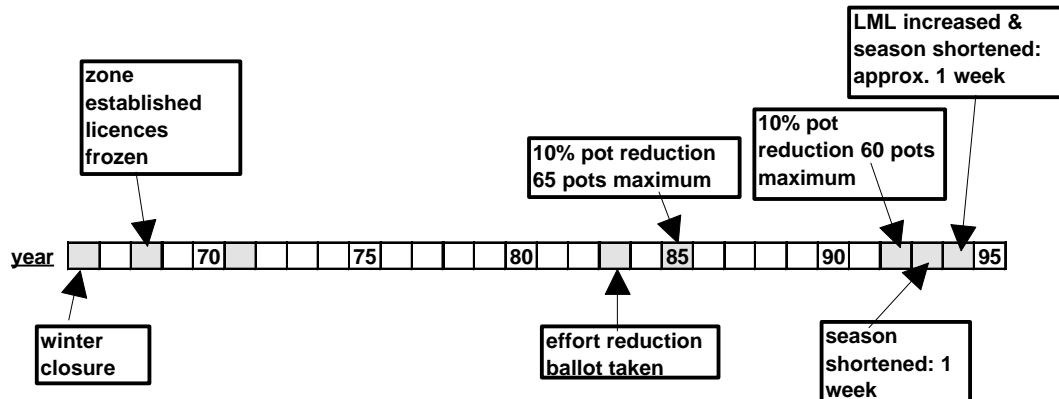


Figure 1. Management timeline for the northern zone lobster fishery from 1966.

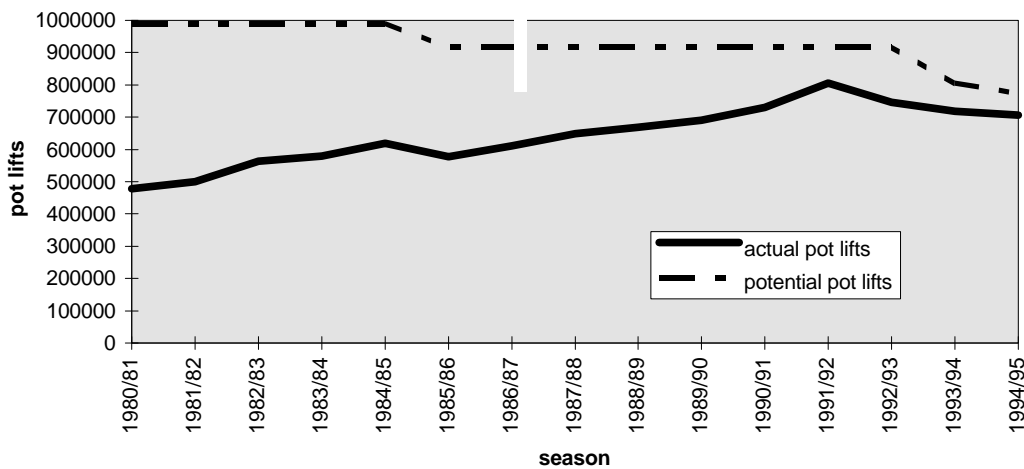


Figure 2. Potential and actual potlifts in the NZRLF. All figures nominal.

The convergence of the potential and actual numbers of potlifts is shown in Figure 2. Unlike many fisheries, there was little latent effort remaining in the fishery when the zone elected to manage increasing fishing power by “time management”. Consequently, time reductions have been quite effective in reducing nominal effort.

### 3.0 Summary of catch and effort data

The catch and effort time series from 1968 to the present time is presented in Figure 3. Data are from logbooks that were maintained by fishers. There has been considerable discussion over the years as to the accuracy of the data. It is generally thought that the degree of error has been decreasing, particularly during the last few years. There is some evidence that the data may have been relatively accurate for quite a long time.

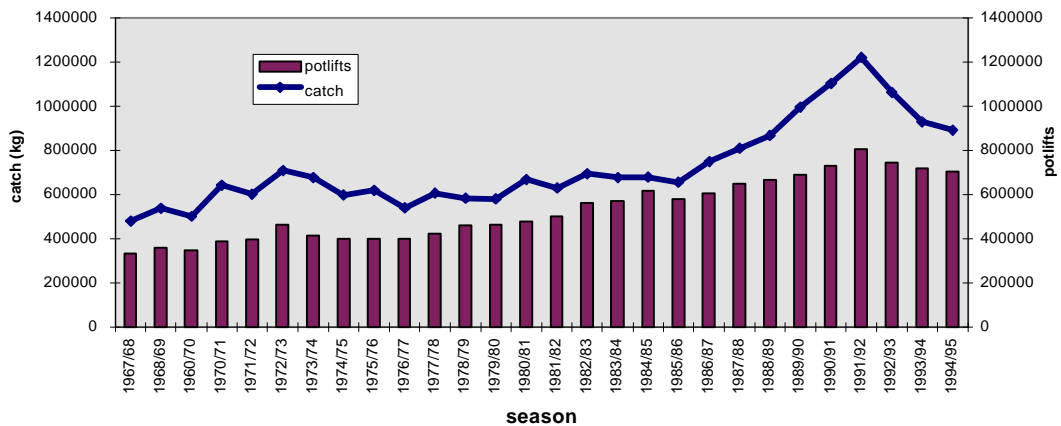


Figure 3. Catch and effort in the northern zone from the 1967/68 season to present.

As can be seen in Figure 3, effort increased substantially from about 1985/86 until 1991/92. During the latter part of this period the catch rate also increased substantially. The higher catch rates may have been due to larger stock size, greater fishing power, or the exploitation of new grounds. In fact, it is thought that all three factors contributed to the increase in catch rates. Recruitment to the fishery appears to have been better than average in 1988 and 1989 (generally the late 80's). There are two sources of data that point to this. Fishers reported comparatively high catches of undersize lobsters in their pots in the late 80's. The seasons that followed were periods of high commercial catch (Figure 4).

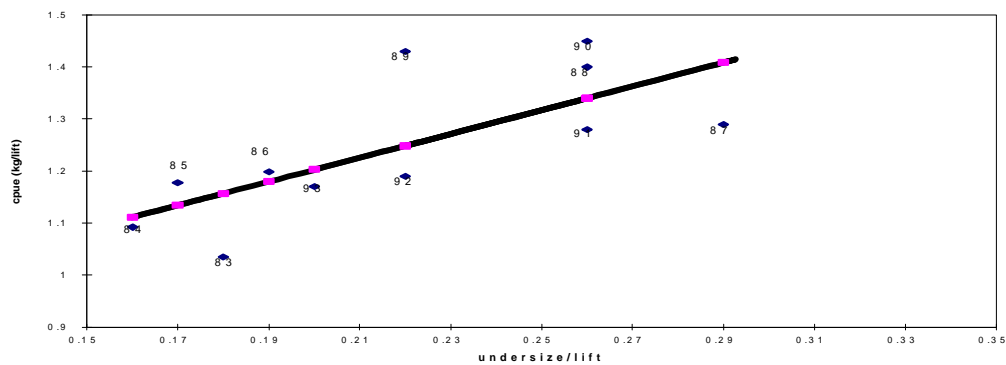


Figure 4. Commercial catch rates (kilograms per potlift) are shown plotted against the undersize catch rates (numbers per potlift) of the previous season. Note the data points are labeled with the year at the start of the season during which the undersize were reported, e.g. the data point labeled “93” refers to the undersize reported during the 1993/94 season and the commercial catch rate of the 1994/95 season. These data are from the “central” part of the fishery and exclude the west coast. A regression line is fitted,  $R^2 = 0.52$ ;  $F = 0.015$ .

It is interesting to note that even at relatively low rates of harvest (see later in text) the effects of variable recruitment are still obvious.

At about the same time that the numbers of undersize lobsters were increasing, the average weight of lobsters in the northern zone was decreasing. This is to be expected if there was a large recruitment event in progress (declining sizes could also be indicative of the fishing down of a stock so that the recruits become a more important fraction of the catch). Concurrently, there was an increase in commercial catch rates. When both these trends were investigated on a block by block basis they were found to be very consistent throughout the zone. An example of these trends is shown in Figure 5.

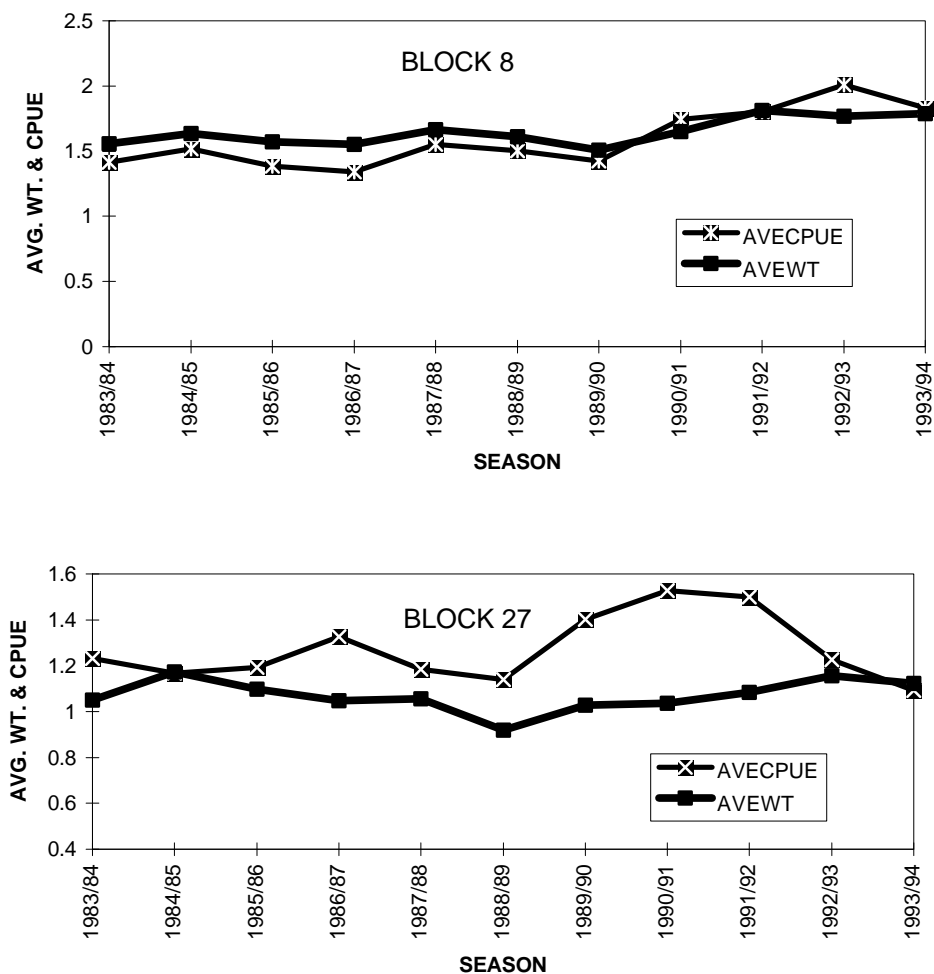


Figure 5. Catch per unit effort and average weight of lobsters caught are shown for the seasons 1983/84 to 1993/94 in block 8 and block 27, in the northern zone. Note the period of 1988 to 1989 in each graph where the average weight reaches a minimum and catch per potlift begins to increase (See Attachment 1 for block locations).

The trends in the catch rate of undersize and legal lobsters and the reduction in the mean weight of the legal catch indicate that there is strong evidence that the high catches, and more specifically the high catch rates in the NZRLF, are the result of several years of strong recruitment into this particular zone.

The other conclusion that can be reasonably drawn from this is that the lower catches and catch rates are a result of lower recruitment since 1991/92. Ideally, we would be able to forecast the next years catches at this point. However, further study of the impact of a larger legal minimum length (LML) on the catch of undersize is required first.

## **4.0 An evaluation of the 1994/95 NZRLF management strategy**

### **4.1 The 1994/95 NZRLF management strategy**

The NZRLF Management Committee preferred that the fishery remained an input managed fishery for the 1994/95 season. As a result of discussions with fishers at the time, there was general consensus that fishing power was likely to increase by approximately five percent during the 1994/95 season. This was assumed to be due to a combination of factors including:

- a. The replacement of older boats for new and more efficient ones; and
- b. upgrading of electronic fishing devices and other fishing equipment with more effective alternatives.

To maintain the 1993/94 effective fishing effort it was necessary to introduce an effort management package. This management package comprised two basic components. The first component was to reduce the length of the season by seven or eight days and the second involved increasing the legal minimum length from 98.5 mm to 102 mm carapace length. The latter measure was introduced on 1 December 1994.

Increasing the LML had two effects:

- a. It reduced the potential catch for the 1994/95 season; and
- b. it would increase yield and egg per recruit in the fishery in the long term.

It was estimated that the imposition of the larger size limit reduce the catch by about 2.5 percent.

The effort management package was intended to reduce the catching potential in the fishery by a total of 6 percent, one percent more than the estimated increase in fishing power of 5 percent. The additional 1 percent was included because this was the assumed amount of effort that would be made up for by fishers fishing extra days. This figure was calculated on the basis of fishers' historic responses to previous pot reductions and time closures.

Three closure periods were designated during the season. Fishers were required to take any two periods off. In November the closure was for 8 days and in December and January closure periods were 7 days. Fewer days off were required in December and January because of higher vulnerability and/or abundance in those months that make pots more effective than in early November.

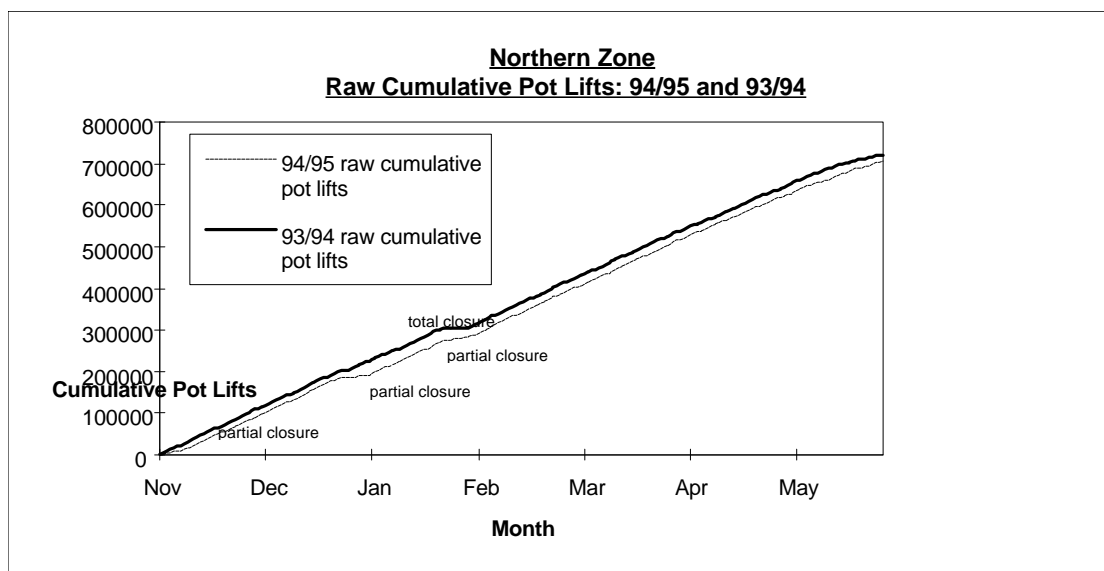
Other measures taken to contain fishing power included a limit of 60 feet (approx. 18 metres) vessel length, engine horse power limited to 1200, more restrictive pot specifications, and a prohibition of “double pulling” of pots (pots not to be pulled and reset more than once per day).

It should be noted that the regulations on vessel length and horsepower are not seen to be immediately limiting since most vessels in the fleet are well below the new specifications, but that these measures will become increasingly important in future years.

The prohibition on double pulling has immediate impacts on the fishery. It is known that the practice of double pulling can significantly increase the catch of vessels in some areas. Since days are now a limiting factor, the practice of double pulling has the potential to erode the positive impacts of any small measures for restricting effort in terms of days fished. There is some anecdotal evidence that the ban on double lifting was only partially successful in eliminating this activity. The practice must be closely monitored, and effectively policed in the future.

#### 4.2 Results of implementing the strategy

In **nominal** terms, potlifts decreased by 1.9 percent from 1993/94 to the 1994/95 season. When the potlifts are corrected for the time of year that they were executed the reduction was 4.2 percent. The correction terms used were the monthly “catchabilities” previously estimated in the model used to calculate the days off in each closure period. The difference between the two results can be seen in Figure 6 where the cumulative raw and corrected potlifts are plotted. The difference between the two seasons in terms of potlifts is more clearly demonstrated in Figure 7, where the cumulative difference between the corrected potlifts in the two seasons is plotted.



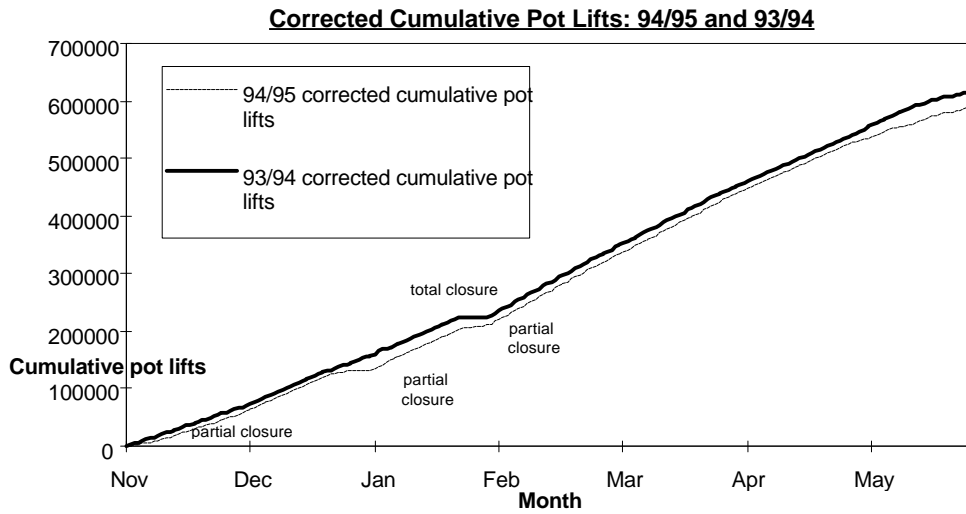


Figure 6. The cumulative raw and corrected potlifts of the 1993/94 and 1994/95 seasons are plotted. Note the difference between the two plots near the end of the season. Correction terms used were the monthly “catchabilities” that are a function of the lobster abundance and their vulnerability.

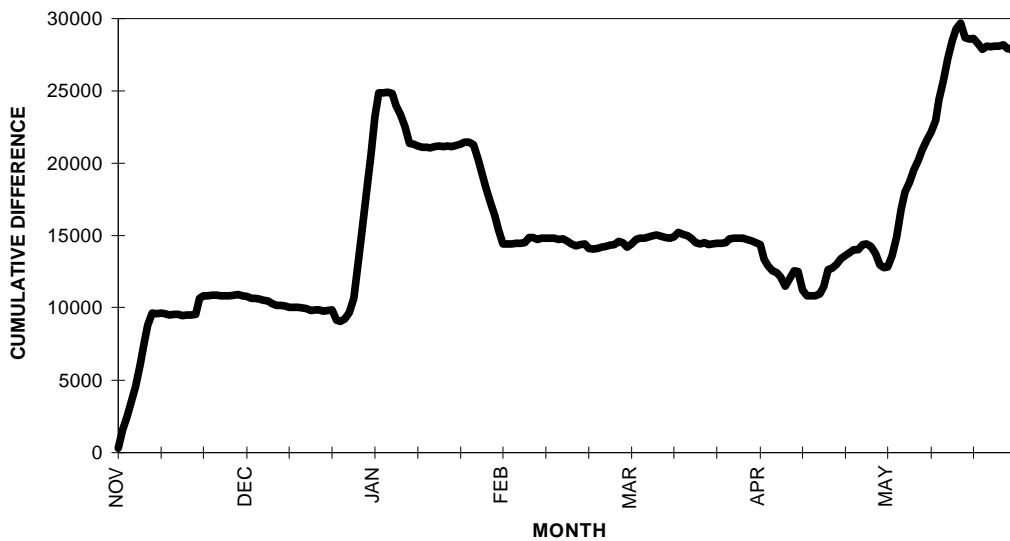


Figure 7. The cumulative difference in corrected potlifts between the 1993/94 and the 1994/95 seasons is plotted. The correction terms are the same as those used above.

The 4.2 percent reduction in corrected potlifts can not be said to be entirely due to the effort management package. It is still unclear whether sea conditions or the weather during the season affected fishers' fishing activities. In terms of average days fished, there was a decrease of only 3 days, indicating that fishers may have tried to make up for the additional seven or eight days that they were required to take off.

In general terms it appears that the system achieved its target relatively well. There is little doubt that the total package was successful in capping effort in the fishery. The increase in LML would create additional benefits for the fishery as well.

If fishing power had increased five percent as anticipated and the stock had remained at a stable level, all things being equal there should have been an increased catch rate of five percent. However, this was not the case. Catch per pot lift declined marginally from 1.29 to 1.26 kg per pot lift. A decline of this magnitude could be due to many factors, including the fact that the CPUE data has not been standardised, environmental effects such as water temperature or the pilchard kill etc., or a slight decline in the population size. It was encouraging that the more rapid decline of the previous two years did not occur.

## 5.0 Recent management directions based on new resource information

Data from the tagging study have allowed the first assessment of harvest rate to be made. The harvest rate was estimated to be approximately 15 percent when using data from length converted catch curves. The biomass in the fishery has been reduced by approximately 27 percent over the past four years. (See Table 1). The reason for the reduction in biomass must be the result of recruitment being lower than the catch removed from the fishery. The lower recruitment hypothesis is supported by the data shown in Figure 4, in particular, where the lower numbers of undersize lobsters in 1992 and 1993 are evident. It should be noted that while the overall rate of harvest may be relatively low, there are clearly areas in the zone where it may be much higher.

Recruitment appears to have varied considerably within the range of stock sizes that have predominated in the fishery in the recent past. Unless the pattern of recruitment changes, it is likely that the fishery will experience other periods of higher than average levels of recruitment in the future. Since part of the record 1991/92 season catch was probably due to an expansion of the fishery and consequent fishing down of lightly or unfished stocks on more scattered bottom habitat total catches in the zone are not likely to reach those levels again.

Table 1. The annual cpue, catch, harvest rate, biomass and percent reduction in biomass. Harvest rate, biomass and reduction in biomass are estimates only. If harvest rate has remained a constant 15 percent then the biomass has been reduced by approximately 27 percent in three years. The 1991/92 season is used as the base season.

season	cpue	catch	harvest rate	biomass(t)	% reduction
1991/92	1.52	1222	0.15	8145	0
1992/93	1.43	1064	0.15	7094	13
1993/94	1.29	930	0.15	6197	24
1994/95	1.26	892	0.15	5945	27

Egg production has been estimated to be approximately 40 percent of that from the pre-fished stock. This estimate was made on the basis of observed growth, size at maturity and fecundity and an estimate of natural and fishing mortality. The estimate is considered to be relatively robust. Forty percent egg production is relatively high compared to the other southern rock lobster fisheries. It is a level that is considered to be safe in most fisheries. On the other hand, if the fishery does not get better

recruitment in future seasons and the biomass is further reduced, egg production would also decline, and should be closely monitored.

To summarise, the sustainability of the fishery is not under immediate threat from the current rate of fishing. Therefore, the strategy to cap the effective effort through input controls is consistent with good management practice. The fishery is reliant on recruitment that appears to be quite variable and must therefore be geared towards some periods of lower catches.

## **6.0 Proposed management package for the 1995/96 fishing season**

The NZRLF Management Committee proposes to manage the trend of increasing fishing power by further reducing the length of the fishing season. It is extremely difficult to quantify the rate at which fishing power is increasing in the fishery and furthermore, it is not likely to be quantified in the short term. Therefore, the committee has relied on intuition and experience, and trends in the WA lobster fishery to guide it in its assessment of the required season reduction for the 1995/96 fishing season.

Factors that were discussed this year were:

- a. The addition of 23 pots that have effectively been out of the fishery for the past seven seasons;
- b. the transfer of licences by sale or lease from low catch rate fishers to higher catch rate fishers;
- c. the replacement of existing vessels and gear with more powerful vessels and gear;
- d. increased knowledge of NZRLF licence holders; and
- e. increased gear efficiency due to partial closures reducing competition for preferred grounds.

It was estimated that the combined effect of these factors would increase the fishing power of the fleet by about three percent.

The NZRLF Management Committee had to decide on the length of the time closure that had to be taken by each NZRLF in order to cap effort during the 1995/96 season. It was decided to add the estimated percentage increase in fishing power over the past two seasons to the estimated three percent for the coming season. A figure of 0.7 percent was added to the estimated 3 percent for the coming season. This was in anticipation that fishers will compensate for additional days off by fishing extra days. Table 2 shows that the days needed to be taken off in the 1994/95 season are in excess of the actual days taken off. As explained below the days referred to in Table 2 are average days, while days in the package had higher than average values December and January.

Table 2. The days removed from the 1993/94 season, agreed increase in fishing power, additional percentage time required to make up for compensatory days fished and the annual “average” days off required to meet the objective are shown. The actual number of days off need to meet the objective depends on which days of selected (see Table 3).

season	days removed	percent increase in fishing power	percent removed by days	extra percentage	total percentage	season length	average days required to meet percentage, or days
1993/94	7	no estimate				211	7
1994/95	0	5	2.5	1	3.5	204	7
1995/96	0	3	3	0.7	3.7	197	7

Northern zone fishers requested that season length reductions be as flexible as possible to ensure that continuity of supply is maintained. Because lobster vulnerability and abundance varies during the season a uniform number of days is not appropriate where the closure times are not fixed. Therefore a table of “standard” days has been calculated. Fishers are required to select a combination of these days within specified closure periods so that the sum of the standard days is greater than or equal to the target reduction of **21** average days, as shown in Table 2. Table 3 has been attached to assist fishers to calculate closure periods.

Table 3. Fortnightly values for standard days to be used when calculating the total days off required for any particular time closure package. Data are presented in their “raw” and smoothed form.

		source: average catch and effort from 1989/90 season to 1993/94 season													
month	nov	dec		jan		feb		mar		apr		may			
fortnight	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
raw data	0.93	0.91	0.97	0.99	1.08	1.16	1.11	1.10	1.17	1.07	0.96	0.93	0.88	0.72	
smoothed	0.89	0.94	0.99	1.03	1.07	1.10	1.12	1.12	1.11	1.08	1.03	0.95	0.85	0.72	

## **7.0 Industry consultative process**

As part of the management process, the NZRLF Association conducts a series of port meetings where the rock lobster scientists present the most recent data on the fishery to the fishers. This provides fishers with the opportunity to have direct input into the management process and allows the scientists to address any concerns that the fishers have with the research program.

Details of the port meetings and the number of fishers who attended appear below.

Kangaroo Island, 6 June 1995 (12 fishers)

Port Lincoln, 15 August 1995 (25 fishers)

Yorke Peninsula, 16 August 1995 (10 fishers)

In addition to these three meetings, an open forum for all fishers was held in Adelaide on 11 August 1995. An estimated 45 (i.e. over half of the NZRLF licence holders) fishers attended this open forum. The overwhelming message from the fishers who attended was that they wanted to continue to manage their fishery with time closures and that these time closures should be as flexible as possible. This was to ensure that the market had a continued supply of lobsters throughout the whole fishing season.

## **8.0 The administrative and compliance implications of the management package**

### **8.1 Administrative considerations**

Administering a complex set of flexible time closures has the potential to place extra demands on existing administrative staff. However, these demands should be able to be accommodated if the system is not unlike the system implemented last season.

The system of closing the season during three periods and then issuing group exemptions so that fisher could operate during two of the closures was not without a few teething problems last year. Nevertheless, the system worked to the satisfaction of the fishers and PISA and a similar system could be implemented quite easily this year, now that the data base has been established.

The scheme will be too complex if it involves creating a large number (i.e. > 5) of time closures where fishers are able to choose different combinations of days within these closures. It would be preferred that a number of set closures be established and then fishers would need to choose a combination of these to achieve the required number of fishing days to be taken off during the fishing season.

Regardless of what system of closures was introduced, fishers must understand that they will not be able to change their fishing periods once the season commences.

## **8.2 Compliance considerations**

Any management system that relies on time closures requires that all fishing gear is removed from the sea or rendered unusable during the closed period. Last season fishers were required to notify the Compliance Unit of PISA Fisheries of the location where their fleet of pots could be inspected for the time that they chose not to fish. It was expected that these locations would be visited by compliance staff to ensure that the pots were not in the sea. These inspections could be done on a compulsory or on a random basis depending on the strategy employed by the Compliance Unit. A more flexible system of selecting time closures may require additional resources from the Compliance Unit, which in turn may need to be funded directly by the NZRLF licence holders.

## **9.0 Summary**

The 1995/96 NZRLF management proposal has not been discussed with other IMCs that may see an impact on the fishery they are responsible for managing. For example, the Marine Scalefish Management Committee may have concerns about a scheme of time closures where fishers are prevented from fishing for rock lobsters while being allowed to fish for scalefish. Lobster fishers have access entitlements to the marine scalefish fishery and have the potential to shift effort into this fishery during the designated closed period. While entitlements to fish in that fishery are not in question, the potential increase in fishing effort in that fishery should be considered and monitored over the next season.

The effectiveness of the time closure strategy will need to be monitored carefully throughout the 1995/96 season. This is because, in order to bring the licensing year into alignment with the financial year as from 1996/97, the management arrangements for the 1996/97 fishing season will need to be developed during the 1995/96 fishing season. This will enable the costs of any compliance and administration required to implement the strategy to be incorporated into the 1996/97 licence fee setting process.

This will not be popular amongst members of the NZRLF Management Committee who run their own vessels. The management committee will need to develop an arrangement to minimise any impact this requirement may have on management committee members.

To conclude, members of the NZRLF Management Committee were unanimous in recommending that a flexible system of time closures was the preferred strategy for the 1995/96 fishing season.