LONG TERM MANAGEMENT OPTIONS

For the

NORTHERN ZONE ROCK LOBSTER FISHERY

Review Report 4

October 7th 2002

Prepared by the Northern Zone Rock Lobster Fishery Management Review Sub-committee, with assistance from industry members of the Fishery Management Committee and in partnership with PIRSA Fisheries.

This is an options paper only. Unless specifically stated otherwise, this paper is not a statement of PIRSA Fisheries policy, nor does it contain recommendations to the Northern Zone Rock Lobster Fishery Management Committee.

The information contained in this paper provides an indication of how the future management options may be constructed – it should be noted that the specific detail are likely to evolve during implementation as the Minister will make final decisions. You are advised not to make business decisions on the basis of this document.

The Review sub-committee will use this and all the review reports, and the outcomes of the consultation over the past twelve months, to form recommendations about the long-term management and industry structure arrangements to the Fishery Management Committee on November 4th 2002.

This paper must not be published or relied upon as being a statement of the long-term management arrangements for the Northern Zone Rock Lobster Fishery.

CONTENTS

SECTION 1 – EXECUTIVE SUMMARY

SECTION 1 – EXECUTIVE SUMMARY

1.1 Why have an options paper?

The Northern Zone Rock Lobster industry, through the Review workshop and questionnaire, has supported responding to the current stock decline, with short and long term management actions to rebuild the stock. In the short term, an additional 8% effort reduction has been implemented for the 2002/03 fishing season. This paper summarises the preferred long term management options requested by industry at the workshop and through the questionnaire, namely;

- **Flexible Time Management (FTM); and**
- **Individual Transferable Quotas (ITQ).**

This options paper has been designed specifically to:

- inform individual licence holders of the likely broad details associated with each proposed management option; and
- to assist individual licence holders to indicate a preferred long term management option for the Northern Zone Rock Lobster Fishery, through an industry ballot.

1.1.1 What has the Northern Zone review process involved so far?

Table 1 – Northern Zone Review Process

October 2001	Industry meeting at West Lakes endorsed a review of the Northern Zone covering assessment of SARDI reports, long term management options and industry structure – 45 industry members present. FMC endorses industry proposal and PIRSA agrees to fund the review through licence fees.
October 2001	Nomination for review sub-committee called from licence holders – 5 received and all appointed by the FMC.
December 2001	**First** meeting sub committee to set review terms of reference. Ian Cartwright endorsed as Independent Chair.
January 2002	Dr Paul Breen (NIWA) appointed to undertake science review.
February 2002	**Second** meeting of sub committee. Decision and consultation protocols and revised timetables agreed – circulated to all licence holders.
March 2002	**Draft Report 1 – Breen Science Review** - sent to all licence holders and presented at open meeting by Dr Breen. **Third** meeting of sub-committee.
May 2002	**Fourth** meeting of sub committee – industry questionnaire developed and Port Lincoln workshop confirmed. **Draft Report 2 – Research Priorities** considered by sub-committee – resolved further work needed.

Table 1 – Northern Zone Review Process - continued

June 2002	Questionnaire responses compiled and **Report 3 – Management Review Discussion Paper & questionnaire responses** distributed to all licence holders.
July 2002	2 day industry workshop in Pt Lincoln. A majority of about **80 participants** endorse; **action to rebuild the stock, a minimum of 8% effort reduction for 2002-03 season, development of details of a quota system (inc. allocation and compliance) and flexible time management and an increase to the upper pot limit.**
July 2002	**Fifth** meeting of sub committee – FMC advised of workshop outcomes and revised timeline for review completion. Consideration of plan to prepare Management Options Paper.
July 2002	FMC recommends 8% effort reduction to Minister and surveys licence holders on extent of increase in upper pot limit. **Increase to 70 pots supported by majority of licence holders**. Subsequently, FMC recommended an increase to the Minister, which has been supported.
July 2002	FMC, sub committee and Port representatives' workshop the implementation of short term (next season) 8% effort reduction and compliance options under quota and flexible time management.
July 2002	Industry meeting Adelaide to discuss quota allocation (number of Guest speakers). 2002-03 management arrangements presented and endorsed.
August 2002	FMC, Sub committee and port industry representatives meet to discuss detail of long term quota and flexible time management options
August 2002	Sub committee industry members & PIRSA review **Draft Report 4 - Long Term Management Options** paper. Industry endorses an independent consultancy to provide advice to industry on quota allocation principles and seeks additional negotiations on proposed compliance costs. Executive summary paper requested for distribution with the options paper and industry ballot.
September 2002	Quota allocation consultancy commissioned by SANZRLFA - all licence holders invited to make written and verbal submissions.
September 2002	**Reports 4 – Long Term Management Options – Sub committee industry members meet** to finalise the executive summary, ballot and final industry meeting.
October 2002	**October – Report 4 Long Term Management Options, Executive Summary and allocation report sent to all licence holders with ballot.**

1.1.2 When will the final recommendation on long term management arrangements be made by the FMC?

Table 2 – Decision Timetable

October 24th – 26th	Ports meetings to answer questions about Long Term Management Options
October 29th	Ballot closes
November 4th	**Sixth** and final meeting of review sub committee – recommendations on long term option to be finalised for the FMC.
November 20th	**FMC meets to consider sub-committee recommendations and make recommendations to the Minister on a long-term management option for implementation in season 2003-04.**

1.1.3 How and when will unresolved issues be handled?

Until a long-term option is supported by the Minister is not possible to deal with all the details and unresolved issues that will need to be addressed during the implementation stage. The FMC will have direct responsibility for developing the details of the options and providing advice to the Minister. Substantial input from the industry will be required to develop the final arrangements that are both practical and cost effective. Some examples of issues, which require additional work, include:

- final compliance arrangements and final costs,
- caufs, and
- quota allocation if a quota is supported.

This work will commence after the Minister has agreed to a long-term option.

1.2 What are we aiming to achieve with the long-term management strategy?

In the **Short Term (2-3 years),** a conservative harvest range must be set for the fishery to allow the stock to recover. The short term sustainable harvest range for the fishery is currently considered to be between **600 and 700 tonnes**. Management will set a total allowable catch (TAC) under a quota system or the number of fishing days under FTM to achieve a catch (yet to be determined) within this range for the foreseeable future. This estimate is subject to the performance of the fishery in the 2002/03 fishing season, and is consistent with a stock recovery plan.

In the **Long Term (5-10 years)**,expectations about the sustainable harvest range should be less than 890 tonnes (the average annual harvest over the past 20 years). The long term sustainable harvest range for the fishery is likely to be in a range between **750 and 850 tonnes**.

In line with the objective to rebuild the stock, a long term objective is to allow the fishery to achieve more stable catches and economic returns over a sustained period, and avoid overfishing, particularly during periods of extended low recruitment.

1.3 What about improving the economic performance of the fleet?

The following measures aimed at achieving higher returns on investment at both the individual business and fishery level, have been recommended to the Minister for Agriculture, Food and Fisheries to be implemented by the 2002-03 season:

- **An upper pot limit of 70; and**
- **Transferring down to zero pots within a fishing season.**

Assuming the long term catch range of 750-850 tonnes following rebuilding is achieved, a 70 pot upper limit would allow 13-15 tonnes/boat to be achieved from this catch range. **This is in line with the desires expressed in the majority of survey responses. Under these proposals:**

- **no-one is being forced to buy up or lease extra pots;**
- **individuals can choose to maintain their current position; and**
- **no extra gear will be created or used.**

It is proposed that when the average holdings of all licences reaches within five of the upper limit that the upper limit be reviewed.

1.4 What are the preferred Long Term Management Options and what problems do they overcome?

The industry survey and workshop have identified a number of fundamental problems with the current system including:

- **lack of flexibility to make fishing decisions which allow both higher prices and best fishing conditions to be targeted;**
- **less and less time available for fishing by cut off dates causing safety issues at sea; and**
- **"pressurised" or forced fishing operations.**

The future long term management options preferred for the fishery are:

1. **More flexible time management (FTM); and**
2. **Individual transferable quotas (ITQs).**

Both systems aim to control the catch within a pre-defined limit. Under both systems scope also exists to increase the catch or available fishing days, should the stock build to the target level in the future. The main aim under each option is to rebuild the stock in the short term and provide a more strategic and less 'reactive' management framework for the long term future of the fishery.

1.4.1 How will the Flexible Time Management System work?

A refined time management system will involve the following:

- Establish a sustainable catch target for each season, similar to a total allowable catch (TAC);
- Assume that all licences will fish during high catch rate periods and estimate catch rate for each season, taking into account estimated future recruitment strength;
- Using the catch target and estimated catch rate, set the total number of fishing days available for fishing each season;
- Allow each individual licence holder to fish for the set number of days whenever they want during the established season with all closures flexible and taken in 5 day blocks;
- All licences fish the same number of days, regardless of pot holdings;
- Remove fixed closures entirely;
- Remove the cut off dates of 14th March and 21st April.
- Maintain other gear restrictions;
- Maintain other vessel size and capacity restrictions; and
- Continued annual review and reductions in fishing effort to account for increases in operational effectiveness over time.

It is important to note that when the catch exceeds the target catch in a given year a reduction in days would occur in the following year to offset the over-catch.

It is also important to note that under this option significant management emphasis will have to be placed on estimating recruitment, catch rate and target catch each year, particularly catch rate. With existing fishery information the future catch rate estimates are not likely to be very robust and will have to be set conservatively.

It is important to note that it is likely that initially a catch target will be established for a three to five year period to ensure stock recovery.

Refer to Section 2 - Options Details for a more detailed outline of the flexible time management system.

1.4.2 What will compliance be for Flexible Time Management?

The proposed compliance and monitoring arrangements for a flexible time management system would operate as follows:

- Focus on monitoring when and where boats are tied up in port and the number of pot lifts;
- Maintain pot restrictions;
- Assume a licence is fishing unless a report is made;
- Monitor fishing days by licence and when all are fished the licence is prevented from fishing – onus is placed on licence holder to report when not fishing and to keep track of available fishing days;

- No transfer of pots during a season from licences to other licences that have fished less days;
- Using the current prior reporting, tie up and departure arrangements;
- Designated tie up ports;
- Prevention of double pot lifting on any given fishing day; and
- Continued controls on vessel size and capacity.

1.4.3 What are the estimated compliance costs for flexible time management?

Table 3 - Indicative annual FTM compliance costs estimated by PIRSA Fisheries compared to the current system.

Item	Current	No VMS	With VMS
Compliance Cost	**$280,000**	**$753,589**	**$537,908**
Estimated annual cost per licence holder	**$4,058**	**$10,922**	**$7,796**

Further investigations by the FMC of more cost effective alternatives would occur when the decision is made about the actual management system that is to be implemented. In particular the at sea vessel costs, compliance officer days and out sourcing options require further consideration under the "No VMS" option. The annual compliance may be lower than that shown above and could reasonably be expected to fall within the range of $8,000 - $12,000 per licence.

1.4.4 How will an Individual Transferable Quota (ITQ) system work?

The proposed Northern Zone ITQ system would involve:

- Allocate each individual licence holder a share of the total allowable catch (TAC);
- Establish a sustainable catch target for each season and set an annual TAC for the fishery;
- Complete flexibility in fishing time during the established season;
- Maintain pot restrictions until any allocation adjustment is completed;
- Maintaining the pot as the unit of trade until any allocation adjustment is completed;
- Removal of input restrictions such as double lifting, boat size and engine power, etc; and
- A monitoring system based on counting numbers not weight.

This option will provide a greater capacity for stock rebuilding through a direct control on the catch and potenatially provide for higher economic returns to licence holders in the long term.

1.4.5 What will compliance be for compliance for an ITQ system?

It is proposed that the compliance and monitoring arrangements under an ITQ system be as follows:

- The system would shift to a focus of monitoring the landings of lobster;
- The monitoring system would be focussed on counting numbers, as opposed to weight of lobster landed;
- Verification in factories supported by a matching catch disposal documentation covering: animal weight and/or numbers, date, and landing location;
- An individually numbered lobster tag system identified to the Northern Zone, or each licence is also being explored;
- Prior report 2 hours before landing, depending on geographic location of the port;
- Designated landing points (approximately 40) – class A & B[1] would be established;
- Operators would be required to commit to a designated landing site and the estimated number of lobster on board the vessel, at the time of prior report;
- PIRSA Fisheries considers the use of a Vessel Monitoring System (VMS) to be a necessary component for this arrangement - to maintain effective compliance levels given the high number of landing points and the geographic extent of the zone and to maintain costs to within reasonable margins;
- Individual animal identification (carapace sticker or horn tag) number, linked to each licence on the vessel at time of capture could be considered if the technology is available;
- Minimal aerial surveillance and at sea capacity would exist to monitor other input restrictions and to ensure that transhipping does not occur;
- Arrangements for continued use of caufs would need to be further investigated.

1.4.6 What are the estimated compliance costs of an individual transferable quota system?

Table 4 - Indicative maximum annual ITQ compliance costs as estimated by PIRSA Fisheries compared to the current system are as follows:

Item	Current	No VMS	With VMS	No VMS With Tags	VMS and Tags
Compliance Cost	**$280,000**	**$700,258**	**$528,846**	**$850,258**	**$614,204**
Estimated Annual Compliance Cost/licence	**$4,058**	**$8,864**	**$6,694**	**$10,763**	**$8,902**

[1] It is proposed that a more stringent class of prior reporting (B) be assigned to ports that are more remote and subject to higher compliance risks.

Further investigations by the FMC of more cost-effective alternatives would occur when the decision is made about the actual management system that is to be implemented. In particular compliance officer days, at sea vessel days and savings when tags are used require further consideration. Therefore compliance cost could be lower than indicated above and could reasonably be expected to fall within the range of $6,000 - $11,000 per licence.

1.4.7 How might ITQ's be allocated?

An industry workshop in July 2002 developed the following principles for allocation:

- The allocation should not redistribute licence values while incorporating some consideration of the historical and average catches;
- All future trading of pots while quota is attached to the pot should occur at the average quota allocation.
- An initial allocation based around 50% catch history and 50% average to be maintained (except for the impact of any pot sales at the average) for a period of 5-10 years, after which all pots would attract the average quota; and
- Quota allocation should at least initially be attached to each pot.

Other considerations, which emerged from the workshop, were:

1. No considerations of catch history after July 1, 2001 should be made and that pots traded after July 1, 2001 attract the average.
2. Catch history stays with the licence, not the licence holder.
3. An Independent Allocation Advisory Panel (a lawyer, an economist and an independent commercial fisher) to recommend the approach and allocation formulae to PIRSA Fisheries. The panel would cover all the issues including the approach to catch history, that is the period, special circumstances, appeals process and how history is accounted for.

PIRSA Fisheries have indicated that a minimum of 50% weighting is likely to be attached to pots, in considering the allocation formula, due to the fact that pots have traditionally represented the economic unit in the fishery.

Following the July industry workshop, an independent consultancy drawing on experienced legal and economic expertise was commissioned the SA Northern Zone Rock Lobster Fishermen's Association to assess the robustness of the outcomes of the industry workshop and PIRSA's position. The consultancy provided the following conclusions and advice to the Northern Zone Rock Lobster Fishermen's Association:

'……the consultants' opinion is that the proposed allocation of ITQ's on the basis of current pot holdings and catch history with an adjustment period offers a sound formula from legal, economic and equity perspectives.

If the proposed allocation method were adopted then it would follow that the quota allocation should initially be attached to each pot. This would allow the pot to remain as the unit of trade, at least until any allocation adjustment is completed.

It is recommended that during the adjustment period trading of pots take place at the average quota allocation. This will work towards maintaining the distribution of existing fishing rights and in this way best pursues the statutory objectives.

With respect to a period of adjustment, the conclusion of the consultants is that a shorter period, say 5 years, is in the circumstances reasonable and consistent with the equity objective.

The terms of reference asked the consultants to assess advice from PIRSA Fisheries indicating that a minimum of 50% weighting will be attached to pots. ***As indicated above, the consultants support the proposed method of allocation that gives an initial 50% weighting to pots.***

The proposed allocation method was not found to be unsound in any way, although, ……. an increase in the pot limit above 70 pots should be given careful consideration if this method of allocation is to be adopted.'

1.4.8 How would the allocation method developed at the workshop work?

Example: 50:50 allocation, 5 year adjustment period

To demonstrate the way in which this method of allocation would work in practice, a hypothetical example has been constructed in which the adjustment period is assumed to be 5 years. In this example (Table 5) it is assumed that the total number of quota units (1 unit equals 1 kilogram) issued for the fishery is 650,000 or 650,000 kilogram. There are 3,950 pots in the fishery the average catch per pot in the fishery over the catch history period is assumed to be 200 kg.

The allocation of quota units has been calculated for three licence holders, low, average and high catch. To simplify the example, each of the licence holders is assumed to own the same number of pots (57). The trend in quota unit holdings over time is clear. For the low catch fisher (with an average catch per pot 30% below the fishery average) the number of units is constant over the five year period and less than the fishery average. At the start of year 6 it increases to be equal to the fishery average. Conversely, the high catch fisher (with an average catch per pot 30% above the fishery average) the number of units is greater than the fishery average over the five year period, then falls to be equal to the average in year 6. The allocation of quota units for the fisher with an average catch per pot equal to the fishery average is unchanged during and following the adjustment period.

Table 5 Allocation example

Total Fishery:			
Quota units	650000		
Pots	3950		
Average catch/pot (kg)	200		
Example Fishers:			
Average Catch rate	*Low*	*Average*	*High*
Av catch/pot (kg)	140	200	260
No. of pots	57	57	57

t (year)	*Allocation of quota units*		
1	7973	9380	10787
2	7973	9380	10787
3	7973	9380	10787
4	7973	9380	10787
5	7973	9380	10787
6	9380	9380	9380

Note that in this hypothetical example 1 unit equals 1 kilogram.

(Further details of the workshop discussions are presented in Section 2 and the complete EconSearch report "Advice on Potential Individual Quota Allocations in the South Australian Northern Zone Rock Lobster Fishery" is provided in Appendix 1).

PIRSA Fisheries has indicated that an Independent Allocation Advisory Panel is likely to be established, if quota was adopted, to provide independent advice to the Minister on the most appropriate allocation method, within a set of agreed principles.

1.4.9 How do the management options compare to the current system?

From a biological perspective, a significant advantage of a quota system is that it will constrain catch when times are good (good recruitment) and contribute significantly to stock rebuilding. Note however, that a quota system could allow over-catch when times are not good (poor recruitment) if the TAC is not appropriately adjusted during periods of lower recruitment.

The flexible time management system outlined in this paper is also aimed at constraining catch when times are good but is likely to be less effective. It may however be more effective at restricting catch during poorer periods, because fishing days are constrained.

From an economic perspective, a quota system will provide the greatest commercial and administrative flexibility and theoretically result in superior economic returns to licence holders, in the long term.

The following tables summarise the features of each of the proposed options against the current system.

Table 6 - System Structure

Design	Current	Flexible Fishing Time Management	Quota
Fishing times & gear	- Previously flexible and fixed closures; - Season 2002-03 all flexible closures with 3 fishing periods within the season; - Pot limits remain; - Vessel size and capacity restrictions remain.	- Licence holder to fish for a set number of days, with greater flexibility (5 day closures) during the season. - Removing fixed closures entirely; - Introducing all flexible closures in 5 day block; - removing cut off dates of 14th, March and 21st April; - Pot limits remain - - Vessel size and capacity restrictions remain	- licence holder to fish with total flexibility during the season; - No time closures during the season; - Pot restrictions to remain during allocation adjustment period. - Vessel size and capacity restrictions removed.
Season	- November 1 Start May 31st End	- November 1 Start May 31st End	- November 1 Start May 31st End
Licence Transfer	Yes – pots	Yes – pots	- Yes – quota attached to pots or quota units if unitised.
Structure	- 70 pot maximum per licence - 25 pot minimum; - leasing below 25 pots during a season has been recommended.	- 70 pot maximum per licence; - 25 pot minimum; - leasing down to zero allowed during a season has been recommended.	- 70 pot maximum per licence; - 25 pot minimum; - leasing down to zero allowed during a season has been recommended.

Table 7 - Targets and Decision Making

Design	Current	Flexible Fishing Time Management	Quota
Fishing Targets	Constant exploitation rate	- Short term total catch 600-700t - long term 750-850t - Catch rate	- short term total catch 600-700t - long term 750-850t
Decision rules to fish to target catch range	- Annual time closure adjustments	- Annual fishing time adjustments, through adjustment to catch rate, catch target and/or total pot holdings.	Annual TAC setting
Effort Controls	- Ongoing reduction in days, pots or licences to offset effort; - existing total pot limit remains; - season remains - vessel size and capacity restrictions remain	- Ongoing reduction in days to offset effort and recruitment fluctuations; - Existing total pot limit remains; - Vessel size and capacity restrictions remain.	- Total pot limit remain; - vessel size and capacity restrictions removed - double lifting restriction removed.

Table 8 - System management costs – indicative only

	Current	FTM	ITQ
Research	**$240,000**	**$260,000**	**$260,000**
Management	**$260,000**	**$280,000**	**$280,000**
Compliance	**$280,000**	**$537,000,000 - $753,000**	**$454,000 - $850,000**
Total Cost	**$780,000**	**$1,077,000 - $1,293,000**	**$993,000 - $1,390,000**
Cost/Licence	**$11,300**	**$15,600- $18,800**	**$14,400 - $20,150**

1. 5 What will the time frame be for implementation?

It is proposed that the new long term management arrangements will be in place for the 2003-04 season.

SECTION 2 – OPTION DETAILS

2. Overview

The review of management arrangements in the Northern Zone Rock Lobster Fishery has been a comprehensive and exhaustive process aimed at identifying all available options for the future management of the fishery. This paper is a culmination of this extensive review process and incorporates critical information on the range of issues associated with each future management option identified.

Responding to the current concern over the stock decline in the Northern Zone Rock Lobster fishery has required consideration of short and long term solutions for managing the fishery. The short and long term issues have been addressed separately. In the short term two measures have been taken to address both sustainability and economic issues:

- **An additional 8% effort reduction in days for the 2002/03 season; and**
- **An increase in the upper pot limit to 70 pots.**

This paper only deals with the **long term management options** aimed specifically at providing a more strategic, and less reactive, framework for managing the fishery. The following two long term management options for the Northern Zone Rock Lobster fishery are presented in detail:

- **Flexible time management (FTM); and**
- **Individual transferable quotas (ITQ).**

This paper draws on the following information:

- legislative requirements outlined in the *Fisheries Act 1982*;
- information provided by the wider industry through the survey circulated in June 2002;
- scientific information provided by SARDI Aquatic Sciences;
- the independent scientific review undertaken by the National Institute of Water and Atmospheric Research, New Zealand (NIWA);
- discussions held at the industry workshop held July 15th- 16th in Port Lincoln, attended by about 80 people;
- guiding advice and principles from PIRSA Fisheries; and
- general discussion and consultation with industry.

Either option, combined with a fleet restructure, will improve fishing operations while delivering to greater or lesser degrees on the following broad management imperatives:

- Long term stock sustainability;
- Stock rebuilding;
- Maintenance of sustainable long term catches;
- Compliance with environmental legislation;
- Improvements in the economic performance of the fishery;
- Cost-effective management and administration; and

- Commercial and administrative flexibility.

This paper does not aim to indicate a preference for either option. The responsibility for recommending which option should be adopted in the future management arrangements lies with the Northern Zone Rock Lobster Fisheries Management Committee. The information contained within this paper does not represent the individual views of review committee members.

3. Management Background

For many years the fishery has been managed under an input control regime. This regime is based principally on a time management system that requires commercial operators to select fixed closures in advance of the season and flexible closures at 12 hours notice during the season.

Other important restrictions include those placed on: the number of fishing licences; individual pot holdings; vessel size and engine capacity; areas fished; the fishing season; a minimum size limit; double pulling; and the retention of egg-bearing females.

The Management Plan (1997) incorporates a series of performance indicators that are used to assess the performance of the fishery against established management objectives and reference points, on an annual basis. These performance indicators are used to guide management decision-making and include: exploitation rate; egg production; mean size; catch rate; and pre-recruit index. Other indicators used for management purposes include the annual total catch and the estimated total biomass.

The existing five year Management Plan is due for review in 2002/03 and will be amended as a result of the outcomes from this review process. A revised Management Plan for the fishery will incorporate any additional measures needed to ensure that the fishery performs well against the objectives of the Fisheries Act 1982 and the assessment and reporting requirements set out in the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

The EPBC Act requires all export fisheries (State and Commonwealth) to meet a set of comprehensive sustainability guidelines (by December 2003), in order to gain export exemption. These guidelines require all State fisheries to demonstrate that individual species and ecosystems are being managed within a broad sustainability framework.

4. The Current Fishery Status

There are currently 69 fishing licences endorsed to take rock lobster in the Northern Zone. This number has been reduced from 81 licences in 1992, through structural adjustment and licence ‘split-ups’.

A total of 3,950 pots are licensed for use in the fishery. In the 2001/02 fishing season a total catch of 674 tonnes was taken with approximately 623,000 pot-

lifts, producing an average nominal catch rate (the actual catch rate recorded through logbooks) of 1.08 kg/pot-lift.

The total catch and actual catch rate were the lowest recorded since the 1985 fishing season.

Table 9. Performance Indicator estimates (and other fishery data)

Reference Points & Fishery Performance Indicators	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Exploitation rate	0.28	0.27	0.26	0.27	0.27	0.27	0.27	0.26	0.25	0.23
Egg production (% of virgin stock)	29.22	26.36	25.14	24.33	24.53	25.44	26.59	26.56	24.02	21.24
Pre-recruit abundance (per pot lift)	0.21	0.18	0.24	0.25	0.30	0.36	0.40	0.34	0.29	0.20
Catch rate (kg per potlift)	1.43	1.29	1.26	1.25	1.26	1.31	1.41	1.43	1.23	1.08
Mean weight (kg)	1.07	1.12	1.1	1.13	1.06	1	0.99	1.01	1.11	1.16
Annual Catch (tonnes)	1064	930	892	903	892	942	1,016	1,001	846	674
Annual Potlifts (000's)	746	719	705	724	718	722	721	700	687	623
Boats	81	79	79	77	75	73	71	70	69	69
Avg. catch/boat (tonnes)	13	12	11	12	12	13	14	14	12	9.4

Source: SARDI

Under the current management approach, the productivity of the stock and the economic viability of the fleet have fluctuated in line with environmental factors that drive recruitment and the fishing pressure applied to the fishery.

The recent stock assessment advice from SARDI (2002) reports the following:

1. *The catch for the 2001/02 fishing season was 674 tonnes, which is 24% below the lower reference limit identified in the Management Plan (891 tonnes in 1994) and the lowest catch for the NZRLF since 1985.*

2. *The CPUE (calculated from season totals of catch in weight and pot lifts) for 2001/02 was 1.08 kg/pot lift, which is 14% below the lower reference limit identified in the Management Plan (1.25 kg/pot lift in 1995 and 1996) and the lowest in the history of the fishery.*

3. *The mean weight of lobsters for the 2001/02 season (calculated from season totals of catch in numbers and weight) was 1.16 kg, which is 3% above the upper reference limit identified in the Management Plan (1.07 kg in 1992) and the highest mean weight since 1982.*

4. *The pre-recruit index for the 2001/02 season (calculated for months of November to March inclusive) was 0.20 undersize/pot lift, which is inside the reference range identified in the Management Plan (0.180 to 0.302 undersize/pot lift in 1992 and 1996 respectively), but the third lowest pre-recruit index recorded since 1987 (the first year in which reliable information on pre-recruit abundance was collected).*

5. *The accuracy of the estimate of pre-recruit abundance for 2001/02 is confirmed by the independent estimates generated by the qR Model that*

suggest that recruitment levels in the 2000/01 and 2001/02 season were the (two) lowest in the fishery's history.

6. *The exploitation rate for the 2001/02 season generated by the qR model was 0.231, which is 12% below the lower limit for the reference year identified in the Management Plan (0.261 in 1994).*

7. *The qR model estimated that egg production in the 2001/02 season was 721 billion eggs, which is 10% below the lower reference limit identified in the Management Plan (799 billion eggs in 1995) and the lowest since 1970.*

8. *Outputs from the qR model and the developing integrated assessment model suggest that the biomass of lobsters in the NZRLF in the 2001/02 season was the lowest in the fishery's history.*

9. *The decline in the exploitation rate for the 2001/02 season suggests that the 7% reduction in effort implemented at the start season succeeded in reducing the catch. However, the high mean weight of lobsters and low levels of recent recruitment suggest that this decrease will not be sufficient to prevent further reductions in the fishable biomass over the next few seasons.*

10. *In order to (i) minimise the rate of depletion of the biomass over the next few seasons, (ii) maximise the rate of recovery of the biomass in the medium-term, and (iii) maximise the long-term yields for the fishery, effort should be reduced significantly below the 2001/02 level.*

Source: Ward (*et al,* 2002)

5. Setting Targets and Limits – What should we be aiming for?

As stated in the previous Management Discussion paper (4 July 2002), it is important to recognise that approaches to managing fisheries are continually changing and being improved. In recent times the trend has been towards establishing targets and limits, or "pegs in the sand", which management plans aim to achieve or avoid. These terms are usually referred to as reference points or trigger points and are now formal legal requirements under new environmental law introduced by Environment Australia (the EPBC Act). Indeed for many years licence holders in the Northern Zone have sought to know: **"what are we aiming for?"**

Target and limit reference points (or pegs in the sand) are specified values of sustainability indicators (ie. biomass, catch rate, egg production, mean weight and pre-recruit index) that correspond to stated management objectives. A ***limit reference point*** is used to describe the state of a fishery that is not considered desirable, while a ***target reference point*** is used to indicate the state of a fishery that is considered desirable.

For example, a *limit reference point* that could be developed as part of a revised Management Plan for the Northern Zone is a stock size (biomass level) that corresponds to that which was reported in the 2000/01 fishing season.

An example of a *target reference point* that could be used in the Northern Zone is the stock size (biomass) that will allow a catch of 850 tonnes to be taken on an annual basis by the commercial sector, during periods of high and low recruitment.

For input (effort) controlled fisheries (if the sustainable harvest range is understood), the optimal amount of harvesting capacity (pots, days and licences) required to catch the sustainable yield must be determined – *this approach represents a constant harvest rate strategy – the aim is to harvest a constant fraction of the biomass each year.*

For output (quota) managed fisheries, the estimated sustainable harvest range (or level) is usually translated to the Total Allowable Catch (TAC) – *this approach represents a constant catch strategy – the aim is to harvest a constant catch each year*.

The existing Northern Zone management system uses a *constant exploitation rate strategy*. Under this system, the total catch increases when the stock size increases, due to increased recruitment, and if the stock size or recruitment declines so does the catch.

The average catch over the past 19 years is estimated to be approximately 890 tonnes; this has led to the status of the fishery today – a 674 tonne catch. During this same period, the exploitation rate (percentage of the legal size stock harvested each year) has been estimated to have remained stable at about 27% - this was the objective of management during the1990's.

However, it is acknowledged that the effectiveness of effort (pot lifts) has increased over time in the fishery, through the adoption of new technologies, and other changes in fisher behaviour (refer to previous discussion paper for a more detailed discussion of this issue). The industry, through the FMC process over the past 10 years, has supported effort reductions aimed at offsetting effort increases.

However changes in effective effort have not been detected by the qR model because of a lack of sufficient input data on the changes in effective effort. It is therefore considered that the 'real' exploitation rate has in fact increased over time in excess of the reductions taken by the industry, and contributed to the current status of the fishery.

Taking into account the known uncertainty associated with the estimates provided by SARDI Aquatic Sciences, it is a fair and reasonable conclusion that the current level of fishing pressure (exploitation rate) is too high. This position was acknowledged by industry in the recent survey and at the Port Lincoln workshop.

This will mean that a 'precautionary approach' will have to be adopted in setting an annual sustainable harvest range for the short-term future of the fishery, regardless of what management regime is adopted.

The previous Discussion Paper (4 July 2002) highlighted that there are a number of different approaches that could be adopted to determine what the short and long term sustainable harvest range for the fishery should be. Rather than rely heavily on one approach over another, it is considered more appropriate to use all available information such as historical catch and effort data and the outputs of fisheries modelling techniques. This more empirical approach allows us to learn from past experiences while also taking advantage of new techniques, and in the end, estimate a more realistic catch range.

Short Term

The short term sustainable harvest range for the fishery is currently considered to be between **600 and 700 tonnes**. This estimate is subject to the performance of the fishery in the 2002/03 fishing season, and is consistent with the development of a stock recovery plan.

The timeframe over which the stock will recover is heavily dependent on the amount of lobster extracted from the stock through fishing, the amount that die naturally, and the amount that enter the fishery through recruitment. Clearly, the less lobster extracted through fishing in the short term, the better the opportunity will be for the stock to recover within a reasonable timeframe. To this end, a conservative harvest range must be set for the fishery in the short term (3 – 5 years) to allow the stock to recover.

The next question is: **"what do we want the stock to recover to?"** This obviously depends upon, first and foremost, the biological needs of the stock and secondly, on industry and community expectations in relation to future sustainable harvests. The important considerations here are what stock parameters (biomass, recruitment, egg production etc) will allow reasonable long term sustainable harvests to be achieved consistently. These parameters must be set conservatively to take into account the known characteristics of the Northern Zone, particularly the high probability that the fishery will continue to periodically experience extended poor recruitment.

This means that the fishery should be managed to build and maintain a larger stock size that will provide:

- sufficient protection for the stock, and the large financial investment in the fishery, particularly during extended periods of low recruitment; and
- Greater stability in catches over the long term.

The recent stock assessment advice from SARDI (2002) reports the following:

"*In order to (I) minimise the rate of depletion of the biomass over the next few seasons, (ii) maximise the rate of recovery of the biomass in the medium term, and (iii) maximise the long term yields for the fishery, effort should be reduced significantly below the 2001 level."*

The Long Term

In the context of the need for a precautionary harvest strategy to be adopted, as outlined above, expectations about the long term sustainable harvest range should be less than 890 tonnes (the average annual harvest over the past 20 years). The long term sustainable harvest range for the fishery is likely to be in a range between **750 and 850 tonnes**. It is worth noting here that an assessment of the fishery undertaken by Prescott and Lewis in 1992 recommended a sustainable harvest range of approximately 850 tonnes.

With this in mind, the target reference points (stock parameters) that need to be established for the fishery should be based on what will allow the fishery to sustain a long term harvest of between 750 and 850 tonnes, not only during favourable periods, but also through extended periods of low recruitment. This may mean establishing a target biomass range (and other stock parameters) that equate to that experienced in a year chosen to be above the long term average.

6. Economic Performance and Fleet Structural Adjustment

If the economic performance of the Northern Zone Rock Lobster Fishery is to be improved, some level of fleet and licence restructuring is needed. This has been acknowledged by the industry via the survey and workshop after considering that:

- return on investment has declined 60% from about 4.5% (1997-98) to 1.8% (2000-01);
- return on investment in fishing boat gear and equipment has dropped about 50% from 21.4% (1997-98) to 9.0% (2000-01); and
- average catch/boat declined 32% from about 14.3 tonnes (1997-98) to 9.8 tonnes (2001-02).

The structural adjustment mechanisms (ie. excluding internal business costs savings) that may be used to improve each of these measures and restore economic performance to previous levels indicated are as follows:

1. Adjust the upper and lower pot limit to allow more pots to be worked from each licence[2];
2. Allow all of the pot entitlements on a licence to be leased out during a season, to a number below the minimum pot holding, but with those pots returning to the licence at the end of the season[3];
3. Reduce the number of active units actually fishing in the fishery , through adjusting the upper and lower pot limit; and
4. Reduce total investment in boats in the fishery by allowing a licence to lease down to a zero pot holding during a season, and as such negating the need for that licence to operate a separate vessel.

The majority of survey responses indicated that an annual catch in excess of 13 tonnes per boat is considered desirable to achieve an acceptable return on investment. Assuming the long term catch range of 750-850 tonnes following rebuilding is achieved, a 70 pot upper limit would allow 13-15 tonnes/boat to be achieved from this catch range.

The existing upper pot limit is 60 pots and the current average pot holding is 57. To allow improvements in economic performance, an increase in the upper pot limit to 70 pots has been recommended by the FMC, following an industry ballot with over 50% of all licence holders supporting this approach.

This recommendation has been put to the Minister for Agriculture, Food and Fisheries. The Minister has supported the increase and it is intended that this measure will be implemented prior to the commencement of the 2002/03 fishing season.

[2] The FMC has recommended that the upper pot limit be increased from 60 to 70 pots for the start of the 2002/03 fishing season.

[3] The FMC has recommended that this more flexible leasing arrangement be implemented for the start of the 2002/03 fishing season.

It is also proposed that when the average pot holding is within 5 of the upper limit a review of the upper limit is triggered.

It is proposed that the current number of licences in the fishery (69) is maintained. The FMC has recommended to the Minister that the regulations be amended to allow for all the pot entitlements on a licence to be leased out during a season, so that the licence (and associated package of fishing entitlements) remains on the shelf or inactive until the expiry of the licence at the end of each season, at which time the licence must have attached to it the minimum pot holding of 25 pots. Such a move will allow:

- individual licences to be leased down to zero pot holdings during a season, and return to the minimum pot holding at the end of each season;
- the possibility of re-activating all 69 licences in the future through maintaining the minimum pot holding at the end of each season;
- greater flexibility in leasing arrangements; and
- Improved economic efficiency because fewer boats could be used to operate the same number of pots.

To some extent this will allow additional business and operational flexibility. Should the economic performance of the fishery recover, existing fishing units that are not being utilised could be reactivated through leasing the desired number of pots. It also assists the fishery to meet a broad social objective of maintaining a capacity for potential access to the fishery by new entrants.

Owners of licences that are shelved each season because the number of pots is leased down to zero would be required to pay the standard licence fees associated with a Northern Zone licence.

Allowing each licence to lease pot holdings down to zero during a season requires a change to the existing regulations. It will allow opportunity for less investment in boats thereby improving both return to boats and gear and overall return on investment from the fishery, whilst maintaining the opportunity for a licence to be reactivated in the future.

Therefore the following measures have been recommended by the FMC as part of a long-term structural adjustment package, to be implemented prior to the commencement of the 2002/03 fishing season:

- An upper pot limit of 70;
- A lower pot limit of 25;
- Maintaining the current number of licences by allowing a licence to lease all pots (below the lower pot limit) during the season.

Each of these measures were supported by the FMC as part of the long-term management arrangements preferred by industry, regardless of which long term option is adopted (ie. quota or time management).

It should be noted that under these measures:

- no-one will be forced to buy up;
- individuals can choose to maintain their current position;
- no extra gear would be created or used;
- Any impact on effort levels will be marginal and is likely to be offset by the reduced spatial distribution in effort caused by fewer vessels fishing the same number of pots over a smaller area.

7. Long Term Management Options

The current system has worked well in principle and could continue to be used as the long-term management approach for the fishery, if effort levels (pots, days and licences) are closely monitored and adjusted regularly to match resource availability (stock size). High levels of Industry and Government support have underpinned it, and any future arrangements will need to achieve improved operations with similar levels of support.

As was indicated at that the industry workshop, the current system in itself has not failed and indeed no-one could have predicted the run of poor recruitment experienced in the fishery, coupled with the continued increases in effective fishing pressure applied by the fleet.

The previous effort reductions taken to address the expansion in fishing effort are unlikely to have been adequate.

The industry survey and workshop have identified a number of fundamental industry related problems with the current system including:

- lack of flexibility to make fishing decisions which allow both higher prices and best fishing conditions to be targeted,
- ever shortening time available for fishing within cut off dates within the season causing safety issues at sea and
- "pressurised" or forced fishing operations.

These are classic symptoms of an input control system, which seeks to constrain fishing effort. The industry has agreed that the future long-term arrangements need to address these problems. As well as these practical problems facing industry, given the accepted low status of the stock:

future management arrangements need to be aimed at rebuilding the stock to levels that will potentially sustain catches and catch rates at levels higher than are currently being experienced in the fishery.

In particular if fishing is to be "depressurised" and safety issues addressed, then removal of the cut off dates within the season is essential.

Two management options have emerged from the industry survey and workshop which are considered to meet the legislative requirements of the *Fisheries Act 1982* and which licence holders have indicated offer the chance to overcome the practical fishing issues mentioned above. The future long term management options preferred for the fishery are:

Option 1 - More flexible time management (FTM); and
Option 2 - Individual transferable quotas (ITQs).

PIRSA Fisheries has advised that no Government preference for either long term management option exists at this stage, on the basis that each option has the capacity to meet the basic objectives of resource protection, outlined in the *Fisheries Act 1982*.

However, it is noted that under either option further reductions in catch or effort will be advocated should there be indications that stock recovery is not being achieved - as measured by the performance of the fishery against established management objectives and reference points.

Under the flexible time management system this will mean further reductions in pots, available fishing days or the number of licences in the fishery. Under a quota system this will mean a reduction in the total allowable catch. Under both systems scope also exists to increase the catch or available fishing days, should the stock build to established target levels in the future.

Both of these options will allow the pursuit of the following broad management objectives, to greater or lesser degrees:

- long term stock sustainability;
- stock rebuilding;
- maintenance of sustainable long term catches;
- Improvements in economic performance;
- cost-effective management and administration;
- commercial and administrative flexibility;
- minimised environmental disturbances; and
- broad social benefits.

Next is a description of each option.

For a detailed comparison of the advantages and disadvantages of input and output control management systems, please refer to section 9 of the previous Report 3 Management Discussion Paper (4 July 2002).

It is proposed that both options initially be implemented within the current season to minimise administrate and compliance costs during the re-building of the fishery.

Option 1 - Flexible Time Management (FTM)

The main issue with the current time management system expressed in the survey and at the industry workshop was the lack of opportunity to fish when the conditions and prices are most attractive. More flexibility to select preferred fishing times was a clear issue identified by industry via the survey for future management arrangements.

The proposed approach to flexible time management is to remove all set closures and allow fishing whenever the licence holder chooses within the established season.

To allow this level of flexibility, the total fishing days available for each licence holder would need to be based on the assumption that fishing would take place during **highest catch rate** period, while accounting for the total number of pots in the fishery and the target catch range set by management. Fishing the available days could then be permitted at any time during the established season.

Note that considerably less fishing days than are available now would be available under this option as all the effort would be expected in the highest catch period – that is, it would be expected that the same catch would be taken with less days at sea.

Also, note that under this option, the standard benefits associated with an input control system that allow the fleet to capture the inter-annual benefits of increases in stock size (and therefore catch) through good recruitments, do not necessarily exist, because a target catch and catch rate would be established.

The Proposed Refined Time Management System

A refined time management system will involve the following measures:

- Establish a sustainable catch target for each season, similar to a total allowable catch (TAC);
- Assume that all licences will fish during high catch rate periods and estimate catch rate for each season, taking into account estimated future recruitment strength;
- Using the catch target and estimated catch rate, set the total number of fishing days to reach the target catch for each season;
- Allow each individual licence holder to fish for the same set number of days whenever they want during the established season with all closures flexible and taken in 5 day blocks;
- All licences fish the same number of days, regardless of pot holding;
- Remove fixed closures entirely;
- Remove the cut off dates of 14th March and 21st April.
- Maintain other gear restrictions;
- Maintain other vessel size and capacity restrictions; and
- Continued annual review and reductions in fishing effort to account for increases in operational effectiveness over time.

Annual Decision Making Process to Estimate Available Fishing Days

Decisions would be made on an annual basis to establish the available fishing days aimed to achieve the desired management objectives. As stated previously, a fundamental assumption underpinning decisions on available fishing days would be that licence holders, if allowed to fish whenever they choose, will elect to fish in the highest catch rate time.

This assumption would have to be **conservative** and would see available fishing days restricted to fewer days than are currently available, based on estimates of the future catch rate, recruitment and the established target harvest range for the fishery. Note that SARDI Aquatic Sciences have consistently expressed concern about the ability to accurately estimate future catch rates under this option.

By way of example, the catch rate in season 2001-02 was estimated to be 1.08 kg/lift and this resulted in a catch of 674 tonnes from 622,911 pot lifts or 158 fishing days on average. The effort occurred throughout the season and not all in the high catch rate time.

Under the FTM system, if 670 tonnes was set as the target catch, then an assumption would be made that it will be taken in the high catch rate time at a catch rate of say 1.3kg/lift. This would result in 130 days being allowed by each individual, regardless of individual pot holdings.

Simple examples in Table 10 show fishing days available for a range of possible target catches and assumptions about future catch rate.

Table 10. Estimated fishing days for a range of target catches and future estimated catch rates, based on a total of 3,950 pots.

	Established Target Catch (kgs)				
	600000	**625000**	**650000**	**675000**	**700000**
Estimated Kg/pot lift	**Estimated Fishing Days**				
1.2	127	132	137	142	148
1.25	122	127	132	137	142
1.3	117	122	127	131	136
1.35	113	117	122	127	131
1.4	108	113	118	122	127

For a catch target of 600,000 kg with an estimated catch rate of 1.2 kg/lift, 127 fishing days would be available. For a target of 700,000 kgs at expected catch rate of 1.4 kgs, 127 fishing days would be available.

It is critical to note that significant management emphasis will be placed on the estimation of recruitment, catch rate and target catch each year, particularly the estimate of the future catch rate. Note that with existing fishery information the catch rate estimates are not likely to be very robust and will have to be set conservatively. Similarly, some of these issues also apply to the setting of a TAC under a quota system.

However, these are likely to be revisited on an annual basis. Under this flexible time management system, as recruitment and stock size fluctuates, the estimated future catch rate and catch target will have to be reviewed to adjust the available days for fishing. That is:

- When recruitment is expected to be higher than the target catch, and catch rates are expected to increase, fewer days will be available to take the target catch; and
- When recruitment is low but higher than the target catch, and catch rates are expected to decrease, additional days will be available to take the target catch.

Management decision making rules will have to be developed and linked to established target and limit reference points to provide certainty for all stakeholder groups in decision making about future effort levels.

It is also important to note that when the catch exceeds the target catch in a given year a reduction in days would occur in the following year to offset the over-catch.

The current issue of effort creep would need to be addressed on an ongoing basis by the FMC and the estimated catch rate would be adjusted to account for estimated effort creep. It is likely that an annual increment to account for effort creep would be incorporated.

FTM Compliance

A move to a more flexible fishing time management system will see the need for additional compliance measures. Options to support more flexible fishing were explored at a workshop of sub committee and FMC industry members, managers and compliance officers in July 2002.

It was agreed at the workshop that the most desirable flexible arrangement would be fishing (and closures) in 1day blocks. However, it was noted that this would potentially mean some form of reporting every day of the season by each licence holder. This would mean a very high requirement for compliance officers to validate that vessels are in port when they have reported to be. It is considered that a Vessel Monitoring System (VMS) would be needed for this arrangement, to maintain effective compliance levels and to keep costs within reasonable margins.

While not excluded as a future possibility, it was considered that initially at least, closures should be taken in 5-day blocks to minimise compliance and monitoring risks and associated costs. Monitoring and controlling total fishing time would take the form of 5-day closures being nominated on a prior report basis, as is the case with the current arrangement. However, under this system, it would be assumed that a licence is being fished unless a prior report has been made. Fishing time would be recorded against the amount allowed for the season at all times, unless a prior report has been made.

A licence holder on any day, with the required 12 hour prior report, would be able to take time off in a 5-day block.

For a 7 month season with 69 boats the possible number of prior reports for the fleet and 5-day closures, for a range of fishing days are shown in Table 11.

Table 11: Fishing Days, Closures and Prior Report Scenarios

Season Length (7 Months) Days	Example available Fishing Days set by management	Total Closure Days	Maximum 5 day closures per licence	Potential Total Prior Reports for the fleet
210	120	90	18	1242
210	125	85	17	1173
210	130	80	16	1104
210	135	75	15	1035
210	140	70	14	966

Other controls would remain in place and aerial surveillance and at sea inspections would continue to monitor correct use of gear etc (eg. over-potting and double lifting).

Therefore the proposed compliance and monitoring arrangements for a flexible time management system would operate as follows:

- assume a licence is fishing unless a report is made;
- Monitor fishing days by licence and when all are used the licence is prevented from fishing – note that the onus is placed on licence holder;
- No transfer of pots during a season from licences to other licences that have fished less days;
- Closures to be in 5 day blocks using the current prior reporting, tie up and departure arrangements;
- Designated tie up ports.

Indicative maximum compliance set up and annual costs provided by PIRSA Fisheries are shown in tables 12 and 13 respectively. **Further investigations by the FMC of more cost effective alternatives would occur when the decision is made about the actual management system that is to be implemented. In particular the at sea vessel costs, compliance officer days under and out sourcing options require further consideration, particularly under the "No VMS" option.**

The cost could reasonably be expected to fall within the range of $7,000 - $12,000 per licence.

Table 12: Estimated Indicative Compliance Set Up Costs - Flexible Time Management

Set-up costs per licence holder	**No VMS**	**With VMS**
VMS transceiver purchase and installation		$6,000
ACA Marine Communications Training		$200
Personal computer (only if not already available)		$2,000
Total set-up costs per licence		**$8,200**
Set-up costs – system	**No VMS**	**With VMS**
Prior reporting	$500	$15,000
Total system set-up costs:	**$500**	**$15,000**

Table 13: Estimated Indicative Annualised Compliance Costs – Flexible Time Management

Annual operating costs	**No VMS**	**With VMS**
Annualised VMS Capital Cost VMS (69 boats over 10 years)		$ 73,274
Estimated closure reports	$613,892	$370,841
Compliance / monitoring (FO Days)	*5 FTE*	*3 FTE*
FO FTEs	$119,594	$ 38,270
Offshore vessel	$ 14,250	$ 4,750
Aerial surveillance		$ 26,000
VMS polling / alerts		$ 21,000
VMS satellite and secure d'base management fees		$21,000
Prior reporting	$ 2,500	$ 420
Admin	$ 3,353	$ 3,353
Total annual operating costs:	**$ 753,589**	**$537,908**
Total annual operating costs/licence	$10,922	$7,796

(Note that the current total Northern Zone compliance budget is approximately $277,000 or $4,014/licence).

Flexible Fishing Time Management Advantages

- Provides greater operational flexibility than the existing system, allowing individuals to make better business decisions which allow both higher prices and best fishing conditions to be targeted;
- Is “de-pressurised” to the extent that no cut off dates would exist except the season end date;
- offers flexibility to fish available days without taking risks in poor weather;
- still allows highly skilled fishers to operate more efficiently and take larger catches than less efficient fishers, and hence potentially realise greater profits; and
- Does not represent a large shift from the current arrangements.

Flexible Fishing Time Management Disadvantages

No matter how good an approximation for the total catch target an effort control system provides, competition among fishers remains. Individual fishers still have an incentive to maximise individual catches at the expense of others in the fleet, which will mean that effective effort will continue to expand at a rate that is difficult to predict.

For this reason continued adjustments to total effort levels will be required under a flexible time management system. This is likely to require further consideration of additional reductions in fishing days, pot numbers and licence numbers.

The system:

- has built in incentives to maximise catch per day – this in theory will not maximise the profit from the fishery compared to a quota system;
- continues to provide an incentive for over investment in fishing capacity;
- continues to provide an incentive for competition between fishers;
- will involve ongoing (annual, regardless of stock status) effort reduction (less days) to offset effective effort increases over time;
- relies heavily on estimates about future catch rates and recruitment and hence allowable fishing days will be set at conservative levels;
- requires annual changes in the number of fishing days and closures;
- requires a more intensive management decision-making system than currently exists, to ensure that the number of available fishing days is matched with resource availability;
- will create greater administrative workloads to track closures taken by individual vessels, particularly when pot trading is being considered within a season;
- does not contribute as directly to stock rebuilding.

Option 2 – Individual Transferable Quotas (ITQ's)

Management systems that directly control the amount, sex or size of fish that may be harvested are generally referred to as output controls. Management systems based primarily on output controls rely directly on restricting the total quantity of fish that may be harvested to a pre-defined limit. Total catch limits are usually, but not always, established on an annual basis and can include over-catch and under-catch provisions.

In recent times, catch quotas have become increasingly more popular in Australia and throughout the world, The simplest situation for introducing a quota management system is that of a single species fishery, captured by a single type of fishing gear, such as a rock lobster fishery.

Importantly, quota systems are almost never used in isolation, and various input controls such as limited entry and season restrictions are used as complementary measures. These measures would continue to apply in the Northern Zone if a quota system was adopted.

The Northern Zone is characterised by regular but highly variable recruitment patterns and generally patchy and discrete reef formations that are known to limit the amount of suitable habitat afforded to lobster. Restricted lobster habitat, coupled with environmental changes mean that puerulus settlement and subsequent recruitment strength has proven to be highly unpredictable. In addition, on average, the growth rate of lobster is known to be higher in the waters of the Northern Zone, than it is in the south eastern waters of the State.

In the past these uncertainties have been considered sufficient to question the reliability of a sustainable catch range estimate for the Northern Zone. In addition, there have been concerns raised over the higher compliance costs and operational difficulties of enforcing a catch limit (quota) over such a vast area of coastline (approximately 2,700 km^1). These characteristics have previously underpinned the high level of Industry and Government support for a management system based on input controls.

However, this said, the fishery has arguably progressed to a different position in 2002, where the environmental carrying capacity (and possible long-term sustainable yield) of the Northern Zone region is better understood. The total annual catch has remained between 600 and 1200 tonnes over the past 20 years, yielding an average annual catch of 890 tonnes over the same period.

The industry survey and workshop indicated that the industry is interested in seriously considering ITQ's as a viable long term management option. In order to make a sensible judgement about ITQ's, detail of how a quota system might work in the Northern Zone, and in particular the costs of compliance and monitoring, and the potential pitfalls associated with quota allocation, were seen as critical in advance of making a decision.

The proposed Quota System

The proposed Northern Zone ITQ system would involve:

- Setting an annual total allowable catch (TAC) for the fishery;
- Allocating each individual licence holder a share of the TAC via ITQ's;
- Complete flexibility in fishing time during the season;
- Maintaining pot restrictions until any allocation adjustment is completed;
- Maintaining the pot as the unit of trade until any allocation adjustment is completed;
- Removal of input control restrictions such as double lifting, boat size and engine power;
- PIRSA Fisheries has indicated that the use of a Vessel Monitoring System (VMS) would be a necessary requirement for this arrangement - to maintain effective compliance levels and to keep compliance costs within reasonable margins;
- A monitoring system focussed on counting numbers of lobster as opposed to weight;
- Exploration of measures to require fish processors to be responsible for providing PIRSA Fisheries with accurate weight records.

An individually numbered lobster tag system identified to the Northern Zone, or each licence is also being explored. This measure, along with the **proposal to count numbers of lobster instead of weight**, could be expected to provide the following benefits:

- Spreading effort over large and small lobsters, thus **ensuring that effort is not focussed on the inshore water 'reds'** because an incentive would still exists to target large lobster;
- Assisting to ensure the cost-effectiveness of compliance operations; and
- Offering product identification/tracking for food safety and marketing purposes.

The TAC for the fishery would be converted to a number of animals by dividing by the average expected weight of each lobster – for example if the target catch was 650,000kgs and the average expected weight was estimated as 1.1kg would see 591,000 tags. If an effective tag system was developed, tags would be allocated in proportion to the quota (in numbers) held by each licence.

Issues to be resolved before a tag system could be introduced include:

- Costs of tags (note $150,000 is provisioned as an estimate in the following section covering compliance costs);
- Timing of application, eg. on when caught or when unloading;
- Injury to animals;
- Form of the tag; and
- Impact on processing operations.

Annual Decisions about Total Allowable catch (TAC)

Decisions would be required on an annual basis to establish a TAC aimed at achieving the established management objectives. **It is likely that initially a TAC will be established for a three to five year period to promote stock recovery.** Such a strategy would need to be reviewed annually to measure progress towards the stated management objectives and the established target reference points.

Following evidence of effective stock rebuilding, at some time in the future, decisions about increasing the TAC will need to be made after considering the trade offs between the economic benefits associated with additional harvesting and the biological benefits of further stock rebuilding. Decisions about TAC increases will need to be made in relation to clear evidence of progress towards established management objectives and target reference points, and in relation to resource sharing issues. Management decision making rules will be developed and linked to the established target and limit reference points, to provide certainty for all stakeholder groups in decision making about TAC adjustments.

Note that under the *Fisheries Act 1982* it is the responsibility of the Director of Fisheries to determine the annual total allowable catch for a given species. Under the current consultative framework established in South Australia (the FMC process), it is likely that the Director of Fisheries will seek advice from the FMC to assist in the annual TAC setting process, as is the case in the Southern Zone.

Theoretically, the stock assessment requirements are similar for both input (effort) and output (quota) control systems, with respect to effort or catch level setting. However, under the proposed refined time management system, additional assessment work will be focussed on predicting future catch rates.

Compliance

A move to an ITQ arrangement will see the need for additional compliance measures. The focus of such a system will be on ensuring the landings of lobster do not exceed the total allowable catch. This will mean a shift away from the current approach aimed at ensuring boats are not at sea during closures, using additional pots or double pulling, to a focus on monitoring total landings.

Options for ITQ compliance were explored at a workshop of sub committee and FMC industry members, managers and compliance officers in July 2002. Experience in other fisheries including the SA Southern Zone lobster fishery, Tasmanian lobster fishery and SA abalone fishery were considered. It was recognised that cost effective compliance will be one of the two key determining factors determining the economic feasibility of a quota arrangement compared to the time management system.

A number of options including VMS and individual lobster tags were explored at the workshop, each with different implications for compliance resources and

costs. The indicative costing for the key options are presented in Tables 14 and 15 below.

Further investigations by the FMC of more cost-effective alternatives would occur when the decision is made about the actual management system that is to be implemented. In particular compliance officer days, at sea vessel days, savings when tags are used require further consideration. Therefore compliance cost could reasonably be expected to fall within the range of $6,500 - $11,000 per licence.

It is proposed that a two-stage approach be taken, involving a start up period of 2 years followed by a review of compliance and necessary adjustments. As was the case in the Southern Zone for seven years, a system of self reporting and random inspections and audit would be the key feature in the start up phase. As well this would be complemented with a prior landing report and could involve the use of a tag system with matching paper trail.

Table 14: Estimated Indicative Set Up Compliance Costs - ITQ Option

Set-up costs – per licence	**No VMS**	**With VMS**	**With Tags**	**VMS and Tags**
VMS transceiver purchase and installation		$6,000		$6,000
ACA Marine Communications Training		$200		$200
Personal computer (only if not already available)		$2,000		$2,000
Total set-up costs per licence		**$8,200**		**$8,200**
Set-up costs – system	**No VMS**	**With VMS**	**With Tags**	**VMS and Tags**
Quota monitoring	$5,000	$60,000	$5,000	$60,000
Prior reporting	$200	$15,000	$200	$15,000
Total system set-up costs:	$5,200	$75,000	$5,200	$75,000

Table 15: Estimated Indicative Annualised Compliance Costs – ITQ Option

Annual operating costs	No VMS	with VMS	With Tags No VMS	VMS and Tags
Annualised Capital Cost VMS (10 years)		$73,273		$73,273
Estimated Total Landings	1500	1500	1500	1500
Compliance / monitoring (FO Days)	$626,420	$375,852	$626,420	$313,852
FO FTEs	5 FTE	3 FTE	5 FTE	3 FTE
Offshore vessel	$47,838	$23,920	$47,838	$23,920
Aerial surveillance	$9,500	$3,800	$9,500	$3,800
VMS polling / alerts		$28,000		$28,000
VMS satellite and secure d'base mgnt fees		$21,000		$21,000
Quota monitoring	$13,500	$2,000	$13,500	$2,000
Prior reporting	$3,000	$1,000	$3,000	$1,000
Admin				
Tag system			$150,000	$150,000
Total annual operating costs:	**$700,258**	**$528,846**	**$850,258**	**$ 614,204**
Total annual operating costs/licence	**$8,864**	**$6,694**	**$10,763**	**$8,902**

Note that the current Northern Zone compliance budget is approximately $277,000 or $4,014/licence.

Therefore it is proposed that the compliance and monitoring arrangements under an ITQ system should be in 2 stages, as follows:

Stage 1:

- Prior report 2 hours before landing, depending on geographic location of the port;
- Designated landing points (approximately 40) – class A & B[4] would be established;
- Operators would be required to commit to a designated landing site and the estimated number of lobster on board the vessel, at the time of prior report;
- PIRSA Fisheries considers the use of a Vessel Monitoring System (VMS) to be a necessary component for this arrangement - to maintain effective compliance levels given the high number of landing points and the geographic extent of the zone and to maintain costs within reasonable margins;
- Individual animal identification (carapace sticker or horn tag) number, linked to each licence on the vessel at time of capture could be considered if the technology is available;
- Audit of animal identification on landings and weight and number verification in factories supported by a matching catch disposal documentation covering:

[4] It is proposed that a more stringent class of prior reporting (B) be assigned to ports that are more remote and subject to higher compliance risks.

  - animal numbers;
  - date; and
  - landing location.
- Minimal aerial surveillance and at sea capacity would exist to monitor other input restrictions and to ensure that transhipping does not occur.

Arrangements for the continued use of caufs would need to be considered.

Stage 2:

The second stage would follow a review of the start up and an assessment by the FMC and PIRSA Fisheries Compliance of the efficacy of the system including consideration of:

- likelihood of quota avoidance;
- the risks to the stock from quota avoidance;
- mechanisms for mitigating quota avoidance; and
- Additional investment in resources required to achieve acceptable levels of risk, if unacceptable levels of risk are identified.

Quota Allocation

There are a number of issues associated with quota allocation that would need to be addressed, if this option is adopted. A strong indication of industry views was achieved at an allocation workshop convened in July 2002, attended by representatives of about 60% of licence holders.

Information was provided on the Tasmanian lobster, SA Southern Zone lobster, Victorian Western Zone lobster and SA abalone fisheries quota allocation processes.

For information, the Adjusted Preferred Shares method of allocating quota in the SA Southern Zone Rock Lobster Fishery was equivalent to a method that allocated a 90% share of the established TAC to all pots, with the remaining 10% of the TAC being extra allocation to fishers with historic base catch per pot, greater than the industry average. This was eventually adjusted back to the average.

In the Western Zone of Victoria a 50/50 weighting was given to both catch history and pots with no adjustment to the average, on the basis that no clear distinction could be made between the relative importance of each component. In the eastern zone of the Victorian fishery 70% was weighted towards catch history due to the large amount of latent licences operating in the fishery. An Independent Allocation Advisory Panel provided recommendations to the Victorian Government on the allocation formulae.

Sample information provided by PIRSA Fisheries indicated that about 80% of licence holders operate near the average of all catches from the

fishery and therefore allocations involving catch history and/or the average are likely to have limited impact on the majority of the fleet.

PIRSA Fisheries have indicated that it is likely that a minimum of 50% weighting will be attached to pots, in considering the allocation formula, due to the fact that pots have traditionally represented the economic unit in the fishery.

Two potential impacts on individual businesses resulting from an allocation process were identified at the Northern Zone allocation workshop, namely:

1. **Impacts on the current value of individuals pots and licences, and**
2. **Impacts on annual incomes from fishing.**

It was noted that the style of allocation and future trading of quota has the potential to impact in different ways on these important business considerations.

The industry workshop supported an objective to minimise the redistribution of wealth, with the following principles for allocation:

Issue 1 – Impact on Pot and Licence values

- Quota allocation should at least initially be attached to each pot
- All future trading of pots while quota is attached to the pot should occur at the average quota allocation.

These principles were supported on the basis that they guarantee the following:

- Pot and licence values are not diminished by the allocation process;
- Each licence holder is treated equally in terms of pot and licence values; and
- Current distribution of licence values in the fishery is not diminished by the allocation process.

Issue 2 – Impact on incomes from fishing

- Catch history should be taken into account;
- Industry catch averages should be taken into account;
- The allocation should not redistribute licence values while incorporating some consideration of the historical and average catches;
- An initial allocation based around 50% catch history and 50% average to be maintained except for the impact of any pot sales for a period of 5-10 years after which all pots would attract the average quota, was well received at the workshop.

These were supported on the basis that:

- Income redistribution impacts are minimised while equity in licence values are protected;
- An adjustment period exists for those with income most impacted; and
- After an established adjustment period each pot is equal in both terms of income earning and trading values.

Other considerations, which emerged from the workshop, include:

1. No considerations of catch history after July 1, 2001 should be made – that is pots traded after July 1, 2001 attract the average.
2. Increases/ decreases in TAC would be shared pro rata to quota holdings.
3. Catch history stays with the licence, not the licence holder.
4. The need for an Independent Allocation Advisory Panel (a lawyer, an economist and an independent commercial fisher) to recommend the approach and allocation formulae to the Minister for Agriculture, Food and Fisheries. The Independent panel would be established by the Minister to cover all the issues including the approach to catch history, that is the period, special circumstances, appeals process and how history is accounted for.
5. Unitisation of quota – that is quota once allocated can be separated from the pot and become the unit of trade rather than the pot. This could occur at the time of allocation as was the case in Western Victoria, or following an adjustment period. The independent panel would make recommendations on the approach to and timing of any unitisation.

Following the industry workshop, an independent consultancy drawing on experienced legal an economic expertise was commissioned the SA Northern Zone Rock Lobster Fishermen's Association to assess the robustness of the outcomes of the industry workshop. The consultancy provided the following conclusions and advice to the Northern Zone Rock Lobster Fishermen's Association:

The objectives set out in Section 20 of the Fisheries Act 1982 must be pursued by the Minister, the Director of Fisheries and Management Committees in the performance of their functions. Any recommendations made by the consultants are necessarily constrained in the same way.

For the reasons given in this Advice, the consultants' opinion is that the proposed allocation of ITQ's on the basis of current pot holdings and catch history with an adjustment period offers a sound formula from legal, economic and equity perspective's.

If the proposed allocation method were adopted then it would follow that the quota allocation should initially be attached to each pot. This would allow the pot to remain as the unit of trade, at least until any allocation adjustment is completed.

It is recommended that during the adjustment period trading of pots take place at the average quota allocation. This will work towards maintaining the

distribution of existing fishing rights and in this way best pursues the statutory objectives.

With respect to a period of adjustment, the conclusion of the consultants is that a shorter period, say 5 years, is in the circumstances reasonable and consistent with the equity objective.

The terms of reference asked the consultants to assess advice from PIRSA Fisheries indicating that a minimum of 50% weighting is likely to be attached to pots. ***As indicated above, the consultants support the proposed method of allocation that gives an initial 50% weighting to pots.*** *It is difficult, however, to make a firm assessment in this regard because the weighting attached to pots is only one component of the allocation formula. For example, an adjustment period of 3 years coupled with an initial weighting to pots of just 17% would generate a similar outcome to that proposed (5 years and 50%), in terms of the average holding of quota units over a 5 year period.*

The proposed allocation method was not found to be unsound in any way, although, as discussed in the previous section, an increase in the pot limit above 70 pots should be given careful consideration if this method of allocation is to be adopted.

(Full details are available in the EconSearch report "Advice on potential individual quota allocations in the South Australian Northern Zone Rock Lobster Fishery – see Appendix 1)

PIRSA Fisheries has indicated that an Independent Allocation Advisory Panel is likely to be established, if quota was adopted, to provide independent advice to the Minister on the most appropriate allocation method, within a set of agreed principles.

ITQ Advantages

The system:

- diminishes the incentive for fishers to compete for a share of the total catch.
- provides a direct control over catch, and therefore the ability to respond effectively to overfishing;
- provides a greater capacity to contribute to stock rebuilding;
- maximum operational flexibility for fishers, in terms of when and how much and when fishing takes place;
- avoids the need to address effort creep;
- flexible transferability of quota units between licences if unitised;
- greater flexibility for administration and management, through direct controls on catch;
- a stronger and more secure access right, to the extent that the rights to a specific quantity of fish are not threatened by other fishers within the fishing season;
- lower risks of over-capitalisation because the incentive for competition between fishers is diminished;

- opportunities to improve safety aspects through less pressure to fish during poor weather;
- theoretically the best chance of capturing maximum economic performance for individual fishers and for the fishery, before costs of management.

ITQ Disadvantages

As with effort controls, output controls are not without problems, Potential issues with the proposed ITQ system for the Northern Zone are:

- An incentive is created for individuals to find ways to take more than the allocated share of the total catch – if compliance is not effective the integrity of the stock and management strategies will be compromised;
- Challenges associated with quota monitoring costs and effectiveness;
- complexity and necessary conservatism in TAC setting and adjustments;
- high-grading and discarding that may emerge, particularly when stocks are in high abundance;
- Income and/or wealth redistribution through the initial allocation;
- Potential for reduced spatial distribution of effort and therefore reduced quality in fishery dependent data collected through logbooks;
- Relies heavily on adequate stock assessment to predict annual TAC's;
- Can reduce employment opportunities for crews and processing sector; and
- Effort could be transferred to inshore areas targeting 'reds', however, this is intended to be addressed by counting numbers of fish as opposed to weights.

Options comparison

From a biological perspective, a quota system will constrain catch when times are good (good recruitment), contributing directly to stock rebuilding but potentially allow over-catch when times are not good (poor recruitment) if the TAC is not adjusted to accommodate reduced recruitment.

One clear advantage of a quota system over an input control system is the capacity it provides to allow stock rebuilding, through the direct control of catch.

The flexible time management system outlined in this paper is also aimed at constraining catch when times are good but is likely to be less effective. It may however be more effective at restricting catch during poorer periods, because fishing days are constrained.

From an economic and social perspective, on balance a quota system theoretically will provide greater commercial and administrative flexibility and result in higher financial returns to licence holders in the long term.

The following tables summarise the features of each of the proposed options against the current system. These points should be considered carefully along with any other additional information when considering your preference.

Table 16 – System Structure

Design	Current	Flexible Fishing Time Management	Quota
Fishing times & gear	- Previously flexible and fixed closures; - Season 2002-03 all flexible closures with 3 fishing periods within the season; - Pot limits remain	- Licence holder to fish for a set number of days, with greater flexibility (5 day closures) during the season. - Removing fixed closures entirely; - Introducing all flexible closures in 5 day blocks; - removing cut off dates of 14th, March and 21st April; - Pot limits remain	- licence holder to fish with total flexibility during the season; - No time closures during the season; - Pot restrictions to remain during allocation adjustment period.
Season	- November 1 Start May 31st End	- November 1 Start May 31st End	- November 1 Start May 31st End
Licence Transfer	Yes – pots	Yes – pots	- Yes – quota attached to pots & traded with the pot or quota units traded if unitised
Structure	- 60 pot maximum; - 25 pot minimum; - leasing below 25 pot minimum allowed during a season	- 70 pot maximum per licence - leasing below 25 pot minimum allowed during a season	- 70 pot maximum per licence and boat - leasing below 25 pot minimum allowed during a season

Table 17 - Targets and Decision making

Design	Current	Flexible Fishing Time Management	Quota
Fishing Targets	Constant exploitation rate	- short term total catch 600-700t - long term 750-850t - catch rate	- short term total catch 600-700t - long term 750-850t
Decision rules to fish to target catch range	Annual time closure adjustments Pot reductions	Annual fishing time adjustments, through adjustment to catch rate, catch target and/or total pot holdings.	Annual TAC setting
Effort Controls	Ongoing reduction in days, pots or licences to offset effort; Existing total pot limit, season, vessel size and capacity restrictions remain.	Ongoing reduction in days to offset effort; Existing total pot limit, season, vessel size and capacity restrictions remain.	Season, total pot limit remain Vessel size and capacity restrictions, double lifting restriction removed

Table 18 - Estimated Indicative Management, Research and Compliance Services & Costs[5]

Management Costs	Current	Flexible Fishing Time Management	Quota
Research Cost Indication	Item: Annual Stock assessment and management advice Cost: **$240,000**	Item: Annual Stock assessment and management advice Cost: Increase to **$260,000** for additional analysis and advice	Item: Annual Stock assessment and management advice. Cost: increase to **$260,000** for additional analysis and advice
Management Cost Indication	Item: PIRSA services, FMC & extension **Cost: $260,000**	Item: PIRSA services, FMC & extension Cost: Increase to **$280,000** for additional decision making time – will require additional funds for implementation period	Item: PIRSA services, FMC & extension Cost: Increase to **$280,000** for additional decision making time – will require additional funds for implementation period
Compliance And Monitoring	- Focus: monitoring closures and pots Resources: - Compliance Officer time – approx 1.5 full time equivalents - Prior reporting - Boat time - Aerial surveillance	- Focus: monitoring closures and pots Resources: - Compliance Officer time – approximately 3-5 full time equivalents, depending on the use of VMS - Prior reporting - Boat time - Aerial surveillance	Focus: Audit of landings and processors Resources: - Compliance Officer time – 3-5 depending on the use of VMS; - tags - Prior reporting - Catch disposal record (CDR) - Limited Boat time & plane
Compliance	**$280,000**	**$537,000,000 - $753,000**	**$454,000 - $850,000**
Total Cost	**$780,000**	**$1,077,000 - $1,293,000**	**$993,000 - $1,390,000**
Cost/Licence	**$11,300**	**$15,600- $18,800**	**$14,400 - $20,150**

[5] The cost estimates provided for each management option are indicative and will require further refinement.

Table 19 - Other ESD Considerations

Item	Current	Flexible Fishing Time Management	Quota
Capacity to Rebuild stocks	Yes if system used effectively but less accurate impact on catch.	Yes if system used effectively but less accurate impact on catch.	Yes – most effective targeted at catch assuming effective compliance.
Constrain Catch and/or effort	Ongoing adjustment for effort required	Constrains effort Ongoing adjustments required Ongoing adjustment for effort required to ensure effort is in line with target catch Fishing days will be set conservatively to allow for periods of low recruitment	Constrains catch TAC must be set conservatively to allow for periods of poor recruitment
Address expanding effort	Ongoing adjustment for effort required	Ongoing adjustment for effort required	Not an issue
Relative strength of access right	Relative catch will vary annually between license holders – serendipity is king Competition for access to a share of the catch remains	Relative catch will vary annually between license holders – serendipity is king Competition for access to a share of the catch remains	Maintains constant catch relativity between licence holders Access to a specific quantity of fish is not threatened by other fishers during a season Competition for access to resource is diminished – assuming TAC is set correctly
Operational flexibility	Fishing time constrained and pressurised	More flexible	Most flexible

Table 20 - Other ESD Considerations - continued

Item	Current	Flexible Fishing Time Management	Quota
Capturing Inter annual variability in stock abundance	Some capacity to capture peaks More efficient fishers can realise greater catches and profits	Less capacity to capture peaks, because of catch and catch rate target setting	Inflexible due to constant catch strategy
Economic Performance	Continued variation in economic performance, in line with natural variation in stock abundance; Capacity to maximise catch value is minimised	Less variation in economic performance, in line with natural variation in stock abundance Capacity to maximise catch value may be improved.	Less variation in economic performance, in line with natural variation in stock abundance. Greater economic performance in long term. Capacity to maximise catch value is maximised
Social Impacts	Nil	Less time at sea & safety aspects improved	Less time at sea & safety aspects improved
Wealth distribution	Nil impacts	Nil impacts	Subject to allocation but either licence values, future income streams and/or both are impacted. Majority estimated 80%) remain relatively unaffected under allocation approach developed at the industry workshop.